ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Inspection Report: 50-313/96-03
50-368/96-03

Licenses: DPR-51
NPF-6

Licensee: Entergy Operations, Inc.
1448 S.R. 333
Russellville, Arkansas

Facility Name: Arkansas Nuclear One, Units 1 and 2

Inspection At: Russellville, Arkansas

Inspection Conducted: April 14 through May 25, 1996

Inspectors: K. Kennedy, Senior Resident Inspector
S. Campbell, Resident Inspector
J. Melfi, Resident Inspector

Approved: Elmo E Collins 6/19/96
Elmo E. Collins, Chief, Project Branch C Date

Inspection Summary

Areas Inspected (Units 1 and 2): Routine, announced inspection of onsite review of an event, operational safety verification, maintenance and surveillance observations, onsite engineering, plant support activities, and miscellaneous operational issues.

Results (Units 1 and 2):

Plant Operations

- The inspectors determined that the command, control, communications, and operator response to a Unit 1 reactor trip and steam generator dryout were very good. Operations personnel properly prioritized their recovery actions and plans were quickly developed to complete these actions (Section 2.1).

- A senior reactor operator (SRO) identified that a portion of the 4000 pound cask loading pit gate had previously been rotated over the fuel during dry fuel storage practice runs on March 6, 1996. As a

result, the 2000 pound Technical Specification (TS) limit for loads travelling over the fuel was exceeded and was a noncited violation of the TS. The SRO forgot to immediately document the violation on a condition report (CR); documentation was made 1 month later. Consequently, the licensee did not process the licensee event report (LER) within the 30-day reporting requirements of 10 CFR 50.73. This was a noncited minor violation (Section 3.1).

- Management's expectations for a slow, controlled, and safe approach to criticality were discussed in the pre-evolution brief for the Unit 1 reactor startup. The operators followed and used all necessary procedures. Operators appropriately stopped the evolution to address an anomaly related to power supply from the control rod drive system. Operator performance during the evolution was good (Section 3.3).

- Operator response to the loss of cooling to the Unit 2 main transformer was good (Section 4.2).

Maintenance

- Maintenance responded rapidly to a failure in the Phase Transformer A cooling fans. Management's involvement was noted in responding to this event (Section 4.2).

- Unit 2 computer technicians demonstrated very good knowledge of the core protection calculator and control element assembly calculator (CEAC) during the conduct of a surveillance test. The technicians appropriately identified a problem with test equipment and an out-of-tolerance condition associated with a power supply (Section 5.2).

Engineering

- Reactor engineering involvement in the Unit 1 approach to criticality was good (Section 3.3).

- The engineering work done to assess the environmental qualification (EQ) of motor cables was thorough (Section 6.1).

Plant Support

- The inspectors observed, through routine tours of radiological and security areas, that the radiation protection and security programs were effectively implemented and maintained (Section 7).

Summary of Inspection Findings:

Closed Items

- LER 313/96-004 (Section 8)
- Noncited Violation 313/9603-01 (Section 3.1)
- Noncited Violation 313/9603-02 (Section 3.1)

Attachment:

- Persons Contacted and Exit Meeting

DETAILS

1 PLANT STATUS

1.1 Unit 1

At the beginning of the inspection period, Unit 1 was at 100 percent power. The unit remained at 100 percent power until 3:12 a.m., May 19, 1996, when the unit tripped due to a feedwater transient (see Section 2.1). The plant began power escalation at 3:02 a.m. on May 24, tied the main generator to the grid at 1:02 a.m. on May 25, and reached 100 percent power on May 25 at 7:33 p.m. The plant remained at 100 percent power for the rest of the inspection period.

1.2 Unit 2

Unit 2 power remained at or near 98 percent throughout the inspection period.

2 ONSITE REVIEW OF AN EVENT (93702)

2.1 Unit 1 - Reactor Trip and Malfunction of Main Steam Safety Valve

On May 19, 1996, at approximately 3:12 a.m., a main feedwater transient resulted in an automatic reactor trip on high reactor coolant system pressure. Following the trip, main steam safety valves on Steam Generator B opened; however, when the steam generator pressure decreased, Valve PSV-2685 failed to close. Operators were unsuccessful in closing the valve using the guidance in the emergency operating procedures and manually isolated Steam Generator B to minimize the cooldown of the reactor coolant system. The shift superintendent entered the emergency plan and determined that plant conditions warranted the declaration of a Notification of Unusual Event. However, due to an error, the shift superintendent indicated on the notification message that an Alert had been declared. This error was quickly corrected but not before Arkansas State officials had been notified. The licensee called the state officials to correct the error.

The inspectors responded to the event and monitored the licensee's activities and efforts to shut the stuck open main steam safety valve and refill the empty steam generator. The licensee found that a nut on the stem of the main steam safety valve rotated down the spindle and contacted the top of the manual lift lever, preventing the valve from reseating. Once this was identified, the licensee was able to shut and gag the valve and refill the dried out Steam Generator B using the emergency feedwater pumps. Once the steam generator was returned to its normal level, operators established a feedwater flowpath to the steam generators using the auxiliary feedwater pump and secured the emergency feedwater pumps. The shift superintendent exited the Notification of Unusual Event at approximately 1:04 p.m. on May 19.

On May 22, the NRC dispatched an Augmented Inspection Team to Arkansas Nuclear One to review the event (NRC Inspection Report 50-313/96-19; 50-368/96-19).

The inspectors determined that the operators response to the event was very good. The shift superintendent maintained good oversight during the event and the subsequent recovery of Steam Generator B. Communications remained disciplined and effective despite the volume and nature of the activities in the control room and the plant. The inspectors noted that the command, control, communications, and operator conduct during the event were consistent with how the operators conduct themselves during their day-to-day activities and during training in the plant simulator. Operations personnel properly prioritized their recovery actions and plans were quickly developed to complete these actions. The licensee developed a good plan for refilling the steam generator which included recommendations from the steam generator vendor and approval by the plant safety committee. The crew brief conducted prior to refilling the steam generator was thorough.

3 OPERATIONAL SAFETY VERIFICATION (71707)

This inspection was performed to ensure that the licensee operated the facility safely and in conformance with license and regulatory requirements and that the licensee's management control systems effectively discharged the licensee's responsibilities for safe operation.

The inspectors conducted control room observations and plant inspection tours and reviewed logs and licensee's documentation of equipment problems. An independent verification of the status of safety systems, a review of TS limiting conditions for operation, and a review of facility records were also performed.

3.1 Cask Loading Pit Gate Lifted Over Irradiated Fuel Stored in the Spent Fuel Pool

On March 6, 1996, while moving the 4000 pound cask loading pit gate from its stored location on the spent fuel pool wall to the cask loading pit, an SRO monitoring the activity noted that a portion of the gate had been rotated over irradiated fuel stored in the spent fuel pool. The cask loading pit is an area used to load and remove new fuel and spent fuel to and from the pool, respectively. When installed, the gate separates the pit from the pool. The SRO was monitoring this activity in support of the dry fuel storage project and, during the lift, knew that TSs prohibited heavy loads (loads over 2000 pounds) from being moved over irradiated fuel. He directed that the crane operator stop the evolution and select a different lift path. The crane operator repositioned the gate and successfully installed the gate without any additional occurrences.

The SRO found, after questioning the crane operator's method on installing the gate, that the operator had used this lift path during previous gate installations. The SRO reviewed Procedure 1402.133, Revision 9, "Operation of the Spent Fuel Pool Crane L-3 Units 1 & 2," Attachment 4, "Crane Load Matrix (Unit 1)," to determine the procedure guidance given for this lift and found that the attachment instructions contradicted TS requirements for prohibiting the lifting of loads greater than 2000 pounds over the fuel. The procedure

attachment stated that, while moving the gate, avoid lifting it over the fuel as much as possible. Step 6.1.3 of the procedure appeared correct. It specified limits and a precaution to prohibited loads in excess of 2000 pounds from travelling over spent fuel. The SRO made a mental note to write a CR to document the event and the contradictory statements but became preoccupied with his duties and forgot to write it at the time.

On April 5 while reviewing Procedure 1402.133 for procedure changes related to the dry fuel storage project, the SRO remembered that a CR needed to be written, and initiated significant CR C-96-0072. While processing the CR, the licensee determined that the operation prohibited by TS (lifting the gate over the fuel) required that a 30-day LER documenting the event be written in accordance with 10 CFR 50.73 (a)(2)(i)(B). LER 313/96-004-0 was completed on May 6, approximately 2 months after the SRO had identified the TS violation.

During their root cause evaluation, the licensee identified that the conflicting procedure instructions may have confused the crane operator. The licensee found that these instructions had existed for several procedure revisions and that the procedure review process missed identifying these inconsistencies during these revisions. However, through interviews, the inspectors found that the crane operator was trained to not lift heavy loads over the fuel and determined that the procedure inconsistencies were not a direct cause of the event. The inspectors concluded that the crane operator simply failed to recognize that he rotated the gate over the fuel.

The licensee developed corrective actions as a result of the event. These actions included:

- Reviewing the CR root cause with personnel involved with the procedure review process to increase their awareness on the type of problems that may occur when inadequate procedure reviews are conducted,

- Removing the crane procedure inconsistencies by making the necessary procedure changes,

- Reviewing the CR root cause and emphasizing to Units 1 and 2 maintenance personnel in reading and following the limits and precautions contained in procedures during the next training cycle, and

- Reviewing and making the necessary changes to other crane procedures related to crane operation over safety-related equipment for inconsistencies with TS requirements.

The inspectors concluded that these actions were acceptable in addressing the issue.

Through interviews, the inspectors concluded that the SRO identified this event as a result of his sensitivity toward lifting heavy objects over spent fuel. The SRO took immediate corrective action in directing the crane

operator to avoid further lifting over the fuel. Rotating a portion of the gate over the fuel stored in the spent fuel pool is a violation of Unit 1 TS 3.8.14. This licensee identified and corrected violation is being treated as a noncited violation, consistent with Section VII.B.1 of the NRC Enforcement Policy (NCV 313/9603-01). Further, because the SRO forgot to initiate the CR on March 6, the LER was, consequently, not issued within 30 days of the event as required by 10 CFR 50.73 (a) and is a violation of this requirement. The inspectors concluded that this failure to report within 30 days is isolated and constitutes a violation of minor significance. It is being treated as a noncited violation consistent with Section IV of th enforcement policy (NCV 313/9603-02).

3.2 Unit 1 - Waste Control Operator Rounds

On May 18, the inspectors accompanied a Unit 1 waste control operator while he recorded log readings of plant parameters and toured the plant. The inspectors noted that the operator recorded the log readings appropriately, was attentive to equipment status, and identified and corrected housekeeping discrepancies. In addition, the operator properly addressed and corrected an alarm condition associated with the hydrogen-oxygen sample system.

3.3 Unit 1 - Reactor Startup and Approach to Criticality

On May 24, the inspectors observed the Unit 1 operators bring the reactor critical following the reactor trip that occurred May 19 (see Section 2.1). A crew brief preceded the reactor startup evolution where industry events involving criticality incidents at other plants were discussed, operator duties were assigned, and applicable startup procedures were reviewed. Operations management communicated that the operators focus on a controlled startup using peer checks and self-verification techniques and reminded the operators that there was no sense of urgency to perform the evolution. The inspectors concluded that the brief was thorough and that management's expectation for a safe reactor startup was clearly communicated.

The reactor startup involved withdrawing control rods from the core and monitoring the startup rate. Operators controlled the startup in that the procedure hold points for withdrawing the control rods to designated positions were met. The reactor operator repeated instructions from the control room supervisor while withdrawing the rods. The licensee stopped withdrawing the rods when an operator noted an anomaly in the power supply circuit for the control rod drive system. The licensee was not able to determine the cause of the anomaly after troubleshooting the power circuit. The licensee recommenced withdrawing control rods after initiating a CR to document the anomaly and determining that the system remained operable. The operators contacted the reactor engineer as more control rods were pulled and the startup rate increased. The reactor engineer tracked the startup rate and the control rod position for criticality. The control rods were withdrawn to near the estimated critical position and the reactor became critical at approximately 4:40 a.m.

The inspectors concluded that the approach to criticality was well controlled. Reactor engineering and operator performance was good. During the startup, the licensee used clear communications, operator peer checks, and self-verification techniques.

4 MAINTENANCE OBSERVATIONS (62703)

4.1 Units 1 and 2 - Maintenance Observations

During this inspection, the inspectors observed and reviewed the selected maintenance activities listed below to verify compliance with regulatory requirements, including licensee procedures; required quality control department involvement; proper use of safety tags; proper equipment alignment; appropriate radiation worker practices; use of calibrated test instruments; and proper postmaintenance testing:

- Unit 1 - Job Order (JO) 00948819, "ICCMDS Cabinet Power Supply Failure and Blown Fuse," performed on May 15.

- Unit 2 - JO 0094432, "Replacement of Reactor Vessel Level Monitor System Cabinet Fans," performed on May 20.

The inspectors confirmed that maintenance personnel performed the activities according to the JO requirements. Selected observations from review of maintenance-related activities are discussed below:

4.2 Unit 2 - Main Transformer A Trouble (JO 00948953)

At 11:35 p.m. on May 15, 1996, Unit 2 operators received a transformer trouble alarm in the control room. The inspectors accompanied the operators while they investigated the cause of the annunciator and the licensee found that the breaker tripped to the two cooling fans to Phase A of the Unit 2 main transformer. The licensee initiated a Priority 1 job request to determine the cause of the failure and found a relay, which swaps power to a group of fans, had shorted and caused both fan groups to fail.

While the cooling system was out of service, the inspectors noted that the operators had established compensatory measures to monitor the transformer for increase in temperature and were prepared to reduce generator load should the temperature become too high. The licensee replaced the shorted relay with a new relay and the cooling system was placed into service without having to reduce turbine generator load. From their investigation, the licensee believed that the relay shorted because a wire into the relay failed due to fatigue. The licensee inspected the other main transformer phases and did not identify similar problems.

The inspectors noted that operator response to the event was prompt; and the Unit 2 maintenance manager, operations manager, and system engineering manager were involved with this event.

5 SURVEILLANCE OBSERVATIONS (61726)

5.1 Units 1 and 2 - Surveillance Test Observations

The inspectors reviewed the tests listed below to verify that the licensee conducted surveillance testing of systems and components in accordance with the TS and approved procedures:

- Unit 1 - Procedure 1312.003, Revision 2, "ICCMDS Surveillance Train B Test," performed on May 14.
- Unit 2 - Procedure 2312.046, Revision 1, "3205 Core Protection Calculator Channel "C" and CEAC "2" Test With Reload Data Block," performed on May 14.
- Unit 2 - Procedure 2304.059, Revision 4, "Unit 2 Area Radiation Monitor Monthly Test," performed on May 22.

The inspectors concluded that the licensee safely performed these surveillance tests in accordance with established procedures.

5.2 Unit 2 - Core Protection Calculator and CEAC Surveillance Test

On May 14, the inspectors observed Unit 2 computer technicians perform portions of Procedure 2312.046, Revision 1, "3205 Core Protection Calculator Channel "C" and CEAC "2" Test With Reload Data Block." The inspectors found that the technicians performed the surveillance very well and possessed a very good knowledge of the hardware and software associated with the core protection calculator and CEAC. The technicians demonstrated good communications with each other and the control room personnel during the performance of the test. At one point, the technicians properly identified erroneous power supply voltage readings and determined that the leads for the digital voltage multimeter were bad. They replaced the leads and continued on with the test. At another point in the test, the technicians identified that a direct current voltage reading for a power supply was outside of the required tolerance. The technicians halted the test and, as required by the procedure, conferred with the shift superintendent to determine the effects of the out-of-tolerance condition on the system. Form 2312.046A, "Determination of Reportability," was completed by a technician during the discussion with the shift superintendent and it was determined that the out-of-tolerance condition did not effect system operability. The technicians made the appropriate adjustment to the power supply to return the voltage reading to within tolerance and continued with the test.

6 ONSITE ENGINEERING (37551)

EQ of Cables to Emergency Core Cooling System/Reactor Building Spray Pump Motors

During a review of CRs, the inspectors found that the licensee had identified, on Significant CR 1-96-0128, that the power cables to the high pressure injection, decay heat removal, and reactor building spray pumps were not environmentally qualified. The licensee discovered this discrepancy while upgrading vendor information for components listed in plant database management system.

During Unit 1 construction, the cables were not required to be EQ, rather, the cables were purchased and installed as quality cables to conform with general design criteria at that time. However, in 1979, NRC Bulletin 79-01 and 79-01A, "Environmental Qualification of Safety-Related Electrical Equipment," required plants to review installed safety-related electrical equipment (which included electrical cables) to determine if this equipment met EQ requirements. In response to these bulletins, ANO qualified most of their cables to EQ requirements after reviewing purchase orders. However, the licensee did not identify the purchase order for the brand of cable used on these pumps as requiring EQ, and, therefore, missed qualifying these cables in 1979.

The licensee found, after completing the initial data entry into the plant database management system, that this brand of cable was only installed on these pumps and not on other safety-related equipment. Subsequently, the licensee located a vendor test report from another plant which indicated that this brand of cable was qualified for a harsh environment. The inspectors concluded that this problem was limited in scope to this brand of cable and did not actually result in degraded equipment. The inspectors concluded that engineering involvement in the identification of the problem and in the CR resolution was good.

7 PLANT SUPPORT ACTIVITIES (71750)

The inspectors performed routine inspections to evaluate licensee performance in the areas of radiological controls, chemistry, and physical security.

During plant tours, the inspectors observed that radiological protection personnel maintained and practiced proper radiological controls while performing activities inside radiological posted areas. Additionally, the inspectors verified that the radiological areas were properly posted and barriers erected. The inspectors reviewed calibration stickers for radiation detectors outside these posted areas and verified that the calibration dates were current. Further, the inspectors verified that effluent monitors used to monitor radiological discharges to the environment were operating when needed and that the licensee had entered the appropriate TS for monitors determined to be out of service. These monitors were properly returned to service within the TS time constraints.

The inspectors verified, through tours of the site perimeter fence and observations of activities at the main guard station, that the security program was properly implemented and maintained.

8 ONSITE REVIEW OF LERs (92700)

(Closed) LER 313/96-004: Heavy Load Transport Over the Spent Fuel Pool

This LER is discussed in Section 3.1.

9 REVIEW OF UPDATED FINAL SAFETY ANALYSIS REPORT (UFSAR) COMMITMENTS

A recent discovery of a licensee operating their facility in a manner contrary to the UFSAR description highlighted the need for a special focused review that compares plant practices, procedures, and/or parameters to the UFSAR description. While performing the inspections discussed in this report, the inspectors reviewed the applicable portions of the UFSAR that related to the areas inspected. The following inconsistencies were noted between the wording of the UFSAR and the plant practices, procedures, and/or parameters observed by the inspectors.

- After observing the surveillance test of the Unit 2 area radiation monitor monthly test (see Section 5.1), the inspectors identified that Section 12.1.4.2 of the Unit 2 Safety Analysis Report stated that two monitors, located on Elevation 404 feet in the Unit 2 auxiliary building, served as criticality alarms in the new and spent fuel handling and storage areas. However, the inspectors noted in the surveillance procedure that there were actually three monitors available for this function.

  The licensee initiated a licensing document change request to revise the Safety Analysis Report to reflect this additional radiation monitor availability.

ATTACHMENT

1 PERSONS CONTACTED

Licensee Personnel

C. Anderson, Unit 2 Operations Manager
B. Bement, Manager, Radiation Protection/Chemistry
M. Chisum, Unit 2 Instrumentation and Control Superintendent
J. Clement, Unit 1 Operations
R. Edington, Unit 1 Plant Manager
D. Fowler, Supervisor, Quality Control
B. Greeson, Unit 2 System Engineer Supervisor
M. Harris, Unit 2 Maintenance Manager
R. Lane, Director, Design Engineering
J. McWilliams, Modifications Manager
D. Mims, Director, Nuclear Safety
J. Powell, Unit 2 Plant Superintendent
M. Ruder, Events Analysis/Assessments
B. Short, Licensing
M. Smith, Supervisor, Licensing
L. Waldinger, General Manager, Plant Operations
J. Waxenfelter, Unit 1 Maintenance

The personnel listed above attended the exit meeting. In addition to these personnel, the inspectors contacted other personnel during this inspection period.

2 EXIT MEETING

The inspectors conducted an exit meeting on May 31, 1996. During this meeting, the inspectors reviewed the scope and findings of the report. The licensee did not express a position on the inspection findings documented in this inspection report. The licensee did not identify as proprietary any information provided to, or reviewed by, the inspectors.