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

February 10, 2017

Rich Anderson, Site Vice President
Arkansas Nuclear One
Entergy Operations, Inc.
1448 SR 333
Russellville, AR 72802-0967

SUBJECT: ARKANSAS NUCLEAR ONE – NRC INSPECTION REPORT
05000313/2016004 AND 05000368/2016004

Dear Mr. Anderson:

On December 31, 2016, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Arkansas Nuclear One facility, Units 1 and 2. On January 12, 2017, the NRC inspectors discussed the results of this inspection with you and other members of your staff. The results of this inspection are documented in the enclosed report.

NRC inspectors documented two findings of very low safety significance (Green) in this report. Both of these findings involved violations of NRC requirements. Further, inspectors documented two licensee-identified violations which were determined to be of very low safety significance (Green). The NRC is treating these violations as non-cited violations (NCVs) consistent with Section 2.3.2.a of the NRC 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, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC resident inspector at Arkansas Nuclear One.

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

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 2.390, “Public Inspections, Exemptions, Requests for Withholding,” a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC’s Public

Document Room or from the Publicly Available Records (PARS) component of the NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Neil O'Keefe, Branch Chief
Project Branch E
Division of Reactor Projects

Docket Nos. 50-313 and 50-368
License Nos. DRP-51 and NPF-6

Enclosure:
Inspection Report 05000313/2016004
and 05000368/2016004
w/ Attachments:
1. Supplemental Information
2. DRS Request for Information

SUBJECT: ARKANSAS NUCLEAR ONE – NRC INSPECTION REPORT
05000313/2016004 AND 05000368/2016004 – DATED FEBRUARY 10, 2017

DISTRIBUTION:
Regional Administrator (Kriss.Kennedy@nrc.gov)
Deputy Regional Administrator (Scott.Morris@nrc.gov)
DRP Director (Troy.Pruett@nrc.gov)
DRS Director (Anton.Vegel@nrc.gov)
DRS Deputy Director (Jeff.Clark@nrc.gov)
DRP Deputy Director (Ryan.Lantz@nrc.gov)
Senior Resident Inspector (Brian.Tindell@nrc.gov)
Resident Inspector (Margaret.Tobin@nrc.gov)
Resident Inspector (Matthew.Kirk@nrc.gov)
Branch Chief, DRP/E (Neil.OKeefe@nrc.gov)
Project Engineer, DRP/E (Brian.Correll@nrc.gov)
Project Engineer, DRP/E (Jackson.Choate@nrc.gov)
Administrative Assistant (Mary.Bennett@nrc.gov)
Public Affairs Officer (Victor.Dricks@nrc.gov)
Project Manager (Thomas.Wengert@nrc.gov)
Team Leader, DRS/IPAT (Thomas.Hipschman@nrc.gov)
Project Engineer, DRS/IPAT (Eduardo.Uribe@nrc.gov)
ACES (R4Enforcement.Resource@nrc.gov)
RITS Coordinator (Marisa.Herrera@nrc.gov)
Regional Counsel (Karla.Fuller@nrc.gov)
Congressional Affairs Officer (Jenny.Weil@nrc.gov)
RIV Congressional Affairs Officer (Angel.Moreno@nrc.gov)
RIV/ETA: OEDO (Jeremy.Bowen@nrc.gov)
RIV RSLO (Bill.Maier@nrc.gov)
ROPreports.Resource@nrc.gov

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U.S. NUCLEAR REGULATORY COMMISSION

REGION IV

Docket: 05000313; 05000368

License: DPR-51; NPF-6

Report: 05000313/2016004; 05000368/2016004

Licensee: Entergy Operations, Inc.

Facility: Arkansas Nuclear One, Units 1 and 2

Location: Junction of Highway 64 West and Highway 333 South
Russellville, Arkansas

Dates: October 1 through December 31, 2016

Inspectors: B. Tindell, Senior Resident Inspector
M. Tobin, Resident Inspector
J. Choate, Project Engineer
B. Correll, Project Engineer
R. Deese, Senior Reactor Analyst
J. Dixon, Senior Project Engineer
N. Greene, Heath Physicist, PhD
P. Jayroe, Project Engineer
M. Kirk, Project Engineer
J. Mateychick, Senior Reactor Inspector
S. Money, Health Physicist, Accompaniment
G. Pick, Senior Reactor Inspector
M. Phalen, Senior Health Physicist

Approved By: Neil O'Keefe
Chief, Project Branch E
Division of Reactor Projects

SUMMARY

IR 05000313/2016004; 05000368/2016004; 10/01/2016 – 12/31/2016; Arkansas Nuclear One, Units 1 and 2, Integrated Inspection Report; Refueling and Other Outage Activities.

The inspection activities described in this report were performed between October 1 and December 31, 2016, by the resident inspectors at Arkansas Nuclear One 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. Additionally, NRC inspectors documented two licensee-identified violations of very low safety significance. The significance of inspection findings is indicated by their color (Green, White, Yellow, or Red), which is determined using Inspection Manual Chapter 0609, "Significance Determination Process." Their cross-cutting aspects are determined using Inspection Manual Chapter 0310, "Aspects within the Cross-Cutting Areas." 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."

Cornerstone: Initiating Events

- Green. The inspectors documented a self-revealed finding and associated non-cited violation of 10 CFR 50 Appendix B Criterion III for the licensee's failure to verify that the decay heat removal (DHR) system drain piping configuration and supports could withstand vibrations created during low pressure and high flow conditions. As a result, a cracked weld and unisolable leak in the DHR system occurred due to high cycle fatigue caused by those conditions. To correct this issue, the licensee repaired the leaking weld and designed and installed a new piping support and piping configuration to reduce vibrations during the expected operating conditions. The licensee entered this issue into the corrective action program as Condition Report CR-ANO-1-2016-03225.

  The failure to design the decay heat removal system piping to withstand expected vibrations from the system's cavitating venturis is a performance deficiency. The performance deficiency is more than minor because it was associated with the design control attribute of the initiating events cornerstone and adversely affected the cornerstone objective to limit the likelihood of events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Specifically, inadequate design of the DHR system piping support resulted in a leak that could have challenged the capability of both trains of the DHR system during shutdown on September 29, 2016. The inspectors performed an initial screening of the finding in accordance with NRC Inspection Manual Chapter (IMC) 0609, "Significance Determination Process," issued October 7, 2016, and were directed to IMC 0609, Appendix G, Attachment 1, "Shutdown Operations Significance Determination Process Phase 1 Screening and Characterization of Findings," since the finding pertained to a degraded condition while the plant was shutdown. Using IMC 0609, Appendix G, Attachment 1, dated May 9, 2014, the inspectors determined that the finding required a Phase 2 evaluation. A senior reactor analyst performed a Phase 2 evaluation in accordance with IMC 0609, Appendix G, Attachment 2, "Phase 2 Significance Determination Process Template for PWR during Shutdown," dated February 28, 2005. The senior reactor analyst performed a Phase 2 evaluation which used realistic break characteristics and plant configuration changes to determine the significance to be of very low safety significance (Green). The inspectors determined this finding did not have a cross-cutting aspect because the most significant contributor did not reflect current licensee performance.

Specifically, the licensee last reviewed and modified the pipe support configuration in 1996. (Section 1R20.2)

Cornerstone: Barrier Integrity

- Green. The inspectors documented a self-revealed finding and associated non-cited violation of Unit 1 Technical Specification 5.4.1.a, for the failure to properly pre-plan and perform a pre-modification walkdown in the Unit 1 train A safety-related switchgear room so that the walkdown would not adversely affect the performance of train. As a result, licensee personnel inadvertently de-energized the A3 switchgear and associated ac buses, which resulted in the loss of one train of spent fuel pool cooling. Operators restored spent fuel pool cooling, the licensee evaluated the human error and performed a training stand-down to ensure pre-job walkdowns did not impact plant equipment. The licensee entered this issue into the corrective action program as Condition Report CR-ANO-1-2016-04356.

  The failure to perform a plant walkdown in a manner that did not impact safety-related switchgear is a performance deficiency. The performance deficiency is more than minor because it adversely affected the human performance attribute of the barrier integrity cornerstone and adversely affected the cornerstone objective to provide reasonable assurance that physical design barriers protect the public from radionuclide releases caused by accidents or events. Specifically, de-energizing the safety-related switchgear resulted in the loss of one train of spent fuel pool cooling and an increase in risk level from Green to Yellow. The inspectors evaluated the finding with NRC Manual Chapter 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," dated June 19, 2012, Exhibit 3, "Barrier Integrity Screening Questions," because the appendix provides the most applicable guidance, regardless of whether the unit was at-power or shutdown. The inspectors determined that the finding screened as having very low safety significance (Green) because the finding did not cause the spent fuel pool to exceed the maximum analyzed temperature, did not damage fuel cladding, did not result in a loss pool water inventory below the minimum analyzed level, and did not affect the pool neutron absorber or soluble boron concentration. The inspectors determined this finding has a cross-cutting aspect in the human performance area of Avoid Complacency, because the primary cause of the performance deficiency involved the failure to plan for the possibility of mistakes and use appropriate error reduction tools. [H.12] (Section 1R20.1)

Licensee-Identified Violations

Violations of very low safety significance that were identified by the licensee have been reviewed by the inspectors. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program. The violations and associated corrective action tracking numbers are listed in Section 4OA7 of this report.

PLANT STATUS

Unit 1 began the period shut down in a planned refueling outage. On December 13, 2016, operators closed the main generator output breakers and reached full power on December 18, 2016.

Unit 2 began the period in an unplanned outage for an emergency diesel generator A bearing failure. The licensee completed repairs and restarted the unit on October 27, 2016, reaching full power on October 29, 2016. On November 18, 2016, the grid operator directed the licensee to lower site electric output due to an unexpected loss of the Mabelvale distribution line. In response, operators lowered Unit 2 power to 45 percent. The next day, the Mabelvale line was restored and operators raised power to 100 percent.

REPORT DETAILS

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R01 Adverse Weather Protection (71111.01)

.1 Readiness for Seasonal Extreme Weather Conditions

a. Inspection Scope

On October 6, 2016, 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 preparations 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 cold weather season.

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

- Units 1 and 2, alternate ac diesel generator system
- Unit 2, service water system

The inspectors reviewed the licensee's procedures and design information to ensure the systems would remain functional when challenged by cold 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.

.2 Readiness for Impending Adverse Weather Conditions

a. Inspection Scope

On October 19, 2016, the inspectors completed an inspection of the station's readiness for impending adverse weather conditions. The inspectors reviewed plant design features, the licensee's procedures to respond to tornadoes and high winds, and the licensee's implementation of these procedures. The inspectors evaluated operator staffing and accessibility of controls and indications for those systems required to control the plant.

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

b. Findings

No findings were identified.

1R04 Equipment Alignment (71111.04)

.1 Partial Walk-Down

a. Inspection Scope

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

- October 5, 2016, Unit 1, spent fuel pool cooling system
- October 25, 2016, Unit 2, emergency feedwater system
- October 28, 2016, Units 1 and 2, start up transformer 2 system

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 three partial system walk-down samples as defined in Inspection Procedure 71111.04.

b. Findings

No findings were identified.

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 six plant areas important to safety:

- October 13, 2016, Unit 1, Fire Area J, containment building
- October 18, 2016, Unit 1, Fire Zone 99-M, north switchgear room
- October 18, 2016, Unit 2, Fire Zone 2101-AA, north switchgear room
- October 18, 2016, Unit 2, Fire Zone 2103-V, west battery room
- October 18, 2016, Unit 2, Fire Zone 2076-HH, electrical equipment room
- October 19, 2016, Unit 2, Fire Zone 2081-HH, lower piping penetration rooms

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 six quarterly inspection samples, as defined in Inspection Procedure 71111.05.

b. Findings

No findings were identified.

1R06 Flood Protection Measures (71111.06)

a. Inspection Scope

On October 11, 2016, the inspectors completed an inspection of underground bunkers susceptible to flooding. The inspectors selected underground bunker MH-03 that contained risk-significant cables whose failure could disable risk-significant equipment.

The inspectors observed the material condition of the cables and splices contained in the bunker and looked for evidence of cable degradation due to water intrusion. The inspectors verified that the cables and vaults met design requirements.

These activities constituted completion of one bunker/manhole sample, as defined in Inspection Procedure 71111.06.

b. Findings

No findings were identified.

1R07 Heat Sink Performance (71111.07)

a. Inspection Scope

On October 18, 2016, the inspectors completed an inspection of the readiness and availability of risk-significant heat exchangers. The inspectors reviewed the data from the performance tests for the Unit 2 emergency diesel generator A lube oil cooler, air cooler, and jacket water cooler service water heat exchangers and verified the licensee used the industry standard periodic maintenance method outlined in EPRI NP-7552 for the heat exchangers. Additionally, the inspectors walked down the heat exchangers to observe their 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 associated with Unit 1 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	WELD IDENTIFICATION	EXAMINATION TYPE
Reactor Coolant System	Cold Leg Drain Nozzle to SE Circ Weld	Ultrasonic
Reactor Coolant System	Pressurizer Bottom Head to Shell Weld	Ultrasonic
Reactor Coolant System	RCP A Suction	Encoded Phased Array Ultrasonic
Reactor Coolant System	RCP A Discharge	Encoded Phased Array Ultrasonic
Reactor Vessel Internals	Control Rod Guide Tube Spacer Assemblies, Control Rod Guide Tube Spacer Castings	Visual Examination (VT-3)
Main Steam	Main Stream Isolation Valve Machining of Valve Bore, Weld Build Up, and Final Machining (CV-2691 and 2692)	Magnetic Particle Examination (MT)

SYSTEM	WELD IDENTIFICATION	EXAMINATION TYPE
Main Feed	EBB-1-18” Field Weld 35	Radiography (RT)

The inspectors reviewed records for the following nondestructive examinations:

SYSTEM	WELD IDENTIFICATION	EXAMINATION TYPE
Reactor Vessel	Inlet Nozzle to Shell Weld at 150 Degrees	Ultrasonic

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 reviewed two indications that were previously examined, and observed whether the licensee evaluated and accepted the indications in accordance with the ASME Code and/or an NRC-approved alternative. The inspectors also reviewed the qualifications of technicians performing the inspections to determine whether they were current.

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

SYSTEM	WELD IDENTIFICATION	EXAMINATION TYPE
Main Steam	Main Stream Isolation Valve Machining of Valve Bore, Weld Build Up, and Final Machining (CV-2691 and CV-2692)	MT

b. Findings

No findings were identified.

.2 Vessel Upper Head Penetration Inspection Activities

a. Inspection Scope

No vessel upper head penetration inspection activities occurred during this outage.

b. Findings

No findings were identified.

.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 Procedure EN-DC-319, “Boric Acid Corrosion Control Program,” Revision 11. 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 50, Appendix B, requirements.

b. Findings

No findings were identified.

.4 Steam Generator Tube Inspection Activities

a. Inspection Scope

The inspectors reviewed the steam generator tube eddy current examination scope and expansion criteria to determine whether these criteria met technical specification requirements, Electric Power Research Institute (EPRI) guidelines, and commitments made to the NRC. The inspectors also reviewed whether the eddy current examination inspection scope included areas of degradations that were known to represent potential eddy current test challenges such as the top of tube sheet and tube support plates.

Steam Generator Inspection

- The inspectors verified that the number and sizes of steam generator tube flaws/degradation identified were consistent with the licensee's previous outage operational assessment predictions.

- The inspectors verified that steam generator eddy current examination scope and expansion criteria met technical specification requirements.

- The inspectors verified that eddy current probes and equipment configurations used to acquire data from the steam generator tubes were qualified to detect the known/expected types of steam generator tube degradation in accordance with Appendix H, "Performance Demonstration for Eddy Current Examination of EPRI Document 1013706."

The inspectors reviewed the licensee's identification of the following tube degradation mechanisms:

- Drilled tube support plate wear (broached tube support plate wear had previously been identified)

Tube Repair

The inspectors verified that the licensee implemented repair methods which were consistent with the repair processes allowed in the plant technical specification requirements and to determine if qualified depth sizing methods were applied to degraded tubes accepted for continued service.

b. Findings

No findings were identified.

.5 Identification and Resolution of Problems

a. Inspection Scope

The inspectors reviewed condition reports which dealt with inservice inspection activities and found the corrective actions were appropriate. From this review, the inspectors concluded that the licensee had 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 had an effective program for applying industry inservice inspection operating experience.

Inspectors were unable to observe reactor vessel baffle former bolt inspections that occurred during the refueling outage, however they discussed baffle former bolt inspection and related issues with the licensee's contractors onsite to perform reactor vessel internals inspections. Inspectors later discussed baffle former bolt inspection progress with the licensee and noted that all of the 864 baffle former bolts in Arkansas Nuclear One, Unit 1, were visually inspected with no issues. Ultrasonic testing of these bolts was in progress at the time; most had been inspected without issue. The design of Arkansas Nuclear One, Unit 1, is different from certain plants that have recently experienced baffle former bolt problems, and widespread failures of these components are not expected based on inspection results to date at Babcock and Wilcox plants.

b. Findings

No findings were identified.

.6 Underwater Laser Peening of Reactor Vessel Bottom Mounted Nozzle Penetrations

a. Inspection Scope

The inspectors reviewed underwater laser peening activities associated with the reactor vessel bottom mounted nozzles. This activity was undertaken as a preventive measure to mitigate primary water stress corrosion cracking of susceptible bottom mounted nozzles and J-groove welds. Surface peening of susceptible materials leaves a residual compressive stress in the metal and thereby eliminates one of the conditions needed to initiate primary water stress corrosion cracking. Peening activities were observed from inside containment and in the control station for the activity and were discussed with various members of licensee and vendor staff.

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

On December 28, 2016, the inspectors reviewed protective and caution tagging training received by Units 1 and 2 licensed operators. This sample was selected because the licensee did not perform any licensed operator requalification training during this quarter due to a significant expansion of the Unit 1 refueling outage. The inspectors assessed the training and program performance.

This activity 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 and risk. The inspectors observed the operators' performance of the following activities:

- October 17 and 19, 2016, Unit 2, emergency diesel generator A 24-hour test and fast start test
- December 12, 2016, Unit 1, reactor startup following refueling outage

In addition, the inspectors assessed the operators' adherence to plant procedures, including the conduct of operations procedure and other operations department policies.

These activities constituted completion of two quarterly licensed operator performance samples, 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 December 30, 2016, the inspectors reviewed the performance and condition of the Unit 1 emergency diesel generators air start system motor failures. The inspectors

reviewed the extent of condition of possible common cause for structures, systems, and component (SSC) 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 SSCs. 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 14, 2016, the inspectors reviewed the licensee's quality control activities through a review of the licensee's control of quality lubricants using the oil control program during maintenance, including commercial-grade dedication and whether quality control verifications were properly specified in accordance with the licensee's Quality Assurance Program.

These activities constituted completion of one quality control 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

On October 10, 2016, the inspectors reviewed a risk assessment performed by the licensee prior to changes in plant configuration and the risk management actions taken by the licensee in response to elevated risk for a heavy lift in the Unit 1 transformer yard to lift the manhole 3 cover.

The inspectors verified that this risk assessment was 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 assessment and verified that the licensee implemented appropriate risk management actions based on the result of the assessment.

These activities constituted completion of one maintenance risk assessments and emergent work control inspection sample, 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 three operability determinations and functionality assessments that the licensee performed for degraded or nonconforming SSCs:

- October 19, 2016, Unit 2, operability determination for late preventative maintenance of a vital feeder breaker
- November 2, 2016, Unit 2, functionality determination for startup transformer 2 operating in voltage reduction mode
- November 3, 2016, Unit 1, operability determination for emergency diesel generator B indicated load and voltage anomalies

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

The inspectors also reviewed operator actions taken or planned to compensate for degraded or nonconforming conditions. The inspectors verified that the licensee effectively managed these operator workarounds to prevent adverse effects on the function of mitigating systems and to minimize their impact on the operators' ability to implement abnormal and emergency operating procedures.

- October 3, 2016, Unit 1, operator work-arounds
- October 7, 2016, Unit 2, operator work-arounds

These activities constituted completion of five operability and functionality review samples, which included two operator work-around samples, as defined in Inspection Procedure 71111.15.

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19)

a. Inspection Scope

The inspectors reviewed nine post-maintenance testing activities that affected risk-significant SSCs:

- October 17, 2016, Unit 2, emergency diesel generator A 24-hour test following generator bearing replacement
- October 31, 2016, Unit 2, service water B sluice gate test following partial cable replacement and splicing
- November 7, 2016, Unit 1, reactor building cooling fan test following outage inspection and motor maintenance
- November 9, 2016, Unit 1, emergency cooling pond service water return isolation valve test following disassembly and inspection of valve internals
- November 13, 2016, Unit 1, emergency diesel generator A test following 12-year maintenance overhaul
- November 14, 2016, Unit 1, reactor coolant pump seal cooling water heat exchanger leak test to confirm leakage location into the intermediate cooling water system
- November 15, 2016, Unit 1, decay heat removal pump A full flow test following disassembly and inspection of pump internals
- November 16, 2016, Unit 2, service water B cross-connect valve and cable testing following permanent modification
- November 19, 2016, Unit 1, start up transformer 1 testing following maintenance and loss of phase detection modification

The inspectors reviewed licensing- and design-basis documents for the SSCs 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 SSCs.

These activities constituted completion of nine 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 Unit 1 refueling outage that concluded on December 13, 2016, and the Unit 2 unplanned outage that concluded on October 27, 2016, the inspectors continued to evaluate the licensee's outage activities, an inspection that began in the previous quarter. 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 and verification of the licensee's fatigue management activities
- Verification that the licensee maintained defense-in-depth during outage activities
- Observation and review of reduced-inventory
- Observation and review of fuel handling activities
- Monitoring of heat-up and startup activities

These activities constituted completion of two refueling outage samples (one refueling and one other), as defined in Inspection Procedure 71111.20.

b. Findings

.1 Failure to Properly Pre-plan Walkdown

Introduction. The inspectors documented a self-revealed, Green finding and associated non-cited violation of Unit 1 Technical Specification 5.4.1.a, for the failure to properly pre-plan and perform a pre-modification walkdown in the Unit 1 train A safety-related switchgear room so that the walkdown would not adversely affect the performance of the train. As a result, licensee personnel inadvertently de-energized the A3 switchgear and associated ac buses, which resulted in the loss of one train of spent fuel pool cooling.

Description. On November 3, 2016, an engineering contractor performed walkdowns in the Unit 1 safety-related A3 switchgear room in preparation for a circuit modification. An engineer opened the potential fuse drawer for the switchgear, which actuated the undervoltage relays and opened all of the supply breakers to the switchgear, inadvertently de-energizing the switchgear. Unit 1 was defueled at the time, so the Unit 1 spent fuel pool cooling system was cooling the offloaded core in addition to other spent fuel. The two trains of safety-related switchgear powered the two trains of spent fuel cooling system pumps. One train of spent fuel pool cooling lost power as a result of the human error and elevated the Unit 1 risk level from Green to Yellow. The redundant train continued to cool the spent fuel pool, so the pool temperature remained below limits, there was no level loss, and boron concentration remained unaffected. Subsequently, the licensee re-energized the switchgear and re-started the spent fuel pool cooling pump.

The personnel performing the walkdown had reviewed and signed on to a tagout for personnel and equipment protection because the A3 switchgear was energized. The engineer was briefed on which cabinet doors that could be opened and conditions in the room, but instead opened a different part of the switchgear. The engineer also failed to heed the warning label on the drawer, which indicated that opening the drawer would de-

energize the bus. Also, a supervisor who accompanied the engineer did not provide adequate oversight, in part because they did not realize the engineer was going to open the drawer. The licensee evaluated the human error and performed training on briefings and self-check human performance tools.

Analysis. The failure to perform a plant walkdown in a manner that did not impact safety-related switchgear is a performance deficiency. The performance deficiency is more than minor because it adversely affected the human performance attribute of the barrier integrity cornerstone and adversely affected the cornerstone objective to provide reasonable assurance that physical design barriers protect the public from radionuclide releases caused by accidents or events. Specifically, de-energizing the safety-related switchgear resulted in the loss of one train of spent fuel pool cooling and increase in risk level from Green to Yellow. The inspectors evaluated the finding with NRC Manual Chapter 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," dated June 19, 2012, Exhibit 3, "Barrier Integrity Screening Questions," because the appendix provides the most applicable guidance, regardless of whether the unit was at-power or shutdown. The inspectors determined that the finding screened as having very low safety significance (Green) because the finding did not cause the spent fuel pool to exceed the maximum analyzed temperature, did not damage fuel cladding, did not result in a loss of pool water inventory below the minimum analyzed level, and did not affect the pool neutron absorber or soluble boron concentration. The inspectors determined this finding has a cross-cutting aspect in the human performance area of H.12, Avoid Complacency, because the primary cause of the performance deficiency involved the failure to plan for the possibility of mistakes and use appropriate error reduction tools.

Enforcement. Unit 1 Technical Specification 5.4.1.a requires, in part, that written procedures shall be established, implemented, and maintained covering the applicable procedures recommended in Regulatory Guide 1.33, "Quality Assurance Program Requirements," Revision 2, Appendix A, February 1978. Regulatory Guide 1.33, Appendix A, Section 9.a, states, in part, that maintenance that can affect the performance of safety-related equipment should be properly pre-planned and performed in accordance with written procedures, documented instructions, or drawings appropriate to the circumstances. Contrary to the above, on November 3, 2016, the licensee failed to properly pre-plan and perform maintenance that can affect the performance of safety-related equipment in accordance with written procedures, documented instructions, or drawings appropriate to the circumstances. Specifically, the licensee failed to identify the intent to access interior portions of the switchgear, plan the administrative controls and manage the nuclear safety risks associated with the pre-modification walkdown, which resulted in adversely affecting the performance of the A3 switchgear by causing it to be deenergized by opening the potential fuse drawer, an activity that was not authorized by written instructions and not briefed in a manner appropriate to the circumstances. Operators restored spent fuel pool cooling, the licensee evaluated the human error and performed a training stand-down to ensure pre-job walkdowns did not impact plant equipment. Because this finding is of very low safety significance and was entered into the corrective action program as Condition Report CR-ANO-1-2016-04356, this violation is being treated as a non-cited violation, consistent with Section 2.3.2 of the NRC Enforcement Policy: NCV 05000313/2016004-01, "Failure to Pre-plan Walkdown to Avoid Impacting Safety Bus."

.2 Failure to Design Pipe Support for Vibration

Introduction. The inspectors documented a self-revealed, Green finding and associated non-cited violation of 10 CFR 50 Appendix B Criterion III for the licensee's failure to ensure that the decay heat removal (DHR) system drain piping configuration and supports could withstand vibrations created during low pressure and high flow conditions. As a result, a cracked weld and unisolable leak occurred due to high cycle fatigue caused by those conditions.

Description. The Unit 1 DHR system trains are cross-connected. The licensee installed four cavitating venturis in the injection and cross-connect lines to limit flow through any one DHR injection line while reactor coolant system pressure is low, such as during a large break loss of coolant accident. However, this design also results in cavitation during certain normal conditions during refueling outages, which was known by the licensee to cause DHR pipe vibrations.

On September 24, 2016, operators shut down Unit 1 to begin a scheduled refueling outage. With the reactor coolant system vented to containment, operators raised DHR flow to cool the reactor vessel to support maintenance scheduled for later in the outage. The high flow and low system pressure caused cavitation in the venturis and an increase in DHR piping vibrations. On September 29, 2016, while in lowered inventory in the reactor coolant system, the Unit 1 control room received a report of a 0.125 gallons per minute leak from a circumferential crack in a weld on a one inch DHR line containing Valve DH-1037, an isolation valve for a pressure instrument connected to the drain line. Operators determined that the leak affected both trains because it was in the cross-connected portion of the system, and was unisolable. The licensee declared both trains of the DHR system inoperable and reduced DHR flow to minimize vibration in the drain line. Operators complied with Technical Specification 3.9.5, Condition B, for two inoperable DHR loops. The operators immediately initiated actions to restore one DHR loop to operable status to operation and closed all containment penetrations providing direct access from the containment atmosphere to the outside atmosphere within four hours.

The licensee entered the issue into their corrective action program as Condition Report CR-ANO-1-2016-03225 and performed a root cause evaluation. The evaluation determined the cause of the crack in the weld to be vibration induced high cycle fatigue due to operating at high flow rate through the cavitating venturis during low pressure conditions, and inadequate piping support to the drain line.

Procedure OP-1104.004, "Decay Heat Removal Operating Procedure," Revision 123, contained "Limits and Precautions" stating, in part, that DHR flow rate should be limited to less than or equal to 2,000 gpm when the reactor coolant system is depressurized to limit vibrations, but may exceed 2,000 gpm to cool the core or to establish the desired cooldown rate. The "Limits and Precautions" did not state for how long flow rates above 2,000 gpm may be maintained. The licensee's review of their reactor operator licensing training program found that, although the 2,000 gpm limit is discussed during initial qualification, the DHR flow limits have not been a part of the biennial requalification training since 2010. From September 24, 2016, until the development of the leak on September 29, 2016, operators maintained an average DHR flow rate of 6,600 gpm to cool the core. The licensee identified that the procedural limitation of flow rate allowed

operators the flexibility to exceed 2,000 gpm without adequate guidance or monitoring of the pipes susceptible to fatigue failure to prevent pipe cracking.

Once operators recognized the leak, they reduced DHR system flow, which significantly reduced the vibrations and inhibited further propagation of the weld crack. The licensee performed an engineering evaluation that determined that if the circumferential crack propagated completely around the line, the failure would have resulted in an unisolable 97 gpm leak located on the discharge header of both trains of DHR, below the suction of the DHR system. If the line had instantaneously sheared at the leak location during lowered reactor coolant system inventory, the DHR system would have lost suction from the reactor coolant system (RCS) in 66 minutes due to the loss of water level and the core would have been uncovered in 159 minutes without operator action. The licensee identified two other DHR drain lines that were susceptible to this same vibration and resultant fatigue-induced cracking. The licensee inspected the welds and did not find any additional cracks.

The licensee determined that if a fatigue-induced weld crack developed during a large break loss of coolant accident, the DHR system would still deliver sufficient flow to cool the core, since this failure was bounded by the original design basis.

In their review of the events, the inspectors noted that, between 1979 and 1996, there have been six cases of fatigue-induced weld cracks in the DHR system piping due to excessive vibration. The licensee installed improved supports for vent and drain lines in the DHR system in an effort to reduce the effects of vibration on the lines. In November 1986, maintenance fitted valve DH-1037 and its DHR drain line with a new tie-back support in an attempt to address the recurring issue of fatigue-induced cracking due to vibration. However, engineering designed the support using seismic loading calculations instead of dynamic loading due to flow, and did not verify design adequacy by evaluating cyclic stresses caused by vibration measured during system operation. In September 1996, maintenance enhanced the socket weld for valve DH-1037 following the fatigue-induced cracking of another pipe weld in the DHR system. This shifted the point of highest cyclic stress somewhat, but did not eliminate the susceptibility to a high cycle fatigue failure.

Analysis. The failure to design the decay heat removal system piping to withstand expected vibrations from the system's cavitating venturis is a performance deficiency. The performance deficiency is more than minor because it was associated with the design control attribute of the initiating events cornerstone and adversely affected the cornerstone objective to limit the likelihood of events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Specifically, inadequate design of the DHR system piping support resulted in a leak that could have challenged the capability of both trains of the DHR system during shutdown operations on September 29, 2016. The inspectors performed an initial screening of the finding in accordance with NRC Inspection Manual Chapter (IMC) 0609, "Significance Determination Process," issued October 7, 2016, and were directed to IMC 0609, Appendix G, Attachment 1, "Shutdown Operations Significance Determination Process Phase 1 Screening and Characterization of Findings," since the finding pertained to a degraded condition while the plant was shut down. Using IMC 0609, Appendix G, Attachment 1, dated May 9, 2014, the inspectors determined that the finding required a Phase 2 evaluation. A senior reactor analyst performed a Phase 2 evaluation in

accordance with IMC 0609, Appendix G, Attachment 2, “Phase 2 Significance Determination Process Template for PWR during Shutdown,” dated February 28, 2005.

In the Phase 2 evaluation, the analyst assumed that the leakage up to the time of discovery was small and would not challenge functioning of the decay heat removal system. The licensee began filling the reactor coolant system approximately 20 hours after discovery of the leakage. The analyst also assumed that, had the leak gone undetected, additional time would have elapsed until the crack had grown to the point where leakage was substantial. Because of the configuration of the piping, an adjacent pipe hanger, and the location of the crack, leakage would have been limited to approximately 6 gallons per minute, which would have extended the time to core uncovery beyond the time where reactor coolant system flood-up would have begun and mitigated the event. With these assumptions, the analyst determined the significance of this issue to be of very low safety significance (Green).

The inspectors determined this finding did not have a cross-cutting aspect because the most significant contributor did not reflect current licensee performance. Specifically, the licensee last reviewed and modified the pipe support configuration in 1996.

Enforcement. Title 10 CFR Part 50, Appendix B, Criterion III, “Design Control”, states, in part, that for those structures, systems and components (SSCs) to which Appendix B applies, measures shall be established for the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of the SSCs. Contrary to the above, from November 1986 until November 2016, for piping and supports associated with the Unit 1 decay heat removal system to which 10 CFR Part 50, Appendix B applies, the licensee failed to select and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related function of the components. Specifically, the licensee failed to ensure that the safety-related piping supports near the DHR cavitating venturis were adequate to withstand the cyclic stresses created during high flow, low pressure conditions, and subsequently failed due to high cycle fatigue. To correct this issue, the licensee repaired the leaking weld and designed and installed a new piping support and piping configuration to reduce vibrations during the expected operating conditions. The licensee also planned to revise Procedure OP-1104.004, “Decay Heat Removal Operating Procedure,” to provide specific administrative guidance to minimize DHR system vibration, and was revising operator requalification training to include reasons for the DHR flow limits. Because this finding is of very low safety significance and was entered into the corrective action program as Condition Report CR-ANO-1-2016-03225, this violation is being treated as a non-cited violation, consistent with Section 2.3.2 of the NRC Enforcement Policy: NCV 05000313/2016004-02, "Failure to Design Pipe Support for Vibration."

1R22 Surveillance Testing (71111.22)

a. Inspection Scope

The inspectors observed seven risk-significant surveillance tests and reviewed test results to verify that these tests adequately demonstrated that the SSCs were capable of performing their safety functions:

In-service tests:

- November 15, 2016, Unit 1, decay heat pump A
- November 30, 2016, Unit 1, motor driven emergency feedwater pump

Containment isolation valve surveillance tests:

- December 2, 2016, Unit 1, equipment hatch local leak rate

Other surveillance tests:

- October 20, 2016, Unit 2, boric acid concentration for shutdown margin
- November 14, 2016, Unit 1, waste control operator rounds
- November 30, 2016, Unit 1, decay heat cooler service water valve CV-3822
- December 1, 2016, Unit 1, emergency diesel generator B

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 SSCs following troubleshooting and testing.

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

b. Findings

No findings were identified.

1EP6 Drill Evaluation (71114.06)

Emergency Preparedness Drill Observation

a. Inspection Scope

The inspectors observed an emergency preparedness drill on May 10, 2016, and reviewed the drill evaluation on December 16, 2016, to verify the adequacy and capability of the licensee's assessment of drill performance. The inspectors reviewed the drill scenario, observed the drill from the simulator, technical support center, and emergency operations facility, and attended the post-drill critique. The inspectors verified that the licensee's emergency classifications, off-site notifications, and protective action recommendations were appropriate and timely. The inspectors verified that any emergency preparedness weaknesses were appropriately identified by the licensee in the post-drill critique and entered into the corrective action program for resolution.

These activities constituted completion of one emergency preparedness drill observation training evolution observation sample, as defined in Inspection Procedure 71114.06.

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 walkdowns 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 walkdowns, 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 were in place, and electronic dosimeter dose and dose rate set points were adequate. 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 constituted 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 inspection procedure 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. Included in this review were Condition Reports CR-ANO-C-2016-03571 (Exposure to Non-Occupational Workers from Dry Fuel Storage) and CR-ANO-C-2016-02946 (Rad Monitor Flow Low During Containment Atmosphere Discharge).

These activities constituted completion of two of the five required samples of occupational ALARA planning and controls program, as defined in Inspection Procedure 71124.02.

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator Verification (71151)

.1 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 October 1, 2015, through September 30, 2016, 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 for Units 1 and 2, as defined in Inspection Procedure 71151.

b. Findings

No findings were identified.

.2 Mitigating Systems Performance Index: Cooling Water Support Systems (MS10)

a. Inspection Scope

The inspectors reviewed the licensee's mitigating system performance index data for the period of October 1, 2015, through September 30, 2016, 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 cooling water support systems for Unit 1 and 2 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 December 31, 2014, to September 30, 2016. 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 constituted 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 or gaseous effluent releases that occurred between December 31, 2014, and September 30, 2016, and were reported to the NRC 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 constituted verification of the radiological effluent technical specifications (RETS)/offsite dose calculation manual (ODCM) 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, self-assessments, 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. The inspectors also reviewed the licensee's progress in addressing the comprehensive recovery plan self-assessment results for the service water system.

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

b. Observations and Assessments

In NRC Inspection Report 05000313; 368/2016007, "Arkansas Nuclear One – NRC Supplemental Inspection Report," dated June 9, 2016 (ML16161B279), the NRC team identified concerns with degradation in the service water systems in both units and the effectiveness of the licensee's efforts to monitor and maintain the system. In response to the problems that the NRC team identified, the licensee committed to perform a service water system self-assessment, upgrade the service water chemical treatment system, and continue service water piping replacement, as documented in the June 17, 2016, Confirmatory Action Letter, EA-16-124 (ML16169A193). The NRC will inspect the licensee's final corrective actions in a future inspection to close out the confirmatory action letter commitment. For this inspection, the inspectors reviewed the licensee's efforts to correct these problems between the June 2016 team inspection and December 31, 2016.

The service water system developed additional leaks in safety-related piping after the inspection. After four leaks developed in the outside containment section of service water supply piping to the Unit 1 A containment cooling coils, the licensee replaced the piping during the Unit 1 refueling outage. The Unit 2 service water A strainer drain line developed a leak that required the licensee to remove the pump from service in order to repair. The Unit 2 room cooler for switchgear 2A-3 developed a leak that required replacing the cooler tube bundle. The Unit 2 service water piping developed a leak that required isolating service water flow to emergency diesel generator B to repair. In each example, the licensee determined that the leaks were caused by corrosion, most likely microbiologically induced corrosion.

On the nonsafety-related portions of service water, new leaks also developed. The Unit 1 intermediate cooling water heat exchanger developed a tube leak. Once the leaking tube was plugged, the licensee determined that the heat exchanger was almost to the tube plugging limit, indicating limited heat transfer margin remained. The Unit 2 main chillers have experienced ongoing tube leaks that could challenge long-term

reliability of the chillers due to moisture in the refrigerant.

On December 29, 2016, the inspectors performed a walkdown of the nonsafety-related portions of service water on both units. At that time, in addition to the above-mentioned leaks, the licensee had five active through-wall leaks in nonsafety-related piping and heat exchangers. The inspectors also noted approximately ten to twenty patches in nonsafety-related piping that stop the leakage, but did not correct the through-wall leaks. For example, the inspectors noted three patches in nonsafety-related service water piping in Unit 2 Corridor 2097, which contains several safety significant electrical distribution panels. One of the patched leaks was almost directly above panel 2RS1, which was a safety significant 120 volt ac distribution panel. The inspectors noted that the licensee installed the patch in 2014, but had deferred repair several times. The licensee was scheduled to replace the piping in October, 2017. The licensee currently recognizes the risk of the leaks and has talked about replacing the piping sooner in a Plant Health Committee meeting.

The licensee completed the service water system self-assessment, as committed to in the confirmatory action letter. In regards to corrosion, the self-assessment team recommended improving the material condition of the system by risk ranking service water piping and components, including susceptibility to corrosion, and then pursuing replacements or repairs based on the risk ranking. The team also recommended improving preventative treatments and inspections by upgrading the chemical injection system and improving piping inspection technology to allow inspections to predict wall corrosion prior to through-wall leaks. The inspectors concluded that the recommendations would address safety-related portions of the service water system, but that the licensee did not yet have a plan to holistically address nonsafety-related portions of raw water systems that could cause a plant transient, flooding, or damage safety-related equipment by spray.

The inspectors noted that the licensee had been implementing a reactive strategy that attempted to manage system degradation caused by corrosion. This strategy had not yet corrected the cause of ongoing degradation by improving chemical control, and did not include systematic non-destructive examination of susceptible components to identify the locations that are degraded. As a result, the licensee was not monitoring the areas of degradation to ensure that minimum wall thickness required by the design were maintained, and remained susceptible to pipe leaks that impacted the availability of safety related equipment, or could spray electrical equipment.

The NRC will continue to monitor the licensee's plans to address these conditions as they develop them following the service water self-assessment.

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 September 16, 2016, the Unit 2 emergency diesel generator A inboard generator bearing failed due to lack of lubrication. Maintenance personnel had unintentionally installed the bearing sight glass with the oil level scribe mark too low to provide adequate lubrication to the bearing.

  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. A performance deficiency associated with this issue was documented in NRC inspection report 05000368/2016011.

- On September 29, 2016, both trains of the Unit 1 Decay Heat Removal System were declared inoperable due to an unisolable leak from a socket weld inside containment. High shutdown cooling flow through cavitating venturis in the system caused a drain pipe to vibrate until a fatigue crack developed in a socket weld.

  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. A performance deficiency with this issue is documented in Section 1R20.2.

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

b. Findings

No findings were identified.

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

(Closed) LER 05000313/2016-004 Decay Heat Removal System Socket Weld Leak due to a Vibration-Induced Fatigue Crack

On September 29, 2016, during refueling outage 1R26 with both trains of Decay Heat Removal (DHR) in service, a 0.125 gpm leak was identified in the Unit 1 DHR system at a one-inch drain line. This leak was on a section of cross-connect piping shared by both trains of the DHR system, resulting in both trains of the DHR system being declared inoperable.

This licensee event report is closed.

See Section 1R20.2 of this inspection report for enforcement related to this event.

These activities constituted completion of one event follow-up sample as defined in Inspection Procedure 71153.

4OA5 Other Activities

.1 (Closed) Unresolved Item 05000313/2016007-17, and 05000368/2016007-17, Determine Impact of Modifying Fire Seals for Flood Protection

During a previous inspection, the NRC identified an unresolved item related to the licensee's ability to meet fire protection program requirements. Specifically, the team identified that the licensee had modified numerous fire-rated seals to also provide a flood protection barrier without ensuring existing fire protection requirements continued to be met. The licensee had added material that allowed the fire seals to also protect against flooding. The licensee could not produce documentation demonstrating that fire-rating testing or qualification testing had been performed for dual function seals using Promatec P12 and Polywater. This was documented in Condition Reports CR-ANO-C-2016-00490 and CR-ANO-C-2016-00658.

During this inspection, the inspector discussed the fire testing that the licensee performed in response to this issue with ANO fire protection personnel, reviewed the test report, and reviewed the calculation that accepted the test report. The inspector determined from review of the test report and the extensive number of photographs that the laboratory had established configurations that matched those installed at the facility. The test results demonstrated that the seals were qualified since they passed the heat and water test required by the applicable standards. Because the tested configurations passed, the inspector determined the performance deficiency was not more than minor. This failure to comply with fire protection program requirements in accordance with License Condition 2.C.(8) for Unit 1 and License Condition 2.C(3)(b) for Unit 2 constitutes a minor violation that is not subject to enforcement action in accordance with the NRC's Enforcement Policy. This unresolved item is closed.

.2 (Closed) Unresolved Item 05000313/2013009-002, and 05000368/2013009-002, Failure to Maintain Adequate Staffing for Operators to Perform a Simultaneous Alternative Shutdown of Both Units and Staff the Fire Brigade

During a previous inspection, the NRC documented an unresolved item related to the failure to implement and maintain in effect all provisions of the approved fire protection program as defined by License Conditions 2.C.(8) for Unit 1 and 2.C.(3)(b) for Unit 2. Specifically, the licensee failed to maintain adequate staffing for operators to perform a simultaneous alternative shutdown of both units and staff the fire brigade. Both license conditions have since been amended to allow the units to transition to risk-informed, performance-based fire protection programs. The licensee identified this issue during the development of the new fire protection programs and documented it in Condition Report CR-ANO-C-2006-00048, Corrective Action 36.

During this inspection, the inspector reviewed applicable sections of the safety evaluations performed during approval of the license amendment requests for transition to risk-informed, performance-based fire protection programs (Amendment Number 256 to Renewed Facility Operating License Number DPR-51 (Unit 1) and Amendment Number 300 to Renewed Facility Operating License Number NPF-6 (Unit 2)). The inspector also reviewed related requests for additional information and the licensee's

responses. The control rooms for both units are in a single fire area. Under the previous fire protection programs, a fire was assumed to damage circuits throughout the fire area. Detailed evaluations of fires in the control rooms developed for the current fire protection programs demonstrated that a fire in the control room of one unit would not result in circuit damage in the other unit's control room. These results support the licensee's approach of performing an alternative shutdown for the unit with the fire (required to assume circuit damage) and a remote shutdown for other unit (not required to assume circuit damage). The licensee's response to fires requiring abandonment for both control rooms due to a fire in either of the control rooms and the required staffing levels were found to be acceptable. Based on these evaluations of control room fires performed for the current fire protection programs, the inspector determined the performance deficiency under the previous fire protection programs was minor because all of the questions associated with IMC 0612, Appendix B, "Issue Screening," Block 3, were answered "no." This failure to comply with fire protection program requirements in accordance with License Condition 2.C.(8) for Unit 1 and License Condition 2.C(3)(b) for Unit 2 constitutes a minor violation that is not subject to enforcement action in accordance with the NRC's Enforcement Policy. This unresolved item is closed.

4OA6 Meetings, Including Exit

Exit Meeting Summary

On October 7, 2016, the inspectors presented the radiation safety inspection results to Mr. R. Anderson, 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 17, 2016, the inspectors presented the fire seal inspection results to Ms. S. Pyle, Manager, Regulatory Assurance, and other members of the licensee staff. The licensee acknowledged the issues presented. The inspectors returned and/or destroyed the proprietary information reviewed.

On October 20, 2016, the inspectors presented the Unit 1 inservice inspection results to Mr. R. Anderson, Site Vice President, and other members of the licensee staff. The licensee acknowledged the issues presented. The inspectors returned and/or destroyed the proprietary information reviewed.

On November 2, 2016, the inspectors presented the fire protection alternative shutdown inspection results to Ms. S. Pyle, Manager, Regulatory Assurance, and other members of the licensee staff. The licensee acknowledged the issues presented. No proprietary information was reviewed.

On January 12, 2017, the inspectors presented the resident inspection results to Mr. R. Anderson, 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.

4OA7 Licensee-Identified Violations

The following violations of very low safety significance (Green) were identified by the licensee and are violations of NRC requirements, which meet the criteria of the NRC Enforcement Policy for being dispositioned as non-cited violations:

- The licensee identified that the Unit 1 emergency diesel generator governors were left in droop mode at all times, so that during a loss of offsite power the speed and frequency of the EDGs would decrease as loading increased and cause a reduction in speed and capability from safety-related motors. The licensee determined that some EDG-powered safety-related motors would not have been capable of providing the required flow rate for a short period of time, but this did not prevent them from performing their safety function.

  Title 10 CFR Part 50, Appendix B, Criterion V, “Instruction, Procedures, & Drawings,” states, in part, that activities affecting quality shall be prescribed by procedures of a type appropriate to the circumstance. Contrary to the above, as of November 2, 2016, the procedure for Unit 1 EDG operations, an activity affecting quality, was not appropriate to the circumstance. Specifically, Procedure OP-1104.036, “Emergency Diesel Generator Operation,” Revision 74, did not state to set the speed droop settings for both ‘A’ and ‘B’ EDGs to zero when not load sharing with another power source and did not specify this as a requirement for the EDGs when in an emergency standby condition. The licensee immediately set the speed droop settings for both EDGs to zero and changed the procedure. The licensee documented the issue in their corrective action program as Condition Report CR-ANO-1-2016-04333.

  Using NRC Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process (SDP) For Findings At-Power,” dated June 19, 2012, the inspectors determined the finding to be of very low safety significance (Green) because the deficiency did not result in a loss of a safety function.

- During the fall 2016 Unit 1 refueling outage, the licensee foreign object search and retrieval (FOSAR) inspections in the steam generator bowls and reactor vessel identified a number of foreign objects, including an 8-inch metal rod. Discussions with the licensee indicated that some of the debris constituted foreign material that should have been prevented from being introduced into the RCS by the foreign material exclusion program. The inspectors concluded that the foreign material was most likely introduced during the previous refueling outage.

  During the prior operating cycle, the licensee’s chemistry sampling identified increased RCS activity, and subsequent fuel bundle examinations of fuel removed from the core identified wear marks through the cladding of two adjacent fuel pins. The fuel assembly with the damage was not placed back into the RCS. Since there was no evidence of broken components inside the RCS, the licensee concluded that the most likely cause was the introduction of foreign material. While it was not possible to determine whether any of the foreign material had actually caused the fuel damage, the inspectors concluded that the licensee had failed to control foreign material and prevent it from entering the RCS.

  Title 10 CFR Part 50, Appendix B, Criterion V, “Instructions, Procedures, and Drawings,” requires, in part, that activities affecting quality shall be accomplished in accordance with documented instructions, procedures, or drawings of a type appropriate to the circumstances. Licensee Procedure EN-MA-118, “Foreign Material Exclusion,” Revision 10,

an Appendix B quality-related procedure, provides instructions for controlling foreign material. Procedure EN-MA-118, Step 5.5, requires, in part, that all material and tools that were introduced to the FME zone are accounted for. Contrary to the above, between January 25, and March 1, 2015, the licensee failed to ensure that all material and tools that were introduced to the FME zone were accounted for. Specifically, the licensee failed to maintain adequate FME control, leading to two damaged cladding pins and slightly elevated dose rates in the RCS piping, as well as another piece of metallic FME in the vessel, as documented in CR-ANO-1-2016-03340. This issue was documented in the licensee's corrective action program under CR-ANO-1-2016-03521. Corrective actions taken include a search for the foreign material and permanent removal of the fuel assembly from the core.

Prior to 2012, the NRC's Significance Determination Process in IMC 0609, Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings," contained guidance to screen all more than minor performance deficiencies affecting fuel barriers to very low safety significance. The inspection manual chapters were restructured in 2012, and the screening was inadvertently omitted, though the NRC was in the process of reinstating that same guidance. Therefore, after consultation with the Office of Nuclear Reactor Regulation, the inspectors determined that this finding is of very low safety significance (Green).

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

R. Anderson, Site Vice President
D. Bice, Senior Specialist, Licensing
P. Butler, Design and Program Engineering Manager
R. Carey, Manager, Emergency Preparedness
T. Chernivec, Outage Manager
C. Couser, Fire Protection Engineer
B. Davis, Engineering Director
G. Doran, Specialist, Radiation Protection
T. Evans, General Manager of Plant Operations
C. Heinzen, Engineer, Fire Protection
D. James, Director, Regulatory Affairs and Recovery
B. Lynch, Manager, Radiation Protection
N. Mosher, Licensing Specialist, Regulatory Assurance
J. Mott, Engineer, Fire Protection
D. Pehrson, Unit 1 Assistant Operations Manager
S. Pyle, Manager, Regulatory Assurance
F. Shewmake, Unit 2 Assistant Operations Manager
B. Short, Senior Licensing Specialist
G. Sullins, Regulatory and Performance Improvement Director
C. Walker, Supervisor, Engineering Programs
T. Whisler, ALARA Supervisor, Radiation Protection

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000313/2016004-01	NCV	Failure to Pre-plan Walkdown to Avoid Impacting Safety Bus (Section 1R20.1)
05000313/2016004-02	NCV	Failure to Design Pipe Support for Vibration (Section 1R20.2)

Closed

05000313/2016-004	LER	Decay Heat Removal System Socket Weld Leak Due to a Vibration-Induced Fatigue Crack (Section 4OA3)
05000313/2016007-17 05000368/2016007-17	URI	Determine Impact of Modifying Fire Seals for Flood Protection (Section 4OA5.1)
05000313/2013009-02 05000368/2013009-02	URI	Failure to Maintain Adequate Staffing for Operators to Perform a Simultaneous Alternative Shutdown of Both Units and Staff the Fire Brigade (Section 4OA5.2)

LIST OF DOCUMENTS REVIEWED

Section 1R01: Adverse Weather Protection

Procedures

Number	Title	Revision
1104.039	Plant Heating and Cold Weather Operations	000
2104.029	Service Water System Operations	000
2106.032	Unit Two Freeze Protection Guide	026
1203.025	Natural Emergencies	060
EN-FAP-EP-010	Severe Weather Response	003

Condition Reports (CRs)

CR-ANO-C-2016-02700	CR-ANO-C-2016-04254	CR-ANO-2-2015-03831
CR-ANO-C-2016-03458	CR-ANO-1-2015-03049	CR-ANO-2-2015-04052
CR-ANO-C-2016-03709	CR-ANO-1-2015-03079	CR-ANO-2-2016-02069
CR-ANO-C-2016-03983	CR-ANO-1-2015-03797	CR-ANO-2-2016-03638
CR-ANO-1-2016-03954	CR-ANO-2-2016-03896	

Work Orders (WOs)

52653228 52653566

Section 1R04: Equipment Alignment

Procedures

Number	Title	Revision
1104.006	Spent Fuel Cooling System	063
2106.006	Emergency Feedwater System Operations	093
1107.001	Electrical System Operations	112
1015.033	ANO Switchyard and Transformer Yard Controls	028

Drawings

Number	Title	Revision
M-235, Sh. 1	Piping & Instrument Diagram Spent Fuel Cooling System	071
M-2204, Sh. 4	Piping & Instrument Diagram Emergency Feedwater	070
E-1, Sh. 1	Station Single Line Diagram	059

Condition Reports (CRs)

CR-ANO-C-2011-02498	CR-ANO-2-2006-02147	CR-ANO-2-2006-02680
CR-ANO-2-2004-00499	CR-ANO-C-2016-03769	

Work Orders (WOs)

254160	296176

Section 1R05: Fire Protection

Procedures

Number	Title	Revision
1003.014	ANO Fire Protection Program	008
1A-372-99-M	North Switchgear Room	006
2A-372-2101-AA	North Switchgear (2A3) Room	004
2A-372-2103-V	West Battery Room	004
2A-372-2076-HH	Electrical Equipment (MG Set) Room	004
2A-372-2081-HH	Lower North Piping Penetration Room	004
2A-372-2081-HH	Upper North Piping Penetration Room	004
1B-ADD-32-K	Reactor Building (North Side)	004
1B-ADD-33-K	Reactor Building (South Side)	004

Condition Reports (CRs)

CR-ANO-C-201604456	CR-ANO-2-2016-03900	CR-ANO-1-2016-03915
CR-ANO-2-2008-01134	CD-ANO-2-2009-00412	CR-ANO-2-2016-03974

Engineering Changes

Number	Title	Revision
41466	Alternate Forced Ventilation System for ANO-1 Battery, DC and Switchgear Areas when VCH-4A/B is Out of Service – Short Term Modifications	000
ANOC-FP-09-00003	Fire Protection Evaluation of Units 1 & 2 HELB Doors	000

Fire Impairments

334	353	1815
416	1824	412
2353	2415	4685
4912		

Miscellaneous

Number	Title	Revision
PFP-U1	Unit 1 Pre-Fire Plans	019
PFP-U2	Unit 2 Pre-Fire Plans	015
	Fire Hazard Analysis	017

Section 1R06: Flood Protection Measures

Work Orders (WOs)

523931 360149

Drawings

Number	Title	Revision
E-613 Sh 1	Underground Conduit and Grounding Transformer Yard Area	15
C-51 Sh 1	Electrical Manholes and Transformer Foundation Details	15

Section 1R07: Heat Sink Performance

Procedure

Number	Title	Revision
2311.008	EDG Heat Exchanger Performance Test	009

Work Order (WO)

52498955

Miscellaneous

Number	Title	Revision Date
0CAN109205	Revised Approach for Compliance to GN 89-13 SW	October 30, 1992
CALC-91-D-2003-01	EDG Capacity Ratings	008
EC-54127	A Review of the U1/U2 EDG Thermal Performance Testing Frequencies	December 18, 2014

Section 1R08: Inservice Inspection Activities

Procedures

Number	Title	Revision Date
54-ISI-364-007	Remote Underwater Visual Examination of Reactor Pressure Vessel Internals and Components in PWRs	August 19, 2013
SI-UT-175	Procedure for Encoded Phased Array Ultrasonic Examination of Dissimilar Metal Piping Welds	001
EN-DC-319	Boric Acid Corrosion Control Program (BACCP)	011
5120.524	ANO1 Steam Generator Analysis Procedure	003
CEP-NDE-0497	Manual Ultrasonic Examination of Welds in Vessels (Non-App. VIII)	005
CEP-NDE-0731	Magnetic Particle Examination (MT) for ASME Section XI	005
SEP-WP-ANO1-001	Welding and Inspection Requirements for Unit 1 Piping/Tubing Systems	001
EN-DC-328	Entergy Nuclear Welding Program	004
CEP-WP-RBMD-1	Repair of Base Metal Defects	001
SEP-ISI-ANO1-101	Program Section for ASME Section XI, Division 1 ANO 1 Inservice Inspection Program	002
SEP-BAC-ANO-001	Boric Acid Corrosion Control Program Inspection and Identification of Boric Acid Leaks for ANO-1 and ANO-2	002
CEP-NDE-0504	Ultrasonic Examination of Small Bore Piping for Thermal Fatigue Damage	004
1104.004	Decay Heat Removal Operating Procedure	121

Condition Reports (CRs)

CR-ANO-1-2016-03225	CR-ANO-1-2016-03511	CR-ANO-1-1987-00008
CR-ANO-1-2016-01095	CR-ANO-1-2016-01096	CR-ANO-1-2016-02779
CR-ANO-1-2015-02238	CR-ANO-1-2015-01937	CR-ANO-1-2015-01897
CR-ANO-1-2015-01870	CR-ANO-1-2015-04053	CR-ANO-1-2015-01950
CR-ANO-1-2016-03363	CR-ANO-1-2016-03362	CR-ANO-1-2016-03361
CR-ANO-1-2016-03159	CR-ANO-1-2016-03158	CR-ANO-1-2016-03157
CR-ANO-1-2016-03067	CR-ANO-1-2016-03035	CR-ANO-1-2016-03038
CR-ANO-1-2016-02999	CR-ANO-1-2016-03001	CR-ANO-1-2016-02997
CR-ANO-1-2016-02991	CR-ANO-1-2016-02988	CR-ANO-1-2016-03002
CR-ANO-1-2016-02984	CR-ANO-1-2016-03006	CR-ANO-1-2016-02920
CR-ANO-1-2016-03899	CR-ANO-1-1996-00391	CR-ANO-1-2016-01301
CR-ANO-1-2015-01874	CR-ANO-1-2015-01871	CR-ANO-1-2016-03156
CR-ANO-C-2016-04023	CR-ANO-1-2014-01170	CR-ANO-1-2016-03032
CR-ANO-1-2016-03360	CR-ANO-1-2016-03359	CR-ANO-1-2016-02996
CR-ANO-1-2016-03010	CR-ANO-1-2016-03007	CR-ANO-1-2016-03155
CR-ANO-1-2016-02966	CR-ANO-1-2016-03044	CR-ANO-1-2016-03030
CR-ANO-1-2016-02778	CR-ANO-1-2015-02483	CR-ANO-1-2016-03005

Work Orders (WOs)

430697	430698	350205	423877	415043
363866	363931	413802		

Miscellaneous

Number	Title	Revision Date
77-9050153-005	ANO-1 EOTSG-A Operability Evaluation	September 21, 2009
51-9202959	ANO 1R24 Tie Rod Bow Operability Assessment	January 30, 2014
CALC ANO1-ME-15-00012	Qualification Test Report for Underwater Laser Peening (ULP) of ANO 1 Reactor Vessel Bottom Mounted Nozzles	000

Miscellaneous

Number	Title	Revision Date
EC 63775	MRS-SSP-3346 Laser Peening of Bottom Mounted Nozzles at ANO 1	1.2
EC 57793	Laser Peening of the ANO-1 RV Bottom Mounted Instrument Nozzles	000
CALC 86-E-0074-180	ANO Unit 1 Bottom Mounted Instrumentation Nozzle Stress Evaluation	000
CALC-ANO1-ME-15-00010	Technical Basis for Underwater Laser Peening of ANO 1 Bottom Mounted Instrumentation Nozzles	000
1CAN051502	Inservice Inspection Summary Report for the Twenty-Fifth Refueling Outage (1R25)	May 28, 2015
N/A	Entergy Operations Incorporated Arkansas Nuclear One, Unit 1, 1R26 Outage Reactor Vessel Internals Remote Visual Examination 10-Year ISI and MRP 227 Visual Inspection Plan	August 1, 2016
51-9260487-000	Arkansas Nuclear One 1R26 Steam Generator Eddy Current Exam Technique Site Validation	March 10, 2016
WDI-PJF-1316681-EPP-001	Arkansas Nuclear One Nuclear Power Plant Unit 1 2016 – Reactor Vessel 10-Year Examinations	000
M-230	P & ID Reactor Coolant System	120
1-HF21 MN/MC-GTAW	Hardfacing Overlay Welding Procedure Specification	002
M-297	Reactor Coolant Piping Arrangement Elevation	002
MIE-006	Reactor Coolant Piping Arrangement Plan	008
CALC-86-E-0074-314	Section III Code Evaluation of Pressurizer 3” Safety Valve Nozzle PSV-001 with Weld Overlay Repair (Including Excavation)	001
51-9263393-000	ANO-1 Condition Monitoring and Preliminary Operational Assessment for 1R26.	November 10, 2016

Section 1R11: Licensed Operator Requalification Program and Licensed Operator Performance

Procedures

Number	Title	Revision
EN-OP-115	Conduct of Operations	017

Procedures

Number	Title	Revision
EN-OP-102	Protective and Caution Tagging	018

Condition Reports (CRs)

CR-ANO-C-2016-02780	CR-ANO-C-2015-04090	CR-ANO-2-2012-00564

Section 1R12: Maintenance Effectiveness

Procedures

Number	Title	Revision
EN-DC-306	Acceptance of Commercial-Grade Items/Services in Safety-Related Applications	005
EN-DC-310	Predictive Maintenance Program	007
EN-MP-120	Material Receipt	010
EN-MP-125	Control of Material	010
SEP-LUB-ANO-001	ANO Lubrication Program	003
SEP-LUB-ANO-001	ANO Oil Analysis Program	003

Condition Reports (CRs)

CR-ANO-C-2016-02700	CR-ANO-C-2016-03458	CR-ANO-C-2016-04254
CR-ANO-C-2016-04305	CR-ANO-C-2016-04306	CR-ANO-1-2016-02522
CR-ANO-1-2016-05727	CR-ANO-1-2016-05724	CR-ANO-1-2016-05716
CR-ANO-1-2016-04677	CR-ANO-1-216-04635	CR-ANO-1-2016-04457

Miscellaneous

Number	Title	Revision Date
	Purchase Order 10437274	
	QC Inspection Receipt 51487 of Purchase Order 10437274	
EPRI NP-5652 and TR-102260	Plant Engineering: Guideline for the Acceptance of Commercial-Grade Items in Nuclear Safety-Related Applications	001
NUPIC Audit 24014	ExxonMobil Lubricants & Petroleum Specialties	December 16, 2015

Section 1R13: Maintenance Risk Assessments and Emergent Work Control

Procedures

Number	Title	Revision Date
COPD-024	Risk Assessment Guidelines	062

Miscellaneous

EC-22975	EC-20923	EC-67301

Work Orders (WOs)

360149

Section 1R15: Operability Determinations and Functionality Assessments

Procedures

Number	Title	Revision
EN-FAP-OP-021	Critical Decision Procedure	005
2107.001	Electrical System Operations	119
2202.008	Station Blackout	013
2202.010	Standard Attachments	023

Condition Reports (CRs)

CR-ANO-2-2016-03602	CR-ANO-1-2016-04100	CR-ANO-1-2016-04183

Work Orders (WOs)

52571962	52465659	51085434	81052443	379148

Miscellaneous

Number	Title	Revision
CALC-11-E-0006-01	ANO-2 Start-Up 2 Fast and Manual Transfer Capability	000
E-35, Sh. 1	Schematic Meter & Relay Diagram, 4160V System	028

Section 1R19: Post-Maintenance Testing

Procedures

Number	Title	Revision
2104.036	Emergency Diesel Generator Operations	090
E-3001	Cable Repair Procedures	000
1305.007	RB Isolation and Miscellaneous Valve Stroke Test	044
1104.036	Emergency Diesel Generator Operation	073
1107.001	Electrical System Operations	112
1104.004	Decay Heat Removal Operating Procedure	123
1402.004	Decay Heat Removal Pump P-34A/B Maintenance	020

Condition Reports (CRs)

CR-ANO-2-2016-03984	CR-ANO-1-2015-02032	CR-ANO-1-2016-04628
CR-ANO-1-2016-04716	CR-ANO-1-2016-04301	CR-ANO-1-2016-04471
CR-ANO-1-2016-04479	CR-ANO-1-2016-4500	

Work Orders (WOs)

456512	459425	428945	52509411

Miscellaneous

Number	Title	Revision Date
LD-16-177	RCP Seal Cooling Water Heat Exchanger Inspection Report for Arkansas Nuclear One Unit #1	October 28, 2016
ECT-67756-01	Post Modification Testing for Service Water Pumps 2P-4C / 2P-4B Discharge Crossover Valve 2CV-1422-2	000
CALC-88-0098-20	ANO-1 DBA Reanalysis	002

Section 1R20: Refueling and Other Outage Activities

Procedures

Number	Title	Revision
1103.018	Maintenance of RCS Water Level	023
1104.004	Decay Heat Removal Operating Procedure	123

Condition Reports (CRs)

CR-ANO-1-2016-03225	CR-ANO-1-1996-00391	CR-ANO-1-2004-01481
CR-ANO-1-2002-01147	CR-ANO-1-2016-04356	CR-ANO-1-2015-02532
CR-ANO-1-2016-03521		

Drawing

Number	Title	Revision
M-230, Sh. 1	Reactor Coolant System	120

Miscellaneous

Number	Title	Revision
CALC-92-E-0077-03	ANO-1 LPI System Pump Performance Requirements	000
CALC-92-E-0077-08	Maximum LPI Flow from the RB Sump	000
CALC-95-E-0095-02	Recirculation Mode Requirements for the LPI System	000

Section 1R22: Surveillance Testing

Procedures

Number	Title	Revision
2102.001	Plant Pre-Heatup and Pre-Critical Checklist	086
1106.006	Emergency Feedwater Pump Operation	098
1104.036, Supp. 2	DG2 Monthly Test	074
1015.003A	Unit 1 Operations Logs	093

Drawings

Number	Title	Revision
M-204, Sh. 3	Emergency Feedwater	034
M-204, Sh. 5	Emergency Feedwater	018
M-212, Sh. 2	Demin. Water Distribution	063
E-283, Sh. 2A	Service Water to Decay Heat Pump Cooler E35, 6A valve CV3822	004

Condition Reports (CRs)

CR-ANO-1-2016-04716	CR-ANO-1-2016-05001	

Maintenance Documents

52665425	52665441	462150

Section 1EP6: Drill Evaluation

Procedures

Number	Title	Revision
1903.011	Emergency Response / Notification	049

Condition Reports (CRs)

CR-ANO-C-2016-02107

Section 2RS1: Radiological Hazard Assessment and Exposure Controls

Procedures

Number	Title	Revision
1104.020	Clean Waste System Operation	059
EN-RP-100	Radiation Worker Expectations	010
EN-RP-101	Access Control for Radiologically Controlled Areas	011
EN-RP-105	Radiological Work Permits	014
EN-RP-121	Radioactive Material Control	012
EN-RP-131	Air Sampling	015
EN-RP-143	Source Control	012
EN-RP-201	Dosimetry Administration	004
EN-RP-202	Personnel Monitoring	010
EN-RP-210	Area Monitoring Program	000
EN-RP-308	Operation and Calibration of Gamma Scintillation Tool Monitors	008

Condition Reports (CRs)

CR-ANO-1-2015-00542	CR-ANO-1-2015-00773	CR-ANO-1-2015-00932
CR-ANO-1-2015-01338	CR-ANO-2-2015-02312	CR-ANO-C-2015-03012
CR-ANO-C-2015-04078	CR-ANO-2-2015-04435	CR-ANO-2-2015-04337
CR-ANO-2-2015-04483	CR-ANO-2-2015-04494	CR-ANO-2-2016-00453
CR-ANO-C-2016-00459	CR-ANO-2-2016-00968	CR-ANO-1-2016-02562
CR-ANO-C-2016-03571		

Radiological Work Permits

Number	Title	Revision
20151412	1R25 Locked High Radiation Area Activities	002
20151450	ISI and Alloy 600 Inspections (excluding RVCH)	002
20151454	MOV Inspection Activities in LHRAs	001
20152430	2R24 Refueling Path Activities	001
20161001	Radiation Protection Activities Unit 1	000
20161401	Radiation Protection Activities During 1R26 (Bulk Work)	000
20161420	Scaffold Installation/Removal – 1R26 (non-LHRAs)	000
20161430	Refueling Activities, Including Remove/Replace Reactor Vessel Closure Head, Plennum, Rad Cal, D-Rings, Detension & Tension Studs	000
20162301	Radiation Protection Activities Unit 2 (Forced Outage)	000

Radiological Surveys

Number	Title	Date
ANO-1502-0337	U1 Letdown Heath Exchanger Room – Coverage for Mechanics Disassembling CV-1213	February 4, 2015
ANO-1609-0627	U1 Reactor Building – 335’ General Area	September 24, 2016
ANO-1609-0673	U1 Reactor Building – 335’ General Area	September 24, 2016
ANO-1609-1035	U2 Reactor Building – 335’ General Area	September 28, 2016
ANO-1609-1066	U2 Reactor Building – 381’ – 389’ South Cavity	September 28, 2016
ANO-1610-0170	U1 Reactor Building – 393’ South Cavity	October 2, 2016

Air Sample Surveys

Number	Title	Date
ANO-2016-02803	F-3A Spent Filter Disposal into Filter Liner	September 17, 2016
ANO-2016-02804	Tritium Tube – New Radwaste Building	September 19, 2016
ANO-2016-02805	F-3B Filter Change – Reactor Building 10 – 335’	September 19, 2016
ANO-2016-02806	BWST Area T-12 Entry – Reactor Building – 354’	September 20, 2016
ANO-2016-02807	Spent Filter Disposal – New Radwaste Building	September 21, 2016

Audits, Self-Assessments, and Surveillances

Number	Title	Date
QA-14/15-2015-ANO-01	Radwaste/Radiation Protection Audit	September 14, 2015
QA-14/15-2015-Site-01	Radwaste/Radiation Protection Audit	September 14, 2015
	ANO 2015 Annual Radiation Protection Report	May 12, 2016
LO-ALO-2016-00036	HEPA and Vacuum Control	June 21, 2016
LO-ALO-2016-00037	Control of Satellite Radiologically Controlled Areas	July 26, 2016

Miscellaneous

Number	Title	Date
371318001	Dry Active Waste Smears Isotopic Analysis	April 1, 2015
371318002	U-1 Secondary Resin Isotopic Analysis	March 31, 2015
391066001	Dry Active Waste Smears Isotopic Analysis	October 13, 2015
391066003	F-4 Filter Isotopic Analysis	January 22, 2016
	NSTS Annual Inventory Reconciliation Report	January 12, 2016

Miscellaneous

Number	Title	Date
	Sealed Source Leak Test Results – Unit 1	February 22, 2016
ANO-2016-0013	2015 Radiation Energy Distribution Evaluation	March 23, 2016
ANO-2016-00065	Annual Inventory of the Miscellaneous Material in the ANO Spent Fuel Pools	August 30, 2016

Section 2RS2: Occupational ALARA Planning and Controls

Procedures

Number	Title	Revision
EN-RP-105	Radiation Work Permits	014
EN-RP-110-05	ALARA Planning and Controls	002
EN-RP-123	Radiological Controls for Highly Radioactive Objects	001
EN-RP-504	Breathing Air	003
1104.033	Reactor Building Ventilation	077
1203.012I	Annunciator H10 Corrective Action	055
1601.307	Unit 1 Off- Normal Operations	015
1604.051	Eberline Radiation Monitoring System	032
1604.051A	Unit 1 SPING Monitor Log	032
1604.051D	Calculating Channel 5 High Alarm Set Points Based on Activity	032
1604.051E	Determining Set Points for Gaseous Releases	032

Condition Reports (CRs)

CR-ANO-1-2016-02946	CR-ANO-1-2016-03332	CR-ANO-2-2015-04435
CR-ANO-1-2015-00932	CR-ANO-1-2015-01338	CR-ANO-2-2015-02312
CR-ANO-1-2015-00773	CR-ANO-1-2015-00542	CR-ANO-2-2015-04494
CR-ANO-1-2016-02970	CR-ANO-1-2016-03290	CR-ANO-2-2015-04457
CR-ANO-1-2016-03306	CR-ANO-1-2016-03231	CR-ANO-1-2016-02969
CR-ANO-C-2015-03907	CR-ANO-C-2015-00411	CR-ANO-2-2015-03096
CR-ANO-C-2015-01891	CR-ANO-C-2015-03027	CR-ANO-C-2016-00236
CR-ANO-C-2015-03012	CR-ANO-C-2016-00459	CR-ANO-2-2015-03814
CR-ANO-C-2015-04078	CR-ANO-C-2016-00968	CR-ANO-1-2016-02994
CR-ANO-1-2016-02737	CR-ANO-1-2016-02998	CR-ANO-1-2016-03345
CR-ANO-1-2016-03339		

Radiation Work Permits

Number	Title	Revision
20151412	1R25 Locked High Radiation Area Activities	000
20151450	ISI and Alloy 600 Inspections (excluding RVCH)	002
20151454	MOV and AOV Maintenance and Testing 1R25	001
20152430	2R24 Refueling Path Activities	001
20152432	Defuel and Refuel the Reactor	000
20152471	Perform Inspections of the U2 Reactor Vessel Closure Head (RVCH)	002
20161401	Radiation Protection Activities	000
20161420	Scaffold Installation / Removal 1R26 (Non- LHRA)	000
20161430	Refueling Activities Including Remove / replace Reactor Vessel Closure Head, Plenum, Rad Cal, O-Rings, Detension and Tension Studs	001
20161432	Defuel and Refuel the Reactor (1R26)	000
20161433	Remove and Replace In-core Detectors	000
20162301	Radiation Protection Activities – Forced Outage	000

Miscellaneous

Number	Title	Revision Date
STM-1-48	System Training Manual – Compressed Air Systems	016

Miscellaneous

Number	Title	Revision Date
STM-2-48	System Training Manual – Instrument Air	015
1GR2016-0056	Gas Release Permit	September 25, 2016
1GR2016-0057	Gas Release Permit	September 25, 2016
1R26	Outage Work Schedule	October 4, 2016
	Laboratory Reports Compressed Air / Gas Quality Testing	August 9, 2016
	Off Site Dose Calculation Manual	026
	Selected Station Logs for Operations, Radiation Protection, and the Outage Control Center	1R26
EC0000005808	Modification to Isolate Circuits Causing EMI/RFI between RI-4830 (PRMS) and SPING 1 (RX-9820)	November 17, 2008
	Station ALARA Committee Presentation	October 5, 2016
	RP Training Presentation and Core Barrel Removal Video	1995

Section 4OA1: Performance Indicator Verification

Procedures

Number	Title	Revision
EN-FAP-OM-005	Nuclear Performance Indicator Program	003
EN-LI-123-12-ANO-RC	Comprehensive Recovery Plan Performance Metrics	003

Section 4OA2: Problem Identification and Resolution

Miscellaneous

Number	Title	Revision
TD C470.0090	Instruction for Two Bearing Spherical Roller Oil Lubricated Alternators	000

Condition Reports (CRs)

CR-ANO-2-2016-03307	CR-ANO-2-2016-03327	CR-ANO-2-2016-03384
CR-ANO-2-2013-00012	CR-ANO-2-2014-00506	CR-ANO-C-2015-04876
CR-ANO-C-2015-04877	CR-ANO-C-2016-03413	CR-ANO-1-2016-01793
CR-ANO-1-2016-02087	CR-ANO-1-2016-04836	CR-ANO-2-2016-02835
CR-ANO-2-2016-02844	CR-ANO-2-2016-03986	CR-ANO-2-2016-04263

Work Orders (WOs)

52620361	52656389	356569	52590333	379058

Section 4OA3: Follow-up of Events and Notices of Enforcement Discretion

Procedures

Number	Title	Revision
1103.018	Maintenance of RCS Water Level	023
1104.004	Decay Heat Removal Operating Procedure	123

Condition Reports (CRs)

CR-ANO-1-2016-03225	CR-ANO-1-1996-00391	CR-ANO-1-2004-01481
CR-ANO-1-2002-01147		

Drawing

Number	Title	Revision
M-230, Sh. 1	Reactor Coolant System	120

Miscellaneous

Number	Title	Revision
CALC-92-E-0077-03	ANO-1 LPI System Pump Performance Requirements	000
CALC-92-E-0077-08	Maximum LPI Flow from the RB Sump	000
CALC-95-E-0095-02	Recirculation Mode Requirements for the LPI System	000

Section 4OA5: Other Activities

Condition Reports (CRs)

CR-ANO-C-2016-00490	CR-ANO-C-2016-00658

Miscellaneous

Number	Title	Revision Date
CALC-ANOC-FP-14-00003	Promatec HDSE Fire and Flood Penetration Seals	002
102539564SAT-002	Test Report for Various Firestop Systems in 23 Penetrations Through 12" Thick Concrete Deck	June 30, 2016
NRC Letter to Entergy Operations, Inc. (ML16223A481)	Arkansas Nuclear One, Unit 1 - Issuance of Amendment Regarding Transition to a Risk-Informed, Performance-Based Fire Protection Program In Accordance With 10 CFR 50.48(c) (CAC NO. MF3419)	October 7, 2016
NRC Letter to Entergy Operations, Inc. (ML15091A461)	Arkansas Nuclear One, Unit No. 1 - Request for Additional Information Regarding License Amendment Request to Adopt National Fire Protection Association Standard 805 (TAC No. MF3419)	May 5, 2015
Entergy Operations, Inc., Letter to NRC (ML15139A196)	Response to Request for Additional Information, Adoption of National Fire Protection Association Standard NFPA-805, Arkansas Nuclear One, Unit 1, Docket No. 50-313, License No. DPR-51	May 19, 2015
Entergy Operations, Inc., Letter to NRC (ML15203A205)	90-Day Response to Request for Additional Information, Adoption of National Fire Protection Association Standard NFPA-805, Arkansas Nuclear One, Unit 1, Docket No. 50-313, License No. DPR-51	July 21, 2015
NRC Letter to Entergy Operations, Inc. (ML14356A227)	Arkansas Nuclear One, Unit No. 2 – Issuance of Amendment Regarding Transition to a Risk-Informed, Performance-Based Fire Protection Program In Accordance With 10 CFR 50.48(c) (TAC NO. MF0404)	February 18, 2015
NRC Letter to Entergy Operations, Inc. (ML13235A005)	Arkansas Nuclear One, Unit 2 - Request for Additional Information Regarding Adoption of National Fire Protection Association Standard NFPA-805 (TAC No. MF0404)	September 11, 2013
Entergy Operations, Inc., Letter to NRC (ML13338A432)	Response to Request for Additional Information - Adoption of National Fire Protection Association Standard NFPA-805, Arkansas Nuclear One, Unit 2, Docket No. 50-368, License No. NPF-6	December 4, 2013

Section 4OA7: Licensee-Identified Violations

Condition Reports (CRs)

CR-ANO-1-2015-02532 CR-ANO-1-2016-04333

Miscellaneous

Number	Title	Revision
EN-MA-118	Foreign Material Exclusion	010
OP-1104.036	Emergency Diesel Generator Operation	074
0062-0172-RPT-001	Arkansas Nuclear One (ANO) Unit 1 Past Operability Evaluation – Effect of EDG Generator Output Frequency Droop Setting	0

The following items are requested for the
Occupational Radiation Safety Inspection
at Arkansas One
October 3 – 7, 2016
Integrated Report 2016004

Inspection areas are listed in the attachments below.

Please provide the requested information on or before **September 16, 2016**.

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 the lead inspector, Marty Phalen at (817) 200-1158 or Martin.Phalen@nrc.gov, or you may reach out to Natasha Greene at (817) 200-1154 or Natasha.Greene@nrc.gov, or Shawn Money at (817) 200-1466 or Shawn.Money@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: **February 2, 2015**

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 date of last inspection, related to this inspection area

D. Procedure indexes for the radiation protection procedures

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. Radiation Protection Program Description
2. Radiation Protection Conduct of Operations
3. Personnel Dosimetry Program
4. Posting of Radiological Areas
5. High Radiation Area Controls
6. RCA Access Controls and Radworker Instructions
7. Conduct of Radiological Surveys
8. Radioactive Source Inventory and Control
9. Declared Pregnant Worker Program

F. List of corrective action documents (including corporate and subtiered systems) since date of last inspection
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.

If not covered above, a summary of corrective action documents since date of last inspection involving unmonitored releases, unplanned releases, or releases in which any dose limit or administrative dose limit was exceeded (for Public Radiation Safety Performance Indicator verification in accordance with IP 71151)

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
a. All radioactive sources that are required to be leak tested
b. All radioactive sources that meet the 10 CFR Part 20, Appendix E, Category 2, and above threshold. 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 radioactive sources inventoried and required to be leak tested. If applicable, specifically provide a list of all radioactive source(s) that have failed its leak test within the last two years

K. A current listing of any non-fuel items stored within your pools and, if available, their appropriate dose rates (Contact / @ 30cm)

L. Computer printout of radiological controlled area entries greater than 100 millirems since the previous inspection to the current inspection entrance date. The printout 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 setpoint 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: **June 22, 2015**

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 date of last inspection, 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 Committee
3. Radiation Work Permit Preparation

F. A summary list of corrective action documents (including corporate and subtiered systems) written since date of last inspection, related to the ALARA program. In addition to ALARA, the summary should also address Radiation Work Permit violations, Electronic Dosimeter Alarms, and 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
Include original dose estimate and actual dose.

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.