

Part 21 ~~50-55(-)~~ DM13
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Bechtel Power Corporation

Engineers - Constructors

12400 East Imperial Highway

Norwalk, California 90650

MAIL ADDRESS

P.O. BOX 60860 TERMINAL ANNEX LOS ANGELES, CALIFORNIA 90060

TELEPHONE (213) 964-6011



50-424
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August 21, 1981

Mr. Karl Seyfrit
Director, Region IV
Office of Inspection and Enforcement
U. S. Nuclear Regulatory Commission
611 Ryan Plaza Drive Suite 1000
Arlington, Texas 76012



SUBJECT: Deficiency Regarding Design of Primary Loop Crossover Leg
Pipe Restraint

Dear Mr. Seyfrit:

Evaluation by Bechtel of the captioned condition indicates the condition is reportable under 10 CFR 21.

The attached report and the following paragraph contains all the information required by 10 CFR 21, 21.21(b)(3).

Although the design is considered unique to the Vogtle project, other Bechtel Divisions were notified by copies of reports and correspondence of the deficiency. Should it be determined that this design concept has been or will be used on other Bechtel projects, the affected Division will report the condition according to the Regulation.

Very truly yours,

BECHTEL POWER CORPORATION

R. L. Patterson

Manager of Division Quality Assurance

RLP:AGC:1m

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REPORT OF
DEFICIENCY REGARDING DESIGN OF PRIMARY LOOP CROSSOVER
LEG PIPE RESTRAINTS

ALVIN W. VOGTLE ELECTRIC GENERATING PLANT - UNITS 1 AND 2

1.0 INTRODUCTION

This report is submitted pursuant to 10 CFR 21 and describes actions undertaken to correct a potential substantial safety hazard/significant deficiency associated with primary loop crossover leg pipe restraints designed by Bechtel Power Corporation and delivered to Georgia Power Company (GPC) for the Alvin W. Vogtle Electric Generating Plant, Units 1 and 2, Docket Numbers 50-424 and 50-425. This potential deficiency was verbally reported to the NRC on July 6, 1981 by Georgia Power Company and by letter on July 31, 1981.

2.0 INDIVIDUAL REPORTING

R. L. Patterson, Bechtel Manager of QA

3.0 FACILITY

Vogtle Electric Generating Plant, Units 1 and 2 (Georgia Power Company), Burke County, Georgia.

4.0 SUPPLYING FIRMS

Design: Bechtel Power Corporation, Los Angeles Power Division

5.0 BASIC COMPONENT IDENTIFICATION

Primary loop crossover leg pipe restraints (4 per unit). The crossover leg restraints are rigid frame steel weldments consisting of a horizontal beam spanning three vertical columns. The restraint is anchored through the containment liner into the basemat. A 2'-9" fill slab is placed over the basemat liner, embedding the restraint to within 2 inches from the top of the columns.

6.0 DEFICIENCY DESCRIPTION

As a result of a request from GPC Construction to relax alignment and contact bearing requirements and an additional request to substitute connection bolting materials, the crossover leg restraint design calculation was reviewed. During the course of this review a deficiency was identified in the assumptions used in modeling the transfer of loads from the crossover leg restraint to the fill slab and containment basemat.

6.0 DEFICIENCY DESCRIPTION (cont.)

The assumed condition of a free standing crossover leg restraint fixed at the basemat, neglecting the presence of the surrounding 2'-9" thick fill slab, does not adequately represent the existing condition of a partially embedded frame. The presence of the fill slab reduces the flexibility of the crossover leg pipe restraint embedded columns. Because the restraint is a statically indeterminate frame structure having more than one load carrying path to its anchorage, the externally applied load is distributed to each path in proportion to its relative stiffness. Neglecting the stiffening effect of the fill slab concrete surrounding the columns causes an incorrect distribution of the load, underestimating the stresses in certain elements.

Because the crossover leg pipe restraints are the only statically indeterminate frame structures in the fill slab, this deficiency is limited to the crossover leg restraint analysis.

7.0 ANALYSIS OF SAFETY IMPLICATIONS

The use of more realistic boundary conditions results in stresses which would exceed allowables in bolted connections in the event of a postulated crossover leg pipe break. This condition represents a substantial safety hazard.

8.0 CORRECTIVE ACTION

The following immediate corrective actions were initiated on the project to address this condition:

- 8.1 The crossover leg restraint design has been reanalyzed to determine the design stresses consistent with proper boundary conditions. This reanalysis resulted in the addition of stiffener plates, splice plates, and the modification of bolts to change material and exclude threads from shear planes. These modifications reduce all calculated stresses below the allowable limits.
- 8.2 The required modifications to the crossover leg restraints were shown on Revision 4 of Drawing 1X2D48L006 and Revision 3 of Drawing 2X2D48L006 which were issued for construction on June 8, 1981. The crossover leg restraint modifications have been completed and the modified restraints installed.
- 8.3 The project has initiated a review of the remaining NSSS restraint and support designs to verify that similar deficiencies do not exist in their design. This evaluation involves technical specialists from the Chief Civil/Structural Engineer's office as well as project civil engineers. Our review of the other NSSS restraint and support designs that are in the fill slab has been completed and no deficiencies were found. The expected completion date for the remaining designs is September 15, 1981.

9.0 CONCLUSION

This deficiency is considered reportable under 10 CFR Part 21. All applicable project documentation for this report is available for inspection at Bechtel's facility in Building No. 46, 11445 South Lakewood Boulevard, Downey, California 90241.