U. S. NUCLEAR REGULATORY COMMISSION

REGION III

REPORT NO. 50-331/95009

FACILITY

Duane Arnold Energy Center
License No. DPR-49

LICENSEE

IES Utilities Incorporated
IE Towers, P. O. Box 351
Cedar Rapids, IA 52406

DATES

September 22 through October 28, 1995

INSPECTORS

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APPROVED BY

R. D. Lanksbury, Chief
Reactor Projects Branch 2

12/13/95
Date

AREAS INSPECTED

Routine, unannounced inspection of plant operations, maintenance, surveillance, onsite engineering, and plant support. Safety assessment and quality verification activities were routinely evaluated.

EXECUTIVE SUMMARY

The inspectors and the licensee identified several concerns within the area of **OPERATIONS** pertaining to valve positioning and communications. The concerns identified were:

- Five extraction steam valves were found partially open instead of closed, as required. This resulted in an unresolved item (URI) (Section 1.2).

- A small flame occurred during the standby diesel generator surveillance. Operators failed to communicate this to plant management and did not document the occurrence on an action request form (Section 3.3).

Examples of excellent operator attentiveness to equipment condition included operators' actions to carefully monitor an increasing emergency diesel generator bearing temperature, to identify that room ventilation louvers were closed when expected to be open, and to secure the test when administrative limits were exceeded (Section 2.1).

During the review of the **MAINTENANCE** area the inspectors and the licensee identified several work planning concerns which included:

- The incorrect installation of a temperature controller for diesel room ventilation (being tracked as a URI). This issue was of concern due to multiple barriers that broke down, including work planning, self-checking, and post maintenance testing (Section 2.1).

- Work planning weaknesses also contributed to problems with a residual heat removal service water (RHRSW) maintenance outage and difficulties during the installation of a replacement well water pump (Section 2.3).

- The lack of control to ensure configuration of environmentally qualified transmitters was an inspection followup item (Section 2.2)

Maintenance activities performed to replace bushings on the autotransformer were well controlled and the inspectors noted strong management oversight of the evolution.

Within the area of **ENGINEERING** the inspectors and licensee identified a concern involving the improper anchoring of a new well water pump during its replacement by a vendor. This issue was of concern due to engineering's failure to utilize quality control measures to prevent the occurrence (Section 3.2).

The inspectors' review of the **PLANT SUPPORT** area did not identify any concerns. Operator access to ECCS pumps improved as a result of a decontamination effort in the reactor building northwest corner room.

The inspectors review in the area of **SELF ASSESSMENT AND QUALITY VERIFICATION** did not identify any concerns. Licensee management aggressively responded to the weaknesses associated with pre-planned RHRSW maintenance outage and initiated a formal root cause evaluation to determine corrective actions.

Summary of Open Items
Unresolved Items: Identified in Sections 1.2 and 2.1
Inspection Followup Item: Identified in Section 2.2

DETAILS

1.0 PLANT OPERATIONS (71707) (92901)

The inspectors observed control room operations, reviewed applicable logs, and conducted discussions with control room operators during the inspection. The inspectors verified the operability of selected emergency systems, reviewed tagout records, and verified proper return to service of affected components. The inspectors conducted tours of the reactor and turbine buildings, pump house, and river intake structure to observe equipment materiel condition and plant housekeeping, and to verify that maintenance work requests had been initiated for equipment in need of maintenance. The inspectors observed that the Plant Manager and Operations Supervisor were well-informed of the overall status of the plant and that they made frequent visits to the control room.

These reviews and observations were conducted to verify that facility operations were in conformance with the requirements established under technical specifications (TS), Title 10 of the *Code of Federal Regulations*, and administrative procedures.

1.1 Plant Materiel Condition

Overall, materiel condition was good, however, the inspectors noted that a number of materiel condition issues arose during the inspection period that required the operators to take prompt action and/or resulted in technical specification limiting condition for operation (LCO) entries. While each individual occurrence was of low safety significance, they represented distractions for operators and other plant staff. In each case, the issue was entered into the plant's maintenance process or corrective action process, where appropriate. The examples are listed below:

- On September 21 and 23, 1995, the "A" reactor water cleanup pump tripped for no obvious reason. After troubleshooting and working with the vendor representative, the problem was found to be degraded components in the variable speed controller, which were subsequently repaired.

- During monthly standby diesel generator (SBDG) surveillance testing on September 17 and October 19, 1995, operators noticed a small, short-lived flame on the exhaust manifold piping for the "B" SBDG. By the end of the inspection period, additional corrective actions were being planned to minimize the chances of future occurrence. See Section 3.3 for details.

- On October 20, 1995, during monthly testing of the "A" SBDG, administrative limits were reached on the generator bearing temperature after approximately 2 hours of operation. Operators secured the test and declared the SBDG inoperable. This was

subsequently determined to be caused by the incorrect installation of the SBDG room ventilation temperature controller. See Section 2.1 for details.

- On October 5, 1995, the cooling tower fan failed when an oil line cracked, spilling oil out, which caused the gears to seize. The licensee determined that the oil line failure was age-related and walked down the other cooling tower fans to look for any similar conditions. No immediate concerns were identified.

1.2 Extraction Steam Valves Found Out of Normal Position

During the routine downpower on October 8, 1995, maintenance personnel identified several drain valves in the condenser and heater bays that appeared to be open. Upon investigation, operators determined that a total of 5 valves were open instead of closed as required. Valve line-up records indicated that the valves were closed prior to start up from refueling outage 13 (April 1995). The licensee could not identify any documentation or information suggesting that the valves had been repositioned for any reason subsequent to the refueling outage. The incorrect positioning of the valves complicated efforts to troubleshoot and resolve the water intrusion into the standby gas treatment (SBGT) system (reference IR 50-331/95007 and IR 50-331/95008). The licensee initiated a root cause analysis to determine the cause of the incorrect valve positions and corrective actions. Pending inspector review of the licensee's investigation, this is an **unresolved item (50-331/95009-01(DRP))**.

1.3 Good Control Room Turnovers and Operator Rounds

Control Room Turnover

Operators maintained a business like and professional approach to control room turnovers. They were attentive, responsive, and identified plant activities that had the potential to conflict with each other. For example, divers were to enter the intake and circulating water pits for maintenance activities, however, electrical lighting panel work was also scheduled for performance that would have affected the intake pit work. After the operators' identification of the conflict, the licensee quickly established priorities and allowed the divers to complete their activities prior to performance of the electrical work.

Plant Rounds

The inspector observed an operator training a new second assistant for the position. Overall, both performed their respective activities well. The trainer carefully double checked all readings obtained by the trainee and made immediate corrections when necessary. Problems identified were quickly resolved, either on the spot by the individual, or by contacting the appropriate organization. For example, an air lock door with a faulty handle was reported to maintenance for repair and a drain system on a valve was turned over to maintenance for replacement. While inspecting the recirculation pump motor generator (MG) set room, a slow oil leak on a closed electric motor was not observed by the operators, however, when notified by the accompanying NRC inspector, the

matter was quickly investigated and additional leakage problems were identified and reported to maintenance.

No violations or deviations were identified in this area. One unresolved item was identified.

2.0 MAINTENANCE AND SURVEILLANCE OBSERVATION (61726) (62703) (92902)

Station maintenance activities of safety-related systems and components listed below were observed and/or reviewed to verify that they were conducted in accordance with approved procedures, regulatory guides, industry codes or standards, and in conformance with TS.

The inspectors observed safety-related surveillance testing and verified that testing was performed in accordance with adequate procedures, that test instrumentation was calibrated, that LCOs were met, that removal and restoration of the affected components were accomplished, that test results conformed with TS and procedure requirements and were reviewed by personnel other than the individual directing the test, and that any deficiencies identified during the testing were properly reviewed and resolved by appropriate management personnel.

The inspectors witnessed portions of maintenance activities on equipment such as the feedwater regulating valve actuator, autotransformer, reactor water cleanup (RWCU) pump controller, RWCU demineralizer, condensate demineralizer, and cooling tower fans, and portions of plant winterization.

The inspectors witnessed portions of test activities on equipment such as SBDGs, reactor core isolation cooling system, and high pressure coolant injection.

Overall, maintenance and surveillance performance was adequate during the inspection period. The inspectors noted several examples where work planning was weak.

2.1 Standby Diesel Generator Room Temperature Controller Installed Incorrectly

On October 20, 1995, during monthly surveillance testing of the "A" SBDG, operators monitored the generator bearing temperature, which was higher than normal. The shift supervisor secured the test after approximately 2 hours of operation, when the temperature reached the vendor provided administrative limit of 205°F. While verifying proper operation of the SBDG room ventilation, the operators identified that the louvers were closed and the room temperature was higher than the expected 108°F. Later in the shift, the cause was determined to be incorrect installation of the room temperature controller, which was replaced on October 9, 1995.

The licensee held a fact-finding meeting on October 20, 1995, and a formal root cause analysis was initiated. Preliminarily, the fact-finding meeting identified that a number of barriers broke down to allow the incorrect installation of the temperature controller, including: (1) lack of specific jumper installation instructions in the work

package in order to ensure that the temperature controller was installed in the reverse acting mode; (2) personnel error during the calibration of the controller which resulted in the failure to identify that it was direct acting instead of reverse acting; (3) inadequate post maintenance testing criteria which resulted in the failure to detect the incorrect installation; and (4) engineering's safety-evaluation applicability review for this work did not specify that this was to be used in the SBDG room.

The impact of the degraded diesel room ventilation on SBDG operability for the time period between October 9 and 20, 1995, was under review by the licensee. Pending completion of the root cause analysis and the operability review, this is an **unresolved item (50-331/95009-02(DRP))**.

The operators' actions to carefully monitor the increasing generator bearing temperature, to identify that room ventilation louvers were closed when expected to be open, and to secure the test when administrative limits were exceeded were examples of excellent operator attentiveness to equipment conditions.

2.2 Plastic Shipping Plugs Installed in Transmitters

During plant tours, the inspectors noted several transmitters with plastic shipping plugs installed in the spare, unused ports. Most of the transmitters in the plant contained steel plugs to seal the unused electrical connection ports. The inspectors discussed the issue with the instrument maintenance supervisor and were informed that current maintenance practices would normally replace the plastic shipping plugs with steel plugs. However, it was unclear as to whether or not appropriate controls existed in order to ensure that appropriate measures were taken for environmentally qualified (EQ) transmitter installation. Although none of the transmitters observed without steel plugs were located in a harsh environment atmosphere, the inspectors were concerned that no administrative controls existed to ensure that the steel plugs were installed in transmitters designed to function in a harsh environment. The inspectors will assess acceptability of the transmitter conditions in harsh environment areas as plant conditions permit access of these areas. Pending further review by the licensee and inspectors, this is an inspection followup item (50-331/95009-03(DRP)).

2.3 Work Planning and Scheduling Weaknesses

During the report period, the inspectors reviewed several maintenance activities and noted that while most activities were well planned, several examples arose where weak work planning contributed to increased outage time or problems with the equipment itself.

Examples of well planned maintenance included:

(1) Plans for a 50 percent downpower on October 8, 1995, to perform turbine valve testing, feedwater regulating valve actuator replacement, and other work were well implemented.

(2) Safety focus and contingency planning were excellent when auto-transformer T-1 was identified as having a degraded bushing and was out of service longer than originally planned.

Examples where planning and scheduling were weak included:

(1) The licensee entered an LCO for a scheduled maintenance outage on the residual heat removal service water (RHRSW) system. Three separate maintenance items, the bulk of the work, were postponed at the last minute due to planning inadequacies. Two of the work packages were taken off of the schedule because of a lack of parts due to personnel error. The third package was not worked because the shift supervisor conservatively halted work when some confusion existed with respect to the required system configuration necessary to perform the maintenance. While these particular events were of low safety significance, the inspectors were concerned that a planned safety system outage went through the licensee's 13-week planning schedule and multiple planning issues caught personnel by surprise at the last minute.

(2) Work on the SBDG room temperature controller was not well controlled and contributed to an elevated generator bearing temperature. As a result of the high bearing temperature, operators secured a TS required SBDG surveillance and declared the diesel inoperable. Poor work planning was one of the barriers that broke down in this event. See Section 2.1 for details.

(3) Work on the installation of a replacement pump for the "B" Well Water Pump was not well controlled and resulted in discharge piping and pump mounting failures during post maintenance testing. While this was primarily a contractor control issue, planning for the job did not ensure that Engineering personnel properly controlled and oversaw work performed by outside contractors. See Section 3.2 for details.

No violations or deviations were identified in this area. One unresolved item and one inspection followup item were identified.

3.0 ONSITE ENGINEERING (37551)

Selected engineering problems or events were evaluated to determine their root cause(s). The effectiveness of the licensee's controls for the identification, resolution, and prevention of problems was also examined. The inspection included review of areas such as corrective action systems, root cause analysis, safety committees, and self assessment. A concern was identified with control of vendor work.

3.1 Engineering Support for Operator Work Arounds

As discussed in NRC inspection report 50-331/95006, the licensee had written an Action Request (AR) document on each operator work around item placed on the list and then the list was prioritized. Since then, some action has been taken for certain items, specifically, good engineering support was evident for reactor vessel water level and feedwater flow oscillations caused mostly by problems with the feedwater regulating valves. Plans were developed for feedwater regulating valve actuator replacements and other work on the controls for the system.

During the 50 percent downpower on October 8, 1995, the "A" feedwater regulating valve actuator was replaced and the oscillations improved. The inspectors will continue to monitor progress on this and other operator work arounds.

3.2 Improper Anchoring of Well Water Pump During Replacement

On October 10, 1995, a vendor improperly anchored a new higher capacity well water pump. While installing the new pump, the vendor realized that the existing embedded studs did not match the new pump base. Therefore, the vendor cut down the studs and new studs were welded to the sole plate. As the pump was running the studs broke off due to cold weld joints caused by using hardened steel studs instead of the type of carbon steel used in the sole plate. The pump shifted causing the spraying of well water containing a weak hypochlorite concentration. Four workers in the area sustained minor eye irritations from the well water. Engineering did not exercise good control of a vendor who was installing the new well water pump. The licensee failed to utilize their quality level controls which should have prevented the wrong studs from being used. This was not considered safety significant since it was not part of a safety system, however, this did demonstrate a lack of vendor control weakness.

3.3 Emergency Diesel Generator Fire

On September 17 and October 19, 1995, a small oil fire occurred on the exhaust piping of the "B" SBDG. A generic design problem with the exhaust manifold flange had allowed oil to leak out of the flange. Since the installation of the SBDG, the exhaust manifold had heated the leaking oil generating smoke. During the SBDG test runs on September 17 and October 19, 1995, a short-lived flame was observed under the exhaust manifold thermal shield. When the inspector questioned the licensee management on this issue, they indicated that they were unaware of the occurrences. The auxiliary operators documented their observations on surveillance sheets but failed to write an Action Request which would have ensured management overview. Licensee management has since planned additional corrective actions to minimize the chances of future occurrence.

No violations or deviations were identified in this area.

4.0 PLANT SUPPORT (71750)

Selected activities associated with radiological controls, radiological effluents, waste treatment, environmental monitoring, physical security, emergency preparedness, and fire protection were reviewed to ensure conformance with facility procedures and/or regulatory requirements. No substantive concerns or issues were identified.

4.1 Decontamination Efforts Improve Operator Access to Emergency Core Cooling System (ECCS) Pumps

The licensee undertook a project to clean, decontaminate, and paint major portion of the reactor building northwest corner room. The room contained one train of residual heat removal pumps, a core spray pump,

and other ECCS valves and instruments. Previously, most of the area near the pumps and instrument racks was contaminated and required dress-out for operator access to check pump oil levels, vibration readings, and materiel condition. Operator access was improved with the decontamination project.

No violations or deviations were identified in this area.

5.0 DEFINITIONS

Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, violations, or deviations. Unresolved items disclosed during the inspection are discussed in Sections 1.2 and 2.1.

Inspection Followup Items

Inspection followup items are matters which have been discussed with the licensee which will be reviewed further by the inspector, and which involve some action on the part of the NRC or licensee, or both. An Inspection followup item disclosed during the inspection is discussed in Section 2.2.

6.0 PERSONS CONTACTED AND MANAGEMENT MEETINGS

The inspectors contacted various licensee operations, maintenance, engineering, and plant support personnel throughout the inspection period. Senior personnel are listed below.

On October 27, 1995, the inspectors met with licensee representatives (designated by *) and summarized the scope and findings of the inspection activities. The licensee did not identify any of the documents or processes reviewed by the inspectors as proprietary.

*J. Franz, Vice President Nuclear
*G. Van Middlesworth, Plant Manager
*R. Anderson, Manager, Outage and Support
*R. Anderson, Operations Supervisor
*P. Bessette, Acting Manager, Nuclear Licensing
*T. Gordon, Acting Maintenance Superintendent
J. Cantrell, Manager, Nuclear Training
*R. Hite, Manager, Radiation Protection
*M. McDermott, Manager, Engineering
K. Peveler, Manager, Corporate Quality Assurance