



**WOLF CREEK GENERATING STATION  
CYCLE 9**

**CORE OPERATING LIMITS REPORT  
Revision 0**

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1.0 CORE OPERATING LIMITS REPORT

The CORE OPERATING LIMITS REPORT (COLR) for Wolf Creek Generating Station Cycle 9 has been prepared in accordance with the requirements of Technical Specification 6.9.1.9.

The core operating limits that are included in the COLR affect the following Technical Specifications:

- 3.1.1.3.b Moderator Temperature Coefficient (MTC) EOL Limit
- 3.1.3.5 Shutdown Rod Insertion Limit
- 3.1.3.6 Control Rod Insertion Limit
- 3.2.1 Axial Flux Difference (AFD)
- 3.2.2 Heat Flux Hot Channel Factor -  $F_Q(Z)$
- 3.2.3 Nuclear Enthalpy Rise Hot Channel Factor -  $F_{\Delta H}^N$
- 3.9.1.b Refueling Boron Concentration

## 2.0 OPERATING LIMITS

The cycle-specific parameter limits for the specifications listed in Section 1.0 are presented in the subsections below:

### 2.1 Moderator Temperature Coefficient (MTC) EOL Limit

(Tech Spec 3.1.1.3.b)

The EOL MTC shall be less negative than -50 pcm/deg F.

(Tech Spec 4.1.1.3.b)

The 300 PPM MTC Surveillance Limit is -41 pcm/deg F (all rods withdrawn, Rated Thermal Power condition).

2.2 Shutdown Rod Insertion Limit

(Tech Spec 3.1.3.5)

The shutdown rods shall be fully withdrawn, as defined in Figure 1.

2.3 Control Rod Insertion Limits

(Tech Spec 3.1.3.6)

The Control Bank Insertion Limits are specified in Figure 1.

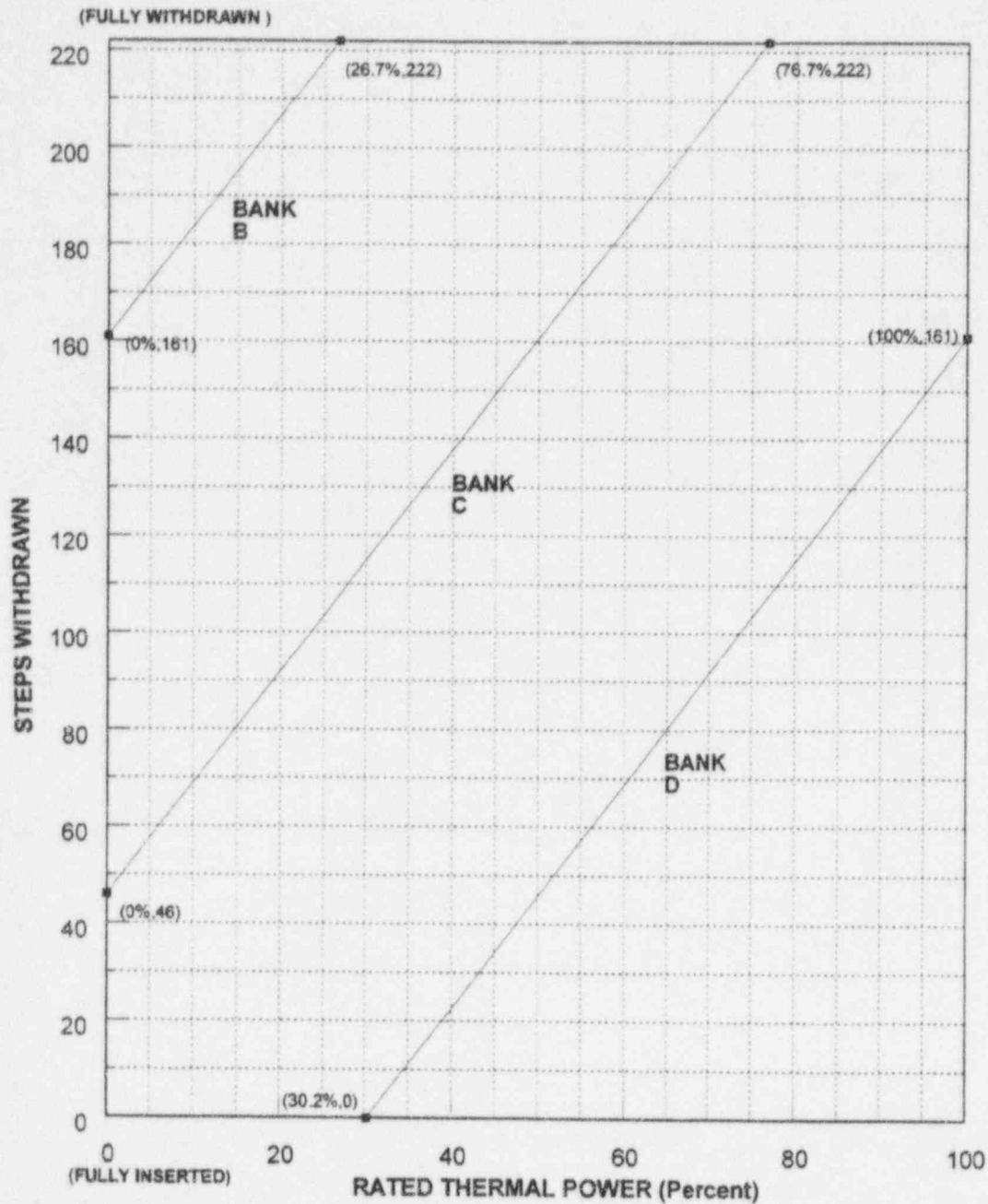


FIGURE 1

ROD BANK INSERTION LIMIT VERSUS  
THERMAL POWER-FOUR LOOP OPERATION

Fully Withdrawn shall be the condition where control rods are at a position within the interval of  $\geq 222$  and  $\leq 231$  steps withdrawn.

2.4 Axial Flux Difference (AFD)

(Tech Spec 3.2.1)

The indicated Axial Flux Difference (AFD) allowed operational space is defined by Figure 2.

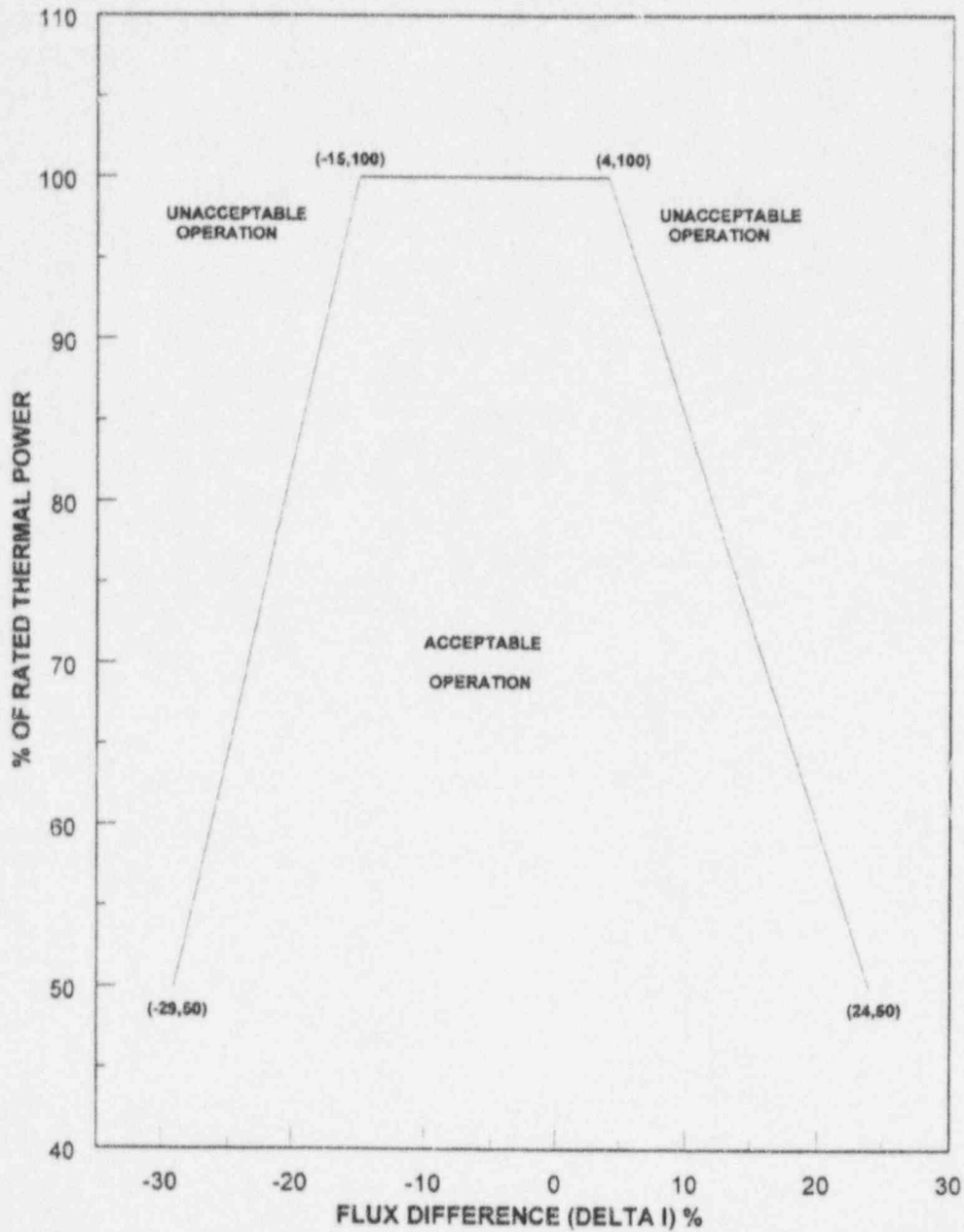


FIGURE 2  
WOLF CREEK UNIT 1  
AXIAL FLUX DIFFERENCE LIMITS AS A FUNCTION OF RATED THERMAL POWER



2.5 Heat Flux Hot Channel Factor -  $F_Q(Z)$

(Tech Spec 3.2.2)

$$F_Q(Z) \leq \frac{F_Q^{RTP}}{P} * K(Z), \text{ for } P > 0.5$$

$$F_Q(Z) \leq \frac{F_Q^{RTP}}{0.5} * K(Z), \text{ for } P \leq 0.5$$

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

$F_Q^{RTP}$  = the  $F_Q(Z)$  Limit at RATED THERMAL POWER (RTP)

= 2.50, and

$K(Z)$  is defined in Figure 3.

(Tech Spec 4.2.2.2.c)

$$F_Q^M(Z) \leq \frac{[F_Q^{RTP}][K(Z)]}{[P][W(Z)]} \text{ for } P > 0.5$$

$$F_Q^M(Z) \leq \frac{[F_Q^{RTP}][K(Z)]}{[W(Z)][0.5]} \text{ for } P \leq 0.5$$

$W(Z)$  = Ratio of the  $F_Q$  from normal operation transients to the  $F_Q$  at steady state conditions



With measurements indicating

$$\text{maximum over } z \left( \frac{F_Q^M(Z)}{K(Z)} \right)$$

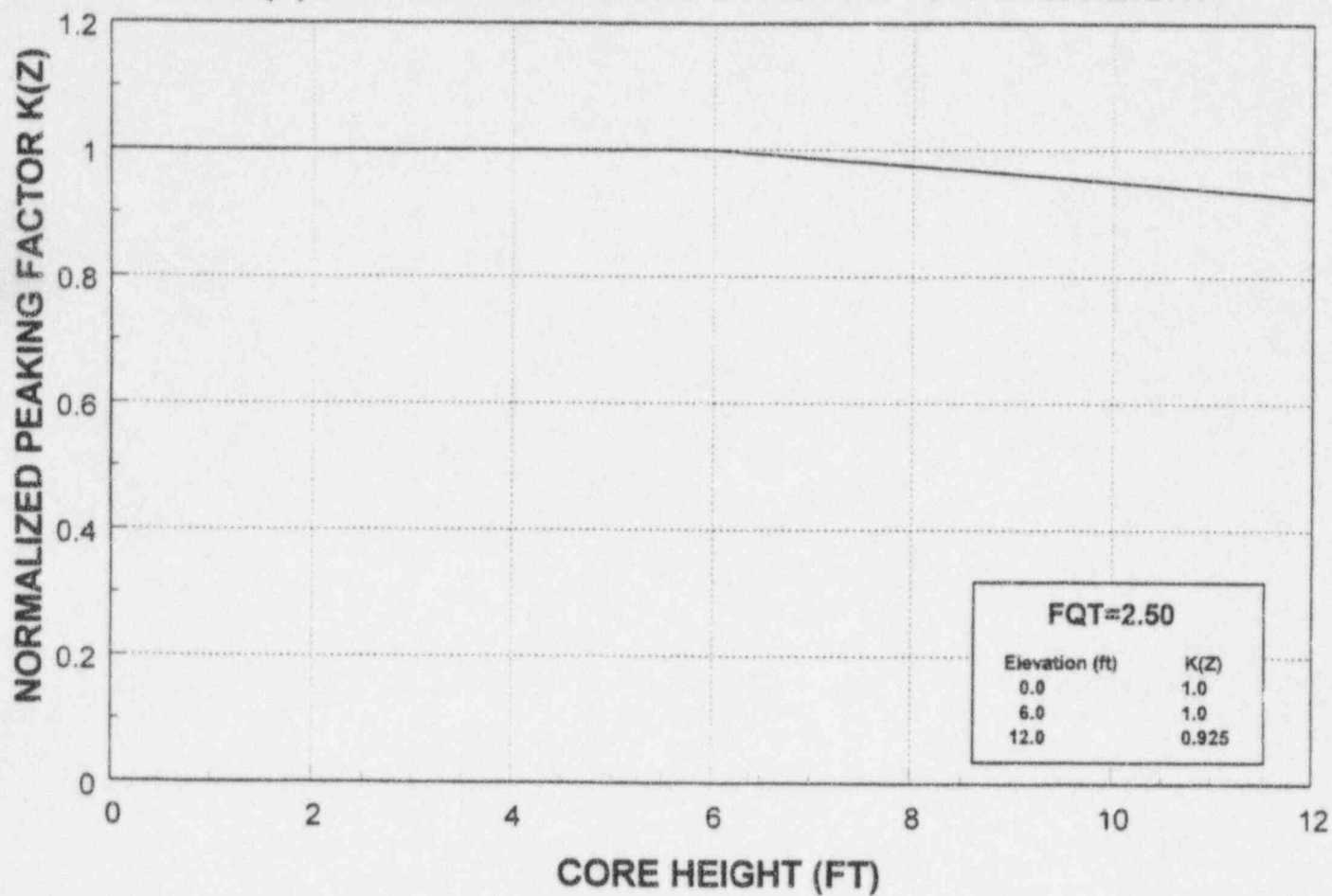
has increased since the previous determination of  $F_Q^M(Z)$ ,

$F_Q^M(Z)$  shall be increased over that specified in 4.2.2.2.c by an appropriate factor, the  $F_Q$  Penalty Factor.

See Appendix A for:

1.  $W(Z)$
1.  $F_Q$  Penalty Factor

**FIGURE 3**  
**K(Z)-NORMALIZED PEAKING FACTOR VS. CORE HEIGHT**



2.6 Nuclear Enthalpy Rise Hot Channel Factor -  $F_{\Delta H}^N$

(Tech Spec 3.2.3)

$F_{\Delta H}^N$  shall be limited by the following relationship:

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

Where,

$F_{\Delta H}^{RTP}$  = The  $F_{\Delta H}^N$  limit at RATED THERMAL POWER (RTP)

= 1.59

$PF_{\Delta H}$  = the power factor multiplier for  $F_{\Delta H}^N$

= 0.3

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

$F_{\Delta H}^N$  = Measured values of  $F_{\Delta H}^N$  obtained by using the movable incore detectors to obtain a power distribution map. The measured values of  $F_{\Delta H}^N$  shall be used since an uncertainty of 4% for incore measurement of  $F_{\Delta H}^N$  has been included in the above limit.

2.7 Refueling Boron Concentration

(Tech Spec 3.9.1.b)

The refueling boron concentration shall be greater than or equal to 2300 PPM.

APPENDIX A

A. Input relating to Specification 4.2.2.2.c:

$$W(Z) = \frac{F_Q(Z)^{\text{max transient}}}{F_Q(Z)^{\text{steady state}}}$$

These values are issued in a controlled report which will be provided on request.

Input relating to Specification 4.2.2.2.e.1

Cycle Burnup	$F_Q^M(Z)$ Penalty Factor
0	2.00
21400	2.00

Note: All cycle burnups outside of the above table shall use a 2% penalty factor for compliance with 4.2.2.2.e Surveillance Requirement.  
Linear interpolation should be used for intermediate cycle burnups.

Technical Specification BASES 3/4.2.5

Cycle 9 Safety Analysis DNB Limit 1.76

WRB-2 Design Limit DNBR 1.23