FROM: U.S. Dept of Interior Geological Survey	DATE OF DOCUMENT: 8-4-70	DATE RECEIVED 8-6-70	NO.:
	LTR. X	MEMO:	REPORT: OTHER:
TO: H. L. Price	ORIG.: 1	CC: 1	OTHER:
	ACTION NECESSARY ☐ NO ACTION NECESSARY ☐	CONCURRENCE ☐ COMMENT ☐	DATE ANSWERED: BY:
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DESCRIPTION: (Must Be Unclassified)

Ltr trans the following re: our ltr dtd 8-20-69

(1 cy)

ENCLOSURES:

Comments on Geologic & Hydrologic aspects for Toledo Edison Co,(Davis-Besse.....

REFERRED TO	DATE	RECEIVED BY	DATE
P. Howe W/2 cys for action	8-6-70		
DISTRIBUTION			
Reg file cy			
OGC- Room P-506-A			
H. Price & Staff			
Morris/Schroeder			
Boyd			
DeYoung			
Case/McCrary			
H. Steele/Tedesco		Orig & 3 cys....Orig to be returned to room 016	

REMARKS:

FEL

U.S. ATOMIC ENERGY COMMISION

MAIL CONTROL FORM FORM AEC-326S (8-60)

☆ U. S. GOVERNMENT PRINTING OFFICE: 1969-364-594

The applicant proposes to found the major plant facilities on the Tymochtee Formation. Normally this dense, hard dolomite should provide a competent foundation for the proposed facilities. However, because solution cavities occur in the formation in the site area, the applicant has proposed to undertake an extensive program of rock exploration, inspection, and remedial treatment in the foundations underlying the major plant structures. The proposed program of exploration and the criteria for remedial treatment should be adequate to assure that no solution cavities of a detrimental size would underlie any of the major plant structures.

Hydrology

Based on studies of the long-term and annual water-level variations of the lake, wind tide, transverse seiche, and wind waves, the flood-protection level of the plant will be established above the plant grade of 584 feet above mean sea level (International Great Lakes Datum, 1955). The analyses of extreme high- and low-water levels of Lake Erie were not reviewed. Extreme flooding on the Toussaint River (drainage area about 143 square miles), which flows easterly past the southern plant boundary, should not exceed the plant grade. At near normal lake levels the flood waters would spread over extensive areas of low-lying marshlands surrounding the plant before topping the several-mile-long beach ridge separating the lake from the marshlands. The maximum elevation of this ridge is less than 580 feet above mean sea level. When lake levels are extremely high, flood waters of the Toussaint River would flow into the marshland areas which would have been inundated by backwater from the lake. It should be noted that during periods of extreme flooding on the Toussaint River or when lake levels are very high, the plant would be surrounded by water, thereby denying land access to the site.

In the site vicinity all known wells supplying potable water are drilled into the Paleozoic sedimentary rocks underlying the 12 to 30 feet of glacial till and glaciolacustrine deposits. The nearest municipal supply is at Genoa, 16 miles southwest of the site. There are no large ground-water supplies available in Ottawa County; large surface-water supplies are taken from Lake Erie (Youngquist, 1949). Based on data obtained from extensive field explorations, the applicant has determined that (1) the water table in the glacial deposits is approximately 1 to 2 feet above the lake level, the hydraulic gradient is about 2 feet per mile toward the lake, and the water table fluctuates with the lake level; (2) the ground water in the underlying sedimentary rocks is under artesian pressure and the piezometric surface at the site corresponds to the lake level and has a gradient of about 2 to 3 feet per mile toward the lake; (3) the coefficient of permeability of the sedimentary rocks, as determined from pumping tests, ranged from 2×10^{-2} to 6×10^{-2} centimeters per second (coefficient of transmissibility, 1×10^{4} to 2×10^{4} gallons per day per foot). The coefficient of permeability of the glacial deposits has been estimated to be less than 10^{-6} centimeters per second. In view of the impervious nature of the glacial deposits and the flat slopes of the water table and piezometric surface, both of which are toward the lake, the applicant concludes that the risk of contamination of the ground-water supplies from the accidental spillage of radioactive liquids on the land surface or by infiltration to the ground is small. Unless the gradient of the piezometric surface were to be reversed as a result of large future

ground-water withdrawals from the artesian aquifer, this conclusion appears to be reasonable.

The nearest potable water-supply intakes in Lake Erie are at Camp Perry and the Erie Industrial Park 3 miles east of the site. Port Clinton, 8 miles east, and Toledo and Oregon, 13 miles west, also utilize Lake Erie water for municipal supplies. The applicant states that radioactive liquid wastes will be released operationally with the circulating-water discharge in concentrations much less than the maximum permissible concentrations specified in 10 CFR 20. The applicant has made an analysis of the concentration of radioactivity which may be expected at the nearest water-supply intakes resulting from the rupture of the primary water storage tank with ensuing direct runoff to the lake, assuming no circulating-water discharge. Based on a theoretical mathematical model of a continuous point-source release, supported by Rhodamine B dye-dilution studies and observations of lake currents, the resulting short-term concentration of tritium at the intakes would be approximately 6.5 times as great as the average yearly maximum permissible concentrations specified in 10 CFR 20.

Because of the uncertainties regarding the photochemical decay of Rhodamine B dye and the absence of the warm-water discharge plume in the dye dilution tests and the model study, the results of the dilution study would not be directly applicable to operating conditions with a circulating-water discharge. Any estimates of dilution for such operating conditions should consider varying lake currents and the actual warm-water discharge of the plant.

Reference

Youngquist, C. V., 1949, Water in Ohio, summary and prospects 1949; Ohio Dept. Public Works, Water Resources Board Bull. 20.

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

AUG - 4 1970

Mr. Harold Price
Director of Regulation
U.S. Atomic Energy Commission
7920 Norfolk Avenue
Bethesda, Maryland 20545

Dear Mr. Price:

Transmitted herewith in response to a request by Mr. Roger S. Boyd, is a review of the geologic and hydrologic aspects of the Davis-Besse Nuclear Power Station - AEC Docket No. 50-346 - proposed by the Toledo Edison Company and the Cleveland Electric Illuminating Company.

This review was prepared by H. H. Waldron and P. J. Carpenter and has been discussed with members of your staff. We have no objections to your making this review a part of the public record.

Sincerely yours,

Acting Director

Enclosure

cc: Walter G. Belter, AEC

2474

The Toledo Edison Company and the Cleveland Electric Illuminating Company
Davis-Besse Nuclear Power Station

AEC Docket No. 50-346

The planned location of the Davis-Besse Nuclear Power Station is on the southwestern shore of Lake Erie, Ottawa County, Ohio. It is approximately 6 miles northeast of Oak Harbor, 9 miles northwest of Port Clinton and 21 miles east of Toledo. The ultimate output of the pressurized-water reactor is given as 2,772 megawatts thermal or 906 megawatts electrical. Water for once-through condenser cooling will be taken from and discharged to Lake Erie via canals approximately 7,000 feet in length.

Based on a review of the "Preliminary Safety Analysis Report" and "Amendments" and an independent check of available data and literature, it appears that the analyses of those hydrologic conditions noted below, and the geologic and foundation conditions pertinent to the site safety evaluation are adequate. Geologic conditions at the site were inspected on May 26, 1970.

Geology

The site is located in the Great Lakes section of the Central Lowland physiographic province. In the station area about 12 to 30 feet of Pleistocene and Holocene deposits, chiefly till and glaciolacustrine silty clay, overlie more than 2,500 feet of nearly flat-lying Paleozoic sedimentary rocks which, in turn, overlie a Precambrian crystalline basement complex.

Bedrock strata immediately underlying the site are reported to be part of the Bass Islands Group of Late Silurian age--about 80 feet of the Tymochtee Formation and more than 130 feet of the underlying Greenfield Formation. Both formations consist of thin-bedded to massive dolomite interbedded with some shale and limestone. The dolomitic strata commonly are hard, contain varying amounts of gypsum and anhydrite, and locally tend to be vuggy and cavernous. Salt beds have not been reported in any of the Upper Silurian evaporite formations in this part of Ohio.

Tectonically the site is situated on the east flank of the Findlay Arch, an ancient, broad, regional, northeast-trending anticlinal structure that separates two deep basins, the Michigan Basin on the northwest and the Appalachian Basin on the southeast. The trace of the axis of the Findlay Arch is inferred to be about 15 miles west of the site. With the exception of this arch, there are no other major geologic structures or faults known in the area that could be expected to localize seismicity in the immediate vicinity of the site. Despite the apparent geologic antiquity of the Findlay Arch, epicenters of several historic earthquakes appear to be associated with the Arch farther south. Consequently, it is assumed that earthquakes with similar intensities also could occur at any point along this major structure, including the vicinity of the site.