

APPENDIX B

U. S. NUCLEAR REGULATORY COMMISSION
REGION IV

Inspection Report: 50-313/88-01
50-368/88-01

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: January 20 through February 21, 1988

Inspectors:

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

2/25/88
Date

W.D. Johnson for
C. C. Harbuck, Resident Reactor Inspector

2/25/88
Date

Approved:

R. E. Farrell for
J. I. Tapia, Acting Chief, Reactor Project
Section A, Division of Reactor Projects

3/4/88
Date

Inspection Summary

Inspection Conducted January 20 through February 21, 1988 (Report 50-313/88-01)

Areas Inspected: Routine, unannounced inspection including operational safety verification, maintenance, surveillance, followup on a previously identified item, followup on TMI Action Item II.K.3.5, and followup on generic letters.

Results: Within the six areas inspected, no violations or deviations were identified.

Inspection Conducted January 20 through February 21, 1988 (Report 50-368/88-01)

Areas Inspected: Routine, unannounced inspection of operational safety verification, maintenance, surveillance, followup on TMI Action Item II.K.3.5, and followup on generic letters.

Results: Within the five areas inspected, one apparent violation was identified (excessive combustibles in diesel generator room, paragraph 3).

DETAILS1. Persons Contacted

- J. Levine, Executive Director, ANO Site Operations
- P. Baker, Plant Modifications Manager
- A. Cox, Unit 1 Operations Superintendent
- E. Ewing, General Manager Technical Support
- B. Garrison, Operations Technical Support
- J. GoBell, Mechanical Maintenance Engineer
- L. Gulick, Unit 2 Operations Superintendent
- C. Halbert, Engineering Supervisor
- D. Harrison, Engineer
- H. Hollis, Security Superintendent
- *D. Howard, Licensing Manager
- L. Humphrey, General Manager Nuclear Quality
- *R. Lane, Engineering Manager
- *D. Lomax, Plant Licensing Supervisor
- A. McGregor, Engineering Services Supervisor
- *J. McWilliams, Maintenance Manager
- *P. Michalk, Licensing Engineer
- V. Pettus, Mechanical Maintenance Superintendent
- *D. Provencher, Quality Assurance Supervisor
- *S. Quennoz, General Manager, Plant Operations
- R. Rispoli, Fire Protection Engineer
- P. Rogers, Special Projects Coordinator
- S. Strasner, Quality Control Engineer
- C. Taylor, Unit 2 Operations Technical Support Supervisor
- L. Taylor, Special Projects Coordinator
- J. Taylor-Brown, Quality Control Superintendent
- *J. Vandergrift, Operations Manager
- *D. Williams, Engineer
- C. Zimmerman, Unit 1 Operations Technical Support Supervisor

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

*Denotes those present during the exit interview.

2. Followup on Generic Letter 87-12 (Units 1 and 2)

This generic letter was issued on July 9, 1987, and is entitled, Loss of Residual Heat Removal (RHR) While The Reactor Coolant System (RCS) is Partially Filled. Pursuant to 10 CFR 50.54(f), the NRC requested the licensees to provide information to assess conformance of pressurized water reactors with their licensing basis and to determine whether additional NRC action is necessary.

The licensee provided responses for ANO-1 and ANO-2 by letters dated September 18, 1987. The letter serial numbers were 1CAN098708 and

2CAN098707. The NRC inspector reviewed these responses and the referenced procedures to determine whether they provided the requested information and to assess the accuracy of the information. A detailed technical review of these responses will be performed by the NRC Office of Nuclear Reactor Regulation.

The following procedures were reviewed by the NRC inspector:

Unit 1

<u>Number</u>	<u>Revision</u>	<u>Title</u>
1203.12I	22	Annunciator K10 Corrective Action
1203.12J	23	Annunciator K11 Corrective Action
1203.12K	20	Annunciator K12 Corrective Action
1015.02	6	Decay Heat Removal and LTOP System Control
1103.11	8	Draining and N ₂ Blanketing of the RCS
1203.28	3	Loss of Decay Heat Removal System
1203.30	4	Loss of Service Water
1104.04	36	Decay Heat Removal Operating Procedure

Unit 2

2203.12D	16	Annunciator 2K04 Corrective Action
2203.12E	15	Annunciator 2K05 Corrective Action
2203.12F	17	Annunciator 2K06 Corrective Action
2203.12G	14	Annunciator 2K07 Corrective Action
1015.08	2	Unit 2 Shutdown Cooling System Maintenance Control
2103.11	9	Draining the Reactor Coolant System
2203.29	1 Chg 1	Loss of Shutdown Cooling
2203.22	2	Loss of Service Water
2104.04	11	Shutdown Cooling System
1015.03B	14	Unit 2 Operations Logs (Mode 5)

The NRC inspector's review of the licensee's responses and the referenced procedures resulted in the following concerns:

- a. The generic letter included Enclosure 1, containing insight gained from evaluation of industry experience in loss of RHR events. The generic letter stated that the licensees' responses should encompass the topics contained in Enclosure 1. The licensee's responses did not encompass all of these topics.
- b. Unit 1 has no alarm to indicate low service water system pressure.
- c. Unit 1 Procedure 1103.11 did not include a requirement for a cross check between the tygon tube level, pressurizer level, and hot leg level during RCS draining. This procedure contained no requirement to suspend draining if level indication was erratic.

- d. Unit 1 Procedure 1203.12I for Annunciator K10-D1 did not address the possibility of water hammer in the decay heat removal heat exchanger when restoring service water to service by starting the standby pump. This procedure did not refer to Procedure 1203.30, Loss of Service Water.
- e. Unit 1 Procedure 1203.12J had a printing error on its index page. The annunciator window letter designations were omitted.
- f. Unit 2 Procedure 2203.12F for Annunciator 2K06-H5, "Service Water Through Shutdown Cooling Heat Exchanger Flow High/Low," refers to Procedure 2203.29, "Loss of Shutdown Cooling." It also includes a note to reference the Technical Specifications (TS) for operability requirements for shutdown cooling. These references may not be appropriate since this alarm will only be present if a recirculation actuation signal is present along with low service water flow. The corresponding procedure for the other train (2203.12E for Annunciator 2K05-J5) did not include these references.
- g. The response to Item 3 of the generic letter for Unit 2 stated that RCS inventory can be replenished by draining the refueling water tank without the use of pumps. This method was not described in Procedure 2203.29.
- h. The Unit 1 response to Item 5 of the generic letter includes a discussion of Procedure 1203.28. The response indicates that the methods described in response to Item 3 to inject RCS inventory are described in the procedure. One of the methods described in the response to Item 3, RCS inventory replenishment by draining the core flood tanks, is not described in the procedure.
- i. Item 2 of the generic letter requested a description of alarms provided for controlling the plant during operation with the RCS partially filled. The licensee's response for Unit 2 included an alarm for high or low service water flow through a shutdown cooling heat exchanger. This does not appear to be an appropriate alarm for the conditions of interest. This annunciator contains logic which requires the presence of a recirculation actuation signal together with high or low service water flow in order to alarm. This annunciator was apparently intended to provide an alarm to indicate a service water flow problem following a loss of coolant accident which led to recirculation actuation.
- j. Unit 2 had no alarm for low shutdown cooling system flow and no indication in the control room of RCS loop water level which could be used during partially drained operations. The licensee informed the NRC inspector that Design Change Package (DCP) 86-2093 will install a low shutdown cooling flow alarm and that DCP 86-2034 will install refueling RCS level instrumentation. Both of these DCPs are

scheduled to be installed during the current refueling outage. The licensee response to Generic Letter 87-12 did not mention these pending design changes.

Although the NRC inspector did not perform a detailed technical review of the responses to this generic letter, he concluded that the responses were inadequate and incomplete. The responses failed to address all of the concerns in the generic letter. The responses did not address the need to isolate containment in a loss of RHR situation as required by Item 5 of the generic letter. The responses did not address the contributing factors discussed in Enclosure 1 of the generic letter, even though some of the factors are directly applicable to ANO.

Revised and improved responses to Generic Letter 87-15 will be required. It is important that the issue receive a complete evaluation. The licensee should coordinate their revised responses with the NRC Office of Nuclear Reactor Regulation.

Generic Letter 87-12 remains open.

3. Operational Safety Verification (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 tagout records, 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. The 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 2 low pressure safety injection system to verify operability. The walkdown was conducted using the current revision of Procedure 2104.40, Attachment A, and Drawings M-2236 and M-2232. The system was aligned properly and no material deficiencies affecting operability were noted.

During a tour of the Unit 1 lower south piping penetration room the NRC inspector noted the following:

- Pipe support HBB-3-H3 for the reactor building cooling unit service water return line upstream of containment isolation control valve CV-3812 had a warped baseplate. The licensee was informed and determined through calculations that the baseplate was structurally adequate. As-built calculations for this support could not be located.

The area beneath the spiral staircase was in need of housekeeping attention. The licensee was informed.

During a plant tour on February 16, 1988, the NRC inspector observed a large box of cloth rags and several rubber hoses in the Unit 2 north diesel generator room. The estimated quantity of these combustibles was in excess of 50 pounds. This room was unoccupied by licensee personnel at the time of the observation, but maintenance was being conducted in the adjacent south diesel generator room. The presence of these combustibles in the north diesel generator room is an apparent violation of Procedure 1000.47, Control of Combustibles (368/8801-01). This procedure imposes a 5-pound limit for ordinary combustibles in the north diesel generator room. The licensee promptly removed the combustibles from the room after being notified.

These reviews and observations were conducted to verify that facility operations were in conformance with the requirements established under TS, the Code of Federal Regulations, and licensee administrative procedures.

4. Monthly Surveillance Observation (Units 1 and 2)

The NRC inspector observed the TS required surveillance testing on Emergency Feedwater Pump P7B (Procedure 2106.06, Supplement I) and verified that testing was performed in accordance with adequate procedures, test instrumentation was calibrated, limiting conditions for operation were met, removal and restoration of the affected components were accomplished, test results conformed with TS and procedure requirements, test results were reviewed by personnel other than the individual directing the test, and any deficiencies identified during the testing were properly reviewed and resolved by appropriate management personnel.

The NRC inspector also witnessed portions of the following test activities:

- . Annual test of Emergency Feedwater Pump 2P7A (Procedure 2106.09, Supplement I). The NRC inspector noted that the pump speed was adequately controlled to prevent an overspeed trip upon stopping flow to each steam generator. This was part of the concern of Open Item 368/8736-01.
- . Monthly test of Low Pressure Safety Injection Pump 2P60A (Procedure 2104.40, Supplement 1)
- . Monthly test of High Pressure Safety Injection Pump 2P89C (Procedure 2305.11)
- . Main steam code relief valve test for Valves 2PSV-1004 (Job Order 748612), 2PSV-1005 (Job Order 748613), and 2PSV-1053 (Job Order 748616) (Procedure 2306.006). The testing was performed using an air-set device in accordance with procedure. All the valves were

either within or slightly above their set point range. Adjustments were made as needed to leave the valves set properly. Valve PSV-1004 experienced trouble reseating completely. The licensee stated this problem would be corrected prior to startup following the refueling outage. It was noted that following the main steam system hydrostatic test all Unit 2 safety valves would be tested and set properly prior to plant start up. The testing monitored was primarily for data collection for the licensee's ongoing investigation into past code safety valve set point drift problems.

Reactor Protection System Channel A Test (Procedure 1304.037). During this test the NRC inspector verified proper control of electrical jumpers.

Calibration of Hydrogen Sampler C178. During this calibration, the NRC inspector verified proper installation of hold cards.

Monthly test of emergency diesel generators (Procedures 1104.36, Supplement II, and 2104.36, Supplement 2)

Monthly test of reactor building ventilation system (Procedure 1104.33, Supplement 7)

18-month surveillance test of emergency diesel generator (Procedure 2306.05, Job Order 748558). This test included preventive maintenance inspections on the diesel engine by mechanical maintenance personnel.

No violations or deviations were identified.

5. Monthly Maintenance Observation (Units 1 and 2)

Station maintenance activities for safety-related systems and components listed below were observed in order to ascertain whether they were conducted in accordance with approved procedures, regulatory guides, and industry codes or standards and in conformance with TS.

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 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:

- . Local leak rate tests (LLRT) of containment sump post-accident sample system manual containment isolation valves SS-542 and SS-543 (Procedure 1304.23 and Plant Engineering Action Request 88-0201). These tests were performed to verify containment integrity while Isolation Valve SV-1440 was turned around and suitable connections were installed to permit LLRTs of SV-1440 and SV-1443.
- . Corrective maintenance to identify which pressurizer level transmitter was malfunctioning. The difference between the pressurizer level indications was greater than allowed by TS (Procedure 1304.22, Job Order 739883) Under this same job order, the NRC inspector observed bench testing of the replacement pressure transmitter.
- . 10-year inservice inspection hydrostatic test of Boric Acid Makeup Tank 2T6B (Special Work Plan 2409.98, Job Order 747395)
- . Repair of Service Water Isolation Valve CV-3810, to Makeup Pump Bearing Cooler E39C and Room Unit Cooler VUC-7C (Job Order 749675). Isolation for the repair was established using a liquid nitrogen freeze seal. Work Plan 1409.103, Freeze Seal On 3-Inch Carbon Steel Service Water Pipe, was reviewed and appeared adequate to control the work. The engineering evaluation required appropriate nondestructive examination of the pipe affected by the freeze seal following the valve repair. No damage to the pipe was subsequently identified. The valve disc had corroded off the valve stem and fallen into the valve body blocking flow. The valve was cleaned out and the disc was replaced.

Because of the failure CV-3810, the licensee subsequently inspected the corresponding valves for the other two makeup pumps, CV-3808 and CV-3809. These valves had been designated for inspection the previous refueling outage (1R7) but were delayed due to a lack of spare parts for the associated Rotork actuators. During the present cycle they have been deenergized and locked open.

The NRC inspector determined that two additional valves had been dispositioned the same way. These were valves CV-3801 and CV-3803. They isolate the service water to the 'A' train spray and decay heat vault. This was discussed with the licensee and plans were made to inspect these valves in the near future.

All five of these valves and the adjacent piping are scheduled to be replaced with stainless steel valves and piping during the next refueling outage.

- . Change filters in 2F11 and 2F11A (Job Order 748412). The NRC inspector verified health physics procedures were properly implemented during this activity.

- . Emergency diesel generator preventive maintenance (Procedure 2304.07, Job Order 748628). This was a refueling outage frequency inspection and cleaning of electrical equipment associated with the emergency diesel generator.
- . Disabling of low speed function of Main Feedwater Block Valve CV-2626 (Temporary Modification 88-1-004)
- . Post-maintenance test of Charging Pump 2P36A (Job Order 750244). This job replaced a broken connecting rod between the cam shaft and a plunger in the crank case. After running the pump a few minutes a loud mechanical pounding noise was heard and the pump was stopped. The initial investigation that followed failed to determine a specific cause. Subsequently the pump was slated for more indepth investigation and repair during the current refueling and outage.

No violations or deviations were identified.

6. Followup on TMI Action Item II.K.3.5 (Units 1 and 2)

This item was entitled Automatic Trip of Reactor Coolant Pumps. The NRC Office of Nuclear Reactor Regulation issued Generic Letters 86-05 and 86-06. These generic letters addressed this issue and included safety evaluations. Generic Letter 86-05 concluded that the information provided by the B&W Owners Group in support of the loss-of-subcooling margin reactor coolant pump trip criteria was acceptable. Generic Letter 86-06 concluded that the information provided by the CE Owners Group in support of the trip-two/leave-two staggered reactor coolant pump trip criteria was acceptable. These generic letters requested licensee written responses to address plant specific concerns.

The licensee responded to Generic Letter 86-05 for ANO-1 by letter dated August 25, 1986. The licensee responded to Generic Letter 86-06 for ANO-2 by letter dated November 24, 1986. The NRC inspector reviewed these responses and noted that they appeared to supply the requested information. These responses made reference to certain action items required by the plants' emergency operating procedures. The NRC inspector reviewed the applicable portions of the emergency operating procedures to verify the accuracy of the responses. No discrepancies were identified.

IE Bulletins 79-05C and 79-06C contained a long term action requirement that licensees propose and submit a design which will assure automatic tripping of the operating reactor coolant pumps under all circumstances in which this action may be needed. Generic Letters 86-05 and 86-06 superseded this requirement by approving the manual reactor coolant pump trip criteria proposed by the B&W and CE Owners Groups.

Generic Letters 86-05 and 86-06, IE Bulletins 79-05C and 79-06C, and TMI Action Item II.K.3.5 are closed for ANO-1 and ANO-2.

No violations or deviations were identified.

7. Followup on Previously Identified Items (Units 1 and 2)

(Open) Open Item 313/8713-02, Target Rock Solenoid Valve Applications.

The NRC inspector found that the licensee had not completed the review of this concern. However, an additional concern regarding these valves was noted during this inspection, and will be followed up as part of the review of this open item. Missing or loose fasteners on the limit switch covers for Target Rock solenoid valves have been recently noted as follows:

- *SV-7512 Post-accident containment atmosphere sample isolation valve (missing one screw)
- *2SV-5842 Post-accident reactor coolant sample containment isolation valve (missing three screws)
- *2SV-0205 Bypass control valve in steam supply to emergency feedwater pump turbine (missing two nuts)
- SV-2663 Bypass control valve in steam supply to emergency feedwater pump turbine (loose limit switch cover)

The licensee issued job orders to correct these deficiencies. The effect on operability, whether other such valves had similar deficiencies, and the root cause(s) remained to be determined. The NRC inspector informed the licensee that this concern should be included in their response to this open item.

*Identified by the NRC inspector.

8. Exit Interview

The NRC inspector met with Mr. S. M. Quennoz, General Manager, Plant Operations, and other members of the AP&L staff at the end of the inspection. At this meeting, the inspector summarized the scope of the inspection and the findings.