



MISSISSIPPI POWER & LIGHT COMPANY

Helping Build Mississippi

P. O. BOX 1640, JACKSON, MISSISSIPPI 39205

June 21, 1982

JAMES P. McGAUGHY, JR.
ASSISTANT VICE PRESIDENT

Office of Inspection & Enforcement
U. S. Nuclear Regulatory Commission
Region II
101 Marietta Street, N.W.
Suite 3100
Atlanta, Georgia 30303

Attention: Mr. J. P. O'Reilly, Regional Administrator

Dear Mr. O'Reilly:

SUBJECT: Grand Gulf Nuclear Station
Units 1 and 2
Docket Nos. 50-416/417
File 0260/15525/15526
PRD-82/30, Final Report,
Jet Impingement
AECM-82/287

On May 21, 1982, Mississippi Power & Light Company notified Mr. R. Butcher, of your office, of a Potentially Reportable Deficiency (PRD) at the Grand Gulf Nuclear Station (GGNS) construction site. The deficiency concerns an error in the calculations for impingement loads on targets during high energy pipe line breaks.

Since high energy fluid could not be released from the affected postulated pipe breaks until non-nuclear heatup, this deficiency will not affect fuel load.

The attached report is submitted with two attachments. Attachment 1 concerns the deficiency and its reportability under the provisions of both 10CFR50.55(e) and 10CFR21 for MP&L. Attachment 2 concerns a 10CFR21 report submitted on behalf of Bechtel Power Corporation. On June 11, 1982, Bechtel notified Mr. R. Butcher, of your office, of the Part 21 for Bechtel and confirmed that the 10CFR50.55(e) time requirements for submission of a written report by MP&L could be applied to the Bechtel 10CFR21 report. On June 16, 1982, MP&L notified Mr. R. Butcher, of your office, of Part 21 applicability for MP&L and confirmed that the 10CFR50.55(e) time requirements for submission of a written report could be applied.

Yours truly,

J. P. McGaughy, Jr.
for J. P. McGaughy, Jr.

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ATTACHMENTS: 1) MP&L Final Report
2) Bechtel's Final Report

cc: See page 2

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Mr. J. P. O'Reilly
NRC

AECM-82/287
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cc: Mr. N. L. Stampley
Mr. R. B. McGehee
Mr. T. B. Conner

Mr. Richard C. DeYoung, Director
Office of Inspection & Enforcement
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Mr. G. B. Taylor
South Miss. Electric Power Association
P. O. Box 1589
Hattiesburg, MS 39401

FINAL REPORT FOR PRD-82/30

1. Name and address of the individual ... informing the commission:

J. P. McGaughy, Jr.
Assistant Vice-President, Nuclear Production
P.O. Box 1640
Jackson, Mississippi 39205

Notification of Part 21 applicability made to Mr. J. P. O'Reilly, NRC,
Region II by letter AECM-82/287, June 21, 1982.

2. Identification of the facility ... which ... contains a deficiency:

Grand Gulf Nuclear Station (GGNS) Units 1 and 2
Port Gibson, Mississippi 39150

3. Identification of the firm ... supplying the basic component which ... contains a deficiency:

Supplied to Grand Gulf by the Bechtel Power Corporation,
Gaithersburg, Maryland.

4. Nature of the deficiency ... and the safety hazard which ... could be created by such a deficiency:

A. Description of the Deficiency

The deficiency involves the use of incorrect jet impingement loads in evaluating the ability of essential components to withstand the effects of postulated high energy line breaks. The following two errors were made:

1. 14.7 psi was subtracted from the calculated jet impingement pressure at the target to correct for the atmospheric pressure acting on the other side of the target. It has now been determined that atmospheric pressure can be subtracted from source pressure only.
2. Thrust coefficient factors used in the Moody expansion of jets were reduced by using a correction factor to account for the effect of increasing friction. This step was incorrect since it failed to account for the effects of decreasing expansion angle associated with increasing friction. The decrease in expansion angle causes "focusing" of the jet, which in turn yields higher target pressures.

These errors reduced the calculated jet impingement load on the targets, thereby causing the analysis to be unconservative.

Based on evaluations performed to date, the following is the extent of the deficiency:

1. Instrument line 3/4"-DCB-7 required for post-accident monitoring, and two associated supports, Q1B21G142H01 and Q1B21G142R02.
2. Instrument line 1"-DCA-26 required for post-accident monitoring and three associated supports, Q1B21G141H01, Q1B21G141R01 and Q1B21G142R01.
3. Pipe support Q1B21G024R10 for main steam relief valve discharge piping.

The deficiency is applicable to Unit 1 and Unit 2.

The deficiency is only applicable to the Bechtel scope of supply.

B. Analysis of Safety Implications

The safety implication of the deficiency is that targets may not be able to withstand the jet impingement loads resulting from postulated high energy line breaks. An evaluation performed by our Architect/Engineer of stress problems which were not previously analyzed for jet forces, due to the incorrect low jet pressures, has identified impingement loads that are excessive for reactor water level sensing lines 3/4"-DCB-7, and 1"-DCA-26 if postulated breaks "Main Steam - RCIC No.1" and "RWCU No.36" occurred. Failure of the sensing lines during a postulated high energy line break at anytime throughout the lifetime of the plant could have affected adversely the operations of the plant.

5. The date on which the information of such deficiency ... was obtained.

Mississippi Power and Light received information of the deficiency on May 20, 1982. We reported the deficiency to Mr. R. Butcher, of your office, as a Potentially Reportable Deficiency on May 21, 1982. An evaluation for Part 21 has been completed and the MP&L "Responsible Officer, "Mr. J. P. McGaughy, Jr., will be notified when he returns to his office.

6. In the case of the basic component ... the number and location of all such components.

The deficiency extends to all identified safety-related targets of postulated high energy line breaks in Unit 1 and Unit 2.

We do not have knowledge of the location of this deficiency other than at GGNS.

7. The corrective action which has been taken ... the name of the individual ... responsible for the action; and the length of time that has been ... taken to complete the action.

A. Corrective Actions Taken

The following actions have been taken to correct the non-conformances:

1. 39 line breaks that had previously been analyzed for jet impingement forces have been re-evaluated and the results are acceptable. The checking and verification of the calculations are presently in progress.
2. 53 large pipe breaks that had not previously been analyzed for jet impingement forces due to low jet pressure derived from the misinterpretation of Moody's equation and curves have been evaluated and the results for 52 breaks are acceptable. As a result for 52 breaks are acceptable. As a result of the evaluation of the remaining large pipe break "LPCI No. 3A", the weld size had to be increased for the Main Steam Relief Valve (MSRV) discharge piping support, Q1B21G024R10. This modification has been completed.
3. 4 small pipe breaks that had not previously been analyzed for jet impingement forces due to the incorrect calculated low jet pressure have been evaluated with the following results:
 - a. For instrument line 3/4"-DCB-7, jet barrier C1841 has been designed and issued for fabrication and installation. This barrier also protects pipe support Q1B21G142R02. Additionally, pipe support Q1B21G142H01 has been redesigned and issued for fabrication and installation.
 - b. For instrument line 1"-DCA-26, jet barrier C1840 has been designed and issued for fabrication and installation. This barrier also protects pipe supports Q1B21G141H01, Q1B21G141R01, and Q1B21G142R01.
 - c. The impingement jets from the two (2) remaining small breaks are shielded by other natural barriers.

The following corrective actions are being taken to prevent recurrence.

1. Specification 9645-M-195.0 is being revised to correct the error.

2. A Problem Alert, No. N-82-1, has already been issued by the Nuclear Chief Engineer of Gaithersburg Power Division to all nuclear projects at Gaithersburg and all Bechtel Power Divisions.

B. Responsible Individual

C. K. McCoy,
Nuclear Plant Manager
Mississippi Power and Light Co.
Responsible for Unit 1

T. H. Cloninger
Unit 2 Project Manager
Mississippi Power & Light Co.
Responsible for Unit 2

C. Length of Time to Complete Actions

Mississippi Power & Light Company received information of the deficiency on May 21, 1982.

All actions are expected to be completed prior to the beginning of Phase II testing.

8. Any advice related to the deficiency ... that has been, is being, or will be given to purchasers or licensees:

As the deficiency did not originate with MP&L, we have no advice to offer.

Error in the Application of Moody's Pipe
Break/Jet Impingement Equation

PART 21 REPORT

1. Name and address of the individual . . . informing the Commission:

L. E. Ruhland
Project Manager
Bechtel Power Corp.
Post Office Box 41
Port Gibson, Mississippi 39150

2. Identification of the facility . . . which contains a defect:

Grand Gulf Nuclear Station (GGNS)
Unit I and Unit II
Port Gibson, Mississippi 39150

3. Identification of the firm constructing the facility . . . contains a defect:

Installed at the GGNS by:
Bechtel Power Corporation
15740 Shady Grove Road
Gaithersburg, Maryland 20877

4. Nature of the defect . . . and the safety hazard which could be created by such defect:

- a. The problem involves the use of incorrect jet impingement loads in evaluating the ability of essential components to withstand the effects of postulated high energy line breaks. The following two errors were made:

1. 14.7 psi was subtracted from the calculated jet impingement pressure at the target to correct for the atmospheric pressure acting on the other side of the target. It has now been determined that atmospheric pressure can be subtracted from source pressure only.
2. Thrust coefficient factors used in the Moody expansion of jets were reduced by using a correction factor to account for the effect of increasing friction. This step was incorrect since it failed to account for the effects of decreasing expansion angle associated with increasing friction. The decrease in expansion angle causes 'focusing' of the jet, which in turn yields higher target pressures.

These errors reduced the calculated jet impingement load on the targets, thereby causing the analyses to be unconservative.

- b. All essential components, such as, piping and pipe supports, structural steel, cable trays, conduits, instrument tubing, etc., are affected.
- c. Based on evaluations performed to date, the following is the extent of the deficiency:
 - 1. Two (2) 3/4" instrument lines required for post-accident monitoring.
 - 2. One pipe support for main steam relief valve discharge piping.
- 5. The date on which the information of such defect . . . was obtained.

An evaluation regarding the applicability of 10 CFR 21 was completed by Bechtel Project Engineering on June 11, 1982.

- 6. In the case of a basic component . . . the number and location of all such components . . . subject to the regulations in this part:

Information concerning the defect is being furnished to (other projects within this Division) and the other Bechtel Power Corp. Divisions for review. Should it be determined that basic components which contain this defect are in use at, have been supplied for, or are being supplied for one or more other Bechtel projects, this will be reported by the cognizant Division directly to the cognizant Director(s) of the NRC Regional Office of Inspection and Enforcement.

- 7. The corrective action which has been . . . taken . . . and the time . . . to complete the action:

Project Engineering has completed their evaluation except that some supporting calculations require checking.

The applicable specification, 9645-M-195.0 is being revised to correct the error.

The following remedial actions have been taken to correct the existing non-conformances:

- 1. Instrument line 3/4"-DCB-7 required for post-accident monitoring, and two associated supports, Q1B21G142H01 and Q1B21G142R02.

Jet barrier C1841 has been designed and issued for fabrication and installation. This barrier also protects pipe support Q1B21G142R02. Additionally, pipe support Q1B21G142H01 has been redesigned and issued for fabrication and installation.

2. Instrument line 1"-DCA-26 required for post-accident monitoring and three associated supports, Q1B21G141H01, Q1B21G141R01 and Q1B21G142R01.

Jet barrier C1840 has been designed and issued for fabrication and installation. This barrier also protects pipe supports Q1B21G141H01, Q1B21G141R01 and Q1B21G142R01.

3. Pipe support Q1B21G024R10 for main steam relief valve discharge piping.

Pipe support Q1B21G024R10 has already been modified.

8. Any advice related to the defect . . . will be given to purchasers or licensees:

Not Applicable