

Attachment

Byron Unit 2 Cycle 7
Operating Limits Report

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Byron Unit 2 Cycle 7
Operating Limit Report - Fxy Portion

This Radial Peaking Factor Limits Report is provided in accordance with paragraph 6.9.1.9 of the Byron Unit 2 Nuclear Plant Technical Specifications.

The Fxy limits for RATED THERMAL POWER within specified core planes for Cycle 7 shall be:

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

- 1) For all core planes containing bank "D" control rods:

$$F_{xy}^{RTP} \leq 1.946 \quad \text{Cycle Burnup} \geq 0 \text{ MWD/MTU}$$

- 2) For all unrodded core planes:

$$\begin{aligned} F_{xy}^{RTP} &\leq 1.748 & 0 \leq \text{Cycle Burnup} \leq 2,000 \text{ MWD/MTU} \\ F_{xy}^{RTP} &\leq 1.762 & \text{Cycle Burnup} > 2,000 \text{ MWD/MTU} \end{aligned}$$

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

- 1) For all core planes containing bank "D" control rods:

$$F_{xy}^{RTP} \leq 1.946 \quad \text{Cycle Burnup} \geq 0 \text{ MWD/MTU}$$

- 2) For all unrodded core planes:

$$\begin{aligned} F_{xy}^{RTP} &\leq 1.721 & 0 \leq \text{Cycle Burnup} \leq 2,000 \text{ MWD/MTU} \\ F_{xy}^{RTP} &\leq 1.721 & \text{Cycle Burnup} > 2,000 \text{ MWD/MTU} \end{aligned}$$

These Fxy(z) limits were used to confirm that the heat flux hot channel factor FQ(z) will be limited to the Technical Specification values of

$$F_Q(z) \leq \frac{[2.50]}{P} [K(Z)] \text{ for } P > 0.5 \text{ and,}$$

$$F_Q(z) \leq [5.00] [K(Z)] \text{ for } P \leq 0.5$$

assuming the most limiting axial power distributions expected to result from the insertion and removal of control Banks C and D during operation, including the accompanying variations in the axial xenon and power distributions as described in the "Power Distribution Control and Load Following Procedures," WCAP-8403, September, 1974. Therefore, these Fxy limits provide assurance that the initial conditions assumed in the LOCA analysis and the ECCS acceptance criteria of 10 CFR 50.46 are met.

See Figures 1 and 2 for the plots of $[F_Q^T(z) \times P_{rel}]$ Versus Axial Core Height and Tables 1 and 2 for the data plotted in Figures 1 and 2.

Byron Unit 2 Cycle 7
Operating Limit Report - MTC Portion

- a) The Moderator Temperature Coefficient (MTC) limits are:
- 1) The BOL/ARO/HZP-MTC shall be less positive than $2.991 \times 10^{-5} \Delta k/k/^{\circ}F$.
 - 2) The EOL/ARO/RTP-MTC shall be less negative than $-4.1 \times 10^{-4} \Delta k/k/^{\circ}F$.

- b) The MTC surveillance limit is:

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

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

Table 1
BYRON UNIT 2 CYCLE 7
F_Q LIMIT EVALUATION
Summary of F_Q vs. Core Height
Cycle Burnup Range of 0 MWD/MTU to < 2000 MWD/P.TU

Core Height (feet)	Maximum F _Q x P	F _Q SPIL LIMIT
0.2504	0.6013	2.5000
0.6250	1.7819	2.5000
0.8763	2.2065	2.5000
1.1267	2.3787	2.5000
1.3771	2.4477	2.5000
1.6274	2.4919	2.5000
1.8778	2.4826	2.5000
2.1282	2.2941	2.5000
2.3786	2.4242	2.5000
2.6289	2.4295	2.5000
2.8793	2.4458	2.5000
3.1297	2.4281	2.5000
3.3801	2.4397	2.5000
3.6304	2.4989	2.5000
3.8808	2.5055	2.5000
4.1312	2.4928	2.5000
4.3816	2.4913	2.5000
4.6320	2.4930	2.5000
4.8823	2.4758	2.5000
5.1327	2.4532	2.5000
5.3831	2.4205	2.5000
5.6335	2.2035	2.5000
5.8838	2.3617	2.5000
6.1342	2.3409	2.4957
6.3846	2.3416	2.4878
6.6350	2.3688	2.4799
6.8853	2.3914	2.4720
7.1357	2.3928	2.4640
7.3861	2.2593	2.4561
7.6365	2.4407	2.4482
7.8868	2.4400	2.4402
8.1372	2.4292	2.4323
8.3876	2.4097	2.4244
8.6380	2.3824	2.4165
8.8883	2.3077	2.4085
9.1387	2.2230	2.4006
9.3891	2.2851	2.3927
9.6395	2.2676	2.3847
9.8899	2.3019	2.3768
10.140	2.3262	2.3689
10.391	2.3157	2.3610
10.641	2.1867	2.3530
10.891	2.1424	2.3451
11.142	2.0001	2.3372
11.392	1.6268	2.3292
11.768	0.5794	2.3174

Unshaded area shows surveillance region.
 Shaded area (top and bottom 15%) is ignored for this surveillance.

Table 2
BYRON UNIT 2 CYCLE 7
F_Q LIMIT EVALUATION
Summary of F_Q vs. Core Height
Cycle Burnup Range of 2000 MWD/MTU to EOL

Core Height (feet)	Maximum F _Q x P	F _Q SPIL LIMIT
0.2504	0.6062	2.5000
0.6259	1.7982	2.5000
0.8763	2.2242	2.5000
1.1267	2.3978	2.5000
1.3771	2.4674	2.5000
1.6274	2.4995	2.5000
1.8778	2.4902	2.5000
2.1282	2.2981	2.5000
2.3786	2.4285	2.5000
2.6289	2.4338	2.5000
2.8793	2.4502	2.5000
3.1297	2.4752	2.5000
3.3801	2.4868	2.5000
3.6304	2.4960	2.5000
3.8808	2.5028	2.5000
4.1312	2.4899	2.5000
4.3816	2.4884	2.5000
4.6320	2.4824	2.5000
4.8823	2.4653	2.5000
5.1327	2.4428	2.5000
5.3831	2.4102	2.5000
5.6335	2.1941	2.5000
5.8838	2.3516	2.5000
6.1342	2.3409	2.4957
6.3846	2.3416	2.4878
6.6350	2.3688	2.4799
6.8853	2.3914	2.4720
7.1357	2.3928	2.4640
7.3861	2.2593	2.4561
7.6365	2.4407	2.4482
7.8868	2.4400	2.4402
8.1372	2.4292	2.4323
8.3876	2.4097	2.4244
8.6380	2.3877	2.4165
8.8883	2.3677	2.4085
9.1387	2.2230	2.4006
9.3891	2.2851	2.3927
9.6395	2.2676	2.3847
9.8899	2.3019	2.3768
10.140	2.3262	2.3689
10.391	2.3157	2.3610
10.641	2.1887	2.3530
10.891	2.1424	2.3451
11.142	2.0051	2.3372
11.392	1.6309	2.3292
11.768	0.5789	2.3174

Unshaded area shows surveillance region.
 Shaded area (top and bottom 15%) is ignored for this surveillance.

Figure 1

Byron Unit 2 Cycle 7
FQ(Z) x P versus Core Height

Cycle Burnup Range of 0 MWD/MTU to <2000 MWD/MTU

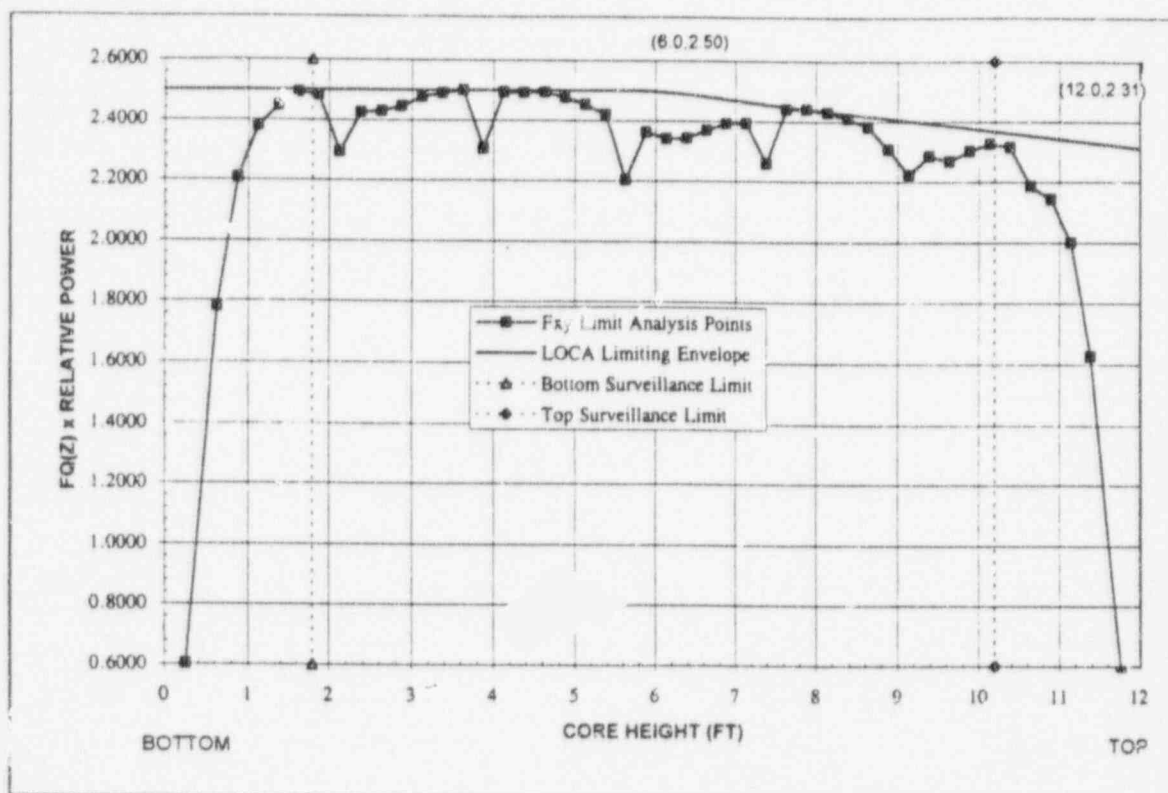


Figure 2

Byron Unit 2 Cycle 7
 $FQ(Z) \times P$ versus Core Height

Cycle Burnup Range of 2000 MWD/MTU to EOL

