



Consumers
Power
Company

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79-10 #9

July 17, 1981

Mr J G Keppler, Regional Director
Office of Inspection & Enforcement
US Nuclear Regulatory Commission
Region III
799 Roosevelt Road
Glen Ellyn, IL 60137

MIDLAND PROJECT -
DOCKET NOS 50-329, 50-330
UNIT NO 1, REACTOR VESSEL BROKEN ANCHOR BOLT
FILE: 0.4.9.35 SERIAL: 12051



References: (1) CP&Co letters to J G Keppler, Same Subject:

- (a) Howe-267-79, dated October 12, 1979
 - (b) Howe-311-79, dated December 14, 1979
 - (c) Howe-51-80, dated March 3, 1980
 - (d) Howe-80-20, dated April 30, 1980
 - (e) Serial 8971, dated May 16, 1980
 - (f) Serial 8809, dated August 1, 1980
 - (g) Serial 9787, dated December 10, 1980
 - (h) Serial 11524, dated March 31, 1981
- (2) J G Keppler letter to S H Howell, Docket No 59-329 and 50-330, dated August 18, 1980
- (3) R L Tedesco letter to J W Cook, Docket No 50-329 and 50-330, dated March 6, 1981

References (1) (a) through (h) were interim 50.55(e) reports, as is this letter, concerning the broken anchor bolts in the Unit No 1 reactor vessel support skirt.

Attachment 1 provides a summary of the actions being taken to resolve this problem.

Another report, either interim or final, will be sent on or before December 15, 1981.

James W. Cook

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Attachment 1: MCAR 37, Interim Report 6, "Broken Reactor Vessel Anchor
Stud in Unit 1," dated July 10, 1981

CC: Director, Office of Inspection & Enforcement
Att Mr Victor Stello, USNRC (38)

Director, Office of Management
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Bechtel Associates Professional Corporation

005897
SUBJECT: MCAR 37 (issued 12/28/79)
Broken Reactor Vessel Anchor Stud in Unit 1

INTERIM REPORT 6

DATE: July 10, 1981

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

Introduction

The discrepancies discussed in this report concern the failed reactor pressure vessel (RPV) anchor studs in Unit 1 and the proposed method of repair.

Background

The anchor studs in question are 2-1/2 inches in diameter and 7 feet, 4 inches long, embedded in the reinforced concrete RPV pedestal. The anchor studs were purchased from Mississippi Valley Structural Steel of St. Louis, Missouri; fabricated by Southern Bolt and Fastener of Shreveport, Louisiana; and heat-treated by J.W. Rex of Lansdale, Pennsylvania. These studs were received on site by Bechtel in early 1976, embedded in concrete by Bechtel in April 1977, and tensioned by Babcock & Wilcox Construction Company in late July 1979. The first stud failure was discovered on September 14, 1979. The second and third stud failures were reported on December 20, 1979, and February 5, 1980, respectively.

Investigative Action

Teledyne Engineering Services performed a metallurgical failure analysis for Bechtel. The resulting reports discuss the stud failure investigation and the use of the present studs for service. The root cause of the studs' failure has been established by TES, acting for Consumers Power Company. The cause of the failures is the excessive hardness of the studs which is due to improper heat treatment. Consumers Power Company has submitted the final report for this investigation to the NRC on March 31, 1981, as a previous 10 CFR 50.55(e) report.

Because of concern over the remaining installed anchor studs, design modifications have been proposed in Reports 1 and 2. The remaining studs have also been detensioned to a nominal stress of 6 ksi. The detailed design for the modifications to the upper lateral support brackets (ULS) has been completed based upon the preliminary loads provided by B&W for the accident condition of a combined seismic and loss-of-coolant accident (LOCA) event. This design has now been issued for construction and the brackets are being modified. It was also determined that machining a flat surface on the reactor vessel to match a flat surface on the ULS bumper is required to provide a uniform parallel bearing surface under all conditions. B&W has determined that it is feasible to machine the vessel, and a field change authorization has been issued for this purpose. Machining is scheduled to start soon.

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A method to initially set the gap between the bumper on the ULS and the RPV so that the RPV approaches but does not contact the bumper at all normal and expected transient conditions is being developed. B&W is completing an analysis to determine the variation in the gap between the brackets and the vessel during normal operating conditions and for expected operating transients.

Bechtel has developed a set of spring constants of the upper lateral supports which include the effects from geometric (due to the gaps between the brackets and the RPV), material nonlinearities, and local internal structure stiffnesses. B&W has completed an analysis of the free standing seismic displacement of the RPV (without the ULS spring rates) and primary shield wall, as well as a parametric LOCA analysis utilizing linear ULS spring rates. Results from a more sophisticated LOCA analysis utilizing the nonlinear ULS spring rates as well as a heat transfer analysis are expected shortly. The results of these analyses will be used to determine the optimum gap setting.

Bechtel has contracted with Raymond Bolting Services to provide consulting services during Unit 1 anchor stud retensioning. A specification for retensioning the studs to 5.0 ± 0.5 ksi (which is below the value of 6 ksi established by Teledyne Engineering Services) has been issued to the site for use. The site is currently obtaining the equipment and developing procedures for implementing this specification. This specification will provide a more accurate means of determining the existing prestress in the Unit 2 studs than that used in determining the Unit 1 stud prestress at detensioning. Raymond Bolting Services will use the Unit 2 results to evaluate the scatter of existing prestress found in the Unit 1 studs during their detensioning.

Corrective Action

Reactor Pressure Vessel Support Modification for Midland Nuclear Power Plant, Midland, Michigan, Report 1, July 1980, was transmitted to Region III by Consumers Power Company Serial 9330, J.W. Cook to J.E. Keppler, on July 24, 1980. Report 2, which provides the analytical techniques for design, was transmitted by Consumers Power Company Serial 9787 on December 10, 1980 as part of 10 CFR 50.55(e). In addition, responses to questions from the NRC have been transmitted by the following Consumers Power Company letters:

- a. Serial 11036, J.W. Cook to H.R. Denton, 1/20/81
- b. Serial 11334, J.W. Cook to H.R. Denton, 2/18/81
- c. Serial 11345, J.W. Cook to H.R. Denton, 2/24/81

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Safety Implications

If uncorrected, this deficiency could have adversely affected the safety of operation of the Midland plant at any time throughout the plant's expected life.

Reportability

This condition was reported to the NRC by Consumers Power Company under 10 CFR 50.55(e) on September 14, 1979.

Submitted by: J.D. S. S. Sobel

Approved by: M. S. Gandy For L.H. CURTIS

Concurrence by:

K. J. Bailey

SS/LED/sg