

NEDO-24155-1
Supplement 1
Class I
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SUPPLEMENTAL RELOAD LICENSING SUBMITTAL
FOR
NINE MILE POINT NUCLEAR POWER STATION
UNIT 1 RELOAD NO. 7
REANALYSIS SUPPLEMENT

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A. INTRODUCTION

This supplement to the Nine Mile Point Nuclear Power Station, Unit 1, Reload No. 7 License Amendment submittal (NEDO-24155, dated November.1978) presents the results of Cycle 6 analysis from BOC6 to EOC6-1500 MWd/t. This information replaces the analysis results from BOC6 to EOC6-2000 MWd/t in NEDO-24155. This analysis at EOC6-1500 MWd/t justifies operation of the plant at 1850 MWt to the point in Cycle 6 at 1500 MWd/t before the end of cycle since adequate margin to the lowest spring safety valve set point is shown to exist at that point. In addition, this supplement adds Appendix C - Verification of Load Line Limit Analysis Applicability to Cycle 6. Appendix C gives analysis results which show that the load line limit analysis is applicable to Cycle 6.

B. CHANGES TO NEDO-24155

This analysis presents inputs and results at EOC6-1500 MWd/t to replace those at EOC6-2000 MWd/t in Sections 6 and 9 of NEDO-24155. Also Figures 2C and 3C of NEDO-24155 are replaced to show inputs and plant response at EOC6-1500 MWd/t. New Appendix C is added to show results of Cycle 6 load line limit analyses. The remainder of NEDO-24155 remains unchanged and is still applicable to Cycle 6.

The following pages are the affected pages of NEDO-24155 and contain the results of analyses at EOC6-1500 MWd/t.

5. STANDBY LIQUID CONTROL SYSTEM SHUTDOWN CAPABILITY (3.3.2.1.3)

<u>ppm</u>	<u>Shutdown Margin (Δk)</u> <u>(20°C, Xenon Free)</u>
600	0.036

6. RELOAD UNIQUE TRANSIENT ANALYSIS INPUTS (3.3.2.1.5 and 5.2)

	<u>EOC6</u>	<u>EOC6 -</u> <u>1000 MWd/t</u>	<u>EOC6 -</u> <u>1500 MWd/t</u>
Void Coefficient N/A,* (c/% Rg)	-6.055/-7.569	-6.722/-8.403	-6.93/-8.66
Void Fraction (%)	35.92	35.92	35.92
Doppler Coefficient N/A (c/% °F)	-0.233/-0.221	-0.228/-0.216	-0.225/-0.213
Average Fuel Temperature (°F)	1204	1204	1204
Scram Worth N/A (\$)	-36.73/-29.38	-35.54/-28.43	-34.63/-27.7
Scram Reactivity	Figure 2a	Figure 2b	Figure 2c

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

	<u>EOC6</u>	<u>8x8</u> <u>EOC6 - 1000 MWd/t</u>	<u>EOC6</u>	<u>8x8R</u> <u>EOC6 - 1000 MWd/t</u>
Peaking factors (local, radial and axial)	1.22 1.688 1.40	1.22 1.741 1.40	1.18 1.837 1.40	1.18 1.895 1.40
R-Factor	1.102	1.102	1.051	1.051
Bundle Power (MWt)	5.744	5.925	6.247	6.442
Bundle Flow (10 ³ lb/hr)	103.41	102.06	98.74	97.45
Initial MCPR	1.24	1.20	1.24	1.20

*N = Nuclear Input Data

A = Used in Transient Analysis

8. SELECTED MARGIN IMPROVEMENT OPTIONS (5.2.2)

None.

9. CORE-WIDE TRANSIENT ANALYSIS RESULTS (5.2.1)

<u>Transient</u>	<u>Exposure</u>	<u>Power (%)</u>	<u>Core Flow (%)</u>	<u>Q/A (%) REF</u>	<u>Q/A (%) REF</u>	<u>P_{DOME} (psig)</u>	<u>P_v (psig)</u>	<u>ΔCPR 8x8/8x8R</u>	<u>Plant Response</u>
Turbine Trip	EOC6	95	100	207.3	101.7	1193	1227	0.17	Figure 3a
w/o Bypass	EOC6 - 1000 MWd/t	98	100	216.6	102.2	1193	1227	0.12	Figure 3b
	EOC6 - 1500 MWd/t	100	100	170.5	101.1	1189	1223	--	Figure 3c
Loss of 100°F Feedwater Heater		100	100	115.4	114.7	1039	1073	0.14	Figure 4
Feedwater Controller Failure	EOC6	100	100	151.2	109.5	1138	1172	0.12	Figure 5

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

<u>Rod Block Reading</u>	<u>Rod Position (Feet Withdrawn)</u>	<u>ΔCPR</u>		<u>LHGR</u>		<u>Limiting Rod Pattern</u>
		<u>8x8</u>	<u>8x8R</u>	<u>8x8</u>	<u>8x8R</u>	
104	5.0	0.20	0.21	15.84	17.65	Figure 6
105*	7.5	0.28	0.30	14.75	16.85	Figure 6
106	8.5	0.28	0.32	14.09	16.05	Figure 6
107	9.0	0.27	0.32	13.69	15.80	Figure 6
108	9.0	0.27	0.32	13.69	15.80	Figure 6
109	9.5	0.26	0.33	13.38	15.55	Figure 6
110	9.5	0.26	0.33	13.38	15.55	Figure 6

*Rod Block Setpoint

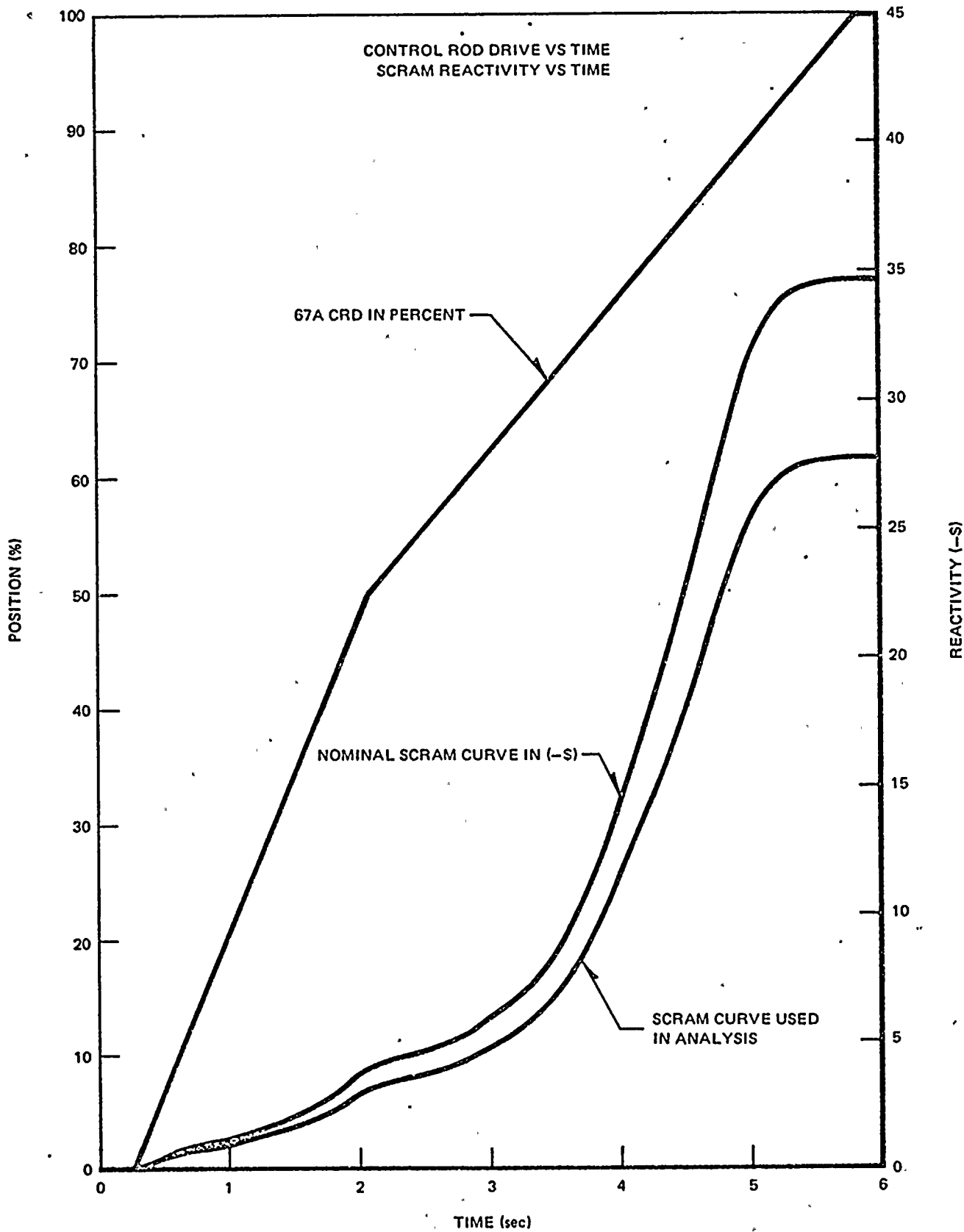


Figure 2c. Scram Reactivity and Control Rod Drive Specifications from BOC6 to EOC6 - 1500 MWd/t

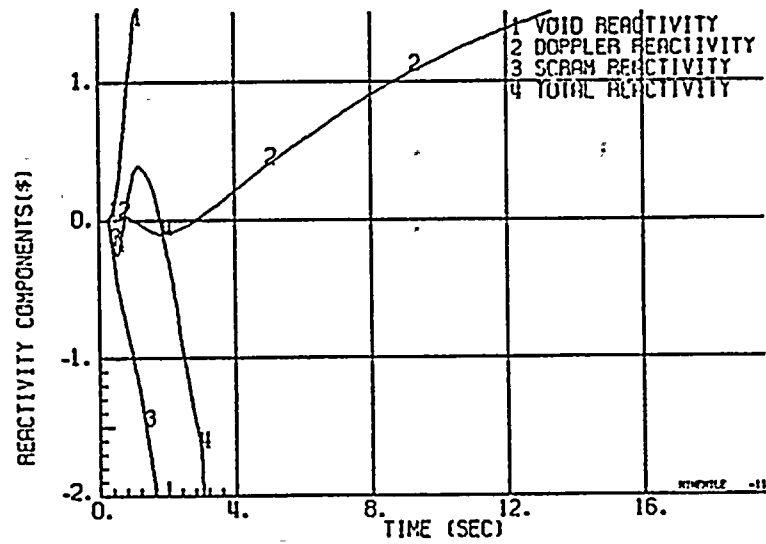
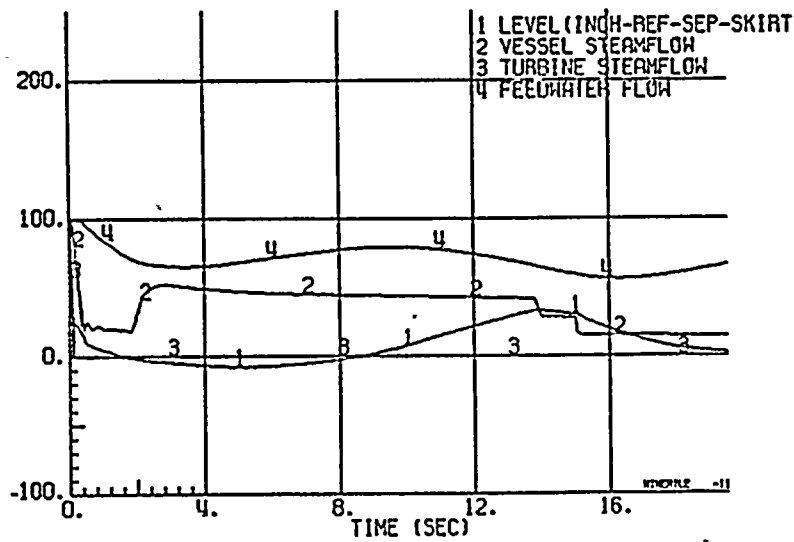
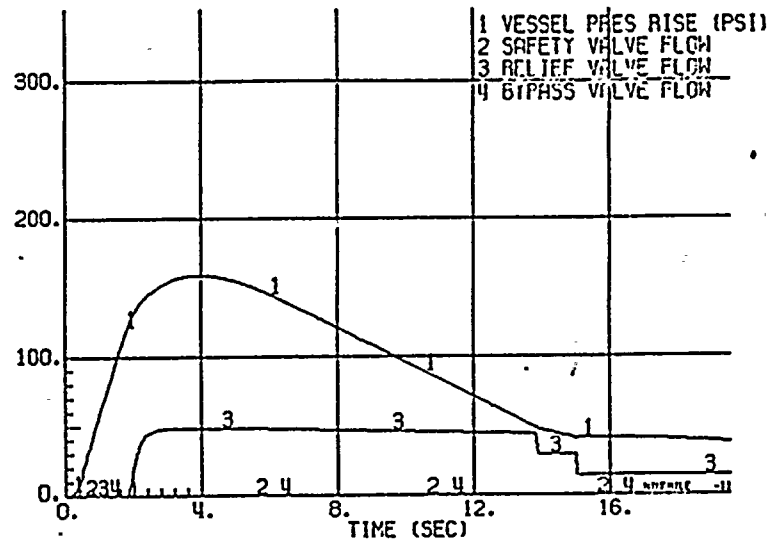
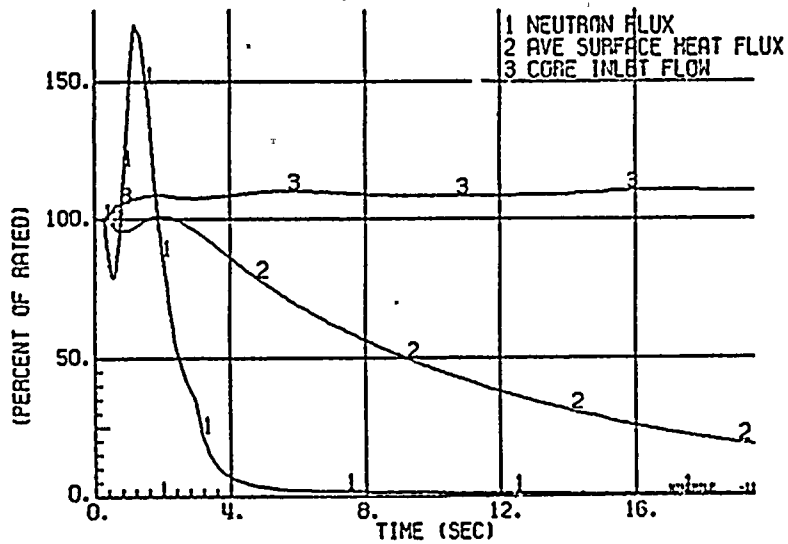


Figure 3c. Plant Response to Turbine Trip without Bypass, 100% Power, EOC6 - 1500 MWd/t

APPENDIX C

VERIFICATION OF LOADLINE LIMIT ANALYSIS APPLICABILITY TO CYCLE 6

The original load line analysis applicable to Nine Mile Point Unit 1 was provided in Reference C.1. That analysis used inputs from Cycle 5; therefore not all of the results provided in Reference C.1 are applicable to Cycle 6. The analyses which require Cycle 6 input are the rod withdrawal error (RWE) and thermal-hydraulic stability analyses. All other results and conclusions reported in Reference C.1 are not cycle dependent, thus no further analyses are required for Cycle 6 and future cycles. The thermal-hydraulic stability analyses results provided in Section 13 of this report are bounding for the load line limit analysis portion of the power/flow map since the Cycle 6 analyses were performed for "extrapolated rod block-natural circulation power" which means that the natural circulation intercept with the 108% APRM rod block line as shown in Figure 2-1 of Reference C.1 is used for analysis. The result is that the thermal-hydraulic stability analysis of Section 13 bounds all operating points at or under the 108% APRM rod block line, from natural circulation conditions to 100% power conditions. RWE analysis results for the load line limit portion of the power flow map for Cycle 6 are presented below. These results show that the safety limit MCPR of 1.07 is not violated when the rod block setpoint is at 105%.

Reference

- C.1 "Nine Mile Point Nuclear Power Station Unit 1 Load Line Limit Analysis License Amendment Submittal," General Electric Company, May 1977 (NEDO-24012).

C.1 LOCAL ROD WITHDRAWAL ERROR (WITH LIMITING INSTRUMENT) TRANSIENT

C.1.1 CONDITION - 91% Power/75% Flow

Rod Block Reading	Rod Position (Feet Withdrawn)	Δ CPR		LHGR		Initial CPR (MPCR Operating Limit)		Lowest MPCR During RWE		Limiting Rod Pattern
		8x8	8x8R	8x8	8x8R	8x8	8x8R	8x8	8x8R	
104	7.0	0.11	0.26	12.65	14.40	1.40	1.37	1.29	1.11	Figure C.1
105 ^a	8.0	0.14	0.26	12.87	14.64	1.40	1.37	1.26	1.11	Figure C.1
106	9.0	0.17	0.33	12.70	14.50	1.40	1.37	1.23	1.04	Figure C.1
107	9.0	0.17	0.33	12.70	14.50	1.40	1.37	1.23	1.04	Figure C.1
108	9.5	0.18	0.35	12.50	14.30	1.40	1.37	1.22	1.02	Figure C.1
109	9.5	0.18	0.35	12.50	14.30	1.40	1.37	1.22	1.02	Figure C.1
110	10.0	0.19	0.36	12.31	14.04	1.40	1.37	1.21	1.01	Figure C.1

C.1.2 CONDITION - 85% Power/61% Flow

Rod Block Reading	Rod Position (Feet Withdrawn)	Δ CPR		LHGR		Initial CPR (MPCR Operating Limit ^b)		Lowest MPCR During RWE		Limiting Rod Pattern
		8x8	8x8R	8x8	8x8R	8x8	8x8R	8x8	8x8R	
104	8.0	0.37	0.34	11.43	13.16	1.50	1.47	1.13	1.13	Figure C.2
105 ^a	8.0	0.37	0.34	11.43	13.16	1.50	1.47	1.13	1.13	Figure C.2
106	8.5	0.38	0.35	11.40	13.20	1.50	1.47	1.12	1.12	Figure C.2
107	8.5	0.38	0.35	11.40	13.20	1.50	1.47	1.12	1.12	Figure C.2
108	9.0	0.40	0.36	11.40	13.20	1.50	1.47	1.10	1.11	Figure C.2
109	9.0	0.40	0.36	11.40	13.20	1.50	1.47	1.10	1.11	Figure C.2
110	9.5	0.41	0.38	11.39	13.15	1.50	1.47	1.09	1.09	Figure C.2

^aRod block setpoint^bThese values are the MPCR operating limits from Section 11 times the K_F of 1.07.

	02	06	10	14	18	22	26
51						6	
47					6		22
43				16		16	
39			4		8		4
35		16		36		36	
31	2		8		0		8
27		16		36		36	

- Notes:
1. Rod pattern is 1/4 core mirror symmetric upper left quadrant shown on map.
 2. No. indicate number of notches withdrawn out of 48. Blank is a withdrawn rod.
 3. Error rod is at (18,31).

Figure C.1. Limiting RWE Rod Pattern (91% Power/75% Flow)

	02	06	10	14	18	22	26
51						0	
47					4		34
43				28		28	
39			8		8		4
35		28		38		36	
31	4		8		0		4
27		28		36		38	

- Notes:
1. Rod pattern is 1/4 core mirror symmetric upper left quadrant shown on map.
 2. No. indicate number of notches withdrawn out of 48. Blank is a withdrawn rod.
 3. Error rod is at (18,31).

Figure C.2. Limiting RWE Rod Pattern (85% Power/61% Flow)