

QUALITY ASSURANCE PROGRAM
MANAGEMENT CORRECTIVE ACTION REPORT
MCAR-1

Enclosure 1
Howe-247-79

REPORT NO. 34

JOB NO. 7220

QNO. Various

DATE August 21, 1979

I *DESCRIPTION (including references):

Specification 7220-C-305, Section 6.2.2 requires tension testing of Drop-In Anchors to meet the values indicated in table 3.2. Additional testing was required by Project Engineering in letter BEBC-2404, dated 8-21-78 and BEBC-2965, dated 5-18-79, to verify past installation practices. A sample and test of 60 randomly selected anchors were to be tested with no failures. Contrary to this, 9 out of 32 drop-in anchors tested utilizing 4 sizes have failed. NCR-2461 has been generated to identify these failures.

*RECOMMENDED ACTION (Optional)

1. Construction

- a) Provide Engineering with data as to utilization, quantity, location and size of all "Q" Supports, utilizing drop-in anchors installed to date.
- b) Determine the cause (how and why) of the anchors failures.

REFERRED TO ☒ ENGINEERING ☒ CONSTRUCTION ☐ QA MANAGEMENT ☒ Quality Control
☐ PROCUREMENT

ISSUED BY W. Duesbach 8-21-79
Project QA Engineer Date

II REPORTABLE DEFICIENCY

☐ NO

Potentially Reportable, to
be determined by Project
Engineering ☐ YES

NOTIFIED CLIENT 8/20/79
Date
A. J. Martinez 8/22/79
Project Manager Date

III CAUSE

CORRECTIVE ACTION TAKEN

POOR
ORIGINAL

AUTHORIZED BY _____
Date

STANDARD DISTRIBUTION

DIVISION QA MANAGER
MANAGER OF QA TPO
SFD - QA MANAGER
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FORMAL REPORT TO CLIENT _____
(If Section II Applies) Date

CORRECTIVE ACTION IMPLEMENTED

7909140374

VERIFIED BY _____
Project QA Engineer Date

*Describe in space provided and attach reference document

RECOMMENDED ACTION (Continued)

- c) Take necessary actions to preclude recurrence.
- 2. Quality Control
 - a) Determine why this high rate of failure for the Drop-In Anchors was not indicated by the normal in-process testing of anchors, referenced in section 6.0 of Spec. 7220-C-305.
- 3. Project Engineering
 - a) Evaluate this condition for reportability under 10 CFR 50.55(e) and issue interim report to the PQAE by September 4, 1979, based on input from engineering and construction and quality control.
 - b) Determine adequacy of all "Q" Drop-In Anchors.
 - c) Determine cause of failure and take action to prevent recurrence.

Bechtel Power Corporation

777 East Eisenhower Parkway
Ann Arbor, Michigan

Mail Address: P.O. Box 1000, Ann Arbor, Michigan 48106



September 5, 1979

BLC-8115

Mr. G. S. Keeley
Project Manager
Consumers Power Company
1945 West Parnall Road
Jackson, Michigan 49201

Midland Units 1 & 2
Consumers Power Company
Bechtel Job 7220
MCAR 34 INTERIM REPORT 1
Files: 2417/2801

Dear Mr. Keeley;

Attached for your information and use is Interim Report 1 for MCAR 34, which addresses Drop-In Anchors. The report indicated a failure rate of 28%. However, since writing the Interim Report, additional results have indicated that of 66 Drop-In Anchors tested, there were 13 failures, resulting in a failure rate of 20%.

The next report is scheduled to be issued on October 2, 1979.

Very truly yours,

A handwritten signature in dark ink, appearing to read "John A. Rutgers".

John A. Rutgers
Project Manager

JAR/SKC/kb
Attachment (3 pages)
cc: Mr. W. R. Bird
Mr. B. W. Marguglio
Mr. D. B. Miller

RECEIVED
SEP 7 1979
QUALITY ASSURANCE

949214

Bechtel Associates Professional Corporation

Attachment to ELC-8115

SUBJECT: MCAR 34 (issued 8/21/79) Drop-In Anchors

INTERIM REPORT 1

DATE: September 4, 1979

PROJECT: Consumers Power Company
Midland Plant Units 1 & 2
Bechtel Job 7220

Introduction

As requested in MCAR 34, this report summarizes project engineering's evaluation and action regarding the failure of the drop-in anchors to meet the tension testing criteria furnished by project engineering.

Description of Deficiency

Specification 7220-C-305, Section 6.2.2 requires tension testing of drop-in anchors to meet the values indicated in Table 3.2 of that specification. Inprocess inspection of drop-in anchors is required in Specification 7220-C-305. However, when it was learned that this inspection at the time of installation was not being done at all times, testing was requested by project engineering on August 21, 1978, and again on May 18, 1979, to verify the adequacy of past installation.

For the testing results to be acceptable, it was necessary that a sample of 60 randomly selected anchors be tested with no failures. According to Specification 7220-C-305, the anchor is considered acceptable if a test load equal to twice the design allowable tensile load is applied and the concrete does not break out; the anchor does not break, distort, or deform; and the anchor does not slip excessively or become loose. Excessive slippage is evident when the washer between the bolt and the concrete can be rotated by hand. However, upon completing tension tests on 32 drop-in anchors involving four different bolt diameters, nine failures had occurred. A nonconformance Report (NCR) has been generated to identify these failures. Approximately 900 drop-in anchors had been installed as of August 17, 1979, when project engineering requested that drop-in anchor installation be suspended until further notice.

949215

Bechtel Associates Professional Corporation

Attachment to BLC-8115

MCAR 34

Interim Report 1, September 4, 1979

Page 2

Investigation

The loads listed for drop-in anchors in Specification 7220-C-305, Table 3.2 were established by Hilti, the manufacturer, through their own testing program. Project engineering met recently with a representative of Hilti at the Midland site to witness testing and installation practices used for the drop-in anchors. Only the electrical group used the drop-in anchor bolts for substantial loads; the other groups have limited their usage to loads of less than approximately 200 pounds.

The Hilti representative verified that the testing procedure used is consistent with Hilti's own test procedure. He emphasized that, if the plug which expands the anchor is not driven in completely with the Hilti tool, the full capacity will not be attained. The design of the Hilti drop-in anchors and the method of setting are illustrated in Figure 1. Based on a preliminary investigation on August 23, 1979, some of the installed plugs were found to be not fully driven into the anchor; however, the extent to which this contributed to the cause of the anchor failures was not established. It was determined that further testing would be needed to establish the specific cause(s) and extent of the anchors' failure to pass the test.

Safety Implications

Project engineering's investigation of the deficiency shows an implication of an adverse effect on plant safety, and therefore is reportable under 10 CFR 50.55(e). Preliminary indication of a 28% failure rate demonstrates an inability to ensure the adequacy of anchor bolt capacities.

Corrective Action

Project engineering has requested that additional testing be performed on a random sampling of 100 drop-in anchors to establish what portion were not correctly set and the effect of this deficiency on the bolt capacity. Results are expected by September 7, 1979; the evaluation will be presented in the next report scheduled for October 2, 1979.

Submitted by:

Brenda L. Megafari

Approved by:

P. J. H. Lento

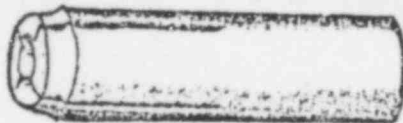
Concurrence by:

K. J. Lento

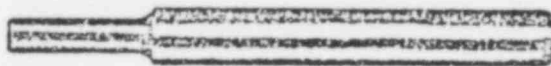
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Attachment to BLC-8115
MCAR 34 INTERIM REPORT 1
September 4, 1979
Page 3



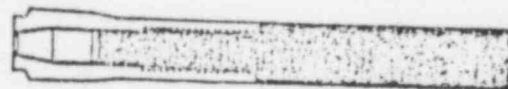
TYPICAL HILTI DROP-IN ANCHOR



HILTI SETTING TOOL



BEFORE EXPANSION



AFTER EXPANSION

POOR
ORIGINAL

(PER HILTI ANCHOR AND FASTENER DESIGN MANUAL)

FIGURE 1.

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