L. M. Stinson (Mike)
Vice President

Southern Nuclear
Operating Company, Inc.
40 Inverness Center Parkway
Post Office Box 1295
Birmingham, Alabama 35201

Tel 205.992.5181
Fax 205.992.0341

SOUTHERN COMPANY
Energy to Serve Your World℠

May 5, 2004

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U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555-0001

Joseph M. Farley Nuclear Plant Units 1 and 2
Application for License Renewal – Request for Additional Information

Ladies and Gentlemen:

This letter is in response to your letter dated April 8, 2004 requesting additional information for the review of the Joseph M. Farley Nuclear Plant, Units 1 and 2, License Renewal Application. Response to this Request for Additional Information (RAI) is provided in the Enclosure to this letter.

Mr. L. M. Stinson states he is a vice president of Southern Nuclear Operating Company, is authorized to execute this oath on behalf of Southern Nuclear Operating Company and to the best of his knowledge and belief, the facts set forth in this letter are true.

If you have any questions, please contact Charles Pierce at 205-992-7872.

Respectfully submitted,

SOUTHERN NUCLEAR OPERATING COMPANY

L. M. Stinson

Sworn to and subscribed before me this 5th *day of* May, *2004.*

Notary Public

My commission expires: 6-7-05

LMS/JAM/slb

A099

Enclosure: Joseph M. Farley Nuclear Plant, Units 1 and 2
Application for License Renewal – Response to April 8, 2004 Request for Additional Information

cc: Southern Nuclear Operating Company
Mr. J. B. Beasley Jr., Executive Vice President
Mr. D. E. Grissette, General Manager – Plant Farley
Document Services RTYPE: CFA04.054; LC# 14031

U. S. Nuclear Regulatory Commission
Ms. T. Y. Liu, License Renewal Project Manager
Mr. L. A. Reyes, Regional Administrator
Mr. S. E. Peters, NRR Project Manager – Farley
Mr. C. A. Patterson, Senior Resident Inspector – Farley

Alabama Department of Public Health
Dr. D. E. Williamson, State Health Officer

ENCLOSURE

Joseph M. Farley Nuclear Plant Units 1 and 2

Application for License Renewal

Response to April 8, 2004 Request for Additional Information

RAI 3.2-7

(This RAI is related to engineered safety features, auxiliary, and/or steam and power conversion systems)

The Bolting Integrity program in Section XI-M18 of NUREG-1801 addresses the aging effects of cracking and loss of preload (stress relaxation) for closure bolting. Cracking is considered an aging effect requiring management (AERM) for high strength bolts where the actual yield strength of the material is equal or greater than 150 ksi and stress relaxation is considered an AERM for bolts in high temperature applications. The LRA Tables 3.2.2-X, 3.3.2-X, and 3.4.2-X do not address cracking or stress relaxation for these conditions. The applicant is requested to discuss if any bolting in the engineered safety features, auxiliary systems, and/or steam and power conversion systems meet these conditions and provide appropriate aging management.

Response

The aging management reviews for the engineered safety features (ESF), auxiliary, and steam and power conversion (S&PC) systems at FNP determined that cracking of high strength bolting and loss of preload due to stress relaxation of bolting are not aging effects requiring management at FNP and no aging management program needs to be credited. The mechanism of concern for cracking for high strength bolts is stress corrosion cracking (SCC). The bases for these conclusions are outlined below.

SCC of High Strength Bolting

For the ESF, auxiliary, and S&PC systems, the bolts identified as having the potential for an actual yield strength that may be equal to or greater than 150 ksi are ASME SA-193 / ASTM A193 Grade B7 bolts. These bolts have a minimum specified yield strength of 105 ksi, however no maximum yield strength is specified for this material. Therefore, the actual yield strength for these bolts could exceed 150 ksi.

Although there have been isolated instances of SCC of bolting in the industry, these failures have been attributed primarily to high yield stress materials (including abnormally high yield stresses resulting from improper heat treatment), excessive bolt preload, and contaminants, such as the use of thread lubricants containing molybdenum sulfide (MoS_2). A review of industry failure databases and NRC generic communications supports the fact that a combination of material selection, control of contaminants, and proper maintenance and torquing procedures is effective in eliminating the potential for SCC of bolting materials. These practices are in place at FNP as discussed below.

Material Selection – EPRI NP-5769, "Degradation of Bolting in Nuclear Power Plants," April 1988 indicates that susceptibility to SCC is minimized through selection of materials having specified minimum yield strengths less than 150 ksi. The ESF, auxiliary and S&PC systems bolting materials meet this criteria. ASME SA-193 / ASTM A193 Grade B7 bolts have a minimum specified yield strength of 105 ksi, which is below the recommended value of 150 ksi.

Control of Contaminants – In general, environmental conditions that could lead to SCC of bolting are not expected to occur in non-Class 1 components. Most bolting at FNP is normally in a dry environment and coated with a lubricant. For bolting located outdoors, the atmosphere is mild in terms of corrosive contaminants (rural environment and remote from coastal regions). Rain tends to wash off contaminants instead of concentrating them. Within the industry, SCC failures of quenched and tempered alloy steel bolting, such as SA-193 Grade B7 bolts, have many times been associated with the use of lubricants that may decompose into SCC-inducing contaminants, most notably MoS_2. FNP has not used lubricants containing MoS_2 and procedural controls are in place at FNP to prevent the use of lubricants containing potentially detrimental species such as chlorides and sulfates.

Control of Bolt Preload – Excessive bolt stresses have resulted in SCC failures in the industry. Proper control of bolt preload through sound bolt torquing practices has been shown to prevent excessive preload and thereby minimize the potential for SCC failures. At FNP, procedural controls are in place to assure that proper bolt torquing practices are used.

The potential for SCC of bolting materials has been addressed at FNP in response to several industry communications including NRC IE Bulletin 82-02, INPO SOER 84-5, and EPRI guidance documents. The bolting materials used, lubricant/contaminant controls, and sound bolt torquing practices have been effective at eliminating this aging effect. A review of recent FNP operating history performed for development of the FNP LRA did not identify any instances of SCC in engineered safety features systems, auxiliary systems, and steam and power conversion systems bolting which includes ASTM SA-193 / ASTM A193 Grade B7 fasteners. Additionally, a review of recent NRC generic communications did not identify any recent bolting failures attributable to SCC.

Therefore, cracking due to SCC is not an aging effect requiring management for the carbon steel and alloy steel bolting materials used in FNP engineered safety features systems, auxiliary systems, and steam and power conversion systems.

Loss of Preload Due to Stress Relaxation of Bolting Materials

SNC has determined that loss of preload (stress relaxation) in bolted connections is not an aging effect requiring management for the engineered safety features systems, auxiliary systems, and steam and power conversion systems at FNP.

Work performed as a part of the EPRI Material Reliability Program indicates that secondary, steady-state, creep only occurs for alloy steels when operating temperatures exceed 40% to 50% of the melting temperature (in absolute units). A conservative lower bound melting temperature for steel bolting materials is 2500°F (2959°R). Accordingly, SNC concludes that no steady-state creep of bolting will occur at operating temperatures below 725°F. The FNP operating temperatures in the engineered safety features systems, auxiliary systems, and steam and power conversion systems are below this threshold temperature.

Leakage at joints is typically associated with improper joint installation (e.g., proper cleanliness, gasketing, and preload) or inadequate joint design, not relaxation of the bolting materials. FNP procedures for joint installation incorporate industry guidance from EPRI NP-5769, *Good Bolting Practices*, and EPRI TR-104213, *Bolted Joint Maintenance and Application Guide*. These procedures provide for the use of proper lubricants and sound bolt torquing practices. However, these procedures are considered to be a part of normal maintenance practices and are not credited as a specific aging management program for license renewal.

Lastly, FNP operating experience has not indicated any problems with loss of preload due to stress relaxation in bolted closures.

Based on this information, SNC maintains that loss of preload due to stress relaxation is not an aging effect requiring management for bolted connections in the engineered safety features systems, auxiliary systems, and steam and power conversion systems at FNP.