UNITED STATES GOVERNMENT

Memorandum

TO : The Files

DATE: FEB 24 1967

THRU: Roger S. Boyd, Chief, Research & Power Reactor Safety Branch, Division of Reactor Licensing

FROM : B. Grimes, Research & Power Reactor Safety Branch, Division of Reactor Licensing

SUBJECT: GEOLOGY AND SEISMOLOGY OF MONTICELLO, MINNESOTA (NSP), DOCKET NO. 50-263 AND OCONEE (DUKE), DOCKET NOS. 50-269 AND 50-270, SITES

On February 16, 1967, a meeting was held in the Bethesda offices between the staff and Mr. Colter of the USGS and Mr. Murphy of the USC&GS. Dr. Newmark was also consulted by speaker-phone during the course of the meeting. Members of the staff present were J. Newell, S. Levine, P. Check, L. Kintner, P. Norian and B. Grimes.

Sites considered were Monticello, Oconee, Vermont Yankee and Point Beach. A description of the consultants' comments were transmitted respectively to Mr. R. Jensen of NSP and Mr. W. Lee by telephone on February 17, 1967. It was decided that a meeting should be held in the near future with our consultants and the NSP consultants present to discuss the Monticello site.

A. Monticello, Minnesota

Our consultant, Mr. Colter, of the USGS, was concerned that the properties of the foundation materials may not be satisfactory. After reviewing the extensive material submitted in draft form (including boring logs and letters from Dames and Moore to NSP), he expressed his opinion that the bearing capacity of the soil might be non-uniform due to the variation of layers and pockets of materials under the buildings. He was particularly concerned that an earthquake might produce a different settlement at different points and cause a tilt of the building. He recommends putting caissons to the bedrock (about 30 feet lower).

Another concern of Mr. Colter was that during high water the river bed would be scoured to a level lower than the bottom of the reactor building (and certainly less than the turbine building) and forces imposed in a lateral direction might cause major earth movements toward the river.

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His third area of concern was that one anchor from the stack was shown located on the edge of the river and would be subject to undercutting. (On the basis of my conversation with Mr. Violette of GE on February 17, however, it appears that this is no longer a problem since the stack has been moved a few hundred feet inland from the reactor building. The indication on the drawings probably dated from the time that they were considering a light-weight steel stack.)

Mr. Murphy of the USC&GS indicated that if the mat foundation was on compacted soil, the .06g design and .12g maximum accelerations proposed by the applicant would be acceptable. These values would have to be raised, however, for a watery soil condition. Dr. Newmark wants a .15g maximum earthquake acceleration because of the watery soil even if the soil properties directly under the reactor building are good. (The horizontal component would still be amplified at the surface.)

Dr. Newmark also has problems with the damping factors and response spectrum and he indicated that detailed comments were to be put in the mail February 17. He stated that the accelerations indicated are low below about 4 cycles/sec on the response curve.

B. Oconee, S.C. (Duke Power)

Although the containment building is to be located on bedrock, Mr. Colter had some general comments on the use of weathered bedrock for fill. Since the bedrock fill would not be stable when used on a steep slope, he recommended that (1) no critical structures should cross a cut fill interface and (2) no fill slopes should be located where they could slide upon a critical structure. (On the basis of a telephone conversation with Mr. Lee of Duke Power on February 17, neither of these comments will affect present plans. Mr. Lee stated that the bedrock fill would be used in dam construction and less valuable fill for the switchyard.)

Mr. Murphy stated that since the epicenters are not well located with respect to geologic features, seismic events are equally likely at all points in the area and that an earthquake should therefore be assumed near the site. He found the proposed design value of .05g on bedrock acceptable. On

the basis of discussions with Dr. Newmark, it was agreed that the maximum potential intensity should be 0.1g on bedrock. Murphy felt that the ground acceleration on overburden (fill and dams) should be between .12g and .15g. Since Newmark favored the higher value, the .15g was picked.

Dr. Newmark indicated that a more extensive analysis would be required on the dams and requested an analysis "similar to that performed on H. B. Robinson." He commented that the philosophy used in determining the response spectrum was not consistent over the entire frequency range and that horizontal and vertical seismic loads should be applied simultaneously. The tornado design wind speed of 225 mph appears to be low.

I transmitted Dr. Newmark's detailed comments, which were included in his letter to Case dated February 14, to Mr. Lee on February 17. Mr. Lee suggested that the matter of dam design might be best handled in a meeting with our consultants and his consultants. I agreed that this would be an efficient way to handle problems in this area.

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