UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
GEORGIA POWER COMPANY, et al.	)	Docket Nos. 50-424 (OL)
	)	50-425 (OL)
(Vogtle Electric Generating Plant, Units 1 and 2)	)	
	)	

AFFIDAVIT OF WALTER R. FERRIS

County of San Francisco)
) ss.
State of California)

I, Walter R. Ferris, being duly sworn according to law, depose and say as follows:

1. My name is Walter R. Ferris. I am a civil engineer and a consultant to Bechtel Civil and Minerals, Inc. on geotechnical matters. My address is 106 Paseo Way, Greenbrae, California 94904. A summary of my professional qualifications and experience is attached hereto as Exhibit A.

2. The purpose of this affidavit is to support Applicants' Motion for Summary Disposition of Joint Intervenors'

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Contention 7. The affidavit addresses Joint Intervenors' allegation that settlement of the Vogtle facility may fracture the marl, thereby defeating the effectiveness of the marl as an aquiclude. I have personal knowledge of the matters set forth herein and believe them to be true and correct.

3. The foundation properties, including shear strength and soil modulus of elasticity, of strata beneath the plant site (the marl and underlying sands) were initially determined during site exploration in 1971 and are discussed in the PSAR at Appendix 2C and in the FSAR at section 2.5.4.2. The bearing capacity of the marl stratum was determined, and the plant was designed such that the marl will not fail under static or dynamic conditions. See FSAR, §§ 2.5.4.8 - 2.5.4.10. The extent and effect of settlement were analyzed.

4. Site excavation commenced in 1974, and following a suspension of the activity, was completed in 1977. During excavation, the marl heave (the rebound of the marl resulting from the removal of overburden during excavation) was monitored. It is plotted in the FSAR in Figure 2.5.4-10. Approximately 1,000,000 square feet of the exposed marl was mapped and revealed no indication of voids or significant fractures or joints. In August, 1977, after excavation was complete, an additional program of drilling and sampling the marl was

conducted. The results of this program verified the design strength of the marl material and its lack of open joints or fractures. The program also demonstrated that the properties of the marl were unaffected by foundation heave.

5. Applicants then initiated and conducted a settlement monitoring program, described in the FSAR at § 2.5.4.13.2. The compacted backfill is slightly heavier than the excavated materials, and it is the backfill rather than the structures that returned most of the overburden to the marl. This weight is distributed over a broad area. Backfilling is now over 90% complete, and the data from the settlement monitoring program indicate that settlement has nearly ceased (i.e. the settlement deformation in the marl and lower sands has stabilized). The combined weight of the compacted backfill and powerblock structures has resulted in a net settlement of less than an inch.

6. The marl is a firm, preconsolidated, calcareous claystone capable of absorbing this small amount of settlement without fracturing. The design undrained shear strength of the marl has been conservatively taken to be 10 kips per square foot. FSAR § 2.5.4.2.2. The net ultimate bearing capacity of the marl, the pressure that would produce a shear stress of 10 kips per square foot permitting shearing of the marl to occur, is therefore calculated to be 60 kips per square foot. See

FSAR, § 2.5.4.10.1; PSAR, § 2C.6.3 (explaining the calculation). The net applied loads of the structures are in the order of 2 to 3 kips per square foot. Therefore, the factor of safety against overstressing is in the order of 20 to 30, which is almost an order of magnitude higher than that considered sufficient in the industry. The net settlement of less than an inch results from compression of the marl and underlying sediments. Even if the entire settlement of less than an inch occurred within the marl, the average strain in the marl would only be about 0.1 percent, which is much less than the failure strain indicated in the tests carried out for design. The test data are provided in section 2C.12.1.4 of the PSAR. Moreover, the marl is not subject to fracturing through failure of the lower sands. As shown in section 2.5.4 of the FSAR, the lower sands have physical strength and elastic physical properties essentially the same as or greater than the overlying marl. Therefore, settlement is absorbed elastically in the marl and sands, and not by brittle failure of the marl.

7. The continued post-settlement integrity of the marl has been further demonstrated by a program of geotechnical verification work conducted at Plant Vogtle during the summer of 1985. The marl was again examined by coring and other methods, and the results again demonstrated that the marl is a dense,

nearly impermeable calcareous claystone without voids, open joints, or fractures. The lack of fractures in the cores and the absence of water inflow during in-situ permeability tests confirmed that the marl has not been fractured by plant construction.

8. It is therefore evident that settlement of the Vogtle facility has not reduced and will not reduce the effectiveness of the marl as an aquiclude.

Walter R. Ferris

Walter R. Ferris

Subscribed and sworn to before me
this 7th day of September, 1985

My commission expires:
March 24, 1989

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EXHIBIT A

PROFESSIONAL QUALIFICATIONS

Walter R. Ferris
Civil Engineer
106 Paseo Way
Greenbrae, CA 94904

I received my B.S. in Civil Engineering from Queens University, Belfast, Northern Ireland in 1951, and my S.M. in Soil Mechanics from Harvard University in 1955. From 1951 to 1952, I served as a junior engineer for Sir William Halcrow & Partners, London, England and worked on the design of several dams in Scotland. In 1952, I joined Power Corporation of Canada, participating in the design of several dams and providing remedial design services for various existing hydroelectric plants in Canada.

From 1953 to 1954, I served as a civil engineer for H. G. Acres & Company, Niagara Falls, Canada during which I was in charge of field exploration, and later design, of the Bersimis I rockfill dam in Quebec, and field inspection of earth embankments for the McArthur Falls hydroelectric plant. I also established a soils laboratory for H. G. Acres.

From 1955 until 1959, I lectured in soil mechanics at Harvard University and taught courses in soil testing, applied soil mechanics and engineering geology. I also assisted Drs. Casagrande and Terzaghi in their consulting practices on embankment dam projects in Brazil, Kenya, Canada, Utah, Connecticut and California.

From 1959 until March, 1985 I was employed by Bechtel Civil & Minerals Inc., and was Chief Soil Engineer for the last 12 years. In that capacity, I was responsible for the design of earth and earthrock dams, tailings dams, foundations of major power plants and heavy industrial structures, airfields and highways.

I have consulted on and participated in the preparation of foundation reports and earthwork studies for numerous nuclear and fossil fuel plants in the U.S.A., Korea, Taiwan, and Spain. Nuclear plants in the U.S.A. included Pilgrim, Hope Creek, Vogtle, Monticello and Palisades. Earth dams designed under direction during this period include the Ruth Dam, Aurora Rampart Dam, Skookumchuck Dam, Carmen Smith Dams, three earth dams for the Oroville-Wyandotte Irrigation District, Turner

Dam, Wells Dam, Ute Dam, and others. I also participated in the design of a number of rockfill dams during this period, including Round Butte Dam in Oregon, Little Grass Valley Dam in California, the Homestake asphalt-faced dam for the City of Aurora in Colorado, and the Ok Ningi water supply dam in Papua New Guinea, as well as a feasibility study for the Xialongdi dam in the People's Republic of China. I have also been involved in the design of numerous tailings dams and mining facilities for tar sands, gold, copper, iron, and molybdenum projects in the United States, Canada, South Africa, Papua New Guinea, Brazil and Colombia.

I am a Registered Civil Engineer in Minnesota and California, and a member of the American Socity of Civil Engineers, the U.S. Committee on Large Dams, the International Society for Soil Mechanics and Foundation Engineering, and the Deep Foundation Institue.