

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

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Report No. 50-331/97007

Licensee: IES Utilities Inc.
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Facility: Duane Arnold Energy Center

Dates: March 18, 1997 - April 25, 1997

Inspectors: K. Riemer, Senior Resident Inspector
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Approved by: M. Jordan, Chief
Reactor Projects Branch 5

EXECUTIVE SUMMARY

Duane Arnold Energy Center NRC Inspection Report 50-331/97007

This inspection report included resident inspectors' evaluation of aspects of licensee operations, engineering, maintenance, and plant support. The inspectors identified examples of weaknesses in the areas of test control and corrective actions.

Operations

- The inspectors concluded that the startup was well controlled and conducted in a slow and conservative manner. (Section 01.2)
- The inspectors identified examples of weak scaffolding control, including, storage of scaffold materials, erection of the scaffold, and subsequent operations department walkdown of the scaffold. (Section 02.2)

Maintenance

- The inspectors identified that the test procedure for RHR service water was inadequate in that it was not consistent with the design basis. This constituted a violation. (Section M3.1)
- The licensee identified a repeat occurrence of the use of incorrect acceptance criteria during daily surveillances. This was an example of a violation. (Section M1.2)
- The licensee identified that a document change form (DCF) was not incorporated during an instrument calibration surveillance test. As a result, instruments were left outside the as-left acceptance criteria. This was a repeat example of problems with control of DCFs and was an example of a violation. (Section M3.2)

Engineering

- The inspectors considered that engineering support was effective in identifying a degraded condition on the RHRSW pump before pump operability was affected. Also maintenance and engineering coordinated effectively to promptly replace the pump. (Section E2.1)

Plant Support

- The inspectors identified one example where turnover between firewatches was inadequate (Section F1.1)

Report Details

Summary of Plant Status

The plant was in a hot shutdown condition at the beginning of the inspection period due to leakage from a drywell cooler. The plant was returned to full power on March 22, 1997. With the exception of a scheduled downpower evolution for turbine valve testing, the plant operated at approximately 100 percent power for the remainder of the inspection period.

I. Operations

01 Conduct of Operations

01.1 General Comments (71707)

The inspectors conducted frequent reviews of plant operations. This included observing routine control room activities, accompanying in-plant operators on daily rounds, attending shift turnovers and crew briefings, and performing panel walkdowns. The conduct of operations was generally considered to be professional. One example of operator error during surveillance testing is discussed in Section M1.2. Other observations are detailed in the sections below.

01.2 Reactor Plant Startup From Maintenance Outage

a. Inspection Scope

On March 14, 1997, the licensee performed a plant shutdown to correct a high drywell leakage rate concern. The high rate was caused by a well water leak from a drywell cooler (reference NRC IR 50-331/97004). The licensee commenced a reactor startup on March 18, 1997; the inspectors observed in-plant and control room startup activities.

b. Observations and Findings

The inspectors observed the following during the startup: effective shift management oversight of the activities, formal communications between operators, and strict procedural adherence. The inspectors did observe minor discrepancies between the operating crews during the conduct of the reactor startup. For example, one crew controlled pressure set adjustments in a more formal manner than did the following crew. Also, not all crews consistently called out the receipt of expected annunciators. The inspectors had no substantive concerns with the crew differences but noted that they did not always match operations management stated expectations. The inspectors discussed their observations with operations management.

c. Conclusions

Overall, the inspectors concluded that the startup was well controlled and conducted in a slow and conservative manner.

02 **Operational Status of Facilities and Equipment**

02.1 Engineered Safety Feature System Walkdowns (71707)

The inspectors used Inspection Procedure 71707 to walk down accessible portions of the following ESF systems:

- control building chillers
- high pressure coolant injection (HPCI)
- standby diesel generators (SBDG)
- reactor core isolation cooling system (RCIC)
- residual heat removal (RHR) system
- RHR service water (RHRSW)
- emergency service water (ESW)

Equipment operability, material condition, and housekeeping were acceptable. Several minor discrepancies were brought to the licensee's attention and were corrected. The inspectors identified concerns with scaffolding installation and storage as discussed below.

02.2 Scaffolding in Contact With Safety-Related Equipment

b. Observations and Findings

On March 31, 1997, the inspectors identified that scaffolding erected to support maintenance activities in the standby diesel generator (SBDG) was in direct contact with panel 1C-93 (1G-31 load control panel). A horizontal scaffold brace had scratched the paint on the back side of the panel. The inspectors reviewed administrative control procedure (ACP) 1408.2, "Scaffold Control," and concluded that no procedural violation existed. The inspectors, however, discussed with operations management their concern for the potential impact to the panel from scaffold movement. The licensee corrected the situation and inspectors verified that the scaffolding was no longer in contact with the panel.

Subsequent to the inspectors' initial identification of the matter, the inspectors observed scaffolding in contact with the back of the same panel on April 9, 1997. The inspectors again discussed the issue with operations management and verified that the situation was corrected.

On April 8, the inspectors identified a concern with the licensee's scaffolding storage in the Torus basement area. Specifically, stored ladder brackets were in contact with safety-related Torus level instrument tubing (LT 4397A and B). The condition was corrected after discussion with operations management.

c. Conclusions

The inspectors did not identify any specific operability concerns as a result of the scaffolding concerns discussed above, and the inspectors determined that a procedural violation did not occur. However, the inspectors concluded that the erection of the scaffold, and subsequent operations department walkdown of the scaffold, were examples of weak scaffolding control.

07 Quality Assurance in Operations

07.1 Licensee Self-Assessment Activities

During the inspection period, the inspectors reviewed multiple licensee self-assessment activities, including:

- Action Request Screening Panels
- Monthly Safety Committee Meeting
- Monthly Quality Assurance Audit Exit
- Operations Committee Meetings

The inspectors observed active management participation and concluded that the self-assessment activities observed were effective.

08 Miscellaneous Operations Issues (92700)

- 08.1 (Closed) Licensee Event Report (LER) 50-331/94-07-00: Residual Heat Removal (RHR) System Shutdown Cooling Isolation. On May 29, 1994, while lining up shutdown cooling, an isolation of the system occurred. The cause was reported to be a pressure surge in the "B" reactor recirculation pump suction piping as a result of opening the shutdown cooling isolation valve. Changes were made to Operating Instruction 149, "RHR System," to prevent recurrence. No additional shutdown cooling isolations have occurred since May 1994. The licensee plans to perform a modification to provide a more permanent resolution to this issue, since this is currently considered an operator work around (Action Request (AR) 940066.05). The inspectors had no further concerns. This item is closed.
- 08.2 (Closed) LER 50-331/95-04-00: Inadvertent Group 3 Isolations from Invalid Signals. The inspectors verified that appropriate corrective actions were implemented. There was no violation of NRC Regulations. This item is closed.
- 08.3 (Closed) Violation 50-331/96013-03: Main Steam Line Radiation Monitors Not Set Per TS. The inspectors reviewed the licensee's response letter dated April 4, 1997, and verified that corrective actions were implemented. This item is closed.
- 08.4 (Closed) LER 50-331/97-01-00: Failure to Comply with TS for Main Steam Line Radiation Monitors. This NRC identified issue was the subject of a violation in Inspection Report 50-331/96013. The inspectors had no further concerns. This item is closed.

II. Maintenance

M1 Conduct of Maintenance

M1.1 General Comments

a. Inspection Scope (62703, 61726)

The inspectors observed or reviewed all or portions of the following work activities:

- Group I primary containment isolation logic test
- RHRSW quarterly surveillance
- RHRSW pump replacement
- Safety related air compressor replacement
- Reactor recirculation lube oil pump repair

b. Observations and Findings

As discussed below and in Section M3, the inspectors were concerned with several examples of problems with test control.

M1.2 Repeat Example of Incorrect Acceptance Criteria Used for ESW Temperatures

a. Inspection Scope (40500, 61726)

During a daily surveillance on April 8, 1997, the licensee identified that incorrect acceptance criteria had been used since February 9, 1997. The licensee initiated AR 971061. The inspectors reviewed this issue and the similarity to another issue identified on December 8 1996.

b. Observations and Findings

On April 8, 1997, operators performing STP 42A001, "Daily Instrument Checks," identified that incorrect ESW temperature acceptance criteria had been used since February 9, 1997. Apparently, an operator documented the incorrect value in STP 42A001 on February 9, 1997, and this incorrect value had been copied daily into the STPs until identification on April 8, 1997.

As discussed in Inspection Report (IR) 50-331/96011, incorrect acceptance criteria for ESW temperature had been used from October 25 until December 8, 1996. The licensee's practice prior to December 8 had been to record the ESW temperature acceptance criteria on an uncontrolled document in the control room. After the December 8, 1996, finding, operations management directed that operators stop using the uncontrolled document and instead, copy the acceptance criteria from surveillance to surveillance.

The use of incorrect acceptance criteria from October 25 until December 8, 1996, was cited as a violation in IR 50-331/96013. The licensee's response to the

violation discussed corrective actions to prevent recurrence; however, the actions did not prevent the use of the incorrect acceptance criteria from February 9 until April 8, 1997.

c. Conclusions

The licensee's corrective actions for the use of incorrect acceptance criteria in December 1996 were ineffective in that incorrect acceptance criteria were again used from February 9 until April 8, 1997. This is considered a violation of 10 CFR Part 50, Appendix B, Criterion XVI. (50-331/97007-01)

M3 Maintenance Procedures and Documentation

M3.1 RHRSW Surveillance Testing Discrepancy

a. Inspection Scope (62703)

The inspectors observed the performance of surveillance test procedure (STP) 45C001-Q, "RHR Service Water Operability Test," Revision 8 on March 31, 1997. The inspectors reviewed the surveillance in detail, including, TS requirements, TS bases, Operating Instructions, and test results.

b. Observations and Findings

The inspectors identified a discrepancy between the surveillance test line-up and the design basis. An analysis was performed in 1983 to reduce the TS required flow rate from 2400 gallons per minute (gpm) to 2040 gpm. The analysis assumed the flow rate of 2040 gpm was delivered to the RHR heat exchanger. During surveillance testing per STP 45C001-Q on March 31, the licensee closed the normally open RHRSW continuous strainer backwash valve before taking the required pressure and flow readings. Closing the backwash valve prior to demonstrating adequate flow rate did not test the most limiting case. By design, the backwash flow rate was approximately 200 gpm.

In response to the inspectors' concerns, the licensee initiated AR 971037 and performed an operability evaluation. Using actual test results, the licensee demonstrated that there was sufficient margin to support design basis flow rate to the heat exchanger with the backwash valve open. The licensee also initiated Document Change Form 97-T-0098, which revised the STP steps to ensure the backwash valve was in the normally open position prior to demonstrating the TS required flow rate for future testing.

c. Conclusions

Although there were no operability concerns, the inspectors were concerned that the test procedure was inadequate. The inspectors concluded that corrective actions were appropriate. This constituted a violation of 10 CFR Part 50, Appendix B, Criterion XI. (50-331/97007-02).

M².2 Incorrect Acceptance Criteria Used Due to Document Change Form (DCF) Not Incorporated During Surveillance

a. Inspection Scope

On April 10, 1997, the licensee identified that changes made to the main steam low pressure switches STP by a DCF were not incorporated prior to performance of the STP on March 25, 1997. This was documented on AR 971137. The inspectors reviewed this issue and the corrective actions for other recent problems with control of DCFs.

b. Observations and Findings

On February 23, 1997, in response to NRC concerns regarding instrument setpoint values (reference IR 50-331/97004), the licensee issued a DCF to revise acceptance criteria and as-left values for main steam low pressure instrumentation calibrated per STP 42A003-Q. When the STP was performed on March 25, 1997, the DCF was not in the test package and, therefore, the old acceptance criteria were used. As a result, all four pressure switches were left outside of the new acceptance criteria. The licensee documented that the switches were operable because they were within the allowable values. The instruments were promptly reset to the new acceptance criteria on April 11, 1997.

The inspectors were concerned with this issue because of the similarity to other recent problems with control of DCFs. See IRs 50-331/96-06, 96-07, and 96011 for details. In the licensee's response to the violation in IR 50-331/96011, corrective actions were discussed that were expected to prevent recurrence of further problems with DCFs. The corrective actions are considered ineffective in that this additional example occurred on March 25, 1997.

c. Conclusions

The inspectors were concerned that control of documents change forms continues to be a challenge at Duane Arnold Energy Center. The failure of the test package performed on March 25, 1997, to incorporate the new acceptance criteria was considered an example of a violation of 10 CFR Part 50, Appendix B, Criterion XVI (50-331/97007-03).

III Engineering

E2 Engineering Support of Facilities and Equipment

a. Inspection Scope (37551)

The inspectors evaluated engineering involvement in resolution of emergent material condition problems and other routine activities. The inspectors reviewed areas such as operability evaluations, root cause analyses, safety committees, and self

assessments. The effectiveness of the licensee's controls for the identification, resolution, and prevention of problems was also examined.

E2.1 Increase in Vibration Levels on "A" RHRSW Pump

a. Inspection Scope (37551)

On April 4, 1997, during review of test results from STP 45C001-Q, "RHRSW Operability Test," engineering identified increased vibration on the "A" RHRSW pump. Although the vibration values met the acceptance criteria, engineering recommended prompt pump replacement. The inspectors reviewed current and past test results for this pump and observed the pump replacement.

b. Observations and Findings

On April 4, 1997, during final review of test results from the STP performed on March 31, 1997, engineering identified an increase in vibration levels on the "A" RHRSW pump. Engineering characterized this as an acute rubbing or looseness condition developing on the pump. Operations considered the pump inoperable and entered a 30-day LCO.

On April 9, the "A" RHRSW pump was replaced with a rebuilt spare. The inspectors observed that the pump replacement was well coordinated between operations, maintenance, and engineering. (Weaknesses identified with the post-installation testing are discussed in IR 50-331/96006.)

On April 11, 1997, testing of the new pump showed higher than expected vibration levels. Engineering obtained additional vibration data and concluded that the high vibration was possibly due to storage of the pump in a horizontal position in the warehouse for over a year. Engineering performed an operability evaluation for Operations and the LCO was canceled on April 18. The new pump was considered to be in "alert" and increased testing was scheduled. Weekly testing of the pump showed that the vibration appeared to be trending down, indicating improvement over time, consistent with the licensee's operability evaluation.

c. Conclusions

The inspectors considered that engineering support was effective in identifying a degraded condition before pump operability was affected. Also maintenance and engineering coordinated effectively to promptly replace the pump. The inspectors planned to review the licensee's root cause analysis for the increase in vibration and the problem with the new pump's high vibration. This is considered an Inspection Follow-up Item (50-331/97007-04).

IV Plant Support

F1 Control of Fire Protection Activities

F1.1 Inadequate Turnover Between Fire Watches

a. Inspection Scope (71750)

During plant tours and observations of maintenance activities, the inspectors examined fire barriers, emergency lighting, and control of flammable materials. The inspectors identified a concern with the turnover between two firewatches.

b. Observations and Findings

On April 15, 1997, during plant tours, the inspectors observed a person performing the required 30-minute firewatch following hot work. When the inspectors questioned the individual on the nature and location of the hot work that had been performed, the individual stated that there had been a grinding activity, but he could not identify the location. The inspectors discussed this concern with maintenance supervision who indicated that the firewatch had relieved another firewatch who had been there during the grinding activity. Maintenance supervision agreed that the firewatch turnover was inadequate.

In response to the inspector's concerns, the licensee initiated changes to Administrative Control Procedure 1412.3, "Control of Ignition Sources," to include specific requirements for briefings to relieving firewatches.

c. Conclusions

The inspectors were concerned with the inadequate turnover between the firewatches. The licensee's corrective actions were considered appropriate.

V. Management Meetings

X1 Exit Meeting Summary

The inspectors presented the inspection results to members of licensee management at the conclusion of the inspection on April 25, 1997. The licensee acknowledged the findings presented.

The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

J. Franz, Vice President Nuclear
G. Van Middlesworth, Plant Manager
R. Anderson, Manager, Outage and Support
P. Bessette, Manager, Engineering
J. Bjorseth, Maintenance Superintendent
D. Curtland, Operations Manager
K. Peveler, Manager, Regulatory Performance

INSPECTION PROCEDURES USED

IP 37551: Onsite Engineering
IP 40500: Effectiveness of Licensee Controls in Identifying, Resolving, and Preventing Problems
IP 61726: Surveillance Observation
IP 62703: Maintenance Observation
IP 62707: Maintenance Observation
IP 71707: Plant Operations
IP 71750: Plant Support
IP 92700: Onsite Followup of Written Reports of Nonroutine Events at Power Reactor Facilities
IP 92901: Followup - Operations
IP 92902: Followup - Engineering
IP 92903: Followup - Maintenance

ITEMS OPENED AND CLOSED

Opened

50-331/97007-01 NOV Repeat Example of Incorrect ESW Acceptance Criteria
50-331/97007-02 NOV RHRSW STP Not Consistent With Design Basis
50-331/97007-03 NOV Repeat Occurrence Of Problem With DCF Control - Incorrect Acceptance Criteria for Main Steam Low Pressure Switches
50-331/97007-03 IFI Increased Vibration on "A" RHRSW Pump

Closed

50-331/94007 LER RHR System Shutdown Cooling Isolation
50-331/95004 LER Inadvertent Group 3 Isolations From Invalid Signals
50-331/96013-03 VIO Main Steam Line Radiation Monitors Not Set Per TS
50-331/97001 LER Failure to Comply with TS for Main Steam Line Radiation Monitors

LIST OF ACRONYMS USED

ACP	Administrative Control Procedure
AR	Action Request
CFR	Code of Federal Regulations
DAEC	Duane Arnold Energy Center
DCF	Document change form
ESW	Emergency service water
GPM	Gallons per minute
HPCI	High Pressure Coolant Injection
IFI	Inspection followup item
IR	Inspection report
LCO	Limiting Condition for Operation
LER	Licensee Event Report
NOV	Notice of Violation
NRC	Nuclear Regulatory Commission
PDR	Public document room
RCIC	Reactor Core Isolation Cooling
RHR	Residual heat removal
RHRSW	Residual heat removal service water
SBDG	Standby diesel generator
STP	Surveillance Test Procedure
TS	Technical Specification
UFSAR	Updated Final Safety Analysis Report