GULF STATES UTILITIES COMPANY

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April 11, 1985
RBG- 20636
File Nos. G9.5, G9.25.1.1

Mr. Robert D. Martin, Regional Administrator
U. S. Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 1000
Arlington, Texas 76011

Dear Mr. Martin:

River Bend Station - Unit 1
Docket No. 50-458
Final Report/DR-75

On January 10, 1985, GSU provided Region IV with a 30-day written report on DR-75 concerning the GHOSH-WILSON computer program used in the reactor building hydrodynamic analysis. The attachment to this letter is GSU's revised final written report with regard to this deficiency.

Sincerely,

J. E. Booker

J. E. Booker
Manager-Engineering,
Nuclear Fuels & Licensing
River Bend Nuclear Group

JEB/PJD/trp

Attachment

cc: Director of Inspection & Enforcement
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

NRC Resident Inspector-Site

INPO

85-194

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ATTACHMENT

April 11, 1985
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DR-75/GHOSH-WILSON Computer Program Used in the Reactor Building Hydrodynamic Analysis

Background and Description of the Problem

This deficiency concerns an error identified in the GHOSH-WILSON computer program that involves the method of determining the stiffness of triangular elements. GHOSH-WILSON computer program ST-200, V02-L04 version, has been used as input for the design of piping, structures, and equipment which have been released for construction and, in many cases, installed.

The method used in determining the stiffness of triangular elements was incorrect. Instead of calculating the area of triangular elements on the basis of the 3 input coordinates, the program instead calculated the area based on 2 coordinates and the centroid of the element. This resulted in a computed area equal to 1/3 of the actual area and a stiffness factor approximately 1/3 of its actual value.

The following areas were examined during the course of the evaluation:

1. Structural steel framing.

2. Reinforced concrete structures.

3. Steel containment vessel/penetrations.

4. Reactor building locks and hatches.

5. Primary shield wall.

6. Checking of pipe stress problems for the new amplified response spectra (ARS) and incorporation into support calculations and drawings.

7. Verification of pipe break exclusion analysis, zero-gap restraints, and dynamic analysis of restrained structures.

8. Verification of various ASME III tanks and NF equipment supports to the new ARS.

9. Equipment qualification - generic analysis for new RRS.

Safety Implication

A review of the new ARS curve indicates that increases and decreases of acceleration values, along with the shift in frequency of peak responses, has resulted due to the correction of triangular element stiffness.

The acceleration value obtained from these curves, along with other loads using applicable loading combination, is used to design the hardware in question.

In order to determine the impact of the GHOSH-WILSON program error, the corrected acceleration values due to hydrodynamic loads must be used with the original loads used in the design of piping, structures, and other equipment.

As a result of the concurrent changes in design input, the extent to which resulting hardware changes were attributable solely to program error is indeterminate. Consequently, it may be assumed that the GHOSH-WILSON program error may have contributed to subsequent design changes. GSU therefore conservatively assumes that the safe operations of the plant could have been adversely affected by this condition.

Corrective Action

The program has been corrected, and all the ARS using the correct version of the program have been available for use since late 1982 and have been and continue to be incorporated in the design and verification programs.

During the course of time, all of the hardware affected by this deficiency has been either designed or qualified with or without modifications, to the latest loads. The following are examples of hardware changes that were implemented as a result of reanalysis:

1. Five of the existing supports were modified and two new supports were added in the reactor plant componenet cooling water piping located in the reactor building (AX 72M).

2. Three of the existing supports were modified and two new supports were added in the service water piping located in the reactor building (AX 19H).

The support additions/modifications result from concurrent effects of:

1. Incorporation of the latest hydrodynamic ARS based on the corrected version of the GHOSH-WILSON program.

2. Incorporation of plant design modifications including the additions of concrete containment fill.

3. Annulus pressurization loads.

4. Jet impingement loads.

5. Qualification of nozzle loads due to piping reroutes.