UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TEXAS 76011-4005

May 3, 2005

Jeffrey S. Forbes
Vice President Operations
Arkansas Nuclear One
Entergy Operations, Inc.
1448 S.R. 333
Russellville, AR 72801-0967

SUBJECT: ARKANSAS NUCLEAR ONE, UNITS 1 AND 2 - NRC PROBLEM IDENTIFICATION AND RESOLUTION INSPECTION REPORT 0500313/2005009; 0500368/2005009

Dear Mr. Forbes:

On February 11, 2005, the Nuclear Regulatory Commission (NRC) completed the onsite portion of a team inspection at your Arkansas Nuclear One, Units 1 and 2, facility. The enclosed report presents the results of this inspection. On February 11, 2005, we discussed the preliminary results of the inspection with you and other members of your staff. The team continued in-office document reviews and conducted a final exit meeting with you and other members of your staff on March 22, 2005.

This inspection examined activities conducted under your license as they relate to the identification and resolution of problems, compliance with the Commission's rules and regulations and with the conditions of your license. The team reviewed approximately 260 condition reports, apparent cause and root cause analyses, as well as supporting documents. In addition, the team reviewed crosscutting aspects of NRC and licensee-identified findings and interviewed personnel regarding the safety conscious work environment.

On the basis of the samples selected for review, the team concluded that, your processes to identify, prioritize, evaluate, and correct problems were generally effective; thresholds for identifying issues remained appropriately low and, in most cases, corrective actions were adequate to address conditions adverse to quality. More importantly, however, the overall effectiveness of your corrective action program has shown improvement in the last six to nine months. Notwithstanding the improvements, poor problem evaluations and untimely resolution of some issues continue to result in self-disclosing and NRC identified violations and findings. We noted that you have measures in place to correct these performance issues. Finally, we've determined that an adequate safety-conscious work environment exists at your facility.

The report documents three findings that were evaluated under the risk significance determination process as having very low safety significance (Green). The NRC has also determined that violations were associated with two of these findings. The violations are being treated as noncited violations because they are of very low safety significance and because they have been entered into your corrective action program consistent with Section VI.A of the Enforcement Policy. If you contest the violations or the significance of these noncited

violations, you should provide a response within 30 days of the date of the inspection report, with the basis for your denial, to the U.S. Nuclear Regulator Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with copies to the Regional Administrator, U.S. Nuclear Regulatory Commission, Region IV, 611 Ryan Plaza Drive, Suite 400, Arlington, Texas 76011; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Arkansas Nuclear One 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 Publicly Available Records component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

//RA//

Linda Joy Smith, Chief
Plant Engineering Branch
Division of Reactor Safety

Dockets: 50-313
50-368

Licenses: DPR-51
NPF-6

Enclosure:
NRC Inspection Report 05000313/2005009 and 05000368/2005009
w/Attachment: Supplemental Information

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J. Dixon-Herrity, OEDO RIV Coordinator **(JLD)**
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SISP Review Completed: _Yes_____ADAMS: Yes ☐ No Initials: _ljs_____
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ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Dockets:	50-313, 50-368
Licenses:	DPR-51, NPF-6
Facility:	Arkansas Nuclear One, Units 1 and 2
Location:	Junction of Hwy. 64W and Hwy. 333 South Russellville, Arkansas
Dates:	January 24-28 and February 7-11, 2005; Exit March 22, 2005
Inspectors:	G. Replogle, Senior Reactor Inspector, Plant Engineering Branch, DRS M. Murphy, Senior Operations Engineer, Operations Branch, DRS J. Dixon, Resident Inspector, Branch D, DRP B. Tindell, Reactor Inspector, Plant Engineering Branch, DRS
Approved by:	L. J. Smith, Chief Plant Engineering Branch Division of Reactor Safety

SUMMARY OF FINDINGS

IR 05000313/2005009, 05000368/2005009;1/24/2005 - 3/22/2005; Arkansas Nuclear One, Units 1 and 2; biennial baseline inspection of the identification and resolution of problems. Violations were identified in the areas of problem identification, and evaluation and prioritization.

The inspection was conducted by a senior reactor inspector, a senior operations engineer, a resident inspector and a reactor inspector. Three Green findings of very low safety significance were identified during this inspection. Two of the findings were classified as noncited violations. The findings were evaluated using the significance determination process. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP). Findings for which the SDP 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 3, dated July 2000.

Identification and Resolution of Problems

- The team reviewed approximately 260 condition reports, apparent and root cause analyses, as well as supporting documents, to assess problem identification and resolution activities. In general, performance in most areas had improved when compared to the prior problem identification and resolution assessment. Notwithstanding the improvements, poor problem evaluations and untimely resolution of some issues continued to result in self-disclosing and NRC identified violations and findings. The licensee has specified remedies to curb these performance problems. Overall, the procedures and processes were generally effective; thresholds for identifying issues were low and, in most cases, corrective actions were adequate to address conditions adverse to quality.

  Based on the interviews conducted, the team concluded that a positive safety conscience work environment exists at Arkansas Nuclear One, Units 1 and 2. The team determined that employees felt free to raise safety concerns to their supervision, the employee concerns program, and the NRC. The team received a few isolated comments regarding trust of site management, an increased work load caused by the corrective action process, and the perception for negative consequences for going to the NRC with safety issues. However, the interviewees all believed that potential safety issues were being addressed and there were no instances identified where individuals had experienced consequences for bringing safety issues to the NRC . The team determined that licensee management was aware of the perceptions and was taking action to address them.

A. Inspector-Identified and Self-Revealing Findings

Cornerstones: Mitigating Systems; Initiating Events

- Green. The team identified a noncited violation of 10 CFR 50, Appendix B, Criterion V (Procedures) for nine examples of the failure to follow plant procedures with respect to documenting, evaluating and correcting boric acid

leaks. This issue has crosscutting aspects associated with problem identification and resolution, as the licensee was not effective at ensuring compliance with the boric acid corrosion program following three similar noncited violations (since 2001).

The failure to follow boric acid control procedures was a performance deficiency. This issue is greater than minor because it affected the mitigating systems cornerstone objective of ensuring availability, reliability, and capability of mitigating systems. The issue is similar to non-minor example 4.a. of Manual Chapter 0609 Appendix E, in that the licensee routinely failed to follow these plant procedures. The finding had very low safety significance (Green) because the affected equipment remained operable consistent with Generic Letter 91-18, "Information to Licensees Regarding NRC Inspection Manual Section on Resolution of Degraded and Nonconforming Conditions," Revision 1. (Section 4OA2e(2)l).

- Green. The team identified a finding, with two examples, where the licensee did not take prompt actions to address longstanding equipment problems that could impact the initiating events and mitigating system cornerstones. Specifically: 1) reactor coolant pump vibrations on two reactor coolant pumps exceeded vendor recommended alert levels, for approximately 15 years in one case; and 2) the licensee has not promptly addressed the extent of condition for molded case circuit breaker problems. This issue involved crosscutting aspects associated with problem prioritization.

  The failure to address these longstanding equipment problems is a performance deficiency. Each issue was more than minor because it either affected the Initiating Events or Mitigating System cornerstone objectives of limiting the likelihood of initiating events (reactor coolant pump vibrations) or ensuring the availability of systems that mitigate plant accidents (molded case circuit breakers). Both issues were of very low safety significance because the affected equipment remained operable consistent with Generic Letter 91-18, "Information to Licensees Regarding NRC Inspection Manual Section on Resolution of Degraded and Nonconforming Conditions," Revision 1 (Section 4OA2e(2)iii).

Cornerstone: Barriers

- Green. The team identified a violation of 10 CFR 50, Appendix B, Criterion XVI (Corrective Actions) for the failure to take prompt corrective actions to address an inadequate containment isolation valve design. In 2000, the licensee identified that the containment isolation valves were not properly designed for their design basis application, in that the valves were designed for a maximum temperature of 200 EF but could be exposed to a temperature of 300 EF during a design basis accident. The valves were still in service at the time of the inspection. This issue had crosscutting aspects associated with problem prioritization.

The failure to take prompt corrective measures to address a condition adverse to quality was a performance deficiency. The inspectors determined that the issue had more than minor safety significance because it impacted the Barriers cornerstone objective and could have affected the ability of safety-related containment isolation valves to perform their design basis function. The finding was of very low risk significance because it was a design/qualification deficiency that did not result in a loss of function per Generic Letter 91-18, "Information to Licensees Regarding NRC Inspection Manual Section on Resolution of Degraded and Nonconforming Conditions," Revision 1 (Section 4OA2e(2)ii).

B. Licensee-Identified Violations

None.

REPORT DETAILS

4 OTHER ACTIVITIES (OA)

4OA2 Identification and Resolution of Problems

The team based the following assessments, in part, on issues that were identified in the assessment period, which ranged from December, 2003 (the last biennial problem identification and resolution inspection) to the end of the inspection on February 11, 2005. The referenced issues came from all inspection efforts conducted during the period. The examples are divided into two groups. The first group (Current Issues) includes problems that were identified during the assessment period where the performance concern also occurred during the same period. The second group (Historical Issues) includes issues that were identified during the assessment period but all the performance deficiencies occurred outside the period of interest.

a. Effectiveness of Problem Identification

(1) Inspection Scope

The inspectors reviewed items selected across the seven cornerstones to determine if problems were being properly identified, characterized, and entered into the corrective action program. Specifically, the team reviewed plant logs and maintenance records and verified that conditions adverse to quality, identified in these processes, were entered into the corrective action program. In addition, the team reviewed a sample of licensee audits and self assessments, trending reports, system health reports, and various other reports and documents related to the corrective action program.

The team interviewed station personnel and evaluated corrective action documentation to determine the licensee's threshold for identifying problems. In addition, in order to assess the licensee's handing of operator experience, the team reviewed the licensee's evaluation of selected industry operating experience reports, including licensee event reports, NRC Generic Letters, Bulletins and Information Notices, and generic vendor notifications.

(2) Assessment

The team determined that problems were properly identified and entered into the corrective action program. Performance had improved when compared to the previous problem identification and resolution assessment (NRC Inspection Report 05000313;368/2003008). For Calendar Year 2004, the licensee had written over 7000 condition reports, which represented more than a 50 percent increase over the previous year. In a few instances, involving boric acid leaks and inaccurate safety injection indications, plant personal did not consistently identify problems as required.

Current Issues

Example 1: The NRC identified that the licensee had failed to identify and correct inaccurate high pressure safety injection and low pressure safety injection valve position indications for 8 years (see NRC Inspection Report 05000313;368/2004003).

Example 2: The NRC identified that the licensee failed to properly monitor and control boric acid leaks in accordance with their boric acid control program (see Section 4OA2e(2)l of this report).

Historical Issues

Example 3: Inadequate identification and resolution of water contaminants in the main turbine trip oil system contributed to a Unit 1 turbine trip and reactor trip (self-revealing, NRC Inspection Report 05000313;368/2004003).

Example 4: Operators failed to properly identify and correct a faulty control rod asymmetric fault response procedure, following problems in both November 2002 and January 2003. Consequently, the procedure was not corrected and operations were again complicated when responding to the same fault on November 27, 2004 (self-revealing, NRC Inspection Report 05000313;368/2004005).

Example 5: The NRC identified that the licensee failed to identify and correct a loose circuit connection in a Unit 2 containment spray pump breaker during receipt inspection. The breaker subsequently failed (self-revealing, NRC Inspection Report 05000313;368/2004004).

b. Prioritization and Evaluation of Issues

(1) Inspection Scope

The team reviewed condition reports and operability evaluations to assess the licensee's ability to evaluate the importance of the conditions adverse to quality. The team reviewed a sample of condition reports, apparent cause analyses and root cause analyses to ascertain whether the licensee properly considered the full extent of conditions, generic implications, common causes, and previous occurrences.

In addition, the team reviewed licensee evaluations of selected industry operating experience reports, including licensee event reports, NRC Generic Letters, Bulletins and Information Notices, and generic vendor notifications to assess whether issues applicable to Arkansas Nuclear One (ANO) were appropriately addressed.

The team performed a historical review of condition reports covering the last 5 years for the emergency diesel generators, the emergency feedwater system, the 125 VDC batteries, the Unit 1 makeup system and the Unit 2 high pressure safety injection system.

(2) Assessment

The team concluded that problems were generally prioritized and evaluated in accordance with the licensee's corrective action program guidance and NRC requirements. The team found that for the sample of root cause reports reviewed, the licensee was generally self critical and thorough in evaluating the causes of significant conditions adverse to quality. However, issues related to poor problem evaluation and prioritization still challenged the licensee, as self-disclosing and NRC identified problems continued to surface. In some instances, plant personnel failed to properly evaluate abnormal equipment performance while in other instances the recommended corrective actions, while effective, were not timely. The licensee had established corrective measures to address performance problems in this area.

Current Issues

Example 1: The NRC identified that the licensee had failed to promptly implement a plan to ensure that carbon dioxide fire extinguishers would not exceed their hydrostatic retest expiration dates. Consequently, hydrostatic testing was not performed on 80 to 90 percent of the fire extinguishers (NRC Inspection Report 05000313;368/2004004).

Example 2: The NRC identified that the licensee did not take prompt corrective measures to clean discolored boric acid deposits on a Unit 2 containment spray pump (for approximately 9 months) until prompted by the NRC (NRC Inspection Report 05000313;368/2004003).

Example 3: Poor operability evaluations and the failure to question abnormal indications resulted in the Unit 2 containment cooling system fan being inoperable for eleven months. The licensee determined that engineering had a bias towards calling equipment operable (self-revealing, NRC Inspection Report 05000313;368/2004005).

Example 4: The NRC identified that the licensee had failed to take prompt measures to address a Unit 1 emergency diesel generator temperature switch oil leak, which progressively got worse until it affected diesel generator operability (NRC Inspection Report 05000313;368/2004005).

Example 5: The NRC identified that the licensee had failed to correct nonconforming containment isolation valves for approximately five years. Valve materials were rated at 200 EF while accident conditions could expose the valves to temperatures as high as 300 EF (Section 4OA2e(2)ii of this report).

Example 6: The NRC identified that the licensee had failed to promptly correct two longstanding equipment problems. Specifically: 1) two reactor coolant pumps had vibration levels that exceed the manufacturers recommended alert limits, one for approximately 15 years; and 2) the licensee had not promptly addressed the extent of condition for molded case circuit breakers that had exceeded their service lives (Section 4OA2e(2)iii of this report).

Historical Issues

Example 7: The licensee failed to take prompt corrective measures to address a faulty power switch associated with Unit 2 control element Assembly 43. This problem led to a dropped control element assembly at power (self-disclosing, NRC Inspection Report 05000313;368/2003005).

Example 8: The licensee failed to promptly address the extent of condition for loose breaker wires. Consequently, the core spray pump failed due to a loose anti-pump relay wire (self-revealing, NRC Inspection Report 05000313;368/2004005).

c. Effectiveness of Corrective Actions

(1) Inspection Scope

The team reviewed plant records, primarily condition reports, to verify that corrective actions related to the issues were identified and implemented, including corrective actions to address common cause or generic concerns. The team sampled specific technical issues to evaluate the adequacy of the licensee's operability determinations.

Finally, the team reviewed a sample of condition reports that addressed past NRC identified violations, for each affected cornerstone, to ensure that the corrective actions adequately addressed the issues as described in the inspection reports. The team also reviewed a sample of corrective actions closed to the work management processes to ensure that corrective actions were still appropriate and timely.

(2) Assessment

In most cases, the licensee's corrective actions were generally effective at addressing the conditions adverse to quality. The NRC had identified a few performance problems during the assessment period but, overall, performance had improved when compared to the previous problem identification and resolution assessment.

Current Issues

Example 1: The NRC identified that the licensee failed to provide adequate compensatory measures for a loss of intake structure automatic and manual fire suppression systems (NRC Inspection Report 05000313;368/2004003).

Example 2: The NRC identified that corrective actions to address deficient risk assessment procedures were not thorough in response to a previous NRC identified violation. The corrective measures did properly address the risk impact of changing weather conditions (NRC Inspection Report 05000313;368/2004004).

Example 3: The NRC identified that the licensee failed to ensure compliance with boric acid control procedures following three prior violations. Subsequently, the NRC identified continuing examples where the boric acid control procedures were not being

implemented (see Section 4OA2e(2)l of this report).

Historical Issues

Example 4: The NRC identified that the licensee had failed to take adequate corrective measures to prevent recurrence of primary water stress corrosion cracking in Alloy 600 material (NRC Inspection Report 05000313;368/2004002).

Example 5: The licensee identified that they had not properly corrected a problem with the Unit 1 south emergency switchgear room Chiller VCH-4B. The chiller was degraded but had previously failed from the same mechanism (NRC Inspection Report 05000313;368/2003005).

d. Assessment of Safety-Conscience Work Environment

(1) Inspection Scope

The team interviewed 22 individuals from different departments representing a cross section of functional organizations and supervisory and non-supervisory personnel. These interviews assessed whether conditions existed that would challenge the establishment of a safety-conscience work environment. The team also reviewed a plant self-assessment that evaluated, in part, the safety-conscious work environment at ANO.

(2) Assessment

The team concluded that a safety-conscience work environment exists at ANO. Based on interviews, station personnel felt free to enter issues into the corrective action program, raise safety concerns with their supervision, to the employees concern program, and to the NRC. The team received a few isolated comments regarding trust of site management, an increased work load caused by the corrective action process, and the perception that negative consequences could occur as a result of going to the NRC with safety issues. However, all the interviewees believed that potential safety issues were being addressed and there were no instances identified where individuals had experienced consequences for bringing safety issues to the NRC. The team determined that licensee management was aware of these perceptions and was taking action to address them.

e. Specific Issues Identified During This Inspection

The team identified the following issues during this inspection.

(1) Inspection Scope

During this assessment the team performed the inspections scoped in Sections 4OA2 a.(1), 4OA2 b.(1), 4OA2 c.(1), 4OA2 d.(1) above.

(2) Findings and Observations

I Noncited Violation 05000313;368/2005009-01; Failure to follow procedures for boric acid leaks

Introduction. The team identified a Green noncited violation of 10 CFR 50, Appendix B, Criterion V (Procedures) because the licensee failed to follow plant procedures with respect to documenting, evaluating and correcting boric acid leaks. This issue has crosscutting aspects associated with problem identification and resolution, as the licensee was not effective at ensuring compliance with the boric acid corrosion program following three similar noncited violations.

Description. On February 9, 2005, the team identified nine examples where the licensee failed to follow procedures to address discolored boric acid (evidence of carbon steel corrosion) on safety-related valves. The affected valves were in the Unit 1 makeup/high pressure injection system and the Unit 2 low pressure safety injection system. All of the affected equipment remained functional. The specific examples included:

- The licensee failed to write a condition report for a significant boric acid leak. On November 4, 2004, the licensee discovered discolored boric acid under the insulation on valve CV-1401. The procedure “Inspection and Evaluation of Boric Acid Leaks” states, in part:

  > For significant boric acid deposits or suspected corrosion... the condition reporting process shall be used to ensure the component is cleaned in a timely manner.

  Contrary to the above, no condition report was written to document and correct the discovery of this leak.

- The team identified eight additional examples where the boric acid control program was not followed. The inspectors observed discolored boric acid in the packing area of Valves CV-1219, CV-1220, CV-1227, CV-1278, CV-1279, CV-1284, CV-1285, and 2CV-5103-1. Licensee records indicated that these valves should have been clean and free of discolored boric acid deposits. Procedure 1032.037, "Inspection of Evaluation of Boric Acid Leaks," states, in part:

  > Upon identification of a boric acid leak the individual who discovered the boric acid leak shall perform one of the following:
  >
  > 1. Enter pertinent information into the Boric Acid Database
  >
  > 2. Complete form 1032.037A and send to Boric Acid Coordinator
  >
  > 3. Call Boric Acid Coordinator with information.

Contrary to the above, while plant operators and system engineers routinely walk down the systems and were expected to check for boric acid leaks, they failed to complete the noted steps of the plant procedure.

The inspectors noted that the licensee had received three previous noncited violations related to non-compliance with the Boric Acid Program. NRC Inspection Report 05000313;368/2001002, contained a noncited violation for the failure to implement a program for trending boric acid corrosion evaluations as required by their procedure. In NRC Inspection Report 05000313;368/2002005, a noncited violation was identified for not documenting potential nozzle leaks on the reactor vessel head. NRC Inspection Report 05000313;368/2004003 contained a noncited violation for the failure to promptly clean discolored boric acid from on a Unit 2 containment spray pump.

Analysis. The failure to follow boric acid control procedures was a performance deficiency. This issue is greater than minor because it affected the mitigating systems cornerstone objective of ensuring availability, reliability, and capability of mitigating systems. The issue is similar to minor example 4.a. of Manual Chapter 0609 Appendix E, in that the licensee routinely failed to follow plant procedures and evaluate the impact of boric acid induced corrosion on safety related equipment. Using the Phase 1 worksheets in Manual Chapter 0609, "Significance Determination Process," the inspectors determined that the finding had very low safety significance (Green) because the affected equipment remained operable consistent with Generic Letter 91-18, "Information to Licensees Regarding NRC Inspection Manual Section on Resolution of Degraded and Nonconforming Conditions," Revision 1. This issue involved problem identification and resolution crosscutting aspects associated with identifying conditions adverse to quality.

Enforcement. Title 10 of the Code of Federal Regulations (CFR), Part 50, Appendix B, Criterion V, states, in part "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 did not follow their Boric Acid Program and Corrective Action Process procedures (for activities affecting quality). Because the violation was of very low safety significance, and was entered into the licensee's corrective action program (Condition Report ANO-C-2005-0271), this violation is being treated as an NCV, consistent with Section VI.A of the NRC Enforcement Policy (NCV 05000368/2005009-01).

ii Noncited Violation 05000368/2005009-02; Untimely corrective measures to address inadequate containment isolation valve design

Introduction. The team identified a Green noncited violation of 10 CFR 50, Appendix B, Criterion XVI (Corrective Actions) for the failure to take prompt corrective actions to address an inadequate containment isolation valve design. In 2000, the licensee identified that the valves were not properly designed for their design basis application, in that the valves were designed for a maximum temperature of 200 EF but could be exposed to a temperature of 300 EF during a design basis accident. The valves were

still in service at the time of the inspection. This issue had crosscutting aspects associated with problem prioritization.

Description. Condition Report ANO-2-2000-0150 documented a qualification issue concerning several Unit 2 containment isolation valves. The valve seats were made of a polymer material that was rated well below the highest expected accident temperature. The material was rated for 200 EF but the required design temperature was 300 EF. This non-conformance was a condition adverse to quality but the licensee had not promptly corrected all of the valves. At the time of the inspection two valves with nonconforming seats were still in service. The affected components included Valve 2CV-2061-2 (outboard, reactor building sump to auxiliary building sump drain valve) and Valve 2CV-2201-2 (outboard reactor drain pump suction valve).

The licensee had determined that the valves' could perform their safety function. The outboard containment isolation valves are normally isolated from the containment by the inboard containment isolation valves, which were not affected by the identified problem. While the inboard valves could be opened periodically, the licensee determined, based on engineering judgement, that the post-accident temperatures at the outboard valves still should not reach 300 EF. The exact environment that the valves could see was not known. However, the inspectors agreed that valve deformation to the point where valve leakage could be substantially impacted was not likely.

The inspectors considered the identified problem a non-conforming condition, consistent with Generic Letter 91-18, "Information to Licensees Regarding NRC Inspection Manual Section on Resolution of Degraded and Nonconforming Conditions," Revision 1. Per the generic letter, the NRC requires prompt corrective measures to address conditions adverse to quality, including non-conforming conditions. Corrective actions taking longer than the next scheduled refueling outage to complete would require appropriate justification (such as more time needed to get required parts). The licensee did not have adequate justification for a five year delay.

Analysis. The failure to promptly correct a condition adverse to quality was a performance deficiency. The inspectors determined that the issue had more than minor safety significance because it impacted the Barriers cornerstone objective and could have affected the ability of safety-related containment isolation valves to perform their design basis function. The finding was of very low risk significance because it was a design/qualification deficiency that did not result in a loss of function per Generic Letter 91-18, "Information to Licensees Regarding NRC Inspection Manual Section on Resolution of Degraded and Nonconforming Conditions," Revision 1. This issue had crosscutting aspects associated with problem prioritization.

Enforcement. The inspectors identified a violation of 10 CFR 50, Appendix B, Criterion XVI (Corrective Actions). The noted regulation requires licensees, in part, to promptly correct conditions adverse to quality. Contrary to this requirement, the licensee identified in 2000 that the seat materials for two containment isolation valves were not properly designed for the expected postaccident conditions, a condition adverse to quality, and the licensee's corrective measures were not prompt. Because the violation

was of very low safety significance, and was entered into the licensee's corrective action program (Condition Report ANO-2-2005-1422), this violation is being treated as an NCV, consistent with Section VI.A of the NRC Enforcement Policy (NCV 05000368/2005009-02).

iii Finding 05000313;368/2005009-03; Long-standing reactor coolant pump and molded case circuit breaker problems

Introduction. The team identified a finding, with two examples, where the licensee did not take prompt corrective actions to address longstanding nonsafety related equipment problems that could impact the initiating events and mitigating system cornerstones. Specifically, reactor coolant pump vibrations exceeded vendor recommended alert levels, in one instance, for approximately 15 years and the licensee has not promptly addressed the extent of condition for molded case circuit breaker problems. This issue had crosscutting aspects associated with problem evaluation.

Description. The team identified two instances where the licensee failed to take prompt measures to address non-safety related problems that can impact the Initiating Events and/or Mitigating Systems cornerstones. Specifically:

- One reactor coolant pump on each unit had vibration levels well above the vendors recommended alert level (7 mils) and close to the vendor's recommended shutdown limit (25 mils). Unit 1 reactor coolant Pump P-32A vibration levels have been over 22 mils since the last refueling outage in May 2004. Unit 2 reactor coolant Pump 2P-32A vibration levels were close to 20 mils. The pump has consistently experienced vibration levels between 15 and 25 mils since 1990. The licensee did not evaluate the impact from long term cyclic fatigue to adjacent piping and other components.

- The licensee did not promptly address the extent of condition for age related molded case circuit breaker failures. In early 2004, during testing, the licensee identified that several Westinghouse HFB molded case circuit breakers did not trip when required. The licensee found vendor information that recommended a 20 year service life and noted that the breakers had been in service for over 30 years. While the licensee had established an action to check with other vendors for similar service life recommendations, almost a year after the failures the licensee had not contacted one additional vendor. The licensee has approximately 600 molded case circuit breakers installed in each unit, from numerous different manufacturers. The failure mode identified above can only be identified through testing. Many of the molded case circuit breakers had not been tested since initial plant startup. The licensee tested approximately 15 circuit breakers each refueling outage.

  The function affected by the problem, tripping, is generally a non-safety related function. The safety-related function is to stay closed during an accident and was not impacted by the age related issue. As such, the installed molded case circuit breakers remained operable. Nevertheless, if a breaker fails to trip when

required the next upstream current limiting device may trip and isolate additional pieces of accident mitigating equipment. Therefore, the issue has some safety significance.

Analysis. Each issue was more than minor because it either affected the Initiating Events cornerstone objective (reactor coolant pump vibrations) or the Mitigating Systems cornerstone objective (molded case circuit breakers). Both issues were of very low safety significance because the affected equipment remained operable consistent with Generic Letter 91-18, "Information to Licensees Regarding NRC Inspection Manual Section on Resolution of Degraded and Nonconforming Conditions," Revision 1. Each issue had crosscutting aspects associated with problem prioritization.

Enforcement. The issues did not involve safety related equipment. No violations of NRC requirements occurred (FIN 05000313;368/2005009-03).

iv Unresolved Item 05000313;368/2005009-04; Untimely corrective measures to address repetitive 4160 VAC cable failures

Introduction. The team documented an unresolved item to address several 4160 VAC cable failures.

Description. On February 2, 2003, Service Water Pump 2P-4C tripped because the feeder cable shorted to ground. The feeder cable was located in an underground vault and was submerged in water. The cables were not designed for submergence. Prior to the trip, the licensee had experienced four similar failures, including the Unit 2 service water Pump A in 1993, the Unit 1 service water Pump C in 1995, the Unit 1 service water Pump C in 1999 (in 1995 the licensee only replaced half of the cable and in 1999 the remaining half failed), and fire water Pump P-6A in 2001.

The inspectors also noted that the NRC had previously issued generic correspondence to address this problem - Information Notice 2002-12, "Submerged Safety-Related Electrical Cables," dated April 21, 2002. The licensee did not adequately address the information notice and did not take actions to replace all the cables that had not yet failed. Subsequently, on February 2, 2003, the fifth 4160 VAC cable failed in service.

As a result of the 2003 Unit 2 SW Pump C failure, the licensee performed a Root Cause Determination, CR-ANO-C-2003-0067, and concluded that black ethylene propylene rubber was susceptible to a phenomena called water treeing. A Sandia National Laboratory report published in 1996, "Aging Management Guideline for Commercial Nuclear Power Plants - Electrical Cable and Terminations," documented the same phenomena that the licensee determined to be the root cause of the failure. In addition, the licensee identified the following contributing causes: (1) corrective action for previously identified problems/events were not adequate to prevent recurrence, management failed to take meaningful corrective action for past events; and (2) previous industry operating experience was not effectively used to prevent problems.

At the time of the inspection, the licensee had replaced all affected 4160 VAC cables and had evaluated the potential for the same problem to affect other submerged cables. The licensee determined that no other groups of cables were impacted.

Analysis. This finding was more than minor because it affected the Initiating Events and Mitigating System cornerstone objectives of limiting the likelihood of initiating events and ensuring the availability of systems that mitigate plant accidents. The inspectors needed additional information concerning the historical cable failures and the potential vulnerability of other cables in the 2003 time frame. This issue is unresolved pending completion of a significance determination.

Enforcement. At the close of the inspection, the inspectors were still evaluating the historical cable failures and the potential for enforcement actions for the failure to take prompt and effective corrective measures to address significant conditions adverse to quality (4160 VAC cable failures). This issue is unresolved pending completion of the additional NRC inspection and completion of a significance determination (URI 05000368/2005009-04).

4OA6 Exit Meeting

The team conducted an exit meeting on March 22, 2005, with Mr. J. Forbes, Vice President, ANO, and other members of the licensee's staff. The licensee acknowledged the findings. While some proprietary information was reviewed during the inspection, all proprietary information was returned to the licensee prior to the exit meeting.

ATTACHMENT

PARTIAL LIST OF PERSONS CONTACTED

ATTACHMENT 1

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

J. Forbes, Vice President, Arkansas Nuclear One
J. Eichenberger, Manager, Corrective Actions and Assessments
C. Eubanks, General Manager, Plant Operations
F. Forrest, Manager, Operations, Unit 1
A. Heflin, Manager, Operations, Unit 2
J. Hoffpauir, Manager, Maintenance
D. James, Acting Director, Nuclear Safety Assurance
J. Kowalewski, Director, Engineering
J. Miller, Manager, Systems Engineering
D. Moore, Superintendent, Radiation Protection
R. Scheide, Licensing Specialist

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000368/2005009-01	NCV	Failure to follow boric acid control procedures (Section 4OA2e(2)I)
05000368/2005009-02	NCV	Untimely corrective actions to address inadequate containment isolation valve design (Section 4OA2e(2)ii)
05000368/2005009-03	FIN	Long-standing reactor coolant pump and molded case circuit breaker problems (Section 4OA2e(2)iii)

Opened

05000368/2005009-04	URI	Untimely corrective actions to address repetitive 4160 VAC cable failures (Section 4OA2e(2)iv)

Closed

None.

Discussed

None

LIST OF DOCUMENTS REVIEWED

The following documents were selected and reviewed by the inspectors to accomplish the objectives and scope of the inspection and to support any findings:

Calculations

5010.015-ATT-5, Change No. 2
84-E-0083-045, Revision 1 PC-2
91-E-0116-01, Revision 5

Condition Reports (CR-ANO-)

C-2001-0218	C-2003-0031	C-2003-0067	C-2003-0107
C-2003-0186	C-2003-0227	C-2003-0281	C-2003-0301
C-2003-0377	C-2003-0413	C-2003-0459	C-2003-0568
C-2003-0604	C-2003-0674	C-2003-0701	C-2003-0736
C-2003-0877	C-2003-1038	C-2003-1080	C-2004-0032
C-2004-0049	C-2004-0147	C-2004-0307	C-2004-0373
C-2004-0386	C-2004-0548	C-2004-0606	C-2004-0686
C-2004-0779	C-2004-0813	C-2004-0851	C-2004-0895
C-2004-0998	C-2004-1070	C-2004-1077	C-2004-1082
C-2004-1086	C-2004-1279	C-2004-1402	C-2004-1493
C-2004-1518	C-2004-1563	C-2004-1564	C-2004-1565
C-2004-1622	C-2004-1686	C-2004-1706	C-2004-1712
C-2004-1767	C-2004-1791	C-2004-1828	C-2004-1847
C-2004-1921	C-2004-1947	C-2004-1952	C-2004-1953
C-2004-2009	C-2004-2035	C-2004-2042	C-2004-2054
C-2004-2081	C-2004-2096	C-2004-2099	C-2004-2119
C-2004-2121	C-2004-2159	C-2004-2175	C-2004-2188
C-2005-0244	C-2005-0271	C-2005-0313	

1-1999-0118	1-2000-0029	1-2001-0045	1-2001-0299
1-2002-0273	1-2003-0050	1-2003-0069	1-2003-0074
1-2003-0087	1-2003-0090	1-2003-0099	1-2003-0108
1-2003-0109	1-2003-0111	1-2003-0113	1-2003-0119
1-2003-0188	1-2003-0193	1-2003-0203	1-2003-0225
1-2003-0237	1-2003-0260	1-2003-0261	1-2003-0337
1-2003-0346	1-2003-0358	1-2003-0378	1-2003-0467
1-2003-0469	1-2003-0501	1-2003-0559	1-2003-0650
1-2003-0703	1-2003-0711	1-2003-0770	1-2003-0791
1-2003-0812	1-2003-0861	1-2003-0868	1-2003-0871
1-2003-0903	1-2003-0905	1-2003-0914	1-2003-0946
1-2003-0949	1-2003-1183	1-2003-1200	1-2003-1264

1-2004-0009	1-2004-0095	1-2004-0097	1-2004-0183
1-2004-0185	1-2004-0270	1-2004-0282	1-2004-0311
1-2004-0329	1-2004-0334	1-2004-0454	1-2004-0488
1-2004-0489	1-2004-0514	1-2004-0588	1-2004-0886
1-2004-0889	1-2004-0980	1-2004-1088	1-2004-1324
1-2004-1337	1-2004-1365	1-2004-1499	1-2004-1511
1-2004-1576	1-2004-1629	1-2004-1663	1-2004-1684
1-2004-1716	1-2004-1726	1-2004-1727	1-2004-1763
1-2004-1789	1-2004-1850	1-2004-1851	1-2004-1858
1-2004-1896	1-2004-1960	1-2004-2033	1-2004-2046
1-2004-2104	1-2004-2115	1-2004-2136	1-2004-2138
1-2004-2172	1-2004-2288	1-2004-2374	1-2004-2482
1-2004-2479	1-2004-2459	1-2004-2559	1-2005-0279

2-1999-0712	2-2000-0150	2-2002-2036	2-2003-0178
2-2003-0189	2-2003-0345	2-2003-0381	2-2003-0433
2-2003-0535	2-2003-0601	2-2003-0608	2-2003-0620
2-2003-0646	2-2003-0703	2-2003-0747	2-2003-0786
2-2003-0855	2-2003-0910	2-2003-0936	2-2003-0977
2-2003-1056	2-2003-1158	2-2003-1237	2-2003-1302
2-2003-1324	2-2003-1339	2-2003-1350	2-2003-1376
2-2003-1421	2-2003-1554	2-2003-1566	2-2003-1574
2-2003-1575	2-2003-1643	2-2003-1680	2-2003-1803
2-2004-0041	2-2004-0102	2-2004-0124	2-2004-0146
2-2004-0163	2-2004-0167	2-2004-0182	2-2004-0183
2-2004-0191	2-2004-0272	2-2004-0299	2-2004-0324
2-2004-0325	2-2004-0329	2-2004-0337	2-2004-0346
2-2004-0359	2-2004-0362	2-2004-0379	2-2004-0504
2-2004-0520	2-2004-0620	2-2004-0668	2-2004-0714
2-2004-0715	2-2004-0776	2-2004-0795	2-2004-0821
2-2004-0840	2-2004-0922	2-2004-1132	2-2004-1188
2-2004-1346	2-2004-1386	2-2004-1539	2-2004-1569
2-2004-1588	2-2004-1593	2-2004-1688	2-2004-1826
2-2004-1916	2-2004-1921	2-2004-1997	2-2004-1999
2-2004-2015	2-2004-2054	2-2005-0060	

LO-ALO-2003-0046	LO-ALO-2003-0048	LO-ALO-2004-0018	LO-ALO-2004-0019
LO-ALO-2004-0080	LO-OPX-2002-0078		

<u>Engineering Requests</u>

963523-N201, Revision 0

ER-ANO-2001-1277-000, Revision 0

ER-ANO-2002-0528-000, Revision 0

ER-ANO-2004-0293-000, Revision 0

Noncited Violations Reviewed

NCV Number	Title
2004003-03	Failure to adequately assess risk due to external conditions
2004003-04	Untimely Corrective Actions to Clean Discolored Boric Acid Deposits
2004004-02	Failure to perform required hydrostatic testing of pressurized fire extinguishers
2004004-03	Failure to adequately assess risk due to external conditions or HELB doors removed
2004005-05	Containment Cooler Fan Inoperable in Excess of Technical Specification Allowed Outage Time
2004005-07	Failure to Identify and Correct a Loose Circuit Connection in Containment Spray Pump Circuitry
2003005-03	Inadequate Procedure for MNSA Installation Leading to a Reactor Coolant System Leak

NRC Information Notices

1989-63, “Possible Submergence of Electrical Circuits Located Above the Flood Level Because of Water Intrusion and Lack of Drainage”

1992-69, “Water Leakage from Yard Area Through Conduits into Buildings”

1993-26, “Grease Solidification Causes Molded Case Circuit Breaker Failure to Close”

1993-64, “Periodic Testing and Preventive Maintenance of Molded Case Circuit Breakers”

1993-82, “Recent Fuel and Core Performance Problems In Operating Reactors”

2001-04, “Neglected Fire Extinguisher Maintenance Causes Fatality”

2002-12, “Submerged Safety-Related Electrical Cables”

Other

Licensee presentation on corrective action program, January 25, 2005

ANO Quarterly Trend Report, 1st Quarter 2003

ANO Quarterly Trend Report, 2nd Quarter 2003

ANO Quarterly Trend Report, 3rd Quarter 2003

ANO Quarterly Trend Report, 4th Quarter 2003

ANO Quarterly Trend Report, 1st Quarter 2004

ANO Quarterly Trend Report, 2nd Quarter 2004

ANO Quarterly Trend Report, 3rd Quarter 2004

ANO Quarterly Trend Report, 4th Quarter 2004

ASLP-STA-OPER, "Operability Determination," Revision 3

Certificate of Conformance 6600-E-2024, Anaconda Cable

Control Room Station Unit 2 Logs from January 1, 2003 through January 10, 2005

Control-Seal Butterfly Valve Technical Data

Electrical Power Research Institute Molded Case Circuit Breaker Application and Maintenance Guide, Revision 2

Final Safety Analysis Report, Unit 1

Final Safety Analysis Report, Unit 2

Flowserve Technical Service Bulletin No. 9309-08-022, "Reactor Coolant Pumps Shaft Vibration Limits"

IEEE-117, Figure 3, "Temperature Vs. Life Curves for Insulation Systems"

Instructions AB DE-ION Circuit Breakers Standard Types EB, EHB, FB and Mark 75 Type HFB, TD W120.0570, Revision 0

Licensee Event Report 05000302/2002-001-00, Florida Power, Crystal River Nuclear Plant

Maintenance Rule Database, Unit 1 Emergency Diesel Generator System

Maintenance Rule Database, Unit 2 Emergency Diesel Generators

Maintenance Rule Database, Unit 2 Turbine Building Sump

PC 95-7098, “Repair of Degraded Power Cabling for Service Water Pump P4C,” Revision 0

PMCD 2001-2464-P C 01, Medium Voltage Cable Trending Program

PMCD 2004-7900-P 2 01, High Voltage Power Supply in Excore Safety Channel Drawer

PMRQ 50013534 01, ABC Fire EXT Safety Related Hydrostatic Test Inspections

PMRQ 50013534 02, ABC Non-Safety Fire EXT Hydrostatic Test Inspection

PMRQ 50013534 05, CO2 Fire EXT Safety Related Hydrostatic Test Inspection

PMRQ 50013534 06, CO2 Non-Safety Related Fire EXT Hydrostatic Test Inspection

Product Data Section 2 Sheet 5, Okoguard-Okolon Type MV-105, 5/8kV Shielded Power Cable

Quality Assurance Audit Report QA-3-2003-ANO-1-Multi

Quality Assurance Surveillance Report QS-2004-ECH-001

Sand96-0344, “Aging Management Guideline for Commercial Nuclear Power Plants - Electrical Cable and Terminations,” September 1996

Specification Number 6600-E-24, 5000 Volt & 8000 Volt Cables, Revision 3

Specification Number ANO-E-2425, 5000 Volt & 8000 Volt Cable, Revision 1

Statement of Conformance 6600-E-24, 5kV 250 MCM 3 Single Cond Triplexen Cable

System Performance Indicators

TDB580-0040, “Instruction Manual, Part II, Reactor Coolant Pump” Revision 7

Unit 1 Technical Specifications

Unit 2 Technical Specifications

Westinghouse Electric Company Technical Bulletin TB-04-13: Replacement Solutions for Obsolete Class Molded Case Circuit Breakers, UL Testing Issues, Breaker Design Life and Trip Band Adjustment

<u>Drawings</u>

2HCB-1-1, “Large Pipe Isometric From Reactor Drain Tank to Penetration 2P-69,” Revision 7

2HCB-1-2, “Large Pipe Isometric 2T-68 Reactor Drain Tank Piping from Containment Penetration 2P-69 to Valve 2CV-2201-2,” Revision 3

2HCB-1-3, “Large Pipe Isometric Reactor Drain from 2CV-2202-1 thru Penetration 2P-69 to 2CV-2201-2,” Revision 1

2 HCB-5-1, “Large Pipe Isometric from Containment Sump Penetration 2P-68 to Auxiliary Building Rad Waste Drain Piping,” Revision 13

E-17 Sheet 1A, Revision 8

E-59, Conduit & Cable Tray Notes & Details, Sheet 11, Revision 4

E-601, Electrical Plot Plan Outdoor Area, Sheet 1, Revision 33

E-2801, Plot Plan Grounding & Underground Conduit Layout, Sheet 1, Revision 46

KN-45-220, As built drawing for 3" valve, Revision 0

M-2242-AA-2, “Contromatics Control-Seal Type II Butterfly Valve to a Limitorque Electric Actuator,” Revision 11

Plant Procedures

1032.037, “Inspection and Evaluation of Boric Acid Leaks,” Change No. 000-08-0

2104.014, “LRW and BMS Operations,” Change No. 034-01-0

2202.003, “Loss of Coolant Accident,” Change No. 006-01-0

2203.012J, “Annunciator 2k10 Corrective Action,” Change No. 030-01-1

COPD024, “Risk Assessment Guidelines,” Revision 14

DC-300, “EN-S Nuclear Management Manual,” Revision 1

EN-LI-102, “Corrective Action Process,” Revision 1

OP 1403.171, “Insulation Resistance Testing,” Revision 3

OP 2203.012D, “Annunciator 2K04 Corrective Action,” Revision 27

Completed Surveillances

2311.002, “Service Water System Flow Test,” Change No. 013-00-0, test completed on 4/16/02

Work Orders

00024270	00033149	00035161	00036923	00037485	00037802
00039628	00040300	00043619	00976247	00957281	00057434
50248158	50245804				

Boric Acid Evaluations

02-1-0419	04-1-0445	02-2-0024	03-1-0062	03-1-0038	03-1-0037
03-1-0039	04-1-0452	03-1-0046			

Initial Information Request

The period of interest covers the last two years or the time since the last PI&R inspection, whichever is longer. Electronic format is preferred but not required. Requested items include:

All procedures governing or applying to the corrective action program, including the processing of information regarding generic communications and industry operating experiences

Procedures and descriptions of any informal systems, used by engineering, operations, maintenance, security, training, and emergency planning for issues below the threshold of the formal corrective action program

A list of all corrective action documents [condition reports (CRs)] that were initiated or closed during the period, including CR number, description of issue and significance classification

A separate list of all CRs closed to other programs, such as MAIs/WOs, ERs, etc.

A copy of each Significant Event Review Team Report and Root Cause Analysis Report for the period (not necessarily the entire CR)

Copies of CRs associated with noncited violations

Copies of CRs associated with repetitive problems or trends

Copies of CRs associated with ineffective or untimely corrective actions

List of all self assessments or QA assessments/audits for the period

Quality assurance audits and surveillances, and functional self assessments of corrective action activities

Control room logs

Security event logs (access and only during on-site inspection)

Radiation protection event logs

List of risk significant systems based on risk achievement worth (RAW) and "0% availability CDF"

Searchable (preferred) list of all maintenance action items/work orders

List of all SSC's placed in or removed from the maintenance rule a(1) category for the period

Human performance and corrective action trend information.

All corrective action program reports or metrics used for tracking effectiveness of the corrective action program for the period

NOTE: Additional documentation will be requested during the inspection.