UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
612 EAST LAMAR BLVD, SUITE 400
ARLINGTON, TEXAS 76011-4125

November 4, 2011

Christopher J. Schwarz, Site Vice President
Arkansas Nuclear One
Entergy Operations, Inc.
1448 SR 333
Russellville, AR 72802-0967

Subject: ARKANSAS NUCLEAR ONE - NRC INTEGRATED INSPECTION REPORT NUMBER 05000313/2011004 AND 05000368/2011004

Dear Mr. Schwarz:

On September 30, 2011, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at the Arkansas Nuclear One facility. The enclosed integrated inspection report documents the inspection findings, which were discussed on October 11, 2011, with you and other members of your staff.

The inspections examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

Based on the results of this inspection, the NRC has identified issues that were evaluated under the risk significance determination process as having very low safety significance (Green). The NRC has determined that violations are associated with these issues. Additionally, three licensee-identified violations, which were determined to be of very low safety significance, are listed in this report. However, because of the very low safety significance and because they were entered into your corrective action program, the NRC is treating these findings as noncited violations, consistent with Section 2.3.2.a of the NRC Enforcement Policy.

These violations were evaluated in accordance with the NRC Enforcement Policy. The current Enforcement Policy is included on the NRC's Web site at (http://www.nrc.gov/about-nrc/regulatory/enforcement/enforce-pol.html).

If you contest the violations or the significance of the noncited violations, 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, D.C. 20555-0001, with copies to the Regional Administrator, U.S. Nuclear Regulatory Commission, Region IV, 612 E. Lamar Blvd, Suite 400, Arlington, Texas, 76011-4125; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001; and the NRC Resident Inspector at the facility. In addition, if you disagree with the cross-cutting aspect assigned to any finding 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 facility.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response, will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html. To the extent possible, your response should not include any personal privacy or proprietary information so that it can be made available to the Public without redaction.

Sincerely,

/RA/

Ray Azua, Acting Chief
Project Branch E
Division of Reactor Projects

Docket: 50-313; 50-368
License: DRP-51, NPF-6

Enclosure:
NRC Inspection Report 05000313/2011004; 05000368/2011004
w/Attachment: Supplemental Information

cc w/Enclosure:

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U.S. NUCLEAR REGULATORY COMMISSION

REGION IV

Docket:	05000313; 05000368
License:	DRP-51; NPF-6
Report:	05000313/2011004; 05000368/2011004
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:	July 1 through September 30, 2011
Inspectors:	A. Sanchez, Senior Resident Inspector J. Rotton, Resident Inspector W. Schaup, Resident Inspector K. Clayton, Senior Operations Engineer R. Kumana, Project Engineer L. Ricketson, P.E., Senior Health Physicist
Approved By:	Ray Azua, Acting Chief, Project Branch E Division of Reactor Projects

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R:_REACTORS\ANO\IR2011004-RP-AS

SUNSI Rev Compl.	☑ Yes ☐ No	ADAMS	☑ Yes ☐ No	Reviewer Initials	RVA
Publicly Avail	☑ Yes ☐ No	Sensitive	☐ Yes ☑ No	Sens. Type Initials	RVA

SRI:DRP/E	RI:DRP/E	RI:DRP/E	SPE:DRP/E	C:DRS/EB1	C:DRS/EB2
ASanchez	JRotton	WTSchaup	RAzua	TRFarnholtz	NFO'Keefe
/RA/ via E	***/RA/ via E***	***/RA/ via E***	***/RA/***	***/RLatta for/***	***/RA/***
11/3/11	11/3/11	11/3/11	10/31/11	10/31/11	10/31/11
C:DRS/OB	C:DRS/PSB1		C:DRS/PSB2	C:DRS/TSB	C:DRP/E
MSHaire	MHay		GEWerner	DPowers	RAzua
/KClayton for/	***/JRollins for/***		***/RA/***	***/RA/***	***/RA/***
10/31/11	11/1/11		10/31/11	11/1/11	11/3/11

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SUMMARY OF FINDINGS

IR 05000313/2011004; 05000368/2011004 07/01/2011 – 09/30/2011; Arkansas Nuclear One, Integrated Resident and Regional Report, Problem Identification and Resolution, and Other Activities (NRC Temporary Instruction [TI] 2515/177)

The report covered a 3-month period of inspection by resident inspectors and announced baseline inspections by region-based inspectors. Four Green noncited violations of significance were identified. The significance of most findings is indicated by their color (Green, White, Yellow, or Red) using Inspection Manual Chapter 0609, "Significance Determination Process." The cross-cutting aspect is determined using Inspection Manual Chapter 0310, "Components Within the Cross Cutting Areas." Findings for which the significance determination process does not apply may be Green or be assigned a severity level after NRC management review. 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: Initiating Events

- Green. The inspectors documented a self-revealing finding for an inadequate work instruction for the 2-02 control element motor generator set flywheel bearing replacement that resulted in a failure of that bearing. Specifically, the licensee failed to provide instructions to obtain flywheel shaft dimensions to ensure adequate interference fit between the bearing and the shaft during corrective maintenance. This bearing subsequently failed on April 6, 2011. The licensee placed the issue into the corrective action program as Condition Report ANO-CR-2-2011-1817. The licensee replaced the failed bearing and shaft assembly and the system was returned to service.

  The failure to provide adequate maintenance work instruction to verify dimensional fit up between the flywheel shaft and bearing for the Unit 2, 2-02 motor generator set prior to reassembly was determined to be a performance deficiency. Specifically, it was within the licensee's ability to foresee and correct and was a failure to meet station requirements to provide adequate maintenance work instruction to maintenance personnel. The performance deficiency was determined to be more than minor because it was associated with the procedure quality attribute of the Initiating Event Cornerstone and affected the cornerstone objective to limit the likelihood of those events that upset plant stability and challenge critical safety functions during power operations. Specifically, due to both control element motor generator sets being in the same room, the failure of the motor generator flywheel bearing caused the failure of that motor generator shaft and could have affected the only operating motor generator set and resulted in a reactor trip. Using Manual Chapter 0609, Exhibit 1, "Phase 1 Initial Screening and Characterization of Finding," the finding was determined to be of very low safety significance because it did not contribute to both the likelihood of a reactor trip and that mitigation equipment or function would not be available.

The inspectors determined that the finding did not have a crosscutting aspect because the performance deficiency is not indicative of current plant performance as the cause of not developing adequate work instructions stems from the late 1990s. (Section 4OA2.6)

- Green. The inspectors documented a self-revealing finding for inadequate work instructions that resulted in the failure of a Unit 2 main feedwater pump A recirculation valve. Specifically, the licensee failed to provide adequate work instructions for reassembling and testing of the Unit 2 main feedwater recirculation valve, 2CV-0731. This valve failed full open during full power operations resulting in exceeding licensed reactor power. The licensee has implemented corrective action to communicate the importance of the positioning of the feedback arm support bracket and has changed the work orders to verify angle and tension of the feedback arm following reassembly of the positioner. The licensee entered this issue into the corrective action program as Condition Report ANO-CR-2-2011-1782.

  The failure to provide adequate work instruction for the assembly and testing of the Unit 2 main feedwater pump A recirculation valve positioner was determined to be a performance deficiency, because it was within the licensee's ability to foresee and correct and was a failure to meet station requirements to provide adequate maintenance work instruction to maintenance personnel. The performance deficiency was determined to be more than minor because it was associated with the procedure quality attribute of the Initiating Events cornerstone and affected the objective to limit the likelihood of those events that upset plant stability and challenge critical safety function during power operations. Specifically, the failure of the recirculation valve caused reactor power to exceed licensed reactor power. Using MC 0609, Exhibit 1, "Phase 1 Initial Screening and Characterization of Findings," the finding was determined to be of very low safety significance because it did not contribute to both the likelihood of a reactor trip and that mitigation equipment or functions would not be available. The inspectors determined that the finding did not have a crosscutting aspect because the performance deficiency is not indicative of current plant performance. (Section 4OA2.5)

Cornerstone: Mitigating Systems

- Green. The inspector identified a noncited violation of 10 CFR 50 Appendix B Criterion III for failure to verify and check the adequacy of design by performance of design reviews, alternate calculations, or a suitable testing program. Specifically, the licensee identified potential void locations during engineering evaluations of the Unit 1 High Pressure Injection, Decay Heat Removal / Low Pressure Injection, Core Flood, and Building Spray systems and did not verify the adequacy of the design of those systems to ensure continued operability. The licensee performed ultrasonic testing on these locations at the time of the identification, but did not install vents, determine an acceptable void size, or establish a program to periodically vent or monitor these locations. The licensee

entered this issue into their corrective action program as Condition Report CR-ANO-1-2011-1406.

The failure to verify and check the adequacy of design of the Unit 1 High Pressure Injection, Decay Heat Removal/Low Pressure Injection, Core Flood, and Building Spray systems is a performance deficiency. The performance deficiency is more than minor because it is associated with the design control attribute of the Mitigating Systems cornerstone and adversely affected the objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The inspector performed a Phase 1 screening, in accordance with Inspection Manual Chapter 0609, Attachment 4, "Phase 1 – Initial Screening and Characterization of Findings," and determined that the finding was of very low safety significance (Green), because the finding was confirmed not to result in a loss of operability. This finding has a crosscutting aspect in the area of problem identification and resolution in the corrective action component because the licensee did not takes appropriate corrective actions to address safety issues in a timely manner. [P.1.d]. (Section 4OA5(1))

- Green. The inspector identified a noncited violation of 10 CFR 50 Appendix B Criterion III for failure to verify and check the adequacy of design by performance of design reviews, alternate calculations, or a suitable testing program. Specifically, when performing a design review, the licensee did not identify the Decay Heat Removal coolers as locations where gas could accumulate in the Decay Heat Removal system and establish methods to verify the adequacy of design to ensure operability. The licensee performed immediate inspection of the heat exchangers by ultrasonic testing and did not find any voids. The licensee entered this issue into their corrective action program as Condition Report CR-ANO-1-2011-01306.

  The failure to identify the Decay Heat Removal heat exchangers as locations where gas could accumulate is a performance deficiency. The performance deficiency is more than minor because if uncorrected, it could lead to a more significant safety concern. Specifically, the licensee could be unaware of an unanalyzed void in the Decay Heat Removal system because they failed to consider the potential for gas accumulation and had no program in place to detect it. The inspector performed a Phase 1 screening, in accordance with Inspection Manual Chapter 0609, Attachment 4, "Phase 1 – Initial Screening and Characterization of Findings," and determined that the finding was of very low safety significance (Green), because the finding was confirmed not to result in a loss of operability. This finding has a crosscutting aspect in the area of human performance in the decision making component because the licensee did not use conservative assumptions in decision making or conduct effectiveness reviews of safety-significant decisions to verify the validity of the underlying assumptions [H.1.b]. (Section 4OA5(2))

- Green. The inspectors identified a noncited violation of 10 CFR 50 Appendix B Criterion III for failure to verify and check the adequacy of design by performance of design reviews, alternate calculations, or a suitable testing program. Specifically, the licensee did not adequately evaluate the required minimum level in the Borated Water Storage Tank to ensure adequate net positive suction head for Emergency Core Cooling System pumps and prevent gas entrainment due to vortex formation. The licensee performed an immediate operability evaluation and concluded that there was sufficient margin in the level to maintain operability. The licensee entered this issue into their corrective action program as Condition Report CR-ANO-1-2011-1407 and CR-ANO-1-2011-1440.

  The failure to adequately evaluate the minimum level in the Borated Water Storage Tanks to ensure adequate net positive suction head for Emergency Core Cooling System pumps and prevent vortex formation is a performance deficiency. The performance deficiency is more than minor because it is associated with the design control attribute of the Mitigating Systems cornerstone and adversely affects the objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the licensee did not adequately ensure that the design of the Borated Water Storage Tank was sufficient to avoid loss of net positive suction head and prevent air entrainment in the Emergency Core Cooling System pumps. The inspector performed a Phase 1 screening, in accordance with Inspection Manual Chapter 0609, Attachment 4, "Phase 1 – Initial Screening and Characterization of Findings," and determined that the finding was of very low safety significance (Green), because the finding was confirmed not to result in a loss of operability. The finding was determined to have no cross-cutting aspect because the performance deficiency occurred in 2004, and is not indicative of current plant performance. (Section 4OA5(3))

Cornerstone: Barrier Integrity

- Green. The inspectors identified a noncited violation of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Actions" for the licensee's failure to take corrective action for an invalid local leak rate test performed on the Unit 2 escape hatch, 2C-2. Specifically, the licensee failed to take appropriate and timely corrective action to develop an appropriate testing method for the inner and outer escape hatch door seals. The issue was entered into the licensee's corrective action program as Condition Report CR-ANO-2-2011-3198.

  The inspectors determined that the licensee's failure to develop an adequate testing method that did not use the strong backs to precondition the escape hatch door seals prior to the 2R20 fall 2009 outage was a performance deficiency. Specifically, the licensee failed to provide timely corrective actions to a condition adverse to quality that had been identified in a previous NRC identified noncited violation and was within the licensee's ability to foresee and correct. The performance deficiency was determined to be more than minor because it was associated with the procedure quality attribute of the Barrier

Integrity cornerstone and adversely affected the cornerstone objective to provide reasonable assurance that physical design barriers (containment) protect the public from radionuclide releases caused by accidents or events and is therefore a finding. Using Manual Chapter 0609.04, "Phase 1 - Initial Screening and Characterization of Findings," the finding was determined to have very low safety significance, Green, because the finding does not represent a degradation of the radiological barrier, or the smoke and toxic gas barrier functions provided for the control room, or does not represent an actual open pathway in the physical integrity of the reactor containment or a heat removal component. The finding was determined to have a crosscutting aspect in the area of problem identification and resolution, associated with the corrective action program in that the licensee did not thoroughly evaluate the problem in a manner to make certain that the resolution addressed the causes and the extent of condition to ensure a new test method, that did not use preconditioning, would be completed in a timely manner to resolve the problem [P.1(c)]. (Section 4OA2.4)

B. Licensee-Identified Violations

Violations of very low safety significance, which were identified by the licensee, have been reviewed by the inspectors. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program. These violations and corrective action tracking numbers (condition report numbers) are listed in Section 4OA7.

REPORT DETAILS

Summary of Plant Status

Unit 1 began the period at 100 percent reactor power and finished the period at 94 percent reactor power due to a coast down for refueling outage 1R23. Unit 2 began the period at 100 percent reactor power and remained at 100 percent reactor power for the period.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity, and Emergency Preparedness

1R01 Adverse Weather Protection (71111.01)

Readiness to Cope with External Flooding

a. Inspection Scope

The inspectors evaluated the design, material condition, and procedures for coping with the design basis probable maximum flood. The evaluation included a review to check for deviations from the descriptions provided in the USAR for features intended to mitigate the potential for flooding from external factors. As part of this evaluation, the inspectors checked for obstructions that could prevent draining, checked that the roofs did not contain obvious loose items that could clog drains in the event of heavy precipitation, and determined that barriers required to mitigate the flood were in place and operable. Additionally, the inspectors performed an inspection of the protected area to identify any modification to the site that would inhibit site drainage during a probable maximum precipitation event or allow water ingress past a barrier. The inspectors also reviewed the abnormal operating procedure for mitigating the design basis flood to ensure it could be implemented as written. Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of one (1) external flooding sample as defined in Inspection Procedure 71111.01-05.

b. Findings

No findings were identified.

1R04 Equipment Alignments (71111.04)

Partial Walkdown

a. Inspection Scope

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

- July 19, 2011, Unit 1, motor-driven emergency feedwater pump while the turbine driven pump was out of service for maintenance

- July 19, 2011, Unit 2, motor-driven emergency feedwater pump while the turbine driven pump was out of service for maintenance

- July 28, 2011, Unit 2, C train high pressure safety injection pump while in service and A train high pressure safety injection pump was out of service for maintenance

- August 11, 2011, Unit 1, alternate AC Generator and Unit 1 K-4A emergency diesel generator during K-4B outage

The inspectors selected these systems based on their risk significance relative to the reactor safety cornerstones at the time they were inspected. The inspectors attempted to identify any discrepancies that could affect the function of the system, and, therefore, potentially increase risk. The inspectors reviewed applicable operating procedures, system diagrams, Safety Analysis Report, technical specification requirements, administrative technical specifications, outstanding work orders, condition reports, and the impact of ongoing work activities on redundant trains of equipment in order to identify conditions that could have rendered the systems incapable of performing their intended functions. The inspectors also inspected accessible portions of the systems to verify system components and support equipment were aligned correctly and operable. The inspectors examined the material condition of the components and observed operating parameters of equipment to verify that there were no obvious deficiencies. The inspectors also verified that the licensee had properly identified and resolved equipment alignment problems that could cause initiating events or impact the capability of mitigating systems or barriers and entered them into the corrective action program with the appropriate significance characterization. Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of four (4) partial system walkdown samples as defined in Inspection Procedure 71111.04-05.

b. Findings

No findings were identified.

1R05 Fire Protection (71111.05)

Quarterly Fire Inspection Tours

a. Inspection Scope

The inspectors conducted fire protection walkdowns that were focused on availability, accessibility, and the condition of firefighting equipment in the following risk-significant plant areas:

- July 19, 2011, Unit 1, Fire Zone 38-Y, emergency feedwater pump room
- July 20, 2011, Unit 1, Fire Zone 40-Y, Safeguards pipe way south
- July 28, 2011, Unit 2, Fire Zone 2007-LL, east pump area and galley
- July 28, 2011, Unit 2, Fire Zone 2024-JJ, emergency turbine driven feedwater pump 2P-7A room
- August 11, 2011, Alternate AC Generator Building

The inspectors reviewed areas to assess if licensee personnel had implemented a fire protection program that adequately controlled combustibles and ignition sources within the plant; effectively maintained fire detection and suppression capability; maintained passive fire protection features in good material condition; and had implemented adequate compensatory measures for out of service, degraded or inoperable fire protection equipment, systems, or features, in accordance with the licensee's fire plan. The inspectors selected fire areas based on their overall contribution to internal fire risk as documented in the plant's Individual Plant Examination of External Events with later additional insights, their potential to affect equipment that could initiate or mitigate a plant transient, or their impact on the plant's ability to respond to a security event. Using the documents listed in the attachment, the inspectors verified that fire hoses and extinguishers were in their designated locations and available for immediate use; that fire detectors and sprinklers were unobstructed; that transient material loading was within the analyzed limits; and fire doors, dampers, and penetration seals appeared to be in satisfactory condition. The inspectors also verified that minor issues identified during the inspection were entered into the licensee's corrective action program. Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of five (5) quarterly fire-protection inspection samples as defined in Inspection Procedure 71111.05-05.

b. Findings

No findings were identified.

1R07 Heat Sink Performance (71111.07)

a. Inspection Scope

The inspectors reviewed licensee programs, verified performance against industry standards, and reviewed critical operating parameters and maintenance records for the emergency diesel cooling water heat exchanger 2E-20B, emergency diesel lube oil cooler 2E-63B and the emergency diesel air cooler 2E-64B used to cool the Unit 2, B emergency diesel generator. The inspectors verified that performance tests were satisfactorily conducted for heat exchangers/heat sinks and reviewed for problems or

errors; the licensee utilized the periodic maintenance method outlined in EPRI Report NP 7552, “Heat Exchanger Performance Monitoring Guidelines”; the licensee properly utilized biofouling controls; the licensee’s heat exchanger inspections adequately assessed the state of cleanliness of their tubes; and the heat exchanger was correctly categorized under 10 CFR 50.65, “Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants.” Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of one (1) heat sink inspection sample as defined in Inspection Procedure 71111.07-05.

b. Findings

No findings were identified.

1R11 Licensed Operator Requalification Program (71111.11)

.1 Quarterly Review

a. Inspection Scope

On August 24, 2011 and August 26, 2001, the inspectors observed a crew of licensed operators in the plant’s simulator, Unit 2 and Unit 1 respectively, to verify that operator performance was adequate, evaluators were identifying and documenting crew performance problems and training was being conducted in accordance with licensee procedures. The inspectors evaluated the following areas:

- Licensed operator performance
- Crew’s clarity and formality of communications
- Crew’s ability to take timely actions in the conservative direction
- Crew’s prioritization, interpretation, and verification of annunciator alarms
- Crew’s correct use and implementation of abnormal and emergency procedures
- Control board manipulations
- Oversight and direction from supervisors
- Crew’s ability to identify and implement appropriate technical specification actions and emergency plan actions and notifications
- Crew’s usage and validation of shutdown procedures

The inspectors compared the crew's performance in these areas to previously established operator action expectations and successful critical task completion requirements. Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of one (1) quarterly licensed-operator requalification program sample as defined in Inspection Procedure 71111.11-05.

b. Findings

No findings were identified.

.2 Biennial Review

a. Inspection Scope

The licensed operator requalification program involves two training cycles that are conducted over a 2-year period. In the first cycle, the annual cycle, the operators are administered an operating test consisting of job performance measures and simulator scenarios. In the second part of the training cycle, the biennial cycle, operators are administered an operating test and a comprehensive written examination. For this annual inspection requirement unit 1 was in the second part of the training cycle while unit 2 was in the first part of the training cycle.

The inspector reviewed the results of the examinations and operating tests for both units to satisfy the annual inspection requirements.

On September 12, 2011, the licensee informed the lead inspector of the following Unit 1 results:

- 9 of 9 crews passed the simulator portion of the operating test
- 48 of 48 licensed operators passed the simulator portion of the operating test
- 48 of 48 licensed operators passed the Job Performance Measure portion of the examination
- 48 of 48 licensed operators passed the biennial written exam

There was no remediation performed for the unit 1 examinations or operating tests.

On September 12, 2011, the licensee informed the lead inspector of the following Unit 2 results:

- 10 of 12 crews passed the simulator portion of the operating test
- 49 of 56 licensed operators passed the simulator portion of the operating test

- 56 of 56 licensed operators passed the Job Performance Measure portion of the examination

The individuals that failed the simulator scenario portions of the operating test were remediated, retested, and passed their retake operating tests.

The inspector completed one (1) inspection sample of the annual licensed operator requalification program.

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness (71111.12)

a. Inspection Scope

The inspectors evaluated degraded performance issues involving the following risk significant system:

- September, 29, 2011, Unit 1, Decay Heat Removal system

The inspectors reviewed events such as where ineffective equipment maintenance has resulted in valid or invalid automatic actuations of engineered safeguards systems and independently verified the licensee's actions to address system performance or condition problems in terms of the following:

- Implementing appropriate work practices
- Identifying and addressing common cause failures
- Scoping of systems in accordance with 10 CFR 50.65(b)
- Characterizing system reliability issues for performance
- Charging unavailability for performance
- Trending key parameters for condition monitoring
- Ensuring proper classification in accordance with 10 CFR 50.65(a)(1) or -(a)(2)
- Verifying appropriate performance criteria for structures, systems, and components classified as having an adequate demonstration of performance through preventive maintenance, as described in 10 CFR 50.65(a)(2), or as requiring the establishment of appropriate and adequate goals and corrective actions for systems classified as not having adequate performance, as described in 10 CFR 50.65(a)(1)

The inspectors assessed performance issues with respect to the reliability, availability, and condition monitoring of the system. In addition, the inspectors verified maintenance effectiveness issues were entered into the corrective action program with the appropriate significance characterization. Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of one (1) quarterly maintenance effectiveness samples as defined in Inspection Procedure 71111.12-05.

b. Findings

No findings were identified.

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

a. Inspection Scope

The inspectors reviewed licensee personnel's evaluation and management of plant risk for the maintenance and emergent work activities affecting risk-significant and safety-related equipment listed below to verify that the appropriate risk assessments were performed prior to removing equipment for work:

- July 5, 2011, alternate AC generator out of service due to air compressor leak – affected both units with different risk assessments
- July 6, 2011, Unit 2, for emergent work while performing 500 KV switching operation in the site switchyard with the Alternate AC generator out of service
- July 7, 2011, Unit 2, severe thunderstorm warning while moving fuel in the spent fuel pool
- July 14, 2011, Unit 2, containment cooling fan 2VSF-1C failed to start on demand
- July 23, 2011, Unit 1 and 2, emergent work on the startup 1 transformer
- September 7, 2011, Unit 2, missed surveillance on the pressurizer safety relief valve 2PSV-4633

The inspectors selected these activities based on potential risk significance relative to the reactor safety cornerstones. As applicable for each activity, the inspectors verified that licensee personnel performed risk assessments as required by 10 CFR 50.65(a)(4) and that the assessments were accurate and complete. When licensee personnel performed emergent work, the inspectors verified that the licensee personnel promptly assessed and managed plant risk. The inspectors reviewed the scope of maintenance work, discussed the results of the assessment with the licensee's probabilistic risk analyst or shift technical advisor, and verified plant conditions were consistent with the

risk assessment. The inspectors also reviewed the technical specification requirements and inspected portions of redundant safety systems, when applicable, to verify risk analysis assumptions were valid and applicable requirements were met. Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of six (6) maintenance risk assessments and emergent work control inspection samples as defined in Inspection Procedure 71111.13-05.

b. Findings

No findings were identified.

1R15 Operability Evaluations (71111.15)

a. Inspection Scope

The inspectors reviewed the following issues:

- July 1, 2011, Unit 1, train A reactor building spray pump after the motor stator temperature element failed high
- July 13, 2011, Unit 2, containment cooling fan 2VSF-1C failed to start on demand
- July 27, 2011, Unit 2, train C high pressure safety injection pump red train supply breaker 2A-407 plunger rod contacting actuating switch assembly
- August 12, 2011, Unit 2, service water leak in service water supply line to train A engineered safeguards features room cooler 2VUC-1A
- August 17, 2011, Unit 1, train A emergency diesel generator lube oil leaks
- September 2, 2011, Unit 2, discovery of a missed surveillance on pressurizer code safety valve 2PSV-4634.

The inspectors selected these potential operability issues based on the risk significance of the associated components and systems. The inspectors evaluated the technical adequacy of the evaluations to ensure that technical specification operability was properly justified and the subject component or system remained available such that no unrecognized increase in risk occurred. The inspectors compared the operability and design criteria in the appropriate sections of the technical specifications and Safety Analysis Report to the licensee personnel's evaluations to determine whether the components or systems were operable. Where compensatory measures were required to maintain operability, the inspectors determined whether the measures in place would function as intended and were properly controlled. The inspectors determined, where appropriate, compliance with bounding limitations associated with the evaluations. Additionally, the inspectors also reviewed a sampling of corrective action documents to

verify that the licensee was identifying and correcting any deficiencies associated with operability evaluations. Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of six (6) operability evaluations inspection samples as defined in Inspection Procedure 71111.15-04

b. Findings

No findings were identified.

1R19 Post Maintenance Testing (71111.19)

a. Inspection Scope

The inspectors reviewed the following post maintenance activities to verify that procedures and test activities were adequate to ensure system operability and functional capability:

- July 1, 2011, Unit ,1 train A reactor building spray pump after replacement of the failed stator temperature element
- July 14, 2011, Unit 2, following repairs to containment cooling fan 2VSF-1C after its failure to start on demand
- August 3, 2011, Unit 1, maintenance on the motor driven emergency feedwater pump P-7B
- August 5, 2011, Unit 2, train B 125 vdc battery charger 2D-31B 10-year refurbishment

The inspectors selected these activities based upon the structure, system, or component's ability to affect risk. The inspectors evaluated these activities for the following (as applicable):

- The effect of testing on the plant had been adequately addressed; testing was adequate for the maintenance performed
- Acceptance criteria were clear and demonstrated operational readiness; test instrumentation was appropriate

The inspectors evaluated the activities against the technical specifications, the Safety Analysis Report, 10 CFR Part 50 requirements, licensee procedures, and various NRC generic communications to ensure that the test results adequately ensured that the equipment met the licensing basis and design requirements. In addition, the inspectors reviewed corrective action documents associated with postmaintenance tests to determine whether the licensee was identifying problems and entering them in the

corrective action program and that the problems were being corrected commensurate with their importance to safety. Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of four (4) post maintenance testing inspection samples as defined in Inspection Procedure 71111.19-05.

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22)

a. Inspection Scope

The inspectors reviewed the USAR, procedure requirements, and technical specifications to ensure that the surveillance activities listed below demonstrated that the systems, structures, and/or components tested were capable of performing their intended safety functions. The inspectors either witnessed or reviewed test data to verify that the significant surveillance test attributes were adequate to address the following:

- Preconditioning
- Evaluation of testing impact on the plant
- Acceptance criteria
- Procedures
- Test data
- Testing frequency and method demonstrated technical specification operability
- Restoration of plant systems
- Fulfillment of ASME Code requirements
- Engineering evaluations, root causes, and bases for returning tested systems, structures, and components not meeting the test acceptance criteria were correct
- Reference setting data
- Annunciators and alarms setpoints

The inspectors also verified that licensee personnel identified and implemented any needed corrective actions associated with the surveillance testing.

- July 2, 2011, Unit 2, train A emergency diesel generator semi-annual fast start surveillance
- July 8, 2011, Unit 1, train A low pressure injection pump quarterly inservice test
- July 19, 2011, Unit 1 turbine driven emergency feedwater pump quarterly inservice surveillance
- August 17, 2011, Unit 2, turbine driven emergency feedwater pump overspeed test
- September 7, 2011, Unit 1, reactor coolant system unidentified leak rate surveillance test

Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of five (5) surveillance testing inspection samples as defined in Inspection Procedure 71111.22-05.

b. Findings

No findings were identified.

Cornerstone: Emergency Preparedness

1EP6 Drill Evaluation (71114.06)

Emergency Preparedness Drill Observation

a. Inspection Scope

The inspectors evaluated the conduct of one routine licensee emergency drill for Unit 2 on September 14, 2011 to identify any weaknesses and deficiencies in classification, notification, and protective action recommendation development activities. The inspectors observed emergency response operations in the simulator, technical support center and the emergency offsite facility to determine whether the event classification, notifications, and protective action recommendations were performed in accordance with procedures. The inspectors also attended the licensee drill critique to compare any inspector-observed weakness with those identified by the licensee staff in order to evaluate the critique and to verify whether the licensee staff was properly identifying weaknesses and entering them into the corrective action program. As part of the inspection, the inspectors reviewed the drill package and other documents listed in the attachment.

These activities constitute completion of one (1) sample as defined in Inspection Procedure 71114.06-05.

b. Findings

No findings were identified.

2. RADIATION SAFETY

Cornerstone: Occupational and Public Radiation Safety

2RS04 Occupational Dose Assessment (71124.04)

a. Inspection Scope

This area was inspected to: (1) determine the accuracy and operability of personal monitoring equipment; (2) determine the accuracy and effectiveness of the licensee's methods for determining total effective dose equivalent; and (3) ensure occupational dose is appropriately monitored. The inspectors used the requirements in 10 CFR Part 20, the technical specifications, and the licensee's procedures required by technical specifications as criteria for determining compliance. During the inspection, the inspectors interviewed licensee personnel, performed walkdowns of various portions of the plant, and reviewed the following items:

- External dosimetry accreditation, storage, issue, use, and processing of active and passive dosimeters
- The technical competency and adequacy of the licensee's internal dosimetry program
- Adequacy of the dosimetry program for special dosimetry situations such as declared pregnant workers, multiple dosimetry placement, and neutron dose assessment
- Audits, self-assessments, and corrective action documents related to dose assessment since the last inspection

Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of the one (1) required sample as defined in Inspection Procedure 71124.04-05.

b. Findings

No findings were identified.

2RS05 Radiation Monitoring Instrumentation (71124.05)

a. Inspection Scope

This area was inspected to verify the licensee is assuring the accuracy and operability of radiation monitoring instruments that are used to: (1) monitor areas, materials, and workers to ensure a radiologically safe work environment and (2) detect and quantify radioactive process streams and effluent releases. The inspectors used the requirements in 10 CFR Part 20, the technical specifications, and the licensee's procedures required by technical specifications as criteria for determining compliance. During the inspection, the inspectors interviewed licensee personnel, performed walkdowns of various portions of the plant, and reviewed the following items:

- Selected plant configurations and alignments of process, postaccident, and effluent monitors with descriptions in the Final Safety Analysis Report and the offsite dose calculation manual

- Select instrumentation, including effluent monitoring instrument, portable survey instruments, area radiation monitors, continuous air monitors, personnel contamination monitors, portal monitors, and small article monitors to examine their configurations and source checks

- Calibration and testing of process and effluent monitors, laboratory instrumentation, whole body counters, postaccident monitoring instrumentation, portal monitors, personnel contamination monitors, small article monitors, portable survey instruments, area radiation monitors, electronic dosimetry, air samplers, continuous air monitors

- Audits, self-assessments, and corrective action documents related to radiation monitoring instrumentation since the last inspection

Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of the one (1) required sample as defined in Inspection Procedure 71124.05-05.

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator Verification (71151)

.1 Data Submission Issue

a. Inspection Scope

The inspectors performed a review of the performance indicator data submitted by the licensee for the second Quarter 2011 performance indicators for any obvious inconsistencies prior to its public release in accordance with Inspection Manual Chapter 0608, "Performance Indicator Program."

This review was performed as part of the inspectors' normal plant status activities and, as such, did not constitute a separate inspection sample.

b. Findings

No findings were identified.

.2 Mitigating Systems Performance Index - Heat Removal System (MS08)

a. Inspection Scope

The inspectors sampled licensee submittals for the mitigating systems performance index - heat removal system performance indicator for Units 1 and 2 for the period from the fourth quarter 2010 through the second quarter 2011. To determine the accuracy of the performance indicator data reported during those periods, the inspectors used definitions and guidance contained in NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 6. The inspectors reviewed the licensee's operator narrative logs, issue reports, event reports, mitigating systems performance index derivation reports, and NRC integrated inspection reports for the period of October 2010 through June 2011 to validate the accuracy of the submittals. The inspectors reviewed the mitigating systems performance index component risk coefficient to determine if it had changed by more than 25 percent in value since the previous inspection, and if so, that the change was in accordance with applicable NEI guidance. The inspectors also reviewed the licensee's issue report database to determine if any problems had been identified with the performance indicator data collected or transmitted for this indicator and none were identified. Specific documents reviewed are described in the attachment to this report.

These activities constitute completion of two (2) mitigating systems performance index - heat removal system samples as defined in Inspection Procedure 71151-05.

b. Findings

No findings were identified.

.3 Mitigating Systems Performance Index - Residual Heat Removal System (MS09)

a. Inspection Scope

The inspectors sampled licensee submittals for the mitigating systems performance index - residual heat removal system performance indicator for Units 1 and 2 for the period from the fourth quarter 2010 through the second quarter 2011. To determine the accuracy of the performance indicator data reported during those periods, the inspectors used definitions and guidance contained in NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 6. The inspectors reviewed the licensee's operator narrative logs, issue reports, mitigating systems performance index derivation reports, event reports, and NRC integrated inspection reports for the period of October 2010 through June 2011 to validate the accuracy of the submittals. The inspectors reviewed the mitigating systems performance index component risk coefficient to determine if it had changed by more than 25 percent in value since the previous inspection, and if so, that the change was in accordance with applicable NEI guidance. The inspectors also reviewed the licensee's issue report database to determine if any problems had been identified with the performance indicator data collected or transmitted for this indicator and none were identified. Specific documents reviewed are described in the attachment to this report.

These activities constitute completion of two (2) mitigating systems performance index - residual heat removal systems sample as defined in Inspection Procedure 71151-05.

b. Findings

No findings were identified.

.4 Mitigating Systems Performance Index - Cooling Water Systems (MS10)

a. Inspection Scope

The inspectors sampled licensee submittals for the mitigating systems performance index - cooling water systems performance indicator for Units 1 and 2 for the period from the fourth quarter 2010 through the second quarter 2011. To determine the accuracy of the performance indicator data reported during those periods, the inspectors used definitions and guidance contained in NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 6. The inspectors reviewed the licensee's operator narrative logs, issue reports, mitigating systems performance index derivation reports, event reports, and NRC integrated inspection reports for the period of October 2010 through June 2011 to validate the accuracy of the submittals. The inspectors reviewed the mitigating systems performance index component risk coefficient to determine if it had changed by more than 25 percent in value since the previous inspection, and if so, that the change was in accordance with applicable NEI guidance. The inspectors also reviewed the licensee's issue report database to determine if any problems had been identified with the performance indicator data collected or transmitted for this indicator and none were identified. Specific documents reviewed are described in the attachment to this report.

These activities constitute completion of two (2) mitigating systems performance index - cooling water system samples as defined in Inspection Procedure 71151-05.

b. Findings

No findings were identified.

4OA2 Identification and Resolution of Problems (71152)

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

.1 Routine Review of Identification and Resolution of Problems

a. Inspection Scope

As part of the various baseline inspection procedures discussed in previous sections of this report, the inspectors routinely reviewed issues during baseline inspection activities and plant status reviews to verify that they were being entered into the licensee's corrective action program at an appropriate threshold, that adequate attention was being given to timely corrective actions, and that adverse trends were identified and addressed. The inspectors reviewed attributes that included the complete and accurate identification of the problem; the timely correction, commensurate with the safety significance; the evaluation and disposition of performance issues, generic implications, common causes, contributing factors, root causes, extent of condition reviews, and previous occurrences reviews; and the classification, prioritization, focus, and timeliness of corrective actions. Minor issues entered into the licensee's corrective action program because of the inspectors' observations are included in the attached list of documents reviewed.

These routine reviews for the identification and resolution of problems did not constitute any additional inspection samples. Instead, by procedure, they were considered an integral part of the inspections performed during the quarter and documented in Section 1 of this report.

b. Findings

No findings were identified.

.2 Daily Corrective Action Program Reviews

a. Inspection Scope

In order to assist with the identification of repetitive equipment failures and specific human performance issues for follow-up, the inspectors performed a daily screening of

items entered into the licensee's corrective action program. The inspectors accomplished this through review of the station's daily corrective action documents.

The inspectors performed these daily reviews as part of their daily plant status monitoring activities and, as such, did not constitute any separate inspection samples.

b. Findings

No findings were identified.

.3 Semi-Annual Trend Review

a. Inspection Scope

The inspectors performed a review of the licensee's corrective action program and associated documents to identify trends that could indicate the existence of a more significant safety issue. The inspectors focused their review on repetitive equipment issues, but also considered the results of daily corrective action item screening discussed in Section 4OA2.2, above, licensee trending efforts, and licensee human performance results. The inspectors nominally considered the 6-month period of January 2011 through June 2011 although some examples expanded beyond those dates where the scope of the trend warranted. The main focus of the inspection pertained to a recent increase in the number of service water and firewater microbiological induced corrosion system leaks.

The inspectors also included issues documented outside the normal corrective action program in major equipment problem lists, repetitive and/or rework maintenance lists, departmental problem/challenges lists, system health reports, quality assurance audit/surveillance reports, self-assessment reports, and Maintenance Rule assessments. The inspectors compared and contrasted their results with the results contained in the licensee's corrective action program trending reports. Corrective actions associated with a sample of the issues identified in the licensee's trending reports were reviewed for adequacy.

These activities constitute completion of one (1) single semi-annual trend inspection sample as defined in Inspection Procedure 71152-05.

b. Findings

A licensee identified violation is documented in Section 4OA7 of this report. No other findings were identified.

.4 Selected Issue Follow-up Inspection

a. Inspection Scope

During a review of items entered in the licensee's corrective action program, the inspectors recognized a corrective action report documenting a failed as-found escape

hatch door seal local leak rate test during the Unit 2 2R21 refueling outage. The licensee entered the issue into the corrective action program as Condition Report CR-ANO-2-2011-768. The inspectors reviewed the condition report for past operability and because of previous issues with local leak rate tests on the escape hatch door seals.

These activities constitute completion of one (1) in-depth problem identification and resolution sample as defined in Inspection Procedure 71152-05.

b. Findings

Introduction. The inspectors identified a Green, noncited violation of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Actions" for the licensee's failure to take timely corrective action for an invalid local leak rate test performed on the Unit 2 escape hatch, 2C-2. Specifically, the licensee failed to take appropriate and timely corrective action to develop an appropriate testing method for the inner and outer escape hatch door seals.

Description. As part of the inspection plan for the recent Unit 2 refueling outage 2R21, spring 2011, the inspectors reviewed the licensee's operability determination for a Condition Report CR-ANO-2-2011-0768 which documented that the Unit 2 escape hatch, 2C-2, inner and outer door seals had failed the local leak rate tests. The inspectors noted that during prior refueling outages, the escape hatch door seals had failed local leak rate tests, and that a noncited violation related to the escape hatch seal testing, had been issued in a previous integrated resident inspection report.

NRC noncited violation 05000368/2008002-02, issued on May 2, 2008, describes a violation of 10 CFR 50, Appendix B, Criterion XI, "Test Control," where the licensee was testing the Unit 2 escape hatch door seals at accident design pressure by placing a strong back on the door to hold it in place. The NRC determined that the practice of using the strong back was preconditioning the escape hatch seals for the test. Prior to the violation the escape hatch seals would pass surveillance tests with a very low leak rate but the barrel test results suggested that the door seals were degraded. The seals were replaced during Unit 2 refueling outage, 2R19, spring 2008, and an as-left barrel test and escape hatch seal test were performed using the same preconditioning testing method. The licensee incorrectly assumed that a section in the ANSI 56.8-1994, "Containment System Leakage Testing Requirements" that dealt with non-testable seals applied in this case because they did not have a viable testing method to test the escape hatch seals at a lower pressure ($\geq$ 10 psig) and that a barrel test only would be enough to declare the escape hatch operable and meet technical specification requirements.

The licensee initiated Condition Report CR-ANO-2-2007-1687 and two corrective actions were taken. First, the seals on the outer door of the escape hatch were replaced and subsequently tested with the strong backs installed to verify adequate sealing of the outer door had been restored. Second, procedures for testing the escape hatch prior to establishing containment integrity and following each ingress and egress were changed to require a barrel test anytime a local leak rate test was performed. However, no corrective actions were performed to address the testing method using the strong backs which constituted preconditioning of the seals.

During the Unit 2 refueling outage 2R20, fall 2009, the licensee continued to perform the as-found escape hatch seal tests using the same preconditioning testing method that was previously identified in the violation for the previous outage. According to the licensee's test results, the inner and outer escape hatch door seals passed the local leak rate test with minimal leakage.

During the recent Unit 2 refueling outage 2R21, spring 2011, the licensee performed the as-found escape hatch seal tests using a new test method that did not rely on the strong backs to test the escape hatch seals. While the escape hatch passed the barrel test the escape hatch door seals grossly failed to meet surveillance leakage acceptance criteria. During the outage, extensive maintenance with significant vendor assistance was performed on the escape hatch and seals. The as-left escape hatch door seal tests and the barrel test were performed with satisfactory results using the new test method without the strong backs and the escape hatch was declared operable.

Analysis. The inspectors determined that the licensee's failure to develop an adequate testing method that did not use the strong backs to precondition the escape hatch door seals prior to the 2R20 fall 2009 outage was a performance deficiency. Specifically, the licensee failed to provide corrective actions to a condition adverse to quality that had been identified in a previous NRC noncited violation and was within the licensee's ability to foresee and correct. The performance deficiency was determined to be more than minor because it was associated with the procedure quality attribute of the Barrier Integrity cornerstone and adversely affected the cornerstone objective to provide reasonable assurance that physical design barriers (containment) protect the public from radionuclide releases caused by accidents or events and is therefore a finding. Using Manual Chapter 0609.04, "Phase 1 - Initial Screening and Characterization of Findings," the finding was determined to have very low safety significance, Green, because the finding does not represent a degradation of the radiological barrier, or the smoke and toxic gas barrier functions provided for the control room, or does not represent an actual open pathway in the physical integrity of the reactor containment or a heat removal component. The finding was determined to have a crosscutting aspect in the area of problem identification and resolution, associated with the corrective action program in that the licensee did not thoroughly evaluate the problem in a manner to make certain that the resolution addressed the causes and the extent of condition to ensure a new test method, that did not use preconditioning, would be completed in a manner to resolve the problem [P.1(c)].

Enforcement. Title 10 of the Code of Federal Regulations Part 50, Appendix B, Criterion XVI, "Corrective Actions, " requires that measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and non-conformances are promptly identified and corrected. Contrary to this requirement, the licensee failed to provide timely corrective actions by failing to develop an adequate testing method that did not use the strong backs which preconditioned the escape hatch seals prior to the 2R20 fall outage seal tests. The finding was of very low safety significance and has been entered into the corrective action program as Condition Report CR-ANO-2-2011-3198; the violation was treated as a noncited violation consistent with Section 2.3.2.a of the NRC Enforcement

Policy: NCV 05000368/2011004-01, “Failure to Take Timely Corrective Actions for Invalid Local Leak Rate Test”.

.5 Selected Issue Follow-up Inspection

a. Inspection Scope

During a review of items entered in the licensee’s corrective action program, the inspectors recognized a corrective action report documenting a Unit 2 failed main feedwater recirculation valve 2CV-0731. The licensee entered the issue into the corrective action program as Condition Report CR-ANO-2-2011-1782.

These activities constitute completion of one (1) in-depth problem identification and resolution sample as defined in Inspection Procedure 71152-05.

b. Findings

Introduction. The inspectors documented a Green self-revealing finding for inadequate work instructions that resulted in the failure of a Unit 2 main feedwater pump A recirculation valve. Specifically, the licensee failed to provide adequate work instructions for reassembling and testing of the Unit 2 main feedwater recirculation valve, 2CV-0731. This valve failed full open during full power operations resulting in exceeding licensed reactor power.

Description. On April 2, 2011, the main Unit 2 feedwater pump A recirculation valve, 2CV-0731, failed full open causing the unit to exceed 100 percent licensed reactor power. Operators took immediate action to reduce reactor power and stabilized the unit at approximately 96 percent reactor power. Control room operators were unsuccessful in closing the valve from the control room. Auxiliary operators were dispatched to the area and closed the valve locally. Reactor power was returned to 100 percent during the following shift.

The original recirculation valve was a motor-operated valve that was later converted to an air-operated valve. In 2006, the Moore positioner was replaced with a Bailey positioner. Due to the space considerations at the valve location, the positioner feedback arm and support brackets were fit up in the field via skill of the craft. The final field configuration was not incorporated into the maintenance work order for future reference. Following the initial installation of the Bailey positioner, the valve positioner functioned as designed. During the spring 2011 refueling outage the positioner was removed to support valve repair. Following restoration from the valve maintenance, the positioner was tested without any identified issues. The testing was performed with the main steam system out of service.

The licensee’s investigation determined that the positioner feedback support arm was misaligned and this allowed the feedback arm to reposition with minimal force, such as system vibration. Since the positioner was field fit during the initial installation and instructions for assembly were not captured, the work instruction provided to the craft did not provide clear guidance for reassembling and testing of the positioner. The

inspectors determined that the licensee failed to document instruction for proper assembly of the feedback arm and the feedback arm support bracket. This left the licensee unaware of the sensitivity of the positioner to misalignment.

The licensee also completed an extent of condition review which identified the main feedwater pump B recirculation valve as the only other valve that is affected by the issue. The licensee has implemented corrective action to communicate the importance the positioning of the feedback arm support bracket and have changed the work orders to verify angle and tension of the feedback arm following reassembly of the positioner.

Analysis. The failure to provide adequate work instruction for the assembly and testing of the Unit 2 main feedwater pump recirculation valve positioner was determined to be a performance deficiency. The performance deficiency was determined to be more than minor because it was associated with the procedure quality attribute of the initiating events cornerstone and affected the objective to limit the likelihood of those events that upset plant stability and challenge critical safety function during power operations. Specifically, the failure of the recirculation valve caused reactor power to exceed licensed reactor power. Using MC 0609, Exhibit 1, "Phase 1 Initial Screening and Characterization of Findings,' the finding was determined to be of very low safety significance because it did not contribute to both the likelihood of a reactor trip and that mitigation equipment or functions would not be available. The inspectors determined that the finding did not have a crosscutting aspect because the performance deficiency is not indicative of current plant performance.

Enforcement. Although a performance deficiency was identified, there were no violations of NRC requirements during the review of this issue because the Unit 2 main feedwater recirculation valve is not safety-related. The licensee entered this issue into the corrective action program as Condition Report ANO-CR-2-2011-1782. This finding will be documented as: FIN 050000368/2011004-02, "Failure to Provide Adequate Work Instruction Results in a Main Feedwater Recirculation Valve Failing Open."

.6 Selected Issue Follow-up Inspection

a. Inspection Scope

During a review of items entered in the licensee's corrective action program, the inspectors recognized a corrective action report documenting the Unit 2, 2-02 motor generator set flywheel bearing failure. The licensee entered the issue into the corrective action program as Condition Report CR-ANO-2-2011-1817.

These activities constitute completion of one (1) in-depth problem identification and resolution sample as defined in Inspection Procedure 71152-05.

b. Findings

Introduction. The inspectors documented a Green self-revealing finding for an inadequate work instruction for the 2-02 control element motor generator set flywheel bearing replacement that resulted in a failure of that bearing. Specifically, the licensee

failed to provide instructions to obtain flywheel shaft dimensions to ensure adequate interference fit between the bearing and the shaft during corrective maintenance.

Description. On April 6, 2011, Unit 2 control room received a fire alarm for the control element motor generator set room. Auxiliary operators were dispatched and found sparks being emitted from the 2-02 motor generator set flywheel outboard bearing. The operators secured the motor generator set and cleared the fire alarm. The bearing and shaft were replaced and the motor generator set was placed back into service and post maintenance vibration testing was completed with no abnormalities.

During the licensee's investigation, the licensee identified that the bearing failure was a result of the loss of the thermal spray coating that had been applied to the shaft in the mid- to late 1990s. This thermal coating applied a metallic material used to make up for the flywheel shaft being too small. The last time the bearing was replaced, the flywheel shaft was found to be smaller in diameter than required for proper interference fit with the bearing. Since a replacement shaft could not be obtained in sufficient time to meet the schedule, the licensee applied a thermal spray to the shaft to increase the diameter. The shaft was machined down to the acceptable dimension and the flywheel bearing was installed.

In spring 2010, vibration data for the 2-02 motor generator flywheel indicated an issue was developing in the outboard bearing. The licensee continued to monitor the vibration and wrote work orders to replace the bearing in refueling outage 2R21. The bearing was replaced without any measurements taken on the flywheel shaft. The motor generator was placed into service following the outage. Post maintenance vibration data indicated a decrease in vibration. Even though the vibration levels were not as low as the licensee had expected, no further troubleshooting was performed. The bearing failed while Unit 2 was at 100 percent reactor power. The 2-01 motor generator set located in the same room, was unaffected by the failure of the 2-02 motor generator. The licensee has taken corrective action to incorporate dimension checks and acceptance criteria for the motor generator sets into the bearing change out maintenance work orders.

Analysis. The failure to provide adequate maintenance work instruction to verify dimensional fit up between the flywheel shaft and bearing for the Unit 2, 2-02 motor generator set prior to reassembly was determined to be a performance deficiency. The performance deficiency was determined to be more than minor because it was associated with the procedure quality attribute of the initiating event cornerstone and affected the cornerstone objective to limit the likelihood of those events that upset plant stability and challenge critical safety functions during power operations. Specifically, due to both control element motor generator sets being in the same room, the failure of the motor generator flywheel bearing caused the failure of that motor generator shaft and could have affected the only operating motor generator set and result in a reactor trip. Using Manual Chapter 0609, Exhibit 1, "Phase 1 Initial Screening and Characterization of Finding," the finding was determined to be of very low safety significance because it did not contribute to both the likelihood of a reactor trip and that mitigation equipment or function would not be available. The inspectors determined that the finding did not have a crosscutting aspect because the performance deficiency is not indicative of current

plant performance as the cause of not developing adequate work instructions stems from the late 1990s.

Enforcement. Although a performance deficiency was identified, there were no violations of NRC requirements during the review of this issue because the Unit 2 control element motor generator set is not safety-related. The licensee entered this issue into the corrective action program as Condition Report ANO-CR-2-2011-1817. This finding will be documented as: FIN 050000368/2011004-03, "Failure to Provide Adequate Work Instruction Results in Failed Bearing on Motor Generator Set."

.7 Selected Issue Follow-up Inspection

a. Inspection Scope

During 2R21, the licensee experienced the failure of six 480 Vac molded case circuit breakers in safety related buses. The licensee entered the issue into the corrective action program as Condition Report CR-ANO-2-2011-0789. Due to failures of similar breakers in previous outages, and the increase in failure rate of the installed breakers from previous outages, the inspectors selected, for a more in-depth review, the station's higher tier apparent cause evaluation that reviewed the potential adverse trend that resulted in a breaker inspection scope expansion of 2R21 breaker testing in accordance with Technical Requirements Manual 3/4.8.2.5. "Containment Penetration Conductor Over-Current Protective Devices." The inspectors selected this issue for review because of the past history of the ITE/Gould Model HE3 molded case circuit breakers and the adverse trend in failure rate. Furthermore, the inspectors determined that the failure of these components could potentially impact station equipment, result in systems not being able to perform their design functions, and the potential effect that these breakers could have on equipment operability and motor control center availability. During the review of the licensee's actions, the inspectors considered the following, as applicable: 1) complete and accurate identification of the problem in a timely manner; 2) evaluation and disposition of operability/reportability issues; 3) consideration of extent of condition;; 4) classification and prioritization of the resolution of the problem; 5) identification of the apparent cause and contributing causes of the problem; 6) identification of corrective actions; and 7) completion of corrective actions in a timely manner.

These activities constitute completion of one (1) in-depth problem identification and resolution sample as defined in Inspection Procedure 71152-05.

b. Findings

No findings were identified.

4OA5 Other Activities

.1 NRC Temporary Instruction (TI) 2515/177, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems (NRC Generic Letter 2008-01)"

a. Inspection Scope

The inspectors evaluated whether the licensee maintained documents, installed system hardware, and implemented actions that were consistent with the information provided in their response to NRC Generic Letter 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems." Specifically, the inspectors verified that the licensee has implemented or was in the process of implementing the commitments, modifications, and programmatically controlled actions described in the response to Generic Letter 2008-01. The inspectors conducted their review in accordance with Temporary Instruction 2515/177 and considered the site-specific supplemental information provided by the Office of Nuclear Reactor Regulation to the inspectors.

The inspectors reviewed the licensing basis, design, testing, and corrective actions as specified in the temporary instruction. The specific items reviewed and any resulting observations are documented below.

Licensing Basis: The inspectors reviewed selected portions of licensing basis documents to verify that they were consistent with the NRR assessment report and that the licensee properly processed any required changes. The inspectors reviewed selected portions of technical specifications, technical specification bases, and the updated final safety analysis report. The inspectors also verified that applicable documents that described the plant and plant operation, such as calculations, piping and instrumentation diagrams, procedures, and corrective action program documents addressed the areas of concern and were changed, if needed, following plant changes. The inspectors confirmed that the licensee performed surveillance tests at the frequency required by the technical specifications. The inspectors verified that the licensee tracked their commitment to evaluate and implement any changes that will be contained in the technical specification task force traveler.

Design: The inspectors reviewed selected design documents, performed system walkdowns, and interviewed plant personnel to verify that the licensee addressed design and operating characteristics. Specifically:

- The inspectors verified that the licensee had identified the applicable gas intrusion mechanisms for their plant.

- The inspectors verified that the licensee had established void acceptance criteria consistent with the void acceptance criteria identified by the Office of Nuclear Reactor Regulation. The inspectors also confirmed that the range of flow conditions evaluated by the licensee was consistent with the full range of design basis events and expected flow rates for various break sizes and locations.

- The inspectors selectively reviewed applicable documents, including calculations and engineering evaluations, with respect to gas accumulation in the emergency core cooling systems, decay heat removal, and containment spray systems. Specifically, the inspectors verified that these documents addressed venting requirements, aspects where pipes were normally voided such as some containment spray piping inside containment, void control during maintenance activities, and the potential for vortex effects that could ingest gas into the systems during design basis events.

- The inspectors conducted a walk down of selected regions of the emergency core cooling systems in sufficient detail to assess the licensee's walk downs. The inspectors completed full system alignment inspections of the Unit 1 Low Pressure Injection system and the Unit 2 Low Pressure Safety Injection system in earlier inspection periods. These additional activities counted towards the completion of this temporary instruction and were documented in Inspection Reports 05000313/2010004; 05000368/2010004 and 05000313/2011003; 05000368/2011003. The inspectors also verified that the information obtained during the licensee's walkdown was consistent with the items identified during the inspectors' independent walk down.

- The inspectors verified that piping and instrumentation diagrams and isometric drawings that describe the residual heat removal and safety injection system configurations. The review of the selected portions of isometric drawings considered the following:

    1. High point vents were identified.

    2. High points without vents were recognizable.

    3. Other areas where gas could accumulate and potentially impact operability, such as at orifices in horizontal pipes, isolated branch lines, heat exchangers, improperly sloped piping, and under closed valves, were described in the drawings or in referenced documentation.

    4. Horizontal pipe centerline elevation deviations and pipe slopes in nominally horizontal lines that exceed specified criteria were identified.

    5. All pipes and fittings were clearly shown.

    6. The drawings were up-to-date with respect to recent hardware changes, and that any discrepancies between as-built configurations and the drawings were documented and entered into the corrective action program for resolution.

- The inspectors verified that the licensee had completed their walk downs and selectively verified that the licensee identified discrepant conditions in their corrective action program and appropriately modified affected procedures and training documents.

Testing: The inspectors reviewed selected surveillance, post-modification test, and post-maintenance test procedures and results implemented during power and shutdown operations to verify that the licensee had approved and was using procedures that appropriately addressed gas accumulation and/or intrusion into the subject systems. This review included the verification of procedures used for conducting surveillances and determination of void volumes to ensure that the void criteria were satisfied and will be reasonably ensured to be satisfied until the next scheduled void surveillance. Also, the inspectors reviewed procedures used for filling and venting following conditions that may have introduced voids into the subject systems to verify that the procedures addressed testing for such voids and provided processes for their reduction or elimination. The inspectors reviewed the performance of the Unit 2 emergency core cooling system procedures for filling and venting in an earlier inspection period. This additional activity counted towards the completion of this temporary instruction and was documented in Inspection Report 05000313/2011002; 05000368/2011002. The inspectors will be conducting a similar inspection of the licensee's filling and venting and gas accumulation management procedures during the next Unit 1 refueling outage.

Corrective Actions: The inspectors reviewed selected corrective action program documents to assess how effectively the licensee addressed the issues in their corrective action program associated with Generic Letter 2008-01. In addition, the inspectors verified that the licensee implemented appropriate corrective actions for selected issues identified in the nine-month and supplemental responses. The inspectors determined that the licensee had effectively implemented the actions required by Generic Letter 2008-01.

Based on this review, the inspector concluded that there is reasonable assurance that the licensee will complete all outstanding items and incorporate this information into the design basis and operational practices. This temporary instruction will remain open for Arkansas Nuclear One pending the completion of the additional inspection activities described above during the next Unit 1 refueling outage and a later review to ensure that that the licensee has sufficiently addressed outstanding items and deficiencies. Additional inspection will be necessary using this temporary instruction and it will be closed in a later inspection report.

b. Findings

(1) Failure to Verify the Adequacy of Design of Unit 1 Emergency Core Cooling Systems to Address Potential Voiding.

Introduction. The inspector identified a Green noncited violation of 10 CFR 50 Appendix B Criterion III for failure to verify and check the adequacy of design by performance of design reviews, alternate calculations, or a suitable testing program. Specifically, the licensee identified potential void locations during engineering evaluations of the Unit 1 High Pressure Injection, Decay Heat Removal/Low Pressure Injection, Core Flood, and Building Spray systems and did not verify the adequacy of the design of those systems to ensure continued operability.

Description. As part of the response to NRC Generic Letter 2008-01, the licensee performed design reviews of the Unit 1 High Pressure Injection, Decay Heat Removal / Low Pressure Injection, Core Flood, and Building Spray systems by means of engineering evaluations and system walkdowns. These evaluations were documented by the licensee as CALC-ANO1-SE-08-00002, CALC-ANO1-SE-08-00003, CALC-ANO1-SE-08-00004, and CALC-ANO1-SE-08-00005. In these evaluations, the licensee identified multiple locations in these systems that were susceptible to gas accumulation due to piping configurations that could not be vented. After identifying these areas, the licensee performed non-destructive evaluation using ultrasonic testing of the affected locations. In cases where the piping was inaccessible, the evaluation was performed on accessible downstream locations. As result of these evaluations, the licensee determined that all the locations evaluated did not have voids, with the exception of a location in the Sodium Hydroxide system piping. This exception was captured in a condition report.

The licensee did not have any requirement for periodic testing of these locations and did not establish a program to periodically monitor these locations for voids. Although the licensee considered the possibility of installing vents in their evaluations, they only generated a corrective action to install vents in the Sodium Hydroxide piping where the void was found. In their evaluations, the licensee did not perform an analysis to credit dynamic venting for removing any potential voids, and did not establish a minimum acceptable void size for these locations. The licensee also did not analyze the potential impact of undetected voids in one or more of these locations.

The licensee relied on vent and fill procedures to prevent void formation. The vent and fill operations were followed by ultrasonic testing of selected locations chosen on a case by case basis by the system engineer. On some occasions, voids were discovered in susceptible locations following vent and fill operations. The licensee implemented an informal ultrasonic testing program for Unit 1 Emergency Core Cooling Systems in 2009. This testing was performed at the direction of the system engineer. In 2010, the licensee identified the need to create a formal work order to perform this testing, and established an “Action Request” to do this. This licensee did not generate a Condition Report to track this action, and the action had not been completed at the time of the inspection. In addition, the licensee did not perform any analysis or documentation to show that the planned testing program would adequately demonstrate operability of the systems.

In response, the licensee generated a condition report to address the issue. The licensee evaluated the informal testing program and determined that the results of the testing were sufficient to demonstrate that the Emergency Core Cooling Systems were operable.

Analysis. The failure to verify and check the adequacy of design of the Unit 1 High Pressure Injection, Decay Heat Removal/Low Pressure Injection, Core Flood, and Building Spray systems is a performance deficiency. The performance deficiency is more than minor because it is associated with the design control attribute of the Mitigating Systems cornerstone and adversely affected the objective to ensure the availability, reliability, and capability of systems that respond to initiating events to

prevent undesirable consequences. The inspector performed a Phase 1 screening, in accordance with Inspection Manual Chapter 0609, Attachment 4, "Phase 1 – Initial Screening and Characterization of Findings," and determined that the finding was of very low safety significance (Green), because the finding was confirmed not to result in a loss of operability. This finding has a crosscutting aspect in the area of problem identification and resolution in the corrective action component because the licensee did not takes appropriate corrective actions to address safety issues in a timely manner. [P.1.d]

Enforcement. Title 10 of the Code of Federal Regulations Part 50, Appendix B, Criterion III, requires, in part, that design control measures shall provide for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program. Contrary to this requirement, in October 2008 and February 2009, engineers failed to verify the adequacy of design of the Unit 1 High Pressure Injection, Decay Heat Removal/Low Pressure Injection, Core Flood, and Building Spray systems. Specifically, personnel documented multiple locations in these systems where gas could accumulate and potentially affect system operability and failed to develop an analysis or a suitable testing program to ensure continued operability. Because the finding is of very low safety significance and has been entered into the licensee's corrective action program as Condition Report CR-ANO-1-2011-01406, this violation is being treated as a noncited violation consistent with Section 2.3.2.a of the NRC Enforcement Policy: noncited violation 05000313/2011004-04, "Failure to Verify the Adequacy of Design of Unit 1 Emergency Core Cooling Systems to Address Potential Voiding."

(2) Failure to Identify the Decay Heat Removal Coolers as Potential Void Locations.

Introduction. The inspector identified a Green noncited violation of 10 CFR 50 Appendix B Criterion III for failure to verify and check the adequacy of design by performance of design reviews, alternate calculations, or a suitable testing program. Specifically, when performing a design review, the licensee did not identify the Decay Heat Removal coolers as locations where gas could accumulate in the Decay Heat Removal system and establish methods to verify the adequacy of design to ensure operability.

Description. As part of the response to NRC Generic Letter 2008-01, the licensee performed a design review of the Unit 1 Decay Heat Removal/Low Pressure Injection system by means of an engineering evaluation and system walkdown [CALC-ANO1-SE-08-00003]. In the evaluation, they evaluated the potential for gas to accumulate in various locations of the system. Some of the locations the licensee identified as susceptible to voiding were the P-34A discharge line and the P34A and P-34B recirculation lines. In the evaluation, the licensee stated in section 5.2.2:

> There is not a vent between the P-34A discharge line downstream of DH-3A and the DH cooler, E-35A. When this line is drained, OPS starts the P-34A pump at reduced flow to flush this known gas void to the BWST (reference OP-1104.004, Section 28).

Neither P-34A1B recirculation lines have vents. Typical flows of 80 gpm will flush any gas void to the E-35A1B cooler where it will be swept to the BWST

The licensee therefore credited system flow with transporting any voids in these locations to the Borated Water Storage Tank through the E-35A and E-35B Decay Heat Removal coolers. The licensee did not have a program to periodically vent or perform non-destructive evaluation on the coolers.

The Decay Heat Removal coolers are baffled U-tube heat exchangers with Decay Heat Removal system flow on the shell side. The cooler inlet is at the top of the heat exchanger and the cooler discharges through two piping penetrations at the bottom of the shell. The flow is split inside the shell and goes through a series of baffles as it passes around the tubes before it exits the shell through the two discharge pipes. Therefore, the shell could be considered two short and wide pipe segments, with internal flow restrictions.

The inspector questioned how voids were assumed to be transported through the shell baffles and down past the tubes through the outlets. The licensee did not have an analysis to show that the flow was sufficient to transport any assumed voids through the shell. In response to the question, the licensee performed a calculation and determined that the Froude number for typical Decay Heat Removal surveillance flow through the shell would be 0.88. The accepted industry standard is that Froude numbers of 1.0 or greater are sufficient to assume full transport of voids. The calculated value of 0.88 is too low to be credited for void transport without further analysis. The inspector determined that the licensee assumed voids would flow through the heat exchanger without considering the need to verify the assumption through analysis.

The licensee immediately performed ultrasonic testing on the cooler vent line nipples to determine whether voids were present. The testing did not reveal any voids in the coolers. The inspector also reviewed the three most recent heat exchanger performance tests on each cooler to assess whether degraded performance occurred that could be attributed to voiding. One instance of degraded performance was noted but was found to be caused by a material issue. No issues related to voiding were found. Based on the results on the ultrasonic testing, the licensee declared the Decay Heat Removal System operable.

Analysis. The failure to identify the Decay Heat Removal heat exchangers as locations where gas could accumulate is a performance deficiency. The performance deficiency is more than minor because if uncorrected, it could lead to a more significant safety concern. Specifically, the licensee could be unaware of an unanalyzed void in the Decay Heat Removal system because they failed to consider the potential for gas accumulation and had no program in place to detect it. The inspector performed a Phase 1 screening, in accordance with Inspection Manual Chapter 0609, Attachment 4, “Phase 1 – Initial Screening and Characterization of Findings,” and determined that the finding was of very low safety significance (Green), because the finding was confirmed not to result in a loss of operability. This finding has a crosscutting aspect in the area of human performance in the decision making component because the licensee did not use

conservative assumptions in decision making or conduct effectiveness reviews of safety-significant decisions to verify the validity of the underlying assumptions [H.1.b]

Enforcement. Title 10 of the Code of Federal Regulations Part 50, Appendix B, Criterion III, requires, in part, that design control measures shall provide for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program. Contrary to this requirement, in October 2008, engineers failed to verify the adequacy of design of the Unit 1 Decay Heat Removal/Low Pressure Injection system. Specifically, personnel failed to perform an adequate design review by failing to identify the Decay Heat Removal coolers as locations where gas could accumulate and potentially affect system operability. Because the finding is of very low safety significance and has been entered into the licensee's corrective action program as Condition Report CR-ANO-1-2011-01306, this violation is being treated as a noncited violation consistent with Section 2.3.2.a of the NRC Enforcement Policy: noncited violation 05000313/2011004-05, "Failure to Identify the Decay Heat Removal Coolers as Potential Void Locations."

(3) Failure to Adequately Evaluate the Required Minimum Level in the Borated Water Storage Tank.

Introduction. The inspectors identified a Green noncited violation of 10 CFR 50 Appendix B Criterion III for failure to verify and check the adequacy of design by performance of design reviews, alternate calculations, or a suitable testing program. Specifically, the licensee did not adequately evaluate the required minimum level in the Borated Water Storage Tank to ensure adequate net positive suction head for Emergency Core Cooling System pumps and prevent gas entrainment due to vortex formation.

Description. The licensee performed a calculation in 1997 to demonstrate sufficient margin in Borated Water Storage Tank level to ensure adequate net positive suction head for the Emergency Core Cooling Systems' pumps. This evaluation considered the minimum level that was required to allow operators to transfer pump suction from the Borated Water Storage Tank to the Reactor Building sump before the level reached the point where the pumps would lose adequate net positive suction head. The licensee later revised this calculation in 2004 to address the possibility of one Borated Water Storage Tank outlet valve failing to close.

The licensee assumed that the actions would start at an indicated level of 6' and an actual level of 5' (1' assumed instrument error). As part of the analysis, the licensee made an assumption of the time it would take operators to perform the procedure. The licensee assumed a 30 second delay for operator action, a 75 second open stroke for the Reactor Building sump valves, a 5 second delay for operator action, and a 20.8 second closure stroke for the Borated Water Storage Tank valves. This results in a total time of 130.8 seconds from the minimum assumed level to full closure of the Borated Water Storage Tank valves. Based on this evaluation, the licensee determined that the level would reach 2.32 ft. The Borated Water Storage Tank is a suction source for all

Emergency Core Cooling System pumps, but the most limiting pumps in this scenario were the High Pressure Injection pumps.

The inspectors questioned how the licensee validated the 130.8 second timeline for the evolution. The licensee reported that they did not time this specific sequence, but did evaluate a similar evolution in the simulator with an additional failure of one Reactor Building sump valve failing to open in January 2011, to use for PRA analysis. Two crews performed the evolution with resulting times of 170 seconds and 185 seconds. Based on this, the licensee had assumed a time of 180 seconds.

The inspectors also questioned how the licensee determined that the vortex breaker installed in the Borated Water Storage Tank would prevent vortices from forming and causing air entrainment in Emergency Core Cooling System pumps. The licensee had scale model testing performed to demonstrate performance of the vortex breakers in the Unit 1 and Unit 2 reactor Building Sumps, but had not performed any testing or analysis to demonstrate the performance of the vortex breaker in the Borated Water Storage Tank.

The licensee generated a condition report to document the deficiencies. The licensee determined that the final level in the Borated Water Storage Tank would be sufficient to ensure adequate net positive suction head for the High Pressure Injection pumps, but with substantially reduced margin. The licensee declared the system operable due to multiple conservative assumptions in their calculation. The licensee also compared the vortex breaker design to the vortex breaker installed in the Unit 2 Reactor Building sump and determined that there was sufficient similarity to address the immediate operability concern.

Analysis. The failure to adequately evaluate the minimum level in the Borated Water Storage Tanks to ensure adequate net positive suction head for Emergency Core Cooling System pumps and prevent vortex formation is a performance deficiency. The performance deficiency is more than minor because it is associated with the design control attribute of the Mitigating Systems cornerstone and adversely affects the objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the licensee did not adequately ensure that the design of the Borated Water Storage Tank was sufficient to avoid loss of net positive suction head and prevent air entrainment in the Emergency Core Cooling System pumps. The inspector performed a Phase 1 screening, in accordance with Inspection Manual Chapter 0609, Attachment 4, “Phase 1 – Initial Screening and Characterization of Findings,” and determined that the finding was of very low safety significance (Green), because the finding was confirmed not to result in a loss of operability. The finding was determined to have no cross-cutting aspect because the performance deficiency occurred in 2004, and is not indicative of current plant performance.

Enforcement. Title 10 of the Code of Federal Regulations Part 50, Appendix B, Criterion III, requires, in part, that design control measures shall provide for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculation methods, or by the performance of a suitable testing

program. Contrary to this requirement, in November 2004, engineers failed to verify the adequacy of design of the Unit 1 Borated Water Storage Tank. Specifically, personnel failed to use appropriate calculation methods for determining the time required for operator actions and failed to use an adequate design review or suitable testing program to verify the adequacy of the installed vortex breaker. Because the finding is of very low safety significance and has been entered into the licensee's corrective action program as Condition Reports CR-ANO-1-2011-1407 and CR-ANO-1-2011-1440, this violation is being treated as a noncited violation consistent with Section 2.3.2.a of the NRC Enforcement Policy: noncited violation 05000313/2011004-06, "Failure to Adequately Evaluate the Required Minimum Level in the Borated Water Storage Tank."

4OA6 Meetings

Exit Meeting Summary

On August 5, 2011, the inspectors presented the results of the radiation safety inspections to Mr. C. Schwarz, Site Vice President, and other members of the licensee staff. The licensee acknowledged the issues presented. The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

On September 15, 2011, the inspectors presented the inspection results to Mr. M. Chisum, General Manager of Plant Operations, and other members of the licensee staff. The licensee acknowledged the issues presented. The inspectors confirmed that none of the potential report input discussed was considered proprietary.

On September 21, 2011, the lead inspector obtained the final annual examination results and telephonically exited with Mr. R. Martin, Unit Operations Training Superintendent. The inspector did not review any proprietary information during this inspection.

On October 11, 2011, the inspectors presented the inspection results to Mr. C. Schwarz, Site Vice President, and other members of the licensee staff. The licensee acknowledged the issues presented. The inspector asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

4OA7 Licensee-Identified Violations

The following violations of very low safety significance (Green) were identified by the licensee and are violations of NRC requirements which meet the criteria of Section 2.3.2 of the NRC Enforcement Policy for being dispositioned as noncited violations.

- Title 10 of the Code of Federal Regulation Part 50, Appendix B, Criterion XVI, "Corrective Action," requires, in part, that "Measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformance are promptly identified and corrected." Contrary to the above, the licensee failed to implement adequate corrective actions to prevent a recurrence of an oil leak previously discovered in July of 2004, on the Unit 1 B Reactor Building Spray Pump inboard bearing housing. Specifically, on

April 28, 2011, a system engineer discovered oil leakage from the same Unit 1 Reactor Building Spray pump inboard bearing housing. The previous corrective action, which called for tightening of the bolts, failed to prevent the leak from reoccurring. The performance deficiency of failing to perform proper corrective actions to prevent the inboard bearing housing from leaking was determined to be more than minor because it was associated with the with the SSC and Barrier Performance attribute of the Containment Barrier Cornerstone and adversely affected the cornerstone objective to provide reasonable assurance that physical design barriers protect the public from radionuclide releases caused by accidents or events and is therefore a finding. Using Manual Chapter 0609.04, "Phase 1 - Initial Screening and Characterization of Findings," the finding was determined to have very low safety significance because the finding does not represent a degradation of the radiological barrier, or the smoke and toxic gas barrier functions provided for the control room, or does not represent an actual open pathway in the physical integrity of the reactor containment or a heat removal component. The issue was placed into the corrective action program as Condition Report CR-ANO-1-2011-588.

- Title 10 of the Code of Federal Regulation Part 50, Appendix B, Criterion XVI, "Corrective Action," requires, in part, that "Measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformance are promptly are promptly identified and corrected." Contrary to the above, the licensee failed to promptly identify and correct a condition adverse to quality, associated with protecting and ensuring service water piping integrity from microbiological induced corrosion issues. Specifically, the licensee was aware of microbiological induced corrosion issues but failed to take timely corrective action to repair numerous issues with the service water chemical injection system during the previous year. The licensee also failed to assess the long term, cumulative risk of deciding not to follow their service water pipe replacement program. Both actions constitute a failure to take timely corrective actions resulting in an increase in microbiological induced corrosion induced service water leaks. The inspectors determined this finding to be of very low safety significance, Green, because it: 1) is not a design or qualification deficiency that resulted in loss of operability or functionality; 2) did not represent an actual loss of safety function of a system or train; 3) did not result in the actual loss of one or more trains of non-technical specification equipment designated as risk significant by 10 CFR 50.65 for greater than 24 hours; and 4) did not screen as potentially more risk significant due to a seismic, flooding, or severe weather initiating event. This issue was entered into the corrective action program as CR-ANO-C-2011-0336.

- Title 10 of the Code of Federal Regulation Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," requires, in part, that "Activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings." Contrary to the above, the licensee failed to provide adequate work instructions to place the high pressure safety injection valve, 2CV-5035-1, in a condition to support effective motor-operated valve contact burnishing. Specifically, the licensee failed to properly burnish the "closed" contacts for motor-

operated valve 2CV-5035-1 during a preventative maintenance activity. The valve subsequently failed to fully close during a surveillance test. The inspectors determined this finding to be of very low safety significance, Green, because it: 1) is not a design or qualification deficiency that resulted in loss of operability or functionality; 2) did not represent an actual loss of safety function of a system or train; 3) did not result in the actual loss of one or more trains of non-technical specification equipment designated as risk significant by 10 CFR 50.65 for greater than 24 hours; and 4) did not screen as potentially more risk significant due to a seismic, flooding, or severe weather initiating event. This issue was entered into the corrective action program as CR-ANO-2-2011-1329.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

S. Baxley, Supervisor, Instruments and Controls
D. Bice, Acting Manager, Licensing
M. Chisum, General Manager Plant Operations
B. Clark, Licensing
B. Doehring, Acting Superintendent, Instruments and Controls
R. Fuller, Manager, Quality Assurance
W. Greeson, Manager, Engineering Programs and Components
G. Hines, System Engineer
D. James, Director, Nuclear Safety Assurance
S. Kelley, Supervisor, Maintenance
R. Martin, Superintendent, Unit 1 Operations Training
J. McCoy, Engineering Director
S. Pyle, Manager, Licensing
C. Schwarz, Site Vice President
R. Schultze, Senior Engineer, Engineering
C. Simpson, Superintendent, Unit 2 Operations Training
J. Smith, Manager, Radiation Protection
B. Short, Senior Specialist, Licensing
P. Williams, Manager, System Engineering

NRC Personnel

A. Sanchez, Senior Resident Inspector
J. Rotton, Resident Inspector
W. Schaup, Resident Inspector

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000368/2011004-01	NCV	Failure to Take Timely Corrective Actions for Invalid Local Leak Rate Test (4OA2.4)
05000368/2011004-02	FIN	Failure to Provide Adequate Work Instruction Results in a Main Feedwater Recirculation Valve Failing Open (4OA2.5)
05000368/2011004-03	FIN	Failure to Provide Adequate Work Instruction Results in Failed Bearing on Motor Generator Set (4OA2.6)
05000313/2011004-04	NCV	Failure to Verify the Adequacy of Design of Unit 1 Emergency Core Cooling Systems to Address Potential Voiding (4OA5(1))
05000313/2011004-05	NCV	Failure to Identify the Decay Heat Removal Coolers as Potential Void Locations (4OA5(2))
05000313/2011004-06	NCV	Failure to Adequately Evaluate the Required Minimum Level in the Borated Water Storage Tank (4OA5(3))

LIST OF DOCUMENTS REVIEWED

Section 1R01: Adverse Weather Protection

DOCUMENT TYPE

NUMBER	TITLE	REVISION
OP-1203.025	Unit 1 Natural Emergency AOP	32
OP-2203.008	Unit 2 Natural Emergency AOP`	21

MISCELLANEOUS DOCUMENTS

NUMBER	TITLE	REVISION
ULD-0-TOP-17	ANO Flooding Topical	0

Section 1R04: Equipment Alignment

PROCEDURES

NUMBER	TITLE	REVISION
OP-2104.039	High Pressure Safety Injection System Operation	65
OP-1106.006	Emergency Feed Water Pump Operation	80
OP-2104.037	Alternate AC Diesel Generator Operation	21
OP-1104.036	Emergency Diesel Generator Operation	56

DRAWINGS

NUMBER	TITLE	REVISION
M-2210 SH 2	Service Water System	81
M-2232 SH 1	Safety Injection System	117
M-204 SH 3	Emergency Feedwater	33
M-204 SH 6	Emergency Feedwater Pump Turbine	20

MISCELLANEOUS DOCUMENTS

NUMBER	TITLE	REVISION
STM 2-05	Emergency Core Cooling System	24
STM 1-27	Emergency Feedwater System	13

Section 1R05: Fire Protection

PROCEDURES

NUMBER	TITLE	REVISION
FHA	ANO Fire Hazard Analysis	13
PFP-U1	ANO Pre-Fire Plan Unit 1	13
PFP-U2	ANO Pre-Fire Plan Unit 2	10

DRAWINGS

NUMBER	TITLE	REVISION
FZ-1072	Unit 1 fire zone detail – lower south piping penetration area and emergency feedwater pump area	3
FZ-2040	Unit 2 fire zone detail – pump area and gallery access	2
FZ-2022	Unit 2 fire zone detail – pump rooms	2
FZ-3040	Fire zone detail – alternate generator building	3

Section 1R07: Heat Sink Performance

PROCEDURES

NUMBER	TITLE	REVISION
OP-2311.008	EDG Heat Exchanger Performance Test	7

DRAWINGS

NUMBER	TITLE	REVISION
M-2210 SH 1	Service Water System	87
M-2217 SH 3	Emergency Diesel Generator Auxiliary Systems	17

MISCELLANEOUS DOCUMENTS

NUMBER	TITLE	DATE
EC-3680	Unit 2, 2K-4A and 2K-4B, Thermal test results for cycle 19	November 7, 2007
EC-24964	Unit 2 EDG Cycle 20 heat exchanger thermal performance evaluation	Dec 14, 2010

CONDITION REPORTS

CR-ANO-2-2010-1545 CR-ANO-2-2011-2742 CR-ANO-2-2011-2743 CR-ANO-2-2011-2775

Section 1R11: Licensed Operator Requalification Program

MISCELLANEOUS DOCUMENTS

NUMBER	TITLE	DATE
None	Written Exam and Op Test Results	Sept 12, 2011

Section 1R12: Maintenance Effectiveness

PROCEDURES

NUMBER	TITLE	REVISION
EN-DC-203	Maintenance Rule Program	1
EN-DC-204	Maintenance Rule Scope and Basis	1
EN-DC-205	Maintenance Rule Monitoring	2
EN-DC-206	Maintenance Rule (a)(1) Process	2

MISCELLANEOUS DOCUMENTS

NUMBER	TITLE	DATE
	Maintenance Rule Database Scoping and Performance Criteria – Unit 1 Decay Heat System	Sept 22, 2011

PROCEDURES

NUMBER	TITLE	REVISION
	Unit 1 Decay Heat Removal System Functional Failure Determination Report	Sept 22, 2011

CONDITION REPORTS

CR-ANO-1-2010-3633 CR-ANO-1-2011-451 CR-ANO-1-2011-530

Section 1R13: Maintenance Risk Assessment and Emergent Work Controls

PROCEDURES

NUMBER	TITLE	REVISION
COPD-024	Risk Assessment Guidelines	35
EN-IS-123	Electrical Safety	8
OP-1015.033	ANO Switchyard and Transformer Yard Controls	16
EN-MA-125	Troubleshooting Control of Maintenance Activities	8

DRAWINGS

NUMBER	TITLE	REVISION
E-2361 SH 1B	Containment Cooling Fan 2VSF1C	9

MISCELLANEOUS DOCUMENTS

NUMBER	TITLE	DATE
	PSA Group Risk Assessment: AACG Risk Impact to Unit 1 versus Unit 2	July 5, 2011
	PSA Group Special Risk Assessment: Perform 500 KV Switching operation with AACG out of service	July 7, 2011

CONDITION REPORTS

CR-ANO-1-2011-1271 CR-ANO-2-2011-1101 CR-ANO-2-2011-1102 CR-ANO-2-2011-2630 CR-ANO-2-2011-2636

WORK ORDERS

00285050-01 00284021-01

Section 1R15: Operability Evaluations

PROCEDURES

NUMBER	TITLE	REVISION
EN-OP-104	Operability Evaluations	4
OP-2104.039	High Pressure System Operation	65
OP-2107.001	Electrical System Operations	89
OP-1104.005	Reactor Building Spray System Operation	61
OP-2304.258	Unit 2 Escape Airlock Leak Rate Test	17
OP-2305.017	Local Leak Rate Testing	26
OP-2411.029	Emergency Air Lock Inspection, Lubrication and Chalk Test	5

DRAWINGS

NUMBER	TITLE	REVISION
M-232 SH 1	Decay Heat Removal System	103
M-236 SH 1	Reactor Building Spray and Core Flood System	92
E-2361 SH 1B	Containment Cooling Fan 2VSF1C	9
30970	Emergency Access Airlock – General Arrangement	0
30970	Emergency Access Airlock – General Assembly	0

CONDITION REPORTS

CR-ANO-1-2005-0421	CR-ANO-2-2007-1687	CR-ANO-1-2010-1289	CR-ANO-1-2010-3573
CR-ANO-1-2011-0998	CR-ANO-2-2011-0768	CR-ANO-2-2011-0888	CR-ANO-2-2011-1197
CR-ANO-1-2011-1262	CR-ANO-2-2011-2724	CR-ANO-2-2011-2849	CR-ANO-2-2011-2976

WORK ORDERS

00267732-01	00267732-06	00267732-07	51571792-01	51669609-01

MISCELLANEOUS DOCUMENTS

NUMBER	TITLE	REVISION / DATE
ASME Code	Evaluation Criteria for Temporary Acceptance of Flaws in	Feb 20,

Case N-513-2	Moderate Energy Class 2 or 3 Piping Section XI, Division 1	2004
2-BOP-UT-11-37	UT Examination of 3 inch stainless steel pipe, spool piece	August 12, 2011
TD T368X.0040	Operating and Maintenance Instructions for Trentec Emergency Airlock	1
Calc-00-E-0010-01	Appendix J Containment Maximum Allowable Leakage Rate	0
Calc-A-22	Containment Net Free Internal Volume	2
ANSI/ANS 56.8	Containment System Leakage Testing Requirements	1994

Section 1R19: Post Maintenance Testing

PROCEDURES

NUMBER	TITLE	REVISION
OP-1104.005	Reactor Building Spray System Operation	61
OP-2104.033	Containment Atmospheric Control	65
OP-2403.035	Unit 2 Class 1E Battery Charger Load Test for 2D31B	8
OP-1412.081	Battery Chargers Cleaning and Inspection	12
OP-1403.191	Motor Testing Using MCE/EMAX	7
OP-1403.065	Unit 1 P-7B Emergency Feedwater Pump Motor Inspection/Maintenance	007-02-0
OP-1412.001	Preventive Maintenance of Limitorque SB/SMB Motor Operators	27
OP-1106.006	Emergency Feedwater Pump Operation	80

DRAWINGS

NUMBER	TITLE	REVISION
M-232 SH 1	Decay Heat Removal System	103
M-236 SH 1	Reactor Building Spray and Core Flood System	92
E-2361 SH 1B	Containment Cooling Fan 2VSF1C	9

CONDITION REPORTS

CR-ANO-2-2011-2630 CR-ANO-2-2011-2636

WORK ORDERS

00284021-01	52258722-01	52283331-01	00276749-01	52316269-01
52286328-01	52298048-01	52298049-01	52287523-01	52286327-01
52276321-01				

Section 1R22: Surveillance Testing

PROCEDURES

NUMBER	TITLE	REVISION
OP-2104.036	Emergency Diesel Generator Operations	79
OP-1106.006	Emergency Feedwater Pump Operation	80
OP-2106.006	Unit 2 Emergency Feedwater System Operations	79
OP-1104.004	Unit 1 Decay Heat Removal Operating Procedure	92

WORK ORDERS

52269589	52269540	52273733	52273718

Section 1EP6: Drill Evaluation

DOCUMENT TYPE

NUMBER	TITLE	REVISION
OP-1903.010	Emergency Action Level Classification	44
OP-1903.011	Emergency Response/Notifications	41

Section 2RS04: Occupational Dose Assessment

PROCEDURES

NUMBER	TITLE	REVISION
EN-RP-201	Dosimetry Administration	3
EN-RP-202	Personnel Monitoring	8
EN-RP-204	Dose Assessment	4
EN-RP-208	Whole Body Counting/In-Vitro Bioassay	3

AUDITS, SELF-ASSESSMENTS, AND SURVEILLANCES

NUMBER	TITLE	DATE
LO-ALO-2010-00048	Pre-NRC Inspection Assessment	January 10, 2011

CONDITION REPORTS

CR-ANO-2-2011-1565 CR-ANO-C-2011-0682 CR-HQN-2011-0327 CR-HQN-2011-0721

MISCELLANEOUS DOCUMENTS

TITLE	DATE
Internal Dose Assessment (CR-ANO-2-2011-01795)	March 14, 2011

Section 2RS05: Radiation Monitoring Instrumentation

PROCEDURES

NUMBER	TITLE	REVISION
EN-RP-302	Operation of Radiation Protection Instrumentation	1
EN-RP-303	Source Checking of Radiation Protection Instrumentation	1
EN-RP-307	Operation and Calibration of the Eberline Personnel Contamination Monitors	2
EN-RP-308	Operation and Calibration of Gamma Scintillation Tool Monitors	4
1601.213	Operation of the Canberra Fastscan Whole Body Counter	0

AUDITS, SELF-ASSESSMENTS, AND SURVEILLANCES

NUMBER	TITLE	DATE
LO-ALO-2010-00048	Pre-NRC Inspection Assessment	January 10, 2011

CONDITION REPORTS

CR-ANO-1-2011-0602 CR-ANO-2-2010-2356 CR-ANO-2-2010-2512

EFFLUENT, PROCESS, AND POSTACCIDENT MONITOR CALIBRATION RECORDS

WORK ORDER NUMBER	TITLE	DATE
51651171	Containment Purge SPING#1 (RX-9820)	August 21, 2008
52194990	Containment Purge SPING#1 (RX-9820)	February 10, 2010
52201164	Radwaste Area SPING#2 (RX-9825)	December 14, 2009
52294748	Radwaste Area SPING#2 (RX-9825)	May 9, 2011
51668839	Fuel Handling Area SPING#3 (RX-9830)	February 23, 2009
52223296	Fuel Handling Area SPING#3 (RX-9830)	July 21, 2010
51569986	Hydrogen Purge SPING#4 (RX-9835)	July 7, 2009
52189242	Hydrogen Purge SPING#4 (RX-9835)	November 23, 2010
51671291	Containment Purge SPING#5 (2RX-9820)	October 27, 2009
52225540	Containment Purge SPING#5 (2RX-9820)	February 15, 2011
51513340	Radwaste Area SPING#6 (2RX-9825)	October 20, 2008
51767856	Radwaste Area SPING#6 (2RX-9825)	December 15, 2009
51664293	Fuel Handling Area SPING#7 (2RX-9830)	August 27, 2009
52218383	Fuel Handling Area SPING#7 (2RX-9830)	January 11, 2011
51566900	Hydrogen Purge SPING#8 (2RX-9835)	March 30, 2009
52039641	Hydrogen Purge SPING#8 (2RX-9835)	August 15, 2010
51669938	Auxiliary Building SPING#10 (2RX-9845)	October 1, 2009
52224002	Auxiliary Building SPING#10 (2RX-9845)	February 11, 2011
51658127	Low Level Radwaste Storage SPING#11 (2RX-9850)	July 30, 2009
52210219	Low Level Radwaste Storage SPING#11 (2RX-9850)	January 4, 2011
52225615	Liquid Radwaste Monitor (RE-4642)	May 5, 2011

RADIATION PROTECTION MONITOR CALIBRATIONS

NUMBER	TITLE	DATE
EPM-006	PM-7 Portal Monitor	April 14, 2011
GSAM-007	SAM Tool Monitor	March 30, 2011
GSAM-009	SAM Tool Monitor	January 4, 2011
PCM-009	Eberline PCM 1b Personnel Contamination Monitor	January 6, 2011
PCM-014	Eberline PCM 1b Personnel Contamination Monitor	December 28, 2010

Section 4OA1: Performance Indicator Verification

DOCUMENT TYPE

NUMBER	TITLE	REVISION
EN-LI-114	Performance Indicator Process	4

Section 4OA2: Identification and Resolution of Problems

PROCEDURES

NUMBER	TITLE	REVISION
OP-2304.258	Unit 2 Escape Airlock Leak Rate Test	17
OP-2305.017	Local Leak Rate Testing	26
OP-2411.029	Emergency Air Lock Inspection, Lubrication and Chalk Test	5

DRAWINGS

NUMBER	TITLE	REVISION
30970	Emergency Access Airlock – General Arrangement	0
30970	Emergency Access Airlock – General Assembly	0

CONDITION REPORTS

CR-ANO-2-2011-888 CR-ANO-2-2011-1197 CR-ANO-2-2007-1687 CR-ANO-2-2011-768

WORK ORDERS

00267732-01 00267732-06 00267732-07 51571792-01 51669609-01

MISCELLANEOUS DOCUMENTS

NUMBER	TITLE	REVISION / DATE
TD T368X.0040	Operating and Maintenance Instructions for Trentec Emergency Airlock	1
Calc-00-E-0010-01	Appendix J Containment Maximum Allowable Leakage Rate	0
Calc-A-22	Containment Net Free Internal Volume	2
ANSI/ANS 56.8	Containment System Leakage Testing Requirements	1994

Section 4OA5: Other Activities

Temporary Instruction 2515/177, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems (NRC Generic Letter 2008-01)"

CONDITION REPORTS

CR-ANO-1-2004-01974	CR-ANO-1-2011-01303	CR-ANO-2-2008-02074
CR-ANO-1-2008-01109	CR-ANO-1-2011-01306	CR-ANO-2-2009-00170
CR-ANO-1-2008-02562	CR-ANO-1-2011-01307	CR-ANO-2-2011-01498
CR-ANO-1-2009-01482	CR-ANO-1-2011-01366	CR-ANO-2-2011-01530
CR-ANO-1-2009-01900	CR-ANO-1-2011-01406	CR-ANO-2-2011-01603
CR-ANO-1-2010-01686	CR-ANO-1-2011-01407	CR-ANO-2-2011-02965
CR-ANO-1-2010-01844	CR-ANO-1-2011-01440	CR-ANO-2-2011-03081
CR-ANO-1-2010-01860	CR-ANO-2-2001-00858	CR-ANO-C-2008-00123
CR-ANO-1-2010-02013	CR-ANO-2-2004-00065	CR-ANO-C-2008-01999
CR-ANO-1-2010-02380	CR-ANO-2-2008-00480	CR-ANO-C-2011-00557
CR-ANO-1-2011-00308	CR-ANO-2-2008-02073	CR-ANO-C-2011-02089

CALCULATIONS

NUMBER	TITLE	REVISION/ DATE
620-0003-12319.1	Gas Injection After Core Flooding Tank Operation	April 23, 1968
CALC-06-E-0001-01	Analysis of Nitrogen Void Upstream from Check	0

	Valves DH-13A, 17, 13B, and 18 in the LPI System	
CALC-06-E-0003-01	Allowable Void Size Indication for LPI/DH Header	1
CALC-1.3.4.25	Vortex Eliminator	3
CALC-88-E-0100-27	P-T Calculation for Unit 1 Core Flood System	1
CALC-89-R-2008-01	Hydraulic Model Studies of Containment Sump Recirculation Intakes	0
CALC-97-E-0212-01	BWST Draindown Analysis	3
CALC-981055N101-01	BWST T-3 Vortex Breaker	0
CALC-98-E-0022-03	DHR Cooler E-35A 1R15 Thermal Performance Test	0
CALC-98-E-0022-05	DHR Cooler E-35B 1R16 Thermal Performance Test	0
CALC-98-E-0044-01	RWT Draindown Analysis	5
CALC-ANO1-ME-07-00001	Proof of Absence of Air Vortices Above Strainers	0
CALC-ANO1-SE-08-00002	Unit 1 HPI Generic Letter 08-01 Gas Intrusion Review	0
CALC-ANO1-SE-08-00003	Unit 1 DH/LPI Generic Letter 08-01 Gas Intrusion Review	0
CALC-ANO1-SE-08-00004	Unit 1 BS Generic Letter 08-01 Gas Intrusion Review	0
CALC-ANO1-SE-08-00005	Summary of Activities Associated with the Resolution of GL 2008-01 for the ANO-1 Core Flood System	0
CALC-ANO1-SE-09-00001	Unit 1 Reactor Building Generic Letter 08-01 Gas Intrusion Review with Follow-up Auxiliary Building Information	0
CALC-ANO2-ME-06-00014	ANO-2 Containment Sump Strainer/Plenum Hydraulic Analysis	0
CALC-ANO2-SE-08-00002	Summary of Activities Associated with the Resolution of GL 2008-01, HPSI System	0
CALC-ANO2-SE-08-00003	Summary of Activities Associated with the Resolution of GL 2008-01, LPSI System	0
CALC-ANO2-SE-08-00004	Unit 2 CSS Generic Letter 08-01 Gas Intrusion Review	0
CALC-ANO2-SE-09-00002	Unit 2 Reactor Building Generic Letter 08-01 Gas Intrusion Review with Follow-up Auxiliary Building Information	0
CALC-ANOC-ME-08-00001	Investigation of the Potential for Vortex Formation in the ANO-2 RWT and CST Suction Flows	0

DRAWINGS

NUMBER	SHEET	TITLE	REVISION
142842E	1	Arrangement of Core Flooding Tank	6
17-MU-18	1	Make-Up Pump Suction	12
17-MU-19	1	Make-Up Pump Suction	13
17-MU-20	1	Make-Up Pump Discharge	15
17-MU-24	1	HP Injection to RCS	8
17-MU-26	1	HP Injection to Reactor Coolant Pump P32A	30
17-MU-28	1	High Pressure Injection to Reactor Coolant System	17
17-MU-37	1	Redundant HPI Injection to Reactor Coolant System	4
28-CA-101	1	Sodium Hydroxide Addition Piping	15
28-CA-102	1	Sodium Hydroxide Addition Piping	14
2CCB-7-1	1	Safety Injection Supply	11
2CCB-71-5	1	HPSI Header to RCS	9
2DCB-1-2	1	HPSI Pump Discharge	16
2GCB-10-1	1	From Containment Spray Pump to SDC Heat Exchanger	14
2GCB-10-1	2	From Containment Spray Pump to SDC Heat Exchanger	3
2GCB-2-1	1	LPSI Pump Inlet Piping	18
2GCB-3-1	1	LPSI Pump Discharge	19
2GCB-3-1	2	LPSI Pump Discharge	3
2GCB-7-1	1	LPSI Discharge Header	18
2GCB-7-1	2	LPSI Discharge Header	5
2GCB-8-1	1	SDC HX Discharge Header to LPSI Header	15
2GCD-11-1	1	Containment Spray From Header to Fill Line	5
2GCD-12-1	1	Containment Spray From Header to Fill Line	4
2HCB-15-1	1	From Containment Sump to Containment Spray Pump	18
2HCB-159-1	1	Spray Header Expansion Loop Drain Line	9
2HCB-160-1	1	Spray Header Expansion Loop Drain Line	7
2HCB-21-2	1	2FI-5693 Return to Line	5
2HCB-24-1	1	Refueling Water Tank 2T-3 to Containment Spray Pumps	5

2HCB-24-2	1	Refueling Water Tank 2T-3 to Containment Spray Pumps	6
2HCB-26-1	1	Containment Spray Pump 2P-35A Supply	15
2HCB-3-1	1	Containment Spray Header	17
2HCB-3-2	1	Containment Spray Ring Header	11
2HCB-4-2	1	Containment Spray Header	8
2HCB-4-3	1	Containment Spray Ring Header	10
5-BS-4	1	P-35A Discharge to Containment	9
5-BS-6	1	Spray Pump Suction	16
5-BS-7	1	Spray Pump Suction	17
6-CF-1	1	Core Flooding To Reactor	24
6-CF-2	1	Core Flooding To Reactor	25
7-DH-10	1	Decay Heat Pump Discharge	21
7-DH-11	1	Decay Heat Pump Discharge	21
7-DH-12	1	Engineered Safeguards Pump Suction Header	20
7-DH-12	2	Engineered Safeguards Pump Suction Header	5
7-DH-13	1	Decay Heat Pump Suctioned Header	12
7-DH-14	1	Primary Make up Pump Suction Header	6
7-DH-15	1	Make-Up Pump Suction	9
7-DH-4	1	Decay Heat Removal From Reactor	23
7-DH-5	1	Decay Heat Pump Discharge	9
7-DH-6	1	Decay Heat Pump Discharge	25
7-DH-7	1	Decay Heat Pump Discharge	10
7-DH-9	1	Decay Heat Removal	22
DH-200	1	Decay Heat Removal Pump Recirculation Piping	9
M-2232	1	Safety Injection System	117
M-2232	2	High Pressure Safety Injection	1
M-2236	1	Containment Spray System	94
M-231	1	Makeup & Purification System	112
M-232	1	Decay Heat Removal System	103
M-236	1	Reactor Building Spray and Core Flooding Systems	92

MU-200	1	Make-Up Pump Discharge	11
MU-228	1	Core Flood Tank T-2A Fill Piping	8

PROCEDURES

NUMBER	TITLE	REVISION
1000.006	Procedure Control	64
1015.003B	Unit Two Operations Logs	69
1103.002	Filling and Venting the Reactor Coolant System	36
1104.001	Core Flood System Operation Procedure	43
1104.002	Makeup & Purification System Operation	71
1104.004	Decay Heat Removal Operating Procedure	93
1104.004	Decay Heat Removal Operating Procedure	92
1104.005	Reactor Building Spray System Operation	61
1309.016	Decay Heat Cooler Thermal Test	0004-1-0
2104.001	Safety Injection Tank Operations	38
2104.004	Shutdown Cooling System	53
2104.039	HPSI System Operation	65
2104.040	LPSI System Operations	58
2105.004	Containment Spray	62
CEP-NDE-0530	Ultrasonic Examination of Components to Determine Fluid Level	3
EN-DC-219	Gas Accumulation Management	0
EN-DC-324	Preventive Maintenance Program	7
EN-LI-102	Corrective Action Process	16
EN-LI-102-02	CR Closure Quality	1
EN-OP-102	Protective and Caution Tagging	13

WORK ORDERS

NUMBER	TITLE	DATE
MWO 00048877	Valve 2SI-13A	November 11, 2010

AR 00106334	Refueling Outage NDE UT for Gas Voids per GL 2008-01	November 24, 2010
AR 00106336	GL 2008-01 On-line NDE UT Checks for ANO-1	November 24, 2010
WO 00227358	Valve 2CV-5043-2	December 30, 2009
WO 52276288	Gas Void Check in Piping Upstream of MU-35A & 35B	August 16, 2011
WO 52272464	Engineering Perform Gas Intrusion Inspection on ECCS	July 18, 2011
WO 52254126	Engineering Perform Gas Intrusion Inspection on ECCS	August 23, 2010
WO 52216614	Engineering Perform Gas Intrusion Inspection on ECCS	November 30, 2010
WO 52243548	Perform Quarterly HPI Pump (P36c) Test	April 6, 2011
WO 52244837	Perform Quarterly LPI Pump (P-34b) & Components Test	April 6, 2011
WO 52237146	Perform Quarterly Reactor Bldg Spray Pump (P-35b) Test	April 6, 2011
WO 52248334	Perform Quarterly HPI Pump (P-36a) Test	May 23, 2011
WO 52248348	Perform Quarterly RB Spray Pump (P-35a) Test	May 23, 2011
WO 52254287	Perform Quarterly LPI Pump (P-34a) Test	July 11, 2011
WO 52255696	Perform Quarterly HPI Pump (P-36b) Test	May 31, 2011
WO 52257131	Perform Quarterly Reactor Bldg Spray Pump (P-35b) Test	May 31, 2011
WO 52261472	Perform Quarterly HPI Pump (P36c) Test	July 11, 2011
WO 52262767	Perform Quarterly LPI Pump (P-34b) & Components Test	July 11, 2011
WO 52265165	Perform Quarterly HPI Pump (P-36a) Test	July 18, 2011

WO 52265178	Perform Quarterly RB Spray Pump (P-35a) Test	July 18, 2011

MISCELLANEOUS DOCUMENTS

NUMBER	TITLE	REVISION/ DATE
0CAN050802	Three Month Response to Generic Letter 2008-01	May 2, 2008
0CAN060801	Supplement to Three Month Response to Generic Letter 2008-01	June 30, 2008
0CAN100801	Nine-Month Response to NRC Generic Letter 2008-01	October 14, 2008
0CAN110903	Response to Request for Additional Information On the Response To Generic Letter 2008-01	November 18, 2009
1CAN030905	Post-Outage Supplemental Response to NRC Generic Letter 2008-01, Arkansas Nuclear One, Unit 1	March 16, 2009
2CAN120902	Post-Outage Supplemental Response to NRC Generic Letter 2008-01, Arkansas Nuclear One, Unit 2	December 9, 2009
EC-00704	HPSI Pressurization System Creation	0
EC-09536	NRC GL 08-01 Gas Intrusion Walkdown Procedure	0
EC-11968	1R21 Decay Heat Cooler E-35A Thermal Performance Test Data	0
EC-22561	Thermal Performance Test of Decay Heat Cooler E-35B	0
EC-26348	Install Vents on the NaOH Header	0
ER-2-2002-529-000	SDC Limits in Reduced Inventory	-
ER-ANO-2004-0294-000	1R18 Decay Heat Cooler E-35A Thermal Test Evaluation	0
ER-ANO-2005-0714-000	1R19 Decay Heat Cooler E-35B Thermal Performance Test Data Evaluation	0
GL 2008-01	Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems	January 11, 2008
LO-ALO-2010-00029	-	-
LO-LAR-2008-00014	-	-
LO-NOE-2009-00481	-	-
NSAL-09-8	Presence of Vapor in ECCS/RHR in Modes 3/4 LOCA Conditions	Nov 3, 2009

PS-S-005	Piping Thresholds and Tolerances	1
SIPD-4263	Install Vents on the RWT Suction Line to A&B ECCS Headers	
SIPD-4281	GL 08-01 Modifications to High Pressure Safety Injection Pump Discharge Cross-Over Line	
SIPD-965	ECCS Pump Seals	
Tagout DH-002	B Decay Heat	August 22, 2011
Tagout HPSI-003	Green Train	August 22, 2011
TI-16304	CST Vortexing Phenomena	
ULD-1-SYS-07	Core Flood System	3
ULD-2-SYS-02	High Pressure Safety Injection System	4
ULD-2-SYS-04	Low Pressure Safety Injection and Shutdown Cooling System	4
ULD-2-SYS-05	Containment Spray System	4
WCAP-16631-NP	Testing and Evaluation of Gas Transport to the Suction of ECCS Pumps	0
WCAP-17271-P	Air Water Transport in Large Diameter Piping Systems	0
-	Updated Final Safety Analysis Report - ANO Unit 1	24
-	Updated Final Safety Analysis Report - ANO Unit 2	23

Section 4OA7: Licensee-Identified Violations

PROCEDURES

NUMBER	TITLE	REVISION
OP-1402.003	Unit 1 Reactor Building Spray Pump P-35A&B Disassembly, Inspection and Reassembly	10
OP-1104.005	Reactor Building Spray System Operation	61

CONDITION REPORTS

CR-ANO-1-2004-1799 CR-ANO-1-2011-558 CR-ANO-1-2011-567 CR-ANO-1-2011-1193

WORK ORDERS

00049204-01