CATEGORY 1

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:9708080163 DOC.DATE: 97/08/04 NOTARIZED: NO DOCKET #
FACIL:50-261 H.B. Robinson Plant, Unit 2, Carolina Power & Light C 05000261
AUTH.NAME AUTHOR AFFILIATION
WILKERSON,T.M. Carolina Power & Light Co.
RECIP.NAME RECIPIENT AFFILIATION
Document Control Branch (Document Control Desk)

SUBJECT: Forwards response to 970312 RAI re seismic qualification of mechanical & electrical equipment for HB Robinson Steam Electric Plant.

DISTRIBUTION CODE: A025D COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 13
TITLE: Seismic Qualification of Equipment in Operating Plants - A-46 - GL-87

NOTES:

	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL
	OGC/HDS3	1	1	PD2-1 PD	1	1
	MOZAFARI,B	1	1			
INTERNAL:	FILE CENTER 01	1	1	NRR/DE	1	1
	NRR/DE/ECGB	1	1	NRR/DE/EMEB	2	2
	NRR/DRCH/HHFB	1	1	NRR/DRCH/HICB	1	1
	NRR/DRPE/PD1-3	1	1	NRR/DSSA/SRXB	1	1
EXTERNAL:	NRC PDR	1	1			

NOTE TO ALL "RIDS" RECIPIENTS:
PLEASE HELP US TO REDUCE WASTE! CONTACT THE DOCUMENT CONTROL DESK, ROOM OWFN 5D-5(EXT. 415-2083) TO ELIMINATE YOUR NAME FROM DISTRIBUTION LISTS FOR DOCUMENTS YOU DON'T NEED!

TOTAL NUMBER OF COPIES REQUIRED: LTTR 13 ENCL 13

CATEGORY 1 DOCUMENT

CP&L

Carolina Power & Light Company
Robinson Nuclear Plant
3581 West Entrance Road
Hartsville SC 29550

Robinson File No.: 13510
Serial: RNP-RA/97-0091
AUG 0 4 1997

United States Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555-0001

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261/LICENSE NO. DPR-23
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION REGARDING
SEISMIC QUALIFICATION OF MECHANICAL AND ELECTRICAL EQUIPMENT

Gentlemen:

NRC letter dated March 12, 1997, transmitted a request for additional information regarding seismic qualification of mechanical and electrical equipment for the H. B. Robinson Steam Electric Plant, Unit No. 2. The response to the request is attached.

Questions regarding this matter may be referred to me or Mr. H. K. Chernoff of my staff at (803) 857-1437.

Very truly yours,

Terry M. Wilkerson

T. M. Wilkerson
Manager - Regulatory Affairs

Attachment

c: Mr. L. A. Reyes, Regional Administrator, USNRC, Region II
Ms. B. L. Mozafari, USNRC Project Manager, HBRSEP
Mr. B. B. Desai, USNRC Senior Resident Inspector, HBRSEP

A025 1/1

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
REQUEST FOR ADDITIONAL INFORMATION
REGARDING VERIFICATION OF SEISMIC ADEQUACY OF MECHANICAL AND ELECTRICAL EQUIPMENT IN OPERATING REACTORS

Request 1

Describe the extent to which the seismic margin methodology, described in the report EPRI NP-6041, was used in the A-46 program at the H. B. Robinson Steam Electric Plant (HBR), including outlier resolutions. Since this methodology is known to yield analytical results that are not as conservative as what might be obtained by following the GIP-2 guidelines, it is generally not acceptable for the A-46 program. Therefore, for each deviation from the GIP-2 guidelines, in situations where the margin methodology is utilized, identify the nature and the extent of the deviation, and provide the justification for its acceptance.

Response 1

CP&L integrated the resolution of USI A-46, "Seismic Qualification of Equipment in Operating Plants," with the Individual Plant Examination for External Events (IPEEE) for the H. B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2. This integration involved combining the walkdown screening requirements such that one plant walkdown could be used for both programs. As discussed in the HBRSEP Project plan, for items within both the A-46 and the IPEEE success paths, the evaluations addressed both the A-46 anchorage requirements and the seismic margin review. In a few cases when it was possible to perform one calculation that serves for both the IPEEE and A-46 reviews, guidelines for both programs were included. The seismic margins methodology was not used to resolve A-46 outlier conditions.

Request 2

In Table 5-4 of the submittal, under "Bounded Elevation," the spectra for the reactor/auxiliary building are bounded at elevation 258 feet, and for the containment building, the spectra are bounded at elevation 325 feet. Clarify whether the spectra at other elevations in both buildings are, indeed, not bounded. For the turbine building, provide a clarification for the seemingly inconsistent note, "SQUG generally not bounded by FSAR" (also refer to the last paragraph of page A-2 of the Third Party Audit Report (Appendix E to the submittal)).

In summary, explain in detail the significance of the spectra not being bounded, as Table 5-4 seems to imply, and provide the justification or resolution for the concern. Revise Table 5-4 for clarification and completeness.

Response 2

Table 5-4 was prepared to indicate building structure elevations for which the Reference Spectrum (1.5 times the SQUG Bounding Spectrum) bounds the in-structure spectra as submitted in the 120 day response. The elevation listed under "Bounded Elevation," indicates the highest elevation for which the in-structure spectra is completely bounded by the Reference Spectrum. Accordingly, the spectra at the building elevations below this level are bounded. For the Turbine Building, clarification is appropriate. The note should read, "Reference Spectrum generally not bounding for equipment mounted on or above the mezzanine elevation." A revised Table 5-4 is included in Attachment 1 of this Enclosure. A comparison of the Turbine Building Mezzanine Floor spectra to the Reference Spectrum is presented in response to Question 3c.

The significance of in-structure response spectra not bounded by the Reference Spectrum is that the capacity versus demand comparison required an additional consideration. A determination of equipment and support frequency was required. This frequency was used to satisfy the "greater than 8 Hertz" requirement of Method A, or in the application of the first special exception under Enveloping of Seismic Demand Spectrum in Section 4.2 of the GIP.

Request 3

Referring to the in-structure response spectra provided in your 120-day response to the NRC's request in Supplement No. 1 to Generic Letter (GL) 87-02, dated May 22, 1992, the following information is requested:

Request 3a

Identify structure(s) that have in-structure response spectra (5 percent critical damping) for elevations within 40 feet above the effective grade that are higher in amplitude than 1.5 times the SQUG Bounding Spectrum.

Response 3a

Five percent damped in-structure spectra for the following two floor elevations exceeds the Reference Spectrum (1.5 times the SQUG Bounding Spectrum) and are considered less than about 40 feet above effective grade.

- Reactor Auxiliary Building - Elevation 262'
- Turbine Building - Mezzanine Elevation

Request 3b

With respect to the comparison of equipment seismic capacity and seismic demand, indicate which method in Table 4-1 of GIP-2 was used to evaluate the seismic adequacy for equipment installed on the corresponding floors in the structure(s) identified in Item (a) above. If you have elected to use method A in Table 4-1 of the GIP-2, provide a

technical justification for not using the in-structure response spectra provided in your 120-day response.

It appears that some licensees, in responding to A-46 concerns, are making an incorrect comparison between each plant's safe shutdown earthquake (SSE) ground motion response spectrum and the SQUG Bounding Spectrum. The SSE ground motion response spectrum for most nuclear power plants is defined at the plant foundation level. The SQUG Bounding Spectrum is defined at the free field ground surface. For plants founded on deep soil or rock, there may not be a significant difference between the ground motion amplitudes at the foundation level and those at the ground surface. However, for sites where a structure is founded on shallow soil, the amplification of the ground motion from the foundation level to the ground surface may be significant.

Response 3b

Safe Shutdown Equipment List (SSEL) components associated with the floor elevations identified in Response 3a, above were accepted based on Methods A.1, B.1, and B.2 of the GIP-2 Table 4-1.

Discussion

The SSE ground motion response spectrum for HBRSEP is defined at the free field. For structures except the Service Water Intake Structure, the free field elevation is the same as the elevation for the top of the foundation. For the Service Water Intake Structure, the SSE ground motion was conservatively applied at the foundation. Therefore, comparisons of the "largest horizontal component of the 5% damped, free-field, Safe Shutdown Earthquake (SSE) ground response spectrum to which the nuclear plant is licensed" (GIP-2 Method A.1) are appropriate. It should also be noted that the more conservative Regulatory Guide 1.60, Revision 1 spectral shape corresponding to the expected maximum ground acceleration for HBRSEP's (0.2 g) is also bounded by the SQUG Bounding Spectrum.

For those components accepted based on Method A.1 of GIP-2 Table 4-1 further justification is provided in the following table. This justification is based on methods other than A.1.

Reactor Auxiliary Building

Equipment ID	Additional Justification
LT-614, LI-614A	These items are rigidly mounted to the structure such that the equipment does not respond in the frequency range where the Reference Spectrum is exceeded. (Method B.1)

Turbine Building

Equipment ID	Additional Justification
MS-V1-8A, 8B, and 8C	The piping is supported at the valve such that the piping does not respond in the frequency ranges where the Reference Spectrum is exceeded. (Method B.1)
AFW-V2-14A, 14B, and 14C	Response spectrum analysis for these piping systems indicates accelerations at the center of gravity of the valve operators to be less than or equal to 1.7 g and 0.4 g for the two horizontal directions and 0.7 g for the vertical direction (damping is 0.5%). These values are considerably less than 3 g used for the operator stress check. (Method B.1)
PCV-1093A, B, and C	Devices similar to these have been seismically tested to accelerations that exceed 10 g (5% damping) for the peak and 6 g Zero Period Acceleration. Amplified in-structure spectra is judged to be much less for these applications. (Equipment Specific Seismic Qualification)
SDN-13, IA-297A, and IA-423	These devices are small manual globe valves and are not required to be included on the SSEL due to inherent seismic ruggedness. However, they were included to ensure appropriate seismic interaction considerations were made.
LI-477A, 487A, and 497A	These level indicators are mounted rigidly to the building steel and therefore the Reference Spectrum envelopes the in-structure spectra for frequencies of concern. (Method B.1)
PIC-477, 487, and 497	The rack supporting these instruments is top braced such that the equipment does not respond in the frequency ranges where the Reference Spectrum is exceeded. (Method B.1)
PT-474, 484, and 494	These instruments were accepted using GERS. (Method B.2)
Steam Dump N_2 Accumulator	The fundamental frequency of this nitrogen tank was determined to be outside the frequency ranges where the Reference Spectrum is exceeded. (Method B.1)
A1-E1/2, CSR and B1-E1/2, CSR	These pressure switches are in the Turbine Building area but are physically attached to the exterior of the Reactor Auxiliary Building. In-structure spectra is enveloped by the Reference Spectrum for this location. (Method B.1)

Request 3c

For the structure(s) identified in Item (a) above, provide the in-structure response spectra designated according to the height above the effective grade. If the in-structure response spectra identified in the 120-day response to Supplement No. 1 to GL 87-02 were not used, provide the response spectra that were actually used to verify the seismic adequacy of equipment within the structures identified in Item (a) above. Also, provide a comparison of these spectra to 1.5 times the Bounding Spectrum.

Response 3c

In-structure response spectra as discussed in the 120-day response to Supplement No. 1 to GL 87-02 were used in the A-46 walkdowns and evaluations. Response spectra addressed in Question 3a above are included as Enclosure 2 to this Attachment. Height above grade is included below.

Building - Floor Elevation	Height Above Grade
Reactor Auxiliary Building - Elevation 262'	36 feet
Turbine Building - Mezzanine Elevation	16.5 feet

Request 4

Provide an assessment of the impact on plant safety in consideration of the proposed schedule for resolving all the identified outliers or open items by the completion of Refueling Outage 18, scheduled to occur during the spring of 1998.

Response 4

Upon completion of A-46 walkdowns, A-46 outlier conditions were identified where repair or modification was expected, excluding minor hardware repairs to cable raceway systems. When the walkdowns were complete a Condition Report was initiated under the Corrective Action Program to assess these conditions as potential design deficiencies including the cumulative effect. No challenges to operability were identified. These items were categorized according to impact to design basis requirements. Design deficiencies were corrected in the Refueling Outage which ended June 21, 1995. The remaining findings were scheduled for repair or modification as identified in our USI A-46 Seismic Evaluation Report, June 1995.

Request 5

You indicated in Chapter 6 of the submittal that the anchorages in the 31 tanks and heat exchangers in the safe shutdown path are adequate. Confirm that the tanks and heat exchangers were evaluated and found structurally adequate in accordance with the rules and procedures given in Section 7 of the GIP.

Response 5

The tanks and heat exchangers were evaluated and found structurally adequate in accordance with the rules and procedures given in Section 7 of the GIP. Acceptance for these tanks and heat exchangers is summarized in the Seismic Evaluation Report, Appendix C "Screening Verification Data Sheets." Note that Equipment ID Numbers AHSS-1, 2, and 3 were incorrectly marked in the Seismic Evaluation Report, Appendix C as Equipment Class 20. They were appropriately evaluated as Equipment Class 21 "Tanks and Heat Exchangers." A revised page is included in Enclosure 1 to this Attachment.

Request 6

You stated on page 27 of the submittal that the tightness check of expansion anchors was performed on a representative number of mechanical and electrical components. State whether the representative number meets the sample size criteria for expansion anchor tightness check as listed on Table C.2-4 of the GIP. If not, provide justification.

Response 6

The reference on page 27 of the submittal does not provide an adequate explanation of the checks performed. In accordance with the Program Plan and GIP-2, tightness checks were performed on accessible expansion anchors. The optional sampling program discussed in the GIP-2 Section 4.4.1 (Check 4) was not exercised. Likewise, the sample size criteria included in Table C.2-4 was not implemented.

The GIP-2 requires that tightness checks be performed on accessible expansion anchors except where anchorage may be judged to be robust or where the anchorage is only loaded in tension (reference GIP-2 Section 4.4.1, Check 4). A description of inaccessible expansion anchors is documented in the Screening and Evaluation Work Sheets (SEWS). Reasonable means to gain access including removing access panels, opening doors, and scheduling the walkdowns during plant and equipment outages were used. Anchors that could not be accessed due to high radiation or without removing permanent equipment (such as determinating cables) were considered inaccessible.

Request 7

Describe self-drilling snap-off anchors and their acceptance criteria.

Response 7

"Self-drilling snap-off" is the name used at Robinson to refer to Phillips Self Drill shell type anchors. Figure C.2-1(a) of the GIP-2 depicts this anchor. Acceptance criteria included in the GIP-2 was used.

Attachment 1

Enclosure 1

Revised Pages for

H. B. Robinson
Steam Electric Plant
Unit No. 2
USI A-46
Seismic Evaluation Report

Table 5-4

BUILDING GRADE ELEVATION AND
SPECTRA BOUNDED ELEVATION

BUILDING	GRADE ELEVATION (FT)	BOUNDED ELEVATION (FT)
Reactor Auxiliary	226	258
Containment	226	325
Inner Structure	226	All Elevations
Circulating Water Structure	182.5	All Elevations
Turbine	226	See Note

Note:

Reference Spectrum generally not bounding for equipment mounted on or above the Mezzanine elevation.

SCREENING VERIFICATION DATA SHEET (SVDS)

EQ CL	EQUIP ID No.	SYSTEM/ EQUIPMENT DESCRIPTION	BLDG	FLOOR ELEV	ROOM OR ROW/COL	BASE ELEV	<40' ?	CAPA-CITY SPEC-TRUM	DE-MAND SPEC-TRUM	CAP. > DE-MAND?	CAVEATS OK?	ANCH. OK?	INTER-ACTION OK?	EQUIP OK?
19	TE-469	TEMPERATURE ELEMENT SRV-1 LINE	RC	275	CONTAINMT-PZR. CUB.	290	No	ABS	CRS	Yes	Yes	N/A	Yes	Yes
19	TE-607	TEMPERATURE ELEMENT CCW DISCH	RAB	226	226 HALL/ SAMPLE ROOM	236	Yes	ABS	CRS	Yes	Yes	N/A	Yes	Yes
20	A-65V	PANEL-A-65V(ROB FOR PSL-1616 & PSL-1684)	RAB	242-6	CABLE SPREAD ROOM	242.5	Yes	ABS	CRS	Yes	Yes	Yes	Yes	Yes
21	AHSS-1	PZR STM SAMPLE HEAT EXCHANGER	RAB	226	SAMPLE ROOM	226	Yes	N/A	N/A	N/A	N/A	Yes	Yes	Yes
21	AHSS-2	PZR LIQUID SAMPLE HEAT EXCHANGER	RAB	226	SAMPLE ROOM	226	Yes	N/A	N/A	N/A	N/A	Yes	Yes	Yes
21	AHSS-3	HOT LEG SAMPLE HEAT EXCHANGER	RAB	226	SAMPLE ROOM	226	Yes	N/A	N/A	N/A	N/A	Yes	Yes	Yes
20	AUX-RLY-RKS A-F	AUXILIARY RELAY RACKS: A-F	RAB	242-6	CABLE SPREAD ROOM	242.5	Yes	ABS	CRS	Yes	No	No	No	No
20	AUX-RLY-RKS G-M	AUX RELAY RACKS: G-M (NO I RACK)	RAB	242-6	CABLE SPREAD ROOM	242.5	Yes	ABS	CRS	Yes	No	No	No	No
20	BOX-208	RELAY BOX	RAB	246	HVS FAN RM	259	Yes	ABS	CRS	Yes	Yes	Yes	Yes	Yes
20	BOX-209	RELAY BOX	RAB	246	HVS FAN RM	259	Yes	ABS	CRS	Yes	Yes	Yes	Yes	Yes
20	CET PANEL A&B	PANEL INCLUDES SSEL ITEMS TM-577 & TM-578 CIRCUIT BOARDS	RAB	249.50	ROD DRIVE	249.50	Yes	ABS	CRS	Yes	Yes	Yes	Yes	Yes
20	EAST HAGAN RACKS	HAGAN RACKS 01-13,26	RAB	254	HAGAN	254	Yes	ABS	CRS	Yes	Yes	Yes	Yes	Yes

Attachment 1

Enclosure 2

In-Structure Response Spectra

for

Reactor Auxiliary Building 262'

and

Turbine Building Mezzanine Floor

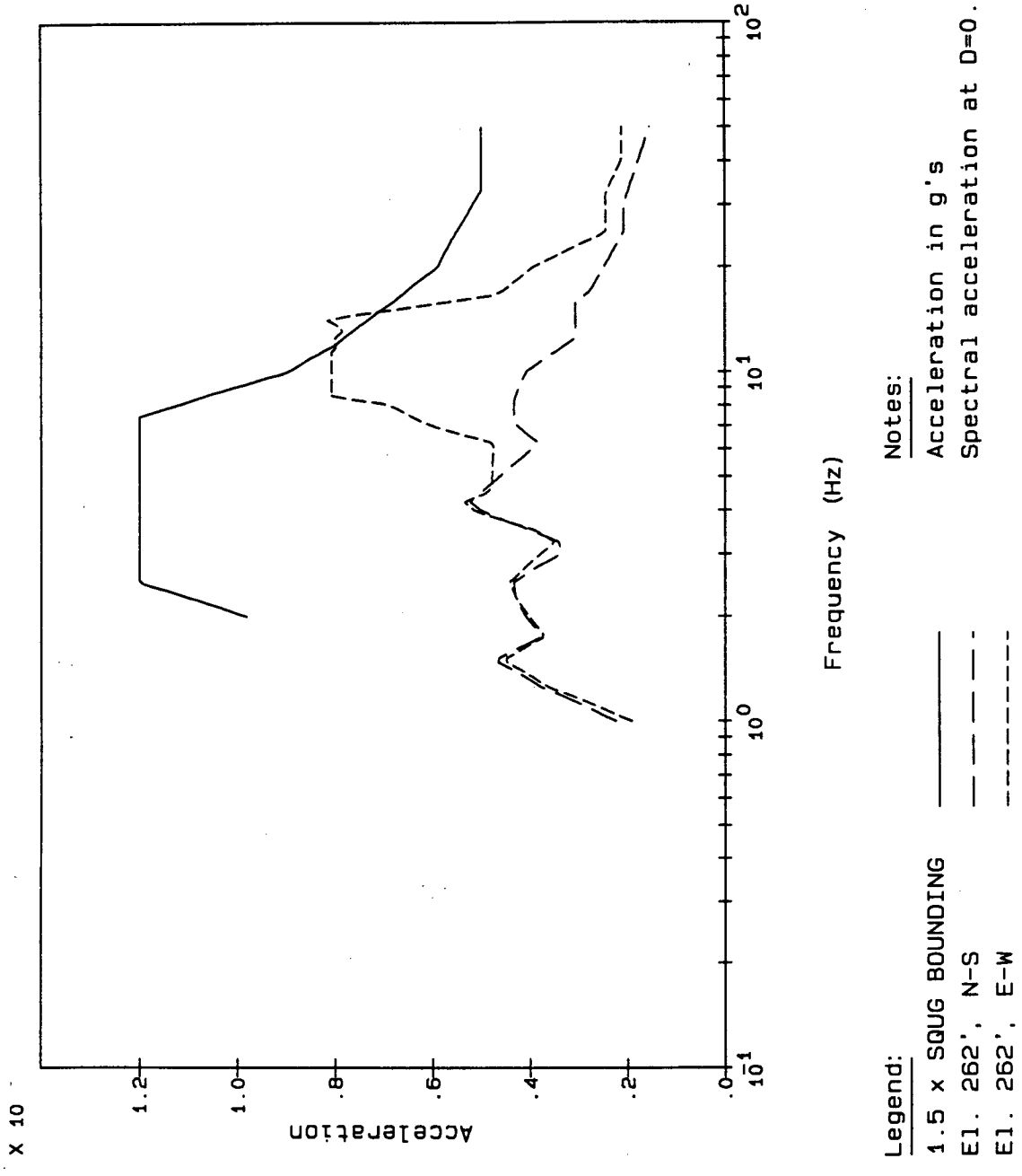

Figure 7A-2: H.B. ROBINSON; REACTOR AUXILIARY BLDG
Comparison of Licensing Basis Spectra Vs SQUG Bounding Spectrum

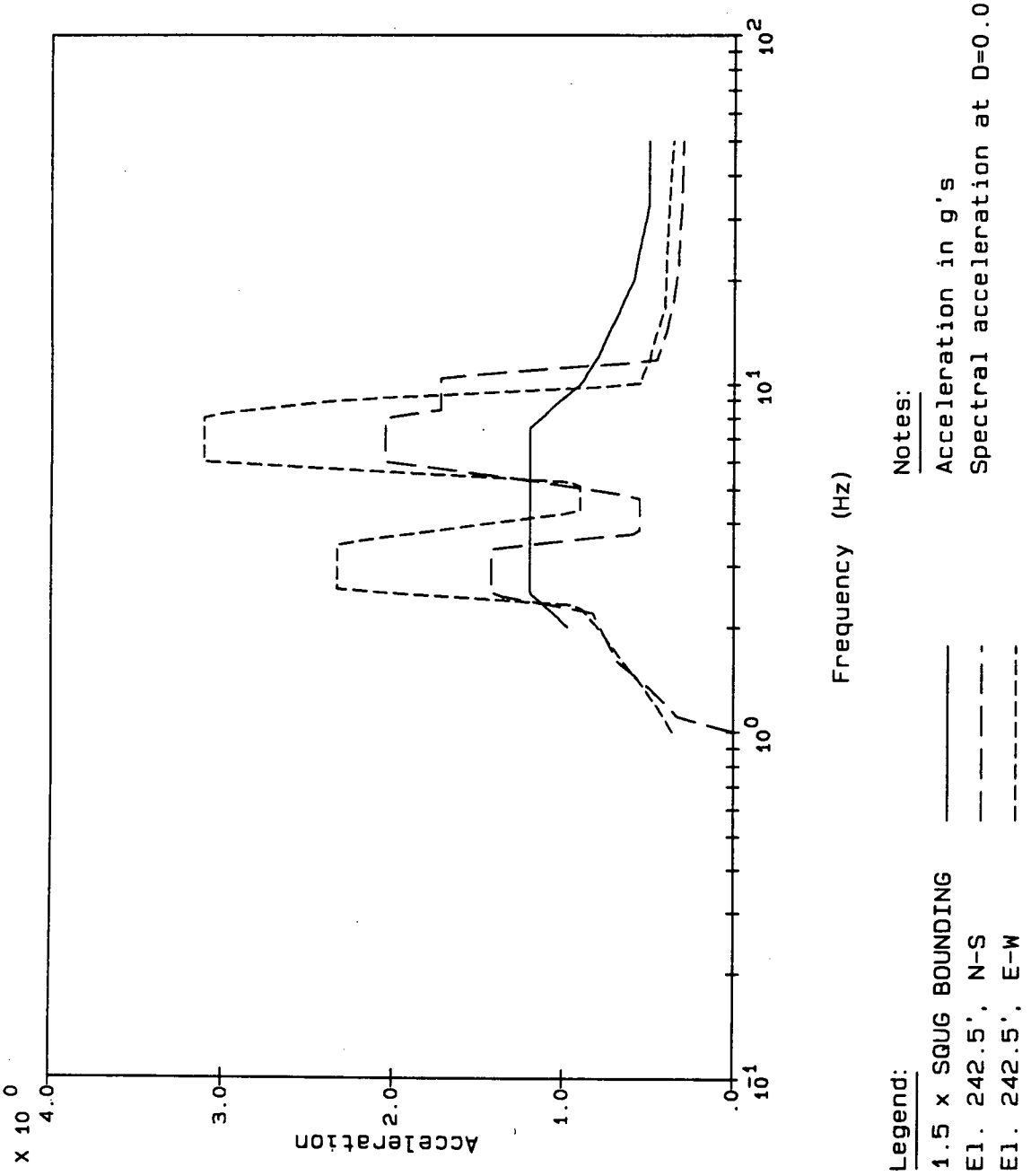

Figure 7E-1: H.B. ROBINSON; TURBINE BUILDING CLASS I BAY
Comparison of Licensing Basis Spectra Vs SQUG Bounding Spectrum

fsar13