

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-331/92023(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, Iowa

Inspection Conducted: December 4, 1992, through January 11, 1993

Inspectors: M. Parker  
C. Miller

Approved:

  
R. D. Lanksbury, Chief  
Reactor Projects  
Section 3B

1/19/93  
Date

Inspection Summary

Inspection on December 4, 1992, through January 11, 1993 (Report No. 50-331/92023(DRP))

Areas Inspected: Routine, unannounced inspection by the resident inspectors of followup, licensee event reports followup, operational safety, maintenance, surveillance, cold weather preparations, regional requests, and report review.

Results: An executive summary follows:

## EXECUTIVE SUMMARY

### Operations

The reactor was operating at about 100 percent power at the beginning of the period, and remained at or near full power for the remainder of the period except for short reductions for control rod adjustments and surveillances. The reactor was operated in excess of 1658 megawatts (MW) averaged over a running 8 hour period, but remained within 1658 MW for the 8 hours of each of the two shifts during which the event occurred (Section 4).

### Maintenance/Surveillance

The licensee completed repairs on the "A" circulating water pump. A short outage is planned for late February 1993 to restore the pump to service, replace control rod position indicating probes, and to perform other maintenance.

### Engineering and Technical Support

Temporary repairs were completed to fortify the high pressure coolant injection (HPCI) and reactor core isolation cooling (RCIC) room doors to enable them to withstand the pressure of steam line breaks in their respective rooms. Permanent repairs are currently being planned.

### Safety Assessment/Quality Verification

Management involvement following a near miss incident on a high reactor pressure surveillance was timely and resulted in good corrective action.

## DETAILS

### 1. Persons Contacted

- \*P. Bessette, Supervisor, Regulatory Communications
- \*D. Engelhardt, Security Superintendent
- \*M. Flasch, Manager, Engineering
- J. Franz, Vice President Nuclear
- \*M. McDermott, Maintenance Superintendent
- \*C. Mick, Operations Supervisor
- \*K. Peveler, Manager, Corporate Quality Assurance
- \*R. Salmon, Manager, Special Projects
- \*B. Schenkelberger, Fire Protection Coordinator
- P. Serra, Manager, Emergency Planning
- \*S. Swails, Manager, Nuclear Training
- \*J. Thorsteinson, Assistant Plant Superintendent, Operations Support
- G. Van Middlesworth, Assistant Plant Superintendent, Operations and Maintenance
- \*T. Wilkerson, Radiation Protection Manager
- \*D. Wilson, Plant Superintendent, Nuclear
- \*K. Young, Manager, Nuclear Licensing

### U. S. Nuclear Regulatory Commission (NRC)

- R. Lanksbury, Chief, Reactor Projects Section 3B
- \*C. Miller, Resident Inspector
- \*M. Parker, Senior Resident Inspector

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

\*Denotes presence at the exit interview on January 11, 1993.

### 2. Followup (92701)(92702)

- a. (Closed) Open Item 50-331/90009-03(DRP): Dual Function Containment Isolation Valves. (A dual function containment isolation valve performs a safety function to open or close to support safety system operation and has a safety function to close to provide primary containment isolation.) This open item concerned whether dual function containment isolation valves should be included in Technical Specifications (TS) and what action should be taken to ensure continued reliability of containment integrity when an emergency core cooling system (ECCS) torus suction valve becomes inoperable.

The issue was first identified in June 1990 when the residual heat removal (RHR) torus suction valve, MO-1989, could not be closed remotely or locally. Several conference calls were held between the licensee and the NRC to determine the licensee's course of

action. The licensee performed a safety evaluation and concluded that continued operation with MO-1989 inoperable, but in the open position, until refueling outage 10 (June 1990) was of minimal safety significance. This valve was assumed to be open in all accident analyses, and none of the RHR modes were adversely affected. Additionally, the RHR torus pump suction valves, MO-1919 and 1921, provided acceptable redundant isolation capabilities in the unlikely event of an RHR pipe leak or pipe rupture. The licensee's position was that TS operability for power operated containment isolation valves did not apply to this valve.

On August 16, 1991, Iowa Electric Light and Power Company (IELP) met with the NRC staff, and concluded that the TS for containment isolation valves did not apply to dual function valves, such as the ECCS torus suction valves. Closure of the valves defeated the ECCS function, and application of the TS action statement for containment isolation valves would be contrary to safety.

The NRC staff stated its position in a letter titled "NRC Position on Operability of Safety-Related Dual Function Valves," dated October 3, 1991. The staff's position was that if any ECCS and/or containment isolation valve experienced a failure mode that did not allow the valve to fully function as intended, the requirements for primary containment isolation may no longer be met. Unless relief was granted, the limiting condition for operation (LCO) for primary containment isolation applied. In addition, even if the valve was stuck open, the malfunction degraded the ECCS function since the system can no longer be isolated.

In a letter dated December 11, 1991, the Iowa Electric Light and Power Company agreed with the NRC's position (reference letter NG-91-3909). The licensee stated that the valves in question were never listed in TS as primary containment isolation valves. Additionally, no documentary explanation for that exclusion was found. The licensee committed to adopt a more conservative position and enter the LCO action statement for primary containment isolation if an ECCS and/or containment isolation valve experienced a failure mode which inhibited the valve from performing its containment isolation function.

To further address this issue, the licensee issued administrative control procedure (ACP) 1410.7, "Guidelines For Inoperable Primary Containment Isolation System (PCIS)," dated April 22, 1992. This procedure identifies PCIS valves and penetrations, applicable TS requirements, and actions required when valves are determined to be inoperable. The procedure is intended to provide specific directions to the plant staff upon discovering an inoperable PCIS valve. This open item is closed.

- b. (Closed) Violation 50-331/91016-02(DRP): Failure To Perform Post Maintenance Testing. This violation concerned the failure to perform maintenance testing following packing adjustments to the "C" outboard main steam isolation valve (MSIV), CV-4419. Prior to performing surveillance testing on the MSIVs, the licensee chose to perform a packing adjustment on CV-4419 to reduce steam leakage as a result of a galled stem. Following the packing adjustment, the licensee performed a surveillance test on the MSIVs, consisting of stroke time testing of the valves. However, following this test, the licensee once again readjusted the packing on CV-4419 to reduce the steam leakage. The failure to perform stroke time testing following the final packing adjustment was considered a violation of TS.

In response to the inspector's concern, the licensee, subsequently, successfully stroke time tested the valve and confirmed the valve's operability in accordance with the American Society of Mechanical Engineers (ASME) code. In response to the violation, the licensee stated that the violation occurred because the technical justification for omitting post maintenance stroke time testing was not formally documented prior to completion of the maintenance action, and that their standard practice was to perform stroke time testing following packing adjustments. In addition, the licensee revised maintenance directive (MD) 024, "Post Maintenance Testing Program." The revision provided additional direction to maintenance on the need for proper review and documentation of the acceptability of deviations from accepted standard practice. This violation is closed.

- c. (Closed) Violation 50-331/91016-03(DRP): Missed Verification of Flowpath to Fire Hose Stations. This violation cited the licensee's failure to completely verify fire hose station flow paths on a quarterly basis as required by TS 4.13.E.1.A. Quarterly verification of five valves in the flow path had been missed from 1985, when Design Change Packages (DCP) 1315 and 1316 had installed them, until October 17, 1991. These DCPs had incorporated a change in Operating Instruction (OI) 513, "Fire Protection System," but had failed to incorporate the appropriate Surveillance Test Procedure (STP) changes to ensure fire hose station flow paths were verified.

Upon discovery of the problem, the licensee verified that all the required valves were in their proper position. The STP was revised on October 18, 1991, to include the previously omitted valves. The event was also reported under Licensee Event Report (LER) 91-011 on November 14, 1991.

Since the time that DCP 1315 and 1316 were initiated, a dedicated surveillance and testing group assumed responsibility to review DCPs for necessary STP changes. Recently, this testing and

surveillance group had been included in project teams for DCPs, so that they were better able to review potential changes to STPs. This violation is closed.

No violations or deviations were identified in this area.

3. Licensee Event Reports Followup (92700)

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 technical specifications.

(Closed) Licensee Event Report (LER) 91-005 (331/91005-LL) and (331/91005-1L): Automatic Reactor Scram Following MSIV Closure. This event report documents a high flux reactor scram caused by the closure of a MSIV and a subsequent PCIS Group IV, shutdown cooling, isolation. A combination of a "B" outboard MSIV control pack nitrogen fitting leak and a failed solder joint on the 2 inch nitrogen supply line to the outboard MSIV accumulators, allowed nitrogen pressure to bleed sufficiently to enable spring pressure to close the "B" outboard MSIV. The reactor scram, forced outage, and subsequent startup were discussed in inspection report 50-331/91011. Corrective actions for the MSIV closure and PCIS isolation are discussed below.

The licensee evaluated the failed 2 inch coupling and found poor workmanship during original construction. The pipe had not been inserted into the joint to a sufficient depth prior to soldering, the solder used was a tin-lead solder normally used in lower temperature applications than the steam tunnel, and the structural mounting of the pipe applied a tensile stress to the joint. A similar failure of a poorly soldered large diameter copper joint resulted in a scram on September 3, 1990. The licensee had begun evaluating and repairing large diameter copper solder joints as part of the corrective action for that event, but had not considered the MSIV nitrogen lines in that effort.

Short term corrective action for the MSIV closure was completed in the forced outage following the scram. Fittings on the MSIV control pack were tightened to ensure they would not allow air to bleed off. The nonsafety-related portion of the copper nitrogen supply header in the steam tunnel was replaced with stainless steel tubing. The safety-related outboard MSIV copper tubing connections were leak checked, and one repair was made. Solder materials used throughout the plant were changed to be more acceptable in high temperature applications.

The licensee performed an engineering review to determine other systems which use copper piping and could affect plant safety or availability upon failure. The safety-related tubing for the outboard MSIV was found to be vulnerable, and was subsequently replaced during the 1992

refueling outage. The safety-related instrument air to the control building ventilation system was determined not to be a problem because its 1 inch or less diameter piping was not nearly as susceptible as was the larger bore piping. The licensee's inspection of 2 inch and above joints on the plant instrument air system rejected 61 of 318 joints inspected. The failure of these joints was due mainly to inadequate solder coupling. Maintenance craft overlaid the nonleaking joints with a metallic epoxy compound while the system was on line. Rather than continue the extensive effort to ultrasonically test the remaining joints, the licensee chose to overlay the rest of the 2 inch and above nonsafety instrument air joints with the metal epoxy compound. This effort is expected to be completed in early 1993, after some delays prevented its completion as planned in 1992.

The cause of the PCIS Group IV isolation was not fully understood, but the licensee suspected that the pressure surge from starting an RHR pump was enough to actuate the high pressure trip setpoint. The licensee installed snubbers on the instrument lines for the PCIS Group IV pressure switches, then tested the system by initiating shutdown cooling, without further incident. The inspectors will continue to follow the licensee's efforts to finish the epoxy overlays on instrument air piping. This LER is closed.

No violations or deviations were identified in this area.

4. Operational Safety Verification (71707) (71710)

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. It was observed that the Plant Superintendent, Assistant Plant Superintendent of Operations, and the Operations Supervisor were well informed of the overall status of the plant and that they made frequent visits to the control room and regularly toured the plant. 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 and cleanliness conditions and verified implementation of radiation protection controls. During the inspection, the inspectors walked down the portions of the RHR system to verify operability by comparing system lineup with plant drawings, as-built configuration or present valve lineup lists; observing equipment conditions that could degrade performance; and verifying that instrumentation was properly valved, functioning, and calibrated.

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

#### Operation Above Administrative Thermal Power Limits

On December 14, 1992, the inspectors reviewed the shift supervisor's log and noted that the plant had exceeded its licensed thermal power output of 1658 MW averaged over an 8 hour period. This 7 minute excursion to 1658.1 MW averaged over 8 hours had minor safety significance due to being within the bounds of transient analyses initial operating conditions. The excursion did point out a weakness in the licensee's oversight of operational activities.

At 10:21 a.m., operators noted that the 8 hour thermal power average had exceed 1658 MW. This occurred for the day shift operating crew which had started their shift about 7:00 a.m. that morning. Average power had been running near 1658 MW since the start of the shift, with xenon burning out slowly, requiring the operators to reduce reactor core flow slightly several times in an attempt to keep average power below the 1658 MW limit of TS. Once the 8 hour average exceeded 1658 MW, operators reduced power further, and notified the operations supervisor. The NRC staff has recognized brief power excursions of up to 2 percent above licensed thermal power limits, provided the average power level over any 8 hour shift is maintained no greater than the 100 percent limit. Since the 8 hour period which exceeded 1658 MW spanned two operating shifts, and the 8 hour thermal power average for each of these shifts was less than 1658 MW, this excursion is not considered to have exceeded TS limits. It did exceed the limit specified in the precautions of Integrated Plant Operating Instruction (IPOI) 3, which state "Do not exceed 1658 MW average thermal power over any eight hour period." The inspectors reviewed this issue with the licensee, and the licensee has agreed to provide clearer operating instructions to licensed operators, and revise IPOI 3 to clarify operating limits over the 8 hour shift. The licensee has also instructed operators on the use of several different computer points intended to help operators maintain reactor power within licensed thermal power limits, and has temporarily reduced the 8 hour thermal power average operating limit to 1654 MW until an acceptable method is in place to ensure licensed thermal power limits will not be exceeded.

No violations or deviations were identified in this area.

#### 5. Monthly Maintenance Observation (62703)

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

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 was assigned to safety-related equipment maintenance which might affect system performance.

Portions of the following maintenance activities were observed and/or reviewed:

- Control Rod Drive Hydraulic Pump "B" seal replacements
- HPCI Barometric Condenser troubleshooting
- Control Rod Drive 02-23 troubleshooting
- Circulating Water Pump 1P-4A repairs

No violations or deviations were identified in this area.

6. Monthly Surveillance Observation (61726)

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

The inspectors also witnessed portions of the following test activities:

- STP-42B022 - RCIC Steam Line High D/P Monthly Functional Test
- STP-42G001 - Reactor High Pressure ARI/RPT Instrument Function/Calibration
- STP-45A002-Q - LPCI System Quarterly Operability Tests
- STP-45E003 - RCIC Simulated Auto Actuation/Restart Test

No violations or deviations were identified in this area.

7. Cold Weather Preparations (71714)

The inspectors reviewed the licensee's cold weather preparations, including IPOI 6, "Cold Weather Operations." Systems susceptible to cold weather damage were inspected to verify that adequate freeze protection measures were in place. Use of heat tracing, area heaters, instrumentation lay up, and fire protection equipment surveillances were reviewed to verify acceptability for cold weather operations. The inspectors confirmed that IPOI 6 procedures were completed and adequate for present system conditions. The inspectors also observed randomly selected systems covered by the procedure to verify that the protective measures were complete and acceptable. The inspectors considered the overall cold weather preparations to be adequate to meet safety objectives.

No violations or deviations were identified in this area.

8. Regional Requests (92702)

a. ECCS Suction Strainers

The inspectors responded to an NRR request for information on the susceptibility of ECCS strainers to plugging from insulation debris following a line break or main steam safety valve (MSSV) actuation in the drywell. The survey was spurred by events described in Information Notice 92-71, "Partial Plugging of Suppression Pool Strainers At A Foreign BWR," where a main steam relief valve on a foreign reactor lifted in primary containment, and plugged ECCS strainers. The licensee had previously evaluated DAEC's susceptibility to the event, considering the guidance of NUREG-0897, Rev. 1, "Containment Emergency Sump Performance", Generic Letter 85-22, "Potential Loss of Post LOCA Recirculation Capability Due to Insulation Debris Blockages," and Regulatory Guide 1.82, "Water Sources For Long-Term Recirculation Cooling Following a Loss-of-Coolant Accident." The licensee concluded that due to the small likelihood of lifting an MSSV, the low amount of debris expected to be generated from the "Nukon" drywell insulation and the suction strainers which were designed for sufficient flow even when 50 percent plugged, corrective actions were not required.

b. Spent Fuel Pool Capacity

The inspectors responded to a Region III request for information on spent fuel pool (SFP) storage capacity. The spent fuel pool at DAEC has an expected full core offload capacity until the 1998 refuel outage. The licensee is planning to rerack about one third of the SFP in late 1993 or early 1994, which will increase storage space from 1898 to 2411 positions. This should extend the full core offload capability to the year 2004.

No violations or deviations were identified in this area.

9. Report Review (90713)

During the inspection period, the inspectors reviewed the licensee's Monthly Operating Report for November 1992. The inspectors confirmed that the information provided met the requirements of TS 6.11.1.C and Regulatory Guide 1.16.

No violations or deviations were identified in this area.

10. Exit Interview (30703)

The inspectors met with licensee representatives (denoted in Section 1) on January 11, 1993, 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.