U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

REGION III

Report No. 50-331/79-18

Docket No. 50-331 License No. DPR-49

Licensee: Iowa Electric Light and
Power Company
IE Towers
Post Office Box 351
Cedar Rapids, IA 52406

Facility Name: Duane Arnold Energy Center

Inspection At: Duane Arnold Site, Palo, IA

Inspection Conducted: July 24-26 and July 31-August 2, 1979

Inspectors: R. L. Spessard
G. C. Wright for — 9/12/79

D. W. Hayes for
E. J. Gallagher — 9/12/79

Approved By: R. L. Spessard
R. L. Spessard, Chief
Reactor Projects Section 1 — 9/12/79

Inspection Summary

Inspection on July 24-26 and July 31-August 2, 1979 (Report No. 50-331/79-18)
Areas Inspected: Routine, unannounced inspection of Maintenance, Procedures, follow-up on previously identified items of noncompliance, follow-up on previously identified outstanding inspection items, follow-up to IE Bulletin No. 79-02, and follow-up on Immediate Action Letter dated July 6, 1979. The inspection involved 62.5 inspector hours onsite by two NRC inspectors.
Results: No items of noncompliance were identified.

DETAILS

1. Persons Contacted

E. L. Hammond, Chief Engineer
D. L. Mineck, Assistant Chief Engineer
*B. York, Operations Supervisor
*R. McCracken, Quality Supervisor
*G. Phillips, Administrative Supervisor
*R. Hannen, Reactor and Plant Performance Engineer
D. Wilson, Technical Engineer
*R. Rockhill, Mechanical Maintenance Supervisor
*J. VanSickel, Assistant Technical Engineer
*J. Gebert, Maintenance Supervisor
D. Teply, Assistant Operations Supervisor
*R. E. Levline, EDS Nuclear
J. Kozman, Bechtel
B. McCall, Bechtel, Field Design Engineer
H. K. Narayan, Bechtel
G. Leighty, Iowa Electric Engineering

*Denotes those present at exit interview.

2. Licensee Action on Previous Inspection Findings

a. (Closed) Noncompliance (331/79-15-10): Procedures were not adhered to which required valve U-32-6 to be locked open. The inspector verified the valve was locked in the open position and that personnel had been instructed on the importance of following procedures.

b. (Closed) Outstanding Inspection Item (331/79-15-03): Licensee commitment to instruct operators on measures for returning systems to operable status following maintenance and testing. The inspector verified that the training had been accomplished.

c. (Closed) Outstanding Inspection Item (331/79-15-05): Licensee commitment to review with operators plant automatic actions initiated by reset of engineering safety features. The inspector verified that the training had been accomplished.

No items of noncompliance were identified.

3. Licensee's Action Regarding Immediate Action Letter of July 6, 1979

An Immediate Action Letter (IAL) was issued by NRC Region III subsequent to a meeting with the NRC on July 6, 1979, in Bethesda, Maryland. The meeting discussed test results as required by IE Bulletin No. 79-02. The IAL required the licensee to evaluate the operability of those

safety-related systems required to be operable by the Technical Specifications as well as the adequacy of expansion anchor bolts installed in concrete block walls. The licensee responded on July 10, 1979, (LDR-98) and concluded that the safety-related systems required to be operable by the Technical Specification are operational.

The inspector reviewed records which the licensee used to establish the above conclusion of system operability. The results of a visual inspection of large pipe supports for gross deficiencies were available in a memo to the Assistant Chief Engineer, dated July 8, 1979. The results of that visual inspection are as follows:

a. Loose Bolts: Hanger drawing Nos: 1558, 2090, 1861, 2012, 2010 1747 and 1573

b. Shell in Contact with Plate: Hanger Drawing Nos: 2066, 1644, 1660, 1793, 1742, 1794, 1580 and 1588

c. As-Built does not comply with Design Drawings: Hanger Drawing Nos: 2066, 2064, 2083, 1808, 1804, 2058, 1793, 1740, 1585, 1582 and 9761

The licensee indicated that loose bolts were retorqued and shell anchors in contact with the base plate were shimmed to provide separation. In addition, the licensee modified the core spray support attached to a concrete block wall by providing an enlarge plate with through the wall bolts in lieu of concrete expansion anchors. During this inspection the licensee also identified seven additional supports attached to block walls. The NRC inspector requested the licensee to evaluate those supports on system operability. The licensee telephoned the RIII office on July 26, 1979 and informed the inspector that an evaluation had been performed and that the systems were conservatively considered to be operational with the supports attached to block walls.

4. Review of Procedures for Base Plate Support Modifications

During the meeting between the NRC and Iowa Electric on July 6, 1979, in Bethesda, Maryland, the licensee's representative stated that the proposed plan would be to discontinue the ongoing testing program and proceed with a 100% replacement program. During this inspection, the procedures developed for the replacement of in-place shell type expansion anchors with wedge type expansion anchor were reviewed. The procedures in effect were as follows:

a. Repair Procedure (GPM-021, Rev. 1), Installation of Hilti Kwik Bolts.

b. Repair Procedure (GPM-022, Rev. 0), Thru-Bolt Installation for Support Base Plates.

c. FCR No. 867, Sequence 1 (6-22-79), Additional Direction Concerning Concrete Expansion Bolt Installation and Guidelines.

d. Repair Procedure (GPM-020, Rev. 1) Evaluation of Concrete Expansion Bolts for Pipe Supports; this procedure has been discontinued since a replacement program has been substituted for the test program.

The following comments were made to the licensee relative to the above procedures:

a. Attachment 1 to Procedure GPM-021 specifies the installation torque for each size anchor. The inspector requested the test results which substantiate those torque values as IE Bulletin No. 79-02, item 4 requires. The licensee referred to a Bechtel letter dated June 26, 1979, which specified the torque values using the empirical equation Mt = kPD. The NRC inspector indicated to the licensee that the values developed using such an equation was not acceptable substantiation that those values provide the preload/setting of the expansion anchors.

   The licensee committed that Hilti Fasteners Inc., would perform on site tests to verify the specified torque values. This work is to be performed the week of August 5, 1979, at the DAEC Site. This item will be inspected during a subsequent inspection (331/79-18-01).

b. The procedure and specifications noted above do not address the requirements for grouting below base plates in order to restore support to original design bases.

   The licensee committed to include material, inspection, and testing requirements for the grout material and to include this work under the established quality assurance program. This item will be inspected during a subsequent inspection. (331/79-18-02).

5. Review of Design Controls

Iowa Electric has contracted Bechtel Power Corporation to perform design verification that the design of the replacement anchors provide a factor of Safety of four for wedge type anchors. The inspector reviewed design calculations being performed at the site with the following comments:

a. The actual design load transferred from the support to the anchor bolts was not available on-site to compare design modi-

fication to required factor of safety of four. Licensee indicated this would be made available to designers on-site. Designers were using Bergen-Patterson drawing load which is not the bolt design load.

b. Design calculations indicated bolt allowable load when in fact the load referenced was the ultimate capacity of the bolt not the allowable design load which is one-fourth ultimate.

c. Design calculations did not verify that the group capacity of the bolts was four times the allowable load. Calculations verified only individual bolt capacities not group effect which may lower the group capacity.

The licensee committed to provide a design guide for use by the designer on-site in order to assure correct design verification and method to be used consistently by each designer. This item will be inspected during a subsequent inspection. (331/79-18-03).

6. Observation of Base Plate Modifications

The inspector observed selected work acitivites including repair of base plate supports, issuance of material from warehouse and installation of concrete expansion anchor bolts. The following comments were made to the licensee:

a. Construction supervision was not present during the installation of the support in MG Set Room (Hanger No. HBP-129-H84). Craftsmen were being instructed by a Bechtel QC inspector. This arrangement is unacceptable since quality control is to independently verify work performed by construction, not to direct that construction effort. The licensee took immediate action to have Bechtel construction present for direction and Bechtel QC for inspection.

b. The craftsmen did not have the repair procedure available and referred to the QC inspector for instructions. The licensee took immediate action to make available installation procedures for craftsmen performing work activities.

c. Repair Procedure GPM-021, Attachment 1 requires the number of turns when torque is applied to the bolt to be recorded. The QC inspector did not record this information nor was it clear to him that this information should be recorded. At this time it had not been determined if the number of turns was a necessary record of the work performed.

d. Repair Procedure GPM-021, Paragraph 5.10 requires a sacrifice nut to be used when driving bolt into drilled hole. Craftsmen did not use this sacrifice nut until the QC inspector informed

them. The laborer informed the NRC inspector that it was his first time installing these devices and that no formal training had been provided for instructions. The craftsmen were instructed and continued to properly install the bolts with sacrifical nut to protect bolt from damage during driving.

The licensee committed that formal training would be given to each laborer performing base plate support modifications.

e. Hanger No. HBP-24-H4 (pump house) was installed without the correct embedment depth. Work had stopped to evaluate alternatives to correct this problem. An NCR or hold tag was to be issued pending resolution.

f. Material distribution was being adequately controlled from the warehouse. Material certification for expansion anchors in was available.

g. Calibrated torque wrenches were being properly used to install expansion anchors.

Observation of base plate modification will be inspected during subsequent inspections relative to the above items.

7. Quality Assurance Program for Base Plate Modifications

According to Iowa Electric's purchase order for the base plate support replacement program, Iowa Electric is to provide the Quality Assurance Program and Bechtel (Contractor) is to implement the program and report to Iowa Electric for program compliance.

During this inspection, it was identified that Iowa Electric's Contractor was not fully aware of the QA program requirements for reporting nonconformances and deviations. The licensee took immediate action to inform Bechtel of their QA responsibilities including planned training in this area.

The licensee committed to hold its contractor accountable for being fully aware of the Quality Assurance Program. Each contractor person is required to be aware, understand and fully implement the established program. This item will be inspected during a subsequent inspection. (331/79-18-04).

8. Iowa Electric Company Response to IEB No. 79-02

The following items regarding Iowa Electric's response to IE Bulletin No. 79-02 were discussed with licensee representatives:

a. Iowa Electric's response to Item 2 states, "When extreme environmental loads are included, a factor of safety of three is

acceptable in accordance with Section B.7.2 of . . . ACI349-76. Using a factor of safety of less than four for wedge type bolts is unacceptable as per IE Bulletin 79-02 criteria. Furthermore, the basic design of embedments at the DAEC is not in accordance with ACI349-76. It is unacceptable to use only a relaxed section of the code without using the fundamental design philosophy that, "the pullout strength of the concrete shall be equal to or greater than the minimum specified tensile strength . . ." as per section B.7.1.1, Design of Expansion Anchors. In addition, ACI349-76 at this time has not been endorsed by the NRC as an approved code for design of embedments.

b. Iowa Electric's response to item 4, states "It is not necessary that the bolt preload be equal to or greater than bolt design load." This statement has not been substantiated by actual tests nor by discussion in the response. Unless shown that bolts do not require preload, all bolts are to be preloaded to equal or greater than design load as per IE Bulletin No. 79-02 (Item 4).

c. Iowa Electric response to Item 4 indicates the method of developing torque values for testing and setting the bolt. As discussed previously in Paragraph 4 of this report, the values used have not been substantiated as required. The licensee is arranging to have the bolt manufacturer perform site specific torque/tension tests to substantiate values being used.

The above items are being reviewed by the NRC task group on IEB 79-02. This item is considered unresolved. (331/79-18-05)

9. Maintenance

A review of the licensee's maintenance activities was conducted to verify that such activities were conducted in accordance with approved procedures, regulatory guides and industry codes or standards and in conformance with Technical Specification requirements.

The review consisted of a random selection of Maintenance Action Requests, (MAR) covering selected safety related equipment and tracking of the activity from issuance of the MAR through completion of the work. The inspector verified that: Approval to perform the work was obtained prior to performing the activity; that approved procedures were used; that procedural and technical content of the procedures was adequate; that inspections, when required, were performed; that testing and calibrations, when required were performed; that records are being maintained by the Quality Department; that the personnel performing the activity were qualified; and that the event initiating the MAR was classified correctly as to its reportability to the NRC.

The following Maintenance Requests (MAR's) were reviewed:

23904	24108
23731	24109
23641	24782
23372	24806
23367	23436
23450	23625
23926	23609
24161	

No items of noncompliance were identified.

10. Procedures

A review of plant procedures was conducted to ascertain whether such procedures are in accordance with Regulatory requirements and whether the technical adequacy of the procedures is consistant with desired actions and modes of operation.

The review consisted of a random selection of; general plant operating procedures; startup, operation and shutdown of safety-related system procedures; alarm condition procedures; emergency procedures; maintenance procedures; and administrative procedures. The inspector verified, for the procedures selected, that: the procedures had been reviewed and approved; permanent and temporary changes had been reviewed and approved; that changes conformed to 10 CFR 50.59 and records maintained thereon; that the procedural and technical content was adequate; that freeze protection was referenced if applicable; and that the procedures in the working files were the latest revision.

The following procedures were reviewed:

IPOI II.C.4	MP 55/56 (OI 55/56)
IPOI VI.D	MP 52 (OI 52)
OI 55/56	MP 60 (OI 59A)
OI 52	MP 44/45 (OI 44/45)
OI 59A	MP 34 (OI 26/34)
OI 44/45	MP 18/19 (OI 18/19)
OI 26/34	ACP 1404.6
OI 18/19	ACP 1402.2
OI 78.3	

Alarm 1C03-A/C-3 (OI 55/56)
Alarm 1C03-C/B-8 (OI 52)
Alarm VI.T.7 (OI 59.A)
Alarm 1C05-A/F-1 (OI 44/45)
Alarm VI-T.1 (OI 26/34)
Alarm VI-F.1-1 (OI 18/19)
Alarm 1C05-B/F-7 (OI 78.3)

EPOI II-D.1
EPOI II-L
EPOI II-Q
EPOI II-B.3

Review of the above referenced procedures does not constitute approval of same.

No items of noncompliance were identified.

11. Exit Interview

The inspectors met with the licensee representatives (denoted in Paragraph 1) on August 1 and 2, 1979, and summarized the scope and findings of the inspection.