



Consumers
Power
Company

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March 1, 1983

82-12 #2

Mr J G Keppler, Regional Administrator
US Nuclear Regulatory Commission
Region III
799 Roosevelt Road
Glen Ellyn, IL 60137

MIDLAND NUCLEAR COGENERATION PLANT
DOCKET NOS 50-329 AND 50-330
SHEAR LUG DESIGN FOR EMBEDS
FILE: 0.4.9.68 SERIAL: 20721

Reference: J W Cook letter to J G Keppler, Same Subject, Serial 19106,
dated December 3, 1982

This letter, as was the referenced letter, is an interim 50.55(e) report regarding the design of embedments in concrete that use shear lugs located in tension zones. The attachment to this letter provides a description of the investigation and the corrective actions being taken with regard to this subject.

Another report, either interim or final, will be sent on or before May 20, 1983.

James W. Cook

JWC/WRB/lr

Attachment: (1) MCAR-63, Interim Report 2, dated February 1, 1983

CC: Document Control Desk, NRC
Washington, DC

RJCook, NRC Resident Inspector
Midland Nuclear Plant

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PDR ADOCK 05000329
S PDR

OC0283-0025A-MP01

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CC: CBechhoefer, ASLB Panel
FPCowan, ASLB Panel
JHarbour, ASLB Panel
AS&L Appeal Panel
MMCherry, Esq
MSinclair
BSTamiris
CRStephens, USNRC
WDPaton, Esq, USNRC
FJKelley, Esq, Attorney General
SHFreeman, Esq, Asst Attornel General
WHMarshall
GJMerritt, Esq, TNK&J

102884

Bechtel Associates Professional Corporation

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SUBJECT: MCAR 63 (ISSUED 11/10/82)
Design of Steel Embedments That Use Shear Lugs Located
in Tension Zones

INTERIM REPORT 2

DATE: February 1, 1983

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

Introduction

This report addresses a concern with the design of steel embedments in concrete that use shear lugs located in tension zones.

Background

The ACI 349 Code, Appendix B, issued August 1979, specifies that shear lugs in embedment designs shall be considered effective only in compression zones. Midland embedment designs were completed and installed before this date and considered that shear lugs accommodate all shear loads and tension bars accommodate all tension loads. Other than ACI 349, Appendix B, no known design code or industry standard issued before ACI 349, Appendix B, restricts the design of embedments using shear lugs.

For embedments within the scope of this MCAR, the Midland Final Safety Analysis Report, Section 3.8, is committed to design reinforced concrete according to ACI 318-63 and 318-71, and structural steel according to the AISC 1969 edition; however, these codes do not specifically address embedment design.

MCAR 63
Interim Report 2
February 1, 1983
Page 2

Investigative Action

Presently, engineering has identified approximately 2,500 embedments having shear lugs. An evaluation is in progress to determine which of the embedments identified have shear lugs located in tension zones.

Investigative action to determine if the embedments used in the Midland plant are satisfactory as designed is under way by means of additional analyses and testing. The additional analyses are to be based on a review criterion being developed to address the concerns regarding shear lugs located in the tension zones. Concurrently, a steel embedment testing program is being developed to determine the effectivity of shear lugs located in tension zones. The results of the test program will be used to refine the criteria established in the evaluation of the adequacy of existing embedments.

If existing embedments are found to be unsatisfactory during this review, necessary corrective measures will be taken.

Probable Cause

The apparent root cause is that before the issuance of ACI 349, Appendix B, this possible behavior of shear lugs in tension zones was not recognized by codes or industry standards.

Corrective Action

No corrective action has been established at this time. The results of the investigation will determine any required corrective actions.

Analysis of Safety Implications

The concern is that shear lugs located in tension zones may not be effective and that this may result in a nonconservative design. The design may be nonconservative to the extent that it may not be capable of performing its required safety function.

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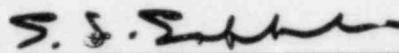
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MCAR 63
Interim Report 2
February 1, 1983
Page 3

Reportability

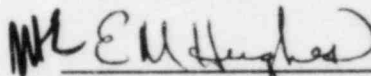
This concern is considered potentially reportable in accordance with Title 10 of the Code of Federal Regulations, Part 50.55(e).

Submitted by:



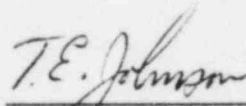
S.L. Sobkowski
Civil/Structural Group
Supervisor

Approved by:



E.M. Hughes
Ann Arbor Project Engineer

Concurrence by:



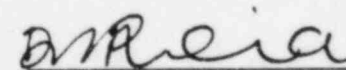
T.E. Johnson
Civil Discipline Chief

Concurrence by:



E.H. Smith
Engineering Manager

Concurrence by:



for M.A. Dietrich
Project Quality Assurance
Engineer