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B.3.2.1
WYR 80-127

December 5, 1980

U.S. Nuclear Regulatory Commission
Washington, DC 20555

Attention: Mr. Darrell G. Eisenhut, Director
Division of Licensing
Office of Nuclear Reactor Regulation

References:
(a) License No. DPR-3 (Docket 50-29)
(b) YAEC Letter to USNRC dated October 15, 1980, WYR 80-114
(c) Geology and Seismology, Yankee Rowe Nuclear Power Plant - Weston Geophysical Corporation, January 29, 1979
(d) Site Dependent Response Spectra, Yankee Rowe - Weston Geophysical Corporation, February 1980

Enclosures:
(A) Preliminary Probabilistic Risk Assessment for Yankee Nuclear Power Station
(B) Interim Seismic Design Basis for Yankee Nuclear Power Station
(C) Preliminary Structural Evaluation for Yankee Nuclear Power Station

Gentlemen:

This letter and its enclosures are provided to summarize the position of Yankee Atomic Electric Company with respect to continued operation of the Yankee plant while detailed seismic analyses are being performed and further structural modifications, if necessary, are made. This position is based on:

(1) A preliminary probabilistic risk assessment of the relative safety of the Yankee plant, compared to other operating plants [see Enclosure (A)].

(2) A detailed seismic evaluation of the Rowe site, based on real data recorded at sites with similar geological characteristics [see References (c) and (d)].

(3) A probabilistic analysis of the seismic hazard at Rowe [see Enclosure (B)].

(4) A structural evaluation of key systems and structures using an Interim Seismic Design Spectrum with median exceedance probability of 10^{-3} [see Enclosures (B) and (C)].

A brief summary of this material is given below.

PROBABILISTIC RISK ASSESSMENT

Recognizing that (1) the low power level, (2) conservative system design, and (3) extremely low population density near the Rowe site give Yankee major advantages over most other operating plants from the standpoint of public safety, we have undertaken a detailed Probabilistic Risk Assessment (PRA) for the Yankee plant. This program is expected to be completed in 1981.

In addition, to get an early indication of the relative safety of Yankee we have conducted a preliminary PRA using two different approaches:

(1) WASH-1400 methodology was used on the Yankee systems to calculate the probability of plant specific accident sequences leading to fission product release for comparison with WASH-1400.

(2) The second approach used was to assume WASH-1400 failure rates and release categories for all plants and compare only the reactor power level and the demographic characteristics of various sites from the standpoint of risk to the public.

The results of these studies are shown on the attached Figures L-1 and L-2. Clearly, the risk associated with operation of the Yankee plant is orders of magnitude less than exists at many other operating plants across the country.

In addition, a conservative analysis [Enclosure (A), page 17] indicates that the additional risk for two years of generation amounts to about 20% of the remaining lifetime risk of Yankee operation to 1997. If the 2 years additional operation are compared to the total lifetime risk of a new large plant as analyzed in WASH-1400, the additional risk of 2 years of Yankee operation is about 10% of the total new plant risk. This is well below the doubling of risk suggested as acceptable for a 3-year interim period by R. Mattson in his memo to D. Eisenhut on August 8, 1980.

SEISMIC EVALUATION

While Yankee is located in an area that is characterized by very infrequent earthquakes of low intensity (see Figure L-3), we are presently conducting a comprehensive seismic analysis of all key systems and structures in the plant, to be completed by December 31, 1981. This analysis will be performed for two different response spectra, in order to evaluate the sensitivity of systems and structures to the design basis chosen. One of these spectra can be the LLL/TERA spectrum (if NRC wishes), but we would not recommend that spectrum.

While this comprehensive seismic analysis is being done, an Interim Seismic Design Basis Spectrum was chosen for use in a preliminary seismic evaluation of key structures and systems (see Figures L-4 and L-5). This interim spectrum is consistent with Appendix A of 10CFR100, and is more conservative than site specific spectra that were developed for Rowe from real seismic data on sites with similar geological characteristics.

SEISMIC PROBABILITY ANALYSIS

A Seismic Probability Analysis has been performed for the Rowe site using the methods developed by Cornell and McGuire [See Enclosure (B)]. Having determined the probabilities associated with various peak ground accelerations by this method, the uniform hazard spectra shown on Figure L-4 were developed using NUREG/CR-0098.

This analysis shows that the Interim Design Basis Spectrum has a median exceedance probability of 10^{-3}. This is consistent with probabilities generally accepted for new nuclear plants with an expected life of 40 years. For an interim period of only the next two years (while seismic analysis and upgrade are underway) we could tolerate a probability 20 times higher, or once in 50 years, with no greater risk of the seismic event occurring; this is an additional factor in any interim evaluation, which should not be overlooked.

STRUCTURAL EVALUATION

Using this Interim Design Basis Spectrum, a structural evaluation has been performed on the following key systems and structures:

Main coolant system
Main coolant by-pass piping
Pressurizer surge line
Pressurizer safety valve inlet piping
Safety injection piping inside vapor container
Shutdown cooling piping inside vapor container
Main steam piping inside vapor container
Feedwater piping inside vapor container
Main steam piping outside vapor container
Feedwater piping outside vapor container
Vapor container
Concrete reactor support structure
Primary auxiliary building and pipe chase
Turbine building
Turbine pedestal

All these systems will withstand the interim design basis seismic event without failure.

In this analysis, credit was taken for two major structural modifications:

(1) Laterial supports installed on all four steam generators (this modification was completed in October).

(2) Collars and anchor bolts installed at the base of six containment support columns (this modification is underway and is expected to be completed before April 1981.)

The fact that only a few modifications are necessary is not surprising and bears out the statements made by H. Denton to E. Weiss, in a letter dated January 10, 1980, that power plant systems and structures possess inherent resistance to seismic events. This inherent resistance is often ignored.

CONCLUSION

Based on these studies, it is our position that the Yankee plant can continue to be operated safely and efficiently (as it has for the last 20 years) at least until detailed seismic analyses are completed and any needed modifications made. Indeed, our preliminary probabilistic studies indicate that the

- o low power level,
- o conservative design
- o stable geology, and
- o low population density

make operation of Yankee less of a risk to the public than many other operating nuclear plants across the country.

Very truly yours,

YANKEE ATOMIC ELECTRIC COMPANY

J. E. Tribble
President

Enclosures

FIGURE L-1

PRELIMINARY PROBABILISTIC RISK ASSESSMENT FOR EARLY FATALITIES
(PLANT SPECIFIC FAILURE RATES USED FOR YANKEE)

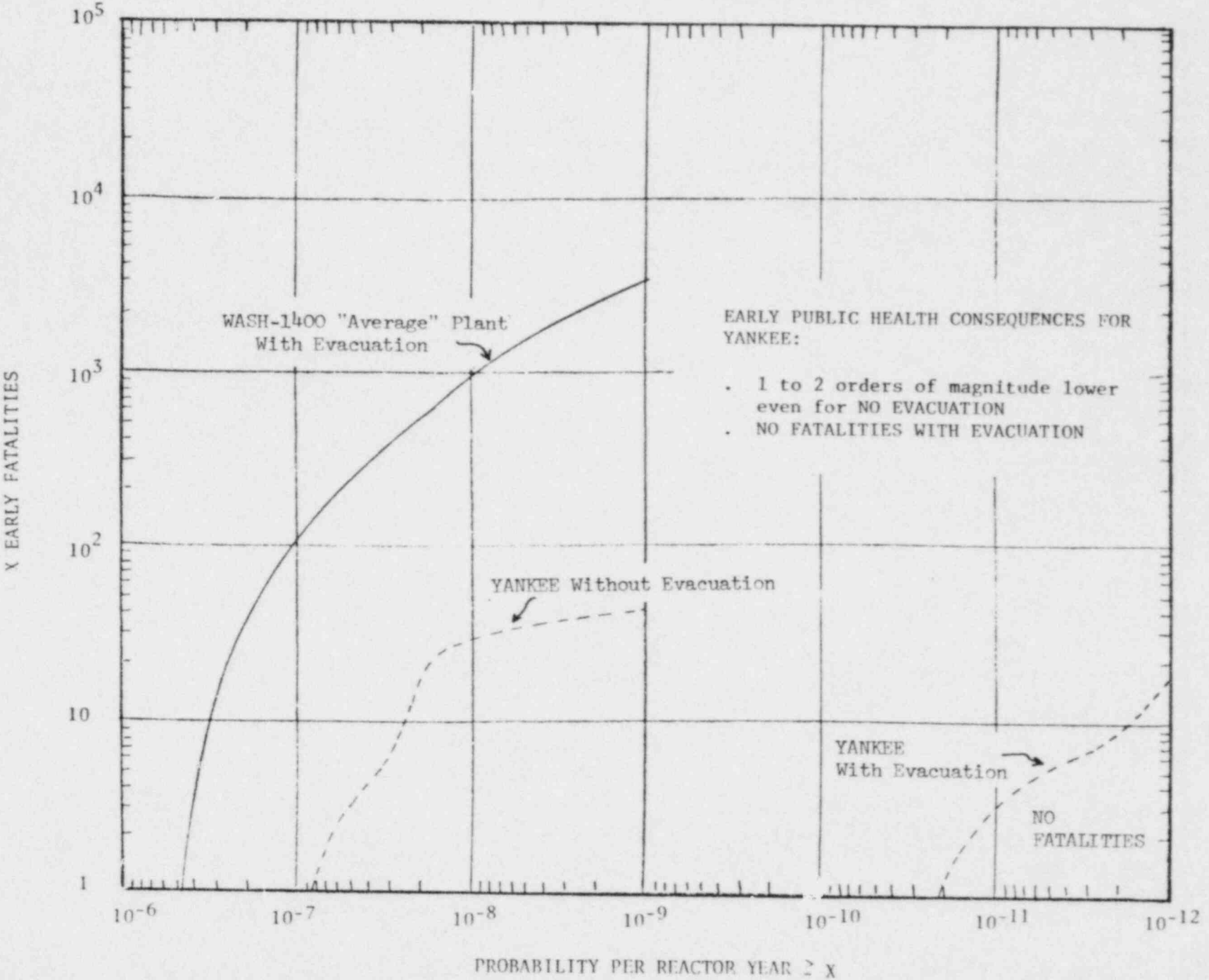


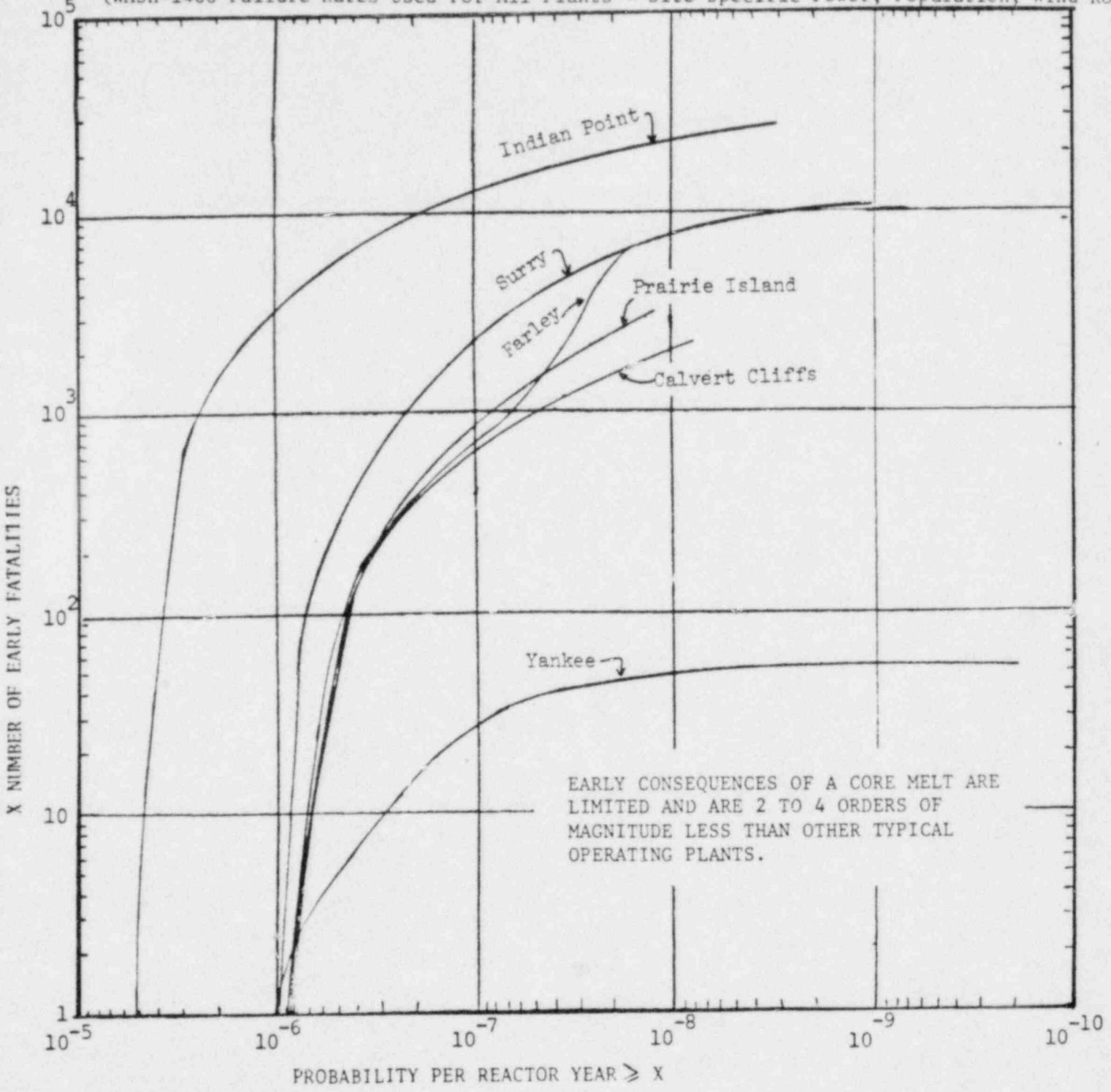
FIGURE L-2

PRELIMINARY PROBABILISTIC RISK ASSESSMENT

SITE COMPARISON

FOR EARLY FATALITIES

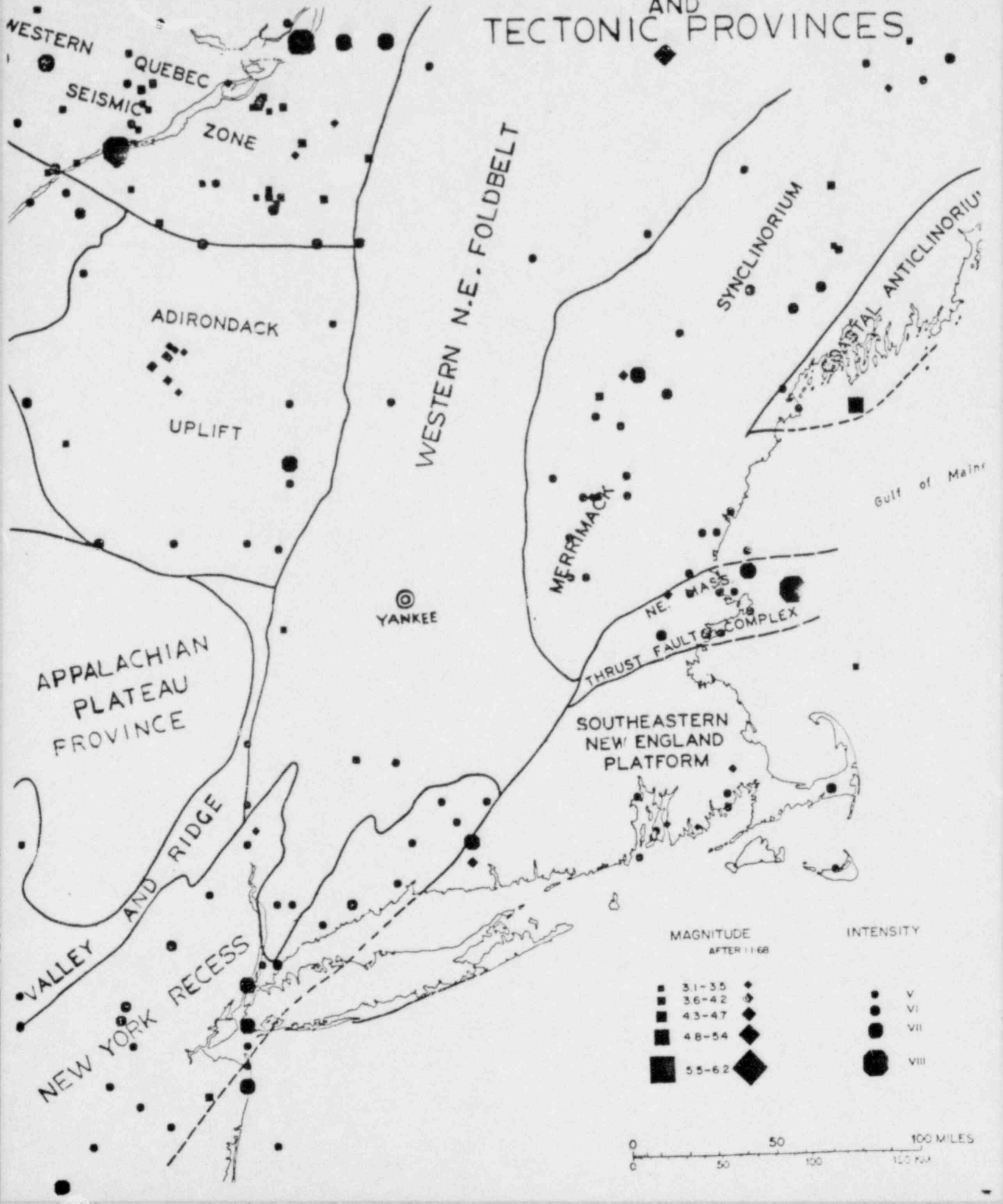
(WASH-1400 Failure Rates Used For All Plants - Site Specific Power, Population, Wind Rose

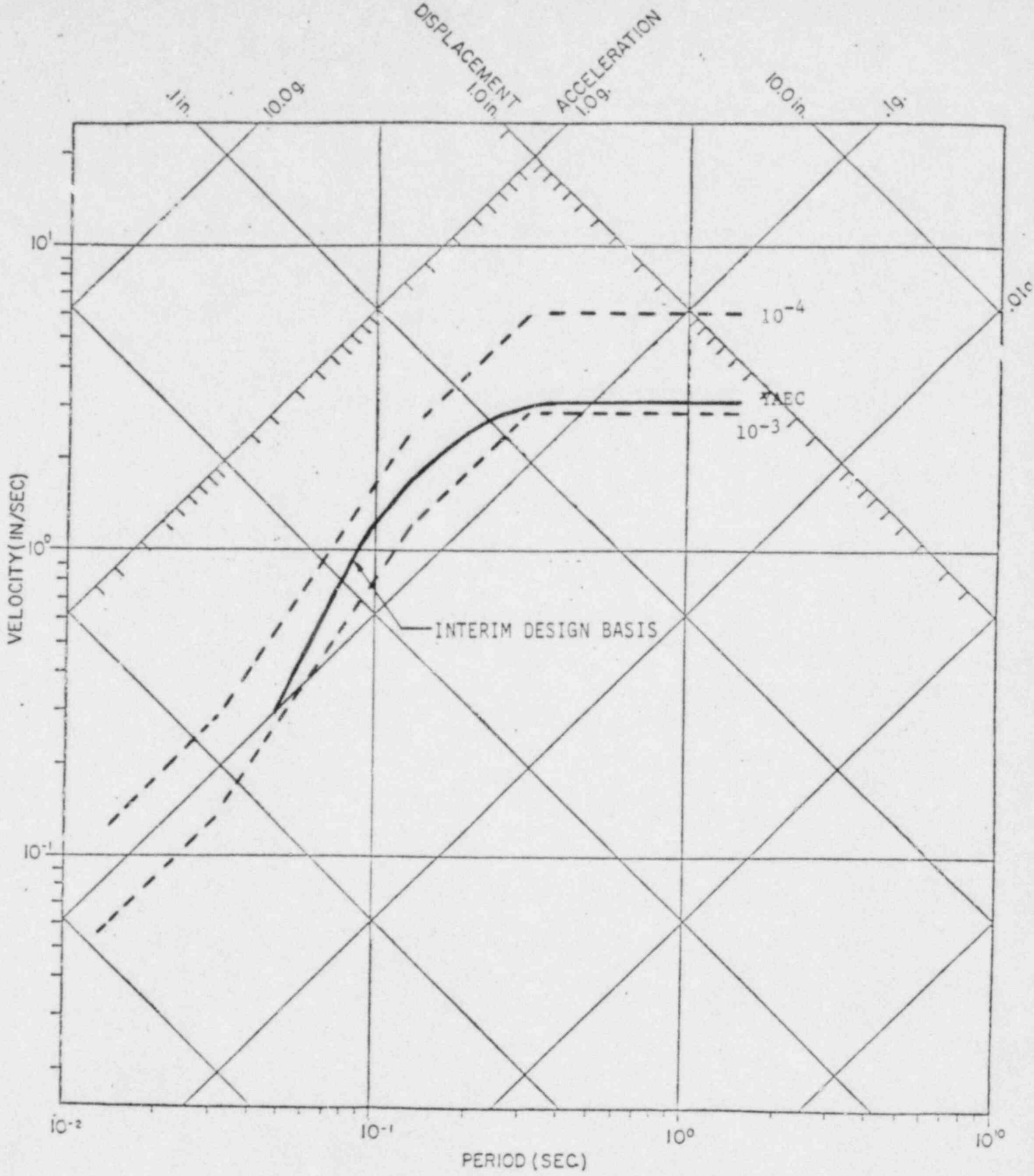


Note: Analysis based on site specific demograph, wind rose and power level.

FIGURE L-3

HISTORICAL EARTHQUAKES AND TECTONIC PROVINCES

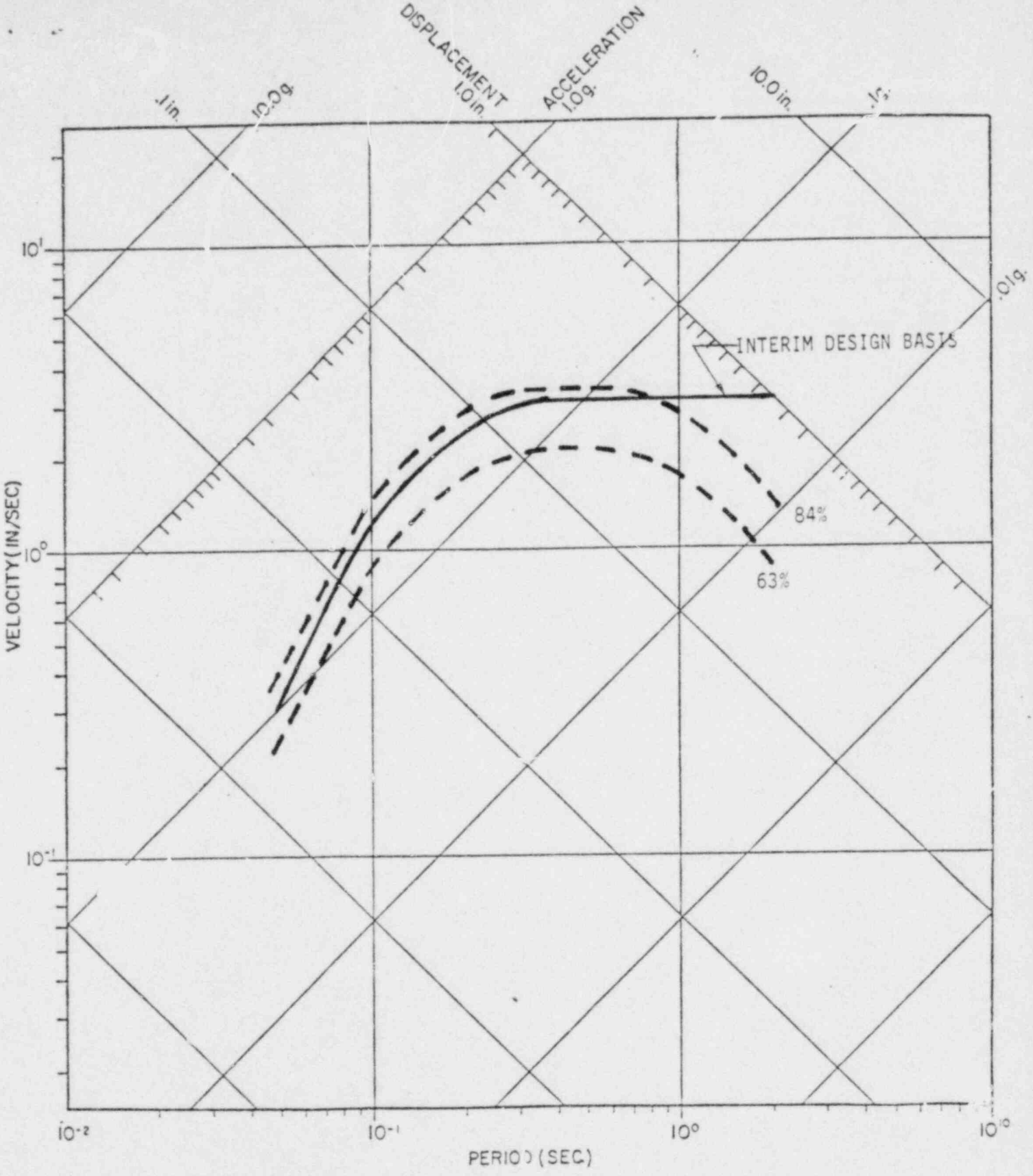




INTERIM DESIGN BASIS SPECTRUM AND
NUREG/CR 0098 MEDIAN UNIFORM HAZARD CURVES

(5% DAMPING)

FIGURE L-4



SITE SPECIFIC SPECTRA

(5% DAMPING)

FIGURE L-5