BEFORE THE

UNITED STATES NUCLEAR REGULATORY COMMISSION

NRC Docket Nos. 50-424, 50-425

In the Matter o[illegible]

GEORGIA POWER COMPANY

SUPPLEMENT 7 TO

APPLICATION FOR LICENSE

UNDER THE ATOMIC ENERGY ACT OF 1954

AS AMENDED

FOR

ALVIN W. VOGTLE NUCLEAR PLANT

UNITS 1, 2

The Applicant, Georgia Power Company, hereby supplements its Application for a Construction Permit and Operating License, originally submitted on August 1, 1972, by the addition of supplementary material attached hereto.

W E Ehrenspenger

by: W. E. Ehrenspenger
Senior Vice President

Sworn to and subscribed before me, this 6th day of December, 1979.

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Lynn C. Beazley

Notary Public

NOTARY PUBLIC, GEORGIA, STATE AT LARGE
MY COMMISSION EXPIRES JULY 26, 1980

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INSTRUCTION SHEET
SUPPLEMENT NO. 7

ALVIN W. VOGTLE NUCLEAR PLANT
PRELIMINARY
SAFETY ANALYSIS REPORT

DO NOT REMOVE EXISTING WHITE PAGES

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Insert Chapter 3, page S7 3.8-37 through 3.8-40 ahead of page 3.8-37

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3.8.1.6 Materials Quality Control and Special Construction Techniques

The materials used in the construction of the containment will conform to the requirements of ACI 301, 318 and 211.1 for concrete; ASTM C618-72 for pozzolans; and, ASTM 615 for reinforcing steel. S7

Quality control procedures shall be as prescribed in ACI 68-33, 68-45.

The containment will be constructed of concrete and steel using proven methods common to heavy, industrial construction. The basic categories for steel are reinforcement, prestressing system, and liner plate.

The applicable design documents in the construction of the containment are listed in paragraph 3.8.1.2.3. S7

3.8.1.6.1 Concrete

The compressive strength (f_c') of concrete will be determined at 28 days for concrete without pozzolans and at 91 days for concrete containing pozzolans. The compressive strength of the concrete for various parts of the containment will be as follows: S7

A. Base mat, tendon gallery and access shaft II - f_c' = 5000 psi

B. Cylinder and dome - f_c' = 6000 psi

Structural concrete will be batched and placed in accordance with specifications for structural concrete for building (ACI 301-72) and building code requirements for reinforced concrete ACI 318-71 with additional specific information and exceptions as noted below paragraph 3.8.1.6.6.

Cement will be type II conforming to the "Specification for Portland Cement," ASTM C 150-72. The cement will not contain more than 0.60 percent by weight of alkalies calculated as Na_2O plus 0.658 K_2O. Certified copies of mill test reports showing the chemical composition and physical properties will be obtained for each load of cement delivered. The temperature of cement at the time of delivery will not be greater than 130 F. The limitation of the alkali content of the cement may be waived provided that the aggregates pass required laboratory tests and have no history of alkali-aggregate incompatibility.

S7 | Table 3.8-2 is deleted by Supplement 7

Table 3.8-3

LINER PLATE MATERIAL PROPERTIES AND CHARACTERISTICS AS ASSUMED IN DESIGN

Material and Specification	Properties and Characteristics Assumed											
	Ultimate Strength ku, ksi		Defined Yield fy, ksi		Ultimate Strain ε_{ult}, %		E $x10^3$ ksi	μ Poisson's Ratio	Thermal Conductivity $\frac{BTU}{ft^{3o}F\ hr}$	α $10^{-6}/^oF$	Heat Capacity BTU $lb/^oF$	Unit Weight lb/ft^3
	Nominal	Range	Nominal	Range	Nominal	Range	Range	Range	Nominal	Nominal	Range	Range
Liner Plate												
ASTM A-285, Grade A	45.	45-55	24.	24-34	30.	30-38	29-30	0.27	27	6.5	0.10	485
ASTM A-442, Grade 55	45.	55-65	30.	30-40	26.	26-35		-0.30			-0.11	-490
ASME SA516, Grade 60	60.	60-72	32.	32-42	25.	25-35						
Penetration Assemblies, Locks, Hatches, Etc.												
ASME SA516, Grade 60	60.	60-72	32.	32-42	25.	25-35						
ASME SA516, Grade 70 (Normalized)	70.	70-85	38.	38-50	21.	21-30						
ASME SA537, Grade B	80.	80-100	60.	60-78	22.	22-30						

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All aggregates will conform to the "Standard Specifications for Concrete Aggregate," ASTM C 33 71a. In addition to the specified gradation, the fine aggregate (sand) will have a fineness modulus of not less than 2.5 or more than 3.0 during normal operations; at least 4 of 5 test samples will not vary more than 0.20 from the average.

Coarse aggregate may be rejected if the loss, when subjected to the Los Angeles abrasion test, ASTM C 131-69, using grading A, exceeds 40 percent by weight at 500 revolutions.

Water used in mixing concrete will be tested to exclude injurious amounts of oil, acid, alkali, organic matter or other deleterious substances. The pH is determined by American Association of State Highway Officials (AASHO) Methods of Sampling and Testing, Designation T26-70. Water will not contain impurities in amounts that will cause either (1) a change in the time of setting of cement by more than 25 percent, or (2) a reduction in the compressive strength of mortar by more than 5 percent compared with results obtained with distilled water.

The concrete will also contain an air entraining admixture and a water reducing admixture. The air entraining admixture will be in accordance with "Specification for Air Entraining Admixtures for Concrete," ASTM C 260-69. It will be capable of entraining 3-6 percent air, will be completely water soluble, and will be completely dissolved when it enters the batch. The water reducing and retarding admixture will conform to the "Standard Specification for Chemical Admixtures for Concrete," ASTM C 494-71, Types A and D. Type A will be used when the ambient temperature is below 70 F. Type D will be used when the ambient air temperature is 70 F and above. Pozzolans used in concrete for the construction of Category 1
S7 structures will conform to "Specifications for Fly Ash and Raw or Calcined Natural Pozzolans for use in Portland Concrete," ASTM C 618-72.

3.8.1.6.1.1 Construction Joints. The shear through construction joints will be evaluated by one of the following methods used to transfer shear where the shear is critical.

Where horizontal shear keys are not used, the concrete surface of construction joint is prepared by a sandblasting, chipping, air airwater cutting to remove all laitance and other foreign materials. The surface of the concrete is then washed thoroughly to remove all loose material. In addition, to the foregoing procedure, the horizontal surface is wetted and covered with mortar of the same cement-sand ratio as used in

combined with direct shear are adopted from ACI 438-69, "Tentative Recommendations for the Design of Reinforced Concrete Members to Resist Torsion."

3.8.3.6 Materials, Quality Control and Special Construction Techniques

The internal structures are constructed of concrete, or concrete containing pozzolans, and steel using proven methods common to heavy industrial construction. Material properties and characteristics assumed in design are given in table 3.8-6. S7

3.8.3.6.1 Concrete

The internal concrete structures have a design compressive strength of 5,000 psi. Materials, quality control and construction techniques are described respectively in paragraphs 3.8.1.6.1, 3.8.1.6.6.1 and 3.8.1.6.7. S7

3.8.3.6.2 Reinforcing Steel

The reinforcing steel has a minimum yield strength of 60,000 psi conforming to ASTM Designation A615-68 Grade 60. Materials, quality control and construction techniques are described respectively in paragraphs 3.8.1.6.2, 3.8.1.6.7 and 3.8.1.6.6.1.

3.8.3.6.3 Structural Steel

Structural steel conforms to ASTM A-36 or other ASTM designation listed in paragraph 3.8.1.6.3. Construction techniques are covered in paragraph 3.8.1.6.6.2.

3.8.3.6.4 Stainless Steel Liner Plate

The fuel transfer canal is lined with 3/16-inch welded stainless steel plate conforming to the requirements of ASTM A-617, Type 304. This material covers stiffeners, anchors, as well as the liner plate, used for the construction of the fuel transfer canal liner. For construction procedures and quality control, see paragraphs 3.8.1.6.6.3 and 3.8.1.6.7.

Table 3.8-6

MATERIAL PROPERTIES AND CHARACTERISTICS AS ASSUMED IN DESIGN

MATERIAL & IDENTIFICATION	PROPERTIES AND CHARACTERISTICS ASSUMED																	
	Ultimate Strength fy (ksi)		Defined Yield fy (ksi)		Ultimate Strain (%)		E (10^3 ksi)		u Poisson Ratio		Thermal Conductivity Btu/hr ft F		Coeff. of Thermal Exp. (10^{-6}/1 F)		Heat Capacity C Btu/lb/ F		Unit wt. W lb/ft^3	
	Nominal	Range	Nominal	Range	Nominal	Range	Nominal	Range	Nominal	Range	Nominal	Range	Nominal	Range	Nominal	Range	Nominal	Range
Concrete																		
6000 psi	6.0	8.0 to 6.0			1.20	1.74 to 1.11	6.0	5.5 to 6.5	0.24	0.20 to 0.30	1.2	1.4 to 1.1	6.0	[illegible] to 6.5	0.21	0.24 to 0.19	145	147 to 143
5000 psi	5.0	7.0 to 5.0			1.09	1.68 to 1.00	5.5	5.0 to 6.0	0.24	0.20 to 0.30	1.2	1.4 to 1.1	6.0	5.5 to 6.5	0.21	0.24 to 0.19	145	147 to 143
4000 psi	4.0	6.0 to 4.0			0.96	1.60 to 0.87	5.0	4.5 to 5.5	0.24	0.20 to 0.30	1.2	1.4 to 1.1	6.0	5.5 to 6.5	0.21	0.24 to 0.19	145	147 to 143
3000 psi	3.0	5.0 to 3.0			0.80	1.50 to 0.72	4.5	4.0 to 5.0	0.24	0.20 to 0.30	1.2	1.4 to 1.1	6.0	5.5 to 6.5	0.21	0.24 to 0.19	145	147 to 143
Structural Steel																		
A36			36.0	40.0 to 36.0			29.0	31.0 to 27.0	0.27	0.24 to 0.30	26.0	24.0 to 28.0	6.5	6.0 to 7.0	0.12	0.14 to 0.10	490	480 to 500
Reinf. Steel																		
A615-60			60.0	66.0 to 60.0			29.0	31.0 to 27.0			26.0	24.0 to 28.0	6.5	6.0 to 7.0	0.12	0.14 to 0.10	490	480 to 500
A615-40			40.0	44.0 to 40.0			29.0	31.0 to 27.0			26.0	24.0 to 28.0	6.5	6.0 to 7.0	0.12	0.14 to 0.10	490	480 to 500
Liner Plate																		
A04L-Stainless Steel			25.0	28.0 to 25.0			28.0	26.0 to 30.0	0.13	0.10 to 0.16	17.0	15.0 to 19.0	9.6	9.0 to 10.2	0.12	0.14 to 0.10	515	505 to 525

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Structure	f_c'
Auxiliary Building	5000 psi
Control Building	4000 psi
Fuel Handling Building	4000 psi
Nuclear Service Cooling Towers	4000 psi
Diesel-Generator Building	4000 psi
Auxiliary Feedwater Pump Building	4000 psi
Category Water Tanks	4000 psi
Pipe Tunnels and Electrical Ducts	4000 psi

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Materials, quality control, and construction techniques are described in paragraphs 3.8.1.6.1, 3.8.1.6.3, 3.8.1.6.2, 3.8.1.6.6 and 3.8.1.6.7. Concrete containing pozzolans shall not be used in the radioactive chemistry laboratory area. S7

3.8.4.7 Testing and Inservice Surveillance Requirements

Testing and inservice surveillance are not required for Category I structures other than the containment building and no formal program of testing and inservice surveillance is planned.

3.8.5 FOUNDATIONS AND CONCRETE STRUCTURES

3.8.5.1 Description of the Foundations and Supports

3.8.5.1.1 Containment

The containment structure foundation is a conventional reinforced concrete mat approximately 10'-6" feet thick. The mat is circular in plan with an approximate diameter of 154 feet. A circular pit and instrumentation cavity extend below the foundation mat; and, a continuous tendon gallery at the periphery is provided for access to three buttresses and tendon installation. The gallery is structurally connected below the base mat and serves as a working space for post tensioning of tensons of the containment shell, buttresses and dome, as well as for inspection purposes. Refer to figures 3.8-2 and 3.8-3 for configuration of the cavities and physical features. A floor steel liner plate with a leak chase system covers the entire slab area which provides a barrier to prevent leakage through the foundation mat supported on the soil. A lean concrete fill (nonstructural slab) of 33 inches is poured into place on top of the liner plate to protect the liner against damage during erection and maintenance. See figures 3.8-2 and 3.8-3.

The foundation slab is designed to sustain all design loads of the containment and interior structures. The mat is analyzed as a slab on an elastic foundation as delineated in the computer model for the ASHSD, FINEL and NASTRAN programs. The loadings are horizontal, vertical, internal pressure, thermal, and earthquake loads. The vertical loads include all the loads supported by the foundation mat and the resulting soils reactions. The earthquake loads are those resulting from the entire structure taken as a whole. The foundation slab is designed for moments, shear and forces resulting from all credible combinations of loads. The effects of LOCA and SSE are considered in the design in an appropriate manner. The finite element method of analysis is employed in the foundation slab design as discussed in 3.8.1.4 and appendix 3F.

For the discussion of the design loadings and method of analyses employed in design of the base mat, refer to subsection 3.7 of the PSAR.

Additional discussions of the base mat is covered in appendix 3R.

3.8.5.1.2 Control Building

The control building is supported on an integral raft type reinforced concrete foundation. The dimensions in plan are 152'0" x 169'4" x three feet thick.

The analysis and design of the control building foundation is the same as for the auxiliary building foundation, see figures 3.8-35, 3.8-36 and 3.8-37, also 3.8.4.4.

The base of the foundation is situated approximately 36 feet above the auxiliary building base floor. In order that no surcharge pressure induced by the control building foundation is transmitted to the auxiliary building walls, a lean concrete fill is placed in the excavation against the wall and excavated slope of the adjacent structural fill supporting the control building foundation. This pour-in-place concrete fill will adequately transfer the foundation base pressure and also avoid failure of the fill structure under the building foundation. The final lateral forces to the foundation are transmitted to the subgrade by friction.