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L. T. Gucwa
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NED-84-641
1320N

December 28, 1984

Director of Nuclear Reactor Regulation
Attention: Mr. John F. Stolz, Chief
Operating Reactors Branch No. 4
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

NRC DOCKETS 50-321, 50-366
OPERATING LICENSES DPR-57, NPF-5
EDWIN I. HATCH NUCLEAR PLANT UNITS 1, 2
VERIFICATION OF OPERABILITY OF CABLE TRAY SUPPORTS

Gentlemen:

Georgia Power Company's (GPC) letter NED-84-637, dated December 21, 1984, briefly described our program to verify the seismic qualification of safety-related cable tray supports. Additional details of the verification program were provided in a conference call between representatives of GPC and Messrs. Stolz, Walker, Panciera, and Hermann of the NRC staff on December 26, 1984. GPC herein provides documentation of the program details discussed in that conversation.

The verification program includes evaluation of support design against the design criteria contained in the Final Safety Analysis Reports (FSARs). In cases where FSAR requirements are not met, an evaluation for operability is conducted. The criteria for the determination of operability of cable tray supports are provided as Attachment A. These criteria are based upon generic specifications used by one of GPC's architect engineers, Bechtel Power Corporation, on many of its nuclear power plant projects and have been reviewed for application by our consultant, Dr. Robert P. Kennedy. It should be noted that these criteria define the minimum acceptable support characteristics, and some criteria were either not invoked or invoked in only limited cases in the determination of operability. Thus, the analyses were generally more conservative than the minimum reflected by the criteria. These criteria were applied for both Plant Hatch units in the evaluation of supports not meeting FSAR requirements.

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Presently, 258 of the estimated 2000 cable tray supports in Hatch Unit 1 and shared structures have been evaluated. Of the 258 Unit 1 and shared structures cable tray supports, 144 were found to meet FSAR criteria and the remaining 114 met the operability criteria of Attachment A. Because the supports were located in areas of the plant which have been extensively modified since initial startup, or were chosen because of long tray spans, the sample is biased toward the worst cases.

A walkdown was conducted by engineers familiar with the seismic analysis of cable tray supports of all Unit 1 and shared structures cable trays to further judge the ability of trays to withstand the effects of a seismic event. Sixty supports were chosen for further analysis. This analysis is expected to be completed by March 31, 1985.

Of the estimated 1300 supports in Unit 2, 983 have been evaluated. Of the 983 Unit 2 supports, 922 met FSAR criteria; 55 met the operability criteria of Attachment A; and six are under evaluation pending receipt of additional field data. The large Unit 2 sample encompassed approximately 75% of the supports and should, therefore, accurately represent the installed supports.

A quick review of the analytical results indicates that in those cases where FSAR criteria were not easily met, the excesses over FSAR criteria were, in the maximum cases, in the range of 50% to 75%. It should be noted that more refined analytical techniques, such as development of time histories for the supports, would reduce the resultant stresses and could bring the analytical results within the FSAR criteria. In all cases analyzed, the operability criteria were met.

GPC has concluded, based upon the factors discussed above, that both Unit 1 and Unit 2 have cable tray support systems which will continue to function both during and following a design basis seismic event, and are, therefore, considered to be operational. Our program to address determination of required long-term corrective actions and reporting, if any, will be provided during the week of January 14, 1985.

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If you have questions regarding this information, please contact my office.

Yours very truly,

L. T. Gucwa

WEB/mb

Attachment

xc: J. T. Beckham, Jr.
H. C. Nix, Jr.
J. P. O'Reilly (NRC-Region II)
Senior Resident Inspector

ATTACHMENT A TO NED-84-641

PLANT HATCH UNITS 1 & 2
CABLE TRAY SUPPORT OPERABILITY CRITERIA
(12-28-84)

INTRODUCTION

A program for the re-evaluation of cable tray supports at Plant Hatch Units 1 and 2 is currently in progress. Since some supports were identified as not meeting established design criteria specified in the FSARs, it was necessary to develop operability criteria which could be used to assess the adequacy of these supports with regard to the overall safety of the plant. The operability criteria were intended to ensure that sufficient margins existed for essential raceway systems even though certain FSAR commitments had not been met.

The operability criteria which were developed, outline specific assumptions, analytical methods, and allowable stress levels which may be used to assess the adequacy of those cable tray supports which exceed FSAR design allowables. It should be noted that for the majority of these supports, it was necessary to invoke only those criteria that were needed to demonstrate that plant safety was not jeopardized, while the other operability criteria were not used at all. Higher damping levels and allowable stress levels were the most frequently applied criteria during the evaluation process.

The operability criteria which were established for the evaluation of cable tray supports is presented below.

CRITERIA

1. Required Response Spectra

   The analyses performed shall be based on the DBE (SSE) floor response spectra.

2. Seismic Direction Combination

   The combination of the component directions for earthquake loads (i.e., vertical and horizontal) shall be computed using the absolute sum method for most severe horizontal component plus vertical component or the SRSS method for three directions. This is in accordance with the FSARs.

3. Analytical Method

   a. Supports shall be analyzed individually based on attachment load proportioned to the support by tributary length.

   b. As an alternative to individual support analysis, the entire tray/support system may be analyzed.

c. In cases where connections are normally assumed "pinned", some degree of fixity may be utilized to increase the load carrying capability of the structural system.

d. When more detailed analytical techniques are required, inelastic response may be used for ductile structures. Energy balance techniques as well as the methods described in Bechtel Design Guide C-2.33 ("Simplified Inelastic Seismic Analysis") may be used. In order to qualify as ductile, a structure shall exhibit ductile behavior as determined by a static analysis using ductility values outlined in Bechtel Topical Report BC-TOP-9A or based on test data (for connections). The failure of expansion anchor bolts shall not be considered ductile. This method is permitted by the FSARs.

4. Damping

Damping for cable tray supports shall be in accordance with the attached curve.

5. Allowable Steel Stresses

a. The allowable stresses for structural steel shall be limited to:

Flexure, tension, compression: 1.7 x Code allowable $\leq F_y$

Shear: 1.5 x Code allowable $\leq 0.57 F_y$

b. An allowable stress increase (due to cold working) is permitted for light gauge cold formed structures in accordance with AISI specifications but shall not exceed 42 ksi.

c. In cases where buckling is the limiting design consideration, the inelastic buckling strength of compression members may be utilized provided serviceability is maintained.

6. Connections Evaluated by Test

Where test data for connection capacities is available, a factor of safety of 1.5 against ultimate is permitted.

7. Allowable Weld Stresses

The allowable stresses for welds shall be limited to:

1.7 x AISC Code Allowable

8. Allowable Stresses for Embedded Anchor Bolts

   a. The allowable stresses for embedded anchor bolts shall be limited to:

      1.7 x Code Allowable

   b. The combination of force components (i.e., shear and tension) shall be based on the AISC trilinear or elliptical interaction relationships if steel is the controlling element. In cases where the concrete is the controlling element, a circular interaction relationship shall be used.

9. Allowables for Expansion Anchors

   a. The allowable shear and tension values for expansion anchors shall be in accordance with the manufacturers' published data and shall be determined using a factor of safety of 2.0, per the acceptance criteria of I & E Bulletin 79-02.

   b. The combination of force components (i.e., shear and tension) shall be based on a circular interaction relationship.

LOWER BOUND DAMPING AS A FUNCTION OF INPUT ZPA