

3/4.2 POWER DISTRIBUTION LIMITS

AXIAL FLUX DIFFERENCE (AFD)

LIMITING CONDITION FOR OPERATION

3.2.1 The indicated AXIAL FLUX DIFFERENCE (AFD) shall be maintained within a +5% target band (flux difference units) about the target flux difference.

APPLICABILITY: MODE 1 ABOVE 50% RATED THERMAL POWER*

ACTION:

- a. With the indicated AXIAL FLUX DIFFERENCE outside of the +5% target band about the target flux difference and with THERMAL POWER:
 1. Above 81% of RATED THERMAL POWER, within 15 minutes:
 - a) Either restore the indicated AFD to within the target band limits, or
 - b) Reduce THERMAL POWER to less than 81% of RATED THERMAL POWER.
 2. Between 50% and 81% of RATED THERMAL POWER:
 - a) POWER OPERATION may continue provided:
 - 1) The indicated AFD has not been outside of the +5% target band for more than 1 hour penalty deviation cumulative during the previous 24 hours, and
 - 2) The indicated AFD is within the limits shown on Figure 3.2-1. Otherwise, reduce THERMAL POWER to less than 50% of RATED THERMAL POWER within 30 minutes and reduce the Power Range Neutron Flux-High Trip Setpoints to $\leq 55\%$ of RATED THERMAL POWER within the next 4 hours.
 - b) Surveillance testing of the Power Range Neutron Flux Channels may be performed pursuant to Specification 4.3.1.1.1 provided the indicated AFD is maintained within the limits of Figure 3.2-1. A total of 16 hours operation may be accumulated with the AFD outside of the target band during this testing without penalty deviation.

*See Special Test Exception 3.10.2
D. C. COOK - UNIT 2

3/4 2-1

8105070 176

POWER DISTRIBUTION LIMITS

ACTION: (Continued)

- c) Surveillance testing of the APDMS may be performed pursuant to Specification 4.3.3.7.1 provided the indicated AFD is maintained within the limits of Figure 3.2-1. A total of 6 hours of operation may be accumulated with the AFD outside of the target band during this testing without penalty deviation.
- b. THERMAL POWER shall not be increased above 81% of RATED THERMAL POWER unless the indicated AFD is within the $\pm 5\%$ target band and ACTION 2.a) 1), above has been satisfied.
- c. THERMAL POWER shall not be increased above 50% of RATED THERMAL POWER unless the indicated AFD has not been outside of the $\pm 5\%$ target band for more than 1 hour penalty deviation cumulative during the previous 24 hours.

SURVEILLANCE REQUIREMENTS

4.2.1.1 The indicated AXIAL FLUX DIFFERENCE 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 AXIAL FLUX DIFFERENCE 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 AXIAL FLUX DIFFERENCE Monitor Alarm is inoperable. The logged values of the indicated AXIAL FLUX DIFFERENCE shall be assumed to exist during the interval preceding each logging.

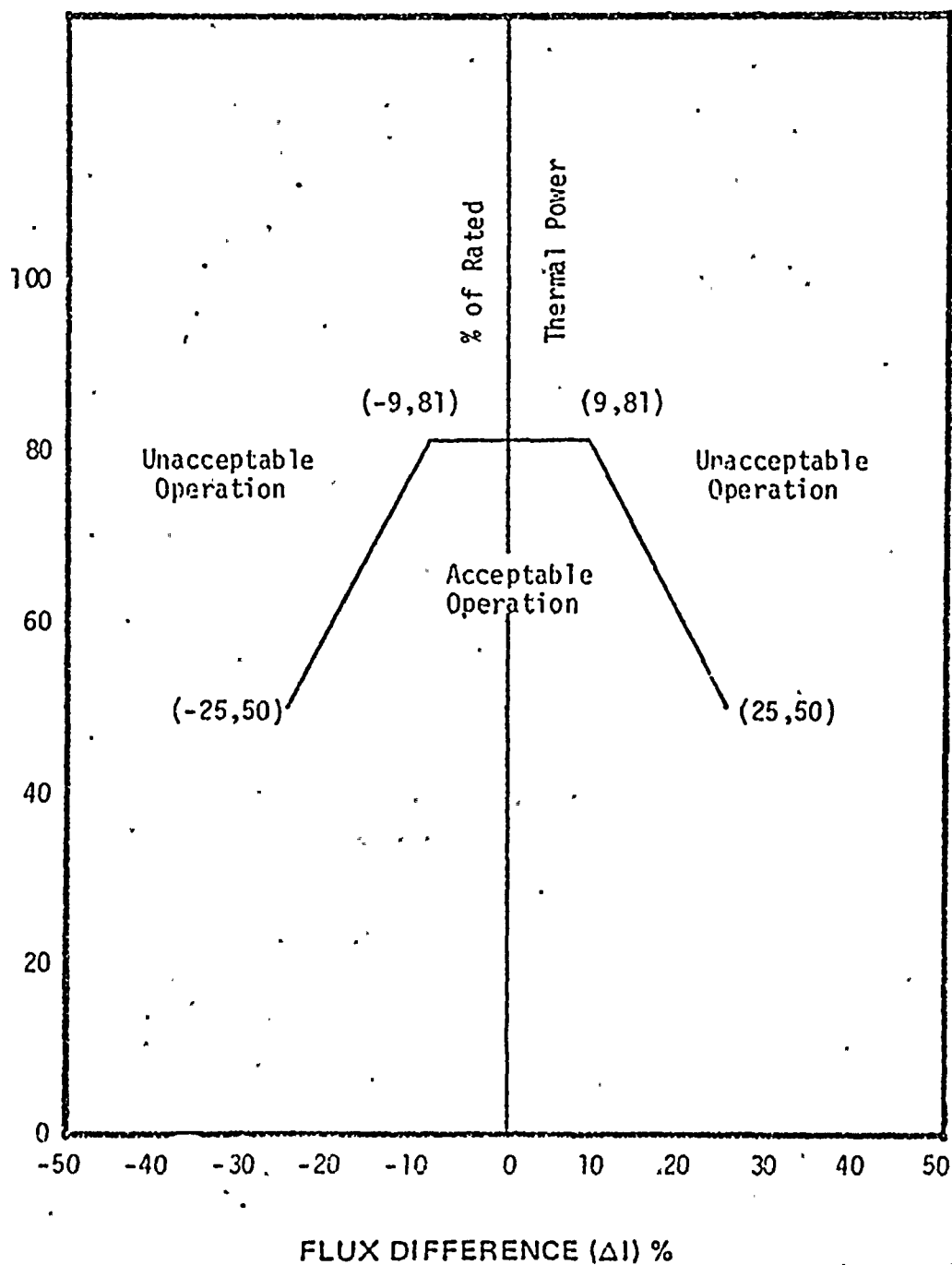


FIGURE 3.2-1 AXIAL FLUX DIFFERENCE LIMITS AS A FUNCTION OF RATED THERMAL POWER

POWER DISTRIBUTION LIMITS

AXIAL POWER DISTRIBUTION

LIMITING CONDITION FOR OPERATION

3.2.6 The axial power distribution shall be limited by the following relationship:

$$[F_j(Z)]_S = \frac{[1.99] [K(Z)]}{(\bar{R}_j)(P_L)(1.03)(1 + \sigma_j)(1.07)}$$

Where:

- $F_j(Z)$ is the normalized axial power distribution from thimble j at core elevation Z .
- P_L is the fraction of RATED THERMAL POWER.
- $K(Z)$ is the function obtained from Figure 3.2-2 for a given core height location.
- \bar{R}_j , for thimble j , is determined from at least $n=6$ in-core flux maps covering the full configuration of permissible rod patterns above 91% of RATED THERMAL POWER in accordance with:

$$\bar{R}_j = \frac{1}{n} \sum_{i=1}^n R_{ij}$$

Where:

$$R_{ij} = \frac{F_{Q_i}^{Meas}}{[F_{ij}(Z)]_{Max}}$$

and $[F_{ij}(Z)]_{Max}$ is the maximum value of the normalized axial distribution at elevation Z from thimble j in map i which had a measured peaking factor without uncertainties or densification allowance of F_Q^{Meas} .

POWER DISTRIBUTION LIMITS

LIMITING CONDITION FOR OPERATION (Continued)

σ_j is the standard deviation associated with thimble j , expressed as a fraction or percentage of \bar{R}_j , and is derived from n flux maps from the relationship below, or 0.02, (2%) whichever is greater.

$$\sigma_j = \frac{\left[\frac{1}{n-1} \sum_{i=1}^n (\bar{R}_j - R_{ij})^2 \right]^{1/2}}{\bar{R}_j}$$

The factor 1.07 is comprised of 1.02 and 1.05 to account for the axial power distribution instrumentation accuracy and the measurement uncertainty associated with F_Q using the movable detector system respectively.

The factor 1.03 is the engineering uncertainty factor.

APPLICABILITY: MODE 1 above 91% OF RATED THERMAL POWER[#].

ACTION:

- a. With a $F_j(Z)$ factor exceeding $[F_j(Z)]_S$ by ≤ 4 percent, reduce THERMAL POWER one percent for every percent by which the $F_j(Z)$ factor exceeds its limit within 15 minutes and within the next two hours either reduce the $F_j(Z)$ factor to within its limit or reduce THERMAL POWER to 91% or less of RATED THERMAL POWER.
- b. With a $F_j(Z)$ factor exceeding $[F_j(Z)]_S$ by > 4 percent, reduce THERMAL POWER to 91% or less of RATED THERMAL POWER within 15 minutes.

[#] The APDMS may be out of service when surveillance for determining power distribution maps is being performed.

POWER DISTRIBUTION LIMITS

SURVEILLANCE REQUIREMENTS

4.2.6.1 $F_j(Z)$ shall be determined to be within its limit by:

- a. Either using the APDMS to monitor the thimbles required per Specification 3.3.3.6 at the following frequencies.
 1. At least once per 8 hours, and
 2. Immediately and at intervals of 10, 30, 60, 90, 120, 240 and 480 minutes following:
 - a) Increasing the THERMAL POWER above 91% of RATED THERMAL POWER, or
 - b) Movement of control bank "D" more than an accumulated total of 5 steps in any one direction.
- b. Or using the movable incore detectors at the following frequencies when the APDMS is inoperable:
 1. At least once per 8 hours, and
 2. At intervals of 30, 60, 90, 120, 240 and 480 minutes following:
 - a) Increasing the THERMAL POWER above 91% of RATED THERMAL POWER, or
 - b) Movement of control bank "D" more than an accumulated total of 5 steps in any one direction.

4.2.6.2 When the movable incore detectors are used to monitor $F_j(Z)$, at least 2 thimbles shall be monitored and an $F_j(Z)$ accuracy equivalent to that obtained from the APDMS shall be maintained.

POWER DISTRIBUTION LIMITS

BASES

Although it is intended that the plant will be operated with the AXIAL FLUX DIFFERENCE within the +5% target band 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 81% 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 one minute average of each of the OPERABLE excore detector outputs and provides an alarm message immediately if the AFD for at least 2 of 4 or 2 of 3 OPERABLE excore channels are outside the target band and the THERMAL POWER is greater than 81% of RATED THERMAL POWER. During operation at THERMAL POWER levels between 50% and 81% 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.

ATTACHMENT No. 2 to AEP:NRC:0564

A modification was made to the high pressure turbine in Unit 2 during the current refueling outage to improve overall turbine efficiency. The current Technical Specification setpoint for the P-7 permissive in the logic of the Reactor Protection System (RPS) is low and needs to be increased to the new value of the first stage turbine impulse chamber pressure corresponding to 10% power (66 psia). Our calculations indicate that the current P-7 setpoint may cause unnecessary tripping of the reactor since Reactor Trip from a Turbine Trip could occur during the turbine overspeed tests with the current (low) setpoint of the impulse chamber pressure. Raising the setpoint of the P-7 permissive to 66 psia will avoid possible unnecessary reactor trips, is consistent with the FSAR value for Reactor Trip/Turbine Trip at or above 10% power, and will not adversely affect the health and safety of the public.

The proposed revision is indicated on the attached page by a vertical line in the right margin.

TABLE 3.3-1 (Continued)

<u>DESIGNATION</u>	<u>CONDITION AND SETPOINT</u>	<u>FUNCTION</u>
P-7	With 2 of 4 Power Range Neutron Flux Channels \geq 11% of RATED THERMAL POWER or 1 of 2 Turbine impulse chamber pressure channels \geq 66 psia.	P-7 prevents or defeats the automatic block of reactor trip on: Low flow in more than one primary coolant loop, reactor coolant pump under-voltage and under-frequency, turbine trip, pressurizer low pressure, and pressurizer high level.
P-8	With 2 of 4 Power Range Neutron Flux channels \geq 51% of RATED THERMAL POWER.	P-8 prevents or defeats the automatic block of reactor trip on low coolant flow in a single loop.
P-10	With 3 of 4 Power range neutron flux channels $<$ 9% of RATED THERMAL POWER.	P-10 prevents or defeats the manual block-of: Power range low setpoint reactor trip, Intermediate range reactor trip, and intermediate range rod stops. Provides input to P-7.

