ATTACHMENT 1

VYNPS
Table 3.11-2
MCPR Operating Limits

Value of "N" in RBM Equation(1)	Average Control Rod Scram Time	Cycle Exposure Range	MCPR Operating Limit for Fuel Type (2)		
			8X8	8X8R	P8X8R
42%	Equal or better than L.C.O. 3.3 C.1.1	BOC to EOC-2 GWD/T	1.29	1.29	1.29
		EOC-2 GWD/T to EOC-1 GWD/T	1.29	1.29	1.29
		EOC-1 GWD/T to EOC	1.30	1.30	1.30
	Equal or better than L.C.O. 3.3 C.1.2	BOC to EOC-2 GWD/T	1.29	1.29	1.29
		EOC-2 GWD/T to EOC-1 GWD/T	1.33	1.31	1.31
		EOC-1 GWD/T to EOC	1.36	1.35	1.35
41%	Equal or better than L.C.O. 3.3 C.1.1	BOC to EOC-2 GWD/T	1.25	1.25	1.25
		EOC-2 GWD/T to EOC-1 GWD/T	1.26	1.25	1.25
		EOC-1 GWD/T to EOC	1.30	1.30	1.30
	Equal or better than L.C.O. 3.3 C.1.2	BOC to EOC-2 GWD/T	1.25	1.25	1.25
		EOC-2 GWD/T to EOC-1 GWD/T	1.33	1.31	1.31
		EOC-1 GWD/T to EOC	1.36	1.35	1.35
$\leq$ 40%	Equal or better than L.C.O. 3.3 C.1.1	BOC to EOC-2 GWD/T	1.25	1.25	1.25
		EOC-2 GWD/T to EOC-1 GWD/T	1.26	1.25	1.25
		EOC-1 GWD/T to EOC	1.30	1.30	1.30
	Equal or better than L.C.O. 3.3 C.1.2	BOC to EOC-2 GWD/T	1.25	1.25	1.25
		EOC-2 GWD/T to EOC-1 GWD/T	1.33	1.31	1.31
		EOC-1 GWD/T to EOC	1.36	1.35	1.35
75%	Special Testing at Natural Circulation (Note 3, 4)		1.30	1.31	1.31

(1) The Rod Block Monitor (RBM) trip setpoints are determined by the equation shown in Table 3.2.5 of the Technical Specifications.

(2) The current analyses for MCPR Operating Limits do not include 7X7 fuel. On this basis further evaluation of MCPR operating limits is required before 7X7 fuel can be used in Reactor Power Operation.

(3) For the duration of pump trip and stability testing.

(4) K_f factors are not applied during the pump trip and stability testing.

ATTACHMENT 2

UPDATE TO THE VERMONT YANKEE
CORE PERFORMANCE ANALYSIS REPORT, YAEC-1275

Note: Replace pages vi, 9, 30, 49, 53, 92, and 94 with the attached.

LIST OF FIGURES

The thermal effects analysis included the calculation of fuel temperatures and fuel cladding gap conductance under nominal core steady state and peak linear heat generation rate conditions. Figures 4.2.1 and 4.2.2 provide the core-average response of gap conductance and fuel temperature, respectively. These calculations integrate the responses of individual fuel batch average operating histories over the core average exposure range of Cycle 9. The gap conductance values are weighted axially by power distributions and radially by volume. The core-wide gap conductance values for the RETRAN system simulations described in Section 7.1 are from this data set at the particular exposure point of interest. The fuel temperature values presented in Figure 4.2.2 are weighted axially and radially by volume.

The gap conductance value input to the hot channel (RETRAN/TCPYAØ1) calculations was evaluated for the P8X8R fresh fuel bundle type for the peak assembly power at the cycle exposure point of peak bundle reactivity. Gap conductance calculated at this point was bounded by a value of 1000 BTU/hr-ft^2-^{o}F. With consideration for the hot channel transient response to bundle power level and gap conductance values calculated for all other fuel types in Cycle 9, a gap conductance value of 1000 BTU/hr-ft^2-^{o}F was utilized for all hot channel calculations at all exposure points and for all fuel bundle types.

Fuel rod local linear heat generation rates at fuel centerline incipient melt were calculated as a function of local axial segment exposure for the gadolinia concentrations in Vermont Yankee fuel bundles and are displayed in

The hot channel calculations are performed with the RETRAN and TCPYAØ1 [14] computer codes. The GEXL correlation [11] is used in TCPYAØ1 to evaluate critical power ratio. The calculational procedure is outlined below.

The hot channel transient ΔCPR calculations are performed via a series of "inner" and "outer" iterations, as illustrated by the flow chart in Figure 7.1.1. The outer loop represents iterations on the hot channel initial power level. These iterations are necessary because the ΔCPR for a given transient varies with Initial Critical Power Ratio (ICPR), yet only the ΔCPR corresponding to a transient MCPR equal to the safety limit (i.e., 1.07 + ΔCPR = ICPR) is appropriate. The approximate constancy of the ΔCPR/ICPR ratio is useful in these iterations. Each outer iteration requires a RETRAN hot channel run to calculate the transient enthalpies, flows, pressure and saturation properties at each time-step required for input to the TCPYAØ1 code. TCPYAØ1 is then used to calculate a CPR at each time-step during the transient, from which a transient ΔCPR is derived. The hot channel is modeled using a chopped cosine axial power shape with a peak/average ratio of 1.4.

The inner loop represents iterations on the hot channel inlet flow. These iterations are necessary because the RETRAN hot channel model calculates an exit loss coefficient when given the initial power level, flow, and pressure drop as input. The pressure drop is assumed equal to the core average pressure drop, and the flow is varied for a given power level until the exit loss coefficient is correct. FIBWR [9] is utilized to estimate the correct inlet flow for a particular power level and pressure drop.

TABLE 7.2.1

CORE WIDE TRANSIENT ANALYSIS RESULTS

Transient	Exposure	Peak Prompt Power (Fraction of Initial Value)	Peak Avg. Heat Flux (Fraction of Initial Value)	ΔCPR	
				8X8	8X8R/P8X8R
Turbine Trip Without Bypass, "Measured" Scram Time	EOC	3.50	1.23	0.23	0.23
	EOC-1000	2.86	1.18	0.19	0.18
	EOC-2000	2.20	1.10	0.09	0.09
Turbine Trip Without Bypass, "67B" Scram Time	EOC	3.97	1.28	0.29	0.28
	EOC-1000	3.38	1.24	0.24	0.23
	EOC-2000	2.79	1.15	0.16	0.15
Generator Load Rejection Without Bypass, "Measured" Scram Time	EOC	3.35	1.22	0.23	0.22
	EOC-1000	2.78	1.17	0.19	0.18
	EOC-2000	2.08	1.08	0.08	0.08
Generator Load Rejection Without Bypass, "67B" Scram Time	EOC	3.93	1.27	0.29	0.28
	EOC-1000	3.40	1.23	0.26	0.24
	EOC-2000	2.78	1.14	0.17	0.16
Loss of 100°F Feedwater Heating	EOC	1.21	-	0.16	0.16
	EOC-1000	1.22	-	0.18	0.18
	EOC-2000	1.23	1.22	0.18	0.18
	BOC	1.21	-	0.16	0.16

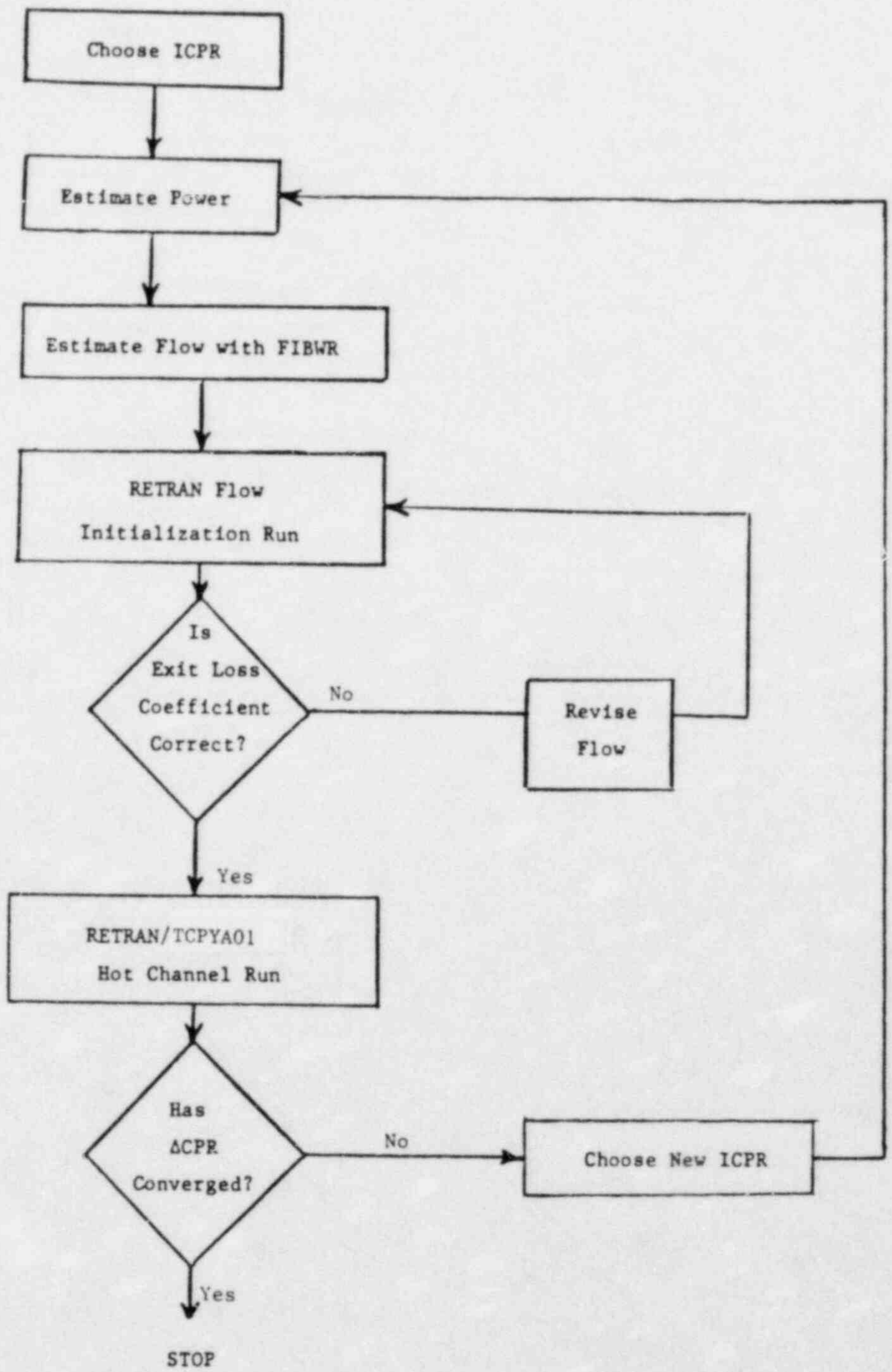

FIGURE 7.1.1

FLOW CHART FOR THE CALCULATION OF ΔCPR USING RETRAN/TCPYA01 CODES

TABLE A.1

VERMONT YANKEE NUCLEAR POWER STATION

CYCLE 9 MCPR OPERATION LIMITS

Value of "N" in RBM Equation(1)	Average Control Rod Scram Time	Cycle Exposure Range	MCPR Operating Limit for Fuel Type (2) 8X8	8X8R	P8X8R
42%	Equal or better than L.C.O. 3.3 C.1.1	BOC to EOC-2 GWD/T	1.29	1.29	1.29
		EOC-2 GWD/T to EOC-1 GWD/T	1.29	1.29	1.29
		EOC-1 GWD/T to EOC	1.30	1.30	1.30
	Equal or better than L.C.O. 3.3 C.1.2	BOC to EOC-2 GWD/T	1.29	1.29	1.29
		EOC-2 GWD/T to EOC-1 GWD/T	1.33	1.31	1.31
		EOC-1 GWD/T to EOC	1.36	1.35	1.35
41%	Equal or better than L.C.O. 3.3 C.1.1	BOC to EOC-2 GWD/T	1.25	1.25	1.25
		EOC-2 GWD/T to EOC-1 GWD/T	1.26	1.25	1.25
		EOC-1 GWD/T to EOC	1.30	1.30	1.30
	Equal or better than L.C.O. 3.3 C.1.2	BOC to EOC-2 GWD/T	1.25	1.25	1.25
		EOC-2 GWD/T to EOC-1 GWD/T	1.33	1.31	1.31
		EOC-1 GWD/T to EOC	1.36	1.35	1.35
≤40%	Equal or better than L.C.O. 3.3 C.1.1	BOC to EOC-2 GWD/T	1.25	1.25	1.25
		EOC-2 GWD/T to EOC-1 GWD/T	1.26	1.25	1.25
		EOC-1 GWD/T to EOC	1.30	1.30	1.30
	Equal or better than L.C.O. 3.3 C.1.2	BOC to EOC-2 GWD/T	1.25	1.25	1.25
		EOC-2 GWD/T to EOC-1 GWD/T	1.33	1.31	1.31
		EOC-1 GWD/T to EOC	1.36	1.35	1.35
75%	Special Testing at Natural Circulation (Note 3, 4)		1.30	1.31	1.31

(1) The Rod Block Monitor (RBM) trip setpoints are determined by the equation shown in Table 3.2.5 of the Technical Specifications.

(2) The current analyses for MCPR Operating Limits do not include 7X7 fuel. On this basis further evaluation of MCPR operating limits is required before 7X7 fuel can be used in Reactor Power Operation.

(3) For the duration of pump trip and stability testing.

(4) K_f factors are not applied during the pump trip and stability testing.

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