where:

P is the fraction of full power at which the core is operating

K(Z) is the function given in Figure TS 3.10-2

Z is the core height location for the FQ of interest

F_Q^T (Ej) is the function given in Figure TS 3.10-6

Ej is exposure of the fuel rod for the F_Q of interest

B. $F_{\Delta H}^N$ Limits For All Fuel

$F_{\Delta H}^N \times 1.04 \leq 1.55\ (1 + 0.2(1 - P))$ For 0 to 24,000 MWD/MTU burnup fuel 48

$F_{\Delta H}^N \times 1.04 \leq 1.52\ (1 + 0.2(1 - P))$ For greater than 24,000 MWD/MTU burnup fuel

where:

P is the fraction of full power at which the core is operating

2. If, for any measured hot channel factor, the relationships specified in 3.10.b.1 are not true, reactor power shall be reduced by a fractional amount of the design power to a value for which the relationships are true, and the high neutron flux trip setpoint shall be reduced by the same fractional amount. If subsequent incore mapping cannot, within a 24 hour period, demonstrate that the hot channel factors are met, the overpower ΔT and overtemperature ΔT trip setpoints shall be similarly reduced. 48

3. Following initial loading and at regular effective full power monthly intervals thereafter, power distribution maps using the movable detection system shall be made to confirm that the hot channel factor limits of specification 3.10.b.1 are satisfied.

4. The measured F_Q^{EQ} (Z) hot channel factors under equilibrium conditions shall satisfy the following relationship for the central axial 80% of the core: 48

A. Westinghouse Electric Corporation Fuel

$$F_Q^{EQ}(Z) \times 1.03 \times 1.05 \times V(Z) \leq (2.22/P) \times K(Z)$$

B. Exxon Nuclear Company Fuel

$$F_Q^{EQ}(Z) \times 1.03 \times 1.05 \times V(Z) \leq F_Q^T(Ej)/P \times K(Z)$$

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where:

P is the fraction of full power at which the core is operating

V(Z) is defined in Figure TS 3.10.b.8

$F_Q^{EQ}(Z)$ is a measured FQ distribution obtained during the target flux determination

5. Power distribution maps using the movable detector system shall be made to confirm the relationship of specification 3.10.b.4 according to the following schedules with allowances for a 25% grace period:

   A. During the target flux difference determination or once per effective full power monthly interval whichever occurs first.

   B. Upon achieving equilibrium conditions after reaching a thermal power level more than 10% higher than the power level at which the last power distribution measurement was performed in accordance with 3.10.b.5.A above. 48

   C. If a power distribution map indicates an increase in peak pin power, $F_{\Delta H}^N$, of 2% or more, due to exposure, when compared to the last power distribution map either of the following actions shall be taken:

      i. $F_Q^{EQ}(Z)$ shall be increased by an additional 2% for comparison to the relationship specified in 3.10.b.4 OR

      ii. $F_Q^{EQ}(Z)$ shall be measured by power distribution maps using the incore movable detector system at least once every 7 effective full power days until a power distribution map indicates that the peak pin power, $F_{\Delta H}^N$, is not increasing with exposure when compared to the last power distribution map.

6. If, for a measured F_Q^{EQ}, the relationships of 3.10.b.4 are not satisfied and the relationships of 3.10.b.1 are satisfied, within 12 hours take one of the following actions:

A. Take corrective actions to improve the power distribution and upon achieving equilibrium conditions measure the target flux difference and verify that the relationships specified in 3.10.b.4 are satisfied, OR

B. Reduce reactor power and the high neutron flux trip setpoint by 1% for each percent that the left hand sides of the relationships specified in 3.10.b.4 exceed the limits specified in the right hand sides.

7. The reference equilibrium indicated axial flux difference as a function of power level (called the target flux difference) shall be measured at least once per full power month.

8. The indicated axial flux difference shall be considered outside of the limits of sections 3.10.b.9 through 3.10.b.12 when more than one of the operable excore channels are indicating the axial flux difference to be outside a limit.

9. Except during physics tests, during excore detector calibration and except as modified by 3.10.b.10 through 3.10.b.12 below, the indicated axial flux difference shall be maintained within a $\pm$ 5% band about the target flux difference. 48

10. At a power level greater than 90 percent of rated power if the indicated axial flux difference deviates from its target band, the flux difference shall be returned to the target band immediately or reactor power shall be reduced to a level no greater than 90 percent of rated power.

11. At power levels greater than 50 percent and less than or equal to 90 percent of rated power:

A. The indicated axial flux difference may deviate from its $\pm$ 5% target band for a maximum of one hour (cumulative) in any 24 hour period provided the flux difference does not exceed an envelope bounded by

-10 percent and +10 percent from the target axial flux difference at 90% rated power and increasing by -1% and +1% from the target axial flux difference for each 2.7% decrease in rated power below 90% and above 50%. If the cumulative time exceeds one hour, then the reactor power shall be reduced immediately to less than or equal to 50% power and the high neutron flux setpoint reduced to less than or equal to 55% of rated power.

B. A power increase to a level greater than 90% of rated power is contingent upon the indicated axial flux difference being within its target band.

12. At a power level no greater than 50% of rated power:

A. The indicated axial flux difference may deviate from its target band.

B. A power increase to a level greater than 50% of rated power is contingent upon the indicated axial flux difference not being outside its target band for more than two hours (cumulative) of the preceding 24 hour period. 48

One half of the time the indicated axial flux difference is out of its target band up to 50% of rated power is to be counted as contributing to the one hour cumulative maximum the flux difference may deviate from its target band at a power level less than or equal to 90% of rated power.

13. Alarms shall normally be used to indicate non-conformance with the flux difference requirement of 3.10.b.10 or the flux difference time requirement of 3.10.b.11A. If the alarms are temporarily out of service, the axial flux difference shall be logged, and conformance with the limits assessed, every hour for the first 24 hours, and half-hourly thereafter.

The plant process computer converts the output voltage signal from each IRPI conditioning module to an equivalent position (in steps) through a curve fitting process, which may include the latest actual voltage-to-position rod calibration curve.

The rod position as determined by any of these methods can then be compared to the bank demand position which is indicated on the group step counters to determine the existence and magnitude of a rod misalignment. This comparison is performed automatically by the plant process computer. The rod deviation monitor on the annunciator panel is activated (or re-activated) if the two position signals for any rod as detected by the process computer deviate by more than a predetermined value. The value of this setpoint is set to warn the operator when the technical specification limits are exceeded. 48

The rod position indicator system is calibrated once per refueling cycle and forms the basis of the correlation of rod position vs. voltage. This calibration is typically performed at hot shutdown conditions prior to initial operations for that cycle. Upon reaching full power conditions and verifying that the rods are aligned with their respective banks the rod position indication may be adjusted to compensate for the effects of the power ascension. After this adjustment is performed, the calibration of the rod position indicator channel is checked at an intermediate and low level to confirm that the calibration is not adversely affected by the adjustment.

INOPERABLE ROD POSITION INDICATOR CHANNELS

The rod position indicator channel is sufficiently accurate to detect a rod $\pm$ 7.5 inches away from its demand position. If the position indicator channel is not operable, the operator will be fully aware of the inoperability of the channel, and special surveillance of core power tilt indications, using established procedures and relying on excore nuclear detectors, and/or movable incore detectors, will be used to verify power distribution symmetry.

INOPERABLE ROD LIMITATIONS

One inoperable control rod is acceptable provided the potential consequences of accidents are not worse than the cases analyzed in the safety analysis report. A 30 day period is provided for the re-analysis of all accidents sensitive to the changed initial condition.

ROD DROP TIME

The required drop time to dashpot entry is consistent with safety analysis.

DNB PARAMETERS

The DNB related accident analysis assumed as initial conditions that the T inlet was $4^{o}F$ above nominal design or T avg was $4^{o}F$ above nominal design. The Reactor Coolant System pressure was assumed to be 30 psi below nominal design.

REFERENCES

(1) FSAR Section 4.3

(2) FSAR Section 4.4

(3) FSAR Section 14

(4) "Rod Misalignment Analysis," July 27, 1981, submitted to NRC with proposed Technical Specification Amendment 46 by letter from E. R. Mathews (WPSC) to D. G. Eisenhut (NRC) dated August 7, 1981.

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(5) Letter from E. R. Mathews, (WPSC), to D. G. Eisenhut, (NRC), dated January 8, 1980, submitting information on Clad Swelling and Fuel Blockage Models.

(6) Letter from E. R. Mathews, (WPSC), to A. Schwencer, (NRC), dated December 14, 1979, submitting the ECCS Re-analysis properly accounting for the zirconium/water reaction.

(7) George C. Cooke, Philip J. Valentine: "Exposure Sensitivity Study for ENC XN-1 Reload Fuel at Kewaunee Using the ENC-WREM-IIA PWR Evaluation Model, WN-NF-79-72," Exxon Nuclear Company, October, 1979.

(8) Letter from L. C. O'Malley, (Exxon Nuclear Company) to E. D. Novak, (WPSC), providing FQ exposure dependence as a function of rod burnup.

(9) XN-NF-77-57 Exxon Nuclear Power Distribution Control for Pressurized Water Reactor, Phase II, January, 1978. 48