



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**

REGION IV  
1600 E. LAMAR BLVD.  
ARLINGTON, TX 76011-4511

March 28, 2014

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

**SUBJECT: ARKANSAS NUCLEAR ONE, UNIT 1 – NRC POST-APPROVAL LICENSE  
RENEWAL INSPECTION REPORT 05000313/2014007**

Dear Mr. Browning:

On March 12, 2014, the U.S. Nuclear Regulatory Commission (NRC) completed a Post-Approval Site Inspection for License Renewal at the Arkansas Nuclear One, Unit 1 facility. The enclosed report documents the inspection results, which were discussed on January 31, 2014, with you and other members of your staff. The team discussed the revised inspection results on March 12, 2014, with Mr. J. McCoy, Director, Engineering and other members of your staff.

The team reviewed selected procedures and records, observed activities, and interviewed personnel.

NRC inspectors documented one finding of very low safety significance (Green) in this report. This finding involved a violation of NRC requirements. The NRC is treating this violation as a non-cited violation consistent with Section 2.3.2.a of the Enforcement Policy.

If you contest the violation or significance of this non-cited violation, 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 the 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 the Arkansas Nuclear One.

J. Browning

- 2 -

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

John L. Dixon, Jr. Acting Chief  
Engineering Branch 2  
Division of Reactor Safety

Docket: 50-313  
License: DPR-51

cc w/enclosure:  
Attachment: Supplemental Information

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**U.S. NUCLEAR REGULATORY COMMISSION**

**REGION IV**

Docket: 05000313

License: DPR-51

Report: 05000313/2014007

Applicant: Entergy Operations, Inc.

Facility: Arkansas Nuclear One, Unit 1

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

Dates: January 13 to March 12, 2014

Inspectors: G. Pick, Senior Reactor Inspector, Engineering Branch 2 (Team Leader)  
S. Graves, Senior Reactor Inspector, Engineering Branch 2  
S. Makor, Reactor Inspector, Engineering Branch 2  
M. Williams, Reactor Inspector, Engineering Branch 1

Approved By: J. Dixon, Jr., Acting Chief  
Engineering Branch 2  
Division of Reactor Safety

## SUMMARY OF FINDINGS

IR 05000313/2014007; 01/13/2014 – 03/12/2014; Arkansas Nuclear One, Unit 1, Post-Approval Site Inspection for License Renewal

The report covers an inspection conducted by regional inspectors in accordance with the NRC Manual Chapter 2515 and the NRC Inspection Procedure 71003. One Green finding of very low safety significance is documented in this report, which involved a violation of NRC requirements. 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." The cross-cutting aspect is determined using Inspection Manual Chapter 0310, "Aspects within the Cross-Cutting Areas." Violations of NRC requirements are dispositioned in accordance with the NRC's Enforcement Policy. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

### A. NRC-Identified Findings and Self-Revealing Findings

Cornerstone: Barrier Integrity

- Green. The team identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," for failure to follow procedures related to review of indications that could affect the structural integrity of the Unit 2 reactor building. Specifically, the licensee failed to perform a subsequent visual inspection of concrete cracks that exceeded acceptable criteria in the previous 5-year inspection as specified in Procedure CEP-CII-004, "General and Detailed Visual Examinations of Concrete Containments," Revision 306. The corrective actions included verifying that the indications did not structurally affect the reactor building in these instances, initiating Condition Report C-2014-00597, and scheduling the affected areas for review during the upcoming 5-year inspection.

The team determined that the failure to assess previous indications of concrete degradation, as specified in plant procedures, was a performance deficiency. The team considered the finding more than minor because, if left uncorrected, the finding would have the potential to lead to a more significant safety concern. Specifically, failure to track the growth of existing cracks on the reactor building could allow degradation to continue to the point of affecting the structural integrity. In accordance with Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," dated June 19, 2012, Exhibit 3, "Barrier Integrity Screening Questions," the issue screened as having very low safety significance (Green) because it did not involve an actual open pathway in the physical integrity of the containment, loss of containment isolation, or reduction in heat removal capability and it did not affect hydrogen igniters. The team determined that this finding had a human performance cross cutting aspect in the area of work management. The licensee did not implement a process of planning, controlling, and executing work activities such that nuclear safety was the overriding priority [H.5] (Section 4OA5.02.b.3).

**B. Licensee-Identified Violations**

None

## REPORT DETAILS

### 4. OTHER ACTIVITIES (OA)

#### 4OA5 Other Activities Post-Approval Site Inspection for License Renewal (71003)

##### Phase 2 Inspection Activities

The team performed the Phase 2 Inspection activities prior to, and within 6 months of the period of extended operation. The period of extended operation is the additional 20 years beyond the original 40-year licensed term. The period of extended operation for Arkansas Nuclear One, Unit 1 begins after midnight on May 20, 2014.

The team evaluated whether the licensee: (1) completed actions required to comply with the license renewal license condition and commitments; (2) implemented the aging management programs that agreed with those approved in the safety evaluation report and described in the safety analysis report; (3) followed the guidance in Nuclear Energy Institute (NEI) 99-04, "Guidelines for Managing NRC Commitment Changes," for changing license renewal commitments and followed the guidance in 10 CFR 50.59 when making changes to the license renewal supplement; (4) identified, evaluated, and incorporated "newly identified" structures, systems, and components into their aging management programs; and (5) implemented operating experience review and corrective action programs that account for aging effects.

During this inspection, the team reviewed 54 of the 57 commitments and closed 49 commitments. The NRC had previously closed three commitments and three aging management programs during the Phase 1 inspection documented in NRC Inspection Report 05000313/2013008 [ML13164A107]. The team did not close Commitments 17850, 17851, 17855, 17872, and 17875. The licensee created new Commitment 19358 to track resolution of the evaluations related to the reactor coolant pump cover. The team reviewed 52 aging management programs and 4 time-limited aging analyses.

In addition, NUREG-1743, "Safety Evaluation Report (SER) Related to the License Renewal of Arkansas Nuclear One, Unit 1," did not have an Appendix A that listed the items NRC considered commitments. Consequently, a Senior Project Manager in the Division of License Renewal issued a memorandum to file entitled, "Commitment Lists for Renewed Operating License (ROL) Plants with No Commitment Appendix Attached to Its ROL Safety Evaluation Reports/NUREGs for Use with IP 71003," dated March 6, 2007, Attachment 1.3, Arkansas Nuclear One, Unit 1 that documented 11 commitments [ML070640041]. The team verified that the licensee had captured these commitments. The team closed eight of these commitments and three commitments remain open.

.01 New Aging Management Programs

a. Inspection Scope

The team evaluated whether the licensee met the commitments and established aging management programs that effectively implemented activities to control the effects of aging. The team compared the commitments and aging management programs to the program descriptions in the safety analysis report supplement and in NUREG-1743.

The team reviewed supporting documents including implementing procedures, work orders, inspection reports, engineering evaluations, and condition reports; and visually inspected structures, systems, and components, as needed. The team evaluated whether the licensee completed the necessary actions to comply with the license conditions stipulated in the renewed facility operating license. The team interviewed the program owners for each program and other licensee personnel to evaluate whether the licensee completed the necessary actions to meet the commitments specified in the safety evaluation report.

The team reviewed nine new aging management programs.

Specific open and closed commitments and specific documents reviewed are listed in the report attachment.

b. Findings and Observations

1. 16.1.1 Buried Pipe Inspection Program (17827)

The Buried Pipe Inspection Program aging management program managed the effects of aging caused by loss of material resulting from corrosion of the external piping surface. The licensee included the service water and diesel fuel oil systems in this program. The licensee performed visual inspections on this piping whenever an excavation uncovered safety-related portions of the piping.

The team reviewed the safety analysis report supplement, program basis documents, implementing procedures and preventative maintenance tasks, license renewal documents, and the safety evaluation report. The team reviewed the results of previous opportunistic inspections, risk-ranking documentation, system health reports for the buried piping program and the cathodic protection system, and the corrective action documents. The team interviewed the program owner and discussed the program health and plans for future inspections based on the risk-ranking results.

Procedure EN-DC-343, "Underground Piping and Tanks Inspection and Monitoring Program," Revision 0, specified the requirements necessary to manage the effects of aging on underground piping and tanks. The program encompassed all buried piping, including piping within the scope of license renewal. Procedure EN-EP-S-002-MULTI, "Underground Piping and Tanks General Visual Inspection," Revision 1, provided the acceptance criteria for the inspections of buried piping coated and uncoated surfaces. Procedure CEP-UPT-0100, "Underground Piping and Tanks Inspection and Monitoring," Revision 1, implemented the guidelines described in NEI 09-14, "Guideline for the



Management of Underground Piping and Tank Integrity,” Revision 1. This procedure also provided direction on risk ranking and segmenting piping systems, and inspection priorities and intervals. The team determined that the licensee had implemented the industry initiative related to risk ranking and scheduling pipe excavations for their buried piping.

While reviewing the risk ranking documents the team identified that the licensee had identified several pipe lines as unknown segments. The program owner determined that some lines within the corrosion risk model database did not have correct line designations. The team verified this was a labeling issue that did not affect the risk ranking of the lines. The licensee entered this issue into the corrective action program as Condition Report 2014-00092.

Based upon review of the Buried Pipe Inspection Program aging management program, the team concluded the licensee implemented actions to effectively manage the effects of aging during the period of extended operation. The team concluded that the licensee met Commitment 17827 prior to the period of extended operation. The team determined that the licensee met Commitment 1 to create a Buried Pipe Inspection Program aging management program as described in a letter to file, Attachment 1.3, Arkansas Nuclear One, Unit 1 [ML070640041].

## 2. 16.1.2 Electrical Components Inspection Program (17874)

The licensee divided the Electrical Component Inspection Program aging management program into three independent subprograms that included:

- Non-Environmentally Qualified Sensitive Instrumentation Circuits
- Non-Environmentally Qualified Inaccessible Medium-Voltage Cables & Manholes
- Non-Environmentally Qualified Insulated Cables and Connections Program

The subprograms managed the effects of aging on cables and connectors caused by: corrosion of connector pins used in impedance-sensitive circuits; change in material properties of connectors and cable splices subject to aging-related stressors; loosening of bolted bus bar connections and reduced insulation and insulator resistance; elevated temperatures in the local areas or caused by the current being carried in cables, wet environments, or corrosive chemicals. The subprograms included inspections of splices, connectors, and cables within the scope of license renewal located in areas conducive to accelerated aging.

The team reviewed program documents, implementing procedures, work orders, license renewal documents, safety analysis report, safety evaluation report, and plant modifications. The team interviewed the program owners and reviewed inspection records. The team walked down manholes and metal enclosed bus ducting to assess material conditions and program effectiveness. The licensee implemented the Electrical Component Inspection Program using the guidance in Procedures EN-DC-346, “Cable Reliability Program,” Revision 6, and EN-DC-348, “Non-EQ Insulated Cables and Connections Inspection,” Revision 5. The team confirmed the licensee performed baseline walk downs and inspections in 2011.

The team confirmed that the licensee had not committed to developing an aging management program for their non-segregated metal-enclosed buses. However, the team determined that the licensee performed preventive maintenance on their metal-enclosed buses. The team verified that the maintenance activities managed the effects of aging caused by loosening of bolted bus bar connections and reduced insulation and insulator resistance on non-segregated bus ducts. The team determined that these activities implemented the same activities recommended in NUREG-1801, "Generic Aging Lessons Learned (GALL) Report," Revision 2, Section XI.E4, "Metal-Enclosed Bus." The team determined that the licensee had performed an aging management review and assessed managing aging effects on their metal-enclosed buses as documented in Engineering Report CALC-ANO1-EE-11-00001, "ANO-1 Screening and Aging Management Review of Electrical Components for RIS 2007-016," Revision 0.

The team determined that the licensee had performed aging management reviews of the electrical components that included reviews for the aging management programs and comparison to the guidelines included in the GALL Report, Revision 0. The team evaluated each subprogram individually as discussed below.

a. Non-Environmentally Qualified Sensitive Instrumentation Circuits

The team confirmed this subprogram managed the effects of aging caused by corrosion of connectors. Engineering Report CALC-ANO1-EE-11-00004, "Non-EQ Sensitive Instrumentation Circuits Test Review," Revision 0, demonstrated the licensee had satisfactorily completed evaluation of the non-environmentally qualified control circuits related to main steam isolation valves, emergency feedwater turbine speed, and the decay heat supply to the makeup pump. The licensee included impedance sensitive, high voltage, low-level signals including nuclear instrumentation, and acoustic monitoring systems as part of their aging management review.

The team verified that Procedure EN-FAP-LR-027, "License Renewal Sensitive Instrumentation Circuits Review Aging Management Program," Revision 1, provided the guidelines to evaluate nuclear instrumentation source range detector connectors and the pressurizer relief valve acoustic monitor connectors as part of this aging management program. The team confirmed that the licensee completed an appropriate quantitative evaluation of test records instead of visual inspection, as allowed by GALL Report, Section XI.E2, "Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits."

Letter 1CAN011405, "Notification of Revised License Renewal Commitments," dated January 30, 2014, revised Commitment 17874 to allow using quantitative data such as performing the review of calibration and test data for the impedance sensitive instrumentation circuits instead of visual inspections. Since the licensee implemented a method to manage the effects of aging allowed by the GALL Report, the team identified no concerns with this commitment change or the activities implemented by the licensee.

b. Non-Environmentally Qualified Inaccessible Medium-Voltage Cables and Manholes

The team confirmed this subprogram managed the effects of aging caused by wetting of inaccessible medium and low voltage cables and connections located in manholes. Engineering Report CALC-ANO1-EE-13-00005, "Non-EQ Inaccessible Medium-Voltage Cable and Manhole Review," Revision 0, demonstrated that the licensee had inspected and evaluated the condition of these components. Procedure EN-DC-346 established the testing and evaluation requirements for monitoring the insulation condition of underground medium and low voltage power cables and provided guidance on manhole inspections and dewatering.

The team determined that the licensee had replaced their in-scope inaccessible medium voltage cables prior to entering the period of extended operation. The licensee conducted Tan Delta testing on the in-scope cables prior to entering the period of extended operation with acceptable results. The licensee established a test frequency of at least once every 6 years during the period of extended operation to identify potential cable insulation degradation.

c. Non-Environmentally Qualified Insulated Cables and Connections Program

The team confirmed this subprogram managed the effects of aging resulting from adverse localized environments caused by temperature, radiation, or moisture. Engineering Report CALC-ANO1-EE-11-00003, "Cable and Connection Inspection Summary Report," Revision 0, demonstrated the licensee had inspected and evaluated the condition of these components. Procedure EN-DC-348 prescribed the requirements for the licensee to walk down the plant areas and evaluate the effects on the accessible portions of the cables and connections subject to aging management review.

Based upon review of Electrical Components Inspection Program aging management program, the team concluded the licensee implemented actions to effectively manage the effects of aging during the period of extended operation. The team concluded that the licensee met Commitment 17874 prior to the period of extended operation. The team determined that the licensee met Commitment 2 to create electrical aging management programs as described in a letter to file, Attachment 1.3, Arkansas Nuclear One, Unit 1 [ML070640041].

3. 16.1.3 Heat Exchanger Monitoring Program (17864)

The Heat Exchanger Monitoring Program aging management program managed the effects of aging caused by cracking and loss of material that could result in degradation in the seismic qualification of the heat exchangers. The licensee performed periodic inspections to manage the effects of aging. The program included the following heat exchangers: reactor building coolers, emergency diesel generator jacket cooling water heat exchangers, make-up pump lube oil coolers, make-up pump room coolers, decay heat room coolers, decay heat system heat exchangers, electrical room chillers and coolers, control room chillers and coolers, emergency feedwater system heat exchangers, and chilled water condensers and evaporators.

The team reviewed program documents, implementing procedures, license renewal documents, safety analysis report, safety evaluation report, and records. The licensee established Procedure SEP-HX-ANO-001, "ANO Heat Exchanger Program," Revision 0, that listed implementing procedures and the license renewal commitments; however, the document had no information regarding the components included in the program or the type of tests (e.g., thermal performance or eddy current) required for each heat exchanger. The licensee indicated that they had implemented their program using preventive maintenance tasks.

The team verified that the preventive maintenance activities implemented the requirements specified in their response to Generic Letter 89-13, "Service Water System Problems Affecting Safety-Related Equipment," dated July 18, 1989. The team determined that the licensee provided sufficient details in individual preventive maintenance tasks that specified the work activities implementing the license renewal commitments.

Based on review of the actions implemented related to the Heat Exchanger Monitoring Program aging management program, the team concluded the licensee implemented actions to effectively manage the effects of aging during the period of extended operation. The team concluded that the licensee met Commitment 17864 prior to the period of extended operation. The team determined that the licensee met Commitment 3 to create a Heat Exchanger Monitoring Program aging management program as described in a letter to file, Attachment 1.3, Arkansas Nuclear One, Unit 1 [ML070640041].

#### 4. 16.1.4 Pressurizer Examinations Program (17848)

The Pressurizer Examinations Program aging management program managed the effects of aging caused by cracking and loss of material. Specifically, the program managed aging effects that could result from cracking of pressurizer cladding and attachments created by thermal fatigue or loss of underlying ferritic steel base metal and cracking of the heater bundle structural welds that connect the heater sheaths to the diaphragm plates. The Pressurizer Examinations Program required examination of the pressurizer cladding and the pressurizer heater penetration welds.

The team reviewed the safety analysis report, license renewal documents, implementing procedures, program documents, and safety evaluation report. The team interviewed the program owner and reviewed inspection records. The team determined that the safety evaluation report allowed the licensee to credit examination of the heater sheath-to-diaphragm plate penetration welds inside the pressurizer for the pressurizer heaters at Oconee if completed prior to the Arkansas Nuclear One, Unit 1, pressurizer inspection.

The team verified that the licensee performed nondestructive examinations of pressurizer items most susceptible to thermal fatigue to assure that cracking of cladding had not extended into the base metal of the pressurizer. The team verified that the licensee included examinations as part of their Inservice Inspection program, which requires inspections during the period of extended operation.

Letter 1CAN011405 revised the commitment to credit an Alloy 600 heater bundle inspection performed at Three Mile Island, Unit 1, in 2003 instead of Oconee Nuclear Station, Unit 1, as described in the safety evaluation report. From review of BAW 2244A, "Demonstration of the Management of the Aging Effects for the Pressurizer," dated December 1997, the team confirmed that both the Three Mile Island and Oconee Nuclear Station heater bundles were fabricated from the same Alloy 82/182 material. Because this material was more susceptible to primary water stress corrosion cracking than stainless steel, the team determined that inspections at either facility would bound the condition of the welds at Arkansas Nuclear One, Unit 1, since the licensee had stainless steel sheathed heaters. The team identified no concerns with this commitment change.

From review of the Three Mile Island heater bundle inspection report, the team confirmed that the completed examination included three more penetrant surface examinations than the licensee had committed and performed VT-3 examinations of the remaining 20 heater sheath-to-diaphragm plate penetration welds. The examination identified no recordable indications or evidence of primary water stress corrosion cracking in the diaphragm plate-to-heater sleeve and heater sleeve-to-heater sheath J-groove welds.

Based on review of the actions implemented related to the Pressurizer Examinations Program aging management program, the team concluded the licensee implemented actions to effectively manage the effects of aging during the period of extended operation. The team concluded that the licensee met Commitment 17848 prior to the period of extended operation. The team determined that the licensee met Commitment 4 to conduct pressurizer examinations as described in a letter to file, Attachment 1.3, Arkansas Nuclear One, Unit 1 [ML070640041].

5. 16.1.5 Reactor Vessel Internals Program (17851)

The Reactor Vessel Internals Program aging management program managed the following aging effects: stress corrosion cracking and irradiation assisted stress corrosion cracking, reduction of fracture toughness by thermal embrittlement and irradiation embrittlement, dimensional changes created by void swelling, and loss of bolted closure integrity because of stress relaxation. This aging management program assured that the aging effects would not result in loss of the intended functions of the reactor vessel internals during the period of extended operation. The licensee was required to submit their inspection plans prior to entering and begin the inspections during the period of extended operation.

The team reviewed the license renewal application, safety evaluation report, safety analysis report, license renewal documents, program documents, reviewed the commitments implementation review document, procedures, work instructions, and interviewed the program owner. At the time of the license extension for Arkansas Nuclear One, Unit 1, the research related to aging mechanisms and management of these mechanisms for reactor vessel internals had just begun. The team determined that the licensee remained aware of industry activities as described in the safety evaluation report and planned to submit their aging management program and inspection plans prior to entering the period of extended operation.

The licensee planned to implement the applicable requirements of Electric Power Research Institute (EPRI) MRP-227A, "Materials Reliability Program: Pressurized Water Reactor Internals Inspection and Evaluation Guidelines," dated December 2011, as their method for managing the effects of aging of the reactor vessel internals. The team confirmed that EPRI MRP-227A managed the same aging effects of concern as described in the licensing documentation. The licensee had developed but had not issued Procedure EN-DC-133, "PWR Vessel Internals Program," Revision 0, that described the implementation of the reactor vessel internals inspections that EPRI MRP-227A described as "Mandatory" or "Needed" across the Entergy Fleet. The licensee established their inspection program in Report 1200459.401, "PWR Internals Aging Management Program Plan for Arkansas Nuclear One, Unit 1," Revision 0. The licensee planned to submit their reactor vessel internals aging management program for review just prior to entering the period of extended operation to allow for the most accurate possible submittal. The licensee tracked their submittal of the Reactor Vessel Internals Program aging management program to the NRC by LR-LAR-2010-00176, Corrective Action 204.

The team reviewed completed examinations of the reactor vessel internals that included visual inspections required by the American Society of Mechanical Engineers (ASME) Section XI. The inspections included volumetric and visual examination of the core barrel bolts. The team verified that the licensee demonstrated sufficient bolt pre-load even though 5 of the 108 lower core barrel bolts had indications in the bolt head to shank region. The licensee could not replace the bolts because of interference created by the shock pads prevented access.

Based on review of the actions implemented related to the Reactor Vessel Internals Program aging management program, the team could not conclude that the licensee implemented actions that would effectively manage the effects of aging during the period of extended operation. Because the licensee had not completed all their planned actions related to this aging management program, the team determined that they could not close Commitment 17851 during this inspection. The team determined that the licensee had not met Commitment 5 to develop a Reactor Vessel Internals Program aging management program as described in a letter to file, Attachment 1.3, Arkansas Nuclear One, Unit 1 [ML070640041]. The team will review implementation of this commitment during the Phase 3 inspection.

6. 16.1.6 Spent Fuel Pool Monitoring Program (17831)

The Spent Fuel Pool Monitoring Program aging management program managed the effects of aging caused by stress corrosion cracking from the external weld heat-affected zones of the spent fuel pool liner. The licensee periodically monitored the spent fuel pool drains to detect leakage from the spent fuel pool liner.

The team reviewed the safety analysis report supplement, program basis documents, implementing procedures and preventative maintenance tasks, structural drawings for the spent fuel pool and drains, license renewal application, and safety evaluation report. The team interviewed the program owners and reviewed inspection records and work orders. The team determined that Procedure OP-1104.006, "Spent Fuel Cooling

System,” Supplement 3, specified the criteria and provided guidance to perform the liner leak checks. Although the licensee committed to performing quarterly leak checks, the team determined that the licensee evaluated the liner leakage every 28 days.

Based upon review of the to the Spent Fuel Monitoring Program aging management program, the team concluded the licensee implemented actions to effectively manage the effects of aging during the period of extended operation. The team concluded that the licensee met Commitment 17831 prior to the period of extended operation. The team determined that the licensee met Commitment 6 to develop a Spent Fuel Monitoring Program aging management program as described in a letter to file, Attachment 1.3, Arkansas Nuclear One, Unit 1 [ML070640041].

7. 16.1.7 Wall Thinning Inspection Program (17855)

The Wall Thinning Inspection Program aging management program managed the effects of aging caused by loss of material. Corrosion of the internal surfaces of carbon steel piping and components caused the loss of material. The licensee evaluated whether the wall thickness remained above the minimum required to avoid leaks or failures under normal conditions and postulated transient and accident conditions, including seismic events. The Wall Thinning Inspection Program included the following systems and components: emergency feedwater pump casing and carbon steel discharge piping and valves; emergency feedwater steam supply components downstream of the steam admission valves; emergency feedwater steam exhaust piping and valves; emergency feedwater carbon steel cooling water, seal water, and instrument piping and valves; emergency feedwater turbine lube oil cooler; carbon steel emergency feedwater supply header piping and valves (condensate supply); sodium hydroxide tank; carbon steel piping and components of the main steam system; and carbon steel components of Penetrations 11, 42, 43, 48, 49, 51, 52, 54, 58, 59, 60, 62, and 64.

The team reviewed the license renewal application, safety evaluation report, safety analysis report, license renewal documents, procedures, work instructions, and corrective action documents. The team interviewed the program owner and reviewed nondestructive examination records. The team determined that the program document did not describe scheduling inspections, basis of line selection, basis for inspection points, and plans for re-inspection. The team determined that the program owner had appropriately identified the inspection points for the plant systems included in this program.

The team determined that the system engineer had developed a spreadsheet that documented the systems included in the wall thinning program and the status of the completed inspections. The team recommended that the system engineer revise the program document to include: (1) details of the system lines included for inspection, (2) basis for the selecting the examination points, (3) plans for future inspections, including sample size, and (4) identification of the wall thickness acceptance criteria. The team verified that the systems had not experienced loss of material since most wall thickness measurements remained within nominal pipe wall thickness and all remained well above the minimum allowed pipe wall thickness. The licensee initiated LR-LAR-2010-00176, Corrective Action 324.

Based on review of the actions implemented related to the Wall Thinning Inspection Program aging management program, the team concluded the licensee implemented actions to effectively manage the effects of aging during the period of extended operation. Because of concerns related to the amount of detail in the Wall Thinning Inspection Program aging management program guidance document, the team will verify the licensee added sufficient detail during the Phase 3 inspection; consequently, Commitment 17855 remained open. The team determined that the licensee had not met Commitment 7 to develop a Wall Thinning Inspection Program aging management program as described in a letter to file, Attachment 1.3, Arkansas Nuclear One, Unit 1 [ML070640041].

.02 Existing Aging Management Programs

a. Inspection Scope

The team evaluated whether the licensee met the commitments listed below, as described in NUREG-1743. The team verified that the licensee implemented procedures, documented inspection results, initiated corrective action documents, and provided training to implementing personnel.

The team reviewed supporting documents including implementing procedures, work orders, inspection reports, engineering evaluations, and condition reports; conducted interviews with licensee staff, including the program owners; observed in-process outage activities; and performed visual inspection of structures, systems, and components including those not accessible during power operation to verify that the licensee completed the necessary actions to comply with the license conditions stipulated in the renewed facility operating license.

The team reviewed 43 existing aging management programs.

Specific open and closed commitments and specific documents reviewed are listed in the report attachment.

b. Findings and Observations

1. 16.2.1 Alloy 600 Program (17871)

The Alloy 600 Program aging management program managed the effects of aging caused by primary water stress corrosion cracking. The program included Alloy 600 and Alloy 82/182 weld metal locations in the reactor coolant system, including the hot leg flow meter element.

The team reviewed the implementing procedures, program documents, license renewal documents, safety analysis report, and the safety evaluation report. The team interviewed the program owner and reviewed nondestructive examination records. The team determined that the licensee had fully scoped the Alloy 600 and Alloy 82/182 welds in their reactor coolant system. Because of cracking and leakage in the industry and at the plant, the licensee initiated actions to mitigate the concerns caused by this type of material by using Alloy 690 and Alloy 52/152 weld overlays. The team determined that



the licensee had mitigated all the small bore Alloy 600 and Alloy 82/182 locations on the pressurizer and on high risk sections of the pressurizer and reactor coolant system piping.

Letter 1CAN011405 revised the commitment to develop an Alloy 600 Inspection Program aging management program to no longer require the program since they included the inspections as part of their Inservice Inspection program. The licensee justified this change because they: (1) mitigated the most susceptible locations by weld overlay or replacement; (2) would perform future code-required examinations as specified in the Inservice Inspection program; and (3) established controls to perform these inspections as specified in their Inservice Inspection program. The team reviewed inspection records and verified that the licensee included these inspections as a specific augmented inspection related to license renewal in their Inservice Inspection program. The team reviewed the design changes that mitigated the welds in the pressurizer and on the small bore piping. The team identified no concerns with this commitment change.

Based on review of the actions implemented related to the Alloy 600 Program aging management program, the team concluded the licensee implemented actions to effectively manage the effects of aging during the period of extended operation. The team concluded that the licensee met Commitment 17871 prior to the period of extended operation.

2. 16.2.2 Alternate AC Diesel Generator Testing and Inspection Program (17840 and 17870)

The Alternate AC Diesel Generator Testing and Inspection Program aging management program managed the effects of aging caused by loss of material, fouling, cracking, and loss of bolted closure integrity. The program included the alternate AC diesel engine, generator, and subassemblies. The licensee performed maintenance and testing activities to manage the aging effects on the alternate AC diesel generator. The licensee used the 4400-kW, commercial-grade packaged diesel generator unit to provide electric power to either Unit 1 or Unit 2 safety-related electrical buses following a station blackout.

The team reviewed the safety analysis report, program basis documents, calculations, implementing procedures, license renewal documents, and safety evaluation report. The team interviewed the program owner, walked down the alternate AC diesel generator, and reviewed inspection records and corrective action documents.

The team determined Procedure OP-2104.037, "Alternate AC Diesel Generator Operations," Revision 26, specified the requirements for quarterly operability testing, which verified the diesel generator would start and carry the design load, and 18-month testing to verify the alternate AC diesel generator satisfied the station blackout design requirements. The team verified that the licensee performed other inspections, including: removing or disassembling components for inspection at frequencies specified by the manufacturer; vibration, temperature, and pressure monitoring; and inspecting for leakage or degradation. The team noted that the Diesel Fuel Oil Program aging management program monitored for the effects of aging for the bulk fuel oil

storage tank, the day tank, and the equipment and piping that support the transfer of fuel to the alternate AC diesel generator.

Based upon review of the Alternate AC Diesel Generator Testing and Inspection Program aging management program, the team concluded the licensee implemented actions to effectively manage the effects of aging during the period of extended operation. The team concluded that the licensee met Commitments 17840 and 17870 prior to the period of extended operation.

3. 16.2.3 ASME Section XI Inservice Inspection Program (17845, 17846 and 17872)

The ASME Section XI Inservice Inspection Program aging management programs managed the effects of aging caused by cracking, loss of material, and loss of mechanical closure integrity at bolted connections. The team evaluated the six ASME Section XI Inservice Inspection program subsections to verify that they addressed activities related to license renewal.

16.2.3.1 to 16.2.3.5 Subsections IWB, IWC, IWD, IWE, and IWF Inspections (17845 and 17846)

The ASME Section XI, Subsection IWB, IWC, and IWD inspections under the scope of the Inservice Inspection Plan identified and corrected degradation of ASME Class 1, Class 2, and Class 3 pressure retaining piping and components and their integral attachments. Subsection IWE inspections identified and corrected degradations of the reactor building liner and their integral attachments. Subsection IWF inspections identified and corrected degradations of supports related to ASME Class 1, Class 2, and Class 3, and the reactor building liner.

The team reviewed the safety analysis report, program basis documents, Inservice Inspection program, license renewal documents, and safety evaluation report. The team interviewed the program owner and reviewed selected inspection records and the scheduling of the Inservice Inspection activities.

The team verified that the licensee specifically identified the inspections being credited for license renewal for each component and for applicable component features in the Inservice Inspection plan.

In addition, the licensee specified they would perform a one-time visual inspection of a reactor coolant pump casing under the requirements of Subsection IWB prior to the end of the initial 40-year license term.

Based upon review of the ASME Section XI, Subsection IWB, IWC, IWD, IWE, and IWF Inservice Inspection aging management programs, the team concluded the licensee implemented actions to effectively manage the effects of aging during the period of extended operation. The team concluded that the licensee met Commitments 17845 and 17846 prior to the period of extended operation.

#### 16.2.3.6 Subsection IWL Inspection Program (17872)

The Subsection IWL Inspection Program aging management program managed the effects of aging caused by loss of material for tendon anchorages, cracking of concrete, and change in material properties of concrete. This program evaluated the quality and structural performance of the reactor building post-tensioning system and concrete components.

The team reviewed the safety analysis report, program basis documents, Inservice Inspection program, license renewal documents, implementing procedures, and safety evaluation report. The team interviewed the program owner and reviewed inspection records. The licensee specified acceptance criteria that met the ASME, Section XI, Subsection IWL requirements. Corrective actions may include re-tensioning, replacing tendons, or reanalysis of the reactor building to assure adequate tendon prestress to meet design requirements.

From review of the Unit 1 inspection records, the team questioned whether the licensee had determined whether the cracking identified in Unit 1 had occurred in Unit 2. The licensee demonstrated that they had evaluated the conditions and determined that they had no impact on the reactor building function. However, during discussions the team determined that the licensee had not established a method to consistently evaluate previously identified conditions as specified in their plant procedures. The licensee issued LR-LAR-2010-00176, Corrective Action 316 to develop a tool to compile inspections, results, and findings that would provide a more effective retrieval of history related to structural components.

Based upon review of the ASME Section XI, Subsection IWL Inservice Inspection aging management program, the team concluded, generally, the licensee implemented actions to effectively manage the effects of aging during the period of extended operation with one exception. Since the corrective actions identified in LR-LAR-2010-00176, Corrective Action 316, applied to the structures monitoring program as well as this program, the team concluded that the licensee had not met Commitment 17872 prior to the period of extended operation. The team will review actions related to establishing a tracking and trending program during the Phase 3 inspection.

#### **Failure to Reassess the Effects of Aging**

Introduction. The team identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," for failure to follow procedures related to review of indications that could affect the structural integrity of the Unit 2 reactor building. Specifically, the licensee failed to perform a subsequent visual inspection of concrete cracks that exceeded acceptable criteria in the previous 5-year inspection as specified in Procedure CEP-CII-004, "General and Detailed Visual Examinations of Concrete Containments," Revision 306. The corrective actions included verifying that the indications did not structurally affect the reactor building in these instances, initiating Condition Report C-2014-00597, and scheduling the affected areas for review during the upcoming 5-year inspection.

Description. The team reviewed licensee activities related to performing the ASME, Section XI, Subsection IWL inspections. The team interviewed station personnel involved with periodic concrete containment inspections. The team reviewed Report MULT-EP-06-0004, "25<sup>th</sup> Year Unit 2 Containment Tendon Surveillance and Concrete Inspection at Arkansas Nuclear One," Revision 0, and Report AN-N-1052-501, "Final Report for the 30<sup>th</sup> Year Tendon Surveillance at ANO Unit 2," dated September 15, 2010. Procedure CEP-CII-004, "General and Detailed Visual Inspections of Concrete Containments," Revision 306, specified steps for performing concrete containment inspections.

Report MULT-EP-06-0004 documented that the reactor building inspection found two cracks exceeding 0.01 inches in maximum width on the bearing plates of tendons 12H26 and 3D128. Additionally, the reactor building inspection identified two cracks exceeding 0.04 inches in maximum width near the ring girder. The licensee evaluated the impact of the second set of cracks in Condition Report 2-2005-01146. The responsible engineer recorded and evaluated each of these cracks.

For the cracks that exceeded 0.04 inches the licensee considered the cause of the cracking, the acceptability of the concrete, and any follow-up actions that needed to be taken. The licensee determined that the general mass of the concrete section remained sound except for the thin feathered edges of the triangular crack pattern. The licensee removed areas identified as hollow until only sound concrete remained. The licensee sealed the exposed concrete with caulking to protect from the elements and to avoid potential water intrusion into any remaining hairline cracks. The responsible engineer attributed the 0.01-inch cracks to temperature curing at initial construction and concluded the cracks had no impact on the containment structure.

The team determined that the reactor building inspection completed in 2010 did not include any record of conditions of the two areas of cracks that the licensee had discovered and evaluated in 2005. Further, the team determined that the licensee did not follow the requirements in Procedure CEP-CII-004 to evaluate these cracks during a subsequent inspection in order to characterize any changes or determine the cracks had not changed. Specifically, Procedure CEP-CII-004, Appendix D, Step 3.1.7 states "Cracks greater than 0.3 mm (0.010 in.) in maximum width on surfaces within 2 feet of tendon anchorage base plates, and cracks greater than 1 mm (0.040 in.) in maximum width in other regions, measured below any surface enhanced widening; EXCEPT for cracks which have been determined to be acceptable 'passive cracks' during previous examinations AND that show no indication of change since the last examination ('passive cracks' are defined as those having an absence of recent growth and absence of other degradation mechanisms at the crack)."

Analysis. The team determined that the failure to assess previous indications of concrete degradation, as specified in plant procedures, was a performance deficiency. The team considered the finding more than minor because, if left uncorrected, the finding would have the potential to lead to a more significant safety concern. Specifically, failure to track the growth of existing cracks on the reactor building could allow degradation to continue to the point of affecting the structural integrity. In accordance with Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," dated June 19, 2012, Exhibit 3,

“Barrier Integrity Screening Questions,” the issue screened as having very low safety significance (Green) because it did not involve an actual open pathway in the physical integrity of the containment, loss of containment isolation, or reduction in heat removal capability and it did not affect hydrogen igniters. The team determined that this finding had a human performance cross cutting aspect in the area of work management. The licensee did not implement a process of planning, controlling, and executing work activities such that nuclear safety was the overriding priority [H.5].

Enforcement. The team identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion V, which states, in part, that “activities affecting quality shall be accomplished in accordance with procedures.” Procedure CEP-CII-004, Appendix D, Step 3.1.7 states that conditions exceeding defined criteria must be recorded and evaluated “EXCEPT for cracks which have been determined to be acceptable ‘passive cracks’ during previous examinations AND that show no indication of change since the last examination.”

Contrary to the above, prior to September 15, 2010, for inspection activities affecting quality, the licensee failed to inspect previously identified crack areas to confirm no changes had occurred as required by procedures. Specifically, during the 30<sup>th</sup> anniversary (2010) of the concrete containment inspection of Unit 2 reactor building, the licensee failed to perform a subsequent visual inspection of concrete cracks that exceeded acceptable criteria from the 25<sup>th</sup> anniversary inspection (2005). The corrective actions included verifying that the indications did not structurally affect the reactor building in these instances, initiating Condition Report C-2014-00597, and scheduling the affected areas for review during the upcoming 5-year inspection.

Because this finding was of very low safety significance and had been entered into the corrective action program, this violation is being treated as a non-cited violation in accordance with section 2.3.2.a of the NRC Enforcement Policy:  
NCV 05000368/2014007-01, “Failure to Reassess the Effects of Aging.”

#### 16.2.3.7 Augmented Inspections Program (17847)

The Augmented Inspections Program aging management programs managed the effects of aging caused by cracking and loss of material in systems and components that did not require examination in accordance with ASME Section XI. The team determined that the licensee established the same controls and performed similar nondestructive examinations as they performed for the ASME Section XI components.

The team verified the licensee established and performed baseline inspections of components in the following augmented inspection programs: (1) main feedwater and main steam system welds, not in the Class 2 piping, to support the high energy line break analysis; (2) borated water storage tank header including the lines from the reactor building sump; (3) welds of the piping wetted by the reactor building sump water; (4) supplemental inspections of the “Q” stainless piping of the main steam system; (5) a one-time inspection of the Penetration 68 piping and components and the decay heat pump room drain valves; (6) special inspections of Penetrations 10, 47, 58, and 64; (7) visual inspection of the pressure retaining surfaces of one reactor coolant pump; (8) volumetric/non-destructive inspection of sodium hydroxide system stainless steel

piping and valves; and (9) volumetric/non-destructive inspection of chilled water system stainless steel tubing and valves.

The team reviewed the implementing procedures, program documents, license renewal documents, safety analysis report, and the safety evaluation report. The team interviewed the program owner and reviewed nondestructive examination records. The team verified that the licensee had appropriately established unique License Renewal Augmented Inspection requirements in their Inservice Inspection program. The team verified that the licensee established unique designators for each of the components and welds if needed, established appropriate inspection samples, and properly conducted the examinations. The team identified no concerns with the examination results.

Letter 1CAN011405 revised the commitment from performing radiographic examination of the reactor building sump Penetration 68 piping Valves CV-4400 and CV-4446 to performing ultrasonic testing examination of welds in the associated piping. Although radiography would provide some indication of gross wall loss in the thick valve bodies, the licensee determined that the aging effects of corrosion and cracking would be manifested earlier in the thinner piping and welds to the valves instead. The team identified no concerns with this commitment change.

The team determined that the licensee had not completed their commitment to perform a one-time inspection of a single reactor coolant pump casing and cover; specifically, the licensee had not inspected the pump cover because of the potential for high radiation exposure. The licensee had replaced three of the four reactor coolant pump covers and planned to replace the final reactor coolant pump cover in 2019. Instead of acquiring additional exposure, the licensee revised their plan to evaluate the effects of aging by taking credit for a reactor coolant pump cover inspection performed at Davis Besse.

The licensee determined that the pump vendor had supplied identical reactor coolant pumps, including the reactor coolant pump covers, to Davis Besse and Arkansas Nuclear One, Unit 1. The licensee identified similar operating conditions for both facilities except for chemistry controls. Davis Besse had imposed a 150 ppb (parts per billion) limit on chlorides and fluorides in their closed cooling water system that was far below the threshold for stress corrosion cracking. Arkansas Nuclear One, Unit 1 had not monitored for the presence of chlorides and fluorides; consequently, the licensee reviewed historical records that included the amount of chlorides and fluorides present when adding makeup water to the closed cooling water system. The licensee determined that, if they concentrated all accumulated chlorides in the pump cover for the life of the plant, the concentration would have remained below the stress corrosion cracking threshold of 50 ppm (parts per million). In addition to determining the chloride concentration for the life of the plant, the licensee initiated a flaw tolerance evaluation to determine the susceptibility of the pump cover to a flaw propagating. The licensee initiated Commitment 19358 to track completing the flaw tolerance evaluation.

Based on review of the actions implemented related to the Augmented Inspections Program aging management programs, the team concluded the licensee implemented actions to effectively manage the effects of aging during the period of extended operation. The team determined that the licensee met Commitment 17847 related to the Augmented Inspections Program aging management program with one exception. The

licensee initiated Commitment 19358 to track the required flaw evaluations for the reactor coolant pump cover; consequently the team considered Commitment 17847 closed. The team will review actions related to Commitment 19358 during the Phase 3 inspection.

As described in a letter to file, Attachment 1.3, Arkansas Nuclear One, Unit 1 [ML070640041], the team determined that the licensee had not met Commitment 8 since the licensee had not inspected the reactor coolant pump cover. The licensee met Commitment 9 related to completing the following augmented inspections: reactor building sump welds; stainless steel main steamline piping; Penetration 68 and decay heat removal drain valves; and Penetrations 10, 47, 58, and 64.

#### 16.2.3.8 Small Bore Piping and Small Bore Nozzles Inspection Program (17847)

The Small Bore Piping and Small Bore Nozzles Inspection Program aging management program managed the effects of aging caused by cracking. This augmented inspection program included small bore reactor coolant system piping and nozzles less than 4-inch and greater than 1-inch in diameter that did not receive nondestructive examinations in accordance with ASME Section XI.

The team reviewed the implementing procedures, program documents, license renewal documents, safety analysis report, and the safety evaluation report. The team interviewed the program owner, reviewed the database used to schedule inspections, and reviewed nondestructive examination records. The team verified the licensee implemented the actions related to inspection schedule, method, personnel qualification, and sample expansion, as specified in industry and regulatory documents. The team verified that the licensee had completed 20 of the 26 weld inspections prior to entering the period of extended operation. The licensee scheduled the remaining six welds for nondestructive examination during the next refueling outage. The team confirmed that the licensee included these inspections as a license renewal required augmented inspection.

Based on review of the actions implemented related to the Small Bore Piping and Small Bore Nozzles Inspection Program aging management program, the team concluded the licensee implemented actions to effectively manage the effects of aging during the period of extended operation. The team determined that the licensee met Commitment 17847 related to the Small Bore Piping and Small Bore Nozzles Inspection Program.

#### 4. 16.2.4 Bolting and Torqueing Program (17852)

The Bolting and Torqueing Program aging management program managed the effects of aging caused by cracking, loss of material, and loss of mechanical closure integrity. The bolting and torqueing activities applied to the pressure boundary components for in-scope license renewal systems and components. Applications include bolted flange connections for vessels (i.e., manways and inspection ports), flanged joints in piping, body-to-bonnet joints in valves, and pressure-retaining bolting associated with pumps or valves and miscellaneous process components.

The team reviewed the implementing procedures, program documents, license renewal documents, safety analysis report, and the safety evaluation report. The team interviewed the program owner and reviewed nondestructive examination records. The team verified that the licensee implemented the required chemistry controls to mitigate the effects of intergranular stress corrosion cracking and performed the nondestructive examinations as recommended. The team verified that the licensee identified the in-scope components that required bolting and torqueing controls.

Based on review of the actions implemented related to the Bolting and Torqueing Program aging management program, the team concluded the licensee implemented actions to effectively manage the effects of aging during the period of extended operation. The team concluded that the licensee met Commitment 17852 prior to the period of extended operation.

5. 16.2.5 Boric Acid Corrosion Prevention Program (17826)

The Boric Acid Corrosion Prevention Program aging management program managed the effects of aging caused by loss of material and the loss of mechanical closure integrity. The Boric Acid Corrosion Prevention Program applied to structures, systems, and components containing, or exposed to, borated water, including the external surfaces of piping, valves, tanks, and bolting made of carbon steel.

The team reviewed the implementing procedures, program documents, license renewal documents, safety analysis report, and the safety evaluation report. The team interviewed the program owner and reviewed reports that track and resolve locations of boric acid leaks. The team verified that the licensee had performed adequate assessment of boric acid leaks; specifically, the licensee either repaired and cleaned up the leakage or performed appropriate dispositions to continue operation until repair and cleanup at the next refueling outage.

Based on review of the actions implemented related to the Boric Acid Corrosion Prevention Program aging management program, the team concluded the licensee implemented actions to effectively manage the effects of aging during the period of extended operation. The team concluded that the licensee met Commitment 17826 prior to the period of extended operation.

6. 16.2.6 Chemistry Control

The following subsections address the individual chemistry control programs in more detail:

- Primary Chemistry Monitoring Program
- Secondary Chemistry Monitoring Program
- Auxiliary Systems Chemistry Monitoring Program
- Diesel Fuel Monitoring Program
- Service Water Chemical Control Program



#### 16.2.6.1 Primary Chemistry Monitoring Program (17879)

The Primary Chemistry Monitoring Program aging management program managed the effects of aging caused by fouling, cracking, loss of material, loss of mechanical closure integrity, mechanical distortion, and reduction of fracture toughness. The program controlled chemistry for the reactor coolant system, spent fuel pool system, reactor water make-up system, letdown purification demineralizers, and the borated water storage tanks.

The team reviewed the safety analysis report, program basis documents, calculations, trend analysis documents, implementing procedures, license renewal application, safety evaluation report, and license renewal documents. The team interviewed the system engineer and program owner, reviewed completed inspections and chemistry trend data, and reviewed corrective action documents. The team reviewed the Primary Water Strategic Plan, dated July 2013, which detailed how the Arkansas Nuclear One, Unit 1, primary chemistry program met the guidance in NEI 97-06, "Steam Generator Program Guidelines," Revision 3.

Procedure OP-1000.106, "Primary Chemistry Monitoring Program," Revision 10, established sampling parameters and frequencies based on EPRI guidelines and plant specific experience. Procedure EN-DC-317, "Steam Generator Program," Revision 6, provided the guidance related to establishing a steam generator program consistent with the guidelines established in NEI 97-06. Procedure CEP-SG-001, "Steam Generator Program," Revision 0, addressed primary side steam generator examinations and maintenance. The procedures included detailed descriptions of primary water chemistry parameters to be monitored, sampling frequencies, and chemistry limits. In some cases, the licensee established action levels more restrictive than the limits specified in the EPRI guidelines.

The team determined that the licensee used EPRI Report TR-105714, "Primary Water Chemistry Guidelines," Revision 4, at the time of their license renewal application submittal. During this inspection the team determined that the licensee based their Primary Water Chemistry Program on EPRI Report 1014986, "Pressurized Water Reactor (PWR) Primary Water Chemistry Guidelines," Revision 6; BAW-1385, "Babcock and Wilcox Water Chemistry Manual," Revision 3; AREVA PWR Fuel Reactor Coolant Chemistry Supplemental Guidelines, Revision 6; and other industry guidelines. The team questioned whether any changes between revisions had changed any monitored parameters. The licensee provided the team with a description and trending graphs of the monitored parameters. The team determined that no changes between revisions adversely impacted the primary water chemistry program.

Based on review of the actions implemented related to the Primary Chemistry Monitoring Program aging management program, the team concluded the licensee implemented actions to effectively manage the effects of aging during the period of extended operation. The team concluded that the licensee met Commitment 17879 prior to the period of extended operation.

#### 16.2.6.2 Secondary Chemistry Monitoring Program (17880)

The Secondary Chemistry Monitoring Program aging management program managed the effects of aging caused by cracking, fouling, and loss of material. The program managed the effects of aging for components in the main feedwater system, emergency feedwater system, main steam system, condensate storage system, and steam generators. The program used sampling activities and analysis to control the levels of contaminants and oxygen within a range that prevented or minimized the occurrence of aging effects.

The team reviewed the safety analysis report supplement, program basis documents, calculations, trend analysis documents, implementing procedures, completed inspections and corrective action documents, license renewal application, and safety evaluation report. The team interviewed the system engineer and program owner.

Procedures OP-1052.007, "Secondary Chemistry Monitoring," Revision 37, and OP-1000.042, "Steam Generator Water Chemistry Monitoring Unit One," Revision 24, provided detailed descriptions of secondary water chemistry control or diagnostic parameters to be monitored, sampling frequencies, and criteria for determining acceptable values. The procedure established action levels and guidelines for each parameter monitored, which included dissolved oxygen, sodium, chloride, sulfate, and silica. Procedure OP-1052.019, "Chemistry Inspections of Plant Systems and Heat Exchangers," Revision 7, provided guidance to control chemistry and inspect plant heat exchangers, including emergency diesel generator cooling water heat exchangers, and intermediate cooling water heat exchangers.

The licensee used EPRI Report TR-102134, "PWR Secondary Water Chemistry Guidelines," Revision 4, at the time of their license renewal application submittal. During this inspection the team determined that licensee based their Secondary Water Chemistry Program on revision 7 of the EPRI report. The inspectors questioned what changes occurred between revisions and if any monitored parameter had different action levels that might adversely affect the secondary water chemistry. The team reviewed descriptions of the changed parameters and determined that only the action levels associated with feedwater oxygen had changed. The new level agreed with industry standards for feedwater oxygen content. The team reviewed and identified no concerns with the changes.

Based on review of the actions implemented related to the Secondary Chemistry Monitoring Program aging management program, the team concluded the licensee implemented actions to effectively manage the effects of aging during the period of extended operation. The team concluded that the licensee met Commitment 17880 prior to the period of extended operation.

#### 16.2.6.3 Auxiliary Systems Chemistry Monitoring Program (17877)

The Auxiliary Systems Chemistry Monitoring Program aging management program managed the effects of aging caused by loss of material, cracking, fouling, and loss of mechanical closure integrity. This program applied to the major components in the intermediate cooling water system, the chilled water systems, the emergency diesel

generator cooling water system, and the alternate AC diesel generator cooling water system.

The team reviewed the safety analysis report supplement, program basis documents, calculations, trend analysis documents, Auxiliary Cooling Water Systems optimization plan, quarterly system health report inputs, implementing procedures, completed inspections and corrective action documents, license renewal application, and safety evaluation report. The team interviewed the system engineer and program owner for the Auxiliary Systems Chemistry Monitoring Program.

Procedure OP-1052.027, "Auxiliary Systems Chemistry Monitoring," Revision 28, implemented the auxiliary systems water chemistry program. The procedure followed the guidance contained in EPRI Report TR-107396, "Closed Cooling Water Chemistry Guideline," Revision 1, vendor recommendations, industry guidance and operating experience. The implementing procedure included detailed descriptions of auxiliary system water chemistry parameters to be monitored, sampling frequencies, corrosion inhibitor and biocide additives, and criteria for determining acceptable values. The procedure established action levels and guidelines for each parameter monitored, which included pH, iron, copper, hardness, nitrate and biological count. The licensee used corrosion coupons to monitor corrosion rates in the intermediate cooling water and closed cooling water systems.

Based on review of the actions implemented related to the Auxiliary Systems Chemistry Monitoring Program aging management program, the team concluded the licensee implemented actions to effectively manage the effects of aging during the period of extended operation. The team concluded that the licensee met Commitment 17877 prior to the period of extended operation.

#### 16.2.6.4 Diesel Fuel Monitoring Program (17878)

The Diesel Fuel Monitoring Program aging management program managed the effects of aging caused by fouling, cracking, and loss of material. The licensee sampled and analyzed the fuel oil in the bulk fuel oil storage tank, emergency diesel generator fuel tanks and day tanks, fire pump diesel day tank, and the alternate AC diesel generator day tank.

The team reviewed the safety analysis report supplement, program basis documents, implementing procedures, completed inspections, license renewal application, and safety evaluation report. The team interviewed the program owner for the Diesel Fuel Monitoring Program. The team verified that Procedure OP-1000.113, "Diesel Fuel Monitoring Program," Revision 13, specified fuel sampling and analysis requirements, acceptance criteria and action levels for fuel samples from transport and storage tanks within the program scope. The team verified that the licensee established limits that met industry standards and the technical specifications.

Based on review of the actions implemented related to the Diesel Fuel Monitoring Program aging management program, the team concluded the licensee implemented actions to effectively manage the effects of aging during the period of extended

operation. The team concluded that the licensee met Commitment 17878 prior to the period of extended operation.

#### 16.2.6.5 Service Water Chemical Control Program (17881)

The Service Water Chemical Control Program aging management program managed the effects of aging caused by loss of material, cracking, fouling, and loss of mechanical closure integrity for systems that used raw water. The program included the service water, auxiliary cooling water, and water suppression portions of the fire protection systems.

The team reviewed the safety analysis report supplement, the program basis documents, calculations, the Service Water and Circulating Water Optimization Plan, implementing procedures, completed inspections, license renewal application, and safety evaluation report. The team interviewed the system engineer and program owner for the Service Water Chemical Control Program.

The licensee established the program following the guidance in EPRI Report TR-106229, "Service Water System Chemical Addition Guidelines," Revision 4; EPRI Report 1025318, "Open Cooling Water Guidelines," Revision 0; equipment vendor specifications; water treatment vendor recommendations; and operating experience. The licensee designed the program to comply with NRC Generic Letter 89-13, "Service Water System Problems Affecting Safety-Related Equipment," dated July 18, 1989. Procedure OP-1052.007, "Secondary Chemistry Monitoring," Revision 34, implemented monitoring practices for Unit 1 service water and circulating water systems, which included specifying parameters, sampling and analysis frequencies, and action levels for the applicable parameters. The team determined the licensee monitored corrosion rates, oxidant levels, and corrosion inhibitor concentrations.

Based on review of the actions implemented related to the Service Water Chemical Control Program aging management program, the team concluded the licensee implemented actions to effectively manage the effects of aging during the period of extended operation. The team concluded that the licensee met Commitment 17881 prior to the period of extended operation.

#### 7. 16.2.7 Reactor Vessel Closure Head Penetration Inspection Program (17873)

The Reactor Vessel Closure Head Penetration Inspection Program aging management program managed the aging effects of primary water stress corrosion cracking in the reactor vessel control rod drive mechanism nozzles.

The team reviewed the implementing procedures, program documents, license renewal documents, safety analysis report, and the safety evaluation report. The team interviewed the program owner and reviewed nondestructive examination records. The team verified that the licensee performed the inspections of the reactor vessel closure head and associated penetration nozzles in accordance with their Inservice Inspection plan.

The licensee installed a replacement reactor vessel closure head manufactured from Alloy 690 material in 2005 after the licensee had discovered cracking of their reactor vessel closure head control rod drive mechanism penetrations. Because the license included their reactor vessel closure head penetrations in their ASME Section XI, Subsection IWB Inservice Inspection program, the licensee removed this as a formal aging management program, as described in Letter 1CAN011405. The team identified no concerns with this commitment change.

Because the reactor vessel closure head was made from Alloy 690 material, the licensee visually examines the reactor vessel closure head control rod drive mechanism nozzles every third refueling outage. The licensee planned to complete their first volumetric examination of the control rod drive mechanism nozzles and the control rod drive mechanism nozzle partial-penetration J-Groove welds during Refueling Outage 25, as specified in Code Case N-729-2 for the fourth inspection interval.

The team determined from review of onsite operating experience that the licensee identified dried boric acid on their replacement reactor vessel head during the bare metal examination during Refueling Outage 22. The licensee determined that a reactor vessel head vent had opened during the previous startup and allowed reactor coolant to spill on the mirror insulation and drip onto the reactor vessel head.

Based on review of the actions implemented related to the Reactor Vessel Closure Head Penetration Inspection Program aging management program, the team concluded that the licensee appropriately monitored for the effects of aging in accordance with their Inservice Inspection program. The team concluded the licensee met Commitment 17873 by withdrawal of the commitment and including the reactor vessel closure head inspections in their Inservice Inspection program.

#### 8. 16.2.8 Fire Protection Program

The licensee performed several Fire Protection Program activities with respect to aging management. The specific aging management programs included:

- Fire Barrier Inspections Program
- Fire Hose Station Inspection Program
- Fire Suppression Water Supply System Surveillance Program
- Fire Suppression Sprinkler System Surveillance Program
- Fire Water Piping Thickness Evaluation Program
- Control Room Halon Fire System Inspection Program

##### 16.2.8.1 Fire Barrier Inspections Program (17857)

The Fire Barrier Inspections Program aging management program managed the effects of aging caused by cracking, loss of material, and change in material properties. The scope included 10 CFR 50.48 required fire walls and floors, fire doors/hatches, fire damper mountings, fire wraps, and penetration fire stops.

The team reviewed implementing procedures, program documents, license renewal documents, safety analysis report, and the safety evaluation report. The team interviewed the program owner and reviewed fire barriers inspection results and condition reports. The team also reviewed the last occurrence of expanded inspection activities. The licensee periodically inspected fire barriers separating redundant safe shutdown systems to assure that they perform their separation functions. The team verified that inspection procedures referenced the license renewal commitments and effectively monitored for the effects of aging.

Based on the review of the actions implemented related to the Fire Barrier Inspections Program aging management program, the team concluded the licensee implemented actions to effectively manage the effects of aging during the period of extended operation. The team concluded that the licensee met Commitment 17857 prior to the period of extended operation.

#### 16.2.8.2 Fire Hose Station Inspection Program (17858)

The Fire Hose Station Inspection Program aging management program managed the effects of aging caused by loss of material. The scope included 10 CFR 50.48 required fire hoses.

The team reviewed implementing procedures, program documents, license renewal documents, safety analysis report, and the safety evaluation report. The team interviewed the program owner and reviewed completed work records for fire hose station visual inspection activities. The team verified that Procedure OP-1003.012, "Fire Hose Station Inspection," Revision 10, contained appropriate acceptance criteria and inspection frequencies.

Based on the review of the actions implemented related to the Fire Hose Station Inspection Program aging management program, the team concluded the licensee implemented actions to effectively manage the effects of aging during the period of extended operation. The team concluded that the licensee met Commitment 17858 prior to the period of extended operation.

#### 16.2.8.3 Fire Suppression Water Supply System Surveillance Program (17859)

The Fire Suppression Water Supply System Surveillance Program aging management program managed the effects of aging caused by loss of material because of internal surface corrosion, fouling, cracking of stainless steel, brass, or bronze components, loss of mechanical closure integrity, and the loss of material from external surfaces. This program applied to piping and valves; diesel fire pump subsystems including the intake air, exhaust, lube oil; and cooling water heat exchangers.

The team reviewed implementing procedures, program documents, license renewal documents, safety analysis report, and safety evaluation report. The team interviewed the program owner and reviewed test records. The team reviewed test results for the following surveillance activities: system flush every 6 months, system functional test performed at least once per 18 months; and a system flow test once every 3 years. The team verified that Procedure OP-1104.032, "Fire Protection Systems," Revision 71,

specified appropriate acceptance criteria. The team determined that the licensee added the jockey fire pumps to their aging management program.

Based on review of the actions implemented related to the Fire Suppression Water Supply System Surveillance Program aging management program, the team concluded the licensee implemented actions to effectively manage the effects of aging during the period of extended operation. The team concluded the licensee met Commitment 17859 prior to the period of extended operation.

#### 16.2.8.4 Fire Suppression Sprinkler System Surveillance Program (17861)

The Fire Suppression Sprinkler System Surveillance Program aging management program managed the effects of aging caused by cracking and loss of material. This program applies to carbon steel, stainless steel, brass, or bronze fire suppression sprinkler system piping, valves, and nozzles.

The team reviewed implementing procedures, program documents, license renewal documents, safety analysis report, and the safety evaluation report. The team interviewed the program owner and reviewed test records for sprinkler system flow tests and spray nozzle tests. The team verified that the licensee had established preventive maintenance tasks to replace the sprinkler heads prior to or during their fiftieth year of service. The team determined that the licensee had implemented this action consistent with the guidance of National Fire Protection Association (NFPA) 25-2008, "Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems." The team verified that Procedure OP-1104.032, "Fire Protection Systems," Supplement 7, testing aligned with the requirements in Technical Requirements Manual, Sections 3.7.9.3 and 3.7.9.4.

Letter 1CAN011405 changed the commitment to perform deluge system flushing quarterly to annually. The team verified that the GALL Report, Section XI.M27, "Fire Water System," endorsed NFPA 25-2008, which specified an annual test frequency. The team identified no concerns with this commitment change.

Based on the review of the actions implemented related to the Fire Suppression Sprinkler System Surveillance Program aging management program, the team concluded the licensee implemented actions to effectively manage the effects of aging during the period of extended operation. The team concluded that the licensee met Commitment 17861 prior to the period of extended operation.

#### 16.2.8.5 Fire Water Piping Thickness Evaluation Program (17862)

The Fire Water Piping Thickness Evaluation Program aging management program managed the effects of aging caused by loss of material resulting from corrosion. This program included cast iron or carbon steel fire water piping.

The team reviewed implementing procedures, program documents, license renewal documents, safety analysis report, and safety evaluation report. The team interviewed the program owner. The team verified that the licensee performed the following tests using work orders: annual firewater system functional and capacity test, semi-annual

flush of the firewater main loops, and the 3-year fire water system flow test. The team verified that the licensee used appropriate methods and procedures when performing wall thickness evaluations.

As recommended by Regulatory Issue Summary 2011-005, "Information on Revision 2 to The Generic Aging Lessons Learned Report for License Renewal of Nuclear Power Plants," dated July 1, 2011, the licensee compared their aging management programs to the requirements in the GALL Report. As a result of the comparison, the licensee determined that they needed to revise their practices for monitoring the thickness of fire water piping. Historically, the licensee had used ultrasonic testing to determine the extent of thinning once they discovered a leak. However, as a result of this assessment, the licensee determined that they need to include periodic ultrasonic thickness evaluations or use internal inspections to monitor for thinning rather than reacting to leaks. The licensee tracked this corrective action with WT-WTHQN-2012-00675, Corrective Action 27.

Based on the review of the actions implemented related to the Fire Water Piping Thickness Evaluation Program aging management program, the team concluded the licensee implemented actions to effectively manage the effects of aging during the period of extended operation. The team concluded that the licensee met Commitment 17862 prior to the period of extended operation.

#### 16.2.8.6 Control Room Halon Fire System Inspection Program (17856)

The Control Room Halon Fire System Inspection Program aging management program managed the effects of aging caused by cracking and loss of material. The in-scope components included the halon discharge nozzles, discharge tube assembly and fittings, and pilot header flexible tubing and fittings.

The team reviewed implementing procedures, program documents, license renewal documents, safety analysis report, system health reports, and safety evaluation report. The team interviewed the program owner, reviewed inspection results and reviewed corrective action documents. Specifically, the team reviewed surveillance results performed to meet Procedure OP-1306.014, "Unit 1 Control Room and Aux. Control Room Halon Fire System Inspection," Revision 30.

Letter 1CAN011405 changed the frequency of visual halon system inspections and Marinite board/acoustical tile inspections from a semi-annual to annual frequency. The team determined that the licensee's compliance review did not have any fire protection program commitments that would prevent the change. In addition, the team determined that the GALL Report, Section XI.M26, "Fire Protection," endorsed NFPA 12A-1973, "Halonogenated Fire Extinguishing Systems – Halon 1301." The team confirmed that NFPA 12A-1973 recommended annual inspections. The team identified no concerns with this commitment change.

Based on the review of the actions implemented related to the Control Room Halon Fire System Inspection Program aging management program, the team concluded the licensee implemented actions to effectively manage the effects of aging during the



period of extended operation. The team concluded that the licensee met Commitment 17856 prior to the period of extended operation.

9. 16.2.9 Flow-Accelerated Corrosion Program (17853)

The Flow-Accelerated Corrosion Program aging management program managed the effects of aging caused by loss of material in susceptible systems. Flow-accelerated corrosion results in pipe wall thinning in carbon steel piping and components under certain flow and chemistry conditions.

The team reviewed the safety analysis report supplement, program basis documents, calculations, corrective action documents, implementing procedures, completed inspections and evaluations, the license renewal application, and safety evaluation report. The team interviewed the program owner. Procedure EN-DC-315, "Flow-Accelerated Corrosion," Revision 9, implemented the flow-accelerated corrosion program. The team verified that the licensee had conducted appropriate analyses and baseline inspections. The program implemented the guidance in NSAC-202L-R3, "Recommendations for an Effective Flow-Accelerated Corrosion Program." The team sampled inspection results and verified that the licensee determined extent of thinning, replaced/repaired components, and performed follow-up inspections. The team noted that the GALL Report, Revision 2, Section XI.M17, "Flow-Accelerated Corrosion," endorsed NSAC-202L, Revision 3.

Letter 1CAN011405 revised the commitment to no longer monitor the main steam lines in the flow-accelerated monitoring program in CHECKWORKS. The licensee implemented this change because their flow-accelerated corrosion susceptibility evaluation demonstrated that carbon steel lines transporting superheated steam with no moisture were not susceptible to flow accelerated corrosion. The team verified that the licensee continued to monitor the main feedwater, condensate, reheat steam, extraction steam, and heater vents and drains systems for flow-accelerated corrosion. Also, the program required visual inspection of the lines to assure no moisture was present and flow-accelerated corrosion was not occurring. The team identified no concerns with this commitment change.

Letter 1CAN011405 revised the nominal wall thickness acceptance criteria. The original acceptance criteria stated that any measured wall thickness below, or projected to be below 70 percent of nominal wall thickness at the next refueling outage would be evaluated to determine if additional areas needed to be examined. The licensee revised the acceptance criteria to require an analysis at 87.5 percent of nominal wall thickness to determine what the lower thickness limit will be, if possible, and whether or not to continue operating with the flow-accelerated corrosion. In addition, the team determined the licensee established a value of 60 percent of nominal wall thickness as the value to prompt an evaluation for sample expansion because the flow-accelerated corrosion could be occurring in other locations. The team determined that the licensee regularly replaced piping and components identified as having experienced flow-accelerated corrosion. The team identified no concerns with this commitment change.

Based on review of the actions implemented related to the Flow Accelerated Corrosion Program aging management program, the team concluded the licensee implemented

actions to effectively manage the effects of aging during the period of extended operation. The team concluded the licensee met Commitment 17853 prior to the period of extended operation.

10. 16.2.10 Inspection and Preventive Maintenance of the Polar Crane Program (17844)

The Inspection and Preventive Maintenance of the Polar Crane Program aging management program managed the effects of aging caused by loss of material. This program included the structural steel associated with the polar crane.

The team reviewed license renewal documents, program documents, implementing procedures, safety analysis report, and safety evaluation report. The team interviewed the program owner and reviewed the last polar crane inspection, lubrication work order, and the related magnetic particle nondestructive examination results. The team verified that the licensee inspected, tested, and maintained the polar crane as specified by their procedures and ANSI B30.2-1996, "Overhead and Gantry Cranes." The team determined the licensee visually inspected the polar crane steel components and tightness checked the bolts every 18 months, in conjunction with other periodic crane inspection activities. The team verified that the implementing procedures identified the appropriate test and maintenance requirements.

Based on review of the actions implemented related to the Inspection and Preventative Maintenance of the Polar Crane Program aging management program, the team concluded the licensee implemented actions to effectively manage the effects of aging during the period of extended operation. The team concluded the licensee met Commitment 17844 prior to the period of extended operation.

11. 16.2.11 Instrument Air Quality Program (17828)

The Instrument Air Quality Program aging management program managed the effects of aging caused by cracking and loss of material. This program applied to all components supplied with instrument air that maintained pressure boundary integrity to perform their intended function. The licensee monitored selected reference points to assess for the presence of water and contaminants.

The team reviewed license renewal documents, implementing procedures, program documents, safety evaluation report, and safety analysis report. The team interviewed the program owner, reviewed completed work orders, and reviewed corrective action documents. The team determined that the licensee monitored selected reference points to assess for the presence of water and contaminants.

Letter 1CAN011405 revised the commitment because the industry changed from ISA S7.3-1975, "Quality Standard for Instrument Air," that specified a value of 3.0 microns to ANSI/ISA-S7.0.0.1-1996, "Quality Standard for Instrument Air," that specified a limit of 40 microns for particle size. The team determined that the licensee identified 50 microns as the smallest limit specified in their vendor technical manuals. The licensee demonstrated that they had monitored the instrument air system for adverse effects with the larger filter standard and had identified none. The team verified that the GALL Report, Revision 2, Section XI.M24, "Compressed Air Monitoring,"

recommended using ANSI/ISA-S7.0.0.1-1996. The team identified no concerns with this commitment change.

Based on review of the actions implemented related to the Instrument Air Quality Program aging management program, the team concluded the licensee implemented actions to effectively manage the effects of aging during the period of extended operation. The team concluded the licensee met Commitment 17828 prior to the period of extended operation.

#### 12. 16.2.12 Leakage Detection in Reactor Building Program (17837)

The Leakage Detection in Reactor Building Program aging management program managed the effects of aging caused by cracking, loss of material, or loss of mechanical closure integrity. The components included those in systems that have the potential to leak contaminated water into the reactor building.

The team reviewed license renewal program basis documents, aging management review documents, procedures, safety analysis report, and safety evaluation report. The team interviewed the program owner, reviewed completed work documents related to tracking, trending and resolution of as-found leaks, and reviewed corrective action documents. The team determined that this program credited the existing leakage monitoring programs required by the technical specifications and the technical requirements manual. Specifically, the licensee monitored for leakage through reactor coolant inventory balance, reactor building sump monitoring, and reactor building radioactivity monitoring.

Based on review of the actions implemented related to the Leakage Detection in Reactor Building Program aging management program, the team concluded the licensee implemented actions to effectively manage the effects of aging during the period of extended operation. The team concluded the licensee met Commitment 17837 prior to the period of extended operation.

#### 13. 16.2.13 Maintenance Rule Programs (17829 and 17875)

The team determined that the licensee implemented two different subprograms under their Maintenance Rule Programs aging management program commitments.

##### Maintenance Rule Mechanical Program (17829)

The Maintenance Rule Mechanical Program aging management program managed the effects of aging caused by cracking, loss of material, and loss of mechanical closure integrity in systems and components. This program included the external surfaces of all systems.

The team reviewed the license renewal application, safety evaluation report, safety analysis report, license renewal documents, implementing procedures, and work instructions. The team interviewed the program owner and reviewed recent inspection reports. The team determined that the licensee implemented this program using Procedure EN-DC-178, "System Walkdowns," Revision 7. The team determined that

this program implemented the requirements described in the GALL Report, Section XI.M36, "External Surfaces Monitoring of Mechanical Components."

Based on review of the actions implemented related to the Maintenance Rule Mechanical Program aging management program, the team concluded the licensee implemented actions to effectively manage the effects of aging during the period of extended operation. The team concluded the licensee met Commitment 17829 prior to the period of extended operation.

#### Maintenance Rule Structural Program (17875)

The Maintenance Rule Structural Program aging management program managed the effects of aging caused by cracking, loss of material, and change in material properties of structures and components. This program included the structures and components identified as being within the scope of license renewal.

The team reviewed the license renewal application, safety evaluation report, and safety analysis report, license renewal documents, implementing procedures, and work instructions. The team interviewed the program owner and reviewed recent inspection reports. The team verified that Procedure EN-DC-150, "Condition Monitoring of Maintenance Rule Structures," Revision 4, provided appropriate guidance for the types of items to evaluate when conducting structures walk downs. The team observed that the staff had experienced a great deal of turnover in personnel, which seemed to challenge the knowledge transfer of system conditions and procedure compliance. Specifically, during discussions the first week of inspection, the Structures Monitoring Program staff informed the inspectors that the position of the Program Administrator, as designated in Procedure EN DC-150, Section 4 was not currently filled at the site. During the second week on-site, the licensee had identified the Program Administrator. This misunderstanding was called to the attention of site management, and may require additional clarification for staff on roles and responsibilities for executing the program effectively.

The team questioned how the licensee planned to monitor whether changes had occurred between inspections. The team confirmed that the licensee documented their inspections but had not established a means to monitor for changes as specified in Procedure EN-DC-150. Specifically, Procedure EN-DC-150, Section 5.5.10 specified, "IF degradations are discovered, THEN they shall be documented so that future monitoring can determine if a trend exists. Proper characterization of the degradation is essential for future trending. Critical measurements, i.e., crack width, length, depth, or area and depth of spall, shall be documented so that future inspectors can determine the amount of growth, if any."

Similarly, the team determined that the licensee had not established a means to retrieve the history of structural components (wall, floor, ceiling, support, etc.) or structures as a whole for other than the 5-year planned inspections. Although personnel review the results from previous 5 year inspection reports, the team determined the present methods for tracking deficiencies could limit effectiveness and ability of engineering personnel to readily retrieve all available history and trends and to monitor issues identified by other means. The licensee issued LR-LAR-2010-00176, Corrective

Action 316 to develop a tool to compile inspections, results and findings that would provide a more effective retrieval of history related to structural components.

The team reviewed how the licensee monitored for changes in groundwater to determine whether the water chemistry had changed. The team determined that the licensee had not evaluated whether the groundwater had become aggressive to below grade and buried portions of concrete structures since approval of the license renewal application. Following this observation, the licensee issued LR-LAR-2010-00176, Corrective Action 316 to include appropriate guidance in EN-DC-150, Attachment 9.21 to ensure the ground water (lake water) chemistry data were reported to the structures monitoring program owner on a periodic basis.

Based on review of the actions implemented related to the Maintenance Rule Structural Program aging management program, the team concluded the licensee had not completed all actions needed to ensure this aging management program will effectively manage the effects of aging during the period of extended operation. Because the licensee had not established a method to consistently track and trend structural defects, the team concluded that the licensee had not met the conditions of Commitment 17875 prior to the period of extended operation. The team will review these actions during the Phase 3 inspection. However, the team determined that the licensee met Commitment 10 related to coatings, as described in a letter to file, Attachment 1.3, Arkansas Nuclear One, Unit 1 [ML070640041].

#### 14. 16.2.14 Oil Analysis Program (17865)

The Oil Analysis Program aging management program managed the effects of aging caused by cracking and loss of material. The licensee established controls to keep their oil systems free of water and particulates. The licensee performed sampling and analysis for the following components: auxiliary building electrical room chillers, emergency diesel generators, decay heat pumps, reactor building spray pumps, primary makeup pumps, diesel-driven fire pump and engine, emergency feedwater pumps and turbine, the alternate AC diesel generator, and the control room chiller compressor.

The team reviewed procedures, program documents, license renewal documents, the safety analysis report, and safety evaluation report. The team interviewed the program owner and reviewed work records associated with the oil analysis program to confirm that the licensee implemented the commitments. The team verified that in-scope systems had experienced no degradation because of contaminated oil and that the licensee had identified no evidence of abnormal wear rates for the in-scope components.

Letter 1CAN011405 eliminated the use of the Total Acid Number as an indicator of oil condition. The licensee verified that 20 years of oil analysis results did not identify the Total Acid Number as the basis for an oil change. The licensee demonstrated that monitoring for a change in viscosity and color provided a better indication of oil oxidation or contamination. In addition, the team verified that the components of interest received regular oil changes and were maintained in a standby condition. The team identified no concerns with this commitment change.

Letter 1CAN011405 changed their standard for particle contamination limits from Society of Automotive Engineers 749D to equivalent International Organization for Standardization cleanliness code limits. The team reviewed the activities the licensee performed when making the conversion and reviewed trend graphs for selected components. The team identified no concerns with this commitment change.

Based on review of the actions implemented related to the Oil Analysis Program aging management program, the team concluded the licensee implemented actions to effectively manage the effects of aging during the period of extended operation. The team concluded the licensee met Commitment 17865 prior to the period of extended operation.

15. 16.2.15 Preventive Maintenance Program (17860 and 17866)

The Preventive Maintenance Program aging management program managed the effects of aging caused by cracking, fouling, loss of material and loss of mechanical closure integrity. The licensee performed preventive maintenance (i.e., preplanned, repetitive maintenance tasks) on plant components and systems with the intent to extend equipment operating life and to minimize the possibility of in-service component failures. The licensee included a specific list of the applicable components and the specific aging effects applicable to them in the updated final safety analysis report.

The team reviewed license renewal program basis documents, implementing procedures, maintenance plans, safety analysis report, system health reports, and safety evaluation report. The team interviewed the program owner and reviewed completed work orders and corrective action documents. The team verified that the licensee included references to license renewal in a sample of the preventive maintenance activities. The team verified that licensee made appropriate changes to preventive maintenance activities including the frequency of performing the activities.

Based on review of the actions implemented related to the Preventative Maintenance Program aging management program, the team concluded the licensee implemented actions to effectively manage the effects of aging during the period of extended operation. The team concluded the licensee met Commitments 17860 and 17866 prior to the period of extended operation. The team determined that the licensee met Commitment 11 related to creating new preventive maintenance activities as described in a letter to file, Attachment 1.3, Arkansas Nuclear One, Unit 1 [ML070640041].

16. 16.2.16 Reactor Building Leak Rate Testing Program (17867)

The Reactor Building Leak Rate Testing Program aging management program managed the effects of aging caused by cracking and loss of material. The licensee implemented this program by conducting integrated leak rate testing and local leak rate testing. These tests evaluated the leakage from the building through the various penetrations.

The team reviewed the implementing procedures, program documents, license renewal documents, safety analysis report, and safety evaluation report. The team discussed containment leak rate testing with the program owner. The team reviewed a sample of

previous testing report and determined the licensee followed procedures and corrected deficiencies.

Based on review of the actions implemented related to the Reactor Building Leak Rate Testing Program aging management program, the team concluded the licensee implemented actions to effectively manage the effects of aging during the period of extended operation. The team concluded the licensee met Commitment 17867 prior to the period of extended operation.

#### 17. 16.2.18 Reactor Vessel Integrity Program (17849)

The Reactor Vessel Integrity Program aging management program managed the effects of aging caused by a reduction in fracture toughness of the reactor vessel. The Reactor Vessel Integrity Program aging management program consisted of the following five interrelated subprograms:

- Master Integrated Reactor Vessel Surveillance Program
- Cavity Dosimetry Program
- Fluence and Uncertainty Calculations
- Pressure/Temperature Limits
- Monitoring Effective Full Power Years

The team reviewed license renewal program basis documents, aging management review documents, plant procedures, program documents, safety analysis report, and safety evaluation report. The team interviewed the program owner and reviewed design documents related to each of the five subprograms. The license had developed draft Procedure SEP-FTP-ANO-1, "Reactor Vessel Integrity Program," Revision A, that included requirements related to the renewed license. The licensee indicated that they would issue this procedure prior to entering the period of extended operation. The team verified that LR-LAR-2010-00176, Corrective Action 27 tracked the revision of this document.

The team determined that the licensee participated in the Master Integrated Reactor Vessel Surveillance Program to ensure that they met the requirements of 10 CFR Part 50, Appendices G and H. The team determined that the material of most concern for the Unit 1 reactor vessel were beltline welds containing Linde 80 copper.

The team verified that the licensee periodically evaluated reactor cavity dosimetry to ensure that they had accurate fluence determinations and predictions. The licensee used solid state cavity dosimeters and foils that had the materials used in construction of their vessel such as nickel and copper. The team verified the licensee had used appropriate materials in the cavity dosimeters.

Based on the removal of the cavity dosimeters, the licensee performed updated fluence and uncertainty calculations at 32 effective full power years and extrapolated to an end-of-life at 48 effective full power years. The team verified that the licensee completed fluence and uncertainty calculations that appropriately determined the accumulated neutron fast fluence values. The licensee used the fast fluence values to develop and

update the pressure/temperature limit curves and pressurized thermal shock calculations.

The team determined that Technical Specification 3.4.3, "RCS Pressure and Temperature (P/T) Limits," provided the analysis of the pressure and temperature limitations for reactor operations for 31 effective full power years. The licensee estimated they would achieve this value in 2015 and expected to submit a Technical Specification amendment request in June 2014.

The team reviewed completed surveillance tests and past evaluations to confirm that the licensee routinely tracked the reactor vessel exposure in effective full power years.

Based on review of the actions implemented related to the Reactor Vessel Integrity Program aging management program, the team concluded the licensee implemented actions to effectively manage the effects of aging during the period of extended operation. The team concluded the licensee had established a program to monitor for the effects of aging for the reactor vessel materials and determined that the licensee met Commitment 17849 prior to the period of extended operation.

#### 18. 16.2.19 Service Water Integrity Program (17830)

The Service Water Integrity aging management program managed the effects of aging caused by cracking, fouling, and loss of material. The program included service water piping and components, and supply piping from the emergency cooling pond.

The team reviewed license renewal program basis documents, aging management review documents, plant procedures, program documents, safety analysis report, and safety evaluation report. The team interviewed the program owner and reviewed heat exchanger test and flow test results.

Letter 1CAN011405 revised the commitment to stop performing air flow testing of the high pressure injection makeup room coolers. The team confirmed that calculations demonstrated that the makeup pump room coolers were no longer required to maintain temperature and performed no safety function. The licensee verified the makeup pump room coolers received the appropriate service water flow during flow balancing and verified that the piping continued to maintain its integrity. The team verified that air flow testing was no longer needed. The team identified no concerns with this commitment change.

Based on review of the actions implemented related to the Service Water Integrity Program aging management program, the team concluded the licensee implemented actions to effectively manage the effects of aging during the period of extended operation. The team concluded the licensee met Commitment 17830 prior to the period of extended operation.



19. 16.2.20 Steam Generator Integrity Program (17854)

The Steam Generator Integrity Program aging management program managed the effects of aging caused by cracking, fouling, and loss of material. The Steam Generator Integrity Program applies to the steam generator internals, tubing, and associated repair techniques and components, such as plugs and sleeves.

The team reviewed procedures, program documents, license renewal documents, safety evaluation report, and safety analysis report. The team reviewed selected inspection records and interviewed the program owner. The team verified that the licensee took an appropriate sample population and dispositioned any deficiencies.

The licensee replaced their once through steam generators in 2005 with steam generators having tubes fabricated from thermally-treated Alloy 690 for improved resistance to flow induced erosion and flow assisted corrosion.

Based on review of the actions implemented related to the existing Steam Generator Integrity Program aging management program, the team concluded the licensee implemented actions to effectively manage the effects of aging during the period of extended operation. The team concluded the licensee met Commitment 17854 prior to the period of extended operation.

20. 16.2.21 System and Component Monitoring, Inspections, and Testing Programs

16.2.21.2 Battery Quarterly Surveillance Program (17841)

The Battery Quarterly Surveillance Program aging management program managed the effects of aging caused by loss of material. The surveillance program looked for physical damage or abnormal deterioration of the battery racks

The team reviewed license renewal program basis documents, aging management review documents, plant procedures, program documents, safety analysis report, and safety evaluation report. The team interviewed the program owner, verified that implementing procedures discussed license renewal commitments, and verified the licensee implemented appropriate corrective actions for condition reports.

Based on review of the actions implemented related to the Battery Quarterly Surveillance Program aging management program, the team concluded the licensee implemented actions to effectively manage the effects of aging during the period of extended operation. The team concluded the licensee met Commitment 17841 prior to the period of extended operation.

16.2.21.3 Control Room Ventilation Testing Program (17833)

The Control Room Ventilation Testing Program aging management program managed the effects of aging caused by fouling. This program applied to the external surfaces of the control room emergency cooling coils.

The team reviewed procedures, program documents, license renewal documents, safety evaluation report, and safety analysis report. The team reviewed selected inspection records and interviewed the program owner. The team verified that the licensee performed periodic maintenance and testing in accordance with the technical specifications.

Based on review of the actions implemented related to the Control Room Ventilation Testing Program aging management program, the team concluded the licensee implemented actions to effectively manage the effects of aging during the period of extended operation. The team concluded the licensee met Commitment 17833 prior to the period of extended operation.

#### 16.2.21.4 Core Flood Tank Monitoring Program (17834)

The Core Flood Tank Monitoring Program aging management program managed the effects of aging caused by loss of material because of boric acid corrosion. This program applied to the wetted portions of the core flood tanks.

The team reviewed license renewal documents, implementing procedures, program documents, safety evaluation report, and safety analysis report. The team interviewed the program owner and verified that the implementing procedures included the license renewal commitments. The licensee implemented this program by monitoring tank levels and pressures once each shift and trending the results.

Based on review of the actions implemented related to Core Flood Tank Monitoring Program aging management program, the team concluded the licensee implemented actions to effectively manage the effects of aging during the period of extended operation. The team concluded the licensee met Commitment 17834 prior to the period of extended operation.

#### 16.2.21.5 Emergency Diesel Generator Testing and Inspection Program (17835 and 17843)

The Emergency Diesel Generator Testing and Inspection Program aging management program managed the effects of aging caused by cracking, fouling, loss of material, and loss of bolted closure integrity. The program included the following subsystems and components for the emergency diesel generator and subassemblies: starting air system, intake air after coolers, cooling water heat exchangers, piping and muffler for the exhaust components, lube oil coolers, cooling water carbon steel components, and stainless steel components

The team reviewed the safety analysis report supplement, program basis documents, implementing procedures and preventative maintenance tasks, license renewal documents, and safety evaluation report. The team interviewed the program owner and reviewed completed inspections and corrective action documents.

The licensee started the emergency diesel generators monthly in accordance with Procedure OP-1104.036, "Emergency Diesel Generator Operation," Revision 66. The licensee used Procedure OP-1402.066, "24 Month Inspection on Unit One Emergency

Diesel Generator Engine,” Revision 35 as part of regular engine maintenance. The team verified the licensee regularly drained and inspected the emergency diesel generator fuel oil tanks.

Based on review of the actions implemented related to Emergency Diesel Generator Testing and Inspection Program aging management program, the team concluded the licensee implemented actions to effectively manage the effects of aging during the period of extended operation. The team concluded that the licensee met Commitments 17835 and 17843 prior to the period of extended operation.

#### 16.2.21.6 Emergency Feedwater Pump Testing Program (17836)

The Emergency Feedwater Pump Testing Program aging management program managed the effects of aging caused by fouling, loss of material, and loss of mechanical closure integrity. The licensee included the turbine-driven and motor-driven emergency feedwater pumps and associated components.

The team reviewed the safety analysis report supplement, program basis documents, implementing procedures and preventative maintenance tasks, license renewal documents, and safety evaluation report. The team interviewed the program owner and reviewed completed inspections and corrective action documents.

Letter 1CAN011405 revised the frequency of testing the emergency feedwater pumps from once per 31 days to quarterly. The team verified that Technical Specification Surveillance Requirement 3.7.5.2 specified testing the emergency feedwater pumps in accordance with the inservice testing program. The team verified that the licensee changed the pump testing frequency when they converted to Improved Technical Specifications in October 2001. ASME Section XI, Subsection IWP specified that inservice tests of pumps will be performed nominally every 3 months. The team identified no concerns with this commitment change.

Based on review of the actions implemented related to Emergency Feedwater Pump Testing Program aging management program, the team concluded the licensee implemented actions to effectively manage the effects of aging during the period of extended operation. The team concluded that the licensee met Commitment 17836 prior to the period of extended operation.

#### 16.2.21.7 Sodium Hydroxide Tank Level Monitoring Program (17838)

The Sodium Hydroxide Tank Level Monitoring Program aging management program managed the effects of aging caused by cracking, loss of material, and loss of mechanical closure integrity. The licensee included the sodium hydroxide system components and monitored for changes in tank level.

The team reviewed license renewal documents, implementing procedures, program documents, safety evaluation report, inspection records, and safety analysis report. The team interviewed the program owner, reviewed condition reports for the last 5 years, and reviewed void check ultrasonic evaluations.

Based on review of the actions implemented related to the Sodium Hydroxide Tank Level Monitoring Program aging management program, the team concluded the licensee implemented actions to effectively manage the effects of aging during the period of extended operation. The team concluded the licensee met Commitment 17838 prior to the period of extended operation.

#### 16.2.21.8 Spent Fuel Pool Level Monitoring Program (17839)

The Spent Fuel Pool Level Monitoring Program aging management program managed the effects of aging caused by cracking that could result in leakage through the spent fuel pool liner.

The team reviewed the safety analysis report, the program basis documents, implementing procedures and preventative maintenance tasks, structural drawings for the spent fuel pool and drains, the license renewal application, the safety evaluation report, and the correspondence to and from the NRC. The team interviewed the program owner, reviewed relevant condition reports, completed inspections, and work orders.

The team verified the licensee monitored the spent fuel pool level during operator rounds and continuous monitoring of installed instrumentation that provided a low pool level alarm in the Control Room. Procedure OP-1015.003A, "UNIT 1 Operations Logs," Revision 83, Attachment B, required that operators record the spent fuel pool level during all modes of operation.

Based on review of the actions implemented related to the Spent Fuel Pool Level Monitoring Program aging management program, the team concluded the licensee implemented actions to effectively manage the effects of aging during the period of extended operation. The team concluded that the licensee met Commitment 17839 prior to the period of extended operation.

### .03 Time-Limited Aging Analyses

#### a. Scope

The team evaluated whether the licensee completed the time-limited aging analyses as described in the safety evaluation report. The team verified whether the licensee conducted appropriate evaluations that demonstrated the time-dependent aging effects continued to meet design requirements throughout the period of extended operation.

#### b. Findings and Observations

##### 1. 16.3.1 Reactor Vessel Neutron Embrittlement (17850)

For the extension of plant service-life from 40 years to 60 years, the licensee identified neutron embrittlement of the beltline region, including pressurized thermal shock and Charpy upper-shelf energy reduction as requiring a time-limited aging analysis.

The team reviewed license renewal program documents, regulatory requirements, surveillance tests, engineering reports, and industry studies. The team interviewed

license renewal personnel and the program owner. This time-limited aging analysis has a companion aging management program and was monitored by the licensee in accordance with the technical specifications. The team determined that the licensee was performing an evaluation to demonstrate that the reactor vessel operating period could be extended from the 31.2 to 54 effective full power years, which would allow operation through the end of the period of extended operation. Technical Specification 3.4.3 provided the analysis of the pressure and temperature limitations for reactor operations for 31 effective full power years. Based on operating history of the plant, the licensee determined that they would achieve 31 effective full power years in 2015. The licensee stated they planned to submit a Technical Specification Amendment request in June 2014 that justified extending the pressure temperature operating limits to 54 effective full power years.

The team determined the licensee used the Reactor Vessel Integrity Program aging management program to ensure that the time dependent parameters used in the time-limited aging analysis evaluations for pressurized thermal shock and Charpy upper-shelf energy reduction remained valid through the period of extended operation. Although the licensee would revise Technical specification 3.4.3 or shut down prior to exceeding 31 effective full power years, the team concluded the licensee had not met the conditions for meeting this time-limited aging analysis prior to the period of extended operation. Similarly, the team concluded that the licensee had not met Commitment 17850 prior to the period of extended operation. The team will review this commitment during the Phase 3 inspection.

## 2. 16.3.2 Metal Fatigue (17876)

For the extension of plant service-life from 40 years to 60 years, the licensee identified metal fatigue resulting from thermal transient cyclic loads as a time-limited aging analysis. The time-limited aging analysis required fatigue evaluations to remain valid for the period of extended operation. The licensee updated their fatigue stress analyses to account for monitoring or tracking of actual operating cycles to ensure sufficient margins existed such that the allowable cycles would not be exceeded. The team verified that the licensee continued to maintain transient cycle logging to ensure the fatigue analysis assumptions remained valid during the period of extended operation.

The licensee evaluated the potential for fatigue cracking of the pressurizer surge line, the makeup/high pressure injection nozzles, and the decay heat removal ASME Class 1 piping using the method and environmental fatigue data provided in NUREG/CR-5704, "Effects of LWR Coolant Environments on Fatigue Design Curves of Austenitic Stainless Steels," dated April 1999 and NUREG/CR-6260, "Application of NUREG/CR-5999, 'Interim Fatigue Curves to Selected Nuclear Power Plant Components.'"

The team verified that the licensee had developed a comprehensive method to count fatigue cycles based on plant conditions. Procedure OP-1010.010, "Unit One Transient Cycle Logging and Reporting," Revision 8, described the specific plant conditions (e.g., time of injection, pressures, power level, and temperatures) that resulted in a cycle count for the piping and components being monitored. The team verified that the licensee projected the cycle counts based on historical performance and confirmed that the cycle counts would not exceed any limits by the end of the period of extended operation if the

cycle count rates remained consistent with past performance. The licensee identified that Unit 1 had experienced two cool down transients and one reactor trip from greater than 20 percent power. Although the licensee had not generated the 2013 fatigue cycle count report, the team reviewed the power level changes and discussed the types of power level changes that would result in cycle counts. The team determined that the licensee appropriately evaluated the transients and counted the cumulative cycles. The licensee met Commitment 17876 prior to entering the period of extended operation.

3. 16.3.3 Environmental Qualification Program (17869)

For the extension of plant service-life from 40 years to 60 years, the environmental qualification program and the continued qualification of long-lived, passive and active electrical components and commodities located in harsh environments were required to be monitored. Procedure EN-DC-164, "Environmental Qualification (EQ) Program," Revision 4, provided the implementing guidance for the environmental qualifications program.

The team reviewed calculations, evaluations, and Environmental Qualification Report Assessments. The team interviewed the program owner, and held discussions on methods used to calculate remaining life for components in the EQ program, composition of electrical insulation in Conex containment electrical penetrations, and component replacement requirements for equipment not qualified for the period of extended operation.

Based on review of the actions implemented related to this time-limited aging analysis, the team concluded reasonable assurance existed that the licensee had performed adequate evaluations demonstrating that the component would continue to function through the period of extended operation without any adverse effects from the applicable aging effects. The team concluded the licensee met Commitment 17869 prior to the period of extended operation.

4. 16.3.6 Aging of Boraflex in Spent Fuel Pool Rack (17868)

This time-limited aging analysis required the licensee to perform continued monitoring of Boraflex in their spent fuel pool storage racks because of industry concerns related to degradation of the Boral material inside the storage racks. The aging effects requiring management included loss of material created by gamma flux, which changes the material characteristics of the base polymer, and chemical environment, from the exposure to borated water. The team determined that the licensee had modified their spent fuel pool to eliminate dependence upon the Boral in the spent fuel pool racks because it had degraded.

The team reviewed license renewal documents, the design modification that installed the Metamic® poison insert assemblies, completed surveillance tests, regulatory requirements and program procedures. The team interviewed licensee personnel including the program owner for conducting the Technical Specifications Surveillance.

Letter 1CAN011405 described that the spent fuel pool racks no longer required aging management since they replaced the Boraflex with Metamic® inserts in the spent fuel

pool racks in 2007. The team determined that the licensee monitored the absorbers in accordance with the Metamic® Coupon Sampling Program and Arkansas Nuclear One, Unit 1, Technical Specification Surveillance Requirement 3.7.15.2. The team identified no concerns with this commitment change.

The team reviewed licensee implementation of Technical Specification Surveillance Requirements 3.7.15.1 and 3.7.15.2. The team verified that the licensee had established appropriate controls for offloading their core such that they placed new and used fuel assemblies in the appropriate regions of their spent fuel pool. The team confirmed that the licensee appropriately classified fuel assemblies and established fuel movements so that they placed the correct type of fuel assembly in the correct region of their spent fuel pool.

The team determined that the licensee continued to monitor their burnable poison assemblies located in their spent fuel pool racks for aging effects. Specifically, the licensee had coupons monitored for loss of material and conducted neutron attenuation testing of the poison insert assembly coupons. Further, the licensee continued to ensure that they maintained a 5 percent subcriticality margin in the spent fuel pool by maintaining the boron concentration above 2000 ppm (parts per million) and by verifying the Metamic® poison insert assemblies continued to absorb neutrons as designed.

Although the licensee revised their license renewal application to remove this commitment to a time-limited aging analysis, the team verified that the licensee continued to monitor their new material for the effects of aging. Further, the team concluded the licensee performed evaluations that demonstrated that the component would continue to function through the period of extended operation without any adverse effects from the applicable aging effects. The team concluded the licensee met Commitment 17868 prior to the period of extended operation.

#### .04 Newly Identified Components

##### a. Inspection Scope

The team evaluated whether the licensee reviewed and identified newly identified components and incorporated these components into the appropriate aging management programs.

##### b. Observations and Findings

Procedure SEP-LR-ANO-001, "Aging Management Review and TLAA Evaluation of Newly Identified SSCs," Revision 0, prescribed the review process to evaluate whether they had any newly identified components. The licensee conducted their initial review for the 11-year period from January 1, 1999, through July 6, 2010. The licensee reviewed correspondence to the NRC; engineering requests, engineering evaluations, and modifications; and reviewed engineering changes. From this set of documents, the licensee performed detailed review of 11 unique components and determined that the aging effects had been included in the license renewal application or determined that they had been replaced and not subject to aging management. The team verified that the licensee had included screening criteria that assessed the impact of engineering

changes and modifications in Procedure EN-DC-115, "Engineering Change Process," Revision 16.

The team independently reviewed the evaluations and determined that the licensee took appropriate actions to identify "newly identified" structures, systems, and components. The team determined that the licensee had established an appropriate scope and appropriately evaluated for management of aging affects.

.05 Verification of Updated Safety Analysis Supplement

a. Inspection Scope

The team evaluated whether the licensee revised the safety analysis report supplement to reflect the aging management program and time-limited aging analysis descriptions in the safety evaluation report. The team compared the aging management program and time-limited aging analysis descriptions to the programs being implemented to determine whether they matched the programs being implemented and whether the licensee had incorporated the newly identified components into the safety analysis report supplement.

b. Observations and Findings

The team determined that the licensee appropriately described their aging management programs in the safety analysis report and had appropriately used their 10 CFR 50.59 program to make changes to the safety analysis report.

.06 Review of Administrative Controls

a. Inspection Scope

The team reviewed administrative controls related to changing commitments, identifying and incorporating operating experience related to aging effects, and identifying deficiencies in the corrective action program attributable to aging effects. The team evaluated whether the licensee updated aging management programs to account for operating experience issued since the licensee had received the renewed license and any changes to the GALL Report or other approved topical reports.

The team reviewed the corrective action program to evaluate whether the applicant established a method to evaluate the effects of aging and to identify deficiencies that might have resulted from aging effects.

The team sampled corrective action documents, interviewed personnel, evaluated corrective actions implemented, and reviewed process documents during this inspection.

b. Observations and Findings

The team determined that the licensee had established appropriate administrative controls. Specifically, the team verified that the licensee had initiated corrective action documents related to aging effects for their aging management programs and had monitored industry operating experience.



The team determined that Procedure EN-LI-110, "Commitment Management Program," Revision 5, followed the recommendations of NEI 99-04. The licensee issued Letter 1CAN011405 that revised numerous commitments. The team reviewed each of the revised commitments while reviewing the implementation of the aging management programs. The team determined that the licensee had appropriately revised these commitments.

The licensee assessment in response to Regulatory Information Summary 2005-011, "Information on Revision 2 to The Generic Aging Lessons Learned Report for License Renewal of Nuclear Power Plants," dated July 1, 2011, identified three gaps among the activities they had described in their license renewal application and those described in GALL Report, Revision 2; specifically, the licensee identified the following areas that needed to be added to their aging management activities:

- Establish a task to perform ultrasonic inspections of above ground tank bottoms within 5 years of entering the period of extended operation and every 10 years thereafter,
- Establish a task to perform ultrasonic testing of fire water system piping at different locations, and
- Create and develop a process to evaluate for the presence of selective leaching.

With the turnover in plant personnel and the large number of new engineers, the team verified that you have established training next quarter for aging management and had been established on a 4-year requalification frequency. Your staff confirmed that you had last provided the training to engineers in 2010. The team noted that the licensee included experienced and, relatively inexperienced, personnel in the technical discussions as part of their succession planning and turnover process.

#### **4OA6 Meetings, Including Exit**

The team presented the initial inspection results to Mr. Jeremy Browning, Site Vice President, and other members of the licensee staff at the conclusion of the onsite inspection on January 31, 2014. The licensee acknowledged the NRC inspection observations and findings.

The team presented the final inspection results to Mr. Jamie McCoy, Director, Engineering, and other members of the licensee staff during a followup exit meeting conducted on March 12, 2014. The team retained no proprietary information and verified that no proprietary information was documented in this report.

ATTACHMENT: SUPPLEMENTAL INFORMATION

## **SUPPLEMENTAL INFORMATION**

### **PERSONS CONTACTED**

#### Licensee

B. Ayers, Chemistry Specialist I, Chemistry  
D. Barborek, Senior Lead Engineer, System Engineering  
R. Bayer, Superintendent, Maintenance  
T. Bennet, Project Manager, Engineering  
M. Bhatti, Senior Lead Engineer, Design Engineering  
K. Brigrance, Chemistry Specialist I, Chemistry  
J. Browning, Site Vice President  
S. Chandler, Senior Engineer, Program Engineering  
R. Chavers, Electrical Coordinator, Maintenance  
D. Conyers, Engineer III, System Engineering  
P. Crosby, Engineer III, Program Engineering  
M. Defrancisco, Mechanical Coordinator, Maintenance  
S. Ellis, Engineer III, Design Engineering  
M. Estep, Engineer II, Design Engineering  
K. Gaston, Senior Lead Engineer, Program Engineering  
J. Gebhart, Technical Specialist IV, Maintenance  
J. Gray, Engineer III, Program Engineering  
T. Hatfield, Engineer II, Program Engineering  
C. Heinzen, Technical Specialist, Fire Protection  
R. Hendrix, Technical Specialist IV, Maintenance  
G. Holman, Senior Chemistry Specialist, Chemistry  
G. Hudnall, Quality Auditor Supervisor, Quality Assurance  
D. James, Director, Regulatory & Performance Improvement  
C. Johnson, Senior Engineer, Design Engineering  
R. Jones, Technical Specialist IV, Maintenance  
C. Kane, Engineer III, System Engineering  
J. Keys, Shift Manager, Operations  
J. Kinder, Senior Engineer, System Engineering  
J. Krentz, Engineer II, Design Engineering  
R. Mars, Senior Engineer, Design Engineering – Electrical  
J. McCoy, Director, Engineering  
R. McGaha, Technical Specialist IV, Program Engineering  
D. Meatheany, Senior Lead Technical Specialist, Program Engineering  
N. Mosher, License Specialist IV, Licensing  
D. Neufeld, Engineer I, System Engineering  
K. Panther, Examiner Level III, Program Engineering  
M. Prock, Supervisor, Chemistry  
S. Pyle, Regulatory Assurance Manager  
P. Schluterman, Technical Specialist III, Maintenance  
L. Schwartz, Supervisor, Design Engineering - Civil  
B. Steinman, Senior Lead Engineer, Environmental Quality  
D. Vest, Senior Engineer, System Engineering

C. Walker, Senior Engineer, Program Engineering  
D. Walker, Technical Specialist, Engineering  
A. Van Es, Engineer I, System Engineering

#### License Renewal

A. Ahrabli, Senior Lead Engineer  
A. Cox, License Renewal Technical Manager  
R. Fougereousse, Consultant, License Renewal – Analysis  
E. Gresh, Project Manager  
L. Howard, Consultant, License Renewal – Mechanical  
T. Ivy, Senior Staff Project Manager  
L. Lloyd, Consultant, License Renewal – Mechanical  
M. McInerney, Consultant, License Renewal - Operations  
H. Rideout, Senior Lead Engineer  
R. Rucker, Consultant, License Renewal – Electrical

### **LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED**

#### **Opened and Closed**

05000368/2014007-01    NCV    Failure to Reassess the Effects of Aging  
(Section 40A5.02.b.3)

### **COMMITMENTS**

NRC closed Commitments 17842, 17863, and 17882 in Inspection Report 05000313/2013008.

The team closed the following Commitments in this inspection report:

17826, 17827, 17828, 17829, 17830, 17831, 17832, 17833, 17834, 17835 & 17843, 17836, 17837, 17838, 17839, 17840 & 17870, 17841, 17844, 17845 & 17846, 17847, 17848, 17849, 17852, 17853, 17854, 17856, 17857, 17858, 17859, 17860 & 17866, 17861, 17862, 17864, 17865, 17867, 17868, 17869, 17871, 17873, 17874, 17876, 17877, 17878, 17879, 17880, 17881, and 17882

As described in the report, the team did not close Commitments 17850, 17851, 17855, 17872, 17875, and 19358.

Additionally, as described in a letter to file entitled, "Commitment Lists for Renewed Operating License (ROL) Plants with No Commitment Appendix Attached to Its ROL Safety Evaluation Reports/NUREGs for Use with IP 71003," dated March 6, 2007, Attachment 1.3, Arkansas Nuclear One, Unit 1, the licensee had 11 commitments listed. The team determined that the following commitments were closed: 1, 2, 3, 4, 6, 9, 10, and 11.

Commitments 5, 7, and 8 coincide with 17851, 17855, and 19358, respectively.

## DOCUMENTS REVIEWED

### General

#### Letters

<u>Number</u>	<u>Title</u>	<u>Date</u>
1CAN010003	License Renewal Application	January 31, 2000
1CAN040001	License Renewal Information	April 11, 2000
1CAN070001	License Renewal Application RAIs	July 6, 2000
1CAN070003	License Renewal Application RAIs	July 31, 2000
1CAN080003	License Renewal Application RAIs	August 24, 2000
1CAN080007	License Renewal Application RAIs	August 30, 2000
1CAN090002	License Renewal Application RAIs	September 6, 2000
1CAN090003	License Renewal Application RAIs	September 7, 2000
1CAN090004	License Renewal Application RAIs	September 12, 2000
1CAN100001	License Renewal Application RAI Clarifications	October 3, 2000
1CAN110001	License Renewal Application RAI Clarifications	November 2, 2000
1CAN120001	License Renewal Application RAI Clarifications	December 20, 2000
1CAN030103	License Renewal Safety Evaluation Report Open Item Responses	March 14, 2001
1CAN011405	Notification of Revised License Renewal Commitments	January 30, 2014
1CNA040107	Arkansas Nuclear One, Unit 1, License Renewal Safety Evaluation Report	April 12, 2001

#### Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision</u>
93-R-1011-01	Review of the Programs Credited in the License Renewal Evaluations	0
LR-LAR-ANO1-2010-00176	Tracking of License Renewal Program Implementation	

#### **4OA5.01 New Aging Management Programs**

##### **16.1.1 Buried Pipe Inspection Program (17827)**

###### **Condition Reports (ANO-1-CR-)**

2013-00024      2013-00304      2013-03034      2013-01187      2014-00092\*  
LO-WTHQN-2011-00219

\*CR's issued as a result of inspection activities.

###### **Design Document**

<u>Number</u>	<u>Title</u>	<u>Revision</u>
ER-ANO-2004-0573-000	ANO Buried Piping Life Cycle Management Study for SW, ACW, FW, CW and Fuel Oil Piping	0

###### **Miscellaneous**

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
	ANO Underground Piping and Tank Program Scope Spreadsheet	
	Opportunistic Inspection of Domestic Water line leak	April 7, 2008
	Opportunistic Inspection of 2HBC-184-8" line for Cathodic Protection inspection	December 12, 2011
	Opportunistic Inspection of Domestic Water line leak	July 23, 2012
6600-C-303	Specification for Installation of Welded Steel Circulating Water Pipe and Fittings for Arkansas Nuclear One	2
6600-M-400	Specification for External Surface Treatment of Underground Metallic Pipe for Arkansas Nuclear One	0
93-R-1016-06	Aging Management Review of the Service Water System	1
93-R-1016-22	Aging Management Review of the Fuel Oil System	1
APL-C-2301	Specific Conditions for Structural Backfill and Pipe Trench Excavation and Backfill for Arkansas Nuclear One	September 14, 1989
CALC-ANO1-ME-11-00002	ANO-1 Buried Pipe Inspection Program for License Renewal Implementation	0

### Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
NEI 09-14	Guideline for the Management of Underground Piping and Tank Integrity	December 2010
Program Health Report	BPT – Buried Piping and Tanks Program	2nd Quarter - 2013
System Health Report	CP – Cathodic Protection	4th Quarter - 2013

### Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
CEP-UPT-0100	Underground Piping and Tanks Inspection and Monitoring	1, 2
EN-DC-343	Underground Piping and Tanks Inspection and Monitoring Program	7, 9
EN-EP-S-002-MULTI	Underground Piping and Tanks General Visual Inspection	1
EN-WM-105	Planning	10
SEP-UIP-ANO	Arkansas Nuclear One (ANO) Underground Components Inspection Plan (Rad and Non-Rad Lines)	1

### **16.1.2 Electrical Components Inspection Program (17874)**

#### Condition Report (ANO-CR-)

C-2003-00067

### Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
93-R-1017-01	Aging Management Review of the Passive Electrical Components	0
93-R-1017-02	ANO-1 License Renewal Screening of Ohmic Heating in Power Cables	0
93-R-1017-03	ANO-1 License Renewal Screening of Power Cables Potentially Subjected to Wetting	0
93-R-1017-04	ANO-1 License Renewal Screening of Frequently Manipulated Cables and Cable Terminations	0

Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
93-R-1017-05	ANO-1 License Renewal Screening of Cables and Terminations Exposed to Potentially Hazardous Chemicals	0
93-R-1017-06	ANO-1 License Renewal Screening of Impedance Sensitive Circuits	0
93-R-1017-07	ANO-1 License Renewal Screening of Cables Exposed to High Radiation Dose Rates	0
93-R-1017-08	ANO-1 License Renewal Screening of Cables Outside Containment Exposed to Elevated Temperatures or Hot Spots	0
93-R-1017-09	ANO-1 License Renewal Screening of Cables Inside Containment Exposed to Elevated Temperatures or Hot Spots	0
93-R-1017-10	ANO-1 License Renewal Screening of Electrical Connections	0
CALC-ANO1-EE-11-00001	ANO-1 Screening and Aging Management Review of Electrical Components for RIS 2007-016	0
CALC-ANO1-EE-11-00003	Cable and Connection Inspection Summary Report	0
CALC-ANO1-EE-11-00004	Non-EQ Sensitive Instrumentation Circuits Test Review	0
CALC-ANO1-EE-13-00005	Non-EQ Inaccessible Medium-Voltage Cable and Manhole Review	0
CR-ANO-C-2003-00067	Root Cause Analysis Report – Degrading Trend of Underground Cable Failures	March 11, 2003
TDD1020150	Instruction Manual for Delta Switchboard Company Non-segregated Bus	2

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
1304.041	Unit 1 Reactor Protection System Channel A Calibration	45
1304.057	Unit 1 Source Range Channels Calibration	20
1304.085	Unit 1 Pressurizer Relief Valve Monitoring System Calibration	17

### Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
1304.098	Unit 1 EFIC Channel A Calibration	30
1403.012	Unit 1 P-4A/B/C Service Water Pump Motor Inspection/Maintenance	13
EN-DC-346	Cable Reliability Program	6
EN-DC-348	Non-EQ Insulated Cables and Connections Inspection	5
EN-FAP-LR-027	License Renewal Sensitive Instrumentation Circuits Review AMP	1
EN-MA-138	VLF Tan Delta and Withstand Testing of Electrical Power Cables	2

### Work Orders

00193345	00209740	00241168	00248455	00261576	00261577
50237515	50244579	51510190	51702040	52319276	52424131

### **16.1.3 Heat Exchanger Monitoring Program (17864)**

### Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision</u>
93-R-1016-06	Aging Management Review of the Service Water System	0
93-R-1016-11	Aging Management Review of the Emergency Feedwater System	0
93-R-1016-24	Aging Management Review of the Chilled Water System	0
CALC-ANO1-ME-11-00007	Review of the Heat Exchanger Monitoring Aging Management Program for License Renewal Implementation	0
Procedure EN-DC-316	Heat Exchanger Performance Monitoring and Condition Monitoring	5



#### 16.1.4 Pressurizer Examinations Program (17848)

##### Examinations

<u>Number</u>	<u>Title</u>	<u>Date</u>
1-ISI-UT-07-025	05-008, Heater Belt Shell to Lower Head Circumferential Seam	May 2, 2007
1-ISI-UT-07-026	05-011, Heater Bundle Shell Long Seam at Y-Axis	May 2, 2007
1-ISI-UT-10-021	05-012, Spray Nozzle to Head Weld	April 5, 2010
1-ISI-VT-13-033	6.8, T-1, 2 & 3 Pressurizer Heater Bundles	March 29, 2013
1-ISI-VT-13-102	6.14, RCS Post-Outage Pressure Test for North Cavity & Pressurizer	August 6, 2013

##### Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
	Technical Basis for Changing Pressurizer Heater Bundle Penetration Weld Examination Commitment	January 16, 2014
93-R-1013-04	Demonstration of the Management of Aging Effects for the ANO-1 Pressurizer	0
51-5055656-00	TMI-1 Pressurizer Heater Bundle Inspection Report	March 5, 2005
BAW-2244A	Demonstration of the Management of Aging Effects for the Pressurizer	December 1997
CALC-ANO1-ME-11-00012	Review of the Pressurizer Examinations Aging Management Program for License Renewal Implementation	0
Drawing MIG-1, Sht 1	Pressurizer General Arrangement	10

##### Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
CEP-NDE-0902	VT-2 Visual Examination (ASME Section XI)	7
OP-5120.242	Unit 1 – Post-Outage Pressure Test	13

### 16.1.5 Reactor Vessel Internals Program (17851)

#### Calculations

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
32-9097174-000	Assessment of the November 2008 Core Barrel Bolts Inspections at Arkansas Unit 1	November 12, 2008
86-E-0074-143	Corrosion Evaluation of Hot Leg Level Tap Nozzle Repair ANO1	0
CALC-ANO1-ME-10-00004	Summary of ANO-1 Lower Core Barrel Bolt Assessment with Structural Analysis	0

#### Examinations

<u>Number</u>	<u>Title</u>	<u>Date</u>
WDI-PJF-1303984-FSR-01	Arkansas Nuclear One, Unit 1, 1R21 Reactor Internals Bolting Inservice Inspection Final Report	December 2008
WDI-STD-088	Reactor Vessel Internals Inspection	November 2008

#### Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
1200459.401	PWR Internals Aging Management Program Plan for Arkansas Nuclear One, Unit 1	0
51-9130650-000	Summary of ANO-1 Lower Core Barrel Bolt Assessment	April 1, 2010
93-R-1013-08	Demonstration of the Management of Aging Effects for the ANO-1 Reactor Vessel Internals	0
AREVA-13-01501	Recommended Examination of Vent Valve Locking Devices for B&W Nuclear Units	May 20, 2013
BAW-2251A	Demonstration of the Management of Aging Effects for the Reactor Vessel	August 1999
CALC-ANO1-ME-11-00026	Review of the Reactor Vessel Internals Aging Management Program for License Renewal Implementation	0
EPRI 1012081	Materials Reliability Program: PWR Internals Material Aging Degradation Mechanism Screening and Threshold Values (MRP-175)	December 2005
EPRI 1016609	Materials Reliability Program: Inspection Standard for PWR Internals (MRP 228)	July 2009

### Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
EPRI 1022863	Materials Reliability Program: Pressurized Water Reactor Internals Inspection and Evaluation Guidelines (MRP-227-A)	December 2011
Letter OG-07-043	Recommendations from Former B&WOG Materials Committee Projects	January 26, 2007
SEP-ISI-ANO1-101	ASME Section XI, Division 1, ANO1 Inservice Inspection Program	0
WCAP-17096-NP	Reactor Internals Acceptance Criteria Methodology and Data Requirements	2

### Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
EN-DC-133	PWR Vessel Internals Program	0
SEP-PVI-ANO1-001	Arkansas Nuclear One Site Specific PWR Vessel Internals Program	0

### **16.1.6 Spent Fuel Pool Monitoring Program (17831) and 16.2.21.8 Spent Fuel Pool Level Monitoring Program (17839)**

#### Condition Report (ANO-1-CR-)

LO-ANO-2006-00088

### Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision</u>
93-R-1016-04	Aging Management Review of the Spent Fuel System	1
CALC-ANO1-ME-11-00005	Review of the Spent Fuel Pool Monitoring Aging Management Program for License Renewal Implementation	0

### Drawings

<u>Number</u>	<u>Title</u>	<u>Revision</u>
M-48	Piping Area Drawing – Reactor Auxiliary Building Section B4	13
M-116	Drainage Auxiliary Building Area No. 4 Plan At EL. 359'-0" – 372'-0"	15
C-233	Auxiliary Building Spent Fuel Pool Area Liner Details	6

### Drawings

<u>Number</u>	<u>Title</u>	<u>Revision</u>
C-231	Auxiliary Building Spent Fuel Pool Area Liner Plan and Sections	11
M-235	Piping & Instrumentation Diagram Spent Fuel Cooling System	68

### Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
OP-1104.006	Spent Fuel Cooling System	55
OP-1015.003A	UNIT 1 Operations Logs	87

### Work Orders

52453252                      52458082                      52462645

### **16.1.7 Wall Thinning Program (17855)**

#### Condition Report (ANO-1-CR-)

2005-00344

### Engineering Reports

<u>Number</u>	<u>Title</u>	<u>Revision</u>
93-R-1016-11	Aging Management Review of the Emergency Feedwater System	0
93-R-1016-12	Aging Management Review of the Sodium Hydroxide System	0
93-R-1016-14	Aging Management Review of the Main Steam System	0
93-R-1016-19	Aging Management Review of the Condensate Storage System	0
93-R-1016-23	Aging Management Review of the Containment Isolation Mechanical Components	0
93-R-1016-24	Aging Management Review of the Chilled Water System	0

### Examinations

<u>Number</u>	<u>Title</u>	<u>Date</u>
DBD01P001	Emergency Feedwater System Pump 7A Discharge	March 19, 2013
DBD02P001	Emergency Feedwater System Pump 7B Discharge	March 20, 2013

### Examinations

<u>Number</u>	<u>Title</u>	<u>Date</u>
EBD06R001	Emergency Feedwater System Discharge Expansion Nozzle	May 15, 2013
EBD11P002	Emergency Feedwater System Minimum Recirc Flow Connection	March 20, 2013
E-109 LO Cooler	Emergency Feedwater Lube Oil Cooler Heat Exchanger Casing	May 29, 2013
HBD24T003	Emergency Feedwater System Cross Tee3	March 21, 201
JBD-1-12	Emergency Feedwater System Cross Tee	May 6, 2013
LRA-P-058	Penetration 58	April 8, 2013
LRA-P-064	Penetration 64	April 8, 2013

### Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
CALC-ANO1- ME-11-00027	Review of the Wall Thinning Inspection Aging Management Program for License Renewal Implementation	0
Engineering Change 17838	ANO-1 Flow Accelerated Corrosion (FAC) Program System Susceptibility Evaluation	November 30, 2009
SEP-WTI-ANO- 001	Wall Thinning Inspection (WTI) Program	0
Work Order 82917-01	T-10 NaOH External Tank Inspection	November 26, 2013

## **4OA5.02 Existing Aging Management Programs**

### **16.2.1 Alloy 600 Program (17871)**

#### Engineering Reports

<u>Number</u>	<u>Title</u>	<u>Revision</u>
93-R-1013-01	Demonstration of the Management of Aging Effects for the ANO-1 Reactor Vessel	0
93-R-1013-03	Demonstration of the Management of Aging Effects for the ANO-1 RCS Piping	0

### Engineering Reports

<u>Number</u>	<u>Title</u>	<u>Revision</u>
93-R-1013-04	Demonstration of the Management of Aging Effects for the ANO-1 Pressurizer	0

### Examinations

<u>Number</u>	<u>Title</u>	<u>Date</u>
1-ISI-UT-13-020	25-029, Cold Leg Drain Nozzle to SE Circ Weld	April 25, 2013
1-ISI-VT-13-032	15-018, Hot Leg Branch Connection Full Penetration Weld	April 2, 2013
1-ISI-VT-13-038	14-012, A600 Mounting Boss w/182 Full Pen Weld to HL	April 3, 2013
ANO-39Q-LPA-01	05-042, Outside Diameter Surface of Weld Overlay	May 8, 2007

### Letters

<u>Number</u>	<u>Title</u>	<u>Date</u>
1CAN050705	Weld Overlay Examination Results	May 22, 2007
1CAN060902	Request for Alternative – Implementation of a Risk-Informed Inservice Inspection Program Based on ASME Code Case N-716	June 11, 2009
1CNA040701	Arkansas Nuclear One, Unit 1 – Request for Alternative ANO1-R&R-010 to Use Proposed Alternative to the American Society of Mechanical Engineers Boiler and Pressure Vessel Code Requirements for Pressurizer Nozzle Weld Overlay	April 6, 2007
1CNA061001	Arkansas Nuclear One, Unit 1 – Request for Alternative ANO1-ISI-014 Re: Implementation of a Risk-Informed Inservice Inspection Program Based on ASME Code Case N-716	June 2, 2010

### Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
	Fourth Interval Listing/Schedule of Unmitigated A600 Components in ISI Program	
	Alloy 600 Components Scheduled for 1R25 RFO	
BAW-2243A	Demonstration of the Management of the Aging Effects for the RCS Piping	March 1995

Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
BAW-2251A	Demonstration of the Management of the Aging Effects for the Reactor Vessel	June 1996
CALC-ANO1-ME-10-00004	Alloy 600 Aging Management Program Review for License Renewal Implementation	0
Engineering Change 12490	1R22 Pressurizer Small Bore Nozzle Replacements	0
ER-ANO-2003-0245-032	1R20 Butt Weld Mitigations on the Pressurizer Spray, Safety, Emergency Relief Valves, Surge Nozzles, Hot Leg Surge Nozzle	0
Case N-770-2	Alternative Examination Requirements and Acceptance Standards for Class 1 PWR Piping and Vessel Nozzle Butt Welds Fabricated with UNS N06082 or UNS W86182 Weld Filler Material with or without Application of Listed Mitigation Activities Section XI, Division 1	June 9, 2011

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
2311.009	ANO Unit 1 and Unit 2 Alloy 600 Inspection	14
2311.009C	Unit 1 Hot Leg A-600 Nozzle/Weld Inspections	10
2311.009N	Unit 1 Pressurizer A-600 Small Bore Nozzle/Weld Inspections	12
CEP-NDE-0902	VT-2 Examination	7
CEP-NDE-3000	ASME Section XI Flaw Evaluation	3
EN-DC-319	Inspection and Evaluation of Boric Acid Leaks	7
SEP-A600-001	Alloy 600 Management Program	0
SEP-ISI-101	ASME Section XI, Division 1, ANO1 Inservice Inspection Program	1
SEP-ISI-ANO1-101	ASME Section XI, Division 1, ANO1 Inservice Inspection Program	0

## **16.2.2 Alternate AC Diesel Generator Testing and Inspection Program (17840 and 17870)**

### Condition Reports (ANO-1-CR-)

2013-02874                      2013-02913

### Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision</u>
93-R-1016-18	Aging Management Review of the Alternate AC Generator System	2
93-R-1016-22	Aging Management Review of the Fuel Oil System	1
CALC-ANO1-ME-13-00009	Review of the Alternate AC Diesel Generator Testing and Inspections Aging Management Program for License Renewal Implementation	0
Procedure OP-2104.037	Alternate AC Diesel Generator Operations	26

### Work Orders

00120342      00120359      50236587      50236740      50236925      50237676  
50238278

## **16.2.3.1 to 16.2.3.5 Subsections IWB, IWC, IWC, IWD, IWE and IWF Inspection Programs (17845 and 17846)**

### Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision</u>
CALC-ANO1-ME-11-00019	Review of the ASME Section XI, Subsection IWB Inspections Aging Management Program for License Renewal Implementation	0
CALC-ANO1-ME-11-00020	Review of the ASME Section XI, Subsection IWC Inspections Aging Management Program for License Renewal Implementation	0
CALC-ANO1-ME-11-00021	Review of the ASME Section XI, Subsection IWD Inspections Aging Management Program for License Renewal Implementation	0
CALC-ANO1-CS-11-00016	Review of the ASME Section XI, Subsection IWE & IWL Aging Management Program for License Renewal Implementation	0



### Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision</u>
CALC-ANO1- CS-11-00020	Review of the ASME Section XI, Subsection IWF Aging Management Program for License Renewal Implementation	0

### **16.2.3.6 Subsection IWL Inspection Program (17872)**

#### Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
CEP-CII-003	General Visual Examinations of Class MC Components	304
CEP-CII-004	General and Detailed Visual Inspections of Concrete Containments	306
CEP-ISI-100	ASME Section XI, Division 1 Fleet Administrative Controls for Inservice Inspection	2
SEP-ISI- ANO1-101	ASME Section XI, Division 1, ANO1 Inservice Inspection Program	0

### **16.2.3.7 and 16.2.3.8 Augmented Inspections Program and Small Bore Piping and Nozzles Inspection Program (17847)**

#### Condition Reports (ANO-CR-)

2-1998-00220          1-1996-00391          1-1996-00502

#### Drawings

<u>Number</u>	<u>Title</u>	<u>Revision</u>
21-LW-39, Sht 1	Large Pipe Isometric, Reactor Building Sump Drain Penetration Piping	10
M-46	Area 4&6 Reactor Auxiliary Building Plan Below EI 335'0"	15
M-106	Drainage Auxiliary Building Areas 4&6 Plan at EL 317'0"	8

#### Examinations

<u>Number</u>	<u>Title</u>	<u>Date</u>
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#### **High Energy Line Break**

1-ISI-UT-11-005	A-10016, EII to Pipe ID #24	October 23, 2011
1-ISI-UT-13-019	31-075, Reducer to Valve (CV-2676)	April 3, 2013

## Examinations

<u>Number</u>	<u>Title</u>	<u>Date</u>
1-ISI-UT-13-028	31-003, Pipe to Sweepolet Branch Connection	May 2, 2013
<b>ANO1-LR-012</b>	<b>Socket Welds</b>	
1-ISI-VE-13-003	1-A-10514, Pipe to Elbow Socket Weld (FW-28)	April 27, 2013
1-ISI-VE-13-004	1-A-10515, Elbow to Pipe Socket Weld (FW-29)	April 27, 2013
1-ISI-VE-13-005	1-A-10516, Pipe to Valve Socket Weld (FW-5C1)	April 27, 2013
1-ISI-VE-13-006	1-A-10527, Elbow to Pipe Socket Weld (FW-13)	April 27, 2013
<b>ANO1-LR-013</b>	<b>Penetration 68</b>	
1-ISI-UT-13-001	1-A-10603, Elbow to Pipe Circ Weld (FW-1B-R1)	March 5, 2013
1-ISI-RT-13-001	1-A-10606, ABS-13 Drain Valve (non-code radiograph)	March 19, 2013
1-ISI-RT-13-002	1-A-10607, ABS-14 Drain Valve (non-code radiograph)	March 19, 2013
<b>ANO1-LR-014</b>	<b>Penetrations 10, 47, 58, &amp; 64</b>	
1-BOP-VT-13-002	Penetration 58, Steam Generator Blow Down	April 2, 2013
1-BOP-VT-13-003	Penetration 64, Steam Generator Blow Down	April 2, 2013
1-BOP-VT-13-008	Penetration 10, Steam Generator Blow Down	April 4, 2013
1-BOP-VT-13-009	Penetration 47, Steam Generator Blow Down	April 4, 2013
1-BOP-VT-13-016	Penetration 64, Steam Generator Blow Down	April 2, 2013
1-BOP-VT-13-017	Penetration 58, Steam Generator Blow Down	April 2, 2013
1-BOP-VT-13-026	Penetration 10, Steam Generator Blow Down	April 4, 2013
1-BOP-VT-13-027	Penetration 47, Steam Generator Blow Down	April 4, 2013
<b>ANO1-LR-015</b>	<b>Reactor Coolant Pump Casing and Cover</b>	
1-ISI-VT-10-078	VT-3 Examination of Pump Casing	April 7, 2010
<b>ANO1-LR-016</b>	<b>Sodium Hydroxide (NaOH) Examinations</b>	
1-ISI-UT-13-002	1-A-10575, Pipe to Valve Circ Weld (FW-18)	March 24, 2013
1-ISI-UT-13-003	1-A-10578, Pipe to Elbow Circ Weld (SW-2, Item #28)	March 24, 2013

## Examinations

<u>Number</u>	<u>Title</u>	<u>Date</u>
1-ISI-UT-13-004	1-A-10579, Elbow to Pipe Circ Weld (SW-3, Item #21)	March 24, 2013
1-ISI-UT-13-005	1-A-10580, Pipe to Pipe Circ Weld (SW-4, Item #11)	March 24, 2013
1-ISI-UT-13-006	1-A-10581, Pipe to Pipe Circ Weld (FW-S33A)	March 24, 2013
1-ISI-UT-13-007	1-A-10582, Pipe to Pipe Circ Weld (FW-S33B)	March 24, 2013
1-ISI-UT-13-008	1-A-10583, Pipe to Pipe Circ Weld (FW-S33C)	March 24, 2013
<b>ANO1-LR-017</b>	<b>Chilled Water Tubing</b>	
1-BOP-RT-13-045	VET-6A Chilled Water SS Tube, 3/8" SS Tubing from Chilled Water System	May 8, 2013
1-BOP-PT-13-052	VET-6A Chilled Water SS Tube, Inside of 3/8" SS Tubing for ANO1-LR-17	May 2, 2013
1-BOP-PT-13-053	VET-6A Chilled Water SS Tube, Inside of 3/8" SS Tubing for ANO1-LR-17	May 3, 2013
<b>ANO1-LR-018</b>	<b>Small Bore Piping and Nozzle Welds</b>	
ANO-10-WOL-01	18-001A, 4" Pressurizer Spray Weld Overlay	April 1, 2010
ANO-10-WOL-04	05-040, 3" Pressurizer Safety Valve PSV-1002 DM Weld	April 1, 2010
1-ISI-VT-10-083	21-064, SE to Nozzle Circ Weld – RCP D	April 6, 2010
1-ISI-UT-11-006	23-060, Elbow to Pipe Circ Seam (HPI)	October 26, 2011
1-ISI-UT-11-016	24-009, Ell to Pipe Circ Seam (Letdown)	October 27, 2011

## Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
	4 <sup>th</sup> Interval Inspection Plan/Reports for Augmented Inspections Related to HELB, ANO1-LR-11, ANO1-LR-12, ANO1-LR-13, ANO1-LR-14, ANO1-LR-16, ANO1-LR-17, and ANO1-LR-18	
	Chillers – Closed Loop Cooling Water Systems Optimization Plan	10
	Various Pump Cover Drawings	

Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
93-R-1016-16	Aging Management Review of the Auxiliary Building & Reactor Building Drains System	0
CALC-ANO1-ME-10-00011	ASME Section XI, Augmented Inspections Aging Management Program Review for License Renewal Implementation	0
CALC-ANO1-ME-10-00023	Small Bore Piping & Small Bore Nozzle Inspections Aging Management Program Review for License Renewal Implementation	0
Case N-716	Alternative Piping Classification and Examination Requirements Section XI, Division 1	April 19, 2006
Commitment P6446	Implement Augmented Inservice Inspection of HPI/Makeup Nozzles, Perform RT of Nozzles	
SES-39	Guidance for Vibration Analysis of Piping and Supports	1
Work Order 106107-1	Disassemble MU-45D/Perform Video Inspection of D HPI Pump	October 29, 2011

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
1402.209	MU-45A, B, C & D Valve Maintenance	0
CEP-COS-100	Control and Use of IDDEAL Concepts Software	2
CEP-NDE-0902	VT-2 Examination	7
CEP-ISI-100	ASME Section XI, Division 1 Fleet Administrative Controls for Inservice Inspection Program	2
LMT-08-PAUT-004	Encoded Phased Array Ultrasonic Examination of Small Bore Austenitic Socket Welds ( $\leq 1.5"$ OD NPS)	0
SEP-ISI-101	ASME Section XI, Division 1, ANO1 Inservice Inspection Program	1
SEP-ISI-ANO1-101	ASME Section XI, Division 1, ANO1 Inservice Inspection Program	0

#### **16.2.4 Bolting and Torqueing Program (17852)**

##### Condition Report (ANO-1-CR-)

2000-00172

##### Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
CALC-ANO1-ME-11-00029	Bolting and Torquing Activities Program Review for License Renewal Implementation	0
NUREG-1993	Generic Safety Issue 29, "Bolting Degradation or Failure in Nuclear Power Plants" (Generic Letter 91-17)	September 1991

##### Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
OP-1025.020	Bolting and Torquing Procedures	15, 17
OP-1402.029	U1 N-9000 RCP Shaft Seal Cartridge Installation	15
OP-1402.109	U1 Reactor Coolant Pump Shaft Seal Assembly	4, 5
OP-2402.093	Safety Injection System Check Valve 2SI-14A, B, C, & D Maint	6
OP-2402.099	U2 Reactor Coolant Pump Shaft Seal Reassembly	3
OP-2402.216	U2 Reactor Coolant Pump Shaft Seal Assembly	0

#### **16.2.5 Boric Acid Corrosion Prevention Program (17826)**

##### Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
	Boric Acid Corrosion Control Program Snapshot/Benchmark Report	November 2013
	Unit 1 Boric Acid Corrosion Control Program Cycle Reports 23 and 25	
CALC-AN01-ME-13-00015	Review of the Boric Acid Corrosion Aging Management Program for License Renewal Implementation	0
FTK-ESPP-G0051	Boric Acid Corrosion Control Evaluation Qualification Card	4
Procedure EN-DC-319	Boric Acid Corrosion Control Prevention Program	10

### 16.2.6.1 Primary Chemistry Monitoring Program (17879)

#### Condition Reports (ANO-1-CR-)

2013-00323

#### Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
	One Year Trend Plot of RCS Hydrogen Chemistry Primary Water Strategic Plan	July 14, 2013
93-R-1013-01	Demonstration of the Management of Aging Effects for the ANO-1 Reactor Vessel (Portions)	0
93-R-1013-03	Demonstration of the Management of Aging Effects for the ANO-1 RCS Piping (Portions)	0
93-R-1013-05	Demonstration of the Management of Aging Effects for the ANO-1 Steam Generators	0
93-R-1016-04	Aging Management Review of the Spent Fuel System	1
1014986	Pressurized Water Reactor (PWR) Primary Water Chemistry Guidelines (Portions)	6
BAW-1385	Babcock and Wilcox Water Chemistry Manual	3
CALC-ANO1-ME-12-00005	Review of the Chemistry Control Aging Management Program for License Renewal Implementation	0
NEI 97-06	Steam Generator Program Guidelines	3
TR-105714	Primary Water Chemistry Guidelines	4

#### Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
1000.106	Primary Chemistry Monitoring Program	10
EN-DC-317	Steam Generator Program	6
SEP-SG-ANO-1-001	ANO Steam Generator Program	0

### 16.2.6.2 Secondary Chemistry Monitoring Program (17880)

#### Condition Report (ANO-1-CR-)

2013-02027

#### Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision</u>
	One Year Trend – Secondary Chemistry Parameters	
	Five Year Trend – Feedwater Oxygen	
	ANO Secondary Systems Data Review , July 2011 through July 2013	
93-R-1013-05	Demonstration of the Management of Aging Effects for the ANO-1 Steam Generators	0
93-R-1016-03	Aging Management Review of the Main Feedwater System	1
93-R-1016-11	Aging Management Review of the Emergency Feedwater System	2
93-R-1016-14	Aging Management Review of the Main Steam System	1
93-R-1016-19	Aging Management Review of the Condensate Storage System	1
CALC-ANO1-ME-12-00005	Review of the Chemistry Control Aging Management Program for License Renewal Implementation	0

#### Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
1000.042	Steam Generator Water Chemistry Monitoring Unit One	24
1052.007	Secondary Chemistry Monitoring	37
1052.019	Chemistry Inspections of Plant Systems and Heat Exchangers	7

### 16.2.6.3 Auxiliary Systems Chemistry Monitoring Program (17877)

#### Condition Reports (ANO-1-CR-)

2012-00774	2013-00036	2013-02652	2013-02834	2013-03042	2013-03205
2013-03289					

Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision</u>
	ANO Chemistry Data Review, July 2011 through July 2013	
	CHILLERS - Closed Loop Cooling Water Systems Optimization Plan	10
93-R-1016-07	Aging Management Review of the Emergency Diesel Generator System	1
93-R-1016-24	Aging Management Review of the Chilled Water Systems	1
93-R-1016-18	Aging Management Review of the AAC Generator System	2
CALC-ANO1-ME-12-00005	Review of the Chemistry Control Aging Management Program for License Renewal Implementation	0
Procedure 1052.027	Auxiliary Systems Water Chemistry Monitoring	18
TR-107396	Closed Cooling Water Chemistry Guideline	1

**16.2.6.4 Diesel Fuel Monitoring Program (17878)**Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision</u>
CALC-ANO1-ME-12-00005	Review of the Chemistry Control Aging Management Program for License Renewal Implementation	0

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
1000.113	Diesel Fuel Monitoring Program	13
1052.023	Conduct of Chemistry	14
1618.010	Sampling Unit 1 Diesel Fuel	19
1618.028	Sampling the Unit 1 Emergency Diesel Fuel Oil Day Tank	8

**16.2.6.5 Service Water Chemical Control Program (17881)**Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision</u>
	Unit 1 and Unit 2 Service Water and Circulating Water Optimization Plan	6



Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision</u>
93-R-1016-05	Aging Management Review of the Water Suppression Portions of the Fire Protection System	2
93-R-1016-06	Aging Management Review of the Service Water System	1
CALC-ANO1-ME-12-00005	Review of the Chemistry Control Aging Management Program for License Renewal Implementation	0

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
OP-1104.029	Service Water and Auxiliary Cooling System (Portions)	104
OP-1104.033	Reactor Building Ventilation	75
OP-1106.006	Emergency Feedwater Pump Operation	89
OP-1309.013	Unit 1 Service Water Flow Test	26
OP-1628.009	Operation of the Unit 1 Service Water Chemical Injection System	11

**16.2.7 Reactor Vessel Closure Head Penetration Inspection Program (17873)**Condition Reports (ANO-1-CR-)

2008-02555                      2010-00994

Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
	1R22 Boroscope Inspections of CRDM Flanges from Head Level and Top of Service Structure	April 3, 2010
	1R22 Bare Metal Visual and Lower Insulation Inspections – JAMKO Video Review	April 4, 2010
1-ISI-VT-10-123	02-007, Reactor Vessel Head Outer Surface	April 6, 2010
86-E-0074-157	Corrosion Evaluation of ANO1 CRDM Weld	2
Code Case N-729-1	Alternative Examination Requirements for PWR Reactor Vessel Upper Heads with Nozzles Having Pressure-Retaining Partial-Penetration Welds Section XI, Division 1	March 28, 2006

### Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
Drawing M1B-400	Specification Drawing for Replacement Reactor Vessel Closure Head ANO-1	0

### **16.2.8.1 Fire Barrier Inspections Program (17857)**

#### Condition Report (ANO-1-CR-)

2011-1324

### Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision</u>
93-R-1015-03	Aging Management Review of the Auxiliary Building	2
93-R-1015-07	Aging Management Review of Bulk Commodities	2
CALC-ANO1- ME-11-00028	Review of the Fire Protection Aging Management Program for License Renewal Implementation	0

### Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
OP-1306.005	Unit 1 Fire Door Inspection Procedure	24
OP-6030.101	Installation of Penetration Seals	9
OP-1405.016	Unit 1 Penetration Fire Barrier Visual Inspection	18

### Work Orders

50239231                      50240454                      52364101                      52302934

### **16.2.8.2 Fire Hose Station Inspection Program (17858)**

### Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision</u>
CALC-ANO1- ME-11-00028	Review of the Fire Protection Aging Management Program for License Renewal Implementation	0

### Procedure

<u>Number</u>	<u>Title</u>	<u>Revision</u>
OP-1003.012	Fire Hose Station Inspection	10

#### Work Orders

50012424                      50010201                      52460586                      52409449

#### **16.2.8.3 Fire Suppression Water Supply System Surveillance Program (17859)**

##### Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision</u>
CALC-ANO1- ME-11-00028	Review of the Fire Protection Aging Management Program for License Renewal Implementation	0
Procedure OP-1104.032	Fire Protection Systems	70, 71

Work Order 50241794

#### **16.2.8.4 Fire Suppression Sprinkler System Surveillance Program (17861)**

##### Calculations

<u>Number</u>	<u>Title</u>	<u>Revision</u>
93-R-1016-05	Aging Management Review of the Water Suppression Portion of the Fire Protection System	24
CALC-ANO1- ME-11-00028	Review of the Fire Protection Aging Management Program for License Renewal Implementation	0
Procedure OP-1104.032	Fire Protection Systems	70, 71

##### Work Orders

50235590                      50235591                      52319315

#### **16.2.8.5 Fire Water Piping Thickness Evaluation Program (17862)**

##### Condition Report (ANO-1-CR-)

2013-00516

##### Calculations

<u>Number</u>	<u>Title</u>	<u>Revision</u>
93-R-1016-05	Aging Management Review of the Water Suppression Portion of the Fire Protection System	24

### Calculations

<u>Number</u>	<u>Title</u>	<u>Revision</u>
CALC-ANO1-ME-11-00028	Review of the Fire Protection Aging Management Program for License Renewal Implementation	0
CALC-A-EP-2005-001	Engineering Report: ANO Microbiologically Influenced Corrosion (MIC) Program	0

### Procedure

<u>Number</u>	<u>Title</u>	<u>Revision</u>
CEP-NDE-0400	Ultrasonic Examination Entergy Nuclear Engineering Programs	3
CEP-NDE-0505	Ultrasonic Thickness Examination Entergy Nuclear Engineering Programs	4
EN-DC-340	Microbiologically Influenced Corrosion (MIC) Monitoring Program	2

### **16.2.8.6 Control Room Halon Fire System Inspection Program (17856)**

#### Condition Reports (ANO-1-CR-)

2010-03815	2012-00429	2012-00515	2012-00573	2012-00603	2012-00722
2013-01447					

### Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision</u>
93-R-1015-03	Aging Management Review of the Auxiliary Building	2
93-R-1016-21	Aging Management Review of the Halon System	1
CALC-ANO1-ME-11-00028	Review of the Fire Protection Aging Management Program for License Renewal Implementation	0
Drawing M-219	Piping & Instrument Diagram Halon Fire System	12
Procedure OP-1306.014	Unit 1 Control Room & Aux. Control Room Halon Fire System Inspection	30

### Work Orders

50233379	52444031
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### 16.2.9 Flow-Accelerated Corrosion Program (17853)

#### Condition Reports (ANO-CR-)

1-2013-01213 1-2013-01235 1-2013-00662 1-2013-01225 1-2013-01132 1-2013-01226  
C-2013-00106  
LR-LAR-2010-00176

#### Design Documents

<u>Number</u>	<u>Title</u>	<u>Revision</u>
EN-CS-S-008-MULTI	Pipe Wall Thinning Structural Evaluation	0
EN-CS-S-009-MULTI	Replacement Material For Flow Accelerated Corrosion (FAC) Degraded Carbon Steel Piping	1

#### Evaluations

<u>Number</u>	<u>Title</u>	<u>Date</u>
1R24-018	Flow Accelerated Corrosion Thickness Examination Data – EBB01E004	April 30, 2013
1R24-083	Flow Accelerated Corrosion Thickness Examination Data - HBD18DGE001	May1, 2013
Engineering Change 17938	ANO-1 Flow Accelerated Corrosion (FAC) Program System Susceptibility Evaluation	November 30, 2009

#### Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
	1R24 Flow Accelerated Corrosion Program Final Inspection Report	
91-E-0023-92	Justification for Tcrit values used on ANOs FAC Program	1
93-R-1016-03	Aging Management Review of the Main Feedwater System	1
93-R-1016-14	Aging Management Review of the Main Steam System	1
CALC-ANO1-ME-13-00011	Review of the Flow Accelerated Corrosion Aging Management Program for License Renewal Implementation	0

### Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
NRC Generic Letter 89-08	Erosion/Corrosion-Induced Pipe Wall Thinning	May 2, 1989
Procedure EN-DC-315	Flow Accelerated Corrosion Program	9

### **16.2.10 Inspection and Preventive Maintenance of the Polar Crane Program (17844)**

#### Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision</u>
CALC-ANO1-CS-10-00001	Review of the Inspection and Preventative Maintenance of the ANO-1 Polar Crane Aging Management Program for License Renewal Implementation	0
93-R-1015-02	Aging Management Review of the Reactor Building Internals	2
B30.2-96	Overhead and Gantry Cranes	
Work Order 52399718		

#### Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
OP-1402.131	Unit 1 Operation of Containment Polar Crane	12
OP-1411.002	Polar Crane (L-002) Lubrication and Inspection	12

### **16.2.11 Instrument Air Quality Program (17828)**

#### Condition Reports (ANO-1-CR-)

2011-01239	2011-01955	2011-02781	2011-03091	2012-01131	2012-01131
2012-01256	2013-00999	2013-03234			

#### Calculations

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
93-R-1016-25	Aging Management Review of the Instrument Air System	1

### Calculations

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
ANSI/ISA-S7.0.01-1996	Quality Standard for Instrument Air	November 12, 1996
CALC-ANO1-ME-11-00022	Review of the Instrument Air Quality Aging Management Program for License Renewal Implementation	0

Work Order 50235337

### Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
OP-1104.012	Breathing Air System	34
OP-1104.024	Instrument Air System	43

## **16.2.12 Leakage Detection in Reactor Building Program (17837)**

### Condition Report (ANO-1-CR-)

2012-01412

### Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision</u>
CALC-ANO1-ME-13-00008	Review of the Leakage Detection in Reactor Building Aging Management Program for License Renewal Implementation	0

### Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
OP-1103.013	RCS Leak Detection	40
OP-1015.003A	Unit 1 Operations Logs	87

## **16.2.13 Maintenance Rule Programs (17829 and 17875)**

### Condition Reports (ANO-1-CR-)

2013-01300                      2013-01331

### Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
CALC-ANOC- CS-10-0002	2010 Maintenance Rule Structural Monitoring 5 Year Walk Down of High Risk Structures and 10 Year Walk Down of Low Risk Structures	0
CALC-ANO1- CS-11-00010	Review of the Maintenance Rule – Structural Aging Management Program for License Renewal Implementation	0
CALC-ANO1- CD-12-00001	U1 1R23 Service Level 1 Safety-Related Coatings Assessment Report	May 2012
CALC-ANO1- ME-11-00003	Review of the Maintenance Rule (Mechanical) Aging Management Program for License Renewal Implementation	0

### Miscellaneous

<u>Title</u>
2010 Visual Examination of Containment Structure Dome
2010 Instake Structure Inspection Report
40 <sup>th</sup> Year Tendon Surveillance at ANO dated October 2013
Unit 2 25 <sup>th</sup> Year Tendon Surveillance Engineering Evaluation dated March 2006
Unit 2 30 <sup>th</sup> Year Tendon Surveillance Engineering Evaluation, dated October 20, 2010

### Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
CEP-CII-04	General and Detailed Visual Examinations of Concrete Containments	304
EN-DC-150	Condition Monitoring of Maintenance Rule Structures	1
EN-DC-159	System Monitoring Program	6
EN-DC-178	System Walkdowns	7
EN-DC-203	Maintenance Rule Program	1

### **16.2.14 Oil Analysis Program (17865)**

### Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
	Lab Report for Emergency Diesel Generator K-4B Crankcase	January 2, 2014



Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
	Trending Analysis for Spray Pump P-35 Reactor Building Motor, March 1999 through June 2013	
CALC-ANO1-ME-12-00003	Review of the Oil Analysis Program for License Renewal Implementation	0

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
EN-DC-150	Condition Monitoring of Maintenance Rule Structures	1
OP-1052.007	Secondary Chemistry Monitoring	36
SEP-LUB-ANO-002	ANO Oil Analysis Program	1

**16.2.15 Preventive Maintenance Program (17860 and 17866)**Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision</u>
93-R-1016-05	Aging Management Review of the Water Suppression Portion of the Fire Protection System	0
93-R-1016-09	Aging Management Review of the RB Cooling and Purge System	1
93-R-1016-10	Aging Management Review of the DHR & LPI System	2
93-R-1016-13	Aging Management Review of the Hydrogen Control System	1
93-R-1016-17	Aging Management Review of Auxiliary Building Ventilation System	1
93-R-1016-20	Aging Management Review of the Control Room Ventilation System	1
93-R-1016-22	Aging Management Review of the Fuel Oil System	1
CALC-ANO1-ME-11-00008	Review of the Preventative Maintenance Aging Management Program for License Renewal Implementation	0
Procedure EN-DC-324	Preventative Maintenance Program	11

### 16.2.16 Reactor Building Leak Rate Testing Program (17867)

#### Condition Reports (ANO-1-CR-)

2013-01362                      2013-01958

#### Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision</u>
	RCS Leakage Program Trending Report, December 2013 to January 2014	
CALC-ANO1-ME-11-00009	ANO-1 Reactor Building Leak Rate Testing for License Renewal Implementation	0

#### Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
SEP-APJ-002	Primary Containment Leakage Rate Testing (Appendix J) Program Section	1
EN-DC-334	Primary Containment Leakage Rate Testing (Appendix J)	2
CEP-APJ-001	Primary Containment Leakage Rate Testing (10CFR50 Appendix J) ProgramPlan	2

### 16.2.18 Reactor Vessel Integrity Program (17849)

#### Calculations

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
32-9004664-001	B&W PTS ( <i>Pressurized Thermal Shock</i> ) Calculation	1
32-9122802-000	ANO-1 End of Cycle 23 Fluence Estimate	October 26, 2009
77-1258569-01	Arkansas Nuclear One – Unit 1 Pressure-Temperature Limits for 32 EFPY	November 1996
86-9057339-000	ANO Unit 1 Fluence Analysis Report, Cycles 19 and 20	November 24, 2008
86-9183332-002	ANO Unit 1 Fluence Analysis Report Cycles 21, 22, and 23, for Reactor Vessel Beltline, Nozzle, and Dutchman Regions	December 11, 2013

Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
10 CFR 50.61	Fracture toughness requirements for protection against pressurized thermal shock events	
10 CFR Part 50, Appendix G	Fracture Toughness Requirements	
10 CFR Part 50, Appendix H	Reactor Vessel Material Surveillance Program Requirements	
03-1201086-01	Framatone Reactor Vessel Cavity Dosimetry Operating Procedure ANO/Unit 1	March 19, 1999
1150-006-014	Fabrication of Entergy Operations, Inc. Arkansas Nuclear One Unit 1 Cycles 21/22 Holders A & B Cavity Dosimetry	April 3, 2007
51-1266178-03	B&W Owners Group Materials Committee Cavity Dosimetry Exchange Document	October 2002
Amendment 248	Technical Specification 3.4.3 RCS Pressure and Temperature (P/T) Limits	
ASTM E 185-82	Conducting Surveillance Tests for Light-Water Cooled Nuclear Power Reactor Vessels	July 1, 1982
BAW-1543	Supplement 6A, Master Integrated Reactor Vessel Surveillance Program	4
BAW-2241NP-A	Fluence and Uncertainty Methodologies	2
CALC-ANO1-ME-11-00006	Review of the Reactor Vessel Integrity Aging Management Program for License Renewal Implementation	0
CALC-ANOC-NE-11-00001	Unit 1 and Unit 2 End of Cycle Fuel Assembly Burnup	0
Engineering Change 20744	1R23 Reactor Vessel Material Surveillance Program Frequency Determination Per OP-1022.013	April 10, 2010
Regulatory Guide 1.99	Radiation Embrittlement of Reactor Vessel Materials	2
Regulatory Guide 1.190	Calculational and Dosimetry Methods for Determining Pressure Vessel Neutron Fluence	March 2001

### Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
1022.011	Reactor Core Monitoring Activities	9
1302.012	Periodic Core Power Distribution	20
CEP-FTP-ANO1	Reactor Vessel Fracture Toughness and Surveillance Material Testing at ANO-1	0
SEP-FTP-ANO1-001	Arkansas Nuclear One, Unit 1 Reactor Vessel Integrity Program	A

### Work Orders

52468673                      52470275

### **16.2.19 Service Water Integrity Program (17830)**

### Evaluations

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
91-R-2013-01	Service Water Performance Testing Methodology	26
Engineering Change 40639	E-35B Thermal Performance Test Evaluation 1R23	December 17, 2012
Engineering Change 43663	Document Analysis OF 1R24 As Found and As Left Service Water Flow Test Per Guidance in CALC-91-R-2013-01	July 19, 2013
Engineering Change 44738	K-4A AND K-4B EDG Thermal Performance Evaluation 2011	November 14, 2013

### Examinations

<u>Number</u>	<u>Title</u>	<u>Date</u>
ACT-04-017	Auxiliary Building Electric Rooms Emergency Chiller Condensers, HtExch E-174 & E-176	October 29, 2007
ACT-02-014	E-20B-1 Emergency Diesel Jacket Water Coolers	May 29, 2013
ACT-02-014	E-20B-2 Emergency Diesel Jacket Water Cooler	June 3, 2013
	E-39B Make-Up Pump Lube Oil Cooler	December 2, 2009

### Letters

<u>Number</u>	<u>Title</u>	<u>Date</u>
0CAN019012	Response to Generic Letter 89-13, "Service Water System Problems Affecting Safety-Related Equipment"	January 26, 1990
0CAN079005	Supplemental Information Related to Generic Letter 89-13, "Service Water System Problems Affecting Safety-Related Equipment"	July 2, 1990
1CAN119010	Revision to Response to Generic Letter 89-13	November 30, 1990
0CAN099110	Implementation Status of Four Issues at ANO	October 3, 1991
1CAN039209	Modified Component Testing List for Generic Letter 89-13"	March 20, 1992
1CAN069202	Completion of ANO-1 Initial Activities for Generic Letter 89-13, Service Water System Problems	June 8, 1992

### Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision</u>
CALC-ANO1-ME-11-00004	Review of the Service Water Integrity Aging Management Program for License Renewal Implementation	0
93-R-1016-06	Aging Management Review of the Service Water System	0
93-R-1016-10	Aging Management Review of the Decay Heat/Low Pressure Injection System	0
SEP-SW-ANO-001	ANO NRC Generic Letter 89-13 Service Water Program	0

### Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
1052.019	Chemistry Inspections of Plant Systems and Heat Exchangers	7
1052.023	Conduct of Chemistry	14
1104.029	Service Water and Auxiliary Cooling System	105
1104.033	Reactor Building Ventilation	73
1106.006	Emergency Feedwater Pump Operation	89
1306.037	Surveillance Test for Unit 1 Sluice Gates SG-1 & SG-2	3

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
1309.013	Unit 1 Service Water Flow Test	24
1309.016	Decay Heat Cooler Thermal Test	6
1309.018	EDG Cooler Thermal Test	8
5120.431	Unit 1 Reactor Building Cooling Fans Flow Rate Test	4
5120.262	Unit 1 Inservice Testing (IST) Visual Valve Inspection	6
EN-DC-316	Heat Exchanger Performance Monitoring and Condition Monitoring	5
EN-DC-340	Microbiologically Influenced Corrosion (MIC) Monitoring Program	2

Work Orders

00277846	00299896	52318888	52318891	52319267	52395630
52399642	52399774	52399815	52401936	52413301	52451578

**16.2.20 Steam Generator Integrity Program (17854)**Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
	Engineering Information Record of the Condition Monitoring and Final Operational Assessment of Steam Generators 1R23	March 2012
	Engineering Information Record of the Technical Summary of Steam Generator Eddy Current Examinations	April 2013
CALC-ANO1-ME-12-00001	Steam Generator Integrity Program Review	0
NEI-97-06	Steam Generator Program Guidelines	3

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
OP-1000.042	Steam Generator Water Chemistry Monitoring Unit One	24
EN-DC-317	Steam Generator Program	7

### 16.2.21.2 Battery Quarterly Surveillance Program (17841)

#### Condition Report (ANO-1-CR-)

2013-03212

#### Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision</u>
93-R-1015-03	Aging Management Review of the Auxiliary Building	2
CALC-ANO1-EE-13-00003	Review of the Battery Quarterly Surveillance Aging Management Program for License Renewal Implementation	0

#### Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
OP-1307.061	Unit 1 D45 Battery Periodic Tests	18
OP-1307.063	Unit 1 D06 and D07 Battery Surveillance	23, 27

#### Work Orders

52401938                      50238478                      52456872                      50238480

### 16.2.21.3 Control Room Ventilation Testing Program (17833)

#### Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
	'A' Control Room Emergency Air Conditioning System Monthly Check Report	November 2013
	Control Room Emergency AC Flow Verification Report	June 2013
93-R-1016.20	Aging Management Review of the Control Room Ventilation System	1
CALC-ANO1-ME-13-00010	Review of the Control Room Ventilation Testing Aging Management Program for License Renewal Implementation	0

#### Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
OP-2104.007	Control Room Emergency Air Conditioning and Ventilation	62

### Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
OP-5120.406	Flow Verification of Control Room Emergency Air Conditioning System	4
OP-5120.523	Control Room Habitability Envelope	3

### **16.2.21.4 Core Flood Tank Monitoring Program (17834)**

#### Condition Report (ANO-1-CR-)

2013-02672

### Drawings

<u>Number</u>	<u>Title</u>	<u>Revision</u>
M1H-100	List of Materials for Core Flooding Tank	1
M1H-1	Arrangement of Core Flooding Tank	8
M-236	Piping & Instrument Diagram Reactor Building Spray and Core Flooding Systems	93

### Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision</u>
93-R-1016-01	Aging Management Review of the Core Flood System	1
CALC-ANO1-ME-13-00013	Review of the Core Flood Tank Monitoring Aging Management Program for License Renewal Implementation	0

### Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
OP-1015.003A	Unit 1 Operation Logs	87
OP-1203.012I	Annunciator K10 Corrective Action	52
OP-1304.010	Unit 1 Core Flooding System Instrumentation – Red Train	22
OP-1304.194	Unit 1 Core Flooding System Instrumentation – Green Train	9
EN-OP-111	Operational Decision-Making Issue (ODMI) Process -Core Flood Tank (T-2A/T-2B)	11



### Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
STM 1-06	ANO-1 System Training Manual – Core Flood System	11

### **16.2.21.5 Emergency Diesel Generator Testing and Inspection Program (17835 and 17843)**

#### Condition Reports (ANO-1-CR-)

2011-00273	2011-00694	2011-00802	2011-00980	2011-01097	2011-01283
2011-02636	2012-00203	2012-00209	2012-00615	2012-00804	2012-01010
2012-01799	2012-03150	2013-01397	2013-01397	2013-01458	2013-01665
2013-01972	2013-02466	2013-02994	2013-02994		

### Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision</u>
93-R-1016-07	Aging Management Review of the Emergency Diesel Generator System	1
CALC-ANO1-ME-13-00002	Review of the Emergency Diesel Generator Testing and Inspections Aging Management Program for License Renewal Implementation	0
TRM 3.8.3	Technical Requirements Manual – Diesel Generator (DG) Testing	39

Work Order 52386768

### Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
OP-1104.036	Emergency Diesel Generator Operation	66
OP-1305-006	Integrated ES System Test	42
OP-1402.066	24 Month Inspection on Unit One Emergency Diesel Generator Engine	35

#### **16.2.21.6 Emergency Feedwater Pump Testing Program (17836)**

##### Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision</u>
CALC-AN01- ME-13-00014	Review of the Emergency Feedwater Pump Testing Aging Management Program for License Renewal Implementation	0
Procedure OP-1106.006	Emergency Feedwater Pump Operation	89

#### **16.2.21.7 Sodium Hydroxide Tank Level Monitoring Program (17838)**

##### Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision</u>
93-R-1016-12	Aging Management Review of the Sodium Hydroxide System	2
CALC-ANO1- ME-000007	Review of the NaOH Tank Level Monitoring Aging Management Program for License Renewal Implementation	0
STM 1-08	Reactor Building Spray & Containment Building	17

##### Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
OP-1015.003A	Unit 1 Operation Logs	83
OP-1203.012H	Annunciator K09 Corrective Action	42
OP-1304.019	Unit 1 Sodium Hydroxide Tank Level Instrument Calibration	17
SEP-ISI-101	Program Section for ASME Section XI, Division 1 ANO 1 Inservice Inspection Program	1
SEP-ISI- ANO1-101	ASME Section XI, Division 1, ANO1 Inservice Inspection Program	0

##### Work Orders

50240935	00311805
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#### **4OA5.03 Time-Limited Aging Analyses**

##### **16.3.1 Reactor Vessel Neutron Embrittlement (17850)**

###### Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
	2013 Operating Cycle Power Level Printout	
	ASME Section III, Appendix G, Fracture Toughness Criteria for Protection against Failure	
	Closeout of Generic Safety Issue 190, Fatigue Evaluation of Metal Components for 60 year Plant Life	December 26, 1999
93-R-1013-01	Demonstration of the Management of the Aging Effects for the ANO-1 Reactor Vessel	0
93-R-1013-02	Class 1 Fatigue Review in Support of License Renewal	0
BAW-2251A	Demonstration of the Management of the Aging Effects for the Reactor Vessel	June 1996
CALC-ANO1-ME-11-00019	Review of the ASME Section XI, Subsection IWB Inspections Aging Management Program for License Renewal	0
CALC-ANO1-ME-11-00020	Review of the ASME Section XI, Subsection IWC Inspections Aging Management Program for License Renewal	0
Calculation 77-1258569-01	Arkansas Nuclear One – Unit 1 Pressure-Temperature Limits for 32 EFPY	November 1996
Technical Specification 3.4.3	Reactor Coolant System Pressure and Temperature (P/T) Limits	

##### **16.3.2 Metal Fatigue (17876)**

###### Calculations

<u>Number</u>	<u>Title</u>	<u>Revision</u>
51-1234566-02	Fatigue Trackable Components and Transients	2
CALC-86-E-0074-320	Environmentally-Assisted Fatigue (EAF) Analysis for Pressurizer Surge Piping, Hot Leg Surge Nozzle, Pressurizer Surge Nozzle and High Pressure Injection Nozzle, ANO-1	0

Calculations

<u>Number</u>	<u>Title</u>	<u>Revision</u>
CALC-86-E-0074-321	Summary Report: Environmental Fatigue Analysis for the Pressurizer Surge Piping, Pressurizer Surge Nozzle, Hot Leg Surge Nozzle, and High Pressure Injection Nozzle, Arkansas Nuclear One, Unit 1	0

Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
	2013 Operating Cycle Power Level Printout	
	Closeout of Generic Safety Issue 190, Fatigue Evaluation of Metal Components for 60 year Plant Life	December 26, 1999
	Criteria of the ASME Boiler and Pressure Vessel Code for Design by Analysis in Sections III and VIII, Division 2	
93-R-1013-02	Class 1 Fatigue Review in Support of License Renewal	0
CALC-ANO1-SE-13-00001	ANO Unit 1 Transient Cycle Report for 2012	0
Engineering Change 27035	License Renewal Engineering Change Documenting Surge Line Piping and Pressurizer Surge Nozzle, Hot Leg Surge Nozzle, and High Pressure Injection Nozzles for Environmentally Assisted Fatigue (EAF) Analyses	0
NUREG/CR-5704	Effects of LWR Coolant Environments on Fatigue Design Curves of Austenitic Stainless Steels	April 1999
Procedure OP-1010.010	Unit One Transient Cycle Logging and Reporting	8
TR-104534-V1	EPRI Fatigue Management Handbook, Volumes 1, 2, 3, and Bibliography	December 1994

### 16.3.3 Environmental Qualification Program (17869)

#### Calculations

<u>Number</u>	<u>Title</u>	<u>Revision</u>
93-R-1018-01	Initial Screening of the ANO-1 EQ Equipment to Evaluate Extension of Qualification into the License Renewal Period	0
00-EQ-1001-01	Qualified Life of VEF-38 A/B Motors	0
11-E-0001-01	Calculation of Qualified Lives of Various Components in Support of ANO-1 License Renewal	1
95-R-0009-01	Environmental Qualification Cable Monitoring Plan & License Renewal	4

#### Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
2325-8079	Parts List – Control Rod Drive Penetration Assembly WR6-1 thru WR6-8	June 17, 1971
Engineering Change 28697	Implement License Renewal on Unit 1 EQ Program	0
Procedure EN-DC-164	Environmental Qualification (EQ) Program	4

### 16.3.6 Aging of Boraflex in Spent Fuel Pool Rack (17868)

#### Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
	ANO1 Refueling Outage 24 core offload sequence report	April 29, 2013
ER-ANO-2001-0168-024	Neutron Absorbing Material Inserted into ANO-1 Spent Fuel Pool	December 14, 2006
Generic Letter 96-04	Boraflex Degradation In Spent Fuel Pool Storage	June 26, 1996
Letter 1CAN070603	License Amendment Request to Support the Use of Metamic® Poison Insert Assemblies in the Spent Fuel Pool Arkansas Nuclear One, Unit 1 (ANO-1)	July 27, 2006

### Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
Netco Letter	Further Evaluation of Corrosion Pits	November 19, 2009
Net-281-01	Pre-Characterization of Metamic® Surveillance Coupons for Arkansas Nuclear One	1
Net-339-01	Inspection and Testing of Metamic® Surveillance Coupons from the Arkansas Nuclear One Units 1 and 2	0
Net-300030-01	Inspection and Testing of Metamic® Surveillance Coupons from the Arkansas Nuclear One Units 1 and 2	1
1022.012	Storage, Control & Accountability of Nuclear Fuel	39
1022.012M	Unit 1 Spent Fuel Pool ICA Map – completed April 30, 2013	
SEP 281-01	Procedures for Pre-Characterization and Recording Metamic® Surveillance Coupon Physical Attributes	0
USAR 9.6.2	Spent Fuel Pool System Description and Evaluation	

### Technical Specifications

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
3.7.15	Spent Fuel Pool Storage	
B 3.7.15	Spent Fuel Pool Storage Bases	
4.3	Fuel Storage	
5.5.17	Metamic Coupon Sampling Program	

### **40A5.04 Newly Identified Components**

#### Evaluations (50.37-ANO1-)

2013-001	2013-002	2013-003	2013-004	2013-005	2013-006
2013-007	2013-008	2013-009	2013-010	2013-011	2013-012
2013-013	2013-014	2013-015	2013-016	2013-017	2013-018

Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision</u>
CALC-ANO1-MS-12-00001	Review ANO1 Changes Made Since License Renewal for 50.37(b) Considerations	1

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
EN-DC-115	Engineering Change Pocess	16
SEP-LR-ANO-001	Aging Management Review and TLAA Evaluation of Newly Identified SSCs	0

**40A5.05 Safety Analysis Report and Administrative Controls**Condition Reports (ANO-1-CR-)

2005-00579	2011-00248	2011-00429	2011-00983	2011-01092	2011-01743
2011-02121	2011-02365	2011-02376	2011-03168	2012-00180	2012-00399
2012-00633	2012-01251	2012-01284	2013-00488	2013-00495	2013-00513
2013-01025	2013-01302	2013-01303	2013-01309	2013-01327	2013-01331
2013-01333	2013-01334	2013-01336	2013-01338	2013-01858	2013-02711

Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
	WT-WTHQN-2012-00675 – Gap Analysis	
	WT-WTANO-2013-00165	
	ANO-CR-C-2013-00910	
LIC-105	Managing Regulatory Commitments Made By Licensees to the NRC	2
NEI 99-04	Guidelines for Managing NRC Commitment Changes	0
RIS 2000-017	Managing Regulatory Commitments Made By Power Reactor Licensees to the NRC Staff	September 21, 2000

Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
RIS 2011-005	Information on Revision 2 to the Generic Aging Lessons Learned Report license Renewal of Nuclear Power Plants	July 1, 2011

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
EN-DC-178	System Walkdowns	7
EN-LI-102	Corrective Action Process	21
EN-LI-110	Commitment Management Program	5
EN-LI-121-01	Trend Codes	5
EN-OE-100	Operating Experience Program	20