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

July 16, 2013

EA-12-215
EA-13-148
EA-13-149

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

SUBJECT: FORT CALHOUN – MANUAL CHAPTER 0350 TEAM INSPECTION REPORT NO. 05000285/2013008

Dear Mr. Cortopassi:

On June 10, 2013, the U.S. Nuclear Regulatory Commission (NRC) completed a team inspection at your Fort Calhoun Station. The purpose of the inspection was to evaluate the readiness of plant hardware, plant staff, and management programs to support a safe restart and continued operation of Fort Calhoun Station. The team focused on those issues described in the Restart Checklist, enclosed in the Confirmatory Action Letter issued to Fort Calhoun Station on June 11, 2012, and updated on February 26, 2013, that were ready for NRC inspection. The enclosed report documents the inspection results which were discussed on May 17, and June 10, 2013, with you and other members of your staff.

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

Based on our review the NRC has determined that a number of items associated with the "Fort Calhoun Station Restart Checklist," contained in the Confirmatory Action Letter dated February 26, 2013 (ML13057A287), were adequately addressed by the station and therefore are being closed. Specifically, the following items are being closed:

- Item 1.e, Third-Party Safety Culture Assessment
- Item 1.f , Integrated Organizational Effectiveness Assessment
- Item 3.f, Quality Assurance
- Item 5.b, Human Performance
- Item 6.b, Review of Licensing Commitments Necessary for Restart

During the course of the inspection, however, numerous restart checklist items were identified that were not fully ready for NRC inspection. Consequently, 36 percent of the original inspection scope was eliminated from the inspection plan. In addition, the NRC determined that a number of items reviewed were not adequate for closure and therefore will require additional actions by your staff. Of particular concern was that in many instances the team identified that current problems being addressed by your staff were not being adequately evaluated and resolved. In many instances these deficiencies were related to poorly documented and readily retrievable design and licensing basis information or the failure to properly use this information. The NRC noted that you are currently in the process of fully understanding the scope of these deficiencies and developing actions to improve performance. The NRC looks forward to reviewing these activities in future inspections.

Twenty-nine NRC identified findings and one self-revealing finding of very low safety significance (Green) were identified during this inspection. Twenty-nine of these findings were determined to involve violations of NRC requirements. Additionally, the NRC has determined that four traditional enforcement Severity Level IV violations occurred. One of these traditional enforcement violations was identified with an associated finding. The NRC is treating these violations as non-cited violations (NCVs) consistent with Section 2.3.2.a of the NRC Enforcement Policy.

Additionally, two other violations of NRC requirements were identified. One of these findings was determined to be a violation related to a previously issued Yellow finding regarding the ability to mitigate an external flooding event (Inspection Reports 05000285/2010007 and 05000285/2010008; ML101970547 and ML102800342, respectively) (EA-13-149). The other finding was determined to be a violation related to a previously issued Red finding regarding a significant internal fire event in the 480 Vac safety-related switchgear (Inspection Report 05000285/2012010; ML12101A193) (EA-13-148). The significance of these findings were bounded by the Yellow finding and Red finding, respectively, and therefore were not characterized by color significance. Both of these findings were determined to involve violations of NRC requirements. Separate citations will not be issued as these items are being evaluated by the NRC under the Manual Chapter 0350, “Oversight of Reactor Facilities in a Shutdown Condition Due to Significant Performance and/or Operational Concerns,” process.

If you contest these violations, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001; with copies to the Regional Administrator, Region IV; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Fort Calhoun Station.

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

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's Agencywide Document Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

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

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

Enclosure:
NRC Inspection Report 05000285/2013008
w/Attachment: Supplemental Information

cc w/ encl: Electronic Distribution

Electronic Distribution:
Regional Administrator (Art.Howell@nrc.gov)
DRP Director (Kriss.Kennedy@nrc.gov)
DRP Deputy Director (Troy.Pruett@nrc.gov)
MC0350 Chairman (Anton.Vegel@nrc.gov)
MC0350 Vice Chairman (Louise.Lund@nrc.gov)
DRS Director (Tom.Blount@nrc.gov)
Acting DRS Deputy Director (Jeff.Clark@nrc.gov)
Senior Resident Inspector (John.Kirkland@nrc.gov)
Resident Inspector (Jacob.Wingebach@nrc.gov)
Branch Chief, DRP/F (Michael.Hay@nrc.gov)
MC0350 Panel member (Michael.Markley@nrc.gov)
MC0350 Panel member (Joseph.Sebrosky@nrc.gov)
MC0350 Panel member (Michael.Balazik@nrc.gov)
Senior Project Engineer, DRP/F (Rick.Deese@nrc.gov)
Project Engineer, DRP/F (Chris.Smith@nrc.gov)
FCS Administrative Assistant (Janise.Schwee@nrc.gov)
Public Affairs Officer (Victor.Dricks@nrc.gov)
Public Affairs Officer (Lara.Uselding@nrc.gov)
Branch Chief, DRS/TSB (Ray.Kellar@nrc.gov)
Project Manager (Lynnea.Wilkins@nrc.gov)
RITS Coordinator (Marisa.Herrera@nrc.gov)
ACES (R4Enforcement.Resource@nrc.gov)
Regional Counsel (Karla.Fuller@nrc.gov)
Technical Support Assistant (Loretta.Williams@nrc.gov)
Congressional Affairs Officer (Jenny.Weil@nrc.gov)
RIV/ETA: OEDO (Vivian.Campbell@nrc.gov)
RidsOEMailCenter.Resource
NRREnforcement.Resource
ROPreports

File located:

SUNSI Rev Compl.	☑ Yes ☐ No	ADAMS	☑Yes ☐ No	Reviewer Initials	MCH
Publicly Avail	☑Yes ☐ No	Sensitive	☐ Yes ☑No		

SRI:DRP/SPB	SRI:DRP/A	SPE:DRP/F	SRI:DRP/C	BC:DRP/F
GWarnick	JGroom	RDeese	JJosey	MHay
/RA via email/	/RA via email/	/RA/	/RA via email/	/RA/
7/11/13	7/8/13	7/3/13	7/8/13	7/15/13
ACES	DD:DNMS			
RBrowder	AVegel			
/RA/	/RA/			
7/12/13	7/16/13			

OFFICIAL RECORD COPY T=Telephone E=E-mail F=Fax

TABLE OF CONTENTS

U.S. NUCLEAR REGULATORY COMMISSION

REGION IV

Docket:	05000285
License:	DPR-40
Report:	05000285/2013008
Licensee:	Omaha Public Power District
Facility:	Fort Calhoun Station
Location:	9610 Power Lane Blair, NE 68008
Dates:	January 14 through June 10, 2013
Inspectors:	A. Allen, Special Assistant, Region II C. Bickett, Senior Project Engineer, Region I J. Brand, Reactor Inspector, Region I M. Davis, Senior Resident Inspector, Region IV R. Deese, Senior Project Engineer, Region IV J. Groom, Senior Resident Inspector, Region IV B. Hagar, Senior Project Engineer, Region IV J. Josey, Senior Resident Inspector, Region IV M. Keefe, Human Factors Specialist, Headquarters A. Klett, Reactor Operations Engineer, Headquarters R. Latta, Senior Reactor Inspector, Region IV K. Martin, Human Factors Engineer, Headquarters S. Morrow, Safety Culture Program Manager, Headquarters F. Ramirez, Resident Inspector, Region III W. Schaup, Resident Inspector, Region IV C. Smith, Project Engineer, Region IV G. Warnick, Senior Resident Inspector, Region IV J. Watkins, Reactor Inspector, Region IV L. Wilkins, Project Manager, Headquarters J. Wingebach, Resident Inspector, Region IV
Approved By:	Michael Hay, Chief Project Branch F Division of Reactor Projects

SUMMARY OF FINDINGS

IR 05000285/2013008; 01/14/2013 – 06/10/2013; Fort Calhoun Station, Supplemental Inspection for Repetitive Degraded Cornerstones, Multiple Degraded Cornerstones, Multiple Yellow Inputs or One Red Input

The report covered a 15 week period of inspection by a safety culture inspection team and an Inspection Manual Chapter 0350 inspection team. Twenty-nine Green non-cited violations and one Green finding were identified. Additionally, four traditional enforcement Severity Level IV violations were identified, one of which had an associated Green finding. Additionally, two other violations of NRC requirements were identified. The significance of most findings is indicated by their color (Green, White, Yellow, or Red) using Inspection Manual Chapter 0609, "Significance Determination Process." The cross-cutting aspect is determined using Inspection Manual Chapter 0310, "Components Within the Cross Cutting Areas." Findings for which the significance determination process does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006. The team identified seven issues that will require additional NRC inspection. These issues are tracked as unresolved items in this report.

A. NRC-Identified Findings and Self-Revealing Findings

Cornerstone: Mitigating Systems

- Green. The team identified a finding for the licensee's failure to maintain their frazil ice detector operational. The detector was sampling a non-representative water temperature which would not have warned operators of the presence of conditions favorable for the formation of frazil ice on intake structure components. The licensee entered the issue into the corrective action program as Condition Report CR 2013-04310 and switched the points they monitored for potential frazil ice formation.

  This performance deficiency is more than minor, and therefore a finding, because it is associated with the configuration control attribute of the Mitigating Systems Cornerstone and affected the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609, Appendix G, "Shutdown Operations Significance Determination Process," Attachment 1, Checklist 4, "PWR Refueling Operation: RCS level > 23' OR PWR Shutdown Operation with Time to Boil > 2 hours And Inventory in the Pressurizer," the finding is determined to have very low safety significance (Green) because the finding did not increase the likelihood of a loss of reactor coolant system inventory; did not degrade the licensee's ability to terminate a leak path or add reactor coolant system inventory; and did not degrade the licensee's ability to recover decay heat removal, this finding did not require a Phase 2 or 3 analysis as stated in Checklist 4. This finding has a cross-cutting aspect in the area of problem identification and resolution associated with the corrective action program component because the licensee did not take

appropriate corrective actions to address a similar condition during the winter of 2011-2012 in a timely manner, commensurate with the safety significance and complexity [P.1(d)] (Section 7.(2)).

- Green. The team identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," associated with the licensee's failure to have safety-related equipment to ensure safe operations down to the design basis low river level. Specifically, from initial plant operations, the licensee failed to ensure that raw water cooling was provided down to the design basis low river level by ensuring the associated specifications and procedures supported raw water pump operation. This issue has been entered into the corrective action program as Condition Reports CR 2013-04169 and CR 2013-06436.

  This performance deficiency is more than minor, and therefore a finding, because it is associated with the configuration control attribute of the Mitigating Systems Cornerstone and affected the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process for Findings At-Power," the finding is determined to have very low safety significance (Green) because it: (1) was not a deficiency affecting the design or qualification of a mitigating structure, system, or component, and did not result in a loss of operability or functionality; (2) did not represent a loss of system and/or function; (3) did not represent an actual loss of function of at least a single train for longer than its technical specification allowed outage time, or two separate safety systems out-of-service for longer than their technical specification allowed outage time; (4) did not represent an actual loss of function of one or more nontechnical specification trains of equipment designated as high safety-significance in accordance with the licensee's maintenance rule program; and (5) did not involve the loss or degradation of equipment or function specifically designed to mitigate a seismic, flooding or severe weather event. This finding has a cross-cutting aspect in the area of problem identification and resolution associated with the corrective action program component because the licensee did not thoroughly evaluate problems such that the resolutions address causes and extent of conditions [P.1(c)] (Section 7.(3)).

- Green. The team identified a non-cited violation of Technical Specification 5.8.1, Procedures, for the licensee's failure to maintain an adequate procedure for the loss of raw water cooling. Specifically, since April 2011, the licensee failed to maintain Procedure AOP-18, "Loss of Raw Water," to adequately align the component cooling water system for the feed and bleed mode. This issue has been entered into the corrective action program as Condition Report CR 2013-04417.

  This performance deficiency is more than minor, and therefore a finding, because it is associated with the procedure quality attribute of the Mitigating Systems Cornerstone and affected the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events

to prevent undesirable consequences. Using Inspection Manual Chapter 0609, Appendix G, "Shutdown Operations Significance Determination Process," Attachment 1, Checklist 4, "PWR Refueling Operation: RCS level > 23' OR PWR Shutdown Operation with Time to Boil > 2 hours And Inventory in the Pressurizer," the finding is determined to have very low safety significance (Green) because the finding did not increase the likelihood of a loss of reactor coolant system inventory; did not degrade the licensee's ability to terminate a leak path or add reactor coolant system inventory; and did not degrade the licensee's ability to recover decay heat removal, this finding did not require a Phase 2 or 3 analysis as stated in Checklist 4. This finding has a cross-cutting aspect in the area of problem identification and resolution associated with the corrective action program component because the licensee did not thoroughly evaluate problems such that the resolutions address causes and extent of conditions [P.1(c)] (Section 7.(5)).

- Green. The team identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," associated with the licensee's failure to account for design basis conditions in their fuel oil consumption calculation. Specifically, since June 2011, the licensee failed to translate the worst case design emergency diesel generator frequency that could impact the consumption of fuel oil into the applicable design documentation. To address the deficiency, this issue has been entered into the corrective action program as Condition Reports CR 2013-04311 and CR 2013-04470.

  This performance deficiency is more than minor, and therefore a finding, because it is associated with the configuration control attribute of the Mitigating Systems Cornerstone and affected the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process for Findings At-Power," the finding is determined to have very low safety significance (Green) because it: (1) was not a deficiency affecting the design or qualification of a mitigating structure, system, or component, and did not result in a loss of operability or functionality; (2) did not represent a loss of system and/or function; (3) did not represent an actual loss of function of at least a single train for longer than its technical specification allowed outage time, or two separate safety systems out-of-service for longer than their technical specification allowed outage time; (4) did not represent an actual loss of function of one or more nontechnical specification trains of equipment designated as high safety-significance in accordance with the licensee's maintenance rule program; and (5) did not involve the loss or degradation of equipment or function specifically designed to mitigate a seismic, flooding or severe weather event. This finding has a cross-cutting aspect in the area of problem identification and resolution associated with the corrective action program component because the licensee did not thoroughly evaluate problems such that the resolutions address causes and extent of conditions [P.1(c)] (Section 7.(6)).

- Green. The team identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," associated with the licensee's failure to ensure that a critical parameter in the design calculation for intake cell level control (sluice gate leakage) was periodically measured to ensure the plant stayed within the parameters of the design calculation. Specifically, since April 2011, the licensee failed to assure that the assumed leakage of the sluice gates was translated into a procedure to periodically measure leakage against acceptance criteria to ensure the leakage was low enough to support the intake structure design calculation. This issue has been entered into the corrective action program as Condition Report CR 2013-04315.

  This performance deficiency is more than minor, and therefore a finding, because it is associated with the configuration control attribute of the Mitigating Systems Cornerstone and affected the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609, Appendix G, "Shutdown Operations Significance Determination Process," Attachment 1, Checklist 4, "PWR Refueling Operation: RCS level > 23' OR PWR Shutdown Operation with Time to Boil > 2 hours And Inventory in the Pressurizer," the finding is determined to have very low safety significance (Green) because the finding did not increase the likelihood of a loss of reactor coolant system inventory; did not degrade the licensee's ability to terminate a leak path or add reactor coolant system inventory; and did not degrade the licensee's ability to recover decay heat removal, this finding did not require a Phase 2 or 3 analysis as stated in Checklist 4. This finding has a cross-cutting aspect in the area of problem identification and resolution associated with the corrective action program component because the licensee did not thoroughly evaluate problems such that the resolutions address causes and extent of conditions [P.1(c)] (Section 7.(8)).

- N/A. The team identified a violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," associated with the licensee's failure to take adequate corrective actions in a timely manner to correct sluice gate preventive maintenance failures. Specifically, prior to February 24, 2013, the licensee failed to prevent repetitive failures of the sluice gates to close upon demand. The licensee implemented corrective actions to remove the silt on the sluice gate ledge which allowed the gates to completely close and has entered the issue into their corrective action program as Condition Report CR 2013-04318. This finding is related to the Yellow finding issued in October 2010 that dealt with issues related to mitigating a significant external flooding event.

  This performance deficiency is more than minor, and therefore a finding, because it is associated with the configuration control attribute of the Mitigating Systems Cornerstone and affected the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The finding was determined to be potentially greater than Green but does not exceed the final significance of the Yellow finding regarding the ability to mitigate an external flooding event (NRC

Inspection Report 05000285/2010008). Since the identified degraded condition is similar in both findings and a full significance determination process was previously conducted, a final significance color is not assigned to this finding. The finding has a cross-cutting aspect in the area of problem identification and resolution associated with the corrective action program component because the licensee did not thoroughly evaluate problems such that the resolutions address causes and extent of conditions [P.1(c)] (Section 7.(9)).

- Green. The team identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," associated with the licensee's failure to accurately model the traveling screens and trash racks in the flow calculation for cell level control. Specifically, since April 2011, the licensee failed to translate the actual plant configuration for flow of water into the intake structure during flooding into the applicable design calculation. This issue has been entered into the corrective action program as Condition Reports CRs 2013-04468 and CR 2013-04310.

  This performance deficiency is more than minor, and therefore a finding, because it is associated with the configuration control attribute of the Mitigating Systems Cornerstone and affected the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process for Findings At-Power," the finding is determined to have very low safety significance (Green) because it: (1) was not a deficiency affecting the design or qualification of a mitigating structure, system, or component, and did not result in a loss of operability or functionality; (2) did not represent a loss of system and/or function; (3) did not represent an actual loss of function of at least a single train for longer than its technical specification allowed outage time, or two separate safety systems out-of-service for longer than their technical specification allowed outage time; (4) did not represent an actual loss of function of one or more nontechnical specification trains of equipment designated as high safety-significance in accordance with the licensee's maintenance rule program; and (5) did not involve the loss or degradation of equipment or function specifically designed to mitigate a seismic, flooding or severe weather event. The finding has a cross-cutting aspect in the area of problem identification and resolution associated with the corrective action program component because the licensee did not thoroughly evaluate problems such that the resolutions address causes and extent of conditions [P.1(c)] (Section 7.(10)).

- Green. The team identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," associated with the licensee's failure to translate the usable volume of fuel oil in tank FO-1 into the applicable design documentation. Specifically, prior to March 6, 2013, the licensee failed to ensure the proper usable volume of available fuel oil in tank FO-1 was translated into design specifications because the calculation did not address vortexing. This issue has been entered into the corrective action program as Condition Report CR 2013-04951.

This performance deficiency is more than minor, and therefore a finding, because it is associated with the configuration control attribute of the Mitigating Systems Cornerstone and affected the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process for Findings At-Power," the finding is determined to have very low safety significance (Green) because it: (1) was not a deficiency affecting the design or qualification of a mitigating structure, system, or component, and did not result in a loss of operability or functionality; (2) did not represent a loss of system and/or function; (3) did not represent an actual loss of function of at least a single train for longer than its technical specification allowed outage time, or two separate safety systems out-of-service for longer than their technical specification allowed outage time; (4) did not represent an actual loss of function of one or more nontechnical specification trains of equipment designated as high safety-significance in accordance with the licensee's maintenance rule program; and (5) did not involve the loss or degradation of equipment or function specifically designed to mitigate a seismic, flooding or severe weather event. The finding has a cross-cutting aspect in the area of problem identification and resolution associated with the corrective action program component because the licensee did not thoroughly evaluate problems such that the resolutions address causes and extent of conditions [P.1(c)] (Section 7.(11)).

- Green. The team identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," associated with the licensee's failure to promptly identify, correct, and prevent recurrence of a significant condition adverse to quality. Specifically, from November 2009 to present, measures established by the licensee failed to assure that the cause of an identified significant condition adverse to quality was corrected and corrective actions taken would preclude repetition involving the failure to identify nonconforming quality equipment before it is installed and relied upon to perform specified safety functions. Specifically, in this instance, the licensee failed to identify that a 480 Volt replacement breaker has a jumper installed inappropriately resulting in the failure of the breaker to trip during a faulted condition. This issue has been entered into the corrective action program as Condition Report CR 2013-04037.

  The performance deficiency is more than minor, and therefore a finding, because it is associated with the protection against external factors attribute of the Mitigating Systems Cornerstone, and affected the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Additionally, if left uncorrected, the licensee's root cause analysis will not provide assurance that effective corrective actions are taken to preclude recurrence of a breaker trip failure. Using Inspection Manual Chapter 0609, Appendix G, "Shutdown Operations Significance Determination Process," Attachment 1, Checklist 4, "PWR Refueling Operation: RCS level > 23' OR PWR Shutdown Operation with Time to Boil > 2 hours And Inventory in the Pressurizer," which contained the initial screening for pressurized water reactors that are shutdown with a time to

boil of greater than 2 hours. Technical Specification 2.7, "Electrical Systems," states that the reactor shall not be heated up or maintained at temperatures above 300 degrees Fahrenheit unless the electrical systems listed in that section [includes the 480 V busses] are operable. Because the plant was maintained below 300 degrees during the exposure period, the team determined that power availability technical specifications were being met as discussed in Checklist 4. Because the finding did not increase the likelihood of a loss of reactor coolant system inventory; did not degrade the licensee's ability to terminate a leak path or add reactor coolant system inventory; and did not degrade the licensee's ability to recover decay heat removal, this finding did not require a Phase 2 or 3 analysis as stated in Checklist 4. Therefore, the finding is determined to have very low safety significance (Green). This finding has a cross-cutting aspect in the area of accountability associated with the other safety culture components because the licensee failed to demonstrate a proper safety focus and reinforce safety principles among their peers. Specifically, the licensee focused on sending a message about the vendor rather than the licensee's failures to establish accountability for the vendor's products and services [O.1(c)] (Section 7.(12)).

- Green. The team identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," associated with the licensee's failure to assure that applicable design basis information, as defined in 10 CFR 50.2, for breaker testing was correctly translated into specifications, drawings, procedures, and instructions. Specifically, from July 2011, to the present the licensee failed to incorporate the basis for the acceptance limits of the digital low resistance ohmmeter values into specifications and procedures. Without a basis for the acceptance values the licensee cannot show that the breakers will perform satisfactorily in service, and incorrect acceptance values could allow high resistance connections to go unnoticed. This issue has been entered into the corrective action program as Condition Report CR 2013-04032.

  This performance deficiency is more than minor, and therefore a finding, because it is associated with the design control attribute of the Mitigating Systems Cornerstone, and affected the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609, Appendix G, "Shutdown Operations Significance Determination Process," Attachment 1, Checklist 4, "PWR Refueling Operation: RCS level > 23' OR PWR Shutdown Operation with Time to Boil > 2 hours And Inventory in the Pressurizer," the team determined that because this finding did not increase the likelihood of a loss of reactor coolant system inventory; did not degrade the licensee's ability to terminate a leak path or add reactor coolant system inventory; and did not degrade the licensee's ability to recover decay heat removal, this finding did not require a Phase 2 or 3 analysis as stated in Checklist 4. Therefore, the finding is determined to have very low safety significance (Green). This finding has a cross-cutting aspect in the area of human performance associated with the work practices component because licensee personnel failed to follow procedures. Specifically, Fort Calhoun Station

personnel failed to follow the requirements specified in Procedure PED-GEI-7, "Specification of Post-Modification Test Criteria" [H.4(b)] (Section 7.(13)).

- N/A. The team identified a violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Actions," associated with the licensee's failure to promptly identify and correct a condition adverse to quality. Specifically, from 1991 to present, the licensee failed to properly evaluate a 4160 Vac/480 Vac transformer fault or a 480 Vac load center bus fault and the potential effect on system operability. This issue has been entered into the corrective action program as Condition Report CR 2013-05631. This finding is related, and potentially contributed, to the Red finding issued on April 10, 2012, regarding a significant internal fire event in the 480 Vac safety-related switchgear.

  The performance deficiency is more than minor, and therefore a finding, because it was associated with both the design control and protection against external factors attribute of the Mitigating Systems Cornerstone, and affected the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The significance of this finding is was potentially greater than Green significance but does not exceed the final significance of the Red finding involving a fire in the 480 Vac safety-related switchgear in June 2011 (NRC Inspection Report 05000285/2012010). Since the identified finding significance is bounded by the Red finding a final significance color is not assigned to this finding. The team determined that although the performance deficiency occurred in 1991, this finding is indicative of current plant performance because the performance characteristic has not been corrected or eliminated. Specifically, the licensee continued to display the same behaviors with regard to decision-making. Therefore, this finding has a cross-cutting aspect in the area of human performance associated with the decision-making component because the licensee failed to use conservative assumptions in decision-making and adopt a requirement to demonstrate that the proposed action is safe in order to proceed rather than a requirement to demonstrate it is unsafe in order to disapprove the action [H.1(b)] (Section 7.(14)).

- Green. The team reviewed a self-revealing non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Actions," for the licensee's failure to address frequency compatibility issues in the 120 Vac electrical distribution system. Specifically, between June 5, 2008, and February 22, 2013, the licensee failed to correct known frequency compatibility issues in the 120 Vac instrument system that resulted in voltage transients and damage to instrumentation supplied by the 120 Vac instrument inverters. This issue has been entered into the corrective action program as Condition Report CR 2013-03866. At the close of the inspection, the licensee was still completing causal analysis and identification of corrective actions necessary to address frequency compatibility issues in the 120 Vac electrical distribution system.

  This performance deficiency is more than minor, and therefore a finding, because it affected the equipment performance attribute of the Mitigating Systems

Cornerstone and affected the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609, Appendix G, "Shutdown Operations Significance Determination Process," the finding is determined to have very low safety significance (Green) because the finding did not increase the likelihood of a loss of reactor coolant system inventory, the finding did not degrade the licensee's ability to terminate a leak path or add reactor coolant system inventory when needed, and the finding did not degrade the licensee's ability to recover decay heat removal once it was lost. This finding had a cross-cutting aspect in the area of problem identification and resolution associated with the corrective action program component. Specifically, the team identified that the licensee failed to adequately evaluate repeated low voltage/ground alarm associated with the 120 Vac distribution system [P.1(c)] (Section 7.(15)).

- Green. The team identified a non-cited violation of 10 CFR Part 50, Appendix B, Criteria III, "Design Control," for the licensee's failure to update calculations to account for non safety-related loads supplied by the emergency diesel generator through non-qualified isolation devices and the cumulative impact on diesel fuel oil consumption. Specifically, prior to April 1, 2013, Calculation EA-FC-92-072, "Diesel Generator Transient Loading Analysis Using EDSA Design Base 3.0," Revision 6, failed to account for the additional diesel fuel oil consumption that would occur due to the loads that would be supplied from the emergency diesel generators through non-CQE isolation devices. The licensee modified Calculation EA-FC-92-072 to address the team's concerns. This issue has been entered into the corrective action program as Condition Report CR 2013-09817.

  The performance deficiency is more than minor, and therefore a finding, because it is associated with the equipment performance attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability and capability of systems that respond to initiating events to prevent undesirable consequences. Because this performance deficiency affected the calculation used to determine the required diesel fuel oil inventory for an accident or a loss of offsite power occurring from at power conditions, the team used Manual Chapter 0609, Appendix A, "The Significance Determination Process for Findings At-Power," and determined the finding to have very low safety significance (Green) because it: (1) was not a deficiency affecting the design or qualification of a mitigating structure, system, or component, and did not result in a loss of operability or functionality; (2) did not represent a loss of system and/or function; (3) did not represent an actual loss of function of at least a single train for longer than its technical specification allowed outage time, or two separate safety systems out-of-service for longer than their technical specification allowed outage time; (4) did not represent an actual loss of function of one or more nontechnical specification trains of equipment designated as high safety-significance in accordance with the licensee's maintenance rule program; and (5) did not involve the loss or degradation of equipment or function specifically designed to mitigate a seismic, flooding or severe weather event. This finding has a cross-cutting aspect in the area of problem identification and

resolution associated with the corrective action program component because the licensee failed to thoroughly evaluate the condition identified in Condition Report CR 2013-04594 to determine its impact to emergency diesel generator fuel oil consumption [P.1(c)] (Section 7.(16)).

- Green. The team identified a non-cited violation of 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," associated with the licensee's failure to adequately monitor the performance of structures, systems, and components, against established goals in a manner sufficient to provide reasonable assurance that these structures, systems, and components are capable of fulfilling their intended functions. Specifically, from June 7, 2011, to the present, the licensee failed to monitor the performance of the 480 Vac busses in a manner sufficient to provide reasonable assurance that they are capable of fulfilling their intended safety functions. This issue has been entered into the corrective action program as Condition Report CR 2013-04352.

  This performance deficiency is more than minor, and therefore a finding, because it is associated with the equipment performance attribute of the Mitigating Systems Cornerstone and affected the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609, Appendix G, "Shutdown Operations Significance Determination Process," Attachment 1, Checklist 4, "PWR Refueling Operation: RCS level > 23' OR PWR Shutdown Operation with Time to Boil > 2 hours And Inventory in the Pressurizer," which contained the initial screening for pressurized water reactors that are shutdown with a time to boil of greater than 2 hours. Technical Specification 2.7, "Electrical Systems," stated that the reactor shall not be heated up or maintained at temperatures above 300 degrees Fahrenheit unless the electrical systems listed in that section [includes the 480 V busses] are operable. Because the plant was maintained below 300 degrees during the exposure period, the team determined that power availability Technical Specifications were being met as discussed in Checklist 4. Because the finding did not increase the likelihood of a loss of reactor coolant system inventory; did not degrade the licensee's ability to terminate a leak path or add reactor coolant system inventory; and did not degrade the licensee's ability to recover decay heat removal, this finding did not require a Phase 2 or 3 analysis as stated in Checklist 4. Therefore, the finding is determined to have very low safety significance (Green). This finding has a cross-cutting aspect in the area of human performance associated with the decision-making component because the licensee failed to use conservative assumptions in decision-making and adopt a requirement to demonstrate that the proposed action is safe in order to proceed rather than a requirement to demonstrate it is unsafe in order to disapprove the action [H.1(b)] (Section 7.(17)).

- Green. The team identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," associated with the licensee's failure to establish adequate instructions for restoring temporary

modifications. Specifically, from January 17, 2013, to the present, the licensee's temporary modification control procedure did not include appropriate criteria for determining that control room and operations control center references reflect current plant configuration and were updated in a timely manner. The licensee initiated Condition Report CR 2013-04286, which stated that the licensee's transition to a new procedure will help ensure that control room and operations control center documents were updated in a timely manner and that the licensee is determining whether any near-term action is necessary to address the issue until then.

This performance deficiency is more than minor, and therefore a finding, because it is associated with the procedure quality attribute of the Mitigating Systems Cornerstone and affected the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Additionally, if left uncorrected, the procedure inadequacy could become a more significant issue because it could allow operators to continue to reference material that does not reflect current plant configuration. Using Inspection Manual Chapter 0609, Appendix G, "Shutdown Operations Significance Determination Process," Attachment 1, Checklist 4, "PWR Refueling Operation: RCS level > 23' OR PWR Shutdown Operation with Time to Boil > 2 hours And Inventory in the Pressurizer," the team determined that because this finding did not increase the likelihood of a loss of reactor coolant system inventory; did not degrade the licensee's ability to terminate a leak path or add reactor coolant system inventory; and did not degrade the licensee's ability to recover decay heat removal, this finding did not require a Phase 2 or 3 analysis as stated in Checklist 4. Therefore, the finding is determined to have very low safety significance (Green). This finding has a cross-cutting aspect in the area of human performance associated with the work control component because the licensee failed to appropriately coordinate work activities by incorporating actions to address the need to keep personnel apprised of work status, the operational impact of work activities, and plant conditions that may affect work activities. Specifically, the licensee did not incorporate actions into the procedure that would address the impact of out-of-date control room references on operator performance [H.3(b)] (Section 7.(18)).

- Green. The team identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," for the licensee's failure to initiate condition reports when problems or conditions adverse to quality were identified in accordance with Procedure FCSG-24-1, "Condition Report Initiation," Revision 3. Specifically, between July 2012 and March 2013, the team identified 11 instances where licensee staff failed to initiate a condition report after identifying a deficiency or a condition adverse to quality. In some instances, licensee personnel had to be prompted by the team to initiate a condition report. As a result, the corrective actions taken to address the conditions could have been potentially untimely. This issue has been entered into the corrective action program as Condition Report CR 2013-06991.

This performance deficiency is more than minor, and therefore a finding, because if left uncorrected it has the potential to lead to a more significant safety concern. Specifically, if the licensee does not enter conditions adverse to quality into the corrective action program, the conditions adverse to quality may not be evaluated and corrected in a timely manner. This finding is associated with Mitigating Systems Cornerstone. The team determined that the finding could be evaluated using the significance determination process in accordance with IMC 0609, "Significance Determination Process," and conducted a Phase 1 characterization and initial screening. Using Phase 1, Table 3, "SDP Appendix Router," the team answered 'yes' to the following question: "Does the finding pertain to operations, and event, or a degraded condition while the plant was shutdown?" As a result, the team used IMC 0609 Appendix G, "Shutdown Operations Significance Determination Process." Using Appendix G, the finding is determined to have very low safety significance (Green) since it did not need a quantitative assessment. This finding has a cross-cutting aspect in the area of problem identification and resolution associated with the corrective action program component because the licensee did not implement a corrective action program with a low threshold for identifying issues [P.1(a)] (Section 7.(19)).

- Green. The team identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," for the licensee's failure to promptly identify and correct conditions adverse to quality. Specifically, between July 2012 and March 2013, the team identified 6 instances where the licensee failed to identify a deficiency or a condition adverse to quality and to enter them into the corrective action program. As a result, conditions adverse to quality may not be corrected in a timely manner commensurate with the safety significance. This issue has been entered into the corrective action program as Condition Report CR 2013-07959.

  This performance deficiency is more than minor, and therefore a finding, because if left uncorrected it has the potential to lead to a more significant safety concern. Specifically, the failure to identify conditions adverse to quality and enter them into the corrective action program, has the potential to lead to a failure to correct conditions adverse to quality in a timely manner commensurate with the safety significance. This finding was associated with the Mitigating Systems Cornerstone. The team determined that the finding could be evaluated using the significance determination process in accordance with IMC 0609, "Significance Determination Process," and conducted a Phase 1 characterization and initial screening. Using Phase 1, Table 3, "SDP Appendix Router," the team answered 'yes' to the following question: "Does the finding pertain to operations, and event, or a degraded condition while the plant was shutdown?" As a result, the team used IMC 0609 Appendix G, "Shutdown Operations Significance Determination Process." Using Appendix G, the finding is determined to have very low safety significance (Green) since it did not need a quantitative assessment. This finding has a cross-cutting aspect in the area of problem identification and resolution associated with the corrective action program component because the licensee did not implement a corrective action program

with a low threshold for identifying issues and did not identify issues completely, accurately, and in a timely manner commensurate with their safety significance [P.1(a)] (Section 7.(20)).

- Green. The team identified a non-cited violation of 10 CFR 50.65(a)(2), "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," associated with the licensee's failure to effectively monitor the performance of penetration seals in Room 81. Specifically, from initial maintenance rule scoping in 1996 to March 2013, the licensee did not demonstrate that the performance or condition of the penetration seals in Room 81 were being effectively controlled and failed to monitor the performance or condition against licensee-established goals, in a manner sufficient to provide reasonable assurance that these components were capable of fulfilling their intended functions. This issue has been entered into the corrective action program as Condition Report CR 2013-05506.

  The performance deficiency is more than minor, and therefore a finding, because it is associated with the protection against the external factors attribute of the Mitigating Systems Cornerstone, and affected the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process for Findings At-Power," the finding is determined to have very low safety significance (Green) because it: (1) was not a deficiency affecting the design or qualification of a mitigating structure, system, or component, and did not result in a loss of operability or functionality; (2) did not represent a loss of system and/or function; (3) did not represent an actual loss of function of at least a single train for longer than its technical specification allowed outage time, or two separate safety systems out-of-service for longer than their technical specification allowed outage time; (4) did not represent an actual loss of function of one or more nontechnical specification trains of equipment designated as high safety-significance in accordance with the licensee's maintenance rule program; and (5) did not involve the loss or degradation of equipment or function specifically designed to mitigate a seismic, flooding or severe weather event. This finding has a cross-cutting aspect in the area of problem identification and resolution associated with the corrective action program component because the licensee failed to thoroughly evaluate problems such that the resolutions address the causes [P.1(c)] (Section 7.(24)).

- Green. The team identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," associated with the licensee's failure to properly evaluate a known degraded condition regarding safety-related air operated valve elastomers that were not qualified for high energy line break or loss of coolant accident temperatures. Specifically, from January 11 through January 18, 2013, due to a an improper application of the single failure criteria, the licensee failed to properly evaluate and correct a known degraded condition associated with safety-related air operated valve elastomers that were not qualified for high energy line break or loss of coolant accident temperatures.

This issue has been entered into the corrective action program as Condition Reports CR 2013-01396 and CR 2013-02611.

This performance deficiency is more than minor, and therefore a finding, because if left uncorrected, the failure to correct the degraded condition had the potential to lead to a more significant safety concern. Specifically, the affected air operated valves would have been in a condition where they would not have been qualified to perform their intended safety function. This issue was associated with the Mitigating Systems Cornerstone. Using Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process for Findings At-Power," the finding is determined to have very low safety significance (Green) because it: (1) was not a deficiency affecting the design or qualification of a mitigating structure, system, or component, and did not result in a loss of operability or functionality; (2) did not represent a loss of system and/or function; (3) did not represent an actual loss of function of at least a single train for longer than its technical specification allowed outage time, or two separate safety systems out-of-service for longer than their technical specification allowed outage time; (4) did not represent an actual loss of function of one or more nontechnical specification trains of equipment designated as high safety-significance in accordance with the licensee's maintenance rule program; and (5) did not involve the loss or degradation of equipment or function specifically designed to mitigate a seismic, flooding or severe weather event. This finding has a cross-cutting aspect in the area of problem identification and resolution associated with the corrective action program component because the licensee failed to thoroughly evaluate problems such that the resolutions address the causes [P.1(c)] (Section 7.(25)).

- Green. The team identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," associated with the licensee's failure to ensure proper inspection, maintenance, and testing of equipment associated with emergency feedwater tank FW-19. Specifically, from initial construction until February 27, 2013, the licensee failed to ensure proper inspection, maintenance, and testing was performed on the emergency feedwater storage tank's sight glass ball check isolation valves, to prevent draining of the tank following failure of the sight glass. The licensee performed an analysis and concluded that operators have adequate time to respond to such a loss of tank FW-19 inventory. This issue has been entered into the corrective action program as Condition Reports CRs 2012-15687, CR 2013-03974, and CR 2013-06170.

  This performance deficiency is more than minor, and therefore a finding, because it was associated with the equipment performance attribute of the Mitigating Systems Cornerstone, and affected the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process for Findings At-Power," the finding is determined to have very low safety significance (Green) because it: (1) was not a deficiency affecting the design or qualification of a mitigating structure, system, or component, and did not result in a loss of

operability or functionality; (2) did not represent a loss of system and/or function; (3) did not represent an actual loss of function of at least a single train for longer than its technical specification allowed outage time, or two separate safety systems out-of-service for longer than their technical specification allowed outage time; (4) did not represent an actual loss of function of one or more nontechnical specification trains of equipment designated as high safety-significance in accordance with the licensee's maintenance rule program; and (5) did not involve the loss or degradation of equipment or function specifically designed to mitigate a seismic, flooding or severe weather event. This finding has a cross-cutting aspect in the area of problem identification and resolution associated with the corrective action program component because the licensee failed to thoroughly evaluate problems such that the resolutions address the causes [P.1(c)] (Section 7.(26)).

- Green. The team identified a Severity Level IV non-cited violation of 10 CFR Part 50.59, with an associated Green finding, because the licensee failed to perform an evaluation for a design change that may have required NRC review and approval. Specifically, from June 2008, the licensee did not evaluate a change that would permanently substitute manual actions for an automatic action to add water and nitrogen gas to the component cooling water surge tank, which is an updated safety analysis report described design function for the component cooling water system. The licensee entered this condition into their corrective action program and planned to perform an evaluation to determine if prior NRC review and approval is needed for this design change. This issue has been entered into the corrective action program as Condition Report CR 2013-04417.

  The team determined that it was reasonable for the licensee to be able to foresee and prevent the occurrence of this deficiency. The team evaluated this performance deficiency as both a traditional enforcement violation, and a reactor oversight process finding. The violation of 10 CFR Part 50.59 was more than minor because it involved a change to an updated safety analysis report design function in that there was a reasonable likelihood that the change would require NRC review and approval. This finding is associated with the Mitigating Systems Cornerstone. The team used the NRC Enforcement Manual and Inspection Manual Chapter 0609, Attachment 4, "Initial Characterization of Findings," to evaluate this issue. The finding is determined to have very low safety significance (Green) because it was a design deficiency confirmed not to result in the loss of operability or functionality. The violation of 10 CFR 50.59 impacted the ability of the NRC to perform its regulatory oversight function and was determined to be Severity Level IV because the resulting changes were evaluated by the significance determination process as having very low safety significance, in accordance with the NRC Enforcement Policy. The NRC concluded that the finding did not reflect current licensee performance (Section 7.(28)).

- Green. The team identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures and Drawings," involving multiple examples of the licensee's failure to perform an adequate operability determination as

required by Procedure NOD-QP-31, "Operability Determination Process." In each example, the team identified that the operability determination lacked adequate technical justification for why the structure, system, or component was operable with the degraded or nonconforming condition. Specifically, on January 24, 2012, June 6, 2012, December 27, 2012, January 22, 2013, and February 5, 2013, the operability determinations for Condition Reports CR 2012-00580, CR 2012-04973, CR 2012-20806, CR 2013-00907, and CR 2013-02260 were not performed in accordance with Procedure NOD-QP-31, Revision 49-53, Step 4.1.3 J. This issue has been entered into the corrective action program as Condition Reports CR 2013-08343, CR 2013-05596, CR 2013-08590, CR 2013-04163, and CR 2013-05353.

This performance deficiency is more than minor, and therefore a finding, because it is associated with the equipment performance attribute of the Mitigating Systems Cornerstone, and affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Since the finding involving inadequate operability determinations occurred while in a shutdown condition, the team used Manual Chapter 0609, Appendix G, "Shutdown Operations Significance Determination Process," and determined the finding to have very low safety significance (Green) because the finding did not increase the likelihood of a loss of reactor coolant system inventory, the finding did not degrade the licensee's ability to terminate a leak path or add reactor coolant system inventory when needed, and the finding did not degrade the licensee's ability to recover decay heat removal once it was lost. This finding has a cross-cutting aspect in the area of problem identification and resolution associated with corrective action program component. Specifically, the team identified that the licensee failed provide an adequate technical discussion such that a reasonable expectation of operability was demonstrated for several degraded or nonconforming conditions [P.1(c)] (Section 7.(31)).

- Green. The team identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures and Drawings," involving multiple examples of the licensee's use of probability or probabilistic risk assessment when performing operability determinations. The use of probability or probabilistic risk assessment when determining operability is contrary to Procedure NOD-QP-31, "Operability Determination Process," Revision 49-53. Specifically, on January 26, 2012 and twice on February 21, 2013, the operability determinations performed for Condition Reports CR 2012-00626, CR 2013-03839, and CR 2013-03842 used probability and/or probabilistic risk assessment to justify the operability of structures, systems, and components. This issue has been entered into the corrective action program as Condition Reports CR 2013-05590, CR 2013-05466, and CR 2013-05597.

  This performance deficiency is more than minor, and therefore a finding, because it is associated with the equipment performance attribute of the Mitigating Systems Cornerstone, and affected the cornerstone objective to ensure the

availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Since the finding involved inadequate operability determinations that occurred while in a shutdown condition and involved plant equipment needed during shutdown conditions, the team used Manual Chapter 0609, Appendix G, "Shutdown Operations Significance Determination Process," and determined the finding to have very low safety significance (Green) because the finding did not increase the likelihood of a loss of reactor coolant system inventory, the finding did not degrade the licensee's ability to terminate a leak path or add reactor coolant system inventory when needed, and the finding did not degrade the licensee's ability to recover decay heat removal once it was lost. This finding has a cross-cutting aspect in the area of human performance associated with the decision-making component because the licensee failed to use conservative assumptions in decision making when performing operability determinations. Specifically, the licensee proposed that a degraded/nonconforming condition was safe by relying on a non-conservative assumption that an event such as a tornado generated missile or external flooding at the site were not likely to occur [H.1(b)] (Section 7.(32)).

- Green. The team identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures and Drawings," involving the licensee's failure to follow procedures when evaluating the impact of component cooling water system leakage on the containment air coolers. Specifically, on October 6, 2010, and December 29, 2010, the operability determinations for Condition Reports CR 2010-04955 and CR 2010-06905 were not performed in accordance with Procedure NOD-QP-31, "Operability Determination Process," Revision 43-44, Step 4.1.3 J, and consequently, failed to evaluate the impact of component cooling water system leakage on containment air coolers operability. This issue has been entered into the corrective action program as Condition Report CR 2013-05630.

  This performance deficiency is more than minor, and therefore a finding, because it is associated with the equipment performance attribute of the Mitigating Systems Cornerstone, and affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process for Findings At-Power," the finding is determined to have very low safety significance (Green) because it: (1) was not a deficiency affecting the design or qualification of a mitigating structure, system, or component, and did not result in a loss of operability or functionality; (2) did not represent a loss of system and/or function; (3) did not represent an actual loss of function of at least a single train for longer than its technical specification allowed outage time, or two separate safety systems out-of-service for longer than their technical specification allowed outage time; (4) did not represent an actual loss of function of one or more nontechnical specification trains of equipment designated as high safety-significance in accordance with the licensee's maintenance rule program; and (5) did not involve the loss or degradation of equipment or function specifically designed to mitigate a seismic,

flooding or severe weather event. This finding has a cross-cutting aspect in the area of problem identification and resolution associated with corrective action program component. Specifically, the team identified that the licensee failed provide an adequate technical discussion such that a reasonable expectation of operability was demonstrated for containment air coolers with known leakage in the component cooling water system [P.1(c)] (Section 7.(33)).

- Green. The team identified a non-cited violation of 10 CFR 50.55a, "Codes and Standards," for the failure of the licensee to follow the ASME Code when establishing new reference curves as corrective action to address the performance of component cooling water pump AC-3A within the "low required action" range of the inservice testing program. Specifically, on July 29, 2011, the licensee failed to follow ASME Code, Subsection ISTB 6200(c), in that, the new reference curves were established without performing an analysis which included verification of the pump's operational readiness at a pump level and a system level, without determining the cause of the change in pump performance, and without an evaluation of all trends indicated by available data. The team confirmed that while the pump was inoperable from an inservice testing perspective during this period, required surveillance testing showed that pump flows and differential pressures were still sufficient to meet the assumptions used in the Fort Calhoun Station safety analysis. This issue has been entered into the corrective action program as Condition Report CR 2013-04010.

  This performance deficiency is more than minor, and therefore a finding, because it is associated with the human performance attribute of the Mitigating Systems Cornerstone, and affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Since this finding was discovered during plant shutdown and involved plant equipment needed during shutdown conditions, the team used Manual Chapter 0609, Appendix G, "Shutdown Operations Significance Determination Process," and determined the finding to have very low safety significance (Green) because the finding did not increase the likelihood of a loss of reactor coolant system inventory, the finding did not degrade the licensee's ability to terminate a leak path or add reactor coolant system inventory when needed, and the finding did not degrade the licensee's ability to recover decay heat removal once it was lost. This finding has a cross-cutting aspect in the area of problem identification and resolution associated with the corrective action program component because the licensee failed to fully evaluate the degraded performance of component cooling water pump AC-3A to ensure that resolutions correctly addressed causes of the degraded performance and the cumulative impact on system operational readiness [P.1(c)] (Section 7.(34)).

- Green. The team identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Actions," for the failure to implement corrective actions to address inadequate procedures involving the degraded/nonconforming condition evaluation and operability determination process. Specifically, prior to March 1, 2013, the licensee failed to correct the procedural inadequacies

associated with Procedure FCSG-24-3, "Condition Report Screening," Revision 3, as identified in the root cause analysis for Condition Report CR 2012-09494. This issue has been entered into the corrective action program as Condition Report CR 2013-04380.

This performance deficiency is more than minor, and therefore a finding, because if left uncorrected, inadequate corrective action program procedures could become a more significant safety concern. This finding is associated with the Mitigating Systems Cornerstone. Since the finding was discovered while in a shutdown condition, the team used Manual Chapter 0609, Appendix G, "Shutdown Operations Significance Determination Process," and determined the finding to have very low safety significance (Green) because the finding did not increase the likelihood of a loss of reactor coolant system inventory, the finding did not degrade the licensee's ability to terminate a leak path or add reactor coolant system inventory when needed, and the finding did not degrade the licensee's ability to recover decay heat removal once it was lost. This finding has a cross-cutting aspect in the area of problem identification and resolution associated with the corrective action program component because the licensee failed to implement a corrective action program with a sufficiently low threshold. Specifically, although the licensee identified significant flaws in Fort Calhoun Station procedures while performing the root cause analysis for Condition Report CR 2012-09494, the licensee failed to initiate the appropriate corrective action documents to drive the necessary procedure changes [P.1(a)] (Section 7.(35)).

- Green. The team identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," associated with the licensee's failure to properly evaluate NRC Bulletin 88-04, "Potential Safety-Related Pump Loss," regarding the auxiliary feedwater pumps. Specifically, from November 28, 2010, through February 2013, the licensee failed to properly evaluate NRC Bulletin 88-04, for strong pump, weak pump, interaction regarding auxiliary feedwater pumps FW-6 and FW-10. The evaluation failed to consider pump-to-pump interaction that may result due to pump discharge check valve leakage. In addition, the licensee failed to re-evaluate the condition after surveillance testing performed on November 28, 2010, and September 1, 2012, identified leakage past both pump discharge check valves. This issue has been entered into the corrective action program as Condition Reports CR 2013-04680 and CR 2013-04806.

  This performance deficiency is more than minor, and therefore a finding, because it was associated with the equipment performance attribute of the Mitigating Systems Cornerstone, and affected the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process for Findings At-Power," the finding is determined to have very low safety significance (Green) because it: (1) was not a deficiency affecting the design or qualification of a mitigating structure, system, or component, and did not result in a loss of operability or functionality; (2) did not represent a loss of system and/or function; (3) did not represent an actual loss of function of at least a single train for longer

than its technical specification allowed outage time, or two separate safety systems out-of-service for longer than their technical specification allowed outage time; (4) did not represent an actual loss of function of one or more nontechnical specification trains of equipment designated as high safety-significance in accordance with the licensee's maintenance rule program; and (5) did not involve the loss or degradation of equipment or function specifically designed to mitigate a seismic, flooding or severe weather event. This finding has a cross-cutting aspect in the area of problem identification and resolution associated with the corrective action program component because the licensee failed to thoroughly evaluate problems such that appropriate corrective actions were promptly implemented [P.1(a)] (Section 7.(36)).

- Green. The team identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," associated with the licensee's failure to properly store the raw water to emergency feedwater storage tank fill hose. Specifically, from July 1996 to February 27, 2013, the licensee failed to provide adequate instructions or procedures to ensure proper storage and temperature qualification of the auxiliary feedwater emergency fill hose. This issue has been entered into the corrective action program as Condition Report CR 2013-52276.

  This performance deficiency is more than minor, and therefore a finding, because it was associated with the design control attribute of the Mitigating Systems Cornerstone, and affected the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process for Findings At-Power," the finding is determined to have very low safety significance (Green) because it: (1) was not a deficiency affecting the design or qualification of a mitigating structure, system, or component, and did not result in a loss of operability or functionality; (2) did not represent a loss of system and/or function; (3) did not represent an actual loss of function of at least a single train for longer than its technical specification allowed outage time, or two separate safety systems out-of-service for longer than their technical specification allowed outage time; (4) did not represent an actual loss of function of one or more nontechnical specification trains of equipment designated as high safety-significance in accordance with the licensee's maintenance rule program; and (5) did not involve the loss or degradation of equipment or function specifically designed to mitigate a seismic, flooding or severe weather event. This finding has a cross-cutting aspect in the area of problem identification and resolution associated with the corrective action program component because the licensee failed to thoroughly evaluate problems such that the resolutions address the causes [P.1(c)] (Section 7.(37)).

- Green. The team identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," associated with the licensee's failure to properly evaluate a known degraded condition regarding the auxiliary feedwater pump discharge check valve leakage and potential over-pressurization of the pumps suction piping. Specifically, from October 10, 2012, to March 15, 2013,

the licensee failed to properly evaluate concerns regarding the auxiliary feedwater pump discharge check valves which resulted in the failure to implement adequate corrective actions to verify leak tightness of the check valves and prevent potential over pressurization of the pump's suction piping. This issue has been entered into the corrective action program as Condition Reports CR 2013-04806 and CR 2013-05018.

This performance deficiency is more than minor, and therefore a finding, because it was associated with the equipment performance attribute of the Mitigating Systems Cornerstone and affected the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process for Findings At-Power," the finding is determined to have very low safety significance (Green) because it: (1) was not a deficiency affecting the design or qualification of a mitigating structure, system, or component, and did not result in a loss of operability or functionality; (2) did not represent a loss of system and/or function; (3) did not represent an actual loss of function of at least a single train for longer than its technical specification allowed outage time, or two separate safety systems out-of-service for longer than their technical specification allowed outage time; (4) did not represent an actual loss of function of one or more nontechnical specification trains of equipment designated as high safety-significance in accordance with the licensee's maintenance rule program; and (5) did not involve the loss or degradation of equipment or function specifically designed to mitigate a seismic, flooding or severe weather event. This finding has a cross-cutting aspect in the area of human performance associated with the decision-making component because the licensee failed to use conservative assumptions in decision-making and adopt a requirement to demonstrate that the proposed action is safe in order to proceed rather than a requirement to demonstrate it is unsafe in order to disapprove the action [H.1(b)] (Section 7.(38)).

- Green. The team identified two examples of a non-cited violation of 10 CFR 50.55a.(f)(4)(ii), "Codes and Standards," associated with the licensee's failure to properly implement applicable code requirements for in-service testing of safety-related pumps and check valves. Specifically, prior to March 11, 2013, the licensee failed to ensure that the testing of safety-related pumps and valves met the requirements of the American Society of Mechanical Engineers Operation and Maintenance Code. The applicable Code for the current in-service test program is the 1998 Edition through the 2000 Addenda. This issue has been entered into the corrective action program as Condition Reports CR 2013-04680, CR 2013-05018, CR 2013-05514, and CR 2013-05569.

  This performance deficiency is more than minor, and therefore a finding, because it was associated with the equipment performance attribute of the Mitigating Systems Cornerstone, and affected the associated cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process for Findings

At-Power," the finding is determined to have very low safety significance (Green) because it: (1) was not a deficiency affecting the design or qualification of a mitigating structure, system, or component, and did not result in a loss of operability or functionality; (2) did not represent a loss of system and/or function; (3) did not represent an actual loss of function of at least a single train for longer than its technical specification allowed outage time, or two separate safety systems out-of-service for longer than their technical specification allowed outage time; (4) did not represent an actual loss of function of one or more nontechnical specification trains of equipment designated as high safety-significance in accordance with the licensee's maintenance rule program; and (5) did not involve the loss or degradation of equipment or function specifically designed to mitigate a seismic, flooding or severe weather event. This finding has a cross-cutting aspect in the area of problem identification and resolution associated with the corrective action program component because the licensee failed to thoroughly evaluate problems such that the resolutions addressed the causes [P.1(c)] (Section 7.(39)).

- Green. The team identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," associated with an inappropriate modification of the auxiliary feedwater system. Specifically, from April 2011 through February 2013, measures established by the licensee did not assure that the modification to remove the turbine driven auxiliary feedwater pumps exhaust back pressure trip, properly considered and addressed the open configuration of the pumps exhaust piping to prevent blockage of the exhaust piping. This issue has been entered into the corrective action program as Condition Report CR 2013-05026, and an immediate operability determination was performed.

  This performance deficiency is more than minor, and therefore a finding, because if left uncorrected, the continued practice of modifying the facility without evaluating for adverse impacts had the potential to lead to a more significant safety concern. Specifically, unevaluated modifications to the facility could introduce adverse changes that result in systems not able to perform their intended safety function which would not be recognized. This finding was associated with the Mitigating Systems Cornerstone. Using Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process for Findings At-Power," the finding is determined to have very low safety significance (Green) because it: (1) was not a deficiency affecting the design or qualification of a mitigating structure, system, or component, and did not result in a loss of operability or functionality; (2) did not represent a loss of system and/or function; (3) did not represent an actual loss of function of at least a single train for longer than its technical specification allowed outage time, or two separate safety systems out-of-service for longer than their technical specification allowed outage time; (4) did not represent an actual loss of function of one or more nontechnical specification trains of equipment designated as high safety-significance in accordance with the licensee's maintenance rule program; and (5) did not involve the loss or degradation of equipment or function specifically designed to mitigate a seismic, flooding or severe weather event. This finding has a cross-cutting aspect in the area of problem identification and resolution associated with the

corrective action program component because the licensee failed to thoroughly evaluate problems such that the resolutions address the causes [P.1(c)] (Section 7.(41)).

Cornerstone: Barrier Integrity

- Green. The team identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," associated with the licensee's failure to translate applicable regulatory requirements and the design basis into specifications, drawings, procedures, and instructions. Specifically, from initial construction to present, the licensee did not perform adequate analysis and/or post-accident condition functional testing of the teflon insulated and teflon sealed Conax electrical penetration assemblies to determine if they were suitable for expected post accident conditions. The licensee has decided to replace or cap all Teflon-insulated containment electrical penetration assemblies prior to returning to power operations. This issue has been entered into the corrective action program as Condition Report CR 2013-03571.

  This performance deficiency is more than minor, and therefore a finding, because it is associated with the design control attribute of the Barrier Integrity Cornerstone and affected the associated cornerstone objective to provide reasonable assurance that physical design barriers (fuel cladding, reactor coolant system, and containment) protect the public from radionuclide releases caused by accidents or events. Using Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process for Findings At-Power," the finding is determined to have very low safety significance (Green) because it did not represent an actual open pathway in the physical integrity of reactor containment, containment isolation system, and heat removal components. This finding has a cross-cutting aspect in the area of problem identification and resolution associated with the corrective action program component because the licensee failed to implement a corrective action program with a low threshold for identifying issues and identify such issues completely, accurately, and in a timely manner commensurate with their safety significance [P.1(a)] (Section 7.(21)).

Cornerstone: Emergency Preparedness

- Green. The team identified a non-cited violation of 10 CFR 50.54(q)(2) for the licensee's failure to maintain the effectiveness of an emergency plan. Specifically, since May 14, 2009, the licensee failed to maintain a proper value for low river level associated with the declaration of an emergency at the ALERT classification level. The licensee did not maintain a standard emergency action level scheme in accordance with the requirements of 10 CFR 50.47(b)(4), which states in part, that a standard emergency classification and action level scheme is in use by the nuclear facility licensee. The emergency action level scheme was not maintained because emergency action levels HU1 and HA1, "Natural or destructive phenomena affecting the Protected Area," contained an inaccurate river level of 973 feet 9 inches. The river level was inaccurate because the basis document, Procedure EPIP-OSC-1, "Emergency Classification," Revision 46,

stated the emergency action level was based on the minimum elevation of the raw water pump suction. Based on available plant data, the minimum elevation of the raw water pump suction was above the Alert declaration point of 973 feet 9 inches. This issue has been entered into the corrective action program as Condition Reports CR2013-04198 and CR 2013-04169.

This performance deficiency is more than minor, and therefore a finding, because it is associated with emergency response organization performance attribute of the Emergency Preparedness Cornerstone and affected the associated cornerstone objective to ensure that the licensee is capable of implementing adequate measures to protect the health and safety of the public in the event of a radiological emergency. Specifically, inaccurate emergency action levels degrade the licensee's ability to implement adequate measures to protect public health and safety. The finding was evaluated using the Emergency Preparedness Significance Determination Process, and was determined to be of very low safety significance (Green) because the finding was not a lost or degraded risk significant planning function. The planning standard function was not degraded because the Notification of Unusual Event and Alert emergency classifications would have been declared although potentially in a delayed manner. This finding was not assigned a cross-cutting aspect because the performance deficiency is not reflective of current performance (Section 7.(4)).

Other Findings

- SLIV. The team identified a non-cited violation of 10 CFR 50.59, "Changes, Test, and Experiments," associated with the licensee's failure to adequately evaluate changes in order to ensure that they did not require prior NRC approval. Specifically, from March 4, 1995, through August 17, 2012, the licensee failed to obtain a license amendment pursuant to Section 50.90 prior to implementing a proposed change, test, or experiment if the change, test, or experiment would result in more than a minimal increase in the likelihood of occurrence of a malfunction of a structure, system, or component important to safety previously evaluated in the updated safety analysis report. This issue has been entered into the corrective action program as Condition Reports CR 2013-04266 and CR 2013-05210.

  Because this performance deficiency had the potential to impact the NRC's ability to perform its regulatory function, the team evaluated it using traditional enforcement. In accordance with Section 7.3.E.6 of the NRC Enforcement Manual, the team used Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process For Findings At-Power," and determined the finding to have very low safety significance (Green) because it: (1) was not a deficiency affecting the design or qualification of a mitigating structure, system, or component, and did not result in a loss of operability or functionality; (2) did not represent a loss of system and/or function; (3) did not represent an actual loss of function of at least a single train for longer than its technical specification allowed outage time, or two separate safety systems out-of-service for longer than their technical specification allowed outage time; (4) did not represent an actual loss of

function of one or more nontechnical specification trains of equipment designated as high safety-significance in accordance with the licensee's maintenance rule program; and (5) did not involve the loss or degradation of equipment or function specifically designed to mitigate a seismic, flooding or severe weather event. Therefore, in accordance with Section 6.1.d.2 of the NRC Enforcement Policy, the team characterized this performance deficiency as a Severity Level IV violation. The team determined that although this issue occurred more than three years ago, this finding is representative of current plant performance. Therefore, this finding has a cross-cutting aspect in the area of human performance associated with the decision-making component because the licensee failed to use conservative assumptions in decision-making and adopt a requirement to demonstrate that the proposed action is safe in order to proceed rather than a requirement to demonstrate it is unsafe in order to disapprove the action [H.1(b)] (Section 7.(40)).

- SLIV. The team identified four examples of a non-cited violation of 10 CFR 50.72, "Immediate Notification Requirements for Operating Nuclear Power Reactors," for the licensee's failure to make required event notifications within 8 hours following discovery of an event requiring a report. Specifically, on April 12, 2012, February 7, 2013, February 25, 2013, and February 27, 2013, the licensee failed to notify the NRC within 8 hours of the occurrence an event or condition that resulted in the nuclear power plant being in an unanalyzed condition that significantly degraded plant safety. This issue has been entered into the corrective action program as Condition Report CR 2013-05070.

  The violation was evaluated using Section 2.2.4 of the NRC Enforcement Policy, because the failure to required event report may impact the ability of the NRC to perform its regulatory oversight function. As a result, this violation was evaluated using traditional enforcement. In accordance with Section 6.9 of the NRC Enforcement Policy, this violation was determined to be a Severity Level IV non-cited violation. The team determined that a cross-cutting aspect was not applicable to this performance deficiency because the failure to make a required report was strictly associated with a traditional enforcement violation (Section 7.(42)).

- SLIV. The team identified nine examples of a non-cited violation of 10 CFR 50.73, "Immediate Notification Requirements for Operating Nuclear Power Reactors," for the licensee's failure to make required licensee event reports within 60 days following discovery of an event requiring a report. Specifically, on nine occurrences between May 9, 2011, and August 30, 2012, the licensee failed to submit a licensee event report for an event meeting the requirements for reporting specified in 10 CFR 50.73. This issue has been entered into the corrective action program as Condition Report CR 2012-03796.

  The violation was evaluated using Section 2.2.4 of the NRC Enforcement Policy, because the failure to submit a required licensee event report may impact the ability of the NRC to perform its regulatory oversight function. As a result, this violation was evaluated using traditional enforcement. In accordance with

Section 6.9 of the NRC Enforcement Policy, this violation was determined to be a Severity Level IV non-cited violation. The team determined that a cross-cutting aspect was not applicable to this performance deficiency because the failure to make a required report was strictly associated with a traditional enforcement violation (Section 7.(43)).

REPORT DETAILS

4. OTHER ACTIVITIES

4OA4 IMC 0350 Inspection Activities (92702)

The inspection team continued the NRC Inspection Manual Chapter (IMC) 0350 inspection activities, which include follow-up on the restart checklist contained in Confirmatory Action Letter (CAL) EA-13-020 issued February 26, 2013. The purpose of this inspection was to perform an assessment of the causes of the performance decline at Fort Calhoun Station (FCS), to assess whether 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 FCS.

The team used the criteria described in baseline and supplemental inspection procedures, various programmatic NRC inspection procedures, and IMC 0350 to assess Omaha Public Power District's (the licensee) performance and progress in implementing its performance improvement initiatives. The team performed on-site and in-office activities, which are described in more detail in the following sections of this report. This report covers inspection activities from January 14 through March 15, 2013. Specific documents reviewed during this inspection are listed in the attachment.

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

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 safety-significant performance deficiencies identified at FCS. 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 identifies the fundamental aspects of organizational performance in the areas of organizational structure and engagement, values, standards, culture, and human behaviors that have resulted in the protracted performance decline and are critical for sustained performance improvement. Section 1 reviews also include an assessment against appropriate NRC Inspection Procedure 95003 key attributes. These assessments are documented in Section 5.

Item 1.a: Flooding Issue – Yellow Finding

(1) Inspection Scope

a. The team reviewed the adequacy of the licensee identified root and contributing causes of the risk significant issue; verified that the extent of condition and extent of causes of the risk significant issue were identified, and verified that the corrective

actions adequately addressed the causes to preclude repetition. (CL Items 1.a.1; 1.a.2; 1.a.3)

The team's assessment was based on the evaluation criteria from Section 02.02 of NRC Inspection Procedure 95001, which aligned with this item. The inspection objectives were to:

- Provide assurance that the root and contributing causes of risk-significant issues were understood;
- Provide assurance that the extent-of-condition and extent-of-cause of risk-significant issues were identified;
- Provide assurance that the licensee's corrective actions for risk-significant performance issues were, or will be, sufficient to address the root and contributing causes and to preclude repetition.

b. The team verified that the actions related to the Yellow finding being implemented by the licensee were adequate to support plant restart. These items are listed in the FCS Flooding and Recovery Action Plan, Revision 3, dated July 9, 2012. (CL Items 4.2.1.1; 4.2.1.2; 4.2.1.3; 4.2.1.6)

c. Open items specifically related to the Yellow finding that were ready for inspection were reviewed by the team. The team reviewed the adequacy of the licensee's root cause and extent of condition evaluations related to the associated deficiencies that protect the plant from the effects of a design basis flood. In addition, the NRC verified that adequate corrective actions were identified associated with the licensee's root and contributing causes and extent of condition evaluations and that implementation of these corrective actions were either implemented or appropriately scheduled for implementation. (Licensee Event Report (LER) 2011-003; LER 2011-001)

(2) Observations and Findings

a. Licensee's Evaluations and Associated Improvement Actions Related to the Yellow Flooding Finding.

Determine that the problem was evaluated using a systematic methodology to identify the root and contributing causes.

The licensee performed a root cause analysis (RCA) associated with Condition Report CR 2010-02387 for the Yellow flooding finding. The team noted at the time of the inspection that the licensee had revised the original version of the RCA and the version the team reviewed was Revision 2, dated March 24, 2011.

The team determined that the licensee evaluated the problem using numerous systematic methodologies and problem analysis techniques to identify the root and contributing causes. The licensee used the following systematic methods to complete the RCA report: 1) Kepner-Tregoe Problem Analysis for developing the

problem statement and to determine the extent of condition; 2) task analysis for analysis of deficiencies in procedure development; 3) event and causal factor charting for plotting the progression of the problem and how past actions contributed; 4) timeline construction for laying out the history and progression of the issue; 5) personal interviews for capturing mindsets and safety culture; 6) missed opportunity matrix for capturing missed chances to identify and correct; 7) management oversight and risk tree analysis techniques for identifying defenses; 8) hazard-barrier target analysis for identifying need for further corrective actions; and 9) why factor tree for identifying major drivers.

The team concluded that the use of the numerous techniques provided an adequate analysis for evaluating the problem.

Determine that the root cause evaluation was conducted to a level of detail commensurate with the significance of the problem.

The team determined that the licensee conducted the RCA to a level of detail commensurate with the significance of the problem. The licensee identified four root causes for the condition that existed, which were:

RC-1: A historically weak procedure revision process did not ensure Updated Safety Analysis Report (USAR) requirements were met;

RC-2: Management oversight of activities associated with flooding was insufficient to prevent recurrence;

RC-3: Licensee organization was not effective in assuring flooding related issues were adequately identified, evaluated, and resolved; and

RC-4: Safe as-is mindsets existed at the station.

The team considered the identification of four root causes to be abnormally high. The depth and breadth of the issue appeared to drive the relatively high number. The team considered the fact that one of the root causes dealt with deficiencies in the CAP to be a large contributor. Treatment of the CAP and its deficiencies was covered in Section 3 of the restart checklist and is further detailed in this report.

Determine that the root cause evaluation included a consideration of prior occurrences of the problem and knowledge of prior operating experience.

The team determined that the RCA included a consideration of prior occurrences of the problem and knowledge of prior operating experience. The licensee identified occurrences and operating experience of the problem as a part of their evaluations. The licensee's RCA team concluded that the organization missed opportunities to identify and resolve the issue at a precursor level. The team agreed with the conclusion, noting the past deficiencies with the CAP.

The team noted the review of operating experience included both internal and external operating experience. The licensee's use of the missed opportunity matrix

aided them in identifying their past identification of their design and licensing basis flood level and their inadequate flooding procedures. For external operating experience, the RCA team identified a missed opportunity to improve their flooding posture when operating experience from a foreign reactor site was not thoroughly reviewed. The team noted that the licensee did capture this missed opportunity in their CAP.

Determine that the root cause evaluation addressed the extent of condition and the extent of cause of the problem.

The team observed that the licensee did separately address both extent of cause and extent of condition.

For extent of condition, the team reviewed the licensee's procedures for two other natural phenomena events (low river level and degraded river level) to ascertain the adequacy of the extent of condition review. These procedures for natural phenomena were contained in Sections IV and V of Procedure AOP-01, "Acts of Nature," Revision 33. The team reviewed these procedures for adequacy. During their reviews, the team identified the following unresolved item (URI), finding (FIN), and non-cited violations:

URI 05000285/2013008-01, "Inadequate Procedure for Combatting Frazil Ice"

FIN 05000285/2013008-02, "Frazil Ice Monitor Not Operational"

NCV 05000285/2013008-03, "Lack of Safety-Related Equipment For Design Basis Low River Level"

NCV 05000285/2013008-04, "Non-conservative Value for Declaring An Alert on Low River Level"

NCV 05000285/2013008-05, "Inadequate Procedure for Combating Loss of Raw Water"

The team concluded that due to these inadequacies with the low river level and degraded river level procedures, the licensee's extent of condition review was not thorough enough. The team came to their conclusion because the nature of the findings had many similarities to the issues associated with the original Yellow flooding finding.

Determine that the root cause, extent of condition, and extent of cause evaluations appropriately considered the safety culture components as described in IMC 0310.

The team determined that the root cause, extent of condition, and extent of cause evaluations appropriately considered the safety culture components as described in IMC 0310. The licensee reviewed each safety culture component and determined if the condition was applicable so that they could link the component to a root or contributing cause.

Determine that appropriate corrective actions are specified for each root and contributing cause.

The team determined that the licensee, in most cases, specified appropriate corrective actions for each root and contributing cause. However, in a few cases, the team found some corrective actions that were not thorough enough. The team also reviewed the technical bases for procedural steps in the revised flooding procedure. The technical bases prove that the procedures and the equipment they call upon would work when demanded under a design basis flood. The team identified the following issues related to FCS personnel's ability to adequately address technical inadequacies in the procedures to mitigate flooding:

NCV 05000285/2013008-06, "Failure to Account for Worst Case Conditions in Fuel Oil Inventory Calculation"

URI 05000285/2013008-07, "Administrative Controls for a Technical Specification for Low River Level"

NCV 05000285/2013008-08, "Sluice Gate Leakage Not Periodically Verified"

NCV 05000285/2013008-09, "Failure to Prevent Failures of the Sluice Gates to Close"

NCV 05000285/2013008-10, "Failure to Accurately Model Raw Water Flow into the Intake Structure"

NCV 05000285/2013008-11, "Failure to Account for Usable Fuel Oil Tank Level in Inventory"

The team concluded that FCS had not sufficiently resolved several technical issues associated with corrective actions for flooding. These issues were essential to ensure the mitigating systems called for in the flooding procedure would work when called upon. The team judged that this was due, in part, to the larger site issue of the improper understanding and incorporation of the design and licensing bases information.

Determine that a schedule has been established for implementing and completing the corrective actions.

The team determined that FCS established a schedule for implementing and completing corrective actions. The team noted that Condition Report CR 2010-02387 contained a long list of corrective actions identified to resolve the issue. The team sampled the items to assure that the more risk significant issues were given higher priority and to assure that interim actions were in place to ensure FCS could deal with any potential flooding issues. Due to the nearly two year time frame from the completion of the RCA and this inspection, the team was able to note that most of the items had been completed. While there were instances regarding the effectiveness of the corrective actions discussed above, the team concluded that the schedule of corrective actions was adequate.

Determine that quantitative or qualitative measures of success have been developed for determining the effectiveness of the corrective actions to prevent recurrence.

The team determined that FCS developed quantitative and qualitative measures of success for determining the effectiveness of the corrective actions to prevent recurrence. These effectiveness reviews were broken down into separate actions in the corrective actions for the RCA. Each of these corrective actions contained detailed means to ascertain the effectiveness measures.

b. FCS Flooding and Recovery Action Plan Items Directly Related to Flooding Corrective Actions

The team reviewed the licensee's actions to resolve the following Flooding and Recovery Action Plan items:

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.

The team reviewed this item which was intended to review that initial outage activities or flood response measures had not damaged flood barriers. The team reviewed records of maintenance on the affected barriers which detailed any such activities and concluded that the licensee had adequately ensured the barriers were still intact. The team noted that implementation of the Flood Impairment Log would track such issues in the future.

4.2.1.2 Issue Procedure SO-G-124, "Flood Barrier Impairment Program"

The licensee issued this program as a corrective action in Condition Report CR 2010-2387 which included creation of a Flood Impairment Log. The team ensured the program contained elements essential to adequate tracking of flood barrier impairments. The team observed adequate implementation of the program.

4.2.1.3 Document external flood barrier impairments as applicable in accordance with Procedure SO-G-124

The team reviewed the original version of the flood impairment log, the log in September 2012, and the log at the time of the inspection to ensure proper implementation. The team also ensured normal work activities were being entered into the log. The team concluded FCS personnel were adequately documenting flood barrier impairments.

4.2.1.6 Identify flood barriers which will not have adequate qualification basis before leaving cold shutdown

For this item, the team observed the maintenance history and documentation of qualification for all applicable flood barriers. The team observed that all of the flood barriers had been demonstrated as qualified.

At the time of this report, the plant was defueled and had yet to leave cold shutdown, so the team considered this item adequate.

c. Resolution of Flooding Issues Submitted in Licensee Event Reports

1. Licensee Event Report LER 2011-003-03, "Inadequate Flooding Protection Due to Ineffective Oversight"

   Licensee Event Report LER 2011-003-03 documented the circumstances and issues associated with the Yellow flooding issue. As a result, any assessment of this LER would mirror the assessment of the licensee's evaluations and associated improvement actions related to the Yellow flooding finding contained earlier in this section.

2. Licensee Event Report LER 2011-001, "Inadequate Flooding Protection Due to Ineffective Oversight"

   Licensee Event Report LER 2011-001 was an earlier version of LER 2011-003. When LER 2011-003 was issued, it contained the latest information available, including all of the pertinent information contained in the earlier versions. The team reviewed LER 2011-001 to confirm it did not contain any different relevant information. The team therefore considered the LER redundant.

(3) Assessment Results

a. Licensee's Evaluations and Associated Improvement Actions Related to the Yellow Flooding Finding

Based on the noted discrepancies in the extent of condition area and the number of deficiencies noted in the technical bases for the flooding procedure, restart checklist items 1.a.1, 1.a.2, and 1.a.3 will remain open.

b. FCS Flooding and Recovery Action Plan Items Directly Related to Flooding Corrective Actions

Based on the reviews the team conducted as discussed, the following items will be closed:

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 Procedure SO-G-124, "Flood Barrier Impairment Program"

4.2.1.3 Document external flood barrier impairments as applicable in accordance with Procedure SO-G-124

4.2.1.6 Identify flood barriers which will not have adequate qualification basis before leaving cold shutdown

c. Resolution of Flooding Issues Submitted in Licensee Event Reports

Based on the reviews the team conducted, the following items are dispositioned as follows:

1. Licensee Event Report LER 2011-003-03, "Inadequate Flooding Protection Due to Ineffective Oversight," will remain open.

2. Licensee Event Report LER 2011-001, "Inadequate Flooding Protection Due to Ineffective Oversight," will be closed.

Item 1.b: Reactor Protection System Contact Failure – White Finding

(1) Inspection Scope

The team reviewed the licensee's assessment of the failure of the M-2 contactor in the reactor protection system that occurred June 14, 2010. The team verified that the licensee adequately identified the root and contributing causes of the risk significant issue; verified that the extent of condition and extent of causes of the risk significant issue were identified, and verified that the corrective actions adequately addressed the causes to preclude repetition. (CL Items 1.b.1; 1.b.2; 1.b.3)

An open item specifically related to the White finding was reviewed by the team. The team verified that the licensee had performed adequate root cause and extent of condition evaluations related to the associated deficiencies. In addition, the NRC verified that adequate corrective actions were identified associated with the licensee's root and contributing causes and extent of condition evaluations and that implementation of these corrective actions are either implemented or appropriately scheduled for implementation. (VIO 2011007-01)

Specifically, the team assessed Revision 3 of the RCA for CR 2011-00451, for which the problem statement was:

> *"Determine why the degraded Reactor Protection System (RPS) M-2 Contactor identified on November 3, 2008, was allowed to continue operation with no appropriate analysis or procedural guidance."*

The team's assessment was based on the evaluation criteria from Section 02.02 of NRC Inspection Procedure 95001, which aligned with this item. The inspection objectives were to:

- Provide assurance that the root and contributing causes of risk-significant issues were understood;

- Provide assurance that the extent-of-condition and extent-of-cause of risk-significant issues were identified;

- Provide assurance that the licensee's corrective actions for risk-significant performance issues were, or will be, sufficient to address the root and contributing causes and to preclude repetition.

(2) Observations and Findings

Determine that the problem was evaluated using a systematic methodology to identify the root and contributing causes.

The team determined that the licensee evaluated this problem using a systematic methodology but did not, in all cases, strictly follow the process for using those systematic techniques to identify the root and contributing causes. Specifically, RCA 2011-00451 employed the use of event and causal factor charting, barrier analysis, common factor analysis, and the why staircase. The barrier analysis and event and causal factor chart associated with RCA 2011-00451, identified many failed barriers that appeared to play a significant role in the events leading to the failure of the reactor protection system M-2 contactor. Included in the analysis were failures of the operating experience programs, the degraded/nonconforming condition evaluation process, work procedures, the work control process, training, communications, and oversight committees. While each of these identified failed barriers and causal factors appeared to play a significant role in this event, the team noted that the supporting analysis did not evaluate each specific failed barrier or causal factor to determine if they represented root and contributing causes. Instead, the team found that the licensee made a broad assumption that there was an overall underlying cause that was common to each of the identified causal factors and failed barriers. The supporting analysis for that assumption was not well supported and revealed a mindset by the licensee that there must be only one root cause for this event. Ultimately, rather than evaluate each specific causal factor or failed barrier, the licensee evaluated the following question with a simple why staircase:

"Why did the FCS organization, at multiple levels and across multiple departments, repeatedly exhibit inappropriate behaviors regarding the M-2 contactor?"

Based on the why analysis conducted on this statement, the licensee concluded the following were the root and contributing causes of the failure to address the degraded M-2 contactor in the reactor protection system:

RC-1: The principles of a strong nuclear safety culture were not effectively implemented at FCS.

CC-1: Inadequate procedures contributed to the sequence of events described in this RCA.

CC-2: Surveillance Test Program, as described in SO-G-23, supports practices that are contrary to industry practices.

CC-3: Maintenance personnel did not clearly and promptly communicate the status of failed surveillances to station operators.

CC-4: The operating crews in 2008 and 2010 declared the M-2 contactor as operable although the I&C technicians stated that they were unable to complete their surveillance test due to the noise from the M-2 contactor.

CC-5: The Engineering Change (EC44745) that would have replaced the "obsolete" contactors was originally requested in November 2008, but not implemented until February 2011.

CC-6: The station did not maintain spare parts for the M contactors, although they were original equipment (approximately 40 years old), classified as "do not run to failure", and in an important plant system.

CC–7: Technical Specification requirements related to the M contactor were unclear to the operating crews.

CC-8: The degraded/nonconforming condition (DNC) subcommittee of the plant review committee was allowed to change the determination classification of a degraded component made by the on-shift operators, without concurrence by the on-shift licensed Shift Manager and without a technical basis for the change.

CC-9: Maintenance technician knowledge of station requirements was inadequate to recognize that the repairs to the M-2 contactor performed in November 2008 constituted changes to fit, form, or function.

CC-10: System engineering and supervisory oversight failed to identify and correct the unapproved change to fit, form, function performed by the maintenance technician in November 2008.

CC-11: Personnel at various levels from multiple departments were aware of the chattering contactor, with noise levels high enough to interfere with conversations in the control room, yet the noise level was tolerated for extended periods of time.

The team noted that the failure to evaluate each individual causal factor and failed barrier was not consistent with Procedure FCSG 24-4, "Condition Report and Cause Evaluation," Revision 5. Specifically, Procedure FCSG 24-4 stated that, "the use of more than two tools is often necessary to ensure all the causal factors and failed barriers have been identified and evaluated for the root and contributing cause(s)." Because these systematic techniques were not strictly followed, the team determined that the final RCA did not fully support RC-1 as the only root causes for this issue.

The team noted that several of the contributing causes more closely fit the definition of a root cause in station procedures. A root cause is defined in Procedure FCSG 24-4, Attachment 1, Section 1.17, as the most basic, fundamental cause(s) of a problem, which, if corrected, will prevent recurrence of the identified problem and similar problems. When evaluated against the cause testing criteria used by the

licensee and described in Procedure FCSG-24-5, “Cause Evaluation Manual,” Revision 5, Attachment 1, Section 34.0, the team found it difficult to exclude several of the contributing causes as root causes. The team did agree that issues involving safety culture at FCS did play a significant role in the reactor protection system M-2 contactor issues but disagreed with the licensee’s analysis that safety culture was the only fundamental cause, which if corrected, would likely prevent recurrence of the identified problem or similar problems.

Determine that the root cause evaluation was conducted to a level of detail commensurate with the significance of the problem.

The licensee’s RCA employed various techniques to analyze the events. In general, the team found it difficult to establish how each of the failed barriers and causal factor were addressed in the development of the root and contributing causes. As discussed above, the team identified that the root and contributing causes may not be appropriately characterized because of a failure to strictly follow systematic cause evaluation techniques. The team concluded that the failure to properly characterize root and contributing causes could lead to an inadequate prioritization of corrective actions.

Determine that the root cause evaluation included a consideration of prior occurrences of the problem and knowledge of prior operating experience.

The team determined that the RCA included evaluations of both internal and industry operating experience. The licensee determined that missed operating experience opportunities were a causal factor but were not considered root or contributing causes. The team determined that the licensee failed to evaluate the contribution of operating experience to this event because of failures to properly implement the systematic cause evaluation techniques.

Determine that the root cause evaluation addressed the extent of condition and the extent of cause of the problem.

The team reviewed the licensee’s RCA as it relates to extent of condition and extent of cause.

For extent of condition, the licensee used same-same, same-similar, similar-same, and similar-similar evaluation method which is documented as Attachment 2 to RCA 2011-00451. Based on this analysis, the licensee determined that an extent of condition does exist and extends to all structures, systems and components at FCS because there is a significant and contemporary issue with accurately determining if a component is degraded or nonconforming. The licensee based this conclusion, in part, on the findings of Condition Report CR 2012-09494, related to deficiencies in identifying degraded/nonconforming conditions and in the performance of operability determinations.

For extent of cause, the licensee evaluated which people could exhibit decisions and actions inconsistent with a strong nuclear safety culture and what processes could

contain instructions that are inconsistent with a strong nuclear safety culture. The licensee informed their extent of cause review through analysis performed under Condition Report CR 2012-08133, "95003 Fundamental Performance Deficiencies Common Factors Analysis," which collectively evaluated the causal analyses conducted to evaluate the fundamental performance deficiencies (FPDs). One of the significant conclusions of the analysis was that:

> *"The analysis of historical safety culture data is reflective of broad degradation in individual and management behaviors, resources, processes, and working environment at the Station. Actions taken by the (station) to improve safety culture have focused more heavily on policy level and management level actions, leaving a vulnerability that not enough has been done to improve individual behaviors."*

Based, in part, on the conclusion from Condition Report CR 2012-08133, the licensee identified that an extent of cause does exist and that it extends across all departments at FCS and through all levels of the organization, from management through individual contributors.

The team concluded that RCA 2011-00451 determined an appropriate extent of condition and appropriate extent of cause for the root cause related to the reactor protection system M-2 contactor issue.

Determine that the root cause, extent of condition, and extent of cause evaluations appropriately considered the safety culture components as described in IMC 0310.

The root cause, extent of condition, and extent of cause evaluations appropriately considered the safety culture components as described in IMC 0310. Specifically, the licensee documented their consideration of the IMC 0310 cross-cutting aspects in Attachment 12 of RCA 2011-00451. The licensee identified several cross-cutting aspects in the area of human performance, problem identification and resolution (PI&R), and other components that were applicable to issues related to deficiencies in degraded/nonconforming condition review and operability evaluations. The final evaluation concluded that only a small number of the safety culture attributes were not to be applicable to RCA 2011-00451.

Determine that appropriate corrective actions are specified for each root and contributing cause.

The team reviewed the licensee's corrective actions for each of the root and contributing causes. In general, the corrective actions identified for the root and contributing causes appear to be technically adequate. However, because of issues involving the development of the root and contributing causes, the team found that corrective actions were not identified for several of the failed barriers identified by the licensee. Specifically, the team found the following associated with Condition Report CR 2011-00451:

- Operating experience process was identified as a failed barrier. Specifically, operating experience was not effectively used to confirm or challenge key assumptions or conclusions used in various decisions during the M-2 contactor series of events. No corrective actions were identified to address weaknesses in the operating experience program.

- The degraded/nonconforming condition evaluation and operability determination process was identified as a failed barrier. Specifically, the licensee identified fundamental flaws in the process used to establish reasonable assurance of operability during the reactor protection system contactor events. No corrective actions were identified to address weaknesses in the degraded/nonconforming condition evaluation and operability determination process.

- Training was identified as a failed barrier. Specifically, knowledge of contactor operation and characteristics was identified as being deficient because it did not provide sufficient guidance to FCS personnel that the "chattering" sounds of the reactor protection system M-2 contactor were indicative of a degraded condition requiring attention. Additionally, knowledge of the requirements of NRC Inspection Manual Chapter 9900 was weak, which led to a degraded/nonconforming condition evaluation process that allowed for prolonged, continued operation with a degraded/nonconforming condition without corrective actions to restore full qualification prior to equipment becoming inoperable. No corrective actions were identified to address weaknesses in the training program.

The team also identified that several condition reports generated from RCA 2011-00451 appear to have been closed with no action taken. Specifically, the team noted the following condition reports as being closed with no action taken:

- Condition Reports CR 2011-01719 and CR 2012-18675 were referenced to address the fact that technical specification requirements related to the M-2 contactor were unclear to the operating crews.

- Condition Report CR 2012-18675 identified that Procedure SO-O-1, "Conduct of Operations," incorrectly referred operations personnel to NUREG- 1432, "Standard Technical Specifications - Combustion Engineering Plants," when guidance was unclear.

The issue related to the improper closure of the above corrective actions was entered into the CAP as Condition Report CR 2013-03989.

<u>Determine that a schedule has been established for implementing and completing the corrective actions.</u>

The team determined that corrective actions may not be appropriately prioritized and sufficiently rigorous to ensure that a similar programmatic breakdown in the process used to address degraded/nonconforming conditions, similar to those involving the

reactor protection system M-2 contactor, will be prevented in the future. Specifically, because the prioritization of corrective actions was based on whether the cause identified was a root and contributing cause, the licensee, at the time of the inspection, had addressed only the root causes for Condition Report CR 2011-00451, but had not fully implemented actions to address the contributing causes. Additionally, as discussed above, because of issues related to the development of the root and contributing causes, the team identified that corrective actions were not identified for several of the failed barriers identified by the licensee and that some of these failed barriers represented root and/or contributing causes as defined by FCS procedures.

Determine that quantitative or qualitative measures of success have been developed for determining the effectiveness of the corrective actions to prevent recurrence.

The team determined that quantitative or qualitative measures of success have been developed for determining the effectiveness of the corrective actions to prevent recurrence. The licensee established, in part, the following effectiveness reviews:

EFR-1: Interim Effectiveness Review - Using the metrics developed for the comprehensive Safety Culture Improvement Plan, review station safety culture performance for the period January 1, 2013 through June 31, 2013.

EFR-2: Final Effectiveness Review - Using the metrics developed for the comprehensive Safety Culture Improvement Plan, review station safety culture performance for the period July 1, 2013 through December 31, 2013.

The team determined that the effectiveness criteria did not meet the criteria established in Procedure FCSG 24-7, "Effectiveness Review of Corrective Actions to Prevent Recurrence (CAPRs)," Revision 1. Specifically, the team identified that EFR-1 and EFR-2, failed to meet Procedure FCSG 24-7, Step 4.3.2, which required that an effectiveness review shall include specific success criteria. The team had difficulty determining how the success criteria specified in the effectiveness reviews would demonstrate that corrective actions have been effective at addressing the fundamental performance issues that resulted in continued operation of the degraded or inoperable reactor protection system M-2 contactor.

The team also identified that the effectiveness review included such a limited subset of data (only 6 months worth of safety culture performance) that it would be difficult to determine if corrective actions have been truly effective.

(3) Assessment Results

Based on issues related to the quality of the RCA performed under Condition Report CR 2011-00451 including development of causal factors, breadth and scope of the identified corrective actions, and the quality of effectiveness reviews, restart checklist item 1.b will remain open.

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

(1) Inspection Scope

a. The team reviewed the licensee's assessment of the Red finding and notice of violation issued to the licensee on April 10, 2012, to determine if the licensee adequately identified the root and contributing causes and the extent of condition and causes of the Red finding and if the corrective actions adequately addressed the causes to preclude repetition. (CL Items 1.c.1; 1.c.2; 1.c.3)

The team assessed the two root cause analyses the licensee developed and included in its closure book for the Red finding (i.e., Closure Book 1.C): RCA 2011-05414, "Breaker Cubicle 1B4A Fire," Revision 3, dated October 5, 2012, and RCA 2011-06621, "1B3A Main Breaker Trip During Switchgear Fault on 1B4A," dated May 3, 2012. The focus of RCA 2011-05414 was identifying the conditions surrounding the initiation of the fire event that occurred on June 7, 2011, and determining what created the fire and subsequent loss of 480 Vac bus 1B4A. The purpose of RCA 2011-06621 was to determine why an adequate level of separation between two trains of 480 Vac power was not maintained during the fire event; however, the purpose statement was redefined several times throughout the document.

The team's assessment was based on the evaluation criteria from Section 02.02 of NRC Inspection Procedure 95001, which aligned with this item. The inspection objectives were to:

- Provide assurance that the root and contributing causes of risk-significant issues were understood
- Provide assurance that the extent-of-condition and extent-of-cause of risk-significant issues were identified
- Provide assurance that the licensee's corrective actions for risk-significant performance issues were, or will be, sufficient to address the root and contributing causes and to preclude repetition

b. An open item specifically related to the Red finding was reviewed by the team. The team verified that the licensee had performed adequate root cause and extent of condition evaluations related to the associated deficiencies that protect the plant from the effects of a design basis flood. In addition, the NRC verified that adequate corrective actions were identified associated with the licensee's root and contributing causes and extent of condition evaluations and that implementation of these corrective actions are either implemented or appropriately scheduled for implementation. (LER 2011-010)

(2) Observations and Findings

a. Licensee's Assessment of the Red finding

Determine that the problem was evaluated using a systematic methodology to identify the root and contributing causes.

The licensee used systematic methods to identify root and contributing causes. Revision 3 of RCA 2011-05414 stated that the analytical methods used during the investigation included events and causal factors charting, fault tree analysis, Kepner-Tregoe analytical troubleshooting, hazard-target-barrier analysis, defense-in-depth analysis, and management oversight and risk tree (MORT) analysis. The RCA identified the problem and the assumptions used in the evaluation. The licensee did not preserve some evidence, as discussed in NRC Inspection Report 05000285/2011014, which impacted the ability to analyze the event.

Root Cause Analysis RCA 2011-06621 stated that the analytical methods used during the investigation included events and causal factors charting and fault tree analysis. A fault tree was created for the event in an attempt to identify all possible means by which load center 1B3A main feeder breaker could have opened inappropriately given the circumstances. The RCA stated that a fault tree was essentially a failure modes and effects analysis that identified the physical failure possibilities. Once the physical failure mode was identified, human performance, programmatic and oversight factors were considered to finally arrive at the root cause. The RCA contained the fault tree created for this investigation.

Root Cause Analysis RCA 2011-05414, Revision 3, documented the following root and contributing causes of the fire.

- *RC: The design process failed to identify critical parameters and interfaces such as the silver plating contact area on the switchgear cubicle stabs. The direct cause of the fire was a high resistance connection of any one of the several different initiators or contributors. The root cause was an engineering design process failure to realize that this system's design margins were reduced and that appropriate measures needed to be implemented to ensure proper operation.*

- *CC-1: Engineering had limited knowledge of the GE-AKD-5 switchgear resulting in an overreliance on vendor knowledge and skill.*

- *CC-2: The design change specifications did not consider the partial plating of the GE-AKD-5 switchgear stabs, resulting in the replacement breaker cradles engaging the bus stabs at the edge of and beyond the silver-plated contact area.*

- *CC-3: PED-GEI-3, "Preparation of Modifications," lacks requirements to identify and compare critical characteristics.*

- *CC-4: High resistance due to breaker cradle fingers engaging the bus stabs in a contact area of hardened grease and copper oxide buildup was the most probable direct cause.*

- *CC-5: Access to the bus side of the GE-AKD-5 switchgear is difficult, which limits the selection of inspection and testing methods.*

- *CC-6: The acrid odor that existed for three days preceding the event was not adequately communicated to engineering, maintenance, or plant management.*

- *CC-7: PED-GEI-03, "Preparation for Modifications," has weak operating experience criteria. The procedure only requires regulatory and EPIX operating experience searches. Existing commitments to SOERs, SERs, SENs, and external operating experience are not required to be reviewed as part of the modification process.*

- *CC-8: Pre-installation procedure prerequisites require the performance of EM-PM-EX-1200, "Inspection and Maintenance of Model AKD-5 Low Voltage Switchgear." EM-PM-EX-1200 directs maintenance to wipe the cubicle disconnects. This cleaning method is known to be insufficient to remove hardened grease. Additionally, there was no independent verification that the stabs were clean.*

- *CC-9: There was a failure to confirm as-left resistance from the line to load side of the switchgear following the modification (inadequate post-maintenance test).*

Root Cause Analysis RCA 2011-06621 documented the following root and contributing causes of the inadequate separation of safety-related equipment.

- *RC-1 (8.1): The RCA stated, "NLI was unaware of the effect of the full function test kit (FFTK) on the zone selection interlock (ZSI) functionality. This knowledge gap resulted in a failure to specify a functionally test that would ensure proper breaker performance. The knowledge gap is also being investigated by NLI. (Refer to NLI NCR number 410. Note: Any root or contributing causes associated with vendor actions will be addressed by the vendor's CAP and not by OPPD's program.)"*

- *RC-2 (8.2): Design Change Package (DCP) preparation procedures do not provide guidance to evaluate design features of new components in regard to the possibility that they may adversely affect required performance characteristics if not properly configured.*

- *CC-1 (8.3): Detailed standards for performing and documenting wire/continuity checks for new wiring do not exist. It is left to the test and field engineer to judge the level of detail required.*

- *CC-2 (8.4): The design engineer did not properly employ the human performance toolbox in regard to maintaining a questioning attitude about the details of operation of the new breakers.*

- *CC-3 (8.5): The field engineer and electricians did not properly employ the human performance toolbox in that they did not question the lack of detail in the CWO for performing wire and continuity checks.*

- *CC-4 (8.6): The vendor manual for the Masterpact breakers does not clearly state how ZSI, if not properly restrained, will impact breaker coordination.*

The team determined that the licensee failed to adequately identify the root cause for the condition described in RCA 2011-06621. The team identified this performance deficiency as NCV 05000285/2013008-12, "Inadequate Root Cause for a Significant Condition Adverse to Quality," which is discussed in Section 7 of this report. This root cause did not reflect the licensee's responsibility for its vendor's actions and work as required by 10 CFR Part 50, Appendix B. The licensee's RCA missed opportunities to consider multiple quality assurance program breakdowns and the lack of physical separation of electrical equipment as causal factors. In addition, by deferring to the vendor's CAP instead of the licensee's CAP to correct a root cause, the licensee was not following its own procedural guidance as discussed in the aforementioned finding. Had the licensee followed its root cause procedure, it could have identified that Root Cause 8.1 was not clearly correctable by the licensee, and therefore, not a root cause. In addition, the concerns in NRC Inspection Report 05000285/2012004 with regards to the issues with the root and contributing causes were neither addressed nor entered into the licensee's CAP.

The team determined that in RCA 2011-05414, the licensee adequately used a systematic methodology to identify the root and contributing causes of the initiation of the fire. The team also determined that the use of an independent contractor contributed to the thoroughness of RCA 2011-05414 with respect to determining what initiated the fire. The team determined that in RCA 2011-06621, the licensee did not adequately use a systematic methodology as demonstrated by errors in the root and contributing causes.

<u>Determine that the root cause evaluation was conducted to a level of detail commensurate with the significance of the problem.</u>

The team determined that Revision 3 of RCA 2011-05414 identified the problem it intended to resolve (i.e., what caused the fire in the West Switchgear Room and subsequent loss of 480 Vac bus 1B4A) and documented the conditions under which the fire event was identified, including how and when the fire was identified. Additional information about the conditions of the fire event was described in NRC Inspection Report 05000285/2011014. The team determined that the level of detail in the RCA was adequate for determining what initiated the fire.

The team determined that RCA 2011-06621 did not clearly identify the problem it intended to resolve because it documented several reasons why this RCA was

performed. Section 1.0 of the RCA stated this RCA was performed to "determine why an adequate level of separation between the two trains of 480 Vac power was not maintained during the June 7 fire event." Section 3.0 of the RCA stated the problem as, "Determine why the coordination between the main feeder and bus tie breakers did not function as designed for load center 1B34A." The licensee determined that the "direct cause" of the load center 1B3A main breaker failure to properly coordinate was a wiring error at a cradle connector (known as a "WAGO™" connector) resulting in the failure to block the zone selective interlock feature. The licensee stated in the RCA, "starting with this direct cause, the problem statement now becomes: Why was the wiring error at the breaker cradle WAGO™ connector not detected and corrected prior to placing main breaker 1B3A in service during the installation of the Masterpact NW breakers in 2009?" In Section 8.0 of the RCA, the licensee summarized the problem statement as, "Determine why breaker 1B3A tripped during the 1B4A bus fire." The licensee redefined the purpose statement as more information was acquired instead of focusing on why an adequate level of separation between two trains of 480 Vac power was not maintained, which resulted in the licensee not considering the lack of physical separation between island bus 1B3A-4A and bus 1B4A as a potential cause. The team determined that redefining the problem statement throughout the analysis contributed to the licensee's difficulty in identifying adequate root and contributing causes.

The team reviewed the RCAs to determine if they documented the plant-specific risk consequences and compliance concerns associated with the fire event. The RCAs contained a section about the safety significance and business impact of the fire event. Root Cause Analysis RCA 2011-05414 concluded that "nuclear safety was impacted due to a potential unanalyzed condition in breaker coordination." Root Cause Analysis RCA 2011-06621 described the event as being significant and reportable. Both RCAs identified "inconsistencies" with the station's 10 CFR Part 50, Appendix R compliance analysis. However, neither RCA discussed the risk significance (e.g., impact on core damage frequency) of the fire event. The RCAs did not mention the Red (i.e., very high) safety significance of the performance deficiency and associated violations regarding the fire event, even though the latest revisions of the RCAs were issued after the NRC's issuance of the Red finding and associated violations. The lack of any mention in the RCAs of the risk significance of the fire event was a weakness with the RCA because the risk significance provided important context and background information.

The licensee's Closure Book 1.c explained how the two root causes addressed the Red finding and associated violations. The two RCAs addressed specific occurrences associated with the fire event (i.e., what caused the fire and what caused the load center 1B3A feeder breaker to trip first). However, neither of the RCAs mentioned the impact this event had on core damage frequency. The licensee did not analyze what caused this event to have very high safety significance. Root Cause Analysis RCA 2011-05414 was sufficient for determining what caused the fire, both physically and programmatically. Root Cause Analysis RCA 2011-06621 was sufficient for determining physically what caused breaker 1B3A to open before BT1B3A; however, if a fire was to occur in either switchgear room, it could still impact redundant trains of safe shutdown equipment in that the redundant train could still

experience the fault current. The team determined that the licensee failed to identify the design of the physical separation of electrical buses as causal factor and observed that RCA 2011-06621 identified the vendor's lack of knowledge as a root cause. Developing a closure book for the Red finding after separate RCAs were completed for different aspects of the risk-significant event was not commensurate with a finding having very high safety significance. The licensee did not consider the event in its entirety as an issue having very high safety significance, which contributed to the inadequacies with RCA 2011-06621.

Determine that the root cause evaluation included a consideration of prior occurrences of the problem and knowledge of prior operating experience.

The team determined that Revision 3 of RCA 2011-05414 documented prior opportunities for identification. The RCA documented that the failure to identify the source of the acrid odor in the switchgear room three days prior to the fire event was a missed opportunity to correct the problem. The RCA documented that breaker cubicle preventive maintenance had not been conducted to clean and inspect the 480 Vac switchgear cubicles nor the bus side of the cubicles.

Root Cause Analysis RCA 2011-05414 also documented the internal and external operating experience reviews performed to determine prior opportunities for identification and potential failure modes that led to the fire. The licensee concluded that Condition Reports CR 2008-03039, CR 2008-03548, CR 2009-02306, and CR 2010-05140 provided opportunities to preclude the fire event at the precursor level. The RCA noted additional condition reports that indicated weaknesses in FCS's safety culture and behaviors. The RCA's overall conclusion of internal operating experience was that it "generally" did not show any specific opportunities to have precluded the fire event at the precursor level. This conclusion diminishes the importance of the specific examples documented in previous pages in the RCA. In its external operating experience section, RCA 2011-05414 documented NRC information that the licensee searched to identify missed learning opportunities associated with similar events. The RCA documented only one NRC generic communication that the licensee reviewed; therefore, the team could not determine the extent of NRC information reviewed by the licensee. The RCA did not document a review of NRC Operating Experience Smart Sample FY 2009-01, which was publicly available in 2009 (http://www.nrc.gov/reactors/operating/ops-experience/opess/2009/ss09-01.pdf) and was related to aspects of the fire event. The RCA documented that the licensee did not properly consider industry operating experience during the design of the replacement breakers in 2009 and some missed opportunities from other external operating experience.

The operating experience sections of RCA 2011-05414 failed to identify some NRC-communicated operating experience; however, the licensee acknowledged that the inadequate operating experience review was a contributing cause to the fire event.

Root Cause Analysis RCA 2011-06621 documented that the licensee missed an opportunity to do adequate wire continuity checks on the breaker. Root Cause Analysis RCA 2011-06621 documented two internal condition reports that were

reviewed and determined to not be related to the RCA, even though one of the condition reports documented that the vendor's design did not meet the licensee's specifications. The licensee concluded that internal operating experience did not reveal any useful information for this investigation. The RCA documented the licensee's review of external operating experience. This review resulted in the identification of the need for additional testing on the breakers. The RCA concluded that "overall FCS external operating experience determinations were seen as adequate." However, only one of the external operating experience reviews discussed the date of the external event, which was in 1992. The RCA did not clearly discern whether FCS had prior opportunities to identify this event from external operating experience. Because the root cause was incorrect, the team did not have assurance that the licensee considered all applicable internal operating experience. In addition, the RCA did not provide enough justification as to whether external operating experience determinations prior the event were adequate.

Determine that the root cause evaluation addressed the extent of condition and the extent of cause of the problem.

Root Cause Analysis RCA 2011-05414 described a root cause and a direct cause. The team considered the direct cause as the condition analyzed in the extent of condition evaluation. Root Cause Analysis RCA 2011-05414 stated that the direct cause of the fire was a high resistance connection on the line side of the breaker 1B4A cubicle. Closure Book 1.c stated that the high resistance connection that caused the load center 1B4A fire occurred at the interface of the cradle to stabs. The licensee determined that an extent of the condition did exist and applied to the remaining 480 Vac load center main and bus tie breakers and cubicles. Closure Book 1.c stated that the extent of condition of the load center 1B4A cubicle fire extended to the other 480 Vac NLI/Square D Masterpact main and bus-tie breakers that were replaced during the November 2009 modification. This modification added a cradle between the breaker and switchgear compartment primary disconnect assembly of each breaker. The breaker finger assembly connected to the NLI cradle, which in turn used fingers to connect to the bus bar copper stabs. The contact surfaces were required by design to be silver-plated to reduce high resistance connections caused by copper oxidation. The modification affected the alignment of this connection.

Closure Book 1.c stated that the 480 Vac main and bus-tie breakers have been thoroughly inspected during the extent of condition associated with RCA 2011-05414. The extent of condition investigation required the remaining load centers to be inspected, cleaned, modified, and "normalized" to meet the manufacturer's requirements and ensure low resistance connections. This included as-found and as-left connection resistance measurements collected for trending purposes and the use of a borescope to verify the primary disconnect finger connection alignment. From October to December 2011, the licensee cleaned and re-silver-plated the primary disconnect stabs to ensure the cradle fingers made contact with the silver-plated portion of the stabs. The RCA also discussed the steps the licensee took to inspect and test the breakers to determine the extent of condition. These tests included performing digital low resistance ohmmeter (DLRO) measurements on the

breaker connections. The RCA stated that the extent of condition inspection found varying as-found resistance across the finger-to-stab contacts caused by a combination of finger travel beyond the silver-plated area of the copper stabs and build-up of copper oxide in combination with hardened grease residue that was not cleaned from the stabs prior to installation of the breaker cradles in 2009. The licensee found signs of possible overheating on other breakers. The team identified a finding related to the basis for the DLRO test acceptance criteria, NCV 05000285/2013008-13, "Failure to Establish and Document Basis for Test Acceptance Criteria," which is further discussed in Section 7 of this report.

Closure Book 1.c stated that the extent of condition considered all of the 480 Vac NLI/Square D breakers affected by the November 2009 modification. Other power circuit breakers in the plant were not modified. These breakers have similar primary disconnect assemblies, but the original design interfaces were not changed, and there were no cradles; therefore, the licensee did not include them in the extent of condition. Currently, load center 1B4A feeder breakers have been replaced with similar NLI cradle devices (known as adapters), but bolted connections were used in this application to preclude high connection resistance problems.

Root Cause Analysis RCA 2011-05414 determined the root cause of the fire to be the design process failing to identify critical parameters and interfaces such as the silver plating contact area on the switchgear cubicle stabs. The engineering design process failed to realize that the system's design margins were reduced and that appropriate measures needed to be implemented to ensure proper operation. The RCA stated that an extent of cause did exist in that other retro-fit modifications or retro-fit roll-in ("turn-key") replacements could be negatively impacted by the design change process if critical interfaces were not identified by the design control process; however, Closure Book 1.c stated that modifications in progress and on-the-shelf were determined to not have been negatively impacted by the design change process. Closure Book 1.c stated that the extent of cause of the load center 1B4A cubicle fire extended to all design activities (specification of post-modification test criteria, preparation of modifications, facility changes, minor configuration changes, procurement specifications, construction work orders (WOs), and field design change requests), which differed from RCA 2011-05414. Closure Book 1.c stated that the design process lacked a requirement to identify and compare critical characteristics when performing modifications and that the design procedures have since been revised to include this requirement along with other enhancements, which the team verified. These include requiring a comparison of new and old features of equipment and considering potential adverse impacts of this equipment, as well as expanding operating experience search criteria during the design change process.

The extent of condition evaluation in RCA 2011-05414 and Closure Book 1.c described an adequate approach for determining the extent of the high resistance connections; however, resolution of the DLRO testing acceptance criteria issue is required before closing this item. The NRC needs assurance that the testing acceptance criteria were adequate. Because the licensee did not document the basis for how it determined the criteria and because the criteria differed among various documents, additional analysis is needed to assure that the testing was

adequate to determine the presence of high resistance connections. Closure Book 1.c was more complete than RCA 2011-05414 in its description of the extent of cause evaluation (e.g. it says that all design activities were affected, whereas RCA 2011-05414 limited the scope to certain activities). Other restart checklist items (e.g., Items 3.c and 5.a) were more appropriate for determining the extent of cause; however, these items were not completed by the end of onsite inspection activities. These evaluations need to be completed before closing this restart checklist item.

For the purpose of determining the extent of the condition, RCA 2011-06621 defined the condition as the failure to properly disable the ZSI breaker feature which resulted in a loss of expected coordination between adjacent 480 Vac breakers. During the June 7, 2011, fire event, the failure to restrain ZSI was caused by a wiring error, which occurred during the installation of the restraining jumpers. The licensee identified other conditions that could cause ZSI to not be adequately restrained, including snap-in connectors not firmly mounted and popping out during breaker racking and a damaged mounting-bracket linkage arm that could cause incomplete circuits at the input to the breaker. The licensee determined that the extent of condition was the possibility that any or all of these failure modes could exist on any of the twelve Masterpact NW breakers installed in the 480 Vac switchgear. The ZSI wires were checked at all twelve breakers and cradles. In the course of the RCA investigation, other adverse breaker conditions were identified and checked. Closure Book 1.c stated that the licensee has verified the correct placement and continuity of the other ZSI jumpers in the station and was verifying breaker overcurrent coordination through primary current injection testing without using a FFTK. The licensee also implemented new guidance for testing control wire that is applicable to all modified and maintained electrical circuits. This was accomplished in Conditon Report Action Item 2011-06621-028. The licensee determined that this type of electronic trip unit did not exist on other power circuit breakers at the time of the extent of condition inspections. Currently 480 Vac switchgear feeder breakers have been installed in load center 1B4A that contain similar control wire jumpers. The closure book stated that these breakers have been included in the corrective actions under Condition Report Action Item 2011-05414-032 to ensure they were tested adequately and would trip as expected.

Root cause analysis RCA 2011-06621 identified two root causes. The first root cause was that the breaker vendor did not identify that the new breakers introduced a new failure mode that could impact a critical design characteristic and failed to identify a test that would ensure that the breakers would perform properly. However, Closure Book 1.c stated that the first root cause was that design engineering did not identify that the new breakers introduced a new failure mode that could impact a critical design characteristic and failed to identify a test that would ensure that the breakers would perform properly. The RCA stated, “One extent of cause is the possibility that the breaker vendor could have provided other electrical equipment to FCS that could have wiring errors or other deficiencies that would not be detected by vendor or plant tests.” The RCA text did not describe the licensee actions taken to address this extent of cause. Closure Book 1.c stated that a review of other modifications for equipment provided by NLI and other electrical and instrumentation and control modifications was performed to determine if wiring errors could exist that

testing would not identify. The criteria of the review were modifications "Issued to Plant" between December 21, 2007, and December 21, 2012. The closure book stated that no wiring errors were identified.

The second root cause was the lack of specific direction in the design change package preparation procedure to require the design engineer to consider the impact of design features of new equipment if not properly disabled. The RCA stated, "A second extent of cause is the possibility that other electrical modifications could have been implemented without consideration of new failure modes being introduced by design features that are not properly disabled." The closure book stated that the root cause has been corrected by revising the appropriate design procedures for all engineering disciplines to require a comparison of new features with the original equipment including a consideration of potential adverse impacts of new features on required performance characteristics. It also required testing in the as-built condition whenever possible and documentation of critical parameters within the design change process. Although the closure book described actions to address the root cause and prevent future occurrences, it did not describe the actions taken to address the extent of the cause.

The extent of condition evaluation in RCA 2011-06621 was adequate for determining the extent of the ZSI wiring errors. Because RCA 2011-06621 had an inadequate root cause (Root Cause 8.1), the extent of cause was inadequate. The licensee will need to revisit this extent of cause after an appropriate root cause is determined. In addition, the extent of cause for Root Cause 8.2 referred to corrective actions taken to address the root cause (i.e., procedural corrections to prevent future modifications from being affected) rather than determining whether prior modifications could have been implemented without consideration of new failure modes being introduced. The licensee's reviews for other restart checklist items (e.g., Items 3.c.1 and 3.c.2) did not consist of a design re-verification or validation; therefore, the team does not have confidence that this extent of cause was properly evaluated and corrected through other restart checklist items.

Determine that the root cause, extent of condition, and extent of cause evaluations appropriately considered the safety culture components as described in IMC 0310.

The safety culture analysis portion of the RCAs failed to identify the reasons for why some safety culture aspects were not applicable, as required by station procedure. This information was important for complete understanding of the circumstances surrounding the event and to ensure that other root and contributing causes were not inappropriately ruled out. The form for documenting the safety culture analysis was not consistent with the instructions in the governing procedure with respect to documenting the reasons why a safety culture aspect was not applicable. The form required the licensee to bin the root and contributing causes into the various components, which would not provide an opportunity to determine if the causal analyses failed to identify other root and contributing causes. In addition, the licensee used a contractor to provide additional insight to RCA 2011-05414, which was incorporated in subsequent revisions of the RCA. Revision 3 of the RCA stated

that the safety culture review was approved with Revision 1, which did not indicate that this evaluation was updated after the contractor's input was provided.

Determine that appropriate corrective actions are specified for each root and contributing cause.

The Red finding, which was issued on April 10, 2012, in NRC Inspection Report 05000285/2012010, was associated with the following three violations.

- Violation 1: 10 CFR Part 50, Appendix B, Criterion III, "Design Control": Design reviews, work planning, and instructions for a modification to install new 480 Vac load center breakers failed to ensure that the cradle adapter assemblies had low resistance connections with the switchgear bus bars by establishing a proper fit and requiring low resistance connections to assure that design basis requirements were maintained.

- Violation 2: 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action": Licensee corrective actions were inadequate to prevent high resistance connections in load center 1B4A caused by hardened grease and oxidation, and maintenance procedures did not contain adequate guidance for torquing bolted connections or measuring abnormal connection temperatures caused by loose electrical connections in the bus compartment of the switchgear.

- Violation 3: FCS License Condition 3.D, "Fire Protection Program": The licensee failed to ensure that design reviews for electrical protection and train separation of the 480 Vac electrical power distribution system were adequate to ensure that a fire in load center 1B4A would not adversely affect operation of redundant safe shutdown equipment in load center 1B3A such that one train of systems necessary to achieve and maintain hot shutdown conditions were free of fire damage.

The team reviewed the licensee's planned and taken corrective actions for addressing the Notice of Violation (NOV) associated with the Red finding. The licensee made nine regulatory commitments in response to the NOV. Seven of the nine commitments have been completed. The two remaining commitments were related to the nine and eighteen-month review of modifications to determine if failure modes were introduced by new features.

Corrective action items and schedules for implementing these items were specified for the root and contributing causes discussed in root cause analyses RCAs 2011-05414 and 2011-06621. Closure Book 1.c provided a table that outlined which corrective actions correlated to the various causes. The team determined that these corrective actions were adequate to address those causes with the exception of the corrective actions for Root Cause 8.1 in RCA 2011-06621 since the root cause was inadequate.

Procedure FCSG-24-5, “Cause Evaluation Manual,” Revision 5, Attachment 1, Step 39, of the cause evaluation manual stated that engineered defenses and proper design were the most effective corrective actions. The licensee extended the area of silver coating on the breaker stabs and corrected the ZSI wiring. Changing the physical separation design of redundant safe shutdown systems would have reduced the risk significance of the fire event and precluded recurrence of such faults affecting redundant trains of safe shutdown equipment; however, the licensee determined that the current design was within its licensing basis.

Determine that a schedule has been established for implementing and completing the corrective actions.

Corrective action items and schedules for implementing these items were specified for the root and contributing causes discussed in root cause analyses RCAs 2011-05414 and 2011-06621. Remaining corrective actions were discussed in the previous section of this report. The team did not identify any issues associated with licensee’s schedule.

Determine that quantitative or qualitative measures of success have been developed for determining the effectiveness of the corrective actions to prevent recurrence.

Team reviewed the licensee's measures for determining the effectiveness of the corrective actions to prevent recurrence. The team identified two examples of inadequate effectiveness measures established in root cause analyses RCAs 2011-05414 and 2011-06621. One effectiveness measure would have allowed for future violations to continue, and the other measure did not establish a reasonable period of time for determining effectiveness.

The effectiveness reviews for the corrective actions established in RCA 2011-06621 (Action Items 2011-06621-037 and 2011-06621-038) stated:

> *“Review modifications created/implemented within the last 9 [and 18] months to determine if failure modes introduced by features not part of original equipment could have been introduced. If more than 5% have issues regarding invalid failure mode determination, this would constitute ineffectiveness.”*

Procedure FCSG-24-5, “Cause Evaluation Manual,” Revision 5, provided instructions for effectiveness reviews. Step 42.0, “Effectiveness Review Plan,” stated, in part, that the effectiveness review should address whether there has been a recurrence of the cause the CAPR was intended to eliminate.

The effectiveness review success criteria allowed for 5 percent of plant modifications to have an invalid failure mode determination, which meant that 5 percent of the modifications reviewed may have inadequate design and 10 CFR 50.59 analyses. The team determined these criteria to be unacceptable because inadequate design control and 10 CFR 50.59 analyses contributed to the fire event, and if these failures continued to occur, the corrective actions would not preclude repetition of the cause. This effectiveness review allowed for recurrence of the cause that the corrective

action was intended to eliminate, and therefore, did not meet the intent of Procedure FCSG-24-5. The licensee stated that one modification having an invalid failure mode determination would trip the 5 percent criteria because of the number of modifications being reviewed; however, there was no assurance that the number of modifications would not increase over time.

An effectiveness review for a corrective action established in RCA 2011-05414 (Action Item 2011-05414-027) stated:

> *"Perform a focused self-assessment on the modifications that were developed/approved during the time period 12/15/11 [-] 6/1/12 under PED-GEI-3 and PED-GEI-29 to determine if a critical [characteristic] has been overlooked. No identified issues in form, fit, or function developed under PED-GEI-3 or GEI-29 is considered a successful effectiveness review."*

Procedures PED-GEI-3, "Preparation of Modifications," Revision 87, and PED-GEI-29, "Preparation of Facility Changes," Revision 56, were updated in March 2012. The time frame covered by the effectiveness review (i.e., approximately 2-3 months after the revised procedures were issued) was inadequate for determining whether corrective actions were effective because it did not allow sufficient time and opportunities for the new procedural changes and training to take effect. Eight engineering changes were reviewed in accordance with the guideline for evaluating vendor prepared modifications (restart checklist item 3.c.1); however, that review process did not consist of an in-depth design review. For example, operating experience specific to the equipment being modified was not considered during the review of the engineering changes. In addition, the one issue that the effectiveness review associated with Action Item 2011-05414-027 did identify required a calculation to address the comment, but the condition report stated the consequence was insignificant rather than stating whether the issue affects form, fit, function, or functional performance. The licensee stated that an engineering assurance group was established that would review every engineering change; however, this action was not documented as an effectiveness review in RCA 2011-05414, and the licensee did not provide any documentation to show that this group would evaluate the effectiveness of the corrective actions established by RCA 2011-05414.

Procedure FCSG-24-5, Attachment 1, Step 39, "Hierarchy of Corrective Action Effectiveness," indicated that corrections to procedures were not likely to preclude recurrence. This corrective action procedure described five levels of corrective action effectiveness. These levels were, in order from most effective to least effective, design for a minimum hazard, use safety devices, use warning devices, use procedures and administrative defenses, and acceptance of risk (i.e., acknowledging that the event may recur). Step 39.1.4 stated:

> "Reliance on procedures, training, and other Administrative Defenses is considered to be the weakest form of corrective action due to the total dependence on the proper human response. Another problem with Administrative Defenses is that they are easy to administer and complete, and

the regulators seem to buy off on them. And yet events that have been "corrected" with primarily administrative fixes are almost certain to recur."

Procedure FCSG-24-5 provided instructions for effectiveness reviews. Step 42.4.1 stated:

"The due date for an effectiveness review should be an appropriate period of time between the completion of the CAPRs [corrective actions to preclude recurrence] and the determination process to be used. This period of time should be long enough to allow for situations to arise that would challenge the CAPRs that were implemented, but not so long that an ineffective CAPR represents an unacceptable risk. The actual time frame should be dictated by the expected frequency of challenges to the CAPR and the consequences of failure. In some situations, it may be appropriate to perform interim effectiveness reviews to see if there have been challenge opportunities."

Because a procedural correction may not be effective in precluding repetition of events, the licensee should have established more frequent effectiveness reviews for the procedural corrective actions. This effectiveness review has acceptable acceptance criteria (i.e., no issues in form, fit, or function); however, the team determined that the corrective actions need more run-time and interim effectiveness reviews in accordance with Procedure FCSG-24-5 before a conclusion can be made about their effectiveness.

Overall, the team concluded through the review of this area, that the licensee failed to properly evaluate a 4160 Vac/480 Vac transformer fault or a 480 Vac load center bus fault and the potential effect on system operability. This issue is documented in Section 7 of this report as VIO 05000285/2013008-14, "Failure to Promptly Identify and Correct a Condition Adverse to Quality."

b. The team reviewed LER 2011-010, "Fire Causes a Circuit Breaker to Open Outside Design Assumptions," dated January 16, 2012, and its supplement, dated June 29, 2012, which reported the June 7, 2011, fire event. The team reviewed this event, as described in NRC Inspection Report 05000285/2011014, which documented several findings. The NRC has identified additional concerns associated with this issue which have been captured in the restart checklist basis document for additional NRC follow-up.

(3) Assessment Results

a. Based on issues related to the identified root and contributing causes in RCA 2011-06621, the extent of condition and cause reviews in root cause analyses RCAs 2011-05414 and 2011-06621, and the quality of effectiveness measures for the corrective actions established in both RCAs, restart checklist item 1.c will remain open.

b. The NRC identified findings related to the licensee's root cause and corrective actions associated with the event, which were described in this report; therefore, the

licensee may need to revise this LER. Therefore, this LER will remain open for additional follow-up.

Item 1.e: Third-Party Safety Culture Assessment

(1) Inspection Scope

a. The team assessed and inspected the results of the safety culture assessment performed by an organization independent of FCS. The scope of the inspection related to safety culture was based on the results of the validation of the licensee's third-party safety culture assessment and RCA. The team evaluated the licensee's third party assessment to verify: (1) the comprehensiveness of licensee third-party safety culture assessment; (2) the methods used by the third-party assessment team to collect and analyze the data were adequate and appropriate; (3) that the licensee's assessment team members were independent and qualified; (4) the licensee's activities to communicate results of the assessment to various levels of management and staff; and (5) the licensee's corrective actions to the assessment results. Consistent with inspection requirements in Section 02.08 and 02.09 of Inspection Procedure 95003, the team evaluated the licensee's third-party safety culture assessment and conducted an independent graded assessment. (CL Items 1.e.1; 1.e.2; 1.e.3; 1.e.4; 1.e.5)

b. The team reviewed the licensee's assessment of the Fundamental Performance Deficiencies (FPDs) associated with Nuclear Safety Culture and Safety Conscience Work Environment. The team also assessed the adequacy of the extent of condition, extent of causes, and corrective actions. (CL Items 1.e.6; 1.e.7; 1.e.8; 1.e.9; 1.e.10; 1.e.11)

   The team's assessment of these FPDs was based on the evaluation criteria from Section 02.02 of NRC Inspection Procedure 95001 which align with this item. The inspection objectives were to:

   - Provide assurance that the root and contributing causes of risk-significant issues were understood
   - Provide assurance that the extent-of-condition and extent-of-cause of risk-significant issues were identified
   - Provide assurance that the licensee's corrective actions for risk-significant performance issues were, or will be, sufficient to address the root and contributing causes and to preclude repetition

(2) Observations and Findings

a. Evaluation of the Licensee's Independent Safety Culture Assessment

   The team reviewed the third-party safety culture assessment performed by Conger and Elsea, Inc. This included a meeting with licensee representatives and one of the

licensee's safety culture assessment contractors at NRC Headquarters in Rockville, Maryland, on February 22, 2012, to discuss the independent safety culture assessment. During this meeting, Conger and Elsea gave a detailed presentation on the assessment methodology. The team performed onsite inspection activities January 14-18, and February 11-15, 2013.

(1) Comprehensiveness

Conger and Elsea conducted a survey during February and March 2012 in which 882 of 994 full-time permanent FCS personnel and long-term contractors participated (93% response rates). A total of 44 individual interviews and 20 focus groups were conducted and 171 individuals participated. Approximately 16 plant observations were conducted including morning meetings, Corrective Action Review Board meetings, turnovers, briefings, and plant tours. The team concluded that Conger and Elsea appropriately screened for workforce attitudes and that useful information was gathered from the survey questions, individual interviews, and focus groups participants. The combined activities of the third-party assessment involved all levels of site and corporate management, and sampled organizational characteristics and attitudes related to each of the safety culture components identified in IMC 0310 "Components within Cross Cutting Areas." The team concluded that Conger and Elsea provided the licensee with the information necessary to develop appropriate corrective actions for the identified safety culture weaknesses.

(2) Assessment Methods

The methods used to collect information for the assessment by Conger and Elsea included document based functional analysis, interviews, Behavioral Anchored Rating Scales (BARS), behavioral observations, and a written survey. The functional analysis identified ten organizational behaviors for assessment. These organizational behaviors were correlated to the NRC safety culture components. Conger and Elsea selected a set of questions for the interviews to gather information related to the safety culture components and attributes based on the document based functional analysis. A specific subset of questions was selected to provide a predefined focus on organizational behaviors identified from the functional analysis. Four of the ten organizational behaviors identified through the functional analysis were included in the BARS administered to the interview/focus group participants. Approximately 675 BARS were collected representing 10 organizational behaviors. The team observed a sampling of the focus groups conducted by the Conger and Elsea.

(3) Independence and Qualifications

The team reviewed the licensee's plans for conducting the safety culture assessment, the credentials of the personnel who conducted the assessment and analyzed the data. The team verified that the third-party assessment team was composed of individuals with knowledge of nuclear safety culture and the topics they were assigned to assess. The team verified through direct

communication with Conger and Elsea that they had unrestricted access to information and opportunities to interview individuals as necessary to complete the assessment.

It was verified that Conger and Elsea subcontracted with an independent professional, to assist in analyzing the statistical properties of the survey instrument and results.

(4) Activities to Communicate Assessment Results

An NRC safety culture assessor observed the presentation of the results to management and to a cross section of non-management employees. The licensee also communicated the assessment results to FCS personnel via a meetings and electronic communications. The team also verified through focus groups that the results of the third-party assessment were shared with the various levels of FCS personnel.

(5) Licensee Analysis and Corrective Actions

The third-party assessment identified various weaknesses associated with the safety culture at FCS in the following areas:

- Accountability
- Decision-making
- Work practices
- Work control
- Lack of confidence and trust in senior management
- Corrective action process
- Oversight
- Operating experience
- Environment for raising concerns
- Change management process

The team concluded that individual findings and recommendations from the safety culture assessment were appropriately reviewed by the licensee to identify corrective actions. The licensee very recently began implementing corrective actions relative to when this inspection was performed.

The licensee began having the compliments and concerns meetings to address, in general, the issues with safety culture and address communications issues at the site. These meetings were held to encourage individuals to bring issues from the line organizations directly to management. Due to the lack of accountability and the lack of trust in management across the various levels of the organization identified by the assessment, there was a change in management across the site. The licensee promoted individuals within the organization, and also replaced higher level management with Exelon employees. There were also

contract stipulations in place which dictated how long Exelon individuals must stay in a position.

During the inspection it was determined that the root cause methods used by the licensee had changed. The team interviewed individuals who participated in various recent root cause teams. These individuals described the third-party assessment as a result of safety culture issues found as a part of the RCA completed to address the flooding issues. The process of revising how RCAs were performed was perceived as an evolution in understanding that the issues at FCS needed the proper emphasis on safety. There is a perceived increase in support received from management concerning placing more importance on human performance aspects of work practices. There was also a perception of less resistance from management when RCAs identify safety culture issues.

The CAP has been modified, which included site wide policy changes. The number of issues that have been entered into the CAP has increased however, it is unknown if all the issues will be addressed in a timely manner and whether the trends will be effectively used. The licensee has hired additional staff to identify issues site wide for entry into the CAP. The team noted that the supplemental staff had vast experience outside of FCS, and was provided to FCS considering the lack of an experienced engineering staff. At the end of this inspection, the team was unable to determine if this supplemental staff will have an active role in addressing the issues; and the level of knowledge transfer that will take place before the staffing levels are decreased, and many of the experienced supplemental staff leaves FCS.

To address one alternative avenue for raising concerns, the Employee Concerns Program (ECP) at FCS is currently undergoing a major overhaul and is in a transitional process. The most recent safety culture assessment, coupled with their causal analysis on the program, led the licensee to recognize the need for major changes to the ECP. Prior to the operating agreement with Exelon in August 2012, the ECP was ineffective and site personnel did not trust that issues raised would remain confidential. To address these ECP shortcomings, the licensee hired a consultant to overhaul the program and implement Exelon's ECP model. As part of the ECP overhaul, the licensee will implement new processes and procedures, update files and documentation, and increase the visibility of ECP representatives.

The plant manager indicated that he was planning to implement an organizational change to move the work schedule planners into the maintenance department to improve the issues with work control.

FCS has implemented requirements for managers across the organization to have dedicated time in the field to provide more oversight to individuals within the various levels of the line organization, and specifically with security officers. Confirming information was heard during focus groups with individuals from various line organizations.

FCS began conducting pulse surveys to assess the effectiveness of oversight departments, such as the CAP, and various safety policies. One sixth of workforce was randomly sampled each month. Overall, the mean of the survey responses increased from September 2012 to January 2013, indicating an improvement in employee perceptions of the safety culture on site, although the increase was not large enough to be statistically significant. Some of the most highly rated survey questions included:

- I would raise a safety concern to my supervisor/management
- Nuclear safety is foremost in plant operations
- I am aware of the ECP and if I wanted to, I could use the program

There were statistically significant increases in the responses to the following questions:

- The condition reporting system is utilized effectively at my station to resolve conditions adverse to quality in a timely manner
- There is an effective upward flow of information to management
- I believe that management supports the ECP
- I believe my work environment is generally professional and open
- Employees take ownership for problems

This suggests that employees perceive improvements in the CAP, the ECP, personal accountability, management communications, and openness.

Questions that continue to get low responses from September to January included:

- There is effective communication between departments
- Coordination issues between work groups are effectively resolved
- Distractions are managed and kept low, including overlapping or simultaneous evolutions
- Resources are shared appropriately among organizations

This suggested that areas that continue to need improvement included communication and coordination across departments and workgroups, prioritization of work, and distribution of resources.

NRC Graded Safety Culture Assessment

The team confirmed the existence of weaknesses in organizational characteristics and attitudes associated with in IMC 0310 “Components within the Cross Cutting Areas.” The purposes of this assessment were to: (1) inform the NRC’s assessment of the contributors to degraded performance in the affected Strategic Performance Areas and (2) validate the licensee’s third-party safety culture assessment. The team verified that previously there were weaknesses in the organization which may have been addressed, however, the negative impact of these weaknesses remain. The most notable remaining safety culture issues identified related to the following safety culture components: decision-making, work control, CAP, environment for raising concerns, continuous learning environment, and organizational change management. These weaknesses were observed among functional groups across the organization, involving engineering, maintenance, security, radiation protection, and CAP personnel.

The team relied on document reviews, individual and group interviews, and behavioral observations to conduct the assessment. The team assessed safety culture attitudes by conducting 17 individual interviews and 22 focus groups with an average of 7 participants in each group, for a total of 152 individuals involved in safety culture-specific interviews over the course of the inspection. These interviews involved personnel from the majority of functional groups at the site and at each management level affecting the organization, including Omaha Public Power District corporate personnel. The team also assessed safety culture-related behaviors during observations of site meetings.

Human Performance: Decision-Making [H.1(c)]

The licensee communicates decisions and the basis for decisions to personnel who have a need to know the information in order to perform work safely, in a timely manner.

Though there have been major changes in the management at FCS, there was a perception that some of the managers in various levels were still learning that the changes in the organizations require everyone to make conservative decisions. There was a perception site wide that there was more information given site wide than previously, and that overall, decision-making was more conservative than before.

Management communicates to the site the decisions and their basis through red or yellow communications. The quality of the communications concerning the decisions that are made was not consistent across the entire organization. There was a perception within some departments that snap judgments were made, and that information on management decisions made was not always clear to the individuals on site as it pertains to their job duty. Across the organization, it was repeated that the basis for decisions which affect the daily duties of individuals was because it was part of the Exelon model without any further technical basis

or explanation of how it addresses any safety aspect of the job function. Individuals were not often given enough high level information (or plan) so that they had the proper perspective on their tasks, such that, they can focus on the task at hand or give pertinent feedback into the process. For example, there was a perception that individuals who were not supervisors do not have a good understanding of the Integrated Performance Improvement Plan (IPIP). The IPIP was communicated weekly at alignment meetings and integration plans were communicated at the supervisor level. However, due to the complexity and high level nature of the communications it does not relate to how the individual can relate the general aspects of the plan to their daily tasks.

Human Performance: Work Control [H.3(b)]

The licensee appropriately coordinates work activities by incorporating actions to address:

(a) The impact of changes to the work scope or activity on the plant and human performance,

(b) The impact of the work on different job activities, and the need for work groups to maintain interfaces with offsite organizations, and communicate, coordinate, and cooperate with each other during activities in which interdepartmental coordination is necessary to assure plant and human performance,

(c) The need to keep personnel apprised of work status, the operational impact of work activities, and plant conditions that may affect work activities,

(d) The licensee plans work activities to support long-term equipment reliability by limiting temporary modifications, operator workarounds, safety systems unavailability, and reliance on manual actions. Maintenance scheduling is more preventive than reactive.

The team identified the coordination of work activities was identified as a pervasive weakness during inspection activities. The work planning process was repeatedly cited as a problem area across organization in various departments and on every level of the organization during the focus groups and interviews. Concerning the coordination of work between the engineering department and the work planning organization, there existed a lack of clear delineation of roles and responsibilities. During the inspection it was apparent that the work planning organization had differing perception of the process of work planning and the quality of work packages than other organizations at FCS. The planners expressed the perception of being blamed for many of the issues with emergent work on site. The effectiveness of the work control process as perceived by the planners was dependent on the specific planner, the process this individual used, and which supervisor was involved in the development of the work packages. This created a lack of continuity in the process and varies the quality of work

packages. There was not a general understanding among the various departments concerning the requirements that planners have when developing packages regarding the approvals, plans, and specifics that need to be in place. This has a direct effect on the perception of the timeliness of work packages developed. The personnel interviewed in maintenance and engineering departments indicated that the quality of the work packages were not consistently adequate. The issues with work control affected the entire site, in that; the package quality added a greater workload on engineering personnel who perceived the re-writing of the packages as outside of the scope of work. This workload also was overwhelming the many new and unqualified workers. The continuous flow of emergent work due to the extended outage status has resulted in packages that were prepared without the proper time dedicated to creating an adequate and complete work package. There was an overall perception of a lack of proper planning for work performed on a daily basis in the maintenance and security departments. These workers come to work and were informed what work would be done on a day to day basis without routinely having work schedules ahead of time.

Individuals interviewed indicated that the lack of proper advance planning, and the overwhelming amount of work remaining to be done due to the prolonged outage configuration, was contributing to a lack of evidence of improvement site wide, though changes have been made. Although management was recently changed to improve the flow of information regarding planning, there remains a perception that changes to daily work plans were made on the spot without proper consideration. Additionally, there was apparent confusion concerning which information was included in WOs as opposed to including the information in procedures. Specifically, there were procedural issues in maintenance due the use of vendor procedures not matching the equipment in use. Changes to procedures were driven by entries into the CAP which included information moving from the WOs to procedures.

There was an existence for a long time that FCS was isolated from the rest of the industry, and there were also silos within the site organization, such that, the communication between organizations was less than adequate with respect to what each organization did. This was especially the case with security, and coordination between departments linked to the work planning issues.

Problem Identification and Resolution: Corrective Action Program [P.1(b) and P.1(d)]

The licensee periodically trends and assesses information from the CAP and other assessments in the aggregate to identify programmatic and common cause problems. The licensee communicates the results of the trending to applicable personnel. [P.1(b)]

The licensee takes appropriate corrective actions to address safety issues and adverse trends in a timely manner, commensurate with their safety significance and complexity. [P.1(d)]

The team determined that the number of condition reports was astounding, such that, FCS personnel expressed during various interviews that they were inundated with the high number. The perception was that there were single individuals who generated a high number of condition reports (sometimes repetitive) that burdened the station. The individuals assigned the condition reports have other duties, and considering the backlog, they were perceived as being overwhelmed. Site personnel expressed that there was a general feeling of being unprepared to address the increased number of condition reports. Some departments don't get the trends associated with the condition reports they generate. The interface with looking for particular issues on the CAP system was perceived to be difficult.

There were specific issues with the CAP in the work planning department. This was singled out because of the work control issues at FCS.

- Not enough research into subjects before condition reports were written
- Not enough people to answer them
- System was so inundated right now that addressing the issues were not timely
- Condition Reports either come back to the individual who generated them, or the corresponding supervisor

Safety Conscious Work Environment [S]

Environment for Raising Concerns - An environment exists in which employees feel free to raise concerns both to their management and/or the NRC without fear of retaliation and employees are encouraged to raise such concerns.

Preventing, Detecting, and Mitigating Perceptions of Retaliation - A policy for prohibiting harassment and retaliation for raising nuclear safety concerns exists and is consistently enforced

The team determined that while there was not a site wide safety conscious work environment (SCWE) issue, there existed a specific issue with individuals raising safety concerns without fear of retaliation in security. Individuals would raise safety concerns; however, there was a perception that when they did raise concerns certain members of management would retaliate. There was a perception that retaliation would be tolerated in the way of being berated by members of security management. The team noted that the licensee was aware of this specific concern and was in the process of taking corrective actions to address the perception issue.

Other: Continuous Learning Environment [O.2(a) and O.2(b)]

The licensee ensures that a learning environment exists. Specifically (as applicable):

> *The licensee provides adequate training and knowledge transfer to all personnel on site to ensure technical competency. [O.2(a)]*
>
> *Personnel continuously strive to improve their knowledge, skills, and safety performance through activities such as benchmarking, being receptive to feedback, and setting performance goals. The licensee effectively communicates information learned from internal and external sources about industry and plant issues. [O.2(b)]*

There was a site wide perception that qualifications were more important than training. This was a perception that appeared to remain at FCS and had existed over a long period of time prior to recent management changes. The qualification process did not allow any individuals from outside of FCS to gain any equivalency credit towards qualifications. This contributed to the perception that the qualification process was overly arduous. Specifically, in the maintenance department, there was the perception that formal classroom training to develop a technical foundation to accompany the on the job training was lacking. The extended outage of the plant has had a limiting effect on how much various individuals on site can learn and gain technical qualifications. Many newer FCS personnel have not seen the plant up and running and have not had the opportunity to learn in the various modes of operation. These factors contributed to the lack of qualified individuals in various departments, including engineering and maintenance.

The team identified a weakness in knowledge transfer due to the high turnover from retirement and many skilled individuals leaving the station. A formal knowledge transfer process is not known site wide. There was also the perception that because of the mass departure of highly skilled individuals, management was unable to take the opportunity for knowledge transfer, such that, there were many inadequately trained individuals on site.

The team determined that while benchmarking and internal and external operating experience practices were increasing in various site organizations and departments, this was an area of weakness in the security department.

Other: Organizational Change Management [O.3]

Management uses a systematic process for planning, coordinating, and evaluating the safety impacts of decisions related to major changes in organizational structures and functions, leadership, policies, programs, procedures, and resources. Management effectively communicates such changes to affected personnel.

Many programmatic changes have been made recently in preparation for the implementation of Exelon policies and procedures. Through interviews and focus groups, it was determined that there were many instances of technical and organizational changes that were implemented, however, the perception from FCS personnel was that they were not involved in determining the safety impacts of the changes made to organizational structures, functions, policies, and procedures. Additionally, when the changes were made, the process of communicating the changes to FCS personnel was not consistent across departments and shifts. Individuals said that though the upper management's presence in the field had improved, the communications were not repeated to cover all shifts and individuals. Many times when the changes were communicated, the technical basis or logistic basis was not shared with the affected personnel.

General Observations

The team identified many issues that were the result of previous weaknesses in site safety culture. The team also observed the actions taken to address the corresponding safety culture components. The actions observed were only taken recently; therefore, the team was unable to determine if the actions contributed to improvements in the safety culture.

Previously, the security guard force did not fully participate in the CAP by initiating condition reports. It appears that changes in management and providing the guard force with safety messages and CAP training has stimulated an increase in the generation of condition reports by security personnel. However, it was not clear at the end of this inspection whether this level of CAP participation would continue.

The site has started using CAP coordinators as benchmarked at other sites. The team also observed that condition reports coded with safety culture are reviewed by a team. These issues are also vetted and evaluated by the site Nuclear Safety Culture Monitoring Panel (NSCMP). The team observed the process during one of the monitoring panel meetings during the inspection. The team observed that the process was orderly and thorough in addressing the identified issues.

The team determined through the results from the safety culture focus groups conducted by FCS human resource staff, the focus groups conducted by the team, the results of the Conger and Elsea assessment, and the results of the pulse surveys administered at FCS, that there does appear to be improvement in the employees' perception of the safety culture at FCS. Though a direct comparison between the Conger & Elsea assessment and the results of the pulse surveys was not possible, the averages for the SCWE questions on the pulse surveys show a slight, increasing trend. Though this trend was not statistically significant, the changes in management at the site specifically appear to have had a profound effect on site personnel. Individuals expressed more

confidence in their management, perceived a greater emphasis on safety, and saw more consistency in how employees were held accountable for their actions.

The team reviewed the RCA associated with SCWE, as documented in Condition Report CR 2012-04262 from July 2012. The team also compared the completed corrective actions with the results from the focus group interviews to determine whether the corrective actions appeared effective in addressing SCWE issues at FCS. The team determined that the RCA appropriately identified the root and contributing causes related to SCWE issues at FCS. It also appeared that the evaluation appropriately considered the extent of condition and extent of cause, and incorporated both internal and external operating experience. Corrective actions implemented as a result of this RCA included:

- Creation of a SCWE metric that will be monitored and trended on a regular basis
- Institution of "Compliments and Concerns" feedback meetings between senior leadership and staff
- Improvements to the Employee Concerns Program and implementation of a Differing Professional Opinion program
- SCWE training for all employees

The team concluded that these corrective actions appeared to address the deficiencies identified in the cause evaluation. Additionally, input from focus groups conducted by the team confirmed that these actions have been effective in improving the SCWE at the station.

Based on information the safety culture team gleaned during interviews and focus groups, one major flaw in the pre-Exelon model of the ECP was a lack of trust in the ECP representative's perceived ability to maintain confidentiality. This was due to the fact that the ECP representative's father was employed as a supervisor at the station. However, since the Exelon management contract was implemented, the former ECP representative has been replaced and the management team has assigned two individuals from the Nuclear Oversight Organization to serve as representatives. During the focus group interviews, the team observed that the two new ECP representatives were well liked and site personnel seemed to be more trusting of the program.

The team reviewed a representative sampling of ECP files. Employee Concerns Program files that were initiated prior to the implementation of the Exelon operating agreement were incomplete and failed to provide a complete history of reported cases. This lack of documentation made it difficult to determine if, and how, cases were resolved. In comparison, ECP files reviewed that were initiated after the Exelon agreement was in place were complete, included adequate documentation to reconstruct events, and allowed the reviewer to more easily determine the disposition of each case.

In sum, the licensee appeared to be addressing the ECP shortfalls that existed prior to the implementation of the Exelon operating agreement. Documentation reviewed interviews with individuals and with focus groups, and observations of ECP-related meetings, as well as visible ECP postings throughout plants, indicated that the ECP is making significant progress toward establishing an effective ECP that is comparable to successful programs within the industry.

b. Fundamental Performance Deficiency Review

The licensee initiated Condition Report CR 2012-04262 to, "Document the results of the Independent Nuclear Safety Culture Assessment completed by Conger & Elsea." That assessment identified the following four Areas for Improvement (AFIs):

AFI #1- Human Performance: "Leadership behavior that demonstrates the ability to develop a strategic vision and path forward for the Station, to make decisions consistent with that vision, to engage the workforce, and clearly communicate the expectations and standards around that vision is needed."

AFI #2 - Problem Identification and Resolution: "Performance Improvement overall, and the CAP in particular, at the Fort Calhoun Station needs to be reassessed and realigned to ensure that all employees understand its value and priority in enhancing performance. In particular, the roles and expected behaviors of Management with respect to the CAP need to be clearly communicated and reinforced."

AFI #3-Safety Conscious Work Environment: "Fort Calhoun Management needs to evaluate what behaviors can be used to create an environment where beneficial challenging, a healthy questioning attitude, and the reporting of concerns can be accepted, supported and desired. Efforts to erase the perceptions of fear around potential punishment will have to be made to provide a better foundation from which the appropriate behaviors can be effectively achieved."

AFI #4- Other Safety Culture Components: "Fort Calhoun needs to ensure that any accountability model that is used is consistently implemented against clearly communicated and prioritized standards and expectations, that recognizes and reinforces desired behaviors and uses effective coaching, minimizing punitive actions, for undesirable behaviors. This process needs to be formalized and clearly understood by all personnel."

In Condition Report CR 2012-04262, the licensee stated that Condition Report 2012-04262 addresses AFI #3 only. They also stated that they were addressing AFI #1 and AFI #4 in the Organizational Effectiveness root-cause analysis (Condition Report CR 2012-03986, associated with restart checklist item 1.f, discussed below), and that they were addressing AFI #2 in the Problem Identification & Resolution Culture RCA (Condition Report CR 2011-10135, associated with restart checklist item 3.a, discussed in Section 3).

As noted above, the licensee did not determine an extent of condition or extent of cause associated with the FPD associated with Nuclear Safety Culture. Instead, they determined extents of condition and extents of causes associated with the FPD associated with Organizational Effectiveness, Safety Conscious Work Environment, and Problem Identification & Resolution Culture.

As noted above, the licensee did not develop corrective actions to address the FPD associated with Nuclear Safety Culture. Instead, they developed corrective actions to address the FPDs associated with Organizational Effectiveness, Safety Conscious Work Environment, and Problem Identification & Resolution Culture.

Determine that the problem was evaluated using a systematic methodology to identify the root and contributing causes.

The team determined that the licensee evaluated this problem using systematic methodology to identify the root and contributing causes. Specifically, the methods used included events and causal factors charting, barrier analysis and management oversight and risk tree analytical techniques. Also, the licensee determined that the MORT analysis and the associated SCWE timeline used for the Organizational Effectiveness RCA (Condition Report CR 2012-03986; discussed below with respect to restart checklist item 1.f) were applicable to the SCWE condition. Using these methods, the licensee identified the following root causes:

- *RC-1: Inadequate program oversight, and shortfalls in communicating standards for the FCS SCWE by station leadership has resulted in erosion of trust in management's ability to effectively implement the core components (CAP, employee concerns program, willingness to raise concerns and prevention of retaliation) of a healthy SCWE.*

- *RC-2: In certain cases, station leaders have exhibited inappropriate behaviors creating a chilled work environment by discouraging employees from writing Condition Reports, minimizing discussion when dissenting opinions were raised and responding in an untimely manner to identified concerns.*

The licensee also identified the following contributing causes:

- *CC-1: Station leadership has not effectively monitored Employee Concerns Program implementation.*

- *CC-2: Station leadership has not appropriately acted on or communicated the lessons learned from the 2010 and 2012 independent nuclear safety culture assessments. As a result employees have not been provided with information that helps them understand the reasons for the current nuclear safety culture and SCWE at the station.*

- *CC-3: Station personnel are not provided adequate training to ensure they have a complete understanding of the significance of maintaining a strong*

nuclear safety culture and SCWE. In addition, personnel who do not require protected area access are not provided training on SCWE prior to starting work at the station.

Determine that the root cause evaluation was conducted to a level of detail commensurate with the significance of the problem.

The RCA was conducted to a level of detail commensurate with the significance of the problem. Specifically, the root-cause team reviewed the 2012 Independent Safety Culture Assessment and associated SCWE guidance information including station procedures, NRC, INPO, and NEI documents. The team constructed a model of employee issue reporting, and reviewed each reporting method for indications of issues. They also constructed a timeline of events related to SCWE, and interviewed individuals in the departments identified as having significant issues by the 2012 Independent Safety Culture Assessment, including Security, Engineering, and Work Management. Furthermore, the licensee compared issues identified using the evaluation methods described above to the activities described in NRC Regulatory Issue Summary 2005-18, "Guidance for Establishing and Maintaining a Safety Conscious Work Environment," and by completing a barrier analysis of certain activities described in that regulatory issue summary, the licensee identified barriers that had failed.

Determine that the root cause evaluation included a consideration of prior occurrences of the problem and knowledge of prior operating experience.

The team determined that the RCA included a consideration of prior occurrences of the problem and knowledge of prior operating experience. Specifically, the licensee's evaluation included consideration of 11 relevant internal condition reports selected from the date range from 2005 to present. It also included searches of the NRC and INPO websites that identified five external sites that had experienced related to SCWE. The licensee's evaluation considered not only those experiences, but also the corrective actions used to address them. Incidentally, the number of internal and external events and the depth of actions available from external operational experience raised the question of why more preventive actions had not been taken. To address that question, the licensee initiated Condition Report CR 2012-04361, "Ineffective Use of Operating Experience."

Determine that the root cause evaluation addressed the extent of condition and the extent of cause of the problem.

The licensee explicitly addressed the extent of condition in the referenced Section F. Specifically, in that section, the licensee stated, in part,

"*The extent of condition evaluation was bounded by those plant processes, equipment operation or maintenance activities, and overall human performance activities where an environment of beneficial challenging, healthy questioning attitude, and the reporting of concerns was not effectively accepted, supported, and desired."*

The licensee concluded that,

> "*The condition evaluated by this root cause analysis crossed organizational/functional area boundaries and extends to plant processes and departments throughout the organization."*

The team considered that these statements describe an appropriate extent of condition for the FPD associated with Safety Conscious Work Environment.

The evaluation also stated that the extent of condition was bounded by Condition Report CR 2012-03986, the RCA for Organizational Ineffectiveness. (See restart checklist item 1.f below)

The licensee explicitly addressed the extent of cause in the referenced Section G. Specifically:

- With respect to extent of cause for RC-1, the licensee's evaluation report stated, "*Due to the pervasiveness and magnitude of issues related to this root cause there is not an organizational level or departmental organization responsible for plant processes, equipment operation, maintenance activities or human performance at FCS that is not impacted by this cause."*

- With respect to extent of cause for RC-2, the licensee's evaluation report stated, "*Through team analysis of the 2012 Independent Safety Culture Assessment, interviews of station personnel and documents reviews related to RC-2 described in this report, in certain cases, station leaders responsible for plant processes, equipment operation, maintenance activities or human performance have exhibited inappropriate behaviors creating a chilled work environment by discouraging employees from writing Condition Reports, minimizing discussion when dissenting opinions were raised and responding in an untimely manner to identified concerns."* The licensee's report also asserted that they had identified a similar set of behaviors in Condition Report CR 2012-03986 (the RCA for Organizational Ineffectiveness; see restart checklist item 1.f below)

The team considered that these statements describe appropriate extents of cause for the root causes of the FPD associated with Safety Conscious Work Environment.

<u>Determine that the root cause, extent of condition, and extent of cause evaluations appropriately considered the safety culture components as described in IMC 0310.</u>

The root cause, extent of condition, and extent of cause evaluations appropriately considered the safety culture components as described in IMC 0310. Specifically, the licensee documented their consideration of the IMC 0310 cross-cutting aspects in Attachment 15 of RCA 2012-04262. Incidentally, Attachment 15 showed that they found that every cross-cutting aspect was applicable, except P.1(a) and S.2(b).

Determine that appropriate corrective actions are specified for each root and contributing cause.

The team determined that appropriate corrective actions were specified for each root and contributing cause. Specifically,

- In corrective action #1 (CA 1, implemented via Action Item Condition Report CR 2012-04262-021), the licensee created monthly metrics to measure and monitor SCWE program effectiveness, via a survey that the licensee administers to the site population every month, beginning in September, 2012. (They administer the survey to a different 1/6 of the site population each month, such that over a six-month period, they survey everyone on site once.)

  The team considered that the subject survey and the corresponding administration plan was an appropriate method for the licensee to assess the attitudes and beliefs of the site population. However, for this corrective action:

  - The team noted that the licensee had developed and promulgated observations based on differences between successive survey results without accounting for the confidence intervals (uncertainties) that were necessarily associated with those results. In response to the team' observation, the licensee re-analyzed their data and revised their observations accordingly. Furthermore, in the future, they stated that they will base observations on three-month-rolling averages of survey data (and thereby take advantage of a much better confidence interval) instead of monthly survey data.

  - The team noted that relatively frequent survey administration can lead to "survey fatigue," which could result in lower response rates. Through questioning the licensee, the team learned that although they will be readily able to note lower response rates, they have only vague plans for how they will improve response rates if they do lower.

- For RC-1 (involving inadequate program oversight and shortfalls in communicating standards by FCS leadership), the licensee specified the following corrective actions to prevent recurrence (CAPRs):

  - *CAPR-1: Use the metrics created in CA1 during MRM, Nuclear Safety Culture Monitoring Panel, Senior Leadership Team, and Safety Audit and Review Committee (SARC) meetings to identify and correct adverse SCWE trends.*

  - *CAPR-2: Implement facilitated small group multi-discipline employee feedback meetings to identify and prioritize site issues for management action.*

The team considered that these actions alone were not adequate to address RC-1. However, the team noted that the licensee's evaluation had stated that the Organizational Effectiveness RCA documented in Condition Report CR 2012-00386 had determined that the failure to effectively implement processes and procedures was due to inadequate oversight and minimal accountability. The team, therefore, considered that corrective actions specified in Condition Report CR 2012-00386 to address the failure to effectively implement processes and procedures would also address RC-1 in Condition Report CR 2012-04262. Thus, when supplemented by corrective actions specified in Condition Report CR 2012-00386, the team considered CAPR-1 and CAPR-2 specified above to be adequate.

- For RC-2 (involving certain FCS leaders exhibiting inappropriate behaviors), the licensee specified one corrective action to prevent recurrence, and designated it *CAPR-3: Develop and conduct training that … focuses on the role of supervisors and managers in ensuring that a healthy nuclear safety culture and SCWE is maintained.*

  The licensee developed this training via Action Item Condition Report CR 2012-04262-029. The team' review of the resulting training material verified that the material tells supervisors and managers what they must do to establish and maintain a healthy nuclear safety culture and SCWE, and that the licensee had incorporated the material into their recurring-training program via MGT 12-10, "Safety Conscious Work Environment."

  Because CAPR-3 provided training on the role of supervisors and managers but did not hold supervisors and managers accountable to the role described in the training, the team considered that CAPR-3 alone was not adequate to address RC-2. However, in RCA 2012-04262 and regarding RC-2, the licensee stated, in part,

  > *"A similar set of behaviors were identified in Condition Report CR 2012-03986; Organizational Ineffectiveness, RC-2, which states; Station leaders are more tactical than strategic, prioritize poorly, delegate little, surrender oversight, rationalize low standards and hesitate to hold personnel accountable, resulting in a culture that values harmony and loyalties over standards, accountability and performance. This root cause is an outcome of the RC-2 from RCA Condition Report CR 2012-03896 Organizational Ineffectiveness and is bounded by that analysis."*

  Therefore, because RC-2 in Condition Report CR 2012-04262 and RC-2 in Condition Report CR 2012-03896 both describe essentially the same problem, CAPR-3 that addresses RC-2 in Condition Report CR 2012-04262 is not stand-alone, but is supplemented by the corrective actions associated with RC-2 in Condition Report CR 2012-03896.

As discussed below with respect to restart checklist item 1.f, the team considered that CAPR-2 and CA-8 through CA-12 as specified in Condition Report CR 2012-03896 were appropriate to address RC-2 in Condition Report CR 2012-03896. Those corrective actions, supplemented by CAPR-3 in Condition Report CR 2012-04262, are therefore appropriate to address RC-2 in Condition Report CR 2012-04262.

- For CC-1 (involving FCS leadership's failure to effectively monitor Employee Concerns Program implementation), the licensee specified the following corrective actions:

  - *CA-2: Address the record keeping deficiencies identified in the IACPD report regarding ECP activities.*

  - *CA-3: Change the reporting relationship of the ECP Coordinator to a level of the organization commensurate with the importance of the program and to ensure confidentiality.*

  - *CA-4: Provide a backup ECP program contact so employees who are uncomfortable with the primary contact have an alternative to raise nuclear safety concerns.*

  - *CA-5: Improve the station advertising of the ECP and contact options…*

  The team considered these corrective actions adequate to address CC-1.

- For CC-2 (involving FCS leadership not appropriately acting on or communicating lessons learned from the 2010 and 2012 independent nuclear safety culture assessments), the licensee specified the following corrective action:

  - *CA-6: Communicate the lessons learned from the outcomes of the 2010 and 2012 safety culture assessments and the path forward. Target population is station and supplemental employees.*

  The team considered this corrective action adequate to address CC-2.

- For CC-3 (involving the failure to provide FCS personnel adequate training to ensure they have a complete understanding of the significance of maintaining a strong nuclear safety culture and SCWE), the licensee specified the following corrective actions:

  - *CA-12: Develop and conduct training … [to] ensure current and future employees, and selected supplemental personnel are knowledgeable on the aspects of a strong nuclear safety culture and SCWE.*

  The team considered this corrective action adequate to address CC-3.

Determine that a schedule has been established for implementing and completing the corrective actions.

A schedule has been established for implementing and completing the corrective actions. The team found that by the time of this inspection, the only action items in Condition Report CR 2012-04262 which the licensee had not closed were the following:

- Condition Report CR 2012-04262-056 AI (an effectiveness review), "Self-assessment determines overall improving trend in SCWE metrics," due May 17, 2013

- Condition Report CR 2012-04262-057 AI (an effectiveness review), "Independent assessment confirms FCS SCWE meets or exceeds industry standards," due September 30, 2013

The team considered this schedule appropriate for completing effectiveness reviews.

Determine that quantitative or qualitative measures of success have been developed for determining the effectiveness of the corrective actions to prevent recurrence.

Quantitative or qualitative measures of success have been developed for determining the effectiveness of the corrective actions to prevent recurrence. Specifically, as stated above,

- Via Action Item Condition Report CR 2012-04262-021, the licensee created monthly metrics to measure and monitor SCWE program effectiveness, via a survey that the licensee administers to 1/6 of the site population every month, beginning in September, 2012.

- Via Action Items Condition Report CR 2012-04262-056 & Condition Report CR 2012-04262-057, the licensee has scheduled assessments to quantitatively confirm an overall improving trend in SCWE metrics, and that the FCS SCWE meets or exceeds industry standards, respectively.

The team considered these measures appropriate for determining the effectiveness of the corrective actions to prevent recurrence. In particular, the monthly survey essentially provides the licensee with an ongoing quantitative measure of the effectiveness of their corrective actions.

(3) Assessment Results

a. The team concluded that the third-party assessment was comprehensive, the methods used by Conger and Elsea were acceptable, and that the licensee's actions to communicate the results to the various levels of staff and management were adequate. Based upon observations gathered from the NRC's graded safety culture assessment, the licensee has taken actions to address the issues identified in the

assessment that should be sufficient to address the identified issue. Therefore, restart items 1.e.1-5 will be closed.

b. The team concluded that for Nuclear Safety Culture and Safety Conscience Work Environment FPDs, evaluated through Condition Report CR 2012-04262 and the FPDs for Organizational Effectiveness and Problem Identification & Resolution Culture: the root and contributing causes of risk-significant issues were understood; the extent-of-condition and extent-of-cause of risk-significant issues were identified; and, the licensee's corrective actions for risk-significant performance issues were, or will be, sufficient to address the root and contributing causes and to preclude repetition, therefore, restart checklist items 1.e.6-11 will be closed.

Item 1.f: Integrated Organizational Effectiveness Assessment

(1) Inspection Scope

The team reviewed the licensee's assessments, including the RCA, of organizational effectiveness and any connections to safety culture insights (from CL Item 1.e). The team assessed whether proper corrective actions were established and incorporated to resolve organizational effectiveness issues that adversely affected station performance. (CL Items 1.f.1; 1.f.2; 1.f.3; 1.f.4; 1.f.5)

The team reviewed the licensee's assessment of the FPD associated with Leadership/Organizational Effectiveness. Specifically, the team assessed Condition Report CR 2012-03986, for which the "Description" section said, in part,

> *"Senior leaders and managers are not providing the necessary leadership to improve organizational performance. Additionally, leadership has failed to be intrusive, set the right priorities, and hold personnel accountable and understand major processes or issues affecting morale. As a result, timeliness and thoroughness of resolution of important issues has been lacking and station performance has declined significantly."*

The team also assessed the adequacy of the extent of condition, extent of causes, and corrective actions. (CL Items 1.f.6; 1.f.7; 1.f.8)

The team's assessment of this FPD was based on the evaluation criteria from Section 02.02 of NRC Inspection Procedure 95001 which align with this item. The inspection objectives were to:

- Provide assurance that the root and contributing causes of risk-significant issues were understood
- Provide assurance that the extent-of-condition and extent-of-cause of risk-significant issues were identified

- Provide assurance that the licensee's corrective actions for risk-significant performance issues were, or will be, sufficient to address the root and contributing causes and to preclude repetition

(2) Observations and Findings

Determine that the problem was evaluated using a systematic methodology to identify the root and contributing causes.

The licensee evaluated this problem using systematic methodology to identify the root and contributing causes. Specifically, the RCA described in Condition Report CR 2012-03986 included events and causal factors charting, barrier analysis, and management oversight and risk tree analytical techniques. In conversations with the team, team members described how they applied those techniques. They also prepared and analyzed a timeline of events that showed a decline in organizational effectiveness from March 26, 2007, through May 15, 2012.

The subject analyses identified the following root causes:

- *RC-1: The OPPD organization failed to establish and implement the essential attributes of governance and oversight, including the key elements of individual roles, responsibilities, and accountabilities to enable FCS to achieve and maintain high levels of operational nuclear safety and reliability.*

- *RC-2: Station leaders are more tactical than strategic, prioritize poorly, delegate little, surrender oversight, rationalize low standards and hesitate to hold personnel accountable, resulting in a culture that values harmony and loyalties over standards, accountability and performance.*

- *RC-3: The FCS leaders failed to develop, implement, and hold people accountable for implementation of important policies and programs, to achieve organizational effectiveness.*

With respect to these root causes, the licensee's evaluation of the MORT Safety Culture Supplement identified a weakness in all areas and components of Safety Culture.

The subject analyses also identified the following contributing causes:

- *CC-1: The principles and attributes for a strong nuclear safety culture are not rigorously applied at FCS.*

- *CC-2: The station leadership team does not consistently implement the FCS Change Management Policy to maintain trust in the organization.*

- *CC-3: The implementation of the FCS communication policy is less than adequate to build trust and reinforce a healthy safety culture.*

The team considered that these root and contributing causes reasonably explain why senior leaders and managers had not provided the necessary leadership to improve organizational performance.

Determine that the root cause evaluation was conducted to a level of detail commensurate with the significance of the problem.

The team determined that the RCA was conducted to a level of detail commensurate with the significance of the problem. Specifically, according to the "Analysis and Cause Determination" section of Condition Report CR 2012-03986 and conversations the team conducted with involved staff members, the analyses included:

- Completing nine observations involving management meetings, staff meetings, Management Review Boards, and shift manager weekend calls

- Reviewing 118 documents including procedures, condition reports, Technical Specifications, USAR, Standing Orders, internal and external Operating Experience, Institute of Nuclear Power Operations assist visit documentation, Institute of Nuclear Power Operations Assessment documentation, [World Association of Nuclear Operators] report documents, Safety Audit and Review Committee report documents, and NRC inspection documentation

- Conducting 19 interviews with key individuals within and outside the organization

Determine that the root cause evaluation included a consideration of prior occurrences of the problem and knowledge of prior operating experience.

The team determined that the RCA included a consideration of prior occurrences of the problem and knowledge of prior operating experience. Specifically,

- With respect to internal operating experience, the analyses described in Condition Report CR 2012-03986 included searching the CAP database over a date range from May 1, 2009, to May 1, 2012, and identifying and reviewing five condition reports the team determined to be noteworthy with respect to their investigation.

- With respect to external operating experience, the team identified and reviewed the experiences at four sites that were relevant to their investigation. Those sites included San Onofre Nuclear Generating Station in 2010, H.B. Robinson in 2010, H.B. Robinson in 2011, and Vogtle in 2011.

Determine that the root cause evaluation addressed the extent of condition and the extent of cause of the problem.

The RCA addressed the extent of condition and the extent of cause of the problem. Specifically:

- With respect to the extent of condition, the "Extent of Condition" section of the root-cause analysis report attached to Action Item 2012-03986-001 says, in part, "*The team concluded the organizational effectiveness deficiencies reviewed by this causal analysis extend to those programs, processes, and departments throughout the organization."*

- With respect to the extent of cause of RC-1, the "Extent of Cause" section of the subject report says, in part, "*Due to the pervasiveness and magnitude of issues related to this root cause there is not an organizational level or departmental organization at FCS that is not impacted by the cause."*

- With respect to the extent of cause of RC-2, the "Extent of Cause" section of the subject report says, in part, "*Through team interviews, document reviews and observations made related to this root cause that station leaders value harmony and loyalties over standards, accountability and performance extends to all leadership levels of the organization. The Strategic Talent Solutions (STS) Leadership assessment also validates this root cause."*

- With respect to the extent of cause of RC-3, the "Extent of Cause" section of the subject report says, in part, "*The key organizational effectiveness programs reviewed by this analysis were ineffectively implemented."*

The team concluded that these statements described an appropriate extent of condition and appropriate extent of cause for the root causes of the FPD associated with Leadership/Organizational Effectiveness.

Determine that the root cause, extent of condition, and extent of cause evaluations appropriately considered the safety culture components as described in IMC 0310.

The root cause, extent of condition, and extent of cause evaluations appropriately considered the safety culture components as described in IMC 0310. Specifically, the licensee documented their consideration of the IMC 0310 cross-cutting aspects in Attachment 5 of RCA 2012-03986. The licensee found that every cross-cutting aspect was applicable, except for P.1(a) and S.2(b).

Determine that appropriate corrective actions are specified for each root and contributing cause.

The team determined that generally the licensee's proposed corrective actions were appropriate to address the root and contributing causes identified, with the following exception:

- For CC-1: (involving not rigorously applying the principles and attributes for a strong nuclear safety culture), the licensee specified *CA17 - Revise NPM-*

1.00, Nuclear Safety, to require safety culture metrics and use of INPO's Principles for a Strong Nuclear Safety Culture as guiding principles for improving performance and nuclear safety margin. (The subject metrics are discussed above with respect to restart checklist item 1.e)

Because NPM-100 is a policy manual and does not itself direct any work activities, and because only one implementing procedure referenced NPM-100, the team considered that CA17 alone was not adequate to require the staff to use INPO's Principles for a Strong Nuclear Safety Culture as guiding principles for conducting activities onsite. In response to the team' challenge on this matter, the licensee initiated Condition Report CR 2013-05663, to extend this corrective action into implementing procedures for improving performance and nuclear safety.

Determine that a schedule has been established for implementing and completing the corrective actions.

The team determined that a schedule has been established for implementing and completing the corrective actions. The team found that by the time of this inspection, the only action item in CR 2012-03986 which the licensee had not closed was the following:

Condition Report CR 2012-03986-049 (an Effectiveness Review): "Assess if the Nuclear Safety Culture Monitoring Panel and Corporate Nuclear Oversight policies have been appropriately developed and effectively implemented and leaders are holding themselves accountable to the policies," due August 15, 2013.

Determine that quantitative or qualitative measures of success have been developed for determining the effectiveness of the corrective actions to prevent recurrence.

The team determined that quantitative or qualitative measures of success have been developed for determining the effectiveness of the corrective actions to prevent recurrence. Specifically, as stated above, Condition Report CR 2012-03986-049 described a qualitative measure of success for determining the effectiveness of the corrective actions to prevent recurrence, and is due on August 15, 2013.

(3) Assessment Results

The team concluded that for the Integrated Organizational Effectiveness assessment and the Leadership/Organizational Effectiveness FPD: the root and contributing causes of risk-significant issues were understood; the extent-of-condition and extent-of-cause of risk-significant issues were identified; and, the licensee's corrective actions for risk-significant performance issues were, or will be, sufficient to address the root and contributing causes and to preclude repetition, therefore, restart checklist item 1.f will be closed.

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

Section 2 of the Restart Checklist contains those items necessary to ensure that important structures, systems, and components affected by the flood and safety significant structures, systems, and components at FCS are in appropriate condition to support safe restart and continued safe plant operation. Section 2 reviews will also include an assessment of how the licensee appropriately addressed the NRC Inspection Procedure 95003 key attributes as described in Section 5.

Item 2.b: System Readiness for Restart Following Extended Plant 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 ensure that the structures, systems, and components are ready for plant restart and they conform to the appropriate licensing and design bases requirements.

.1 System Health Reviews

(1) Inspection Scope

The team assessed whether the licensee identified an adequate scope associated with the system heath reviews for the auxiliary feedwater (AFW), emergency core cooling, and emergency diesel generator systems. The team performed this limited review since all of the information necessary to fully assess this area was not ready for review by the time of this inspection. (CL Items 2.b.1.2; 2.b.1.6; 2.b.1.13)

(2) Observations and Findings

The team reviewed the completed system health readiness reviews for the AFW, emergency core cooling, and emergency diesel generator systems. The team compared the scope of issues identified with the criteria established in Procedure FCSG-65-6, “System Health Readiness Reviews for Restart,” Revision 1. In general, the team found the licensee reviews to be complete, and once corrective actions have been implemented, the team determined the review should provide reasonable assurance that the subject systems are capable of performing their required functions. The team noted that the licensee’s review did not identify a recent technical issue involving Ametek inverters and an incompatibility the emergency diesel generator frequency range as documented in Condition Report CR 2013-03943. The team found that the issue should have been identified by the licensee as required by Procedure FCSG-65-6, Step 4.2.3, which required, in part, that the licensee obtain a list of condition reports and review the list to identify closed condition reports related to issues that could potentially (either individually or collectively) prevent the system from performing its maintenance rule function. The team found that previous condition reports documented compatibility issues between the Ametek inverters and the emergency diesel generators when performing engineered safety feature testing. The team found

that the resolution of these condition reports did not correct the technical issue associated with frequency incompatibility between the emergency diesel generators and the Ametek inverters. The team determined this was a non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Actions" which is documented in Section 7 of the report as NCV 05000285/2013008-15, "Failure to Correct Conditions Adverse to Quality Involving Frequency Compatibility Issues in the 120 Vac System."

With regard to prioritization and corrective actions, the team found that the licensee appeared to appropriately identify the required corrective actions and work orders (WOs) necessary for restart. The team did identify that in some cases; the licensee corrective actions to address identified design issues did not directly address the design deficiency but instead, performed an evaluation that justified why the deficiency did not need to be corrected. In many cases, the team identified that the licensee's evaluation was limited in scope and failed to fully evaluate the impact of the technical issue. Specifically, the team identified the following example:

- Condition Report CR 2012-04594 documented the use of non-critical quality element isolation devices used to isolate emergency diesel generators from non-Class 1E electrical loads. The team identified that the licensee's evaluation of this issue failed to account for the impact these loads would have on diesel fuel oil consumption. The team determined this was a non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control" which is documented in Section 7 of the report as NCV 05000285/2013008-16, "Failure to Account for Additional Diesel Loading from Non-Safety Loads."

The team noted that during the inspection, the required restart corrective actions were not completed and that in each of the system health readiness reviews, the licensee concluded that the system was not ready for restart.

(3) Assessment Results

The team concluded that the scope associated with the licensee's system heath readiness reviews for the AFW, emergency core cooling, and emergency diesel generator systems was adequate and in accordance with FCS procedures. However, the team noted that a large number of outstanding corrective actions and WOs remained open for each of the systems reviewed. The team agreed with the licensee's conclusions that AFW, emergency core cooling, and emergency diesel generator system were not ready for restart. Pending completion of the open items identified by the licensee and follow-up assessment by the NRC, restart checklist item 2.b.1 will remain open.

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

(1) Inspection Scope

The team assessed the adequacy for each of the licensee's detailed reviews and selected samples for independent verification that the licensee properly assessed each system. (CL Items 2.b.2.1; 2.b.2.2; 2.b.2.3; 2.b.2.4)

(2) Observations and Findings

The team reviewed the licensee's assessment on the systems using NRC IMC Inspection Procedure 95003 key attribute review as guidance. For each of the licensee's detailed reviews, the team evaluated design, equipment performance, configuration control, and procedure quality to ensure that degraded conditions that could result in risk significant events, or that could challenge the reliability and availability of mitigating systems, were identified and corrected.

In the area of design, the team performed an independent assessment of risk significant design issues to verify system capability to perform intended functions with a sufficient margin of safety. The team's review included the following:

- An assessment of the effectiveness of corrective actions for deficiencies involving design.
- A review of several modifications to the system to determine if the system was capable of functioning as specified by the current design and licensing documents, regulatory requirements, and commitments for the facility.
- A review to determine if the system was operated consistent with the design and licensing documents.
- An evaluation of the interfaces between engineering, plant operations, maintenance, and plant support groups.

The team compared the results of their independent assessment against the licensee's completed review to verify that design issues associated with the subject systems were identified and corrected. In general, the team found that the licensee's review did identify several issues related to design that could challenge system capability. The team noted that the licensee's review was limited to the last five years. The five years scope of data was selected by the licensee to encompass the events leading into the past NRC Inspection Procedure 95002 inspection conducted in 2008. The team was concerned that many design basis document reconstitution issues that were carried open for many years may have been closed without adequate actions. It appeared that many of those old open items were now resurfacing and in many cases, pre-date the 5 year scope established by the licensee. As a specific example that was not captured in the licensee's detailed system review, the team noted that recent LER 2013-003, documented that high pressure safety injection pumps could operate in run-out during a design basis accident. The team noted that this

particular design issue was known as early as 1990 by FCS personnel but never properly corrected.

The team also identified that in some cases; the licensee's corrective actions to address identified design issues did not directly address the design deficiency, but instead, performed an evaluation that justified why the deficiency did not need to be corrected. In many cases, the team identified that the licensee's evaluation of the design issue lacked adequate technical or licensing basis justification for why the issue did not warrant corrective action.

In the area of equipment performance, the team performed an independent assessment to determine if the licensee was adequately maintaining and testing the functional capability of risk significant systems and components. The team's review included the following:

- A review to assess the effectiveness of corrective actions for deficiencies involving equipment performance, including equipment designated for increased monitoring via implementation of the maintenance rule.

- A review to determine if the licensee had effectively implemented programs for control and evaluation of surveillance testing, calibration, and post-maintenance testing.

- A review to assess the operational performance of the selected safety system to verify its capability of performing the intended safety functions.

- A review to assess decision-making regarding longstanding equipment issues (i.e. whether conservative decisions were made and decisions supported long term equipment reliability)

- A review to determine if any unresolved long-term equipment issues exist and to determine whether inadequate resources were a cause or contributed to any inappropriate delay in resolving those issues.

The team compared the results of their independent assessment against the licensee's completed review to verify that equipment performance issues associated with the subject systems were identified and corrected.

The team determined that in some instances the licensee had failed to identify issues. Specifically, the licensee failed to recognize they were not in compliance with the requirements of 10 CFR 50.65. Specifically, the licensee failed to adequately monitor the performance of the 480 Vac buses, instead monitoring had stopped pending implementation of corrective actions. The team identified NCV 05000285/2013008-17, "Failure to Adequately Implement the Maintenance Rule." which is discussed in Section 7 of this report.

In the area of configuration control, the team performed an independent assessment to ensure that risk-significant systems and the principle fission

product barriers were in the configurations which support their safety functions. The team's review included the following:

- Assess the effectiveness of corrective actions for deficiencies involving configuration control.

- Perform a walkdown of the selected system. In addition, if the selected system does not directly have a containment over-pressure safety function (such as containment spray), conduct an additional review of such a system.

- Determine that the work control process uses risk appropriately during planning and scheduling of maintenance and surveillance testing activities and the control of emergent work.

- Determine whether the primary and secondary chemistry control programs adequately control the quality of plant process water to ensure long-term integrity of the reactor coolant pressure boundary.

- Assess the programs and controls (tracking systems) in place for maintaining knowledge of the configuration of the fission product barriers including: containment leakage monitoring and tracking, containment isolation device operability (valves, blank flanges), and reactor coolant leak-rate calculation and monitoring.

- Review the results of the plant specific Individual Plant Examination (IPE) relative to the system(s) selected. Determine if the IPE is being maintained to reflect actual system conditions regarding system capability and reliability.

The team compared the results of their independent assessment against the licensee's completed review to verify that configuration control issues associated with the subject systems were identified and corrected. In general, the team found that the licensee procedures and processes for configuration control were adequate. The team did, however, identify an issue associated with configuration control for the licensee's failure to maintain adequate instructions for restoring temporary modifications, which is documented in Section 7 of this report as NCV 05000285/2013008-18, "Failure to Establish Adequate Instructions for Restoring Temporary Modifications."

In the area of procedure quality, the team independently reviewed the technical adequacy of procedures by verifying that they were consistent with desired actions and modes of operation. The team's review included the following:

- Assess the effectiveness of corrective actions for deficiencies involving procedure quality.

- Evaluate the quality of procedures and as applicable determine the adequacy of the procedure development and revision processes.

The team compared the results of their independent assessment against the licensee's completed review to verify that procedure quality issues associated with the subject systems were identified and corrected. In general, the team found that the quality of licensee procedures was adequate.

(3) Assessment Results

The team concluded that the licensee's detailed system reviews for the 5 year period was performed in accordance with FCS procedures. However, the team noted that a large number of design issues were recently discovered that fell outside of the licensee's 5 year scope. The team found this to be an indication that the licensee's scope was too narrowly focused. Additionally, for several of the design issues identified by the licensee, the evaluation and corrective actions appeared to be inadequate because they lacked sufficient technical or licensing basis justification for the proposed action. Because of the above described issues involving adequacy of scope and adequacy of corrective actions, restart checklist item 2.b.2 will remain open.

3. Adequacy of Significant Programs and Processes

Section 3 of the Restart Checklist addresses major programs and processes in place at FCS. Section 3 reviews will also include an assessment of how the licensee appropriately addressed the NRC Inspection Procedure 95003 key attributes as described in Section 5.

Item 3.a: Corrective Action Program

(1) Inspection Scope

a. The team assessed the licensee's evaluations and associated improvement actions related to the corrective action program (CAP). The team also conducted independent inspections to validate whether the CAP is appropriately functioning. Specifically, the team assessed the RCA for Condition Report CR 2011-10135, for which the problem statement was:

"The Fort Calhoun Station Problem Identification and Resolution culture has accepted individual and organizational behaviors that preclude the effective and timely detection, evaluation, and correction of performance deficiencies."

Additionally, the team verified that the licensee has established appropriate effectiveness measures to monitor the effectiveness of program improvements. (CL Items 3.a.1; 3.a.2; 3.a.3; 3.a.4)

The team's assessment of this RCA was based on the evaluation criteria from Section 02.02 of NRC Inspection Procedure 95001, which aligned with this item. The inspection objectives were to:

- Provide assurance that the apparent and contributing causes of risk-significant issues were understood

- Provide assurance that the extent-of-condition and extent-of-cause of risk-significant issues were identified

- Provide assurance that the licensee's corrective actions for risk-significant performance issues were, or will be, sufficient to address the apparent and contributing causes and to preclude repetition.

b. The team reviewed the licensee's assessment of the FPD associated with the CAP. The team also assessed the adequacy of the extent of condition, extent of causes, and corrective actions. (CL Items 3.a.5; 3.a.6; 3.a.7)

c. The team reviewed the licensee's assessment of the Operating Experience Program. The team also assessed the adequacy of the extent of condition, extent of causes, and corrective actions. Additionally, the team verified that the licensee has established appropriate effectiveness measures to monitor the effectiveness of program improvements. (CL Items 3.a.8; 3.a.9; 3.a.10; 3.a.11)

d. The team performed specific independent inspections that included assessing the Corrective Actions Program effectiveness in resolving the previously identified non-cited violations of NRC requirements. The team verified that adequate corrective actions were identified associated with the licensee's casual analysis and extent of condition evaluations and that implementation of corrective actions were either implemented or appropriately scheduled for implementation. (CL Items NCV 2012004-01; NCV 2011006-06; NCV 2011004-01; NCV 2011002-02; NCV 2011002-03; NCV 2011002-04; NCV 2010002-01; NCV 2010003-01; NCV 2010003-05; NCV 2010004-02; NCV 2010004-04)

e. The team performed an independent inspection that included assessing the Corrective Actions Program effectiveness in resolving the issues submitted in an LER. (CL Item LER 2012-003)

f. The team performed an inspection following the guidance in NRC Inspection Procedure 71152, "Problem Identification and Resolution." This inspection focused on ensuring that the CAP was effectively being implemented and addressing those items related to design, human performance, procedure quality, equipment performance, configuration control, emergency response, occupational radiation safety, and public radiation safety. These items are defined as "Key Attributes" in NRC Inspection Procedure 95003. (CL Item 3.a.12)

(2) Observations and Findings

a. <u>Licensee's Evaluations and Associated Improvement Actions Related to the Corrective Action Program</u>

Determine that the problem was evaluated using a systematic methodology to identify the root and contributing causes.

The licensee initially identified issues with CAP efficiency in RCA 2010-02387, which was documented as a result of the Yellow NRC finding associated with flooding. Subsequently, during the NRC Problem Identification and Resolution (PI&R) inspection (documented in NRC Inspection Report 05000285/2011006), the inspectors noted that a cause analysis for the ineffectiveness of the CAP was not performed. As a result, in December 2011, the licensee performed RCA 2011-10135, "Corrective Action Program Effectiveness," which documented the causes and corrective actions to address the deficiencies of the CAP. The licensee used a systematic methodology in developing the RCA for Condition Report CR 2011-02387. The information gathered from the RCA was used during the analysis for RCA 2011-10135 and was supplemented by information gathered using additional techniques including, common factors analysis, why factor tree, and modified stream analysis. However, the licensee appears to not strictly and systematically follow the methods in all cases. For example, the licensee listed the why factor tree as one of the systematic methods used, but in the RCA documentation it appeared to be combined with the modified stream analysis method and answers to the why questions were not documented. In addition, even though events and causal factors analysis was listed in the methodology, the RCA did not include documentation for this analysis. The team observed that there are no details as to how these methods were used systematically to come up with the root causes. Instead, the licensee used a combination of supplemental techniques to document the results of the RCA.

The team noted that the RCA overall was very hard to follow, and because it was developed early in the licensee's recovery process it did not follow the same format as more recent RCAs. Notwithstanding these observations, the team determined that the root and contributing causes identified by the licensee reasonably explained why FCS PI&R culture accepted individual and organizational behaviors that precluded the effective and timely detection, evaluation, and correction of performance issues.

While reviewing a sample of risk-significant RCAs in April 2012, the licensee identified an adverse trend in the quality of RCAs. The trend was based on the need to revise previously completed RCAs. To document and address this trend, the licensee initiated Condition Report CR 2012-03495 which was assigned an investigation class that required an RCA. In combination with RCA 2011-10135, the licensee used RCA 2012-03495, "Poor RCA Quality," to address issues associated with FCS CAP. Both of them will be used in the discussion in the sections that follow to assess the licensee's evaluations and associated improvement actions related to the CAP.

The team determined that the licensee evaluated this RCA quality problem using a systematic methodology to identify the root and contributing causes. Specifically, the RCA associated with Condition Report CR 2012-03495 employed the use of the management oversight and risk tree, human performance evaluation system, barrier analysis, event and causal factor chart, and safety culture review. The team

determined that the root and contributing causes identified by the licensee for RCA 2012-03495 reasonably explained the negative trend in the quality of RCAs covering cause determination, corrective action development, and evaluation depth and breadth.

Determine that the root cause evaluation was conducted to a level of detail commensurate with the significance of the problem.

The team determined that the RCAs were conducted to a level of detail commensurate with the significance of the problem. Specifically, as discussed above, the licensee conducted RCA 2011-10135 using events and causal factors analysis, common factors analysis, why factor tree, and modified stream analysis event and causal factor charting, barrier analysis, and the why-staircase. The licensee conducted RCA 2012-03495 using MORT, human performance evaluation system, barrier analysis, event and causal factor chart, and safety culture review. The analysis was also supplemented by information gathered through interviews, internal operating experience review and timelines. The licensee used a combination of methods to ensure the evaluations were more thorough. The licensee's RCA techniques were generally thorough, albeit better documented and comprehendible in RCA 2012-03495. The team concluded the licensee reviewed the problem statements to identify the fundamental problems with the CAP process.

Determine that the root cause evaluation included a consideration of prior occurrences of the problem and knowledge of prior operating experience.

The team determined that the RCAs included evaluations of both internal and external industry operating experience. The team noted that the operating experience review was a significant contributor to support the evaluation of Condition Report CR 2011-10135. The team noted that licensee questioned the applicability of previous issues with related root causes like the RCA for Condition Report CR 2010-02387, and noted many additional missed opportunities. The licensee determined that, for RCA on CAP effectiveness, missed operating experience opportunities were a causal factor but were not considered root or contributing causes.

Determine that the root cause evaluation addressed the extent of condition and the extent of cause of the problem.

The team reviewed root cause analyses RCAs 2011-10135 and 2012-03495 as it relates to extent of condition and extent of cause.

For extent of condition, the licensee evaluated the extent to which the actual condition existed with other plant processes, equipment, or human performance. The licensee concluded that the inadequate resolution of performance deficiencies extended to all programs, processes, and departments throughout the FCS organization. The team noted that the licensee's analysis did not contain a specific approach as a basis to determine the extent of condition. Specifically, Procedure NOD-QP-19, "Cause Analysis Program," Revision 43, which was the procedure that was in effect at the time RCA 2011-10135 was prepared, did not provide specific

techniques to determine, in a systematic way, the extent of the condition being evaluated. As a result, even though the licensee appropriately considered the safety culture components as described in NRC IMC 0310 as part of their review, the review provided no methodical basis for its conclusion. As a comparison, the current procedure, Procedure FCSG-24-5, "Cause Evaluation Manual," Revision 5, provided 2 different approaches to determine the extent of condition and specified several tools that could be used in the process.

In addition, RCA 2011-10135 stated that the Identifying, Assessing and Correcting Performance Deficiencies (IACPD) review would address the areas impacted by the CAP effectiveness issue. Specifically, the IACPD would review the Significant Performance Deficiencies (SPDs) among other areas like Audits and Assessments, Employee Concerns Program, Performance Improvement Programs, and Suggestion Program and Differing Professional Opinions. The licensee concluded that the corrective actions that would result from the RCAs on the FPDs would address the extent of condition of the CAP effectiveness issue. Essentially, the licensee closed these actions to the premise that another evaluation and subsequent corrective actions would address the inadequacies identified in the extent of condition review.

For extent of cause, the licensee reviewed the root causes of the identified problems to determine where they may have impacted other plant processes, equipment, or human performance. The licensee concluded that the root causes in RCA 2011-10135, extend to "flawed mental models, misguided beliefs, and misplaced values associated with core and enabling processes that produce electricity." In addition, the licensee determined that the root causes extended to the "NRC Inspection Manual Chapter Safety Culture components of Decision Making, Resources, Work Control, Work Practices, Willingness to Raise concerns, Accountability, Continuous Learning, Organizational Change Management and Safety Policies." The licensee did not provide a basis and meaning for their conclusion statement, or document a systematic method to support the results. In addition, the licensee did not provide an explanation for the extent of cause boundaries as required by Procedure NOD-QP-19. The team concluded that the extent of cause review for RCA 2011-10135 was less than adequate.

The licensee concluded that the negative trend in the quality of root cause analyses extended to Tier 1 Apparent Cause Analyses (ACAs), engineering analyses, operability determinations, reportability determinations, and the Systematic Approach to Training. The team noted that this determination was performed considering risk perspectives and concluded the extent was appropriate. However, since the licensee Recovery Organization has a specific task called "DNC/Operability Evaluations" to evaluate the quality of operability evaluations, the analysis determined that this item could be removed from the extent of condition and addressed through the FCS Recovery process. Operability process is included in the restart checklist under Item 3.e.

For the extent of cause, the licensee evaluated which activities could be affected by management failing to establish and maintain a culture within which issues were thoroughly evaluated and reviewed. For this cause, the licensee concluded that the

extent was all activities at FCS. The licensee also evaluated what programs would be impacted by the failure to develop and implement an effective corporate level policy and concluded that the following programs would be impacted: operating experience, self assessment, observations, benchmarking, human performance, safety culture, leadership development, succession planning, knowledge transfer, workforce planning, work management, engineering, and employee concerns.

Determine that the root cause, extent of condition, and extent of cause evaluations appropriately considered the safety culture components as described in IMC 0310.

The root cause, extent of condition, and extent of cause evaluations appropriately considered the safety culture components as described in IMC 0310. Specifically, the licensee documented their consideration of the IMC 0310 cross-cutting aspects in Section 9 of the root-cause evaluation associated with RCA 2011-10135, and in Section L of RCA 2012-03495. The licensee identified several cross-cutting aspects in the area of human performance, problem identification and resolution and other components were applicable to issues related to the CAP effectiveness. Root Cause Analysis RCA 2012-03495 considered safety culture as one of the root causes.

Determine that appropriate corrective actions are specified for each root and contributing cause.

The team reviewed the licensee's corrective actions for each of the root and contributing causes for both RCAs. The Corrective Action to Prevent Recurrence (CAPR) implemented to address the root causes identified in RCA 2011-10135, was to define the standards of the mental models, beliefs, values, and behaviors needed for the effective and timely disposition of performance deficiencies. Other corrective actions included benchmarking another utility's PI&R culture in order to learn and understand the industry's best practice, and modifying the standing orders, policies, and procedures that provide guidance to implement the CAP to apply the lessons learned from benchmarking and to reflect the redefined mental models and behaviors. Training station personnel was another corrective action.

The team found that the licensee's corrective actions, although necessary, were very general in nature. The team noted that the licensee's corrective action plan did not include actions to specifically target some of the contributing causes and as a result, the licensee was relying on the corrective actions mentioned above, which focused primarily on changing the mental models, beliefs, values, and behaviors, to resolve the CAP effectiveness. Specifically, no specific actions were included to address issues like organization leadership skills, coordination of changes to the CAP, challenges in prioritizing and depth of the effectiveness reviews.

Since the licensee recently completed the corrective actions associated with CAP effectiveness and was in the process of implementing the newly revised processes and procedures, the team determined it was too early to make a determination on the adequacy of the corrective actions.

The corrective actions associated with RCA 2012-03495, on poor RCA quality, appeared to be adequate in principle. However, the team noted that several of the corrective actions will be tracked and implemented through other documents and activities associated with FCS recovery process. For example, the extent of cause associated with management's failure to establish and maintain adequate safety culture will be assessed in Condition Report CR 2012-04262 by the FCS Independent Nuclear Safety Culture Assessment. The other extent of cause, associated with the failure to develop and implement effective corporate level policies will be addressed with Condition Report CR 2012-03986, Organizational Ineffectiveness at FCS. The extent of conditions on engineering analysis, Systematic Approach to Training, and reportability determinations were captured in CRs 2012-05559, 2012-05545, and 2012-05563 respectively.

Determine that a schedule has been established for implementing and completing the corrective actions.

The team determined that a schedule has been established for implementing and completing the corrective actions. However, the team observed that the licensee was not yet noticing the expected results with implementation of the CAPRs and recently completed corrective actions. Specifically, the effectiveness reviews for the RCA for CAP effectiveness did not pass the acceptance criteria and as a result the licensee will have to generate additional corrective actions. In addition, during the inspection the team identified numerous examples of inadequate or untimely corrective actions, improper issue evaluation, and failures to identify conditions adverse to quality. These examples are documented and discussed in Section 7 of this inspection report.

Determine that quantitative or qualitative measures of success have been developed for determining the effectiveness of the corrective actions to prevent recurrence.

The licensee developed effectiveness reviews (EFRs) to measure the progress and success of the CAPRs for both RCAs. The licensee established, in part, effectiveness reviews consisting of performance indicators for PI&R Culture to verify they were within goals for at least 5 of the first 9 months they were in use. Another EFR's goals were that performance issues with PI&R components were less than 50 percent of the performance between 2006 and 2011. However, to date, the EFRs on CAP Effectiveness did not pass the acceptance criteria. The licensee found that even though the CAPRs were implemented and challenged against the criteria, they were experiencing recurrence of the actions they were intending to eliminate. As a result the licensee will have to implement a new set of corrective actions to address the RCAs associated with the CAP effectiveness.

The reviews for the EFRs on poor RCA quality consisted of random site personnel interviews to verify understanding of the new policy. Another EFR was associated with performing a self-assessment to verify that the quality of RCAs has improved. The team identified that the licensee did not perform an adequate EFR in accordance with Procedure FCSG-24-7, "Effectiveness Reviews of CAPRs."

Specifically, one of the EFRs completed using on site personnel interviews was not appropriate in that the grading method was inconsistent and the EFR was considered satisfactory when it should have failed. As a result, new CAPRs should have been established to address the initial conditions adverse to quality. The due date for the self assessment to verify RCA quality has improved was not completed at the time of this inspection and consequently will have to be reviewed at a later date.

During the inspection, the team identified additional examples, associated with FPD reviews or RCAs, where the licensee did not perform adequate EFRs. These included EFRs for root cause analyses RCA 2011-03495, "Poor Root Cause Analysis Quality," RCA 2011-05414, "Breaker Cubicle 1B4A Fire," RCA 2011-06621, "1B3A Main Breaker Trip During Switchgear Fault on 1B4A," RCA 2012-08135, "Human Performance," and RCA 2012-08126, "Performance Improvement." Overall, the team found that the EFRs for the different FPDs were general and lacked thoroughness. These observations, which were also an indication of CAP effectiveness, were provided to the licensee and were entered into the CAP.

b. Licensee's Assessment of the Fundamental Performance Deficiency Associated with the Corrective Action Program

The FCS Recovery Team identified several FPDs, one of which was CAP effectiveness. The FPD stated that the CAP did not effectively identify, evaluate, and resolve issues. Prior to the licensee completing the FPD evaluations in July 2012, an RCA was completed in February 2012, which analyzed FCS's CAP performance. This analysis was RCA 2011-10135, which is discussed in the previous section. Another RCA that analyzed RCA quality was completed in June 2012. Because the licensee had already completed these 2 RCAs by the time the FPD evaluation commenced, the licensee developed a comparative analysis to identify gaps between the areas covered by the FPD and 2 RCAs. This comparative analysis was to ensure that the FPD was encompassed by the corrective actions stated in the RCAs and no additional actions were necessary. In the comparative analysis the licensee did not identify gaps between the issues identified as the CAP FPD and the areas being addressed in the RCAs. As a result, the licensee concluded that no further cause evaluation was needed and that the existing RCAs would be used to track the corrective actions associated with the CAP FPD.

During the initial review of the comparative analysis, the team identified that for several of the issues covered in the CAP FPD, the licensee did not provide sufficient documentation to justify that those areas of the FPD would be covered by the existing RCAs. For example, an item from the CAP FPD read as follows:

"Root Cause Analyses do not receive the management attention, resources, and priority appropriate for significant plant events."

"Corrective actions in several RCAs lack clarity or do not correlate to the root or contributing cause statements."

The licensee's corrective actions for these statements stated that they would anchor alignment and accountability for activities related to the effective and timely detection, evaluation, and correction of performance deficiencies by correcting inappropriate behaviors and positively reinforcing desired behaviors. In addition, the long term corrective actions listed stated that they would perform focused observations and coaching of the PI&R process in the field. The team concluded that these actions would not be sufficient to address those items of the FPD. Additionally, several of the actions listed in the comparative analysis were documented with incorrect information. The incorrect information appeared to have been a documentation oversight. The team provided this observation to the licensee and it was documented in Condition Report CR 2013-05595. Subsequently, the licensee revised the comparative analysis to address the observations.

The team concluded that the revised comparative analysis covered the areas identified in the CAP FPD. As a result, the evaluation of the licensee's adequacy of extent of condition, extent of causes, and corrective actions for this FPD were bounded by the discussions in section (a) above.

In analyzing recent CAP performance, the licensee identified that FCS has seen slow improvements in the overall effectiveness of the CAP. Consequently, the licensee initiated Condition Report CR 2013-08675 in April 2013, to document that gaps in performance including timeliness in the resolution of issues, quality of action closures, effective trending to resolve issues at lower levels, ability to address significant conditions adverse to quality with rigorous analysis and identify actions that were able to withstand internal and external scrutiny. As a result, the licensee has chartered another RCA team to evaluate and improve CAP effectiveness, and modify correction actions as necessary.

c. Licensee's Assessment of the Operating Experience Program

Operating experience had been identified as a contributing cause to all 15 of the FPDs, yet it did not appear to have been addressed separately as a major deficiency by FCS. Instead, an assessment of the Operating Experience Program was included in the RCA for Condition Report CR 2012-08126 that was performed to assess the FPD associated with Performance Improvement. Root Cause Analysis RCA 2012-08126 noted that the licensee's investigation of the FPD associated with Performance Improvement involved assessment of performance improvement processes at FCS. These processes included; Operating Experience, Trending, Self-Assessment, Observation, Benchmarking, Performance Indicators, and Performance Assessment. The team's assessment of operating experience is detailed in this section while the remainder of the team's review of this FPD is documented in Section 5, Item 5.m.

The team concluded that the licensee's assessment of Performance Improvement initiatives, specific to operating experience, was too general to effectively address the operating experience portion of the CAP. The NRC's concern with the licensee's practices with operating experience was that the site Operating Experience Program was not effectively being implemented to enhance the performance of FCS. The

team contrasted these concerns with the problem statement in the RCA which stated:

> *"The Station has not effectively used the performance improvement tools to drive Station improvements. INPO guidelines for performance improvement have not been effectively implemented. Ineffective use of Performance Improvement tools may hinder the Station's ability to identify opportunities to detect and prevent problems, to promptly intervene before they become consequential, and drive Station improvements for current work practices and key Station activities."*

The team concluded that this problem statement sought to address the overall NRC concern, but did not specifically address other specific concerns.

More specifically for this concern: learning from internal and external industry events had not been internalized; the screening process had not been consistently applied to preclude events; there were weaknesses in the training and qualification of individuals assigned to administer and implement the program; program expectations were unclear; and there was a lack of management oversight to ensure adequate implementation. The team noted actions called for by the RCA were to improve the operating experience procedures, to address knowledge gaps by developing qualification checklists, and to improve management oversight of the program. The team concluded that these corrective actions did not address all of the NRC's concerns.

The team determined that RCA 2012-08126 included consideration of prior occurrences of the problem and knowledge of prior operating experience. As indicated in the RCA, operating experience processes were being used and actions were being taken to incorporate operating experience into applicable plant procedures and design documents to ensure proper maintenance and operation of facility structures, systems, and components. However, the team determined that dissemination of industry operating experience to cognizant organizations including the technical evaluations and inclusion of pertinent operational information remained an area of concern.

The team determined that the failure to adequately incorporate industry operating experience was identified as a contributing cause in all of the Fundamental Performance Deficiency RCAs. Many of these RCAs have not undergone the requisite effectiveness reviews to confirm adequate implementation. The team concluded that more time is needed to gauge adequacy of organizational changes to reflect improved performance in the implementation and behaviors associated with operating experience.

Additionally, the team also determined that the majority of the Condition Reports reviewed (approximately 70), concerning operating experience deficiencies in the last 12 months, were primarily classified as administrative in nature and closed based on low level or minor impact with no objective evidence indicating that the cumulative effects of these conditions had been appropriately evaluated.

Finally, the team also determined that the recent NRC Security inspection (NRC Inspection Report 05000285/2013405) identified an area of concern related to the inconsistent and infrequent identification and evaluation of industry operating experience, indicating that the licensee's Operating Experience Program needs improvement.

d. Corrective Actions Program Effectiveness in Resolving the Previously Identified Non-Cited Violations

1. NCV 2012004-01, "Failure to report an Event to the NRC within 60 Days for an Operation Prohibited by Technical Specifications"

   Non-cited violation NCV 2012004-01 documented a Severity Level IV non-cited violation for the licensee's failure to submit a LER within 60 days after the discovery that irradiated fuel was moved while spent fuel pool area charcoal filtration system VA-66 was not in operation, contrary to Technical Specification 2.8.3(4). The team reviewed this non-cited violation and the licensee's corrective actions to address the non-compliance. The team found that the licensee restored compliance by submitting LER 2012-008, "Technical Specification Violation for Fuel Movement (VA-66)," on November 29, 2012. The team noted that the licensee continued to exhibit weakness in the timeliness of making required LERs (see NCV 0500285/2013008-46 in Section 7 of this report). The team interviewed the licensing staff and discovered that many of the late LERs were attributed to a backlog of significant technical issues identified by the licensee and a fundamental misunderstanding about what constituted time of discovery. Corrective actions to address knowledge gaps involving the reportability process were initiated under CR 2012-03796, completed in July 2012. The team observed that following completion of these corrective actions, LERs submitted after August 2012 were generally timely and met the 60 day requirement. Based on the licensee's action to restore compliance for NCV 2012004-01, and actions taken under Condition Report CR 2012-03796, this restart checklist item will be closed.

2. NCV 2011006-06, "Failure to Implement an Adequate Trending Program"

   Non-cited violation NCV 2011006-06 was identified during the PI&R inspection documented in NRC Inspection Report 05000285/2011006. The licensee entered this issue into the CAP and developed ACA 2011-9791, "Significant Adverse Trend in the Station's Ability to Document and Trend Adverse Conditions Occurring at the Station." The team noted that the analysis and corrective actions associated with this ACA focused on CAP trending and did not address equipment trending. The corrective actions stated and planned match the ones documented on RCA 2011-10135, "CAP Effectiveness." Specifically, the corrective actions address the site mental models, beliefs, values, and behaviors needed for the effective and timely resolution of performance deficiencies. The team noted that the licensee did not develop corrective actions to address equipment monitoring and trending, which was also included as part of the NCV. The licensee stated that it was their initial understanding that the

NCV was written specifically for CAP trending and not equipment trending. As a result it was not addressed.

In addition, the team reviewed Condition Report CR 2012-0543 which documented the Pre-PI&R Self-Assessment. The self-assessment, which was completed by the licensee in January 2013, identified equipment trending as an area for improvement (AFI). In Condition Report CR 2013-01203, which was generated to document the AFIs as a result of the self-assessment, the licensee documented the planned corrective actions to address the trending AFI. The condition report stated that FCS will continue to improve equipment trending and health monitoring by transitioning to the Exelon process for System Engineering. Other corrective actions included recommencing the documentation of System Health Reports, implementation of an engineering group trending board and instituting periodic Plant Health Committee review of trends.

The team concluded that since the licensee had not developed appropriate corrective actions to address equipment trending, and recently identified this issue as an AFI, this restart CL item cannot be evaluated for closure. In addition, the licensee is in the process of implementing the corrective actions established as a result of the AFI. The team will assess this trending issue in a future inspection. This restart checklist item will remain open.

3. NCV 2011004-01, “Failure to Incorporate Design Information Into Procedures”

   Non-cited violation NCV 2011004-01 documented a Green non-cited violation for the licensee’s failure to incorporate design information into procedures for operation of the component cooling water (CCW) system for temporary off-normal system conditions during refueling. Specifically, the licensee failed to ensure that the maximum flow assumption contained in Calculation FC06700 was incorporated in CCW operating procedures. The licensee entered this condition into their CAP as Condition Report CR 2011-04886. The team reviewed the condition report and concluded the licensee had taken actions to ensure when the unique conditions existed that precautions were available to ensure the pumps had adequate net positive suction head. Based on the licensee’s action to restore compliance for NCV 2011004-01 and actions taken under Condition Report CR 2011-04886, this restart checklist item will be closed.

4. NCV 2011002-02, “Failure to Determine the Cause of the Out Of Tolerance Condition Regarding Reactor Protection System Channel A Trip Unit 6”

   Non-cited violation NCV 2011002-02 documented a Green non-cited violation associated with the CAP where the licensee repeatedly failed to correct the inoperable condition of reactor protection system channel A trip unit 6 due to a defective wire. Between July 28, 2003, and November 29, 2010, the licensee failed to determine the cause of the out of tolerance condition impacting reactor protection system channel A trip unit 6 (A/TU-6). The team observed that this issue was entered into the CAP as Condition Report CR 2010-06190. The team reviewed the causal analyses and determined that the licensee’s evaluation of

the cause of the failure was inclusive. The team noted that the causal analyses addressed the potential cause and developed adequate corrective actions to prevent recurrence. Based on the licensee's action to restore compliance for NCV 2011004-01 and actions taken under Condition Report CR 2010-06190, this restart checklist item will be closed.

5. NCV 2011002-03, "Failure to Submit a Timely Licensee Event Report"

   Non-cited violation NCV 2011002-03 documented a Severity Level IV non-cited violation of for the licensees' failure to submit an LER within 60 days after the discovery that the reactor protection system A T/U-6, had been inoperable from November 8 until November 29, 2010. Per the licensee's technical specifications, reactor protection system A T/U-6 should have been in the trip position within 48 hours from time of discovering loss of operability. The team found that the licensee restored compliance by submitting LER 2011-002, "Failure of an RPS Trip Unit," on July 27, 2011. The team noted that the licensee continued to exhibit weaknesses in the timeliness of making required LERs (see NCV 0500285/2013008-46 in Section 7 of this report). The team interviewed the licensing staff and discovered that many of the late LERs were attributed to a backlog of significant technical issues identified by the licensee and a fundamental misunderstanding about what constitutes time of discovery. Corrective actions to address knowledge gaps involving the reportability process were initiated under Condition Report CR 2012-03796, completed in July 2012. The team observed that following completion of these corrective actions, LERs submitted after August 2012 were generally timely and met the 60 day requirement. Based on the licensee's action to restore compliance for NCV 2011002-03 and actions taken under Condition Report CR 2012-03796, this restart checklist item will be closed.

6. NCV 2011002-04, "Failure to Verify Design Adequacy of Refueling Water Storage Tank Vortex Eliminator"

   Non-cited violation NCV 2011002-04 documented a Green non-cited violation associated with the licensee's failure to verify the adequacy of the safety injection refueling water tank vortex eliminator to prevent potential air entrainment due to vortexing in safety-related pump suction piping. This finding was entered into the CAP as Condition Reports CR 2007-02452 and CR 2011-00311. The team reviewed the ACA report associated with this Condition Report CR 2011-00311 and noted that one of the apparent causes was that the corrective actions did not drive the staff to perform a rigorous enough analysis. The team noted that the licensee had performed an in-depth analysis and associated calculation revisions to revise the analyses of vortexing. The licensee also provided additional guidance to engineers on expectations for the rigor of analyses. The team reviewed the licensee's extent of condition review and considered it adequate. Based on the licensee's action to restore compliance for NCV 2011002-04 and actions taken under Condition Report CR 2011-00311, this restart checklist item will be closed

7. NCV 2010002-01, “Inadequate Reportability Guidance”

   Non-cited violation NCV 2010002-01 documented a Severity Level IV non-cited violation of Technical Specification 5.8.1 for inadequate corrective action documents. Specifically, the non-cited violation documented that the licensee’s CAP did not adequately address the assigning of reportability evaluations. As a result, the licensee failed to evaluate the reportability of a condition that was determined to be reportable until questioned by the NRC. The team reviewed station procedures and found that the licensee’s CAP does now adequately address the assigning of reportability evaluations. The team noted that the licensee continues to exhibit weakness in the timeliness of making required LERs (see NCV 0500285/2013008-46 in Section 7 of this report). The team interviewed the licensing staff and discovered that many of the late LERs was attributed to a backlog of significant technical issues identified by the licensee and a fundamental misunderstanding about what constitutes time of discovery. Corrective actions to address knowledge gaps involving the reportability process were initiated under CR 2012-03796, completed in July 2012. The team observed that following completion of these corrective actions, LERs submitted after August 2012 were generally timely and met the 60 day requirement. Based on the licensee’s action to revise station procedures to address the assigning of reportability evaluations and actions taken under CR 2012-03796, this restart checklist item will be closed.

8. NCV 2010003-01, “Failure to Provide Adequate Limiting Condition for Operation for Operation for High River Level”

   Non-cited violation NCV 2010003-01 documented a condition where the historical limiting condition for operation in Technical Specification 2.16 was at too high of a river level during a flooding condition to ensure plant safety. The technical specification required a plant shutdown to cold shutdown conditions when Missouri River levels exceeded 1009 feet. This level was noted to be too high. The licensee submitted a license amendment request in April 2012 to lower the level requirement for initiating a shutdown to cold shutdown to 1004 feet. This license amendment request was under review by the NRC’s Office of Nuclear Reactor Regulation at the time of the inspection. The team also had questions pertaining to the low river level requirements of Technical Specification 2.16, which were detailed in the extent of condition review of Section 1.a, “Yellow Flooding Issue” of this report. Based on the ongoing review of the license amendment request and the low river level concerns, this restart checklist item will remain open.

9. NCV 2010003-05, “Failure to Submit a Required Licensee Event Report”

   Non-cited violation NCV 2010003-05 documented a Severity Level IV non-cited violation for the failure to submit an LER within 60 days after the discovery that the turbine-driven AFW pump, FW-10, was inoperable from February 26 until April 6, 2009, which was a condition prohibited by technical specifications. Additionally, on March 11, 2009, the electric motor-driven AFW pump, FW-6, was

inoperable for approximately 4 hours when diesel generator 1 was inoperable. This condition resulted in both AFW pumps being simultaneously inoperable, which was also a reportable condition. The team found that the licensee restored compliance by submitting LER 2010-003, "Inadequate Margin Renders Auxiliary Feedwater Pump Inoperable," on August 10, 2010. The team noted that the licensee continued to exhibit weakness in the timeliness of making required LERs (see NCV 0500285/2013008-46 in Section 7 of this report). The team interviewed the licensing staff and discovered that many of the late licensee even reports were attributed to a backlog of significant technical issues identified by the licensee and a fundamental misunderstanding about what constitutes time of discovery. In general, the licensee acknowledged a misconception that time of discovery for reportability did not begin until the determination was made that the event was reportable. Corrective actions to address knowledge gaps involving the reportability process were initiated under Condition Report CR 2012-03796, completed in July 2012. The team observed that following completion of these corrective actions, LERs submitted after August 2012 were generally timely and met the 60 day requirement. Based on the licensee's action to restore compliance for NCV 2010003-05 and actions taken under Condition Report CR 2012-03796, this restart checklist item will be closed.

10. NCV 2010004-02, "Failure to Submit a Required Licensee Event Report"

    Non-cited violation NCV 2010004-02 documented a Severity Level IV non-cited violation for the failure to submit an LER within 60 days after the discovery that the diesel fuel oil storage system was inoperable for approximately 24 hours from January 6, 2010, until January 7, 2010, which was a condition prohibited by technical specifications. The team found that the licensee restored compliance by submitting LER 2010-005, "Inoperability of the Emergency Diesel Generator Fuel Oil Transfer System," on January 26, 2011. The team noted that the licensee continued to exhibit weakness in the timeliness of making required LERs (see NCV 0500285/2013008-46 in Section 7 of this report). The team interviewed the licensing staff and discovered that many of the late LERs were attributed to a backlog of significant technical issues identified by the licensee and a fundamental misunderstanding about what constitutes time of discovery. Corrective actions to address knowledge gaps involving the reportability process were initiated under Condition Report CR 2012-03796, completed in July 2012. The team observed that following completion of these corrective actions, LERs submitted after August 2012 were generally timely and met the 60 day requirement. Based on the licensee's action to restore compliance for NCV 2010004-02 and actions taken under Condition Report CR 2012-03796, this restart checklist item will be closed.

11. NCV 2010004-04, "Failure to Translate Calculation into Calibration Procedure"

    Non-cited violation NCV 2010004-04 documented a Green non-cited violation where the licensee failed to correctly translate results of Calculation FC 05561, "CCW Relief Valve Setpoints," into calibration procedures used to calibrate pressure control switches PCS-412 and PCS-413. The licensee has entered this

violation into their CAP as Condition Report CR 2010-03658. For the condition, the licensee performed an ACA and determined that the procedure revision process was not following due to human error which led to the condition. The corrective actions consisted of correcting the calibration procedures and recalibrating the setpoints to their proper values. The licensee's design engineering group also reset their human performance error clock to emphasize the importance of this error to their engineers. The team determined that the corrective actions were reasonable and adequate. Based on the licensee's action to restore compliance for NCV 2010004-02 and actions taken under Condition Report CR 2010-03658, this restart checklist item will be closed.

e. Corrective Actions Program Effectiveness in Resolving the Issues Submitted in Licensee Event Reports

LER 2012-003, "Non-Conservative Error in Calculation for Alternate Hot Leg Injection Results in Unanalyzed Condition"

Licensee Event Report LER 2012-003 documented the licensee's discovery that a non-conservative error was made in the input calculation for post-loss of coolant accident flow. The calculation used an incorrect input for low pressure safety injection pump performance. The licensee entered this condition into their CAP as CR 2012-01914. The licensee performed an ACA and determined that they had inadequately supervised their vendor when design information was transmitted to that vendor. The team observed that corrective actions included revising the calculation and incorporation of a more extensive owner acceptance procedure for calculations. Based on the licensee's action to resolve the issue, including actions taken under CR 2012-01914, this LER and restart checklist item will be closed.

f. Problem Identification and Resolution Inspection

The team reviewed the licensee's CAP implementing procedures and interviewed site personnel responsible for the CAP at FCS to assess the implementation of the CAP. The team reviewed risk and safety significant issues in the licensee's CAP since the last NRC PI&R Inspection in November 2011. In addition, the team used the restart checklist contained in Confirmatory Action Letter 4-12-002, dated June 11, 2012, as a source for issues to inspect. The team reviewed a sample of condition reports including associated root cause, apparent cause, and simple cause evaluations, that had been issued during the inspection period and as a result of the IMC 0350 Recovery activities, to determine if problems were being properly identified, prioritized, and entered into the CAP for evaluation and resolution. The team also evaluated the timeliness and effectiveness of corrective actions for selected condition reports, completed investigations, NRC findings, including cited and non-cited violations, and LERs.

The team reviewed a sample of system health reports, operability determinations, self-assessments, effectiveness reviews, trending reports and metrics, and various other documents related to the CAP. The team evaluated the licensee's efforts in establishing the scope of problems and establishing timeliness of the corrective

actions by reviewing selected condition reports and their associated investigations, in addition to the closure books associated with each of the items listed in the restart checklist. The team's review included verifying the licensee considered the full extent of cause and extent of condition for problems, as well as how the licensee assessed generic implications and previous occurrences. The team assessed the timeliness and effectiveness of corrective actions, completed or planned, and looked for additional examples of similar problems. The team interviewed plant personnel to identify other processes that may exist where problems may be identified and addressed outside the CAP.

The team reviewed corrective action documents that addressed past NRC-identified violations to ensure that the associated corrective actions adequately addressed the issues described in the inspection reports. The team also reviewed the results of recent audits and self-assessments related to the licensee's CAP to compare and contrast the identified problems and corrective actions being taken as a result of these audits and self-assessments with the results of the inspection.

The team considered risk insights from both the NRC and FCS risk assessments to focus the sample selection and plant tours on risk significant structures, systems, and components. In a previous inspection, the team selected the AFW system for an in-depth inspection. The results of that inspection were documented in NRC Inspection Report 05000285/2012012. The Operating Experience portion of the CAP Assessment is documented in Section 3, Item 3.a, of this report and the Assessment of Safety Culture Work Environment is documented in Section 1, Item 1.e, of this report.

The team conducted a walkdown of multiple systems as part of the overall 0350 Restart Checklist inspection to assess, in part, whether problems were appropriately identified and entered into the CAP.

Identification of Problems

The team identified several instances where the licensee did not enter conditions adverse to quality into the CAP at a low threshold. These performance issues were determined to be examples of a non-cited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," which is documented in Section 7 of the report as NCV 05000285/2013008-19, "Failure to Initiate Condition Reports in Accordance with the Corrective Action Program Procedures." The team also identified instances where the licensee failed to identify conditions adverse to quality that could potentially have resulted in untimely corrective actions. These examples were determined to be a non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," and is documented in Section 7 of the report as NCV 05000285/2013008-20, "Failure to Identify Conditions Adverse to Quality."

The team also observed that at times, licensee personnel stated that they needed to research issues to ensure a condition report was required. The team concluded that, in these specific instances, the threshold for writing condition reports was too high. Nevertheless, FCS personnel had identified and initiated a significant number of

condition reports during the 16-month period covered in this inspection. Of note was that a considerable percentage of these condition reports were generated during FCS's discovery phase, where issues to be addressed prior to restart were being identified, documented, and placed in the CAP.

Notwithstanding the examples found, the team concluded that the licensee's threshold for identifying problems and entering them into the CAP was sufficiently low and consistent with licensee's procedural requirements the majority of the time. However, the examples identified by the team demonstrate that the licensee still needs to improve in this area of the CAP.

Prioritization and Evaluation of Issues

The team identified instances where condition reports were given low priorities even when they were associated with issues that needed to be corrected in a timelier manner. The team noted that due to the large number of condition reports being generated at the site and based on the plant current recovery mode, the CAP required great effort with the volume of condition reports that the site has to disposition on a daily basis. Consequently, some issues were assigned categories that place the corrective actions in the future with only minimal constraints for time. The team also identified several examples where the licensee did not appropriately perform operability and reportability determinations. This included inappropriate dispositioning of issues using the operability determination process and untimely LERs and event notifications. The team also found some examples where the licensee failed to follow CAP procedures during the evaluation and resolution of issues. Additionally, the team identified some examples where the licensee failed to do an appropriate extent of condition reviews associated with root and apparent cause evaluations. The instances identified demonstrate that at times the licensee's extent of condition reviews were limited and narrowly focused. Specific observations and findings associated with these examples are documented in the related sections of the report.

The team identified several instances where the licensee failed to perform appropriate evaluations for equipment issues. Examples included the licensee's ability to consistently classify safety-related equipment, the licensee not applying single failure criteria appropriately, not ensuring safety-related equipment would be available for all river levels in the licensing basis, using inappropriate evaluations to justify operability, and not applying ASME code correctly.

In general, the team noted that the examples identified were associated with inadequate prioritization and evaluation of issues, and in many instances were related to the licensee's poor understanding of the FCS design and licensing basis. Based on these examples, the team concluded that even though the licensee generally prioritized condition reports in a satisfactory manner, further improvement is needed in this area of the CAP.

Specific observations noted in the area of prioritization and evaluation included:

- Adequacy of Evaluation and Classification of Condition Reports. During this inspection and also during previous inspections in 2012, the inspectors have identified examples where the licensee did not appropriately classify condition reports in accordance with the safety significance of the issue. The identified examples included:

- RCA for M-2 Contactor Failure, documented in Condition Report CR 2011-00451, revealed several potential legacy, unanalyzed condition issues. The licensee wrote condition reports for those issues that had originally been inappropriately closed to the track and trend process.

- RCA for M-2 Contactor Failure, documented in Condition Report CR 2011-00451, revealed that Procedure SO-G-23, "Surveillance Testing Program," may allow preconditioning during surveillance testing. The Condition Report generated to document this issue was closed to a simple cause analysis.

- The licensee failed to thoroughly evaluate and classify the 6 intake structure exterior sluice gates and their motor operators as Safety Class 3. The details of this finding were documented in NRC Inspection Report 05000285/2013011.

- The inspectors identified 2 examples of the failure to perform adequate written evaluations of changes in accordance with 10 CFR 50.59. They involved changes to safety-related procedures, the USAR and plant equipment without the required NRC approval. The details of this finding were documented in NRC Inspection Report 05000285/2013011.

- The team noted that the licensee self-identified that they had inadequately classified CRs during a review of condition reports generated during audits or external reviews.

- Adequacy of Extent of Condition Review on Root Cause Analysis. The team identified examples where the licensee had not completed an adequate extent of condition evaluation for the following significant conditions adverse to quality:

- For an RCA associated with the Yellow finding for flooding, the licensee failed to identify items such as weak procedure content for degraded and low river levels.

- The causal analysis for the identification that sluice gates needed to be safety class components, as documented in NRC Inspection Report 05000285/20120002, only addressed procedural issues. The causal analysis did not address why the sluice gates were not safety class and the extent of condition to other components.

- For RCA 2011-05414, “Breaker Cubicle 1B4A Fire,” the licensee had identified an action item to evaluate the extent of cause; however, this review was limited to modifications that were not yet installed. The licensee did not evaluate what was already installed in the plant.

- The extent of condition review for CR 2010-04466, “Failure to Perform a 50.59 Evaluation for a Motor Control Center (MCC) Feeder Cable Splice,” did not identify all applicable CRs related to inadequate 50.59 evaluations. (NCV 05000285/2010004-05)

- FCS failed to do an extent of condition review associated with improper in-service testing for AFW pumps during evaluation of a similar issue identified by nuclear oversight regarding the safety injection and low pressure safety injection pumps. This issue was documented in CRs 2012-01640 and 2012-04850.

- The inspectors identified that licensee personnel had inadequate bolt torque instructions for a cable junction/termination box. The licensee fixed the specific work order but did not review other WOs to determine if this error was also present. This issue was documented in CR 2012-10612.

- The extent of condition review for RCA 2010-02387 failed to ensure an adequate procedure for low river level. Specifically, the licensee failed to ensure that adequate equipment was available to measure river level locally to be able to comply with Procedure AOP-1, “Acts of Nature,” Section IV, “Low River Level.” The details of this violation are documented in NRC Inspection Report 05000285/2012011.

- Adequacy of Operability Determination and Reportability Evaluations after Identifying Degraded Conditions. During the inspection, the team identified examples where the evaluations for operability determinations were not completed appropriately. These included:

- Operability evaluation performed under Condition Report CR 2013-00907 for General Electric HFA Relays incorrectly determined that the relays were operable even though they failed seismic qualification testing. This issue was documented in CR 2013-04163. Additionally, the Engineering Assurance Group did not identify the incorrect conclusion about the General Electric HFA Relays that failed seismic qualification testing (CR 2013-04288).

- Operability evaluation performed under Condition Report CR 2013-02260, for the containment air coolers VA-15/16 missing seismic brace, concluded that equipment was operable even though the component was over-stressed.

- The following event notifications were identified as being made greater than 8 hours after the discovery of the reportable condition: EN 48781 for an inverter issue and EN 48730 for a high pressure safety injection pump unanalyzed condition.

- The following LERs were identified as being submitted greater than 60 days after discovery of the reportable condition: LER 2011-005, LER 2011-007, LER 2012-007, LER 2012-009, LER 2012-010, LER 2012-011, LER 2012-012, LER 2012-013, and LER 2012-015.

- Corrective Action Program Procedure FCSG-24-4, "Condition Report and Cause Evaluation" Adherence. The team identified examples where the licensee did not follow the subject procedure. These included:

- In RCAs 2011-5414, "Breaker Cubicle 1B4A Fire," and 2011-6621, "1B3A Main Breaker Trip During Switchgear Fault on 1B4A," the licensee failed to document the basis for why some of the safety culture aspects were not applicable.

- In RCAs 2011-10135, "Corrective Action Program Effectiveness," and 2012-03495, "Poor Root Cause Analysis Quality," the licensee failed to document the basis for the methodology used.

- Following additional RCA work performed by a vendor, where multiple new failure modes were identified, a revision of RCA 2011-05414, "Breaker Cubicle 1B4A Fire," was created. The licensee failed to update the safety culture component analysis and as a result failed to determine how the changes would have impacted the safety culture portion of this RCA.

- Following additional RCA work that resulted from findings identified by an offsite reviewer from Exelon, a revision of RCA 2012-08126, for the Performance Improvement FPD, was created. The licensee failed to update the safety culture component analysis and as a result failed to determine how the changes would have impacted the safety culture portion of this RCA.

- Adequacy of Root and Apparent Cause Analysis to Evaluate Conditions Adverse to Quality. The team identified several instances where the root and apparent cause analyses prepared by the licensee to address a significant condition adverse to quality was inadequate. The following are examples:

- In RCAs 2011-05414, "Breaker Cubicle 1B4A Fire" and 2011-06621, "1B3A Main Breaker Trip During Switchgear Fault on 1B4A," the licensee failed to do an adequate RCA because it documented the vendor's lack of knowledge on breaker testing as the first root cause for one of the Red finding RCAs. The root cause stated that root/contributing causes associated with vendor actions will not be addressed by FCS's program. (Section 1, Item 1.c)

- The RCA for the M2 contactor issue, documented as RCA 2011-00451, identified a number of contributing causes and other issues which appear to be barriers that, if properly in place, could have prevented the M2 contactor issue. In many respects, the identified contributing causes more closely fit the definition of a root cause in Procedure FCSG 24-4, "Condition Report and Cause Evaluation," in that the most basic, fundamental cause(s) of a

problem, which, if corrected, will prevent recurrence of the identified problem and similar problems. In addition, RCA 2012-09494, "Operability Determinations," and RCA 2012-08137, "Processes to Address Regulatory Requirements," were inadequate because several of the identified contributing causes meet the definition of a root cause. (Section 1, Item 1.b)

- In RCA 2012-8125, "Engineering Design/Configuration Control," the licensee identified 2 root causes with CAPRs that had already been implemented yet issues with design and configuration control continue to occur today. Therefore, the licensee either failed to identify appropriate corrective actions, and/or inadequately prioritized corrective action implementation. (Section 5, Item 5.a)

- RCA 2012-05615, "Collective Significance - Critical Quality Elements," appeared to be incomplete because it did not address the root and contributing causes associated with FCS's ability to properly classify structures, systems, and components as safety-related. The team identified several examples of improperly classified components during this inspection indicating that corrective actions are needed in this area. (Section 3, Item 3.b.1)

- In RCA 2012-08137, "Regulatory Processes and Infrastructure," the licensee failed to do an adequate RCA because the analysis did not support the identified root cause and contributing causes as the only causes of the event. In addition, there were several other failed barriers and causal factors identified that should have been considered as root or contributing causes. As a result, the corrective actions may not have been appropriately prioritized and sufficiently rigorous. (Section 5, Item 5.l)

- In RCA 2012-08126 "Performance Improvement," Revision 1, some corrective actions were inappropriately cancelled, leaving no other corrective actions to address the identified extent of condition related to training inadequacies. The revision to the RCA only changed to the causes and the corrective action plan. Consequently, the referenced causes and corrective actions in the safety culture review were no longer applicable. (Section 5, Item 5.m)

Effectiveness of Corrective Actions

The team identified numerous examples where the corrective actions associated with conditions adverse to quality were not completed in a timely or effective manner. The range of instances covered failure to perform adequate effectiveness reviews, the failure to take corrective actions following multiple failures of plant equipment, not taking corrective actions to address the apparent cause of a condition adverse to quality, and having knowledge about equipment issues and not addressing them adequately or in a timely manner.

The team also reviewed the list of Operator Challenges (OCs) at FCS. Overall, the review indicated that corrective action due dates were usually extended an excessive number of times before resolution was achieved. In some instances, the team noted that when the significance of the OC was not the highest, resolution of issues were deferred repeatedly, sometimes by years. The team noted that recent OCs that should have been processed through the new CAP were being delayed and due dates were being extended. The licensee indicated that they planned to resolve most of the OCs before start-up from the extended shutdown.

It is noteworthy to mention that a Security team inspection conducted on January 2013, as part of the 0350 CAL Inspection, documented examples associated with the CAP. Specifically, when evaluating the CAP within the Security department, the inspection team concluded that licensee security personnel did not consistently develop appropriate corrective actions to address problems. In addition, the security team identified corrective actions associated with conditions adverse to quality that were not completed in a timely or effective manner. The results of this inspection are documented in NRC Inspection Report 05000282/2013405.

The team reviewed the root cause analyses associated with the licensee's FPDs and identified that, in general, the corrective actions designed to prevent recurrence were broad and that, at times, the associated contributing causes met the definition of root cause as well. In many instances, the effectiveness of the corrective actions was impacted by the lack of rigor in evaluating issues, as described in the previous section.

The team concluded that the licensee adequately develops appropriate corrective actions to address problems. The team noted that there has been improvement in the overall performance of the CAP as compared to the results of the last PI&R inspection. The team noted that the new CAP procedures and process appear adequate, but CAP behaviors by individuals still need improvement as evidenced by the large number of CAP issues. As mentioned above, the team identified examples of corrective actions associated with conditions adverse to quality that were not completed in a timely or effective manner.

Specific observations are listed below:

- Adequacy of Effectiveness Reviews (EFRs) of Corrective Actions to Prevent Recurrence. The team identified examples where the licensee did not perform adequate effectiveness reviews of corrective actions to prevent recurrence in accordance with Procedure FCSG-24-7, "Effectiveness Reviews of CAPRs." The specific examples are as follows:

    - The EFR completed for RCA 2011-03495, "Poor Root Cause Analysis Quality," was not appropriate in that the grading method was inconsistent and the EFR was considered satisfactory when it should have failed. As a result, new corrective actions to prevent recurrence should have been established to address the initial conditions adverse to quality.

- The EFRs for RCA 2011-05414, “Breaker Cubicle 1B4A Fire,” looked at 6 months of information and were determined to be complete. The team noted that, in light of the FPDs, the review should have been on a continuous basis. In addition, there was no documented basis for the DLRO values the licensee currently used.

- The EFR for RCA 2011-06621, “1B3A Main Breaker Trip During Switchgear Fault on 1B4A,” reviewed modifications created/implemented recently and its success criteria allowed a small percentage of modifications to have issues regarding invalid failure mode determination. The team noted that allowing for failures made for an inadequate EFR.

- RCA 2011-06621, “1B3A Main Breaker Trip During Switchgear Fault on 1B4A,” where the vendor's lack of knowledge regarding the testing kits was deemed a cause, had no effectiveness review performed for this root cause.

- The interim EFR for RCA 2012-08135, “Human Performance,” relied on metrics that do not provide meaningful data due to existing plant conditions and changes to the condition report coding process. Specifically, Metric CHU-1 relies on station human performance event clock resets, but the reset criteria are heavily weighted toward events that could only occur while the station is at power. Additionally, Metrics CHU-2 and CHU-3 are being skewed in the positive direction due to changes in condition report coding that only requires coding of level B and A condition reports.

- The EFRs identified for RCA 2012-08126, “Performance Improvement,” Revision 1, associated with CAPR-2 were incorrect. Consequently, the identified EFRs would not have appropriately measured the effectiveness of the corrective action to prevent recurrence. As a result, Condition Report CR 2013-06760 was initiated to revise RCA 2012-08126 to identify appropriate EFRs for CAPR-2.

- Adequacy and Timeliness of Corrective Action. During the course of the inspection, the team identified examples where the licensee failed to take appropriate or timely corrective actions commensurate with the issue’s safety significance. The specific examples are as follows:

  - As documented in Condition Report CR 2013-03943, the Ametek Inverter Frequency range is not compatible with the emergency diesel generator frequency range. The team identified that this issue was previously known but possibly not addressed. The team noted that the CAP/de-graded nonconforming process did not adequately address this issue.

  - River sluice gates CW-14A, B, C, and D failed to fully close during its monthly cycling test on February 2013. This failure happened following numerous failures during all the monthly tests since August 2012. The licensee has not taken adequate action to prevent the failures to close since they make the sluice gates nonfunctional. The details of this violation and others associated

with the same issue were discussed in NRC Inspection Report 05000285/2012012.

- ACA for NCV 20100004-05, "Failure to Perform a 50.59 Evaluation for a Motor Control Center (MCC) Feeder Cable Splice," determined that the apparent cause was due to misjudgment by the design engineer. However, the corrective action (CA) did not address the cause (i.e., the CAs was to revise the screening and prepare an evaluation). The licensee generated a condition report to capture this performance gap.

- The team identified that the licensee failed to follow ASME OM Code, Section ISTB 6200, "Corrective Actions," for CCW pump AC-3A degraded pump performance in the "required action range." Specifically, the licensee failed to determine the cause of the change in pump performance, failed to perform an analysis that showed a verification of the pump's operational readiness at both pump level and system level, and failed to perform an evaluation of all trends indicated by available data. Consequently, CCW pump AC-3a remained in service without properly established reference values from July 29, 2011, until June 2012, when the pump was rebuilt. This issue was entered into the CAP as Condition Report CR 2013-04010.

- The licensee failed to take timely corrective actions with respect to nonconforming conditions in several circuit breakers. These conditions were determined to have been the cause of the bus 1B4A bus bar failure that caused the fire. The details of this violation were documented in NRC Inspection Report 05000285/2012005.

(3) Assessment Results

a. Licensee's Evaluations and Associated Improvement Actions Related to the Corrective Action Program

Based on the continuing implementation of corrective actions, the licensee's unsatisfactory results on effectiveness reviews, and because the licensee is still generating additional corrective actions to address CAP effectiveness, restart checklist items 3.a.1, 3.a.2, 3.a.3, and 3.a.4 will remain open.

b. Licensee's Assessment of the Fundamental Performance Deficiency Associated with the Corrective Action Program

Because the results of the licensee's assessment of the FPD associated with the CAP are bounded by the previous section, and the licensee recently chartering a team to perform another RCA on the CAP, restart checklist items 3.a.5, 3.a.6, and 3.a.7 will remain open.

c. Licensee's Assessment of the Operating Experience Program

Issues involving inadequate operating experience reviews continued to manifest themselves as indicated by the observed deficiencies in the recent security

inspection report and in numerous condition reports which were reconciled with a simple cause evaluation or closed to trending. The team determined that the effort by the licensee to lump operating experience weaknesses in the RCA did not provide for the proper analysis needed to address this deficiency which was prevalent in nearly all of the recent Fundamental Performance Deficiency RCAs. Therefore, restart checklist items 3.a.8, 3.a.9, 3.a.10, and 3.a.11 will remain open pending the verification of the effective resolution of this quality affecting activity.

d. Corrective Actions Program Effectiveness in Resolving the Previously Identified Non-Cited Violations

Based on the team's independent inspections that included assessing the corrective actions program effectiveness in resolving previously identified non-cited violations, Non-Cited Violations NCVs 2012004-01, 2011004-01, 2011002-02, 2011002-03, 2011002-04, 2010002-01, 2010003-05, 2010004-02, and 2010004-04, will be closed; and Non-Cited Violations NCVs 2011006-06 and 2010003-01 will remain open pending additional review.

e. Corrective Actions Program Effectiveness in Resolving the Issues Submitted in Licensee Event Reports

Based on the team's independent inspections that included assessing the Corrective Actions Program effectiveness in resolving LER 2012-003, this LER and associated restart checklist item will be closed.

f. Problem Identification and Resolution Inspection

On the basis of the samples selected for review, the team concluded that, overall, the CAP at FCS was functional in identifying, evaluating, and correcting issues with various degrees of effectiveness. The licensee had a sufficiently low threshold for identifying issues and entering them into the CAP. Issues entered in the CAP were prioritized and evaluated based on plant risk and uncertainty, personnel safety, and organizational behaviors. Corrective actions were mostly implemented in a timely manner, commensurate with their safety significance.

Although implementation of the CAP was determined to be functional overall, two findings of very low safety significance (Green) were identified by the inspectors in this section of the CAL inspection. These findings were also determined to involve NCVs of NRC requirements. Details of these NCVs are documented in Section 7 of the report. In addition, the team identified several issues that were either minor in nature and/or represented otherwise negative performance. They were provided to the licensee as observations.

Based on the large number of observations provided in each of the areas of CAP, it is evident that even though the CAP at FCS is functional, there is significant room for improvement. The team noted that the site has established a new set of procedures to implement the CAP and that these procedures would allow for an adequate execution of a healthy program. Nevertheless the behaviors by plant individuals

were still lacking as demonstrated by the observations discussed in the sections above. These behaviors of failing to fully implement CAP procedures, compounded by the fact that the program was fairly new, support the team conclusion that more time was needed to for the CAP to demonstrate sustained performance.

Additionally, the team noted that, associated with the large number of deficiencies noted in the areas of prioritization and evaluation of issues and effectiveness of corrective action, was the general poor understanding of the site's design and licensing basis.

The site continued to demonstrate progress, as compared to the last PI&R inspection performed in November 2011. However, based on all the observations identified by the team, in all 3 areas of CAP, restart checklist item 3.a.12 will remain open for additional inspections to ensure an improved implementation of the CAP is in place.

Item 3.b: Equipment Design Qualifications

(1) Inspection Scope

Open items specifically related to maintaining systems, structures, and components within their licensing and design basis were reviewed by the team. The team verified that the licensee has performed adequate casual analysis and extent of condition evaluations related to the issues. The team verified 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. (CL Items LER 2012-014; LER 2012-002)

(2) Observations and Findings

The team reviewed the subject LERs. At the time of this inspection the licensee was still evaluating the technical issues. The team identified NCV 05000285/2013008-21, "Failure to Ensure that Design Requirements Associated with the Containment Electrical Penetrations Assemblies Were Correctly Translated Into Installed Plant Equipment," which is documented in Section 7 of this report.

(3) Assessment Results

The team was unable to complete reviews of these LERs and additional NRC inspection will be required to determine whether these open items can be closed, therefore, restart checklist item 3.b will remain open.

Item 3.b.1: Safety-Related Parts Program

(1) Inspection Scope

The team reviewed the licensee's assessment of issues related to the safety-related parts program at FCS. The team assessed the licensee's equipment design quality classifications review for inconsistent quality classifications. Additionally, the team assessed the licensee's review of the use of non-safety-related parts in safety-related applications. Specifically, the team assessed the RCA for Condition Report CR 2012-05615, for which the problem statement was:

> *"FCS did not maintain compliance in all cases to the Updated Safety Analysis Report, Appendix A, Section 4.0, Design Control, such that non-safety graded parts would not be installed in safety grade applications. This would result in failure to comply with the FCS design basis. Design basis compliance is not assured."*

The team also assessed the adequacy of the extent of condition, extent of causes, and corrective actions (CL Items 3.b.1.1; 3.b.1.2; 3.b.1.3).

The team's assessment of this RCA was based on the evaluation criteria from Section 02.02 of NRC Inspection Procedure 95001, which aligned with this item. The inspection objectives were to:

- Provide assurance that the apparent and contributing causes of risk-significant issues were understood
- Provide assurance that the extent-of-condition and extent-of-cause of risk-significant issues were identified
- Provide assurance that the licensee's corrective actions for risk-significant performance issues were, or will be, sufficient to address the apparent and contributing causes and to preclude repetition

(2) Observations and Findings

Determine that the problem was evaluated using a systematic methodology to identify the root and contributing causes.

The team determined that the licensee evaluated this problem using a systematic methodology to identify the root and contributing causes. Specifically, RCA 2012-05615 employed the use of event and causal factor charting, barrier analysis, common factor analysis, and the why staircase. The licensee identified the following as the root cause for why FCS has allowed non-safety-related parts to be installed in safety grade applications:

> *RC-1: Inadequate procedural guidance and an ineffective training/mentoring process have resulted in an ineffective work planning and review process with the potential for non-CQE parts being installed where CQE parts are required.*

(CQE stands for critical quality element and is synonymous with safety-related).

The licensee's RCA also identified the following contributing causes:

CC-1: A lack of adequate reference documents and resources/tools (BOM, CQE List, Asset Suite, etc.) for planners, engineers, and maintenance personnel to reference exists.

CC-2: Ownership of important resources (Bill of Materials, CQE List, Asset Suite) is not known by Station personnel.

CC-3: Overconfidence in Station personnel abilities to accomplish work has resulted in inadequate use of human performance tools and a rationalization that current expectations, standards, and performance are sufficient for Station needs.

CC-4: Station personnel were willing to work around Station procedures using "tribal" knowledge (experience) to complete tasks which resulted in a procedure use and adherence issue.

CC-5: The CAP has not fully assessed and effectively resolved identified CQE issues.

CC-6: A station personnel knowledge gap exists for the CQE classification boundaries and dedication requirements.

The team determined that these root and contributing causes reasonably explain why the safety-related parts program at FCS failed to maintain design control such that non-safety graded parts have been installed in safety grade applications. However, the team identified that the RCA appeared to be incomplete because it did not address the licensee's ability to properly classify structures, systems, and components as safety-related. NRC's Manual Chapter 0350 Panel FCS Restart Checklist Basis Document, Item 3.b.1, Safety-Related Parts Program, specifically identified that the NRC will assess the licensee's equipment design quality classifications review for inconsistent quality classifications. The team identified several examples of improperly classified components during this inspection indicating that corrective actions are needed in this area. The team identified a URI associated with these incorrect classifications, which is discussed in Section 7 of this report as URI 05000285/2013008-22, "Fort Calhoun Station's Ability to Classify Components as Safety-Related." The team also identified a URI associated with the licensee's use of piping codes which is discussed in Section 7 of this report as URI 05000285/2013008-23, "Code of Record for Safety-Related Piping Systems."

Determine that the root cause evaluation was conducted to a level of detail commensurate with the significance of the problem.

The team determined that the RCA was conducted to a level of detail commensurate with the significance of the problem. Specifically, as discussed above, the licensee conducted this evaluation not only by using event and causal factor charting, barrier analysis, and the why-staircase, but also by conducting interviews, reviewing documents, and attending meetings. The licensee's RCA techniques were generally thorough and identified the root and contributing causes of deficiencies in the safety-

related parts program relative to work planning and work control. However, the team did identify that the root cause was incomplete because it failed to address the root and contributing causes of why the licensee has had continuing difficulties in the safety classification of structures, systems, and components.

Determine that the root cause evaluation included a consideration of prior occurrences of the problem and knowledge of prior operating experience.

The team determined that the RCA included evaluations of both internal and industry operating experience. The team determined that the licensee's evaluations of industry operating experience provided sufficient detail such that general conclusions could be established regarding any similarities.

Determine that the root cause evaluation addressed the extent of condition and the extent of cause of the problem.

The team reviewed the licensee's RCA as it relates to extent of condition and extent of cause.

For extent of condition, the licensee evaluated the extent to which the actual condition exists with other plant processes, equipment, or human performance. The licensee's analysis used the same-same, same-similar, similar-same, and similar-similar evaluation method. The licensee concluded that the extent of condition does exist relative to other processes, procedures or commitments where nonconformity with established requirements could result in a non-compliance with the FCS design basis. The licensee also found that an extent of condition may exist for nuclear safety culture which has not been fully addressed by causal analysis but can affect the station's commitment to written agreements related to the FCS design basis. The licensee initiated Condition Report CR 2012-17437 to address this extent of condition issue.

The team noted that the licensee's did not specifically document where the actual condition of non-safety-related components may exist in safety-related equipment as part of the extent of condition. This was determined to be a documentation oversight since, through interviews; the team found that the licensee had a comprehensive plan to address this element of extent of condition established under Action Item 29 of Condition Report CR 2011-09459 and CA-13 of Condition Report CR 2012-05615. That plan reviewed safety-related WOs for the past two cycles to identify where non-safety parts were inappropriately used in safety-related applications. The team found that these corrective actions would reasonably address any current issues where non-safety-related components were used in safety-related applications. The team determined that while the licensee's strategy to address extent of condition was technically sound, the failure of the RCA to address weaknesses in the ability to classify safety-related components could result in a less than adequate extent of condition review.

For extent of cause, the licensee reviewed the root causes of an identified problem to determine where they may have impacted other plant processes, equipment, or

human performance. The licensee's analysis determined that an extent of cause does exist related to the adequacy of non-accredited training programs. The licensee initiated Condition Reports CR 2012-18335 to address the issues identified with non-accredited training.

Determine that the root cause, extent of condition, and extent of cause evaluations appropriately considered the safety culture components as described in IMC 0310.

The root cause, extent of condition, and extent of cause evaluations appropriately considered the safety culture components as described in IMC 0310. Specifically, the licensee documented their consideration of the IMC 0310 cross-cutting aspects in Attachment 11 of RCA 2012-05615. The licensee identified several cross-cutting aspects in the area of human performance, problem identification and resolution, and other components were applicable to issues related to deficiencies in identifying degraded/nonconforming conditions and operability evaluations. The final evaluation concluded that only a small number of the safety culture attributes were not to be applicable to RCA 2012-05615.

Determine that appropriate corrective actions are specified for each root and contributing cause.

The team reviewed the licensee's corrective actions for each of the root and contributing causes. The team found that the corrective actions addressed the root and contributing causes for why the licensee has allowed non-safety graded parts to be installed in safety grade applications. The team noted that the corrective actions focused primarily on work planning procedure changes and development and implementation of training for work planners. The team also found that Corrective Action 13 of Condition Report CR 2012-05615 which implemented a review of the past two cycles of safety-related work order adequately addressed the extent of condition relative to where non-safety parts may have been inappropriately used in safety-related applications. The team did note that the licensee's corrective action plan did not include any actions to address weaknesses in the station's ability to classify structures, systems, and components. The team determined that the licensee's corrective actions would only be effective once weaknesses in the ability to classify safety-related components are corrected.

Determine that a schedule has been established for implementing and completing the corrective actions.

The team determined that a schedule has been established for implementing and completing the corrective actions. The team found that corrective actions to prevent recurrence had been scheduled or implemented which included procedures changes and implementation of necessary training for work planners. Additionally, corrective actions to address the contributing causes had been scheduled. The team determined that that licensee's schedule for implementing corrective actions appeared to be commensurate with the significance of the issues they are addressing.

Determine that quantitative or qualitative measures of success have been developed for determining the effectiveness of the corrective actions to prevent recurrence.

The team determined that quantitative or qualitative measures of success have been developed for determining the effectiveness of the corrective actions to prevent recurrence. The licensee established, in part, effectiveness reviews consisting of independent self-assessments to determine if the necessary guidance for planners to resolve CQE issues was incorporated into FCS procedures. Additionally, the licensee identified interim and final effectiveness reviews consisting of independent self-assessments to review condition reports and WOs for CQE related issues. The review provided specific performance measure to verify the frequency of CQE related issues is reduced. The team determined that the licensee's effectiveness criteria did meet the criteria established in Procedure FCSG 24-7, "Effectiveness Review of Corrective Actions to Prevent Recurrence (CAPRs)," Revision 1, in that the effectiveness review specified specific success criteria.

(3) Assessment Results

Based on the finding that the RCA associated with CR 2012-05615 did not address the ability of the licensee to properly classify structures, systems, and components as safety-related, restart checklist item 3.b.1 will remain open.

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

(1) Inspection Scope

The team reviewed the licensee's high energy line break (HELB) analyses and supporting documents to ensure the plant is within the license and design basis for HELB effects. (CL Item 3.b.2)

(2) Observations and Findings

The team reviewed FCS's reconstituted design analyses for the HELB program, FC07863, "HELB Mass and Energy Release in the Auxiliary Building for FCS," Revision 0, FC07864, "HELB Environmental Analysis for FCS Auxiliary Building," Revision 0, and FC07889, "HELB Analysis for FCS Auxiliary Building Room 81," Revision 0. In general, the team found the licensee's analyses to be complete and thorough, but noted that modifications were still in progress to fully implement the new analysis. Based on their reviews, the team determined that the reconstituted HELB analyses should provide reasonable assurance that regulatory requirements are being met when all modifications are completed. The team was unable to review and assess the equipment qualification reconstitution due to the program not being complete and ready for inspection.

The team identified the following issues during their review:

a. While preparing for the inspection, the licensee questioned the team regarding the need for an RCA for the reconstitution activities. Specifically, the licensee

noted that the Manual Chapter 0350 Restart Checklist Bases Document, dated November 13, 2012, stated:

> "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."

The team determined that the licensee had previously identified issues with the electrical equipment qualification and HELB programs, as documented in Condition Reports CR 2007-02715 and CR 2008-01186. The licensee had determined that all regulatory requirements were currently being met by the program; the issue was a failure to meet industry best practices. The licensee subsequently performed an RCA to determine why FCS's electrical equipment qualification program (this includes the HELB program) did not meet industry standards. The licensee determined the root cause of this issue to be organizational changes caused a loss of knowledge transfer and documentation which was exacerbated by; the historical design basis documents not always being retrievable and auditable, and there being no rigorous review of the environmental qualification program since the early 1990s. The licensee's corrective actions focused on complying with industry best practices.

The team noted that the licensee documented degraded or nonconforming conditions in the CAP. As the licensee resolved these conditions of programmatic weaknesses and documentation deficiencies the licensee discovered additional issues with the programs, including lack of design bases analyses, equipment configuration, and equipment qualification issues. Based on this, the licensee recognized the need to reconstitute the electrical equipment qualification program, and initiated the electrical equipment qualification program corrective action project in 2008. The team determined that this program was performed outside of the CAP.

The team reviewed Procedures SO-R-2, "Condition Reporting and Corrective Action," Revision 53a, and FCSG-24-1, "Condition Report Initiation," Revision 3, to determine the standards with regard to condition report initiation and cause evaluation. The team noted that both procedures required that conditions adverse to quality be entered into the CAP. The team also noted that Procedure SO-R-2 defined a significant condition adverse to quality as, "An event or condition that is a significant condition adverse to quality that has major potential or actual impact. The event presents significant risk or consequences to the safe, reliable operation of the plant, personnel safety, or organizational and human behaviors, such that, recurrence is unacceptable." The team determined that the programmatic degradation of the electrical equipment qualification program and HELB program constituted a significant condition adverse to quality

as defined by Procedure SO-R-2. Next, the team reviewed the requirements of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action." The team noted that Criterion XVI required that for significant conditions adverse to quality, the measures taken by the licensee shall assure that the cause of the condition is determined and that corrective action taken to preclude repetition. Based on this, the team determined that the licensee had failed to enter a significant condition adverse to quality into the CAP. The team informed the licensee of their concerns and Condition Report CR 2013-02857 was initiated to capture the issue in the CAP. The licensee subsequently determined that an RCA was required for this issue.

b. During review of the station's analyses, the team determined that the approved design analysis contained in FC07864 was not representative of current plant configuration. Specifically, the team noted that the analysis credited auto isolation of Room 13 based on room temperature. However, the team determined that the actual configuration of the plant did not have this isolation feature fully installed, tested, and operable. The team determined that the licensee had approved this analysis before fully implementing this feature. The licensee initiated Condition Report CR 2013-04501 to address this issue.

c. The team determined that the reviews conducted by the licensee during their reconstitution program for the HELB program had failed to identify potentially inaccurate information contained in the USAR. Specifically, Appendix M, "Postulated High Energy Line Rupture Outside the Containment," evaluated the affects of flooding in auxiliary building Room 81, and its potential to affect equipment in other rooms. The USAR noted that water would accumulate on the floor of the room, and that certain modifications had been made to ensure that water will not pass through the floor of Room 81 around piping, cable trays, conduit and ventilation ductwork into the switchgear area and electrical penetration area on the floor below. The evaluations of Room 81 flooding also assumed that leakage through cracks in the concrete flooring was minimal, within the capability of floor drains, and that leakage would not impact the operation of safety-related equipment in the rooms below. During discussions with the licensee, the team determined that there were no floor drains in the switchgear area and electrical penetration area on the floor below. The licensee initiated Condition Reports CR 2013-04501 to address this issue.

d. The team performed an independent review of the licensee's maintenance rule scoping, classification, and performance evaluations of the equipment credited with preventing water migration into the switchgear area and electrical penetration area on the floor below the penetration seals in Room 81. The team determined that the licensee had not appropriately demonstrated that the penetration seals could perform their intended function through testing. The team noted that the licensee was only performing visual inspections of the penetration seals. However, some of the seals were housed in encasements that would not allow full inspections, and a visual inspection would not demonstrate the ability of the seal to prevent water and steam migration into the adjoining rooms. The team determined this to be a non-cited violation of 10 CFR

50.65(a)(2), “Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants,” which is documented in Section 7 of this report as NCV 05000285/2013008-24, “Failure to Effectively Monitor the Performance of Penetration Seals.”

e. The team reviewed the licensee’s resolution of CR 2012-05509. This condition report questioned the adequacy of air operated valves inside containment to withstand containment main steam line break and loss of coolant accident temperatures because the valves have nitrile based elastomers used in the air filter regulator and actuator. The licensee identified a population of susceptible valves inside the containment. During their review, the team determined that the licensee had missed two previous opportunities to identify that there were additional valves, both inside and outside containment, with similar lower temperature rating nitrile elastomers. The team identified performance deficiencies associated with 10 CFR Part 50, Appendix B, Criterion III, “Design Control,” which are documented in Section 7 of this report as NCV 05000285/2013008-25, “Deficient Evaluation for Known Degraded Conditions: Safety-Related AOV Elastomers not Qualified for HELB/LOCA Temperatures,” and NCV 05000285/2013008-26, “Failure to Properly Inspect, Maintain, and Test Emergency Feedwater Tank Equipment.”

f. During the team’s review of HELB assumptions and steam flow paths, the team identified a potential unmonitored release point. The team identified URI 05000285/2013008-27, “Continuous Monitoring Capability of Post Accident Main Steam Radiation Monitor RM-064,” associated with this concern which is documented in Section 7 of this report.

(3) Assessment Results

The team concluded that the analyses associated with the licensee’s HELB reconstitution program were adequate and when all of the proposed modifications were completed would serve to demonstrate regulatory compliance. However, the team determined that the licensee had failed to adequately determine the cause of the program’s decline/failure and implement corrective actions to prevent recurrence of this issue. The team also noted that the licensee’s equipment qualification program was not ready for inspection. Based on these issues, restart checklist item 3.b.2 will remain open.

Item 3.c: Design Changes and Modifications

(1) Inspection Scope

The team verified that selected actions being implemented by the licensee adequately addressed design changes and modifications to the facility. These items are listed in the FCS Flooding and Recovery Action Plan, Revision 3, dated July 9, 2012. Specifically, the team assessed the effectiveness of the licensee’s implementation of changes to facility structures, systems, and components, evaluations required by 10 CFR 50.59, and the USAR, to provide assurance that

changes implemented by the licensee have been appropriately implemented. (CL Items 4.5.1.1; 4.5.1.2)

(2) Observations and Findings

The team performed an independent review of Modification EC 53202, "Modify Piping and Supports for FW-10 MS Supply for HELB Concerns," Revision 0. This was a limited scope review, looking only at the modification package, since the in-plant modification was not completed at the time of this inspection. During this review, the team assessed the effectiveness of the licensee's process for preparing the modification, the associated evaluations required by 10 CFR 50.59, and how required updates to the USAR were identified for incorporation.

(3) Assessment Results

The team concluded that the licensee had appropriately evaluated this modification. Pending installation and acceptance of this modification and follow-up assessment by the NRC, restart checklist item 3.c will remain open.

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

(1) Inspection Scope

The team evaluated the adequacy of the licensee's assessment of the 10 CFR 50.59 process, 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. (CL Items 3.c.2.1; 3.c.2.2; 3.c.2.3)

In addition, for the NRC items specifically related to the 10 CFR 50.59 concerns, the team verified that the licensee performed adequate root cause and extent of condition evaluations related to the design change process. The team verified that the licensee identified adequate corrective actions associated with the root and contributing causes, and the extent of condition and cause evaluations. The team also verified that the licensee implemented or appropriately scheduled the implementation of these corrective actions. (CL Items URI 2011014-02; and NCV 2010004-05)

(2) Observations and Findings

Determine that the problem was evaluated using a systematic methodology to identify the root and contributing causes.

The team determined that the licensee evaluated the problem using several systematic methodologies to identify the root and contributing causes. The licensee used the following systematic methods to complete the RCA report: (1) Event and Causal Factor Charting; (2) Barrier Analysis; (3) Stream Analysis; and (4) Data gathering through interviews and document reviews.

Determine that the root cause evaluation was conducted to a level of detail commensurate with the significance of the problem.

The team determined that the licensee conducted the root cause evaluation to a level of detail commensurate with the significance of the problem. The licensee identified two root causes for the condition that existed, which were station management oversight and station personnel were not always identifying design functions and critical characteristics, in part, due to using the wrong design change process, unclear licensing basis documents, having low standards, and lack of knowledge of the current licensing basis (CLB), 10 CFR 50.59, and 10 CFR 72.48 processes.

Determine that the root cause evaluation included a consideration of prior occurrences of the problem and knowledge of prior operating experience.

The team determined that the root cause evaluation included a consideration of prior occurrences of the problem and knowledge of prior operating experience. The licensee identified occurrences and operating experience of the problem as a part of the event and causal factor and barrier analysis evaluations. However, the team identified that the RCA did not provide an external operating experience conclusion in the RCA report (i.e., the licensee conducted a review of external operating experience but did not establish a conclusion for the review). The RCA stated, in part, that the information was limited and did not provide FCS with any real cause to evaluate external operating experience. The team concluded that the external operating experience reviewed by the licensee was relevant to FCS because similar conditions occurred at other facilities. The licensee generated Condition Report CR 2013-04205 to capture this performance gap.

Determine that the root cause evaluation addressed the extent of condition and the extent of cause of the problem.

The team determined that the licensee's root cause evaluation did not fully address the extent of condition and the extent of cause of the problem. The team determined that the scope of the RCA focused on events within the past five years for the extent of condition and the extent of cause of the problem. However, based on NRC inspection, and interviews with the licensee's recovery team members, there were a number of plant changes identified outside the scope of the 50.59 RCA review period that failed to receive prior NRC review and approval before implementation (e.g., tornado missiles and piping code modifications). These latent design control practices could potentially have an adverse affect on the design change process. Additionally, the team identified recent 50.59 issues that the licensee did not discover during the scope of the RCA review (e.g., CCW automatic to manual design function change for adding water and shutdown cooling change issues). Specifically, Section 7 of this report documents the following non-cited violation and unresolved items associated with the team's review of this area:

NCV 05000285/2013008-28, "Failure to Perform an Evaluation for a Change to Component Cooling Water Make-up"

URI 05000285/2013008-29, “Use of Alternate Seismic Evaluation Criteria”

URI 05000285/2013008-30, “Evaluation of Change to Alternate Shutdown Cooling Flowpath”

As a part of the review of the extent of condition and cause, the team reviewed the apparent cause report related to restart checklist item NCV 2010004-05, “Failure to Perform a 50.59 Evaluation for a Motor Control Center (MCC) Feeder Cable Splice.” The team identified some performance deficiencies associated with the corrective actions for NCV 2010004-05. The team noted that the licensee’s evaluation determined that the apparent cause was due to misjudgment by the design engineer performing the 50.59 screening. However, the corrective action did not address the apparent cause, in that, the corrective action was to revise the screening and prepare an evaluation. The team concluded that a revision of the screening did not address a human performance error of misjudgment by the design engineer. The team considered this performance deficiency as minor because another corrective action associated with one of the contributing causes addressed this issue. The licensee entered this issue of concern into their CAP as Condition Report CR 2013-04215 to capture this performance gap. The team also identified that the extent of condition review for NCV 2010004-05 did not identify all applicable condition reports related to inadequate 50.59 screenings and evaluations. However, the licensee did capture most of these condition reports in the overall RCA for the 10 CFR 50.59 process restart checklist item.

An NRC special inspection team identified an unresolved item related to the licensee’s implementation of the requirements of the 10 CFR 50.59 process due to a modification that replaced circuit breakers in the 480 Vac system in NRC Inspection Report 05000285/2011014, ML 12072A128. The team reviewed the unresolved item, condition reports, and additional information related to restart checklist item URI 2011014-02, “Failure to Perform an Adequate 50.59 Review for the 480V Main and Bus-Tie Breakers with Molded Case Type or Equivalent.” Based on this review, the team determined that the licensee did not perform an adequate screening, which would have determined that the licensee needed an evaluation with the potential to need prior NRC review and approval. However, the licensee identified this issue of concern as a part of their RCA report for this 10 CFR 50.59 process restart checklist item. The team determined that since the licensee identified this issue in the RCA report, and it was associated with the design control Red finding violation, then a review of those corrective actions would allow the team to close this unresolved item.

<u>Determine that the root cause, extent of condition, and extent of cause evaluations appropriately considered the safety culture components as described in IMC 0310</u>.

The team determined that the root cause, extent of condition, and extent of cause evaluations appropriately considered the safety culture components as described in IMC 0310. The licensee reviewed each safety culture component and determined if the condition was applicable so that they could link the component to a root or contributing cause.

Determine that appropriate corrective actions are specified for each root and contributing cause.

The team determined that the licensee specified appropriate corrective actions for each root and contributing causes. However, the team identified that only one of the three corrective actions to prevent reoccurrence (CAPRs) for the root causes were in place. Specifically, the CAPR for root cause 2 (RC2) implemented a team to evaluate all engineering changes as an interim action. The licensee called the team established in accordance with this corrective action the Engineering Assurance Group (EAG). The EAG started performing these evaluations on December 10, 2012. The EAG created performance indicators (PIs) to review the progress of engineering changes. The EAG identified a number of issues that resulted in a red PI in the 50.59 screening process in a relative short period. However, the team identified that there was no feedback mechanism to provide to the engineering departments performing these engineering changes. Additionally, the team noted that there was no condition report written for the Red PI. Furthermore, based on a review of the actions to date, the team determined that this interim action CAPR did not fully address the entire second root cause (RC2), in that the interim action CAPR did not address the unclear licensing basis documents, or the 50.59 database being inaccurate or not updated. Specifically, there were no corrective actions in place to ensure an update of the CLB documents and that the licensee trained FCS personnel to understand those documents. The team concluded that changes to the facility would be impacted by the incomplete understanding of the existing design and licensing bases.

Determine that a schedule has been established for implementing and completing the corrective actions.

The team determined that the licensee established a schedule for implementing and completing some of the corrective actions. For example, the team noticed that the licensee scheduled corrective actions to address the contributing cause for poor engineering performance. The licensee scheduled the initial training for March 15, 2013. However, the licensee moved the training to an undetermined date. The team concluded that the licensee had not established or assigned a new date at the time of this inspection. The team also concluded that the licensee had poor controls over engineering changes for a number of years which led to inconsistent implementation of design changes. Prior to the root cause evaluation, the team determined that the licensee did not have a formal process for the Plant Review Committee members who reviewed 50.59 evaluations (i.e., no checklist), and did not establish performance indicators for deficient 50.59 screening and/or evaluations.

Determine that quantitative or qualitative measures of success have been developed for determining the effectiveness of the corrective actions to prevent recurrence

The team determined that the licensee developed quantitative and qualitative measures of success for determining the effectiveness of the corrective actions to prevent recurrence. These effectiveness reviews consisted of developing

performance indicators to track and analyze trends of performance gaps in the 10 CFR 50.59 and 10 CFR 72.48 processes.

(3) Assessment Results

The team concluded that, for the most part, the licensee understood the root and contributing causes of this risk-significant issue associated with 10 CFR 50.59 Screenings and Safety Evaluations. Therefore, restart checklist item 3.c.2.1 will be closed.

However, the licensee's corrective actions to prevent reoccurrence for the second root cause did not fully address the lack of knowledge of the design and licensing basis, and the unclear licensing basis documents used to perform the 10 CFR 50.59 screenings and safety evaluations. In addition, the team concluded that the licensee needed to extend their scope because of the number of issues identified by the NRC that needed potential license amendments. Therefore, restart checklist items 3.c.2.2 and 3.c.2.3 will remain open.

Based on the team's independent inspections, as discussed in the Observations and Findings section above, and the licensee's action to restore compliance for NCV 2012004-01 and actions taken under Condition Report CR 2012-03796, the restart checklist items associated with the review of URI 2011014-02 and NCV 2010004-05 will be closed.

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

(1) Inspection Scope

a. The team reviewed the licensee's assessment of issues related to the Vendor Information Control Program. The team evaluated 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. Specifically, the team assessed Condition Report CR 2012-09227, for which the problem statement was:

"FCS did not adequately maintain control of vendor manuals design control information as required by NRC regulations, ongoing commitments to the NRC, and station procedures."

The team also assessed the adequacy of the extent of condition, extent of causes, and corrective actions (CL Items 3.d.1.1; 3.d.1.2; 3.d.1.3).

The team's assessment was based on the evaluation criteria from Section 02.02 of NRC Inspection Procedure 95001, which aligned with this item. The inspection objectives were to:

- Provide assurance that the apparent and contributing causes of risk-significant issues were understood

- Provide assurance that the extent-of-condition and extent-of-cause of risk-significant issues were identified

- Provide assurance that the licensee's corrective actions for risk-significant performance issues were, or will be, sufficient to address the apparent and contributing causes and to preclude repetition

b. For an NRC item specifically related to vendor manual and vendor information control concerns, the team verified that the licensee has performed adequate casual analysis and extent of condition evaluations related to the issue. In addition, the team verified that adequate corrective actions were identified associated with the causes and extent of condition evaluations and that implementation of these corrective actions were either implemented or appropriately scheduled for implementation. (CL Item NCV 2011006-05)

(2) Observations and Findings

a. Determine that the problem was evaluated using a systematic methodology to identify the apparent and contributing causes.

The licensee used the following systematic methods to complete the ACA associated with vendor control manual information control issues: events and causal factor charting, cause and effect analysis, barrier analysis, data gathering through interviews, and document review. The licensee used a human performance gap analysis to evaluate human performance issues. The team determined that the licensee evaluated the issue using a systematic methodology to identify apparent and contributing causes.

Determine that the apparent cause evaluation was conducted to a level of detail commensurate with the significance of the problem.

The licensee's ACA included an adequate event and causal factor chart to determine apparent and contributing causes. The licensee identified the apparent causes of the issue to be: (1) the removal of all staff from the vendor manual program group and (2) station procedures for processing engineering changes were inadequate to ensure vendor manual design control information was current, accurate, and complete. The licensee determined that the contributing causes included: (1) ineffective change management when deciding to remove all staff from the vendor manual group; (2) the lack of a trending process for vendor information control issues; and (3) personnel knowledge and skill gaps associated with vendor manual information control that is not being effectively addressed by training. Based on the work performed for this ACA, the team concluded that the ACA was conducted to a level of detail commensurate with the significance of the problem.

Determine that the apparent cause evaluation included a consideration of prior occurrences of the problem and knowledge of prior operating experience.

The licensee's ACA included an evaluation of internal and external operating experience. The licensee considered prior occurrences and operating experience. As a result of this review, the licensee determined that vendor manuals were not up to date and not consistently updated per the engineering change process. The licensee also determined that procedures and work instructions did not consistently incorporate vendor recommendations, and FCS procedures did not exist to incorporate vendor recommendations. Based on the licensee's evaluation and conclusions, the team determined that the licensee's ACA adequately considered prior occurrences of the problem and knowledge of prior operating experience.

Determine that the apparent cause evaluation addressed the extent of condition and the extent of cause of the problem.

The licensee's evaluation considered the extent of condition associated with the lack of vendor manual control. The licensee determined that the issues associated with vendor manual control also applied to the operating experience program (NOD-QP-21). NRC inspectors had previously identified problems with vendor manual control during the PI&R inspection in 2011. These concerns, which were previously documented in Inspection Report IR 05000285/2011006 as a Green non-cited violation, were captured in the licensee's extent of condition evaluation. The licensee's evaluation also considered the extent of cause associated with the lack of vendor manual control. The licensee determined that the issue of removing all the staff from the vendor manual program had the potential to affect any program or process at the site. The ACA documented the potential for the operating experience, configuration control, and preventative maintenance programs to be impacted by resource allocation and management issues. The licensee determined that the issues related to inadequate procedures for processing engineering changes to ensure vendor manual design control information was current, accurate, and complete was a subset of configuration control issues previously identified and being evaluated under the engineering design and configuration control FPD. The team concluded that the licensee's ACA addressed the extent of condition and the extent of cause of the issue.

Determine that the apparent cause, extent of condition, and extent of cause evaluations appropriately considered the safety culture components as described in IMC 0310.

The apparent cause, extent of condition, and extent of cause evaluations appropriately considered the safety culture components as described in IMC 0310. Specifically, the licensee documented their consideration of the IMC 0310 cross-cutting aspects in Attachment 5 of the apparent cause evaluation associated with Condition Report CR 2012-03986. The licensee identified several cross-cutting aspects in the area of human performance, problem identification and resolution and other components were applicable to issues related to vendor manuals information control issues.

Determine that appropriate corrective actions are specified for each apparent and contributing cause.

The corrective actions for the apparent and contributing causes listed in the ACA appear to be appropriate. To address the apparent cause related to the removal of staff from the vendor manual program group, the licensee has staffed the vendor manual group with oversight, and ensured safety-significant vendor information was current and continued to be updated. The inability to ensure vendor manual design control information was current, accurate, and complete due to inadequate procedures for processing engineering changes will be addressed through procedure revisions.

The RCA for organizational ineffectiveness will address the contributing cause associated with ineffective change management when deciding to remove all staff from the vendor manual group. Trending codes will be added to the CAP and related procedures will be updated to correct the lack of a trending process for vendor information control issues. The licensee will develop new training to improve the knowledge and skill gaps associated with vendor manual information control. The team determined that the proposed corrective actions were appropriate and addressed the apparent and contributing causes.

Determine that a schedule has been established for implementing and completing the corrective actions.

The team determined that a schedule has been established for implementing and completing the corrective actions. In general, the team found that the timeline established was commensurate with the significance of the issues being addressed.

Determine that quantitative or qualitative measures of success have been developed for determining the effectiveness of the corrective actions to prevent recurrence.

The team found that no effectiveness reviews were developed for Condition Report Condition Report CR 2012-09227 since issues related to vendor manual information control issues were only evaluated under an apparent cause evaluation, and therefore, did not include corrective actions to prevent recurrence. The team found that this was consistent with Procedure FCSG 24-7, “Effectiveness Reviews of Corrective Actions to Prevent Recurrence (CAPRs)”, Revision 1.

b. Non-cited violation NCV 05000285/2011006-05 documents a green non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, “Design Control,” for the failure of FCS personnel to establish adequate measures for the selection and review for suitability of application of parts equipment, and processes that are essential to the safety-related function of structures, systems, and components. Specifically, the NCV 05000285/2011006-05 identified numerous condition reports involving inadequate implementation of vendor manual information that affected the suitability of application of parts equipment, and processes that are essential to the safety-related function of structures, systems, and component repair and refurbishment activities over an extended period.

   The team reviewed the licensee’s corrective actions to address NCV 05000285/2011006-05 which included actions taken under Condition Report CR

2012-09227. The team concluded that the actions taken under this condition report including the development of an apparent cause, identification of extent of condition and implementation of corrective actions will be sufficient to address the performance deficiency identified in NCV 05000285/2011006-05.

(3) Assessment Results

a. The team concluded that for Condition Report CR 2012-09227: the apparent and contributing causes of risk-significant issues were understood; the extent-of-condition and extent-of-cause of risk-significant issues were identified; and, the licensee's corrective actions for risk-significant performance issues were, or will be, sufficient to address the apparent and contributing causes and to preclude repetition. Therefore, restart checklist item 3.d.1 will be closed.

b. Based on the licensee's actions to address NCV 05000285/2011006-05, the associated restart checklist item will be closed.

Item 3.e: Operability Process

(1) Inspection Scope

The team reviewed the licensee's assessment of the FPD associated with Processes to Meet Regulatory Requirements specifically related to the Operability Determination process. Specifically, the team assessed the RCA for Condition Report CR 2012-09494, which identified the following programmatic and cultural deficiencies:

- Deficiencies in the accurate identification of current licensing basis degraded/nonconforming conditions
- Operability determinations/functionality assessments are not sufficiently rigorous
- Discrepant conditions are not always resolved in a timely manner commensurate with the safety significance of the condition
- Cause analysis and extent of condition are not consistently rigorous to identify the underlying cause of the equipment's deficient condition and the broadness impact of the condition
- The characteristics necessary for equipment to be fully qualified are not well understood or applied

The team also assessed the adequacy of the extent of condition, extent of causes, and corrective actions. (CL Items 3.e.1; 3.e.2; 3.e.3)

The team's assessment of this FPD was based on the evaluation criteria from Section 02.02 of NRC Inspection Procedure 95001 which align with this item. The inspection objectives were to:

- Provide assurance that the root and contributing causes of risk-significant issues were understood
- Provide assurance that the extent-of-condition and extent-of-cause of risk-significant issues were identified
- Provide assurance that the licensee's corrective actions for risk-significant performance issues were, or will be, sufficient to address the root and contributing causes and to preclude repetition

(2) Observations and Findings

Determine that the problem was evaluated using a systematic methodology to identify the root and contributing causes.

The team determined that the licensee evaluated this problem using a systematic methodology to identify the root and contributing causes. Specifically, RCA 2012-09494 employed the use of barrier analysis to identify applicable causal factors. The licensee further refined the results of the barrier analysis by use of a "Five Whys" analysis to determine the root causes. The licensee then evaluated the cause statements against "cause testing" established in FCS procedures to confirm the root and contributing causes. The licensee identified the following as root causes for the FPD:

RC-1: Leadership has not provided adequate governance and oversight for key regulatory required programs and activities.

RC-2: Operations leadership did not recognize the risk associated with failing to keep pace with the industry standard for an Operations led organization.

The team found that the supporting systematic analysis did not fully support RC-1 and RC-2 as the only root causes for the FPD related to evaluating degraded/nonconforming conditions and the operability determination process. Specifically, the barrier analysis identified many additional failed barriers involving processes, skills, and knowledge issues. Through the "Five Whys" analysis, the licensee determined that deficiencies in leadership and governance and oversight (RC-1 and RC-2) directly led to all of the failed barriers identified in the RCA. However, the team noted that the supporting analysis did not establish a strong correlation between the failed barriers and how leadership and adequate governance and oversight would have prevented the failed barriers. Additionally, the team noted that the systematic techniques employed, while meeting procedural requirements, could lead to very subjective results. Specifically, the team noted that the licensee relied heavily on the "Five Whys" for determining the root causes of this FPD. The

team found that an event and causal factor chart or other more rigorous systematic techniques were not used for this particular root cause which was atypical for a programmatic performance issue of this nature.

In the final analysis, the licensee documented the additional failed barriers involving processes, skills, and knowledge issues as contributing causes. The team noted that several of the contributing causes more closely fit the definition of a root cause in FCS procedures. A root cause is defined in Procedure FCSG 24-4, "Condition Report and Cause Evaluation", Attachment 1, Section 1.17, as the most basic, fundamental cause(s) of a problem, which if corrected, will prevent recurrence of the identified problem and similar problems. The following three contributing causes were identified by the inspection team as fundamental causes, which if corrected, would likely prevent recurrence of the identified problem or similar problems:

CC-2: Processes to perform, and support performance of, Degraded/Non-Conforming Condition identification and Operability Determinations are not adequate to ensure consistently accurate and timely determinations.

CC-3: Knowledge and skills to perform, and support performance of, Degraded/Non-Conforming Condition identification and Operability Determinations are not adequate to ensure consistently accurate and timely determinations.

CC-4: Tools used to perform, and support performance of, Degraded/Non-Conforming Condition identification and Operability Determinations are not adequate to ensure consistently accurate and timely determinations.

The team evaluated each of the root and contributing cause against the cause testing criteria used by the licensee and described in Procedure FCSG-24-5, "Cause Evaluation Manual", Attachment 1, Section 34.0. In general, the team found it difficult to exclude contributing causes 2, 3, and 4 as root causes. Specifically, when evaluated against the "cause test" questions from Section 34.0, the team could possibly answer "YES" to each of the following three questions suggesting that contributing cause 2, 3, and 4 had elements more closely related to a root cause.

1. If this cause being considered was absent, would the event that initiated the evaluation have occurred?

2. If this cause is eliminated, is there a way for the same event to occur?

3. If this cause is eliminated, will there be future similar events?

As an example, for question 2 above, the team found that if contributing cause 3 was eliminated (i.e. question is a "YES"), operators and engineers would not have the knowledge and skills to perform, and support identification of degraded/nonconforming condition and performance of operability determinations. If this were to occur, the team determined there would be a way for the same event to occur suggesting contributing cause 3 is more closely related to a root cause.

The team did agree that issues involving leadership and adequate governance and oversight likely played a significant role in the deficiencies in identifying degraded/nonconforming conditions and in performing operability determinations. The team discovered through interviews that the licensee considered management oversight as the ultimate backstop against the FPD. The team disagreed with the licensee that leadership and adequate governance and oversight should be the only barrier in place to prevent recurrence of this FPD and that additional defense in depth barriers, such as those involving contributing causes 2, 3, and 4, should also be in place to prevent recurrence of deficiencies in identifying degraded/nonconforming conditions and performance of operability determinations.

Determine that the root cause evaluation was conducted to a level of detail commensurate with the significance of the problem.

The licensee's RCA employed various techniques to analyze the events. In general, the quality of analysis was sound and identified several failed barriers in the process for identification of degraded/nonconforming conditions and operability determinations. In some cases, the team could not identify how each of the failed barriers was addressed in the development of the root and contributing causes. As discussed above, the team identified that the root and contributing causes may not be appropriately characterized which could lead to an inadequate prioritization of corrective actions.

Determine that the root cause evaluation included a consideration of prior occurrences of the problem and knowledge of prior operating experience.

The team determined that the RCA included evaluations of both internal and industry operating experience. The licensee's evaluations of industry operating experience provided sufficient detail such that general conclusions could be established regarding any similarities.

Determine that the root cause evaluation addressed the extent of condition and the extent of cause of the problem.

The team reviewed the RCA as it relates to extent of condition and extent of cause.

For extent of condition, the licensee's evaluation determined that an extent of condition for deficiencies in identifying degraded/nonconforming conditions and performance of operability determinations does not exist at FCS. The licensee's determination was based on the phrase "currently exists undetected". Consequently, the licensee concluded that other regulatory-required programs, such as, the operability determination process were not effectively implemented at FCS but the condition was known as documented in Condition Report CR 2012-08137, Regulatory Processes and Infrastructure. The team generally agreed that the licensee had identified similar processes, such as those documented in Condition Report CR 2012-08137, which were not being effectively implemented at FCS.

The licensee also performed a review to determine if potential undetected consequential equipment conditions exist as an extent of condition concern for Condition Report 2012-09494. This assessment included a review of selected risk-informed condition reports from the three most recent operating cycles (December 1, 2006 to March 20, 2012) and assessed approximately 6,500 condition reports and seven root cause analyses. The licensee determined that the extent of condition and extent of cause had been identified and that the review provides reasonable assurance that no further unidentified conditions adverse to quality exist from the specified period.

The team disagreed with the licensee's conclusion that no further unidentified conditions adverse to quality existed from the specified period, and consequently, concluded that an extent of condition involving potential undetected consequential equipment conditions likely existed. This conclusion was based on several inadequate operability determinations and several previously unrecognized degraded or nonconforming conditions that were identified by the team during the inspection. Specifically, Section 7 of this report documents the following non-cited violations which involved multiple examples related to inadequate operability determinations:

NCV 05000285/2013008-31, "Multiple Examples of Operability Determinations that Lacked Adequate Technical Justification"

NCV 05000285/2013008-32, "Multiple Examples of Inadequate Risk-Based Operability Determinations"

NCV 05000285/2013008-33, "Inadequate Operability Determination due to Failure to Establish Component Cooling Water System Leakage Criteria"

NCV 05000285/2013008-34, "Failure to Follow ASME Code Requirements when Establishing New Pump Reference Values as Corrective Actions"

Based on the above, the team concluded that the licensee failed to identify the full extent of condition as it relates to potential undetected consequential equipment conditions that had previously been evaluated incorrectly in the operability determination process.

For extent of cause, the licensee identified extent of cause concerns involving inadequacies in reinforcing high standards and accountability which was determined to cross all department and work process boundaries. The licensee addressed the extent of cause through the organizational ineffectiveness RCA performed under Condition Report CR 2012-03986. The licensee determined that corrective actions taken to address the organizational ineffectiveness extent of cause fully address the extent of cause for Condition Report CR 2012-09494. The team found that the corrective actions generally addressed the extent of cause related to root cause 1 and 2.

The team noted that issues involving contributing cause 2, 3, and 4 which related to knowledge and skills, processes and tools did not receive an extent of cause

evaluation. This is consistent with Procedure FCSG-24-5, "Cause Evaluation Manual," Step 35.3.1.c, which only required an extent of cause evaluation for each root cause and each apparent cause. The team determined that this was another example of the importance of properly classifying the causal factors as either root and contributing causes.

Determine that the root cause, extent of condition, and extent of cause evaluations appropriately considered the safety culture components as described in IMC 0310.

The root cause, extent of condition, and extent of cause evaluations appropriately considered the safety culture components as described in IMC 0310. Specifically, the licensee documented their consideration of the IMC 0310 cross-cutting aspects in Attachment 5 of RCA 2012-09494. The licensee identified several cross-cutting aspects in the area of human performance, problem identification and resolution and other components that were applicable to issues related to deficiencies in degraded/nonconforming condition identification and operability evaluations.

Determine that appropriate corrective actions are specified for each root and contributing cause.

The team reviewed the licensee's corrective actions for each of the root and contributing causes. In general, the corrective actions identified for the root and contributing causes appear to be technically adequate, however, at the time of this inspection, only those corrective actions needed to address the root causes involving leadership and adequate governance and oversight had been implemented. The team did note that a failed process barrier associated with Procedure FCSG-24-3, "Condition Report Screening," was identified in the RCA. No corrective action had been taken to address this procedural inadequacy. The team determined this was a non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Actions," which is documented in Section 7 of this report as NCV 05000285/2013008-35, "Failure to Correct Condition Adverse to Quality Associated with Corrective Action Program Procedures and the Operability Process."

The team also reviewed several interim actions implemented by the licensee. Interim actions were taken to temporarily prevent the effects of a condition or make an event less likely to recur during the period when final corrective actions or corrective actions were completed. The team noted that as part of the interim actions, the licensee established an independent review group to include non-FCS personnel experienced in degraded/nonconforming condition evaluation and operability/functionality determinations. This group, called the Engineering Assurance Group (EAG), was established in December 2012, and was tasked with reviewing the technical adequacy of operability determinations reviewed and approved by the operations department. Additionally, the EAG began a review of condition reports written since March 20, 2012, to try and identify previous, incorrect operability determinations.

The team found that the interim actions related to the EAG have been ineffective. Specifically, Section 7 of this report documents the following non-cited violations

which involved several recent examples related to inadequate operability determinations:

NCV 05000285/2013008-31, “Multiple Examples of Operability Determinations that Lacked Adequate Technical Justification.”

NCV 05000285/2013008-32, “Multiple Examples of Inadequate Risk-Based Operability Determinations.”

For most of the examples included in the above non-cited violations, the EAG did not identify the inadequate operability determinations.

Determine that a schedule has been established for implementing and completing the corrective actions.

The team determined that corrective actions may not be appropriately prioritized and sufficiently rigorous to ensure the operability determinations and degraded/nonconforming condition evaluations made in the near future will be accurate and timely. Specifically, because the prioritization of corrective actions was based on whether the cause identified was a root and contributing cause, the licensee, at the time of the inspection, had addressed only the root causes for Condition Report CR 2012-09494, but had not fully implemented actions to address the following three contributing causes:

> *CC-2: Processes to perform, and support performance of, Degraded/Non-Conforming Condition identification and Operability Determinations are not adequate to ensure consistently accurate and timely determinations.*
>
> *CC-3: Knowledge and skills to perform, and support performance of, Degraded/Non-Conforming Condition identification and Operability Determinations are not adequate to ensure consistently accurate and timely determinations.*
>
> *CC-4: Tools used to perform, and support performance of, Degraded/Non-Conforming Condition identification and Operability Determinations are not adequate to ensure consistently accurate and timely determinations.*

The team questioned if accurate and timely operability determinations could be made without first addressing the processes, knowledge, and tools issues identified in contributing causes 2, 3, and 4. The team noted that several recent operability determinations were inadequate (see Section 7 of this report), and in most cases, the team identified that had the licensee implemented corrective actions to address contributing causes 2, 3, and 4, the inadequate operability determination would likely had been prevented.

Determine that quantitative or qualitative measures of success have been developed for determining the effectiveness of the corrective actions to prevent recurrence.

The team determined that quantitative or qualitative measures of success have been developed for determining the effectiveness of the corrective actions to prevent recurrence. The licensee established, in part, the following three effectiveness reviews:

EFR-1: Leadership skill assessment indicates an improving trend in station leader performance.

EFR-2: Conduct a self-assessment of station performance [regarding operability evaluations and Screening and classification of degraded and non-conforming conditions] period 8/1/2013 – 10/31/2013.

EFR-3: Perform a self assessment that FCS has used performance improvement programs (e.g., benchmarking and self-assessments) to establish department and station standards consistent with industry best practices [regarding operability evaluations and Screening and classification of degraded and non-conforming conditions]:

The team determined that some of the licensee's effectiveness criteria did not meet the criteria established in Procedure FCSG 24-7, "Effectiveness Review of Corrective Actions to Prevent Recurrence (CAPRs)," Revision 1. Specifically, the team identified that EFR-1 and EFR-3, failed to meet Procedure FCSG 24-7, Step 4.3.2, which required that an effectiveness review shall include specific success criteria. The team also identified that it was difficult to conclude how EFR-1 and EFR-3 would objectively measure performance improvements related to the operability determination process.

The team also identified that while EFR-2 did provide specific success criteria, the review included such a limited subset of data (only 3 months' worth of operability determinations) that it would be difficult to determine if corrective actions have been truly effective.

(3) Assessment Results

For the FPD associated with Processes to Meet Regulatory Requirements specifically related to the Operability Determination process, the team concluded that, based on issues related to the quality of the RCA performed under Condition Report CR 2012-09494 including development of causal factors, identification of extent of condition, timing and prioritization of corrective actions and the quality of effectiveness reviews, restart checklist item 3.e will remain open.

Item 3.f: Quality Assurance

Upon entering a service agreement with Exelon, the site changed the name of the Quality Assurance group to Nuclear Oversight (NOS), with that group retaining the same Quality Assurance function.

(1) Inspection Scope

The team reviewed the licensee's assessment of the FPD associated with Nuclear Oversight effectiveness. Specifically, the team assessed the RCA for Condition Report CR 2012- 08142, which identified the following problem statement:

> *"Nuclear Oversight (NOS) has not identified many of the substantive issues that have resulted in the decline in station performance. NOS lacks sufficient focus on identifying adverse behaviors and conditions that, if corrected, can arrest declining performance before more significant issues occur. Issues identified by NOS are not communicated in a manner that compels site leaders to act. Site leaders do not value input from NOS."*

The team also assessed the adequacy of the extent of condition, extent of causes, and corrective actions. (CL Items 3.f.1; 3.f.2; 3.f.3)

The team's assessment of the RCA was based on the evaluation criteria from Section 02.02 of NRC Inspection Procedure 95001 which align with this item. The inspection objectives were to:

- Provide assurance that the root and contributing causes of risk-significant issues were understood
- Provide assurance that the extent-of-cause and extent-of-condition of risk-significant issues were identified ;
- Provide assurance that the licensee's corrective actions for risk-significant performance issues were, or will be, sufficient to address the root and contributing causes to preclude recurrence.

This inspection also included a review of the Quality Assurance processes and a review of sampled assessments or audits performed by the Quality Assurance department. In addition, the team assessed the effectiveness of the oversight provided by the Safety Audit and Review Committee. (CL Items 3.f.4; 3.f.5)

(2) Observations and Findings

<u>Determine that the problem was evaluated using a systematic methodology to identify the root and contributing causes</u>.

The team determined that the licensee evaluated this problem using systematic methodology to identify the root and contributing causes. Specifically, RCA 2012-08142 described using event and causal factor charting, barrier analysis, and the cause and effect tree.

The licensee identified the following as the root cause and contributing causes:

> *RC-1: Nuclear Oversight has failed to effectively use trending, benchmarking, self-assessment, missed opportunity reviews, and observations, which has inhibited NOS' ability to identify adverse NOS behaviors and conditions that*

eventually led to the decline in NOS performance and thus a decline in station performance.

CC-1: Nuclear Oversight's failure to follow written guidance has resulted in deficiencies which have impacted NOS department performance.

CC-2: Nuclear Oversight lacks the requisite skills and knowledge in order to drive the station to improve performance.

CC-3: Nuclear Oversight has failed to challenge important safety decisions and prioritization of safety significant issues.

Determine that the root cause evaluation was conducted to a level of detail commensurate with the significance of the problem.

The team determined that the RCA was conducted to a level of detail commensurate with significance of the problem. Specifically, and indicated in the "Analysis and Cause Determination" section of RCA 2012-08142, the analysis included use of the cause and effect tree to organize causal factors identified from event and causal factor charting and barrier analysis to identify root and contributing causes. Gap analysis and training needs analysis were also used to analyze knowledge and skill issues associated with training needs.

The RCA team also reviewed pertinent documents including; governing procedures, related condition reports and causal analyses, self-assessments, performance indicators and system health reports, Quality Assurance reports, external operating experience, INPO programmatic guidance and assist visit documentation, as well as, NRC documents.

Determine that the root cause evaluation included a consideration of prior occurrences of the problem and knowledge of prior operating experience.

The team determined that the RCA included consideration of prior occurrences of the problem and knowledge of prior operating experience. As indicated in the RCA, operating experience processes were being used and some actions were being taken to incorporate operating experience in oversight activities. However, internal and external operating experience has not been reviewed collectively to understand the underlying implications for NOS performance gaps. It was also noted in the RCA that NOS related operating experience has been evaluated in isolation and actions have been taken to address discrete issues without consideration of the collective significance. Although operating experience itself was not determined to be a contributor to the problem statement in the RCA, the collective evaluation of the data to improve NOS department performance is captured within the root cause statement and corrective actions. The RCA also indicated that appropriate use of performance improvement processes such as trending will enable NOS to aggregate NOS department information including operating experience in order to address underlying gaps in NOS performance.

Determine that the root cause evaluation addressed the extent of condition and the extent of cause of the problem.

The team reviewed the licensee's RCA relative to the extent of condition and the extent of cause.

For the extent of condition, the licensee evaluated the extent to which the actual condition existed relative to other plant processes, equipment, or human performance. Specifically, the licensee's analysis used the same-same, same-similar, similar-same, and similar-similar evaluation methodology. Based on the scope of the RCA and the data reviewed the licensee determined that an extent of condition did not exist in other plant processes, equipment, or human performance.

For the extent of cause, the licensee reviewed relevant information to determine the extent to which the root cause existed and to evaluate the potential that the condition existed in other applicable plant processes, systems, equipment, or human performance related activities. The licensee's analysis determined that an extent of cause does exist for FCS plant processes, equipment, or personnel impacted by a weak continuous learning environment.

As noted in the RCA, the safety significance review of this condition identified actual and/or potential impacts in the areas of nuclear, industrial, radiological, business, and regulatory risks. These risks were reviewed and the RCA team did not identify any immediate concerns related to the identified risks. The RCA team also determined that the specified corrective actions to prevent recurrence would be timely enough to arrest the condition in the problem statement before further risks to safety materialized.

Determine that the root cause, extent of condition, and extent of cause evaluations appropriately considered the safety culture components as described in IMC 0310.

The root cause, extent of condition, and extent of cause evaluations appropriately considered the safety culture components described in IMC 0350. Specifically, the licensee documented their assessment of the IMC 0350 cross-cutting aspects in Attachment 9 of the RCA associated with RCA 2012-08142. As indicated in this attachment, several cross-cutting aspects in the area of human performance, problem identification, safety conscious work environment, and other components were determined to be applicable to issues related to deficiencies in degraded/nonconforming conditions. The final evaluation concluded that 26 of the 37 safety culture aspects were applicable based on the facts discovered in the RCA. Accordingly, each of the 26 applicable aspects was used to establish the failed barriers and cause/effect relationships in the cause and effect tree analysis.

Determine that appropriate corrective actions are specified for each root and contributing cause.

The team reviewed the licensee's corrective actions for the root and contributing causes. Based on the results of this review, the team determined that the licensee's

corrective actions adequately addressed the root and contributing causes for why NOS has not identified many of the substantive issues that have resulted in the decline in station performance. Specifically, in response to the root cause, that NOS had failed to effectively use trending, benchmarking, self-assessment, and missed opportunity reviews, which eventually led to the decline of NOS and station performance, extensive corrective actions to preclude recurrence were initiated. Similarly, the corrective actions initiated to address the contributing causes which included organizational challenges appeared thorough. However, the team noted that the associated corrective actions were primarily focused on process improvements rather than behaviors and safety culture.

Determine that a schedule has been established for implementing and completing the corrective actions.

The team determined that a schedule has been established for implementing and completing the associated corrective actions. Specifically, the team established that corrective actions to preclude recurrence had been initiated that included; establishing NOS performance expectation for using trending, benchmarking, self-assessments, and missed opportunity reviews to ensure NOS performance issues were identified and resolved in a timely manner. The team also determined that schedules had been developed to revise appropriate implementing documents, conduct regular meetings with NOS personnel to reinforce expectations, and to establish effective guidance related to corporate governance and oversight controls. Additionally, corrective actions to address contributing causes had been scheduled. The team determined that the licensee's schedule for implementing corrective actions appeared to be commensurate with the significance of the respective issues.

Determine that quantitative or qualitative measures of success have been developed for determining the effectiveness of the corrective actions to prevent recurrence

The team determined that quantitative or qualitative measures of success have been developed for determining the effectiveness of the corrective actions to preclude recurrence. The licensee established effectiveness review processes that included independent self-assessment to determine corrective action sustainability related to trending, benchmarking, missed opportunity reviews, and observations of NOS reports. The effectiveness reviews provided specific performance measures to objectively confirm the adequacy corrective actions. Based on these reviews, the team determined that the licensee's effectiveness criteria satisfied the guidance provided in Procedure FCSG 24-7, "Effectiveness Review of Corrective Actions to Prevent Recurrence(CAPRs)," Revision1.

Only one observation pertaining to valuing the input of NOS was noted. This observation dealt with the site judging they were adequately prepared for certain aspects of this NRC inspection despite NOS producing a memorandum pointing out deficiencies in the station's readiness. Specifically, Memorandum 13-NOS-012, dated January 28, 2013, was issued from the Manager, NOS to the FCS Site Vice President regarding NRC inspection readiness. The memorandum communicated

the NOS determination that FCS was not fully ready for the subject inspection since the scheduled resolution of some of the identified issues and their subsequent implementation will challenge the inspection date.

(3) Assessment Results

The team determined that for the Nuclear Oversight Effectiveness FPD: the root and contributing causes of risk significant issues were understood; the extent-of-condition and extent-of-cause of risk-significant issues were identified; and, the licensee's corrective actions for risk-significant performance issues were, or will be, sufficient to address the root and contributing causes and to preclude repetition. The team also determined that the oversight activities performed by NOS have been effectively performed and that there have been marked improvements in the overall performance and technical adequacy of audit and assessment process. Therefore, restart checklist item 3.f will be closed.

4. Review of the Integrated Performance Improvement Plan

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

(1) Inspection Scope

The team reviewed the IPIP, Revision 4, to ensure its pre-startup and post-startup actions and plans were adequate to address the conditions that led to the protracted decline in plant performance. (CL Item 4.1)

(2) Observations and Findings

The team completed a review of IPIP, Revision 4. The team observed that concerns associated with the NRC's review of IPIP, Revision 3, documented in NRC Inspection Report 05000285/2012004 were resolved in Revision 4.

The team noted that IPIP, Page 5 stated, "This plan, the supporting activities, and resulting schedule are living documents. That is, as additional issues, extent of condition, or other items of impact are identified, the plan will be revised." The team questioned the licensee regarding their intentions to revise the IPIP based on the identification of additional issues included in the restart checklist contained in the latest revision to the Confirmatory Action Letter (CAL) EA-13-020 issued February 26, 2013. The team was informed that Revision 5 of the IPIP was in progress.

The team observed that the licensee was not following the recovery process outlined in the IPIP. Specifically, the licensee was providing inspection information to the team as "ready for inspection" prior to being ready as defined in Procedure FCSG-65-2, "Recovery Checklist Issue Closure/NRC Inspection Guideline," Revision 3. In fact, the team had to reduce the original inspection scope by 36 percent since all of

the information necessary for the team to review certain restart checklist items was not made ready for NRC inspection in the timeframe necessary to perform an adequate review.

(3) Assessment Results

The Restart Checklist Basis Document, Revision 4, stated that, "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."

Based on the above, restart checklist item 4.1 will remain open until a review of all changes to the IPIP is completed.

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

(1) Inspection Scope

a. The team independently assessed the extent of risk significant design issues. The review covered the as-built design features of the AFW system. This review verified its capability to perform its intended functions with a sufficient margin of safety. The basis for selecting the AFW system was its high risk significance in the specific individual plant evaluation, and input from system health reports, performance indicators, condition reports, and LERs. Focus was on modifications rather than original system design. Information from this inspection was used to assess the licensee's ability to maintain and operate the facility in accordance with the design basis. (CL Item 5.a.1)

The team's review included the following:

- Assessment of effectiveness of corrective actions for deficiencies involving design
- Selection of several modifications to the AFW 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 AFW system is operated consistent with the design and licensing documents

- Evaluation of the interfaces between engineering, plant operations, maintenance, and plant support groups

b. The team reviewed the licensee's assessment of the FPD associated with Engineering Design/Configuration Control. Specifically, the team assessed the RCA associated with Condition Report CR 2012-08125, for which the problem statement was:

> *"Changes to plant configuration and design and licensing bases are not effectively analyzed, controlled, and implemented. These change processes are not always conducted in a manner that maintains configuration control and operating design margins."*

The team also assessed the adequacy of the extent of condition, extent of causes, and corrective actions. (CL Items 5.a.2; 5.a.3; 5.a.4)

The team's assessment of this FPD was based on the evaluation criteria from section 02.02 of NRC Inspection Procedure 95001 which align with this item. The inspection objectives were to:

- Provide assurance that the root and contributing causes of risk-significant issues were understood;

- Provide assurance that the extent-of-condition and extent-of-cause of risk-significant issues were identified;

- Provide assurance that the licensee's corrective actions for risk-significant performance issues were, or will be, sufficient to address the root and contributing causes and to preclude repetition

c. For NRC items specifically related to design concerns associated with the AFW system, the team verified that the licensee has performed adequate casual analysis and extent of condition evaluations related to the failures. In addition, the team verified that adequate corrective actions were identified associated with the causes and extent of condition evaluations and that implementation of these corrective actions were either implemented or appropriately scheduled for implementation. (CL Items NCV 2010006-01; NCV 2010006-02; NCV 2010006-03; NCV 2010006-04)

(2) Observations and Findings

a. Auxiliary Feedwater System Design Feature Review

The team completed an in depth assessment of select risk significant design issues associated with the auxiliary feedwater system. During this review the team identified several issues associated with the auxiliary feedwater system. Specifically:

- NCV 05000285/2013008-36, “Deficient Evaluation of NRC Bulletin 88-04, Strong Pump Weak Pump Due to Failure to Consider The Effect of AFW Pumps Discharge Check Valves Leakage”

- NCV 05000285/2013008-37, “Improper Storage of the Raw Water to Auxiliary Feedwater Emergency Tank Fill Hose”

The team noted that in preparation for this inspection the licensee had engaged a contractor to perform a design evaluation of the auxiliary feedwater system. As part of their inspection the team reviewed the contractor’s report to see what, if any issues were identified, and how issues were resolved. The team determined that the contractor had performed a thorough review and identified several issues for the licensee. However, the licensee had failed to adequately evaluate and resolve these issues. Specifically:

- NCV 05000285/2013008-38, “Deficient Evaluation for Known Degraded Conditions - AFW Pumps Discharge Check Valve Leakage and Potential Overpressure of AFW Pump Suction Piping”

- NCV 05000285/2013008-39, “Failure to Properly Implement Applicable ASME OM Code Requirements.”

The specific issues are documented in Section 7 of this report.

b. Fundamental Performance Deficiency Review

Determine that the problem was evaluated using a systematic methodology to identify the root and contributing causes.

The team determined that the licensee had evaluated this issue using systematic methodologies in an attempt to identify the root and contributing causes. Specifically, the RCA associated with Condition Report CR 2012-08125 employed the use of: 1) event and causal factor charting, 2) common factors analysis, 3) Kepner-Tregoe performance system analysis, 4) control barrier analysis, 5) stream analysis, and 6) cause testing.

Using the above mentioned methods, the licensee determined that the root cause of the FCS’s issues associated with engineering design/configuration control was:

> *RC-1: Governance and oversight has not been effective, in that management failed to establish and enforce appropriate roles & responsibilities, standards, and expectations for engineers.*

The team reviewed the licensee’s analysis to determine how the licensee had arrived at the identified root cause and noted that the licensee used the following logic to determine the root cause. The licensee performed barrier analysis, documented in Attachments 5 through 12, and identified failed barriers involving; engineering procedures (content and use), the training program, the CAP, the performance improvement, nuclear oversight audit program, management oversight and

organization, design and licensing basis documents, and human performance. Next, the licensee used these failed barriers to inform the development of causal factors which were then used in a stream analysis to develop a team consensus on the most fundamental causes that were driving the other causes. The licensee determined that this analysis showed that problems with roles & responsibilities, standards, and expectations were driving the other causes. The licensee then developed cause statements using the following criteria to identify the causal factors:

> Root Cause: The most basic, fundamental cause(s) of a problem, which, if corrected, will prevent recurrence of the identified problem.
>
> Contributing Cause: Causes, that if corrected, would not by themselves have prevented the event, but are important enough to be identified for consideration of changes to improve the quality of the process or product.

The licensee documented the preliminary cause statements as:

- *Governance and oversight has not been effective, in that management failed to establish and enforce appropriate roles & responsibilities, standards, and expectations for engineers.*
- *Ineffective management and prioritization of engineering workload have impacted the quality of engineering work.*
- *Engineering management has not effectively managed resources to ensure the number of qualified and experienced engineers is sufficient.*
- *Engineers lack sufficient knowledge of design and licensing basis information, and detailed understanding of plant systems and equipment.*
- *The engineering personnel training program lacks instructional resources and sufficient training materials to support design and licensing basis requirements.*
- *Engineering technical human performance tools are not effectively understood and utilized to prevent errors.*
- *Weaknesses exist in tools engineers use to maintain configuration and design basis requirements [e.g., design procedures, design basis documents (errors and incomplete information), and configuration databases information (incomplete and difficult to retrieve)].*
- *The CAP did not effectively resolve issues related to engineering design / configuration control.*
- *Performance Improvement programs were not used effectively to drive improvements to processes for changing plant configuration and licensing bases.*

- *Nuclear Oversight has not identified problems with changes to plant configuration and design and licensing basis and driven performance improvement.*

The licensee then performed cause testing as described in Procedure FCSG-24-5, "Cause Evaluation Manual," Revision 5, Attachment 1, Section 34, and determined that governance and oversight to be the root cause and the remaining causes to be contributing causes.

The team determined that the licensee's analysis did not support RC-1 as the root cause for the issues associated with the engineering design/configuration control programs. The team determined that the licensee's analysis did not adequately establish a strong causal link between the failed barriers and inadequate governance and oversight. Furthermore, the team questioned how the licensee determined that governance and oversight would have prevented the failed barriers. The team noted that new station management was in place, and the station was under the new governance and oversight plan, yet design/configuration issues continued to occur. Specifically, the team identified the following contemporary issues during the inspection:

- Engineers using internally generated information that was in conflict with the stations design basis analysis when evaluating in-service testing results.

- Engineer's use of non-design basis information/methodologies to justify acceptance of nonconforming conditions associated with tornado missile vulnerabilities.

- Engineer's inappropriate application of alternate seismic criteria to structures, systems, and components.

- Engineer's inappropriate application of the ASME code to station piping systems.

- Engineer's failure to thoroughly evaluate a modification performed on the steam driven AFW pump.

The team evaluated each of the contributing causes in accordance with the cause testing criteria documented in Procedure FCSG-24-5 and determined that several of the contributing causes more closely fit the definition of a root cause documented in Procedure FCSG-24-4, "Condition Report and Cause Evaluation," Section 1.17, in that they appeared to represented the most basic fundamental causes of the problem, which, if corrected, will prevent recurrence of the identified problem:

CC-3: Engineers lack sufficient knowledge of design and licensing basis information, and detailed understanding of plant systems and equipment.

CC-4: The engineering personnel training program lacks instructional resources and sufficient training materials to support design and licensing basis requirements.

Determine that the root cause evaluation was conducted to a level of detail commensurate with the significance of the problem.

The team determined that the licensee's RCA employed various techniques to analyze the events. In general, the quality of analysis was sound and identified several failed barriers associated with engineering design/configuration control. However, the team could not follow/reconstruct the licensee's logic for determining the final causal factors since it was done by collegiate review by the root cause team. As discussed above, the team identified that the root and contributing causes may not be appropriately characterized which could lead to an inadequate prioritization of corrective actions.

Determine that the root cause evaluation included a consideration of prior occurrences of the problem and knowledge of prior operating experience.

The team determined that the licensee's RCA included evaluations of both internal and industry operating experience. The licensee's evaluations of industry operating experience provided sufficient detail such that general conclusions could be established regarding any similarities.

Determine that the root cause evaluation addressed the extent of condition and the extent of cause of the problem.

The team reviewed the licensee's RCA as it relates to extent of condition and extent of cause.

During their evaluation for extent of condition, the licensee found that an extent of condition existed in; Procedure change and inadequacy, Operations (system configurations via valve lineups), Maintenance/Work Management (configuration changes during maintenance), Degraded/Non-Conforming conditions, and 10 CFR 50.59. The team determined that the extent of condition review performed by the licensee for RCA 2012-08125 was adequate and appeared to bound the identified problem statement. The team noted that the licensee was addressing these extent of condition issues through corrective actions in other RCAs.

For extent of cause, the licensee determined that an extent of cause existed for RC-1. They determined that the Organizational Ineffectiveness RCA associated with Condition Report CR 2012-03986, determined a root cause that the OPPD organization has failed to establish and implement the essential attributes of governance and oversight, including the key elements of individual roles, responsibilities, and accountabilities to enable FCS to achieve and maintain high levels of operational nuclear safety and reliability. Furthermore, the extent of cause of RCA 2012-03986 determined that there was not an organizational level or departmental organization at FCS that was not impacted by this cause. Therefore,

the licensee determined that the extent of cause for RCA 2012-08125 was bounded by the areas reviewed by RCA 2012-03986 for Organizational Ineffectiveness, and no additional extent of cause or corrective action was required. The team determined that this extent of cause did not adequately identify the extent of cause. Specifically, as noted above the team determined that the licensee had failed to identify the root cause of this issue and this resulted in an inadequate extent of cause evaluation. The team determined that this highlighted the importance of properly classifying and evaluating causal factors to accurately determine the root and contributing causes.

Determine that the root cause, extent of condition, and extent of cause evaluations appropriately considered the safety culture components as described in IMC 0310.

The team determined that the licensee's root cause, extent of condition, and extent of cause evaluations appropriately considered the safety culture components as described in IMC 0310. The team noted that the licensee had documented their detailed review of the safety culture components in Attachment 17 of RCA 2012-08125. The licensee identified several cross-cutting aspects in the area of human performance, problem identification and resolution, safety conscious work environment, and other components were applicable to the issue of engineering design and configuration control.

Determine that appropriate corrective actions are specified for each root and contributing cause.

The team reviewed the licensee's corrective actions for the root and contributing causes. In general, the corrective actions identified for the root and contributing causes appear to be technically adequate, however, at the time of this inspection, only a limited number of corrective actions had been completed.

The team noted that the licensee had implemented interim actions to provide a temporary means to make recurrence of this issue less likely during the time the licensee was evaluating the identified condition and until implementation of the corrective actions to prevent recurrence or final corrective actions. The team noted that the licensee established the following interim actions:

- Establish an engineering quality review team to review a sample of engineering products after they are issued. The Independent engineering review board was also implemented to provide an independent third party review of selected engineering products prior to their issuance. The start date for this action was July 23, 2012.

- The Engineering Director conducted a department briefing that reinforced expectations for conduct of engineering and technical rigor. The briefing included a discussion on the process to validate the basis for licensing and design basis inputs to engineering work. The start date for this action was December 31, 2012.

- Engineering Leadership conducted one-on-one periodic meetings with direct reports to discuss work activities, priorities, and reinforce expectations. The purpose was to verify appropriate alignment and prioritization with engineering activities and resources. The start date for this action was October 30, 2012.

The team determined that to date, the licensee's corrective actions do not appear to be effective. Specifically, during the inspection the team identified several recent issues associated with design/configuration control.

- NCV 05000285/2013008-38, "Deficient Evaluation for Known Degraded Conditions - AFW Pumps Discharge Check Valve Leakage and Potential Overpressure of AFW Pump Suction Piping"

- NCV 05000285/2013008-40, "Failure to Obtain Prior NRC Approval for a Facility Change"

- NCV 05000285/2013008-41, "Failure to Properly Implement Applicable ASME OM Code Requirements."

- NCV 05000285/2013008-41, "Inappropriate Modification of Turbine Driven Auxiliary Feedwater Pump Back Pressure Protection Trip."

The specific issues are documented in Section 7 of this report.

Determine that a schedule has been established for implementing and completing the corrective actions.

The team determined that the corrective actions may not be appropriately prioritized and sufficiently rigorous to ensure that future design/configuration control activities will be adequate. Specifically, because the licensee's prioritization of corrective actions was based on whether the cause identified was a root and contributing cause, at the time of the inspection the corrective actions for the contributing causes 3 and 4 had been scheduled but not fully implemented.

The team questioned whether FCS's engineering design/configuration control could be implemented adequately without first addressing the issues identified in contributing causes 3 and 4. During the inspection, the team identified several instances where engineers failed to adequately evaluate and/or control the FCS design basis due to lack of knowledge of design and licensing basis. The team determined that had the licensee correctly evaluated this area and implemented corrective actions to address the knowledge and training issues, these deficiencies likely would have been prevented.

Determine that quantitative or qualitative measures of success have been developed for determining the effectiveness of the corrective actions to prevent recurrence.

The team determined that quantitative and qualitative measures of success have been developed to determine the effectiveness of the identified corrective actions to prevent recurrence. The noted that the licensee established the following effectiveness reviews:

CAPR-1: A self-assessment determines that OPPD has established and implemented the essential attributes of governance and oversight, including the key elements of individual roles, responsibilities, and accountabilities, and station performance is improving. Complete the self-assessment with a team comprised of industry and OPPD personnel. Scheduled completion date is February 15, 2013.

CAPR-2: A self-assessment determines that OPPD has established and implemented Engineering policies and procedures with clear expectations of engineering behaviors consistent with INPO 05-003 and INPO 05-006, including the key elements of individual roles, responsibilities, and accountabilities, and performance related to the quality of engineering activities and the products produced is white or better, per the metrics established. Scheduled completion date is June 30, 2014.

The team determined that the licensee's effectiveness criteria did not meet the criteria established in Procedure FCSG-24-5, "Cause Evaluation Manual," Revision 5, which provided instructions for effectiveness reviews. Step 42.0, "Effectiveness Review Plan," stated, in part, that the effectiveness review should address whether there has been a recurrence of the cause the CAPR was intended to eliminate.

The team noted that the success criteria for the effectiveness review of CAPR 1 did not address engineering design/configuration control and did not evaluate for recurrence of issues in this area. Instead, the success criteria evaluated FCS performance as a whole.

The team also determined that the licensee's effectiveness criteria did not meet the criteria established in Procedure FCSG 24-7, "Effectiveness Review of Corrective Actions to Prevent Recurrence (CAPRs)," Revision 1. Specifically, the team identified that the effectiveness reviews for CAPR 1 and 2, failed to meet Procedure FCSG 24-7, Step 4.3.2, which required that an effectiveness review shall include specific success criteria. The team determined that it was difficult to conclude how these effectiveness reviews could objectively measure performance improvements.

During the review, the team determined that additional NRC review was needed for a concern associated with the fact that the licensee no longer maintains the construction code of record for safety-related piping systems as described in the USAR. A URI was identified by the team which is documented in Section 7 of this report as URI 05000285/2013008-23, "Code of Record for Safety-Related Piping Systems."

c. Review of Actions Taken for Auxiliary Feedwater System Design Concerns

The team completed a review of the cause evaluations and actions taken to address previously identified design concerns associated with NCVs 2010006-01, 2010006-02, 2010006-03, and 2010006-04. During the review of corrective actions the team determined that a corrective action that had been implemented to address NCV 2010006-01 resulted in a design control issue. The team documented this as NCV 05000285/2013008-41, "Inappropriate Modification of Turbine Driven Auxiliary Feedwater Pump Back Pressure Protection Trip."

(3) Assessment Results

a. The team concluded that based on the issues identified during this inspection, restart checklist item 5.a.1 will remain open.

b. The team concluded that based on issues related to the quality of the RCA preformed under Condition Report CR 2012-08125 including development of causal factors, timing and prioritization of corrective actions and the quality of effectiveness reviews, restart checklist item 5.a will remain open.

c. The team concluded that that based on the issues identified during this inspection the restart checklist item for NCV 2010006-01 will remain open.

The team concluded that the reviews conducted for NCVs 2010006-02, 2010006-03, and 2010006-04 demonstrated that these issues had been reviewed by the licensee to a sufficient level of detail. Therefore, the restart checklist items for NCVs 2010006-02, 03, and 04 will be closed.

Item 5.b: Human Performance

(1) Inspection Scope

The team reviewed the licensee's assessment of the FPD associated with Human Performance. Specifically, the team assessed the RCA for Condition Report CR 2012-08135, for which the problem statement was:

> *"Station leaders and employees have not taken sufficient action to improve human performance. The station lacks an integrated approach to solving human performance issues."*

The team also assessed the adequacy of the extent of condition, extent of causes, and corrective actions (CL Items 5.b.1; 5.b.2; 5.b.3).

The team's assessment of this FPD was based on the evaluation criteria from Section 02.02 of NRC Inspection Procedure 95001 which align with this item. The inspection objectives were to:

- Provide assurance that the root and contributing causes of risk-significant issues were understood
- Provide assurance that the extent-of-condition and extent-of-cause of risk-significant issues were identified

- Provide assurance that the licensee's corrective actions for risk-significant performance issues were, or will be, sufficient to address the root and contributing causes and to preclude repetition

(2) Observations and Findings

Determine that the problem was evaluated using a systematic methodology to identify the root and contributing causes.

The team determined that the licensee evaluated this problem using a systematic methodology to identify the root and contributing causes. Specifically, RCA 2012-08135 employed the use of event and causal factor charting, barrier analysis, and the why-staircase.

The team concluded that the root and contributing causes developed from these systematic methods reasonably explain why FCS leaders and employees have not taken sufficient action to improve human performance and why FCS lacks an integrated approach to solving human performance issues. The licensee determined that the root cause of persistent human performance issue was because FCS leadership lacks the understanding of, and does not value, a formal program for improving human performance. The licensee also identified a number of contributing causes including issues related to effectiveness of the CAP at addressing previous human performance issues and the identification that FCS personnel had previously accepted working around poor procedures.

Determine that the root cause evaluation was conducted to a level of detail commensurate with the significance of the problem.

The licensee's RCA included extensive timelines of the events and employed various techniques to analyze the events, as discussed above. The licensee's RCA was generally thorough and identified the root causes for the station's lack of an integrated approach to solving human performance issues.

Determine that the root cause evaluation included a consideration of prior occurrences of the problem and knowledge of prior operating experience.

The team determined that the RCA included evaluations of both internal and industry operating experience. The licensee's evaluations of industry operating experience provided sufficient detail such that general conclusions could be established regarding any similarities.

Determine that the root cause evaluation addressed the extent of condition and the extent of cause of the problem.

The team determined that the licensee's RCA addressed the extent of condition and the extent of cause of the problem. Specifically, because of the generic/global aspects of activities impacted by human performance as it relates to all activities at FCS, the licensee's root cause team determined that extent of condition and extent

of cause concerns do exist. Several interim and long term corrective actions were identified to address extent of condition and extent of cause.

Determine that the root cause, extent of condition, and extent of cause evaluations appropriately considered the safety culture components as described in IMC 0310.

The root cause, extent of condition, and extent of cause evaluations did consider the safety culture components as described in IMC 0310. The team noted that the licensee evaluation of cross-cutting aspects documented in Attachment 3 of the RCA only considered the human performance aspects from NRC IMC 0310 but did not consider all possible cross-cutting aspects. However, several additional cross-cutting aspects were documented in Section L, "Safety Culture Review." The team determined that the supporting documentation for the applicable safety culture components as documented in Attachment 3 was not complete and did not fully document why these additional cross-cutting aspects were applicable.

Determine that appropriate corrective actions are specified for each root and contributing cause.

The team determined that appropriate corrective actions were specified for each root and contributing cause. Corrective actions to prevent recurrence were identified that included the development and implementation of a Human Performance Strategic Plan which included eight stages from development of a strategic plan to implementation. Additionally, corrective actions were identified to address the contributing causes involving the effectiveness of the CAP at addressing previous human performance issues and the identification that FCS personnel had previously accepted working around poor procedures.

Determine that a schedule has been established for implementing and completing the corrective actions.

The team determined that a schedule has been established for implementing and completing the corrective actions. The team found that by the time of this inspection, corrective actions had been implemented to address the root cause which included implementation of the first four stages of a human performance strategic plan. The corrective actions for the remaining four stages were currently scheduled on a timeline commensurate with the significance of the issues they were addressing. Additionally, the team noted that a schedule had been developed for the corrective actions to address the contributing causes. At the time of the inspections, all corrective actions to address the contributing causes had been started.

Determine that quantitative or qualitative measures of success have been developed for determining the effectiveness of the corrective actions to prevent recurrence.

The team determined that quantitative or qualitative measures of success have been developed for determining the effectiveness of the corrective actions to prevent recurrence. The team identified that the metrics used to measure human performance as part of the interim effectiveness reviews do not provide meaningful

data due to existing plant conditions and changes to the condition report coding process. Specifically, metric CHU-1 relies on FCS human performance event clock resets but the reset criteria is heavily weighted toward events that could only occur while FCS is at power. Due to the licensee's current operational status, little or no meaningful information would be obtained from measuring FCS clock resets. Additionally, metrics CHU-2 and CHU-3 were being skewed in the positive direction due to changes in condition report coding that only required coding of level B and A condition reports. The licensee initiated Condition Report CR 2013-05501 to document issues related to the accuracy of the human performance metrics.

(3) Assessment Results

The team concluded that for the Human Performance FPD: the root and contributing causes of risk-significant issues were understood; the extent-of-condition and extent-of-cause of risk-significant issues were identified; and, the licensee's corrective actions for risk-significant performance issues were, or will be, sufficient to address the root and contributing causes and to preclude repetition, therefore, restart checklist item 5.b will be closed.

Item 5.d: Equipment performance

(1) Inspection Scope

The team reviewed LER 2012-005-01, "Technical Specification Violation Due to Inadequate Testing of Emergency Diesel Fuel Pumps," to verify that the licensee had performed adequate casual analyses and extent of condition evaluations related to this equipment issue. In addition, the team verified that adequate corrective actions were identified associated with the causes and extent of condition evaluations and that implementation of these corrective actions were either implemented or appropriately scheduled for implementation. (CL Item LER 2012-005-01)

(2) Observations and Findings

On February 21, 2012, during a review of FCS surveillance procedures, it was identified that the emergency diesel generator fuel oil transfer pumps have not been tested in accordance with the requirements of technical specifications. The inadequate testing was caused by a procedure change made in 1990 that removed the required monthly test of the automatic low level start feature of the fuel oil transfer pumps. Since not all testing required to demonstrate emergency diesel generator operability was complete, the licensee considered this a violation of technical specifications and issued LER 2012-005-01, as required by 10 CFR 50.73(a)(2)(i)(B), 10 CFR 50.73(a)(2)(ii)(B), 50.73(a)(2)(v)(B) and (D), and 10 CFR 50.73(a)(2)(vii).

The team reviewed the LERs associated with this event and determined that the report adequately documented the summary of the event including the causes of the event, the potential extent of condition, the potential safety consequences and the corrective actions required to address the performance deficiency. The team noted

that while the required testing was not completed as required by technical specifications, the diesel fuel oil transfer pumps have performed successfully during required emergency diesel generator surveillances and the low level switches are calibrated on a refueling frequency. The team noted corrective actions included revisions to the emergency diesel generator surveillance tests to ensure fuel oil transfer pump auto operation was verified on a monthly basis. The team reviewed these updated surveillance procedures and found that they adequately addressed the fuel oil transfer pump testing required by technical specifications. The team determined that the previous failure to perform all testing required by Technical Specification 3.7(1)e, "Emergency Power System Periodic Tests," resulted in a violation of Technical Specification 2.7, "Electrical Systems." This finding was determined to be of very low safety significance because it represented a qualification deficiency confirmed not to result in a loss of operability. This licensee identified violation was entered into the CAP as Condition Report CR 2012-01324. No additional violations of regulatory requirements were identified.

(3) Assessment Results

Based on the above, LER 2012-005-01 and the associated restart checklist item will be closed.

Item 5.k: Resource Management

(1) Inspection Scope

The team assessed the licensee's assessment of the FPD associated with Resource Management. Specifically, the team assessed the RCA for Condition Report CR 2012-08131, for which the problem statement was, in part:

> *"Leadership weaknesses in prioritization of station activities and strategic planning have resulted in resource management issues…"*

The team also assessed the adequacy of the extent of condition, extent of causes, and corrective actions. (Not a Restart Checklist Item)

The team's assessment of this FPD was based on the evaluation criteria from Section 02.02 of NRC Inspection Procedure 95001 which align with this item. The inspection objectives were to:

- Provide assurance that the root and contributing causes of risk-significant issues were understood
- Provide assurance that the extent-of-condition and extent-of-cause of risk-significant issues were identified;
- Provide assurance that the licensee's corrective actions for risk-significant performance issues were, or will be, sufficient to address the root and contributing causes and to preclude repetition

(2) Observations and Findings

Determine that the problem was evaluated using a systematic methodology to identify the root and contributing causes.

The team determined that the licensee evaluated this problem using systematic methodology to identify the root and contributing causes. Specifically, RCA 2012-08131 described using event and causal factor charting, barrier analysis, and the why-staircase. It also stated,

> *"The RCA team conducted 30 interviews, from the Chief Executive Officer (CEO) of OPPD to craft persons and technicians at FCS. The RCA team evaluated over 100 documents, various internal and external operating experience (OE), and attended a variety of related Station meetings. The RCA team participated in multiple brainstorming sessions on each individual component of the RCA report to obtain input from all RCA team members and reach consensus on ideas and conclusions"*

Also, in conversations with the RCA team, root-cause team members described how they applied those techniques.

The team concluded that the root and contributing causes reasonably explain why leadership weaknesses in prioritization of FCS activities and strategic planning resulted in resource management issues. In addition, in the "Analysis Approach" section of RCA 2012-08131, the licensee said,

> *"From interview statements, observations, and data evaluated, the RCA team identified that the Station does not have issues with the quantity of resources provided and available, but with the management of these resources."*

The licensee thus acknowledged a link between organizational effectiveness (discussed above with respect to CL Items 1.f.6 through 1.f.9) and resource management (discussed here).

Determine that the root cause evaluation was conducted to a level of detail commensurate with the significance of the problem.

The team determined that the RCA was conducted to a level of detail commensurate with the significance of the problem. Specifically, as discussed above, the licensee conducted this evaluation not only by using event and causal factor charting, barrier analysis, and the why-staircase, but also by conducting interviews, reviewing documents, and attending meetings. Furthermore, the RCA team conducted this evaluation through two components, which they designated as "leadership weaknesses in prioritization of Station activities," and "leadership weaknesses in strategic planning." They therefore conducted the following specific analyses:

- *Optimized (Lean) Station Processes Barrier Analysis*
- *Strategic Planning Barrier Analysis*
- *Strategic Planning Why Staircase*
- *Workforce Planning Barrier Analysis*
- *Workforce Planning Why Staircase*

Determine that the root cause evaluation included a consideration of prior occurrences of the problem and knowledge of prior operating experience.

The team determined that the RCA included evaluations of both internal and industry operating experience. The licensee's evaluations of industry operating experience provided sufficient detail such that general conclusions could be established regarding any similarities.

Determine that the root cause evaluation addressed the extent of condition and the extent of cause of the problem.

The team determined that the RCA addressed the extent of condition and the extent of cause of the problem. Specifically,

- With respect to extent of condition, the licensee stated that their evaluation included the following three items because these items were not evaluated elsewhere:

  Qualification: For this item, the licensee said, "*Management of qualifications is an extent of condition under the RCA problem statement. The lack of strategic planning for aging workforce and workforce turnover directly affects work completion at the Station."*

  NRC work hours rules: For this item, the licensee said, "*Based on the information above, an Extent of Condition does exist. Actions taken in previous condition reports and the actions in the condition report listed above (Condition Report CR 2012-01839) will address this extent of condition."*

  Outage: For this item, the licensee said, *"An extent of condition exists for the Outage function. Currently, no "baseline schedule" is used, a fundamental weakness for FCS outage management. The Station lacks resource loading or planning and no prioritization process is in place to ensure that the right work is being performed. Additionally, FCS has historically not acknowledged external feedback on how to improve the Outage Management function."*

- With respect to extent of cause for both root causes, the licensee said, "*the extent of cause is bounded by the programs reviewed during this analysis*

and the other fundamental performance deficiency root/apparent causes and no additional extent of cause review is required."

Determine that the root cause, extent of condition, and extent of cause evaluations appropriately considered the safety culture components as described in IMC 0310.

The root cause, extent of condition, and extent of cause evaluations appropriately considered the safety culture components as described in IMC 0310. Specifically, the licensee documented their consideration of the IMC 0310 cross-cutting aspects in Attachment 5 of RCA 2012-03986. The licensee found that every cross-cutting aspect was applicable, except for P.1(a) and S.2(b).

Determine that appropriate corrective actions are specified for each root and contributing cause.

The team determined that appropriate corrective actions were specified for each root and contributing cause. In summary, corrective actions were identified that help define, communicate, and execute expectations for a strategic approach to managing the plant; and to establish and communicate clear expectations for behaviors relative to oversight and accountability. These actions were expected to address leadership weaknesses to improve the management of resources at FCS.

Determine that a schedule has been established for implementing and completing the corrective actions.

The team determined that a schedule has been established for implementing and completing the corrective actions. The team found that corrective actions to prevent recurrence have been implemented or scheduled which addressed the leadership weaknesses that caused the resource management issues at FCS. Additionally, corrective actions to address the contributing causes had been implemented or scheduled. The team determined that that licensee's schedule for implementing corrective actions appeared to be commensurate with the significance of the issues they are addressing.

Determine that quantitative or qualitative measures of success have been developed for determining the effectiveness of the corrective actions to prevent recurrence.

The team determined that quantitative or qualitative measures of success have been developed for determining the effectiveness of the corrective actions to prevent recurrence. Specifically, as noted above, the licensee has scheduled quantitative measures of success via Action Items Condition Reports CR 2012-08131-038, CR 2012-08131-039, CR 2012-08131-040, and CR 2012-08131-042.

(3) Assessment Results

The team concluded that for the Resource Management FPD: the root and contributing causes of risk-significant issues were understood; the extent-of-condition

and extent-of-cause of risk-significant issues were identified; and, the licensee's corrective actions for risk-significant performance issues, when implemented, should be sufficient to address the root and contributing causes and to preclude repetition.

Item 5.I: Processes to Meet Regulatory Requirements

(1) Inspection Scope

The team reviewed the licensee's assessment of the FPD associated with deficiencies with Processes to Meet Regulatory Requirements. Specifically, the team assessed the RCA for CR 2012-08137, for which the problem statement was:

"Deficiencies in the design and implementation of fundamental regulatory required processes have caused NRC violations, delayed and/or ineffective correction of equipment issues in important safety systems, and have the potential to reduce safety margin. The infrastructure to support healthy regulatory programs is weak."

The team also assessed the adequacy of the extent of condition, extent of causes, and corrective actions. (Not a Restart Checklist Item)

The team's assessment of this FPD was based on the evaluation criteria from Section 02.02 of NRC Inspection Procedure 95001 which align with this item. The inspection objectives were to:

- Provide assurance that the root and contributing causes of risk-significant issues were understood
- Provide assurance that the extent-of-condition and extent-of-cause of risk-significant issues were identified
- Provide assurance that the licensee's corrective actions for risk-significant performance issues were, or will be, sufficient to address the root and contributing causes and to preclude repetition

(2) Observations and Findings

Determine that the problem was evaluated using a systematic methodology to identify the root and contributing causes.

The team determined that the licensee evaluated this problem using a systematic methodology to identify the root and contributing causes. Specifically, RCA 2012-08137 employed the use of event and causal factor charting, barrier analysis, common factor analysis, Pareto analysis and the why staircase.

The licensee identified the following as the root cause for the deficiencies in the regulatory process and infrastructure:

RC-1: Leadership has not provided adequate governance and oversight for key regulatory required programs and activities.

The team found that the supporting systematic analysis did not fully support RC-1 as the only root causes for deficiencies in the regulatory process and infrastructure. Specifically, the barrier analysis included in Attachment 5 identified several failed barriers involving procedures, processes, organizational effectiveness, skills and knowledge, training and management issues. Through the "five whys" analysis, the licensee determined that these failed barriers were caused by RC-1. However, the team noted that the supporting analysis did not establish a strong correlation between the failed barriers and how adequate governance and oversight would have prevented the failed barriers.

In the final analysis, the licensee documented the additional failed barriers as contributing causes. The team noted that several of the contributing causes more closely fit the definition of a root cause in FCS procedures. Specifically, the several contributing causes appeared to meet the definition of a root cause in Procedure FCSG 24-4, "Condition Report and Cause Evaluation", Section 1.17, in that it represented the most basic, fundamental cause of a problem, which, if corrected, will prevent recurrence of the identified problem and similar problems. The following three contributing causes were identified by the inspection team as fundamental causes, which if corrected, would likely prevent recurrence of the identified problem or similar problems:

CC-2: The quality and completeness of information contained in databases, software and procedures does not support accurate and timely regulatory decision making.

CC-3: Current Licensing Basis documents are not always clear and up-to-date.

CC-5: Engineering and Operations knowledge deficiencies exist in current licensing basis and regulatory processes.

The team evaluated each of the root and contributing causes against the cause testing criteria used by the licensee and described in Procedure FCSG-24-5, "Cause Evaluation Manual," Attachment 1, Section 34.0. In general, the team found it difficult to exclude contributing causes 2, 3, and 5 as root causes. Specifically, when evaluated against the "cause test" questions from Section 34.0, the team could possibly answer "YES" to each of the following three questions suggesting that contributing causes 2, 3, and 5 had elements more closely related to a root cause.

1. If this cause being considered was absent, would the event that initiated the evaluation have occurred?

2. If this cause is eliminated, is there a way for the same event to occur?

3. If this cause is eliminated, will there be future similar events?

As an example, for question 2 above, the team found that if contributing cause 5 was eliminated (i.e. question is a "YES"), operators and engineers would not have the knowledge and skills to perform regulatory required processes such as 10 CFR 50.59 evaluations or operability evaluations. Without having the required knowledge and skills, the team determined there would be a way for the same event (inadequate evaluations) to occur suggesting contributing cause 5 is more closely related to a root cause.

While the team did agree that issues involving adequate governance and oversight likely contributed to deficiencies in the regulatory process and infrastructure, the team disagreed with the licensee's conclusion that adequate governance and oversight should be the only barrier in place to prevent recurrence of this FPD. The team noted that the analysis did identify additional defense in depth barriers that would also prevent recurrence of the licensee's failure to meet regulatory requirements but at the time of this inspection, corrective actions had not been implemented to address those additional defense in depth barriers because they were considered contributing causes and not root causes.

Determine that the root cause evaluation was conducted to a level of detail commensurate with the significance of the problem.

The licensee's RCA employed various techniques to analyze the events. In general, the quality of analysis was sound and identified several failed barriers in the implementation of regulatory processes and infrastructure. In some cases, the team could not identify how each of the failed barriers was addressed in the development of the root and contributing causes. As discussed above, the team identified that the root and contributing causes may not be appropriately characterized which could lead to an inadequate prioritization of corrective actions.

Additionally, the team found the licensee's RCA for issues related to the regulatory processes and infrastructure and other FPDs did not address the licensee's failure to implement elements of the Safety Enhancement Program. The Safety Enhancement Program was established around 1990 and consisted of a set of regulatory commitments aimed at improving FCS performance. The team noted that many elements of the Safety Enhancement Program appear to be closely related to the root and contributing causes of the current FPDs suggesting that the failure to implement that program should be considered a causal factor that warrants further evaluation.

Determine that the root cause evaluation included a consideration of prior occurrences of the problem and knowledge of prior operating experience.

The team determined that the RCA included evaluations of both internal and industry operating experience. The licensee's evaluations of industry operating experience provided sufficient detail such that general conclusions could be established regarding any similarities.

Determine that the root cause evaluation addressed the extent of condition and the extent of cause of the problem.

The team reviewed the licensee's RCA as it relates to extent of condition and extent of cause.

For extent of condition, the licensee found that an extent of condition existed and it included all regulatory required processes. The licensee determined that the full scope of extent of condition encompasses all processes that are based on regulations, codes, and industry standards and subject to inspection or assessment oversight. The team agreed with the licensee's analysis that the extent of condition of Condition Report CR 2012-08137 was adequately bound by the problem statement.

For extent of cause, the licensee identified extent of cause concerns involving inadequacies in reinforcing high standards and accountability which was determined to cross all department and work process boundaries. The licensee addressed the extent of cause through the organizational ineffectiveness RCA performed under Condition Report CR 2012-03986. The licensee determined that corrective actions taken to address the organizational ineffectiveness extent of cause fully address the extent of cause for Condition Report CR 2012-08137. The team found that the corrective actions generally addressed the extent of cause related to root cause 1. The team noted that contributing cause 2, 3, and 5 which related to knowledge and skills, process, procedures, and tools did not receive an extent of cause evaluation since Procedure FCSG-24-5, "Cause Evaluation Manual," Step 35.3.1.c, only required an extent of cause evaluation for each root cause and each apparent cause. The team determined that this was another example of the importance of properly classifying the causal factors as either root and contributing causes.

Determine that the root cause, extent of condition, and extent of cause evaluations appropriately considered the safety culture components as described in IMC 0310.

The root cause, extent of condition, and extent of cause evaluations appropriately considered the safety culture components as described in IMC 0310. Specifically, the licensee documented their consideration of the IMC 0310 cross-cutting aspects in Attachment 5 of RCA 2012-08137. The licensee identified several cross-cutting aspects in the area of human performance, problem identification and resolution, and other components that were applicable to issues related to deficiencies in the regulatory process and infrastructure.

Determine that appropriate corrective actions are specified for each root and contributing cause.

The team reviewed the licensee's corrective actions for each of the root and contributing causes. In general, the corrective actions identified for the root and contributing causes appear to be technically adequate, however, at the time of this inspection, only those corrective actions needed to address the root causes involving leadership and adequate governance and oversight had been implemented.

The licensee also implemented several interim actions which were taken to temporarily prevent the effects of a condition or make and event less likely to recur during the period when the condition is being evaluated and until final corrective actions or corrective actions to prevent recurrence were completed. The team noted that as part of the interim actions, the licensee established an independent review group called the Engineering Assurance Group (EAG). This group was established in December 2012 and was tasked with reviewing the technical adequacy of operability determinations, 10 CFR 50.59 evaluations, and technical specification application.

The team found that to date, the licensee's corrective actions do not appear to be effective. Specifically, during the inspection the team identified several recent evaluations related to operability, reportability, 10 CFR 50.59, and the maintenance rule that were inadequate. The specifics of these inadequate evaluations are documented in Section 7 of this report as the following non-cited violations:

NCV 05000285/2013008-42, "Failure to Make Timely Event Notifications for Unanalyzed Conditions"

NCV 05000285/2013008-43, "Repetitive Issues Involving Untimely Submittal of Required Licensee Event Reports"

NCV 05000285/2013008-31, "Multiple Examples of Operability Determinations that Lacked Adequate Technical Justification"

NCV 05000285/2013008-32, "Multiple Examples of Inadequate Risk-Based Operability Determinations"

NCV 05000285/2013008-17, "Failure to Adequately Implement the Maintenance Rule"

NCV 05000285/2013008-24, "Failure to Effectively Monitor the Performance of Penetration Seals"

NCV 5000285/2013008-28, "Failure to Perform an Evaluation for a change to Component Cooling Water Make-up"

NCV 05000285/2013008-33, "Inadequate Operability Determination due to Failure to Establish Component Cooling Water System Leakage Criteria"

NCV 05000285/2013008-34, "Failure to Follow ASME Code Requirements when Establishing New Pump Reference Values as Corrective Actions"

NCV 05000285/2013008-39, "Failure to Properly Implement Applicable ASME OM Code Requirements"

NCV 05000285/2013008-40, "Failure to Obtain Prior NRC Approval for a Facility Change"

For each of the above non-cited violations, the team found that weakness in procedures, processes, skills and knowledge, and training (i.e. the causes documented in contributing causes 2, 3, and 5 but to date have not been corrected) were directly attributable to the performance deficiency. Additionally, the team found that for most of the examples, the EAG did not identify the inadequate evaluations which lead the team to conclude that interim actions related to the EAG have not been consistently effective.

Determine that a schedule has been established for implementing and completing the corrective actions.

The team determined that corrective actions may not be appropriately prioritized and sufficiently rigorous to ensure such that implementation of regulatory required programs in the near future will be adequate. Specifically, because the prioritization of corrective actions was based on whether the cause identified was a root and contributing cause, at the time of the inspection, the licensee had only fully addressed the root cause for Condition Report CR 2012-08137. The corrective actions for the following three contributing causes had been scheduled but not implemented at the time of the inspection:

CC-2: The quality and completeness of information contained in databases, software and procedures does not support accurate and timely regulatory decision making.

CC-3: Current Licensing Basis documents are not always clear and up-to-date.

CC-5: Engineering and Operations knowledge deficiencies exist in current licensing basis and regulatory processes.

The team questioned if regulatory required programs and infrastructure could be implemented adequately without first addressing the issues identified in contributing causes 2, 3, and 5. During the inspection, the team identified several evaluations related to operability, reportability, 10 CFR 50.59, and the maintenance rule that were inadequate. In most cases, the team identified that had the licensee implemented corrective action to address contributing causes 2, 3, and 5, the inadequate evaluations would likely have been prevented.

Determine that quantitative or qualitative measures of success have been developed for determining the effectiveness of the corrective actions to prevent recurrence.

The team determined that quantitative or qualitative measures of success have been developed for determining the effectiveness of the corrective actions to prevent recurrence. The licensee established, in part, the following three effectiveness reviews:

EFR-1: Leadership skill assessment indicates an improving trend in station leader performance.

EFR-2: Conduct a self-assessment of station performance [regarding regulatory required processes] for the period August 1, 2013 – October 31, 2013.

The team determined that some of the licensee's effectiveness criteria did not meet the criteria established in Procedure FCSG 24-7, "Effectiveness Review of Corrective Actions to Prevent Recurrence (CAPRs)," Revision 1. Specifically, the team identified that effectiveness review EFR-1, failed to meet the guidance in Procedure FCSG 24-7, Step 4.3.2, which required that an effectiveness review shall include specific success criteria. The team also identified that it was difficult to conclude how effectiveness review EFR-1 would objectively measure performance improvements in regulatory required programs and infrastructure.

The team also identified that while effectiveness review EFR-2 did provide specific success criteria, the review included such a limited subset of data (only 3 months worth data) that it would be difficult to determine if corrective actions have been truly effective.

(3) Assessment Results

For the FPD associated with Processes to Meet Regulatory Requirements, the team concluded that, based on issues related to the quality of the RCA preformed under Condition Report CR 2012-08137 including development of causal factors, timing and prioritization of corrective actions and the quality of effectiveness reviews, this inspection area will remain open, pending a future inspection of those actions and reviews.

Item 5.m: Performance Improvement

(1) Inspection Scope

The team reviewed the licensee's assessment of the FPD associated with Performance Improvement. Specifically, the team assessed the RCA for Condition Report CR 2012-08126, for which the problem statement was:

"The Station has not effectively used the performance improvement tools to drive Station improvements. INPO guidelines for performance improvement have not been effectively implemented.

Ineffective use of Performance Improvement tools may hinder the Station's ability to identify opportunities to detect and prevent problems, to promptly intervene before they become consequential, and drive Station improvements for current work practices and key Station activities."

The team also assessed the adequacy of the extent of condition, extent of causes, and corrective actions. (Not a Restart Checklist Item)

The team's assessment of this FPD was based on the evaluation criteria from Section 02.02 of NRC Inspection Procedure 95001 which align with this item. The inspection objectives were to:

- Provide assurance that the root and contributing causes of risk-significant issues were understood
- Provide assurance that the extent-of-condition and extent-of-cause of risk-significant issues were identified
- Provide assurance that the licensee's corrective actions for risk-significant performance issues were, or will be, sufficient to address the root and contributing causes and to preclude repetition

(2) Observations and Findings

Determine that the problem was evaluated using a systematic methodology to identify the root and contributing causes.

The licensee evaluated this problem using a systematic methodology to identify root and contributing causes. Specifically, RCA 2012-08126 employed the use of event and causal factor charting, barrier analysis, why staircase, and stream analysis. In addition, the licensee performed an assessment of the FCS Performance Improvement programs against the INPO Performance Improvement Model. The licensee's stream analysis was used to determine the causal factor drivers, identified by the other analysis methods, to assist in determining the root and contributing causes.

The subject analyses identified the following root and contributing causes:

RC: Senior management did not exhibit strong ownership of the Station's performance improvement programs to ensure these programs were implemented in accordance with Station procedures.

CC-1: The picture of performance improvement excellence is not known at FCS.

CC-2: Management provides insufficient expectations, oversight, and accountability for effective performance improvement programs.

CC-3: Management is more tactical than strategic.

CC-4: Deficiencies in skills and knowledge have contributed to ineffective performance improvement programs.

CC-5: Deficiencies exist in the content of some performance improvement procedures.

CC-6: Station personnel are not held accountable to comply with performance improvement procedures.

CC-7: External feedback has not been used effectively to improve the performance Improvement programs.

CC-8: Management did not implement effective change management processes for performance improvement.

CC-9: The Station does not have a strategic plan that provides guidance for the implementation of the Station's performance improvement programs.

In December 2012, an offsite reviewer from Exelon performed an assessment review of RCA 2012-08126, and determined the RCA was unacceptable and did not meet industry standards. Condition Report CR 2012-20580 was initiated to document the issues associated with the unacceptable RCA, which stated that the reviewer; did not agree with the root cause, believes the CAPR does not address the root cause and will not prevent recurrence, did not see actions to address extent of condition or cause, and did not see a conclusion on how operating experience was used. A FCS qualified root cause analyst conducted an independent review in response to Condition Report CR 2012-20580 and agreed with the Exelon assessment. Consequently, the decision was made by the Manager-Regulatory Assurance and the Supervisor-Performance Improvement, to revise the causes and corrective action plan based on the comments. The RCA data analysis was not re-performed; instead, the revision only included changes to the causes and corrective action plan. An independent root cause analyst re-examined the data presented in the analysis and revised the root cause and eliminated contributing causes CC-1, CC-2, CC-3, and CC-6. The revised root and contributing causes were as follows:

RC: Station management failed to establish a culture that valued constant performance improvement, thereby accepting a model that measured performance against internal standards vice industry best practices, did not proactively pursue identifying/implementing those best practices, and was infrequently receptive to constructive feedback from external sources.

CC-1: Deficiencies in skills and knowledge have contributed to ineffective performance improvement programs.

CC-2: Deficiencies exist in the content of some performance improvement procedures.

CC-3: External feedback has not been used effectively to improve the performance Improvement programs.

CC-4: Management did not implement effective change management processes for performance improvement.

CC-5: The Station does not have a strategic plan that provides guidance for the implementation of the Station's performance improvement programs.

Although the systematic methodology used by the licensee initially identified root and contributing causes that were determined to be unacceptable; the team determined that the revised root and contributing causes were also supported by the original analyses. The team considered that the revised root and contributing causes more appropriately explain why the licensee has not effectively used the performance improvement tools to drive FCS improvements.

Determine that the root cause evaluation was conducted to a level of detail commensurate with the significance of the problem.

The licensee's RCA employed various techniques to analyze the events. In general, the quality of analysis was sound and identified several failed barriers in the licensee's ineffective use of performance improvement tools.

Determine that the root cause evaluation included a consideration of prior occurrences of the problem and knowledge of prior operating experience.

The team determined that the RCA included evaluations of both internal and industry operating experience. The team determined that the licensee's evaluation associated with RCA 2012-08126, Revision 0, provided sufficient detail such that general conclusions could be established regarding any similarities. In fact, the RCA team identified a "Repeat Event" per Procedure FCSG-24-4, "Condition Report and Cause Evaluation." Specifically, Condition Report CR 2007-01704, "FCS Corrective Action Program Common Cause and Safety Culture Report," identified causal factors that relate specifically to the identified causes of the problems described in the RCA. The RCA team observed that the information from this common cause analysis was evidence that these conditions have existed at FCS since the NRC Inspection Procedure 95002 PI&R findings in 2007. The operating experience review associated with RCA 2012-08126, Revision 0, further identified that the licensee failed to perform root cause analyses on the causal factors resulting from the common cause analysis associated with Condition Report CR 2007-01704, as would be expected in a properly functioning CAP. Because the common cause analysis did not have follow-up RCAs, no CAPRs were developed. The RCA team concluded the following:

> *The problem statement and causes found in Condition Report CR 2007-1704 are nearly identical to the ineffectively used "performance improvement tools" being investigated by this RCA team. Based on this conclusion, this RCA team determined that Condition Report CR 2012-08126 is a "Repeat Event." The reason the corrective actions for Condition Report CR 2007-01704 were ineffective is as stated previously, the reliance on procedure changes, creation of metrics, and insufficient staffing of the new PI group, without any corrective actions to change personnel behaviors with respect to use of PI tools. Without the necessary staffing of the PI group and management oversight and accountability, including coaching and mentoring of behavior changes, ineffective use of PI tools continues at the Station.*

During the review to address the comments from the independent Exelon review conducted in December 2012, a FCS root cause analyst considered whether the event described in Condition Report CR 2007-01704 fully met the definition of a "Repeat Event" as defined in Procedure FCSG-24-4. The analyst concluded that because Condition Report CR 2007-01704 was improperly evaluated at a lower significance level that did not require RCAs or CAPRs, it could not meet the definition of a "Repeat Event". Specifically, no CAPRs were identified for the previous event, thus, it was not a reasonable expectation that the corrective actions should have prevented the repeat event. The analyst revised RCA 2012-08126 accordingly.

The team determined, however, the similarities between the events described in CR 2007-01704 and the RCA were adequately considered in the development of the CAPRs for the subject RCA. Specifically, the identified corrective actions promote behaviors and hold personnel accountable, such that, lessons learned from the operating experience review have been appropriately applied.

Determine that the root cause evaluation addressed the extent of condition and the extent of cause of the problem.

The team determined that the licensee's RCA addressed the extent of condition and the extent of cause of the problem. The licensee's RCA team performed an extent of condition evaluation and identified the following programs or processes have not been effectively used to drive FCS improvements:

- Corrective Action Program
- Employee Concerns Program (ECP)
- Human Performance tool usage
- Nuclear Oversight (NOS)
- Organizational Effectiveness
- Training

For each program or process identified, the RCA team determined if and where the program or process was analyzed. All but one of the programs identified above used for improving performance are having, or have had, cause analyses and interim actions performed. The area not covered was the use of training strategically to improve FCS performance. To address this extent of condition, Corrective Actions 7 and 8 were originally developed.

> *CA-7: Perform a gap analysis of Station training programs compared to INPO and industry guidance to identify ways to use training strategically to improve Station performance.*
>
> *CA-8: Based on the gap analysis performed in CA-7, develop and execute a training improvement plan to use training strategically to improve Station performance.*

The team reviewed revision 1 of the RCA, and identified that Corrective Actions CA-7 and CA-8 were inappropriately cancelled. Additionally, no other corrective actions to

address the identified extent of condition were specified. The licensee provided the following explanation to the team's identification of this deficiency:

> "The extent of condition did not change from revision 0 and revision 1 of the RCA. There were two corrective actions (CA-7 and CA-8) in revision 0 that were deleted in revision 1. It was surmised that CA-4 and CA-5 of revision 1 would address the extent of condition by conducting a gap analysis of performance improvement procedures. After further review and understanding the intent of the extent of condition was to look more at training strategically to improve performance. The RCA will be revised to add actions to perform reviews of training. The revision is tracked under Condition Report CR 2013-06760-003."

Revision 2 of RCA 2012-08126 was completed on April 4, 2013, which identified the following corrective actions to address the extent of condition:

> *CA-8: Revise Training Excellence Plan to include a review of the Extent of Condition from this RCA.*
>
> *CA-9: Complete a review of the Extent of Condition from this RCA for applicability to non-accredited training programs. Generate a new action item in Condition Report CR 2012-08126 to address any findings.*
>
> *CA-10: Revise and implement CAP/PI TPMP to align with relevant causal analyses and program assessments with regards to Corrective Action and Performance Improvement programs.*

The team determined that the RCA identified that an extent of cause does exist. Programs with potential weaknesses were identified as FPDs and have been assessed as part of the FCS recovery efforts. The RCA team concluded that no additional actions were needed at this time.

Determine that the root cause, extent of condition, and extent of cause evaluations appropriately considered the safety culture components as described in IMC 0310.

The team reviewed the safety culture review for RCA 2012-08126, Revision 1, and observed that the included review was entirely based on Revision 0. Since the RCA was revised, which only changed and/or deleted causes and corrective action plan, the referenced causes and corrective actions in the safety culture review were no longer applicable. Condition Report CR 2013-06760 was initiated to document the invalid review. The licensee provided the following response to the team's concerns:

> "The revision to the causes and corrective actions provided a better line of sight to the issues. The specific safety aspects that were determined in Revision 0 were determined to be applicable in Revision 1. An error was made in not updating the Safety Culture Review Section in Revision 1 to align with the revised numbering sequence of the causes and corrective actions. The RCA will be revised to correct the numbering sequence in the Safety Culture Revision Section."

Revision 2 of the RCA was completed on April 4, 2013, which revised the Safety Culture Review section to align with the revised numbering sequence of the causes and corrective actions established in Revision 1.

Determine that appropriate corrective actions are specified for each root and contributing cause.

The team determined that appropriate corrective actions were specified for each root and contributing cause. Corrective actions were identified that establish policies, processes, and programs that improve organizational effectiveness, develop the tools and resources needed, promote correct behaviors, and hold personnel accountable, such that, appropriate performance improvement tools are effectively used to drive FCS improvements.

Determine that a schedule has been established for implementing and completing the corrective actions.

The team determined that a schedule has been established for implementing and completing the corrective actions. The team found that corrective actions to prevent recurrence have been implemented which addressed the organizational ineffectiveness at FCS. Additionally, corrective actions to address the contributing causes had been implemented or scheduled. The team determined that that licensee's schedule for implementing corrective actions appeared to be commensurate with the significance of the issues they are addressing.

Determine that quantitative or qualitative measures of success have been developed for determining the effectiveness of the corrective actions to prevent recurrence.

The team determined that the effectiveness reviews specified for RCA 2012-08126, "Performance Improvement," Revision 1, associated with CAPR-2 were incorrect. Consequently, the identified EFRs would not have appropriately measured the effectiveness of the corrective action to prevent recurrence. As a result, Condition Report CR 2013-06760 was initiated to revise the RCA to identify appropriate EFRs for CAPR-2.

The licensee performed a review of the issue per Condition Report CR 2013-06760 and acknowledged that CAPR-2 and the associated effectiveness review were revised in Revision 1. The identified CAPR was from the Site Operational Focus RCA and the identified effectiveness review was from the Organizational Ineffectiveness RCA. However, the due dates were not in alignment, and therefore, the effectiveness review was completed prior to the CAPR. Revision 2 of RCA 2012-08126 was completed on April 4, 2013, which re-instated CAPR-2 from Revision 0, which was from the Organizational Ineffectiveness RCA with the direct tie to the effectiveness review from the Organizational Ineffectiveness RCA.

(3) Assessment Results

The team concluded, with Revision 2 of RCA 2012-08126 to address the issues identified by the team, that for the Performance Improvement FPD: the root and contributing causes of risk-significant issues were understood; the extent-of-condition and extent-of-cause of risk-significant issues were identified; and, the licensee's corrective actions for risk-significant performance issues were, or will be, sufficient to address the root and contributing causes and to preclude repetition.

6. Licensing Issue Resolution

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

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

(1) Inspection Scope

The team conducted a commitment management audit, focusing on the implementation of regulatory commitments. (CL Item 6.b.1)

(2) Observations and Findings

The audit reviewed commitments made by the licensee during the lifetime of operation, including since the previous audit on September 29-30, 2010, which was documented in an audit report dated December 2, 2010 (ADAMS Accession No. ML103200651). The audit consisted of two major parts: (1) verification of the licensee's implementation of NRC commitments that have been completed and (2) verification of the licensee's program for managing changes to NRC commitments.

The NRC staff examined 25 commitments made by the licensee during the lifetime of the plant. The NRC staff reviewed a sample of selected commitments which were generally being effectively implemented or were being captured in the licensee's commitment management program. By letter dated July 3, 2013 (ADAMS Accession Number ML13169A107), the NRC staff documented the audit results.

The NRC staff found that the licensee's commitment tracking program had adequately captured all of the audited regulatory commitments, minus one instance, as noted in the audit results. Licensee personnel were able to effectively track commitments through the licensee's system through implementing documents. The NRC staff concluded that the licensee's program for managing more recent NRC commitments adequately follows the NEI 99-04 guidelines for commitment tracking, commitment changes, and reporting requirements.

The NRC questioned the adequacy of the licensee's ability to adequately modify commitments created prior to the creation of the NEI 99-04 guidance; specifically the management of Safety Enhancement Program items. NEI 99-04 identifies items that

should be categorized as “regulatory commitments” or items that would be better classified in another program.

(3) Assessment Results

Based on the results of the audit, the NRC staff concluded that the licensee has implemented an effective program to manage current and future regulatory commitments and regulatory commitment changes in accordance with NEI 99-04 guidance, and therefore, restart checklist item 6.b.1 will be closed.

7. Specific Issues Identified During This Inspection

(1) Inadequate Procedure for Combating Frazil Ice

Introduction. The team identified a URI for a potentially inadequate procedure for combating frazil icing of the travelling screens.

Description. The team performed a walkdown with a licensee senior reactor operator to determine the adequacy of the licensee’s preparations for the occurrence of a frazil ice event. The team noted three issues with the adequacy of the licensee’s procedure for such conditions, which was in Section V, “Degraded River Conditions,” of Procedure AOP-01, “Acts of Nature,” Revision 33.

First, the procedure did not give direction to open a valve that would need to be opened to direct auxiliary steam to the travelling screens to melt the ice formed on the screens. Step 15 of Section V, “Degraded River Conditions,” of Procedure AOP-01, “Acts of Nature,” instructed operators to direct auxiliary steam to the travelling screens. The procedural step directs hooking up a high temperature hose to a fitting and throttling open valve AS-823. During the walkdown, the licensee and the team noted that the procedure did not include direction to open valve AS-811, a normally closed valve. Valve AS-811 would need to be opened in order to allow steam to the hose used to melt the ice formed on the travelling screens. Valve AS-811 was easily identified as being in the steam flowpath as it was adjacent to valve AS-823.

Second, the team noted that the procedure lacked any personnel safety warnings associated with handling a hose with steam. The team did note, however, that gloves and a face shield were staged with the hose to protect personnel, however the procedure did not warn of the danger of handling live steam which is a condition rarely encountered by operators.

Finally, the team noted that the procedure did not direct the operators where to direct the steam on the travelling screens, instead Procedure AOP-01, Step 15, Section V, simply instructed operators to initiate steam to the travelling screens. Also, the procedure gave no guidance for a strategy for preferential de-icing of one or more screens, such that an adequate river water flow path would be assured. This issue was entered into the CAP as Condition Report CR 2013-04309.

The licensee informed the team that the susceptibility of frazil icing of the intake components was extremely low due to the low flow velocity of river water into the intake

structure. The licensee provided Army Corps of Engineer reports which described the phenomenon. The team required additional inspection to determine if the flow into the intake structure was sufficiently low to preclude frazil ice formation. As a result, the team identified Unresolved Item URI 05000285/2013008-01, “Inadequate Procedure for Combating Frazil Ice.”

(2) Frazil Ice Monitor Not Operational

Introduction. The team identified a Green finding for the licensee's failure to maintain their frazil ice detector operational. The detector was sampling a non-representative water temperature which would not have warned operators of the presence of conditions favorable for the formation of frazil ice on intake structure components.

Description. The team questioned the licensee as to when FCS would be alerted to be ready to enhance their posture towards potential frazil ice events. The licensee informed the team that the primary driver for being forewarned for such events would be the frazil ice monitor alarm in the control room. This alarm monitors environmental parameters to alert operators that conditions favorable for the formation of frazil ice exist. If frazil ice were to occur, it could adversely affect the trash racks and travelling screens by forming ice on these components. These conditions, if not prevented, would then reduce river water flow to the suction of the raw water pumps, the travelling screen wash pumps, and the fire water pumps.

Specifically, the frazil ice monitoring setup alarms when an air temperature of less than 20 degrees Fahrenheit and a circulating water condenser inlet water temperature of less than 39 degrees Fahrenheit exist. When operators receive the alarm, they implement additional actions such as locally checking a chain in the intake structure for icing and performing more frequent monitoring of environmental conditions.

When the team asked questions about the frazil ice monitoring scheme, the operator accompanying team on the walkdown realized that the frazil ice monitor was not functional because the circulating water system was not in operation. The point in the circulating water system was chosen for its validity during power operations at the plant, however, when the plant was shut down the point was not representative. The frazil ice monitor was non-functional. The team concluded that the station would not have been warned of conditions favorable for the formation of frazil ice and considered this a performance deficiency. The licensee entered this condition into their CAP and switched the points they monitored for potential frazil ice formation.

The team asked how FCS handled this condition in the winter of 2011-2012 since the plant was also shutdown then. The licensee responded that this condition was entered into the CAP at that time and representative points were implemented to monitor for frazil ice. The team noted that the licensee did not use the CAP to prescribe any corrective action that would alert the licensee to have representative monitoring points in service for winters when the circulating water system was not in operation or after a plant trip when the condenser was not providing warm water to the intake structure. The team considered this weakness to have contributed to the non-functional frazil ice detector for the winter of 2012-2013 prior to the team's questions.

The licensee informed the team that a shift manager had recognized this vulnerability previously and programmed the plant computer to give an equivalent alarm to alert for conditions favorable for the formation of frazil ice. The team noted though that this alarm, while capable of providing the necessary warning, did not fall under the same structure of review and maintenance that the permanent alarm did, and thus still considered the failure to maintain a functional frazil ice detector was a performance deficiency.

Analysis. The licensee's failure to maintain a functional frazil ice detector was a performance deficiency. This performance deficiency is more than minor, and therefore a finding, because it is associated with the configuration control attribute of the Mitigating Systems Cornerstone and affected the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609, Appendix G, "Shutdown Operations Significance Determination Process," Attachment 1, Checklist 4, "PWR Refueling Operation: RCS level > 23' OR PWR Shutdown Operation with Time to Boil > 2 hours And Inventory in the Pressurizer," the finding is determined to have very low safety significance (Green) because the finding did not increase the likelihood of a loss of reactor coolant system inventory; did not degrade the licensee's ability to terminate a leak path or add reactor coolant system inventory; and did not degrade the licensee's ability to recover decay heat removal, this finding did not require a Phase 2 or 3 analysis as stated in Checklist 4. This finding has a cross-cutting aspect in the area of problem identification and resolution associated with the CAP component because the licensee did not take appropriate corrective actions to address a similar condition during the winter of 2011-2012 in a timely manner, commensurate with the safety significance and complexity [P.1(d)].

Enforcement. This finding does not involve enforcement action because no violation of a regulatory requirement was identified. Because this finding does not involve a violation, has very low safety significance, and has been entered into the licensee's CAP as Condition Report CR 2013-04310, it is identified as a finding: FIN 05000285/2013008-02, "Frazil Ice Monitor Not Operational."

(3) Lack of Safety-Related Equipment for Design Basis Low River Level

Introduction. The team identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," associated with the licensee's failure to have safety-related equipment to ensure safe operations down to the design basis low river level.

Description. The team noted during their review of low river level procedures that the design basis low river level for FCS was 976 feet 9 inches. The team then reviewed the licensee's ability to combat a low river level event at that level.

Procedure AOP-01, "Acts of Nature," Revision 33, for low river level instruct operators to secure the raw water pumps at an intake cell level of 976 feet 9 inches as prescribed by the raw water pump vendor manual. The team noted that this level was an intake cell level and not Missouri River level. Components between the Missouri River and the intake cell cause intake cell level to be lower than river level. Specifically, trash racks and travelling screens are used to remove debris from the water. These components, when perfectly clean and free of debris, lower intake cell level by one inch as described in Calculation FC 08030. The presence of debris on these components causes the level difference between the Missouri River and the intake cell to be even greater. Procedure AOP-01 required the raw water pumps to be secured at a cell level of 976 feet 9 inches, which would equate to an actual river level of 976 feet 10 inches or higher. The team determined that since the low design basis river level for the facility was 976 feet 9 inches, that the licensee did not have necessary raw water pumping capability down to the lower end of the design basis range.

Additionally, the team noted that uncertainties in intake cell level measurement were not taken into consideration when ensuring the raw water pumps were not run below the 976 feet 9 inches level prescribed in the raw water pump vendor materials/manual.

Following the team's questions regarding the adequacy of the procedure, the licensee contacted the vendor to further understand the basis for the prescribed action to secure the pumps at an intake cell level of 976 feet 9 inches. The vendor provided a memorandum to the licensee which stated that there was margin in the 976 feet 9 inches value, and that the pumps could be operated safely at a level down to 975 feet 6 inches. The team considered this information and recognized that there appeared to be margin; such that, the raw water pumps would likely function at the design basis river level with additional loading on the trash racks and travelling screens. However, the team still concluded that the raw water pumps were not operable since Procedure AOP-01 did not support operating the raw water pumps below 976 feet 9 inches, and since the memorandum was not part of the licensee's current licensing basis.

Analysis. The licensee's failure to ensure that raw water cooling was provided down to the design basis low river level by ensuring its specifications and procedures supported raw water pump operation was a performance deficiency. This performance deficiency is more than minor, and therefore a finding, because it is associated with the configuration control attribute of the Mitigating Systems Cornerstone and affected the associated cornerstone objective to ensure the availability, reliability, and capability of

systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process for Findings At-Power," the finding is determined to have very low safety significance (Green) because it: (1) was not a deficiency affecting the design or qualification of a mitigating structure, system, or component, and did not result in a loss of operability or functionality; (2) did not represent a loss of system and/or function; (3) did not represent an actual loss of function of at least a single train for longer than its technical specification allowed outage time, or two separate safety systems out-of-service for longer than their technical specification allowed outage time; (4) did not represent an actual loss of function of one or more nontechnical specification trains of equipment designated as high safety-significance in accordance with the licensee's maintenance rule program; and (5) did not involve the loss or degradation of equipment or function specifically designed to mitigate a seismic, flooding or severe weather event. This finding has a cross-cutting aspect in the area of problem identification and resolution associated with the CAP component because the licensee did not thoroughly evaluate problems such that the resolutions address causes and extent of conditions [P.1(c)].

Enforcement. Title 10 CFR Part 50, Appendix B, Criterion III, "Design Control," requires, in part, that measures shall be established to assure that applicable regulatory requirements and the design basis for those structures, systems, and components are correctly translated into specifications, drawings, procedures, and instructions. Contrary to this requirement, from initial plant operations, the licensee failed to establish measures to assure that applicable regulatory requirements and the design basis for those components were correctly translated into specifications, drawings, procedures, and instructions. Specifically, the licensee failed to ensure that raw water cooling was provided down to the design basis low river level by ensuring the associated specifications and procedures supported raw water pump operation. Because the finding was of very low safety significance (Green) and has been entered into the CAP as Condition Reports CR 2013-04169 and CR 2013-06436, this violation is being treated as a non-cited violation consistent with Section 2.3.2.a of the NRC Enforcement Policy: NCV 05000285/2013008-03, "Lack of Safety-Related Equipment for Design Basis Low River Level."

(4) Non-conservative Value for Declaring An Alert on Low River Level

Introduction. The team identified a Green non-cited violation of 10 CFR 50.54(q)(2) for the licensee's failure to maintain the effectiveness of an emergency plan. Specifically, the licensee failed to maintain a proper value for low river level associated with the declaration of an emergency at the ALERT classification level.

Description. The emergency action level (EAL) declaration conditions for low river level at FCS are 976 feet 9 inches for a Notice of Unusual Event and 973 feet 9 inches for an Alert. The bases for these low river level conditions are to ensure that the raw water pumps will perform their specified safety function and maintain the availability of the ultimate heat sink (UHS). Specifically, the raw water pump performance begins to degrade at a river level of 976 feet 9 inches and the minimum submergence that the raw water pumps should not be operated below is a river level of 973 feet 9 inches. This

guidance is under the natural hazards portion of the EAL scheme since operation of the raw water system at FCS is sensitive to river levels.

Procedure AOP-01, “Acts of Nature,” Revision 33, for low river level, instructed operators to secure the raw water pumps at an intake cell level of 976 feet 9 inches as prescribed by the raw water pump vendor manual. The team observed that the action required by Procedure AOP-01 resulted in a procedurally driven loss of the raw water system (UHS) at 976 feet 9 inches. This procedurally driven loss of UHS led the team to question when an Alert declaration should be made. Licensee emergency preparedness personnel informed the team that their developmental guidance for the declaration point was guidance contained in NEI 99-01, “Methodology for Development of Emergency Action Levels,” Revision 5. This guidance described declaring an Alert when the function of the raw water system would be lost due to low river level if the licensee made an emergent decision to run the raw water pumps below their procedurally prescribed suction level. This led the team to question when the raw water function would be lost and not just when driven by procedures. The value when the pumps would actually be lost would make a more appropriate point to declare the Alert.

The team noted that the minimum raw water pump suction requirement per the vendor was 973 feet 9 inches water (cell) level. The team also noted that the pump vendor added 3 feet of margin and instructed the licensee not to operate the raw water pumps below 976 feet 9 inches water (cell) level. The vendor did not specify all of the assumptions and inputs the vendor used in deriving the 3 feet of margin. The team observed that river level does not exactly correspond to intake cell level, where the raw water pumps take suction, since the travelling screens and trash racks create flow restrictions which “hold up” flow to the cell. According to Calculation FC 07384, with the travelling screens perfectly clean, the level differential is 1 inch, so river level would have to be 973 feet 10 inches to provide an adequate suction to the raw water pumps. The team concluded that declaring the ALERT when river level was at 973 feet 9 inches would correspond to an intake cell level of 973 feet 8 inches which was below minimum suction requirements for the raw water pumps. Also, the team observed that FCS calculations indicated that vortexing would begin at an intake cell level of 974 feet 10 inches. Thus, the team concluded that the declaration of the ALERT at 973 feet 9 inches river level was non-conservative since intake cell level would be below suction requirements for the raw water pumps.

Analysis. The licensee’s failure to maintain a standard emergency action level scheme was a performance deficiency. This performance deficiency is more than minor, and therefore a finding, because it is associated with emergency response organization performance attribute of the Emergency Preparedness Cornerstone and affected the associated cornerstone objective to ensure that the licensee is capable of implementing adequate measures to protect the health and safety of the public in the event of a radiological emergency. Specifically, inaccurate emergency action levels degrade the licensee’s ability to implement adequate measures to protect public health and safety. The finding was evaluated using the Emergency Preparedness Significance Determination Process, and was determined to be of very low safety significance (Green) because the finding was not a lost or degraded risk significant planning function. The planning standard function was not degraded because the Notification of Unusual

Event and Alert emergency classifications would have been declared although potentially in a delayed manner. This finding was not assigned a cross-cutting aspect because the performance deficiency is not reflective of current performance.

Enforcement. Title 10 CFR 50.54(q)(2), states in part, that a nuclear power reactor licensee shall follow and maintain the effectiveness of an emergency plan that meets the requirements of Appendix E to Part 50 and the planning standards of 50.47(b). Contrary to the above, since May 14, 2009, FCS failed to maintain the effectiveness of the site Radiological Emergency Response Plan. Specifically, the licensee did not maintain a standard emergency action level scheme in accordance with the requirements of 10 CFR 50.47(b)(4), which states in part, that a standard emergency classification and action level scheme is in use by the nuclear facility licensee. The emergency action level scheme was not maintained because emergency action levels HU1 and HA1, "Natural or destructive phenomena affecting the Protected Area," contained an inaccurate river level of 973 feet 9 inches. The river level was inaccurate because the basis document, Procedure EPIP-OSC-1, "Emergency Classification," Revision 46, stated the emergency action level was based on the minimum elevation of the raw water pump suction. Based on available plant data, the minimum elevation of the raw water pump suction was above the Alert declaration point of 973 feet 9 inches. Because this violation was of very low safety significance (Green) and has been entered into the CAP as Condition Reports CR 2013-04198 and CR 2013-04169, this violation is being treated as a non-cited violation, consistent with Section 2.3.2.a of the NRC Enforcement Policy: NCV 05000285/2013008-04, "Non-Conservative Value for Declaring an Alert on Low River Level."

(5) Inadequate Procedure for Combating Loss of Raw Water

Introduction. The team identified a Green non-cited violation of Technical Specification 5.8.1, Procedures, for the licensee's failure to maintain an adequate procedure for the loss of raw water cooling. Specifically, the procedure did not properly line up the CCW system for the feed and bleed mode.

Description. The team reviewed Procedure AOP-01, "Acts of Nature," Revision 33, Section IV, "Low River Level." Procedure AOP-01, Section IV, Step 6 directed operators to follow Procedure AOP-18, "Loss of Raw Water," Revision 7, if the raw water system becomes unavailable. The team performed a walkdown of this procedure with a plant operator. Specifically, the team was interested in two portions of Procedure AOP-18, Appendix B, "Fire Water System Backup," and Step 14, "Component Cooling Water Feed and Bleed."

The CCW feed and bleed method relied on "feeding" the system by filling the CCW surge tank with its normal demineralized water source and "bleeding" the system by opening a drain valve to purge warm water which had previously removed heat from plant heat loads.

During the walkdown of Procedure AOP-18, Step 14, the operator informed the team member that he noted in his pre-walkdown preparation that he discovered that the procedure did not adequately address the existing plant configuration used for adding

water to the CCW system. The procedure assumed the plant was in a configuration in which automatic make-up of water to the CCW system existed, but the licensee had changed this configuration two years before. The configuration in the plant instead relied on manual operations to initiate make-up to the system. Because the procedure relied on automatic make-up, the procedure would not work as written and the team considered it inadequate.

Additionally, the team noted that Chicago style hose connection fittings were present on the drain pipe outlets which would be used to "bleed" the system. The team noted that with the fittings on the drain valves that the size of the opening for draining (or "bleeding") the system was reduced to less than the 1.5 inch size of the drain pipe. This smaller opening would reduce the draining flow rate. The team learned through an interview with operations personnel that the 1.5 inch drain valve size was chosen to correspond to the 1.5 inch inlet (make-up) flow pipe size for the CCW system, such that "feed" flow and "bleed" flow would be balanced. The team concluded that with the fittings on the drain valves that this balanced flow approach would be disturbed.

Analysis. The licensee's failure to maintain an adequate procedure to align the CCW system for the feed and bleed mode was a performance deficiency. This performance deficiency is more than minor, and therefore a finding, because it is associated with the procedure quality attribute of the Mitigating Systems Cornerstone and affected the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609, Appendix G, "Shutdown Operations Significance Determination Process," Attachment 1, Checklist 4, "PWR Refueling Operation: RCS level > 23' OR PWR Shutdown Operation with Time to Boil > 2 hours And Inventory in the Pressurizer," the finding is determined to have very low safety significance (Green) because the finding did not increase the likelihood of a loss of reactor coolant system inventory; did not degrade the licensee's ability to terminate a leak path or add reactor coolant system inventory; and did not degrade the licensee's ability to recover decay heat removal, this finding did not require a Phase 2 or 3 analysis as stated in Checklist 4. This finding has a cross-cutting aspect in the area of problem identification and resolution associated with the CAP component because the licensee did not thoroughly evaluate problems such that the resolutions address causes and extent of conditions [P.1(c)].

Enforcement. Technical Specification 5.8.1.a states, in part, that "written procedures shall be established, implemented, and maintained covering the applicable procedures recommended in Regulatory Guide 1.33, Revision 2, Appendix A, February 1978." NRC Regulatory Guide 1.33, Revision 2, Appendix A, Section 6, addresses procedures for combating emergencies and other significant events, including the "Loss of Service Water" event. Procedure AOP-18, "Loss of Raw Water," Revision 7, addresses loss of service water events. Contrary to the above, since April 2011, the licensee failed to maintain a written procedure covering loss of service water events. Specifically, the licensee failed to maintain Procedure AOP-18, "Loss of Raw Water," such that it reflected the existing plant configuration in order for Operations to align the CCW system for the feed and bleed mode. Because the finding was of very low safety significance (Green) and has been entered into the CAP as Condition Report CR 2013-04417, this

violation is being treated as a non-cited violation, consistent with Section 2.3.2.a of the NRC Enforcement Policy: NCV 05000285/201308-05, "Inadequate Procedure for Combating Loss of Raw Water."

(6) Failure to Account for Worst Case Conditions in Fuel Oil Inventory Calculation

Introduction. The team identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," associated with the licensee's failure to account for design basis conditions in their fuel oil consumption calculation.

Description. The team reviewed the licensee's procedure for flooding and noted that the strategy to ensure power to equipment after offsite power was lost relied on the emergency diesel generators. In fact, the licensee's strategy was to use only one diesel generator in an effort to conserve fuel oil. The team noted that this strategy was necessary to have a seven day supply of fuel oil available.

The team reviewed Calculation FC08034, "Diesel Fuel Usage During a Severe Flooding Event," which calculated fuel oil consumption and compared the value to available fuel oil inventory during a flooding event. Not all fuel oil tanks would be available during a design basis flood. The team noted that the calculation assumed that the frequency of running diesel generator could be higher than the nominal 60 hertz. Specifically, during the first day of diesel generator operation frequency was assumed to be 61 hertz and the frequency was assumed to be 60.5 hertz for days 2 through 7.

The team questioned how these frequency assumptions aligned with those described in NRC Information Notice 2008-02, "Findings Identified During Component Design Bases Inspections." The information notice described that NRC inspectors identified instances where the emergency diesel generators loading calculations failed to account for the increased electrical load resulting from operation at the maximum frequency allowed by technical specifications. Assuming a worst case design frequency would be consistent with design practices.

The team noted that FCS's technical specifications did not contain this maximum allowed frequency. Fort Calhoun Document EA FC-92-072 discussed a frequency spectrum of 60.5 +/- 0.3 hertz for the emergency diesel generators. Thus, 60.8 hertz was the maximum frequency the team identified in FCS's design documentation. The team questioned FCS personnel why diesel generator fuel consumption was not determined with the assumption that the diesel generators were run at 60.8 hertz (at the top end of the spectrum) for the entire seven day period, or even at a higher maximum frequency, if applicable. The team postulated that during a flood the emergency diesel generator could be initially operated as high as the 60.8 hertz value and a single failure could make frequency remain there for the entire seven days. The licensee initiated Condition Reports CR 2013-04311 and CR 2013-04470 to address the deficiency identified by the team.

Analysis. The licensee's failure to account for design basis conditions in their fuel oil consumption calculation was a performance deficiency. This performance deficiency is more than minor, and therefore a finding, because it is associated with the configuration

control attribute of the Mitigating Systems Cornerstone and affected the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process for Findings At-Power," the finding is determined to have very low safety significance (Green) because it: (1) was not a deficiency affecting the design or qualification of a mitigating structure, system, or component, and did not result in a loss of operability or functionality; (2) did not represent a loss of system and/or function; (3) did not represent an actual loss of function of at least a single train for longer than its technical specification allowed outage time, or two separate safety systems out-of-service for longer than their technical specification allowed outage time; (4) did not represent an actual loss of function of one or more nontechnical specification trains of equipment designated as high safety-significance in accordance with the licensee's maintenance rule program; and (5) did not involve the loss or degradation of equipment or function specifically designed to mitigate a seismic, flooding or severe weather event. This finding has a cross-cutting aspect in the area of problem identification and resolution associated with the CAP component because the licensee did not thoroughly evaluate problems such that the resolutions address causes and extent of conditions [P.1(c)].

Enforcement. Title 10 CFR Part 50, Appendix B, Criterion III, "Design Control," requires, in part, that measures shall be established to assure that applicable regulatory requirements and the design basis for those structures, systems, and components are correctly translated into specifications, drawings, procedures, and instructions. Contrary to this requirement, since June 2011, the licensee failed to establish measures to assure that applicable regulatory requirements and the design basis for those components were correctly translated into specifications, drawings, procedures, and instructions. Specifically, the licensee failed to translate the worst case design emergency diesel generator frequency that could impact the consumption of fuel oil into the applicable design documentation. Because the finding was of very low safety significance (Green) and has been entered into the CAP as Condition Reports CR 2013-04311 and CR 2013-04470, this violation is being treated as a non-cited violation, consistent with Section 2.3.2.a of the NRC Enforcement Policy: NCV 05000285/2013008-06, "Failure to Account for Worst Case Conditions in Fuel Oil Inventory Calculation."

(7) Administrative Controls for a Low River Level Technical Specification

Introduction. The team identified an unresolved item associated with the technical specification for low river level and its use of administrative controls.

Description. The team reviewed the Technical Specification 2.16, "River Level," as part of their review of the extent of condition review for the Yellow flooding finding. The team noted that the technical specification was applicable to the Missouri River level at the intake structure. The objective of the technical specification was "to specify the maximum and minimum Missouri River levels which must be present to assure safe reactor operation."

The team noted during their review of low river level procedures that the design basis low river level for FCS was 976 feet 9 inches. The team also noted that plant

procedures for low river level have operators secure the raw water pumps at an intake cell level of 976 feet 9 inches as prescribed by the raw water pump vendor manual

The two levels, river level and cell level, represent two physically different water levels which are not the same. Because of the licensee's use of trash racks and travelling screens between the intake cell and the river, cell level will be lower than river level. Calculation FC 07384 described the relationship of intake cell level and river level and highlighted that intake cell level will be at least 1 inch lower than river level due to the differential pressure across the racks and screens. As a result, raw water pumps would have to be secured by procedure prior to lowering river level reaching its lower technical specification value and the raw water pumps would not be available for heat removal. The team questioned how the technical specification required action to place the plant in cold shutdown at a river level 976 feet 9 inches could be carried out with the raw water pumps secured by procedure. The team also questioned whether basing action in the technical specification on a river level of 976 feet 9 inches was conservative, or whether a higher river level would be more appropriate to assure plant safety.

When questioned by the team, the licensee produced Condition Report CR 2006-03381 which previously evaluated this issue. The condition report corrective actions initially were focused towards initiating a license amendment, but later the corrective actions focused on revising the technical specification bases. A plant memorandum reviewed by the team summarized the final actions as follows:

> *"It was decided that the current technical specification minimum river level of 976 feet 9 inches is valid as the lower limit of operability but that additional information was needed to define higher operational limits that would be dependent on plant conditions.*
>
> *Revisions to Technical Specification 2.4 and 2.16 Basis Sections were made (TSBC 07-002-0) to clarify that the minimum submergence water level of 976 feet 9 inches required for operability of raw water pumps applies to the cell level at the pump suction, which can be lower than river level due to head losses across the trash racks, traveling screens and other components that result from debris and/or icing."*

The team considered these actions to be administrative controls, and therefore, Administrative Letter 98-10, "Dispositioning of Technical Specifications That Are Insufficient to Assure Plant Safety," would be applicable. Administrative Letter 98-10 states, "Imposing administrative controls in response to an improper or inadequate technical specification is considered an acceptable short-term corrective action. The staff expects that, following the imposition of administrative controls, an amendment to the technical specification, with appropriate justification and schedule, will be submitted in a timely fashion." This issue was entered into the CAP as Condition Report CR 2013-04733.

Additional NRC inspection is necessary to determine if this case was an instance of untimely corrective action for a deficient technical specification. The team considered this to be an unresolved item, URI 05000285/2013008-07, "Administrative Controls for a

Low River Level Technical Specification."

(8) Sluice Gate Leakage Not Periodically Verified

Introduction. The team identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," associated with the licensee's failure to ensure that a critical parameter in the design calculation for intake cell level control (sluice gate leakage) was periodically measured to ensure the plant stayed within the parameters of the design calculation.

Description. The team reviewed the licensee's basis for providing cooling water flow to safety-related components and the ultimate heat sink during design basis flood conditions. During the flood, flow into the intake cell where the raw water pumps draw suction must be controlled so it is equal to that being pumped out of the intake cells by the raw water pumps.

To attain the proper flow balance, the licensee used a method of closing all but one sluice gate and leaving the one remaining sluice gate throttled slightly open. Flow into the intake cell could come from two sources – that which is controlled by throttling one of the sluice gates and that which leaks past the sluice gates. Sluice gate leakage would not be controllable. By controlling the amount of flow allowed in by throttling the one sluice gate, operators could maintain a stable intake cell water level.

The team noted that the licensee assumes in their procedures and calculations that one or two raw water pumps would be running. This assumption infers that the sluice gate leakage is a critical parameter in the licensee's design strategy because if leakage were too high, a third raw water pump may be needed which is beyond the licensee's analyses. The quality requirements of 10 CFR 50, Appendix B, requires the ability to demonstrate that structures, systems, and components will perform satisfactorily in service. Since this sluice gate leakage parameter was critical to the analyzed operation of the sluice gates for flood control, they would need to be periodically verified to ensure the leakage was not excessive and the in-flow into the intake structure in a design basis flood did not invalidate the design bases of the strategy.

The licensee performed an initial measurement of the intake cell leakage past the sluice gates in 2011, but had not done it since. The team did learn from the licensee that they had planned to implement a leakage check once they changed strategies to the trash rack modification, but had nothing in place for the current credited strategy.

Analysis. The licensee's failure to periodically measure sluice gates for leakage to ensure the leakage was not excessive was a performance deficiency. This performance deficiency is more than minor, and therefore a finding, because it is associated with the configuration control attribute of the Mitigating Systems Cornerstone and affected the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609, Appendix G, "Shutdown Operations Significance Determination Process," Attachment 1, Checklist 4, "PWR Refueling Operation: RCS level > 23' OR PWR Shutdown Operation with Time to Boil > 2 hours And Inventory in

the Pressurizer," the finding is determined to have very low safety significance (Green) because the finding did not increase the likelihood of a loss of reactor coolant system inventory; did not degrade the licensee's ability to terminate a leak path or add reactor coolant system inventory; and did not degrade the licensee's ability to recover decay heat removal, this finding did not require a Phase 2 or 3 analysis as stated in Checklist 4. This finding has a cross-cutting aspect in the area of problem identification and resolution associated with the CAP component because the licensee did not thoroughly evaluate problems such that the resolutions address causes and extent of conditions [P.1(c)].

Enforcement. Title 10 CFR Part 50, Appendix B, Criterion III, "Design Control," requires, in part, that measures shall be established to assure that applicable regulatory requirements and the design basis for those structures, systems, and components are correctly translated into specifications, drawings, procedures, and instructions. Contrary to this requirement, since April 2011, the licensee failed to establish measures to assure that applicable regulatory requirements and the design basis for those components were correctly translated into specifications, drawings, procedures, and instructions. Specifically, the licensee failed to assure that the assumed leakage of the sluice gates was translated into a procedure to periodically measure leakage against acceptance criteria to ensure the leakage was low enough to support the intake structure design calculation. Because the finding was of very low safety significance (Green) and has been entered into the CAP as Condition Report CR 2013-04315, this violation is being treated as a non-cited violation, consistent with Section 2.3.2.a of the NRC Enforcement Policy: NCV 05000285/2013008-08, "Sluice Gate Leakage Not Periodically Verified."

(9) Failure to Prevent Failures of the Sluice Gates to Close

Introduction. The team identified a violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," associated with the licensee's failure to take adequate corrective actions in a timely manner to correct sluice gate preventive maintenance failures.

Description. The team reviewed NRC Inspection Report 05000285/2012012 which described issues between August and December 2012, where the licensee failed to maintain functionality of the river sluice gates. During the course of that inspection, the team noted there were a number of performance deficiencies that involved the sluice gates not being suitably maintained and preventive maintenance not being managed appropriately. Specifically, the licensee was not consistent in ensuring that the river sluice gates were capable of fulfilling their intended safety function and did not manage the CAP to achieve resolution of the multiple programmatic and operational issues that were experienced. As a result, the functionality of the safety-related raw water system was challenged during that time. Closing of the sluice gates is an important assumption in the licensee's method to control intake cell level during a flooding event.

On February 24, 2013, the sluice gates failed to close during a preventive maintenance activity. The team observed that this was the latest in a number of instances where the sluice gates failed to close all the way. For additional details associated with previous failures refer to Inspection Finding 5000285/2012012-03, "Failure to Properly Manage

the Functionality of the River Sluice Gates," (ML13045B055). The team considered that corrective actions taken to ensure the flood mitigation feature would work correctly had been ineffective due to the repeated sluice gate failures.

The licensee implemented corrective actions to remove the silt on the sluice gate ledge which allowed the gates to completely close. The actions involved a method which throttled the sluice to increase flow velocity across the sluice gate ledge, effectively flushing any debris off of the ledge. The team considered this method to be readily available and effective in removing the debris.

Analysis. The licensee's failure to ensure that the sluice gates would close when required was a performance deficiency. This performance deficiency is more than minor, and therefore a finding, because it is associated with the configuration control attribute of the Mitigating Systems Cornerstone and affected the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The significance of this finding is bounded by the significance of a related Yellow finding regarding the ability to mitigate an external flooding event (NRC Inspection Report 05000285/2010008). The finding has a cross-cutting aspect in the area of problem identification and resolution associated with the CAP component because the licensee did not thoroughly evaluate problems such that the resolutions address causes and extent of conditions [P.1(c)].

Enforcement. Title 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," requires, in part, that measures shall be established to assure that conditions adverse to quality such as failures and deficiencies, are promptly identified and corrected. Contrary to this requirement, prior to February 24, 2013, the licensee failed to promptly identify and correct a condition adverse to quality. Specifically, the licensee failed to prevent repetitive failures of the sluice gates to close upon demand. The licensee has entered these issues into their CAP as Condition Report CR 2013-04318. This finding is related to the Yellow finding issued in October 2010 that dealt with issues related to mitigating a significant external flooding event. A separate citation will not be issued as this finding, and its corrective actions, will be managed by the Manual Chapter 0350 Oversight Panel: VIO 05000285/2013008-09, "Failure to Prevent Failures of the Sluice Gates to Close (EA-13-149)."

(10) Failure to Accurately Model Raw Water Flow into the Intake Structure

Introduction. The team identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," associated with the licensee's failure to accurately model the traveling screens and trash racks in the flow calculation for cell level control.

Description. The team reviewed the licensee's method of level control in the intake cells during a flooding event. This review included referencing actual plant configuration to ensure any design basis documents reflected the actual plant.

The team reviewed Calculation FC08030, "Intake Cell Level Control Using the Intake Structure Sluice Gates," which characterized the flow of water into the intake cells. The

team noted that the calculation assumed a minimal loss coefficient for a thick walled orifice with an infinite flow area. The team considered that this assumption was inconsistent with actual plant configuration. The intake structure was built with trash racks and travelling screens between the Missouri River and the intake cells. The team considered that these components would represent more than a minimal loss coefficient.

Proper modeling would be necessary to ensure that the adequate flow balance in and out of the intake structure would be maintained to ensure the functionality of the raw water pumps during a flooding event. Additionally, any loading of the screens or intake trash racks could disturb this flow balance. Without proper modeling, the licensee could not ensure the flow balance would be continually adequate to support raw water pump functionality.

Analysis. The licensee's failure to accurately model the intake structure for the flow model for flooding was a performance deficiency. This performance deficiency is more than minor, and therefore a finding, because it is associated with the configuration control attribute of the Mitigating Systems Cornerstone and affected the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process for Findings At-Power," the finding is determined to have very low safety significance (Green) because it: (1) was not a deficiency affecting the design or qualification of a mitigating structure, system, or component, and did not result in a loss of operability or functionality; (2) did not represent a loss of system and/or function; (3) did not represent an actual loss of function of at least a single train for longer than its technical specification allowed outage time, or two separate safety systems out-of-service for longer than their technical specification allowed outage time; (4) did not represent an actual loss of function of one or more nontechnical specification trains of equipment designated as high safety-significance in accordance with the licensee's maintenance rule program; and (5) did not involve the loss or degradation of equipment or function specifically designed to mitigate a seismic, flooding or severe weather event. The finding has a cross-cutting aspect in the area of problem identification and resolution associated with the CAP component because the licensee did not thoroughly evaluate problems such that the resolutions address causes and extent of conditions [P.1(c)].

Enforcement. Title 10 CFR Part 50, Appendix B, Criterion III, "Design Control," requires, in part, that measures shall be established to assure that applicable regulatory requirements and the design basis for those structures, systems, and components are correctly translated into specifications, drawings, procedures, and instructions. Contrary to this requirement, since April 2011, the licensee failed to establish measures to assure that applicable regulatory requirements and the design basis for those components were correctly translated into specifications, drawings, procedures, and instructions. Specifically, the licensee failed to translate the actual plant configuration for flow of water into the intake structure during flooding into the applicable design calculation. Because the finding is of very low safety significance (Green) and has been entered into the CAP as Condition Reports CR 2013-04468 and CR 2013-04310, this violation is being treated as a non-cited violation, consistent with Section 2.3.2.a of the NRC Enforcement Policy:

NCV 05000285/2013008-10, “Failure to Accurately Model Raw Water Flow into the Intake Structure.”

(11) Failure to Account for Usable Fuel Oil Tank Level in Inventory

Introduction. The team identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, “Design Control,” associated with the licensee’s failure to ensure the proper usable volume of available fuel oil in tank FO-1 was translated into design specifications because the calculation did not address vortexing.

Description. The team reviewed the licensee’s procedure for flooding and noted that the strategy for ensuring power to equipment after offsite power was lost used the emergency diesel generators. The licensee’s strategy was to use one diesel generator to conserve fuel oil. The team noted that this strategy was necessary to have a seven day supply of fuel oil available. The team reviewed Calculation FC 08034 for the assumptions the licensee made for available fuel.

The team noted that some of the fuel oil in fuel oil tank FO-1 was assumed in the fuel oil available to meet the seven day supply. The team questioned licensee personnel if the assumption of available fuel oil in tank FO-1 considered the effect of vortexing in the tank. The phenomenon of vortexing occurs at low tank levels and could lead to the introduction of air into the fuel transfer pump, and is therefore, undesirable and should be avoided. Vortexing is typically addressed by analyzing when vortexing would occur and include limits and instructions to not use the affected tank below the analyzed level. The team observed that vortexing would eliminate usable fuel oil volume in tank FO-1. In response to the team’s question, the licensee indicated that the amount of available fuel oil in Calculation FC 08034 had not been reduced for vortexing considerations.

The calculation originally showed the licensee would have had approximately 600 gallons of fuel above and beyond what would be required for seven days of consumption. This reduction in available fuel oil reduced that volume by 260 gallons. The licensee initiated Condition Report CR 2013-04951 to capture this issue in the CAP.

Analysis. The licensee’s failure to account for vortexing in the design fuel oil calculations was a performance deficiency. This performance deficiency is more than minor, and therefore a finding, because it is associated with the configuration control attribute of the Mitigating Systems Cornerstone and affected the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609, Appendix A, “The Significance Determination Process for Findings At-Power,” the finding is determined to have very low safety significance (Green) because it: (1) was not a deficiency affecting the design or qualification of a mitigating structure, system, or component, and did not result in a loss of operability or functionality; (2) did not represent a loss of system and/or function; (3) did not represent an actual loss of function of at least a single train for longer than its technical specification allowed outage time, or two separate safety systems out-of-service for longer than their technical specification allowed outage time; (4) did not represent an actual loss of function of one or more nontechnical specification trains of equipment designated as high safety-

significance in accordance with the licensee's maintenance rule program; and (5) did not involve the loss or degradation of equipment or function specifically designed to mitigate a seismic, flooding or severe weather event. The finding has a cross-cutting aspect in the area of problem identification and resolution associated with the CAP component because the licensee did not thoroughly evaluate problems such that the resolutions address causes and extent of conditions [P.1(c)].

Enforcement. Title 10 CFR Part 50, Appendix B, Criterion III, "Design Control," requires, in part, that measures shall be established to assure that applicable regulatory requirements and the design basis for those structures, systems, and components are correctly translated into specifications, drawings, procedures, and instructions. Contrary to this requirement, prior to March 6, 2013, the licensee failed to establish measures to assure that applicable regulatory requirements and the design basis for those components were correctly translated into specifications, drawings, procedures, and instructions. Specifically, the licensee failed to translate the usable volume of fuel oil in tank FO-1 into the applicable design documentation. Because the finding was of very low safety significance (Green) and has been entered into the CAP as Condition Report CR 2013-04951, this violation is being treated as a non-cited violation, consistent with Section 2.3.2.a of the NRC Enforcement Policy: NCV 05000285/2013008-11, "Failure to Account for Usable Fuel Oil Tank Level in Inventory."

(12) Inadequate Root Cause for a Significant Condition Adverse to Quality

Introduction. The team identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," associated with the licensee's failure to promptly identify, correct, and prevent recurrence of a significant condition adverse to quality.

Description. In response to the fire event of June 7, 2011, the licensee initiated Condition Report CR 2011-06621 to investigate the breaker 1B3A spurious trip. The licensee performed an RCA for Condition Report CR 2011-6621, "1B3A Main Breaker Trip During Switchgear Fault on 1B4A," dated May 3, 2012.

During their evaluation the licensee determined that the direct cause of breaker 1B3A spurious trip was a wiring error at a cradle connector (known as a "WAGO™" connector) resulting in the failure to block the zone selective interlock feature. The licensee then used the direct cause to determine the root cause. Specifically, the licensee's evaluation states, "starting with this direct cause, the problem statement now becomes: Why was the wiring error at the breaker cradle WAGO™ connector not detected and corrected prior to placing main breaker 1B3A in service during the installation of the Masterpact NW breakers in 2009?"

The licensee determined that there were two primary barriers that were intended to identify a wiring error prior to accepting new equipment for operability described in Engineering Procedure PED·GEI-7, "Specification of Post-Modification Test Criteria." These were wire or continuity checks and component tests. The licensee noted that wire checks are not expected to be the ultimate verification that a new component will perform its design function, but it is one means of finding wiring errors before they

impact system performance. A component or functional test is the most reliable means of ensuring that wiring errors are not adversely impacting system function.

The RCA described the licensee's understanding of the vendor's actions preceding the breaker failure. The vendor's factory acceptance test included a requirement to verify the breaker wiring by using vendor supplied wiring diagrams. This wiring verification failed to identify the wiring error, and is the subject of a vendor investigation. Vendor factory acceptance testing also required the performance of current injection testing which tested the time current trip settings to verify that the breakers would trip at the appropriate time delay with fault current present. This test should have identified the wiring error, but failed to do so because the test was performed with the use of a test box referred to as a full function test kit. The function of the full function test kit is to inhibit a breaker feature known as "thermal imaging" which is not needed during testing and tends to impede the test. However, inhibiting the thermal imaging feature of the breaker also disables the zone select interlock feature, regardless of the condition of the zone select interlock jumpers installed at the cradle WAGO™ connector. Therefore, performing injection tests using the full function test kit will not identify a zone select interlock wiring problem at the cradle. The RCA stated that the vendor was unaware of the effect of the full function test kit on the zone select interlock functionality, and this knowledge gap resulted in a failure to specify a test that would ensure proper breaker performance.

The root cause stated that FCS personnel then performed receipt inspection and post modification testing of the new breakers. The tests performed on-site included a verification of breaker wiring and current injection test similar to the inspection and test performed by the vendor during the factory acceptance testing. The licensee determined that standards for performing and documenting wire/continuity checks for new wiring did not exist, and it was left to the test and field engineer to judge the level of detail required. The licensee also determined that the work order directed the electrician to inhibit thermal imaging using the full function test kit when performing current injection testing. This also represented a failure by FCS personnel to recognize that the full function test kit masked the wiring error at the WAGO™ connector.

Based on this, the licensee determined that there were four missed opportunities for finding the zone select interlock jumper wiring error. Two occurred during the factory acceptance test which was performed by the vendor, and two occurred during receipt inspection and post modification testing of the new breakers, which were performed by FCS personnel.

The licensee identified two root causes for this issue:

- Root Cause 8.1: The vendor was unaware of the effect of the full function test kit on the zone select interlock functionality. This knowledge gap resulted in a failure to specify a functionally test that would ensure proper breaker performance. The knowledge gap is also being investigated by the vendor. (Note: Any root or contributing causes associated with vendor actions will be addressed by the vendor's CAP and not by OPPD's program.)

- Root Cause 8.2: Design Change Package (DCP) preparation procedures do not provide guidance to evaluate design features of new components in regard to the possibility that they may adversely affect required performance characteristics if not properly configured.

The team used the guidance from NRC Inspection Procedure 95002 when reviewing the licensee's RCA. Inspection Procedure 95002 instructs inspectors to determine whether the licensee's questioning process appeared to have been conducted until the causes were beyond the licensee's control. The procedure also states that causes or events outside of the licensee's control are not root causes. The team also reviewed Procedure NOD-QP-19, "Cause Analysis Program," Revision 3. Procedure NOD-QP-19 defined a root cause as, "the most basic, fundamental cause(s) of a problem, which, if corrected, will prevent recurrence," and Attachment 4 of this procedure sets the standards and expectations for the development of causal statements. Step 2.3 in Attachment 4 states that one of the considerations for a causal statement is that it should be clearly correctable with measurable change. Step 2.3.2.a stated, "Difficulty in determining how to measure the causes of a corrective action is an indication that the cause statement may not be clearly correctable."

The team determined that Root Cause 8.1 was meant to address the wiring error. However, Root Cause 8.1 failed to meet the definition of a root cause described in Inspection Procedure 95002 and Procedure NOD-QP-19. Specifically, the team noted that Root Cause 8.1 only identified the vendor as being responsible for the knowledge gap that resulted in inadequate performance testing of the new breakers. The root cause also stated that the vendor is responsible for the corrective actions, but failed to identify the overall responsibility resides with the licensee. Because this root cause only identified the vendor as being responsible, it failed to reflect 10 CFR Part 50, Appendix B requirements regarding the licensee's responsibilities for its vendors, equipment, procurement, testing and identifying conditions adverse to quality (e.g. Criterion I, IV, XI, and XVI).

The licensee also expressed the position that Root Cause 8.2 would be sufficient if Root Cause 8.1 was deleted from the RCA. However, the team determined that the wiring error still could have gone undetected if the design process up front was adequate, because the receipt inspection process also failed. NRC Inspection Report 05000285/2012004 documented NRC inspector observations about this RCA, including the inspector's views that an appropriate root cause was that the licensee's quality assurance department and field technicians failed to verify that the safety-related equipment received from the vendor was properly configured. The licensee's quality assurance department failed to require a separate receipt inspection to verify the equipment supplied by the vendor was configured correctly, met the purchase order specifications, and had installation instructions for verifying proper wiring configuration.

The team determined that Root Cause 8.1 was inadequate because it focused on the vendor and failed to identify possible root causes within the licensee's ability to correct (i.e., multiple breakdowns in the licensee's quality assurance program, including failures in receipt inspection and testing). The team noted that without the appropriate root

cause identified, the RCA does not provide assurance that corrective actions will preclude recurrence.

Analysis. The licensee's failure to adequately evaluate, correct, and preclude repetition of an identified significant condition adverse to quality was a performance deficiency. The performance deficiency is more than minor, and therefore a finding, because it is associated with the protection against external factors attribute of the Mitigating Systems Cornerstone, and affected the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Additionally, if left uncorrected, the licensee's RCA will not provide assurance that effective corrective actions are taken to preclude recurrence of a breaker trip failure. Using Inspection Manual Chapter 0609, Appendix G, "Shutdown Operations Significance Determination Process," Attachment 1, Checklist 4, "PWR Refueling Operation: Reactor Coolant System (RCS) level > 23' OR PWR Shutdown Operation with Time to Boil > 2 hours And Inventory in the Pressurizer," which contained the initial screening for pressurized water reactors that are shutdown with a time to boil of greater than 2 hours. Technical Specification 2.7, "Electrical Systems," states that the reactor shall not be heated up or maintained at temperatures above 300 degrees Fahrenheit unless the electrical systems listed in that section [includes the 480 V busses] are operable. Because the plant was maintained below 300 degrees during the exposure period, the team determined that power availability technical specifications were being met as discussed in Checklist 4. Because the finding did not increase the likelihood of a loss of RCS inventory; did not degrade the licensee's ability to terminate a leak path or add RCS inventory; and did not degrade the licensee's ability to recover decay heat removal, this finding did not require a Phase 2 or 3 analysis as stated in Checklist 4. Therefore, the finding is determined to have very low safety significance (Green). This finding has a cross-cutting aspect in the area of accountability associated with the other safety culture components because the licensee failed to demonstrate a proper safety focus and reinforce safety principles among their peers. Specifically, the licensee focused on sending a message about the vendor rather than the licensee's failures to establish accountability for the vendor's products and services [O.1(c)].

Enforcement. Title 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," requires, in part, that measures be established to assure that conditions adverse to quality such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformance's are promptly identified and corrected. For significant conditions adverse to quality, the measures shall assure that the cause of the condition is determined and corrective action taken to preclude repetition. Contrary to the above, from November 2009 to present, measures established by the licensee failed to assure that the cause of an identified significant condition adverse to quality was corrected and corrective actions taken would preclude repetition. Specifically, from November 2009 to present, measures established by the licensee failed to assure that the cause of an identified significant condition adverse to quality was corrected and corrective actions taken would preclude repetition involving the failure to identify nonconforming quality equipment before it is installed and relied upon to perform specified safety functions. Specifically, in this instance, the licensee failed to identify that a 480 Volt replacement breaker has a jumper installed inappropriately resulting in the failure of the breaker to trip during a faulted condition. Because the finding was of very low safety significance

(Green) and has been entered into the CAP as Condition Report CR 2013-04037, this violation is being treated as a non-cited violation, consistent with Section 2.3.2.a of the NRC Enforcement Policy: NCV 05000285/2013008-12, "Inadequate Root Cause for a Significant Condition Adverse to Quality."

(13) Failure to Establish and Document Basis for Test Acceptance Criteria

Introduction. The team identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," associated with the licensee's failure to assure that applicable design basis information, as defined in 10 CFR 50.2, for breaker testing was correctly translated into specifications, drawings, procedures, and instructions.

Description. The licensee developed an RCA for Condition Report CR 2011-05414, "Breaker Cubicle 1B4A Fire," Revision 3, dated October 5, 2012, to determine the cause of the fire in the west switchgear room on June 7, 2011. The licensee determined the fire was caused, in part, by the breaker cradle fingers being inserted beyond the silver-plated bus stab area, which created a high resistance interface. The RCA states that the licensee failed to perform DLRO (digital low resistance ohmmeter) testing after the modification. The root cause stated, in part:

> "The NLI breaker cradle fingers are longer than the original GE AKD-5 breaker fingers, resulting in insertion at the edge of and beyond the silver-plated bus stab area. There was a high resistance at the stab to finger interface. The high resistance connection overheated the finger cluster resulting in bus grounding and phase to phase shorting. Therefore, high resistance due to breaker cradle fingers engaging the bus stabs in a contact area of hardened grease and copper oxide buildup was the most Direct Cause of the event.
>
> Digital low resistance ohmmeter resistance checks are an accurate way of verifying high resistance connections do not exist. The installation instructions for the NLI modification directed that DLRO readings be obtained on the breaker and cradle with the breaker closed to confirm resistance was less than 100 micro-ohms across the mated pair. These DLRO readings were obtained with the breaker and cradle removed from the switchgear. Post installation readings were not obtained with the breaker and cradle inserted into the switchgear providing final as-left baseline readings. As a result, it is unknown what the resistance was on breaker 1B4A following installation. The root cause was determined during the extent of condition checks of the remaining breakers that were modified.
>
> Failure to confirm as-left resistance from the line to load side of the switchgear following the modification has been determined to be a contributing cause to the event."

The root cause contained an independent vendor report that evaluated the cause of the fire. This report states, "A typical value for a connection is perhaps 100 micro-Ohms rather than the 100,000 micro-Ohms seen here. If a connector component were failing

(such as cracking) it would eventually pass through the 100 micro-Ohm regime and thereby create the hot conductor scenario."

The team reviewed the results of factory acceptance testing performed by the breaker vendor in August 2011. The tests were performed in accordance with Procedure SVP-150, "Standard Verification Plan for NLI/Square-D Masterpact Circuit Breakers," Revision 0. Procedure Step 5.8, "Contact Resistance (Ductor Test)," measures the resistance from the line bus to the load bus of the cradle for each phase when the breaker is closed in the connect position. The acceptance criteria were that each phase is 20 percent of the average resistance and a maximum contact resistance of ≤ 100 micro ohms.

The licensee did additional DLRO testing after the fire to determine the extent of the high resistance connection condition in other breakers. The root cause stated, "DLRO readings were taken on the line side to load side through the breaker and cradle. As-left readings were deemed satisfactory if any reading was less than two times that of any other reading. This is documented in the extent of condition WOs. The WOs contained instructions to contact the Responsible Engineer if the criterion was not met."

The WOs used in 2011 (e.g., WOs 421870-01 and 419854-01) and 2012 (e.g., WOs 450348-01 and 450355-01) required DLRO testing for as-found breaker primary contact resistance and bus resistance. The locations of the test values and location of the tests varied depending on the breaker and testing configuration. The DLRO acceptance values ranged from ≤ 50 micro-ohms to ≤ 300 micro-ohms. The WOs contained a step under each numerical value for notifying a supervisor or system engineer if any of the resistance readings were greater than two times that of the other readings.

Because the acceptance criteria used during the extent of condition testing (i.e., less than two times that of any other reading) did not match the breaker vendor's or the independent vendor's suggested acceptance criteria (i.e., less than 100 micro ohms and each phase within 20 percent of the average resistance), the team requested the licensee to provide the basis of the DLRO acceptance criterion used in the extent of condition testing. The licensee provided the WOs that contained the DLRO testing acceptance criteria; however, the licensee could not produce the basis for those criteria.

Licensee personnel stated that an engineer, who has since retired from the plant, developed acceptance values that were greater than 100 micro ohms because the values could not be taken directly at the bus after the breakers were installed; therefore, the values had to take into account additional electrical connections. This is similar to a statement in NRC Inspection Report 05000285/2011014, which was, "As-found readings not taken directly at bus, but in adjacent cubicle with additional series electrical connections." However, this engineer did not record the basis for his acceptance values.

The team determined that without a basis for the testing acceptance criteria, the licensee cannot demonstrate that extent of condition and current DLRO testing is acceptable, and therefore, show that the breakers will perform satisfactorily in service. By not documenting the basis for the DLRO test acceptance criteria, the licensee failed to meet the requirements of Procedure PED-GEI-7, "Specification of Post-Modification Test

Criteria," Steps 3.2 and 4.2.1, which require the licensee to identify tests and acceptance criteria for modifications and document those evaluations in the PED-GEI-7 form.

Analysis. The licensee's failure to identify and document the basis for the digital low resistance ohmmeter test acceptance criteria was a performance deficiency. This performance deficiency is more than minor, and therefore a finding, because it is associated with the design control attribute of the Mitigating Systems Cornerstone, and affected the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609, Appendix G, "Shutdown Operations Significance Determination Process," Attachment 1, Checklist 4, "PWR Refueling Operation: RCS level > 23' OR PWR Shutdown Operation with Time to Boil > 2 hours And Inventory in the Pressurizer," the team determined that because this finding did not increase the likelihood of a loss of RCS inventory; did not degrade the licensee's ability to terminate a leak path or add RCS inventory; and did not degrade the licensee's ability to recover decay heat removal, this finding did not require a Phase 2 or 3 analysis as stated in Checklist 4. Therefore, the finding is determined to have very low safety significance (Green). This finding has a cross-cutting aspect in the area of human performance associated with the work practices component because licensee personnel failed to follow procedures. Specifically, FCS personnel failed to follow the requirements specified in Procedure PED-GEI-7, "Specification of Post-Modification Test Criteria" [H.4(b)].

Enforcement. Title 10 CFR Part 50, Appendix B, Criterion III, "Design Control," states, in part, that measures shall be established to assure that applicable regulatory requirements and the design bases, as defined in 10 CFR 50.2 and as specified in the license application, for those components to which this appendix applies, are correctly translated into specifications, drawings, procedures, and instructions. Contrary to the above, from July 2011 to the present, measures established by the licensee did not assure that applicable regulatory requirements and the design bases, as defined in 10 CFR 50.2 and as specified in the license application, for those components to which this appendix applies, were correctly translated into specifications, drawings, procedures, and instructions. Specifically, the licensee failed to incorporate the basis for the acceptance limits of the digital low resistance ohmmeter values into specifications and procedures. Without a basis for the acceptance values the licensee cannot show that the breakers will perform satisfactorily in service, and incorrect acceptance values could allow high resistance connections to go unnoticed. Because the finding was of very low safety significance (Green) and has been entered into the CAP as Condition Report CR 2013-04032, this violation is being treated as a non-cited violation, consistent with Section 2.3.2.a of the NRC Enforcement Policy: NCV 05000285/2013008-13, "Failure to Establish and Document Basis for Test Acceptance Criteria."

(14) Failure to Promptly Identify and Correct a Condition Adverse to Quality

Introduction. The team identified a violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Actions," associated with the licensee's failure to promptly identify and correct a condition adverse to quality.

Description. While reviewing Calculation EA-91-084, "Breaker/Fuse Coordination Study," Revision 8, the team noted that Section 6.1.3, stated, in part, "The coordination analysis for the 480 Vac load center busses reveals adequate coordination exists for each of the six 480 Vac busses through the 4160 Vac/480 Vac transformers. Overlap occurs between the transformer primary and secondary side devices; however, preference is not given to coordination of these devices since they feed the same load." Section 6.1.6 also states:

- The only fault not fully protected for is a 4160 Vac/480 Vac transformer fault or a 480 Vac Load Center bus fault. In this case, the possibility of a fault is extremely small. This is especially true since the replacement of the 4160 Vac/480 Vac GE transformers in 1984. There have been no transformer failures of the "new" Westinghouse transformers and there has never been a 480 Vac bus fault. This condition is considered acceptable and is consistent with the original relay setting design.

- The design is consistent with the USAR, Section 8. Section 8.3.1, "4.16-kV System," does not state that all breakers are coordinated (selective tripping), it only states that normal power plant design practices were followed in most respects. Section 8.3.2, "480-V System," states that selective tripping is provided for the 480-V system, which is a true statement. No further actions are required.

The team reviewed USAR, Section 8.3.1, and determined that it did not explicitly discuss breaker coordination for the 4160 Vac system. However, the team noted that Calculation EC-91-084 determined that coordination is not required because overlap would allow either the 480 Vac feeder breaker or the 4160 Vac breaker to show protection for the equipment on the 480 Vac bus since both devices feed the same loads.

The team questioned the adequacy of the licensee's determination regarding breaker coordination. Specifically, in the case of a 480 Vac bus fault upstream of the 480 Vac feeder breakers, the maximum fault current would not be sufficient to meet the 4160 Vac trip setpoint and the fault would not be cleared automatically. The team also questioned whether the basis used by the licensee for not showing protection for a 4160 Vac/480 Vac transformer fault or a 480 Vac load center bus fault was valid. Specifically, the team noted that both of these events had occurred on June 7, 2011, when a phase-to-phase arc fault developed in breaker cubicle 1B4A. This generated a fault current of 16,000 amperes, and lasted for approximately 42 seconds, until operators manually de-energized transformer T1B-4A by opening breaker 1A4-10, in accordance with the FCS fire protection procedures.

The team determined that the licensee had identified a potentially significant condition adverse to quality in that FCS is not fully protected from a 4160 Vac/480 Vac transformer fault or a 480 Vac load center bus fault. However, the licensee did not enter this issue into the CAP for evaluation and resolution. Instead, the licensee used a risk based argument that the failure probability was extremely small and misapplied the USAR

section related to breaker coordination. Based on this, the team determined that the licensee had failed to promptly identify and correct a condition adverse to quality.

The team informed the licensee of their concerns and the licensee initiated Condition Report CR 2013-05631 to capture this issue in the CAP.

Analysis. The licensee's failure to promptly identify and correct conditions adverse to quality was a performance deficiency. The performance deficiency is more than minor, and therefore a finding, because it was associated with both the design control and protection against external factors attribute of the Mitigating Systems Cornerstone, and affected the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The significance of this finding is bounded by the significance of a related Red finding regarding a fire in the 480 Vac safety-related switchgear in June 2011 (NRC Inspection Report 05000285/2012010). The team determined that although the performance deficiency occurred in 1991, this finding is indicative of current plant performance because the performance characteristic has not been corrected or eliminated. Specifically, the licensee continued to display the same behaviors with regard to decision-making. Therefore, this finding has a cross-cutting aspect in the area of human performance associated with the decision-making component because the licensee failed to use conservative assumptions in decision-making and adopt a requirement to demonstrate that the proposed action is safe in order to proceed rather than a requirement to demonstrate it is unsafe in order to disapprove the action [H.1(b)].

Enforcement. 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Actions," requires, in part, that measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformance's are promptly identified and corrected. Contrary to the above, from 1991 to present, measures established by the licensee failed to assure that an identified condition adverse to quality was corrected. Specifically, the licensee failed to properly evaluate a 4160 Vac/480 Vac transformer fault or a 480 Vac load center bus fault and the potential effect on system operability. This issue has been entered into the CAP as Condition Report CR 2013-05631. The significance of this violation is bounded by the significance of a previously issued finding of very high safety significance (Red) issued on April 10, 2012, regarding a significant internal fire event in the 480 Vac safety-related switchgear (EA 2012-121). A separate citation will not be issued as this finding, and its corrective actions, will be managed by the Manual Chapter 0350 Oversight Panel: VIO 05000285/2013008-14, "Failure to Promptly Identify and Correct a Condition Adverse to Quality (EA-13-148)."

(15) Failure to Correct Conditions Adverse to Quality Involving Frequency Compatibility Issues in the 120 Vac System

Introduction. The team reviewed a self-revealing Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Actions," for the licensee's failure to address frequency compatibility issues in the 120 Vac electrical distribution system.

Description. On February 22, 2013, the licensee performed engineered safety feature (ESF) testing in accordance with surveillance test Procedure OP-ST-ESF-0002, "Diesel Generator No. 1 and No. 2 Auto Operation," Revision 60. During performance of this procedure, the licensee received instrument bus A and C low voltage/ground alarms and indications of hard electrical grounds on the safety-related instrument buses. An acrid odor was detected by several personnel in the control room. Subsequent review revealed possible equipment damage to several electrical components supplied by instrument busses A and C. The licensee initiated Condition Report CR 2013-03866 documenting the issues identified during ESF testing. The licensee determined that this equipment damage was likely caused by voltage transients that occur when loads were shed or sequenced onto the 4160 Vac and 480 Vac busses (as is the case during ESF testing) because the frequency of the reference bypass transformer exceeds the frequency range setting of the Ametek SCI inverters.

The team reviewed the maintenance and corrective action history associated with instrument busses and the associated electrical inverters. The team found that during the 2008 refueling outage, the licensee installed Ametek SCI inverters as replacement for the existing Elgar inverters. Since installation of the Ametek SCI inverters in 2008, the team found there was a consistent history of trouble and instrument bus low voltage/ground alarms received in the control room during ESF testing. Specifically, the team noted the following prior instances where inverter trouble and instrument bus low voltage/ground alarms were received during ESF testing:

- June 5, 2008: Condition Report CR 2008-03954 documented that the control room received instrument bus A and C low voltage/ground alarms during performance of Procedure OP-ST-ESF-0002.

- March 16, 2012: Procedure OP-ST-ESF-0002, was performed and instrument bus A and C low voltage/ground alarms cycled in and out while diesel generator 1 was loaded on bus 1A3.

- June 27, 2012: Condition Report CR 2012-06046 documented that the control room received instrument bus A and C low voltage/ground alarms during performance of Procedure OP-ST-ESF-0002.

For each of the above events, the licensee took no corrective actions to address the underlying cause of the instrument bus low voltage/ground alarms. Additionally, the team noted that since installation of the Ametek SCI inverters, the licensee initiated the following condition reports associated with unexpected instrument bus low voltage/ground alarms in the main control room:

- April 3, 2009: Condition Report CR 2009-01558 documented that the control room received instrument bus A low voltage/ground alarm. The team noted that between August 8, 2009, and April 9, 2011, the control room would receive instrument bus low voltage/ground alarm an additional 7 times as documented in Condition Reports CR 2009-03630, CR 2010-00463, CR 2010-01118, CR 2010-03375, CR 2011-01275, CR 2011-01547, and CR 2011-00327. In each instance, the above listed condition reports were classified as Category D conditions which

required the licensee only to trend the condition but did not require corrective action or cause evaluation.

- May 9, 2011: Condition Report CR 2011-04567 documented that the control room received instrument bus A low voltage/ground alarm. The licensee determined that the alarm came in and cleared in a spurious manner which did not support troubleshooting to determine a cause for the issue. The licensee monitored for additional alarms from July 7 to July 9, 2011.

- March 31, 2012: Condition Report CR 2012-02509 documented that that the control room received instrument bus A, B, and D low voltage/ground alarms following restoration of the 480 Vac busses to a normal alignment. This condition report was classified as Condition C and was closed with no action taken.

- August 26, 2012: Condition Report CR 2012-11736 documented that the control room received instrument bus B low voltage/ground alarm. The licensee determined that the likely cause of this alarm was a brief low voltage condition on the bypass transformer causing the inverter to have an out of sync condition and noted that this was similar behavior to that displayed by the inverters during ESF testing. No corrective actions were implemented.

- November 10, 2012: Condition Report CR 2012-17598 documented that the control room received instrument bus C low voltage/ground alarm. The team noted that between November 11, 2012, and January 11, 2013, the control room would receive instrument bus low voltage/ground alarms an additional 3 times as documented in Condition Reports, CR 2012-17611, CR 2013-00553, and CR 2013-00652. In each instance, the above listed condition reports were classified as Category D conditions which required the licensee only to trend the condition but did not require corrective action or cause evaluation.

The team found that the licensee's action to address receipt of low voltage/ground alarms during ESF testing and the resolution of the above listed condition reports included only minimal formal troubleshooting or cause evaluation. Consequently, the licensee's CAP failed to adequately address frequency compatibility issues in the 120 Vac electrical distribution system identified as early as 2008. These frequency compatibility issues resulted in voltage transients sufficient to cause equipment damage and system inoperability whenever loads were shed or sequenced onto the 4160 Vac and 480 Vac busses. On February 25, 2013, the licensee reported Event Notification EN 48781 notifying the NRC of an unanalyzed condition involving vital bus inverters that were potentially inoperable during emergency diesel generator operation since the diesel frequency range is wider than that which is acceptable for the inverters.

At the close of the inspection, the licensee was still completing causal analysis and identification of corrective actions necessary to address frequency compatibility issues in the 120 Vac electrical distribution system.

Analysis. The licensee's failure to implement corrective actions for a condition adverse to quality associated with frequency compatibility issues in the 120 Vac instrument

system was a performance deficiency. This performance deficiency is more than minor, and therefore a finding, because it affected the equipment performance attribute of the Mitigating Systems Cornerstone and affected the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609, Appendix G, “Shutdown Operations Significance Determination Process,” the finding is determined to have very low safety significance (Green) because the finding did not increase the likelihood of a loss of reactor coolant system inventory, the finding did not degrade the licensee’s ability to terminate a leak path or add reactor coolant system inventory when needed, and the finding did not degrade the licensee’s ability to recover decay heat removal once it was lost. This finding had a cross-cutting aspect in the area of problem identification and resolution associated with the CAP component. Specifically, the team identified that the licensee failed to adequately evaluate repeated low voltage/ground alarm associated with the 120 Vac distribution system [P.1(c)].

Enforcement. Title 10 CFR Part 50, Appendix B, Criterion XVI, “Corrective Actions," requires, in part, that measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected. Contrary to the above, between June 5, 2008, and February 22, 2013, the licensee failed to correct a condition adverse to quality associated with 120 Vac instrument system. Specifically, the licensee failed to correct known frequency compatibility issues in the 120 Vac instrument system that resulted in voltage transients and damage to instrumentation supplied by the 120 Vac instrument inverters. Because the finding was of very low safety significance (Green) and has been entered into the CAP as Condition Report CR 2013-03866, this violation is being treated as a non-cited violation consistent with Section 2.3.2.a of the NRC Enforcement Policy: NCV 05000285/2013008-15, “Failure to Correct Conditions Adverse to Quality Involving Frequency Compatibility Issues in the 120 Vac System.”

(16) Failure to Account for Additional Diesel Loading from Non-Safety Loads

Introduction. The team identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criteria III, “Design Control,” for the licensee’s failure to update calculations to account for non safety-related loads supplied by the emergency diesel generator through non-qualified isolation devices and the cumulative impact on diesel fuel oil consumption.

Description. On May 29, 2012, the licensee initiated Condition Report CR 2012-04594 which documented that during emergency diesel generator dead load pickup, it was necessary to credit the dropping out, of energized non-critical quality element contactors (CQE) located in turbine building motor control centers in order to prevent excessive starting current from tripping the diesel generator output breaker during non-design basis accident loss of offsite power scenarios. Non-CQE equipment is not safety-related and generally assumed to not operate to mitigate the consequences of design basis event. In June 2012, the licensee performed a preliminary engineering analysis to determine the impact of the additional electrical load impact on both emergency diesel generators. That analysis concluded that the additional non safety-related loads could result in an

additional 326 amps added to the motor starting load and that the additional electrical current could exceed the trip setting for the diesel generator output breakers. On August 6, 2012, the licensee submitted LER 2012-011, "Emergency Diesel Inoperability Due to Bus Loads During a LOOP," which documented the electrical loading issues associated with the incorrect crediting of non-CQE isolation devices constituted a violation of the technical specifications.

On November 2, 2012, a vendor study was completed for the licensee that included an updated calculation of peak electrical current due to the additional dead load from the equipment supplied by the non-CQE contactors. This calculation more precisely modeled the transient response of the emergency diesel generators and determined that both diesel generators are capable of performing their design function even if non-CQE contactors are not credited for isolating power to associated non safety-related loads. Based on this study, the licensee concluded that the issue identified in Condition Report CR 2012-04594 was not a condition adverse to quality and that it did not constitute a reportable condition. The licensee retracted LER 2012-011 by letter dated February 28, 2013. No further corrective actions were identified by the licensee.

The team reviewed Condition Report CR 2012-04594, LER 2012-002, and the vendor analysis that modeled the emergency diesel generator transient response without crediting the non-CQE contactors. The vendor analysis predicted a worst case starting current of 874.31 amperes which is below the emergency diesel generator output breaker instantaneous over current trip setting of 960 amperes. The team noted that the vendor analysis only predicted the transient response from the additional loads associated with the non-CQE isolation devices and not the steady state impact on diesel generator performance. The team compared the loading of both emergency diesel generators with the addition of the non-CQE related loads to the diesel fuel oil consumption model in Calculation EA-FC-92-072, "Diesel Generator Transient Loading Analysis Using EDSA Design Base 3.0," Revision 6. The team noted that Calculation EA-FC-92-072 determined that for the worst case diesel loading over 7 days would result in 24,452.8 gallons consumed from an available capacity of 25,774.0. The team found that the licensee's calculation of record did not account for the additional load supplied from the non-CQE isolation devices and questioned if sufficient fuel oil inventory margin remained to meet the 7 day mission requirement for the emergency diesel generators.

The licensee reviewed the team's concerns and modified Calculation EA-FC-92-072 to add the additional load to the first 48 hours of diesel generator operation. The licensee limited the period that the additional non safety-related loads would be supplied to the emergency diesel generators to 48 hours because operations is directed in the emergency operating procedures to reduce diesel generator loading. The team found that this assumption is consistent with the current fuel consumption model which credits load shedding after 48 hours. With the added load, the licensee determined that an additional 1228.6 gallons of fuel oil would be consumed which would result in 25,681.4 of an available capacity of 25,774.0 gallons being consumed. This issue was entered into the licensee's CAP as Condition Report CR 2013-09817.

Analysis. The licensee's failure to account for the additional loading on the emergency diesel generators was a performance deficiency. The performance deficiency is more than minor, and therefore a finding, because it is associated with the equipment performance attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability and capability of systems that respond to initiating events to prevent undesirable consequences. Because this performance deficiency affected the calculation used to determine the required diesel fuel oil inventory for an accident or a loss of offsite power occurring from at power conditions, the team used Manual Chapter 0609, Appendix A, "The Significance Determination Process for Findings At-Power," and determined the finding to have very low safety significance (Green) because it: (1) was not a deficiency affecting the design or qualification of a mitigating structure, system, or component, and did not result in a loss of operability or functionality; (2) did not represent a loss of system and/or function; (3) did not represent an actual loss of function of at least a single train for longer than its technical specification allowed outage time, or two separate safety systems out-of-service for longer than their technical specification allowed outage time; (4) did not represent an actual loss of function of one or more nontechnical specification trains of equipment designated as high safety-significance in accordance with the licensee's maintenance rule program; and (5) did not involve the loss or degradation of equipment or function specifically designed to mitigate a seismic, flooding or severe weather event. This finding has a cross-cutting aspect in the area of problem identification and resolution associated with the CAP component because the licensee failed to thoroughly evaluate the condition identified in Condition Report CR 2013-04594 to determine its impact to emergency diesel generator fuel oil consumption. [P.1(c)].

Enforcement. Title 10 CFR Part 50, Appendix B, Criteria III, "Design Control," requires, in part, that design control measures shall provide for verifying or checking the adequacy of design such as by the performance of design reviews or by the use of alternate or simplified calculational methods. Contrary to the above, prior to April 1, 2013, the licensee failed to implement measures for verifying or checking the adequacy of the design of the onsite diesel fuel oil storage system. Specifically, Calculation EA-FC-92-072, "Diesel Generator Transient Loading Analysis Using EDSA Design Base 3.0," Revision 6, failed to account for the additional diesel fuel oil consumption that would occur due to the loads that would be supplied from the emergency diesel generators through non-CQE isolation devices. Because the finding was of very low safety significance (Green) and has been entered into the CAP as Condition Report CR 2013-09817, this violation is being treated as a non-cited violation consistent with Section 2.3.2.a of the NRC Enforcement Policy: NCV 05000285/2013008-16, "Failure to Account for Additional Diesel Loading from Non-Safety Loads."

(17) Failure to Adequately Implement the Maintenance Rule

Introduction. The team identified a Green non-cited violation of 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," associated with the licensee's failure to adequately monitor the performance of structures, systems, and components, against established goals in a manner sufficient to provide reasonable assurance that these structures, systems, and components are capable of fulfilling their intended functions.

Description. During the team's review of the electrical distribution system's readiness for restart, the team requested that the licensee provide a description of the system's Maintenance Rule monitoring status. The licensee provided the team a list dated February 7, 2013, which included various electrical distribution system equipment groups monitored in accordance with 10 CFR 50.65(a)(1). The 480 Vac bus, specifically Busses 1B3A and 1B3A-4A, was one of the groups contained in the list.

The licensee placed Busses 1B3A and 1B3A-4A in Maintenance Rule Category (a)(1) monitoring status on July 7, 2008, because 480 Vac bus tie breaker BT-1B3A failed to close during a hot bus transfer, and the 480 Vac Bus 1B3A was lost. The licensee's February 2013 Maintenance Rule status list stated that the actions and monitoring goals for returning this equipment to Maintenance Rule Category (a)(2) status are no 480 Vac breaker failures to function because of maintenance preventable malfunctions in the AK-50 cubicles because of inadequate preventative maintenance through the current outage. In addition, the list's "current status" column for this equipment stated that goal monitoring had stopped. The team questioned this and the licensee informed the team that goal monitoring stopped after the June 7, 2011, fire event.

The team questioned why goal monitoring had stopped, and the licensee provided a written response that stated the 480 Vac bus goal monitoring stopped after the 1B4A fire. Specifically, the licensee was waiting for all new corrective actions to be implemented, which included the load center 1B4A replacement or rebuild, rather than setting new goals and monitoring as required by 10 CFR 50.65. The licensee said that the 480 Vac busses were all available to provide power; however, they were not required to be operable while the plant was shut down. The licensee did not provide the team an adequate justification for why goal monitoring had stopped; nor did it provide updated Maintenance Rule goals for this equipment group while it was undergoing corrective actions.

Analysis. The licensee's failure to monitor performance or condition of the 480 Vac busses against established goals was a performance deficiency. This performance deficiency is more than minor, and therefore a finding, because it is associated with the equipment performance attribute of the Mitigating Systems Cornerstone and affected the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609, Appendix G, "Shutdown Operations Significance Determination Process," Attachment 1, Checklist 4, "PWR Refueling Operation: RCS level > 23' OR PWR Shutdown Operation with Time to Boil > 2 hours And Inventory in the Pressurizer," which contained the initial screening for pressurized water reactors that are shutdown with a time to boil of greater than 2 hours. Technical Specification 2.7, "Electrical Systems," stated that the reactor shall not be heated up or maintained at temperatures above 300 degrees Fahrenheit unless the electrical systems listed in that section [includes the 480 V busses] are operable. Because the plant was maintained below 300 degrees during the exposure period, the team determined that power availability Technical Specifications were being met as discussed in Checklist 4. Because the finding did not increase the likelihood of a loss of RCS inventory; did not degrade the licensee's ability to terminate a leak path or add RCS inventory; and did not degrade the licensee's ability to recover decay heat removal, this finding did not require

a Phase 2 or 3 analysis as stated in Checklist 4. Therefore, the finding is determined to have very low safety significance (Green). This finding has a cross-cutting aspect in the area of human performance associated with the decision-making component because the licensee failed to use conservative assumptions in decision-making and adopt a requirement to demonstrate that the proposed action is safe in order to proceed rather than a requirement to demonstrate it is unsafe in order to disapprove the action [H.1(b)].

Enforcement. Title 10 of the Code of Federal Regulations, Section 50.65(a)(1) requires, in part, that holders of an operating license shall monitor the performance of systems and components against licensee-established goals, in a manner sufficient to provide reasonable assurance that such structures, systems, and components are capable of fulfilling their intended safety functions. Contrary to the above, from June 7, 2011, to the present, the licensee failed to monitor the performance of the 480 Vac busses in a manner sufficient to provide reasonable assurance that they are capable of fulfilling their intended safety functions. Because the finding was of very low safety significance (Green) and has been entered into the CAP as Condition Report CR 2013-04352, this violation is being treated as a non-cited violation consistent with Section 2.3.2.a of the NRC Enforcement Policy: NCV 05000285/2013008-17, "Failure to Adequately Implement the Maintenance Rule."

(18) Failure to Establish Adequate Instructions for Restoring Temporary Modifications

Introduction. The team identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," associated with the licensee's failure to establish adequate instructions for restoring temporary modifications.

Description. Fort Calhoun Procedure SO-O-25, "Temporary Modification Control," Revision 81, contained instructions for closing out temporary modifications and updating control room and operations control center documents (e.g., piping and instrumentation diagrams (P&IDs)) to reflect that equipment has been restored. NRC Inspection Report 05000285/2013002 described a concern with this procedure. When reviewing a sample of the Engineering Change (EC) packages, the inspectors noted a difference between two packages (i.e., EC 53288 and EC 54320) in the timing of when the plant was physically restored and when the procedures and drawings used by operations personnel were subsequently updated. In one package, the time difference was two days; in the other, the time difference was approximately six weeks. The team noticed that Procedure SO-O-25 did not contain a timing requirement for when the operators' procedures and drawings had to be updated after the plant was physically restored from a temporary modification. The inspectors questioned if the lack of a timing requirement could allow for operators to reference outdated procedures and drawings that no longer represented the current configuration of the plant. The team discussed this observation with licensee management on February 1, 2013.

During this inspection, the team searched the licensee's CAP system to see if the inspectors' concern had been entered into the CAP. The team did not find a condition report to document the concern. However, the team found a condition report dated February 13, 2013 (Condition Report CR 2013-03056), that described that the control

room P&IDs were not updated to show that a temporary block on the safety-related low pressure safety injection suction valve (HCV-2937) was removed after a temporary modification was restored. The condition report documented that the licensee did not follow its processes for closing out temporary modifications.

The team asked the licensee if the concern from NRC Inspection Report 05000285/2013002 was entered into the CAP. The licensee did not enter this issue into the CAP. After the team challenged the licensee as to why it did not follow its CAP procedures for entering issues into its CAP, the licensee created a condition report on February 27, 2013, to capture the concern with the adequacy of Procedure SO-O-25.

Procedure SO-O-25, "Temporary Modification Control," Revision 80, does not contain instructions for ensuring that documents (e.g., P&IDs) used by the control room and operations control center are updated in a timely manner after a plant is physically restored from a temporary modification.

Analysis. The licensee's failure to establish adequate instructions for restoring temporary modifications was a performance deficiency. This performance deficiency is more than minor, and therefore a finding, because it is associated with the procedure quality attribute of the Mitigating Systems Cornerstone and affected the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Additionally, if left uncorrected, the procedure inadequacy could become a more significant issue because it could allow operators to continue to reference material that does not reflect current plant configuration. Using Inspection Manual Chapter 0609, Appendix G, "Shutdown Operations Significance Determination Process," Attachment 1, Checklist 4, "PWR Refueling Operation: RCS level > 23' OR PWR Shutdown Operation with Time to Boil > 2 hours And Inventory in the Pressurizer," the team determined that because this finding did not increase the likelihood of a loss of RCS inventory; did not degrade the licensee's ability to terminate a leak path or add RCS inventory; and did not degrade the licensee's ability to recover decay heat removal, this finding did not require a Phase 2 or 3 analysis as stated in Checklist 4. Therefore, the finding is determined to have very low safety significance (Green). This finding has a cross-cutting aspect in the area of human performance associated with the work control component because the licensee failed to appropriately coordinate work activities by incorporating actions to address the need to keep personnel apprised of work status, the operational impact of work activities, and plant conditions that may affect work activities. Specifically, the licensee did not incorporate actions into the procedure that would address the impact of out-of-date control room references on operator performance [H.3(b)].

Enforcement. Title 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," requires that activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings. Instructions, procedures, or drawings shall include appropriate quantitative or qualitative acceptance criteria for determining that important activities have been satisfactorily accomplished. Contrary to this requirement, from January 17, 2013, to the present, the licensee's temporary modification control procedure did not

include appropriate criteria for determining that control room and operations control center references reflect current plant configuration and were updated in a timely manner. The licensee initiated Condition Report CR 2013-04286, which stated that the licensee's transition to a new procedure will help ensure that control room and operations control center documents were updated in a timely manner and that the licensee is determining whether any near-term action is necessary to address the issue until the new procedure is in effect. Because the finding was of very low safety significance (Green) and has been entered into the CAP as Condition Report CR2013-04286, this violation is being treated as a non-cited violation consistent with Section 2.3.2.a of the NRC Enforcement Policy: NCV 05000285/2013008-18, "Failure to Establish Adequate Instructions for Restoring Temporary Modifications."

(19) Failure to Initiate Condition Reports in Accordance with the Corrective Action Program Procedures

Introduction. The team identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," for the licensee's failure to initiate condition reports when problems or conditions adverse to quality were identified in accordance with Procedure FCSG-24-1, "Condition Report Initiation," Revision 3. Specifically, during the course of the inspection, the team identified 11 examples where licensee staff failed to enter conditions adverse to quality into the CAP when they were identified. As a result, corrective actions needed to address the conditions adverse to quality could have been potentially untimely.

Description. Procedure FCSG-24-1, "Condition Report Initiation," Revision 3, was the CAP procedure for initiating Condition Reports. The procedure specified that when a plant employee identifies a problem or condition adverse to quality, they are required to initiate a condition report prior to leaving the work site at the end of the work day. It also stated that if any doubt exists concerning an issue, a condition report should be generated. During the course of the inspection, the team noted that at times, the condition report originators would take days and even months to initiate a condition report. In some instances, licensee personnel had to be prompted by the team to generate the condition report to document questions generated during discussions with the team or when it was evident that a problem or condition adverse to quality had been identified. Lastly, the team also noted a few instances where licensee personnel stated that they had to research an issue further to ensure it warranted writing a condition report

The following were the specific examples associated with this performance deficiency:

1. Engineering personnel reviewing a change from automatic to manual actions on the CCW surge tank had identified that the 50.59 Screening was deficient. They stated they had the intention to write a Condition Report but failed to do so. As a result, the engineers missed an opportunity to self-identify a problem.

2. Licensee personnel failed to initiate a condition report when they discovered that they had performed an inadequate reportability evaluation for EN 47862. Specifically, during the review of LER 2012-003, "Non-Conservative Error in

Calculation for Alternate Hot Leg Injection Results in Unanalyzed Condition," reported under 10 CFR 50.73, the licensee discovered that the issue should have been reported as an event notification under 10 CFR 50.72 and no Condition Report was written to document that failure.

3. Operations personnel failed to initiate a condition report when they discovered that the frazil ice monitor alarm was not operable in 2012. After the inspectors questioned the licensee regarding the issue being placed into the CAP, the operations personnel initiated the condition report to document the issue.

4. The licensee failed to initiate a condition report for the following late reports made to the NRC under 10 CFR 50.73: LER 2011-007, "Violation of Technical Specifications due to Reactor Coolant System Boundary Leakage," LER 2012-010, "Seismic Qualification of Instrument Racks," LER 2012-011, "Emergency Diesel Inoperability due to Bus Loads during a LOOP," and LER 2012-014, "Containment Beam 22 Loading Conditions outside of the Allowable Limits." This issue was entered into the CAP as Condition Report CR 2013-04186.

5. During the August and September 2012 monthly test of the river water sluice gates, the licensee failed to write a condition report following the failure of the surveillance test and the identification of debris by the divers performing an inspection of the intake structure. In addition, although the testing for October 2012 did not occur, divers found silt at the bottom of the intake structure. The licensee failed, again, to enter this condition into the CAP.

6. During a licensee and NRC discussion regarding the Operator Challenge program, the team noticed that the procedure revision being used by the licensee of Procedure FCSG-45, "Operator Challenger Program," was not the most recent revision. Following the discussion, the team had to prompt the licensee to write a condition report on the issue. This issue was entered into the licensee's CAP as Condition Report CR 2013-04301.

7. The team questioned licensee personnel about the time frame for changing the controlling documentation when removing a temporary modification from the plant. A condition report on the issue was written by the licensee a month after the question was asked by the team.

8. During a meeting between the team and engineering personnel to discuss the FCS licensing basis, the team questioned the electrical bus separation adequacy. Following the discussion, the NRC had to prompt the licensee to write a condition report on the issue.

9. The Engineering Assurance Group created performance indicators to track the progress of the engineering changes being made. The EAG identified a number of issues and there was a red performance indicator in 50.59 Screenings; however, the licensee did not write a condition report for the red performance indicator.

10. During the team's review of Condition Report CR 2012-17250, "FW-6-M Discrepancy and Disposition Report – As Found Condition," the team had to prompt the licensee to consider past operability and to write a condition report to document the issue. This issue was entered into the licensee's CAP as Condition Report CR 2013-03474.

11. NRC Inspection Report 05000285/2012004 identified several observations about RCA 2011-06621, "1B3A Main Breaker Trip During Switchgear Fault on 1B4A." The licensee did not capture those observations in a condition report and did not determine whether the root causes in the RCA needed to be re-evaluated.

Analysis. The licensee's failure to initiate condition reports when a problem or condition adverse to quality was identified was a performance deficiency. This performance deficiency is more than minor, and therefore a finding, because if left uncorrected it has the potential to lead to a more significant safety concern. Specifically, if the licensee does not enter conditions adverse to quality into the CAP, the conditions adverse to quality may not be evaluated and corrected in a timely manner. This finding is associated with Mitigating Systems Cornerstone. The team determined that the finding could be evaluated using the SDP in accordance with IMC 0609, "Significance Determination Process," and conducted a Phase 1 characterization and initial screening. Using Phase 1, Table 3, "SDP Appendix Router," the team answered 'yes' to the following question: "Does the finding pertain to operations, and event, or a degraded condition while the plant was shutdown?" As a result, the team used IMC 0609 Appendix G, "Shutdown Operations Significance Determination Process." Using Appendix G, the finding is determined to have very low safety significance (Green) since it did not need a quantitative assessment. This finding has a cross-cutting aspect in the area of problem identification and resolution associated with the CAP component because the licensee did not implement a CAP with a low threshold for identifying issues [P.1(a)].

Enforcement. Title 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," requires, in part that activities affecting quality be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and be accomplished in accordance with these instructions, procedures, or drawings. Procedure FCSG-24-1, "Condition Report Initiation," Revision 3, provided instructions for identifying and reporting existing or potential conditions adverse to quality or other deficiencies. Procedure FCSG-24-1, which is associated with activities affecting quality, stated, in part, that a condition report was required to be initiated prior to leaving the work site at the end of the originator's work day. Contrary to the above requirement, between July 2012 and March 2013, the licensee failed to enter conditions adverse to quality into the CAP in a timely manner following the identification of the condition. Specifically, the team identified 11 instances where licensee staff failed to initiate a condition report after identifying a deficiency or a condition adverse to quality. In some instances, licensee personnel had to be prompted by the team to initiate a condition report. As a result, the corrective actions taken to address the conditions could have been potentially untimely. Because the finding was of very low safety significance (Green) and has been entered into the CAP as CR 2013-06991, this violation is being treated as a non-cited violation consistent with Section 2.3.2.a of the NRC Enforcement

Policy: NCV 5000285/2013008-19, “Failure to Initiate Condition Reports in Accordance with the Corrective Action Program Procedures.”

(20) Failure to Identify Conditions Adverse to Quality

Introduction. The team identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, “Corrective Action,” for the licensee’s failure to promptly identify and correct conditions adverse to quality. Specifically, during the course of the inspection, the team identified 6 examples where the licensee failed to identify that a condition adverse to quality associated with structures, systems, and components existed. Consequently, these conditions adverse to quality were not entered into the CAP in a prompt manner to ensure timely correction.

Description. The team identified several instances where the licensee did not identify conditions adverse to quality associated with structures, systems, and components at FCS. The following is a summary of the identified performance deficiencies with the references to the specific sections of the report where the issues are further described.

1. The licensee failed to identify that the station has a single failure vulnerability associated with the control room ventilation system. The licensee had an opportunity to identify this issue in 2011, when a failure was experienced and subsequently, when the vendor recommended the licensee write a condition report to evaluate the issue. When the team asked questions during this inspection then the licensee entered the issue into the CAP. This failure could have prevented the licensee from identifying other conditions adverse to quality. (Item 5.a)

2. The licensee failed to identify, correct, and implement actions to preclude repetition of a significant condition adverse to quality. Specifically, the licensee failed to correct a significant vulnerability associated with the design of the 480 Vac electrical distribution system. (Item 1.c)

3. The licensee failed to identify that FCS engineers lack sufficient knowledge of plant design and licensing basis information, and a detailed understanding of plant systems and equipment. This issue meets FCS’s definition of a significant condition adverse to quality as defined in Procedure SO-R-2, “Condition Reporting and Corrective Action,” Revision 53a. (Item 5.a)

4. The licensee failed to recognize that the use of alternate seismic criteria and method (ASCM) to analyze structures when the NRC safety evaluation report limits the use of ASCM method to heating, ventilation, air-conditioning (HVAC) and piping could be an issue. As a result, calculations used to determine a structure’s response to an earthquake may be incorrect/unapproved when using this method. (Item 2.d)

5. The licensee failed to identify that the gage glass for tank FW-19 cannot withstand a HELB environment. The licensee credits the sight glass ball check valves to work to prevent draining the tank, however, there are no preventive maintenance tasks associated with them. The valves were not in the in-service testing program, they are not tested, and there were no historical records for repair/replacement of these

valves. The licensee entered this issue into the CAP as Condition Report CR 2013-03974. (Item 3.b.2)

6. The licensee failed to identify that the raw water to AFW emergency fill hose was being improperly stored. Specifically, the hose was only qualified to 158 degrees F, but it was stored in a room where room temperatures would exceed this rating during a HELB. The licensee entered this issue into the CAP as Condition Report CR 2013-05276. (Item 5.a)

Analysis. The licensee's failure to identify conditions adverse to quality in a timely manner and properly enter them into the CAP was a performance deficiency. This performance deficiency is more than minor, and therefore a finding, because if left uncorrected it has the potential to lead to a more significant safety concern. Specifically, the failure to identify conditions adverse to quality and enter them into the CAP, has the potential to lead to a failure to correct conditions adverse to quality in a timely manner commensurate with the safety significance. This finding was associated with the Mitigating Systems Cornerstone. The team determined that the finding could be evaluated using the SDP in accordance with IMC 0609, "Significance Determination Process," and conducted a Phase 1 characterization and initial screening. Using Phase 1, Table 3, "SDP Appendix Router," the team answered 'yes' to the following question: "Does the finding pertain to operations, and event, or a degraded condition while the plant was shutdown?" As a result, the team used IMC 0609 Appendix G, "Shutdown Operations Significance Determination Process." Using Appendix G, the finding is determined to have very low safety significance (Green) since it did not need a quantitative assessment. This finding has a cross-cutting aspect in the area of problem identification and resolution associated with the CAP component because the licensee did not implement a CAP with a low threshold for identifying issues and did not identify issues completely, accurately, and in a timely manner commensurate with their safety significance [P.1(a)].

Enforcement. Title 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," requires, in part that measures shall be established to assure that conditions adverse to quality such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and non conformances are promptly identified and corrected. Contrary to the above, between July 2012 and March 2013, the licensee failed to identify conditions adverse to quality in a timely manner. Specifically, the team identified 6 instances where the licensee failed to identify a deficiency or a condition adverse to quality and to enter them into the CAP. As a result, conditions adverse to quality may not be corrected in a timely manner commensurate with the safety significance. Because the finding was of very low safety significance (Green) and has been entered into the CAP as Condition Report CR 2013-07959, this violation is being treated as a non-cited violation consistent with Section 2.3.2.a of the NRC Enforcement Policy: NCV 5000285/2013008-20, "Failure to Identify and Correct Conditions Adverse to Quality."

(21) Failure to Ensure that Design Requirements Associated with the Containment Electrical Penetration Assemblies Were Correctly Translated Into Installed Plant Equipment

Introduction. The team identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," associated with the licensee's failure to translate applicable regulatory requirements and the design basis into specifications, drawings, procedures, and instructions.

Discussion. The containment electrical penetration assemblies perform multiple functions as described in USAR paragraphs 5.9 and 5.9.3. They are designed to withstand normal environmental conditions during plant operations and to maintain the integrity of the containment structure following a design basis accident. The containment electrical penetrations are of the canister type furnished by the manufacture as fully assembled, complete with wiring, inner seal, outer seal, and factory tested units. Installation only requires welding the canisters into penetration pipe stubs, and splicing/connecting the penetration assembly wiring to field cables. The original containment electrical penetration assemblies (Conax) were fabricated of Teflon insulated, solid conductors bound in a matrix of insulating/sealing material, all held in compression with a swaged, stainless steel outer housing. The insulating/sealing material for these assemblies also contained Teflon. In particular two of these Teflon designs were utilized in significant numbers at FCS in original construction; 119 in environmentally qualified applications and approximately 530 in non-environmentally qualified applications. These electrical penetrations perform two design functions: 1) containment integrity for both Class 1E and non-Class 1E equipment electrical conductors that will not fail in a post-LOCA environment and 2) Environmental Qualification (EQ) to maintain electrical continuity for important to safety electrical equipment to remain functional during and following design basis events.

The containment electrical penetrations were designed and supplied to the licensee by the Conax Buffalo Corporation (Conax). Conax performed Teflon-seal electrical penetration testing in 1971 and 1979; however these tests were not comprehensive, and excluded radiation exposure and post-LOCA environment conditions. Subsequently, in 1981, Conax provided the licensee its position that should the inner seal (inside containment) fail, the outer seal (outside containment) would provide Containment integrity as the outer seal would be exposed to a less severe environment.

NRC Bulletin 79-01, "Environmental Qualification of Class 1E Equipment," required the licensee to perform a detailed review of the environmental qualification of Class 1E electrical equipment to ensure that the equipment will function under (i.e. during and following) postulated accident conditions. Bulletin 79-01B expanded the scope of the original NRC Bulletin 79-01 by requiring the licensees to provide additional information to resolve safety concerns relating to design basis environments and current qualification criteria not addressed in the facilities' final safety analysis reports. These include high energy line breaks inside and outside primary containment, aging, and submergence.

The licensee, following the requirements of IE Bulletin 79-01B, "Environmental Qualification of Class 1E Equipment," contracted Wyle Laboratories in 1983-1984 to perform comprehensive design basis accident testing of three electrical penetration subassemblies which included thermal aging; radiation exposure; and post-LOCA conditions of pressure, temperature, and steam in this order. Consequential electrical, seismic, and pressure leak functional testing followed and revealed the failure of the

Teflon wire insulation, failure of the inboard Teflon subassembly seal, and some outside seal leakage from one of the three tested subassemblies.

The licensee submitted LER 1984-009 in July 1984 documenting the above and providing its conclusions (supported by Conax) that the Class 1E electrical conductors would fail their EQ requirements, the inboard seal would fail, and the outboard seal would serve as the pressure boundary providing Containment integrity. The licensee stated in this LER, in part, "It is the District's judgment, based upon the test evidence that the penetrations failed to perform their electrical function and concluded that the damage to the lead wire insulation would occur only after accumulation of high radiation dose and a pressure/steam environment. It is also in the District's judgment that this environment is present only during a LBLOCA in which fuel damage occurs releasing fission products. It should be noted that even in the case of a LBLOCA; all equipment is expected to complete its immediate accident function (e.g., reactor trip, safeguards initiation, etc.)." In September 1985 and pursuant to the requirements of 10 CFR Part 21, Conax submitted a defect report stating the same conclusion.

The licensee took a two phase approach to this problem as documented in LER 1984-009. In Phase I, the licensee upgraded all subassemblies associated with equipment which were required to be energized to accomplish long-term core cooling or accomplish post-accident monitoring (119 assemblies), with Kapton/polysulfone assemblies. The licensee excluded the balance of equipment that was classified as Electrical Equipment Qualification (EEQ) related which: 1) does not accomplish a mitigation function in a LBLOCA; 2) completes its function before failure; or 3) can be dealt with administratively from the replacement program in Phase 1, and instead, decided to modify or otherwise qualify the remaining Teflon-insulated material assemblies. The licensee decided to install a combination of qualified heat shrink tubing (Raychem) to the lead wires and qualified room temperature vulcanizing (RTV) silicone rubber to seal the heat shrink covered lead wire interface at the subassembly seal by sealing the area between the heat shrink and the stainless steel sheath. In Phase II, the licensee committed to complete the environmental qualification of the remainder of the non-modified assemblies by the requested extension date of November 30, 1985.

The team noted that although these materials individually may have been qualified they were never tested in the configuration that the licensee proposed to install. Furthermore, the licensee apparently failed to recognize that all of these penetrations were part of the primary containment boundary, and containment integrity is required to be maintained during accident conditions.

Following a review of environmental qualification records, the licensee submitted LER 2012-002 in May 2012 after determining that six EQ containment electrical penetration assemblies containing Teflon electrical conductor wire insulation and Teflon subassembly seals were missed and not replaced during the investigation and analysis as discussed above from 1983-1985. The licensee performed an apparent cause analysis in July 2012 addressing the overlooked assemblies and also questioned the ability of the remaining non-Class 1E and non-EQ assemblies ability to maintain containment integrity following qualification by analysis and not post-accident condition functional testing. At the licensee's request as part of a RCA, Westinghouse provided

post accident total integrated dose calculations for the inner and outer seals. This analysis indicated the inner Teflon seal would receive a failure threshold total integrated dose within minutes after accident initiation as well as within 40 years of normal plant operation without an accident. The outer seal, assuming a compromised inner seal, would also receive a failure threshold total integrated dose over the duration of accident conditions.

The licensee continued to try and qualify the existing assemblies with another different modified version of the existing assemblies and proposed to perform these qualification tests in three phases. The NRC continued to question and challenge this approach in view of the current testing results that indicated that any Teflon-insulated materials inside or outside containment would not perform its insulating or sealing function for the duration of the accident. Follow-on functional testing on two spare subassemblies in November 2012 confirmed inner seal failure in post-accident conditions. In preparation to continue to try and modify the existing assemblies the licensee attempted to prepare a mock-up assembly in a laboratory for future testing. However, it was determined that the proposed modified assemblies were very difficult to construct and were not likely achievable in the field conditions that exist at the plant. The licensee decided to replace or cap all Teflon-insulated containment electrical penetration assemblies prior to returning to power operations.

Analysis. The licensee's failure to ensure that design requirements associated with the containment penetration assemblies were correctly translated into installed plant equipment was a performance deficiency. This performance deficiency is more than minor, and therefore a finding, because it is associated with the design control attribute of the Barrier Integrity Cornerstone and affected the associated cornerstone objective to provide reasonable assurance that physical design barriers (fuel cladding, RCS, and containment) protect the public from radionuclide releases caused by accidents or events. Using Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process for Findings At-Power," the finding is determined to have very low safety significance (Green) because it did not represent an actual open pathway in the physical integrity of reactor containment, containment isolation system, and heat removal components. This finding has a cross-cutting aspect in the area of problem identification and resolution associated with the CAP component because the licensee failed to implement a CAP with a low threshold for identifying issues and identify such issues completely, accurately, and in a timely manner commensurate with their safety significance [P.1(a)].

Enforcement. Title 10 CFR Part 50, Appendix B, Criterion III, "Design Control," requires, in part, that measures shall be established to ensure that applicable regulatory requirements and the design basis are correctly translated into specifications, drawings, procedures, and instructions. It further requires that measures shall be established for the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of the structures, systems and components. Contrary to the above, from initial construction to present, measures established by the licensee for the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of the structures, systems and components with regard to the containment

penetrations were inadequate. Specifically, the licensee did not perform adequate analysis and/or post-accident condition functional testing of the teflon insulated and teflon sealed Conax electrical penetration assemblies to determine if they were suitable for expected post accident conditions. Because the finding was of very low safety significance (Green) and has been entered into the CAP as Condition Report CR 2013-03571, this violation is being treated as a non-cited violation consistent with Section 2.3.2.a of the NRC Enforcement Policy: NCV 05000285/2013008-21, "Failure to Ensure that Design Requirements Associated with the Containment Electrical Penetration Assemblies Were Correctly Translated Into Installed Plant Equipment (EA-12-215)."

(22) Fort Calhoun Station's Ability to Classify Components as Safety-Related

Introduction. The team identified an unresolved item associated with the licensee's compliance with 10 CFR Part 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants." Specifically, the team identified a concern involving the licensee's ability to identify the structures, systems, and components (SSCs) important to safety as required by 10 CFR Part 50, Appendix B, Criterion II, "Quality Assurance Program."

Description. The team found it difficult to determine how the licensee identified SSCs important to safety as required by 10 CFR Part 50, Appendix B, Criterion II. The team noted that several recent performance deficiencies have been identified by the NRC for not classifying SSCs as safety-related based on the safety function being performed. The team determined the licensee's causal analysis to date for these issues was inadequate. Consequently, during the on-site inspection, the team questioned the classification of various SSCs which appear to meet the definition of safety-related, but have not been designated as such by the licensee. 10 CFR Part 50.2, "Definitions" defines safety-related SSCs as, "…those structures, systems, and components that are relied upon to remain functional during and following design basis events to assure: (1) the integrity of the reactor coolant pressure boundary; (2) the capability to shut down the reactor and maintain it in a safe shutdown condition; or (3) the capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to the applicable guideline exposures set forth in 10 CFR Part 50.34 (a)(1) or 10 CFR Part 50.100.11 of this chapter, as applicable."

The team determined that the licensee may not have identified all the SSCs important to safety to ensure the controls of 10 CFR Part 50, Appendix B are applied. Additional review and follow up will be required to determine if this issue represents a performance deficiency or constitutes a violation of NRC requirements. This issue is identified as URI 05000285/2013008-22, "Fort Calhoun Station's Ability to Classify Components as Safety-Related."

(23) Code of Record for Safety-Related Piping Systems

Introduction. The team identified a URI associated with the licensee's use of piping codes. Specifically, the team is concerned that the licensee is no longer maintaining the construction code of record for safety-related piping systems as described in the USAR.

Description. Fort Calhoun Station original code of record for safety-related piping is USAS B31.7, “Nuclear Power Piping,” 1968 Draft Edition. The licensee reclassified a number of systems in the early 1990’s. The licensee then reconciled the code of construction to newer ASME Section III code. The codes were not able to be reconciled in all instances. Specifically, the analysis stated that the material allowable values had to be evaluated on a case by case basis to ensure the conservative values were chosen for analysis. The team has identified numerous examples where the licensee has used the wrong material allowable as required by the reconciliation analysis.

The team was concerned that using the incorrect material allowable in piping analyses could be non-conservative and affects the operability of structures, systems, or components required to ensure safe operation. Additional review and follow up will be required to determine if this issue represents a performance deficiency or constitutes a violation of NRC requirements. This issue is identified as URI 05000285/2013008-23, “Code of Record for Safety-Related Piping Systems.”

(24) Failure to Effectively Monitor the Performance of Penetration Seals

Introduction. The team identified a Green non-cited violation of 10 CFR 50.65(a)(2), "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," associated with the licensee's failure to effectively monitor the performance of penetration seals in Room 81.

Description. While reviewing the licensee's maintenance rule scoping, classification, and performance evaluation of the penetration seals in Room 81, the team identified a concern. Specifically, the licensee failed to appropriately demonstrate the availability of the penetration seals in Room 81 when evaluating whether their performance or condition had been demonstrated to be effectively controlled. The team noted that the licensee was only performing visual inspections of the penetration seals. However, some of the seals were housed in encasements that would not allow full inspections, and a visual inspection would not demonstrate the ability of the seal to prevent water and steam migration into the adjoining rooms.

The team reviewed the licensee's CAP database and noted that there had been previously documented instances where seals were found to be leaking/passing water to adjacent rooms. Based on this, the team determined that the visual inspections were not adequately and appropriately monitoring the penetration seals to ensure that their performance or condition had been demonstrated to be effectively controlled. The licensee initiated Condition Report CR 2013-05506 to capture this issue in the CAP.

The team noted that the licensee's evaluations in the previously written condition reports for leaking penetration seals were inadequate. Specifically, the licensee failed to recognize and correct the lack of appropriate monitoring criteria for the penetration seals.

Analysis. The licensee's failure to effectively monitor the performance of maintenance rule scoped equipment in accordance with 10 CFR 50.65(a)(2) was a performance deficiency. The performance deficiency is more than minor, and therefore a finding, because it is associated with the protection against the external factors attribute of the Mitigating Systems Cornerstone, and affected the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process for Findings At-Power," the finding is determined to have very low safety significance (Green) because it: (1) was not a deficiency affecting the design or qualification of a mitigating structure, system, or component, and did not result in a loss of operability or functionality; (2) did not represent a loss of system and/or function; (3) did not represent an actual loss of function of at least a single train for longer than its technical specification allowed outage time, or two separate safety systems out-of-service for longer than their technical specification allowed outage time; (4) did not represent an actual loss of function of one or more nontechnical specification trains of equipment designated as high safety-significance in accordance with the licensee's maintenance rule program; and (5) did not involve the loss or degradation of equipment or function specifically designed to mitigate a seismic, flooding or severe weather event. This finding has a cross-cutting aspect in

the area of problem identification and resolution associated with the CAP component because the licensee failed to thoroughly evaluate problems such that the resolutions address the causes [P.1(c)].

Enforcement. Title 10 of the Code of Federal Regulations, Section 50.65(a)(1) requires, in part, that holder of an operating license shall monitor the performance or condition of structures, systems, and components against licensee-established goals, in a manner sufficient to provide reasonable assurance that the structures, systems, and components are capable of fulfilling their intended safety functions. Title 10 CFR 50.65(a)(2) states, in part, that monitoring as specified in 10 CFR 50.65(a)(1) is not required where it has been demonstrated that the performance or condition of a structure, system, or component is being effectively controlled through the performance of appropriate preventive maintenance, such that the structure, system, or component remains capable of performing its intended function. Contrary to the above, from initial maintenance rule scoping in 1996 to March 2013, the licensee did not demonstrate that the performance or condition of the penetration seals in Room 81 were being effectively controlled through the performance of appropriate preventative maintenance, and failed to monitor the performance or condition of the penetration seals in Room 81 against licensee-established goals, in a manner sufficient to provide reasonable assurance that these components were capable of fulfilling their intended functions. Because the finding was of very low safety significance (Green) and has been entered into the CAP as Condition Report CR 2013-05506, this violation is being treated as a non-cited violation consistent with Section 2.3.2.a of the NRC Enforcement Policy: NCV 05000285/2013008-24, "Failure to Effectively Monitor the Performance of Penetration Seals."

(25) Deficient Evaluation for Known Degraded Conditions: Safety-Related Air Operated Valve Elastomers not Qualified for HELB/LOCA Temperatures

Introduction. The team identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," associated with the licensee's failure to properly evaluate a known degraded condition regarding safety-related air operated valve elastomers that were not qualified for HELB or loss of coolant accident temperatures.

Description. The licensee initiated Condition Report CR 2012-05509, due to questions raised by a contractor regarding the adequacy of air operated valves (AOVs) HCV-1107A and HCV-1108A (AFW inlet valves), which were located inside of containment, to withstand accident condition temperatures. Specifically, the contractor had questioned the adequacy of the AOVs to withstand main steam line break (MSLB) or loss of coolant accident (LOCA) temperatures due to having nitrile elastomers installed. The licensee reviewed this issue and determined that the design temperature limit for the nitrile elastomers in valves HCV-1107A and HCV-1108A was 180 degrees Fahrenheit (°F), which was acceptable for the normal operating temperature inside containment (120 °F). However, during MSLB or LOCA accident conditions, the temperature inside containment was predicted to reach 370 °F. The licensee determined that this temperature could affect the valves' ability to operate as required during an accident due to potential failure of the nitrile elastomers.

During an extent of condition review, the licensee evaluated other air operated valves located inside the containment building that were equipped with air accumulators to determine if they were subject to the same concerns as HCV-1107A and HCV-1108A. The licensee determined that RCS loop 1A charging line stop valve HCV-238, RCS loop 2A charging line stop valve HCV-239, and pressurizer RC-4 auxiliary spray inlet valve HCV-240 had the same filter regulators and valve actuators with nitrile elastomers. This configuration was similar to HCV-1107A and HCV-1108A, and consequently, was subject to the same concerns. Since these valves have both open and close functions supported by an air accumulator, failure of the nitrile based elastomers could prevent the valves from fulfilling their intended safety function. The licensee reported this issue on September 24, 2012, in LER 2012-017, "Containment Valve Actuators' Design Temperature Ratings below Those Required for Design Basis Accidents."

The team noted that the licensee had identified twenty AOVs that contained the nitrile elastomers both inside and outside of the containment building.

The team reviewed the licensee's extent of condition review for other nonqualified elastomers, which was documented in the ACA associated with Condition Report CR 2012-08621, "Extent of Condition Research," dated January 10, 2013, which was a white paper prepared by a contractor for the licensee. This document evaluated approximately 15 of the 17 other safety-related AOVs that could potentially be exposed to the same adverse temperature conditions as valves HCV-238, HCV-239, and HCV-240 identified in LER 2012-017.

The team, however, determined that the operability determinations and corrective actions for this degraded condition were not adequate. Specifically, the licensee only planned to replace the nonconforming elastomers for three of the twenty AOVs affected (HCV-238, HCV-239, and HCV-240). The team determined that the licensee had incorrectly concluded that operability of several of the valves would not be impacted during a HELB or LOCA accident condition. This was based on a deficient engineering judgment which had determined that the valves would not be required to operate in the accident environment. The team determined the deficient evaluation was due to an improper application of the single failure criteria.

The team questioned the licensee's planned actions, noting that adequate corrective actions had not been taken for the identified condition adverse to quality. Specifically, they determined that operability of the other safety-related AOVs could be impacted if the elastomers were not replaced prior to returning the systems to service.

The team informed the licensee of their concerns and Condition Reports CR 2013-01396 and CR 2013-02611 were initiated to capture these issues in the CAP.

Analysis. The licensee's failure to properly evaluate and correct a known deficient condition regarding safety-related elastomers that were not qualified for the HELB or LOCA accident temperature conditions was a performance deficiency. This performance deficiency is more than minor, and therefore a finding, because if left uncorrected, the failure to correct the degraded condition had the potential to lead to a more significant safety concern. Specifically, the affected AOVs would have been in a condition where

they would not have been qualified to perform their intended safety function. This issue was associated with the Mitigating Systems Cornerstone. Using Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process for Findings At-Power," the finding is determined to have very low safety significance (Green) because it: (1) was not a deficiency affecting the design or qualification of a mitigating structure, system, or component, and did not result in a loss of operability or functionality; (2) did not represent a loss of system and/or function; (3) did not represent an actual loss of function of at least a single train for longer than its technical specification allowed outage time, or two separate safety systems out-of-service for longer than their technical specification allowed outage time; (4) did not represent an actual loss of function of one or more nontechnical specification trains of equipment designated as high safety-significance in accordance with the licensee's maintenance rule program; and (5) did not involve the loss or degradation of equipment or function specifically designed to mitigate a seismic, flooding or severe weather event. This finding has a cross-cutting aspect in the area of problem identification and resolution associated with the CAP component because the licensee failed to thoroughly evaluate problems such that the resolutions address the causes [P.1(c)].

Enforcement. Title 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," requires, in part, that measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies , deviations, defective material and equipment, and nonconformance's are promptly identified and corrected. Contrary to the above, from January 11 through January 18, 2013, measures established by the licensee failed to assure that an identified condition adverse to quality was promptly evaluated and corrected. Specifically, due to a an improper application of the single failure criteria, the licensee failed to properly evaluate and correct a known degraded condition associated with safety-related air operated valve elastomers that were not qualified for HELB or LOCA temperatures. Because the finding was of very low safety significance (Green) and has been entered into the CAP as Condition Reports CR 2013-01396 and CR 2013-02611, this violation is being treated as a non-cited violation consistent with Section 2.3.2.a of the NRC Enforcement Policy:
NCV 05000285/2013008-25, "Deficient Evaluation for Known Degraded Conditions: Safety-Related Air Operated Valve Elastomers not Qualified for HELB/LOCA Temperatures."

(26) Failure to Properly Inspect, Maintain, and Test Emergency Feedwater Tank Equipment

Introduction. The team identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," associated with the licensee's failure to ensure proper inspection, maintenance, and testing of equipment associated with emergency feedwater tank FW-19.

Description. The team reviewed Calculation FC06148, "Auxiliary Feedwater Storage Requirements," Revision 7, which determined that at least 55,000 gallons of water were required to provide emergency feedwater for the removal of the maximum decay heat produced during the eight hours after a reactor trip. Emergency feedwater storage tank FW-19, is located in Room 81, which also contains the main steam lines, the main feedwater lines, main steam isolation valves, and safety relief valves. The location of

these components in this room makes this room susceptible to a HELB. During a HELB in Room 81, the temperature in the room is expected to reach 382 °F. Tank FW-19, includes a staggered pair of level glass that can be severed/damaged during a HELB, seismic event, or by postulated missiles.

On February 27, 2013, during a plant walkdown, the team questioned whether the tank sight glass was safety-related and whether it would be able to survive a seismic event or elevated temperature and pressure resulting from the postulated HELB in Room 81. In addition, the team questioned the design of the sight glass isolation valves and its capability of isolating leakage from the tank should the glass break or become damaged. Condition Reports CRs 2012-15687, 2013-03974, and 2013-06170 were initiated to address the team's concerns.

Station engineer's initial evaluation stated the level gages were Jerguson Model 56 gauges, provided with manual isolation valves. The sight glass also has built-in ball check valves designed to stop leakage from the tank should the sight glass break. However, engineers could not find any documentation showing the temperature rating or safety classification of the sight glass. The team noted the ball check valves were not in FCS's in-service test program, and questioned what inspection, testing, and/or maintenance activities were performed on the valves. Engineers could not find any historical data showing any inspection, testing, maintenance, or replacement of the valves. The team was concerned with the operability of emergency feedwater tank FW-19, since the reliability of the ball check valves to prevent loss of inventory from the tank during a postulated HELB or seismic event could not be assured.

A preliminary calculation performed by engineering to address the team's concerns determined that a maximum leakage rate of 9.8 gpm would leak from tank FW-19 should the sight glass break. The engineering evaluation also stated that the sight glass design included two additional manual isolation valves in series with the ball check valves that could be used by operators to isolate the damaged sight glass. Engineers also stated that there was an alarm in the main control room designed to alarm when the tank goes below 88 percent. Abnormal Operating Procedure AOP-30, "Emergency Fill of Emergency Feedwater Storage Tank," Revision 11, had provisions for operators to fill the tank if the level goes below 88 percent. The analysis concluded that operators have adequate time to respond to such a loss of tank FW-19 inventory. Condition Report CR 2013-06170 was written to identify the need for a calculation to document the leakage from a tank FW-19 sight glass failure.

The team reviewed the engineering evaluation and determined it was incomplete and had failed to address the fact that the AFW system and emergency tank FW-19 were required to operate following a high energy break in Room 81, and the environmental conditions would not allow operations personnel to enter the room to isolate the damaged sight glass for some period of time. The team informed the licensee of these concerns.

The licensee re-evaluated the engineering analysis to include the team's concerns. The new evaluation determined that for a HELB, such as a main steam line break in Room 81, there was no specific AFW tank volume required. In addition, engineers determined

that FCS had several procedures and operator training to re-fill tank FW-19 remotely via the condensate storage tank or the demineralized water storage tank.

The team also noted that Condition Report CR 2012-14517, documented a concern raised by a contractor during their CDBI self assessment activities review of the AFW system. Specifically, the contractor identified a lack of documentation showing there was no detrimental seismic interaction of Room 81 lights with tank FW-19 level gages and the level gage's seismic capability. The engineering evaluation for this condition determined the gage glass had metal rods that protected the glass from being broken by the lights in a seismic event. In addition, the condition report stated that the sight glass itself was not a seismic concern because it was not explicitly discussed in the Screening Evaluation Work Sheets (SEWS) for tank FW-19 in the Seismic Report (ISI A-46). The team determined that the licensee's evaluation of this issue missed an opportunity to properly evaluate the seismic capability of the emergency tank sight glass.

Analysis. The licensee's failure to ensure proper inspection, maintenance, and testing was performed on the emergency feedwater storage tank's sight glass ball check isolation valves was a performance deficiency. This performance deficiency is more than minor, and therefore a finding, because it was associated with the equipment performance attribute of the Mitigating Systems Cornerstone, and affected the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process for Findings At-Power," the finding is determined to have very low safety significance (Green) because it: (1) was not a deficiency affecting the design or qualification of a mitigating structure, system, or component, and did not result in a loss of operability or functionality; (2) did not represent a loss of system and/or function; (3) did not represent an actual loss of function of at least a single train for longer than its technical specification allowed outage time, or two separate safety systems out-of-service for longer than their technical specification allowed outage time; (4) did not represent an actual loss of function of one or more nontechnical specification trains of equipment designated as high safety-significance in accordance with the licensee's maintenance rule program; and (5) did not involve the loss or degradation of equipment or function specifically designed to mitigate a seismic, flooding or severe weather event. This finding has a cross-cutting aspect in the area of problem identification and resolution associated with the CAP component because the licensee failed to thoroughly evaluate problems such that the resolutions address the causes [P.1(c)].

Enforcement. Title 10 CFR Part 50, Appendix B, Criterion III, "Design Control," states, in part, that, measures shall be established to assure that applicable regulatory requirements and the design bases, as defined in 10 CFR 50.2 and as specified in the license application, for those structures, systems, and components to which this appendix applies, are correctly translated into specifications, drawings, procedures, and instructions. Contrary to the above, from initial construction until February 27, 2013, measures established by the licensee did not assure that applicable regulatory requirements and the design bases, as defined in 10 CFR 50.2 and as specified in the license application, for those components to which this appendix applies, were correctly translated into specifications, drawings, procedures, and instructions. Specifically, the

licensee failed to ensure proper inspection, maintenance, and testing was performed on the emergency feedwater storage tank's sight glass ball check isolation valves, to prevent draining of the tank following failure of the sight glass. Because the finding was of very low safety significance (Green) and has been entered into the CAP as Condition Reports CR 2012-15687, CR 2013-03974, and CR 2013-06170, this violation is being treated as a non-cited violation consistent with Section 2.3.2.a of the NRC Enforcement Policy: NCV 05000285/2013008-26, "Failure to Properly Inspect, Maintain, and Test Emergency Feedwater Tank Equipment."

(27) Continuous Monitoring Capability of Post Accident Main Steam Radiation Monitor RM-064

Introduction. The team identified an unresolved item associated with post accident radiation monitor RM-064. Specifically, the team is concerned about the capability of the monitor to provide representative measurements due to the system configuration, and this could represent a failure to ensure continuous effluent monitoring of the main steam lines following a steam generator tube rupture accident.

Description. Following the Three Mile Island Accident in March 25, 1979, licensees were required to ensure all potential effluent release points from nuclear power plants were equipped with high range radiation monitors. In particular, NUREG-0737, Section II.F.1.1 requires in part; that for pressurized water reactors such as FCS, Unit 1, steam release points be monitored for noble gases, and that indication of the activity must be monitored and recorded continuously. In addition Section II.F.1.1 requires the monitors shall be capable of functioning both during and following an accident. System designs shall accommodate a design-basis release and then be capable of following decreasing concentrations of noble gasses. In addition, the monitoring system shall be capable of obtaining readings at least every 15 minutes during and following an accident.

By application dated March 9, 1984, the licensee requested an amendment to the stations technical specifications in response to the Commission's Generic Letter 83-37, "NUREG-0737 Technical Specifications." The generic letter, which was issued in November 1, 1983, advised licensees to submit new technical specifications for NUREG-0737 items, including Section II.F.1.1, "Noble Gas Effluent Monitors (II.F.1.1)."

The station's potential post-accident steam release points include the main steam relief valves, the atmospheric dump valve, and the steam driven AFW pumps steam turbine. To comply with the high range radiation monitoring requirements, the licensee installed noble gas effluent monitors including, radiation monitor RM-064. Per USAR Section 11.2.3.11, RM-064, the post-accident main steam line monitor, is an off-line monitor designed to measure the steam activity by sampling steam from the two steam headers via two isolation valves HCV-921 and HVC-922. The monitor is placed in service in the event of a steam generator tube rupture. The monitor is capable of sampling steam from both steam headers and the recorded data from this monitor can then be utilized to quantify effluents released through the main atmospheric dump valve, the main steam safety valves, and the AFW pump turbine. Radiation monitor RM-064 is located in the turbine building next to Room 81.

The team noted that the design basis accident analysis contained in USAR, Section 14.14, “Steam Generator Tube Rupture Accident,” required the licensee to assume a coincident reactor trip and a loss of off-site power. Due to the assumed simultaneous loss of off-site power with the reactor trip, the reactor is cooled down by releasing steam via the main steam safety valves and atmospheric dump valve, creating a direct release path to the environment. In addition, due to the loss of off-site power, the normal condenser off-gas radiation monitor becomes un-available due to the loss of condenser vacuum. This leaves radiation monitor RM-064 as the only monitor available to measure radioactivity in the main steam lines. The analysis assumes all activity released from the faulted steam generator ceases when it is isolated by plant operators 2 hours after the event.

The design of the FCS main steam line monitor is provided in MR-FC-79-190C, “Post Accident Main Steam Line High Range Radiation Monitor RM-064, Revision 0, dated June 4, 1982. The station has two 28 inch diameter headers leading to the main turbine. Each main steam line is provided with six main steam safety valves each having different lift set-points. The pipe connecting these valves is 2.5 inches in diameter. The pipe connecting to the atmospheric dump valve is 3 inches in diameter. The sample line to radiation monitor RM-064 is 3/8 inch in diameter. This line is located upstream of the main steam isolation valves, in Room 81 of the auxiliary building. The distance from the main steam header to the actual location of radiation monitor RM-064 (outside Room 81) is over sixty feet long, while the main steam safeties and steam dump valve, are within 12 feet away from the main steam headers.

The team reviewed the USAR, main steam drawings, applicable calculations, and interviewed engineers and operators to identify the design basis requirements for radiation monitor RM-064 and to verify it was capable of performing its intended functions. On February 27, 2013, the team performed a walkdown of radiation monitor RM-064 and the steam lines. Because radiation monitor RM-064 is normally isolated, the team questioned how long it would take operators to put the monitor in service, and how the licensee met the requirement of continuous monitoring.

The team also determined that for the “B” steam generator header the location of the 3/8 inch sample line leading to radiation monitor RM-064 was installed downstream of three of the main steam safety valves, including the lowest lift set-point valve. For the “A” steam generator header, the 3/8 inch sample line was located downstream of two of the safety valves but upstream of the lowest lift set point relief. Due to the location of the sample lines being downstream of the safety valves, the difference in pipe sizing between the lines to the monitor (3/8 inch), the main steam safety valves (2.5 inch), and the atmospheric dump valve (3 inch) and the distance from the main steam header to the monitor, the team questioned how the licensee assured a representative measurement would be obtained during and after a steam generator tube rupture accident. The team informed the licensee of their concerns and the licensee initiated Condition Reports CR 2013-04442, 2013-05515, and 2013-06267, to capture these concerns in the CAP.

During subsequent evaluations the licensee determined that there was not an established time requirement for operators to put radiation monitor RM-064 in service.

The licensee performed a simulator dry run with licensed operators to estimate the time required to place the monitor in service. During this simulated event, it took operators approximately 23 minutes to put the monitor in service, thus indicating that there could be an unmonitored release to the environment for at least 23 minutes following a steam generator tube rupture accident. Regarding the representative sample concern, engineers determined that without a sophisticated computer model it could not be definitely shown that the degree of turbulent mixing in the steam lines is sufficient to equalize the concentrations of radioactive gasses and entrained particulates downstream of the main steam safety valves where the lines connecting to radiation monitor RM-064 were located. The licensee issued Condition Report CR 2013-10507 requesting a detailed calculation to address this concern. The team determined this condition has existed since the time radiation monitor RM-064 was installed in February 1983, until February 27, 2013, when the issue was identified by the team.

An engineering technical evaluation was then performed under Condition Report CR 2013-04442, based on existing radiological analysis Calculation FC06820 used for the steam generator accident analysis (USAR 14.14). This technical evaluation removed many of the conservative assumptions included in Calculation FC06820. Based on this basic evaluation and using engineering judgment, the licensee determined that there would be sufficient mixing and adequate concentration to provide a representative radiation measurement.

The team concluded that further review is necessary in order to properly evaluate and disposition this issue. This issue is identified as URI 05000285/2013008-27, "Continuous Monitoring Capability of Post Accident Main Steam Radiation Monitor RM-064."

(28) Failure to Perform an Evaluation for a Change to Component Cooling Water Make-up

Introduction. The team identified a Severity Level IV non-cited violation of 10 CFR Part 50.59, with an associated Green finding, because the licensee failed to perform an evaluation for a design change that may have required NRC review and approval. Specifically, the licensee did not evaluate a change that would permanently substitute a manual action for an automatic action to add water and nitrogen gas to the CCW surge tank, which is a design function described in the USAR.

Description. The team reviewed two engineering changes, a temporary and permanent modification related to a design function for CCW surge tank AC-2. Temporary engineering change 43140, "Interim Changes to Resolve CCW Surge Tank Class Boundary Issues," provided changes to design documents and procedures that implemented operator actions to manually isolate valves associated with adding water and nitrogen gas to the CCW surge tank during normal operations. Permanent engineering change 41455, "CCW Surge Tank Class Boundary Component Upgrades," provided an upgrade to the safety classifications of these components. In both cases, the team identified that the licensee only performed a 10 CFR 50.59 screening. The team determined that replacing an automatic function with a manual action was considered to be an adverse change to the reliability of a normally automatic design function for the CCW system and required a 10 CFR 50.59 evaluation to determine if this

action did not present more than a minimal increase in the likelihood of occurrence of a malfunction of a system, structure, component important to safety previously evaluated in the USAR.

The team noted that the licensee introduced these permanent manual actions in place of a previously automatic one as described in Section 9.7.4.1 of the USAR. The USAR stated, in part, that the make-up to the CCW system was pumped to the surge tank from the demineralized water system through an automatic open-shut valve which was actuated by a level control switch on the surge tank. The licensee implemented this design function change in both their abnormal and emergency operating procedures. The team concluded that this change involved new operator manual actions that changed a design function credited in the licensee's USAR and may have required prior NRC review and approval. The licensee made these changes in 2008.

Analysis. The failure to perform an evaluation prior to implementing a proposed change, test or experiment to a design function described in the USAR was a performance deficiency. The team determined that it was reasonable for the licensee to be able to foresee and prevent the occurrence of this deficiency. The team evaluated this performance deficiency as both a traditional enforcement violation, and a reactor oversight process finding. The violation of 10 CFR Part 50.59 was more than minor because it involved a change to an USAR design function in that there was a reasonable likelihood that the change would require NRC review and approval. This finding is associated with the Mitigating Systems Cornerstone. The team used the NRC Enforcement Manual and Inspection Manual Chapter 0609, Attachment 4, "Initial Characterization of Findings," to evaluate this issue. The finding is determined to have very low safety significance (Green) because it was a design deficiency confirmed not to result in the loss of operability or functionality. The violation of 10 CFR 50.59 impacted the ability of the NRC to perform its regulatory oversight function and was determined to be Severity Level IV because the resulting changes were evaluated by the significance determination process as having very low safety significance, in accordance with the Section 6.1.d of the NRC Enforcement Policy. The NRC concluded that the finding did not reflect current licensee performance.

Enforcement. 10 CFR Part 50.59, "Changes, Tests, and Experiments," Section (c)(2) require, in part, that a licensee shall obtain a license amendment prior to implementing a proposed change, test, or experiment if the change, test, or experiment that would result in more than a minimal increase in the likelihood of occurrence of a malfunction of a structure, system, or component important to safety previously evaluated in the USAR. 10 CFR Part 50.59, Section (d)(1) stated, in part, that the licensee shall maintain records of changes in the facility or procedures and that the records must include a written evaluation that provides the bases for the determination that the change does not require a license amendment. Contrary to the above, since June 2008, the licensee did not perform an evaluation for a design change that may have required NRC review and approval. Specifically, the licensee did not evaluate a change that would permanently substitute manual actions for an automatic action to add water and nitrogen gas to the CCW surge tank, which is an USAR described design function for the CCW system. The licensee entered this condition into their CAP and planned to perform an evaluation to determine if prior NRC review and approval is needed for this design change.

Because this finding was determined to be of very low safety significance and entered into the CAP as Condition Report CR 2013-04417, this violation is being treated as a non-cited violation consistent with the NRC Enforcement Policy: NCV 5000285/2013008-28, "Failure to Perform an Evaluation for a change to Component Cooling Water Make-up."

(29) Use of Alternate Seismic Evaluation Criteria

Introduction. The team identified an unresolved item associated with the licensee's use of alternate seismic criteria when evaluating site structures. The alternate seismic criteria were approved for use by the NRC for piping and HVAC systems but were not explicitly approved for structures.

Description. The team identified that the licensee applied an alternate seismic evaluation method called Alternate Seismic Criteria Methodology in place of the original USAR seismic criteria delineated in Appendix F. The use of ASCM was originally proposed to the NRC on December 2, 1988, as alternate design criteria for new designs, modifications, and reanalysis of piping and pipe supports, electrical raceways, HVAC ducting, and anchor bolts. The team reviewed licensing documents and correspondence, and concluded that the NRC approved the use of ASCM for piping and HVAC systems and that the licensee had assumed the NRC had tacitly approved ASCM for structural calculations because the NRC staff did not specifically deny its use in those areas. The licensee informed the team that ASCM was used in several structural seismic evaluations including the auxiliary building and intake structure. At the close of the inspection, other potentially affected structures were being evaluated by the licensee.

The team is concerned that the licensee inappropriately used ASCM without NRC approval and that ASCM may be non-conservative with respect to the seismic evaluation criteria specified in the USAR, Appendix F. The effect of the alternative seismic analysis is not known because the seismic spectra are different and are too complex for a qualitative analysis. Additional NRC review and follow up will be required to determine if this issue represents a performance deficiency or constitutes a violation of NRC requirements. This issue is identified as URI 05000285/2013008-29, "Use of Alternate Seismic Evaluation Criteria."

(30) Evaluation of Change to Alternate Shutdown Cooling Flowpath

Introduction. The team identified an unresolved item related to engineering change modifications that changed a procedure to include the replacement of automatic actions with manual actions. Specifically, the10 CFR 50.59 evaluation proposed a change to substitute automatic flow control of shutdown cooling flow and temperature with manual control using the low pressure safety injection loop injection valves alternate shutdown cooling flow control.

Description. During a review of Engineering Change Modification 54058, "Procedure Change to Allow Closing of HCV-335 while on Alternate Shutdown Cooling," the team identified that the licensee changed a procedure to include the replacement of an

automatic action with a manual action. Specifically, the engineering change proposed to close both shutdown cooling heat exchanger isolation valve HCV-335 and flow control valve FCV-326 while pinning open valve HCV-341 and manually throttling low pressure safety injection loop injection valves to maintain the desired RCS temperature and flow rate. The team questioned whether the licensee required prior NRC review and approval to make this change since flow control valve FCV-326 normally controls temperature and flow automatically as described in Section 9.3.4.3 of the USAR. The licensee entered this issue of concern into the CAP. Additional NRC review and follow up will be required to determine if this issue represents a performance deficiency associated with meeting the 10 CFR 50.59 requirement of more than a minimal increase in the likelihood of occurrence of a malfunction of a system, structure, or component important to safety previously evaluated in the USAR. This item is unresolved pending review of the licensee's evaluation. This issue is identified as URI 05000285/2013008-30, "Evaluation of Change to Alternate Shutdown Cooling Flowpath."

(31) Multiple Examples of Operability Determinations that Lacked Adequate Technical Justification

Introduction. The team identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures and Drawings," involving multiple examples of the licensee's failure to perform an adequate operability determination as required by Procedure NOD-QP-31, "Operability Determination Process." In each example, the team identified that the operability determination lacked adequate technical justification for why the structure, system, or component was operable with the degraded or nonconforming condition.

Description. The team identified the following five examples of inadequate operability determinations performed by the licensee.

- Condition Report CR 2012-00580 documented that safety-related cables associated with the raw water system housed in junction boxes on the south wall of the turbine building may be impacted by a potential failure of an adjacent power transformer. The immediate operability determination for this condition report did not provide an adequate technical basis for concluding that these junction boxes would remain operable following a potential failure of the power transformer. The licensee's operability determination failed to consider internally generated missiles. The USAR, Section 5.8.1, stated, in part that protection from internal missiles has been provided to engineered safeguards, and auxiliary systems equipment and components required to maintain containment integrity and control accidents are protected against loss of function. This issue was entered into the CAP as Condition Report CR 2013-08343,

- Condition Report CR 2012-04973 documented that several CCW relief valve setpoints were set below steady state design pressure with all three CCW pumps running. The condition report identified this as an adverse condition that could result in a loss of CCW inventory which could challenge system operability. The immediate operability determination incorrectly concluded that the CCW system remained operable because the raw water system can be used as an alternative

to cool engineered safeguards system. This issue was entered into the CAP as Condition Report CR 2013-05596.

- Condition Report CR 2012-20806 documented low available margin for 125 Vdc battery EE-8A. The licensee evaluated operability for this component by using guidance from NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," Revision 0, to justify a different battery aging factor than those endorsed in IEEE 485, "IEEE Recommended Practice for Sizing Large Lead Storage Batteries for Generating Stations and Substations," 1997 edition. The battery aging factor was changed from 1.25 as specified in IEEE 485 to 1.2. The team determined that under the operability determination for Condition Report CR 2012-20806, the battery would become inoperable at a battery capacity of approximately 83.3 percent which is non-conservative relative to the current surveillance testing Procedure EM-ST-EE-0005, "Battery No. 1 (EE-8A) Capacity Discharge Test," Revision 23, Step 7.13.24, which requires a battery capacity of greater than 80 percent. This issue was entered into the CAP as Condition Report CR 2013-08590.

- Condition Report CR 2013-00907 identified General Electric Model HFA Relays that failed seismic qualification testing because of installation related issues. The operability determination incorrectly determined that relays were operable but degraded in the currently installed non-seismically qualified configuration. This issue was entered into the CAP as Condition Report CR 2013-04163.

- Condition Report CR 2013-02260 documented a missing seismic brace for containment air coolers VA-15/16. The operability determination incorrectly concluded that the equipment was operable even though applied stress with the missing brace was greater than allowable stress. The team noted that the operability evaluation lacked any technical basis for concluding that the coolers would fulfill their safety function while in the overstressed condition. This issue was entered into the CAP as Condition Report CR 2013-05353.

The team determined that for each of the above examples, the operability determination lacked adequate technical justification for why the structure, system, or component was operable with the degraded or non-conforming condition. The team noted that Procedure NOD-QP-31, "Operability Determination Process," Step 4.1.3 J, required, in part, that, "A positive determination of operability must be justified, including…a technical discussion of why the concern identified does not prevent the item from fulfilling its intended safety function(s). This should demonstrate that the item is not exceeding its design basis specified in the reference documents."

Analysis. The licensee's failure to perform operability determinations in accordance with FCS procedures was a performance deficiency. This performance deficiency is more than minor, and therefore a finding, because it is associated with the equipment performance attribute of the Mitigating Systems Cornerstone, and affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Since the finding involving inadequate operability determinations occurred while in a shutdown condition,

the team used Manual Chapter 0609, Appendix G, "Shutdown Operations Significance Determination Process" and determined the finding to have very low safety significance (Green) because the finding did not increase the likelihood of a loss of RCS inventory, the finding did not degrade the licensee's ability to terminate a leak path or add RCS inventory when needed, and the finding did not degrade the licensee's ability to recover decay heat removal once it was lost. This finding has a cross-cutting aspect in the area of problem identification and resolution associated with CAP component. Specifically, the team identified that the licensee failed provide an adequate technical discussion such that a reasonable expectation of operability was demonstrated for several degraded or nonconforming conditions [P.1(c)].

Enforcement. Title 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures and Drawings," requires, in part, that activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings. Contrary to the above, on January 24, 2012, June 6, 2012, December 27, 2012, January 22, 2013, and February 5, 2013, the licensee failed to complete activities affecting quality in accordance with prescribed procedures. Specifically, the operability determinations for Condition Reports CR 2012-00580, CR 2012-04973, CR 2012-20806, CR 2013-00907, and CR 2013-02260 were not performed in accordance with Procedure NOD-QP-31, "Operability Determination Process," Revision 49-53, Step 4.1.3 J, which required, in part, that, "A positive determination of operability must be justified, including a technical discussion of why the concern identified does not prevent the item from fulfilling its intended safety function(s). This should demonstrate that the item is not exceeding its design basis specified in the reference documents." Because the finding was of very low safety significance (Green) and has been entered into the CAP as Condition Reports CR 2013-08343, CR 2013-05596, CR 2013-08590, CR 2013-04163, and CR 2013-05353 this violation is being treated as a non-cited violation consistent with Section 2.3.2.a of the NRC Enforcement Policy: NCV 05000285/2013008-31, "Multiple Examples of Operability Determinations that Lacked Adequate Technical Justification."

(32) Multiple Examples of Inadequate Risk-Based Operability Determinations

Introduction. The team identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures and Drawings," involving multiple examples of the licensee's use of probability or probabilistic risk assessment (PRA) when performing operability determinations. The use of probability or PRA when determining operability is contrary to Procedure NOD-QP-31, "Operability Determination Process," Revision 49-53.

Description. The team identified the following three examples of operability determinations performed by the licensee that relied on the use of probability or PRA to justify why a structure, system, or component was operable with the degraded or nonconforming condition.

- Condition Report CR 2012-00626 documented that the electrical penetration room air conditioning condensers VA-95 and VA-96 were not adequately

protected from the effects of postulated flooding up to 1014 feet MSL. The immediate operability determination for this condition report incorrectly concluded that the components were operable because the air condition condensers were capable of maintaining electrical penetration rooms below 105 degrees F, which was a limit established in the PRA.

- Condition Report CR 2013-03839 documented concerns that the control room air conditioning condensers VA-46A and VA-46B and the AFW pump FW-10 exhaust were not adequately protected from tornado generated missile. The immediate operability determination for this condition report incorrectly concluded that the components were operable based on engineering judgment that the strike probability for these components was low.

- Condition Report CR 2013-03842 documented concerns that the emergency feedwater storage tank FW-19 was not adequately protected from tornado generated missile. The immediate operability determination for this condition report incorrectly concluded that the component was operable based on engineering judgment that the strike probability for this component was low.

The use of probability or PRA in operability determinations is not consistent with NRC Inspection Manual Part 9900 Technical Guidance, "Operability Determinations & Functionality Assessments for Resolution of Degraded or Nonconforming Conditions Adverse to Quality or Safety." The team noted that Procedure NOD-QP-31, "Operability Determination Process," appropriately excludes the use of probability or PRA from the operability determination process. Specifically, Procedure NOD-QP-31, Step 13.1, stated, in part, that the definition of operability is that the structure, system, or component must be capable of performing its specified safety function or functions, which inherently assumes that the event occurs and that the safety function or functions can be performed. Therefore, the use of PRA or probabilities of occurrence of accidents or external events is not consistent with the assumption that the event occurs, and is not acceptable for making operability decisions.

This issue was entered into the CAP as Condition Reports CR 2013-05590, CR 2013-05466, and CR 2013-05597.

Analysis. The licensee's failure to perform an operability determination in accordance with FCS procedures was a performance deficiency. This performance deficiency is more than minor, and therefore a finding, because it is associated with the equipment performance attribute of the Mitigating Systems Cornerstone, and affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Since the finding involved inadequate operability determinations that occurred while in a shutdown condition and involved plant equipment needed during shutdown conditions, the team used Manual Chapter 0609, Appendix G, "Shutdown Operations Significance Determination Process" and determined the finding to have very low safety significance (Green) because the finding did not increase the likelihood of a loss of RCS inventory, the finding did not degrade the licensee's ability to terminate a leak path or add RCS inventory when needed, and the finding did not degrade the licensee's ability to recover

decay heat removal once it was lost. This finding has a cross-cutting aspect in the area of human performance associated with the decision making component because the licensee failed to use conservative assumptions in decision making when performing operability determinations. Specifically, the licensee proposed that a degraded/nonconforming condition was safe by relying on a non-conservative assumption that an event such as a tornado generated missile or external flooding at the site were not likely to occur [H.1(b)].

Enforcement. Title 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures and Drawings," requires, in part, that activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings. Contrary to the above, on January 26, 2012 and twice on February 21, 2013, the licensee failed to complete activities affecting quality in accordance with prescribed procedures. Specifically, the operability determinations performed for Condition Reports CR 2012-00626, CR 2013-03839, and CR 2013-03842 used probability and/or PRA to justify the operability of structures, systems, and components. The use of probability or PRA is contrary to Procedure NOD-QP-31, "Operability Determination Process", Revision 51-53, Step 13.1, which stated in part, the use of PRA or probabilities of occurrence of accidents or external events is not consistent with the assumption that the event occurs, and is not acceptable for making operability decisions. Because the finding was of very low safety significance (Green) and has been entered into the CAP as Condition Reports CR 2013-05590, CR 2013-05466, CR 2013-05597, this violation is being treated as a non-cited violation consistent with Section 2.3.2.a of the NRC Enforcement Policy: NCV 05000285/2013008-32, "Multiple Examples of Inadequate Risk-Based Operability Determinations."

(33) Inadequate Operability Determination due to Failure to Establish Component Cooling Water System Leakage Criteria

Introduction. The team identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures and Drawings," involving the licensee's failure to follow procedures when evaluating the impact of CCW system leakage on the containment air coolers.

Description. During a system review, the team compared the operational history of the CCW system with the design specified in the USAR, Section 9.7.2. The team found that the design of the CCW surge tank included provisions that the upper portion of the tank contained nitrogen overpressure to exert a static head on the CCW pump suction. A minimum tank pressure of 34 psig is required to preclude vaporization of CCW in the containment air cooling coils in the event of a loss of offsite power coincident with a loss of coolant accident or main steam line break. Since nitrogen is normally isolated to the surge tank and supplied from a non safety-related source, the team determined that system leakage could impact the ability to maintain a minimum tank pressure of 34 psig, and in turn, challenge the ability of the system to prevent vaporization of CCW in the containment air cooling coils. The team challenged the licensee on what leakage criteria has been established to prevent vaporization of CCW in the containment air cooling coils

and found that the licensee had not established any leakage criteria for either water or nitrogen.

Since the licensee did not have any established leakage criteria for the CCW system, the team requested a history of condition reports related to component cooling system leakage. The team found that in the past, significant leakage has been identified in the CCW system. Specifically, the team noted the following two condition reports documenting significant leakage in the CCW system:

- Condition Report CR 2010-04955 documented that leakage from the CCW system has increased from approximately 10-20 gallons per day to approximately 95 gallons per day.

- Condition Report CR 2010-06905 documented that leakage from the CCW system has increased from approximately 5 gallons per day to approximately 165 gallons per day.

For each of the above condition reports, the immediate operability determination concluded that the CCW system was operable because the quantity of the leakage was well within the capacity that operations personnel could replenish inventory via normal makeup to the CCW surge tank. The team found that the immediate operability determination was inadequate because it credited a non safety-related make-up to the tank that may not be available following an accident, and because the operability determination failed to evaluate the impact of CCW system leakage on containment air cooler operability. The team determined that for each of the above examples, the operability determination lacked adequate technical justification for why the containment air coolers would remain operable with the identified leakage. The team noted that Procedure NOD-QP-31, "Operability Determination Process," Step 4.1.3 J, required, in part, that, "A positive determination of operability must be justified, including…a technical discussion of why the concern identified does not prevent the item from fulfilling its intended safety function(s). This should demonstrate that the item is not exceeding its design basis specified in the reference documents."

This issue was entered into the licensee's CAP as Condition Report CR 2013-05630.

Analysis. The licensee's failure to perform an operability determination in accordance with FCS procedures was a performance deficiency. This performance deficiency is more than minor, and therefore a finding, because it is associated with the equipment performance attribute of the Mitigating Systems Cornerstone, and affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process for Findings At-Power," the finding is determined to have very low safety significance (Green) because it: (1) was not a deficiency affecting the design or qualification of a mitigating structure, system, or component, and did not result in a loss of operability or functionality; (2) did not represent a loss of system and/or function; (3) did not represent an actual loss of function of at least a single train for longer than its technical specification allowed outage time, or two separate safety systems out-of-service for

longer than their technical specification allowed outage time; (4) did not represent an actual loss of function of one or more nontechnical specification trains of equipment designated as high safety-significance in accordance with the licensee's maintenance rule program; and (5) did not involve the loss or degradation of equipment or function specifically designed to mitigate a seismic, flooding or severe weather event. This finding has a cross-cutting aspect in the area of problem identification and resolution associated with CAP component. Specifically, the team identified that the licensee failed provide an adequate technical discussion such that a reasonable expectation of operability was demonstrated for containment air coolers with known leakage in the CCW system [P.1(c)].

Enforcement. Title 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures and Drawings," requires, in part, that activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings. Contrary to the above, on October 6, 2010, and December 29, 2010, the licensee failed to complete activities affecting quality in accordance with prescribed procedures. Specifically, the operability determinations for Condition Reports CR 2010-04955 and CR 2010-06905 were not performed in accordance with Procedure NOD-QP-31, "Operability Determination Process," Revision 43-44, Step 4.1.3 J, which required, in part, that, "A positive determination of operability must be justified, including…a technical discussion of why the concern identified does not prevent the item from fulfilling its intended safety function(s). This should demonstrate that the item is not exceeding its design basis specified in the reference documents." In each instance, the licensee failed to evaluate the impact of CCW system leakage on containment air coolers operability. Because the finding was of very low safety significance (Green) and has been entered into the CAP as Condition Report CR 2013-05630, this violation is being treated as a non-cited violation consistent with Section 2.3.2.a of the NRC Enforcement Policy: NCV 05000285/2013008-33, "Inadequate Operability Determination due to Failure to Establish Component Cooling Water System Leakage Criteria."

(34) Failure to Follow ASME Code Requirements when Establishing New Pump Reference Values as Corrective Actions

Introduction. The team identified a Green non-cited violation of 10 CFR 50.55a, "Codes and Standards," for the failure of the licensee to follow the ASME Code when establishing new reference curves as corrective action to address the performance of CCW pump AC-3A within the "low required action" range of the inservice testing program.

Description. On July 27, 2011, the licensee performed Procedure OP-ST-CCW-3003, "AC-3a: Component Cooling Water Pump Inservice Test", Revision 22. This procedure is used to accomplish the inservice testing requirements in accordance with the 1999 Edition through the 2000 Addenda of the American Society of Mechanical Engineers (ASME) for Operation and Maintenance (OM) Code. During performance of the inservice test, the CCW pump AC-3a demonstrated pump differential pressure and flow within the "low required action" range. As required by Step 9.3 of the procedure and

Section ISTB-6200(b) of the ASME OM Code, the licensee declared the pump inoperable. Later on July 27, 2011, the licensee re-performed Procedure OP-ST-CCW-3003, which confirmed that performance of CCW pump AC-3a was within the "low required action" range. The licensee initiated Condition Report CR 2011-06365 to document the unacceptable inservice test results for CCW pump AC-3a.

On July 29, 2011, the licensee performed Procedure SE-ST-CCW-3002, "CCW Pump Base Line Curve Procedure", Revision 10, to establish a new set of reference curves for CCW pump AC-3a. Establishing of new reference curves was done as corrective action to address the degraded performance of CCW pump AC-3a. Following establishment of new reference curves, CCW pump AC-3a was declared operable. No actual corrective maintenance was performed to address the degraded performance of CCW pump AC-3a.

The team reviewed the inservice testing results and the licensee's corrective action to address pump AC-3a performance within the "low required action" range of the inservice testing program. The team found that the licensee's corrective action failed to meet ASME OM Code because the licensee justified cooling water pump AC-3a continued use through the establishment of a new set of reference values. However, contrary to Subsection ISTB-6200(c), "New Reference Values" the licensee failed to determine the cause of the change in pump performance, failed to perform an analysis that showed a verification of the pump's operational readiness at both pump level and system level, and failed to perform an evaluation of all trends indicated by available data. Component cooling water pump AC-3a remained in service without properly established reference values from July 29, 2011, until May 29, 2012, when the pump was rebuilt under Work Order WO 420940. The team confirmed that while the pump was inoperable from an inservice testing perspective during this period, required surveillance testing showed that pump flows and differential pressures were still sufficient to meet the assumptions used in the FCS safety analysis. This issue was entered into the licensee's CAP as Condition Report CR 2013-04010.

Analysis. The licensee's failure to follow the code requirements when establishing new reference values as corrective action to address degraded pump performance was a performance deficiency. This performance deficiency is more than minor, and therefore a finding, because it is associated with the human performance attribute of the Mitigating Systems Cornerstone, and affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Since this finding was discovered during plant shutdown and involved plant equipment needed during shutdown conditions, the team used Manual Chapter 0609, Appendix G, "Shutdown Operations Significance Determination Process," and determined the finding to have very low safety significance (Green) because the finding did not increase the likelihood of a loss of RCS inventory, the finding did not degrade the licensee's ability to terminate a leak path or add RCS inventory when needed, and the finding did not degrade the licensee's ability to recover decay heat removal once it was lost. This finding has a cross-cutting aspect in the area of problem identification and resolution associated with the CAP component because the licensee failed to fully evaluate the degraded performance of component cooling pump

AC-3A to ensure that resolutions correctly addressed causes of the degraded performance and the cumulative impact on system operational readiness [P.1(c)].

Enforcement. Title 10 of the Code of Federal Regulations, Section 50.55a(b), "Codes and Standards," requires, in part, that systems and components of boiling and pressurized water cooled nuclear power reactors must meet the requirements of the ASME Code for Operation and Maintenance of Nuclear Power Plants. Contrary to the above, on July 29, 2011, the licensee failed to meet ASME OM Code as required by 10 CFR 50.55a(b). Specifically, the licensee failed to follow ASME Code, Subsection ISTB 6200(c), when establishing new reference curves for CCW pump AC-3a as corrective action to address performance within the "low required action" range of the inservice testing program. The new reference curves were established without performing an analysis which included verification of the pump's operational readiness at a pump level and a system level, without determining the cause of the change in pump performance, and without an evaluation of all trends indicated by available data. Because the finding was of very low safety significance (Green) and has been entered into the CAP as Condition Report CR 2013-04010, this violation is being treated as a non-cited violation consistent with Section 2.3.2.a of the NRC Enforcement Policy: NCV 05000285/2013008-34, "Failure to Follow ASME Code Requirements when Establishing New Pump Reference Values as Corrective Actions."

(35) Failure to Correct Condition Adverse to Quality Associated with Corrective Action Program Procedures and the Operability Process

Introduction. The team identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Actions," for the failure to implement corrective actions to address inadequate procedures involving the degraded/nonconforming condition evaluation and operability determination process.

Description. On December 31, 2012, the licensee completed an RCA for Condition Report CR 2012-09494. This condition report evaluated programmatic and cultural deficiencies in the degraded/nonconforming evaluation process and in the performance of operability determinations and functionality assessments. The barrier analysis for this RCA identified a failed barrier relative to the licensee's CAP procedures and how they implement portions of the operability determination process. Specifically, the licensee's root cause team identified the following inadequacies in the CAP procedures:

- Procedure FCSG-24-3, "Condition Report Screening," does not lead the shift technical advisor or the shift manager to determine if a component is degraded or nonconforming before the determination of operability is made. Additionally, the shift technical advisor or the shift manager is not led to use degraded/nonconforming condition determination as an aid to determining operability.

- Procedure FCSG-24-3 does not reference Regulatory Information Summary 2005-20, "Revision to NRC Inspection Manual Part 9900 Technical Guidance: Operability Determinations & Functionality Assessments for Resolution of Degraded or Nonconforming Conditions Adverse to Quality or Safety," or NRC

Inspection Manual 9900, "Operability Determinations & Functionality Assessments for Resolution of Degraded or Nonconforming Conditions Adverse to Quality or Safety." Additionally, Procedure FCSG-24-3 does not provide a process that follows the guidance in NRC Inspection Manual 9900.

- Procedure FCSG-24-3 permits degraded/nonconforming condition evaluation and operability determinations to be made with a "Yes/No" in the condition report with no requirement for supporting documentation.

- Procedure FCSG-24-3 does not reinforce the on-shift shift manager as the final authority for evaluating degraded/nonconforming conditions and operability determinations.

During inspection of the RCA for Condition Report CR 2012-09494, the team reviewed the current revision of Procedure FCSG-24-3, "Condition Report Screening," Revision 3, and found that the failed barriers described above had not been corrected. Consequently, the team determined that as written, Procedure FCSG-24-3, Revision 3, attempted to implement portions of the operability determination process but did not provide adequate references or direct users to the actual operability determination Procedure NOD-QP-31. This issue was entered into the licensee's CAP as Condition Report CR 2013-04380.

Analysis. The licensee's failure to implement corrective actions for a condition adverse to quality associated with inadequate procedures was a performance deficiency. This performance deficiency is more than minor, and therefore a finding, because if left uncorrected, inadequate CAP procedures could become a more significant safety concern. This finding is associated with the Mitigating Systems Cornerstone. Since the finding was discovered while in a shutdown condition, the team used Manual Chapter 0609, Appendix G, "Shutdown Operations Significance Determination Process," and determined the finding to have very low safety significance (Green) because the finding did not increase the likelihood of a loss of RCS inventory, the finding did not degrade the licensee's ability to terminate a leak path or add RCS inventory when needed, and the finding did not degrade the licensee's ability to recover decay heat removal once it was lost. This finding has a cross-cutting aspect in the area of problem identification and resolution associated with the CAP component because the licensee failed to implement a CAP with a sufficiently low threshold. Specifically, although the licensee identified significant flaws in FCS procedures while performing the RCA for Condition Report CR 2012-09494, the licensee failed to initiate the appropriate corrective action documents to drive the necessary procedure changes [P.1(a)].

Enforcement. Title 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Actions," requires, in part, that measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected. Contrary to the above, prior to March 1, 2013, the licensee failed to correct a condition adverse to quality associated with FCS procedures implementing the corrective action program and the licensee's operability determination process. Specifically, the licensee failed to

correct the procedural inadequacies associated with Procedure FCSG-24-3, "Condition Report Screening," Revision 3, which were identified in the RCA for Condition Report CR 2012-09494, dated December 31, 2012. Because the finding was of very low safety significance (Green) and has been entered into the CAP as Condition Report CR 2013-04380, this violation is being treated as a non-cited violation consistent with Section 2.3.2.a of the NRC Enforcement Policy: NCV 05000285/2013008-35, "Failure to Correct Condition Adverse to Quality Associated with Corrective Action Program Procedures and the Operability Process."

(36) Deficient Evaluation of NRC Bulletin 88-04

Introduction. The team identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," associated with the licensee's failure to properly evaluate NRC Bulletin 88-04, "Potential Safety-Related Pump Loss," regarding the AFW pumps.

Description. The team reviewed the licensee's response to NRC Bulletin 88-04, "Potential Safety-Related Pump Loss." This bulletin, in part, identified a concern regarding dual pump operation in parallel. Specifically, when two centrifugal pumps operate in parallel and one of the pumps is stronger than the other (i.e., has a higher developed head for the same flow), the weaker pump may be dead-headed when the pumps are operating in the minimum flow mode. The phenomenon is manifested at low flow rates because of the flatness of the pump characteristic curve in this range. The head difference is not a problem at moderate, to high, flow conditions because of the shape of the pump characteristic curve in these regions. This centrifugal pump flow condition has been described as hydraulic instability, or impeller recirculation, at some point below the best efficiency point on their characteristic curve. These unsteady flow phenomena become progressively more pronounced as the flow is further decreased, and can result in pump damage from pump vibration, excessive forces on the impeller, and cavitation. The concern involves parallel pump operation with both pumps re-circulating through a common minimum flow recirculation line, or with a piping configuration that does not preclude pump-to-pump interaction during minimum flow operation. The bulletin also identified that the second concern may exist independent of whether, or not, there is a common recirculation pump flow path.

The bulletin requested licensees to evaluate the capability of safety-related pumps to run long term at minimum recirculation flow rates. The bulletin stated that many licensees had accounted for thermal considerations in setting the minimum recirculation flow rates, but had failed to consider flow instability effects. The latter consideration could necessitate a considerable increase in minimum flow settings.

Actions Requested by Bulletin 88-04 included, in part, the following:

1. Promptly determine whether, or not, its facility has any safety-related system with a pump and piping system configuration that does not preclude pump-to-pump interaction during miniflow operation and could, therefore, result in dead-heading of one or more of the pumps.

2. If the situation described in Item 1 exists, evaluate the system for flow division taking into consideration: (a) the actual line and component resistances for the as-built configuration of the identified system; (b) the head versus flow characteristics of the installed pumps, including actual test data for “strong” and “weak” pump flows; (c) the effect of test instrument error and reading error; and (d) the worst case allowances for deviation of pump test parameters as allowed by the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) Section XI, Paragraph IWP-3100.

3. Evaluate the adequacy of the minimum flow bypass lines for safety-related centrifugal pumps with respect to damage resulting from operation and testing in the minimum flow mode. This evaluation should include consideration of the effects of cumulative operating hours in the minimum flow mode over the lifetime of the plant and during the postulated accident scenario involving the largest time spent in this mode. The evaluation should be based on best current estimates of potential pump damage from operation of the specific pump models involved, derived from pertinent test data and field experience on pump damage. The evaluation should also include verification from the pump suppliers that current miniflow rates (or any proposed modifications to miniflow systems) are sufficient to ensure that there will be no pump damage from low flow operation. If the test data does not justify the existing capacity of the bypass lines (e.g., if the data does not come from flows comparable to the current capacity), or if the pump supplier does not verify the adequacy of the current miniflow capacity, the licensee should provide a plan to obtain additional test data and/or modify the miniflow capacity as needed.

Memorandum LIC-88-1988, dated July 8, 1988, provided the licensee’s initial response to Bulletin 88-04. This letter stated, in part, “Each AFW pump has its own independent miniflow recirculation line to the emergency feedwater storage tank. Since there are two separate lines, there is no possibility of pump-to-pump interaction during simultaneous miniflow operation of FW-6 and FW-10.”

The team verified that the AFW pumps do not share a common minimum flow recirculation line. However, the team determined the initial response failed to address the second concern delineated in the bulletin regarding pump and piping system configuration that does not preclude pump-to-pump interaction during miniflow operation. Specifically, the evaluation did not consider pump-to-pump interaction that may result due to pump discharge check valve leakage. During interviews with the licensee, the team learned that the AFW pumps discharge check valves have a history of back leakage. This was based on previous surveillance tests (November 28, 2010, and September 1, 2012) which showed evidence of leakage through each of the check valves. The team determined that the applicable pump surveillance testing verified the check valves close, but it did not measure check valve leakage. In addition, the licensee does not perform preventive maintenance activities, nor any type of routine visual inspections of the check valves internals, and the licensee had no documentation to show the check valves had ever been replaced. Based on pump data and vendor pump curves, the team noted the turbine driven emergency feedwater pump is stronger than the motor driven pump. Therefore, the team determined that due to known leakage past

the pumps discharge check valves, and associated system piping configuration, the AFW system has a condition that does not preclude pump-to-pump interaction during low flow/mini flow operation. The team was concerned that the weaker motor driven AFW pump could therefore, be dead-headed during parallel operation by the stronger turbine driven pump.

Fort Calhoun Station engineers reviewed specific documentation and the licensee's initial response to NRC Bulletin 88-04, and could not find any specific analysis to show that the licensee had considered the potential of the stronger pump affecting the re-circulation flow of the weaker pump assuming leakage past the check valves (FW-173 or FW-174). Condition Reports CR 2013-04680 and CR 2013-04806 were initiated to address the team's concerns.

Analysis. The licensee's failure to ensure proper evaluation of Bulletin 88-04 to minimize and manage, or eliminate, the potential for AFW pump damage was a performance deficiency. This performance deficiency is more than minor, and therefore a finding, because it was associated with the equipment performance attribute of the Mitigating Systems Cornerstone, and affected the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process for Findings At-Power," the finding is determined to have very low safety significance (Green) because it: (1) was not a deficiency affecting the design or qualification of a mitigating structure, system, or component, and did not result in a loss of operability or functionality; (2) did not represent a loss of system and/or function; (3) did not represent an actual loss of function of at least a single train for longer than its technical specification allowed outage time, or two separate safety systems out-of-service for longer than their technical specification allowed outage time; (4) did not represent an actual loss of function of one or more nontechnical specification trains of equipment designated as high safety-significance in accordance with the licensee's maintenance rule program; and (5) did not involve the loss or degradation of equipment or function specifically designed to mitigate a seismic, flooding or severe weather event. This finding has a cross-cutting aspect in the area of problem identification and resolution associated with the CAP component because the licensee failed to thoroughly evaluate problems such that appropriate corrective actions were promptly implemented [P.1(a)].

Enforcement. Title 10 CFR Part 50, Appendix B, Criterion III, "Design Control," states, in part, that measures shall be established to assure that applicable regulatory requirements and the design bases, as defined in 10 CFR 50.2, and as specified in the license application, for those components to which this appendix applies, are correctly translated into specifications, drawings, procedures, and instructions. Contrary to the above, from November 28, 2010, through February 2013, measures established by the licensee did not assure that applicable regulatory requirements and the design bases, as defined in 10 CFR 50.2 and as specified in the license application, for those components to which this appendix applied, were correctly translated into specifications, drawings, procedures, and instructions. Specifically, the licensee failed to properly evaluate NRC Bulletin 88-04, "Potential Safety-Related Pump Loss," for strong pump, weak pump, interaction regarding AFW pumps FW-6 and FW-10. The evaluation failed to consider

pump-to-pump interaction that may result due to pump discharge check valve leakage. In addition, the licensee failed to re-evaluate the condition after surveillance testing performed on November 28, 2010, and September 1, 2012, identified leakage past both pump discharge check valves. Because the finding was of very low safety significance (Green) and has been entered into the CAP as Condition Reports CR 2013-04680 and CR 2013-04806, this violation is being treated as a non-cited violation consistent with Section 2.3.2.a of the NRC Enforcement Policy: NCV 05000285/2013008-36, "Deficient Evaluation of NRC Bulletin 88-04, Strong Pump Weak Pump Due to Failure to Consider The Effect of AFW Pumps Discharge Check Valves Leakage."

(37) Improper Storage of the Raw Water to Auxiliary Feedwater Emergency Tank Fill Hose

Introduction. The team identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," associated with the licensee's failure to properly store the raw water to emergency feedwater storage tank fill hose.

Description. Emergency feedwater storage tank FW-19, is sized to provide enough water volume for eight hours of operation. Other sources of water are credited as a source of make-up/emergency fill for tank FW-19, for the emergency feedwater system to perform its safety-related function. Technical Specification Bases, Section 2.5, credited the safety-related raw water system as a source for water make-up to tank FW-19. Similarly, USAR, Section 9.4, "Auxiliary Systems Auxiliary Feedwater System," credited the raw water system as the water make-up source for tank FW-19 in case of an emergency. The licensee has dedicated a fire hose to perform this function. The fire hose was installed in July 1996 per Engineering Change EC11230, "(MR-FC-94-018) Back-Up RW Tie-in for EFWST in Room 81," Revision 0. The control of tank FW-19 refill activities is performed in accordance with Abnormal Operating Procedure AOP-30, "Emergency Fill of Emergency Feewater Storage Tank," Revision 11. The fire hose was periodically tested to ensure operability, and the licensee has performed actual verification of proper fit and interface between the hose and the emergency feedwater storage tank valve that would be used to refill the tank.

Updated Safety Analysis Report, Section M.2.3, listed the AFW system, and its associated emergency feedwater storage tank FW-19, as essential equipment required to place, and maintain, the plant in a shutdown condition following a postulated HELB outside containment with simultaneous loss of off-site power. The team inspected the AFW system, including storage tank FW-19 and associated components, to verify that it was capable of meeting its design basis requirements. The team reviewed applicable portions of the USAR and drawings to identify the design basis requirements for the tank. The team reviewed calculations and surveillance test procedures to verify that the tank was capable of achieving design basis head/flow requirements during limiting design basis conditions, and that test acceptance criteria were consistent with these requirements.

Emergency feedwater storage tank FW-19, is located in Room 81. Room 81 also contains other safety-related systems and components, including main steam lines, main

feedwater lines, main steam isolation valves, and safety relief valves. During a HELB in Room 81, the temperature in the room is expected to reach 382 degrees Fahrenheit.

During a walkdown of Room 81, the team noted the dedicated fire hose for raw water emergency make-up to tank FW-19 was stored in Room 81. The team questioned the temperature rating of the fire hose, and whether the hose was qualified for the high energy break temperature (382 degrees Fahrenheit). Engineering personnel determined the fire hose was only qualified for 158 degrees Fahrenheit. Consequently, the fire hose may not be able to perform its required safety function due to the inappropriate storage location. The team determined the improper storage of the fill hose existed from the time it was installed in July 1996, until February 27, 2013, when the issue was identified by team. The licensee initiated Condition Report CR 2013-05276 to address this issue.

In addition, the team noted that Condition Reports CR 2012-15442 and CR 2013-15690 had been previously initiated to document concerns raised by a contractor during their component design basis inspection activities to review the AFW system. Specifically, they questioned the basis, and justification, for the use of the fire hose for emergency fill of tank FW-19, and the need to update Procedure AOP-30 to reflect the actual raw water system flow testing performed. The team determined that the licensee's evaluation of these issues missed an opportunity to identify this issue.

Analysis. The licensee's failure to properly store the fire hose dedicated for emergency fill of emergency feedwater tank FW-19 was a performance deficiency. This performance deficiency is more than minor, and therefore a finding, because it was associated with the design control attribute of the Mitigating Systems Cornerstone, and affected the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process for Findings At-Power," the finding is determined to have very low safety significance (Green) because it: (1) was not a deficiency affecting the design or qualification of a mitigating structure, system, or component, and did not result in a loss of operability or functionality; (2) did not represent a loss of system and/or function; (3) did not represent an actual loss of function of at least a single train for longer than its technical specification allowed outage time, or two separate safety systems out-of-service for longer than their technical specification allowed outage time; (4) did not represent an actual loss of function of one or more nontechnical specification trains of equipment designated as high safety-significance in accordance with the licensee's maintenance rule program; and (5) did not involve the loss or degradation of equipment or function specifically designed to mitigate a seismic, flooding or severe weather event. This finding has a cross-cutting aspect in the area of problem identification and resolution associated with the CAP component because the licensee failed to thoroughly evaluate problems such that the resolutions address the causes [P.1(c)].

Enforcement. 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures and Drawings," requires, in part, that activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings. Contrary to the above, from July 1996 to February 27, 2013,

the licensee failed to adequately prescribe documented instructions or procedures for activities affecting quality. Specifically, the licensee failed to provide adequate instructions or procedures to ensure proper storage and temperature qualification of the AFW emergency fill hose. Because the finding was of very low safety significance (Green) and has been entered into the CAP as Condition Report CR 2013-52276, this violation is being treated as a non-cited violation consistent with Section 2.3.2.a of the NRC Enforcement Policy: NCV 05000285/2013008-37, "Improper Storage of the Raw Water to Auxiliary Feedwater Emergency Tank Fill Hose."

(38) Deficient Evaluation for Known Degraded Conditions – AFW Pumps Discharge Check Valve Leakage and Potential Overpressure of AFW Pump Suction Piping

Introduction. The team identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," associated with the licensee's failure to properly evaluate a known degraded condition regarding the AFW pump discharge check valve leakage and potential over-pressurization of the pumps suction piping.

Description. During preparation for the NRC AFW component design basis inspection, the licensee contracted an independent third party to perform a design evaluation of the AFW system. The evaluation identified the following concerns regarding the pump discharge check valve leakage testing:

- The pump discharge check valve leakage testing performed per surveillance test Procedures OP-ST-AFW-3011 (pump FW-6, valve FW-173), and OP-ST-FW-3009 (pump FW-10, valve FW-174), do not adequately verify the check valve leakage as intended. Specifically, the contractor was concerned that the leakage test was performed with the minimum flow recirculation valves open and the procedure had no basis to relate a 20 psid pressure rise to the 1 gpm system back leakage allowed per Calculation FC07536;

- The method of testing can lead to pressurization of the suction pipe in excess of its pressure rating.

Calculation FC07536, "FW-6 and FW-10 Suction and Discharge Piping Friction Loss (Proto-Flo Model)," Revision 0, assumed 1 gpm leakage when modeling each of the pumps. The licensee initiated Condition Report CR 2012-15218 to address these concerns.

The team reviewed the contractor performed component design basis inspection assessment report, applicable surveillance procedures, Condition Report CR 2012-15218, and associated evaluations and corrective actions implemented. The team also performed system walkdowns, and interviewed the AFW system and design engineers and their supervisors.

The team noted corrective actions documented in Condition Report CR 2012-15218 (EC 58937) included revisions to the surveillance procedures to ensure the non-running AFW pump's minimum flow recirculation valve (FCV-1368 or FCV-1369) was closed during testing to prevent potential leakage past the check valve back to the emergency

feedwater storage tank. In addition, the team noted, the surveillance procedures required closing each of the non-running pump suction isolation valves. The procedure, therefore, was implemented by taking suction from the emergency storage tank, starting each AFW pump (one at a time), closing the non-running pump suction isolation valve and its minimum flow recirculation valve, and establishing an alternate flow path back to the tank. The team questioned this test method, since the procedures verify that the check valves open and close, but they do not measure, or quantify, leakage past the check valves.

During the interviews with FCS personnel, the team noted that the AFW pump suction piping was rated for 150 psi and the pump discharge pressure ranges between 1120 and 1245 psig, such that, leakage past the check valves had the potential to over pressurize the suction piping. The team noted that previous surveillance tests, performed on November 28, 2010, and September 1, 2012, showed evidence of leakage through each of the check valves, but the leakage was not quantified and this issue was not entered into the CAP. In addition, the team determined that the licensee does not perform preventive maintenance activities, nor any type of routine visual inspections of the check valve internals. Further, the licensee had no documentation to show the valves had ever been replaced.

The team reviewed Procedure OP-PM-AFW-001 which was implemented during plant shutdown for verification of AFW flow to the steam generators documented in Work Order WO 00314218, dated December 11, 2009. The team noted this procedure confirmed pump FW-6 delivered 259 gpm total flow to the two steam generators, which was greater than the required 180 gpm design basis flow. However, the team identified that there was a 40 gpm unaccounted for flow rate. Specifically, during testing, the measured pump's suction flow was 300 gpm, while the flow to the steam generators was 259 gpm. The team questioned this and FCS engineers determined this was also a possible indication of pump discharge check valve leakage and some instrument inaccuracy. The team noted that this discrepancy had not been entered into the CAP for evaluation.

The team determined that the concern for over pressurization of the AFW pump suction piping only existed during pump testing. The concern is eliminated during normal and standby system operation since the pump suction isolation valves are maintained in their automatic (normal/open position), and during accident conditions since both pumps would automatically start. However, the team determined that the implemented corrective actions to isolate the non-running AFW pump minimum flow recirculation valve was deficient and did not properly address the specific deficiencies identified by the contractor. Specifically, the corrective actions did not measure leakage past the check valves to ensure the calculated 1 gpm allowable leakage limit was properly verified and maintained. Additionally, the team determined that closing the minimum flow recirculation valves during pump surveillance testing increased the possibility of pressurizing the non-running pump's suction piping above its design rating since the procedure also closes the non-running pump's suction isolation valve, essentially bottling up the non-running pipe suction pipe. The licensee initiated Condition Reports CR 2013-04806 and CR 2013-05018 to address the team's concerns.

Analysis. The licensee's failure to properly evaluate and correct a known deficient condition regarding the AFW pump discharge check valves was a performance deficiency. This performance deficiency is more than minor, and therefore a finding, because it was associated with the equipment performance attribute of the Mitigating Systems Cornerstone and affected the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process for Findings At-Power," the finding is determined to have very low safety significance (Green) because it: (1) was not a deficiency affecting the design or qualification of a mitigating structure, system, or component, and did not result in a loss of operability or functionality; (2) did not represent a loss of system and/or function; (3) did not represent an actual loss of function of at least a single train for longer than its technical specification allowed outage time, or two separate safety systems out-of-service for longer than their technical specification allowed outage time; (4) did not represent an actual loss of function of one or more nontechnical specification trains of equipment designated as high safety-significance in accordance with the licensee's maintenance rule program; and (5) did not involve the loss or degradation of equipment or function specifically designed to mitigate a seismic, flooding or severe weather event. This finding has a cross-cutting aspect in the area of human performance associated with the decision-making component because the licensee failed to use conservative assumptions in decision-making and adopt a requirement to demonstrate that the proposed action is safe in order to proceed rather than a requirement to demonstrate it is unsafe in order to disapprove the action [H.1(b)].

Enforcement. Title 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Actions," requires, in part, that measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformance's are promptly identified and corrected. Contrary to the above, from October 10, 2012, to March 15, 2013, measures established by the licensee failed to assure that an identified condition adverse to quality was corrected. Specifically, the licensee failed to properly evaluate concerns regarding the AFW pump discharge check valves, which resulted in the failure to implement adequate corrective actions to verify leak tightness of the check valves and prevent potential over pressurization of the pump's suction piping. Because the finding was of very low safety significance (Green) and has been entered into the CAP as Condition Reports CR 2013-04806 and CR 2013-05018, this violation is being treated as a non-cited violation consistent with Section 2.3.2.a of the NRC Enforcement Policy: NCV 05000285/2013008-38, "Deficient Evaluation for Known Degraded Conditions – AFW Pumps Discharge Check Valve Leakage and Potential Overpressure of AFW Pump Suction Piping."

(39) Failure to Properly Implement Applicable ASME OM Code Requirements

Introduction. The team identified two examples of a Green non-cited violation of 10 CFR 50.55a.(f)(4)(ii), "Codes and Standards," associated with the licensee's failure to properly implement applicable American Society of Mechanical Engineers (ASME) Operation and

Maintenance (OM) Code requirements for in-service testing of safety-related pumps and check valves.

Description. The first example involved AFW pump discharge check valves FW-172 and FW-173. During preparation for the NRC AFW system component design basis inspection, the licensee had a contractor perform a design evaluation of the AFW system. The contractor identified several concerns regarding the AFW pumps discharge check valve leakage tests. These issues were captured in Condition Report CR 2012-15218. The team reviewed Condition Report CR 2012-15218, and the current in-service inspection program plan and noted that it included the discharge check valves FW-172 and FW-173. The plan categorized the valves as Category C valves. The ASME OM Code required that Category C check valves (those that are self-actuated in response to some system characteristic such as pressure or flow direction), that perform a safety function in the closed position to prevent reverse flow must be tested in a manner that proves that the disc travels to the seat on flow cessation or flow reversal. The team determined that the applicable AFW In-Service Test Procedures OP-ST-AFW-3009, "Auxiliary Feedwater Pump FW-6 Steam Isolation Valve, and Check Valve Tests," Revision 21, and OP-ST-AFW-3011, "Auxiliary Feedwater Pump FW-10 Steam Isolation Valve, and Check Valve Tests," Revision 14, verified the check valves open and close as required, but did not specify any leakage limit nor measure the amount of seat leakage.

The team then reviewed Calculation FC07536, "FW-6 and FW-10 Suction and Discharge Piping Friction Loss (Proto-Flo Model)," Revision 0, and noted that it assumed a 1 GPM leakage rate through the check valves when modeling each of the pumps. The team questioned the licensee's classification of the check valves. The team determined that the licensee's design analysis represented a specified leak rate limit, which was not in accordance with the OM Code requirements. Specifically, the team noted that for Category A/C check valves (those that have a specified leak rate limit and are self-actuated in response to a system characteristic), the OM Code required that seat leakage must be limited to a specific maximum amount in the closed position to verify fulfillment of their safety function.

The team concluded, the FCS in-service testing program did not specify a seat leakage limit for these check valves to ensure they were properly tested and to verify fulfillment of their required isolation function. The team determined that valves FW-172 and FW-173 were not properly incorporated into the in-service testing program. These valves should have been classified as Category A/C valves, with testing also being performed to verify that the specified leak rate was not being exceeded. The team informed the licensee of their concerns and the licensee initiated Condition Reports CR 2013-04680 and Condition Reports CR 2013-05514 to capture this issue in the CAP.

The second example involved AFW pumps FW-6 and FW-10. The team determined that the in-service testing for motor driven AFW pump FW-6, and associated pump discharge check valve FW-173, was performed quarterly, per Procedure OP-ST-AFW-3009. Similarly, the turbine driven AFW pump FW-10, and associated check valve FW-174, were tested per Procedure OP-ST-AFW-3011. The team noted that pumps FW-6 and FW-10 used identical instrumentation and have the same system parameters, and thus,

the instrument uncertainty for the two pumps' installed instrumentation would be the same.

Calculation FC06642, "Uncertainty Calculation to Support ISI Testing," Revision 4, established instrument uncertainties for instrumentation related to testing the performance of safety-related pumps. Consideration of instrument uncertainties ensures the pumps will maintain operable as long as the surveillance testing limits are observed. Calculation FC06642, calculated a 6.6 GPM flow uncertainty for pumps FW-6 and FW-10. For motor driven pump FW-6, the in-service test procedure specified a flow test acceptance criteria of greater than or equal to 180 GPM and a reference value of 185 GPM. For turbine driven pump FW-10, the in-service test acceptance criteria was 290 GPM and the reference value was 295 GPM.

Based on this information, the team questioned how both pumps could use the same instrumentation with such large differences in reference values. Specifically, the team noted that the ASME OM Code, Subsection ISTB-3510, required a flow instrument accuracy of $\pm$ 2 percent of actual full gage range which amounts to 6 GPM. During a control room walkdown, the team noted the flow instrument gage for pump FW-6, had a range of 0 to 300 GPM, with increments of 5 GPM. The team reviewed the completed surveillance tests for both pumps for the last five years and confirmed the test data showed each pump had met their required design flow acceptance criteria of greater than 180 GPM and 290 GPM (respectively), using the in-plant flow instruments. However, the team determined that the acceptance criteria and reference values for pump FW-6 do not provide adequate margin to account for the required instrument accuracy and uncertainty to adequately trend pump performance and to detect a degraded pump condition using installed plant equipment.

The team informed the licensee of their concerns and the licensee initiated Condition Reports CR 2013-05018 and CR 2013-05569 to capture this issue in the CAP. Subsequently, FCS engineers determined that there was a reasonable expectation of operability for pump FW-6 because the pump was used bi-annually during plant start-up, to deliver approximately 225 GPM per Procedure OP-PM-AFW-0001, "Flow Path Verification of Auxiliary Feedwater System."

Analysis. The licensee's failure to properly implement applicable ASME OM Code requirements for in-service testing of safety-related pumps and check valves was a performance deficiency. This performance deficiency is more than minor, and therefore a finding, because it was associated with the equipment performance attribute of the Mitigating Systems Cornerstone, and affected the associated cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process for Findings At-Power," the finding is determined to have very low safety significance (Green) because it: (1) was not a deficiency affecting the design or qualification of a mitigating structure, system, or component, and did not result in a loss of operability or functionality; (2) did not represent a loss of system and/or function; (3) did not represent an actual loss of function of at least a single train for longer than its technical specification allowed outage time, or two separate safety systems out-of-service for longer than their technical

specification allowed outage time; (4) did not represent an actual loss of function of one or more nontechnical specification trains of equipment designated as high safety-significance in accordance with the licensee's maintenance rule program; and (5) did not involve the loss or degradation of equipment or function specifically designed to mitigate a seismic, flooding or severe weather event. This finding has a cross-cutting aspect in the area of problem identification and resolution associated with the CAP component because the licensee failed to thoroughly evaluate problems such that the resolutions addressed the causes [P.1(c)].

Enforcement. Title 10 CFR 50.55a.(f)(4)(ii) "Codes and Standards," requires in part, that inservice tests to verify operational readiness of safety-related pumps and valves must comply with the latest edition and addenda of the ASME Code for Operation and Maintenance of Nuclear Plants. The applicable Code for the current FCS in-service test program is the 1998 Edition through the 2000 Addenda. ASME OM Code, Section ISTB-3510, requires that for in-service testing, flow instrument accuracy shall be within ± 2 percent of full-scale. Contrary to the above, prior to March 11, 2013, the licensee failed to ensure that the testing of safety-related pumps met the requirements of the ASME OM Code. Specifically, the licensee's acceptance criteria and reference values for Pump FW-6 failed to provide adequate margin to account for the required instrument accuracy and uncertainty. Because the finding was of very low safety significance (Green) and has been entered into the CAP as Condition Reports CR 2013-04680, CR 2013-05018, CR 2013-05514, and CR 2013-05569, this violation is being treated as a non-cited violation consistent with Section 2.3.2.a of the NRC Enforcement Policy: NCV 05000285/2013008-39, "Failure to Properly Implement Applicable ASME OM Code Requirements."

(40) Failure to Obtain Prior NRC Approval for a Facility Change

Introduction. The team identified a Severity Level IV non-cited violation of 10 CFR 50.59, "Changes, Test, and Experiments," associated with the licensee's failure to adequately evaluate changes in order to ensure that they did not require prior NRC approval.

Description. In Incident Report 940396, the licensee determined that the currently installed, refrigerant cooled, control room air condition units were susceptible to failure in the event of a large break loss of coolant accident or a main steam line break inside of containment due to cooling water inadequacies. This failure would result in the control room exceeding its design temperature. To address this, the licensee implemented Modification MR-FC-94-020, "CR A/C Units VA-46A/B Improved Reliability." This modification changed the units from refrigerant cooled to air cooled and relocated the units from inside of the auxiliary building (a Class 1 structure) to the roof of the auxiliary building.

The team reviewed Modification MR-FC-94-020 and noted that the licensee had not provided tornado missile protection for the condensing units when they were relocated from inside of the auxiliary building to the roof of the building. Instead, the licensee had used a probabilistic approach to determine if tornado missile protection was required for the two condensing units. Memo PED-DEN-95-0054, "Selection of Design Basis

Tornado Missile and Wind Loading for VA-46A/B Air Condensers," and Calculation FC06375, "Calculation of Tornado Strike for FCS Control Room HVAC Air Condensers," Revision 0, both cited NUREG 0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," as the basis for using a probabilistic approach to determining if tornado missile protection was required based on strike probabilities. The licensee took the position that NUREG 0800 constituted guidance from the NRC that allowed the licensee the option to choose which methodology was to be used for assessing FCS with regard to tornado missile protection requirements. The team also noted that the licensee performed a 10 CFR 50.59 evaluation for this modification and determined that it did not require prior NRC approval.

The team noted that FCS was committed to complying with Draft General Design Criteria GDC-2, published July 11, 1967, which required that the systems and components needed for accident mitigation remain fully functional before, during, and after a tornado event. The team noted that USAR, Section 5.8.2, described the spectrum of tornado missiles for which FCS must show protection. The team also determined that the station's licensing basis had not previously evaluated the loss of the condensing units due to tornado missile damage.

Based on this, the team determined that this modification should have required prior NRC approval. Specifically, the relocation of the control room air conditioning condensers had resulted in more than a minimal increase in the likelihood of occurrence of a malfunction of a structure, system, or component important to safety previously evaluated in the USAR.

The team informed the licensee of their concerns and the licensee initiated Condition Reports CR 2013-04266 and CR 2013-05210 to capture this issue in the CAP. Subsequently, the licensee determined that Modification MR-FC-94-020 as implemented should have required prior NRC approval.

Analysis. The licensee's failure to implement the requirements of 10 CFR 50.59 and adequately evaluate changes to requirements for tornado missile protection in the USAR was a performance deficiency. Because this performance deficiency had the potential to impact the NRC's ability to perform its regulatory function, the team evaluated it using traditional enforcement. In accordance with Section 7.3.E.6 of the NRC Enforcement Manual, the team used Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process For Findings At-Power," and determined the finding to have very low safety significance (Green) because it: (1) was not a deficiency affecting the design or qualification of a mitigating structure, system, or component, and did not result in a loss of operability or functionality; (2) did not represent a loss of system and/or function; (3) did not represent an actual loss of function of at least a single train for longer than its technical specification allowed outage time, or two separate safety systems out-of-service for longer than their technical specification allowed outage time; (4) did not represent an actual loss of function of one or more nontechnical specification trains of equipment designated as high safety-significance in accordance with the licensee's maintenance rule program; and (5) did not involve the loss or degradation of equipment or function specifically designed to mitigate a seismic, flooding or severe weather event. Therefore, in accordance with Section 6.1.d.2 of the NRC Enforcement Policy, the team

characterized this performance deficiency as a Severity Level IV violation. The team determined that although this issue occurred more than three years ago, this finding is representative of current plant performance. Therefore, this finding has a cross-cutting aspect in the area of human performance associated with the decision-making component because the licensee failed to use conservative assumptions in decision-making and adopt a requirement to demonstrate that the proposed action is safe in order to proceed rather than a requirement to demonstrate it is unsafe in order to disapprove the action [H.1(b)].

Enforcement. Title 10 of the Code of Federal Regulations, Section 50.59, "Changes, Tests, and Experiments," Section (c)(1) states, in part, that a licensee may make changes in the facility as described in the USAR without obtaining a license amendment pursuant to 10 CFR 50.90 only if; (i) a change to the technical specifications incorporated in the license is not required, and (ii) the change, test, or experiment does not meet any of the criteria in paragraph (c)(2). In 10 CFR 50.59, Section (c)(2) states, in part, that a licensee shall obtain a license amendment pursuant to Section 50.90 prior to implementing a proposed change, test, or experiment if the change, test, or experiment would result in more than a minimal increase in the likelihood of occurrence of a malfunction of a structure, system, or component important to safety previously evaluated in the USAR. Contrary to the above, from March 4, 1995, through August 17, 2012, the licensee failed to obtain a license amendment pursuant to Section 50.90 prior to implementing a proposed change, test, or experiment if the change, test, or experiment would result in more than a minimal increase in the likelihood of occurrence of a malfunction of a structure, system, or component important to safety previously evaluated in the USAR. Specifically, the licensee moved the control room air conditioning units from inside the Auxiliary Building (a class 1 structure) to the roof of the Auxiliary Building, failing to adequately consider the impacts due to tornado missile damage. Because this violation was entered into the CAP as Condition Reports CR 2013-04266 and CR 2013-05210, to ensure compliance was restored in a reasonable amount of time, and the violation was not repetitive or willful, this Severity Level IV violation is being treated as a non-cited violation, consistent with Section 2.3.2.a of the NRC Enforcement Policy: NCV 05000285/2013008-40, "Failure to Obtain Prior NRC Approval for a Facility Change."

(41) Inappropriate Modification of Turbine Driven Auxiliary Feedwater Pump Back Pressure Protection Trip

Introduction. The team identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," associated with an inappropriate modification of the AFW system.

Description. Condition Report CR 2010-0813 documented the licensee's RCA that was performed to evaluate the repeated tripping of turbine driven AFW pump FW-10. This evaluation identified a vulnerability by which reset lever FW-64-RL (which is part of the governor control linkage) could be inadvertently bumped (and not recognized) by personnel passing by, or working near pump FW-10. This was likely because the reset lever projected out from the side into the personnel traffic area. To address this concern, EC 48714 installed a clamp (FW-64-C) to prevent the latching lever from being

"partially unlatched" or totally unlatched if inadvertently bumped by personnel passing by the reset lever. In conjunction with the added clamp, the backpressure trip device, which would actuate the trip latch when its set-point was reached, was removed since it was no longer needed and its function was defeated with the installation of the clamp.

The team performed field walkdowns of the modifications, interviewed system and design engineers and their supervisors, and reviewed the RCA. During the review, the team identified that the 8 inch exhaust pipe for the pump consisted of a straight up opening to the environment without a screen or bend (goose neck) to prevent possible blockages in the steam exhaust piping. The team was concerned that animals, snow, ice, rain, or debris could enter the pipe and create a back pressure condition that would impact pump operability. This back pressure condition would no longer be detected by operations personnel due to the modifications implemented.

The licensee entered this issue into the CAP Condition Report CR 2013-05026, and performed an immediate operability determination. No actual impact on operability of the pump occurred because the plant was in a cold shutdown mode and pump operation testing scheduled to be performed prior to plant start-up would have identified any blockage of the turbine driven AFW pump exhaust pipe.

Analysis. The licensee's failure to adequately consider all possible issues associated with the actual physical configuration of the steam driven AFW pump exhaust pipe during modification was a performance deficiency. This performance deficiency is more than minor, and therefore a finding, because if left uncorrected, the continued practice of modifying the facility without evaluating for adverse impacts had the potential to lead to a more significant safety concern. Specifically, unevaluated modifications to the facility could introduce adverse changes that result in systems not able to perform their intended safety function which would not be recognized. This finding was associated with the Mitigating Systems Cornerstone. Using Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process for Findings At-Power," the finding is determined to have very low safety significance (Green) because it: (1) was not a deficiency affecting the design or qualification of a mitigating structure, system, or component, and did not result in a loss of operability or functionality; (2) did not represent a loss of system and/or function; (3) did not represent an actual loss of function of at least a single train for longer than its technical specification allowed outage time, or two separate safety systems out-of-service for longer than their technical specification allowed outage time; (4) did not represent an actual loss of function of one or more nontechnical specification trains of equipment designated as high safety-significance in accordance with the licensee's maintenance rule program; and (5) did not involve the loss or degradation of equipment or function specifically designed to mitigate a seismic, flooding or severe weather event. This finding has a cross-cutting aspect in the area of problem identification and resolution associated with the CAP component because the licensee failed to thoroughly evaluate problems such that the resolutions address the causes [P.1(c)].

Enforcement. Title 10 CFR Part 50, Appendix B, Criterion III, "Design Control," states, in part, that measures shall be established to assure that applicable regulatory requirements and the design bases, as defined in 10 CFR 50.2 and as specified in the

license application, for those components to which this appendix applies, are correctly translated into specifications, drawings, procedures, and instructions. Contrary to the above, from April 2011 through February 2013, measures established by the licensee did not assure that applicable regulatory requirements and the design bases, as defined in 10 CFR 50.2 and as specified in the license application, for those components to which this appendix applies, were correctly translated into specifications, drawings, procedures, and instructions. Specifically, measures established by the licensee did not assure that the modification to remove the turbine driven AFW pumps exhaust back pressure trip, properly considered and addressed the open configuration of the pumps exhaust piping to prevent blockage of the exhaust piping. Because the finding was of very low safety significance (Green) and has been entered into the CAP as Condition Report CR 2013-05026, this violation is being treated as a non-cited violation consistent with Section 2.3.2.a of the NRC Enforcement Policy: NCV 05000285/2013008-41, "Inappropriate Modification of Turbine Driven Auxiliary Feedwater Pump Back Pressure Protection Trip."

(42) Failure to Make Timely Event Notifications for Unanalyzed Conditions

Introduction. The team identified four examples of a Severity Level IV non-cited violation of 10 CFR 50.72, "Immediate Notification Requirements for Operating Nuclear Power Reactors," for the licensee's failure to make required event notifications within 8 hours following discovery of an event requiring a report.

Description. The team identified four examples of a failure to make a required event notification within the 8 hour time limit specified in 10 CFR 50.72(b)(3), "Immediate Notification Requirements for Operating Nuclear Power Reactors." The following specific examples were noted by the team:

- April 25, 2012, Event Notification EN 47862 notifying the NRC of an unanalyzed condition resulting from non-conservative errors in calculations for post recirculation actuation signal flows of the low pressure safety injection pumps. This event was originally discovered by the licensee on April 12, 2012; however, the event notification was not made to the NRC until 5:22 p.m. on April 25, 2012.

- February 7, 2013, Event Notification EN 48730 notifying the NRC of an unanalyzed condition involving the current design basis calculations that indicated the high pressure safety injection pumps could potentially operate in a run-out condition under certain worst case conditions. This event was originally discovered by the licensee on January 31, 2013; however, the event notification was not made to the NRC until 6:21 p.m. on February 7, 2013.

- February 25, 2013, Event Notification EN 48781 notifying the NRC of an unanalyzed condition involving vital bus inverters that were potentially inoperable during emergency diesel generator operation since the diesel frequency range was wider than that which was acceptable for the inverters. This event was originally discovered during engineered safeguards feature testing that occurred on February 24, 2013, at approximately 5:00 p.m., however, the report was not made to the NRC until 4:01 p.m. on February 25, 2013.

- February 27, 2013, Event Notification EN 48787 notifying the NRC of an unanalyzed condition involving General Electric™ model HFA relays that failed to meet seismic qualification due to the relay backing plate mounting screws discovered to be at less than the specified torque. This event was brought to the attention of the licensee by the inspection team at approximately 9:00 a.m. on February 26, 2013; however, the event notification was not made to the NRC until 12:55 a.m. on February 27, 2013.

The team interviewed the operations and licensing staff about the cause of the recent late 8 hour reports. The licensee had previously initiated corrective actions to address knowledge gaps involving the reportability process under Condition Report CR 2012-03796, completed in July 2012. The team determined that while these corrective actions were generally effective at addressing late LERs, additional knowledge gaps existed involving time of discovery for immediate event notifications. Specifically, in all four instances of late reports identified by the team, the licensee incorrectly concluded that reportability did not begin until the control room was notified of the condition.

Analysis. The team determined that the failure to make a required event notification was a violation of 10 CFR 50.72. The violation was evaluated using Section 2.2.4 of the NRC Enforcement Policy, because the failure to required event report may impact the ability of the NRC to perform its regulatory oversight function. As a result, this violation was evaluated using traditional enforcement. In accordance with Section 6.9 of the NRC Enforcement Policy, this violation was determined to be a Severity Level IV non-cited violation. The team determined that a cross-cutting aspect was not applicable to this performance deficiency because the failure to make a required report was strictly associated with a traditional enforcement violation.

Enforcement. Title 10 of the Code of Federal Regulations, Section 50.72(b)(3)(ii)(B) requires, in part, that the licensee shall notify the NRC as soon as practical and in all cases within eight hours of the occurrence of any event or condition that results in the nuclear power plant being in an unanalyzed condition that significantly degrades plant safety. Contrary to the above, on April 12, 2012, February 7, 2013, February 25, 2013, and February 27, 2013, the licensee failed to notify the NRC within 8 hours of the occurrence an event or condition that resulted in the nuclear power plant being in an unanalyzed condition that significantly degraded plant safety. Because this violation has been entered into the CAP as Condition Report CR 2013-05070, compliance was restored in a reasonable amount of time, and the violation was not repetitive or willful, this Severity Level IV violation is being treated as a non-cited violation, consistent with Section 2.3.2.a of the Enforcement Policy: NCV 05000285/2013008-42, “Failure to Make Timely Event Notifications for Unanalyzed Conditions.”

(43) Repetitive Issues Involving Untimely Submittal of Required Licensee Event Reports

Introduction. The team identified nine examples of a Severity Level IV non-cited violation of 10 CFR 50.73, “Immediate Notification Requirements for Operating Nuclear Power Reactors,” for the licensee’s failure to make required LERs within 60 days following discovery of an event requiring a report.

Description. The team identified nine examples of failure to make a required event notification within the 60 day time limit specified in 10 CFR 50.73(a)(1). The following specific examples were noted by the team:

- Licensee Event Report LER 2011-005, “Failure to Correctly Enter Technical Specifications Limiting Condition for Operation for the Reactor Protective System.” This issue was first identified on June 14, 2010; however, the LER was not submitted to the NRC until May 9, 2011.

- Licensee Event Report LER 2011-007, “Violation of Technical Specifications due to Reactor Coolant System Boundary Leakage.” This issue was first identified on April 12, 2011; however, the LER was not submitted to the NRC until June 17, 2011.

- Licensee Event Report LER 2012-007, “Failure of Pressurizer Heater Sheath.” This issue was first identified on May 9, 2010; however, the LER was not submitted to the NRC until July 23, 2012.

- Licensee Event Report LER 2012-009, “Inoperable Equipment due to Lack of Environmental Qualifications.” This issue was first identified on December 13, 2011; however, the LER was not submitted to the NRC until July 23, 2012.

- Licensee Event Report LER 2012-010, “Seismic Qualification of Instrument Racks.” This issue was first identified on December 6, 2011; however, the LER was not submitted to the NRC until August 3, 2012.

- Licensee Event Report LER 2012-011, “Emergency Diesel Inoperability due to Bus Loads during a LOOP.” This issue was first identified on April 16, 2012; however, the LER was not submitted to the NRC until August 6, 2012.

- Licensee Event Report LER 2012-012, “Multiple Safety Injection Tanks Rendered Inoperable.” This issue was first identified on March 19, 2012; however, the LER was not submitted to the NRC until December 18, 2012.

- Licensee Event Report LER 2012-013, “Inadequate Calculation of Uncertainty Results in a Technical Specification Violation.” This issue was first identified on December 7, 2011; however, the LER was not submitted to the NRC until August 17, 2012.

- Licensee Event Report LER 2012-015, “Electrical Equipment Impacted by High Energy Line Break Outside of Containment.” This issue was first identified on September 16, 2011; however, the LER was not submitted to the NRC until August 30, 2012.

The team interviewed the licensing staff and discovered that many of the late licensee even reports were attributed to a backlog of significant technical issues identified by the licensee and a fundamental misunderstanding about what constituted the time of discovery. In general, the licensee acknowledged a misconception that time of discovery

for reportability did not begin until the determination was made that the event was reportable. This position is contrary to the guidance in NUREG-1022, "Event Reporting Guidelines 10 CFR 50.72 and 10 CFR 50.73," which states the discovery date is generally the date when the event was discovered rather than the date when an evaluation of the event is completed. Corrective actions to address knowledge gaps involving the reportability process were initiated under Condition Report CR 2012-03796, completed in July 2012. The team observed that following completion of these corrective actions, LERs submitted after August 2012 were generally timely and met the 60 day requirement specified in 10 CFR 50.72(a)(1).

Analysis. The team determined that the failure to make a required LER was a violation of 10 CFR 50.73. The violation was evaluated using Section 2.2.4 of the NRC Enforcement Policy, because the failure to submit a required LER may impact the ability of the NRC to perform its regulatory oversight function. As a result, this violation was evaluated using traditional enforcement. In accordance with Section 6.9 of the NRC Enforcement Policy, this violation was determined to be a Severity Level IV non-cited violation. The team determined that a cross-cutting aspect was not applicable to this performance deficiency because the failure to make a required report was strictly associated with a traditional enforcement violation.

Enforcement. Title 10 of the Code of Federal Regulations, Section 50.73(a)(1), requires, in part, that the licensee submit a LER for any event of the type described in this paragraph within 60 days after the discovery of the event. Contrary to the above, on nine occurrences between May 9, 2011, and August 30, 2012, the licensee failed to submit a LER for an event meeting the requirements for reporting specified in 10 CFR 50.73. Because this violation has been entered into the CAP as Condition Report CR 2012-03796, compliance was restored in a reasonable amount of time, and the violation was not repetitive or willful, this Severity Level IV violation is being treated as a non-cited violation, consistent with Section 2.3.2.a of the Enforcement Policy: NCV 05000285/2013008-43, "Repetitive Issues Involving Untimely Submittal of Required Licensee Event Reports."

4OA6 Meetings, Including Exit

Exit Meeting Summary

On March 15, 2013, the team presented the inspection results in an on-site debrief to Mr. Louis P. Cortopassi, Vice President and Chief Nuclear Officer, and other members of the licensee staff. The licensee acknowledged the issues presented.

On May 17, 2013, the team presented the inspection results in a public exit meeting to Mr. Louis P. Cortopassi, Vice President and Chief Nuclear Officer, and other members of the licensee staff. The licensee acknowledged the issues presented.

On June 10, 2013, the team presented the inspection results by conference call to Mr. Louis P. Cortopassi, Vice President and Chief Nuclear Officer, and other members of the licensee staff. The licensee acknowledged the issues presented.

The inspector asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

J. Adams, Principle Engineer Design Engineering (Retired Supplemental Worker)
D. Bakalar, Manager, Site Security
W. Beck, Exelon, Quad Cities RAM
J. Bonsum, EPM
B. Cable, Nuclear Safety Culture Coordinator
C. Cameron, Supervisor Regulatory Compliance
J. Cate, Supervisor, Nuclear Engineering
L. Cortopassi, Site Vice President
D. Digiacinto, Senior Nuclear Design Engineer Electrical/I&C
M. Doghman, VP Energy Delivery
K. Erdman, Supervisor, Engineering Programs
M. Ferm, Manager, Site Performance Improvement
M. Frans, Manager, Engineering Programs
R. Gaston, Licensing Manager
M. Greeno, NRC Inspection Readiness Team Contractor
R. Hall, GNJ Recovery Director
J. Hansen, VP OPPD
W. Hansher, Supervisor, Nuclear Licensing
R. Haug, Senior Consultant
M. Hirschfeld, Senior Organization Development Consultant
K. Ihnen, Manager, Manager, Site Nuclear Oversight
R. Hugenroth, Supervisor, Nuclear Assessments
J. James, Manager, Outage
R. King, Director, Site Maintenance
K. Kingston, Chemistry Manager/Nuclear Safety Culture Advocate
J. Kuzela, Control Room Supervisor
J. Lindsey, Training Director
T. Maine, Manager, Radiation Protection
T. Masne, RPM
E. Matzke, Senior Licensing Engineer
J. McManis, Manager, Projects
S. Miller, Manager, Design Engineering
V. Naschansy, Director, Site Engineering
B. Obermeyer, Manager, CAP
P. O'Neil, Senior Consultant, NWI Consulting, Inc.
T. Orth, Director, Site Work Management
A. Pallas, Manager, Shift Operations
M. Prospero, Division Manager, Plant Operations
J. Rainey, Human Resources Business Partner
B. Rash, Recovery Lead
K. Root, Regulatory

R. Short, Manager, Recovery
T. Simpkin, Manager, Site Regulatory Assurance
M. Smith, Manager, Operations
S. Swanson, Operations Director
K. Wells, Nuclear Design Engineer Design Electrical/I&C
J. Wiegand, Manager, Operations Support
G. Wilhelmsen, Exelon Nuclear Partners
J. Zagata, Reliability Engineer

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

05000285/2013008-01	URI	Inadequate Procedure for Combating Frazil Ice
05000285/2013008-07	URI	Administrative Controls for a Technical Specification for Low River Level
05000285/2013008-09	VIO	Failure to Prevent Failures of the Sluice Gates to Close
05000285/2013008-14	VIO	Failure to Promptly Identify and Correct a Condition Adverse to Quality
05000285/2013008-22	URI	Fort Calhoun Station's Ability to Classify Components as Safety-Related
05000285/2013008-23	URI	Code of Record for Safety-Related Piping Systems
05000285/2013008-27	URI	Continuous Monitoring Capability of Post Accident Main Steam Radiation Monitor RM-064
05000285/2013008-29	URI	Use of Alternate Seismic Evaluation Criteria
05000285/2013008-30	URI	Evaluation of Change to Alternate Shutdown Cooling Flowpath

Opened and Closed

05000285/2013008-02	FIN	Frazil Ice Monitor Not Operational
05000285/2013008-03	NCV	Lack of Safety-Related Equipment for Design Basis Low River Level

05000285/2013008-04	NCV	Non-Conservative Value for Declaring an Alert on Low River Level
05000285/2013008-05	NCV	Inadequate Procedure for Combating Loss of Raw Water
05000285/2013008-06	NCV	Failure to Account for Worst Case Conditions in Fuel Oil Inventory Calculation
05000285/2013008-08	NCV	Sluice Gate Leakage Not Periodically Verified
05000285/2013008-10	NCV	Failure to Accurately Model Raw Water Flow into the Intake Structure
05000285/2013008-11	NCV	Failure to Account for Usable Fuel Oil Tank Level in Inventory
05000285/2013008-12	NCV	Inadequate Root Cause for a Significant Condition Adverse to Quality
05000285/2013008-13	NCV	Failure to Establish and Document Basis for Test Acceptance Criteria
05000285/2013008-15	NCV	Failure to Correct Conditions Adverse to Quality Involving Frequency Compatibility Issues in the 120Vac System
05000285/2013008-16	NCV	Failure to Account for Additional Diesel Loading from Non-Safety Loads
05000285/2013008-17	NCV	Failure to Adequately Implement the Maintenance Rule
05000285/2013008-18	NCV	Failure to Establish Adequate Instructions for Restoring Temporary Modifications
05000285/2013008-19	NCV	Failure to Initiate Condition Reports in Accordance with the Corrective Action Program Procedures
05000285/2013008-20	NCV	Failure to Identify Conditions Adverse to Quality
05000285/2013008-21	NCV	Failure to Ensure that Design Requirements Associated with the Containment Electrical Penetration Assemblies Were Correctly Translated Into Installed Plant Equipment
05000285/2013008-24	NCV	Failure to Effectively Monitor the Performance of Penetration Seals

05000285/2013008-25	NCV	Deficient Evaluation for Known Degraded Conditions: Safety-Related Air Operated Valve Elastomers not Qualified for HELB/LOCA Temperatures
05000285/2013008-26	NCV	Failure to Properly Inspect, Maintain, and Test Emergency Feedwater Tank Equipment
05000285/2013008-28	NCV	Failure to Perform an Evaluation for a Change to Component Cooling Water Make-Up
05000285/2013008-31	NCV	Multiple Examples of Operability Determinations that lacked Adequate Technical Justification
05000285/2013008-32	NCV	Multiple Examples of Inadequate Risk-Based Operability Determinations
05000285/2013008-33	NCV	Inadequate Operability Determination due to Failure to Establish Component Cooling Water System Leakage Criteria
05000285/2013008-34	NCV	Failure to Follow ASME Code Requirements when Establishing New Pump Reference Values as Corrective Actions
05000285/2013008-35	NCV	Failure to Correct Condition Adverse to Quality Associated with Corrective Action Program Procedures and the Operability Process
05000285/2013008-36	NCV	Deficient Evaluation of NRC Bulletin 88-04, Strong Pump Weak Pump Due to Failure to Consider The Effect of AFW Pumps Discharge Check Valves Leakage
05000285/2013008-37	NCV	Improper Storage of the Raw Water to Auxiliary Feedwater Emergency Tank Fill Hose
05000285/2013008-38	NCV	Deficient Evaluation for Known Degraded Conditions – AFW Pumps Discharge Check Valve Leakage and Potential Overpressure of AFW Pump Suction Piping
05000285/2013008-39	NCV	Failure to Properly Implement Applicable ASME OM Code Requirements
05000285/2013008-40	NCV	Failure to Obtain Prior NRC Approval for a Facility Change
05000285/2013008-41	NCV	Inappropriate Modification of Turbine Driven Auxiliary Feedwater Pump Back Pressure Protection Trip

05000285/2013008-42	NCV	Failure to Make Timely Event Notifications for Unanalyzed Conditions
05000285/2013008-43	NCV	Repetitive Issues Involving Untimely Submittal of Required Licensee Event Reports

Closed

05000285/2011-001	LER	Inadequate Flooding Protection Due to Ineffective Oversight
05000285/2012-003	LER	Non-Conservative Error in Calculation for Alternate Hot Leg Injection Results in Unanalyzed Condition
05000285/2012-005-01	LER	2012-005-01, "Technical Specification Violation Due to Inadequate Testing of Emergency Diesel Fuel Pumps
2011014-02	URI	Failure to Perform an Adequate 50.59 Review for the 480V Main and Bus-Tie Breakers with Molded Case Type or Equivalent

LIST OF DOCUMENTS REVIEWED

Section 4OA4: IMC 0350 Inspection Activities (92702)

PROCEDURES

NUMBER	TITLE	REVISION / DATE
NOD-QP-28	Safety Enhancement Program	
PED-QP-13	Design Basis Document Control	
PB-1	Writer's Guide for Plant Level Design Basis Documents	
SG-1	Writers Guide for System Design Basis Documents	
QAM-12	Quality Assurance Audit Scheduling	
SO-G-21	Modification Control	
PAP	Procedure Administration Program	
NPM-1.00	Nuclear Safety	5

NPM 2.04	Establishing and Maintaining a Safety Conscious Working Environment	4
NPM 2.04	Establishing and Maintaining a Safety Conscious Working Environment	5
FCSG-62	Site Nuclear Safety Culture Process	5
TBD-EPIP-OSC-1A	Recognition Category A, Abnormal Rad Levels/Radiological Effluent	2
EPIP-EOF-6	Dose Assessment	46
PBD-19	Electrical Equipment Qualification Program	4
PED-QP-15	Electrical Equipment Qualification Program	12
00314218-01	Flow Path Verification of Auxiliary Feedwater System	December 11, 2009
IC-CP-01-1368	Calibration of Auxiliary Feedwater Pump FW-6 Flow Loop F-1368	13
IC-CP-01-1369	Calibration of Auxiliary Feedwater Pump FW-10 Flow Loop F-1369	10
OP-ST-AFW-3009	Auxiliary Feedwater Pump FW-6 Steam Isolation Valve, and Check Valve Tests	21
OP-ST-AFW-3011	Auxiliary Feedwater Pump FW-10 Steam Isolation Valve, and Check Valve Tests	14
AOP-30	Emergency Fill of Emergency Feedwater Storage Tank	11
MGT-12-10	Safety Conscious Work Environment Training Slides	September 2012
MGT-12-12	Safety Conscious Work Environment Training Slides	Fall 2012
SE-ST-FW-3002	Feedwater Check Valves FW-161 and FW-162 Reverse Flow Test	12a
SO-M-101	Maintenance Work Control	96
SO-O-25	Temporary Modification Control	81
NOD-QP-19	Cause Analysis Program	43
EM-PM-EX-1200	Inspection and Maintenance of Model AKD-5 Low Voltage Switchgear	17
EM-PM-EX-1201	Inspection and Maintenance of Model AKD-5 Low Voltage Switchgear 1B4A	0

EM-RR-EX-0203	Receipt Inspection of 480-Volt Square D/NLI Masterpact Type NW/NT Breakers/Cradles	0
ERPG-EAG-01	Engineering Recovery Process Guide - Engineering Assurance Group	0
PED-GEI-2	Preparation of Procurement Specifications	16
PED-GEI-3	Preparation of Modifications	87
PED-GEI-7	Specification of Post Modification Test Criteria	15
PED-GEI-28	Preparation of Construction Work Orders	28
PED-GEI-29	Preparation of Facility Changes	55
PED-GEI-35	Preparation of Minor Configuration Changes	66
PED-GEI-52	Preparation of Field Design Change Requests	13
PED-GEI-60	Preparation of Substitute Replacement Items	45
PED-EWP-9	Testing of Control Circuits	0
FCSG-24-2	Evidence Quarantining	2
FCSG-24-5	Cause Evaluation Manual	5
FCSG-24-4	Condition Report and Cause Evaluation	3
FCSG-24-4	Condition Report and Cause Evaluation	5
NOD-QP-19	Cause Analysis Program	43
EM-ST-EE-0005	Capacity Discharge Test for Station Battery No. 1 (EE-8A)	23,25
FCSG-24-1	Condition Report Initiation	3
FCSG-24-3	Condition Report Screening	6a
FCSG-24-4	Condition Report and Cause Evaluation	6a
FCSG-65-7	Program Restart Readiness	1
FCSG-65-8	Department Restart Readiness	2
NOD-QP-31.5	Degraded and Non-Conforming Evaluation	0
NOD-QP-38	Employee Concerns	9
NOD-QP-38	Employee Concerns	10
NOD-QP-X	Resolution of Differing Opinions	0
OI-AFW-4	Operating Instruction Auxiliary Feedwater Startup and System Operation	78

OP-ST-CCW-3002	AC-3A Component Cooling Water Pump Inservice Test	22
SE-ST-CCW-3002	CCW Pump Baseline Curve Procedure	10
SO-G-23	Surveillance Test Program	59

ENGINEERING ANALYSIS

NUMBER	TITLE	REVISION
EA-FC-06-032	Environmental Parameters for Electrical Equipment Qualification	0
EA-FC-10-020	Electrical Equipment Qualification Radiation Dose Reconstitution Analysis	0
EA-11-037	Summary of Design Basis Reconstitution for High Energy Line Break (HELB) Outside of Containment in Response to CR 2007-3407	0
EA-FC-08-023	Vortexing in Safety-Related Tanks	14
EA-12-024	Determination of Design Temperature for Elastomers in Valves HCV-107A and HCV-1108A	
ACASR 2012-08621	Apparent Cause Evaluation-potential Elastomer Failure During a design Basis Accident for Valves HCV-238, HCV-239, and HCV-240	1
EA-FC-12-005	Harsh-mild Environment Threshold Criteria	0

CONDITION REPORTS

NUMBER

2005-04735	2005-04735-003	2005-04735-014	2006-06036	2007-02622
2007-03407	2007-02554	2008-04611	2009-02197	2009-04327
2009-05356	2009-06233	2009-00905	2009-05912	2009-04579
2009-05780	2009-02308	2009-04569	2009-01611	2009-12442
2009-05270	2009-05439	2009-05541	2009-05170	2009-04860
2009-06371	2009-06424	2009-05269	2009-04552	2009-06234
2010-04492	2010-03723	2010-00199	2010-01704	2010-01403
2010-04668	2010-00813	2011-08951	2011-00451	2011-08238
2011-05777	2011-07654	2011-00334	2011-06910	2011-07306
2011-01719	2011-02860	2011-06344	2011-07816	2011-09924
2011-02400	2011-08019	2011-09384	2011-09855	2011-01941
2011-06621	2011-05414	2011-02069	2012-08129	2012-08131
2012-04900	2012-03057	2012-03701	2012-04484	2012-04681

2012-10935	2012-05926	2012-06246	2012-06514	2012-10625
2012-13416	2012-10941	2012-10953	2012-12175	2012-14747
2012-13417	2012-02539	2012-13418	2012-13334	2012-13419
2012-08133	2012-11806	2012-13420	2012-13421	2012-13243
2012-03967	2012-11816	2012-12067	2012-02580	2012-11805
2012-11804	2012-11941	2012-11986	2012-04452	2012-07902
2012-11982	2012-04169	2012-04280	2012-04444	2012-04467
2012-04490	2012-04536	2012-04602	2012-04903	2012-03986-019
2012-04262	2012-04262-021	2012-04662	2012-04262-022	2012-04262-023
2012-18336	2012-04262-055	2012-04262-058	2012-18336-001	2012-03986
2012-12443	2012-08123	2012-18338	2012-04899	2012-12378
2012-17353	2012-08129	2012-08124	2012-00451	2012-09494
2012-09112	2012-17354	2012-17355	2012-04594	2012-08137
2012-12044	2012-07112	2012-08642	2012-09111	2012-08123
2012-12430	2012-12305	2012-11986	2012-11987	2012-11994
2012-17352	2012-11982	2012-04662	2012-17362	2012-17353
2012-17572	2012-18336	2012-17361	2012-12460	2012-12547
2012-08142	2012-05580	2012-18338	2012-03254	2012-03974
2012-01541	2012-01910	2012-02723	2012-05134	2012-05509
2012-04132	2012-04516	2012-04850	2012-06452	2012-008621
2012-05569	2012-05846	2012-01640	2012-13620	2012-13694
2012-08684	2012-13299	2012-13306	2012-14517	2012-14736
2012-13919	2012-14045	2012-14464	2012-15218	2012-15440
2012-14800	2012-15116	2012-15215	2012-15690	2012-15696
2012-15441	2012-15666	2012-15687	2012-15747	2012-15750
2012-15697	2012-15703	2012-15721	2012-15805	2012-15844
2012-15755	2012-15758	2012-15770	2012-16038	2012-16145
2012-16023	2012-16025	2012-16030	2012-8851	2012-20806
2012-16171	2012-15399	2012-15750	2012-02534	2012-02881
2012-02026	2012-02115	2012-02498	2012-03805	2012-08521
2012-02947	2012-03397	2012-03796	2012-08737	2012-09179
2012-08522	2012-08526	2012-08528	2012-10477	2012-11874
2012-09196	2012-09494	2012-10206	2012-14958	2012-15721
2012-16900	2012-17447	2012-17717	2012-18345	2012-18347
2012-18675	2012-18793	2012-19477	2012-19769	2012-20128
2013-03056	2013-04037	2013-04034	2013-00730	2013-02202
2013-04167	2013-04286	2013-04223	2013-04032	2013-04033

2013-01396	2013-02278	2013-02557	2013-04504	2013-05026
2013-02710	2013-04141	2013-04442	2013-02611	2013-04680
2013-04806	2013-05018	2013-05026	2013-04547	2013-06267
2013-05515	2013-05569	2013-05693	2013-05276	2013-05668*
2013-10507	2013-04937*	2013-05663*	2013-05018	2013-05497*
2013-04934*	2013-04518*	2013-00907	2013-05674	2013-04377*
2013-01186	2013-00195	2013-03529	2013-01073	2013-01143
2013-03866	2013-01187	2013-03943	2013-03639	2013-03798
2013-04163	2013-03928	2013-04288	2013-04001	2013-04126
2013-04635	2013-04186	2013-05191	2013-04416	2013-04627
2013-05501	2013-04748	2013-05630	2013-05205	2013-05230
2013-00187	2013-03242	2012-08130		

WORK ORDERS

NUMBER

0056822-01	0097154-01	0097241-01	00125729-01	00335376-01
00314285-01	00338706-01	00314218-01	00357868-01	00370608
0370376-01	00437003-01	443770-01	450313-01	450346-01
450348-01	450350-01	450351-01	450352-01	450353-01
450355-01	450357-01	472447-01	CWO 181503	CWO 329995-39
CWO 419854-01	CWO 421870-01	CWO 421871-01		

ACTION REQUESTS

NUMBER

2770	9290	9359	10237	13509
14047	14052	14053	14078	14097
14133	31024	36796	42918	51966
51959	53806			

MR-FC

NUMBER

97-007

EC

NUMBER

41455	53257	33464

FCSG

NUMBER

38	24	24-1	24-10	24-12
24-2	24-4	24-5	24-6	24-6.1
24-7	24-8	24-8.1	24-9	62

TREND CODES

NUMBER

ADE	ADI	ADP	OAI	OCR

CALCULATIONS

NUMBER

08081	07078	07076	06969	06148
06642	07536	05302	05374	06282

DRAWINGS

NUMBER

11405-M-121	FO-4446	FO-1005	EM-1368/1369	00357868-01
80055	11405-M-253			

LERS

NUMBER

2011-005	2011-007	2012-007	2012-008	2012-009
2012-010	2012-011	2012-012	2012-013	2012-014
2012-015	1988-019	2011-010-01	2011-010	

RCAS

NUMBER

2011-5414

MISCELLANEOUS

NUMBER	TITLE	REVISION / DATE
	10 CFR 50.59 Evaluation of Manual Operator Action to open valve FW-1360	
SDBD-AC-CCW-100	CCW Design Basis Document	

TDB260.0020	Instruction Manual for Installation, Operation And Maintenance of MSB, MSC, MSD, MSE Horizontal, Multi-Stage Pumps	
NPM-100	Nuclear Safety	
MGT0302	Safety Culture	
MGT12-10	Safety Conscious Work Environment	
NPM-2.04		
	Final Closure Book for Resource Management	
FC06148	Auxiliary Feedwater Storage Tank Required Capacity	
FC05007	Usable Capacity of Emergency Feedwater Storage Tank FW-19	
FC06537		
TS-FC-87-231B	Memo	October 30, 1987
EM-PM-EX-1200		
PG-PDS-1		
AA/SA-PDS-3		
ECP-PDS-3		
SPD-PDS-7		
FPD	Safety Conscious Work Environment	
	Organizational Effectiveness Recovery Index	
RIS 2005-18	Effective Processes for Problem Identification and Resolution	
	Operations Memo 2007-01	
SEP-10	Safety Enhancement Program	
SEP-21	Safety Enhancement Program	
SEP-65	Safety Enhancement Program	
	FCS PI Report	
	FCS QA Audit	
	Final Closure Book for the FPD associated with Nuclear Safety Culture	
	Corporate Nuclear Oversight (GOSP) Committee Charter	September 18, 2012

ECP-03	IACDP Problem Development Sheet	
FCS-95003-IACPD-03	IACPD – FCS Performance Goals Assessment Performance Area	
FCS-95003-IACPD-08	IACPD – FCS Audits and Assessments Assessment Performance Area	
FCS-95003-IACPD-02	IACPD – FCS Significant Performance Deficiencies Assessment Performance Area	
Policy 3.06	Corporate Governance, Oversight, Support, and Perform (GOSP) Model of Fort Calhoun Station"	July 27, 2012
RA 2013-0454	Governance & Oversight Self-Assessment	
	Mapping Leadership Skills/Attributes to Nuclear Safety Culture Results	February 2013
	95003 Collective Evaluation Final Report	
	FCS Nuclear Safety Culture Monitoring Panel First Quarter 2012 Report	
	FCS Nuclear Safety Culture Monitoring Panel Fourth Quarter 2012 Report	
	FCS Nuclear Safety Culture Senior Leadership Team Third Quarter 2012 Report	
MGT 12-10	Safety Conscious Work Environment	September 2012
USAR Appendix G	Responses to 70 Criteria	22
MR-FC-79-190C	Post-Accident Main Steam High Range Radiation Monitor RM-064, Final Design Package	0
Reg. Guide 1.97	Criteria for Accident Monitoring Instrumentation for Nuclear Power Plants	4
NRC Bulletin 88-04	Loop Accuracy for AFW Pump FW-6 Flow Channel Loop F-1368, Response to CAR 94-044	April 27, 1994
NUREG-1482	Guidelines for Testing at Nuclear Power Plants	1
PED-SYE-94-0297	Revised Accuracy for FM-1368-2 on IC-CP-01-1368, Reference Memo PED-SYE-94-0297	May 26, 1994
Nuenergy, Attachment 9, Final	Support of CDBI Self-Assessment Activities	0
LIC-80-0083	Response to Bulletin 80-10, Contamination of Nonradioactive Systems	July 3, 1980
NRC-83-0015	NRC Resident Inspection	January 20, 1983

NRC-83-0092	NRC Resident Inspection	March 25, 1983
NRC-83-0185	NRC Resident Inspection	June 14, 1983
LIC-84-065	Application for Amendment of Operating License	March 7, 1984
LIC-84-209	Amendment 81 to Facility Operating License	July 12, 1984
LIC-85-009	Environmental Qualification of Safety-Related Electrical Equipment	January 10, 1985
LIC-88-929	Updated Response To Bulletin 88-04	November 4, 1988
LIC-12-0142	Licensee Event Report LER 2012-017	0
USAR-Appendix M	Postulated High Energy Line Repture Outside the Containment	10
USAR-9.4	Auxiliary Feedwater System	
USAR-Appendix M	Postulated High Energy Line Rupture Outside Containment	12
USAR-14.14	Steam Generator Tube Rupture Accident	15
NRC Bulletin 80-10	Contamination of Nonradioactive System and Resulting Potential Unmonitored, Uncontrolled Release of Radioactivity to Environment	May 6, 1980
NRC-04-024	Safety Evaluation for the Fourth 10-Year Interval Inservice Inspection Program Plan, Fort Calhoun	March 1, 2004
ASME OM Code 1988	Code For Operation And Maintenance Of Nuclear Power Plants	
NCV 05000285/2010006-01	Failure to Correct Repeated Tripping of the Turbine-Driven Auxiliary Feedwater Pump FW-10	August 12, 2010
NCV 05000285/2010006-02	Failure to Verify That the Turbine-Driven Auxiliary Feedwater Pump exhaust Backpressure Trip Lever was Fully Latched	August 12, 2010
NCV 05000285/2010006-03	Failure to Vent Control Oil Following Maintenance Results in Failure of the Turbine-Driven Auxiliary Feedwater Pump to Start	August 12, 2010
RCA 2013-0813	Root Cause Analysis Steam Driven Auxiliary Feedwater Pump (FW-10) Tripped Off	April 23, 2010
PLDBD-ME-11	Internal Missiles and High Energy Line Break	15
EC48714	Installation of FW-10 Manual Trip Latch Clamp FW-64-C	0

NCR 449	Non Conformance Report	
NCR 410	Nonconformance Report Project # 093-15901	
	Recovery Issue Meeting Minutes for 1.c Closure Book	December 17, 2012 and February 8, 2013
FCS 95003	Project RSSPA Key Attribute Review Final Report for EDS & HPSI,	October 15, 2012
ERPG-DNC/OPEVAL-01	Engineering Recovery Process Guide – Degraded Nonconforming Conditions and Operability Evaluations	4
OPPD-E-12-002	Project Study Report – Study to Ensure Acceptable Diesel Generator Performance During Non-DBA Loss of Offsite Power Scenarios	0
SE-PM-EX-1600	Preventive Maintenance Infrared Thermographic Surveys	July 29, 2010
	Safety Conscious Work Environment at Fort Calhoun Station Rout Cause	1
	Fort Calhoun Station Nuclear Safety Culture Focus Groups, Summary of Findings	January 2013
	Fort Calhoun Station Nuclear “Two C’s” Meetings, Summary of Findings	January 2013
	Fort Calhoun Safety Culture Composite Index	December 2012
	Fort Calhoun Station Independent Safety Culture Assessment, Conger & Elsea, Inc.	May 2012
	Weekly Leadership Alignment Meeting Slides	February 4, 2013
	Weekly Leadership Alignment Meeting Slides	February 11, 2013
	Fort Calhoun Safety Culture Composite Index	January 2013
	Safety Conscious Work Environment Fundamental Performance Deficiency Analysis	July 2012
	Corporate Governance, Oversight, Support and Perform Model of Fort Calhoun Station	
	Leadership/Organizational Effectiveness CR 2012-08130 and Nuclear Safety Culture CR 2012-08129 Fundamental Performance Deficiency Analysis	July 2012

Corrective Action Program CR 2012-08124 Fundamental Performance Deficiency Analysis	July 2012
Security Self Assessment Report	August 2012