VERMONT YANKEE
NUCLEAR POWER CORPORATION

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BVY 99-133

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

References:

(a) Letter, USNRC to VYNPC, "Request for Additional Information Regarding Verification of Seismic Adequacy of Mechanical and Electrical Equipment," NVY 99-79, dated August 25, 1999.

(b) Letter, VYNPC to USNRC, "Response to Request for Additional Information," BVY 98-99, dated July 17, 1998.

(c) Letter, VYNPC to USNRC, "Response to Supplement No. 1 to Generic Letter 87-02 on SQUG Resolution of USI A-46," BVY 92-112, dated September 18, 1992.

(d) Letter, VYNPC to USNRC, "Supplemental Information Regarding VYNPC Response to Generic Letter 87-02, Supplement 1 on SQUG Resolution of USI A-46," BVY 92-113, dated September 18, 1992.

(e) Letter, USNRC to VYNPC, "Evaluation of 120-Day Response to Supplement No. 1 to Generic Letter 87-02," NVY 92-200, dated November 12, 1992.

(f) Letter, N.P. Smith (SQUG) to B.W. Sheron (USNRC), "Basis for Use of GIP Method A," dated June 10, 1998.

(g) Letter, RG&E to USNRC, "Response to NRC Second Request for Additional Information on the Resolution of Unresolved Safety Issue (USI) A-46," Docket No. 50-244, dated February 2, 1999.

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

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

Subject: **Vermont Yankee Nuclear Power Station**
License No. DPR-28 (Docket No. 50-271)
Response to Request for Additional Information Regarding
Verification of Seismic Adequacy of Mechanical and Electrical Equipment

Reference (a) requested Vermont Yankee (VY) to provide additional information with regard to use of Generic Implementation Procedure, Revision 2 (GIP-2) Method A.1 for the comparison of seismic capacity to seismic demand. Attached for your use is a written response to the staff's request.

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We trust that the information provided will enable you to complete your review of Vermont Yankee's USI A-46 response; however, should you have any questions on this matter, please contact Mr. Wayne M. Limberger at (802) 258-4237.

Sincerely,

VERMONT YANKEE NUCLEAR POWER CORPORATION

Don M. Leach
Vice President, Engineering

Attachments

cc: USNRC Region 1 Administrator
USNRC Resident Inspector – VYNPS
USNRC Project Manager – VYNPS
Vermont Department of Public Service

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Attachment 1

Vermont Yankee Nuclear Power Station

Response to Request for Additional Information Regarding

Verification of Seismic Adequacy of Mechanical and Electrical Equipment

NRC REQUEST

GIP-2 provides for several methods of comparing seismic capacity to seismic demand. Method A.1 compares the Seismic Qualification Utility Group (SQUG) bounding spectrum to the plant's safe shutdown earthquake (SSE) ground response spectrum. GIP-2 places limitations on the use of Method A.1. These limitations are that the SSE ground response spectrum can be used for comparison to the bounding spectrum when: (1) the equipment is mounted in the nuclear plant at an elevation within approximately 40 feet of the effective grade; (2) the equipment, including its supports, has a fundamental natural frequency greater than about 8 Hz; or (3) the amplification factor between the free field ground response spectrum and the in-structure response spectra (IRS) is not more than about 1.5.

A review of the Vermont Yankee IRS to the ground response spectrum ratio at locations where GIP-2 Method A.1 was used indicates that the amplification factors, above 8 Hz, of some of these IRS appear to be significantly above the 1.5 limit set by GIP-2. We request that you provide a building specific justification for the use of Method A.1 at the locations where the amplification significantly exceeds the 1.5 limit above 8 Hz.

VY RESPONSE

Vermont Yankee used Method A.1 for determining seismic demand in the following buildings and elevations:

- Reactor Building up to Elevation 280'
- Drywell up to Elevation 269'
- Turbine Building up to Elevation 272'-6"
- Intake Structure up to Elevation 237'-6"
- Control Building up to Elevation 272'-6"

The in-structure response spectra (ISRS) for these buildings were submitted in Reference (b). Descriptions of the buildings and the methods used for computing the ISRS were described in References (c) and (d). In Reference (e), the NRC concurred that these ISRS should be considered "conservative, design" for GIP-2.

GIP-2 recommends the use of realistic, median-centered ISRS. It cautions that the use of conservative, design ISRS may introduce substantial conservatism (GIP-2, page 4-22). Since realistic, median-centered ISRS were not available, Vermont Yankee utilized Method A.1, as recommended by GIP-2, subject to the restrictions and limitations given in GIP-2, page 4-16.

Vermont Yankee's interpretation of the limitations for Method A.1 given on GIP-2, page 4-16, are that (1) the equipment be mounted at an elevation below about 40 feet above the effective grade, and (2) the equipment, including its supports, should have a fundamental frequency greater than about 8 Hz. It is Vermont Yankee's interpretation that GIP-2 does not require the licensee to meet any further restrictions; that is, GIP-2 states that the amplification factor between the free field response spectra and the realistic, median-centered in-structure response spectra, for elevations up to about 40 feet above effective grade and at frequencies greater than about 8 Hz, will not be more than about 1.5 for reinforced concrete frame and shear wall structures and heavily-braced steel frame structures. A detailed basis for this interpretation has been provided by the Seismic Qualification Utility Group in Reference (f).

If the ISRS provided by Vermont Yankee in Reference (b) at the elevations where Method A.1 was used are compared to the ground response spectrum (GRS) at frequencies of 8 Hz and above, the following amplifications are seen:

Building	Elevation	Max $Sa_{,ISRS}/Sa_{,GRS}$, $f \geq 8$ Hz
Reactor	280'	4.6
Drywell	269'	5.3
Turbine	272'-6''	3.7
Intake	237'-6"	5.6
Control	272'-6"	1.7

The amplification factor for the Control Building shown above at a value of 1.7 is about 1.5. The amplification factor for the other four buildings shown above ranges from 3.7 to 5.6 and exceeds about 1.5. The amplifications that are more than about 1.5 are due to conservatisms associated with the analytical procedures used in the development of the ISRS. These conservatisms have been discussed with respect to similar buildings at the R.E. Ginna Nuclear Power Plant in Reference (g). Reference (h) presented information developed by the Seismic Qualification Utility Group demonstrating that factors of conservatism in conservative design ISRS can be shown to be in the range of 2.5 to 5. The structures discussed in Reference (h) are reinforced concrete shear wall structures. From Reference (b) it is seen that the Vermont Yankee structures are also reinforced concrete shear wall structures. The mean factor of conservatism for these results contained in Reference (h), 3.77, was used by the NRC staff to estimate the realistic, median-centered amplification for the Ginna structures in Reference (i).

Building-specific amplification factors, expressed as the ratio of realistic, median-centered ISRS to the GRS can be estimated for each Vermont Yankee building applying the 3.77 mean factor of conservatism from Reference (i) to the amplifications in the above table for the Reactor, Drywell, Turbine and Intake structures. This yields the following:

Building	Elevation	Amplification
Reactor	280'	1.2
Drywell	269'	1.4
Turbine	272'	1.0
Intake	237'	1.5

Consideration of the above indicates that amplifications in the Vermont Yankee ISRS beyond the 1.5 factor used in GIP-2 Method A.1 are due to conservatisms inherent in the ISRS calculation procedures, and they do not invalidate the use of Method A.1. Similar to the conclusions drawn in the Reference (i) letter and associated SER, if median-centered spectra were developed for locations at Vermont Yankee where Method A.1 was used, it is estimated that the amplification factor above 8 Hz would be about 1.5.

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Attachment 2

Vermont Yankee Nuclear Power Station

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Summary of Vermont Yankee Commitments

SUMMARY OF VERMONT YANKEE COMMITMENTS

BVY NO.: 99-133

The following table identifies commitments made in this document by Vermont Yankee. Any other actions discussed in the submittal represent intended or planned actions by Vermont Yankee. They are described to the NRC for the NRC's information and are not regulatory commitments. Please notify the Licensing Manager of any questions regarding this document or any associated commitments.

COMMITMENT	COMMITTED DATE OR "OUTAGE"
None	None