Attachment 1

St. Lucie Unit 2 Marked-Up Technical Specification Pages

	2-8 (with insert)
3/4	2-4 (with insert)
3/4	2-12 (with insert)

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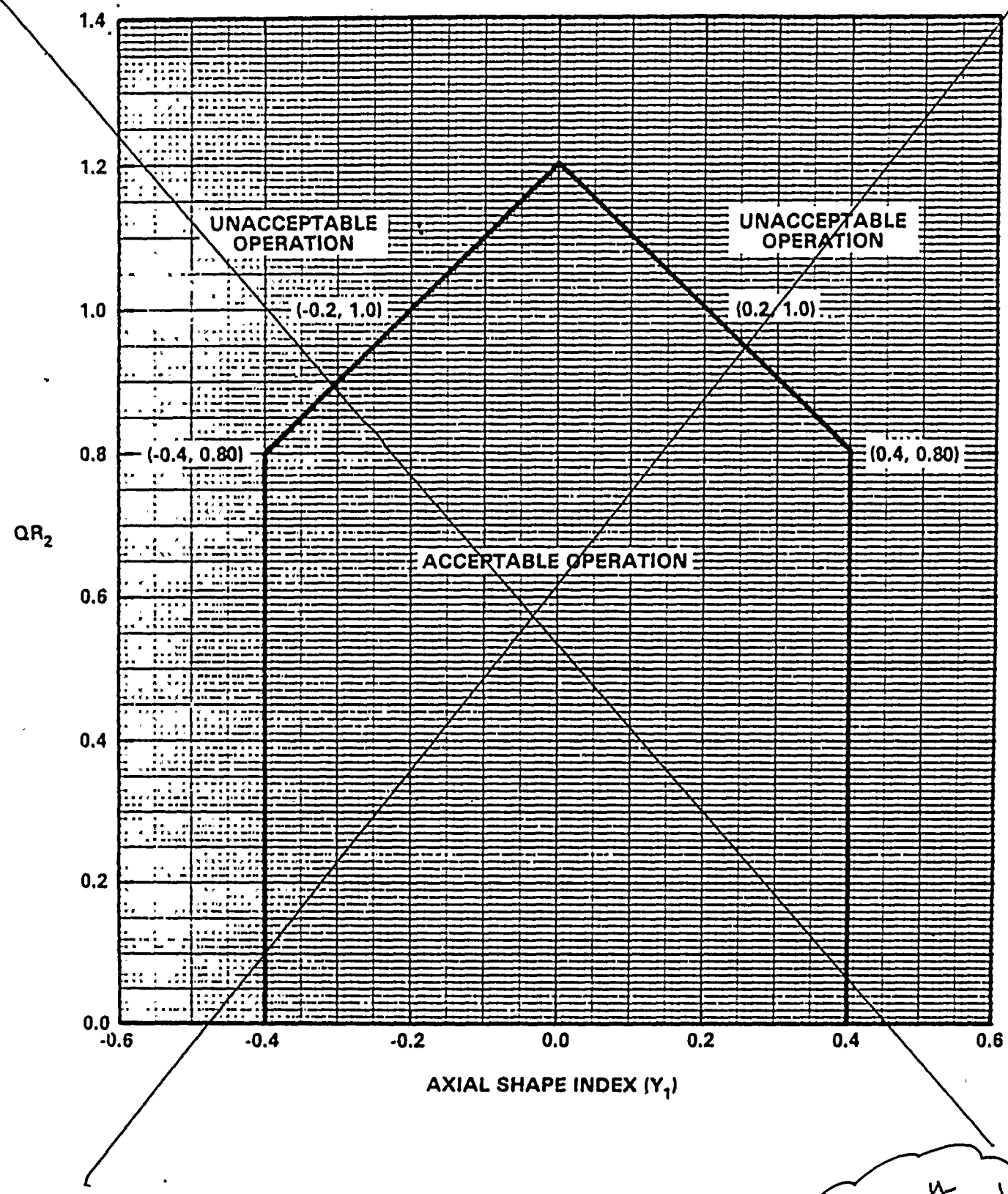


Figure 2.2-2
Local power density-high trip setpoint
Part 2 (QR_2 versus Y_1)

Replace with Insert Attached

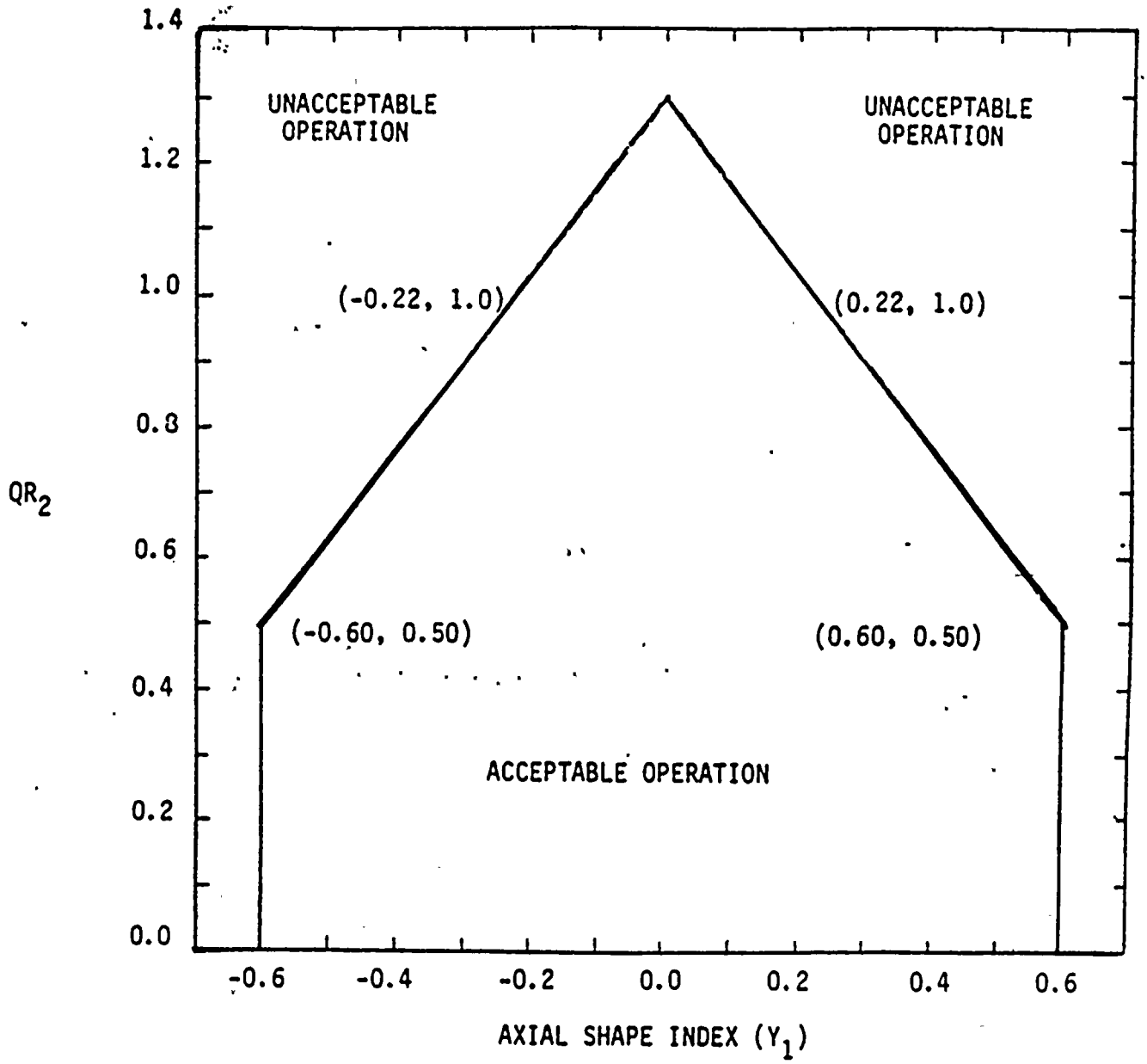


FIGURE 2.2-2

LOCAL POWER DENSITY-HIGH TRIP SETPOINT
PART 2 (QR_2 versus Y_1)

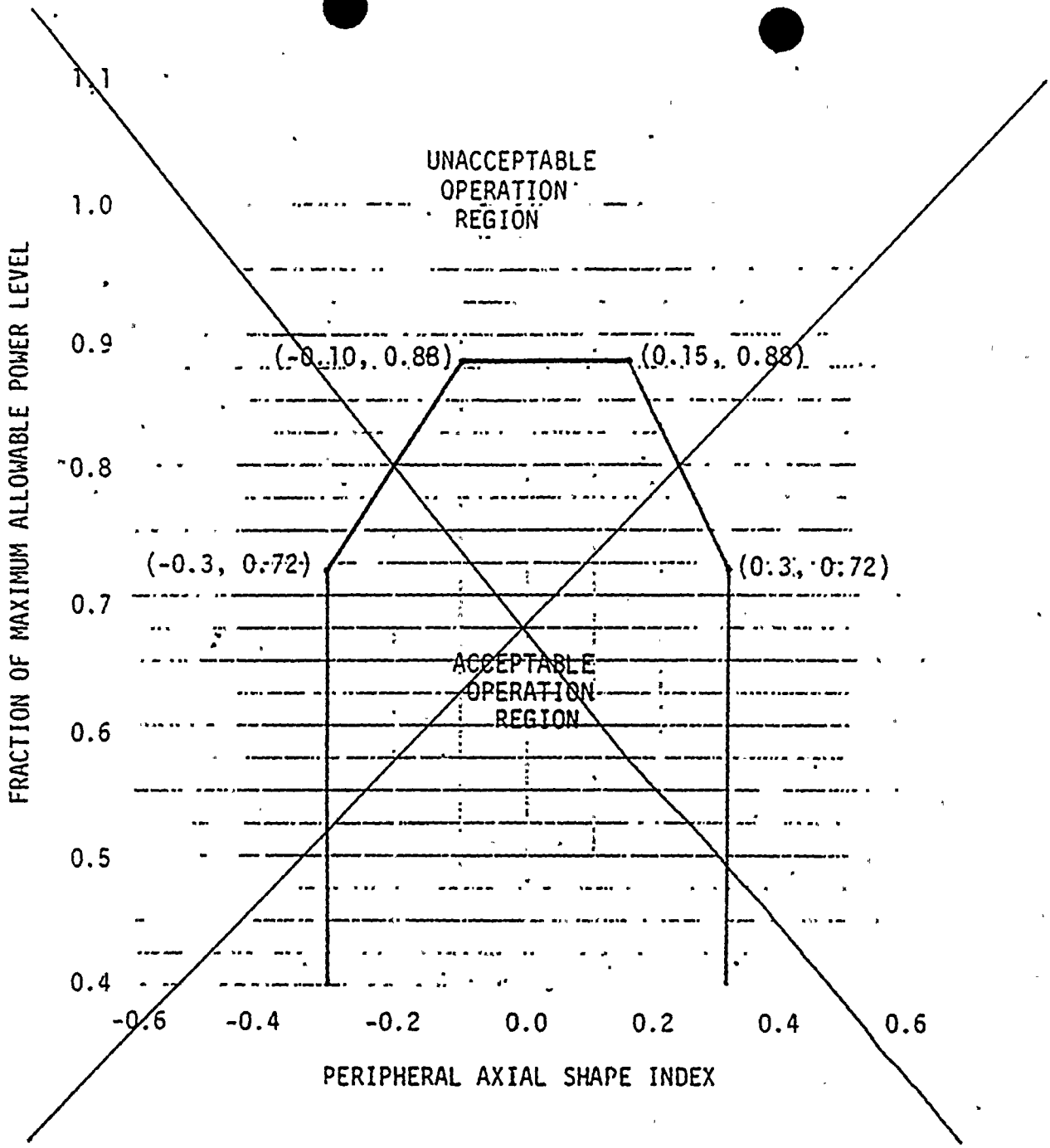
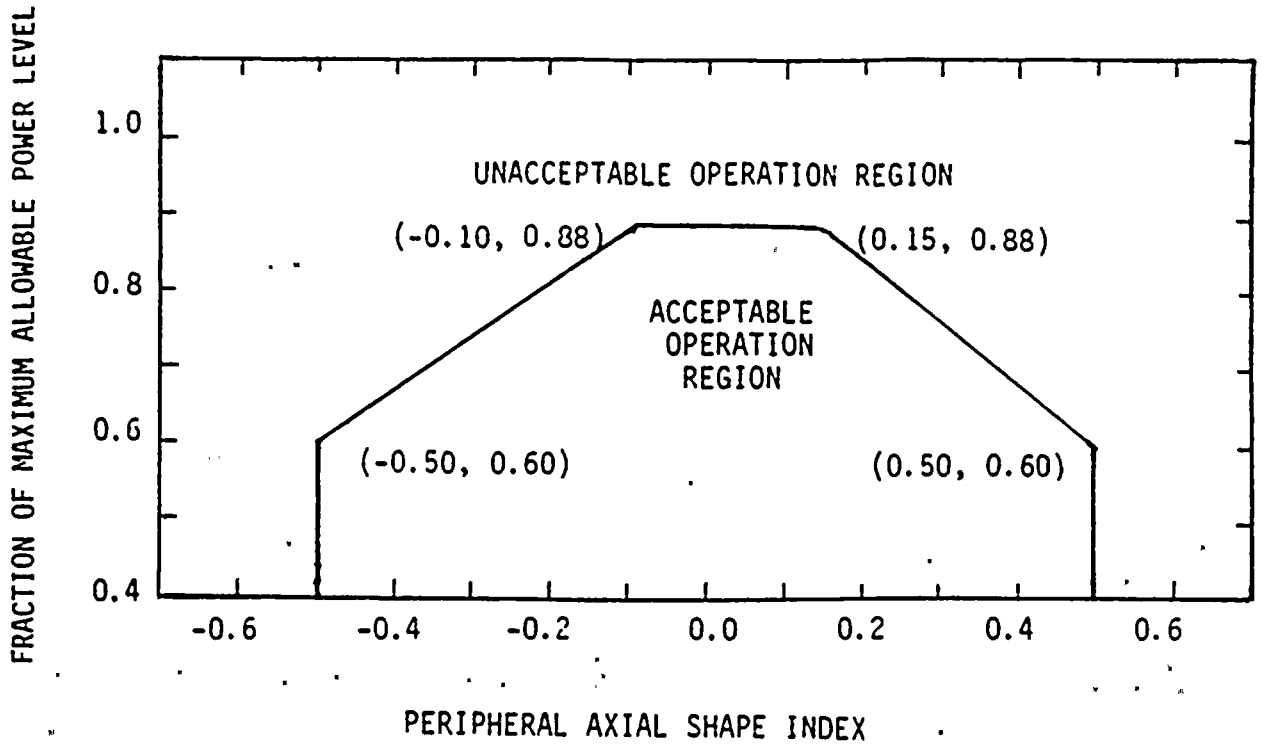


FIGURE 3.2-2

AXIAL SHAPE INDEX VS FRACTION OF MAXIMUM ALLOWABLE POWER LEVEL PER SPECIFICATION 4.2.1.3

Replace with Insert Attached



(NOT APPLICABLE BELOW 40% POWER)

FIGURE 3.2-2

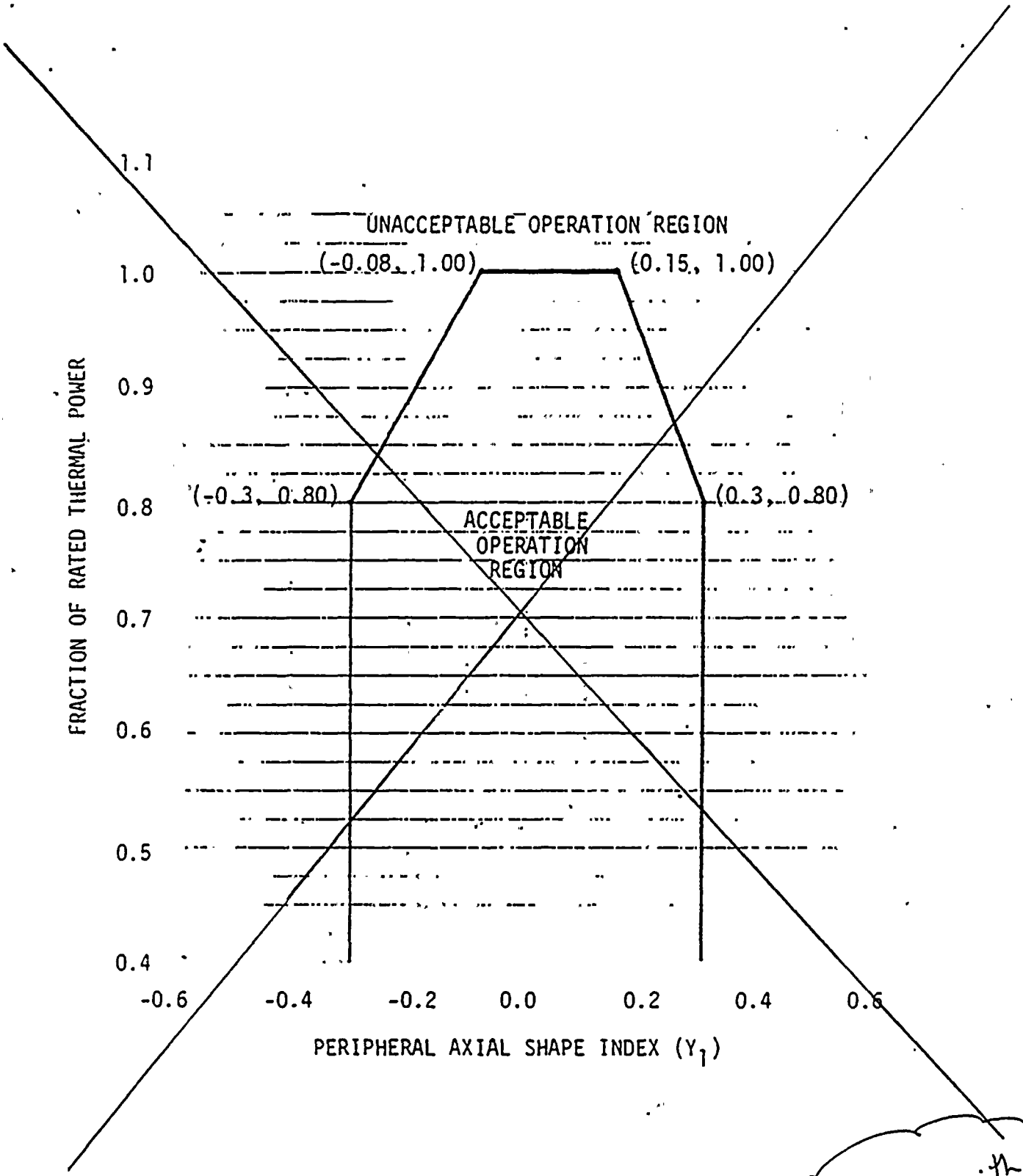


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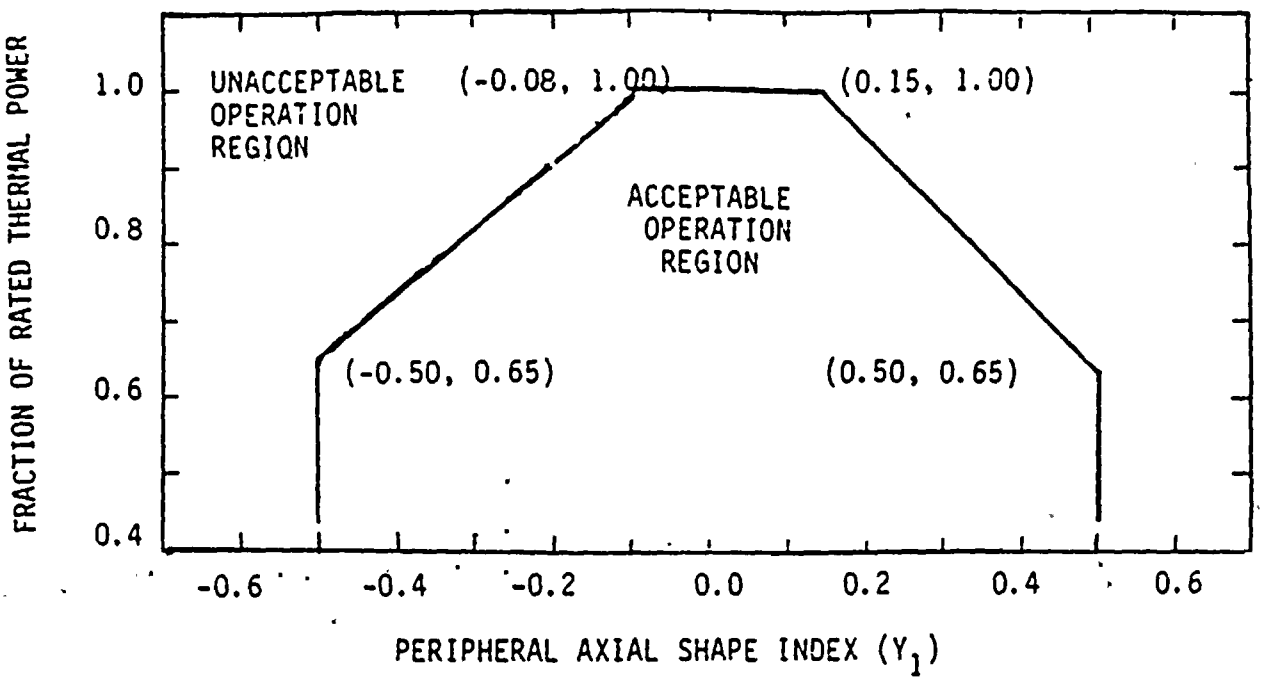
FIGURE 3.2-4

AXIAL SHAPE INDEX OPERATING LIMITS WITH FOUR REACTOR COOLANT PUMPS OPERATING



(NOT APPLICABLE BELOW 40% POWER)

FIGURE 3.2-4

AXIAL SHAPE INDEX OPERATING LIMITS WITH FOUR REACTOR COOLANT PUMPS OPERATING

Attachment 2

Safety Analysis

Introduction

To achieve greater operational flexibility at lower power, expansion of the Axial Shape Index (ASI) limits for the Departure from Nucleate Boiling (DNB) and Linear Heat Rate (LHR) related Limiting Conditions for Operation (LCOs) and the LHR related Limiting Safety System Setpoints (LSSS) is proposed. The proposed changes modify the Local Power Density (LPD) LSSS (Figure 2.2-2), the LHR LCO (Figure 3.2-2) maximum allowed power level versus peripheral Axial Shape Index (ASI) for the ex-core detector monitoring system, and the DNB LCO fraction of rated thermal power versus peripheral ASI for four reactor coolant pumps operating (Figure 3.2-4).

It is proposed to expand the LPD LSSS ASI limits for power levels below 50% from ± 0.4 to ± 0.6, to expand the ASI limits of the LHR LCO for powers below 60% (but above 40%) and the ASI limits of the DNB LCO for powers below 65% (but above 40%) from ± 0.3 to ± 0.5. For Figure 2.2-2, it is also proposed to increase the ASI limits slightly above 0.8 of rated power and to raise the apex of the curve from 1.2 to 1.3.

Discussion

The LCO ASI limits above 40% power are used as the assumed initial conditions for all Design Basis Events (DBEs) evaluated in the St. Lucie Unit 2 Updated Final Safety Analysis Report (UFSAR). Below 40% power the initial conditions are set by the LPD LSSS ASI limits. The expansion of these LCO and LSSS ASI limits for intermediate power affects only those DBEs that are initiated at those power levels. However, the DBEs are not typically analyzed at intermediate power levels because the consequences of these events, when initiated from intermediate power levels (100% > initial power > 0%), are bounded by either the full power or zero power results. Thus, to justify the proposed changes to the Technical Specification LCO and LSSS ASI limits it was necessary to reevaluate only those zero power events which might be adversely affected. Previously licensed analyses for various DBEs initiated at or above 65% power are not affected by the proposed changes. Therefore, the analyses on record for these events is still bounding. The zero power events potentially affected by the proposed expansion of the ASI limits were determined to be:

> Boron Dilution, Control Element Assembly (CEA) Withdrawal, Excess Load, Steam Line Break (SLB), and CEA Ejection.

The safety analyses of record for these DBEs used input parameters that are ASI dependent, such as scram reactivity insertion rates. The values assumed for these parameters in the analyses of record are more adverse (conservative) than the values at the Technical Specification LCO and LSSS ASI limits in order to

bound future cycles' operation. In the evaluation of the proposed ASI limits expansion, it has been verified (using current NRC approved methodology and the proposed ASI limits) that the safety analysis that is currently licensed remains valid. In particular, for each of the events mentioned, the expanded Technical Specification LCO and LSSS limits were justified on the basis of engineering arguments. No reanalysis of the events, per se, was necessary. These arguments can be summarized as follows:

1. Low Power Boron Dilution - this event has no explicit ASI dependence. The only possible axial shape effects are in relation to the scram reactivity insertion rate. This is a second order effect, at best, and has a negligibly small impact on the transient. Consequently, the boron dilution event analysis results on record are still applicable.

2. Excess Load and CEA Withdrawal - the only significant impact of the expanded ASI limits on these events is the change in scram reactivity insertion rate for axial shapes associated with the more positive (+.6 vs. +.4) ASIs. In the negative ASI regime, the scram reactivity versus insertion actually improves as the ASI becomes more negative. Thus, as long as the reduction in initial available overpower margin (i.e., AOPM) can be accommodated in the setpoints (as has been demonstrated to be the case), these events are analyzed. In the positive ASI regime, the scram reactivity insertion rate is reduced in going from +.4 to +.6 ASI. However, this effect is offset by the following conservatisms in the analyses of record:

   a. The limiting ASI assumed in determining the minimum AOPM is negative while a positive ASI was used to determine the scram reactivity insertion rate characteristics. Use of a consistent set of ASI and scram data for both AOPM and scram reactivity considerations would produce better results.

   b. Generic versus cycle specific neutronics parameters (kinetics, constants, etc.) and available scram worths were used in the analyses of record. Use of cycle specific neutronics data would produce results which are more favorable by an amount more than sufficient to accommodate the proposed ASI changes.

3. Zero Power CEA Ejection and SLB - the ASIs used (e.g., in selecting the scram reactivity characteristics) in the analysis of record already are conservative with respect to the proposed ± 0.6 ASI limits. Thus, no additional evaluations were necessary for these events.

To generate the expanded LSSS and LCO ASI bands at low power, the following analyses were performed:

1. The CETOP deck used for the Cycle 4 Reload Safety Evaluation (RSE) analyses was checked and certified for use over the wider ASI ranges being analyzed.

2. Using this deck, the Power to Fuel Design Limits on Departure from Nucleate Boiling Ration, (DNBR) (Pfdn) plots from Cycle 4 were extended to cover the wider ASI ranges desired.

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3. The Pfdn plots were then adjusted by the uncertainties and biases described in the CEN-123(F)-P Part 3, and by the ASI and power dependent Cycle 4 required over-power margins (ROPM). The resulting limits were then compared to the desired DNB LCO band to ensure that no limit points were inside the desired Technical Specification limits.

4. The Power to Fuel Design Limits on Linear Heat Rate (Pfdl) plots from Cycle 4 were adjusted by the LHR related uncertainties and biases described in the CEN-123(F)-P Part 1. The resulting limits were then compared to the desired LHR LSSS limits as was done in Step (3) for the DNB LCO limits.

5. The Pfdl plots from step 4 were then adjusted by the Cycle 4 LHR related ROPMs. The resultant limits were compared to the desired LHR LCO limits as described for the LHR LSSS and DNB LCO in (4) and (3) above, respectively.

The analyses described above showed that in all cases margin still exists between the expanded Technical Specification limits and the calculated limiting values. In the case of the LPD LSSS limits (Figure 2.2-2) the closest approach to the actual calculated LSSS limits occurs at 66% power and an ASI of +.48. At this limiting power level/ASI pair a margin of 12% still exists. For the DNB LCO (Figure 3.2-2) the point of minimum margin occurs at 100% power for an ASI of -0.08. The CEA subgroup drop event sets the ROPM for these limits. At this limiting power level/ASI pair, a margin of 5% still exists. In the case of the LHR LCO (Figure 3.2-4) the point of minimum margin occurs at 88% power for an ASI of -0.15. At this limiting power level/ASI pair a margin of 10.5% still exists. The LCO limits in this case are set by the Large Break Loss of Coolant Accident (LOCA) kw/ft limit.

The results of the setpoint evaluations described above are shown in proposed revised Figures 2.2-2, 3.2-2, and 3.2-4. The ASI limits on each of these figures remain the same as the current Technical Specification limits above 65% power except for the LPD LSSS (see Figure 2.2-2). It should be noted that the LPD trip is not the primary trip in the safety analysis of any Design Basis Event (DBE). However, the LPD trip ensures that the peak local power density in the fuel remains below that corresponding to fuel centerline melting as a consequence of axial power shape maldistributions. Since this trip is not the primary trip for any DBE, no events analyzed for the safety analysis are adversely effected, by the slight increase in the ASI limits above 0.8 fraction of rated power. The same is also true for the increase in the apex of Figure 2.2-2 from 1.2 to 1.3, since core power is limited by the Variable Power Trip - High whose setpoint is 107% of rated full power.

Attachment 3

Determination of No Significant Hazards Consideration

The standards used to arrive at a determination that a request for amendment involves no significant hazards consideration are included in the Commission's regulation, 10 CFR 50.92, which state that no significant hazards considerations are involved if the operation of the facility in accordance with the proposed amendment would not (1) involve a significant increase in the probability or consequences of an accident previously evaluated; or (2) create the possibility of a new or different kind of accident from any accident previously evaluated; or (3) involve a significant reduction in a margin of safety. Each standard is discussed as follows:

(1) Operation of the facility in accordance with the proposed amendment would not involve a significant increase in the probability or consequences of an accident previously evaluated.

The Axial Shape Index (ASI) limits are used as initial assumptions for all Design Basis Events (DBEs) evaluated in the safety analysis. The expansion of these ASI limits for lower powers is applicable only to those DBEs that are evaluated between hot full and hot zero power. Events are not typically analyzed at intermediate power levels. Events initiated from intermediate power levels (100% > initial power > 0%) are unaffected since these are bounded by the results of events initiated from either the full power or zero power events.

The existing safety analyses for these events use input parameters that are axial shape dependent, such as scram reactivity insertion curves, which are more adverse (conservative) than the Technical Specification Limiting Condition for Operation (LCO) and Limiting Safety System Setpoint (LSSS) axial shape limits at all power levels in order to bound future cycles' operation. It was verified, using current methodology and the proposed ASI limits, that the current safety analysis remains valid.

The current ASI limits allowed by the Departure from Nucleate Boiling (DNB) and Linear Heat Rate (LHR) LCOs and LSSSs are expanded for greater operational flexibility at lower powers. This proposed change will not increase the probability or consequences of an accident previously evaluated because the proposed limits are still conservative with respect to the actual calculated limiting values.

(2) Use of the modified specification would not create the possibility of a new or different kind of accident from any accident previously evaluated.

The proposed changes in the Technical Specifications do not affect any active hardware involving plant operation, nor do they alter the assumptions or methodology of the safety analyses. Therefore, they will not create the possibility of a new or different kind of accident from any previously evaluated.

(3) Use of the modified specification would not involve significant reduction

in a margin of safety.

The wider ASI bands allowed at lower powers have been reviewed for their impact upon the current licensed safety analysis. The licensed safety analysis of record remains unchanged due to the expanded ASI range for low powers. Therefore, there is no significant reduction in a margin of safety.

Based on the above, we have determined that the proposed amendment does not (1) involve a significant increase in the probability or consequences of an accident previously evaluated, (2) create the probability of a new or different kind of accident from any accident previously evaluated, or (3) involve a significant reduction in a margin of safety; and therefore does not involve a significant hazards consideration.

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