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SUBJECT:
FORWARDING RESPONSE TO NRC LTR DTD 03/22/78 ON SEVERAL QUESTIONS RE SUBJECT FACILITY"S CYCLE 2 RELOAD SAFETY EVALUATION.

PLANT NAME: ST LUCIE #1

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May 17, 1978
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Office of Nuclear Reactor Regulation
Attention: Mr. R. W. Reid, Director
Operating Reactors Branch #4
Division of Operating Reactors
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Reid:

Re: St. Lucie Unit 1
Docket No. 50-335
RSE Questions

We recently received several questions from the NRC staff on the St. Lucie Unit 1, Cycle 2 Reload Safety Evaluation (RSE) which we forwarded to the Division of Operating Reactors on March 22, 1978 (L-78-99). Responses to the questions are attached.

Very truly yours,

Robert E Uhrig

Robert E. Uhrig
Vice President

REU/MAS/mb

Attachment

cc: Mr. James P. O'Reilly, Region II
Harold F. Reis, Esquire

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ATTACHMENT

Re: St. Lucie Unit 1
Docket No. 50-335
RSE Questions

1. Question

Section 3 of Reference 1 states that "an assembly that exhibits minimal wear after Cycle 1 will be selected for the core center position in Cycle 2". What inspection was done in order to select the fuel assembly for the center position? What were the results of this inspection?

Response

This subject is discussed in Florida Power & Light Company letter L-78-170 of May 11, 1978 from Robert E. Uhrig to R. W. Reid.

2. Question

Section 5.3.2 of Reference 1 discusses a new procedure for calculating Doppler cross sections using fuel temperatures derived from the FATES code. Please describe in detail the process by which the fuel temperatures are converted into the appropriate cross sections. Reference or discuss the previous method and provide a comparison of the two methods.

Response

The improved fuel temperature vs. kw/ft correlation referred to in Section 5.3.2 is the same as that referred to in reload submittals for other C-E plants, the latest of which is Calvert Cliffs-1 Cycle 3.

The local fuel temperatures are calculated in the PDQ code as a function of absolute power density in watts/cc and burnup in MWD/T by means of a polynomial fit. The form of this polynomial is

$$T_f(°F) = T_{MOD}(°F) + \left(\sum_{I=0}^{2} B(I) M^I P\right) + \left(\sum_{J=0}^{3} C(J) M^J P^2\right)$$

where P = power density (watts/cc)
M = burnup (MWD/T)
B(I), C(J) = input coefficients

The PDQ code then calculates the departure from a reference temperature $\Delta \sqrt{T°K}$ which is used as the fuel temperature variable in a cross section representation. The macroscopic cross sections for any fuel region in a PDQ calculation is represented as a function of burnup, moderator density and $\Delta\sqrt{T_f}$.

The previous method employed did not account for the burnup dependence of the effective fuel temperature on the local power density. Typical fuel temperatures used in the St. Lucie-1 Cycle 2 analysis are 1320°F at BOC 2 and 1180°F at EOC 2. Table 2-1 presents a comparison of the calculated fuel temperature using both the previous and present methods.

The use of the burnup dependent fuel temperatures improves the prediction of cycle length. Power distribution calculations using the burnup dependent fuel temperatures do not yield substantially different results when compared to the previous method.

TABLE 2-1

Fuel Temperature Comparison @ Full Power

	Cycle 1		Cycle 2	
Previous Method	BOC	EOC	BOC	EOC
Core Average Temperature	1420	1420	-	-
Current Method				
Core Average Temperature	1420	1330	1320	1180
D Fuel	-	-	1350	1200
C Fuel	1120	1064	1385	1140

QUESTION 3

(a) In Table 5-2 of the Reload Submittal, explain why the Shutdown Margin and Safeguards Allowance has a value of 3.3% rather than 4.1% since the results of the steam line break analysis show that a minimum total reactivity worth needed to prevent a return to criticality for Cycle 2 for the No Load One Loop Case is 4.1%. Also, in Sections 3.4.1.1.1 and 3.4.1.1.2 of the Bases of the St. Lucie 1 Technical Specifications it is stated that "in the analysis of this accident (the Steam Line Break) a minimum shutdown margin of 4.1% $\Delta\kappa/\kappa$ is initially required to control the reactivity transient."

(b) What uncertainties are included in the various reactivity numbers of Table 5-2 of the Cycle 2 RSE?

(c) Explain why the CEA bite allowance of Table 5-2 is less than for Cycle 1.

(d) Section 3.10.4 of the Technical Specifications allows operation at less than 5% power (Mode 2) operation with only one loop in operation for the performance of physics tests. However, for such a situation it is not clear that the 3.3% shutdown margin is adequate since it is based on a two loop analysis. Please suggest a method to resolve this problem.

(e) A curve is provided to the licensee by C-E which gives the minimum soluble boron concentration as a function of time during the cycle in order to assure that 4.1% shutdown margin will be maintained in mode 3. Please supply this curve along with a discussion of its derivation and assumptions.

(f) The proposed Technical Specifications for shutdown margin (Sections 3.1.1.1 and 3.1.1.2) show that, in Mode 3, 4.1% shutdown margin is required, while in Mode 4 only 1% shutdown margin is required. However, there is only a 1°F difference between the lowest allowable Mode 3 temperature and the highest allowable Mode 4 temperature. Show that at 300°F the reactivity insertion due to cooldown from a Steam Line Break is less than 1% shutdown margin requirement of Section 3.1.1.2.

(g) Please explain the reason for changing the mode 4 shutdown margin requirement from Section 3.1.1.1 to Section 3.1.1.2.

(h) Please clarify the discrepancy in CEA bite required reactivity between Table 5-2 of Reference 1 where the Cycle 1 value is given as 0.9 and the discussion on page 13 of Reference 1 where the Cycle 1 value is given as 0.4.

RESPONSE

(a) As noted in the text Table 5-2 presents a summary of CEA shutdown worths and reactivity allowances for Cycle 2 with a comparison to reference cycle data. The format of the table is similar to that presented for the reference cycle in the FSAR. It generally characterizes the changes in reactivity that occur during a trip from full power with a corresponding change in core parameters to the zero power state. It is not intended to represent any particular limiting accident or A00, although the quantity shown as "Shutdown Margin and Safeguards Allowance" represents the numerical value of the worth which is applied to the hot zero power steamline break accident. A value of 3.3% $\Delta\rho$ is used in this table because it corresponds to the minimum required margin at zero power, which is the limiting condition for two loop operation.

Proposed Technical Specification 3/4 1.1 requires: (3.1.1.1) 3.3% shutdown margin in modes 1 and 2, and (3.1.1.2) 4.1% shutdown margin in mode 3.

Technical Specification 3/4 4.1 requires that 4 pumps be in operation in modes 1 and 2.

No load, one loop routine operation is only permitted in mode 3. Since mode 3 requires 4.1% shutdown margin, there is an adequate amount of negative reactivity to prevent a return to criticality for the case of the No Load One Loop Steam Line Break.

(b) As noted in the response to question 3 (a), Table 5-2 is presented in a format that can easily be compared to a similar table in the FASR. The parameters used are limiting values obtained from calculations with uncertainties applied as listed below:

(b) continued . . .

- o Worth of all inserted CEA's
- o Stuck CEA allowance
- o Worth of all CEA's less highest worth CEA stuck out

} Nominal values- no uncertainties applied

- o Power defect, HFP to HZP - Conservatively estimated values which include an uncertainty of at least:

  $\pm.3 \times 10^{-4}\ \Delta\rho/^{0}F$ on MTC

  $\pm.3 \times 10^{-5}\ \Delta\rho/^{0}F$ on Doppler

  ±10% on CEA related effects as well as temperature differences in the fuel and moderator which are at least as great as those which have been measured or calculated

- o Moderator voids - at least ±10% of calculated effects.
- o CEA bite, boron deadband and maneuvering band - at least ±10% of calculated effects
- o Shutdown margin and safeguards allowance - Minimum value required by Technical Specifications
- o Margin available - This number represents additional margin which has not been ascribed to account for any particular effect or any uncertainty related to that effect

Table 5-2 does not characterize any particular accident or A00. For the analysis of any specific accident or A00, conservative or "most limiting" parameters are used. A calculational uncertainty of at least ± 10% is applied to all CEA related reactivity effects.

[illegible]
[illegible]
[illegible]

(c) The CEA bite allowance is less for Cycle 2 because the Cycle 2 Power Dependent Insertion Limit (PDIL) permits only a 25% insertion of the first regulating CEA bank, whereas the first cycle PDIL permitted more than 50% of the first regulating bank to be inserted at full power. This would normally have led to an allowance of 0.4% $\Delta\rho$ for CEA bite and boron and maneuvering band, but an additional 0.2% $\Delta\rho$ was included to conservatively allow for a Technical Specification change which would allow all of the CEAs to be placed at an upper limit of 129 inches instead of the previous 132 inches.

(d) Section 3.10.5 of the Technical Specifications is a special test exception which is intended to permit Physics tests and thermal hydraulic tests to be performed at power levels below 5% of rated thermal power. It was also intended to permit test operation with no pumps running. This exemption was required to accomplish the extensive tests conducted at initial core startup. No tests are anticipated in Cycle 2 that will involve this test exception. It is suggested, however, that this special test exception continue to be included in the Technical Specifications so that it may be invoked, if needed, in future cycles.

(e) Sections 3.1.1.1 and Section 3.1.1.2 of the Technical Specifications provide required minimum shutdown margins for various operating modes. The surveillance requirements associated with these sections specify the factors which must be considered in verifying that the appropriate margins are available. These conditions have been incorporated into plant operating procedures to insure compliance.

(f) In Mode 3, the 4.1% $\Delta\rho$ shutdown margin is only needed to accommodate the one loop no load Steam Line Break initiated at coolant temperatures around 532°F. At lower temperatures in that mode, the shutdown margin needed decreases in proportion to the temperature decrease. Since there is no convenient way to subdivide Mode 3, the 4.1% $\Delta\rho$ shutdown margin requirement was conservatively specified for the entire mode.

In Mode 4 with temperatures < 300°F, the secondary pressure is so low that a Steam Line Break would result in a cooldown of no more than ~90°F to the point where atmospheric pressure is reached. A conservative estimate of resultant reactivity addition due to Doppler and moderator effects shows that < 1% $\Delta\rho$ would be added during cooldown. Thus, the shutdown margin requirement in the Technical Specification for Mode 4 is adequate to prevent an inadvertent criticality during a Steam Line Break initiated at temperatures of < 300°F.

(g) The mode 4 shutdown margin requirement was transferred from Technical Specification 3.1.1.1 to Technical Specification 3.1.1.2 because this mode does not require any more shutdown margin during cooldown of any design basis event than is required in mode 5. The temperature breakpoint between Technical Specification 3.1.1.1 and Technical Specification 3.1.1.2 was adjusted to reflect the proper mode temperature definition as specified in Table 1.1 of definition 1.4 (Operational Modes).

(h) Page 13 of RSE does not specify a value for the worth of the cycle 1 CEA bite. This page does discuss the fact that the normal CEA bite worth for cycle 2 of 0.4% $\Delta\rho$ was increased to 0.6% $\Delta\rho$ to account for potential CEA insertion to 129". Please see answer to question 3C.

4. Question

Section 6.1 discusses the removal of the engineering factor on local heat flux, F_q^E, from the COSMO model. Please present a detailed discussion of this change in design procedure, using the nomenclature of CENPD-161P, Appendix D.

Response

The engineering factor on heat flux, F_q^E, incorporates allowances for uncertainties which affect the local heat flux in a fuel rod. This factor accounts for variations in pellet density, diameter and enrichment, and for variations in the clad outer diameter. These variations are considered to be independent of the uncertainties on power distribution measurement and calculation which are accounted for in the Nuclear Uncertainty on Radial Peaking Factor (F_r^N), and are also considered independent of the mechanisms affecting the fuel rod bow augmentation factor (F_r^F). Because these three allowances accommodate independent phenomena they can legitimately be combined statistically to determine their combined effect.

The design procedure used in the FSAR was to apply F_q^E deterministically in COSMO in the final calculation of DNBR, as detailed in Appendix D of CENPD-161-P. F_r^N was also applied deterministically as a factor on axially integrated radial peak when determining DNBR margin. The fuel rod bow augmentation factor was not previously applied explicitly, by virture of arguments presented in CENPD-225-P which demonstrate that the deterministic rather than the statistical use of F_q^E and F_r^H produces more than sufficient margin to accommodate F_r^F.

For St. Lucie I Cycle 2, the intention is to take credit for excess conservatism in the previous deterministic use of F_q^E and F_r^N. This is done by combining these factors statistically in determination of DNBR margin. The effects of fuel rod bow are accommodated by including the rod bow augmentation factor in this statistical combination. Because F_q^E is applied in this statistical combination, outside of COSMO, this factor is removed from the COSMO model. The statistical procedure employed is detailed in CEN-89(F)-P.

QUESTION 5

For the CEA withdrawal transient which was reanalyzed for Cycle 2:

(a) Justify the decreased coil holding time for Cycle 2.

(b) Explain why the ASI value was changed from -0.03 to +0.69 for the CEA withdrawal analysis.

(c) Was a reactivity insertion rate of 2.0 x 10^{-4} $\Delta\rho$/sec used for both the full power and zero power cases?

RESPONSE

(a) Experimental measurements of the rod drop times taken during Cycle 1 showed that the largest holding coil delay for the rods was less than .4 sec. The assured holding coil delay was thus reduced to take credit for the extra margin between .4 and .5 sec delay times.

(b) The conditions shown for the CEA withdrawal for the initial cycle represent nominal values and were used to illustrate the general transient behavior for the CEA withdrawal. An axial shape index of -.03 was used in this transient. Another Cycle 1 transient, the depressurization event, produced the limiting pressure bias input to the TM/LP trip.

For Cycle 2, the CEA withdrawal produces the limiting pressure bias input to the TM/LP trip. For the pressure bias input, which is related to the time required to terminate the transient DNBR decrease, a bottom peaked axial shape (i.e., positive ASI value) is conservative. Since we wish to bound future cycles as well as Cycle 2, a conservative shape index of +.69 was used for this transient.

(c) The maximum differential worth for any rod configuration between full power and zero power was used in the analyses to ensure conservatism. This means that a reactivity insertion rate of 2.0 x 10^{-4} $\Delta\rho$/sec was used at both full and zero power.

QUESTION 6

Provide the specific page of the BG&E Unit 1, Cycle 2 reference in which an additional 2% margin was taken for negative shape indices.

RESPONSE

The reference to the BG&E Unit 1, Cycle 2 submittal was intended to identify a previously approved submittal to NRC where methods for obtaining margin gains were described. In this submittal, margin gains of greater than the 2% used for St. Lucie are demonstrated.

The initial available thermal margin for the loss of flow transient for Cycle 2 differs from that for Cycle 1 primarily due to increases in radial peaking factors. To provide for operation at 2560 MWt consistent with other operating limits, credit was taken for conservatisms such as those described for BG&E Unit 1, Cycle 2 in generating margin requirements for the loss of flow. This is illustrated by examining the discussion in the BG&E submittal. Table 7-2 of the BG&E submittal shows that the limiting required overpower margin (ROPM) for Cycle 1 was 120.7% as opposed to 115.2% for Cycle 2. This table also shows that the limiting transient for determaining the ROPM for Cycle 1 is the loss of flow transient, while for Cycle 2, the ROPM is dictated by the CEA drop transient. This reduction in required overpower margin for LOF is due primarily to the methods employed. Using the same methods for St. Lucie 1, would show gains of more than the 2% for which credit is being taken.

[illegible]

[illegible]
[illegible]
[illegible]

7. <u>Question</u>

Explain in more detail the statement in Section 7.6 of the Reload Submittal that "credit was taken for a more realistic Doppler defect value for Cycle 2 instead of the conservative Doppler defect used in Cycle 1".

<u>Response</u>

In Cycle 1, a conservatively high effective fuel temperature of 1900°F was used in the determination of the Doppler defect. For Cycle 2, calculations yielded an effective fuel temperature of 1400°F as appropriate for calculating the Doppler defect. The lower fuel temperature for Cycle 2 produces a smaller defect compared to the Cycle 1 value.

8. Question

Justify or reference the justification for the high power trip set point change from 106.5% to 107% in Table 2.2-1 of the Technical Specifications.

Response

A 5% power measurement uncertainty is applied in the process of generating LSSS limits. In the past, this uncertainty was applied in a multiplicative fashion, but evaluations showed that application of the uncertainty in this fashion is unduly conservative. In accordance with current methods (as described in CENPD-199P), the power measurement uncertainty is now deducted algebraically. It is this difference in the manner in which the uncertainty is applied that leads to the 107% versus 106.5% LSSS limit. This same change has been previously incorporated for other C-E plants, beginning with Cycle 4 of Ft. Calhoun Unit 1.

QUESTION 9

Explain the change in Steam Generator water level setpoint from 36.3% to 37%.

RESPONSE

The steam generator water level low trip value of 37% water level is consistent with the existing safety analysis for St. Lucie Unit 1. There is no change in the recommended value for this trip from Cycle 1 to Cycle 2. The Cycle 1 trip value was transmitted by C-E to FP&L in F-CE-5572, dated January 26, 1976. Apparently, it was inadvertently left out of the Cycle 1 Tech Specs. This change is being made to bring this setpoint into line with the assumptions in the safety analysis.

QUESTION 10

Explain the mechanism responsible for lowering the fuel melting power in the "end 5% of the core length regions of some B fuel pins."

RESPONSE

The mechanism responsible for lowering the power required for fuel centerline melting in the "end 5% of the core length regions" is produced by conservatisms inherent in the calculational method used. The power to fuel centerline melt is calculated with the FATES code which, as described in CENPD-139, contains power dependent fuel relocation model. Since the axial extremities of the fuel rods have relatively low power levels during normal operation, these portions of the fuel rods have less fuel pellet relocation than the central, higher powered regions. Thus, the end regions contain larger calculated fuel-clad gaps and correspondingly lower gap conductances. During the calculation of power escalation to fuel centerline melt, the relocation model is intentionally bypassed thereby producing no thermal credit for the additional relocation which would occur. Therefore, although the axial segment of the fuel rod being considered is raised to a power level sufficient to melt the fuel centerline, the fuel pellet relocation is still based on that of the power level during normal operation. For the 5% extremities, this amount of relocation is minimal, producing the lower power-to-fuel melting indication.

11. Question

Page B 3/4 1-3 of the Technical Specifications explains the changes to the boration system requirements as follows:

The boron addition capability after the plant has been placed in Modes 5 and 6 requires either 1660 gallons of 8% boric acid solution from the boric acid tanks or 1630 gallons of 1720 ppm borated water from the refueling water tank to makeup for contraction of the primary coolant that could occur if the temperature is lowered from 200°F to 140°F.

Although the amount of water appears to be sufficient to adjust for contraction with either case, the boron concentration in the RWST is less than 1/8 of that in the boric acid tank. Justify the option to use either of these two sources of borated makeup water.

Response

During Modes 5 and 6, borated water is required as a makeup for reactor coolant contraction during cooldown. The two available sources of borated water are the Refueling Water Tank (RWT) @ 1720 ppm and the Boric Acid Makeup Tank (BAMT) @ 8 wt% boric acid. The boron concentration of these sources is determined by other Technical Specifications. Both sources of water have a boron concentration far in excess of the reactor coolant system concentration required to maintain the degree of subcriticality for each mode. Thus, water from these sources is required for makeup rather than boron. The difference between the 1660 gallons from the BAMT and the 1630 gallons from the RWT is due to the assumed densities of each of the borated water sources since the two sources are at different temperatures.

QUESTION 12

In Table 7-2, explain the increase in the three pump plenum factor.

RESPONSE

The difference between the Cycle 1 and Cycle 2 three-pump plenum factor is due to recent interpretations of flow model data which indicate that 1.09 is a more appropriate factor for the 2560 MWT plants. This revision results in a consistent application of this factor with all other plants of this class.

QUESTION 13

The Batch B fuel assemblies appear to have burnups in excess of 13000 Mwd/MTU. However, Section 4.3 states that these assemblies have not yet attained enough burnup to counteract the initial pellet densification. Please provide curves of average fuel temperature as a function of burnup to show that the B fuel is limiting in stored energy compared to the D fuel assemblies.

RESPONSE

The following tabulation of average fuel pellet temperature versus burnup for the hottest batch B fuel pin and the hottest batch D fuel pin in Cycle 2 show that the hottest B fuel pin at beginning of Cycle 2 has an average fuel pellet temperature which is several hundred degrees greater than the average pellet temperature of the hottest D fuel pin at any time in the cycle.

[illegible]

Average Fuel
Temperature for
Hottest Batch B
Fuel

Rod Average Burnup (MWD/MTU)	Peak Power (kw/ft)	Average Fuel Pellet Temperature (^{0}F)
10081	14.4	2466
10820	14.4	2445
11640	14.4	2416
13281	14.4	2359
14924	14.4	2297
16565	14.4	2234
18206	14.4	2169
19846	14.4	2098
21487	14.4	2029
23128	14.4	1982
25001	14.4	1982
27500	14.1	1954
29995	13.7	1898
32492	13.2	1838
34984	12.7	1779
37481	12.2	1720

Average Fuel Temperature
for Hottest Batch D Fuel

Rod Average Burnup (MWD/MTU)	Peak Power (Kw/ft)	Average Fuel Pellet Temperature (^{0}F)
0	14.4	2101
82	14.4	2119
820	14.4	2166
1641	14.4	2140
3283	14.4	2114
4922	14.4	2066
8205	14.4	2013
11487	14.4	2013
14768	14.4	2012
18051	14.4	2012
19999	14.4	2012

14. Question

It is the opinion of the staff that Section 3.2.5 of the Technical Specifications is not required and may be deleted if the statement can be made that calculations show that the fuel rod cladding is not predicted to collapse within the lifetime of the fuel.

Response

The calculations that have been performed show that the fuel rod cladding will not collapse at burnups up to 37,500 MWD/T. This exposure is greater than the anticipated exposure of any fuel used in the core. Therefore, Sections 3.2.5 and B 3/4.2.5 should be removed. The succeeding Section in 3.2 and B 3/4.2 should be renumbered.

QUESTION 15

Reference 2 states that an insepction will be made of the fuel assemblies for which retention plates were added during a shutdown to replace poison rods during cycle 1. Please confirm that these insepctions were completed and summarize the results of these inspections.

RESPONSE

Combustion Engineering has inspected the fuel assembly retention assemblies installed on those fuel assemblies reconstituted during the 1976 shutdown.

As a result of this inspection, all were found to be in excellent shape and are performing as expected.

Specific inspections conducted were:

A - Core Scan - 100% Inspection of retention assemblies from the top.

B - Fuel Sleeving - All assemblies with retention assemblies that were sleeved were inspected in greater detail.

C - Reactor Vessel ISI and Loose Parts Inspection - The assemblies adjacent to the lower core shroud access opening were inspected.

D - Fuel Inspection - The bundles which contained retention plates, including 1C-112, were visually inspected with a boroscope.

QUESTION 16

Section 7.0 (Page 33) discusses the analysis of the Full Length CEA Drop Incident. It is stated that:

"The Full Length CEA Drop has been reanalyzed for Cycle 2 in order to enhance operating flexibility. Although the CEA drop worth has decreased (non-conservative), the maximum increase in radial peaking factors (radial distortion factor) has also decreased. The lower distortion factor reduces the margin requirements for this incident and compensates for the smaller absolute dropped rod worth."

It appears that, according to the numbers for radial peaking factors for Cycles 1 and 2, that the maximum increase in radial peaking factors has increased, not decreased. (See Page Table 7.4-3 of Reference 1.)

Please check this statement for consistency with the CEA Drop discussion of Reference 1.

RESPONSE

Please refer to Table 7.4-1. This table shows that the radial peaking distortion factor used in the CEA drop analysis has decreased from 1.27 (unrodded) and 1.22 (Bank 7 region) to 1.17 in both regions. The post drop radial peaking factors shown in Table 7.4-3 are indeed higher than Cycle 1. This is due to the increase in the allowable pre-drop radial factors for Cycle 2 as shown in Table 7-2.

This data is consistent with the discussions in reference 1. The summary on page 33 is augmented by a full discussion on page 43 of reference 1.

QUESTION 17

There appears to be no reason for the change to Section 3.2.1 of the Technical Specifications since the net effect of both is the same. It is the position of the Staff that Section 3.2.1 should remain in its present form unless more justification can be provided for the change. This includes the factor L/17.085 which should be retained. (This may require a change to Figure 3.2-2).

RESPONSE

The need to change Section 3.2.1 of the Technical Specification results from the following considerations. Operation within the acceptable area as shown in Figure 3.2-2 assures that the peak linear heat rate (PLHR) will not exceed the maximum allowable value given in Figure 3.2-1. In this determination, Figure 3.2-2 must include the maximum allowable planar radial power peaking factor Fxy^T, the envelope of axial power distributions and allowance for control rod insertion in accordance with the power dependent insertion limit (PDIL). Since the planar radial peaking factor limit for Cycle 2 is greater than that of Cycle 1, it would be necessary to change Figure 3.2-2 for that reason alone since for the same axial power peaking factor the greater radial factor would lead to a greater peak linear heat rate. In order to minimize the power penalty due to the increased radial peaking factor, two other considerations were factored into the proposed Tech Spec 3.2.1. First, a smaller ASI range for the maximum acceptable power level is imposed; second, control rod insertion is limited to the long term insertion limit when peak linear heat rate is monitored on ex-core detectors. Both of these modifications result in a reduction of the peak linear heat rate tending to offset the increase in the radial factor and thus allow higher reactor power before the limiting peak linear heat rate is approached. By recalculating the curve in Figure 3.2.-2 for the current peak linear heat rate limit of 14.8 kw/ft and accounting for the items discussed above, the impact on allowable reactor power level is minimized when monitoring PLHR by using ex-core detectors. The factor L/17.085 is no longer needed in this analysis since the limiting peak linear heat rate is explicitly incorporated into the analysis and the small additional uncertainty (.5%) on linear heat rate has also been taken into account in the analysis.

[illegible]