Commonwealth Edison
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Chicago, Illinois 60690

April 27, 1981

Dennis M. Crutchfield, Chief
Operating Reactors Branch #5
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Dresden 2
SEP Topic III-6, Seismic Design Considerations and III-11, Component Integrity
NRC Docket No. 50-237

Reference: (a): Dennis M. Crutchfield's letter of January 30, 1981 to D.L. Peoples.

(b): Robert F. Janecek's letter of March 13, 1981 to Dennis M. Crutchfield

Dear Mr. Crutchfield:

Commonwealth Edison had EDS review the EGG-EA-5065 "Summary of the Dresden Unit 2 Piping Calculations" report transmitted by reference (a). The positive findings given in the report were based upon the original design information and the SSRT report on Dresden 2.

Three representative piping systems were chosen for analysis based on current criteria in order to review the original design basis of these systems. We find the piping analysis methods used by EG&G to be acceptable except for minor comments as noted below. The following piping analysis techniques were reviewed:

1.1 Modeling Assumptions

The mass spacing, piping component and support modeling, and material specification were satisfactory.

1.2 Boundary Conditions

Based on the design information available in the Recirculation and LPCI systems, boundary conditions were adequately modeled. The major assumption is that equipment was modeled rigid and acts as an anchor for the piping.

In the LPCI analysis, overlapping to include a larger portion of the 24" ring header is recommended. Current criteria requires overlapping between separate analyses to include three or more supports in each direction. Similarly, non-seismic piping past LPCI valves V7 and V9 should be evaluated for its mass effects in addition to the stiffness effects.

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1.3 Seismic Anchor Motions

EG & G analyses excluded the consideration of seismic displacement of equipment to which the piping is attached. Current code rules provide an option that effects of seismic anchor movement can be included in the secondary stress evaluation. Therefore, primary stress results still remain unchanged, and conclusions on pipe stresses for OBE and SSE are unaffected.

1.4 Temperature and Pressure Input

The design temperature and pressure for the small piping example were assumed to be 70°F and 0 psi. Most of the Blume piping for Dresden 2 (diameter less than or equal to 10 inches) have design temperature and pressure exceeding 150°F and 150 psig. A higher temperature and pressure assumption for the rigorous analysis is more appropriate for comparison purposes as low temperature and pressure will produce unconservative stress results and allowables.

1.5 Input Response Spectra

The OBE and SSE response spectra for the analyses in the EG & G Report were taken from the original John Blume Floor Spectra and the SSRT report for Dresden 2, respectively. The OBE spectrum was developed for the analysis of Reactor Building piping systems by John A. Blume & Associates, and the SSE spectrum was developed for the safety assessment of the Dresden Unit 2 piping system under the SEP Program. These spectra were reviewed for appropriate applications and we conclude that spectra applied were directly scaled from the horizontal spectra across the entire frequency range. Horizontal and vertical response spectra are compared in Figure 1 for a typical nuclear power plant. The frequency shift as shown in the figure is expected to similarly occur for the Dresden response spectra. The EG & G vertical spectra are, however, more appropriate than the flat vertical spectra used in the original design.

1.6 Damping Value for Piping Analysis

The analyses were performed with 2% and 3% damping values for small and large diameter piping, respectively. These values are acceptable based on Regulatory Guide 1.61.

1.7 Assumed OBE Spectra in the Recirculation Loop Analysis

The recirculation loop was analyzed using the OBE spectrum taken from the original Blume report. The original design basis OBE spectrum came from the Brown's Ferry spectrum. Small discrepancies found in the stress comparisons between original John A. Blume analysis and EG & G analysis may be caused by the difference in response spectra for OBE.

1.8 Support Stiffness Values

A support stiffness value of 10^6 lb/in is a reasonable assumption for piping analysis based on current support and structural design practices, and a good upper bound value for Dresden 2.

2.0 CONCLUSIONS

Piping analyses performed by EG & G to evaluate Dresden 2 piping design criteria have been reviewed and found to be generally consistent with current code requirements and analysis methods. The piping configurations which were modeled for this evaluation were assumed "current", but do not reflect the as-built pipe and support configurations in the field. Due to this limitation, conclusions on the stress results and support loads are only valid in a general sense for that particular category of piping. The analyses should not be used to verify specific system adequacy in the event of a Safe Shutdown Earthquake. If a detailed stress and support evaluation of the Recirculation and LPCI systems were performed to current criteria it would incorporate in the analysis the following items:

1. As-built pipe configuration - final as-built configurations following IE Bulletin 79-14 modifications would be used.

2. Pipe boundary conditions - adequate overlap techniques would be used when a physical anchor is not available for termination of the piping model.

3. Seismic model combinations - effect of closely spaced modes should be considered as per NRC Regulatory Guide 1.92.

4. Equipment stiffness - Realistic pump component stiffnesses would be used. This information is usually included in the pump stress report.

5. Vertical response spectra - Specific building vertical spectra would be used instead of the 2/3 scaling factor. In the absence of specific vertical spectra, we would use the 2/3 factor.

For the open items in reference (b) the status is as follows:

1. Junction of Reactor Building and Turbine Building

Information submitted to Paul O'Connor on March 30, 1981 by R.F. Janecek.

2. Control Rod Drive Units and Associated Hydraulic Tubing Supports

A conference call was conducted with the staff on April 16, 1981 to provide the details of the analysis which is being

2. (Cont'd) performed on the system under the 79-14 program. When the next 79-14 status report is issued, it will cover the status of the control rod drive work including a schedule for completing the work. A copy of the report will be forwarded to you for your information.

3. Motor - Operated Valves

In the current re-analysis being done as a result of I.E. Bulletin 79-14, EDS is considering the effects of valve mass eccentricity for both air and motor operated valves.

4. Reactor Vessel and Internal Shroud Support

Based on the information obtained during the conference call between the NRC, the NRC's consultants, CECo and GE, Edison has started GE on obtaining the requested information. GE states they have found the requested information and will forward it to Edison by May 15, 1981. Edison will forward the information to the Staff by the end of May.

5. Recirculation Pump and Supports

Edison has received the Staff's report titled, "Summary of Dresden Unit 2 Recirculation Loop Piping Reanalysis". The report is being processed to determine the scope of review and its schedule.

6. Piping

In the original analysis of small diameter piping, pipes were supported to meet rigid or flexible span requirements, and support loads were determined from support reaction curves. In the process of reanalyzing piping systems for I.E. Bulletin 79-14, EDS reviewed the rigid spans per Blume criteria and found that their fundamental frequencies exceed twice building fundamental frequency. Pipes which were supported in the resonant or flexible range, and therefore have span frequencies of less than twice building fundamental frequency, are reanalyzed rigorously as part of the I.E. Bulletin 79-14 effort.

7. Battery Racks

The battery racks have been reanalyzed with the wooden cell braces replaced with 2] x 2] x [angles bolted to the rack with]" bolts. The racks with this proposed modifications have been found to be seismically adequate. The necessary paperwork to initiate this modification will be issued by mid-May.

For items 8, 9, 10, and 11 the status remains the same as listed in reference (b).

Please address any questions you may have concerning this matter to this office.

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Very truly yours,

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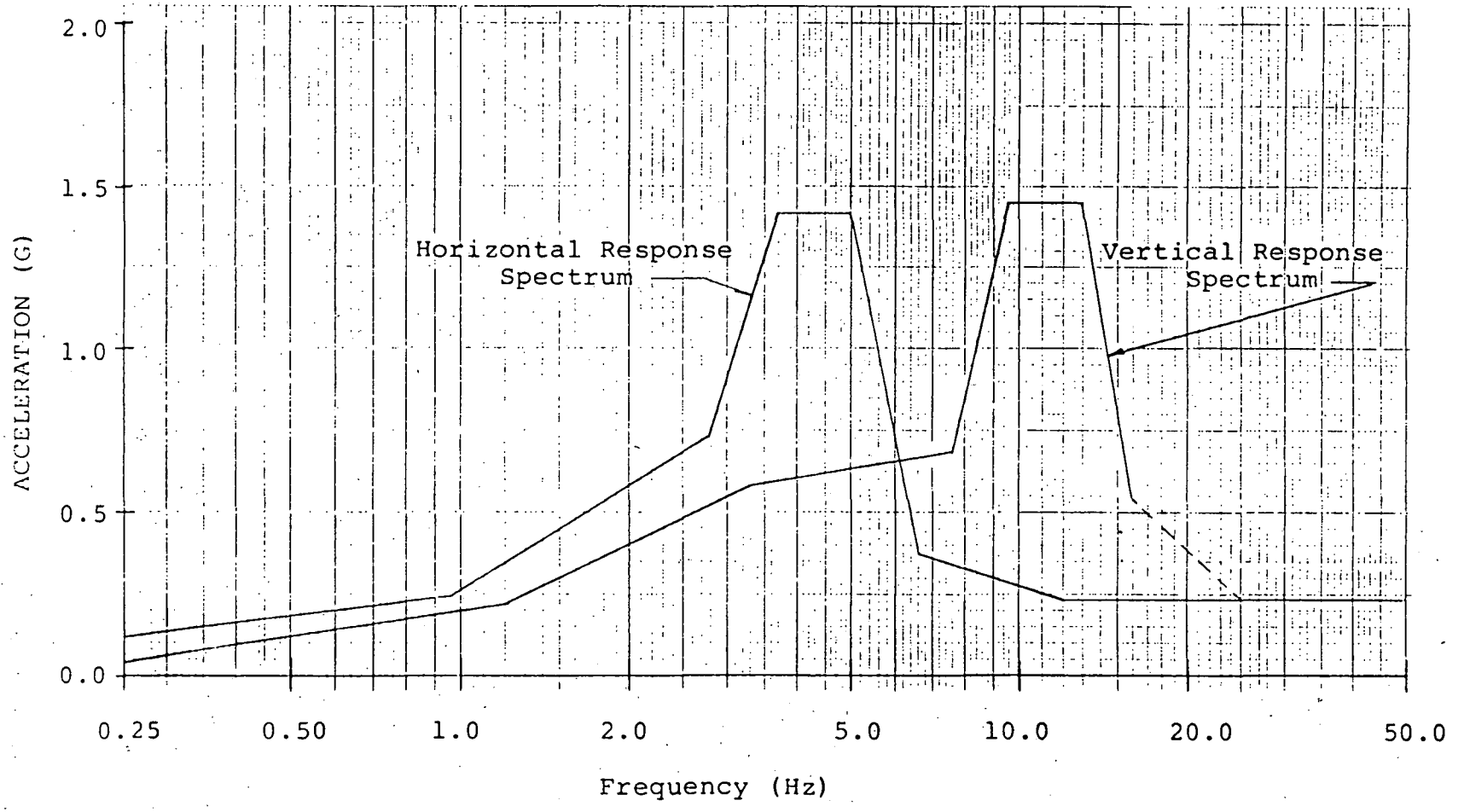

FIGURE 1 COMPARISON OF HORIZONTAL AND VERTICAL SPECTRA

(Typical Reactor Building - GE Mark I, Similar to Dresden - SSE 3% Damping)

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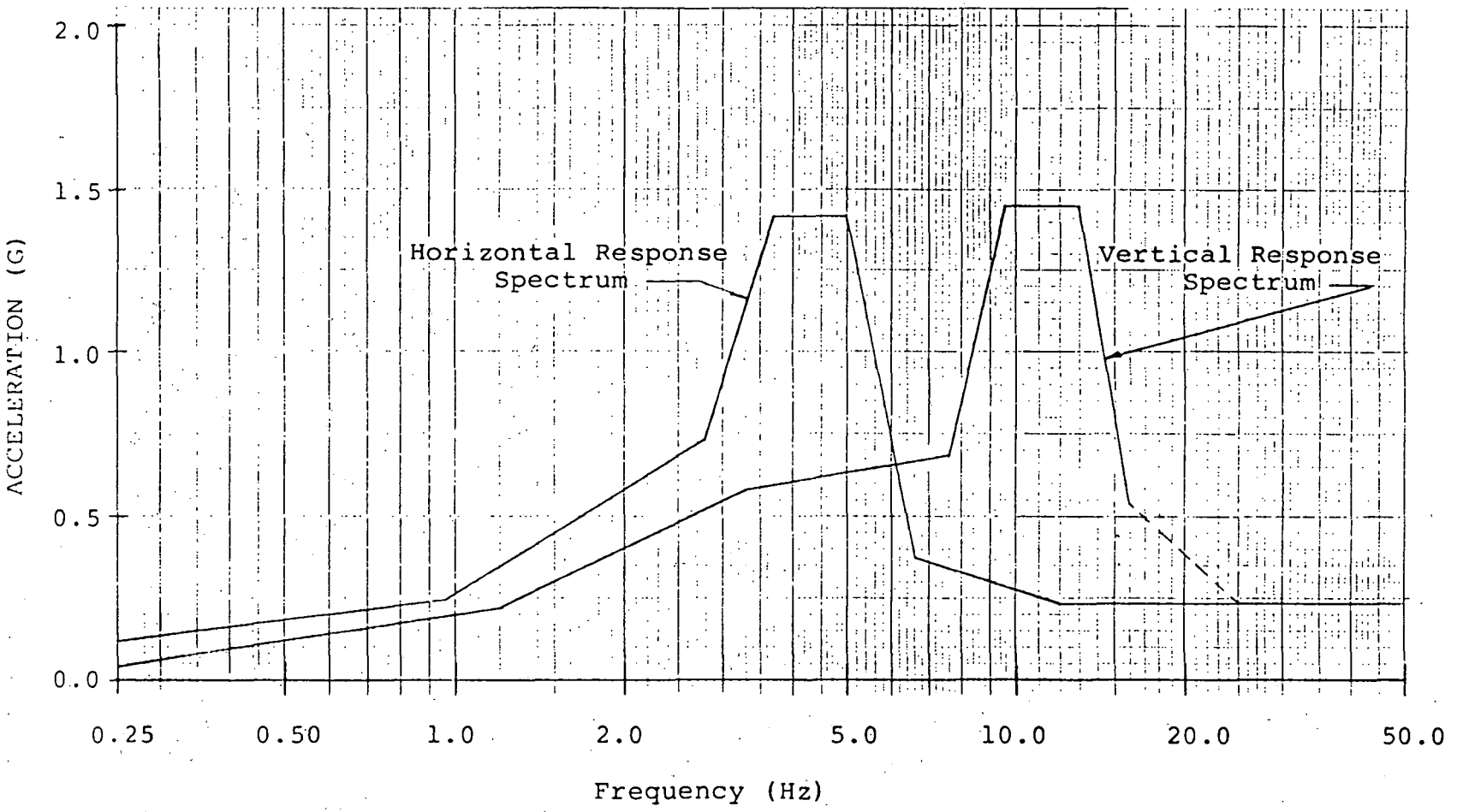

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