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

February 10, 2021

Mr. Fadi Diya
Senior Vice President and Chief Nuclear Officer
Ameren Missouri
Callaway Plant
8315 County Road 459
Steedman, MO 65077

SUBJECT: CALLAWAY PLANT – INTEGRATED INSPECTION REPORT AND ASSESSMENT FOLLOW-UP LETTER (05000483/2020004)

Dear Mr. Diya:

On December 31, 2020, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at the Callaway Plant. On January 6, 2021, the NRC inspectors discussed the results of this inspection with Mr. B. Cox, Site Vice President and other members of your staff. The results of this inspection are documented in the enclosed report.

Two findings of very low safety significance (Green) are documented in this report. Neither of these findings involved a violation of NRC requirements.

A licensee-identified violation which was determined to be of very low safety significance is documented in this report. We are treating this violation as a non-cited violation (NCV) consistent with Section 2.3.2 of the Enforcement Policy.

As a result of its quarterly review of plant performance, which was completed on January 25, 2021, the NRC updated its assessment of Callaway Plant. The NRC's evaluation consisted of a review of performance indicators and inspection results. This letter informs you of the NRC's assessment of and its plans for a future inspection at your facility. This letter supplements, but does not supersede, the annual assessment letter issued on March 3, 2020. (ADAMS Accession No. ML20055E107)

The NRC's review of Callaway Plant identified that the Unplanned Scrams per 7,000 Critical Hours performance indicator has crossed the Green-White threshold. This White performance indicator is the result of having three unplanned scrams during the second through fourth quarter of 2020 combined with having lower than normal hours of critical operation for the year. Each of the scrams involved equipment failures that led to automatic reactor trips.

The NRC determined the performance at Callaway Plant Unit 1 to be in the Regulatory Response Column (i.e., Column 2) of the Reactor Oversight Process Action Matrix beginning in the fourth quarter of 2020. Therefore, the NRC plans to conduct a supplemental inspection in

accordance with Inspection Procedure 95001, "Supplemental Inspection Response to Action Matrix Column 2 (Regulatory Response) Inputs." We will schedule this inspection after you notify the NRC of your readiness for this inspection in writing. The objectives of the supplemental inspection procedure are to: (1) to ensure that the root and contributing causes of individual and collective White performance issues are understood; (2) to independently assess and ensure that the extent of condition and extent of cause of individual and collective White performance issues are identified; (3) to ensure that completed corrective actions to address and preclude repetition of White performance issues are prompt and effective; and (4) to ensure that pending corrective action plans direct prompt and effective actions to address and preclude repetition of White performance issues.

If you contest the violation or the significance or severity of the violation 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 IV; the Director, Office of Enforcement; and the NRC Resident Inspector at the Callaway Plant.

If you disagree with a cross-cutting aspect assignment or a finding not associated with a regulatory requirement 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 IV; and the NRC Resident Inspector at the Callaway Plant.

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,

Michael C. Hay
Digitally signed by Michael C. Hay
Date: 2021.02.10 13:41:55 -06'00'

Anton Vegel, Director
Division of Reactor Projects

Docket No. 05000483
License No. NPF-30

Enclosure:
As stated

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OFFICE	RIV/DRP/D				
NAME	TVegel				
DATE	02/09/2021				

U.S. NUCLEAR REGULATORY COMMISSION
Inspection Report

Docket Number:	05000483
License Number:	NPF-30
Report Number:	05000483/2020004
Enterprise Identifier:	I-2020-004-0007
Licensee:	Ameren Missouri
Facility:	Callaway Plant
Location:	Steedman, MO
Inspection Dates:	October 1 to December 31, 2020
Inspectors:	D. Bradley, Senior Resident Inspector S. Janicki, Resident Inspector B. Baca, Health Physicist J. Drake, Senior Reactor Inspector
Approved By:	Neil F. O'Keefe, Chief Reactor Projects Branch B 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 the Callaway Plant, 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. A licensee-identified non-cited violation is documented in report section: 71153.

List of Findings and Violations

<table>
<tr><td colspan="4">Untimely Corrective Actions for Isophase Bus Degradation</td></tr>
<tr><td>Cornerstone</td><td>Significance</td><td>Cross-Cutting Aspect</td><td>Report Section</td></tr>
<tr><td>Initiating Events</td><td>Green
FIN 05000483/2020004-02
Open/Closed</td><td>[H.11] - Challenge the Unknown</td><td>71153</td></tr>
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<table>
<tr><td colspan="4">Failure to Evaluate the Adequacy of a Design Change for Main Feedwater Regulating Valve Positioner</td></tr>
<tr><td>Cornerstone</td><td>Significance</td><td>Cross-Cutting Aspect</td><td>Report Section</td></tr>
<tr><td>Initiating Events</td><td>Green
FIN 05000483/2020004-01
Open/Closed</td><td>[H.3] - Change Management</td><td>71153</td></tr>
<tr><td colspan="4">The inspectors reviewed a self-revealed Green finding for the licensee's failure to adequately evaluate the failure modes of the main feedwater regulating valve positioner as part of a design change process. Specifically, the development and installation of a replacement main feedwater control system required a Failure Modes and Effects Analysis. The licensee failed to recognize and evaluate the failure mode and effects of placing a local keylock switch to control swapping between the primary and backup MFRV positioners. As a result, the plant experienced an automatic reactor trip when the primary main feedwater regulating valve positioners failed and the secondary positioner could not be quickly placed into service due to the addition of this feature.</td></tr>
</table>

Additional Tracking Items

Type	Issue Number	Title	Report Section	Status
LER	05000483/2020-004-00	Violation of Technical Specification 3.8.1, “ACSources - Operating	71153	Closed
LER	05000483/2020-006-00	Reactor Trip Due to Main Generator Ground Fault	71153	Closed
LER	05000483/2020-002-00	Reactor Trip and Auxiliary Feedwater Actuation Following Spurious MFRV Closure	71153	Closed

PLANT STATUS

Callaway Plant began the inspection period shut down for a planned refueling outage. The licensee commenced a reactor startup on December 19, 2020, and connected the main generator to the electric grid on December 22. On December 24 at 90 percent reactor power, the licensee experienced an automatic turbine and reactor trip from an electrial fault in the main generator. The licensee remained shut down through the end of the 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 performed plant status activities described in IMC 2515, Appendix D, "Plant Status," and conducted routine reviews using Inspection Procedure (IP) 71152, "Problem Identification and Resolution." 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 Disease 2019 (COVID-19), resident 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; conducted plant status activities as described in IMC 2515, Appendix D, "Plant Status," 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 portions 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

<u>71111.04 - Equipment Alignment</u>

<u>Partial Walkdown Sample (IP Section 03.01) (2 Samples)</u>

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

(1) Emergency diesel generator B on October 23, 2020
(2) Residual heat removal B after planned major work window on October 26, 2020

71111.05 - Fire Protection

Fire Area Walkdown and Inspection Sample (IP Section 03.01) (4 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) Auxiliary building 2000' elevation including the volume control tank room and valve compartment, fire area A-8, on October 11, 2020
(2) Auxiliary Building 2047' elevation, fire area A-19 on October 27, 2020
(3) Turbine Building 2065' elevation during main generator repairs, fire area TB-1 on November 17, 2020
(4) Control building 2016' elevation, fire areas C-14 and C-16, on November 23, 2020

71111.08P - Inservice Inspection Activities (PWR)

PWR Inservice Inspection Activities Sample (IP Section 03.01) (1 Sample)

(1) The inspectors verified that the reactor coolant system boundary, steam generator tubes, reactor vessel internals, risk-significant piping system boundaries, and containment boundary are appropriately monitored for degradation and that repairs and replacements were appropriately fabricated, examined and accepted by reviewing the following activities from October 13 to October 27, 2020:

03.01.a - Nondestructive Examination and Welding Activities.

The inspectors evaluated non-destructive examination activities by reviewing the following records:

1) Ultrasonic Examinations

a) Reactor Coolant System, BB-036-BCA, 2-BB-06-F001 Circumferential Weld

b) Reactor Coolant System, BB-036-BCA, 2-BB-06-F006 Pipe to Cap

c) Reactor Coolant System BB-056-BCA 2-BB-01-S401-10, Nozzle to reducer

d) Reactor Coolant System, BB-05-BCA, BB-005-BCA, Weld 2-EM-03-FW235

2) VT-3 Examinations

a) Main Steam System AB-0220-EBD-8, FW-04, Plate to pipe

b) Main Steam System AB-0220-EBD-8, FW-03, Plate to Angle iron

3) Magnetic Particle Examinations

a) Component Cooling Water, Base Metal Repair near M1 manway, FW-01

The inspectors evaluated welding activities by reviewing the following records:

1) Gas Tungsten Arc Welding

   a) Weld FW-01, Safety Injection Accumulator Tank C Vent Valve

   b) Weld FW-02, Safety Injection Accumulator Tank C Vent Valve

03.01.c – Pressurized Water Reactor Boric Acid Corrosion Control Activities.

The inspectors reviewed the following condition reports and associated boric acid evaluations:

- 202005121
- 202005127
- 202005306
- 202004846
- 201901976
- 201901977
- 201902013
- 201902052
- 201902091
- 201902183
- 201902190
- 201902267
- 201902269
- 201902288
- 201902331

The inspectors evaluated a sample of 32 condition reports associated with inservice inspection activities. The inspectors did not identify any findings or violations of more than minor significance.

<u>71111.11Q - Licensed Operator Requalification Program and Licensed Operator Performance</u>

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

(1) The inspectors observed and evaluated licensed operator performance in the control room during Mode 4, including filling of steam generators with auxiliary feed, on November 23, 2020

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

(1) The inspectors observed and evaluated simulator training, including just-in-time training for the refueling outage, on November 6, 2020

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) Auxiliary building ventilation systems including fan belt failures on November 15, 2020
(2) Low voltage circuit breakers including preventative maintenance and breaker obsolescence issues on December 11, 2020

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) Planned elevated risk during lowered reactor coolant system (RCS) inventory for reactor disassembly on October 7, 2020
(2) Planned elevated risk while moving fuel and during B safety train work window on October 10, 2020
(3) Planned elevated risk during A safety train outage with containment restrictions on October 28, 2020
(4) Planned elevated risk during lowered RCS inventory for reactor reassembly on November 5, 2020

71111.15 - Operability Determinations and Functionality Assessments

Operability Determination or Functionality Assessment (IP Section 03.01) (2 Samples)

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

(1) Essential service water check valve degradation, Condition Report 202005988, on November 3, 2020
(2) Circuit breaker settings for residual heat removal containment sump suction valve, Condition Report 202006217, on November 4, 2020

71111.18 - Plant Modifications

Temporary Modifications and/or Permanent Modifications (IP Section 03.01 and/or 03.02) (2 Samples)

The inspectors evaluated the following temporary or permanent modifications:

(1) Permanent modification for auxiliary feedwater (AFW) pumps under modification package MP 19-0017, "Inboard/Outboard Mechanical Seal Orifice Re-design for AFW Pumps," on November 1, 2020.

(2) Permanent modification for solid state protection system under modification package MP 18-0074, "Remove Single Point Vulnerability from Universal Logic Board and Safeguards Driver Boards," on December 7, 2020.

71111.19 - Post-Maintenance Testing

Post-Maintenance Test Sample (IP Section 03.01) (5 Samples)

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

(1) Emergency diesel generator B following planned maintenance including internal tank inspections on October 22, 2020
(2) Component cooling water train B following planned maintenance including heat exchanger inspections and cleaning on October 26, 2020
(3) Essential service water train B following planned maintenance including motor-operated valve refurbishment on October 28, 2020
(4) Condensate storage tank following planned maintenance including floating cover seal replacement on October 28, 2020
(5) Reactor coolant pump B following planned maintenance to replace the third stage seal on December 7, 2020

71111.20 - Refueling and Other Outage Activities

Refueling/Other Outage Sample (IP Section 03.01) (1 Sample)

(1) The inspectors evaluated Refueling Outage 24 activities from October 1 to December 24, 2020.

71111.22 - Surveillance Testing

The inspectors evaluated the following surveillance tests:

Surveillance Tests (other) (IP Section 03.01) (4 Samples)

(1) Safety injection comprehensive pump test, on October 14, 2020
(2) Residual heat removal check valve and safety injection recirculation mode test on October 15, 2020
(3) Residual heat removal containment sump suction valve test on October 26, 2020
(4) Turbine--driven auxiliary feedwater pump check valve test on November 17, 2020

OTHER ACTIVITIES – BASELINE

71151 - Performance Indicator Verification

The inspectors verified licensee performance indicators submittals listed below:

MS07: High Pressure Injection Systems (IP Section 02.06) (1 Sample)

(1) October 1, 2019, through September 30, 2020

MS09: Residual Heat Removal Systems (IP Section 02.08) (1 Sample)

(1) October 1, 2019, through September 30, 2020

OR01: Occupational Exposure Control Effectiveness Sample (IP Section 02.15) (1 Sample)

(1) April 1, 2019, through September 30, 2020

PR01: Radiological Effluent Technical Specifications/Offsite Dose Calculation Manual Radiological Effluent Occurrences (RETS/ODCM) Radiological Effluent Occurrences Sample (IP Section 02.16) (1 Sample)

(1) April 1, 2019, through September 30, 2020

71152 - Problem Identification and Resolution

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

(1) The inspectors reviewed the licensee's corrective action program for potential adverse trends in non-safety onsite electrical power distribution that might be indicative of a more significant safety issue.

71153 – Follow-up of Events and Notices of Enforcement Discretion

Event Report (IP Section 03.02) (3 Samples)

The inspectors evaluated the following licensee event reports (LERs):

(1) LER 2020-004-00, Violation of Technical Specification 3.8.1, "AC Sources - Operating" (ADAMS Accession No. ML20310A328). The inspection conclusions associated with this LER are documented in this report under the Inspection Results Section. This LER is closed.
(2) LER 2020-006-00, Reactor Trip Due to Main Generator Ground Fault (ADAMS Accession No. ML20330A267). The inspection conclusions associated with this LER are documented in this report under the Inspection Results Section. This LER is closed.
(3) LER 2020-002-00, Reactor Trip and AFW Actuation Following Spurious MFRV Closure (ADAMS Accession No. ML20155K873). The inspection conclusions associated with this LER are documented in this report under the Inspection Results Section. This LER is closed.

Personnel Performance (IP Section 03.03) (1 Sample)

(1) The inspectors evaluated an unplanned reactor trip due to a main generator fault and the licensee's performance on December 24, 2020.

INSPECTION RESULTS

Observation: Semi-Annual Trend Review	71152
The inspectors reviewed the licensee's corrective action program, performance indicators, system health reports, and other documentation to identify trends that might indicate the existence of a more significant safety issue related to the non-safety onsite power distribution	

system. Specifically, the 100-, 200- and 300-series power loops provide power to support buildings and non-safety systems located outside the protected area. The majority of the cables are routed underground in manholes and have many splices to create branches. These loops are interconnected for redundancy.

Background

The following condition reports and plant health issues related to non-safety onsite power distribution were identified by the inspectors as relevant:

Condition Report or Health Issue	Subject	Maintenance Rule Evaluation Assigned
202004227	Switchyard circuit breaker MD522 tripped open due to a ground fault on a failed splice in manhole 59-17 associated with the 200 series power loop requiring complicated repairs and temporary power for over a month	No
202000586	Cable diagnostics vendor assessed cable splice thermography results as having severe degradation	N/A
201907079	Configuration management gap on manhole/cable drawings and cable schedule identified	N/A
201904463	Circuit breaker MD522 tripped from an unknown cause. Possibilities included a short on the 300 series loop due to rainfall.	No
2018013	System health issue created to address the unknown status of splices from prior water submersion damage	N/A
201803524	Adverse trend on the 300 series loop splices identified	N/A
201803237	Circuit breaker MD522 tripped from a fault on the 300 series loop (splice)	Yes
201801981	Circuit breaker MD522 tripped from a fault on the 300 series loop (splice)	Yes
201704538	Manhole 59-17 splices not properly supported and twisting/sagging. Thermography of splices in the intermediate advisory range. Splices are associated with 100 and 200 series power loops.	N/A
201606688	Fire pump house 480V load center did not cross tie when 200 series power was lost	Yes
2015009	System health issue created to add an additional circuit breaker for the 100 series loop for fault separation	N/A
2014018	Health issue identified to correct cable splices that are subject to prolonged submersion in water and was resolved by adding sump pumps to the affected manholes.	N/A

Callaway identified multiple indications of degraded cables leading up to the August 26, 2020, cable splice failure. Health issue 2014018 was identified in 2014 to correct cable splices that are subject to prolonged submersion in water and was closed by adding sump pumps to the affected manholes. The inspectors noted that this did not directly address the damage already caused to the cables from submersion. Health issue 2015009 was created in 2015 to add an additional circuit breaker for the 100 series loop for fault separation but had not yet been implemented at the time of this inspection.

In 2017, a visual inspection of cables in manhole 59-17 found multiple twisted and sagging cables due to a lack of cabling supports which caused the degraded cables to droop. Several cables had sagged to the point where the splices were resting on the bottom of the manhole, which was subject to frequent water intrusion, resulting in submersion. Thermography of the degraded cables was performed which identified multiple cable splices with elevated temperature in or above the advisory range.

Following the 2017 inspection for manhole 59-17, Callaway wrote Job 17003677 to correct the degraded cabling. Callaway then performed a self-assessment of the cable program and considered replacing degraded splices with a new design under Condition Report action 201704781-002. The licensee, however, later determined they would have difficulty obtaining the parts, concluding “more time is needed to determine resolution…there is no risk to the plant.”

In 2018, Callaway identified a trend for multiple splice and cable failures for the 300 series loop. The inspectors noted that by limiting the scope of the review to the 300 series, the licensee had a missed opportunity to include the 100 and 200 series loops based on the similarities between them in design and fault history. In this trend review, the licensee concluded that plant health issues would address any concerns on the 100 and 200 series loops. Health issue 2018013 was identified in 2018 to address the unknown status of splices from prior water submersion damage and would have driven cable replacements by 2021.

In 2019, the licensee was planning a job to replace several corroded cable supports in manholes throughout the site. Workers in the field identified a configuration management discrepancy where the cables installed in the field failed to match the system drawings for the non-safety 100/200/300 series power loops. The loss of configuration control created a potential safety hazard, complicated the job planning and manhole work, and added additional delays to the long-term resolution of the degraded cabling and splices.

In January 2020, a cable vendor conducted diagnostics on the 200 series power loop and reported that severe degradation existed and failure could be expected. In response, the licensee identified the degraded 200 series power loop as a plant health issue. In September 2020, the licensee experienced a failure of the 200 series power loop that could not easily be isolated or repaired. As a result, the licensee performed a reactive and complicated repair plan that lasted over a month, required several temporary diesel generators to power non-safety buildings, and required several new cables to be installed because the degree of cable degradation made it inadvisable to splice into.

Assessment

The inspectors concluded the licensee’s management of the degradation in the non-safety onsite power distribution system was ineffective. Although the issues were documented in the corrective action program and elevated to senior plant leadership via the Plant Health

process, the licensee's strategy for resolving issues in the non-safety electrical system has relied on system redundancies to maintain system functionality and the reactive performance of corrective maintenance when failures do occur. In September 2020, the fault and repair plan resulted in the station being unable to use several non-safety buildings for workspace when an unrelated reactor trip occurred with the non-safety power loop repairs in-progress. This resulted in, for example, the outage control center being relocated to the technical support center building due to needing an adequately sized space with diesel-power and internet connections.

The inspectors noted that cable aging is a cumulative effect that can significantly alter the cable's material condition prior to obvious signs of failure. For example, IEEE Standards 323-1974 and 383-1974 recommend that cable splices are treated as an integral part of each system and that an aging management program is needed to maintain reliable performance.

The inspectors also concluded that the assignment of Maintenance Rule evaluations for non-safety power failures has been inconsistent for failures that were quite similar. Specifically, recent failures under Condition Reports 202004463 and 202004227 were not formally evaluated unlike the previous examples under Condition Reports 201803237 and 201801981. Instead of having an action assigned after condition report screening, the staff pre-screened the 2020 condition reports as not having an impact to the Maintenance Rule function and partially based that decision on the similarities to the 2018 condition reports. This practice can reduce the visibility of the issues to plant management and lead to errors when dissimilar failures are incorrectly convolved outside a formal evaluation.

The inspectors noted that the licensee's slow response to the cable degradation appeared to be influenced by an incomplete assessment of the potential impacts to plant operation. While the system provided multiple sources of power to most loads, the design did not guarantee power to all locations in the event of faults. The licensee did not consider the impact to plant operations or emergency response capabilities from maintenance configurations in the event of certain failures, nor did they appear to recognize that some failures could impact plant risk from fire because pumps and valves needed for fire response could lose power.

In response to the September 2020 cable fault, the licensee created several condition reports and actions within those condition reports to address the above issues. For example, Condition Report 202004227 captures the corrective actions and condition monitoring plan for the degraded non-safety cables and splices. The licensee has also generated several roll-up condition reports to address their gaps to excellence in leadership and trends in plant performance including Condition Reports 202007036, 202007042, and 202007175.

The inspectors did not identify any additional trends or concerns that might be indicative of a more significant issue. The inspectors concluded that no more than minor performance deficiency existed.

Untimely Corrective Actions for Isophase Bus Degradation			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Initiating Events	Green FIN 05000483/2020004-02 Open/Closed	[H.11] - Challenge the Unknown	71153

The inspectors reviewed a self-revealed Green finding for the licensee's failure to correct degradation in high voltage flexible links connecting different segments of the isophase bus in a timely manner. Specifically, starting in 2013, the licensee identified damage to main generator isophase flexible links and did not correct the condition until a fragment caused a ground fault on September 27, 2020. This resulted in a turbine trip and automatic reactor trip.
<u>Description</u>: On September 27, 2020, the licensee was operating at 98 percent reactor power and coasting down into their planned refueling outage with no significant evolutions in progress and no significant equipment out of service. The control room received a reactor trip due to a main turbine generator trip with several alarms on the main generator. The operators entered E-0 "Reactor Trip or Safety Injection," confirmed systems responded as expected without complications, and transitioned into normal shutdown procedures with the plant stabilized in Mode 3. This event was reported under Licensee Event Report (LER) 2020-006-00, "Reactor Trip Due to Main Generator Ground Fault." (ADAMS Accession Number ML20330A267) The electrical output of the main generator is routed to the main transformers through metal bus bars. There are three phases, each of which is routed individually through metal bus ducts. The bus bars are supported in the center of their associated duct by insulated supports. The specifically sized air gap is needed to prevent an electrical arc between the bus bars and the ducts. Bus bar segments are connected by flexible links to allow the bus bars to expand due to heating when they conduct electric current. In Callaway's system, the flexible links are made of thin sheets of metal laminated together and bolted at each end to adjacent bus bars. The links are shaped like the Greek letter omega (Ω) with each "foot" bolted to a different bus bar to allow flexing. The initial troubleshooting determined that there had been a fault in the 25kV main generator output. Once the plant was cooled down, the licensee inspected the isophase bus system which provides the path for electricity from the main generator to the main transformer. The licensee then identified a metallic leaf had broken from a flexible link on the B phase of the isophase bus, fallen from the energized isophase bus, and briefly provided a fault pathway across the air gap from the bus bars to the ducting which ultimately caused the trip The licensee documented the plant trip and the condition of the flexible link in a condition report and formed a cause evaluation team. In parallel, the inspectors independently reviewed the condition report history of the isophase bus system and associated corrective actions. In 2013, the licensee first identified damage to the flexible link at the 5B inspection point on the B phase of the isophase bus under Condition Report 201306251. This condition included separation of layers, or the flexible link leaves, from each other and some bending of leaves. At the time, the licensee added an additional inspection requirement to future inspections but concluded a separated lamination "would be trapped inside the isophase causing no damage." In 2016, the licensee found another portion of flexible links with damage and again concluded that a separation would not lead to a fault under Condition Report 201603032. In 2017 and 2019, the licensee monitored the 5B inspection point on the B phase of the isophase bus flexible link without generating condition reports and without implementing corrective action under jobs 16505654 and 17514010. In each case, the degradation was deemed acceptable and not significant enough to warrant a new condition report. In contrast, the licensee did correct a flexible link issue on the C phase of the isophase bus in 2019 under Condition Report 201902559. Specifically, the flexible link, as a whole, had

shifted so that it was no longer meeting the required minimum air gap between the bus and ducting such that there was a risk of an electrical short. The licensee recognized the unacceptable distance and corrected the issue.

Finally, in September 2020, the B phase isophase bus flexible link leaves separated enough such that one leaf became separated from bus due to cooling air flow and fatigue failure, created an electrical short from the bus to the ducting, and tripped the main generator and reactor.

The inspectors determined the licensee failed to correct the degraded flexible link associated with the isophase bus in a timely manner. The licensee describes timely corrective actions in procedure APA-ZZ-00500, Appendix 15, "Adverse Condition – Significance Level 4," including revisions 15 through 33 that were in effect since 2013. Specifically, timely corrective actions are "prompt" and consider "impact on plant operation," "risk of recurrence," and "significance of recurrence." Although the licensee did correct a flexible link configuration that was clearly unacceptable in 2019, the licensee failed to adequately consider a failure where the flexible link continues to perform its intended function but damaged portions separate and become conducting debris in the insulating air gap with the potential to cause a fault and a plant transient. As a result, the licensee failed to recognize the need for prompt corrective action and the degraded conditions on flexible links were allowed to exist for seven years until a failure occurred which caused a reactor trip.

Corrective Actions: The licensee stabilized the plant in Mode 3, performed troubleshooting to identify the cause of the turbine and reactor trip, performed inspections of the isophase bus duct system, repaired the damaged flexible links but continued to monitor other degraded links, and generated a condition report.

Corrective Action References: Condition Report 202004895

Performance Assessment: Performance Deficiency: The failure to correct degraded flexible links used to connect isophase bus segments in a timely manner is 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 Initiating Events Cornerstone and adversely affected the cornerstone objective to limit the likelihood of events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Specifically, the performance deficiency resulted in the main turbine generator automatically tripping on an electrical fault and the reactor automatically tripping from the turbine trip.

Significance: The inspectors assessed the significance of the finding using Appendix A, "The Significance Determination Process (SDP) for Findings At-Power." The finding was determined to be of very low safety significance (Green) because it caused a reactor trip but did not cause a loss of mitigating equipment relied on to transition the plant from the onset of a trip to a stable shutdown condition.

Cross-Cutting Aspect: H.11 - Challenge the Unknown: Individuals stop when faced with uncertain conditions. Risks are evaluated and managed before proceeding. The finding had a human performance cross-cutting aspect associated with challenging the unknown, in that the licensee only corrected isophase flexible links that were clearly unacceptable during a complete inspection of the isophase bus in 2019 and allowed other degradations to remain

uncorrected. Specifically, the licensee corrected a flexible link on the C phase due to its unacceptable proximity to the duct in the 2019 refueling outage but did not adequately evaluate and manage the risk from the degradation on the B phase. As a result, the licensee monitored the B phase degradation to failure and a portion of the link became separated and electrically faulted the main generator in September 2020 causing a reactor trip.
Enforcement: Inspectors did not identify a violation of regulatory requirements associated with this finding.

Failure to Evaluate the Adequacy of a Design Change for Main Feedwater Regulating Valve Positioner			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Initiating Events	Green FIN 05000483/2020004-01 Open/Closed	[H.3] - Change Management	71153
The inspectors reviewed a self-revealed Green finding for the licensee's failure to adequately evaluate the failure modes of the main feedwater regulating valve positioner as part of a design change process. Specifically, the development and installation of a replacement main feedwater control system required a Failure Modes and Effects Analysis. The licensee failed to recognize and evaluate the failure mode and the implications of installing a local keylock switch to control swapping between the primary and backup MFRV positioners. As a result, the plant experienced an automatic reactor trip when the primary main feedwater regulating valve positioner failed and the backup positioner could not be quickly placed into service.			
Description: On April 4, 2020, the Callaway Plant was operating at 100 percent power and experienced an automatic reactor trip due to a low steam generator water level signal. Prior to the reactor trip, the control room received a digital feedwater trouble alarm and noted a lowering level in the C steam generator and the C main feedwater regulating valve (MFRV) unexpectedly going closed. Operators placed the C MFRV in manual control and attempted to restore the steam generator water level to the program band. When the control room staff recognized that the C MFRV was not responding to manual control, the control room supervisor directed a manual reactor trip. Prior to manually tripping the reactor, the steam generator C water level dropped to 17 percent, causing an automatic reactor trip. After the trip, systems responded as expected for the event and the plant was stabilized in Mode 3. This event was reported under Licensee Event Report (LER) 2020-002-00, "Reactor Trip and AFW Actuation Following Spurious MFRV Closure." (ADAMS Accession Number ML20155K873) After stabilizing the plant, the licensee conducted interviews, performed plant walkdowns, and commenced troubleshooting to determine the cause for the loss of steam generator water level control. The licensee determined the loss of level control was caused by a failure of the C MFRV primary positioner in a manner that prevented the backup positioner from being able to control the MFRV position. A local inspection of the MFRV controller indicated that the fault did not allow enough time for operators to transfer control to the backup positioner when the primary positioner failed. As a result, the failed primary positioner could not respond to automatic or manual control signals which led to the decrease in C steam generator water level.			

As background, each MFRV has electropneumatic primary and backup positioners that control air pressure to move the MFRV. The positioners were modified and installed in April 2013 as part of MP 03-1002, "Main Feedwater Pump Turbine Control System Replacement," Revision 2. A Failure Modes and Effects Analysis (FMEA) was performed as part of the required plant modification design review process to identify and mitigate potential design flaws. The MFRV control system was designed to rely on the primary positioner with the backup positioner in standby. Intended to be fault-tolerant, the MFRV control system allows the backup positioner to take control for some failure modes of the primary positioner such as loss of air. The licensee, however, was later concerned that the control system could hunt between positioners for some failure modes and added a local manual key switch. If this key switch is turned, it forces the control system to select only one positioner for input. As a result, the design requires operations staff to respond to the MFRV positioner locally in some failure modes such as an internal failure of a positioner to swap which positioner is in control. Because the primary positioner failed in a way that sent a large close signal to the MFRV, the backup could not compensate and operations did not have enough time to allow operators to locally force the backup positioner into control via the key switch.

The licensee's cause evaluation team for the April 2020 reactor trip reviewed this design to explore the reason why the MFRV controller failed to swap between positioners. Ultimately, the licensee's cause review determined that the 2013 FMEA failed to identify a plausible scenario where a fault in the primary positioner would prevent locally transferring MFRV control to the backup positioner fast enough to avoid a plant transient. As a result, the MFRV control system had an unrecognized latent single point vulnerability (SPV).

The inspectors independently reviewed the licensee's cause work, the main feedwater control system modification package, and the corrective action history. Procedure EDP-ZZ-01131, "Plant Health and Performance Monitoring Program," describes health issues as significant or long-standing equipment issues including SPVs and directs the identification and prioritization of addressing them. Appendix O, "Single Point Vulnerabilities," of that procedure states that "redundant components should be evaluated as single point vulnerabilities because there are failure modes that can defeat design." The inspectors noted that the pre-2013 MFRV controls utilized a single positioner, that this was previously identified as an SPV, and MP 03-1002 was intended to improve the design for the positioners to include dual channels of control. The inspectors concluded that the lack of a robust failure modes analysis in 2013 did not allow the new design, with a dual positioner approach, to be identified as containing a SPV. As a result, actions were not put in place to eliminate or mitigate the design vulnerability.

Further, the inspectors noted that, when the licensee decided to install a local key lock switch on the MFRV controller to prevent the system from cycling between controllers, plant leadership did not adequately consider the potential consequences. Specifically, failure modes requiring manual operator action can prevent swapping controllers in a timely manner in the event of a failure that caused the MFRV to rapidly open or shut because the keylock switch is located near the valve out in the plant.

The inspectors further noted that, since the implementation of MP 03-1002, Callaway had experienced several positioner failures. For example, in 2017, the licensee experienced a sluggish response on one positioner for the A MFRV as documented in Condition Report 201702962. In this case, the licensee had adequate time to respond to the transient, shift controllers, and regain automatic control of the A MFRV using the backup controller. Following the 2017 failure, Callaway generated a plant health issue to monitor the positioner's performance based the history of failures including Condition Reports 201602773,

201603418, 201702370, and 201702962. As part of the system health review, the licensee performed a review of the original design modification package and information from the vendor including the new failure analysis. To improve positioner performance, the licensee added additional maintenance and design items related to system air quality. For example, the licensee began replacing air filters, air regulators, and all primary positioners every outage due to their concerns about reliability. The plant health review process, however, failed to identify the MFRV positioner as a component with the potential to be a SPV. This represented a second missed opportunity to identify the failure mode.

Corrective Actions: After stabilizing the plant, the licensee conducted interviews, performed a plant walkdown, and commenced troubleshooting to determine the cause for the loss of steam generator water level control. Additionally, the licensee replaced the valve positioners for all four MFRVs and generated a condition report.

Corrective Action References: Condition Report 202001783

Performance Assessment:

Performance Deficiency: The failure to identify and mitigate a failure mode of the replacement main feedwater regulating valve positioner during the design change process that made a plant transient more likely is 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 Initiating Events Cornerstone and adversely affected the cornerstone objective to limit the likelihood of events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Specifically, the performance deficiency resulted in the lowering steam generator water level control and an automatic reactor trip.

Significance: The inspectors assessed the significance of the finding using Appendix A, “The Significance Determination Process (SDP) for Findings At-Power.” The finding was determined to be of very low safety significance (Green) because it caused a reactor trip but did not cause a loss of mitigating equipment relied on to transition the plant from the onset of a trip to a stable shutdown condition. Specifically, plant systems automatically responded to the trip and the licensee was able to transition into normal shutdown procedures.

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. The finding had a human performance cross-cutting aspect associated with Change Management in that plant leadership did not maintain a clear focus on nuclear safety when planning, communicating, and executing major changes. Specifically, in 2017 and following MFRV positioner failures, the licensee initiated plant health issues to improve the MFRV positioner performance. Station leadership did not ensure the timeliness, scope, and depth of the review and associated actions such that significant unintended consequences were avoided. As a result, the licensee did not identify the failure to swap to the backup positioner in a timely manner as a potential SPV and a plant trip occurred.

Enforcement: Inspectors did not identify a violation of regulatory requirements associated with this finding.

Licensee-Identified Non-Cited Violation	71153
This violation of very low safety significance associated with a failure to properly preplan maintenance that can affect the performance of safety-related equipment was identified by the licensee, has been entered into the licensee corrective action program, and is being treated as a non-cited violation, consistent with Section 2.3.2 of the Enforcement Policy.	

Violation: Callaway Plant Technical Specification 5.4.1, “Procedures,” requires, in part, that written procedures shall be established, implemented, and maintained covering the applicable procedures recommended in Regulatory Guide 1.33, Revision 2, Appendix A, February 1978. Regulatory Guide 1.33, Revision 2, Appendix A, Section 9, “Procedures for Performing Maintenance,” states, in part, 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, from August 5 to September 9, 2020, the licensee failed to properly preplan and perform maintenance that can affect the performance of safety-related equipment in accordance with written procedures, documented instructions, or drawings appropriate to the circumstances. Specifically, documented instructions for planned work on the A train emergency diesel generator utilized a gagged-open jacket water relief valve as a worker protection tagout boundary. When restoring from maintenance, the licensee did not ensure the relief valve properly reseated in the closed position and, instead, the valve was left partially open due to foreign material in its seat. As a result, the jacket water system experienced leakage through the partially open relief valve was undetected for 35 days, which rendered the associated emergency diesel generator inoperable. This was reported in Licensee Event Report (LER) 2020-004-00, Violation of Technical Specification 3.8.1, "AC Sources – Operating" (ADAMS Accession Number ML20310A328).

Significance/Severity: Green. The inspectors determined the finding needed a detailed risk evaluation, per the Mitigating Systems Screening Questions in IMC 0609, Appendix A, Exhibit 2, since the inoperability of the A train emergency diesel generator represented a loss of the Probabilistic Risk Assessment function of one train of a multi-train technical specification system for greater than its technical specification allowed outage time. Based on the information provided in LER 2020-004-00 and from direct inspection performed by the resident inspectors, the Senior Risk Analyst made the following assumptions:

1. This performance deficiency impacted the ability of Emergency Diesel Generator A to provide power for its intended run time during an exposure time (EXP) of 35.5 days;

2. At the calculated leakage rate, Emergency Diesel Generator A would have run on demand for 3.8 days (Run Time) without intervention;

3. The failure to maintain the relief valve closed would not affect diesel generator availability if the nonsafety-related makeup system continued to run;

4. Based on Assumption 3, this performance deficiency would only impact the plant during a complete loss of offsite power;

5. During an actual long-term loss of offsite power, plant procedures would provide for increased attention to the running diesel generator and its operating parameters;

6. With a leak this slow, control room annunciation would alert operators to a low level in the jacket water storage tank long before failure of the diesel generator; and

7. Based on Assumptions 5 and 6, there is a likelihood that operators would observe and mitigate the leak from the relief valve prior to diesel failure.

Using the site-specific Standardized Plant Analysis Risk (SPAR) model, the analyst quantified the following parameters:

- The frequency of a total loss of offsite power (P_{LOOP}) was 3.24E-02/year.

- The probability of not recovering offsite power within the 3.8 days that the diesel would run (P_{NR}) was 1.61E-02.

- The failure of Emergency Diesel Generator B to start (P_{FTS}) was 2.86E-03.

- The failure of Emergency Diesel Generator B to run for 23 hours plus 3.8 days (P_{FTR}) was 1.71E-01

Using the parameters above, the analyst calculated the probability that: a total loss of offsite power would occur over a 35.5 day exposure period; Emergency Diesel Generator B would fail; and offsite power would not be recovered in 3.8 days resulting in a station blackout (P_{SBO}). This calculation performed was as follows:

$P_{SBO} = (P_{LOOP} \div 365) * EXP * P_{NR} * (P_{FTS} + P_{FTR})$

$= (3.24E\text{-}02/\text{year} \div 365 \text{ days/year}) * 35.5 \text{ days} * 1.61E\text{-}02 * (2.86E\text{-}03 + 1.71E\text{-}01)$

$= 8.82E\text{-}06$

The analyst used the SPAR model to quantify the conditional core damage probability for a station blackout with no offsite power recovery. The parameter value was 1.50E-02. The dominant core-damage sequence was:

- Grid-related Loss of Offsite Power
- Both Emergency Diesel Generators fail to run
- No recovery of offsite power
- Failure of operators to align alternate ac power
- Nonrecovery of the Emergency Power Supply system

Multiplying the station blackout probability and the conditional core damage probability resulted in an incremental conditional core damage probability of 1.32E-07. The analyst noted that, given Assumption 7, some level of specific recovery for Emergency Diesel Generator A would be appropriate in this evaluation. Therefore, qualitatively, the analyst determined that the incremental conditional core damage probability was less than 1.0E-07. As a result, the analyst determined that neither an external events review nor an assessment of large-early release frequency was warranted. Given the

incremental conditional core damage probability (ΔCDF) of less than 1.0E-07, the analyst determined that the performance deficiency was of very low safety significance (Green).

Corrective Action References: Condition Report 202004518

EXIT MEETINGS AND DEBRIEFS

The inspectors confirmed that proprietary information was controlled to protect from public disclosure.

- On October 30, 2020, the inspectors presented the inservice inspection results to B. Cox, Site Vice President and other members of the licensee staff.
- On January 6, 2021, the inspectors presented the integrated inspection results to Mr. B. Cox, Site Vice President and other members of the licensee staff.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71111.04	Corrective Action Documents	Condition Reports	201602500, 201603131, 201707731, 201807138, 201907538, 202005057, 202005262, 202005582, 202005603, 202005647, 202005749	
	Miscellaneous	EJ-40, Addendum 1	Updated Residual Heat Removal Flow Instrument Uncertainty For EOPs	0
		M-22MEJ01	Piping and Instrumentation Diagram Residual Heat Removal System - FSAR Figure 5.4-7	62
	Procedures	OSP-EJ-00001	Residual Heat Removal Suction Valve Automatic Actuation Test	17
		OSP-EJ-V001B	Train B Residual Heat Removal Valve Inservice Test	7
		OSP-SA-24133	Train A Diesel Generator and Sequencer Testing	10
		OTN-NE-0001B	Standby Diesel Generation System – Train B	56
71111.05	Miscellaneous		Fire Pre-Plan	Various
		RFR 14421	Approval of Temporary Fire Extinguishers	0
71111.08P	Corrective Action Documents	Condition Reports	201805684, 201805691, 201805713, 201805716, 201805856, 201805898, 201805908, 201805909, 201805987, 201806090, 201806138, 201806140, 201806250, 201806475, 201806492, 201806564, 201806706, 201807312, 201808417, 201807312, 201900495, 201900726, 201900727, 2019-0729, 201901402, 201901664, 201901687, 201901694, 201901697, 201901869, 201902249, 202000051, 202000906, 202001083, 202001457, 202003385	
	Corrective Action Documents Resulting from Inspection	Condition Reports	202006108, 202006137, 202006138, 202006139	
	Miscellaneous	1·8002354/450	EPHV8950D / Safety Injection Accumulator Tank C Vent Valve, WPS-0808T01	
		19004144/530	Main Steam System AB-0220-EBD-8, FW-04, Plate to Pipe, FW-03, Plate to Angle Iron	

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		20003319/500	Component Cooling Water Heat Exchanger, FW-01, Base Metal Repair	
	Procedures	APA-ZZ-00500 Appendix 1	Operability Determinations	35
		APA-ZZ-00500, Appendix 3	Past Operability and Reportability Evaluations (REPO)	26
		APA-ZZ-00661	Administration of Welding	17
		EDP-ZZ-01004	Boric Acid Corrosion Control Program Procedure	23
		LMT-08-PDI-UT-1	Ultrasonic Examination of Ferritic Piping Welds	0
		LMT-08-PDI-UT-2	Ultrasonic Examination of Austenitic Piping Welds	0
		LMT-08-PDI-UT-3	Ultrasonic Through Wall Sizing in Piping	0
		LMT-08-UT-004	Ultrasonic Examination of Vessel Welds and Adjacent Base Metal > 2.0” in Thickness	1
		LMT-08-UT-119	Conventional Ultrasonic Instrument Linearity	1
		MDP-ZZ-LM001	FLM (Fluid Leak Management Procedure	19
		MTW-ZZ-WP002	Welder Performance Qualification	27
		PDI-ISI-254	Remote Inservice Examination of Reactor Vessel Shell Welds	
		QCP-ZZ-05048	Quality Control Boric Acid Walkdown for Reactor Coolant System Pressure Boundary	14
		QCP-ZZ-05049	Quality Control Reactor Pressure Vessel Head Bare Metal Examination	6
71111.11Q	Corrective Action Documents	Condition Reports	201903787, 201903820	
	Procedures	APA-ZZ-00703	Fire Protection Operability Criteria and Surveillance Requirements	30
		ISP-SM-LL0L2	Containment Equipment Hatch Leak Rate Test	9
		ODP-ZZ-00001, Addendum 3	Crew Performance Improvement and Qualifications	49
		ODP-ZZ-00014	Operational Mode Change Requirements	55
		OSP-EF-0002B	Essential Service Water Train B Flow Verification	14
		OSP-EJ-00002	RCS/RHR Suction Valve Automatic Actuation Test	16
		OSP-SA-00004	Visual Inspection of Containment for Loose Debris	26

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		OTS-AP-00001	Non-Safety Auxiliary Feedwater Pump Testing and Operations	11
	Work Orders		19595961, 19505091, 1950658, 19506837	
71111.12	Corrective Action Documents	Condition Reports	201904396, 202000878, 202001464, 202001844, 202002287, 202004273, 202002569, 202004979, 202005388, 202005936, 202005955, 202006148, 202006408, 202006502	
	Miscellaneous	NUMARC 93-01	Industry Guidelines for the Monitoring the Effectiveness of Maintenance	4F
	Procedures	APA-ZZ-00500	Corrective Action Program	71
		APA-ZZ-00549, Appendix B	Guidelines Used to Determine Functional Importance of a Component	13
		EDP-ZZ-01128	Maintenance Rule Program	29
		EDP-ZZ-01128, Appendix 4	Maintenance Rule System Functions	22 and 24
71111.13	Corrective Action Documents	Condition Reports	201207322, 201707612, 201803059, 202000019, 202007007	
	Miscellaneous		RF24 Shutdown Safety Management Plan	7
		NUMARC 93-01	Industry Guidelines for Monitoring the Effectiveness of maintenance at Nuclear Power Plants	4F
	Procedures	APA-ZZ-00322, Appendix F	Online Work Integrated Risk Management	18
		APA-ZZ-01250	Operational Decision Making	18
		EDP-ZZ-01128, Appendix 1	SSCs in the Scope of the Maintenance Rule at Callaway	11
		ODP-ZZ-00002	Equipment Status Control	95
		ODP-ZZ-00002, Appendix 2	Risk Management Actions for Planned Risk Significant Activities	19
		ODP-ZZ-0002, Appendix 2	Risk management Actions for Planned Risk Significant Activities	17
71111.15	Corrective Action Documents	Condition Reports	202005988, 20206088, 202006217	
	Procedures	APA-ZZ-00340	Surveillance Program Administration	37

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		APA-ZZ-00500, Appendix 1	Operability Determinations	35
		APA-ZZ-01250	Operational Decision Making	19
		OSP-EF-P0001B	Essential Service Water Train B Inservice Test	72
71111.18	Corrective Action Documents	Condition Reports	201803497, 201907579, 202001404, 202001427, 202001428, 202002796, 202003932, 202003965, 202003966	
	Miscellaneous	MP 19-0017	Inboard/Outboard Mechanical Seal Orifice Re-design for AFW Pumps	
		RFR 180077		
		RFR 180206		
	Work Orders		19003559, 19003560	
71111.19	Corrective Action Documents	Condition Reports	201904103, 202005407, 202005562, 202005857, 202006872, 202006893	
	Miscellaneous	Job 15507242	C Reactor Coolant Pump Seal	
	Procedures	MPM-BB-QP001	Reactor Coolant Pump Seal Removal and Replacement	44
		OTN-NE-0001B	Standby Diesel Generation System – Train B	56
	Work Orders		06118053, 12002428, 17512578, 17513064, 18503659, 18504224, 19505985, 19506119	
71111.20	Corrective Action Documents	Condition Reports	202004179, 202004659, 202005271, 202005461, 202005379, 202006659	
	Procedures	ITL-BB-0L53B	RCS Loop 4 Hot Leg Midloop Level Loop Calibration	14
		ITL-BB-L53BB	RCS Loop Level (CTMT Vented) Calibration	8
	Work Orders		19504054, 19504059, 19504257	
71111.22	Corrective Action Documents	Condition Reports	201009642, 201401615, 201408598, 202005349, 202006088	
	Miscellaneous	Job 19506491	Turbine Driven Auxiliary Feedwater Pump Inservice Test	
	Procedures	MPM-BG-QP02A	Centrifugal Charging Pump Mechanical Seal Replacement	10
		MPM-BG-QP02B	Centrifugal Charging Pump Mechanical Seal Rebuild	4
		OSP-AL-PV005	Train A and Train B Safety Injection Comprehensive Pump Test	26
		OSP-EJ-V002A	RHR Pump Containment Sump Suction and RWST Suction Inservice Test	32

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		OSP-EM-P0002	Train A and Train B Safety Injection Comprehensive Pump Test	11
		OSP-EM-V0004	RHR Check Valve and SI Pump Recirc Valve Inservice Test	23
		OTN-EJ-00002, Addendum 1	A RHR Pump Drain and Refill	13
	Work Orders		19504365, 19505005, 19505276, 20203212, 20003215, 20003559,	
71124.01	Corrective Action Documents	Condition Reports	201901659, 201901995, 201902542, 201902688, 201903079, 201903205, 201903222, 201903396, 201903716, 201903831, 201904139, 201904693, 201904719, 201905171, 202000248, 202000951, 202002405, 202004719, 202004932, 202005042, 202007039	
71124.02	Corrective Action Documents	Condition Reports	201902603, 201902652, 201903116, 201904604, 202000012	
71151	Corrective Action Documents	Condition Reports	201902139, 201903512, 201907189, 201901249, 201902202, 201904331, 201905229, 202004658, 202004693, 202002486, 202003459	
	Miscellaneous		Access Control Dose 100 mRem or Greater Report: 04/08/2019 - 10/20/2020	
			Callaway Energy Center 2019 Annual Radioactive Effluent Release Report	1
		PM0911004	Dose Assessment from Liquid Effluents Reports for periods ending: 03/31/2020, 06/30/2020, and 09/30/2020	
		PM0911009	Dose Assessment from Noble Gases Reports for periods ending: 03/31/2020, 06/30/2020, and 09/30/2020	
		PM0911010	Dose Assessment from Radioiodine and Particulates Reports for periods ending: 03/31/2020, 06/30/2020, and 09/30/2020	
	Procedures		MSPI Basis Document	18
		APA-ZZ-01111	Mitigating Systems Performance Index Program Administration	4
		KDP-ZZ-020000	NRC Performance Indicator Data Collection	10

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		RP-DTI-PERFORMANCE INDICATORS	Radiation Protection Performance Indicators	3
		RRA-ZZ-00001	NRC Performance Indicator Program	12
71152	Corrective Action Documents	Condition Reports	199502137, 199803439, 200002670, 200407114, 200601140, 200601141, 200100865, 201006478, 201203474, 201604298, 201606685, 201704538, 201907079, 201907612, 202000586, 202004273, 202007612,	
	Procedures		Maintenance Rule Scope Evaluation (PA, PG, PO, MD)	1
71153	Corrective Action Documents	Condition Reports	202001783, 202004368, 202004518, 202004895, 202007410	
	Miscellaneous	M-11759-00009	Digital Feedwater System - Main Feedwater Regulating Valve and Bypass Valve	1
		M-22AE01	P&ID Feedwater System	0
	Procedures	APA-ZZ-00500	Corrective Action Program	72
		APA-ZZ-00500, Appendix 12	Significant Adverse Condition – ADCN-1	38
		APA-ZZ-00500, Appendix 15	Adverse Condition – ADCN-4	35
		MDPZZ-TR001	Planning and Execution of Formal Troubleshooting Activities	24