



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

February 26, 1988

Docket No. 50-289

LICENSEE: GPU Nuclear Corporation

FACILITY: Three Mile Island Unit 1

SUBJECT: SUMMARY OF FEBRUARY 18, 1988 MEETING WITH GPU NUCLEAR TO
DISCUSS MATTERS RELATED TO THE 1988 REFUELING OUTAGE (7R)

The NRC staff met with representatives of GPU Nuclear on February 18, 1988 in Rockville, Maryland (One White Flint North) to discuss matters pertaining to the 7R refueling outage planned to commence on June 17, 1988. The meeting provided a forum for the licensee to discuss key aspects of the license amendment request to be submitted to the NRC on April 1, 1988 in support of the refueling outage and to allow the staff to identify any areas where particular information will be required for the staff to conduct its review of the amendment request.

The amendment request will include NRC approval to raise the rated power level from 2,535 MWt to 2,568 MWt, a 1.3% increase in power output. The licensee pointed out that most of the safety analyses used to initially license TMI-1 were performed on the basis of a 2,568 MWt power level assumption so that operation at this power level is already bounded by existing analyses. A systematic review of all implications of the higher power rating has been undertaken as outlined in Enclosure 2.

The licensee discussed TMI-1 fluence reduction program and materials surveillance program and stated that new calculations using the recently issued Regulatory Guide 1.99, Revision 2 may indicate an even higher PTS margin than previous calculations yielded. Details of this topic are shown in Enclosure 2.

Commensurate with longer fuel cycles in the future, TMI-1 will start loading new fuel with higher enrichment values (up to 3.63 weight percent U-235 for cycle 7). To support the intent to use more highly enriched fuel, the licensee has applied for an amendment request to raise the storage enrichment limits from 3.5 to 4.3 weight percent. The staff is presently reviewing this request and expects to issue an amendment before May 1, 1988.

The licensee discussed changes that will be required to the technical specifications to support startup from this refueling outage and requested issuance of the required amendment by July 1, 1988. Based on the information presented at this meeting, the staff does not anticipate any significant technical or scheduler difficulties in reviewing the amendment requests needed to support Cycle 7 of operation.

The licensee questioned how the ACRS would become involved, if at all, in the request to raise the rated power level. The staff noted that ACRS will be given a copy of the incoming amendment request and the staff's safety evaluation thereof. ACRS will then decide if they want to review these documents on a formal basis. The staff does not foresee ACRS review of these documents as delaying issuance of the amendments required for restart.

Enclosure 1 is a list of attendees at this meeting. Enclosure 2 is a copy of the visual aids used by the licensee during the meeting.

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Enclosures: As stated

cc w/attachments:
See next page

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MEETING ATTENDANCE LIST
MEETING ON TMI-1 7R REFUELING OUTAGE

FEBRUARY 18, 1988

Name

Organization

Ronald W. Hernan
Wayne Hodges
Walter L. Brooks
Susan Peleschak
Joe McCarthy
David Distel
Howard Crawford
Scott Wilkerson
Peter Suhocki
Ajit K. Bhattacharyya

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NRC/NRR/SRXB
NRC/NRR/SRXB
NRC/Region I/DRP
GPUN
GPUN
GPUN
GPUN
Babcock & Wilcox
State of Pennsylvania/DER/BRP

TMI-1 CYCLE 7 RELOAD REPORT
GPUN/NRC MEETING
FEBRUARY 18, 1988

AGENDA

- I. INTRODUCTION
 - A. MEETING PURPOSE
 - B. STATUS OF CYCLE 6
 - C. SCHEDULE FOR CYCLE 7 OUTAGE
 - D. STATUS OF CYCLE 7 RELOAD REPORT
- II. RELOAD DESIGN
 - A. 18-MONTH CYCLE
 - B. CYCLE DESIGN
 - C. PTS/FLUENCE REDUCTION
- III. DIFFERENCES FROM TMI-1 CYCLE 6
 - A. RATED POWER UPGRADE TO 2568 MWt
 - B. ENRICHMENT INCREASE TO 3.63 Wt %
 - C. ZIRCALOY INTERMEDIATE GRIDS
 - D. FUEL ROD PREPRESSURE REDUCTION
 - E. FLECSET APPLICATION
 - F. CONSERVATIVE DOSE EVALUATION
 - G. TECHNICAL SPECIFICATION CURVES
 - CORE PROTECTION SAFETY LIMIT/BASES
 - VARIABLE LOW PRESSURE SETPOINT REMOVAL
 - POWER-DEPENDENT TILT LIMIT
 - ERROR ADJUSTED CURVES
 - H. STARTUP PROGRAM
- IV. GPUN SUMMARY
- V. DISCUSSION

I. INTRODUCTION

A. MEETING PURPOSE

- CYCLE 7 RELOAD BRIEFING
- PRESUBMITTAL DISCUSSION

B. CYCLE 6 STATUS

- 100% FP OPERATION
- CURRENT PLANNED MINI-OUTAGE (~ 4 DAYS)
- CORE AT 302 EFPD
- EXPECTED SHUTDOWN 6/17/88
@ ABOUT 425 EFPD

C. CYCLE 7 OUTAGE SCHEDULED

- START JUNE 17TH
- END ABOUT AUGUST 20TH
- DURATION ~2 MONTHS
- APPROVED TECH SPEC AMENDMENT: JULY 1ST

D. STATUS OF CYCLE 7 RELOAD REPORT

- FINAL RR TO GPUN: MARCH 8TH
- TSCR TO NRC: APRIL 1ST

II. RELOAD DESIGN

A. 18 MONTH CYCLE

- LOW LEAKAGE DESIGN
- 445 +/- 15 EFPD
- 76 FRESH FUEL ASSEMBLIES

B. CYCLE DESIGN

- CORE MAP (FIGURES 3-1, 3-2)
- CONTROL ROD MAP (FIGURE 3-3)
- BPRA MAP (FIGURE 3-4)

Figure 3-1. Core Loading Diagram for TMI-1 Cycle 7

← FUEL TRANSFER CANAL

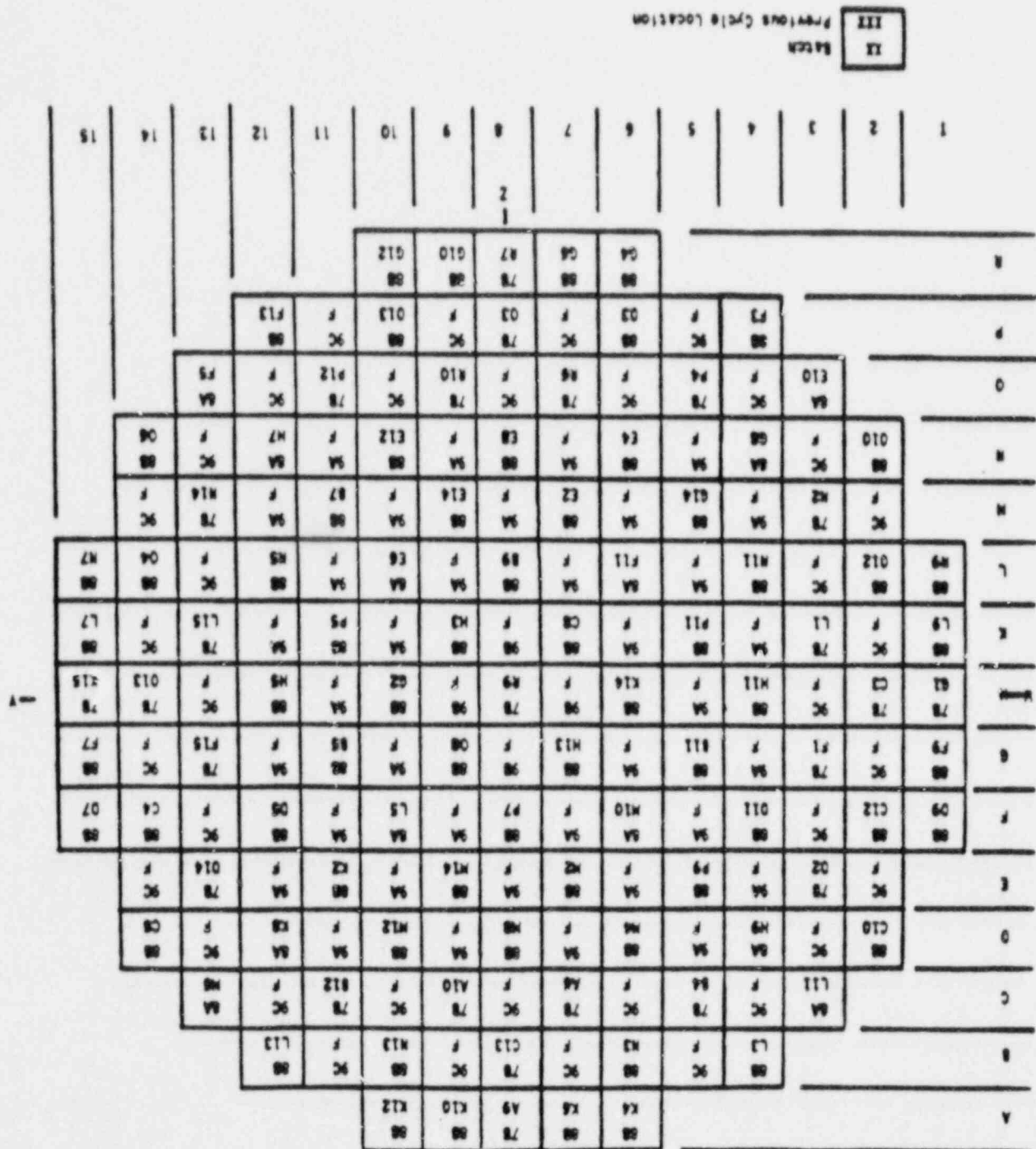


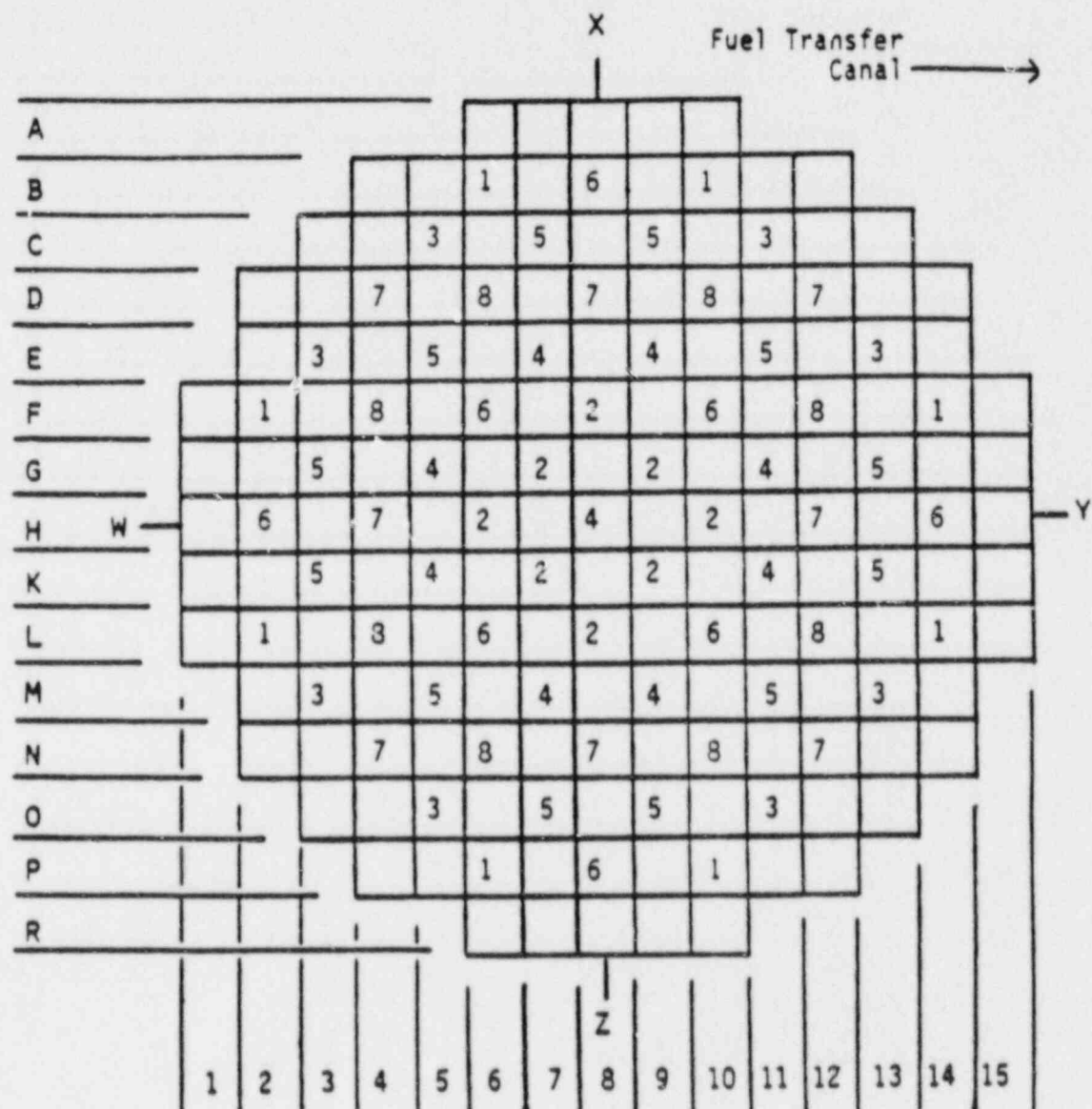
Figure 3-2. Enrichment and Burnup Distribution for
TMI-1 Cycle 7

	8	9	10	11	12	13	14	15
H	2.85 17,558	2.95 0	2.85 13,331	2.85 0	2.85 16,507	3.63 0	2.85 15,735	2.85 17,554
K		2.85 16,000	2.85 0	2.85 11,292	2.85 0	2.85 16,347	3.63 0	2.85 16,344
L			2.95 16,817	2.85 0	2.85 16,236	3.63 0	2.85 12,711	2.85 16,695
M				2.85 13,329	2.85 0	2.85 13,746	3.63 0	
N					2.95 16,451	3.63 0	2.85 16,035	
O						2.95 16,788		
P								
R								

X.XX Initial enrichment

XX,XXX BOC burnup, MWd/mtU

Figure 3-3. Control Rod Locations and Group Designations for TMI-1 Cycle 7



X Group Number

Group	No. of Rods	Function
1	8	Safety
2	8	Safety
3	8	Safety
4	9	Safety
5	12	Control
6	8	Control
7	8	Control
8	8	APSRs

Figure 3-4. LBP Enrichment and Distribution for
TMI-1 Cycle 7

	8	9	10	11	12	13	14	15
H		1.000		1.000		1.312		
K	1.000		0.800		0.500		0.200	
L		0.800		0.300		1.312		
M	1.000		0.800		0.200			
N		0.500		0.200		0.200		
O	1.312		1.312		0.200			
P		0.200						
R								

X.XXX

LBP Concentration
(wt% B₄C in Al₂O₃)

No. of
BPRA's

Concentration,
wt% B₄C

12

1.312

8

1.000

16

0.800

8

0.500

24

0.200

Total 68

II. RELOAD DESIGN (CONT'D)
C. PTS FLUENCE REDUCTION

BACKGROUND

- JANUARY 1986 BAW-1895
"PTS EVALUATION IN
ACCORDANCE WITH
10CFR50.61 FOR B&WOG
REACTOR PRESSURE
VESSELS"
- TMI-1 MET PTS
CRITERIA AT
CRITICAL WELD
- ASSUMED LL CY 6
7; VLL CY 8
- MARCH 1986 BAW-1901
"ANALYSIS OF CAPSULE
TMI-1C GPUN TMI-1 RV
MATERIALS SURVEILLANCE
PROGRAM"
- SAME CYCLE SCHEME
ASSUMPTIONS
METHODS AS
BAW-1901
- 100°F PTS MARGIN
- CYCLES 6 AND 7
LOW LEAKAGE DESIGN
- ABOUT 30 %
FLUENCE DECREASE
- TWICE-BURNED ASSEMBLY
ON MAJOR AXIS (FIGS.
3-1 AND 3-2)
- ADDITIONAL
FLUENCE REDUC-
TION AT
CRITICAL WELDS
CY6: 25%
CY7: 20%

III. DIFFERENCES CY 6 TO 7

A. RATED POWER UPGRADE

- 2535 MW_T TO 2568 MW_T (1.3% INCREASE)

- PLANT SYSTEM REVIEW

- . BALANCE OF PLANT
- . TURBINE-GENERATOR
(NAMEPLATE RATING INCREASE)
- . NSSS
- . RPS
- . ESFAS
- . INSTRUMENTATION
- . ELECTRICAL

- SAFETY ANALYSIS REVIEWS

- . FSAR ACCIDENTS
 - PLANT RESPONSE (MOST AT 2568 MW_T)
 - OFFSITE DOSE (CYCLE 7 AT 2568 MW_T)
- . EMERGENCY PROCEDURE GUIDELINES
- . ATWS
- . STEAM GENERATOR TUBE PLUGGING EFFECTS

III. DIFFERENCES CY 6 TO 7 (CONT'D)

A. TMI-1 RATED POWER UPGRADE (CONT'D)

● OPERATIONAL REVIEWS

- . CYCLE 7 TECHNICAL SPECIFICATION LIMITS ARE FOR 2568 MW_T
- . REACTOR VESSEL FLUENCE
- . CORE DESIGN (FSAR CHAPTER 3 OF 2568 MW_T)

● ENVIRONMENTAL REVIEWS

- . NORMAL RADIOLOGICAL RELEASES
- . THERMAL IMPACT
- . CHEMICAL IMPACT
- . WATER USAGE
- . FISH & ENTRAINMENT IMPINGEMENT
- . COOLING TOWER EFFECTS/SALT DRIFT
- . METEOROLOGY
- . LAND USE/POPULATION/PUBLIC FACILITIES

III. DIFFERENCES CY6 TO 7 (CONT'D)

A. TMI-1 RATED POWER UPGRADE (CONT'D)

● CONCLUSIONS

- . PLANT SYSTEMS CAN BE OPERATED WITHIN THEIR DESIGN LIMITS AT 2568 MW_T
- . PRESENT SAFETY ANALYSIS RESULTS BOUND OPERATION AT 2568 MW_T
- . PRIMARY SYSTEM DESIGN PARAMETERS REMAIN UNCHANGED
- . ENVIRONMENTAL IMPACT IS BOUNDED BY PRESENT LIMITS

III. DIFFERENCES CY6 TO 7 (CONT'D)

B. ENRICHMENT INCREASE

- 3.63 WT%
- 36 OF 76 FRESH ASSEMBLIES (FIG. 3-2)
- 4 FAs @ 2.95 W/O; 36 FAs @ 2.85 W/O
- SPENT FUEL POOL W/O UPGRADE
 - . PREVIOUS SFP LIMIT: 3.5 W/O
 - . NEW ANALYSIS LIMIT: 4.3 W/O
 - . TSCR SUBMITTED; JAN 1988
 - . TARGET APPROVAL: MAY 1ST
 - . FUEL DELIVERY STARTS: MAY 2ND
 - . NRC REVIEW STATUS

III. DIFFERENCES (CONT'D)

C. ZIRCALOY INTERMEDIATE GRIDS

- PREVIOUSLY USED IN: RANCHO SECO
OCONEE 1, 2, 3
CRYSTAL RIVER 3
- DESIGN APPROVED PER BAW-1781P
(RANCHO SECO CY7 RELOAD REPORT, VOL 1, APRIL 1983)
- USE OF BWC CHF CORRELATION
- BWC 95/95 MDNBR: 1.18
- CORE BYPASS FLOW INCREASE
 - . CY6: 8.4%; CY7: 8.8%
 - . ACTUAL BYPASS: 7.6%

III. DIFFERENCES (CONT'D)

D. FUEL ROD PREPRESSURE REDUCTION

- PREVIOUSLY USED IN: OCONEE 1, 2, 3
 CRYSTAL RIVER 3
 ANO-1
- HIGH BURNUP BENEFIT
- 38 OF 76 FRESH FAs
- LOCA KW/FT CREDIT NOT TAKEN IN CY7

III. DIFFERENCES (CONT'D)

E. FLECSET APPLICATION

- FLECSET APPROVED OCTOBER 1987
- EM CHANGE COMPLETED
- 1/2 KW/FT BENEFIT @2-FOOT LEVEL OF LOCA LIMITS

F. CONSERVATIVE DOSE EVALUATION

- CY6 TO CY7 RADIONUCLIDE INVENTORY CHANGES INSIGNIFICANT (CYCLE 7 AT 2568 MW_T)
- BOUNDING DOSE EVALUATION PERFORMED
 - . 10% INVENTORY INCREASE
 - . UPDATED PLANT PARAMETERS
- RESULTS
 - . INCREASED DOSE VALUES OVER PREVIOUS ANALYSES
 - . WELL BELOW 10CFR100 LIMITS
 - . FUTURE FSAR BASES

III. DIFFERENCES (CONT'D)

G. TECHNICAL SPECIFICATION

● SAFETY LIMITS

CORE PROTECTION SAFETY LIMITS

- . PRESSURE-TEMPERATURE
 - 0 LYNXT CROSSFLOW ANALYSIS
 - 0 LESS-RESTRICTIVE P-T LIMITS
- . AXIAL POWER IMBALANCE

CORE PROTECTION SAFETY BASES

- . 4, 3, 2 PUMPS

● LIMITING SAFETY SETTINGS

P-T ENVELOP SETPOINTS

- . VLP TRIP REMOVAL
- . PROTECTION BY HIGH TEMPERATURE AND LOW PRESSURE SETPOINTS

AXIAL POWER IMBALANCE SETPOINTS

● LIMITING CONDITIONS FOR OPERATION

ROD POSITION LIMITS

- . THREE BURNUP WINDOWS
- . 2 PUMP/ 3 PUMP / 4 PUMP CURVES
- . ERROR-ADJUSTED
- . INDICATED % RATED POWER

III. G. TECHNICAL SPECIFICATION CURVES (CONT'D)

OPERATIONAL IMBALANCE LIMITS

- THREE BURNUP WINDOWS
- ERROR-ADJUSTED
- INDICATED POWER

LOCA LIMITED MAXIMUM LHR

- NUREG-0630/FLECSET (0-1000 MWD/MTU)
- TACO2 (DENSIFICATION PERIOD) (1000-2600 MWD/MTU)
- TACO 2 (REMAINDER OF CYCLE) (AFTER 2600 MWD/MTU)

POWER-DEPENDENT TILT LIMIT

- 0-50% FP
- ABOVE 50% FP

III. DIFFERENCES (CONT'D)

H. STARTUP PROGRAM

- . FLUX SYMMETRY TEST
- . POWER DOPPLER MEASUREMENT TECHNIQUE

Meeting Summary Distribution

Docket File

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