



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

MAR 17 1980

MEMORANDUM FOR: Robert E. Jackson, Chief  
Geosciences Branch, DSS

THRU: *Robert E. Jackson for*  
Leon Reiter, Leader  
Geology and Seismology Section  
Geosciences Branch, DSS

FROM: Sandra L. Wastler, Geologist  
Geology and Seismology Section  
Geosciences Branch, DSS

SUBJECT: SEISMOLOGICAL INPUT PARAMETERS FOR USE IN ARMY CORPS  
OF ENGINEERS (COE) GEOTECHNICAL REVIEW OF MIDLAND 1  
AND 2

The studies to evaluate the soil liquefaction and stability of the Midland site, under dynamic loading, should be conducted using values of peak horizontal acceleration in the range of 0.12g to 0.19 g at the ground surface. The lower limit of this range is the present design value for the Midland site (Midland, PSAR). The upper limit is based on past staff analysis for some sites in the Central Stability Region whereby the MM Intensity VII-VIII Anna, Ohio earthquake is used to develop the seismic design for the Midland site (e.g. Erie SER). When site specific spectra are not used the current staff positions would be to utilize the Trifunac and Brady empirical intensity acceleration relationship resulting in a peak acceleration of .19g for MMI VII-VIII. The actual acceleration to be used for this site is still under consideration but is bracketed by these values.

The range of epicentral intensities of interest is approximately equivalent to a magnitude range of 5.0 to 5.5 (Nuttli and Herrmann, 1978). The enclosure is a list of strong motion records which respond to the above magnitude range, epicentral distance and site conditions which are appropriate for use as time history input for this study. These time histories were selected to cover the magnitude and distance ranges believed to be needed for this study. They were recorded at locations with subsurface conditions similar to those at the Midland site.

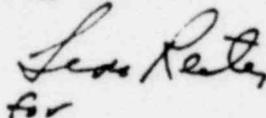
8003280 189

MAR 17 1980

R. E. Jackson

- 2 -

Amplification of the vibratory ground motion because of specific soil foundation conditions unique to the Midland site should be investigated. One method would be to follow the suggestions of NUREG 75/072 (Shannon and Wilson, Inc. and Agbabian Associates, 1975). Other procedures may also be used to evaluate site amplification where the results may serve as future input into the final determination of the seismic criteria to be established by the NRC Seismology Section staff.



Sandra L. Wastler, Geologist  
Geology and Seismology Section  
Geosciences Branch  
Division of Systems Safety

Enclosure:  
As stated

cc: w/enclosure  
L. Reiter  
T. Cardone  
R. McMullen  
R. Rothman  
P. Sobel  
J. Greeves  
J. Kane  
S. Wastler  
L. Heller

## +EARTHQUAKE

LOCATION	DATE	MAG	Distance KM	Recording Site	Reference Information
San Francisco, CA	3/22/57	5.3	15	Alexander Building, SF	Cal Tech A014
San Francisco, CA	3/22/57	5.3	17	State Building, San Francisco	Cal Tech A016
San Francisco, CA	3/22/57	5.3	17	Southern Pacific Building, SF	Cal Tech A013
Northern, CA	9/4/62	5.0	19	Eureka Federal Building	Cal Tech V330
Northern, CA	3/9/49	5.3	29	Hollister Public Library	Cal Tech U301
Central CA	1/19/60	5.0	8.5	Hollister Public Library	Cal Tech U307
Lytle Creek CA	9/12/70	5.4	13	Wrightwood, CA	Cal Tech U334
Southern CA	3/18/57	4.7	5.4	Pt. Hueneme Naval Res. Lab	Cal Tech 329
Southern CA	9/12/70	5.4	22	Cedar Springs Dam	Cal Tech W336
Friuli, Italy	5/11/76	5.3	12	Majano	Basilini et al 1977
Friuli, Italy	5/15/76	5.0	14	Forgaria-Cornino	Basilini et al 1977

MIDLAND PLANT - UNITS 1 and 2  
 CONSUMERS POWER COMPANY  
 DOCKET NOS. 50-329/330  
 GEOTECHNICAL ENGINEERING REVIEW CONSIDERATIONS  
 PREPARED BY: Joseph Kane, DSS, GB, GES

The following guidance covers only the geotechnical engineering review considerations related to seismic design.

1. In general, the major objective of the COE review should be to provide assurance that conservative dynamic soil and rock properties have been adopted in acceptable methods of analysis and whose results reflect a reasonable margin of safety. Geotechnical engineering review responsibilities include evaluation of the input, assumptions, method of analysis and the results of studies on slope stability, bearing capacity, settlement, lateral earth pressure and liquefaction. In addition, the adequacy of proposed soil layering characteristics and properties that are required in soil-structure interaction analysis should be evaluated. Variation of dynamic properties (e.g. shear modulus) from selected best estimates should be evaluated as suggested in Standard Review Plan, Section 2.5.2
2. Examples of strong motion records that are considered by the NRC staff to be appropriate for use as time histories in a site specific design approach for Midland include:

<u>Location</u>	<u>Date</u>	<u>Magnitude</u>	<u>Distance</u>	<u>Recording Site</u>
San Francisco	3/22/57	5.3	15	Alexander Building, SF
San Francisco	3/22/57	5.3	17	State Building, SF
Northern, Calif.	3/9/49	5.3	29	Hollister Public Library
Ferndale, Calif.	10/3/41	—	29	Ferndale City Hall

We anticipate that Consumers Power Company will consider many other records in addition to the above but have offered these time histories to the COE for guidance in completing their independent check computations and evaluation of stability against liquefaction. The factors which we considered in the selection of the above earthquake records included:

- a. Comparable magnitude earthquakes at comparable epicentral distances.
- b. Records of strong motion that would produce a broad response spectra over a wide frequency range.
- c. Comparable foundation conditions (e.g. depth to bedrock, soil types, etc.) and similar shear wave velocity profiles.