



UNITED STATES  
ATOMIC ENERGY COMMISSION  
DIRECTORATE OF REGULATORY OPERATIONS  
REGION III  
799 ROOSEVELT ROAD  
GLEN ELLYN, ILLINOIS 60137

TELEPHONE  
(312) 858-2660

A. RO Inspection Report No. 050-331/73-15

Transmittal Date : January 28, 1974

Distribution:  
RO Chief, FS&EB  
RO:HQ (5)  
DR Central Files  
Regulatory Standards (3)  
Licensing (13)  
RO Files

Distribution:  
RO Chief, FS&EB  
RO:HQ (4)  
L:D/D for Fuels & Materials  
DR Central Files  
RO Files

B. RO Inquiry Report No. \_\_\_\_\_

Transmittal Date : \_\_\_\_\_

Distribution:  
RO Chief, FS&EB  
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Regulatory Standards (3)  
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RO Chief, FS&EB  
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C. Incident Notification From: \_\_\_\_\_  
(Licensee & Docket No. (or License No.))

Transmittal Date : \_\_\_\_\_

Distribution:  
RO Chief, FS&EB  
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REGION III  
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GLEN ELLYN, ILLINOIS 60137

DR

TELEPHONE  
(312) 858-2660

JAN 28 1974

Iowa Electric Light and Power Company  
ATTN: Mr. Charles W. Sandford  
Vice President, Engineering  
Security Building  
P. O. Box 351  
Cedar Rapids, Iowa 52405

Docket No. 50-331

Gentlemen:

This refers to the inspection conducted by Mr. J. W. Sutton of this office on December 12-14, 1973, of construction activities at the Duane Arnold site authorized by AEC Construction Permit No. CPPR-70 and to the discussion of our findings with Messrs. Root and Cook and others of your staff at the conclusion of the inspection.

A copy of our report of this inspection is enclosed and identifies the areas examined during the inspection. Within these areas, the inspection consisted of a selective examination of procedures and representative records, interviews with plant personnel, and observations by the inspector.

No violations of AEC requirements were identified within the scope of this inspection.

In accordance with Section 2.790 of the AEC's "Rules of Practice," Part 2, Title 10, Code of Federal Regulations, a copy of this letter and the enclosed inspection report will be placed in the AEC's Public Document Room. If this report contains any information that you or your contractors believe to be proprietary, it is necessary that you make a written application to this office, within twenty days of your receipt of this letter, to withhold such information from public disclosure. Any such application must include a full statement of the reasons for which it is claimed that the information is proprietary, and should be prepared so the proprietary information identified in the application is contained in a separate part of the document. Unless we receive an application to withhold information or are otherwise contacted within the specified time period, the written material identified in this paragraph will be placed in the Public Document Room.

Iowa Electric Light and Power      - 2 -  
Company

JAN 28 1974

Should you have any questions concerning this inspection, we will be glad to discuss them with you.

Sincerely yours,

James G. Keppler  
Regional Director

Enclosure:  
RO Inspection Rpt No. 050-331/73-15

bcc: RO Chief, FS&EB  
RO:HQ (4)  
Licensing (4)  
DR Central Files  
RO Files  
PDR  
Local PDR  
NSIC  
DTIE  
OGC, Beth, P-506A

U. S. ATOMIC ENERGY COMMISSION  
DIRECTORATE OF REGULATORY OPERATIONS

REGION III

Report of Construction Inspection

RO Inspection Report No. 050-331/73-15

Licensee: Iowa Electric Light and Power Company  
Security Building  
P. O. Box 351  
Cedar Rapids, Iowa 52405  
  
Duane Arnold Energy Center  
Palo, Iowa

License No. CPPR-70  
Category: B

Type of Licensee: BWR (GE) - 538 Mwe

Type of Inspection: Routine, Announced

Dates of Inspection: December 12-14, 1973

Dates of Previous Inspection: October 3 and 4, 1973 (Construction)

Principal Inspector: *JW Sutton*  
J. W. Sutton

1-28-74  
(Date)

Accompanying Inspectors: None

Other Accompanying Personnel: None

Reviewed By: *RC Hayes*  
D. W. Hayes, Senior Reactor Inspector  
Reactor Construction Branch

1-28-74  
(Date)

SUMMARY OF FINDINGS

Enforcement Action

A. Violations

No violations of AEC requirements were identified during this inspection.

B. Safety Matters

No safety matters were identified.

Licensee Action on Previously Identified Enforcement Matters

A. Failure to Implement a Procedure for Large Pipe Hanger Installation and Inspection (RO Inspection Reports No. 050-331/73-09 and No. 050-331/73-14)

The corrective action, for the subject item, outlined in the Iowa Electric Light and Power Company (IEL&P) letter of October 11, 1973, in response to the RO:III letter dated September 5, 1973, was found to have been satisfactorily accomplished and documented. This matter is considered resolved. (Paragraph 1)

B. Failure to Use an Approved Procedure for Installation of Non-Bechtel Purchased Pipe Hangers (RO Inspection Report No. 050-331/73-14)

See item C below.

C. Failure to Control Issuance of Nonapproved Documents (RO Inspection Report No. 050-331/73-14)

The corrective action, for this and item B above, as outlined in the IEL&P letter of December 11, 1973, in response to the RO:III letter dated November 12, 1973, was found to have been satisfactorily accomplished and documented. This matter is considered closed. (Paragraph 1)

Design Changes

No new design changes were identified during the inspection.

Unusual Occurrences

No unusual occurrences were identified.

Other Significant Findings

A. Current Findings

1. Status of Construction

	<u>Percent Complete (December 7, 1973)</u>
a. <u>Piping (Greater Than 2 1/2")</u>	
Main Steam	100%
Feedwater	100%
Recirculation	100%
CRD	100%
Total (Process Piping)	99.9%
b. <u>Electrical</u>	<u>Percent Complete</u>
Trays	100%
Conduit	99%
Cable Pulled	99%
c. <u>Instrumentation</u>	<u>Percent Complete</u>
Installation	98%
Initial Calibration	95%
d. <u>Overall Construction</u>	97%

2. Fuel Loading

February 15, 1974

B. Unresolved Matters

No new unresolved matters were identified.

C. Status of Previously Reported Unresolved Matters

1. Reactor Building Overhead Crane (RO Inspection Reports  
No. 050-331/73-09, No. 050-331/73-12, and No. 050-331/73-14)

The reactor building overhead crane and supporting structures have been nondestructively examined and subjected to a full load performance test. This matter is considered closed. (Paragraph 2)

2. Corporate QA Audits (RO Inspection Reports No. 050-331/73-04, No. 050-331/73-09, and No. 050-331/73-14)

The inspector reviewed a report of an organization audit performed during October 1973 by the IEL&P corporate audit committee. An additional audit, to document the QA implementation of IEL&P's QA program, is to be conducted prior to fuel loading. This item remains open. (Paragraph 3)

#### Management Interview

- A. The following persons attended the management interview at the conclusion of the inspection.

##### Iowa Electric Light and Power Company (IEL&P)

L. D. Root, Assistant Project Manager  
G. A. Cook, Manager - Quality Assurance  
R. D. Essig, Quality Assurance Engineer  
D. E. Gembler, Quality Assurance Engineer  
D. L. Hammond, Quality Assurance Engineer

##### Bechtel, Incorporated (Bechtel)

L. E. Rosetta, Project Superintendent  
G. S. Cacciaguidi, Assistant Project Field Engineer  
M. J. Jacobson, Project Quality Assurance Engineer  
C. R. Edwards, Acting Project Field Quality Control Engineer

- B. Matters discussed and comments, on the part of management personnel, were as follows:

1. The inspector stated that he had reviewed the Nuclear Audit and Testing Company (NATCO) reports of audits conducted at the General Electric Company (GE) Wilmington, North Carolina, fuel fabricating facility and noted that the NATCO inspector had identified two areas of concern relative to the fuel channel manufacturing process. The areas were: (1) lack of signoff in regard to the visual inspection of the fuel channel radii following the "Brake" bending operation, and (2) striking of the side wall of the fuel channel with a rubber mallet to assure that the side walls conformed to flatness and cross sectional squareness requirements. In response to questioning, the licensee stated that they would request GE to analyze and comment on these items. (Paragraph 4)

2. The inspector stated that the cleanliness conditions observed at the 855' level in the reactor building appeared unacceptable. A film of light powder (carbon) covered the reactor internals and the reactor and refueling pool areas. The inspector asked what steps would be taken, by IEL&P, to clean this area prior to fuel loading. The licensee presented the inspector with a copy of the "855' Control Procedure" and recommended cleaning of the area to be completed prior to removal of the reactor vessel cover and prior to fuel loading. The licensee also stated that the fuel would be hand wiped to remove any dust that may have penetrated the Visqueen protective cover. (Paragraph 5)
3. The inspector stated that he had discussed with Mr. W. H. Barnum, Assistant to the President and Chairman of the Internal Practices Audit Committee, the results of a corporate audit conducted by his committee during October 1973, relative to the organizational structure and responsibilities of the IEL&P QA organization and had no further questions. The inspector added that it was his understanding that a second audit, covering implementation of the IEL&P QA program would be conducted prior to fuel loading. The licensee stated that this was correct. (Paragraph 3)
4. The inspector stated that it appeared the revised program and procedures for large hanger installation were now acceptable and that the revised procedures were being followed and the results documented. (Paragraph 1)

## REPORT DETAILS

### Persons Contacted

The following persons, in addition to individuals listed under the Management Interview Section of this report, were contacted during the inspection:

#### Iowa Electric Light and Power Company (IEL&P)

W. H. Barnum, Assistant to the President  
Dr. J. Bull, Nuclear Engineer  
G. G. Hunt, Chief Engineer - Plant  
E. L. Hammond, Assistant Chief Engineer  
D. A. Moen, Reactor and Plant Performance Engineer  
R. Lehman, Maintenance Supervisor

#### Kemper Insurance Company (Kemper)

B. McCall, Code Inspector

#### Bechtel, Incorporated (Bechtel)

R. L. Youngblood, Lead Hanger Engineer

1. Large Pipe Hanger Inspection (RO Inspection Reports No. 050-331/73-09 and No. 050-331/73-14)

#### Procedure Review

The inspector reviewed a Bechtel procedure, titled "Procedure for Bechtel Power Corporation Large Pipe Hanger Installation and Inspection for the Duane Arnold Energy Center," Revision 1, dated December 6, 1973. The procedure had been reviewed and commented on by IEL&P and GE personnel. The approved copy was signed by Bechtel's project engineer, field engineer, startup engineer, field QC engineer, and project superintendent. The procedure had been prepared by Bechtel's lead hanger engineer, assigned to the Duane Arnold site on October 9, 1973. The present Bechtel hanger inspection force consists of thirteen men. Since the start of the revised hanger inspection program in October 1973, 6,000 hangers have been physically identified in 51 piping systems. As of the current inspection, hangers on six systems have been completely inspected for proper installation and setting, the results documented, and the hangers and records released to operations.

The two violations identified in RO Inspection Report No. 050-331/73-14: (1) failure to use an approved procedure for the installation of non-Bechtel purchased pipe hangers, and (2) failure to control issuance of nonapproved documents have been resolved by the revised hanger procedure. The inspector selectively examined pipe hangers for proper implementation of the revised program, and no discrepancies were identified. However, continued followup is planned for the next scheduled inspection.

2. Reactor Building Overhead Crane (RO Inspection Reports No. 050-331/73-09, No. 050-331/73-12, and No. 050-331/73-14)

The inspector reviewed completed documentation attesting to the fact that the main hoist lifting components on the reactor building overhead crane had been nondestructively tested and that the hoist cable trolley and bridge structures were visually inspected. Testing of the overhead crane started on October 10, 1973, and was completed on October 22, 1973. A overload test of 125 tons was applied to the main hoisting components and a six-ton overload was applied on the auxiliary component. The test procedures for both the NDE and overload tests were reviewed and found acceptable and included: (1) procedure for Bechtel field inspection of the reactor building crane dated October 10, 1973, and (2) procedure for field load test of the reactor building crane, dated October 11, 1973. The procedures had been reviewed and approved by IEL&P, Bechtel, and the Harnischfeger Corporation (Harnischfeger) prior to the inspection. The results of the inspection and tests were well documented and properly signed. In addition to the above tests, the inspector reviewed a Bechtel interoffice memo, dated November 20, 1973, which indicated that Bechtel Engineering, San Francisco, California, had evaluated the effects of the crane overload occurrence on the reactor building structures. The calculations indicated that, "the stress induced by the crane overload are below the stress for which the building was designed and did not have any adverse effect on the integrity of the structure."

RO:III received an IEL&P report, dated November 17, 1973, pursuant to 10 CFR Part 50.55(e) requirements stating that the misalignment problem of the reactor building crane pinion gear possibly could have been caused by "stress relieving of the welded structure caused by the vibration during rail shipment." In response to questioning in regard to this statement, IEL&P personnel contacted Harnischfeger. The inspector was shown a telephone memo between IEL&P and Harnischfeger personnel which further affirmed the original statement made by Harnischfeger during the August 21, 1973, meeting at the Harnischfeger plant. The entire matter of the reactor building crane misalignment and overload is considered resolved.

3. Corporate QA Audits (RO Inspection Reports No. 050-331/73-04, No. 050-331/73-05, No. 050-331/73-09, and No. 050-331/73-14)

Documents pertaining to the preparation and implementation of a corporate QA audit, conducted during October 1973, by the internal audit committee, were examined by the inspector. The documents reviewed were:

- a. Letters dated October 11, 1973, from the Chairman of the Board and President of IEL&P to the Assistant to the President and the Vice President - Engineering, stating that an internal audit of the quality assurance program should be conducted for the Duane Arnold Nuclear Project. The assistant to the President was appointed chairman of the audit committee.
- b. A completed audit report, titled "IPAC Audit Report No. 1, Quality Assurance Program." The audit covered the requirements of Appendix B to 10 CFR Part 50, Criterion I, Organization. The report was considered to be comprehensive, and deficiencies identified were properly documented.
- c. Letter of December 3, 1973, to the Chairman of the audit committee from the Vice President - Engineering, indicating corrective action taken as a result of the October audit findings.
- d. Letter of December 3, 1973, to the Manager, Quality Assurance, from the Vice President - Engineering, directing the QA manager to prepare the necessary documents to resolve the deficiencies identified during the October 1973 audit.
- e. Letter of December 7, 1973, to the audit committee chairman from the Chairman of the Board and President, indicating receipt of the audit report and verifying the plan to continue the review of QA activities.

The audit was conducted using checklists and reports of the audit were properly distributed to responsible IEL&P personnel. During a meeting with the audit committee chairman, the chairman stated that an additional audit, dealing with implementation of the QA program, would be conducted prior to fuel loading. This matter is to be reviewed during the next scheduled inspection.

4. GE Fuel Fabricating Plant Audit

Reports of inspections conducted by an IEL&P contractor, Nuclear Audit and Testing Company (NATCO) at the GE fabricating plant located in

Wilmington, North Carolina, were reviewed. The purpose of the inspections, conducted on September 6 and 7 and October 27, 1973, was to review the records pertaining to GE's inspection of the fuel bundle lower tie plate crack problem. The majority of records reviewed by NATCO were classified as proprietary. During NATCO's review of the fuel channel fabrication and inspection records, two items were considered as deficiencies by NATCO: (1) failure to sign off the visual inspection of the inside and outside radii following the brake forming operation on the fuel channel, and (2) striking of the side wall of the fuel channel with a rubber mallet by the GE inspector to assure that the channel side walls complied with the flatness and cross-sectional squareness requirements. The NATCO report stated that "cold working raises the possibility of subsequent channel distortion or the generation of defects in the channel during reactor operation."

The inspector requested further clarification in regard to this matter and followup is planned for the next scheduled inspection.

5. Reactor Building Cleanliness, 855-Foot Level

The cleanliness condition on the 855-foot level was found unacceptable. A film of powder (carbon) was observed covering the reactor internals and the refueling and fuel and storage pools. The 855' level had been released to IEL&P operations by Bechtel. When this matter was brought to the attention of the IEL&P representative, he stated that the IEL&P control procedure, RE5-855' Level, Revision 2, was in effect and that cleanliness inspections were being conducted by operations personnel. A review of the "855' Cleanliness Inspection Reports" indicated that, on December 7, 1973, a dust condition was noted, with no indication of further steps to be taken to control this condition. The inspector was further informed that the dust was caused by welding, grinding, and cutting activities in the reactor drywell. Initially, filters were installed in the upper manhole openings in the containment vessel but, due to poor air circulation, the filters were removed, and this allowed the dust to be freely expelled into the 855' level. The reactor and plant performance engineer conducted a survey of the area on December 13, 1973, and as a result of this survey, a directive was issued prohibiting the removal of the vessel's temporary cover, until the area has been recleaned in accordance with procedure requirements. All cleaning is to be completed prior to fuel load. In addition, the fuel is to be inspected and wiped or cleaned, as necessary.

Further review of this matter is planned during the next scheduled inspection.

6. High Energy Pipe Modification (RO Inspection Reports No. 050-331/73-09 and No. 050-331/73-14)

Two concrete impingement walls have been constructed in the area of the feedwater line elbows located on the ground floor at the north end of the turbine building. The structural steel has not, as yet, been installed as required by the specification. This matter is to be reviewed during the next scheduled inspection.

7. Nonconformance Reports (NCR's) Field Deviation Instructions (FDI's) and Field Deviation Disposition Requests (FDDR's)

The inspector reviewed a list of open NCR's that had been generated by the Bechtel QC group. The list was dated December 11, 1973, and included all NCR's that are required to be resolved prior to fuel loading. A continuing review of NCR's is being maintained by IEL&P and Bechtel QA/QC personnel. Completed NCR's are being properly documented and signed.

8. Pins/Bolts Found in Three Spring Type Hangers in the 22" Recirculation System Lines Following Completion of the Primary System Hydrostatic Test

The licensee informed RO:III, by telephone on November 6, 1973, that, upon completion of the primary system hydrostatic test, pins or bolts were found inserted in three spring type pipe hangers in the 22" primary recirculation line system. IEL&P submitted a report dated November 14, 1973, to RO:III indicating the conditions surrounding this occurrence. The report indicated that inspection of the hangers, prior to the test, indicated that the retaining pins in the three hangers in question had been removed. At the completion of the test, re-examination of the hangers uncovered the fact that pins or bolts were found inserted in the three hangers. An engineering analysis was performed to determine if any undue stresses were encountered in the piping during the test. The analysis indicated that none occurred. IEL&P investigated the circumstances surrounding this occurrence and have concluded that the cause was due to unauthorized insertion of pins or bolts in the three hangers by person, or persons, unknown. The inspector informed the licensee that the original submittal of this occurrence on November 14, 1973, was not correct and that the data should be resubmitted as required by 10 CFR Part 50, Paragraph 50.55(e). The licensee indicated that a revised report would be submitted.

9. Noncode Piping Installed in Discharge Line from the Residual Heat Removal System Safety Relief Valves

On November 11, 1973, the licensee informed RO:III, by telephone, that, during a routine record review of piping systems, it was disclosed that

four pieces (about 350 feet) of nuclear Class II piping had been specified, manufactured, and installed between the discharge of the safety relief valves (on the RHR inlet piping to the heat exchangers) and the suppression pool, instead of nuclear Class I, as stated in the FSAR. The piping, which forms an extension of the containment pressure boundary, is six-inch carbon steel. It was manufactured to the requirements of ANSI B31.7, Class II, instead of ASME Nuclear Vessel Code Section III, Class B, Extension of Containment Code Cases 1425, 1426, and 1427. The licensee discussed the matter with their A-E and authorized code inspector. It was decided to cut out the 20 shop welds in the piping and reweld the piping to conform to the requirements of the ASME Code, Section III, Class B, including code cases. During the current inspection, work was in progress. The analysis of the problem is documented on Bechtel NCR No. 1556, Revision 1. Followup is planned during the next scheduled inspection.

10. Fuel Element Orifice, Type I and Type II

RO:III was informed, on November 26, 1973, that, during a routine inspection of fuel elements, the licensee found an orifice for a Type I fuel element installed in a Type II fuel element and an orifice for a Type II element installed in a Type I element. Further investigation and analysis is underway by IEL&P. The inspector was informed by the licensee that a report will be filed pursuant to 10 CFR Part 50.55(e). Followup of this item will be performed by the responsible Test and Startup Branch inspector.

11. Valve Casting Wall Thickness Measurement Program

IEL&P has completed their valve casting wall thickness measurement program and is in the process of summarizing and documenting the results. A report is to be available for review during the next scheduled inspection. This item remains open pending a review of the completed summary.

12. Quality Assurance Audits - Site

a. IEL&P Audits

The inspector reviewed a comprehensive QA inspection audit program that was initially implemented onsite during June 1973. The program is being conducted to verify the collection, retention, and storage of site construction records. The audits are being performed using a predetermined sample plan to permit a degree of assurance that the documentation in the site QC vault is complete, correct, and acceptable. The scope covers all site documentation

relative to the construction of the Duane Arnold Energy Center. Reports of audits that have been performed have been distributed to all responsible parties. Corrective action relative to deficiencies identified during the audits have also been documented. A general status log of all audits is being maintained. Audits completed to date include: (1) soil composition; (2) rebar; (3) concrete batch plant equipment calibration records; (4) concrete aggregate, placement, cylinder test, and delivery records; and (5) precast T beam shop inspection records.

b. Bechtel Audits

The inspector reviewed reports of Bechtel's QA site audits, conducted since the last inspection. The QA daily log was also reviewed. Deficiencies identified during the audits are being properly corrected and documented. A master log of all open items required to be completed prior to fuel loading is being maintained. A continuing review of IEL&P and Bechtel QA audits is planned during subsequent inspections.

13. Safeguard Cable Separation

The inspector requested to be kept informed regarding the progress of cable installation and final QA/QC inspection schedules. The inspector stated that verification, that the separation criteria for safeguard cables had been met, was required prior to fuel loading and that he could not complete this inspection until the remaining cables had been installed, inspected (by QA/QC) and released.

14. Preservice Inspection

The inspector reviewed drafts of Volumes I and II of the Preliminary Duane Arnold Energy Center Preservice Report, prepared by GE. The inspection was performed to comply with the intent of the July 1971 Edition of Appendix IX of Section III and Section XI of the American Society of Mechanical Engineers' Boiler and Pressure Vessel Code. All work was performed in accordance with the Duane Arnold Energy Center's Final Safety Analysis Report, Appendix J.

The inspection itself was performed in three parts: (1) The RPV was examined during the period between April 4, 1972, and April 24, 1972; (2) several areas of the RPV were reexamined in June of 1972 to evaluate and verify the previous results; (3) the third section, "The Piping Pressure Boundary," was examined in May and June of 1972. The report covered all examinations performed during the above mentioned three intervals.

The examinations were performed by two-man teams. These teams consisted of an examiner and a data taker. All personnel performing examinations as a part of this inspection were certified in accordance with the 1968 Edition of the American Society for Nondestructive Testing Recommended Practice, SNT-TC-1a.

The primary reference standard for the examinations was the American Society of Mechanical Engineers' Basic Calibration Block as described in Appendix IX of Section III of the ASME Code.

The report included the procedures used during the examinations, listings and certifications of the personnel participating in the examination, certification of the equipment used, and the FSAR appendix complied with. Also included were isometric drawings of the piping systems involved, together with a master system checklist for each piping system and sketches of the reactor pressure vessel showing the location of all welds examined. A table was attached that listed the areas examined and those areas which had recordable indication.