UNITED STATES
ATOMIC ENERGY COMMISSION
DIVISION OF COMPLIANCE
REGION III
799 ROOSEVELT ROAD
GLEN ELLYN, ILLINOIS 60137

TELEPHONE
(312) 858-2660

REGULATORY OPERATIONS, REGION III

A. RO Inspection Report No. 050-331/73-04

Transmittal Date : May 7, 1973

Distribution:
RO Chief, RT&OB or RO Chief, RCB
RO:HQ (5)
DR Central Files
Regulatory Standards (3)
Licensing (13)

Distribution:
RO Chief, M&FFB
RO:HQ (4)
L:D/D for Fuel & Materials
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B. RO Inquiry Report No. _____

Transmittal Date : _____

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RO Chief, RT&OB or RO Chief, RCB (2)
RO:HQ (5)
DR Central Files
Regulatory Standards (3)
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Distribution:
RO Chief, M&FFB
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C. Incident Notification From: _____
(Licensee & Docket No. (or License No.)

Transmittal Date : _____

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RO Chief, RT&OB or RO Chief, RCB
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DR Central

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

TELEPHONE
(312) 858-2660

May 7, 1973

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 Messrs. Sutton and Rohrbacher of this office on April 4 - 6, 1973, of construction activities at the Duane Arnold site authorized by AEC Construction Permit No. CPPR-70 and to the discussion of our findings at the conclusion of the inspection with Messrs. Root, Cook, Kacer, and Essig of your staff.

Areas examined during the inspection are identified in the enclosed inspection report. Within these areas, the inspection consisted of selective examination of procedures and representative records, interviews with plant personnel, and observations by the inspectors.

No violations of AEC requirements were identified within the areas examined during this inspection.

By way of this letter, we wish to confirm our understanding, during this inspection, that you intend to: (1) document the results of action taken to assure that a generic problem, associated with Allis Chalmers molded case circuit breakers, is not applicable to the Allis Chalmers circuit breakers installed in the Duane Arnold Plant, and (2) evaluate ways and means to assure that the Duane Arnold Quality Assurance/Quality Control Program is subject to periodic audit by personnel not directly associated with implementation of the program. We will examine action on your part, relative to these matters, during our next routine inspection.

A copy of our report of this inspection is enclosed and, 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 the enclosed inspection report contains information which you or

your contractors believe to be proprietary, it is necessary that you submit a written application to this office, within 20 days of the date of this letter, requesting that such information be withheld from public disclosure. If such an application is submitted, it must identify the basis for which information is claimed to be proprietary and should be prepared so that proprietary information identified is contained in a separate part of the document, since the application excluding this separate part, will also be placed in the Public Document Room. If we do not receive an application to withhold information, or are not otherwise contacted within the specified time period, the enclosed report will be placed in the Public Document Room with a copy of this letter.

Unless you wish to make application to withhold information, no reply to this letter is necessary; however, should you have questions concerning this inspection, we will be glad to discuss them with you.

Sincerely yours,

Boyce H. Grier
Regional Director

Enclosure:
RO Inspection Rpt No. 050-331/73-04

bcc: RO Chief, CB
RO Chief, OB
RO:HQ (4)
Licensing (4)
DR Central Files
Regions I & II
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. 050-331/73-04

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: April 4 - 6, 1973

Dates of Previous Inspection: March 28 - 30, 1973

Principal Inspector: J. W. Sutton
Lead Project Inspector — 5-4-73 (Date)

Accompanying Inspector: R. A. Rohrbacher
Project Inspector — 5-4-73 (Date)

Other Accompanying Personnel: None

Reviewed By: D. W. Hayes, Senior Project Inspector (Acting)
Reactor Construction Branch — 5-4-73 (Date)

SUMMARY OF FINDINGS

Enforcement Action

A. Violations

No violations of AEC requirements were identified.

B. Safety Matters

No safety matters were identified.

Licensee Action on Previously Identified Enforcement Matters

Unapproved Ferrite Inspection Procedure (RO Inspection Report No. 050-331/73-02)

This matter is presently under review by the licensee.

Design Changes

No new design changes were identified.

Unusual Occurrences

No unusual occurrences were identified.

Other Significant Findings

A. Current Findings

1. Status of Construction (April 5, 1973)

a. Piping (Greater Than 2 1/2")

	Percent Complete
Main Steam	100%
Feedwater	99%
Recirculation	100%
CRD	98%
Total (Process Piping)	91%

		Percent Complete
b.	Electrical Cable	
	Trays	99%
	Conduit	85%
	Cable Pulled	83%
c.	Instrumentation	
	Installation	54%
	Initial Calibration	44%
d.	Overall Construction	86.6%
e.	Scheduled System Hydro	May 1973
f.	Fuel Delivery	June 15, 1973

2. Main Condensate Pumps

The two main condensate pumps were found defective and have been taken out of service. One pump is to be replaced and parts of the second pump are to be repaired. (Paragraph 3)

3. QA/QC Personnel

An additional QC engineer has been added to the Bechtel field staff.

B. Unresolved Matters

1. Reactor Pressure Vessel Lower Head Repair

A groove was accidently cut in the RV lower head cladding by a hand grinder. (Paragraph 1)

2. Defective Reversing Starters

Defective mechanical and electrical interlocks on several Allis Chalmers reversing starters were found during testing. (Paragraph 2)

3. Corporate QA Audits

The inspector requested documentation that would indicate that internal corporate level audits had been performed by Iowa

Electric Light and Power Company (IEL&P) personnel. The inspector was informed that only informal audits had been performed and that they had not been documented. The inspector stated that this matter would be considered as an open item and will be reviewed during the next routine inspection.

4. Relocation of Chilled Water Piping

The inspector was informed that work to relocate the chilled water piping in the control room has not been completed. This matter remains open and will be reviewed during the next inspection.

C. Status of Previously Reported Unresolved Matters

1. Lack of Certification Documentation for Transducers Used During Valve Measurement Program (RO Inspection Report No. 050-331/73-02)

This matter is still under review by the licensee and remains open.

2. Evaluation of the Ferrite Content of Stainless Steel Welds (RO Inspection Report No. 050-331/73-02)

The inspector reviewed a General Electric Company (GE) letter dated March 22, 1973, sent to IEL&P, that indicated that ferrite content of 5% - 25% was acceptable in stainless steel welds as indicated in the Bechtel piping specification, No. 7884-M-113. Documentation to establish that the method used for the ferrite measurements of SS welds was consistent with the methods described in Bechtel specification No. 7884-M-113 was not available. This matter remains open pending review and evaluation of the ferrite measurements.

3. Instrument Calibration Procedures (RO Inspection Reports No. 050-331/72-09 and No. 050-331/72-10)

During this inspection, completed and approved instrument calibration procedures were reviewed. All randomly selected procedures reviewed in detail were found to be adequate. This matter is considered to be resolved. (Appendix A, Paragraph 1.b)

4. Valve Wall Thickness Verification (RO Inspection Reports No. 050-331/72-02, No. 050-331/72-09, and No. 050-331/72-11)

The inspector reviewed a GE letter dated February 2, 1973, that indicated the GE evaluation of the wall thickness of valve No. 143 had been made and was found to be within limits. The letter was reviewed and accepted by IEL&P. This matter is considered closed.

5. No Approved Welding Procedure Available at the Work Location (RO Inspection Report No. 050-331/72-10, Anchor Valve Company)

The inspector reviewed an Anchor Valve Company (Anchor) letter dated March 3, 1973, sent to the Bechtel Corporation (Bechtel) that stated that Section 3 of the Anchor Quality Assurance Manual, special order instruction (SOI) specified the instructions and manufacturing procedures required by the contract specifications. The SOI indicates the steps to be taken by Anchor personnel so that the required documentation is provided during the manufacturing process. This matter is considered resolved.

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, Quality Assurance Engineer
R. D. Essig, Quality Assurance Engineer
W. J. Kacer, Quality Assurance Engineer

Bechtel Corporation (Bechtel)

L. E. Rosetta, Project Superintendent
M. J. Jacobson, Project Quality Assurance Engineer
J. R. Behres, Lead Quality Control Engineer

General Electric Company (GE)

W. A. Kruse, Site Engineer

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

1. The inspector stated that he had reviewed the circumstances pertaining to the failure of the condensate pumps and inquired what effect, if any, the failure would have on the construction schedule. The licensee indicated that they have been in contact with Byron Jackson (B-J) and did not believe that the construction schedule would be appreciably affected. Pump "A" will be replaced and pump "B" will be repaired onsite. (Paragraph 3)

2. The inspector stated that he had reviewed the circumstances surrounding the grinding incident that occurred in the RV lower head and the proposed repair procedures. In response to questioning the licensee stated that IEL&P intended to report this matter pursuant to the requirements of 10 CFR Part 50.55(e). (Paragraph 1)

3. The inspector stated that he had reviewed the circumstances surrounding the defective Allis Chalmers reversing starter interlocks and asked if this matter would also be reported under 10 CFR Part 50.55(e) requirements.

   The licensee stated that IEL&P would report this matter as required under 10 CFR Part 50.55(e). (Paragraph 2)

4. The inspector inquired if a corporate QA audit had been performed by IEL&P. The licensee indicated that informal type audits have been made but that they had not been formally documented. The licensee added that this matter would be discussed further with IEL&P management personnel.

5. The inspector indicated that the problem associated with the control rod blades appeared to be generic and that further investigation would be made. The licensee stated that this problem is still being reviewed and that IEL&P QA personnel were discussing the problem with GE. (Paragraph 4)

6. The inspector asked if a list of items, documented by NCR's for resolution, would be required to be completed prior to the system hydrostatic test. The licensee stated that a list of items, required to be completed prior to the hydrostatic test, would be provided and that steps would be taken to resolve these items prior to the system hydrostatic test. (Paragraph 5)

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.

Bechtel Corporation (Bechtel)

F. Wills, Lead Field Engineer - Electrical
R. W. Ripple, Field Engineer - Electrical
R. G. Maes, Internals Engineer
W. Pons, Reactor Superintendent

General Electric Company (GE)

W. N. Jones, Control and Instrument Engineer

Results of Inspection

1. Reactor Pressure Vessel Lower Head Repair

Prior to the inspection, RO:III had been notified by IEL&P that, due to an accident involving an air driven hand grinder, a groove had been accidently cut into the lower reactor head cladding. The inspector reviewed the circumstances surrounding the occurrence. The area in question was inspected, and the following information was obtained.

An unattended hand grinder fell from a work platform. The start mechanism was triggered and the grinder ran for 15 - 20 minutes before being discovered.

The resulting groove was about 2 3/8" long by 1/8" wide, with a 5/16" maximum depth and was located in an area between two stub tubes. Ultrasonic measurements indicated that the stub tube seal weld had not been damaged. The groove in the cladding had not penetrated into the lower head base metal. The inspector reviewed the proposed repair procedure and noted that the groove will be repaired, using a blending procedure. A complete stress analysis will be required after completion of the repair.

A follow-up review of this matter will be made during the next routine inspection. This incident will be reported per 10 CFR Part 50.55(e).

2. Defective Reversing Starters

The inspector was informed, during the inspection, that 190 defective mechanical interlocks located in Allis Chalmers size 1 and size 2 reversing starters were to be replaced. This matter had been previously under study by Bechtel, following notification from another Bechtel engineered nuclear site, that defective reversing starters had been found and were being replaced. Three failures did occur at the Duane Arnold site during the valve testing program. The starters were located in motor control centers that distribute power to safety related systems. The electrical as well as the mechanical interlocks failed to function in the Duane Arnold starters.

It was also brought to the inspector's attention that defective sliding plate actuating mechanisms for Allis Chalmers molded case circuit breakers up through size 3 starters had been found defective at the other Bechtel engineered nuclear site. No defective mechanisms of this type were found at the Duane Arnold site. This matter will be reviewed during the next routine inspection. The licensee indicated that this matter would be reported to the Commission to comply with the provisions of 10 CFR Part 50.55(e).

3. Main Condensate Pumps

The inspector was informed that, during the condensate pump testing, condensate pump "A" had been totally destroyed due to a failure. Condensate pump "B" was dismantled and cracks were found in the stiffening webs of No. 5 and No. 6 bowls.

Both pumps had been used for approximately 20 hours in March 1973, before the failure of pump "A". Specifications were 3000 HP, 1200 RPM, 8400 GPM @ 1080°F and 450 psig. The pumps are seven-stage type, with cast iron bowls (standard design). The pumps, manufactured by B-J during the latter part of 1971, were installed in the condensate system during January 1973. The cause of the failure is being investigated by IEL&P, Bechtel, and B-J. The inspector was informed that pump "A" and the two defective bowls on pump "B" would be replaced. Pump "B" will be repaired onsite. It has been estimated that it will require 1 1/2 - 2 weeks to repair pump "B" and between 2 - 3 months to replace pump "A". The licensee indicated that a rental pump will be used to flush out the main piping systems in preparation for the hydrostatic tests. The licensee indicated that this item was not considered as reportable under the provisions of 10 CFR Part 50.55(e). This matter will be further reviewed during the next regular inspection.

4. Control Rod Blades

The inspector was informed that GE had requested IEL&P to return all control rod blades to the GE plant at Wilmington, North Carolina, for modification. This problem was uncovered at the Millstone nuclear site, by GE, and all sites (12) with similar control rod blades were notified. This matter was previously reported by Region I, and a letter has been sent to GE by RO.

The licensee conducted an audit on March 14, 1973, at the GE Wilmington plant to review the circumstances surrounding this matter. Further investigation is planned by IEL&P QA personnel. The inspector will review the final results of the investigation during the next routine inspection.

5. Deviation Notices (NCR)

The inspector reviewed a Bechtel letter, issued to the field on March 20, 1973, indicating that a total of 110 outstanding items would have to be completed prior to the hydrostatic test of the primary systems. The list appeared to include BOP items that could be completed after hydro. Bechtel personnel stated that this list would be further refined. This matter will be reviewed during the next inspection.

6. Quality Assurance Audits

The inspector reviewed audits that had been performed by IEL&P personnel, both on and offsite during the past three months. The following audits were made by IEL&P:

a. GE, Wilmington, North Carolina - Offsite

January 3 - 4 - 23 - 24, 1973 - fuel production

February 14 - 15 - 27 - 28, 1973 - fuel production

March 13 - 14, 1973, fuel production and control rod modification

b. Bechtel - Onsite

January 8, 1973 - NCR audit

January 24 - 29, 1973 - Electrical control panel separation

January 21, 1973 - Welding filler metal control

February 4 through March 9, 1973 - Audit of spare and replacement parts

February 7 - 8, 1973 - Design document control

January 25 - February 13, 1973 - Instrument set points

February 26 - March 2, 1973 - Cable separation

March 6 - 8, 1973 - Calibration and control of tools and test equipment

c. Bechtel QA engineers had conducted audits of the following:

January 4, 1973 - Field installed cable

February 16, 1973 - Main steam line piping

All audits were found to be well documented and had been performed using check sheets. The audit reports were distributed to both IEL&P and Bechtel management.

The inspector also reviewed the Bechtel QA daily logbook for open items. The log was found to be up-to-date, with all closed out items so noted.

7. GE Steam Line - IEL&P Audit, November 17, 1972

The three questions raised during this audit were reported as satisfactorily resolved in a GE letter dated January 4, 1973. This matter is considered closed.

8. Oil Storage Tank (Diesel)

Quality documentation for the replacement diesel oil storage tank was reviewed. The tank was manufactured by the Sauder Tank Company under a Bechtel PO. The tank was built to ASME Code Section VIII requirements. The seismic report for the tank has not been received onsite, however, Bechtel site QA personnel have requested this information for the site files. The documents reviewed consisted of the following:

Bechtel PO No. 7884-K-41

Certificate of testing

Welder's qualifications

QC checklist

RT reports

Material certification (chemical - physical)

Nameplate "rubbing"

National Board Report, November 8, 1972

Leak test results

Statement of conformance

All documents were found to be properly completed and signed. This item remains open pending receipt and review of the seismic report.

Attachment:
Appendix A

APPENDIX A

Prepared By: _____ Engineering Inspector — 5-4-73 (Date)

Reviewed For Information: _____ Lead Project Inspector — 5-4-73 (Date)

Reviewed By: _____ Senior Reactor Inspector — 5-4-73 (Date)

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)

J. H. Gebert, Electrical Maintenance Supervisor
G. (NMI) Chvoj, Instrument and Control Engineer

Bechtel Corporation (Bechtel)

D. W. Hutton, Quality Assurance Engineer
C. R. Edwards, Quality Control Engineer
R. S. Love, Quality Control Engineer

Results of Inspection

1. Electrical and Instrumentation Components

a. Implementation of QA Program

The IEL&P line and quality assurance organization and functional relationships relative to instrumentation were reviewed, and it was determined that applicable AEC, licensee, and contractor requirements were met. The IEL&P electrical maintenance organization is responsible for maintaining, reviewing, revising, and approving instrument calibration procedures and calibration data. An IEL&P instrument and control engineer is available for technical assistance, and IEL&P QA personnel make audits of instrumentation activities performed by both Bechtel and IEL&P personnel. The IEL&P QA personnel are organizationally independent from those responsible for cost and scheduling activities.

The Bechtel QA/QC personnel are responsible for receiving inspection, observing testing and installation activities, and for reviewing records associated with instrumentation during construction.

b. Review of QC System

Prior to this inspection, instrument calibration procedures were in the process of preparation. During this inspection, it appeared that all calibration procedures, presently required, are complete and have been reviewed and approved. Most of the initial calibration procedures were prepared by Bechtel and approved by IEL&P.

Ten process instrument calibration procedures, for use on Class I instruments, were selected at random and reviewed in detail. These procedures were found to be adequate.

Three groups of procedures, each in a separate binder, are controlled and maintained by the IEL&P Electrical Maintenance Supervisor. Calibration procedures for process instruments are maintained in the Instrument Field Calibration Procedures binder. Calibration procedures for electrical test equipment, used to test electrical components, are included in the Electrical Calibration Procedures binder. Calibration procedures for test instruments, which are generally used in the instrument shop, are maintained in the Laboratory Calibration Procedures binder. About 75 of these procedures are presently approved and available for use. A representative of the licensee stated that a revised method, to assure proper distribution and control of procedure revisions, is expected to be put into effect in the near future.

c. Record Review

Instrument installation records related to Class I instruments were reviewed in general, and about fifteen were spot checked for conformance to applicable requirements. In addition, a detailed review of installation records were made for the components of one channel of the manual scram circuit, the components in one core spray pump activation circuit, and the components in one feedwater valve control circuit. This detailed review included data sheets, checklists, and other records to verify that the components were installed in accordance with specifications and instructions including the contractor's field inspection manual. These records were determined to be adequate, and no deviations from applicable requirements, including approval signatures and dates, were noted.

The manufacturer's records, including identification and material certifications where required, were reviewed for the components in the three subsystems identified above. All records reviewed appeared to be satisfactory.

d. Observation of Work

Instrument components in the manual scram circuit, the core spray pump activation circuit, and the feedwater valve control circuit were inspected relative to installation techniques, protection, and provisions for quarantine of nonconforming components. From observations of completed work and work in progress, it was determined that applicable construction requirements were met relative to the above activities.

2. Cables and Terminations

Implementation of QA Program

The implementation of the licensee's commitment to use electrical cables in the drywell vessel, that will withstand the postulated radiation-steam environment, was reviewed. A revised, technical specification (Bechtel Specification No. 7884-E19, Revision 2) for power and control cable includes provisions for design and testing to ensure that the cable can withstand initial conditions of 340°F, 56 psig and 100% relative humidity after radiation exposure of 5.5×10^7 rads. This revised cable specification is considered to be adequate.