U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-331/95007

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

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

Facility Name: Duane Arnold Energy Center

Inspection At: Palo, Iowa

Inspection Conducted: June 24 through August 16, 1995

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9/22/95
Date

Inspection Summary

Inspection on June 24 through August 16, 1995 (Report No. 50-331/95007)

Areas Inspected: Routine, unannounced inspection of plant operations, maintenance, surveillance, onsite engineering, plant support, followup of events, followup of previous inspection findings, licensee event report followup, and report review. Announced inspections of Effectiveness of Licensee Controls in Identifying, Resolving, and Preventing Problems (40500) and Emergency Preparedness (82701).

Results: Summary of items opened in this report:

Violations: Identified in Section 2.1
Unresolved Items: Identified in Sections 3.1, 3.2
Inspection Follow-up Items: Identified in Section 4.1.1.
Non-cited Violations: None

An executive summary follows:

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EXECUTIVE SUMMARY

Plant Operations

Overall operator performance during the inspection period was mixed. While the inspectors noted examples of excellent performance by operators, there were several examples of weak operator performance during the conduct of fundamental tasks such as reactivity control, tagout implementation, and surveillance testing performance (Section 1.1).

Maintenance

Overall maintenance performance during the inspection period was mixed. Failure to follow the maintenance process for replacement of a chiller motor was considered a violation of technical specifications (Section 2.1). Check valve maintenance was not performed in accordance with procedure as a result of personal error due to inadequate self checking and verification (Section 2.2). There was good teamwork and coordination for temporary repair of a casing leak on the "A" feedwater pump temporary repair. However, the inspectors identified a weakness in communications between operations and maintenance to ensure consistent monitoring of the temporary repair as planned (Section 2.3).

Engineering

The performance of engineering during the inspection period was good. The inspectors noted aggressive pursuit when water was identified in the standby gas treatment system during routine testing, however, an Unresolved item (URI) was issued to followup on the root cause, when determined (Section 3.1). The licensee identified that a 1989 procedure change to the test method for determining the end of cycle recirculation pump trip response time was made in error. This was considered good identification by engineering, however, a URI was issued to evaluate corrective actions, when implemented (Section 3.2). Based on several licensee-identified discrepancies between drawings and as-built installation for thermal overloads, configuration control was considered a weakness (Section 3.3).

Plant Support

The overall condition of the emergency preparedness program was excellent. One Inspection Followup Item was identified concerning the content of followup messages to offsite agencies (Section 4.1.1). No concerns were identified with radiological controls, physical security, or fire protection.

Self Assessment/Quality Verification

The inspectors concluded that, overall, the licensee maintains an effective corrective action program with strong management support for critical self-assessments (Section 5.0). The corrective actions to resolve a discrepancy noted regarding check valve maintenance was narrow in scope (Section 2.2).

The comprehensive and highly detailed 1994 Quality Assurance audit of the Emergency Preparedness Program satisfied the requirements of 10 CFR 50.54(t) (Section 4.1.4).

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.

The inspectors conducted these reviews and observations 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.

The plant operated at approximately full power throughout most of the report period. There were two downpowers for routine turbine valve testing on July 8 - 9 and August 5 - 6. Also, on July 20, power was reduced to approximately 50 percent for several hours in order to repair a feedwater pump casing leak. (See Section 2.3 for details.)

1.1 Operator Performance

Overall operator performance during the inspection period was mixed. While the inspectors noted examples of excellent performance by shift supervisors, control room operators and non-licensed operators, the inspectors observed several examples of weak operator performance during the conduct of fundamental tasks such as reactivity control, tagout implementation, and surveillance testing performance. The safety significance of the weaknesses noted was low. The examples observed are listed below.

1.1.1 Good Auxiliary Operator Identification of Degraded Equipment Conditions:

On June 24, 1995, while performing plant rounds, an auxiliary operator noticed 5 amp spikes on an uninterruptible AC power system. The auxiliary operator reported the information to the control room, and control room personnel notified electrical maintenance supervision and the system engineer of the problem. The licensee initiated corrective maintenance action request (CMAR) A26513 to resolve the problem. The source of the spiking was subsequently determined to be a laser printer at the operator control station. The operator's identification of the problem demonstrated good cognizance of plant equipment conditions and a thorough, questioning attitude.

1.1.2 Excellent Operator Response to Reactor Water Level Low Level Alarm:

On June 26, 1995, control room operators received the low level alarm on reactor pressure vessel (RPV) level indicator 1C05. The "B" RPV level controller was in service at the time; the operator noted that the "B" level indicator (LI4560) was at 182 inches and going down. Normal reactor water level was approximately 191 inches, the low level alarm was received at 186 inches, and the low-low level reactor trip would have occurred at 170 inches. Feedwater flow began to increase due to the indicated drop in reactor level. The operator promptly placed level control to the "A" controller and returned level and feed flow to their proper parameters. The licensee documented the occurrence via Action Request (AR) 95-1314 and CMAR A26522. The operator's prompt response to the level change demonstrated excellent panel awareness and cognizance of plant conditions.

1.1.3 Good Shift Supervisor Control and Oversight of Downpower Evolution:

The inspectors observed portions of the routine monthly downpowers on July 8 through July 9 and August 5 through 6, which were performed to support turbine valve testing. The overall conduct of the evolutions was controlled and professional and communications were excellent. The shift supervisor demonstrated excellent control and oversight of the reactor power change evolutions.

1.1.4 Operator Manipulation of Valve With Hold Tag Attached

On July 7, 1995, the inspectors observed a non-licensed operator using a pipe wrench to operate a small manual valve that had a Hold Card attached. The operator explained that he was requested to do this by the licensed operator in the control room and was not certain whether the Tagout Procedure allowed him to operate a valve with a Hold Card attached. Based on interviews, the licensed operator thought it would be acceptable to open the valve because the tagout was still under the control of operations and had not been accepted by maintenance personnel. There was also no personnel safety hazard associated with opening the valve. Subsequently, the Assistant Operations Supervisor requested the licensed operator to process a Tagout Change Sheet.

Although not a procedure violation, the inspectors were concerned that corrective actions following a Hold Card issue on May 24, 1995, were not completely effective (See IR 50-331/95006 for details.). Despite increased management attention to the issue, management expectations were not met in this instance. This was considered another example of a weakness in the implementation of the Tagout Process.

1.1.5 Reactor Core Isolation Cooling (RCIC) Surveillance Testing Weaknesses:

On July 13, 1995, operators performed STP 45E001-Q, "RCIC System Quarterly Operability Test," following a scheduled outage of the RCIC system. The inspectors observed the performance of the surveillance and concluded that operator performance of the test was weak. The inspectors' observations and concerns are listed below.

- While attempting to start up the system to test the RCIC pump operability, the RCIC turbine tripped twice on electrical overspeed. While the operator followed the procedure, on step 7.2.40 of the surveillance some confusion existed on how far to crack open MO2515 (RCIC test bypass valve) with respect to increasing turbine speed. The procedure had been successfully performed on multiple occasions in the past and had not recently been revised; however, the licensee informed the inspectors that the electrical overspeed trip was a repeat issue. The inspectors were concerned with the operator's inability to properly start up the RCIC system for surveillance testing. The licensee initiated an AR to resolve this particular issue.

- The inspectors noted that some confusion or miscommunications existed with respect to obtaining the required American Society of Mechanical Engineers (ASME) turbine speed data. Obtaining the data required using a hand-held tachometer at the RCIC location (as opposed to using RCIC turbine RPM indicator on the control room panel). The auxiliary operator obtaining the data was unsure of the precise method needed to obtain the data, and the system engineer had to be contacted to resolve the issue. The inspectors were concerned that the operator's delay in obtaining the test data required the RCIC system to be unnecessarily operated for a longer time period than was normally the case.

- During the RCIC surveillance test, torus water temperature reached 95°F which required the operators to enter Emergency Operating Procedure (EOP) 2 for high suppression pool water temperature. Licensee personnel informed the inspectors that the suppression pool water temperature limit was not normally reached during RCIC testing. While the 95°F value is an administrative limit (technical specification limit is 105°F), the necessity to simultaneously enter the EOPs and perform surveillance testing presented a potentially significant challenge and distraction to the operators.

1.1.6 Control Rod Positioning Error

On July 21, 1995, during the return to full power following feedwater pump repairs, the reactor engineer noted that control rod 30-35 was not in its correct position. Step 30 of pull sheet 95-106 moved a group of four control rods from notch position 32 to notch position 34. The first rod had been successfully moved to its correct position. Rod 30-35 was the second of four rods to be moved. The control room operator believed that he had correctly positioned the rod but apparently did not hold the control rod movement switch long enough to ensure that the control rod settled into its correct position. At the time of rod movement, the second control room operator was attending to other matters and the reactor engineer was involved in monitoring power levels and fuel conditions. After the last of the four control rods had been positioned, the reactor engineer noted that control rod 30-35 was in the wrong position (rod still at position 32 vice position 34) and notified control room personnel. Control room personnel secured rod movement and

consulted Abnormal Operating Procedure (AOP) 255.1 ("Control Rod Movement/Indication Abnormal"). With the concurrence of the reactor engineer and shift supervisor, the operator moved the rod to its correct location. The licensee documented the occurrence via AR 95-1358. The inspectors concurred with the licensee's conclusion that the error did not meet the formal definition of a mispositioned control rod per licensee procedures, and that the event was of minor safety significance. However, the inspectors were concerned with the lack of attention to detail and inadequate self checking present during the conduct of reactivity changes.

1.2 Plant Materiel Condition

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. The issues noted were separate from the long standing work arounds and equipment issues list noted in a prior inspection report (reference NRC Inspection Report (IR) No. 50-331/95006(DRP)). The examples are listed below:

- On June 26, 1995, the control room operators received the reactor low level alarm and noted that the "B" water level controller was at 182 inches and going down (reference paragraph 1.1 for operator response to this event). The licensee initiated AR 95-1314 to document the event and track resolution. The behavior of the "B" level controller was a repeat occurrence; the same controller also showed a drop in indicated level following refueling outage 13. The change in indicated reactor water level required prompt operator response to prevent a potential low-low level condition and reactor trip.

- On July 9, 1995, an operator attempted a 0.1 percent change to decrease the B reactor recirculation speed; however, the pump speed decreased 3.5 percent. According to the licensee, two other similar unexpected step changes had occurred during recent power reductions, all on the "B" controller. Although the exact cause was not identified, the licensee replaced the display unit for the "B" controller to preclude further occurrences. No further problems with controlling decreasing speed have been observed.

- On July 10, 1995, operators attempted to switch offgas trains from the "B" train to the "A" train. The "A" recombiner temperature failed to increase and as a result, hydrogen levels in the system began to increase and reached greater than 4 percent. The operators secured the "A" system and returned the "B" train to service. The licensee documented the occurrence via AR 95-1341. In addition to requiring the operators to respond and switch divisions, the hydrogen concentration level necessitated a brief entry into a TS LCO while the "B" train was placed back in service and hydrogen levels restored to below 4 percent.

- On July 12, and again on July 25, 1995, two brief breaches of secondary containment requirements occurred which required control room operators to enter and exit a TS LCO for secondary containment. On July 12, 1995, both airlock doors at the reactor building to radwaste control room airlock were momentarily opened at the same time. On July 25, 1995, both reactor building doors at the main control point airlock were open simultaneously. Both instances occurred due to improper functioning of the door interlocks. In both cases personnel promptly restored secondary containment conditions; thus the safety significance was very low. Also in both instances, the licensee documented the occurrence via the AR system and maintenance personnel repaired the doors.

- On July 18, 1995, during valve manipulations while in suppression pool cooling lineup, the operator noted that residual heat removal service water (RHRSW) valve position controller PDIC1947 was not responding. The problem was traced to an intermittent problem with relay ZM1947, which was subsequently replaced. This was a repeat problem with this component, which had shown a similar intermittent problem on June 12. At that time, technicians cleaned the contacts for a cable on ZM1947 and thought the problem was resolved. In both cases, operators were required to enter a 7-day LCO when the component failed.

- On July 19, a water/steam leak was coming from a bolt hole on the feedwater pump casing flange. The maintenance and engineering departments decided that prompt repair was important to prevent further damage to the feedwater pump flange. On July 20, the licensee reduced plant power to approximately 50 percent to secure the feedwater pump and make a temporary repair. See section 2.3 for more details.

- On July 28, at approximately 12:55 p.m., with the reactor at approximately 100 percent power, 12 control room annunciators, including condensate storage tank (CST) level and high pressure coolant injection (HPCI) and RCIC swap from CST to torus, alarmed when instrument AC 1Y23 circuit 11 tripped. Operators and electricians responded to investigate and found no obvious reason for the circuit trip. The circuit was reset and the HPCI and RCIC system were realigned to normal standby readiness approximately 25 minutes later.

- On August 2, 1995, operators attempted to run the "C" RHRSW pump for testing purposes. The pump tripped and an auxiliary operator reported seeing sparks coming from the motor. The operators declared the pump inoperable and entered a 30 day TS LCO. The licensee documented the occurrence via AR 95-1374; at the end of the inspection period licensee personnel were still working on plans to repair or replace the motor.

The inspectors will track licensee resolution of the individual issues during future routine inspections. In all the above examples, the licensee took prompt action to restore the deficient condition and entered the item in the corrective action process. While the inspectors concluded that the safety significance of the items noted was low, the

inspectors will also assess overall licensee performance with respect to preventing distractions to operators and other plant staff that arise as a result of equipment condition issues.

No violations or deviations were identified in this area.

2.0 Maintenance and Surveillance Observations (62703) (61726) (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 limiting conditions for operation 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 following items were considered during this review:

a) compliance with limiting conditions while components or systems were removed from service,

b) obtaining approvals before initiating work,

c) accomplishment of activities using approved procedures,

d) proper performance of functional testing and/or calibrations before returning components or systems to service,

e) accomplishment of activities by qualified personnel;

f) proper certification of parts and materials,

g) implementation of appropriate and effective radiological controls and fire prevention practices, and

h) review of maintenance backlog to determine status of outstanding jobs and to assure that priority was assigned to safety-related equipment maintenance which might affect system performance.

The inspectors witnessed portions of maintenance activities on equipment such as RHRSW dp controller, feedwater pump, and RCIC and standby gas treatment systems. The inspectors witnessed portions of test activities on equipment such as reactor core isolation cooling system, standby diesel generators, and standby gas treatment system. Overall performance in the areas of maintenance and surveillance was mixed. The inspectors identified a violation for failure to properly follow the maintenance process when a component was replaced with a different

component. Also, other minor concerns were noted with procedural adherence and communications as discussed below.

2.1 Review of Thermal Overload (TOL) Sizes

The inspectors noted that the licensee lacked design calculations for sizing the TOLs for continuous duty motors. According to the licensee, the original sizing of the TOLs was performed by the motor vendor based on full load current, service rating and temperature rise; however, no calculations were performed. The licensee was currently in the process of developing a standard for continuous duty motors. In 1992, the licensee developed a design basis document for sizing TOLs for motor operated valves in response to Generic Letter 89-10.

The inspector reviewed the licensee's control of TOL sizes and the design standards. In general, the inspector verified that the TOL sizes conformed to the motor vendor's acceptance criteria with some variances. However, the inspector determined that the slight differences with the required TOL and the actual one installed in the field would not affect the operability of the motors.

The inspector walked down a selected number of motors to determine temperature and service factor nameplate data. During the walkdown, the inspector noted that the full load current of the safety-related control building chiller motor did not match the drawing. This particular motor had been replaced on May 3, 1995, under CMAR A23991. Although, the old and new motors were both rated 20 horsepower and the manufacturer was the same, the model numbers were different. Procedure No. 1408.10, "Engineered Maintenance Action (EMA)," Revision 4, required use of this procedure when a maintenance action affects or requires changes to controlled documents. The procedure also required completion of a 10 CFR 50.59 safety evaluation applicability checklist. The inspector found that the licensee had not updated the controlled documents. In addition, no calculations were performed to determine the adequacy of the existing TOL. Furthermore, the licensee did not complete the 50.59 safety applicability checklist. The licensee stated that the new motor was thought to be exactly like the old one and as a consequence, an EMA was not issued. As a result, the design specifications of the new motor were not evaluated. In response to the inspector's concern, the licensee performed an analysis to evaluate the new motor. The licensee's analysis determined that the motor was operable; however, the TOL did not meet the plant's TOL sizing methodology. The licensee planned to replace the TOL when the opportunity arose. On July 13, 1995, the licensee issued AR 95-1348 to document corrective actions.

Technical specification 6.8.1 required that procedures covering corrective maintenance operations which could have an effect on the nuclear safety of the facility be implemented. Procedure 1408.1, "Engineered Maintenance Action," Revision 4, required the use of this procedure when a maintenance action affects or requires changes to controlled documents. The failure to follow the requirements of Procedure 1408.1 in this case is considered to be a violation of TS. (50-331/95007-01)

2.2 Residual Heat Removal (RHR) Check Valve Maintenance

On June 23, 1995, the inspectors noted that 2 of the 20 body to bonnet nuts for RHR discharge check valve V19-0001 had less than full thread engagement contrary to procedure GMP-MECH-001, "General Bolting Requirements," Revision 5. The inspectors were concerned that both the mechanic who did the work in December 1994 and the quality control (QC) inspector annotated on the Torque Data Sheet that the thread protrusion was satisfactory even though the condition of two fasteners did not meet the procedural requirements.

In response to the inspectors' concerns, the licensee documented the condition as a nonconformance on an Action Request (AR) form and engineering performed a calculation to justify operability of the valve and system. Although the significance of this issue was minor, as proven by the calculation that supported the operability determination, the inspectors were also concerned with the narrow scope of the corrective actions for this issue. When the AR was closed on July 27, the corrective actions included review of the minimum thread engagement requirements with the mechanical maintenance staff, however, the resolution of the AR did not involve the QC department or address why the verification process did not identify this discrepancy back in December 1994. After the inspectors questioned the scope of the AR resolution, the licensee decided to provide additional training to QC inspectors on the issue. The inspectors considered this issue to be an example of personal error due to breakdown in self-checking and verification. Additionally, the inspectors considered the initial scope of corrective actions to be narrow. The inspectors considered the final resolution of the issue to be acceptable.

2.3 Reactor Feedwater Pump Temporary Repair

The inspectors noted prompt response and good teamwork to resolve and repair a leak on the "A" feedwater pump that was identified by the inspectors. However, the inspectors were concerned that informal communications between operations and maintenance did not ensure consistent periodic monitoring of the temporary repair. On July 19, the inspectors noted a puddle of water on the "A" reactor feedwater pump skid. Once the lagging was removed, the licensee determined the water/steam leak to be coming from a bolt hole on the feedwater pump casing flange. The maintenance and engineering departments discussed the repair options internally and with the pump manufacturer and decided that prompt repair was important to prevent further damage to the feedwater pump flange. On July 20, the licensee reduced plant power to approximately 50 percent to secure the feedwater pump and make a temporary repair. Permanent repair plans were being developed for the next refueling outage. The inspectors considered that this repair effort indicated good teamwork between engineering and maintenance.

At the time of the temporary repair, the maintenance department mentioned that a damaged gasket was the probable cause of the leak and that the chances of the leak migrating to another bolt hole were considered likely. The maintenance personnel indicated that monitoring of the flange would be important in order to allow early detection of a leak in order to prevent steam cutting of the feedwater pump casing

flange. However, when the inspectors inquired as to the frequency and method of monitoring approximately 1 week later, the maintenance personnel found that operators were not consistently checking the area for leaks. The inspectors considered this to be a weakness in communication between the two departments, especially since checking the flange for leaks seemed to be important from a plant materiel condition perspective. Operations management issued a shift order to more formally specify periodic monitoring of the flange for leaks.

One violation was identified in this area. No deviations were identified in this area.

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. Engineering followup in response to identified problems was good overall. The plant's investigation of water intrusion into the standby gas treatment system was aggressive.

3.1 Water Found in Standby Gas Treatment System During Routine Surveillance Testing

On July 26, 1995, during performance of a standby gas treatment (SBGT) surveillance run, the "B" SBGT system exhaust fan tripped its thermal overloads, and operators subsequently declared the "B" train inoperable. The licensee concluded that the "B" train was potentially inoperable while the "A" train was removed from service on July 25, 1995, for planned maintenance. The licensee formally notified the NRC of the occurrence in accordance with 10 CFR 50.72 (reference Section 6.3).

Licensee troubleshooting of the event revealed that the "B" train exhaust fan casing had approximately 10 gallons of water in it. Investigation of the "A" side fan showed no water intrusion. The licensee installed a temporary modification to replace the plugs on the exhaust fan casings with drain valves; per the system engineers request, the operators opened the valves on a daily basis to drain the water and aid in trending purposes for identification of the water intrusion source in order to perform permanent corrective action. For the next several days, operators drained varying amounts (0 - 1250 ml) of water from both divisions of the SBGT system.

Licensee personnel aggressively pursued the matter and began isolating potential pathways for the water intrusion into the system. These troubleshooting efforts were still ongoing at the end of the inspection period. However, the licensee's preliminary cause assessment determined that the water source was from a radwaste tank, 1T-6, that vented to the same ductwork to the offgas stack that the SBGT system connected into. A temporary modification was installed to close the damper between 1T-6 and the rest of the ductwork. Following the temporary modification, there was no more water found in the SBGT fans. The licensee informed the inspectors of their intent to submit a Licensee Event Report (LER)

30 days after the initial discovery of water in the SBGT system. Pending inspector review of the licensee's determination of the root cause of the water intrusion and associated implications for both trains of the SBGT system, this is an Unresolved Item (50-331/95007-02 (DRP)).

3.2 Incorrect Surveillance Test for End of Cycle Recirculation Pump Trip

On July 19, the licensee identified that the current test method used for end of cycle recirculation pump trip (RPT) response time was not correct. The licensee determined that a test method change, made as part of a surveillance procedure change in 1989, was in error. The technical specifications (TS) required a test each operating cycle to verify that the system response time was less than 140 milliseconds. The TS also specified that the response time was from initiation of turbine control valve fast closure or turbine stop valve closure to actuation of the breaker secondary (auxiliary) contact. However, since 1989, the test only measured part of the total response time and compared it to the original acceptance criteria of 140 milliseconds. The licensee's corrective actions included: (1) initiating an Action Request (AR) to formally document the issue and corrective actions, and (2) prompt evaluation by engineering to support system operability. The licensee retrieved actual test data collected during the outage and used some design information to support assumptions made during the operability evaluation. The conclusion was that one of the four channels was inoperable, but the TS requirement of one channel per trip system was met. The licensee also reviewed past test data back to 1989 and found that the system was operable in the past. The rest of the corrective actions were being developed, with a due date of August 21, 1995. The inspectors considered the identification of the issue to be good and will review the corrective actions when completed. This is considered an Unresolved Item. (50-331/95007-03 (DRP)).

No violations or deviations were identified in this area. Two URIs were identified.

3.3 Configuration Control Discrepancies

From June 15 through June 19, Duane Arnold experienced trips of three nonsafety-related continuous duty motors. During this period the reactor building closed cooling water (RBCCW) pump, the pump house supply fan, and the station air compressor motors all tripped due to thermal overloads. On June 20, 1995, during a surveillance run, the essential service water (ESW) pump motor also tripped due to the thermal overload (TOL). As a result of the TOL trips within a short period of time, the licensee issued action request (AR) 95-0960. The licensee's corrective actions included determining why the motors tripped and to determine if the TOL sizes and settings matched the design drawings.

The licensee found that the pump house supply fan tripped due to plugged filters. The licensee could not determine why the other motors tripped but increased the surveillance frequency for the ESW pump from monthly to weekly. No spurious trips due to thermal overloads had occurred of the ESW pump motor or any other motor in the plant since June 20.

The licensee identified a number of discrepancies between the drawings and the as-built configuration. During a walkdown of the motor control centers (MCCs), the licensee found that the TOL for the ESW motor had been set at 108 percent instead of the required 115 percent. In addition, the licensee found that one of the TOLs for the RBCCW pump had been installed upside down. The licensee found additional examples of incorrect TOL settings and TOLs installed upside down. The inspectors were concerned with the improper installation of some of the TOLs inside the cubicles. The licensee stated that proper TOL installation was considered skill of the craft. The licensee initiated a training maintenance action request (TMAR) to ensure that proper training would be given to personnel involved with TOL installation and maintenance. In addition, the licensee found examples where the design drawing specified a starter for a motor but no starter was installed, a TOL was designated as type FH but was actually a type H, an FH91A TOL was actually H92 and where the drawing designated a size 2 starter but the starter was actually a size 1. The discrepancies found by the licensee were similar to those documented in a previous violation.

The licensee had previously been issued a violation (331/90003-01E) for configuration control involving the TOL sizes in the field that differed from the design drawings. Part of the licensee's corrective actions at that time were to walkdown the MCC cubicles, revise the controlled design documentation to reflect the appropriate device designations and verify "the appropriateness of the sizing for the application." For the continuous duty motors the licensee had apparently not resized the TOL to determine the correct size for the application. The licensee had only recently issued a draft design document for sizing continuous duty motor TOLs. The inspectors concluded that the drawing errors were not safety significant. The licensee could not determine if the discrepancies occurred after all the MCCs had been walked down. The configuration control discrepancies were similar in nature to concerns identified in a recent engineering and technical support (E&TS) inspection (report No. 50-331/95004). The inspectors considered the licensee's configuration control a weakness.

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.

The following observations were made:

4.1 Operation Status of the Emergency Preparedness (EP) Program (82701)

4.1.1 Emergency Plan and Implementing Procedures

The Corporate Emergency Plan was merged with the Duane Arnold Energy Center (DAEC) Emergency Plan. Many of the former Corporate Plan Implementing Procedures (CPIPS) were eliminated or revised, but the process had not been completed.

The inspector reviewed Emergency Plan Implementing Procedure (EPIP) 5.2, "Recovery and Reentry," dated March 15, 1991, and Corporate Plan Implementing Procedure (CPIP) 6.1, "Recovery and Re-entry," dated February 1995. Both procedures indicated that they provided guidance to corporate personnel. Additional information was needed to describe NRC needs during the Recovery Phase.

Conversion of the emergency classification system to that developed by the Nuclear Utilities Management And Resource Council was planned for the near future. This action would require NRC approval and agreement by offsite authorities prior to implementation.

The DAEC Emergency Plan, Section E, Part 2.4., "Followup Messages to Offsite Authorities," indicated that various kinds of information would be provided if known and appropriate to the circumstances. Emergency Plan Implementing Procedure 1.2, "Notifications," Attachment 5, "Emergency Action Level Notification Form," did not include much of the referenced information, such as recommended emergency response actions. Efforts to resolve this discrepancy will be tracked as an Inspection Followup Item. (50-331/95007-04 (DRSS))

4.1.2 Emergency Response Facilities, Equipment, Instrumentation and Supplies

Tours were conducted through the Control Room, Technical Support Center (TSC), Operational Support Center (OSC), and Emergency Operations Facility (EOF). Each facility was well maintained and in an operational state of readiness. Current copies of the Emergency Plan, Emergency Plan Implementing Procedures and appropriate forms were present in each facility.

The inspectors observed a demonstration of an innovative new electronic status board that linked the TSC to the EOF, OSC, and the Joint Public Information Center (JPIC). Personnel in the EOF, TSC or JPIC could make entries to the system, which would simultaneously drive displays in each facility. This system had significant potential for improved information transfer.

Documents reviewed indicated that emergency equipment inventories and maintenance were very good, with timely corrective actions taken where deficiencies were identified. No problems or concerns were identified.

Designations had not been made for NRC Site Team seating in the TSC or EOF, or the telephones which these individuals would utilize. The licensee indicated they would review this prior to the 1996 exercise.

4.1.3 Training

Records indicated that drills and exercises were formally critiqued, and significant critique items selected for corrective action, as appropriate.

It was noted that the Emergency Preparedness Training guides reviewed dated from 1992-1993. Discussion with licensee personnel indicated that they will be reviewed/revised by the end of the year. The training

program was under review to determine if drills/breakout groups should be emphasized.

During verification of Emergency Response Organization (ERO) training qualifications, the inspector identified that a number of emergency response positions had the minimum of two persons identified in the Emergency Plan. The position of System Engineering Supervisor was filled by one person. This had been self-identified by the EP staff and was immediately corrected by training an additional person for this position. With only two persons available for certain emergency response positions, vacations, illnesses, and travel could make staffing key positions difficult.

4.1.4 Audits

The 1994 EP Audit was reviewed by the inspectors and found to be highly detailed and of great scope and depth. Strengths identified in the audit included interface with offsite agencies, all ERO positions were three deep or greater, and there was a thorough, effective drill critique process. An attachment to the audit included notes on the evaluation of interface with the offsite agencies and copies of the letters transmitting the assessment of effectiveness of licensee's interface with the State and local agencies. Three audit findings resulted from the audit. Corrective actions had been implemented and these findings were closed.

The 1995 audit had been completed on July 21, 1995, and the audit report was being developed. Discussions with the lead auditor indicated a performance based approach was taken for this audit, including observations of the July 12, 1995, emergency drill. Overall results were very good with strengths identified in initial ERO training, challenging and realistic drills, well written procedures, and a professional staff. Two audit findings resulted from the audit and corrective actions had been initiated for these findings.

4.2 Emergency Preparedness Exercise

The resident inspectors observed the licensee's announced emergency preparedness exercise on August 2, 1995, including pre-exercise briefings and post-exercise critiques. Overall performance during the exercise was excellent. The licensee demonstrated good response to the exercise accident scenario, excellent communications and team work, and the ability to implement onsite emergency plans. A concern identified during the October 19, 1994, exercise regarding preplanning for inplant team actions was reviewed and closed as discussed in Section 7.2.

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

5.0 Effectiveness of Licensee Controls in Identifying, Resolving, and Preventing Problems (40500)

During this inspection period the inspectors evaluated the effectiveness of licensee controls in identifying, resolving, and preventing issues that degrade the quality of plant operations or safety. The controls

reviewed included the following: on-site and off-site safety review committees, AR system, corrective action program, root cause analysis program, self-assessment capabilities, and operating experience feedback mechanisms.

The inspectors identified no violations or deviations. The inspectors concluded that, overall, the licensee maintains an effective corrective action program with strong management support for critical self-assessments. During a May 1995 management visit, the NRC questioned the licensee about the use of multiple tracking systems for identified deficiencies. As a result of the NRC questioning, the Licensing department performed a self-assessment of the corrective action process. The review identified several enhancements that could be made with respect to lowering the number of separate deficiency tracking systems. The inspectors agreed with the licensee's assessment that the refinements made have the potential to improve the corrective action process, however the implementation of the changes was too recent to adequately assess their effectiveness. In addition, the inspectors identified several other weaknesses but noted that the licensee had recognized them and was working on enhancements or improvements to the system.

5.1 Operations Department

Operations department self-assessments were critical and had strong management support. Operations personnel were outward looking as evidenced by their participation in several peer reviews at other facilities. These visits to outside facilities involved all levels of the operations department and the individuals involved brought back several process improvements from their visits. The most significant of these involved operator training improvements. The operations department also requested several assist audits from the onsite quality assurance organization.

One weakness the inspectors noted was that the operations department did not recognize a chronic trend in plant drawing discrepancies. Routinely, operations personnel would identify one to three discrepancies per week in system and electrical drawings during drawing reviews before performing system lineups and out of services. Plant management considered these to be examples of operators identifying potential problems. The licensee initiated action requests (ARs) to document the errors and initiate corrections to the specific drawing. These ARs were Level 4s and did not require root cause determination. This resulted in correcting only the identified error on the affected drawing and did not identify the process that was creating the drawing errors. Engineering had initiated a trend of identified drawing errors in January 1995 as a response to an NRC concern. Based on this trend, engineering initiated a recent AR identifying that drawing errors were a chronic problem. However, Operations was not aware of either the trending efforts or the AR initiated by engineering. The inspectors were concerned that Engineering and Operations did not communicate their efforts or concerns about drawing errors.

Operations continued the temporary operations shift supervisor (TOSS) process from the previous SALP period. The process continued to provide

benefits for operations and the participating departments. The TOSS program was formalized and well received by station management and other departments. It provided operations input into other departments and imported into operations an increased understanding of other department's processes. Other departments had a similar process but they were not formalized and were done on an as needed basis.

The inspectors reviewed several root cause determinations and solutions to Level 4 ARs generated by the operations department. Level 4 ARs did not require root cause determinations and could receive a solution team evaluation. A solution team generally consisted of personnel from the department assigned the responsibility for resolution. Additional team members, based on the need for specific expertise, could be selected to assist in determining a solution. The ARs that received root cause determinations were detailed and effective. Several of the Level 4 reviews were noticeably of lesser detail and not fully effective. These were usually evaluated by solutions teams and involved extensive usage of engineering judgment. Some of these resulted in recurrence of the original problem.

The licensee had recently recognized this weakness prior to the inspector's identification and used an outside organization to evaluate their root cause determination efficiency. The evaluation identified the weakness associated with the usage of engineering judgment instead of conventual root cause determination methods. The licensee initiated corrective actions prior to the inspection. These actions included offering root cause training for station personnel participating on solution teams and providing extensive training for root cause determination team members. The licensee appears to be adequately staffed to perform several intensive root cause determinations simultaneously. The inspectors noted that the Licensing department significantly increased the number of root cause determinations performed in 1995.

The inspector's review of LER 95-04 revealed that the root causes were not readily identified. In addition, the prescribed corrective actions did not appear to address the problem. Further discussions with quality assurance and licensing revealed that the licensee had previously identified this weakness. Additionally, corrective actions were determined and initiated to ensure that root cause determination training was scheduled for the licensing staff and other personnel performing AR reviews.

5.2 Maintenance Department

The licensee's ability to identify, resolve, and prevent material and programmatic issues that degrade quality in the maintenance area was good. The last licensee audit of the Maintenance and M&TE (MMTE) programs was thorough, however, corrective actions in one area identified during the audit appeared incomplete.

The inspector reviewed completed and in-process action requests, corrective maintenance action requests, and preventive maintenance action requests. The administration of each of these systems appeared timely, and resolution of issues that were identified was appropriate.

The action request system was a strength. This system appeared to be of significant value since it provided plant personnel with a method to identify potential plant issues on a variety of topics.

The corrective maintenance system was also a strength. Although the CMAR backlog exceeded the licensee's goals, the total backlogs were within these goals prior to the March 1995 outage. During the outage, the number of outstanding CMARs rose when priority was given to work that specifically required outage conditions. The licensee had made recent progress toward reducing the CMAR backlog. During tours of the reactor and turbine buildings, the inspector noted only a small number of minor leaks. The inspector assessed that the relative absence of leaks confirmed the overall effectiveness of the corrective maintenance program. During repairs to the "A" reactor feedwater pump, the ownership displayed by craft personnel was commendable.

The inspectors also evaluated the preventive maintenance action request system. Although the preventive maintenance completion rate exceeded the licensee's goal, each of the persons interviewed communicated a belief that benefit would be realized if this program were updated/revised, but the current program contributed to the safe and reliable operation of the plant. The inspector agreed with this assessment.

The licensee's ability to resolve and/or identify problems in the following maintenance related areas was weak:

- Drawing Control - One of the recommendations made following the last MMTE audit was that directions should be provided to plant personnel regarding drawing control (QDR 93-200 refers). During the 17 months that had elapsed since this audit, the number of monthly drawing discrepancies identified had remained relatively constant. The inspector was concerned because the corrective actions that were taken following the audit had not resulted in a downward trend with respect to the number of drawing discrepancies identified.

- Corner Rooms - In both corner rooms, the areas surrounding the core spray and residual heat removal (RHR) pumps were contaminated and there was visible rust on many of the pipes located beneath the RHR pumps in the northwest corner room. The inspector assessed that both corner rooms represented a departure from the standards that were evident throughout most of the plant. The licensee informed the inspectors that decontamination of the rooms was planned for the fall of 1995.

5.3 Plant Support

Overall, the inspectors noted good problem tracking and proper management attention to assure appropriate followup of deficiencies. The training department performed good, critical self-evaluations in response to noted weaknesses. In the Security department, the inspectors noted good tracking and breakdown of events; however, the process was not formalized, but rather, was accomplished through the Security Supervisor. The licensee informed the inspectors that the

process was under review to consider proceduralizing the Security department's method to resolve problems. The licensee made good use of peer evaluations for operating events. Issues raised by peer evaluations received appropriate management attention.

The inspectors noted good tracking and breakdown of events in the radiation protection (RP) department. As part of the licensee's recent effort to reduce the number of deficiency tracking systems, the health physicist (HP) Supervisor was requiring ARs for all radiological occurrence reports (RORs). The HP technicians preferred using the ROR process, as opposed to the AR system, because of the information available on the sheets. The inspectors did not have any concerns with the results obtained by the licensee. The inspectors noted the good practice of having HPs write RORs/ARs rather than just reporting events to their supervision and having the supervisors write them; the process appeared to empower the HPs and encourage them to use the system.

The inspectors also attended a safety committee meeting and operations committee meetings. The committees appeared to give appropriate attention to issues and to raise questions freely, and to be critical of performance when appropriate.

No violations or deviations were identified in this area.

6.0 Followup of Events (93702)

During the inspection period, the licensee experienced several events, some of which required prompt notification of the NRC pursuant to 10 CFR 50.72. The inspectors pursued the events onsite with licensee and/or other NRC officials. In each case, the inspectors verified that the notification was correct and timely, if appropriate, that the licensee was taking prompt and appropriate actions, that activities were conducted within regulatory requirements, and that corrective actions would prevent future recurrence. The specific events were as follows:

6.1 Group III Isolation

On June 25, a primary containment isolation system group III isolation occurred along with the initiation of the "B" standby gas treatment system (SGTS) when the fuel pool exhaust radiation monitor power supply failed. Investigation determined that a fuse blew in the power supply, which caused it to fail downscale and initiate the automatic actions as designed. Following repair of the power supply and replacement of the fuse, the isolation was reset. The inspectors will review corrective actions in detail when the LER is closed.

6.2 Reactor Core Isolation Cooling Isolation

On July 25, a primary containment isolation system group VI, RCIC steam supply valve isolation occurred during installation of a relay block for surveillance testing. The inspectors will review corrective actions in detail when the LER is closed.

No violations or deviations were identified in this area.

7.0 Followup of Previous Inspection Findings (92901) (92902) (92903) (92904)

7.1 (Closed) Unresolved Item 50-331/93019-06(DRS): Minimal actions had been taken to address pressure locking and thermal binding of MOVs. Acceptability of all valves deemed susceptible to pressure locking and thermal binding will be evaluated using an upcoming Generic Letter on this issue. This item is closed.

7.2 (Closed) Inspection Followup Item 50-331/94018-01(DRSS): Briefing and preplanning for inplant teams was not sufficient. During the 1994 evaluated exercise, some inplant teams were unaware of how to complete assigned tasks, indicating that inplant team preplanning was not sufficient. Changes had been made to the forms utilized for inplant teams, addressing equipment identification, the concern addressed, and work instructions. This was evaluated during the 1995 exercise. The inspectors observed several briefings for inplant teams during the August 2, 1995, emergency preparedness exercise and noted that the briefings were detailed and thorough. There was active involvement from participants to discuss repair plans and contingencies. This item is closed.

7.3 (Closed) Violation 50-331/94020-01(DRP): No acceptance criteria to ensure proper yoke clamp installation on RCIC steam supply valve. The inspectors reviewed corrective actions, which included: (1) proper installation of yoke clamp on RCIC valve in November 1994 and a followup check of tightness in March 1995, (2) procedure revisions to provide acceptance criteria, and (3) training on yoke clamp installation. The inspectors considered the corrective actions appropriate. This item is closed.

No violations or deviations were identified in this area.

8.0 Licensee Event Report (LER) Followup (92700) (90712)

Through direct observations, discussions with licensee personnel, and review of records, the following event reports were reviewed to determine that reportability requirements were fulfilled, immediate corrective actions were accomplished, and corrective actions to prevent recurrence had been accomplished in accordance with TS.

8.1 (Closed) LER 50-331/95005, Revision 0: Reactor Scram due to "B" Feedwater Pump Trip Caused by Lube Oil Pump Coupling Failure. The licensee's corrective actions included replacement of the failed coupling and plugged orifice, inspection of the coupling and orifice on the "A" feedwater pump, and revisions to the maintenance procedure to ensure periodic inspection of the orifice. The inspectors concluded that the corrective actions were appropriate to prevent recurrence. This item is closed.

No violations or deviations were identified in this area.

9.0 Report Review (90713)

During the inspection period, the inspectors reviewed the licensee's monthly operating reports for June and July 1995. The inspectors confirmed that the information provided met the requirements of TS 6.11.1.C and Regulatory Guide 1.16.

10.0 Definitions

10.1 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 IFI disclosed during the inspection is discussed in Section 4.1.1.

10.2 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 Section 3.1 and 3.2.

11.0 Exit Interview (30703)

The inspectors met with licensee representatives on August 16, 1995, and informally throughout the inspection period and summarized the scope and findings of the inspection activities. The inspectors also discussed the likely information content of the inspection report with regard to documents or processes reviewed by the inspectors. The licensee did not identify any such documents or processes as proprietary. The licensee acknowledged the findings of the inspection.

11.1 Persons Contacted

*J. Franz, Vice President Nuclear
D. Mineck, Assistant 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

In addition, the inspectors interviewed other licensee personnel including operations shift supervisors, control room operators, engineering personnel, and contractor personnel (representing the licensee).

*Denotes those present at the exit interview on August 16, 1995.