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

May 13, 2015

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

SUBJECT: ARKANSAS NUCLEAR ONE – NRC INTEGRATED INSPECTION REPORT 05000313/2015001 and 05000368/2015001

Dear Mr. Browning:

On March 31, 2015, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Arkansas Nuclear One facility, Units 1 and *2*. On April 2, 2015, the NRC inspectors discussed the results of this inspection with you and other members of your staff. Inspectors documented the results of this inspection in the enclosed inspection report.

NRC inspectors documented one finding of very low safety significance (Green) in this report. This finding involved a violation of NRC requirements. Additionally, NRC inspectors documented one Severity Level IV violation with no associated finding. Further, inspectors documented a licensee-identified violation which was determined to be of very low safety significance in this report. The NRC is treating these violations as non-cited violations (NCVs) consistent with Section 2.3.2.a of the NRC Enforcement Policy.

If you contest the violations or significance of these NCVs, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region IV; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC resident inspector at Arkansas Nuclear One.

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

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Sincerely,

/RA/

Ryan E. Lantz
Deputy Director
Division of Reactor Projects

Docket Nos. 50-313, 50-368
License Nos. DPR-51; and NPF-6

Enclosure: Inspection Report 05000313/2015001 and
05000368/2015001 w/ Attachments:
1. Supplemental Information
2. Request for Information
3. Detailed Risk Evaluation ANO-2 HELB Door 447 Issue

cc w/ encl:
Electronic Distribution for Arkansas Nuclear One

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Letter to Jeremy Browning from Ryan E. Lantz dated May 13, 2015

SUBJECT: ARKANSAS NUCLEAR ONE – NRC INTEGRATED INSPECTION REPORT 05000313/2015001 and 05000368/2015001

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U.S. NUCLEAR REGULATORY COMMISSION

REGION IV

Docket:	05000313; 05000368
License:	DPR-51; NPF-6
Report:	05000313/2015001; 05000368/2015001
Licensee:	Entergy Operations Inc.
Facility:	Arkansas Nuclear One, Units 1 and 2
Location:	Junction of Hwy. 64 West and Hwy. 333 South Russellville, Arkansas
Dates:	January 1 through March 31, 2015
Inspectors:	B. Tindell, Senior Resident Inspector M. Young, Resident Inspector S. Garchow, Senior Operations Engineer N. Greene, PhD, Health Physicist P. Hernandez, Health Physicist J. Melfi, Project Engineer W. Sifre, Senior Reactor Inspector M. Williams, Acting Resident Inspector
Approved By:	R. Lantz Deputy Director Division of Reactor Projects

SUMMARY

IR 05000313/2015001; 05000368/2015001; 01/01/2015 – 03/31/2015; Arkansas Nuclear One, Units 1 and 2, Integrated Inspection Report; Plant Modifications, Other Activities.

The inspection activities described in this report were performed between January 1 and March 31, 2015, by the resident inspectors at Arkansas Nuclear One and inspectors from the NRC's Region IV office. One finding of very low safety significance (Green) is documented in this report. This finding involved a violation of NRC requirements. Additionally, NRC inspectors documented one Severity Level IV violation with no associated finding and one licensee-identified violation of very low safety significance. The significance of inspection findings is indicated by their color (Green, White, Yellow, or Red), which is determined using Inspection Manual Chapter 0609, "Significance Determination Process." Their cross-cutting aspects are determined using Inspection Manual Chapter 0310, "Aspects within the Cross-Cutting Areas." Violations of NRC requirements are dispositioned in accordance with the NRC Enforcement Policy. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process."

Cornerstone: Initiating Events

- SLIV. The inspectors identified a non-cited violation of 10 CFR 50.9, "Completeness and Accuracy of Information," for the licensee's failure to provide information to the NRC that was complete and accurate in all material respects. Specifically, the Unit 2 unplanned scrams per 7000 critical hours performance indicator data submitted to the NRC for the second and third quarters of 2014 was inaccurate. The performance indicator data submitted did not include a Unit 2 plant scram that occurred on April 27, 2014. When the second quarter and third quarter 2014 data was corrected and submitted to the NRC on March 4, 2015, the unplanned scrams per 7000 critical hours performance indicator transitioned from Green to White. The issue was entered into the licensee's corrective action program as Condition Report CR-ANO-2-2015-00362.

  The licensee failed to provided information to the NRC that was complete and accurate in all material respects, as required by 10 CFR 50.9. The NRC's significance determination process (SDP) is not designed to assess the significance of violations that impact or impede the regulatory process. Therefore, the issue of two quarterly submittals of discrepant unplanned scrams performance indicator data was assessed using the traditional enforcement process in accordance with the Enforcement Policy. The inspectors determined the violation to be at Severity Level IV, because the licensee submitted inaccurate performance indicator data to the NRC that would have caused the performance indicator to change from Green to White (Enforcement Policy example 6.9.d.11). Traditional enforcement violations are not assigned a cross-cutting aspect. (Section 4OA5)

Cornerstone: Mitigating Systems

- Green. The inspectors identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," for the licensee's failure to assure that applicable regulatory requirements and the design basis were correctly translated into specifications, drawings, procedures, and instructions and that design changes were subject to design control measures commensurate with those applied to the original design. Specifically, the Unit 2 radwaste supply fans', 2VSF-7A and B, plenum doors

and turbine building fire door 447 were maintained open, which provided a potential path for steam to enter the auxiliary building and impact both safety-related dc power trains during a high energy line break event in the turbine building. On February 12, 2014, the licensee suspended the modification and corrected the procedure. The licensee documented the concern in Condition Report CR-ANO-2-2014-00345.

The licensee's failure to maintain separation of safety related systems and high energy piping systems in accordance with design, as stated in the Safety Analysis Report, was a performance deficiency. The performance deficiency was more than minor because it was associated with the design control attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609, Attachment 4, "Initial Characterization of Findings," dated July 1, 2012 and Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," Exhibit 2, dated July 1, 2012, the inspectors determined that the finding required a detailed risk evaluation because the finding represented a potential loss of system and/or function of the safety-related dc motor control centers, battery chargers and inverters.

A senior reactor analyst performed the detailed risk evaluation and determined that the change to the core damage frequency was less than 4.8E-7/year (Green). The dominant core damage sequences included losses of the plant's DC electrical systems. The initiating event likelihood of a rupture of the specific section of piping needed to initiate core damage sequences was extremely low.

The inspectors determined that there was no cross-cutting aspect associated with this finding because the cause of the performance deficiency occurred more than three years ago, and was not representative of current licensee performance. (Section 1R18)

Licensee-Identified Violations

A violation of very low safety significance (Green) that was identified by the licensee has been reviewed by the inspectors. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program. This violation and associated corrective action tracking numbers are listed in Section 4OA7 of this report.

PLANT STATUS

Unit 1 began the period at 100 percent power. On January 7, 2015, Unit 1 commenced reactor power coastdown. On January 25, 2015, the unit entered refueling outage 25. On March 1, 2015, operators closed the main generator output breakers. The unit operated at 100 percent power for the rest of the inspection period.

Unit 2 operated at 100 percent power for the entire inspection period.

REPORT DETAILS

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R01 Adverse Weather Protection (71111.01)

Readiness for Impending Adverse Weather Conditions

a. Inspection Scope

On March 25, 2015, the inspectors completed an inspection of the station's readiness for impending adverse weather conditions. The inspectors reviewed plant design features, the licensee's procedures to respond to predicted severe weather for high wind warning or severe thunderstorm, and the licensee's implementation of these procedures. The inspectors evaluated operator staffing and accessibility of controls and indications for those systems required to control the plant.

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

b. Findings

No findings were identified.

1R04 Equipment Alignment (71111.04)

.1 Partial Walkdown

a. Inspection Scope

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

- January 27, 2015, Unit 1, reactor coolant system level instrumentation during lowered inventory operations
- January 27, 2015, Unit 1, decay heat removal suction during lowered inventory operations
- February 3, 2015, Unit 1, spent fuel pool cooling during full core offload

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

These activities constituted three partial system walkdown samples as defined in Inspection Procedure 71111.04.

b. Findings

No findings were identified.

.2 Complete Walkdown

a. Inspection Scope

On January 30, 2015, the inspectors performed a complete system walkdown inspection of the Unit 1 decay heat removal system. The inspectors reviewed the licensee's procedures and system design information to determine the correct system lineup for the existing plant configuration. The inspectors also reviewed outstanding work orders, open condition reports, temporary modifications, and other open items being tracked by the licensee's operations department. The inspectors then visually verified that the system was correctly aligned for the existing plant configuration.

These activities constituted one complete system walkdown sample, as defined in Inspection Procedure 71111.04.

b. Findings

No findings were identified.

1R05 Fire Protection (71111.05)

.1 Quarterly Inspection

a. Inspection Scope

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

- January 25, 2015, Unit 1, Fire Zone 32-K and 33-K, reactor building
- February 1, 2015, Unit 1, Fire Zone 110-L, south battery room and DC equipment room
- February 3, 2015, Unit 1, Fire Zone 99-M, north switchgear room
- February 3, 2015, Unit 1, Fire Zone 100-N south switchgear room

- February 4, 2015, Unit 1, Fire Zone 197-X, turbine building elevations 372 feet and 386 feet

- February 10, 2015, Unit 1, Fire Zone N, intake structure

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

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

b. Findings

No findings were identified.

.2 Annual Inspection

a. Inspection Scope

The inspectors completed their annual evaluation of the licensee's fire brigade performance. This evaluation included an observation of an announced fire drill for a fire in the Unit 2 south emergency diesel room on March 19, 2015.

During this drill, the inspectors evaluated the capability of the fire brigade members, the leadership ability of the brigade leader, the brigade's use of turnout gear and fire-fighting equipment, and the effectiveness of the fire brigade's team operation. The inspectors also reviewed whether the licensee's fire brigade met NRC requirements for training, dedicated size and membership, and equipment.

These activities constituted one annual inspection sample, as defined in Inspection Procedure 71111.05.

b. Findings

No findings were identified.

1R08 Inservice Inspection Activities (71111.08)

The activities described in subsections 1 through 4 below constitute completion of one inservice inspection sample, as defined in Inspection Procedure 71111.08.

.1 Non-destructive Examination (NDE) Activities and Welding Activities

a. Inspection Scope

The inspectors directly observed the following nondestructive examinations:

SYSTEM	WELD IDENTIFICATION	EXAMINATION TYPE
Main Steam	1-ISI-UT-15-004	Ultrasonic
High Pressure Injection	1-ISI-UT-15-003	Ultrasonic
Main Feedwater	1-ISI-UT-15-006	Ultrasonic
Service Water	1-BOP-PT-15-021	Dye Penetrant
Service Water	1-BOP-MT-15-034	Magnetic Particle
High Pressure Injection	1-BOP-UT-15-039	Ultrasonic

The inspectors reviewed records for the following nondestructive examinations:

SYSTEM	WELD IDENTIFICATION	EXAMINATION TYPE
Low Pressure Injection	1-ISI-PT-15-001	Dye Penetrant
Main Steam	1-ISI-MT-15-002	Magnetic Particle
Borated Water Storage Tank	1-BOP-RT-15-051	Radiograph
Borated Water Storage Tank	1-BOP-RT-15-052	Radiograph
Borated Water Storage Tank	1-BOP-RT-15-053	Radiograph
High Pressure Injection	1-BOP-RT-15-054	Radiograph
High Pressure Injection	1-BOP-UT-15-40	Ultrasonic

During the review and observation of each examination, the inspectors observed that activities were performed in accordance with the ASME code requirements and applicable procedures. The inspectors also reviewed the qualifications of all nondestructive examination technicians performing the inspections to determine whether they were current.

The inspectors reviewed records for the following welding activities:

SYSTEM	WELD IDENTIFICATION	WELD TYPE
Service Water	FW-46C1	Gas Tungsten Arc Weld
Service Water	FW-47AC2	Gas Tungsten Arc Weld
Service Water	FW-60	Gas Tungsten Arc Weld
Service Water	FW-66	Gas Tungsten Arc Weld

The inspectors reviewed that the welding procedure specifications and the welders had been properly qualified in accordance with ASME Code Section IX requirements. The

inspectors also determined that essential variables were identified, recorded in the procedure qualification record, and formed the bases for qualification of the welding procedure specifications.

b. Findings

No findings were identified.

.2 Vessel Upper and Lower Head Penetration Inspection Activities

a. Inspection Scope

The inspectors reviewed the results of the licensee's bare metal visual inspection of the Reactor Vessel Upper and Lower Head Penetrations to determine whether the licensee identified any evidence of boric acid challenging the structural integrity of the reactor head components and attachments. The inspectors also verified that the required inspection coverage was achieved and limitations were properly recorded. The inspectors reviewed that the personnel performing the inspection were certified examiners to their respective nondestructive examination method.

b. Findings

No findings were identified.

.3 Boric Acid Corrosion Control (BACC) Inspection Activities

a. Inspection Scope

The inspectors reviewed the licensee's implementation of its boric acid corrosion control program for monitoring degradation of those systems that could be adversely affected by boric acid corrosion. The inspectors reviewed the documentation associated with the licensee's boric acid corrosion control walkdown as specified in Procedure CEP-BAC-001, "Boric Acid Corrosion Control Program Plan," Revision 1. The inspectors reviewed whether the visual inspections emphasized locations where boric acid leaks could cause degradation of safety significant components, and whether engineering evaluation used corrosion rates applicable to the affected components and properly assessed the effects of corrosion induced wastage on structural or pressure boundary integrity. The inspectors observed that corrective actions taken were consistent with the ASME Code, and 10 CFR Part 50, Appendix B requirements.

b. Findings

No findings were identified.

.4 Steam Generator Tube Inspection Activities

The licensee did not perform inspections of the steam generator tubes. No inspections were required this outage. No primary side inspections were performed. Therefore, the inspectors determined this section of Inspection Procedure 71111.08 was not applicable.

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

.1 Review of Licensed Operator Requalification

a. Inspection Scope

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

- On January 2, 2015, the inspectors observed "Just in Time" simulator training for a Unit 1 operating crew for an emergent modification to turbine lube oil piping which could have resulted in a loss of turbine lube oil.

- On February 7, 2015, the inspectors observed "Just in Time" simulator training for a Unit 1 operating crew in support of the upcoming post outage plant startup.

- On March 26, 2015, the inspectors observed an evaluated simulator scenario performed by a Unit 2 operating crew.

These activities constitute completion of three quarterly licensed operator requalification program samples, as defined in Inspection Procedure 71111.11.

b. Findings

No findings were identified.

.2 Review of Licensed Operator Performance

a. Inspection Scope

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

- January 27, 2015, Unit 1, lowered reactor coolant system inventory

- January 30, 2015, Unit 1, shift trains for decay heat removal and makeup during lowered inventory

- March 23, 2015, Unit 2, turbine driven emergency feedwater pump surveillance

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

These activities constitute completion of two quarterly licensed operator performance samples, as defined in Inspection Procedure 71111.11.

b. Findings

No findings were identified.

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

a. Inspection Scope

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

- January 23, 2015, Unit 1, outage risk assessment for refueling outage 25
- January 27, 2015, Unit 1, reactor coolant system in lowered inventory
- January 23, 2015, Unit 1, turbine driven emergency feedwater pump overspeed trip testing
- February 27, 2015, Unit 1, nuclear instrument failed during reactor startup

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

Additionally, on January 2, 2015, the inspectors observed portions of one emergent work activity that had the potential to cause an initiating event for Unit 1. The inspectors observed a temporary modification for the turbine lube oil system piping leak near check valve, LO-79, and an associated temporary modification.

The inspectors verified that the licensee appropriately developed and followed a work plan for these activities. The inspectors verified that the licensee took precautions to minimize the impact of the work activities on unaffected structures, systems, and components (SSCs).

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

b. Findings

No findings were identified.

1R15 Operability Determinations and Functionality Assessments (71111.15)

a. Inspection Scope

The inspectors reviewed five operability determinations and functionality assessments that the licensee performed for degraded or nonconforming SSCs:

- March 10, 2015, Unit 1, operability of the reactor building sump following refueling outage

- March 19, 2015, Unit 1, operability determination of core flood tank, T-2A, due to an unexpected elevated water level alarm

- March 20, 2015, Unit 1, operability determination of main steam isolation valves due to higher than expected friction

- March 25, 2015, Unit 2, operability determination of auxiliary building degraded flood seals

- March 25, 2015, Unit 1, functionality assessment of atmospheric dump valve

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

These activities constitute completion of five operability and functionality review samples, as defined in Inspection Procedure 71111.15.

b. Findings

No findings were identified.

1R18 Plant Modifications (71111.18)

.1 Temporary Modifications

a. Inspection Scope

The inspectors reviewed two temporary plant modifications that affected risk-significant SSCs:

- February 3, 2015, Unit 1, supplemental service water emergency makeup to Unit 1 spent fuel pool during full core offload

- February 10, 2015, Unit 1, temporary fire pump installation to support the intermediate cooling water heat exchanger and spent fuel pool

The inspectors verified that the licensee had installed and removed these temporary modifications in accordance with technically adequate design documents. The inspectors verified that these modifications did not adversely impact the operability or availability of affected SSCs. The inspectors reviewed design documentation and plant procedures affected by the modifications to verify the licensee maintained configuration control.

These activities constitute completion of two samples of temporary modifications, as defined in Inspection Procedure 71111.18.

b. Findings

Introduction. The inspectors identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," for the licensee's failure to assure that applicable regulatory requirements and the design basis were correctly translated into specifications, drawings, procedures, and instructions and that design changes were subject to design control measures commensurate with those applied to the original design. Specifically, the Unit 2 radwaste supply fans, 2VSF-7A and B, plenum doors and turbine building fire door 447 were maintained open, which provided a potential path for steam to enter the auxiliary building and impact both safety-related dc power trains during a high energy line break event in the turbine building.

Description. While touring the ventilation equipment area in the Unit 2 turbine building, inspectors noted that fire door 447 was tied open. The door had a caution tag attached that read "closing this door may affect battery operability due to temperature concerns or auxiliary building temperature concerns." The tag referenced Procedure OP-2106.032, "Unit Two Freeze Protection Guide," Revision 23, Attachment G, "T-MOD for Maintaining Battery Operability During Cold Weather," which inspectors reviewed to understand the potential effects to battery operability. The procedure required battery room temperatures be maintained greater than 60 degrees Fahrenheit and allowed for opening door 447 and opening the inlet plenums for radwaste supply fans 2VSF-7A and 2VSF-7B. This provided a flow path for warm turbine building air to be discharged into the battery corridor which would increase the battery room temperatures.

Inspectors reviewed engineering evaluations that supported the temporary modification for this alignment during periods of cold weather. The subject reviews, which were completed in 2002, stated that because the radwaste supply fans take suction from the roof of the turbine building, during wintertime operations, the outside air supply temperatures can be between 10 to 20 degrees Fahrenheit. The colder air would then be delivered into the corridor at the battery rooms, reducing the battery room temperatures to unacceptable levels. By opening up the air path to the turbine building, the colder outside air would mix with the warmer turbine building air to increase the temperature of the corridor at the battery rooms. Inspectors noted that the evaluations did not account for the impacts of a high energy line break inside the turbine building on any equipment supplied by the radwaste fans, specifically, the effects of humidity on electrical equipment.

Unit 2, Safety Analysis Report, Amendment 23, Section 3.6.5.1, "Separation," defined the design basis and stated that separation between redundant safety-related components and separation between these components and high energy piping systems has been provided in the design and layout of this plant. This separation provides the primary means of assuring safe plant shutdown capability following a postulated high energy pipe break. Inspectors reviewed Drawing M-2263, Sheet 6, "Piping and Instrumentation Diagram Air Flow Diagram HVAC Auxiliary Building Miscellaneous Rooms," Revision 13, and determined that the radwaste supply fans not only supplied the battery room corridor, but they also supplied both direct current equipment rooms. Inspectors were concerned that, in the event of a main steam or feedwater line break in the turbine building, steam could be drawn into the open plenums of the radwaste supply

fans and adversely impact both trains of safety-related batteries, direct current switchgear, battery chargers, and inverters.

Since 2002, the licensee had been using the temporary modification and the periods of alignment varied based on the battery room temperatures. Inspectors noted that the licensee installed the modification for the radwaste supply fans on January 4, 2014, and the modification was suspended on February 12, 2014, after inspectors identified that the engineering evaluation that supported the temporary modification did not consider high energy line break effects on the direct current power system. The licensee documented the concern in Condition Report CR-ANO-2-2014-00345.

Analysis. The inspectors concluded that the failure to maintain separation of safety related systems and high energy piping systems in accordance with design, as stated in the Safety Analysis Report, was a performance deficiency. The performance deficiency was more than minor because it was associated with the design control attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the Unit 2 radwaste supply fans, 2VSF-7A and B, plenum doors and turbine building fire door 447 were maintained open, which provided a path for steam to potentially adversely impact both dc power trains during a high energy line break event in the turbine building. Using Inspection Manual Chapter 0609, Attachment 4, “Initial Characterization of Findings,” dated July 1, 2012 and Appendix A, “The Significance Determination Process (SDP) for Findings At-Power,” Exhibit 2, dated July 1, 2012, the inspectors determined that the finding required a detailed risk evaluation because the finding represented a potential loss of system and/or function of the safety-related dc motor control centers, battery chargers and inverters.

A senior reactor analyst performed the detailed risk evaluation and determined that the change to the core damage frequency was less than 4.8E-7/year (Green). The dominant core damage sequences included losses of the plant’s DC electrical systems. The initiating event likelihood of a rupture of the specific section of piping needed to initiate core damage sequences was extremely low. See Attachment 3 for the detailed risk evaluation.

The inspectors determined that there was no cross-cutting aspect associated with this finding because the cause of the performance deficiency occurred more than three years ago, and was not representative of current licensee performance.

Enforcement. Title 10 CFR Part 50, Appendix B, Criterion Ill, "Design Control," states, in part, that measures shall be established to assure that applicable regulatory requirements and the design basis, as defined in § 50.2 and as specified in the license application, for those structures, systems, and components to which this appendix applies, are correctly translated into specifications, drawings, procedures, and instructions. Design changes shall be subject to design control measures commensurate with those applied to the original design. Unit 2, Safety Analysis Report, Amendment 23, Section 3.6.5.1, “Separation,” defined the design basis and stated, that separation between redundant safety-related components and separation between these components and high energy piping systems has been provided in the design and layout of this plant. This separation provides the primary means of assuring safe plant shutdown capability following a postulated high energy pipe break.

Contrary to the above, between January 3, 2002, and February 12, 2014, the licensee failed to assure that applicable regulatory requirements and the design basis were correctly translated into specifications, drawings, procedures, and instructions and that design changes were subject to design control measures commensurate with those applied to the original design. Specifically, Unit 2 Procedure OP-2106.032, "Unit Two Freeze Protection Guide," Attachment G, "T-MOD for Maintaining Battery Operability During Cold Weather," allowed radwaste supply fans, 2VSF-7A and B, plenum doors and turbine building fire door 447 to be maintained open, which provided a path for steam to potentially adversely impact both dc power trains during a high energy line break event in the turbine building. The licensee corrected the conditions by closing the plenum doors and removing the temporary modification allowance from the procedure. This violation is being treated as a noncited violation (NCV), consistent with Section 2.3.2 of the Enforcement Policy. The violation was entered into the licensee's corrective action program as Condition Report CR-ANO-2-2014-00345.
(NCV 05000368/2015001-01, Failure to Protect Safety Equipment From Potential High Energy Line Breaks)

.2 Permanent Modifications

a. Inspection Scope

On February 10, 2015, the inspectors reviewed a permanent modification to the Unit 1 reactor coolant system to remove the loop drain lines.

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

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

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19)

a. Inspection Scope

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

- January 4, 2015, Unit 1, motor driven emergency feedwater pump ground sensing and lockout relay replacements

- February 5, 2015, Unit 1, emergency diesel generator 1 full load reject test following governor replacement

- February 23, 2015, Unit 1, turbine driven emergency feedwater system test following outage maintenance activities

- February 6, 2015, Unit 1, emergency feedwater initiation and control power supply test following replacement

- February 3, 2015, Unit 1, service water to emergency feedwater isolation valve test following maintenance

- February 6, 2015, Unit 1, emergency feedwater initiation and control test following circuit breaker replacement

- March 11, 2015, Unit 2, reviewed turbine driven emergency feedwater test conducted on June 10, 2014, following outage maintenance activities

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

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

b. Findings

No findings were identified.

1R20 Refueling and Other Outage Activities (71111.20)

a. Inspection Scope

During the Unit 1 refueling outage that concluded on March 1, 2015, the inspectors evaluated the licensee's outage activities. The inspectors verified that the licensee considered risk in developing and implementing the outage plan, appropriately managed personnel fatigue, and developed mitigation strategies for losses of key safety functions. This verification included the following:

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

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

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22)

a. Inspection Scope

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

In-service tests:

- February 3, 2015, Unit 1, disassembly, inspection and re-assembly of emergency feedwater check valve, MS-272

Other surveillance tests:

- January 24, 2015, Unit 1, turbine driven emergency feedwater pump overspeed trip testing
- January 25, 2015, Unit 1, reactor coolant system boundary valves during decay heat removal operation
- January 30, 2015, Unit 1, borated water storage outlet check valve BW-4B full flow test
- January 30, 2015, Unit 1, low pressure injection pump 34A full flow test
- February 1, 2015, Unit 1, battery bank, D-07, service discharge test
- February 3, 2015, Unit 1, A-3 bus protective relay trip test
- February 9, 2015, Unit 1, vital battery D07 service discharge test
- February 21, 2015, Unit 1, turbine driven emergency feedwater pump test at low steam pressure
- March 23, 2015, Unit 2, turbine driven emergency feedwater pump quarterly test

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

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

b. Findings

No findings were identified.

Cornerstone: Emergency Preparedness

1EP6 Drill Evaluation (71114.06)

.1 Training Evolution Observation

a. Inspection Scope

On March 26, 2015, the inspectors observed simulator-based licensed operator requalification training that included implementation of the licensee's emergency plan. The inspectors verified that the licensee's emergency classifications, off-site notifications, and protective action recommendations were appropriate and timely. The inspectors verified that any emergency preparedness weaknesses were appropriately identified by the evaluators and entered into the corrective action program for resolution.

These activities constitute completion of one training observation sample, as defined in Inspection Procedure 71114.06.

b. Findings

No findings were identified.

2. RADIATION SAFETY

Cornerstones: Public Radiation Safety and Occupational Radiation Safety

2RS1 Radiological Hazard Assessment and Exposure Controls (71124.01)

a. Inspection Scope

The inspectors assessed the licensee's performance in assessing the radiological hazards in the workplace associated with licensed activities. The inspectors assessed the licensee's implementation of appropriate radiation monitoring and exposure control measures for both individual and collective exposures. The inspectors walked down various portions of the plant and performed independent radiation dose rate measurements. The inspectors interviewed the radiation protection manager, radiation protection supervisors, and radiation workers. The inspectors reviewed licensee performance in the following areas:

- The hazard assessment program, including a review of the licensee's evaluations of changes in plant operations and radiological surveys to detect dose rates, airborne radioactivity, and surface contamination levels

- Instructions and notices to workers, including labeling or marking containers of radioactive material, radiation work permits, actions for electronic dosimeter alarms, and changes to radiological conditions

- Programs and processes for control of sealed sources and release of potentially contaminated material from the radiologically controlled area, including survey performance, instrument sensitivity, release criteria, procedural guidance, and sealed source accountability

- Radiological hazards control and work coverage, including the adequacy of surveys, radiation protection job coverage and contamination controls, the use of electronic dosimeters in high noise areas, dosimetry placement, airborne radioactivity monitoring, controls for highly activated or contaminated materials (non-fuel) stored within spent fuel and other storage pools, and posting and physical controls for high radiation areas and very high radiation areas

- Radiation worker and radiation protection technician performance with respect to radiation protection work requirements

- Audits, self-assessments, and corrective action documents related to radiological hazard assessment and exposure controls since the last inspection

These activities constitute completion of one sample of radiological hazard assessment and exposure controls as defined in Inspection Procedure 71124.01.

b. Findings

No findings were identified.

2RS3 In-plant Airborne Radioactivity Control and Mitigation (71124.03)

a. Inspection Scope

The inspectors evaluated whether the licensee controlled in-plant airborne radioactivity concentrations consistent with ALARA principles and that the use of respiratory protection devices did not pose an undue risk to the wearer. During the inspection, the inspectors interviewed licensee personnel, walked down various portions of the plant, and reviewed licensee performance in the following areas:

- The licensee's use, when applicable, of ventilation systems as part of its engineering controls

- The licensee's respiratory protection program for use, storage, maintenance, and quality assurance of National Institute of Safety and Health (NIOSH)-certified equipment, qualification and training of personnel, and user performance

- The licensee's capability for refilling and transporting self-contained breathing apparatus (SCBA) air bottles to and from the control room and operations support center during emergency conditions, status of SCBA staged and ready for use in the plant and associated surveillance records, and personnel qualification and training

- Audits, self-assessments, and corrective action documents related to in-plant airborne radioactivity control and mitigation since the last inspection

These activities constitute completion of one sample of in-plant airborne radioactivity control and mitigation as defined in Inspection Procedure 71124.03.

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

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

4OA1 Performance Indicator Verification (71151)

.1 Unplanned Scrams per 7000 Critical Hours (IE01)

a. Inspection Scope

The inspectors reviewed licensee event reports (LERs) for the period of January 1, 2014, through December 31, 2014, to determine the number of scrams that occurred. The inspectors compared the number of scrams reported in these LERs to the number reported for the performance indicator. Additionally, the inspectors sampled monthly operating logs to verify the number of critical hours during the period. The inspectors used definitions and guidance contained in Nuclear Energy Institute Document 99-02, “Regulatory Assessment Performance Indicator Guideline,” Revision 7, to determine the accuracy of the data reported.

These activities constituted verification of the unplanned scrams per 7000 critical hours performance indicator for Units 1 and 2, as defined in Inspection Procedure 71151.

b. Findings

See Section 4OA5 for closure of an unresolved item associated with the unplanned scrams per 7000 critical hours performance indicators.

.2 Unplanned Power Changes per 7000 Critical Hours (IE03)

a. Inspection Scope

The inspectors reviewed operating logs, corrective action program records, and monthly operating reports for the period of January 1, 2014, through December 31, 2014, to determine the number of unplanned power changes that occurred. The inspectors compared the number of unplanned power changes documented to the number reported for the performance indicator. Additionally, the inspectors sampled monthly operating logs to verify the number of critical hours during the period. The inspectors used definitions and guidance contained in Nuclear Energy Institute Document 99-02, “Regulatory Assessment Performance Indicator Guideline,” Revision 7, to determine the accuracy of the data reported.

These activities constituted verification of the unplanned power outages per 7000 critical hours performance indicator for Units 1 and 2, as defined in Inspection Procedure 71151.

b. Findings

No findings were identified.

.3 Unplanned Scrams with Complications (IE04)

a. Inspection Scope

The inspectors reviewed the licensee's basis for including or excluding in this performance indicator each scram that occurred between January 1, 2014, through December 31, 2014. The inspectors used definitions and guidance contained in Nuclear Energy Institute Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, to determine the accuracy of the data reported.

These activities constituted verification of the unplanned scrams with complications performance indicator for Units 1 and 2, as defined in Inspection Procedure 71151.

b. Findings

No findings were identified.

.4 Occupational Exposure Control Effectiveness (OR01)

a. Inspection Scope

The inspectors verified that there were no unplanned exposures or losses of radiological control over locked high radiation areas and very high radiation areas during the period of April 1, 2014, to December 31, 2014. The inspectors reviewed a sample of radiologically controlled area exit transactions showing exposures greater than 100 mrem. The inspectors used definitions and guidance contained in Nuclear Energy Institute Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, to determine the accuracy of the reported data.

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

b. Findings

No findings were identified.

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

a. Inspection Scope

The inspectors reviewed corrective action program records for liquid or gaseous effluent releases that occurred between April 1, 2014, and December 31, 2014, and were

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

These activities constituted verification of the RETS/ODCM radiological effluent occurrences performance indicator as defined in Inspection Procedure 71151.

b. Findings

No findings were identified.

4OA2 Problem Identification and Resolution (71152)

Routine Review

a. Inspection Scope

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

b. Findings

No findings were identified.

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

.1 (Closed) Licensee Event Report 05000368/2014-002-00, Automatic Reactor and Main Generator trip with a Subsequent Emergency Feedwater Actuation and Start of an Emergency Diesel Generator

a. Inspection Scope

On April 3, 2014, Unit 2 tripped from 100 percent power due to a lightning strike on an offsite power line that resulted in a momentary undervoltage condition on startup transformer 3. This under voltage condition initiated a fast transfer of nonvital buses to startup transformer 2. However, by design two of the buses did not transfer, which caused loss of power to two reactor coolant pumps and a reactor trip. All safety equipment operated as expected. No additional deficiencies were identified during the review of the licensee event report. This licensee event report is closed.

b. Findings

No findings were identified.

.2 (Closed) Licensee Event Report 05000368/2013-003-00, Inoperable Offsite Power Supply Transformer Arkansas Nuclear One - Unit 2

a. Inspection Scope

On August 20, 2013, the licensee identified an undocumented wiring configuration associated with the Unit 2 startup transformer 3 voltage regulator circuit. Startup transformer 3 is one of two offsite power source transformers designed to supply offsite power for Unit 2. The wiring configuration would have prevented the startup transformer 3 voltage regulator from operating as designed.

The voltage regulator has an automatic tap-changer designed to step up transformer voltage in response to a low voltage condition after a twenty second time delay to maintain a pre-defined voltage control band. This twenty second time delay is designed to be bypassed for three minutes in the event of a main turbine generator lockout, to allow immediate voltage adjustments as Unit 2 station loads are fast transferred from the unit auxiliary transformer to the offsite startup transformer 3 during worst case accident load sequencing. The discovered wiring configuration prevented the bypass of the twenty second time delay, resulting in the inoperability of the offsite power source. The inspectors reviewed the data and determined that startup transformer 3 did not exceed its technical specification allowed outage time due to new calculations performed by the licensee since the issuance of the LER. The incorrect wiring configuration appeared to have been introduced in the 2005-2006 timeframe. On August 21, 2013, a temporary modification was installed to remove the startup transformer 3 voltage regulatory tap-change controller twenty second time delay, which restored the startup transformer 3 operability. This licensee event report was reviewed and no violations of NRC requirements were identified. This licensee event report is closed.

b. Findings

No findings were identified.

.3 (Closed) Licensee Event Report 05000368/2014-004-01, Technical Specification 3.0.4 Violation due to a Mode Change with an Inoperable Emergency Feedwater Pump

a. Inspection Scope

The licensee changed Unit 2 modes from Mode 4 to Mode 3 with the turbine driven emergency feedwater pump inoperable, which is a violation of technical specifications, due to a human performance error. Maintenance personnel had failed to follow the work instructions for governor calibration, which resulted in unstable operation of the governor and the turbine overspeed trip during surveillance testing. This performance deficiency is minor because the error was detected by a post-maintenance test before the equipment was returned to service. This failure to comply with technical specifications constitutes a minor violation that is not subject to enforcement action in accordance with the NRC's Enforcement Policy. This licensee event report is closed.

b. Findings

No findings were identified.

The activities described in this section constitute completion of three event follow-up samples, as defined in Inspection Procedure 71153.

4OA5 Other Activities

(Closed) Unresolved Item 05000368/2014005-05, "Unit 2 Unplanned Scrams Performance Indicator"

Introduction. The inspectors identified a NRC-identified Severity Level IV non-cited violation of 10 CFR 50.9, "Completeness and Accuracy of Information," for the licensee's failure to provide information to the NRC that was complete and accurate in all material respects. Specifically, the licensee failed to ensure that the Unplanned Scrams per 7000 Critical Hours performance indicator data for the second quarter of 2014 was accurate and complete in all material respects.

Description. On April 27, 2014, Unit 2 experienced an Axial Shape Index (ASI) trip when performing a rapid downpower at the request of the transmission grid operator due to severe weather affecting the grid. This unplanned reactor trip was caused by exceeding the core protection calculator ASI limits. As noted in Licensee Event Report 05000368/2014-003-00, and NRC Inspection Report 2014004, the ASI limits were exceeded, due in part to plant operators not following the downpower reactivity plan. The automatic trip occurred at approximately 50 percent power and was uncomplicated.

The licensee did not include this scram as an input into the unplanned scrams per 7000 critical hours performance indicator. The inspectors reviewed the event details and NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, and determined that the trip should have been counted as an unplanned scram. The licensee disagreed with the inspector's interpretation and submitted a frequently asked question, FAQ 14-09, to the NRC Reactor Oversight Process Working Group. The licensee stated that the exemption guidance for an anticipatory plant shutdown applied to this scram.

The NRC concluded that the Unit 2 trip that occurred on April 27, 2014, did count as an unplanned scram because the exemption in the guidance did not apply to this scram. The NRC received the licensee's updated performance indicator submittal; dated March 4, 2015, and adequately summarized the Unit 2 unplanned scrams per 7000 critical hours. Once the information inaccuracies were corrected, the Unit 2 unplanned scrams per 7000 critical hours performance indicator changed from Green to White during the second and third quarters of 2014.

Once the frequently asked question was finalized, the NEI 99-02 guidance remained unchanged and no new information was developed. Therefore, the licensee's submittals of inaccurate unplanned scrams performance indicator data for both calendar quarters were reasonably within the licensee's ability to foresee and correct, and therefore should have been prevented.

The issue was entered into the licensee's corrective action program as Condition Report CR-ANO-2-2015-00362 and the licensee is performing a root cause evaluation for the scrams.

Analysis. The inspectors concluded that a non-cited violation of 10 CFR 50.9, "Completeness and Accuracy of Information," because the licensee provided information to the NRC that was not complete and accurate in all material respects. The NRC's significance determination process (SDP) is not designed to assess the significance of violations that impact or impede the regulatory process. Therefore, the issue of two quarterly submittals of discrepant unplanned scrams performance indicator data was assessed using the traditional enforcement process in accordance with the Enforcement Policy. The inspectors determined the violation to be at Severity Level IV, because the licensee submitted inaccurate performance indicator data to the NRC that would have caused the performance indicator to change from Green to White (Enforcement Policy example 6.9.d.11). Traditional enforcement violations are not assigned a cross-cutting aspect.

Enforcement. Title 10 CFR 50.9, "Completeness and Accuracy of Information," requires, in part, that information provided to the NRC by a licensee shall be complete and accurate in all material respects.

Contrary to the above, on July 21, 2014, the licensee provided information to the NRC that was not complete and accurate information in all material respects. Specifically, the Unit 2 unplanned scrams per 7000 critical hours performance indicator data submitted to the NRC for the second and third quarters of 2014 were inaccurate. The performance indicator data submitted did not include a Unit 2 plant scram on April 27, 2014. When the second quarter and third quarter 2014 data was corrected and submitted to the NRC on March 4, 2015, the unplanned scrams per 7000 critical hours performance indicator transitioned from Green to White. This information was material to the NRC, since the NRC uses the performance indicator data to determine the amount of inspection effort to be expended at a facility. Since this issue was entered into the licensee's corrective action program as Condition Report CR-ANO-2-2015-00362, the violation was not willful, and compliance was restored within a reasonable period of time, this violation is being treated as a Non-Cited Violation (NCV), consistent with Section 2.3.2.a of the Enforcement Policy. (NCV 05000368/2015001-02, Failure to Accurately Report Unplanned Scrams per 7000 Critical Hours Performance Indicator)

4OA6 Meetings, Including Exit

Exit Meeting Summary

On February 5, 2015, the inspectors presented the radiation safety inspection results to Mr. J. Browning, Site Vice President, and other members of the licensee staff. The licensee acknowledged the issues presented. The licensee confirmed that any proprietary information reviewed by the inspectors had been returned or destroyed.

On February 11, 2015, the inspectors presented the inservice inspection results to Mr. D. James, Director, Regulatory and Performance Improvement, and other members of the licensee staff. The licensee confirmed that any proprietary information reviewed by the inspectors had been returned or destroyed.

On April 2, 2015, the inspectors presented the inspection results to Mr. J. Browning, and other members of the licensee staff. The licensee acknowledged the issues presented. The licensee confirmed that any proprietary information reviewed by the inspectors had been returned or destroyed.

4OA7 Licensee-Identified Violations

The following violation of very low safety significance (Green) was identified by the licensee and is a violation of NRC requirements which meets the criteria of the NRC Enforcement Policy for being dispositioned as a non-cited violation.

Title 10 CFR 71.5, Section (a), “Transportation of Licensed Material,” requires each licensee who transports licensed material outside the site of usage, shall comply with the applicable requirements of the DOT regulations in 49 CFR. 49 CFR Part 172.800(b) requires, in part, that the licensee must develop and adhere to a transportation security plan. The licensee implemented Procedure EN-RW-106, “Integrated Transportation Security Plan,” to adhere to these requirements.

Contrary to the above, on December 18, 2014, the licensee identified that they failed to follow their Transportation Security Plan (TSP). Specifically, licensee personnel shipped a radioactive quantity of Category 2, RAM-QC, on the public highways to a waste processor without acknowledging the shipment as a RAM-QC shipment or making appropriate notifications as required by Procedure EN-RW-106. Six shipments were identified as being shipped in violation of the TSP requirements because they failed to identify the material as RAM-QC due to inadequate Category 2 threshold values.

In accordance with Inspection Manual Chapter 0609, Attachment 4, “Initial Characterization of Findings,” and Appendix D, “Public Radiation Safety Significance Determination Process,” dated February 12, 2008, the inspectors determined the finding has very low safety significance (Green) because the licensee had an issue involving transportation of radioactive waste, but it did not involve: (1) a radiation limit being exceeded, (2) a breach of package during transport, (3) a certificate of compliance issue, (4) a low level burial ground nonconformance, or (5) a failure to provide emergency information. The licensee documented this issue in their corrective action program as Condition Report CR-ANO-C-2014-03341 and made corrections to Procedure EN-RW-106 to prevent this issue from reoccurring. There is no cross-cutting aspect with this violation due to it being licensee-identified.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

T. Black, Health Physics Technician
B. Daiber, Design Engineering Manager, Engineering
G. Doran, Specialist, Radiation Protection
B. Greeson, Design Engineering Supervisor, Engineering
T. Hogrefe, Supervisor, Radiation Protection
D. James, Director, Regulatory and Performance Improvement
D. Marvel, Manager, Radiation Protection
N. Mosher, Specialist, Licensing
K. Panther, Senior Staff NDE Level III, Projects- NDE
S. Pyle, Manager, Regulatory Assurance
L. Webb, Dosimetry
C. Williams, Dosimetry

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000368/2015001-01	NCV	Failure to Protect Safety Equipment From Potential High Energy Line Breaks (Section 1R18)
05000368/2015001-02	SLIV	Failure to Accurately Report Unplanned Scrams per 7000 Critical Hours Performance Indicator (Section 4OA5)

Closed

05000368/2014-002-00	LER	Automatic Reactor and Main Generator trip with a Subsequent Emergency Feedwater Actuation and Start of an Emergency Diesel Generator (Section 4OA3.1)
05000368/2013-003-00	LER	Inoperable Offsite Power Supply Transformer Arkansas Nuclear One - Unit 2 (Section 4OA3.2)
05000368/2014-004-01	LER	Technical Specification 3.0.4 Violation due to a Mode Change with an Inoperable Emergency Feedwater Pump (Section 4OA3.3)
05000368/2014005-05	URI	Unit 2 Unplanned Scrams Performance Indicator (Section 4OA5)

LIST OF DOCUMENTS REVIEWED

Section 1R01: Adverse Weather Protection

Condition Reports (CR)

CR-ANO-C-2015-00859

Section 1R04: Equipment Alignment

Procedures

Number	Title	Revision
OP-1203.038	Loss of Decay Heat Removal	28
OP-1203.028	Loss of Decay Heat Removal	28
OP-1015.002	Decay Heat Removal and LTOP System Control	52
OP-1103.018	Maintenance of RCS Water Level	20
OP-1104.006	Spent Fuel Cooling System	60
OP-1104.004	Decay Heat Removal Operating Procedure	56
STM 1-07	Spent Fuel Cooling System	06
STM 1-05	Decay Heat Removal System	16

Drawings

Number	Title	Revision
E-182 Sh. 3	Schematic Diagram Decay Heat Return Isolation Valve CV-1050	22
E-182 Sh. 3A	Schematic Diagram Decay Heat Return Isolation Valve CV-1410	07
M-235 Sh. 1	Piping & Instrument Diagram Spent Fuel Cooling System	69
M-232	Decay Heat Removal System	105

Section 1R05: Fire Protection

Procedures

Number	Title	Revision
1A-372-99-M	North Switchgear Room	04
1A-372-100-N	South Switchgear Room	02
1A-372-110-L	South Battery Room & DC Equipment Room	02
OP-1003.014	Fire Protection Program	07

Procedures

Number	Title	Revision
1A-372-197-X	Turbine Building Fire Plan Elevation 372’	05
1A-372-197-X	Turbine Building Fire Plan Elevation 386’	05
2A-372-2093-P	South Diesel Generator Room	02
FHA	Fire Hazard Analysis	16
OP-1015.00	Fire Brigade Organization and Responsibilities	30

Drawings

Number	Title	Revision
FZ-1045 Sh. 1	Fire Zone Detail - So. Battery Rm., No. Switchgear Rm. & So. Switchgear Room	03
FZ-2047	Fire Zone Detail - North & South Diesel Generator Rooms	02

Miscellaneous

Number	Title	Date
FBDRL-2015-05	Unit 2 South Diesel Generator Room Drill Scenario	March 19, 2015

Section 1R08: Inservice Inspection Activities

Procedures

Number	Title	Revision
CEP-NDE-0641	Liquid Penetrant Examination (PT) for ASME Section XI	07
CEP-NDE-0731	Magnetic Particle Examination (MT) for ASME Section XI	03
CEP-WP-002	Qualification, Development, and Control of Welding Procedure Specifications	01
CEP-WP-003	Qualification and Control of Welders	02
CEP-WP-004	Control and Documentation of Welding Activities	04
CEP-WP-005	Control and Issuance of Welding Material	01
CEP-WP-006	Review and Approval of Vendor Welding Programs	01
EN-DC-328	Entergy Welding Program	03
CEP-BAC-001	Boric Acid Corrosion Control Program Plan	01
EN-DC-202	NEI 03-08 Materials Initiative Process	06

Procedures

Number	Title	Revision
CEP-NDE-0730	Non-Section XI Magnetic Particle Examination (MT)	04
CEP-NDE-0423	Manual Ultrasonic Examination of Austenitic Piping Welds (ASME XI)	06

Miscellaneous

Number	Title	Revision/Date
LO-AOL-2010-00056	Assessment Report: Welding Program Assessment	August, 2011
LO-HQNLO-2011-00059	Snapshot Assessment/Report of the Alloy 600 Program	June 9, 2011
EN-LI-104, Attachment 9.5	Inservice Inspection (ISI) and Pressure Test Program Focused Self Assessment	November 15, 2012
EC-35529	ANO-1 Reactor Building Drain Permanent Removal of Piping to Eliminate Dose Source	00
EN-DC-202	NEI 03-08 Materials Initiative Process	06
QAPM	Entergy Quality Assurance Program Manual	29

Condition Reports

CR-ANO-1-2015-00498	CR-ANO-1-2015-00248	CR-ANO-1-2014-00586
CR-ANO-1-2015-00309	CR-ANO-1-2015-00275	CR-ANO-1-2015-00287
CR-ANO-1-2013-03230	CR-ANO-1-2013-02605	CR-ANO-1-2014-01067
CR-ANO-1-2014-01165	CR-ANO-1-2014-01340	CR-ANO-1-2015-00149
CR-ANO-1-2015-00298	CR-ANO-1-2015-00279	CR-ANO-1-2014-01073
CR-ANO-1-2015-00694		

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

Procedures

Number	Title	Revision
OP-1203.012C	Annunciator K04 Corrective Action	42
OP-1202.001	Reactor Trip	35
OP-1102.008	Approach to Criticality	28
OP-1202.012	Repetitive Tasks	13

Procedures

Number	Title	Revision
OP-1106.002	Generator Hydrogen System	35
A1SPGJIT1RSU	Post Refueling Reactor Startup and Turbine Roll	06
OP-1015.001	Conduct of Operations	109

Miscellaneous

Number	Title	Revision
SES-2-023	Unit 2 Licensed Operator Requalification Simulator Scenario	07

Section 1R13: Maintenance Risk Assessments and Emergent Work Control

Procedures

Number	Title	Revision
COPD-024	Risk Assessment Guidelines	53
OP-1015.033	ANO Switchyard and Transformer Yard Controls	25
STM 1-24	Turbine Controls and Auxiliaries	25
OLA-2014-00067	1R25 Outage Risk Assessment Team Report	00
COP-24	Risk Assessment Guidelines	54
OP-1015.048	Shutdown Operations Protection Plan	16

Miscellaneous

Number	Title	Revision
STM 2-23-1	System Training Manual – Switchyard Components and Operation	15

Work Orders (WO)

356820

Condition Reports (CRs)

CR-ANO-1-2014-2094 CR-ANO-1-2015-01193

Section 1R15: Operability Determinations and Functionality Assessments

Procedures

Number	Title	Revision
OP-1104.001	Core Flood System Operating Procedure	60

Procedures

Number	Title	Revision
OP-1015.036	Containment Building Closeout	44

Miscellaneous

Number	Title	Revision
EC-55658	Operability Determination Input for CR-ANO-1-2015-200 1R25 Roll-up CR for Coatings	15

Condition Reports (CRs)

CR-ANO-1-2015-01528	CR-ANO-1-2015-00253	CR-ANO-1-2015-01104
CR-ANO-1-2015-00200	CR-ANO-2-2015-00499	

Section 1R18: Plant Modifications

Procedures

Number	Title	Revision
OP-1309.013	Unit 1 Service Water Flow Test	29
OP-1104.028	ICW System Operating Procedure	37

Calculations

Number	Title	Revision
ER-ANO-1999-1909-008	Temporary alteration for Temp Fire Pump Usage During Unit Outages	00
ER-ANO-2000-3327-003	Clarification to performance requirements for ER-ANO-2000-3327-002	00

Drawings

Number	Title	Revision
M-206	Piping and Instrumentation Diagram - Steam Generator Secondary System	130
M-213	Piping and Instrumentation Diagram - Laundry Waste and Containment and Auxiliary Building Sump Drainage	30
M-214	Piping and Instrumentation Diagram - Clean Liquid Radioactive Waste	24
M-230	Piping and Instrumentation Diagram - Reactor Coolant System	119

Drawings

Number	Title	Revision
M-236	Piping and Instrumentation Diagram - Reactor Building Spray and Core Flooding Systems	93
P-214	ISI Boundary Diagram - Clean Liquid Radioactive Waste	02
P-230	ISI Boundary Diagram - Reactor Coolant System	06

Miscellaneous

Number	Title	Revision
EC-35529	ANO-1 RBD Permanent Removal of Piping to Eliminate Dose Source	00

Section 1R19: Post-Maintenance Testing

Procedures

Number	Title	Revision
OP-1104.036	Emergency Diesel Generator Operation	068
OP-1106.006	Emergency Feedwater Pump Operation	095

Condition Reports (CRs)

CR-ANO-2-2014-02000

Work Orders (WOs)

401120	307115	52516165-02	52512571	326655
307115	307122			

Section 1R20: Refueling and Other Outage Activities

Procedures

Number	Title	Revision
STM 1-03	Reactor Coolant System	16
OP-1102.016	Power Reduction and Plant Shutdown	25
OP-1102.010	Plant Shutdown and Cooldown	75

Miscellaneous

Number	Title	Revision
	ANO-1 Cycle 25: EOC Coastdown Reactivity Plan	0

Section 1R22: Surveillance Testing

Procedures

Number	Title	Revision
OP-1106.006	Emergency Feedwater Pump Operation	95
OP-1307.063	Unit 1 D06 and D07 Battery Surveillance	29
OP-1402.192	Disassembly, Inspection and Re-Assembly of MS-271 and MS-272	07
OP-1307.063	Unit 1 D06 and D07 Battery Surveillance, Supplement 4, Service Discharge Test	29
OP-2106.006	Emergency Feedwater System Operations	88
OP-1104.005	Reactor Spray System Operation	72
OP-1104.004	Decay Heat System Operations	115

Work Orders (WOs)

00363489-01 52516165-01 00377612-01 00363489-01

Condition Reports (CR)

CR-ANO-1-2015-0499

Section 1EP6: Drill Evaluation

Miscellaneous

Number	Title	Revision
SES-2-023	Unit 2 Licensed Operator Requalification Simulator Scenario	07

Section 2RS1: Radiological Hazard Assessment and Exposure Controls

Procedures

Number	Title	Revision
EN-RP-100	Radiation Worker Expectations	09
EN-RP-101	Access Control for Radiologically Controlled Areas	10
EN-RP-104	Personnel Contamination Events	07
EN-RP-106	Radiological Survey Documentation	05
EN-RP-108	Radiation Protection Posting	14
EN-RP-121	Radioactive Material Control	09
EN-RP-143	Source Control	10
EN-RP-151	Radiological Diving	03

EN-RP-202	Personnel Monitoring	09
EN-RP-204	Special Monitoring Requirements	06
EN-RP-311	Electronic Alarming Dosimeters	02
EN-RW-106	Integrated Transportation Security Plan	02, 03

Condition Reports (CRs)

CR-ANO-1-2014-00741	CR-ANO-1-2014-00837	CR-ANO-1-2014-00878
CR-ANO-2-2014-00807	CR-ANO-2-2014-01059	CR-ANO-2-2014-01107
CR-ANO-2-2014-01189	CR-ANO-2-2014-01211	CR-ANO-2-2014-01266
CR-ANO-2-2014-01406	CR-ANO-2-2014-01428	CR-ANO-2-2014-01470
CR-ANO-2-2014-01632	CR-ANO-2-2014-01633	CR-ANO-2-2014-01878
CR-ANO-C-2014-01564	CR-ANO-C-2014-02110	CR-ANO-C-2014-02274
CR-ANO-1-2014-01903	CR-ANO-1-2014-01965	CR-ANO-2-2014-01134
CR-ANO-C-2014-03341	CR-ANO-2-2014-01144	CR-ANO-C-2014-01182
CR-ANO-2-2014-01361	CR-ANO-2-2014-01385	CR-ANO-C-2014-01339
CR-ANO-2-2014-01485	CR-ANO-2-2014-01498	

Radiological Work Permits

Number	Title	Revision
20151405	Tours and Inspections in Support of 1R25	00
20151407	Decontamination Activities	00
20151417	Install and Remove Insta-Cote Material	00
20151430	Refueling Activities Including: Remove/Replace Reactor Vessel Closure Head, Plenum, Rad Cal, O-Rings	00
20151456	Reactor Building Ventilation Maintenance	00
20151475	Reactor Building Drain Header Modification	00

Radiological Surveys

Number	Title	Date
ANO-1501-0483	U1 Reactor Building 401' Refueling Canal	January 25, 2015
ANO-1501-0828	U1 Reactor Building 401' Reactor Head Stand	January 25, 2015
ANO-1501-0609	U1 Reactor Building 335' Rx Drain Line cut out	January 26, 2015

Radiological Surveys

Number	Title	Date
ANO-1501-0663	U1 Reactor Building 404' General Area	January 26, 2015
ANO-1501-0825	U1 Reactor Building 335' Rx Drain Line Cut Out	January 29, 2015
ANO-1502-0201	U1 Reactor Building 376' Coil removal from Chiller unit	February 3, 2015
ANO-1502-0242	U1 LHRA Boundary Near Incore Instrument Tank	February 3, 2015
ANO-1502-0244	U1 Reactor Building 401' Refueling Canal	February 3, 2015
ANO-1502-0245	U1 Reactor Building 335' General Area	February 3, 2015
ANO-1502-0257	U1 Reactor Building 376' Post Decontamination survey	February 3, 2015

Air Sample Surveys

Number	Title	Date
AS-ANO-2015-01542	Remove RAD Cal Lead Screws	January 29, 2015
AS-ANO-2015-01548	Northside RX Head Lift	January 29, 2015
AS-ANO-2015-01561	Cavity Drain Line	January 31, 2015
AS-ANO-2015-01582	Northside G/A Welding Activities	February 1, 2015
AS-ANO-2015-01601	VUC-1B removal	February 3, 2015
AS-ANO-2015-01603	RX Cavity Type Area – Drain Down Activities	February 3, 2015
AS-ANO-2015-01607	Refuel Canal Plugs	February 3, 2015

Radioactive Source Leak Tests

Number	Title	Date
21	Cesium-137 (50 Ci)	August 25, 2014
48	Plutonium-Beryllium (4.71 Ci)	August 25, 2014

Radioactive Source Leak Tests

Number	Title	Date
1014	Cesium-137 (400 Ci)	August 25, 2014
1210	Cesium-137 (80 mCi)	August 25, 2014
1211	Cesium-137 (100 Ci)	August 25, 2014

Miscellaneous Documents

Number	Title	Date
ALO-LO-2013-00110	Triennial Assessment Identified Gap – Focused Assessment of Contamination and High Radiation Area Controls	August 5, 2014
ANO-2014-0054	Annual Inventory of the Miscellaneous Material in the ANO SFPs	August 28, 2014
	ANO Outage Daily Report	February 2, 2015

Section 2RS3: In-Plant Airborne Radioactivity Control and Mitigation

Procedures

Number	Title	Revision
OP-1601.406	Setup and Operation of Breathing Air Sample Kits	02
EN-RP-102	Radiological Control	04
EN-RP-131	Air Sampling	13
EN-RP-501	Respiratory Protection Program	05
EN-RP-503	Selection, Issue, and Use of Respiratory Protection Equipment	06
EN-RP-504	Breathing Air	03

Radiological Work Permits

Number	Title	Revision
20151407	Decontamination Activities	00
20151417	Install and Remove Insta-Cote Material	00
20151430	Refueling Activities Including: Remove/Replace Reactor Vessel Closure Head, Plenum, Rad Cal, O-Rings	00
20151456	Reactor Building Ventilation Maintenance	00
20151475	Reactor Building Drain Header Modification	00

Miscellaneous Documents

Number	Title	Date
	FireHawk M7 Air Mask Manual	2012
	ANO Outage Daily Report	February 2, 2015
ALO-LO-2013-00110	Triennial Assessment Identified Gap – Focused Assessment of Contamination and High Radiation Area Controls	August 5, 2014

Condition Reports (CRs)

CR-ANO-C-2014-03293	CR-ANO-2-2015-00084	CR-ANO-C-2014-01274
CR-ANO-2-2014-01829	CR-ANO-2-2014-01232	

Section 4OA1: Performance Indicator Verification

Procedures

Number	Title	Revision
OP 1015.033	ANO Switchyard and Transformer Yard Controls	26

Condition Reports (CRs)

CR-ANO-1-2014-01996	CR-ANO-C-2014-03238	CR-ANO-C-2014-03253
CR-ANO-C-2014-03254		

Miscellaneous

Number	Title	Revision/Date
SAR Figure 8.2-2	500 – 161 KV SUBSTATION ONE LINE DIAGRAM	20
Data Input Forms	EN-LI-114, Attachment 9.2, NRC Performance Indicator Data Sheets 4th quarter 2014	1/16/2015
	Unit 1 Monthly Operating Data Reports, October, November, December 2014	
	Unit 2 Monthly Operating Data Reports, October, November, December 2014	

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

Procedures

Number	Title	Revision
2106.006	Emergency Feedwater System Operations	84

Drawings

Number	Title	Revision/Date
78713C	Wiring Diagram Governor and Tachometer	5-17-72
E2308	Schematic Diagram, Emergency Feedwater Pump Speed Control	14

Miscellaneous

Number	Title	Revision
EC-47413	ST#3 Past Operability due to Increased Voltage Regulatory Time Delay	1

Work Orders (WOs)

335874	52436505	52535758

Condition Reports (CRs)

CR-ANO-2-2013-01616	CR-ANO-2-1999-00525	CR-ANO-1-2007-01305
CR-ANO-1-2008-02198	CR-ANO-2-2013-00459	CR-ANO-2-2013-00569
CR-ANO-2-2013-02034	CR-ANO-2-2014-00893	CR-ANO-2-2014-02000
CR-ANO-2-2014-02008	CR-ANO-2-2014-02856	CR-ANO-2-2014-02886

The following items are requested for the
Occupational Radiation Safety Inspection
at Arkansas Nuclear One
(February 2 – 6, 2015)
Integrated Report 2015001

Inspection areas are listed in the attachments below.

Please provide the requested information on or before **January 16, 2014**.

Please submit this information using the same lettering system as below. For example, all contacts and phone numbers for Inspection Procedure 71124.01 should be in a file/folder titled "1- A," applicable organization charts in file/folder "1- B," etc.

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

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

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

If you have any questions or comments, please contact the lead inspector, Natasha Greene at (817) 200-1154 or Natasha.Greene@nrc.gov.

Currently, the other inspector will be Pete Hernandez. He may be contacted at (817) 200-1168 or Pete.Hernandez@nrc.gov.

PAPERWORK REDUCTION ACT STATEMENT

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

1. Radiological Hazard Assessment and Exposure Controls (71124.01)
Date of Last Inspection: May 16, 2014

A. List of contacts (with official title) and telephone numbers for the radiation protection organization staff and technicians

B. Applicable organization charts

C. Audits, self-assessments, and licensee event reports (LERs) written since date of last inspection, related to this inspection area

D. Procedure indexes for the radiation protection procedures

E. Please provide specific procedures related to the following areas noted below. Additional specific procedures may be requested by number after the inspector reviews the procedure indexes.
1. Radiation Protection Program Description
2. Radiation Protection Conduct of Operations
3. Personnel Dosimetry Program
4. Posting of Radiological Areas
5. High Radiation Area Controls
6. RCA Access Controls and Radworker Instructions
7. Conduct of Radiological Surveys
8. Radioactive Source Inventory and Control
9. Declared Pregnant Worker Program

F. List of corrective action documents (including corporate and subtiered systems) since date of last inspection
a. Initiated by the radiation protection organization
b. Assigned to the radiation protection organization
c. Identify any condition reports that are potentially related to a performance indicator event

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

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

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

H. List of active radiation work permits

I. Radioactive source inventory list

3. In-Plant Airborne Radioactivity Control and Mitigation (71124.03)
Date of Last Inspection: May 16, 2014

A. List of contacts and telephone numbers for the following areas:
1. Respiratory protection program
2. Self-contained breathing apparatus

B. Applicable organization charts

C. Copies of audits, self-assessments, vendor or NUPIC audits for contractor support, self-contained breathing apparatuses (SCBAs) and LERs, written since date of last inspection related to:
1. Installed air filtration systems
2. SCBAs

D. Procedure index for:
1. use and operation of continuous air monitors
2. use and operation of temporary air filtration units
3. Respiratory protection

E. Please provide specific procedures related to the following areas noted below. Additional specific procedures may be requested by number after the inspector reviews the procedure indexes.
1. Respiratory protection program
2. Use of SCBAs
3. Air quality testing for SCBAs

F. A summary list of corrective action documents (including corporate and subtiered systems) written since date of last inspection, related to the airborne monitoring program including:
1. Continuous air monitors
2. SCBAs
3. Respiratory protection program

NOTE: The lists should indicate the <u>significance level</u> of each issue and the <u>search criteria</u> used. Please provide documents which are “searchable.”

G. List of SCBA-qualified personnel - reactor operators and emergency response personnel

H. Inspection records for SCBAs staged in the plant for use since date of last inspection

I. SCBA training and qualification records for control room operators, shift supervisors, shift technical advisors, and operational support center personnel for the last year

A selection of personnel may be asked to demonstrate proficiency in donning, doffing, and performance of functionality check for respiratory devices.

Attachment 3
Detailed Risk Evaluation
ANO-2 HELB Door 447 Issue

A Region IV senior reactor analyst performed a detailed risk evaluation of the high energy line break concern and concluded it to be of very low safety significance (Green). Total change in core damage frequency was 4.8E-7/year.

Internal Events

Assumptions:

1. Only 20 feet of the main steam piping, if ruptured, could produce steam in sufficient quantities and flow that would progress through Door 447 to impact the electrical DC buses.
2. If the steam were to be directed into Door 447 from the 20 foot section of interest, the failure of all Unit 2 vital battery chargers and DC Buses 2D01 and 2D02 would result.
3. The break in the steam piping is too small to initiate a main steam isolation signal which would shut the main steam isolation valves and negate adverse effects to plant safety equipment.

Analysis:
First, the analyst identified the approximate frequency for a steam line piping break. Updated 2010 data from NUREG/CR-6928, "Industry-Average Performance for Components and initiating Events at U.S. Commercial Nuclear Power Plants," with data updated in 2010, specified the mean frequency for a large leak pipe fault as 2.5E-11/ft-hour. Second, the analyst used the Arkansas Nuclear One - Unit 2 SPAR model, Revision 8.26, to calculate the conditional core damage probability for a high energy line break which resulted in a subsequent failure of all Unit 2 vital battery chargers and DC Buses 2D01 and 2D02. The results of the loss of this equipment produced a plant state conditional core damage probability of 1.0 in the analysis. The analyst used a cutset truncation of 1.0E-11 and assumed an exposure interval of 39 days, which was the time the vulnerability was present in the plant. The delta-core damage frequency (delta-CDF) for internal events was estimated as follows:

2.5E-11/foot-hour * 20 (feet of piping) * 39 days* 24 hours/day * 1.0 = 4.7E-7

External Events

Tornados

Assumptions:

1. Only a tornado of F2 or above would have been able to damage the section of pipe that would produce a plume of steam through Door 447.
2. Tornadoes of intensity F2 or above in the 39 day exposure period of January 4 to February 12 would have occurred at the same frequency as they had historically from 1950 – 2006 within a 100 kilometer radius of the plant.
3. Operators would be well aware of impending tornadic activity. When a tornado hit the plant, operators would diagnose the break in the main steam line with nominal success (a human error probability of 1.0E-2).
4. Operators would take action after diagnosis of the break in the main steam line with nominal success (a human error probability of 1.0E-3).

Analysis:
The analyst observed that 4 tornados of F2 intensity or greater had historically hit in the dates of interest. These tornados accounted for 1.45% of the total yearly probability of a strike by a tornado of intensity of F2 or above with a probability of 4.8E-6. The analyst applied the exposure time of 39 days (0.107 years) and a plant condition CCDP of 1.0 to obtain:

4.8E-6/year * 0.107 years * 1.1E-2 * 1.0 = 5.7E-9

The analyst used this estimate as the risk posed by a tornado striking the plant and breaking the 20 foot section of piping that would then discharge into Door 447.

Seismic

Assumptions:
1. The seismic frequency and fragilities information were used from the Risk Assessment Standardization Project Manual, Volume 2, External Events.
2. The 20 foot section of steam piping that would have to break is 42-inch piping and a section of moisture separator reheater piping. The piping is not seismically qualified, but is of robust construction that is adequately supported. The analyst used the surrogate of component cooling water piping for the seismic event.
3. During a seismic event, the analyst modeled the turbine building as failing with Risk Assessment Standardization Project Manual fragilities and causing damage to the piping.
4. Operators would be well aware of seismic activity. When an earthquake hit the plant, operators would diagnose the break in the main steam line with nominal success (a human error probability of 1.0E-2).
5. Operators would take action after diagnosis of the break in the main steam line with nominal success (a human error probability of 1.0E-3).

Analysis:
The seismic analysis for piping failure analysis yielded a seismic initiating event frequency of 2.30E-6/year. Applying this to the 39 day exposure period and 1.1E-2 operator human error probability yielded:

2.3E-6/year * 0.107 years * 1.1E-2 * 1.0 = 2.7E-9

The seismic analysis for turbine building failure which would impact the piping yielded a seismic initiating event frequency of 3.8E-6/year. Applying this to the 39 day exposure period and a 1.1E-2 operator human error probability yielded:

3.8E-6/year * 0.107 years * 1.1E-2 * 1.0 = 4.5E-9

Combining the seismic analyses yielded a total seismic risk of 8.2E-9.

Other External Events
The analyst reviewed the Individual Plant Examination for External Events and screened other external events qualitatively as insignificant for this performance deficiency.

Total External Events

The total external events risk was obtained by summing the tornado and seismic risks.

Tornado	5.7E-9
Seismic	8.2E-9
Total External	1.4E-8

Total Risk

The total risk was obtained by summing the external and internal events risks.

External	1.4E-8
Internal	4.7E-7
Total Risk	4.8E-7

Since the change in core damage frequency was less than 1E-6, the finding was of very low safety significance (Green).

Large Early Release Frequency (LERF)

The analyst used Manual Chapter 0609, Appendix H, Containment Integrity Significance Determination Process, to determine that this condition was not a significant contributor to the large early release frequency (LERF) because steam generator tube rupture and intersystem LOCA sequences were not affected by the performance deficiency.