



UNITED STATES  
ATOMIC ENERGY COMMISSION

~~XXXXXXXXXXXXXXXXXXXX~~  
REGION II - SUITE 818  
230 PEACHTREE STREET, NORTHWEST  
ATLANTA, GEORGIA 30303

TELEPHONE: 404/526-4803

DIRECTORATE OF REGULATORY OPERATIONS

RO Inspection Report Nos. 50-313/72-11 and 50-368/72-7

Licensee: Arkansas Power and Light Company  
Sixth and Pine Streets  
Pine Bluff, Arkansas 71601

Facility Name: Arkansas Nuclear One, Units 1 and 2  
Docket Nos.: 50-313 and 50-368  
License Nos.: CPPR-57 and Pending  
Category: A3 and A1

Location: Russellville, Arkansas

Type of License: B&W, PWR-2568 Mwt, 880 Mwe  
Combustion, PWR-2910 Mwt, 990 Mwe

Type of Inspection: Routine, Unannounced

Dates of Inspection: October 25-27, 1972

Dates of Previous Inspection: August 29-31, 1972

Principal Inspector: V. L. Brownlee 12/8/72  
V. L. Brownlee, Reactor Inspector  
Facilities Construction Branch Date

Accompanying Inspector: B. J. Cochran 12/11/72  
B. J. Cochran, Reactor Inspector  
Facilities Construction Branch Date

C. R. McFarland 12/8/72  
C. R. McFarland, Reactor Inspector  
Facilities Construction Branch Date

8004140588

E. J. Vallish

E. J. Vallish, Reactor Inspector  
Facilities Construction Branch

12-8-72  
Date

Other Accompanying Personnel: None

Principal Inspector:

V. L. Brownlee

V. L. Brownlee, Reactor Inspector  
Facilities Construction Branch

12/8/72  
Date

Reviewed By:

W. A. Crossman

W. A. Crossman, Acting Senior Reactor Inspector  
Facilities Construction Branch

12-13-72  
Date

SUMMARY OF FINDINGS

I. Enforcement Action

A. Violations

None

B. Safety Items

None

II. Licensee Action on Previously Identified Enforcement Matters

A. Violations

None

B. Safety Items

None

III. Design Changes

None

IV. Unusual Occurrences

None

V. New Unresolved Items

- A. Paddle-Type Flow Switches - Unit 1. Refer to Report Details I, paragraph 6.
- B. B&W Safety Cabinets - Internal Panel Wiring - Unit 1. Refer to Report Details II, paragraph 3.
- C. Cable Installation in Control Room and Computer Room False Floor and Floor of Main Control Panels -- Unit 1. Refer to Report Details II, paragraph 2.

- D. Aluminum Instrumentation Housings Located Inside Containment - Unit 1. Refer to Report Details II, paragraph 4.
- E. Storage and Inspection Program for Installed or Stored In-Place Equipment - Unit 1. Refer to Report Details II, paragraph 5.
- F. G-E Reactor Trip Breakers - Unit 1. Refer to Report Details II, paragraph 6.
- G. Qualification of containment Instrumentation - Unit 1. Refer to Report Details II, paragraph 4.

VI. Status of Previously Reported Unresolved Items

None

VII. Management Interview

The inspectors met with Moore, Loth, and Sly, and apprised them of their general areas of inspection and findings:

A. Brownlee

1. Construction Status

Moore was asked for confirmation of the progress of construction, work summary, schedule of systems turnover as noted in Details I, paragraphs 2 and 3.

Moore stated that AP&L's forecast remains as stated.

2. Paddle-Type Flow Switches (Construction Experience Report 72-3)

The licensee was requested to determine if any such devices are used within the nuclear plant piping systems. Refer to Details I, paragraph 6.

The inspector was informed that this information would be made available during a subsequent inspection.

3. Valve Wall Thickness Verification (RO Letter dated June 30, 1972)

The licensee confirmed his previously stated position that AP&L did not propose to develop and implement a valve wall thickness verification program until the AEC defined the requirements with regard to AP&L's letters of response, July 28 and August 7, 1972. Refer to Details I, paragraph 7.

4. Follow-on Review of Document Control and Weld Material Control

The licensee was informed that follow-on inspection of these items revealed no areas of concern. Refer to Details I, paragraph 4 and 5.

5. Interim Field and Nonconformance Reports

No deficiencies were identified during this inspection. Refer to Details I, paragraph 8.

B. Cochran

1. Separations Criteria

Apparent Violation of the Separations Criteria in Internal Panel Wiring - The licensee agreed to request B&W to perform an engineering evaluation of all safety cabinets and advise AP&L of the recommended resolution. Refer to Report Details II, paragraph 3.

2. Cable Separation, Tray Loading and Quality of Workmanship

Cable installation under the control room and computer room false floors and on the floor of the main control panels is considered unacceptable for safety related circuits. The licensee has agreed to request Bechtel to investigate the problem areas. Refer to Report Details II, paragraph 2.

3. Use of Aluminum Housings Within Containment

Aluminum instrument housings on instruments located inside the containment building. The licensee stated that an inventory of all aluminum located inside the containment building had been taken and included in the FSAR. They agreed to review the listing to determine if the instrument housings were included in the inventory and if the aluminum was acceptable to Licensing. Refer to Report Details II, paragraph 4.

4. Equipment Storage and Inspection

Apparent Breakdown of QA Storage and Inspection Program for Installed or Stored In-Place Equipment - The licensee assured the inspector that the program was effective and would obtain the inspection records for the inspector's examination during subsequent inspections. Refer to Report Details II, paragraph 5.

5. Request for Additional Information

The inspector requested the licensee to obtain the following information for examination during the next inspection:

- a. Test data on the G-E reactor trip breakers (four).
- b. Confirm that the instruments located inside the containment building were designed to function following the Design Basis Accident (DBA).

C. McFarland

No specific action is required of the licensee resulting from the review of work relating to (1) the main steam block valves, (2) the pressurizer safety and relief valves, and (3) the main steam safety valve vents to atmosphere. Refer to Details III.

D. Vallish

No specific action is required of the licensee regarding examination of the reactor vessel and internals, the control rod drive motor tube extension defect analysis, the primary pumps and pressurizer installation, and the cleanliness QC requirements concerning mechanical components. There were no problem areas identified. Refer to Details IV.

The licensee acknowledged the comments.

DETAILS I

Prepared By: V.L. Brumlee 11/3/72

Date of Inspection: October 25-27, 1972

Reviewed By: Williamson 12/13/72

1. Persons Contacted

Arkansas Power and Light Company (AP&L)

N. A. Moore - Chief QA Coordinator  
A. C. Bland - QC Inspector (Civil)  
C. L. Bean - QC Inspector (Mechanical)  
E. Quattlebaum - QC Inspector (Electrical)  
G. H. Miller - Assistant Superintendent

Bechtel Engineering Corporation (Bechtel)

W. T. Stubblefield - Project Superintendent  
P. W. Sly - QC Engineer (Records)  
K. Higgins - QC Engineer (Mechanical)  
R. E. Allan - QA Engineer (Electrical)  
J. B. Loth - Project QA Engineer  
C. G. Beckham - QA Engineer (Mechanical)  
R. J. Glover - Startup Engineer  
E. Gwinn - Mechanical Engineer, Piping System Supports and Hangers  
D. Carter - QC Records Clerk

2. General

This report is a dual report for the AP&L, ANO-1 and 2 units.

Progress of construction: The following list provides the estimated percent physical construction complete total effort:



<u>Description</u>	<u>8/27/72</u>	<u>10/27/72</u>
Unit No. 1 (Total)	87	89
Piping Systems	88	92
Reactor Coolant	92	95
Core Flood	60	70
Decay Heat Removal	92	95
Makeup and Purification	70	80
Main Steam	87	85
Feedwater	92	93
Electrical (Total)	75	62
Raceway and Conduit	96	98
Switchboard and Shutdown Board Installation	95	93
Cable Pull	70	85
Cable Termination	50	75
Reactor Protection	35	70
Engineered Safety Features	35	70
Switchgear	96	99
Unit No. 2 (Total)	7	8
Total Effort Under Exemption	95	96

Bechtel personnel onsite for Unit No. 1 is 822 and 53 subcontractor personnel; Unit No. 2, 94 and 93 subcontractor personnel; total, 1062. AP&L personnel 92 and 5 QA personnel. Labor problems, none.

### 3. Work Summary and Schedule

#### A. Unit 1

Site efforts continue to be concentrated on piping and electrical systems installation. All major components have been set.

Electrical systems installation (cable pulling and termination) is progressing at full capacity.

Systems turnover appears to be progressing on somewhat of a slower pace than originally scheduled. The startup program is composed of eighty startup systems. Presently, twenty-nine systems have been completely turned over and eighteen have partial package turnover. Thirty-three startup systems remain fully in construction status. No preoperational testing has been completed on the partiality or completely turned over systems.



Evaluation of the status of systems turnover and preoperational testing program indicates that the scheduled fuel loading date of June 1973 may be highly optimistic.

B. Unit 2

Construction efforts on Unit 2 are concentrated on the turbine building area. Containment liner is at ground level. Liner leak chase installation has been completed and tested. Internal concrete placement has commenced. Containment wall first lift concrete has been placed. Auxiliary building construction is at ground level.

4. Document Control

Bechtel QC personnel have been responsive in correcting the lack of drawing control. The inspector reviewed the results of a 100% site drawing control audit. After discussion with AP&L/Bechtel QA/QC personnel and examination of audit results, RO concludes that we have no further questions regarding this item.

5. Weld Material Control

Site examination did not identify areas of concern regarding weld material control. Indications are that AP&L/Bechtel have increased their surveillance and control of weld material. RO has no further questions regarding this item.

6. Paddle-Type Flow Switches (Construction Experience Report 72-3, July 1972)

There was insufficient evidence onsite to assure that no paddle-type flow switches were used in the nuclear plant piping systems.

The inspector was informed that this information would be made available during a subsequent inspection.

7. Valve Wall Thickness Verification (RO Letter dated June 30, 1972)

AP&L has submitted their letters of response, July 28 and August 7, 1972, to our letter of June 30, 1972. The letters identified the following exception to the AEC letter of June 30, 1972: No forged or cast valves less than 2-1/2 inches will be verified. Their letter of response has been forwarded to RO Headquarters for evaluation assistance.

AP&L does not propose to develop and implement a qualification program until AEC defines the requirements regarding their letter of exception.

8. Interim Field Report and Nonconformance Report

Interim Field Reports A001-A162, dated December 3, 1970 to July 2, 1971, were examined. Seven reports remain to be resolved. Bechtel has identified these reports and are presently attempting to close them out as soon as possible. A selective examination of nineteen reports was performed. The identified deficiencies, recommended corrective actions, disposition, and closeout actions are defined and records indicate traceability.

Nonconformance reports are serialized and filed by discipline. The following number of nonconformance reports have been written to date: Mechanical - 641, Electrical - 587, Civil - 336. A selective examination of fifteen reports was examined. The identified deficiencies, recommended corrective actions, disposition and closeout actions are defined and records indicate traceability.

Discussion with AP&L/Bechtel QA/QC personnel indicates that they are consciously attempting to maintain a nonconforming system that sufficiently addresses the problem, provides resolution, traceability and closeout of the problem.

No deficiencies were identified.

REPORT DETAILS II

Prepared By: W. Brunden for B.J. Coker 12/8/72

Date of Inspection: October 25-27, 1972

Reviewed By: W. C. ... 12/13/72

1. Persons Contacted

AP&L

A. Bland  
N. Moore  
D. Quattlebaum

Bechtel

A. Nispeling  
P. Sly  
J. Mobley

2. Control Room and Computer Room Wiring

The computer room and one section of the control room are equipped with false floors with approximately 18 inches of space between the floors, to provide bottom access to the electrical equipment cabinets. The cable routing design called for installation of cable in trays and conduit in the floor space. At the present time, the cable trays have been filled beyond their capacity and cables are run on the concrete floor and in all directions until it is a "birds nest" effect. The contractor representative reported that the construction engineer had questioned the design but had been told that Engineering said that the installation was all right and for them to continue to add cables to the already overcrowded areas.

The inspector advised the licensee's representative that the installation was not according to good electrical construction practice and RO would expect them to be prepared to audit all the cables in these areas to confirm that the safety channels separation criteria had not been violated nor had the installed cables been damaged by the installation.

3. Control Panel Wiring

Cables enter the main control panels through sleeves in the floor. Instead of grouping the cables and placing them in protective trays inside the panels, they are scattered over on the floor of the panel so the electricians stand and walk on the cables when working in the panels. During the inspection, the inspector called the licensee's attention to a worker with a ladder setting on the cable in one of the crowded aisle ways between the cabinets.

Inspection of engineered safeguards panels C-88, C-89 and C-90 revealed that wiring from three separate safety channels was run together in raceways inside the panels. The mixing of safety channel wiring within a raceway is in violation of the separations criteria. However, since this problem is similiar to a previously identified wiring problem in these panels and is being reviewed by B&W, the licensee agreed to request B&W to perform an engineering analysis of all safety panels for possible wiring violations.

4. Instrumentation Located in the Containment Building

The quality assurance records were unable to confirm the instruments located in the containment building were designed to operate following the DBA. Pressure transmitters manufactured by Bailey Meter Company, Fisher and Porter, Foxboro and Motorola are located inside the containment building to monitor reactor pressure, pressurizer level, safety injection tank pressure, and containment building pressure and are required to function for a finite period following the accident.

The licensee agreed to obtain certification that the instruments were designed for operation following the DBA or were tested for the hostile environment.

Further examination of the instruments installed in the containment revealed that the instrument housings were made from cast aluminum. This appears to be a violation of Licensing requirement restricting the use of aluminum in the containment building.

The licensee stated that an inventory of aluminum located in the containment building was made and documented in the FSAR; however, he was not sure whether the instruments in question were included in the inventory. He agreed to obtain this information and have it available for future RO inspections.

5. Installed Equipment Storage and Inspection Program

A detailed examination of QA records and conversations with Bechtel QC personnel indicated that they did not have an operating inspection program for inspection of equipment stored in place or installed but not in service. Examination of some of the scattered records indicated that some of the motors (decay heat removal pump motors) were meggered when they were received at the site in November 1971 and January 1972, but there were no records to indicate they had been inspected since that time.

The licensee and contractor were unable to provide documentation to show that motors are meggered and rotated on a periodic basis.

At the management interview, a contractor's representative assured the inspector that the records were available and he could produce them. He was at a loss why the inspector and the constructor QC people could not find them during the inspection. The inspector advised him that he would review the records during the next inspection.

6. Periodic Record Review

QA records for the emergency diesel generators, 125 volt a.c. vital bus, 124 volt d.c. station battery, scram trip breaker, engineered safeguards control circuits and control rod drive control circuits were inspected to confirm that installation records identified the essential information to confirm that the equipment and circuits had been installed in a quality manner and nonconforming material or incompleted tests were identified.

The licensee was requested to provide test data on the G-E reactor trip breakers.

The records indicated that the licensee did not have an operating inspection program for periodic inspection of installed equipment.

7. Periodic Observation of Work Performance

The inspection verified that the licensee/contractor was meeting his construction requirements by random sampling of QA records for the diesel generator, 125 volt a.c. vital bus system, 125 volt d.c. battery system, scram trip breaker, engineered safeguards circuitry and rod drive control system.



The circuit schedule identified the cable requirements such as number and size of conductors and type of insulation. The cable pull cards are made from information in the schedule and identify the installation requirements to the construction forces. Sampling of completed pull cards confirms the type of insulation, size, and number of conductors and identification of the inspector.

A random sampling of cable runs confirms that cables are installed in accordance with the design requirements as shown in the circuit schedule. As a general rule, safeguards cable is routed in conduit except for occasional runs in cable trays. Cable tray runs are in open areas not subject to missiles or hostile environments.

The conduit tray schedule provides the proper identification and routing of conduit and trays. In addition, the schedules identify the circuit assigned to each conduit or tray, length of run, percent full and size of conduit or tray.

Safeguards cables, trays and conduits are color coded to assist in maintaining channel separation. Cables in four safety channels are colored red, green, blue and yellow while the trays and conduits are identified with colored diamonds along with the identification number.

The computer program is designed to continuously monitor the cable and tray fill by calculating the cross-section area of each cable as it is assigned to the conduit or tray and summarizing the total area.

Continuity and meggering tests are performed only on high voltage and power cables. Low voltage and signal cables are given a functional test after they are terminated.

DETAILS III

Prepared By: C. R. M. Fairland 12/8/72  
Date

Date of Inspection: October 25-27, 1972

Reviewed By: V. L. Bruner 12/8/72

1. Persons Contacted

Persons other than those attending the Management Interview:

Bechtel

- C. Becham - QA Engineer
- D. Bivins - Authorized Inspector
- K. Higgins - QC Engineer
- R. McKinnon - Mechanical Engineer

2. Main Steam Block Valves

- A. The records maintained for the components when they were received, stored and installed were reviewed. Installation is essentially complete; however, Bechtel has not performed the hydrostatic testing nor performed the final cleaning. The manufacturer's material and fabrication certification and NDT records were reviewed for CV2692, one of the two block valves, and they conform to the Technical Specifications of the purchase order for the valves. The techniques used to handle, place and install CV2692 were examined and there are no further areas of inspection needed. A manufacturer's representative, erector, witnessed the installation of the valve operators and approved the assembly, testing and setting of the limit switches for both block valves, CV2691 and CV2692. The installed valves are expected to be housed in a maintenance structure in the near future. The pipe ends are capped, but neither the system nor the components have been flushed or cleaned for the final inspection. There was no evidence of any nonconforming components of the valves.

The procedures to be used for the final cleaning and flushing of the system are included in the startup procedures. The procedures used for cleaning the piping and valves prior to field fabrication and installation were reviewed and no deficiencies were identified.



3. Pressurizer Safety and Relief Valves

The records maintained for the components when they were received, stored, and installed were reviewed. Installation is temporary with four of eight bolts in place on each valve. A minor field design change notice will be required to rotate the test handle of one of the two valves to prevent interference with existing piping. The manufacturer's records were reviewed and no deficiencies were noted; B&W and Bechtel have accepted the shop QC records. The records provided certification of the material, the nondestructive tests (RT, LP, UT), the hydrostatic test, operational test, cleanliness and painting. The records provided engineering and QA approvals by the manufacturer and the QA audit by B&W. The records and certifications provide for the requirements of the purchase order and the Technical Specifications. There was no evidence of any nonconforming components of the valves. Cleanliness is being maintained and procedures for final cleaning after the system hydrostatic test were reviewed and no deficiencies were identified.

To date, Bechtel has not provided AP&L with their stress analysis of the piping system from the subject valves to the quench tank considering the dynamic effects of full flow through the valves and piping as discussed in Inspection Report No. 50-313/72-7.

4. Main Steam Safety Valve Vents to the Atmosphere

Work on the installation of the main steam vents to the atmosphere from the steam system safety valves is not complete on any of the eight valves observed for the south steam generator. Work is progressing using the field installation manual procedures and design and installation criteria established by the pipehanger department of a major manufacturer under contract to Bechtel. The requirements and procedures were examined and no deficiencies were identified.

DETAILS IV

Prepared By: EJ Wallis 12-8-72

Date of Inspection: OCT 25-27, 1972

Reviewed By: VL Browlee 12/8/72

1. Persons Contacted

C. Bean - QA Engineer, Mechanical - AP&L  
K. Higgins - QC Engineer, Mechanical, Bechtel  
R. Paulcheck - QC Engineer, Mechanical/Instrumentation, Bechtel  
W. Hickson - Consultant Engineer, B&W  
R. Quinlan - QC Supervisor, B&W

2. Reactor Vessel and Internals Modifications

Field work is progressing within the scope of the approved procedures. Field welding of certain revised instrument guide tubes to the flow distributor resulted in an out-of-tolerance at the end of these guide tubes. The assembly was shipped to the B&W shop for correction and was then returned to the construction site. The B&W QC supervisor stated that a design change is being implemented for follow-on units in this area. No deficiencies were identified.

3. Control Rod Drive Tube Defect Analysis

All of the reinspected tubes were returned to the site for installation. The licensee is planning an audit of the inspection results for adequacy. Follow-on inspections will include this subject.

4. Primary Pump Installation

Review of inspection records of these units, stored in place, and installed in the pipe system resulted in no deficiencies. Adequate techniques of handling, placing and installation was evidenced during the inspection. Provisions for protection and the maintenance of cleanliness were in effect. Provisions were also in effect to quarantine and make disposition of non-conformance during this installed period. Cleaning and cleanliness procedures and requirements exist in the field and were reviewed without comment.

5. Pressurizer Installation

This inspection scope and results are the same as described for the primary pump installation, above; and resulted in no further questions.

6. Reactor Vessel Internals

Review of inspection records during storage of these internals resulted in no deficiencies. Record review of the material and fabrication certification; material chemical, NDT and other testing specifications resulted in the determination that those internals were procured meeting the construction requirements and as specified in the application. Inspection revealed the establishment of a "clean room" wherein the modification and assembly of the internals is being accomplished. Provisions were evident for the protection and maintenance of cleanliness of these components. Procedures and requirements have been established for the final cleaning of these internals which conform to the construction requirements. Inspection in the field indicates that the licensee/contractor's line and quality control organizations for mechanical components are in accordance with the application.