UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
1600 E. LAMAR BLVD
ARLINGTON, TX 76011-4511

January 28, 2018

EA-17-186

Mr. Fadi Diya, Senior Vice President
and Chief Nuclear Officer
Ameren Missouri
Callaway Plant
P. O. Box 620
Fulton, MO 65251

SUBJECT: CALLAWAY PLANT – NRC INTEGRATED INSPECTION REPORT 05000483/2017004 AND EXERCISE OF ENFORCEMENT DISCRETION

Dear Mr. Diya:

On December 31, 2017, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Callaway Plant. On January 3, 2018, the NRC inspectors discussed the results of this inspection with Mr. B. Cox, Senior Director, Nuclear Operations, and other members of your staff. The results of this inspection are documented in the enclosed report.

NRC inspectors documented two findings of very low safety significance (Green) in this report. Both of these findings involved violations of NRC requirements. The NRC is treating these violations as non-cited violations (NCVs) consistent with Section 2.3.2.a of the Enforcement Policy.

If you contest the violations or significance of these NCVs, you should provide a response within 30 days of the date of this inspection report, with the basis for 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 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.

A tornado-generated missile protection violation was identified for Technical Specification 3.7.9, “Ultimate Heat Sink.” Because the violation was identified during the discretion period covered by Enforcement Guidance Memorandum 15-002, Revision 1, “Enforcement Discretion for Tornado Missile Protection Non-compliance,” and because the licensee was implementing compensatory measures, the NRC is exercising enforcement discretion by not issuing an enforcement action and is allowing continued reactor operation.

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 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

/RA/

Nicholas H. Taylor, Branch Chief
Project Branch B
Division of Reactor Projects

Docket No. 50-483
License No. NPF-30

Enclosure:
Inspection Report 05000483/2017004
w/ Attachment:
1. Supplemental Information
2. Request for Information Quarterly Baseline Inspection
3. Request for Information Occupational Radiation Safety Inspection

cc w/encl: Electronic Distribution

U.S. NUCLEAR REGULATORY COMMISSION

REGION IV

Docket:	05000483
License:	NPF-30
Report:	05000483/2017004
Licensee:	Union Electric Company
Facility:	Callaway Plant
Location:	8315 County Road 459 Steedman, MO 65077
Dates:	October 1 through December 31, 2017
Inspectors:	D. Bradley, Senior Resident Inspector S. Janicki, Resident Inspector R. Kopriva, Senior Reactor Inspector P. Elkmann, Senior Emergency Preparedness Inspector S. Money, Health Physicist J. O'Donnell, CHP, Health Physicist
Approved By:	Nicholas H. Taylor Chief, Project Branch B Division of Reactor Projects

SUMMARY

IR 05000483/2017004, 10/01/2017 - 12/31/2017; Callaway Plant, Equipment Alignment, Problem Identification and Resolution.

The inspection activities described in this report were performed between October 1 and December 31, 2017, by the resident inspectors at the Callaway Plant and inspectors from the NRC's Region IV office. Two findings of very low safety significance (Green) are documented in this report. Both of these findings involved violations of NRC requirements. The significance of inspection findings is indicated by their color (i.e., Green, greater than Green, White, Yellow, or Red), determined using Inspection Manual Chapter 0609, "Significance Determination Process," dated April 29, 2015. Their cross-cutting aspects are determined using Inspection Manual Chapter 0310, "Aspects within the Cross-Cutting Areas," dated December 4, 2014. Violations of NRC requirements are dispositioned in accordance with the NRC Enforcement Policy. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," dated July 2016.

Cornerstone: Mitigating Systems

- Green. The inspectors identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," for the licensee's failure to provide design control measures for verifying or checking the adequacy of the design of the ultimate heat sink cooling tower. Specifically, the licensee did not provide an analysis to demonstrate that the safety-related ultimate heat sink cooling tower structure and associated equipment located within were capable of withstanding the effects of a probable maximum precipitation flooding event. As immediate corrective actions, the licensee walked-down the structure and performed an analysis of the ultimate heat sink cooling tower under probable maximum precipitation conditions. The licensee entered this issue into their corrective action program under Condition Report 201707058.

  Failure to provide design control measures for verifying or checking the adequacy of the design of the ultimate heat sink cooling tower was a performance deficiency. This performance deficiency was more than minor, and therefore a finding, because it adversely affected the design control attribute of the Mitigating Systems Cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the licensee did not have an analysis of record for the effect of probable maximum precipitation on the ultimate heat sink cooling tower at the time of inspection although their license basis documents would require it. Using Inspection Manual Chapter 0609, Attachment 4, "Initial Characterization of Findings," and Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," Exhibit 2, "Mitigating Systems Screening Questions," dated June 19, 2012, the inspectors determined that the finding was of very low safety significance (Green) because it did not involve the loss or degradation of equipment or function specifically designed to mitigate a seismic, flooding, or severe weather initiating event. The finding had a cross-cutting aspect in the area of human performance associated with avoiding complacency because the licensee failed to recognize and plan for the possibility of mistakes, latent issues, and inherent risk, even while expecting successful outcomes. Specifically, the licensee did not recognize and plan for mistakes and latent errors in Calculation ARC-1372 during its creation and approval in November 2016 [H.12]. (Section 1R04)

- Green. The inspectors identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," for the licensee's failure to assure that applicable regulatory requirements and the design basis were correctly translated into procedures for the safety injection pumps and centrifugal charging pumps. Specifically, licensee Procedure APA-ZZ-00500, Appendix 1, "Operability and Functionality Determinations," Revision 29, incorrectly based the safety injection pumps and centrifugal charging pumps mission times on small break loss of coolant accident scenarios and did not consider large break loss of coolant accidents. As a result, the non-conservative mission times of 10 hours were incorrectly translated into past operability assessments and operator procedures for acceptable system parameters. As immediate corrective actions, the licensee issued a night order to communicate the correct mission time for safety injection and centrifugal charging systems to operations staff. The licensee entered this issue into their corrective action program under Condition Reports 201707137 and 201706900.

  Failure to assure that applicable regulatory requirements and the design basis are correctly translated into procedures for the safety injection pumps and centrifugal charging pumps was a performance deficiency. This performance deficiency was more than minor, and therefore a finding, because it adversely affected the design control attribute of the Mitigating Systems Cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, licensee Procedure APA-ZZ-00500, Appendix 1, "Operability and Functionality Determinations," Revision 29, incorrectly based the safety injection pumps and centrifugal charging pumps mission times on small break loss of coolant accident scenarios and did not consider large break loss of coolant accidents. As a result, the non-conservative mission times of 10 hours were incorrectly translated into past operability assessments and operator procedures for acceptable system parameters. Using Inspection Manual Chapter 0609, Attachment 4, "Initial Characterization of Findings," and Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," Exhibit 2, "Mitigating Systems Screening Questions," dated June 19, 2012, the inspectors determined that the finding was of very low safety significance (Green) because (1) the finding was not a deficiency affecting the design or qualification of a mitigating system; (2) the finding did not represent a loss of system and/or function; (3) the finding did not represent an actual loss of function of a single train for greater than its technical specification allowed outage time; and (4) the finding does not represent an actual loss of function of one or more non-technical specification trains of equipment designated as high safety-significant in accordance with the licensee's maintenance rule program for greater than 24 hours. The finding did not have a cross-cutting aspect since the mission time guidance was last revised in 2012 and is not reflective of current performance. (Section 4OA2)

PLANT STATUS

Callaway Plant began the inspection period at 98 percent in a power coast down to a planned refueling outage. On October 7, 2017, the licensee shut down the reactor and commenced the planned refueling outage. On December 17, 2017, the licensee commenced a reactor startup. On December 19, 2017, the licensee connected the main generator to the electric grid and concluded the planned refueling outage. The licensee reached 100 percent power on December 22, 2017 and remained at this power level through the end of the inspection period.

REPORT DETAILS

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R01 Adverse Weather Protection (71111.01)

Readiness for Seasonal Extreme Weather Conditions

a. Inspection Scope

On November 6, 2017, the inspectors completed an inspection of the station's readiness for seasonal extreme weather conditions. The inspectors reviewed the licensee's adverse weather procedures for cold weather and evaluated the licensee's implementation of these procedures. The inspectors verified that, prior to the onset of cold weather, the licensee had corrected weather-related equipment deficiencies identified during the previous winter.

The inspectors selected three risk-significant systems that were required to be protected from cold weather:

- essential service water train A
- essential service water train B
- emergency diesel generator train A

The inspectors reviewed the licensee's procedures and design information to ensure the systems would remain functional when challenged by adverse weather. The inspectors verified that operator actions described in the licensee's procedures were adequate to maintain readiness of these systems. The inspectors walked down portions of these systems to verify the physical condition of the adverse weather protection features.

These activities constituted one sample of readiness for seasonal adverse weather, as defined in Inspection Procedure 71111.01.

b. Findings

No findings were identified.

1R04 Equipment Alignment (71111.04)

Partial Walk-Down

a. Inspection Scope

The inspectors performed partial system walk-downs of the following risk significant systems:

- October 19, 2017, essential service water train A and ultimate heat sink
- October 26, 2017, emergency diesel generator A
- November 14, 2017, essential service water train B
- November 28, 2017, electrical penetration assemblies

The inspectors reviewed the licensee's procedures and system design information to determine the correct lineup for the systems. They visually verified that critical portions of the systems were correctly aligned for the existing plant configuration.

These activities constituted four partial system walk-down samples as defined in Inspection Procedure 71111.04.

b. Findings

Introduction. The inspectors identified a Green, non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," for the licensee's failure to provide design control measures for verifying or checking the adequacy of the design of the ultimate heat sink (UHS) cooling tower. Specifically, the licensee did not provide an analysis to demonstrate that the safety-related UHS cooling tower structure and associated equipment located within were capable of withstanding the effects of a probable maximum precipitation (PMP) flooding event.

Description. On October 19, 2017, the inspectors performed a system walk-down of the UHS cooling tower. The UHS fans provide forced-draft cooling of essential service water as it flows through the safety-related UHS cooling tower to remove heat from plant components required to reach safe shutdown. The 2035 foot elevation of the UHS cooling tower contains safety-related UHS fans and fan motors in two rooms that are separated by train. The floors and walls of each room are comprised of reinforced concrete for tornado missile protection. The ceiling of each room, however, is open to the sky, by design, to allow a path for air flow through the UHS fans via a metal grating. See Section 1R15 of this report for a discussion of the tornado missile protection of the metal grating. The drain system for each room is comprised of scuppers that transport water out the sides of the building and floor drains that transport water to the UHS basin.

The inspectors noted the line-of-sight to the sky and reviewed design documents for PMP flooding events. The inspectors reviewed Calculation ARC-1372, "Review of Flood Levels in the UHS Cooling Tower," Revision 0. This calculation was created in November 2016 and it only considers internal flooding sources such as essential service water piping.

At the time of inspection, the licensee did not have an analysis of record for the effect of PMP on the UHS cooling tower. Stated differently, the licensee did not have analysis for

concerns such as the maximum allowable water height in the rooms for structural integrity, the maximum allowable water height that could affect safety-related UHS fan motors adversely, and the adequacy of sizing for scuppers and drains to ensure the PMP does not challenge those limits.

The inspectors noted that the licensee is committed to Regulatory Guide 1.102, "Flood Protection for Nuclear Power Plants," Revision 1, which states:

> Analysis supporting the invulnerability of safety-related structures, systems, and components from the effects of local PMP should be performed using the point rainfall value of the PMP for the site area.

The licensee is also committed to Regulatory Guide 1.27, "Ultimate Heat Sink for Nuclear Power Plants," Revision 2, which states:

> The ultimate heat sink complex…should be capable of withstanding, without loss of the sink safety functions specified…the most severe natural phenomena expected at the site…

Section 3.11(B), "Environmental Design of Mechanical and Electrical Equipment," of the Final Safety Analysis Report states:

> Engineered safety features systems, components, and structures which are exposed to the outside environment will be capable of sustaining…precipitation…without a loss of function.

Section 2.4.2.3, "Effects of Local Intense Precipitation," of the Final Safety Analysis Report states:

> Roof-drain design of safety-related structures for locally intense precipitation as severe as that of the PMP is provided so that safety-related facilities would not be affected.

The inspectors concluded that the licensee failed to provide design control measures for verifying or checking the adequacy of the design of the ultimate heat sink cooling tower. Specifically, the licensee did not have an analysis of record for the effect of PMP on the UHS cooling tower at the time of inspection although their license basis documents would require it. The licensee performed a preliminary analysis of the PMP on the UHS cooling tower, only crediting drain pathways that could be visually confirmed to be clear, and determined there would be less than one half inch of water accumulated. This amount of water does not challenge equipment in the area, such as UHS fan motors, which are located several feet above the floor.

As immediate corrective actions, the licensee walked-down the structure and performed an analysis of the ultimate heat sink cooling tower under PMP conditions. The licensee entered this issue into their corrective action program under Condition Report 201707058.

Analysis. The failure to provide design control measures for verifying or checking the adequacy of the design of the ultimate heat sink cooling tower was a performance deficiency. This performance deficiency was more than minor, and therefore a finding, because it adversely affected the design control attribute of the Mitigating Systems Cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the licensee did not have an analysis of record for the effect of PMP on the UHS cooling tower at the time of inspection although their license basis documents would require it. Using Inspection Manual Chapter 0609, Attachment 4, "Initial Characterization of Findings," and Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," Exhibit 2, "Mitigating Systems Screening Questions," dated June 19, 2012, the inspectors determined that the finding was of very low safety significance (Green) because it did not involve the loss or degradation of equipment or function specifically designed to mitigate a seismic, flooding, or severe weather initiating event. The finding had a cross-cutting aspect in the area of human performance associated with avoiding complacency because the licensee failed to recognize and plan for the possibility of mistakes, latent issues, and inherent risk, even while expecting successful outcomes. Specifically, the licensee did not recognize and plan for mistakes and latent errors in Calculation ARC-1372 during its creation and approval in November 2016 [H.12].

Enforcement. Title 10 CFR 50, Appendix B, Criterion III, "Design Control," requires, in part, that design control measures shall provide for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program. Contrary to the above, prior to October 19, 2017, for the quality-related structure and components associated with the ultimate heat sink (UHS) cooling tower, to which 10 CFR Part 50, Appendix B applies, the licensee failed to provide for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program. Specifically, the licensee did not have an analysis of record for the effect of probable maximum precipitation (PMP) on the UHS cooling tower. As immediate corrective actions, the licensee walked-down the structure and performed an analysis of the ultimate heat sink cooling tower under PMP conditions. The licensee entered this issue into their corrective action program under Condition Report 201707058. This violation is being treated as a non-cited violation, consistent with Section 2.3.2.a of the Enforcement Policy. NCV 05000483/2017004-01, "Design Control of the Ultimate Heat Sink Cooling Tower."

1R05 Fire Protection (71111.05)

Quarterly Inspection

a. Inspection Scope

The inspectors evaluated the licensee's fire protection program for operational status and material condition. The inspectors focused their inspection on four plant areas important to safety:

- October 13, 2017, reactor building elevation 2026', fire area RB-1

- November 28, 2017, main feedwater and main steam isolation valve rooms, fire area A-23
- November 29, 2017, essential service water train A and B pump rooms, fire areas UNPH and USPH
- November 30, 2017, upper and lower cable spreading rooms, fire areas C21 and C22

For each area, the inspectors evaluated the fire plan against defined hazards and defense-in-depth features in the licensee's fire protection program. The inspectors evaluated control of transient combustibles and ignition sources, fire detection and suppression systems, manual firefighting equipment and capability, passive fire protection features, and compensatory measures for degraded conditions.

These activities constituted four quarterly inspection samples, as defined in Inspection Procedure 71111.05.

b. Findings

No findings were identified.

1R07 Heat Sink Performance (71111.07)

a. Inspection Scope

On October 30, 2017, the inspectors completed an inspection of the readiness and availability of risk-significant heat exchangers. The inspectors observed performance tests for the component cooling water train A heat exchanger, observed the licensee's implementation of biofouling controls, and observed the licensee's inspection of the component cooling water train A heat exchanger and the material condition of the heat exchanger internals. Additionally, the inspectors walked down the component cooling water train A system to observe its performance and material condition.

These activities constituted completion of one heat sink performance annual review sample, as defined in Inspection Procedure 71111.07.

b. Findings

No findings were identified.

1R08 Inservice Inspection Activities (71111.08)

The activities described in subsections 1 through 4 below constitute completion of one

inservice inspection sample, as defined in Inspection Procedure 71111.08.

.1 Non-destructive Examination Activities and Welding Activities

a. Inspection Scope

The inspectors directly observed the following nondestructive examinations:

SYSTEM	COMPONENT IDENTIFICATION	EXAMINATION TYPE
Auxiliary Feedwater	Work Order 16004137-500, Motor-Driven Auxiliary Feedwater System Discharge Check Valve FW-1, Upstream Side of Valve, Report 5010-17-0041	Magnetic Particle
Auxiliary Feedwater	Work Order 16004137-500, Motor-Driven Auxiliary Feedwater System Discharge Check Valve FW-2, Downstream Side of Valve, Report 5010-17-0042	Magnetic Particle
Essential Service Water	Work Order 17001711, Preparation for Weld Overlay on 8 inch Essential Service Water Pipe, EF-054-HBC-8", Report 17-000163	Ultrasonic
Reactor Coolant System	Work Order 11510850/500, Isometric BG-21-S001, Stainless Steel Pipe to Elbow Weld BB-004-BCA, Report 17-000164	Ultrasonic
Reactor Coolant System	Work Order 16511578/507, Isometric BB-05-01 S001, Pressurizer Surge Line From Loop 4, Weld BB-069-BCA, Report 17-000202	Ultrasonic
Reactor Coolant System	Outlet Nozzle 22° Dissimilar Metal Weld 2-RV-301-121-A, Analysis Log DM-22-01	Ultrasonic
Reactor Coolant System	Outlet Nozzle 158° Dissimilar Metal Weld 2-RV-301-121-B, Analysis Log DM-158-01	Ultrasonic
Reactor Coolant System	Inlet Nozzle 247° Dissimilar Metal Weld 2-RV-302-121-C, Analysis Log DM-247-01	Ultrasonic
Reactor Coolant System	Inlet Nozzle 293° Dissimilar Metal Weld 2-RV-302-121-D, Analysis Log DM-293-01	Ultrasonic
Reactor Coolant System	Reactor Vessel Interior Walls above Core Barrel Support Ledge, 0° thru 360°	Visual

SYSTEM	COMPONENT IDENTIFICATION	EXAMINATION TYPE
Reactor Coolant System (Pressurizer)	Work Order 165066501500, Reactor Coolant System Pressurizer Safety Relief Valve BB-8010A, Flange Bolting Surface, Report 5040-17-0005	Visual
Reactor Coolant System	Work Order 16511668-500, Containment Pressure Boundary Inspection of the Recirculation Sumps, Reports 22-27-001 and 22-28-001	Visual
Safety Injection	Work Order 16511812/500, Line EM-083-BCA-1-1/2, Grid Location RB-2009-AO3U-O, Report 5042-17-0068	Visual
Safety Injection	Work Order 16511822/500, Hanger Support EP01R014231, Report 5042-17-0070	Visual
Safety Injection	Work Order 16511811/500, Line EM-087-BCA-1-1/2 inch, Grid Location RB-2009-A04U-O, Report 5042-17-0069	Visual

The inspectors reviewed records for the following nondestructive examinations:

SYSTEM	COMPONENT IDENTIFICATION	EXAMINATION TYPE
Essential Service Water	Work Order 17001711-500, Weld Overlay on Line EF-054-HBC Due to Pitting, Report 5010-17-0048	Magnetic Particle
Chemical Volume and Control System	Work Order 11510853/500, Surface Examination on the hanger welded attachments, on 2-BG-02-A002, Report 5000-17-0008	Penetrant
Reactor Coolant System	Outlet Nozzle 202^{o} Dissimilar Metal Weld 2-RV-301-121-C, Analysis Log DM-202 01	Ultrasonic
Reactor Coolant System	Outlet Nozzle 338^{o} Dissimilar Metal Weld 2-RV-301-121-D, Analysis Log DM 338-01	Ultrasonic
Reactor Coolant System	Inlet Nozzle 67^{O} Dissimilar Metal Weld 2-RV-302-121-A, Analysis Log DM-67-01	Ultrasonic

SYSTEM	COMPONENT IDENTIFICATION	EXAMINATION TYPE
Reactor Coolant System	Inlet Nozzle 113° Dissimilar Metal Weld 2-RV-302-121-B, Analysis Log DM-113-01	Ultrasonic
Reactor Coolant System	Reactor Pressure Vessel, Job 14513470, Report 5041-16-0094	Visual
Residual Heat Removal	Residual Heat Removal Heat Exchanger A Lower Channel Head Bolting Surface, Report 5041-17-0022	Visual

During the review and observation of each examination, the inspectors observed whether activities were performed in accordance with the ASME Code requirements and applicable procedures. The inspectors also reviewed the qualifications of all nondestructive examination technicians performing the inspections to determine whether they were current. The inspectors reviewed three relevant indications and determined that the licensee corrected or accepted the indications in accordance with the ASME Code requirements.

The inspectors directly observed a portion of the following welding activities:

SYSTEM	WELD IDENTIFICATION	EXAMINATION TYPE
Auxiliary Feedwater	Work Order 160041371500, Valve ALV0054, Weld FW-01	Gas Tungsten Arc Welding / Shielded Metal Arc Welding
Auxiliary Feedwater	Work Order 160041371500, Valve ALV0054, Weld FW-02	Gas Tungsten Arc Welding / Shielded Metal Arc Welding

The inspectors reviewed records for the following welding activities:

SYSTEM	WELD IDENTIFICATION	EXAMINATION TYPE
Essential Service Water	Work Order 17001711-500-6, Weld FW-01, External Weld Overlay, Location EF-054-HBC	Shielded Metal Arc Welding

The inspectors reviewed whether the welding procedure specifications and the welders had been properly qualified in accordance with ASME Code Section IX requirements. The inspectors also determined whether that essential variables were identified, recorded in the procedure qualification record, and formed the bases for qualification of the welding procedure specifications.

b. Findings

No findings were identified.

.2 Vessel Upper Head Penetration Inspection Activities

The bare metal visual inspection of the reactor vessel upper head penetrations was not required to be performed in this outage.

.3 Boric Acid Corrosion Control Inspection Activities

a. Inspection Scope

The inspectors reviewed the licensee's implementation of its boric acid corrosion control program for monitoring degradation of those systems that could be adversely affected by boric acid corrosion. The inspectors reviewed the documentation associated with the licensee's boric acid corrosion control walk-down as specified in Procedures EDP-ZZ-01004, "Boric Acid corrosion Control Program," Revision 20, MDP-ZZ-LM001, "Fluid Leak Management Program," Revision 16, and QCP-ZZ-05048, "Boric Acid Walkdown for RCS Pressure Boundary," Revision 14. The inspectors reviewed whether the visual inspections emphasized locations where boric acid leaks could cause degradation of safety significant components, and whether engineering evaluation used corrosion rates applicable to the affected components and properly assessed the effects of corrosion induced wastage on structural or pressure boundary integrity. The inspectors observed whether corrective actions taken were consistent with the ASME Code, and 10 CFR Part 50, Appendix B requirements.

b. Findings

No findings were identified.

.4 Steam Generator Tube Inspection Activities

The steam generator tube inspections were not required to be performed in this outage.

.5 Water Jet Peening

a. Inspection Scope

During construction of light water reactors, pressurized water reactors and boiling water reactors, Alloy 600, a nickel-chromium-iron alloy was used in many locations of the reactor coolant system. Operating experience has shown that Alloy 600 and related weld filler materials, UNS N06082 and UNS W86182 (also referred to as Alloys 82 and 182 or collectively as Alloy 82/182), are susceptible to stress corrosion cracking in the reactor coolant environment. For the primary systems of pressurized water reactors, this degradation mechanism is called primary water stress corrosion cracking. Industry operating experience to date has identified cracks at Alloy 82/182 welds, including some through-wall leaks, at several locations in the reactor coolant system piping and/or components:

- Reactor pressure vessel outlet nozzle butt welds
- Control rod drive mechanism nozzles and welds
- Bottom mounted instrument nozzles and welds

- Pressurizer nozzle butt welds (cracks detected at Wolf Creek by inspection prior to mitigation by weld overlay)

- Pressurizer heater sleeves

- Steam generator primary side channel head drain attachment welds (Wolf Creek had experienced leakage at these locations)

- Steam generator primary side nozzle butt welds

Alloy 82/182 dissimilar metal welds are used on all inlet and outlet nozzles to attach a stainless steel safe-end to the low alloy steel nozzle of the vessel. The intent of the water jet peening project was to mitigate the susceptibility of these locations to primary water stress corrosion cracking by changing the stresses on the wetted surfaces using a water jet peening technique. The water jet peening process is designated as a surface stress improvement mitigation technique per ASME Code Case N-770-4, "Alternative Examination Requirements and Acceptance Standards for Class 1 PWR Piping and Vessel Nozzle Butt Welds Fabricated With UNS N06082 or UNS W86182 Weld Filler Material With or Without Application of Listed Mitigation Activities Section XI." Water jet peening treatment of the entire wetted surface of the susceptible material (Alloy 82/182) was performed using a qualified procedure that is documented to meet the performance criteria of ASME Code Case N-770-4, Appendix I.

Pre-peening examinations associated with water jet peening mitigation were performed in accordance with the licensee's Inservice Inspection Program, which included ASME Code Case N-770-1, "Alternative Examination Requirements and Acceptance Standards for Class 1 PWR Piping and Vessel Nozzle Butt Welds Fabricated With UNS N06082 or UNS W86182 Weld Filler Material With or Without Application of Listed Mitigation Activities Section XI, Division 1," that described augmented examination requirements. Code Case N-770-1 was the basis for the augmented examinations of reactor vessel nozzle dissimilar metal welds currently required by the NRC.

The nozzle tubes for the bottom mounted nozzles are wrought Alloy 600 and the nozzles are attached to the vessel with Alloy 82/182 J-groove welds. Water jet peening covered the highly stressed portions of the nozzle tube inside and outside surfaces. "Highly stressed" is defined as a calculated stress greater than 10 ksi. Peening was performed over longer lengths of the inside and outside diameters to assure that at risk material was fully covered by the mitigation process. The entire wetted surfaces of the Alloy 82/182 J-groove welds were treated by water jet peening. The water jet peening technique employed gets its mitigating effect by leaving the surface in a residual stress state of biaxial compression. Cracks do not initiate in compression so performing peening prior to crack initiation helps prevent primary water stress corrosion cracking. The water jet peening process was applied in accordance with 10 CFR Part 50, Appendix B, Criterion IX. Because the effectiveness of peening cannot be confirmed by measurements on the treated surfaces in the field, the process had been qualified by laboratory testing and analysis. Qualification testing confirmed that appropriate levels and depths of residual stress were achieved. Qualification testing and analysis confirm that residual compressive stress levels were sufficient to maintain compression on the wetted surfaces under normal reactor operating conditions for the remainder of plant life. For the reactor vessel inlet and outlet nozzle dissimilar metal welds, the residual

compressive stress extends to a depth of at least 1 mm (0.040 in.) below the treated surfaces. For the bottom mounted nozzles, the compressive residual stress extends to a minimum depth of 0.5 mm (0.020 in.).

The purpose of the activities to reduce the susceptibility of the reactor vessel nozzle dissimilar metal welds and bottom mounted nozzle dissimilar metal welds to primary water stress corrosion cracking by creating a favorable compressive residual stress on the wetted surfaces of the susceptible materials in these components, which eliminates future initiation of primary water stress corrosion cracking. The licensee completed water jet peening of all of the hot and cold leg vessel nozzles and all of the bottom mounted instrumentation nozzles. The licensee is continuing to address the NRC augmented examinations due to current uncertainty of the future NRC position on ASME Code Case N-770-4.

.6 Identification and Resolution of Problems

a. Inspection Scope

The inspectors reviewed 28 condition reports which dealt with inservice inspection activities and found the corrective actions for inservice inspection issues were appropriate. From this review the inspectors concluded that the licensee has an appropriate threshold for entering inservice inspection issues into the corrective action program and has procedures that direct a root cause evaluation when necessary. The licensee also has an effective program for applying industry inservice inspection operating experience.

b. Findings

No findings were identified.

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

.1 Review of Licensed Operator Requalification

a. Inspection Scope

The inspectors observed simulator training for an operating crew. The inspectors assessed the performance of the operators and the evaluators' critique of their performance. The inspectors also assessed and the modeling and performance of the simulator during the training activities:

- October 4, 2017, reactor shutdown
- November 7, 2017, reactor startup

These activities constituted completion of one quarterly licensed operator requalification program sample, as defined in Inspection Procedure 71111.11.

b. Findings

No findings were identified.

.2 Review of Licensed Operator Performance

a. Inspection Scope

The inspectors observed the performance of on-shift licensed operators in the plant's main control room. At the time of the observations, the plant was in a period of heightened activity or risk. The inspectors observed the operators' performance of the following activities:

- December 17, 2017, reactor startup including criticality and physics testing
- December 18, 2017, power operation and turbine testing including crew turnover
- December 19, 2017, power ascension including crew turnover

In addition, the inspectors assessed the operators' adherence to plant procedures, including Procedure ODP-ZZ-00001, "Operations Department – Code of Conduct," Revision 103, and other operations department policies.

These activities constituted completion of one quarterly licensed operator performance sample, as defined in Inspection Procedure 71111.11.

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness (71111.12)

.1 Routine Maintenance Effectiveness

a. Inspection Scope

On October 7, 2017, the inspectors reviewed floor drain and oily waste drain systems as one instance of degraded performance or condition of safety-significant structures, systems, and components.

The inspectors reviewed the extent of condition of possible common cause structures, systems, and component failures and evaluated the adequacy of the licensee's corrective actions. The inspectors reviewed the licensee's work practices to evaluate whether these may have played a role in the degradation of the structures, systems and components. The inspectors assessed the licensee's characterization of the degradation in accordance with 10 CFR 50.65 (the Maintenance Rule), and verified that the licensee was appropriately tracking degraded performance and conditions in accordance with the Maintenance Rule.

These activities constituted completion of one maintenance effectiveness sample, as defined in Inspection Procedure 71111.12.

b. Findings

No findings were identified.

.2 Quality Control

a. Inspection Scope

On October 23, 2017, the inspectors reviewed the licensee's quality control activities through a review of the licensee's control of quality parts during maintenance associated with an essential service water pump replacement.

These activities constituted completion of one quality control maintenance effectiveness sample, as defined in Inspection Procedure 71111.12.

b. Findings

No findings were identified.

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

a. Inspection Scope

The inspectors reviewed three risk assessments performed by the licensee prior to changes in plant configuration and the risk management actions taken by the licensee in response to elevated risk:

- October 11, 2017, planned yellow risk for reduced inventory for reactor disassembly
- October 18, 2017, planned yellow risk for reduced electrical power sources for transformer XNB01 outage
- November 13, 2017, planned yellow risk for reduced inventory during reactor reassembly

The inspectors verified that these risk assessment were performed timely and in accordance with the requirements of 10 CFR 50.65 (the Maintenance Rule) and plant procedures. The inspectors reviewed the accuracy and completeness of the licensee's risk assessments and verified that the licensee implemented appropriate risk management actions based on the result of the assessments.

These activities constituted completion of three maintenance risk assessments and emergent work control inspection samples, as defined in Inspection Procedure 71111.13.

b. Findings

No findings were identified.

1R15 Operability Determinations and Functionality Assessments (71111.15)

a. Inspection Scope

The inspectors reviewed two operability determinations that the licensee performed for degraded or nonconforming structures, systems, or components:

- October 6, 2017, operability determination of ultimate heat sink train A fans due to a relay failure

- October 20, 2017, operability determination of ultimate heat sink trains A and B due to tornado missile vulnerabilities

The inspectors reviewed the timeliness and technical adequacy of the licensee's evaluations. Where the licensee determined the degraded structures, systems or components to be operable, the inspectors verified that the licensee's compensatory measures were appropriate to provide reasonable assurance of operability. The inspectors verified that the licensee had considered the effect of other degraded conditions on the operability of the degraded systems, structures, or components.

These activities constituted completion of two operability and functionality review samples as defined in Inspection Procedure 71111.15.

b. Findings

Enforcement Action EA-17-186, Enforcement Discretion for Tornado-Generated Missile Protection Non-compliances

Description. Title 10 of the Code of Federal Regulations Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants," Criterion 2, "Design Bases for Protection Against Natural Phenomena," states, in part, that structures, systems, and components important to safety shall be designed to withstand the effects of natural phenomena, such as tornadoes. Criterion 4, "Environmental and Dynamic Effects Design Basis," states, in part, that structures, systems, and components important to safety shall be appropriately protected against dynamic effects including missiles that may result from events and conditions outside the nuclear power unit. Section 3.5.3.1, "Tornado Missile Barrier Design Procedures," of the Final Safety Analysis Report describes the parameters of tornado-resistant structures including wall thickness and concrete strength. Table 3.3-1, "Tornado-Resistant Buildings and Structures," of the Final Safety Analysis Report lists the structures that are designed to withstand tornado-generated missile impact.

On February 7, 2017, the NRC issued Enforcement Guidance Memorandum (EGM) 15-002, "Enforcement Discretion for Tornado-Generated Missile Protection Non-compliance," Revision 1 (ADAMS Accession Number ML16355A286). The EGM referenced a bounding, generic risk analysis performed by the NRC staff that concluded that tornado-generated missile vulnerabilities pose a low risk significance to operating nuclear plants. Because of this, the EGM described the conditions under which the NRC staff may exercise enforcement discretion for non-compliance with the current licensing basis for tornado-generated missile protection. Specifically, if the licensee could not meet the technical specification required actions within the required completion time, the EGM allows the staff to exercise enforcement discretion provided the licensee implements initial compensatory measures prior to the expiration of the time allowed by the limiting condition for operation. The compensatory actions should provide additional protection such that the likelihood of tornado-generated missile effects are lessened. The EGM then requires the licensee to implement more comprehensive compensatory measures within approximately 60 days of issue discovery. The compensatory measures must remain in place until permanent repairs are completed, or until the NRC

dispositions the non-compliance in accordance with a method acceptable to the NRC such that discretion is no longer needed. Because EGM 15-002 listed Callaway as a Group A plant, enforcement discretion will expire on June 10, 2018.

During this inspection period, the licensee invoked EGM 15-002 on one occasion for the ultimate heat sink. Section 9.2.5, "Ultimate Heat Sink," of the Final Safety Analysis Report describes the safety function of the ultimate heat sink (UHS) system as removing heat from the essential service water system to permit a safe shutdown of the unit following an accident. Section 9.2.5.2.2 further states, "The cooling tower is protected from horizontal and vertical tornado missiles."

On October 20, 2017, the inspectors identified that the power and control cables for the UHS fan motors were not protected from tornado-generated missiles. Specifically, the metal grating above the UHS structure is improperly sized. The grating has a minimum opening of 2.125 inches which is large enough to allow a design basis missile, a 1 inch diameter steel rod, to pass through and potentially impact the cabling for the UHS fan motors. The inspectors noted the cable trays, conduit, and cables themselves had not been analyzed for tornado missile impact. Note that the UHS fan motors provide forced-draft cooling of essential service water as it flows through the safety-related UHS cooling tower to remove heat from plant components required to reach safe shutdown. Impact of a tornado-generated missile could cause the UHS fans to fail and provide inadequate air flow to cool essential service water. This vulnerability was identified as part of routine NRC walk-downs and inspection of plant components. This issue was entered into the corrective action program as Condition Report 201705851.

At the time of discovery, the plant was defueled and not in a mode of applicability for the associated UHS Technical Specification 3.7.9. As a result, the NRC reviewed this issue for prior periods of time when Technical Specification 3.7.9 was applicable.

Technical Specification 3.7.9 requires, in part, that the UHS shall be operable in Modes 1, 2, 3, and 4. Technical Specification 3.7.9.B requires, for the UHS inoperable for reasons other than Condition A, to be in Mode 3 within 6 hours and be in Mode 5 within 36 hours. Considering the licensee entered lower modes as part of a planned refueling outage in October 2017 and the required action completion times of the technical specification, the NRC determined that the licensee failed to comply with the required actions of Technical Specification 3.7.9.B for dates prior to October 9, 2017.

As a result of this issue, the licensee initiated Condition Report 201705851, invoked the enforcement discretion guidance, and implemented initial compensatory measures. The licensee instituted compensatory measures intended to reduce the likelihood of tornado-generated missile effects. These included verifying that guidance was in place for severe weather procedures, abnormal and emergency operating procedures, and diverse and flexible coping strategies (FLEX) support guidelines, that training on these procedures was current, and that a heightened level of awareness of the vulnerability was established.

Enforcement. Technical Specification 3.7.9 requires, in part, that the UHS shall be operable in Modes 1, 2, 3, and 4. Technical Specification 3.7.9.B requires, for the UHS inoperable for reasons other than Condition A, to be in Mode 3 within 6 hours and be in Mode 5 within 36 hours. Contrary to the above, prior to October 9, 2017, the UHS was not operable and action was not initiated to be in Mode 3 within 6 hours and be in

Mode 5 within 36 hours. Specifically, the power and control cables for the UHS fan motors were not protected from tornado-generated missiles. The licensee initiated a condition report, invoked the enforcement discretion guidance, and implemented initial compensatory measures. The inspectors verified through inspection sampling that the EGM 15-002 enforcement discretion criteria were met and that the issue was documented in Condition Report 201705851. Therefore, EGM 15-002 enforcement discretion was applied to the required shutdown actions associated with this technical specification.

1R18 Plant Modifications (71111.18)

Permanent Modifications

a. Inspection Scope

On November 29, 2017, the inspectors reviewed the permanent modification, MP 13-0042, emergency diesel generator neutral ground cable replacement.

The inspectors reviewed the design and implementation of the modification. The inspectors verified that work activities involved in implementing the modification did not adversely impact operator actions that may be required in response to an emergency or other unplanned event. The inspectors verified that post-modification testing was adequate to establish the operability of the structure, system, or component as modified.

These activities constituted completion of one sample of permanent modifications, as defined in Inspection Procedure 71111.18.

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19)

a. Inspection Scope

The inspectors reviewed four post-maintenance testing activities that affected risk-significant structures, systems, or components:

- October 26, 2017, essential service water train A motor replacement
- October 27, 2017, emergency diesel generator train A outage
- November 17, 2017, containment coolers trains A and B replacement
- November 27, 2017, instrument inverter replacement

The inspectors reviewed licensing- and design-basis documents for the structures, systems, or components and the maintenance and post-maintenance test procedures. The inspectors observed the performance of the post-maintenance tests to verify that the licensee performed the tests in accordance with approved procedures, satisfied the established acceptance criteria, and restored the operability of the affected structures, systems, or components.

These activities constituted completion of four post-maintenance testing inspection samples, as defined in Inspection Procedure 71111.19.

b. Findings

No findings were identified.

1R20 Refueling and Other Outage Activities (71111.20)

a. Inspection Scope

During the station's refueling outage that concluded on December 19, 2017, the inspectors evaluated the licensee's outage activities. The inspectors verified that the licensee considered risk in developing and implementing the outage plan, appropriately managed personnel fatigue, and developed mitigation strategies for losses of key safety functions. This verification included the following:

- Review of the licensee's outage plan prior to the outage
- Review and verification of the licensee's fatigue management activities
- Monitoring of shut-down and cool-down activities
- Verification that the licensee maintained defense-in-depth during outage activities
- Observation and review of reduced-inventory activities
- Observation and review of fuel handling activities
- Monitoring of heat-up and startup activities

These activities constituted completion of one refueling outage sample as defined in Inspection Procedure 71111.20.

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22)

a. Inspection Scope

The inspectors observed five risk-significant surveillance tests and reviewed test results to verify that these tests adequately demonstrated that the structures, systems, and components were capable of performing their safety functions:

Other surveillance tests:

- October 5, 2017, main steam safety valve set pressure testing
- October 9, 2017, integrated engineering safety feature actuation system train A test
- October 13, 2017, full flow emergency core cooling system testing to refueling cavity

- November 9, 2017, essential service water train A response to loss of offsite power

- November 17, 2017, integrated engineering safety feature actuation system train B test

The inspectors verified that these tests met technical specification requirements, that the licensee performed the tests in accordance with their procedures, and that the results of the test satisfied appropriate acceptance criteria. The inspectors verified that the licensee restored the operability of the affected structures, systems, and components following testing.

These activities constituted completion of five surveillance testing inspection samples, as defined in Inspection Procedure 71111.22.

b. Findings

No findings were identified.

1EP4 Emergency Action Level and Emergency Plan Changes (71114.04)

a. Inspection Scope

The inspectors performed an in-office review of Emergency Plan Implementing Procedure EIP-ZZ-00101, "Classification of Emergencies," Revision 54, effective October 20, 2017. This revision reordered and made minor editorial changes to clarify the process of identifying applicable emergency action levels.

This revision was compared to its previous revision, to the criteria of NUREG-0654, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," Revision 1, and to the standards in 10 CFR 50.47(b) to determine if the revision adequately implemented the requirements of 10 CFR 50.54(q)(3) and 50.54(q)(4). The inspectors verified that the revision did not reduce the effectiveness of the emergency plan. This review was not documented in a safety evaluation report and did not constitute approval of licensee-generated changes; therefore, this revision is subject to future inspection.

These activities constitute completion of one emergency action level and emergency plan changes sample as defined in Inspection Procedure 71114.04.

b. Findings

No findings were identified.

2. RADIATION SAFETY

Cornerstones: Public Radiation Safety and Occupational Radiation Safety

2RS1 Radiological Hazard Assessment and Exposure Controls (71124.01)

a. Inspection Scope

The inspectors evaluated the licensee's performance in assessing the radiological hazards in the workplace associated with licensed activities. The inspectors assessed the licensee's implementation of appropriate radiation monitoring and exposure control measures for both individual and collective exposures. During the inspection, the inspectors interviewed licensee personnel, walked down various areas in the plant, performed independent radiation dose rate measurements, and observed postings and physical controls. The inspectors reviewed licensee performance in the following areas:

- Radiological hazard assessment, including a review of the plant's radiological source terms and associated radiological hazards. The inspectors also reviewed the licensee's radiological survey program to determine whether radiological hazards were properly identified for routine and non-routine activities and assessed for changes in plant operations.

- Instructions to workers including radiation work permit requirements and restrictions, actions for electronic dosimeter alarms, changing radiological condition, and radioactive material container labeling.

- Contamination and radioactive material control, including release of potentially contaminated material from the radiologically controlled area, radiological survey performance, radiation instrument sensitivities, material control and release criteria, and control and accountability of sealed radioactive sources.

- Radiological hazards control and work coverage. During walk downs of the facility and job performance observations, the inspectors evaluated ambient radiological conditions, radiological postings, adequacy of radiological controls, radiation protection job coverage, and contamination controls. The inspectors also evaluated dosimetry selection and placement as well as the use of dosimetry in areas with significant dose rate gradients. The inspectors examined the licensee's controls for items stored in the spent fuel pool and evaluated airborne radioactivity controls and monitoring.

- High radiation area and very high radiation area controls. During plant walk downs, the inspectors verified the adequacy of posting and physical controls, including areas of the plant with the potential to become risk-significant high radiation areas.

- Radiation worker performance and radiation protection technician proficiency with respect to radiation protection work requirements. The inspectors determined if workers were aware of significant radiological conditions in their workplace, radiation work permit controls/limits in place, and electronic dosimeter dose and dose rate set points. The inspectors observed radiation protection technician job performance, including the performance of radiation surveys.

- Problem identification and resolution for radiological hazard assessment and exposure controls. The inspectors reviewed audits, self-assessments, and corrective action program documents to verify problems were being identified and properly addressed for resolution.

These activities constitute completion of the seven required samples of radiological hazard assessment and exposure control program, as defined in Inspection Procedure 71124.01.

b. Findings

No findings were identified.

2RS2 Occupational ALARA Planning and Controls (71124.02)

a. Inspection Scope

The inspectors assessed licensee performance with respect to maintaining individual and collective radiation exposures as low as is reasonably achievable (ALARA). The inspectors performed this portion of the attachment during the refueling outage in order to directly observe the licensee's ALARA process activities including planning, implementation of radiological work controls, execution of work activities, and ALARA review of work-in-progress. During the inspection the inspectors interviewed licensee personnel, reviewed licensee documents, and evaluated licensee performance in the following areas:

- Implementation of ALARA and radiological work controls. The inspectors observed pre-job briefings, reviewed planned radiological administrative, operational, and engineering controls, and compared the planned controls to field activities.

- Radiation worker and radiation protection technician performance during work activities performed in radiation areas, airborne radioactivity areas, or high radiation areas.

- Problem identification and resolution for ALARA and radiological work controls. The inspectors reviewed audits, self-assessments, and corrective action program documents to verify problems were being identified and properly addressed for resolution.

These activities constitute completion of three samples of the five required samples of occupational ALARA planning and controls program, as defined in Inspection Procedure 71124.02, and completes the inspection

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity, Emergency Preparedness, Public Radiation Safety, Occupational Radiation Safety, and Security

4OA1 Performance Indicator Verification (71151)

.1 Mitigating Systems Performance Index: High Pressure Injection Systems (MS07)

a. Inspection Scope

The inspectors reviewed the licensee's mitigating system performance index data for the period of fourth quarter 2016 through third quarter 2017 to verify the accuracy and completeness of the reported data. The inspectors used definitions and guidance contained in Nuclear Energy Institute Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, to determine the accuracy of the reported data.

These activities constituted verification of the mitigating system performance index for high pressure injection systems, as defined in Inspection Procedure 71151.

b. Findings

No findings were identified.

2 Mitigating Systems Performance Index: Residual Heat Removal Systems (MS09)

a. Inspection Scope

The inspectors reviewed the licensee's mitigating system performance index data for the period of fourth quarter 2016 through third quarter 2017 to verify the accuracy and completeness of the reported data. The inspectors used definitions and guidance contained in Nuclear Energy Institute Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, to determine the accuracy of the reported data.

These activities constituted verification of the mitigating system performance index for residual heat removal systems, as defined in Inspection Procedure 71151.

b. Findings

No findings were identified.

.3 Occupational Exposure Control Effectiveness (OR01)

a. Inspection Scope

The inspectors verified that there were no unplanned exposures or losses of radiological control over locked high radiation areas and very high radiation areas during the period of October 1, 2015, to September 30, 2017. The inspectors reviewed a sample of radiologically controlled area exit transactions showing exposures greater than

100 millirem. The inspectors used definitions and guidance contained in Nuclear Energy Institute Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, to determine the accuracy of the reported data.

These activities constitute verification of the occupational exposure control effectiveness performance indicator, as defined in Inspection Procedure 71151.

b. Findings

No findings were identified.

.4 Radiological Effluent Technical Specifications (RETS)/Offsite Dose Calculation Manual (ODCM) Radiological Effluent Occurrences (PR01)

a. Inspection Scope

The inspectors reviewed corrective action program records for liquid and gaseous effluent releases that occurred between October 1, 2015, and September 30, 2017, and leaks and spills to verify the performance indicator data. The inspectors used definitions and guidance contained in Nuclear Energy Institute Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, to determine the accuracy of the reported data.

These activities constitute verification of the Radiological Effluent Technical Specifications/Offsite Dose Calculation Manual Radiological Effluent Occurrences performance indicator, as defined in Inspection Procedure 71151.

b. Findings

No findings were identified.

4OA2 Problem Identification and Resolution (71152)

.1 Routine Review

a. Inspection Scope

Throughout the inspection period, the inspectors performed daily reviews of items entered into the licensee's corrective action program and periodically attended the licensee's condition report screening meetings. The inspectors verified that licensee personnel were identifying problems at an appropriate threshold and entering these problems into the corrective action program for resolution. The inspectors verified that the licensee developed and implemented corrective actions commensurate with the significance of the problems identified. The inspectors also reviewed the licensee's problem identification and resolution activities during the performance of the other inspection activities documented in this report.

b. Findings

No findings were identified.

.2 Semiannual Trend Review

a. Inspection Scope

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. The inspectors verified that the licensee was taking corrective actions to address identified adverse trends.

These activities constituted completion of one semiannual trend review sample, as defined in Inspection Procedure 71152.

b. Observations and Assessments

The inspectors evaluated a sample of corrective actions for issues adverse to the flooding analysis credited to protect safety-related equipment. Inspectors also reviewed the licensee's planned or completed response to recent flooding-related issues that were self-revealed or identified by NRC inspectors:

- NCV 05000483/2012003-01, "Failure to Incorporate Operating Experience for a 10 CFR 50.65(a)(3) Assessment." (ADAMS Accession Number ML12219A105)

- NCV 05000483/2016001-02, "Operability Evaluation for Degraded Flood Mitigation Capability in Piping Penetration Room." (ADAMS Accession Number ML16130A822)

- NCV 05000483/2017007-03, "Inputs to Internal Flooding Calculations Not Translated into Procedures or Instructions." (ADAMS Accession Number ML17283A392)

- NCV 05000483/2017004-01, "Design Control of the Ultimate Heat Sink Cooling Tower." (Section 1R04 of this report)

The inspectors noted the following observations:

- Since January 1, 2016, the licensee has initiated 13 condition reports for adverse conditions affecting flooding. These condition reports included issues such as untimely revisions in flooding calculations, foreign material found in drains, failure to translate design to calculations, and failure to translate design to procedures. Many of these issues are related to the four non-cited violations discussed above. Specifically, the condition reports documented direct inspection issues, inspection comments, or extent of condition issues identified during the licensee's cause evaluation process for these non-cited violations. At the time of inspection, however, the licensee had not identified an adverse trend or evaluated possible common causes between the related issues. In the review of the four non-cited violations, the inspectors determined a possible emerging trend existed which warrants additional evaluation.

- As a corrective action from NCV 05000483/2012003-01, the licensee established a periodic preventative maintenance task to inspect drain systems credited to remove water in station flooding calculations. These systems include floor drain,

equipment drain, and oily waste. In the review of these corrective actions, the inspectors identified a few issues that were not of more-than-minor significance.

In licensee Procedure EDP-ZZ-00128, "Maintenance Rule Program," Revision 25, the floor drain and equipment drain systems did not have a maintenance rule function to remove water, per design calculations, to maintain safety-related systems operable in the affected space during flooding. The licensee, however, was classifying failures under the maintenance rule using other existing criteria for indications/alarms of flooding. Further, the Maintenance Rule Program procedure did not establish reliability performance criteria for the oily waste system although it is credited to remove water from control building spaces such as the diesel generator rooms and areas within the main control room. The licensee, however, had not experienced failures that would have challenged the maintenance rule function of this system.

The licensee entered these comments into the corrective action program under Condition Report 201706702.

- As described in Section 1R04 of this report, the licensee failed to provide design control measures for verifying or checking the adequacy of the design of the ultimate heat sink cooling tower. The inspectors also noted, as a result of this failure, that the periodic preventative maintenance task to inspect drain systems did not include the ultimate heat sink cooling tower. Stated differently, the lack of an analysis for the effect of precipitation led to the failure to establish a preventative maintenance task to inspect those drains since they were not yet credited administratively. This issue is captured within Condition Report 201707058.

The inspectors verified that these issues were addressed within the scope of the corrective action program. The inspectors evaluated the licensee's response to these issues and determined the actions will address the identified causes.

c. Findings

No findings were identified.

.3 Annual Follow-up of Selected Issues

a. Inspection Scope

The inspectors selected two issues for an in-depth follow-up:

- On November 13, 2017, the inspectors reviewed the licensee's actions for an oil leak on the train B safety injection pump. This issue was documented in Condition Report 201704706.

The inspectors assessed the licensee's problem identification threshold, cause analyses, extent of condition reviews and compensatory actions. The inspectors verified that the licensee appropriately prioritized the corrective actions and that these actions were adequate to correct the condition.

- On November 14, 2017, the inspectors reviewed the reactor vessel cladding defect indications to date. This issue was documented in Condition Reports 200403624, 200703975 and 201303121.

  The inspectors assessed the licensee's problem identification threshold, cause analyses, operability determination, calculations and extent of condition reviews. The inspectors verified that the licensee appropriately prioritized monitoring reactor vessel cladding defect indications and that these actions were adequate.

These activities constituted completion of two annual follow-up samples as defined in Inspection Procedure 71152.

b. Findings

Introduction. The inspectors identified a Green, non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," for the licensee's failure to assure that applicable regulatory requirements and the design basis are correctly translated into procedures for the safety injection (SI) pumps and centrifugal charging pumps (CCPs). Specifically, licensee Procedure APA-ZZ-00500, Appendix 1, "Operability and Functionality Determinations," Revision 29, incorrectly based the SI pumps and CCPs mission times on small break loss of coolant accident (SBLOCA) scenarios and did not consider large break loss of coolant accidents (LBLOCA). As a result, the non-conservative mission times of 10 hours were incorrectly translated into past operability assessments and operator procedures for acceptable system parameters.

Description. On November 13, 2017, the inspectors reviewed the past operability and corrective actions for Condition Report 201704706. This condition report describes an oil leak from the train B SI pump discovered during surveillance testing on September 11, 2017. Specifically, the leak occurred at a lubrication oil filter gasket and was large enough to challenge operability of the SI train at 51 drops per minute.

The licensee provides guidance to operations staff on the allowable leak rates in order to achieve the mission time for safety-related components. Procedure ODP-ZZ-0016E Appendix 1, "Operations Technician General Inspection Guide," Revision 21, describes the SI pumps in Section 1.8.3: "With oil level greater than or equal to 1/4 level: 26 drops per minute (dpm) is maximum allowable leakage."

In the past operability review attached to Condition Report 201704706, the licensee justified that the SI pump was operable:

> Guidance in ODP-ZZ-0016E Appendix 1 is based on the pump starting with the oil level at 1/4 of the sight glass and assumes an additional 24 hours between Operations Technicians (OT) walk downs of the pump…daily OT walk downs have shown the oil level was always above 1/4 sight glass level…no oil additions were required…the allowable leak rate becomes 89 dpm for the 10 hour mission time.

The inspectors reviewed the basis of the 10 hour mission time referenced in the past operability review. The licensee provides guidance to staff on safety-related component mission times in Procedure APA-ZZ-00500, Appendix 1, "Operability and Functionality

Determinations," Revision 29. Specifically, Attachment 2 of this procedure states the following for both the CCP and SI systems for mission time:

> From Calculation BN-28, the longest calculated injection phase for a Small Break LOCA is bounded by a 5 hour duration. Allow an additional 5 hours for cooldown and depressurization for RHR [Residual Heat Removal] entry conditions. Maximum duration: 10 hours.

The inspectors reviewed Calculation BN-28, "RWST drain down time during a SBLOCA," Revision 0, and noted the LBLOCA was not included. The Final Safety Analysis Report describes the need for the SI and CCP pumps in LBLOCA scenarios. In Final Safety Analysis Report table 15.0-8, "Operator Actions Required for Small and Large LOCAS," the need for hot leg recirculation is described as occurring 13 hours after cold leg recirculation. These recirculation terms are described in the notes to Final Safety Analysis Report figure 6.3-2 as involving residual heat removal, SI, and CCP pumps.

The inspectors questioned the licensee on the mission time of SI and CCP pumps in LBLOCA scenarios. The inspectors noted that mission time guidance was added to APA-ZZ-00500, Appendix 1, in 2012. After reviewing their safety analysis and discussing the issue with the reactor technology vendor, the licensee acknowledged that the mission time basis in Procedure APA-ZZ-00500, Appendix 1 was incorrect and generated Condition Report 201706900.

The inspectors concluded that the licensee failed to assure that applicable regulatory requirements and the design basis are correctly translated into procedures for the SI pumps and CCPs. Specifically, licensee Procedure APA-ZZ-00500, Appendix 1, "Operability and Functionality Determinations," Revision 29, incorrectly based the SI pumps and CCPs mission times on SBLOCA scenarios and did not consider LBLOCA. As a result, the non-conservative mission times of 10 hours were incorrectly translated into past operability assessments and operator procedures for acceptable system parameters.

As immediate corrective actions, the licensee issued a night order to communicate the correct mission time for SI and CCP systems to operations staff. The licensee entered this issue into their corrective action program under Condition Reports 201707137 and 201706900.

Analysis. The failure assure that applicable regulatory requirements and the design basis are correctly translated into procedures for the SI pumps and CCPs was a performance deficiency. This performance deficiency was more than minor, and therefore a finding, because it adversely affected the design control attribute of the Mitigating Systems Cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, licensee Procedure APA-ZZ-00500, Appendix 1, "Operability and Functionality Determinations," Revision 29, incorrectly based the SI pumps and CCPs mission times on SBLOCA scenarios and did not consider LBLOCA. As a result, the non-conservative mission times of 10 hours were incorrectly translated into past operability assessments and operator procedures for acceptable system parameters. Using Inspection Manual Chapter 0609, Attachment 4, "Initial Characterization of Findings," and Appendix A, "The Significance Determination

Process (SDP) for Findings At-Power," Exhibit 2, "Mitigating Systems Screening Questions," dated June 19, 2012, the inspectors determined that the finding was of very low safety significance (Green) because (1) the finding was not a deficiency affecting the design or qualification of a mitigating system; (2) the finding did not represent a loss of system and/or function; (3) the finding did not represent an actual loss of function of a single train for greater than its technical specification allowed outage time; and (4) the finding does not represent an actual loss of function of one or more non-technical specification trains of equipment designated as high safety-significant in accordance with the licensee's maintenance rule program for greater than 24 hours. The finding did not have a cross-cutting aspect since the mission time guidance was last revised in 2012 and is not reflective of current performance.

Enforcement. Title 10 CFR 50, Appendix B, Criterion III, "Design Control," requires, in part, that measures shall be established to assure that applicable regulatory requirements and the design basis, for those structures, systems, and components to which this appendix applies are correctly translated into specifications, drawings, procedures, and instructions. Contrary to the above, prior to November 21, 2017, for the quality-related components associated with the safety injection and centrifugal charging pump systems, to which 10 CFR Part 50, Appendix B applies, the licensee failed to assure that applicable regulatory requirements and the design basis, for those structures, systems, and components to which this appendix applies are correctly translated into specifications, drawings, procedures, and instructions. Specifically, licensee Procedure APA-ZZ-00500, Appendix 1, "Operability and Functionality Determinations," Revision 29, incorrectly based the SI pumps and CCPs mission times on SBLOCA scenarios and did not consider LBLOCA. As a result, the non-conservative mission times of 10 hours were incorrectly translated into past operability assessments and operator procedures for acceptable system parameters. As immediate corrective actions, the licensee issued a night order to communicate the correct mission time for SI and CCP systems to operations staff. The licensee entered this issue into their corrective action program under Condition Reports 201707137 and 201706900. This violation is being treated as a non-cited violation, consistent with Section 2.3.2.a of the Enforcement Policy. NCV 05000483/2017004-02, "Incorrect Safety Injection Pumps and Centrifugal Charging Pumps Mission Time"

4OA3 Follow-up of Events and Notices of Enforcement Discretion (71153)

.1 (Closed) Licensee Event Report 05000483/2017-002-00, "Inadequate Protection from Tornado Missiles Identified Due to Nonconforming Design"

The inspectors reviewed the licensee event report associated with plant design for a postulated tornado generated missile impact on the condensate storage tank valve house and potential effect on auxiliary feedwater pumps' recirculation lines. This issue was previously dispositioned in Section 1R15 of NRC Integrated Inspection Report 05000483/2017003 (ADAMS Accession Number ML17304A950) and granted enforcement discretion under Enforcement Guidance Memorandum (EGM) 15-002, "Enforcement Discretion for Tornado-Generated Missile Protection Non-compliance," Revision 1 (ADAMS Accession Number ML16355A286). The inspectors determined that the licensee event report adequately documented the issue including the safety consequence and corrective actions. No additional findings or violations of NRC requirements were identified. This licensee event report is closed.

.2 (Closed) Licensee Event Report 05000483/2016-001-01, "Control Room Air Conditioning Inoperability Due to Essential Service Water Pressure Transient"

The inspectors reviewed the licensee event report associated with a pressure transient on the essential service water system during testing and design basis events. This issue was previously dispositioned in Section 4OA2 of NRC Integrated Inspection Report 05000483/2016002 (ADAMS Accession Number ML16225A577) as a cited violation: VIO 05000483/2016002-04, "Failure to Promptly Correct Conditions Adverse to Quality." Further discussion of this issue, including the follow-up inspection of the cited violation, is found in Section 4OA5 of this report. The inspectors determined that the licensee event report adequately documented the issue including the safety consequence and corrective actions. No additional findings or violations of NRC requirements were identified. This licensee event report is closed.

These activities constituted completion of two event follow-up samples, as defined in Inspection Procedure 71153.

4OA5 Other Activities

(Closed) VIO 05000483/2016002-04, "Failure to Promptly Correct Conditions Adverse to Quality"

In Integrated Inspection Report 05000483/2016002 (ADAMS Accession Number ML16225A577), the NRC issued a cited violation for the licensee's failure to promptly correct a condition adverse to quality associated with the essential service water (ESW) system. Specifically, the licensee failed to adequately resolve water hammer and corrosion issues which were previously identified by the NRC as non-cited violation 05000483/2010006-01 in NRC Biennial Problem Identification and Resolution Inspection Report 05000483/2010006 (ADAMS Accession Number ML103540576).

The licensee performed the following root cause evaluations to address this cited violation:

- Condition Report 201603472, "Leaks Identified During B ESFAS Testing," discusses the pressure transients on the ESW system
- Condition Report 201602658, "Adverse Trend in Leakage and Degradation From Safety Related Copper Nickel Tubed Heat Exchangers," discusses the corrosion and erosion of susceptible materials associated with ESW system heat exchangers
- Condition Report 201506340, "Consequential Failure Events Negative Trend," discusses the organizational behaviors that led to an untimely resolution of a condition adverse to quality

In the case of the ESW pressure transient, the licensee concluded that the original ESW system design did not appropriately account for water column separation and collapse pressure transients inherent during operation. As a corrective action to prevent recurrence, the licensee developed a transient analysis of dynamic forces

during ESW operation and will use those results to inform design changes. The licensee also replaced gaskets with a more robust design.

In the case of the susceptible materials in ESW heat exchangers, the licensee concluded that copper-nickel heat exchangers are of a design subject to accelerated degradation including corrosion and erosion. As a corrective action to prevent recurrence, the licensee replaced safety-related room coolers with a stainless steel design, replaced containment coolers with new copper-nickel heat exchangers, and established a plan to monitor those remaining copper-nickel components for the degradation mechanisms. The licensee also improved equipment used to inject and monitor chemicals for corrosion control.

The inspectors reviewed the cause evaluations including for extent of condition and extent of cause. Inspectors walked down the system including inside containment, reviewed documentation of acceptance testing, related procedures and programs, and discussed the corrective actions with responsible personnel.

The inspectors noted the licensee's actions will address the equipment-related aspect of this violation by implementing a major modification to the ESW system to mitigate water hammer events. As described in the licensee's reply to the Notice of Violation dated June 27, 2017 (ADAMS Accession Number ML17178A225), the licensee is designing significant modifications to ESW system to dampen the pressure pulses during water hammer events and will fully implement that design by the end of Refueling Outage 23 in 2019. Further, the licensee's actions addresses the other equipment-related aspect of this violation by replacing copper-nickel heat exchangers in the ESW system to mitigate corrosion concerns.

The licensee addressed the organizational behaviors of this violation by institutionalizing an effective technical conscience and communicating those responsibilities to all employees. This effort reinforced expectations for use of the corrective action program and early identification of equipment issues. Additionally, licensee management established dedicated trending and monitoring time into the weekly schedule. Further, licensee management added a daily agenda task to meet with staff to identify technical concerns that require senior leadership's attention. Through the improved organization behaviors and establishment of a long term asset management plan for the ESW system, the licensee action's address the untimely resolution of the condition adverse to quality.

In reviewing the root causes described above, the inspectors noted the improvements to licensee programs and procedures. The team determined that the corrective actions to address the cause of this violation are appropriate and the licensee's timely action will restore compliance.

4OA6 Meetings, Including Exit

Exit Meeting Summary

On October 20, 2017, regional inspectors presented the radiation safety inspection results to Mr. T. Herrmann, Site Vice President, and other members of the licensee staff. The licensee acknowledged the issues presented. The licensee confirmed that any proprietary information reviewed by the inspectors had been returned or destroyed.

On October 27, 2017, regional inspectors presented the inservice inspection results to Mr. T. Herrmann, Site Vice President, and other members of the licensee staff. The licensee acknowledged the issues presented. The licensee confirmed that any proprietary information reviewed by the inspectors had been returned or would be destroyed.

On December 13, 2017, the Emergency Preparedness inspector presented the results of the in-office inspection of Procedure EIP-ZZ-00101, Revision 54, with Mr. B. Cox, Senior Director, Nuclear Operations, and other members of the licensee staff. The licensee acknowledged the issues presented. The licensee confirmed that any proprietary information reviewed by the inspectors had been returned or destroyed

On January 3, 2018, the resident inspectors presented the inspection results to Mr. B. Cox, Senior Director, Nuclear Operations, and other members of the licensee staff. The licensee acknowledged the issues presented. The licensee confirmed that any proprietary information reviewed by the inspectors had been returned or destroyed.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

A. Alley, Supervising Engineer, Engineering Programs
S. Banker, Senior Director, Engineering
F. Bianco, Director, Nuclear Operations
G. Clemens, Radiation Protection Operations Technician
J. Cortez, Director, Training
B. Cox, Senior Director, Nuclear Operations
W.Crawford, Sr. Health Physicist, Radiation Protection
D. Davis, Non-destructive Testing, Level III
R. Davis, Engineer, Engineering Programs
T. Elwood, Supervising Engineer, Regulatory Affairs
G. Forster, Non-destructive Testing Supervisor, Level III
J. Geyer, Manager, Radiation Protection
T. Herrmann, Site Vice President
A. Hunt, Engineer, Regulatory Affairs
L. Kanuckel, Director, Nuclear Oversight
J. Kovar, Engineer, Licensing
R. Lutz, Project Engineer, Engineering Projects - Mechanical
M. McLachlan, Senior Director, Plant Support
J. Nurrenbern, Program Owner, Boric Acid
E. Olson, Director, Engineering Programs
R. Pohlman, Licensing Engineer
G. Polowy, Nuclear Corporation Oversight
E. Ptasznik, Engineer, Regulatory Affairs/Licensing
G. Rauch, Manager, Emergency Preparedness
S. Thomure, Training Supervisor, Welding Engineering
M. Vonderhaar, Supervisor, Radiation Protection
R. Wink, Manager, Regulatory Affairs

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000483/2017004-01	NCV	Design Control of the Ultimate Heat Sink Cooling Tower (1R04)
05000483/2017004-02	NCV	Incorrect Safety Injection Pumps and Centrifugal Charging Pumps Mission Time (Section 4OA2)

Closed

05000483/2017-002-00	LER	Inadequate Protection from Tornado Missiles Identified Due to Nonconforming Design (Section 4OA3)
05000483/2016-001-01	LER	Control Room Air Conditioning Inoperability Due to Essential Service Water Pressure Transient (Section 4OA3)
05000483/2016-002-04	VIO	Failure to Promptly Correct Conditions Adverse to Quality (Section 4OA5)

LIST OF DOCUMENTS REVIEWED

Section 1R01: Adverse Weather Protection

Procedures

Number	Title	Revision
APA-AA-00330	Preventative maintenance program	50
APA-ZZ-00750	Hazzard Barrier Program	39
APA-ZZ-00830	Hazzard Communication Program	19
OTN-GF-00001	Miscellaneous Building HVAC Systems	9
OTN-QJ-00003	Plant Freeze Protection Heat Tracing Procedure	3
OTS-ZZ-00007	Plant Cold Weather	33
OTO-ZZ-00012	Severe Weather	38

Condition Reports

201500260	201400987	201609296	201600229

Jobs

17503286	14512496	13513839

Miscellaneous

Number	Title	Revision
ULDBD-GF-001	Miscellaneous buildings HVAC	2

Section 1R04: Equipment Alignment

Procedures

Number	Title	Revision
ITL-EF-0T113	Loop Temp; UHS Pond Avg Temp	8
OSP-EF-00001	Essential Service Water Valve Lineup Verification	9
OSP-EF-0002B	Essential Service Water Train B Flow Verification	0
OSP-NE-0001A	Standby Diesel Generator A Periodic Tests	64
OSP-ZZ-00001	Control Room Shift and Daily Log Readings and Channel Checks	89

Drawings

Number	Title	Revision
M-U2EF01	Essential Service Water System	69

Condition Reports

201706137	201705823	201705976	201706223	201706433
201704918	201704953	201705094	201705427	201705358
201707058	201706818	201704918	201500651	

Jobs

15500811

Miscellaneous

Number	Title	Revision
EF-45	Acceptance Criteria Used in Essential Service Water Flow Balance Procedures	8
EFTR0113	Acceptance Criteria Instrument Sheet	1
M-EF-10	Essential Service Water System Flow Requirements	0

Section 1R05: Fire Protection

Procedures

Number	Title	Revision
FPP-ZZ-00100	Site Wide Fire Protection Inspection Procedure	11

Condition Reports

201200891	201705360	201705766	201705967	201706347
201706818	201706984	201707027		

Miscellaneous

Number	Title	Revision Date
Various	Fire Preplan Manual – Fire Areas	38
AMEND 206	Issuance of Amendment Regarding Transition to a Risk Informed, Performance-Based Fire Protection Program in Accordance with 10 CFR 50.48(c) (TAC No. ME7046)	January 13, 2014

Section 1R07: Heat Sink Performance

Procedures

Number	Title	Revision
APA-ZZ-00802, Appendix 1	Callaway Energy Center Confined Space Listing	5

Drawings

Number	Title	Revision
M-22EG02	Component Cooling Water System	24
ETP-ZZ-03001	GL 89-13 Heat Exchanger Inspection	11
EDP-ZZ-01112	Heat Exchanger Predictive Performance Manual	22

Condition Reports

201706084	201705916	201706204	201706168	201706121
201706120	201603610			

Jobs

16004557	16505163

Miscellaneous

Number	Title	Revision
EG-59	Minimum Wall Thickness Calculation for CCW HX Water Boses	0
M-EF-39	Heat Exchanger Tube Minimum Wall	0
EG-42	CCW – Calculate the Number of Tubes that can be plugged	0
WEST-0435	Westinghouse Instruction Manual for Auxillary Heat Exchangers Prepared for SNUPPS	1
M-072-00024	Instruction Manual for Component Cooling Water Heat Exchangers for the SNUPPS Project	7

Section 1R08: Inservice Inspection Activities

Calculations

Number	Title	Date
1001077.313	Callaway Reactor Pressure Vessel Nozzle Water Jet Peening Design and Nondestructive Examination	May 24, 2016

Condition Reports

201605790	201700782	201703657	201705333
201606802	201700885	201704025	201705437
201607792	201701753	201704643	201705528
201608559	201701776	201704648	201705661
201609013	201702085	201704835	201705764
201609024	201702109	201704980	201705820
201609148	201702203	201705263	201705854
201700757	201702688	201705321	

Drawings

Number	Title	Revision
C-2052, Sheet 3	Bechtel – Pipe Whip Restraints Standard Details	1
C-2L2956	Pressure Boundary Drawings – Reactor Building Floor Plan, Elevation 1998'-6"	1
GM-RB1974N-8X11	Callaway Plant Auxiliary Building Grid Map – Floor Elevation 1974'-0"	B
GM-RB2000-8X11	Callaway Plant Reactor Building Grid Map – Floor Elevation 2000'-0"	C
L5-01FT700	Water Jet Peening Required Mitigation Area Drawing for Reactor Vessel Nozzles	1
L5-01FT710	Water Jet Peening Required Mitigation Area Drawing for Bottom Mounted Instrumentation Inner Surface	2
L5-01FT711	Water Jet Peening Required Mitigation Area Drawing for Bottom Mounted Instrumentation Outer Surface and J-Weld	2
M-25EM03(Q)	Bechtel – Hanger Location Dwg. High Pressure Coolant Injection System – Reactor Building	22
M-25EP01 (Q)	Bechtel – Hanger Location Drawing, Accumulator Safety Injection System Loop Numbers 1 & 4, Reactor Building	15
M-2EMO3 C032/031 (Q)	Bechtel – High Pressure Coolant Injection System Reactor Building	3
OP-DS-C-66074, Sheet 1	Nozzle Type Safety Valve	1

Procedures

Number	Title	Revision
EDP-ZZ-00016	Checklist for Program Review – Appendix 5	3
MTW-ZZ-WP501	Welding of P-1 Materials	14
MTW-ZZ-WP502	Welding of P-1 to P-3 Materials	10
MTW-ZZ-WP503	Welding of P-1 to P-4 Materials	8
MTW-ZZ-WP504	Welding of P-1 to P-5 Materials	10
MTW-ZZ-WP505	Welding of P-1 to P-8 Materials	10
MTW-ZZ-WP506	Welding Of P-4X (Including Welding Of P-1 And P-8 To P-4X) Materials	8
MTW-ZZ-WP509	Welding of P-3 Materials	8
MTW-ZZ-WP510	Welding of P-4 Materials	9
MTW-ZZ-WP511	Welding of P-5 Material	10
MTW-ZZ-WP512	Welding of P-5 to P-8 Materials	5
MTW-ZZ-WP513	Welding of P-6 to P-8 Materials	4
MTW-ZZ-WP514	Welding Of P-8 Materials	16
MTW-ZZ-WP524	Torch Brazing of Copper Alloys.	8
MTW-ZZ-WP525	Welding of P-4 to P-8 Materials.	4
MTW-ZZ-WP527	Welding of P-34 Materials.	3
QCP-ZZ-05000	Liquid Penetrant Examination	26
QCP-ZZ-05010	Magnetic Particle Examination	20
QCP-ZZ-05030	Radiographic Procedure for Examination of Weldments and Castings	18
QCP-ZZ-05040	Visual Examination to ASME VT-1	23
QCP-ZZ-05041	Visual Examination to ASME VT-2	30
QCP-ZZ-05042	Visual Examination to ASME VT-3	21
EDP-ZZ-01004	Boric Acid Corrosion Control Program	20
MDP-ZZ-LM001	Fluid Leak Management Program	16
QCP-ZZ-05048	Boric Acid Walkdown For Reactor Coolant System Pressure Boundary	14

Miscellaneous

Number	Title	Revision/Date
ASME Code Case N-432-1	Repair Welding Using Automatic or Machine Gas Tungsten-Arc Welding (GTAW) Temper Bead Technique	
ASME Code Case N-513-3	Evaluation Criteria for Temporary Acceptance of Flaws in Moderate Energy Class 2 or 3 Piping	
ASME Code Case N-516-3	Underwater Welding	
ASME Code Case N-532-5	Alternative Requirements to Repair and Replacement Documentation Requirements and Inservice Summary Report Preparation and Submission	
ASME Code Case N-561-2	Alternative Requirements for Wall Thickness Restoration of Class 2 and High Energy Class 3 Carbon Steel Piping, Section XI, Division 1	
ASME Code CaseN-562-2	Alternative Requirements for Wall Thickness Restoration of Class 3 Moderate Energy Carbon Steel Piping, Section XI, Division 1	
ASME Code Case N-597-2	Requirements for Analytical Evaluation of Pipe Wall Thinning, Section XI, Division 1	
ASME Code Case N-600	Transfer of Welder, Welding Operator, Brazer, and Brazing Operator Qualifications Between Owners	
ASME Code Case N-638-4	Similar and Dissimilar Metal Welding Using Ambient Temperature Machine GTAW Temper Bead Technique	
ASME Code Case N-651	Ferritic and Dissimilar Metal Welding Using SMAW Temper Bead Technique Without Removing the Weld Bead Crown for the First Layer	
ASME Code Case N-652-1	Alternative Requirements to Category B-G-1, B-G-2, and C-D Bolting Examination Methods and Selection Criteria, Section XI, Division 1	
ASME Code Case N-661-2	Alternative Requirements for Wall Thickness Restoration of Classes 2 and 3 Carbon Steel Piping for Raw Water Service	
ASME Code Case N-705	Evaluation Criteria for Temporary Acceptance of Degradation in Moderate Energy Class 2 or 3 Vessels and Tanks	
ASME Code Case N-762	Temper Bead Procedure Qualification for Repair/Replacement Activities Without Post Weld Heat Treatment, Section XI, Division 1	
EDP-ZZ-00016, Appendix 5	Self Assessment for Alloy 600, Condition Report 201304594	3

Miscellaneous

Number	Title	Revision/Date
Callaway Action Request 201309684-31	Self Assessment for ISI Program, Procedure EDP-ZZ-00016	June 20, 2014
Callaway Action Request 201304594, Action 2.11	Self Assessment for ASME Section XI Repair/Replacement, Procedure EDP-ZZ-00016, Appendix 5	October 8, 2014
Callaway Action Request 201304594, Action 2.36	Self Assessment for Welding, Procedure EDP-ZZ-00016, Appendix 5	October 8, 2014
MP 15-0031	Applicability Determination: Primary Water Stress Corrosion Cracking Mitigation of Reactor Vessel Loop Nozzles and Bottom Mounted Instrument Nozzles by Water Jet Peening	0
MP 15-0031	50.59 SCREEN: Primary Water Stress Corrosion Cracking Mitigation of Reactor Vessel Loop Nozzles and Bottom Mounted Instrument Nozzles by Water Jet Peening	0
MP 15-0031	Engineering Disposition – Modification: Alloy 600 Primary Water Stress Corrosion Cracking Mitigation of Reactor Vessel Loop Nozzles and Bottom Mounted Instrument Nozzles by Water Jet Peening	0
MP 15-0031	Engineering Hazards & Programs Screen: Alloy 600 Primary Water Stress Corrosion Cracking Mitigation of Reactor Vessel Loop Nozzles and Bottom Mounted Instrument Nozzles by Water Jet Peening	0

Work Orders

11510850-500	16506650-500	16511811-500
11510853-500	16511578-507	16511812-500
16004137-500	16511668-500	16511822-500

Section 1R11: Licensed Operator Requalification Program

Procedures

Number	Title	Revision
E-1	Loss of Reactor or Secondary Coolant	19
ES-1.3	Transfer to Cold Leg Recirculation	12
ES-1.4	Transfer to Hot Leg Recirculation	10
ODP-ZZ-00001	Operations Department – Code of Conduct	103

Procedures

Number	Title	Revision
ODP-ZZ-00001, Addendum 15	Operability and Functionality Determinations	11
ODP-ZZ-00003	Shift Relief and Turnover	37
ODP-ZZ-00008	Night Orders – Standing Orders – Operations Information Reports	16
OTG-ZZ-00002	Reactor Startup – IPTE	60
OTG-ZZ-00005	Plant Shutdown 20% Power to Hot Standby	49

Condition Reports

201705187	201705270	201705715	201705881	201706320
201706357	201706702	201707028	201707282	

Miscellaneous

Number	Title	Revision
KC-26	Nuclear Safety Capability Assessment	1
17671-010b	Callaway NFPA 805 Fire PRA – Main Control Room Fire Analysis	3

Section 1R12: Maintenance Effectiveness

Procedures

Number	Title	Revision
APA-ZZ-00500, Appendix 5	Maintenance Rule (MR)	22
EDP-ZZ-01128	Maintenance Rule Program	25
EDP-ZZ-01128, Appendix 2	Summary of SSC Performance Criteria	32

Condition Reports

201203302	201204582	201404573	201604238	201604244
201605630	201605716	201606109	201701041	

Jobs

16001980	17503857

Miscellaneous

Number	Title	Revision
M-FL-08	Control Building Flooding	6
PM1007364	Gravity Drains	
	Maintenance Rule Scope Evaluations	various

Section 1R13: Maintenance Risk Assessment and Emergent Work Controls

Procedures

Number	Title	Revision
APA-ZZ-00150 App U	Outage Work Integrated Risk Management	8
APA-ZZ-00322 App F	Online Work Integrated Risk Management	15
ODP-ZZ-00002 App 2	Risk Management Actions for Planned Risk Significant Activities	13
ODP-ZZ-00002 App 3	Risk Management Actions for Fire Risk Systems and Components	3

Condition Reports

201705956	201706137	201707197

Miscellaneous

Number	Title	Date
	Shift Outage Manager turnover	various

Section 1R15: Operability Evaluations

Procedures

Number	Title	Revision
APA-ZZ-00152	Emergent Issues Response	19
APA-ZZ-00500, Appendix 1	Operability and Functionality Determinations	30
ODP-ZZ-00001, Addendum 15	Operability and Functionality Determinations	11
OTO-ZZ-00012	Severe Weather	39

Condition Reports

201705851	201703205	201705236	201600447

Section 1R18: Plant Modifications

Procedures

Number	Title	Revision
APA-ZZ-00604	Request for Resolution	37
APA-ZZ-00605	Temporary System Modifications	35

Drawings

Number	Title	Revision
M-18-00307	Standby Diesel Generator Interconnection Wiring Diagram	9

Condition Reports

201103911	201103912	201706473	201102064	201205556
201706267				

Jobs

16004023	16004024

Miscellaneous

Number	Title	Revision
	Okonite Product Data Sheet 32-60548	
	Post Change Test Plan: Replace EDG Neutral Ground Cables	0
`	Engineering Disposition: Replace EDG Neutral Ground Cables	
EDR-5018	Life Assessment of Raychem Heat Shrinkable High Voltage Terminations	5
M-018-00988	Class 1E Qualification Report for Okoguard Insulated Power Cables for use in Standby Diesel Generator	0
RFR 201308916	Evaluate Replacement of EDG Neutral Cable and Resistor Bank	0
Spec No. 10466-E-058	Cable Voltage Test Information	2

Section 1R19: Post-Maintenance Testing

Procedures

Number	Title	Revision
OSP-EF-0002B	Essential Service Water Train B Flow Verification	9
OSP-NE-0001A	Standby Diesel Generator A Periodic Tests	64
OTO-NN-00001	Loss of Safety Related Instrument Power	
OSP-EF-0002A	Essential Service Water Train A Flow Verification	10
OSP-EF-P001A	ESW Train A Inservice Test	78

Condition Reports

201303233	201506872	201608084	201605339	

Jobs

17506279	16506167	17000271	16506264	17000270
17000272	17000273	14000992	13005743	13005744
13005746	13005745			

Miscellaneous

Number	Title	Revision
	Engineering Disposition - Modification to Install Class 1E Swing Inverters	March 23, 2016
CA2687	Post Change Test Plan - Modification to Install Class 1E Swing Inverters	September 17, 2012
E-051C	Specification for Swing Inverter DC Transfer Switches	0
E-1061	Specification for Class 1E 120V AC Vital Bus Inverters and Swing Inverters	0
RFR 200805033	Modification to install 1E Swing Inverters	0
ULDBD-EF-001	Essential Service Water	2

Section 1R20: Refueling and Other Outage Activities

Procedures

Number	Title	Revision
APA-ZZ-00905	Limitations of Callaway Plant Staff Working Hours	20
ETP-ZZ-00035	Refueling Performance - IPTE	41
OSP-GT-00003	Containment Closure	21

Procedures

Number	Title	Revision
OTG-ZZ-00005	Plant Shutdown 20% Power to Hot Standby	49
OTG-ZZ-00006	Plant Cooldown Hot Standby to Cold Shutdown	77
OTN-BB-00002 Addendum 6	Draining the RCS to Limited Inventory or Reduced Inventory – IPTE	29
OTO-ZZ-00012	Severe Weather	39
SWPM	Safe Work Practices Manual	20

Condition Reports

201706700	201706706	201705838	201705615	201706311
201407328	201705345	201705480	201705312	

Miscellaneous

Number	Title	Revision
	Refuel 22 Scope Removals	various

Section 1R22: Surveillance Testing

Procedures

Number	Title	Revision
OSP-EJ-V002B	RWST to RHR Suction Check Valve Inservice Test	10
OSP-EM-V0004	RHR Check Valve and SI Pump Recirc Valve Inservice Test	22
OSP-EP-V0006	SI Accumulator Discharge Check Valve Test	9
OSP-SA-2413A	Train A Diesel Generator and Sequencer Testing	26
OSP-SB-0002A	SSPS Train A Operation in Modes 5, 6, and No Mode	7
ESP-AB-01000	Main Steam Safety Valve Set Pressure Testing	14
APA-ZZ-00356	Pump and Valve Inservice Test Program	24
APA-ZZ-00320	Work Execution	62
OSP-SA-2413A	Train B Diesel Generator and Sequencer Testing	29
OTS-SA-00001	Operations of Engineered Safety Feature Actuation System	41
OTS-EF-0009A	Simulate A Train ESW Response to Loss of Offsite Power	1
ETP-ZZ-ST030	Simulate B Train ESW Response to Loss of Offsite Power	0

Drawings

Number	Title	Revision
M-140	Main Steam Safety Valve	7
J-104-00176	ESF Actuation System – Block Diagram Logic	

Condition Reports

201108292	20010572	200402766	200901607	201302349
201705295	200703191	201603472	200705198	201603472
201602658	201605270	201605397		

Jobs

11512393	16504422	16504439	17005212	14510725
1410735	17004332	17004333	17503857	16002133

Miscellaneous

Number	Title	Revision Date
Spec No. 10466-M-140	Design Specification for Main Steam Safety Valves in Nuclear Service for the SNUPPS	9
SCP980130	Increased MSSV Tolerance Range for Callaway	0
M-1179	Technical Specifications for Replacement Containment Coolers	2
RFR 170087	ESW Water Hammer Mitigation Modification	0
AUCA 16-006	Root Cause Analysis for CAR 201603472 Leaks Identified During B ESFAS Testing	June 6, 2016

Section 2RS1: Radiological Hazard Assessment and Exposure Controls

Procedures

Number	Title	Revision
APA-ZZ-00014	Conduct of Operations – Radiation Protection	23
APA-ZZ-01000	Callaway Energy Center Radiation Protection Program	42
APA-ZZ-01000 APPA	Control of Radioactive Material	20
HDP-ZZ-01500	Radiological Postings	45
HDP-ZZ-03000	Radiological Survey Program	45

Procedures

Number	Title	Revision
HDP-ZZ-03000 APPB	Performing Radiation Surveys	11
HDP-ZZ-03000 APPD	Performing Airborne Radioactivity Surveys	9
HTP-ZZ-01203	Radiological Area Access Control	56
HTP-ZZ-02004	Control of Radioactive Sources	39
HTP-ZZ-02023	Unconditional Release of Material From Radiological Controls	19
HTP-ZZ-06001	High Radiation/Locked High Radiation/Very High Radiation Area Access	51
RTN-HC-01000	Preparation of Radwaste/Radioactive Material for Shipment	26

Audits and Self-Assessments

Number	Title	Date
SSA 201600059	Simple Self-Assessment: HRA/LHRA/VHRA Controls	October 28, 2016

Condition Reports

201603553	201603733	201605765	201605811	201606318
201606772	201606911	201607234	201700188	201701008

Radiation Work Permits

Number	Title	Revision
10507831	Motor Change on C Reactor Coolant Pump and Associated Tasks	0
10516191	Replace HKE09A Hydraulic Cylinder, Replace Limit Switches, Inspect Cart/Rails	1
11513626	Replace Mechanical Seal on A Reactor Coolant Pump	0
16003256	RadChem Helper/Deconner Routine Activities and General Decon Support of Water Jet Peening During Refuel 22	0
16505066	Remove and Reinstall Reactor Vessel Lower Internals	0

Radiation Surveys

Number	Title	Date
CA-M-20171002-6	NS-1 Neutron Source Quarterly Routine	October 2, 2017

Radiation Surveys

Number	Title	Date
CA-M-20171006-29	RB2047 General Area	October 7, 2017
CA-M-20171007-10	RB2068E Containment Downpost Survey	October 7, 2017
CA-M-20171009-42	RBRCPP-3 Post Shielding A RCP Platform	October 9, 2017
CA-M-20171010-42	RB 2026 Reactor Coolant Pump Platform C Scaffold	October 10, 2017
CA-M-20171011-12	RBRCP1 A RCP Shroud Bumping	October 10, 2017
CA-M-20171012-18	RB2023I Scaffold Survey	October 12, 2017
CA-M-20171014-21	RB2023I Scaffold Survey C Loop	October 14, 2017
CA-M-20171016-27	RB 2047-CAV Post Lower Internal/Core Barrel Move Survey	October 16, 2017
CA-M-20171019-12	FB2047 Transfer Canal	October 19, 2017

Air Sampling

Number	Title	Date
1710131200	RB 2047 Routine	October 13, 2017
1710151310	RB 2000 O/S Bioshield Job Coverage Particulate	October 15, 2017
1710151706	Routine 2047 RB	October 15, 2017
1710162040	RB 2000 GA Particulate	October 17, 2017

Miscellaneous Documents

Number	Title	Date
	Accountable Radioactive Source Inventory	
HSP-ZZ-00001	Sealed Beta-Gamma Source Leak Test	January 18, 2017
HSP-ZZ-00001	Sealed Beta-Gamma Source Leak Test	June 20, 2017

Section 2RS2: Occupational ALARA Planning and Controls

Procedures

Number	Title	Revision
APA-ZZ-01000	Callaway Energy Center Radiation Protection Program	42
APA-ZZ-01001	Callaway Plant ALARA Program	26
APA-ZZ-01001, Appendix A	Plant ALARA Review Committee Members and Alternate List	32

Procedures

Number	Title	Revision
HDP-ZZ-01100	ALARA Planning and Review	21
HDP-ZZ-01200	Radiation Work Permits	31
HTP-ZZ-01101	Administrative Controls for Radiation Shielding	24

Audits and Self-Assessments

Number	Title	Date
201600059-68	Simple Self-Assessment – Outage ALARA Documentation	October 27, 2016
AP17001	Nuclear Oversight Audi of Radiation Protection	February 28, 2017

Condition Reports

201607676	201607799	201609039	201609221	201700450
201701218	201704005			

Radiation Work Permits

Number	Title	Revision
10516191	Replace HKE09A Hydraulic Cylinder, Replace Limit Switches, Inspect Cart Rails (Includes RP Coverage and Gross Rinse by Deconners)	0,1
R22HDLI	Remove and Reinstall Reactor Vessel Lower Internals	0
R22RCPSEAL	Replace Mechanical Seal on A Reactor Coolant Pump	0
R22RCPSWAPC	Motor Change on C Reactor Coolant Pump and Associated Tasks	0
R22WPSTTDN	Water Jet Peening Setup and Tear Down During Refuel 22	0
R22WPWTR	Water Jet Peening	0

ALARA Planning, In-Progress Reviews, and Post-Job Reviews

RWP Number	Title	Revision / Date
10516191	ALARA Plan Level 2 – RF22 Transfer Canal	October 17, 2017
16505461750	Work-In-Progress Review – RF22 Build / Remove Scaffold to 2BG21S010A, BB8378A&B, and BB04C002231	October 13, 2017
R22HDLI	ALARA Plan Level 2 – R22-56321 Low Intern	September 21, 2017

ALARA Planning, In-Progress Reviews, and Post-Job Reviews

RWP Number	Title	Revision / Date
R22RCPSWAPC	ALARA Plan Level1 – R22-52620 RCP Motor	September 26, 2017
R22REGENSHIELD	ALARA Plan Level 2 – RF22-50820 RB Shield	September 21, 2017
R22RVINSPECT	Work-In-Progress Review – NETS Inspection/cleaning of RV and In-Core Tunnel Pit	October 10, 2017
R22WPSTTDN R22WPWTR	ALARA Plan Level 2 – RF22 Water Jet Peening	October 2, 2017

Miscellaneous Documents

Title	Date
Callaway Energy Center Long Range Dose and Source Term Reduction Plan (Condensed)	
RF22 Shielding List	October 13, 2017

Section 4OA1: Performance Indicator Verification

Procedures

Number	Title	Revision
	Mitigating Systems Performance Index (MSPI) Basis Document	17
APA-ZZ-01111	Mitigating Systems Performance Index (MSPI) Program Administration	4
KDP-ZZ-02000	NRC Performance Indicator Data Collection	18
RRA-ZZ-00001	NRC Performance Indicator Program	9

Condition Reports

201705752 201702886 201700936

Miscellaneous

Number	Title	Date
	Control Room Log	Various

Section 4OA2: Identification and Resolution of Problems

Procedures

Number	Title	Revision
APA-ZZ-00500, Appendix 1	Operability and Functionality Determinations	18
EDP-ZZ-01128, Appendix 4	Maintenance Rule System Functions	18
ODP-ZZ-0016E, Appendix 1	Operations Technician General Inspection Guide	21
EDP-ZZ-04070. Appendix C	PWR Vessel Internals Aging Management Program	3
QCP-ZZ-05042	Visual Examination to ASME VT-3	21

Condition Reports

200603399	201009024	201707189	201707167	201705506
201706888	201706067	201706090	201706138	201706133
201705117	201704803	201703998	201203302	201605630
201605716	201606109	201701041	201604238	201604244
201305705	200703975	200404656	201101322	

Jobs

16505243

Miscellaneous

Number	Title	Revision Date
BN-28	RWST Drain Down Time During a SBLOCA	0
BB-183	Evaluation of Reactor Vessel Cladding Indication Inside Bottom Head During Refuel 13	2
M-706-00068	Instruction Manual for Reactor Vessel Assembly	11
RFR 23470	Evaluate Indications in Reactor Vessel Cladding	A
05042-07-115	VT-3 Examination Report	5/4/07
SCP-04-49	Reactor Vessel Cladding Indication Assessment	5/7/04

Section 4OA3: Event Follow-Up

Procedures

Number	Title	Revision
APA-ZZ-00500, Appendix 1	Operability and Functionality Determinations	29

Condition Reports

201704176	201603472	201602658	201506340

Section 4OA5: Other Activities

Procedures

Number	Title	Revision
APA-ZZ-00500	Corrective Action Program	68
APA-ZZ-00500, Appendix 12	Significant Adverse Condition – ADCN-1	28
APA-ZZ-00500 App 7	Effectiveness Reviews	11
OTN-EF-00001	Essential Service Water System	74

Condition Reports

201603472	201602658	201506340

Initial Request for Information
Quarterly Baseline Inspection
Callaway Plant

Inspection Report: 05000483/2017004

Inspection Dates: October 1 – December 31, 2017

Inspection Procedure: IP 71111 series, IP 71152

Lead Inspector: Dan Bradley, Senior Resident Inspector

Information Requested For 4th Quarter 2017

The following information should be sent to the resident office in hard copy or electronic format (Certrec IMS preferred) to the attention of Dan Bradley by October 16, 2017. These items shall be available and ready for review on the day indicated in this request. Please provide requested documentation electronically in "pdf" files, Excel, or other searchable formats, if possible. The information should contain descriptive names and be indexed and hyperlinked to facilitate ease of use. If requested documents are large and/or only hard copy formats are available, please inform the inspector and provide subject documentation.

Please provide the following information for the **essential service water system**:

1. A list of all calculations and drawings associated with the selected system.

2. A list of condition reports associated with the selected system for the last 3 years.

3. A list of work orders associated with the selected system for the last 3 years, including all open work orders.

4. An Excel spreadsheet list of equipment basic events (with definitions), including importance measures sorted by risk achievement worth and Fussell-Vesely from your internal events probabilistic risk assessment. Include basic events with a risk achievement value of 1.3 or greater.

5. A list of any pre-existing evaluations or calculations with low design margins for the selected system.

6. A list of maintenance rule components and functions; based on engineering or expert panel judgment, for the selected system.

7. A list of maintenance rule functional failure evaluations for the last 3 years for the selected system.

8. A list of operating experience evaluations for the last 3 years for the selected system.

9. A list of all procedures and calculations that involve time-critical operator actions.

10. A list of permanent and temporary modifications performed in the past 3 years for the selected system. Include a list of any documents associated with modifications such as: calculations, specifications, vendor manuals, Final Safety Analysis Report, Technical Specifications and Bases updates, updated procedures, and maintenance and surveillance activities and procedures.

11. A list of the design calculations that provide the design margin information for the selected system.

12. A list of root cause evaluations associated with component failures or design issues initiated/completed in the last 3 years for the selected system.

13. A list of any common-cause failures of components in the last 3 years for the selected system.

14. An electronic copy of the design bases documents for the selected system.

15. An electronic copy of the system health notebooks for the selected system.

Inspector Contact Information:

Dan Bradley
Senior Resident Inspector
573-676-3181
Dan.Bradley@nrc.gov

Mailing Address:
U.S. NRC Resident Inspector Office
8201 NRC Road
Steedman, MO 65077

The following items are requested for the
Occupational Radiation Safety Inspection
at Callaway
October 16-20, 2017
Integrated Report 2017004

Inspection areas are listed in the attachments below.

Please provide the requested information on or before **September 27, 2017**.

Please submit this information using the same lettering system as below. For example, all contacts and phone numbers for Inspection Procedure 71124.0**1** should be in a file/folder titled "**1**- A," applicable organization charts in file/folder "**1**- B," etc.

If information is placed on *ims.certrec.com*, please ensure the inspection exit date entered is at least 30 days later than the onsite inspection dates, so the inspectors will have access to the information while writing the report.

In addition to the corrective action document lists provided for each inspection procedure listed below, please provide updated lists of corrective action documents at the entrance meeting. The dates for these lists should range from the end dates of the original lists to the day of the entrance meeting.

If more than one inspection procedure is to be conducted and the information requests appear to be redundant, there is no need to provide duplicate copies. Enter a note explaining in which file the information can be found.

If you have any questions or comments, please contact John O'Donnell at (817) 200-1441 or John.ODonnell@nrc.gov.

PAPERWORK REDUCTION ACT STATEMENT

This letter does not contain new or amended information collection requirements subject to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.). Existing information collection requirements were approved by the Office of Management and Budget, control number 3150-0011.

1. Radiological Hazard Assessment and Exposure Controls (71124.01) and Performance Indicator Verification (71151)

Date of Last Inspection: 4/11/2016

A. List of contacts and telephone numbers for the Radiation Protection Organization Staff and Technicians

B. Applicable organization charts

C. Audits, self-assessments, and LERs written since 4/11/2016, related to this inspection area

D. Procedure indexes for the radiation protection procedures

E. Please provide procedures related to the following areas noted below. Additional procedures may be requested by number after the inspector reviews the procedure indexes.

1. Radiation Protection Program
2. Radiation Protection Conduct of Operations, if not included in #1.
3. Personnel Dosimetry
4. Posting of Radiological Areas
5. High Radiation Area Controls
6. RCA Access Controls and Radiation Worker Instructions
7. Conduct of Radiological Surveys
8. Radioactive Source Inventory and Control

F. List of corrective action documents (including corporate and sub-tiered systems) since April 11, 2016.

a. Initiated by the radiation protection organization
b. Assigned to the radiation protection organization

NOTE: The lists should indicate the <u>significance level</u> of each issue and the <u>search criteria</u> used. Please provide in document formats which are "searchable" so that the inspector can perform word searches.

G. List of radiologically significant work activities scheduled to be conducted during the inspection period. (If the inspection is scheduled during an outage, please also include a list of work activities greater than 1 rem, scheduled during the outage with the dose estimate for the work activity.)

H. List of active radiation work permits

I. Radioactive source inventory list all radioactive sources that are required to be leak tested. Indicate which sources are 10 CFR Part 20, Appendix E, Category 1 or Category 2. Please indicate the radioisotope, initial and current activity (w/assay date), and storage location for each applicable source.

J. The last two leak test results for the Category 1 or 2 radioactive sources and any other radioactive source(s) that have failed its leak test within the last two years

K. A list of any non-fuel items stored in the spent fuel pools, and if available, their appropriate dose rates (Contact / @ 30 cm)

L. A list of radiological controlled area entries greater than 100 millirem since 4/11/2016. The list should include the date of entry, some form of worker identification, the radiation

work permit used by the worker, dose accrued by the worker, and the electronic dosimeter dose alarm set-point used during the entry (for Occupational Radiation Safety Performance Indicator verification in accordance with IP 71151).

2. Occupational ALARA Planning and Controls (71124.02)
Date of Last Inspection: 11/7/2016

A. List of contacts and telephone numbers for ALARA program personnel

B. Applicable organization charts

C. Copies of audits, self-assessments, and LERs, written since 11/7/2016, focusing on ALARA

D. Procedure index for ALARA Program

E. Please provide specific procedures related to the following areas noted below. Additional Specific Procedures may be requested by number after the inspector reviews the procedure indexes.
1. ALARA Program
2. ALARA Planning
3. ALARA Committee
4. Radiation Work Permit Preparation

F. A summary list of corrective action documents (including corporate and sub-tiered systems) written since 11/7/2016, related to the ALARA program, including exceeding RWP Dose Estimates.

NOTE: The lists should indicate the significance level of each issue and the search criteria used. Please provide in document formats which are “searchable” so that the inspector can perform word searches.

G. List of work activities greater than 1 rem, since date of last inspection, Including original dose estimates and actual doses accrued.

H. Site dose totals and 3-year rolling averages for the past 3 years (based on dose of record)

I. Outline of source term reduction strategy

J. If available, provide a copy of the ALARA outage report for the most recently completed outages for each unit

K. Please provide your most recent Annual ALARA Report.

CALLAWAY PLANT - NRC INTEGRATED INSPECTION REPORT 05000483/2017004 AND EXERCISE OF ENFORCEMENT DISCRETION DATED JANUARY 28, 2018

KKennedy, RA
SMorris, DRA
TPruett, DRP
AVegel, DRS
RLantz, DRP
JClark, DRS
SKirkwood, RC
NTaylor, DRP
DProulx, DRP
JMelfi, DRP
DBradley, DRP
SJanicki, DRP
DYancey, DRP
JBowen, RIV/OEDO
VDricks, ORA
JWeil, OCA
JKlos, NRR
AMoreno, RIV/CAO
BMaier, RSLO
THipschman, IPAT
EUribe, IPAT
MHerrera, DRMA
R4Enforcement
ROPreports
ROPassessment

ADAMS ACCESSION NUMBER: ML18025A001

■ SUNSI Review By: NHT/RDR	ADAMS ■ Yes ☐ No	☐ Non-Sensitive ■ Sensitive	■ Publicly Available ☐ Non-Publicly Available	Keyword: NRC-002

OFFICE	SRI/DRP/B	RI/DRP/B	C:DRS/EB1	C:DRS/EB2	C:DRS/OP	C:DRS/PSB2
NAME	DBradley	SJanicki	TFarnholtz	GWerner	VGaddy	HGepford
SIGNATURE	***/RA/***	***/RA/***	***/RA/***	***/RA/***	***/RA/***	***/RA/***
DATE	1/22/2018	01/24/2018	01/16/2018	01/17/2018	1/17/2018	1/19/2018
OFFICE	TL:DRS/IPAT	ORA/ACES	C:DRP/B			
NAME	THipschman	MVasquez	NTaylor			
SIGNATURE	***/RA/***	***/RA CAlldredge for/***	***/RA/***			
DATE	1/17/2018	1/19/2018	1/28/18			

OFFICIAL RECORD COPY