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VICE-PRESIDENT  
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NUCLEAR SECTION  
R. H. LOGGIE  
OCT 25 1983  
Noted:  
October 25, 1983

Docket Nos. 50-352  
50-353

Mr. A. Schwencer, Chief  
Licensing Branch No. 2  
Division of Licensing  
U.S. Nuclear Regulatory Commission

Subject: Limerick Generating Station, Units 1 and 2  
NRC Environmental Qualification Branch (EQB)  
Request for Additional Information

References: 1) Meeting, March 4, 1983, NRC EQB et al and  
PECO Re: Equipment Qualification  
2) LGS Safety Evaluation Report (SER) NUREG 0991,  
August 1983

Enclosure: Low Frequency Content of SRV Loading

File: GOVT 1-1 (NRC)

Dear Mr. Schwencer:

We are pleased to provide, in the Enclosure to this letter, the information requested at the Reference 1) meeting and as discussed in the LGS Safety Evaluation Report (Reference 2) page 3-51 regarding low frequency content of SRV loading.

Should any additional information be required, please do not hesitate to contact us.

Very truly yours,

*John S. Kemper*

Enclosure  
Copy to: See Attached Service List.

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cc: Judge Lawrence Brenner	(w/o enclosure)
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ENCLOSURE

Subject: Low Frequency Content of LGS SRV Loading Discussed  
at March 4, 1983 PECO/NRC Meeting

- References:
- 1) LGS Safety Evaluation Report (SER) NUREG 0991, August, 1983
  - 2) LGS Design Assessment Report (DAR)
  - 3) Safety/Relief Valve Quencher Loads: Evaluation of BWR Mark II and III Containments - NUREG-0802

In response to Reference 1, page 3-51, NRC concern expressed "about the applicant's assertion that the Limerick SRV loadings have low frequency content, at around 6 to 10 Hz.", we offer the following:

The Limerick Safety Relief Valves discharge in the suppression pool through "T"-Quenchers. The "T"-Quencher design was developed in conjunction with Susquehanna Steam Electric Station (SSES) by Kraftwork Union (KWU). In addition to the design of the "T"-Quencher, KWU also developed the specification for SRV discharge load in the suppression pool. Discussion of LGS SRV Load Definition is found in the Design Assessment Report (Reference 2) Volume 3 Chapter 4, and the discussion of T-Quencher Verification Tests is found in Chapter 8. In addition, Reference 3 - NUREG-0802 provides acceptance criteria for hydrodynamic loads on piping, equipment, and structures resulting from SRV actuation. This NUREG recognizes and accepts the low frequency content of "T"-Quencher forcing function which is used in the Limerick design.

From a review of Power Spectral Density Functions shown in Reference 2 Volume 3 Figures 4.1-28 thru 33, it can be seen that the predominant frequency of the SRV forcing function is in the 6 to 10 Hz range. PSDs from the Karlstein Test shown in Reference 2 Figures 8.5-77-79 confirm the low frequency content of the SRV forcing function. PSDs from the KWU load specification and PSD comparisons from SRV tests in Reference 2, Figures 8.5-80-88 all show the predominant 8+ Hertz frequency.

Appendix A of Reference 2 Volume 2 lists and illustrates the containment mode shapes 1 thru 23, which cover a frequency range of 3.92 to 39.31 Hz. Containment response spectra from the KWU generated SRV design load being applied to the Structural Model are shown in Appendix A Figures A.2-1 thru 33. Several of these indicate "peaks" or significant response in the 6-10 Hz range; e.g., A.2-18, 19, 20, 21, 22, 23, 24, 25, 26, 27. Appendix B of Reference 2 Volume 2 contains the mode shapes, frequencies, and participation factors for the Reactor Building and Control Structure. Response Spectra for the Reactor Building and Control Structure, Figures B.2-1 thru B.2-58, indicate "peaks" in the 6 to 10 Hz range, most notably Figures B.2-33-43, 47-51.

It is recognized that high frequency content ( $>40$  Hz) exists as shown on various structure floor response spectra in Reference 2 Volume 2 Appendices A and B. These response spectra have been included in the load combinations used for equipment qualification and for assessing response of equipment due to SRV actuations over the life of the plant.