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SUBJECT: Forwards results of analysis requested at 831206 meeting re pipe sys in high amplification area of annulus structure,Info closes SSER 20 Open Item 2.

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SUBJECT: Forwards results of analysis requested at 851210 meeting re pipe sys in [illegible] classification area of annulus structure.Info closes SSER 20 open Item 2.

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PACIFIC GAS AND ELECTRIC COMPANY

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J. O. SCHUYLER
VICE PRESIDENT
NUCLEAR POWER GENERATION

January 6, 1984

PGandE Letter No: DCL-84-003

Mr. George W. Knighton, Chief
Licensing Branch No. 3
Division of Licensing
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Re: Docket No. 50-275, OL-DPR-76
Diablo Canyon Unit 1
SSER 20 Open Item 2

Dear Mr. Knighton:

In the Diablo Canyon Safety Evaluation Report, Supplement No. 20 (SSER 20), the Staff indicated a need for further information to provide assurance that the horizontal response spectra from the containment interior concrete provides an adequate basis for qualifying the piping systems supported from the annulus steel framing. PGandE provided information on this subject in letters dated September 9, October 12, and November 28, 1983.

At a meeting on December 6, 1983, the Staff requested that PGandE perform additional analysis for a piping system in the high amplification area of the annulus structure. In response to that request, enclosed are the details of the proposed study.

Sincerely,

J. O. Schuyler

Enclosure

cc: D. G. Eisenhut
H. E. Schierling
Service List

A001
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ENCLOSURE

PGandE Letter No.: DCL-84-003

Study of Conservatism in Annulus Piping Systems for Spectral Input Above 20 Hertz

In order to further quantify the design conservatism in the piping attached to the annulus structure to resist seismic loads, the DCP will reanalyze three piping systems in more detail than is done in the normal production qualification analyses. The majority of the annulus piping is supported from elevation 101' and 106'. These detailed analyses will include piping at elevation 106' since that piping is further above the base and will experience a more severe seismic response. Further, the three selected piping systems pass through the most severely excited zone on that level. These three piping systems were selected to provide a range of frequencies, support configurations, and pipe diameters. The analysis of the piping systems will be performed through the combined load equations for supports and pipe stress.

The piping analysis will be performed in three steps as follows:

1. An envelope response spectra encompassing the actual support locations will be used as a uniform input to all supports. Variable damping as suggested by the Pressure Vessel Research Council piping committee will be used. The response spectra will be broadened according to the Hosgri criteria.

2. A set of envelope acceleration time-histories will be applied as uniform support motion; i.e., all supports will experience the same motion. Two damping options will be considered: (a) uniform damping of 2% and (b) the variable damping in step 1 above.

3. The piping systems will be subjected to multiple support acceleration time histories; i.e., the motion of the annulus at each support point will be determined and then applied at the corresponding locations on the piping system. A uniform damping of 2% and the variable damping in step 1 will be considered.

In all three steps, only the Hosgri load combination will be considered because the DE/DDE spectra do not have amplification beyond 20 Hertz.

The analysis will be considered complete when sufficient information has been developed to quantify the appropriate level of conservatism. If, for example, this has been accomplished at the end of step 2, step 3 will not be performed. Studies by Lawrence Livermore National Laboratory indicate considerable conservatism exists when comparing the conventional methods of analysis (envelope response spectra) with the time-history method of analysis and, in particular, when multiple support time-histories are used. In fact, in a recent public ACRS meeting in San Francisco (December 15 and 16, 1983), the smallest ratio reported for conventional analysis results to the multiple support time history analysis results is 1.9.

If the conservatism needs further quantification beyond that obtained in this study, additional studies could be performed considering such items as coupled horizontal and vertical analysis, a more precise definition of damping, a refinement of the horizontal input motion into the annulus steel, and the effect of gaps between the piping and seismic supports.