



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION III  
799 ROOSEVELT ROAD  
GLEN ELLYN, ILLINOIS 60137

JUN 16 1977

Docket No. 50-331

Iowa Electric Light and Power  
Company

ATTN: Mr. Duane Arnold  
President

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

Gentlemen:

This refers to the inspection conducted by Messrs. F. A. Maura and C. H. Brown of this office on February 24, 25; March 12-16; and April 19-22, 1977, of activities at Duane Arnold Energy Center authorized by NRC Operating License No. DPR-49 and to the discussion of our findings with Mr. Hammond at the conclusion of the inspection, and with Messrs. Wallace and Hammond in Cedar Rapids on June 2, 1977.

The enclosed copy of our inspection report identifies areas examined during the inspection. Within these areas, the inspection consisted of a selective examination of procedures and representative records, observations, and interviews with personnel.

During this inspection, certain of your activities appeared to be in noncompliance with NRC requirements, as described under Enforcement Items in the Summary of Findings section of the enclosed inspection report.

With regards to Infraction Items A. 1 and A.2 the inspection showed that action was taken to correct the identified noncompliance and to prevent recurrence. Consequently, no reply to these two items is required and we have no further questions regarding these items at this time.

With regards to Infraction Item A.3 it should be noted that this is the second consecutive time which you have failed to perform the test in accordance with the test procedure or to

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revise the procedure in accordance with your Technical Specifications. Therefore, your response should emphasize the steps being taken to avoid further recurrence.

This notice is sent to you pursuant to the provisions of Section 2.201 of the NRC's "Rules of Practice," Part 2, Title 10, Code of Federal Regulations. Section 2.201 requires you to submit to this office within twenty days of your receipt of this notice a written statement or explanation in reply, including for each item of noncompliance: (1) corrective action taken and the results achieved; (2) corrective action to be taken to avoid further noncompliance; and (3) the date when full compliance will be achieved.

In our meeting with you on June 2, 1977, we discussed our concerns (see Paragraph 4, Report Details of the enclosed inspection report) over past and future MSIV tests. We understand that you will revise your MSIV test procedure to incorporate lessons learned in the past, including methods for eliminating and/or controlling leakage through the outboard MSIV's when testing inboard MSIV's. In your reply to this letter please confirm these understandings. Also, please provide us a copy of your revised MSIV leak test procedure at least 30 days prior to conducting the next leak test.

In accordance with Section 2.790 of the NRC's "Rules of Practice," Part 2, Title 10, Code of Federal Regulations, a copy of this notice, the enclosed inspection report, and your response to this notice will be placed in the NRC's Public Document Room, except as follows. If this report contains information that you or your contractors believe to be proprietary, you must apply in writing to this office, within twenty days of your receipt of this notice, to withhold such information from public disclosure. The application must include a full statement of the reasons for which the information is considered proprietary, and should be prepared so that proprietary information identified in the application is contained in an enclosure to the application.

Iowa Electric Light and  
Power Company

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We will gladly discuss any questions you have concerning this inspection.

Sincerely,

James G. Keppler  
Director

Enclosure: IE Inspection  
Report No. 50-331/77-13

cc w/encl:  
Mr. E. L. Hammond, Chief  
Engineer  
✓ Central Files  
Reproduction Unit NRC 20b  
PDR  
Local PDR  
NSIC  
TIC

OFFICE	R111	R111	R111	R111	R111	R111
SURNAME	Maura/Brown	WSCF	Fiorelli	Kister	Norelius	Keppler
DATE	6/15/77				6/15/77	

UNITED STATES NUCLEAR REGULATORY COMMISSION  
OFFICE OF INSPECTION AND ENFORCEMENT

REGION III

Report of Operations Inspection

IE Inspection Report No. 50-331/77-13

Licensee: Iowa Electric Light and Power Company  
IE Towers  
P. O. Box 351  
Cedar Rapids, IA 52405

Duane Arnold Energy Center  
Palo, IA

License No. DPR-49  
Category: C

Type of Licensee: BWR (GE) 538 MWe

Type of Inspection: Routine, Unannounced

Dates of Inspection: February 24, 25; March 12-16; April 19-22; and  
June 2, 1977

Principal Inspector: *F. A. Maura*  
F. A. Maura

6/15/77  
(Date)

Accompanying Inspector: *C. H. Brown Sr*  
C. H. Brown

6/15/77  
(Date)

Other Accompanying Personnel: W. S. Little

Reviewed By; *W. S. Little for*  
W. S. Little, Chief  
Nuclear Support Section

6/15/77  
(Date)

## SUMMARY OF FINDINGS

### Inspection Summary

Inspection on February 24, 25; March 12-16; April 19-22; and June 2, 1977, (77-13): Reviewed selected refueling and maintenance procedures; verified that certain pre-refueling and refueling activities were conducted; observed testing of inboard and outboard MSIV's to determine the as found condition; and observed maintenance activities on the diesel generator. Six items of noncompliance were found relating to failure to follow procedure, failure to test refueling interlocks as required by Technical Specifications and failure to maintain adequate records.

### Enforcement Items

The following items of noncompliance were found during the inspection:

#### A. Infractions

1. Contrary to Technical Specification 3.9.A.3 during the 1976 refueling the fuel grapple hoist load switch was not tested at  $\leq$  400 lbs and therefore the setting could not be confirmed. (Paragraph 2.c, Report Details)
2. Contrary to Technical Specification 4.9.A.1, the fuel grapple hoist jam interlock was not tested during the 1976 refueling. (Paragraph 2.c, Report Details)
3. Contrary to Technical Specification 6.8.1.6, STP 47A005 was not adhered to during the performance of some of the MSIV's "as found" leak rate tests in that the pressure decay method used and the flow regulator installed were not as described in the specific and general test procedures, respectively. (Paragraph 4.b, Report Details)
4. Contrary to 10 CFR 50, Appendix B, Criterion XVII "Quality Assurance Records," some of the MSIV leak test records did not state all of the pertinent conditions under which the tests were run, and this lack of information affected the results of some of the inboard MSIV tests.

### Deficiency

1. Contrary to Technical Specification 6.8.1.6, procedure STP 47A005 was not adhered to in that the flowmeter P-139 used in testing the "B" outboard MSIV was not calibrated for the 24 psig test condition prior to its use. (Paragraph 4.b, Report Details)

2. Contrary to Technical Specification 6.10.1.4, records of the Refueling Interlock Functional Test conducted on April 6, 1977, could not be located by the licensee on April 21, 1977, whereas they are required to be kept for five years. (Paragraph 3, Report Details)

Licensee Action on Previously Identified Enforcement Items

Not inspected.

Other Significant Items

A. Systems and Components

The accuracy of the inboard MSIV leakage rate was questioned due to the type of test performed and the way in which the tests were carried out. A calculated amount subject to varying assumptions has to be added to the measured values. (Paragraph 4.d, Report Details)

Unresolved Item - Reportability requirements for the outboard MSIV leakage rate measurements other than thru-the-seat leakage have been referred to IE:HQ for resolution. The licensee's interpretation does not account for MSIV packing or leakage control system (LCS) leakage. (Paragraph 4.c, Report Details)

B. Facility Items (Plans and Procedures)

STP 47A005, Rev. 4 as it applied to the leakage rate testing of the MSIV's requires considerable improvement to prevent the type of ad hoc testing experienced during this outage. (Paragraph 4.a, Report Details)

C. Managerial Items

None.

D. Deviations

None.

E. Status of Previously Reported Unresolved Items

Not inspected.

## Management Interview

- A. Management interviews were conducted with Mr. Hammond on March 13, 16, and April 21, 1977, and in a telephone conversation, to identify specific items of noncompliance regarding MSIV leak rate testing on May 12, 1977.
1. The problem areas regarding the MSIV leak rate testing procedure were discussed. (Paragraph 4.a, Report Details)
  2. The items of noncompliance identified under Enforcement Items were discussed.
  3. Test procedures, maintenance action requests (MARs) and other forms that the licensee used during performance of maintenance were discussed. Examples of weak points noted were the lack of requirements to inform operations on such items as tightening packing on MSIVs during the leak test and the filling out the MARs specifying what tests are required after maintenance. (Paragraph 6, Report Details)
  4. Administrative procedures controlling maintenance and testing by facility personnel and by contractor personnel were discussed. (Paragraph 6, Report Details)
- B. A management meeting was conducted with Messrs. Wallace and Hammond on June 2, 1977 at the Cedar Rapids corporate office. Those in attendance from NRC, RIII were: C. H. Brown, H. B. Kister, W. S. Little and F. A. Maura. The following areas were discussed:
1. RIII concerns about the MSIV test methods used and the conduct of the tests. (Paragraph 4, Report Details)
  2. RIII concerns about future testing methods.
  3. RIII accepts the licensees test results for the MSIV leak rate tests with some reservations due to the incomplete documentation of test conditions for some of the MISV's.

## REPORT DETAILS

### 1. Persons Contacted

E. Hammond, Chief Engineer  
J. Gebert, Maintenance Superintendent  
R. Rinderman, Quality Supervisor  
R. Hannen, Reactor and Plant Performance Engineer  
L. Nelson, Engineer  
C. Vondra, Shift Supervising Engineer  
D. Gibson, Shift Supervising Engineer  
M. Hammer, Shift Supervising Engineer  
D. Barton, Nuclear Station Operating Engineer  
R. Salmon, Engineer, Corporate Office

### Nuclear Services Corporation

G. Larsen  
C. Rowley  
T. Ashita  
R. Uffer

### 2. Review of Refueling Procedures

The following approved procedures were reviewed and found to include all requirements described in the Technical Specifications and FSAR unless otherwise stated below:

- a. Fuel and Reactor Component Handling Procedure #9, New Fuel Receiving and Inspection, Rev. 4.

A review of the records showed that all 100 new fuel assemblies were received and inspected in accordance with this procedure and ANSI N45.2.2.

- b. Fuel and Reactor Component Handling Procedure #5, Procedure for Moving Fuel Between Reactor Core and Spent Fuel Pool, Rev. 4.

Regarding core verification, the procedure requires a check for correct fuel assembly seating and location with the use of a TV camera. It also requires video taping of the inspection.

- c. STP 49A001, Rev. 2, Refueling Interlocks Functional Tests.

Refueling interlock described in Technical Specification 3.9.A.3 was tested during the 1976 refueling outage at approximately



460 lbs instead of the  $\leq$  400 lbs required setting and therefore could not have been confirmed to be set as required. In addition, the fuel grapple hoist jam interlock (1200 lbs) was not included in the procedure and was not tested during the last refueling outage as required by paragraph 4.9.A.1 of the Technical Specifications. The procedure was revised prior to this outage and the required test weights built in order to satisfy the Technical Specification requirements.

The licensee's plans were to unload only the 100 assemblies of 7 x 7 fuel which were being replaced with new 8 x 8 fuel; plus five assemblies which were being rechanneled; and as time allowed an undetermined number of assemblies for drilling the bypass flow holes in the lower tie plate casting. The licensee does not plan to perform fuel inspections or sipping operations of exposed fuel assemblies.

### 3. Refueling Activities

The inspector verified that all pre-fueling activities required by;

- a. STP 49A001, Refueling Interlocks Functional Tests
- b. STP 49B001, SRM Daily Response Check
- c. STP 47C001, Secondary Containment Integrity
- d. STP 42D004, Standby Gas System Actuation and Reactor Building Isolation

were completed prior to the start of refueling and as required during the refueling period covered by this inspection. However, the Refueling Interlocks Functional Test required for the week of April 6, 1977 could not be found by the licensee, although the Operating Log (Book 42) stated that it was satisfactorily completed at 1510 hrs on April 6, 1977. The misplacement of the test results is considered to be in noncompliance with Technical Specification 6.10.1.4 and Quality Assurance Manual procedure 1317.1, Plant Records Management Systems, paragraph 5.4.

### 4. MSIV Leak Rate Tests

#### a. Procedure

The test method used by the licensee was designed to directly measure the MSIV leakage rate using a rotameter. The test equipment was a rotameter mounted in a line taken off upstream of the leakage control system (LCS) valves. With the steam line upstream of the inboard valve pressurized with air to 24

psig this allows measurement with the rotameter of the leakage through the inboard valve seats into the steam line provided there are no other paths of leakage such as through the closed outboard MSIV and/or the LCS valves.

The outboard MSIV's were to be tested by filling the steam line with water upstream of the inboard MSIV to give a head of water equivalent to 24 psig. With the outboard MSIV and the LCS valves closed, the steam line volume between the inboard and outboard MSIV's was to be maintained at 24 psig with the air flow into the volume measured with the rotameter.

The sections of STP 47A005, Rev. 2, dated February 14, 1977, and March 11, 1977, applicable to leak rate testing of the MSIV's were reviewed. The following areas of concern were noted and discussed with the licensee on March 13, 1977 prior to the start of testing:

- (1) The procedure did not address the need for a stabilization period prior to taking of data.
- (2) The procedure did not address the effect that leakage past the outboard MSIV and leakage control system (LCS) would have in determining the true leakage rate of the inboard MSIV.
- (3) The procedure failed to consider the temperature effect on the outboard MSIV test results. (The test was performed at a time when the metal temperatures were at least 150<sup>o</sup>F and probably closer to 200<sup>o</sup>F. No efforts were made to determine what the metal temperature was).
- (4) The procedure did not establish a minimum length of time for data taking, except in case of zero leakage which required waiting five minutes for observation of bubbles in the bubbler.
- (5) The general procedures included options to test by pressure decay method or by measuring the makeup required to maintain a constant pressure. The specific procedure for MSIV testing did not allow for the pressure decay method.
- (6) Brooks flowmeters P-138 and P-139 lacked calibration certifications for 24 psig and 14.7 psia.

- (7) The procedure did not address the possibility of water in the line, and what provisions would be made to maintain the measuring equipment dry.
- (8) The test procedure should be revised to include their responses (see below) and correct other minor errors and omissions.

In response to the above comments the licensee and his consultants stated that:

- (1) They did not consider the temperature effect during the outboard valve tests, or the pressure effect which might create unmeasured leakage paths during the inboard valve tests significant enough to be worthy of consideration. The licensee could not produce the engineering basis to justify their conclusions.
- (2) A stabilization period of 30 minutes and a data recording period of at least 15 minutes would be followed.
- (3) Flow meters P-138 and P-139 would not be used.
- (4) Did not think water in the line would be a problem and if it did it would be handled at that time.
- (5) The test procedure would not be revised prior to the start of testing, but they would honor the above commitments.

b. Test Performance

The inspectors witnessed the performance of the inboard and outboard MSIV's leakage rate tests for the as found condition. The tests were performed by Nuclear Services Corporation under contract for the licensee. The tests were performed immediately following unit cooldown. The MSIV's were closed under 150 psig reactor pressure on March 13, 1977. The inboard valves were tested that same day; the outboard valves the following day.

During the tests of the inboard MSIV's the volume between both valves was found to contain considerable amount of water which had to be drained prior to testing. The remaining moisture caused considerable difficulty in maintaining the long tubing from the MSIV line to the flowmeter free of water during the

testing of the inboard valves. At times this caused wide fluctuations in the flow readings and the water had to be drained as the readings would slowly decrease. Once the line was fully blocked, the flow would stop. The licensee initially made no attempt to correct the problem until the inspector, (by shaking the water out of the tubing) demonstrated that a small amount of water was capable of blocking the air flow. (Test of inboard "A" valve). No attempt was made to correct the condition and for the duration of the inboard valves tests routine shaking and draining of the lines was required. The inspectors were concerned that, especially with the buildup of moisture in the line to the rotameter, the pressure in the volume between the MSIV's could increase to several inches of water thereby increasing the unmeasurable leakage out of the volume through paths other than through the rotameter. No attempt was made to measure the pressure in the volume between the two MSIVs during the test. Following the test, the licensee had the flowmeter manufacturer measure the pressure required to drive the flowmeter. Calculations for line losses were also made. The flowmeters and pressure gauges used for the inboard valve tests had been calibrated to standards traceable to NBS. Flowmeter accuracy was 1% of full scale.

During the performance of the outboard valves test, excessive leakage was measured by a combination of pressure decay plus makeup flow. This was caused by the fact that a flow regulator instead of a pressure regulator had been installed in the test rig. In any event, the available flow meters were not capable of measuring the leakage experienced in the as found condition. These are considered to be infractions to Technical Specification 6.8.1.6 in that the specific test procedure for MSIV's within STP 47A005, did not allow test by pressure decay, and the general procedure for the use of the local leak rate test required a pressure regulator instead of a flow regulator.

During the performance of the leak rate test on the "B" outboard MSIV Brooks flowmeter P-139 was used to measure the makeup air. As stated earlier this flowmeter had not been calibrated for the conditions for which used (24 psig) and its use is considered to be a deficiency of 10 CFR 50, Appendix B, Criterion V in that Quality Assurance Manual procedure 1312.1, paragraph 5.1.1 which requires that the measuring instrument used be calibrated, adjusted and maintained at prescribed intervals or prior to use was not followed.

c. Test Results

The raw data obtained during the performance of the as found leakage tests has been reduced with the following results:

<u>Leakage Path</u>	<u>Main Steam Line Leakage, scf/hr</u>			
	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
Outboard MSIV Seat, packing and Leakage Control System	71.0	17.1	138.5	58.3
Inboard MSIV measured leakage				
Data Reduced by inspector	4.3	0	0.1	2.2
Data Reduced by licensee	3.9	0	0.1	2.5

Tests to determine the paths of the leakage measured during the outboard valve tests were performed by the licensee. These tests, with the exception of the one performed on the A line the afternoon of March 15, were not witnessed by the inspector. A review of the data taken by the licensee showed the following results:

<u>Leakage Path</u>	<u>MSL Leakage Rate, scf/hr</u>			
	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
Leakage Control System Valves	33.3	7.2	137.7	50.2
Outboard MSIV Packing	33.0	5.2	0.8	0.8
Outboard MSIV Seat	4.7	4.7	0.8	0.8

The quality of the raw data for MSL "C" and "D" does not permit a breakdown between MSIV packing and seat leakage for lines C and D. In addition, the licensee has stated that the raw data can not be used to breakdown the different leakage paths as shown above because certain operations, such as tightening of packing, were not recorded. It is the licensee's position that the leakage shown for line "C" to be through the leakage control system was actually MSIV packing leakage. It was also the licensee's position that the LCS seat leakage was equivalent to that measured by tests several days after the MSIV tests. These LCS values ranged between 0 and 0.19 scf/hr. The licensee's failure to maintain proper records of the

actions being taken are considered to be an infraction of Technical Specification 6.10.4 and 10 CFR 50, Appendix B, Criterion XI.

It is the licensee's position that the large leakage obtained during the "as found" tests, in excess of the Technical Specification limit of 11.5 scf/hr at 24 psig is not reportable because it is not thru-seat-leakage. This item has been referred to IE:HQ for resolution.

d. Calculated Results for Inboard MSIV

Due to the nature of the test performed on the inboard MSIV's the actual leakage rate for the inboard MSIV equals the measured leakage rate plus the leakage rate through the outboard MSIV seat and packing and LCS valves at the time of the inboard valve tests. Since the LCS and outboard MSIV leakage rate was not measured it becomes necessary to calculate the unknown leakage at the  $\Delta P$  which may have existed in the volume between the inboard and outboard valves at the time of the test.

Certain assumptions must be made due to the lack of information, such as:

- (1) The available raw data, although incomplete is assumed to be accurate and reflect what took place,
- (2) The  $\Delta P$  in the volume between the two valves is assumed to be no greater than the  $\Delta P$  required to drive the flowmeter.

Since the "C" outboard valve test experienced the largest leakage, calculations were made for this line only, and based on the above assumptions an unknown leakage rate for the "C" inboard MSIV of 12.1 scf/hr was calculated.

The licensee's position is that the above assumptions are not correct because the raw data is incomplete and therefore their calculations for the unknown leakage rate for the "C" line is approximately 0.6 scf/hr. This large discrepancy shows the importance of maintaining accurate records throughout the test program in order to minimize or eliminate the number of assumptions which must be made. It also points out the need to improve the test performance so that the need for additional calculations are reduced.

5. Maintenance

The listed items (a through e) were verified to be included in the procedures for selected maintenance activities performed during the 1977 refueling outage. The activities reviewed were the installation of key lock switches in the HFIC and RCIC monitoring circuits, the standby Diesel Generating set annual inspection, and the cleaning and checking of the breakers.

- a. Administrative approvals for removing the systems and/or equipment from service and returning it back to service were found to be as required by the facility procedures.
- b. Procedures hold points for inspection or review by other licensee personnel appeared to be sufficient and were found to be as procedurally required.
- c. The provisions for testing the equipment and/or system before it is turned operable was stated on the work request form. The tests to be performed were surveillance tests in these instances. The licensee stated that the systems startup procedures are to be performed after this refueling outage to verify all systems are functional.
- d. The licensee stated a complete pre-startup check is to be made on all of the plant systems, not just on the systems that have been disturbed during the refueling outage. These pre-startup checks coupled with surveillance tests to be performed per the work requests for systems that have had maintenance performed provides several levels of verification that the systems are returned to normal with jumpers removed.
- e. The responsibility for reporting any design or construction related deficiencies noted during maintenance to licensee management appears to be defined in the facility procedures as the foreman on-the-job. The foreman reports any deficiencies to the maintenance department for evaluation.

6. Maintenance Activities

The work-in-progress was observed, in part, on the diesel generator inspection and installation of key lock switches for the HPCI and RCIC circuits. The procedures were not in the vicinity of the work being performed. The procedures are not required to be at the work site and in answer to an inquiry by the inspector, the licensee stated that the procedure would be reviewed for possible loss of

control with a vendor working on safety related equipment. The inspector did not note any deviations from procedures during any of the periods of observations.

7. Maintenance Personnel

The personnel that were performing the work on the diesel generator were contracted experienced vendor personnel that routinely perform this sort of maintenance on similar machines. The foreman had performed the maintenance on the machines in October of last year.