ADVANCED NUCLEAR FUELS CORPORATION

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WNP-2 CYCLE 4 RELOAD ANALYSIS

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1.0 INTRODUCTION

This report summarizes the results of the analyses performed by Advanced Nuclear Fuels Corporation (ANF) in support of the Cycle 4 reload for the Supply System Nuclear Project Number 2 (WNP-2). WNP-2 is scheduled to commence Cycle 4 operation in June 1988. This report is intended to be used in conjunction with Exxon Nuclear Company (ENC) topical report XN-NF-80-19(A), Volume 4, Rev. 1, "Application of the ENC Methodology to BWR Reloads," which describes the analyses performed in support of this reload, identifies the methodology used for those analyses, and provides a generic reference list. Section numbers in this report are the same as corresponding section numbers in XN-NF-80-19(A), Volume 4, Rev. 1. Appendix A of this report addresses single loop operation.

Final feedwater temperature reduction (FFTR) analysis with thermal coastdown was performed for WNP-2. This FFTR analysis is applicable after the all rods out condition is reached with normal feedwater temperature. That is, additional MCPR limit changes are applicable when Cycle 4 reactor operation is being extended with thermal coastdown and FFTR.

The WNP-2 Cycle 4 core will comprise a total of 764 fuel assemblies, including 152 ANF 8x8 unirradiated assemblies, 148 once irradiated ANF 8x8 assemblies, 128 twice irradiated ANF 8x8 assemblies, and 336 thrice irradiated P8x8R assemblies fabricated by General Electric (GE). The reference core configuration is described in Section 4.2.

The design and safety analyses reported in this document were based on the design and operational assumptions in effect for WNP-2 during the previous operating cycle which encompass core flow up to 106% of the design basis value.

2.0 FUEL MECHANICAL DESIGN ANALYSIS

Applicable Fuel Design Report: Reference 9.8

The expected power history for the fuel to be irradiated during Cycle 4 of WNP-2 is bounded by the assumed power history in the fuel mechanical design analyses.

3.0 THERMAL HYDRAULIC DESIGN ANALYSIS

3.1 Design Criteria

3.1.3 Fuel Centerline Temperature

The LHGR curve in Figure 3.4 of Reference 9.8 shows that the ANF 8x8 fuel centerline temperature is protected for 120% over power. The LHGR curve in Reference 9.8 is greater than 120% above the LHGR limit curve in Reference 9.1. Therefore, fuel centerline melt is protected for all ANF 8x8 exposures within the bounds of the referenced LHGR curves.

3.2 Hydraulic Characterization

3.2.5 Bypass Flow

Calculated Bypass Flow Fraction	11.6%

3.3 MCPR Fuel Cladding Integrity Safety Limit

3.3.1 Coolant Thermodynamic Condition

Core Power	3817 MWt
Core Inlet Enthalpy	526.4 Btu/lbm
Steam Dome Pressure	1030 psia
Feedwater Temperature	420°F

3.3.2 Design Basis Radial Power Distribution

See Figure 3.1

3.3.3 Design Basis Local Power Distribution

See Figures 3.2 and 3.3.

4.0 NUCLEAR DESIGN ANALYSIS

4.1 Fuel Bundle Nuclear Design Analysis

Assembly Average Enrichment	2.64 w/o U-235
Radial Enrichment Distribution	Figure 4.1
Axial Enrichment Distribution	Uniform 2.81 w/o U-235 with 6-inch top and bottom natural uranium blankets
Burnable Poisons	Figure 4.1
Non-Fueled Rods	Figure 4.1
Neutronic Design Parameters	Table 4.1

Note: The reload includes 24 ANF 8x8 assemblies of the 2.72 w/o U-235 design loaded in Cycle 3 and described in the Cycle 3 Reload Analysis Report XN-NF-87-25.

4.2 Core Nuclear Design Analysis

4.2.1 Core Configuration — Figure 4.2

Core Exposure at EOC3 (MWd/MTU)	15,300
Core Exposure at BOC4 (MWd/MTU)	11,200
Core Exposure at EOC4 (MWd/MTU)	16,900

4.2.2 Core Reactivity Characteristics

BOC Cold k-eff, All Rods Out	1.1194
BOC Cold k-eff, Strongest Rod Out	0.9894
Reactivity Defect (R-Value)	0.0
Standby Liquid Control System (SBLC) 660 ppm Boron, Cold k-eff	0.9654

4.2.4 Core Hydrodynamic Stability

%Power/%Flow State Points	Decay Ratio (COTRAN)
65/45*	0.55
46/27.6**	0.88
42/23.8***	0.82

*45 percent flow - APRM Rod Block intercept point.

**Two pump minimum flow - 46 percent power.

***Natural circulation flow - APRM Rod Block intercept point.

5.0 ANTICIPATED OPERATIONAL OCCURRENCES

Applicable Transient Analysis Report — Reference 9.3

5.1 Analysis Of Plant Transients At Increased Core Flow Conditions

Reference 9.3 and 9.11

Limiting Transient(s): Load Rejection Without Bypass (LRWB)
Feedwater Controller Failure (FWCF)
Loss of Feedwater Heating (LOFH)

Transient analyses for WNP-2 Cycle 2 anticipated operational events showed that delta CPR values at design basis conditions are bounded by delta CPR values at design basis power (104%) and increased core flow conditions (106%). Thus Cycle 4 analyses results at increased core flow conditions are conservatively applicable to rated flow conditions.

Cycle 4 specific analyses of transient events were performed with the recirculation pump (RPT) in service and out of service, with normal scram speed (NSS) and technical specification scram speed (TSSS), and at exposures of end-of-cycle and at end-of-cycle -2000 MWd/MTU (3754 MWd/MTU) as shown in following table. On a generic basis, analyses were performed for thermal coastdown with FFTR to extend cycle operation.

The loss of feedwater heating event was analyzed on a plant specific bounding value basis and the delta CPR results are bounding values for WNP-2.

Transient*	% Power/ % Flow	Maximum Heat Flux %	Maximum Power %	Maximum Pressure psig	Delta CPR GE Fuel	Delta CPR ANF Fuel
LRNB, NSS RPT Operable	104/106	119	373	1170	0.25	0.24
LRNB, NSS RPT Inoperable	104/106	125	505	1181	0.32	0.29
LRNB, TSSS RPT Operable	104/106	125	442	1175	0.32	0.30
LRNB, TSSS RPT Inoperable	104/106	131	574	1189	0.38	0.35
LRNB, TSSS RPT Inoperable end-of-cycle minus 2000 MWd/MTU	104/106	110	284	1168	0.05	0.05
FWCF, NSS RPT Operable	47/106	50	187	1010	0.12	0.1
FWCF, NSS RPT Inoperable	47/106	52	129	1020	0.15	0.14
FWCF, TSSS RPT Operable	47/106	51	110	1013	0.14	0.12
LOFH	N/A	N/A	N/A	N/A	0.09	0.09

5.2 Analyses For Reduced Flow Operation — Reference 9.3 and 9.11

Limiting Transient: Recirculation Flow Increase

5.4 ASME Overpressurization Analysis — Reference 9.3 and 9.11

Limiting Event — MSIV Closure

*Normal scram speed (NSS) is based on measured plant scram insertio data, see Section 7.2.3.1.

Worst Single Failure	MSIV Position Scram Trip
Maximum Pressure	1315 psig
Maximum Steam Dome Pressure	1286 psig

5.5 Control Rod Withdrawal Error

Initial Control Rod Pattern for CRWE Analysis — Figure 5.1

Rod Block Monitor Setting	Distance Withdrawn (ft)	ANF Fuel Delta-CPR	GE Fuel Delta-CPR
106%*	5.0	0.17	0.21
107%	5.5	0.18	0.22
108%	6.0	0.20	0.23

5.6 Fuel Loading Error

	With Loading Error	Correctly Loaded Core
Maximum LHGR, kW/ft	16.2	13.4
Minimum MCPR	1.25	1.41

5.7 Determination Of Thermal Margins

Summary of Thermal Margin Requirements

All system transient results at the more limiting increased flow conditions (106%). LRWB results for the more limiting power (design basis condition - 104%) for this transient.

*Rod Block Monitor Setting (RBM) of 106% for Cycle 4.

Event	Equipment Operational Status	Delta CPR GE Fuel	Delta CPR ANF Fuel	MCPR Limit GE Fuel	MCPR Limit ANF Fuel	Model
LRNB	RPT Operable, NSS	0.25	0.24	1.31	1.30	COTRANSA/XCOBRA-T
LRNB	RPT Inoperable, NSS	0.32	0.29	1.38	1.35	" "
LRNB	RPT Operable, TSSS	0.32	0.30	1.38	1.36	" "
LRNB	RPT Inoperable, TSSS	0.38	0.35	1.44	1.41	" "
LRNB	RPT Inoperable, TSSS, EOC -2000 MWd/MTU	0.05	0.05	1.11	1.11	" "
FWCF	RPT Operable, NSS	0.12	0.11	1.18	1.17	" "
FWCF	RPT Inoperable, NSS	0.15	0.14	1.21	1.20	" "
FWCF	RPT Operable, TSSS	0.14	0.12	1.20	1.18	" "
LOFH	N/A	0.09	0.09	1.15	1.15	XTGBWR

Note: For cycle extension with reduced feedwater temperature, add 0.02 to delta CPR/MCPR LRNB and subtract 0.01 delta CPR/MCPR from FWCF transient results in the above table.

MCPR Operating Limits At Rated Condition For Cycle Exposures Less Than EOC -2000 MWd/MTU (100 To 106% Flow)

Fuel Type	MCPR Limit (106% RBS)
ANF	1.23
GE	1.27

MCPR Operating Limits At Rated Condition From EOC -2000 MWd/MTU To EOC (100 To 106% Flow) With Normal Feedwater Temperature

Fuel Type	MCPR Limit
ANF	1.30
GE	1.31

MCPR Operating Limits At Rated Condition Beyond All Rods Out With Reduced Feedwater Temperature (100 To 106% Flow And Thermal Coastdown) Point (EOC4)

Fuel Type	MCPR Limit
ANF	1.32
GE	1.33

MCPR Limits at Off-Rated Conditions	Figure 5.2 and 5.3
Reduced Flow MCPR Limit	Reference 9.3 and 9.11

6.0 POSTULATED ACCIDENTS

6.1 Loss-Of-Coolant Accident

6.1.1 Break Location Spectrum — Reference 9.4

6.1.2 Break Size Spectrum — Reference 9.4

6.1.3 MAPLHGR Analyses (ANF Fuel) — Reference 9.5

Limiting Break: Split Break in the Recirculation Suction Piping With an Area Equal to Sixty Percent of the Double-Ended Cross-Sectional Pipe Area

Bundle Average Exposure (MWd/MTM)	MAPLHGR (kW/ft)	Peak Clad Temperature, °F	Peak Local MWR, %
0	13.0	1765	0.49
5,000	13.0	1766	0.48
10,000	13.0	1765	0.47
15,000	13.0	1772	0.47
20,000	13.0	1788	0.54
25,000	11.3	1699	0.34
30,000	9.4	1521	0.17
35,000	7.9	1397	0.10

6.2 Control Rod Drop Accident — Reference 9.7

Dropped Control Rod Worth, mK	8.9
Doppler Coefficient dk/kdT, 1/°F	9.5×10^{-6}
Effective Delayed Neutron Fraction	0.0050
Four-Bundle Local Peaking Factor	1.26
Maximum Deposited Fuel Rod Enthalpy (cal/gm)	149

7.0 TECHNICAL SPECIFICATIONS

7.1 Limiting Safety System Settings

7.1.1 MCPR Fuel Cladding Integrity Safety Limit

MCPR Safety Limit 1.06

7.1.2 Steam Dome Pressure Safety Limit

Pressure Safety Limit 1346 psig

7.2 Limiting Conditions For Operation

7.2.1 Average Planar Linear Heat Generation Rate Limits For ANF 8x8 Fuel

Bundle Average Exposure (MWd/MTU)	MAPLHGR (kW/ft)
0	13.0
5,000	13.0
10,000	13.0
15,000	13.0
20,000	13.0
25,000	11.3
30,000	9.4
35,000	7.9

These MAPLHGR limits are not impacted by the small enrichment change associated with ANF fuel loaded for Cycle 4. For single loop operation these limits also apply to ANF Fuel consistent with the flow dependent MCPR curve (1.35 at 50 percent of rated flow)

7.2.2 Minimum Critical Power Ratio

Rated Condition MCPR Operating Limit Up To EOC -2000 MWd/MTU Exposure (100 To 106% Flow)

Fuel Type	Limit (106% RBS)
ANF	1.23
GE	1.27

Rated Conditions MCPR Operating Limits From EOC -2000 MWd/MTU To EOC (100% To 106% Flow)

Fuel Type	Limit
ANF	1.30
GE	1.31

Thermal Coastdown and FFTR Rated Condition MCPR Operating Limit Beyond All Rods Out Point With Reduced Feedwater Temperature (100% to 106% Flow)

Fuel Type	Limit
ANF	1.32
GE	1.33

Reduced Flow MCPR Limit (all cycle exposures) Figures 5.2 and 5.3

7.2.3 Surveillance Requirements

7.2.3.1 Scram Insertion Time Surveillance

The ANF reload safety analyses were performed using the control rod insertion times shown below which are based on plant data. In the event that plant surveillance shows these scram insertion times may be exceeded, the plant thermal margin limits are to default to the values which correspond to the technical specification (TSSS) control rod scram times (see Section 5.7).

Position Inserted From Fully Withdrawn	Average Rod Time In Seconds As Defined In Footnote*
Notch 45	0.404
Notch 39	0.660
Notch 25	1.504
Notch 5	2.624

7.2.3.2 Stability Surveillance

Core hydrodynamic stability analyses require slight modification to the Technical Specifications which preclude operation in specified power/flow regions. The results of these analyses support operation below a line defined by the following power/flow points: 42% Power/23.8% Flow, 46% Power/27.6% Flow and 65% Power/45% Flow (see Section 4.2.4).

Surveillance requirements remain unchanged for Cycle 4, e.g., surveillance is required when operating in a power flow region above the 80% rod line and less than 45% core flow.

7.2.3.3 Technical Specification LHGR Surveillance

The Technical Specification linear heat generation rate (LHGR) limit versus average planar exposure for ANF 8x8 reload fuel is shown in Figure 7.1. This figure was developed from information contained in Reference 9.1, and the region of permissible operation is shown.

*Slowest measured average control rod insertion time to specified notches for each group of four control rods arranged in a 2x2 array.

TABLE 4.1 NEUTRONIC DESIGN VALUES

Fuel Pellet	
Fuel Material	UO_2 Sintered Pellets
Density, g/cc	10.36
% of T.D.	94.5
Diameter, inch	
Enriched Fuel	0.4055
Natural Fuel	0.4045
Fuel Rod	
Fuel Length, inch	150
Cladding Material	Zircaloy-2
Clad, I.D., inch	0.414
Clad, O.D., inch	0.484
Fuel Assembly	
Number of Fuel Rods	62
Number of Inert Water Rods	2
Fuel Rod Enrichments	Figure 4.1
Fuel Rod Pitch, inch	0.641
Fuel Assembly Loading, kgU	176.0

TABLE 4.1 NEUTRONIC DESIGN VALUES
(Continued)

Core Data	
Number of Fuel Assemblies	764
Rated Thermal Power, MW	3323
Rated Core Flow, Mlbm/hr	108.5
Core Inlet Subcooling, Btu/lbm	19.0
Reactor Pressure, psia	1008.0
Channel Thickness, inch	0.100
Fuel Assembly Pitch, inch	6.00
Water Gap Thickness (symmetric), inch	0.522
Control Rod Data	
Absorber Material	B_4C
Total Blade Span, inch	9.75
Total Blade Support Span, inch	1.58
Blade Thickness, inch	0.260
Blade Face-To-Face Internal Dimension, inch	0.200
Absorber Rods Per Blade	76
Absorber Rod Outside Diameter, inch	0.188
Absorber Rod Inside Diameter, inch	0.138
Absorber Density, % of Theoretical	70.0

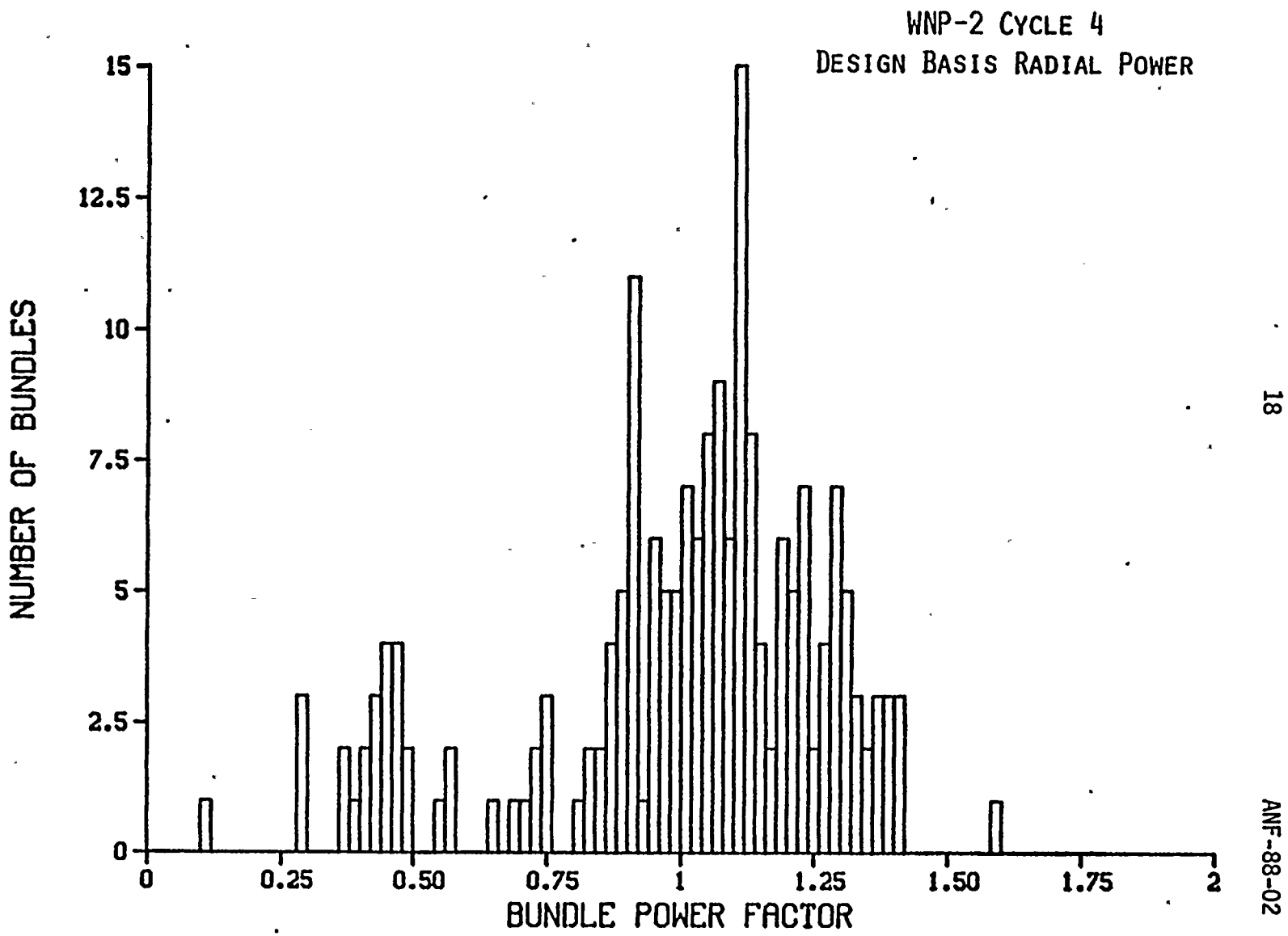


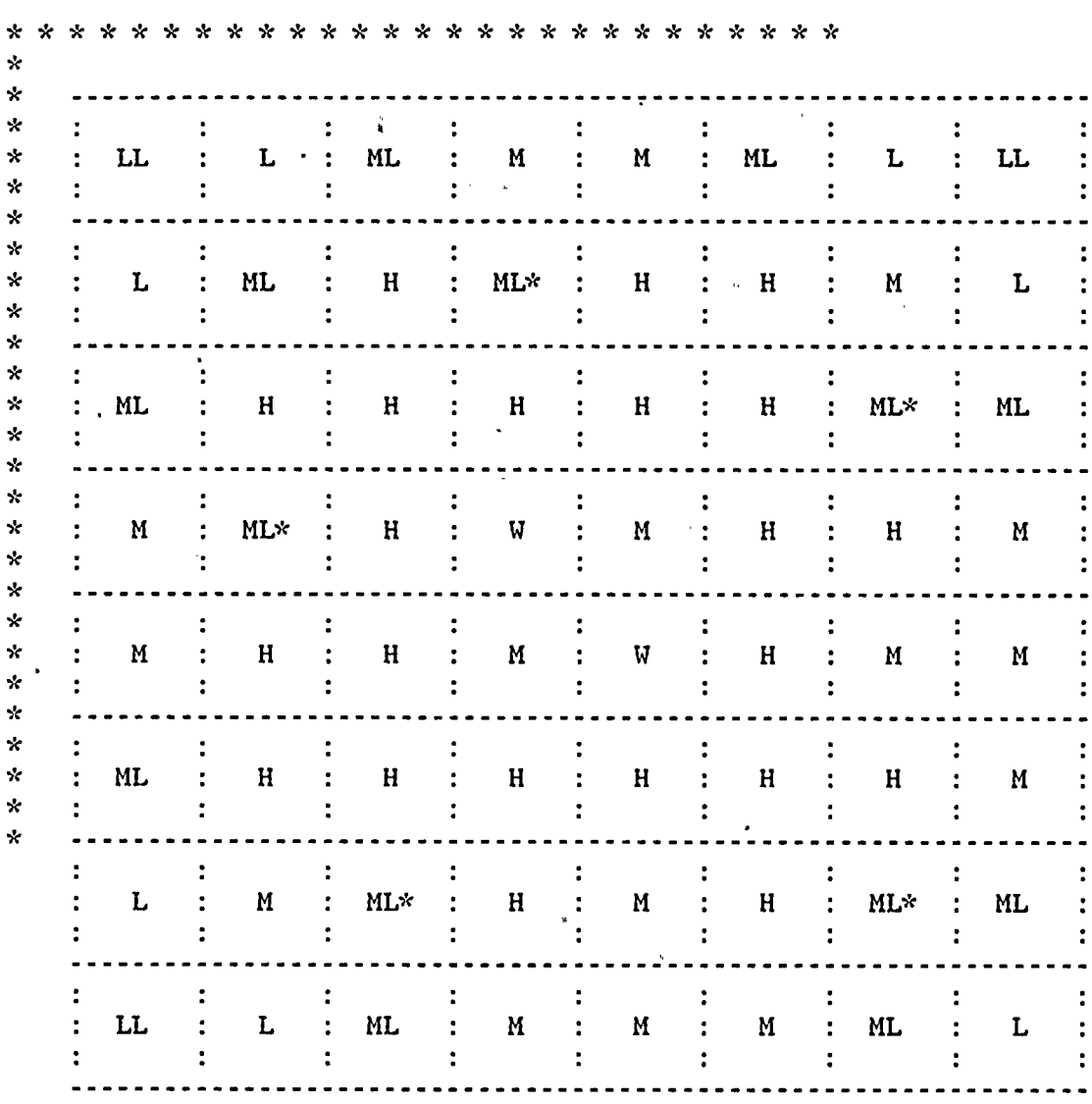
Figure 3.1 Radial Power Histogram For 1/4 Core Safety Limit Model

LL 0.93	L 0.95	ML 1.02	M 1.06	M 1.06	ML 1.02	L 0.95	LL 0.92
L 0.95	ML 0.97	H 1.08	ML 0.87	H 1.04	H 1.07	M 1.04	L 0.95
ML 1.02	H 1.08	H 1.01	H 1.00	H 0.98	H 1.00	ML 0.90	ML 1.02
M 1.06	ML 0.87	H 1.00	W 0.00	M 0.90	H 0.97	H 1.03	M 1.06
M 1.06	H 1.04	H 0.98	M 0.90	W 0.00	H 0.99	M 0.93	M 1.05
ML 1.02	H 1.07	H 1.00	H 0.97	H 0.99	H 1.00	H 1.06	M 1.08
L 0.95	M 1.04	ML 0.90	H 1.03	M 0.93	H 1.06	ML 0.96	ML 1.07
LL 0.92	L 0.95	ML 1.02	M 1.06	M 1.05	M 1.08	ML 1.07	L 1.03

Figure 3.2 WNP-2 Cycle 4 Safety Limit Local Peaking Factors (ANF XN-3 Fuel)

LL 0.95	L 0.96	ML 1.00	M 1.03	M 1.03	ML 1.00	L 0.96	LL 0.95
L 0.96	ML 0.98	H 1.05	ML 0.92	H 1.03	H 1.05	M 1.02	L 0.96
ML 1.00	H 1.05	H 1.02	H 1.01	H 1.00	H 1.01	ML 0.94	ML 1.00
M 1.03	ML 0.92	H 1.01	W 0.00	M 0.93	H 1.00	H 1.03	M 1.03
M 1.03	H 1.03	H 1.00	M 0.93	W 0.00	H 1.00	M 0.97	M 1.03
ML 1.00	H 1.05	H 1.01	H 1.00	H 1.00	H 1.02	H 1.05	M 1.04
L 0.96	M 1.02	ML 0.94	H 1.03	M 0.97	H 1.05	ML 0.97	ML 1.03
LL 0.95	L 0.96	ML 1.00	M 1.03	M 1.03	M 1.04	ML 1.03	L 1.00

Figure 3.3 WNP-2 Cycle 4 Safety Limit Local Peaking Factors (ANF XN-1, -2 Fuel)



LL RODS (3) --- 1.50 W/O U235
L RODS (7) --- 1.94 W/O U235
ML RODS (9) --- 2.50 W/O U235
M RODS (16) --- 2.86 W/O U235
H RODS (22) --- 3.43 W/O U235
ML* RODS (5) --- 2.50 W/O U235 + 2.00 W/O GD203
W RODS (2) --- INERT WATER ROD

Figure 4.1 WNP-2 Cycle 4 Enriched Zone Enrichment Distribution

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	C	B	D	B	C	B	D	B	C	B	D	B	C	D	A
2	B	E	B	F	B	F	B	F	B	F	C	E	B	F	A
3	D	B	D	B	D	C	D	B	D	B	D	C	D	C	B
4	B	F	B	C	B	F	B	F	B	F	B	E	B	F	A
5	C	B	D	B	F	B	D	B	D	C	D	C	D	C	B
6	B	F	C	F	B	C	B	F	B	F	B	F	B	F	A
7	D	B	D	B	D	B	F	B	D	C	C	C	D	B	B
8	B	F	B	F	B	F	B	D	B	F	B	F	B	A	
9	C	B	D	B	D	B	D	B	E	C	D	D	A		
10	B	F	B	F	C	F	C	F	C	D	B	A	B		
11	D	C	D	B	D	B	C	B	D	B	C				
12	B	E	C	E	C	F	C	F	D	A					
13	C	B	D	B	D	B	D	B	A	B					
14	D	F	C	F	C	F	B	A							
15	A	A	B	A	B	A	B								

Fuel Type	Number of Assemblies	Description
A	56	GE 8x8 Type II 1.76 w/o U-235 (Cycle 1)
B	280	GE 8x8 Type III 2.19 w/o U-235 (Cycle 1)
C	128	ANF 8x8 2.72 w/o U-235 (Cycle 2)
D	148	ANF 8x8 2.72 w/o U-235 (Cycle 3)
E	24	ANF 8x8 2.72 w/o U-235 (Cycle 4)
F	128	ANF 8x8 2.64 w/o U-235 (Cycle 4)

Figure 4.2 WNP-2 Cycle 4 Reference Loading Pattern by Fuel Type (One Quarter of Symmetrical Core Loading)

	2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	
59					--	--	--	--	--	--	--					59
55				--	--	00	--	36	--	00	--	--				55
51			--	--	--	--	--	--	--	--	--	--	--			51
47		--	--	24	--	18	--	00	--	18	--	24	--	--		47
43	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	43
39	--	00	--	18	--	00	--	24	--	00	--	18	--	00	--	39
35	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	35
31	--	36	--	00	--	24	--	12	--	24	--	00	--	36	--	31
27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27
23	--	00	--	18	--	00	--	24	--	00*	--	18	--	00	--	23
19	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	19
15		--	--	24	--	18	--	00	--	18	--	24	--	--		15
11			--	--	--	--	--	--	--	--	--	--	--			11
7				--	--	00	--	36	--	00	--	--				7
3					--	--	--	--	--	--	--					3
	2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	

* Control Rod Being Withdrawn
Rod Position in Notches Withdrawn
Full in = 00
Full Out = --

Figure 5.1 WNP-2 Cycle 4 Control Rod Withdrawal Analysis
Initial Control Rod Pattern

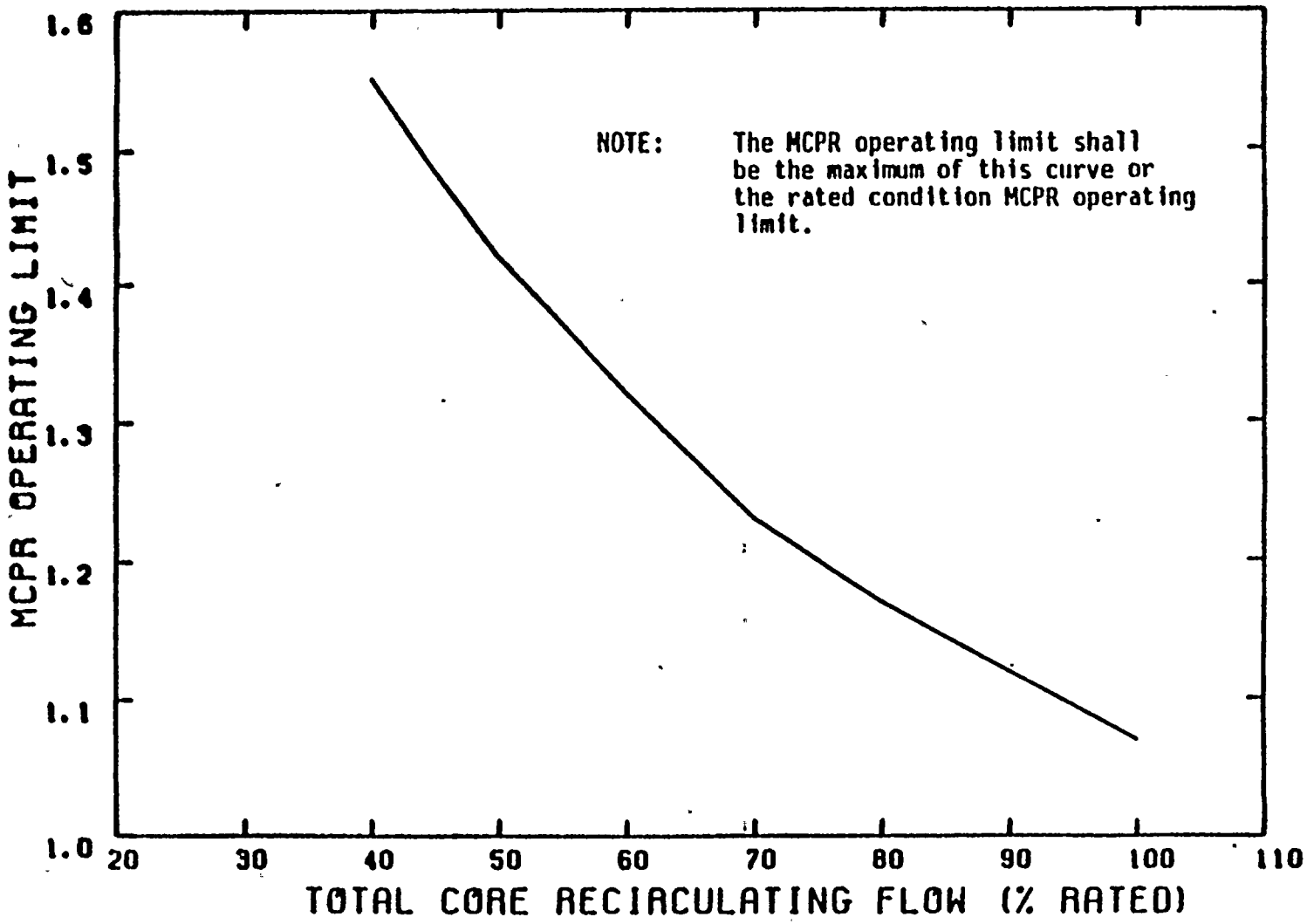


Figure 5.2 Reduced Flow MCPR Operating Limit For Normal Feedwater Temperature

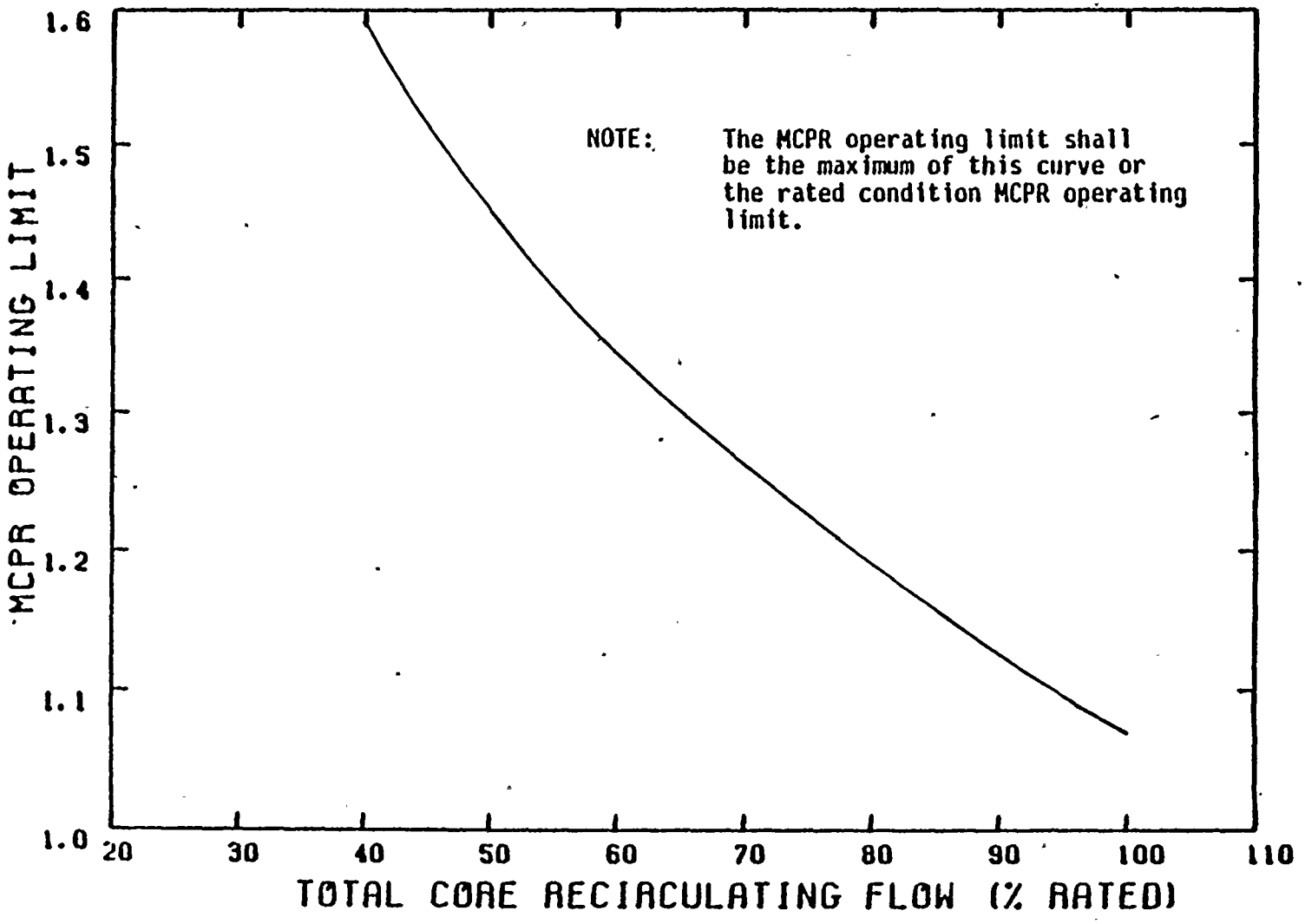
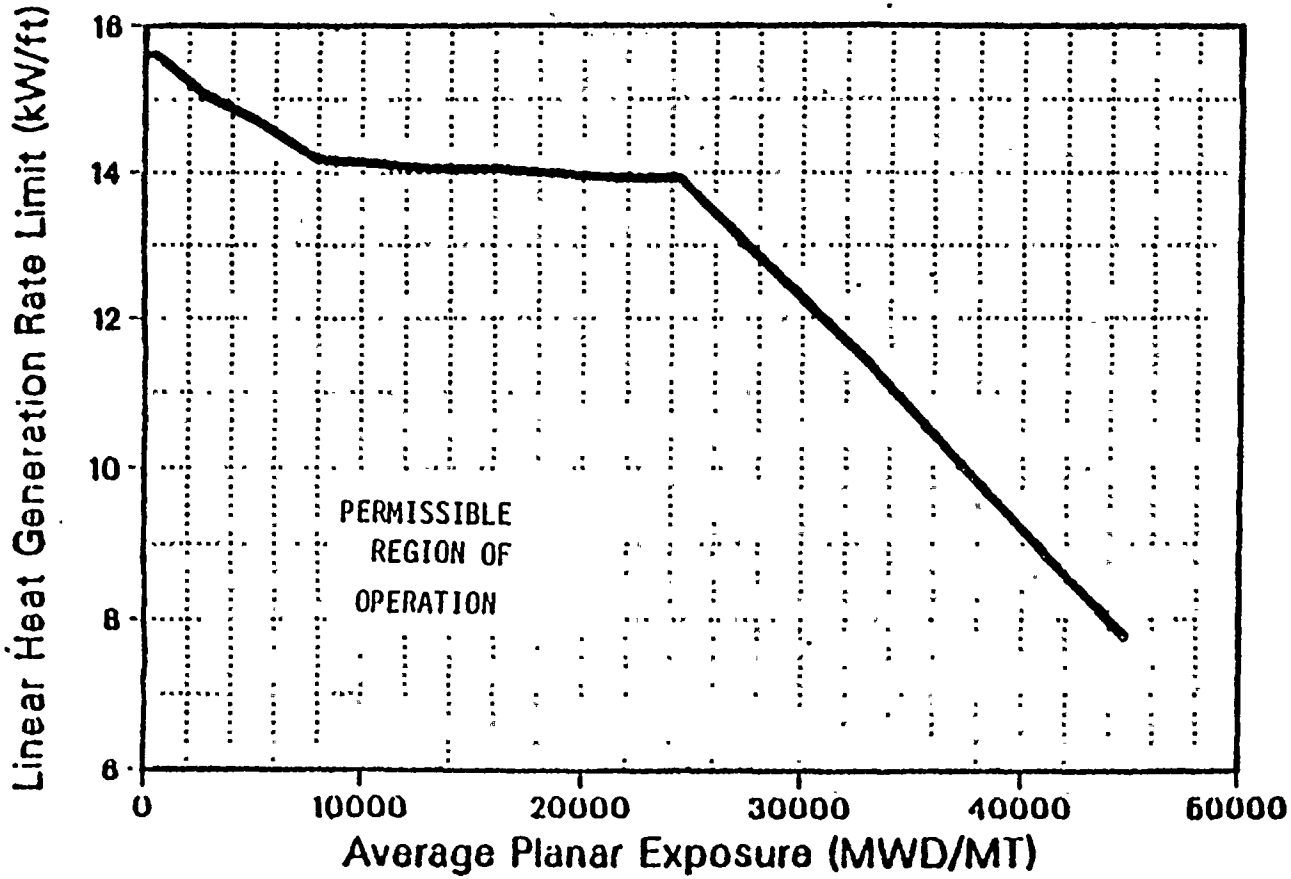


Figure 5.3 Reduced Flow MCPR Operating Limit For FFTR Operation



EXP	LHGR
0	15.62
610	15.62
2,680	15.10
5,230	14.71
7,940	14.19
10,470	14.13
13,220	14.06
15,980	14.06
18,780	14.00
21,590	13.93
24,420	13.93
27,280	13.08
30,150	12.24
33,060	11.40
36,960	10.47
38,900	9.66
41,830	8.66
44,760	7.77

Figure 7.1 Linear Heat Generation Rate (LHGR) Limit Versus Average Planar Exposure, ANF 8x8 Fuel

9.0 ADDITIONAL REFERENCES

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9.8 "Generic Mechanical Design for Exxon Nuclear Jet Pump BWR Reload Fuel," XN-NF-85-67(A), Revision 1, Exxon Nuclear Company, Inc., Richland, WA 99352, September 1986.

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9.10 J. B. Edgar, Letter to WPPSS, Supplemental Licensing Analysis Results, ENWP-86-0067, Exxon Nuclear Company, Inc., Richland, WA 99352, April 15, 1986.

9.11 J. E. Krajicek, "WNP-2 Plant Transient Analysis With Final Feedwater Temperature Reduction," XN-NF-87-92, Advanced Nuclear Fuels Corporation, Richland, WA 99352, June 1987.

APPENDIX A

Single Loop Operation

(SLO)

ANF recently performed analyses for WNP-2 which demonstrate the safety of plant operation with a single recirculation loop out of service for an extended period of time. These analyses were performed for the most limiting transient events, the pump seizure accident and the loss-of-coolant-accident (LOCA) for the maximum extended power state during WNP-2 single loop operation (SLO). The results of the SLO analyses are summarized below:

- The two loop MCPR operating limits (rated conditions) bound the transient requirements for SLO. The single loop transient analyses need not be performed on a cycle by cycle basis and the two loop MCPR operating limits applicable for a cycle are appropriate for single loop conditions for that cycle.

- The postulated pump seizure accident, evaluated for SLO conditions, is calculated to have a less severe radiological release than the LOCA. The radiological consequences of this postulated accident are bounded by the radiological evaluation performed by General Electric (GE) for the LOCA and are well within the 10 CFR 100 limits.

- The single loop ECCS analysis supports the use of the WNP-2 two loop MAPLHGR limits for ANF fuel when the reactor is operating in the SLO mode consistent with the flow dependent MCPR curve (1.35 at 50 percent of rated flow). Single loop operation of WNP-2 with the two loop ANF fuel MAPLHGR limits assures that the emergency core cooling systems for the WNP-2 plant will meet the U.S. NRC acceptance criteria of 10 CFR 50.46 for loss-of-coolant accident breaks up to and including the double-ended severance of a reactor coolant pipe.

The transient and pump seizure accident analyses are described in ANF-87-119 and the LOCA analyses are described in ANF-87-118.

With a single recirculation loop in operation, the GE analyses supported continued operation with an increase of 0.01 in the MCPR safety limit. ANF performed a single loop MCPR safety limit calculation and found that less than one tenth of one percent of the rods to be in boiling transition which supports a MCPR safety limit of 1.07. Because of the similarity between the ANF and GE fuel types making up the core, and because of the similarity in the magnitude of the uncertainties which determine the MCPR safety limit, this small increase in the safety limit value can be used for operation with ANF fuel and single loop analyses. For Cycle 4 operation with both recirculation loops in operation, the MCPR safety limit is 1.06, which is the same value as was used for the previous cycles. For Cycle 4 operation with a single recirculation loop in service, the MCPR safety limit is 1.07, which is also the same value used for the previous cycles.

ANF-88-02
Issue Date: 1/15/88

WNP-2 CYCLE 4 RELOAD ANALYSIS

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Document Control (5)

ENCLOSURE 2

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SUPPLY SYSTEM/NRC - REGION V MANAGEMENT MEETING
JANUARY 18, 1990
WALNUT CREEK, CA

AGENDA

I.	INTRODUCTION	D. W. MAZUR	5 MIN
II.	SALP STATUS		
	* OVERVIEW OF OPERATIONS ACTIVITIES	C. M. POWERS	5 MIN
	* MAINTENANCE	R. L. WEBRING	60 MIN
	* OPERATIONS	C. M. POWERS	30 MIN
	* ENGINEERING TECHNICAL SUPPORT	J. P. BURN	30 MIN
	* SAFETY ASSESSMENT/ QUALITY VERIFICATION	G. D. BOUCHEY	30 MIN
III.	FASTENER ISSUES	C. M. POWERS	15 MIN
IV.	SUMMARY	A. L. OXSEN	10 MIN

OPERATIONS

* MAINTENANCE ENHANCEMENT PROGRAM
* TECH SPEC IMPROVEMENT PROGRAM
* TECHNICAL SUPPORT
* RADIOLOGICAL WORK PRACTICES/EFFLUENT MONITORING ISSUE
* ADHERENCE TO PROCEDURES
* EQUIPMENT OPERABILITY DETERMINATIONS

WNP-2 MAINTENANCE INITIATIVES

* DRIVEN BY:

  - NRC CONCERNS (SALP/SSOMI REPORTS)

    - o PROCEDURAL INADEQUACIES AND WEAKNESS RESULTING IN OVER-RELIANCE ON "SKILL OF THE CRAFT"

    - o WORK CONTROL PROCESS INADEQUACIES - DETAIL, CONTENT, RIGOR AND COMPLIANCE

    - o PLANT MATERIEL CONDITION INCLUDING WORK BACKLOG/DEFERRAL OF LONG-TERM CORRECTIVE MAINTENANCE

WNP-2 MAINTENANCE INITIATIVES

- SUPPLY SYSTEM MANAGEMENT PERSPECTIVE (FEEDBACK FROM INTERNAL AUDITS AND CONTRACTED AUDITORS) INCLUDING:
  - o SUPPLY SYSTEM QA MAINTENANCE ASSESSMENT
  - o INPO EVALUATION REPORT
  - o SUPPLY SYSTEM CONTRACTED AUDITS (IMPELL AND HARE)
  - o MAINTENANCE SELF-ASSESSMENT
  - o INCREASED EXPECTATIONS FOR MAINTENANCE BASED ON INDUSTRY TRENDS
- PERFORMANCE DURING AND FOLLOWING THE SPRING, 1989 OUTAGE
  - o SHUTDOWN COOLING ISOLATIONS
  - o REACTOR SCRAM RESULTING FROM PERSONNEL ERROR - 8/17/89
  - o OTHER PERSONNEL/PROCEDURE RELATED ERRORS

WNP-2 MAINTENANCE INITIATIVES

* CONCLUSIONS:
  - GENERAL CONSENSUS OF EVALUATION FINDINGS
  - NEED FOR IMPROVEMENT IN THOSE AREAS IDENTIFIED BY SALP/SSOMI
  - ADDITIONAL ISSUES FOR IMPROVEMENT INCLUDE:
    - o EXCESSIVE CONTROL ROOM DEFICIENCIES
    - o PREVENTIVE MAINTENANCE PROGRAM
    - o TRENDING OF EQUIPMENT FAILURES
    - o MAINTENANCE TRAINING
    - o CRAFT TASK ASSIGNMENT AND COORDINATION OF WORK ACTIVITIES
* FUNDING HAS BEEN ALLOCATED FOR THIS FISCAL YEAR AND IS PLANNED FOR FUTURE BUDGET CYCLES

PROCEDURE UPGRADE PLAN

* GOALS/OBJECTIVES

  - IMPROVE EXISTING PROCEDURES:

    CONTENT/LEVEL OF DETAIL

    TECHNICAL ACCURACY

    SETPOINTS/TOLERANCES

    TOOLING/TEST EQUIPMENT REQUIREMENTS

    WORKING CONDITIONS AND LIMITATIONS

  - IDENTIFY AND DEVELOP NEW PROCEDURES
  - INCORPORATE LESSONS LEARNED
  - INCORPORATE IN A COMMON FORMAT -- OTHER DEPARTMENTS AND INPO GUIDELINES
  - IMPROVE "HUMAN FACTORS" ELEMENT
  - INSTITUTE A VALIDATION AND VERIFICATION REVIEW - ALL PROCEDURES

PROCEDURE UPGRADE PLAN

* STAFFING STATUS

  - FULL STAFFING:
    1 SUPERVISOR AND 7 + WRITERS

  - CURRENTLY:
    1 SUPERVISOR AND 4 WRITERS

  - COMPRISED OF MAINTENANCE/
    CONTRACT ENGINEERS AND
    TECHNICIANS

  - FULL STAFFING BY 3/1/90 ALONG
    WITH COMPLETION OF FACILITY

  - STAFF ASSIGNMENTS WILL BE FULL
    TIME INCLUDING OUTAGES

PROCEDURE UPGRADE PLAN

* SCHEDULE
  - UPGRADES COMPLETE 1ST QUARTER 1992
  - PRIORITY ASSIGNED TO PREVIOUSLY IDENTIFIED CRITICAL AREAS (RCA/LERS/NOV)
  - PROCEDURES CRITICAL TO PLANNED PLANT EVOLUTIONS GIVEN PRIORITY (EG. EXCESS FLOW CHECK VALVE TESTING)
  - SURVEILLANCES UPGRADED IN CONJUNCTION WITH THE TECH SPEC IMPROVEMENT PROGRAM

PROCEDURE UPGRADE PLAN

* TO DATE

  - A REVERIFICATION HAS BEEN CONDUCTED TO ENSURE EACH TECH SPEC SURVEILLANCE REQUIREMENT HAS BEEN MET - NO DISCREPANCIES WERE IDENTIFIED

  - DETAILED REVIEWS OF SELECTED SURVEILLANCE PROCEDURES BY THE SUPPLY SYSTEM SSFI TEAM HAVE DETERMINED THAT TECH SPEC REQUIREMENTS ARE ADEQUATELY ADDRESSED AND DOCUMENTED.

PROCEDURE WRITER'S GUIDE/HUMAN FACTORS PLAN FOR WNP-2

* SHORT TERM - UTILIZE THE MAINTENANCE PROCEDURE WRITER'S GUIDE WHICH INCORPORATES INPO GUIDELINES

  - PROVIDE EACH WRITER WITH HUMAN FACTORS PRINCIPLE'S TRAINING

  - PROVIDE EACH WRITER WITH TRAINING ON THE EXISTING WRITER'S GUIDE

PROCEDURE WRITER'S GUIDE/HUMAN FACTORS PLAN FOR WNP-2

* LONG TERM - DEVELOP AND IMPLEMENT THE WNP-2 WRITER'S GUIDE

  - APPLICABLE TO MAINTENANCE AND OPERATIONS WITH SOME DEPARTMENT-SPECIFIC GUIDELINES
  - COMPLETE AND AVAILABLE FOR USE BY 4/1/90
  - UTILIZE LESSONS LEARNED FROM INDUSTRY EOP AUDITS AND UPGRADE PROCESS
  - ESTABLISH METHODOLOGY FOR PERFORMING VERIFICATION AND VALIDATION OF PLANT PROCEDURES
  - WILL HELP TO ENSURE:
    TECHNICAL ACCURACY
    INCORPORATION OF HUMAN FACTORS PRINCIPLES
    PROCEDURE USEABILITY
    OPERATIONAL CORRECTNESS

PROCEDURE COMPLIANCE

* I & C SURVEILLANCE EFFORT, R-4 TO PRESENT

  - CRITICAL SURVEILLANCES INITIALLY LIMITED TO SPECIFIC CRAFT
  - FULL TIME SUPERVISION OF CRITICAL SURVEILLANCES
  - IN-DEPTH REVIEW OF SURVEILLANCE PRACTICES
  - INTERVIEWS OF CRAFT, SUPERVISION, ENGINEERS
  - DEVELOPED A DETAILED SURVEILLANCE WORK PRACTICE DOCUMENT
  - TRAINING CONDUCTED BY THE I & C SUPERVISOR WITH EACH TECHNICIAN
  - ELIMINATED REQUIREMENT FOR FULL-TIME SUPERVISION OF SURVEILLANCE ACTIVITIES

PROCEDURE COMPLIANCE

* IMPROVED PROCEDURES

  - TECHNICIAN FEEDBACK ON PROCEDURAL INADEQUACIES HAS INCREASED DRAMATICALLY

  - TECHNICIANS UNWILLING TO "MAKE" A PROCEDURE WORK - REQUIRING DEVIATIONS OR REVISIONS TO REMOVE ERRORS

  - PROCEDURE IMPROVEMENTS INCLUDE HUMAN FACTOR ELEMENTS

PROCEDURE COMPLIANCE

* DISCIPLINE FOR COMPLIANCE PROBLEMS

  - DISCIPLINE INCLUDING TIME OFF WITHOUT PAY, PERSONNEL LETTERS ON FILE AND LIMITATIONS ON WORK ASSIGNMENTS HAVE BEEN ENACTED

  - DRIVEN HOME THE MESSAGE OF PROCEDURAL COMPLIANCE

PREVENTIVE MAINTENANCE PROGRAM UPGRADE

* PHASE I REVIEW

  - GOALS AND OBJECTIVES

    - o COORDINATE PM ACTIVITIES WITH ONGOING CORRECTIVE MAINTENANCE
    - o MINIMIZE INEFFICIENCIES IN THE EXISTING PM PROGRAM
    - o ELIMINATE MULTIPLE VISITS TO COMPONENTS
    - o ELIMINATE TIME DEPENDENT ACTIVITIES THROUGH CONDITION MONITORING
    - o SUPPORT THE PHASE II EFFORT IN IMPLEMENTATION
    - o DEVELOP SUPPLY SYSTEM READINESS TO CONTINUE RCM APPLICATION AT CONTRACT END
    - o PROVIDE ENGINEERING SUPPORT OF THE PHASE II EFFORT VIA PERFORMING THE PRA ANALYSES OF PLANT SYSTEMS
    - o ESTABLISH A SUPPLY SYSTEM REVIEW TEAM

PREVENTIVE MAINTENANCE PROGRAM UPGRADE

* PHASE I REVIEW

  - STAFFING

    - o FULL STAFFING LEVEL:
      1 SUPERVISOR AND 4 REVIEWERS
    - o CURRENT STAFFING:
      1 SUPERVISOR AND 3 REVIEWERS
    - o COMPRISED OF MAINTENANCE/CONTRACT ENGINEERS AND SELECTED CRAFT PERSONNEL
    - o FULL STAFFING BY 3/1/90
    - o STAFF ASSIGNMENTS WILL BE FULL TIME
    - o EFFORT WILL CONTINUE FOR A MINIMUM OF 2 YEARS

PREVENTIVE MAINTENANCE PROGRAM UPGRADE

* PHASE II REVIEW

  - GOALS AND OBJECTIVES

    - o IMPROVE THE EFFICIENCY AND EFFECTIVENESS OF APPLIED MAINTENANCE EFFORTS

    - o REDUCE PROGRAM SCOPE THROUGH DIRECTED EFFORTS AT CRITICAL COMPONENTS WHERE PERFORMANCE CAN BE INFLUENCED BY PM OR WHERE FAILURE MEASURABLY IMPACTS PLANT SAFETY OR AVAILABILITY

PREVENTIVE MAINTENANCE PROGRAM UPGRADE

* PHASE II REVIEW

  - RELIABILITY CENTERED MAINTENANCE APPROACH

    - o EVALUATION OF ALL WNP-2 SYSTEMS
    - o APPLY RCM TO SELECTED SYSTEMS
    - o UTILIZE SYSTEM PRA ANALYSES, EQUIPMENT HISTORY, INDUSTRY HISTORY, PLANT ENVIRONMENTAL AND SERVICE CONDITIONS, SAFETY SIGNIFICANCE AND VENDOR RECOMMENDATIONS TO DEVELOP COMPONENT RECOMMENDATIONS
    - o DEVELOP REVISED PROGRAM FOR PLANNED MAINTENANCE, CONDITION MONITORING, COMPONENT REPLACEMENT, AND IDENTIFY RECOMMENDED DESIGN CHANGES
    - o DEVELOP PROCEDURES TO SUPPORT RECOMMENDED ACTIVITIES
    - o DEVELOP A LIVING RCM PROGRAM TO BE CONDUCTED BY THE SUPPLY SYSTEM

PREVENTIVE MAINTENANCE PROGRAM UPGRADE

* PHASE II REVIEW
  - SCHEDULE
    - o PRE-SELECTION OF 5 POTENTIAL CONTRACTORS FROM A FIELD OF 17 COMPLETED
    - o REQUEST FOR PROPOSALS TO BE ISSUED 1/19/90
    - o NEGOTIATIONS AND RECOMMENDATIONS FOR AWARD IN MARCH, 1990
    - o CONTRACT AWARD SCHEDULED FOR APRIL
    - o MOBILIZATION ON SITE AS EARLY AS MAY
    - o RCM REVIEW PERIOD APPROXIMATELY 2 YEARS

PREVENTIVE MAINTENANCE PROGRAM UPGRADE

* PHASE II REVIEW

  - STAFFING

    - o 7 MEMBER SELECTION PANEL APPOINTED TO GUIDE PROCUREMENT
    - o PHASE I STAFF IN PLACE TO SUPPORT CONTRACT EFFORTS
    - o SUPPLY SYSTEM ENGINEERING CURRENTLY WORKING ON WNP-2 PRA ANALYSES
    - o CONTRACTOR STAFFING TO INCLUDE A MINIMUM OF 15 PEOPLE

WORK PROCESS IMPROVEMENTS

* APPROACH
  - ASSIGNMENT OF A MAINTENANCE SUPERVISOR, FULL TIME FOR 3+ MONTHS
  - REVIEW OF THE PROCESS FOR 5 OTHER UTILITIES
  - REVIEW CONCERNS OF NRC/INPO/INTERNAL AUDITS
  - CONSIDERED KNOWN INEFFICIENCIES COMMON TO WNP-2 USERS

WORK PROCESS IMPROVEMENTS

* GOALS
  - REDUCE DEPENDENCY ON "SKILL OF THE CRAFT"
  - IMPROVE PACKAGE CLARITY - AVOID MISUNDERSTANDINGS
  - ADDRESS HUMAN FACTORS PRINCIPLES IN PACKAGING
  - ACHIEVE INCREASED CRAFT ACCOUNTABILITY
  - DEVELOP COMMONALITY OF CONTENT AND FORMAT
  - IMPROVE WORK DOCUMENTATION AND FEEDBACK FROM CRAFT PERSONNEL
  - INCREASE EFFICIENCY IN WORK IMPLEMENTATION THROUGH MORE ACCURATE DETAILED INSTRUCTIONS TO THE CRAFT

WORK PROCESS IMPROVEMENTS

* WORK PACKAGING AND TRAINING

  - DEVELOP STANDARDS FOR PACKAGES (EG. TOOLING, PARTS, SETPOINTS, TOLERANCES, SETTINGS)

  - REQUIRE PARTS STAGING AND DOCUMENT INCORPORATION INTO EACH PACKAGE.

  - UTILIZE A COMMON FORMAT TO ASSIST IN THE REVIEW AND IMPLEMENTATION OF THE PACKAGE

  - DEVELOP AND IMPLEMENT A TRAINING PROGRAM PRIOR TO IMPLEMENTATION

WORK PROCESS IMPROVEMENTS

* TRANSITION TO COMPUTER DEVELOPED PACKAGES
  - ONE SHOP CURRENTLY CONVERTING TO PC DEVELOPED PACKAGES
  - NEW PROCESS BEING DEVELOPED TO COMPLEMENT PC DEVELOPED PACKAGES
  - REMAINING MAINTENANCE SHOPS WILL CONVERT TO PC DEVELOPED PACKAGES WITHIN THE YEAR

WORK PROCESS IMPROVEMENTS

* SCHEDULE
  - PROCEDURE DRAFT BY THE END OF JANUARY 1990
  - PROCEDURE POC APPROVAL BY MID FEBRUARY 1990
  - TRAINING COMPLETE AND IMPLEMENT BY MARCH 1990

WORK CONTROL PROGRAM

* GOALS

  - IMPLEMENT A "DEMAND SCHEDULE" SUPPORTING GOALS, NEEDS AND PRIORITIES OF THE PLANT

  - IMPLEMENT AN EFFECTIVE "WORK COORDINATION FUNCTION" TO SUPPORT DEMAND SCHEDULE

WORK CONTROL PROGRAM

* IMPROVE THE "READY TO WORK" PROCESS
  - INCREASE COMMITMENT AND ACCOUNTABILITY FOR WORK PACKAGE PREPARATION
  - INCREASE EMPHASIS WITHIN SUPPORT ORGANIZATIONS FOR ACHIEVING "READY TO WORK" STATUS

WORK CONTROL PROGRAM

* COORDINATION IMPROVEMENT

  - IMPROVE METERING OF WORK TO THE CONTROL ROOM - DECREASE CHALLENGES TO PLANT

  - DEVELOP MANAGEMENT FEEDBACK

  - INCREASE ACCOUNTABILITY ACROSS DISCIPLINES

  - INCREASE COORDINATION BETWEEN MAINTENANCE AND SUPPORT ORGANIZATIONS

  - HELP ELIMINATE BARRIERS WHICH SLOW OR STOP PLANNED WORK

WORK CONTROL PROGRAM

* ORGANIZATION STRUCTURE AND STAFFING
  - CHARTERED IN DECEMBER, 1989
  - IMPLEMENT IN FEBRUARY, 1990
  - NEW GROUP WITH A FULL TIME SUPERVISOR IN THE PLANNING & SCHEDULING DEPARTMENT
  - TOTAL OF 9 MEMBERS, AT LEAST 6 IN A FULL TIME STATUS
  - INITIALLY HEADED BY THE ASSISTANT OPERATIONS MANAGER
  - STAFFED BY HAND-PICKED INDIVIDUALS FROM EACH DEPARTMENT, INCLUDING THOSE WHO CURRENTLY HOLD SUPERVISORY POSITIONS

WORK CONTROL PROGRAM

* REQUESTED INPO ASSISTANCE

  - SS REQUESTED AN INPO ASSIST VISIT DIRECTED AT WORK CONTROL
  - TEAM WILL BE ON-SITE THE FIRST OF FEBRUARY
  - GOAL TO OBTAIN CRITICAL AND TIMELY COUNSELING DURING THE START-UP PHASE OF THIS EFFORT

DEFERRAL OF LONG TERM CORRECTIVE MAINTENANCE/ PLANT MATERIEL CONDITION/BACKLOG REDUCTION

* CORRECTION OF LONG STANDING ISSUES
  - MSIV GALLING REPAIRS COMPLETE IN SPRING 1990 OUTAGE
  - SRV VACUUM BREAKER LEAKAGE REPAIRED, CONTAINMENT UNIDENTIFIED LEAKAGE BELOW .5 GPM
  - SRV REBUILD PROGRAM ONGOING WITH COMPLETION PLANNED IN 1991
  - REPLACEMENT OF THE RILEY LEAK DETECTION MODULES IN 1989
  - REPLACEMENT OF ALL MAIN TURBINE LOW PRESSURE ROTORS IN 1991

DEFERRAL OF LONG TERM CORRECTIVE MAINTENANCE/ PLANT MATERIEL CONDITION/BACKLOG REDUCTION

* ATTENTION TO GENERIC CONCERNS

  - INITIATING A LIVE-LOAD VALVE PACKING PROGRAM IN CONTAINMENT IN 1990

  - MOV UPGRADE PROGRAM ONGOING FOR ALL PLANT MOVs

  - MOV DESIGN BASIS TESTING PROGRAM UNDERWAY - GENERIC LETTER 89-10

  - CRD HCU VALVE REFURBISHMENT EFFORT BEGINNING IN 1990

DEFERRAL OF LONG TERM CORRECTIVE MAINTENANCE/ PLANT MATERIEL CONDITION/BACKLOG REDUCTION

* ONGOING ISSUES
  - SEMI-ANNUAL PLANT CLEANUP EFFORT ESTABLISHED
  - BACKLOG REDUCTION PROGRAM INSTITUTED FOR MWRs/PMs
  - INCREASED VISIBILITY OF LONG STANDING PROBLEMS THROUGH THE PLANT WEEKLY REPORT
  - ONGOING PAINTING PROGRAM

WNP-2 EQUIPMENT TRENDING PROGRAMS

* PERFORMANCE MONITORING

  - ON-GOING PROGRAM SHARED BETWEEN PLANT TECHNICAL/PLANT MAINTENANCE
  - BASED ON VIBRATION MONITORING, OIL ANALYSIS, TRENDING OPERATIONAL PARAMETERS, THERMOGRAPHY, MOVATS
  - PROVIDES HISTORY FOR TECH SPEC/ASME COMPONENT TRENDS
  - PROVIDES A HISTORY OF SELECTED PLANT COMPONENT OPERATIONAL PARAMETERS AT GIVEN FREQUENCIES
  - HELPS IDENTIFY PROBLEMS BEFORE THE FAILURE STAGE IS REACHED

WNP-2 EQUIPMENT TRENDING PROGRAMS

* EQUIPMENT FAILURE TRENDING
  - NEWLY INSTITUTED IN MAINTENANCE
  - PERFORMED ON A 6 MONTH FREQUENCY - REVIEW OF PLANT FAILURE HISTORY
  - REQUIRES DETAILED REVIEW OF COMPONENTS WHICH EXCEED 20 FAILURES IN PLANT LIFE, 3 IN THE PAST 12 MONTHS OR SHOW AN INCREASING TREND
  - RECOMMENDATIONS FOR INCREASED CONDITION MONITORING, REVISED WORK PRACTICES, EQUIPMENT CHANGEOUT RESULT FROM THE REVIEW
  - PROVIDES A HARD COPY REPORT FOR EQUIPMENT HISTORY ON RESULTS OF THE EVOLUTION

WNP-2 EQUIPMENT TRENDING PROGRAMS

* FUTURE IMPROVEMENTS

  - RCM RECOMMENDATIONS FOR CONDITION MONITORING WILL ESTABLISH THE BASIS OF THE PERFORMANCE MONITORING PROGRAM

  - IMPROVEMENTS IN WORK PROCESS (MWR) PROGRAM WILL RESULT IN MORE DETAILED AND ACCURATE FAILURE DATA

MAINTENANCE/TRAINING INITIATIVES

* GOALS AND OBJECTIVES

  - RE-EVALUATION IN PROCESS TO ESTABLISH PERFORMANCE BASED OBJECTIVES AND MEASURES OF MAINTENANCE ACTIVITIES

  - RESTRUCTURING OF THE EXISTING TRAINING PROGRAM WILL FALL OUT OF THIS RE-EVALUATION

MAINTENANCE/TRAINING INITIATIVES

* JOB AND TASK ANALYSIS (JTA)
  - SUPPLY SYSTEM CONTRACTED (AUGUST, 1989) JOB AND TASKS ANALYSIS OF THE 3 MAINTENANCE DISCIPLINES
  - PRODUCTS WILL INCLUDE: TRAINING OBJECTIVES, JOB PERFORMANCE MEASURES, AND INSTRUCTIONAL SEQUENCING
  - RESULT WILL BE TO DEVELOP THE BASIS FOR FUTURE TRAINING PROGRAMS BASED ON ACTUAL TASKS REQUIRED
  - SCHEDULED TO COMPLETE IN JUNE, 1990

MAINTENANCE/TRAINING INITIATIVES

* ON THE JOB TRAINING (OJT)
  - TASK IS TO: 1) EVALUATE TRAINING PERFORMANCE 2) ASSIST IN OJT 3) SERVE AS PLANT POINT OF CONTACT WITH TRAINING
  - THREE FULL TIME TRAINERS HIRED AND ASSIGNED
  - REMOVES THIS BURDEN FROM THE MAINTENANCE SUPERVISOR

MAINTENANCE/TRAINING INITIATIVES

* QUALITY ASSESSMENT TEAM (QAT)
  - CHARTERED BY THE SUPPLY SYSTEM QUALITY COUNCIL
  - TASKED WITH IDENTIFYING ISSUES CRITICAL TO THE SUCCESSFUL IMPLEMENTATION OF THE MANY CHANGES UNDERWAY IN MAINTENANCE/TRAINING
  - CHAIRED BY THE MANAGER OF MAINTENANCE TRAINING
  - 8 MEMBERS FROM VARIOUS LEVELS WITHIN MAINTENANCE AND TRAINING

MAINTENANCE/TRAINING INITIATIVES

* MAINTENANCE ASSIGNMENT OF PERSONNEL
  - GOAL TO CLARIFY THE BASIS OF CRAFT WORK ASSIGNMENT
  - CONVERTING TO COMPUTER BASED SYSTEM FOR IDENTIFYIN CRAFT TRAINING
  - ESTABLISH FORMAL DOCUMENTATION OF CRAFT QUALIFICAT BASIS
  - ASSURE PERSONNEL QUALIFICATIONS BY DEMONSTRATED PERFORMANCE
  - INCORPORATE THIS REVISED PROCESS INTO THE WORK PLANNING EFFORT
  - FULLY IMPLEMENT BY 3/1/90

MAINTENANCE MANAGEMENT/SUPERVISORY REALIGNMENT

* GOAL

  - IMPROVE WORK CONTROL, PACKAGE PREPARATION AND TASK ACCOUNTABILITY IN EACH DISCIPLINE SHOP

MAINTENANCE MANAGEMENT/SUPERVISORY REALIGNMENT

* ACTION TAKEN

  - SHOP RESTRUCTURING - ADDITION OF WORK CONTROL AND ENGINEERING SUPERVISORS
  - ASSIGNMENT OF HAND-PICKED, EXEMPT CRAFT SUPERVISORS IN EACH SHOP
  - ASSIGNMENT OF PARTS/MATERIALS HANDLERS AND SHOP PLANNERS IN EACH SHOP
  - PROVIDES THE ORGANIZATIONAL STRUCTURE NECESSARY IN TAKING THE NEXT STEPS IN MAINTENANCE IMPROVEMENT

CONTROL ROOM DEFICIENCY REDUCTION PROGRAM

* GOAL

  - REDUCE THE NUMBER OF DEFICIENCIES TO 50 BY 1/1/90

  - REDUCE THE NUMBER OF DEFICIENCIES TO 25 AT THE END OF THE SPRING 1990 OUTAGE

CONTROL ROOM DEFICIENCY REDUCTION PROGRAM

* ACTIONS TAKEN

  - MANAGEMENT "WHITE PAPER" DEVELOPED OUTLINING PROGRAM ELEMENTS

    - o ASSIGNMENT OF A NEW PRIORITY WORK CLASS BETWEEN 1 AND 2
    - o REQUIRE WORK INSTRUCTION COMPLETION WITHIN 3 DAYS OF PROBLEM INDENTIFICATION
    - o SCHEDULE TO WORK JOBS WITHIN 3 DAYS OF ACHIEVING RTW STATUS
    - o EXPEDITE PARTS PROCUREMENT
    - o UTILIZE SHOP OVERTIME AS NECESSARY
    - o INCREASE DESIGN CHANGE PRIORITY WITHIN ENGINEERING

CONTROL ROOM DEFICIENCY REDUCTION PROGRAM

* RESULTS TO DATE/PLANS
  - NUMBER OF DEFICIENCIES LOWERED TO 74 FROM 94 IN OCTOBER
  - 53 TASKS ARE CURRENTLY OUTAGE-RELATED
  - ENGINEERING WILL COMPLETE THE DESIGN FOR OVER 20 PACKAGES PRIOR TO R-5
  - THE POST R-5 GOAL IS STILL ACHIEVABLE

TECHNICAL SPECIFICATION IMPROVEMENT PROGRAM

* COMPLETE REWRITE OF LCOs; EXPANSION OF BASES
* PROCEDURE TO REQUIREMENT CROSS-CHECK
* SSFI REVIEW OF APPLICABLE PROCEDURES
* MODE CHANGE SURVEILLANCE REVIEW
* VALIDATION AND VERIFICATION ON REVISED PROCEDURES

TECHNICAL SUPPORT

* ADDED RESOURCES FOR BACKLOG REDUCTION EFFORTS AND SYSTEM ENGINEERING SUPPORT
* COMPLIANCE SUPPORT FOR REPORTABLITY DETERMINATIONS FOR OPERATIONS
* TECHNICAL STAFF TRAINING COURSES ON:
  - 10 CFR 50.59
  - ROOT CAUSE ASSESSMENTS
  - PROJECT MANAGEMENT
  - PMRs
  - MWR WORK PACKAGE PREPARATION
  - PMT
* IMPROVED LONG RANGE PLANNING
* DEVELOPED A JOINT TECH STAFF/ GENERATION ENGINEERING SYSTEM WALKDOWN PROCESS

IMPROVEMENTS IN RADIOLOGICAL WORK PRACTICES

* IMPROVED ROR IDENTIFICATION, ROOT CAUSE ASSESSMENTS & TRENDING OF RESULTS

* ESTABLISHED HP SPONSOR PROGRAM

* HP SUPERVISION ASSISTS IN RAD. REFRESHER TRAINING COURSES

* DEVELOPING MORE MOCK-UP TRAINING FOR CRAFTS

* CONDUCTING STRENGTHENED ALARA PRE-JOB BRIEFINGS

* IMPROVED RAD. WORK PRACTICES EMPHASIZED BY CRAFT SUPERVISION, FIELD WALKDOWNS

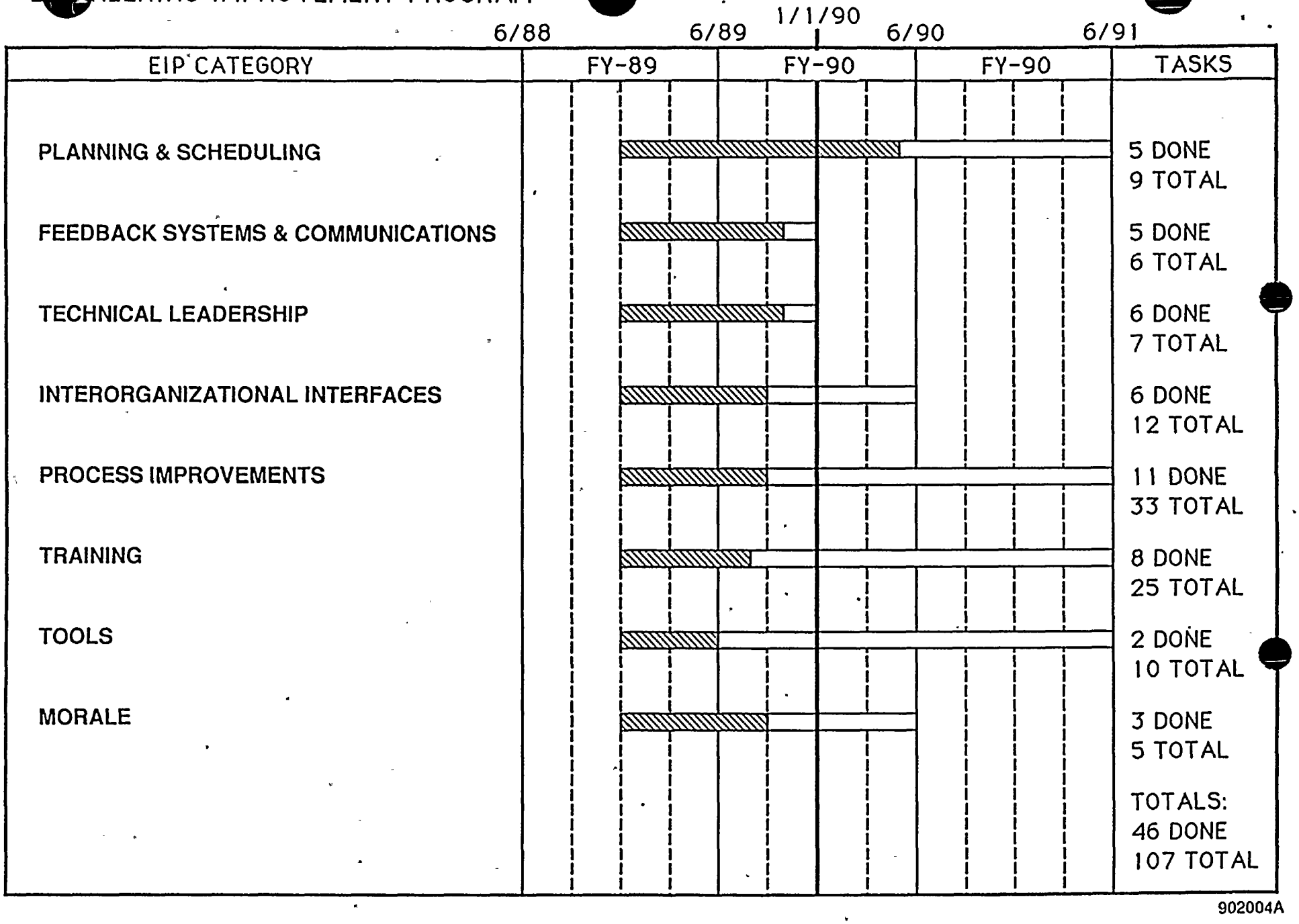
* HP SPONSORED NUMEROUS DOSE REDUCTION INITIATIVES
  - CRD ROOM MODS
  - SYSTEM FLUSHES
  - MODIFIED SHUTDOWN SEQUENCES

* PERFORMANCE INDICATORS PROVIDE POSITIVE FEEDBACK

ADHERENCE TO PROCEDURES

* TQA AND QAT - TRAINING ON QUALITY IMPROVEMENTS
* PER PROCESS
  - HPES
  - PEER
  - ROOT CAUSE
* DISCIPLINE
* SURVEILLANCE WORK DOCUMENT/TRAINING

E[illegible]NEERING IMPROVEMENT PROGRAM



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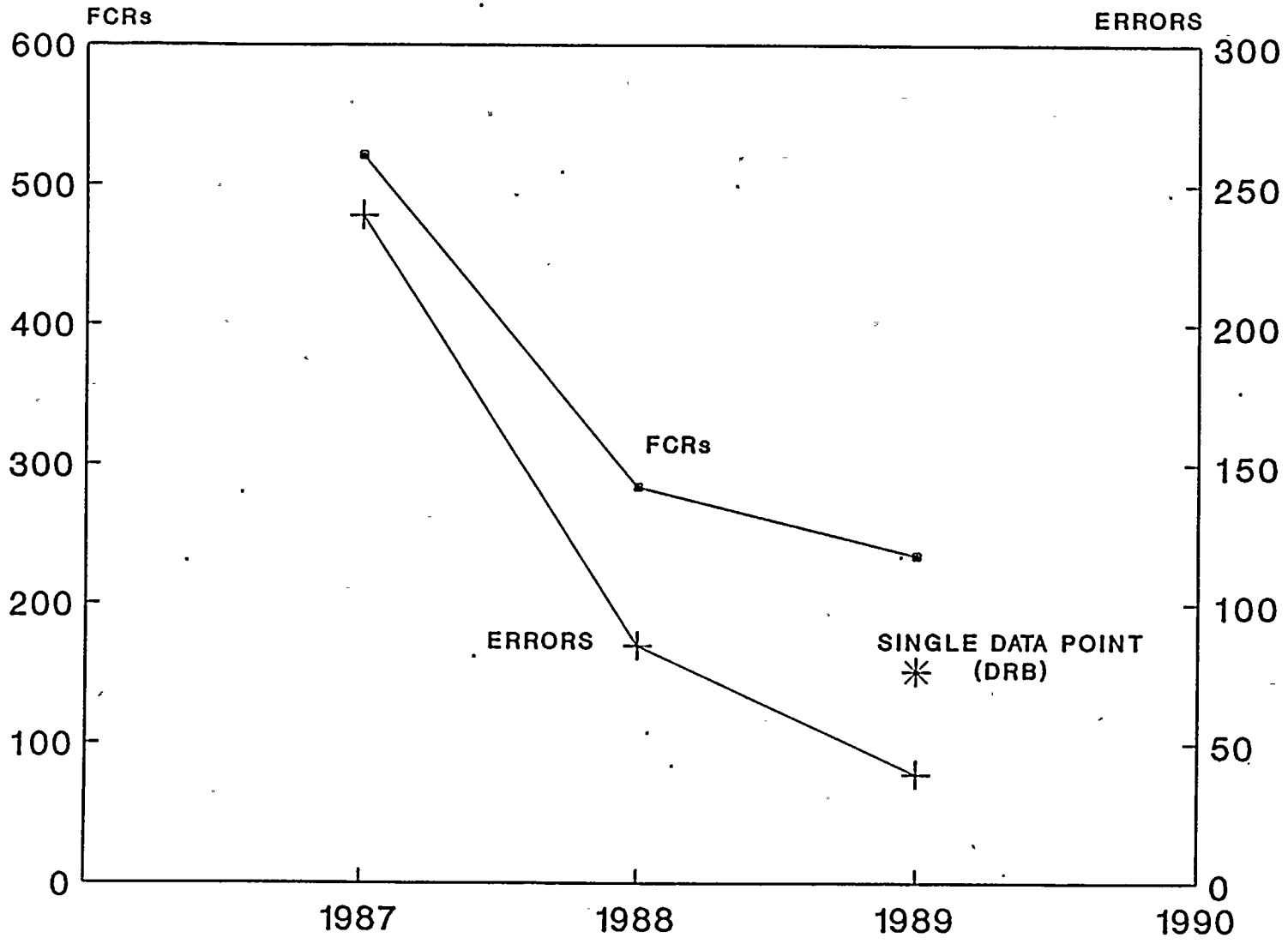
LEGEND: SCHEDULE PERCENT ACHIEVED TODAY

ENGINEERING IMPROVEMENT PROGRAM EFFECTIVENESS



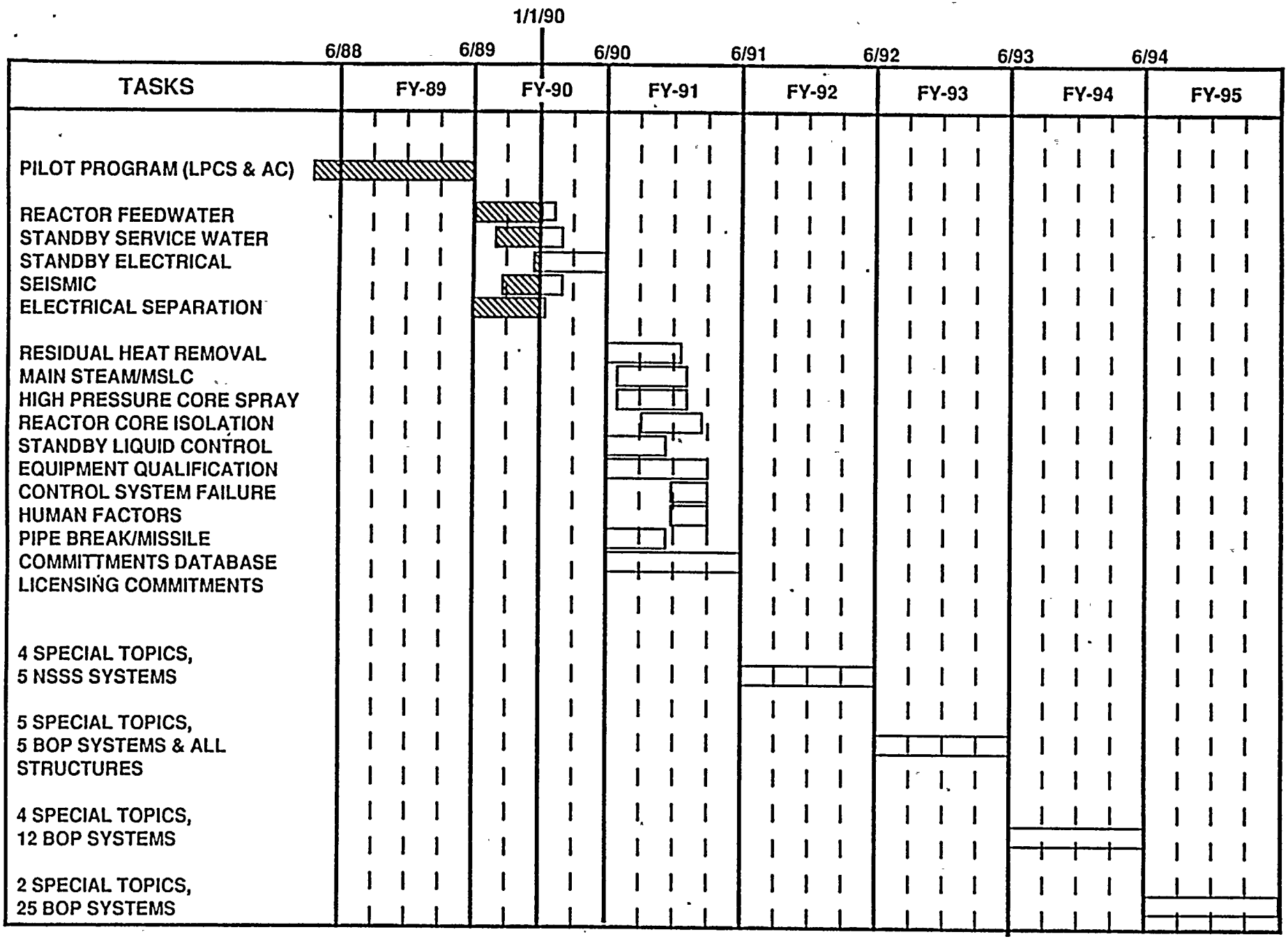
ENGINEERING IMPROVEMENT PROGRAM EFFECTIVENESS
QUALITY CIRCLE RESULTS

DESCRIPTION	TECHNICAL MERIT	CONSTRUCT-ABILITY	MOD TEST & OPERABILITY	WALKDOWN EFFECTIVENESS
BDC 86-0617 IN-1 INVERTER	5.0	5.0	4+	4.0
BDC 86-0273 FW HTR DUAL LEVEL CONTROL	5.0	4.0	4.8	4.0
BDC 84-0542-1 RRC PUMP SEAL FLOW INSTRUMENTATION	NOT EVALUATED	2.5	3.0	5.0

LEGEND

1.0 - UNSATISFACTORY
2.5 - AVERAGE
5.0 - EXCELLENT

DESIGN REQUIREMENTS PROGRAM



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ELECTRICAL WIRING DIAGRAMS

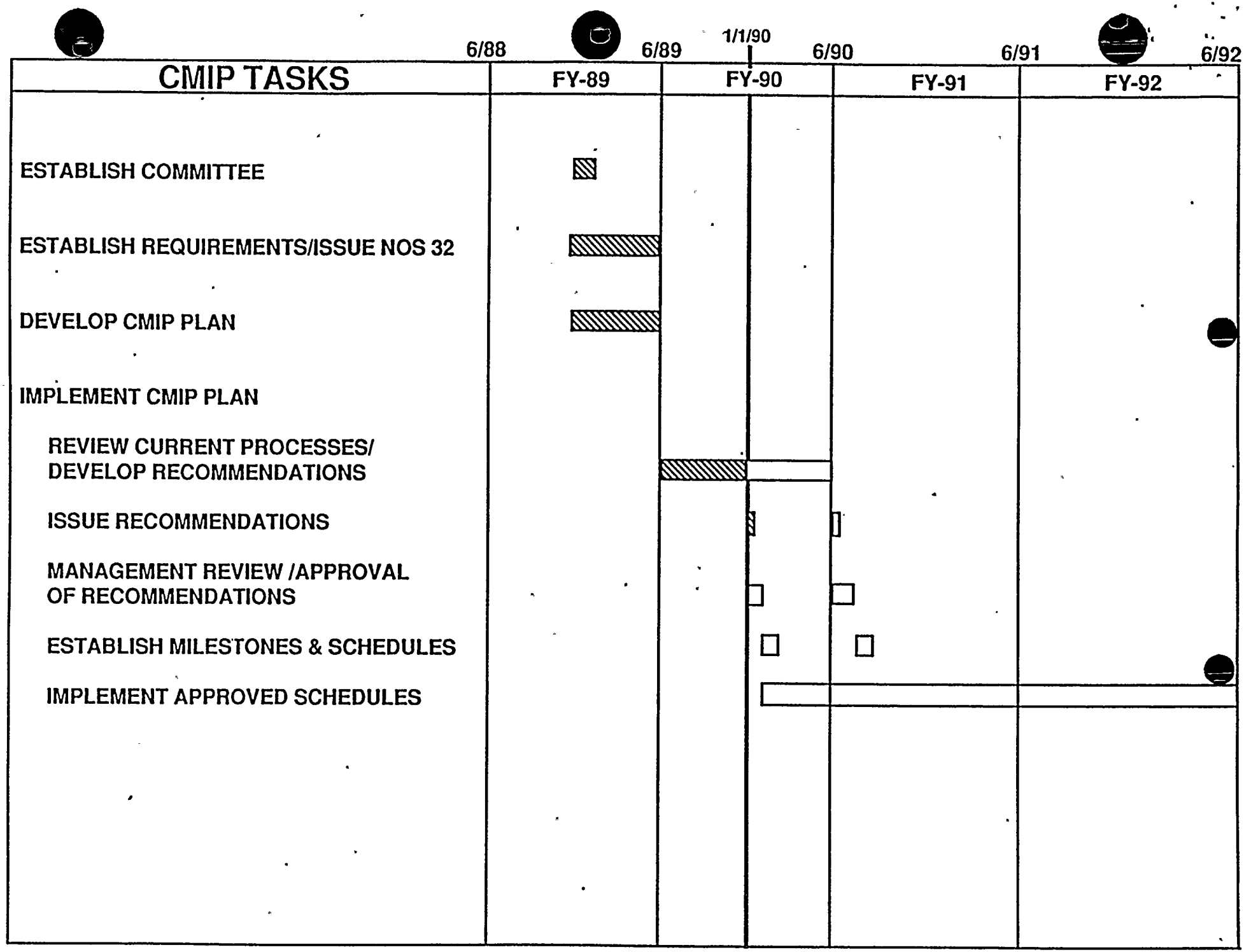
*	EWD'S COMPLETE	
	- MOV'S	463
	- SYSTEM LEVEL	240
	TOTAL	703
*	EWD'S PLANNED NEXT 6 MOS	330
*	EWD'S PLANNED FY - 1991	330

CONFIGURATION MANAGEMENT IMPROVEMENT PROGRAM (CMIP)

* PURPOSE

  - ESTABLISH THE REQUIREMENTS FOR CONFIGURATION MANAGEMENT, I.E., THOSE REQUIREMENTS WHICH WOULD ENSURE PLANT HARDWARE COMPLIES WITH AND IS ACCURAT REFLECTED IN PLANT DOCUMENTS

  - DEVELOP AND IMPLEMENT A PLAN TO
    - o REVIEW CURRENT ORGANIZATIONAL WORK PROCESSES TO THE ESTABLISHED REQUIREMENTS
    - o PROVIDE RECOMMENDATIONS FOR IMPROVEMENTS


6/88
6/89
1/1/90
6/90
6/91
6/92
CMIP TASKS
FY-89
FY-90
FY-91
FY-92
ESTABLISH COMMITTEE
ESTABLISH REQUIREMENTS/ISSUE NOS 32
DEVELOP CMIP PLAN
IMPLEMENT CMIP PLAN
REVIEW CURRENT PROCESSES/ DEVELOP RECOMMENDATIONS
ISSUE RECOMMENDATIONS
MANAGEMENT REVIEW /APPROVAL OF RECOMMENDATIONS
ESTABLISH MILESTONES & SCHEDULES
IMPLEMENT APPROVED SCHEDULES
LEGEND:
SCHEDULE
PERCENT ACHIEVED
902004

SETPOINT PROGRAM

TASK		PLAN	STATUS
1.0	IDENTIFY HARSH ENVIRONMENT EQUIPMENT	10/31/89	COMPLETE
2.0	PERFORM SAFE SHUTDOWN ANALYSIS	12/31/89	COMPLETE
3.A	REVISE METHODOLOGY USING ISA RP67.04	12/31/89	COMPLETE
3.B	TABULATE TESTED SETPOINT ACCURACY FROM EQ DATA	12/31/89	COMPLETE
3.C	RECALCULATE SETPOINTS	3/31/90	BEHIND SCHEDULE
4.0	RESOLVE SETPOINT OPERATIONAL PROBLEMS	6/30/90	NOT STARTED
5.0	REVISE PROCEDURES/RECALIBRATE EQUIPMENT	8/1/90	NOT STARTED

SAFETY ASSESSMENT/QUALITY VERIFICATION

* SALP ISSUES
  - "AGGRESSIVENESS" OF OVERSIGHT GROUPS/RESPONSIVENESS IN RESOLVING PROBLEMS
  - ORGANIZATION/STAFFING QUALIFICATIONS
  - ROOT CAUSE PROGRAM EFFECTIVENESS
  - QUALITY OF LICENSING SUBMITTALS

SAFETY ASSESSMENT/QUALITY VERIFICATION

* OVERALL PROGRAM STATUS/DIRECTION
  - QUALITY IMPROVEMENT
  - NUCLEAR SAFETY PROGRAMS
  - PROCUREMENT QA
  - QA/QC

EFFECTIVENESS ASSESSMENT

* PLANS APPROVED BY QUALITY COUNCIL (DIRECTOR)
* STATUS REVIEWED MONTHLY BY QUALITY COUNCIL
* RESULTS REPORTED TO QUALITY COUNCIL
* EXPERT CONSULTANTS IN SOME CASES

EFFECTIVENESS ASSESSMENT

CATEGORY		STATUS/SCHEDULE
1)	CHEMISTRY	DRAFT COMPLETE Q COUNCIL BRIEFING 2/90
2)	EMERGENCY PREPAREDNESS	2/90
3)	ENGINEERING/TECH SUPPORT	FOUR PHASE PLAN (8/90)
4)	INDUSTRIAL SAFETY	MULTIPHASE PLAN (12/90)
5)	MAINTENANCE/SURVEILLANCE	TWO PHASE PLAN (4/90 AND 1/91)
6)	OPERATING EXPERIENCE REVIEWS	THREE PHASES (2 COMPLETE) LAST PHASE SCHEDULED (4/90)
7)	OPERATIONS	SCHEDULED (2/90)
8)	ORG AND ADMIN.	MULTIPHASE PLAN (6/90)
9)	OUTAGE MANAGEMENT	SCHEDULED (9/90)
10)	RADIOLOGICAL PROTECTION	COMPLETED (11/89)
11)	SAFETY ASSURANCE/QUALITY	PLAN UNDER DEVELOPMENT
12)	SECURITY	SCHEDULED 2/90
13)	TRAINING AND QUALIFICATION	PLAN UNDER DEVELOPMENT

1989 ASSESSMENT STATISTICS

	NUMBER
* NUCLEAR SAFETY	
- INDUSTRY OPERATING EXPERIENCE REVIEWS:	490
- NUCLEAR SAFETY/ENGINEERING ASSESSMENTS:	28
- MAJOR TEAM INSPECTIONS (SSFI, SSOMI):	2
* QUALITY ASSURANCE	
- CORPORATE QA AUDITS:	15
- WNP-2 QUALITY SURVEILLANCES:	96
- OFF-SITE VENDOR AUDITS/REVIEWS:	71
* QUALITY CONTROL INSPECTIONS	
- MWRs REVIEWED:	5,994
- MWRs ASSIGNED INSPECTION "HOLD POINTS":	1,294
- OTHER INSPECTIONS:	161
- RECEIVING INSPECTIONS (LINE ITEMS):	8,405
* TOTAL NUMBER OF QUALITY FINDINGS	
- QFRs ISSUED:	289*

* INCLUDES 33 FINDINGS ASSOCIATED WITH SSFI ISSUED AS PERS

ORGANIZATION/STAFF QUALIFICATION

1) ORGANIZATION IMPROVEMENTS COMPLETE

2) STAFF INCREASED IN FY 90

3) RECRUITING SUCCESS

INTERNAL	8
EXTERNAL	14
TOTAL	22

4) OPERATIONAL EXPERIENCE (NRC LICENSES & CERTIFICATES)

* 19 INDIVIDUALS
* SROs

WNP-2	6
COMMERCIAL BWRs	11
OTHER	5

* ROs 12

TOTAL 34

5) EDUCATIONAL QUALIFICATIONS

* ADVANCED DEGREES — 7 INDIVIDUALS (10 DEGREES)
* ENGR OR SCIENCE — 33 INDIVIDUALS (43 DEGREES)
* CERTIFIED PEs — 17 INDIVIDUALS

6) USE OF OUTSIDE EXPERTS

* CONSULTANTS
* UTILITY TRADES
* INTERNAL ASSIGNMENTS

ROOT CAUSE ASSESSMENT
PROGRAM STATUS

* IMPROVED PROBLEM REPORTING AND RCA
  - MORE PROBLEMS REPORTED (976 IN 1989 vs 728 IN 1988)
  - MANAGEMENT REVIEW OF ALL PERs (MRC)
  - MORE FORMAL RCA (192 IN 1989 vs 29 IN 1988)

* INCIDENT INVESTIGATION PROCESS IMPLEMENTED
  - ACTIVATED BY MANAGEMENT
  - BROADER VIEW THAN NORMAL RCA

* TRAINING OF ADDITIONAL RCA STAFF
  - RCA PROCESS TRAINING - 140 ENGINEERS
  - IN-HOUSE RCA TRAINING - 17 ENGINEERS
  - MORT TRAINING FOR RCA STAFF

* INCREASED EMPHASIS ON IMPLEMENTATION

* REPORT QUALITY/PRECURSOR ASSESSMENT

* INDEPENDENT EFFECTIVENESS ASSESSMENT

ROOT CAUSE ASSESSMENT
PROGRAM STATUS
(CON'T)

* EXAMPLES OF SIGNIFICANT EVENTS ANALYZED (1989)
  - INSULATOR FAULT (SCRAM 89-01)
  - ROD DRIFT EVENT
  - SHUTDOWN COOLING EVENTS IN R-4
  - TURBINE BLADE CRACKS
  - SCRAM DURING DEH TESTING (SCRAM 89-02)
  - RFW PUMP TRIP (SCRAM 89-03)
  - RFW THRUST BEARING FAILURE
  - I & C SURVEILLANCE SCRAM (89-04)
  - EXTRACTION STEAM LINE EXPANSION JOINT FAILURE
  - LIMITORQUE BOLT TORQUING ISSUE
  - RESINS IN HVAC SYSTEM
  - COOLING TOWER STRUCTURAL AND MECHANICAL (CONCRETE SPALLING)

QUALITY OF LICENSING SUBMITTALS

* QUARTERLY MEETINGS WITH NRR TO SPECIFICALLY ADDRESS THIS ISSUE

* NO KNOWN PROBLEMS SINCE ISSUANCE OF THE LATEST SALP

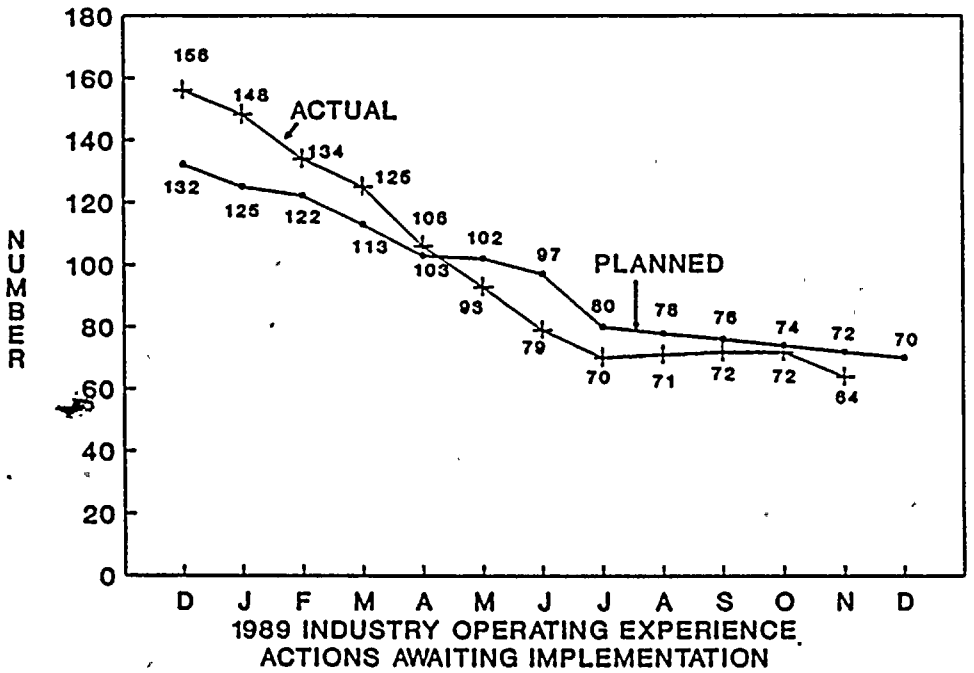
SAFETY ASSESSMENT/QUALITY VERIFICATION PROGRAM STATUS AND INITIATIVES

* QUALITY IMPROVEMENT
  - MANAGEMENT TRAINING (QMS)
  - EMPLOYEE TRAINING ("THE QUALITY ADVANTAGE")
  - TEAMS - PROBLEM SOLVING
  - MANAGEMENT EMPHASIS - QUALITY COUNCIL

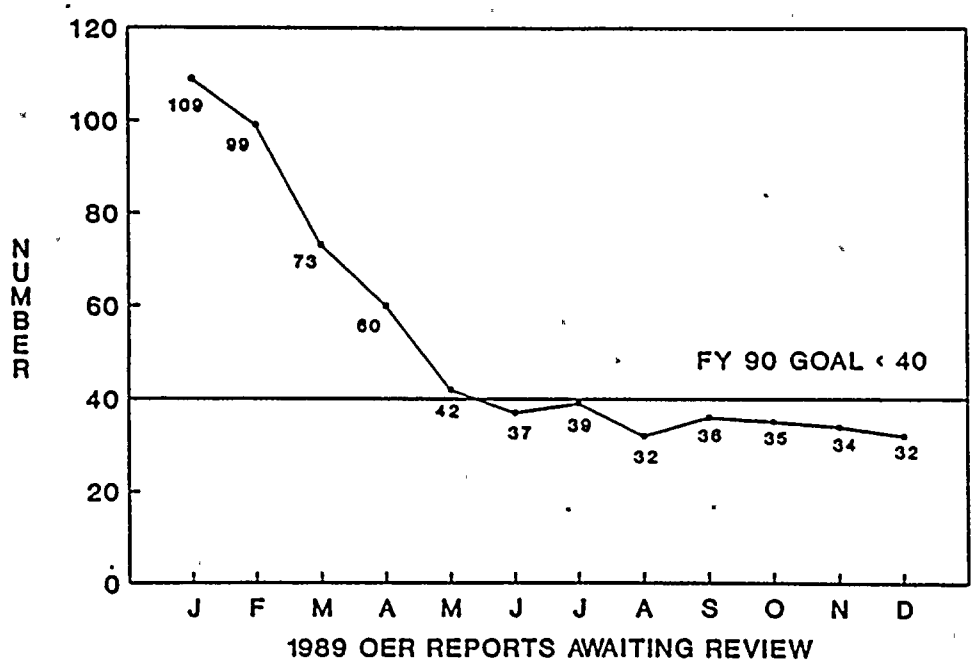
NUCLEAR SAFETY ASSESSMENT

* INDUSTRY EXPERIENCE REVIEW
* 50.59 REVIEW IMPROVEMENTS
  - PROCEDURES
  - TRAINING
* SSFI - AC DISTRIBUTION SYSTEM
* TECHNICAL ASSESSMENTS
* RELIABILITY/RISK DIRECTED OVERSIGHT

OER PERFORMANCE



1989 INDUSTRY OPERATING EXPERIENCE
ACTIONS AWAITING IMPLEMENTATION



1989 OER REPORTS AWAITING REVIEW

QUALITY VERIFICATION

* PROCUREMENT QA
  - RECEIVING INSPECTION
  - VENDOR AUDITS
  - SPECIFICATION/DOCUMENT REVIEWS
* TRENDING AND REPORTING
* QA/QC EFFECTIVENESS

SAFETY ASSESSMENT/QUALITY VERIFICATION PROGRAM STATUS AND INITIATIVES

* SUMMARY

  - ADDRESSING SALP ISSUES
  - "AGGRESSIVE" STATE-OF-ART SAFETY/QUALITY PROGRAMS
  - EXCELLENT STAFF (DEDICATED/QUALIFIED)
  - CONTINUOUS IMPROVEMENT
    - o OPERATING EXPERIENCE (RCA)
    - o NUCLEAR SAFETY ASSESSMENT
    - o QA/QC
    - o LICENSING PROGRAMS

SAFETY RELATED VALVE FASTENERS

* NOV RECEIVED 1/15/90
* SUPPLY SYSTEM CONCURS WITH VALIDITY OF THE VIOLATIONS
* INDUSTRY EXPERIENCE ALERTED SUPPLY SYSTEM TO POTENTIAL PROBLEMS WITH VIBRATION LOOSENING BOLTS
* SS DEVISED PREVENTIVE MAINTENANCE ACTIVITY WHICH WAS LATER PROVEN INADEQUATE

SAFETY RELATED VALVE FASTENERS

* ACTIVITY LACKED DELINEATION OF VIBRATION-SENSITIVE VALVES, POSITIVE CLAMPING FORCE VERIFICATION TECHNIQUE AND MANAGEMENT FEEDBACK ON EFFECTIVENESS

* ABSENT FEEDBACK, MANAGEMENT INACCURATELY BELIEVED PROBLEM WAS PRECLUDED

* GIVEN NEW PER PROCESS AND FORMAL ROOT CAUSE ASSESSMENTS. APPROPRIATE PM ACTIONS IN PLACE:
  - TORQUE VERIFICATION MONTHLY
  - ENGINEERED CAPTURE MECHANISM FOR SUSPECT VALVES
  - FAILURE REPORTING

SAFETY RELATED VALVE FASTENERS

* EXPERIENCE INDICATES TORQUE SELECTION IS INADEQUATE

* SPECIFIC ACTIONS TO RE-TORQUE RHR-V-24A/B INADEQUATE

* Q/A SURVEILLANCE ON BOLT TORQUING CONCLUDED:
  - TRAINING NEEDED FOR WORK PACKAGE PREPARERS, QC OVERVIEWERS AND CRAFT IMPLEMENTERS
  - TORQUE SELECTION NEEDS CLARIFICATION AND REVIEW
  - GENERIC TORQUE SELECTION GUIDANCE (PPM10.2.10) NEEDS CLARIFICATION/RESTRICTIONS

* CORRECTIVE ACTIONS ON THESE ISSUES UNDER DEVELOPMENT