UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
245 PEACHTREE CENTER AVENUE N.E., SUITE 1200
ATLANTA, GEORGIA 30303-1200

October 28, 2021

Mr. Steven M. Snider
Site Vice President
Duke Energy Carolinas, LLC
7800 Rochester Highway
Seneca, SC 29672-0752

SUBJECT: OCONEE NUCLEAR STATION – INTEGRATED INSPECTION REPORT 05000269/2021003 AND 05000270/2021003 AND 05000287/2021003

Dear Mr. Snider:

On September 30, 2021, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Oconee Nuclear Station. On October 25, 2021, the NRC inspectors discussed the results of this inspection with you and other members of your staff. The results of this inspection are documented in the enclosed report.

Three findings of very low safety significance (Green) are documented in this report. These findings involved violations of NRC requirements. We are treating these violations as non-cited violations (NCVs) consistent with Section 2.3.2 of the Enforcement Policy.

If you contest the violations or the significance or severity of the violations documented in this inspection report, you should provide a response within 30 days of the date of this inspection report, with the basis for your 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; and the NRC Resident Inspector at 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 U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region II; and the NRC Resident Inspector at Oconee Nuclear Station.

This letter, its enclosure, and your response (if any) will be made available for public inspection and copying at http://www.nrc.gov/reading-rm/adams.html and at the NRC Public Document Room in accordance with Title 10 of the *Code of Federal Regulations* 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

/RA/

Eric J. Stamm, Chief
Reactor Projects Branch 1
Division of Reactor Projects

Docket Nos. 05000269 and 05000270 and 05000287
License Nos. DPR-38 and DPR-47 and DPR-55

Enclosure:
As stated

cc w/ encl: Distribution via LISTSERV®

SUBJECT: OCONEE NUCLEAR STATION – INTEGRATED INSPECTION REPORT 05000269/2021003 AND 05000270/2021003 AND 05000287/2021003 dated October 28, 2021

DISTRIBUTION:
M. Kowal, RII
S. Price, RII
PUBLIC
RidsNrrPMOconee Resource
RidsNrrDro Resource

ADAMS ACCESSION NUMBER: ML21301A125

X SUNSI Review		X Non-Sensitive ☐ Sensitive		X Publicly Available ☐ Non-Publicly Available	
OFFICE	RII/DRP	RII/DRP	RII/DRP	RII/DFFI	RIV/DRP
NAME	J. Nadel	A. Ruh	N. Smalley	N. Peterka	T. DeBey
DATE	10/27/2021	10/25/2021	10/27/2021	10/27/2021	10/25/2021
OFFICE	RIIDRP	RIIDRP	RIIDRP		
NAME	A. Rosebrook	D. Jackson	E. Stamm		
DATE	10/22/2021	10/27/2021	10/28/2021		

OFFICIAL RECORD COPY

U.S. NUCLEAR REGULATORY COMMISSION
Inspection Report

Docket Numbers:	05000269, 05000270, and 05000287
License Numbers:	DPR-38, DPR-47, and DPR-55
Report Numbers:	05000269/2021003, 05000270/2021003, and 05000287/2021003
Enterprise Identifier:	I-2021-003-0016
Licensee:	Duke Energy Carolinas, LLC
Facility:	Oconee Nuclear Station
Location:	Seneca, South Carolina
Inspection Dates:	July 01, 2021 to September 30, 2021
Inspectors:	J. Nadel, Senior Resident Inspector A. Ruh, Resident Inspector N. Smalley, Resident Inspector P. Cooper, Senior Reactor Inspector T. DeBey, Resident Inspector N. Peterka, Fuel Facility Inspector A. Rosebrook, Senior Reactor Analyst
Approved By:	Eric J. Stamm, Chief Reactor Projects Branch 1 Division of Reactor Projects

Enclosure

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee's performance by conducting an integrated inspection at Oconee Nuclear Station, in accordance with the Reactor Oversight Process. The Reactor Oversight Process is the NRC's program for overseeing the safe operation of commercial nuclear power reactors. Refer to https://www.nrc.gov/reactors/operating/oversight.html for more information.

List of Findings and Violations

Failure to Verify Capacity of Reactor Building Cooling Units			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000269,05000270,05000287/2021003-01 Open/Closed	None (NPP)	71111.07A
Inspectors identified a Green finding and associated non-cited violation (NCV) of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," when the licensee failed to verify the adequacy of design of the reactor building cooling units (RBCUs). Specifically, the licensee improperly evaluated RBCU performance test data when determining the fouling factor and heat transfer capability.			

Failure to Assess Internal Flooding Risk of Maintenance Activity			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000269,05000270,05000287/2021003-02 Open/Closed	[H.3] - Change Management	71111.13
The inspectors identified a Green finding and associated NCV of 10 CFR 50.65(a)(4) when the licensee failed to assess the risk associated with high pressure service water (HPSW) system alignments during testing.			

Failure to Install Shorting Jumpers in the Motor Driven Emergency Feedwater Pump 4160V Switchgears			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000269,05000270,05000287/2021003-03 Open/Closed	None (NPP)	71111.15
A self-revealed Green finding and associated NCV of 10 CFR Part 50, Appendix B, Criterion V, "Procedures, Instructions, and Drawings," was identified when it was discovered that a set of jumpers depicted on a plant drawing had never been installed on terminal blocks in 4160V safety-related switchgear 2TE15 for the 2B motor driven emergency feedwater pump.			

Additional Tracking Items

Type	Issue Number	Title	Report Section	Status
URI	05000269,05000270, 05000287/2020003-02	Operation of Normally Closed Seismic Boundary Valves	71111.18	Closed

PLANT STATUS

Unit 1 operated at or near 100 percent rated thermal power (RTP) for the entire inspection period.

Unit 2 operated at or near RTP until August 24, 2021, when power was reduced to 25 percent RTP due to a boric acid leak identified in containment. The unit was returned to 100 percent RTP on August 25, 2021, following a disposition that the leak was not from a primary pressure boundary. Unit 2 operated at or near RTP for the remainder of the inspection period.

Unit 3 operated at or near RTP for the entire inspection period.

INSPECTION SCOPES

Inspections were conducted using the appropriate portions of the inspection procedures (IPs) in effect at the beginning of the inspection unless otherwise noted. Currently approved IPs with their attached revision histories are located on the public website at http://www.nrc.gov/reading-rm/doc-collections/insp-manual/inspection-procedure/index.html. Samples were declared complete when the IP requirements most appropriate to the inspection activity were met consistent with Inspection Manual Chapter (IMC) 2515, "Light-Water Reactor Inspection Program - Operations Phase." The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel to assess licensee performance and compliance with Commission rules and regulations, license conditions, site procedures, and standards. Starting on March 20, 2020, in response to the National Emergency declared by the President of the United States on the public health risks of the coronavirus (COVID-19), resident and regional inspectors were directed to begin telework and to remotely access licensee information using available technology. During this time, the resident inspectors performed periodic site visits each week, increasing the amount of time on site as local COVID-19 conditions permitted. As part of their onsite activities, resident inspectors conducted plant status activities as described in IMC 2515, Appendix D; observed risk significant activities; and completed on site portions of IPs. In addition, resident and regional baseline inspections were evaluated to determine if all or a portion of the objectives and requirements stated in the IP could be performed remotely. If the inspections could be performed remotely, they were conducted per the applicable IP. In some cases, portions of an IP were completed remotely and on site. The inspections documented below met the objectives and requirements for completion of the IP.

REACTOR SAFETY

71111.01 - Adverse Weather Protection

Impending Severe Weather Sample (IP Section 03.02) (1 Sample)

(1) The inspectors evaluated the main control room response to a tornado warning, entry into procedure AP/0/A/1700/006, Natural Disaster, on August 17, 2021.

71111.04 - Equipment Alignment

Partial Walkdown Sample (IP Section 03.01) (4 Samples)

The inspectors evaluated system configurations during partial walkdowns of the following systems/trains:

(1) Low pressure service water system for Unit 3 on July 29, 2021, following failure of 3A pump to run
(2) Train 2B of motor driven emergency feedwater on August 12, 2021, during maintenance on the 2A train
(3) Keowee Units 1 and 2 on September 2, 2021, following breaker maintenance and alignment swap
(4) Train 3A of high pressure injection on September 9, 2021, following pump surveillance and alignment swap

71111.05 - Fire Protection

Fire Area Walkdown and Inspection Sample (IP Section 03.01) (5 Samples)

The inspectors evaluated the implementation of the fire protection program by conducting a walkdown and performing a review to verify program compliance, equipment functionality, material condition, and operational readiness of the following fire areas:

(1) Fire zone 15: Unit 2 main feed pump area, on August 10, 2021
(2) Fire zone 106: Unit 1 cable room, on August 30, 2021
(3) Fire zone 29: Unit 3 4160V switchgear, on August 30, 2021
(4) Fire zone 81: Unit 2 auxiliary building 200 level hallway, on September 3, 2021
(5) Fire zone 110: Units 1/2 control room, on September 26, 2021

71111.06 - Flood Protection Measures

Inspection Activities - Internal Flooding (IP Section 03.01) (1 Sample)

The inspectors evaluated internal flooding mitigation protections in the:

(1) Auxiliary building elevation 783' and 771' corridors

71111.07A - Heat Sink Performance

Annual Review (IP Section 03.01) (1 Sample)

The inspectors evaluated readiness and performance of:

(1) Unit 2 reactor building cooling units A, B, and C

71111.07T - Heat Sink Performance

Heat Exchanger (Service Water Cooled) (IP Section 03.02) (3 Samples)

The inspectors evaluated heat exchanger/sink performance on the following:

(1) Safe shutdown facility (SSF) HVAC Condenser #1 (CCW-CD-0001)
(2) Low pressure injection Cooler 1B – 1LPI-HX-000B
(3) Reactor building cooling unit A – 1RBCHX000A

71111.11Q - Licensed Operator Requalification Program and Licensed Operator Performance

Licensed Operator Performance in the Actual Plant/Main Control Room (IP Section 03.01) (1 Sample)

(1) The inspectors observed and evaluated licensed operator performance in the control room during a pump swap and comprehensive pump test for Unit 3 low pressure service water system on August 3, 2021, and during tornado warning on August 17, 2021.

Licensed Operator Requalification Training/Examinations (IP Section 03.02) (1 Sample)

(1) The inspectors observed and evaluated team skill exercises on multiple units with the following scenarios: 1) elevated reactor coolant system (RCS) dose equivalent iodine, turbine master trip to hand, 1A main steam line break, 1A steam generator tube rupture; 2) loss of startup transformer (CT) 4, Keowee Hydro Units (KHU) operational checks, support Unit 3 loss of CT3; 3) loss of CT3, RCS/low pressure injection (LPI) leakage on July 8, 2021.

71111.12 - Maintenance Effectiveness

Maintenance Effectiveness (IP Section 03.01) (2 Samples)

The inspectors evaluated the effectiveness of maintenance to ensure the following structures, systems, and components (SSCs) remain capable of performing their intended function:

(1) Protected service water system, failures of 3B high pressure injection (HPI) pump transfer switch and 3HP-24 control switch on March 29, 2021, and May 13, 2021, respectively (nuclear condition reports (NCR) 2382256, 2376228)
(2) Unit 3 containment isolation penetrations and valves, failures on April 16, 2020, April 28, 2020, and July 11, 2020 (NCRs 2327394, 2327585, 2338927, 2325782)

Aging Management (IP Section 03.03) (1 Sample)

The inspectors evaluated the effectiveness of the aging management program for the following SSCs that did not meet their inspection or test acceptance criteria:

(1) Keowee Units 1 and 2 penstock and power tunnel four-year civil inspection, NCR 2390576

71111.13 - Maintenance Risk Assessments and Emergent Work Control

Risk Assessment and Management Sample (IP Section 03.01) (4 Samples)

The inspectors evaluated the accuracy and completeness of risk assessments for the following planned and emergent work activities to ensure configuration changes and appropriate work controls were addressed:

(1) Units 1, 2, and 3 elevated yellow risk on July 8, 2021, due to fire protection system flow testing

(2) Unit 3 yellow risk on July 12, 2021, during 3C LPI pump and protected service water battery charger #1 maintenance
(3) Units 1, 2, and 3 elevated green risk on July 20, 2021, due to both Keowee hydrostation units out of service for planned maintenance and inspection
(4) Unit 2 green risk on August 24, 2021, with yellow grid risk and Unit 2 at 25 percent power due to reactor coolant system leakage in containment

71111.15 - Operability Determinations and Functionality Assessments

Operability Determination or Functionality Assessment (IP Section 03.01) (6 Samples)

The inspectors evaluated the licensee's justifications and actions associated with the following operability determinations and functionality assessments:

(1) Work request (WR) 20206702, work order (WO) 20484010, NCR 02392361, Unit 2 motor driven emergency feedwater pump after motor failing to run and exceeding starting duties while troubleshooting
(2) NCR 2392364, 2B motor driven emergency feedwater pump damaged terminal block
(3) NCRs 2394935 and 2395220, Unit 2 unidentified leakage increase and discovery of boric acid in Unit 2 containment basement
(4) NCR 2396614, gas void identified at 3BS-27 and 3BS-28 measuring 0.012 cubic feet
(5) NCR 2399553, steam leak from bottom flange of 2MS-95 during turbine driven emergency feedwater pump testing
(6) NCR 2399025, closing function of 1, 2, and 3HP-26 not evaluated in motor operated valve program

71111.19 - Post-Maintenance Testing

Post-Maintenance Test Sample (IP Section 03.01) (7 Samples)

The inspectors evaluated the following post-maintenance test activities to verify system operability and functionality:

(1) IP/2/A/0400/022, KHU-2 Turbine Sump Pump Level Control Switch Calibration, after level switch replacement, WO 20474456, on July 7, 2021
(2) PT/3/A/0203/006 A, Low Pressure Injection Pump Test – Recirculation, for the 3C LPI pump following pump internals replacement, WO 20429385, on July 14, 2021
(3) OP/0/A/2000/041, KHS - Modes of Operation, maintenance runs on Keowee Hydroelectric Units 1 and 2 following a dual unit maintenance outage, on July 21, 2021
(4) IP/3/A/4980/051 A, CO-5, CO-6, CO-7, CO-8, and CO-11 Relay Test, and IP/3/A/4980/050 A, Brown Boveri GR-5 Ground Shield Relay Test, following relay replacements on 3TC-11 for 3A low pressure service water pump, WOs 20483072, 20483069, on July 28, 2021
(5) MP/0/A/1200/010 A, Relief Valve Set Pressure Testing and Adjustment, and leak checks following replacement of K1-AB-17 on ACB-1, on August 31, 2021
(6) IP/0/A/2001/002, Inspection and Maintenance of Keowee Hydro Station Air Circuit Breakers, following replacement of ACB-4 low-low pressure switch, on September 2, 2021
(7) PT/2/A/0600/012, Turbine Driven Emergency Feedwater Pump Test, following an electrical relay replacement, on September 28, 2021

71111.22 - Surveillance Testing

The inspectors evaluated the following surveillance tests:

Surveillance Tests (other) (IP Section 03.01) (5 Samples)

(1) PT/2/A/0600/013, 2B Motor Driven Emergency Feedwater Pump Test, on April 26, 2021
(2) OP/0/A/1600/010, SSF Diesel-Generator, monthly surveillance run, on July 14, 2021
(3) PT/0/A/0620/009, Keowee Hydro Operations, Unit 2 operability run, on July 22, 2021
(4) PT/0/A/0620/009, Keowee Hydro Operations, Unit 1 operability run, on July 22, 2021
(5) PT/0/A/0400/15, SSF Submersible Pump Test, on September 14, 2021

Inservice Testing (IP Section 03.01) (1 Sample)

(1) PT/0/A/0250/025, HPSW Pump and Fire Protection Flow Test, on September 24, 2021

RCS Leakage Detection Testing (IP Section 03.01) (1 Sample)

(1) PT/0/A/0102/008, Rebaselining of Unit 2 unidentified leakage values, on September 1, 2021

71114.06 - Drill Evaluation

Drill/Training Evolution Observation (IP Section 03.02) (1 Sample)

The inspectors evaluated:

(1) Training drill 2021-02 on August 18, 2021, which included turnover from Team 4 to Team 1, Shift C, and included participation from the Emergency Operations Facility and the Joint Information Center.

OTHER ACTIVITIES – BASELINE

71151 - Performance Indicator Verification

The inspectors verified licensee performance indicators submittals listed below:

MS09: Residual Heat Removal Systems (IP Section 02.08) (3 Samples)

(1) Unit 1 (July 1, 2020 through June 30, 2021)
(2) Unit 2 (July 1, 2020 through June 30, 2021)
(3) Unit 3 (July 1, 2020 through June 30, 2021)

BI01: Reactor Coolant System (RCS) Specific Activity Sample (IP Section 02.10) (3 Samples)

(1) Unit 1 (July 1, 2020 through June 30, 2021)
(2) Unit 2 (July 1, 2020 through June 30, 2021)
(3) Unit 3 (July 1, 2020 through June 30, 2021)

71152 - Problem Identification and Resolution

Semiannual Trend Review (IP Section 02.02) (1 Sample)

(1) The inspectors reviewed the licensee's corrective action program and the 1T2021 Trending Report on July 15, 2021, for potential adverse trends in work planning and implementation risk recognition that might be indicative of a more significant safety issue.

Annual Follow-up of Selected Issues (IP Section 02.03) (1 Sample)

The inspectors reviewed the licensee's implementation of its corrective action program related to the following issues:

(1) NCRs 2392172, 2392364, 2391434, 2B motor driven emergency feedwater pump repeat failure to run in February 2021 and August 2021 due to damaged terminal block.

OTHER ACTIVITIES – TEMPORARY INSTRUCTIONS, INFREQUENT AND ABNORMAL

2515/194 - Inspection of the Licensee's Implementation of Industry Initiative Associated With the Open Phase Condition Design Vulnerabilities In Electric Power Systems (NRC Bulletin 2012-01)

Revision 0 of this Temporary Instruction (TI) was previously inspected, and closed, in Inspection Report 2019013 (ADAMS ML19318G943.) However, a subsequent revision to the Nuclear Energy Institute (NEI) Voluntary Initiative (Revision 3) provided plants the option of to leave the open phase protection (OPP) system in monitoring mode only in lieu of activating the automatic trip circuitry, provided it was supported by a risk evaluation. Revision 1 (and later Revision 2) of this TI was issued to provide inspection guidance for the new option.

The inspectors reviewed licensee analyses and procedures that demonstrated operator manual actions would successfully mitigate the impact of an open phase condition (OPC). The analyses were reviewed remotely, and the procedures were reviewed and walked down on site. The inspectors completed Section 03.01c of TI 2515/194, Revision 2.

The inspectors verified that modeling used for the OPC reflected the as-designed and as-built plant, assumptions made by the licensee were reasonable, and licensee procedures were adequate to successfully respond to an OPC. The inspectors also verified that human reliability analysis and recovery evaluations were done in accordance with NEI and voluntary initiative guidance.

During the two-year monitoring period there were two instances of spurious actuations of the OPP logic which would have resulted in a loss of off-site power. These spurious trips were documented in the licensee corrective action program as action request (AR) 2296030 (October 2019) and AR 2356836 (November 2020). Both spurious trips were the result of grid perturbations due to switching operations in the switchyard. Corrective actions included additional monitoring consultation with the vendor and recommended changes to the time delay relay setting. The OPP system was not in automatic so there was no impact on plant operations.

INSPECTION RESULTS

<table>
<tr><td colspan="4">Failure to Verify Capacity of Reactor Building Cooling Units</td></tr>
<tr><td>Cornerstone</td><td>Significance</td><td>Cross-Cutting Aspect</td><td>Report Section</td></tr>
<tr><td>Mitigating Systems</td><td>Green
NCV
05000269,05000270,05000287/2021003-01
Open/Closed</td><td>None (NPP)</td><td>71111.07A</td></tr>
<tr><td colspan="4">Inspectors identified a Green finding and associated non-cited violation (NCV) of 10 CFR Part 50, Appendix B, Criterion III, “Design Control,” when the licensee failed to verify the adequacy of design of the reactor building cooling units (RBCUs). Specifically, the licensee improperly evaluated RBCU performance test data when determining the fouling factor and heat transfer capability.</td></tr>
<tr><td colspan="4">Description: RBCU fouling is routinely monitored during plant operation because tube-side fouling from the low pressure service water system increases over time and reduces the capability of the RBCUs. On November 18, 1997, site engineers revised calculation OSC-5667, “Reactor Building Cooling Unit Performance Test – Unit 3,” to use a different methodology for calculating the internal fouling factor reflected by performance test data. Engineers made this revision because the performance test data of brand-new cooling coils were analyzed with validated vendor software and the results indicated that the coils were performing as if they were somewhat fouled. Engineers suspected the lost cooling performance was related to a non-uniform airflow distribution across the coil, rather than fouling, and that the fouling factors being obtained during performance tests were higher than what truly existed. Engineers used the fouling factor and vendor-provided tables to extrapolate the RBCU cooling capacity to design basis accident conditions for comparison against acceptance criteria derived from cooling capacity assumptions in the plant’s safety analyses. If the obtained fouling factors were overly/conservatively high, then RBCU performance was being underpredicted which prompted more frequent testing. Engineers, in consultation with the vendor, sought to obtain a more realistic fouling factor by determining an “effective RBCU coil length” from the clean coil test data. A reduced surface area was assumed by reducing the length of the coils in the software until a zero fouling factor was obtained. After doing this for all nine RBCUs, a statistical average of those reduced lengths plus two standard deviations was established as the “effective RBCU coil length.” This artificial coil length amounted to 73 percent of the actual coil length and represented a reduction in coil capacity attributable to non-fouling sources and was used when determining the fouling factor from all routine RBCU performance tests since 1997 for all three units.

Inspectors assessed that the methodology change may be appropriate for the purpose of determining the actual physical fouling of the coils, however, the negative effect on RBCU capacity from the suspected non-uniform airflow in Oconee’s installation was no longer being accounted for by the method. This negative effect was important because the vendor’s tables for extrapolating RBCU performance to accident conditions were based on similar software that assumed a uniform air distribution across the full actual coil length. Secondly, adjustments to the fouling factor associated with instrument uncertainty of performance test equipment was originally derived based on the full coil length and was not re-derived for analyses using a shorter coil length, which was non-conservative. An additional complicating factor was that performance testing was done with the RBCU fan in high speed, whereas during an accident, the fan would be operated in low speed. How the fan speed related to the</td></tr>
</table>

air distribution effect was not readily known, but engineers suspected that the negative effect would be less in low speed.

When these calculational errors were evaluated, revisions to other calculations were required to establish operability of the RBCUs. The post-accident containment analyses were re-run assuming a 23 percent reduction in the previously assumed RBCU capacity to generate a new post-accident temperature profile. The effect resulted in a temperature increase of approximately 10 degrees Fahrenheit over the course of the accident. Some conservatism was removed from the environmental qualification of reactor building equipment to accommodate the elevated post-accident temperature effects and the licensee determined the equipment would still achieve the required post-accident life.

Corrective Actions: The licensee reperformed the post-accident containment analyses with a reduced RBCU capacity and initiated actions to revise environmental qualification calculations, test acceptance criteria, and the updated final safety analysis report.

Corrective Action References: NCR 2386632

Performance Assessment:

Performance Deficiency: The licensee's failure to verify the adequacy of design of the RBCUs per 10 CFR Part 50, Appendix B, Criterion III, was a performance deficiency. Specifically, the licensee improperly evaluated RBCU performance test data when determining the fouling factor and heat transfer capability.

Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the Design Control 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. Specifically, after evaluating the calculation errors, there was a reasonable doubt about the equipment's operability, which reduced assurance in the equipment's capability and required the licensee to revise other calculations in order to establish operability.

Significance: The inspectors assessed the significance of the finding using Appendix A, "The Significance Determination Process (SDP) for Findings At-Power." Using Exhibit 2, "Mitigating Systems Screening Questions," inspectors determined the finding was of very low safety significance (Green) because it was a deficiency affecting the design of the RBCUs, but they maintained their operability.

Cross-Cutting Aspect: Not Present Performance. No cross-cutting aspect was assigned to this finding because the inspectors determined the finding did not reflect present licensee performance.

Enforcement:

Violation: 10 CFR Part 50, Appendix B, Criterion III required, in part, that design control measures shall provide for checking the adequacy of design, such as by the performance of design reviews. Contrary to the above, since November 18, 1997, the design review calculations for RBCU performance test evaluations did not verify the adequacy of design of the RBCUs due to the use of non-conservative methods. Specifically, the licensee improperly evaluated RBCU performance test data when determining the fouling factor and heat transfer capability.

Enforcement Action: This violation is being treated as a non-cited violation, consistent with Section 2.3.2 of the Enforcement Policy.

Failure to Assess Internal Flooding Risk of Maintenance Activity			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000269,05000270,05000287/2021003-02 Open/Closed	[H.3] - Change Management	71111.13
The inspectors identified a Green finding and associated non-cited violation (NCV) of 10 CFR 50.65(a)(4) when the licensee failed to assess the risk associated with high pressure service water (HPSW) system alignments during testing.			
Description: On July 8, 2021, the licensee conducted performance test PT/0/A/0250/024, "Fire Protection System Three Year Flow Test." The purpose of the test was to verify adequate flow through fire protection piping headers by aligning flow from the elevated water storage tank (EWST) through various HPSW fire hydrants around the site. Enclosure 13.2 of the test required the primary instrument air compressor to be removed from service since the test would affect the normal HPSW cooling supply to that compressor. The limits and precautions of the procedure stated, "Anytime HPSW-21, HPSW-958 or 3HPSW-453 [are] open, Auxiliary Building flood concerns must be considered." This note was purposed to alert operators to the fact that certain alignments during the test would effectively bypass the 600 gallon per minute flood limiting valve, HPSW-960, because the test would open alternate 16-inch and 4-inch auxiliary building (AB) supply valves that could supply a piping failure in the AB. During the test, operators appropriately entered selected licensee commitment 16.9.11a, condition A, to restore the valves to a functional status within seven days. In terms of a maintenance risk assessment required by licensee procedure AD-WC-ALL-0240, "On-line Risk Management Process," the licensee had assessed the risk of the primary instrument air compressor being out of service and determined the risk was "Green" and that normal work controls were adequate. Inspectors noted that the internal flooding risk associated with directly connecting the 90,000 gallon EWST to the 16-inch non-seismic piping on the second floor of the AB through HPSW-21 and HPSW-958, was not considered in the risk assessment. When considered, the risk would indicate "Yellow" risk and require shift manager approval as well as other risk management actions. In March of 2020, Duke corporate probabilistic risk assessment specialists provided the site with new electronic risk assessment tool (ERAT) codes associated with AB flooding in document CSD-WC-ONS-0240, "ONS ERAT Guidance." One new code was specifically intended for application when either HPSW-21 or HPSW-958 are "opened and remain open." Implementing supervisors did not apply this ERAT code because the test procedure had an enclosure describing compensatory actions to realign the HPSW system in the event of a fire or AB flood event. Inspectors evaluated these compensatory actions as insufficient to maintain the isolation valves as still being capable of performing their intended function for their required duration (available). AD-WC-ALL-0240, Attachment 1, "Availability Determination," section 1.11 stated components that are out of normal alignment during testing are unavailable, unless one of the following is met: a) the component would be automatically repositioned to its safety position if needed to perform its safety function, b) the test procedure provides appropriate guidance for realigning in the event the SSC is needed to perform its safety function, c) manual action can be taken by a designated operator to restore the component. In this case, the use of a designated operator to perform manual actions to			

support equipment availability required meeting several additional criteria such as: approval from the operations shift manager that the manual actions were adequate, consideration of other duties of the personnel performing the manual actions, and consideration of the time limit for performing the manual actions. The licensee had not performed or made an assessment of these factors. Inspectors assessed that a large HPSW piping failure during these test alignments could permit flowrates in excess of 10,000 gallons per minute into the AB from the static pressure of the EWST. Automatic starting of one or both of the 6,000 gallon per minute HPSW pumps could also occur as the EWST level dropped, which could exacerbate the flooding. Considering that the maximum accumulation volume determined in calculation OSC-8671, "Auxiliary Building Flood Design Values," was conservatively determined to be approximately 40,000 gallons before flooding could spill over the protective curbing, a very limited amount of time appeared to be available for implementation of the procedure's compensatory measures. Operators were briefed on the actions but were not required to remain in the vicinity of the isolation valves during testing. Based on the multiple steps required and the various locations that the individuals performing the testing could be located and would need to respond to, there was reasonable doubt that the actions would be, "virtually certain of success (i.e., probability nearly equal to one during accident conditions)," as required by AD-WC-ALL-0240, Attachment 1.

A review of additional HPSW testing procedures revealed that PT/0/A/0250/005, "High Pressure Service Water Pump Functional Test," and PT/0/A/0250/025, "HPSW Pump and Fire Protection Flow Test," contained similar deficiencies. A review of testing from the previous 12 months revealed an additional occurrence on September 2, 2020, where site risk should have been classified as "Yellow" during the simultaneous removal from service of the 2B low pressure injection train.

Corrective Actions: The licensee updated the model work orders for three HPSW system test procedures to apply the proper risk assessment coding.

Corrective Action References: NCR 2391095

Performance Assessment:

Performance Deficiency: The licensee's failure to perform a risk assessment when required by licensee procedure AD-WC-ALL-0240 was a performance deficiency. Specifically, the licensee failed to assess the risk associated with unavailability of normally closed HPSW flood isolation valves when routine system testing opened them.

Screening: The inspectors determined 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. The mitigating cornerstone objectives were adversely affected since overall elevated plant risk would put the plant into a higher licensee-established risk category. Specifically, when considered, plant risk would have been assessed as "Yellow" on July 8, 2021, and September 2, 2020, when HPSW isolation valves were open in conjunction with other planned maintenance activities.

Significance: The inspectors assessed the significance of the finding using Appendix K, "Maintenance Risk Assessment and Risk Management SDP." Using flowchart 1, "Assessment of Risk Deficit," inspectors determined the finding was of very low safety significance (Green) because the incremental core damage probability deficit (ICDPD) was

less than 1E-6. The assumptions used were an incremental core damage frequency deficit of 1E-5 per year with a cumulative exposure time of 128 hours of isolation valve unavailability during routine HPSW tests in the previous 12 months, resulting in an ICDPD of 1.5E-7.

Cross-Cutting Aspect: H.3 - Change Management: Leaders use a systematic process for evaluating and implementing change so that nuclear safety remains the overriding priority. In this case, change management gaps associated with implementation of a new online risk management procedure, AD-WC-ALL-0240, in 2019, coupled with site-specific ERAT code changes through CSD-WC-ONS-0240 in 2020, led to the continued use of existing site test procedures without evaluating whether new risk coding was required or whether availability guidance was being met.

Enforcement:

Violation: 10 CFR 50.65(a)(4) required, in part, that before performing maintenance activities (including but not limited to surveillance, post-maintenance testing, and corrective and preventive maintenance), the licensee shall assess and manage the increase in risk that may result from the proposed maintenance activities. Contrary to the above, the licensee failed to perform an adequate risk assessment in that the overall maintenance risk assessments performed by the licensee for all plant maintenance to be performed during the weeks of July 8, 2021, and September 2, 2020, were inadequate because they failed to account for HPSW internal flood isolation valves that were concurrently out of service.

Enforcement Action: This violation is being treated as a non-cited violation, consistent with Section 2.3.2 of the Enforcement Policy.

Failure to Install Shorting Jumpers in the Motor Driven Emergency Feedwater Pump 4160V Switchgears			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000269,05000270,05000287/2021003-03 Open/Closed	None (NPP)	71111.15

A self-revealed Green finding and associated non-cited violation (NCV) of 10 CFR Part 50, Appendix B, Criterion V, “Procedures, Instructions, and Drawings,” was identified when it was discovered that a set of jumpers depicted on a plant drawing had never been installed on terminal blocks in 4160V safety-related switchgear 2TE15 for the 2B motor driven emergency feedwater pump.

Description: On August 2, 2021, the licensee began routine lubrication and breaker testing maintenance on the 2B motor driven emergency feedwater (MDEFW) pump. The pump was started for post-maintenance testing and it tripped a few seconds after being started. The overload trip relays were found triggered. Troubleshooting activities, which included multiple subsequent pump starts with electrical data recording equipment connected, led to the discovery of degraded neutral wire connections on a terminal block in the 2TE15 4160V switchgear cabinet. The wires on the terminal block go to a current transformer (CT) that is used for motor current display and to determine when an overcurrent condition exists for the motor. The purpose of the terminal block is to short all four CT wires together. There is a shorting bar that spans the four terminals to create a short. Site electrical drawing OEE-217-

55, “4160 Switchgear #2TE Unit #15 2B Motor Driven Emergency Feedwater Pump 2B,” Revision 9, also indicated that three jumpers should be installed to provide a redundant shorting path. Those jumpers were not installed on the 2B MDEFW pump terminal block. Site personnel also found that the screws holding the shorting bar were loose, leading to poor electrical contact with the terminals and subsequent arcing and overheating of the wire on terminal #3. The looseness of these contacts and the associated damage to wire #3 was determined to be the cause of the pump trip. The residents noted that, had the jumpers been installed as prescribed by OEE-217-55, they would have provided redundant shorting, and would have prevented the trip of the 2B MDEFW pump. A subsequent extent of condition inspection revealed that the shorting bar screws were loose by a range of 1/16 to 1 full turn and the jumpers were not installed on all five remaining MDEFW pumps across all three Oconee units. The jumpers were also shown installed on plant drawings OEE-117-90, OEE-117-91, OEE-217-54, OEE-317-66, and OEE-317-67 for the other five MDEFW pumps. No evidence of overheating or arc damage was found on the other pumps and no similar failures had occurred on the other pumps. The residents noted that the terminal bar and jumpers are an integral part of the switchgear itself, were shown on the manufacturer’s drawing, and therefore the failure to install the jumpers is an original plant construction issue.

It was also noted that the 2B MDEFW pump experienced an identical failure during surveillance testing on February 1, 2021. At that time, a relay was replaced, and the pump operated satisfactorily. A subsequent cause evaluation after the August 2, 2021, failure determined that the failure in February was due to the same cause, namely the loose screws and arcing on the terminal block.

On October 4, 2021, the licensee made a report to the NRC under 10 CFR 50.73(a)(2)(i)(B) for a condition prohibited by technical specifications after they determined that the 2B MDEFW pump had been rendered inoperable from February 1, 2021, through August 4, 2021, due to the missing jumpers and the terminal block loose screws and arcing. The resulting intermittent failures reduced the reliability of the pump to the point where reasonable assurance of operability no longer existed.

Corrective Actions: The licensee replaced the 2B MDEFW pump terminal block and installed shorting jumpers as shown in the station drawing OEE-217-55. After an extent of condition review revealed that the jumpers were missing and terminal screws were loose on the five remaining MDEFW pumps, all shorting bar screws were tightened, and the required shorting jumpers were installed on all MDEFW pump switchgears.

Corrective Action References: NCR 2392364

Performance Assessment:

Performance Deficiency: The licensee’s failure to install shorting jumpers in safety-related 4160V switchgears for the motor driven emergency feedwater pumps, as prescribed in station drawings such as OEE-217-55, was a performance deficiency.

Screening: The inspectors determined the performance deficiency was 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. Specifically, shorting jumpers shown in station drawing OEE-217-55, were not installed on switchgear 2TE15 in accordance with that drawing. The

missing shorting jumpers contributed to the failure of the 2B motor driven emergency feedwater pump to run after it was started on August 2, 2021.

Significance: The inspectors assessed the significance of the finding using Appendix A, "The Significance Determination Process (SDP) for Findings At-Power." Using Exhibit 2, "Mitigating Systems Screening Questions," the inspectors determined that a detailed risk evaluation was required because the finding did involve loss of the PRA function of a single train of the emergency feedwater system for greater than its technical specification allowed outage time.

A regional Senior Reactor Analyst (SRA) preformed a detailed risk assessment for the degraded condition. The SRA modeled the condition using the Oconee Units 1, 2, and 3 SPAR model version 8.60 dated May 3, 2019, and SAPHIRE 8 Version 8.2.3. The exposure period was from the failed surveillance test on February 1, 2021, until discovery and return to service on August 4, 2021, a period of 184 days. MDEFW pump B (EFW-MDP-FS-B) was set to failure to start. Common cause failure adjustments were automatically made for a common cause failure of both MDEFWs in accordance with RASP manual guidance. The dominant accident sequence was a plant transient with a failure of main feedwater and all emergency feedwater. The change in core damage frequency for a 184-day exposure period was approximately 2.8 E-7 which corresponds to a finding of very low safety significance (Green).

Cross-Cutting Aspect: Not Present Performance. No cross-cutting aspect was assigned to this finding because the inspectors determined the finding did not reflect present licensee performance.

Enforcement:

Violation: 10 CFR Part 50, Appendix B, Criterion V, states, in part, that activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings. Contrary to the above, since original construction, the licensee failed to install shorting jumpers in the safety-related 4160V switchgears for the motor driven emergency feedwater pumps on all three units, as prescribed in station drawings OEE-117-90, OEE-117-91, OEE-217-54, OEE-217-55, OEE-317-66, and OEE-317-67.

Enforcement Action: This violation is being treated as a non-cited violation, consistent with Section 2.3.2 of the Enforcement Policy.

URI	Operation of Normally Closed Seismic Boundary Valves	71111.18
	URI 05000269,05000270,05000287/2020003-02	

Description: In 1998, NCR 1880594 described a need to develop a site licensing position for the opening of normally closed, manually operated, seismic boundary valves and whether any specific limitations or compensatory actions were required. In May of 2000, the licensee established a position and modified UFSAR Section 3.7.3.9, "Interaction of Other Piping with Piping Designed for Seismic Conditions," through implementation of UFSAR Change Package 99-219. The change concluded that opening any seismic boundary valve was acceptable and would not impact system operability for evolutions with a clearly definable beginning and end time and that the expectation was that the valve would be in the closed

position much more than it would be in the open position. After this position was challenged by inspectors, the licensee determined that the original approved 10 CFR 50.59 review that was used to change UFSAR Section 3.7.3.9 could not be located. Inspectors opened this unresolved item (URI) to determine if the licensee's method of operating seismic system boundary valves in the past had created any risk-significant regulatory issues.

In response to the opening of this URI, the licensee took several actions. Firstly, they created a UFSAR change package that will remove the vague language unsupported by a valid 10 CFR 50.59 review regarding operation of seismic boundary valves from Section 3.7.3.9 of the UFSAR. In addition, the licensee created calculation OSC-11334, "Seismic to Non-Seismic Piping Boundary Valve Review," Rev 0. This calculation established a new licensing basis review of all seismic boundary valves in the plant to support the modified language in UFSAR Section 3.7.3.9. Seismic boundary valves were categorized into groups based on several factors, such as whether they are open or closed in mode 1. The list of valves was then evaluated for their potential to adversely affect the safety-related functions of structures, systems, and components (SSCs) if a break were to occur in non-seismic piping. The calculation identified no significant issues with any of the reviewed valves. Inspectors performed a detailed review of the calculation and its assumptions and reviewed a sample of valves through smart sample selection on the 2021 power operated valve (POV) engineering team inspection in August 2021.

Inspectors determined through the reviews described above that all the performance deficiencies identified, which include the missing 10 CFR 50.59 record, the unsupported UFSAR language, and a missing analysis which was identified for a specific valve during the POV inspection, were minor. Specifically, all the more than minor screening questions in IMC 0612, Issue Screening, were answered "no" for all performance deficiencies identified. Additionally, the sample-based review of calculation OSC-11334 did not identify any examples of seismic boundary valve operation that challenged the safety-related function of an SSC.

Corrective Action Reference(s): NCRs 2347573, 2393991

EXIT MEETINGS AND DEBRIEFS

The inspectors verified no proprietary information was retained or documented in this report.

- On August 26, 2021, the inspectors presented the Triennial Heat Sink inspection results to Steve Snider and other members of the licensee staff.
- On September 30, 2021, the inspectors presented the TI-194 Revision 2 inspection results to Steve Snider and other members of the licensee staff.
- On October 25, 2021, the inspectors presented the integrated inspection results to Steve Snider and other members of the licensee staff.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
2515/194	Calculations	OSC-11939	Oconee PRA Analysis of Implementation Options for Open Phase Condition Protection	1
	Corrective Action Documents	AR 2296030	OPP alarm and logic trip	
		AR 2356836	OPP alarm and logic trip	
	Corrective Action Documents Resulting from Inspection	AR 02400199	NRC inspection Observations	
		CAS WR 20210470	Unit 3 OPP cabinet In service green LED not lit.	
	Procedures	PT/0/A/0250/010 F	Transformer CT-5 Mulsifyre Wet Test	010
71111.04	Corrective Action Documents		02391434	
	Drawings	O FD-121A-2.8	Flow Diagram of Condensate System Condensate Make-up and Emergency Feedwater Pump Suction	18
		O FD-121D-2.1	Flow Diagram of Emergency Feedwater System	42
		O FD-124A-01-01	Flow Diagram of Low Pressure Service Water System	055
	Procedures	AD-OP-ALL-0200	Clearance and Tagging	21
		AD-OP-ALL-0204	Plant Status Control	5
		OP/2/A/1106/006	Emergency FDW System	117
		PT/3/A/0202/011	High Pressure Injection Pump Test	094
		PT/3/A/0251/001	Low Pressure Service Water Pump Test	100
	Work Orders		20206265, 20483069, 20483072	
71111.05	Fire Plans	CSD-ONS-PFP-1AB-0809	Pre-Fire Plan for U1 Auxiliary Building Elevation 809	0
		CSD-ONS-PFP-2AB-0783	Pre-Fire Plan for Unit 2 Auxiliary Building Elevation 783	001
		CSD-ONS-PFP-2TB-0775	Pre-Fire Plan for U2 Turbine Building Elevation 775	000
		O-0310-FZ-026	Turbine Building – Unit 2 Fire Protection Plan Fire Area & Fire Zone Boundaries Plan at EL 775+0	2
		O-0310-K-13	Auxiliary & Reactor Building – Unit 1 Fire Protection Plan & Fire Barrier, Flood & Pressure Boundaries Plan at El 822+0 & ELL 825+0	15

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		O-0310-K-14	Auxiliary & Reactor Building – Unit 2 Fire Protection Plan & Fire Barrier, Flood & Pressure Boundaries Plan at El 822+0 & ELL 825+0	18
		O-0310-L-002	Turbine Building – Unit 2 Fire Protection Plan & Fire Barriers, Flood, & Pressure Boundaries Plan at EL 775+0	12
	Procedures	AD-EG-ALL-1520	Transient Combustible Control	14
71111.06	Calculations	OSC-5539	High Pressure Service Water System Hydraulic Model	12
		OSC-8671	Auxiliary Building Flood Design Values	8
	Corrective Action Documents		1880838	
	Drawings	O-422H-14	Instrument Detail Elevated Raw Water Storage Tank Volume Gauge	
		O-423A	Service Water Piping – Outside Powerhouse	45
		O-437A	Piping Layout Plan & Sections Elevation 783'-9" Auxiliary Building	76
		OFD-124C-01-04	Flow Diagram of High Pressure Service Water System (West Yard)	41
	Miscellaneous	OSS-0254.00-00-1002	Design Basis Specification for High Pressure Service Water System	47
	Procedures	AP/1-2/A/1700-030	Auxiliary Building Flood	24
71111.07A	Calculations	OSC-10774	Oconee Nuclear Station Reactor Building Component Evaluations Under PSW Conceptual Design Event Scenarios	6
		OSC-10776	Aerofin – Additional LOCA Analysis to Support Reduced Margin for RBCU Cooling Coils	0
		OSC-10785	GOTHIC Containment Analysis Utilizing the Protected Service Water (PSW) System	4
		OSC-10821	Evaluation of RBCUs for Heat Removal During a PSW Event	3
		OSC-11956	Reactor Building Cooling Units Performance Test	0
		OSC-5667	Reactor Building Cooling Unit Performance Test – Unit 3	75
		OSC-6146	Post-LOCA Reactor Building Cooling Unit Capacity	3
		OSC-8064	ROTSG Long-Term Containment Response Following a	19

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
			Large Break LOCA	
	Drawings	OFD-124B-1.2	Flow Diagram of Low Pressure Service Water System Reactor Building Cooling Units	36
	Procedures	AM/0/A/3007/066	Abnormal Procedure for Installation and Removal of RBCU Hale Pumps and Hoses	4
		AP/0/A/1700/051	Alternate Reactor Building Cooling	3
		OP/0/A/1106/042	Portable Pump Operations	16
71111.11Q	Miscellaneous	SAE-R295	Simulator Exercise Guide	0.0
	Procedures	AP/O/A/1700/006	Natural Disaster	033
		OP/3/A/1104/010	Low Pressure Service Water	116
71111.12	Calculations	OSC-8692	Keowee Civil Inspection	
	Corrective Action Documents		2305874, 2381381	
	Miscellaneous		Power Tunnel Inspection 2021	08/04/2021
			Keowee 2017 Inspection Report	12/15/2017
		OSC-8692	Keowee Civil Inspections	10
		OSS-0254.00-00-4001	Design Basis Spec for Reactor Building Containment Isolation	44
	Procedures	AD/EG/ALL/1210	Maintenance Rule Program	3
		AD/EG/ALL/1214	Condition Monitoring of Structures	1
		AD/ONS/ALL/1214	Condition Monitoring of Structures	2
		PT/3/A/0150/006	Mechanical Penetration Leak Rate Data	73
		PT/3/A/0150/034	Leak Rate History Record and Reactor Building Leak Rate Verification	12
		PT/3/A/0151/063	Penetration 63 Leak Rate Test	4
	Work Orders		20201306, 20406859, 20406860	
71111.13	Calculations	OSC-11821	Oconee Phoenix Model Development	3
	Corrective Action Documents		1809532, 1880838, 2228836, 2267258, 2267538, 2319072	
	Miscellaneous		Phoenix Risk Assessment 21W29	
			Special Emphasis Reports dated July 8, 2021 and September 2, 2020	
	Procedures	AD-NF-ALL-0501	Electronic Risk Assessment Tool (ERAT)	5

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		AD-WC-ALL-0410	Work Activity Integrated Risk Management	11
71111.15	Calculations	DPC 1205.19-00-0002	Evaluation of Rate-Of-Loading Effects	6
		OSC-0556	Reactor Building Spray Line – System 54A Piping Analysis Problem No. 3-54-03	24
		OSC-6659	Station Blackout (SBO) Event Mitigation Requirements	8
		OSC-8505	Oconee HELB EQ Analysis for Penetration Rooms	4
		OSC-9592	Gas-Water Waterhammer Loads in Building Spray Header (PIP O-08-5705, PDO)	0
		OSC-9610	Evaluation of LPI, CF, RBS, & HPI Systems for Generic Letter 2008-01	2
	Corrective Action Documents		02392361, 02392172, 1785659, 2394935, 2395220, 2390873	
	Drawings	O-2439B	Piping Layout East Penetration Room Elevation 822’-0” Auxiliary Building	47
		O-2439C	Piping Layout West Penetration Room Elevation 809’-3” Auxiliary Building	61
		O-2439E	Piping Layout Sections Elevation 809’-3” Auxiliary Building	39
		OEE-117-90-1A	MDEFW Electrical Diagram	
		OEE-117-91-1B	MDEFW Electrical Diagram	
		OEE-217-54-2A	MDEFW Electrical Diagram	
		OEE-217-55-2B	MDEFW Electrical Diagram	
		OEE-317-66-3A	MDEFW Electrical Diagram	
		OEE-317-67-3B	MDEFW Electrical Diagram	
		OFD-103A-3.1	Flow Diagram of Reactor Building Spray System (BS)	32
		OFD-121D-1	Flow Diagram of Emergency Feedwater System	39
		OFD-122A-2.4	Flow Diagram of Main Steam System Emergency Feedwater Pump Turbine Steam Supply and Exhaust	24
		OM 200.B-0006.001	Emergency Feedwater Pump Instruction Book	D15
	Miscellaneous		Operation Decision Making Evaluation for U2 RCS Leakage	09/27/2021
		OSS-0254.00-00-1000	Design Basis Specification for the Emergency Feedwater System	057

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		WCAP-16465-NP	Pressurized Water Reactor Owners Group Standard RCS Leakage Action Levels and Response Guidelines for Pressurized Water Reactors, September 2006	
	Procedures	OP/2/A/1106/006	Emergency FDW System	117
		PT/2/A/0600/010	Reactor Coolant Leakage	080
		PT/2/A/0600/012	Turbine Driven Emergency Feedwater Pump Test	98
		PT/2/A/0600/013	Motor Driven Emergency Feedwater Pump Test	76
		PT/3/A/0203/012	HPI/LPI/RBS Piping Venting	15
	Work Orders		20465154, 20484010	
71111.19	Corrective Action Documents		1907284, 2395485, 2391434	
	Drawings	KEE-214-1	Elementary Diagram Generator Control ACB-4 Control Circuit	23
		KFD-107A-1.1	Flow Diagram Air Circuit Breaker Air System	18
		KTC-1-AB-017	Unit 1 AB Relief Valve Test Acceptance Criteria	4
		OEE-117-1	Elementary Diagram Breaker Internal Diagram	6
		OEE-317-22	Elementary Diagram 4160V Switchgear #3TC, Unit #11 L.P. Service Water Pump Motor No. 3A	9
	Miscellaneous	OSS-0254.00-00-1047	(MECH) Design Basis Spec for Keowee Turbine Sump Pump (TS) System	014
	Procedures	IP/2/A/0400/022	KHU-2 Turbine Sump Pump Level Control Switch Calibration	008
		OP/0/A/2000/013	KHU-1 Generator	027
		OP/0/A/2000/014	KHU-2 Generator	028
		OP/0/A/2000/041	KHS – Modes of Operation	041
		PT/2/A/0600/012	Turbine Driven Emergency Feedwater Pump Test	098
		PT/3/A/0203/006A	Low Pressure Injection Pump Test - Recirculation	094
	Work Orders		20474456, 20477827	
71111.22	Procedures	OP/0/A/1600/010	Operation of the SSF Diesel-Generator	097
		PT/0/A/0400/015	SSF Submersible Pump Test	024
		PT/0/A/0620/009	Keowee Hydro Operations	055
71114.06	Miscellaneous		ONS Drill 21-02 General Information	
	Procedures	CSD-EP-ALL-	Drill and Exercise Templates	0

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		0800-01		
71151	Miscellaneous	CP/0/A/2005/022	Determination of Reported Tech Spec Dose Equivalent Iodine-131	006
71152	Corrective Action Documents		02367963, 02392172, 02341117	
	Drawings	O FD-121D-01-01	Flow Diagram of Emergency Feedwater System	039
		OEE-217-55	Elementary Diagram 4160 Switchgear Motor Driven Emergency Feedwater Pump	09
	Miscellaneous		WR 20200618	
			1st Triannual 2021 Site Trending Forum Data Package	
	Procedures	PT/2/A/0600/013	Motor Driven Emergency Feedwater Pump Test	
	Work Orders		20484010, 20484533, 20484535, 20484534, 20484532, 20484531, 20449854	