UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
245 PEACHTREE CENTER AVENUE NE, SUITE 1200
ATLANTA, GEORGIA 30303-1257

August 4, 2016

Mr. Scott Batson
Site Vice President
Duke Energy Carolinas, LLC
Oconee Nuclear Station
7800 Rochester Highway
Seneca, SC 29672

SUBJECT: OCONEE NUCLEAR STATION - NRC INTEGRATED INSPECTION REPORT 05000269/2016002, 05000270/2016002, 05000287/2016002

Dear Mr. Batson:

On June 30, 2016, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Oconee Nuclear Station Units 1, 2, and 3. On July 19, 2016, the NRC inspectors discussed the results of this inspection with you and other members of your staff. Inspectors documented the results of the inspection in the enclosed report.

NRC inspectors documented three findings of very low safety significance (Green) in this report. These findings involved violations of NRC requirements. Additionally, NRC inspectors documented one Severity Level IV violation with no associated finding under the traditional enforcement process. The NRC is treating these violations as non-cited violations (NCV) consistent with Section 2.3.2.a of the Enforcement Policy.

If you contest the violations or significance of these NCVs you should provide a response within 30 days of the date of this inspection report, with the basis for you denial, to the U.S. Nuclear Regulatory Commission ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region II; the director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC resident inspector at the Oconee Nuclear Station.

If you disagree with a cross-cutting aspect assignment in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region II; and the NRC resident inspector at the Oconee Nuclear Station.

In accordance with Title 10 of the Code of Federal Regulations 2.390 "Public Inspections, Exemptions, Requests for Withholding," 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 Documents 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/

Frank Ehrhardt, Chief
Reactor Projects Branch 1
Division of Reactor Projects

Docket Nos.: 50-269, 50-270, 50-287
License Nos.: DPR-38, DPR-47, DPR-55

Enclosure: NRC Integrated Inspection Report 05000269/2016002, 05000270/2016002, 05000287/2016002
w/Attachment: Supplemental Information

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Letter to S. Batson from F. Ehrhardt dated August 4, 2016

SUBJECT: OCONEE NUCLEAR STATION - NRC INTEGRATED INSPECTION REPORT 05000269/2016002, 05000270/2016002, AND 05000287/2016002

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U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos.:	50-269, 50-270, 50-287
License Nos.:	DPR-38, DPR-47, DPR-55
Report No.:	05000269/2016002, 05000270/2016002, and 05000287/2016002
Licensee:	Duke Energy Carolinas, LLC
Facility:	Oconee Nuclear Station, Units 1, 2 and 3
Location:	Seneca, SC 29672
Dates:	April 1, 2016 through June 30, 2016
Inspectors:	E. Crowe, Senior Resident Inspector N. Childs, Resident Inspector J. Parent, Resident Inspector A. Hutto, Senior Resident Inspector (Catawba) M. Toth, Project Engineer P. Cooper, Reactor Inspector (Section 1R08) R. Williams, Senior Reactor Inspector (Section 1R08) A. Nielsen, Senior Health Physicist (Section 2RS8) C. Dykes, Health Physicist (Sections 2RS1, 2RS6 and 4OA1) R. Kellner, Health Physicist (Sections 2RS7 and 4OA1) J. Montgomery, Senior Reactor Inspector (Section 4OA5)
Approved by:	Frank Ehrhardt, Chief Reactor Projects Branch 1 Division of Reactor Projects

Enclosure

SUMMARY

IR 05000269/2016002, 05000270/2016002, and 05000287/2016002, April 1, 2016, through June 30, 2016; Oconee Nuclear Station, Units 1, 2 and 3, Inservice Inspection Activities, Problem Identification and Resolution, Followup of Events and Notices of Enforcement Discretion

The report covered a 3-month period of inspection by resident inspectors, a visiting resident inspector and seven regional inspectors. There were three NRC-identified and one self-revealing violations documented in this report. The significance of inspection findings are indicated by their color (i.e., greater than Green, or Green, White, Yellow, Red) and determined using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process," (SDP) dated April 29, 2015. Cross-cutting aspects are determined using IMC 0310, "Aspects within the Cross-Cutting Areas" dated December 4, 2014. All violations of NRC requirements are dispositioned in accordance with the NRC's Enforcement Policy dated February 4, 2015. The NRC's program for overseeing the safe operations of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision (Rev.) 5.

Cornerstone: Mitigating Systems

- Green. An NRC-identified Green non-cited violation (NCV) of Oconee Nuclear Station Units 1, 2, and 3 Renewed Facility Operating License Condition 3.D, "Fire Protection," was identified for the licensee's failure to adequately implement the requirements of the transient combustible material program. Specifically, the licensee failed to control the storage of transient combustible material in the Oconee main control rooms with the proper evaluation in accordance with procedure AD-EG-ALL-1520, "Transient Combustible Control," Attachment 3, "Allowed Combustible Materials in Level B and Level C Areas." The licensee removed the stored items from each of the main control rooms and entered this issue into their corrective program as nuclear condition reports (NCRs) 02012091, 02012290, and 02013990.

  The licensee's failure to control the storage of transient combustible material in the Oconee main control rooms with the proper evaluation in accordance with procedure AD-EG-ALL-1520 was a performance deficiency. The performance deficiency was more than minor because it was associated with the protection against external factors 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 (i.e., core damage). Specifically, uncontrolled transient combustibles challenge the habitability requirements of the main control room in the event of a fire and the ability of licensed operators to respond to events using the systems designed to prevent undesirable consequences. The finding was screened in accordance with IMC 0609, "Significance Determination Process," Attachment 4, "Initial Characterization of Findings" and IMC 0609 Appendix F, "Fire Protection Significance Determination Process" Task 1.3.1, and determined to be of very low safety significance (Green) because the finding did not prevent the reactor from reaching and maintaining a safe shutdown condition. The finding was determined to have a cross-cutting aspect of procedure adherence in the human performance cross-cutting

area because the licensee failed to implement the requirements of station procedure AD-EG-ALL-1520, "Transient Combustible Control." [H.8] (Section 4OA2)

- Green. A self-revealing Green violation of Oconee Technical Specification 5.4, "Procedures," was identified for the licensee's failure to establish adequate procedures to detect degradation of the startup transformer power cables. Station procedure IP/0/A/2400/002, "Substation Insulators, Lighting Arrestors, CCVT, Transformer Drop Down Line, Bus Inspection and Maintenance," lacked sufficient detail for maintenance personnel to properly inspect power cables for cracks and fraying. This allowed undetected degradation of the Oconee startup transformer power cables to develop causing the Unit 3 startup transformer to become inoperable. The licensee performed repair activities on the degraded power cables to remove areas where strands of the power cables were severed and re-established proper connections. Also, the licensee created work orders in their work management process to replace the drop down lines on the Unit 1 and Unit 3 startup transformers. The licensee entered this issue into their corrective program as NCR 01733811.

  The licensee's failure to establish an adequate procedure to detect degradation of startup transformer power cables during periodic maintenance was a performance deficiency. The performance deficiency was determined to be more than minor because it was 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 (i.e. core damage). Specifically, the power cable failure caused inoperability of the Unit 3 startup transformer. The finding was screened in accordance with IMC 0609, "Significance Determination Process," Attachment 4 and Appendix A and determined to require a detailed risk evaluation. A senior reactor analyst performed a detailed risk evaluation of this condition and determined delta CDF was 3E-7 (Green). The finding was determined to have a cross-cutting aspect of evaluation in the problem identification and resolution cross-cutting area because the licensee's corrective actions resulting from a degraded power cable in 2002 failed to incorporate sufficient detail into their procedures necessary to detect frayed cables. [P.2] (Section 4OA3)

- SL IV. An NRC-identified Severity Level IV NCV of 10 CFR 50.72(b)(3)(v) was identified for the licensee's failure to make a required non-emergency eight hour notification for a loss of the emergency AC power path function. On December 7, 2015 Oconee Nuclear Station Unit 3 experienced a loss of the emergency AC power path function for approximately 21 minutes. The licensee entered this issue into their corrective action program as NCR 01981762 and will evaluate their internal reportability procedures regarding the time of discovery.

  The failure to make an eight hour non-emergency report for a loss of the emergency AC power path function per 10 CFR 50.72(b)(3)(v) was a performance deficiency. This performance deficiency impacted the ability of the NRC to perform its regulatory oversight function and was dispositioned using traditional enforcement. This violation was assessed using Section 2.2.4 of the NRC's Enforcement Policy, revised February 4, 2015. Using the example listed in Section 6.9.d.9, "A licensee fails

to make a report required by 10 CFR 50.72," the issue was determined to be a Severity Level IV violation. In accordance with IMC 0612, because this violation involved traditional enforcement and does not have an underlying technical violation that would be considered more than minor, a cross-cutting aspect was not assigned to this violation. (Section 4OA3)

Cornerstone: Barrier Integrity

- Green. An NRC-identified Green NCV of 10 CFR Part 50.55a, "Codes and Standards," was identified for the licensee's failure to conduct 100 percent general visual examinations of the moisture barriers to the containment liner in accordance with Subsection IWE of American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI. Specifically, the licensee failed to conduct visual examinations of the sealant applied to interior expansion joint locations in containment. In response, the licensee repaired the identified moisture barriers and confirmed the operability of the containment liner with the satisfactory results of the containment integrated leak rate test. The licensee entered this issue into their corrective action program as NCR 02027086.

  The failure to conduct a general visual examination of 100 percent of the moisture barriers intended to prevent intrusion of moisture against inaccessible areas of the containment liner was a performance deficiency. The performance deficiency was determined to be more than minor because it was associated with the design control attribute of the barrier integrity cornerstone and adversely affected the cornerstone objective of providing reasonable assurance that physical design barriers protect the public from radionuclide releases caused by accidents or events. Specifically, the inspectors determined that this finding was of more than minor significance because the failure to conduct required visual examinations and identify the degraded moisture barriers, which could allow the intrusion of water, if left uncorrected, had the potential to lead to a more significant concern. The inspectors used IMC-0609, Appendix A, "The Significance Determination Process (SDP) For Findings At-Power," Exhibit 3 – "Barrier Integrity Screening Questions," and determined that the finding was of very low safety significance (Green) because it did not represent an actual open pathway in the physical integrity of the reactor containment and did not involve an actual reduction in function of hydrogen igniters in the reactor containment. The inspectors determined no cross-cutting aspect was associated with this finding because the finding was not reflective of present licensee performance. (Section 1R08)

REPORT DETAILS

Summary of Plant Status

Unit 1 began the inspection period at approximately 100 percent rated thermal power (RTP) and remained at this power level for the remainder of the inspection period.

Unit 2 began the inspection period at approximately 100 percent RTP and remained at this power level for the remainder of the inspection period.

Unit 3 began the inspection period at approximately 100 percent RTP. On April 23, 2016, the unit was shutdown for a planned refueling outage. The reactor achieved criticality on May 15, 2016 and returned to 100 percent RTP on May 17, 2016. The unit remained at this power level for the remainder of the inspection period.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R01 Adverse Weather Protection (71111.01)

a. Inspection Scope

.1 Summer Readiness of Offsite and Alternate AC Power System

Because the licensee implemented modifications to the protected service water (PSW) offsite power source and implemented a new interface agreement controlling this power source, the inspectors reviewed the licensee's procedures for operation and continued availability of offsite and onsite alternate AC power systems. The inspectors also reviewed the communication protocols between the transmission system operator and the licensee to verify that the appropriate information is exchanged when issues arise that could affect the offsite power system.

The inspectors reviewed the material condition of offsite and onsite alternate AC power systems (including switchyard and transformers) by performing a walkdown of the switchyard. The inspectors reviewed outstanding work orders and assessed corrective actions for degraded conditions that impacted plant risk or required compensatory actions. Documents reviewed are listed in the attachment.

.2 Readiness to Cope with External Flooding

The inspectors evaluated the licensee's implementation of flood protection procedures and compensatory measures during impending conditions of flooding or heavy rains. The inspectors reviewed the updated final safety analysis report and related flood analysis documents to identify those areas containing safety related equipment that could be affected by external flooding and their design flood levels. The inspectors walked down flood protection barriers, reviewed procedures for coping with external flooding, and reviewed corrective actions for past flooding events. The inspectors verified that the procedures for coping with flooding could reasonably be used to achieve the desired results. For those areas where operator actions are credited, the inspectors

assessed whether the flooding event could limit or prevent the required actions. Documents reviewed are listed in the attachment.

The inspectors conducted walkdowns of the following plant areas containing risk-significant structures, systems, and components that are below flood levels or otherwise susceptible to flooding:

- exterior walls and openings in the main turbine building
- exterior walls and openings in the auxiliary building

The inspectors reviewed the licensee's compensatory measures identified in CAL 2-10-003, "Confirmatory Action Letter – Oconee Nuclear Station Units 1, 2, and 3 Commitments to Address External Flooding Concerns" to ensure the measures were available and properly maintained. This review included field walkdowns of temporary equipment to assess its material condition and operability. In addition, the inspectors reviewed the licensee's procedures for external flood mitigation and conducted interviews with personnel responsible for implementing the licensee's program to assess the licensee's ability to respond to potential events.

b. Findings

No findings were identified.

1R04 Equipment Alignment (71111.04)

a. Inspection Scope

.1 Partial Walkdown

The inspectors verified that critical portions of the selected systems were correctly aligned by performing partial walkdowns. The inspectors selected systems for assessment because they were a redundant or backup system or train, were important for mitigating risk for the current plant conditions, had been recently realigned, or were a single-train system. The inspectors determined the correct system lineup by reviewing plant procedures and drawings. Documents reviewed are listed in the attachment.

The inspectors selected the following four systems or trains to inspect:

- Unit 1 and 2 control room air handling unit 1-12 during modification of control room air handling unit (AHU) 1-11 and its associated chilled water system
- Unit 1, 2 and 3, component cooling system coolers line-up in support of eddy-current testing of 1CC-C1 & 3CC-C1 component cooling coolers
- Unit 1, 2 and 3 motor driven emergency feedwater and turbine driven emergency feedwater pumps, breakers, and switches and steam generator emergency feedwater supply valve switches with PSW out of service for AHU 1-11 modification work
- Unit 3, power availability (4160V emergency switchgear, CT-3, cable room, and equipment room) with borated water storage tank gravity feed unavailable during Unit 3 reactor building integrated leak rate testing

.2 Complete Walkdown

The inspectors verified the alignment of the Unit 3 low pressure service water system. The inspectors selected this system for assessment because it is a risk-significant mitigating system. The inspectors determined the correct system lineup by reviewing plant procedures, drawings, the updated final safety analysis report, and other documents. The inspectors reviewed records related to the system design, maintenance work requests, and deficiencies. The inspectors verified that the selected system was correctly aligned by performing a complete walkdown of accessible components. The inspectors observed whether there was indication of degradation, and if so, verified the degradation was being appropriately managed in accordance with an aging management program and it had been entered into the licensee's corrective action program.

To verify the licensee was identifying and resolving equipment alignment discrepancies, the inspectors reviewed corrective action documents, including condition reports and outstanding work orders. The inspectors also reviewed periodic reports containing information on the status of risk-significant systems, including maintenance rule reports and system health reports. Documents reviewed are listed in the attachment.

b. Findings

No findings were identified.

1R05 Fire Protection (71111.05AQ)

a. Inspection Scope

.1 Quarterly Inspection

The inspectors evaluated the adequacy of selected fire plans by comparing the fire plans to the defined hazards and defense-in-depth features specified in the fire protection program. In evaluating the fire plans, the inspectors assessed the following items:

- control of transient combustibles and ignition sources
- fire detection systems
- fire suppression systems
- manual firefighting equipment and capability
- passive fire protection features
- compensatory measures and fire watches
- issues related to fire protection contained in the licensee's corrective action program

The inspectors toured the following five fire areas to assess material condition and operational status of fire protection equipment. Documents reviewed are listed in the attachment.

- Unit 3, low pressure injection (LPI) hatch area, fire zone 60
- Unit 3, high pressure injection (HPI) hatch area, fire zone 61
- Unit 3, component cooler room, fire zone 79
- Unit 3, reactor building, fire zone 124

- Unit 1, 6900/4160V switchgear area, fire zone 34

.2 Annual Inspection

The inspectors evaluated the licensee's fire brigade performance during a drill on April 5, 2016 and assessed the brigade's capability to meet fire protection licensing basis requirements. The inspectors observed the following aspects of fire brigade performance:

- capability of fire brigade members
- leadership ability of the brigade leader
- use of turnout gear and fire-fighting equipment
- team effectiveness
- compliance with site procedures

The inspectors also observed the post-drill critique to assess if it was appropriately critical, included discussions of drill observations, and identified any areas requiring corrective action. Documents reviewed are listed in the attachment.

b. Findings

No findings were identified.

1R06 Flood Protection Measures (71111.06)

a. Inspection Scope

.1 Internal Flooding

The inspectors reviewed related flood analysis documents and walked down the areas listed below containing risk-significant structures, systems, and components susceptible to flooding. The inspectors verified that plant design features and plant procedures for flood mitigation were consistent with design requirements and internal flooding analysis assumptions. The inspectors also assessed the condition of flood protection barriers and drain systems. In addition, the inspectors verified the licensee was identifying and properly addressing issues using the corrective action program. Documents reviewed are listed in the attachment.

- Unit 2, 2B LPI and 2B reactor building spray pump room
- Unit 3, 3B LPI and 3B reactor building spray pump room

b. Findings

No findings were identified.

1R08 Inservice Inspection Activities (71111.08)

a. Inspection Scope

Non-Destructive Examination Activities and Welding Activities

From May 2 through May 5, 2016, the inspectors conducted an onsite review of the implementation of the licensee's inservice inspection (ISI) program for monitoring degradation of the reactor coolant system boundary, risk-significant piping and component boundaries, and containment boundaries in Unit 3.

The inspectors reviewed the following non-destructive examinations (NDEs) mandated by the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code of Record: 2007 Edition with 2008 Addenda) to evaluate compliance with the ASME Code, Section XI and Section V requirements and, if any indications or defects were detected, to evaluate if they were dispositioned in accordance with the ASME Code or an NRC-approved alternative requirement. The inspectors also reviewed the qualifications of the NDE technicians performing the examinations to determine whether they were current and in compliance with the ASME Code requirements.

- liquid penetrant (PT), 3-51A-0-2478A-H5C lug-to-pipe weld, Class 1
- ultrasonic examination (UT), 3-RCP-3A2-F pump flange bolting, ASME Class 1
- magnetic particle, 3-PIB2-4, ASME Class 1
- UT, 3-PIA2-4 pipe to elbow, ASME Class 1
- UT, 3-RPV-25-209-54 closure stud, ASME Class 1

The inspectors reviewed the following welding activities, qualification records, and associated documents in order to evaluate compliance with procedures and the ASME Code, Section XI and Section IX requirements. Specifically, the inspectors reviewed the work order, repair and replacement plan, weld data sheets, welding procedures, procedure qualification records, welder performance qualification records, and NDE reports.

- 3-LP-0252-1, pipe-to-pipe weld, 3" branch pipe on borated water storage tank, Class 3
- 3LPSW-563, pipe-to-pipe weld, replace 4" pipe on low pressure service water, Class 2
- 3MS-1, pipe-to-pipe weld, replace downstream piping of main steam relief valve, Class 3

During non-destructive surface and volumetric examinations performed since the previous refueling outage, the licensee did not identify any relevant indications that were analytically evaluated and accepted for continued service; therefore, no NRC review was completed for this inspection procedure attribute.

PWR Vessel Upper Head Penetration Inspection Activities

The inspectors verified that for the Unit 3 vessel head, a bare metal visual (BMV) examination was required during this outage, in accordance with the requirements of

ASME Code Case N-729-1 and 10 CFR 50.55a(g)(6)(ii)(D). The inspectors reviewed portions of the bare metal visual examination of the reactor vessel upper head penetrations to determine if the examinations were performed in accordance with the requirements of ASME Code Case N-729-1 and 10 CFR 50.55a(g)(6)(ii)(D). The licensee did not perform a volumetric examination of the reactor vessel upper head penetrations. The inspectors confirmed the dates of the last volumetric examination to verify that no examinations were required in accordance with the requirements of ASME Code Case N-729-1, as modified by 10 CFR 50.55a(g)(6)(ii)(D) and NRC-approved alternatives.

The inspectors reviewed the following examination that identified relevant indications accepted for continued service. Specifically, the inspectors reviewed the examination records and their associated evaluations to verify that licensee's acceptance for continued service was in accordance with the requirements of 10 CFR 50.55a(g)(6)(ii)(D) or an NRC-approved alternative.

- VT-16-1598, visual examination for boric acid detection, 3-RPV-HEAD-PEN

The evaluation concluded that the indications were not indicative of nozzle leakage.

Boric Acid Corrosion Control Inspection Activities

The inspectors reviewed the licensee's boric acid corrosion control (BACC) program activities to determine if the activities were implemented in accordance with the commitments made in response to NRC Generic Letter 88-05, "Boric Acid Corrosion of Carbon Steel Reactor Pressure Boundary Components in PWR Plants," and applicable industry guidance documents. Specifically, the inspectors performed an onsite records review of procedures and the results of the licensee's containment walkdown inspections performed during the current refueling outage. The inspectors also interviewed the BACC program owner, conducted an independent walkdown of containment to evaluate compliance with licensee's BACC program requirements, and verified that degraded or non-conforming conditions, such as boric acid leaks, were properly identified and corrected in accordance with the licensee's BACC and corrective action programs.

The inspectors reviewed the following engineering evaluations, completed for evidence of boric acid leakage, to determine if the licensee properly applied applicable corrosion rates to the affected components; and properly assessed the effects of corrosion induced wastage on structural or pressure boundary integrity in accordance with the licensee's procedures.

- Action Request (AR) 01854751 3LP-22 Active Boric Acid Leak, 01/28/15
- AR 01866469 3HP-36 Excessive Boric Acid Accumulation, 10/07/14
- AR 01986898 Active Boric Acid Leak on Pipe Cap Downstream of 3LWD-1137, 1/26/16
- AR 01874026 Findings During Hot Standby Tour, 5/27/14
- AR 01908490 3-HPI-IV-0134 Excessive Boric Acid Leak, 04/21/15
- AR 01957411 3LP-42, Request Engineering Evaluation for 3LP-42, 10/12/15
- AR 02022864 RX Bottom Head ISI Inspection, 05/03/16

The inspectors reviewed the following condition reports and associated corrective actions related to evidence of boric acid leakage to evaluate if the corrective actions completed were consistent with the requirements of the ASME Code and 10 CFR Part 50, Appendix B, Criterion XVI.

- AR 01855682, Unit 3 RB Tour Results, 02/02/15
- AR 01871088, Dry Boron Accumulation on 3HP-974, 11/02/14
- AR 01873948, SSF RC Make-up Accumulator Leaking, 10/28/14
- AR 02022758, U3EOC28 Hot Shutdown Tour Results, 5/19/16
- AR 02024359, 3HP-18 Boron at Valve End Weld, 5/28/16

Steam Generator Tube Inspection Activities

The inspectors reviewed the eddy current (EC) examination activities performed in the Unit 3 steam generators A and B during this current refueling outage to verify compliance with the licensee's technical specifications, ASME BPVC Section XI, and Nuclear Energy Institute 97-06, "Steam Generator Program Guidelines."

The inspectors reviewed the scope of the EC examinations, and the implementation of scope expansion criteria, to verify these were consistent with the Electric Power Research Institute (EPRI) Pressurized Water Reactor Steam Generator Examination Guidelines, Revision 7. The inspectors reviewed documentation for a sample of EC data analysts, probes, and testers to verify that personnel and equipment were qualified to detect the applicable degradation mechanisms in accordance with the EPRI Examination Guidelines. This review included a sample of site-specific examination technique specification sheets (ETSSs) to verify that their qualification and site-specific implementation were consistent with Appendix H or I of the EPRI Examination Guidelines. The inspectors also reviewed a sample of EC data for steam generator tubes 3A-R22C81, 3A-R79C72, 3A-R87C124, 3A-R140C68 and 3B-R22C20, with a qualified data analyst, to confirm that data analysis and equipment configuration were performed in accordance with the applicable ETSSs and site-specific analysis guidelines. The inspectors verified that recordable indications were detected and sized in accordance with vendor procedures.

The inspectors selected a sample of degradation mechanisms from the Unit 3 Degradation Assessment report (i.e. tube support plate wear and loose parts wear) and verified that their respective in-situ pressure testing criteria were determined in accordance with the EPRI Steam Generator Integrity Assessment Guidelines, Revision 3. Additionally, the inspectors reviewed EC indication reports to determine whether tubes with relevant indications were appropriately screened for in-situ pressure testing. The inspectors also compared the latest EC examination results with the last Condition Monitoring and Operational Assessment report for Unit 3 to assess the licensee's prediction capability for maximum tube degradation and number of tubes with indications. The inspectors verified that the licensee's evaluation was conservative and that current examination results were bound by the operational assessment projections.

The inspectors assessed the latest EC examination results to verify that new degradation mechanisms, if any, were identified and evaluated before plant startup. The review of EC examination results included the disposition of potential loose part indications on the steam generator secondary side to verify that corrective actions for

evaluating and retrieving loose parts were consistent with the EPRI Guidelines. The inspectors also reviewed a sample of primary-to-secondary leakage data for Unit 3 to confirm that operational leakage in each steam generator remained below the detection or action level threshold during the previous operating cycle.

The inspectors' review included the implementation of tube repair criteria and repair methods to verify they were consistent with plant technical specifications and industry guidelines. The inspectors verified that the licensee had selected the appropriate tubes for plugging based on the required plugging criteria. The inspectors reviewed the tube plugging procedure and directly observed tube plugging activities for tubes in steam generators A and B, to determine if the licensee installed the tube plugs in accordance with the applicable procedures.

Furthermore, the inspectors interviewed licensee staff and reviewed a sample of inspection results for the inspection conducted in the secondary side internals of steam generators A and B, to verify that potential areas of degradation based on site-specific operating experience were inspected, and appropriate corrective actions were taken to address degradation indications.

Identification and Resolution of Problems

The inspectors reviewed a sample of ISI-related issues entered into the corrective action program to determine if the licensee had appropriately described the scope of the problem and had initiated corrective actions. The review also included the licensee's consideration and assessment of operating experience events applicable to the plant. The inspectors performed this review to ensure compliance with 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," requirements.

b. Findings

NCV 05000287/2016002-01, "Failure to Perform ISI General Visual Examinations of Containment Moisture Barrier"

Introduction: The inspectors identified a Green NCV of 10 CFR Part 50.55a, "Codes and Standards," for the licensee's failure to conduct 100 percent general visual examinations of the moisture barriers to the containment liner in accordance with Subsection IWE of ASME, Section XI. Specifically, the licensee failed to conduct visual examinations of the sealant applied to interior expansion joint locations in containment.

Description: During the construction of the containment building, both the concrete floor slab as well as the internal concrete structures were constructed and/or installed directly on top of the basemat containment liner. Expansion joints were placed along the vertical interfaces of these concrete structures to reduce internal stressors of the concrete, in order to resist cracking by allowing for independent movement, as well as thermal expansion and contraction. A moisture barrier, a sealant in this case, was applied along the ½-inch concrete gap, directly above where the expansion joint was installed, to prevent moisture from reaching the inaccessible portions of the containment liner. On May 3, 2016, during a walk down of containment, the inspectors identified areas of degraded moisture barriers within the interior portions of the containment floor.

The containment ISI program is required by 10 CFR 50.55a to be implemented in accordance with ASME Section XI, Subsection IWE, "Requirements for Class MC and Metallic Liners of Class CC Components of Light-Water Cooled Plants." Subsection IWE, Table IWE-2500-1, Category E-A, "Containment Surfaces," Item E1.30, "Moisture Barriers," requires a general visual examination of 100 percent of moisture barriers. The reference to moisture barriers is further defined in Note (3) of this table, which states, in part; "Examination shall include moisture barrier materials intended to prevent intrusion of moisture against inaccessible areas of the pressure retaining metal containment shell or liner at concrete-to-metal interfaces and at metal-to-metal interfaces which are not seal welded."

Discussions with licensee staff revealed that the interior moisture barriers were not part of the containment ISI program. The most recent informal inspection of the interior areas occurred during the spring 2009 outage (3EOC24), where some of the moisture barriers that did not meet acceptance criteria were repaired in the fall 2010 outage (3EOC25). At the time that the inspector identified the degraded interior moisture barriers, no inspections were scheduled to verify the current or future acceptability of these locations, nor was there reasonable assurance that any potential future inspection would meet the requirements and/or minimum standards of ASME XI, Subsection IWE. In response to the identified condition, the licensee repaired the moisture barriers and confirmed the operability of the containment liner with the satisfactory results of the containment integrated leak rate test, which was performed during this outage. The issue was entered into the licensee's corrective action program as NCR 02027086.

Analysis: The failure to conduct a general visual examination of 100 percent of the moisture barriers intended to prevent intrusion of moisture against inaccessible areas of the containment liner was a performance deficiency. The inspectors determined that this finding was of more than minor significance because the failure to conduct required visual examinations and identify the degraded moisture barriers, which could allow the intrusion of water, if left uncorrected, had the potential to lead to a more significant concern. This finding was associated with the design control attribute of the barrier integrity cornerstone, and adversely affected the cornerstone objective of providing reasonable assurance that physical design barriers protect the public from radionuclide releases caused by accidents or events. Specifically, visual examinations of the containment metal liner or moisture barrier provide assurance that the liner remains capable of performing its intended safety function. The inspectors used IMC 0609, Appendix A, "The Significance Determination Process (SDP) For Findings At-Power," Exhibit 3 – "Barrier Integrity Screening Questions," dated June 19, 2012, and determined that the finding was of very low safety significance (Green) because it did not represent an actual open pathway in the physical integrity of the reactor containment and did not involve an actual reduction in function of hydrogen igniters in the reactor containment.

The inspectors reviewed this performance deficiency for cross-cutting aspects as required by IMC 0310, "Components With Cross-Cutting Aspects," dated December 4, 2014. The inspectors determined no cross-cutting aspect was associated with this finding because the finding was not reflective of present licensee performance.

Enforcement: Title 10 of the Code of Federal Regulations (CFR) Part 50.55a(b), "Codes and Standards," states in part, that systems and components of boiling and pressurized water-cooled nuclear power reactors must meet the applicable requirements of the ASME BPV Code, subject to the conditions in 10 CFR Part 50.55a(b)(2). The 1998

Edition with the 2000 Addenda of ASME BPV Code, Section XI, Subsection IWE, through the latest edition and addenda incorporated by reference in paragraph 10 CFR 50.55a(a) (i.e. 2007 Edition with 2008 Addenda) require examination of moisture barriers in metal containments. Specifically, Table IWE-2500-1, Category E-A, "Containment Surfaces," Item E1.30, "Moisture Barriers," requires a general visual examination of 100 percent of moisture barriers intended to prevent intrusion of moisture against inaccessible areas of the pressure retaining metal containment shell every inspection period.

Contrary to the above, since the initial 10 CFR 50.55a, Subsection IWE requirements were established until present, the licensee failed to conduct and implement the required visual examinations of the interior moisture barriers at the expansion joint locations, which provide a moisture barrier to the basemat containment liner. In addition, the inspections were not part of the licensee's ISI program thus no inspections were scheduled to verify the current or future acceptability of these moisture barrier locations in accordance with ASME XI, Subsection IWE. In response to the identified condition, the licensee repaired the moisture barriers and confirmed the operability of the containment liner with the satisfactory results of the containment integrated leak rate test, which was performed during this outage. Because this finding is of very low safety significance, and has been entered into the licensee's corrective action program as NCR 02027086, this violation is being treated as an NCV, consistent with Section 2.3.2.a of the NRC Enforcement Policy. (NCV 05000287/2016002-01, Failure to Perform ISI General Visual Examinations of Containment Moisture Barrier)

1R11 Licensed Operator Requalification Program and Licensed Operator Performance (71111.11)

a. Inspection Scope

.1 Resident Inspector Quarterly Review of Licensed Operator Requalification

On June 24, 2016, the inspectors observed a simulator scenario conducted for training of an operating crew in preparation for controlling plant evolutions precisely (CPE). The CPE scenario is intended to allow the operating crew to perform and progress through the scenario with limited instructor interaction.

The scenario involved an underground power path lockout, multiple emergency feedwater equipment failures, a main steam line break outside containment, an AFIS actuation failure, and a station blackout. Events progressed to a point where the crew entered an Alert, followed by a Site Area Emergency event declaration.

The inspectors assessed the following:

- licensed operator performance
- the ability of the licensee to administer the scenario and evaluate the operators
- the quality of the post-scenario critique
- simulator performance

Documents reviewed are listed in the attachment.

.2 Resident Inspector Quarterly Review of Licensed Operator Performance in the Actual Plant/Main Control Room

The inspectors observed licensed operator performance in the Unit 1/2 main control room on April 19, 2016 during a response to an abnormal Unit 1 condition involving a configuration control issue where the reactor building normal sump level was increasing. This condition resulted due to failure to completely isolate the borated water storage tank (BWST) drain line during preventative maintenance on the reactor building spray pump suction isolation valve.

The inspectors observed licensed operator performance in the Unit 3 main control room on May 6 and 7 during reduced inventory operations.

The inspectors observed licensed operator performance in the Unit 3 main control room on May 15 during reactor pull to critical and zero power physics testing.

The inspectors assessed the following:

- use of plant procedures
- control board manipulations
- communications between crew members
- use and interpretation of instruments, indications, and alarms
- use of human error prevention techniques
- documentation of activities
- management and supervision

Documents reviewed are listed in the attachment.

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness (71111.12)

a. Inspection Scope

The inspectors assessed the licensee's treatment of the two issues listed below to verify the licensee appropriately addressed equipment problems within the scope of the maintenance rule (10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants"). The inspectors reviewed procedures and records to evaluate the licensee's identification, assessment, and characterization of the problems as well as their corrective actions for returning the equipment to a satisfactory condition. The inspectors also interviewed plant personnel to assess the licensee's treatment of performance deficiencies and extent of condition. Documents reviewed are listed in the attachment.

- Unit 0, main control room cooling/B chiller unit multiple component failures
- Unit 2, 125 volt DC power system control battery 2CA cells low after 100 hour equalizing charge

b. Findings

No findings were identified.

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13)

a. Inspection Scope

The inspectors reviewed the five maintenance activities listed below to verify that the licensee assessed and managed plant risk as required by 10 CFR 50.65(a)(4) and licensee procedures. The inspectors assessed the adequacy of the licensee's risk assessments and implementation of risk management actions. The inspectors also verified that the licensee was identifying and resolving problems with assessing and managing maintenance-related risk using the corrective action program. Additionally, for maintenance resulting from unforeseen situations, the inspectors assessed the effectiveness of the licensee's planning and control of emergent work activities. Documents reviewed are listed in the attachment.

- Unit 3, April 27, 2016, emergent defense-in-depth (DID) yellow risk due to failure of 3A condenser circulating water (CCW) booster pump to start while attempting to establish additional spent fuel cooling during defuel activities
- Unit 3, May 6-7, 2016, planned DID orange risk during reduced RCS inventory conditions to remove steam generator nozzle dams
- Unit 0, June 2, 2016, projected yellow risk due to 1A and 3A component cooling (CC) coolers out-of-service for planned maintenance combined with removal of auxiliary building fire barrier in preparation for 2B LPI cooler eddy current testing
- Unit 0, June 13, 2016, planned yellow risk due to modification of control room air handling units combined with non-functionality of the protected service water system
- Unit 0, June 29, 2016, planned yellow risk due to planning activities for modification of differential relays for the 230 KV switchyard yellow bus

b. Findings

No findings were identified.

1R15 Operability Determinations and Functionality Assessments (71111.15)

a. Inspection Scope

.1 Operability and Functionality Review

The inspectors selected the six operability determinations or functionality evaluations listed below for review based on the risk-significance of the associated components and systems. The inspectors reviewed the technical adequacy of the determinations to ensure that technical specification operability was properly justified and the components or systems remained capable of performing their design functions. To verify whether components or systems were operable, the inspectors compared the operability and design criteria in the appropriate sections of the technical specification and updated final safety analysis report to the licensee's evaluations. Where compensatory measures were required to maintain operability, the inspectors determined whether the measures

in place would function as intended and were properly controlled. Additionally, the inspectors reviewed a sample of corrective action documents to verify the licensee was identifying and correcting any deficiencies associated with operability evaluations. Documents reviewed are listed in the attachment.

- Unit 0, Approximately 20 additional components were identified that should be added to the scope of operable but degraded/non-conforming components in NCR 01904926 SSF: Non-QA equipment used in QA-1 applications, NCR 02018719
- Unit 1, pressurizer heater bank 1 failed, NCR 02018247
- Unit 1, 1PSW-22 did not pass stroke time acceptance criteria, NCR 02035887
- Unit 2, 2B high pressure injection contact pressure did not meet acceptance criteria during planned maintenance, NCR 02019828
- Unit 3, 3TD-14 breaker charging springs are not charged, NCR 02031359
- Unit 3, 3HP-254 inservice testing surveillance requirement not fully completed, NCR 02023700

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19)

a. Inspection Scope

The inspectors either observed post-maintenance testing or reviewed the test results for the maintenance activities listed below to verify the work performed was completed correctly and the test activities were adequate to verify system operability and functional capability.

- OP/0/A/1106/019, Keowee Hydro at Oconee, Enclosure 4.9, Overhead Keowee Unit or Overhead Power Path Removal and Restoration following repairs to PCB-8 and PCB-9 degraded current transformer circuit on March 21, 2016
- PT/2/A/0152/009, Feedwater System Valve Stroke Test following repairs to 2FWD-315 to correct inadequate stroke time on April 12, 2016
- Work Order (WO) 20080309 04, Perform functional B Chiller testing following repairs to B Chiller on May 14, 2016

The inspectors evaluated these activities for the following:

- acceptance criteria were clear and demonstrated operational readiness
- effects of testing on the plant were adequately addressed
- test instrumentation was appropriate
- tests were performed in accordance with approved procedures
- equipment was returned to its operational status following testing
- test documentation was properly evaluated

Additionally, the inspectors reviewed a sample of corrective action documents to verify the licensee was identifying and correcting any deficiencies associated with post-maintenance testing. Documents reviewed are listed in the attachment.

b. Findings

No findings were identified.

1R20 Refueling and Other Outage Activities (71111.20)

a. Inspection Scope

For the Unit 3 refueling outage from April 23, 2016 through May 16, 2016, the inspectors evaluated the following outage activities:

- outage planning
- shutdown, cooldown, refueling, heatup, and startup
- reactor coolant system instrumentation and electrical power configuration
- reactivity and inventory control
- decay heat removal and spent fuel pool cooling system operation
- containment closure

The inspectors verified that the licensee:

- considered risk in developing the outage schedule
- controlled plant configuration per administrative risk reduction methodologies
- developed work schedules to manage fatigue
- developed mitigation strategies for loss of key safety functions
- adhered to operating license and technical specification requirements

The inspectors verified that safety-related and risk-significant structures, systems, and components not accessible during power operations were maintained in an operable condition. The inspectors also reviewed a sample of related corrective action documents to verify the licensee was identifying and correcting any deficiencies associated with outage activities. Documents reviewed are listed in the attachment.

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22)

a. Inspection Scope

The inspectors reviewed the eleven surveillance tests listed below and either observed the test or reviewed test results to verify testing adequately demonstrated equipment operability and met technical specification and current licensing basis. The inspectors evaluated the test activities to assess for preconditioning of equipment, procedure adherence, and equipment alignment following completion of the surveillance. Additionally, the inspectors reviewed a sample of related corrective action documents to verify the licensee was identifying and correcting any deficiencies associated with surveillance testing. Documents reviewed are listed in the attachment.

Routine Surveillance Tests

- IP/0/A/3000/023 SY1, 230 kV Switchyard Battery SY-1 Performance Test
- IP/0/A/3000/023 SY2, 230 kV Switchyard Battery SY-2 Performance Test
- PT/0/A/0620/019, Keowee Over Frequency Protection Functional Test
- PT/3/A/0150/003A, Reactor Building Integrated Leak Rate
- PT/3/A/0610/001 J, Emergency Power Switching Logic Functional Test
- PT/0/A/0711/001, Zero Power Physics Test – Unit 3

In-Service Tests (IST)

- PT/1/A/0202/011, High Pressure Injection Pump Test

Reactor Coolant System Leak Detection

- PT/1/A/0600/010, Reactor Coolant Leakage
- PT/2/A/0600/010, Reactor Coolant Leakage
- PT/3/A/0600/010, Reactor Coolant Leakage

Containment Isolation

- PT/3/A/0151/007, Penetration 7 Leak Rate Test

b. Findings

No findings were identified.

2. RADIATION SAFETY [RS]

2RS1 Radiological Hazard Assessment and Exposure Controls (71124.01)

a. Inspection Scope

Hazard Assessment and Instructions to Workers

During facility tours, the inspectors directly observed radiological postings and container labeling for areas established within the radiologically controlled area (RCA) of the Unit 1, Unit 2, and Unit 3 auxiliary buildings, and radioactive waste (radwaste) processing and storage locations. The inspectors independently measured radiation dose rates or directly observed conduct of licensee radiation surveys for selected RCA areas. The inspectors reviewed survey records for several plant areas including surveys for airborne radioactivity, gamma surveys with a range of dose rate gradients, surveys for alpha-emitters and other hard-to-detect radionuclides, and pre-job surveys for upcoming tasks. The inspectors also discussed changes to plant operations that could contribute to changing radiological conditions since the last inspection. The inspectors attended pre-job briefings and reviewed radiation work permit (RWP) details to assess communication of radiological control requirements and current radiological conditions to workers.

Control of Radioactive Material

The inspectors observed surveys of material and personnel being released from the RCA using small article monitor, personnel contamination monitor, and portal monitor instruments. The inspectors discussed equipment sensitivity, alarm setpoints, and release program guidance with licensee staff. The inspectors also reviewed records of leak tests on selected sealed sources and discussed nationally tracked source transactions with licensee staff.

Hazard Control

The inspectors evaluated access controls and barrier effectiveness for selected high radiation area (HRA), locked high radiation area (LHRA), and very high radiation area (VHRA) locations and discussed changes to procedural guidance for LHRA and VHRA controls with radiation protection (RP) supervisors. The inspectors reviewed implementation of controls for the storage of irradiated material within the spent fuel pool. Established radiological controls, including airborne controls and electronic dosimeter (ED) alarm setpoints, were evaluated for selected Unit 3 refueling outage 28 tasks. In addition, the inspectors reviewed licensee controls for areas where dose rates could change significantly as a result of plant shutdown and refueling operations. The inspectors also reviewed the use of personnel dosimetry including extremity dosimetry and multibadging in high dose rate gradients.

Radiation Worker Performance and RP Technician Proficiency

Occupational workers' adherence to selected RWPs and RP technician proficiency in providing job coverage were evaluated through direct observations and interviews with licensee staff. Jobs were observed in HRAs and contaminated areas including maintenance and refueling activities in the containment building. The inspectors also evaluated worker responses to dose and dose rate alarms during selected work activities.

Problem Identification and Resolution

The inspectors reviewed and assessed condition reports associated with radiological hazard assessment and control. The inspectors evaluated the licensee's ability to identify and resolve the issues. The inspectors also reviewed recent self-assessment results.

Radiation protection activities were evaluated against the requirements of Updated Final Safety Analysis Report (UFSAR) Section 12; Technical Specification Section 5.4; 10 CFR Parts 19 and 20; Regulatory Guide 8.38, "Control of Access to High and Very High Radiation Areas in Nuclear Power Plants"; and approved licensee procedures. Licensee programs for monitoring materials and personnel released from the RCA were evaluated against 10 CFR Part 20 and IE Circular 81-07, "Control of Radioactively Contaminated Material". Documents and records reviewed are listed in the Attachment.

The inspectors completed the required seven samples as specified in Inspection Procedure (IP) 71124.01.

b. Findings

No findings were identified.

2RS6 Radioactive Gaseous and Liquid Effluent Treatment (71124.06)

a. Inspection Scope

Radioactive Effluent Treatment Systems

The inspectors walked-down selected components of the gaseous and liquid radioactive waste (radwaste) processing and effluent discharge systems. The walk-downs included visual inspection of RIA-33 [plant discharge liquid radioactive waste (radwaste)], 4RIA-45 (radwaste facility vent), RIAs-43, -44, -45 and -46 (Unit 1, Unit 2 and Unit 3 vent particulate, iodine and gas), RIAs -47, -48, -49 and -49A (reactor building vent particulate, iodine, and gas), RIA-53 (interim radwaste building vent gas), and the hot machine shop vent. To the extent practical, the inspectors observed and evaluated the material condition of in-place waste processing equipment for indications of degradation or leakage that could constitute a possible release pathway to the environment. Inspected components included but were not limited to waste gas decay tanks, gaseous and liquid monitor skids, floor drains, measurement equipment and sample points for Unit 1, Unit 2 and Unit 3 and associated piping and valves. The inspectors interviewed licensee staff regarding equipment configuration and effluent monitor operation. The inspectors also walked down and/or reviewed surveillance test records for reactor building gaseous waste vent, hot machine shop ventilation, and reactor building purge filters.

Effluent Sampling and Release

The inspectors observed the collection and processing of particulate and iodine cartridge effluent samples from auxiliary building stack monitors for Unit 1, Unit 2 and Unit 3. Technician proficiency in collecting and processing the sample was evaluated. The inspectors reviewed recent liquid and gaseous release permits including pre-release sampling results, effluent monitor alarm setpoints, and public dose calculations. For selected effluent monitoring instruments, the inspectors reviewed offsite dose calculation manual (ODCM), and selected licensee commitments (UFSAR 16.11), compliance for calibration and functional tests, and that sources used for calibration were NIST traceable. The inspectors also evaluated the licensee's capability to collect high-range, post-accident effluent samples for these systems. The inspectors reviewed and discussed with licensee staff methodology for determining ventilation and stack flow rates and compared current vent flows to design values in the ODCM.

The inspectors reviewed the 2014 and 2015 Annual Radioactive Effluent Release Reports (ARERR) to evaluate reported doses to the public, to review any anomalous events and to review ODCM changes. The inspectors also reviewed compensatory sampling data for time periods when selected radiation monitors were out-of-service. The inspectors reviewed the results of interlaboratory cross-checks for the labs performing plant effluents. The inspectors also reviewed effluent source term evaluation and changes to effluent release points. In addition, the inspectors evaluated recent land use census results.

Problem Identification and Resolution

The inspectors reviewed and discussed selected corrective action program documents associated with gaseous and liquid effluent processing and release activities including licensee sponsored assessments. The inspectors evaluated the licensee's ability to identify and resolve issues.

Radwaste system operation and effluent processing activities were evaluated against requirements and guidance documented in the following: 10 CFR Part 20; 10 CFR Part 50, Appendix I; ODCM; Updated Final Safety Analysis Report (UFSAR) Section 11 & Section 16, selected license commitments; Regulatory Guide (RG) 1.21, "Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants"; RG 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50 Appendix I"; and Technical Specifications Section 5.5. Documents reviewed during the inspection are listed in the report Attachment.

The inspectors completed the required six samples specified in Inspection Procedure (IP) 71124.06.

b. Findings

No findings were identified.

2RS7 Radiological Environmental Monitoring Program (REMP) (71124.07)

a. Inspection Scope

Environmental Program Review (Status, Analysis, and Results)

The inspectors reviewed results presented in the Annual Radiological Environmental Operating Report (AREOR) documents issued for calendar year (CY) 2014 and CY 2015, and changes to the ODCM contained in the ARERR. REMP contract laboratory interlaboratory cross-check program results, and current procedural guidance for offsite collection, processing and analysis of airborne particulate and iodine, broadleaf vegetation, fish, milk, shoreline sediment, and surface water samples were reviewed and discussed. The AREOR environmental measurement results were reviewed for consistency with licensee effluent data and evaluated for radionuclide concentration trends. The inspectors reviewed detection level sensitivity requirements for environmental samples analyzed by the offsite environmental laboratory.

REMP Implementation and Site Inspection

The inspectors observed routine airborne sample and broad leaf vegetation samples collection and surveillance at selected locations as required by the licensee's REMP as specified in the current ODCM and applicable procedures. The inspectors observed equipment material condition and verified operability, including verification of flow rates and total sample volume results for the weekly airborne particulate filter and iodine cartridge change-outs at six atmospheric sampling stations. Calibration and maintenance surveillance records for the installed environmental air sampling stations

and composite water samplers were also reviewed. Thermo-luminescent dosimeter (TLD) material condition and placement were observed at select ODCM defined locations. In addition, land use census results and actions for missed samples, including compensatory measures, were reviewed and discussed.

Meteorological Monitoring Program

During walkdowns of the primary and backup meteorological towers the inspectors observed the physical condition of the meteorological tower and its instrumentation and discussed equipment operability, maintenance history, and backup power supplies with licensee staff. The inspectors evaluated transmission of locally generated meteorological data to other licensee groups such as emergency operations personnel and main control room operators. For the meteorological measurements of wind speed, wind direction, and temperature, the inspectors reviewed applicable tower instrumentation calibration records. The inspectors also discussed with licensee staff measurement data recovery for 2015 and 2016.

Ground Water Protection

The inspectors reviewed the licensee's continued implementation of the industry's ground water protection initiative [Nuclear Energy Institute (NEI) 07-07] and discussed any changes to the program with RP representatives. The inspectors discussed program guidance for dealing with spills, leaks, and unexpected discharges with licensee staff and reviewed recent entries into the 10 CFR 50.75(g) decommissioning file. The inspectors reviewed and discussed the licensee's program for monitoring of structures, systems, and components (SSCs) with the potential to release radioactive material to the environment. In addition the inspectors walked down selected SSCs and groundwater wells to confirm locations and ascertain material condition of the wells. Potential effluent release points due to onsite surface water bodies were also discussed.

Identification and Resolution of Problems

The inspectors reviewed corrective action program documents in the areas of radiological environmental monitoring, groundwater protection, and meteorological tower maintenance. The inspectors evaluated the licensee's ability to identify and resolve the issues. The inspectors also reviewed recent self-assessment results.

The inspectors evaluated REMP implementation and meteorological monitoring against the requirements and guidance contained in: 10 CFR Part 20; Appendix I to 10 CFR Part 50; TS Sections 5.0; ODCM, Rev. 57; RG 4.15, Quality Assurance for Radiological Monitoring Programs (Normal Operation) - Effluent Streams and the Environment; and the Branch Technical Position, "An Acceptable Radiological Environmental Monitoring Program" – 1979; Safety Guide 23, Onsite Meteorological Programs; and approved licensee procedures. Documents reviewed are listed in the Attachment.

The inspectors completed the required three samples specified in Inspection Procedure (IP) 71124.07.

b. Findings

No findings were identified.

2RS8 Radioactive Solid Waste Processing and Radioactive Material Handling, Storage, and Transportation (71124.08)

a. Inspection Scope

Waste Processing and Characterization

During inspector walk-downs, accessible sections of the liquid and solid radwaste processing systems were assessed for material condition and conformance with system design diagrams. Inspected equipment included storage tanks, transfer piping, resin dewatering and packaging components, and abandoned radwaste processing equipment. The inspectors discussed component function, processing system changes, and radwaste program implementation with licensee staff.

The inspectors reviewed the 2014 Annual Radioactive Effluent Report and radionuclide characterizations from 2015 to 2016 for selected waste streams. For primary resin, filters, and dry active waste (DAW), the inspectors evaluated analyses for hard-to-detect nuclides, reviewed the use of scaling factors, and examined quality assurance comparison results between licensee waste stream characterizations and outside laboratory data. Waste stream mixing and concentration averaging methodology were evaluated and discussed with radwaste staff. The inspectors also reviewed the licensee's process for monitoring changes in waste stream isotopic mixtures.

Radioactive Material Storage

During walk-downs of indoor and outdoor radioactive material storage areas, the inspectors observed the physical condition and labeling of storage containers and the posting of radioactive material areas. The inspectors also reviewed licensee procedural guidance for storage and monitoring of radioactive material.

Transportation

The inspectors evaluated shipping records for consistency with licensee procedures and compliance with NRC and Department of Transportation (DOT) regulations. The inspectors reviewed emergency response information, DOT shipping package classification, waste classification, radiation survey results, and container handling methodology. The inspectors also observed shipment preparations for a DAW package and evaluated technician performance and knowledge of DOT requirements.

Problem Identification and Resolution

The inspectors reviewed condition reports in the areas of shipping and radwaste processing. The inspectors evaluated the licensee's ability to identify and resolve the issues.

Radwaste processing, radioactive material handling, and transportation activities were reviewed against the guidance and requirements contained in the licensee's Process

Control Program; UFSAR Chapter 11; 10 CFR Part 20; 10 CFR Part 61; 10 CFR Part 71; the Branch Technical Position on Waste Classification (1983); and NUREG-1608, "Categorizing and Transporting Low Specific Activity Materials and Surface Contaminated Objects". Documents reviewed during the inspection are listed in the report Attachment.

The inspectors completed the required six samples as specified in IP 71124.08.

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator Verification (71151)

a. Inspection Scope

The inspectors reviewed a sample of the performance indicator (PI) data, submitted by the licensee, for the Unit 1, Unit 2, and Unit 3 PIs listed below. The inspectors reviewed plant records compiled between March 2015 and March 2016 to verify the accuracy and completeness of the data reported for the station. The inspectors verified that the PI data complied with guidance contained in Nuclear Energy Institute 99-02, "Regulatory Assessment Performance Indicator Guideline," and licensee procedures. The inspectors verified the accuracy of reported data that were used to calculate the value of each PI. In addition, the inspectors reviewed a sample of related corrective action documents to verify the licensee was identifying and correcting any deficiencies associated with PI data. Documents reviewed are listed in the attachment.

Cornerstone: Mitigating Systems

- high pressure injection system
- cooling water system

Cornerstone: Barrier Integrity

- reactor coolant system leak rate

Cornerstone: Occupational Radiation Safety

The inspectors reviewed recent occupational exposure control effectiveness PI results for the occupational radiation safety cornerstone and reviewed PI records generated between November 2015 and March 2016. For the assessment period, the inspectors reviewed ED alarm logs and condition reports related to controls for exposure significant areas. Documents reviewed are listed in the report attachment.

Cornerstone: Public Radiation Safety

The inspectors reviewed the radiological control effluent release occurrences PI results for the public radiation safety cornerstone from October 2015 through April 2016. For the assessment period, the inspectors reviewed cumulative and projected doses to the

public and condition reports related to radiological effluent TS/ODCM issues. The inspectors also reviewed licensee procedural guidance for collecting and documenting PI data. Documents reviewed are listed in the attachment.

b. Findings

No findings were identified.

4OA2 Problem Identification and Resolution (71152)

.1 Routine Review

The inspectors screened items entered into the licensee's corrective action program to identify repetitive equipment failures or specific human performance issues for follow-up. The inspectors reviewed problem identification program reports, attended screening meetings, or accessed the licensee's computerized corrective action database.

.2 Semi-Annual Trend Review

a. Inspection Scope

The inspectors reviewed issues entered in the licensee's corrective action program and associated documents to identify trends that could indicate the existence of a more significant safety issue. The inspectors focused their review on equipment degrading trends including repetitive failures and human performance trends, but also considered the results of inspector daily problem identification program report screenings, licensee trending efforts, and licensee human performance results. The review nominally considered the 6-month period of January 2016 through June 2016 although some examples extended beyond those dates when the scope of the trend warranted. The inspectors compared their results with the licensee's analysis of trends. Additionally, the inspectors reviewed the adequacy of corrective actions associated with a sample of the issues identified in the licensee's trend reports. The inspectors also reviewed corrective action documents that were processed by the licensee to identify potential adverse trends in the condition of structures, systems, and/or components as evidenced by acceptance of long-standing non-conforming or degraded conditions. Documents reviewed are listed in the attachment.

b. Findings and Observations

No findings were identified.

.3 Annual Followup of Selected Issues

a. Inspection Scope

The inspectors conducted a detailed review of the following two problem identification program reports:

- NCR 02016327, Housekeeping and fire protection walk down items
- NCR 02018602, Unauthorized station configuration change – gas bottle racks in Unit 3 main control room

The inspectors evaluated the following attributes of the licensee's actions:

- complete and accurate identification of the problem in a timely manner
- evaluation and disposition of operability and reportability issues
- consideration of extent of condition, generic implications, common cause, and previous occurrences
- classification and prioritization of the problem
- identification of root and contributing causes of the problem
- identification of any additional condition reports
- completion of corrective actions in a timely manner

Documents reviewed are listed in the attachment.

b. Findings and Observations:

NCV 05000269, 270, 287/2016002-02, "Failure to Properly Control Transient Combustible Materials in the Oconee Main Control Rooms"

Introduction: A NRC-identified Green NCV of Oconee Nuclear Station Units 1, 2, and 3 Renewed Facility Operating License Condition 3.D, "Fire Protection," was identified for the licensee's failure to adequately implement the requirements of the transient combustible material program.

Description: On March 16, 2016, during a walkdown of the Unit 3 control room, inspectors identified vacuum cleaners, a carpet blower and other cleaning supplies located in an enclosed area of the Unit 3 main control room which contained a cable tray with energized power cables. The inspectors questioned the control room staff and fire protection personnel who indicated the enclosed area should be considered a cable chase rather than a storage room. The door to the enclosed area was labeled "Bartlett Storage Location" and was being treated as a permanent storage location. The licensee was unable to produce any evaluation for this area as a permanent storage location. The licensee entered the above adverse condition in their corrective action program as NCR 0201209.

Duke Energy's nuclear operating fleet administrative procedure, AD-EG-ALL-1520, "Transient Combustible Control," Section 5.1, "General Requirements," Item 16 requires adequate clearance, free of combustible material to be maintained around energized electrical equipment. Duke Energy Carolinas, LLC nuclear operating fleet administrative procedure, AD-EG-ALL-1520, "Transient Combustible Control," Section 5.2.1.7 states if the area is designated as a Level B area, then perform the following: (a) If the combustible material is allowed per Attachment 3, "Allowed Combustible Materials in Level B and Level C Areas," then no transient combustible permit is required and no compensatory measures are required. Unit 1/2 and Unit 3 main control rooms are designated as Level B areas and Attachment 3 allows items described in the description section above to be present when in use. Section 5.2.1.7 further states if the combustible material is to be used more than one shift, then determine the fuel package size per Attachment 4, "Fuel Package Size Determination for Transient Combustibles." Section 5.3, "Permanent Storage Area," requires permanent storage areas to be analyzed and approved by the fire protection program manager or designee. This section also requires the material condition coordinator to maintain a list of approved

permanent storage areas in the power block. The licensee was unable to produce an evaluation of the area by the fire protection program manager or designee. Also, this area was not included in the approved permanent storage areas in the power block list maintained by the Oconee material condition coordinator.

The licensee performed additional inspections of the Unit 1/2 and Unit 3 main control areas and discovered multiple items in the Unit 1/2 main control room areas that were not allowed by fleet administrative procedure, AD-EG-ALL-1520, "Transient Combustible Control," Attachment 3, "Allowed Combustible Materials in Level B and Level C Areas". Some of the items discovered by the licensee included boxes with materials awaiting use in the control room, boxes of material from the technical support center left behind from the area's renovation, a portable speaker no longer used, a wood-framed white board, a pull-down projector screen, and several plastic wire looms. Additionally, the licensee discovered an unanalyzed wooden desk in the Unit 3 main control room area. All items had been stored in the control rooms for many shifts and were removed by the licensee upon discovery.

Analysis: The licensee's failure to control the storage of transient combustible material in the Oconee main control rooms with the proper evaluation in accordance with procedure AD-EG-ALL-1520 was a performance deficiency. The performance deficiency was more than minor because it was associated with the protection against external factors 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 (i.e., core damage). Specifically, uncontrolled transient combustibles challenge the habitability requirements of the main control room in the event of a fire and the ability of licensed operators to respond to events using the systems designed to prevent undesirable consequences. The finding was screened in accordance with IMC 0609, "Significance Determination Process," Attachment 4, "Initial Characterization of Findings," and IMC 0609 Appendix F, "Fire Protection Significance Determination Process," Task 1.3.1, and determined to be of very low safety significance because the finding did not prevent the reactor from reaching and maintaining a safe shutdown condition. The finding was determined to have a cross-cutting aspect of procedure adherence in the human performance cross-cutting area because of the licensee failed to implement the requirements of station procedure AD-EG-ALL-1520, "Transient Combustible Control." (H.8)

Enforcement: Oconee Nuclear Station Units 1, 2, and 3 Renewed Operating Licensee Condition 3.D, "Fire Protection," states, in part, that Duke Energy Carolinas, LLC shall implement and maintain in effect all provisions of the approved fire protection program that comply with 10 CFR 50.48(c) and NFPA 805. NFPA 805 Section 5.3.3.4.1 states: "Procedures for the control of general housekeeping practices and the control of transient combustibles shall be developed and implemented." Contrary to the above, on March 16, 2016, the inspectors identified that the Oconee Nuclear Station did not implement the fire protection requirements per nuclear operating fleet administrative procedure AD-EG-ALL-1520, "Transient Combustible Control." Specifically, the station allowed housekeeping and cleaning supplies to be permanently stored in an enclosed area of the Unit 3 main control room without the proper evaluation and controls required by AD-EG-ALL-1520. Additionally, transient combustible items were discovered in the Unit 1/2 main control room which were not in use and left in the area for more than one shift without proper evaluation per nuclear operating fleet administrative procedure, AD-

EG-ALL-1520, Attachment 4, "Fuel Package Size Determination." The licensee entered this issue into their corrective program as NCRs 02012091, 02012290, and 02013990. Additionally, the licensee removed the stored items from each of the main control rooms. Because this violation was of very low safety significance and was entered into the licensee's corrective action program, this violation is being treated as an NCV consistent with Section 2.3.2.a of the Enforcement Policy. (NCV 05000269, 270, 287/2016002-02, Failure to Properly Control Transient Combustible Materials in the Oconee Main Control Rooms)

4OA3 Followup of Events and Notices of Enforcement Discretion (NOED)

.1 (Closed) Licensee Event Report (LER) 05000287/2015-02 Broken Electrical Conductor Supplying Unit 3 Start-up Transformer

(Closed) Unresolved Item (URI) 05000269/287/2016008-01 Potential Lack of Adequacy of the Licensee's Maintenance Program to Detect Substantial Degradation of Cables and Their Connections Used on Oconee Large Oil Filled Stationary Transformers

a. Inspection Scope

On December 7, 2015, operations personnel at Oconee Unit 3 discovered the power delivery conductor on the "Y" phase of the start-up transformer severed. The start-up transformer was declared inoperable because the overhead emergency AC power path was not capable of fulfilling its safety function. The licensee repaired the severed power delivery conductor and restored operability of the start-up transformer. A subsequent investigation by licensee staff determined that both emergency AC power paths were briefly inoperable because of planned maintenance activities in-progress on the second emergency AC power path (underground path) at the time of discovery of the severed power cable. The licensee performed a cause determination and identified the failure of the power delivery cable to be fatigue related.

On January 5, 2016, the NRC sent an inspection team to the Oconee Nuclear Site to perform a special inspection after completing an initial assessment of the circumstances surrounding the power cable failures/degradation on the Unit 1 and Unit 3 startup transformers on December 22, 2015. The inspection team completed the charter items of the special inspection charter on January 8, 2016. The inspectors determined that the following inspection activities should be pursued and opened an unresolved item to determine if a performance deficiency exists:

- review of the licensee's completed cause determination
- review of any additional testing and metallurgical reports
- review of any licensee event report submitted by the licensee
- review of requirements associated with emergency AC power paths and associated transformers

During the period of time covered by this integrated inspection report, the Oconee NRC resident inspectors completed the list of reviews described above. The licensee performed an apparent cause determination which concluded that Aeolian vibrations caused fatigue cracking that propagated to conductor failure on the Unit 3 start-up transformer. During interviews with licensee staff, the inspectors learned that this same

phenomena was the likely cause of the degradation of individual strands on the Unit 1 start-up transformer which were discovered during extent of condition inspections performed by the licensee. The NRC resident inspectors also reviewed station procedures which directed the periodic inspections of the start-up transformers and their physical connections. LER 05000287/2015-02 and URI 05000269/287/2016008-01 are closed.

b. Findings

.i NCV 05000287/2016002-03, "Degraded Power Cables Result in Inoperable Startup Transformer and Loss of Unit 3 Safety Function"

Introduction: A self-revealing Green violation of Oconee Technical Specification 5.4, "Procedures," was identified for the licensee's failure to establish adequate procedures to detect degradation of the startup transformer power cables. Station procedure IP/0/A/2400/002, "Substation Insulators, Lighting Arrestors, CCVT, Transformer Drop Down Line, Bus Inspection and Maintenance," lacked sufficient detail for maintenance personnel to properly inspect power cables for cracks and fraying. This allowed undetected degradation of the Oconee startup transformer power cables to develop causing the Unit 3 startup transformer to become inoperable.

Description: On December 7, 2015, the "Y" phase power feed to the Unit 3 startup transformer power cable severed due to fatigue cracking caused by Aeolian vibrations. The power cable is 4/0 aluminum conductor steel reinforced (ACSR) 6/1 stranding consisting of six outer strands of aluminum wire of 0.188 inch diameter wire concentrically stranded around a single steel 0.188 inch diameter core wire. During the licensee's industry operating experience review, the licensee determined that this size wire is susceptible to Aeolian vibrations. Overhead bus line conductor movement had been observed many times by multiple site personnel over the life of the plant but was never officially documented.

The NRC inspectors discovered that the Unit 2 startup transformer had experienced broken strands on its power cables in 2002. Oconee Nuclear Station Engineering and Maintenance departments determined due to the nature of the breaks that the broken strands in 2002 were the result of mechanical stress. Oconee personnel noted the cables were more susceptible to movement in the wind and movement during energization as a result of electric and magnetic forces. Licensee corrective actions for the Unit 2 issue included replacing the portion of these power cables which drop vertically down from the horizontally run lines from the Oconee 230KV switchyard. Additional corrective actions included inspections of the Unit 1 and Unit 3 startup transformer power cables. Those inspections were accomplished on Unit 1 on November 6, 2006 and on Unit 3 on April 12, 2012. The licensee accomplished those inspections utilizing station procedure IP/0/A/2400/002, "Substation Insulators, Lighting Arrestors, CCVT, Transformer Drop Down Line, Bus Inspection and Maintenance."

During the review of the December 7, 2015 event, the NRC inspectors reviewed procedure IP/0/A/2400/002 and noted that Section 7.4, "Transformer Drop Down Line Maintenance," requires the licensee to ensure all connections are clean, to inspect all connections for cracks and fraying, and approved electrical joint compound is applied to all connections. However, the procedure does not inspect the actual cable to ensure that all strands of the cable are intact. The licensee also came to the same conclusion in

their final apparent cause determination.

As discussed above, the last time the licensee inspected CT-3 startup transformer cable using procedure IP/0/A/2400/002 was on April 25, 2012. During this inspection the licensee did not identify any adverse conditions.

Analysis: The licensee's failure to establish an adequate procedure to detect degradation of startup transformer power cables during periodic maintenance was a performance deficiency. The performance deficiency was determined to be more than minor because it was 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 (i.e. core damage). Specifically, the power cable failure caused inoperability of the Unit 3 startup transformer. The finding was screened in accordance with IMC 0609, "Significance Determination Process," Attachment 4, "Initial Characterization of Findings," and IMC 609 Appendix A "The Significance Determination Process for Findings At-Power," and was determined to require a detailed risk evaluation. A senior reactor analyst performed a detailed risk evaluation of this condition. A bounding calculation was performed that assessed both the long term degradation of CT-3 and the short term when the power cable was severed. The influential assumptions were: 1) that other dissimilar transformers that supply electrical power to the unit (i.e., CT-4 and CT-5) were not adversely affected by this performance deficiency, and 2) the underground power path from the Keowee hydro units was assumed to be unavailable at its nominal value. The dominant accident sequence was a loss of offsite power where electrical power to the unit failed in part due to the performance deficiency and core damage resulted. The delta CDF result was 3E-7 (Green).

The finding was determined to have a cross-cutting aspect of evaluation in the problem identification and resolution cross-cutting area because the licensee's corrective actions resulting from the degraded power cable in 2002 failed to incorporate sufficient detail into their procedures necessary to detect frayed cables. (P.2)

Enforcement: Oconee Nuclear Station Technical Specification 5.4, "Procedures," requires 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. Appendix A of Regulatory Guide 1.33, Revision 2 states that maintenance that can affect the performance of safety-related equipment should be properly preplanned and performed in accordance with written procedures, documented instructions, or drawings appropriate to the circumstances. Contrary to the above, leading to the date of the event (December 7, 2015) the licensee failed to establish an adequate procedure to detect degradation of the startup transformer power cables. Specifically, station procedure IP/0/A/2400/002, "Substation Insulators, Lighting Arrestors, CCVT, Transformer Drop Down Line, Bus Inspection and Maintenance," contained insufficient details for station personnel to perform adequate inspections of the Oconee Nuclear Station startup transformer power cable necessary to detect degradation of individual strands of the cables. The licensee entered this issue into their corrective program as NCR 01733811. Additionally, the licensee performed repair activities on the degraded power cables to remove areas where strands of the power cables were severed and re-established proper connections. Also, the licensee created work orders in their work management process to replace the drop down lines on the

Unit 1 and Unit 3 startup transformers. This violation is being treated as an NCV consistent with Section 2.3.2.a of the Enforcement Policy. (NCV 05000287/2016002-03, "Degraded Power Cables Result in Inoperable Startup Transformer and Loss of Unit 3 Safety Function")

.ii NCV 05000287/2016002-04, "Failure to Make a Non-Emergency Eight Hour Notification of a Loss of Safety Function."

Introduction: An NRC-identified Severity Level IV NCV of 10 CFR 50.72(b)(3)(v) was identified for the licensee's failure to make a required non-emergency eight hour notification for a loss of the emergency AC power path function. On December 7, 2015 Oconee Nuclear Station Unit 3 experienced a loss of the emergency AC power path function for approximately 21 minutes.

Description: At 5:00 AM on December 7, 2015, Unit 3 operations personnel declared the underground emergency AC power path inoperable and implemented a tagout to electrically isolate the Unit 3 main feeder bus #2 emergency power circuit breaker (S-2). Technical Specification 3.8.1 requires this breaker to be operable to ensure the underground emergency AC power path and the backup power path from Lee combustion turbines are available. During the implementation of the tagout, operations personnel discovered a previously implemented tagout interfered with the completion of the isolation of circuit breaker S-2.

At 8:20 AM on December 7, 2015 an outside auxiliary operator discovered a severed power cable on the safety related Unit 3 startup transformer. The operator reported the condition to the work control supervisor (licensed SRO) who came to the general location of the transformer to evaluate the condition. The work control supervisor called the system engineer to assist in the evaluation of the severed power cable. At 8:47 AM the work control supervisor informed the Unit 3 control room supervisor of the degraded condition of the safety related Unit 3 startup transformer. The Unit 3 control room supervisor declared the startup transformer inoperable and logged entry into Technical Specification 3.8.1 Condition A (a 36 hour LCO).

At the time of the discovery (8:20AM) of the Unit 3 startup transformer severed power cable, the operators implementing the S-2 tagout were discussing the tagout interference with the Unit 3 control room supervisor. At 8:41 AM on December 7, 2015, the licensee decided to restore circuit breaker S-2 to an operable status. At this time, the licensee restored operability of the underground path.

The licensee evaluated the above conditions for reportability and determined that an eight hour non-emergency report was not required for loss of safety function because the loss of function did not exist at the point the Unit 3 startup transformer was declared inoperable. NUREG-1022, "Event Report Guidelines 10 CFR 50.72 and 50.73," Section 2.5, "Time Limits for Reporting," states in part: "The discovery date is generally the date when the event was discovered rather than the date when an evaluation of the event is completed. For example, if a technician sees a problem, but a delay occurs before an engineer or supervisor has a chance to review the situation, the discovery date (which starts the 60-day clock) is the date that the technician sees a problem." 10 CFR 50.72(b)(3)(v) states in part: "Any event or condition that at the time of discovery could have prevented the fulfillment of the safety function of structures or systems that are need to: (A) shutdown the reactor and maintain it in a safe condition; (B) remove residual

heat; (C) control the release of radioactive material; or (D) mitigate the consequences of an accident." The licensee evaluated the above statements and determined that since it was fleet policy to declare the "point of discovery" at the time that the control room supervisor (licensed SRO) declares a component inoperable, the issue was not reportable. The licensee did recognize that a loss of safety function existed for 21 minutes while circuit breaker S-2 was being restored to an operable status. The licensee did submit an LER within the required time limits under 10 CFR 50.73(a)(2)(v), an event or condition that could have prevent fulfillment of a safety function.

Analysis: The failure to make an eight hour non-emergency report for a loss of the emergency AC power path function per 10 CFR 50.72(b)(3)(v) was a performance deficiency. This performance deficiency impacted the ability of the NRC to perform its regulatory oversight function and was dispositioned using traditional enforcement. This violation was assessed using Section 2.2.4 of the NRC's Enforcement Policy, revised February 4, 2015. Using the example listed in Section 6.9.d.9, "A licensee fails to make a report required by 10 CFR 50.72," the issue was determined to be a Severity Level IV violation. In accordance with IMC 0612, because this violation involved traditional enforcement and does not have an underlying technical violation that would be considered more than minor, a cross-cutting aspect was not assigned to this violation.

Enforcement: 10 CFR 50.72(b)(3)(v), 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 at the time of discovery could have prevent the fulfillment of the safety function of structures or systems that are needed to: (A) shut down the reactor and maintain it in a safe condition; (B) remove residual heat; (C) control the release of radioactive material; or (D) mitigate the consequences of an accident." Contrary to the above, on December 7, 2015, the licensee failed to notify the NRC within eight hours of a loss of the emergency AC power function of Oconee Nuclear Station Unit 3. The licensee entered this issue into their corrective action program as NCR 01981762 and will evaluate their internal reportability procedures regarding the time of discovery. Because the violation was determined to be a SL IV violation and the licensee has entered the issue into their corrective action program, this violation is being treated as an NCV, consistent with Section 2.3.2.a of the NRC Enforcement Policy. This finding will be tracked as NCV 05000287/2016002-04, "Failure to Make a Non-Emergency Eight Hour Notification of a Loss of Safety Function."

4OA5 Other Activities

(Closed): URI 05000269, 270, 287/2016007-01, Pressure Boundary of Motor Operated Valves Could be Breached Due to Fire-Induced Hot Short

a. Inspection Scope

During an NRC Triennial Fire Protection Inspection (TFPI), as documented in NRC Inspection Report 05000269, 270, 287/2016007, inspectors documented a URI regarding the licensee's evaluation of certain motor operated valves (MOVs) in the Nuclear Safety Capability Assessment (NSCA). The NSCA demonstrates how the licensee can safely achieve and maintain safe and stable plant conditions in the event of a fire. As a part of the licensee's transition to NFPA 805, the licensee identified a number of MOVs that could be susceptible to hot shorts that bypass the torque or limit switch and could result in damage to the valves that cause an unmitigated loss of reactor

coolant system (RCS) inventory due to leakage through the damaged valves' pressure boundary or the valves' associated sealing components. These valves were classified as non-compliant components or variances from deterministic requirements (VFDRs). The subsequent evaluation of these valves by the licensee's Fire PRA group determined that these VFDRs met the acceptance criteria of the Fire Risk Evaluation, as documented in OSC-9314, as being acceptable "as-is" and that no further action was required. After additional evaluation, Oconee Valve Engineering determined that, due to the size of the installed motor/gearbox, 9 MOVs could potentially suffer this type of valve damage, to the extent that the integrity of the valve body or bonnet could be compromised. For the 9 affected valves, the licensee performed additional evaluations to determine whether some portion of the valve would fail before the valve's pressure boundary is compromised, or that any possible leakage that may result can be bounded by the credited RCS make-up source—in this case, the reactor coolant make-up pump.

The licensee's additional evaluations demonstrated that damage to the valve body would not occur for the 9 affected valves. Inspectors posed additional questions about the effect on the sealing performance of the packing/joint seals of the valves, and the licensee was able to show that the postulated motor stall events would not be expected to cause excessive leakage from the valve's sealing components.

b. Findings

No findings were identified.

4OA6 Meetings, Including Exit

On July 19, 2016, the resident inspectors presented the inspection results to Mr. Scott Batson and other members of the licensee's staff. The inspectors verified that no proprietary information was retained by the inspectors or documented in this report.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

K. Adomako, System Engineer
D. Berkshire, Senior Scientist
A. Best, BACCP
E. Burchfield, Engineering Manager
K. Ellis, ISI Program Owner
P. Downing, Corporation SG Lead
A. Ginn, Containment ISI Program
M. Ginn, Site Engineering
M. Hatley, SG Site Lead
E. Lampe, Supervising Scientist, Radiation Protection (RP) Tech Staff
P. Metler, Sr. Nuclear Licensing Specialist
T. Ray, Plant Manager
L. D. Robinson, Radiation Protection Manager
T. Thulien, Duke Energy Level III
A. Wallach, Scientist II
C. Wasik, Regulatory Affairs Manager
A. Wells, Fire Protection Engineering Manager

NRC Personnel

E. Crowe, Sr. Resident Inspector
N. Childs, Resident Inspector

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000287/2016002-01	NCV	Failure to Perform ISI General Visual Examinations of Containment Moisture Barrier (Section 1R08)
05000269/270/287/2016002-02	NCV	Failure to Properly Control Transient Combustible Materials in the Oconee Main Control Rooms (Section 4OA2)
05000287/2016002-03	NCV	Degraded power cables result in inoperable startup transformer and loss of Unit 3 safety function (Section 4OA3)
05000287/2016002-04	NCV	Failure to Make a Non-Emergency Eight Hour Notification of a Loss of Safety Function (Section 4OA3)

Discussed

None

Opened

None

Closed

05000287/2015-02	LER	Broken Electrical Conductor Supplying Unit 3 Start-up Transformer (Section 4OA3)
05000269/287/2016008-01	URI	Potential lack of adequacy of the licensee's maintenance program to detect substantial degradation of cables and their connections used on Oconee large oil filled stationary transformers (Section 4OA3)
05000269, 270, 287/2016007-01	URI	Pressure Boundary of Motor Operated Valves Could be Breached Due to Fire-Induced Hot Short (Section 4OA5)

LIST OF DOCUMENTS REVIEWED

Section 1R01: Adverse Weather Protection

Documents

Confirmatory Action Letter – Oconee Nuclear Station, Units 1, 2, and 3 Commitments to Address External Flooding Concerns, dated June 22, 2010
COP-NUC-P01, TSC-SOC Response to Nuclear Switchyard Low Voltage, Rev. 004
ONS-PSW-SUB-01, Oconee Nuclear Station PSW Substation and Oconee Site 100KV Substation Operating Guidelines Interface Agreement, Rev. 000
OSC-7256, External Flood/Ground Water Mitigation Requirements, Rev. 002
Job Plan – GN-11921

Procedures

AP/0/A/1700/006, Natural Disaster, Rev. 027
AP/0/A/1700/047, External Flood Mitigation, Rev. 019
AP/1/A/1700/013, Dam Failure, Rev. 033
NSD, Generation Risk Management Process, Rev. 017
OP/0/A/1107/016, Removal and Restoration of Switchyard Electrical Equipment, Rev. 038
OP/0/A/1107/016A, Removal and Restoration of 230KV Transmission Lines, Rev. 016
OP/0/A/1107/016B, Removal and Restoration of 525KV Transmission Lines, Rev. 015
OP/0/A/1107/016E, Removal and Restoration of 230KV Switchyard Buses, Rev. 016
OP/0/A/1107/016F, Removal and Restoration of 525KV Switchyard Buses, Rev. 012
RP/0/A/1000/035, Severe Weather Preparations, Rev. 001

Work Orders

Duke Hydro WO 104472249

Section 1R04: Equipment Alignment

Drawings

OFD-124A-3.1, Flow Diagram of Low Pressure Service Water System Turbine Bldg. (Low Pressure Service Water Pumps), Rev. 037
OFD-124A-3.2, Flow Diagram of Low Pressure Service Water System Turbine Bldg. (Main Turbine Oil Tank), Rev. 030
OFD-124A-3.3, Flow Diagram of Low Pressure Service Water System (Turbine Bldg. Services), Rev. 027
OFD-124B-1.1, Flow Diagram of Low Pressure Service Water System (Auxiliary Building Services), Rev. 065
OFD-124B-2.1, Flow Diagram of Low Pressure Service Water System (Auxiliary Building Services), Rev. 074
OFD-124B-3.1, Flow Diagram of Low Pressure Service Water System (Auxiliary Building Services), Rev. 061
OFD-124B-3.2, Flow Diagram of Low Pressure Service Water System (Reactor Building Cooling Units 3A, 3B, & 3C Cooling Coils), Rev. 029
OFD-124B-3.3, Flow Diagram of Low Pressure Service Water System (Reactor Building Ventilation Cooling), Rev. 018
OFD-124B-3.4, Flow Diagram of Low Pressure Service Water System (R.C. Pump Motor Cooling & R.B. Fire Protection), Rev. 035
OFD-124B-3.5, Flow Diagram of Low Pressure Service Water System (Radiation Monitors),

Rev. 011
OFD-124B-3.6, Flow Diagram of Low Pressure Service Water System (LPSW) Auxiliary Building Air Handling Units, Rev. 025
OFD-124B-3.7, Flow Diagram of Low Pressure Service Water System (Air Handling Unit Drains), Rev. 002
OFD-144A-1.1, Flow Diagram of Component Cooling System (Supply & Return), Rev. 016
OFD-144A-2.1, Flow Diagram of Component Cooling System (Supply & Return), Rev. 012
OFD-144A-3.1, Flow Diagram of Component Cooling System (Supply & Return), Rev. 014

Documents
Oconee Nuclear Station Protected Equipment Log for May 10, 2016
Oconee Nuclear Station Protected Equipment Log for June 15, 2016
SSS-LPW, Low Pressure Service Water (LPSW), Rev. 023c

Procedures
OP-OC-SSS-LPW, Low Pressure Service Water (LPSW), Rev. 023a
OP-OC-SSS-LPW, Low Pressure Service Water (SSS-LPW), Rev. 023c

Section 1R05: Fire Protection

Documents
O-0-SOG-9000-020, Fire Brigade Guideline: 20 - Key Equipment List by Fire Zone, Rev. 000
O-FS-3-AB-9771-001, Pre-Fire Plan for Unit 3 Auxiliary Bldg., Elev. 771' & 783', Rev. 001
O-FS-3-AB-9783-001, Pre-Fire Plan for Unit 3 Auxiliary Bldg., Elev. 783', Rev. 001
O-FS-3-RB-9000-001, Pre-Fire Plan for Unit 3 Reactor Bldg., Elev. 777' – 861', Rev. 001
O-FS-1-TB-9796-001, Pre-Fire Plan for Unit 1 Turbine Bldg., Elev. 796', Rev. 001
O-FS-2-TB-9775-001, Pre-Fire Plan for Unit 2 Turbine Bldg., Elev. 775', Rev. 000

Other
Oconee Nuclear Site Second Quarter 2016 Fire Drill # 02-16-02

Procedures
PT/0/B/0250/030, Quarterly Fire Brigade Equipment Inspection, Rev. 022

Section 1R06: Flood Protection Measures

Documents
OSC-8671, Auxiliary Building Design Flood Values, Rev. 005

Section 1R08: Inservice Inspection Activities

Drawings
0-2438-114883-01, Isometric Piping Layout RC Makeup Connection, Rev. B
0-2441, Piping Layout Plan – Main Steam, Rev. 010
0-67B, Basement Floor, Rev. 008
0-67A-005, Basement Floor Slab – Concrete Details, Rev. 000
0-1067A-1, Basement Floor Slab Concrete Section & Details, Rev. 003
0-67A, Basement Floor Slab, Rev. 040
0-ISIC2-2062-0001, Concrete Containment Inservice Inspection Areas, Rev. 001
0-ISIC2-2062-0002, Concrete Containment Inservice Inspection Areas, Rev. 001
0-ISIC2-2062-0003, Concrete Containment Inservice Inspection Areas, Rev. 001
0-ISIC2-2062-0004, Concrete Shell Wall Inservice Inspection Areas, Rev. 001
0-ISIC2-2062-0005, Concrete Shell Wall Inservice Inspection Areas, Rev. 001
0-ISIC2-2062-0006, Concrete Shell Wall Inservice Inspection Areas, Rev. 001

0-ISIC2-2062-0007, Concrete Shell Wall Inservice Inspection Areas, Rev. 001
0-ISIC2-2062-0008, Containment Liner Plate Inservice Inspection Areas, Rev. 001
0-ISIC2-2062-0009, Containment Liner Plate Inservice Inspection Areas, Rev. 004
0-ISIC2-2062-0010, Containment Liner Plate Inservice Inspection Areas, Rev. 003
0-ISIC2-2062-0011, Containment Liner Plate Inservice Inspection Areas, Rev. 002
0-ISIC2-2062-0012, Containment Liner Plate Penetrations Inservice Inspection Areas, Rev. 001
0-ISIC2-2062-0013, Containment Liner Plate Penetrations Inservice Inspection Areas, Rev. 001
0-ISIC2-2062-0014, Equipment Hatch Inservice Inspection Areas, Rev. 001
0-ISIC2-2062-0015, Emergency Personnel Air Lock Inservice Inspection Areas, Rev. 001
0-ISIC2-2062-0016, Emergency Personnel Air Lock Inservice Inspection Areas, Rev. 001
0-ISIC2-2062-0017, Personnel Air Lock Inservice Inspection Areas, Rev. 001
0-ISIC2-2062-0018, Personnel Air Lock Inservice Inspection Areas, Rev. 001
0-ISIC2-2062-0019, Containment Metal Line Penetration Table, Rev. 001
3-09-0024, Main Steam Relief Valves from 3A & 3B, Rev. 004
3-LP-0252, Low Pressure Injection System from BWST to Drain, Rev. 000
3-LPS-0613, Low Pressure Service Water 3A1 and 3B1 Reactor Coolant Pump Motor Cooler Inlet, Rev. 013
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