James S. Baumstark
Vice President
Nuclear Engineering

Consolidated Edison Company of New York, Inc.
Indian Point 2 Station
Broadway & Bleakley Avenue
Buchanan, New York 10511

Internet: baumstarkj@coned.com
Telephone: (914) 734-5354
Cellular: (914) 391-9005
Pager: (917) 457-9698
Fax: (914) 734-5718

December 13, 1999

Re: Indian Point Unit No. 2
Docket No. 50-247

Document Control Desk
US Nuclear Regulatory Commission
Mail Station P1-137
Washington, DC 20555-0001

Subject : Supplemental Information Regarding Resolution of Unresolved Safety Issue A-46, "Seismic Qualification of Equipment in Operating Plants," (TAC No. M69453)

Reference : 1) Con Edison Letter to USNRC dated September 3, 1999
2) USNRC Letter to Con Edison dated April 15, 1999

Pursuant to 10 CFR 50.54(f), Consolidated Edison Company of New York, Inc. (Con Edison) previously submitted, via Reference 1, a response to a NRC Request for Additional Information (RAI) relative to Unresolved Safety Issue A-46.

On November 1, 1999, discussions between members of your staff and Con Edison were held with regard to the use of Method A.1 as defined in Generic Implementation Procedure, Revision 2 (GIP-2). In general, the staff questioned the applicability for using Method A.1 for estimating the seismic demand of equipment located on Elevation 98'-0" of the Primary Auxiliary Building (PAB).

The specific questions identified were as follows:

1 NRC calculations of the amplification factor between the free-field ground response spectrum (Indian Point Unit 2 Housner Spectrum with a peak ground acceleration of 0.15g, 5% of critical damping) and the Primary Auxiliary Building in-structure response spectrum for elevation 98 feet (5%of critical damping, as shown in the figure on page 4 of your response to the NRC request for additional information) result in amplification factors higher than 1.5 and as high as 6.33 in the frequency range above 8 Hertz. In light of this justify your use of Method A.1.

2 Is elevation 98 feet in the Primary Auxiliary Building the only location in the Indian Point 2 plant where you used GIP-2 Method A.1 for comparing the

A025

seismic capacity to the seismic demand in the implementation of the USI A-46 program? If it is not the only location, demonstrate that the limitations on the use of Method A.1 are met at these other locations.

3 If you are relying on the acceleration values of the response spectrum of the time history actually used to generate the Primary Auxiliary Building in-structure response spectra being higher than those of the Housner Input Design Spectrum as a factor adding to the conservatism of the in-structure response spectra, provide a comparison of these two input spectra both for 5% of critical damping.

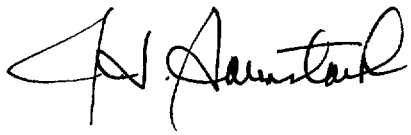
4 In your evaluation of the Component Cooling Surge Tank 0021CCST the seismic demand was defined as 1.5 times the ground response spectrum. This is not a GIP-2 method. Provide a technical justification as to why this method is appropriate. If this method was used for the evaluation of other tanks or equipment, identify them and provide their locations and a justification for the use of this method.

5 In your response to our original request for information on the use of Method A.1, you reference NUREG/CR-1489 and state that it shows conservatisms in In-structure response spectra at nuclear power plants with factors of 1.5 to 8. We have reviewed that document and can not find that information. Please provide a page reference for the information if you plan to pursue that argument.

Con Edison's responses to the questions discussed on November 1 are provided in the Attachment to this letter.

No new regulatory commitments are being made by Con Edison in this correspondence. Should you or your staff have any concerns regarding this matter, please contact Mr. John McCann, Manager, Nuclear Safety & Licensing.

Very truly yours,



Attachment

Subscribed and sworn to
before me this 13th day
of December 1999.

Karen L. Lancaster
Notary Public

KAREN L. LANCASTER
Notary Public, State of New York
No. 60-4643659
Qualified In Westchester County
Term Expires 9/30/01

C: Mr. Hubert J. Miller
Regional Administrator-Region I
US Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, PA 19406

Mr. Jefferey F. Harold, Project Manager
Project Directorate I-1
Division of Reactor Projects I/II
US Nuclear Regulatory Commission
Mail Stop 14B-2
Washington, DC 20555

Senior Resident Inspector
US Nuclear Regulatory Commission
PO Box 38
Buchanan, NY 10511

ATTACHMENT

SUPPLEMENTAL INFORMATION REGARDING
RESOLUTION OF UNRESOLVED SAFETY ISSUE A-46

Consolidated Edison Company of New York, Inc.
Indian Point Unit No. 2
Docket No. 50-247
December 1999

Question 1

NRC calculations of the amplification factor between the free-field ground response spectrum (Indian Point Unit 2 Housner Spectrum with a peak ground acceleration of 0.15g, 5% of critical damping) and the Primary Auxiliary Building in-structure response spectrum for elevation 98 feet (5% of critical damping, as shown in the figure on page 4 of your response to the NRC request for additional information) result in amplification factors higher than 1.5 and as high as 6.33 in the frequency range above 8 Hertz. In light of this justify your use of Method A.1.

Response

References:

(a) Harstead Engineering Associates, Generation of Seismic Floor Response Spectra for Indian Point Generating Station, Report No. 8208-1, March 28, 1983.

(b) Letter, RG&E to USNRC, "Additional Information of Use of GIP Method A, R.E. Ginna Nuclear Power Plant," Docket No. 50-244, dated May 25, 1999.

(c) Letter, USNRC to RG&E," Plant Specific Safety Evaluation of USI A-46 Program Implementation at the R.E. Ginna Nuclear Power Plant," Docket No. 50-244, dated July 17, 1999.

The high amplification factor cited in the question is due to conservatism in the analysis of the structure.

Reference (a) documents the generation of the in-structure response spectra (ISRS) for the Primary Auxiliary Building (PAB) used in the USI A-46 resolution at Indian Point Unit 2. The report states that the fundamental frequencies of the building response are 13.58 and 13.88 Hz in the East-West and North-South directions, respectively. Figures II.29 and II.6 from Reference (a), attached, are the East-West and North-South ISRS for PAB elevation 98 feet. The ISRS peak spectral accelerations are 0.85g and 0.95 g in the East-West and North-South directions, respectively. The report describes that the ISRS were calculated, smoothed and broadened using standard industry techniques and criteria for design ISRS generation including time history analysis.

Reference (a) also provides response spectra plotted for the free-field time history used in the ISRS generation. Figure IV.5 from Reference (a), attached, is the 5% damped spectrum of the input time history. The spectral acceleration is 0.215g at 13.58 Hz and 0.22g at 13.88 Hz.

The 1.5 amplification factor referred to in the GIP for Method A is meant to be the ratio of the realistic, median-centered ISRS to the GRS. Realistic, median-centered ISRS are not available for Indian Point 2. However, it is possible to estimate what realistic, median-centered ISRS would be using the following procedure that was applied to reinforced concrete shear wall structures at the Ginna nuclear plant as discussed in Reference (c).

Reference (b) presented information developed by the Seismic Qualification Utility Group comparing overall margins between median-centered analysis and design-basis analysis for five reinforced concrete shear wall structures at four nuclear power plants. The ratios of the conservative design spectra to median-centered spectra presented in Reference (b) were 2.53,

5.3, 3.3, 2.3 and 5.4. In Reference (c) the NRC staff considered the wide range of ratios to be due to the different methods and levels of conservatism used in the analyses of the structures rather than differences between structural configurations. The staff then used the mean value of the ratios, 3.77, to estimate the amplification factor for the Ginna structures. The IP2 PAB is also a reinforced concrete shear wall structure so the information in Reference (b) and the discussion in Reference (c) is applicable.

Dividing the peak spectral accelerations of the design ISRS for elevation 98 feet of the PAB by the mean value of the ratios from Reference (b), 3.77, results in estimated realistic, median-centered peak spectral accelerations of 0.23g and 0.25g for the East-West and North-South directions, respectively. The ratios of these values to the corresponding spectral accelerations of the input free field time history (0.215g and 0.22g) are 1.07 and 1.14, respectively. This indicates that if realistic, median-centered ISRS were developed for elevation 98 feet of the PAB, the amplification would be about 1.5, thus justifying use of Method A.1 at this location.

INDIAN POINT UNIT 2 RESPONSE SPECTRA FOR SSE

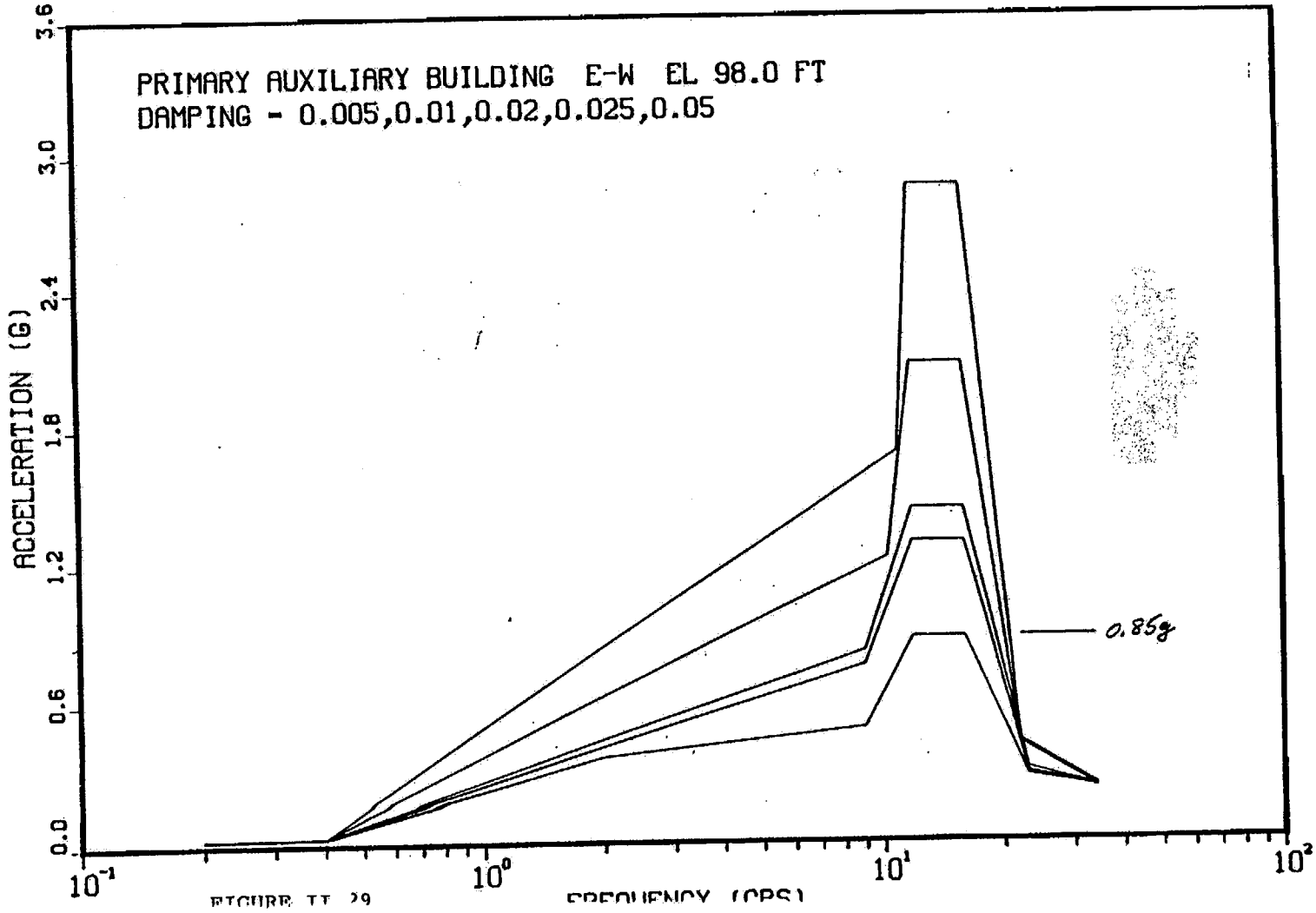


FIGURE TT 29 FREQUENCY (CPS)

INDIAN POINT UNIT 2 RESPONSE SPECTRA FOR SSE

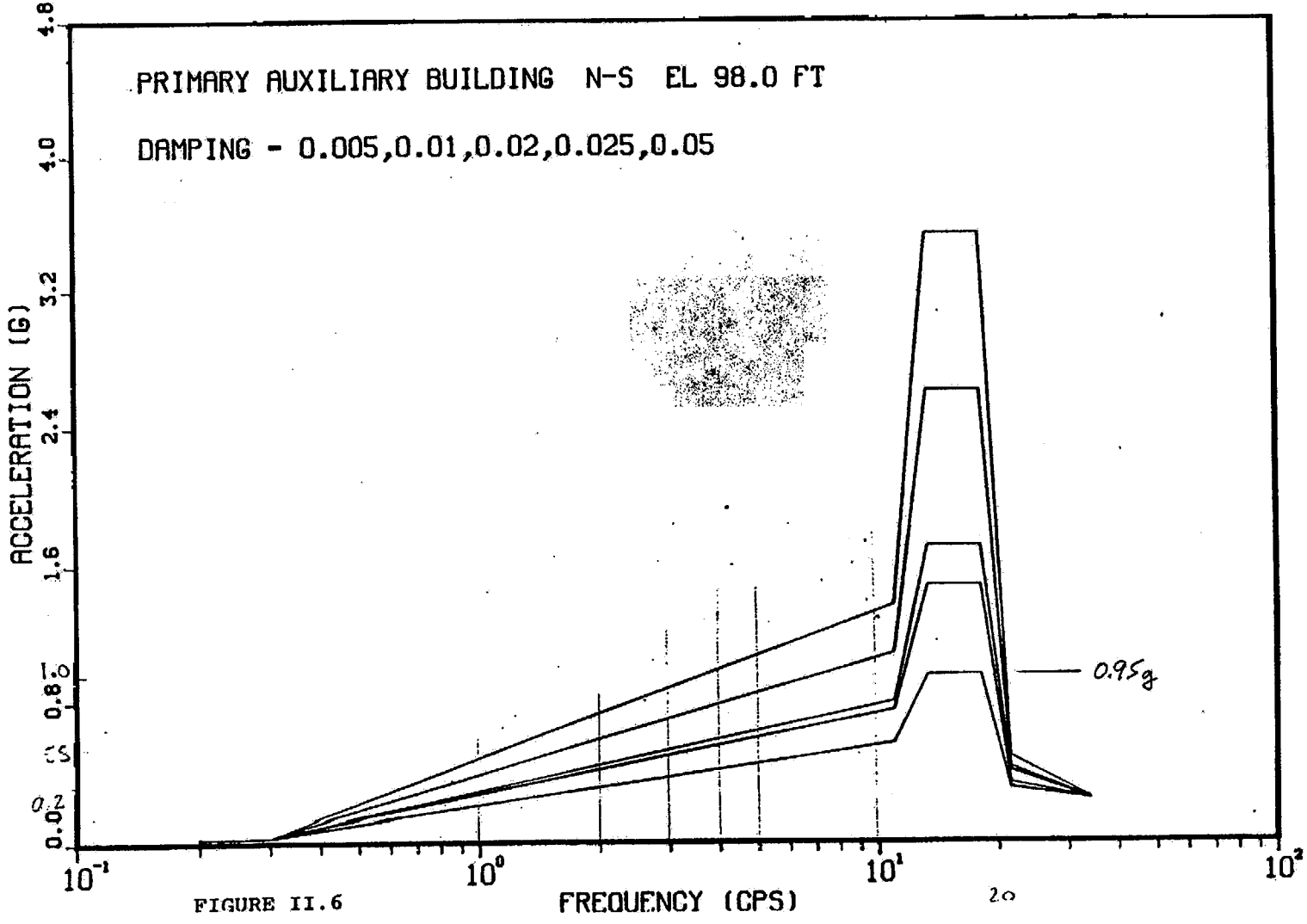


FIGURE II.6

INDIAN POINT RESPONSE SPECTRA FOR SSE

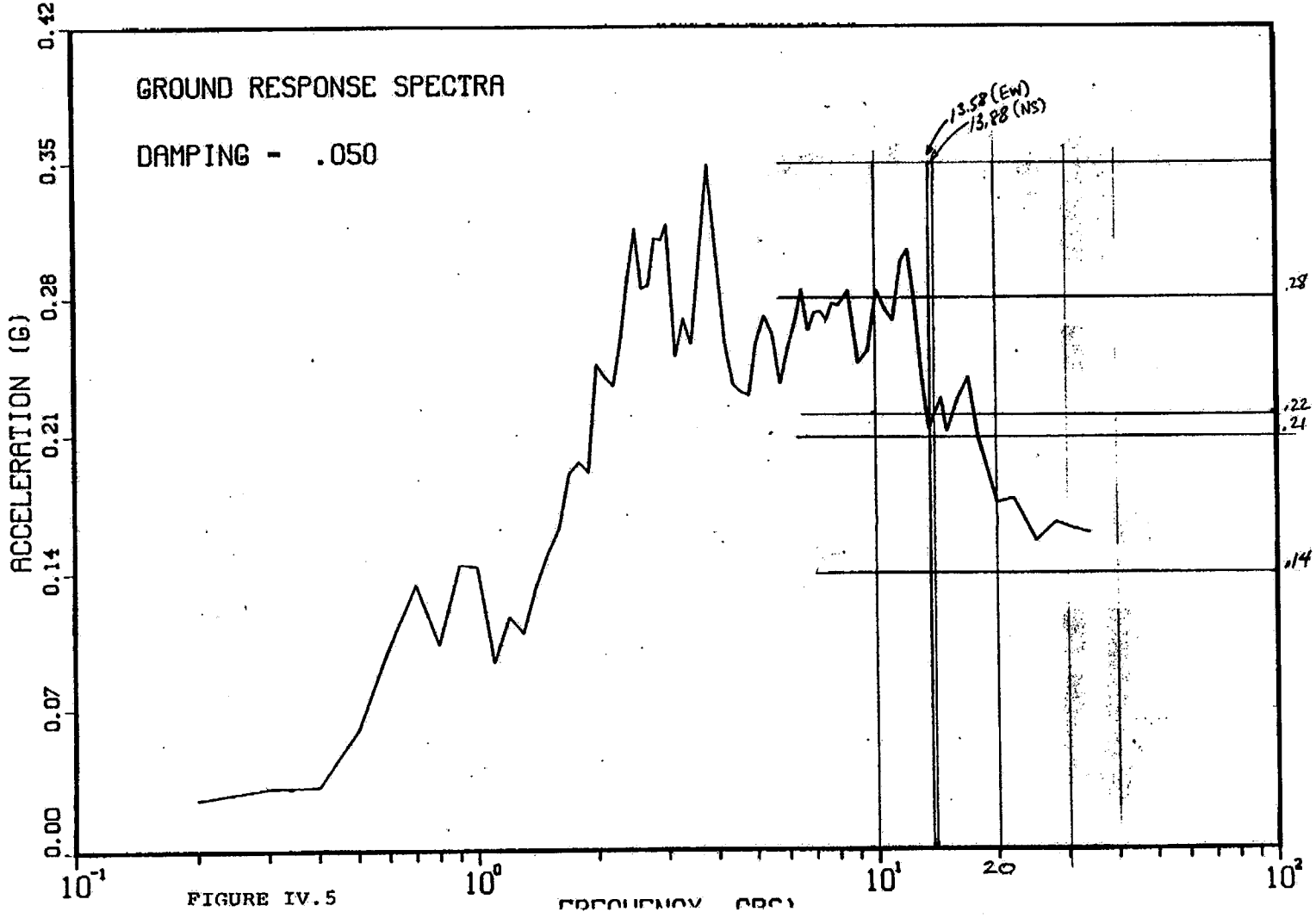


FIGURE IV.5

Question 2

Is elevation 98 feet in the Primary Auxiliary Building the only location in the Indian Point 2 plant where you used GIP-2 Method A.1 for comparing seismic capacity to seismic demand in the implementation of the USI A-46 program? If it is not the only location, demonstrate that the limitations on the use of Method A.1 are met at these other locations.

Response

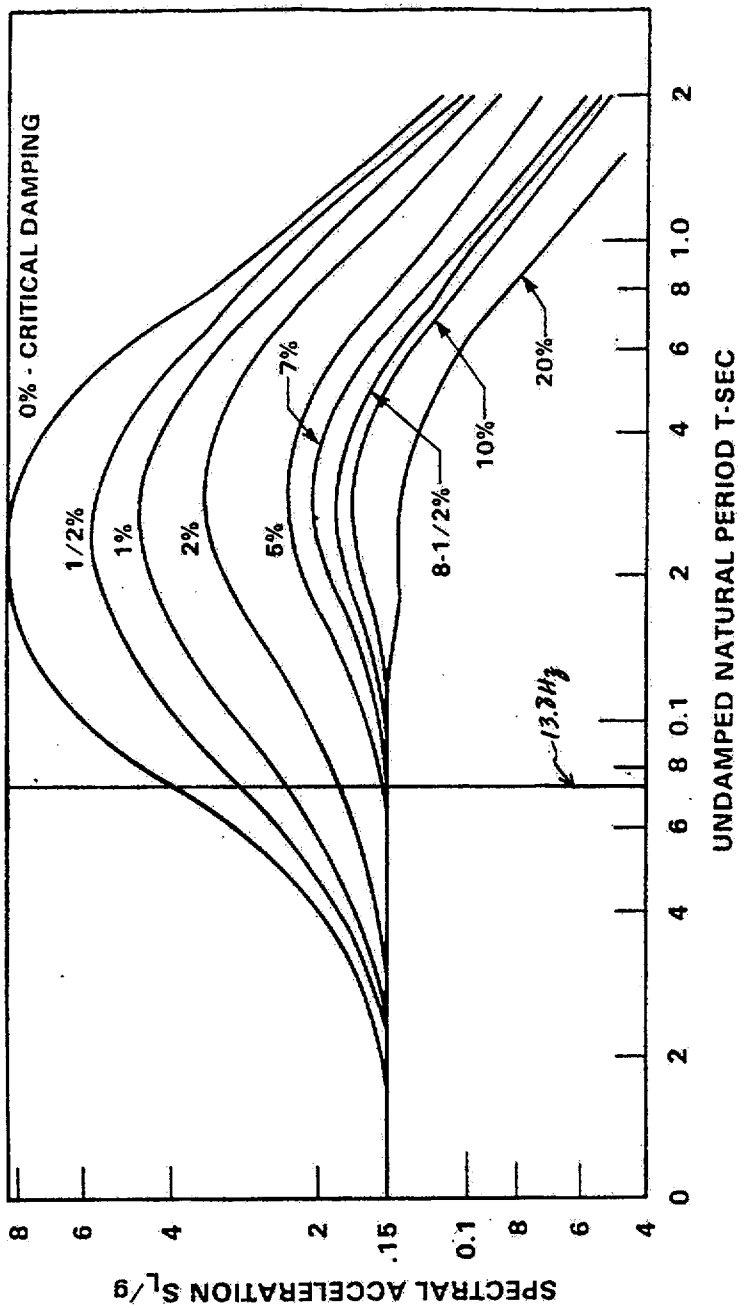
Elevation 98 feet in the Primary Auxiliary Building was the only location in the Indian Point 2 plant where GIP-2 Method A.1 was used for comparing seismic capacity to seismic demand in the implementation of the USI A-46 program.

Question 3

If you are relying on the acceleration values of the response spectrum of the time history actually used to generate the Primary Auxiliary Building in-structure response spectra being higher than those of the Housner Input Design Spectrum as a factor adding to the conservatism of the in-structure response spectra, provide a comparison of these two spectra for 5% of critical damping.

Response

The response spectrum of the time history actually used to generate the Primary Auxiliary Building in-structure response spectra is shown following the response to question 1. For comparison, the Housner Design Response Spectrum (FSAR Figure 1.11-2) is attached. For comparison, the spectral acceleration values for 5% of critical damping at the primary N-S building response frequency of 13.8 Hertz are 0.22g and 0.155g, respectively.



CONSOLIDATED EDISON CO. INDIAN POINT UNIT 2
Figure 1.11-2 Fifteen Percent of Gravity Response Spectra

Revision 2

Question 4

In your evaluation of the Component Cooling Surge Tank 0021CCST the seismic demand was defined as 1.5 times the ground response spectrum. This is not a GIP-2 method. Provide a technical justification as to why this method is appropriate. If this method was used for the evaluation of other tanks or equipment, identify them and provide their locations and a justification for the use of this method.

Response

The calculation is an analysis of the component anchorage and the platform structure to which it is anchored. As per GIP-2 Section 7.4.2, Step 10, page 7-57, determination of the seismic demand was done in accordance with GIP-2 Section 4.4.3. Step 1 of Section 4.4.3 requires use of an appropriate in-structure response spectrum. GIP-2 Table 4-3 lists the three different types of in-structure response spectra which may be used, along with the factors of conservatism by which they must be multiplied. The first type of in-structure response spectrum listed in the table is 1.5 times the SSE horizontal ground response spectrum.

The statement in the calculation for 21CCST derives from the paragraph preceding GIP-2 Table 4-3. This paragraph and Table 4-3 are attached.

The tank in question met the requirements given in Table 4-3; namely, it was located less than 40 feet above grade and its frequency was greater than 8 Hz. For horizontal tanks and heat exchangers, the low frequency slosh mode is not significant (as opposed to large flat-bottomed vertical tanks) and is not included in the evaluation procedure of GIP-2 Section 7.4.2.

This method was used only at elevation 98 feet of the Primary Auxiliary Building, and only for equipment which met the requirements given in GIP-2 Table 4-3.

The first type of response spectrum given in Table 4-3 (1.5 times SSE horizontal ground response spectrum) is considered a median-centered type of response spectrum for elevations below about 40 feet above the effective grade when the equipment has its lowest natural frequency (overall structural mode) above about 8 Hz. The 1.5 factor is an effective amplification factor between the free-field ground motion and the floors in the plant.

Table 4-3

FACTORS OF CONSERVATISM FOR DIFFERENT TYPES OF IN-STRUCTURE RESPONSE SPECTRA

Type of In-Structure Response Spectrum[a]	Additional Factor of Conservatism
1.5 times SSE horizontal, ground response spectrum for equipment which: Is mounted below about 40 feet above the effective grade and Has its lowest natural frequency (overall structural mode) above about 8 Hz	
Realistic, median-centered, horizontal in-structure response spectrum for SSE	
Conservative, design, horizontal in-structure response spectrum for SSE	

(a) The types of response spectra and the terminology used in this table are described in Section 4.2.

Question 5

In your response to our original request for information on the use of Method A.1, you reference NUREG/CR-1489 and state that it shows conservatisms in in-structure response spectra at nuclear power plants with factors of 1.5 to 8. We have reviewed that document and can not find that information. Please provide a page reference for the information if you plan to pursue that argument.

Response

Con Edison does not plan to pursue that argument.