

Harry Tauber  
Vice President  
Engineering and Construction

**Detroit  
Edison**

2000 Second Avenue  
Detroit, Michigan 48226  
(313) 237-8000

*May 20, 1982*

EF2 - 57,385

Mr. L. L. Kintner  
U. S. Nuclear Regulatory Commission  
Office of Nuclear Reactor Regulation  
Division of Licensing  
Washington, D. C. 20555

Dear Mr. Kintner:

References: (1) Enrico Fermi Atomic Power Plant, Unit 2  
NRC Docket No. 50-341  
(2) EF2-54,761 dated August 25, 1981  
(3) EF2-54,665 dated September 9, 1981

Subject: Seismic Re-Evaluation of the NSSS Piping

The seismic reassessment of the NSSS piping, as discussed in the referenced letters and the SSER, has essentially been completed. A summary of the analytical results of this reassessment is provided in Attachment I.

The results show that all piping stresses are within ASME Code allowable values and that the loads on pipe mounted equipment are within prescribed limits. However, some snubbers have predicted loads that exceed their rated loads, and three recirculation discharge reactor pressure vessel nozzles have loads that exceed the allowable values.

Detroit Edison is in the process of upgrading these snubbers to accommodate the site-specific seismic loads and expects that the increased stiffness of these supports will result in acceptable loads at the reactor vessel nozzles.

*Boo!*  
*1/1*

Mr. L. L. Kintner

EF2 - 57,885

Page 2

It should be noted that the reactor water cleanup piping inside containment (not required for plant safe shutdown) was also originally analyzed using the center-of-gravity method for seismic response spectra selection. This piping system is currently being analyzed for the final as-built condition using an acceptable response spectra selection method (envelope method).

Sincerely,

*C.M. Heidel for H. Tauber*

cc: B. Little

Attachment I to EF2-57,885

Contents: Appendix A: Mathematical Models - Recirculation  
Appendix B: Equation 9 Stress Summary - Recirculation  
Appendix C: Support and Equipment Loads - Recirculation  
Appendix D: Mathematical Model - Main Steam  
Appendix E: Equation 9 Stress Summary - Main Steam  
Appendix F: Support and Equipment Loads - Main Steam  
Appendix G: Seismic Analysis Input Summary

## APPENDIX A - Node Diagram

Figure A1 - Fermi 2 Recirculation Loop A  
Isometric Joint Diagram

Figure A2 - Fermi 2 Recirculation Loop B  
Isometric Joint Diagram



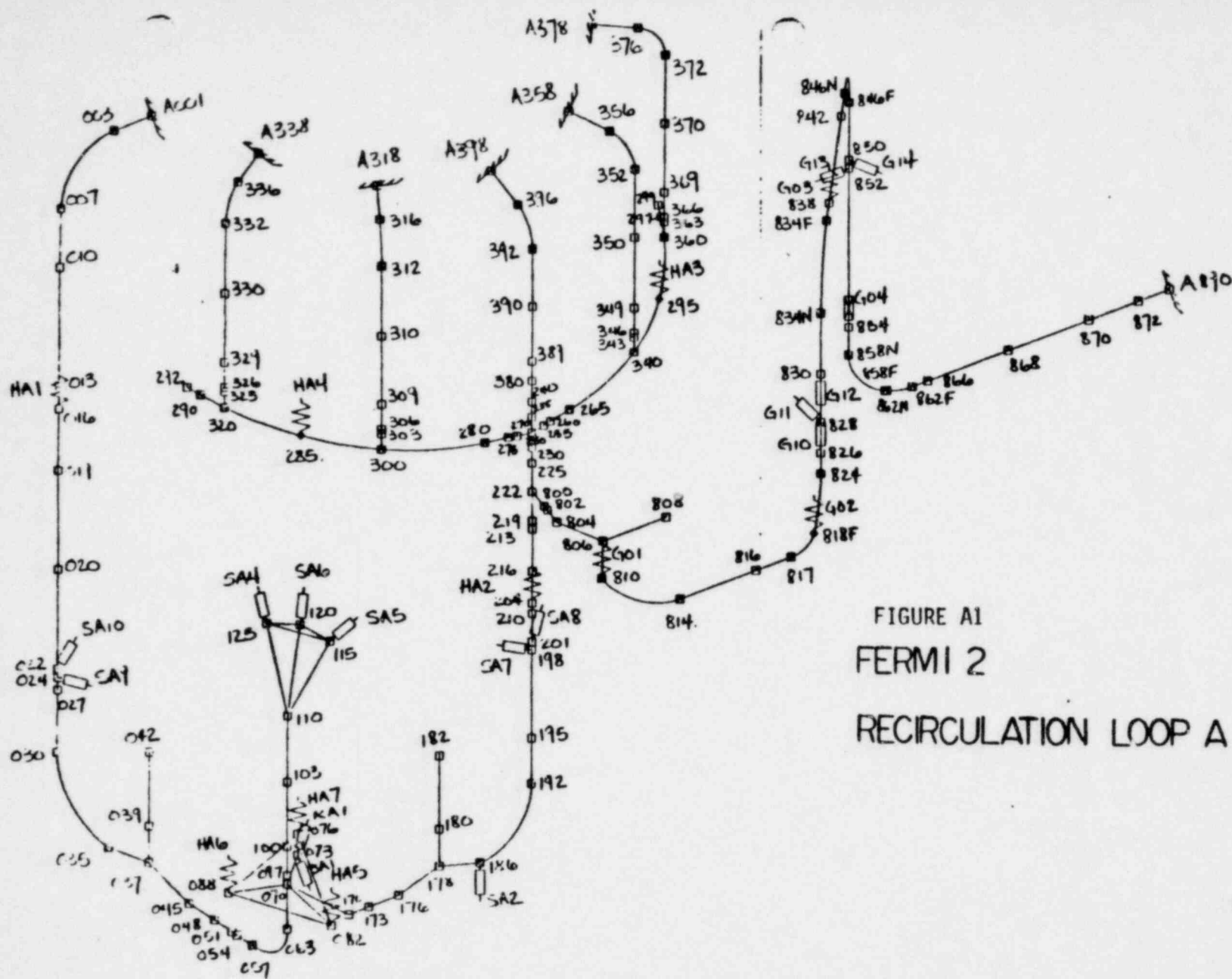
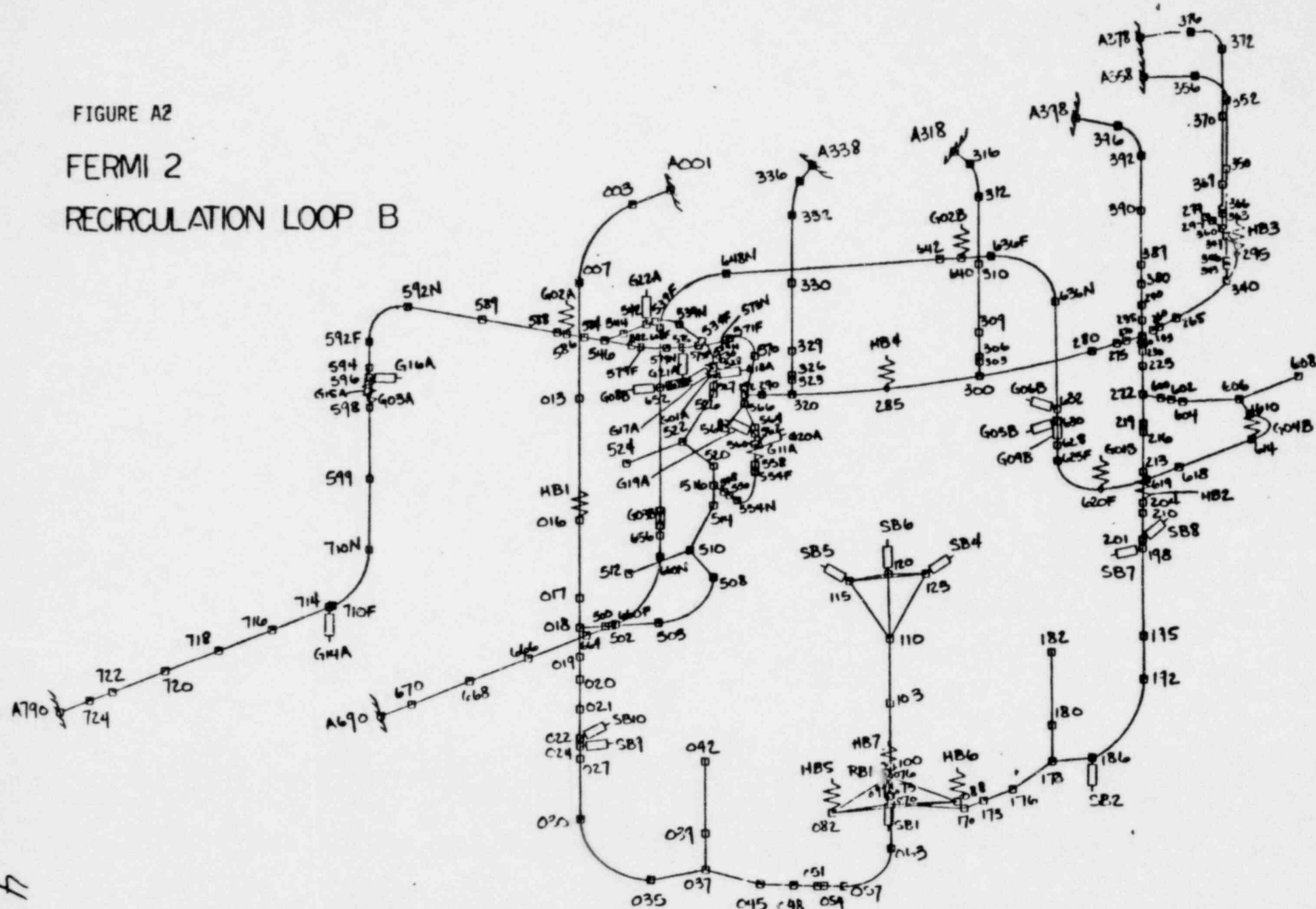


FIGURE A1  
FERMI 2  
RECIRCULATION LOOP A

FERMI 2

RECIRCULATION LOOP B



## APPENDIX B - Analytical Results Summary

Table B-1     Piping Analysis Results - Recirc. Loop A

Table B-2     Piping Analysis Results - Recirc. Loop B

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TABLE B-1 PIPING ANALYSIS RESULTS - RECIRCULATION LOOP A

GENERAL ELECTRIC COMPANY  
BOILING WATER REACTOR SYSTEMS DEPARTMENT

SPEC NO. 22A

REV. NO.  
PAGE NO.

FERMI 2 RECIRC A

SUCTION NOZZLE TO PUMP

PART 2 TABLE 02-

LEVEL D	FO 9	"
NO	S	R
057.	16323.	0.33
035.	15919.	0.32
003.	15799.	0.32
018.	15627.	0.31
001.	12518.	0.25
007.	12073.	0.24
063.	11842.	0.24
019.	11470.	0.23
013.	11235.	0.22
024.	11049.	0.22
022.	10976.	0.22
020.	10939.	0.22
054.	10663.	0.21
051.	10519.	0.21
027.	10461.	0.21
046.	10237.	0.21
045.	10196.	0.20
010.	9866.	0.20
030.	9700.	0.19

THE LOADING COMBINATION USED FOR THE ANALYSIS \*\* 1\*\*\* ARE AS FOLLOW

LEVEL D 1 PP + WT1 + SSEI

\*\*\*NOTE\*\*\* ALL UNITS ARE IN POUNDS, INCHES EXCEPT NOTED

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GENERAL ELECTRIC COMPANY  
BOILING WATER REACTOR SYSTEMS DEPARTMENT

SPEC NO. 22A

REV. NO.  
PAGE NO.

PART 2 TABLE 02-

PUMP DISCH TO RHR RTN TEE

FERMI 2 RECIRC A

LEVEL D	EQ 9	R
198.	21633.	0.43
204.	16391.	0.33
186.	15847.	0.32
201.	15544.	0.31
192.	15488.	0.31
170.	14412.	0.29
216.	13172.	0.26
216.	12549.	0.25
173.	12288.	0.25
210.	11641.	0.23
176.	11484.	0.23
195.	10688.	0.21

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BOILING WATER REACTOR SYSTEMS DEPARTMENT

SPEC NO. 22A

REV. NO.  
PAGE NO.

FORM 2 RECIRC A

RHR RTN TEE TO RPV NOZZLES

PART 2 TABLE 02-

LEVEL D	EO 9	R
NO	S	R
380.	31573.	0.63
800.	30214.	0.60
250.	29379.	0.59
376.	24405.	0.49
398.	24319.	0.49
250.	24188.	0.48
398.	21877.	0.44
369.	21323.	0.43
392.	21264.	0.43
300.	19938.	0.40
356.	19870.	0.40
338.	19076.	0.38
372.	18641.	0.37
360.	17901.	0.36
316.	17499.	0.35
363.	17076.	0.34
358.	16818.	0.34
368.	16815.	0.34
352.	16768.	0.34
318.	16105.	0.32
312.	15761.	0.32
340.	15452.	0.31
369.	15239.	0.30
332.	15215.	0.30
378.	15173.	0.30
343.	14811.	0.30
346.	14612.	0.29
250.	14531.	0.29
250.	14531.	0.29
230.	14351.	0.29
225.	14168.	0.28
320.	14081.	0.28
222.	13984.	0.28
222.	13805.	0.28

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BOILING WATER REACTOR SYSTEMS DEPARTMENT

SPEC NO. 22A

REV. NO.  
PAGE NO.

FERMI 2 RECIRC A

RHR RTN TEE TO RPV NOZZLES

PART 2 TABLE 02-

LEVEL D	EQ 9	R
NO	S	R
265.	13799.	0.28
323.	13550.	0.27
349.	13443.	0.27
326.	13384.	0.27
390.	13353.	0.27
303.	13302.	0.27
306.	13130.	0.26
335.	13016.	0.26
219.	12864.	0.26
329.	12394.	0.25
309.	12147.	0.24
340.	11975.	0.24
255.	11709.	0.23
280.	11702.	0.23
340.	11066.	0.22
222.	10822.	0.22
300.	10819.	0.22
250.	10585.	0.21
250.	10585.	0.21
235.	10401.	0.21
295.	10345.	0.21
295.	10345.	0.21
360.	10317.	0.21
270.	10316.	0.21
240.	10200.	0.20
300.	10090.	0.20
370.	10033.	0.20
350.	10020.	0.20
285.	9839.	0.20
285.	9839.	0.20
320.	9690.	0.19
310.	9623.	0.19
330.	9375.	0.19
360.	8573.	0.17

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SPEC NO. 22A

REV. NO.  
PAGE NO.

FERMI 2 RECIRC A

RHR RTN TEE TO RPV NOZZLES

PART 2 TABLE 02-

LEVEL D	EQ 9	
NO	S	R
320.	8528.	0.17
297.	8442.	0.17
290.	8438.	0.17
299.	8422.	0.17
292.	8422.	0.17



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REV. NO.  
PAGE NO.

FERMI 2 RECIRC A

DISCHARGE RHR RETURN

PART 2 TABLE 02-

LEVEL D	ED 9	S	R
NO			
826.	32842.	0.62	
810.	16058.	0.30	
834.	15069.	0.28	
814.	14747.	0.28	
818F	13733.	0.26	
824.	13354.	0.25	
834F	13011.	0.25	
818F	12400.	0.23	
834N	12381.	0.23	
846F	12017.	0.23	
817.	11702.	0.22	
846N	11493.	0.22	
838.	11271.	0.21	
858N	11073.	0.21	
858F	10965.	0.21	
890.	10961.	0.21	
872.	10920.	0.20	
862F	10911.	0.19	
862N	10903.	0.19	
802.	10071.	0.19	
870.	9882.	0.19	
830.	9716.	0.18	
816.	9704.	0.18	
850.	9628.	0.18	
804.	9623.	0.18	
828.	9568.	0.18	
852.	9532.	0.18	
842.	9235.	0.17	
868.	9164.	0.17	
866.	8941.	0.17	

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# TABLE B-2 PIPING ANALYSIS RESULTS - RECIRCULATION LOOP B

GENERAL ELECTRIC COMPANY  
BOILING WATER REACTOR SYSTEMS DEPARTMENT

REV. NO.  
PAGE NO.

SPEC NO. 22A

PART 2 TABLE 02-

SUCTION NOZZLE TO PUMP

FENMI 2 RECIRC B

LEVEL D	EQ 9	R
NO	S	R
01A.	45382.	0.91
01B.	21635.	0.43
035.	18342.	0.37
003.	18187.	0.36
057.	17761.	0.36
007.	16392.	0.31
001.	14425.	0.29
030.	14406.	0.29
500.	13748.	0.27
016.	13563.	0.27
017.	13504.	0.27
018.	13291.	0.27
019.	12723.	0.25
020.	12336.	0.25
024.	12255.	0.24
022.	12227.	0.24
021.	12134.	0.24
063.	12053.	0.24
027.	11605.	0.23
013.	11514.	0.23
054.	11360.	0.23
051.	11331.	0.23
048.	11226.	0.22
045.	11099.	0.22

THE LOADING COMBINATION USED FOR THE ANALYSIS IS AS FOLLOWS

LEVEL D 1 FP + WT1 + SSEI

\*\*\*NOTE\*\*\* ALL UNITS ARE IN POUNDS, INCHES EXCEPT NOTED

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GENERAL ELECTRIC COMPANY  
BOILING WATER REACTOR SYSTEMS DEPARTMENT

SPEC NO. 22A

REV. NO.  
PAGE NO.

-----  
PUMP DISCH TO RHR RTN TEE PART 2 TABLE 02-  
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FERMI 2 RECIRC B

LEVEL D	EQ 9	R
NO	S	R
201.	23270.	0.47
198.	20667.	0.41
186.	17825.	0.38
204.	16821.	0.34
192.	15643.	0.31
170.	13949.	0.28
216.	13207.	0.26
216.	12389.	0.23
210.	12257.	0.25
173.	11893.	0.24
176.	11332.	0.23
195.	10607.	0.21

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FERMI 2 RECIRC B

RHR RTN TEE TO SPV NOZZLES

PART 2 TABLE 02-

LEVEL	D	EO	S	R	S
600.	30314.	0.61			
360.	29819.	0.60			
250.	25573.	0.51			
250.	23069.	0.46			
398.	22440.	0.45			
398.	21136.	0.42			
376.	20044.	0.40			
369.	19867.	0.40			
300.	19241.	0.38			
392.	19064.	0.38			
356.	18685.	0.37			
358.	17342.	0.35			
336.	17067.	0.34			
316.	16656.	0.33			
372.	15999.	0.32			
318.	15293.	0.31			
352.	15288.	0.31			
360.	14542.	0.29			
312.	14150.	0.28			
363.	13991.	0.28			
376.	13941.	0.28			
366.	13816.	0.28			
340.	13791.	0.28			
222.	13469.	0.27			
332.	13462.	0.27			
250.	13451.	0.27			
250.	13451.	0.27			
343.	13254.	0.26			
230.	13224.	0.26			
336.	13223.	0.26			
346.	13089.	0.26			
225.	12996.	0.26			
265.	12762.	0.26			
369.	12746.	0.25			

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BOILING WATER REACTOR SYSTEMS DEPARTMENT

SPEC NO. 22A

REV. NO.  
PAGE NO.

FERMI 2 RECIRC B

RHR RTN TEE TO RPV NOZZLES

PART 2 TABLE G2-

LEVEL D	LG	S	R
NO	12740.	0.25	
390.	12728.	0.25	
320.	12722.	0.25	
303.	12599.	0.25	
219.	12594.	0.25	
222.	12581.	0.25	
306.	12361.	0.25	
323.	12244.	0.24	
326.	12145.	0.24	
349.	11968.	0.24	
222.	11767.	0.24	
309.	11756.	0.24	
280.	11580.	0.23	
329.	11181.	0.22	
340.	10929.	0.22	
255.	10609.	0.21	
340.	10503.	0.21	
300.	10308.	0.21	
250.	10286.	0.21	
270.	10153.	0.20	
235.	9988.	0.20	
300.	9982.	0.20	
240.	9841.	0.20	
295.	9841.	0.20	
295.	9825.	0.20	
360.	9559.	0.19	
370.	9524.	0.19	
285.	9524.	0.19	
285.	9446.	0.19	
320.	9444.	0.19	
330.	9354.	0.19	
310.	9302.	0.19	
370.	8542.	0.17	

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BOILING WATER REACTOR SYSTEMS DEPARTMENT

SPEC NO. 22A

REV. NO.  
PAGE NO.

FERMI 2 RECIRC B

RHR RTN TEE TO RPV NOZZLES

PART 2 TABLE 02-

LEVEL D	EQ 9	R
320.	8508.	0.17
297.	8438.	0.17
290.	8433.	0.17
299.	8422.	0.17
292.	8422.	0.17

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SPEC NO. 22A

REV. NO.  
PAGE NO.

PART 2 TABLE 02-

SUCTION RHR

PERMI 2 RECIRC B

LEVEL D	EQ 9	S	R
NO			
516.	25169.	0.47	
527.	25099.	0.47	
546.	24762.	0.47	
559.	22262.	0.42	
508.	22011.	0.41	
534M	20194.	0.38	
570.	19953.	0.38	
592F	18556.	0.35	
534F	17953.	0.34	
579F	17289.	0.33	
579M	16550.	0.31	
503.	16128.	0.30	
790.	15781.	0.30	
592N	15677.	0.30	
539M	15536.	0.29	
539F	15377.	0.29	
710M	14866.	0.28	
534F	14675.	0.28	
710F	14645.	0.28	
724.	14405.	0.27	
598.	14311.	0.27	
573F	13804.	0.26	
722.	13362.	0.25	
571F	13295.	0.25	
554M	13231.	0.25	
502.	13219.	0.25	
573M	12515.	0.24	
516.	12416.	0.23	
514.	12410.	0.23	
528.	11835.	0.22	
530.	11793.	0.22	
526.	11681.	0.22	
596.	11415.	0.21	
594.	11413.	0.21	

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GENERAL ELECTRIC COMPANY  
BOILING WATER REACTOR SYSTEMS DEPARTMENT  
SPEC NO. 22A  
REV. NO.  
PAGE NO.  
PART 2 TABLE 02-  
FERMI 2 RECTOR B  
SUCTION RHR

LEVEL D	EO 9	R
NO	S	R
720.	11171.	0.21
546.	11120.	0.21
562.	10763.	0.20
516.	10609.	0.20
560.	10552.	0.20
520.	10331.	0.20
546.	10517.	0.20
564.	10460.	0.20
564.	10414.	0.20
544.	10163.	0.19
542.	10071.	0.19
566.	9891.	0.19
562.	9858.	0.19
714.	9733.	0.18
566.	9725.	0.18
716.	9683.	0.18
546.	9462.	0.18
546.	9462.	0.18
576.	9427.	0.18
716.	9352.	0.18
550.	9283.	0.17
599.	9146.	0.17
589.	9038.	0.17



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PART 2 TABLE 02-

DISCHARGE RHR

ON 3 11 1966

620F	22634	0.43
625F	22381	0.42
636	19864	0.37
620F	19346	0.36
619	18001	0.34
680N	17221	0.32
648N	17043	0.32
648F	17031	0.32
610	16791	0.32
636N	16704	0.31
636F	16232	0.31
660F	15915	0.30
614	15818	0.30
690	15744	0.30
670	14515	0.27
604	12930	0.24
630	12746	0.24
632	12581	0.24
640	12373	0.23
668	12352	0.23
628	12205	0.23
632	11846	0.22
618	11334	0.21
602	11173	0.21
666	10906	0.21
642	10783	0.20
664	10747	0.20

## APPENDIX C - Pipe Mounted Equipment

Table C-1 Pipe Mounted Equipment Loads Summary - Recirc. Loop A

Table C-2 Pipe Mounted Equipment Loads Summary - Recirc. Loop B

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GENERAL ELECTRIC COMPANY  
BOILING WATER REACTOR SYSTEMS DEPARTMENT

SPEC NO. 22A

REV. NO.  
PAGE NO.

RPV

EQUIP LOAD-NOZZLES

LOCATION		FORCE	RATIO	NO. COMB	MOMENT	RATIO	NO. COMB	
001.	003.	LEVL D	39653.	0.1020	1	2562089.	0.3330	1
316.	316.	LEVL D	14433.	0.4525	1	592879.	0.9385	1
336.	336.	LEVL D	6224.	0.1951	1	403585.	0.6389	1
356.	356.	LEVL D	15330.	0.4806	1	644267.	1.0199	1
376.	376.	LEVL D	7066.	0.2215	1	531543.	0.6414	1
396.	396.	LEVL D	30010.	0.9407	1	1156786.	1.6312	1

THE LOADING COMBINATION USED FOR THE ANALYSIS +NOZL \*\*\* ARE AS FOLLOW

LEVEL D 1 WT1 + SSEI

GENERAL ELECTRIC COMPANY  
BOILING WATER REACTOR SYSTEMS DEPARTMENT

SPEC NO. 22A

REV. NO.  
PAGE NO.VALVE-PUMP/MOTOR ACCEL

			LEVEL D ACCEL	RATIO	EQ.
037. 039.	AH	2.0922	0.5103	1	
	AV	0.9186	0.2297	1	
042. 039.	AH	2.2653	0.5525	1	
	AV	0.9242	0.2310	1	
070. 073.	AH	1.0663		1	
	AV	1.4064		1	
100. 103.	AH	0.9339		1	
	AV	1.4105		1	
110. 103.	AH	1.7135		1	
	AV	1.4159		1	
178. 180.	AH	1.4396	0.1454	1	
	AV	1.0295	0.2574	1	
182. 180.	AH	2.0693	0.2090	1	
	AV	1.0339	0.2565	1	
806. 808.	AH	1.4002	0.2600	1	
	AV	1.3263	0.4428	1	
808. 806.	AH	1.4901	0.2980	1	
	AV	1.3864	0.4621	1	

ALL MODE ACCELERATION HAVE BEEN PROCESSED

THE LOADING COMBINATION USED FOR THE ANALYSIS \*\*VACC \*\*\* ARE AS FOLLOW

LEVL D 1 SSEI

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GENERAL ELECTRIC COMPANY  
BOILING WATER REACTOR SYSTEMS DEPARTMENT

SPEC NO. 22A

REV. NO.  
PAGE NO.

EQUIP LOAD-NOZZLES RPV

LOCATION		FORCE	RATIO	NO. COMB	MOMENT	RATIO	NO. COMB
001.	003.	LEVL D 60045.	0.1545	1	3539255.	0.4599	1
318.	318.	LEVL D 12502.	0.3919	1	511905.	0.8104	1
338.	338.	LEVL D 7212.	0.2261	1	349105.	0.5526	1
358.	358.	LEVL D 14219.	0.4457	1	801917.	0.9529	1
378.	378.	LEVL D 7725.	0.2422	1	401795.	0.6381	1
398.	398.	LEVL D 25497.	0.7993	1	995852.	1.5765	1

THE LOADING COMBINATION USED FOR THE ANALYSIS \*\*NOZL \*\*\* ARE AS FOLLOW

LEVL D 1 WT1 + SSEI

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GENERAL ELECTRIC COMPANY  
BOILING WATER REACTOR SYSTEMS DEPARTMENT  
VALVE-PUMP/MOTOR ACCEL

SPEC NO. 22A

REV. NO.  
PAGE NO.

			LEVEL D		
			ACCEL	RATIO	EQ.
037.	039.	AH	2.0092	0.4901	1
		AV	1.0025	0.2506	1
042.	039.	AH	2.7832	0.8788	1
		AV	1.0067	0.2517	1
070.	073.	AH	1.1163		1
		AV	1.6912		1
100.	103.	AH	0.9639		1
		AV	1.8935		1
110.	103.	AH	1.8595		1
		AV	1.7063		1
178.	180.	AH	2.1148	0.2138	1
		AV	0.9285	0.2321	1
182.	180.	AH	2.7195	0.2747	1
		AV	0.9330	0.2332	1
510.	512.	AH	2.0409	0.4082	1
		AV	1.6318	0.5439	1
512.	510.	AH	2.4744	0.4949	1
		AV	2.1069	0.7023	1
522.	524.	AH	1.1854	0.2371	1
		AV	1.5918	0.5306	1
524.	522.	AH	2.1914	0.4383	1
		AV	2.2630	0.7543	1
568.	568.	AH	1.5573	0.3115	1
		AV	1.4611	0.4870	1
568.	568.	AH	2.9099	0.5820	1
		AV	2.4782	0.8254	1

THE LOADING COMBINATION USED FOR THE ANALYSIS \*\*VACC \*\*\* ARE AS FOLLOW

LEVEL D 1 SSEI

606.	606.	AH	1.7513	0.3503	1
		AV	1.8594	0.6198	1
608.	608.	AH	1.9041	0.3808	1
		AV	2.4376	0.8125	1

ALL NODE ACCELERATION HAVE BEEN PROCESSED

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# SUPPORT SUMMARY - RECIRCULATION

SUPPORT MARK	SERVICE LEVEL *	LOAD	SNUBBER RATING	RATIO
SA10	B	20432	15300	1.335
	D	28469	23600	1.206
SA9	B	37371	15300	2.443
	D	46079	23600	1.953
SA1	B	22626	15300	1.479
	D	47196	23600	2.000
SA5	B	52037	54600	.953
	D	67064	91000	.737
SA6	B	24603	15300	1.608
	D	50704	23600	2.148
SA4	B	53282	54600	.976
	D	68175	91000	.749
SA2	B	17266	15300	1.128
	D	27750	23600	1.176
SA7	B	35886	54600	.657
	D	64816	91000	.712
SA8	B	19652	15300	1.284
	D	28149	23600	1.193
RA1	B	30266	N/A	.034
	D	43792	N/A	.032

\* LEVEL B = OBE

LEVEL D = SITE SPECIFIC SSE



# SUPPORT SUMMARY - RECIRCULATION (CONT.)

SUPPORT MARK	SERVICE LEVEL	LOAD	SNUBBER RATING	RATIO
SB10	B	34120	54600	.625
	D	50015	91000	.550
SB9	B	47656	54600	.873
	D	69448	91000	.763
SB1	B	29489	15300	1.927
	D	43748	23600	1.854
SB2	B	31446	54600	.576
	D	47718	91000	.524
SB7	B	37805	54600	.692
	D	52926	91000	.582
SB8	B	46350	54600	.849
	D	68162	91000	.749
SB5	B	40914	54600	.749
	D	57253	91000	.629
SB6	B	54826	54600	1.004
	D	81712	91000	.898
SB4	B	48014	54600	.879
	D	67575	91000	.743
RBI	B	33896	N/A	.038
	D	46909	N/A	.035

# SUPPORT SUMMARY - RECIRCULATION (CONT.)

SUPPORT MARK	SERVICE LEVEL	LOAD	SUPPORT DESIGN LOAD	SNUBBER RATING
2299-G18	B	12362	27740	54600
	D	17520		91000
2299-G17	B	8189	22500	54600
	D	12045		91000
2299-G22	B	18522	20850	54600
	D	28233		91000
2299-G20	B	18536	29032	54600
	D	25462		91000
2299-G19	B	24385	26155	54600
	D	33727		91000
2299-G21	B	19269	27638	54600
	D	28423		91000
2299-G15	B	9565	9620	15300
	D	14629		23600
2299-G16	B	12553	23300	54600
	D	19737		91000
2299-G14	B	14209	7175	15300
	D	17846		23600

NOTE: LINE 2299 IS THE RHR SUPPLY PIPING

# SUPPORT SUMMARY - RECIRCULATION (CONT.)

SUPPORT MARK	SERVICE LEVEL	LOAD	SUPPORT DESIGN LOAD	SNUBBER RATING
2298-G10	B D	12271 19048	23575	2@ 15300 <sub>ca</sub> 2@ 23600 <sub>ca</sub>
2298-G11	B D	11117 20892	22825	54600 91000
2298-G12	B D	15492 23487	13635	15300 23600
2298-G14	B D	11494 17062	15640	15300 23600
2298-G13	B D	12075 19071	11355	15300 23600
2298-G04	B D	28140 31236	59290	N/A

NOTE: LINE 2298 IS THE DIV I RHR RETURN PIPING

# SUPPORT SUMMARY - RECIRCULATION (CONT)

SUPPORT MARK	SERVICE LEVEL	LOAD	SUPPORT DESIGN LOAD	SNUBBER RATING
2327-G09	B	15983	18855	2 @ 15300 <sub>m</sub>
	D	24810		2 @ 23600 <sub>m</sub>
2327-G05	B	29411	18260	54600
	D	43509		91000
2327-G06	B	13041	18260	54600
	D	18666		91000
2327-G07	B	21483	11355	54600
	D	31133		91000
2327-G08	B	25000	15640	15300
	D	36843		23600
2327-G03	B	32997	46200	N/A
	D	37607		

NOTE: LINE 2327 IS THE DIV II RHR RETURN PIPING

#### APPENDIX D - Node Diagram

- Figure A-1      Node Diagram - Main Steam A
- Figure A-2      Node Diagram - Main Steam B
- Figure A-3      Node Diagram - Main Steam C
- Figure A-4      Node Diagram - Main Steam D

# FERMI-2 MS-A

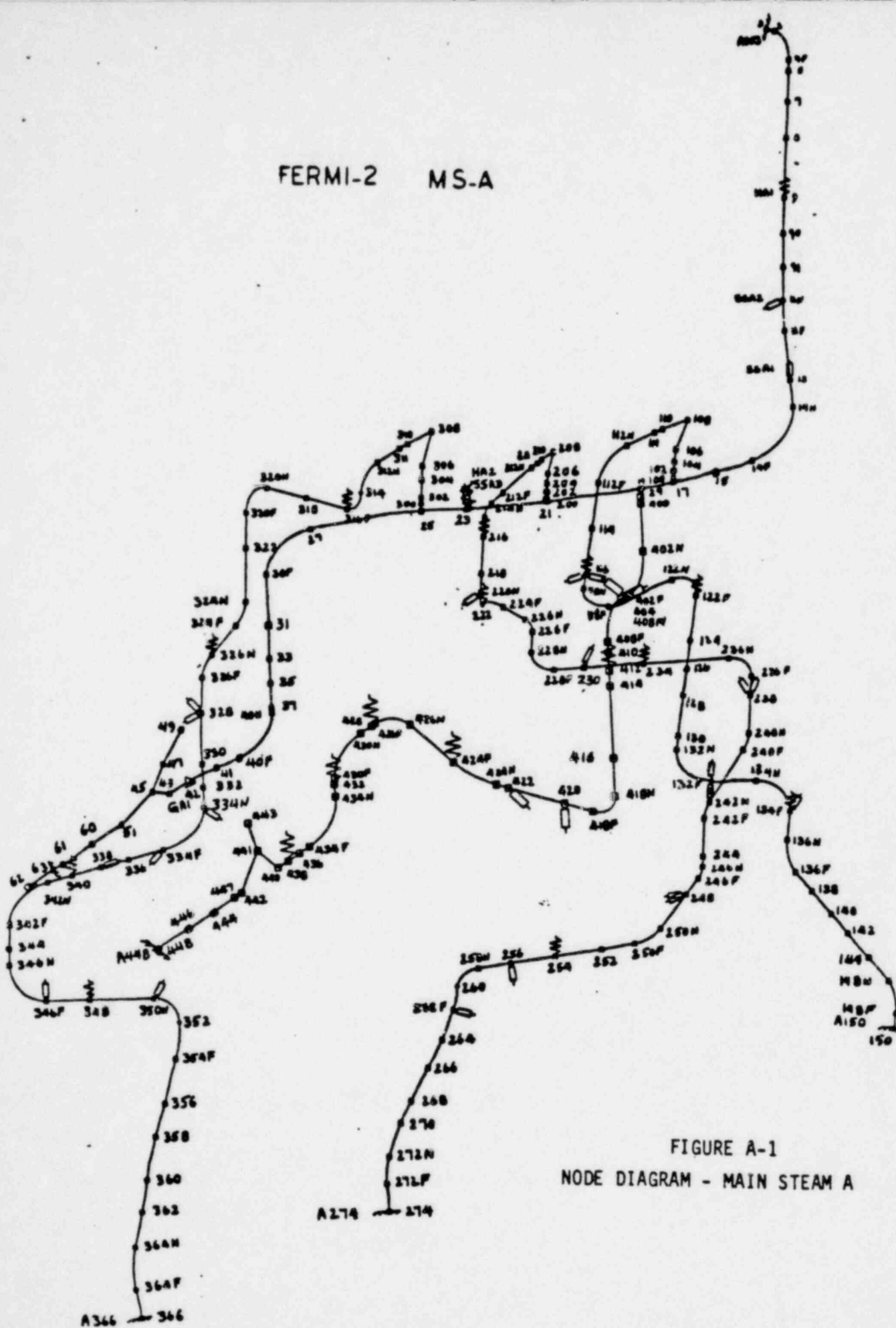


FIGURE A-1  
NODE DIAGRAM - MAIN STEAM A

# FERMI-2 MS-B

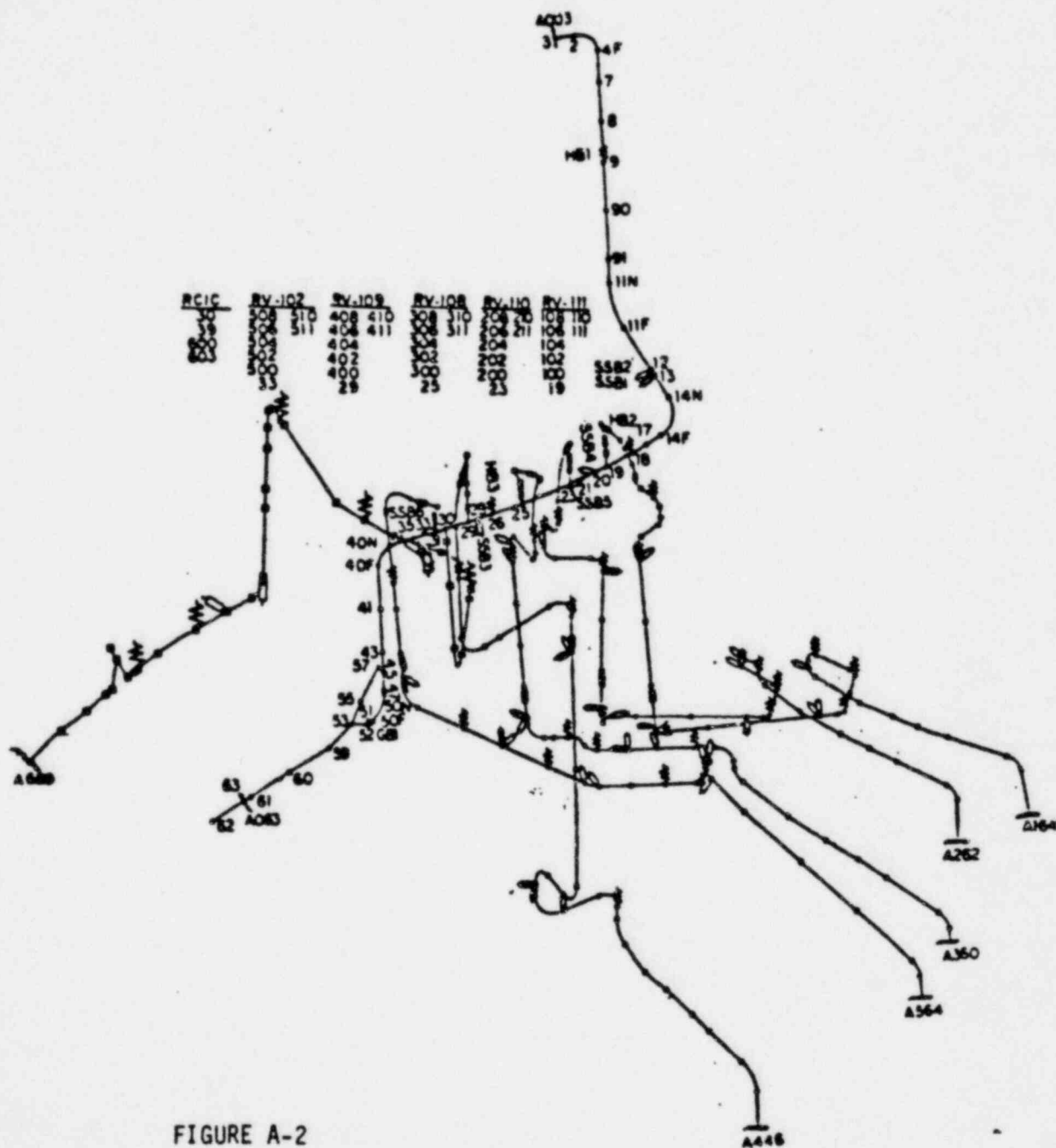


FIGURE A-2  
NODE DIAGRAM - MAIN STEAM B

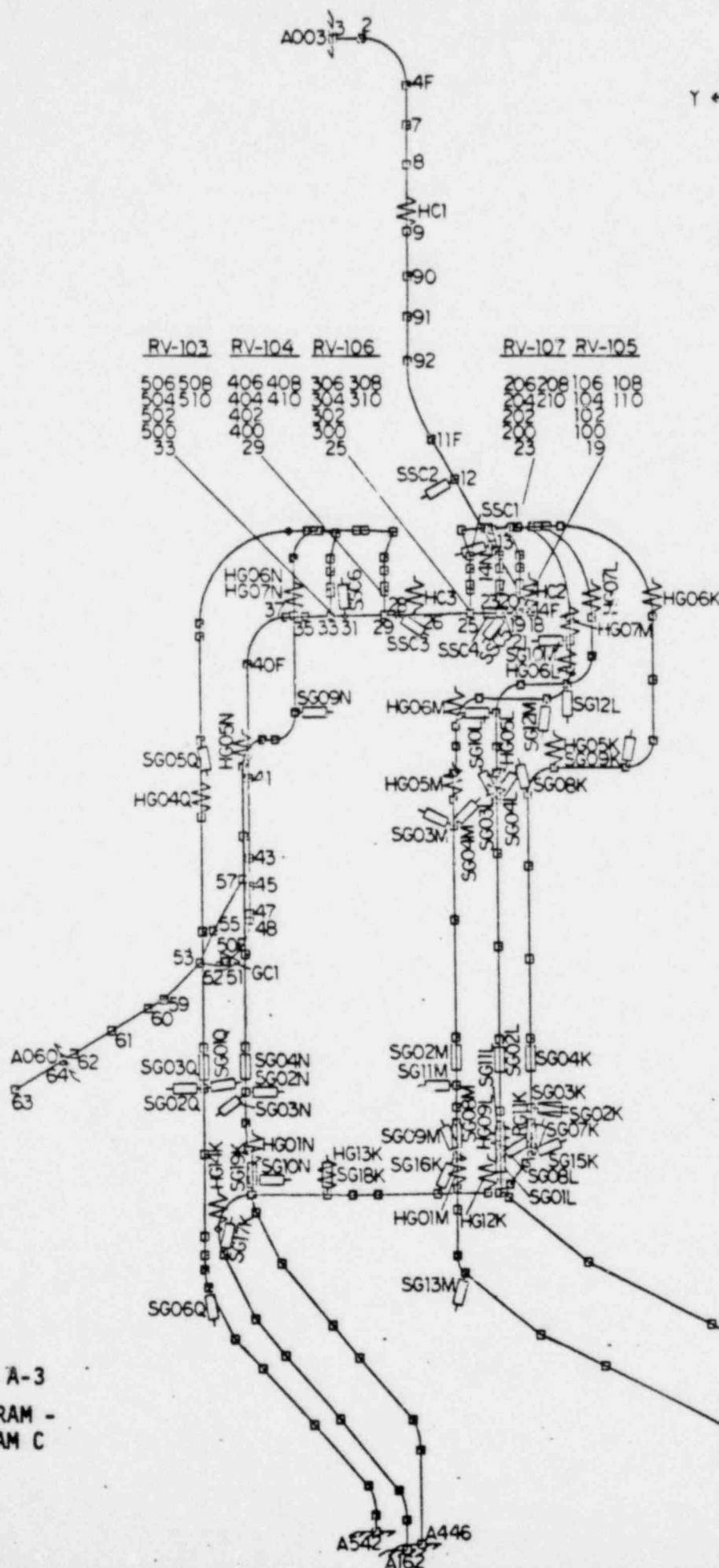
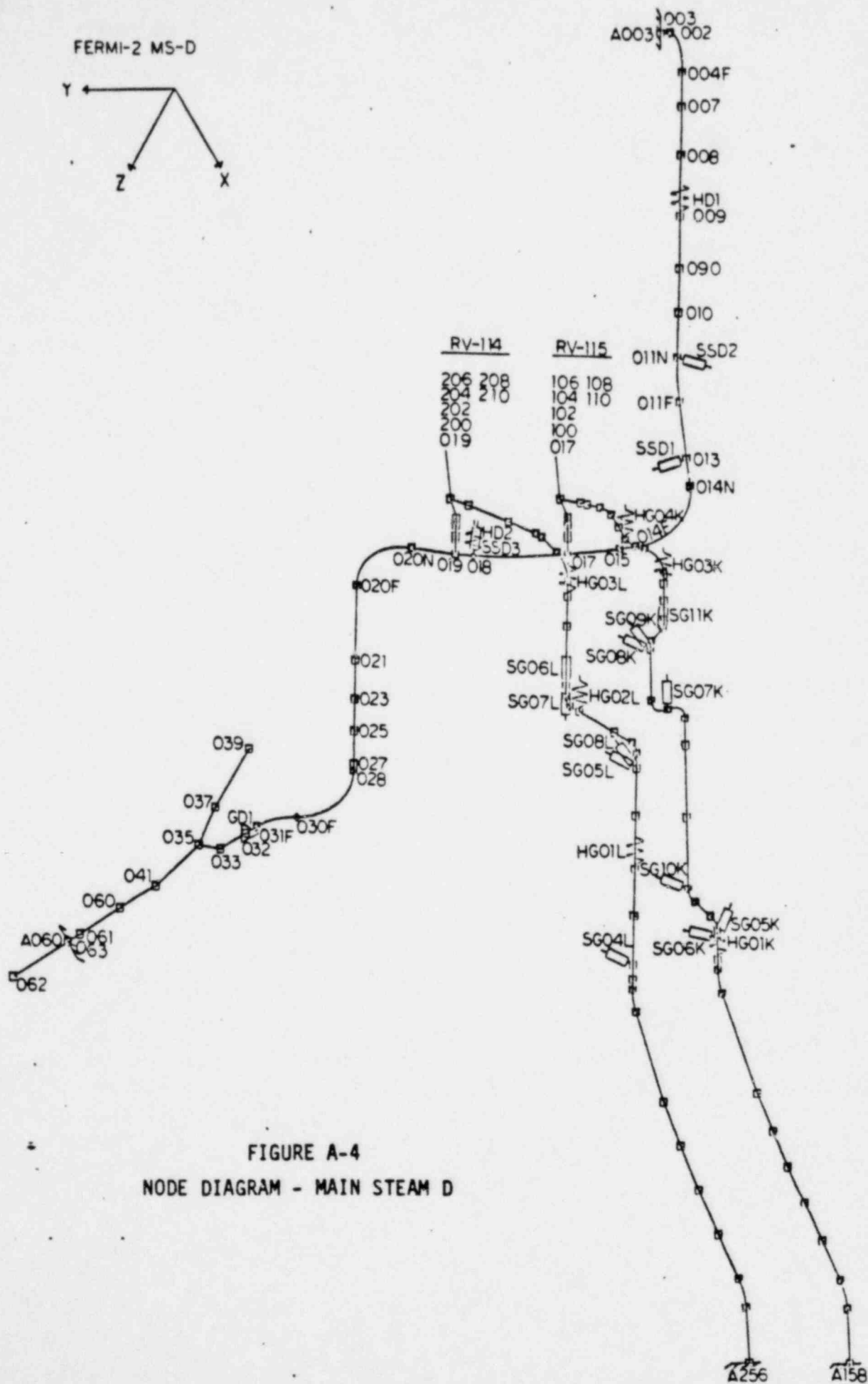


FIGURE A-3  
NODE DIAGRAM -  
MAIN STEAM C





## APPENDIX E - Analytical Results Summary

Table B-1	Piping Analysis Results - Main Steam A
Table B-2	Piping Analysis Results - Main Steam B
Table B-3	Piping Analysis Results - Main Steam C
Table B-4	Piping Analysis Results - Main Steam D

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## ENRICO FERMI 2

## MAIN STEAM LINE A

## PART 2 TABLE G2-

MAIN STEAM  
LEVEL D EQ 9 \*

NO	S	R
009.	21827.	0.38
042.	16383.	0.29
042.	13520.	0.24
002.	12323.	0.21
014F	11924.	0.21
041.	11864.	0.20
027.	11283.	0.20
040M	11173.	0.19
030F	11137.	0.19
040F	10937.	0.19
040F	10937.	0.19
014M	10763.	0.19
003.	10736.	0.19
003.	10736.	0.19
023.	10583.	0.18
011M	10455.	0.18
011F	9811.	0.17
082.	9779.	0.17
015.	9595.	0.17
005.	9268.	0.16
008.	9257.	0.16
007.	9198.	0.16
060.	9163.	0.16
037.	9134.	0.16
004F	9044.	0.16
004F	9043.	0.16
013.	9017.	0.16
033.	8988.	0.16
061.	8408.	0.15
037.	6525.	0.11
063.	4890.	0.09
051.	3712.	0.06

BRANCH CONNECTIONS  
LEVEL D EQ 9 \*

NO	S	R
100.	18516.	0.32
200.	18188.	0.32
029.	16384.	0.29
300.	14525.	0.25
021.	10452.	0.18
025.	10031.	0.17
021.	10027.	0.17
025.	10014.	0.17
019.	9983.	0.17
017.	9729.	0.17
017.	9673.	0.17
019.	9660.	0.17

RELIEF VALVE STEM  
LEVEL D EQ 9 \*

NO	S	R
102.	11817.	0.22
202.	11044.	0.21
104.	10674.	0.20
204.	10273.	0.19
302.	8730.	0.18
304.	8030.	0.15

HPCI LINE  
LEVEL D EQ 9 \*

NO	S	R
404.	32415.	0.61
412.	13906.	0.26
422.	11259.	0.21
426F	11139.	0.21
418F	10425.	0.20
426M	10379.	0.20
400.	9931.	0.19
418M	9435.	0.18
447.	8663.	0.16
408M	8332.	0.16
420.	8059.	0.15
402M	8011.	0.15
402F	7965.	0.15
428.	7692.	0.14
430M	7609.	0.14
444.	7304.	0.14
408F	7122.	0.13
438.	7048.	0.13
434F	6856.	0.13
430F	6828.	0.13
448.	6763.	0.13
442.	6751.	0.13
432.	6704.	0.13
434M	6629.	0.12
414.	6597.	0.12
424M	6364.	0.12
424F	6176.	0.12
424F	6167.	0.12
440.	5278.	0.10
446.	5077.	0.10

THE LOADING COMBINATION USED FOR THE ANALYSIS \*\* 1\*\*\* ARE AS FOLLOW

LEVEL D	1	PP + WT1	+ SQRT((SSE1) **2	+ (TSV) **2	)
LEVEL D	2	PP + WT1	+ SQRT((SSE1) **2	+ (RV1) **2	)

TABLE B-1 PIPING ANALYSIS RESULTS - MAIN STEAM A

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ENRICO FERMI 2

MAIN STEAM LINE B

PART 2 TABLE 02-

MAIN STEAM				BRANCH CONNECTIONS				RELIEF VALVE STEM				RCIC LINE			
NO	LEVEL D	S	EQ 9	NO	LEVEL D	S	EQ 9	NO	LEVEL D	S	EQ 9	NO	LEVEL D	S	EQ 9
009	18522	0.32		200	18855	0.33		202	12341	0.23		817	20051	0.38	
051	15026	0.26		300	18522	0.32		302	11850	0.22		849F	16949	0.32	
018	12953	0.23		100	17286	0.30		204	11366	0.21		649N	16093	0.30	
002	12744	0.22		500	17271	0.30		304	11195	0.21		647	16070	0.30	
026	12635	0.22		039	15609	0.27		502	11118	0.21		800	11040	0.21	
050F	12416	0.22		400	15000	0.26		102	10704	0.20		651	10423	0.20	
040F	12391	0.22		019	9736	0.17		504	10247	0.19		635N	9819	0.18	
040M	11993	0.21		025	9721	0.17		104	10019	0.19		635F	9797	0.18	
014F	11837	0.21		023	9675	0.17		402	8739	0.16		669	9528	0.18	
014N	11667	0.20		023	9669	0.17		404	8315	0.16		613	9412	0.18	
003	11662	0.20		025	9645	0.17						611F	9086	0.17	
00	11662	0.20		019	9594	0.17						803	8661	0.18	
004F	11591	0.20		029	9470	0.16						605	8081	0.15	
011N	11462	0.20		029	9356	0.16						811N	7718	0.15	
050M	11447	0.20		033	9316	0.18						609	7525	0.14	
011F	10497	0.18		030	9270	0.18						833	6962	0.13	
021	9633	0.17		033	9257	0.16						641	6940	0.13	
017	9572	0.17		030	9202	0.16						831	8901	0.13	
028	9551	0.17										837	6857	0.13	
012	9393	0.16										605F	6849	0.13	
031	9249	0.16										639	6731	0.13	
007	9201	0.16										605N	6486	0.12	
035	9143	0.16										666	6358	0.12	
041	9110	0.16										667	6324	0.12	
062	8984	0.16										659	5820	0.11	
047	8965	0.16										661	1982	0.04	
043	8924	0.16										663	1744	0.03	
060	8721	0.15													
061	8307	0.14													
047	6493	0.11													
053	4876	0.08													
052	3291	0.06													
059	3269	0.06													

TABLE B-2 PIPING ANALYSIS RESULTS - MAIN STEAM B

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## GENERAL ELECTRIC COMPANY

## BOILING WATER REACTOR SYSTEMS DEPARTMENT

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## ENRICO FERMI 2

## MAIN STEAM LINE C

PART 2 TABLE G2-

## MAIN STEAM

## BRANCH CONNECTIONS RELIEF VALVE STEAM

LEVEL D NO	EQ 9 S	R	LEVEL D NO	EQ 9 S	R	LEVEL D NO	EQ 9 S	R
021.	20975.	0.37	400.	18514.	0.32	402.	11851.	0.22
009.	18468.	0.32	100.	18152.	0.32	102.	11388.	0.21
031.	17471.	0.30	200.	16513.	0.29	104.	10643.	0.20
031.	17029.	0.30	300.	15936.	0.28	404.	10097.	0.19
050F	14556.	0.25	500.	13990.	0.24	202.	9853.	0.19
002.	13452.	0.23	019.	9869.	0.17	204.	9226.	0.17
048.	13370.	0.23	025.	9781.	0.17	302.	9120.	0.17
040F	12247.	0.21	019.	9754.	0.17	502.	8088.	0.15
014M	11814.	0.21	025.	9743.	0.17	304.	7964.	0.15
014F	11745.	0.20	023.	9719.	0.17	504.	7545.	0.14
092.	11615.	0.20	023.	9610.	0.17			
037.	11530.	0.20	029.	9539.	0.17			
004F	11471.	0.20	029.	9454.	0.16			
003.	11403.	0.20	033.	9103.	0.16			
003.	11403.	0.20	033.	9051.	0.16			
011F	10748.	0.19						
018.	9960.	0.17						
026.	9896.	0.17						
028.	9733.	0.17						
020.	9699.	0.17						
017.	9589.	0.17						
012.	9425.	0.16						
047.	9412.	0.16						
013.	9320.	0.16						
007.	9163.	0.16						
043.	9112.	0.16						
063.	9080.	0.16						
060.	8921.	0.16						
061.	8720.	0.15						
062.	8328.	0.14						
047.	6488.	0.11						
064.	4876.	0.08						
052.	3333.	0.06						
059.	3301.	0.06						

TABLE B-3 PIPING ANALYSIS RESULTS - MAIN STEAM C

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GENERAL ELECTRIC COMPANY  
BOILING WATER REACTOR SYSTEMS DEPARTMENT

SPEC NO. 22A7930

REV. NO.  
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ENRICO FERMI 2

MAIN STEAM LINE D

PART 2 TABLE G2-

MAIN STEAM

LEVEL D	EQ 9	S	R
NO			
009.	18780.	0.33	
032.	17064.	0.30	
031F	13092.	0.23	
002.	12326.	0.21	
014F	12137.	0.21	
020M	11777.	0.21	
026.	11579.	0.20	
003.	11483.	0.20	
003.	11483.	0.20	
020F	11429.	0.20	
011N	11288.	0.20	
030F	11195.	0.19	
030F	11195.	0.19	
014N	10379.	0.18	
011F	10297.	0.18	
004F	10140.	0.18	
018.	9896.	0.17	
015.	9480.	0.17	
062.	9413.	0.16	
027.	9205.	0.16	
007.	8981.	0.16	
023.	8979.	0.16	
021.	8965.	0.16	
060.	8918.	0.16	
013.	8769.	0.15	
061.	8386.	0.15	
027.	6511.	0.11	
063.	4886.	0.09	
033.	3542.	0.08	
041.	3541.	0.06	

BRANCH CONNECTIONS

LEVEL D	EQ 9	S	R
NO			
200.	16474.	0.29	
100.	13841.	0.24	
019.	9739.	0.17	
017.	9636.	0.17	
019.	9609.	0.17	
017.	9577.	0.17	

RELIEF VALVE STEM

LEVEL D	EQ 9	S	R
NO			
202.	10672.	0.20	
204.	10032.	0.19	
102.	7319.	0.14	
104.	6586.	0.12	

TABLE B-4 PIPING ANALYSIS RESULTS - MAIN STEAM D

APPENDIX F - Pipe Mounted Equipment Loads Summary

Table C-1	Pipe Mounted Equipment Loads Summary - Main Steam A
Table C-2	Pipe Mounted Equipment Loads Summary - Main Steam B
Table C-3	Pipe Mounted Equipment Loads Summary - Main Steam C
Table C-4	Pipe Mounted Equipment Loads Summary - Main Steam D

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-----  
SRV FLANGE MOMENT(MS-A)

	MOMENT	LEVEL D RATIO	EQ.
106. 104.	377080.	0.4077	2
206. 204.	295848.	0.3198	2
306. 304.	243021.	0.2627	2
110. 111.	300120.	0.5002	2
210. 211.	261193.	0.4353	2
310. 311.	227727.	0.3795	2

THE LOADING COMBINATION USED FOR THE ANALYSIS \*\*FLGM \*\*\* ARE AS FOLLOW

LEVEL D 1	WT1	+	TE	+	SQRT((SSEI	+	SSD )**2	+	( TSV )**2	)
LEVEL D 2	WT1	+	TE	+	SQRT((SSEI	+	SSD )**2	+	( RV1 )**2	)

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## RELIEF VALVE ACCEL(MS-A)

		LEVEL D			
		ACCEL	RATIO	EQ.	
108.	108.	AH	1.7762	0.2220	2
		AV	0.8446	0.1408	2
208.	208.	AH	2.2069	0.2759	2
		AV	1.1282	0.1880	2
308.	308.	AH	1.9322	0.2415	2
		AV	1.3086	0.2181	2

## HPCI VALVE ACCEL(MS-A)

		LEVEL D			
		ACCEL	RATIO	EQ.	
441.	443.	AH	0.4506	0.0901	2
		AV	0.3237	0.1079	2
443.	441.	AH	0.8165	0.1633	2
		AV	0.2297	0.0766	2

THE LOADING COMBINATION USED FOR THE ANALYSIS \*\*VACC \*\*\* ARE AS FOLLOW

LEVEL D 1    SORT((SSEI )\*\*2    + ( TSV    )\*\*2    )  
LEVEL D 2    SORT((SSEI )\*\*2    + ( RV1    )\*\*2    )

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## MSIV INLET/OUTLET(MS-A)

	MOMENT	LEVEL D RATIO	EQ.
043. 045.			
FA	37477.	0.0104	1
TOR	885025.	0.0154	2
MOM	1706156.	0.0594	2
051. 060.			
FA	16812.	0.0047	1
TOR	154340.	0.0027	2
MOM	1466386.	0.0510	2

## MSIV BONNET(MS-A)

	MOMENT	LEVEL D RATIO	EQ.
047. 049.			
FA	2363.	0.0573	2
TOR	0.	0.0000	2
MOM	313910.	0.1975	2

THE LOADING COMBINATION USED FOR THE ANALYSIS \*\*MSIV \*\*\* ARE AS FOLLOW

LEVL D 1	WT1	+	TE	+	SQRT((SSEI	+	SSSD )**2	+	( TSV )**2	)
LEVL D 2	WT1	+	TE	+	SQRT((SSEI	+	SSSD )**2	+	( RV1 )**2	)

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## NOZZLE(MS-A)

LOCATION			FORCE	RATIO	NO. COMB	MOMENT	RATIO	NO. COMB
003.	002.	LEVL D	38173.	0.1899	1	1286957.	0.2894	1

THE LOADING COMBINATION USED FOR THE ANALYSIS \*\*NOZL \*\*\* ARE AS FOLLOW

LEVL D 1 WT1 + SQRT((SSE1 )\*\*2 + ( TSV )\*\*2 )  
 LEVL D 2 WT1 + SQRT((SSE1 )\*\*2 + ( RV1 )\*\*2 )

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-----  
SRV FLANGE MOMENT(MS-B)

	MOMENT	LEVEL D RATIO	EQ.
106. 104.	455232.	0.4921	2
206. 204.	467651.	0.5056	2
306. 304.	393690.	0.4256	2
406. 404.	262661.	0.2842	2
506. 504.	380278.	0.4111	2
110. 111.	424758.	0.7079	2
210. 211.	457033.	0.7617	2
310. 311.	375050.	0.6251	2
410. 411.	282464.	0.4708	2
510. 511.	317973.	0.5300	2

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## RELIEF VALVE ACCEL (MS-B)

		LEVEL D ACCEL	RATIO	EQ.
108.	108.	AH 2.0615	0.2577	2
		AV 1.3944	0.2324	2
208.	208.	AH 2.2154	0.2769	2
		AV 1.3625	0.2271	2
308.	308.	AH 1.9200	0.2400	2
		AV 1.1669	0.1945	2
408.	408.	AH 1.6103	0.2013	2
		AV 0.6999	0.1500	2
508.	508.	AH 1.7730	0.2216	2
		AV 0.6322	0.1054	2

## RCIC VALVE ACCEL (MS-B)

		LEVEL D ACCEL	RATIO	EQ.
662.	664.	AH 0.6912	0.1782	2
		AV 0.5077	0.1692	2
664.	662.	AH 1.2401	0.2480	2
		AV 0.3941	0.1314	2

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MSIV INLET/OUTLET(MS-R)

		MOMENT	LEVEL D RATIO	EQ.
052.	061.			
	FA	22432.	0.0062	1
	TOR	140103.	0.0026	2
	MOM	1654254.	0.0576	2
059.	060.			
	FA	34348.	0.0095	1
	TOR	70533.	0.0012	2
	MOM	1165625.	0.0413	2

MSIV BONNET(MS-B)

		MOMENT	LEVEL D RATIO	EQ.
055.	057.			
	FA	2337.	0.0567	2
	TOR	0.	0.0000	2
	MOM	200414.	0.1261	2

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GENERAL ELECTRIC COMPANY  
BOILING WATER REACTOR SYSTEMS DEPARTMENT

SPEC NO. 22A7828

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NOZZLE(MS-B)

LOCATION			FORCE	RATIO	NO. COMB	MOMENT	RATIO	NO. COMB
003.	002.	LEVL D	45600.	0.2030	1	1731996.	0.3895	1

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SRV FLANGE MOMENT(MS-C)

	MOMENT	LEVEL D RATIO	EQ.
106. 104.	442216.	0.4761	2
206. 204.	416927.	0.4529	2
306. 304.	298487.	0.3227	2
406. 404.	374373.	0.4047	2
506. 504.	370934.	0.4010	2
110. 111.	453867.	0.7565	2
210. 211.	365114.	0.6085	2
310. 311.	280733.	0.4679	2
410. 411.	297149.	0.4952	2
510. 511.	300553.	0.5009	2



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RELIEF VALVE ACCEL(MS-C)

			LEVEL D		
		ACCEL	RATIO	EQ.	
106. 108.	AH	2.4889	0.3111	2	
	AV	1.0007	0.1668	2	
206. 208.	AH	2.5872	0.3234	2	
	AV	1.0307	0.1718	2	
306. 308.	AH	2.4579	0.3072	2	
	AV	1.1465	0.1911	2	
406. 408.	AH	2.6980	0.3373	2	
	AV	0.8908	0.1485	2	
506. 508.	AH	1.7788	0.2224	2	
	AV	0.8075	0.1346	2	

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MSIV INLET/OUTLET(MS-C)

	MOMENT	LEVEL D RATIO	EQ.
052. 051.			
FA	34718.	0.0096	1
TOR	54004.	0.0009	1
MOM	550402.	0.0539	1
059. 060.			
FA	36761.	0.0102	1
TOR	56853.	0.0010	1
MOM	1138547.	0.0396	1

## MSIV BONNET(MS-C)

	MOMENT	LEVEL D RATIO	EQ.
055. 057.			
FA	2189.	0.0531	2
TOR	0.	0.0000	1
MOM	198193.	0.1247	2

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GENERAL ELECTRIC COMPANY  
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NOZZLE(MS-C)

LOCATION			FORCE	RATIO	NO. COMB	MOMENT	RATIO	NO. COMB
003.	002.	LEVL D	43367.	0.1931	1	1597876.	0.3593	1

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SRV FLANGE MOMENT(MS-D)

	MOMENT	LEVEL D RATIO	EQ.
106. 104.	297464.	0.3218	2
206. 204.	413861.	0.4474	2
110. 111.	231652.	0.3859	2
210. 212.	336226.	0.5604	2

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RELIEF VALVE ACCEL(MS-D)

		LEVEL D		
		ACCEL	RATIO	EQ.
106. 106.	AH			
	AV	1.4788	0.1849	2
		0.7585	0.1264	2
206. 206.	AH			
	AV	1.7330	0.2166	2
		0.7566	0.1261	2

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GENERAL ELECTRIC COMPANY  
BOILING WATER REACTOR SYSTEMS DEPARTMENT

MSIV INLET/OUTLET(MS-D)

MOMENT LEVEL D  
RATIO EQ.

033. 032.  
FA 40201. 0.0111 1  
TOR 198847. 0.0035 2  
MOM 1432896. 0.0499 1

041. 080.  
FA 23594. 0.0065 1  
TOR 105859. 0.0018 1  
MOM 1146358. 0.0399 1

MSIV BONNET(MS-D)

MOMENT LEVEL B  
RATIO EQ.

037. 039.  
FA 2274. 0.0552 2  
TOR 0. 0.0000 1  
MOM 177189. 0.1115 2

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GENERAL ELECTRIC COMPANY  
BOILING WATER REACTOR SYSTEMS DEPARTMENT

SPEC NO. 22A7630

REV. NO.  
PAGE NO.

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NOZZLE(MS-D)

LOCATION			FORCE	RATIO	NO. COMB	MOMENT	RATIO	NO. COMB
003.	002.	LEVL D	43183.	0.1922	1	1853883.	0.3719	1

# SUPPORT SUMMARY - MAIN STEAM

SUPPORT MARK	SERVICE LEVEL *	LOAD	SNUBBER RATING	RATIO
SA1	B	10678	54600	.1956
	D	17184	91000	.1888
SA2	B	14903	54600	.2729
	D	25995	91000	.2857
SA3	B	10141	15300	.6628
	D	13673	23600	.5794
SC1	B	8541	15300	.5582
	D	13261	23600	.5619
SC2	B	11393	15300	.7446
	D	14859	23600	.6296
SC3	B	14395	15300	.9408
	D	17348	23600	.7351
SC4	B	12190	15300	.7967
	D	13917	23600	.5897
SC5	B	18122	15300	1.1844
	D	21519	23600	.9118
SC6	B	13176	15300	.8612
	D	17213	23600	.7294

\* LEVEL B =  $\text{SQRT} \left[ \text{OBE}^2 + (\text{MAX RVI OR TSV})^2 \right]$   
 LEVEL D =  $\text{SQRT} \left[ (\text{SITE SPECIFIC SSE})^2 + (\text{MAX RVI OR TSV})^2 \right]$



# SUPPORT SUMMARY - MAIN STEAM (CONT.)

SUPPORT MARK	SERVICE LEVEL	LOAD	SNUBBER RATING	RATIO
SB1	B	12932	15300	.8452
	D	18681	23600	.7916
SB2	B	14462	15300	.9452
	D	18744	23600	.7942
SB3	B	13911	15300	.9092
	D	17115	23600	.7252
SB4	B	11575	15300	.7565
	D	12959	23600	.5491
SB5	B	17840	54600	.3267
	D	22966	91000	.2524
SB6	B	16535	54600	.3028
	D	20620	91000	.2266
SD1	B	7526	54600	.1378
	D	11076	91000	.1217
SD2	B	14951	54600	.2738
	D	25775	91000	.2832
SD3	B	8598	15300	.5620
	D	11944	23600	.5061

# SUPPORT SUMMARY - MAIN STEAM (CONT.)

SUPPORT MARK	SERVICE LEVEL	LOAD	SUPPORT DESIGN LOAD	SNUBBER RATING
2297-G08	B	5685	15000	15300
	D	10543		23600
2297-G09	B	1680	6000	6000
	D	2731		9000
2297-G10	B	6727	12000	15300
	D	11394		23600
2297-G11	B	5934	12000	15300
	D	10570		23600
2192-G06	B	348	4000	6000
	D	614		9000
2192-G07	B	631	6000	6000
	D	1121		9000
2192-G13	B	1343	4000	6000
	D	2147		9000
2192-G14	B	1398	4000	6000
	D	2208		9000
2192-G15	B	1008	2000	6000
	D	1508		9000

NOTE: LINE 2297 IS THE HPCI STEAM SUPPLY PIPING  
 LINE 2192 IS THE RCIC STEAM SUPPLY PIPING

APPENDIX G

Seismic Analysis Input Summary

<u>Item</u>	<u>Criteria</u>
Equipment Damping OBE:	0.5%
Site Specific SSE:	2%
Site Damping Site Specific SSE:	5%
Cutoff Frequency (ARS):	33 HZ
Response Spectra Selection:	All Spectra Applicable to Support and Anchor Locations.
Seismic Analysis Method:	Multiple Support Excitation