

VERMONT YANKEE NUCLEAR POWER CORPORATION

SEVENTY SEVEN GROVE STREET  
RUTLAND, VERMONT 05701

TZ  
B.4.2.1  
WVY 79-85  
REPLY TO:  
ENGINEERING OFFICE  
TURNPIKE ROAD  
WESTBORO, MASSACHUSETTS 01581  
TELEPHONE 617-366-9011

July 31, 1979

United States Nuclear Regulatory Commission  
Office of Inspection and Enforcement  
Region I  
King of Prussia, Pennsylvania

Attention: Mr. Boyce H. Grier, Director

References: (a) License No. DPR-28 (Docket No. 50-271)  
(b) Letter to VYNPC dated March 8, 1979.  
(c) Letter VYNPC to USNRC, dated July 6, 1979.  
(d) Letter to VYNPC dated July 26, 1979.

Dear Sir:

Subject: Supplementary Response to I&E Bulletin No. 79-02, Revision 1

In response to your request for additional information, Reference (d), we present the following interim results of our continuing program of inspection, test and analysis of Seismic Category I piping supports and expansion type anchor bolts:

Test results of about 4% of expansion type anchor bolts in accessible areas at Vermont Yankee indicate that 90% of the full population of drilled-in anchor bolts will develop a minimum of 100% of the allowable design load (ultimate bolt capacity divided by four). This is based on testing of randomly selected anchor bolts in many systems and many areas in the plant. Our criterion for establishing this load capability level is by determining that the anchor will accept an equivalent design tension load applied by torquing. These tension values have been verified by torque versus tension testing done on site.

7908240580

773 343

United States Nuclear Regulatory Commission  
Attention: Mr. Boyce H. Grier, Director

July 31, 1979  
Page Two

Test results also show that 67% of anchor bolts at Vermont Yankee will develop 400% of the allowable design load (ultimate bolt capacity). We have concluded that a properly installed concrete expansion anchor bolt is one which meets all installation criteria; i.e., proper thread engagement, proper shell to core maximum dimension limits, and correct embedment depth and also will accept the design load pre-tension application. A bolt meeting these criteria is capable of developing the full value of the ultimate load or 400 percent of design load.

Further evaluation of test data was done to estimate an effective holding capacity above 100 percent of design load of those bolts which hold the pre-tension but fail one or more of the other inspection criteria. As a result of that effort we have estimated that using average bolt degradations the expansion anchors which failed one or more of the inspection criteria but are holding the design load pre-tension have a holding capacity approaching 250% of design load.

Based on the results of this testing, Vermont Yankee plans to fully test and qualify all expansion anchor bolts to 400% of allowable design load or replace with approved anchor bolts which provide equal factors of safety. Completion of this program is scheduled to occur within three weeks of completion of the next refueling outage which is scheduled for early November 1979.

The breakdown of types of baseplates and percentages in which they occur which you requested is as follows:

773 344

Number of Bolts per Baseplate

Bolts	2	4	5	6
Percent	23.1%	48.1%	23.1%	5.7%

Number of Baseplates per Support

Bolts	1	2	3	4	5	6
Percent	52.4%	31.7%	11.1%	1.6%	1.6%	1.6%

Our estimate of the number of pipe supports inside the drywell which are supported by expansion type anchor bolts is currently zero. We are still reviewing drawings and will inform you if this estimate is in gross error.

We are convinced that no degradation of systems operation or safety under any design conditions exists now or is anticipated due to the current anchor bolt failures detected by our inspection program. We have reached this conclusion after careful assessment of the conservatisms originally applied in the design of seismic pipe support systems at Vermont Yankee.

The initial seismic design loads were based on estimated building responses due to an earthquake. Late in the design cycle reactor building dynamic analyses were conducted which identified maximum accelerations of the building structures and the frequency at which they occurred. This re-evaluation is described in Amendment 27 to the Vermont Yankee Final Safety Analysis Report.

United States Nuclear Regulatory Commission  
Attention: Mr. Boyce H. Grier, Director

July 31, 1979  
Page Four

For conservatism it was assumed that all Seismic Category I piping systems were in resonance with the building structures and peak accelerations of the building response spectra were applied as design accelerations to these systems. All piping systems and supports were then re-analyzed to these new and much higher loads. Many seismic supports were re-designed and modified late in the construction phase to meet these new criteria. This design re-evaluation is now known as the "Robinson Fix".

When our test program at Vermont Yankee began to identify anchor bolt failures we did a resonance evaluation of all Seismic Category I piping systems in the plant to assure ourselves that the design conservatisms afforded by the "Robinson Fix" are applicable to Vermont Yankee piping systems.

This evaluation showed that except for two piping runs (from fixed anchor to fixed anchor) in Residual Heat Removal, two runs in High Pressure Coolant Injection, one run in Reactor Core Coolant Injection and one run close to resonance in the Service Water System, all other seismic piping in the plant is well above building resonant frequencies.

Therefore, since the seismic supports were designed to support piping systems in resonance with building structures, but in reality most of the piping systems vibrate at frequencies well above building resonances; then the design factors applied by the seismic re-evaluation (Robinson Fix) amount to factors of safety for those systems not in resonance. These factors range from 3.44 at the lowest building elevation to 20.04 for the highest building levels. The runs (anchor point to anchor point)

340

United States Nuclear Regulatory Commission  
Attention: Mr. Boyce H. Grier, Director

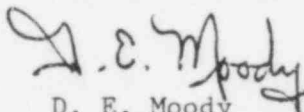
July 31, 1979  
Page Five

which have been identified to be in or close to resonance will have all expansion anchor bolts fully tested and qualified (passed all inspection criteria plus pre-tension) to 400% design load or replaced with approved anchor bolts providing equal factors of safety. This effort will be complete by mid-August 1979.

We trust that this explanation of our program, and our conclusions meet with your approval. If however, you require additional information on this subject, please contact us at your convenience.

Sincerely,

VERMONT YANKEE NUCLEAR POWER CORPORATION



D. E. Moody  
Manager of Operations

MMA/slw

773 347