

FROM: U. S. Dept. of the Interior
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 Washington, D. C. (

DATE OF DOCUMENT: 6/19/67
 DATE RECEIVED: 6/20/67
 LTR. MEMO: REPORT: OTHER:

TO: Harold Price
 ORIG.: 1 CC: 1 OTHER: 9 cys. reproduced
 ACTION NECESSARY CONCURRENCE DATE ANSWERED:
 NO ACTION NECESSARY COMMENT BY:

CLASSIF.: U POST OFFICE REG. NO:
 FILE CODE: DOCKET: 50-269, 270 & -287

DESCRIPTION: (Must Be Unclassified)
 Ltr. trans. the following in response to Case's 12-21-66 request:

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 Geology and Hydrology Aspects of the license appl. of the Duke Power & Light Company Oconee Nuclear Station

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UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON, D.C. 20242

JUN 19 1967

Mr. Harold L. Price
Director of Regulations
U. S. Atomic Energy Commission
4915 St. Elmo Avenue
Bethesda, Maryland 20545

Dear Mr. Price:

Transmitted herewith in response to the request of Edson G. Case, dated December 21, 1966, is a review of the geologic and hydrologic aspects of the license application of the Duke Power and Light Company Oconee Nuclear Station.

This review prepared by Henry W. Coulter and Eric L. Meyer of the U. S. Geological Survey has been discussed with members of your staff and we have no objections to your making it a part of the public record.

Sincerely yours,

Director

Enclosure

Oconee Nuclear Station, Duke Power Company
Units 1, 2, and 3
Oconee County, South Carolina
AEC Dockets 50-269, 50-270

HYDROLOGY

This review is based on information provided by the applicant in the Preliminary Safety Analysis Report and Supplements 1 through 4.

The proposed plant is approximately half a mile west of the Keowee River at an altitude of 794 feet above mean sea level (msl), and 129 feet above the flood pool elevation of the Hartwell Reservoir, ponded by a dam about 35 miles downstream from the site. Cooling water for the nuclear plant will be taken from Keowee Reservoir to be ponded by Keowee Dam (proposed) on the Keowee River and another dam on the Little River. This pool will cover the drainage divide between the two streams at one point upstream from the plant site; normal pool level is 800 feet msl. The low point of the ridge that separates Keowee Reservoir and the site is shown on topographic maps to be between 820 to 827 feet msl. The surcharge on the reservoir due to a maximum probable flood on Keowee River is given as 808 feet msl. Flooding of the site either by topping the ridge or by a rise of the river below Keowee Dam does not appear to be possible.

Liquid radioactive wastes from the reactor are to be discharged into the tailrace of the proposed Keowee Dam hydro-power units. Concentrations of waste radionuclides are computed in section 11 of the Preliminary Safety Analysis Report assuming dilution by the average discharge past Keowee dam. In determining the radioactive effluent limits set by 10 CFR 20, credit for this dilution should be allowed only if complete mixing of the wastes and river water occurs prior to entry of the combined discharge into unrestricted areas. Consideration should also be given to avoiding radioactive waste releases during periods when flow is low, as it would be when the hydro-power units are not in use.

GEOLOGY

The applicants geologic analysis of the Oconee Nuclear Station site presented in the Atomic Energy Commission Docket (50-269-270) was examined and compared with the available literature.

Because little is known concerning geological details of structural elements within the piedmont crystalline zone and most epicentral locations there are inexact, attempts to relate individual seismic events to specific structures within the zone cannot be made with any great degree of confidence. Hence it must be assumed that an earthquake equal in intensity to the largest earthquake that has been recorded anywhere throughout the zone may occur at any given locality within the zone.

In general, when dealing with weathered crystalline rocks throughout the Piedmont Province the following considerations apply. Where the interlocking texture of the saprolite is undisturbed it will stand in steep slopes in cut faces and will support considerable loads. However, when saprolite is reworked and used as fill it may be subject to failure even in moderate slopes. Thus any saprolite fill should be so located as to avoid the possibility of impingement on critical structures in the event of slope failure and the location of structures across a saprolite cut-fill interface should be avoided.

Boring data indicate that adequate foundation conditions on firm bedrock beneath the plant site should be encountered at anticipated elevations. Because of the irregularity of the weathered zone, the requirement for detailed modifications of footing design as is usual in standard engineering practice to ensure bearing on sound rock at all localities may be anticipated.

The applicants responses to questions 12.1 and 12.2 contained in amendment #4 to Docket Nos. 50-269, 50-270, and 50-287 indicate that foundation investigations and stability analyses comparable to those undertaken for other critical plant components have been, or will be, undertaken for the dams and intake structures necessary to provide cooling water supply to the plant.