NEDO-24221 79NED405 CLASS I OCTOBER 1979

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# RETURN TO REACTOR BOCKET FILES

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NEDO-24221 79NED405 Class I October 1979

# SUPPLEMENTAL RELOAD LICENSING SUBMITTAL FOR MONTICELLO NUCLEAR GENERATING PLANT RELOAD 7

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FILES

Sr. Licensing Engineer

**RETURN TO REACTOR DOCKET** FILES

RETURN TO REACTOR DOCKET

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#### NEDO-24221

## IMPORTANT NOTICE REGARDING

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1. PLANT-UNIQUE ITEMS (1.0)\*

Plant parameter changes	- see Appendix A
GETAB initial conditions	s – see Appendix A
Loading Error LHGR	- see Appendix A

2. RELOAD FUEL BUNDLES (1.0, 2.0, 3.3.1 AND 4.0)

		Fuel Type	Number	Number Drilled
	Irradiated	8DB262	192	None
	Irradiated	8DB250	28	None
	Irradiated	8DB219L	52	None
. <sup>.</sup>	Irradiated	8DRB265L	52	52
	Irradiated	8DRB282	60	60
	New	P8DRB282	56	56
	New	P8DRB265L	44	_44
Total			484	212

3. REFERENCE CORE LOADING PATTERN (3.3.1)

Nominal previous cycle core exposure: 15.65 GWd/t. Nominal core average exposure at end of cycle 17.29 GWd/t including coastdown. Core loading pattern: Figure 1.

4. CALCULATED CORE EFFECTIVE MULTIPLICATION AND CONTROL SYSTEM WORTH -NO VOIDS, 20°C (3.3.2.1.1 AND 3.3.2.1.2)

BOC keff

Uncontrolled	1.114
Fully Controlled	0.955
Strongest Control Rod Out	0.988
R, Maximum Increase in Cold Core Reactivity	
with Exposure Into Cycle, $\Delta k$	0.000

\*() refers to areas of discussion in Generic Reload Fuel Application," NEDE-24011-P-A-1, August 1979.

5. STANDBY LIQUID CONTROL SYSTEM SHUTDOWN CAPABILITY (3.3.2.1.3)

ppm

**9**00

Shutdown (Margin (Δk) (20°C, Xenon Free) 0.092

6. RELOAD-UNIQUE TRANSIENT ANALYSIS INPUTS (3.3.2.1.5 AND 5.2)

	EOC 8
Void Coefficient N/A* (¢/% Rg)	-6.98/-8.73
Void Fraction (%)	37.37
Doppler Coefficient N/A (¢/°F)	-0.228/-0.216
Average Fuel Temperature (°F)	1157
Scram Worth N/A (\$)	-38.0/-30.4
Scram Reactivity versus Time	Figure 2

7. RELOAD-UNIQUE GETAB TRANSIENT ANALYSIS INITIAL CONDITION PARAMETERS (5.2)

	EOC 8				
Exposure	<u>8x8</u>	<u>8x8R</u>	P8x8R		
Peaking factor (local, radial, axial)	1.22, 1.53, 1.40	1.20, 1.66, 1.40	1.20, 1.63, 1.40		
R-Factor	1.098	1.051	1.051		
Bundle Power (MWt)	5.157	5.595	5.499		
Bundle Flow (10 <sup>3</sup> 1b/hr)	105.1	102.7	102.7		
Initial MCPR	1.41	1.41	1.44		

8. SELECTED MARGIN IMPROVEMENT OPTIONS (5.2.2)

None

\*N = Nuclear Input Data

A = Used in Transient Analysis

CORE-WIDE TRANSIENT ANALYSIS RESULTS (5.2.1)

Transient	Exposure	Power (%)	Core Flow (%)	¢ ( <u>z nbr</u> )	Q/A (Z NBR)	P <sub>SL</sub> (psig)	P <sub>v</sub> (psig)	<u>ACPR</u> 8x8/8x8R/P8x8R	Plant Response
Turbine Trip without Bypass	EOC 8	100	100	411.9	119.7	1177	1215	0.34/0.34/0.37	Figure 3
Loss of 100°F Feedwater Heater	<b></b> .	100	100	117.7	117.0	1022	1067	0.16/0.16/0.17	Figure 4
Feedwater Controller Failure	EOC 8	100	100	301.4	118.8	1154	1195	0.30/0.30/0.32	Figure 5

10. LOCAL ROD WITHDRAWAL ERROR (WITH LIMITING INSTRUMENT FAILURE) TRANSIENT SUMMARY (5.2.1)

		$\Delta CPR$	LHGR	
Rod Block <u>Reading</u>	Rod Position (Feet Withdrawn)	8x8/8x8R and P8x8R	8x8/8x8R and P8x8R	Limiting Rod Pattern
104	3.5	0.09/0.20	11.8/13.7	
105	3.5	0.09/0.20	11.8/13.7	Figure 6
106	4.0	0.11/0.21	11.9/14.4	
107	4.5	0.12/0.23	11.9/14.6	
108*	6.0	0.18/0.27	12.4/15.4	
109	7.0	0.20/0.29	12.7/15.8	

11. OPERATING MCPR LIMIT (5.2, Appendix C)

<u>8x8</u>	8x8R	<u>P8x8R</u>
1.42	1.46	1.46

## 12. OVERPRESSURIZATION ANALYSIS SUMMARY (5.3)

Transient	Power	Core Flow	P <sub>s1</sub>	Pv	Plant
	(%)	(%)	(psig)	(psig)	Response
MSIV Closure (Flux Scram)	100	100	1235	1254	Figure 7

\*Indicates setpoint selected.

13. STABILITY ANALYSIS RESULTS (5.4)

Decay Ratio: Figure 8

Reactor Core Stability:

Decay Ratio,  $x_2/x_0$ 

0.550

(Natural Circulation-100% Rod Line)

Channel Hydrodynamic Performance

	Decay Ratio (Natural Circulation 100% Rod Line)
8x8 Channel	0.10
8x8R Channel	0.06
P8x8R Channel	0.06

14. LOSS-OF-COOLANT ACCIDENT RESULTS (5.5.2)

Fuel types 8DRB265L and 8DRB282 were introduced in Reload-6. The Reload-6 MAPLHGR, PCT and Local Oxidation Fraction are applicable to P8DRB265L and P8DRB282, respectively, for Reload-7.

15. LOADING ERROR RESULTS (5.5.4)

Limiting event: Mislocated Bundle

## MCPR

8x8R Monitored 8x8 Mislocated 1.07

16. CONTROL ROD DROP ANALYSIS RESULTS (5.5.1)

Maximum incremental control rod worth:  $0.97\% \Delta k$ 



FUEL TYPE						
A = 8DB262	E = 8DRB282					
B = 8DB250	F = P8DRB282					
C = 8DB219L	G = P8DRB265L					
D = 80RB265L	1					

Figure 1. Reference Core Loading Pattern

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Figure 2. Scram Reactivity and Control Rod Drive Specifications

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Figure 3. Plant Response to Turbine Trip Without Bypass







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Figure 4. Plant Response to Loss of 100°F Feedwater Heating







Figure 5. Plant Response to Feedwater Controller Failure







	02	06	10	14	18	22	26	30
51					•	14		
47							24	
43				10		6		
39			22		36		36	
35		8		8		8		
31	30		36		36		36	
27		8		40		0		

NOTES: 1. ROD PATTERN IS 1/4 CORE MIRROR SYMMETRIC, UPPER LEFT QUADRANT SHOWN ON MAP

> 2. NUMBER INDICATES NUMBER OF NOTCHES WITHDRAWN OUT OF 48. BLANK IS A WITHDRAWN ROD

3. ERROR ROD AT 22,27

# Figure 6. Limiting RWE Rod Pattern

Figure 7. Plant Response to MSIV Closure





PERCENT OF RATED 300. 1 VESSEL PRES RISE 2 SAFETY VALVE FLOW 3 RELIEF VALVE FLOW 4 BYPASS VALVE FLOW 5 BYPAS

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Figure 8. Decay Ratio

## APPENDIX A

## PLANT PARAMETER CHANGES

<u>Safety/Relief Valve</u> - (Table 5.4, page 5-62, Operating Plants Pressure Relief Systems) 8 S/R valves installed

> 7 S/R valves assumed in analysis capacity at setpoint 82.6% Lowest setpoint = 1108 + 1% psig

GETAB Initial Conditions (Table 5-8, page 5-66)

Reactor Core Pressure	1038 psia
Inlet Enthalpy	524.3 Btu/1b

Loading Error Results (5.5.4, Table 5-8, page 5-66)

Limiting Event for LHGR:

8x8 Monitored

8x8 Mislocated 18.67 kW/ft