

APPENDIX B

U. S. NUCLEAR REGULATORY COMMISSION
REGION IV

Inspection Report: 50-313/88-25
50-368/88-25

Licenses: DPR-51
NPF-6

Dockets: 50-313
50-368

Licensee: Arkansas Power & Light Company
P. O. Box 551
Little Rock, Arkansas 72203

Facility Name: Arkansas Nuclear One (ANO), Units 1 and 2

Inspection At: ANO Site, Russellville, Arkansas

Inspection Conducted: August 1-September 15, 1988

Inspectors:

W. D. Johnson
W. D. Johnson, Senior Resident Reactor
Inspector

9/22/88
Date

R. C. Haag
R. C. Haag, Resident Reactor Inspector

9/22/88
Date

James H. Miltner
J. D. Gilbert, Reactor Inspector

10/13/88
Date

Approved:

D. D. Chamberlain
D. D. Chamberlain, Chief, Reactor Project
Section A, Division of Reactor Projects

10/12/88
Date

Inspection Summary

Inspection Conducted August 1 through September 15, 1988 (Report 50-313/88-25)

Areas Inspected: Routine, unannounced inspection including followup of events, maintenance, followup on previously identified items, operational safety verification, surveillance, and Part 21 reports.

Results: Within the six areas inspected, one violation was identified (control of components, paragraph 3).

Inspection Conducted August 1 through September 15, 1988 (Report 50-368/88-25)

Areas Inspected: Routine, unannounced inspection including followup of event, maintenance, followup on previously identified items, operational safety verification, surveillance, control of possible moderator dilution events, and Part 21 reports.

Results: Within the seven areas inspected, one violation was identified (failure to calibrate a torque wrench attachment, paragraph 4).

DETAILS1. Persons Contacted

- *J. Levine, Executive Director, ANO Site Operations
- *B. Baker, Modifications Manager
- E. Bickel, Health Physics Superintendent
- M. Bolanis, Health Physics Specialist
- B. Converse, Operations Assessment Superintendent
- A. Cox, Unit 1 Operations Superintendent
- E. Ewing, General Manager, Plant Support
- M. Frala, Nuclear Chemistry Supervisor
- J. Garrett, Materials Management Superintendent
- H. Greene, Quality Assurance Superintendent
- L. Gulick, Unit 2 Operations Superintendent
- *D. Howard, Licensing Manager
- *L. Humphrey, General Manager Nuclear Quality
- G. Kendrick, I&C Maintenance Superintendent
- *R. Lane, Engineering Manager
- D. Lomax, Plant Licensing Supervisor
- A. McGregor, Engineering Services Supervisor
- *J. McWilliams, Maintenance Manager
- B. Michalk, Mechanical Engineer
- *P. Michalk, Licensing Engineer
- V. Pettus, Mechanical Maintenance Superintendent
- D. Provencher, Quality Assurance Supervisor
- S. Quennoz, General Manager
- C. Shively, Plant Engineer Superintendent
- G. Storey, Industrial Safety Coordinator
- C. Taylor, Unit 2 Operations Technical Support Supervisor
- L. Taylor, Special Projects Coordinator
- *J. Vandergrift, Operations Manager
- *R. Wewers, Work Control Center Manager
- C. Zimmerman, Unit 1 Operations Technical Support Supervisor

*Present at exit interview.

The NRC inspectors also contacted other plant personnel, including operators, technicians, and administrative personnel.

2. Plant Status (Units 1 and 2)

Unit 1 operated at near 85 percent power at the beginning of the month of August then gradually reduced power to 69 percent on August 29, 1988. The unit was then shut down for the start of the 8th refueling outage. Unit 2 was manually tripped from 100 percent power on August 1, 1988, due to a failure of a pressure sensing line for a reactor coolant pump seal. Following repair and modifications of lines connecting to the reactor coolant pump seals, Unit 2 reached 100 percent power on August 19, 1988, and continued to operate at 100 percent for the remainder of the inspection period.

3. Followup of Events (93702) (Unit 1)

- a. On August 29, 1988, the licensee tagged out a portion of the decay heat removal system in order to repair the relief valve on the discharge line from the Train A decay heat removal pump. After system realignment on August 30, 1988, decay heat system flow could not be achieved through Control Valve CV-1428. On August 31, 1988, CV-1428 was disassembled for inspection. The NRC inspector observed a portion of this work performed under Job Order 765137. This inspection did not identify any failure which could restrict flow through the valve. A licensee review found the following:

- Manual Valve DH-3A was found shut. This valve is in series with CV-1428.
- DH-3A had been inadvertently shut on August 29 while the system was being aligned for relief valve repairs. This valve was not listed on the hold card record sheet, and no hold card was attached to the valve.
- DH-3A had not been opened during system alignment following relief valve repairs on August 30.

Section 6.6 of Procedure 1000.27, "Hold and Caution Card Control," covers hold card installation. Step 6.6.2 states, "Verify the component by label as being the component which is specified on the Hold Card." The unauthorized closing of Valve DH-3A while installing hold cards on the decay heat removal system is an apparent violation of this procedure. (313/8825-01) This was not a violation of Technical Specifications because the plant was not in an operational condition where Train A of decay heat removal was required.

The NRC inspector expressed concern to the licensee that operations personnel did not carefully check decay heat removal system alignment prior to requesting maintenance on Valve CV-1428. During review of this event, the NRC inspector found that the licensee's method of controlling locked valves had a weakness. Licensee procedures include requirements for obtaining shift supervisor approval and for documenting position changes for locked valves. These requirements have not been implemented during periods when the unit was in a cold shutdown or refueling shutdown condition. The licensee's response to the above violation should address control of locked valves in the decay heat removal system during cold and refueling shutdown conditions.

- b. On September 5, 1988, the decay heat removal system was inadvertently isolated. This was caused by inadvertent closure of one of the motor operated valves in the suction line to the decay heat removal pumps from the reactor coolant system. Valve CV-1410 closed during performance of Procedure 1304.53, "ESAS Analog Channel No. 2 Calibration." In addition to calibration of an engineered safety

features actuation system channel, this procedure calibrates the setpoint for closure of a decay heat removal system isolation valve (CV-1410) and calibrates the related pressure transmitter and pressure indicator (PT-1041 and PI-1041). In order to prevent inadvertent closure of CV-1410 during the calibrations, Step 6.2 of Procedure 1304.53 requires the power supply breaker for CV-1410 to be open with a hold card attached. The licensee failed to comply with this procedural requirement; and during performance of Step 7.7 of the procedure, CV-1410 closed. The valve remained operable and was reopened in about 12 minutes. This is a second example of the licensee's failure to follow procedures concerning control of components. (313/8825-01)

- c. The NRC inspector performed a followup review of the event at ANO-2 which occurred on August 1, 1988. The event was determined to have been caused by a failure of a reactor coolant pump seal pressure sensing line and subsequent degradation of the reactor coolant pump shaft seals. The licensee determined that the failure of the 3/8-inch stainless steel tubing sensing line was caused by fatigue. The failure history for reactor coolant pumps indicated that pumps A and B have had failures in the 3/8-inch tubing down stream of the second isolation valve while pump C has had failures in the 3/4-inch pipe welds between the two isolation valves. On the basis of a review of the failure history and design analysis, the licensee selected various areas for liquid penetrant examination to assure the integrity of other similar reactor coolant pump seal piping and tubing. The licensee performed design reviews and engineering analyses to eliminate the fatigue failure in the pipe welds and tubing. The licensee, in a conference call with NRC on August 5, 1988, committed to implementing design changes which would eliminate the fatigue failure in the reactor coolant pump seal piping and tubing prior to taking the plant critical.

On September 8, 1988, the licensee issued Licensee Event Report 368/88-011-u0. This LER described the event in detail. It also discussed the root cause evaluation and described the repairs and modifications which were implemented prior to plant startup.

4. Monthly Maintenance Observation (62703) (Units 1 and 2)

Station maintenance activities for the safety-related systems and components listed below were observed to ascertain that they were conducted in accordance with approved procedures, Regulatory Guides, and industry codes or standards; and in conformance with the Technical Specifications.

The following items were considered during this review: the limiting conditions for operation were met while components or systems were removed from service; approvals were obtained prior to initiating the work; activities were accomplished using approved procedures and were inspected as applicable; functional testing and/or calibrations were performed prior

to returning components or systems to service; quality control records were maintained; activities were accomplished by qualified personnel; parts and materials used were properly certified; radiological controls were implemented; and fire prevention controls were implemented.

Work requests were reviewed to determine the status of outstanding jobs and to ensure that priority is assigned to safety-related equipment maintenance which may affect system performance.

The following maintenance activities were observed:

- . Inspection of Unit 1 emergency diesel generator (Job Order 761574, Procedure 1402.66)
- . Inspection of decay heat removal cooler outlet Valve CV-1428 (Job Order 765137)
- . Disassembly of turbine driven emergency feedwater pump for installation of mechanical seals (Job Order 759543)
- . Preventive maintenance on the operator for a service water discharge crossover valve (CV-3640) (Job Order 764721)
- . Replacement of an emergency diesel generator fuel oil line. A defect in the fuel line had been corrected by silver brazing; however, that repair was considered temporary. (Job Order 763593)
- . Replacement of Valve SW-610 (service water discharge valve for Makeup Pump P-36C lube oil cooler). While troubleshooting the high lube oil temperature for P-36C, the licensee discovered partially restricted flow in the service water discharge from the lube oil cooler. The initial investigation for the cause of restricted flow revealed that the disc was separated from the valve stem but did not identify the failure mechanism. The licensee is continuing to investigate the cause of disc and stem separation and the resident inspectors will followup on licensee corrective actions during future inspections.
- . Troubleshooting Radiation Monitor RE-2400, reactor building air sample monitor for reactor coolant leakage (Procedure 1304.027, Job Order 763759)
- . Replacement of the upper motor bearing for Service Water Pump 2P-4C (Procedures 2402.34 and 2403.04, Job Orders 765647 and 765460). The NRC inspector reviewed Technical Manuals G080-1710, "General Electric Vertical Induction Motors," and F091-010, "Fairbanks-Morse Vertical Shaft Deep Well Turbine Pumps," to verify that the licensee's procedures contained the required instructions recommended by the vendors.
- . Eddy current testing in Steam Generator A

- . Installation of tubing for emergency feedwater pump Pressure Transmitter PT-2804 and Pressure Indicator Switch PDIS-2804. Design Change Package 86-1006.
- . Troubleshooting the electrical supply disconnects for service water Pump 2P-4B (Job Order 717504 and 717361)
- . Repair of the body to cap leakage for boric acid makeup pump discharge Check Valve 2CVC-41B (Job Order 742669). During repairs the licensee discovered the body to cap gasket had not been installed. Condition Report 2-88-138 was written to address the missing gasket and determine the root cause. The licensee has not completed the condition report evaluation. The NRC inspector observed reassembly of the valve and the use of a torque adapter (crow's foot) when torquing two of the six cap fasteners. When questioned by the NRC inspector concerning calibrations, the mechanic stated the torque wrench was calibrated; however, the crow's foot was not included in the calibration. Nor had the indicated torque been adjusted to compensate for the increase in applied torque when using the crow's foot.

Procedure 1405.011, "Bolting and Torquing Guidelines," provides requirements for the selection and use of wrenching devices. Specifically, paragraph 8.4.2.A.2 requires the indicated torque to be adjusted in accordance with Attachment 4 when torque multipliers or adapters that extend the point of applied torque are used. Also, paragraph 8.4.4.C requires a torque wrench to be calibrated while attached to any adapters or extenders that will be used during torquing. Failure to adjust the indicated torque when using a torque adapter or to include the torque adapter with the torque wrench during calibration is an apparent violation. (368/8825-01)

When reviewing Procedure 1405.011, the NRC inspector questioned the accuracy of Step 8.4.2.A.3. This step allows the use of universal joints during torquing applications and requires the correction of applied torque per Attachment 4. This attachment addresses the use of torque multipliers and adapters that provide a mechanical advantage such that the applied torque is greater than indicated torque. The attachment does not provide sufficient instructions for adjusting the applied torque when using a universal joint. The licensee is reviewing this issue.

5. Followup on Previously Identified Items (92701, 92702) (Units 1 and 2)

- a. (Closed) Violations 368/8627-02 and 368/8615-08: Control of scaffold erection near safety-related equipment.

The NRC inspector reviewed Revision 28 of Procedure 1000.24, "Control of Maintenance." This procedure implemented controls on scaffold erection. These controls appear to be adequate to prevent recurrence of the violation. These items are closed.

- b. (Closed) Violation 368/8623-01: Failure to obey radiological posting.

The NRC inspector reviewed the licensee's corrective actions following this violation and found them to be appropriate. It was concluded that this violation represented an isolated case. During this review, the NRC inspector expressed concern that there was no logging and tracking system for Radiological Safety Infraction/Condition (RSIC) Reports. Procedure 1000.25 was subsequently revised in July 1988. This procedure requires RSIC Reports to be assigned a unique serial number and to be logged and tracked by health physics personnel. This item is closed.

- c. (Closed) Open Item 368/8736-01: Root cause determination of overspeed trip of Emergency Feedwater Pump 2P7A turbine.

The licensee determined that the root cause of the turbine overspeed trip was inconsistent performance of the overspeed trip mechanism. The governor tappet of the trip mechanism was bent due to excessive thread length, causing inconsistent tripping of the turbine. Since correction of the tappet length, the licensee has been recording and reviewing the peak turbine speed during the quarterly surveillance tests. Three surveillance tests have been completed with consistent peak speed and no overspeed trips. This item is closed.

- d. (Closed) Unresolved Item 313/8429-02; 368/8429-02: Establishment of a program for verification of operations procedures and associated piping and instrumentation drawings (P&IDs).

In response to Unresolved Item 313/8501-01 and Deviation 313/8810-01, the licensee has committed to perform reviews of P&IDs to identify discrepancies. In addition, the licensee has established a process such that P&IDs are updated when procedural valve lineups are revised. These items are closed.

- e. (Closed) Open Item 313/8636-01: Review of test results for reactor coolant system pressure test.

The NRC inspector reviewed the test records for the reactor coolant system hydrostatic test that was performed subsequent to the repair on a high pressure injection nozzle. The test was performed in accordance with the ASME B&PV Code with acceptable results. This item is closed.

- f. (Closed) Violation 313/8732-04; 368/8732-02. Failure to incorporate correction factors into procedures for monitoring leakage across pressure interface check valves.

The plant preheatup and precritical checklist procedures (1102.01 and 2101.01) were revised to include the pressure adjustment criteria for surveillance testing of the RCS/LPSI interface check valves. The

NRC inspector reviewed the procedures and verified that the pressure adjustment requirements specified in the Order For Modification of License were included. These items are closed.

6. Operational Safety Verification (71707, 71709, 71710 and 71881) (Units 1 and 2)

The NRC inspectors observed control room operations, reviewed applicable logs, and conducted discussions with control room operators. The NRC inspectors verified the operability of selected emergency systems, reviewed tag-out records and verified proper return to service of affected components, and ensured that maintenance requests had been initiated for equipment in need of maintenance. The NRC inspectors made spot checks to verify that the physical security plan was being implemented in accordance with the station security plan. The NRC inspectors verified implementation of radiation protection controls during observation of plant activities.

The NRC inspectors toured accessible areas of the units to observe plant equipment conditions, including potential fire hazards, fluid leaks, and excessive vibration. The NRC inspectors also observed plant housekeeping and cleanliness conditions during the tours.

The NRC inspectors walked down the accessible portions of the Unit 1 emergency feedwater system to verify operability. The walkdown was conducted using Attachment A, "Emergency Feedwater Manual Valve Lineup," to Procedure 1106.06, "Emergency Feedwater Pump Operation." Drawings reviewed during the preparation and conduct of the walkdown included M-204, Sheets 3 and 5, and M-212, Sheets 1 and 2. While no system misalignments were identified, the NRC inspectors identified the following minor discrepancies to the licensee for corrective action:

- . One valve, CS-2804C, listed on the lineup sheet does not exist. Licensee personnel had noted this discrepancy, and it was scheduled for correction during the next procedure revision.
- . Several cases were noted in which drawings did not correctly identify the locked status of manual valves. The licensee is in the process of removing locked status information from piping and instrumentation drawings.
- . Brass fittings were attached to Valve CS-2802B, a manual pressure point isolation valve. The purpose of these fittings was not clear, and they were removed by licensee personnel.
- . The valve lineup listed Valve FW-68A as FW-68. Licensee representatives stated that this discrepancy will be corrected in the next procedure revision.
- . Valves CS-288 and CS-289 provide isolation for condensate storage tank level transmitters. Both valves are required to be open.

CS-288 was found to be 20 percent open and CS-289 was found to be 80 percent open. Upon notification, licensee operators confirmed the reported valve positions and fully opened both valves. Although these valves need not be fully open for proper operation of their associated level transmitters, they normally have been maintained fully open. Licensee personnel were unable to determine why these valves were not fully open.

- . Insulation was missing from Valve CS-289. Job Request 810190 was prepared for installation of insulation.
- . Drawing M-204, Sheet 3, contained an incorrect reference to M-212, Sheet 1, Location H1. This was corrected prior to the end of the inspection.
- . Drawing M-212, Sheet 2, indicated Valve CS-19 as normally throttled. This should be changed to normally open.

These reviews and observations were conducted to verify that facility operations were in conformance with the requirements established under Technical Specifications, 10 CFR, and administrative procedures.

No violations or deviations were identified.

7. Monthly Surveillance Observation (61726) (Units 1 and 2)

The NRC inspector observed the Technical Specification required surveillance testing on the various components listed below and verified that testing was performed in accordance with adequate procedures, that test instrumentation was calibrated, that limiting conditions for operation were met, that removal and restoration of the affected components were accomplished, that test results conformed with Technical Specifications and procedure requirements, that test results were reviewed by personnel other than the individual directing the test, and that any deficiencies identified during the testing were properly reviewed and resolved by appropriate management personnel.

The NRC inspector witnessed portions of the following test activities:

- . Monthly test of Emergency Diesel Generator K4A (Procedure 1104.36, Supplement 1)
- . Postmaintenance test of Unit 2 emergency diesel generator (Procedure 2104.36, Supplement 2)
- . Calibration of Unit 1 reactor protection system Channel A (Job Order 761681)
- . Calibration of Unit 1 reactor protection system Channel C (Procedure 1304.43)

- . Accuracy check on voltage and amperage meters on Control Panel C-10 (Job Order 782486)
- . Diesel fire pump test (Procedure 1104.32, Supplement 1)
- . Process radiation monitoring system test (Job Order 765617, Procedure 2304.16)
- . Month'y test of Unit 1 reactor protection system Channel A (Procedure 1304.37, Job Order 761959)
- . Monthly test of Unit 2 reactor protection system Channel A (Procedure 2304.37, Job Order 761967). The NRC inspector identified the wording of Step 8.15.10 as incorrect. The step required the test voltage to be raised until a low refueling water tank level pretrip occurs. The test voltage must be lowered until a pretrip occurs. The licensee was notified and it was verified that the other three channel procedures had the correct wording. This procedure error appeared isolated and it had no effect on the performance of the surveillance test. The licensee is revising the affected procedure to provide the correct instructions.
- . Quarterly surveillance inspection of Diesel Fire Pump Engine K-5 (Procedure 1306.27, Job Order 762741)
- . Month'y test of Unit 1 area radiation monitors (Procedure 1304.095, Job Order 763129)
- . Monthly test of Containment Spray Pump 2P-35B (Procedure 2104.05, Supplement 2)
- . Monthly test of High Pressure Safety Injection Pump 2P-89B (Procedure 2104.39, Supplement 2)
- . Monthly test of Unit 2 Emergency Diesel Generator 2K4B (Procedure 2104.36, Supplement II). The NRC inspector observed the monthly test on August 9, 1988, and September 8, 1988. The August 9 test was the second attempt of the monthly surveillance. On August 8, 1988, a fire occurred at the south exhaust header and the diesel generator was shut down. During the following test on August 9, no fires were observed and the surveillance was completed satisfactorily. During the September 8 test a fire occurred at the north exhaust header. The operator promptly extinguished the fire and the remainder of the surveillance was completed. The fires were a result of oil leakage at exhaust header joints and the subsequent ignition of the oil. The licensee has made recent modifications on exhaust header joints in response to recurring fires; however, the header joints which had the two recent fires had not been modified. The licensee has issued two conditions reports for corrective action investigation. Additional investigation and corrective action by the licensee are needed to correct the exhaust header fires. The

resident inspectors will continue to monitor the monthly surveillance testing of the emergency diesel generators and licensee actions taken to solve this problem.

No violations or deviations were identified.

8. Verification of Changes Made to Comply with PWR Moderator Dilution Requirements (Temporary Instruction 2515/94) (Unit 2)

The NRC inspector reviewed the licensee's response concerning the analysis of the potential for, and the consequences of, a boron dilution accident for Unit 2. During the licensee's analyses to identify and evaluate the potential for possible boron dilution events, no postulated dilution scenarios were identified that would continue until reactor criticality. On the basis of this review, the licensee determined no procedure changes were required.

In the safety evaluation for Unit 2, Cycle 2 reload, the NRC staff addressed the inadvertent boron dilution event for all modes of operation. The staff's position was that a positive means for alerting the operator to a boron dilution event in progress should be installed as soon as practical. In response, the licensee proposed the addition of audible control room alarms on count rate from the startup range neutron detectors. Each alarm was to be placed on independent channels and be equipped with a variable setpoint to allow alarm adjustment to account for existing plant conditions. The NRC inspector reviewed the installed boron dilution monitors and verified compliance with criteria in the safety evaluation and with commitments stated by the licensee.

No violations or deviations were identified.

9. Part 21 Reports (90714) (Units 1 and 2)

The NRC inspector reviewed records pertaining to the licensee's evaluation of 10 CFR Part 21 reports. Copies of these reports had been provided to the licensee as documented in NRC Inspection Reports 50-313/87-30; 50-368/87-30 and 50-313/87-38; 50-368/87-38. The NRC inspector found that the licensee had reviewed each report for applicability and had taken action when appropriate. The licensee's evaluation of three of the reports was not complete at the time of the inspection. The following Part 21 reports, listed by NRC Region IV tracking numbers, are considered closed:

86-002	87-011	87-035
86-003	87-016	87-036
86-009	87-019	87-038
86-013	87-020	87-042
87-002	87-025	87-044
87-003	87-028	87-046
87-004	87-029	87-051
87-005	87-030	87-055

87-006
87-007

87-031

87-065

No violations or deviations were identified. The licensee's operations assessment group had implemented an effective system for performance of Plant Impact Reviews and Plant Impact Evaluations for Part 21 reports and for tracking any resultant action assignments.

10. Exit Interview

The NRC inspectors met with Mr. J. M. Levine, Director, Site Nuclear Operations, and other members of the AP&L staff at the end of the inspection. At this meeting, the inspectors summarized the scope of the inspection and the findings.