

OCT 14 1980

Docket Nos.: 50-329/330 CM, OL

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Mr. J. W. Cook
Vice President
Consumers Power Company
1945 West Parnall Road
Jackson, Michigan 49201

Dear Mr. Cook:

SUBJECT: SEISMOLOGICAL INPUT FOR THE MIDLAND SITE

One of the open items associated with our radiological safety review of your application for operating licenses for Midland Plant, Units 1 and 2, and identified in our letter of March 30, 1979, is the establishment of acceptable seismological input parameters. Resolution of this open item is also necessary for approval of the remedial actions associated with the soils settlement matter which was the subject of the December 6, 1979 Order on Modification of Construction Permits.

As noted in your response to our previous requests 361.2, 361.4, 361.5 and 361.7, you consider the Michigan Basin to be a distinct tectonic province for the purpose of evaluating site seismic design input, whereas during the Midland OL review, the staff has found insufficient support that the Central Stable Region can be subdivided into separate tectonic provinces. Your approach using historic seismicity in the Michigan Basin resulted in a Safe Shutdown Earthquake (SSE) characterized by Modified Mercalli Intensity (MMI) of VI, and a Modified Housner response spectra anchored at 0.12g. Discussed below is the staff's current view as to two acceptable approaches, either of which specifies the controlling earthquake from the Central Stable Region and which also requires consideration of soil amplification.

The controlling earthquake we would currently require to be used in determining the SSE for the Midland site is similar to that which occurred in Anna, Ohio in March 1937, and has a body wave magnitude of 5.3 M_{BLg} , and a MMI of VII-VIII. Nuttli, (State-of-the-Art for Assessing Earthquake Hazards in the United States, Report 12, Credible Earthquakes for the Central U. S.: Misc. Paper S-73-1 U. S. Army Engineering Waterways Experiment Station, 1978) using an alternative method has also suggested this magnitude as the "Maximum" when using residual events (those remaining after seismic zones such as Anna, Wabash Valley, etc. are removed) for the Central United States. It is important to note that the July 29, 1980 Kentucky earthquake had a magnitude of 5.1-5.4 M_{BLg} and occurred in a "residual area".

The following alternatives of characterizing the SSE would be acceptable to the staff and are consistent with the staff's Standard Review Plan (SRP) Section 2.5.2:

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The Anna, Ohio earthquake of March 9, 1937 is the largest historic earthquake in the Central Stable Region tectonic province. This earthquake had a MMI of VII-VIII and should be assumed to occur near the site (Appendix A to 10 CFR Part 100, SRP Section 2.5.2). Using this intensity one acceptable approach would be based upon the standardized response spectra of Regulatory Guide 1.60 anchored at 0.19g as determined by the trend of the means of the intensity acceleration values in Trifunac and Brady (Seismological Society of America Bull., V. 65, 1975).

An alternative method of describing the SSE and response spectra resulting from an "Anna" type earthquake assumed to occur near the site involves using the magnitude. As was indicated during the recent OL review on Sequoyah, magnitude may be a more realistic estimate of earthquake size than intensity. Therefore a description of the SSE can also be obtained by collecting representative real time histories for a magnitude of $5.3 \pm .5 M_{blg}$, epicentral distances less than 25 kilometers at soil sites. Such a collection has been made by Lawrence Livermore Laboratory (LLL, Draft, Seismic Hazard Analysis: Site Specific Response Spectra Results, August 23, 1979) but it would be beneficial if you update this data set as appropriate. It is the staff's position that the representation appropriate for use in establishing the SSE is the 84th percentile of the response spectra as derived directly from the real time histories.

The input for the comparative analysis of your present response spectra (Modified Housner) and Regulatory Guide 1.60 both anchored at 0.12g was at the foundation level. It is our conclusion that the appropriate location for vibratory ground motion input for your Midland site be at the top of the natural glacial till (essentially the original regional ground surface). Above this till is a thin sand layer which is highly variable in density and the compacted fill that was placed to raise plant grade. Therefore either of our above acceptable approaches will also require an assessment of soil amplification from the till surface.

We are available to meet with you at your earliest opportunity to discuss the above approach in order that acceptable data and methods of describing vibratory ground motion can be utilized for the Midland site.

Contact our project manager, Darl Hood, if you wish to arrange such a meeting or desire clarification of this letter.

Sincerely,

/s/

Robert L. Tedesco
Assistant Director for Licensing
Division of Licensing

cc: See next page

*See previous yellow

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