Thomas D. Gatlin
Vice President, Nuclear Operations
803.345.4342

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A SCANA COMPANY

November 16, 2012
RC-12-0179

Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Sir / Madam:

Subject: VIRGIL C. SUMMER NUCLEAR STATION (VCSNS) UNIT 1
DOCKET NO. 50-395
OPERATING LICENSE NO. NPF-12
RELIEF REQUEST RR-III-09 REQUEST FOR INFORMATION
FATIGUE CRACK GROWTH AND TRANSIENTS

Reference:

1. Letter from T. D. Gatlin (VCSNS) to Document Control Desk (NRC), "Reactor Vessel Head Penetration Weld Repair Under WCAP-15987," dated October 22, 2012 [ML12306A530]

2. Letter from T. D. Gatlin (VCSNS) to Document Control Desk (NRC), "Relief Request RR-III-09 Alternative Weld Repair For Reactor Vessel Head Penetration," dated October 30, 2012

3. Letter from T. D. Gatlin (VCSNS) to Document Control Desk (NRC), "Relief Request RR-III-09 Supplemental Information," dated November 5, 2012

4. Letter from T. D. Gatlin (VCSNS) to Document Control Desk (NRC), "Relief Request RR-III-09 Request For Information ," dated November 14, 2012

South Carolina Electric & Gas Company (SCE&G), acting for itself and as an agent for South Carolina Public Service Authority, hereby submits a response to the Request for Additional Information (RAI).

This letter contains no commitments.

A047
NRR

Should you have any questions, please call Bruce L. Thompson at 803-931-5042.

Very truly yours,

Thomas D. Gatlin

JG/TDG/ts

Enclosure: Relief Request RR-III-09, Fatigue Crack Growth RAIs
Attachment 1: Response to RAIs

c: K. B. Marsh
S. A. Byrne
J. B. Archie
N. S. Carns
J. H. Hamilton
R. J. White
W. M. Cherry
V. M. McCree
R. E. Martin
NRC Resident Inspector
K. M. Sutton
NSRC
RTS (CR-12-04775, LTD 1331)
File (810.19-2)
PRSF (RC-12-0179)

VIRGIL C. SUMMER NUCLEAR STATION UNIT 1
REQUEST FOR ADDITIONAL INFORMATION
Relief Request RR-III-09
Alternative Weld Repair For Reactor Vessel Head Penetration
Fatigue Crack Growth

By E-mail on November 15, 2012, additional information was requested to support the review of the subject relief request:

1. ***Please provide a sketch of the head cross section / J-groove weld / nozzle tube / weld overlay showing the dimensions of the flaw assumed in the present analysis (LTR-PAFM-12-137-NP Rev. 2).***

2. ***Which two or three of the reactor coolant system transients given in Table 2-2 of the analysis are the most significant drivers of fatigue crack growth? What are the stress and delta K associated with each of these transients?***

3. ***Please explain why the analysis for the fatigue life of the Byron head with the assumed 2.54 inch J-groove weld flaw predicted "at least 10 years of service life time" (WCAP-16401) and the present analysis for the fatigue life of VC Summer head with the slightly smaller 2.32 inch assumed flaw size showed that the "fatigue crack growth for 20 years is insignificant."***

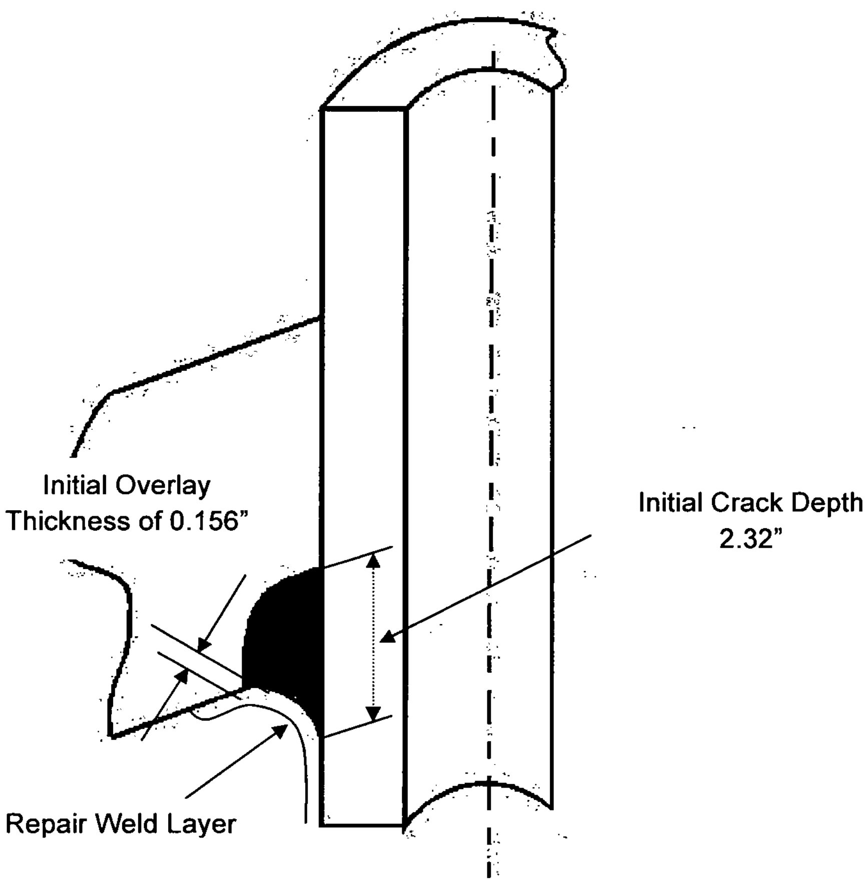
[VCSNS Response]
The responses to these topics are provided in Attachment 1.

VIRGIL C. SUMMER NUCLEAR STATION (VCSNS) UNIT 1
DOCKET NO. 50-395
OPERATING LICENSE NO. NPF-12

Attachment 1

Response to RAIs

Please provide a sketch of the head cross section / J-groove weld / nozzle tube / weld overlay showing the dimensions of the flaw assumed in the present analysis (LTR-PAFM-12-137-NP Rev. 2).



Note: The remaining overlay thickness is 0.142" after 20 years of fatigue crack growth

Which two or three of the reactor coolant system transients given in Table 2-2 of the analysis are the most significant drivers of fatigue crack growth? What are the stress and delta K associated with each of these transients?

The initial ΔK for the three thermal transients that have the most significant contribution to fatigue crack growth are as follows:

1. Loss of Load (200 cycles for 40 years), $\Delta K = 20.8$ ksi-in$^{1/2}$
2. Unit Unloading (18300 cycles for 40 years), $\Delta K = 4.9$ ksi-in$^{1/2}$
3. Heatup (200 cycles for 40 years), $\Delta K = 16.6$ ksi-in$^{1/2}$

Please note that only ΔK is provided since the time history stress data are too voluminous and would not be helpful in assessing the magnitude of fatigue crack growth.

Please explain why the analysis for the fatigue life of the Byron head with the assumed 2.54 inch J-groove weld flaw predicted "at least 10 years of service life time" (WCAP-16401) and the present analysis for the fatigue life of VC Summer head with the slightly smaller 2.32 inch assumed flaw size showed that the "fatigue crack growth for 20 years is insignificant."

A more detailed set of thermal transients was analyzed for V.C. Summer as compared to WCAP-16401. The thermal transient stresses used in WCAP-16401 are based only on the five most significant thermal transients out of the full set of normal/upset thermal transients. The effects of the remaining thermal transients are conservatively accounted for simply by adding the design cycles of these unanalyzed thermal transients to the design cycles of the five most significant transients analyzed.

For V. C. Summer, the full set of normal/upset thermal transients was analyzed and provided a more representative set of thermal transient stresses for the fatigue crack growth analysis. This more precise set of stresses resulted in a longer service life for the weld repairs.