

APPENDIX

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Inspection Report: 50-313/93-17
50-368/93-17

Operating Licenses: DPR-51
NPF-6

Licensee: Entergy Operations, Inc.
Route 3, Box 137G
Russellville, Arkansas 72801

Facility Name: Arkansas Nuclear One, Units 1 and 2

Inspection At: Russellville, Arkansas

Inspection Conducted: April 5-9, 1993

Inspector: C. E. Johnson, Reactor Inspector, Maintenance Section
Division of Reactor Safety

Approved:

Dale A. Powers
Dr. Dale A. Powers, Chief, Maintenance Section
Division of Reactor Safety

5/11/93
Date

Inspection Summary

Areas Inspected (Unit 1): No inspection of Unit 1 activities was performed.

Areas Inspected (Unit 2): Routine, announced inspection of the implementation of the licensee's maintenance program.

Results (Unit 1): Not applicable.

Results (Unit 2):

- The licensee's maintenance procedures and instructions provided sufficient details and conformed to the licensee's administrative requirements (Section 2.1).
- Maintenance records were easily retrievable (Section 2.1).
- The licensee did not maintain strong oversight of safety-related work performed by contractors (Section 2.3).
- The licensee's preventive maintenance engineering evaluation process was a maintenance program strength (Section 2.7).

- The mechanical maintenance training programs were well documented (Section 2.8).

Summary of Inspection Findings:

- Inspection Followup Items 368/9317-01 and 368/9317-02 were identified (Sections 2.3.1 and 2.6.1, respectively).

Attachments:

- Attachment 1 - Persons Contacted and Exit Meeting
- Attachment 2 - Documents Reviewed

DETAILS

1 PLANT STATUS

During this inspection period, Arkansas Nuclear One, Unit 2, was operating at 100 percent power.

2 MAINTENANCE PROGRAM IMPLEMENTATION (62700)

The purpose of this inspection was to determine whether the licensee's maintenance program was being implemented in accordance with regulatory requirements; to determine the effectiveness of the maintenance program on important plant equipment; and to determine if the maintenance staff was implementing an effective maintenance program.

To determine the specific components, systems, or areas to inspect, the inspector reviewed the operating history of selected plant equipment and discussed with plant personnel completed maintenance activities.

2.1 Procedures and Records Review

2.1.1 Discussion

The inspector reviewed maintenance procedures used to conduct the work activities discussed in the following paragraphs. Most procedures reviewed were incorporated into the applicable maintenance job orders (JOs). Corrective maintenance JOs reviewed, that did not reference a procedure, included detailed instructions. The inspector compared and determined that the vendor technical manuals were consistent with the instructions in the work packages. Instructions properly utilized vendor technical instructions.

Procedures reviewed conformed to the licensee's administrative requirements, including approval and control. A sampling of the maintenance procedures reviewed were found to conform to the licensee's specified procedure format. Quality control (QC) inspection holdpoints were included in JOs that referenced procedures, but hold points were not referenced in all cases for those JOs that did not reference procedures. Section 2.3, of this report, further discusses this issue.

The inspector also reviewed the records associated with the maintenance activities selected and determined that:

- Required administrative approvals were obtained before initiating work;
- Licensee inspections were made in accordance with requirements;
- Vendor maintenance recommendations were included in instructions;

- Parts and materials were identified in work packages;
- Corrective and preventive maintenance records were assembled and stored as part of the maintenance history; and
- Maintenance records were easily retrievable.

The maintenance procedures and associated records reviewed are listed in Attachment 2.

2.1.2 Conclusions

The procedures and instructions, which were reviewed, provided sufficient detail and conformed to the licensee's administrative requirements.

2.2 Charging Pump 2P-36A

2.2.1 Discussion

The inspector reviewed completed maintenance activities for Charging Pump 2P-36A. This is a reciprocating pump located in the chemical volume and control system (CVCS). Review of the maintenance history indicated that this pump had repetitive problems. These problems mostly consisted of a degraded plunger and packing leaks. The inspector inquired of the licensee as to what measures were taken to resolve the problems that persisted. The licensee indicated that in June 1987 they changed from the Gaulin-specified charging pump plunger packing to a new packing system designed by UTEX industries. This change was initiated by Plant Change No. 87-0857 for all three charging pumps. In January of 1988, Plant Change No. 88-0062 was initiated to replace the existing seal design with a slightly modified seal design. Recently, the licensee initiated Temporary Change No. 92-2-0050, which replaced the plunger with a new plunger coated with 2 to 5 micron layers of titanium nitride, in an effort to increase the charging pump packing and plunger longevity.

The inspector's review of current maintenance records determined that corrective actions have not completely alleviated the pump plunger problem. From discussions with the licensee, the inspector learned the following:

- The licensee was trending the pump maintenance problems.
- The reciprocating pump plunger degradation is an industry-wide concern according to the licensee's investigation.
- The licensee plans to present this issue to the Combustion Engineering Owners' Group for resolution.
- The licensee was developing other preventive maintenance plans in order to reduce the incidence of recurring failures.

Further review of maintenance records for the charging pumps indicated that procedures were sufficient to allow performance of the intended work. Maintenance personnel who performed the work indicated so by signing the appropriate steps in the instructions. Verification of work by QC was performed, as required, and post-maintenance testing was performed.

2.2.2 Conclusions

The sampled maintenance activities were clearly documented, including plant changes, and temporary modifications. Instructions were clear and of sufficient detail. The licensee's most recent actions and plans to improve charging pump performance appeared reasonable.

2.3 Service Water Valve 2CV-1543-1

2.3.1 Discussion

The inspector reviewed the records of completed maintenance activities performed on Service Water Valve 2CV-1543-1. This is a Safety-Related Class 3 valve. The inspector selected this valve, which in December 1991, stuck in an intermediate position during system realignment. Review of the maintenance history indicated that this valve had no past problems of this nature. The inspector reviewed the required surveillance tests, which were performed on a frequency of every 18 months. The records indicated that the tests were performed as required.

Review of Job Order No. 00859654 indicated that corrective maintenance was performed on this valve. The maintenance activities were to clean, inspect, and repair as required. Discussions with the licensee indicated that a contractor (Atlantic Valve Group) performed the corrective maintenance. It appeared that contract maintenance personnel verified performance of the work done on Valve 2CV-1543-1 in accordance with work instructions by initialling the required steps. Inservice inspection and testing was performed and properly documented in the work package.

Review of the maintenance package indicated that the valve was disassembled and reassembled without any QC observation to verify assembly of the valve and verify torque values. Quality control did, however, perform a VT-2 examination of this valve after reassembly to verify that there were no leaks. The inspector noted that there was a QC review of the maintenance package prior to work being performed, and maintenance personnel were required to contact QC prior to beginning the work. However, according to Procedure QC-14, "Job Order Review Prior To Field Issue," Revision 4, QC had an option to add additional holdpoints to the work package. Review of the maintenance package indicated that QC did review the package and that maintenance personnel did, in fact, contact QC prior to beginning any work activities. However, discussion with licensee personnel indicated that QC opted to not witness any work because they were busy observing other activities.

This current example of the licensee not witnessing contractor activities is not a violation of regulatory requirements. NRC Inspection Report 50-313/92-26; 50-368/92-26 addressed an NRC-identified problem wherein there was a lack of oversight by the licensee of work activities performed by contractors, and a violation of regulatory requirements occurred. In addition, NRC Inspection Report 50-313/93-16, 50-368/93-16 addressed a problem wherein the licensee identified inadequate implementation of the inservice inspection program by contractors who were not subject to strong licensee oversight. The licensee was addressing these issues.

The inspector investigated a potentially similar problem with High Pressure Safety Injection Valve 2CV-5103-1. This valve was worked on by contractors. The work package did not reference a procedure, and there was no evidence of direct licensee oversight of this work activity. Later, this valve failed during its quarterly stroke test. The licensee was in the process of evaluating the root cause of the failure during this inspection. In discussions with systems engineering personnel, the resident inspector learned that incorrect maintenance activities may have been the cause of this valve performance problem. Further NRC review of this high pressure safety injection valve issue, is an inspection followup item (368/9317-01).

2.3.2 Conclusions

Required work instructions in the corrective maintenance packages reviewed were properly followed. Instructions included in the packages were sufficient to perform the required work. The licensee did not maintain strong oversight of safety-related work performed by contractors.

2.4 Emergency Diesel Generator Air Compressor 2C-4A

2.4.1 Discussion

The starting-air system is designed to store and supply an adequate source of compressed air for the emergency diesel generators for fast, reliable cranking and starting under planned or emergency start conditions. The inspector selected the compressor of this system for review because of continuing maintenance problems.

Review of the corrective maintenance packages indicated that most of the problems were the result of moisture collecting in the unloader and corroding the internals with subsequent binding of the unloaders. Maintenance personnel had installed new unloaders following the instructions given in the maintenance packages. The instructions were sufficiently detailed to perform the necessary work and administrative approvals were apparently obtained prior to initiating work activities.

The licensee had initiated Plant Change No. 92-8024 to alleviate this moisture buildup by installing drain valves at the low point of the discharge lines of all four air compressors. An appropriate safety evaluation determination of

the acceptability of this modification was made and included in the plant change package.

The review of this package indicated that there were no QC holdpoints; however, the QC representative produced documentation showing that QC had been present during the maintenance activities.

2.4.2 Conclusions

Maintenance records indicated that required administrative approvals were obtained before initiating work, which was performed and properly documented in the maintenance work package. Plant Change No. 92-8024 properly included a safety evaluation determination.

2.5 Instrument Air Compressor 2C-27B

2.5.1 Discussion

The inspector selected several corrective maintenance packages for review. The equipment selected was non-safety-related, but important to safety because it supplies compressed air to safety-related components in order for them to perform their intended functions.

The instrument air compressor has had problems with oil leaks. The inspector reviewed two corrective maintenance work packages, and it appeared that several parts were replaced such as pistons, rings, and gaskets. The maintenance packages contained appropriate documentation, and it appeared that all steps in the work instructions were followed properly. The inspector noted that the replacement parts used were from the approved site material list. In addition, post-maintenance tests were documented to have been performed as required.

The licensee stated that this instrument air compressor's problems were being trended, and that they planned to overhaul the compressor as a short-term resolution measure. The long-term resolution measure was to perform an engineering evaluation of replacement of the compressor. It appeared from the review of the licensee's records that maintenance problems related to Compressor 2C-27B were attributable to aging-related wear out. No apparent indications of poor maintenance practices were noted by the inspector.

2.5.2 Conclusions

The sampled maintenance packages were well documented. Replacement parts used were from the approved site material list. Instructions were clear and of sufficient detail.

2.6 Rosemont Flow Transmitter 2FT-5091

2.6.1 Discussion

The inspector selected Rosemont Flow Transmitter 2FT-5091 for review because it has a long history of maintenance problems. There had been at least four condition reports written on the instrument's failures. This safety-related instrument provides flow indication for the low-pressure safety-injection pump.

The inspector reviewed the last three surveillance tests on this transmitter and associated instrumentation to determine if required Technical Specification surveillance frequencies were met, and if any problems were identified. Flow calibration of this transmitter and associated instrumentation were noted to have been performed every 18 months. Surveillance records indicated that required surveillance frequencies were met, and that problems were identified. The two most prevalent problems were the erroneous indication of flow when no flow was present, and out-of-calibration determinations. The licensee's most recent investigation (issued February 17, 1993) determined that the transmitter's low side vent was leaking, the transmitter head was loose, the Conax connector was loose, and foreign material (e.g., tape or grinding shavings and boric acid crystals) was found in the transmitter bellows. The history of the transmitter and its associated instrumentation were discussed in engineering evaluations that concluded several probable root causes. Several of the causes identified were inadequate work practices.

The inspector's review of Corrective Maintenance Job Order No. 879146 determined that transmitter 2FT-5091 was replaced with a new transmitter. Discussions with the licensee during this inspection, indicated that the new transmitter was not functioning properly.

The licensee's corrective actions implemented to date have not alleviated problems. These corrective actions have included recalibrations, flushing of sensing lines, and retightened fittings. The licensee suspects that the most probable root cause for the transmitter failure is the introduction of foreign material into the transmitter. The licensee planned to issue a memorandum on this problem and conduct training for operations and maintenance personnel. Because of the recent failure of Transmitter 2FT-5091, this issue will be pursued on a subsequent inspection to determine if inadequate maintenance or installation practices is a cause for continuing problems for this and other safety-related flow transmitters. This issue is an inspection followup item (368/9317-02).

2.6.2 Conclusions

Surveillance tests were performed as required within the specified frequencies. Corrective Maintenance Job Order No. 00879146 was properly documented. The flow transmitter was replaced and calibrated in accordance with requirements.

2.7 Preventive Maintenance (PM)

2.7.1 Discussion

The inspector reviewed PM records of the emergency diesel generator air compressor (2C-4A). This PM task required sampling and changing of oil, filters, and gaskets. Records indicated that the PM tasks were performed in accordance with appropriate procedures, and within the required times. PM task instructions were sufficiently detailed and clear.

The inspector also requested PM records for the chemical volume and control system letdown strainer (2F-28) and service water system strainer basket assembly (2F-6A). Discussions with the licensee indicated that there was no routine PM task for these particular strainers. These strainers were monitored by Operations because of continued clogging. The interval for cleaning these strainers was based upon the pressure drop across them. Differential pressure indicators existed for these strainers and were monitored by Operations. When Operations has requested cleaning of these strainers, maintenance personnel initiated corrective maintenance JOs to perform the work.

Review of the PM requirements for filters and strainers indicated that the licensee had established initial PM requirements based on the evaluation of the following:

- Maintenance history,
- Vendor recommendations,
- Industry experience information, and
- Equipment qualification program requirements.

This evaluation was termed the preventive maintenance engineering evaluation (PMEE). PMEEs have been used on various plant safety-related components. PMEE No. 100, "Filters, Strainers and Traps," Revision 4, addressed all filters, strainers and traps. This PMEE listed manufacturers' recommendations and justification; PM activities required; and acceptable lubricants and solvents, and the basis for selection. The thoroughness of this PMEE process was considered a strength of the licensee's PM program. In addition, its implementation was considered appropriate.

The inspector also determined that input was made appropriately to the PM program based on equipment failures.

The inspector noted that a compilation of late and incomplete PM activities was available for management review.

2.7.2 Conclusions

Preventive maintenance activities on sampled equipment reviewed was determined to have been performed within the required times. The licensee's PMEE process was considered a strength of the licensee's PM program.

2.8 Training and Certification

2.8.1 Discussion

The inspector reviewed the certification and training of seven maintenance personnel selected from the completed maintenance records reviewed. There were five journeyman and two apprentices (helpers) involved. The journeymen were all qualified to perform the selected work. The apprentices were working along with these journeymen under on-the-job training controls. The apprentices had completed the necessary basic maintenance training. The training programs were well documented. Review of the mechanical maintenance, plant repairman training program indicated that the licensee had a well developed program for the initial and continuing training programs for mechanical maintenance personnel. In addition, training records were easily retrievable.

2.8.2 Conclusions

From a sampling of maintenance personnel who had performed the sampled work, all were found to have been qualified, and the mechanical maintenance training programs were well documented.

ATTACHMENT 1

1 PERSONS CONTACTED

1.1 Entergy Personnel

- *J. Barrett, Supervisor, Quality Control
- *S. Boncheff, Licensing Specialist
- *M. Bourgeois, Outage Manager, Unit 2
- *R. Carter, Technical Assistant, Unit 2 Maintenance
- M. Chisum, Superintendent, Instrumentation and Controls
- B. Converse, Supervisor, Engineering Programs
- *R. Douet, Maintenance Manager, Unit 1
- D. Eichenberger, Supervisor, Maintenance Training
- *J. Fisicaro, Director, Licensing
- *M. Harris, Maintenance Manager, Unit 2
- T. Ivy, Project System Engineer Unit 2
- R. Mitchell, Preventive Maintenance Coordinator
- D. Payne, Repair and Replacement Coordinator
- *J. Powell, Superintendent, Central Maintenance
- *G. Provenche, Supervisor, Quality Assurance
- *E. Randall, Plant Manager, Unit 2
- *M. Sellman, General Manager, Plant Operations
- R. Turner, Engineer, Instrumentation and Controls
- *J. Vandergrift, Plant Manager, Unit 1
- T. Woodson, System Engineer

1.2 NRC Personnel

- *A. Gaines, Resident Inspector (Acting)
- *L. Smith, Senior Resident Inspector
- *K. Weaver, Engineering Aide

In addition to the personnel listed above, the inspector contacted other personnel during this inspection period.

*Denotes personnel that attended the exit meeting.

2 EXIT MEETING

An exit meeting was conducted on April 9, 1993. During this meeting, the inspector summarized the scope and findings of the inspection. The licensee did not identify as proprietary, any information provided to, or reviewed by the inspector.

ATTACHMENT 2

DOCUMENTS REVIEWED

MAINTENANCE JOB ORDER	CONDITION REPORT	PLANT CHANGE & TEMPORARY MODIFICATION	PROCEDURE
Pump 2P-36A			QCO-14, "Job Order Review Prior To Field Issue," Revision 4
JO 00825828	CR-2-92-0125	TM-92-2-0050 PC 87-0857 PC 88-0062	PMEE No. 100, "Filters, Strainers and Traps," Revision 4
JO 00827660			Station Administrative Procedure No. 1000.115 "Preventive Maintenance Program," Revision 2
JO 00849020			Administrative Procedure No. 1000.006, "Procedure Control," Revision 37
JO 00857514			Maintenance Administrative Procedure No. 1025.003, "Conduct Of Maintenance," Revision 38
JO 00841956			Maintenance Administrative Procedure No. 1025.033, "Control Of Post-Maintenance Testing," Revision 2
JO 00841667			Maintenance Administrative Procedure No. 1025.002, "Maintenance Department Organization and Responsibilities," Revision 5
EDG Air Compressor 2C-4A			Plant Administrative Procedure No. 1000.024, "Control Of Maintenance," Revision 40
JO 00882180		PC-92-8024	
JO 00869316			
JO 00876510			
JO 00854209			
JO 00884653			

MAINTENANCE JOB ORDER	CONDITION REPORT	PLANT CHANGE & TEMPORARY MODIFICATION	PROCEDURE
JO 00835400			
JO 00848207			
Instrument Air Compressor 2C-27B			
JO 00859053			
JO 00847879			
JO 00828394			
Strainers 2F-6A and 2C-28			
JO 00828394			
JO 00859053			
JO 00841928			
JO 00859847			
JO 00862078			
JO 00809379			
Flow Tran. 2FT-5091			
JO 00870562	CR-2-92-0456		
JO 00879146			
JO 00829044			
JO 00789248			
JO 00838412			
JO 00855298			
JO 00871621			

* Other procedures reviewed were included in the Job Orders.