

ATTACHMENT 1

ST. LUCIE UNIT 1

MARKED-UP TECHNICAL SPECIFICATION PAGES

2-7 (WITH INSERT)
3/4 2-4 (WITH INSERT)
3/4 2-15 (WITH INSERT)

9003150482 900309
PDR ADOCK 05000335
P PDC

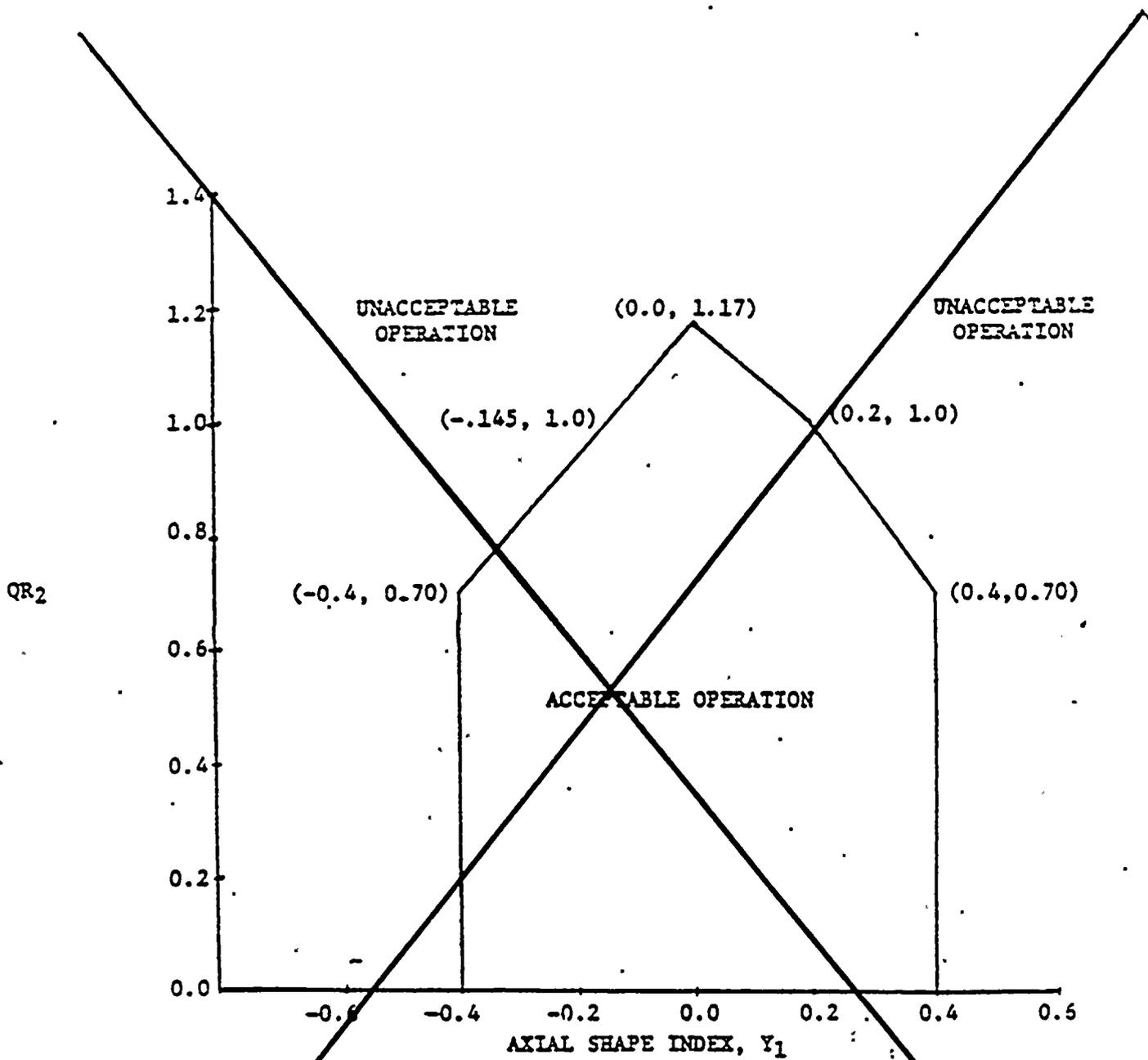


FIGURE 2.2-2
Local Power Density-High Trip Setpoint Part 2(QR₂ Versus Y₁)

ST. LUCIE - UNIT 1

2-7

Amendment No. 27, 32, 48

*Replace with
Insert Attached*

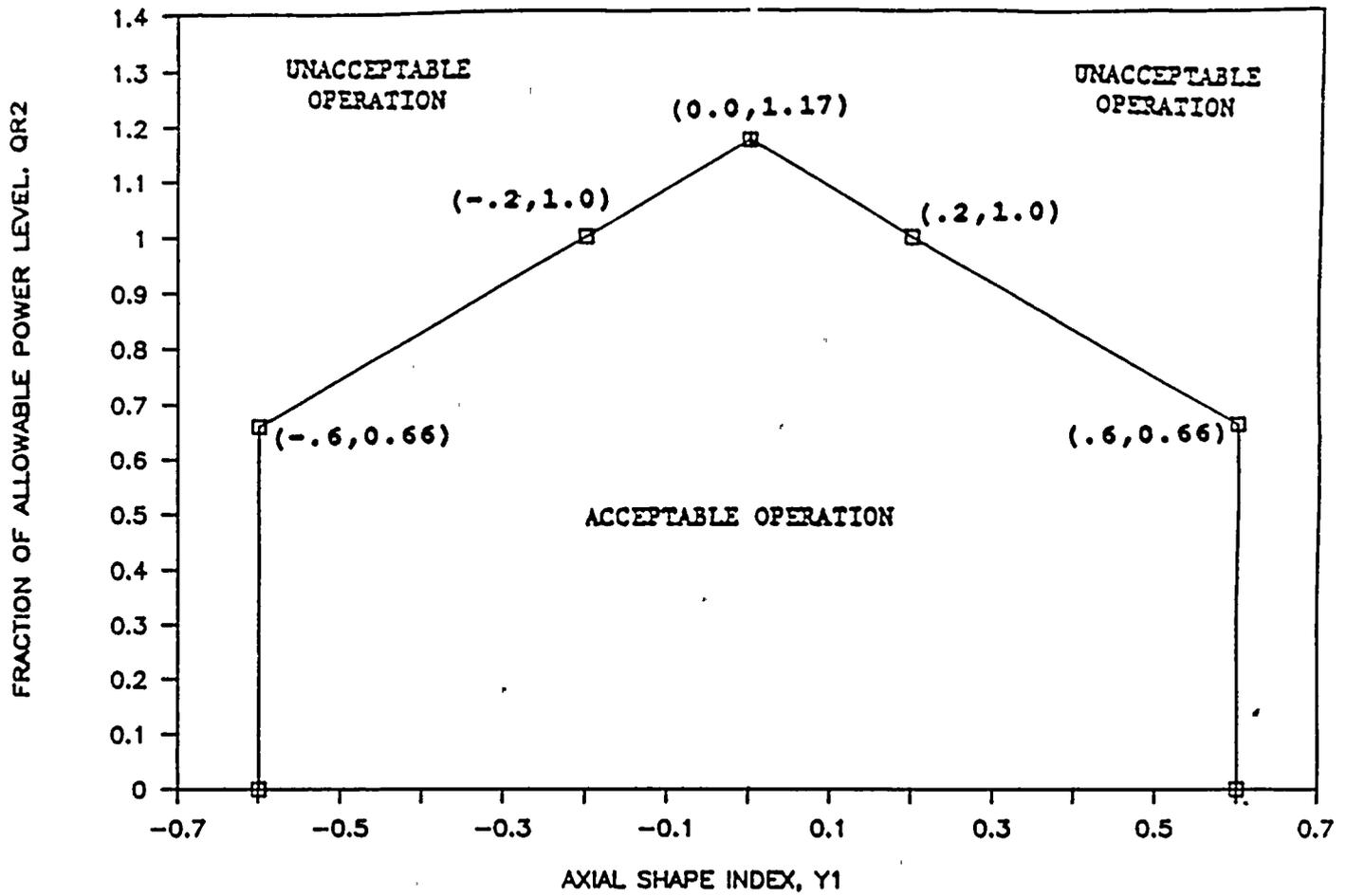
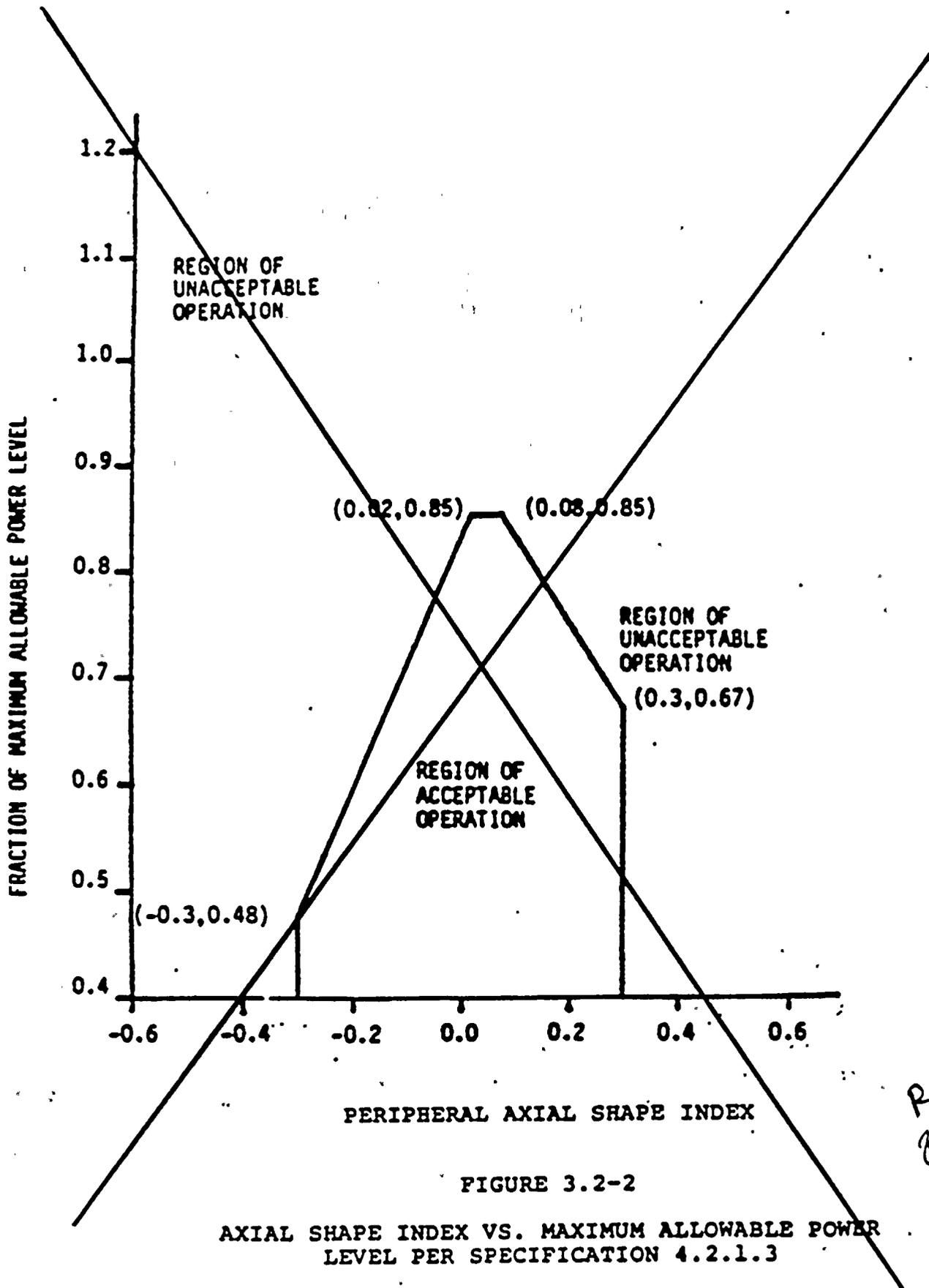


FIGURE 2.2-2

LOCAL POWER DENSITY- HIGH TRIP SETPOINT PART 2 (QR2 Versus Y1)

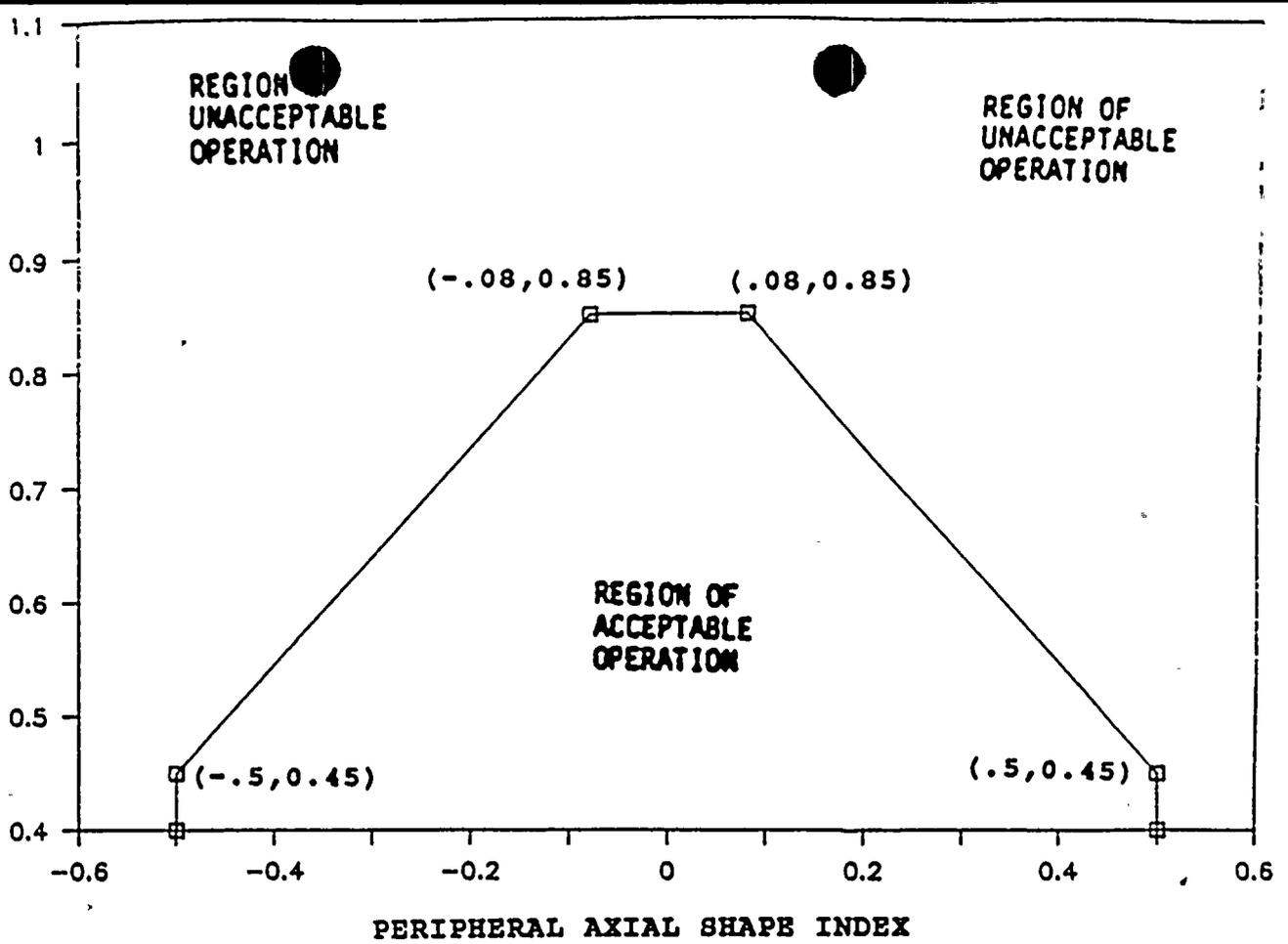


*Replace with
Insert attach*

FIGURE 3.2-2

AXIAL SHAPE INDEX VS. MAXIMUM ALLOWABLE POWER LEVEL PER SPECIFICATION 4.2.1.3

FRACTION OF MAXIMUM ALLOWABLE POWER LEVEL



(NOT APPLICABLE BELOW 40% POWER)

FIGURE 3.2-2
AXIAL SHAPE INDEX VS. MAXIMUM ALLOWABLE POWER
LEVEL PER SPECIFICATION 4.2.1.3

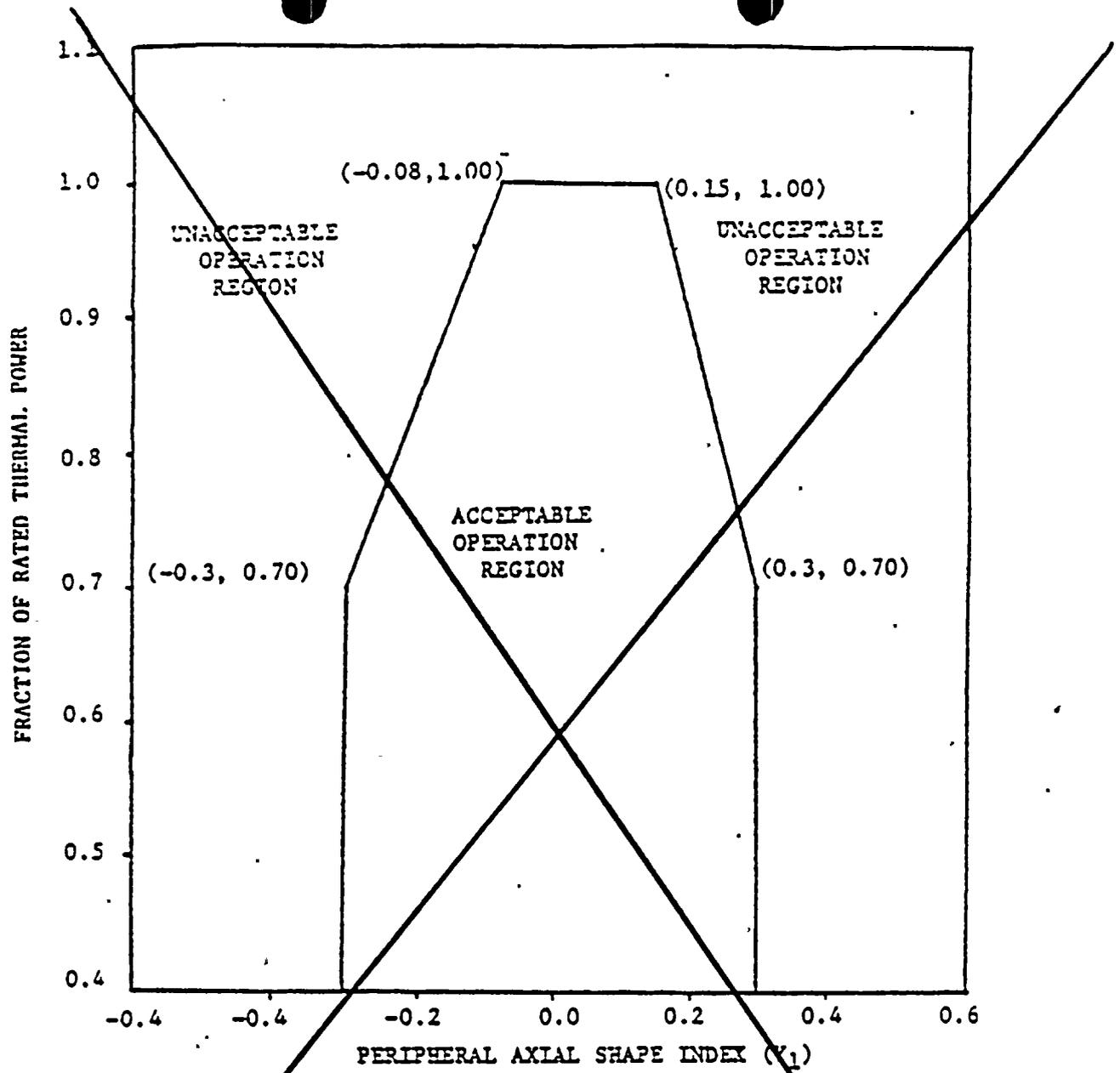


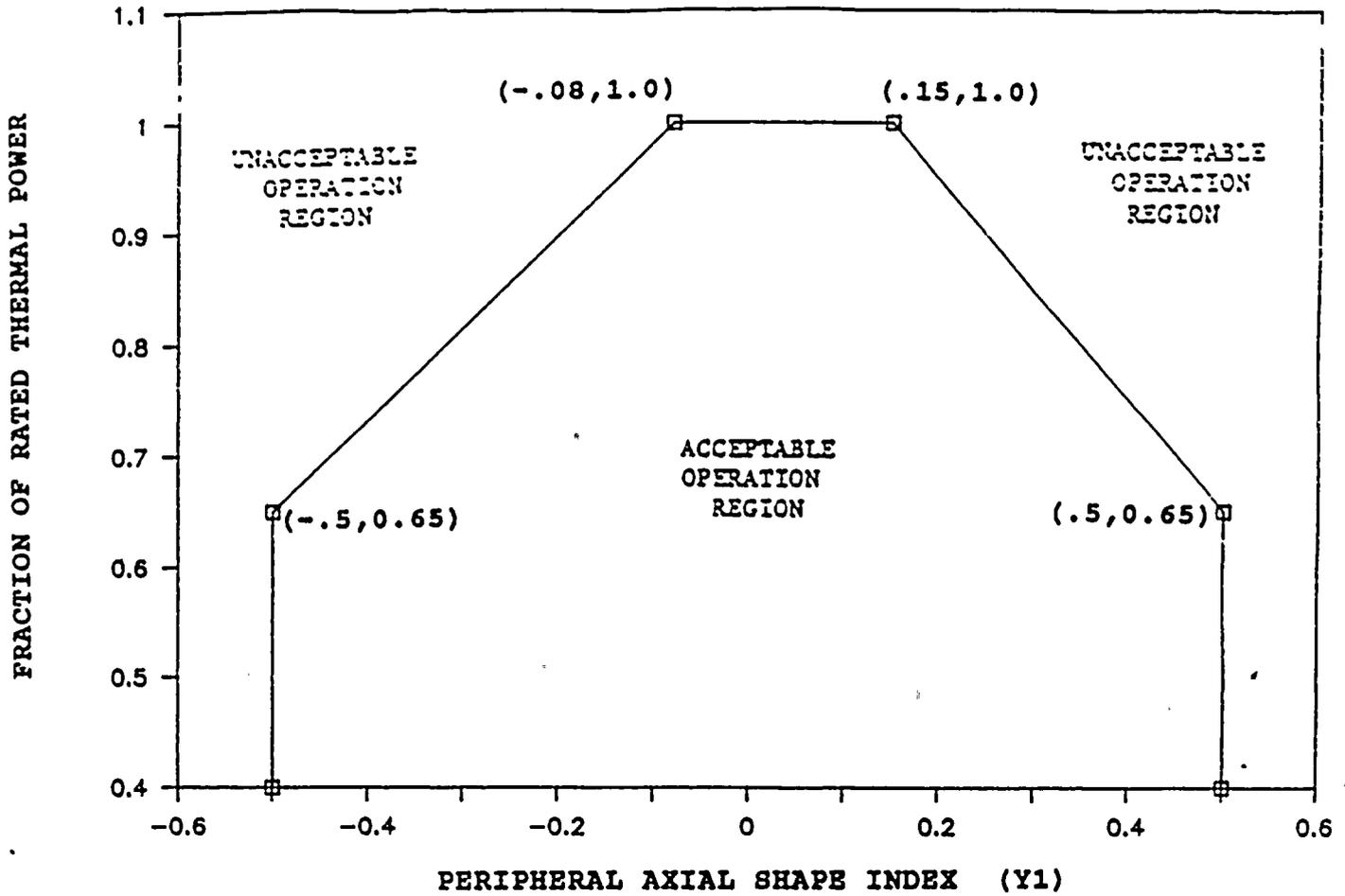
FIGURE 3.2-4
 AXIAL SHAPE INDEX Operating Limits With 4 Reactor Coolant Pumps Operating

ST. LUCIE - UNIT 1

3/4 2-15

Amendment No. 27, 28, 48

*Replace with
 Insert Attached*



(NOT APPLICABLE BELOW 40% POWER)

FIGURE 3.2-4

AXIAL SHAPE INDEX Operating Limits With
4 Reactor Coolant pumps Operating

ATTACHMENT 2

ST. LUCIE UNIT 1

SAFETY ANALYSIS

AXIAL SHAPE INDEX LIMITS EXPANSION

SAFETY ANALYSIS

ST. LUCIE UNIT 1 AXIAL SHAPE INDEX LIMITS EXPANSION

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 Local Power Density (LPD) Limiting Condition for Operation (LCOs) and the LPD related Limiting Safety System Setpoints (LSSS) is proposed. The proposed change modifies the Local Power Density LSSS (Technical Specification Figure 2.2-2), the LPD LCO (Technical Specification Figure 3.2-2) maximum allowed power level versus peripheral Axial Shape Index (ASI) for ex-core detector monitoring system, and DNB LCO fraction of the rated thermal power versus peripheral ASI for four reactor coolant pumps operating (Technical Specification Figure 3.2-4).

It is proposed to expand the LPD LSSS ASI limits for power levels below 66% from ± 0.4 to ± 0.6 and for 100% power level from -0.145 to -0.2 . It is also proposed to expand the ASI limits of the LPD LCO for power levels below 45% (but above 40%) and the ASI limits of the DNB LCO for powers below 65% (but above 40%) from ± 0.3 to ± 0.5 . In addition changes were made to ASI limits of the LPD LCO at 85% power level from 0.02 to -0.08 .

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 1 FSAR. 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 levels affects only those DBEs that are initiated at those power levels. However, the DBEs are not typically analyzed at intermediate power levels because these events, when initiated from intermediate power levels ($100\% > \text{initial power} > 0\%$), 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 analyses that are currently licensed remain 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:

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 negligible small impact on the transient. Consequently, the boron dilution event analysis results on record are still applicable.

Excess Load and CEA Withdrawal: St. Lucie Unit 1 FSAR shows that the case initiated from hot zero power for CEA Withdrawal and Excess Load are bounded by their respective full power cases. Figure A shows that with the expanded ASI tent, for the Loss of Flow and CEA drop events, the margin in DNBR increases as power is decreased for ASIs less than -0.08. The trend will be the same for DNBRs calculated for CEA withdrawal and Excess Load transients, and the 100% power cases would remain limiting. Also, the variable high power trip would limit power excursions initiated from partial power, so that the maximum core power, and therefore the minimum DNBR, would be achieved in the 100% power cases.

Steam Line Break (SLB): The LPD-LSSS and DNB-LCO setpoints are administrative controls used in the plant to prevent fuel centerline melt and DNB from occurring during normal operation and Anticipated Operational Occurrences (AOOs). The ASI tents do not apply to the steamline break event for the following reasons: (1) The steamline break event is a Condition IV Postulated Accident. The Standard Review Plan acceptance criteria allows DNB and centerline melt to occur during a Postulated Accident. Thus, the LCO and LSSS setpoints are not required to provide protection against DNB for the steamline break event. (2) The axial shapes generated to verify the ASI tents for normal operation and AOOs do not necessarily represent the power shapes occurring during a steamline break event. Axial power shapes used in the Advanced Nuclear Fuels (ANF) XCOBRA-IIIC code to calculate DNBR and centerline melt for a steamline break

event are generated by the ANF Neutronics computer code XTG and are specific to the conditions predicted to occur in the core during a steamline break event. Therefore, the proposed modifications to the ASI tents do not impact the steamline break analysis.

Spectrum of CEA Ejection Accidents: Axial peaking factors used for these events are not dependent on ASI tent limits. The criterion for this event is based on maximum local deposited energy to the fuel, which is determined by the maximum allowed local power. The calculation uses nominal Beginning-Of-Cycle and End-Of-Cycle maximum F_q to determine this power. Thus, the ASI limiting axial profiles are not used, and therefore this event is not affected by the ASI tent changes.

The expanded LSSS and LCO ASI tents were compared to the limiting data points from the Cycle 9 setpoint analysis. These comparisons show that the limiting data points from the Cycle 9 setpoint analysis are higher than the expanded ASI tents, LPD LSSS, LPD LCO, and DNB LCO.

The analyses/comparisons described above showed that in all cases margin still exists between the expanded Technical Specification limits and the calculated values. Figures 1, 2 and 3, LPD LSSS, LPD LCO and DNB LCO respectively, show the existing and expanded ASI limits and the limiting data points. Figures 1, 2 and 3 show that in all the proposed cases margin is still available.

The results of the setpoint evaluations described above are shown in proposed revised Technical Specification 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 (Figure 2.2-2) and LPD LCO (Figure 3.2-2). It should be noted that the LPD LSSS trip is not the primary trip in the safety analysis of any Design Basis Event (DBE). However, the LPD LSSS 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 affected. The allowed power versus ASI points for the LPD LCO are determined by considering all possible axial shapes and a maximum Linear Heat Generation Rate (LHGR) of 15 kw/ft, determined by the large break LOCA analysis. The proposed modified LPD LCO tent does not change any of the limiting data points (Figure 2) used in the safety analysis. Therefore the proposed change in the LPD LCO tent does not affect any of the FSAR Chapter 15 events.

The final conclusion of the analysis is that all events and setpoints are bounded by previous analyses.

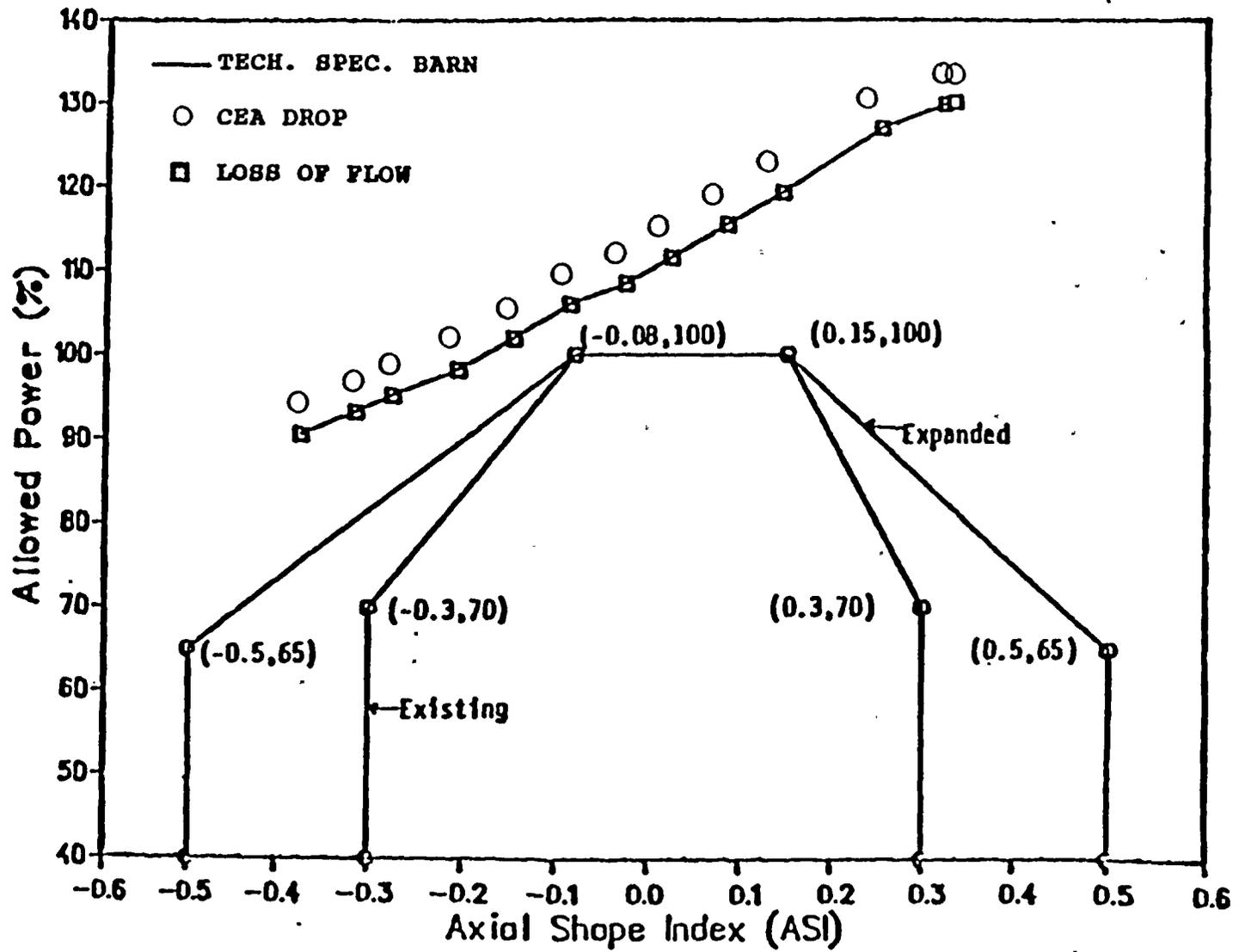


FIGURE A

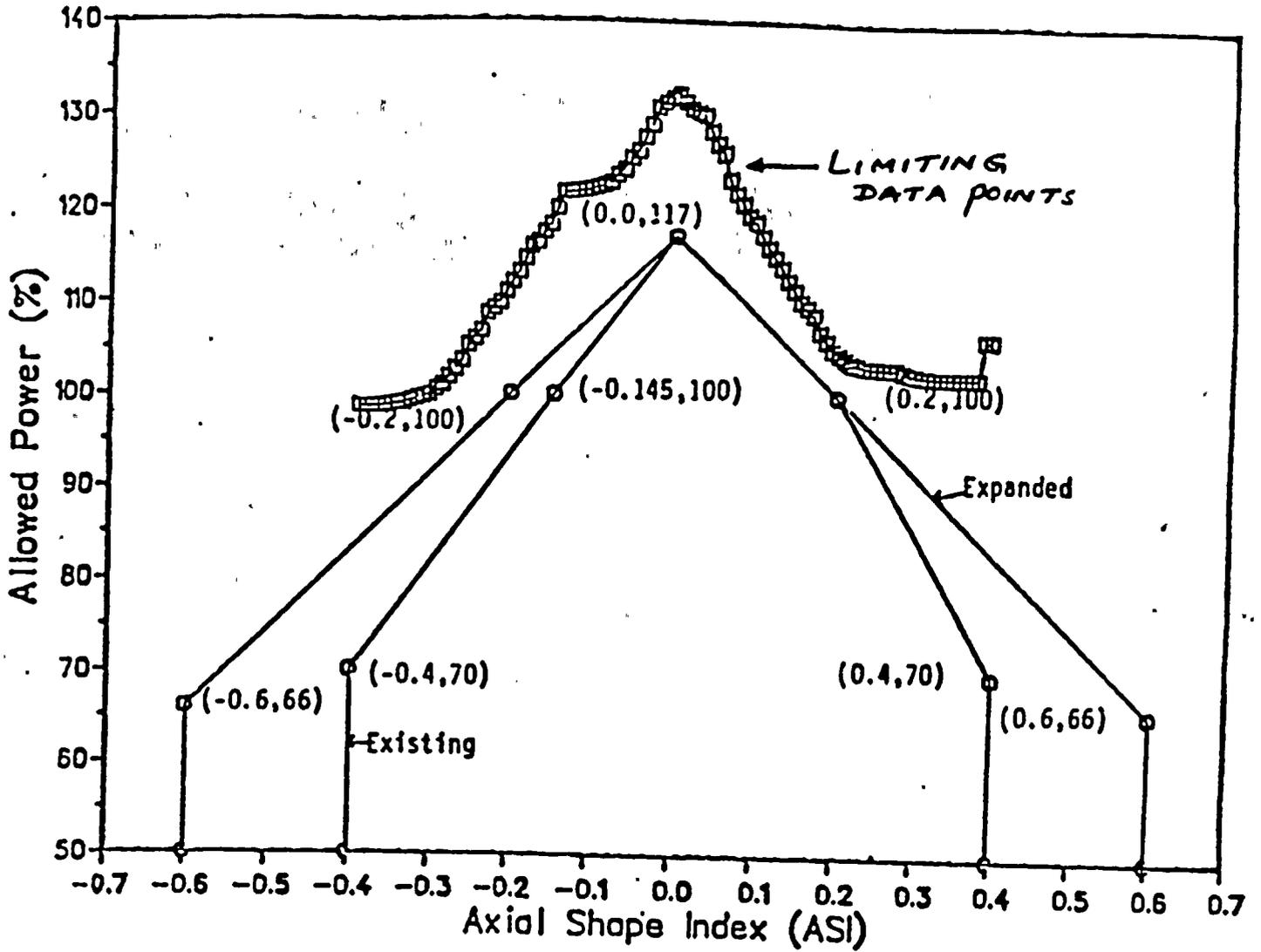


FIGURE 1 EXPANDED LPD L888 ASI TENT

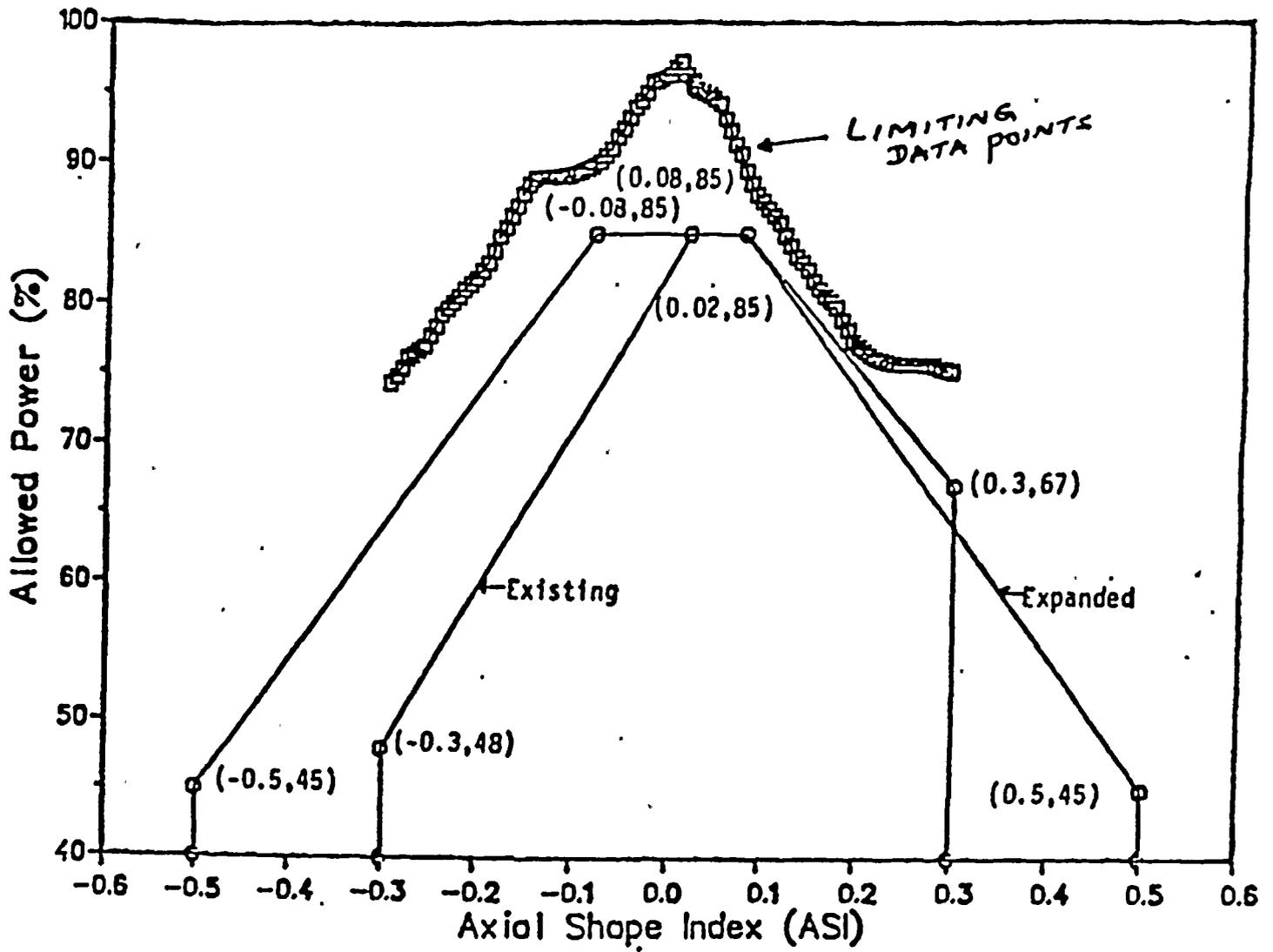


FIGURE 2 EXPANDED LPD LCO ASI TENT

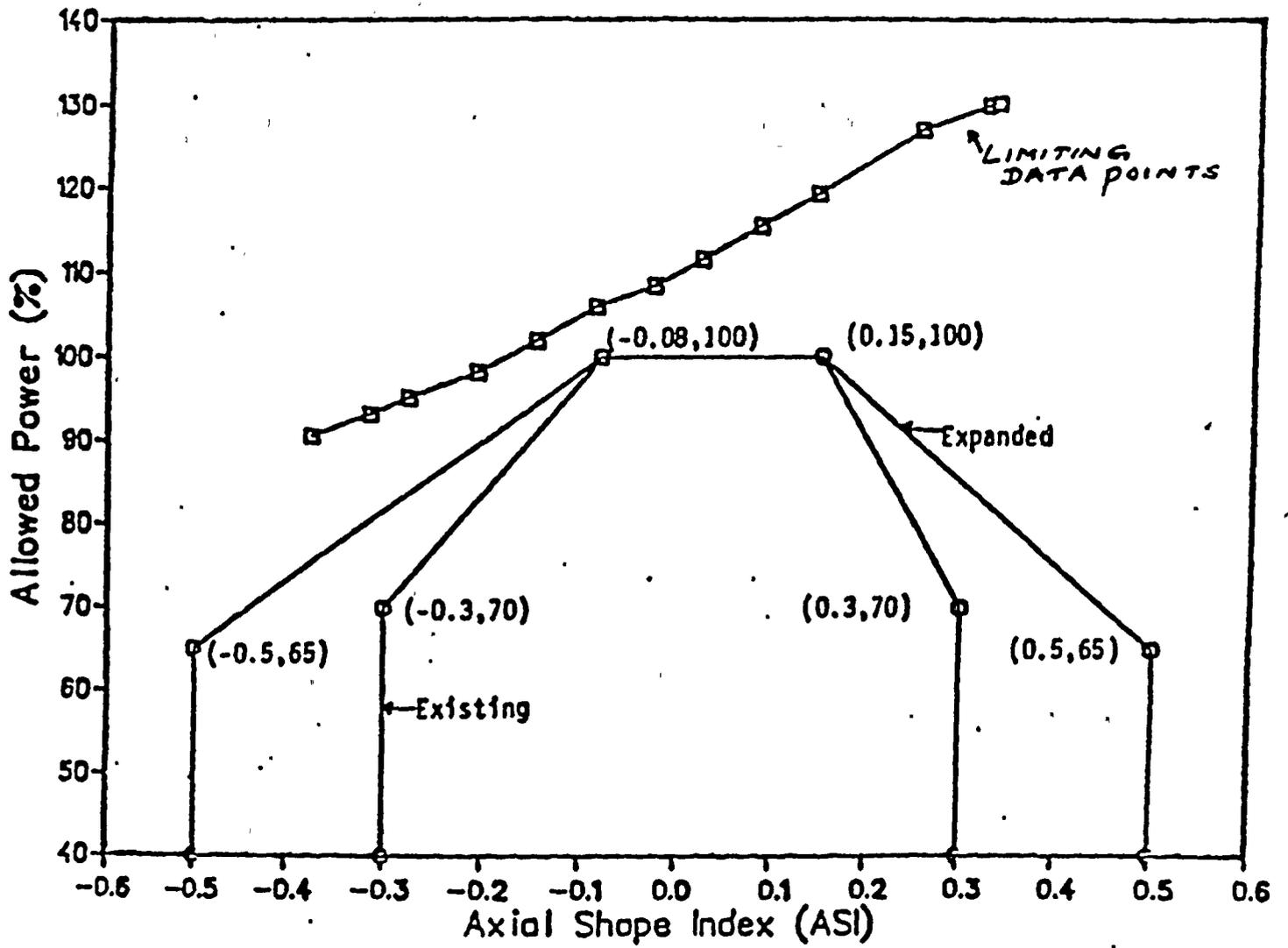


FIGURE 3 EXPANDED DNB LCO ASI TENT

ATTACHMENT 3

ST. LUCIE UNIT 1

DETERMINATION OF NO SIGNIFICANT HAZARDS CONSIDERATION

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, 10CFR50.92, which states 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 Design Basis Events (DBEs) evaluated in the safety analysis. The expansion of these ASI limits are 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, 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 Local Power Density (LPD) LCOs and Limiting Safety System Setpoints (LSSSs) are expanded for greater operational flexibility. This proposed change will not increase the probability or consequences of an accident previously evaluated because the proposed limits are bounded by the actual calculated limiting values.

- (2) Operation of the facility in accordance with the proposed amendment would not create the possibility of a new or different kind of accident from any 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) Operation of the facility in accordance with the proposed amendment would not involve significant reduction in a margin of safety.

The wider ASI bands 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 limits. Therefore, there is no significant reduction in a margin of safety.

Based upon 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 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; and therefore does not involve a significant hazards consideration.