FROM: Washington, D. C.

DATE OF DOCUMENT: 2-12-67

DATE RECEIVED: 2-13-67

NO.: 1928

LTR. x MEMO: REPORT: OTHER

TO: H. Price

ORIG.: 1 CC: 1 OTHER: 6 cys. reproduced

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FILE CODE: DOCKET: 50-261 (SUPPL. ONLY)

DESCRIPTION: (Must Be Unclassified)

Ltr. trans. the following; and advising that they have no objections to our making it a part of the public record:

ENCLOSURES: (1 cy. rec'd)

Review (three-page) of the geologic and hydrologic aspects of the license appl. for CP&L.....

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U. S. ATOMIC ENERGY COMMISSION **MAIL CONTROL FORM** FORM AEC-326S. (8-60)

☆ U. S. GOVERNMENT PRINTING OFFICE: 1966—235-519

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

FEB 10 1967

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

Dear Mr. Price:

Transmitted herewith in response to the request of Mr. Edson G. Case, dated August 1, 1966, is a review of the geologic and hydrologic aspects of the license application of the Carolina Power and Light Company, H. B. Robinson Unit No. 2 nuclear power station site.

This review prepared by Henry W. Coulter and Eric L. Meyer of the 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,

Arthur A. Baker

Acting Director

Enclosure

Carolina Power and Light Company
H. B. Robinson Unit No. 2

The site is in Darlington County, South Carolina, on the shore of Lake Robinson, an impoundment of Black Creek about 37 miles upstream from its confluence with the Pee Dee River. Hydrologic questions at this site concern primarily the recycling of the flow of Black Creek, whose average annual flow is less than 20 percent of the coolant flow needs of the nuclear power plant alone.

Geology

The analysis of the geology of the H. B. Robinson Unit No. 2 site presented in Atomic Energy Commission Docket 50-261, was reviewed and compared with the available geological literature.

Although it may be anticipated that earthquakes within the general region will continue to occur with approximately the same frequency and with approximately the same intensity with which they have been recorded during the past 100 years, there are no identifiable geologic structures which could be expected to localize earthquakes in the immediate vicinity of the site. The fact that foundation support of the plant is to be on saturated, relatively incompetent, Coastal Plain sediments rather than on competent bedrock suggests the possibility of some degree of seismic amplification.

Detailed correlation of laboratory test data with stratigraphic units as determined from individual bore holes will be required as a necessary basis for final computation of the support capability and proper engineering design of the pile foundations for the plant.

Hydrology

Water Stages

The Safety Analysis Report shows a calculated flood of 39,000 cfs (cubic feet per second) based on probable maximum precipitation for the area. The unit hydrograph on which the calculation is based is not shown, therefore, the computation cannot be checked, but the figure appears to be reasonably conservative in relation to known floods in the region.

The spillways at Lake Robinson dam were designed to pass a flood of 40,000 cfs at a stage of 221.67 feet, or about 3.3 feet below the grade elevation of the plant. Failure of the tainter gates which operate the spillways could lead to higher stages, but it appears that any potential failures could be corrected during the approach of a flood prior to overtopping of the grade of the plant.

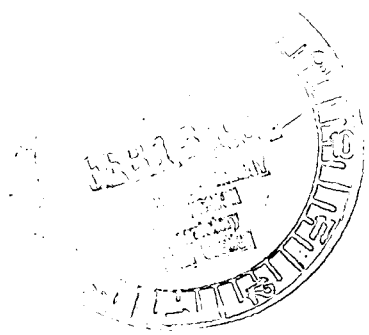
Low stage of Black Creek at the site prior to construction of Lake Robinson dam was between the 160 and 170 feet contours as shown in Fig. 2-7, of the Safety Analysis Report. The cooling water intake for the steam condenser is at about 210 feet.

Recycling of water

The flow of Black Creek is small in comparison to the condenser cooling water requirements of a large electric power plant, and a dam creating Lake Robinson was constructed to permit recirculation of stored water. The capacity of the lake is given as 1.35 billion cubic feet representing approximately a 10-day supply for the nuclear plant at 1,100 cfs. Average flow of Black Creek is conservatively estimated at 169 cfs, and minimum monthly flow at 21 cfs. Records of nearby stream flow indicate that average annual flow is quite variable. For instance, during the drought in the southeastern United States that lasted from 1950 to 1957, the average annual flow of the Lynches River at Effingham was less than 60 percent of the long-term mean during 1951, 1955, 1956, and 1957. Seasonal minimum flows occur usually in the period July to October.

The average residence time of water in the lake has been calculated to be 37 days during a wet period, January through March 1964, and 70 days during a somewhat drier period from October through December 1963, when flow in Black Creek averaged 181 cfs. During dry summers average residence time would increase to over 100 days, as it did during the period July through October 1963, and since the lake holds a 10-day supply of cooling water for the reactor, water would then be recycled on the average of 10 times or more.

The Safety Analysis Report discusses accumulation of radionuclides in the lake as a result of recyclying and derives a formula for a maximum release rate of radionuclides for a given flow rate of Black Creek. The formula is mathematically correct. Figures of maximum permissible releases are intended to take dry periods into account, the figure given for cesium-137 could lead to concentrations higher than the limits set in 10 CFR 20 during extended drought periods. It may be necessary to reduce releases to take drought conditions into consideration.



Sorption of activity on particles is not considered in the Safety Analysis Report. Radionuclides sorbed by particles would probably settle out and accumulate in the lake. The rate of sorption would depend on various factors, such as the type and concentration of suspended sediments in the water, the composition of the lake bed and the discharge canal bed. The significance of the potential accumulation of sorbed radionuclides should be assessed and taken into consideration in setting release limits.

The recycling of water would also lead to a rise in water temperatures in Lake Robinson and would affect the inlet temperatures of the power plant's condenser cooling system. An estimate of this rise under severe conditions such as an extended summer drought should be made so that this factor can be taken into consideration in the design of the plant's condenser cooling system.

Black Creek is not used for public water supply downstream from the site. Five miles downstream the creek is again ponded by a dam in Hartsville where the water is used industrially. There may also be recreational uses in Hartsville.