



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

September 1, 1988

Docket No. 50-416

LICENSEE: System Energy Resources, Inc.
FACILITY: Grand Gulf Nuclear Station, Unit 1
SUBJECT: SUMMARY OF JULY 28, 1988 MEETING REGARDING THE THIRD
FUEL RELOAD

The purpose of the meeting was to discuss licensing actions related to the third fuel reload. Participants are listed in Enclosure 1. Enclosure 2 is a handout prepared by the licensee. The third reload in preparation for fuel cycle 4 will consist of the replacement of the remainder of the General Electric fuel assemblies (248) and 28 Advanced Nuclear Fuel (ANF) assemblies with new ANF fuel assemblies. Four of the reload assemblies will be lead test assemblies (LTAs). The new fuel assemblies, except LTAs, will be 8x8 assemblies, having the same dimensions as previously used ANF and GE fuel. However, the new fuel will have a higher enrichment and will be designed to achieve a higher burnup (39,000 MWD/MT maximum and 35,000 MWD/MT batch average).

The LTAs will be a 9x9 array of fuel rods with two fuel rod diameters and five "injection" water rods (sheets 12-16, Enclosure 2). The "injection" water rods are designed to achieve a higher critical heat flux due to more effective distribution of coolant. The LTAs will be located in a core region where they will not reach limiting thermal or hydraulic limits.

The staff advised the licensee that to satisfy the requirement of 10 CFR 51.52, an environmental assessment would be needed if expected burnup will exceed 33,000 MWD/MT average or if fuel enrichment will exceed 4% by weight. The staff advised that an environmental assessment for the Shearon Harris Plant has been issued for burnups to 60,000 MWD/MT and enrichments to 5%, and that it may be adopted by SERI for GGNS-1, if it is shown to be applicable.

Spent fuel criticality will be recalculated to demonstrate that the 0.95 k_{eff} limit is not reached for the higher enriched fuel. The analysis regarding no significant hazards considerations will address the reduced margin to criticality of the higher enriched fuel.

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PDR ADOCK 05000416
P PNU

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The methods of analysis to be used for the third reload and limits in the Technical Specifications are similar to those used for previous ANF reloads (sheets 4-11, Enclosure 20). The licensee said it would submit the reload application by December 9, 1988 and requested the amendment to be issued March 21, 1988 for an April 4, 1989 startup. The staff indicated this schedule appeared to be reasonable.

Sincerely,

LSI

Lester L. Kintner, Senior, Project Manager
Project Directorate II-1
Division of Reactor Projects I/II

Enclosures:
As stated

cc w/encls:
See attached list

(SYSTEM ENERGY RESOURCES, INC)

ML
PM: PDEI: DRPR: NRR
LKintner: dlm
08/29/88

EG
D: PDEI: DRPR: NRR
EGAdensam
08/30/88

DISTRIBUTION FOR MEETING SUMMARY DATED: September 1, 1988

Facility: GRAND GULF NUCLEAR STATION

Docket File

NRC PDR

Local PDR

PDII-1 Reading

E. Adensam

P. Anderson

L. Kintner

OGC

E. Jordan (MNBB 3302)

B. Grimes (9A2)

ACRS (10)

B. Troskoski (17D19)

M. Hodges (8E23)

cc: Licensee/Applicant Service List

DF01

Enclosure 1

ATTENDEES

JULY 28, 1988 MEETING WITH SERI

RE: THIRD CORE RELOAD

NAME

AFFILIATION

Les Kintner
Wayne Hodges
Yosi Balas
Israel Nir
W. D. Hamilton
D. A. Adkisson
R. S. Reynolds
F. H. Smith

NRC/PD21
NRC/RXSB
SERI/Licensing
System Services, Inc./MSU
System Services, Inc./MSU
ANF/Reload Licensing
ANF/BWR Safety Licensing
System Services, Inc./MSU

A G E N D A
USNRC/SERI/ANF Cycle 4 Licensing Meeting
July 28, 1988

- I. Introduction/Objectives
 - o Agenda
 - o Schedule
- II. Core Design
 - o Cycle 4 Overview
 - o Spent Fuel Criticality
- III. Cycle 4 8X8 High Burnup
 - o Status of Approved Criteria/Design
 - o Plant Specific Design Analysis
- IV. Cycle 4 Thermal Limits
 - o Summary of Anticipated Changes/Reasons for Changes
 - o Power Dependent Limits
 - o Flow Dependent Limits
- V. 9X9 - 5 LTA
 - o Program Objectives
 - o Design Description and Progress
 - o Licensing Basis
 - o TS Changes
- VI. Other TS Changes
 - o GE References with ANF Core
- VII. Wrap Up
 - o Summary of TS Changes
 - o Schedule

GRAND GULF CYCLE 4 LICENSING MEETING

O MEETING PURPOSE:

- INFORM NRC OF PLANNED CYCLE 4 ACTIVITIES/TECH SPEC CHANGES.
- IDENTIFY CYCLE 4 ISSUES
- IDENTIFY AREAS POTENTIALLY REQUIRING CLARIFICATION.

GGNS-1 CYCLE SUMMARY

CYCLE	DESIGN ENERGY	ENRICHED ZONE	BATCH SIZE
2	1110 GWDs	2.99 w/o	264
3	1420 GWDs	3.21 w/o	288
4	1698 GWDs	3.61 w/o	276

0 CYCLE 4 FRESH FUEL MAPLHGR LIMIT

SPENT FUEL CRITICALITY

CURRENT BASIS:

3.5 w/o ENRICHED, UNIFORMLY DISTRIBUTED

GE 8x8 DIMENSIONS

NO CREDIT FOR AXIAL LEAKAGE

NO GAD

REVISED BASIS:

3.61 w/o ENRICHED, CONSERVATIVE ENRICHMENT DISTRIBUTION

ANF 8x8 DIMENSIONS

NO CREDIT FOR AXIAL LEAKAGE

NO GAD

CYCLE 4 8X8 HIGH BURNUP

- O FRESH 8X8 FUEL TO BE INSERTED IN CYCLE 4 WILL BE DESIGNED TO ALLOW HIGHER BURNUP.
- O ANF'S APPROVED METHODOLOGY ENCOMPASSES ANTICIPATED END OF LIFE EXPOSURE (XN-NF-82-06(A)); HOWEVER, GENERIC DESIGN APPROVAL IS LOWER (XN-NF-85-67(A)).
- O APPROACH: GRAND GULF SPECIFIC ANALYSIS WILL BE PROVIDED AS PART OF THE CYCLE 4 SUBMITTAL.

GGNS-1 CYCLE 4 THERMAL LIMITS

O BACKGROUND

- ANF LICENSING ANALYSIS (CYCLE 2)
SUPPORTED GE THERMAL LIMITS (CYCLE 1)
- CYCLE 4 IS THE FIRST ALL ANF FUEL CORE
- APPROPRIATE TO INSTALL LIMITS GENERATED BY ANF METHODS
AND ANALYSES

O APPROACH

- ESTABLISH REVISED LIMITS BASED ON ALL ANF FUEL CORE AND
ANF METHODOLOGY
- CONFIRM LIMITS FOR CYCLE 4 USING THE CYCLE SPECIFIC
TRANSIENT ANALYSIS RESULTS
- CONFIRM LIMITS FOR EACH SUBSEQUENT CYCLE USING CYCLE
SPECIFIC TRANSIENT ANALYSIS RESULT

POWER-DEPENDENT MCPR

- O CURRENT MCPR_p LIMIT WAS GENERATED BASED ON:
 - GE ANALYSIS
 - GENERIC BWR-6 CURVES
- O ANALYSES TO SUPPORT REVISED MCPR_p LIMIT INCLUDE:
 - CRWE (GENERICALLY APPROVED)
 - PRESSURIZATION TRANSIENTS (CYCLE SPECIFIC)
 - LOFWH (PLANT SPECIFIC)
- O REVISED MCPR_p LIMIT
 - CHANGES IN OFF-RATED LIMIT ABOVE 40% POWER
 - NO CHANGE IN RATED LIMIT VALUE

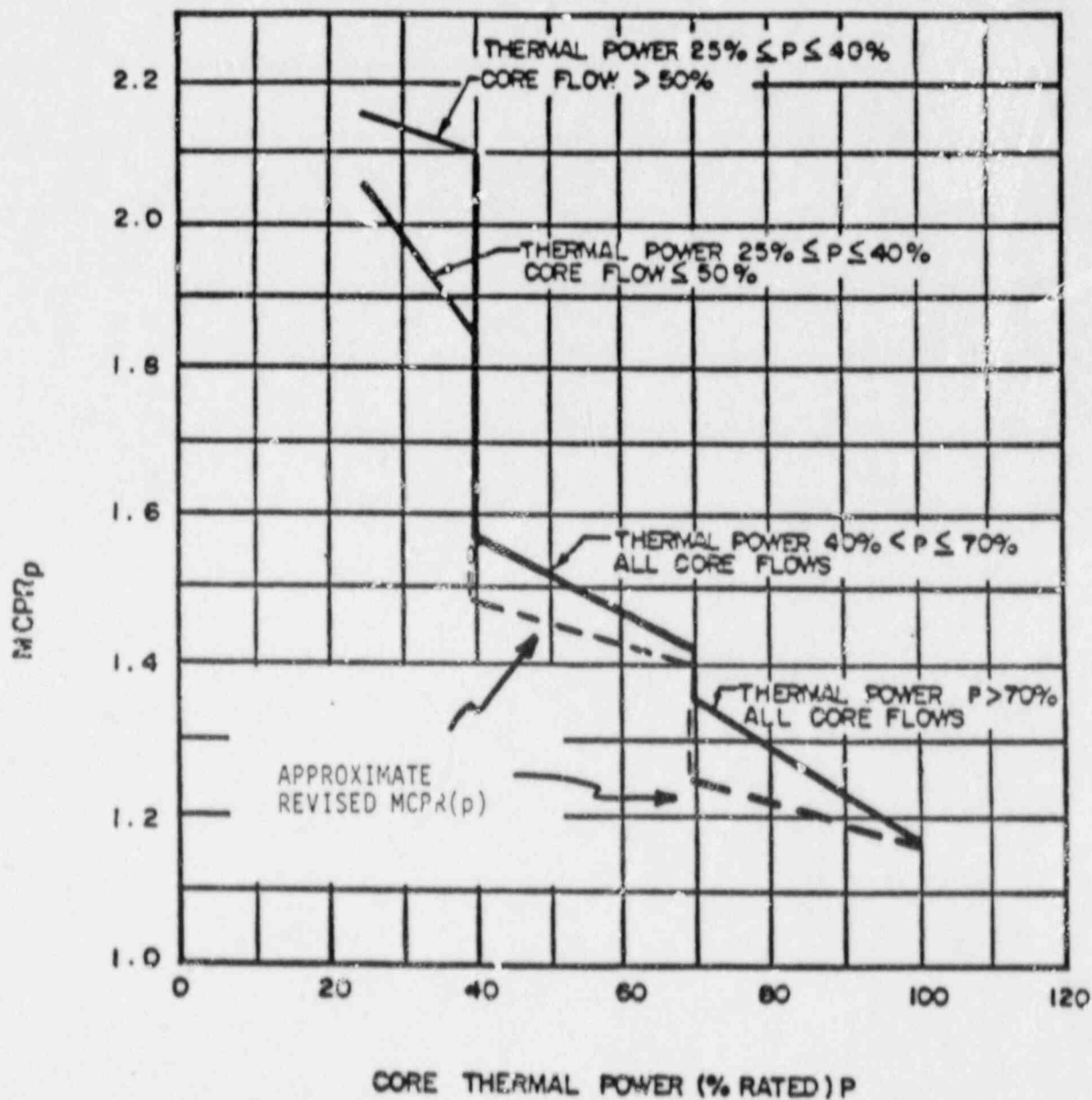


FIGURE 3.2.3-2 MCP_p

FLOW-DEPENDENT THERMAL LIMITS

O CURRENT FLOW-DEPENDENT LIMITS

- $MCPR_F$ WAS GENERATED BASED ON GE BWR-6 GENERIC ANALYSIS
- $MAPFAC_F$ WAS GENERATED BASED ON ANF BWR-6 ANALYSIS

BOTH LIMITS ARE BASED ON OPERATOR-CONTROLLED MAXIMUM CORE FLOW SETTINGS OF 102.5% AND 107% OF RATED CORE FLOW

O GENERAL APPROACH TO REVISE LIMITS

- GENERATE LIMITS BASED ON ALL ANF FUEL AND METHODOLOGY
- ELIMINATE THE OPERATOR-CONTROLLED CORE FLOW SETTING BY ASSUMING MAXIMUM ACHIEVABLE CORE FLOW FOR THE LIMITING EVENT
- GENERATE LIMITS BASED ON:
 1. TWO-LOOP FLOW RUNOUT EVENT FOR NON LOOP MANUAL OPERATION
 2. ONE-LOOP FLOW RUNOUT EVENT FOR LOOP MANUAL OPERATION

NOTE: THE ONE-LOOP FLOW RUNOUT EVENT IS THE ONLY CREDIBLE FLOW RUNOUT EVENT IN THE LOOP MANUAL OPERATING MODE.

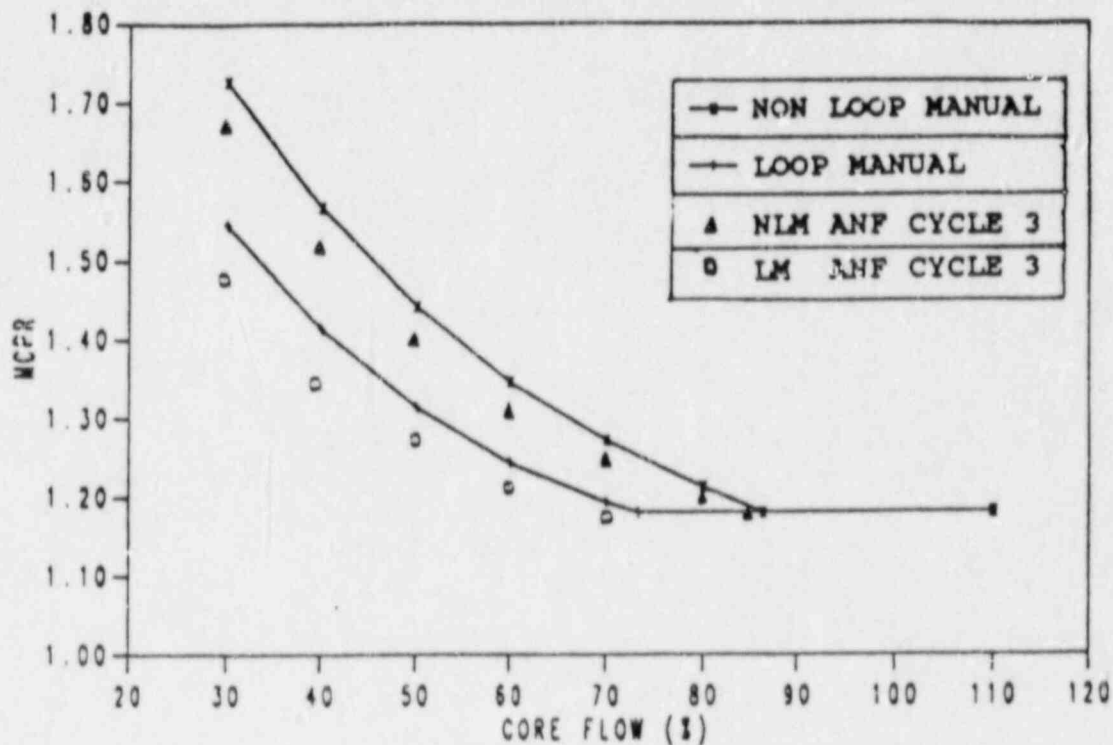
BY RESTRICTING OPERATIONS TO THE LOOP MANUAL MODE, FLOW RUNOUT (AND THEREFORE DELTA-CPR) WILL BE LESS SEVERE.

FLOW-DEPENDENT THERMAL LIMITS (CONT.)

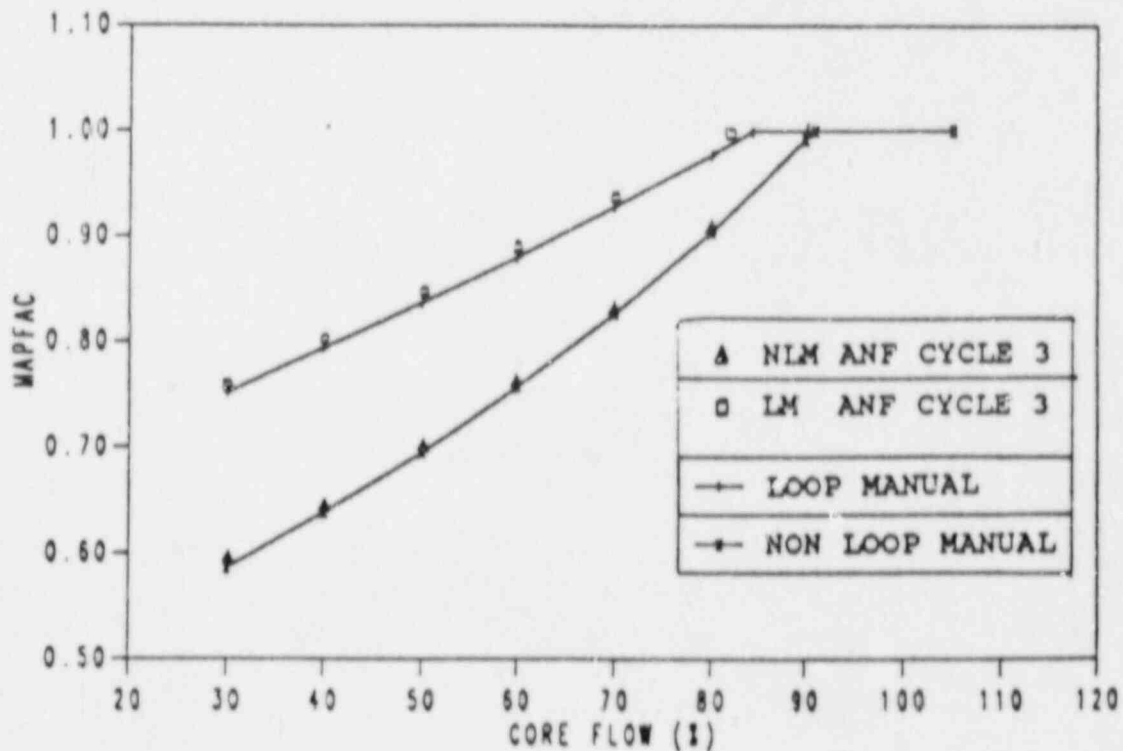
- O ANALYSIS TO SUPPORT REVISED FLOW-DEPENDENT LIMIT
 - ESTABLISH BOUNDING LIMITS BASED ON AVAILABLE ANF RESULTS FOR GGNS CYCLES 2 AND 3 AND ANTICIPATED CYCLE DEPENDENT VARIATIONS FOR:
 - 1. LOOP MANUAL OPERATIONS
 - 2. NON LOOP MANUAL OPERATIONS
 - PERFORM CYCLE 4 SPECIFIC ANALYSIS TO CONFIRM LIMITS ARE BOUNDING

- O REVISED FLOW-DEPENDENT LIMITS
 - REVISED $MCPR_F$ VS. CURRENT LIMITS
 - REVISED $MAPFAC_F$ VS. CURRENT LIMITS
 - CYCLE 3 SPECIFIC ANALYSIS CONFIRMED LIMITS

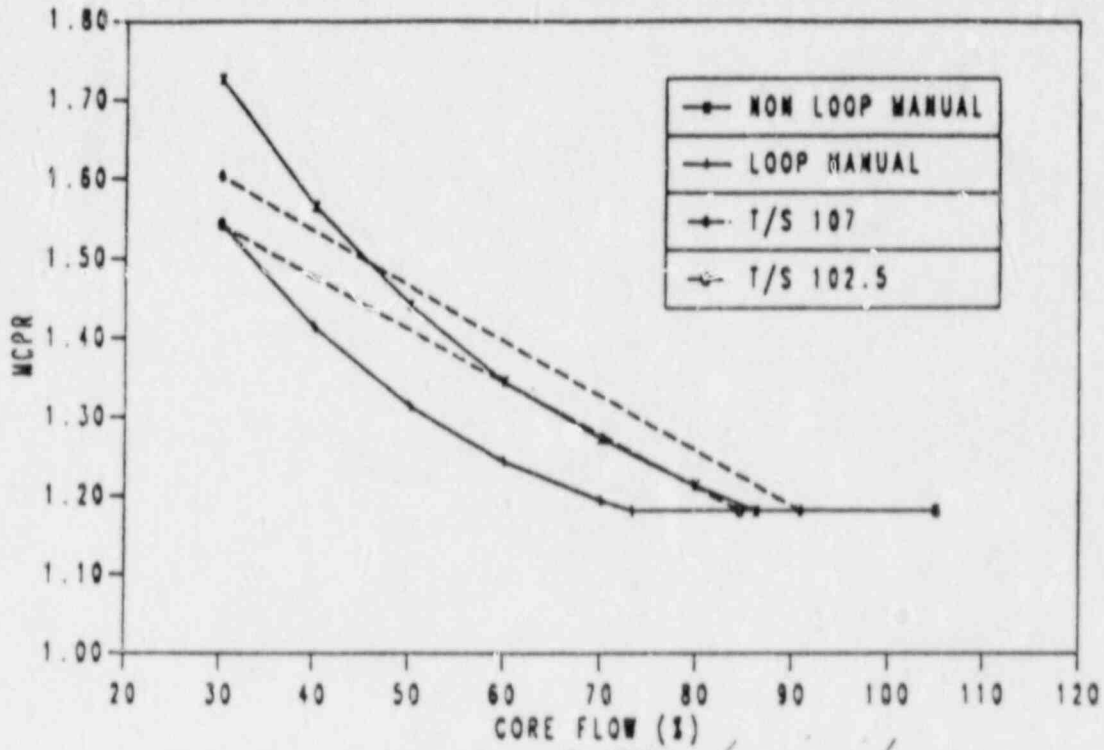
CYCLE 3 CONFIRMATION OF REVISED FLOW DEPENDENT MCPR LIMIT



CYCLE 3 CONFIRMATION OF REVISED FLOW DEPENDENT MAPFAC LIMIT

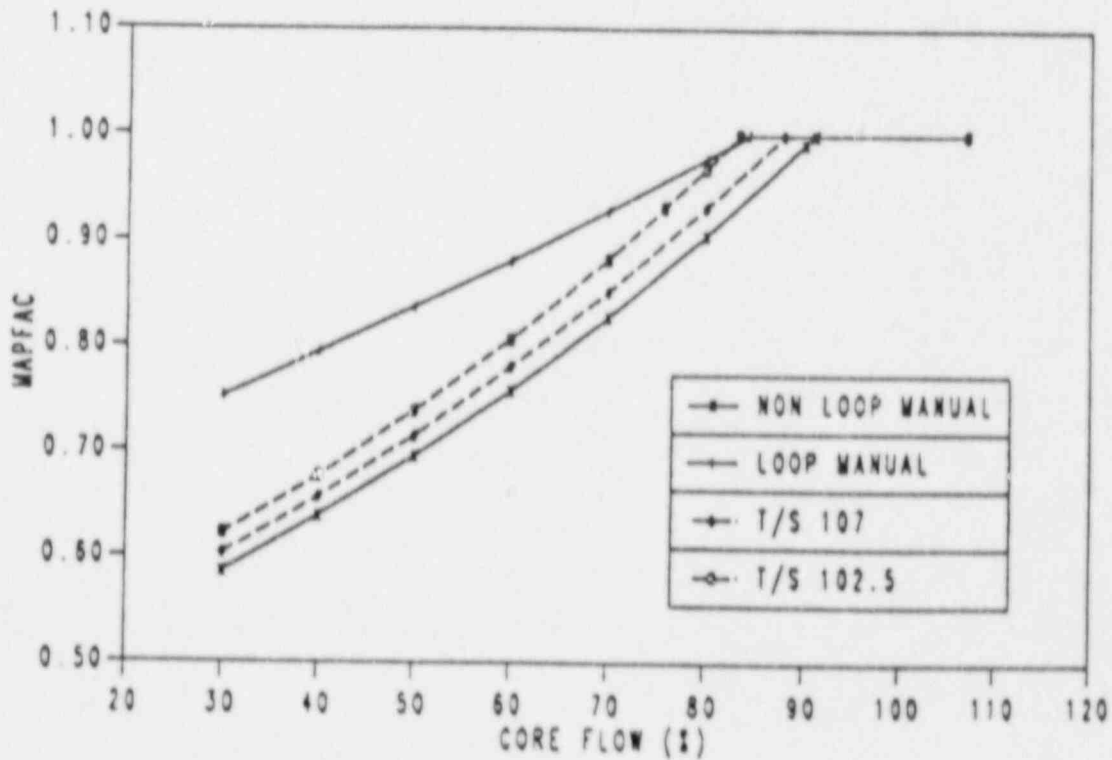


FLOW DEPENDENT MCPR LIMITS COMPARISON



- - - - - present TS Limits
 _____ proposed TS Limits

FLOW DEPENDENT WAPFAC LIMITS COMPARISON



9X9-5 DESIGN SUMMARY

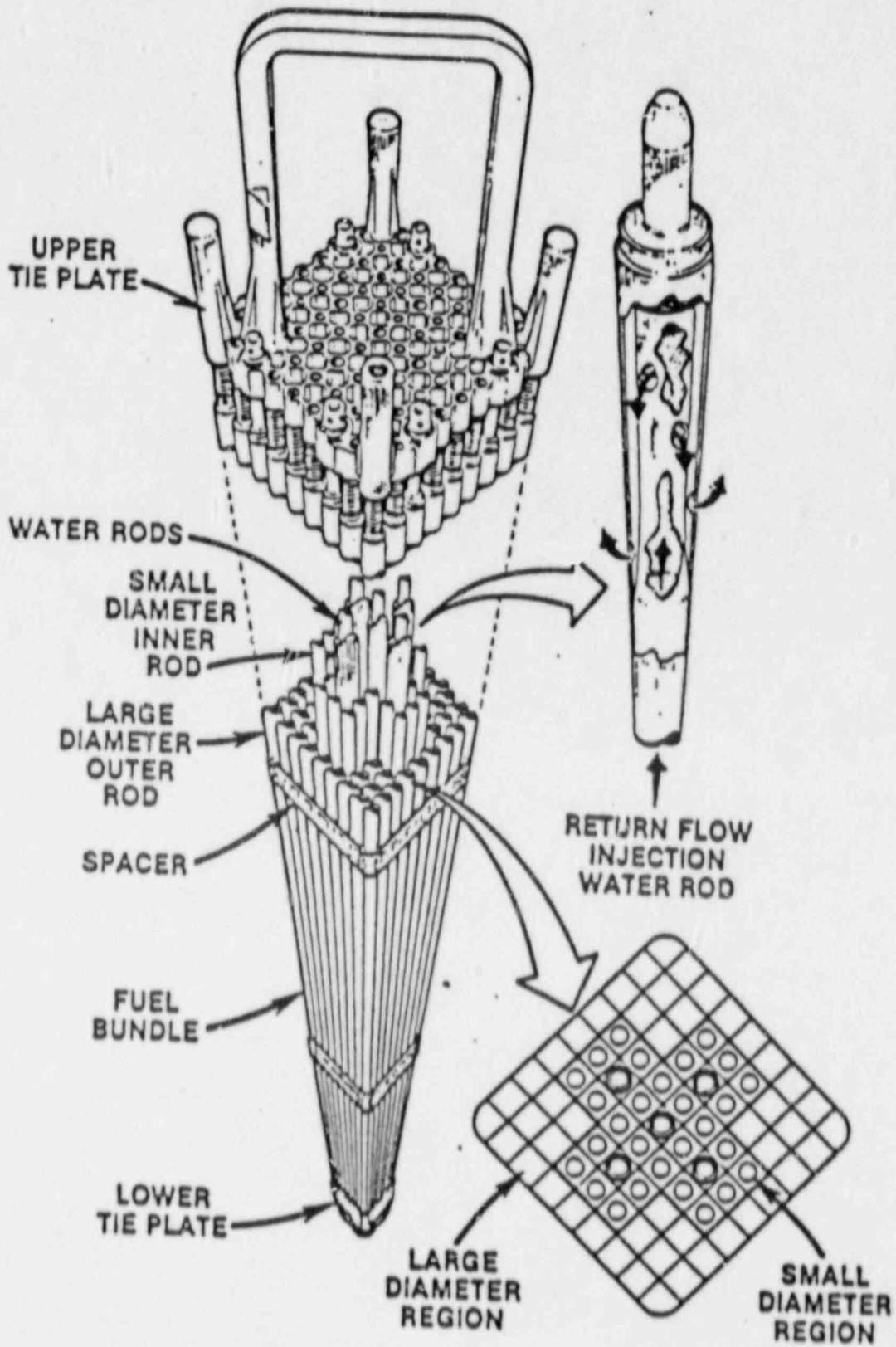
0 PERFORMANCE RELATIVE TO 8X8:

- HIGHER CRITICAL POWER DUE TO MORE EFFECTIVE DISTRIBUTION OF COOLANT.
- IMPROVED LOCA PERFORMANCE DUE TO LOWER LHGR, GREATER HEAT TRANSFER AREA, MORE INERT SURFACE.

0 DESIGN FEATURES:

- TWO FUEL ROD DIAMETERS (.443" & .417").
- FIVE "INJECTION" WATER RODS.

9x9-5 C-LATTICE



9x9-5 LEAD PROGRAM

PROGRAM OBJECTIVES

- o DEMONSTRATE PERFORMANCE OF 9x9-5 DESIGN.

LICENSING BASES:

- o MECHANICAL, THERMAL-HYDRAULIC, AND NEUTRONIC COMPATIBILITY WITH CORESIDENT 8x8 FUEL.
 - 9x9-5 LTAs WILL BE NEUTRONICALLY SIMILAR TO CYCLE 4 8x8 FUEL ASSEMBLIES (LOCAL PEAKING, REACTIVITY).
 - USE OPERATING LIMITS CONSISTENT WITH 8x8 FUEL (MCPR, MAPLHGR, MAPFAC).
 - PLACED IN NON-LIMITING LOCATION.
- o ANALYSIS TOOLS: BASED ON CURRENTLY APPROVED METHODOLOGY (I.E., XM3 CHF CORRELATION, 9x9 LHGR LIMITS, ETC.).

9X9-5 LTAs NEUTRONIC DESIGN

- O LEADS WILL BE DESIGNED TO BE NEUTRONICALLY "TRANSPARENT" TO THE CYCLE 4 8X8 ASSEMBLIES.
- O DESIGN SUMMARY:
 - AVERAGE ENRICHMENT OF LTAs: 3.50% (vs. 3.61% FOR 8X8 FUEL DESIGN),
 - 9 RODS WITH AXIALLY DISTRIBUTED GADOLINIA (4.5 & 5.5 w/o GD203)

9X9-5 LTAs TECH SPEC CHANGES

- O TECH SPEC CHANGES WILL BE JUSTIFIED BASED ON GRAND GULF SPECIFIC 8X8 LIMITS OR APPROVED 9X9 LIMITS.
 - 9X9-5 MAPLHGR (NEW) - CONSISTENT WITH 8X8 LIMITS.
 - MAPFAC (NO CHANGE) - USE CYCLE 4 8X8 FUEL CURVES.
 - MCPR (NO CHANGE) - USE CYCLE 4 8X8 FUEL LIMITS.
 - LHGR FOR 9X9-5 (NEW) - BASED ON "STANDARD" 9X9 LHGR LIMIT (XN-NF-85-67).
 - TECH SPEC BASES - VARIOUS MINOR CHANGES.

OTHER TECH SPEC CHANGES

- o TECHNICAL SPECIFICATIONS WILL BE "CLEANED UP" OVER NEXT TWO CYCLES TO MINIMIZE REFERENCE TO GE FUEL & ANALYSES.
 - EVEN THOUGH CYCLE 4 IS ALL ANF FUEL, NEED TO ALLOW FOR CONTINGENT REINSERTION OF GE FUEL ASSEMBLY.
 - NSSS AND OTHER SYSTEMS RELATED ANALYSES WILL REMAIN VALID.
- o CYCLE 4 PHASE OF TECH SPEC "CLEAN UP" PROGRAM WILL BE LIMITED TO BASES, OTHER MINOR AREAS.
 - EXTENSION OF 28,500 MWD/MTU LIMIT FOR APPLICATION OF GE MAPLHGR'S TO ANF FUEL DURING SLO.
- o CYCLE 5 WILL REQUIRE CHANGES TO SUPPORT 9X9-5 RELOAD.
 - "CLEAN UP" PROGRAM WILL BE COMPLETED AT THAT TIME.

TS CHANGE SUMMARY

- 0 CYCLE 4 FRESH FUEL MAPLHGR LIMITS
- 0 THERMAL LIMITS
- 0 LTA PROGRAM
- 0 "CLEAN-UP" PROGRAM

GRAND GULF CYCLE 4 SCHEDULE

- O RELOAD SUBMITTAL TO NRC: DEC. 9, 1988
- O MEETING WITH NRC: DEC. 20, 1988
- O LICENSE ISSUED: MARCH 21, 1989
- O CYCLE 4 STARTUP: APR. 4, 1989

DISTRIBUTION FOR MEETING NOTICE DATED: September 1, 1988

Facility: GRAND GULF NUCLEAR STAION, UNIT 1

Docket or Central File

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