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SCE&G®
A SCANA COMPANY

September 7, 2004

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

Gentlemen:

Subject: VIRGIL C. SUMMER NUCLEAR STATION
DOCKET NO. 50-395
OPERATING LICENSE NO. NPF-12
CORE OPERATING LIMITS REPORT (COLR)
FOR CYCLE 15, REVISION 1

In accordance with Section 6.9.1.11 of the Virgil C. Summer Nuclear Station Technical Specifications, South Carolina Electric & Gas Company (SCE&G) hereby submits revision 1 to the Cycle 15 Core Operating Limits Report (COLR).

Should you have any questions, please call Mr. Jeffrey W. Pease at (803) 345-4124.

Very truly yours,

Jeffrey B. Archie

JWP/JBA
Attachment

NOTE: Attachment is on file in NL&OE

c: Without Attachment unless noted
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SOUTH CAROLINA ELECTRIC & GAS COMPANY

VIRGIL C. SUMMER NUCLEAR STATION

CORE OPERATING LIMITS REPORT

FOR

CYCLE 15

REVISION 1

AUGUST 2004

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2.0 Operating Limits

The cycle-specific parameter limits for the specifications listed in Section 1.0 are presented in the subsections which follow. These limits have been developed using the NRC-approved methodologies specified in Technical Specification 6.9.1.11.

2.1 Moderator Temperature Coefficient (Specification 3.1.1.3):

2.1.1 The Moderator Temperature Coefficient (MTC) limits are:
The BOL/ARO-MTC shall be less positive than the limits shown in Figure 1.
The EOL/ARO/RTP-MTC shall be less negative than $-5x10^{-4}$ $\Delta k/k/°F$.

2.1.2 The MTC Surveillance limit is:
The 300 ppm/ARO/RTP-MTC should be less negative than or equal to $-4.1x10^{-4}$ $\Delta k/k/°F$

where: BOL stands for Beginning of Cycle Life
ARO stands for All Rods Out
RTP stands for RATED THERMAL POWER
EOL stands for End of Cycle Life

2.1.3 The Revised Predicted near-EOL 300 ppm MTC shall be calculated using the following algorithm from Reference 2:

Revised Predicted MTC = Predicted MTC + AFD Correction + Predictive Correction*

*Predictive Correction is -3 pcm/°F.

If the Revised Predicted MTC is less negative than the SR 4.1.1.3b limit of $-4.1x10^{-4}$ $\Delta k/k/°F$, and all of the benchmark data contained in the surveillance procedure are met, then an MTC measurement in accordance with SR 4.1.1.3b is not required.

2.2 Shutdown Rod Insertion Limits (Specification 3.1.3.5):

The shutdown rods shall be withdrawn to at least 230 steps.

2.3 Control Rod Insertion Limits (Specification 3.1.3.6):

Control Bank A and B rods shall be withdrawn to at least 230 steps. Control Bank C and D Insertion Limits are specified by Figure 2. Control rod overlap is 102 steps.

2.4 Axial Flux Difference (Specification 3.2.1):

2.4.1 The Axial Flux Difference (AFD) Limits for RAOC operation for Cycle 15 are shown in Figure 3.

2.4.2 The Axial Flux Difference (AFD) target band during base load operations for Cycle 15 is: BOL - EOL (0 – 22,800 MWD/MTU): ±5% about a measured target value.

2.4.3 The minimum allowable power level for base load operation, APL^{ND}, is 75% of RATED THERMAL POWER.

2.5 Heat Flux Hot Channel Factor - $F_Q(z)$ (Specification 3.2.2):

$$F_Q(Z) \leq \frac{F_Q^{RTP}}{P} \times K(Z) \qquad \text{for } P > 0.5$$

$$F_Q(Z) \leq \frac{F_Q^{RTP}}{0.5} \times K(Z) \qquad \text{for } P \leq 0.5 \qquad \text{where: } P = \frac{\text{Thermal Power}}{\text{Rated Thermal Power}}$$

2.5.1 $F_Q^{RTP} = 2.40$

2.5.2 K(z) is provided in Figure 4.

2.5.3 Elevation dependent W(z) values for RAOC operation at 150, 3000, 10000, and 20000 MWD/MTU are shown in Figures 5 through 8 and Tables 1 through 4, respectively. This information is sufficient to determine W(z) versus core height in the range of 0 MWD/MTU to EOL burnup through the use of three point interpolation. A 2% penalty factor shall be used at all burnups to increase $F_Q^M(z)$ as per Surveillance Requirement 4.2.2.2e.

2.5.4 Elevation dependent $W(z)_{BL}$ values for base load operation between 75 and 100% of rated thermal power with the item 2.4.2 specified target band about a measured target value at 150, 1300, 3000, 4700, 10000, and 20000 MWD/MTU are shown in Figures 9 through 14 and Tables 5 through 10, respectively. This information is sufficient to determine $W(z)_{BL}$ versus core height for burnups in the range of 0 MWD/MTU to EOL burnup through the use of three point interpolation. Table 11 shows F_Q margin decreases for base load operation that are greater than 2% per 31 Effective Full Power Days (EFPD). These values shall be used to increase $F_Q^M(z)$ as per Surveillance Requirement 4.2.2.4e. A 2% penalty factor shall be used at all burnups that are outside the range of Table 11.

2.5.5 Elevation dependent $W(z)_{BL}$ values to be used in the event that an axial offset deviation (AOD) condition exists (as defined by measured axial offset more negative than predicted by 3% or more at beginning of cycle) are shown in Figures 15 through 20 and Tables 12 through 17, respectively. These values apply to base load operation between 75 and 100% of rated thermal power with the item 2.4.2 specified target band about a measured target value at 150, 1300, 3000, 4700, 10000, and 20000 MWD/MTU. This information is sufficient to determine $W(z)_{BL}$ versus core height for burnups in the range of 0 MWD/MTU to EOL burnup through the use of three point interpolation. A 2% penalty factor shall be used at all burnups to increase $F_Q^M(z)$ as per Surveillance Requirement 4.2.2.2e.

2.6 RCS Flow Rate and Nuclear Enthalpy Rise Hot Channel Factor - $F_{\Delta H}^N$ (Specification 3.2.3):

$$R = \frac{F_{\Delta H}^N}{F_{\Delta H}^{RTP} \times \left(1 + PF_{\Delta H}^N \times (1 - P)\right)} \qquad \text{where: } P = \frac{\text{Thermal Power}}{\text{Rated Thermal Power}}$$

2.6.1 $F_{\Delta H}^{RTP} = 1.62$

2.6.2 $PF_{\Delta H} = 0.3$

2.6.3 The Acceptable Operation Region from the combination of Reactor Coolant System total flow and R is provided in Figure 21.

2.7 Power Distribution Measurement Uncertainty (Specifications 3.2.2 and 3.2.3):

If the Power Distribution Monitoring System is OPERABLE, as defined in Technical Specification 3.3.3.11, the uncertainty, $U_{F\Delta H}$, to be applied to the Nuclear Enthalpy Rise Hot Channel Factor $F^N_{\Delta H}$ shall be calculated by the following formula:

$$U_{F\Delta H} = 1.0 + \frac{U_{\Delta H}}{100.0}$$

where: $U_{\Delta H}$ = Uncertainty for enthalpy rise as defined in equation (5-19) in Reference 1.

If the Power Distribution Monitoring System is OPERABLE, as defined in Technical Specification 3.3.3.11, the uncertainty, U_{FQ}, to be applied to the Heat Flux Hot Channel Factor $F_Q(z)$ shall be calculated by the following formula:

$$U_{FQ} = \left(1.0 + \frac{U_Q}{100.0}\right) \cdot U_e$$

where: U_Q = Uncertainty for power peaking factor as defined in equation (5-19) in Reference 1.

U_e = Engineering uncertainty factor.
= 1.03

If the Power Distribution Monitoring System is INOPERABLE, as defined in Technical Specification 3.3.3.11, the uncertainty, $U_{F\Delta H}$, to be applied to the Nuclear Enthalpy Rise Hot Channel Factor $F^N_{\Delta H}$ shall be calculated by the following formula:

$$U_{F\Delta H} = U_{F\Delta Hm}$$

where: $U_{F\Delta Hm}$ = Base $F_{\Delta H}$ measurement uncertainty.
= 1.04

If the Power Distribution Monitoring System is INOPERABLE, as defined in Technical Specification 3.3.3.11, the uncertainty, U_{FQ}, to be applied to the Heat Flux Hot Channel Factor $F_Q(z)$ shall be calculated by the following formula:

$$U_{FQ} = U_{qu} \cdot U_e$$

where: U_{qu} = Base F_Q measurement uncertainty.
= 1.05

U_e = Engineering uncertainty factor.
= 1.03

3.0 References

1) WCAP-12473-A (Non-Proprietary), "BEACON Core Monitoring and Operations Support System," August, 1994.

2) WCAP-13749-P-A, "Safety Evaluation Supporting the Conditional Exemption of the Most Negative EOL Moderator Temperature Coefficient," March 1997, (W Proprietary).

Figure 2. Rod Group Insertion Limits Versus Thermal Power for Three Loop Operation V. C. Summer - Cycle 15