

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-331/86006(DRP)

Docket No. 50-331

License No. DPR-49

Licensee: Iowa Electric Light and Power
Company
IE Towers, P. O. Box 351
Cedar Rapids, IA 52406

Facility Name: Duane Arnold Energy Center

Inspection At: Palo, IA

Inspection Conducted: March 18 through May 19, 1986

Inspectors: J. S. Wiebe
N. V. Gilles

Approved By: *D.C. Boyd*
D. C. Boyd, Chief
Reactor Projects Section 2D

6-19-86
Date

Inspection Summary

Inspection on March 18 through May 19, 1986 (Report No. 50-331/86006(DRP))

Areas Inspected: Routine unannounced inspection by the resident inspectors of licensee action on previous inspection findings, operational safety, maintenance, surveillance, Licensee Event Reports, outage activities, and modifications and facility changes.

Results: Of the seven areas inspected, two violations were identified in one area (Paragraph 6 - failure to perform post maintenance testing on the Reactor Core Isolation Cooling System static inverter - and failure to take adequate corrective action to preclude repetition).

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DETAILS

1. Persons Contacted

- R. Hannen, Assistant Plant Superintendent, Operations
- *B. Lacy, Maintenance Superintendent (Acting)
- *R. Lessly, Design Engineering Manager
- *E. Matthews, Quality Assurance Manager
- *C. Mick, Operations Supervisor
- *W. Miller, Assistant Plant Superintendent, Technical Support
- *D. Mineck, Plant Superintendent, Nuclear
- *J. Probst, Technical Support Engineer
- *J. Smith, Technical Support Supervisor
- *K. Young, Assistant Plant Superintendent, Radiation Protection/Security

In addition, the inspectors interviewed several other licensee personnel including Operations Shift Supervisors, Control Room Operators, engineering personnel, and contractor personnel (representing the licensee).

*Denotes those personnel present at the exit interviews.

2. Licensee Action on Previous Inspection Findings

- a. (Closed) Open Item (331/85015-01(DRP)): Personnel Errors. A scheduled outage was conducted during the last half of the month of March. During the outage and during the outage recovery effort, no significant personnel errors occurred even though significant numbers of contractors were onsite to support the outage. Based on the above, the inspectors consider the licensee's efforts in this area to be effective in reducing personnel errors. This item is considered closed.
- b. (Closed) Open Item (331/85021-10(DRP)): Long Term Corrective Action for Sequencing Diesel Generator Loads. A permanent modification was installed and tested to sequence the required Loss of Coolant Accident loads onto the emergency busses even if power is being received from a transformer instead of the diesel generator. This item is considered closed.
- c. (Open) Violation Severity Level IV (331/85029-04(DRP)): Surveillance Test on the Equipment Drain Sump Flow Timers Did Not Verify Proper Alarm and Initiating Action. A study of the Surveillance Test Program to ensure 10 CFR Part 50.36(c)(3) is met is scheduled for completion by December 31, 1986. This item remains open pending NRC review of the licensee's study.
- d. (Closed) Unresolved Item (331/85034-03(DRP)): Vibration Readings on Core Spray Pump. The licensee has agreed that if data taken for Section XI of the ASME Boiler and Pressure Vessel Core is in the required action range, the affected component will be declared inoperable unless a known instrument problem has caused the data to fall in the required action range, in which case the instrument problem will be corrected and the data will be retaken.

With respect to the vibration readings on the Core Spray Pump, the licensee's consultant has determined that (1) the pump and motor are operating within acceptable vibration limits, and (2) the cause of the vibration readings above 30 mils is due to one or more of the following effects:

- A mechanical resonance occurring in the magnetically mounted transducer during the vibration measurement.
- An inherent problem that occurs when low frequency accelerometer signals are integrated to produce velocity and displacement outputs.

The licensee has relocated the measurement points to make the point more accessible and reduce the above effects. This item is considered resolved.

- e. (Open) Open Item (331/86002-01(DRP)): Limitorque Operators With Nonqualified Wire. During the Spring 1986 outage the licensee replaced the wiring in 34 Limitorque Valve Operators that perform a safety function in a High Energy Line Break (HELB) environment with qualified wiring. Eleven other Limitorque Valve Operators were previously replaced, and according to the licensee, have qualified wiring. The remaining 51 Limitorque Valve Operators in the EQ program are in harsh (radiation only) environments. The licensee has inspected 11 of these valves to determine the type of wire in the valve operators. Based on the type of wire (in some cases engineering judgement was used to determine the type of insulation) and insulation material, the licensee evaluated the insulation material and determined that the insulation would not fail under accident conditions. This type of evaluation, however, is not consistent with NRC requirements for having traceable documentation for the wires and qualification testing of a similar or actual wire sample of the type installed in the valve operators. The licensee has committed to replacing the wiring in the affected valve operators with wiring that is consistent with NRC requirements. The wire replacements will be accomplished on a noncontrolling basis during outages until the next refueling outage when all the wiring will be replaced prior to startup.

This item remains open pending replacement of the wiring in all the affected valve operators.

- f. (Closed) Open Item (331/85021-01(DRP)): Incorporation of Ambient Vaporizer Temperature Control Valve and Pressure Control Valve Into the Preventive Maintenance Tracking Program. The inspectors verified that the above equipment was added to the plant preventive maintenance program. This item is considered closed.

3. Operational Safety Verification

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. Tours of the reactor building and turbine building were conducted to observe plant equipment conditions, including potential fire hazards, fluid leaks, and excessive vibrations and to verify that maintenance requests had been initiated for equipment in need of maintenance. The inspectors, by observation and direct interview, verified that the physical security plan was being implemented in accordance with the station security plan.

The inspectors observed plant housekeeping/cleanliness conditions and verified implementation of radiation protection controls. During the inspection, the inspectors walked down the accessible portions of the Residual Heat Removal, Emergency Service Water, Core Spray, Diesel Generator, and Standby Liquid Control Systems to verify operability. The inspectors also witnessed portions of the Radioactive Waste System controls associated with radwaste shipments and barreling.

These reviews and observations were conducted to verify that facility operations were in conformance with the requirements established under technical specifications, 10 CFR, and administrative procedures.

No problems or concerns were identified.

4. Monthly Maintenance Observation

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

The following items were considered during this review: the limiting conditions for operation were met while components or systems were removed from service; approvals were obtained prior to initiating the work; activities were accomplished using approved procedures and were inspected as applicable; functional testing and/or calibrations were performed prior to returning components or systems to service; quality control records were maintained; activities were accomplished by qualified personnel; parts and materials used were properly certified; radiological controls were implemented; and fire prevention controls were implemented.

Work requests were reviewed to determine status of outstanding jobs and to assure that priority is assigned to safety-related equipment maintenance which may affect system performance.

The following maintenance activities were observed/reviewed:

- HPCI Throttle Valve Repair
- Residual Heat Removal Discharge Check Valve Repair
- Traversing Incore Probe Ball Valve Repair
- Safety Relief Valve Power Cable Replacement
- Intermediate Range Monitor Overlap Adjustment
- Limitorque Valve Operator Wire Replacement

No problems or concerns were identified.

5. Monthly Surveillance Observation

The inspectors observed technical specifications required surveillance testing on the Emergency Diesel Generators, Drywell Pressure Instruments, and Operator Daily and Shiftly Checks (selected portions) 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 technical specifications 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.

No problems or concerns were identified.

6. Licensee Event Reports Followup

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 action was accomplished, and corrective action to prevent recurrence had been accomplished in accordance with technical specifications.

- a. (Closed) Licensee Event Report (LER) 86-005 (331/86-005-LL): Reactor Core Isolation Cooling (RCIC) Inverter Trip on High Input Voltage. The inverter tripped on high input voltage due to battery equalization in progress at the time. The licensee experienced similar problems with inverters in the RCIC and High Pressure Coolant Injection (HPCI) systems in 1974, and raised the high input voltage sensor trip points to the manufacturer's recommended value on these inverters. However, the licensee did not change the setpoint on a spare inverter in storage, which was eventually installed in the RCIC system on August 2, 1985. The result was the installation of a defective inverter into the RCIC system and the subsequent inverter trip on March 11, 1986. This is an apparent violation (331/86006-01(DRP)) of 10 CFR 50, Appendix B, Section VIII which requires in part that measures established for the identification and control of materials,

parts, and components be designed to prevent the use of incorrect or defective materials, parts, and components. A replacement inverter was installed in the RCIC system, and its trip setpoints checked prior to installation. The licensee is developing a procedure to adequately test this and similar inverters prior to installation. The licensee is also reviewing controls in place to ensure spares installed from stock reflect operating experience. This LER is considered closed.

- b. (Closed) LER 86-006 (331/86-006-LL): Reactor Water Cleanup (RWCU) System Isolation Due to Failed Tank Head Gasket. The isolation was caused by a high differential flow condition between the inlet and outlet of the "B" filter demineralizer as a result of gross leakage in the area of the main head flange. A suspected cause of the failure was lower than expected torque values for the tank head bolts. The main head flange gasket was replaced and the bolts were torqued to the required value. The licensee checked bolt torque values on the "A" filter demineralizer, which were also lower than expected. The bolts were torqued to the required value. The licensee plans to recheck these torque values prior to restart from the next refuel outage and to inspect and replace the gaskets on the "A" filter demineralizer. This LER is considered closed.
- c. (Closed) LER (331/86-007-LL): RCIC Isolation Due to Temperature Switch Design Problem. The cause of the isolation was an internal design problem with a temperature differential switch in the Steam Leak Detection System (SLDS). The isolation was received when the temperature switch was taken to the READ position as part of a daily surveillance test. The manufacturer of the temperature switch is aware of a design problem with this particular model producing spurious signals when switched to the READ position. To correct this problem the licensee has installed a short time delay within the RCIC and HPCI SLDS circuitry to eliminate isolations from spurious signals, without affecting system response to a real event. This LER is considered closed.
- d. (Closed) LER 86-008 (331/86-008-LL): Reactor Protection System (RPS) Trip from Spurious Signal While in Cold Shutdown. The trip was caused by a spurious signal in the "A" RPS logic. The "B" RPS channel was already tripped due to a 24 VDC battery discharge test in progress. The cause of the spurious signal is unknown since no annunciators were received with the trip, and the process computer was de-energized for maintenance at the time. The licensee believes the trip was caused by a spurious electrical spike generated from outage activities. The trip signal was reset immediately. The licensee has reviewed recent functional tests performed on each trip sensor, and no deviations were found. This LER is considered closed.
- e. (Closed) LER 86-009 (331/86-009-LL): Standby Gas Treatment System (SGTS) Actuation During Outage Maintenance. Actuation of the SGTS was caused by a downscale trip of the "A" Reactor Building Exhaust

Ventilation Radiation Monitor. The radiation monitor tripped because of maintenance work being performed on a drywell cooling valve which shares common instrument AC power with the monitor. The operator who prepared the equipment tags for the maintenance did not realize the connection between the two components, since he did not consult the Electrical Distribution List. This document was revised to reflect the common power supply when a similar event occurred in 1985, documented in LER 85-012. This is an apparent violation (331/86006-05(DRP)) of 10 CFR 50, Appendix B, Section XVI which requires in part that measures be established and taken to assure that corrective actions are taken to preclude repetition. Furthermore, the Iowa Electric Light and Power Company QA Manual Sections 14.3.2 and 14.3.3 identify LERs as a system to correct conditions adverse to quality. The licensee has placed temporary warning tags on the breakers involved and has instructed operators to consult the Electrical Distribution List or the Electrical Distribution Information System (EDIS) in the future. A work request was initiated to modify the power supply circuits to separate dissimilar equipment. The licensee is continuing to develop its EDIS, a computerized system which will eventually replace all documents presently used by operators. This LER is considered closed.

- f. (Closed) LER 86-011 (331/86-011-LL): Main Steam Line Isolation (MSIV) Failure to Open Due to Stem Binding. During observation of MSIV movement prior to running a surveillance test, the licensee observed the valve to stick in the partially open position. Removal of the packing gland and packing material revealed surface galling on both the valve stem and junk ring. The licensee discovered that a small piece of stellite material had broken off the junk ring and caused the valve stem to bind. The licensee suspects that a metallurgical flaw caused the stellite to break away and believes this to be an isolated occurrence. The galling was removed from the valve stem and junk ring, and the valve was reassembled and stroke tested satisfactorily. The seven other MSIV stems were inspected and no evidence of surface galling found. This LER is considered closed.

Two violations were identified.

7. Outage Activities

The licensee entered a scheduled outage on March 15, 1986, to perform maintenance activities and technical specification required surveillance tests. The outage was scheduled to last two weeks, but was extended a week when problems were discovered late in the outage with one of the MSIV and an instrument air compressor. In the process of shutting down for the outage, the licensee discovered a leaking check valve in the injection line of one train of the Residual Heat Removal (RHR) system, causing pressurization of that system. During the outage, the licensee disassembled the valve when attempts to seat the valve with hydrostatic pressure failed. A small shoulder on a hinge pin in the valve was found which was causing the valve disc to bind on the seat. The shoulder was

ground down and the valve reassembled. The valve was again hydro tested and found to be leak tight. This same valve was inspected during the last outage and the problem with the hinge pin was not discovered. The inspectors are concerned that inspection procedures may be inadequate in addressing problems of this type, and intend to review the inspection procedures for the RHR check valve (Open Item No. 331/86006-02(DRP)). During startup after the outage, the check valve again began to leak, but the licensee had procedures in place to prevent pressurization of the RHR system through operational means. Once reactor pressure reached a higher level, the check valve seated and no further problems occurred.

One item of concern was identified.

8. Modifications and Facility Changes

During review of a modification of the HPCI and RCIC steam leak detection circuitry, the inspectors noted that the HPCI relays (Quality Level 1, Seismic) were being installed using Quality Level 4 hardware. No engineering evaluation could be found which showed that the installed configuration was able to withstand a seismic event. It is the inspectors' judgement that because the weight of the relays is small no safety concern exists with the installed configuration. The inspectors are concerned, however, that the lack of an evaluation may indicate that engineering is not adequately considering the ability of installed equipment to withstand a seismic event. Similar instances have occurred for modifications such as: (1) acid pipe routed through the diesel generator room, and (2) replacement battery did not fit battery rack. Although these examples were shown to not affect the operability of the equipment, the initial engineering design appeared not to consider seismic aspects adequately. The inspectors are concerned that this apparent lack of consideration could ultimately lead to a condition where safety-related equipment is degraded. This item is open pending NRC review of the licensee's actions to correct this weakness (331/86006-03(DRP)).

During the above inspection, the licensee informed the inspectors that the RCIC relays in the steam leak detection circuitry were being replaced with Quality Level 4 relays. The original relays were being replaced to prevent spurious isolations of the RCIC system and Quality Level 1 relays would not be available for five to seven weeks. It was the licensee's position that the Quality Level 4 relays were better than the relays which were allowing the spurious isolations to occur. The Quality Level 4 relays are identical to the Quality Level 1 relays except for the required documentation. The relays are manufactured at the same facility using the same specifications. The Quality Level 4 relays were inspected for physical damage and correct nameplate data and were functionally tested. The licensee conditionally released the relays for installation and operation in accordance with their administrative procedures. The documentation included a 10 CFR 50.59 review that was marginally adequate. The conditional release expires during the next refueling outage; however, the licensee agreed to replace the relays when they become available and the RCIC system is out of service for other reasons. This item is open pending installation of the Quality Level 1 relays (331/86006-04(DRP)).

Two items of concern were identified.

9. Open Items

Open items are matters which have been discussed with the licensee, which will be reviewed further by the inspectors, and which involve some action on the part of the NRC or licensee or both. Open items disclosed during the inspection are discussed in Paragraphs 7 and 8.

10. Exit Interview

The inspectors met with licensee representatives (denoted in Paragraph 1) throughout the inspection period and at the conclusion of the inspection on May 20, 1986, and summarized the scope and findings of the inspection activities. The inspectors also discussed the likely informational 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.