AEC DISTRIBUTION FOR PART 50 DOCKET MATERIAL
(TEMPORARY FORM)

CONTROL NO: 6154

FILE:

FROM:	DATE OF DOC	DATE REC'D	LTR	MEMO	RPT	OTHER
L. O. Mayer Northern States Power Company 414 Nicollet Mall Minneapolis, Minnesota 55401	8-9-73	8-13-73	x			

TO:	ORIG	CC	OTHER	SENT AEC PDR	SENT LOCAL PDR
J. F. O'Leary	1 signed	39		x	x

CLASS	UNCLASS	PROP INFO	INPUT	NO CYS REC'D	DOCKET NO:
	x			40	50-263

DESCRIPTION:
Ltr furnishing supplemental information to cycle 2 startup report....

ENCLOSURES:

ACKNOWLEDGED
DO NOT REMOVE

PLANT NAME: Monticello

FOR ACTION/INFORMATION 8-13-73 LB

BUTLER(L)	SCHWENCER(L)	✓ZIEMANN(L)	REGAN(E)
W/ Copies	W/ Copies	W/ 7 Copies	W/ Copies
CLARK(L)	STOLZ(L)	DICKER(E)	
W/ Copies	W/ Copies	W/ Copies	W/ Copies
GOLLER(L)	VASSALLO(L)	KNIGHTON(E)	
W/ Copies	W/ Copies	W/ Copies	W/ Copies
KNIEL(L)	SCHEMEL(L)	YOUNGBLOOD(E)	
W/ Copies	W/ Copies	W/ Copies	W/ Copies

INTERNAL DISTRIBUTION

✓REG FILE	TECH REVIEW	DENTON	LIC ASST	A/T IND
✓AEC PDR	HENDRIE	GRIMES	BROWN (E)	BRAITMAN
✓OGC, ROOM P-506A	SCHROEDER	GAMMILL	✓DIGGS (L)	SALTZMAN
✓MUNTZING/STAFF	✓MACCARY	KASTNER	GEARIN (L)	
CASE	KNIGHT	BALLARD	GOULBOURNE (L)	PLANS
GIAMBUSSO	PAWLICKI	SPANGLER	LEE (L)	MCDONALD
BOYD	SHAO		MAIGRET (L)	DUBE
MOORE (L)(BWR)	✓STELLO	ENVIRO	SERVICE (L)	
DEYOUNG(L)(PWR)	HOUSTON	MULLER	SHEPPARD (E)	INFO
✓SKOVHOLT (L)	NOVAK	DICKER	SMITH (L)	C. MILES
P. COLLINS	ROSS	KNIGHTON	TEETS (L)	
	IPPOLITO	YOUNGBLOOD	WADE (E)	
REG OPR	✓TEDESCO	REGAN	WILLIAMS (E)	
✓FILE & REGION(3)	LONG	PROJECT LDR	WILSON (L)	
MORRIS	LAINAS			
✓STEELE	BENAROYA	HARLESS		
	VOLLMER			

EXTERNAL DISTRIBUTION

✓1 - LOCAL PDR Mineapolis, Minn.
✓1 - DTIE(ABERNATHY)
✓1 - NSIC(BUCHANAN)
1 - ASLB(YORE/SAYRE/ WOODARD/"H" ST.
✓16 - CYS ACRS ~~HOLDING~~ SENT TO LIC ASST. R. DIGGS 8-13-73

(1)(2)(9)-NATIONAL LAB'S
1-R.Schoonmaker,OC,GT,D-323
1-R. CATLIN, E-256-GT
1-CONSULTANT'S
NEWMARK/BLUME/AGBABIAN
1-GERALD ULRIKSON...ORNL

1-PDR-SAN/LA/NY
1-GERALD LELLOUCHE
BROOKHAVEN NAT. LAB
1-AGMED(WALTER KOESTER
RM-C-427-GT
✓1-RD..MULLER...F-309 GT

Regulatory File

NSP

NORTHERN STATES POWER COMPANY

MINNEAPOLIS, MINNESOTA 55401

August 9, 1973

Mr. J F O'Leary, Director
Directorate of Licensing
United States Atomic Energy Commission
Washington, D C 20545

Dear Mr. O'Leary:

MONTICELLO NUCLEAR GENERATING PLANT
Docket No. 50-263 License No. DPR-22

Supplemental Information to Cycle 2 Startup Report

The third paragraph of Section V, Startup Testing, of our Cycle 2 Startup Report submitted July 12, 1973 describes startup tests done to confirm core calculations. Because of recent questions and telephone discussions on that subject we are submitting the attached information which expands that paragraph.

Yours very truly,

L. O. Mayer

L O Mayer, PE
Director of Nuclear Support Services

LOM/MHV/sf

cc: B H Grier
G Charnoff
Minnesota Pollution Control Agency
Attn. K Dzugan

6154

MONTICELLO NUCLEAR GENERATING PLANT

SUPPLEMENTAL INFORMATION TO CYCLE 2 STARTUP REPORT

Startup testing was done to confirm core calculations which were made by both General Electric and Northern States Power. Shutdown margin demonstrations were done at cold conditions with the most reactive control rod withdrawn. Rod 06-31 was calculated to be the strongest rod; its worth, with all other rods inserted, was calculated to be .0334 delta k. Rods adjacent to the strongest rod had claculated worths of the order of .0315 delta k; control rods of this strength have very large individual notch worths over the range of interest. Therefore, a diagonally adjacent rod was withdrawn to demonstrate sufficient shutdown margin. The core was xenon-free with a samarium concentration at the time of testing greater than the equilibrium operating level by an equivalent of .0024 delta k. The test objective was to demonstrate a shutdown margin including transient poison effects in addition to the .0025 delta k shutdown margin required by Technical Specifications. This required that a .0049 delta k shutdown margin be demonstrated. To meet this requirement rod 06-31 was fully withdrawn and rod 10-27 was withdrawn to position 08. This and symmetric locations were determined to be the most reactive areas of the core by both GE and NSP calculations. The 08 position on rod 10-27 represented .0084 delta k as calculated by NSP. Calculations identified other rods having relatively high worth; a total of five test cases were established as listed below. Subcriticality was verified in each case.

Case	Rod Full Out	Partially Withdrawn Rod Location	Position	Shutdown Margin Verified With One-Rod-Out
A	06-31	10-27	08	.0084 delta k
B	30-47	26-43	08	.0084 delta k
C	06-27	10-31	08	.0089 delta k
D	18-27	22-31	08	.0098 delta k
E	26-27	22-31	08	.0100 delta k

Figure 1 identifies control blades fabricated in Wilmington with darkened circles. The letters on that figure identify the location of rods used in each shutdown margin demonstration case; numeric subscripts indicate the position of each control rod. (Position 00 is fully inserted; 48 is fully withdrawn. Withdrawal to position 08 is equivalent to a 24" withdrawal from fully inserted.) Adequate shutdown margin was verified in the region of influence of numerous Wilmington fabricated control rod blades.

The core has been operated with quadrant symmetric control rod patterns to establish a symmetric exposure distribution. Shuffling and new fuel additions during the recent refueling outage maintained that symmetry. During cycle 2 startup testing the symmetry was verified. The control rods represented by single circles on Figure 2 were fully withdrawn according to the normal rod withdrawal procedure. Four in-sequence rods, identified by double circles, were adjusted to determine similar critical patterns. All other rods remained fully inserted. Critical configurations were determined to be:

	Rod Positions			
Test Case	26-35	26-19	34-27	18-27
I A	48	00	08	00
I B	48	00	00	08
II A	08	00	18	00
II B	00	10	18	00
III A	00	10	00	48
III B	00	10	48	00

In the dispersed control rod pattern shown, the reactivity worth of an individual notch is generally very low. One notch (two positions) is the smallest discrete step of control rod movement available. Demonstrating criticality within one notch confirms the symmetry of core reactivity. This was done as is borne out by the above tabulation of critical rod configuration data. Each control cell represented on Figure 2 is a 12-inch square. For the critical rod configurations tabulated above, the critical array centers around a 36-inch square island; control rods to the periphery of that island are coupled very loosely. Likewise, the effective height of the island includes only a short section near the top of the core. It was shown that a rod at position 48, as in cases I and III, contributes no more than a rod at position 18, as in case II. The most reactive part of the critical array is the upper 24 to 30 inches of the core which corresponds to control rod positions 08 to 10. This demonstration verified that symmetry of reactivity exists in the top region of the reloaded core.

MONTICELLO NUCLEAR GENERATING PLANT

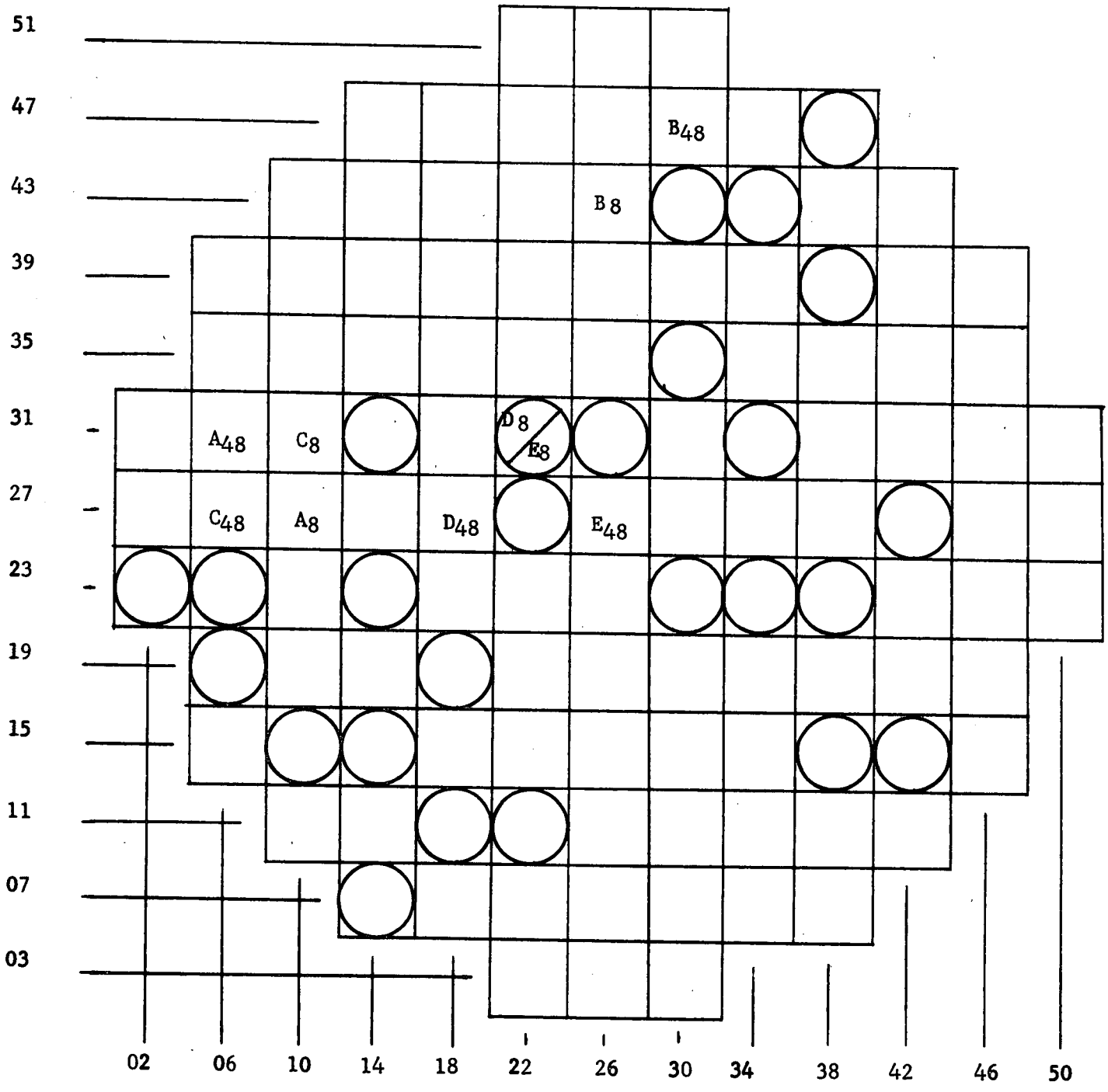

FIGURE 1

SUMMARY OF SHUTDOWN MARGIN TESTING

MONTICELLO NUCLEAR GENERATING PLANT

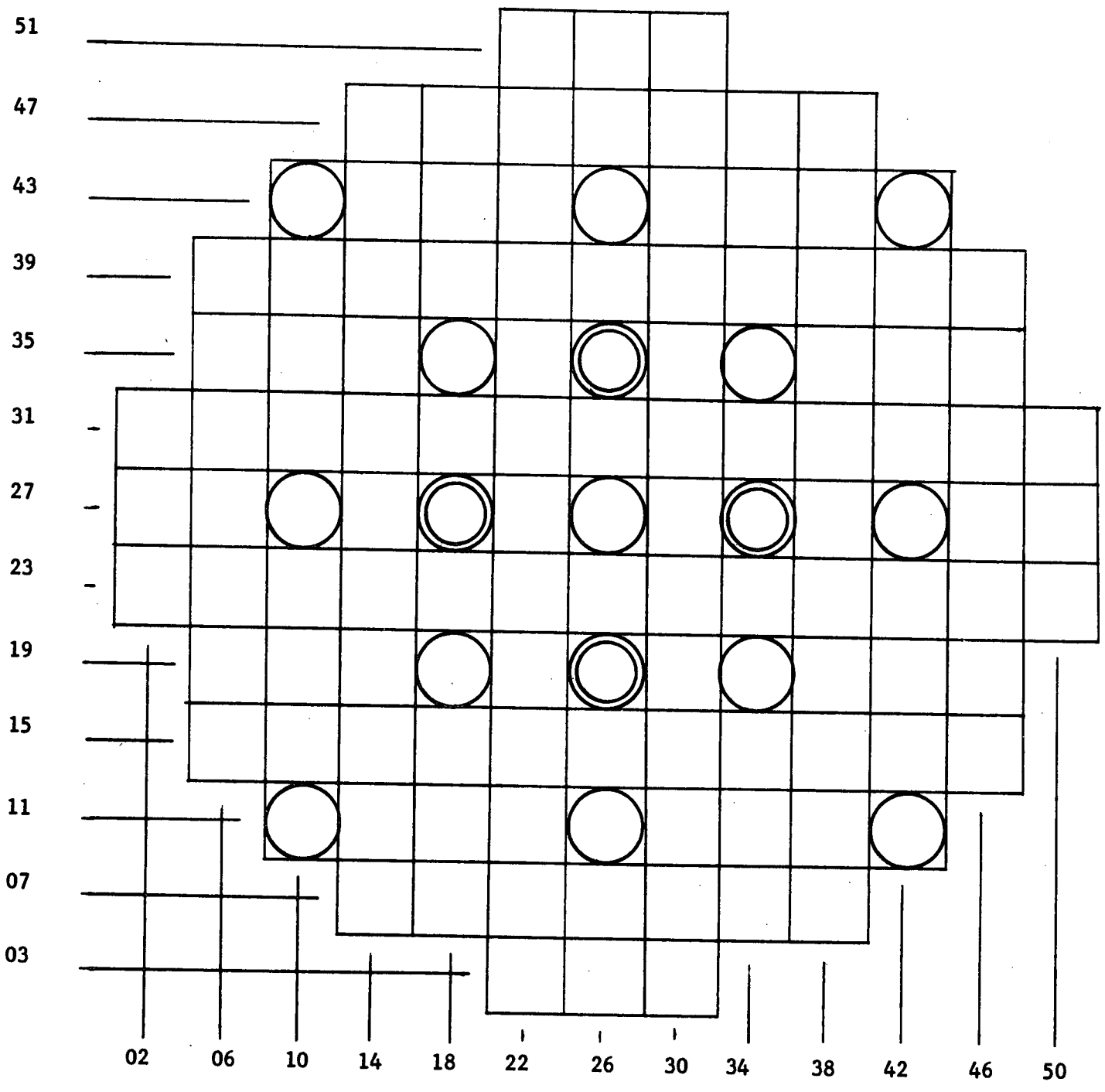

FIGURE 2

CORE SYMMETRY VERIFICATION