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Georgia Power
the southern electric system

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ELV-03889
000521

Docket Nos. 50-424
50-425

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555

Gentlemen:

VOGTLE ELECTRIC GENERATING PLANT
REQUEST TO REVISE
TECHNICAL SPECIFICATION 4.6.1.6.1.d.2

In accordance with the requirements of 10 CFR 50.90 and 10 CFR 50.59, Georgia Power Company (GPC) hereby proposes to amend the Vogtle Electric Generating Plant (VEGP) Unit 1 and Unit 2 Technical Specifications (TS), Appendix A to Operating Licenses NPF-68 and NPF-81. The proposed amendment would revise the surveillance requirements for the containment tendon sheathing filler grease.

The proposed amendment and its basis are described in enclosure 1. Our evaluation pursuant to 10 CFR 50.92 showing that the proposed amendment does not involve significant hazards considerations is provided in enclosure 2. A mark up of the affected page is provided as enclosure 3. In accordance with 10 CFR 50.91, the designated state official will be sent a copy of this letter and all enclosures. Georgia Power Company requests approval of the proposed amendment by December 31, 1993.

Mr. C. K. McCoy states that he is a Vice President of Georgia Power Company and is authorized to execute this oath on behalf of Georgia Power Company and that, to the best of his knowledge and belief, the facts set forth in this letter and enclosures are true.

GEORGIA POWER COMPANY

By: C.K. McCoy
C. K. McCoy

Sworn to and subscribed before me this 14th day of September 1992.

Mary N. Bentley
Notary Public

MY COMMISSION EXPIRES MAY 6, 1995

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Georgia Power

CKM/NJS

Enclosures:
1. Basis for Proposed Change
2. 10 CFR 50.92 Evaluation
3. Marked Up Page

c(w): Georgia Power Company
Mr. W. B. Shipman
Mr. M. Sheibani
NORMS

U. S. Nuclear Regulatory Commission
Mr. S. D. Ebneter, Regional Administrator
Mr. D. S. Hood, Licensing Project Manager, NRR
Mr. B. R. Bonser, Senior Resident Inspector, Vogtle

State of Georgia
Mr. J. D. Tanner, Commissioner, Department of Natural Resources

ENCLOSURE 1

VOGTLE ELECTRIC GENERATING PLANT
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BASIS FOR PROPOSED CHANGE

Proposed Change

The Vogtle Electric Generating Plant (VEGP) Unit 1 and Unit 2 Technical Specifications (TS) require, in part, that the containment tendon sheathing filler grease be verified operable by assuring that the "amount of grease replaced does not exceed 5% of the net duct volume, when injected at a pressure not to exceed the designer's specifications." This surveillance requirement (TS 4.6.1.6.1.d.2) is applicable when a tendon is opened for inspection pursuant to TS 4.6.1.6.1. The purpose of the surveillance requirement is to verify that there are no significant voids in the grease, thereby providing assurance of minimum grease coverage so that the tendon is protected from degradation due to corrosion.

The proposed change would replace the requirement to verify the grease void fraction with a requirement to replace the grease removed during a tendon inspection.

Basis

Surveillance requirement 4.6.1.6.1 specifies a number of inspection activities to be performed on randomly selected tendons. These activities typically require the tendons to be opened (i.e., the grease can covering the end anchorages is removed) and many of these inspection activities require detensioning of the tendon, strand removal, etc. As a result, a certain amount of sheathing filler grease is removed during the process, and this grease must be replaced when the inspection of the tendon is completed. The existing TS imposes an additional requirement to assure that the sheathing filler grease void fraction does not exceed 5 percent of the net duct volume.

In order to assess the grease void fraction, the grease is heated and injected into the tendon duct under pressure. The pressure at which grease is injected is limited to 150 psig for vertical tendons and 100 psig for horizontal tendons. For horizontal tendons, hot grease is injected until it exits the opposite end of the tendon duct. If grease cannot be forced from the opposite end, the pumping operation is transferred to that end. For vertical tendons, grease is injected into both ends of the tendon until it exits the high point vent. If grease cannot be forced from the high point vent, the operation is moved to the top of the containment and grease is injected at the vent. The void fraction consists of the ratio of the volume of grease actually added to the duct (accounting for any grease that may be forced out of the vent for vertical tendons or out of the ends for horizontal tendons) to the net duct volume.

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The 5-percent void fraction limit has been exceeded on several occasions during containment tendon surveillances at VEGP. (See Special Report 50-424/1987-002, dated May 18. 1988, SL-4577; Special Report 50-424/1989-003, dated November 29, 1989, ELV-01105; and Special Report 50-424/1991-005, dated November 7, 1991, ELV-03200.) In each of these cases. the grease voids were attributed to one or more of the following factors.

1. The grease (Visconorust 2090-P4) has a coefficient of expansion of about 1 percent per 20 °F. The initial filling temperature of the grease averaged approximately 180 °F. Cold weather conditions can cool the grease to approximately 40 °F, resulting in a net contraction of approximately 7 percent of the net duct volume. As the grease cools it shrinks and adheres to the steel surfaces, creating voids which are distributed along the entire length of the duct. [In fact, these voids are required to accommodate the grease as it expands due to increases in temperature from plant operation and/or increases in the temperature of the outside air. This is illustrated by the following experience. On June 22, 1990, grease was observed leaking from four horizontal tendon end caps (three on Unit 2 and one on Unit 1). The grease leaks occurred at the O-rings of each tendon and were attributed to the regreasing of the tendons during a surveillance completed in the Fall of 1989. Apparently, the grease that was injected during the regreasing operation completely filled the voids in the horizontal tendon ducts and left no room for thermal expansion of the grease. Subsequently, outside ambient air temperatures reached 100 plus degrees in June of 1990, resulting in internal pressures that were greater than the capacity of the O-rings.]

2. Calculated voids between the strands which comprise the tendon bundle are approximately 3 percent of the net duct volume. If during the initial operation the tendon bundle is cold, the grease will solidify on the surface of the tendon bundle as it is being pumped into the sheathing. Small voids will be left between the strands. During the regreasing process, hot grease is again pumped into the tendon sheathing. As this hot grease comes in contact with the cool grease around the tendon and warms it, it is likely that grease will enter the tendon bundle voids. This migration can also occur in areas where tendon strands are in close proximity to the tendon sheathing.

3. The initial filling method could have resulted in air entrapment within the grease, accounting for voids up to 2 percent of the net duct volume.

BASIS FOR PROPOSED CHANGE

4. The machining tolerances on the wires, trumpets, and other components could account for as much as 1 percent of the void volume. This would affect the calculation of the net duct volume, assuming nominal dimensions for the components making up the tendon.

The procedure used by GPC for installing the tendons ensured a high degree of corrosion protection for the tendons. The tendons were handcoated with Visconorust 2090-P4 as they were pulled into the sheathing. Additionally, the tendons were coated with a temporary corrosion preventive material at the factory. During the greasing procedure, vents were opened to allow the release of air bubbles, and hot grease was pumped into each tendon duct until a clear flow of grease was observed exiting the appropriate vent. Inspections were made to identify any grease leakage from the tendon ducts. This process ensured that the tendons originally received a thorough coating of grease.

Visconorust 2090-P4, manufactured by the Viscosity Oil Company, provides an effective barrier to moisture and air which retards the effect of a corrosive atmosphere. The protective film provided by the grease is not easily penetrated by free water, and the grease has a reserve alkalinity for long-term acid neutralization. The film aids in retarding corrosion due to water soluble ions from chlorides, nitrates, and sulfides. As part of the tendon surveillance (as required by the TS), grease samples (which are from the anchorhead region of the tendons) are chemically analyzed for water content, chlorides, nitrates, sulfides, and reserve alkalinity. The analyses of these samples have always conservatively yielded results well in excess of the TS limits. Furthermore, visual inspections of tendon components, lift-off force testing, and actual strand removal have not revealed any degradation due to corrosion and cracking.

As an additional consideration, the tendon ducts are not designed to be leak-tight. Since the regreasing operation involves injecting the grease under relatively high pressure (100 - 150 psig), the very method of measuring the void fraction could cause grease to be forced out through weak locations in the duct (the taped joints, for example), and this in turn could result in cracking of the surrounding concrete.

While it cannot be attributed to a regreasing operation, it should be noted that there has been some minor grease leakage through the unit 2 containment cylindrical shell concrete. (See Special Report 50-424/1989-003, dated November 29, 1989, ELV-01105 and Special Report 50-425/1991-003, dated October 8, 1991, ELV-03155.) The leakage has occurred through vertical cracks in the exterior surface of the containment shell located just above the basemat. Based upon the location of the leakage, it is likely that this grease is leaking from the taped joints of the sheathing of several vertical tendons. This is also where the hydraulic head of the grease is at its highest for the vertical tendons. Since the tendon sheathing is not designed to be leak-tight, the reduced viscosity of the oil caused by high summer temperatures apparently allowed the grease, driven by the high hydraulic head, to leak from the taped joints into the hairline cracks in the concrete adjacent to the tendons. This leakage has been monitored regularly since it was identified, and the grease leakage at the worst location has remained below 1 percent of the net duct volume of any vertical tendons in the area. Existing leakage will continue to be monitored, and new leakage will be identified and documented in accordance with existing plant procedures. If the cumulative leakage at any location approaches a significant quantity, an engineering evaluation will be performed to determine the appropriate level of corrective action required to ensure the continued operability of the sheathing filler grease. This leakage through the concrete illustrates the susceptibility of the ducts to leakage even though the involved tendons have not been subjected to regreasing.

Finally, by letter dated April 19, 1990, to Mr. Hans Asher of the NRC, Mr. C. W. Novak of Viscosity Oil makes the following points regarding the matter of grease voids in tendon ducts and the action of the Visconorust 2090 P-4 corrosion preventive.

1. The original design of their system took into account that there would be voids, and, given the different variables, a total void fraction of 20 percent is possible.

2. The key to their system is that each tendon is fully coated with grease with some initial penetration into the tendon bundle during the original pumping process. Once the tendon is coated with hot grease in this manner, the Visconorust 2090 P-4, on cooling, contracts but leaves a heavy film up to 20 mils or more on the tendon surface, providing ample corrosion protection.

3. During a surveillance, the attempt to pump grease into one end of a tendon duct and out the other could do more harm than good. The system was well coated initially and pressurizing the ducts in an attempt to break through the solid Visconorust 2090 P-4 could potentially force grease through weak locations in the tendon sheathing, or damage vent caps or seals.

4. Pumping an excessive amount of grease into the ducts could overfill the system, leaving no room for expansion of the grease due to an increase in ambient temperature.

A copy of the referenced letter is attached for your information.

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Based on the above discussion, GPC believes the following conclusions can be drawn regarding the grease void fraction limit specified by the TS.

1. The void fraction is not a good indicator of corrosion protection as evidenced by the number of variables which can affect measurement of the void fraction. This is further supported by the fact that visual inspections, lift-off force testing, chemical analyses of grease samples, and tendon strand removal (and subsequent inspection and testing) have revealed no evidence of degradation due to corrosion, in spite of the fact that the void fraction limit has been exceeded on several occasions. In addition, as cited above, the vendor supports our argument that the void fraction is not a good indicator of corrosion protection.

2. The method required for measuring the void fraction is difficult and inherently imprecise since it involves forcing hot grease under pressure into a duct filled with solidified grease in an effort to fill all voids. Furthermore, damage can actually result by forcing grease out the joints in the sheathing and into the concrete, or by filling the voids and not allowing for thermal expansion of the grease.

3. Surveillance requirements involving lift-off force testing, visual inspection of tendon components and containment interior and exterior surfaces, and chemical analyses of the sheathing filler grease provide definitive indication of degradation of the tendons due to corrosion or other causes.

Therfore, GPC proposes to delete the grease void fraction limit of surveillance requirement 4.6.1.6.1.d.2 and replace it with a requirement to restore as a minimum the grease removed during the surveillance.