Consumers Power Company

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September 15, 1982 80-04 #7

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

MIDLAND PROJECT -
DOCKET NOS 50-329 AND 50-330
HELBA RESTRAINT DESIGN
FILE: 0.4.9.41 SERIAL: 19039

References: J W Cook letters to J G Keppler, Same Subject:

(1) Serial 883C, dated September 19, 1980
(2) Serial 10070, dated December 1, 1980
(3) Serial 11525, dated April 3, 1981
(4) Serial 13663, dated September 4, 1981
(5) Serial 14634, dated December 14, 1981
(6) Serial 16147, dated March 31, 1982

This letter, as were the referenced letters, is an interim 50.55(e) report concerning HELBA restraint design. Enclosure 1 provides a current status of the actions being taken with regard to this matter.

Another report, either interim of final, will be sent on or before January 30, 1983.

James W. Cook

JWC/WRB/jac

Enclosure 1: MCAR-40, Interim Report 7, "High-Energy Line Break Analysis (HELBA) Pipe Whip Restraint Designs," dated September 1, 1982

CC: Document Control Desk, NRC
Washington, DC

RJCook, NRC Resident Inspector
Midland Nuclear Plant

OC0982-0012A-MP01

SEP. 22 1982 IE27

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Bechtel Associates Professional Corporation

Management Corrective Action Report (MCAR)

SUBJECT: MCAR 40 (issued 8/26/80)

High-Energy Line Break Analysis (HELBA)
Pipe Whip Restraint Designs

~~FINAL~~/INTERIM REPORT 7

DATE: September 1, 1982

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

Introduction

This report provides the current status of MCAR 40 and actions performed since Interim Report 6.

Description of Deficiency

FSAR Section 3.6.2.2 states that the analysis of the thrust forces which result in the event of a pipe rupture is described in BN-TOP-2. Contrary to the intent of BN-TOP-2, the steady-state thrust forces rather than the transient peak thrust forces were used in the energy balance techniques for the design of HELBA pipe whip restraints.

Summary of Investigation

All but six of the blowdown thrust force time histories have been determined using the computer program PRTHRUST and comparable hand calculations. The restraint designs have been evaluated with the PIPERUP computer program as discussed in Corrective Action below.

Analysis of Safety Implication

The safety-related function of a pipe whip restraint is to limit pipe movement following a high-energy line break to prevent unacceptable damage to essential systems or components. Designing the restraint using the steady-state thrust force instead of the higher transient thrust force could compromise this safety function. The size of the restraints may be inadeqaute for the increased loads, and/or their location may be inadequate as a higher thrust force may cause the plastic hinge length to decrease outside the range of the restraint. This defiency, were it to have remained uncorrected, may have adversely affected the safety of operations at the Midland plant if certain types of accidents were to occur.

Probable Cause

The probable cause of this discrepancy has been identified as a misinterpretation of the requirements of BN-TOP-2.

Corrective Action

Corrective actions completed in the past are documented in previous interim reports.

Status of Restraint Reanalysis:

The attached table, originally included with Interim Report 2, shows the current status of restraints potentially affected by the concern of MCAR 40. Entries left blank indicate incomplete analyses.

The initial population of restraints affected by MCAR 40 reported in Interim Report 2 was 325. Deletions due to pipe rerouting, shifts in break locations, changes in analysis assumptions, etc., have reduced the number of affected restriants to 116. Of these 116 restraints:

a) Analysis has been completed on 73 (63%), showing 29 meeting design requirements and 44 requiring modifications.

b) Analysis has been partially completed on an additional 24 (21%) and all of these meet design requirements for the design concern (size or location) examined.

c) Analysis is incomplete on the remaining 19 (16%).

As discussed in Interim Report 2, the MCAR 40 reanalysis has been integrated into the normal HELBA production work and, as such, does not permit easy differentiation of the effects of MCAR 40 from the effects of other modifications. Based on a review of the blowdown time-histories, it is estimated that no more than two thirds of the 44 restraints determined to require modification do so because of the MCAR 40 problem. This is about 5% of the total pipe whip restraints in the plant.

The attached table will be updated again in the next report.

Reportability

This condition was reported by Consumers Power Company to the NRC as a potential 10 CFR 50.55(e) reportable condition on August 21, 1980.

Submitted by: William A. Kelley for F Clemente
Nuclear Systems Group Supervisor

Approved by: [signature]
Project Engineer

Concurrence by: Richard L Loos
Chief Nuclear Engineer

Concurrence by: E H Smith
Engineering Manager

Concurrence by: [signature] for
Project Quality Assurance Engineer

JAC/DDK/cs

Attachment: Status of Pipe Whip Restraints Affected by MCAR 40, dated 09/01/82

MIDLAND UNITS 1 AND 2

STATUS OF PIPE WHIP RESTRAINTS AFFECTED BY MCAR 40[1]

System ID	Pipe[2] Restraint	Bldg	Restr Install (%)	Constr Hold	Size OK Phase I	Loc OK Phase I	Size OK Phase II	Loc OK Phase II	Mod. Needed Size	Mod. Needed Loc
Inside Containment										
DH return line	PR-610-2-6	Reactor	50	No	No	No				
DH return line	PR-610-2-8	Reactor	50	No	No	No	OK	OK	No	No
DH return line	PR-610-2-10	Reactor	50	No	No	No	No	No	Yes	Yes
DH return line	PR-610-2-12	Reactor	50	No	No	No	No	No	Yes	Yes
DH return line	PR-611-2-3	Reactor	100	No	No	No	No	No	Yes	Yes
DH return line	PR-611-2-5	Reactor	100	No	No	No	No	No	Yes	Yes
DH return line	PR-611-2-9	Reactor	100	No	No	No	OK	OK	No	No
DH return line	PR-611-2-12	Reactor	0	No	No	No	No	No	Yes	Yes
DH return line	PR-611-2-13	Reactor	0	No	No	No	No	No	Yes	Yes
DH return line	PR-611-2-21	Reactor	100	No	No	No	No	OK	Yes	No
MFW	PR-638-13-5	Reactor	0	No	No	No				
MFW	PR-638-13-6	Reactor	0	No	No	OK		-		No
MFW	PR-638-13-7	Reactor	0	No	No	OK		-		No
MFW	PR-638-13-8	Reactor	0	No	No	No				
MFW	PR-638-13-9	Reactor	0	No	No	OK		-		No
MFW	PR-638-13-14	Reactor	0	No	No	OK		-		No
MFW	PR-638-13-15	Reactor	0	No	No	OK		-		No
MFW	PR-638-13-16	Reactor	0	No	No	OK		-		No
MFW	PR-638-13-17	Reactor	0	No	No	OK		-		No
MFW	PR-638-13-18	Reactor	0	No	No	No		OK		No
MFW	PR-638-13-19	Reactor	0	No	No	OK		-		No
MFW	PR-638-13-20	Reactor	0	No	No	OK		-		No
MFW	PR-638-13-21	Reactor	NA	No	No	No	OK	OK	No	No
MFW	PR-639-13-2	Reactor	100	No	No	No				
MFW	PR-639-13-16	Reactor	50	No	No	OK		-		No
MFW	PR-639-13-17	Reactor	50	No	No	No				
MFW	PR-639-13-18	Reactor	30	No	No	No				
MFW	PR-639-13-29	Reactor	50	No	No	OK		-		No
MFW	PR-639-13-35	Reactor	100	No	OK	OK	-	-	No	No
HPI, Normal MU	PR-604-1-15	Reactor	0	No	OK	No	-	No	No	Yes
HPI, Normal MU	PR-604-2-41	Reactor	NA	No	OK	No	-		No	
Letdown	PR-603-3-2	Reactor	0	No	No	No	No	No	Yes	Yes
Letdown	PR-603-3-4	Reactor	0	No	OK	No	-		No	
Letdown	PR-603-3-6	Reactor	100	No	No	No				
Letdown	PR-603-3-8	Reactor	100	No	OK	No	-		No	
Letdown	PR-603-3-9	Reactor	100	No	OK	No	-		No	
Letdown	PR-603-3-10	Reactor	0	No	OK	No	-		No	
Letdown	PR-604-3-7	Reactor	0	No	No	No	No	No	Yes	Yes
Letdown	PR-604-3-9	Reactor	100	No	No	No	No	No	Yes	Yes

Pipe Whip Restraints Affected by MCAR 40 (Continued)

System ID	Pipe[2] Restraint	Bldg	Restr Install (%)	Constr Hold	Size OK Phase I	Loc OK Phase I	Size OK Phase II	Loc OK Phase II	Mod. Needed Size	Mod. Needed Loc
Letdown	PR-604-3-10	Reactor	NA	No	-	No	No	No	Yes	Yes
Letdown	PR-604-3-48	Reactor	0	No	No	No	No	No	Yes	Yes
Outside Containment										
AFW	PR-633-4-4	Aux	0	No	No	No		OK		No
AFW	PR-633-5-1	Aux	0	No	No	No	No	OK	Yes	No
AFW	PR-633-5-2A	Aux	0	No	No	No	No	No	Yes	Yes
AFW	PR-633-5-3	Aux	0	No	No	No	OK	OK	No	No
AFW	PR-633-5-5	Aux	0	No	No	No	No	OK	Yes	No
AFW	PR-633-5-6A	Aux	100	No	No	No	No	No	Yes	Yes
AFW	PR-633-5-6B	Aux	100	No	No	No	No	No	Yes	Yes
AFW	PR-633-5-7	Aux	0	No	No	No	No	No	Yes	Yes
AFW	PR-633-5-9	Aux	0	No	No	No				
AFW	PR-633-5-12	Aux	0	No	No	No				
AFW	PR-633-5-18	Aux	0	No	No	No	No	No	Yes	Yes
AFW	PR-634-5-1	Aux	0	No	No	No				
AFW	PR-634-5-2	Aux	0	No	No	No				
AFW	PR-634-5-3	Aux	0	No	No	No		OK		No
AFW	PR-634-5-4B	Aux	0	No	No	No		OK		No
AFW	PR-634-5-10	Aux	100	No	No	No				
AFW	PR-634-6-2A	Aux	100	No	No	No	No	No	Yes	Yes
AFW	PR-634-6-3	Aux	0	No	No	No	OK	OK	No	No
AFW	PR-634-6-4	Aux	100	No	No	No	No	No	Yes	Yes
AFW	PR-634-6-7	Aux	100	No	No	No	No	No	Yes	Yes
AFW	PR-634-6-8	Aux	100	No	No	No				
Main steam	PR-631-2-1	Aux	NA		-	-	OK	OK	No	No
Main steam	PR-631-2-2	Aux	NA		-	-	OK	OK	No	No
Main steam	PR-631-2-3	Aux	NA		-	-	OK	OK	No	No
Main steam	PR-631-2-4	Turbine	40	No						
Main steam	PR-631-2-5	Turbine	40	No						
Main steam	PR-631-2-6	Turbine	40	No						
Main steam	PR-631-3-1	Aux	95	No	-	-	OK	OK	No	No
Main steam	PR-631-3-2	Aux	95	No	-	-	OK	OK	No	No
Main steam	PR-631-3-3	Aux	95	No	-	-	OK	OK	No	No
Main steam	PR-631-3-4	Turbine	0	No						
Main steam	PR-631-3-5	Turbine	0	No						
Main steam	PR-631-3-6	Turbine	0	No						
Main steam	PR-632-2-1	Aux	95	No	-	-	OK	OK	No	No
Main steam	PR-632-2-2	Aux	95	No	-	-	OK	OK	No	No
Main steam	PR-632-2-3	Aux	95	No	-	-	OK	OK	No	No

Pipe Whip Restraints Affected by MCAR 40 (Continued)

System ID	Pipe[2] Restraint	Bldg	Restr Install (%)	Constr Hold	Size OK Phase I	Loc OK Phase I	Size OK Phase II	Loc OK Phase II	Mod. Needed Size	Mod. Needed Loc
Main steam	PR-632-2-4	Turbine	40	No		OK		-		No
Main steam	PR-632-2-5	Turbine	40	No		OK		-		No
Main steam	PR-632-2-6	Turbine	40	No	OK	OK	-	-	No	No
Main steam	PR-632-2-7	Turbine	40	No	OK	OK	-	-	No	No
Main steam	PR-632-2-8	Turbine	0	No	OK	OK	-	-	No	No
Main steam	PR-632-2-9	Turbine	0	No	OK	OK	-	-	No	No
Main steam	PR-632-3-1	Aux	95	No	-	-	OK	OK	No	No
Main steam	PR-632-3-2	Aux	95	No	-	-	OK	OK	No	No
Main steam	PR-632-3-3	Aux	95	No	-	-	OK	OK	No	No
Main steam	PR-632-3-4	Turbine	0	No		OK		-		No
Main steam	PR-632-3-5	Turbine	0	No		OK		-		No
Main steam	PR-632-3-6	Turbine	0	No	OK	OK	-	-	No	No
Main steam	PR-632-3-7	Turbine	0	No	OK	OK	-	-	No	No
Main steam	PR-632-3-8	Turbine	0	No	OK	OK	-	-	No	No
Main steam	PR-632-3-9	Turbine	0	No	OK	OK	-	-	No	No
Main steam	PR-632-3-10	Aux	90	No	OK	OK	-	-	No	No
Main steam	PR-660-1-1	Aux	90	No	NO	OK	No	-	Yes	No
Main steam	PR-660-1-2	Aux	90	No	No	OK	No	-	Yes	No
Main steam	PR-660-1-3	Aux	90	No	-	-	OK	OK	No	No
Main steam	PR-660-1-4	Aux	90	No	-	-	OK	OK	No	No
Main steam	PR-660-1-5	Tunnels	0	No	NO	No	No	No	Yes	Yes
Main steam	PR-660-1-6	Tunnels	0	No	No	OK	No	-	Yes	No
Main steam	PR-660-1-7	Tunnels	0	No	No	OK	No	-	Yes	No
Main steam	PR-660-1-8	Tunnels	0	No	No	No	No	No	Yes	Yes
Main steam	PR-660-1-9	Tunnels	0	No	No	OK	No	-	Yes	No
Main steam	PR-660-1-10	Tunnels	0	No	No	No	No	No	Yes	Yes
Main steam	PR-660-1-11	Tunnels	0	No	No	No	No	No	Yes	Yes
Main steam	PR-660-1-12	Tunnels	0	No	No	OK	No	-	Yes	No
Main steam	PR-660-1-13	Aux	95	No	No	OK	No	-	Yes	No
Main steam	PR-660-1-14	Tunnels	0	No	No	No	No	No	Yes	Yes
Main steam	PR-660-1-15	Tunnels	0	No	No	No	No	No	Yes	Yes
Letdown	PR-603-15-1	Aux	0	No	No	No	-	-	Yes	Yes
Letdown	PR-603-15-4	Aux	0	No	No	No	-	-	Yes	Yes
Letdown	PR-603-15-5	Aux	0	No	No	No	-	-	Yes	Yes
Letdown	PR-604-15-1	Aux	0	No	No	No	-	-	Yes	Yes
Letdown	PR-604-15-2	Aux	0	No	No	No	-	-	Yes	Yes
Letdown	PR-604-15-3	Aux	0	No	No	No	-	-	Yes	Yes
Letdown	PR-604-15-5	Aux	0	No	No	No	-	-	Yes	Yes
Letdown	PR-604-15-7	Aux	0	No	No	No	-	-	Yes	Yes

[1]Phase I is an energy balance analysis; Phase II is a time history (dynamic) analysis
[2]Total potentially affected pipe whip restraints = 116

Pipe Whip Restraints Affected by MCAR 40 (Continued)

LEGEND:

DH: Decay heat
MFW: Main feedwater
AFW: Auxiliary feedwater
HPI: High-pressure injection
MU: Makeup
AUX: Auxiliary
NA: Not available