Stephen A. Byrne
Senior Vice President, Nuclear Operations
803.345.4622

SCE&G®
A SCANA COMPANY

May 24, 2001
RC-01-0107

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

Attention: Ms. K. R. Cotton

Gentlemen:

Subject: VIRGIL C. SUMMER NUCLEAR STATION (VCSNS)
DOCKET NO. 50/395
OPERATING LICENSE NO. NPF-12
TECHNICAL SPECIFICATION CHANGE REQUEST - TSP 00-0270
POWER DISTRIBUTION LIMITS - CHANGE TO $F_Q(z)$ MONITORING REGION

South Carolina Electric & Gas Company (SCE&G), acting for itself and as agent for South Carolina Public Service Authority, hereby requests an amendment to the Virgil C. Summer Nuclear Station (VCSNS) Technical Specifications (TS). This request is being submitted pursuant to 10 CFR 50.90.

The proposed changes will revise the verification requirement of specifications 4.2.2.2 and 4.2.2.4, "Heat Flux Hot Channel Factor" to decrease the exclusion zone at the top and bottom of the core. This proposed change has been determined to be required since during the end of life (EOL) of the previous two fuel cycles, the maximum $F_Q(z)$ was determined to occur in the exclusion region.

In order to assure the peak $F_Q(z)$ is monitored and evaluated at and near EOL, SCE&G requests that the excluded region be reduced in the top and the bottom of the core from 15% to 10% of the active core.

SCE&G desires approval for this change by September 3, 2001, with a 30-day implementation period to allow for procedure changes and training prior to reaching end of core life for Cycle 13. This will ensure that the peak $F_Q(z)$ is monitored and tracked before the shift to the exclusion region occurs.

The TS change request is contained in the following attachments:

Attachment I	Remove/Insert Page Table Explanation of Changes Summary Marked-up Technical Specification Pages Revised Technical Specification Pages
Attachment II	Safety Evaluation
Attachment III	No Significant Hazards Evaluation

A001

This proposed TS amendment request has been reviewed by both the Plant Safety Review Committee and the Nuclear Safety Review Committee.

There are no other TS changes in process that will affect or be affected by this change request.

There are no significant changes to any FSAR or FPER sections. FSAR Sections 4.3, 4.4, 15.1, and 15.2 were reviewed. The FPER was reviewed but was not applicable.

A copy of this application and associated attachments is being provided to the designated South Carolina State official in accordance with 10 CFR 50.91.

I certify under penalty of perjury that the foregoing is true and correct.

Should you have questions, please call Mr. Philip A. Rose at (803) 345-4052.

Very truly yours,

Stephen A. Byrne

PAR/SAB/dr
Attachments (3)

c: N. O. Lorick
N. S. Carns
T. G. Eppink (w/o Attachment)
R. J. White
L. A. Reyes
K. R. Cotton
NRC Resident Inspector
Paulett Ledbetter
K. M. Sutton
T. P. O'Kelley
W. R. Higgins
RTS (TSP 00-0270)
File (813.20)
DMS (RC-01-0107)

STATE OF SOUTH CAROLINA :
: **TO WIT** :
COUNTY OF FAIRFIELD :

I hereby certify that on the 24th day of May 2001, before me, the subscriber, a Notary Public of the State of South Carolina personally appeared Stephen A. Byrne, being duly sworn, and states that he is the Vice President, Nuclear Operations of the South Carolina Electric & Gas Company, a corporation of the State of South Carolina, that he provides the foregoing response for the purposes therein set forth, that the statements made are true and correct to the best of his knowledge, information, and belief, and that he was authorized to provide the response on behalf of said Corporation.

WITNESS my Hand and Notarial Seal

Notary Public

My Commission Expires

July 13, 2005
Date

Attachment To License Amendment No. XXX
To Facility Operating License No. NPF-12
Docket No. 50-395

Replace the following pages of the Appendix A Technical Specifications with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Remove Pages	Insert Pages
3/4 2-6	3/4 2-6
3/4 2-6a	3/4 2-6a
3/4 2-6c	3/4 2-6c
B 3/4 2-4	B 3/4 2-4
B 3/4 2-5	B 3/4 2-5

SCE&G – EXPLANATION OF CHANGES SUMMARY

Page	Affected Section	Bar #	Description of Change	Reason for Change
3/4 2-6	4.2.2.2.e	1	Change $F_Q^M(z)$ penalty to identify the Core Operating Limits Report as the location that governs the penalty.	Determination that the peak $F_Q(z)$ can occur outside the monitoring region and to relocate the penalty factor.
	4.2.2.2.e	2	Add "core" in front of "power distribution measurements".	Clarification and consistency.
	4.2.2.2.f	3	Change 4.2.2.2c. to 4.2.2.2.c.	Typographical change only.
	4.2.2.2.e (1), (2); 4.2.2.2.f (1)	4	Change: 4.2.2.2.e (1) to 4.2.2.2.e.1. 4.2.2.2.e (2) to 4.2.2.2.e.2 4.2.2.2.f (1) to 4.2.2.2.f.1.	Typographical change only. This error was initiated during Amendment 75.
3/4 2-6a	4.2.2.2.f. 2.	1	Change: 4.2.2.2.f (2) to 4.2.2.2.f.2.	Typographical change only. This error was initiated during Amendment 75.
	4.2.2.2.f. 2(a)	2	Change: 4.2.2.2f.1) to 4.2.2.2.f.(1).	Typographical change only.
	4.2.2.2.f	3	Change: 4.2.2.2c. to 4.2.2.2.c 4.2.2.2e. to 4.2.2.2.e 4.2.2.2f. to .4.2.2.2.f.	Typographical change only.
	4.2.2.2.g	4	Change the limits of the exclusion region.	Determination that the peak $F_Q(z)$ can occur outside the monitoring region.

SCE&G -- EXPLANATION OF CHANGES SUMMARY Continued

Page	Affected Section	Bar #	Description of Change	Reason for Change
3/4 2-6c	4.2.2.4.e. 1	1	Change $F_Q^M(z)$ penalty to identify the Core Operating Limits Report as the location that governs the penalty.	Determination that the peak $F_Q(z)$ can occur outside the monitoring region and to relocate the penalty factor.
	4.2.2.4.e. 2	2	Add "core" in front of "power distribution measurements".	Clarification and consistency.
	4.2.2.4.g	3	Change the limits of the exclusion region	Determination that the peak $F_Q(z)$ can occur outside the monitoring region.
	4.2.2.5	4	Correct capitalization errors.	Upper case changes only.
B 3/3 2-4	B3/4.2.2 and B3/4.2.3	1	Add a discussion of why a penalty is added to $F_Q(z)$ and actions required to assure analysis limits are not exceeded.	Determination that the peak $F_Q(z)$ can occur outside the monitoring region and to relocate the penalty factor.
	B3/4.2.2 and B3/4.2.3	2	Added "limits of" in front of "RCS Total Flow Rate".	Clarification and consistency.
B 3/3 2-5	B3/4.2.2 and B3/4.2.3	1	• Pagination change only. • Last paragraph beginning with "The 12-hour": Changed "would" to "could" and capitalized "Figure".	• Pagination change. • Clarification and consistency.

SURVEILLANCE REQUIREMENTS (Continued)

e. With the maximum value of

$$\frac{F_Q^M(z)}{K(z)}$$

over the core height (z) increasing since the previous determination of $F_Q^M(z)$ either of the following actions shall be taken:

INSERT A (1) 1. ~~$F_Q^M(z)$ shall be increased by 2% over that specified in Specification 4.2.2.2c. or~~

(2) 2. $F_Q^M(z)$ shall be measured at least once per 7 Effective Full Power Days until two successive core power distribution measurements indicate that the maximum value of

$$\frac{F_Q^M(z)}{K(z)}$$

over the core height (z) is not increasing.

f. With the relationships specified in Specification 4.2.2.2c. above not being satisfied:

(1) 1. Calculate the maximum percent over the core height (z) that $F_Q(z)$ exceeds its limit by the following expression:

$$\left\{\left[\frac{F_Q^M(z) \times W(z)}{\frac{F_Q^{RTP}}{P} \times K(z)}\right] - 1\right\} \times 100 \text{ for } P \geq 0.5$$

$$\left\{\left[\frac{F_Q^M(z) \times W(z)}{\frac{F_Q^{RTP}}{0.5} \times K(z)}\right] - 1\right\} \times 100 \text{ for } P < 0.5$$

Insert A for TSP 00-0270

Increase $F_Q^M(z)$ by the appropriate penalty factor specified in the COLR and verify that this value satisfies the relationship in Specification 4.2.2.2.c, or

SURVEILLANCE REQUIREMENTS (Continued)

(2) 2. One of the following actions shall be taken:

(a) Within 15 minutes, control the AFD to within new AFD limits which are determined by reducing the applicable AFD limits by 1% AFD for each percent $F_Q(z)$exceeds its limits as determined in Specification 4.2.2.2f(1). Within 8 hours, reset the AFD alarm setpoints to these modified limits, or
2.f.(1)

(b) Comply with the requirements of Specification 3.2.2 for $F_Q(z)$ exceeding its limit by the percent calculated above, or

(c) Verify that the requirements of Specification 4.2.2.3 for Base Load operation are satisfied and enter Base Load operation.

g. The limits specified in Specifications 4.2.2.2c, 4.2.2.2e, and 4.2.2.2f above are not applicable in the following core plane regions:

1. Lower core region from 0 to 15% 10%, inclusive.
2. Upper core region from 85 90 to 100%, inclusive.

4.2.2.3 Base Load operation is permitted at powers above APL^{ND} if the following conditions are satisfied:

a. Prior to entering Base Load operation, maintain THERMAL POWER above APL^{ND} and less than or equal to that allowed by Specification 4.2.2.2 for at least the previous 24 hours. Maintain Base Load operation surveillance (AFD within applicable target band about the target flux difference) during this time period. Base Load operation is then permitted providing THERMAL POWER is maintained between APL^{ND} and APL^{BL} or between APL^{ND} and 100% (whichever is most limiting) and F_Q surveillance is maintained pursuant to Specification 4.2.2.4. APL^{BL} is defined as the minimum value of:

$$APL^{BL} = \frac{F_Q^{RTP} \times K(z)}{F_Q^{M}(z) \times W(z)_{BL}} \times 100\%$$

over the core height (z) where: $F_Q^M(z)$ is the measured $F_Q(z)$ increased by the applicable allowances for manufacturing tolerances and measurement uncertainty as specified in the COLR. The F_Q limit is F_Q^{RTP}. $W(z)_{BL}$ is the cycle dependent function that accounts for limited power distribution transient encountered during base load operation. F_Q^{RTP}, K(z), and $W(z)_{BL}$ are specified in the CORE OPERATING LIMITS REPORT as per Specification 6.9.1.11.

over the core height (z) increasing since the previous determination of $F_Q^M(z)$ either of the following actions shall be taken:

INSERT B

1. ~~$F_Q^M(z)$ shall be increased by 2 percent over that specified in 4.2.2.4.c, or~~

2. $F_Q^M(z)$ shall be measured at least once per 7 Effective Full Power Days until 2 successive core power distribution measurements indicate that the maximum value of

$$\frac{F_Q^M(z)}{K(z)}$$

over the core height (z) is not increasing.

f. With the relationship specified in 4.2.2.4.c above not being satisfied, either of the following actions shall be taken:

1. Place core in an equilibrium condition where the limit in 4.2.2.2.c is satisfied, and remeasure $F_Q^M(z)$, or

2. Comply with the requirements of Specification 3.2.2 for $F_Q(z)$ exceeding its limit by the maximum percent calculated over the core height (z) with the following expression:

$$\left\{\left[\frac{F_Q^M(z) \times W(z)_{BL}}{\frac{F_Q^{RTP}}{P} \times K(z)}\right] - 1\right\} \times 100 \text{ for } P \geq APL^{ND}$$

g. The limits specified in 4.2.2.4.c, 4.2.2.4.e, and 4.2.2.4.f above are not applicable in the following core plane regions:

1. Lower core region 0 to ~~15 percent~~ 10%, inclusive.

2. Upper core region ~~85~~ 90 to 100 ~~percent~~ %, inclusive.

4.2.2.5 When $F_Q(z)$ is measured for reasons other than meeting the requirements of Specification 4.2.2.2 an overall measured $F_Q(z)$ shall be obtained:

a. From a power distribution map

1. When THERMAL POWER is ≤ 25%, but > 5% of RATED THERMAL POWER, or

2. When the Power Distribution Monitoring System (PDMS) is inoperable;

and increasing the measured $F_Q(z)$ by the applicable manufacturing and measurement uncertainties as specified in the COLR.

b. From the PDMS when THERMAL POWER is > 25% of RATED THERMAL POWER; and increasing the measured $F_Q(z)$ by the applicable manufacturing and measurement uncertainties as specified in the COLR.

Insert B for TSP 00-0270

Increase $F_Q^M(z)$ by the appropriate penalty factor specified in the COLR and verify that this value satisfies the relationship in Specification 4.2.2.4.c, or

HEAT FLUX HOT CHANNEL FACTOR and RCS FLOWRATE and NUCLEAR ENTHALPY RISE HOT CHANNEL FACTOR (Continued)

For measurements obtained using the Power Distribution Monitoring System (PDMS), the appropriate measurement uncertainty is determined using the measurement uncertainty methodology contained in WCAP-12472-P-A. The cycle and plant specific uncertainty calculation information needed to support the PDMS calculation is contained in the COLR. The PDMS will automatically calculate and apply the correct measurement uncertainty, and apply a 3% allowance for manufacturing tolerance.

The hot channel factor $F_Q^M(z)$ is measured periodically and increased by a cycle and height dependent power factor appropriate to either RAOC or Base Load operation, W(z) or $W(z)_{BL}$, to provide assurance that the limit on the hot channel factor, $F_Q(z)$ is met. W(z) accounts for the effects of normal operation transients and was determined from expected power control maneuvers over the full range of burnup conditions in the core. $W(z)_{BL}$ accounts for the more restrictive operating limits allowed by Base Load operation which result in less severe transient values. INSERT C The W(z) and $W(z)_{BL}$ functions described above for normal operation are specified in the CORE OPERATING LIMITS REPORT (COLR) per Specification 6.9.1.11.

When RCS flow rate is measured, no additional allowances are necessary prior to comparison with the limits of the RCS Total Rate Versus R figure in the COLR. Measurement errors of 2.1% for RCS total flow rate, including 0.1% for feedwater venturi fouling, have been allowed for in determining the limits of RCS Total Flow Rate Versus R Figure in the COLR.

For $F_{\Delta H}^N$ measurements obtained from a full core flux map taken with the incore detector flux mapping system, a 4% measurement uncertainty allowance should be applied to the measured $F_{\Delta H}^N$ value prior to comparison with the limits of the RCS Total Flow Rate Versus R Figure in the COLR. The appropriate measurement uncertainty for $F_{\Delta H}^N$ measurements obtained using the Power Distribution Monitoring System (PDMS) is determined using the uncertainty methodology described in WCAP-12472-P-A. The cycle and plant specific uncertainty calculation information needed to support the PDMS uncertainty calculation is contained in the COLR. The PDMS will automatically calculate and apply the correct measurement uncertainty to the measured $F_{\Delta H}^N$ value.

The 12-hour ~~periodic~~ surveillance of indicated RCS flow is sufficient to detect only flow degradation which ~~would~~ could lead to operation outside the acceptable region of operation specified on the RCS Total Flow Rate Versus R ~~f~~Figure in the COLR.

3/4.2.4 QUADRANT POWER TILT RATIO

The quadrant power tilt power ratio limit assures that the radial power distribution satisfies the design values used in the power capability analysis. Radial power distribution measurements are made during startup testing and periodically during power operation.

Insert C for TSP 00-0270

If two most recent $F_Q(z)$ evaluations show an increase in the maximum value of $\left[\frac{F_Q^M(z)}{K(z)}\right]$ over the core height (z), it is not guaranteed that $F_Q^M(z)$ will remain within the transient limit during the following surveillance interval. Technical Specification Surveillance Requirement 4.2.2 requires that $F_Q^M(z)$ be increased by a penalty factor as specified in the COLR and compared to the transient $F_Q(z)$ limit. If there is insufficient margin, i.e., this value exceeds the limit, the $F_Q^M(z)$ must be measured once per 7 EFPD until either $F_Q^M(z)$ increased by the penalty factor is within the transient limit, or two successive power distribution measurements indicate the maximum value of $\left[\frac{F_Q^M(z)}{K(z)}\right]$ over the core height (z) has not increased.

No changes - Pagination only

QUADRANT POWER TILT RATIO (Continued)

The limit of 1.02, at which corrective action is required, provides DNB and linear heat generation rate protection with x-y plane power tilts. A limiting tilt of 1.025 can be tolerated before the margin for uncertainty in F_Q is depleted. The limit of 1.02 was selected to provide an allowance for the uncertainty associated with the indicated power tilt.

The two hour time allowance for operation with a tilt condition greater than 1.02 but less than 1.09 is provided to allow identification and correction of a dropped or misaligned control rod. In the event such action does not correct the tilt, the margin for uncertainty on F_Q is reinstated by reducing the maximum allowed power by 3 percent for each percent of tilt in excess of 1.0.

For purposes of monitoring QUADRANT POWER TILT RATIO when one excore detector is inoperable, the movable incore detectors or a core power distribution measurement are used to confirm that the normalized symmetric power distribution is consistent with the QUADRANT POWER TILT RATIO. The incore detector monitoring is done with a full incore flux map or two sets of 4 symmetric thimbles. These locations are C-8, E-5, E-11, H-3, H-13, L-5, L-11, N-8.

3/4.2.5 DNB PARAMETERS

The limits on the DNB related parameters assure that each of the parameters are maintained within the normal steady state envelope of operation assumed in the transient and accident analyses. The limits are consistent with the initial FSAR assumptions and have been analytically demonstrated adequate to maintain a minimum of DNBR in the core at or above the design limit throughout each analyzed transient. The maximum indicated T_{avg} limit of 589.2°F and the minimum indicated pressure limit of 2206 psig correspond to analytical limits of 591.4°F and 2185 psig respectively, read from control board indications.

The 12-hour periodic surveillance of these parameters through instrument readout is sufficient to ensure that the parameters are restored within their limits following load changes and other expected transient operation.

e. With the maximum value of

$$\frac{F_Q^M(z)}{K(z)}$$

over the core height (z) increasing since the previous determination of $F_Q^M(z)$ either of the following actions shall be taken:

1. Increase $F_Q^M(z)$ by the appropriate penalty factor specified in the COLR and verify that this value satisfies the relationship in Specification 4.2.2.2.c, or

2. $F_Q^M(z)$ shall be measured at least once per 7 Effective Full Power Days until two successive core power distribution measurements indicate that the maximum value of

$$\frac{F_Q^M(z)}{K(z)}$$

over the core height (z) is not increasing.

f. With the relationships specified in Specification 4.2.2.2.c. above not being satisfied:

1. Calculate the maximum percent over the core height (z) that $F_Q(z)$ exceeds its limit by the following expression:

$$\left\{\left[\frac{F_Q^M(z) \times W(z)}{\frac{F_Q^{RTP}}{P} \times K(z)}\right] - 1\right\} \times 100 \text{ for } P \geq 0.5$$

$$\left\{\left[\frac{F_Q^M(z) \times W(z)}{\frac{F_Q^{RTP}}{0.5} \times K(z)}\right] - 1\right\} \times 100 \text{ for } P < 0.5$$

2. One of the following actions shall be taken:

   (a) Within 15 minutes, control the AFD to within new AFD limits which are determined by reducing the applicable AFD limits by 1% AFD for each percent $F_Q(z)$ exceeds its limits as determined in Specification 4.2.2.2.f.(1). Within 8 hours, reset the AFD alarm setpoints to these modified limits, or

   (b) Comply with the requirements of Specification 3.2.2 for $F_Q(z)$ exceeding its limit by the percent calculated above, or

   (c) Verify that the requirements of Specification 4.2.2.3 for Base Load operation are satisfied and enter Base Load operation.

g. The limits specified in Specifications 4.2.2.2.c., 4.2.2.2.e., and 4.2.2.2.f. above are not applicable in the following core plane regions:

1. Lower core region from 0 to 10%, inclusive.
2. Upper core region from 90 to 100%, inclusive.

4.2.2.3 Base Load operation is permitted at powers above APL^{ND} if the following conditions are satisfied:

a. Prior to entering Base Load operation, maintain THERMAL POWER above APL^{ND} and less than or equal to that allowed by Specification 4.2.2.2 for at least the previous 24 hours. Maintain Base Load operation surveillance (AFD within applicable target band about the target flux difference) during this time period. Base Load operation is then permitted providing THERMAL POWER is maintained between APL^{ND} and APL^{BL} or between APL^{ND} and 100% (whichever is most limiting) and F_Q surveillance is maintained pursuant to Specification 4.2.2.4. APL^{BL} is defined as the minimum value of:

$$APL^{BL} = \frac{F_Q^{RTP} \times K(z)}{F_Q^M(z) \times W(z)_{BL}} \times 100\%$$

over the core height (z) where: $F_Q^M(z)$ is the measured $F_Q(z)$ increased by the applicable allowances for manufacturing tolerances and measurement uncertainty as specified in the COLR. The F_Q limit is F_Q^{RTP}. $W(z)_{BL}$ is the cycle dependent function that accounts for limited power distribution transient encountered during base load operation. F_Q^{RTP}, K(z), and $W(z)_{BL}$ are specified in the CORE OPERATING LIMITS REPORT as per Specification 6.9.1.11.

over the core height (z) increasing since the previous determination of $F_Q^M(z)$ either of the following actions shall be taken:

1. Increase $F_Q^M(z)$ by the appropriate penalty factor specified in the COLR and verify that this value satisfies the relationship in Specification 4.2.2.4.c, or

2. $F_Q^M(z)$ shall be measured at least once per 7 Effective Full Power Days until 2 successive core power distribution measurements indicate that the maximum value of

$$\frac{F_Q^M(z)}{K(z)}$$

over the core height (z) is not increasing.

f. With the relationship specified in 4.2.2.4.c above not being satisfied, either of the following actions shall be taken:

1. Place core in an equilibrium condition where the limit in 4.2.2.2.c is satisfied, and remeasure $F_Q^M(z)$, or

2. Comply with the requirements of Specification 3.2.2 for $F_Q(z)$ exceeding its limit by the maximum percent calculated over the core height (z) with the following expression:

$$\left\{\left[\frac{F_Q^M(z) x W(z)_{BL}}{\frac{F_Q^{RTP}}{P} x K(z)}\right] - 1\right\} x\ 100 \text{ for } P \geq APL^{ND}$$

g. The limits specified in 4.2.2.4.c, 4.2.2.4.e, and 4.2.2.4.f above are not applicable in the following core plane regions:

1. Lower core region 0 to 10%, inclusive.

2. Upper core region 90 to 100%, inclusive.

4.2.2.5 When $F_Q(z)$ is measured for reasons other than meeting the requirements of Specification 4.2.2.2 an overall measured $F_Q(z)$ shall be obtained:

a. From a power distribution map

1. When THERMAL POWER is ≤ 25%, but > 5% of RATED THERMAL POWER, or

2. When the Power Distribution Monitoring System (PDMS) is inoperable;

and increasing the measured $F_Q(z)$ by the applicable manufacturing and measurement uncertainties as specified in the COLR.

b. From the PDMS when THERMAL POWER is > 25% of RATED THERMAL POWER; and increasing the measured $F_Q(z)$ by the applicable manufacturing and measurement uncertainties as specified in the COLR.

HEAT FLUX HOT CHANNEL FACTOR and RCS FLOWRATE and NUCLEAR ENTHALPY RISE HOT CHANNEL FACTOR (Continued)

For measurements obtained using the Power Distribution Monitoring System (PDMS), the appropriate measurement uncertainty is determined using the measurement uncertainty methodology contained in WCAP-12472-P-A. The cycle and plant specific uncertainty calculation information needed to support the PDMS calculation is contained in the COLR. The PDMS will automatically calculate and apply the correct measurement uncertainty, and apply a 3% allowance for manufacturing tolerance.

The hot channel factor $F_Q^M(z)$ is measured periodically and increased by a cycle and height dependent power factor appropriate to either RAOC or Base Load operation, W(z) or $W(z)_{BL}$, to provide assurance that the limit on the hot channel factor, $F_Q(z)$ is met. W(z) accounts for the effects of normal operation transients and was determined from expected power control maneuvers over the full range of burnup conditions in the core. $W(z)_{BL}$ accounts for the more restrictive operating limits allowed by Base Load operation which result in less severe transient values. If two most recent $F_Q(z)$ evaluations show an increase in the maximum value of $\left[\frac{F_Q^M(z)}{K(z)}\right]$ over the core height (z), it is not guaranteed that $F_Q^M(z)$ will remain within the transient limit during the following surveillance interval. Technical Specification Surveillance Requirement 4.2.2 requires that $F_Q^M(z)$ be increased by a penalty factor as specified in the COLR and compared to the transient $F_Q(z)$ limit. If there is insufficient margin, i.e., this value exceeds the limit, the $F_Q^M(z)$ must be measured once per 7 EFPD until either $F_Q^M(z)$ increased by the penalty factor is within the transient limit, or two successive power distribution measurements indicate the maximum value of $\left[\frac{F_Q^M(z)}{K(z)}\right]$ over the core height (z) has not increased. The W(z) and $W(z)_{BL}$ functions described above for normal operation are specified in the CORE OPERATING LIMITS REPORT (COLR) per Specification 6.9.1.11.

When RCS flow rate is measured, no additional allowances are necessary prior to comparison with the limits of the RCS Total Rate Versus R figure in the COLR. Measurement errors of 2.1% for RCS total flow rate, including 0.1% for feedwater venturi fouling, have been allowed for in determining the limits of RCS Total Flow Rate Versus R Figure in the COLR.

For $F_{\Delta H}^N$ measurements obtained from a full core flux map taken with the incore detector flux mapping system, a 4% measurement uncertainty allowance should be applied to the measured $F_{\Delta H}^N$ value prior to comparison with the limits of the RCS Total Flow Rate Versus R Figure in the COLR. The appropriate measurement uncertainty for $F_{\Delta H}^N$ measurements obtained using the Power Distribution Monitoring System (PDMS) is determined using the uncertainty methodology described in WCAP-12472-P-A. The cycle and plant specific uncertainty calculation information needed to support the PDMS uncertainty calculation is

HEAT FLUX HOT CHANNEL FACTOR and RCS FLOWRATE and NUCLEAR ENTHALPY RISE HOT CHANNEL FACTOR (Continued)

contained in the COLR. The PDMS will automatically calculate and apply the correct measurement uncertainty to the measured $F^N_{\Delta H}$ value.

The 12-hour periodic surveillance of indicated RCS flow is sufficient to detect only flow degradation which could lead to operation outside the acceptable region of operation specified on the RCS Total Flow Rate Versus R F.igure in the COLR.

3/4.2.4 QUADRANT POWER TILT RATIO

The quadrant power tilt power ratio limit assures that the radial power distribution satisfies the design values used in the power capability analysis. Radial power distribution measurements are made during startup testing and periodically during power operation.

The limit of 1.02, at which corrective action is required, provides DNB and linear heat generation rate protection with x-y plane power tilts. A limiting tilt of 1.025 can be tolerated before the margin for uncertainty in F_Q is depleted. The limit of 1.02 was selected to provide an allowance for the uncertainty associated with the indicated power tilt.

The two hour time allowance for operation with a tilt condition greater than 1.02 but less than 1.09 is provided to allow identification and correction of a dropped or misaligned control rod. In the event such action does not correct the tilt, the margin for uncertainty on F_Q is reinstated by reducing the maximum allowed power by 3 percent for each percent of tilt in excess of 1.0.

For purposes of monitoring QUADRANT POWER TILT RATIO when one excore detector is inoperable, the movable incore detectors or a core power distribution measurement are used to confirm that the normalized symmetric power distribution is consistent with the QUADRANT POWER TILT RATIO. The incore detector monitoring is done with a full incore flux map or two sets of 4 symmetric thimbles. These locations are C-8, E-5, E-11, H-3, H-13, L-5, L-11, N-8.

3/4.2.5 DNB PARAMETERS

The limits on the DNB related parameters assure that each of the parameters are maintained within the normal steady state envelope of operation assumed in the transient and accident analyses. The limits are consistent with the initial FSAR assumptions and have been analytically demonstrated adequate to maintain a minimum of DNBR in the core at or above the design limit throughout each analyzed transient. The maximum indicated T_{avg} limit of 589.2°F and the minimum indicated pressure limit of 2206 psig correspond to analytical limits of 591.4°F and 2185 psig respectively, read from control board indications.

The 12-hour periodic surveillance of these parameters through instrument readout is sufficient to ensure that the parameters are restored within their limits following load changes and other expected transient operation.

SAFETY EVALUATION FOR ADOPTING A REVISED METHODOLOGY (HEAT FLUX HOT CHANNEL FACTOR) FOR THE VIRGIL C. SUMMER NUCLEAR STATION TECHNICAL SPECIFICATIONS

Description of Amendment Request

1.0 INTRODUCTION

The Virgil C. Summer Nuclear Station (VCSNS) Technical Specifications (TS) Section 4.2.2.2.e, g and 4.2.2.4.e, g, are being changed to adopt a revised methodology that relocates the Heat Flux Hot Channel Factor, $F_Q(z)$, penalty for increasing $F_Q(z)$ versus burnup to a table in the Core Operating Limits Report (COLR). Additionally proposed is an increase in the $F_Q(z)$ surveillance region to be consistent with the current core design and provide assurance that the peak $F_Q(z)$ is monitored and evaluated near end of core life.

Additionally, the Technical Specifications Bases section for the Heat Flux Hot Channel Factor are being revised to provide a discussion on the reason for the penalty factor and the actions required.

2.0 BACKGROUND

Westinghouse Electric Company revised their topical report WCAP-10216-P, "Relaxation of Constant Axial Offset Control - F_Q Surveillance Technical Specification". WCAP-10216-P is referenced in Technical Specification (TS) Section 6.9.1.11. WCAP-10216-P-A, Revision 1A has received NRC approval and is used to determine the core operating limits.

The $F_Q(z)$ TS takes into account the possibility that $F_Q(z)$ may increase between surveillances. The TS require that when performing the surveillance, the resulting maximum $F_Q(z)$ value must be compared to the maximum $F_Q(z)$ determined from the previous measurement. If the maximum $F_Q(z)$ has increased since the previous determination, the TS allows two options: either the current $F_Q(z)$ must be increased by an additional 2.0 percent to account for further increases in $F_Q(z)$ before the next surveillance, or the surveillance period must be reduced to every seven effective full power days (EFPD).

The current methodology provide two options for accounting for the $F_Q(z)$ increases:

1. The penalty will be included in the COLR as replacement for the current 2.0 percent standard value.

2. The additional penalty in excess of 2.0 percent may be factored into the W(z) function, which is a cycle dependent function that accounts for power distribution transients encountered during normal operations.

The current TS methodology places the additional penalty in excess of 2.0 percent into the W(z) function. The proposed method will replace the cycle specific penalty in the COLR. The current TS 6.9.1.11.b includes both methods as options. The methodology will provide additional peaking margin when $F_Q(z)$ is increasing.

The TS indicate that when verifying the $F_Q^M(z)$ is within its limits, the top and bottom 15% of the core are excluded from consideration due to the difficulty in making a precise measurement for the region and the low probability that this region would be more limiting than the central 70% of the active core. However, near end-of-life (EOL) of cycles 11 and 12, the maximum $F_Q(z)$ was measured in the 15% exclusion region of the core. In these cycles the near EOL maximum measured $F_Q(z)$ occurred just in the exclusion region near the boundary of the exclusion region of the core. Based on predicted values and similarities of the previous cycles to Cycle 13 design, we expect the same to occur near EOL of Cycle 13.

Safety Evaluation

The heat flux hot channel factor ($F_Q(z)$) is defined as the maximum local heat flux on the surface of a fuel rod at core height z, divided by the average fuel rod heat flux. This value is defined and measured to assure that the design limits on peak local power density and that in the event of a Loss of Coolant Accident (LOCA), the peak fuel clad temperature will not exceed acceptance criteria. Since $F_Q(z)$ surveillance is only required when power has been increased by ten percent of rated power since the previous surveillance, or at least every 31 effective full power days (EFPD), the technical Specifications (TS) take into account the possibility that $F_Q(z)$ may increase between surveillances.

The TS requires that when performing the surveillance, the resulting maximum $\left[\frac{F_Q^M(z)}{K(z)}\right]$ value must be compared to the maximum value determined from the previous measurement. If the maximum value of this ratio has increased since the previous determination, then the TS allows two options: either the current $F_Q(z)$ must be increased by an appropriate burn-up dependent penalty to account for further increases in $F_Q(z)$ before the next surveillance, or the surveillance period must be reduced to every seven EFPD.

Currently the penalty is applied via a combination of two percent which is located in the TS and the W(z) functions which are located in the Core Operating Limits Report (COLR). The W(z) values currently include any excess penalty (if needed) above two percent. Based on Westinghouse RAOC methodology (WCAP-10216-P-A, Revision 1A, "Relaxation of Constant Axial Offset Control F_Q Surveillance Technical Specification") which was approved by the NRC in 1994, the burn-up dependent penalty factors can be relocated from the TS to the COLR. Consistent with this methodology, these cycle specific and burn-up dependent

penalty factors will have a minimum value of two percent and the W(z) functions will no longer include any excess penalty.

WCAP-10216-P-A, Revision 1A also indicated that when verifying that $F_Q^M(z)$ is within limits, the top and bottom 15 percent of the core (0-15% and 85-100% of core height) are excluded from consideration due to the difficulty in making a precise measurement for these regions and the low probability that these regions would be more limiting than the central 70 percent of the core. However, in cycles 11 and 12, the near end-of-life (EOL) maximum measured $F_Q(z)$ occurred just inside the exclusion region near the boundary of the exclusion region. Based on predicted values and similarities of the previous cycles to the cycle 13 design, SCE&G expects the same to occur near EOL of cycle 13. It should be noted that when transient $F_Q(z)$ is calculated analytically. It is shown that the $F_Q(z)$ limit is met for the entire active height of the core (i.e., no exclusion region is assumed).

The effect of the proposed changes was assessed on the following areas:

- LOCA and Non-LOCA transient Analyses of Record
- Core Design

Non-LOCA Transient Analyses

The proposed changes will not adversely affect the non-LOCA analyses, because neither the penalty factor nor the $F_Q^M(z)$ monitoring exclusion zones are modeled in the non-LOCA events. Therefore, the requirements of the non-LOCA safety analyses will continue to be satisfied.

LOCA and LOCA-Related Evaluations

The proposed changes were reviewed against the following LOCA related analyses and determined to not have any adverse impact.

- Large and Small Break LOCA
- Reactor Vessel and Loop LOCA Blow down Forces
- Post-LOCA Long Term Core Cooling Sub-Criticality
- Post-LOCA Long Term Core Cooling Minimum Flow and Hot Leg Switch Over to Prevent Boron Precipitation

Furthermore, these changes do not affect the normal plant operating parameters, Engineered Safeguards Systems or Reactor Protection systems actuations, or any other plant capability important to the mitigation of a LOCA. The assumptions used in the analyses for LOCA related events are likewise unaffected.

Core Design Evaluation

Although most plants measure the maximum $F_Q(z)$ within the center 70 percent of the core, there exists design factors that can cause the peak $F_Q(z)$ to occur within the measurement exclusion zone. Recent designs performed for V. C. Summer include six inch non-fully enriched axial blankets, long cycle lengths at increased Rated Thermal Power (RTP), and a relatively small number of feed assemblies. Toward EOL, these design factors tend to cause the axial power distribution to be "pinched" toward the ends of the core. The maximum F_Q may also occur in the exclusion zone near beginning-of-life if a large number of part length integral fuel burnable absorbers (IFBA) rods are used in the design of the core and if those rods have six inches of uncoated enriched fuel between the IFBA coating and the blanket.

The top and bottom 15 percent of the core is currently excluded for consideration due to the difficulty in making precise measurements for this region and the low probability (for most core designs) that this region would be more limiting than the central 70 percent of active core height. It has been demonstrated that the accuracy of elevation dependent measured peaking factors decreases towards the ends of the core. However, this reduction in accuracy is small when the exclusion zone is reduced from 15 percent to 10 percent and does not result in any increase to TS measurement uncertainties.

Furthermore, SCE&G has data that indicates that the maximum F_Q is present in the (current) exclusion zone. Changing the exclusion zone from 15 percent to 10 percent for the F_Q monitoring will allow the monitoring of those cases where the peak F_Q occurs within the current 15 percent exclusion region. Since measuring the transient $F_Q(z)$ within the exclusion region is more conservative than the current TS requirement, there is no adverse safety significance to this change in the TS defined exclusion region.

With respect to the relocation of the burn-up dependent F_Q penalty factors from the TS to the COLR and not including the excess burn-up dependent F_Q penalty factors implicitly in the W(z) function, this change is administrative in nature. NRC approved methods are used. Since none of the inputs within the core design or analysis are affected and guidelines provided in WCAP-10216-P-A, Revision 1A are followed, there are no adverse safety concerns associated with this relocation.

NO SIGNIFICANT HAZARDS EVALUATION FOR ADOPTING A REVISED METHODOLOGY (HEAT FLUX HOT CHANNEL FACTOR) FOR THE VIRGIL C. SUMMER NUCLEAR STATION TECHNICAL SPECIFICATIONS

Description of Amendment Request

1.0 INTRODUCTION

The Virgil C. Summer Nuclear Station (VCSNS) Technical Specifications (TS) Section 4.2.2.2.e, g and 4.2.2.4.e, g, are being changed to adopt a revised methodology that relocates the Heat Flux Hot Channel Factor, $F_Q(z)$, penalty for increasing $F_Q(z)$ versus burnup to a table in the Core Operating Limits Report (COLR). Additionally proposed is an increase in the $F_Q(z)$ surveillance region to be consistent with the current core design and provide assurance that the peak $F_Q(z)$ is monitored and evaluated near end of core life.

Additionally, the Technical Specifications Bases section for the Heat Flux Hot Channel Factor are being revised to provide a discussion on the reason for the penalty factor and the actions required.

2.0 BACKGROUND

Westinghouse Electric Company revised their topical report WCAP-10216-P, "Relaxation of Constant Axial Offset Control - F_Q Surveillance Technical Specification". WCAP-10216-P is referenced in Technical Specification (TS) Section 6.9.1.11. WCAP-10216-P-A, Revision 1A has received NRC approval and is used to determine the core operating limits.

The $F_Q(z)$ TS takes into account the possibility that $F_Q(z)$ may increase between surveillances. The TS require that when performing the surveillance, the resulting maximum $F_Q(z)$ value must be compared to the maximum $F_Q(z)$ determined from the previous measurement. If the maximum $F_Q(z)$ has increased since the previous determination, the TS allows two options: either the current $F_Q(z)$ must be increased by an additional 2.0 percent to account for further increases in $F_Q(z)$ before the next surveillance, or the surveillance period must be reduced to every seven effective full power days (EFPD).

The current methodology provide two options for accounting for the $F_Q(z)$ increases:

1. The penalty will be included in the COLR as replacement for the current 2.0 percent standard value.

2. The additional penalty in excess of 2.0 percent may be factored into the W(z) function, which is a cycle dependent function that accounts for power distribution transients encountered during normal operations.

The current TS methodology places the additional penalty in excess of 2.0 percent into the W(z) function. The proposed method will replace the cycle specific penalty in the COLR. The current TS 6.9.1.11.b includes both methods as options. The methodology will provide additional peaking margin when $F_Q(z)$ is increasing.

The TS indicate that when verifying the $F_Q^M(z)$ is within its limits, the top and bottom 15% of the core are excluded from consideration due to the difficulty in making a precise measurement for the region and the low probability that this region would be more limiting than the central 70% of the active core. However, near end-of-life (EOL) of cycles 11 and 12, the maximum $F_Q(z)$ was measured in the 15% exclusion region of the core. In these cycles the near EOL maximum measured $F_Q(z)$ occurred just in the exclusion region near the boundary of the exclusion region of the core. Based on predicted values and similarities of the previous cycles to Cycle 13 design, we expect the same to occur near EOL of Cycle 13.

Basis for No Significance Hazards Consideration Determination

South Carolina Electric & Gas Company (SCE&G) has evaluated the proposed changes to the VCSNS TS described above against the Significant Hazards Criteria of 10 CFR 50.92 and has determined that the changes do not involve any significant hazard. The following is provided in support of this conclusion.

1. Does the change involve a significant increase in the probability or consequences of an accident previously evaluated?

   No.

   The proposed changes to the measurement and evaluation of the maximum $F_Q(z)$ will provide conservative limits for assuring the plant is operated in a safe and consistent manner. No changes are being made that could initiate an accident. The consequences of accidents previously evaluated are unaffected by these proposed changes as no change to equipment response or accident mitigation capabilities (including assessment capabilities) has occurred. The proposed changes have no impact on the principal safety barriers of the plant.

   Therefore, the change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the change create the possibility of a new or different kind of accident from any accident previously evaluated?

   No.

   The proposed changes decrease the size of the core region that is excluded from the evaluation of peak $F_Q(z)$ and relocate penalties from the TS to the COLR per an approved methodology. No new accident scenarios, failure mechanisms or limiting single failures are introduced as the result of this proposed change. This change does not challenge the integrity or performance of any safety-related system.

   Therefore, the possibility of a new or different kind of accident is not created.

3. Does this change involve a significant reduction in margin of safety?

   No.

   The proposed change relocates the penalties associated with measuring $F_Q(z)$ and decreases the size of the core regions excluded from the TS required surveillance for peak $F_Q(z)$. There is no effect on the availability operability, or performance of the safety-related systems, structures, or components. The margin of safety associated with the acceptance criteria for any accident is unchanged. All surveillances will be performed at their required frequencies and with the same acceptance criteria, which assures the plant conditions prior to transients, events, and accidents remains within the conditions assumed in the safety analyses.

   The Bases of the TS are founded in part on the ability of the regulatory criteria being satisfied assuming limiting conditions for operation for various systems. Conformance to the regulatory criteria for operation with $F_Q^M(z)$ penalty factor relocation and the $F_Q^M(z)$ exclusion region changes is demonstrated, and the regulatory limits are not exceeded. Therefore, there is no significant reduction in the margin of safety resulting from the proposed changes.

Pursuant to 10 CFR 50.91, the preceding analyses provides a determination that the proposed Technical Specifications change poses no significant hazard as delineated by 10 CFR 50.92.

Environmental Assessment

This proposed Technical Specification change has been evaluated against criteria for and identification of licensing and regulatory actions requiring environmental assessment in accordance with 10 CFR 51.21. It has been determined that the proposed change meets the criteria for categorical exclusion as provided for under 10 CFR 51.22(c)(9). The following

is a discussion of how the proposed Technical Specification change meets the criteria for categorical exclusion.

10 CFR 51.22(c)(9): Although the proposed change involves change to requirements with respect to inspection or Surveillance Requirements,

(i) The proposed change involves No Significance Hazards Consideration (refer to the No Significance Hazards Consideration Determination section of this Technical Specification Change Request);

(ii) there are no significant changes in the types or significant increase in the amounts of any effluents that may be released offsite since the proposed change does not affect the generation of any radioactive effluents nor does it affect any of the permitted release paths; and

(iii) there is no significant increase in individual or cumulative occupational radiation exposure.

Accordingly, the proposed change meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Based on the aforementioned and pursuant to 10 CFR 51.22(b), no environmental assessment or environmental impact statement need be prepared in connection with issuance of an amendment to the Technical Specifications incorporating the proposed change.