

April 17, 2000

Mr. David Wilson
Vice President, Nuclear
IES Utilities, Inc.
Alliant Tower
200 First Street SE
P. O. Box 351
Cedar Rapids, IA 52406-0351

SUBJECT: DUANE ARNOLD INSPECTION REPORT 50-331/2000001(DRP)

Dear Mr. Wilson:

This refers to the inspection conducted on February 10 through April 1, 2000, at the Duane Arnold Energy Center (DAEC) facility. The NRC conducted a routine safety inspection. The enclosed report presents the results of this inspection.

During this 7-week inspection period, your staff's conduct of activities at the DAEC facility was characterized by good coordination of maintenance activities between operations and maintenance personnel. We noted that site management conservatively decided to reduce power to repair a steam leak on a moisture separator reheater manway. However, we note that a planned modification following a repair to address a similar steam leak in 1991 was not installed during a subsequent refueling outage due to an outage scheduling error. This resulted in an unnecessary dose expenditure of approximately 235 millirem to perform the current additional repair, and the power manipulations performed to support the repair represented an unnecessary challenge to operators.

No violations of NRC requirements were identified during the course of this inspection.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be placed in the NRC Public Electronic Reading Room link at the NRC homepage, <http://www.nrc.gov/NRC/ADAMS/index.html>.

Sincerely,

/RA/

Kenneth Riemer, Acting Chief
Reactor Projects Branch 2

Docket No. 50-331
License No. DPR-49

Enclosure: Inspection Report 50-331/2000001(DRP)

See Attached Distribution

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D. Wilson

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cc w/encl: E. Protsch, Executive Vice President,
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K. Peveler, Manager, Regulatory Performance
State Liaison Officer
Chairperson, Iowa Utilities Board
The Honorable Charles W. Larson, Jr.
Iowa State Representative

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U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No: 50-331
License No: DPR-49

Report No: 50-331/2000001(DRP)

Licensee: Alliant, IES Utilities Inc.
200 First Street SE
P. O. Box 351
Cedar Rapids, IA 52406-0351

Facility: Duane Arnold Energy Center

Location: Palo, Iowa

Dates: February 10 through April 1, 2000

Inspectors: P. Prescott, Senior Resident Inspector
M. Kurth, Resident Inspector

Approved by: Kenneth Riemer, Acting Chief
Reactor Projects Branch 2
Division of Reactor Projects

EXECUTIVE SUMMARY

Duane Arnold Energy Center NRC Inspection Report 50-331/2000001(DRP)

This inspection report included the resident inspectors' evaluations of aspects of licensee operations, engineering, maintenance, and plant support.

Operations

- Operators maintained good oversight of control room activities during routine and non-routine evolutions. This included good operator knowledge of plant equipment status and effective communications between operators and reactor engineers. (Section O1.1)

Maintenance

- Overall, maintenance activities and surveillance tests were conducted in an acceptable manner. However, the inspectors identified poor foreign material exclusion control which allowed insulation debris to enter the reactor core isolation cooling barometric condenser condensate pump motor during maintenance. In addition, during movement of the refueling mast in support of maintenance activities, the z-positioner display fell into the fuel pool due to inadequate fastening of the z-positioner transducer cable and display to the refueling bridge. (Section M1.1)
- Maintenance workers were proficient in performing a weld repair of the "A" moisture separator reheater manway, which minimized their accumulated radiation dose. However, a planned modification following a repair to address a similar steam leak in 1991 was not installed during a subsequent refueling outage due to an outage scheduling error. This resulted in 235 millirem of unnecessary dose to perform the additional repair, and the associated power reduction performed to support the repair represented an unnecessary challenge to operators. (Section M1.2)

Engineering

- The licensee effectively demonstrated, through testing, that the primary containment nitrogen makeup valves were capable of closing during a design basis accident. The inspectors noted good communications between engineering, maintenance, and operations personnel during the testing. (Section E1.1)

Plant Support

- Operations shift management made timely and accurate emergency classifications during an emergency preparedness drill. The inspectors identified a discrepancy between the drill and the exercise scenario manual. (Section P1.1)

Report Details

Summary of Plant Status

The licensee operated the plant at full power at the beginning of the inspection period. On February 26, licensee personnel reduced power to 64 percent to perform a control rod sequence exchange and main turbine valve testing, and returned the plant to full power the following day. On March 5, licensee personnel reduced power to 55 percent to support weld repair activities on the "A" moisture separator reheater manway, and returned the plant to full power the same day. The plant operated at or near full power for the remainder of the inspection period.

I. Operations

O1 Conduct of Operations

O1.1 Observations of Routine Activities and Power Reductions and Ascensions

a. Inspection Scope (71707)

The inspectors conducted reviews of operators and operations shift management during shift activities. The reviews included observations of control room shift turnovers and operator performance during plant evolutions. The inspectors interviewed operations personnel regarding plant status and events, and reviewed daily logs.

The inspectors observed the following evolutions:

On February 26, operators reduced power to 64 percent to support a control rod sequence exchange and main turbine valve testing. Operators returned the plant to full power following the completion of the work.

On March 5, operators reduced power to 55 percent to support weld repair activities on the "A" moisture separator reheater. Operators returned the plant to full power following the completion of the work.

b. Observations and Findings

The inspectors observed that operations personnel effectively communicated operational information, maintained accurate records, and were knowledgeable of plant and equipment status. Operators conducted effective shift turnovers and made proper use of procedures. Overall, the operators were properly focused on safe operation of the plant.

On February 26, 2000, operators reduced reactor power for a control rod sequence exchange and main turbine valve testing. Control rod manipulations were performed without error. The inspectors noted good communication between operations and reactor engineering personnel.

On March 5, 2000, licensee management conservatively reduced power to support weld repair work on the "A" moisture separator reheater (see Section M1.2). Following the

weld repair, operators returned the plant to full power. The power reduction and ascension were conducted properly and without error.

c. Conclusions

Operators maintained good oversight of control room activities during routine and non-routine evolutions. This included good operator knowledge of plant equipment status and effective communications between operators and reactor engineers.

O2 Operational Status of Facilities and Equipment

O2.1 General Plant Tours and System Walkdowns (71707)

The inspectors walked down accessible portions of the reactor core isolation cooling (RCIC) system. Equipment operability, material condition, and housekeeping were acceptable. The inspectors did not identify any substantive concerns.

O8 Miscellaneous Operations Issues (92901)

O8.1 (Closed) Licensee Event Report (LER) 50-331/2000001-00: Automatic Reactor Scram While Restoring Level Transmitter to Service

This event was discussed in Inspection Report 50-331/99015(DRP). No new issues were revealed by the LER. A violation of NRC requirements was previously identified for an inadequate procedure. This LER is closed.

II. Maintenance

M1 Conduct of Maintenance

M1.1 General Comments

a. Inspection Scope (62707, 61726)

The inspectors observed all or portions of the maintenance and surveillance activities listed below. The applicable surveillance test or work package documentation was reviewed.

Maintenance Activities

- Corrective Work Order (CWO) A46002: Dryer separator storage pit drain isolation valve V34-0028 - Fix valve leak
- CWO A46368: Main generator exciter rectifier bank number 1 - Investigate and repair 40 drop per minute leak
- Preventive Work Order (PWO) 1111605: Residual heat removal (RHR) pump 1P-229A suction shutdown cooling valve operator MO-2011 - Overhaul Limitorque actuator
- PWO 1111606: RHR system heat exchanger vent valve to torus MO-2044A - Lubricate and inspect Limitorque actuator

- PWO 1111610: RCIC outboard torus suction isolation valve operator MO-2517 - Valve Operation and Testing Evaluation System testing

Surveillance Activities

- Equipment Monitoring Procedure 1E201-HT, "RHR Heat Exchangers 1E201A and 1E201B Heat Transfer Test," Revision 2
- Surveillance Test Procedure (STP) 3.3.1.1-13, "Turbine Control Valve EOC [End of Cycle] RPT [Reactor Protection Trip] Logic and RPS [Reactor Protection System] Functional Test," Revision 2
- STP 3.3.1.1-19, "Functional Test of TSV [Turbine Stop Valve] Closure Input to RPS and RPT," Revision 3
- STP 3.5.1-04, "LPCI [Low Pressure Coolant Injection] Subsystem Simulated Automatic Actuation," Revision 0
- STP 3.6.1.3-03, "MSIV [Main Steam Isolation Valve] Trip/Closure Time Check," Revision 0
- STP 3.7.7-01, "Bypass Valves Test," Revision 1
- STP NS930002, "Main Turbine Stop and Combined Intermediate Valves Test," Revision 0

b. Observations and Findings

Overall, the activities were conducted effectively and in a thorough manner. Technicians were knowledgeable of their assigned tasks and work document requirements. However, the inspectors identified an example of poor foreign material exclusion control during RCIC system maintenance. The inspectors observed that during the removal of insulation from the barometric condenser, debris entered the condenser condensate pump motor. The inspectors brought this to the attention of licensee personnel. An electrical maintenance technician subsequently vacuumed the internals of the motor and removed the debris.

Also, on March 27, 2000, licensee personnel were in the process of removing the refueling bridge mast from the fuel pool. When the mast was nearly retracted, due to an improperly fastened transducer cable, the z-positioner display, which provided a digital readout of mast and grapple height, was pulled out of its storage tray. The weight of the display caused the transducer cable to unplug from the back of the display, and the z-positioner display fell into the fuel pool. The licensee retrieved the display from the pool and verified that no components in the pool, including fuel bundles, were damaged.

During a review of this event, the licensee determined that during preparations for fuel movements during the previous refueling outage, the z-positioner display was removed for repairs. When the display was removed from the refueling bridge, duct tape that was used to prevent movement of the display, was removed. The duct tape was not used when the display was reinstalled on the refueling bridge. The inspectors determined that the use of duct tape was not appropriate since it was potential foreign material and had not been evaluated for use as a fastener for the z-positioner display. In addition, the z-positioner modification package included a mounting bracket which would have prevented this event, but was not installed.

The inspectors verified that the z-positioner display was being replaced with two new units that were to be attached by fasteners to the bridge. In addition, the licensee

planned to revise applicable procedures to include an inspection of the refueling bridge to ensure no loose equipment could become dislodged during use.

c. Conclusions

Overall, maintenance and surveillance activities were conducted in an acceptable manner. However, the inspectors identified poor foreign material exclusion control, which allowed insulation debris to enter the RCIC barometric condenser condensate pump motor. In addition, during movement of the refueling mast in support of maintenance activities, the z-positioner display fell into the fuel pool due to inadequate fastening of the z-positioner transducer cable and display to the refueling bridge. The z-positioner modification included a mounting bracket which would have prevented this event, but was not installed.

M1.2 Moisture Separator Reheater (MSR) Manway Steam Leak Repair

a. Inspection Scope (62707)

The inspectors observed portions of repair activities to address a steam leak on the "A" MSR manway. The inspectors reviewed the following documents:

- CWO A46416, "Manway on Turbine Side of MSR Leaking"
- Engineered Maintenance Action (EMA) 11042G, "Replace MSR Manway With New Design"
- DAEC Library No. G080LSTG V4, "Volume IV MSR, General Electric (GE) Vendor Manual"

b. Observations and Findings

On February 27, 2000, operations personnel observed a 3-foot steam plume from a hole in the seal ring weld on the "A" MSR manway. Corrective Work Order A46416 was generated to seal weld a 1-inch pipe with an attached spool valve over the leak pending a permanent modification during the next refueling outage. On March 5, reactor power was reduced to 55 percent and the repair work was performed. Maintenance workers were proficient in performing the weld repair, which minimized their accumulated radiation dose to 235 millirem.

During a review of this event, the licensee discovered that a similar MSR repair was performed in 1991. The repair was intended to be temporary until the next refueling outage when a strongback modification was to be installed. Although the modification was planned, it was not installed in subsequent refueling outages due to an outage scheduling error. Action Request (AR) 18606 was generated to ensure that the modification would be installed during the next refueling outage.

c. Conclusions

Maintenance workers were proficient in performing a weld repair of the "A" moisture separator reheater manway, which minimized their accumulated radiation dose. However, a planned modification following a repair to address a similar steam leak in 1991 was not installed during a subsequent refueling outage due to an outage scheduling error. This resulted in 235 millirem of unnecessary dose to perform the

additional repair, and the associated power reduction performed to support the repair represented an unnecessary challenge to operators.

M8 Miscellaneous Maintenance Issues (92902)

- M8.1 (Closed) LER 50-331/99007-00: Safety Relief Valve Opened During 125 Volts Direct Current Ground Troubleshooting Due to Two Faults in the Solenoid Valve Direct Current Circuit.

This event was discussed in Inspection Report 50-331/99014(DRP). No new issues were revealed by the LER. This LER is closed.

III. Engineering

E1 Conduct of Engineering

E1.1 Primary Containment Isolation Valves - Nitrogen Makeup System

a. Inspection Scope (37551)

The inspectors reviewed the licensee's actions after licensee personnel identified that three nitrogen makeup primary containment isolation valves may not be capable of automatic closure at the design basis accident differential pressure of 45 pounds per square inch differential (psid). The inspectors discussed this issue with operations, maintenance, and system engineering personnel. The inspectors reviewed the following documents:

- CWO A49587, "Diagnostic Testing of Containment Nitrogen Makeup Supply Isolation Valve CV4311"
- CWO A49588, "Diagnostic Testing of Containment Nitrogen Makeup Isolation Valve CV4312"
- CWO A49589, "Diagnostic Testing of Containment Nitrogen Makeup Isolation Valve CV4313"
- AR 18916, "Degradation of CV4311, CV4312, and CV4313 - Operator Performance"
- STP 3.6.1.3-02, "Primary Containment Isolation System and American Society of Mechanical Engineers Valve Functional Test"

b. Observations and Findings

On February 14, 2000, while performing calculations associated with the air-operated valve program, engineering personnel identified that primary containment isolation valves CV4311, CV4312, and CV4313 were potentially incapable of automatic closure during a design basis loss-of-coolant-accident (DBLOCA). The required closing force generated by the valve operating springs was calculated to be lower than the required thrust necessary following a DBLOCA. The licensee declared the valves inoperable and, in accordance with technical specifications, isolated the affected flow path. The inspectors verified that the containment path was properly isolated. The licensee notified the NRC Headquarters Operations Center in accordance with 10 CFR 50.72(b)(1)(ii)(B).

On February 15 through 17, the licensee performed testing on the primary containment nitrogen makeup isolation valves. The planned testing documents were of appropriate detail and provided sufficient instructions. The testing results demonstrated that the actual valve seating force exceeded the required seating force, and the valves would close during a DBLOCA. The inspectors observed good communications between engineering, maintenance, and operations personnel during the test. The licensee declared the valves operable, exited the technical specification limiting condition for operation, and retracted the 10 CFR 50.72 notification. As part of their long-term corrective actions, the licensee planned to replace the actuator springs on the valves to increase the operability margin.

c. Conclusions

The licensee effectively demonstrated, through testing, that the primary containment nitrogen makeup isolation valves were capable of automatic closure during a design basis accident. The inspectors noted good communications between engineering, maintenance, and operations personnel during the testing.

E8 Miscellaneous Engineering Issues (92903)

E8.1 (Closed) Unresolved Item 50-331/97-006-11: Review of AR 97-967 Evaluation Results. This item was originally opened due to a concern about a discrepancy between the river water inlet temperature and the temperature at the residual heat removal heat exchangers. The original concern was reviewed in Inspection Report 50-331/99-002, at which time the inspectors noted that the licensee had put into place administrative controls in the event river temperature exceeded 90 degrees. The inspectors also noted that the majority of the 4.3 degrees discrepancy was thought to be due to the effects of instrument uncertainty upon the heat exchanger performance test results. The licensee wrote action requests AR 8106, 8107 and 8108 to address these associated concerns and revised residual heat removal heat exchanger heat transfer testing procedure EMP-1E201-HT "RHR Heat Exchangers 1E-201A&B Heat Transfer Test," Revision 2, to incorporate appropriate corrective actions. The inspectors reviewed the action requests and the revised procedure and determined the actions were acceptable. The inspectors noted that the licensee had not identified any occasions where the river temperature exceeded 91 degrees and the residual heat removal heat exchangers were in service. Therefore, no violation occurred. Between the administrative controls and the revised heat exchanger testing procedures, the inspectors had no concerns that the heat exchangers could be placed into a beyond the design basis operating condition. This item is closed.

E8.2 (Closed) LER 50-331/99006-00: Indications in Recirculation Riser Nozzle to Safe-End Welds.

This event was discussed in Inspection Reports 50-331/99013(DRS) and 50-331/99014(DRP). No new issues were revealed by the LER. This LER is closed.

IV. Plant Support

P1 Conduct of Emergency Preparedness Activities

P1.1 Emergency Preparedness Drill Observation

a. Inspection Scope (71750)

The inspectors observed an emergency preparedness drill on February 23, 2000. The inspectors observed operations personnel in the simulator and reviewed the associated "Exercise Scenario Manual."

b. Observations and Findings

The emergency drill allowed personnel an opportunity to classify emergencies that included an unusual event, alert, and a general emergency. Operations shift management made timely and accurate emergency classifications. The inspectors identified a discrepancy between the drill and the exercise scenario manual. Section 6.1, "Master Sequence of Events," discussed initial conditions that included spent fuel movements on the refueling floor. During the drill, the operations staff did not contact the refueling floor to secure fuel movements. When questioned, an emergency preparedness staff member explained that initial conditions provided to the simulator crew had not included fuel movement activities; however, the exercise scenario manual was not revised to reflect the change.

c. Conclusions

Operations shift management made timely and accurate emergency classifications during the emergency preparedness drill. The inspectors identified a discrepancy between the drill and the exercise scenario manual.

R8 Miscellaneous Plant Issues (92904)

R8.1 (Closed) Inspection Followup Item (IFI) 50-331/99008-01: Justification Documentation for Not Calibrating Area Radiation Monitors Referenced in the Updated Final Safety Analysis Report.

The licensee initiated ARs 16465 and 16539 to review the deletion of calibrations for 15 non-emergency area radiation monitors (ARMs). The licensee determined that periodic calibration of the ARMs was prudent. The ARMs were added to the calibration program on a 4-year calibration frequency. This item is closed.

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 March 31, 2000. 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

R. Anderson, Plant Manager
J. Bjorseth, Maintenance Superintendent
D. Curtland, Operations Manager
R. Hite, Manager, Radiation Protection
M. McDermott, Manager, Engineering
K. Peveler, Manager, Regulatory Performance
G. Van Middlesworth, Site General Manager
D. Wilson, Vice President Nuclear

INSPECTION PROCEDURES USED

IP 37551: Onsite Engineering
IP 61726: Surveillance Observation
IP 62707: Maintenance Observation
IP 71707: Plant Operations
IP 71750: Plant Support
IP 92901: Followup - Operations
IP 92902: Followup - Maintenance
IP 92903: Followup - Engineering
IP 92904: Followup - Plant Support

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

50-331/97-006-11	URI	Residual Heat Removal System concerns
50-331/99006-00	LER	Indications in Recirculation Riser Nozzle to Safe-End Welds
50-331/99007-00	LER	Safety Relief Valve Opened During 125 Volts Direct Current Ground Troubleshooting Due to Two Faults in the Solenoid Valve Direct Current Circuit
50-331/99008-01	IFI	Justification Documentation for not Calibrating Area Radiation Monitors Referenced in the Updated Final Safety Analysis Report
50-331/2000001-00	LER	Automatic Reactor Scram While Restoring Level Transmitter to Service

Discussed

None

LIST OF ACRONYMS USED

AR	Action Request
ARM	Area Radiation Monitors
CFR	Code of Federal Regulations
CWO	Corrective Work Order
DAEC	Duane Arnold Energy Center
DBLOCA	Design Basis Loss-of-Coolant-Accident
DRP	Division of Reactor Projects
DRS	Division of Reactor Safety
EMA	Engineered Maintenance Action
EOC	End of Cycle
GE	General Electric
IFI	Inspection Followup Item
IP	Inspection Procedure
LER	Licensee Event Report
LPCI	Low Pressure Coolant Injection
MSIV	Main Steam Isolation Valve
MSR	Moisture Separator Reheater
psid	Pounds Per Square Inch Differential
PWO	Preventive Work Order
RCIC	Reactor Core Isolation Cooling
RHR	Residual Heat Removal
RPS	Reactor Protection System
RPT	Reactor Protection Trip
STP	Surveillance Test Procedure
TSV	Turbine Stop Valve
URI	Unresolved Item