

DRESDEN UNIT 2

CYCLE 9

INITIAL CRITICALITY COMPARISON

PURPOSE

The intent of this procedure is to perform a critical eigenvalue comparison. This is done by comparing the predicted control rod pattern to the actual control rod pattern at criticality taking into account period and temperature coefficient corrections.

CRITERIA

The actual cold critical rod pattern shall be within 1.0% $\Delta k/k$ of the predicted control rod pattern. If the difference is greater than $\pm 1.0\% \Delta k/k$, Exxon Nuclear Company and Commonwealth Edison Company Core Management Engineers will be promptly notified to investigate the reactivity anomaly.

RESULTS AND DISCUSSION

Unit 2 went critical on April 25, 1983 at 9:30am utilizing an A-2 sequence. The moderator temperature was 154°F and the period was 115 seconds. Exxon Nuclear predictions and rod worths were calculated using the XTGBWR code, which assumed a moderator temperature of 170°F.

After corrections were made for temperature and period, the actual critical was within 1.0% $\Delta k/k$ of the predicted critical. Table 4-1 summarizes the results.

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TABLE 4-1
CRITICAL EIGENVALUE CALCULATIONS

ITEM	$\Delta k/k$
k_{eff} with all rods in	= 0.954 *
ρ inserted by group 1 rods	= 0.037 *
ρ inserted by group 2 rods at criticality	= 0.01838 *
XTGBWR k_{eff} at critical rod pattern (170°F)	= 1.00938 *
Temperature correction between 154°F and 170°F = -0.0028	
Moderator temperature coefficient = -3.3×10^{-5} ($\Delta k/k$)/°F *	
XTGBWR k_{eff} at critical rod pattern	= 1.00658
k_{eff} at time of criticality with ∞ period = 1.000	
Period correction for 115 second period	= +0.00053 **
Actual k_{eff} with 115 second period	= 1.00053
Difference = 0.00605 $\Delta k/k$	
(XTGBWR k_{eff} - Actual k_{eff}) = 0.605% $\Delta k/k$	

SOURCES

* Exxon letter, R.H. Schutt to H.E. Bliss, dated March 7, 1983.

** ρ vs. τ tables