

U. S. NUCLEAR REGULATORY COMMISSION
REGION III

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Report No. 50-331/96007

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

Facility: Duane Arnold Energy Center

Dates: September 7 - November 5, 1996

Inspectors: K. Riemer, Senior Resident Inspector
M. Kurth, Reactor Engineer

Approved by: M. J. Jordan, Chief
Reactor Projects Branch 5

EXECUTIVE SUMMARY

Duane Arnold Energy Center
NRC Inspection Report 50-331/96007

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

Several examples of human performance problems related to personnel errors and inattention to detail occurred during the period. Significantly, these errors were identified as a result of self-revealing events rather than through the normal self-assessment process. These events continued a trend that emerged during the last inspection period. The events occurred during the conduct of routine activities and were observed across multiple departments. During the latter part of the inspection period, the inspectors observed improved performance during the conduct of refuel outage activities.

Operations

- The inspectors identified an emergent trend in minor configuration control issues. Subsequent to inspector discussion with plant management, the Quality Assurance department initiated an action request (AR) to document the trend in valve or switch mispositionings. This item will be tracked as an inspection followup item (IFI). (Section 02.2)
- An operator established a tagout that was not in accordance with the specified tagout sequence. As a result, a sample cooler relief valve lifted. This item resulted in a Notice of Violation. (Section 01.2)
- The reactor shutdown evolution was well controlled and performed in a slow, conservative, and deliberate manner. (Section 04.1)
- The inspectors observed good attention to detail by operations and reactor engineering personnel during the conduct of fuel moving evolutions. In one instance, a potential fuel mispositioning event was prevented by appropriate attention to detail and verification techniques. (Section 04.2)
- Overall utility performance, with respect to shutdown risk, was prudent and demonstrated an appropriate safety focus. The inspectors observed a deliberate and well thought out plan on one occasion where operators secured the primary means of decay heat removal to support reactor pressure vessel inspections. (Section 07.2)

Maintenance

- Multiple barrier breakdowns associated with planned maintenance on the drywell nitrogen pressure system resulted in a maintenance worker breaching the system outside of the tagout boundary. This resulted in a Notice of Violation (Section M1.2).
- Incorrectly installed test equipment in the switchyard resulted in control room operators receiving alarms on the Division II 125 VDC system. This resulted in a Notice of Violation (Section M1.3).
- Incorrect test equipment installation and the failure to properly incorporate a document change form (DCF) resulted in damage to components in the 125 VDC system. This resulted in a Notice of Violation (Section M1.4).
- Personnel error and inadequate verification techniques on the part of maintenance technicians resulted in a High Pressure Coolant Injection (HPCI) system automatic isolation. (Section M1.5)
- A prior NRC inspection report documented inspector concerns with operator performance during the conduct of a Reactor Core Isolation Cooling (RCIC) surveillance test. Subsequent licensee investigation revealed the potential for design inadequacies for flow control from the remote controller; the issue will be tracked as an inspection followup item. (Section M8.1)
- The inspectors observed excellent maintenance technician support to troubleshoot and resolve a control rod problem during the plant shutdown activities. (Section M1.7)
- The inspectors' tour of the drywell identified housekeeping deficiencies; subsequent licensee activities identified additional discrepancies. (Section M2.1)

Engineering

- Engineering support for emergent material condition issues was thorough and appropriate. (Section 1.1)
- Engineering maintained good oversight of scram solenoid pilot valve testing activities. (Section E1.2)

Report Details

Summary of Plant Status

The plant began this inspection period at 100 percent power and, with the exception of scheduled downpower evolutions for planned testing activities and control rod sequence exchanges, operated near 100 percent power. On October 10, 1996, operators commenced a reactor plant shutdown, and on October 11, 1996, the unit was removed from service for a planned refueling outage.

I. Operations

01 Conduct of Operations

01.1 General Comments (71707)

The inspectors conducted frequent reviews of plant operations. In general, the conduct of operations was professional and safety-conscious. Inspector observations indicated that control room staffing levels were appropriate and operations personnel were knowledgeable of plant conditions and responded promptly and appropriately to alarms. In particular, the inspectors continued to notice thorough shift turnovers during this period. Specific events and noteworthy observations are detailed in the sections below.

01.2 Tagging Error

b. Observations and Findings

The licensee identified, that on October 10, 1996, an operator did not properly follow the specified tagout sequence while isolating the reactor building sample sink chiller. As a result of this error, the relief valve for the reactor building closed cooling water (RBCCW) sample cooler lifted. The operator realized the cause and reestablished the correct valve positions, which allowed the relief valve to reseat. The operator immediately informed operations shift management of the occurrence and the licensee documented the event via action request (AR) 96-2071. The tagout was then properly establish according to the sequence specified in the tagout.

c. Conclusions

In a prior inspection report (50-331/95008, dated October 25, 1995), the NRC issued a notice of violation (NOV) to the licensee for failure to follow the tagout procedure and properly restore a system to the correct lineup. The subject inspection report documented NRC concerns with weaknesses in the implementation of the tagout program. The licensee's response to the NOV documented its corrective actions. One of the corrective actions was a revision to procedure, Duane Arnold ACP 1410.5, "Tagout Program," providing additional guidance on tagging activities such as tagging sequence. The procedure states, in part, that the

person hanging tags shall place the components in the position required by the Component Tagout Form. The inspectors concluded that the licensee's corrective actions in response to the prior NOV, had they been followed, would have prevented this event. However, 10 CFR Part 50, Appendix B, Criterion V, required that activities affecting quality be accomplished according to procedures. The failure of the operator to follow the sequence specified in the tagout is considered an example of a violation for failure to follow procedures (50-331/96007-01).

01.3 Limiting Condition for Operation (LCO) Issues

a. Inspection Scope

On October 23, 1996, licensee personnel identified that an LCO entry into the 14 day fire plan LCO was not properly accomplished during work on electrical gear. (The affected components were the Standby Gas Treatment System and Standby Filter Unit deluge). On October 20, 1996, 1A4 (4160 VAC Essential Switch gear) was deenergized for maintenance and the LCO should have been entered. The LCO was not entered until October 21, when work on 1D21/1D23 (125 VDC Division 2 Distribution Panel "B"/"D") was commenced.

b. Observations and Findings

Once licensee personnel identified the issue, operators reentered the LCO and recalculated the current date of the LCO. The inspectors independently verified that the equipment was in day 5 of a 14 day LCO. The licensee also verified that current fire protection impairment request was still active for the affected systems. The licensee attributed the cause of the event to a failure to recognize the effect of the loss of the motor control center power on the deluge initiation logic. The licensee initiated a procedure work request to list the deluge logics as loads to their respective breakers.

c. Conclusions

The inspectors concluded there were no adverse consequences that resulted from this event. Both affected systems were still in their allowed LCO time frames and current fire protection impairment requests were still in place. While the identification of the issue by an oncoming STA demonstrated an excellent questioning attitude and good knowledge of current plant system status and interrelationships, the matter should have been identified prior to LCO entry.

01.4 Group III and Group V Isolations

a. Inspection Scope

On October 20, 1996, spurious Division II primary containment isolation system group III and group V isolations occurred. The group III isolation resulted in a secondary containment isolation, loss of drywell ventilation, and isolation of various containment and reactor coolant

sample valves. The group V isolation resulted in the isolation of the reactor water cleanup system.

b. Observations and Findings

The licensee believed that the likely cause of the isolations was a voltage transient on a temporary power connection that was established to support refueling outage maintenance activities. Operators responded appropriately to the event and reset all isolations. The inspectors concluded that established plant procedures were followed for setting up the temporary power supply. The inspectors will perform a more detailed review of the event during formal review and closure of the associated licensee event report (LER 96-05).

01.5 Conclusions on Conduct of Operations

The inspectors determined that operations personnel performed well during the conduct of most routine daily activities. However, continuing a trend documented in the previous NRC inspection report, the inspectors noted several instances of human performance problems related to personnel error and inattention to detail. The events were similar in nature to those observed in other departments.

02 Operational Status of Facilities and Equipment

02.1 Engineered Safety Feature (ESF) System Walkdowns (71707)

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

- Residual Heat Removal System
- High Pressure Coolant Injection
- Reactor Core Isolation Cooling
- Standby Diesel Generators
- Residual Heat Removal Service Water System

Equipment operability, material condition, and housekeeping were acceptable in all cases. The inspectors identified no substantive concerns as a result of these walkdowns.

02.2 Configuration Control Issues

b. Observations and Findings

During routine inspector review of operator logs, action requests (ARs) and AR screening meetings, the inspectors identified an emergent trend in configuration control issues. All of the observed items were balance-of-plant, non-safety related types of issues. Following inspector discussions with management, the quality assurance department initiated an AR to document the trend in valve and switch mispositionings report. Operations management informed the inspectors

that complete valve lineups would be performed on all systems prior to startup following the refueling outage. Pending a successful startup with reconfiguration control issues and formal inspector review of the licensee's resolution to AR 96-1996, this is an inspection followup item (IFI 50-331/96007-07).

04 Operator Knowledge and Performance

04.1 Reactor Shutdown Activity

a. Inspection Scope

On October 10, 1996, the licensee commenced a reactor plant shutdown in preparation for refueling outage fourteen. On October 11, 1996, the main generator was disconnected from the electrical grid.

b. Observations and Findings

The inspectors observed pre-shutdown evolution briefings and both in-plant and main control room shutdown activities. The inspectors observed the following during the shutdown: effective shift management oversight of the activities, formal communications between operators, strict procedural adherence, and a calm control room atmosphere. The inspectors also observed conservative practices and a strong questioning attitude when an equipment problem occurred during the shutdown. When operators attempted to insert control rod 10-11, the control rod would not change position. The operators conservatively suspended shutdown activities to allow instrument and control (I&C) technicians to troubleshoot the problem. This included halting all rod insertion activities to preclude an asymmetric rod pattern if the problem turned out to be generic. Maintenance and operations personnel soon identified a failed relay as the cause; the relay was replaced and normal shutdown activities re-commenced.

c. Conclusions

The inspectors concluded that the shutdown was well controlled and conducted in a slow, conservative, and deliberate manner. The inspectors noted excellent coordination and planning between operators and maintenance personnel to resolve the control rod insertion problem.

04.2 Fuel Movement Activity

b. Observations and Findings

On October 19, 1996, the inspectors observed fuel movements and noted excellent attention to detail on the part of licensee staff. The licensee utilized four people on the refueling bridge to conduct fuel movements; a crane driver and a spotter (both contract personnel), a licensed senior reactor operator (SRO), and a licensee nuclear engineer. The spotter's job was to direct the driver to the correct bundle for fuel movement. At one point, the spotter directed the crane driver to

the wrong bundle. Before the bundle could be grappled for movement, the driver questioned if he was in the correct location. At the same time, both the SRO and the reactor engineer directed that the bundle not be grappled because the crane was positioned over the incorrect location in the core.

The refueling crew halted fuel movement activities and immediately informed the main control room of the issue. The licensee subsequently attributed the cause to miscommunications between the contract personnel due to their unfamiliarity with working with each other. The spotter was relieved and replaced by a new contract individual. Fuel movements re-commenced after a briefing was held to discuss what had nearly happened.

c. Conclusions

The inspectors concluded that licensee personnel (the SRO and the reactor engineer) demonstrated excellent oversight of the task. Attention to detail and a strong questioning attitude on their part prevented the wrong fuel bundle from being grappled and prevented the possibility of a fuel movement error. Further fuel movement activities were conducted without mishap.

07 Quality Assurance in Operations

07.1 Licensee Self-Assessment Activities

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

- Routine Operations Committee Meetings
- Routine Action Request Screening Meetings
- Special infrequently performed testing or evolution management briefings

The inspectors observed active management participation at the meetings. Identified deficiencies were being tracked by the licensee's AR process. The inspectors were concerned with a negative trend in human performance events, first documented in the prior inspection period, that occurred during this inspection period. These events were both licensee and NRC identified and occurred during the performance of routine, fundamental tasks. The consequences of these events worsened in severity from the prior inspection period.

07.2 Shutdown Risk Management

b. Observations and Findings

The inspectors reviewed the licensee's shutdown risk practices as specified in procedures "Outage Risk Management Guideline" (OMG-7) and integrated plant operating instruction (IPOI 8), "Outage and Refueling Operations." The inspectors concluded that control room operators were

knowledgeable of current plant conditions and were aware of which systems were listed as being "protected" systems. Control room pre-shift briefings included discussions on current plant conditions, system status, overall shutdown risk status, time to boil, and designated protected systems. In particular, the inspectors determined that licensee actions to secure shutdown cooling to support various outage maintenance activities were performed after appropriate management reviews and according to established licensee procedures.

c. Conclusions

The inspectors concluded that control room operators were cognizant of current plant conditions and aware of shutdown risk status. Licensee personnel utilized established, approved methods to perform work while the plant was in a shutdown condition.

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:

- Scram Solenoid Pilot Valve testing
- Diesel Fire Pump operability test
- Excess Flow Check Valve testing
- Nitrogen Compressor work activities
- 125 VDC testing and calibration activities
- High Pressure Coolant Injection steam line differential pressure testing
- Control Rod troubleshooting activities
- Reactor Feed Pump repairs
- "B" Standby Diesel Generator PM activities
- Feedwater Regulating Valve modifications
- Main Turbine overspeed testing

b. Observations and Findings

The inspectors noted good execution of maintenance activities performed during the refueling outage. However, continuing a theme raised in the prior NRC inspection report and observed across other departments, the inspectors and licensee noted examples of poor human performance during maintenance activities conducted prior to the outage. These errors led to a maintenance worker breaching a system outside of the established tagout boundary, damage to 125 VDC equipment, and an ESF isolation.

M1.2 Nitrogen Compressor Work

a. Inspection Scope (62703)

On September 9, 1996, maintenance work proceeded on a component that had not been properly isolated for maintenance. The inspectors independently reviewed this event in parallel with the licensee's investigation.

b. Observations and Findings

On September 9, a maintenance technician commenced work on the drywell pneumatic nitrogen compressor (1K-014) suction filter and discovered that the filter was not isolated. The mechanic replaced the filter and contacted control room personnel. Control room personnel changed the tagout to add the appropriate isolation for the filter work. The licensee documented the event by initiating AR 96-1745.

The inspector's review of the issue identified multiple barriers that broke down and failed to prevent the event from occurring:

- The planner who planned and processed the preventative maintenance action request (PMAR) work package performed an inadequate review of the work scope. The scope of work listed on the tagout request did not adequately describe the full job scope. The tagout request only identified the compressor as the component to be worked.
- The tagout request form itself was inadequate. The tagout request was submitted from maintenance to operations with the "tagout guidance" section of the form blank. The operator filled out the "tagout guidance" section of the request rather than returning the form to the planner.
- The PMAR was not clear on the scope of the work. The job had been previously performed in May of 1996, and the maintenance technician had submitted a procedure remarks sheet for the procedure. The remarks provided clarification to identify filters that should be inspected and changed. The system engineer converted the remarks sheet into a procedure work request but due to a change in the scheduled performance date of the PMAR, the mechanical shop did not incorporate the improvements into the PMAR.
- Poor communications occurred between operations and maintenance personnel. There were no discussions between operators and maintenance on the scope of the work when the PMAR was signed on for work. This became evident when operators established a tagout that did not adequately set boundaries for all the work activities. Additionally, there was an inconsistent implementation of the tagout request preparation. In most cases,

the tagout requests were completed correctly. However, in cases where they were not, operators routinely filled in the missing information rather than send the request back for correction. As a result, the individuals preparing the tagout requests missed opportunities to realize that the requests were forwarded to the control room with insufficient detail.

The licensee's immediate corrective actions for the event included re-emphasizing expectations for tagouts, reviewing all tagout requests and tagouts for the week, and having the quality assurance department review a sample of tagout requests and tagouts established prior to the refueling outage. Additionally, management directed maintenance and operations personnel to review prints and tagouts together prior to the final release of work in the field. The mechanical maintenance department was also tasked with developing a plan to improve the tagout request process.

c. Conclusions

This event was self revealing in that the error was not identified until the maintenance technician breached the system. The inspectors reviewed the event and the licensee's immediate corrective actions and concluded that there were no significant safety consequences as a result. Fortunately, the system being worked was of a low pressure (approximately 1.5 psig) and no injury resulted. In addition to the original AR initiated to document the event, the licensee initiated an addendum AR (AR 96-1745.01) to have the mechanical maintenance shop develop a plan to enhance tagout requests. The licensee also performed a formal root cause analysis of the event. The inspector reviewed the licensee's root cause analysis report and identified no substantive differences between the licensee's conclusions and the inspector's conclusions. However, the inspectors were concerned with the number of barriers that broke down to allow the event to occur. 10 CFR Part 50, Appendix B, Criterion V, required, in part, that activities affecting quality shall be prescribed by documented instructions or procedures of a type appropriate to the circumstances. The work instructions issued on September 9, 1996, for maintenance on the drywell pneumatic nitrogen compressor was not adequate in isolating the suction filter and constitutes an example of a violation of 10 CFR 50, Appendix B, Criterion V (50-331/96007-03).

M1.3 Incorrect Test Equipment Installation

a. Inspection Scope (62703)

On September 9, 1996, electrical maintenance personnel incorrectly hooked up test equipment during the performance of the annual maintenance inspection for CB0220 (161 KV generator output "H" breaker to the Hiawatha line) and generated a 125 VDC trouble alarm.

b. Observations and Findings

During the annual maintenance inspection for CB0220, test equipment was connected between the plant 125VDC and the substation 125 VDC. The purpose of the evolution was to test the breaker. When the test was run, the trip test would not work and a 125 VDC Division II trouble alarm was received. Personnel stopped testing and reviewed the prints. Licensee personnel determined that the leads to the trip coil were mispositioned and that the trip coil was being cross powered between plant DC and the substation DC. The licensee documented the occurrence in AR 96-1748. Testing personnel subsequently correctly repositioned the leads to the proper trip coil and satisfactorily completed the testing. The licensee's subsequent investigation revealed that the procedures lacked details on the exact locations for the test instrument recorder leads; the procedures were revised to include specific information on locations for the travel recorder hook-up.

c. Conclusions

This event was self revealing in that the procedure deficiency was not identified until the 125 VDC Division II trouble alarm was received. 10 CFR Part 50, Appendix B, Criterion V, required in part that activities affecting quality shall be prescribed by documented instructions or procedures of a type appropriate to the circumstances. The failure of the procedure to specify the exact location for the test equipment hook-up constitutes a second example of an inadequate procedure (50-331/96007-04).

M1.4 125 VDC Instrument Calibration Error Causes Alarms and Equipment Damage

b. Observations and Findings

On September 25, 1996, control room operators received several instrument AC and 125 VDC Division II trouble alarms. At the time instrument and control (I&C) technicians were working on 1D25 (120 volt instrument AC power supply) and reported that they received an unexpected response under their maintenance procedure. Operators directed the I&C technicians to stop work and back out of the procedure. Maintenance personnel investigated and discovered two blown fuses and a blown capacitor in 1D20 (DC distribution panel). Maintenance personnel also identified a damaged resistor in the ground detection circuit. Maintenance personnel replaced the damaged components and the licensee documented the event per AR 96-1843.

The inspectors discussed the issue with I&C maintenance personnel and reviewed the preliminary results of the licensee's investigation. The licensee's investigation revealed that the I&C technician hooked up the test equipment probes incorrectly and that he did not lift a required lead. The licensee also reported that a temporary document change form (DCF) should have been incorporated into the procedure but was not. The DCF added an additional lead to lift and provided guidance on where to hook up the temporary power supply.

c. Conclusions

This event was self revealing in that the individual's failure to follow procedure was not evident until control room personnel received multiple alarms and subsequently discovered damaged components. The inspectors were concerned that this event was another example of human error that occurred during the performance of routine day to day activities. 10CFR Part 50, Appendix B, Criterion V, required that activities affecting quality be accomplished according to procedures. The failure of the maintenance technician to incorporate the temporary DCF and properly perform the maintenance activities is considered an example of a violation for failure to follow procedures (50-331/96007-05).

M1.5 HPCI Isolation Due to Personnel Error During Testing

a. Inspection Scope

On October 8, 1996, MO 2239 (HPCI outboard steam supply isolation valve) unexpectedly isolated during testing of the HPCI system.

b. Observations and Findings

Maintenance personnel were performing surveillance test procedure (STP) 42A026-Q ("HPCI Steam Line High DP Instrument Functional Test/Calibration") when the isolation occurred. The inspectors subsequently verified that the licensee entered the appropriate Technical Specifications (TS) LCO action statement for the HPCI system and that the licensee properly notified the NRC. The licensee documented the isolation per AR 96-2073 (the event will also be formally documented via a Licensee Event Report).

The inspectors reviewed the licensee's preliminary investigation results. The cause of the event was attributed to personnel error in that relay blocks were placed on the incorrect relay contacts. The STP correctly identified which relay contacts to block, however the technicians involved did not properly verify their correct placement. Correctly installing the blocks would have prevented the isolation from occurring. The individuals assumed that they knew which contact was to receive the block and did not utilize information on the back of the relay cabinet that could have helped in identifying the correct contact to block. Additionally, the technicians did not utilize the proper method for dual verification. The technician who was to perform the dual verification did not understand this type of relay and, rather than providing a true dual verification, accepted the first technician's explanation for where to place the relay block.

c. Conclusions

The inspectors concluded that the failure to follow the procedure and properly perform the required dual verification directly resulted in the subsequent ESF actuation. Part 50 of 10 CFR, Appendix B, Criterion V, required that activities affecting quality be accomplished according to

procedures. The failure of the maintenance technicians to properly perform STP 424026-Q verification activities and perform the surveillance procedure is considered an example of a violation for failure to follow procedures (50-331/96007-06).

M1.6 Phase Rotation Check Error

a. Inspection Scope

On October 9, 1996, electrician error during a phase rotation check contributed to tripping of the reactor water cleanup pumps (RWCU) and damage to the test gear used for the phase rotation check.

b. Observations and Findings

Electrical maintenance personnel were requested to perform a phase rotation check of the fuel pool cooling and cleanup pump in preparation for temporary power activities during the outage. The electrician utilized a phase rotation meter from the shop, and with an assistant, attempted to perform the routine electrical check. Upon attempting to connect the meter leads, an arc was drawn and blew out the side of the meter. The meter was destroyed and the voltage fluctuation caused the fuel pool cooling and clean up pump and the RWCU pumps to trip. The individual was not injured and no damage occurred to plant equipment.

The licensee considered the phase rotation checks to be "skill of the craft" and the meters were not controlled test equipment. The electrician had successfully performed this type of check in the past. However, the meter used in this case was not designated for use on energized equipment. The electricians were not aware of the distinctions between those meters used for energized gear checks and those used for de-energized checks. This particular meter, however, had a warning sticker on the bottom of the meter warning that it was not to be used on energized gear.

The licensee initiated AR 96-2074 to document and resolve the problem. The licensee's immediate corrective actions included removing all phase rotation meters from the shop except those used for energized gear, initiating a work request to verify no damage to installed plant equipment, and initiating a training action request to conduct formal training on the use of the phase rotation meters.

c. Conclusions

The inspectors reviewed the licensee's immediate corrective actions and had no substantive concerns.

M1.7 I&C Troubleshooting During Reactor Shutdown

a. Inspection Scope

During the reactor shutdown, control rod 10-11 would not insert when given a normal insert signal by the operators.

b. Observations and Findings

The inspectors observed the I&C troubleshooting efforts undertaken to resolve the problem with control rod 10-11. The inspectors noted excellent maintenance support to resolve the problem. The inspectors also observed effective communications between operators and maintenance personnel involved in the troubleshooting efforts (see also Section 0.4.1). Timely resolution of the issue (a failed relay) allowed the operators to continue the shutdown in a normal, controlled fashion.

M2 Maintenance and Materiel Condition of Facilities and Equipment

M2.1 Drywell Housekeeping

b. Observations and Findings

The inspectors performed routine drywell inspections during the outage to assess licensee housekeeping and material control effectiveness. On October 22, 1996, the inspectors toured the drywell and concluded that housekeeping conditions were adequate for the mode the plant was in at the time. Some of the housekeeping deficiencies identified by the inspectors included the following: multiple loose tie-wraps, especially at the lower levels, several balls of wadded up tape material, rubber booties, work gloves, a hardhat, and miscellaneous loose tools. The licensee removed the identified items from the drywell; however, the inspectors were concerned with the potential for debris to potentially impact the emergency core cooling system suction strainers located in the torus if satisfactory housekeeping conditions were not re-established prior to plant startup. The licensee informed the inspectors that the drywell would be completely cleaned prior to plant startup from the refueling outage.

Subsequent to the inspectors' drywell inspection, on October 24, the licensee discovered a dropped hardhat near one of the drywell downcomers. When personnel went to retrieve the hardhat, they returned with two trash bags mostly full of general debris. Management re-emphasized their expectations to sitewide personnel concerning drywell housekeeping standards and stated that the observed conditions would not be tolerated.

In addition to the housekeeping weaknesses identified by the inspector and the licensee, the inspectors also identified two additional concerns as a result of the October 22 drywell inspection. The inspectors identified a plastic threaded cap on the actuator body of M02238 (HPCI Steam Supply Isolation). Other motor operated valves in the drywell

contained a metal cap in the same location. The licensee replaced the plastic cap with a metal cap. The inspectors also identified an approximately 1.5 by 2 foot section of a cloth type insulation blanket lying on the handwheel of a Red Tagged valve. The licensee removed the blanket from the tagged valve's handwheel and operators verified that the valve was still in the correct position.

c. Conclusions

The inspectors concluded that drywell housekeeping was adequate for the conditions existing at the time (plant in cold shutdown). The drywell housekeeping would need to be improved to support a plant startup. Licensee management informed the inspectors that the drywell would be properly cleaned prior to closing out the drywell and commencing a reactor startup. The inspectors will monitor the effectiveness of licensee containment housekeeping efforts as part of the routine inspections performed prior to plant startup following a refueling outage.

M8 **Miscellaneous Maintenance Issues (92902)**

M8.1 Reactor Core Isolation Cooling (RCIC) Governor Issue:

In a prior NRC inspection report (50-331/96-03), the inspectors documented concerns with operator performance during the conduct of surveillance testing activities on the RCIC system. Subsequent licensee investigation into the issue identified the potential for the original design characteristics of the RCIC logic circuitry to have impacted the operators' ability to conduct the surveillance without causing a RCIC turbine overspeed trip. Pending further inspector review of the licensee's troubleshooting effort and resolution, this is an inspection followup item (50-331/96007-07).

III Engineering

E1 **Conduct of Engineering**

a. Inspection Scope (37551)

The effectiveness of the licensee's controls for the identification, resolution, and prevention of problems was examined. The inspection included review of areas such as corrective action processes, root cause analysis, safety committees, and self assessment.

E1.1 Engineering Support for Plant Activities

b. Observations and Findings

The inspectors noted prompt engineering support to address emergent materiel condition issues that arose during the inspection period. The inspectors observed that emergent plant condition items were

appropriately captured in the licensee's corrective action process and that engineering personnel aggressively supported maintenance personnel in problem resolution.

E1.2 Scram Solenoid Pilot Valve Testing

b. Observations and Findings

The inspectors reviewed and observed the licensee's testing program to monitor degradation of the control rod scram solenoid pilot valve (SSPV) diaphragms. Weekly testing of the SSPVs showed a gradual degradation of the diaphragms. The inspectors concluded that the licensee's testing program adequately verified that control rod performance still satisfied the applicable TS and Updated Final Safety Analysis Report (UFSAR) requirements. The licensee informed the inspectors that the SSPV diaphragms would be replaced during the refueling outage (from a Viton diaphragm to a Buna-N diaphragm). The unit was shut down for the refueling outage prior to SSPV performance degrading to the point where TS limits were reached.

E1.3 Conclusions on Conduct of Engineering

The inspectors concluded that overall Engineering support to plant activities was appropriate and well performed.

E2 Engineering Support of Facilities and Equipment

The inspectors reviewed plant equipment and activities against the UFSAR descriptions. No discrepancies were noted during plant equipment walkdowns.

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 November 5, 1996. 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
D. Curtland, Operations Manager
P. Bessette, Manager, Engineering
J. Bjorseth, Maintenance Superintendent
R. Hite, Manager, Radiation Protection
K. Peveler, Manager, Regulatory Performance

INSPECTION PROCEDURES USED

IP 37551: 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 92901: Followup - Operations
IP 92902: Followup - Engineering
IP 92903: Followup - Maintenance
IP 64704: Fire Protection Program
IP 83729: Occupational Exposure During Extended Outages
IP 83750: Occupational Exposure
IP 92700: Onsite Followup of Written Reports of Nonroutine Events at Power Reactor Facilities
IP 92902: Followup - Engineering
IP 92903: Followup - Maintenance
IP 93702: Prompt Onsite Response to Events at Operating Power Reactors

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-331/96007-01	NOV	Tagging Error
50-331/96007-02	IFI	Configuration Control
50-331/96007-03	NOV	Improper Tagout Established
50-331/96007-04	NOV	Incorrect Test Equipment Installation
50-331/96007-05	NOV	125 VDC Calibration Error
50-331/96007-06	NOV	HPCI Isolation
50-331/96007-07	IFI	RCIC Governor

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
ESF	Engineered Safety Feature
I&C	Instrument and Control
IFI	Inspection followup item
IP	Inspection procedure
IR	Inspection report
LCO	Limiting Condition for Operation
LER	Licensee Event Report
NOV	Notice of Violation
NRR	Office of Nuclear Reactor Regulation
PMAR	Preventative Maintenance Action Request
RCIC	Reactor Core Isolation Cooling
SRO	Senior Reactor Operator
SSPV	Scram Solenoid Pilot Valve
STP	Surveillance Test Procedure
TS	Technical Specification
UFSAR	Updated Final Safety Analysis Report
VDC	Voltage - Direct Current