

James W Cook Vice President - Projects, Engineering and Construction

General Offices: 1945 West Parnall Road, Jackson, MI 49201 • (517) 788-0453

December 3, 1982

82-12 #1

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: 19106

This letter is an interim 50.55(e) report regarding the design of steel embedments in concrete that use shear lugs located in tension zones. This concern was reported to Mr D Hunter of your staff on November 5, 1982. The attachments to this letter provide a description of the investigation and corrective actions being taken with regard to this subject.

JWC/WRB/1r

Attachments: (1) Management Corrective Action Report MCAR-1, Report No 63, dated 11/10/82

(2) MCAR-63, Interim Report 1, dated November 29, 1982

CC: Document Control Desk, NRC Washington, DC

> RJCook, NRC Resident Inspector Midland Nuclear Plant

8212100273 821203 PDR ADOCK 05000329 S PDR

DEC 8 1982

CC CBechhoefer, ASUB Panel
RSDecker, ASUB Panel
FPCowaa, ASUB Panel
JHarbour, ASUB Panel
AS&L Appeal Panel
MMCherry, Esq
MSinclair
BStamiris
CRStephens, USNRC
WDPaton, Esq. USNRC
FJKelley, Esq, Attorney General
SHFreeman, Esq, Asst Attorney General
WHMarshall
GJMerritt, Esq, TNK&J
Great Lakes QA Managers

Attachment 1

QUALITY ASSURANCE PROGRAM MANAGEMENT CORRECTIVE ACTION REPORT MCAR-1

Serial 19106 82-12 #1

JOB NO.:	9.0.2		REPORT NO.: 63	
000110	7220	Q NO.:	DATE:11/10/82	
RECOMMENDE 1. Determine if and testing as r 2. If the design provide the neces 3. Determine the	bars accommodes hear lugs in endes. The concertation in a noncertation. There is DACTION' (Options the embedment required. In is not satisfies any corrections	ate tension stre mbedment designs n is that shear onservative designs no commitment to tal): s are satisfacto factory, identify we actions. nd take appropris	shear lugs accommodate all shear stresses. The ACI 349 code issued August shall be considered effective only in lugs located in tension zones ay not gn and possibly impacting performance of ACI 349 in the Midland FSAR. Try as designed through additional analysis affected embedments by location and sate action to preclude recurrence.	be of
REFERRED TO:	XX Engineering	☐ Construc	ction	
	☐ Procureme		/ Management	
	•		ISSUED BY: Broject GA Engreer Date	182
II REPORTABLE D	EFICIENCY:		NOTIFIED CLIENT: 11/5/82	
□ NO	- 1	EX YES	Project Marager Date Date	o upo
II CAUSE:				
CORRECTIVE AC	CTION TAKEN:			
CORRECTIVE AC	CTION TAKEN:		AUTHORIZED BY:	
AAPD DISTRIBUTION MGR OF CONSTRUCTION MGR OF ENGINEERING MGR OF PROCUREMENT	PACI DISTRIBUTION CHIEF CONSTR OC ENGR CLIENT PFOCE	OTHER DISTRIBUTION MGR OF QL. TPO GPD - QA MGR LAPD - QA MGR		
AAPD DISTRIBUTION MGR OF CONSTRUCTION MGR OF ENGINEERING	PAC / DISTRIBUTION CHIEF CONSTR OC ENGR CLIENT PFOCE PROJECT CONSTR MOR	MGR OF QL - TPO GPD - QA MGR	FORMAL REPORT TO CLIENT	
AAPD DISTRIBUTION MGR OF CONSTRUCTION MOR OF ENGINEERING MOR OF PROCUREMENT MGR OF PROJ OPERATIONS MGR OF QUALITY ASSURANCE CONSTRUCTION MGR ENGINEERING MGR SUPPLIER QUALITY MGR	PAC / DISTRIBUTION CHIEF CONSTR OC ENGR CLIENT PFOCE PROJECT CONSTR MGR PROJECT ENGINEER PROJECT MGR PROJECT MGR PROJ PROCUREMENT MGR SITE MGR	MGR OF GIL - TPO GPD - GA MGR LAPD - GA MGR SFPD - GA MGR	FORMAL REPORT TO CLIENT (If Section II Applies)	

Number

Page of

Bechtel Associates Professional Corporation 82-12 #1

SUBJECT:

MCAR 63 (ISSUED 11/10/82)

Design of Steel Embedments That Use Shear Lugs Located

in Tension Zones

INTERIM REPORT 1

DATE:

November 29, 1982

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. Some Midland embedment designs, which were completed and installed before this date, considered that shear lugs accommodate all shear loads and that 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 directly address embedment design.

Investigative Action

Presently, all embedments within the scope of this MCAR are being identified and located.

A review criterion is being developed that will address the concerns regarding shear lugs located in tension zones.

Bechtel Associates Professional Corporation

MCAR 63 Interim Report 1 November 29, 1982 Page 2

An investigation is under way to determine if the embedments used in the Midland plant are satisfactory as designed by means of additional analyses, and if required, testing.

If an existing embedment design is found to be unsatisfactory, the embedment will be identified by location and necessary corrective measures will be taken.

Probable Cause

The potential deficiency was identified following the issuance of ACI 349, Appendix B. The root cause is that, before the issuance of ACI 349, Appendix B, this possible failure mode 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.

Bechtel Associates Professional Corporation

MCAR 63 Interim Report 1 November 29, 1982 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