ATTACHMENT B

BRAIDWOOD STATION

Proposed Changes to Appendix A
Technical Specifications of facility
Operating Licenses NPF-72 and NPF-77

Revised Pages:

IV
V
1-4
3/4 1-1
3/4 1-14
3/4 1-15
3/4 1-20
3/4 1-21
3/4 1-22
3/4 2-1
3/4 2-2
3/4 2-3
3/4 2-4
3/4 2-5
3/4 2-8
B 3/4 2-2
6-22

SECTION PAGE

3/4.0 APPLICABILITY.. 3/4 0-1

3/4.1 REACTIVITY CONTROL SYSTEMS

3/4.1.1 BORATION CONTROL

Shutdown Margin - T_{avg} > 200°F.......................... 3/4 1-1

Shutdown Margin - $T_{avg} \leq$ 200°F.......................... 3/4 1-3

Moderator Temperature Coefficient.......................... 3/4 1-4

Minimum Temperature for Criticality.......................... 3/4 1-6

3/4.1.2 BORATION SYSTEMS

Flow Path - Shutdown.......................... 3/4 1-7

Flow Paths - Operating.......................... 3/4 1-8

Charging Pump - Shutdown.......................... 3/4 1-9

Charging Pumps - Operating.......................... 3/4 1-10

Borated Water Source - Shutdown.......................... 3/4 1-11

Borated Water Sources - Operating.......................... 3/4 1-12

Boron Dilution Protection System.......................... 3/4 1-13a

3/4.1.3 MOVABLE CONTROL ASSEMBLIES

Group Height.......................... 3/4 1-14

TABLE 3.1-1 ACCIDENT ANALYSES REQUIRING REEVALUATION IN THE EVENT OF AN INOPERABLE FULL-LENGTH ROD.......................... 3/4 1-16

Position Indication Systems - Operating.......................... 3/4 1-17

Position Indication System - Shutdown.......................... 3/4 1-18

Rod Drop Time.......................... 3/4 1-19

Shutdown Rod Insertion Limit.......................... 3/4 1-20

Control Rod Insertion Limits.......................... 3/4 1-21

FIGURE 3.1-1 ~~ROD BANK INSERTION LIMITS VERSUS THERMAL POWER FOUR LOOP OPERATION~~ (THIS FIGURE IS NOT USED) 3/4 1-22

SECTION PAGE

3/4.2 POWER DISTRIBUTION LIMITS

3/4.2.1 AXIAL FLUX DIFFERENCE 3/4 2-1
FIGURE 3.2-1 ~~AXIAL FLUX DIFFERENCE LIMITS AS A FUNCTION OF RATED THERMAL POWER.~~ (THIS FIGURE IS NOT USED). 3/4 2-3
3/4.2.2 HEAT FLUX HOT CHANNEL FACTOR........................... 3/4 2-4
FIGURE 3.2-2 ~~K(Z)-NORMALIZED $F_Q(Z)$ AS A FUNCTION OF CORE HEIGHT~~ (THIS FIGURE IS NOT USED)... 3/4 2-5
3/4.2.3 RCS FLOW RATE AND NUCLEAR ENTHALPY RISE HOT CHANNEL FACTOR.. 3/4 2-8
3/4.2.4 QUADRANT POWER TILT RATIO.............................. 3/4 2-10
3/4.2.5 DNB PARAMETERS... 3/4 2-13
TABLE 3.2-1 DNB PARAMETERS... 3/4 2-14

3/4.3 INSTRUMENTATION

3/4.3.1 REACTOR TRIP SYSTEM INSTRUMENTATION...................... 3/4 3-1
TABLE 3.3-1 REACTOR TRIP SYSTEM INSTRUMENTATION.................. 3/4 3-2
TABLE 3.3-2 (THIS TABLE IS NOT USED).............................. 3/4 3-7
TABLE 4.3-1 REACTOR TRIP SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS.................................... 3/4 3-9
3/4.3.2 ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION.. 3/4 3-13
TABLE 3.3-3 ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION.................................... 3/4 3-15
TABLE 3.3-4 ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION TRIP SETPOINTS...................... 3/4 3-23
TABLE 3.3-5 (THIS TABLE IS NOT USED).............................. 3/4 3-30
TABLE 4.3-2 ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS........... 3/4 3-34

OFFSITE DOSE CALCULATION MANUAL

1.18 The OFFSITE DOSE CALCULATION MANUAL (ODCM) shall contain the methodology and parameters used in the calculation of offsite doses resulting from radioactive gaseous and liquid effluents, in the calculation of gaseous and liquid effluent monitoring alarm/trip setpoints, and in the conduct of the Environmental Radiological Monitoring Program. The ODCM shall also contain (1) the Radioactive Effluent Controls and Radiological Environmental Monitoring Programs required by Sections 6.8.4.e and f, and (2) descriptions of the information that should be included in the Annual Radiological Environmental Operating and Radioactive Effluent Release Reports required by Specification 6.9.1.6 and 6.9.1.7.

OPERABLE - OPERABILITY

1.19 A system, subsystem, train, component or device shall be OPERABLE or have OPERABILITY when it is capable of performing its specified function(s), and when all necessary attendant instrumentation, controls, electrical power, cooling or seal water, lubrication or other auxiliary equipment that are required for the system, subsystem, train, component, or device to perform its function(s) are also capable of performing their related support function(s).

OPERATING LIMITS REPORT

1.19.a The OPERATING LIMITS REPORT (OLR) is the unit-specific document that provides operating limits for the current operating reload cycle. These cycle-specific operating limits shall be determined for each reload cycle in accordance with Specification 6.9.1.9. Plant Operation within these operating limits is addressed in individual specifications.

OPERATIONAL MODE - MODE

1.20 An OPERATIONAL MODE (i.e., MODE) shall correspond to any one inclusive combination of core reactivity condition, power level, and average reactor coolant temperature specified in Table 1.2.

PHYSICS TESTS

1.21 PHYSICS TESTS shall be those tests performed to measure the fundamental nuclear characteristics of the core and related instrumentation: (1) described in Chapter 14.0 of the FSAR, (2) authorized under the provisions of 10 CFR 50.59, or (3) otherwise approved by the Commission.

PRESSURE BOUNDARY LEAKAGE

1.22 PRESSURE BOUNDARY LEAKAGE shall be leakage (except steam generator tube leakage) through a nonisolable fault in a Reactor Coolant System component body, pipe wall, or vessel wall.

3/4.1.3 MOVABLE CONTROL ASSEMBLIES

GROUP HEIGHT

LIMITING CONDITION FOR OPERATION

3.1.3.1 All full-length shutdown and control rods shall be OPERABLE and positioned within ± 12 steps (indicated position) of their group step counter demand position.

APPLICABILITY: MODES 1* and 2*.

ACTION:

a. With one or more full-length rods inoperable due to being immovable as a result of excessive friction or mechanical interference or known to be untrippable, determine that the SHUTDOWN MARGIN requirement of Specification 3.1.1.1 is satisfied within 1 hour and be in HOT STANDBY within 6 hours.

b. With one full-length rod trippable but inoperable due to causes other than addressed by ACTION a. above, or misaligned from its group step counter demand height by more than ± 12 steps (indicated position), POWER OPERATION may continue provided that within 1 hour: 4

1. The rod is restored to OPERABLE status within the above alignment requirements, or

2. The rod is declared inoperable and the remainder of the rods in the group with the inoperable rod are aligned to within ± 12 steps of the inoperable rod while maintaining the rod sequence and insertion limits of ~~Figure 3.1-1~~ Specification 3.1.3.6. The THERMAL POWER level shall be restricted pursuant to Specification 3.1.3.6 during subsequent operation, or

3. The rod is declared inoperable and the SHUTDOWN MARGIN requirement of Specification 3.1.1.1 is satisfied. POWER OPERATION may then continue provided that:

   a) The THERMAL POWER level is reduced to less than or equal to 75% of RATED THERMAL POWER within the next hour and within the following 4 hours the High Neutron Flux Trip Setpoint is reduced to less than or equal to 85% of RATED THERMAL POWER.

   b) The SHUTDOWN MARGIN requirement of Specification 3.1.1.1 is determined at least once per 12 hours;

*See Special Test Exceptions Specifications 3.10.2 and 3.10.3.

ACTION (Continued)

c) A power distribution map is obtained from the movable incore detectors and $F_Q(Z)$ and $F^N_{\Delta H}$ are verified to be within their limits within 72 hours; and

d) A reevaluation of each accident analysis of Table 3.1-1 is performed within 5 days; this reevaluation shall confirm that the previously analyzed results of these accidents remain valid for the duration of operation under these conditions;

c. With more than one full-length rod trippable but inoperable due to causes other than addressed by ACTION a. above, or misaligned from its group step counter demand height by more than ± 12 steps (indicated position), POWER OPERATION may continue provided that:

1. Within 1 hour, the remainder of the rods in the group(s) with the inoperable rods are aligned to within ± 12 steps of the inoperable rods while maintaining the rod sequence and insertion limits of ~~Figure 3.1-1~~. Specification 3.1.3.6. The THERMAL POWER level shall be restricted pursuant to Specification 3.1.3.6 during subsequent operation, and

2. The inoperable rods shall be restored to OPERABLE status within 72 hours.

Otherwise, be in HOT STANDBY within 6 hours.

SURVEILLANCE REQUIREMENTS

4.1.3.1.1 The position of each full-length rod shall be determined to be within the group demand limit by verifying the individual rod positions at least once per 12 hours except during time intervals when the rod position deviation monitor is inoperable, then verify the group positions at least once per 4 hours.

4.1.3.1.2 Each full-length rod not fully inserted in the core shall be determined OPERABLE by movement of at least 10 steps in any one direction at least once per 31 days.

SHUTDOWN ROD INSERTION LIMIT

LIMITING CONDITION FOR OPERATION

limited in physical insertion as specified in the OPERATING LIMITS REPORT.

3.1.3.5 All shutdown rods shall be ~~fully withdrawn~~.

APPLICABILITY: MODES 1* and 2*#.

ACTION:

inserted beyond the insertion limit

With a maximum of one shutdown rod ~~not fully withdrawn~~, except for surveillance testing pursuant to Specification 4.1.3.1.2, within 1 hour either:

a. ~~Fully withdraw the rod, or~~

b. Declare the rod to be inoperable and apply Specification 3.1.3.1.

Restore the rod to within the insertion limit specified in the OPERATING LIMITS REPORT, or

SURVEILLANCE REQUIREMENTS

to be within the insertion limit.

4.1.3.5 Each shutdown rod shall be determined ~~fully withdrawn~~:

a. Within 15 minutes prior to withdrawal of any rods in Control Bank A, B, C, or D during an approach to reactor criticality, and

b. At least once per 12 hours thereafter.

*See Special Test Exceptions Specifications 3.10.2 and 3.10.3.

#With K_{eff} greater than or equal to 1.

CONTROL ROD INSERTION LIMITS

LIMITING CONDITION FOR OPERATION

3.1.3.6 The control banks shall be limited in physical insertion as ~~shown in Figure 3.1-1.~~ specified in the OPERATING LIMITS REPORT.

APPLICABILITY: MODES 1* and 2*#.

ACTION:

With the control banks inserted beyond the above insertion limits, except for surveillance testing pursuant to Specification 4.1.3.1.2:

a. Restore the control banks to within the limits within 2 hours, or

b. Reduce THERMAL POWER within 2 hours to less than or equal to that fraction of RATED THERMAL POWER which is allowed by the bank position using the ~~above figure, or~~ insertion limits specified in the OPERATING LIMITS REPORT, or

c. Be in at least HOT STANDBY within 6 hours.

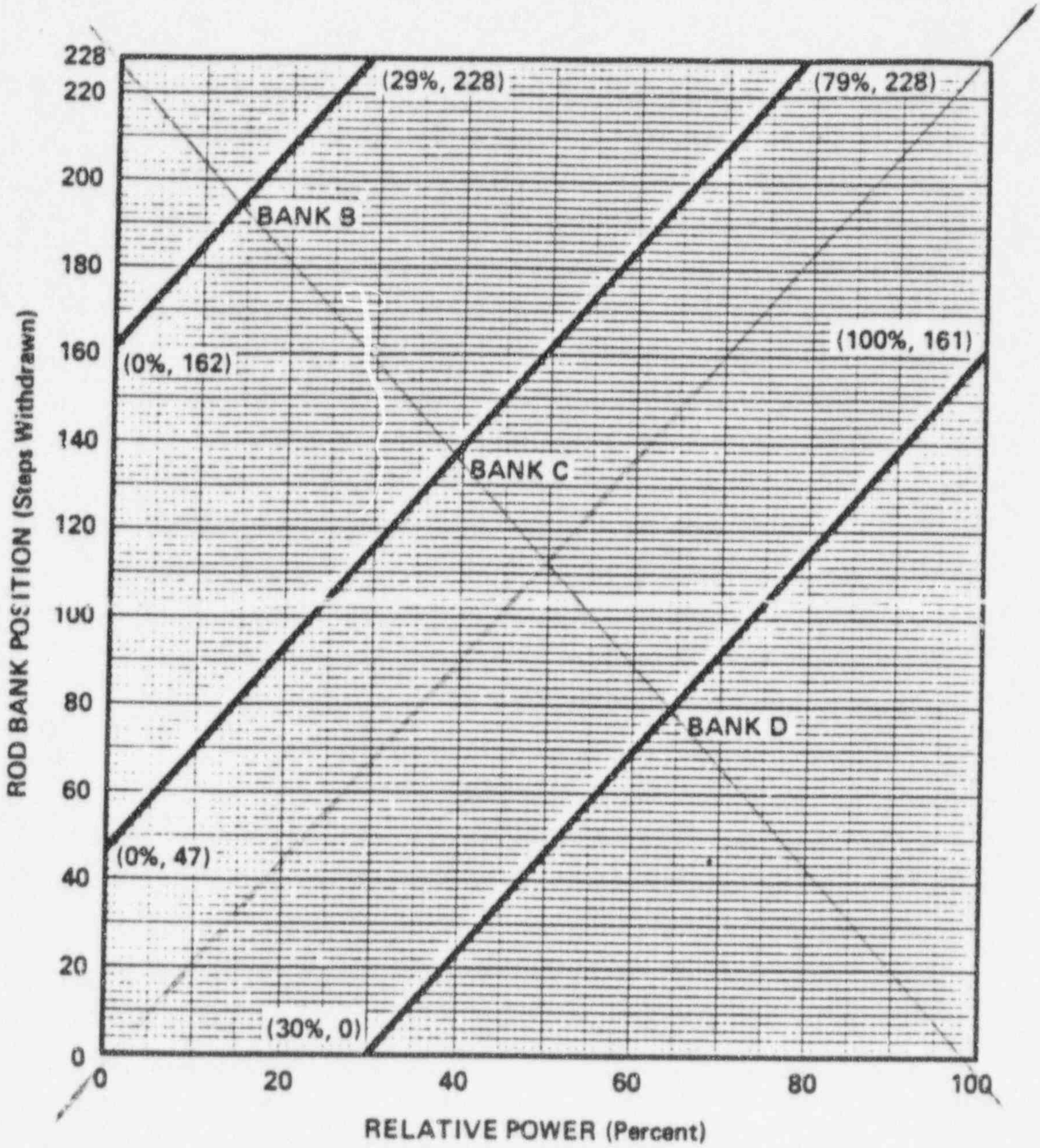
SURVEILLANCE REQUIREMENTS

4.1.3.6 The position of each control bank shall be determined to be within the insertion limits at least once per 12 hours except during time intervals when the Rod Insertion Limit Alarm is inoperable, then verify the individual rod positions at least once per 4 hours.

*See Special Test Exceptions Specifications 3.10.2 and 3.10.3.

#With K_{eff} greater than or equal to 1.

FIGURE 3.1-1
(THIS FIGURE IS NOT USED)



~~FIGURE 3.1-1~~

~~ROD BANK INSERTION LIMITS VERSUS THERMAL POWER~~
~~FOUR LOOP OPERATION~~

3/4.2.1 AXIAL FLUX DIFFERENCE

The target band is specified in the OPERATING LIMITS REPORT.

LIMITING CONDITION FOR OPERATION

3.2.1 The indicated AXIAL FLUX DIFFERENCE (AFD) shall be maintained within the ~~following~~ target band (flux difference units) about the target flux difference:

~~a. ± 5% for Cycle 1 core average accumulated burnup of less than or equal to 5000 MWD/MTU, and~~

~~b. + 3%, -9% for Cycle 1 core average accumulated burnup of greater than 5000 MWD/MTU, and~~

~~c. + 3%, -12% for each subsequent cycle.~~

The indicated AFD may deviate outside the ~~above~~ required target band at greater than or equal to 50% but less than 90% of RATED THERMAL POWER provided the indicated AFD is within the Acceptable Operation Limits ~~of Figure 3.2-1~~ specified in the OPERATING LIMITS REPORT and the cumulative penalty deviation time does not exceed 1 hour during the previous 24 hours.

The indicated AFD may deviate outside the ~~above~~ required target band at greater than 15% but less than 50% of RATED THERMAL POWER provided the cumulative penalty deviation time does not exceed 1 hour during the previous 24 hours.

APPLICABILITY: MODE 1 above 15% of RATED THERMAL POWER*.

ACTION:

a. With the indicated AFD outside of the ~~above~~ required target band and with THERMAL POWER greater than or equal to 90% of RATED THERMAL POWER, within 15 minutes, either:

   1. Restore the indicated AFD to within the ~~above~~ required target band limits, or

   2. Reduce THERMAL POWER to less than 90% of RATED THERMAL POWER.

b. With the indicated AFD outside of the ~~above~~ required target band for more than 1 hour of cumulative penalty deviation time during the previous 24 hours or outside the Acceptable Operation Limits ~~of Figure 3.2-1~~ specified in the OPERATING LIMITS REPORT and with THERMAL POWER less than 90% but equal to or greater than 50% of RATED THERMAL POWER, reduce:

   1. THERMAL POWER to less than 50% of RATED THERMAL POWER within 30 minutes, and

   2. The Power Range Neutron Flux - High# Setpoints to less than or equal to 55% of RATED THERMAL POWER within the next 4 hours.

specified in the OPERATING LIMITS REPORT.

*See Special Test Exceptions Specification 3.10.2.

#Surveillance testing of the Power Range Neutron Flux channel may be performed pursuant to Specification 4.3.1.1 provided the indicated AFD is maintained within the Acceptable Operation Limits ~~of Figure 3.2-1.~~ A total of 16 hours operation may be accumulated with the AFD outside of the ~~above~~ required target band during testing without penalty deviation.

LIMITING CONDITION FOR OPERATION

ACTION (Continued)

c. With the indicated AFD outside of the ~~above~~ required target band for more than 1 hour of cumulative penalty deviation time during the previous 24 hours and with THERMAL POWER less than 50% but greater than 15% of RATED THERMAL POWER, the THERMAL POWER shall not be increased equal to or greater than 50% of RATED THERMAL POWER until the indicated AFD is within the ~~above~~ required target band.

SURVEILLANCE REQUIREMENTS

4.2.1.1 The indicated AFD shall be determined to be within its limits during POWER OPERATION above 15% of RATED THERMAL POWER by:

a. Monitoring the indicated AFD for each OPERABLE excore channel:

   1) At least once per 7 days when the AFD Monitor Alarm is OPERABLE, and

   2) At least once per hour for the first 24 hours after restoring the AFD Monitor Alarm to OPERABLE status.

b. Monitoring and logging the indicated AFD for each OPERABLE excore channel at least once per hour for the first 24 hours and at least once per 30 minutes thereafter, when the AFD Monitor Alarm is inoperable. The logged values of the indicated AFD shall be assumed to exist during the interval preceding each logging.

4.2.1.2 The indicated AFD shall be considered outside of its target band when two or more OPERABLE excore channels are indicating the AFD to be outside the target band. Penalty deviation outside of the ~~above~~ required target band shall be accumulated on a time basis of:

a. One minute penalty deviation for each 1 minute of POWER OPERATION outside of the target band at THERMAL POWER levels equal to or above 50% of RATED THERMAL POWER, and

b. One-half minute penalty deviation for each 1 minute of POWER OPERATION outside of the target band at THERMAL POWER levels between 15% and 50% of RATED THERMAL POWER.

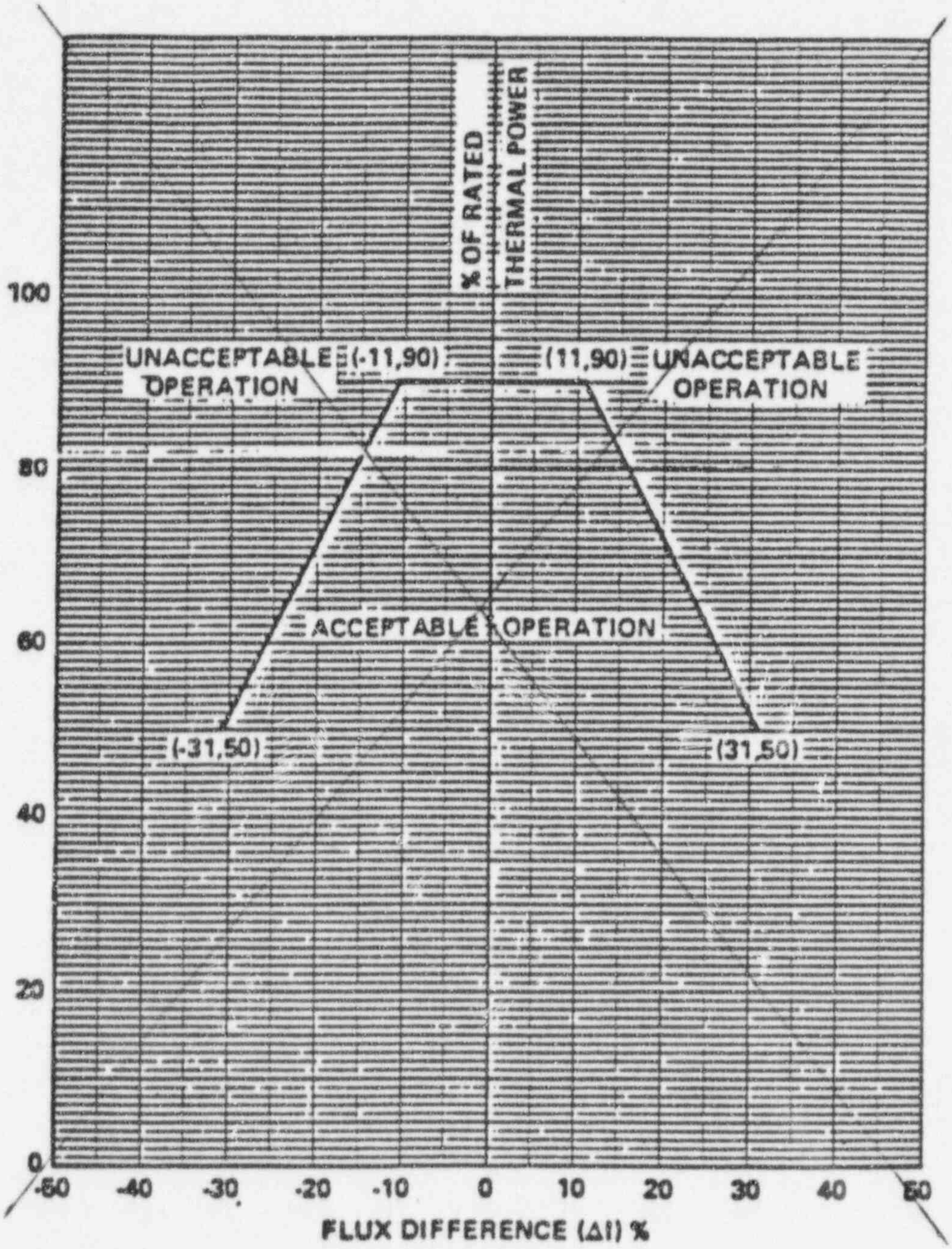
4.2.1.3 The initial determination of target flux difference following a refueling outage shall be based on design predictions. Otherwise, the target flux difference of each OPERABLE excore channel shall be determined by measurement at least once per 92 Effective Full Power Days.

4.2.1.4 The target flux difference shall be updated at least once per 31 Effective Full Power Days by either determining the target flux difference pursuant to Specification 4.2.1.3 above or by linear interpolation between the most recently measured value and the predicted value at the end of the cycle life.

FIGURE 3.2-1

(THIS FIGURE IS NOT USED)

~~AXIAL FLUX DIFFERENCE LIMITS AS A~~
~~FUNCTION OF RATED THERMAL POWER~~



3/4.2.2 HEAT FLUX HOT CHANNEL FACTOR - $F_Q(Z)$

LIMITING CONDITION FOR OPERATION

3.2.2 $F_Q(Z)$ shall be limited by the following relationships:

[F_Q^{RTP}]

$F_Q(Z) \leq \frac{\cancel{[2.32]}}{P}$ [K(Z)] for P > 0.5, and ~~(Unit 1 Cycle 2 and Unit 2 Cycle 1)~~

$\frac{[F_Q^{RTP}]}{[0.5]}$

$F_Q(Z) \leq \cancel{[4.64]}$ [K(Z)] for P ≤ 0.5.

~~$F_Q(Z) \leq \frac{[2.50]}{P}$ [K(Z)] for P > 0.5, and (Unit 1 Cycle 3 and after; Unit 2 Cycle 2 and after)~~

~~$F_Q(Z) \leq$ [5.00] [K(Z)] for P ≤ 0.5.~~

Where:

$$P = \frac{\text{THERMAL POWER}}{\text{RATED THERMAL POWER}},$$

~~and~~ K(Z) is the function ~~obtained from Figure 3.2-2~~ specified in the OPERATING LIMITS REPORT for a given core height location.

APPLICABILITY: MODE 1.

ACTION:

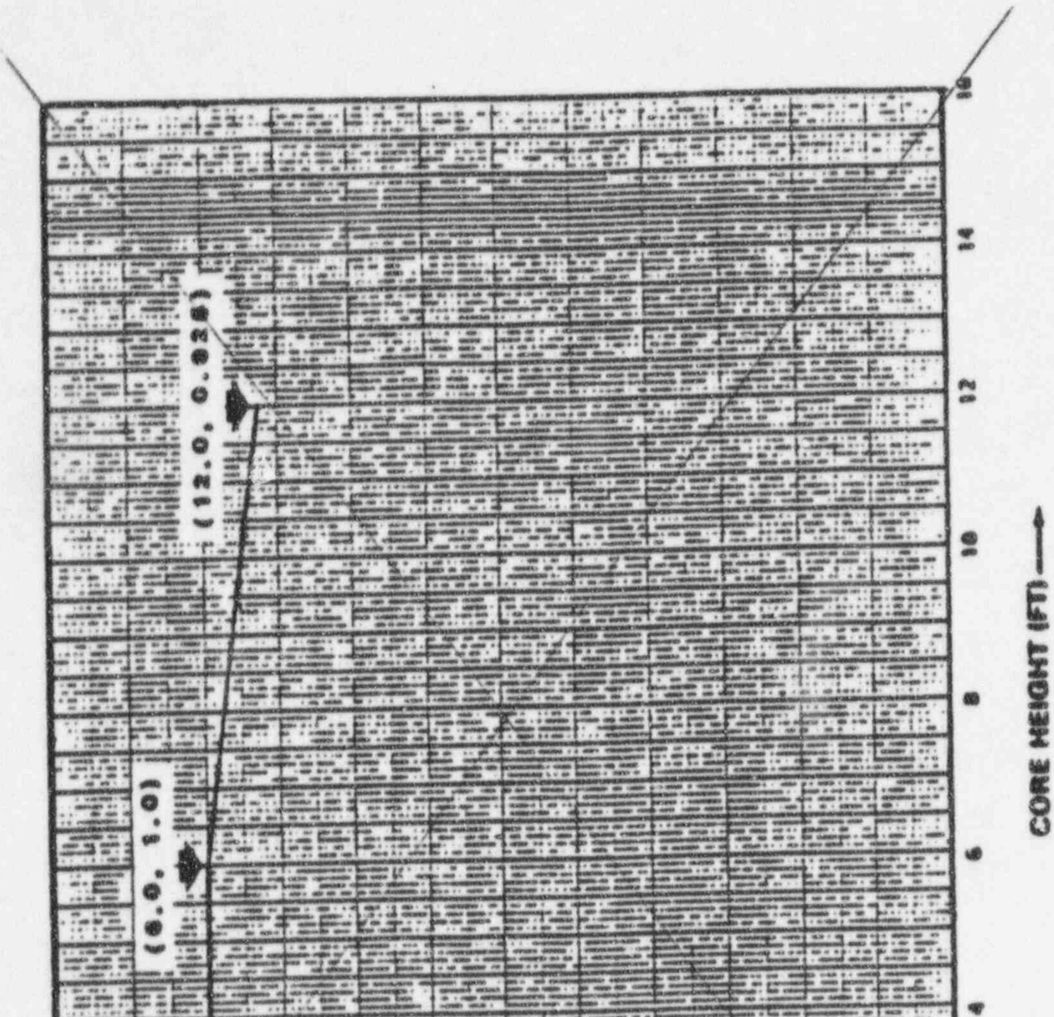
With $F_Q(Z)$ exceeding its limit:

a. Reduce THERMAL POWER at least 1% for each 1% $F_Q(Z)$ exceeds the limit within 15 minutes and similarly reduce the Power Range Neutron Flux-High Trip Setpoints within the next 4 hours; POWER OPERATION may proceed for up to a total of 72 hours; subsequent POWER OPERATION may proceed provided the Overpower ΔT Trip Setpoints have been reduced at least 1% for each 1% $F_Q(Z)$ exceeds the limit; and

b. Identify and correct the cause of the out-of-limit condition prior to increasing THERMAL POWER above the reduced limit required by ACTION a., above; THERMAL POWER may then be increased provided $F_Q(Z)$ is demonstrated through incore mapping to be within its limit.

F_Q^{RTP} = the F_Q limit(s) at RATED THERMAL POWER (RTP) specified in the OPERATING LIMITS REPORT, and

FIGURE 3.2-2
(THIS FIGURE IS NOT USED)



~~FIGURE 3.2-2~~

~~K(Z) - NORMALIZED $F_Q(Z)$ AS A FUNCTION OF CORE HEIGHT~~

3/4.2.3 RCS FLOW RATE AND NUCLEAR ENTHALPY RISE HOT CHANNEL FACTOR

LIMITING CONDITION FOR OPERATION

3.2.3 Indicated Reactor Coolant System (RCS) total flow rate and $F^N_{\Delta H}$ shall be maintained as follows for four loop operation.

a. 1) *RCS Total Flowrate ≥ 390,400 gpm, and

2) **RCS Total Flowrate ≥ 371,400 gpm, and

$F^{RTP}_{\Delta H}$ PF$_{\Delta H}$

b. $F^N_{\Delta H} \leq \cancel{1.55}\ [1.0 + \cancel{0.3}\ (1.0\text{-}P)]$ ~~for OFA fuel~~

~~$F^N_{\Delta H} \leq 1.65\ [1.0 + 0.3\ (1.0\text{-}P)]$ for VANTAGE 5 fuel~~

where:

INSERT A

Measured values of $F^N_{\Delta H}$ are obtained by using the movable incore detectors. An appropriate uncertainty of 4% (nominal) or greater shall then be applied to the measured value of $F^N_{\Delta H}$ before it is compared to the requirements. ~~and~~

~~$P = \frac{\text{THERMAL POWER}}{\text{RATED THERMAL POWER}}$~~

APPLICABILITY: MODE 1.

ACTION:

With RCS total flow rate or $F^N_{\Delta H}$ outside the region of acceptable operation:

a. Within 2 hours either:

1. Restore RCS total flow rate and $F^N_{\Delta H}$ to within the above limits, or

2. Reduce THERMAL POWER to less than 50% of RATED THERMAL POWER and reduce the Power Range Neutron Flux-High Trip Setpoint to less than or equal to 55% of RATED THERMAL POWER within the next 4 hours.

*Applicable to Unit 1 and Unit 2 until completion of cycle 5.
**Applicable to Unit 1 and Unit 2 starting with cycle 6.

INSERT A

$P = \dfrac{\text{THERMAL POWER}}{\text{RATED THERMAL POWER}}$,

$F_{\Delta H}^{RTP}$ = the $F_{\Delta H}^{N}$ limit(s) at RATED THERMAL POWER (RTP) specified in the OPERATING LIMITS REPORT, and

$PF_{\Delta H}$ = the Power Factor Multiplier(s) for $F_{\Delta H}^{N}$ specified in the OPERATING LIMITS REPORT.

Specified in the OPERATING LIMITS REPORT

BASES

AXIAL FLUX DIFFERENCE (Continued)

Although it is intended that the plant will be operated with the AFD within the target band required by Specification 3.2.1 about the target flux difference, during rapid plant THERMAL POWER reductions, control rod motion will cause the AFD to deviate outside of the target band at reduced THERMAL POWER levels. This deviation will not affect the xenon redistribution sufficiently to change the envelope of peaking factors which may be reached on a subsequent return to RATED THERMAL POWER (with the AFD within the target band) provided the time duration of the deviation is limited. Accordingly, a 1-hour penalty deviation limit cumulative during the previous 24 hours is provided for operation outside of the target band but within the limits ~~of Figure 3.2-1~~ while at THERMAL POWER levels between 50% and 90% of RATED THERMAL POWER. For THERMAL POWER levels between 15% and 50% of RATED THERMAL POWER, deviations of the AFD outside of the target band are less significant. The penalty of 2 hours actual time reflects this reduced significance.

Provisions for monitoring the AFD on an automatic basis are derived from the plant process computer through the AFD Monitor Alarm. The computer determines the 1-minute average of each of the OPERABLE excore detector outputs and provides an alarm message immediately if the AFD for two or more OPERABLE excore channels are outside the target band and the THERMAL POWER is greater than 90% of RATED THERMAL POWER. During operation at THERMAL POWER levels between 50% and 90% and between 15% and 50% RATED THERMAL POWER, the computer outputs an alarm message when the penalty deviation accumulates beyond the limits of 1 hour and 2 hours, respectively.

Figure B 3/4 2-1 shows a typical monthly target band.

3/4.2.2 and 3/4.2.3 HEAT FLUX HOT CHANNEL FACTOR, and RCS FLOWRATE AND NUCLEAR ENTHALPY RISE HOT CHANNEL FACTOR

The limits on heat flux hot channel factor, RCS flowrate, and nuclear enthalpy rise hot channel factor ensure that: (1) the design limits on peak local power density and minimum DNBR are not exceeded, and (2) in the event of a LOCA the peak fuel clad temperature will not exceed the 2200°F ECCS acceptance criteria limit.

Each of these is measurable but will normally only be determined periodically as specified in Specifications 4.2.2 and 4.2.3. This periodic surveillance is sufficient to insure that the limits are maintained provided:

a. Control rods in a single group move together with no individual rod position differing by more than ± 12 steps, indicated, from the group demand position,

b. Control rod groups are sequenced with overlapping groups as described in Specification 3.1.3.6, REPORTING REQUIREMENTS (Continued)

ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT*

6.9.1.6 The Annual Radiological Environmental Operating Report covering the operation of the facility during the previous calendar year shall be submitted prior to May 1 of each year. The report shall include summaries, interpretations, and analysis of trends of the results of the Radiological Environmental Monitoring Program for the reporting period. The material provided shall be consistent with the objectives outlined in (1) the ODCM and (2) Sections IV.B.2, IV.B.3, and IV.C of Appendix I to 10 CFR Part 50.

SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT**

6.9.1.7 A Radioactive Effluent Release Report covering the operation of the facility during the previous year shall be submitted prior to May 1 of each year. The report shall include a summary of the quantities of radioactive liquid and gaseous effluents and solid waste released from the facility. The material provided shall be (1) consistent with the objectives outlined in the ODCM and PCP and (2) in conformance with 10 CFR 50.36a and Section IV.B.1 of Appendix I to 10 CFR Part 50.

MONTHLY OPERATING REPORT

6.9.1.8 Routine reports of operating statistics and shutdown experience, including documentation of all challenges to the PORVs or RCS safety valves, shall be submitted on a monthly basis to the Director, Office of Resource Management, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, with a copy to the Regional Administrator of the NRC Regional Office, no later than the 15th of each month following the calendar month covered by the report.

OPERATING LIMITS REPORT

INSERT B →

~~6.9.1.9 Operating limits shall be established and documented in the OPERATING LIMITS REPORT before each reload cycle or any remaining part of a reload cycle. The analytical methods used to determine the operating limits shall be those previously reviewed and approved by the NRC in Topical Reports: 1) WCAP 9272-P-A "Westinghouse Reload Safety Evaluations Methodology" dated July 1985, 2) WCAP-8385 "Power Distribution Control and Load Following Procedures" dated September 1974, 3) NFSR-0016 "Benchmark of PWR Nuclear Design Methods" dated July 1983, and/or 4) NFSR-0081 "Benchmark of PWR Nuclear Design Methods Using the PHOENIX-P and ANC Computer Codes" dated July 1990. The operating limits shall be determined so that all applicable limits (e.g., fuel thermal-mechanical limits, core thermal-hydraulic limits, ECCS limits, nuclear limits such as shutdown margin, and transient and accident analysis limits) of the safety analysis are met. The OPERATING LIMITS REPORT, including any mid-cycle revisions or supplements thereto, shall be provided upon issuance, for each reload cycle, to the NRC Document Control Desk with copies to the Regional Administrator and Resident Inspector.~~

*A single submittal may be made for a multi-unit station.

**A single submittal may be made for a multi-unit station. The submittal should combine those sections that are common to all units at the station; however, for units with separate radwaste systems, the submittal shall specify the releases of radioactive material from each unit.

INSERT B

OPERATING LIMITS REPORT

6.9.1.9 Operating limits shall be established and documented in the OPERATING LIMITS REPORT (OLR) before each reload cycle or any remaining part of a reload cycle for the following:

1. Moderator Temperature Coefficient for Specification 3.1.1.3,
2. Shutdown Bank Insertion Limit for Specification 3.1.3.5,
3. Control Bank Insertion Limit for Specification 3.1.3.6,
4. Axial Flux Difference Limits, Target Band for Specification 3.2.1,
5. Heat Flux Hot Channel Factor and K(Z) for Specification 3.2.2,
6. Nuclear Enthalpy Rise Hot Channel Factor, and Power Factor Multiplier for Specification 3.2.3, and
7. F_{xy} Radial Peaking factor for Specification 4.2.2.2.

The analytical methods used to determine the operating limits shall be those previously reviewed and approved by the NRC in the latest approved version of the following documents:

1. WCAP 9272-P-A, "Westinghouse Reload Safety Evaluations Methodology" (Westinghouse Proprietary). (Methodology for Specification: Shutdown Bank Insertion Limit, Control Bank Insertion Limit, Axial Flux Difference, Heat Flux Hot Channel Factor, and Nuclear Enthalpy Rise Hot Channel Factor)

2. WCAP-8385,"Power Distribution Control and Load Following Procedures-Topical Report" (Westinghouse Proprietary). (Methodology for Specification: Axial Flux Difference, Constant Control Offset Control)

3. WCAP 9220-P-A, "Westinghouse ECCS Evaluation Model-1981 Version" (Westinghouse Proprietary). (Methodology for Specification: Heat Flux Hot Channel Factor)

4. WCAP 9561-P-A, Add. 3, "BART A-1: A Computer Code for Best Estimate Analysis of Reflood Transients - Special Report: Thimble Modeling Westinghouse ECCS Evaluation Model" (Westinghouse Proprietary). (Methodology for Specification: Heat Flux Hot Channel Factor)

5. WCAP 10266-P-A, "The 1981 Version of Westinghouse Evaluation Model using BASH Code" (Westinghouse Proprietary). (Methodology for Specification: Heat Flux Hot Channel Factor)

6. NFSR-0016, "Commonwealth Edison Company Topical Report on Benchmark of PWR Nuclear Design Methods", (Methodology for Specification: Shutdown Bank Insertion Limit, Control Bank Insertion Limit, Axial Flux Difference, Heat Flux Hot Channel Factor, and Nuclear Enthalpy Rise Hot Channel Factor)

7. NFSR-0081, "Commonwealth Edison Company Topical Report on Benchmark of PWR Nuclear Design Methods Using the Phoenix-P and ANC Computer Codes", (Methodology for Specification: Shutdown Bank Insertion Limit, Control Bank Insertion Limit, Axial Flux Difference, Heat Flux Hot Channel Factor, and Nuclear Enthalpy Rise Hot Channel Factor)

8. WCAP 10079-P-A, "NOTRUMP, A Nodal transient Small Break and General Network Code" (Westinghouse Proprietary). (Methodology for Specification: Heat Flux Hot Channel Factor and Nuclear Enthalpy Rise Hot Channel Factor)

9. WCAP 10054-P-A, "Westinghouse Small Break ECCS Evaluation Model using NOTRUMP Code," (Westinghouse Proprietary). (Methodology for Specification: Axial Flux Difference, Heat Flux Hot Channel Factor, and Nuclear Enthalpy Rise Hot Channel Factor)

10. ComEd letter from D. Saccomando to the Office of Nuclear Reactor Regulation dated December 21, 1994, transmitting an attachment that documents applicable sections of WCAP-11992/11993 and ComEd application of the UET methodology addressed in "Additional Information Regarding Application for Amendment to Facility Operating Licenses-Reactivity Controls Systems"

The operating limits shall be determined so that all applicable limits (e.g. fuel thermal-mechanical limits, core thermal-hydraulic limits, ECCS limits, nuclear limits such as SHUTDOWN MARGIN, and transient and accident analysis limits) of the safety analysis are met.

The OPERATING LIMITS REPORT, including any mid-cycle revisions or supplements thereto, shall be provided upon issuance, for each reload cycle, to the NRC Document Control Desk with copies to the Regional Administrator and Resident Inspector.

ATTACHMENT B

BYRON STATION

Proposed Changes to Appendix A
Technical Specifications of facility
Operating Licenses NPF-37 and NPF-66

Revised Pages:

IV
V
1-4
3/4 1-14
3/4 1-15
3/4 1-20
3/4 1-21
3/4 1-22
3/4 2-1
3/4 2-2
3/4 2-3
3/4 2-4
3/4 2-5
3/4 2-8
B 3/4 2-2
6-22

SECTION	PAGE
3/4.0 APPLICABILITY	3/4 0-1
3/4.1 REACTIVITY CONTROL SYSTEMS	
3/4.1.1 BORATION CONTROL	
Shutdown Margin - $T_{avg} > 200°F$	3/4 1-1
Shutdown Margin - $T_{avg} \leq 200°F$	3/4 1-3
Moderator Temperature Coefficient	3/4 1-4
Minimum Temperature for Criticality	3/4 1-6
3/4.1.2 BORATION SYSTEMS	
Flow Path - Shutdown	3/4 1-7
Flow Paths - Operating	3/4 1-8
Charging Pump - Shutdown	3/4 1-9
Charging Pumps - Operating	3/4 1-10
Borated Water Source - Shutdown	3/4 1-11
Borated Water Sources - Operating	3/4 1-12
Boron Dilution Protection System	3/4 1-13a
3/4.1.3 MOVABLE CONTROL ASSEMBLIES	
Group Height	3/4 1-14
TABLE 3.1-1 ACCIDENT ANALYSES REQUIRING REEVALUATION IN THE EVENT OF AN INOPERABLE FULL-LENGTH ROD	3/4 1-16
Position Indication Systems - Operating	3/4 1-17
Position Indication System - Shutdown	3/4 1-18
Rod Drop Time	3/4 1-19
Shutdown Rod Insertion Limit	3/4 1-20
Control Rod Insertion Limits	3/4 1-21
FIGURE 3.1-1 ~~ROD BANK INSERTION LIMITS VERSUS THERMAL POWER FOUR LOOP OPERATION~~ (THIS FIGURE IS NOT USED)	3/4 1-22

SECTION PAGE

3/4.2 POWER DISTRIBUTION LIMITS

3/4.2.1 AXIAL FLUX DIFFERENCE.. 3/4 2-1

FIGURE 3.2-1 ~~AXIAL FLUX DIFFERENCE LIMITS AS A FUNCTION OF RATED THERMAL POWER~~ (THIS FIGURE IS NOT USED)........ 3/4 2-3

3/4.2.2 HEAT FLUX HOT CHANNEL FACTOR.. 3/4 2-4

FIGURE 3.2-2 ~~K(Z)-NORMALIZED $F_Q(Z)$ AS A FUNCTION OF CORE HEIGHT~~... 3/4 2-5

3/4.2.3 RCS FLOW RATE AND NUCLEAR ENTHALPY RISE HOT CHANNEL FACTOR.. 3/4 2-8

3/4.2.4 QUADRANT POWER TILT RATIO... 3/4 2-10

3/4.2.5 DNB PARAMETERS.. 3/4 2-13

TABLE 3.2-1 DNB PARAMETERS.. 3/4 2-14

3/4.3 INSTRUMENTATION

3/4.3.1 REACTOR TRIP SYSTEM INSTRUMENTATION................................ 3/4 3-1

TABLE 3.3-1 REACTOR TRIP SYSTEM INSTRUMENTATION.......................... 3/4 3-2

TABLE 3.3-2 (THIS TABLE IS NOT USED)..................................... 3/4 3-7

TABLE 4.3-1 REACTOR TRIP SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS.. 3/4 3-9

3/4.3.2 ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION... 3/4 3-13

TABLE 3.3-3 ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION... 3/4 3-15

TABLE 3.3-4 ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION TRIP SETPOINTS........................... 3/4 3-23

TABLE 3.3-5 (THIS TABLE IS NOT USED)..................................... 3/4 3-30

TABLE 4.3-2 ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS........... 3/4 3-34

OFFSITE DOSE CALCULATION MANUAL

1.18 The OFFSITE DOSE CALCULATION MANUAL (ODCM) shall contain the methodology and parameters used in the calculation of offsite doses resulting from radioactive gaseous and liquid effluents, in the calculation of gaseous and liquid effluent monitoring Alarm/Trip Setpoints, and in the conduct of the Environmental Radiological Monitoring Program. The ODCM shall also contain (1) the Radioactive Effluent Controls and Radiological Environmental Monitoring Programs required by Sections 6.8.4e and f, and (2) descriptions of the information that should be included in the Annual Radiological Environmental Operating and Semiannual Radioactive Effluent Release Reports required by Specifications 6.9.1.6 and 6.9.1.7.

OPERABLE - OPERABILITY

1.19 A system, subsystem, train, component or device shall be OPERABLE or have OPERABILITY when it is capable of performing its specified function(s), and when all necessary attendant instrumentation, controls, electrical power, cooling or seal water, lubrication or other auxiliary equipment that are required for the system, subsystem, train, component, or device to perform its function(s) are also capable of performing their related support function(s).

OPERATING LIMITS REPORT

(OLR)

1.19.a The OPERATING LIMITS REPORT is the unit-specific document that provides operating limits for the current operating reload cycle. These cycle-specific operating limits shall be determined for each reload cycle in accordance with Specification 6.9.1.9. Plant operation within these operating limits is addressed in individual specifications.

OPERATIONAL MODE - MODE

1.20 An OPERATIONAL MODE (i.e., MODE) shall correspond to any one inclusive combination of core reactivity condition, power level, and average reactor coolant temperature specified in Table 1.2.

PHYSICS TESTS

1.21 PHYSICS TESTS shall be those tests performed to measure the fundamental nuclear characteristics of the core and related instrumentation: (1) described in Chapter 14.0 of the FSAR, (2) authorized under the provisions of 10 CFR 50.59, or (3) otherwise approved by the Commission.

PRESSURE BOUNDARY LEAKAGE

1.22 PRESSURE BOUNDARY LEAKAGE shall be leakage (except steam generator tube leakage) through a nonisolable fault in a Reactor Coolant System component body, pipe wall, or vessel wall.

REACTIVITY CONTROL SYSTEMS

3/4.1.3 MOVABLE CONTROL ASSEMBLIES

GROUP HEIGHT

LIMITING CONDITION FOR OPERATION

3.1.3.1 All full-length shutdown and control rods shall be OPERABLE and positioned within ± 12 steps (indicated position) of their group step counter demand position.

APPLICABILITY: MODES 1* and 2*.

ACTION:

a. With one or more full-length rods inoperable due to being immovable as a result of excessive friction or mechanical interference or known to be untrippable, determine that the SHUTDOWN MARGIN requirement of Specification 3.1.1.1 is satisfied within 1 hour and be in HOT STANDBY within 6 hours.

b. With one full-length rod trippable but inoperable due to causes other than addressed by ACTION a. above, or misaligned from its group step counter demand height by more than ± 12 steps (indicated position), POWER OPERATION may continue provided that within 1 hour:

   1. The rod is restored to OPERABLE status within the above alignment requirements, or

   2. The rod is declared inoperable and the remainder of the rods in the group with the inoperable rod are aligned to within ± 12 steps of the inoperable rod while maintaining the rod sequence and insertion limits of ~~Figure 3.1-1~~. The THERMAL POWER level shall be restricted pursuant to Specification 3.1.3.6 during subsequent operation, or Specification 3.1.3.6.

   3. The rod is declared inoperable and the SHUTDOWN MARGIN requirement of Specification 3.1.1.1 is satisfied. POWER OPERATION may then continue provided that:

      a) The THERMAL POWER level is reduced to less than or equal to 75% of RATED THERMAL POWER within the next hour and within the following 4 hours the High Neutron Flux Trip Setpoint is reduced to less than or equal to 85% of RATED THERMAL POWER.

      b) The SHUTDOWN MARGIN requirement of Specification 3.1.1.1 is determined at least once per 12 hours;

*See Special Test Exceptions Specifications 3.10.2 and 3.10.3.

ACTION (Continued)

c) A power distribution map is obtained from the movable incore detectors and $F_Q(Z)$ and $F^N_{\Delta H}$ are verified to be within their limits within 72 hours; and

d) A reevaluation of each accident analysis of Table 3.1-1 is performed within 5 days; this reevaluation shall confirm that the previously analyzed results of these accidents remain valid for the duration of operation under these conditions;

c. With more than one full-length rod trippable but inoperable due to causes other than addressed by ACTION a. above, or misaligned from its group step counter demand height by more than $\pm$ 12 steps (indicated position), POWER OPERATION may continue provided that:

1. Within 1 hour, the remainder of the rods in the group(s) with the inoperable rods are aligned to within $\pm$ 12 steps of the inoperable rods while maintaining the rod sequence and insertion limits of ~~Figure 3.1-1~~ Specification 3.1.3.6. The THERMAL POWER level shall be restricted pursuant to Specification 3.1.3.6 during subsequent operation, and

2. The inoperable rods shall be restored to OPERABLE status within 72 hours.

Otherwise, be in HOT STANDBY within 6 hours.

SURVEILLANCE REQUIREMENTS

4.1.3.1.1 The position of each full-length rod shall be determined to be within the group demand limit by verifying the individual rod positions at least once per 12 hours except during time intervals when the rod position deviation monitor is inoperable, then verify the group positions at least once per 4 hours.

4.1.3.1.2 Each full-length rod not fully inserted in the core shall be determined OPERABLE by movement of at least 10 steps in any one direction at least once per 31 days.

REACTIVITY CONTROL SYSTEMS

SHUTDOWN ROD INSERTION LIMIT

LIMITING CONDITION FOR OPERATION

3.1.3.5 All shutdown rods shall be ~~fully withdrawn~~. limited in physical insertion as specified in the OPERATING LIMITS REPORT.

APPLICABILITY: MODES 1* and 2*#.

ACTION:

With a maximum of one shutdown rod ~~not fully withdrawn~~ inserted beyond the insertion limit, except for surveillance testing pursuant to Specification 4.1.3.1.2, within 1 hour either:

a. ~~fully withdraw the rod, or~~ Restore the rod to within the insertion limit specified in the OPERATING LIMITS REPORT, or

b. Declare the rod to be inoperable and apply Specification 3.1.3.1.

SURVEILLANCE REQUIREMENTS

4.1.3.5 Each shutdown rod shall be determined ~~fully withdrawn~~: to be within the insertion limit

a. Within 15 minutes prior to withdrawal of any rods in Control Bank A, B, C, or D during an approach to reactor criticality, and

b. At least once per 12 hours thereafter.

*See Special Test Exceptions Specifications 3.10.2 and 3.10.3.

#With K_{eff} greater than or equal to 1.

CONTROL ROD INSERTION LIMITS

LIMITING CONDITION FOR OPERATION

3.1.3.6 The control banks shall be limited in physical insertion as ~~shown in figure 3.1-1.~~ specified in the OPERATING LIMITS REPORT.

APPLICABILITY: MODES 1* and 2*#.

ACTION:

With the control banks inserted beyond the ~~above~~ insertion limits, except for surveillance testing pursuant to Specification 4.1.3.1.2:

a. Restore the control banks to within the limits within 2 hours, or

b. Reduce THERMAL POWER within 2 hours to less than or equal to that fraction of RATED THERMAL POWER which is allowed by the bank position using the ~~above figure, or~~ insertion limits specified in the OPERATING LIMITS REPORT, or

c. Be in at least HOT STANDBY within 6 hours.

SURVEILLANCE REQUIREMENTS

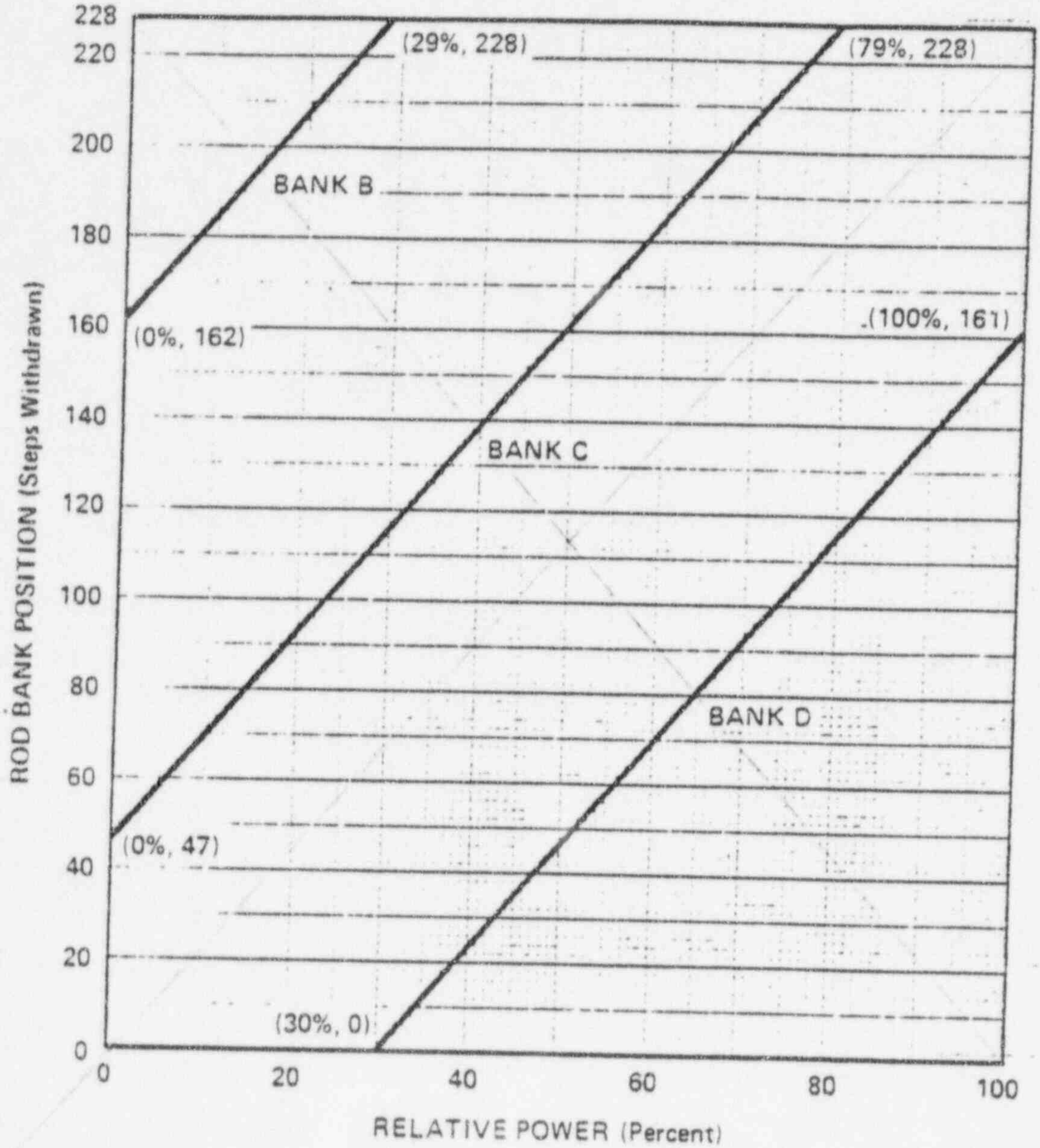
4.1.3.6 The position of each control bank shall be determined to be within the insertion limits at least once per 12 hours except during time intervals when the Rod Insertion Limit Alarm is inoperable, then verify the individual rod positions at least once per 4 hours.

*See Special Test Exceptions Specifications 3.10.2 and 3.10.3.

#With K_{eff} greater than or equal to 1.

FIGURE 3.1-1

(THIS FIGURE IS NOT USED)



~~FIGURE 3.1-1~~

~~ROD BANK INSERTION LIMITS VERSUS THERMAL POWER~~
~~FOUR LOOP OPERATION~~

3/4.2 POWER DISTRIBUTION LIMITS

3/4.2.1 AXIAL FLUX DIFFERENCE

The target band is specified in the OPERATING LIMITS REPORT.

LIMITING CONDITION FOR OPERATION

3.2.1 The indicated AXIAL FLUX DIFFERENCE (AFD) shall be maintained within the ~~following~~ target band (flux difference units) about the target flux difference~~:~~

~~a. ± 5% for Cycle 1 core average accumulated burnup of less than or equal to 5000 MWD/MTU, and~~

~~b. + 3%, -9% for Cycle 1 core average accumulated burnup of greater than 5000 MWD/MTU, and~~

~~c. + 3%, -12% for each subsequent cycle.~~

The indicated AFD may deviate outside the ~~above~~ required target band at greater than or equal to 50% but less than 90% of RATED THERMAL POWER provided the indicated AFD is within the Acceptable Operation Limits ~~of Figure 3.2-1~~ specified in the OPERATING LIMITS REPORT and the cumulative penalty deviation time does not exceed 1 hour during the previous 24 hours.

The indicated AFD may deviate outside the ~~above~~ required target band at greater than 15% but less than 50% of RATED THERMAL POWER provided the cumulative penalty deviation time does not exceed 1 hour during the previous 24 hours.

APPLICABILITY: MODE 1 above 15% of RATED THERMAL POWER*.

ACTION:

a. With the indicated AFD outside of the ~~above~~ required target band and with THERMAL POWER greater than or equal to 90% of RATED THERMAL POWER, within 15 minutes, either:

   1. Restore the indicated AFD to within the ~~above~~ required target band limits, or

   2. Reduce THERMAL POWER to less than 90% of RATED THERMAL POWER.

b. With the indicated AFD outside of the ~~above~~ required target band for more than 1 hour of cumulative penalty deviation time during the previous 24 hours or outside the Acceptable Operation Limits ~~of Figure 3.2-1~~ specified in the OPERATING LIMITS REPORT and with THERMAL POWER less than 90% but equal to or greater than 50% of RATED THERMAL POWER, reduce:

   1. THERMAL POWER to less than 50% of RATED THERMAL POWER within 30 minutes, and

   2. The Power Range Neutron Flux - High# Setpoints to less than or equal to 55% of RATED THERMAL POWER within the next 4 hours.

*See Special Test Exceptions Specification 3.10.2.

#Surveillance testing of the Power Range Neutron Flux channel may be performed pursuant to Specification 4.3.1.1 provided the indicated AFD is maintained within the Acceptable Operation Limits ~~of Figure 3.2-1~~ specified in the OPERATING LIMITS REPORT. A total of 16 hours operation may be accumulated with the AFD outside of the ~~above~~ required target band during testing without penalty devia on.

LIMITING CONDITION FOR OPERATION

ACTION (Continued)

c. With the indicated AFD outside of the ~~above~~ required target band for more than 1 hour of cumulative penalty deviation time during the previous 24 hours and with THERMAL POWER less than 50% but greater than 15% of RATED THERMAL POWER, the THERMAL POWER shall not be increased equal to or greater than 50% of RATED THERMAL POWER until the indicated AFD is within the ~~above~~ required target band.

SURVEILLANCE REQUIREMENTS

4.2.1.1 The indicated AFD shall be determined to be within its limits during POWER OPERATION above 15% of RATED THERMAL POWER by:

a. Monitoring the indicated AFD for each OPERABLE excore channel:

1) At least once per 7 days when the AFD Monitor Alarm is OPERABLE, and

2) At least once per hour for the first 24 hours after restoring the AFD Monitor Alarm to OPERABLE status.

b. Monitoring and logging the indicated AFD for each OPERABLE excore channel at least once per hour for the first 24 hours and at least once per 30 minutes thereafter, when the AFD Monitor Alarm is inoperable. The logged values of the indicated AFD shall be assumed to exist during the interval preceding each logging.

4.2.1.2 The indicated AFD shall be considered outside of its target band when two or more OPERABLE excore channels are indicating the AFD to be outside the target band. Penalty deviation outside of the ~~above~~ required target band shall be accumulated on a time basis of:

a. One minute penalty deviation for each 1 minute of POWER OPERATION outside of the target band at THERMAL POWER levels equal to or above 50% of RATED THERMAL POWER, and

b. One-half minute penalty deviation for each 1 minute of POWER OPERATION outside of the target band at THERMAL POWER levels between 15% and 50% of RATED THERMAL POWER.

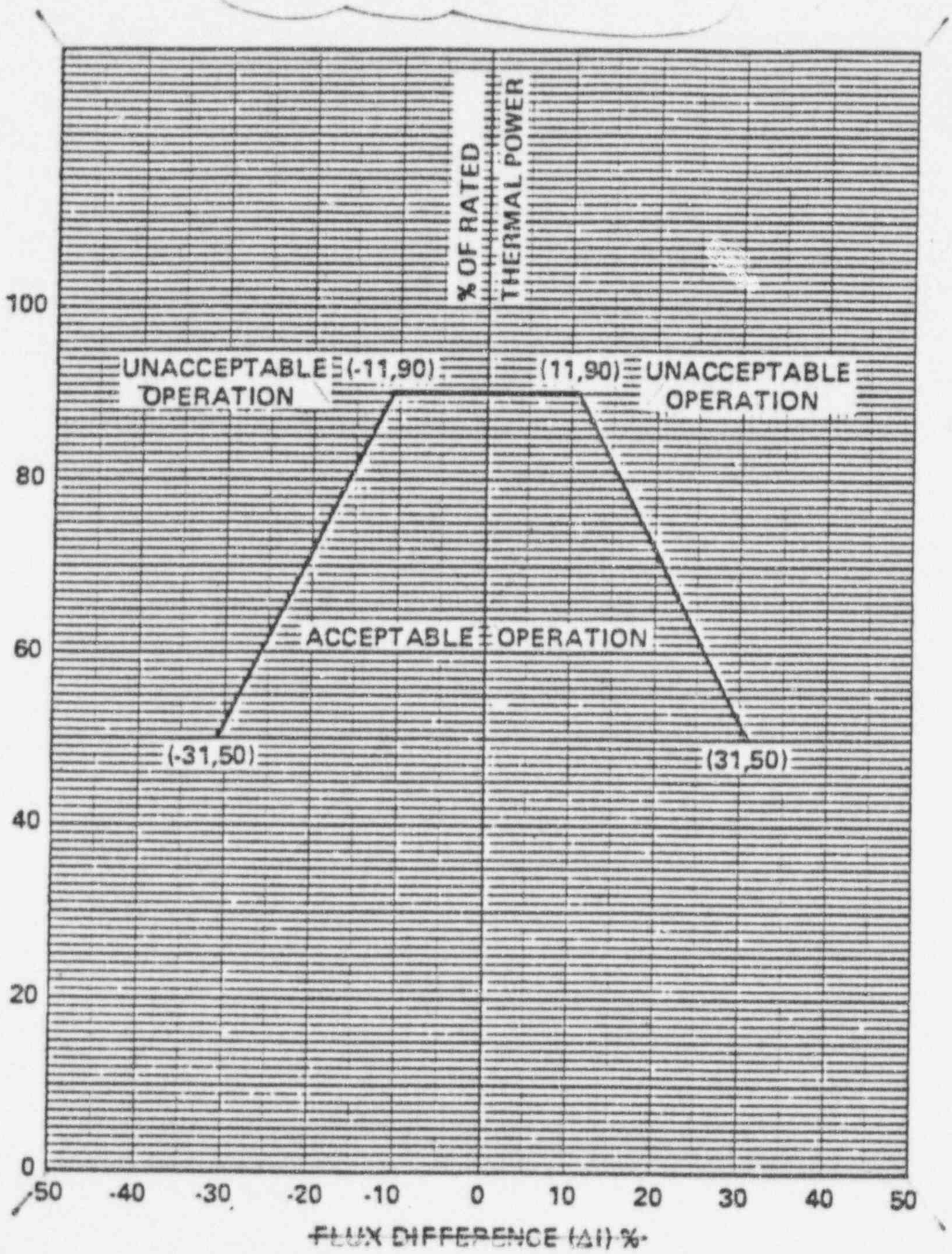
4.2.1.3 The initial determination of target flux difference following a refueling outage shall be based on design predictions. Otherwise, the target flux difference of each OPERABLE excore channel shall be determined by measurement at least once per 92 Effective Full Power Days.

4.2.1.4 The target flux difference shall be updated at least once per 31 Effective Full Power Days by either determining the target flux difference pursuant to Specification 4.2.1.3 above or by linear interpolation between the most recently measured value and the predicted value at the end of the cycle life.

FIGURE 3.2-1

~~AXIAL FLUX DIFFERENCE LIMITS AS A FUNCTION OF RATED THERMAL POWER~~

(THIS FIGURE IS NOT USED)



3/4.2.2 HEAT FLUX HOT CHANNEL FACTOR - $F_Q(Z)$

LIMITING CONDITION FOR OPERATION

3.2.2 $F_Q(Z)$ shall be limited by the following relationships:

$[F_Q^{RTP}]$

$F_Q(Z) \leq \frac{\cancel{[2.32]}}{P} [K(Z)]$ for $P > 0.5$*, and

$\frac{[F_Q^{RTP}]}{[0.5]}$

$F_Q(Z) \leq \cancel{[4.64]} [K(Z)]$ for $P \leq 0.5$*.

~~$F_Q(Z) \leq \frac{[2.50]}{P} [K(Z)]$ for $P > 0.5$**~~,

~~$F_Q(Z) \leq [5.00] [K(Z)]$ for $P \leq 0.5$**~~.

Where:

F_Q^{RTP} = the F_Q limites at RATED THERMAL POWER (RTP) specified in the OPERATING LIMITS REPORT, and

$$P = \frac{\text{THERMAL POWER}}{\text{RATED THERMAL POWER}},$$

~~and~~ K(Z) is the function ~~obtained from Figure 3.2-2~~ specified in the OPERATING LIMITS REPORT for a given core height location.

APPLICABILITY: MODE 1.

ACTION:

With $F_Q(Z)$ exceeding its limit:

a. Reduce THERMAL POWER at least 1% for each 1% $F_Q(Z)$ exceeds the limit within 15 minutes and similarly reduce the Power Range Neutron Flux-High Trip Setpoints within the next 4 hours; POWER OPERATION may proceed for up to a total of 72 hours; subsequent POWER OPERATION may proceed provided the Overpower ΔT Trip Setpoints have been reduced at least 1% for each 1% $F_Q(Z)$ exceeds the limit; and

b. Identify and correct the cause of the out-of-limit condition prior to increasing THERMAL POWER above the reduced limit required by ACTION a., above; THERMAL POWER may then be increased provided $F_Q(Z)$ is demonstrated through incore mapping to be within its limit.

~~*Unit 1 Cycle 3 and Unit 2 Cycle 2~~

~~**Unit 1 Cycle~~ 4 and after; Unit 2 Cycle ~~3 and after~~

FIGURE 3.2-2

(THIS FIGURE IS NOT USED)

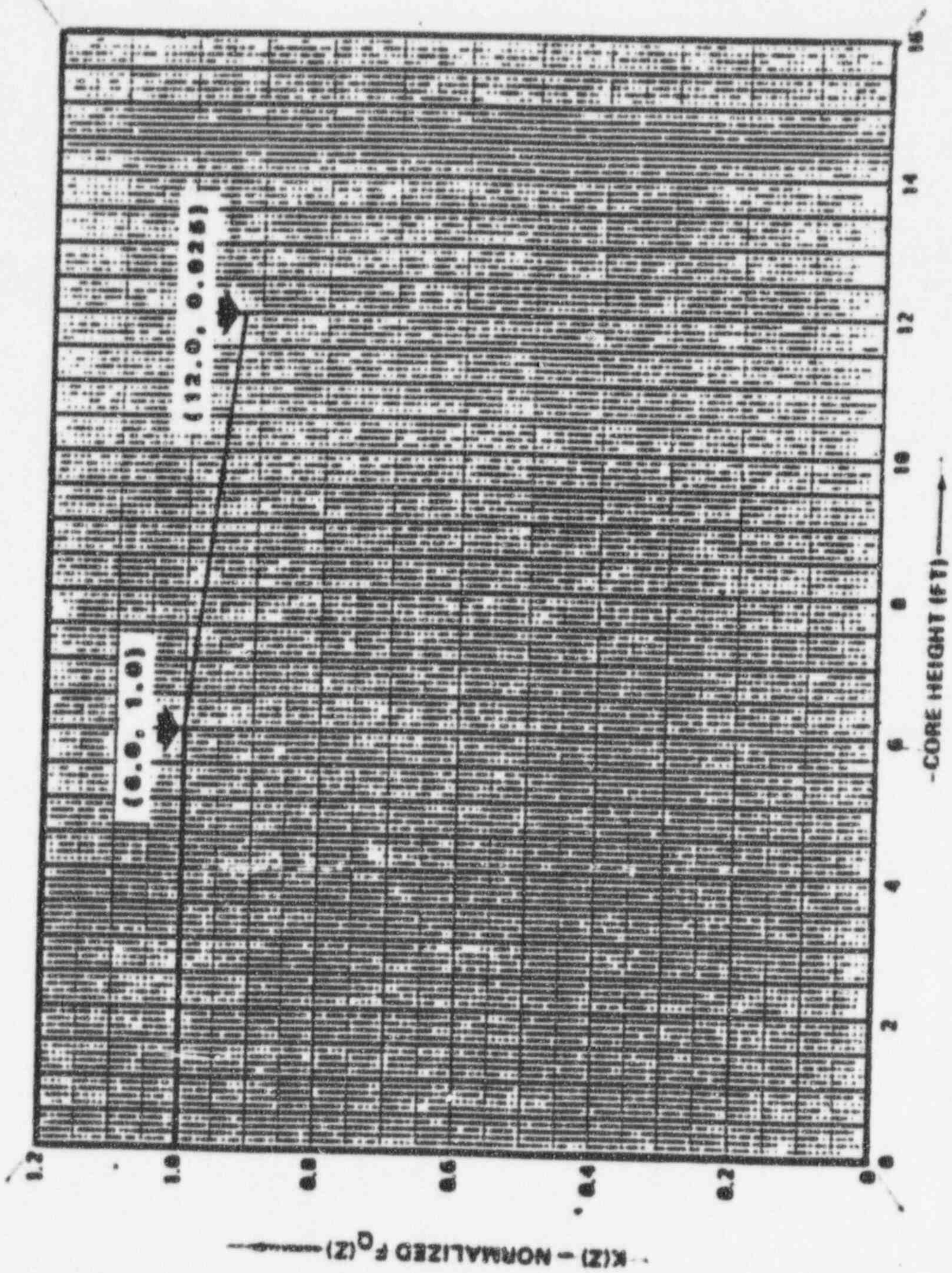


FIGURE 3.2-2

K(Z) - NORMALIZED $F_Q(Z)$ AS A FUNCTION OF CORE HEIGHT

3/4.2.3 RCS FLOW RATE AND NUCLEAR ENTHALPY RISE HOT CHANNEL FACTOR

LIMITING CONDITION FOR OPERATION

3.2.3 Indicated Reactor Coolant System (RCS) total flow rate and $F^N_{\Delta H}$ shall be maintained as follows for four loop operation.

a. 1)* RCS Total Flowrate ≥371,400 gpm,

2)** RCS Total Flowrate ≥390,400 gpm, and

$F_{\Delta H}^{RTP}$

b. $F^N_{\Delta H}$ ≤~~1.55~~ [1.0 + ~~0.3~~ (1.0-P)] ~~for OFA fuel~~ $PF_{\Delta H}$

~~$F^N_{\Delta H}$ ≤1.65 [1.0 + 0.3 (1.0-P)] for VANTAGE 5 fuel~~

where:

INSERT A

Measured values of $F^N_{\Delta H}$ are obtained by using the movable incore detectors. An appropriate uncertainty of 4% (nominal) or greater shall then be applied to the measured value of $F^N_{\Delta H}$ before it is compared to the requirements~~, and~~ .

~~P = THERMAL POWER / RATED THERMAL POWER.~~

APPLICABILITY: MODE 1.

ACTION:

With RCS total flow rate or $F^N_{\Delta H}$ outside the region of acceptable operation:

a. Within 2 hours either:

1. Restore RCS total flow rate and $F^N_{\Delta H}$ to within the above limits, or

2. Reduce THERMAL POWER to less than 50% of RATED THERMAL POWER and reduce the Power Range Neutron Flux-High Trip Setpoint to less than or equal to 55% of RATED THERMAL POWER within the next 4 hours.

*Applicable to Unit 1. Applicable to Unit 2 after cycle 5.
**Not applicable to Unit 1. Applicable to Unit 2 until the completion of cycle 5.

INSERT A

$P = \dfrac{\text{THERMAL POWER}}{\text{RATED THERMAL POWER}}$,

$F_{\Delta H}^{RTP}$ = the $F_{\Delta H}^{N}$ limit(s) at RATED THERMAL POWER (RTP) specified in the OPERATING LIMITS REPORT, and

$PF_{\Delta H}$ = the Power Factor Multiplier(s) for $F_{\Delta H}^{N}$ specified in the OPERATING LIMITS REPORT.

AXIAL FLUX DIFFERENCE (Continued)

(specified in the OPERATING LIMITS REPORT)

Although it is intended that the plant will be operated with the AFD within the target band required by Specification 3.2.1 about the target flux difference, during rapid plant THERMAL POWER reductions, control rod motion will cause the AFD to deviate outside of the target band at reduced THERMAL POWER levels. This deviation will not affect the xenon redistribution sufficiently to change the envelope of peaking factors which may be reached on a subsequent return to RATED THERMAL POWER (with the AFD within the target band) provided the time duration of the deviation is limited. Accordingly, a 1-hour penalty deviation limit cumulative during the previous 24 hours is provided for operation outside of the target band but within the limits ~~of Figure 3.2-1~~ while at THERMAL POWER levels between 50% and 90% of RATED THERMAL POWER. For THERMAL POWER levels between 15% and 50% of RATED THERMAL POWER, deviations of the AFD outside of the target band are less significant. The penalty of 2 hours actual time reflects this reduced significance.

Provisions for monitoring the AFD on an automatic basis are derived from the plant process computer through the AFD Monitor Alarm. The computer determines the 1-minute average of each of the OPERABLE excore detector outputs and provides an alarm message immediately if the AFD for two or more OPERABLE excore channels are outside the target band and the THERMAL POWER is greater than 90% of RATED THERMAL POWER. During operation at THERMAL POWER levels between 50% and 90% and between 15% and 50% RATED THERMAL POWER, the computer outputs an alarm message when the penalty deviation accumulates beyond the limits of 1 hour and 2 hours, respectively.

Figure B 3/4 2-1 shows a typical monthly target band.

3/4.2.2 and 3/4.2.3 HEAT FLUX HOT CHANNEL FACTOR, and RCS FLOWRATE AND NUCLEAR ENTHALPY RISE HOT CHANNEL FACTOR

The limits on heat flux hot channel factor, RCS flowrate, and nuclear enthalpy rise hot channel factor ensure that: (1) the design limits on peak local power density and minimum DNBR are not exceeded, and (2) in the event of a LOCA the peak fuel clad temperature will not exceed the 2200°F ECCS acceptance criteria limit.

Each of these is measurable but will normally only be determined periodically as specified in Specifications 4.2.2 and 4.2.3. This periodic surveillance is sufficient to insure that the limits are maintained provided:

a. Control rods in a single group move together with no individual rod position differing by more than ± 12 steps, indicated, from the group demand position,

b. Control rod groups are sequenced with overlapping groups as described in Specification 3.1.3.6, REPORTING REQUIREMENTS (Continued)

ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT*

6.9.1.6 The Annual Radiological Environmental Operating Report covering the operation of the facility during the previous calendar year shall be submitted prior to May 1 of each year. The report shall include summaries, interpretations, and analysis of trends of the results of the Radiological Environmental Monitoring Program for the reporting period. The material provided shall be consistent with the objectives outlined in (1) the ODCM and (2) Sections IV.B.2, IV.B.3, and IV.C of Appendix I to 10 CFR Part 50.

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT**

6.9.1.7 A Radioactive Effluent Release Report covering the operation of the facility during the previous year shall be submitted prior to May 1 of each year. The report shall include a summary of the quantities of radioactive liquid and gaseous effluents and solid waste released from the facility. The material provided shall be (1) consistent with the objectives outlined in the ODCM and PCP and (2) in conformance with 10 CFR 50.36a and Section IV.B.1 of Appendix I to 10 CFR Part 50.

MONTHLY OPERATING REPORT

6.9.1.8 Routine reports of operating statistics and shutdown experience, including documentation of all challenges to the PORVs or RCS safety valves, shall be submitted on a monthly basis to the Director, Office of Resource Management, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, with a copy to the Regional Administrator of the NRC Regional Office, no later than the 15th of each month following the calendar month covered by the report.

OPERATING LIMITS REPORT

INSERT 6.

~~6.9.1.9 Operating limits shall be established and documented in the OPERATING LIMITS REPORT before each reload cycle or any remaining part of a reload cycle. The analytical methods used to determine the operating limits shall be those previously reviewed and approved by the NRC in Topical Reports: 1) WCAP-9272-P-A "Westinghouse Reload Safety Evaluations Methodology" dated July 1985, 2) WCAP-8385 "Power Distribution Control and Load Following Procedures" dated September 1974, 3) NFSR-0016 "Benchmark of PWR Nuclear Design Methods" dated July 1983, and/or 4) NFSR-0081 "Benchmark of PWR Nuclear Design Methods Using the PHOENIX-P and ANC Computer Codes" dated July 1990. The operating limits shall be determined so that all applicable limits (e.g., fuel thermal-mechanical limits, core thermal-hydraulic limits, ECCS limits, nuclear limits such as shutdown margin, and transient and accident analysis limits) of the safety analysis are met. The OPERATING LIMITS REPORT, including any mid-cycle revisions or supplements thereto, shall be provided upon issuance, for each reload cycle, to the NRC Document Control Desk with copies to the Regional Administrator and Resident Inspector.~~

*A single submittal may be made for a multi-unit station.

**A single submittal may be made for a multi-unit station. The submittal should combine those sections that are common to all units at the station; however, for units with separate radwaste systems, the submittal shall specify the releases of radioactive material from each unit.

INSERT B

OPERATING LIMITS REPORT

6.9.1.9 Operating limits shall be established and documented in the OPERATING LIMITS REPORT (OLR) before each reload cycle or any remaining part of a reload cycle for the following:

1. Moderator Temperature Coefficient for Specification 3.1.1.3,
2. Shutdown Bank Insertion Limit for Specification 3.1.3.5,
3. Control Bank Insertion Limit for Specification 3.1.3.6,
4. Axial Flux Difference Limits, Target Band for Specification 3.2.1,
5. Heat Flux Hot Channel Factor and K(Z) for Specification 3.2.2,
6. Nuclear Enthalpy Rise Hot Channel Factor, and Power Factor Multiplier for Specification 3.2.3, and
7. F_{xy} Radial Peaking factor for Specification 4.2.2.2.

The analytical methods used to determine the operating limits shall be those previously reviewed and approved by the NRC in the latest approved version of the following documents:

1. WCAP 9272-P-A, "Westinghouse Reload Safety Evaluations Methodology" (Westinghouse Proprietary). (Methodology for Specification: Shutdown Bank Insertion Limit, Control Bank Insertion Limit, Axial Flux Difference, Heat Flux Hot Channel Factor, and Nuclear Enthalpy Rise Hot Channel Factor)

2. WCAP-8385,"Power Distribution Control and Load Following Procedures-Topical Report" (Westinghouse Proprietary). (Methodology for Specification: Axial Flux Difference, Constant Control Offset Control)

3. WCAP 9220-P-A, "Westinghouse ECCS Evaluation Model-1981 Version" (Westinghouse Proprietary). (Methodology for Specification: Heat Flux Hot Channel Factor)

4. WCAP 9561-P-A, Add. 3, "BART A-1: A Computer Code for Best Estimate Analysis of Reflood Transients - Special Report: Thimble Modeling Westinghouse ECCS Evaluation Model" (Westinghouse Proprietary). (Methodology for Specification: Heat Flux Hot Channel Factor)

5. WCAP 10266-P-A, "The 1981 Version of Westinghouse Evaluation Model using BASH Code" (Westinghouse Proprietary). (Methodology for Specification: Heat Flux Hot Channel Factor)

6. NFSR-0016, "Commonwealth Edison Company Topical Report on Benchmark of PWR Nuclear Design Methods", (Methodology for Specification: Shutdown Bank Insertion Limit, Control Bank Insertion Limit, Axial Flux Difference, Heat Flux Hot Channel Factor, and Nuclear Enthalpy Rise Hot Channel Factor)

7. NFSR-0081, "Commonwealth Edison Company Topical Report on Benchmark of PWR Nuclear Design Methods Using the Phoenix-P and ANC Computer Codes", (Methodology for Specification: Shutdown Bank Insertion Limit, Control Bank Insertion Limit, Axial Flux Difference, Heat Flux Hot Channel Factor, and Nuclear Enthalpy Rise Hot Channel Factor)

8. WCAP 10079-P-A, "NOTRUMP, A Nodal transient Small Break and General Network Code" (Westinghouse Proprietary). (Methodology for Specification: Heat Flux Hot Channel Factor and Nuclear Enthalpy Rise Hot Channel Factor)

9. WCAP 10054-P-A, "Westinghouse Small Break ECCS Evaluation Model using NOTRUMP Code," (Westinghouse Proprietary). (Methodology for Specification: Axial Flux Difference, Heat Flux Hot Channel Factor, and Nuclear Enthalpy Rise Hot Channel Factor)

10. ComEd letter from D. Saccomando to the Office of Nuclear Reactor Regulation dated December 21, 1994, transmitting an attachment that documents applicable sections of WCAP-11992/11993 and ComEd application of the UET methodology addressed in "Additional Information Regarding Application for Amendment to Facility Operating Licenses-Reactivity Controls Systems"

The operating limits shall be determined so that all applicable limits (e.g. fuel thermal-mechanical limits, core thermal-hydraulic limits, ECCS limits, nuclear limits such as SHUTDOWN MARGIN, and transient and accident analysis limits) of the safety analysis are met.

The OPERATING LIMITS REPORT, including any mid-cycle revisions or supplements thereto, shall be provided upon issuance, for each reload cycle, to the NRC Document Control Desk with copies to the Regional Administrator and Resident Inspector.

ATTACHMENT C

Evaluation of Significant Hazards Considerations
for Proposed Changes to Appendix A
Technical Specifications of Facility
Operating Licenses NPF-37,
NPF-66, NPF-72, and NPF-77

Commonwealth Edison Company (ComEd) has evaluated the proposed amendment and determined that it involves no significant hazards considerations. According to 10CFR50.92(c), a proposed amendment to an operating license involves no significant hazards considerations if 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.

A. INTRODUCTION

Generic Letter (GL) 88-16, "Removal of Cycle-Specific Parameter Limits from Technical Specification", dated October 4, 1988 was issued to encourage licensees to amend Technical Specifications (TS) related to cycle-specific parameters. Several Technical Specifications contain limits associated with reactor physics parameters that generally change with every core reload, possibly requiring changes to the Technical Specifications each fuel cycle. The generic letter provided guidance for relocating certain cycle-specific core operating limits from the Technical Specifications to a licensee controlled document, provided NRC approved methodologies are used to determine these cycle-specific core operating limits. Consequently, changes to these cycle dependent core operating limits would be allowed without prior NRC approval and results in a monetary and personnel resource savings for the licensees and the NRC.

ComEd proposes relocating these cycle-specific core operating limits from the Technical Specifications to an Operating Limits Report (OLR). Currently, the OLR contains a cycle-specific limit for the radial peaking factor, F_{xy} and Moderator Temperature Coefficient (MTC).

This amendment request proposes expanding the OLR to include the additional cycle-specific core operating limits from the GL. If approved, the following Technical Specification limits will also be located in the OLR:

1. Shutdown Bank Insertion Limit for TS 3.1.3.5,
2. Control Bank Insertion Limit for TS 3.1.3.6,
3. Axial Flux Difference Limits, Target Band for TS 3.2.1,
4. Heat Flux Hot Channel Factor and K(Z) for TS 3.2.2, and
5. Nuclear Enthalpy Rise Hot Channel Factor, and Power Factor Multiplier for Specification 3.2.3.

The cycle-specific parameters proposed for relocation to the OLR and the proposed TS markups are consistent with the guidance provided in Westinghouse Owners Group letter WOG-90-016, "Core Operating Limits Report License Amendment Submittal", dated January 19, 1990. The proposed changes are also consistent with NUREG-1431, "Standard Technical Specifications for Westinghouse Plants."

1. **The proposed Technical Specification changes do not involve a significant increase in the probability or consequences of an accident previously evaluated.**

   The relocation of the cycle-specific core operating limits from the Technical Specifications has no influence or impact on the probability or consequences of any accident previously evaluated. The Technical Specifications will continue to require operation within the analyzed core operating limits and the appropriate actions will be taken if the limits are exceeded. The cycle specific limits within the OLR will be implemented and controlled by plant procedures. Any needed revisions of the limit values in the OLR will be performed based on NRC approved methodology as delineated in TS 6.9.1.9. Each accident analysis addressed in the Byron and Braidwood Updated Final Safety Analysis Report (UFSAR) will be examined with respect to changes in cycle dependent parameters. These parameters are obtained from the application of NRC approved reload design methodologies, to ensure that the transient evaluation of new reloads are bounded by previously accepted analysis. This examination, which will be performed under the requirements of 10 CFR 50.59 process, ensures that future reloads will not involve a significant increase in the probability or consequences of an accident previously evaluated.

   Therefore, the proposed changes do not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. **The proposed changes do not create the possibility of a new or different kind of accident from any accident previously evaluated.**

   The relocation of the cycle specific variables has no influence or impact, nor does it contribute in any way to the probability or consequences of any new or different kind of accident. No safety related equipment, safety function or plant operations will be altered as a result of this proposed change. The cycle specific variables are calculated using NRC approved methods and submitted to the NRC for their review to allow the Staff to continue to trend the values of these limits. The Technical Specifications will continue to require operation within the analyzed core operating limits and appropriate actions will be taken, when, or if, the limits are exceeded.

   Therefore, the proposed changes do not in any way create the possibility of a new or different kind of accident from any accident previously evaluated.

3. **The proposed change does not involve a significant reduction in a margin of safety for the following reasons:**

   The margin of safety is not affected by the relocation of cycle specific core operating limits from the Technical Specifications. The margin of safety presently provided by current Technical Specifications remains unchanged. Appropriate measures exist to control the values of these cycle specific limits. The proposed amendment continues to require operation within the core limits as obtained from the NRC approved reload design and safety analysis methodologies. Appropriate actions are required to be taken, when, or if, these limits are exceeded.

   The development of the limits for future reloads will continue to conform to those methods described in the NRC approved documentation. In addition, each future reload will involve a 10 CFR 50.59 safety review to assure that operation of the Byron and Braidwood units within the cycle specific limits will not involve a reduction in the margin of safety as defined in the basis for any Technical Specification.

   Therefore, the proposed changes do not impact operation of the plant in a manner that involves a significant reduction in the margin of safety.

Therefore, based on the above evaluation, Commonwealth Edison has concluded that these changes do not involve significant hazards considerations.

ATTACHMENT D

Environmental Assessment for
Proposed Changes to Appendix A
Technical Specifications of Facility
Operating Licenses NPF-37, NPF-66,
NPF-72, and NPF-77

Commonwealth Edison has evaluated the proposed changes associated with expanding the Operating Limits Report against the 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 changes do not involve (i) a significant hazards consideration, (ii) a significant change in the types of or significant increases in the amounts of any effluent that may be released off-site nor do they affect any of the permitted release paths, or (iii) a significant increase in individual or cumulative occupational radiation exposure (10 CFR 51.22(C)(9)). The proposed changes do not involve changes in record keeping and reporting requirements (10 CFR 51.22(c)(10)). Accordingly, the proposed changes meet the eligibility criteria for categorical exclusion set forth 10 CFR 51.22(c)(9) and (10). Therefore, pursuant to 10 CFR 51.22(b), an environmental assessment or environmental impact statement of the proposed changes is not required for the changes proposed by the Technical Specification change request.

ATTACHMENT E

Byron Station Unit 1 Cycle 7
Operating Limits Report

OPERATING LIMITS REPORT (OLR) for BYRON UNIT 1, CYCLE 7

1.0 OPERATING LIMITS REPORT

This Operating Limits Report (OLR) for Byron Station Unit 1 Cycle 7 has been prepared in accordance with the requirements of Technical Specification 6.9.1.9.

The Technical Specifications affected by this report are listed below:

3/4.1.1.3	Moderator Temperature Coefficient
3/4.1.3.5	Shutdown Rod Insertion Limit
3/4.1.3.6	Control Rod Insertion Limits
3/4.2.1	Axial Flux Difference
3/4.2.2	Heat Flux Hot Channel Factor
3/4.2.3	Nuclear Enthalpy Rise Hot Channel Factor

2.0 OPERATING LIMITS

The cycle-specific parameter limits for the specifications listed in Section 1.0 are presented in the following subsections. These limits have been developed using the NRC approved methodologies specified in Technical Specification 6.9.1.9.

2.1 Moderator Temperature Coefficient (Specification 3/4.1.1.3)

2.1.1 The Moderator Temperature Coefficient (MTC) limits are:

a. The BOL/ARO/HZP-MTC shall be less positive than 0 $\Delta k/k/°F$.

b. The EOL/ARO/RTP-MTC shall be less negative than -4.1×10^{-4} $\Delta k/k/°F$.

2.1.2 The EOL/ARO/RTP-MTC Surveillance limit is:

The 300 ppm/ARO/RTP-MTC should be less negative than or equal to -3.2×10^{-4} $\Delta k/k/°F$.

where: BOL stands for Beginning of Cycle Life
ARO stands for All Rods Out
HZP stands for Hot Zero Thermal Power
EOL stands for End of Cycle Life
RTP stands for RATED THERMAL POWER

2.2 Shutdown Rod Insertion Limit (Specification 3/4.1.3.5)

2.2.1 All shutdown banks shall be withdrawn to at least 228 steps.

2.3 Control Rod Insertion Limits (Specification 3/4.1.3.6)

2.3.1 The control banks shall be limited in physical insertion as shown in Figure 1.

2.4 Axial Flux Difference (Specification 3/4.2.1)

2.4.1 The AXIAL FLUX DIFFERENCE (AFD) target band is +3, -12% of the target flux difference.

2.4.2 The AFD Acceptable Operation Limits are provided in Figure 2.

2.5 Heat Flux Hot Channel Factor (Specification 3/4.2.2)

2.5.1 $F_Q(Z) \le [F_Q^{RTP}/P][K(Z)]$ for $P > 0.5$

$F_Q(Z) \le [F_Q^{RTP}/0.5][K(Z)]$ for $P \le 0.5$

where: P = the ratio of THERMAL POWER to RATED THERMAL POWER

$F_Q^{RTP} = 2.50$

K(Z) is provided in Figure 3.

2.5.2 $F_{xy}^{L} = F_{xy}^{RTP}\,[1 + 0.2(1 - P)]$

F_{xy}^{RTP} limits within specified core planes shall be:

a. For the lower core region from greater than or equal to 0% to less than or equal to 50%:

1) $F_{xy}^{RTP} \le 1.950$ for all core planes containing bank "D" control rods

2) For all unrodded core planes:

$F_{xy}^{RTP} \le 1.732$	$0 \le$ Cycle Burnup $\le$ 10,000 MWD/MTU
$F_{xy}^{RTP} \le 1.746$	$10{,}000 <$ Cycle Burnup $<$ 16,000 MWD/MTU
$F_{xy}^{RTP} \le 1.716$	Cycle Burnup $\ge$ 16,000 MWD/MTU

b. For the upper core region from greater than 50% to less than or equal to 100%:

1) $F_{xy}^{RTP} \le 1.890$ for all core planes containing bank "D" control rods

2) For all unrodded core planes:

$F_{xy}^{RTP} \le 1.784$	$0 \le$ Cycle Burnup $\le$ 10,000 MWD/MTU
$F_{xy}^{RTP} \le 1.807$	$10{,}000 <$ Cycle Burnup $<$ 16,000 MWD/MTU
$F_{xy}^{RTP} \le 1.769$	Cycle Burnup $\ge$ 16,000 MWD/MTU

2.5.3 A plot of $[F_Q(z) * P_{Rel}]$ vs Axial Core Height is provided in Figure 4 and Table 1 contains the data plotted in Figure 4.

2.6 Nuclear Enthalpy Rise Hot Channel Factor (Specification 3/4.2.3)

$F^{N}_{\Delta H} \leq F^{RTP}_{\Delta H}[1.0 + PF_{\Delta H}(1.0 - P)]$

where: P = the ratio of THERMAL POWER to RATED THERMAL POWER

$F^{RTP}_{\Delta H}$ = 1.65 for VANTAGE 5 Fuel

$F^{RTP}_{\Delta H}$ = 1.55 for OFA Fuel

$PF_{\Delta H}$ = 0.3

Figure 1:
Control Bank Insertion Limits Versus Percent Rated Thermal Power

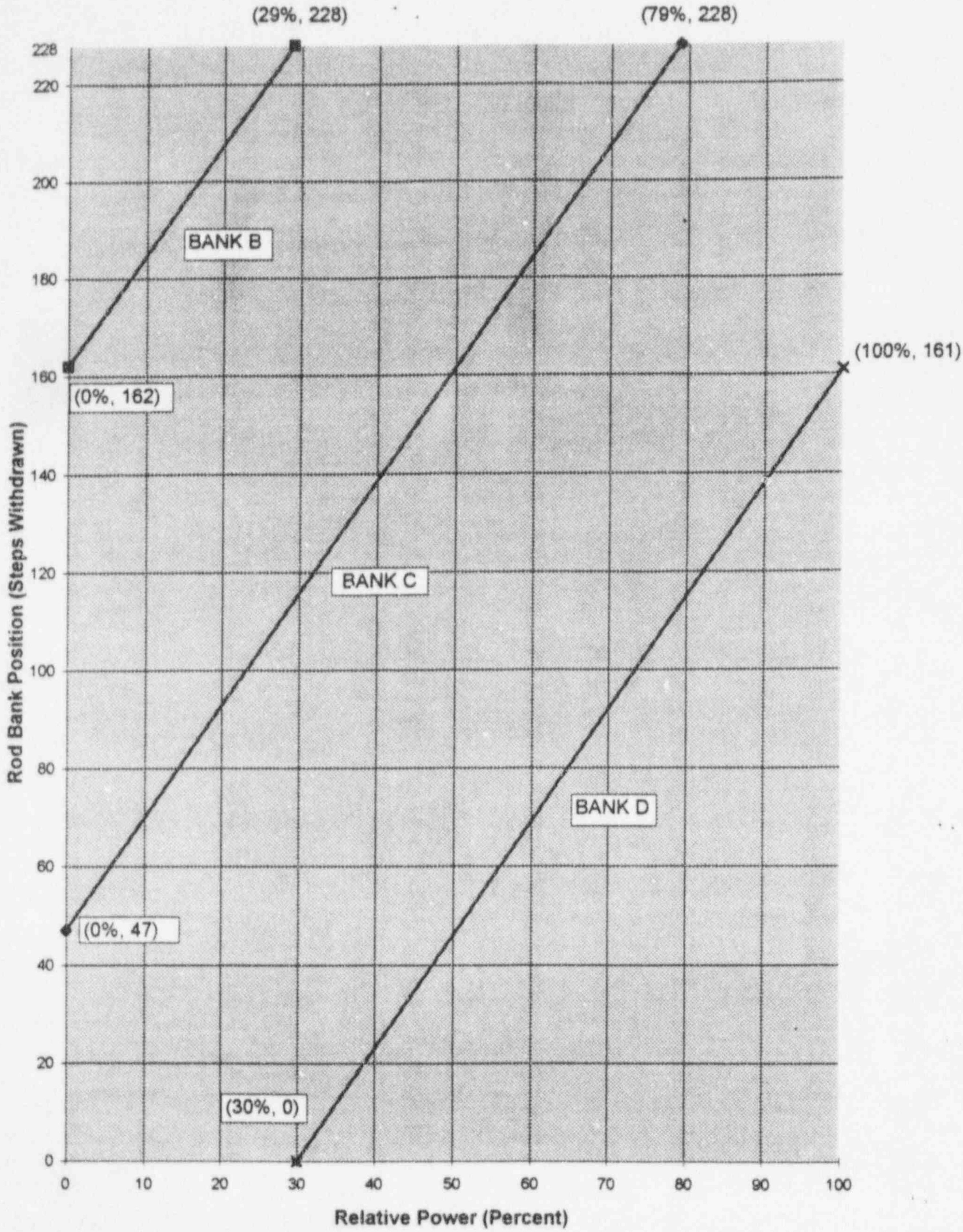


FIGURE 2: Axial Flux Difference Limits As A Function of Rated Thermal Power

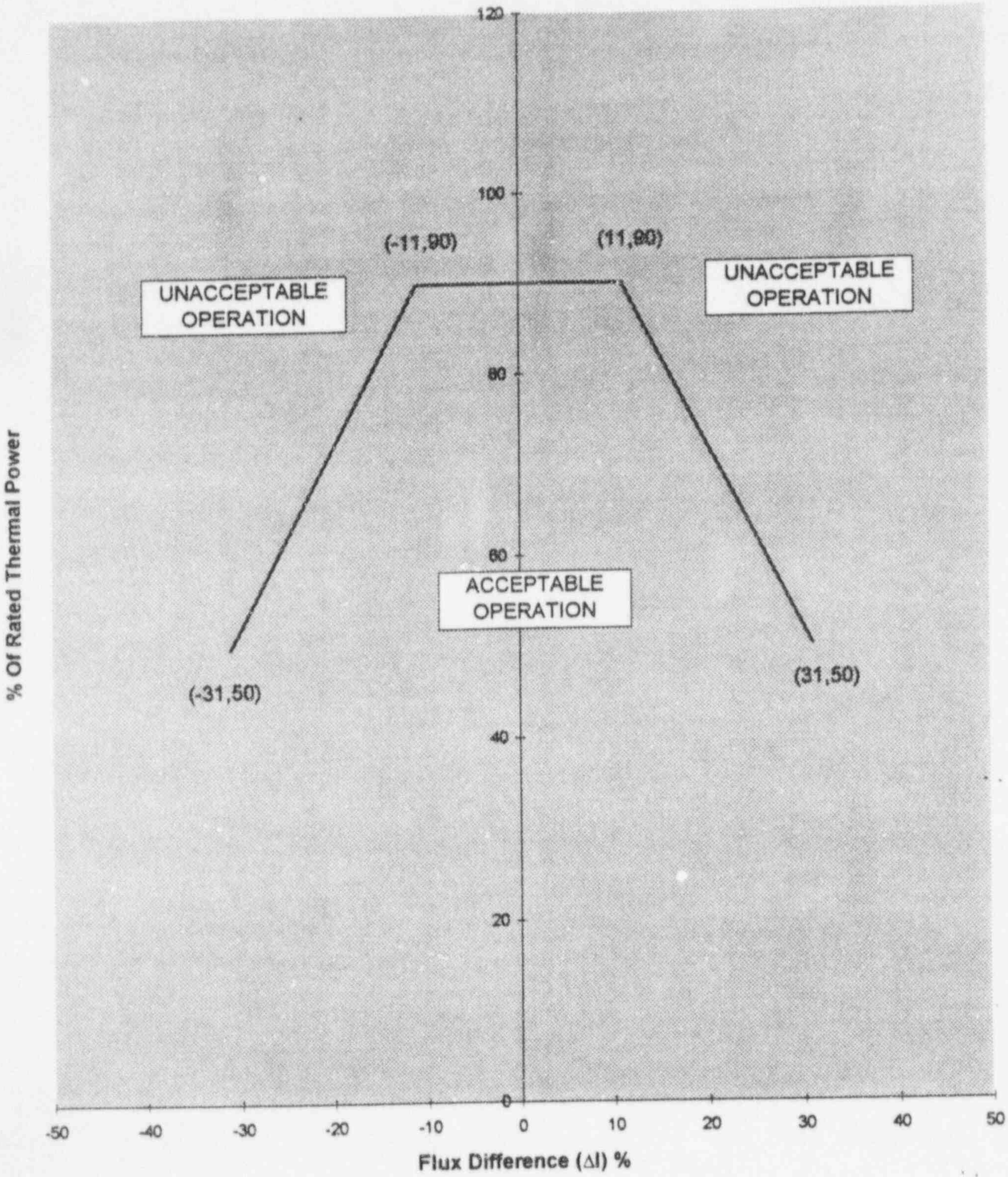


Figure 3: K(Z) - Normalized $F_Q(Z)$ As A Function of Core Height

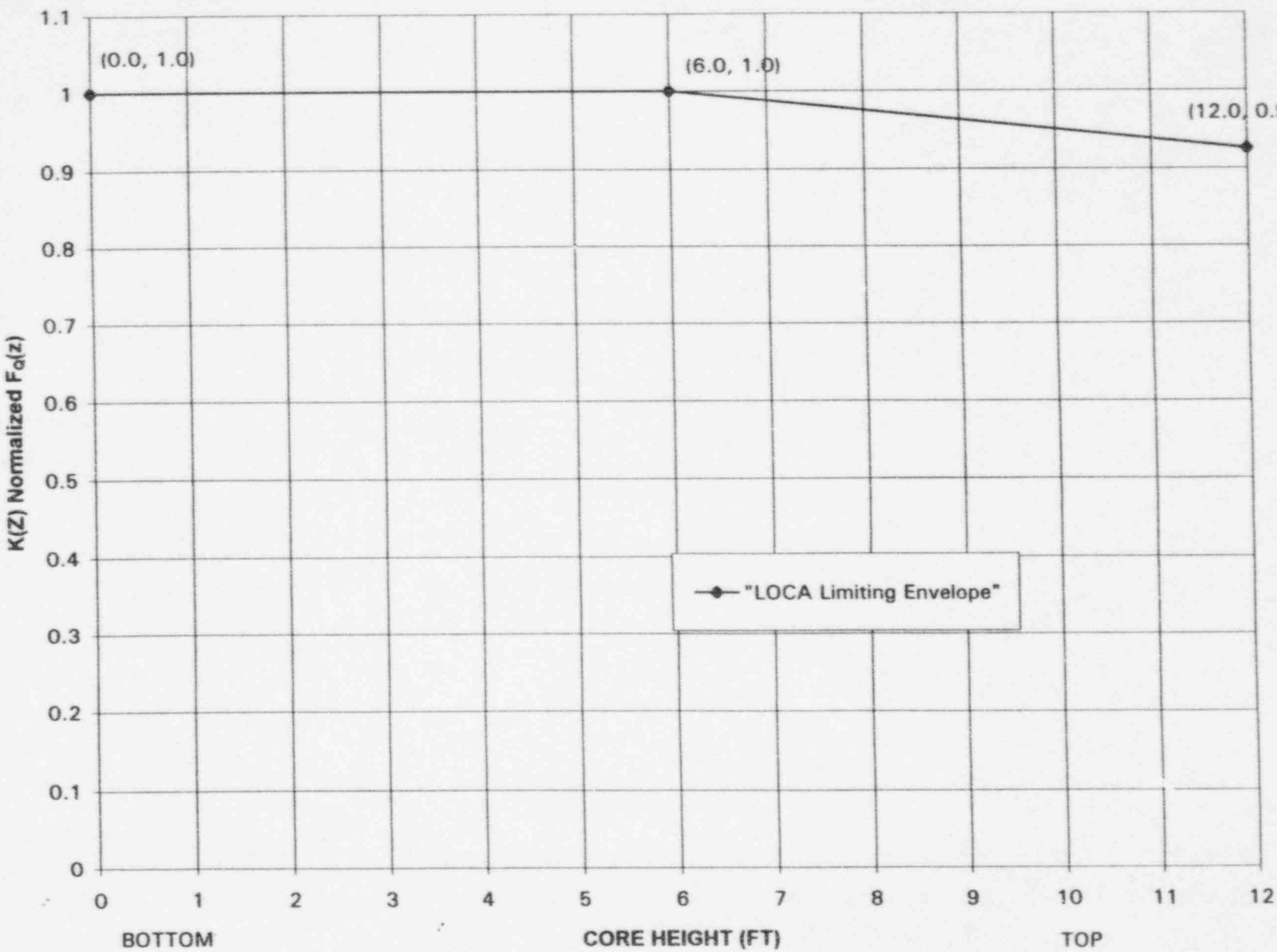
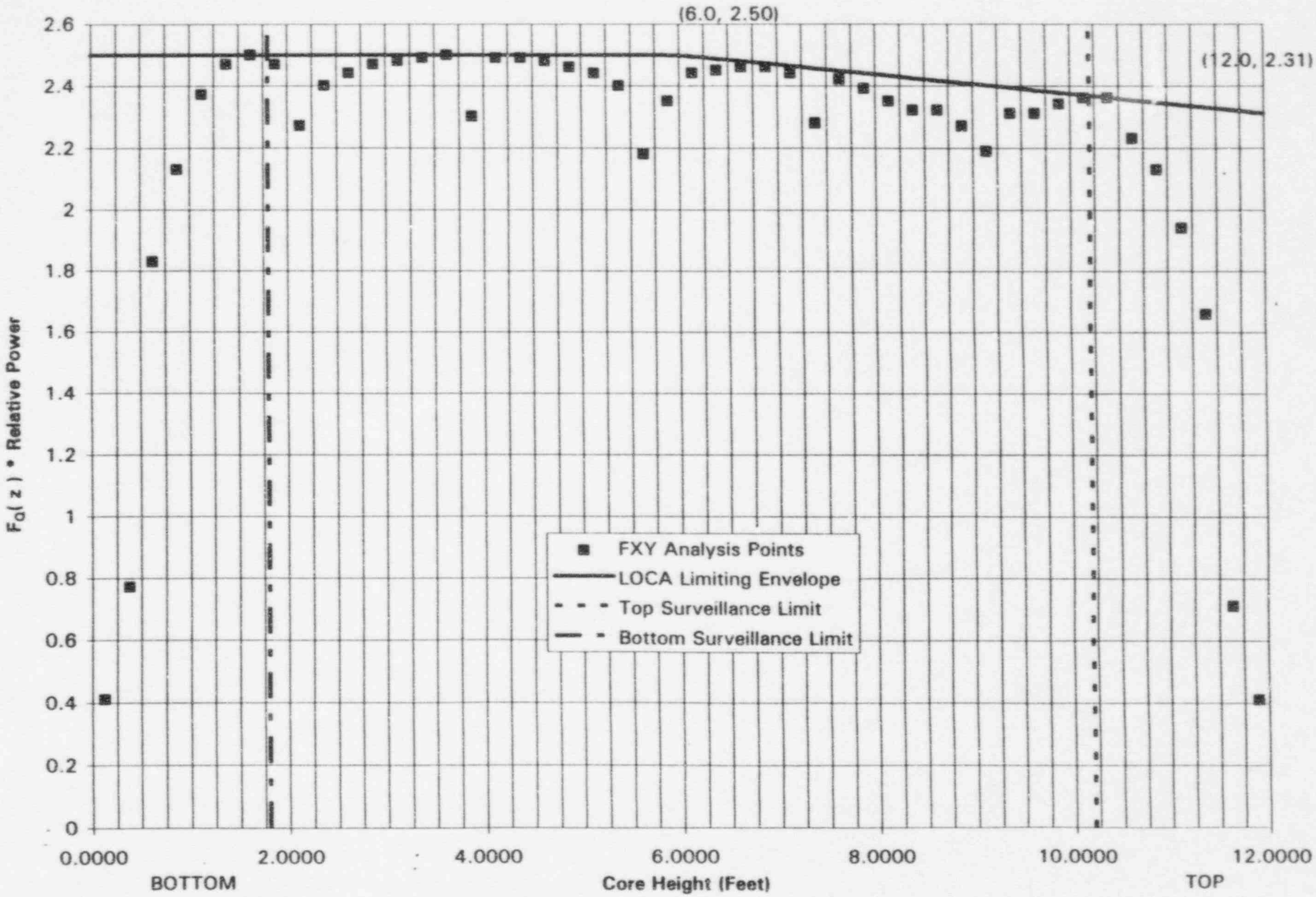


Figure 4: $[F_Q(z) * P_{Rel}]$ vs. Axial Core Height



OPERATING LIMITS REPORT (OLR) for BYRON UNIT 1, CYCLE 7

Table 1: [$F_Q(z)$ * P_{Rel}] vs. Axial Core Height

		CORE HEIGHT (FEET)	MAXIMUM F_Q * P
BOTTOM	1	0.1252	0.41
	2	0.3756	0.77
	3	0.6259	1.83
	4	0.8763	2.13
	5	1.1267	2.37
	6	1.3771	2.47
	7	1.6274	2.50
	8	1.8778	2.47
	9	2.1282	2.27
	10	2.3786	2.40
	11	2.6289	2.44
	12	2.8793	2.47
	13	3.1297	2.48
	14	3.3801	2.49
	15	3.6305	2.50
	16	3.8808	2.30
	17	4.1312	2.49
	18	4.3816	2.49
	19	4.6320	2.48
	20	4.8823	2.46
	21	5.1327	2.44
	22	5.3831	2.40
	23	5.6335	2.18
	24	5.8838	2.35
	25	6.1342	2.44
	26	6.3846	2.45
	27	6.6350	2.46
	28	6.8853	2.46
	29	7.1357	2.44
	30	7.3861	2.28
	31	7.6365	2.42
	32	7.8868	2.39
	33	8.1372	2.35
	34	8.3876	2.32
	35	8.6380	2.32
	36	8.8883	2.27
	37	9.1387	2.19
	38	9.3891	2.31
	39	9.6395	2.31
	40	9.8898	2.34
	41	10.1402	2.36
	42	10.3906	2.36
	43	10.6410	2.23
	44	10.8914	2.13
	45	11.1417	1.94
	46	11.3921	1.66
	47	11.6425	0.71
TOP	48	11.8929	0.41

ATTACHMENT F

Byron Station Unit 2 Cycle 6
Operating Limits Report

OPERATING LIMITS REPORT (OLR) for BYRON UNIT 2, CYCLE 6

1.0 OPERATING LIMITS REPORT

This Operating Limits Report (OLR) for Byron Station Unit 2 Cycle 6 has been prepared in accordance with the requirements of Technical Specification 6.9.1.9.

The Technical Specifications affected by this report are listed below:

3/4.1.1.3	Moderator Temperature Coefficient
3/4.1.3.5	Shutdown Rod Insertion Limit
3/4.1.3.6	Control Rod Insertion Limits
3/4.2.1	Axial Flux Difference
3/4.2.2	Heat Flux Hot Channel Factor
3/4.2.3	Nuclear Enthalpy Rise Hot Channel Factor

OPERATING LIMITS REPORT (OLR) for BYRON UNIT 2, CYCLE 6

2.0 OPERATING LIMITS

The cycle-specific parameter limits for the specifications listed in Section 1.0 are presented in the following subsections. These limits have been developed using the NRC approved methodologies specified in Technical Specification 6.9.1.9.

2.1 Moderator Temperature Coefficient (Specification 3/4.1.1.3)

2.1.1 The Moderator Temperature Coefficient (MTC) limits are:

a. The BOL/ARO/HZP-MTC shall be less positive than 0 $\Delta k/k/°F$.

b. The EOL/ARO/RTP-MTC shall be less negative than -4.1×10^{-4} $\Delta k/k/°F$.

2.1.2 The EOL/ARO/RTP-MTC Surveillance limit is:

The 300 ppm/ARO/RTP-MTC should be less negative than or equal to -3.2×10^{-4} $\Delta k/k/°F$.

where: BOL stands for Beginning of Cycle Life
ARO stands for All Rods Out
HZP stands for Hot Zero Thermal Power
EOL stands for End of Cycle Life
RTP stands for RATED THERMAL POWER

2.2 Shutdown Rod Insertion Limit (Specification 3/4.1.3.5)

2.2.1 All shutdown banks shall be withdrawn to at least 228 steps.

OPERATING LIMITS REPORT (OLR) for BYRON UNIT 2, CYCLE 6

2.3 Control Rod Insertion Limits (Specification 3/4.1.3.6)

2.3.1 The control banks shall be limited in physical insertion as shown in Figure 1.

2.4 Axial Flux Difference (Specification 3/4.2.1)

2.4.1 The AXIAL FLUX DIFFERENCE (AFD) target band is +3, -12% of the target flux difference.

2.4.2 The AFD Acceptable Operation Limits are provided in Figure 2.

2.5 Heat Flux Hot Channel Factor (Specification 3/4.2.2)

2.5.1 $F_Q(Z) \leq [F_Q^{RTP}/P][K(Z)]$ for $P > 0.5$

$F_Q(Z) \leq [F_Q^{RTP}/0.5][K(Z)]$ for $P \leq 0.5$

where: P = the ratio of THERMAL POWER to RATED THERMAL POWER

$F_Q^{RTP} = 2.50$

K(Z) is provided in Figure 3.

2.5.2 $F_{xy}^{L} = F_{xy}^{RTP}\,[1 + 0.2(1 - P)]$

F_{xy}^{RTP} limits within specified core planes shall be:

a. For the lower core region from greater than or equal to 0% to less than or equal to 50%:

1) $F_{xy}^{RTP} \leq 2.052$ for all core planes containing bank "D" control rods

2) For all unrodded core planes:

$F_{xy}^{RTP} \leq 1.765$ — $0 \leq$ Cycle Burnup $\leq$ 12,000 MWD/MTU
$F_{xy}^{RTP} \leq 1.774$ — Cycle Burnup > 12,000 MWD/MTU

b. For the upper core region from greater than 50% to less than or equal to 100%:

1) $F_{xy}^{RTP} \leq 1.994$ for all core planes containing bank "D" control rods

2) For all unrodded core planes:

$F_{xy}^{RTP} \leq 1.750$ — $0 \leq$ Cycle Burnup $\leq$ 12,000 MWD/MTU
$F_{xy}^{RTP} \leq 1.786$ — Cycle Burnup > 12,000 MWD/MTU

2.5.3 A plot of $[F_Q(z) * P_{Rel}]$ vs Axial Core Height is provided in Figures 4 and 5 and Tables 1 and 2 contain the data plotted in Figures 4 and 5.

2.6 Nuclear Enthalpy Rise Hot Channel Factor (Specification 3/4.2.3)

$F_{\Delta H}^{N} \leq F_{\Delta H}^{RTP}[1.0 + PF_{\Delta H}(1.0 - P)]$

where: P = the ratio of THERMAL POWER to RATED THERMAL POWER

$F_{\Delta H}^{RTP}$ = 1.65 for VANTAGE 5 Fuel

$F_{\Delta H}^{RTP}$ = 1.55 for OFA Fuel

$PF_{\Delta H}$ = 0.3

Figure 1:
Control Bank Insertion Limits Versus Percent Rated Thermal Power

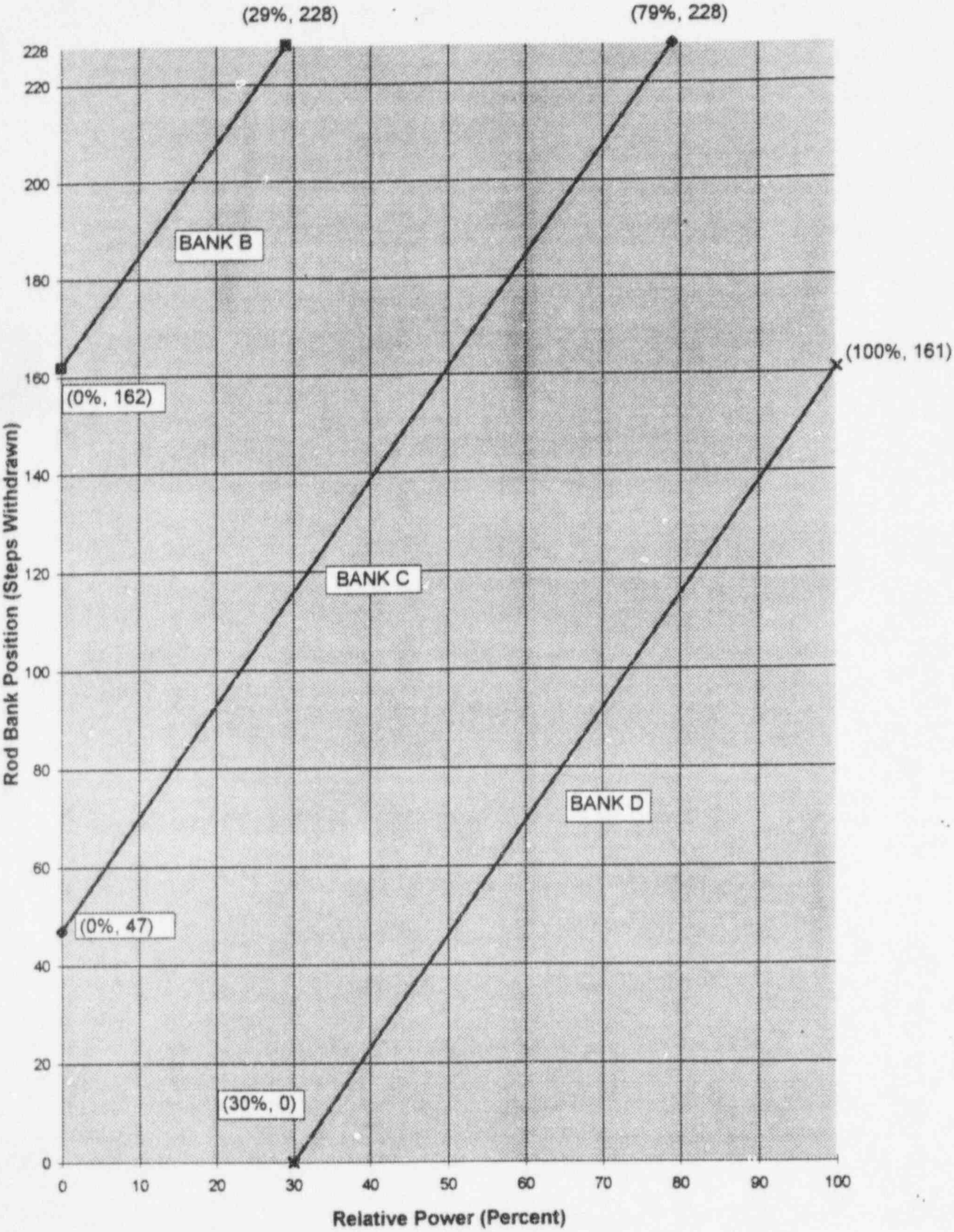


FIGURE 2: Axial Flux Difference Limits As A Function of Rated Thermal Power

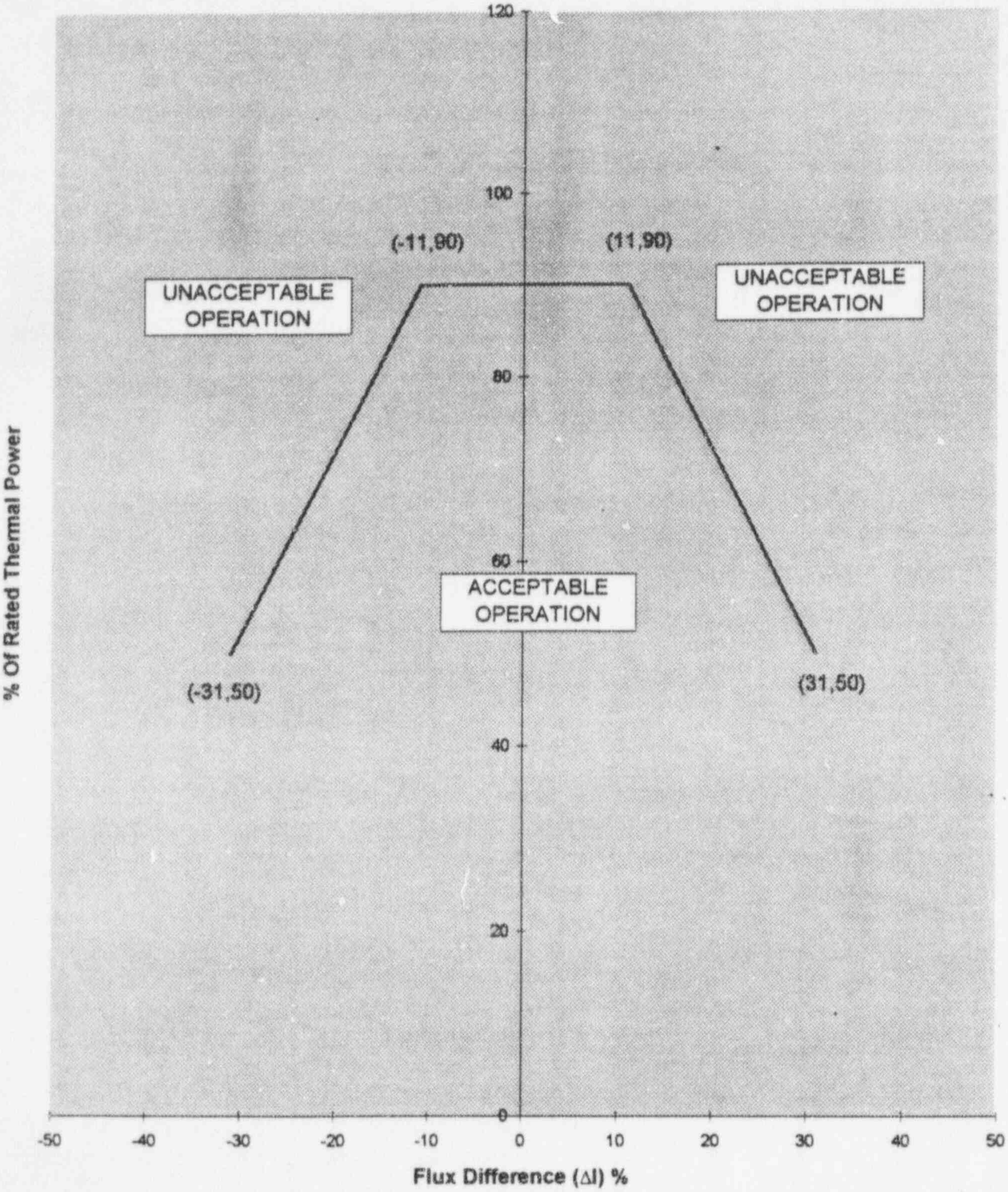


Figure 3: K(Z) - Normalized $F_Q(Z)$ As A Function of Core Height

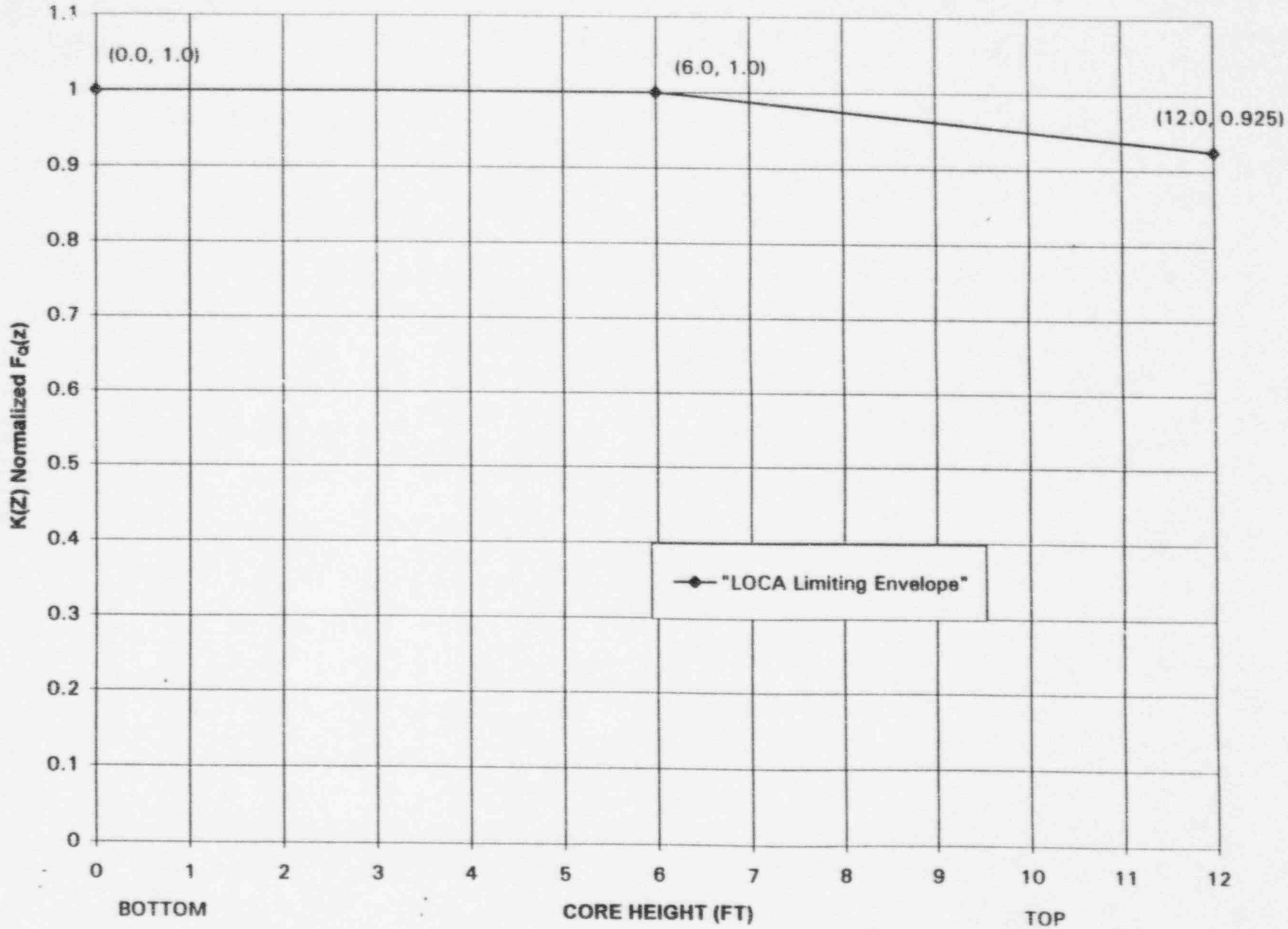


Figure 4: [$F_Q(z)$ * P_{rel}] vs. Axial Core Height
Cycle Burnup of 0 to 12,000 MWD/MTU

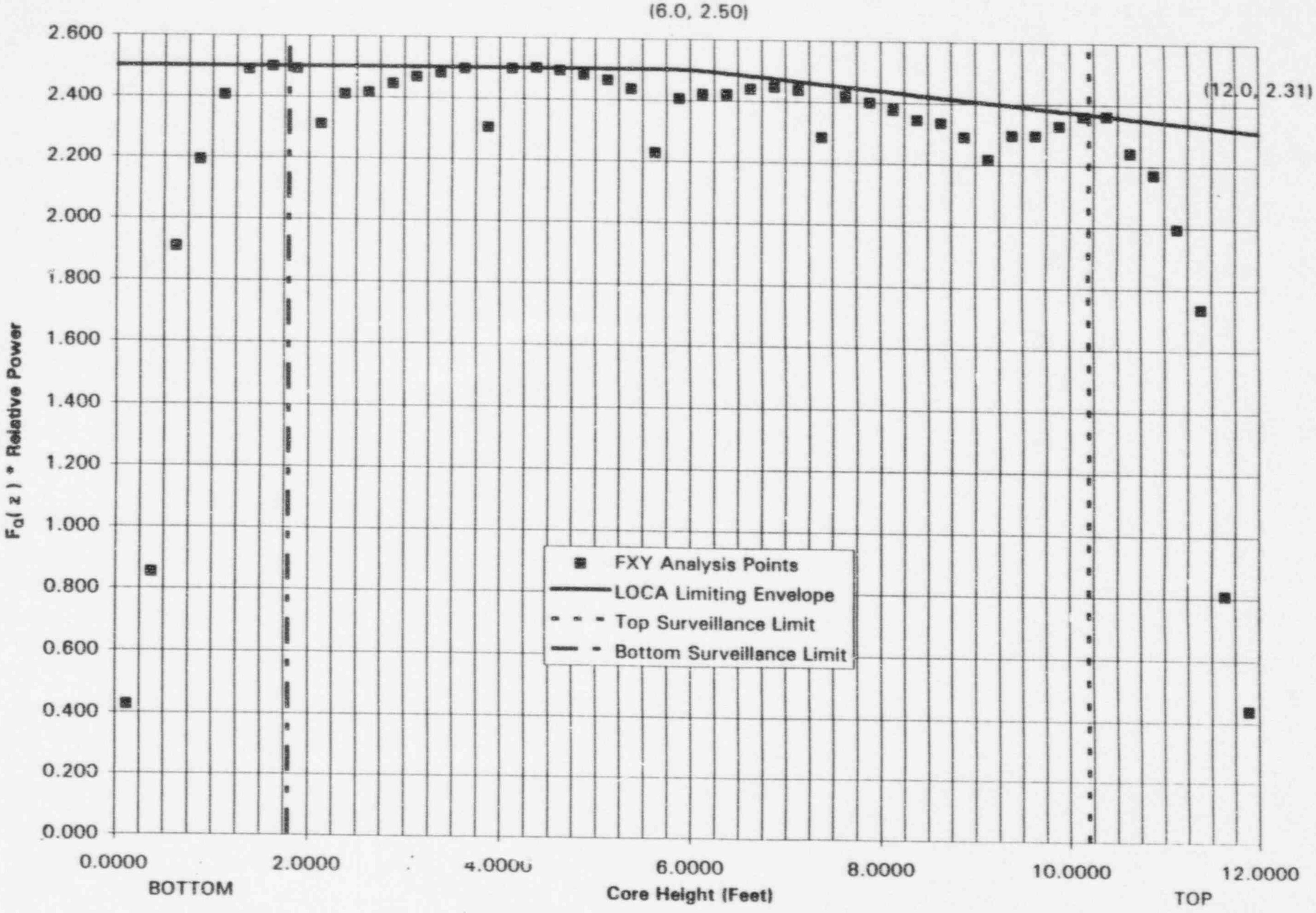
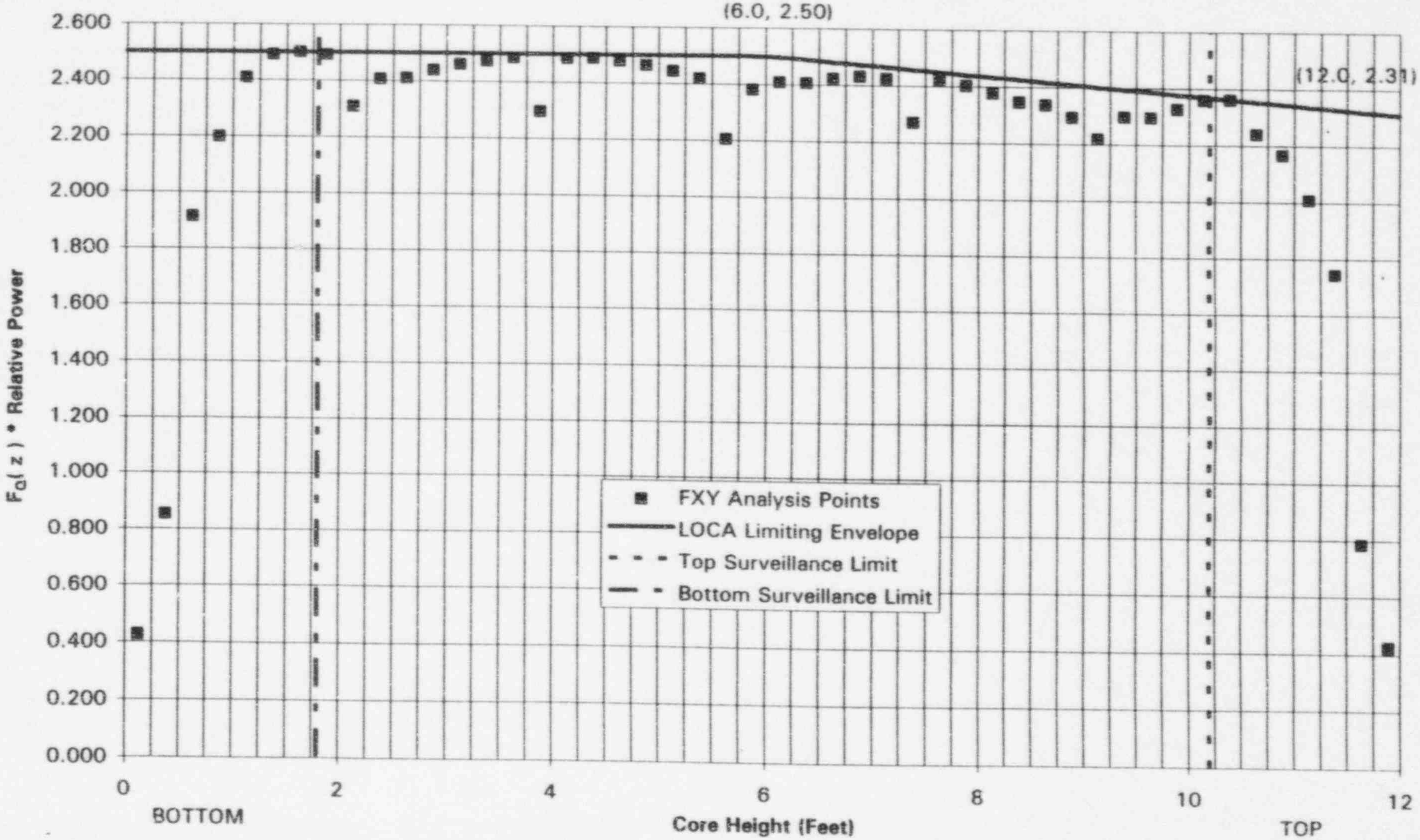


Figure 5: [$F_Q(z)$ * P_{rel}] vs. Axial Core Height
Cycle Burnup of > 12,000 MWD/MTU



OPERATING LIMITS REPORT (OLR) for BYRON UNIT 2, CYCLE 6

TABLE 1: [$F_Q(z)$ * P_{Rel}] vs Axial Core Height
Cycle Burnup of 0 to 12,000 MWD/MTU

		CORE HEIGHT (FEET)	MAXIMUM F_Q * P
BOTTOM	1	0.1252	0.424
	2	0.3756	0.852
	3	0.6259	1.908
	4	0.8763	2.192
	5	1.1267	2.405
	6	1.3771	2.487
	7	1.6274	2.499
	8	1.8778	2.490
	9	2.1282	2.310
	10	2.3786	2.408
	11	2.6290	2.414
	12	2.8793	2.444
	13	3.1297	2.466
	14	3.3801	2.480
	15	3.6305	2.495
	16	3.8808	2.304
	17	4.1312	2.497
	18	4.3816	2.499
	19	4.6320	2.492
	20	4.8823	2.478
	21	5.1327	2.461
	22	5.3831	2.435
	23	5.6335	2.227
	24	5.8839	2.404
	25	6.1342	2.419
	26	6.3846	2.419
	27	6.6350	2.437
	28	6.8854	2.445
	29	7.1357	2.435
	30	7.3861	2.283
	31	7.6365	2.419
	32	7.8869	2.398
	33	8.1372	2.376
	34	8.3876	2.344
	35	8.6380	2.334
	36	8.8884	2.289
	37	9.1388	2.217
	38	9.3891	2.296
	39	9.6395	2.296
	40	9.8899	2.327
	41	10.1400	2.358
	42	10.3910	2.361
	43	10.6410	2.240
	44	10.8910	2.171
	45	11.1420	1.994
	46	11.3920	1.735
	47	11.6430	0.807
TOP	48	11.8930	0.436

OPERATING LIMITS REPORT (OLR) for BYRON UNIT 2, CYCLE 6

TABLE 2: [$F_Q(z) * P_{Rel}$] vs Axial Core Height
Cycle Burnup of > 12,000 MWD/MTU

		CORE HEIGHT (FEET)	MAXIMUM $F_Q * P$
BOTTOM	1	0.1252	0.425
	2	0.3756	0.853
	3	0.6259	1.912
	4	0.8763	2.196
	5	1.1267	2.407
	6	1.3771	2.489
	7	1.6274	2.499
	8	1.8778	2.490
	9	2.1282	2.308
	10	2.3786	2.405
	11	2.6290	2.409
	12	2.8793	2.439
	13	3.1297	2.459
	14	3.3801	2.472
	15	3.6305	2.484
	16	3.8808	2.295
	17	4.1312	2.484
	18	4.3816	2.487
	19	4.6320	2.477
	20	4.8823	2.463
	21	5.1327	2.444
	22	5.3831	2.417
	23	5.6335	2.205
	24	5.8839	2.380
	25	6.1342	2.407
	26	6.3846	2.406
	27	6.6350	2.422
	28	6.8854	2.430
	29	7.1357	2.423
	30	7.3861	2.271
	31	7.6365	2.422
	32	7.8869	2.402
	33	8.1372	2.377
	34	8.3876	2.345
	35	8.6380	2.337
	36	8.8884	2.293
	37	9.1388	2.218
	38	9.3891	2.297
	39	9.6395	2.295
	40	9.8899	2.326
	41	10.1400	2.358
	42	10.3910	2.360
	43	10.6410	2.240
	44	10.8910	2.166
	45	11.1420	2.007
	46	11.3920	1.743
	47	11.6430	0.784
TOP	48	11.8930	0.423

ATTACHMENT G

Braidwood Station Unit 1 Cycle 5A
Operating Limits Report

OPERATING LIMITS REPORT (OLR) for BRAIDWOOD UNIT 1, CYCLE 5A

1.0 OPERATING LIMITS REPORT

This Operating Limits Report (OLR) for Braidwood Station Unit 1 Cycle 5A has been prepared in accordance with the requirements of Technical Specification 6.9.1.9.

The Technical Specifications affected by this report are listed below:

3/4.1.1.3	Moderator Temperature Coefficient
3/4.1.3.5	Shutdown Rod Insertion Limit
3/4.1.3.6	Control Rod Insertion Limits
3/4.2.1	Axial Flux Difference
3/4.2.2	Heat Flux Hot Channel Factor
3/4.2.3	Nuclear Enthalpy Rise Hot Channel Factor

OPERATING LIMITS REPORT (OLR) for BRAIDWOOD UNIT 1, CYCLE 5A

2.0 OPERATING LIMITS

The cycle-specific parameter limits for the specifications listed in Section 1.0 are presented in the following subsections. These limits have been developed using the NRC approved methodologies specified in Technical Specification 6.9.1.9.

2.1 Moderator Temperature Coefficient (Specification 3/4.1.1.3)

2.1.1 The Moderator Temperature Coefficient (MTC) limits are:

a. The BOL/ARO/HZP-MTC shall be less positive than 0 $\Delta k/k/°F$.

b. The EOL/ARO/RTP-MTC shall be less negative than -4.1×10^{-4} $\Delta k/k/°F$.

2.1.2 The EOL/ARO/RTP-MTC Surveillance limit is:

The 300 ppm/ARO/RTP-MTC should be less negative than or equal to -3.2×10^{-4} $\Delta k/k/°F$.

where: BOL stands for Beginning of Cycle Life
ARO stands for All Rods Out
HZP stands for Hot Zero Thermal Power
EOL stands for End of Cycle Life
RTP stands for RATED THERMAL POWER

2.2 Shutdown Rod Insertion Limit (Specification 3/4.1.3.5)

2.2.1 All shutdown banks shall be withdrawn to at least 231 steps.

2.3 Control Rod Insertion Limits (Specification 3/4.1.3.6)

2.3.1 The control banks shall be limited in physical insertion as shown in Figure 1.

2.4 Axial Flux Difference (Specification 3/4.2.1)

2.4.1 The AXIAL FLUX DIFFERENCE (AFD) target band is +3, -12% of the target flux difference.

2.4.2 The AFD Acceptable Operation Limits are provided in Figure 2.

2.5 Heat Flux Hot Channel Factor (Specification 3/4.2.2)

2.5.1 $F_Q(Z) \leq [F_Q^{RTP}/P][K(Z)]$ for $P > 0.5$

$F_Q(Z) \leq [F_Q^{RTP}/0.5][K(Z)]$ for $P \leq 0.5$

where: P = the ratio of THERMAL POWER to RATED THERMAL POWER

$F_Q^{RTP} = 2.50$

K(Z) is provided in Figure 3.

2.5.2 $F_{xy}^{L} = F_{xy}^{RTP}\,[1 + 0.2(1 - P)]$

F_{xy}^{RTP} limits within specified core planes shall be:

a. For the lower core region from greater than or equal to 0% to less than or equal to 50%:

1) $F_{xy}^{RTP} \leq 2.700$ for all core planes containing bank "D" control rods

2) $F_{xy}^{RTP} \leq 1.755$ for all unrodded core planes

b. For the upper core region from greater than 50% to less than or equal to 100%:

1) $F_{xy}^{RTP} \leq 2.052$ for all core planes containing bank "D" control rods

2) $F_{xy}^{RTP} \leq 1.772$ for all unrodded core planes

2.5.3 A plot of $[F_Q(z) * P_{Rel}]$ vs Axial Core Height is provided in Figure 4 and Table 1 contains the data plotted in Figure 4.

2.6 Nuclear Enthalpy Rise Hot Channel Factor (Specification 3/4.2.3)

$F^{N}_{\Delta H} \leq F^{RTP}_{\Delta H}[1.0 + PF_{\Delta H}(1.0 - P)]$

where: P = the ratio of THERMAL POWER to RATED THERMAL POWER

$F^{RTP}_{\Delta H}$ = 1.65 for VANTAGE 5 Fuel

$F^{RTP}_{\Delta H}$ = 1.55 for OFA Fuel

$PF_{\Delta H}$ = 0.3

Figure 1:
Control Bank Insertion Limits Versus Percent Rated Thermal Power

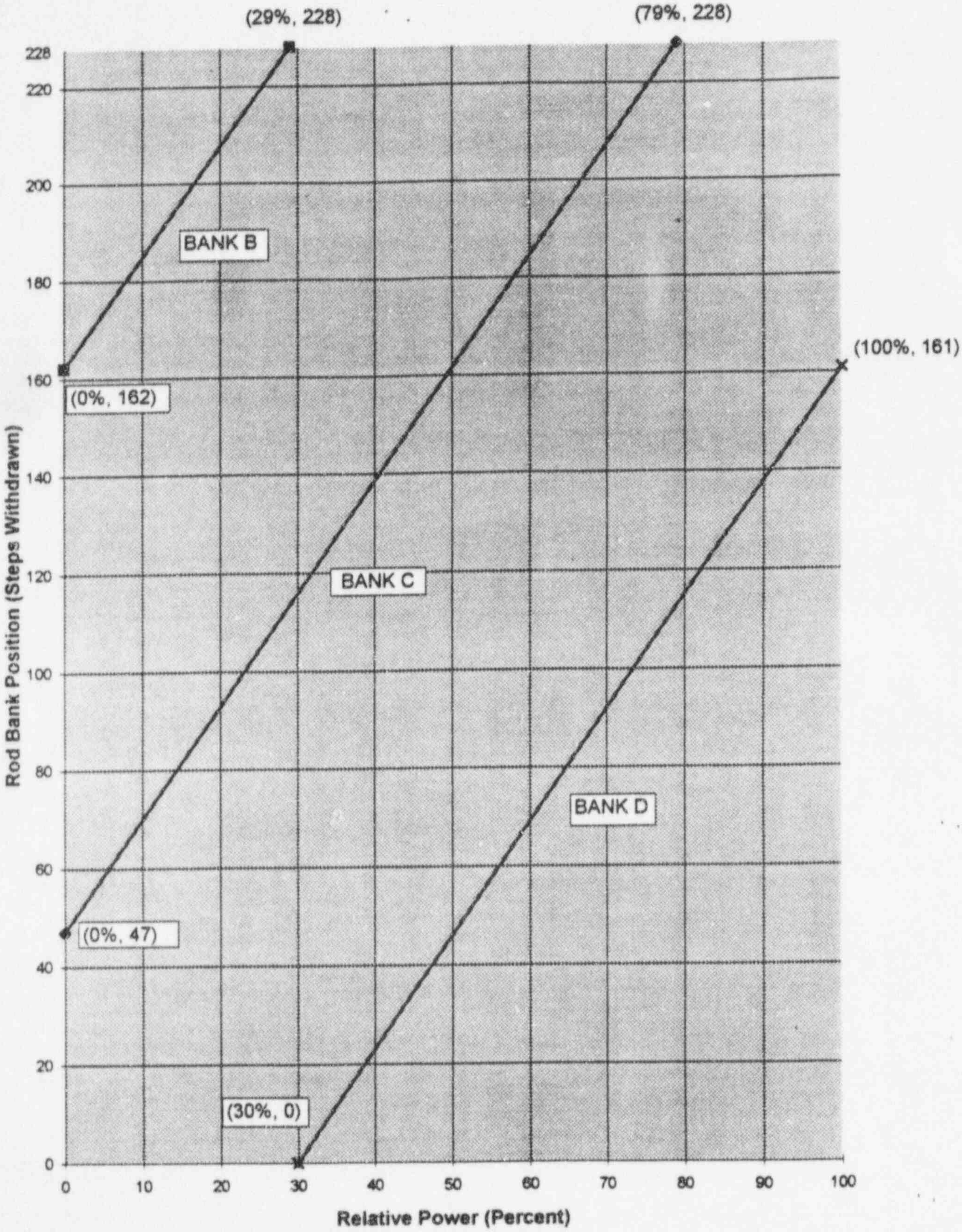


FIGURE 2: Axial Flux Difference Limits As A Function of Rated Thermal Power

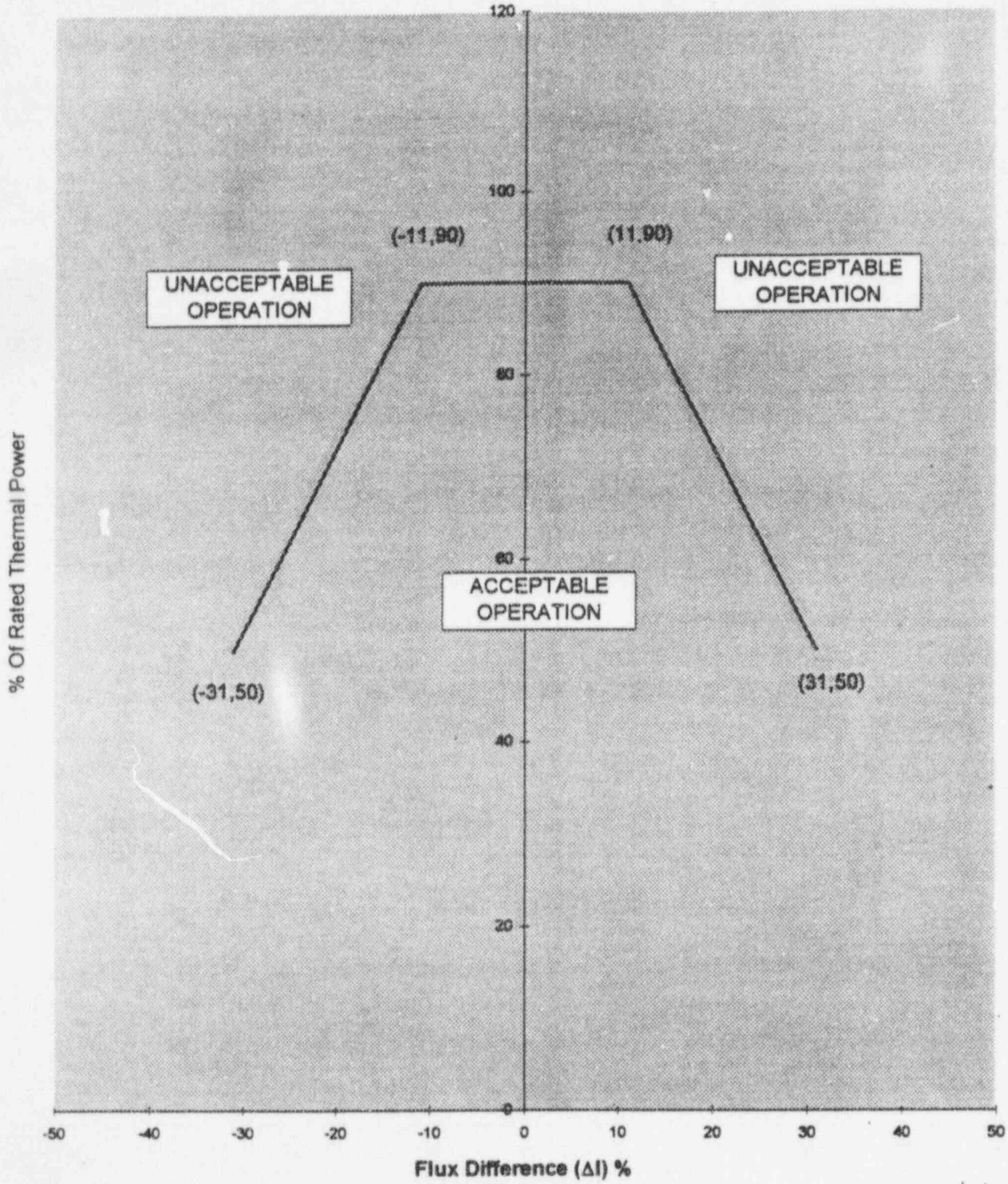


Figure 3: K(Z) - Normalized $F_Q(Z)$ As A Function of Core Height

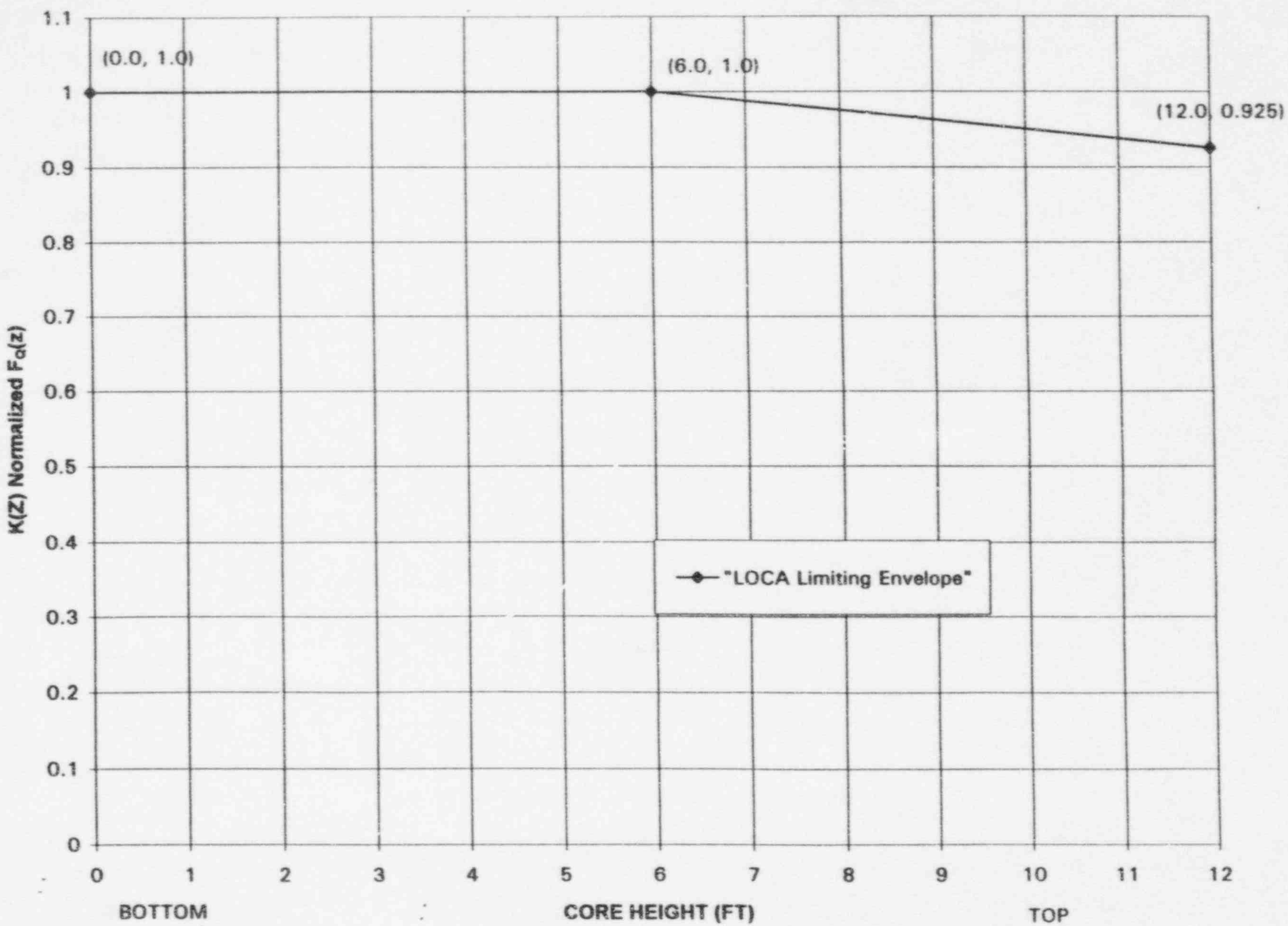
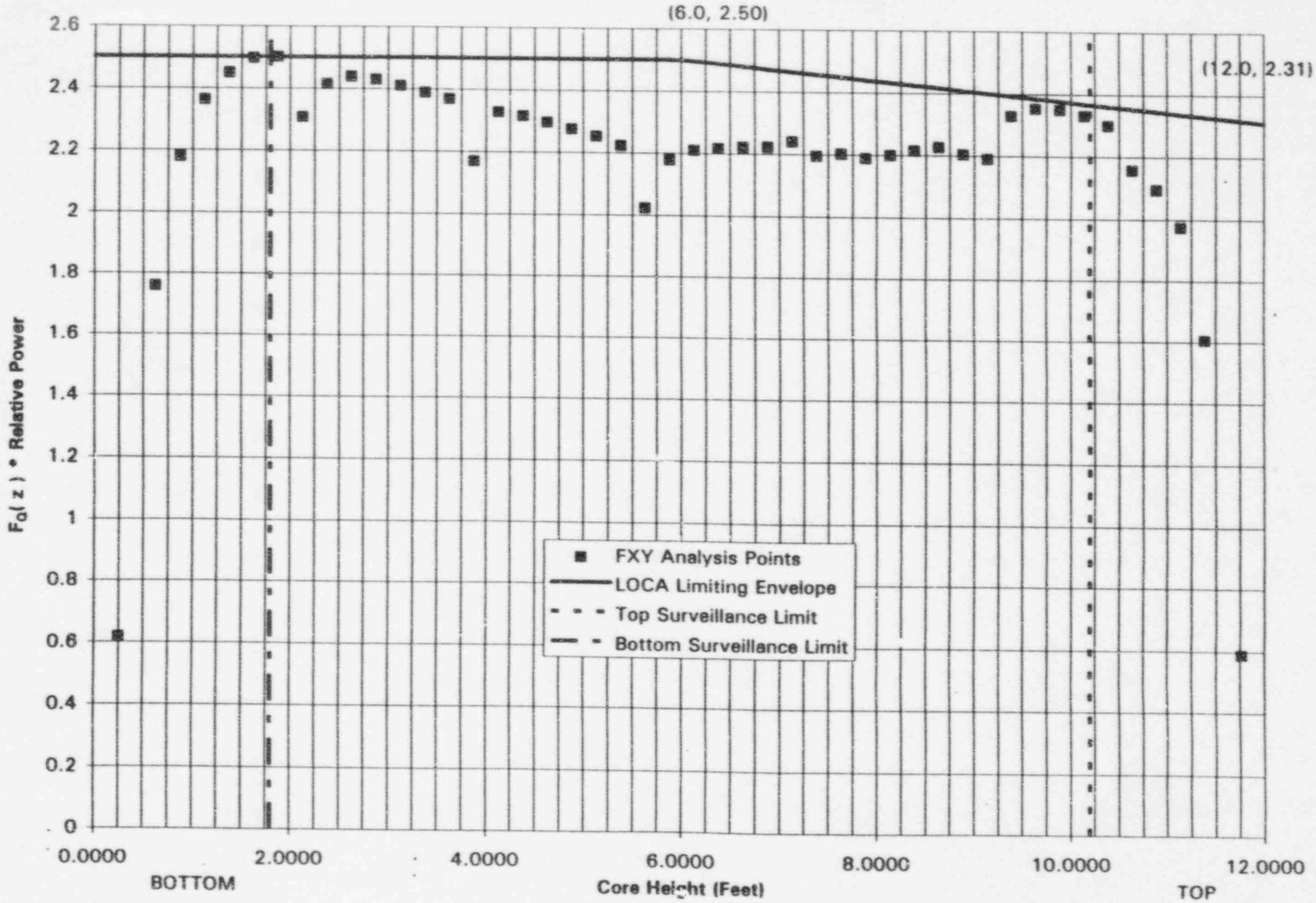


Figure 4: [$F_Q(z)$ * P_{Rel}] vs. Axial Core Height



OPERATING LIMITS REPORT (OLR) for BRAIDWOOD UNIT 1, CYCLE 5A

Table 1: [$F_Q(z)$ * P_{Rel}] vs. Axial Core Height

		CORE HEIGHT (FEET)	MAXIMUM F_Q * P
BOTTOM	1	0.2504	0.617
	2	0.6259	1.757
	3	0.8763	2.178
	4	1.1267	2.362
	5	1.3771	2.449
	6	1.6275	2.496
	7	1.8778	2.499
	8	2.1282	2.307
	9	2.3786	2.415
	10	2.6290	2.438
	11	2.8793	2.429
	12	3.1297	2.410
	13	3.3801	2.388
	14	3.6305	2.368
	15	3.8808	2.168
	16	4.1312	2.328
	17	4.3816	2.316
	18	4.6320	2.296
	19	4.8824	2.274
	20	5.1327	2.252
	21	5.3831	2.223
	22	5.6335	2.024
	23	5.8839	2.177
	24	6.1342	2.209
	25	6.3846	2.216
	26	6.6350	2.220
	27	6.8854	2.221
	28	7.1358	2.241
	29	7.3861	2.194
	30	7.6365	2.201
	31	7.8869	2.188
	32	8.1373	2.199
	33	8.3876	2.213
	34	8.6380	2.226
	35	8.8884	2.203
	36	9.1388	2.190
	37	9.3891	2.327
	38	9.6395	2.353
	39	9.8899	2.349
	40	10.1400	2.331
	41	10.3910	2.299
	42	10.6410	2.157
	43	10.8910	2.094
	44	11.1420	1.973
	45	11.3920	1.604
TOP	46	11.7680	0.587

ATTACHMENT H

Braidwood Station Unit 2 Cycle 5
Operating Limits Report

OPERATING LIMITS REPORT (OLR) for BRAIDWOOD UNIT 2, CYCLE 5

1.0 OPERATING LIMITS REPORT

This Operating Limits Report (OLR) for Braidwood Station Unit 2 Cycle 5 has been prepared in accordance with the requirements of Technical Specification 6.9.1.9.

The Technical Specifications affected by this report are listed below:

3/4.1.1.3	Moderator Temperature Coefficient
3/4.1.3.5	Shutdown Rod Insertion Limit
3/4.1.3.6	Control Rod Insertion Limits
3/4.2.1	Axial Flux Difference
3/4.2.2	Heat Flux Hot Channel Factor
3/4.2.3	Nuclear Enthalpy Rise Hot Channel Factor

OPERATING LIMITS REPORT (OLR) for BRAIDWOOD UNIT 2, CYCLE 5

2.0 OPERATING LIMITS

The cycle-specific parameter limits for the specifications listed in Section 1.0 are presented in the following subsections. These limits have been developed using the NRC approved methodologies specified in Technical Specification 6.9.1.9.

2.1 Moderator Temperature Coefficient (Specification 3/4.1.1.3)

2.1.1 The Moderator Temperature Coefficient (MTC) limits are:

a. The BOL/ARO/HZP-MTC shall be less positive than 0 $\Delta k/k/^\circ F$.

b. The EOL/ARO/RTP-MTC shall be less negative than -4.1×10^{-4} $\Delta k/k/^\circ F$.

2.1.2 The EOL/ARO/RTP-MTC Surveillance limit is:

The 300 ppm/ARO/RTP-MTC should be less negative than or equal to -3.2×10^{-4} $\Delta k/k/^\circ F$.

where: BOL stands for Beginning of Cycle Life
ARO stands for All Rods Out
HZP stands for Hot Zero Thermal Power
EOL stands for End of Cycle Life
RTP stands for RATED THERMAL POWER

2.2 Shutdown Rod Insertion Limit (Specification 3/4.1.3.5)

2.2.1 All shutdown banks shall be withdrawn to at least 228 steps.

2.3 <u>Control Rod Insertion Limits</u> (Specification 3/4.1.3.6)

2.3.1 The control banks shall be limited in physical insertion as shown in Figure 1.

2.4 <u>Axial Flux Difference</u> (Specification 3/4.2.1)

2.4.1 The AXIAL FLUX DIFFERENCE (AFD) target band is +3, -12% of the target flux difference.

2.4.2 The AFD Acceptable Operation Limits are provided in Figure 2.

2.5 <u>Heat Flux Hot Channel Factor</u> (Specification 3/4.2.2)

2.5.1 $F_Q(Z) \leq [F_Q^{RTP}/P][K(Z)]$ for $P > 0.5$

$F_Q(Z) \leq [F_Q^{RTP}/0.5][K(Z)]$ for $P \leq 0.5$

where: P = the ratio of THERMAL POWER to RATED THERMAL POWER

$F_Q^{RTP} = 2.50$

K(Z) is provided in Figure 3.

2.5.2 $F_{xy}^{L} = F_{xy}^{RTP}\,[1 + 0.2(1 - P)]$

F_{xy}^{RTP} limits within specified core planes shall be:

a. For the lower core region from greater than or equal to 0% to less than or equal to 50%:

1) $F_{xy}^{RTP} \leq 2.052$ for all core planes containing bank "D" control rods

2) $F_{xy}^{RTP} \leq 1.735$ for all unrodded core planes

b. For the upper core region from greater than 50% to less than or equal to 100%:

1) $F_{xy}^{RTP} \leq 2.052$ for all core planes containing bank "D" control rods

2) $F_{xy}^{RTP} \leq 1.817$ for all unrodded core planes

2.5.3 A plot of $[F_Q(z)^{*} P_{Rel}]$ vs Axial Core Height is provided in Figure 4 and Table 1 contains the data plotted in Figure 4.

2.6 Nuclear Enthalpy Rise Hot Channel Factor (Specification 3/4.2.3)

$F^{N}_{\Delta H} \leq F^{RTP}_{\Delta H}[1.0 + PF_{\Delta H}(1.0 - P)]$

where: P = the ratio of THERMAL POWER to RATED THERMAL POWER

$F^{RTP}_{\Delta H}$ = 1.65 for VANTAGE 5 Fuel

$F^{RTP}_{\Delta H}$ = 1.55 for OFA Fuel

$PF_{\Delta H}$ = 0.3

Figure 1:
Control Bank Insertion Limits Versus Percent Rated Thermal Power

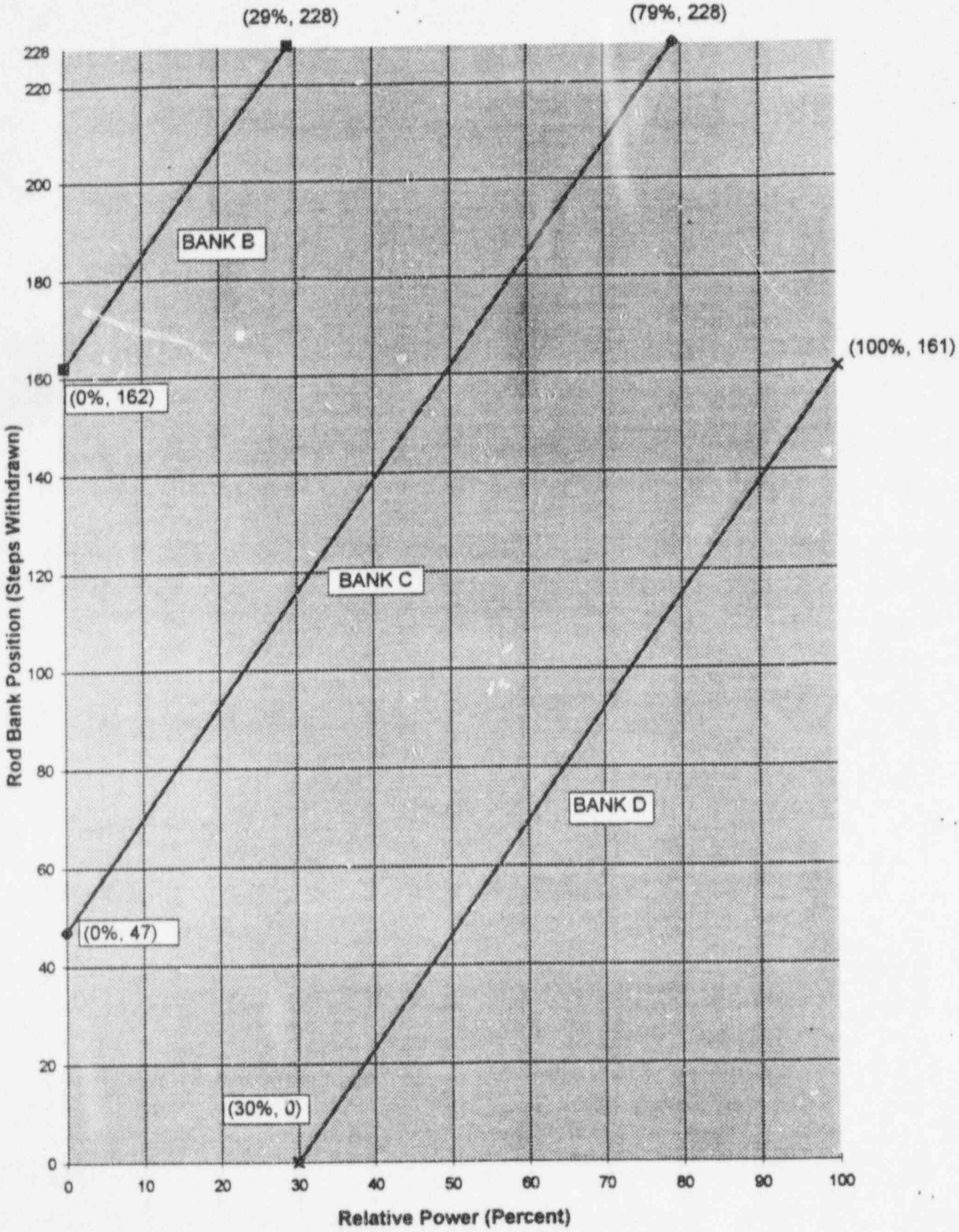


FIGURE 2: Axial Flux Difference Limits As A Function of Rated Thermal Power

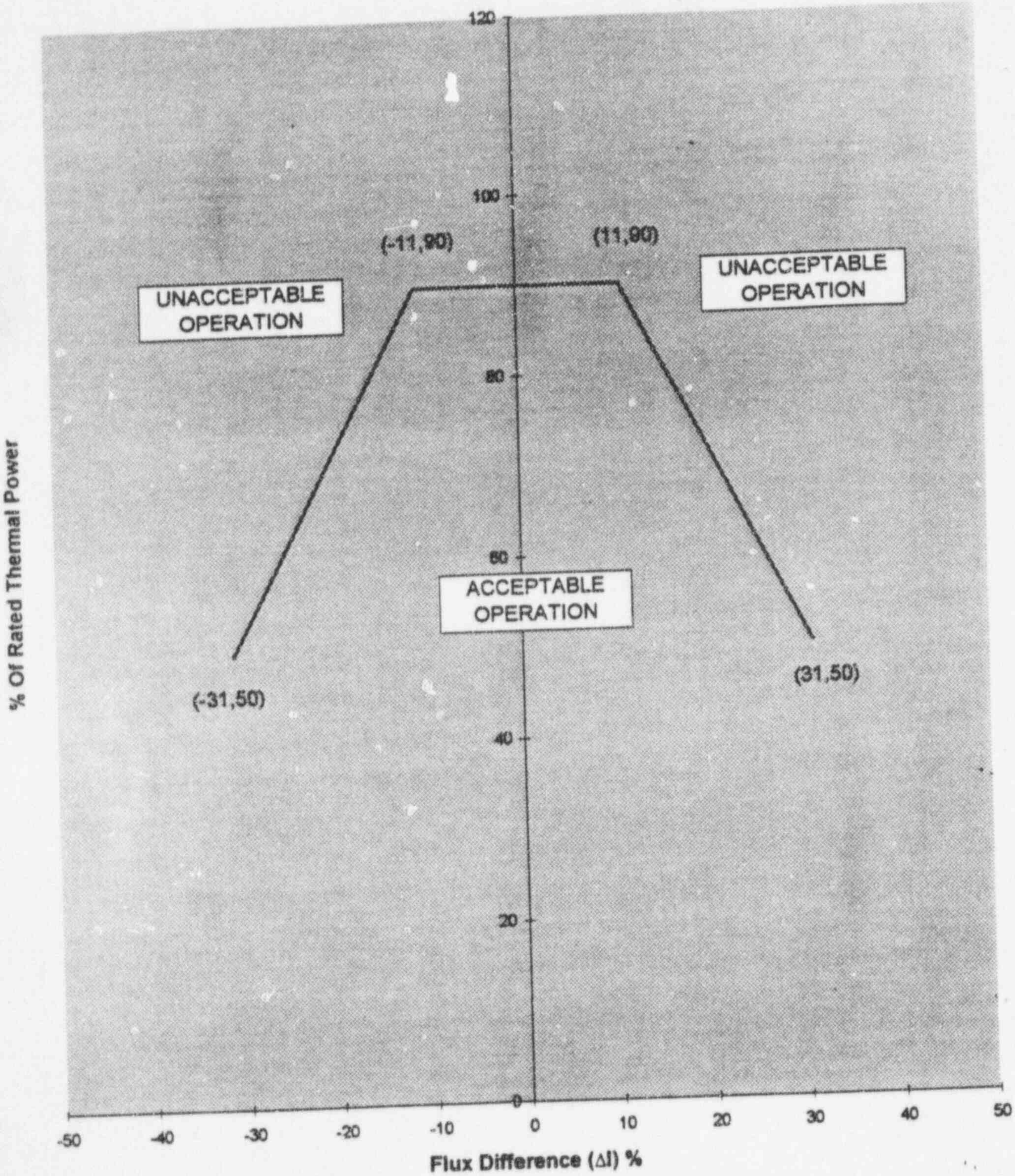


Figure 3: K(Z) - Normalized $F_Q(Z)$ As A Function of Core Height

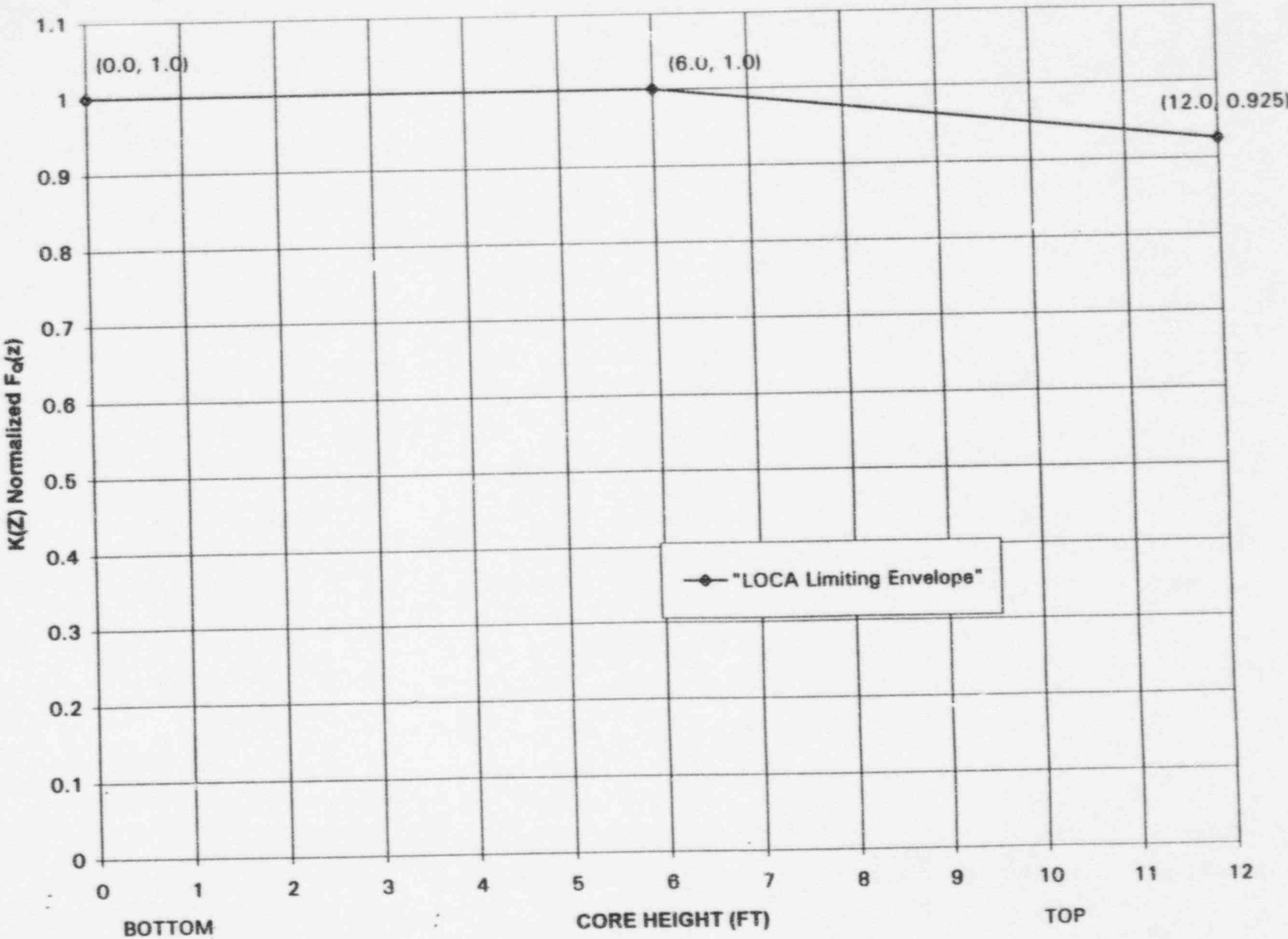
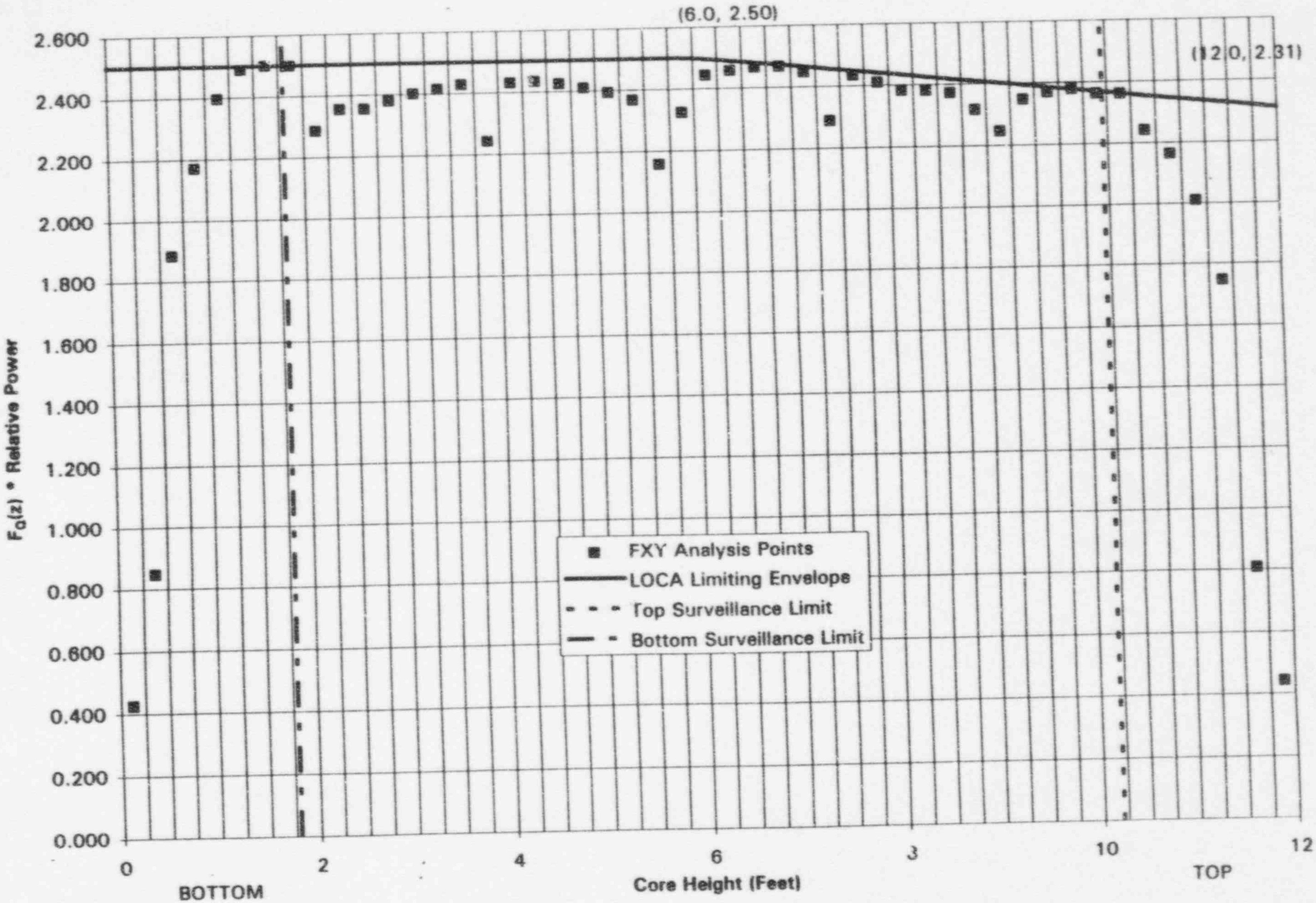


Figure 4: $[F_Q(z) * P_{Rel}]$ vs. Axial Core Height



OPERATING LIMITS REPORT (OLR) for BRAIDWOOD UNIT 2, CYCLE 5

Table 1: [$F_Q(z)$ * P_{Rel}] vs. Axial Core Height

		CORE HEIGHT (FEET)	MAXIMUM F_Q * P
BOTTOM	1	0.1252	0.424
	2	0.3756	0.844
	3	0.6259	1.882
	4	0.8763	2.170
	5	1.1267	2.395
	6	1.3771	2.488
	7	1.6274	2.500
	8	1.8778	2.499
	9	2.1282	2.285
	10	2.3786	2.354
	11	2.6289	2.355
	12	2.8793	2.378
	13	3.1297	2.399
	14	3.3801	2.414
	15	3.6305	2.427
	16	3.8808	2.243
	17	4.1312	2.430
	18	4.3816	2.433
	19	4.6320	2.423
	20	4.8823	2.409
	21	5.1327	2.391
	22	5.3831	2.366
	23	5.6335	2.156
	24	5.8838	2.323
	25	6.1342	2.442
	26	6.3846	2.456
	27	6.6350	2.464
	28	6.8853	2.467
	29	7.1357	2.447
	30	7.3861	2.289
	31	7.6365	2.433
	32	7.8868	2.408
	33	8.1372	2.382
	34	8.3876	2.380
	35	8.6380	2.371
	36	8.8884	2.315
	37	9.1387	2.246
	38	9.3891	2.347
	39	9.6395	2.368
	40	9.8899	2.377
	41	10.1400	2.362
	42	10.3910	2.360
	43	10.6410	2.241
	44	10.8910	2.162
	45	11.1420	2.010
	46	11.3920	1.747
	47	11.6420	0.805
TOP	48	11.8930	0.441