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

April 21, 2005

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

SUBJECT: ARKANSAS NUCLEAR ONE - NRC INTEGRATED INSPECTION REPORT 05000313/2005002 AND 05000368/2005002

Dear Mr. Forbes:

On March 24, 2005, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Arkansas Nuclear One, Units 1 and 2, facility. The enclosed integrated inspection report documents the inspection findings, which were discussed on March 25, 2005, with members of your staff.

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

This report documents one NRC-identified and three self-revealing findings of very low safety significance (Green). Three of these findings were determined to involve violations of NRC requirements, however, because of the very low safety significance and because they are entered into your corrective action program, the NRC is treating these violations as noncited violations (NCVs) consistent with Section VI.A of the NRC Enforcement Policy. If you contest these 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 DC 20555-0001; with copies to the Regional Administrator, U.S. Nuclear Regulatory Commission Region IV, 611 Ryan Plaza Drive, Suite 400, Arlington, Texas 76011-4005; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington DC 20555-0001; and the NRC Resident Inspector at Arkansas Nuclear One, Units 1 and 2, 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 (if any) will be made available electronically for public inspection

in the NRC Public Document Room or from the Publicly Available Records (PARS) 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/

Troy W. Pruett, Chief
Project Branch D
Division of Reactor Projects

Dockets: 50-313
50-368
Licenses: DPR-51
NPF-6

Enclosure:
NRC Inspection Report 05000313/2005002 and 05000368/2005002
w/Attachments: Supplemental Information and Phase 3 Evaluation, Inoperable Containment Cooling Fan 2VSF-1B, Arkansas Nuclear One, Unit 2

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SISP Review Completed: __TWP__ ADAMS: / Yes ☐ No Initials: __TWP__
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JLDixon	ELCrowe	RWDeese	TWPruett	MFRunyun	ATGody
E-TWPruett	**E-TWPruett**	**E-TWPruett**	**/RA/**	**N/A**	**/RA/**
03/29/05	03/29/05	03/29/05	04/21/05	04/ /05	04/19/05

C:DRS/PSB	D:DRS/PEB	DRS/SRA	C:DRS/EB	C:DRP/D	
MPShannon	LJSmith	DPLoveless	JAClark	SCSchwind	
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04/18/05	04/18/05	04/ /05	04/19/05	04/ /05	

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U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Dockets:	50-313, 50-368
Licenses:	DPR-51, NPF-6
Report:	05000313/2005002 and 05000368/2005002
Licensee:	Entergy Operations, Inc.
Facility:	Arkansas Nuclear One, Units 1 and 2
Location:	Junction of Hwy. 64W and Hwy. 333 South Russellville, Arkansas
Dates:	January 1 through March 24, 2005
Inspectors:	E. Crowe, Resident Inspector R. Deese, Senior Resident Inspector J. Dixon, Resident Inspector D. Dumbacher, Resident Inspector, Callaway T. Rhoades, Resident Inspector, Wolf Creek
Approved By:	Troy W. Pruett, Chief, Project Branch D Division of Reactor Projects
Attachment 1:	Supplemental Information
Attachment 2:	Phase 3 Evaluation, Inoperable Containment Cooling Fan 2VSF-1B, Arkansas Nuclear One, Unit 2

CONTENTS

SUMMARY OF FINDINGS

IR 05000313/2005002, 05000368/2005002; 01/01/05 - 03/24/05; Arkansas Nuclear One, Units 1 and 2; Refueling and Outage Activities, Event Followup, Other Activities.

This report covered a 3-month period of inspection by resident inspectors. The inspection identified three Green noncited violations and one Green finding. The significance of most findings is indicated by their color (Green, White, Yellow, or Red) using Inspection Manual Chapter 0609, "Significance Determination Process." Findings for which the significance determination process does not apply may be Green or be assigned a severity level after NRC management's 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.

A. NRC-Identified and Self-Revealing Findings

Cornerstone: Initiating Events

- Green. A self-revealing finding was identified for an inadequate maintenance procedure which did not include vendor recommended maintenance for electrical tightness checks for the Unit 1 main feedwater block valves. As a result of a loose connection, Valve CV-2675 failed to fully close after a reactor trip on August 29, 2003. The valve failure led to an inability to control steam generator level which resulted in an automatic initiation of the emergency feedwater system. This finding had cross cutting aspects of human performance in the area of resources, in that the maintenance procedure did not have technically accurate instructions for this type of actuator since the procedure did not include the connections in the clutch housing.

  This finding is more than minor because it affected the initiating events cornerstone objective of limiting the likelihood of those events that upset plant stability and challenge critical safety functions and affected the cornerstone attribute of procedural quality because an inadequate maintenance procedure increased the probability of a steam generator overfeed event. Using the Phase 1 worksheets in Manual Chapter 0609, "Significance Determination Process," the issue was determined to have very low safety significance because emergency feedwater initiation and control and rapid feedwater reduction systems both performed as designed and no steam generator overfeed event occurred (Section 4OA3).

Cornerstone: Mitigating Systems

- Green. A self-revealing noncited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," occurred when postmaintenance testing for Unit 2 Containment Cooler Fan 2VSF-1B was not performed after circuit breaker maintenance. This resulted in the failure to detect that the fan was inoperable. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program as Condition Report ANO-2-2004-1688.

This finding is more than minor because it affected the mitigating systems cornerstone objective of ensuring the availability and reliability of a system that responds to initiating events to prevent undesirable consequences. Based on the results of Phases 2 and 3 Significance Determination Process analyses, the finding was determined to be of very low safety significance because only Containment Cooling Fan 2VSF-1B was inoperable (Section 4OA5).

- Green. A self-revealing noncited violation of Unit 2 Technical Specification 3.6.2.3, "Containment Cooling System," occurred since the Unit 2 Containment Cooler 2VSF-1B was inoperable in excess of its specified allowed outage time. The containment cooler was out of service for over 11 months before the licensee discovered that the fan motor had been improperly wired. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program as Condition Report ANO-2-2004-1688.

  This finding is more than minor because it affected the mitigating systems cornerstone objective of ensuring the availability and reliability of a system that responds to initiating events to prevent undesirable consequences. Based on the results of Phases 2 and 3 Significance Determination Process analyses, the finding was determined to be of very low safety significance because only Containment Cooling Fan 2VSF-1B was inoperable (Section 4OA5).

Cornerstone: Occupational Radiation Safety

- Green. On March 14, 2005, the inspectors identified a noncited violation of 10 CFR 20.1902 (a) because the licensee failed to post a radiation area. When downposting the Unit 2 Train B high pressure safety injection room, a licensee radiation protection technician removed the high radiation area posting and did not replace it with a radiation area posting. The licensee subsequently properly posted the room as a radiation area. This finding had human performance crosscutting aspects in the area of personnel that involved a radiological protection technician's inattention to detail.

  The finding was greater than minor because it is associated with the occupational radiation safety cornerstone objective of ensuring adequate protection of worker health and safety from exposure to radiation from radioactive material and affected the cornerstone attribute of program and process because the room was not posted as required due to personnel error. When processed through Appendix C, "Occupational Radiation Safety Significance Determination Process," of Manual Chapter 0609, "Significance Determination Process," the finding was determined to be of very low safety significance because it was not associated with as low as is reasonably achievable planning or work controls, there was no overexposure or a substantial potential for overexposure, and the ability to assess dose was not compromised (Section 1R20).

B. Licensee-Identified Violations

None

REPORT DETAILS

Summary of Plant Status

Unit 1 began the inspection period at 100 percent rated thermal power (RTP) and remained there until March 18 when power was reduced to 85 percent RTP for 5 hours to perform main turbine governor valve maintenance. The unit was then returned to 100 percent RTP and remained there throughout the remainder of the inspection period.

Unit 2 began the inspection period at 100 percent RTP and remained there until March 9, 2005, when the unit was shut down for Refueling Outage 2R17, 6 days earlier than previously scheduled due to concerns with a leaking steam generator tube. The unit remained shutdown throughout the remainder of the inspection period.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity

1R01 Adverse Weather Protection (71111.01)

.1 Readiness for Seasonal Susceptibilities

a. Inspection Scope

The inspectors completed a review of the licensee's readiness of seasonal susceptibilities involving extreme low temperatures. The inspectors (1) reviewed plant procedures, the Updated Final Safety Analysis Report, and Technical Specifications to ensure that operator actions defined in adverse weather procedures maintained the readiness of essential systems; (2) walked down portions of the below listed systems to ensure that adverse weather protection features were sufficient to support operability including the ability to perform safe shutdown functions; (3) evaluated operator staffing levels to ensure the licensee would maintain the readiness of essential systems required by plant procedures; and (4) reviewed the corrective action program (CAP) to determine if the licensee identified and corrected problems related to adverse weather conditions.

- January 13, 2005, Unit 1 service water, fire protection, and condensate storage tank systems

The inspectors completed one sample.

b. Findings

No findings of significance were identified.

1R04 Equipment Alignment (71111.04)

.1 Partial System Walkdowns

a. Inspection Scope

The inspectors (1) walked down portions of the two below listed risk important systems and reviewed plant procedures and documents to verify that critical portions of the selected systems were correctly aligned and (2) compared deficiencies identified during the walk down to the licensee's CAP to ensure problems were being identified and corrected.

- February 2, 2005, Unit 1 Emergency Diesel Generator (EDG) K-4A
- February 14, 2005, Unit 1 EDG K-4B

The inspectors completed two samples.

Complete Walkdown

The inspectors (1) reviewed plant procedures, drawings, the Updated Final Safety Analysis Report, Technical Specifications, and vendor manuals to determine the correct alignment of the system; (2) reviewed outstanding design issues, operator work arounds, and CAP documents to determine if open issues affected the functionality of the system; and (3) verified that the licensee was identifying and resolving equipment alignment problems.

- March 9-11, 2005, Unit 2 shutdown cooling systems (low pressure safety injection systems)

The inspectors completed one sample.

b. Findings

No findings of significance were identified.

1R05 Fire Protection (71111.05)

a. Inspection Scope

Routine Inspection

The inspectors walked down the six below listed plant areas to assess the material condition of active and passive fire protection features, their operational lineup, and their operational effectiveness. The inspectors (1) verified that transient combustibles and hot work activities were controlled in accordance with plant procedures; (2) observed the condition of fire detection devices to verify they remained functional; (3) observed fire suppression systems to verify they remained functional; (4) verified that fire extinguishers and hose stations were provided at their designated locations and that they were in a satisfactory condition; (5) verified that passive fire protection features (electrical raceway barriers, fire doors, fire dampers, steel fire proofing, penetration seals, and oil collection systems) were in a satisfactory material condition; (6) verified that adequate compensatory measures were established for degraded or inoperable fire protection features; and (7) reviewed the CAP to determine if the licensee identified and corrected fire protection problems.

- March 1, 2005, common alternate AC diesel generator
- March 4, 2005, Unit 2 Fire Zone 2115-I, boric acid makeup tank room
- March 4, 2005, Unit 2 Fire Zone 2010-LL, “C” high pressure safety injection (HPSI) pump room
- March 8, 2005, Unit 2 Fire Zone 2109-U, EDG corridor
- March 8, 2005, Unit 2 Fire Zone 2099-W, west DC equipment room
- March 17, 2005, Unit 1 Fire Zone 149-E, upper north electrical penetration room

The inspectors completed six samples.

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalification Program (71111.11)

a. Inspection Scope

The inspectors observed testing and training of senior reactor operators and reactor operators to identify deficiencies and discrepancies in the training, to assess operator performance, and to assess the evaluator's critique. The training scenario involved a loss of main feedwater with a subsequent reactor trip and a reactor coolant leak with failure of one high pressure injection path to provide flow to the core.

- January 18, 2005, Unit 1 simulator, Dynamic Exam Scenario ES-1-008, Revision 3

The inspectors completed one sample.

b. Findings

No findings of significance were identified.

1R12 Maintenance Effectiveness (71111.12)

a. Inspection Scope

The inspectors reviewed the two below listed maintenance activities to (1) verify the appropriate handling of structure, system, and component (SSC) performance or condition problems; (2) verify the appropriate handling of degraded SSC functional performance; (3) evaluate the role of work practices and common cause problems; and (4) evaluate the handling of SSC issues reviewed under the requirements of the Maintenance Rule, Appendix B of 10 CFR Part 50, and Technical Specifications.

- March 4-5, 2005, Unit 2 emergency core cooling containment sump isolation valves (1) Sump Suction Isolation Valve 2CV-5648-2 leakage and (2) Sump Isolation Valve 2CV-5650-2 failure to close

- March 11, 2005, Unit 2 Main Steam Line Radiation Monitors 2RE-1007 and 2RE-1057

The inspectors completed two samples.

b. Findings

No findings of significance were identified.

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

a. Inspection Scope

Risk Assessment and Management of Risk

The inspectors reviewed the below listed assessment activities to verify (1) performance of risk assessments when required by 10 CFR 50.65 (a)(4) and licensee procedures prior to changes in plant configuration for maintenance activities and plant operations; (2) the accuracy, adequacy, and completeness of the information considered in the risk assessment; (3) that the licensee recognizes, and/or enters as applicable, the appropriate licensee-established risk category according to the risk assessment results and licensee procedures; and (4) the licensee identified and corrected problems related to maintenance risk assessments.

- February 1-4, 2005, Unit 1 EDG K-4B maintenance outage
- February 15-17, 2005, Unit 1 EDG K-4A maintenance outage

The inspectors completed two samples.

Emergent Work Control

The inspectors (1) verified that the licensee performed actions to minimize the probability of initiating events and maintained the functional capability of mitigating systems and barrier integrity systems; (2) verified that emergent work-related activities such as troubleshooting, work planning/scheduling, establishing plant conditions, aligning equipment, tagging, temporary modifications, and equipment restoration did not place the plant in an unacceptable configuration; and (3) reviewed the CAP to determine if the licensee identified and corrected risk assessment and emergent work control problems.

- February 26 through March 11, 2005, Unit 2 Steam Generator A tube leakage

- March 4-5, 2005, Unit 2 emergency core cooling containment sump isolation valves (1) Sump Suction Isolation Valve 2CV-5648-2 leakage and (2) Sump Isolation Valve 2CV-5650-2 failure to close

- March 8, 2005, Unit 2 shutdown for refueling outage earlier than planned due to steam generator tube leakage

The inspectors completed three samples.

b. Findings

No findings of significance were identified.

1R14 Operator Performance During Nonroutine Plant Evolutions and Events (71111.14, 71153)

a. Inspection Scope

The inspectors (1) reviewed operator logs, plant computer data, and/or strip charts for the below listed evolutions to evaluate operator performance in coping with nonroutine events; (2) verified that the operator response was in accordance with the response required by plant procedures and training; and (3) verified that the licensee has identified and implemented appropriate corrective actions associated with personnel performance problems that occurred during the nonroutine evolutions sampled.

- February 26 through March 15, 2005, Unit 2 increasing primary-to-secondary leakage in Steam Generator A

- March 18, 2005, Unit 1 downpower to repair Main Turbine Governor Valve 4

The inspectors completed two samples.

b. Findings

No findings of significance were identified.

1R15 Operability Evaluations (71111.15)

a. Inspection Scope

The inspectors (1) reviewed plant status documents such as operator shift logs, emergent work documentation, deferred modifications, and standing orders to determine if an operability evaluation was warranted for degraded components; (2) referred to the Updated Final Safety Analysis Report and design basis documents to review the technical adequacy of licensee operability evaluations; (3) evaluated compensatory measures associated with operability evaluations; (4) determined degraded component impact on any Technical Specifications; (5) used the significance determination process to evaluate the risk significance of degraded or inoperable equipment; and (6) verified that the licensee has identified and implemented appropriate corrective actions associated with degraded components.

- CR 2-2004-1755 January 12, 2005, Unit 2 bird parts found in emergency feedwater (EFW) turbine exhaust line
- CR 2-2005-0066 January 14, 2005, Unit 2 bent support rods on Safety-Related Battery 2D-12
- CR 1-2005-0050 January 20, 2005, Unit 1 Service Water Pump P-4B corrosion
- CR 1-2005-0239 February 7, 2005, Unit 1 EDG K-4B output breaker
- CR 1-2005-0213 February 8, 2005, Unit 1 EFW Steam Admission Bypass Solenoids SV-2613 and SV-2667
- CR-2-2005-0760 March 23, 2005, Unit 2 Loop 1 SW leak on Weld 2SW-8411

The inspectors completed six samples.

b. Findings

No findings of significance were identified.

1R16 Operator Work-Arounds (71111.16)

a. Inspection Scope

The inspectors reviewed the below listed operator workaround to (1) determine if the functional capability of the system or human reliability in responding to an initiating event is affected, (2) evaluate the effect of the operator workaround on the operator's ability to implement abnormal or emergency operating procedures, and (3) verify that the licensee has identified and implemented appropriate corrective actions associated with operator workarounds.

- March 3, 2005, Unit 1 Makeup Tank Outlet Valve CV-1275

The inspectors completed one sample.

b. Findings

No findings of significance were identified.

1R19 Postmaintenance Testing (71111.19)

a. Inspection Scope

The inspectors selected the four below listed postmaintenance test activities of risk significant systems or components. For each item, the inspectors (1) reviewed the applicable licensing basis and/or design-basis documents to determine the safety

functions, (2) evaluated the safety functions that may have been affected by the maintenance activity, and (3) reviewed the test procedure to ensure it adequately tested the safety function that may have been affected. The inspectors either witnessed or reviewed test data to verify that acceptance criteria were met, plant impacts were evaluated, test equipment was calibrated, procedures were followed, jumpers were properly controlled, the test data results were complete and accurate, the test equipment was removed, the system was properly realigned, and deficiencies during testing were documented. The inspectors also reviewed the CAP to determine if the licensee identified and corrected problems related to postmaintenance testing.

- January 12, 2005, Unit 1 EDG K-4B voltage regulator repairs
- January 19, 2005, Unit 1 EDG Exhaust Fan VEF-24C rewiring
- January 21, 2005, Unit 1 SW Valve CV-6034 repairs
- March 22, 2005, Unit 2 Containment Purge Monitor 2RITS-8233 repairs

The inspectors completed four samples.

b. Findings

No findings of significance were identified.

1R20 Refueling and Outage Activities (71111.20)

a. Inspection Scope

The inspectors reviewed the following risk significant refueling items or outage activities to verify defense in depth commensurate with the outage risk control plan and compliance with the Technical Specifications (1) the risk control plan, (2) tagging/clearance activities, (3) reactor coolant system instrumentation, (4) electrical power, (5) decay heat removal, (6) spent fuel pool cooling, (7) inventory control, (8) reactivity control, (9) containment closure, (10) reduced inventory or midloop conditions, (11) refueling activities, (12) cooldown activities, (13) radiological postings, and (14) licensee identification and implementation of appropriate corrective actions associated with refueling and outage activities.

- March 9-24, 2005, beginning of Unit 2 planned Refueling Outage 2R17, commenced early due to primary-to-secondary leakage in Steam Generator A

The inspectors completed one sample.

b. Findings

Introduction. A Green NCV was identified by the inspectors for the failure to post a radiation area in accordance with 10 CFR 20.1902(a).

Description. On March 11, 2005, the licensee posted the Unit 2 Train B HPSI room as a high radiation area while radiation levels in the room were elevated due to a planned reactor coolant system crud burst. The room is normally posted as a radiation area at the door since there are several accessible areas in the room in which an individual

could receive a dose in excess of 5 millirem in 1 hour at 30 centimeters from the radiation source. On March 14, 2005, radiation protection (RP) personnel surveyed the room in order to downpost the room to a radiation area since radiation levels had decreased after clean-up of the crud burst. The surveys confirming the room was a radiation area had been completed when the inspectors approached the RP supervisor at the entrance of the controlled access area about entering the room. The RP supervisor instructed the RP technician to change the posting of the room to a radiation area posting and briefed the inspectors on the radiological conditions. The inspectors then proceeded to the room and discovered the room was not posted. The inspectors determined that the radiation area had not been posted when the high radiation area posting was removed.

Analysis. The inspectors determined that the licensee's failure to properly post a radiation area in accordance with a 10 CFR 20.1902(a) is a performance deficiency. The finding is more than minor because it is associated with the occupational radiation safety cornerstone objective of ensuring adequate protection of worker health and safety from exposure to radiation from radioactive material and affected the cornerstone attribute of program and process because the room was not posted as required due to personnel error. The inspectors determined that this finding affected the occupational radiation safety cornerstone and involved the potential for a worker's unplanned or unintended dose resulting from an inadequate radiological posting. When processed through Appendix C, "Occupational Radiation Safety Significance Determination Process," of Manual Chapter 0609, "Significance Determination Process," the finding was determined to be of very low safety significance because the finding did not involve as low as is reasonably achievable planning or work controls, no individual received an overexposure or a substantial potential for overexposure, and the ability to assess dose was not compromised. This finding had human performance crosscutting aspects in the area of personnel that involved a radiological protection technician's inattention to detail when downposting a high radiation area.

Enforcement. 10 CFR 20.1902(a) requires the licensee to post each radiation area with a conspicuous sign or signs. Contrary to this, on March 14, 2005, the licensee did not post a radiation area to alert workers of radiological conditions in the Unit 2 Train B HPSI room. Because the failure to post a radiation area was of very low safety significance and has been entered into the CAP as CR ANO-2-2005-0551, this violation is being treated as a noncited violation, consistent with Section VI.A of the NRC Enforcement Policy: NCV 05000368/2005002-01, "Failure to Post a Radiation Area."

1R22 Surveillance Testing (71111.22)

a. Inspection Scope

The inspectors reviewed the Updated Final Safety Analysis Report, procedure requirements, and Technical Specifications to ensure that the five below listed surveillance activities demonstrated that the SSC's tested were capable of performing their intended safety functions. The inspectors either witnessed or reviewed test data to verify that the following significant surveillance test attributes were adequate: (1) preconditioning; (2) evaluation of testing impact on the plant; (3) acceptance criteria; (4) test equipment; (5) procedures; (6) jumper/lifted lead controls; (7) test data;

(8) testing frequency and method demonstrated Technical Specification operability; (9) test equipment removal; (10) restoration of plant systems; (11) fulfillment of ASME Code requirements; (12) updating of performance indicator data; (13) engineering evaluations, root causes, and bases for returning tested SSCs not meeting the test acceptance criteria were correct; (14) reference setting data; and (15) annunciators and alarms setpoints. The inspectors also verified that the licensee identified and implemented any needed corrective actions associated with the surveillance testing.

- January 18, 2005, Unit 1 reactor coolant system leak detection
- January 26, 2005, Unit 1 service water flow test
- February 23, 2005, Unit 2 Containment Spray Pump 2P-35A quarterly surveillance test (inservice test)
- March 21, 2005, Unit 2 Containment Sump Isolation Valve 2CV-5650-2 quarterly surveillance test (inservice test)
- March 21, 2005, Unit 1 Service Water Pump P-4C quarterly surveillance test (inservice test)

The inspectors completed five samples.

b. Findings

No findings of significance were identified.

1R23 Temporary Plant Modifications (71111.23)

a. Inspection Scope

The inspectors reviewed the Updated Final Safety Analysis Report, plant drawings, procedure requirements, and Technical Specifications to ensure that the below listed temporary modification was properly implemented. The inspectors (1) verified that the modification did not have an affect on system operability/availability, (2) verified that the installation was consistent with the modification documents, (3) ensured that the postinstallation test results were satisfactory and that the impact of the temporary modification on permanently installed SSC's were supported by the test, (4) verified that the modifications were identified on control room drawings and that appropriate identification tags were placed on the affected drawings, and (5) verified that appropriate safety evaluations were completed. The inspectors verified that the licensee identified and implemented any needed corrective actions associated with temporary modifications.

- February 8, 2005, Unit 1 Reactor Coolant Pump Seal Injection Flow Control Valve CV-1207

The inspectors completed one sample.

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4OA2 Identification and Resolution of Problems (71152)

.1 Daily Reviews

a. Inspection Scope

The inspectors performed a daily review of all condition reports entered into the licensee corrective action program during this inspection period to identify repetitive failures and human performance issues. These daily reviews also assessed licensee identification of issues at the appropriate threshold and entry of these issues into their corrective action program.

b. Findings

No findings of significance were identified.

4OA3 Event Followup (71153)

.1 (Closed) Licensee Event Report 05000313/2003001-00, Automatic Actuation of the Reactor Protection System and Actuation of the EFW System Caused by a Lightning-Induced Closure of the Main Turbine Governor Valves

a. Inspection Scope

The inspectors reviewed the licensee event report and corrective action document CR ANO-1-2003-0916 to verify the cause of the August 29, 2003, Unit 1 reactor trip and that corrective actions taken were reasonable. The reactor trip was caused by a lightning-induced electro-hydraulic control system malfunction. The inspectors reviewed plant parameters, station logs, and verified that licensee staff properly implemented the appropriate plant procedures and that plant equipment performed as required. The inspectors also reviewed the cause of the sequence of events dating back to the original procurement of the two-speed motor actuator for Main Feedwater Valve CV-2675 and associated operational experience.

b. Findings

Introduction. A self-revealing Green finding was identified for an inadequate maintenance procedure which did not include vendor recommended maintenance for the Unit 1 main feedwater block valve.

Description. On August 29, 2003, the licensee experienced a reactor trip from the automatic actuation of the reactor protection system due to high reactor coolant system pressure. The high system pressure was caused by the inadvertent closure of the main

turbine governor valves due to a lightning-induced electro-hydraulic control system malfunction. As a normal response to this reactor trip, the main feedwater block valves received close signals from the integrated control system (ICS). However, the main feedwater block valve for Steam Generator B Main Feedwater Valve CV-2675 only closed to about 93 percent resulting in erratic control of feedwater flow. As a result, the setpoint for the EFW initiation and control (EFIC) system was reached and EFW flow was initiated. Following a reactor trip, ICS operates to control level in the steam generators; but in this instance, since the main feedwater block valve failed to fully close and the operators allowed the level to reach the EFW initiation setpoint, three systems were operating to control level: (1) ICS, (2) EFIC, and (3) rapid feedwater reduction. Had EFIC or the rapid feedwater reduction systems failed to operate as designed, an overfeed condition could have resulted. This condition existed for approximately 2 hours as both main and EFW pumps were providing water to the steam generators.

The failure of the Main Feedwater Block Valve CV-2675 to fully close was due to a loose connection inside the two-speed clutch housing to a capacitor on the fast speed closing coil. The loose connection caused two diodes in the bridge rectifier to short when the valve switched from fast speed to slow speed. As a result, the slow speed clutch could not engage and the valve failed at the 93 percent closed position.

The valve manufacturer recommended, as part of normal routine maintenance, to verify all electrical connections tight. While the licensee did have wording to this effect in preventative maintenance Procedure 1412.001, “Preventative Maintenance of Limitorque SB/SMB Motor Operators,” the motors for the main feedwater block valves were unique. They had two stages, high and low speed, with electrical connections inside the clutch housing. The preventative maintenance procedure did not have any steps, notes, precautions, etc., to make the person performing the preventative maintenance aware of the connections inside the clutch housing. As a result of this unique condition for these valves, the procedure was not adequate to perform the recommended checks.

Analysis. The inspectors determined that the licensee’s failure to perform vendor recommended maintenance is a performance deficiency. This finding is more than minor because it affected the initiating events cornerstone objective of limiting the likelihood of those events that upset plant stability and challenge critical safety functions and affected the cornerstone attribute of procedural quality because an inadequate maintenance procedure increased the probability of a steam generator overfeed event. Using the Phase 1 worksheets in Manual Chapter 0609, “Significance Determination Process,” the issue was determined to have very low safety significance because EFW initiation and control and rapid feedwater reduction systems both performed as designed and no steam generator overfeed event occurred. This finding had cross cutting aspects of human performance in the area of resources, in that, the maintenance procedure did not have technically accurate usable steps for this type of actuator since the procedure did not reference the connections in the clutch housing.

Enforcement. No violation of regulatory requirements occurred. The inspectors determined that the finding did not represent a noncompliance because it occurred on nonsafety secondary plant equipment. Licensee personnel entered this issue into the

CAP as CR ANO-1-2003-0916. FIN 05000313/2005002-02, “Inadequate Maintenance Procedure for the Main Feedwater Block Valve Motor Actuator.”

4OA4 Cross Cutting Aspects of Findings

Cross-Reference to Human Performance Findings Documented Elsewhere

Personnel

Section 1R20 describes a finding associated with radiological protection personnel not paying attention to detail when downposting a high radiation area.

Resources

Section 4OA3 describes a condition, in the area of resources, where the maintenance procedure did not have technically accurate usable steps for the main feedwater block valve actuator since the procedure did not reference the connections in the clutch housing.

4OA5 Other Activities

.1 (Closed) AV 05000368/2004005-04, Two Examples of a Failure to Conduct Postmaintenance Testing Associated with a Containment Cooler Fan

The inspectors completed the significance determination for the two examples of this apparent violation documented in NRC Inspection Report 05000313/2004005 and 05000368/2004005. The failure to perform postmaintenance testing on safety-related equipment was considered to be a performance deficiency. This finding was more than minor because it affected the mitigating systems cornerstone objective of ensuring the availability of systems which respond to initiating events and affected the cornerstone attribute of procedure quality because the failure to include testing requirements in the procedure led to the fan’s inoperability. The Phase 1 worksheets in Manual Chapter 0609, “Significance Determination Process,” were used to conclude that a Phase 2 analysis was required since both the mitigating systems and barrier integrity cornerstones and were degraded. The Phase 2 analysis was performed using Appendix A, “Technical Basis For At Power Significance Determination Process,” of Manual Chapter 0609, “Significance Determination Process,” and the Phase 2 worksheets from “Risk-Informed Inspection Notebook for Arkansas Nuclear One - Unit 2.” The inspectors assumed that the duration of the inoperability of the containment fan cooler was 11 months and 25 days and that operations personnel would not be able to recover the containment cooler. Inspectors also assumed that both coolers in the train which included Containment Cooling Fan 2VSF-1B were inoperable throughout the 11 month, 25 days exposure time. The most limiting core damage sequences involved a loss of AC or DC busses, a failure of EFW, and a failure of containment spray recirculation. Specifically, the small break loss of coolant accident and stuck open relief valve sequences were most limiting. A review of the Phase 2 analysis and performance of a Phase 3 analysis by a regional senior reactor analyst determined the finding to be of very low safety significance because only Containment

Cooler 2VSF-1B was inoperable. Details of the Phase 3 analysis are included as Attachment 2 to this report.

The inspectors determined that the failure to perform an adequate postmaintenance test following the performance of Procedure OP 2307.22, "Unit 2 Containment Penetration Conductor Over Current Protective Device Inspection," did not meet the requirements of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings." The example involving postmaintenance testing following the maintenance on the containment fan cooler flow switch was not a violation of NRC requirements in that the switch was not safety-related. Because of the very low safety significance of this finding and because the licensee included this condition in their CAP as CR ANO-2-2004-1688, this violation is being treated as an NCV, consistent with Section VI.A of the NRC Enforcement Policy: NCV 05000368/2005002-03, "Failure to Conduct Postmaintenance Testing for a Containment Cooler Fan."

.2 (Closed) AV 05000368/2004005-05, Containment Cooler Fan Inoperable in Excess of Technical Specification Allowed Outage Time

The inspectors completed the significance determination of this apparent violation documented in NRC Inspection Report 05000313/2004005 and 05000368/2004005. Operation of Unit 2 with Containment Cooling Fan 2VSF-1B in an inoperable condition was considered to be a performance deficiency since it was reasonably within the licensee's ability to diagnose and correct this condition. This finding was more than minor because it affected the mitigating systems cornerstone objective of ensuring the availability of systems which respond to initiating events and affected the cornerstone attribute of configuration control because not all required operating equipment was available. The Phase 1 worksheets in Manual Chapter 0609, "Significance Determination Process," were used to conclude that a Phase 2 analysis was required since both the mitigating systems and barrier integrity cornerstones were degraded. As a result, the inspectors performed a Phase 2 analysis using Appendix A, "Technical Basis For At Power Significance Determination Process," of Manual Chapter 0609, "Significance Determination Process," and the Phase 2 worksheets from "Risk-Informed Inspection Notebook for Arkansas Nuclear One - Unit 2." The inspectors assumed that the duration of the inoperability of the containment fan cooler was 11 months and 25 days and that operations personnel would not be able to recover the containment cooler. Inspectors also assumed that both coolers in the train which included Containment Cooling Fan 2VSF-1B were inoperable throughout the 11 month, 25 days exposure time. The most limiting core damage sequences were involved a loss of AC or DC busses, a failure of EFW, and a failure of containment spray recirculation. Specifically, the small break loss of coolant accident and stuck open relief valve sequences were most limiting. A review of the Phase 2 analysis and performance of a Phase 3 analysis by a regional senior reactor analyst determined the finding to be of very low safety significance because only Containment Cooler 2VSF-1B was inoperable. Details of the Phase 3 analysis are included as Attachment 2 to this report.

The inspectors determined that the improper wiring of Containment Cooling Fan 2VSF-1B resulted in Technical Specification 3.6.2.3, "Containment Cooling Systems," not being met for more than 11 months. Because of the very low safety significance of this finding and because the licensee included this condition in their CAP

as CR ANO-2-2004-1688, this violation is being treated as an NCV, consistent with Section VI.A of the NRC Enforcement Policy: NCV 05000368/2005002-04, "Containment Cooler Fan Inoperable in Excess of Technical Specification Allowed Outage Time."

4OA6 Meetings, Including Exit

The resident inspectors presented the inspection results to Mr. C. Eubanks, General Manager, Plant Operations, and other members of the licensee's management staff on March 25, 2005. The licensee acknowledged the findings presented. The inspectors noted that while proprietary information was reviewed, none would be included in this report.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

B. Berryman, Manager, Planning and Scheduling
J. Browning, Manager, Unit 2 Outage
R. Carter, Assistant Operations Manager, Unit 2
S. Cotton, Manager, Training
J. Eichenberger, Manager, Corrective Actions and Assessments
C. Eubanks, General Manager, Plant Operations
J. Forbes, Vice President, Arkansas Nuclear One
A. Heflin, Manager, Operations, Unit 2
G. Hines, Maintenance Rule Coordinator
J. Hoffpauir, Manager, Maintenance
R. Holeyfield, Manager, Emergency Planning
W. James, Manager, Alloy 600 Project
D. James, Acting Director, Nuclear Safety Assurance
J. Keys, Acting Manager, Operations, Unit 1
J. Kowalewski, Director, Engineering
J. Miller, Manager, Systems Engineering
D. Moore, Superintendent, Radiation Protection
K. Nichols, Manager, Design Engineering
R. Partridge, Manager, Technical Support
S. Pyle, Licensing Specialist
C. Reasoner, Manager, Engineering Programs and Components
C. Stout, Superintendent, Instrumentation and Controls Maintenance
C. Tyrone, Manager, Quality Assurance

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000368/2005002-01	NCV	Failure To Post a Radiation Area (Section 1R20)
05000313/2005002-02	FIN	Inadequate Maintenance Procedure for the Main Feedwater Block Valve Motor Actuator (Section 4OA3)
05000368/2005002-03	NCV	Failure to Conduct Postmaintenance Testing for a Containment Cooler Fan (Section 4OA5)
05000368/2005002-04	NCV	Containment Cooler Fan Inoperable in Excess of Technical Specification Allowed Outage Time (Section 4OA5)

Closed

05000313/2003001-00	LER	Reactor Trip due to Automatic Actuation of the Reactor Protection System on High Reactor Coolant System Pressure and Actuation of the EFW System Resulting from a Lightning-Induced Closure of the Main Turbine Governor Valves (Section 4OA3)
05000368/2004005-04	AV	Two Examples of Failure to Conduct Postmaintenance Testing Associated with a Containment Cooler Fan (Section 4OA5)
05000368/2004005-05	AV	Containment Cooler Fan Inoperable in Excess of Technical Specification Allowed Outage Time (Section 4OA5)

Discussed

None

LIST OF DOCUMENTS REVIEWED

In addition to the documents called out in the inspection report, the following documents were selected and reviewed by the inspectors to accomplish the objectives and scope of the inspection and to support any findings:

Section 1R01: Adverse Weather Protection

Procedures

1104.039, "Plant Heating and Cold Weather Operations," Revision 16
2106.032, "Unit 2 Freeze Protection Guide," Revision 10

Plant Drawings

M—209, Sheet 1, Revision 105
M—209, Sheet 2, Revision 40
M—209, Sheet 3, Revision 6
M—209, Sheet 4, Revision 14
M—210, Sheet 1, Revision 140
M—212, Sheet 2, Revision 58
M—219, Sheet 1, Revision 77
M—2210, Sheet 1, Revision 84
M—2210, Sheet 2, Revision 79
M—2210, Sheet 3, Revision 86
M—2210, Sheet 4, Revision 4

Section 1R04: Equipment Alignment

Procedures

1015.008, "Unit 2 Shutdown Cooling Control," Revision 18
1104.036, "Emergency Diesel Generator Operation," Revision 42
2104.004, "Shutdown Cooling System," Revision 29
2203.029, "Loss of Shutdown Cooling," Revision 11

Plant Drawings

M—217, Sheet 1, Revision 88
M—217, Sheet 2, Revision 40
M—217, Sheet 3, Revision 22
M—217, Sheet 4, Revision 8

Miscellaneous

ANO Commitments to Generic Letter 88-17
Calculation 92-E-0078-08, “LPSI Pump NPSH Calculation,” Revision 1
ULD-1-SYS-04, “Low Pressure Safety Injection and Shutdown Cooling System,” Revision 3
ULD-0-TOP-09, “Loss of Decay Heat Removal Topical,” Revision 1

Condition Reports

ANO-2-2002-0792
ANO-2-2003-0858
ANO-2-2004-1401
ANO-2-2004-1891
ANO-2-2005-0056
ANO-2-2005-0116
ANO-2-2005-0264

Section 1R05: Fire Protection

Plant Documents

Fire Hazards Analysis, Revision 9

Plant Drawings

FP-102, Sheet 1, Revision 29
FP-2102, Sheet 1, Revision 31
FP-2103, Sheet 1, Revision 26
FP-2106, Sheet 1, Revision 13

Section 1R11: Licensed Operator Requalification Program

Dynamic Exam Scenario ES-1-008, Revision 3

Section 1R12: Maintenance Effectiveness

Condition Reports

ANO-1-1996-0135
ANO-2-2003-0700
ANO-2-2004-0696
ANO-2-2004-0712
ANO-2-2004-1660
ANO-2-2004-1661
ANO-2-2004-1674
ANO-2-2004-1754
ANO-2-2004-1766
ANO-2-2004-1856
ANO-2-2004-1865
ANO-2-2004-1868
ANO-2-2004-1973
ANO-2-2004-1993
ANO-2-2005-0001
ANO-2-2005-0373
ANO-2-2005-0374
ANO-2-2005-0386

ANO-2-2005-0395
ANO-2-2005-0396
ANO-2-2005-0587
ANO-2-2005-0616
ANO-2-2005-0619
ANO-2-2005-0628
ANO-2-2005-0629

Engineering Request

ER-010143

Miscellaneous

Entergy White Paper on Maintenance Rule EOP Significance
Maintenance Rule Database, Unit 2 Containment Spray System
Maintenance Rule Database, Unit 2 Reactor Building

Plant Procedures

2202.002, “Reactor Trip Recovery,” Revision 4
2202.003, “Loss of Coolant Accident,” Revision 6
2204.004, “Steam Generator Tube Rupture,” Revision 6
2304.086, “Unit 2 Main Steam Radiation Monitor Calibration,” Revision 10
COPD024, “Risk Assessment Guidelines,” Revision 14
COPD027, “Emergent Issue Checklist,” Revision 2

Regulatory Guide

1.16, “Monitoring the Effectiveness of Maintenance at Nuclear Power Plants”

Work Order/Request

00052297-01
50571959-01
50571959-02

Section 1R13: Maintenance Risk Assessments and Emergent Work Control

Condition Reports

ANO-2-2005-0344
ANO-2-2005-0373
ANO-2-2005-0374
ANO-2-2005-0386

Procedures

2203.038, “Primary to Secondary Leakage,” Revision 7
Arkansas Nuclear One Shutdown Operations Protection Plan, February 2, 2005

COPD024, “Risk Assessment Guidelines,” Revision 14

COPD027, “Emergent Issue Checklist,” Revision 2

Miscellaneous

Unit 2 Night Orders, “”A” SG N–16 Leakage”

Unit 2 Operations Decision Making Instruction, “”A” Steam Generator Primary-to-Secondary Leakage”

Section 1R14: Operator Performance During Nonroutine Plant Evolutions and Events

Procedures

1102.016, “Power Reduction and Plant Shutdown,” Revision 3
2203.038, “Primary to Secondary Leakage,” Revision 7

Miscellaneous

Unit 2 Night Orders, “'A' SG N–16 Leakage”

Unit 2 Operations Decision Making Instruction, “'A' Steam Generator Primary-to-Secondary Leakage”

Section1R15: Operability Evaluations

Condition Reports

ANO-1-2005-0050
ANO-1-2005-0213
ANO-1-2005-0239
ANO-2-2005-0066
ANO-2-2005-0760

Section 1R16: Operability Work-Arounds

Condition Reports

ANO-1-2004-0432
ANO-1-2004-0466
ANO-C-2004-0740

Procedure

2104.004, “Shutdown Cooling System,” Revision 29

Miscellaneous

Nonoutage Operator Work Arounds Database
Active Unit 2 Operator Work Arounds Database

Section 1R19: Postmaintenance Testing

Condition Reports

ANO-1-2004-2505
ANO-1-2004-2528
ANO-1-2005-0040
ANO-2-2004-1879

Procedures

1104.036, “Emergency Diesel Generator Operation,” Revision 42
2304.016, “Unit 2 Gaseous Process Radiation Monitoring System Calibration,” Revision 17
2304.016, “Unit 2 Process Radiation Monitoring Monthly Test,” Revision 15

Work Orders/Request

00054262-01
00057434-02

Section 1R22: Surveillance Testing

Condition Reports

ANO-1-2004-1589
ANO-1-2004-2076
ANO-1-2004-2480
ANO-1-2005-0150
ANO-C-2002-0828
ANO-C-2004-2274

Engineering Calculation

88-E-0100-23

Plant Documents

ULD-1-SYS-10, “ANO-1 Service Water Systems,” Revision 11

Procedures

1103.013, “RCS Leak Detection,” Revision 20
1104.029, “Service Water and Auxiliary Cooling System,” Revision 5
1412.083, “Rotork Valves and Valvops Inspection and Lubrication,” Revision 56
1304.181, “Unit 1 RCS Radiation Leak Detection System Quarterly Test,” Revision 8
1309.013, “Unit 1 Service Water Flow Test,” Revisions 11 and 13

Work Order/Requests

50571959-01
50984950-01

Section 1R23: Temporary Plant Modifications

Engineering Request

ANO-2005-0017-000

Section 4OA3: Event Followup

Condition Reports

ANO-1-2003-0913
ANO-1-2003-0916

Miscellaneous

Maintenance Rule Database, Unit 1 Feedwater System
Post Transient Review, Unit 1 Reactor Trip, August 29, 2003
Problem Identification Tracking Work Sheet, Unit 1 Reactor Trip, August 29, 2003
Model Work Order 50239971

Procedures

1403.038, "Maintenance of Limitorque SB and SMB Actuators," Revision 14
1412.001, "Preventative Maintenance of Limitorque SB/SMB Motor Operators," Revision 13
Preventative Maintenance Engineering Evaluation, "Limitorque Motor Operators," Revision 17

LIST OF ACRONYMS

ANO	Arkansas Nuclear One
CAP	corrective action program
CFR	Code of Federal Regulations
EDG	emergency diesel generator
EFIC	emergency feedwater initiation and control
EFW	emergency feedwater
HPSI	high pressure safety injection
ICS	integrated control system
RP	radiation protection
RTP	rated thermal power
SSC	structure, system and component

ATTACHMENT 2

PHASE 3 EVALUATION
INOPERABLE CONTAINMENT COOLING FAN 2VSF-1B
ARKANSAS NUCLEAR ONE, UNIT 2

I. Performance Deficiency

Licensee electricians reversed power supply breaker leads for Containment Cooling Fan 2VSF-1B during maintenance. Postmaintenance testing was inadequate and did not identify that the fan was rotating in the reverse direction.

II. Background

The containment cooling system consists of two groups, with two containment cooling units per group. One group consists of Containment Cooling Fans 2VSF-1A and 2VSF-1B while the other group consists of Containment Cooling Fans 2VSF-1C and 2VSF-1D. On a containment cooling actuation signal, bypass dampers open which allow postaccident air intake to bypass the normally operating chilled water coils and allow air cooling by the safety-related service water coils. One containment spray loop, in conjunction with two containment cooling units, is sufficient for postaccident containment cooling.

On October 3, 2003, the power supply breaker for Containment Cooling Fan 2VSF-1B was incorrectly installed following inspection and testing. Motor leads were reversed which caused the motor to rotate in the reverse direction. Postmaintenance testing did not verify correct rotation. With the fan rotating in the reverse direction, and with the associated backdraft damper closed, no airflow and no cooling capability were provided by Containment Cooling Fan 2VSF-1B. The fan was discovered to be rotating in the reverse direction on September 29, 2004, and was restored to operable status later that day.

III. Initial Characterization of Risk

In accordance with NRC Inspection Manual Chapter 0612, Section 05.03, “Screen for Minor Issues,” the inspectors reviewed the sample minor findings in Appendix E, “Examples of Minor Issues.” This performance deficiency was similar to Example 5.b because Containment Cooling Fan 2VSF-1B was returned to service in an inoperable condition.

The inspectors evaluated the issue using the SDP Phase 1 screening worksheet for the Initiating Events, Mitigating Systems, and Barrier Cornerstones provided in NRC Inspection Manual Chapter 0609, Appendix A, Significance Determination of Reactor Inspection Findings for At-Power Situations.” The screening indicated that a Phase 2 estimation was required because the performance deficiency was assumed to degrade two cornerstones. Specifically, at ANO-2, containment cooling capability is credited for long-term core decay heat removal (Mitigating Systems Cornerstone) and to maintain containment pressure less than design (Barriers Cornerstone) following an accident.

In accordance with NRC Inspection Manual 0609, Appendix A, Attachment 1, “User Guidance for Determining the Significance of Reactor Inspection Findings for At-Power

Situations," the inspectors evaluated the subject finding using the Risk-Informed Inspection Notebook for ANO-2, Revision 1. The following assumptions were made:

1. The Containment Cooling Unit 2VSF-1B would fail to start on demand because the fan was rotating in the reverse direction when operating.

2. The exposure time for the condition was 361 days.

3. The fan was nonrecoverable because operators were unable to diagnose that the fan was operating in the reverse direction.

Table 2 of the risk-informed notebook requires that all initiating event scenarios with the exception of LSW be evaluated when a performance deficiency affects the containment cooling system. The dominant sequences from the notebook were as follows:

Initiating Event	Sequence	Mitigating Functions	Results
Transient with Loss of Power Conversion System	4	EFW-CSR	9
Small-Break LOCA	3	CSR	6
Medium-Break LOCA	2	CSR	7
Stuck-Open Relief Valve	2	CSR	6
Large-Break LOCA	4	CSR	8
Loss of Offsite Power with Failure of EAC	2	SOSV-CSR	9
	6	EFW-CSR	8
Loss of DC Bus 2D02	5	EFW-CSR	8
Loss of Nuclear Side of CCW	5	RCPTRIP-CSR	9

Using the counting rule worksheet, this finding was estimated to be WHITE. However, the notebook also identified in a footnote to Table 1 that benchmarking results indicated that the SDP notebook would overestimate by one color the result for a failed train of containment cooling compared to the licensee's probabilistic safety assessment result. A Phase 3 evaluation was performed to confirm this result.

IV. Phase 3 Analysis

Internal Initiating Events

Assumptions

The results from the notebook estimation were compared with an evaluation developed using a standardized plant analysis risk (SPAR) model simulation of the failure of Containment Cooling Fan 2VSF-1B. The analyst also reviewed an assessment performed by the licensee's probabilistic risk assessment staff (Mike Lloyd). The SPAR runs were based on the following analyst assumptions:

1. The SPAR model, Revision 3.11, was used to assess the significance of this finding. This model, including the component test and maintenance basic events, represents an appropriate tool for evaluating the finding.

2. The analyst assumed that common cause could not be excluded from consideration because the same performance deficiency could have potentially caused the other containment cooler breakers to have been incorrectly installed.

3. Because of Assumption 2, Basic Event CCS-XHE-XR-FAN1B (operator fails to restore CFC 1B Following Test and Maintenance) was not an acceptable choice for modeling this finding. This basic event had no impact on common cause failure probability for the containment fan coolers.

4. Setting Basic Event CCS-FAN-FS-FAN1B (Containment Fan Cooler 1B fails to start) to TRUE was an acceptable means of modeling this finding. This resulted in satisfied logic for Gate CCS-B (Containment Fan Cooler 2VSF-1B is unavailable) and provided input to the common cause failure term.

5. The condition existed from October 3, 2003, through September 29, 2004. Therefore, an exposure time of 361 days was used.

6. The analyst assumed the containment cooling fan was not recoverable. This was because the fan had been in returned to service operating in the reverse direction for the entire exposure period without being discovered operating improperly. It is considered not likely that the condition would have been diagnosed after an accident. Corrective actions would have required breaker maintenance.

Analysis

As stated in Assumption 4, Basic Event CCS-FAN-FS-FAN1B was set to the house event “TRUE.” This prevented the fan from being credited as a functional containment cooling system component in the 2/4 success logic for containment fan coolers in the containment cooling system fault tree.

The analyst performed a SPAR model condition assessment using GEM to calculate the change in core damage frequency over the exposure period (361 days as stated in Assumption 5). The delta-CDF from internal initiators was 4.5E-8 over the exposure period.

The analyst noted that the SDP Phase 2 benchmark report identified that the notebook overestimated by one color a finding involving an entire train of the containment cooling system. Given that the subject finding only involved one of the two units in a containment cooling train, and based on the order of magnitude approximation of the Phase 2 process, the analyst determined that the Phase 2 result was corroborated by the Phase 3 evaluation.

External Events

The plant-specific SDP worksheets do not currently include initiating events related to fire, flooding, severe weather, seismic, or other external initiating events. In accordance with Manual Chapter 0609, Appendix A, Attachment 1, Step 2.5, "Screening for the Potential Risk Contribution Due to External Initiating Events," experience with using the Site Specific Risk-Informed Inspection Notebooks has indicated that accounting for external initiators could result in increasing the risk significance attributed to an inspection finding by as much as one order of magnitude. The analyst determined that an evaluation of external risk would not be required because the result of the Phase 3 indicated that the risk was less than 1×10^{-7}. Therefore, an increase in the risk by an order of magnitude would not result in the significance of the finding crossing the 1×10^{-6} threshold.

Risk Contribution from Large Early Release Frequency

In accordance with Manual Chapter 0609, Appendix A, Attachment 1, Step 2.6, "Screening for the Potential Risk Contribution Due to LERF," the analyst determined that the finding was not significant from a large early release frequency perspective and no further evaluation was necessary because the Phase 3 result provided a risk significance estimation of less than 1×10^{-7}.

V. Licensee Risk Assessment

The analyst noted that both the licensee's and the analyst's results indicated that the finding was of very low risk significance. The results were within a factor of 2 of each other.

VI. Conclusion

The performance deficiency resulted in a finding that was of very low risk significance (Green).

VII. References

ANO-2 SPAR model, Revision 3.11
ANO-2 System Training Manual STM 2-9, "Containment Cooling and Purge Systems"
Licensee Event Report 050368/2004-002
Condition Report CR-ANO-2-2004-1688
"Informal Calculation of Risk Impact of 2VSF-1B OOS," Revision 1, October 11, 2004