ABWR SSAR

Amendment 20 - Page change instruction

The following pages (11x17 fold out drawings) have been changed, please make the specified changes in your SSAR. Pages are listed as page pairs (front & back). Bold page numbers represent a page that has been changed by Amendment 20

REMOVE PAGE No.	ADD PAGE No.
CHAPTER 1	
1.7-6,7	*1.7-6,7
CHAPTER 3	
3H.3-57 - 59	*3H.3-57,58
Add	*3H.3-59,60
Add	*3H.3-61,62
Add	*3H.3-63,64
CHAPTER 4	
4.6-24,25	*4.6-24,25
Add	*4.6-25.1
4.6-26	*4.6-26
CHAPTER 5	
5.1-5,6	*5.1-5,6
5.1-7,8	*5.1-7,8
5.1-9,9.1	*5.1-9,9.1
5.1-9.2,9.3	*5.1-9.2,9.3
5.1-9.4,9.5	*5.1-9.4,9.5
5.1-9.6	*5.1-9.6
5.2-44,45	*5.2-44,45
5.2-46,47	*5.2-46,47
5.2-48,49	*5.2-48,49
5.2-50,51	*5.2-50,51
5.2-52,53	*5.2-52,53
5.4-47,47.1	*5.4-47,47.1
5.4-48	*5.4-48
5.4-51,52	*5.4-51,52
5.4-52.1	*5.4-52.1
5.4-53,54	*5.4-53,54
5.4-55,56	*5.4-55,56
5.4-57,58	*5.4-57,58
5.4-58.1,58.2	*5.4-58.1,58.2
5.4-58.3	*5.4-58.3

REMOVE PAGE No.	ADD PAGE No.
5.4-59,60	*5.4-59,60
5.4-61,62	*5.4-61,62
5.4-62.1	*5.4-62.1
5.4-63,64	*5.4-63,64
6.2-88,89	*6.2-88,89
6.2-90,91	*6.2-90,91
Add	*6.2-91.1
6.2-92	*6.2-92,92.1
6.3-25,26	*6.3-25,25.1
Add	*6.3-26
6.3-33,34	*6.3-33,34
6.5-13	*6.5-13,13.1
Add	*6.5-13.2
6.7-4	*6.7-4
CHAPTER 9	
9.1-23,24	*9.1-23,24
9.1-24.1	*9.1-24.1
9.2-26,27	*9.2-26,27
9.2-28,29	*9.2-28,29
9.2-30,31	*9.2-30,31
9.2-32,33	*9.2-32,33
9.2-34,34a	*9.2-34,34.1
9.2-35	*9.2-35
9.2-38	*9.2-37,38
Add	*9.2-38.1
9.2-39,40	*9.2-39,40
9.2-41	*9.2-41,41.1
9.2-45,46	*9.2-45,45.1
Add	*9.2-45.2,
Add	9.2-46
9.3-16	*9.3-16,16.1
9.4-8	*9.4-8
9.5-11	*9.5-11

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CHAPTER 1
PAGE STATUS

PAGE	AMEND
1 COVER	
1-ii	8
1-iii	17
1-iv	11
1.1-ii	8
1.1-1	9
1.1-2	1
1.1-3	2
1.2-ii	20
1.2-iii	20
1.2-iv	20
1.2-v	20
1.2-vi	20
1.2-vi.1	20
1.2-vi.2	20
1.2-vi.3	20
1.2-vi.4	20
1.2-vii	6
1.2-viia	6
1.2-viii	19
1.2-ix	19
1.2-1	7
1.2-2	
1.2-3	1
1.2-4	1
1.2-5	20
1.2-6	20
1.2-7	20
1.2-8	20
1.2-9	20
1.2-10	20
1.2-11	20
1.2-12	20
1.2-13	20
1.2-14	20
1.2-15	20
1.2-16	20
1.2-16.1	20
1.2-16.2	20
1.2-16.3	20
1.2-16.4	20
1.2-16.5	20
1.2-16.6	20
1.2-16.7	20
1.2-17	14
1.2-18	6
1.2-18a	5
1.2-19	4
1.2-19a	6
1.2-19b	6
1.2-20	4
1.2-21	4
1.2-22	4
1.2-23	4
1.2-24	4
1.2-25	4
1.2-26	4
1.2-27	4
1.2-28	4
1.2-29	4
1.2-29a	4
1.2-29b	4
1.2-29c	4
1.2-29d	6
1.2-29e	6
1.2-29f	6
1.2-29g	6
1.2-29h	6
1.2-29i	6
1.2-29j	6
1.2-30	16
1.2-31	16
1.2-32	16
1.2-33	16
1.2-34	16
1.2-35	16
1.2-36	16
1.2-37	16
1.2-38	16
1.2-39	6
1.2-40	14
1.2-41	14
1.2-42	14
1.2-43	14
1.2-44	6
1.2-45	6
1.2-46	19
1.2-47	19
1.2-48	14
1.2-49	14
1.2-50	19
1.2-51	19
1.2-52	19
1.2-53	19
1.3-ii	1
1.3-1	1
1.3-2	15
1.3-3	16
1.3-4	15
1.3-5	15
1.3-6	15
1.3-7	15
1.3-8	15
1.3-9	1
1.3-10	1
1.3-11	1
1.3-12	1
1.3-13	6
1.3-14	1
1.3-15	1
1.3-16	1
1.3-17	1
1.3-18	7
1.3-19	1
1.4-ii	1
1.4-1	8
1.4-2	1
1.4-3	7
1.5-1	14
1.6-1	20
1.6-2	8
1.6-3	15
1.6-4	15
1.7-ii	17
1.7-1	20
1.7-2	20
1.7-3	13
1.7-4	17
1.7-5	17
1.7-5.1	17
1.7-5.2	8
1.7-5.3	20
1.7-5.4	14
1.7-5.5	20
1.7-5.6	20
1.7-5.7	13
1.7-5.8	13
1.7-5.9	13
1.7-5.10	13
1.7-5.11	13
1.7-5.12	13
1.7-5.13	13
1.7-5.14	13
1.7-5.15	13
1.7-5.16	13
1.7-6	20
1.7-7	20
1.7-8	6
1.7-9	6
1.7-10	6
1.7-11	6
1.7-12	6
1.7-13	6
1.7-14	6
1.7-15	6

CHAPTER 1
PAGE STATUS (Continued)

PAGE	AMEND
1.7-16	6
1.7-17	6
1.7-18	6
1.8-i	12
1.8-ii	12
1.8-1	20
1.8-1.1	20
1.8-2	6
1.8-3	6
1.8-4	6
1.8-5	6
1.8-6	6
1.8-7	6
1.8-8	6
1.8-9	8
1.8-10	8
1.8-11	6
1.8-12	6
1.8-13	6
1.8-14	6
1.8-15	6
1.8-16	6
1.8-16a	6
1.8-17	6
1.8-18	6
1.8-19	6
1.8-20	8
1.8-21	10
1.8-22	10
1.8-23	10
1.8-24	3
1.8-25	8
1.8-26	2
1.8-27	7
1.8-28	2
1.8-29	8
1.8-30	8
1.8-31	2
1.8-32	2
1.8-33	8
1.8-34	2
1.8-35	2
1.8-36	8
1.8-37	6
1.8-38	14
1.8-39	8
1.8-40	8
1.8-41	8
1.8-42	14
1.8-43	17
1.8-44	15
1.8-45	10
1.8-46	18
1.8-47	8
1.8-48	17
1.8-49	8
1.8-50	2
1.8-51	6
1.8-52	12
1.8-53	12
1.8-54	19
1.8-54.1	19
1.8-55	12
1.8-56	12
1.8-57	17
1.8-58	17
1.8-59	13
1.8-60	12
1.8-61	12
1.8-62	17
1.8-63	12
1.8-64	12
1.8-65	12
1.8-66	12
1.8-67	12
1.8-68	17
1.8-69	12
1.8-70	20
1.8-70.1	20
1.8-71	12
1.8-72	12
1.8-73	20
1.8-74	12
1.8-75	12
1.8-76	12
1.8-77	12
1.8-78	12
1.8-79	12
1.8-80	12
1.8-81	12
1.8-82	12
1.8-83	12
1.8-84	12
1.8-85	20
1.8-86	12
1.8-87	20
1.8-87.1	20
1.8-87.2	20
1.8-87.3	20
1.8-87.4	20
1.8-88	12
1.8-89	17
1.8-90	20
1.8-91	20
1.9-i	6
1.9-1	6
1.9-2	15
1.9-3	16
1.9-4	20
1.9-5	18
1.9-6	18
1A COVER	
1A-i	17
1A-ii	17
1A-iv	17
1A-v	17
1A.1-1	8
1A.2-i	17
1A.2-ii	17
1A.2-iv	17
1A.2-v	17
1A.2-1	6
1A.2-2	8
1A.2-3	8
1A.2-4	4
1A.2-5	4
1A.2-6	10
1A.2-7	13
1A.2-8	16
1A.2-8.1	17
1A.2-9	17
1A.2-10	5
1A.2-10a	6
1A.2-11	8
1A.2-12	15
1A.2-13	13
1A.2-13a	8
1A.2-14	15
1A.2-14a	6
1A.2-15	9
1A.2-15a	9
1A.2-16	4
1A.2-17	15
1A.2-18	17
1A.2-18.1	17
1A.2-19	13
1A.2-19.1	17
1A.2-20	16
1A.2-21	16
1A.2-22	16
1A.2-23	16
1A.2-24	16
1A.2-25	16
1A.2-26	16
1A.2-27	16
1A.3-i	20
1A.3-1	17

CHAPTER 1
PAGE STATUS (Continued)

PAGE	AMEND
1A.4-1	16
1AA COVER	
1AA-i	11
1AA-iii	20
1AA.1-1	10
1AA.2-1	11
1AA.2-2	10
1AA.3-1	10
1AA.3-2	11
1AA.4-1	11
1AA.4-2	11
1AA.4-3	11
1AA.5-1	11
1AA.5-2	11
1AA.5-3	11
1AA.5-4	11
1AA.5-5	11
1AA.5-6	11
1AA.5-7	11
1AA.5-8	11

CHAPTER 2
PAGE STATUS

PAGE	AMEND
2 COVER	
2-ii	15
2.0-ii	6
2.0-1	16
2.0-2	16
2.1-ii	6
2.1-1	16
2.1-2	6
2.1-3	9
2.1-4	9
2.1-5	20
2.2-ii	15
2.2-1	16
2.2-2	15
2.3-ii	18
2.3-1,2	18
2A COVER	
2A-ii	15
2A-iii	15
2A-1	20
2A-2	20
2A-3	20
2A-4	20
2A-5	20
2A-6	20
2A-7	20
2A-8	20
2A-9	20
2A-10	20
2A-11	20
2A-12	20
2A-13	20
2A-14	20
2A-15	20
2A-16	20
2A-17	20
2A-18	20
2A-19	20
2A-20	20
2A-21	20
2A-22	20
2A-23	20
2A-24	20
2A-25	20
2A-26	20
2A-27	20
2A-28	20
2A-29	20
2A-30	20
2A-31	20
2A-32	20
2A-33	20
2A-34	20
2A-35	20
2A-36	20
2A-37	20
2A-38	20
2A-39	20
2A-40	20
2A-41	20
2A-42	20
2A-43	20
2A-44	20
2A-45	20
2A-46	20

CHAPTER 3
PAGE STATUS

PAGE	AMEND
3 COVER	
3.0-i	7
3.0-ii	7
3.0-iii	7
3.0-iv	1
3.0-v	1
3.0-vi	17
3.1-i	1
3.1-ii	1
3.1-iii	1
3.1-iv	7
3.1-v	1
3.1-vi	1
3.1-vii	1
3.1-viii	1
3.1-ix	1
3.1-x	7
3.1-xi	7
3.1-1	11
3.1-2	7
3.1-3	1
3.1-4	7
3.1-5	1
3.1-6	1
3.1-7	1
3.1-8	1
3.1-9	7
3.1-10	1
3.1-11	7
3.1-12	7
3.1-13	1
3.1-14	1
3.1-15	1
3.1-16	7
3.1-17	7
3.1-18	1
3.1-19	8
3.1-19.1	8
3.1-20	8
3.1-21	9
3.1-21.1	9
3.1-22	8
3.1-23	1
3.1-24	7
3.1-25	1
3.1-26	7
3.1-27	1
3.1-28	2
3.1-29	1
3.1-30	1
3.1-31	7
3.1-32	1
3.1-33	7
3.1-34	1
3.1-35	3
3.1-36	1
3.1-37	6
3.1-38	7
3.1-39	7
3.1-40	7
3.1-41	14
3.2-i	20
3.2-1	15
3.2-2	3
3.2-3	7
3.2-4	3
3.2-5	1
3.2-6	20
3.2-7	20
3.2-7.1	20
3.2-7.2	20
3.2-7.3	20
3.2-7.4	20
3.2-8	20
3.2-8.1	20
3.2-9	20
3.2-10	20
3.2-11	20
3.2-11.1	20
3.2-12	20
3.2-13	20
3.2-13.1	20
3.2-14	20
3.2-14.1	20
3.2-15	20
3.2-16	20
3.2-17	20
3.2-18	20
3.2-18.1	20
3.2-19	20
3.2-19.1	20
3.2-20	20
3.2-21	20
3.2-21.1	20
3.2-21.2	20
3.2-21.3	20
3.2-21.4	20
3.2-22	20
3.2-23	20
3.2-23.1	20
3.2-23.1.1	20
3.2-23.2	20
3.2-24	20
3.2-24.1	20
3.2-25	20
3.2-25.1	20
3.2-26	20
3.2-27	20
3.2-28	20
3.2-29	20
3.2-30	20
3.2-31	20
3.2-32	6
3.2-33	20
3.2-34	20
3.2-34.1	20
3.2-35	2
3.2-36	20
3.2-37	20
3.3-i	6
3.3-ii	6
3.3-iii	1
3.3-1	6
3.3-2	6
3.3-3	1
3.3-4	1
3.4-i	18
3.4-iii	18
3.4-1	18
3.4-1.1	18
3.4-2	16
3.4-2.1	18
3.4-3	6
3.4-4	16
3.4-4.1	16
3.4-5	16
3.4-6	20
3.4-6.1	18
3.4-7	18
3.4-8	20
3.4-9	16
3.5-i	16
3.5-iii	16
3.5-iv	16
3.5-1	3
3.5-2	17
3.5-3	20
3.5-3.1	16
3.5-4	14
3.5-5	1
3.5-6	14
3.5-6.1	14
3.5-7	14
3.5-7.1	14
3.5-8	16
3.5-8.1	16
3.5-8.2	16
3.5-9	1
3.5-10	3
3.6-i	1
3.6-iii	1

CHAPTER 3
PAGE STATUS (Continued)

PAGE	AMEND
3.6-iv	20
3.6-v	1
3.6-1	7
3.6-2	3
3.6-3	10
3.6-4	7
3.6-5	17
3.6-5.1	17
3.6-6	7
3.6-7	1
3.6-8	7
3.6-9	14
3.6-10	1
3.6-11	1
3.6-12	7
3.6-13	6
3.6-14	6
3.6-15	7
3.6-16	1
3.6-17	8
3.6-18	1
3.6-19	3
3.6-20	1
3.6-21	6
3.6-22	7
3.6-23	7
3.6-24	1
3.6-25	1
3.6-26	1
3.6-27	20
3.6-27.1	20
3.6-28	1
3.6-29	10
3.6-30	17
3.6-30.1	17
3.6-31	7
3.6-32	17
3.6-33	1
3.6-33.1	10
3.6-33.2	10
3.6-34	1
3.6-35	1
3.6-36	1
3.6-37	1
3.6-38	1
3.6-39	1
3.6-40	1
3.7-ii	18
3.7-iii	1
3.7-iv	1
3.7-v	20
3.7-vi	20
3.7-vii	20
3.7-viii	1
3.7-ix	16
3.7-x	18
3.7-1	12
3.7-2	1
3.7-3	16
3.7-4	7
3.7-5	1
3.7-6	1
3.7-7	1
3.7-8	18
3.7-8.1	19
3.7-9	18
3.7-10	1
3.7-11	1
3.7-12	1
3.7-13	1
3.7-14	1
3.7-15	1
3.7-16	1
3.7-17	3
3.7-17a	3
3.7-18	1
3.7-19	1
3.7-20	1
3.7-21	1
3.7-22	1
3.7-23	11
3.7-24	20
3.7-24.1	20
3.7-24.2	20
3.7-25	7
3.7-26	9
3.7-27	7
3.7-28	1
3.7-29	1
3.7-30	18
3.7-31	1
3.7-32	1
3.7-33	1
3.7-34	1
3.7-34.1	18
3.7-34.2	20
3.7-34.3	20
3.7-35	1
3.7-36	1
3.7-37	1
3.7-38	1
3.7-39	1
3.7-40	1
3.7-41	1
3.7-42	1
3.7-43	1
3.7-44	1
3.7-45	1
3.7-46	1
3.7-47	1
3.7-48	1
3.7-49	1
3.7-50	1
3.7-51	1
3.7-52	1
3.7-53	1
3.7-54	1
3.7-55	1
3.7-56	1
3.7-57	1
3.7-58	16
3.7-59	16
3.7-60	16
3.7-61	16
3.7-62	1
3.7-63	1
3.7-64	1
3.7-65	1
3.7-66	1
3.7-67	18
3.7-68	18
3.8-ii	1
3.8-iii	1
3.8-iv	1
3.8-v	4
3.8-vi	1
3.8-vii	7
3.8-viii	7
3.8-ix	1
3.8-x	1
3.8-1	4
3.8-2	16
3.8-3	1
3.8-4	1
3.8-5	1
3.8-6	7
3.8-7	1
3.8-8	4
3.8-9	4
3.8-10	7
3.8-11	6
3.8-12	4
3.8-13	1
3.8-14	2
3.8-15	1
3.8-16	7
3.8-17	7
3.8-18	1

CHAPTER 3
PAGE STATUS (Continued)

PAGE	AMEND	PAGE	AMEND	PAGE	AMEND	PAGE	AMEND
3.8-19	7	3.8-53	1	3.9-19	7	3.9-51	1
3.8-20	14	3.8-54	1	3.9-20	13	3.9-52	1
3.8-21	6	3.8-55	1	3.9-21	13	3.9-53	1
3.8-21a	6	3.8-56	1	3.9-22	7	3.9-54	6
3.8-22	17	3.9-i	1	3.9-23	1	3.9-55	3
3.8-23	18	3.9-ii	18	3.9-24	7	3.9-56	3
3.8-23a	6	3.9-iv	1	3.9-25	7	3.9-57	3
3.8-24	7	3.9-v	11	3.9-26	1	3.9-58	1
3.8-25	6	3.9-vi	13	3.9-27	6	3.9-58.1	14
3.8-26	7	3.9-vii	7	3.9-28	1	3.9-58.2	14
3.8-26a	7	3.9-viii	1	3.9-29	7	3.9-58.3	14
3.8-27	6	3.9-ix	1	3.9-30	3	3.9-58.4	14
3.8-27a	6	3.9-x	20	3.9-31	15	3.9-58.5	14
3.8-28	20	3.9-xi	16	3.9-31.1	11	3.9-58.6	14
3.8-29	3	3.9-xii	16	3.9-32	1	3.9-58.7	14
3.8-30	1	3.9-1	1	3.9-33	7	3.9-58.8	14
3.8-31	1	3.9-2	3	3.9-34	15	3.9-58.9	14
3.8-32	7	3.9-3	11	3.9-34.1	11	3.9-58.10	14
3.8-33	17	3.9-3.1	11	3.9-35	16	3.9-58.11	14
3.8-34	3	3.9-4	11	3.9-36	3	3.9-58.12	14
3.8-35	3	3.9-5	3	3.9-36a	10	3.9-58.13	14
3.8-36	1	3.9-6	11	3.9-37	13	3.9-58.14	14
3.8-37	1	3.9-7	3	3.9-38	1	3.9-58.15	20
3.8-38	1	3.9-8	3	3.9-39	11	3.9-58.16	20
3.8-39	1	3.9-9	11	3.9-40	11	3.9-58.17	14
3.8-40	1	3.9-10	1	3.9-41	1	3.9-58.18	14
3.8-41	1	3.9-11	12	3.9-42	7	3.9-58.19	14
3.8-42	1	3.9-11a	3	3.9-43	7	3.9-58.20	14
3.8-43	1	3.9-12	7	3.9-44	17	3.9-58.21	14
3.8-44	1	3.9-13	7	3.9-44.1	20	3.9-58.22	14
3.8-45	1	3.9-14	1	3.9-44.2	20	3.9-58.23	14
3.8-46	1	3.9-15	2	3.9-45	20	3.9-58.24	14
3.8-47	1	3.9-16	7	3.9-45.1	16	3.9-58.25	14
3.8-48	1	3.9-17	11	3.9-46	1	3.9-58.26	14
3.8-49	1	3.9-17.1	8	3.9-47	1	3.9-58.27	14
3.8-50	1	3.9-18	16	3.9-48	1	3.9-58.28	14
3.8-51	1	3.9-18.1	11	3.9-49	9	3.9-58.29	14
3.8-52	2			3.9-50	7		

CHAPTER 3
PAGE STATUS (Continued)

PAGE	AMEND
3.9-58.30	14
3.9-58.31	14
3.9-58.32	14
3.9-59	14
3.9-60	1
3.9-61	1
3.9-62	1
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3.9-64	11
3.10-i	1
3.10-ii	6
3.10-iv	9
3.10-1	8
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3.10-4	7
3.10-5	7
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3.10-10	1
3.11-ii	14
3.11-1	17
3.11-1.1	17
3.11-2	17
3.11-3	17
3A COVER	
3A.i	1
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3A.iv	9
3A.1-2	1
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3A.3-ii	1
3A.3-1	1
3A.3-2	1
3A.3-3	16
3A.3-4	1
3A.3-5	1
3A.3-6	7
3A.3-7	1
3A.3-8	1
3A.3-9	1v
3A.3-10	1
3A.3-11	1
3A.3-12	1
3A.4-ii	1
3A.4-1	1
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3A.4-3	1
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3A.4-5	1
3A.4-6	1
3A.4-7	1
3A.4-8	1
3A.4-9	1
3A.4-10	-
3A.5-ii	1
3A.5-1	1
3A.5-2	1
3A.5-3	1
3A.5-4	1
3A.5-5	1
3A.5-6	1
3A.6-ii	1
3A.6-1	1
3A.6-2	1
3A.7-ii	1
3A.7-1	1
3A.7-2	1
3A.8-ii	16
3A.8-iii	16
3A.8-1	16
3A.8-2	7
3A.8-2.1	16
3A.8-3	1
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3A.8-22	1
3A.8-23	1
3A.8-24	1
3A.8-25	1
3A.8-26	16
3A.8-27	16
3A.8-28	16
3A.8-29	16
3A.8-30	16
3A.9-1	1
3A.10-1	1
3A.11	1
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3AA-9	1
3AA-10	1
3AA-11	1
3AA-12	1
3B COVER	
3B-ii	6
3B-iii	6
3B.1-ii	6
3B.1-1	6
3B.2-ii	7
3B.2-1	6
3B.3-ii	7
3B.3-1	6
3B.4-ii	6
3B.4-iii	8
3B.4-iv	8
3B.4-1	6
3B.5-ii	6
3B.5-1	6
3B.6-1	6
3B.7-1	6
3C COVER	
3C-ii	1
3C-1	1
3C.2-1	1
3C.3-1	1
3D COVER	

CHAPTER 3
PAGE STATUS (Continued)

PAGE	AMEND	PAGE	AMEND	PAGE	AMEND	PAGE	AMEND
3D-ii	1	3E.2-15	1	3F.2-ii	1	3G.2-14-15	4
3D-iii	1	3E.2-16	1	3F.2-iii	1	3G.2-16	4
3D.1-1	1	3E.2-17	1	3F.2-1	7	3G.2-17	4
3D.2-ii	1	3E.2-18	1	3F.2-2	7	3G.2-18	4
3D.2-1	1	3E.2-19	1	3F.2-3	7	3G.2-19	4
3D.3-1	1	3E.2-20	1	3F.2-4	1	3G.2-20	4
3D.4-ii	1	3E.2-21	1	3F.2-5	1	3G.2-21	4
3D.4-1	1	3E.2-22	1	3F.3-ii	1	3G.2-22	4
3D.4-2	1	3E.2-23	1	3F.3-1	7	3G.2-23	4
3D.5-ii	1	3E.3-ii	1	3F.3-2	7	3G.2-24	4
3D.5-1	1	3E.3-iii	1	3F.3-3	1	3G.2-25	4
3D.6-ii	1	3E.3-1	1	3F.3-4	1	3G.2-26	4
3D.6-1	1	3E.3-2	1	3G COVER		3G.2-27	4
3D.7-ii	1	3E.3-3	1	3G-ii	17	3G.2-28	4
3D.7-1	1	3E.3-4	8	3G.1-ii	4	3G.2-29	4
3D.7-2	1	3E.3-5	1	3G.1-1	4	3G.2-30	4
3E COVER		3E.3-6	1	3G.1-2	4	3G.2-31	4
3E-ii	1	3E.3-7	1	3G.1-3	4	3G.2-32	4
3E.1-1	1	3E.3-8	1	3G.1-4	4	3G.2-33	4
3E.2-ii	1	3E.3-9	1	3G.2-ii	4	3G.2-34	4
3E.2-iii	1	3E.4-ii	1	3G.2-iii	4	3G.3-ii	4
3E.2-1	1	3E.4-iii	1	3G.2-iv	4	3G.3-1	4
3E.2-2	7	3E.4-1	1	3G.2-1	4	3G.3-2	6
3E.2-3	1	3E.4-2	1	3G.2-2	4	3G.3-3	4
3E.2-4	7	3E.4-3	1	3G.2-3	4	3G.3-4	6
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3E.2-6	20	3E.4-5	1	3G.2-5	4	3G.3-6	4
3E.2-7	1	3E.4-6	1	3G.2-6	4	3G.4-ii	4
3E.2-8	1	3E.4-7	1	3G.2-7	4	3G.4-iii	4
3E.2-9	1	3E.4-8	1	3G.2-8	4	3G.4-1	4
3E.2-10	1	3E.4-9	1	3G.2-9	4	3G.4-2	4
3E.2-11	1	3E.5-1	8	3G.2-10	4	3G.4-3	11
3E.2-12	1	3F COVER		3G.2-11	4	3G.4-4	4
3E.2-13	1	3F-ii	1	3G.2-12	4	3G.4-5	4
3E.2-14	1	3F.1-1	8	3G.2-13	4	3G.4-6	4
						3G.4-7	4
						3G.4-8	4

CHAPTER 3
PAGE STATUS (Continued)

PAGE	AMEND
3G.4-9	4
3G.4-10	4
3G.4-11	4
3G.4-12	4
3G.4-13	4
3G.4-14	4
3G.5-11	16
3G.5-111	16
3G.5-1v	16
3G.5-1	17
3G.5-2	16
3G.5-3	16
3G.5-4	16
3G.5-5	16
3G.5-6	16
3G.5-7	16
3G.5-8	16
3G.5-9	16
3G.5-10	16
3G.5-11	16
3G.5-12	16
3G.5-13	16
3G.5-14	16
3G.5-15	16
3H COVER	
3H-11	4
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3H.1-1	4
3H.1-2	4
3H.2-1	4
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3H.3-9	4
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3H.3-14	4
3H.3-15	4
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3H.3-17	4
3H.3-18	4
3H.3-19	4
3H.3-20	4
3H.3-21	4
3H.3-22	4
3H.3-23	4
3H.3-24	4
3H.3-25	4
3H.3-26	4
3H.3-27	4
3H.3-28	4
3H.3-29	4
3H.3-30	4
3H.3-31	4
3H.3-32	4
3H.3-33	4
3H.3-34	4
3H.3-35	4
3H.3-36	4
3H.3-37	4
3H.3-38	4
3H.3-39	4
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3H.3-42	4
3H.3-43	4
3H.3-44	4
3H.3-45	4
3H.3-46	4
3H.3-47	4
3H.3-48	4
3H.3-49	4
3H.3-49.1	20
3H.3-49.2	20
3H.3-49.3	20
3H.3-49.4	20
3H.3-50	6
3H.3-51	6
3H.3-52	6
3H.3-53	6
3H.3-54	6
3H.3-54a	6
3H.3-55	16
3H.3-56	6
3H.3-57	20
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3H.4-1	20
3I COVER	
3I-11	14
3I.1-1	14
3I.2-11	14
3I.2-1	14
3I.3-11	17
3I.3-111	17
3I.3-1v	14
3I.3-1 - 25	17

CHAPTER 4
PAGE STATUS

PAGE	AMEND
4 COVER	
4-i	15
4-ii	16
4.1-i	0
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4.4-i	15
4.4-ii	15
4.4-iv	15
4.4-1	15
4.4-2	15
4.4-3	15
4.4-4	17
4.4-5	15
4.4-6	15
4.4-7	15
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4.4-9	15
4.4-10	15
4.4-11	15
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4.5-4	2
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4B COVER	
4B-ii	16
4B-1	20
4B-2	15
4B-3	15
4B-4	15
4B-5	15
4B-6	16
4B-7	16
4B-8	16
4C COVER	
4C-ii	16
4C-1	15

CHAPTER 5
PAGE STATUS

PAGE	AMEND
5 COVER	
5.0-i	13
5.0-iii	15
5.1-i	15
5.1-1	2
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5.1-3	15
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5.2-36.3	13
5.2-36.4	13
5.2-36.5	13
5.2-36.6	13
5.2-36.7	13
5.2-36.8	13
5.2-36.9	13
5.2-36.10	13
5.2-36.11	13
5.2-36.12	13
5.2-36.13	13
5.2-36.14	19
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5.4-2	15
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5.4-5	15
5.4-5.1	15
5.4-6	15

CHAPTER 5
PAGE STATUS (Continued)

PAGE	AMEND
5.4-7	15
5.4-7.1	15
5.4-8	15
5.4-9	15
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5A.2-3	13
5A.5-1	13
5A.2-4	13
5A.3-1	13
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5AB-1	13
5AB-2	13
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5AB-16	13
5AB-17	13
5AB-18	13
5AB-19	13
5AB-20	13
5AB-21	13
5AB-22	13

CHAPTER 6
PAGE STATUS

PAGE	AMEND
6 COVER	
6.0-i	15
6.0-ii	13
6.0-iv	13
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CHAPTER 6
PAGE STATUS (Continued)

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CHAPTER 6
PAGE STATUS (Continued)

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6A-8	11
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6A-10	11
6B COVER	
6B-1	11
6B-2	11
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6B-4	11
6B-5	11
6B-6	11
6B-7	11

CHAPTER 7
PAGE STATUS

PAGE	AMEND
7 COVER	
7-i	14
7-ii	5
7-iv	20
7-v	11
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7.3-59	2

CHAPTER 7
PAGE STATUS (Continued)

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7.3-69	2	7.3-107	2	7.4-111	2	7.5-11	5
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				7.4-26	2		

CHAPTER 7
PAGE STATUS (Continued)

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7.6-41	20	7.6-75	20	7.7-26	2	7.7-54	20
7.6-42, .1	20	7.6-76	20	7.7-27	2	7.7-55	20
7.6-42.2, .3	20	7.6-77, .1	20	7.7-28	2	7.7-56	20
7.6-42.4, .5	20	7.6-78	5	7.7-29	2	7.7-57	20
7.6-42.6, .7	20	7.6-79	5	7.7-30	2	7.7-58	20
7.6-42.8, .9	20	7.6-80-81	14	7.7-31	2	7.7-59	20
7.6-43	17	7.6-82	14	7.7-32	2	7.7-60, .1	20
7.6-44	2	7.7-i	20	7.7-33	2	7.7-61	2
7.6-45	2	7.7-iii	11	7.7-34	11	7.7-62	2
7.6-46	20	7.7-iv	11	7.7-34.1	11	7.7-63	2
7.6-47	20	7.7-v	14	7.7-34.2	11	7.7-64	2
7.6-48	20	7.7-1	2	7.7-34.3	11	7.7-65	2
7.6-49	20	7.7-2	2	7.7-34.4	11	7.7-66	2
7.6-50	20	7.7-3	2	7.7-34.5	11	7.7-67	2
7.6-51	20	7.7-4	2	7.7-34.6	11	7.7-68	2
7.6-52	20	7.7-5	2	7.7-34.7	11	7.7-69	2
7.6-53	20	7.7-6	2	7.7-34.8	11		
				7.7-34.9	11		

CHAPTER 7
PAGE STATUS (Continued)

PAGE	AMEND
7.7-70	2
7.7-71	2
7.7-72	2
7.7-73	2
7.7-74	2
7.7-75	2
7.7-76	2
7.7-77	2
7.7-78	2
7.7-79	2
7.7-80	2
7.7-81	2
7.7-82	2
7.7-83	2
7.7-84	2
7.7-85	2
7.7-86	2
7.7-87	14
7.7-87.1	14
7.7-88	11
7.7-89	11
7.7-90	11
7.7-91	11
7.7-92	11
7.7-93	11
7.7-94	11
7.7-95	11
7.7-96	11
7.8-11	20
7.8-1	20
7A COVER	
7A-11	6
7A-111	6
7A.1-1	6
7A.2-1 22	20
7A.3-1 ~ 3	20
7A.4-1	6
7A.5-1	6
7A.6-1	6
7A.7-1	8

CHAPTER 8
PAGE STATUS

PAGE	AMEND
8 COVER	
8-ii	10
8.1-ii	10
8.1-1	10
8.1-1.1	10
8.1-2	10
8.1-2.1	10
8.1-3	10
8.1-4	10
8.1-5	10
8.1-6	10
8.2-ii	17
8.2-1	17
8.2-2	17
8.3-ii	1
8.3-iii	2
8.3-iv	2
8.3-v	10
8.3-vi	10
8.3-1	16
8.3-1.1	10
8.3-2	10
8.3-3	10
8.3-4	10
8.3-5	10
8.3-5.1	10
8.3-6	17
8.3-6.1	10
8.3-7	10
8.3-7.1	10
8.3-8	10
8.3-9	10
8.3-10	10
8.3-11	10
8.3-12	10
8.3-12.1	10
8.3-13	10
8.3-14	10
8.3-15	10
8.3-16	10
8.3-16.1	10
8.3-17	10
8.3-18	10
8.3-18.1	10
8.3-19	10
8.3-20	10
8.3-20.1	10
8.3-21	10
8.3-22	10
8.3-23	17
8.3-23.1	10
8.3-24	10
8.3-25	10
8.3-26	10
8.3-27	10
8.3-28	10
8.3-29	17
8.3-30	10
8.3-31	10
8.3-32	10
8.3-33	10
8.3-34	10
8.3-35	10
8.3-36	10
8.3-37	10

CHAPTER 9
PAGE STATUS

PAGE	AMEND
9 COVER	
9-ii	6
9-iii	17
9-iv	17
9-v	17
9.1-ii	16
9.1-iii	18
9.1-iv	16
9.1-v	16
9.1-vi	17
9.1-vii	20
9.1-viii	18
9.1-ix	16
9.1-1	17
9.1-1.1	16
9.1-1.2	18
9.1-2	18
9.1-2a	17
9.1-2b	7
9.1-2c	7
9.1-2d	16
9.1-2e	17
9.1-3	20
9.1-3.1	18
9.1-4	20
9.1-5	18
9.1-5.1	20
9.1-6	16
9.1-6.1	20
9.1-6.2	20
9.1-6.3	16
9.1-6.4	16
9.1-6.5	16
9.1-6.6	16
9.1-6.7	16
9.1-6.8	16
9.1-6.9	18
9.1-6.10	16
9.1-6.11	16
9.1-6.12	16
9.1-6.13	16
9.1-7	17
9.1-8	17
9.1-9	17
9.1-10	17
9.1-11	17
9.1-12	17
9.1-13	20
9.1-13a	6
9.1-13b	16
9.1-13c	6
9.1-13d	6
9.1-13e	6
9.1-14	6
9.1-15	6
9.1-16	6
9.1-17	12
9.1-18	6
9.1-19	6
9.1-20	6
9.1-21	6
9.1-22	6
9.1-22.1	16
9.1-22.2	[illegible]
9.1-22.3	18
9.1-23	20
9.1-24	20
9.1-24.1	20
9.1-25	2
9.1-26	6
9.1-27	6
9.1-28	6
9.1-29	6
9.1-30	6
9.1-31	6
9.1-32	16
9.1-33	6
9.1-34	6
9.1-35	16
9.1-36	6
9.1-37	6
9.1-38	16
9.1-39	16
9.2-ii	18
9.2-iia	18
9.2-iii	17
9.2-iv	16
9.2-iva	18
9.2-v	18
9.2-vi	16
9.2-1	16
9.2-1.1	16
9.2-1.2	16
9.2-1.3	16
9.2-1.4	16
9.2-2	20
9.2-3	20
9.2-3.1	20
9.2-4	17
9.2-4.1	17
9.2-5	14
9.2-6	20
9.2-6.1	20
9.2-7	18
9.2-8	14
9.2-9	17
9.2-9.1	17
9.2-10	20
9.2-10.1	18
9.2-11	18
9.2-12	18
9.2-12.1	18
9.2-12.2	18
9.2-13	20
9.2-14	2
9.2-15	7
9.2-15.1	17
9.2-16	18
9.2-17	14
9.2-18	16
9.2-19	14
9.2-19.1	18
9.2-20	2
9.2-21	2
9.2-22	14
9.2-23	14
9.2-24	14
9.2-25	17
9.2-25a	7
9.2-25b	7
9.2-25c	11
9.2-25d	18
9.2-26	20
9.2-27	20
9.2-28	20
9.2-29	20
9.2-30	20
9.2-31	20
9.2-32	20
9.2-33	20
9.2-34	20
9.2-34.1	20
9.2-35	20
9.2-36	20
9.2-37	20
9.2-38	20
9.2-38.1	20
9.2-39	20
9.2-40	20
9.2-41	20
9.2-41.1	20
9.2-42	7
9.2-43	7
9.2-44	7
9.2-45	20
9.2-45.1	20

CHAPTER 9
PAGE STATUS (Continued)

PAGE	AMEND
9.2-45.2	20
9.2-46	11
9.3-ii	15
9.3-iii	16
9.3-iiia	16
9.3-iiib	16
9.3-iv	20
9.3-1	11
9.3-1a-1d	16
9.3-2	20
9.3-3	20
9.3-3.1	20
9.3-4	2
9.3-5	11
9.3-6	2
9.3-7 - 7.1	16
9.3-8	8
9.3-9	4
9.3-10	4
9.3-11 - 11.2	16
9.3-12	20
9.3-13	11
9.3-13.1	16
9.3-13.2	16
9.3-14	3
9.3-15	18
9.3-15a - 15f	16
9.3-16	20
9.3-16.1	20
9.3-17	2
9.3-18	2
9.3-19 - 23	20
9.3-24	20
9.4-ii	20
9.4-iii	20
9.4-iv	6
9.4-v	6
9.4-vi	6
9.4-vii	6
9.4-viii	6
9.4-ix	16
9.4-1	17
9.4-1.1	17
9.4-1.2	17
9.4-1.3	17
9.4-1.4	17
9.4-1.5	16
9.4-2	16
9.4-2a	16
9.4-2b	16
9.4-2b.1	16
9.4-2c-21a	18
9.4-2j	17
9.4-2k	17
9.4-3	6
9.4-3a	5
9.4-4	6
9.4-5	20
9.4-6	2
9.4-7	2
9.4-7.1 - 7.5	16
9.4-7.6	16
9.4-7.7	16
9.4-7.8	16
9.4-7.9	16
9.4-7a - 7a.4	20
9.4-7b	16
9.4-7c	16
9.4-7c.1	16
9.4-7c.2	16
9.4-7d - 7d.2	20
9.4-7e - 7e.2	20
9.4-7f	20
9.4-7g	6
9.4-7h	6
9.4-8	20
9.4-9	6
9.5-ii	17
9.5-ii.1	17
9.5-iii	16
9.5-iv	16
9.5-v	16
9.5-v.1	16
9.5-v.2	17
9.5-vi	17
9.5-1 - 1.7	18
9.5-2 - 2b	16
9.5-3 - 3.4	18
9.5-4 - 4.2	18
9.5-5 - 5.1	16
9.5-6 - 6.1	16
9.5-7 - 7.1	16
9.5-8 - 8a	16
9.5-9	2
9.5-10	9
9.5-10.1	10
9.5-10.2	10
9.5-10.3	20
9.5-10.4	10
9.5-10.5	16
9.5-10.6	16
9.5-10.7	17
9.5-10a	6
9.5-10f	17
9.5-10g	17
9.5-11	20
9.5-12	6
9.5-13	10
9.5-14	14
9.5-15	14
9.5-16	14
9.5-17	16
9.5-18	16
9.5-19	16
9.5-20	16
9.5-21	16
9A COVER	
*9A-ii	20
*9A-iii	16
9A.1-1	14
9A.2-ii	6
9A.2-1 - 8	16
9A.3-ii	6
9A.3-1 - 2	16
*9A.4-ii	20
*9A.4-iii	20
9A.4-iv	20
9A.4-v	20
9a.4-v.1	20
9A.4-vi	20
9A.4-vii	20
9A.4-viii	20
9A.4-ix	20
9A.4-x	20
9A.4-x.1	20
9A.4-xi	20
9A.4-xii	20
9A.4-xiii	20
9A.4-xiii.1	16
9A.4-xiii.2	16
9A.4-xiii.3	16
9A.4-xiii.4	16
9A.4-xiv	14
9A.4-xv	16
9A.4-xvi	16
9A.4-xvii	16
9A.4-1 - 271	20

*Pages out-of-order, reprocessing.

CHAPTER 9
PAGE STATUS (Continued)

PAGE	AMEND
9A.5-ii	16
9A.5-iii	6
9A.5-1 - 9	18
9A.6-ii	14
9A.6-1 - 182	20
9B COVER	
9B-ii	17
9B.1-1	17
9B.2-ii	17
9B.2-1 - 7	17
9B.2-8	17
9B.2-9	17
9B.2-10	17
9B.2-11	17
9B.2-12	17
9B.3-1	17

CHAPTER 10
PAGE STATUS

PAGE	AMEND
10 COVER	
10-i	18
10-ii	17
10.1-i	3
10.1-1	7
10.1-2	7
10.1-3	7
10.1-4	7
10.1-5	8
10.1-6	7
10.1-7	7
10.1-8	7
10.1-9	7
10.2-i	3
10.2-ii	16
10.2-1	16
10.2-2	3
10.2-3	8
10.2-4	12
10.2-5	8
10.2-6	16
10.2-6.1	16
10.2-7	8
10.2-7.1	16
10.2-8	17
10.2-9	16
10.2-10	3
10.2-11	3
10.2-12	11
10.2-13	3
10.2-14	3
10.3-i	3
10.3-1	15
10.3-2	15
10.3-3	17
10.3-4	3
10.3-5	11
10.3-6	3
10.3-7	3
10.4-i	3
10.4-ii	17
10.4-iv	17
10.4-v	17
10.4-v.1	17
10.4-vi	3
10.4-1	3
10.4-2	3
10.4-3	3
10.4-4	17
10.4-5	17
10.4-5.1	17
10.4-6	17
10.4-7	17
10.4-7.1	17
10.4-8	17
10.4-9	3
10.4-10	17
10.4-10.1	17
10.4-11	3
10.4-12	20
10.4-13	20
10.4-14	11
10.4-15	20
10.4-16	11
10.4-17	17
10.4-18	11
10.4-19	11
10.4-20	7
10.4-21	3
10.4-22	3
10.4-23	3
10.4-24	14
10.4-25	3
10.4-26	17
10.4-27	11
10.4-28	3
10.4-29	3
10.4-30	3
10.4-31	11
10.4-31.1	11
10.4-32	16
10.4-33	11
10.4-34	11
10.4-35	16
10.4-36	11

CHAPTER 11
PAGE STATUS

PAGE	AMEND
11 COVER	
11-i	7
11-ii	20
11.1-ii	6
11.1-iii	6
11.1-1	6
11.1-2	6
11.1-3	6
11.1-4	6
11.1-5	18
11.1-6	6
11.1-7	6
11.1-8	6
11.1-9	6
11.1-10	6
11.1-11	6
11.1-12	6
11.2-ii	6
11.2-iii	16
11.2-1 - 49	20
11.3-ii	16
11.3-iii	6
11.3-iv	16
11.3-v	16
11.3-1 - 25	20
11.4-ii	18
11.4-iii	6
11.4-1 - 9	20
11.5-ii	17
11.5-iii	17
11.5-iv	19
11.5-1	18
11.5-2	18
11.5-2.1	18
11.5-3	18
11.5-4	18
11.5-5	18
11.5-6	17
11.5-7	18
11.5-8	17
11.5-9	18
11.5-9.1	18
11.5-10	18
11.5-11	17
11.5-12	17
11.5-13	18
11.5-14	18
11.5-15	18
11.5-16	18
11.5-17	18
11.5-18	18
11.5-19	17
11.5-20	17
11.5-21	18
11.5-22	17
11.6-1	7

CHAPTER 12
PAGE STATUS

PAGE	AMEND
12 COVER	
12-ii	10
12.1-ii	2
12.1-iii	6
12.1-1	7
12.1-2	6
12.1-3	18
12.1-3.1	18
12.1-4	18
12.2-ii	20
12.2-iii	20
12.2-iii.1	18
12.2-iv	18
12.2-v	20
12.2-1	20
12.2-1.1	20
12.2-2	10
12.2-3	10
12.2-4	10
12.2-4.1	20
12.2-4.2	20
12.2-5	18
12.2-6	18
12.2-6.1	18
12.2-7	20
12.2-8	6
12.2-9	2
12.2-10	18
12.2-11	10
12.2-12	10
12.2-13	2
12.2-14	10
12.2-15	10
12.2-16	10
12.2-17	20
12.2-17.1	20
12.2-17.2	20
12.2-17.3	20
12.2-17.4	20
12.2-17.5	20
12.2-17.6	20
12.2-18	10
12.2-19	10
12.2-20	10
12.2-21	10
12.2-22	10
12.2-23	10
12.2-24	10
12.2-25	20
12.2-25.1	10
12.2-25.2	10
12.2-25.3	20
12.2-25.4	20
12.2-25.5	10
12.2-26	10
12.2-26.1	10
12.2-27	10
12.2-27.1	10
12.2-27.2	10
12.2-27.3	10
12.2-27.4	10
12.2-27.5	10
12.2-27.6	10
12.2-27.7	10
12.2-27.8	10
12.2-27.9	10
12.2-27.10	10
12.2-28	10
12.2-29	10
12.2-30	10
12.2-31	20
12.2-31.1	10
12.2-32	18
12.2-32.1	18
12.2-33	10
12.2-33.1	14
12.2-33.2	14
12.2-33.3	14
12.2-33.4	18
12.2-33.5	18
12.2-33.6	18
12.2-33.7	18
12.2-33.8	18
12.2-33.9	20
12.2-33.10	20
12.2-34	2
12.3-ii	20
12.3-iii	20
12.3-iv	6
12.3-v	6
12.3-vi	10
12.3-vii	10
12.3-viii	18
12.3-ix	18
12.3-1	18
12.3-2	20
12.3-2.1	20
12.3-3	10
12.3-4	10
12.3-5	10
12.3-6	10
12.3-7	10
12.3-8	10
12.3-9	10
12.3-10	10
12.3-11	10
12.3-12	10
12.3-13	20
12.3-13.1	20
12.3-13.2	20
12.3-13.3	20
12.3-14	18
12.3-14.1	18
12.3-15	20
12.3-15.1	18
12.3-16	10
12.3-17	10
12.3-17.1	18
12.3-17.2	18
12.3-17.3	18
12.3-17.4	18
12.3-18	6
12.3-19	6
12.3-20	6
12.3-21	17
12.3-22	17
12.3-23	6
12.3-24	6
12.3-25	6
12.3-26	17
12.3-27	6
12.3-28	6
12.3-29	6
12.3-30	6
12.3-31	6
12.3-32	6
12.3-33	6
12.3-34	6
12.3-35	6
12.3-36	6
12.3-37	17
12.3-38	6
12.3-39	6
12.3-40	10
12.3-41	10
12.3-42	17
12.3-43	10
12.3-44	17
12.3-45	10
12.3-46	10
12.3-47	10
12.3-48	10
12.3-49	10
12.3-50	10
12.3-51 - 55	10
12.3-56	17
12.3-57	17

CHAPTER 12
PAGE STATUS

PAGE	AMEND
12.3-58	17
12.3-59	17
12.3-60	17
12.3-61	17
12.3-62	17
12.3-63	10
12.3-64	10
12.3-65	10
12.3-66	10
12.3-67	10
12.3-68	17
12.3-69	10
12.3-70	10
12.3-71	10
12.3-72	10
12.3-73	10
12.3-74	10
12.3-75	10
12.3-76	10
12.3-77	10
12.3-78	10
12.3-79 - 82	10
12.3-83	18
12.3-84	18
12.3-85	18
12.3-86	18
12.3-87	18
12.4-11	20
12.4-1	20
12.4-2	20
12.4-2.1	20
12.4-2.2	20
12.4-3	20
12.5-1	7

CHAPTER 13
PAGE STATUS

PAGE	AMEND
13 COVER	
13-ii	8
13.1-1	7
13.2-1	7
13.3-1	11
13.3-2	11
13.3-3	11
13.3-4	11
13.3-5	11
13.4-1	7
13.5-1	7
13.6-ii	8
13.6-iii	8
13.6-iv	8
13.6-1	8
13.6-2	16
13.6-3	15
13.6-4	2
13.6-5	2
13.6-6 - 19	8

CHAPTER 14
PAGE STATUS

PAGE	AMEND
14 COVER	
14.0-ii	B
14.1-1	B
14.2-ii	2
14.2-iii	18
14.2-iv	2
14.2-v	18
14.2-vi	18
14.2-vii	11
14.2-vii.1	18
14.2-vii.2	18
14.2-viii	18
14.2-1	2
14.2-2	2
14.2-3	2
14.2-4	18
14.2-5	18
14.2-5.1	18
14.2-6	2
14.2-7	20
14.2-7.1	18
14.2-8	2
14.2-9	18
14.2-10	18
14.2-11	18
14.2-12	18
14.2-12.1	18
14.2-13	2
14.2-14	2
14.2-15	18
14.2-16	18
14.2-17	2
14.2-18	2
14.2-19	18
14.2-20	18
14.2-21	18
14.2-22	18
14.2-23	2
14.2-24	18
14.2-25	18
14.2-26	18
14.2-26.1	18
14.2-27	18
14.2-28	18
14.2-29	18
14.2-30	18
14.2-31	18
14.2-31.1	18
14.2-32	18
14.2-33	18
14.2-33.1	18
14.2-34	18
14.2-35	18
14.2-36	18
14.2-37	18
14.2-38	18
14.2-39	18
14.2-40	18
14.2-41	18
14.2-42	18
14.2-42.1	11
14.2-43	18
14.2-44	18
14.2-44.1	18
14.2-44.2	18
14.2-44.3	18
14.2-44.4	18
14.2-44.5	18
14.2-44.6	18
14.2-44.7	18
14.2-44.8	18
14.2-44.9	18
14.2-44.10	18
14.2-44.11	18
14.2-44.12	11
14.2-44.13	
14.2-44.14	1b
14.2-44.15	18
14.2-44.16	18
14.2-45	18
14.2-45.1	18
14.2-46	18
14.2-46.1	18
14.2-47	2
14.2-48	18
14.2-48.1	18
14.2-49	18
14.2-50	2
14.2-51	2
14.2-52	18
14.2-53	18
14.2-54	18
14.2-54.1	18
14.2-55	18
14.2-55.1	18
14.2-56	2
14.2-57	18
14.2-57.1	18
14.2-58	18
14.2-58.1	18
14.2-59	18
14.2-60	2
14.2-61	18
14.2-61.1	18
14.2-62	2
14.2-63	11
14.2-64	18
14.2-65	18

CHAPTER 15
PAGE STATUS

PAGE	AMEND
15 COVER	
15-i	15
15-ii	2
15-iii	2
15-iv	2
15-v	15
15.0-i	15
15.0-ii	15
15.0-1	15
15.0-1.1	15
15.0-2	15
15.0-2.1	15
15.0-3	15
15.0-4	15
15.0-5	15
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15.1-iv	0
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15.1-vii	18
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15.1-2	15
15.1-3	15
15.1-3.1	15
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15.1-5.1	15
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15.1-7	15
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15.2-viii	15
15.2-ix	15
15.2-x	0
15.2-xi	15
15.2-xii	16
15.2-1	15
15.2-1.1	15
15.2-2	15
15.2-2.1	15
15.2-3	15
15.2-3.1	15
15.2-4	15
15.2-5	16
15.2-6	15
15.2-7	15
15.2-8	15
15.2-9	15
15.2-10	15
15.2-11	15
15.2-12	15
15.2-13	15
15.2-14	15
15.2-15	15
15.2-16	15
15.2-17	16
15.2-18	15
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15.3-iv	0
15.3-v	0
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15.3-3	17
15.3-4	0
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15.3-14	15
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15.4-iv	0
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15.4-vi	2
15.4-vii	2
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15.4-6	17
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15.4-12	2
15.4-13	2
15.4-14	2
15.4-15	15
15.4-16	2
15.4-17	2
15.4-18	2

CHAPTER 15
PAGE STATUS (Continued)

PAGE	AMEND
15.4-19	2
15.4-20	2
15.4-21	2
15.4-22	2
15.4-23	15
15.4-24	15
15.4-25	2
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15.5-ii	2
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15.6-6	8
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15.6-7	8
15.6-8	2
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15.6-10	8
15.6-11	17
15.6-12	17
15.6-13	17
15.6-14	2
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15.6-16	2
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15.6-23	8
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15.6-29	8
15.6-29.1	8
15.6-30	8
15.7-i	9
15.7-iii	17
15.7-iv	17
15.7-v	17
15.7-1	17
15.7-1.1	17
15.7-2	9
15.7-3	2
15.7-4	2
15.7-5	17
15.7-6	17
15.7-7	17
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15.7-9	17
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15.7-12	17
15.7-13	17
15.7-14	12
15.7-15	17
15.7-16	17
15.7-17	17
15.7-18	17
15.7-19	17
15.7-20	17
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15A-ii	0
15A-iii	0
15A-iv	0
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15A.2-ii	0
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15A.3-7	7
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15A.4-2	0
15A.4-3	0
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15A.6-iii	17
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15A.6-v	0
15A.6-vi	0
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15A.6-viii	0
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15A.6-7	17
15A.6-8	17
15A.6-8.1	17
15A.6-8.2	17
15A.6-8.3	17
15A.6-9	17
15A.6-10	17
15A.6-11	17
15A.6-12	2
15A.6-13	17
15A.6-14	17
15A.6-15	17
15A.6-16	2
15A.6-17	2
15A.6-18	0
15A.6-19	0
15A.6-19.1	17

CHAPTER 15
PAGE STATUS (Continued)

PAGE	AMEND
15A.6-20	17
15A.6-21	17
15A.6-22	17
15A.6-23	10
15A.6-24	17
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15A.6-41	17
15A.6-42	0
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15A.6-46	17
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15A.6-48	17
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15A.6-52	17
15A.6-53	17
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15A.6-67	0
15A.6-68	0
15A.6-69	0
15A.6-70	0
15A.6-71	0
15A.6-72	17
15A.6-73	17
15A.6-74	17
15A.6-75	17
15A.6-76	17
15A.6-77	17
15A.6-78	0
15A.6-79	0
15A.6-80	0
15A.6-81	0
15A.6-82	2
15A.6-83	2
15A.6-84	2
15A.6-85	2
15A.6-86	2
15A.6-87	2
15A.6-88	2
15A.6-89	7
15A.6-90	7
15A.6-91	7
15A.7-11	0
15A.7-1	0
15A.8-11	0
15A.8-1	0
15B COVER	
15B-11	6
15B.1-1	14
15B.2-11	6
15B.2-111	6
15B.2-1 - 24	20
15B.3-11	6
15B.3-1 - 5	18
15B.4-11	6
15B.4-1 - 4	20
15C COVER	
15C-11	15
15C.1-1	15
15C.2-11	15
15C.2-1	15
15C.2-2 - 5	15
15C.3-1	15
15C.4-1	15
15C.5-11	15
15C.5-1	15
15C.5-2	15
15C.5-3	15
15C.5-4	15
15C.5-5	15
15C.5-6	15
15C.5-7	15
15C.5-8	15
15D COVER	
15D-11	15
15D.1-1	15
15D.2-11	15
15D.2-1	15
15D.2-2	15
15D.3-11	15
15D.3-1	15
15D.3-2	15
15D.3-3 - 4	15
15D.4-11	15
15D.4-1	15
15D.4-2	15
15E COVER	
15E-11	15
15E.1-1	15
15E.2-11	15
15E.2-1	15
15E.2-2	15
15E.3-11	15
15E.3-1	15
15E.3-2	15
15E.3-3	15
15E.3-4	15
15E.4-1	15
15E.5-11	15
15E.5-111	15
15E.5-1	15
15E.5-2	15
15E.5-3	15
15E.5-4	15
15E.5-5	15
15E.5-6	15
15E.5-7	15
15E.5-8	15
15E.5-9	15
15E.5-10	15
15E.5-11	15
15E.5-12	15
15E.5-13	15
15E.5-14	15
15E.5-15	15
15E.5-16	15
15E.5-17	15
15E.5-18	15
15E.6-1	15
15E.7-1	15

CHAPTER 16
PAGE STATUS

PAGE	AMEND
16 COVER	
16-i	9
16-ii	9
16-iv	9
16-v	9
16.1-ii	9
16.1-1	9
16.1-2	
16.1-3	
16.1-4	9
16.1-5	9
16.1-6	9
16.1-7	9
16.1-8	9
16.1-9	9
16.1-10	9
16.1-11	9
16.1-12	9
16.1-13	9
16.1-14	9
16.1-15	9
16.1-16	9
16.1-17	9
16.1-18	9
16.1-19	9
16.1-20	9
16.1-21	9
16.1-22	9
16.1-23	9
16.1-24	9
16.1-25	9
16.1-26	9
16.2-1	9
16.3-1	9
16.3-2	9
16.3-3	9
16.3-4	9
16.3-5	9
16.4-ii	9
16.4-1	9
16.4-2	9
16.4-3	9
16.4-4	9
16.4-5	9
16.4-6	9
16.4-7	9
16.4-8	9
16.4-9	9
16.4-10	9
16.4-11	9
16.4-12	9
16.4-13	9
16.4-14	9
16.4-15	9
16.4-16	9
16.4-17	9
16.4-18	9
16.4-19	9
16.4-20	9
16.4-21	9
16.4-22	9
16.4-23	9
16.5-ii	9
16.5-1	9
16.5-2	9
16.5-3	9
16.6-1	9
16.7-ii	9
16.7-1	9
16.7-2	9
16.7-3	9
16.7-4	9
16.7-5	9
16.7-6	9
16.7-7	9
16.7-8	9
16.7-9	9
16.7-10	9
16.7-11	9
16.7-12	9
16.7-13	9
16.7-14	9
16.7-15	9
16.8-ii	9
16.8-1	9
16.8-2	9
16.8-3	9
16.8-4	9
16.8-5	9
16.8-6	9
16.8-7	9
16.8-8	9
16.8-9	9
16.8-10	9
16.8-11	9
16.9-ii	20
16.9-1	9
16.9-2	9
16.9-3	9
16.9-4	9
16.9-5	9
16.9-6	9
16.9-7	9
16.9-8	9
16.9-9	9
16.9-10	9
16.9-11	9
16.9-12	9
16.9-13	9
16.9-14	9
16.9-15	9
16.9-16	9
16.9-17	9
16.9-18	9
16.9-19	9
16.9-20	9
16.9-21	9
16.9-22	9
16.9-23	9
16.9-24	9
16.9-25	9
16.9-26	9
16.9-27	9
16.9-28	9
16.9-29	9
16.9-30	17
16.9-31	9
16.9-32	9
16.9-33	9
16.9-34	9
16.9-35	9
16.9-36	9
16.9-37	9
16.9-38	9
16.9-39	9
16.9-40	9
16.9-41	9
16.9-42	9
16.10-ii	9
16.10-1	9
16.10-2	9
16.10-3	9
16.10-4	9
16.10-5	9
16.10-6	9

CHAPTER 16
PAGE STATUS

PAGE	AMEND
16 COVER	
16-ii	9
16-iii	9
16-iv	9
16-v	9
16.1-ii	9
16.1-1	9
16.1-2	9
16.1-3	9
16.1-4	9
16.1-5	9
16.1-6	9
16.1-7	9
16.1-8	9
16.1-9	9
16.1-10	9
16.1-11	9
16.1-12	9
16.1-13	9
16.1-14	9
16.1-15	9
16.1-16	9
16.1-17	9
16.1-18	9
16.1-19	9
16.1-20	9
16.1-21	9
16.1-22	3
16.1-23	9
16.1-24	9
16.1-25	9
16.1-26	9
16.2-1	9
16.3-1	9
16.3-2	9
16.3-3	9
16.3-4	9
16.3-5	9
16.4-ii	9
16.4-1	9
16.4-2	9
16.4-3	9
16.4-4	9
16.4-5	9
16.4-6	9
16.4-7	9
16.4-8	9
16.4-9	9
16.4-10	9
16.4-11	9
16.4-12	9
16.4-13	9
16.4-14	9
16.4-15	9
16.4-16	9
16.4-17	9
16.4-18	9
16.4-19	9
16.4-20	9
16.4-21	9
16.4-22	9
16.4-23	9
16.5-ii	9
16.5-1	9
16.5-2	9
16.5-3	9
16.6-1	9
16.7-ii	9
16.7-1	9
16.7-2	9
16.7-3	9
16.7-4	9
16.7-5	9
16.7-6	9
16.7-7	9
16.7-8	9
16.7-9	9
16.7-10	9
16.7-11	9
16.7-12	9
16.7-13	9
16.7-14	9
16.7-15	9
16.8-ii	9
16.8-1	9
16.8-2	9
16.8-3	9
16.8-4	9
16.8-5	9
16.8-6	9
16.8-7	9
16.8-8	9
16.8-9	9
16.8-10	9
16.8-11	9
16.9-ii	20
16.9-1	9
16.9-2	9
16.9-3	9
16.9-4	9
16.9-5	9
16.9-6	9
16.9-7	9
16.9-8	9
16.9-9	9
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16.9-11	9
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16.9-16	9
16.9-17	9
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16.9-19	9
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16.9-21	9
16.9-22	9
16.9-23	9
16.9-24	9
16.9-25	9
16.9-26	9
16.9-27	9
16.9-28	9
16.9-29	9
16.9-30	17
16.9-31	9
16.9-32	9
16.9-33	9
16.9-34	9
16.9-35	9
16.9-36	9
16.9-37	9
16.9-38	9
16.9-39	9
16.9-40	9
16.9-41	9
16.9-42	9
16.10-ii	9
16.10-1	9
16.10-2	9
16.10-3	9
16.10-4	9
16.10-5	9
16.10-6	9

CHAPTER 15
PAGE STATUS

PAGE	AMEND
15 COVER	
15-i	15
15-ii	2
15-iv	2
15-v	15
15.0-i	15
15.0-ii	15
15.0-1	15
15.0-1.1	15
15.0-2	15
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15.0-3	15
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15.0-6	15
15.0-7	15
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15.4-16	2
15.4-17	2
15.4-18	2

CHAPTER 15
PAGE STATUS (Continued)

PAGE	AMEND
15.4-19	2
15.4-20	2
15.4-21	2
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CHAPTER 15
PAGE STATUS (Continued)

PAGE	AMEND
15A.6-20	17
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15B.1-1	14
15B.2-i	6
15B.2-ii	6
15B.2-1 - 24	20
15B.3-i	6
15B.3-1 - 5	18
15B.4-i	6
15B.4-1 - 4	20
15C COVER	
15C-i	15
15C.1-1	15
15C.2-i	15
15C.2-1	15
15C.2-2 - 5	15
15C.3-1	15
15C.4-1	15
15C.5-i	15
15C.5-1	15
15C.5-2	15
15C.5-3	15
15C.5-4	15
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15C.5-6	15
15C.5-7	15
15C.5-8	15
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15D.2-1	15
15D.2-2	15
15D.3-i	15
15D.3-1	15
15D.3-2	15
15D.3-3 - 4	15
15D.4-i	15
15D.4-1	15
15D.4-2	15
15E COVER	
15E-i	15
15E.1-1	15
15E.2-i	15
15E.2-1	15
15E.2-2	15
15E.3-i	15
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15E.3-4	15
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15E.5-i	15
15E.5-iii	15
15E.5-1	15
15E.5-2	15
15E.5-3	15
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15E.5-5	15
15E.5-6	15
15E.5-7	15
15E.5-8	15
15E.5-9	15
15E.5-10	15
15E.5-11	15
15E.5-12	15
15E.5-13	15
15E.5-14	15
15E.5-15	15
15E.5-16	15
15E.5-17	15
15E.5-18	15
15E.6-1	15
15E.7-1	15

CHAPTER 16
PAGE STATUS

PAGE	AMEND
16 COVER	
16-ii	9
16-iii	9
16-iv	9
16-v	9
16.1-ii	9
16.1-1	9
16.1-2	9
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16.1-4	9
16.1-5	9
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16.4-17	9
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16.4-21	9
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16.4-23	9
16.5-ii	9
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16.8-3	9
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16.9-42	9
16.10-ii	9
16.10-1	9
16.10-2	9
16.10-3	9
16.10-4	9
16.10-5	9
16.10-6	9

CHAPTER 16
PAGE STATUS (Continued)

PAGE	AMEND	PAGE	AMEND	PAGE	AMEND	PAGE	AMEND
16.10-7	9	16.11-29	9	16.13-7	9	16A.4-5	9
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16.10-9	9	16.11-31	9	16.13-9	9	16A.4-7	9
16.10-10	9	16.11-32	9	16.13-10	9	16A.4-8	9
16.10-11	9	16.11-33	9	16.13-11	9	16A.4-9	9
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16.10-15	9	16.11-37	9	16.13-15	9	16A.4-13	9
16.11-ii	9	16.11-38	9	16.13-16	9	16A.4-14	9
16.11-1	9	16.11-39	9	16A COVER	9	16A.4-15	9
16.11-2	9	16.11-40	9	16A-ii	9	16A.4-16	9
16.11-3	9	16.11-41	9	16A-iii	9	16A.4-17	9
16.11-4	9	16.11-42	9	16A-iv	9	16A.4-18	9
16.11-5	9	16.11-43	9	16A-v	9	16A.4-19	9
16.11-6	9	16.12-ii	9	16A.1-1	9	16A.4-20	9
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16.11-8	9	16.12-2	9	16A.1-3	9	16A.4-22	9
16.11-9	9	16.12-3	9	16A.2-1	9	16A.4-23	9
16.11-10	9	16.12-4	9	16A.2-2	9	16A.4-24	9
16.11-11	9	16.12-5	9	16A.2-3	9	16A.4-25	9
16.11-12	9	16.12-6	9	16A.3-ii	9	16A.4-26	9
16.11-13	9	16.12-7	9	16A.3-1	9	16A.4-27	9
16.11-14	9	16.12-8	9	16A.3-2	9	16A.4-28	9
16.11-15	9	16.12-9	9	16A.3-3	9	16A.4-29	9
16.11-16	9	16.12-10	9	16A.3-4	9	16A.4-30	9
16.11-17	9	16.12-11	9	16A.3-5	9	16A.4-31	9
16.11-18	9	16.12-12	9	16A.3-6	9	16A.4-32	9
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16.11-20	9	16.12-14	9	16A-3-8	9	16A.4-34	9
16.11-21	9	16.13-ii	9	16A-3-9	9	16A.4-35	9
16.11-22	9	16.13-1	9	16A-3-10	9	16A.5-ii	9
16.11-23	9	16.13-2	9	16A.4-ii	9	16A.5-1	9
16.11-24	9	16.13-3	9	16A.4-1	9	16A.5-2	9
16.11-25	9	16.13-4	9	16A.4-2	9	16A.5-3	9
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16.11-27	9	16.13-6	9	16A.4-4	9	16A.5-5	9
16.11-28	9					16A.5-5	9

CHAPTER 16
PAGE STATUS

PAGE	AMEND
16 COVER	
16-ii	9
16-iii	9
16-iv	9
16-v	9
16.1-ii	9
16.1-1	9
16.1-2	9
16.1-3	9
16.1-4	9
16.1-5	9
16.1-6	9
16.1-7	9
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16.9-3	9
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16.9-37	9
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16.9-39	9
16.9-40	9
16.9-41	9
16.9-42	9
16.10-ii	9
16.10-1	9
16.10-2	9
16.10-3	9
16.10-4	9
16.10-5	9
16.10-6	9

CHAPTER 16
PAGE STATUS (Continued)

PAGE	AMEND
16.10-7	9
16.10-8	9
16.10-9	9
16.10-10	9
16.10-11	9
16.10-12	9
16.10-13	9
16.10-14	9
16.10-15	9
16.11-i	9
16.11-1	9
16.11-2	9
16.11-3	9
16.11-4	9
16.11-5	9
16.11-6	9
16.11-7	9
16.11-8	9
16.11-9	9
16.11-10	9
16.11-11	9
16.11-12	9
16.11-13	9
16.11-14	9
16.11-15	9
16.11-16	9
16.11-17	9
16.11-18	9
16.11-19	9
16.11-20	9
16.11-21	9
16.11-22	9
16.11-23	9
16.11-24	9
16.11-25	9
16.11-26	9
16.11-27	9
16.11-28	9
16.11-29	9
16.11-30	9
16.11-31	9
16.11-32	9
16.11-33	9
16.11-34	9
16.11-35	9
16.11-36	9
16.11-37	9
16.11-38	9
16.11-39	9
16.11-40	9
16.11-41	9
16.11-42	9
16.11-43	9
16.12-i	9
16.12-1	9
16.12-2	9
16.12-3	9
16.12-4	9
16.12-5	9
16.12-6	9
16.12-7	9
16.12-8	9
16.12-9	9
16.12-10	9
16.12-11	9
16.12-12	9
16.12-13	9
16.12-14	9
16.13-i	9
16.13-1	9
16.13-2	9
16.13-3	9
16.13-4	9
16.13-5	9
16.13-6	9
16.13-7	9
16.13-8	9
16.13-9	9
16.13-10	9
16.13-11	9
16.13-12	9
16.13-13	9
16.13-14	9
16.13-15	9
16.13-16	9
16A COVER	9
16A-i	9
16A-ii	9
16A-iv	9
16A-v	9
16A.1-1	9
16A.1-2	9
16A.1-3	9
16A.2-1	9
16A.2-2	9
16A.2-3	9
16A.3-i	9
16A.3-1	9
16A.3-2	9
16A.3-3	9
16A.3-4	9
16A.3-5	9
16A.3-6	9
16A.3-7	9
16A-3-8	9
16A-3-9	9
16A-3-10	9
16A.4-i	9
16A.4-1	9
16A.4-2	9
16A.4-3	9
16A.4-4	9
16A.4-5	9
16A.4-6	9
16A.4-7	9
16A.4-8	9
16A.4-9	9
16A.4-10	9
16A.4-11	9
16A.4-12	9
16A.4-13	9
16A.4-14	9
16A.4-15	9
16A.4-16	9
16A.4-17	9
16A.4-18	9
16A.4-19	9
16A.4-20	9
16A.4-21	9
16A.4-22	9
16A.4-23	9
16A.4-24	9
16A.4-25	9
16A.4-26	9
16A.4-27	9
16A.4-28	9
16A.4-29	9
16A.4-30	9
16A.4-31	9
16A.4-32	9
16A.4-33	9
16A.4-34	9
16A.4-35	9
16A.5-i	9
16A.5-1	9
16A.5-2	9
16A.5-3	9
16A.5-4	9
16A.5-5	9
16A.5-6	9

CHAPTER 16
PAGE STATUS (Continued)

PAGE	AMEND	PAGE	AMEND	PAGE	AMEND	PAGE	AMEND
16A.5-7	9	16A.8-5	9	16A.9-29	9	16A.10-7	9
16A.5-8	9	16A.8-6	9	16A.9-30	9	16A.10-8	9
16A.5-9	9	16A.8-7	9	16A.9-31	9	16A.10-9	9
16A.5-10	9	16A.8-8	9	16A.9-32	9	16A.10-10	9
16A.5-11	9	16A.8-9	9	16A.9-33	9	16A.10-11	9
16A.6-1	9	16A.8-10	9	16A.9-34	9	16A.10-12	9
16A.7-11	9	16A.8-11	9	16A.9-35	9	16A.10-13	9
16A.7-1	9	16A.8-12	9	16A.9-36	9	16A.10-14	9
16A.7-2	9	16A.8-13	9	16A.9-37	9	16A.10-15	9
16A.7-3	9	16A.8-14	9	16A.9-38	9	16A.10-16	9
16A.7-4	9	16A.9-11	9	16A.9-39	9	16A.10-17	9
16A.7-5	9	16A.9-1	9	16A.9-40	9	16A.10-18	9
16A.7-6	9	16A.9-2	9	16A.9-41	9	16A.11-11	9
16A.7-7	9	16A.9-3	9	16A.9-42	9	16A.11-1	9
16A.7-8	9	16A.9-4	9	16A.9-43	9	16A.11-2	9
16A.7-9	9	16A.9-5	9	16A.9-44	9	16A.11-3	9
16A.7-10	9	16A.9-6	9	16A.9-45	9	16A.11-4	9
16A.7-11	9	16A.9-7	9	16A.9-46	9	16A.11-5	9
16A.7-12	9	16A.9-8	9	16A.9-47	9	16A.11-6	9
16A.7-13	9	16A.9-9	9	16A.9-48	9	16A.11-7	9
16A.7-14	9	16A.9-10	9	16A.9-49	9	16A.11-8	9
16A.7-15	9	16A.9-11	9	16A.9-50	9	16A.11-9	9
16A.7-16	9	16A.9-12	9	16A.9-51	9	16A.11-10	9
16A.7-17	9	16A.9-13	9	16A.9-52	9	16A.11-11	9
16A.7-18	9	16A.9-14	9	16A.9-53	9	16A.11-12	9
16A.7-19	9	16A.9-15	9	16A.9-54	9	16A.11-13	9
16A.7-20	9	16A.9-16	9	16A.9-55	9	16A.11-14	9
16A.7-21	9	16A.9-17	9	16A.9-56	9	16A.11-15	9
16A.7-22	9	16A.9-18	9	16A.9-57	9	16A.11-16	9
16A.7-23	9	16A.9-19	9	16A.9-58	9	16A.11-17	9
16A.7-24	9	16A.9-20	9	16A.9-59	9	16A.11-18	9
16A.7-25	9	16A.9-21	9	16A.9-60	9	16A.11-19	9
16A.7-26	9	16A.9-22	9	16A.10-11	9	16A.11-20	9
16A.7-27	9	16A.9-23	9	16A.10-1	9	16A.11-21	9
16A.8-11	9	16A.9-24	9	16A.10-2	9	16A.11-22	9
16A.8-1	9	16A.9-25	9	16A.10-3	9	16A.11-23	9
16A.8-2	9	16A.9-26	9	16A.10-4	9	16A.11-24	9
16A.8-3	9	16A.9-27	9	16A.10-5	9	16A.11-25	9
16A.8-4	9	16A.9-28	9	16A.10-6	9	16A.11-26	9

CHAPTER 16
PAGE STATUS (Continued)

PAGE	AMEND
16A.11-27	9
16A.11-28	9
16A.11-29	9
16A.11-30	9
16A.11-31	9
16A.11-32	9
16A.11-33	9
16A.11-34	9
16A.11-35	9
16A.11-36	9
16A.11-37	9
16A.11-38	9
16A.11-39	9
16A.11-40	9
16A.11-41	9
16A.11-42	9
16A.11-43	9
16A.11-44	9
16A.11-45	9
16A.11-46	9
16A.11-47	9
16A.11-48	9
16A.11-49	9
16A.11-50	9
16A.12-11	9
16A.12-1	9
16A.12-2	9
16A.12-3	9
16A.12-4	9
16A.12-5	9
16A.12-6	9
16A.12-7	9
16A.12-8	9
16A.12-9	9
16A.12-10	9
16A.12-11	9
16A.12-12	9
16A.12-13	9
16A.12-14	9
16A.12-15	9
16A.12-16	9
16A.12-17	9
16A.12-18	9
16A.12-19	9
16A.12-20	9
16A.12-21	9
16A.12-22	9
16A.12-23	9
16A.12-24	9
16A.13-11	9
16A.13-1	9
16A.13-2	9
16A.13-3	9
16A.13-4	9
16A.13-5	9
16A.13-6	9
16A.13-7	9
16A.13-8	9
16A.13-9	9
16A.13-10	9
16A.13-11	9
16A.13-12	9
16A.13-13	9
16A.13-14	9
16A.13-15	9
16A.13-16	9
16A.13-17	9
16A.13-18	9
16A.13-19	9
16A.13-20	9

CHAPTER 17
PAGE STATUS

PAGE	AMEND
17 COVER	
17-ii	2
17-iii	2
17.0-ii	2
17.0-1	2
17.0-2	8
17.1-ii	2
17.1-1	17
17.1-2	2
17.1-3	10
17.2-1	7

CHAPTER 18
PAGE STATUS

PAGE	AMEND
18 COVER	
18-ii	13
18-iii	14
18.1-1	13
18.2-1	13
18.3-ii	13
18.3-1	13
18.3-2	13
18.3-3	13
18.3-4	6
18.4-ii	13
18.4-iii	13
18.4-iv	13
18.4-v	13
18.4-1	13
18.5-ii	13
18.5-iii	13
18.5-1	13
18.6-1	13
18A-COVER	
18A-ii	13
18A.0-1	14
18A.1-1	13
18A.2-1 - 4	17
18A.3-1	14
18A.4-1- 15	19
18A.5-1- 23	19
18A.6-1- 12	19
18A.7-1	19
18A.8-1- 5	19
18A.9-1- 3	19
18A.10-1	14
18A.11-1- 8	19
18A.12-1- 7	19
18A.13-1- 3	19
18B-COVER	
18B-ii	15
18B-1	20
18B-2- 24	19
18C-COVER	
18C-ii	13
18C.0-1	20
18C.1-ii	13
18C.1-1	13
18C.2-ii	13
18C.2-1	13
18C.3-ii	13
18C.3-1	13
18C.4-1	13
18C.5-ii	13
18C.5-1	13
18C.6-ii	13
18C.6-1	13
18C.7-ii	13
18C.7-1	13
18D-COVER	
18D-ii	14
18D.0-1	14
18D.1-ii	14
18D.1-1 - 11	20
18D.2-ii	14
18D.2-1 - 6	17

CHAPTER 19
PAGE STATUS

PAGE	AMEND
19 COVER	
19-ii	8
19-iii	8
19-iv	18
19.1-ii	4
19.1-1	14
19.2-ii	4
19.2-iii	4
19.2-1	10
19.3-ii	8
19.3-iii	8
19.3-iv	8
19.3-1	14
19.4-ii	13
19.4-iii	20
19.4-1	13
19.5-ii	8
19.5-1	11
19.6-ii	8
19.6-1	10
19A COVER	
19A-ii	6
19A-iii	6
19A-iv	6
19A-v	6
19A.1-ii	6
19A.1-1	10
19A.2-ii	6
19A.2-iii	6
19A.2-iv	6
19A.2-v	6
19A.2-1 - 11	17
19A.3-ii	14
19A.3-1	17
19B COVER	
19B-ii	11
19B-iii	16
19B-iv	17
19B.1-ii	14
19B.1-1 - 10	17
19B.2-ii	17
19B.2-iii	11
19B.2-1 - 62	18
19B.3-ii	17
19B.3-1 - 2	17
19C COVER	
19C-ii	15
19C-iii	15
19C.1-1	15
19C.2-ii	15
19C.2-1 - 2	15
19C.3-ii	15
19C.3-1 - 35	15
19C.4-1 - 2	16
19D COVER	
19D-ii	20
19D-iii	4
19D.1-1	10
19D.2-ii	4
19D.2-1	10
19D.3-ii	4
19D.3-1	10
19D.4-ii	4
19D.4-iii	4
19D.4-iv	4
19D.4-v	4
19D.4-1	10
19D.5-ii	8
19D.5-iii	8
19D.5-iv	8
19D.5-v	9
19D.5-1	10
19D.6-ii	8
19D.6-iii	4
19D.6-iv	4
19D.6-1 - 224	20
19D.7-ii	4
19D.7-1	10
19D.8-ii	4
19D.8-1	10
19E COVER	
19E-ii	8
19E-1	10
19E.2-ii	8
19E.2-iii	8
19E.2-iv	8
19E.2-v	10
19E.2-vi	8
19E.2-vii	8
19E.2-viii	8
19E.2-ix	8
19E.2-x	8
19E.2-1 - 112	18
19E.3-ii	20
19E.3-iii	8
19E.3-1	10
19F COVER	
19F-ii	20
19F.1-ii	4
19F.1-1	10
19F.2-ii	4
19F.2-iii	4
19F.2-iv	4
19F.2-v	4
19F.2-1	10
19F.3-ii	4
19F.3-iii	4
19F.3-1	10
19F.4-1	10
19G COVER	
19H COVER	
19H-ii	8
19H.1-1	10
19H.2-ii	20
19H.2-1	10
19H.3-ii	8
19H.3-1	10
19H.4-ii	8
19H.4-1 - 10	20
19H.5-1	10
19I COVER	
19I-ii	8
19I.1-1	10
19I.2-ii	8
19I.2-1	10
19I.3-ii	8
19I.3-1	10
19I.4-ii	8
19I.4-1	10
19I.5-1	10
19J COVER	
19J-ii	9
19J.1-1	10
19J.2-1	10
19J.3-1	10
19J.4-ii	9
19J.4-1	10
19J.5-ii	9
19J.5-1	13
19J.6-ii	9

CHAPTER 19
PAGE STATUS

PAGE	AMEND
19J.6-1	10
19K-COVER	
19K-ii	14
19K.1-1	14
19K.2-1	14
19K.3-1	14
19K.4-1	14
19K.5-ii	14
19K.5-1	14
19K.6-1	14
19L-COVER	
19L-ii	15
19L-iii	20
19L.1-1	15
19L.2-1	15
19L.3-1	15
19L.4-ii	15
19L.4-1 - 2	15
19L.5-ii	15
19L.5-1 -9	15
19L.6-ii	15
19L.6-iii	15
19L.6-1 - 18	15
19L.7-ii	15
19L.7-1 - 3	15
19L.8-ii	15
19L.8-1 - 4	15
19L.9-ii	15
19L.9-1 - 2	15
19L.10-ii	15
19L.10-1 - 2	15
19L.11-1	15

PAGE	AMEND
19M-Cover	20
19M-ii	20
19M.1-1	20
19M.2-1	20
19M.3-ii	20
19M.3-1 - 2	20
19M.3-3	20
19M.3-4	20
19M.4-ii	20
19M.4-1 - 3	20
19M.5-ii	20
19M.5-1 - 23	20
19M.6-ii	20
19M.6-iii	20
19M.6-1 - 17	20
19M.7-1	20
19M.8-1	20

PAGE	AMEND
19N-COVER	19
19N-ii	18
19N-iii	18
19N.1-ii	18
19N.1-1	18
19N.1-2	18
19N.1-3	18
19N.2-1	18
19N.3-1	18
19N.4-ii	18
19N.4-1	18
19N.5-ii	18
19N.5-1- 6	20
19N.6-ii	18
19N.6-1	18
19N.7-1	18
19N.8-1	18

CHAPTER 20
PAGE STATUS

PAGE	AMEND
20 COVER	
20-ii	9
20-iii	17
20.1-ii	10
20.1-1	10
20.1-1.1	17
20.1-1.2	17
20.1-1.3	17
20.1-1.4	17
20.1-1.5	17
20.1-1.6	17
20.1-1.7	17
20.1-1.8	20
20.1-1.9	20
20.1-1.10	17
20.1-1.11	17
20.1-1.12	17
20.1-1.13	17
20.1-1.14	17
20.1-1.15	17
20.1-1.16	17
20.1-1.17	17
20.1-1.18	17
20.1-1.19	17
20.1-1.20	17
20.1-1.21	17
20.1-1.22	17
20.1-2	16
20.1-3	16
20.1-4	16
20.1-5	16
20.1-6	16
20.2-ii	9
20.2-1	2
20.2-2	16
20.2-3	20
20.2-4	3
20.2-4a	3
20.2-4b	3
20.2-4c	3
20.2-4d	3
20.2-4e	3
20.2-4f	3
20.2-4g	3
20.2-4h	3
20.2-4i	3
20.2-4j	3
20.2-4k	3
20.2-4l	3
20.2-4m	3
20.2-4n	3
20.2-4o	3
20.2-4p	17
20.2-4q	9
20.2-4r	16
20.2-4s	16
20.2-4t	16
20.2-5	3
20.2-5a	3
20.2-5b	3
20.2-5c	7
20.2-6	3
20.2-6a	3
20.2-7	2
20.2-8	2
20.2-9	2
20.2-10	2
20.2-11	2
20.2-11a	3
20.2-11b	3
20.2-11c	3
20.2-11d	3
20.2-11e	20
20.2-11f	3
20.2-11g	3
20.2-11h	3
20.2-11i	3
20.2-11j	3
20.2-11k	20
20.2-12	3
20.2-12a	3
20.2-12b	3
20.2-12c	3
20.2-12d	3
20.2-12e	3
20.2-12f	3
20.2-12g	3
20.2-12h	3
20.2-12i	3
20.2-12j	3
20.2-12k	3
20.2-12l	3
20.2-12m	3
20.2-12n	3
20.2-12o	3
20.2-12p	3
20.2-13	9
20.2-13.1	9
20.2-13.2	11
20.2-13.2.1	11
20.2-13.3	9
20.2-13.4	9
20.2-13.5	18
20.2-13.6	11
20.2-13.7	9
20.2-13.8	9
20.2-13.9	9
20.2-13.10	9
20.2-13.11	9
20.2-13.12	11
20.2-13.13	11
20.2-13.14	11
20.2-14	10
20.2-14.1	10
20.2-14.2	10
20.2-14.3	10
20.2-14.4	10
20.2-14.5	10
20.2-14.6	10
20.2-14.7	10
20.2-14.8	10
20.2-14.9	10
20.2-14.10	10
20.2-14.11	10
20.2-14.12	10
20.2-14.13	10
20.2-14.14	10
20.2-14.15	10
20.2-14.16	10
20.2-15	7
20.2-15.1	7
20.2-15.2	7
20.2-15.3	7
20.2-15.4	9
20.2-15.5	16
20.2-15.6	16
20.2-15.7	16
20.2-15.8	16
20.2-15.9	16
20.2-15.10	16
20.2-15.11	16
20.2-15.12	16
20.2-15.13	16
20.2-15.14	16
20.2-15.15	16
20.2-15.16	16
20.2-15.17	16
20.2-15.18	16
20.2-15.19	16
20.2-15.20	16
20.2-15.21	16
20.2-15.22	16
20.2-15.23	16
20.2-15.24	16
20.2-15.25	16

CHAPTER 20
PAGE STATUS (Continued)

PAGE	AMEND
20.2-15.26	16
20.2-15.27	16
20.2-15.28	16
20.2-18	11
20.2-18.1	11
20.2-18.2	11
20.2-18.3	11
20.2-18.4	11
20.2-18.5	11
20.2-17	16
20.2-17.1	16
20.2-17.2	16
20.2-17.3	16
20.2-17.4	16
20.2-17.5	16
20.2-17.6	16
20.2-18	1
20.2-18.1	7
20.2-18.2	7
20.2-18.3	7
20.2-18.4	7
20.2-18.5	13
20.2-19	7
20.2-19.1	15
20.2-19.2	15
20.2-19.3	15
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CHAPTER 20
PAGE STATUS (Continued)

PAGE	AMEND
20.3-64	12
20.3-65	8
20.3-65.1	9
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20.3-162	8
20.3-162.1	8
20.3-163	4

CHAPTER 20
PAGE STATUS (Continued)

PAGE	AMEND
20.3-164	7
20.3-164.1	8
20.3-165	7
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CHAPTER 20
PAGE STATUS (Continued)

PAGE	AMEND
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20B-37	11

CHAPTER 20
PAGE STATUS (Continued)

PAGE	AMEND
20B-38	11
20B-39	11
20B-40	11
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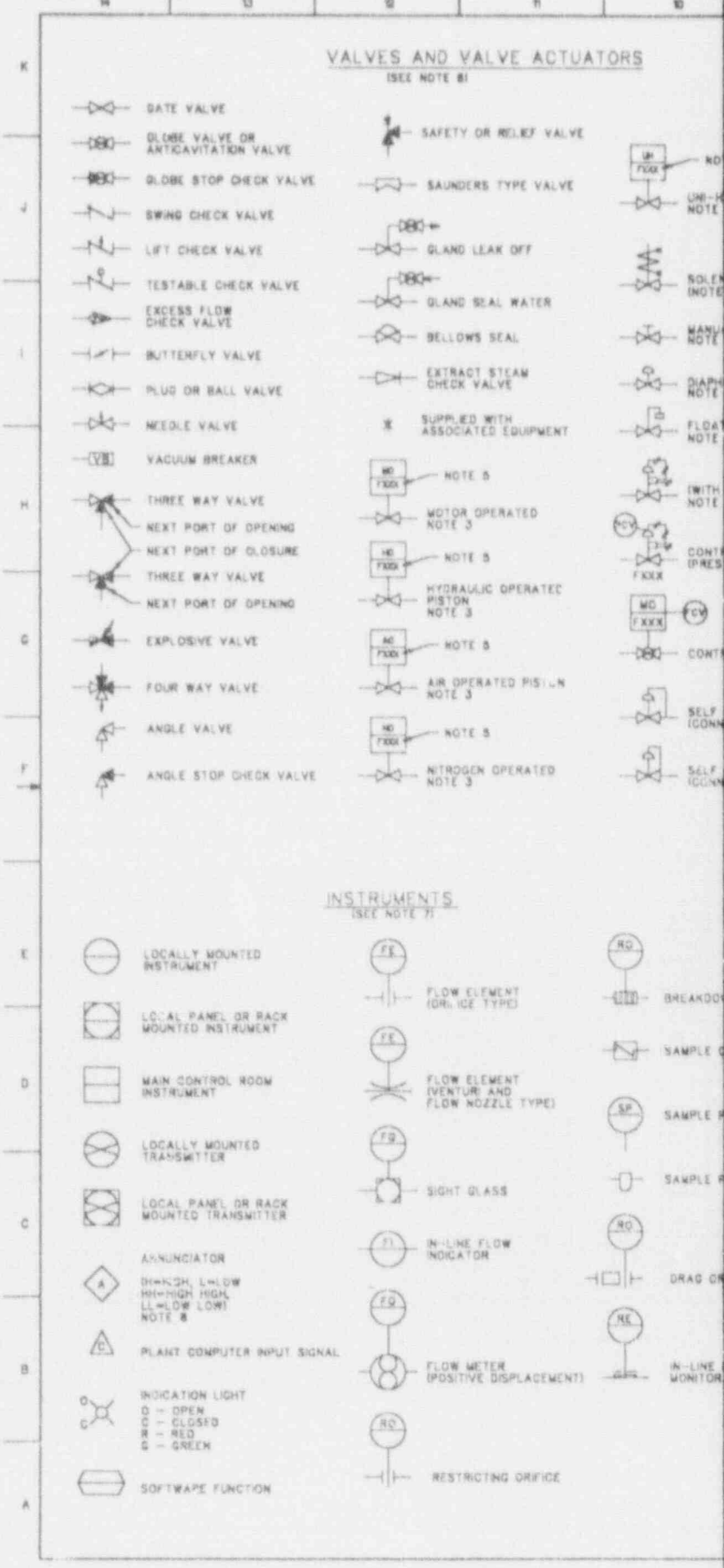
20B-47	15


VALVES AND VALVE ACTUATORS
(SEE NOTE 8)
GATE VALVE
GLOBE VALVE OR ANTICAVITATION VALVE
GLOBE STOP CHECK VALVE
SWING CHECK VALVE
LIFT CHECK VALVE
TESTABLE CHECK VALVE
EXCESS FLOW CHECK VALVE
BUTTERFLY VALVE
PLUG OR BALL VALVE
NEEDLE VALVE
VACUUM BREAKER
THREE WAY VALVE
NEXT PORT OF OPENING
NEXT PORT OF CLOSURE
THREE WAY VALVE
NEXT PORT OF OPENING
EXPLOSIVE VALVE
FOUR WAY VALVE
ANGLE VALVE
ANGLE STOP CHECK VALVE
SAFETY OR RELIEF VALVE
SAUNDERS TYPE VALVE
GLAND LEAK OFF
GLAND SEAL WATER
BELLOWS SEAL
EXTRACT STEAM CHECK VALVE
SUPPLIED WITH ASSOCIATED EQUIPMENT
NOTE 5
MOTOR OPERATED NOTE 3
NOTE 5
HYDRAULIC OPERATED PISTON NOTE 3
NOTE 5
AIR OPERATED PISTON NOTE 3
NOTE 5
NITROGEN OPERATED NOTE 3
INSTRUMENTS
(SEE NOTE 7)
LOCALLY MOUNTED INSTRUMENT
LOCAL PANEL OR RACK MOUNTED INSTRUMENT
MAIN CONTROL ROOM INSTRUMENT
LOCALLY MOUNTED TRANSMITTER
LOCAL PANEL OR RACK MOUNTED TRANSMITTER
ANNUNCIATOR
H=HIGH, L=LOW
HH=HIGH HIGH
LL=LOW LOW
NOTE 8
PLANT COMPUTER INPUT SIGNAL
INDICATION LIGHT
O - OPEN
C - CLOSED
R - RED
G - GREEN
SOFTWARE FUNCTION
FLOW ELEMENT (ORIFICE TYPE)
FLOW ELEMENT (VENTURI AND FLOW NOZZLE TYPE)
SIGHT GLASS
IN-LINE FLOW INDICATOR
FLOW METER (POSITIVE DISPLACEMENT)
RESTRICTING ORIFICE
SAMPLE
DRAG

SPECIALITIES

- THREADED CAP
- QUICK CONNECTION OR HOSE CONNECTION
- WELD CAP
- BLIND FLANGE
- SPECTACLE FLANGE
- INSULATING FLANGE
- INCREASER, REDUCER
- EXPANSION JOINT
- FLANGE CONNECTION
- FLEXIBLE CONNECTION
- RUPTURE DISC
- SPOOL PIECE
- TRAP
- UNION CONNECTION
- BOUNDARY
- BASKET STRAINER (DOUBLE)
- BASKET STRAINER (SINGLE)
- CONE STRAINER
- PLATE STRAINER
- "Y" TYPE STRAINER
- FILTER
- EJECTOR
- EDUCTOR
- CONDENSING CHAMBER
- DRAIN FUNNEL (NOTE 8)
- PRIMARY CONTAINMENT VESSEL PENETRATION (X-000)
- (PENETRATION NUMBER TO BE SHOWN INSIDE BOX)

RW	MUW	SYSTEM
SS	CS	MATERIAL
15 atg	14 atg	MAXIMUM OPERATING PRESSURE
60 °C	66 °C	MAXIMUM OPERATING TEMPERATURE
3B(1A)	4D(3B)	DESIGN/QUALITY CLASS (CONSTRUCTION PERMIT BASE (DESIGN BASE)) NOTE 11
As (EXAMPLE)	B(S1,S2)	SEISMIC CLASS (CONSTRUCTION PERMIT BASE (DESIGN BASE)) NOTE 11

NOTES:

1. SYMBOLS DEFINED IN THIS DOCUMENT SHALL BE USED IN ALL P&ID'S.
2. ANY SYMBOL NOT DEFINED IN THE DOCUMENT IF USED, SHALL BE DESCRIBED NEXT TO THE SYMBOL IN THE P&ID OR A NOTE TO EXPLAIN THE SYMBOL SHALL BE ADDED IN THE P&ID.
3. SYMBOL SHOWS ACTUATOR ON A GATE VALVE FOR DEMONSTRATION PURPOSES ONLY. FOR APPLICATION OF THE ACTUATOR TO OTHER VALVE TYPES, REPLACE THE GATE VALVE SYMBOL WITH THE APPROPRIATE VALVE SYMBOL.
4. VALVE SYMBOL IN P&ID SHALL BE SHOWN IN ITS NORMAL CONDITION. FOR EXAMPLE NORMALLY OPEN IS REPRESENTED BY ▷◁ AND NORMALLY CLOSED IS REPRESENTED BY ▶◀ .
5. VALVE NUMBER TO WHICH THE ACTUATOR BELONGS.
6. VALVE IDENTIFICATION AREA ON THE VALVE SYMBOL SHALL BE AS SHOWN.
7. LOCATION OF "PANEL NUMBER" FOR INSTRUMENTS IS ABOVE SYMBOL, POINT IDENTIFICATION (PID) NUMBER FOR COMPUTER INPUT IS BELOW SYMBOL. H/L DESCRIPTION FOR ANNUNCIATOR AND "O/C", "R/G" FOR INDICATION LIGHT IS AS INDICATED.
8. ANNUNCIATOR SETPOINT FOR THIRD OR MORE LOW OR HIGH ALARM SHALL BE SHOWN WITH A DIGIT AND AN ALPHABETICAL LETTER. EXAMPLE: "LOW LOW LOW=3L","HIGH HIGH HIGH HIGH=4H"
9. LOCATION OF "TRAIN DIVISION OR NUMBER" SHALL BE AT THE LOWER SIDE OF THE SYMBOL.
10. (A) PIPING IDENTIFICATION SHALL FOLLOW THE FORMAT AS SHOWN.
    (B) IN THIS FORMAT, PIPE SCHEDULE, MATERIAL SPECIFICATION AND PROCESS FLUID MAY BE SUMMARIZED IN A NOTE ON P&ID AND MAY BE OMITTED FROM THE IDENTIFICATION. FOR EXAMPLE – WHEN THE PIPE SCHEDULE IS SUMMARIZED IN NOTE, THE FORMAT MAY BE SHORTENED TO 100A-FDW-102-CS-W.
    (C) SYSTEM ACRONYM (MPL NUMBER) SHALL BE PER TABLE 3.2-1.
    (D) NUMBERING SHALL BE DONE USING THE FLOW DIRECTION NUMBERING ▶ 100 SAME AS EQUIPMENT NUMBERING DESCRIBED IN TABLE 1.7-5. SEE TABLE 1.7-5 FOR PIPE NUMBERING AND NUMBER SERIES ASSIGNED TO DIFFERENT CATAGORIES OF PIPE.
    (E) PIPE NUMBER SHALL CHANGE AT BOUNDARY SYMBOL (SEE SPECIALITIES ITEMS IN THIS DRAWING) (e. WHERE ANY OF THE PARAMETERS SHOWN AT THE BOUNDARY SYMBOL CHANGE.

NOTES CONTINUED ON SHEET 2

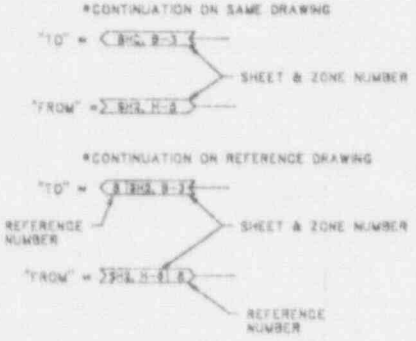
SI
APERTURE
CARD

Also Available On
Aperture Card

PIPING AND INSTRUMENT ELECTRICAL LINE

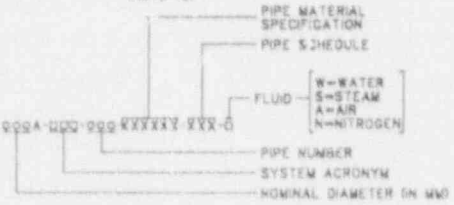
- PRIMARY PROCESS LINE
- AUXILIARY PROCESS LINE OR INSTRUMENT LINE
- PNEUMATIC SUPPLY LINE
- INSTRUMENT ELECTRICAL WIRING
- CAPILLARY TUBING
- HEAT TRACED LINE
- STEAM HEATED PIPE
- PIPING CONNECTING POINT
- PIPING NON-CONNECTING POINT
- BRANCH
- BRANCH
- LINE CONTINUATION
- LINE FROM OTHER SYSTEM

LINE CONTINUATION SYMBOLS



PIPING IDENTIFICATION

(NOTE 10)



EXAMPLE: 100A-FDW-02-CS-356-S

- ELECTRICAL CONNECTING POINT
- ELECTRICAL NON-CONNECTING POINT

92-092-22

Figure 1.7-1 PIPING AND INSTRUMENTATION DIAGRAM SYMBOLS (Sheet 1 of 2)

9204160195 -01

TABLE 1: INSTRUMENT LEGENDS

MEASURED VARIABLE \ FUNCTION		AMPLIFIER	CONTROLLER	FUNCTION GENERATOR	PRIMARY ELEMENT	INDICATOR	INDICATING CONTROLLER	INDICATING RECORDER	INDICATING SWITCH	INTEGRATOR	
		AM	C	F	E	I	IC	IR	IS	Q	
CONCENTRATION	CN				CNE	CNI					
CASING ELONGATION	SX				SXE	SXI					S
DENSITY	D		DC		DE	DI			DIS		D
DEW POINT	DW				DWE	DWI					D
DIFFERENTIAL ELONGATION	DX	DXAM			DXE	DXI					D
DIFFERENTIAL FLOW	DF					DFI			DFIS		D
DIFFERENTIAL PRESSURE	DP		DPC			DPI			DPIS		D
DIFFERENTIAL TEMPERATURE	DT		DTC			DTI			DTIS		D
ECCENTRICITY	E	EAM			EE	EI					E
ELECTRICAL CONDUCTIVITY	C				CE	CI			CIS		C
ELECTRICAL CURRENT	A					AI					A
ELECTRICAL FREQUENCY	HZ					HZI					H
ELECTRICAL POWER	W					WI					W
ELECTRICAL POTENTIAL	V					VI					V
FLOW	F		FC	FF	FE	FI	FIC	FIR	FIS	FQ	F
HYDROGEN	H2				H2E	H2I		H2IR	H2IS		H
HUMIDITY	M				ME	MI					M
HYDROGEN ION DENSITY	PH	PHAM	PHC		PHE	PHI					
LEVEL	L		LC		LE	LI			LIS		L
NEUTRON FLUX	N	NAM	NC		NE	NI				NQ	N
OXYGEN	O2		O2C		O2E	O2I		O2R	O2IS		O
PRESSURE	P		PC		PE	PI			PIS		P
POSITION	PO		POC		POE	POI			POIS		P
RADIATION	R				RE	RI			RIS	RQ	R
REDUCTION OXIDATION POTENIAL DIFF	RO				ROE					ROQ	R
SPEED OR ROTATION FREQUENCY	S	SAM	SC		SE	SI					S
SIGNAL MONITOR	OS										
TEMPERATURE	T		TC		TE	TI			TIS		T
TIME	TM		TMC			TMI			TMIS	TMQ	
TORQUE	TO				TOE						T
TURBIDITY	TU				TUE	TUI					T
VIBRATION	VB		VBC		VBE	VBI			VBIS		V
VIBRATION PHASE ANGLE	PA				PAE	PAI					P
VOLT-AMPERE REACTIVE POWER HOUR	QH					QHI					Q
VOLT-AMPERE REACTIVE POWER	Q					QI					Q
WATT-HOUR	WH					WHI					W
WEIGHT	WT		WFC		WFE	WTI					W

	RECORDER SWITCH	SAMPLER	SIGHT GLASS	SWITCH	TEST POINT	TRANSMITTER	TELEMETER
	RS	SW	G	S	X	T	TL
R				SXS		SXT	
R	DRS			DS	DX	DT	
R				DWS		DWT	
R				DXS		DXT	
R	DFRS			DFS		DFT	
R	DPRS			DPS	DPX	DPT	
R	DTRS			DTS		DTT	
R						ET	
R		CSW		CS	CX	CT	
R						AT	ATL
R						HZT	HZTL
R						WT	WTL
R						VT	VTL
R	FRS		FG	FS	FX	FT	
R	H2RS	H2SW		H2S		H2T	
R						MT	
R		PHSW			PHX		
R	LRS		LG	LS	LX	LT	
R					NX	NT	
R	O2RS			O2S			
R	PRS			PS	PX	PT	
R	PDRS			PDS		PDT	
R	RRS	RSW		RS	RX	RT	
R				ROS		ROT	
R				SS		ST	
				OSS			
R	TRS			TS	TX	TT	
	TWRS						
R				TQS		TQT	
R				TUS		TUT	
R				VBS		VBT	
R						PAT	
R						QHT	QHTL
R						QT	QTL
R						WHT	WHTL
R				WYS			

ABBREVIATIONS

MATERIAL
CS – CARBON STEEL
SS – STAINLESS STEEL

SERVICE SUPPLY SOURCES
A/S – AIR SUPPLY
E/S – ELECTRICAL POWER SUPPLY
N_2/S– NITROGEN SUPPLY

FAILURE CONDITION
FAI – FAIL AS-IS
FO – OPEN ON AIR OR ELECTRICAL FAILURE
FC – CLOSE ON AIR OR ELECTRICAL FAILURE

VALVE CONDITION
LO – LOCKED OPEN
LC – LOCKED CLOSED
NO – NORMALLY OPEN
NC – NORMALLY CLOSED
NE – NORMALLY ENERGIZED
ND – NORMALLY DE-ENERGIZED

MISCELLEOUS
AC – ALTERNATING CURRENT
DC – DIRECT CURRENT

DRAINS
LCW – LOW CONDUCTIVITY WASTE
HCW – HIGH CONDUCTIVITY WASTE
SD – STORM DRAIN
NSD – NON-RADIOACTIVE STORM DRAIN
HSD – HOT SHOWER DRAIN

CONTROL VALVES
FCV – FLOW CONTROL VALVE
PCV – PRESSURE CONTROL VALVE
LCV – LEVEL CONTROL VALVE
TCV – TEMPERATURE CONTROL VALVE

NOTES (CONT)
1. DESIGN AND SAFETY CLASSIFICATION CORRELATION

BOUNDARY SYMBOL		REFERENCE TABLE 3.2-3	
DESIGN CLASS	QUALITY CLASS	SAFETY DESIGNATION	QUALITY GROUP
1	A	SC-1	A
2	B	SC-2	B
3	A	SC-2	B
	B	SC-2	B
4	A	SC-2	B
	C	SC-3 OR NNS	C
	D	NNS	C
	F	–	–
5	B	SC-2	B
6	D	NNS	D
	F	–	–
7	F	–	–
	D	–	–
	F	–	–
	D	–	–

SEISMIC DESIGN CLASSIFICATION CORRELATION

BOUNDARY SYMBOL	REFERENCE TABLE 3.2-2
SEISMIC CLASS	SEISMIC CATEGORY
As	I
A	I
B*	I OR NSC
C	NSC

NNS – NON NUCLEAR SAFETY
NSC – NON SEISMIC CATEGORY I

* SEISMIC CLASS B STRUCTURES, SYSTEMS OR COMPONENTS REQUIRED TO PREVENT THE RELEASE OF RADIOACTIVE MATERIAL FOLLOWING A DESIGN BASIS ACCIDENT ARE SEISMIC CATEGORY I; ALL OTHER SEISMIC CLASS B ITEMS ARE NSC. S_1 AND S_2 ARE RESPECTIVELY, DESIGN EARTHQUAKE MAXIMUM AND EXTREME LOADS.

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Figure 1.7–1 PIPING AND INSTRUMENTATION DIAGRAM SYMBOLS (Sheet 2 of 2)

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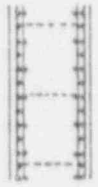
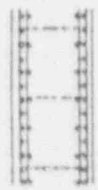
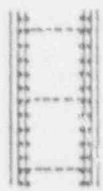
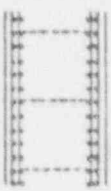
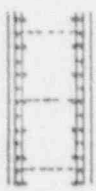
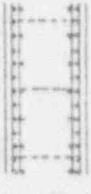
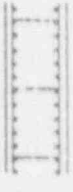
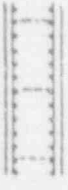
TP12300		1200	900
			
		1200	900
		D32@200+D29@400	D35@200
		D32@200+D29@400	D35@200
TP 4800		1200	
			
		1200	
		D35@200+D35@400	
		D35@200+D35@400	
TP -1700		1300	800
			
		1300	800
		D35@200+D35@200	D29@200
		D35@200+D35@200	D29@200
TP -8200		1500	1200
			
		1500	1200
		D35@200+D35@200	D29@200+D29@400
		D35@200+D35@200	D29@200+D29@400

TP35,200		300		
				
		300		
		D16@200		
		D16@200		
TP31,700		600	300	
				
		600	300	
		D22@200	D16@200	
		D22@200	D16@200	
TP 22,500		900	500	
				
		900	500	
		D29@200	D22@200	
		D38@200	D22@200	
TP 18,100		1200	900	800
				
		1200	900	800
		D29@200+D25@400	D32@200	D29@200
		D29@200+D25@400	D38@200	D29@200

800	
	
800	
D32D29@200	
D32D29@200	

92-049-11

Figure 3H.3–8 LIST OF SEISMIC WALL SECTIONS

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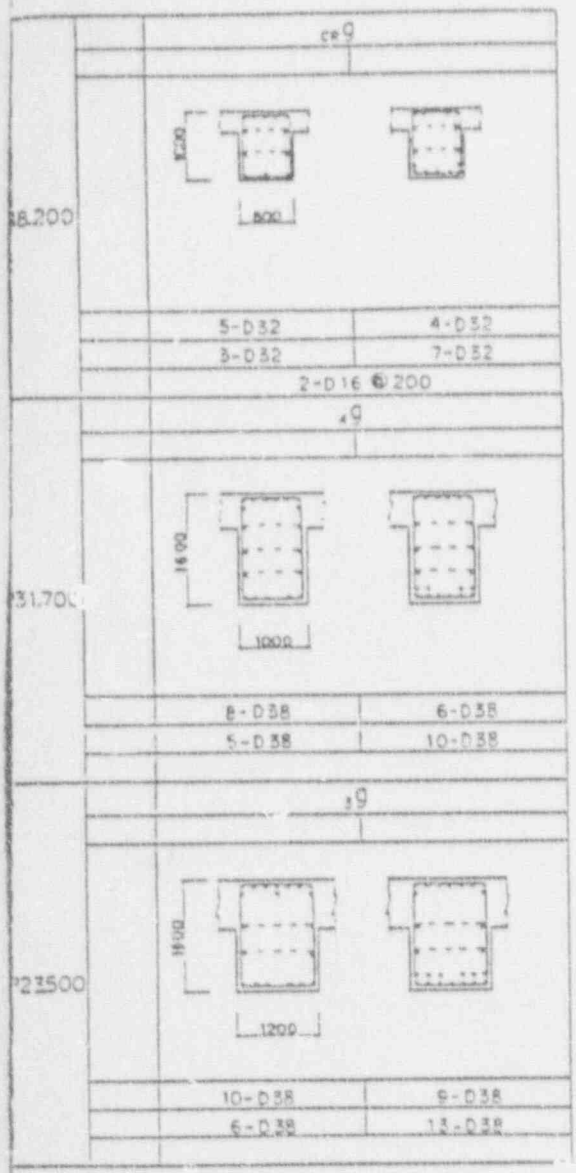
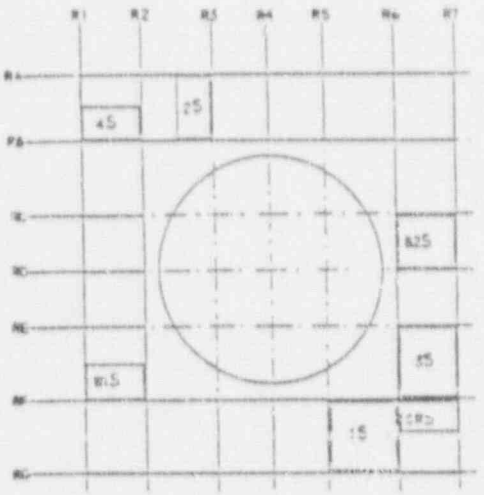
List of Slab Section

TP38.200	RS	300	D13 @200	D13 @200
			D13 @200	D13 @200
TP 31.700	4S	500	D16 @200	D16 @200
			D16 @200	D16 @200
TP 27.500	3S	800	D19 @200	D19 @200
			D19 @200	D19 @200
TP18.100	2S	800	D19 @200	D19 @200
			D19 @200	D19 @200
TP12.300	1S	1200	D29 @200	D29 @200
			D29 @200	D29 @200
TP 4.800	B1S	500	D19 @200	D19 @200
			D19 @200	D19 @200
TP-1.700	B2S	900	D19 @200	D19 @200
			D19 @200	D19 @200

List of Sub-Beam Section

TP18.100	9-D38	6-D38
	6-D38	10-D38
TP12.300	9-D38	6-D38
	6-D38	9-D38
TP 4.800	9-D38	6-D38
	6-D38	9-D38
	3-D19 @200	
TP-1.700	6-D38	4-D38
	4-D38	6-D38





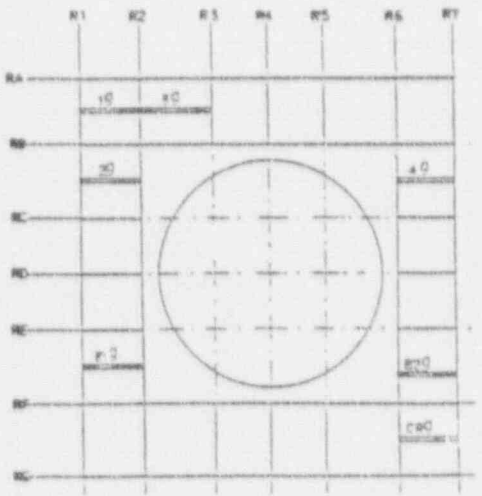


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Figure 3H.3-9 LIST OF SLAB AND SUB-BEAM SECTIONS

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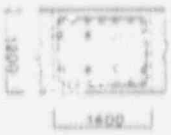
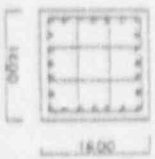
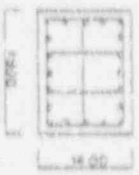
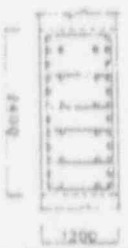
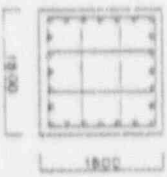
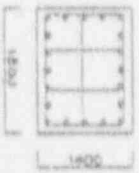
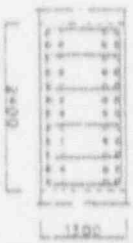
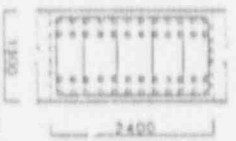
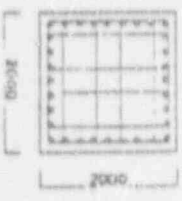
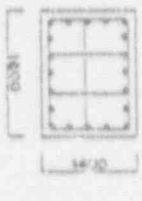
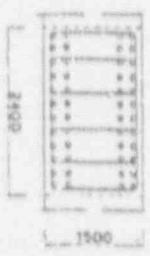
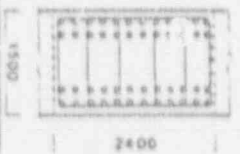
1C#6	1C#6	P	1C#7	1C#6
	1C#6			
7-D35 4-D16@150		18-D35	32-D35	14-D32 8-D29
B1C#6	B1C#6	B1P	B1C#7	B1C#6
				
24-D32 4-D16@150	24-D35 4-D16@150	20-D35 4-D16@150	36-D35	36-D35
B2C#6	B2C#6	B2P	B2C#7	B2C#6
				
32-D38 6-D16@200	24-D38 4-D16@150	20-D38 4-D16@150	48-D35	48-D35
B3C#6	B3C#6	B3P	B3C#7	B3C#6
				
36-D38 6-D16@200	32-D38 6-D16@200	20-D38 4-D16@150	48-D35	48-D35

92-049-13

Figure 3H.3–10 LIST OF COLUMN SECTIONS (1 of 2)

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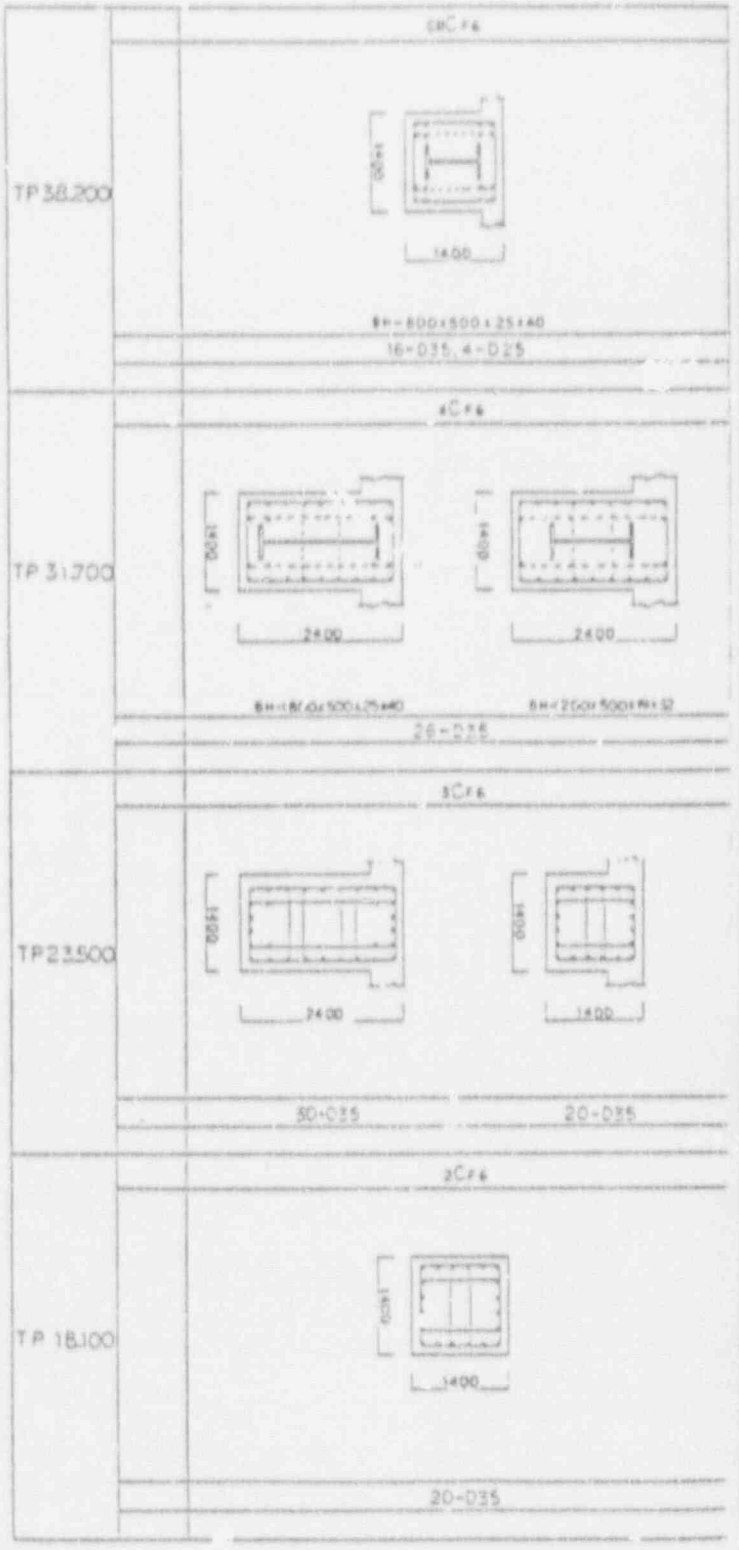

TP 38.200
8C F6
1400
BH=800x500x25x40
16-D35, 4-D25
TP 31.700
8C F6
2400
2400
BH=1850x500x25x40
BH=2550x500x28x32
26-D35
TP 23.500
3C F6
2400
1400
30-D35
20-D35
TP 18.100
2C F6
1400
20-D35

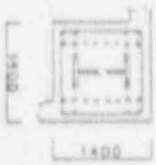
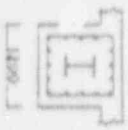
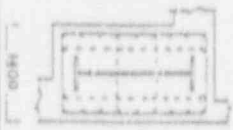
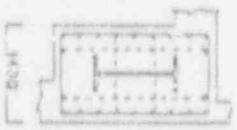
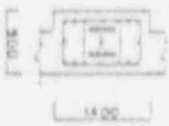
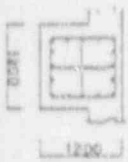
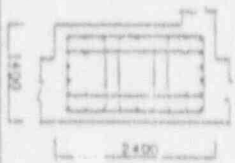
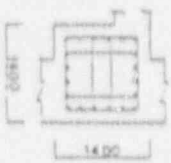
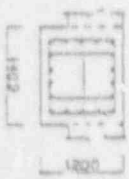
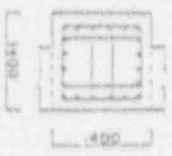
	2HC66	2HC64
		
	BH-600×500×25×40	H-400×400×13×21
	16-D35, 4-D25	14-D25
	4C66	4C64
	 	
BH-600×500×11×18	BH-1800×500×25×40 BH-1200×500×19×32	H-400×400×13×21
16-D35	26-D35	16-D29
3C77	3C66	
	 	
16-D35	30-D35 20-D35	
2C77	2C66	
		
18-D35	20-D35	

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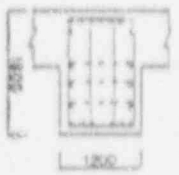
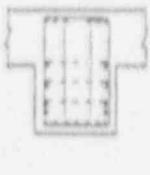
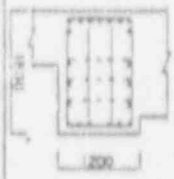
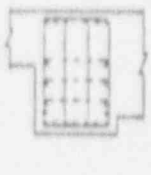
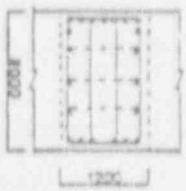
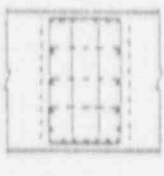
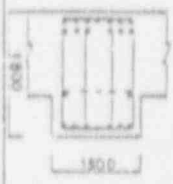
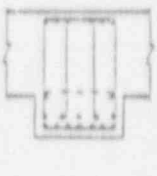
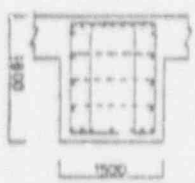
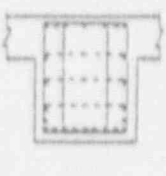
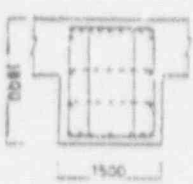
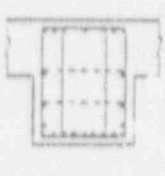
Figure 3H.3-10 LIST OF COLUMN SECTIONS (2 of 2)

9204160195-06

TP 18.100	2G F56.68C		2G F23		
			2		
					
	10 - D38	6 - D38	9 - D38	6 - D38	
	6 - D38	9 - D38	6 - D38	9 - D38	
TP 12.300	1G F12		1G F56		
			5		
					
	9 - D38	9 - D38	18 - D38	6 - D38	
	6 - D38	9 - D38	6 - D38	12 - D38	
TP 4.800	B1G F12		B1G F56		
			B1G F12		
	11 - D38	7 - D38			
	7 - D38	11 - D38			
TP -1.700	B2G F12		B2G F56		
			B2G F12		
	11 - D38	7 - D38			
	7 - D38	11 - D38			

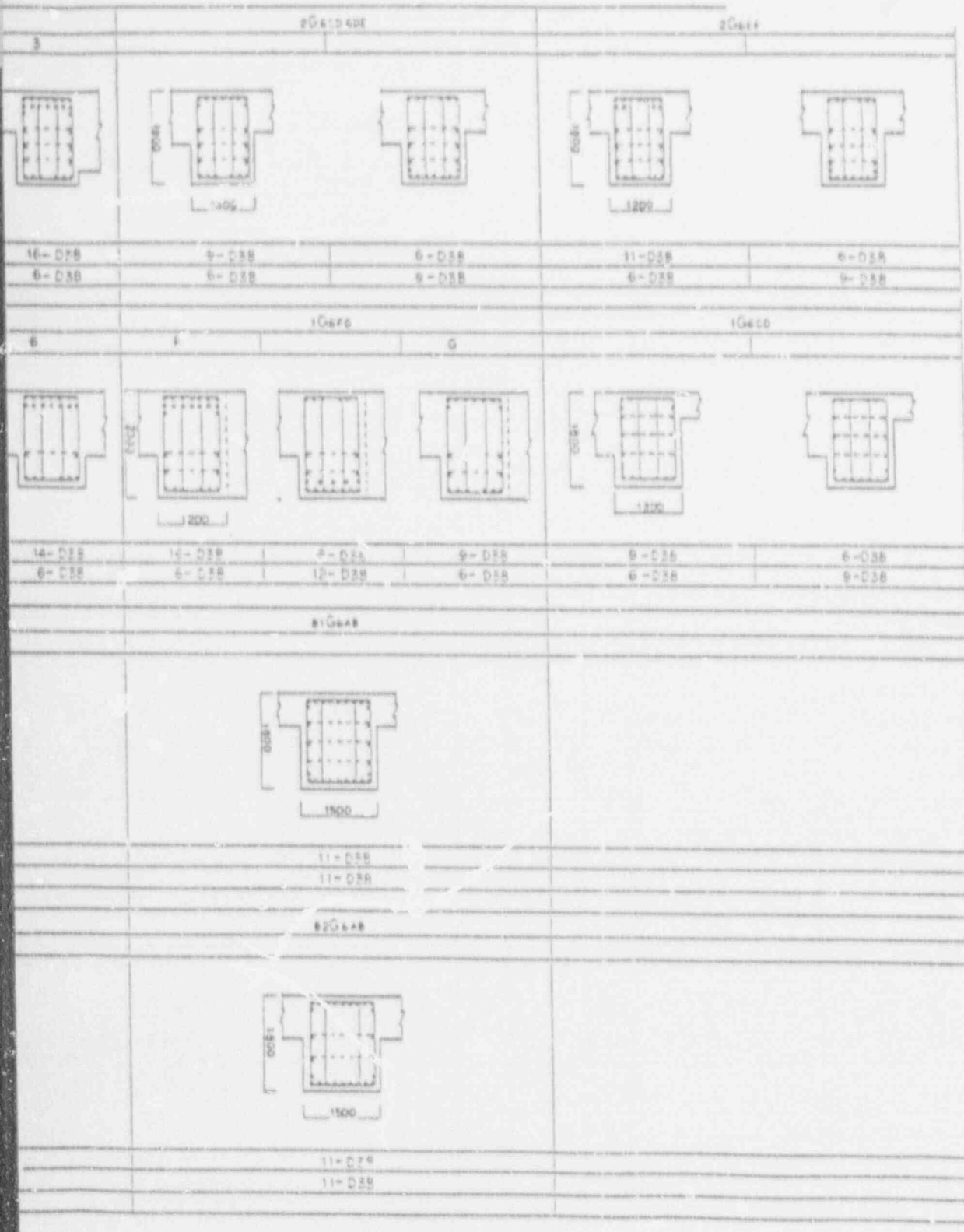


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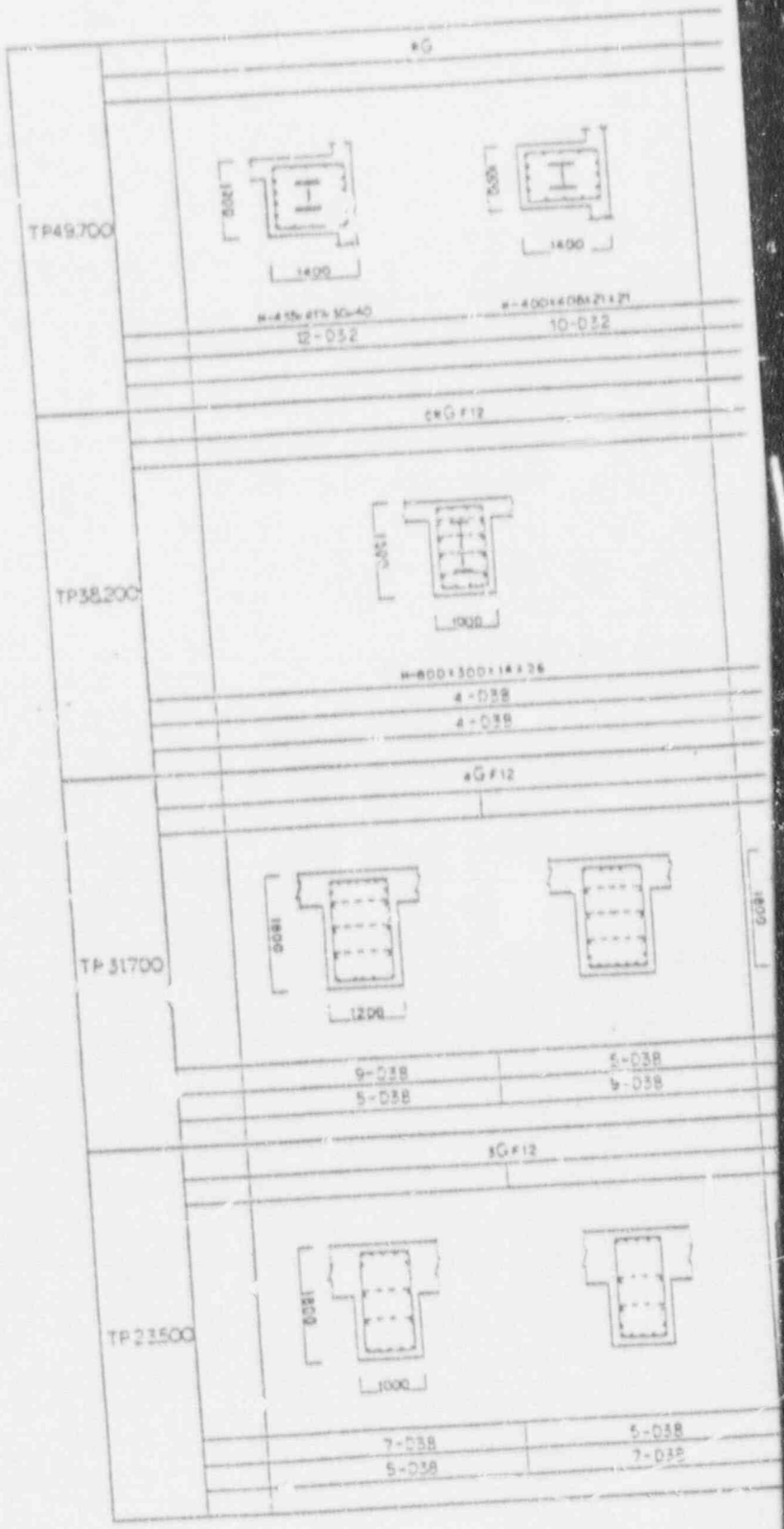
Figure 3H.3–11 LIST OF BEAM SECTIONS (1 of 2)

9204160195-07


TP49.700
TP38.200
TP31.700
TP23.500
1400
1400
1000
1200
1000
12-D32
10-D32
4-D38
4-D38
9-D38
5-D38
5-D38
6-D38
7-D38
5-D38
5-D38
7-D38

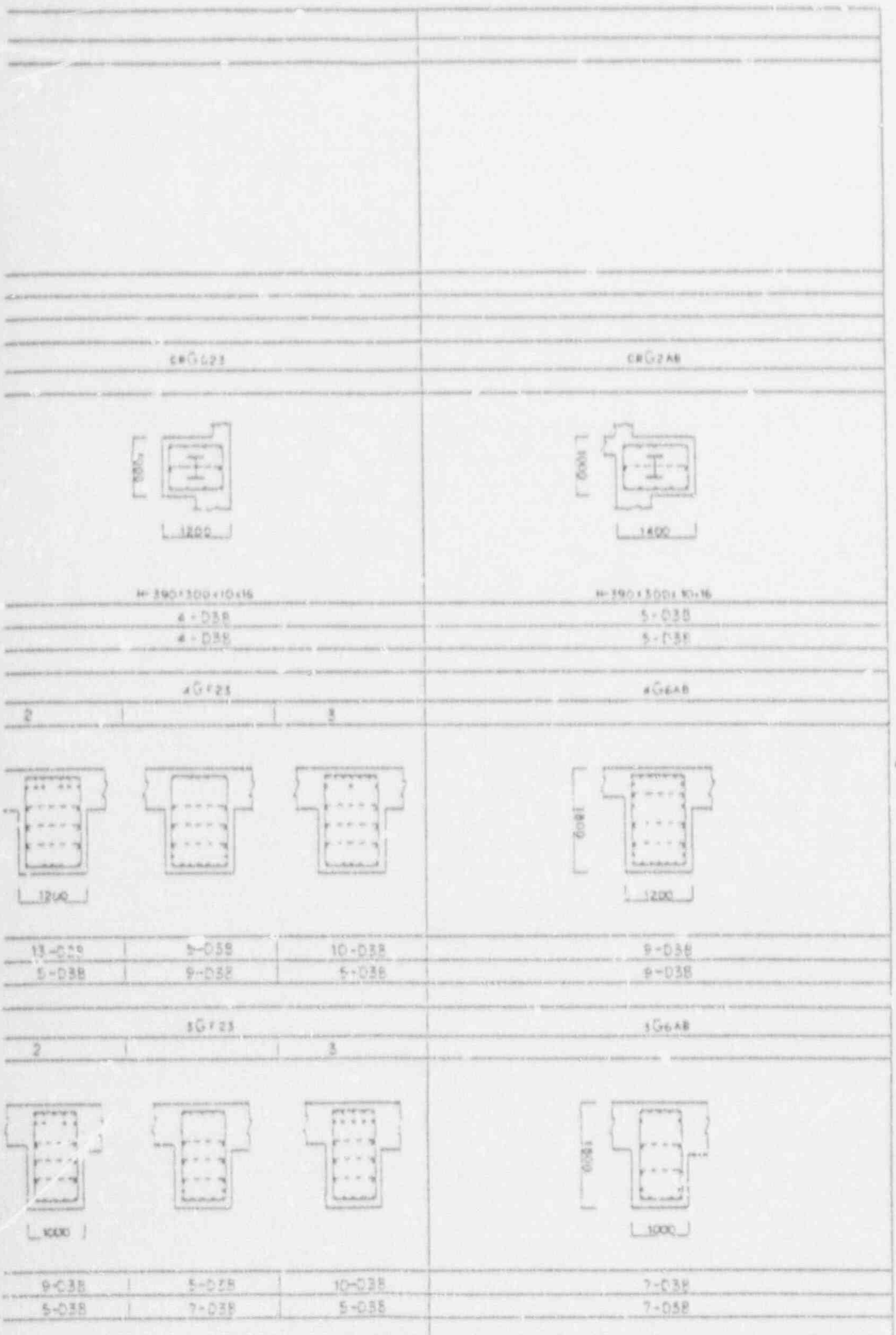


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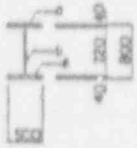
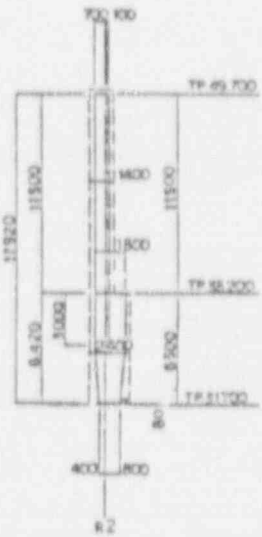
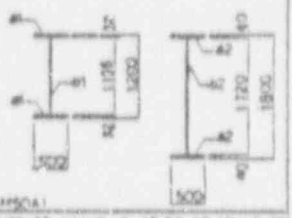
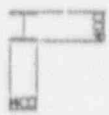
Figure 3H.3–11 LIST OF BEAM SECTIONS (2 of 2)

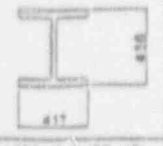
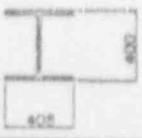
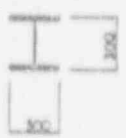
List of Steel Column Section

S=1:200, S=1:50

		C1	C2	C3
TP 49.700 ⌇ TP 38.200				
		SM50A		
		A : FB-40 B : WB-25		
JOINT	PLG1	—— ——		
	PLG2	—— ——		
	WEB	—— ——		
TP 38.200 ⌇ TP 31.700				
		SM50A		
		B1:FB-32 B1:WB-19 B2:FB-40 B2:WB-25		
		B : 40×600×L300		
		4-M45 L=1575		
TP49.700 ⌇ TP38.200				
			SM50A	
			H=400×400×13×21	
JOINT	PLG1		—— ——	
	PLG2		—— ——	
	WEB		—— ——	
TP 38.200 ⌇ TP 31.700		TP49.700 ~ TP38.200		
				SM50A
		H=400×400×13×21		H=440×300×11×18
		B=25×500×500		B=25×400×540
		4-M30 L=1050		4-M30 L=1050

t of Steel Beam Section

S=1:20

	SG1		SG2		SG3		SG4		SG5	
										
	H-438×417×30×40		H-400×408×21×21		H-390×300×10×16		H-800×300×14×26		H-300×300×10×15	
PLG	SE-22×420 2SBs-25×170	20-M24	SE-16×420 2SBs-12×170	12-M24	SE-12×300 2SBs-16×110	8-M24	SE-16×300 2SB-25×110	14-M24	SE-9×300 2SBs-16×110	8-M24
WEB	2SBs-22	20-M24	2SBs-16	12-M24	2SBs-6	5-M24	2SBs-9	12-M24	2SBs-6	4-M24

of Steel Sub-Beam Section

S=1:20

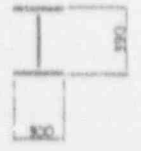
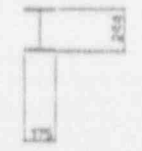
	B1		B2	
				
	H-390×300×10×16		H-244×175×7×11	
WEB	2SBs-9	6-M22	2SBs-6	4-M22
	1-120.16 @500		1-120.16 @500	

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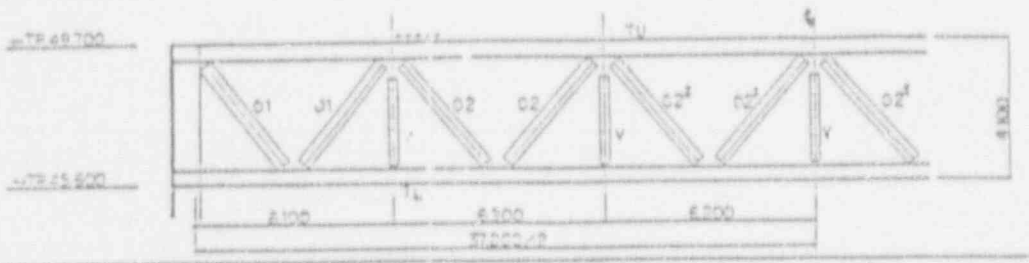
Figure 3H.3–12 LIST OF STRUCTURAL STEEL SECTIONS (1 of 2)

9204160195-09

List of Roof Truss

S=1:150



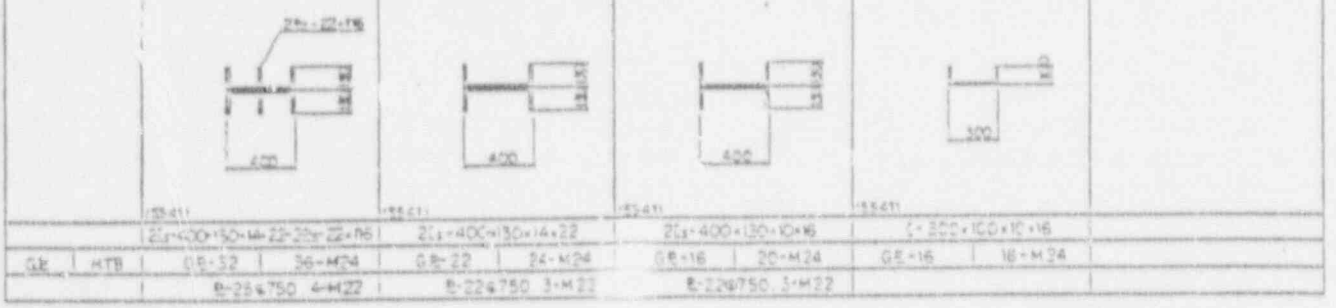
		JOINT					
		FLG			WEB		
TU	H=295×417×30×40	SR-22	23R_1-28	28-M22	23R_2-28	18-M22	
TL	H=478×417×30×40	SR-22	23R_1-28	28-M22	23R_2-28	18-M22	
D1	H=400×408×21×21	SR-16	23R_1-16	16-M22	23R_2-16	10-M22	
D2	H=356×208×9×14	SR-9	23R_1-9	8-M22	23R_2-9	6-M22	I: SS41
V	[-300×100×10×16	———	———	———	———	———	SS41

List

TU
TL
D
V

List of Roof Brace

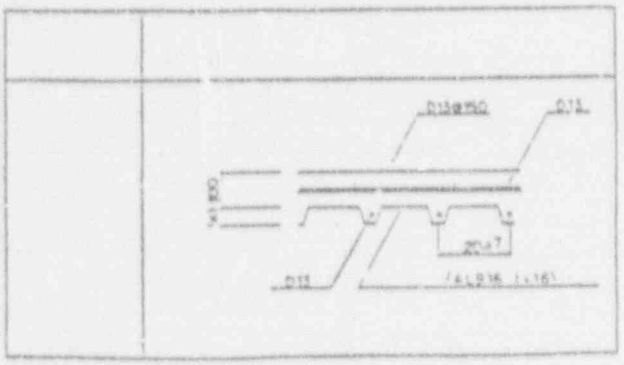
S=1:20

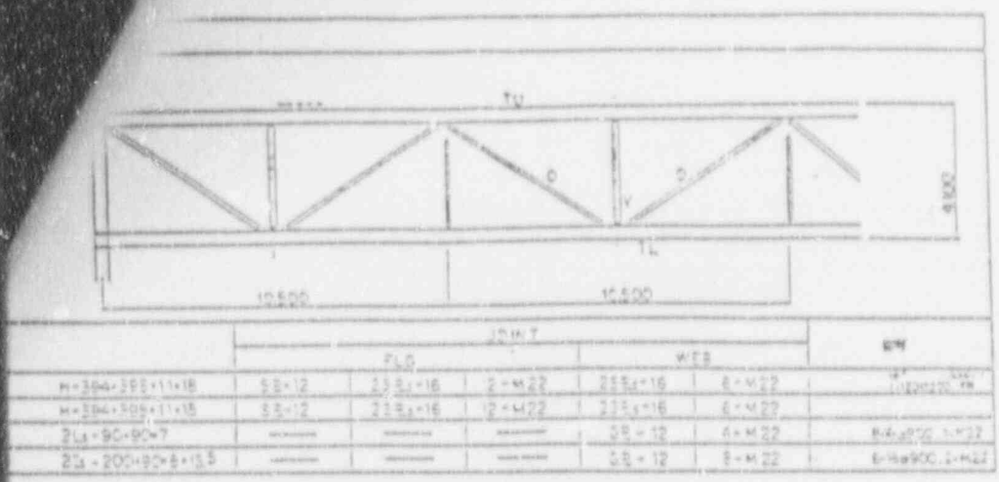


		H81	H82	H83	H84
		2L-400×150×14×22	2L-400×130×14×22	2L-400×130×10×16	[-300×100×10×16
GK	HTB	GR-32 / 36-M24	GR-22 / 24-M24	GR-16 / 20-M24	GR-16 / 18-M24
		R-226750 4-M22	R-226750 3-M22	R-226750 3-M22	

List of Roof Slab

S=1:10





	JOINT					
	FLG			WEB		
H-394×398×11×18	8-□12	2-□352×16	2-M22	2-□554×16	6-M22	
H-394×405×11×18	8-□12	2-□352×16	12-M22	2-□554×16	6-M22	
2L-90×90×7	———	———	———	2-□8-12	4-M22	
2L-200×90×8×13.5	———	———	———	2-□8-12	8-M22	

S=1:50 Crane Girder Detailed Drawing

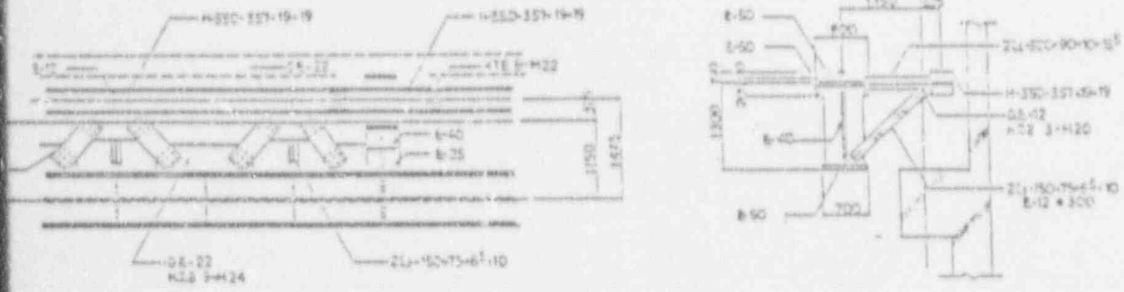


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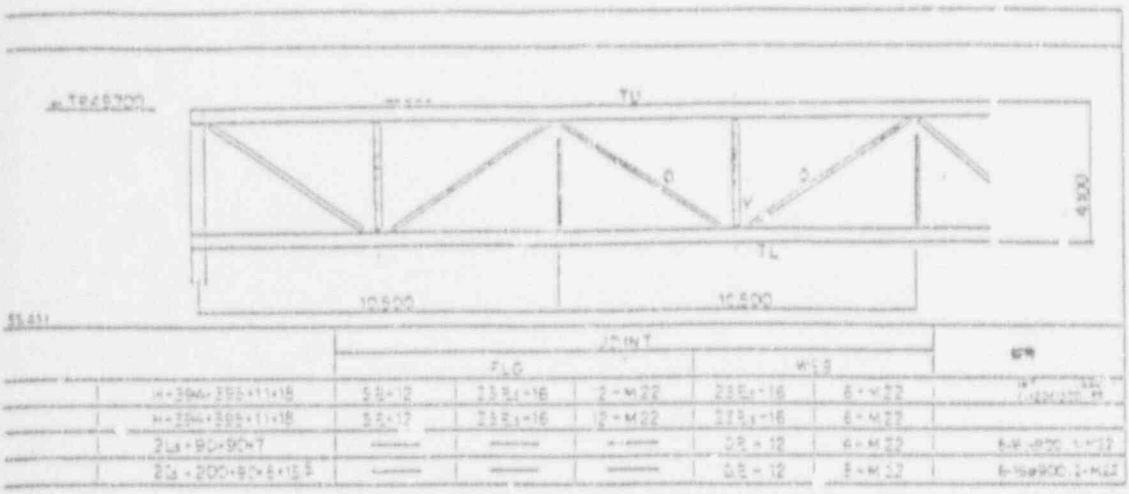
Figure 3H-12 LIST OF STRUCTURAL STEEL SECTIONS (2 of 2)

9204160195-10

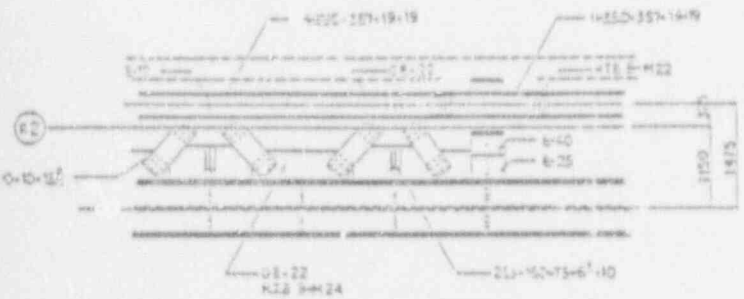
of Roof Joint Beam

S=1:100



	JOINT					
	FLG			WEB		
1	H-396×199×11×18	5-M22	2-PL-16	2-M22	2-PL-16	8-M22
2	H-294×302×12×12	5-M22	2-PL-16	2-M22	2-PL-16	8-M22
3	2L-90×90×7	—	—	—	PL-12	4-M22
4	2L-200×90×8×13.5	—	—	—	PL-12	8-M22

S=1:50 Crane Girder Detailed Drawing



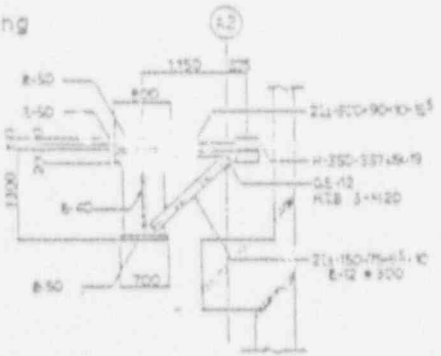


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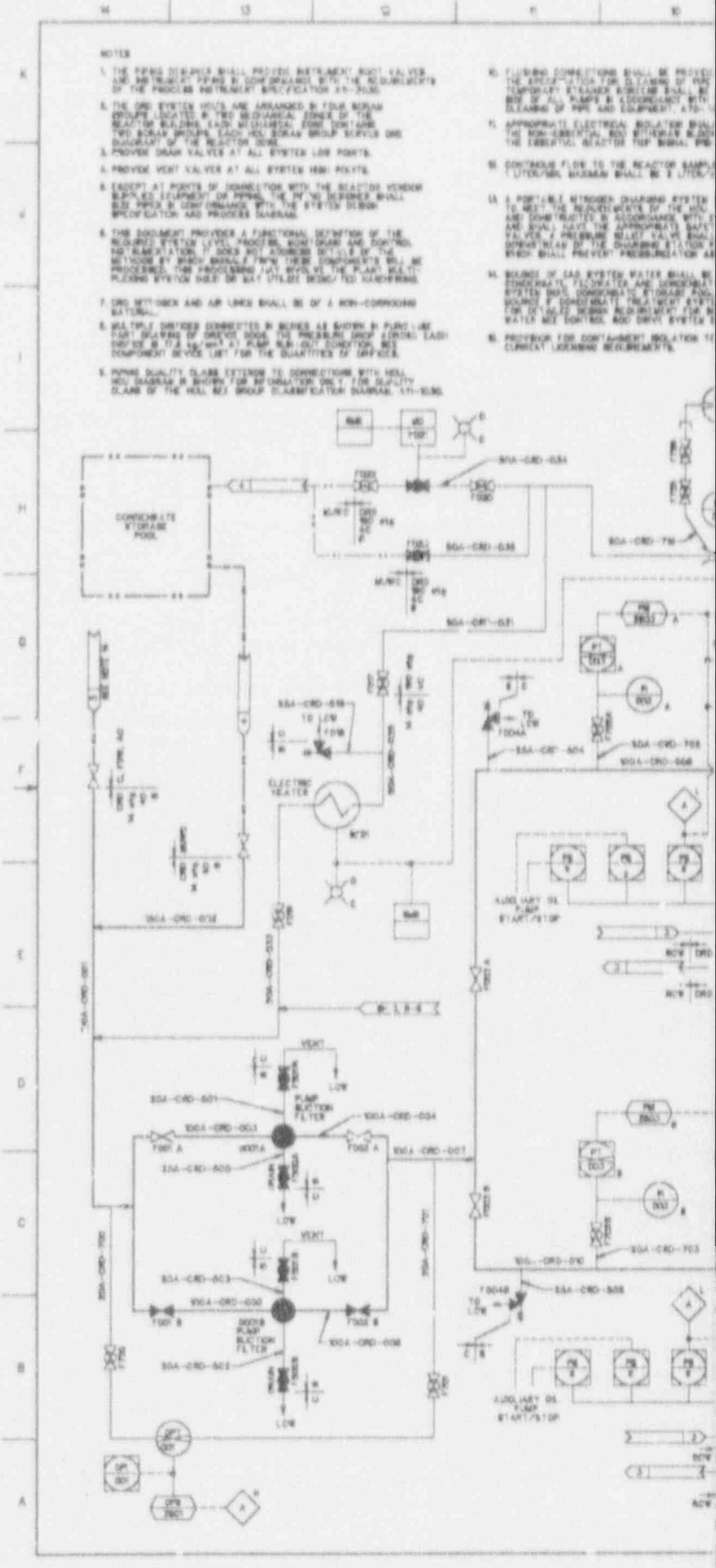
Figure 3H.3-12 LIST OF STRUCTURAL STEEL SECTIONS (2 of 2)

9204160195-10


NOTES
CONDENSATE STORAGE POOL
VENT
LOW
FILTER
AUXILIARY OIL PUMP START/STOP
ELECTRIC HEATER

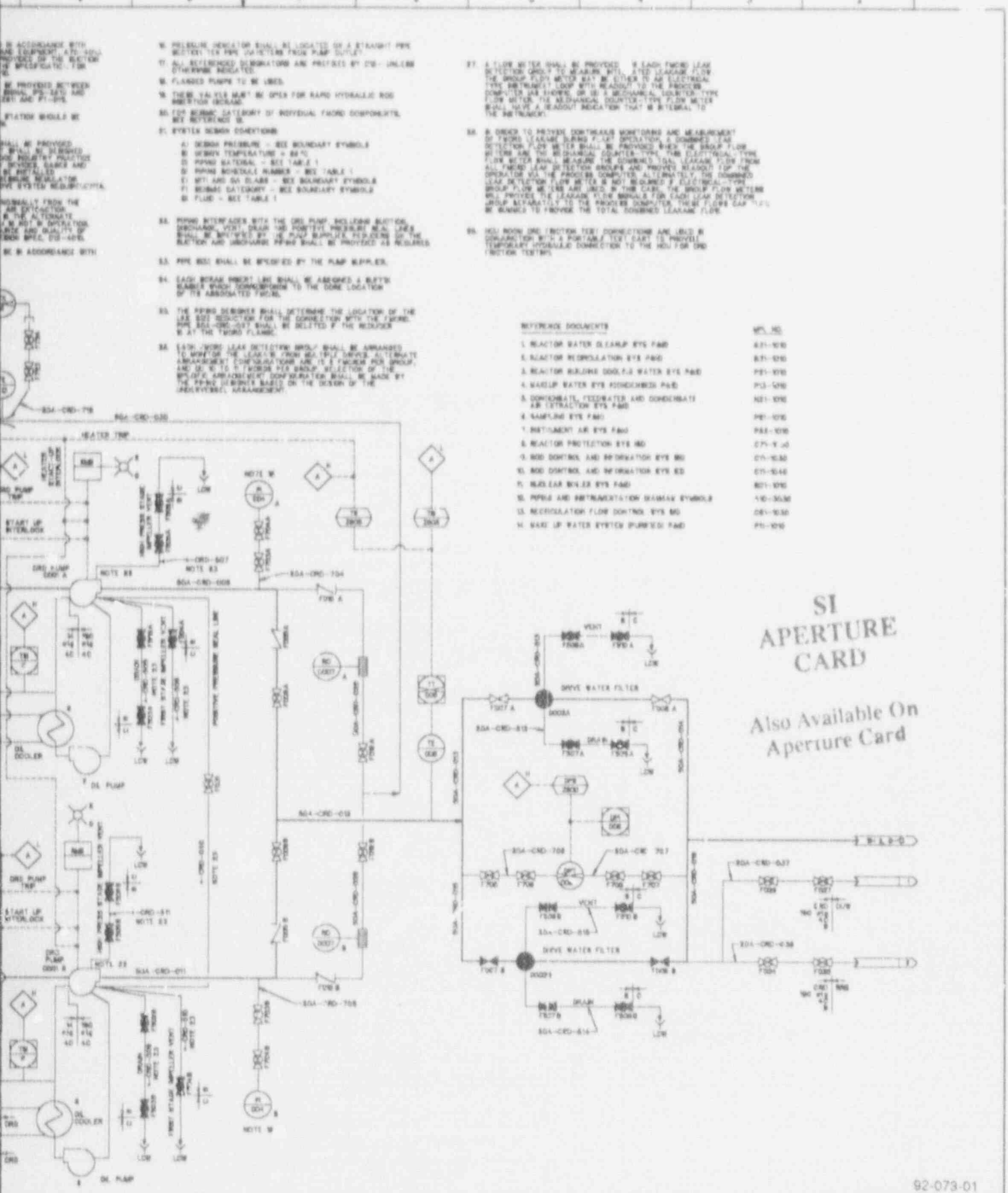
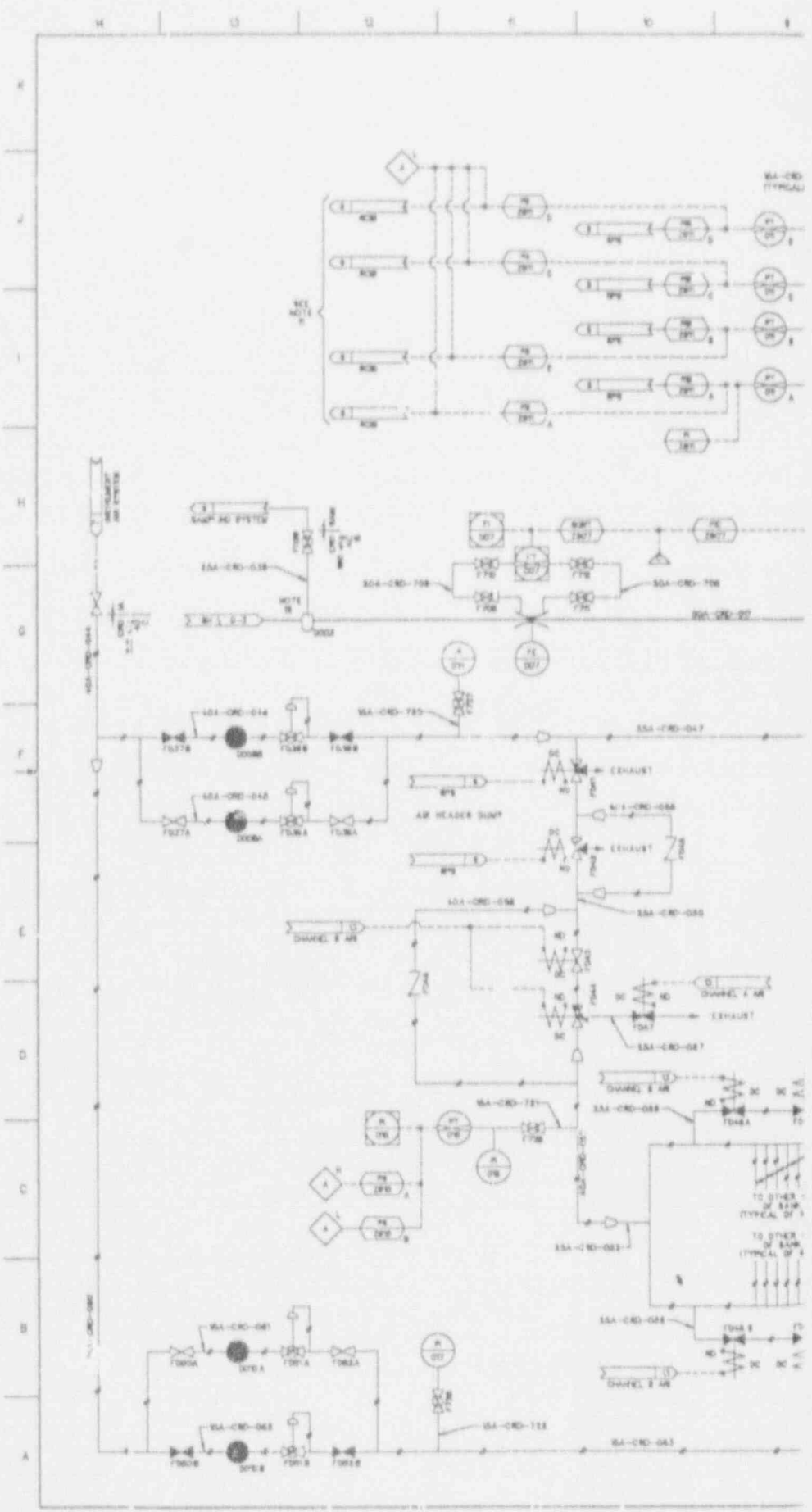


Figure 4.6–8 CONTROL ROD DRIVE SYSTEM P&ID (Sheet 1 of 3)

9204160195 - //


AIR HEADER SUMP
EXHAUST
CHANNEL A AIR
CHANNEL B AIR
TO OTHER DC BANK (TYPICAL OF 4)

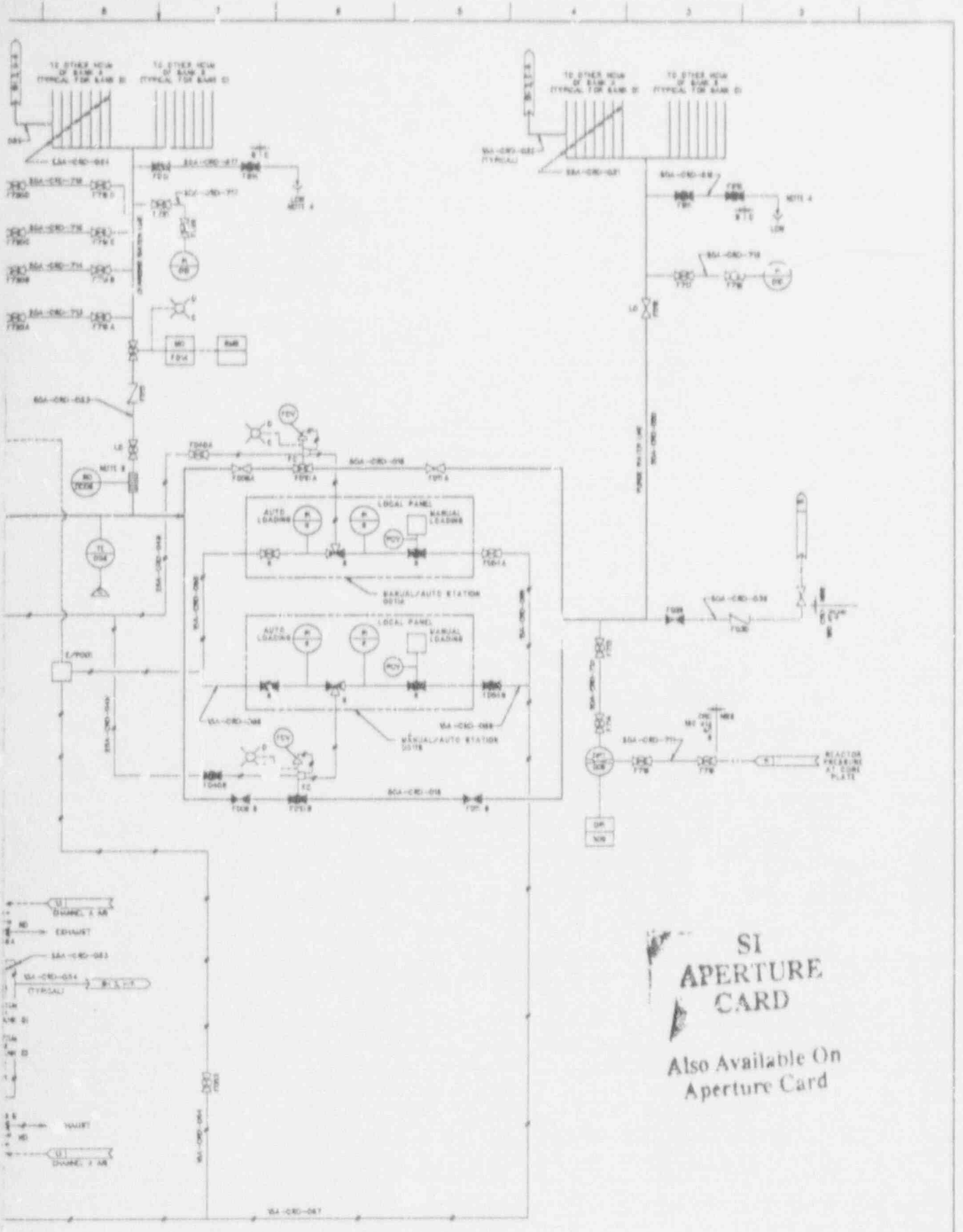


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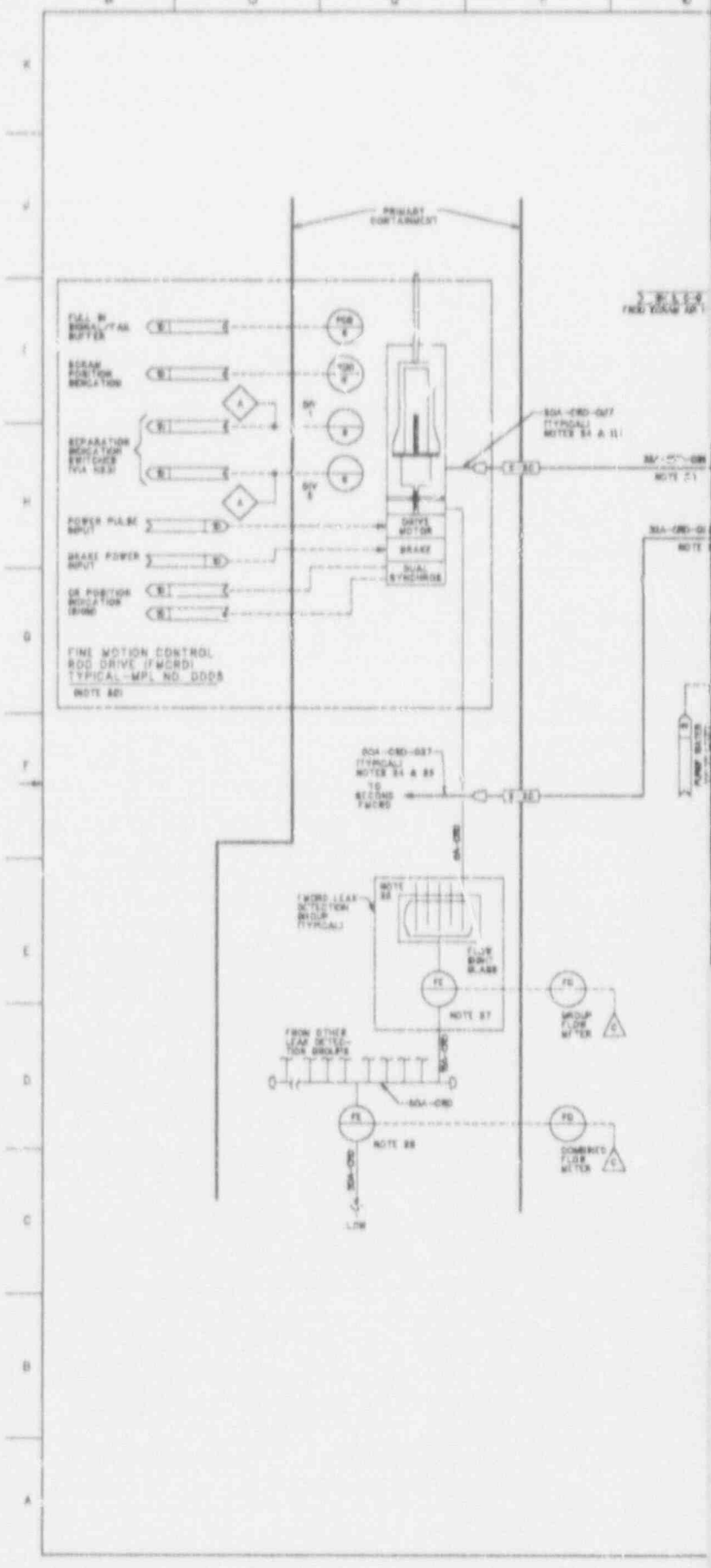
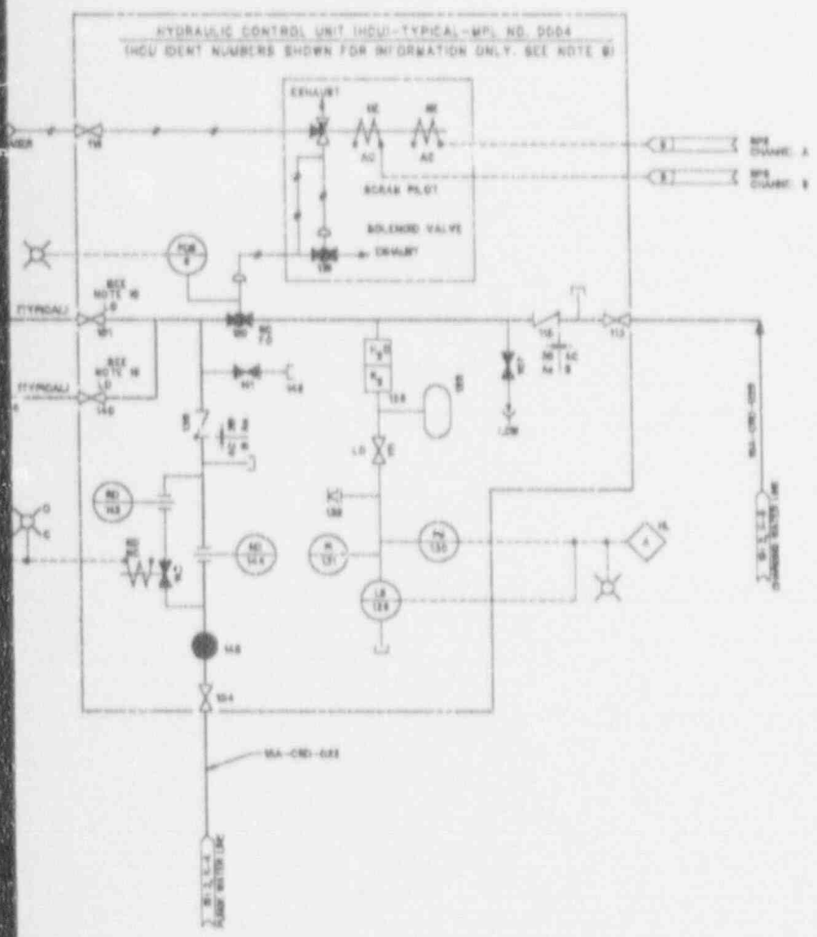
Figure 4.6–8 CONTROL ROD DRIVE SYSTEM P&ID (Sheet 2 of 3)

9204160195 - /2


PRIMARY CONTAINMENT
FINE MOTION CONTROL ROD DRIVE (FMCRD) TYPICAL-MFL NO. 0005
NOTE 80
DRIVE MOTOR
BRAKE
DUAL SYNCHROSE
FMCRD LEAK DETECTION GROUP (TYPICAL)
NOTE 88
NOTE 87
FROM OTHER LEAK DETECTOR GROUPS
NOTE 89
TO SECOND FMCRD
LOW



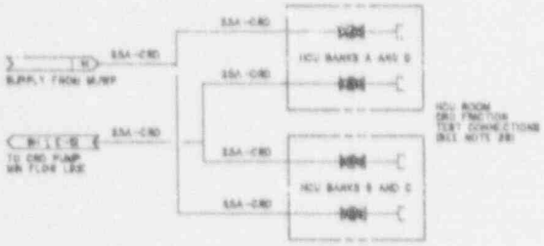


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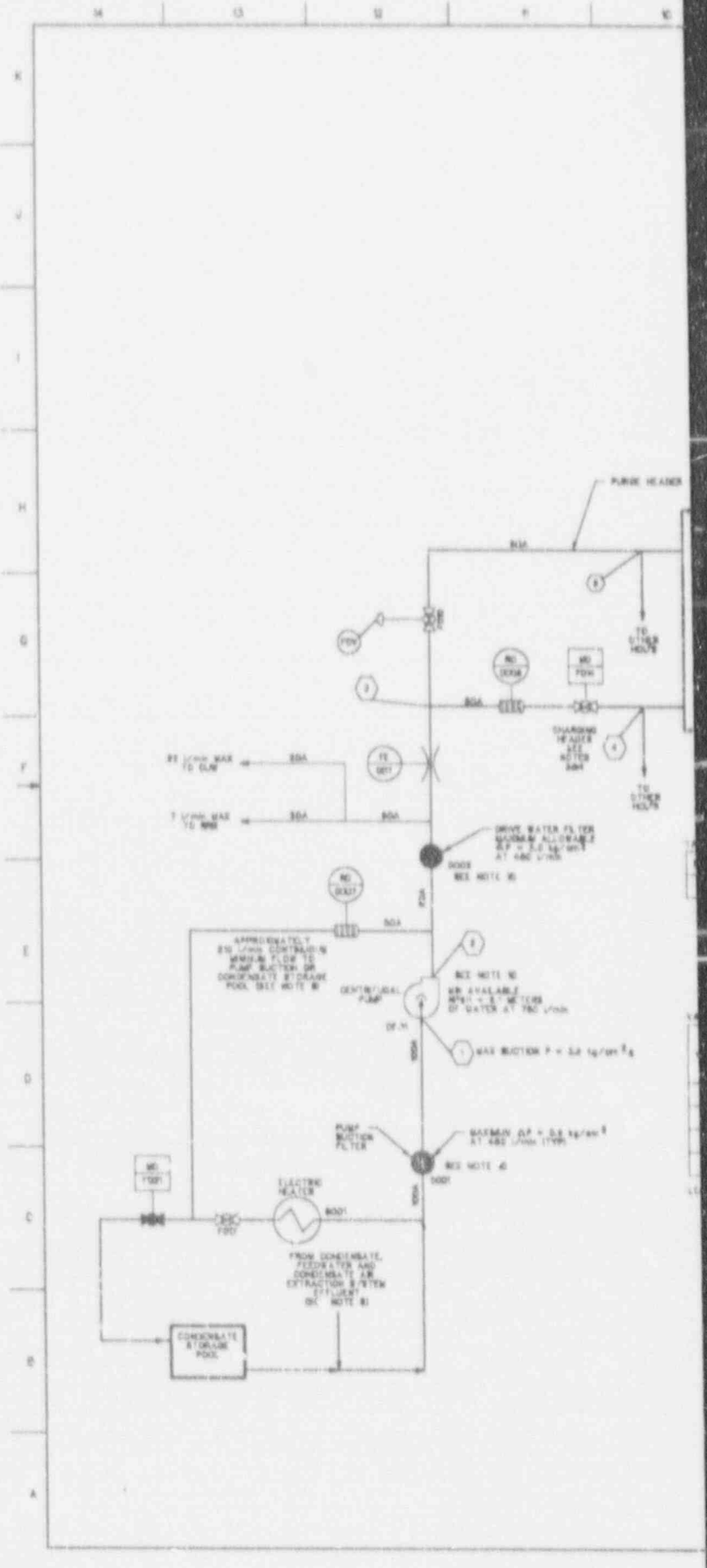
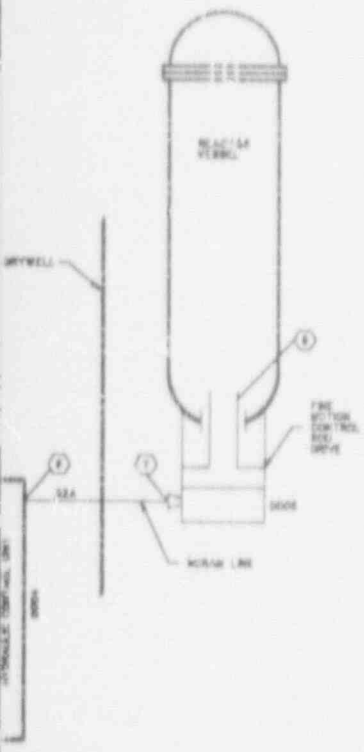
Figure 4.6–8 CONTROL ROD DRIVE SYSTEM P&ID (Sheet 3 of 3)

9204160195 -/3


PURGE HEADER
80A
TO LITTER HOLD
FT 001
80A
80A
DRIVE WATER FILTER
MAXIMUM ALLOWABLE
AT 480 L/min
SEE NOTE 10
SEE NOTE 10
AIR AVAILABLE
AT 9.1 METERS
OF WATER AT 780 L/min
MAX SUCTION P = 3.0 kg/cm²g
PUMP
SUCTION
FILTER
SEE NOTE 4
ELECTRIC
HEATER
FROM CONDENSATE,
FEEDWATER AND
CONDENSATE AIR
EXTRACTION SYSTEM
SEE NOTE 11
CONDENSATE
STORAGE
POOL



MODE A NORMAL OPERATION – B21B PUMP WATER HEADERS (SEE NOTES 6 AND 7)

MODE	1	2	3	4	5	6	7	8
FLOW, L/min	Q_1	Q_2	Q_3	0	Q_4	1.1*1.2	0.1*1.2	0.1*1.2
PRESSURE, kg/cm²g	0.8 (MAX)	70+ = 304 kg/cm² MAX			P6+1.4 MAX	P6+3.0	P6+3.0	P6

BAR LINE LOSS 0.3 kg/cm²

CONDITIONS :

1. NORMAL DRIVE OPERATION
2. MIN/MAX PUMP FLOW TO DRIVES
3. PRESSURE OF REACTOR AT 70.3 kg/cm²g MEASURE AT VESSEL BOTTOM

MODE E SCRAM – B21B SCRAM LINE

MODE	1	2	3	4	5	6	7	8
FLOW, L/min	330	330				172	172	172
PRESSURE, kg/cm²g						7.1 kg/cm² MIN 9.4 kg/cm² MAX LINE LOSES SEE NOTE 8		P6

CONDITIONS :

1. DRIVES SCRAMMED
2. FLOWS BASED ON ROD VELOCITY OF 34 cm/Sec
3. PRESSURE OF REACTOR AT 70.3 kg/cm²g MEASURED AT VESSEL BOTTOM

MODE C BORAM COMPLETED – B21B THC PUMP SUCTION LINE

MODE	1	2	3	4	5	6	7	8
FLOW, L/min	TBC MAX	TBC MAX	0.01	331 MAX	0	SEE NOTES 3&4		
PRESSURE, kg/cm²g	TBD+ kg/cm²					SEE NOTES 3&4		P6

CONDITIONS :

1. BORAMMING OF DRIVES COMPLETED
2. MAXIMUM CRD SUPPLY PUMP FLOW
3. PRESSURE OF REACTOR [illegible] 47.0 kg/cm²g

TABLE 1 DORAM PRESSURE/TEMPERATURE

MODE	1	2	3	4	5	6	7	8
PRESSURE, kg/cm²g	14.0	150	150	150	150	150	150	87.4
TEMP °C	66	66	66	66	66	66	66	303

NOTES :

1. DESIGN PRESSURE, TEMPERATURE AND LINE SIZE WILL BE FINALIZED AT THE DETAILED DESIGN PHASE. ACTUAL LINE SIZES ARE CHOSEN BY PIPING DESIGN SHALL MEET THE PROCESS DATA HYDRAULIC REQUIREMENTS.
2. THE TERM P6 IS DEFINED AS THE REACTOR PRESSURE IMMEDIATELY ABOVE THE CORE PLATE.
3. PUMP RUNOUT CAPACITY OF THE LOW SHALL NOT BE EXCEEDED. ORIFICE REGULATES THE PRESSURE AT THE INLET. LINE SIZE SHALL BE GREATER THAN A TOTAL OF 827 L/min WILL FLOW THROUGH ALL THE DRIVES WHEN P6 = 0 kg/cm²g LEAKAGE FLOW AT MODES (1) AND (8) IS EQUAL TO 831 OF [illegible] NUMBER OF DRIVES.
4. RESTRICTING ORIFICE, MODE B CONSISTS OF 104 TRIPLE ORIFICES CONNECTED IN SERIES SET WITH THE QUANTITIES OF ORIFICE. THE PRESSURE DROP EACH ORIFICE IS 17.8 kg/cm² AT 760 L/min.
5. LINE FROM THE CONDENSATE, FEEDWATER AND CONDENSATE AIR EXTRACTION SYSTEM MUST SHALL BE SIZED TO MAINTAIN A FLOW RATE APPROXIMATELY TWICE NORMAL MODE A CRD SYSTEM FLOW RATE. SURPLUS FLOW WILL BE DIVERTED TO CONDENSATE STORAGE POOL (CSP). CSP WILL PROVIDE AS A TABLETE SOURCE OF WATER FOR THE CRD SYSTEM IF SYSTEM NOT IS NOT AVAILABLE.
6. KS/YY MEANS MIN/MAX CONDITIONS
7. SEE TABLE 5 FOR MAXIMUM AND MINIMUM VALUES OF Q_1, Q_2, Q_3 AND Q_4. NORMAL PUMP FLOW AT FLOWS Q_1 & ARE L/min. BASED ON NORMAL + RUN FLOW OF 10 L/min AT LOCATIONS 6, 7 AND 8.
8. LINE LOSSES ARE FOR THE SCRAM LINE ONLY. TOTAL STANDARD LOSSES FOR THE HCU AND SCRAM LINES ARE 11.2 kg/cm² MINIMUM AND 21.0 kg/cm² MAXIMUM.
9. ACTUAL FLOW WILL BE DETERMINED DURING THE DETAILED DESIGN PHASE.
10. TYPICAL OF BOTH LOOPS ONLY ONE LOOP SHOWN.

TABLE 5 SYSTEM FLOW RATES (L/min) (NOTE 8)

NUMBER OF DRIVES	Q_1	Q_2	Q_3	Q_4
205	383/908	383/908	144/287	144/287

VE CONDITIONS

VALVE ID	MODE A		MODE B	MODE C
	BYPASS THRU ELECTRIC HEATER MOD	FLOW TO CONDENSATE STORAGE POOL		
050	O	O	O	C
054	O	O	O	O
057	O	C	O	O
031	C	O	C	C

NOTE: O = OPEN C = CLOSED

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Figure 4.6–9 CONTROL ROD DRIVE SYSTEM PROCESS DIAGRAM

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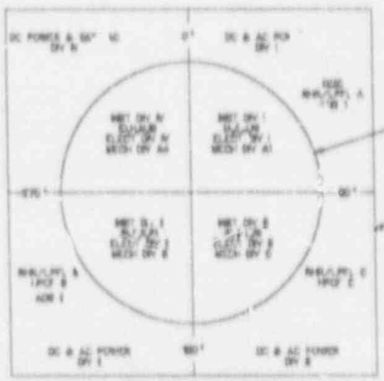

ORIENTATION OF THE NUCLEAR ISLAND SYSTEM
INSTRUMENTS TO MEET SEPARATION REQUIREMENTS
INCLUDES ASSOCIATED INSTRUMENT BUFFS AND EQUIP LOCATIONS

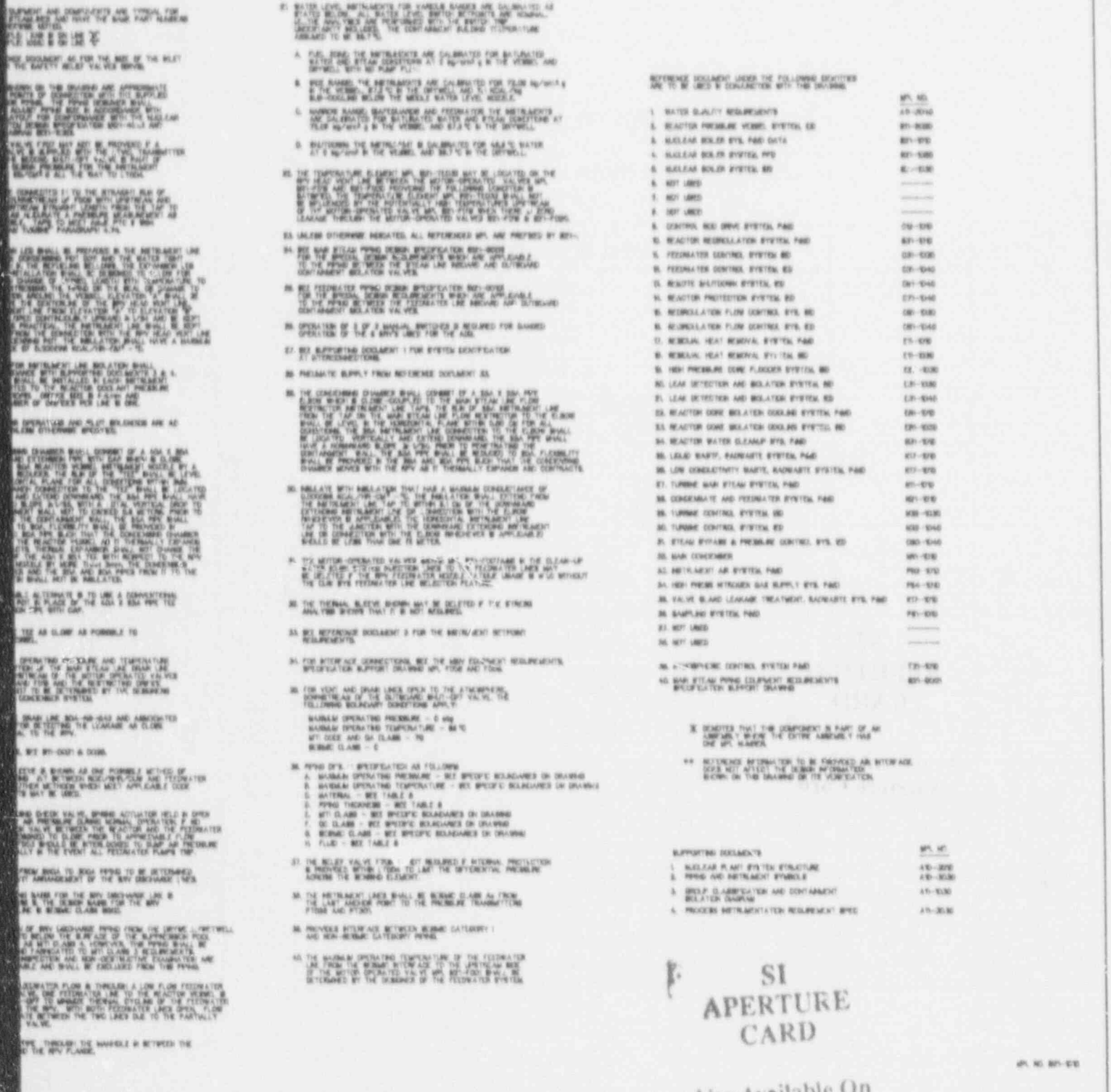

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Figure 5.1-3 NUCLEAR BOILER SYSTEM P&ID (Sheet 1 of 11)

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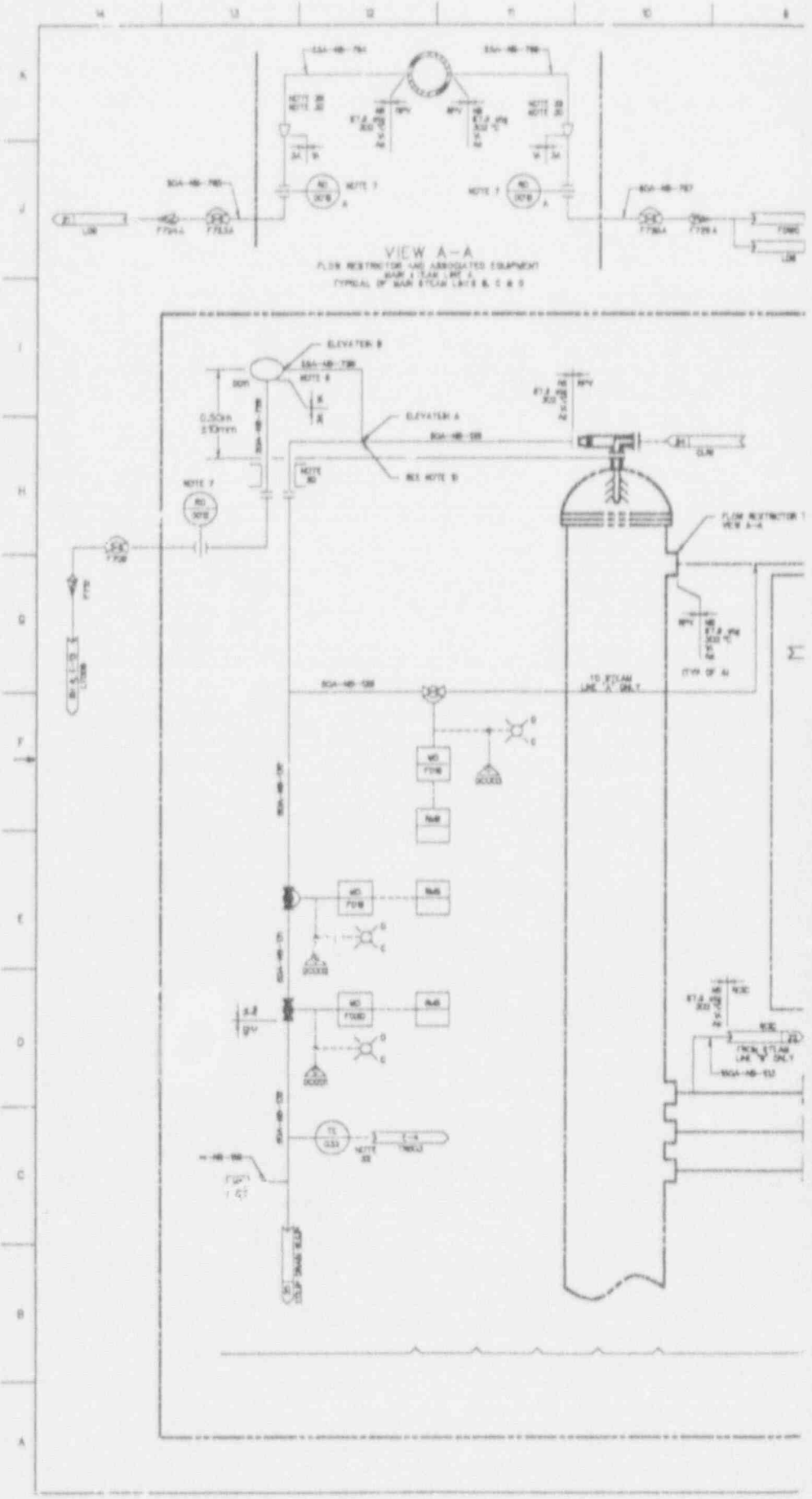

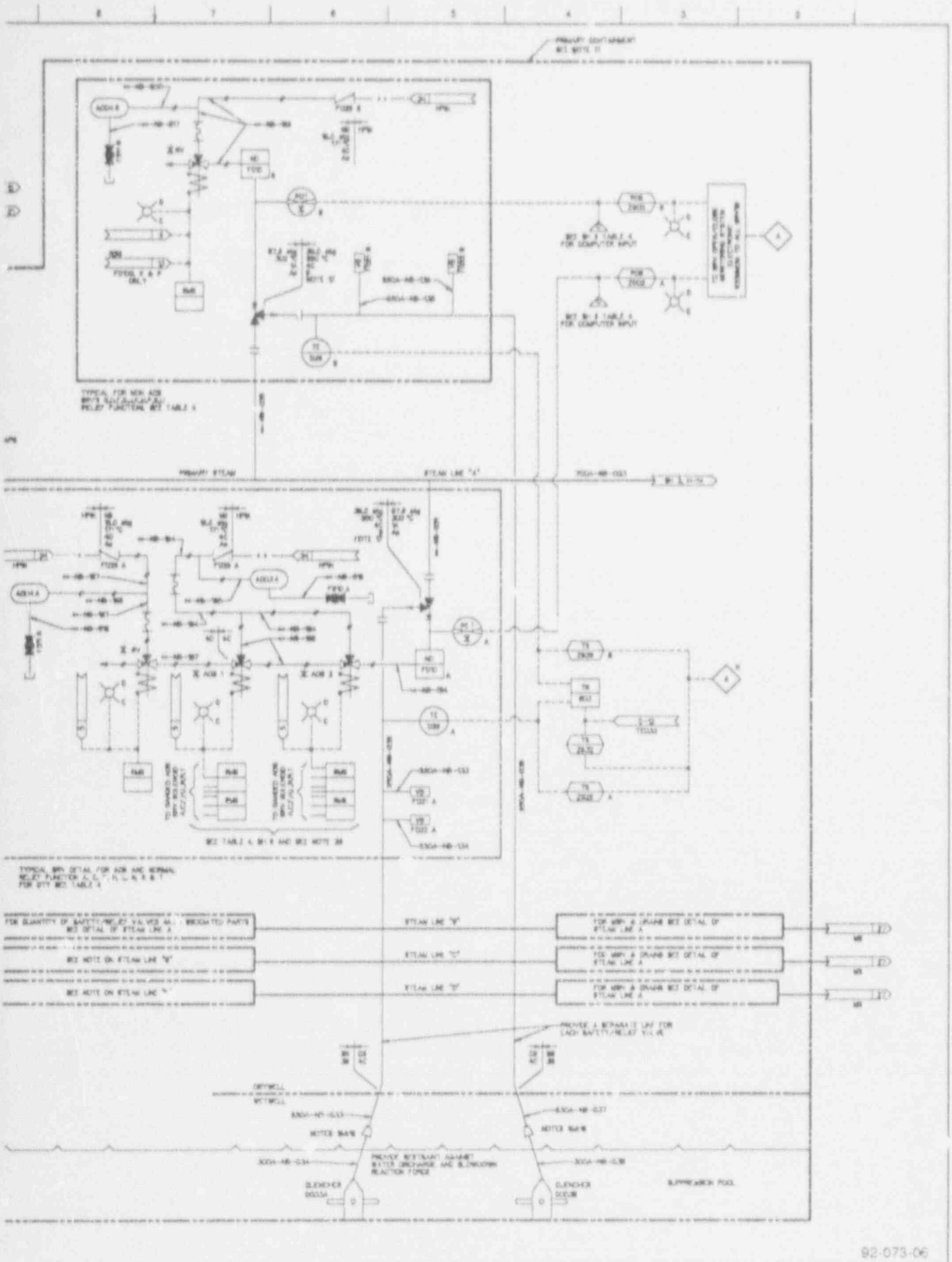

Figure 5.1-3 NUCLEAR BOILER SYSTEM P&ID (Sheet 2 of 11)

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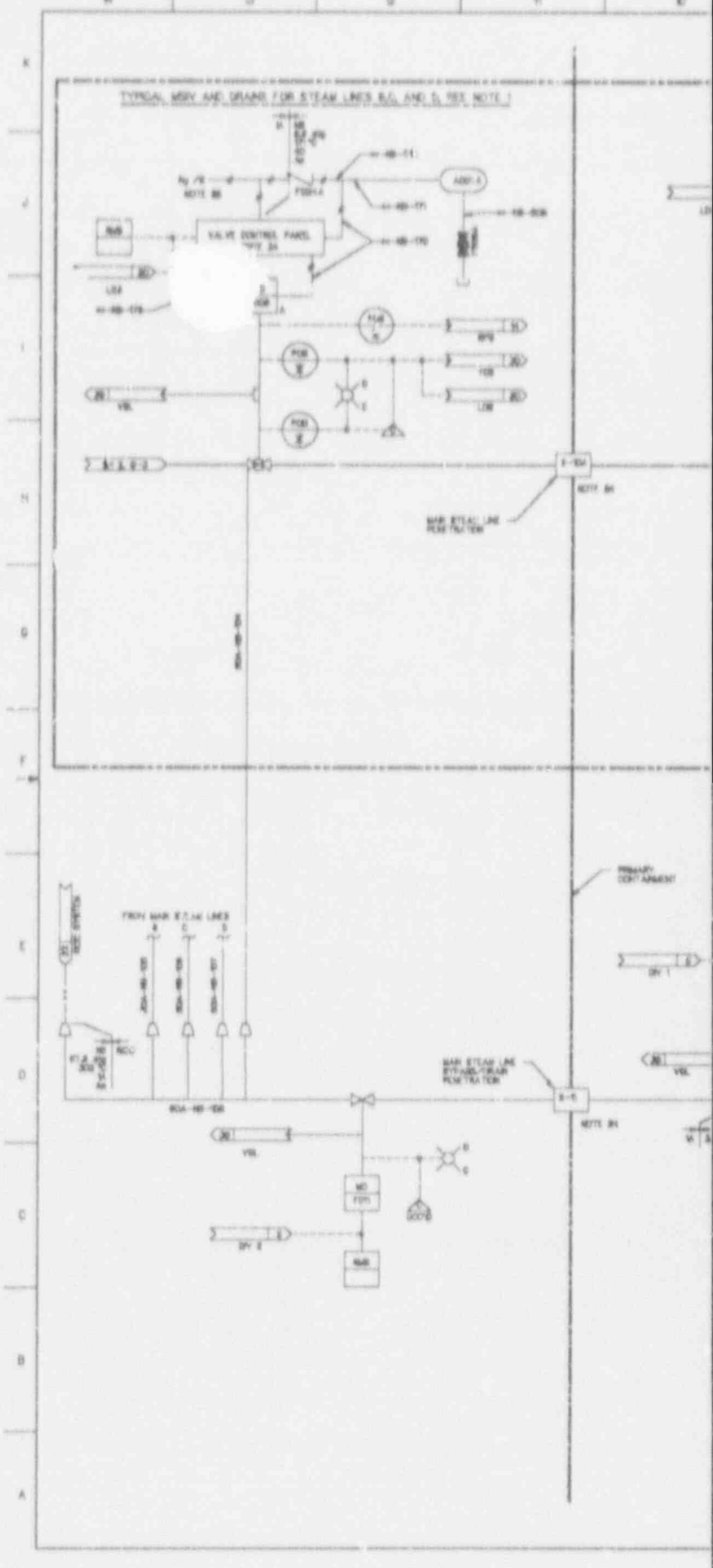
TYPICAL MSIV AND DRAINS FOR STEAM LINES B,C, AND D, TEST (NOTE)
VALVE CONTROL PANEL
MAIN STEAM LINE PENETRATION
PRIMARY CONTAINMENT
FROM MAIN STEAM LINES
VSL
DRY
NOTE 8A

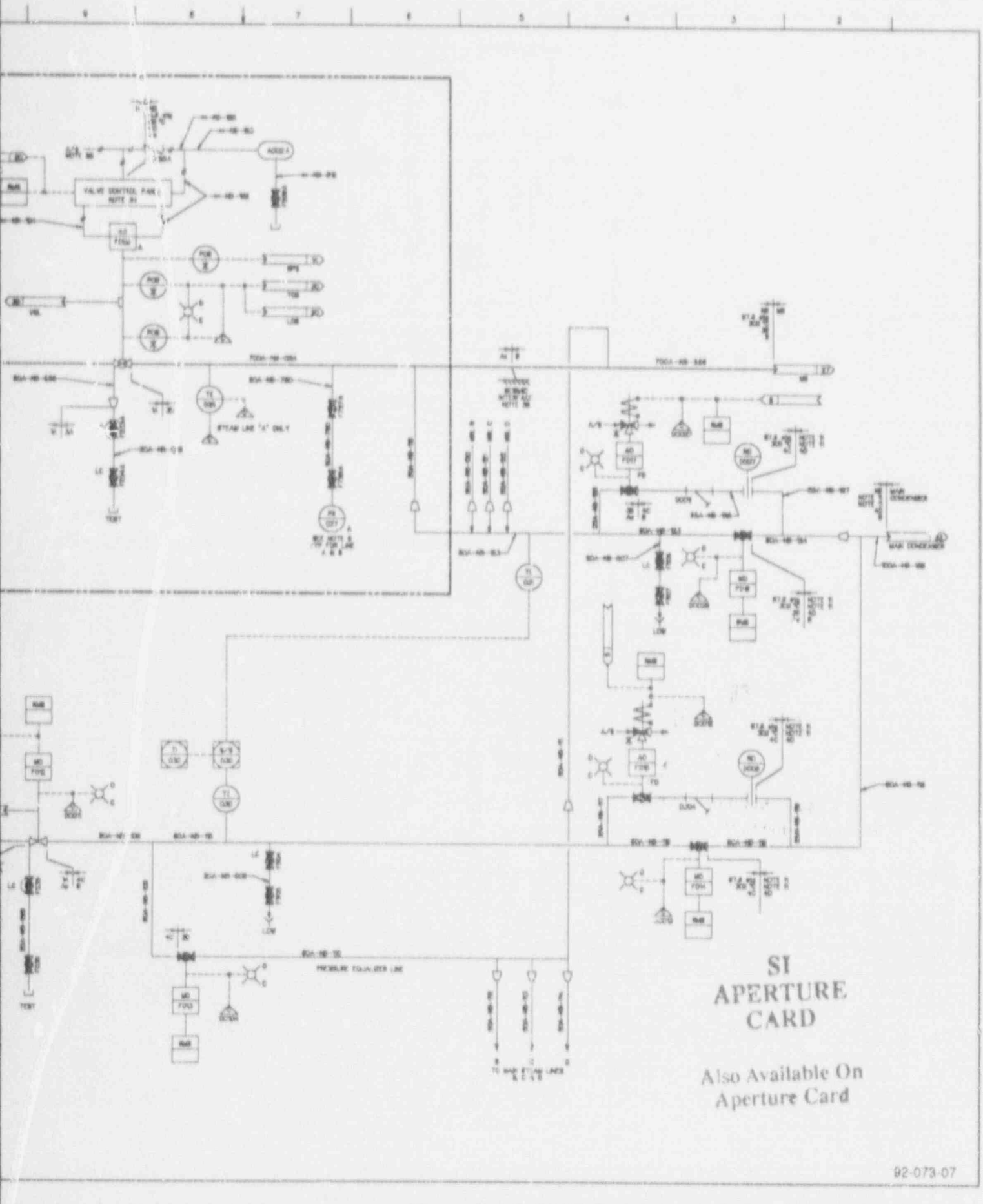

Figure 5.1–3 NUCLEAR BOILER SYSTEM P&ID (Sheet 3 of 11)

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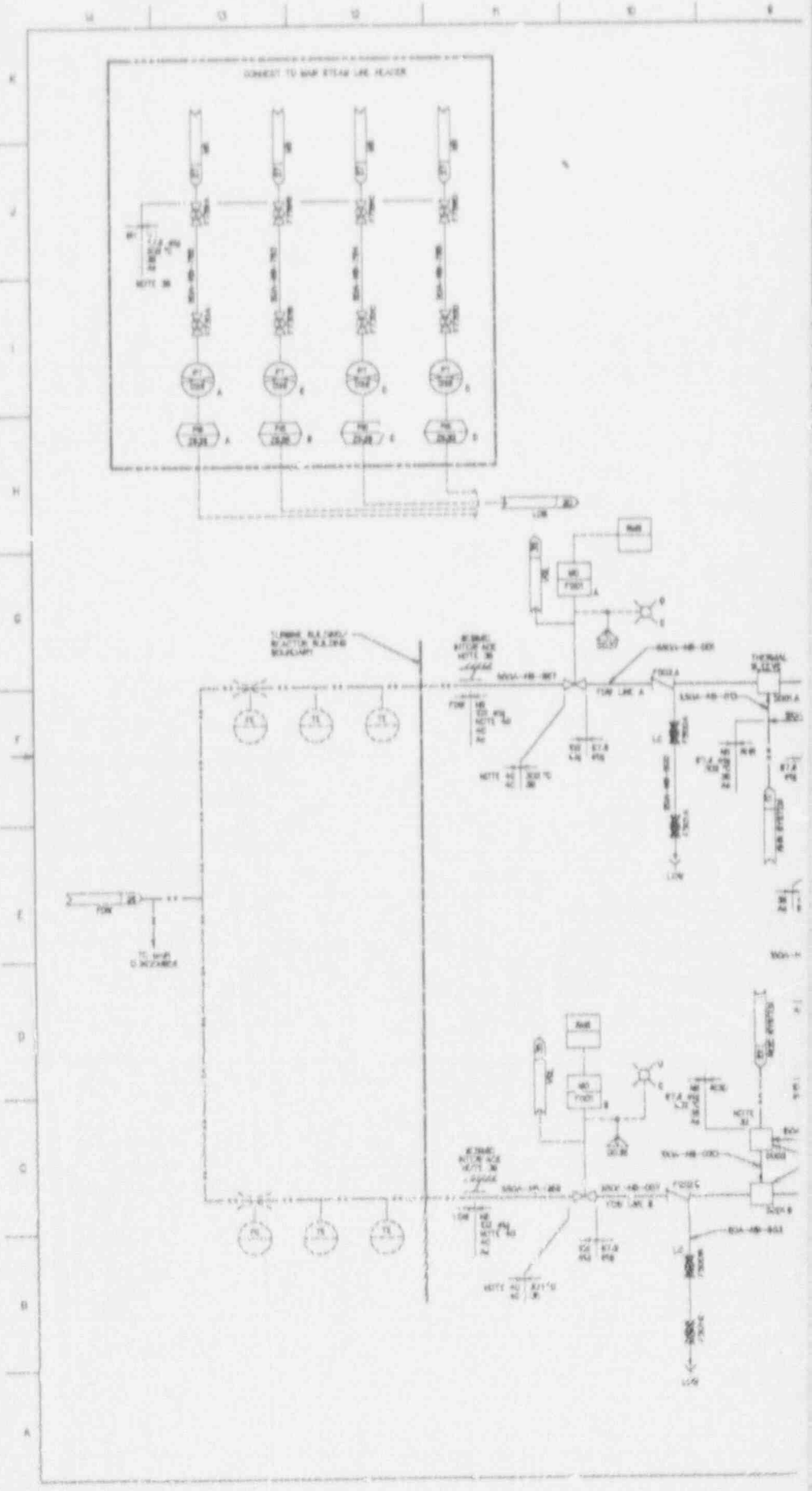
CONNECT TO MAIN STEAM LINE HEATER
NOTE 36
LOW
TO VENT
TO DRAIN
NOTE 36
NOTE 36

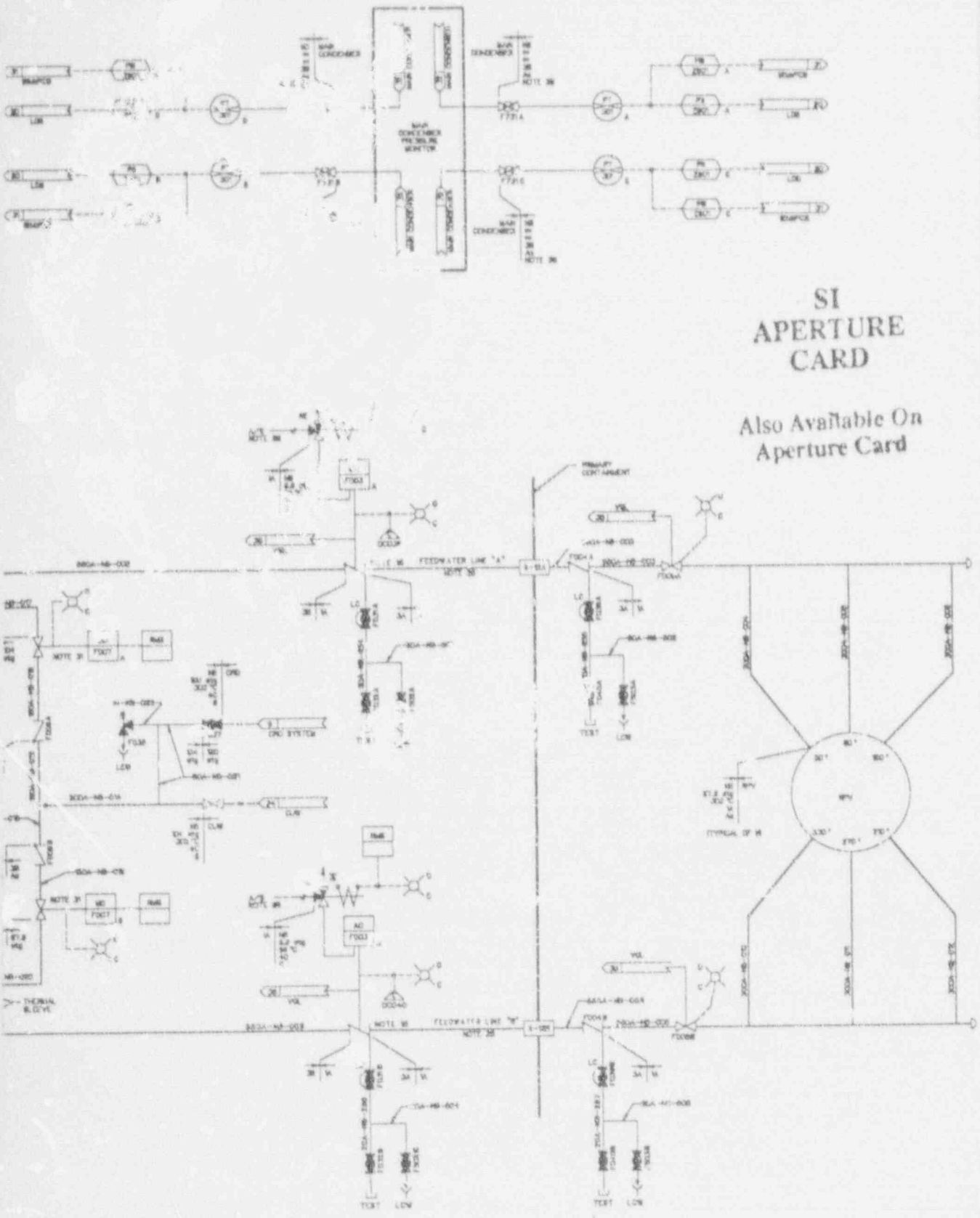

Figure 5.1–3 NUCLEAR BOILER SYSTEM P&ID (Sheet 4 of 11)

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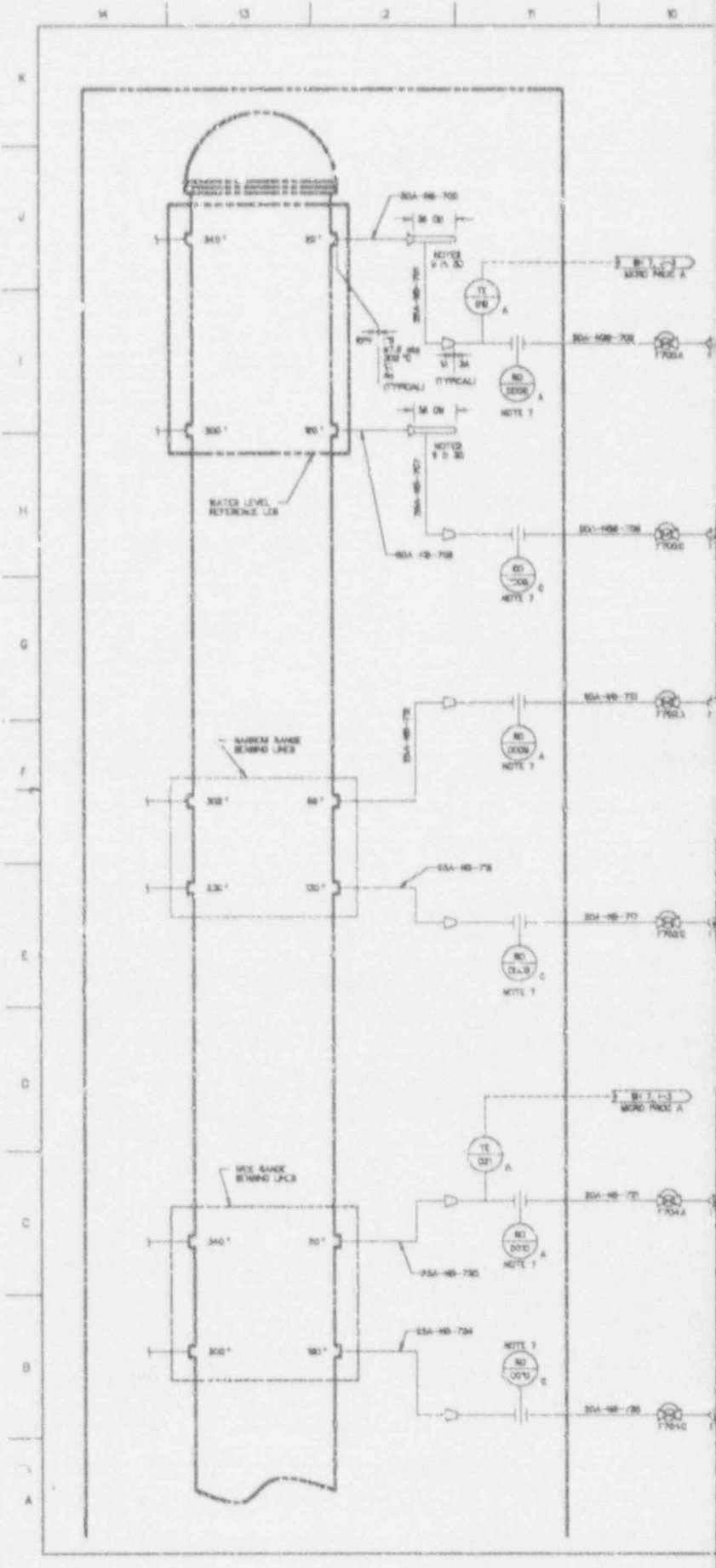

14
13
12
11
10
K
J
I
H
G
F
E
D
C
B
A
340°
85°
300°
180°
WATER LEVEL REFERENCE LOS
NARROW RANGE BEHIND LPCS
WIDE RANGE BEHIND LPCS
NOTE 7
NOTE 8
(TYPICAL)

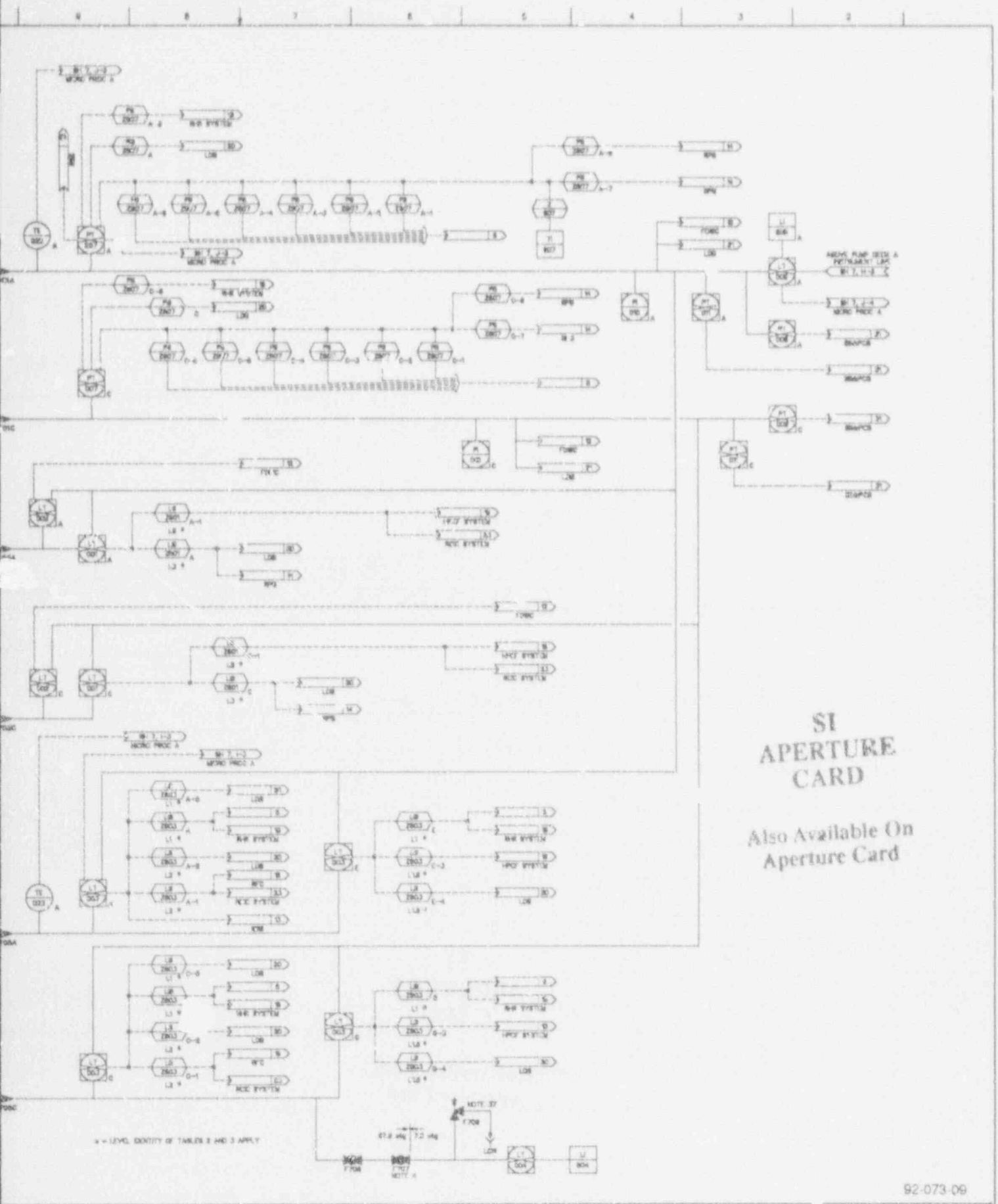
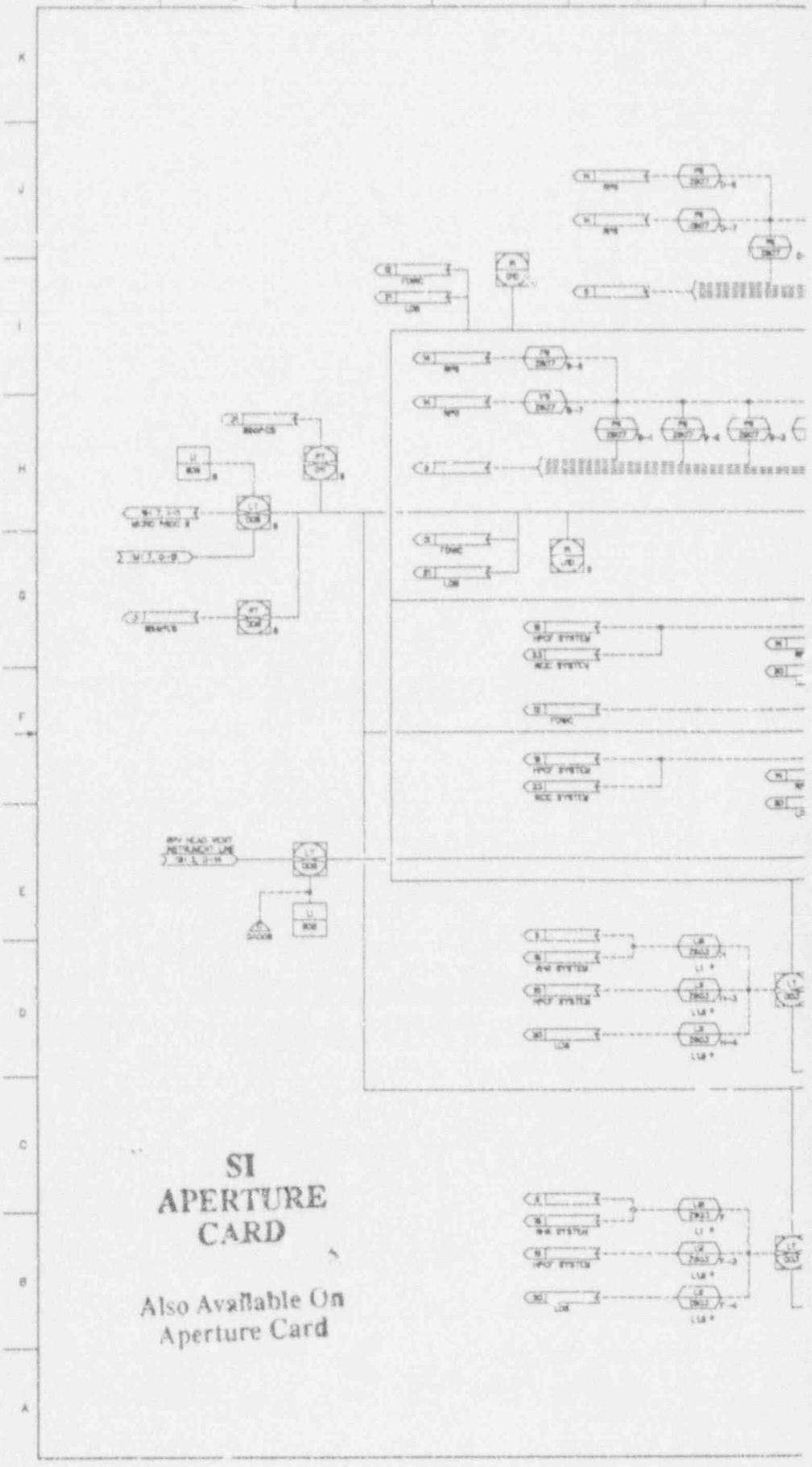


Figure 5.1-3 NUCLEAR BOILER SYSTEM P&ID (Sheet 5 of 11)

9204160195 -/9



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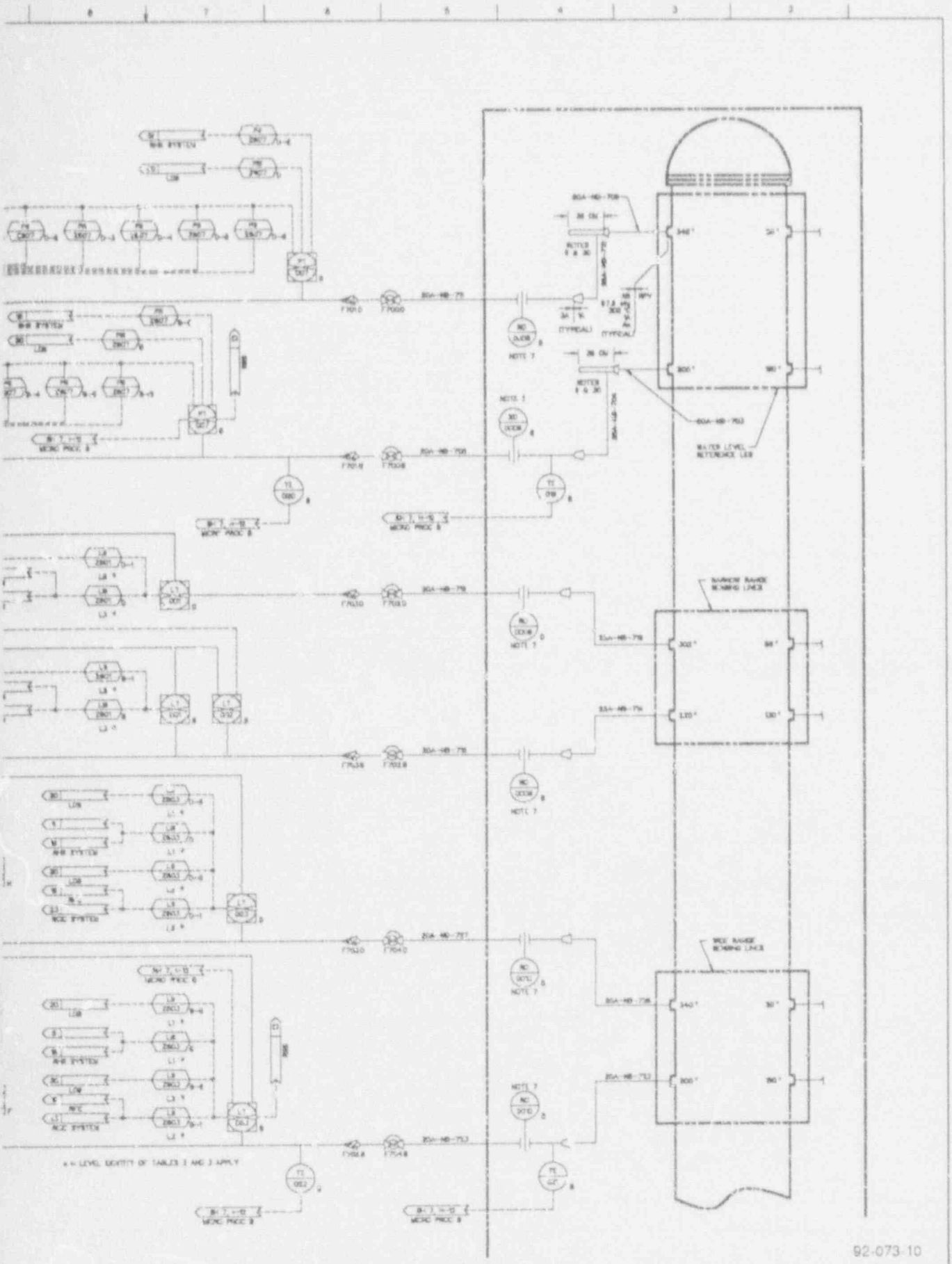

Figure 5.1-3 NUCLEAR BOILER SYSTEM P&ID (Sheet 6 of 11)

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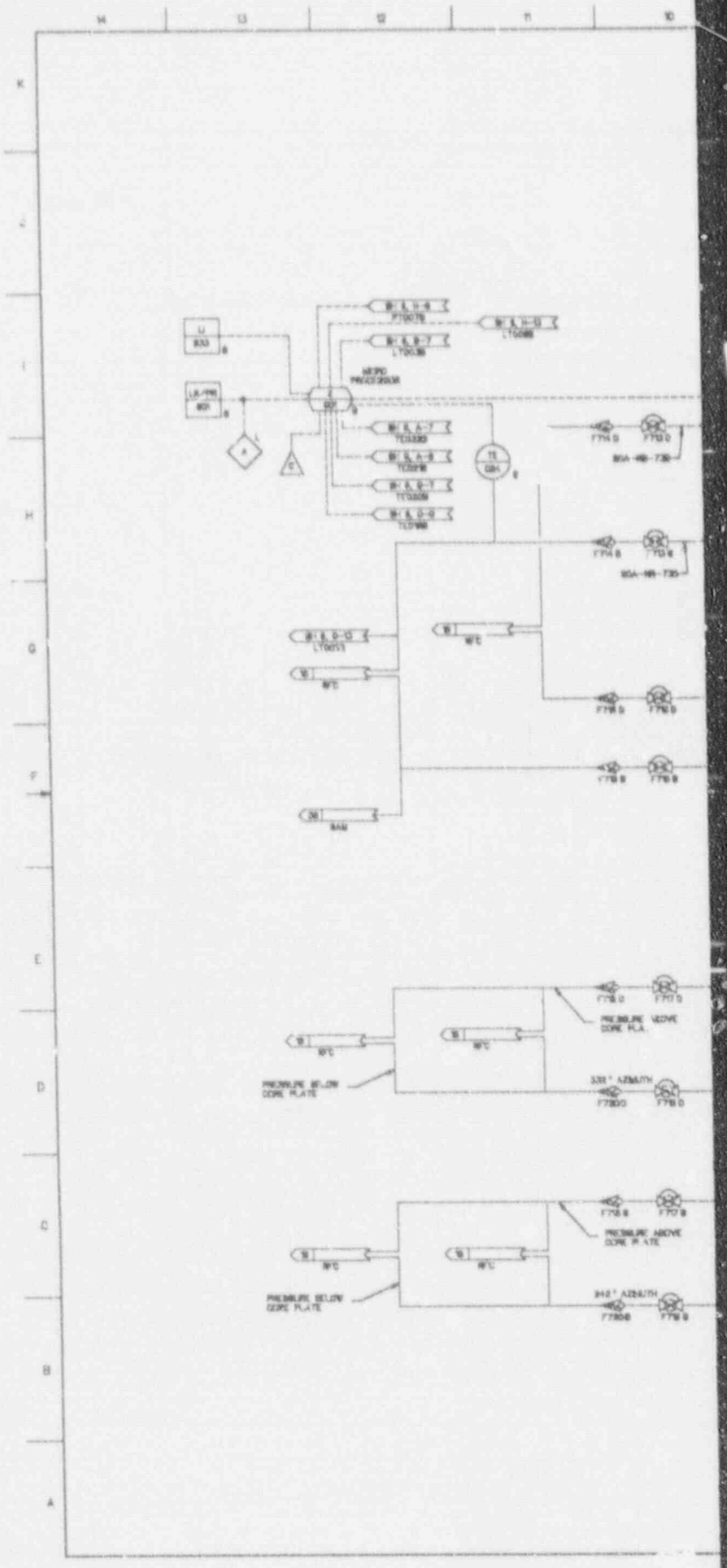
PRESSURE ABOVE CORE PLATE
PRESSURE BELOW CORE PLATE
330° AZIMUTH
PRESSURE ABOVE CORE PLATE
PRESSURE BELOW CORE PLATE
330° AZIMUTH

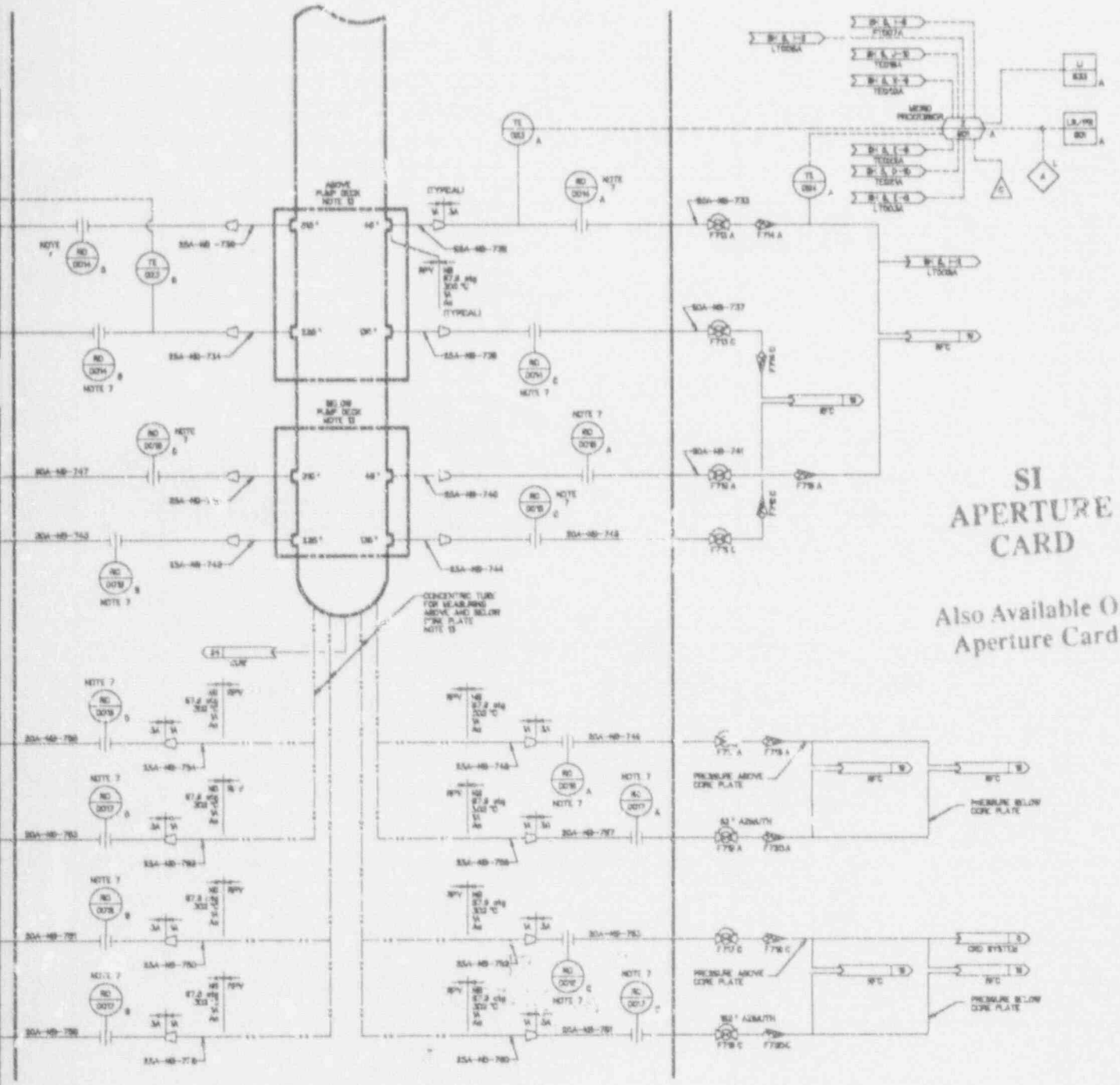

Figure 5.1–3 NUCLEAR BOILER SYSTEM P&ID (Sheet 7 of 11)

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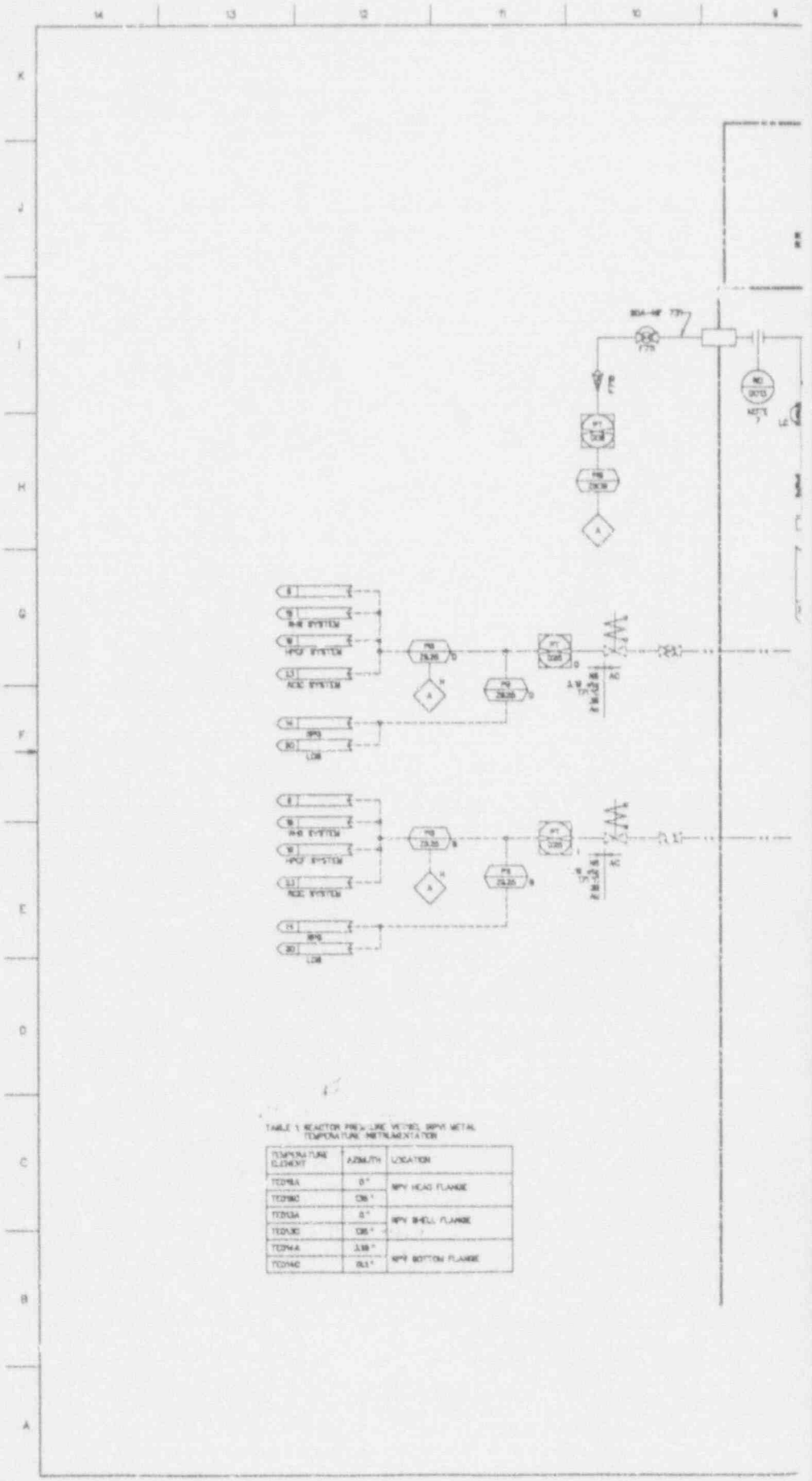

TABLE 1 REACTOR PRESSURE VESSEL (RPV) METAL TEMPERATURE INSTRUMENTATION

TEMPERATURE ELEMENT	AZIMUTH	LOCATION
TE2YRA	0°	RPV HEAD FLANGE
TE2YRC	136°	
TE2YJA	0°	RPV SHELL FLANGE
TE2YJC	136°	
TE2YKA	338°	RPV BOTTOM FLANGE
TE2YKC	180°	

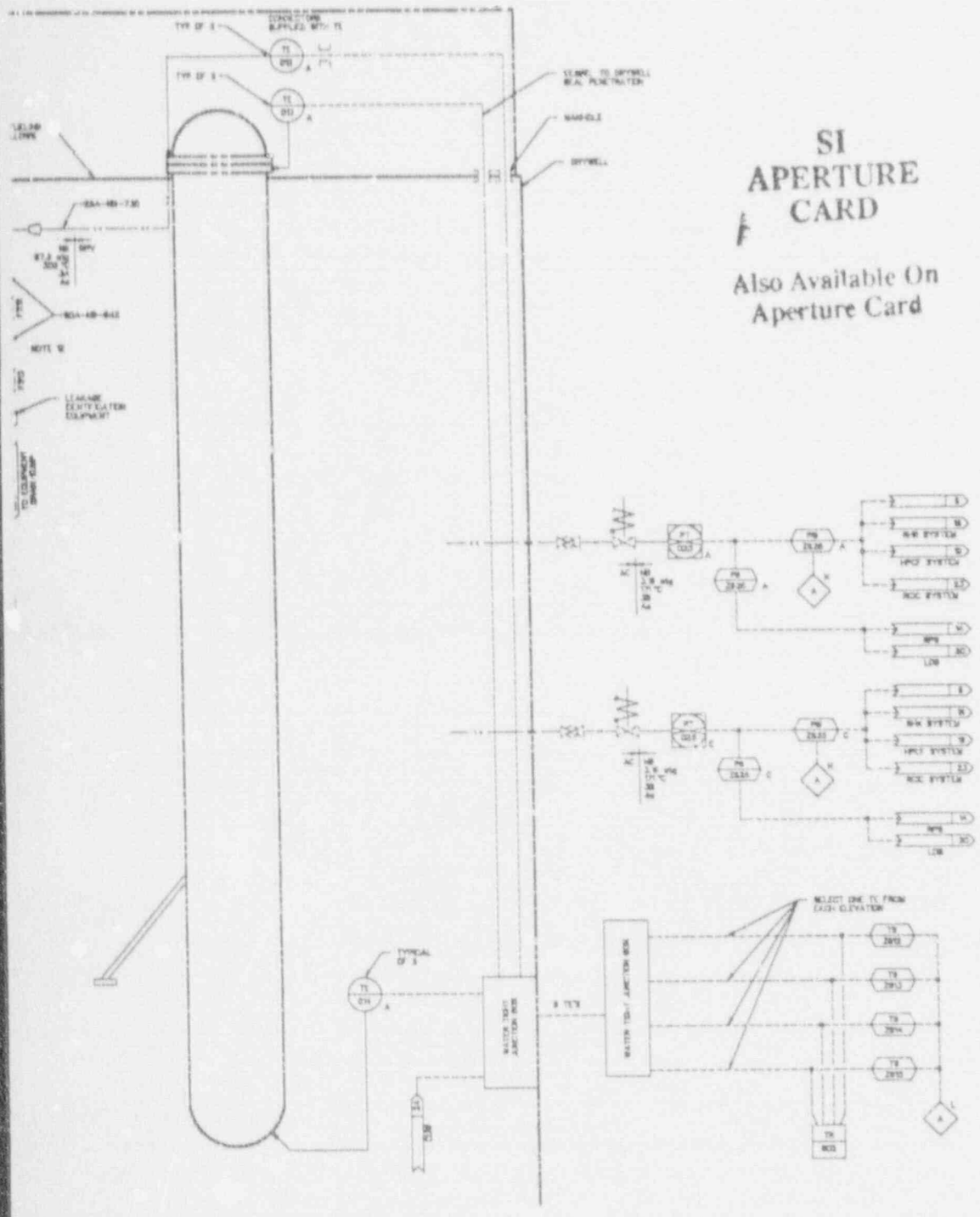

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Figure 5.1-3 NUCLEAR BOILER SYSTEM P&ID (Sheet 8 of 11)

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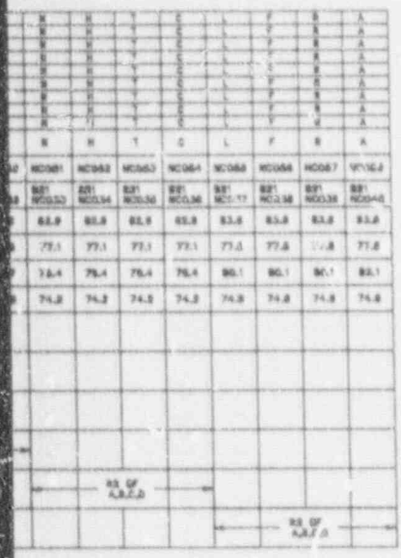
TABLE 4: BUFFER LETTER ASSIGNMENTS FOR SAFETY/RELIEF VALVES AND ASSOCIATED EQUIPMENT

SAFETY/RELIEF VALVE TYPE		P	J	N	Q	S	R	K	E	U	D
TEMPERATURE ELEMENT TE028		P	J	N	Q	S	R	K	E	U	D
BELLOWS VALVE	A268										
	A268 2										
	BPV	P	J	N	Q	S	R	K	E	U	D
ACCUMULATOR	A043										
	A004	P	J	N	Q	S	R	K	E	U	D
CHECK VALVE	TF68										
	TL29	P	J	N	Q	S	R	K	E	U	D
BPV OPER (LOOP MONITORING SYSTEM)		P	J	N	Q	S		K	E	U	D
	COMPUTER INPUT ⚠3	NC041	NC043	NC043	NC044	NC045	NC048	NC047	NC048	NC048	NC0
+ COMPUTER INPUT	⚠3	B21 NC013	B21 NC054	B21 NC068	B21 NC088	B21 NC087	B21 NC088	B21 P*128	B21 NC130	B21 NC031	B21 NC0
OPENING SET PRESSURE (kg/cm² g)		80.8	80.8	81.8	81.2	81.8	81.8	83.3	83.3	83.3	83
OPENING RESEAT PRESSURE (kg/cm² g)		78.2	78.2	79.8	79.8	79.8	79.8	79.8	79.8	79.8	79
RELIEF SET PRESSURE (kg/cm² g)		76.8	77.2	79.8	78.8	79.8	78.8	78.7	78.7	78.7	78
RELIEF RESEAT PRESSURE (kg/cm² g)		71.4	73.1	73.8	73.8	73.8	73.8	73.8	73.8	73.8	73
	FT007A THRU D/ PB-2807A-8 THRU D-8	RB OF A,B,C,D									
	FT007A THRU D/ PB-2807A-8 THRU D-8		RB OF A,B,C,D								
	FT007A THRU D/ PB-2807A-4 THRU D-4			RB OF A,B,C,D							
	FT007A THRU D/ PB-2807A-3 THRU D-3								RB "E" A,B,C,D		
	FT007A THRU D/ PB-2807A-2 THRU D-2										
	FT007A THRU D/ PB-2807A-1 THRU D-1										

+ COMPUTER INPUTS FOR BPV POSITION SEE PERFORMANCE MONITORING AND CONTROL SYSTEM 09-402B

TABLE 5 ELEVATION CORRELATION CHART

REFERENCE	DOS.S VESSEL INCHES ABOVE VESSEL ZERO	REFERENCE	REACTOR VESSEL WATER LEVEL IDENTITY (SEE TABLE 3)	CONTROL ROOM WATER LEVEL INDICATION (SEE NOTE 2)		
				POST ACCIDENT MONITOR	SAFEGUARDS	
				FUEL ZONE RANGE	WIDE RANGE	NARROW RANGE
				LI 9063 Rm.	LIR 2903A,B, C,D,E,F,J,K,M	LIR 2801A, B,D,E,F
INSTRUMENT LINE NOZZLE	2108.8 cm	TOP INSIDE OF HEAD				
	1833.8 cm				880.1 cm	
	1664.1 cm	MAIN STEAM LINE NOZZLES				608.0 cm
			9 1586.3 cm			484.4 cm
		HI-ALARM NORMAL WATER LEVEL LOW ALARM	7 1383.5 cm			
	1341.1 cm		6 1330.8 cm			
			5 1198.7 cm			380.8 cm
	1287.3 cm	RECIRCULATION INLET N				300.8 cm
	1224.8 cm	BOTTOM OF DRYER SKIRT				
INSTRUMENT LINE NOZZLE (NARROW RANGE)	1213.0 cm		2 1166.1 cm		397.3 cm	
				127.0 cm		
			LO 1013.5 cm		78.1 cm	
			1 936.8 cm		34.7 cm	
	904.80 cm	TOP OF ACTIVE FUEL (TAF)		0 cm	0 cm	0 cm
INSTRUMENT LINE NOZZLE (WIDE RANGE)	897.0 cm					
				-381.0 cm		
	160.8 cm	UPPER				
UPPER PUMP DECK	154.3 cm 170.3 cm	INSTRUMENT LINE NOZZLES				
LOWER PUMP DECK	175.0 cm	LOWER				
	0 cm	BOTTOM HEAD				



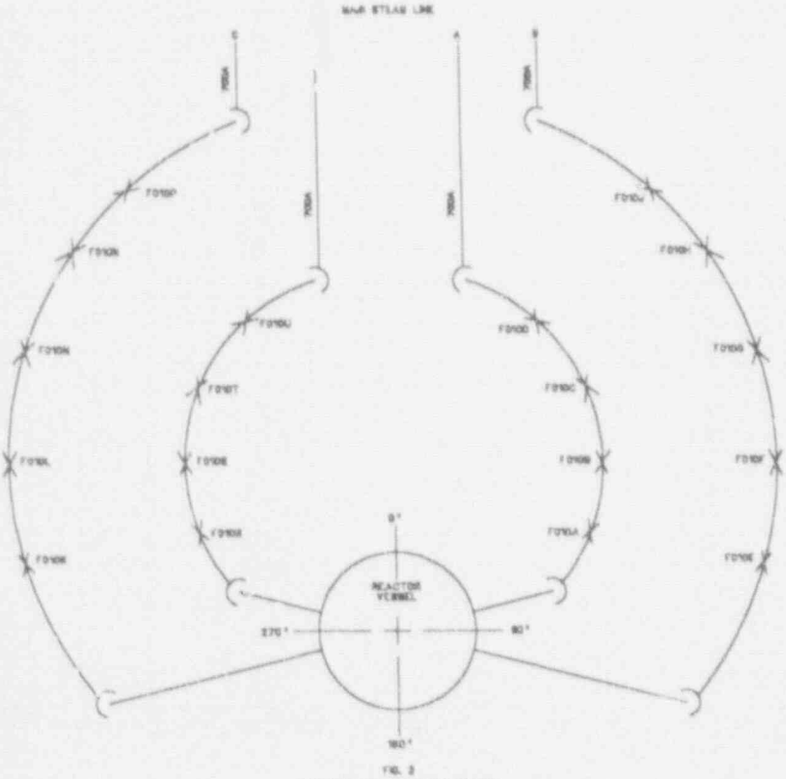


FIG. 3
SAFETY/RELIEF VALVE ORIENTATION AND STEAM PIPING LINE SIZES

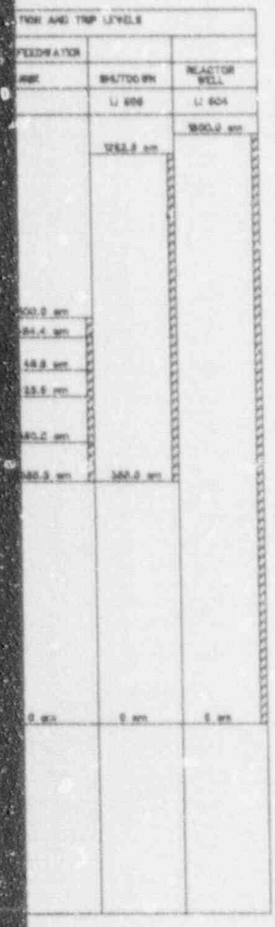


TABLE 3 WATER LEVEL TRIP FUNCTION

REACTOR VESSEL WATER LEVEL	DESCRIPTION OF TRIPS	INSTRUMENT PROVIDING TRIP SIGNAL	NOTES
8	TRIPS RCIC TURBINE	LS-263A-1 THRU D-1	NARROW RANGE
	TRIP HPCF INJECTOR VALVES	LS-263A-1 THRU D-1	NARROW RANGE
	CLOSE MAIN TURBINE STOP VALVES TRIPS FEEDWATER PUMPS	SEE REFERENCE DOCUMENT 18	NARROW RANGE
7	HIGH LEVEL ALARM	SEE REFERENCE DOCUMENT 18	NARROW RANGE
4	LOW LEVEL ALARM RWM FLOW [illegible] TRIP OF FEED PUMPS		NARROW RANGE
3	[illegible] TRIP	LB-260A THRU D	NARROW RANGE
	CLOSE RHR SHUTDOWN COOLING ISOLATION VALVES	LB-260A THRU D	NARROW RANGE
	CLOSE CONTAINMENT MCIL VALVES LUB EXCEPT DW COOLING AND CUW MCIL VALVES AND MSIV'S	LB-260A THRU D	NARROW RANGE
	TRIP 4 OF RRC PUMPS	SEE REFERENCE DOCUMENT 18	NARROW RANGE
2	INITIATE RCIC	LB-260-3A-1 THRU D-1	WIDE RANGE
	TRIP REMAINING 3 RRC PUMPS	LB-260-3A-1 THRU D-1	WIDE RANGE
	CLOSE CUW MCIL VALVES	LB-260-3A-4 THRU D-4	WIDE RANGE
1.5	INITIATE HPCF B & C	LB-260-3C-3 THRU H-3	WIDE RANGE
	CLOSE MSIV'S & DW COOLING SYSTEM MCIL VALVES	LB-260-3C-4 THRU H-4	WIDE RANGE
1	INITIATE ADS (WITH CONCURRENT HIGH DRYWELL PRESSURE)	LB-260-3A THRU H	WIDE RANGE
	INITIATE RHR/LPFL MODE	LB-260-3A THRU H	WIDE RANGE

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Figure 5.1–3 NUCLEAR BOILER SYSTEM P&ID (Sheet 9 of 11)

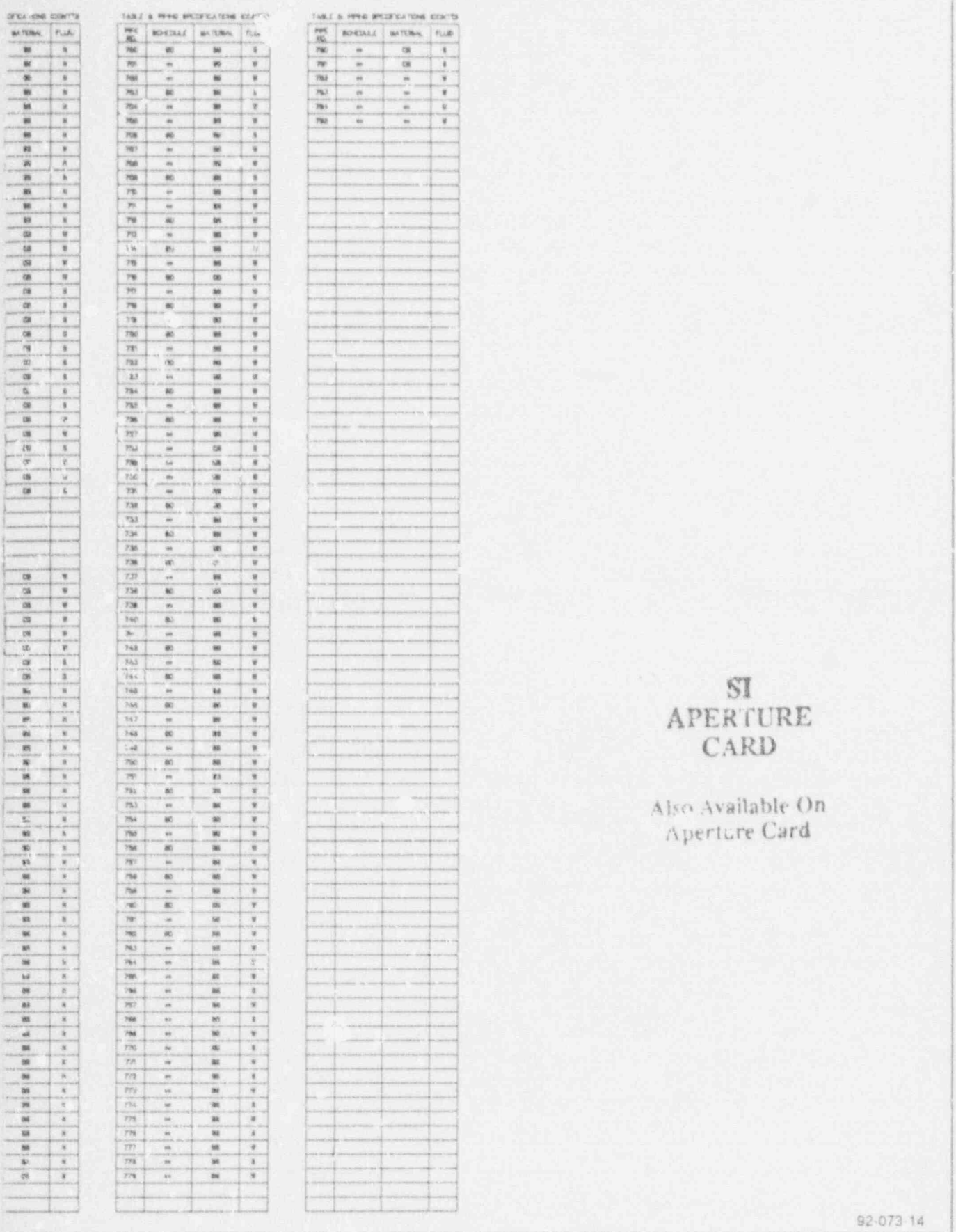

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Figure 5.1–3 NUCLEAR BOILER SYSTEM P&ID (Sheet 10 of 11)

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TABLE 6 : PIPE NUMBERS FOR THE MAIN STEAM LINES

MAIN STEAM LINE	MRV TO THE OUTBOARD MSIV	OUTBOARD MSIV TO MSIVRE INTERFACE	MSIVRE INTERFACE TO MAIN STEAM SYSTEM	OUTBOARD MSIV TEST LINE	
				OUTBOARD MSIV TO REDUCER	DOWNSTREAM REDUCER
A	700A-MB-083	700A-MB-084	700A-MB-085	80A-MB-836	80A-MB-837
B	700A-MB-085	700A-MB-086	700A-MB-870	80A-MB-870	80A-MB-871
C	700A-MB-087	700A-MB-088	700A-MB-871	80A-MB-880	80A-MB-881
D	700A-MB-088	700A-MB-030	700A-MB-872	80A-MB-834	80A-MB-835

TABLE 7 : PIPE NUMBERS FOR THE SAFETY/RELIEF VALVE MRVI DISCHARGE LINES

MRV	MRVI DISCHARGE LINE				VACUUM RELIEF	
	MRL TO MRV NOTE 2	MRV TO SHIELDING FLOOR	SHIELDING FLOOR TO REDUCER	REDUCER TO SILENCER	UPSTREAM	DOWNSTREAM
F700A	350A-MB-032	350A-MB-033	350A-MB-033	300A-MB-034	100A-MB-133	100A-MB-134
F700B	350A-MB-036	350A-MB-036	350A-MB-037	300A-MB-038	100A-MB-135	100A-MB-136
F700C	350A-MB-039	350A-MB-040	350A-MB-041	300A-MB-042	100A-MB-137	100A-MB-138
F700D	350A-MB-043	350A-MB-044	350A-MB-045	300A-MB-046	100A-MB-139	100A-MB-140
F700E	350A-MB-047	350A-MB-048	350A-MB-049	300A-MB-050	100A-MB-141	100A-MB-142
F700F	350A-MB-051	350A-MB-052	350A-MB-053	300A-MB-054	100A-MB-143	100A-MB-144
F700G	350A-MB-055	350A-MB-056	350A-MB-057	300A-MB-058	100A-MB-145	100A-MB-146
F700H	350A-MB-059	350A-MB-060	350A-MB-061	300A-MB-062	100A-MB-147	100A-MB-148
F700J	350A-MB-063	350A-MB-064	350A-MB-065	300A-MB-066	100A-MB-149	100A-MB-150
F700K	350A-MB-067	350A-MB-068	350A-MB-069	300A-MB-070	100A-MB-151	100A-MB-152
F700L	350A-MB-071	350A-MB-072	350A-MB-073	300A-MB-074	100A-MB-153	100A-MB-154
F700M	350A-MB-075	350A-MB-076	350A-MB-077	300A-MB-078	100A-MB-155	100A-MB-156
F700N	350A-MB-079	350A-MB-080	350A-MB-081	300A-MB-082	100A-MB-157	100A-MB-158
F700P	350A-MB-083	350A-MB-084	350A-MB-085	300A-MB-086	100A-MB-159	100A-MB-160
F700R	350A-MB-087	350A-MB-088	350A-MB-089	300A-MB-090	100A-MB-161	100A-MB-162
F700S	350A-MB-091	350A-MB-092	350A-MB-093	300A-MB-094	100A-MB-163	100A-MB-164
F700T	350A-MB-095	350A-MB-096	350A-MB-097	300A-MB-098	100A-MB-165	100A-MB-166
F700U	350A-MB-099	350A-MB-100	350A-MB-101	300A-MB-102	100A-MB-167	100A-MB-168

TABLE 8 : PIPE NUMBERS FOR THE MAIN STEAM ISOLATION VALVE MRVI PNEUMATIC LINES

MRV	OPENING CHECK VALVE TO MRV	OPENING FROM ACCUMULATOR	CLOSING VALVE CONTROL PANEL TO MRV	VENT LINE
F0086A	80-MB-170	80-MB-171	80-MB-172	80-MB-608
F0086B	80-MB-172	80-MB-174	80-MB-175	80-MB-609
F0086C	80-MB-176	80-MB-177	80-MB-178	80-MB-610
F0086D	80-MB-179	80-MB-180	80-MB-181	80-MB-611
F0086A	80-MB-182	80-MB-183	80-MB-184	80-MB-612
F0086B	80-MB-185	80-MB-186	80-MB-187	80-MB-613
F0086C	80-MB-188	80-MB-189	80-MB-190	80-MB-614
F0086D	80-MB-191	80-MB-192	80-MB-193	80-MB-615

TABLE 5 : PIPE NUMBERS FOR THE MAIN STEAM LINE (MSL) INSTRUMENT LINES

MAIN STEAM LINE	MSL FLOW RESTRICTOR INSTRUMENT LINES				MSL PENETRATION TEST PCV.
	INSTRUMENT LINE TO LOB		INSTRUMENT LINE TO LOB & FDWC		
	MSL TO PCV/LOCA	RESTRICTOR TO CHECK TYPE CHECK VALVE	MSL TO RESTRICTOR	RESTRICTOR TO CHECK/FDWC FLOW CHECK VALVE	
A	B3A-MB-764	[illegible]-MB-768	B3A-MB-758	B3A-MB-767	B3A-MB-780
B	B3A-MB-769	B3A-MB-769	B3A-MB-770	B3A-MB-777	B3A-MB-781
C	B3A-MB-775	B3A-MB-773	B3A-MB-774	B3A-MB-775	-
D	B3A-MB-776	B3A-MB-777	B3A-MB-779	B3A-MB-778	-

TABLE 6 : PIPE NUMBERS FOR THE SAFETY/RELIEF VALVE (SRV) PNEUMATIC LINES

SRV	ADS PNEUMATIC LINES				PNEUMATIC LINES FOR POWER-ACTUATED RELIEF		
	CHECK VALVE TO SOV "ADS B" TO SRV	BRANCH LINE FROM ACCUMULATOR	BRANCH LINE THRU SOV "ADS A" TO SOV "ADS B"	ACCUMULATOR VENT LINE	CHECK VALVE TO SOV "ADS A" OR SRV (NON-ADS SRV)	BRANCH LINE FROM ACCUMULATOR	ACCUMULATOR VENT LINE
F010A	[illegible]-MB-184	[illegible]-MB-185	[illegible]-MB-126	[illegible]-MB-171	[illegible]-MB-180	[illegible]-MB-186	[illegible]-MB-917
F010B					[illegible]-MB-188	[illegible]-MB-205	[illegible]-MB-918
F010C	[illegible]-MB-201	[illegible]-MB-202	[illegible]-MB-203	[illegible]-MB-172	[illegible]-MB-204	[illegible]-MB-206	[illegible]-MB-920
F010D					[illegible]-MB-926	[illegible]-MB-927	[illegible]-MB-921
F010E					[illegible]-MB-236	[illegible]-MB-930	[illegible]-MB-922
F010F	[illegible]-MB-210	[illegible]-MB-211	[illegible]-MB-212	[illegible]-MB-923	[illegible]-MB-213	[illegible]-MB-214	[illegible]-MB-924
F010G					[illegible]-MB-215	[illegible]-MB-216	[illegible]-MB-930
F010H	[illegible]-MB-217	[illegible]-MB-218	[illegible]-MB-219	[illegible]-MB-931	[illegible]-MB-220	[illegible]-MB-[illegible]	[illegible]-MB-927
F010J					[illegible]-MB-232	[illegible]-MB-233	[illegible]-MB-928
F010K					[illegible]-MB-224	[illegible]-MB-226	[illegible]-MB-929
F010L	[illegible]-MB-228	[illegible]-MB-227	[illegible]-MB-229	[illegible]-MB-932	[illegible]-MB-230	[illegible]-MB-[illegible]	[illegible]-MB-933
F010M					[illegible]-MB-Cpl	[illegible]-MB-[illegible]	[illegible]-MB-935
F010N	[illegible]-MB-233	[illegible]-MB-234	[illegible]-MB-235	[illegible]-MB-934	[illegible]-MB-[illegible]	[illegible]-MB-[illegible]	[illegible]-MB-936
F010P					[illegible]-MB-[illegible]	[illegible]-MB-[illegible]	[illegible]-MB-[illegible]
F010R	[illegible]-MB-240	[illegible]-MB-241	[illegible]-MB-242	[illegible]-MB-937	[illegible]-MB-243	[illegible]-MB-244	[illegible]-MB-938
F010S					[illegible]-MB-245	[illegible]-MB-246	[illegible]-MB-[illegible]
F010T	[illegible]-MB-247	[illegible]-MB-248	[illegible]-MB-249	[illegible]-MB-939	[illegible]-MB-[illegible]	[illegible]-MB-[illegible]	[illegible]-MB-940
F010U					[illegible]-MB-[illegible]	[illegible]-MB-[illegible]	[illegible]-MB-941

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Figure 5.1–3 NUCLEAR BOILER SYSTEM P&ID (Sheet 11 of 11)

NOTES:

1. ALL ANNUALS ARE TRANSMITTED AS DIGITAL DATA TO EACH TLU OR BLU THROUGH EACH DIGITAL OUTPUT.

2. FOUR TEMPERATURE ELEMENTS SHALL BE LOCATED AT APPROXIMATELY EQUAL INTERVALS IN THE VERTICAL DIRECTION SO AS TO MONITOR AMBIENT TEMPERATURES OVER THE FULL HEIGHT OF THE DRYWELL.

3. TEMPERATURE DETECTORS SHALL BE LOCATED OR SHIELDED SO THAT THE DETECTOR IS SENSITIVE TO THE AIR TEMPERATURE AND NOT THE RADIATED HEAT FROM HOT EQUIPMENT.

4. ALL INSTRUMENT LINES THAT CONNECT TO THE REACTOR COOLANT PRESSURE BOUNDARY AND PENETRATE THE CONTAINMENT WALL SHALL HAVE SLOW MOV RESTRICTING ORIFICES INSIDE THE CONTAINMENT. SEE SUPPORTING DOCUMENTS [illegible] FOR ADDITIONAL REQUIREMENTS.

5. EACH INSTRUMENT LINE THROUGH THE CONTAINMENT WALL SHALL HAVE TWO ISOLATION VALVES OUTSIDE THE CONTAINMENT LOCATED AS CLOSE TO THE CONTAINMENT AS PRACTICAL.

6. SOLENOID OPERATED CLOSE VALVES MAY BE ADOPTED FOR THE AOV OPERATED VALVES.

7. THIS DIAGRAM PROVIDES A FUNCTIONAL DEFINITION OF THE REQUIRED SYSTEM LEVEL PROCESS MONITORING AND CONTROL INSTRUMENTATION. IT DOES NOT ADDRESS DETAILS OF THE METHODS BY WHICH SIGNALS FROM THESE DEVICES WILL BE PROCESSED. THIS PROCESSING MAY INVOLVE THE PLANT MULTIPLEXING SYSTEM (MDS) OR MAY UTILIZE HARDWIRED SPECIFIC ELECTRICAL ISOLATION REQUIREMENTS SHOWN ON THIS DRAWING MAY BE UNNECESSARY IF MULTIPLEXED SIGNAL TRANSMISSION PROVIDES INHERENT ISOLATION.

8. ALL ALARMS SHALL BE LOCATED IN THE MAIN CONTROL ROOM.

9. ALL INPUTS TO DRF/FMCR SHALL BE CONTINUOUSLY RECORDED.

10. THE LOG SHALL BE DESIGNED IN ACCORDANCE WITH THE SYSTEM DESIGN SPECIFICATION (E31-4010). OTHER PRIMARY CONTAINMENT ISOLATION VALVES, WHICH ARE PART OF OTHER SYSTEMS, ARE NOT SHOWN ON THIS [illegible]. THOSE VALVES ARE SHOWN ON THE LOG/DSE - INTERLOCK BLOCK DIAGRAM (E31-1030).

11. FOR REACTOR WATER LEVELS MONITORING, SEE B21-1010.

12. FOR DRYWELL PRESSURE MONITORING, SEE B22-1010.

13. FOR DETECTION OF RADIATION LEAKAGE [illegible] COOLING WATER SUPPLYING RECIRC PUMP, RHR, AND CUW HEAT EXCHANGERS, SEE P11-1040.

14. LETTER DESIGNATIONS FOR FOUR DIVISIONS ARE AS FOLLOWS:

    A, E, J, R - DIVISION 1
    B, F, K, P - DIVISION 2
    C, G, L, S - DIVISION 3
    D, H, M, T - DIVISION 4

15. IF HEAT TRACING OF SAMPLE LINE IS NECESSARY TO PREVENT CONDENSATION, THE MAXIMUM ALLOWABLE SAMPLE TEMPERATURE IS LIMITED BY THE PHOTOMULTIPLIER TUBES IN THE MONITORING CHASSIS (L6).

16. BALL VALVE MAY BE ADOPTED FOR THIS GATE VALVE.

17. DTMs, TLU, BLU, OLU ARE PART OF SAFETY SYSTEM LOGIC AND CONTROL, SEE REFERENCE DOCUMENT 16L.

    A. DTMs SHOWN ON SHEETS 3 & 4 PROCESS SENSOR INPUTS FOR MSIV ISOLATION TRIP LOGIC.

    B. DTMs SHOWN ON SHEETS 5 & 6 PROCESS SENSOR INPUTS FOR LOCA ISOLATION TRIP LOGIC.

    C. DTMs SHOWN ON SHEETS 7 & 10 PROCESS SENSOR INPUTS FOR AUXILIARY DSF ISOLATION TRIP LOGIC.

    D. TLUs AND OLUs SHOWN ON SHEET 3 AND SHEET 4 PROCESS 2-OUT-OF-4 COINCIDENCE LOGIC FOR MSIV CLOSURE TRIP.

    E. BLUs SHOWN ON SHEETS 5 & 6 PROCESS 2-OUT-OF-4 COINCIDENCE LOGIC FOR LOCA ISOLATION.

    F. BLUs SHOWN ON SHEETS 7 & 10 PROCESS 2-OUT-OF-4 COINCIDENCE LOGIC FOR AUXILIARY DSF ISOLATION.

18. DMUs, MUX, DMS AND MDMS ARE PART OF THE MULTIPLEXING SYSTEM (MDS).

19. ALL INSTRUMENT LINES ARE 304-HB SEAMLESS STEEL SCHEDULE 40, SAMPLING LINES ARE 316-HB SCHEDULE 10.

REFERENCES

	MFL NO.
1. REACTOR CORE ISOLATION COOLING SYSTEM P&ID	E51-1010
2. NUCLEAR BOILER SYSTEM P&ID	B21-1010
3. REACTOR WATER CLEANUP SYSTEM P&ID	G31-1010
4. SAMPLING SYSTEM P&ID	P61-1010
5. PROCESS RADIATION MONITORING SYSTEM IED	D11-1040
6. SAORASTE SYSTEM P&ID	E77-1010
7. INSTRUMENT AIR SYSTEM P&ID	P53-1010
8. ESSENTIAL MULTIPLEXING SYSTEM IED	H13-1030
9. LEAK DETECTION & ISOLATION SYSTEM IED	E31-1030
10. REACTOR PROTECTION SYSTEM IED	C71-1040
11. STANDBY LIQUID CONTROL SYSTEM IED	C41-1030
12. SAFETY SYSTEM & LOGIC CONTROL IED	A38-0260
13. PERFORMANCE MONITORING & CONTROL SYSTEM IED	D61-1010
14. NEUTRON MONITORING SYSTEM IED	D51-1010
15. SUPPRESSION POOL CLEAN-UP SYSTEM P&ID	G61-1010
16. REACTOR BUILDING WATER CLEAN-UP SYSTEM P&ID	P21-1010
17. HVAC NORMAL COOLING WATER SYSTEM P&ID	P54-1010
18. STANDBY GAS TREATMENT SYSTEM P&ID	T52-1010
19. ATMOSPHERIC CONTROL SYSTEM P&ID	T31-1010
20. FLAMMABILITY CONTROL SYSTEM P&ID	T48-1010
21. HEATING, VENTILATING & AIR CONDITIONING P&ID	U41-1010

SUPPORTING DOCUMENTS

	MFL NO.
1. PIPING AND INSTRUMENT DIAGRAM SYSBOLS	A35-3030
2. PROCESS INSTRUMENTATION	A75-3030
3. GROUP CLASSIFICATION & CONTAINMENT ISOLATION DIAG	A75-1030

LEGEND

ABBREVIATIONS

PCLU - OUTPUT LOGIC UNIT
TLU - TRIP LOGIC UNIT
DTM - DIGITAL TRIP MODULE
RMU - REMOTE MULTIPLEXING UNIT
SLU - SAFETY SYSTEM LOGIC UNIT
EMUX - ESSENTIAL MULTIPLEXING SYSTEM
NEMUX - NON-ESSENTIAL MULTIPLEXING SYSTEM

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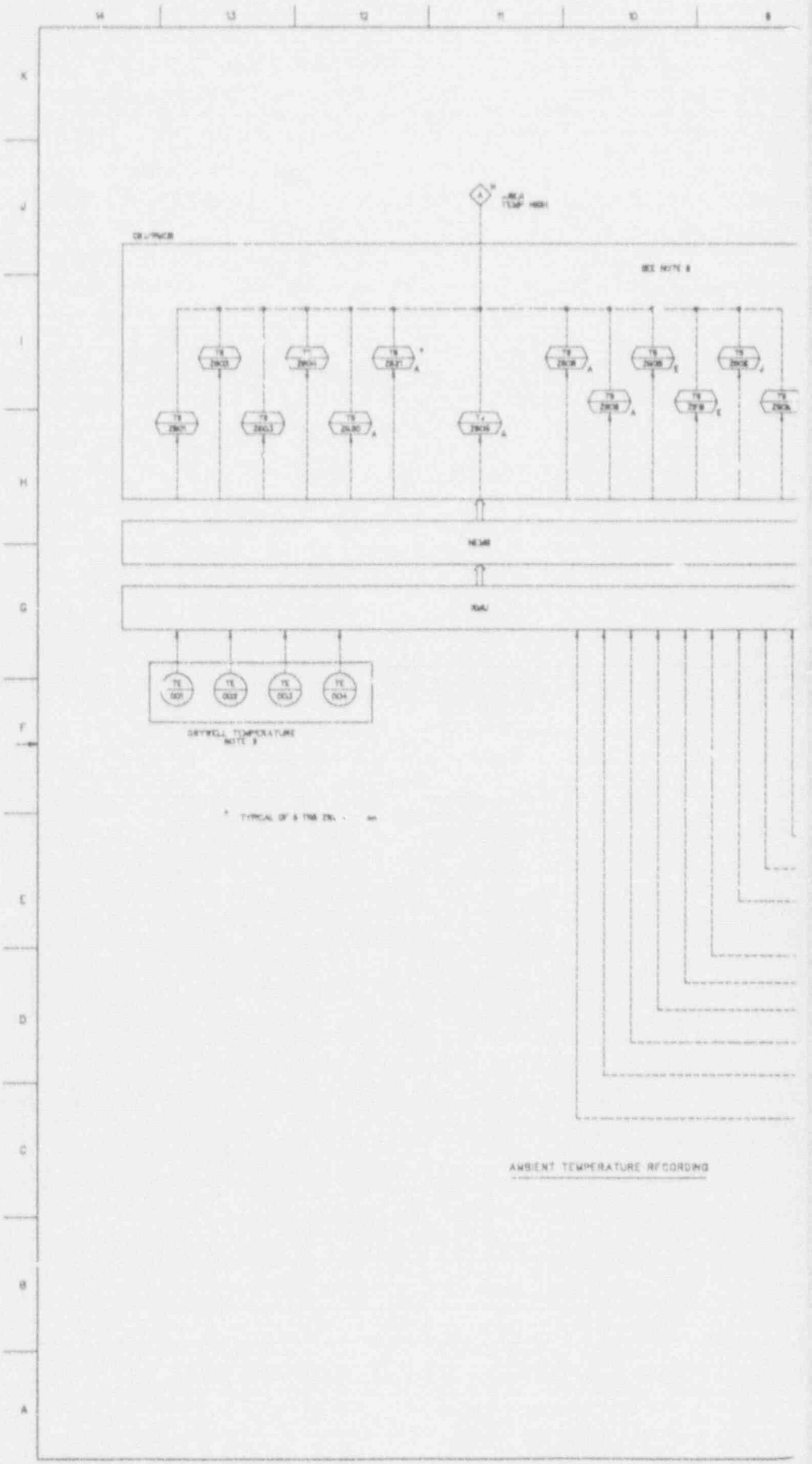
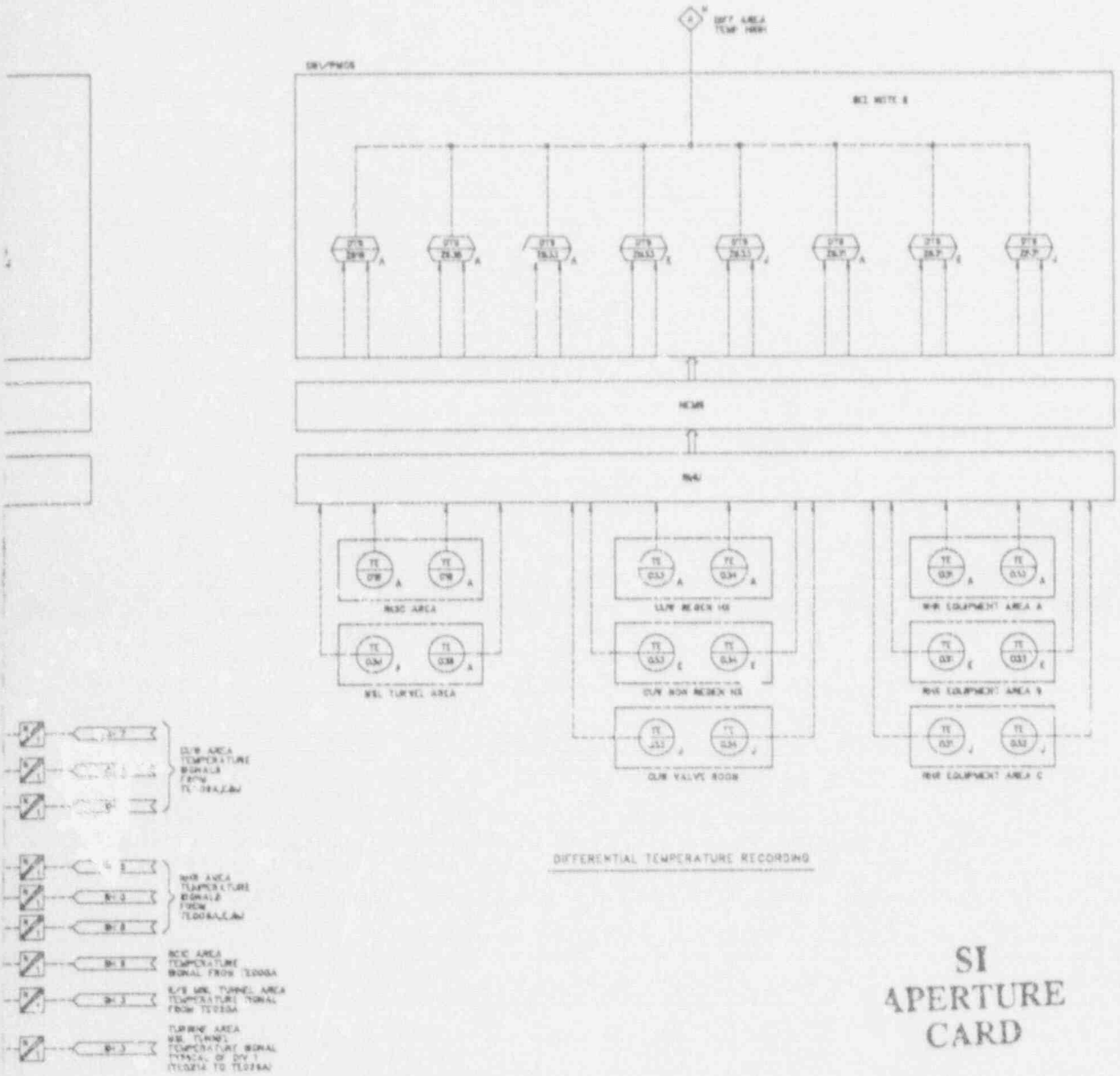
MFL NO. E31-1010

92-073-16

Figure 5.2–8 LEAK DETECTION AND ISOLATION SYSTEM IED (Sheet 1 of 10)

9204160195 -26


DRYWELL TEMPERATURE
NOTE 3
AMBIENT TEMPERATURE RECORDING



DIFFERENTIAL TEMPERATURE RECORDING

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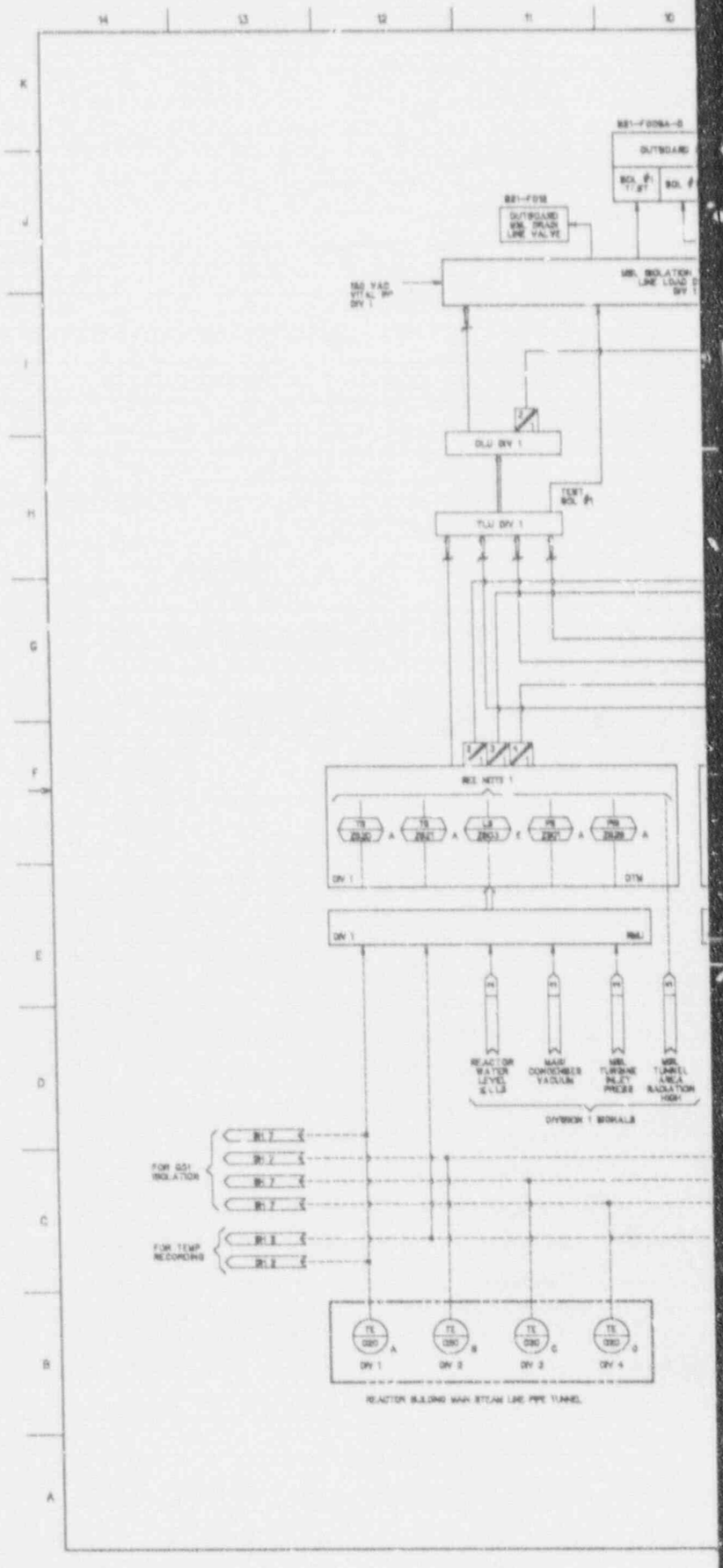
92-03-17

Figure 5.2–8 LEAK DETECTION AND ISOLATION SYSTEM IED (Sheet 2 of 10)

9204160195 -27


14
13
12
11
10
K
J
I
H
G
F
E
D
C
B
A
OUTBOARD
OUTBOARD MSL DRAIN LINE VALVE
DLU DIV 1
TLU DIV 1
TEST
DIV 1
DIV 2
DIV 3
DIV 4
FOR GDI ISOLATION
FOR TEMP RECORDING
REACTOR BUILDING MAIN STEAM LINE PIPE TUNNEL

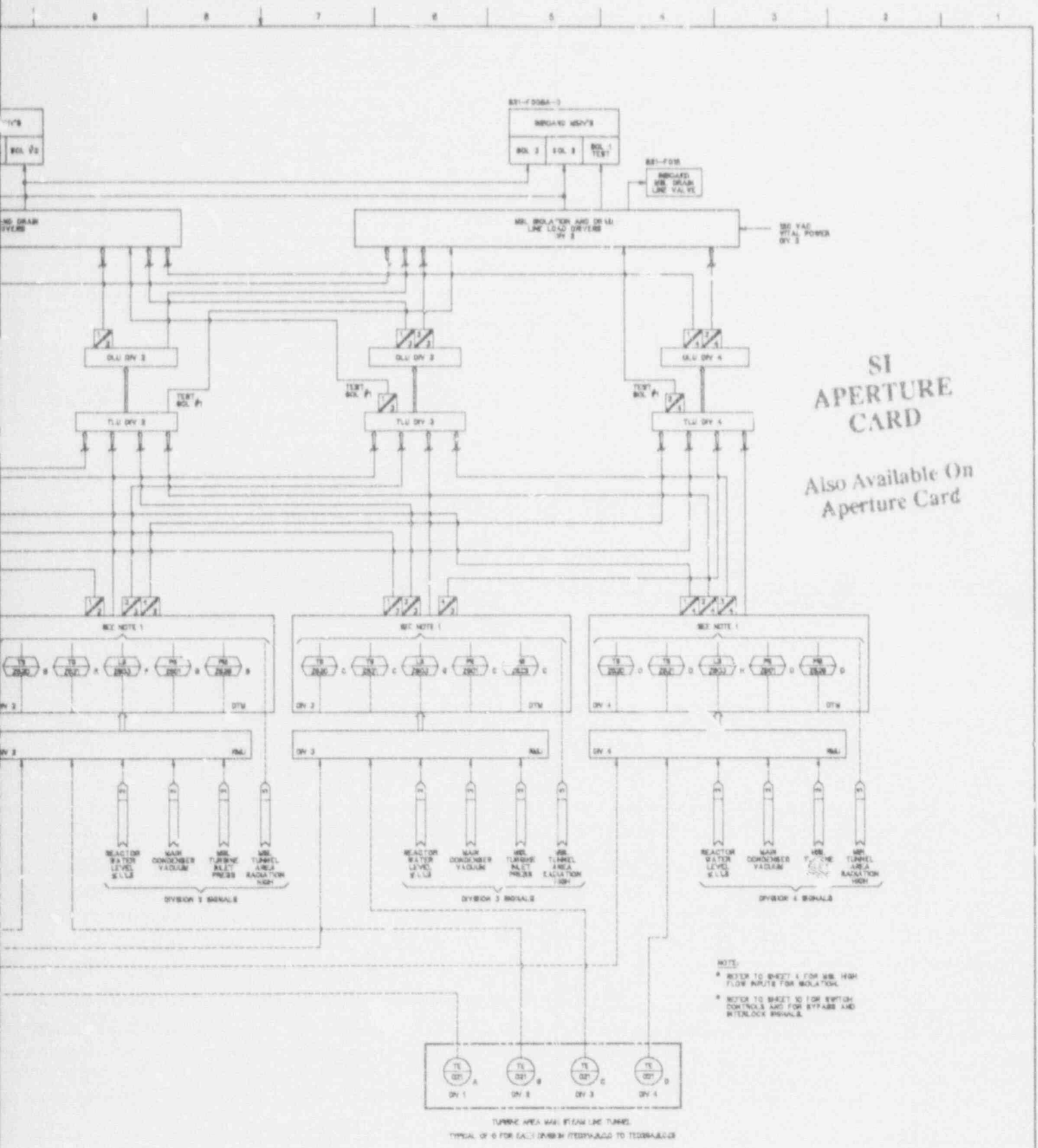


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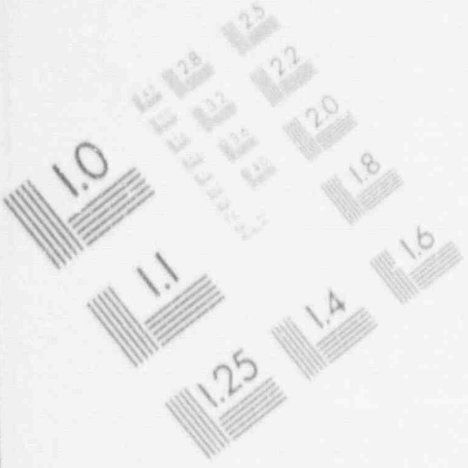
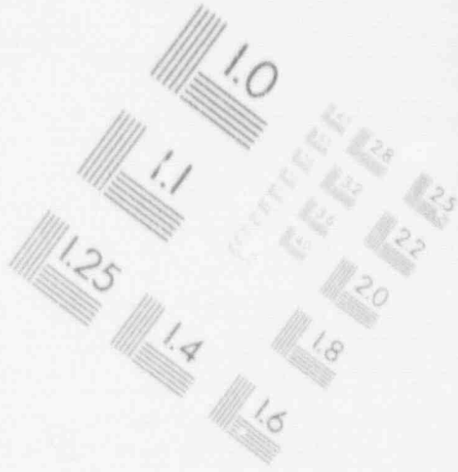
Figure 5.2-8 LEAK DETECTION AND ISOLATION SYSTEM IED (Sheet 3 of 10)

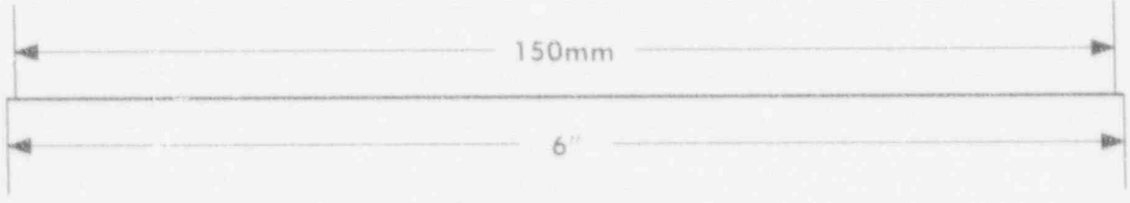
9204160195 - 28

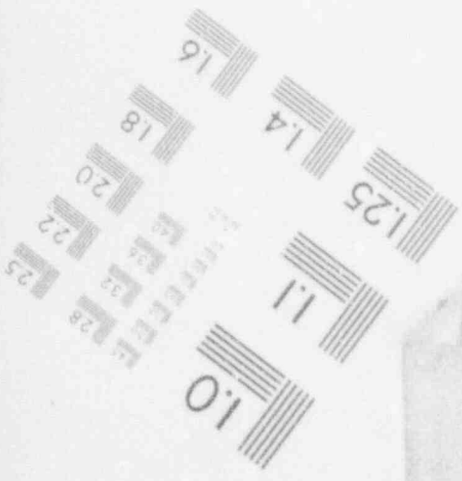
1

IMAGE EVALUATION
TEST TARGET (MT-3)









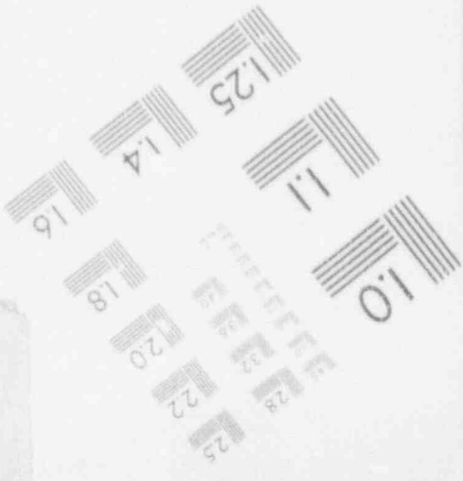


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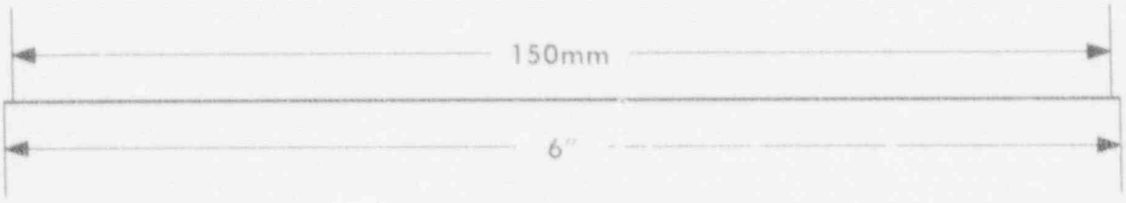
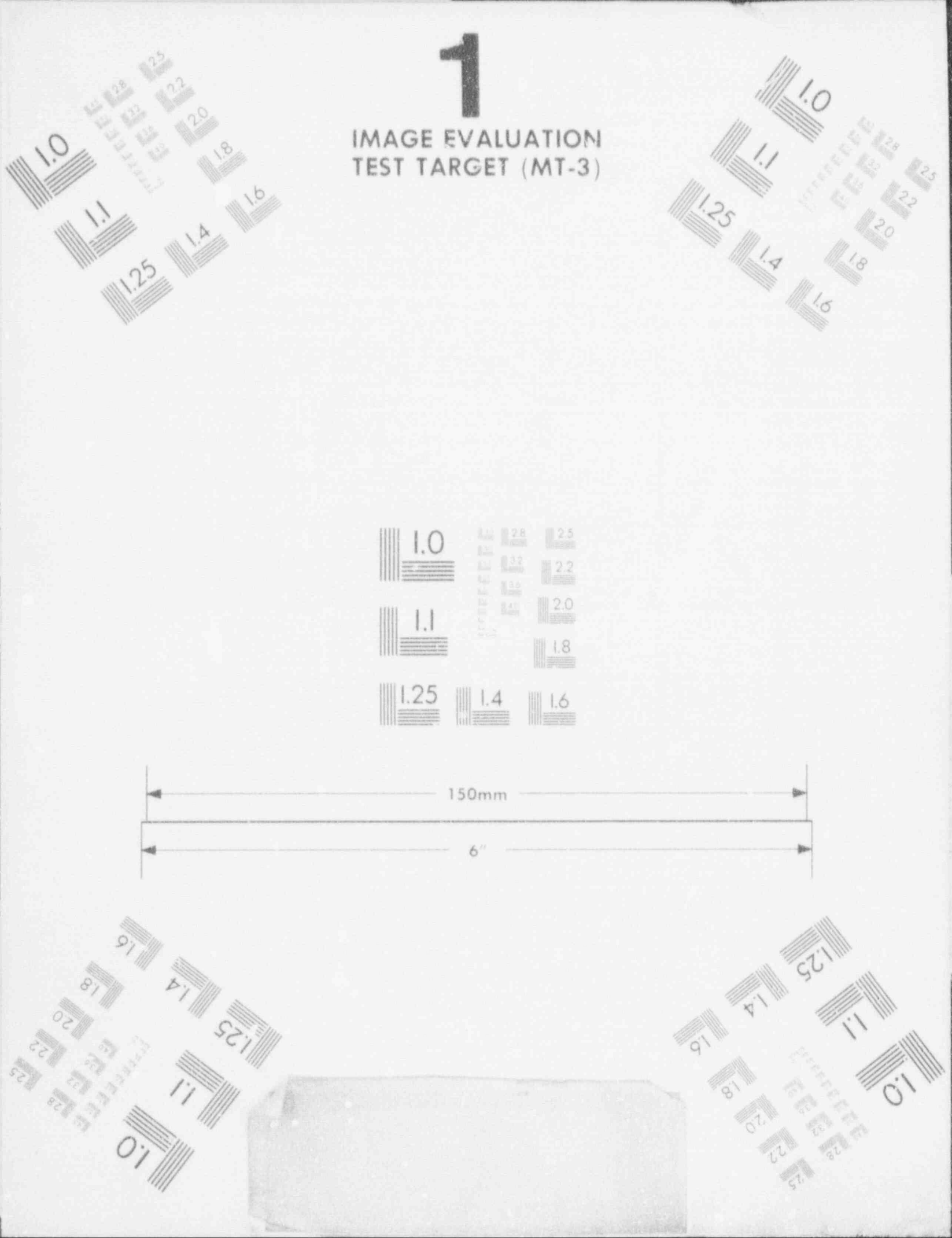
IMAGE EVALUATION
TEST TARGET (MT-3)

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2.8
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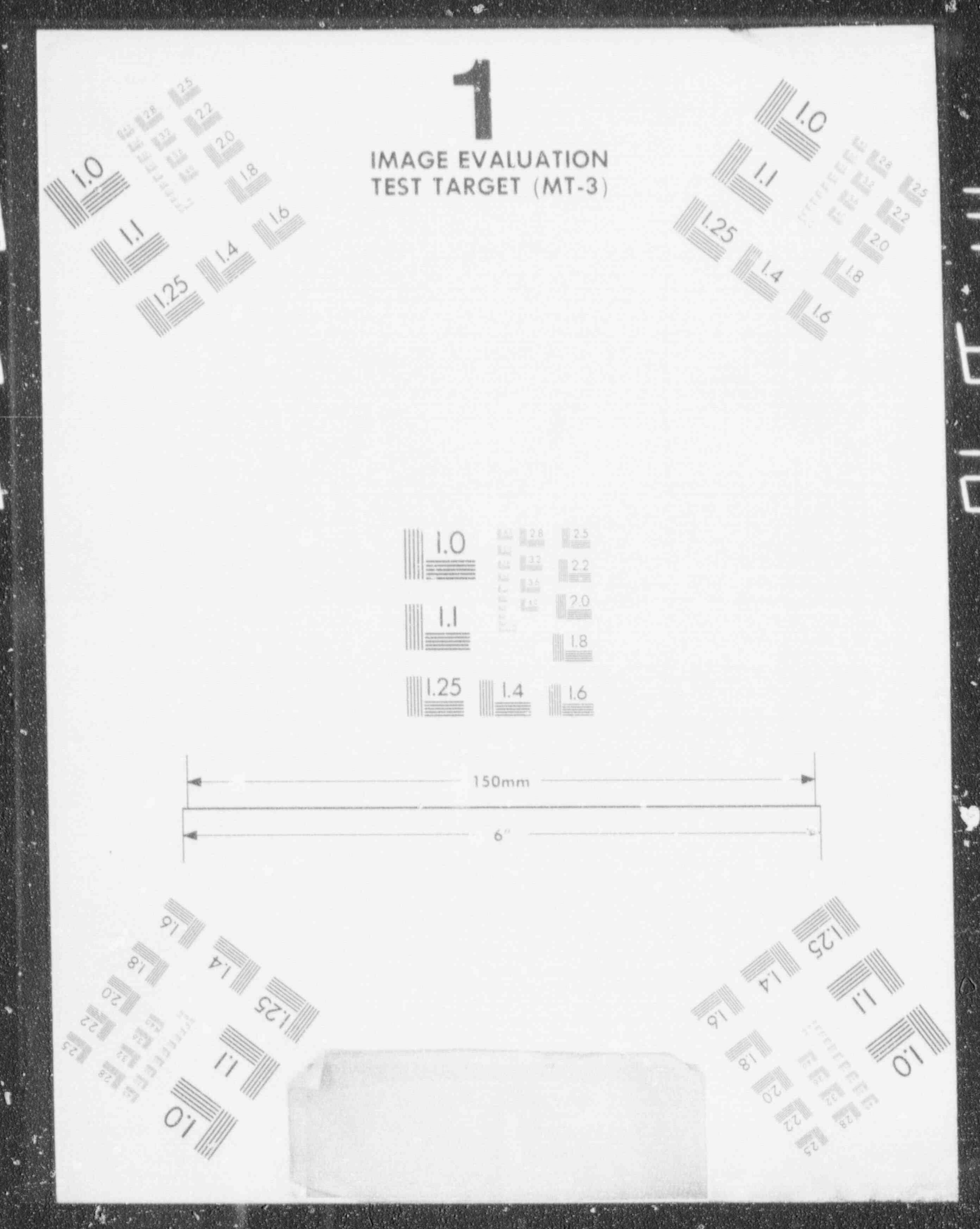
3.6
4.0
4.5
150mm
6"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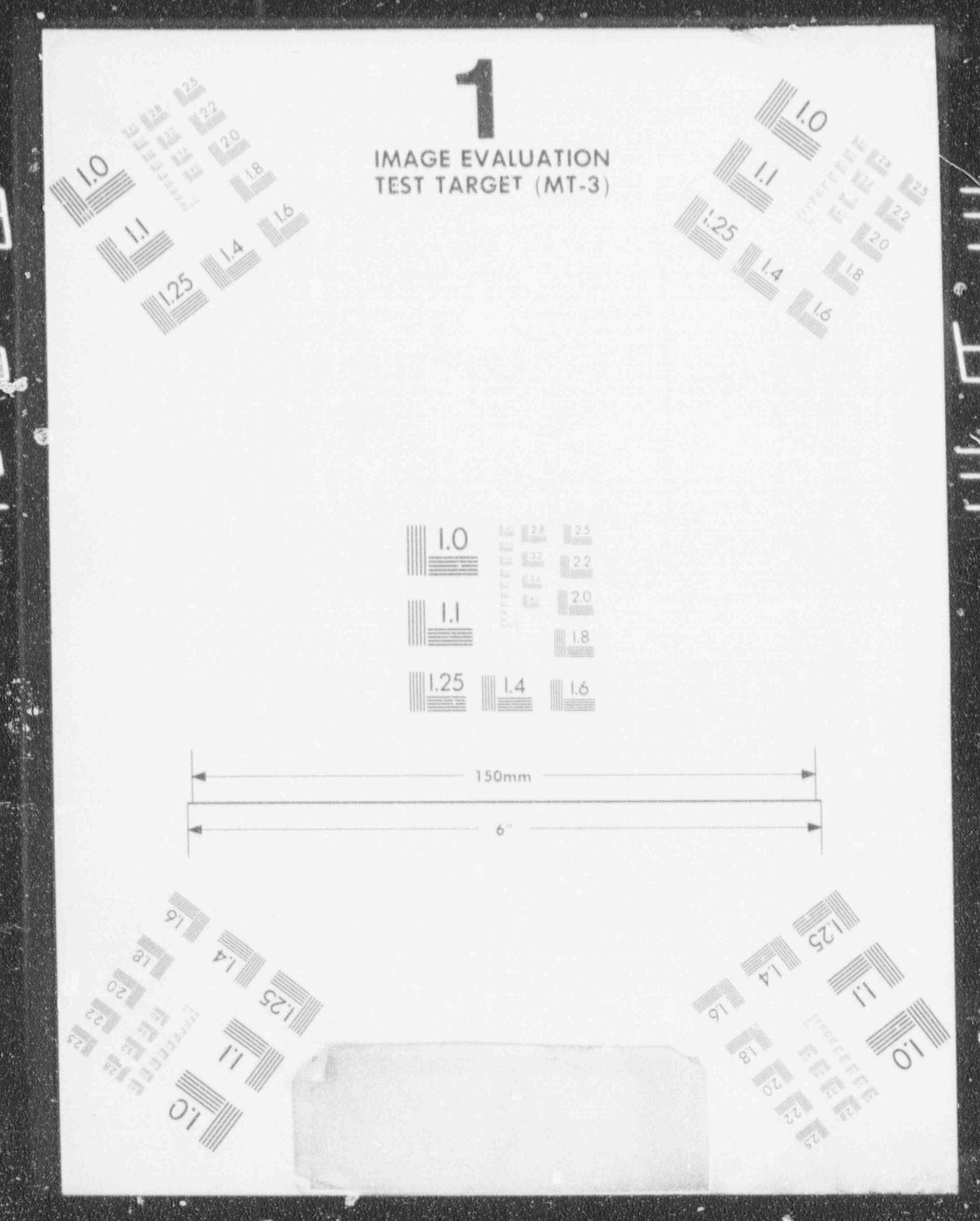
150mm
6"


1
IMAGE EVALUATION
TEST TARGET (MT-3)
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1.1
1.25
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1.8
2.0
2.2
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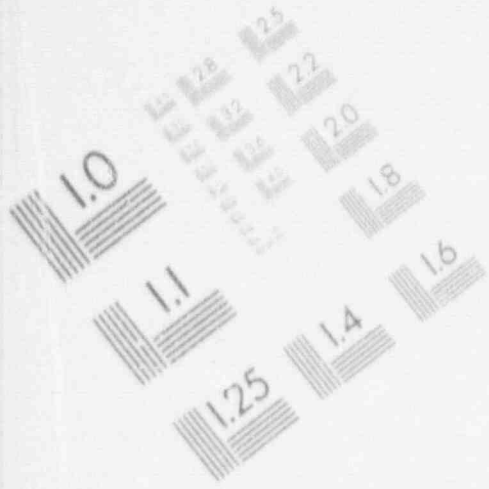
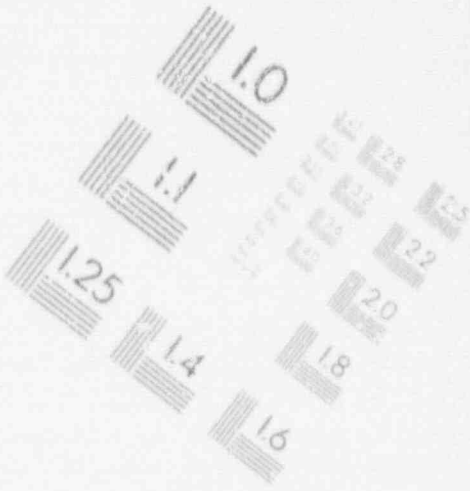
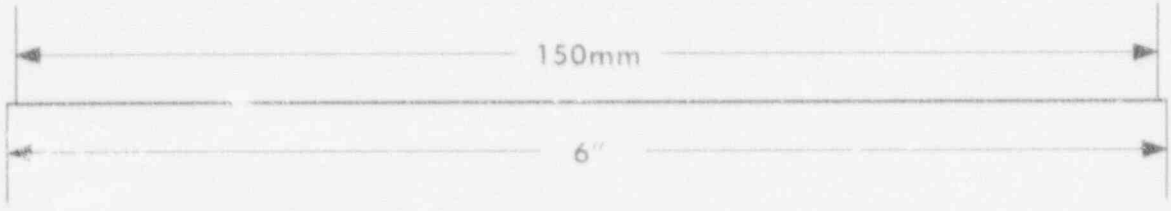
2.8
3.2
3.6
4.0
150mm
6"

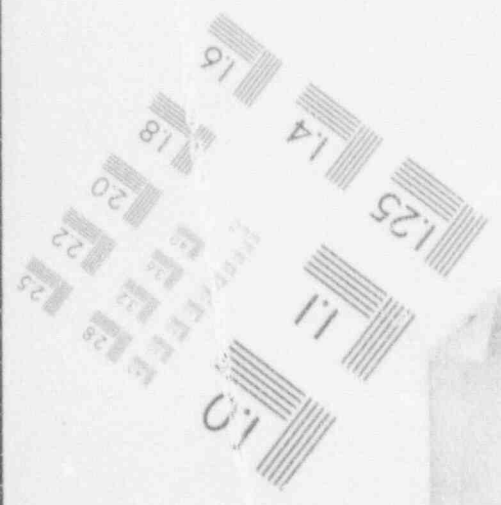
1

IMAGE EVALUATION
TEST TARGET (MT-3)









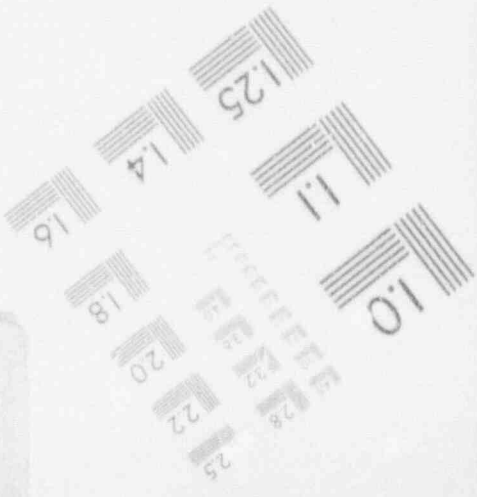


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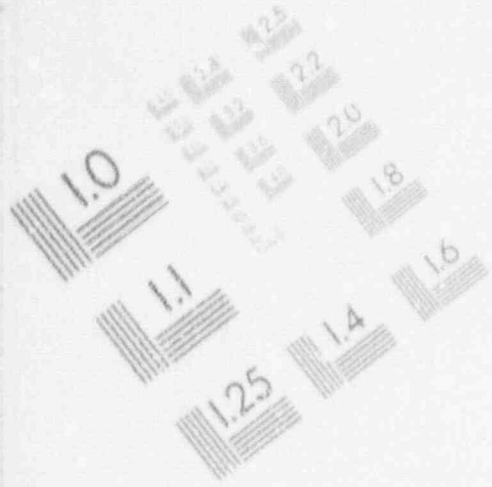
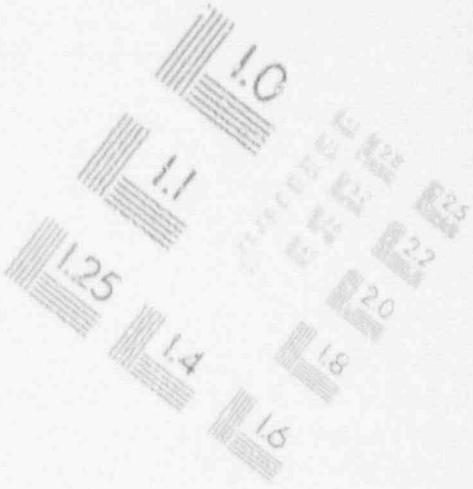
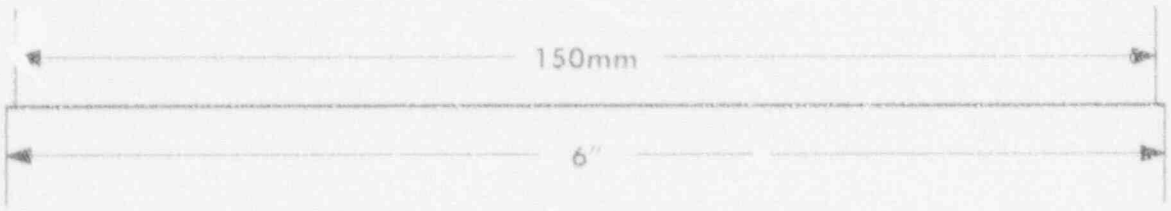
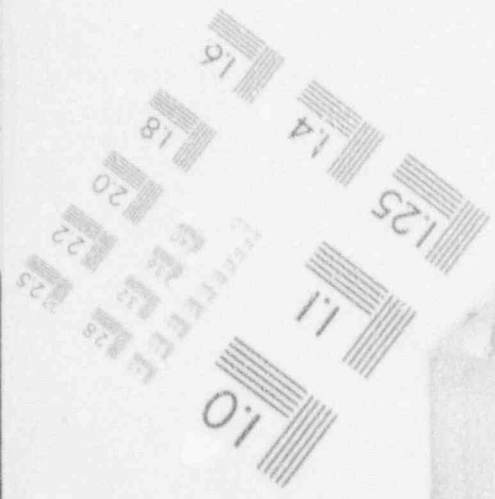
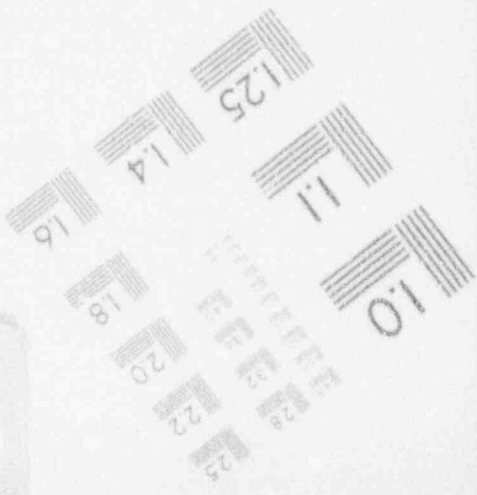
IMAGE EVALUATION TEST TARGET (MT-3)

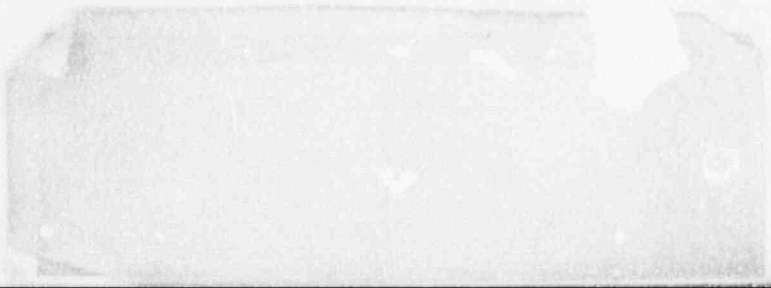


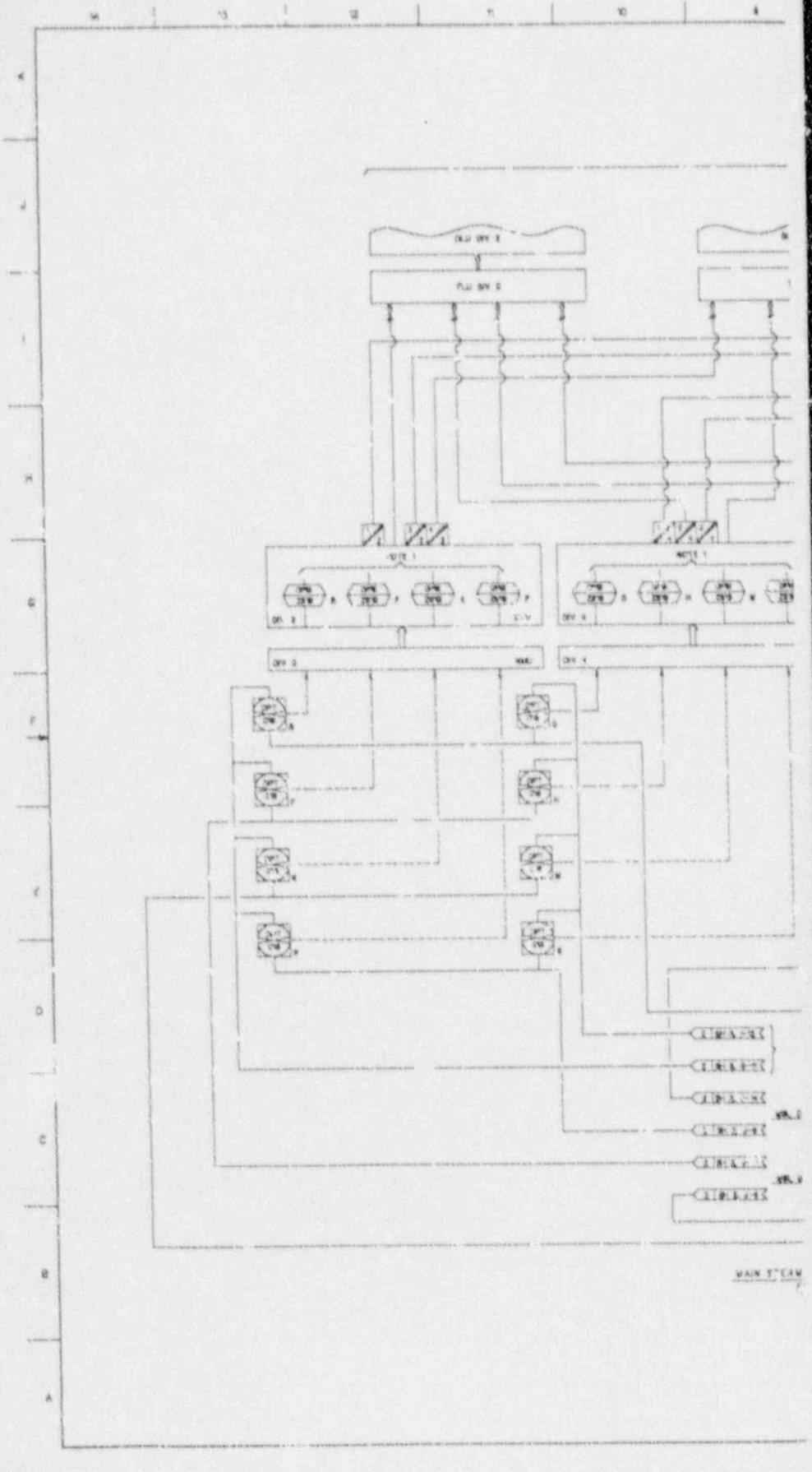












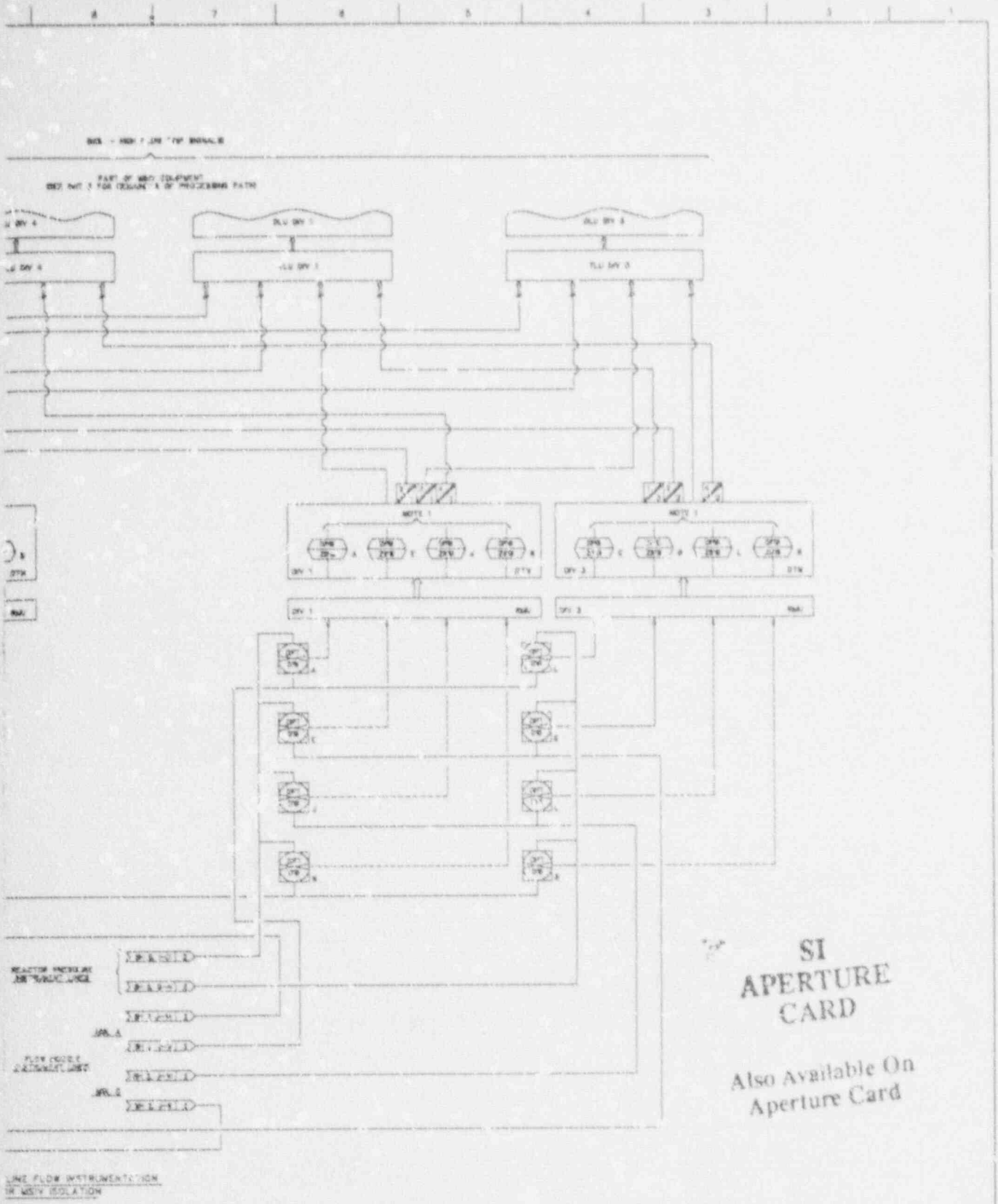


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Figure 5.2-8 LEAK DETECTION AND ISOLATION SYSTEM IED (Sheet 4 of 10)

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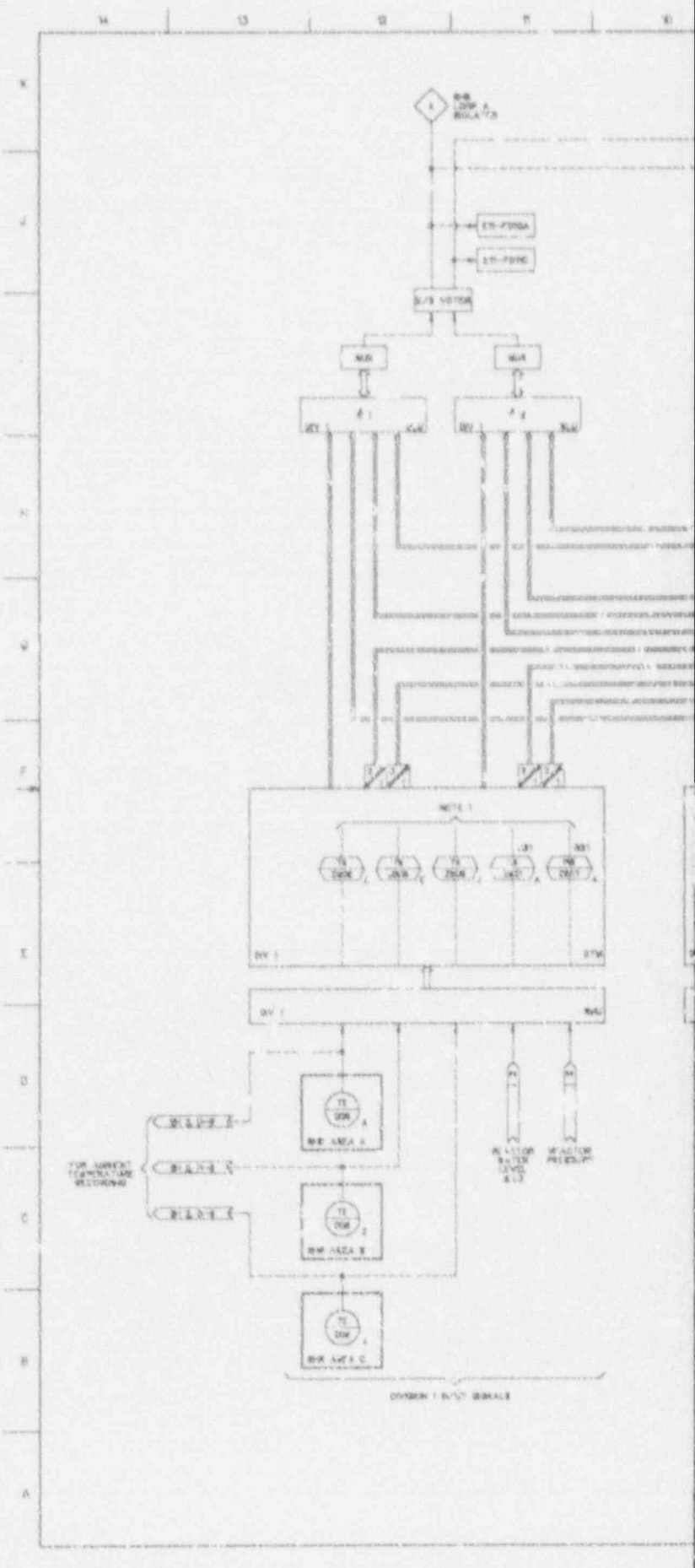


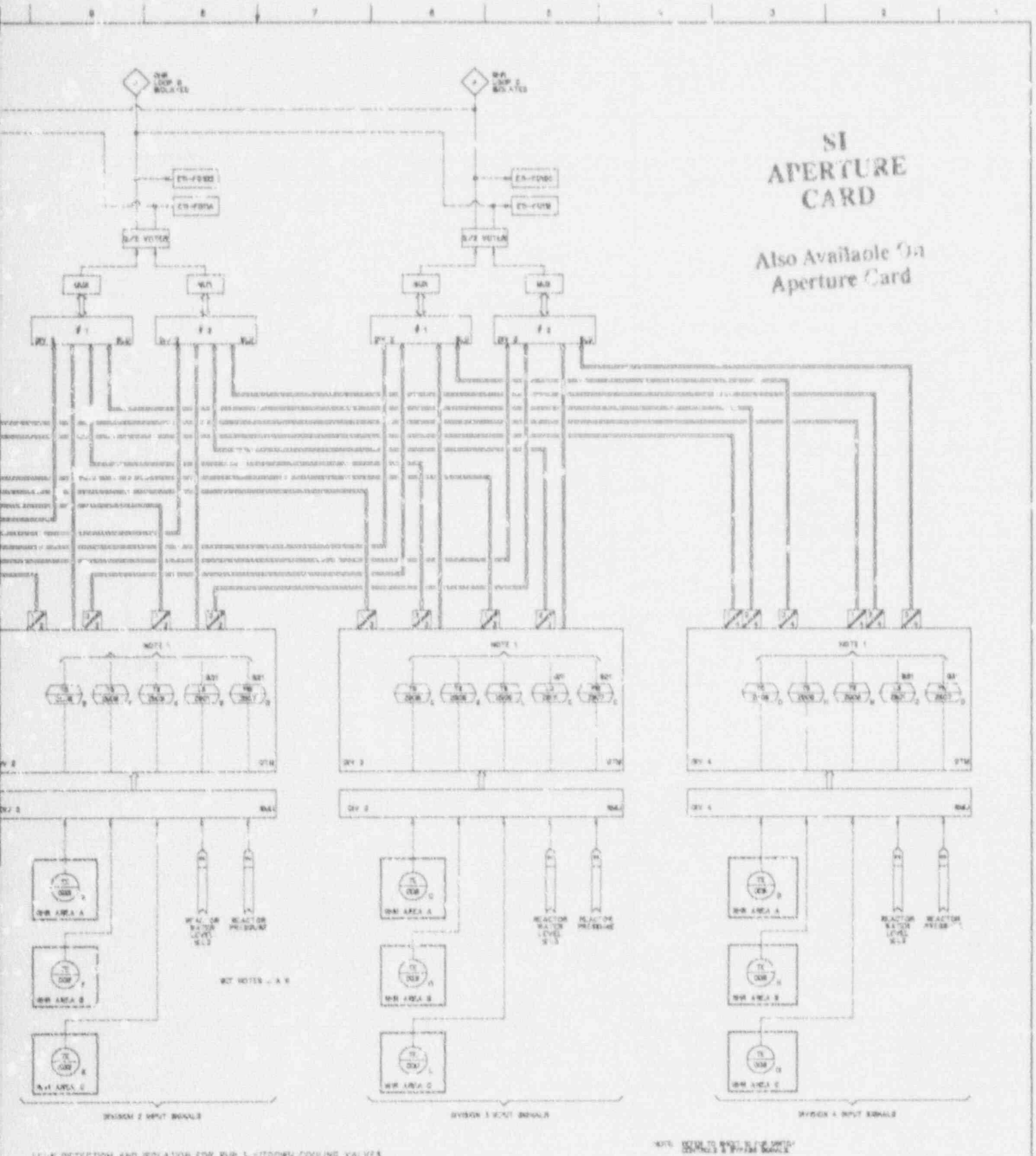
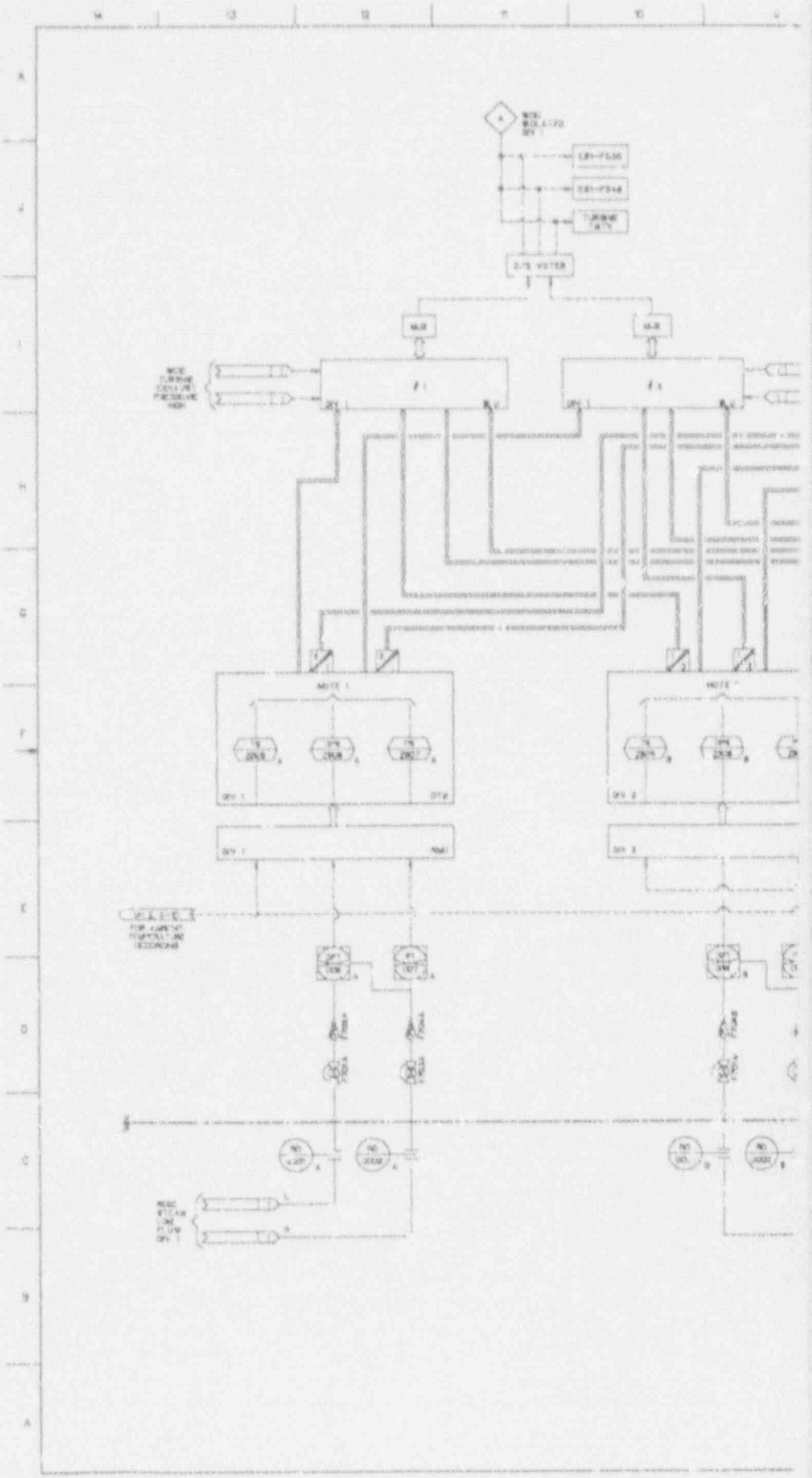


Figure 5.2-8 LEAK DETECTION AND ISOLATION SYSTEM IED (Sheet 5 of 10)

9204160195 - 30



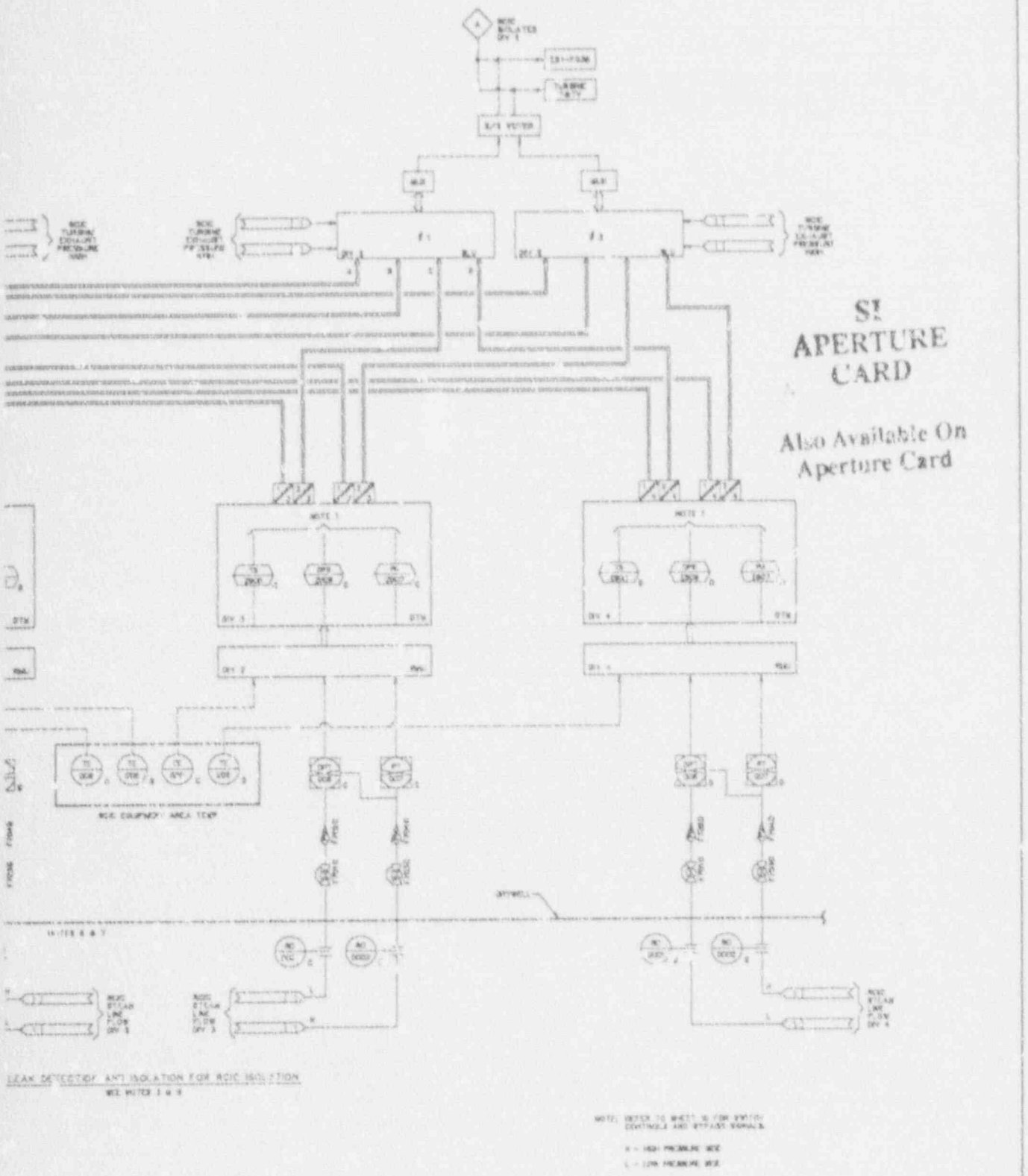


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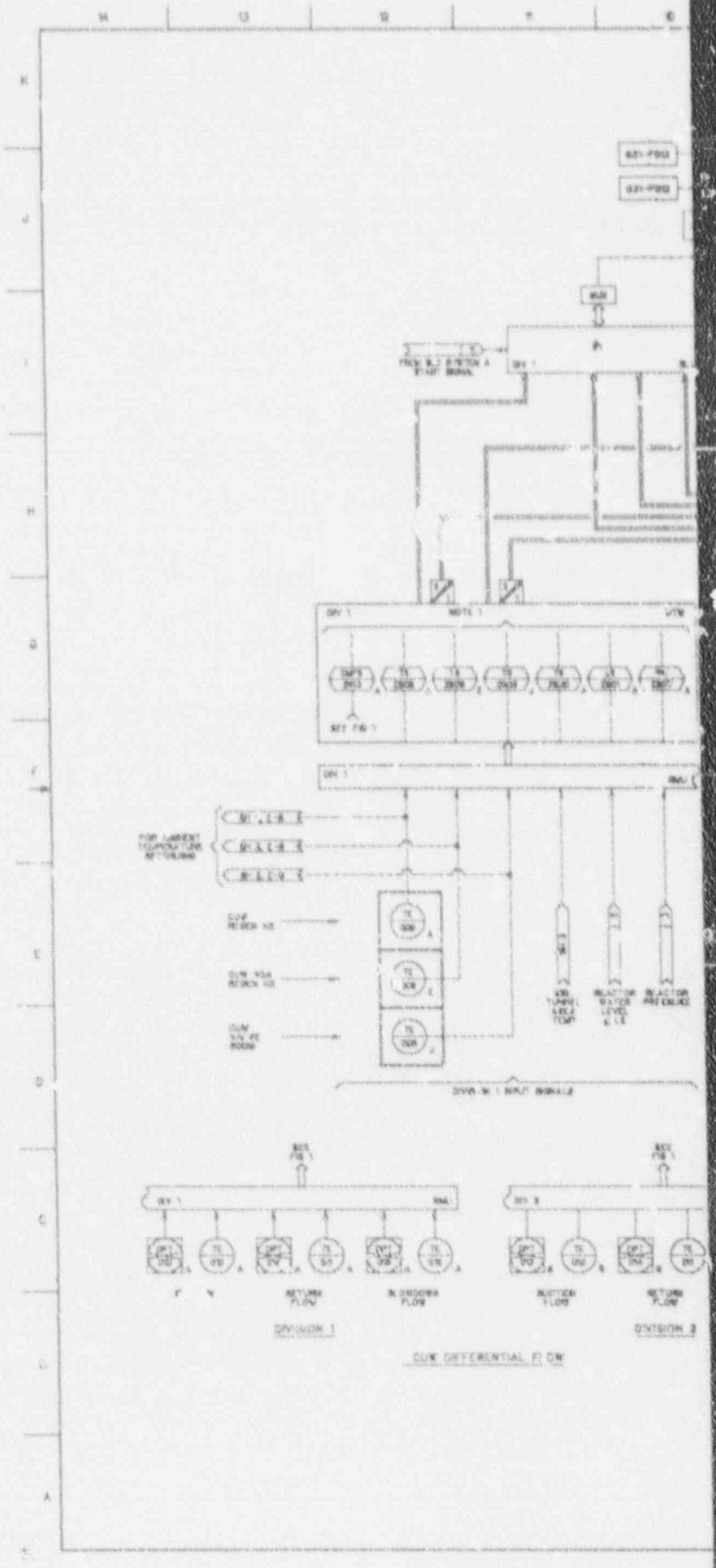
Figure 5.2-8 LEAK DETECTION AND ISOLATION SYSTEM IED (Sheet 6 of 10)

9204160195 -3


DIVISION 1
DIVISION 2
CUW DIFFERENTIAL FLOW

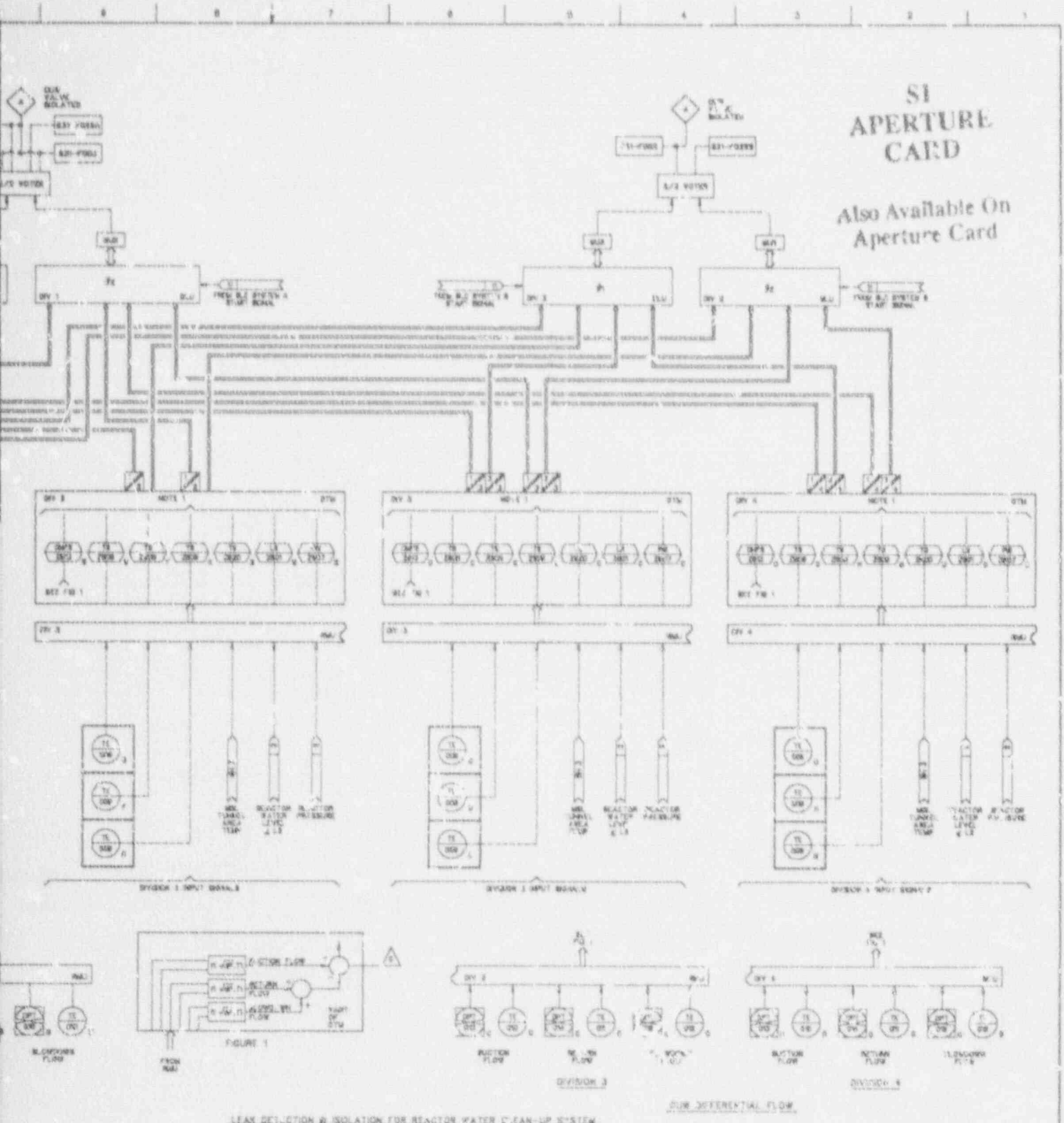
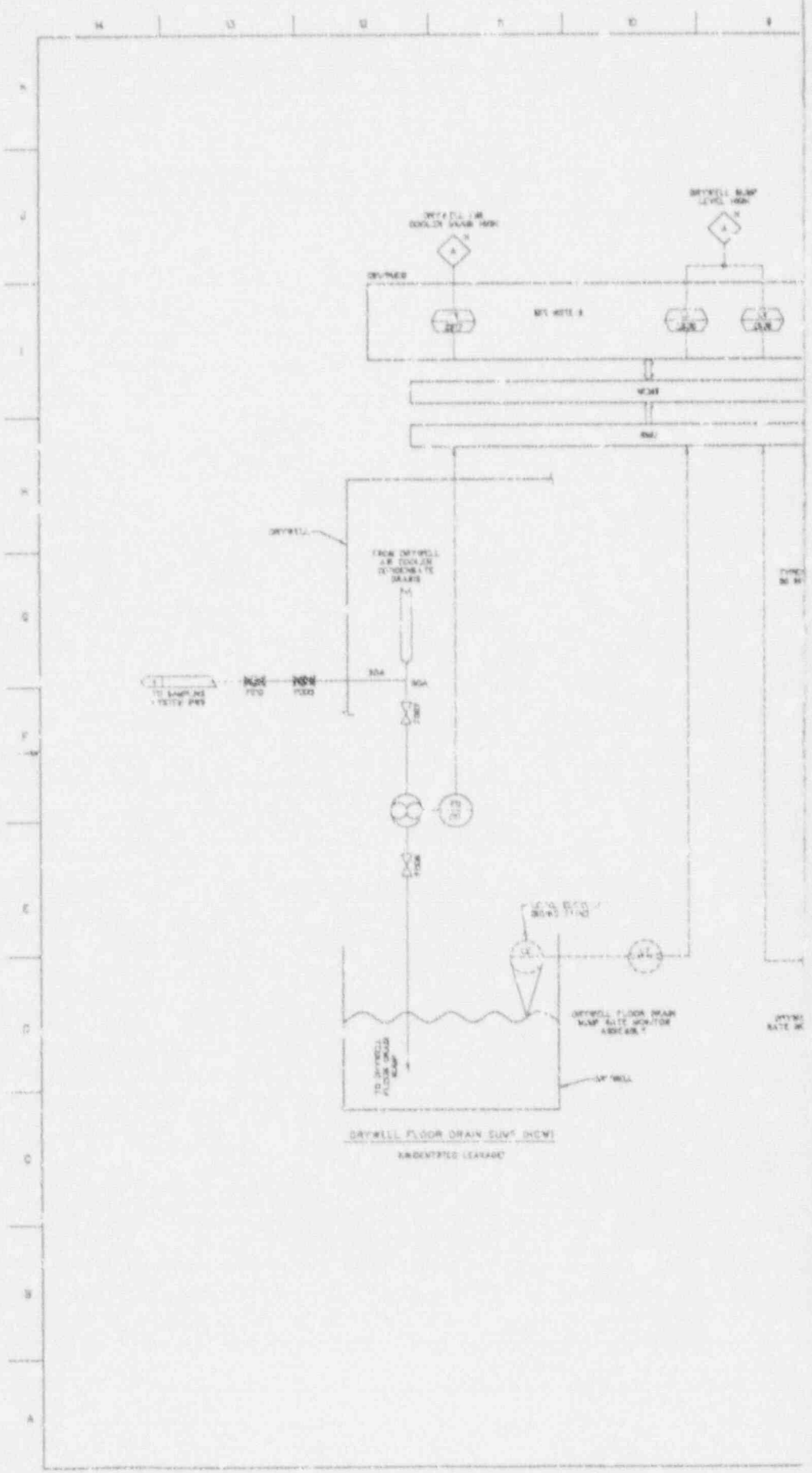


Figure 5.2-8 LEAK DETECTION AND ISOLATION SYSTEM IED (Sheet 7 of 10)

9204160195-32


DRYWELL
FROM DRYWELL AIR COOLER CONDENSATE DRAINS
TO SAMPLING SYSTEM
DRYWELL FLOOR DRAIN SUMP (HCW)
UNDILUTED LEAKAGE

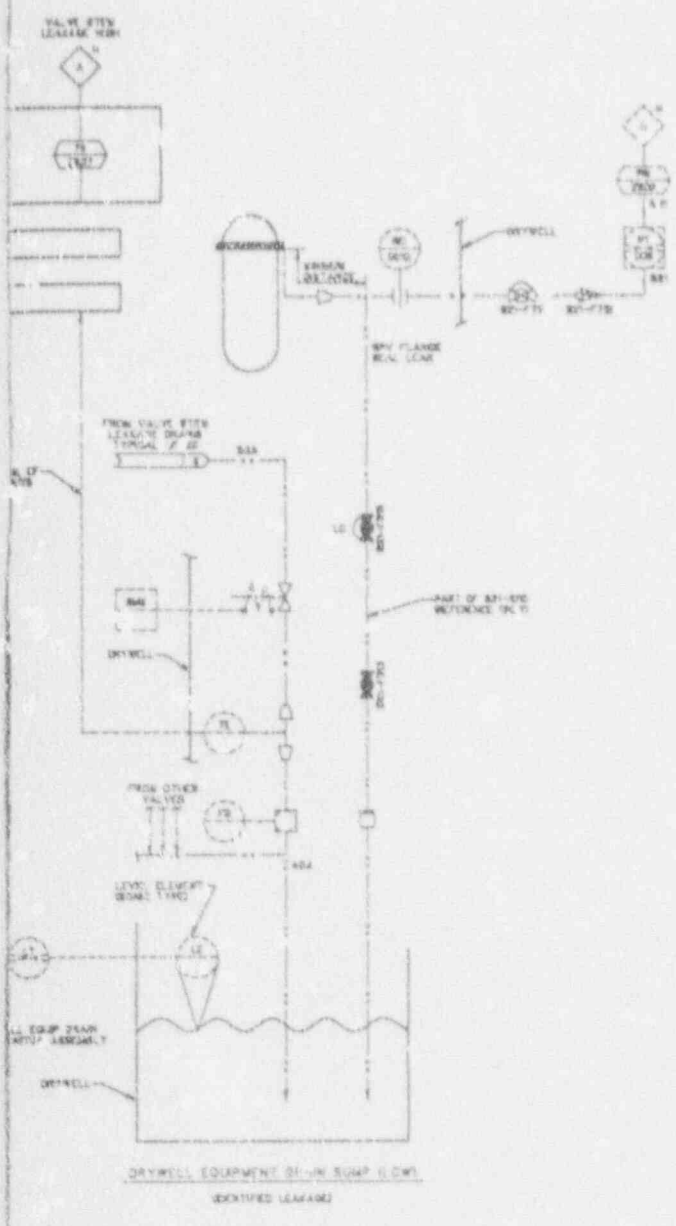


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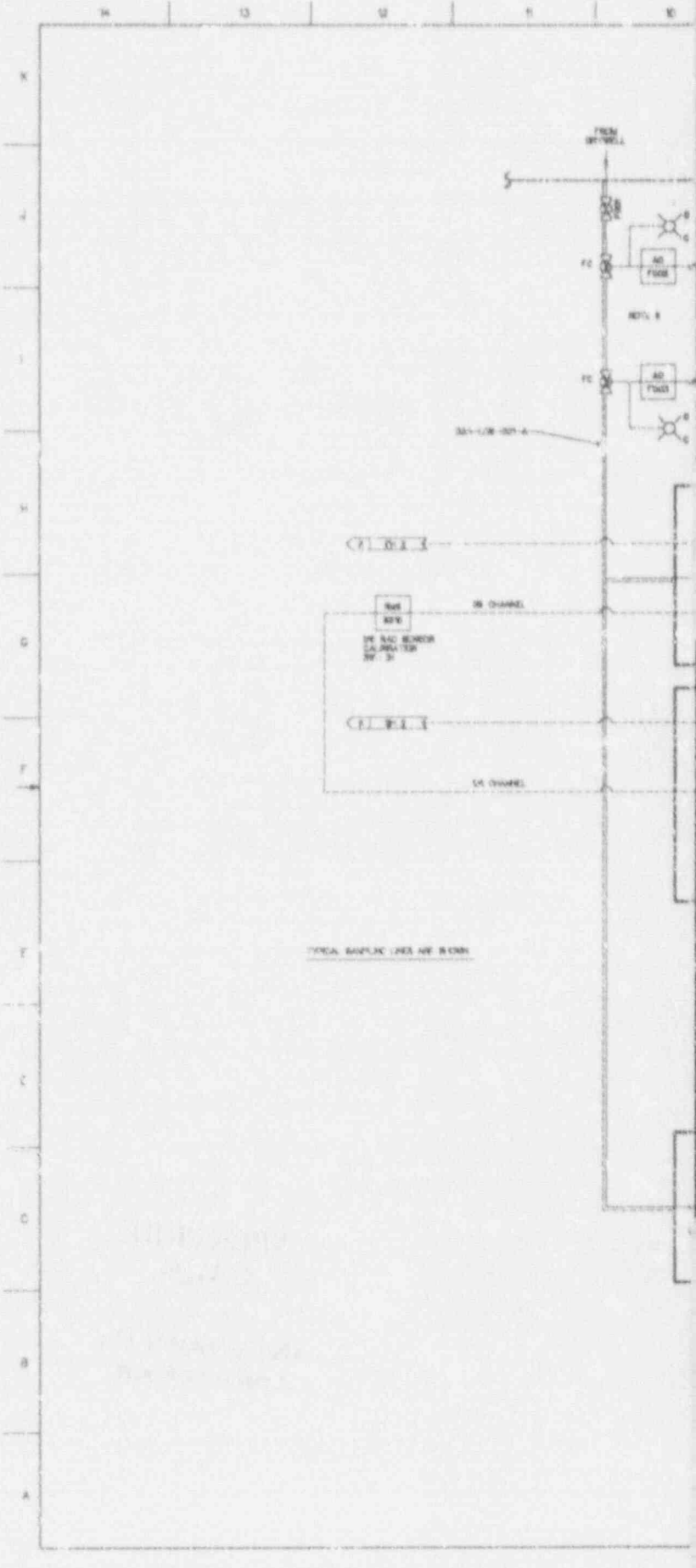
Figure 5.2-8 LEAK DETECTION AND ISOLATION SYSTEM IED (Sheet 8 of 10)

9204160195 - 33



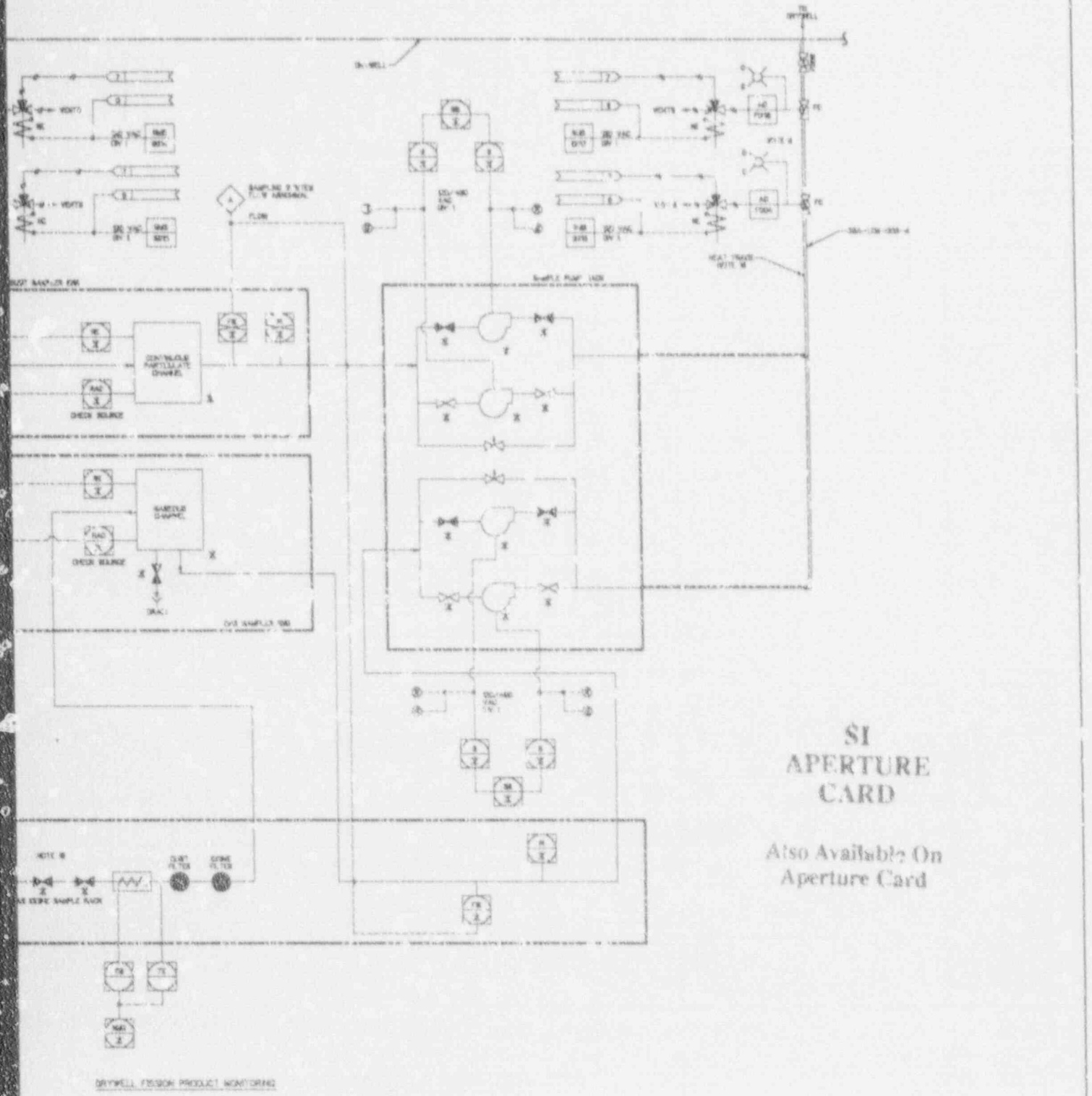


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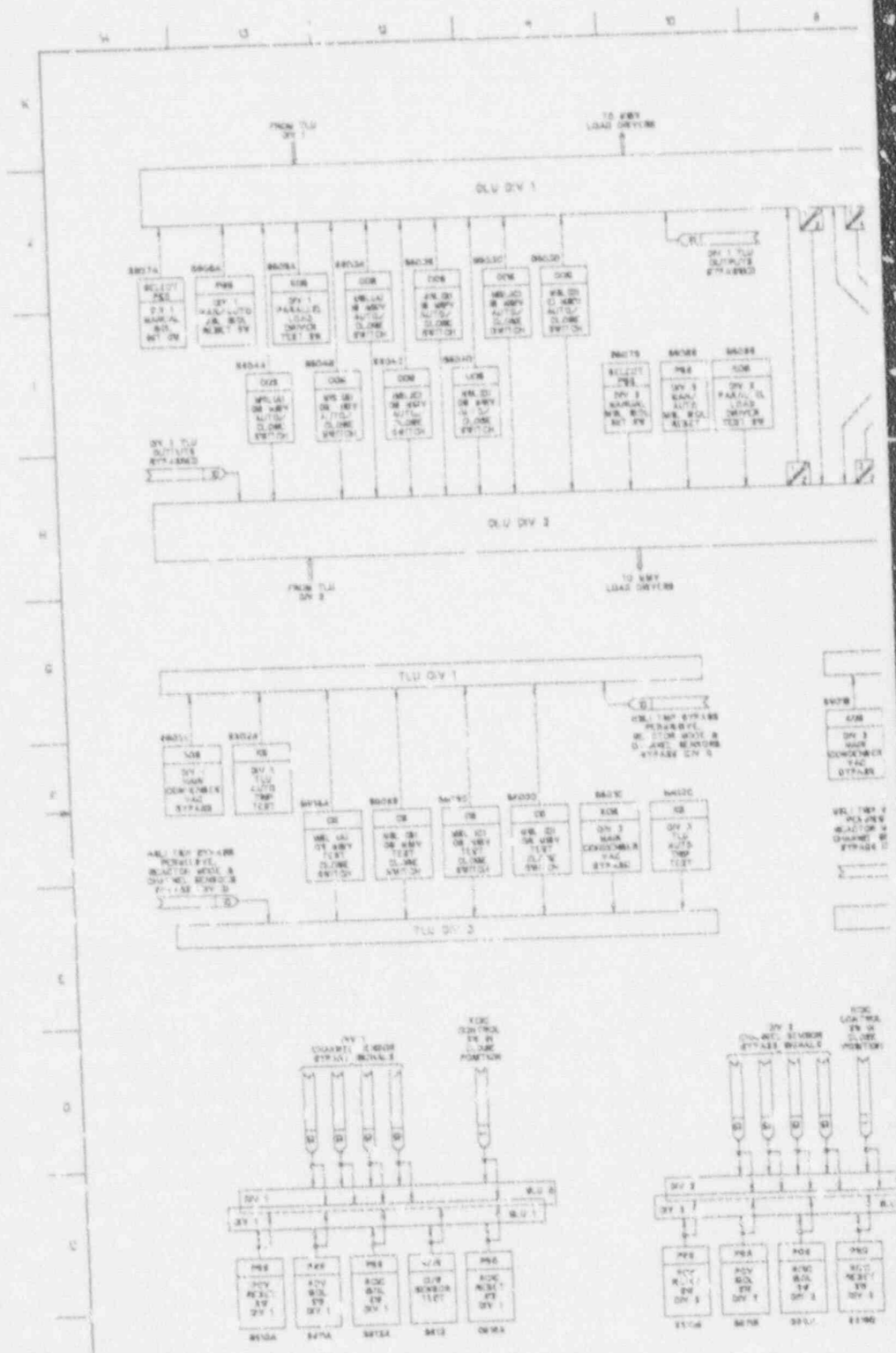
Figure 5.2-8 LEAK DETECTION AND ISOLATION SYSTEM IED (Sheet 9 of 10)

9204160195 -34



LEAK DETECTION SYSTEM SWITCHES AND OTHER INTERFACE

NOTE: THE INTERCONNECTING WIRING LINES BETWEEN DLU/2 REPRESENT SOV RESET SIGNALS INCLUDED TO PERMIT THE VALVES TO FULLY CLOSE BEFORE THEY CAN BE OPENED BY THE OPERATOR.

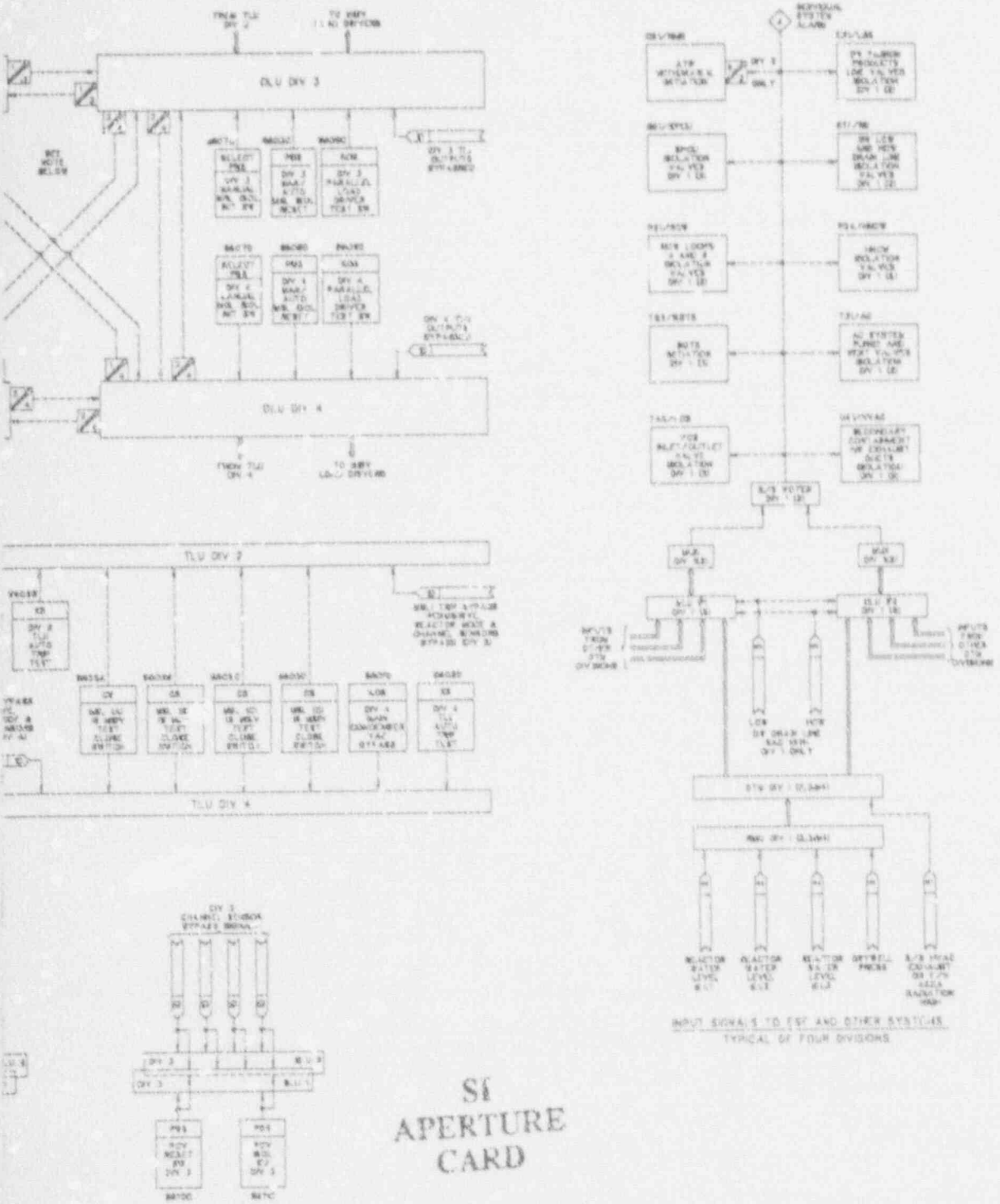


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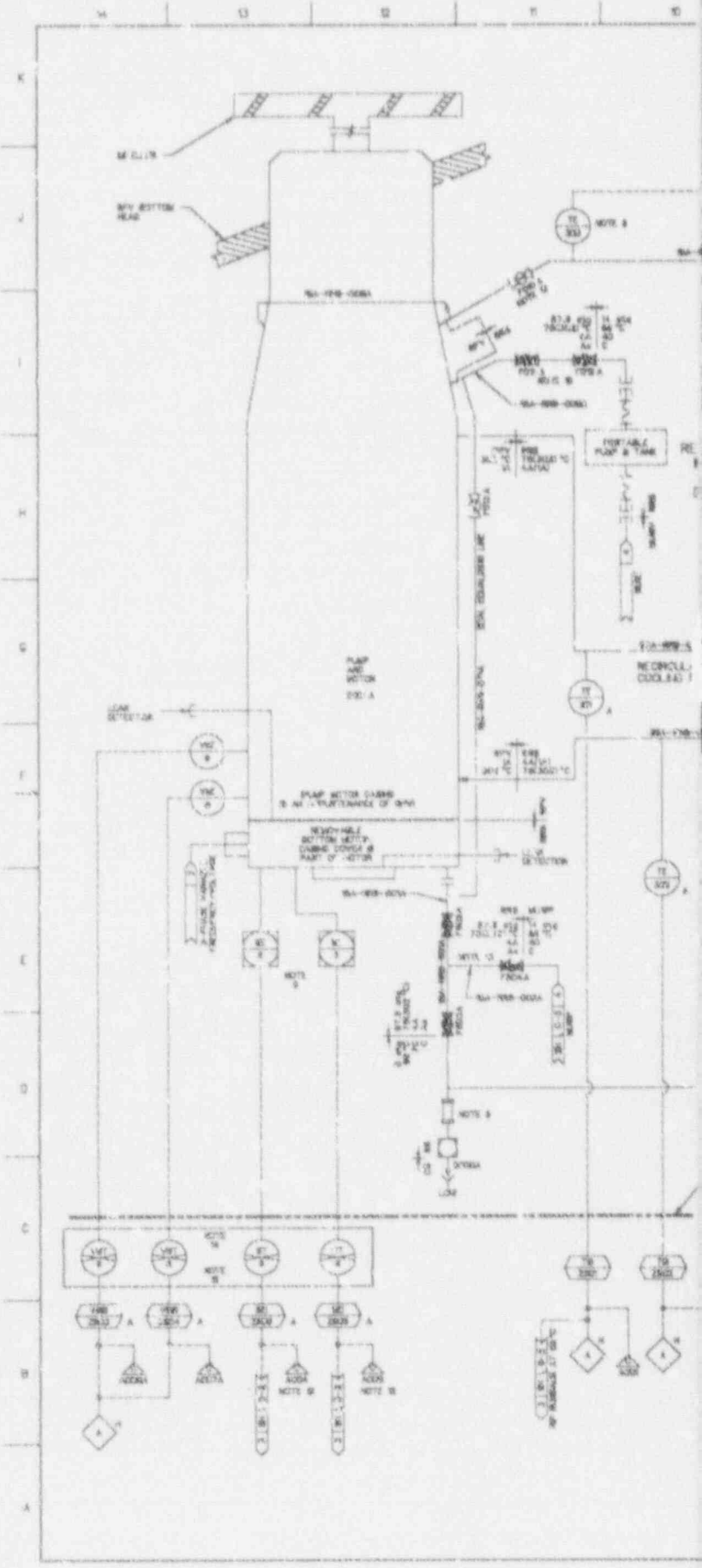
Figure 5.2-8 LEAK DETECTION AND ISOLATION SYSTEM IED (Sheet 10 of 10)

9204160195 -35



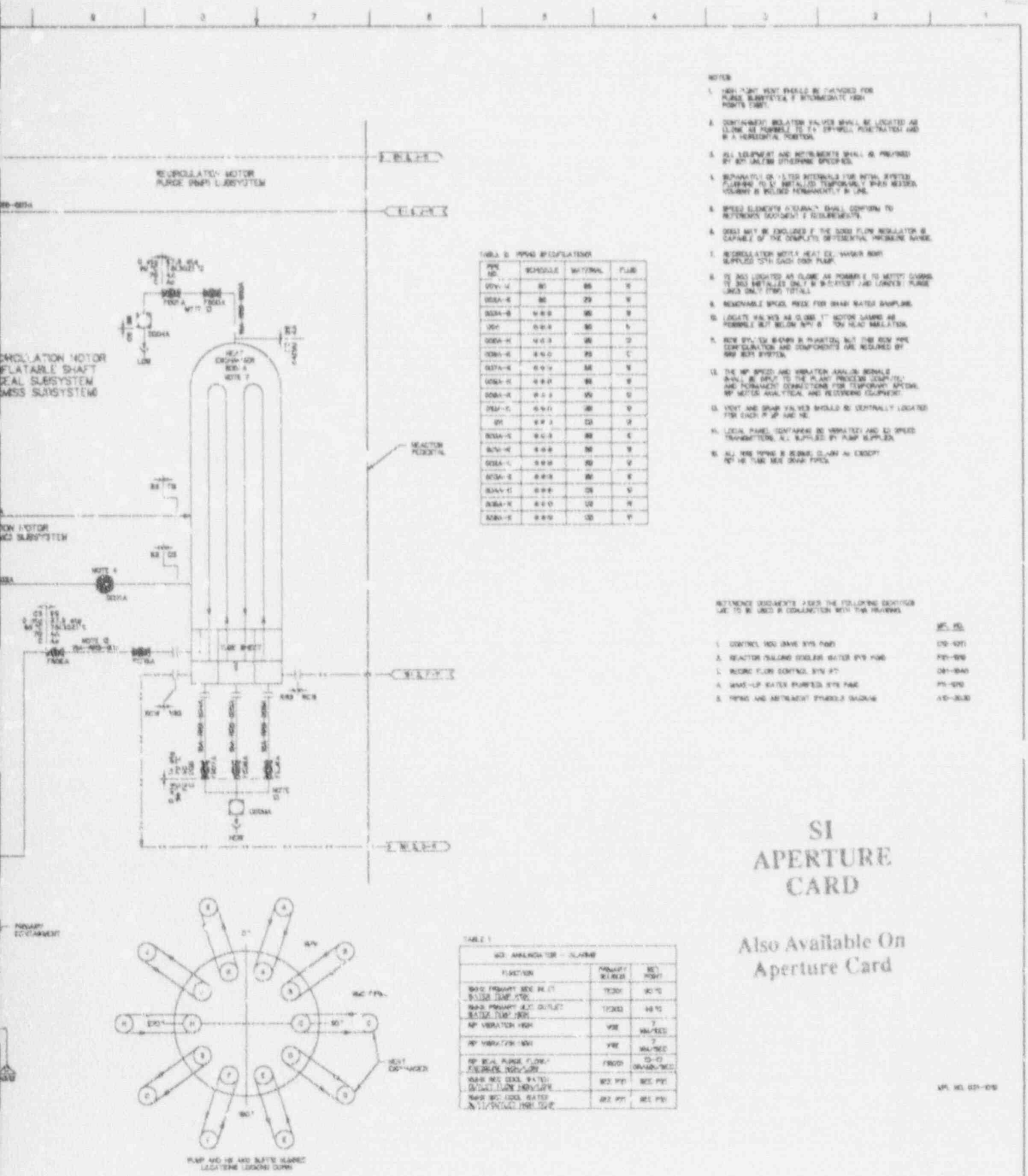
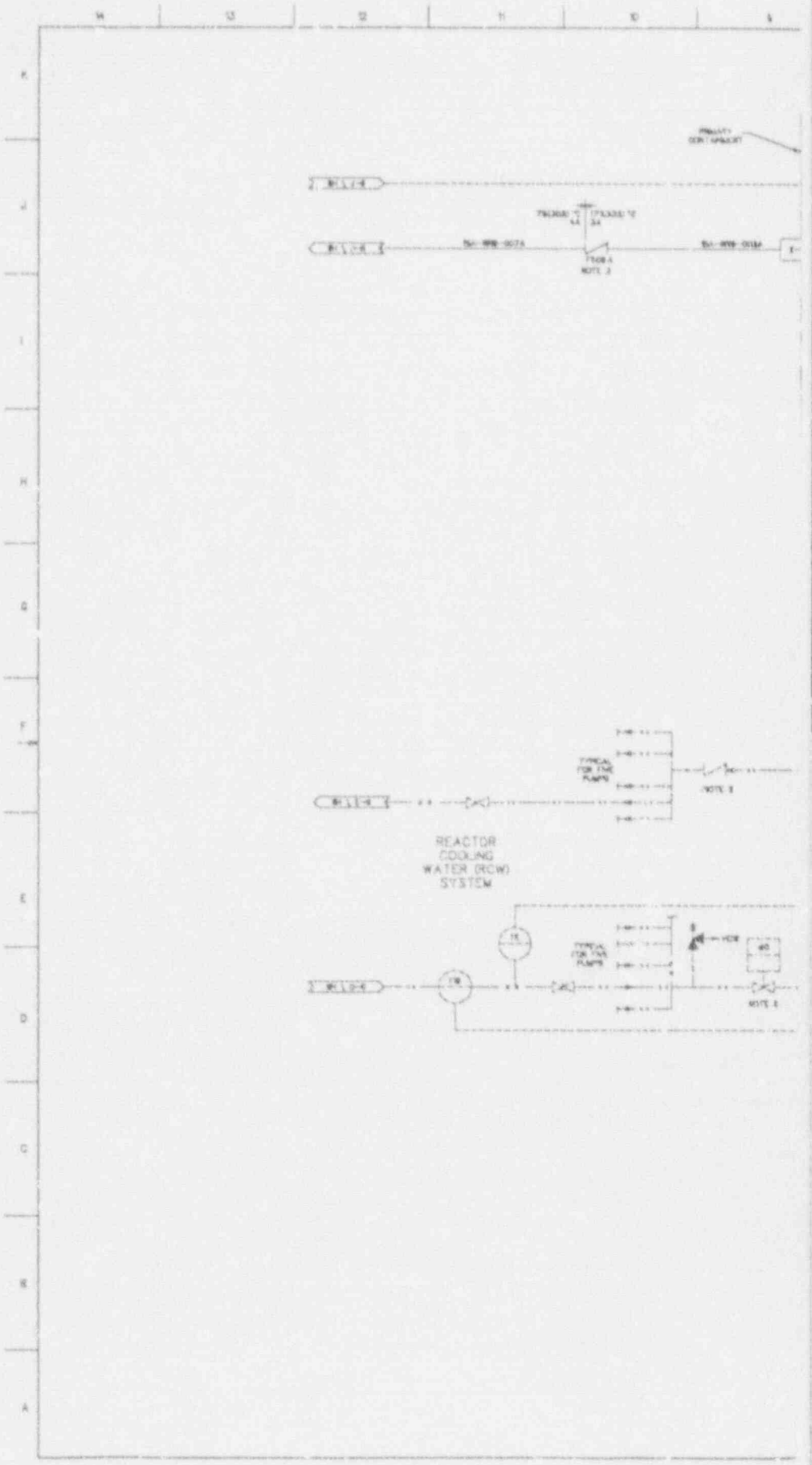


Figure 5.4-4 REACTOR RECIRCULATION SYSTEM P&ID (Sheet 1 of 2)


REACTOR
COOLING
WATER (RCW)
SYSTEM

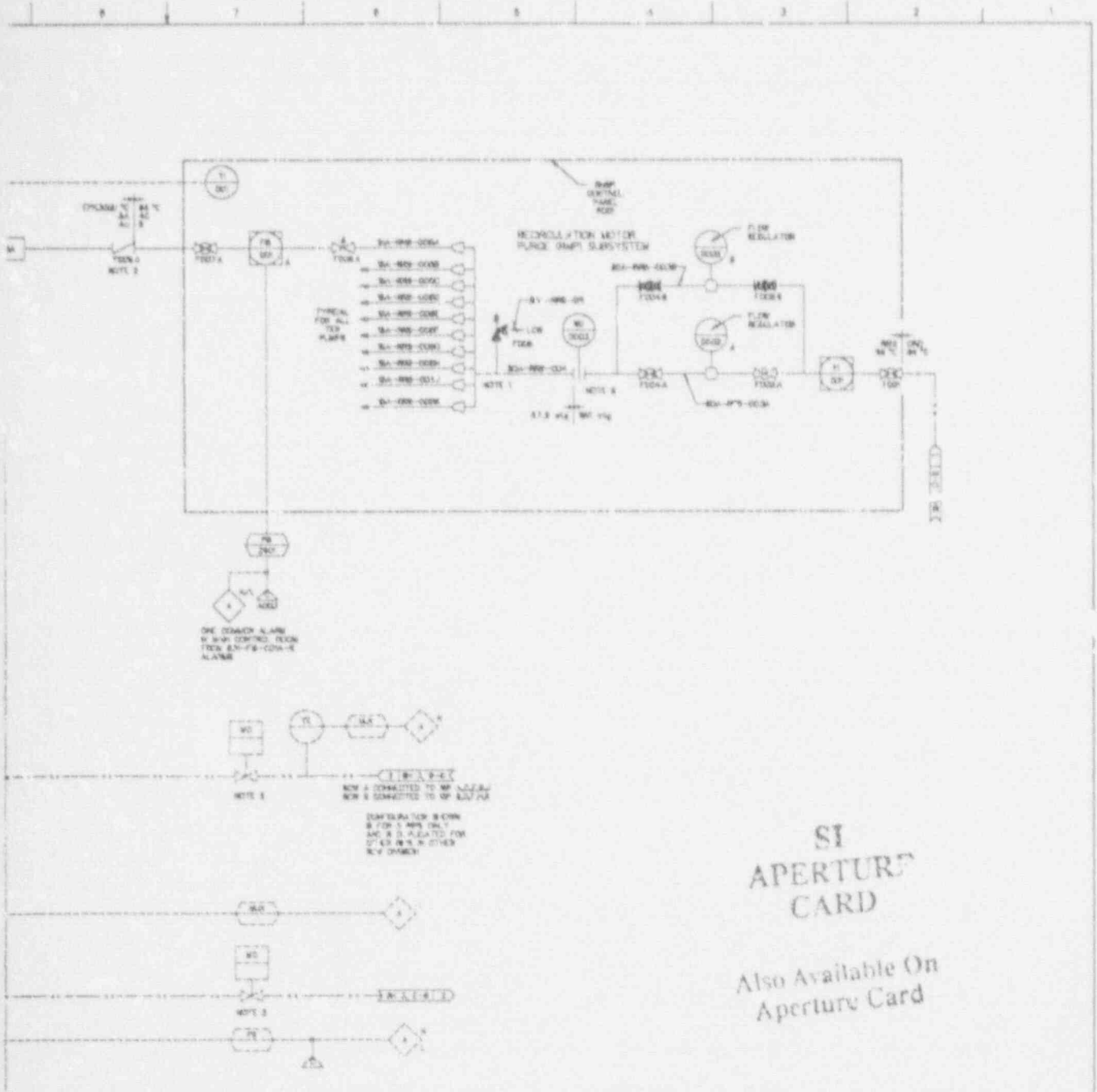


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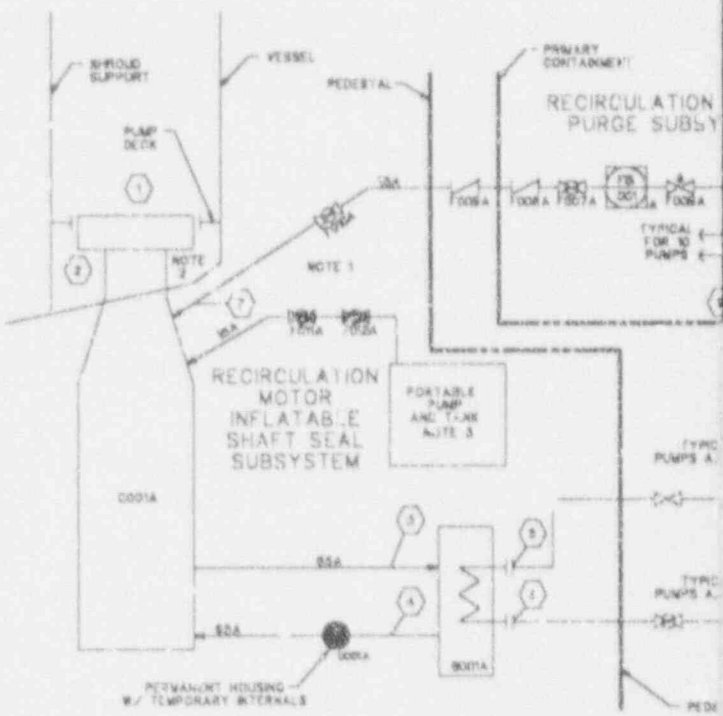
Figure 5.4–4 REACTOR RECIRCULATION SYSTEM P&ID (Sheet 2 of 2)



RECIRCULATION MOTOR COOLING SUB
REPEATED FOR PUMPS B,D,F,H,

MODE "B2" REACTOR NORMAL OPERATION --- (8 PUMPS OPERATING)
DATA SHOWN FOR THE PUMP OUT OF SERVICE
CORE FLOW = 100%
PUMP SPEED = 80% OF RATED

SEE NOTE 5

POSITION	1	2	3	4	5	6	7	8
FLOW M³/HR	[illegible]	[illegible]	MAT. DIAG.		30 MAX	30 MAX	15/17 NOTES 5&11	135/155 NOTES 5&11
TEMP (°C)	278	278			35		30/70	40/60
PRESS Kg/cm²	73.9	78.8	77.4	77.3	ΔP = 1.0 MAX			159
AVAILABLE NPSH (M)	134							

MODE [illegible] REACTOR HOT STANDBY --- (0 PUMPS OPERATING)
ALL PUMPS ARE AT SAME SPEED
CORE FLOW = 32.5%
PUMP SPEED = 480 RPM

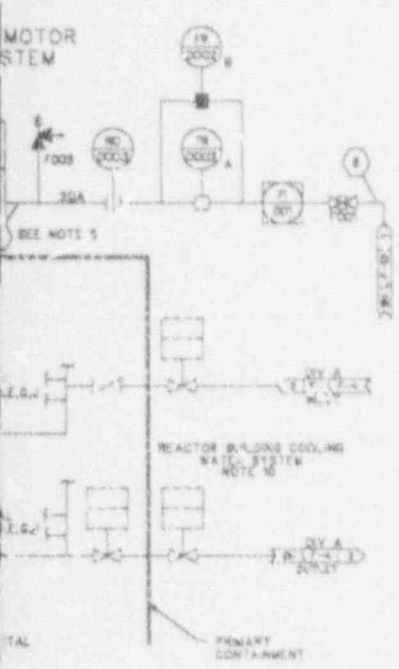
SEE NOTE 5

POSITION	1	2	3	4	5	6	7	8
FLOW M³/HR	2295	2295	2	2	30 MAX	30 MAX	15/17 NOTES 5&11	135/155 NOTES 5&11
TEMP (°C)	282	282	38	38	38		30/70	40/60
PRESS Kg/cm²	[illegible]	[illegible]	70.3	70.0	ΔP = 1.0 MAX			158
AVAILABLE NPSH (M)	18							

MODE "D" REACTOR COLD START UP --- (10 PUMPS OPERATING)
ALL PUMPS ARE AT SAME SPEED
CORE FLOW = 32.5%
PUMP SPEED = 480 RPM

SEE NOTE 5

POSITION	1	2	3	4	5	6	7	8
FLOW M³/HR	2250	2250	2	2	30 MAX	30 MAX	15/17 NOTES 5&11	135/155 NOTES 5&11
TEMP (°C)	100	100	38	38	38		30/70	40/60
PRESS Kg/cm²	1.8 [illegible]	2.2	1.8	2.2	ΔP = 1.0 MAX			158
AVAILABLE NPSH (M)	20							



MODE "A1" REACTOR NORMAL OPERATION (10 PUMPS OPERATING)
ALL PUMPS ARE AT SAME SPEED
CORE FLOW = 75% --- RATED DESIGN
PUMP SPEED @ 100% OF RATED (NOTE 8)

SEE NOTE 5

POSITION		1	2	3	4	5	6	7	8
FLOW M³/HR		7700	7700	8	8	30 MAX	XX MAX	15/25 NOTES 4&11	150/195 NOTES 4&11
TEMP. (°C)		278	278	55	36	38		30/70	40/60
PRESS.		77.6	78.8	78.0	77.8	ΔP = LO MAX			138
AVAILABLE NPSH	(M)	121							

MODE "A2" REACTOR NORMAL OPERATION (10 PUMPS OPERATING)
ALL PUMPS ARE AT SAME SPEED
CORE FLOW = 100% --- RATED DESIGN
PUMP SPEED @ 80% OF RATED (NOTE 8)

SEE NOTE 5

POSITION		1	2	3	4	5	6	7	8
FLOW M³/HR		8812	8812	7	7	30 MAX	30 MIN	15/25 NOTES 4&11	150/195 NOTES 4&11
TEMP. (°C)		278	278	49	36	38		30/70	40/60
PRESS.		77.3	78.5	77.4	77.2	ΔP = LO MAX			138
AVAILABLE NPSH	(M)	124							

MODE "V1" REACTOR NORMAL OPERATION (9 PUMPS OPERATING)
ONE PUMP OUT OF SERVICE
CORE FLOW = 100% --- RUNNING PUMP DATA
PUMP SPEED @ 100% OF RATED (NOTE 8)

SEE NOTE 5

POSITION		1	2	3	4	5	6	7	8
FLOW M³/HR		8281	8281	8	8	30 MAX	30 MIN	15/25 NOTES 4&11	150/195 NOTES 4&11
TEMP. (°C)		278	278	53	36	38		30/70	40/60
PRESS.		77.5	78.8	77.4	77.3	ΔP = LO MAX			138
AVAILABLE NPSH	(M)	134							

NOTES:

1. ALL VALVES SHOWN IN THEIR NORMAL PLANT OPERATING POSITION AND ARE IN THE SAME POSITION FOR ALL OPERATING MODES.
2. THE PURGE FLOW (RMP) 7 FLOWS IN TO THE REACTOR AT 8.
3. THE RECIRCULATION MOTOR INFLATABLE SHAFT SEAL SUBSYSTEM IS USED ONLY DURING SHUTDOWN.
4. XX/YY MEANS MIN/MAX CONDITIONS.
5. VALUES GIVEN FOR POSITION 1-7 ARE FOR EACH ONE OF THE PUMPS OPERATING IN THE DEFINED MODE CONDITION (9 OR 10 PUMPS OPERATING).
6. PUMP RATED SPEED ASSUMED AT 1500 RPM.
7. THIS VALUE IS MAXIMUM REVERSE FLOW.
8. TDH VALUES INCLUDE 0 PERCENT MARGIN.
9. POSITION "8" DICATED EXCLUSIVELY FOR DEFINING DESIGN PRESSURE/TEMPERATURE CONDITIONS (NOT PROCESS CONDITIONS).
10. RCW (P21) FOR RIP'S B,D,F,H,K, IS SIMILAR TO RIP'S A,C,E,G,J.
11. POSITIONS 7 & 8 FLOW IS GRAMS/SECOND FOR ALL MODES.

REFERENCE DOCUMENTS UNDER THE FOLLOWING IDENTITIES ARE TO BE USED IN CONJUNCTION WITH THIS DRAWING.

	WPL NO.
1. CONTROL ROD DRIVE SYS. PFD	C12-1020
2. REACTOR BUILDING COOLING WATER SYSTEM, PFD	P21-1030
3. REAC RECIRC SYS P&ID	B31-1010
4. PIPING AND INSTRUMENT SYMBOLS DIAGRAM	A10-3030

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Figure 5.4-5 REACTOR RECIRCULATION SYSTEM PFD

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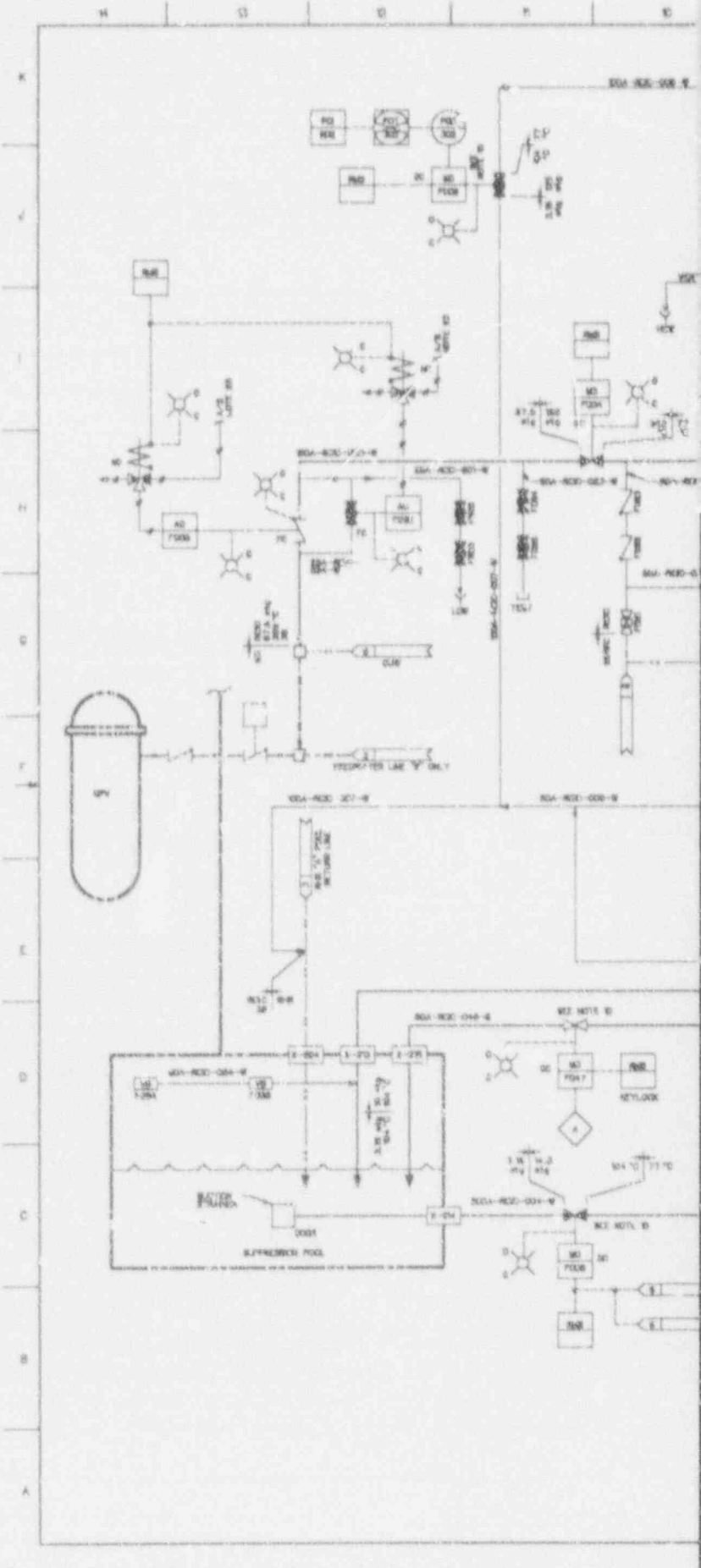

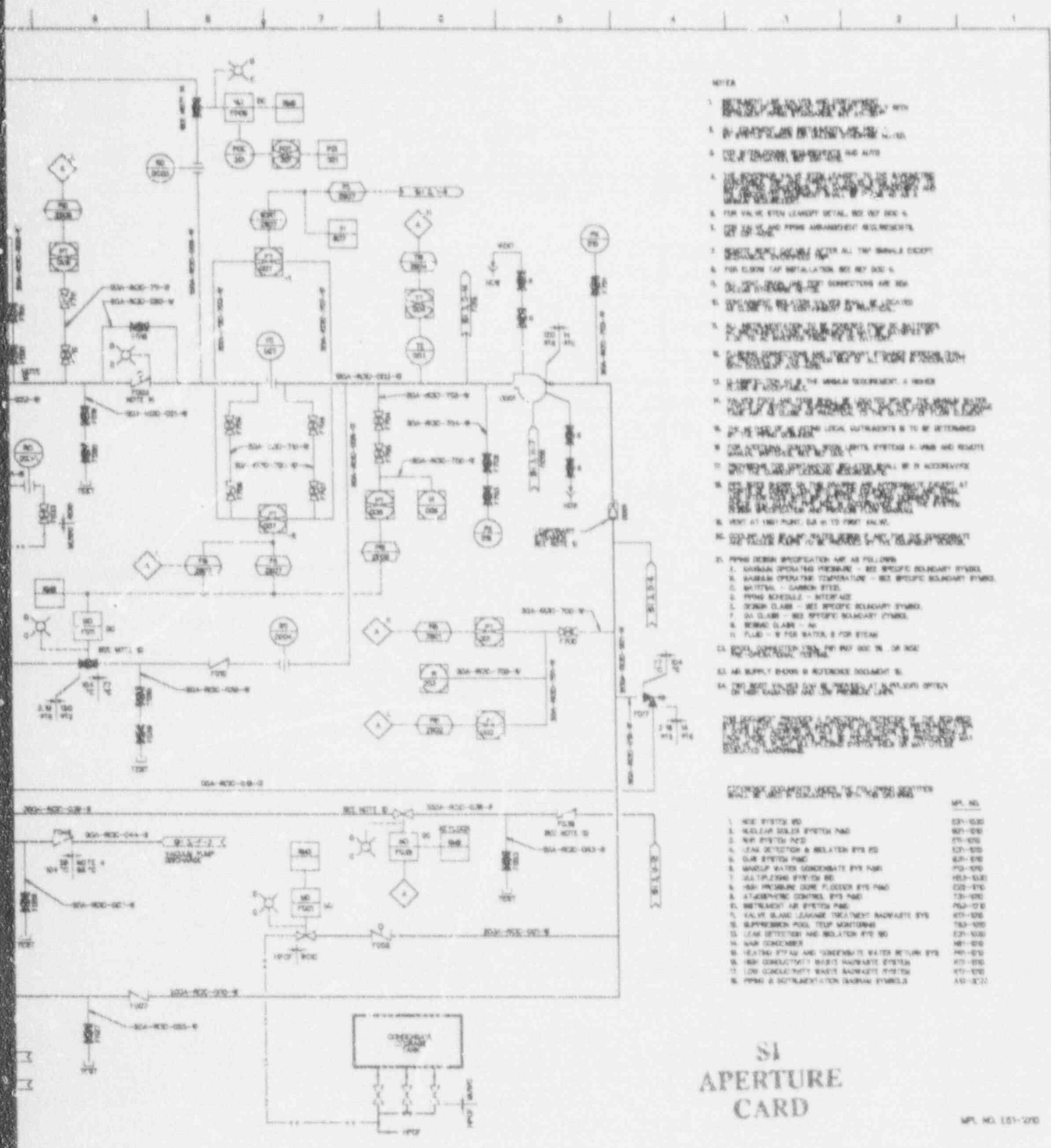

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Figure 5.4–8 REACTOR CORE ISOLATION COOLING SYSTEM P&ID (Sheet 1 of 3)

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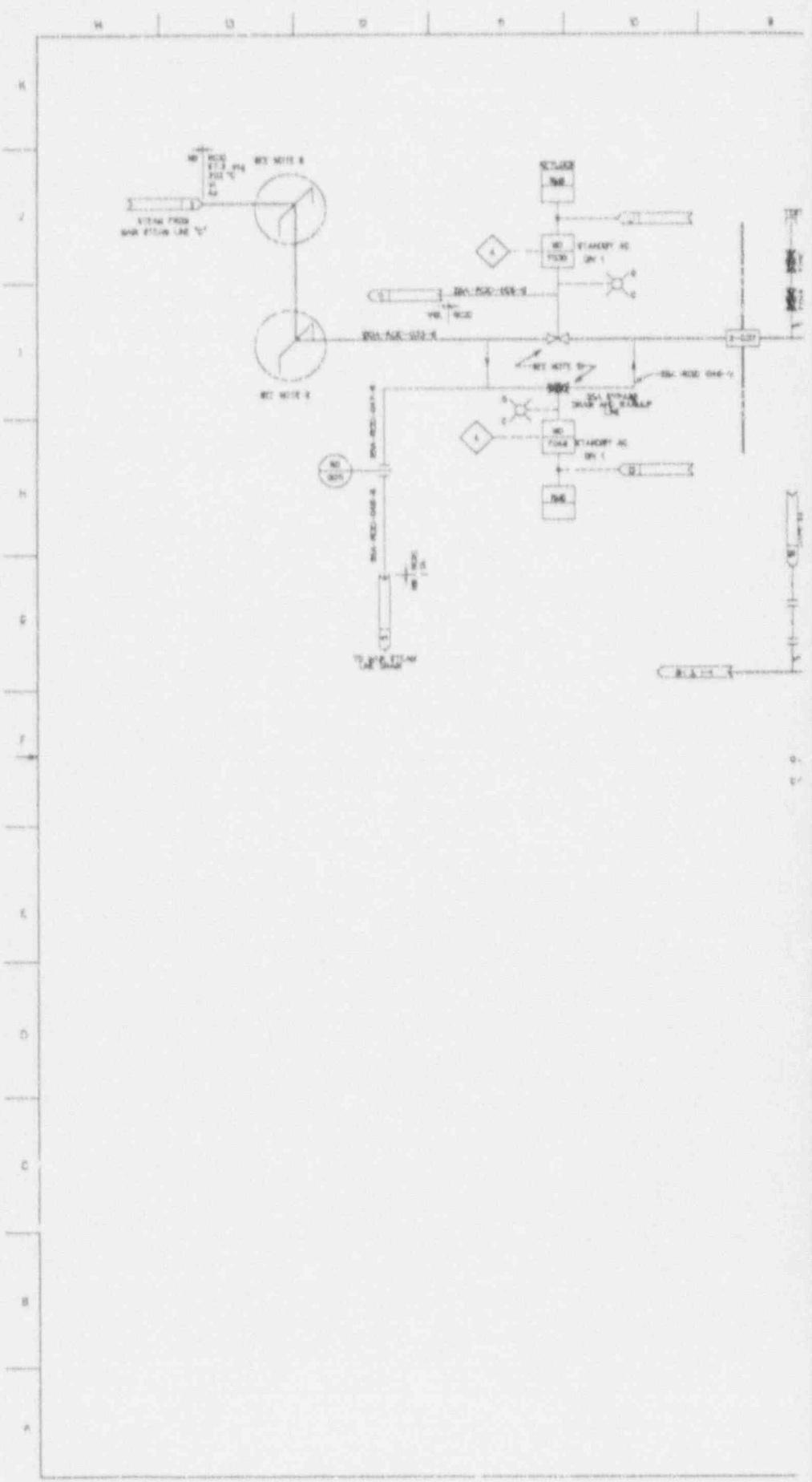

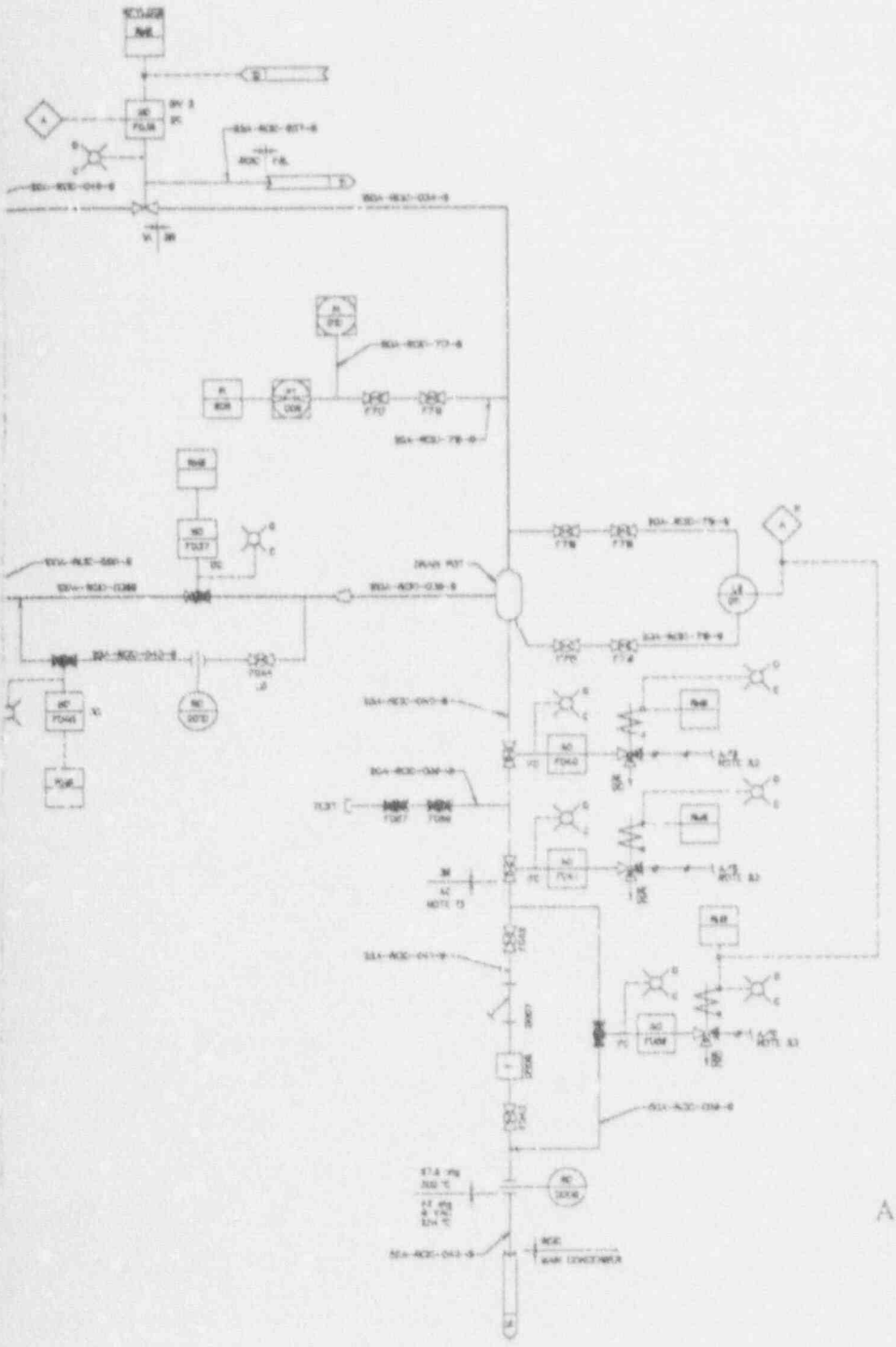

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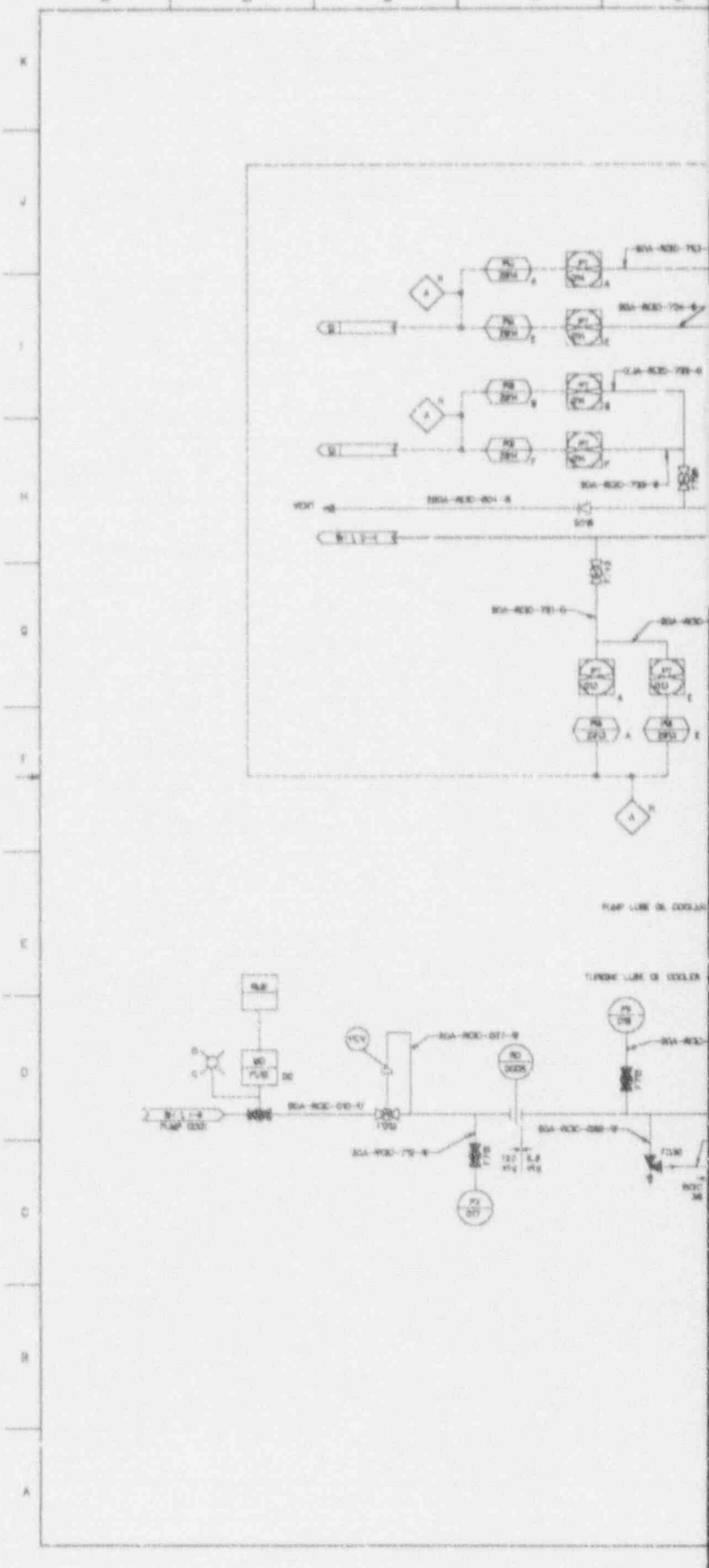
Figure 5.4–8 REACTOR CORE ISOLATION COOLING SYSTEM P&ID (Sheet 2 of 3)

9204160195 - 40



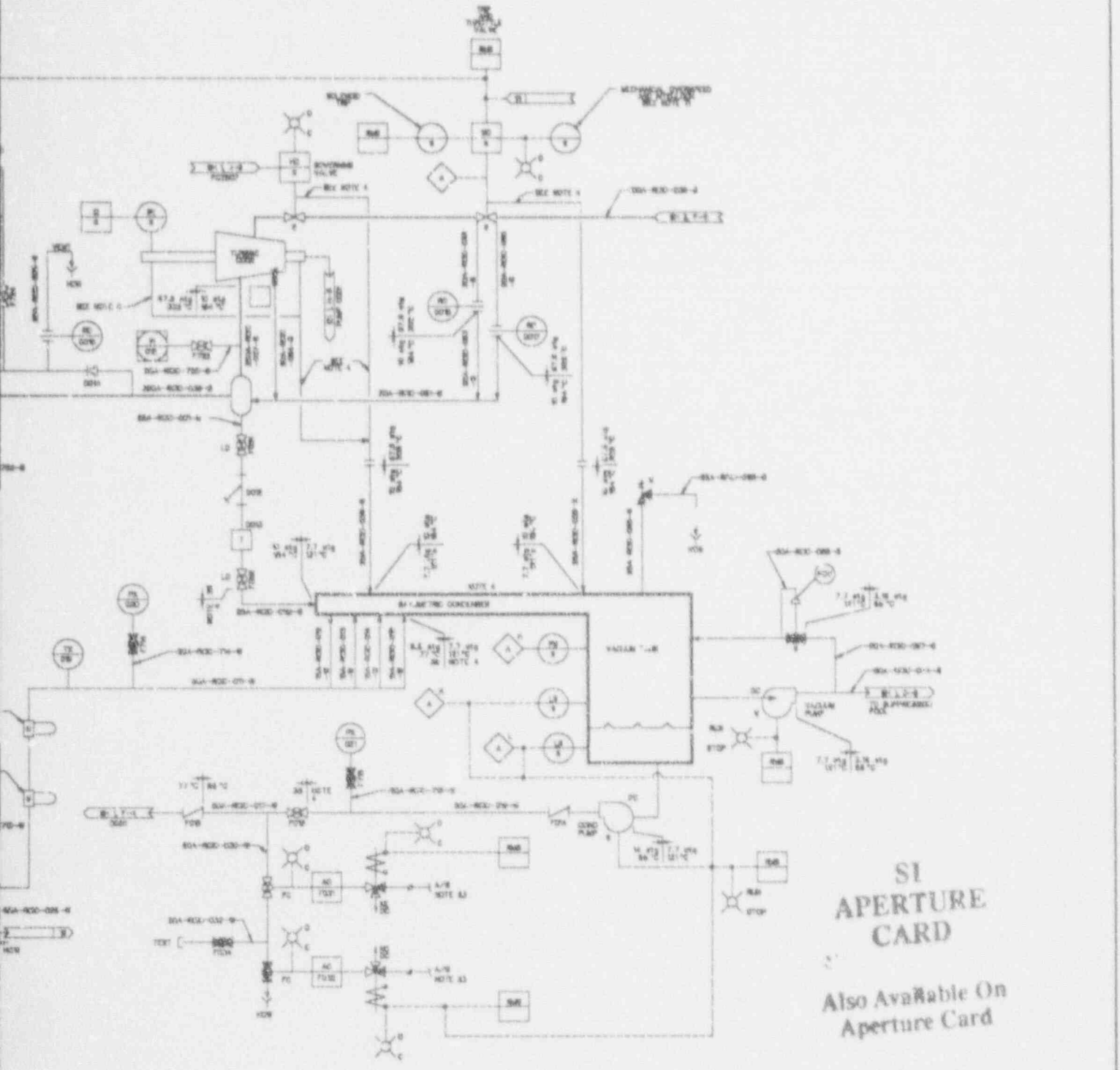


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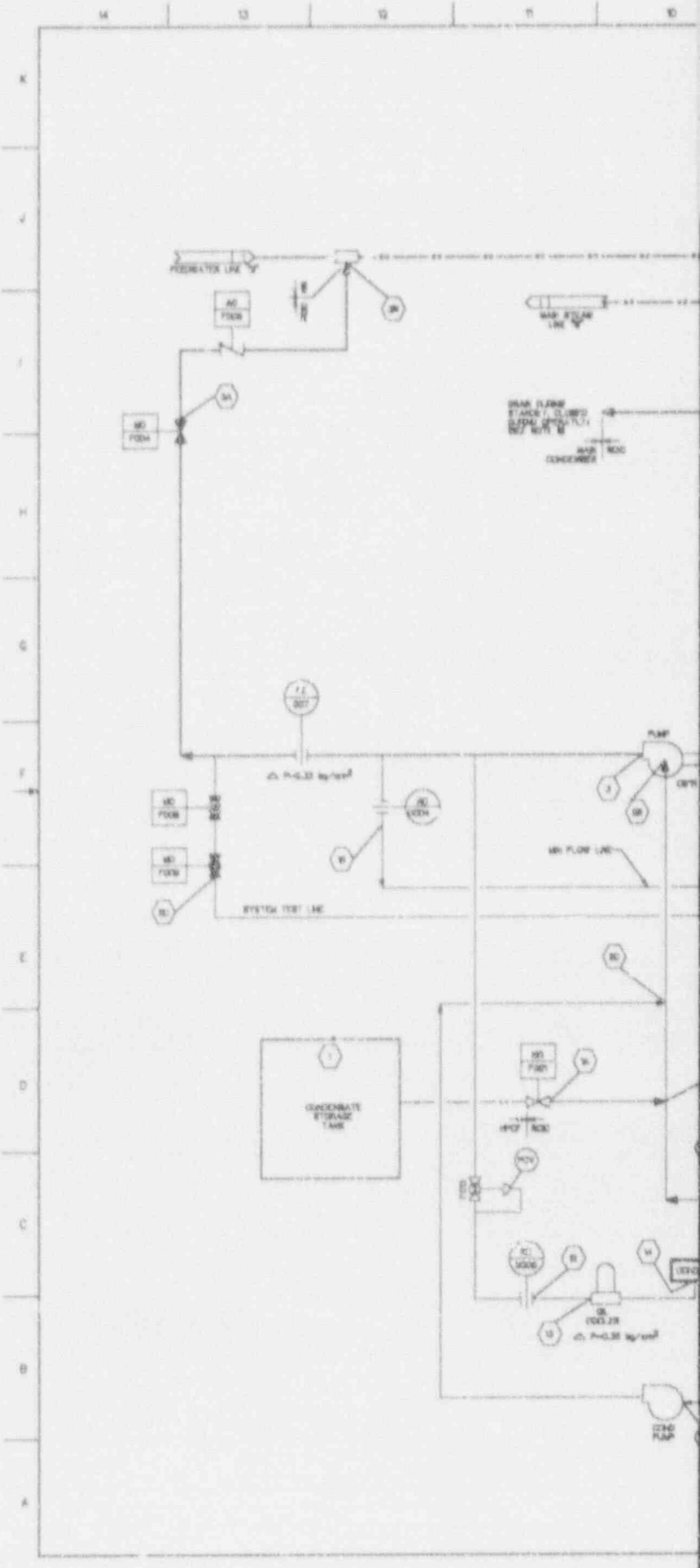
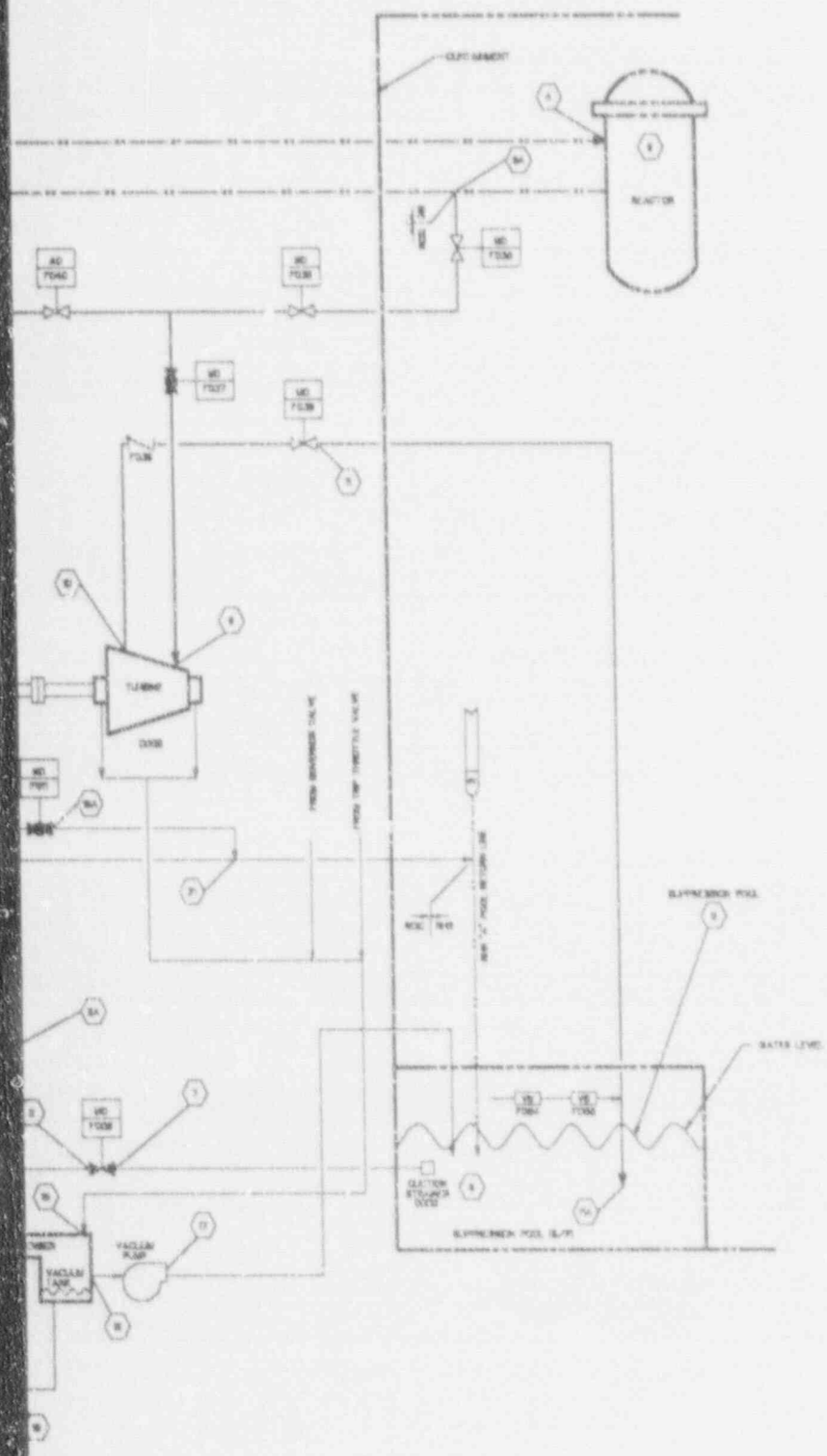
Figure 5.4–8 REACTOR CORE ISOLATION COOLING SYSTEM P&ID (Sheet 3 of 3)

9204160195 -4/





NOTES

1. ATMOSPHERIC PRESSURE OF 12 kg/cm² abs WAS USED IN CALCULATIONS.
2. RATED FLOWS ARE SHOWN IN m³/hr. RATED FLOWS IN 000 kg/hr.
3. THE UNRECOVERED FLOW CRITICAL PRESSURE DROP OF 3.5 kg/cm² (PSID DIFFUSE) IS A FIXED LOSS BETWEEN POSITIONS (3) AND (4).
4. THE LUBE OIL COOLER PRESSURE DROP OF 0.35 kg/cm² IS A FIX LOSS BETWEEN POSITIONS (12) AND (14).
5. THE CONTROLLING MODES FOR LINE MIXING ARE ARRANGEMENT AND:

SUCTION FROM CONDENSATE STORAGE	MODE A & B
SUCTION FROM SUPPRESSION POOL	MODE C & D
PUMP SHUTDOWN	MODE D & B
RETURN SUPPLY	MODE A & B
TURBINE EXHAUST	MODE A & C
TEST LINE	MODE C
COOLING SYSTEM	MODE A

6. SYSTEM OPERATION IS POSSIBLE WITH INITIATIVE PRESSURES IN THE REACTOR VESSEL AND THE SUPPRESSION POOL AT THESE VESSEL CONDITIONS DO NOT CONFORM WITH THE SPECIFICATION, AND NO DATA IS SHOWN.
7. PUMP MINIMUM FLOW REQUIREMENT MAY OCCUR DURING ANY OPERATING MODE. FLOW REQUIREMENT IS 30.5 m³/hr WHEN WITH TURBINE/PUMP AT MINIMUM SPEED (LT. MODE A).
8. DURING SYSTEM STANDBY, EQUIPMENT IS NOT OPERATING, INTERMITTENT FLOW OCCURS THROUGH THE RETURN SUPPLY LINE DRAIN TRAP SYSTEM AT 10 kg/cm² AIR AND 760°C.
9. THIS TABLE IS FOR INFORMATION ONLY. SEE NOTE 5 AND 6 FOR REQUIRED VALUES.
10. FLOW VALUES SHOWN IN MODES C & D ARE BASED UPON INJECTION PIPING SYSTEM PERMITTING THE MINIMUM REQUIRED AMOUNT OF COOLABLE TO BE PROVIDED TO THE RCIC PUMP WHEN THE SUPPRESSION POOL SUCTION STRAINER IS NOT PROPERLY FLOODED.
11. RETURN FLOWS FOR TEST MODE AT PUMP 2A (1) (5) (7) AIR (16) ARE BASED UPON A PUMP TDH OF 760 m.
12. DURING RCIC SYSTEM OPERATION A FLOW OF 0.05 m³/hr OCCURS THROUGH THE TURBINE EXHAUST LINE DRAIN TO SYSTEM AT 10 kg/cm² Abs AND 760°C.
13. SEE NOT DOC 1 FOR PEAK PRESSURE.

REFERENCE DOCUMENTS UNDER THE FOLLOWING IDENTIFIER SHALL BE USED IN CONJUNCTION WITH THIS DRAWING:

	APL. NO.
1. NUCLEAR BOILER SYSTEM PFD	001-5001
2. RESIDUAL HEAT REMOVAL SYSTEM PFD	074-5002
3. HIGH PRESSURE CORE FLOODER SYS PFD	033-5001
4. RCIC P-T/Gs P&ID	031-1010
5. PIPING - I/C INSTRUMENTATION	010-5030

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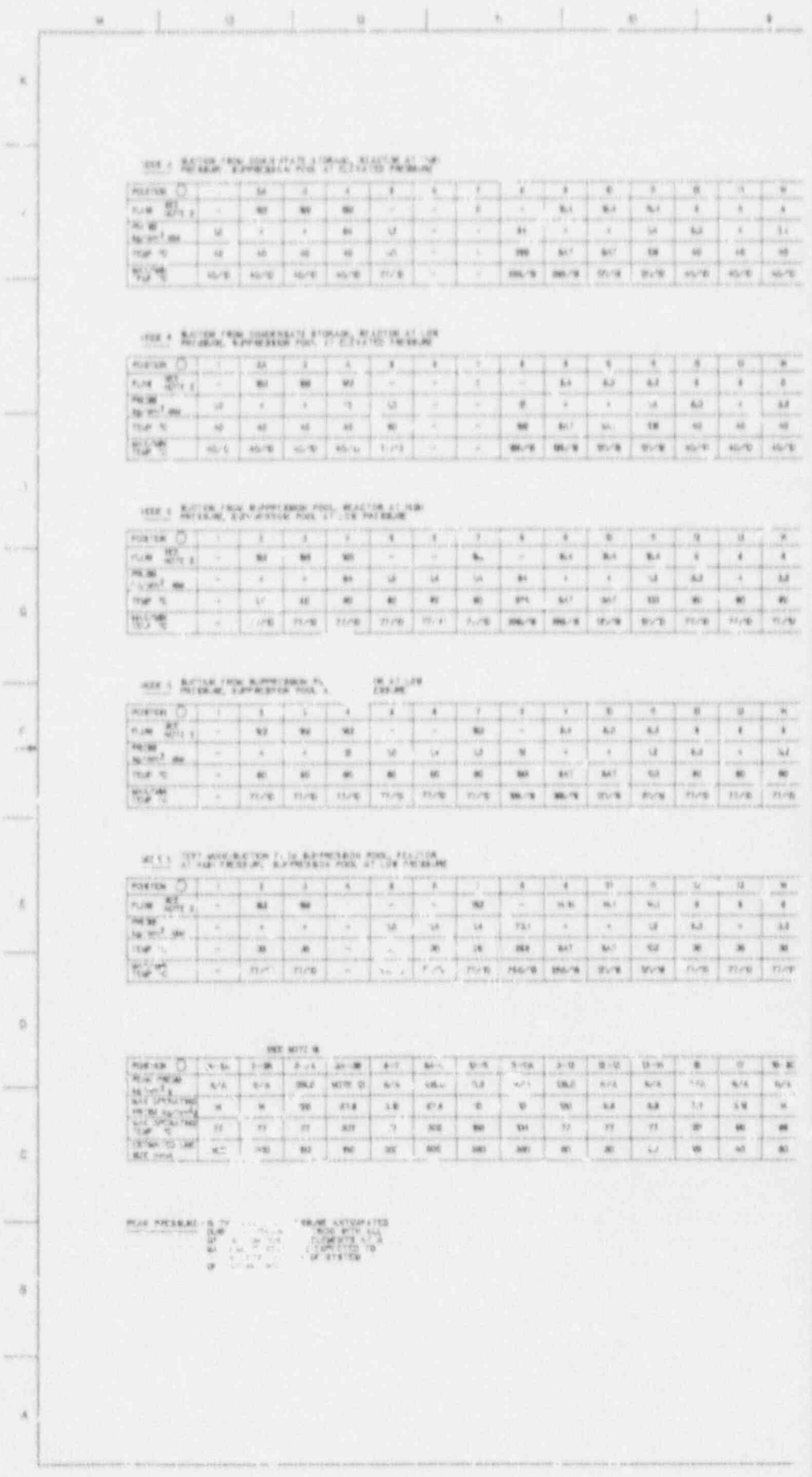
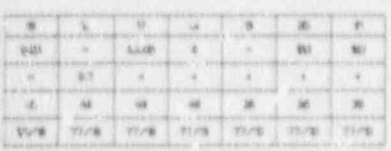
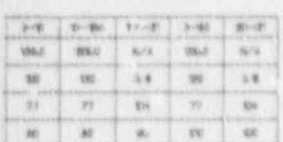
Figure 5.4-9 RCIC SYSTEM PFD (Sheet 1 of 2)

9204160195 -42







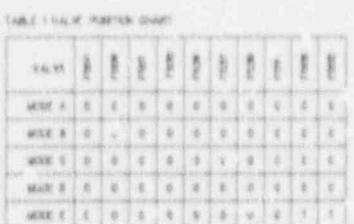


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Figure 5.4–9 RCIC SYSTEM PFD (Sheet 2 of 2)

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NOTES:

1. [illegible] ARE TO BE ASME AS NOTED.
2. [illegible] SHALL BE [illegible] WITH [illegible] CRITERIA.
3. [illegible] REQUIRED IF [illegible] FOR [illegible].
4. [illegible] ALARMS, [illegible] ARE [illegible].
5. [illegible] SHALL BE [illegible].
6. [illegible] SHALL BE LOCATED AT AN ELEVATION [illegible].
7. [illegible] RATED, IF REQUIRED, IS SPECIFIED BY [illegible].
8. [illegible] SHALL BE LOCKED AS CLOSE AS POSSIBLE TO THE CONTAINMENT PENETRATION.
9. [illegible] SHALL HAVE [illegible] AND THE EQUIPMENT NUMBER.
10. [illegible] AND TEMPORARY STRAINER SHALL BE PROVIDED.
11. [illegible] SHALL BE HORIZONTAL OR VERTICAL UNLESS [illegible].
12. [illegible] SHALL BE LOCATED AT THE HIGHEST POINT OF THE PIPING OUTSIDE THE CONTAINMENT BETWEEN VALVES [illegible].
13. [illegible] RETURN TO RPV THROUGH PENETRATION [illegible].
14. [illegible] FOR [illegible] SHALL BE ROUTED UPSTREAM OF REMOTE M.O. OR MANUAL ISOLATION.
15. VALVE [illegible] SHALL BE AS CLOSE AS POSSIBLE TO THE CONNECTION TO THE MAIN LINE.
16. [illegible] SHALL BE INSTALLED AT THE HIGHEST POINT IN THE [illegible] SHALL MEET THE PIPING SLOPE REQUIREMENTS.
17. [illegible] SHALL BE LOCATED AS CLOSE AS PRACTICAL TO THE REACTOR [illegible].
18. VALVES [illegible] ARE TO BE [illegible] WITH [illegible] OPERATOR [illegible] AND [illegible] AS FOLLOWS:
    A. MANUAL OPERATING PRESSURE - SEE SPECIFIC BOUNDARY SYSTEM
    B. MANUAL OPERATING TEMPERATURE - SEE SPECIFIC BOUNDARY SYSTEM
    C. MATERIAL - CARBON STEEL
    D. PIPING [illegible] - BUTTWELD
    E. [illegible] CLASS - SEE SPECIFIC BOUNDARY SYSTEMS
    F. [illegible] CLASS - SEE SPECIFIC BOUNDARY SYSTEMS
    G. SEISMIC CLASS - [illegible]
    H. FLUID - WATER
19. AIR SUPPLY TO [illegible] AIR SYSTEM SUPPLY. SEE SPECIFIED SUPPLY SYSTEM SUPPLY. SEE SUPPLY SYSTEM SUPPLY.
20. STRAINER TYPE AS SUPPLIED WITH [illegible].
21. [illegible] FOR [illegible] SHALL BE [illegible].

14. [illegible]
15. [illegible]
17. [illegible]
18. [illegible]
19. [illegible]

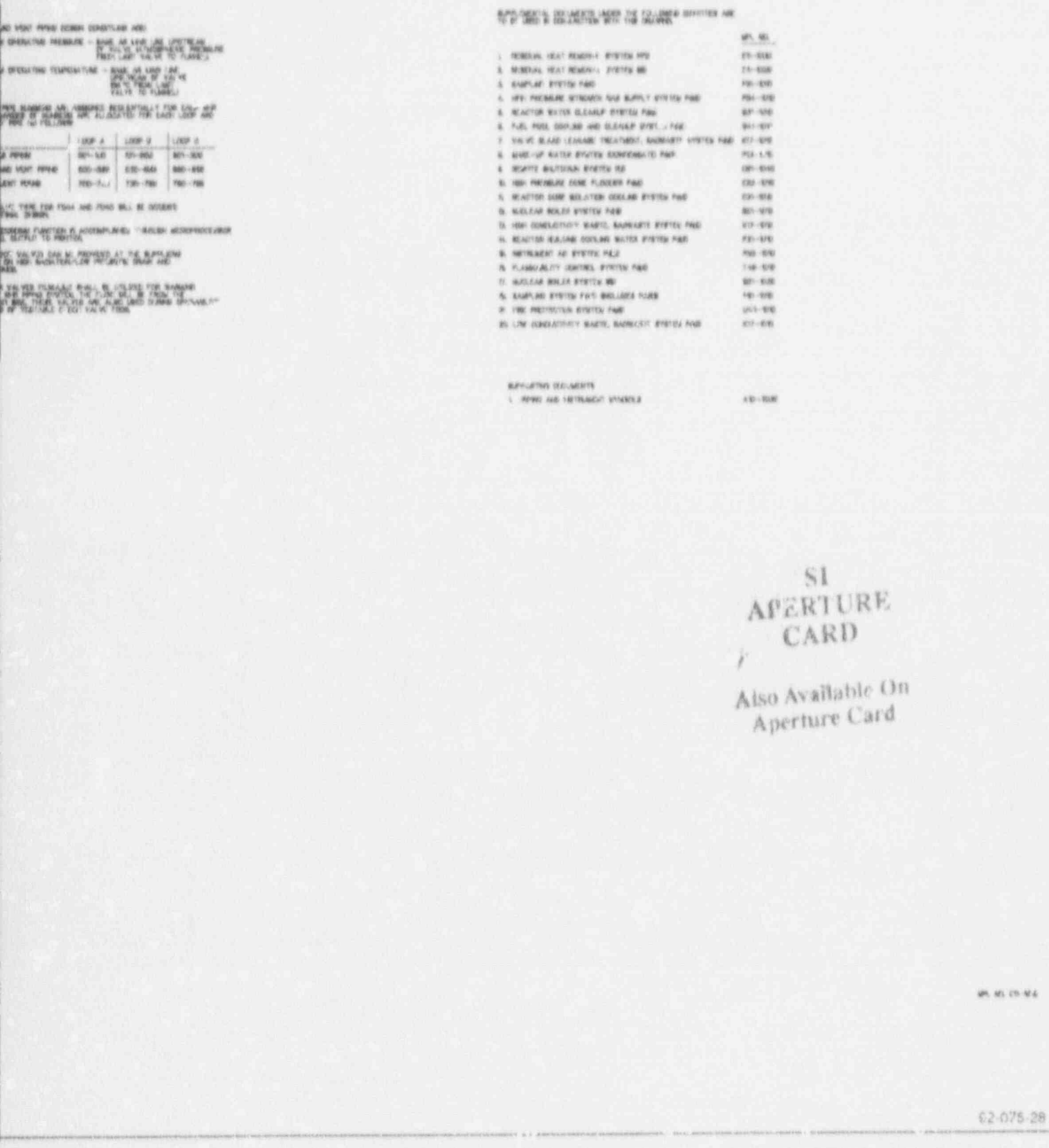

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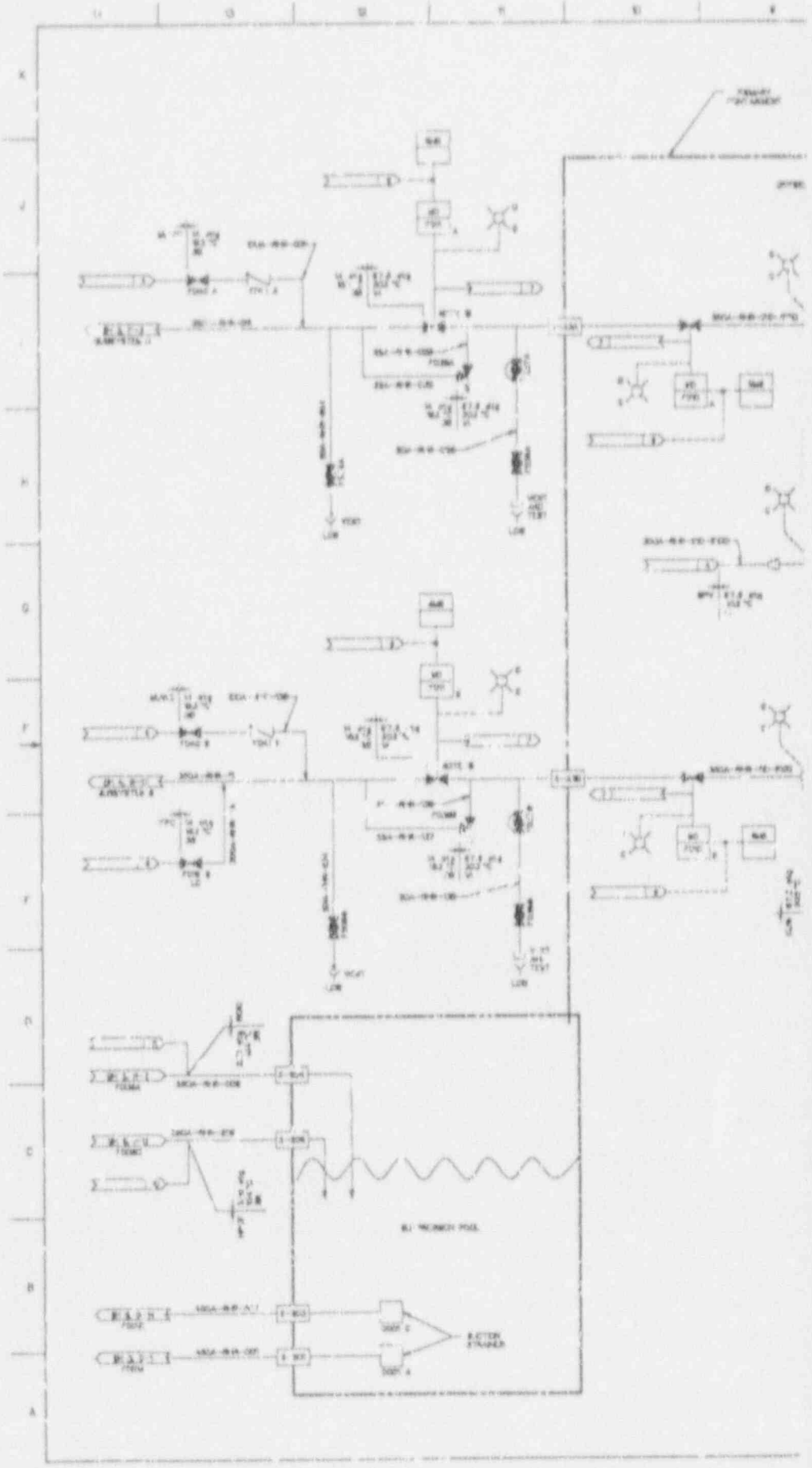
Figure 5.4-10 RESIDUAL HEAT REMOVAL SYSTEM P&ID (Sheet 1 of 7)



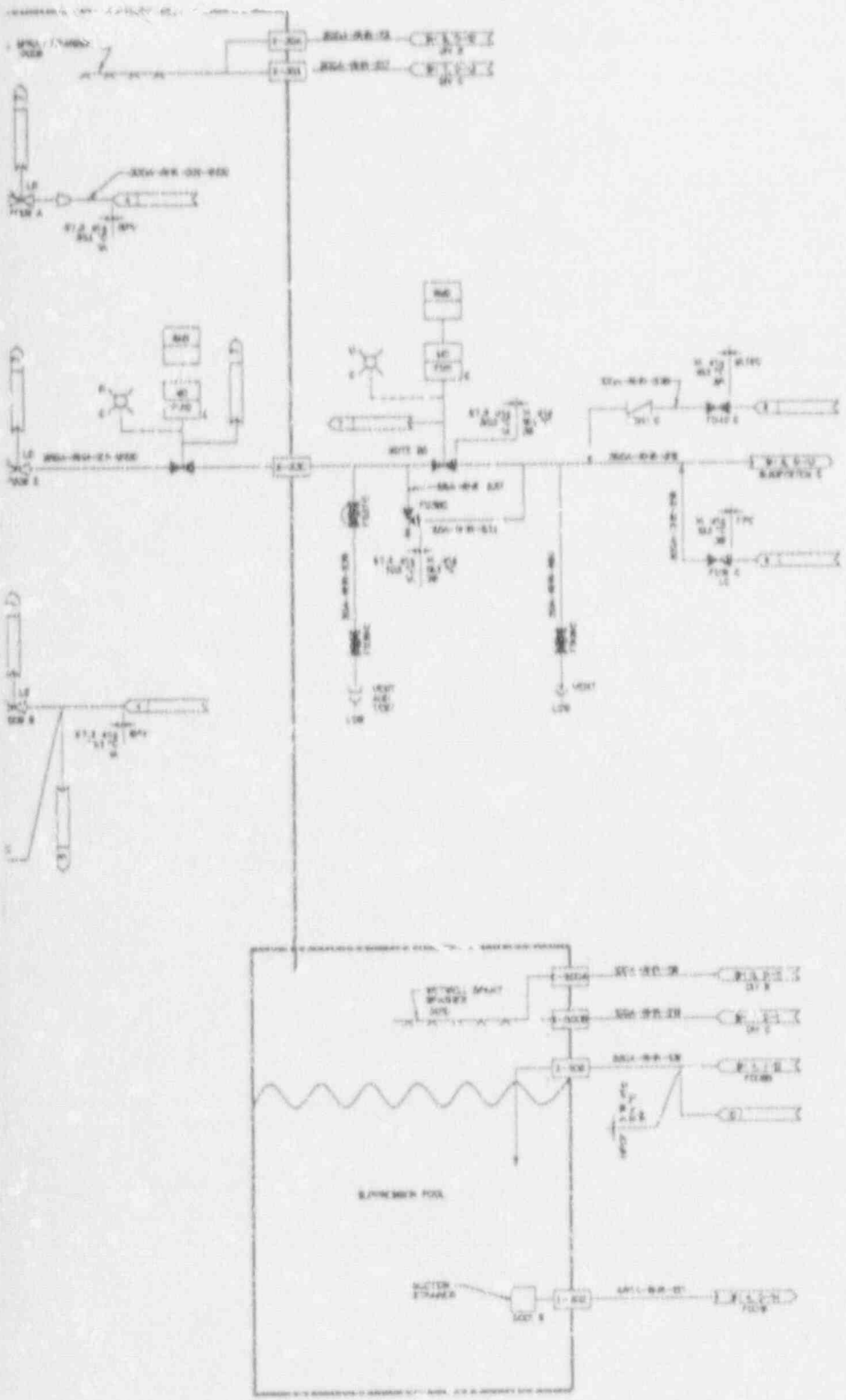


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Figure 5.4-10 RESIDUAL HEAT REMOVAL SYSTEM P&ID (Sheet 2 of 7)

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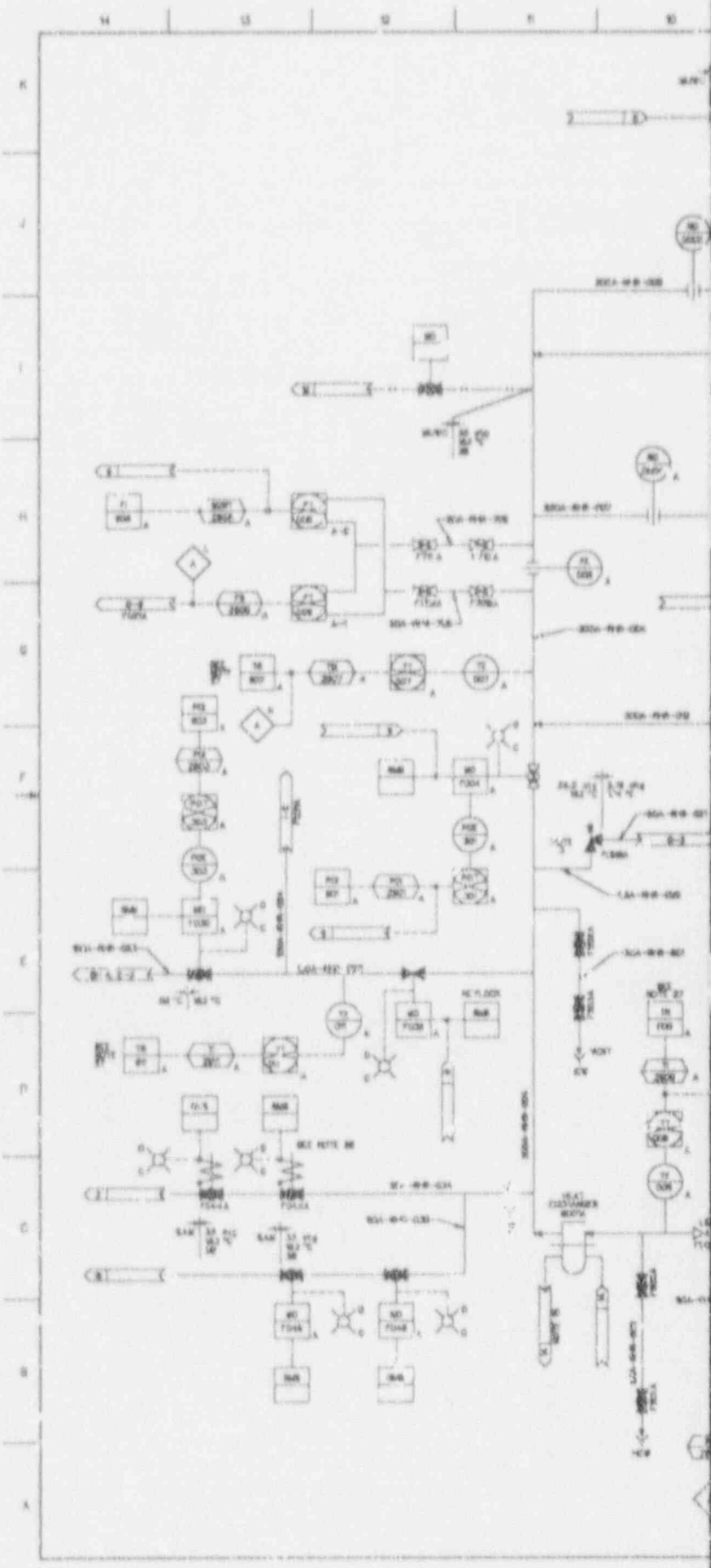

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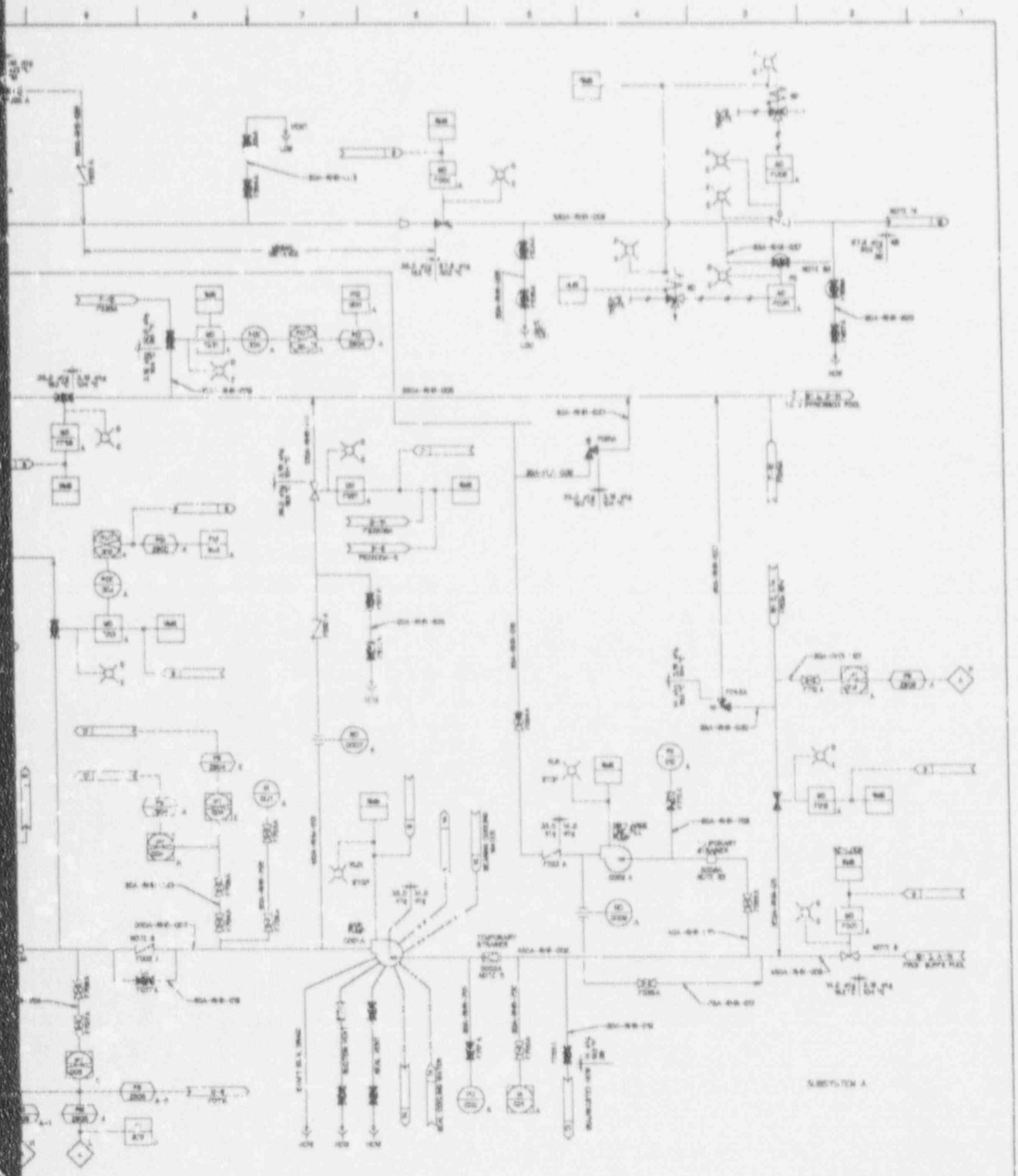
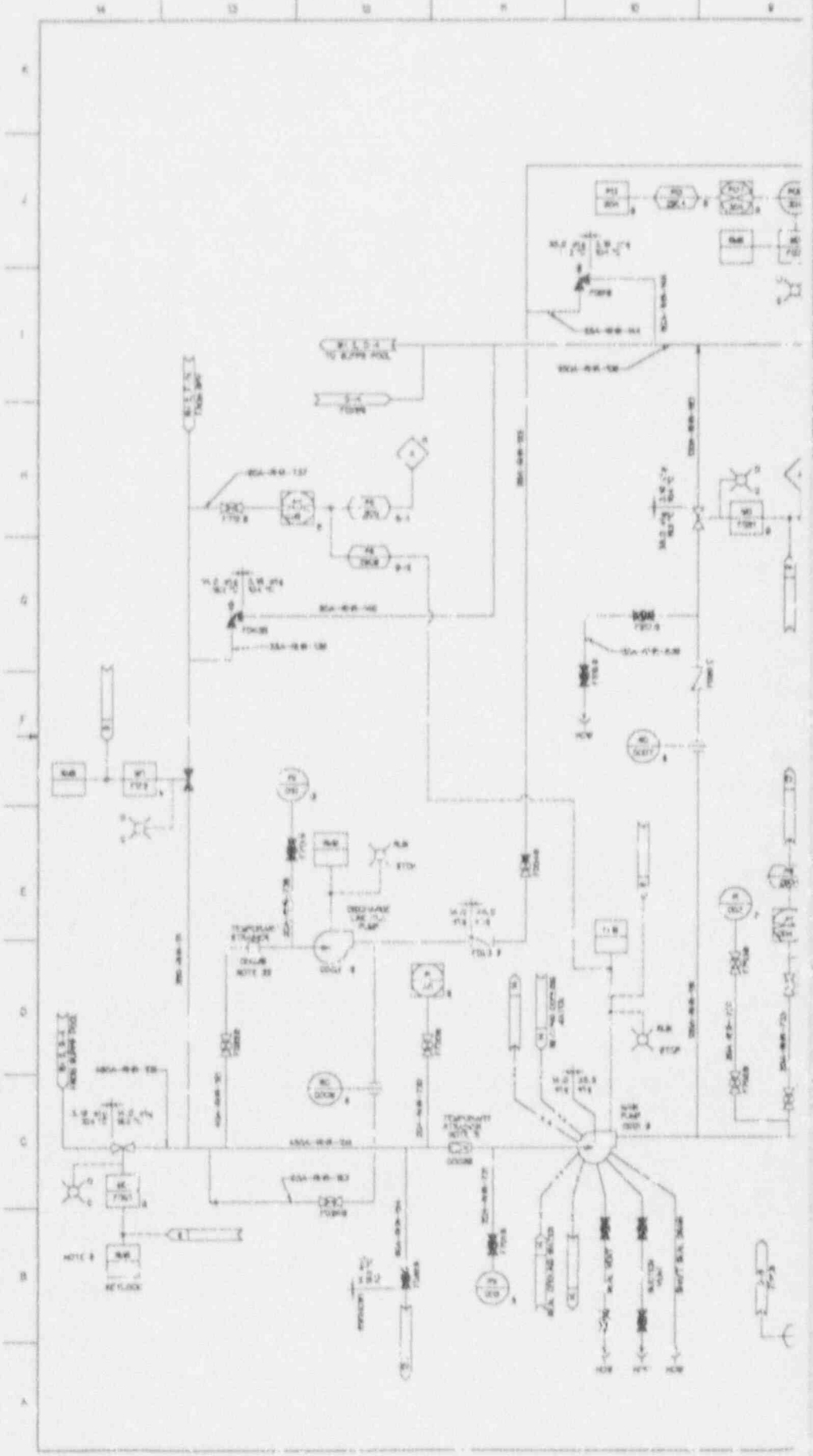


Figure 5.4-10 RESIDUAL HEAT REMOVAL SYSTEM P&ID (Sheet 3 of 7)

9204160195-46



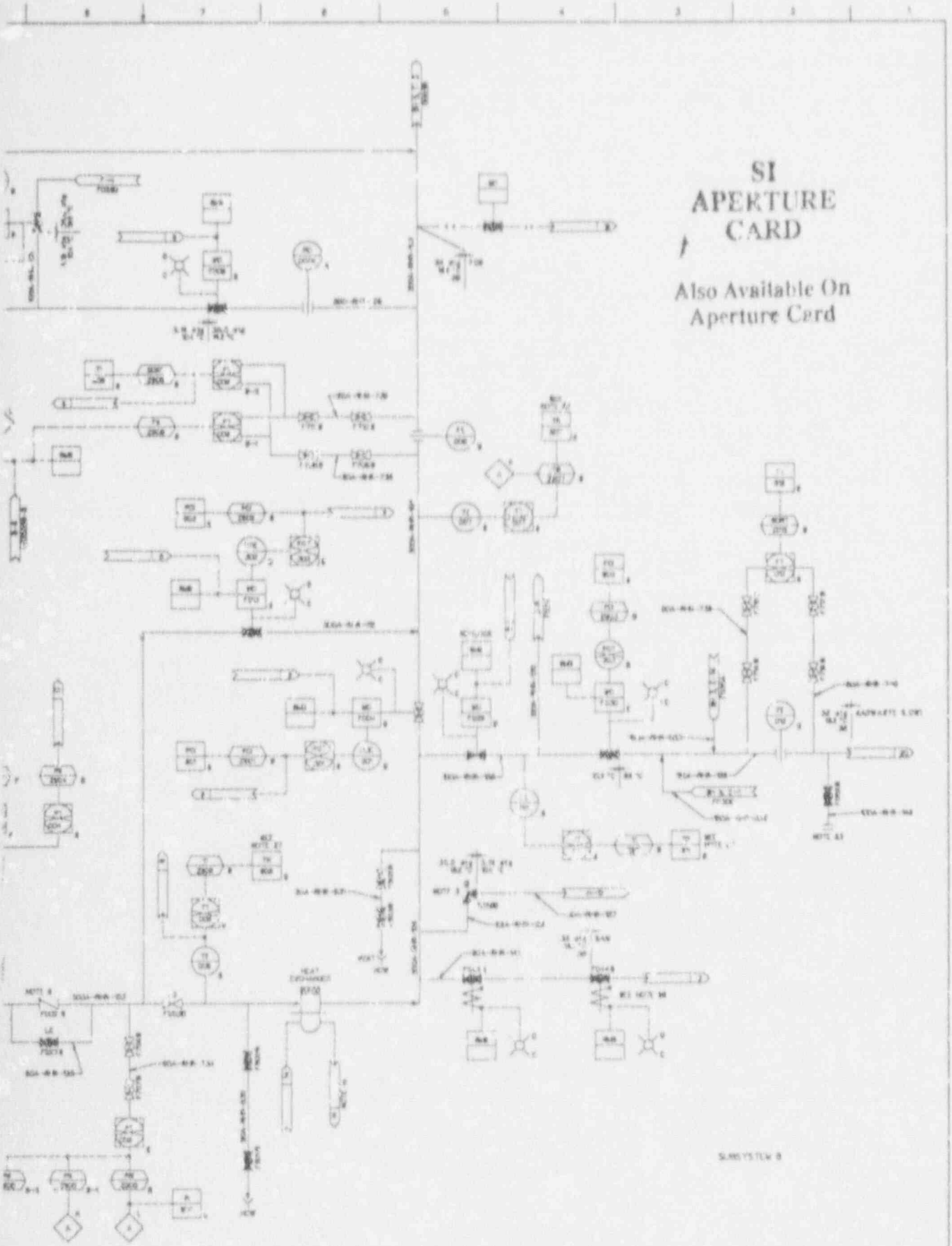
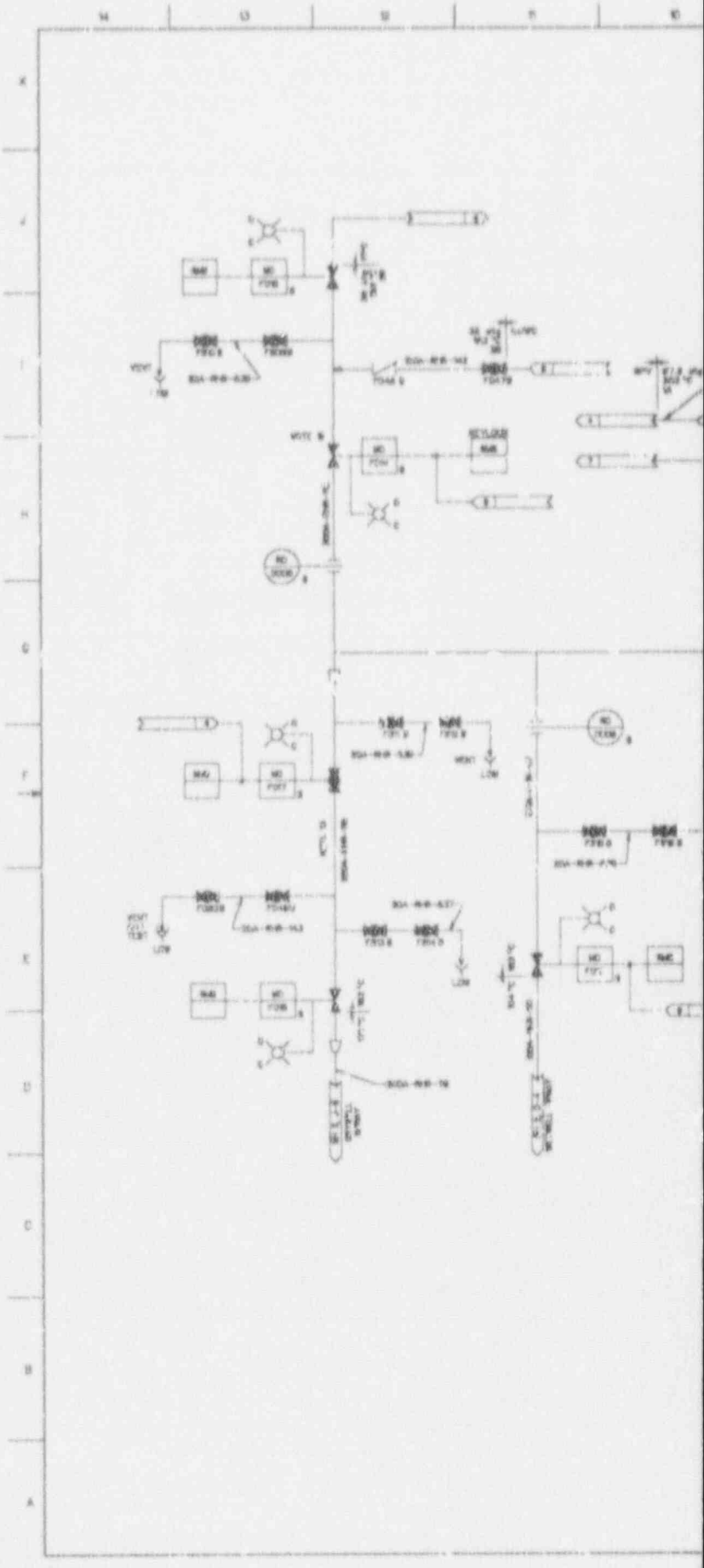


Figure 5.4–10 RESIDUAL HEAT REMCVAL SYSTEM P&ID (Sheet 4 of 7)

9204160195 – 47



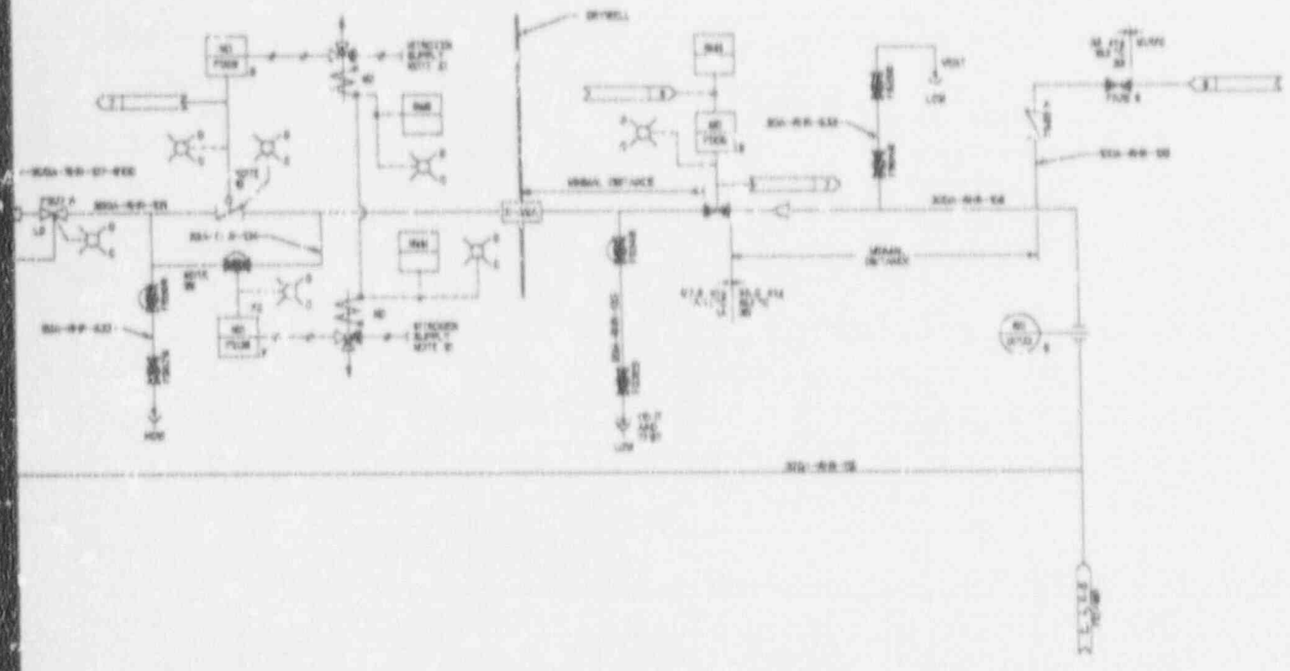


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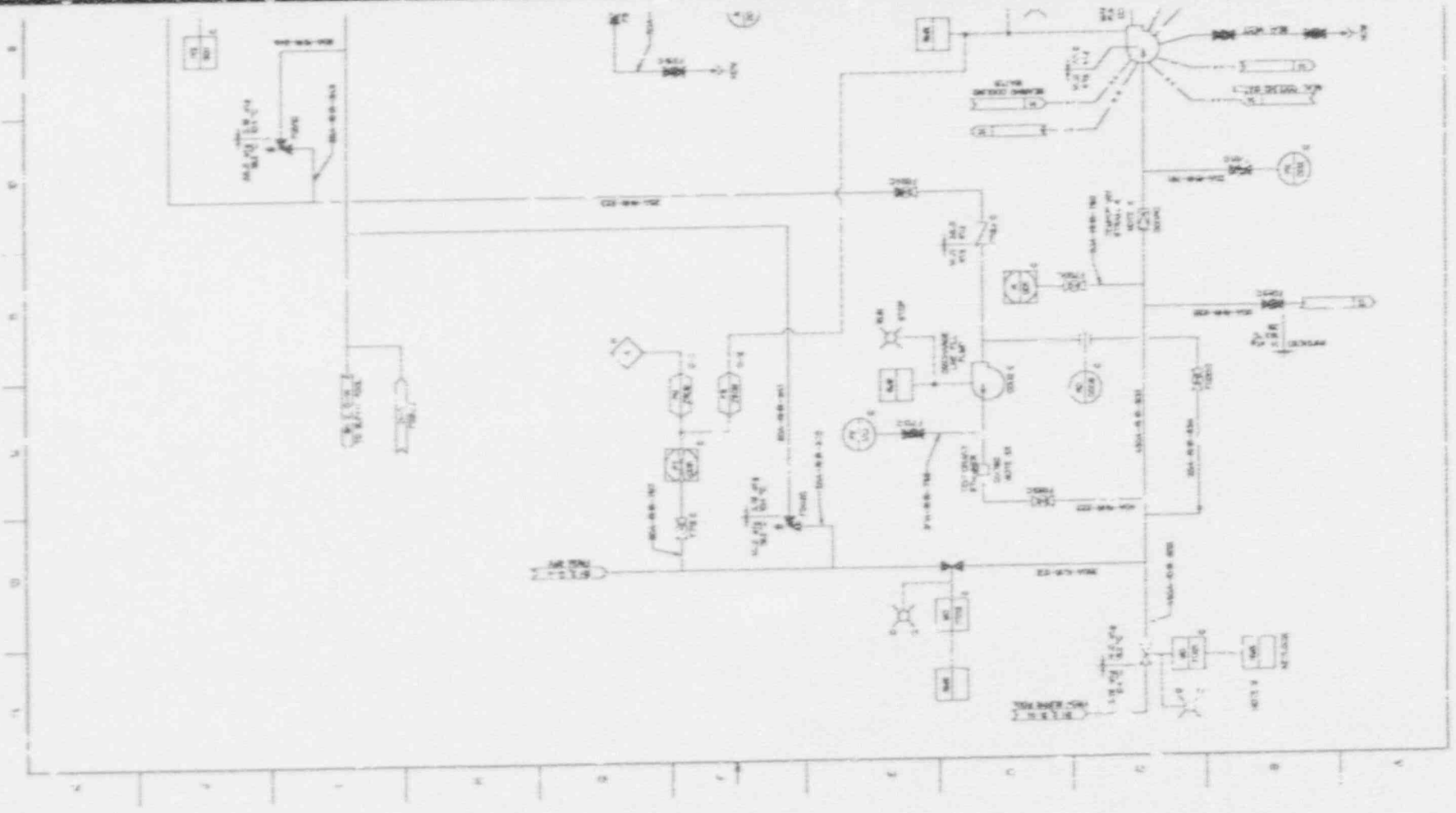
Figure 5.4–10 RESIDUAL HEAT REMOVAL SYSTEM P&ID (Sheet 5 of 7)

9204160195-48



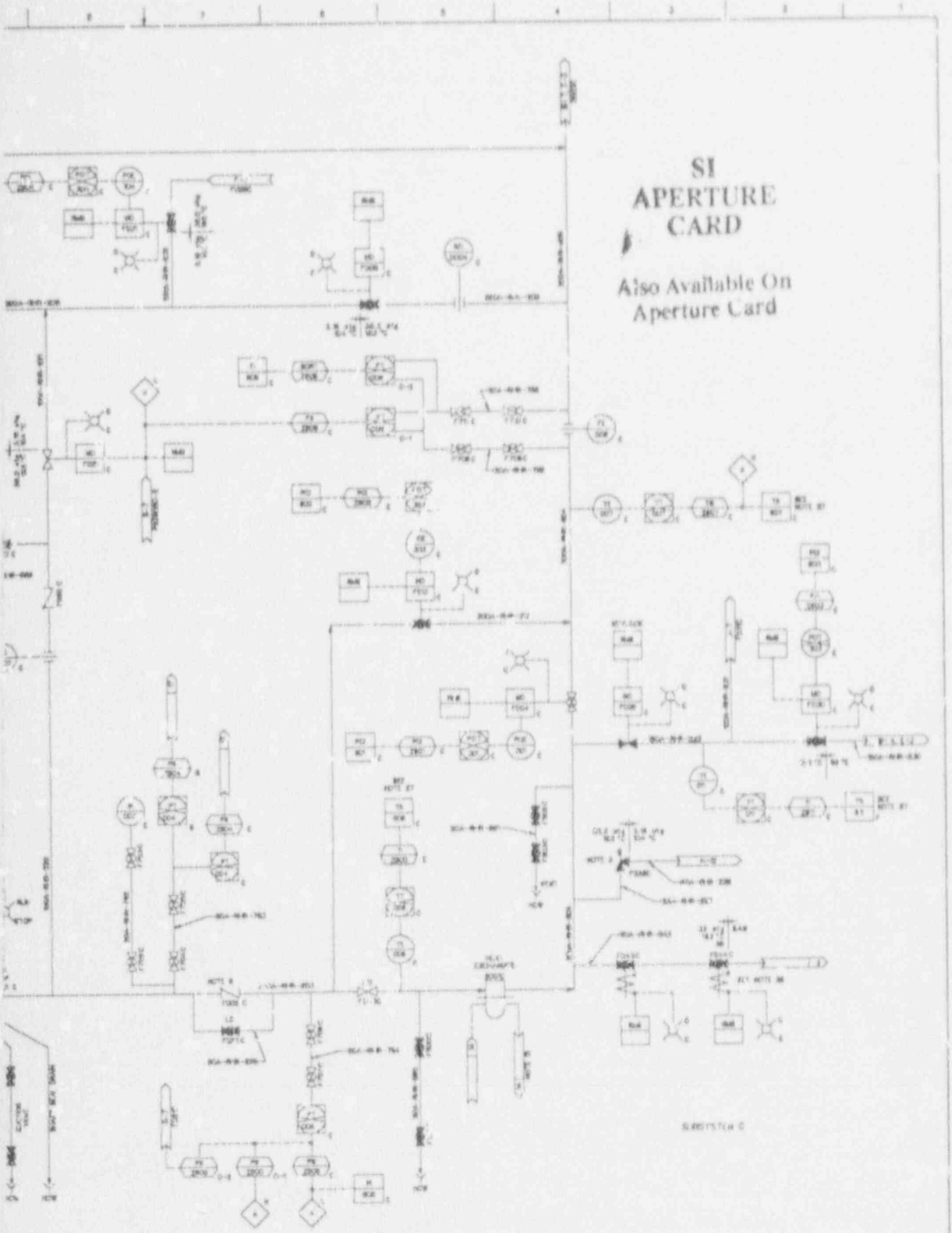
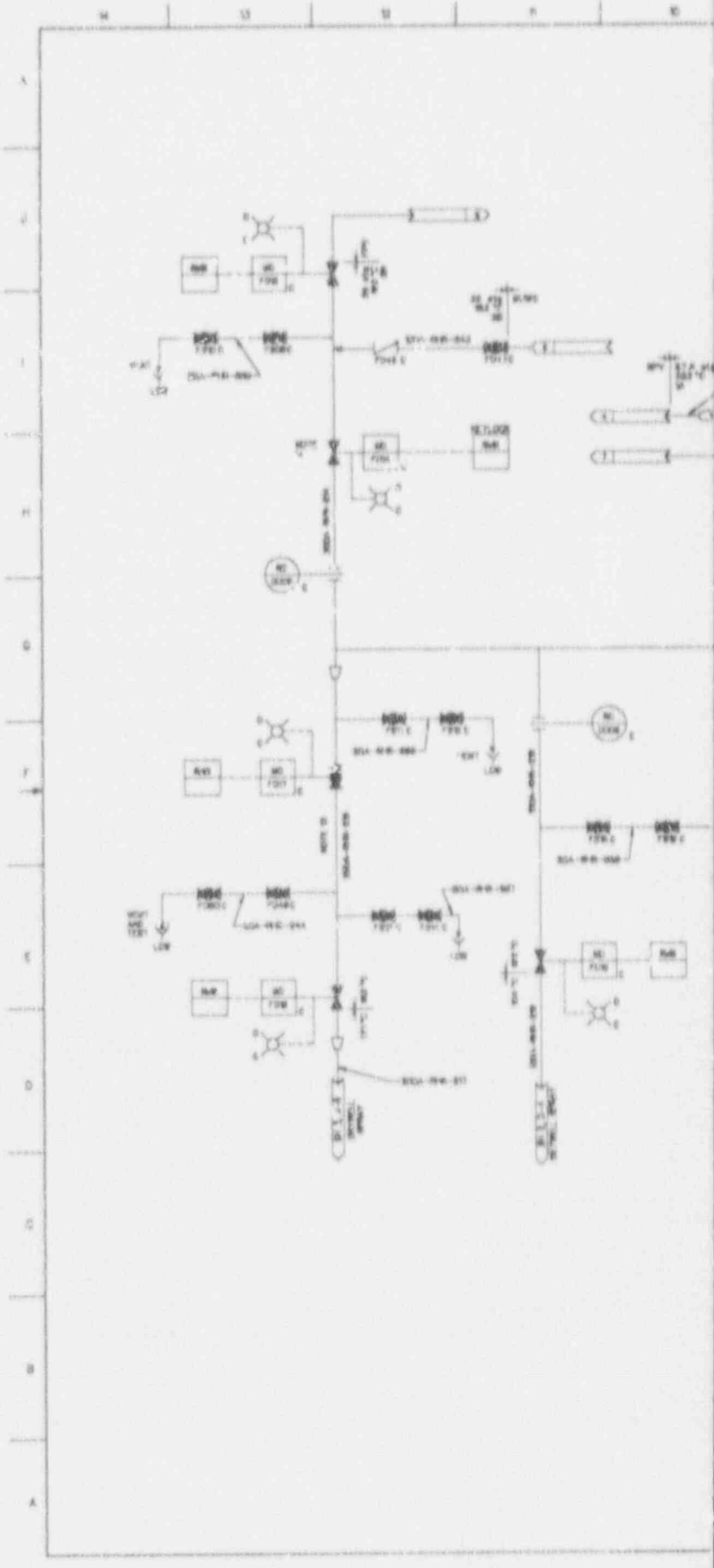


Figure 5.4–10 RESIDUAL HEAT REMOVAL SYSTEM P&ID (Sheet 6 of 7)

9204160195 -49



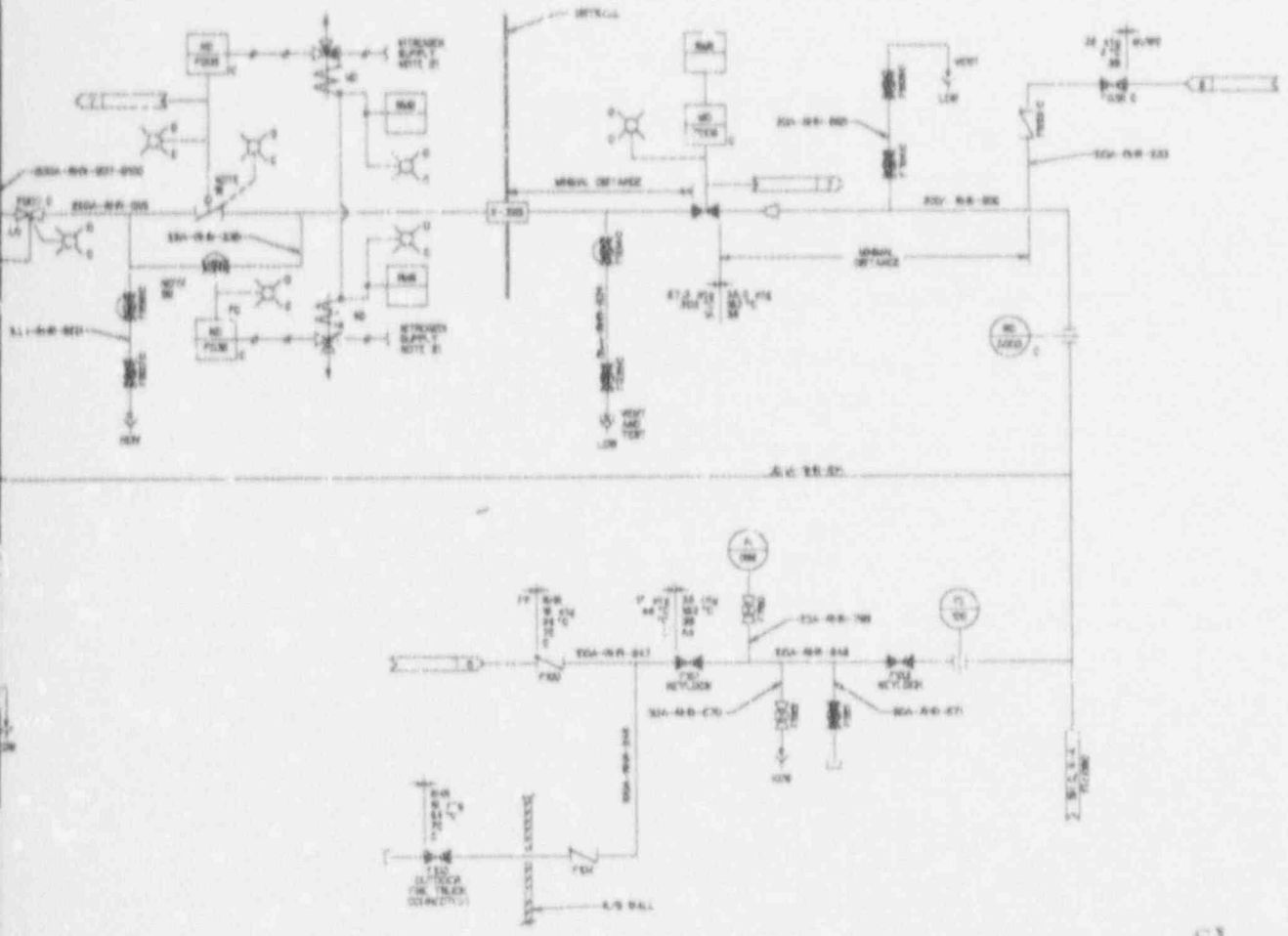


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Figure 5.4-10 RESIDUAL HEAT REMOVAL SYSTEM P&ID (Sheet 7 of 7)

9204160195-50

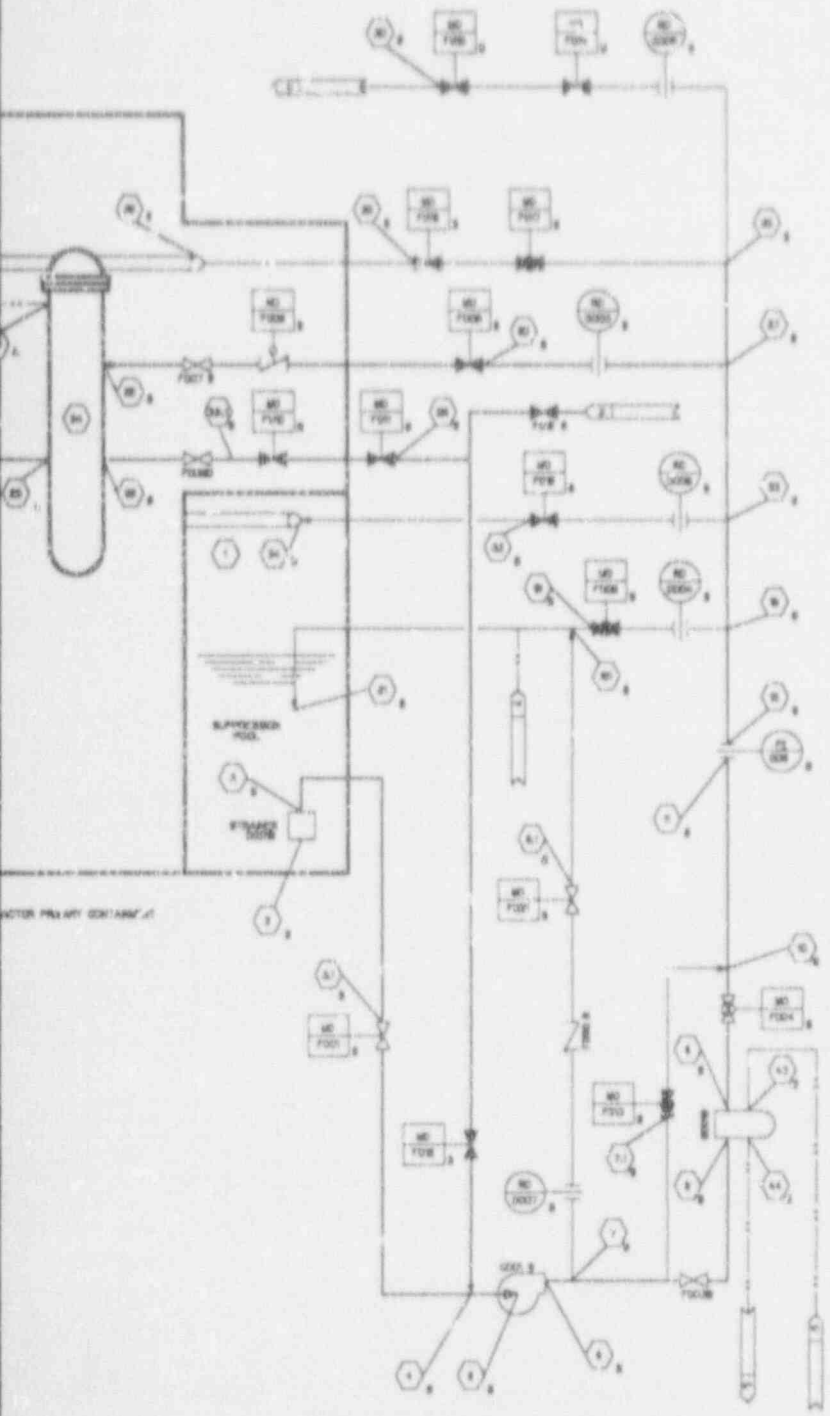

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Figure 5.4–11 RHR SYSTEM PFD (Sheet 1 of 2)

9204160195 -5/

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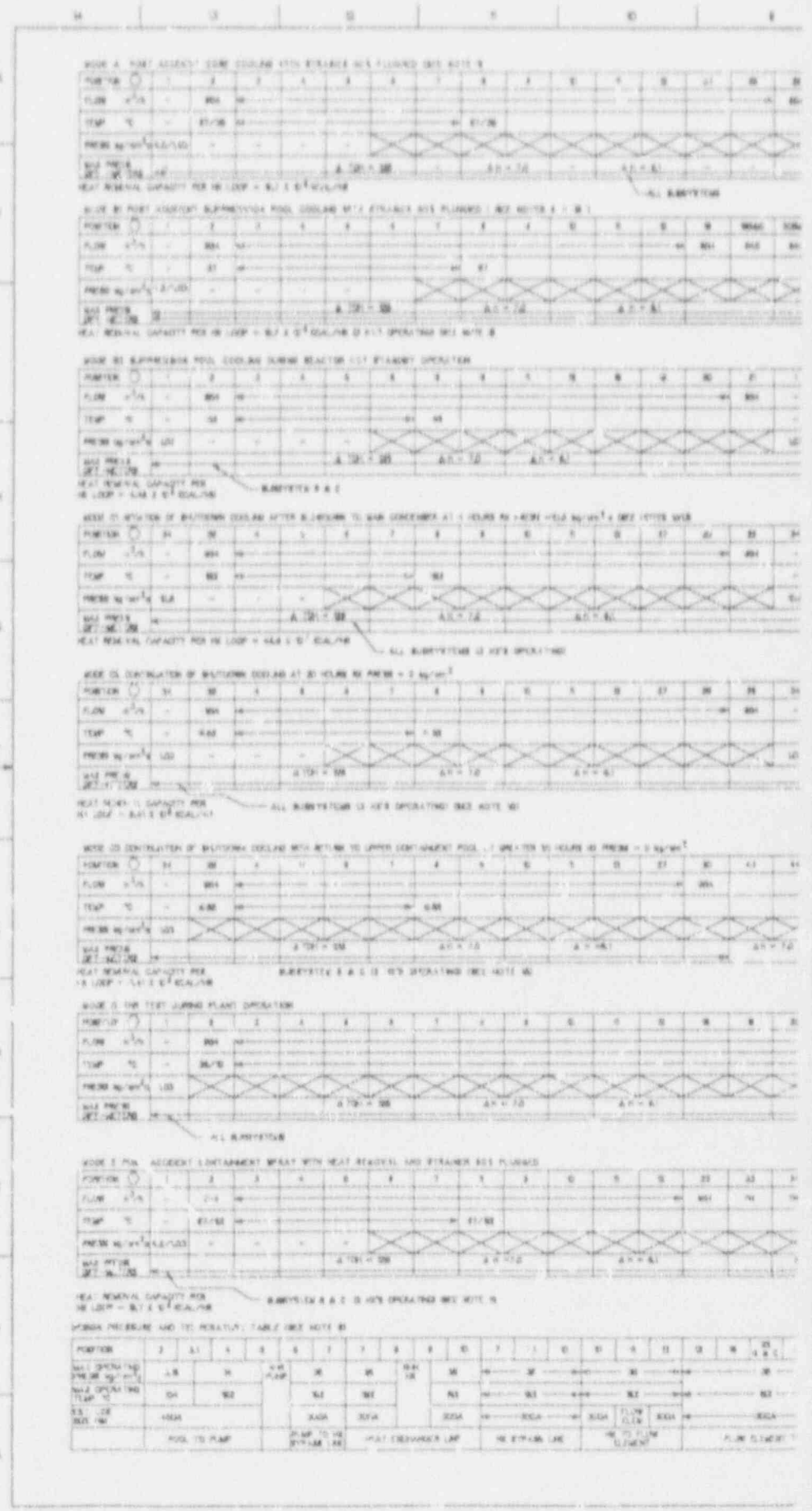

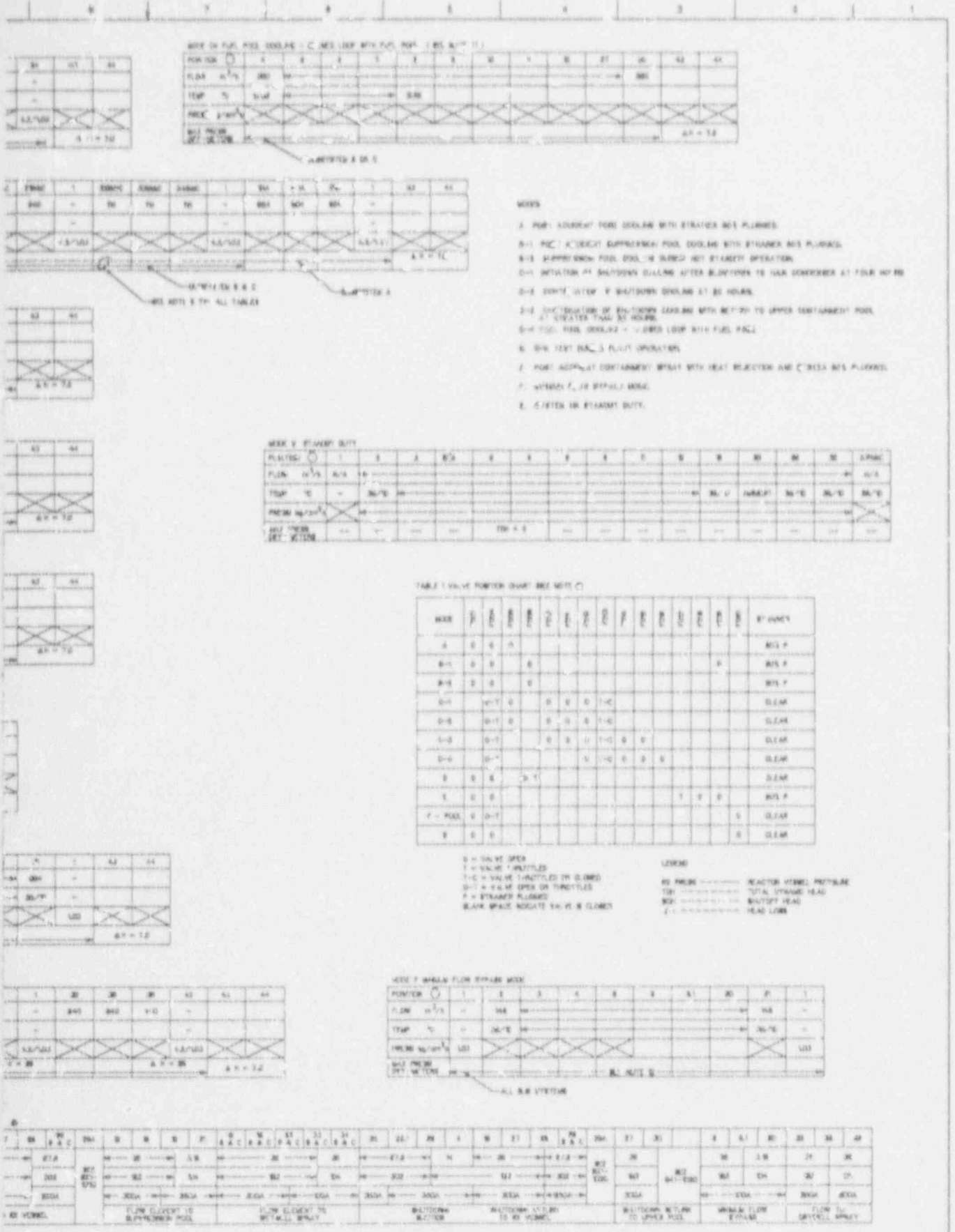

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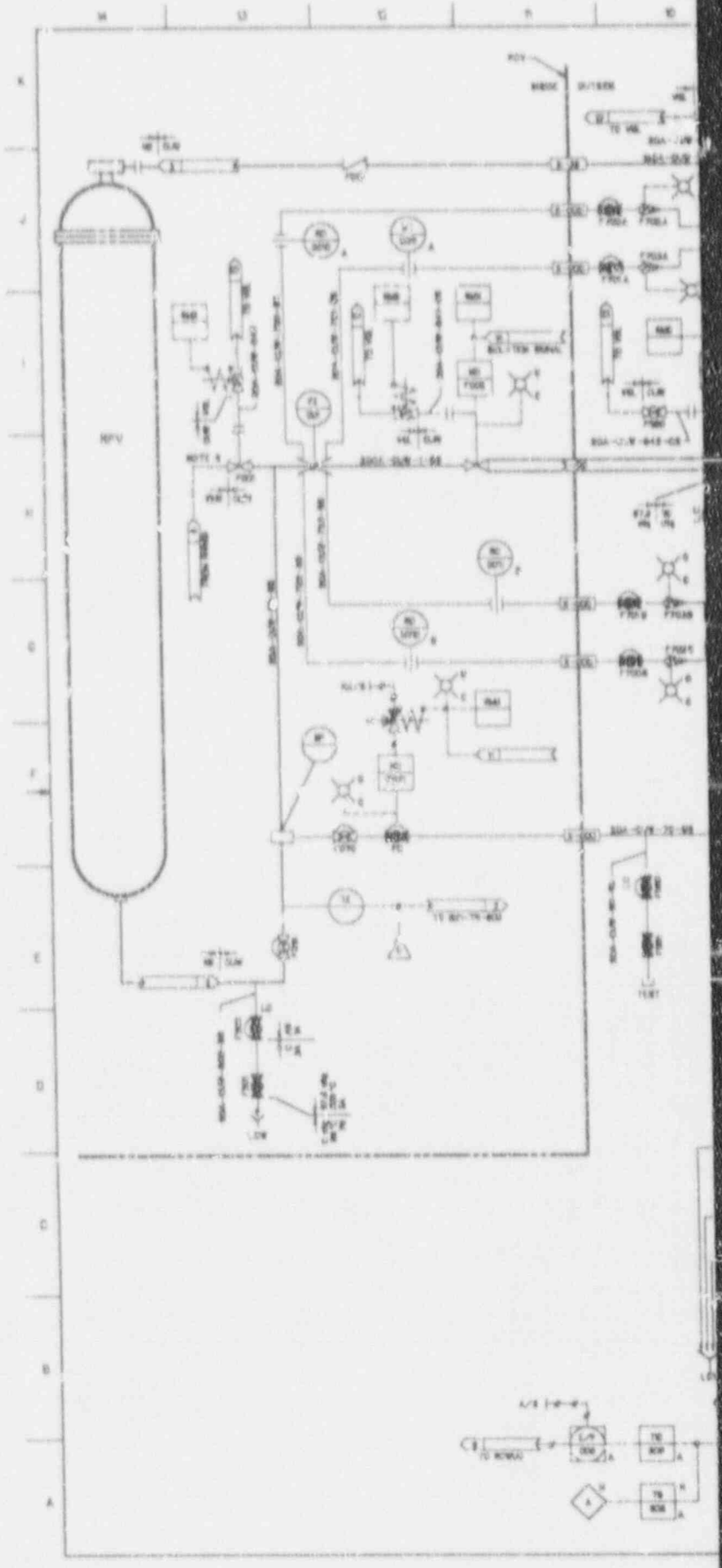
Figure 5.4-11 RHR SYSTEM PFD (Sheet 2 of 2)



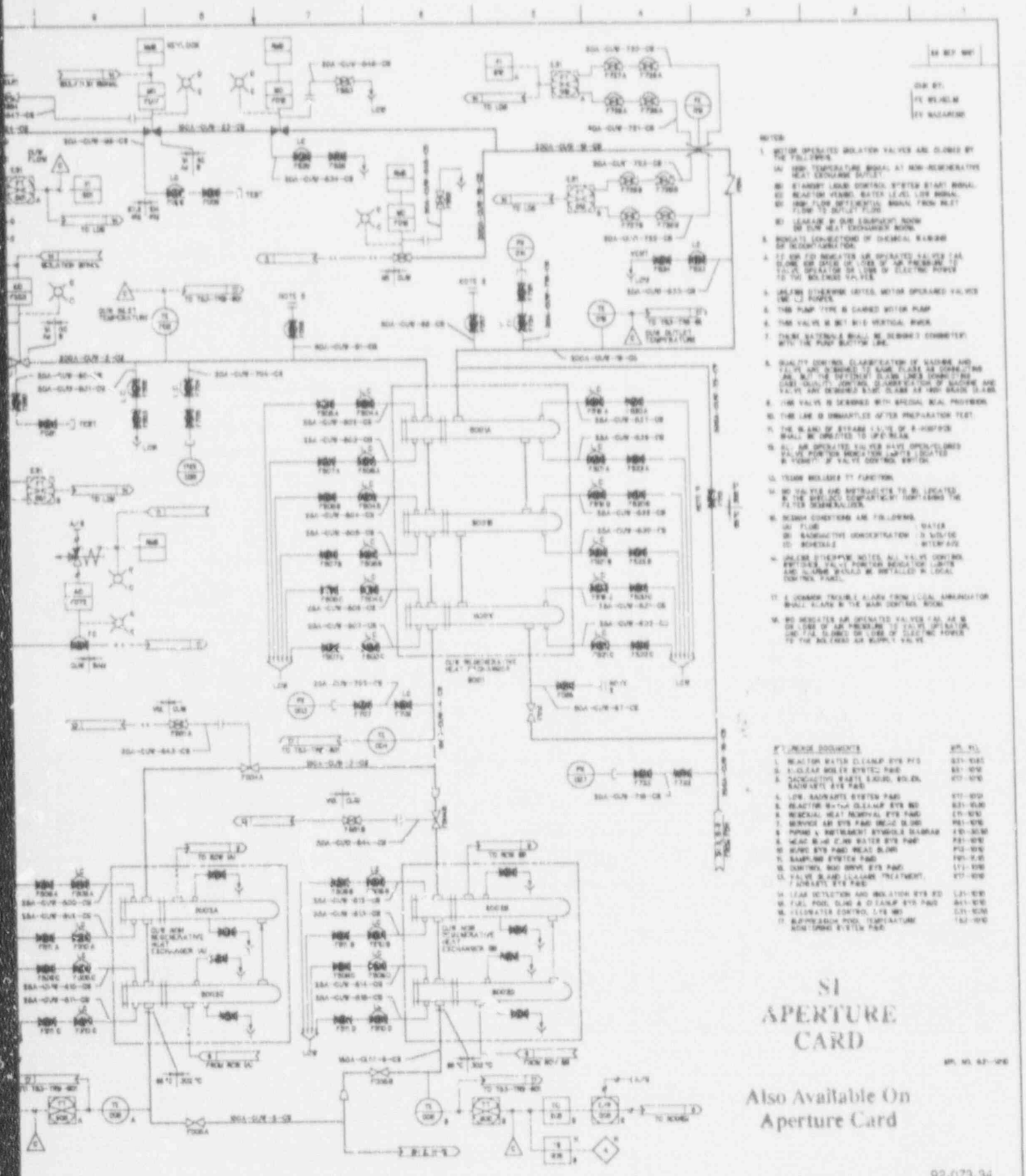


Figure 5.4-12 REACTOR WATER CLEANUP SYSTEM P&ID (Sheet 1 of 3)

9204160195-53

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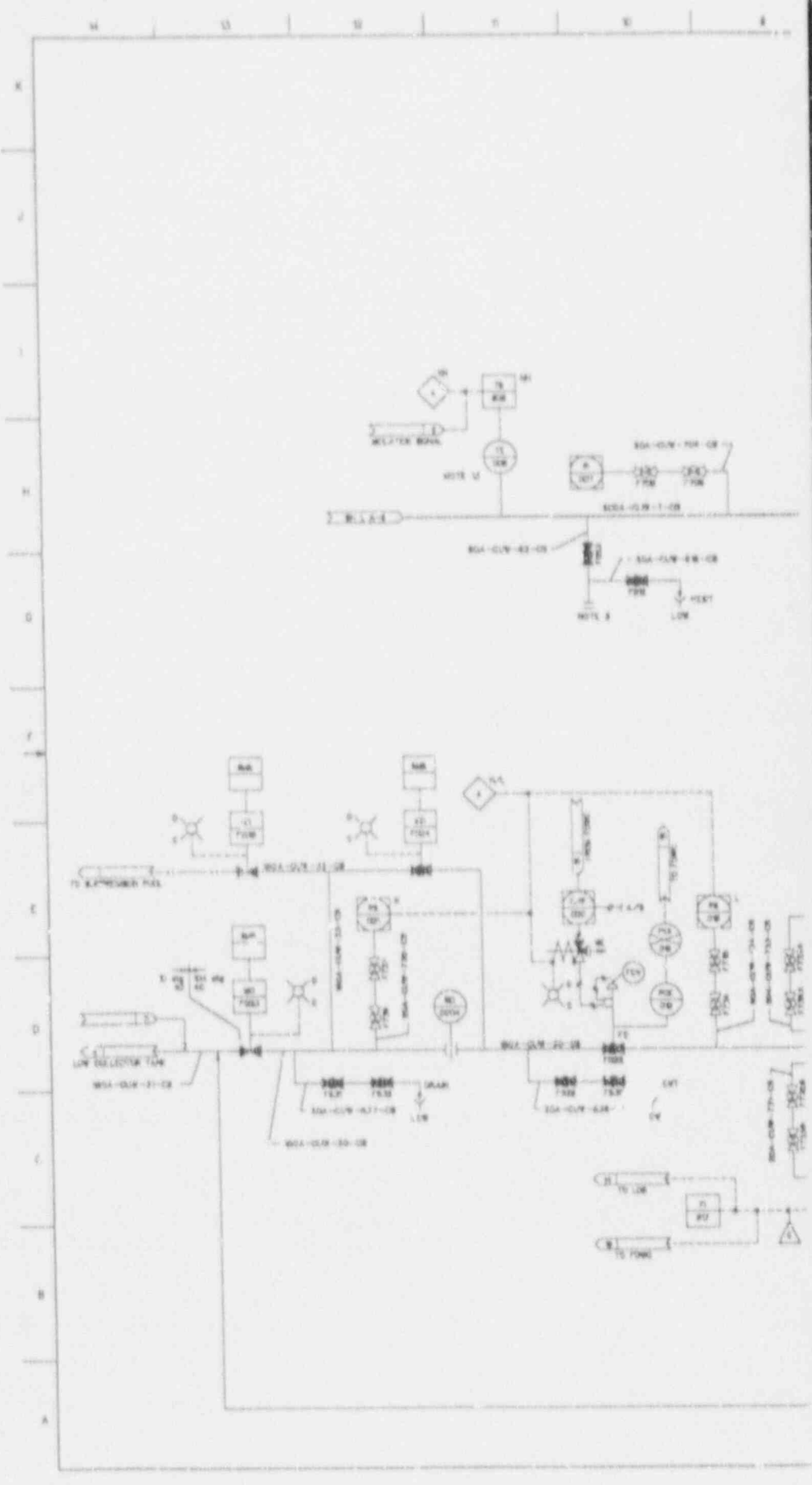

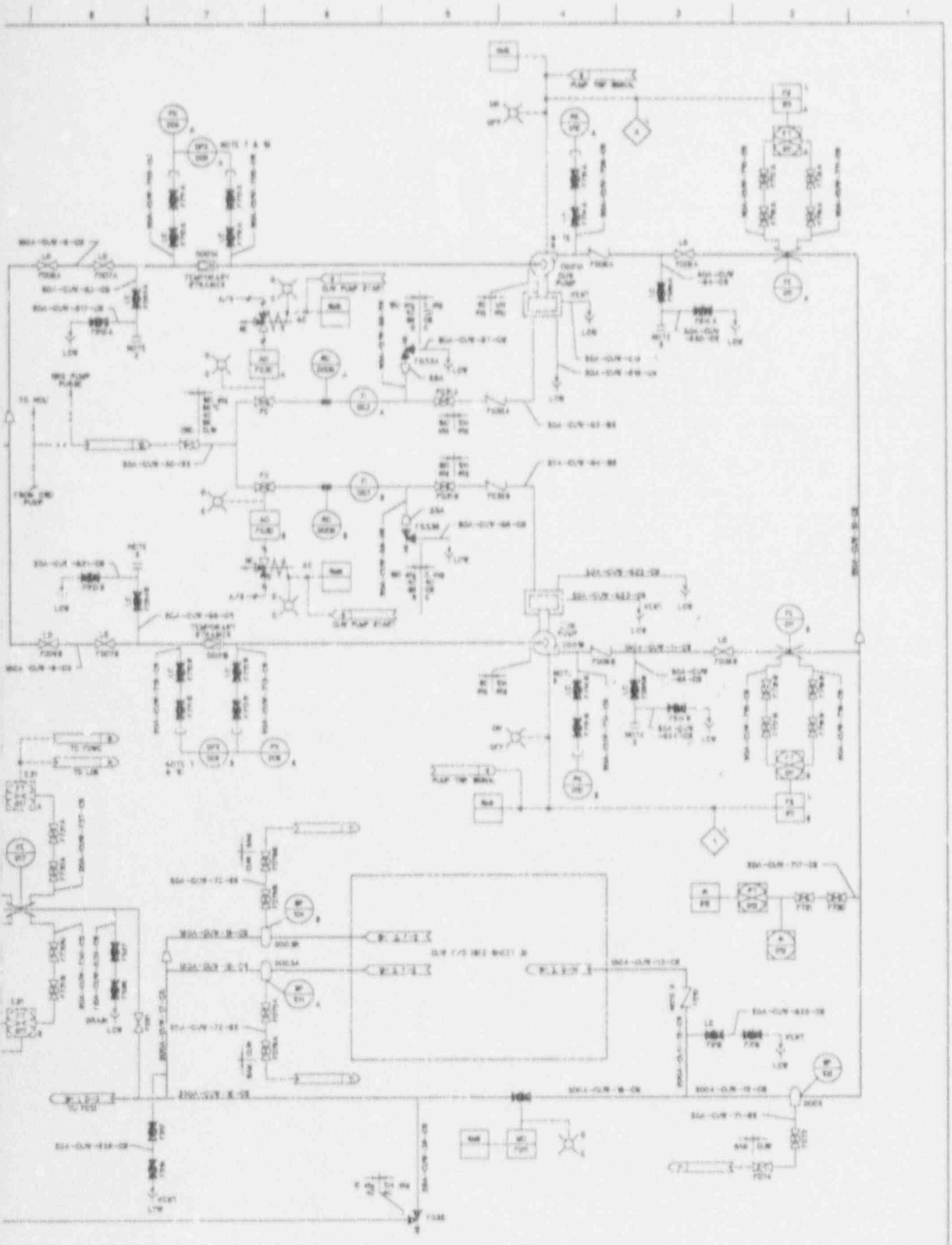

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Figure 5.4--12 REACTOR WATER CLEANUP SYSTEM P&ID (Sheet 2 of 3)

9204160195 -54

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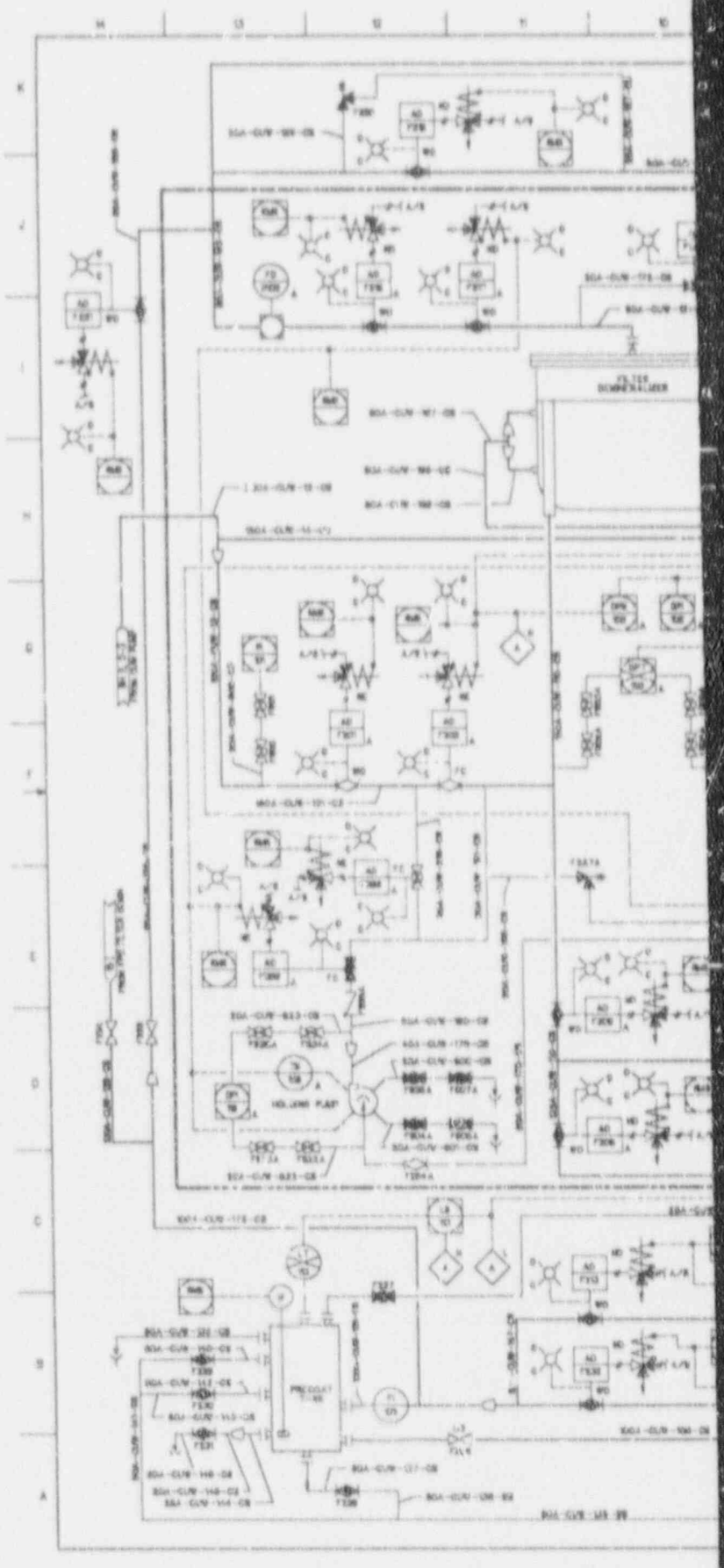


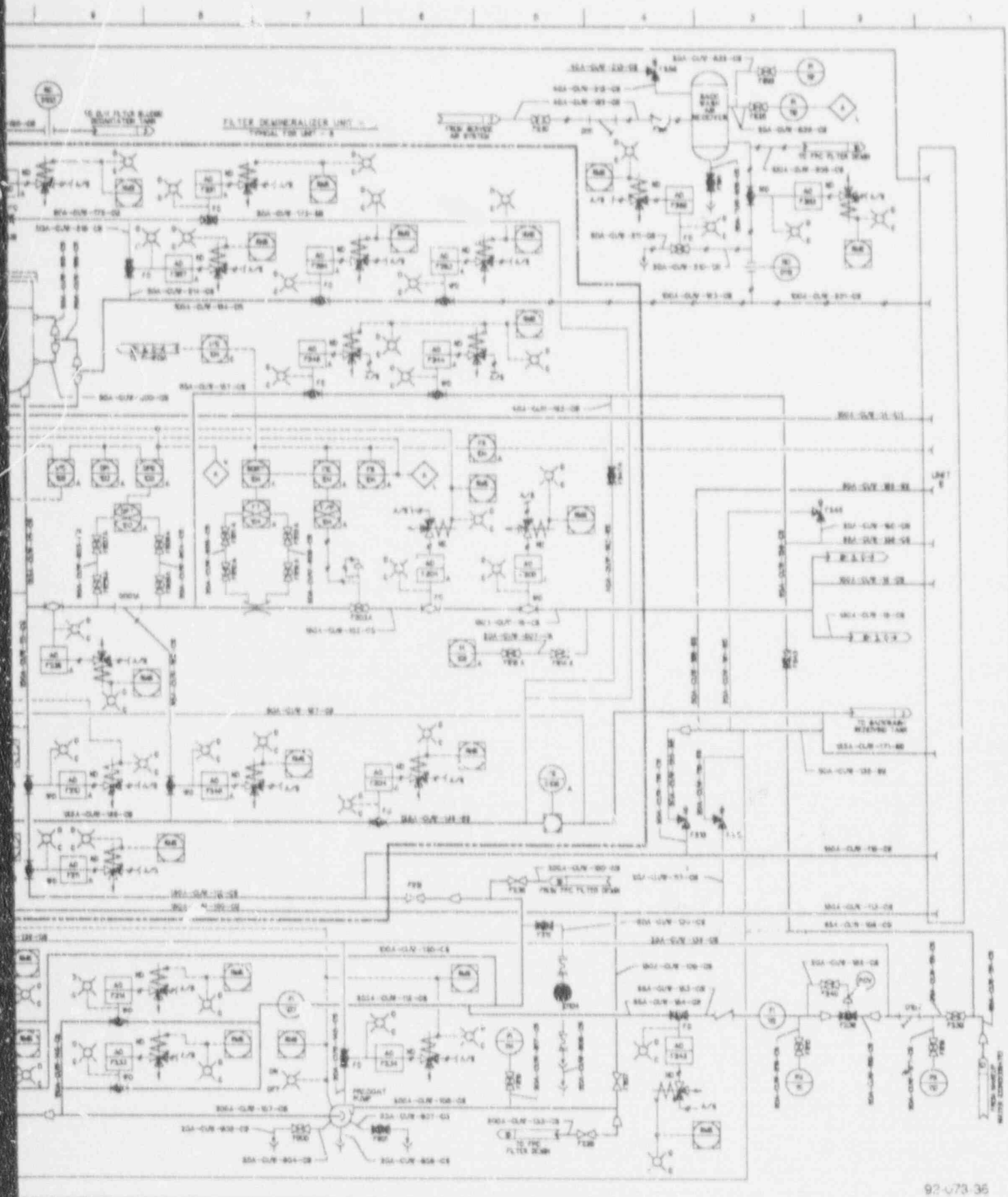
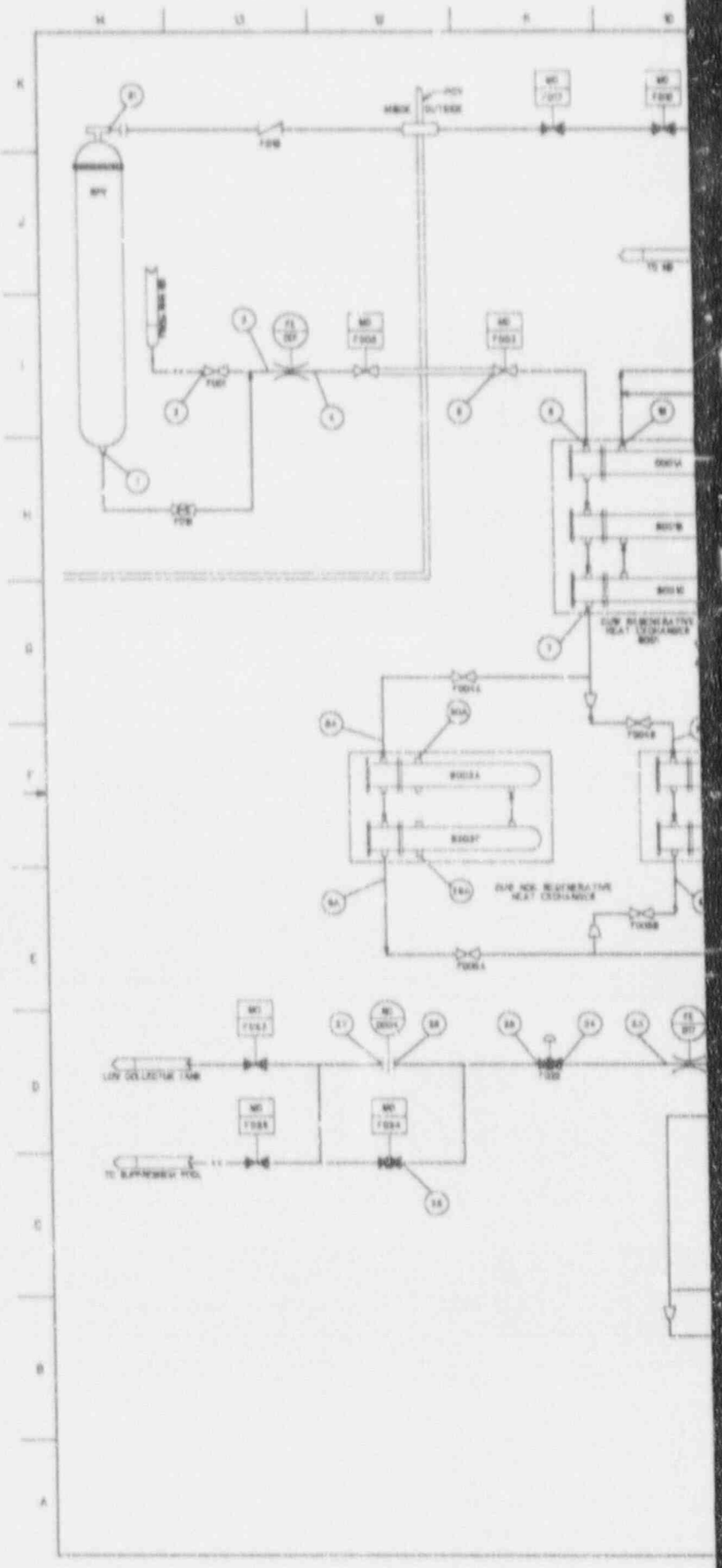


Figure 5.4–12 REACTOR WATER CLEANUP SYSTEM P&ID (Sheet 3 of 3)

9204160195 -55



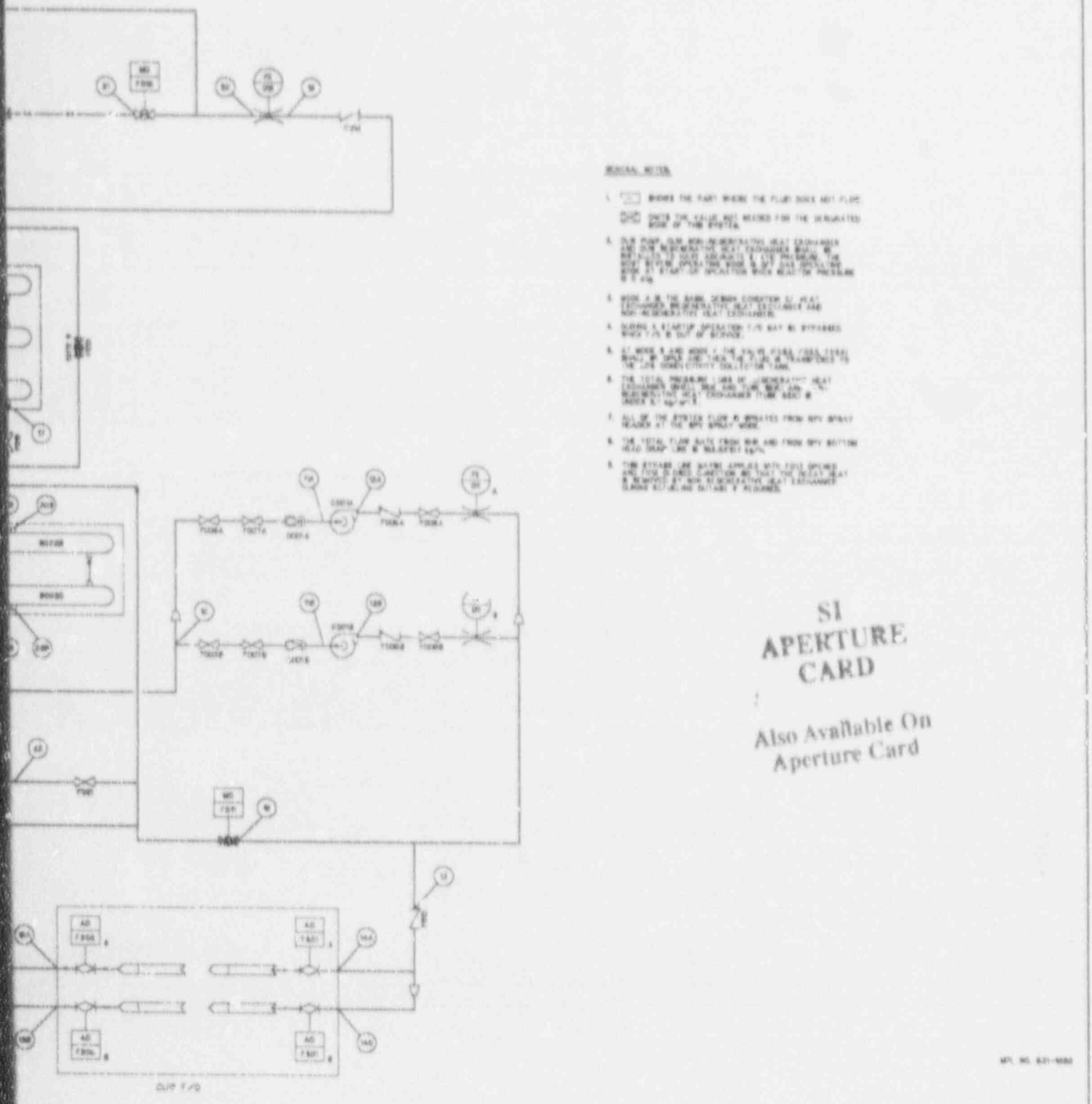


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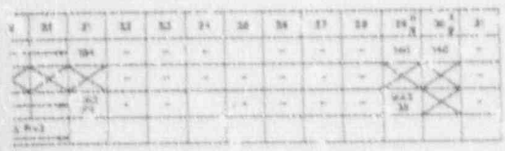
Figure 5.4–13 REACTOR WATER CLEANUP SYSTEM PFD (Sheet 1 of 2)

9204160195 – 56

TABLE 1 VALVE OPENING/CLOSING CONDITION

SIGNAL NO. / VALVE NO.	F003	F004	F011	F018	F019	F023	F033	F034	F307	C304
0	0	0	C	0	C	C	C	C	C	0
1	0	0	*	C	C	*	C	C	0	0
2	0	0	0	0	C	C	C	C	C	C
3	0	*	0	0	C	C	C	C	C	C
4	0	*	C	0	C	C	C	C	0	C
5	U	C	C	C	C	*	0	0	C	0
6	0	0	C	C	*	C	C	*	0	0

O : OPENING C : CLOSING * : UNSTATED



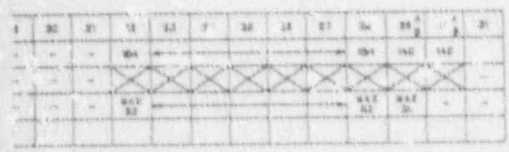


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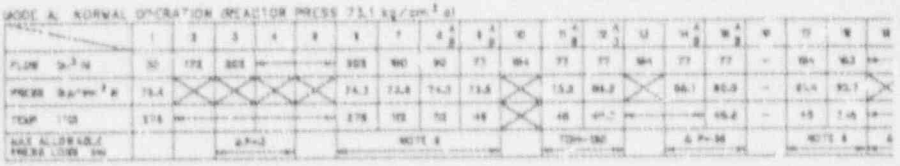
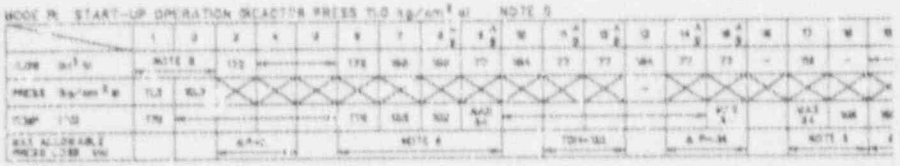
Figure 5.4-13 REACTOR WATER CLEANUP SYSTEM PFD (Sheet 2 of 2)

9204160195-57

MODE A: NORMAL OPERATION (REACTOR PRESS 73.1 kg/cm² a)



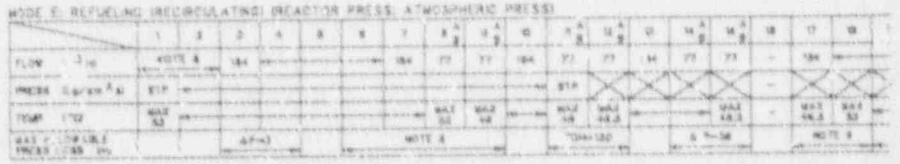
MODE R: START-UP OPERATION (REACTOR PRESS 71.0 kg/cm² a) NOTE 5



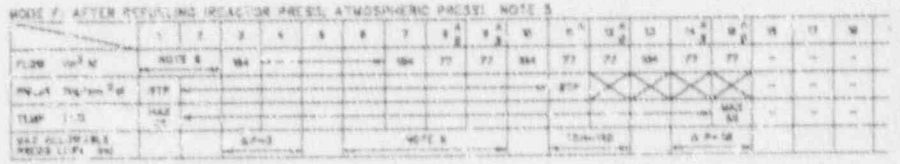
MODE C: HOT STANDBY OPERATION (MAIN CONDENSER AVAILABLE) (REACTOR PRESS 73.1 kg/cm² a)

MODE D: HOT STANDBY OPERATION (MAIN CONDENSER ISOLATION) (REACTOR PRESS 77.8 kg/cm² a)

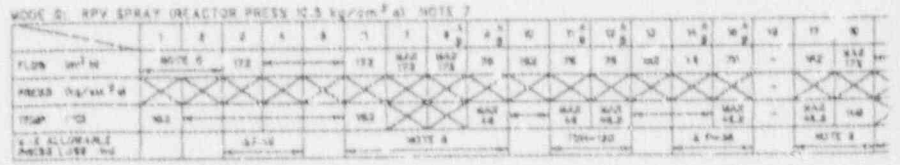
MODE E: REFUELING (RECIRCULATING) (REACTOR PRESS: ATMOSPHERIC PRESS)

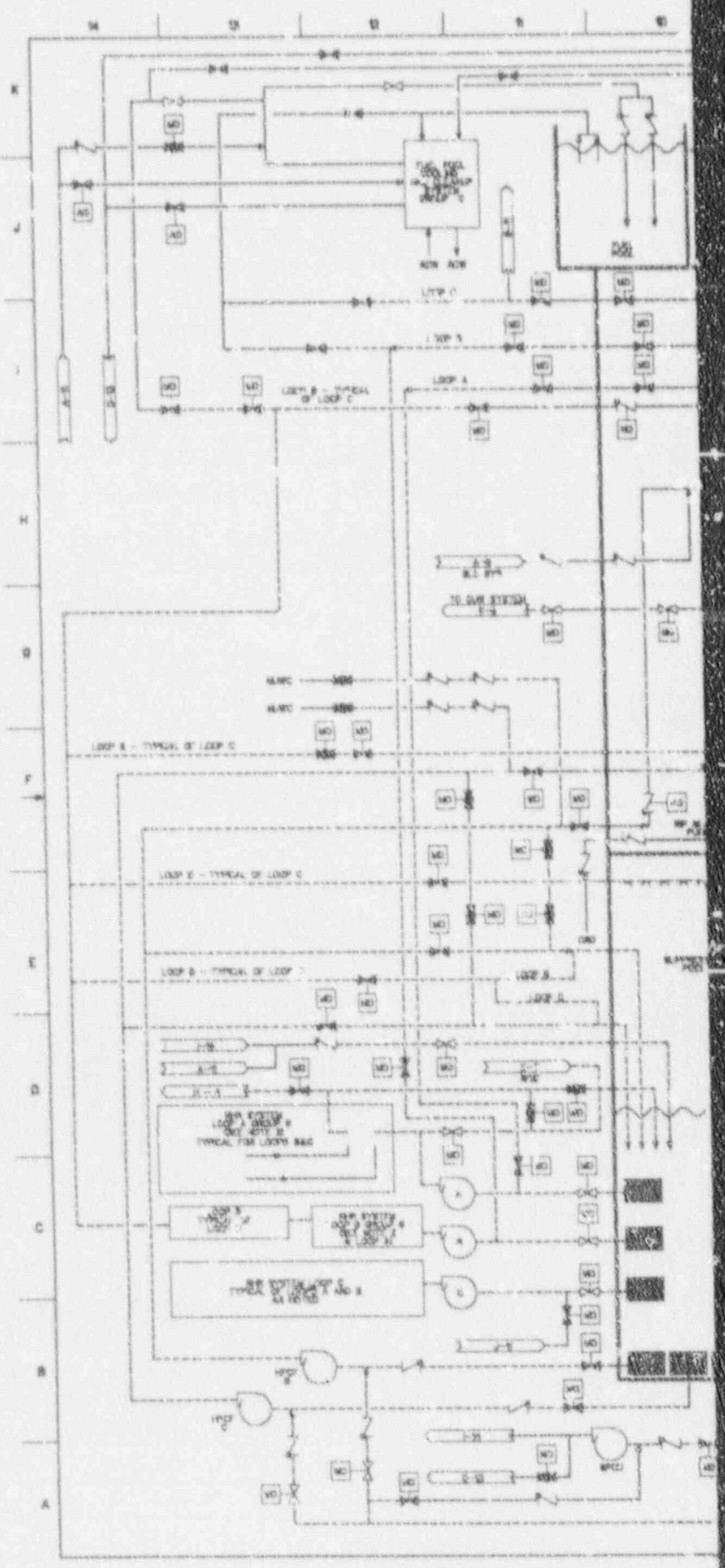


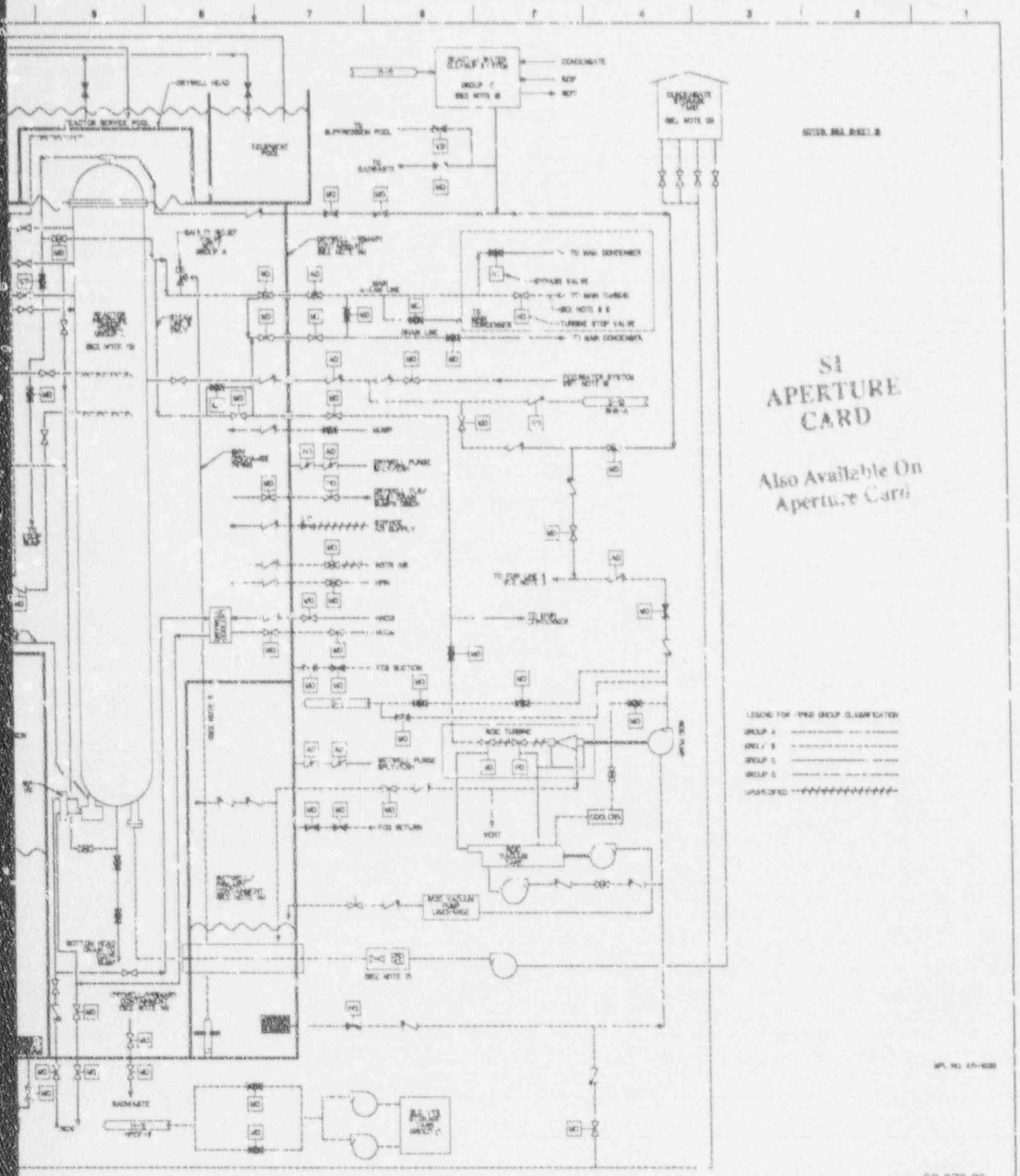
MODE F: AFTER REFUELING (REACTOR PRESS: ATMOSPHERIC PRESS) NOTE 5



MODE G: RPV SPRAY (REACTOR PRESS 12.5 kg/cm² a) NOTE 7







92-073-39

Figure 6.2–38 PLANT REQUIREMENTS, GROUP CLASSIFICATION AND CONTAINMENT ISOLATION DIAGRAM (Sheet 1 of 2)

9204160195-58

NOTES:

1. A SEPARATE LINE IS TO BE PROVIDED FOR EACH SAFETY/RELIEF VALVE.

2. RESIDUAL HEAT REMOVAL SYSTEM LOOPS (SUBSYSTEMS) A AND B ONLY ARE REPRESENTED AS TYPICAL LOOPS. LOOP C IS SIMILAR TO LOOP B.

3. RCIC INJECTION VIA FEEDWATER SYSTEM B.

4. TABLE 3.2-1 OF BSAR/LOAC IS CONTROLLING FOR GROUP CLASSIFICATION AND CONTAINMENT ISOLATION REQUIREMENTS. THE PRESSURE INTEGRITY OF NUCLEAR ISOLATION COMPONENTS SPECIFICATION (MPS No. ATI-30100) DESCRIBES REQUIREMENTS FOR EACH GROUP CLASSIFICATION. INDIVIDUAL SYSTEMS PIDS SPECIFY SYSTEM AND COMPONENTS REQUIREMENTS.

5. GROUP CLASSIFICATION CHANGES AT VALVE UNLESS OTHERWISE STATED. VALVES SHALL COMPLY TO HIGHEST CLASSIFICATION. INLINE PUMPS SHALL HAVE LINE GROUP CLASSIFICATION.

6. REACTOR WATER CLEANUP SYSTEM

THE FILTER-DEMINERALIZER PRECOAT/BACKWASH PORTION OF THE CUW DOWNSTREAM THE HIGH PRESSURE BLOCK VALVES SHALL BE GROUP B.

7. CONTROL ROD DRIVE-HYDRAULIC CONTROL UNIT

THE PORTION OF THE CRD SYSTEM WHICH IS RELATED TO THE SCRAM FUNCTION IS GROUP A. THE PORTION OF THE CRD SYSTEM WHICH IS NOT RELATED TO THE SCRAM FUNCTION IS GROUP B.

8. MAIN STEAM LINE/TURBINE BYPASS LINE/BRANCH LINES

A. THE MAIN STEAM LINE INSPECTION RECORDS PERTAINING TO THE LINES BETWEEN THE SHUT-OFF VALVE AND TURBINE STOP VALVE SHALL BE MAINTAINED FOR THE LIFE OF THE PLANT. THESE RECORDS SHALL INCLUDE DATA PERTAINING TO QUALIFICATION OF INSPECTION PERSONNEL, EXAMINATION PROCEDURES, AND EXAMINATION RESULTS.

B. THE MAIN STEAM LINES AND IN-LINE COMPONENTS UP TO THE TURBINE STOP VALVES SHALL BE GROUP B, BEYOND IS GROUP D.

C. BRANCH LINES OF MSL BETWEEN THE EXTERNAL ISOLATION VALVE AND THE TURBINE STOP VALVE SHALL BE GROUP B OUT TO AND INCLUDING THE FIRST VALVE CAPABLE OF TIMELY ACTUATION.

D. BRANCH LINES OF THE TURBINE BYPASS LINE UP TO THE BYPASS VALVE SHALL BE GROUP B OUT TO AND INCLUDING THE FIRST VALVE CAPABLE OF TIMELY ACTUATION.

9. FEEDWATER

BRANCH LINES OF THE FW LINE BETWEEN THE SECOND AND THIRD VALVE OUT TO AND INCLUDING THE FIRST MOTOR ACTUATED VALVE TO BE GROUP B.

10. CONDENSATE STORAGE TANK

THE CONDENSATE STORAGE TANK WILL BE DESIGNED, FABRICATED, AND TESTED TO MEET THE INTENT OF API STANDARD API 650. IN ADDITION, THE SPECIFICATIONS FOR THIS TANK WILL ACQUIRE (1) 100 PERCENT SURFACE EXAMINATION OF THE SIDE WALL TO BOTTOM JOINT AND (2) 100 PERCENT VOLUMETRIC EXAMINATION OF THE SIDE WALL WELD JOINTS, GROUP D CLASSIFICATION.

11. PNEUMATIC PIPING, VESSELS & FITTINGS (FIG. II-)

PNEUMATIC SYSTEMS ASSOCIATED WITH ACTUATION OF SAFETY RELATED VALVES TO ACCOMPLISH SAFETY FUNCTIONS (E.G. MAIN STEAM SAFETY/RELIEF VALVES) ARE CLASSIFIED GROUP C. THIS CLASSIFICATION IS INTENDED TO APPLY TO COMPONENTS SUCH AS THE AIR PIPING, FITTINGS, AND ACCUMULATOR TANKS. THIS CLASSIFICATION DOES NOT APPLY TO COMPONENTS OF THE SYSTEM SUCH AS AIR CONTROL VALVES, AIR CHECK VALVES, AND CYLINDER (OR DIAPHRAM) AIR ACTUATORS. THESE COMPONENTS ARE CONSIDERED AS "SPECIAL EQUIPMENT" AND ARE SELECTED BASED ON ENGINEERING REVIEWS, OPERATING EXPERIENCE, AND TESTING AS BEING THE MOST SUITABLE FOR THE APPLICATION. SUCH EQUIPMENT IS REQUIRED TO BE QUALIFIED TO DEMONSTRATE OPERABILITY DURING NORMAL AND EMERGENCY AMBIENT CONDITIONS. COMPONENTS NORMALLY FURNISHED WITH THE PROCESS VALVE (E.G. AIR CONTROL VALVES, AIR ACTUATORS) ARE PERFORMANCE TESTED WITH THE VALVE AS PART OF ITS ACCEPTANCE TEST PROCEDURE.

12. INSTRUMENT, SAMPLE & OTHER

A VALVE, ORIFICE DATA

1. VALVES: AUTOMATIC, RE
LY BOX+ AUTOMATIC OR
INDICATION MINIMUM PRA

2. ORIFICE/PIPE+ SIZED TO

3. VALVE: LOCKED CLOSED

4. VALVE: SAME AS 2 IF
AUTOMATIC (NON-CHECK

5. VALVE-PROCESS SHUT

6. 8.4mm (1/4") ORIFICE+
PROCESS TO PERMIT OP

+ VALVES AND ORIFICES
SO RESTRICTIVE AS TO
OF THE LINE.

B. GROUP CLASSIFICATION OF

PROCESS SYSTEM TO WHICH ALL LINES ARE CONNECTED-ORIFICE CLASSIFICATION	GROUP CL OF LINES THRU ROOT VALVES LINES C 50mm (2" M 50mm (2"
A	A
B	B
C	C (3)
D	D (3)

1. GROUP SSIFICATION
NRC LINES; ISOLVES
JURI IAL AUTHORI
POSTU RETROFITS.

(2) SAFETY RELATED SYSTE
ESSENTIAL TO BOTH OF

A. AVOIDING THE UNACCE
OPERATIONAL TRANSI
EVENTS BY CONTRIBU
ESSENTIAL SAFETY A

B. SATISFYING THE SAME

13. THE REACTOR COOLANT PRESS
AND CONNECTING PIPING, PUMP
AND INCLUDES THE OUTERMOST
OF THE SYSTEM OR COMPONEN

14. THE CONTAINMENT IS DESIGNED
OF THE ASME CODE FOR REINF
WHICH FORM AN EXTENSION OF
RETAINING COMPONENTS, PARTS
PORTION OF THE SYSTEM WHIC
AND INCLUDING THE OUTERMOS
THE CONTAINMENT WHICH IS CL

SMALL LINES (FIG X)

NOTE (PERABLE, OR EXCESS FLOW
ANUAL RESETTING, REMOTE POSITION
TICAL SPACING FROM CONTAINMENT.

SET FLOW PER NRC REGULATORY GUIDE 1.11.

AUTOMATIC, OR X ABOVE.

X IS X (OR LOCKED CLOSED

ED.

DICATED AS CLOSE AS PRACTICAL TO THE
MAIN VENTING OF NON-CONDENSIBLES.

W THE LINES SHOULD NOT BE
DANGER THE SAFETY FUNCTION

MALL DIAMETER LINES.

SSIFICATION TO AND OR ISOLATION		CLASSIFICATION OF LINES BEYOND ROOT OR ISOLATION VALVES	
PSI WATER PSI STEAM	LINES 25mm (1" NPS) WATER 50mm (2" NPS) STEAM AND SMALLER	SAFETY RELATED SYSTEMS (2)	NON-SAFETY RELATED SYSTEMS
B (3) B C (2) D (2)		B B C N/A	D D D D

NO CODE REQUIREMENTS ARE BASED ON CURRENT
R. EACH PROJECT SHALL VERIFY WITH STATE
ITS TO AVOID MISUNDERSTANDINGS AND

IS ARE THOSE SYSTEMS WHOSE ACTIONS ARE
NG FOLLOWING:

RTAIN RESULTS FOR ABNORMAL
NTS, ACCIDENTS, AND SPECIAL
ING TO THE ACCOMPLISHMENT OF
CTIONS.

E FAILURE CRITERION (WHERE APPLICABLE).

URE BOUNDARY INCLUDES THE REACTOR VESSEL
AND VALVES, AND EXTENDS TO
PRIMARY CONTAINMENT ISOLATION VALVE(S)
LOCATED.

AND CONSTRUCTED TO THE REQUIREMENTS
ORCED CONCRETE CONTAINMENT. COMPONENTS
CONTAINMENT ARE DEFINED AS PRESSURE-
MATERIALS OR APPURTENANCES IN THE
EXTENDS FROM THE CONTAINMENT TO
ISOLATION VALVE LOCATED OUTSIDE OF
(PAYLE OF AUTOMATIC ACTUATION EQUIP B.

FIG X

INSTRUMENTATION SAMPLE, & OTHER SMALL LINES (SEE NOTE (3))
TYPICAL

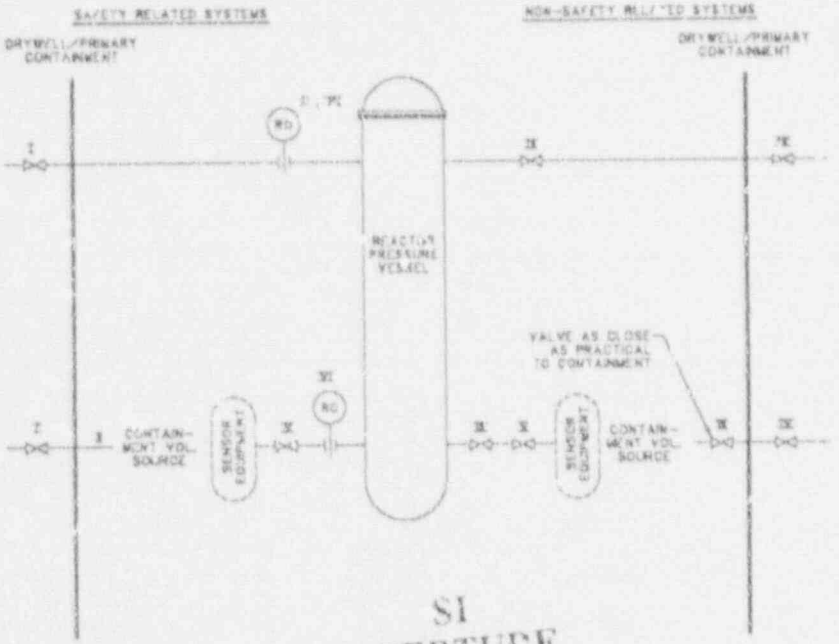


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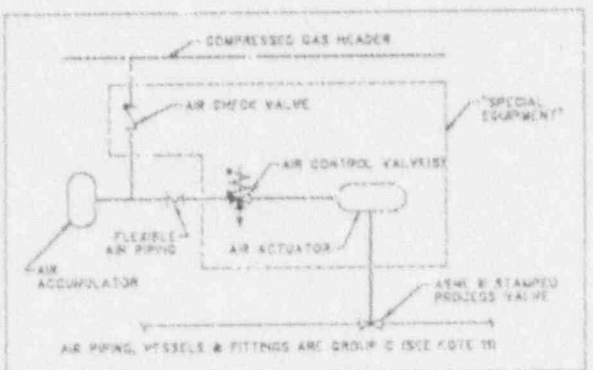
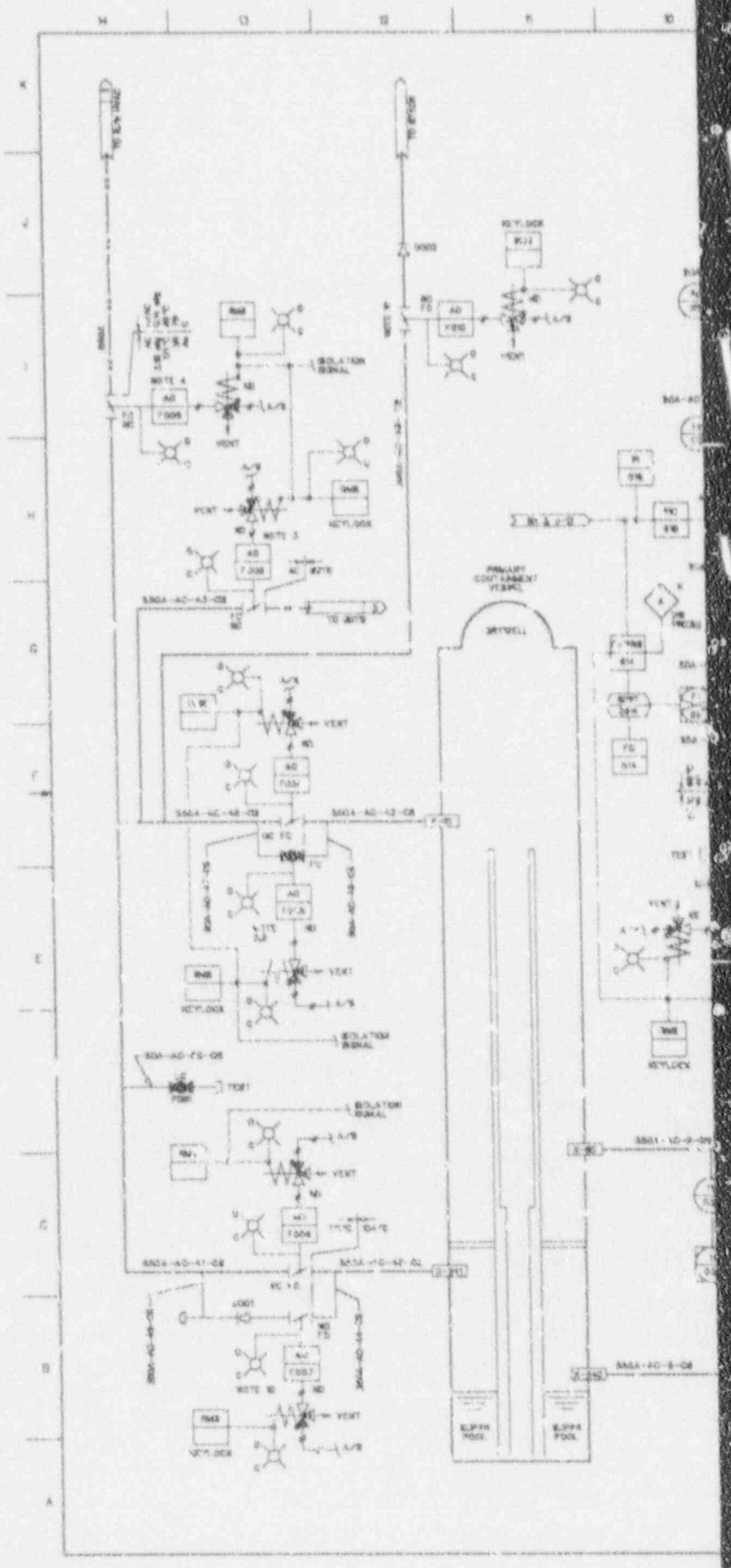
FIG III



92-073-40

Figure 6.2-38 PLANT REQUIREMENTS, GROUP CLASSIFICATION AND CONTAINMENT ISOLATION DIAGRAM (Sheet 2 of 2)

9204160195-59



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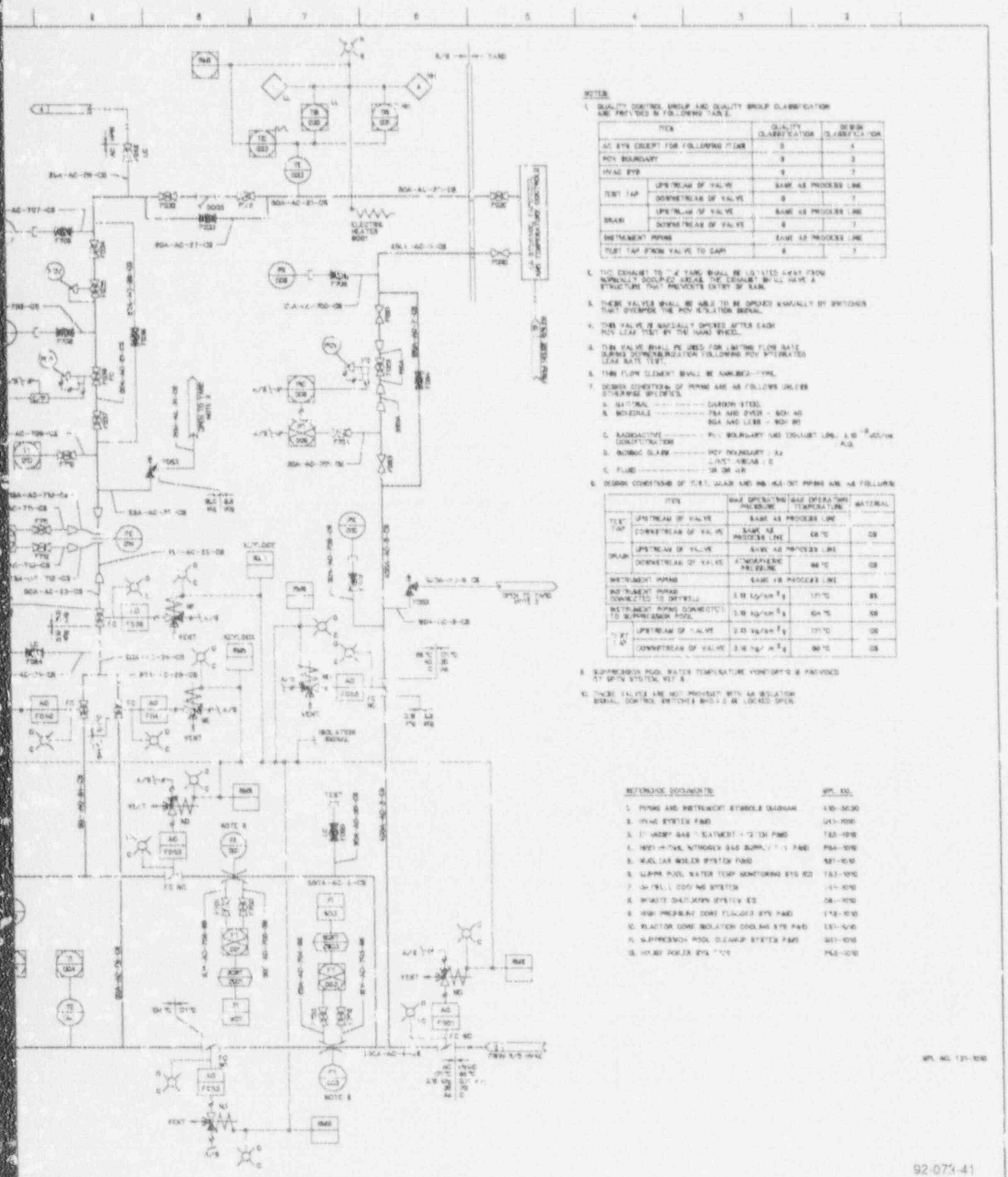
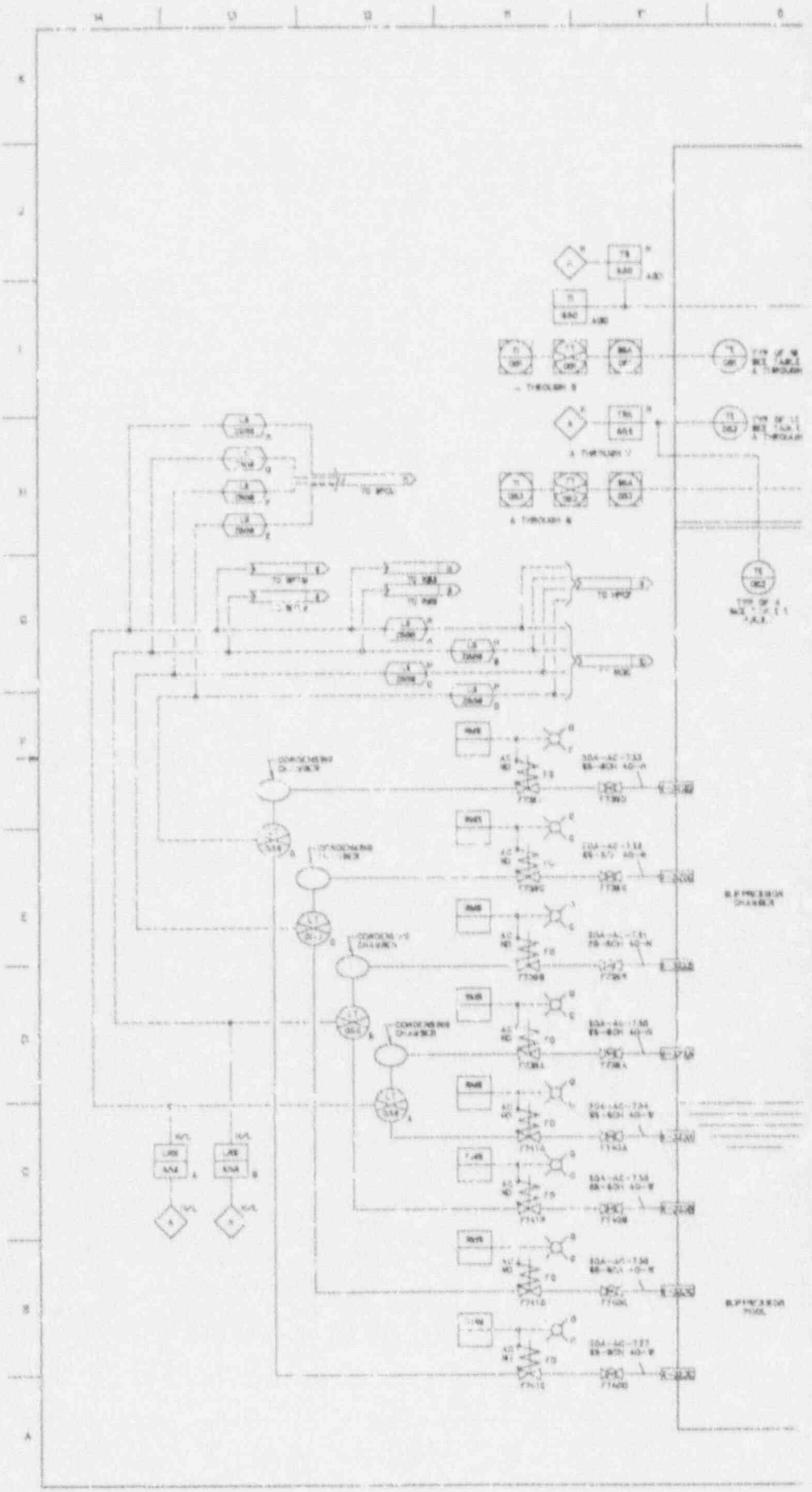


92-073-41

Figure 6.2-39 ATMOSPHERIC CONTROL SYSTEM P&ID (Sheet 1 of 3)

9204160195-GC



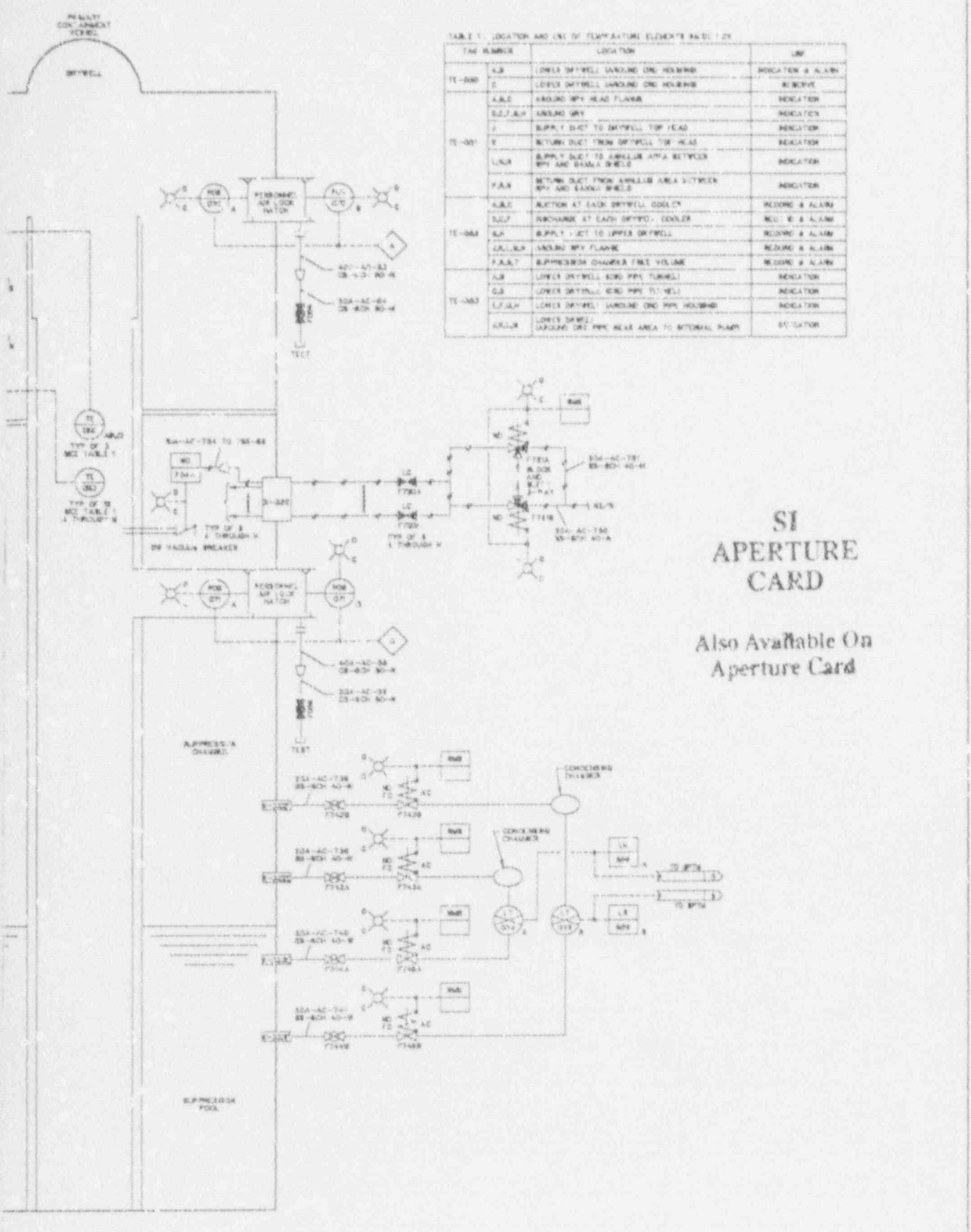
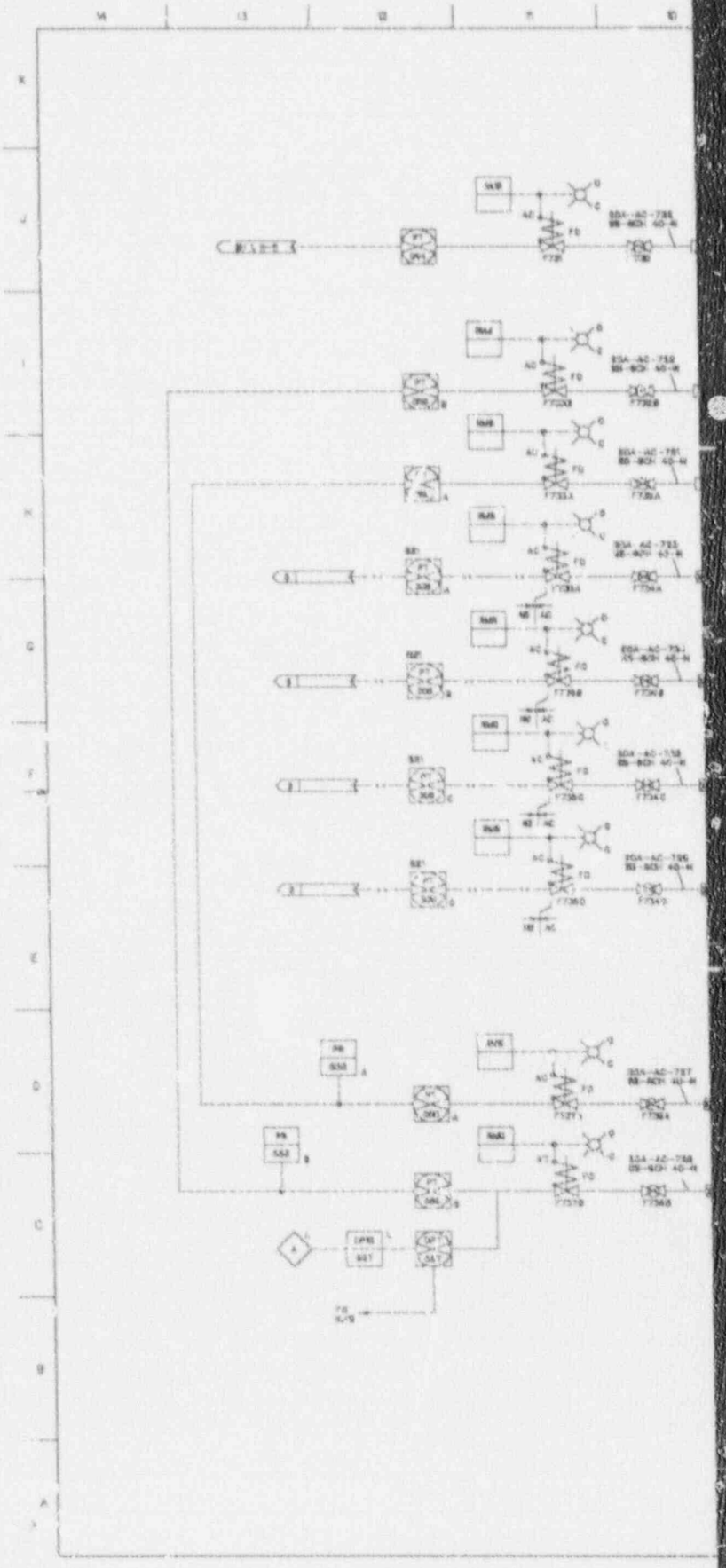


Figure 6.2-39 ATMOSPHERIC CONTROL SYSTEM P&ID (Sheet 2 of 3)

9204160195 -6/



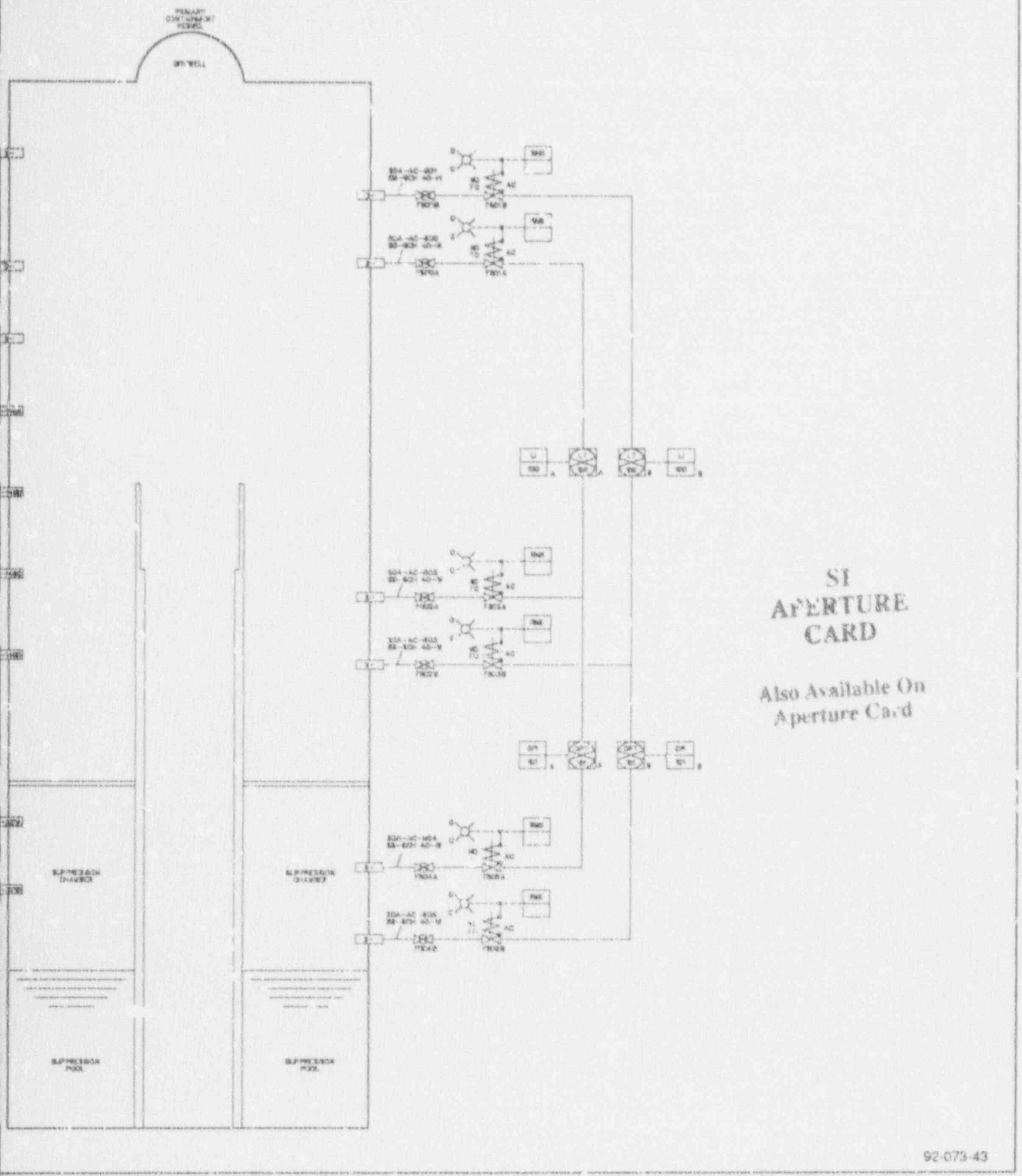


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Figure 6.2-39 ATMOSPHERIC CONTROL SYSTEM P&ID (Sheet 3 of 3)

9204160195 62

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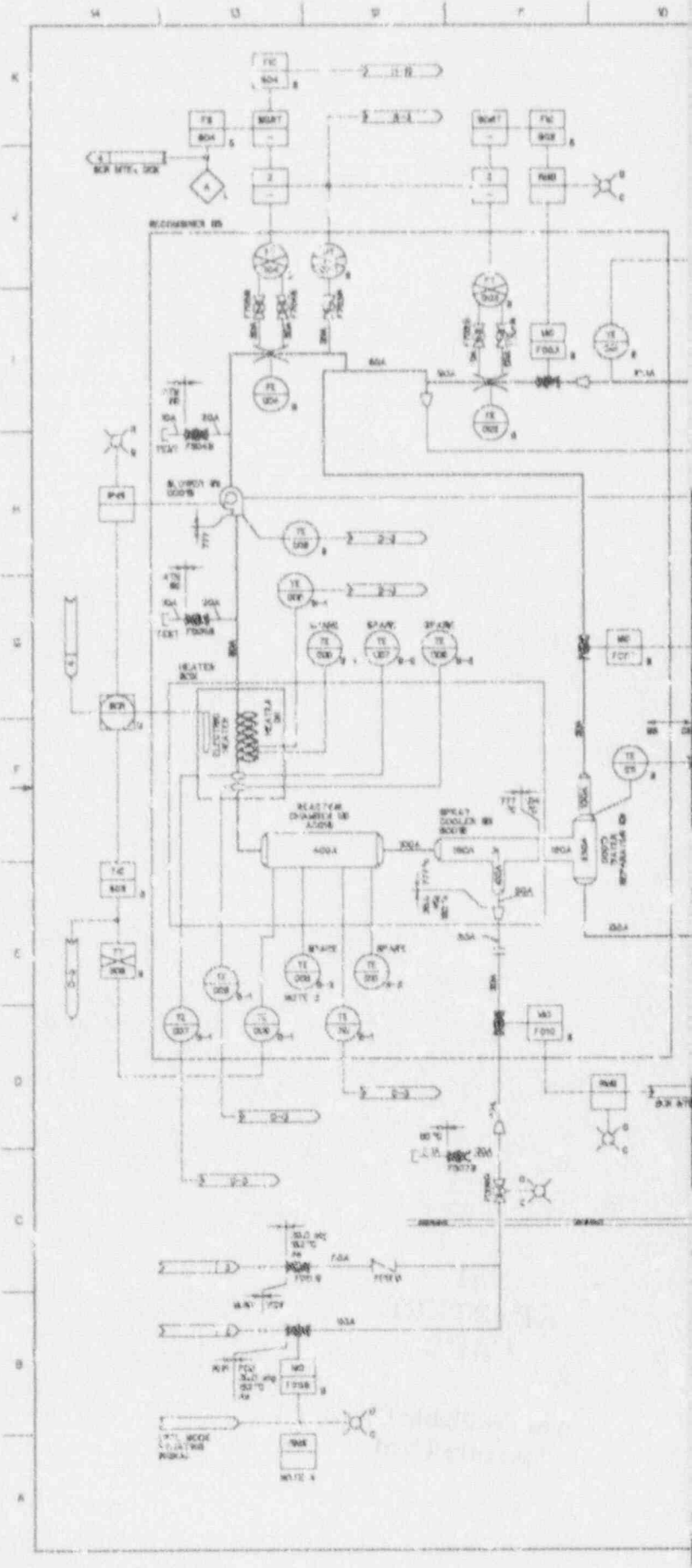
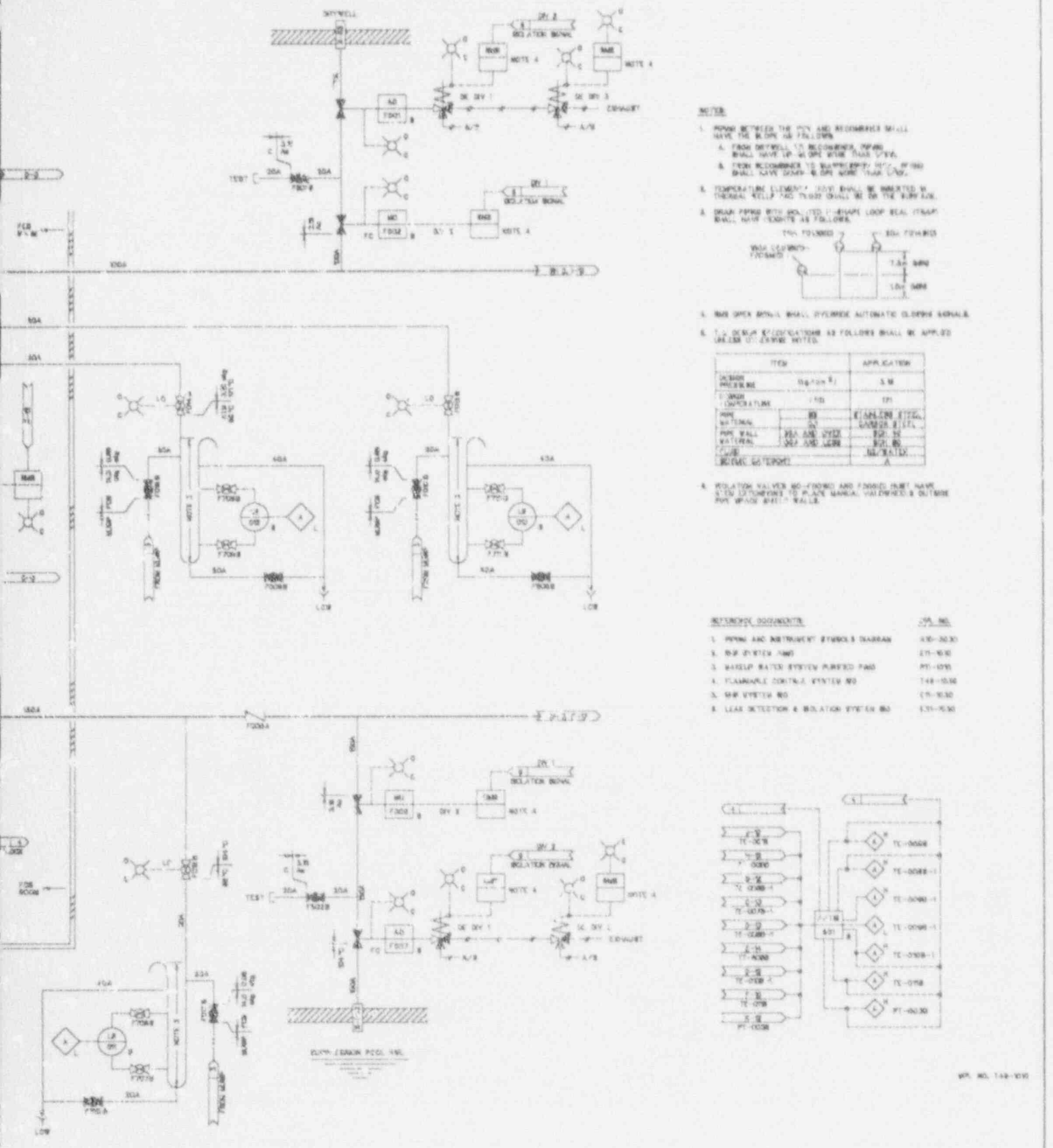
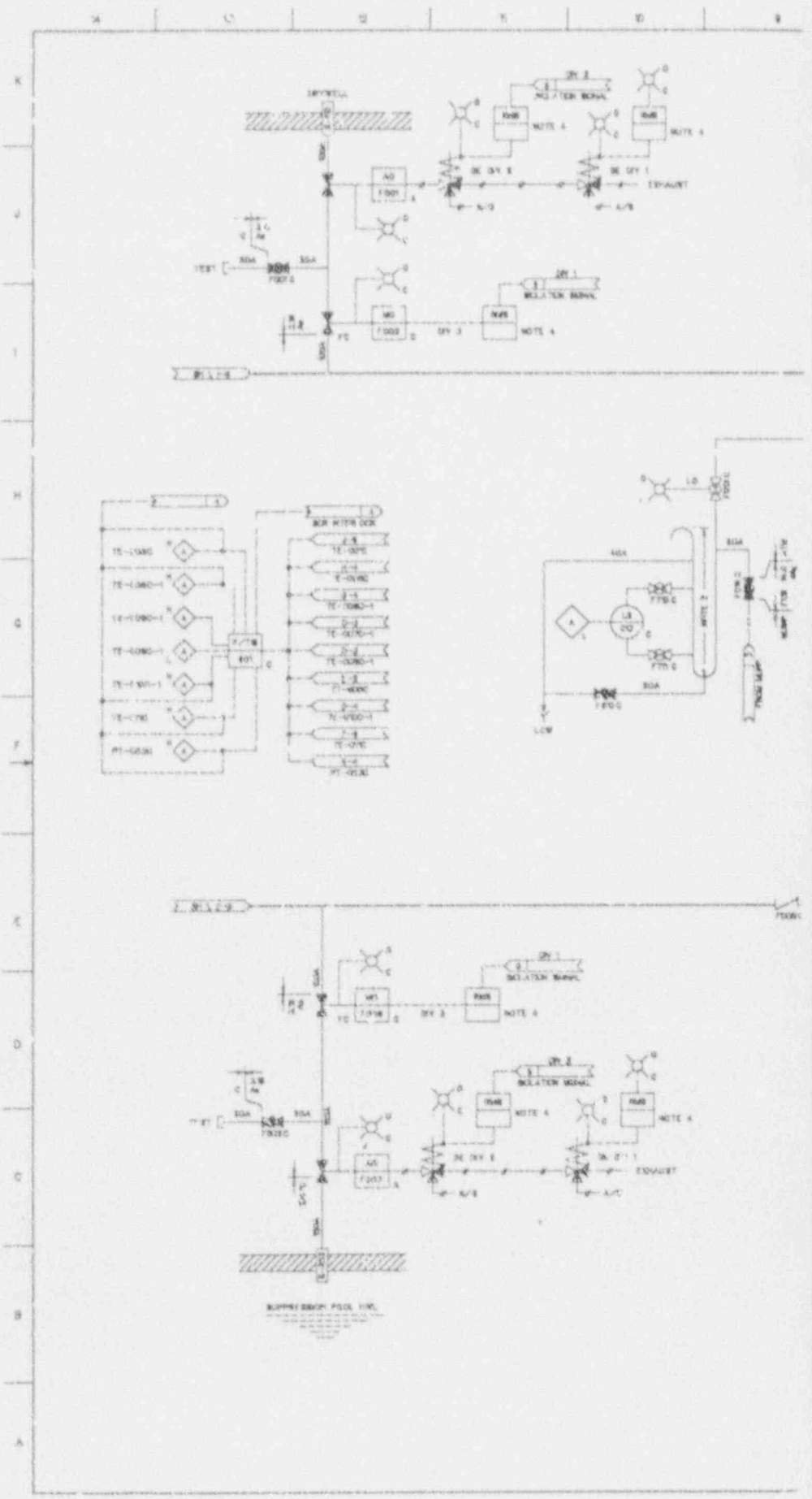




92-092-20

Figure 6.2-40 FLAMMABILITY CONTROL SYSTEM P&ID (Sheet 1 of 2)

9204160195-63



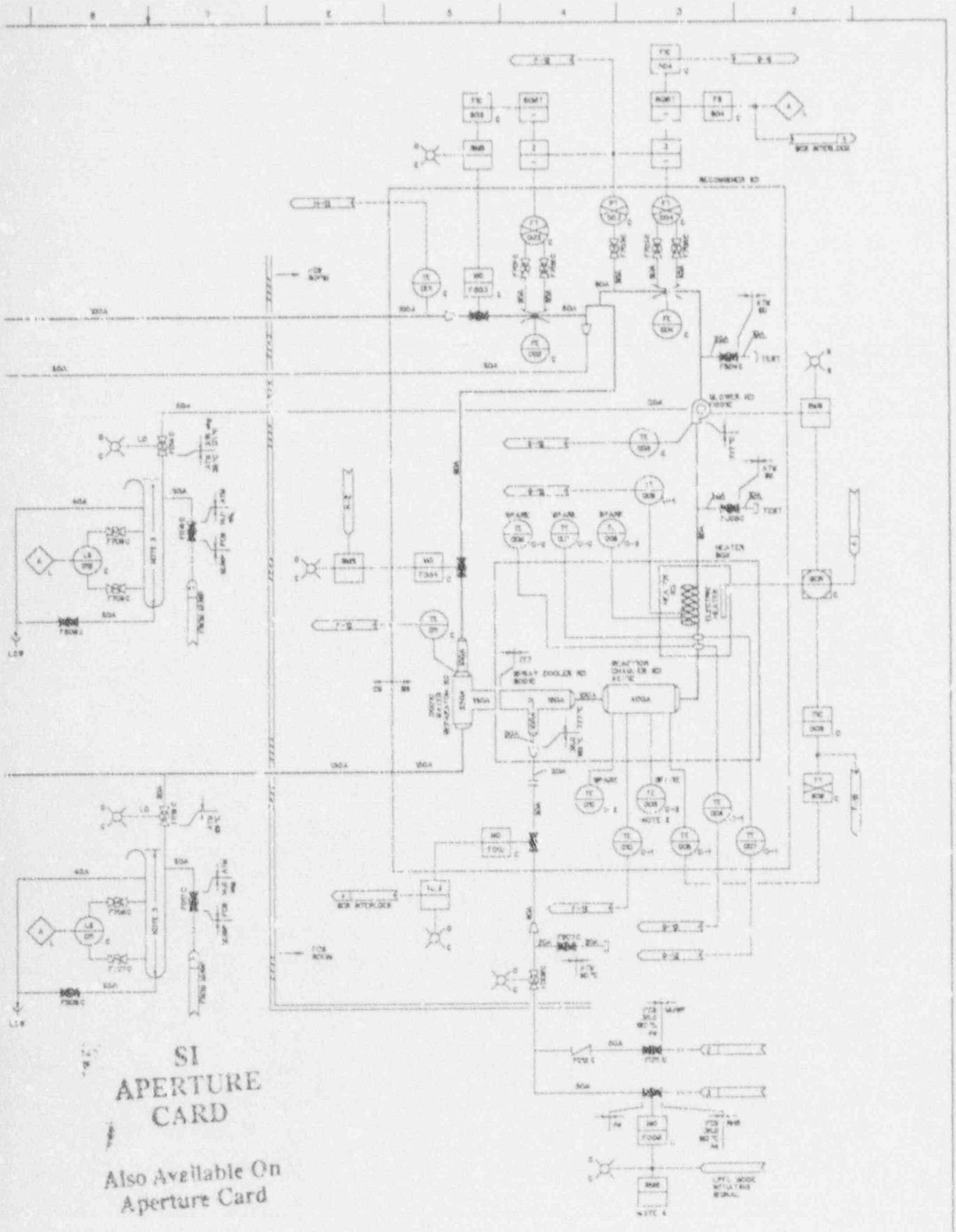


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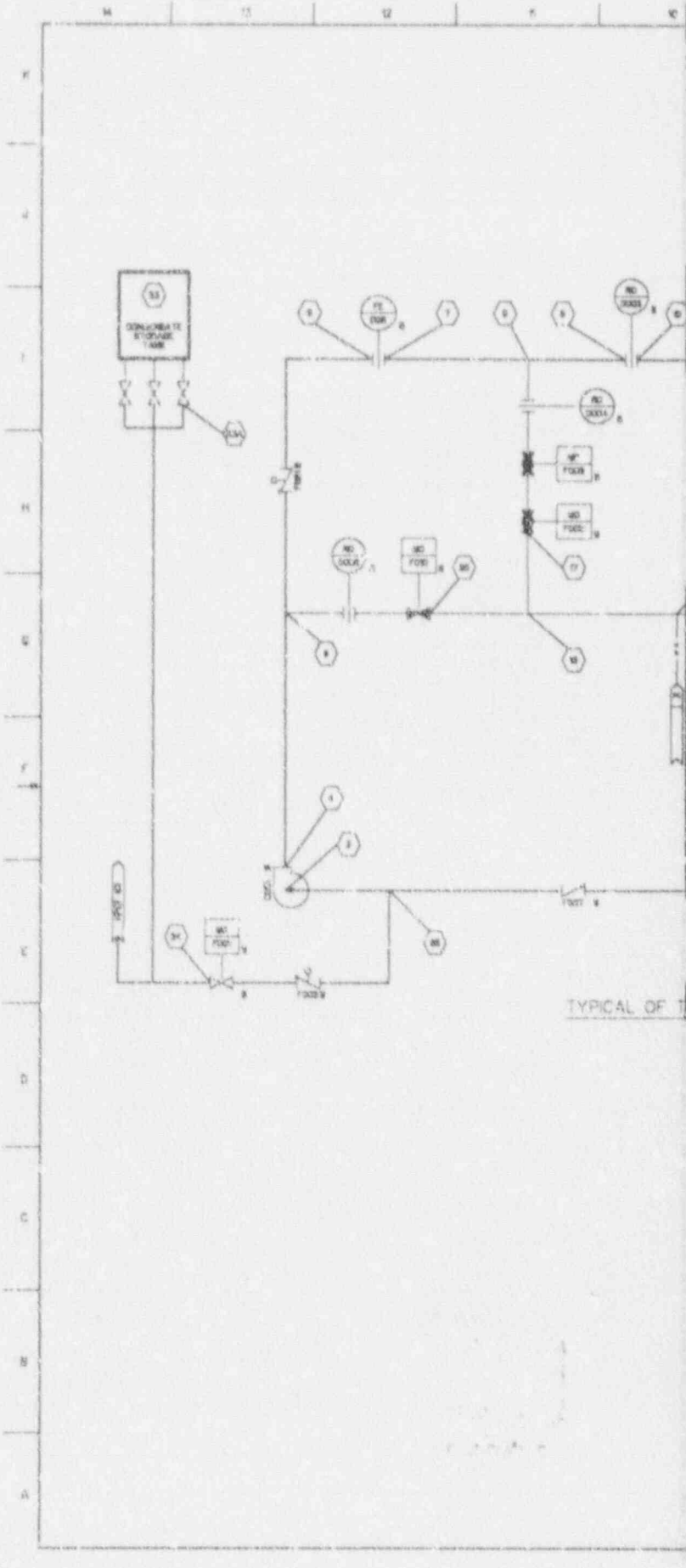
Figure 6.2-40 FLAMMABILITY CONTROL SYSTEM P&ID (Sheet 2 of 2)

9204160195-64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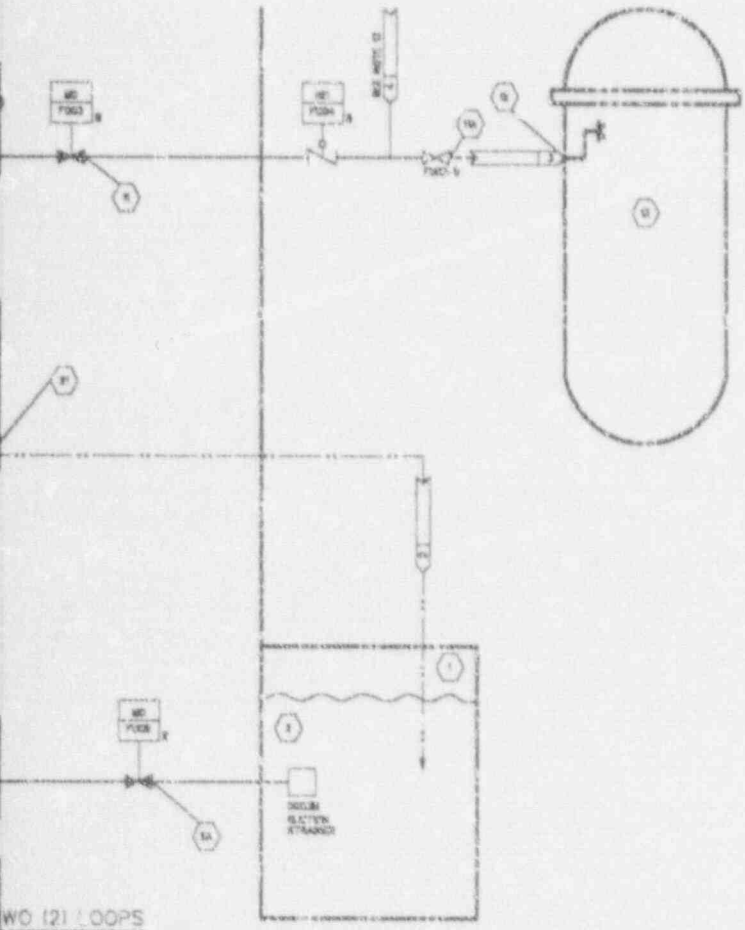

NOTES:

1. STANDBY LIQUID CONTROL (SLC) INJECTION INTO CORE FLOODER LOOP B DOES NOT AFFECT SYSTEM PIPING DESIGN FOR THAT LOOP.
2. SAFETY DATA & LIMITS ARE TO BE PROVIDED BY THE PIPING DESIGNER. ☐ INDICATES SYSTEM VALUE AND BRACKETED VALUES OF THAT PARAMETER.
3. MAXIMUM ELEVATION DIFFERENCE BETWEEN T.S. MINIMUM SUPPRESSION POOL LEVEL AND THE CORE FLOODING LOOP NOZZLE, MODULUS, IS 30.1 METERS.
4. IS ABOVE "D" THE NPSH AVAILABLE AT 1 METER ABOVE THE PUMP FLOOR SHALL MEET OR EXCEED 5.8 METERS WITH REACTOR STAGNATION IN 3 FLOODS.
5. THE PRESSURE DIFFERENCE BETWEEN POINTS 9 AND 10 SHALL BE ADJUSTED DURING PRE-OPERATIONAL TESTING, SO THAT:
   (a) THE FLOW RATE (Q) FOR MODE "A" IS EQUALS OR EXCEEDS AT THE ALLOWABLE PRESSURE SETPOINT.
   (b) THE NPSH AVAILABLE TO THE HPCF PUMPS IN MODE "C" IS NOT LESS THAN SPECIFIED IN NOTE 4.
   (c) THE PUMP VIBRATION ALLOWABLE ALARM LIMIT IS NOT EXCEEDED.
   (d) THE RUNOUT FLOW DOES NOT EXCEED VENDOR TESTED FLOW.
6. MINIMUM FLOW REFERS TO MINIMUM FLOW RATE IN MODE "C" WHEN THE PUMP VENDOR RECOMMENDED MINIMUM FLOW RATE IS LESS THAN THE MINIMUM, THE PUMP RECIRCULATION MUST BE ABLE TO MEET THE MINIMUM.
7. TAG TAB (-B FOR REFERENCE ONLY. SEE REFERENCE DOC. FOR RECOMMENDED VALUES.
8. TABLE 1 INDICATES VALVE POSITION DURING VARIOUS OPERATING MODES.
9. FOR MODE 5, (RPV) 1.1 MPA, 21.10.12 SECOND FOR A SHORT DURATION (1.0) AFTER LOCA.
10. MODE A REFLECTS INITIAL TEST CONDITIONS FOR THE INJECTION VALVE AND MINIMUM FLOW RECIRCULATION VALVE. THE BYPASS FLOW CONDITION WOULD BE USED FOR SHAKEDOWN OF THE FLOW TEST LOOP.
11. VALVES E22-F004A & C AUTOMATICALLY OPENS ON REACTOR WATER LOW LEVEL AND CLOSES ON HIGH LEVEL.
12. INTERCONNECTIONS BETWEEN THE HIGH PRESSURE CORE FLOODER SYSTEM AND THE RHR SYSTEM ARE FROM HPCF LOOP "B" TO RHR "C".
13. [illegible] SUBMERGENCE IS ON LOOP "B" ONLY.
14. NPSH AVAILABLE FROM THE CONDENSATE TANK MUST EQUAL OR EXCEED NPSH REQUIRED IN NOTE 4.
15. POSITIONS A3, B4, AND B5 APPLY WHEN SUCTION IS TAKEN FROM CST.
16. PRESSURES INITIAL SUCTION / BALANCE @ 70 DEGREES STORAGE TANK.
17. LOW NOZZLE SUCTION LINE LOSS FROM SUPPRESSION POOL TO PUMP SUCTION.
18. REQUIRED TOTAL DYNAMIC HEAD.

SUPPLEMENTAL DIAGRAMS UNDER THE FOLLOWING IDENTITIES ARE TO BE USED IN CONJUNCTION WITH THIS DRAWING:

	APL. NO.
1. HIGH PRESSURE CORE FLOODER (HPCF) P&ID	130-1010
2. RESIDUAL HEAT REMOVAL (RHR) P&ID	05-1005
3. REACTOR PRESSURE VESSEL (RPV)	05-1001
4. STANDBY LIQUID CONTROL (SLC) P&ID	041-1010

SUPPORTING DOCUMENTS

	APL. NO.
1. PIPING & INSTRUMENT DIAGRAM (P&ID) SYMBOLS	A05-1000

APL. NO. 130-1000

92-073-44

Figure 6.3–1 HPCF PROCESS DIAGRAM (Sheet 1 of 2)

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MODE "A" (LOSS OF REACTOR AT HIGH PRESSURE (LOOP 3 OR 4) SEE NOTE 9)

POSITION	1	2	3	4	5	6	7	8	9	10	11	12	13
FLOW m^3/h	N/A	900	↓						900	N/A	900	900	900
TEMP °C	66/70	↓							66/70		66/70	66/70	66/70
PRESS kg/cm^2 g	120									83.8	100		
MAX PRESS DIFF - MN/SQM				80.2	NOTE 11								

MODE "B" ACCIDENT, INJECTION AT RATED FLOW RATE (LOOP 3 OR 4) SEE NOTE 9 AND 8

POSITION	1	2	3	4	5	6	7	8	9	10	11	12	13
FLOW m^3/h	N/A	727	↓						727	N/A	727	727	727
TEMP °C	120/70	↓							120/70		66/70	66/70	66/70
PRESS kg/cm^2 g	100									8.00	100		
MAX PRESS DIFF - MN/SQM				100	NOTE 11		8.1			99			

MODE "C" ACCIDENT, PUMP OPERATING AT RUNOUT (LOOP 3 OR 4) SEE NOTE 9

POSITION	1	2	3	4	5	6	7	8	9	10	11	12	13
FLOW m^3/h	N/A	1000	↓						1000	N/A	1000	1200	1000
TEMP °C	120/70	↓							120/70		66/70	66/70	66/70
PRESS kg/cm^2 g	100									100	100		
MAX PRESS DIFF - MN/SQM	NOTE 11			≈ 100	NOTE 10								

MODE "D" SYSTEM TEST TO SUPPRESSION POOL (LOOP 3 OR 4) SEE NOTE 10 AND 12

POSITION	1	2	3	4	5	6	7	8	9	10	11	12	13
FLOW m^3/h	N/A	727/1454	↓						727/1454	727/1454	727/1454	727/1454	727/1454
TEMP °C	38/70	↓							38/70	66/70	66/70	66/70	66/70
PRESS kg/cm^2 g	100										100		
MAX PRESS DIFF - MN/SQM				≈ 100/200	NOTE 10								

MODE "E" SYSTEM TEST TO ALTERNATE VESSEL (LOOP 3 OR 4) SEE NOTE 10

POSITION	1	2	3	4	5	6	7	8	9	10	11	12	13
FLOW m^3/h	N/A	1000	↓						1000	N/A	1000	1000	1000
TEMP °C	38/70	↓							38/70		66/70	66/70	66/70
PRESS kg/cm^2 g	100									100	100		
MAX PRESS DIFF - MN/SQM				≈ 100	NOTE 10								

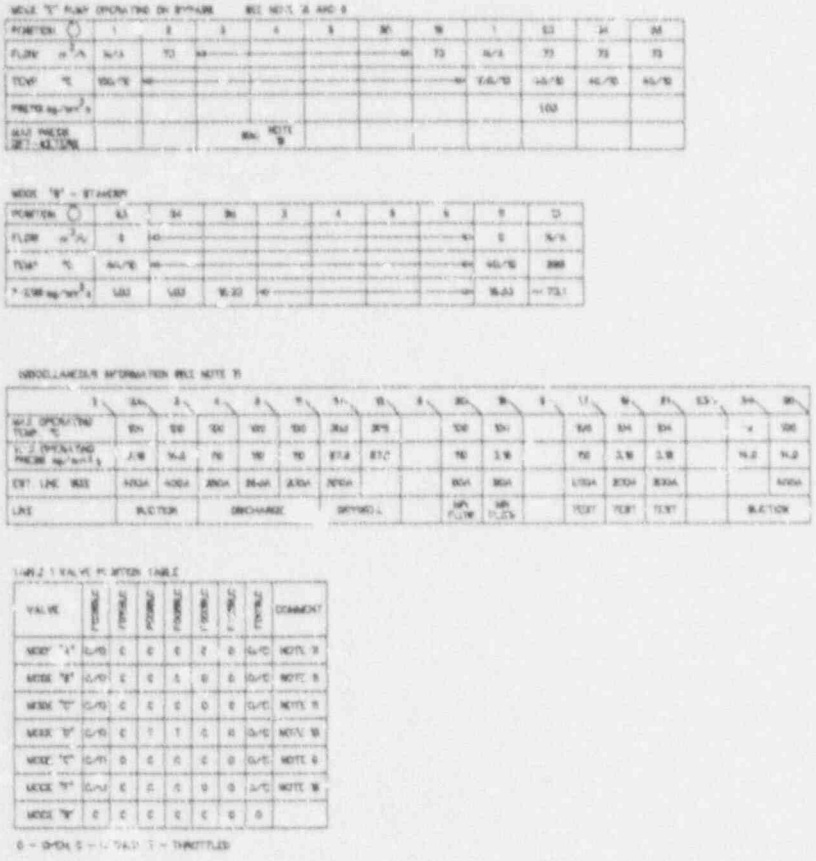

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Figure 6.3–1 HPCF PROCESS DIAGRAM (Sheet 2 of 2)

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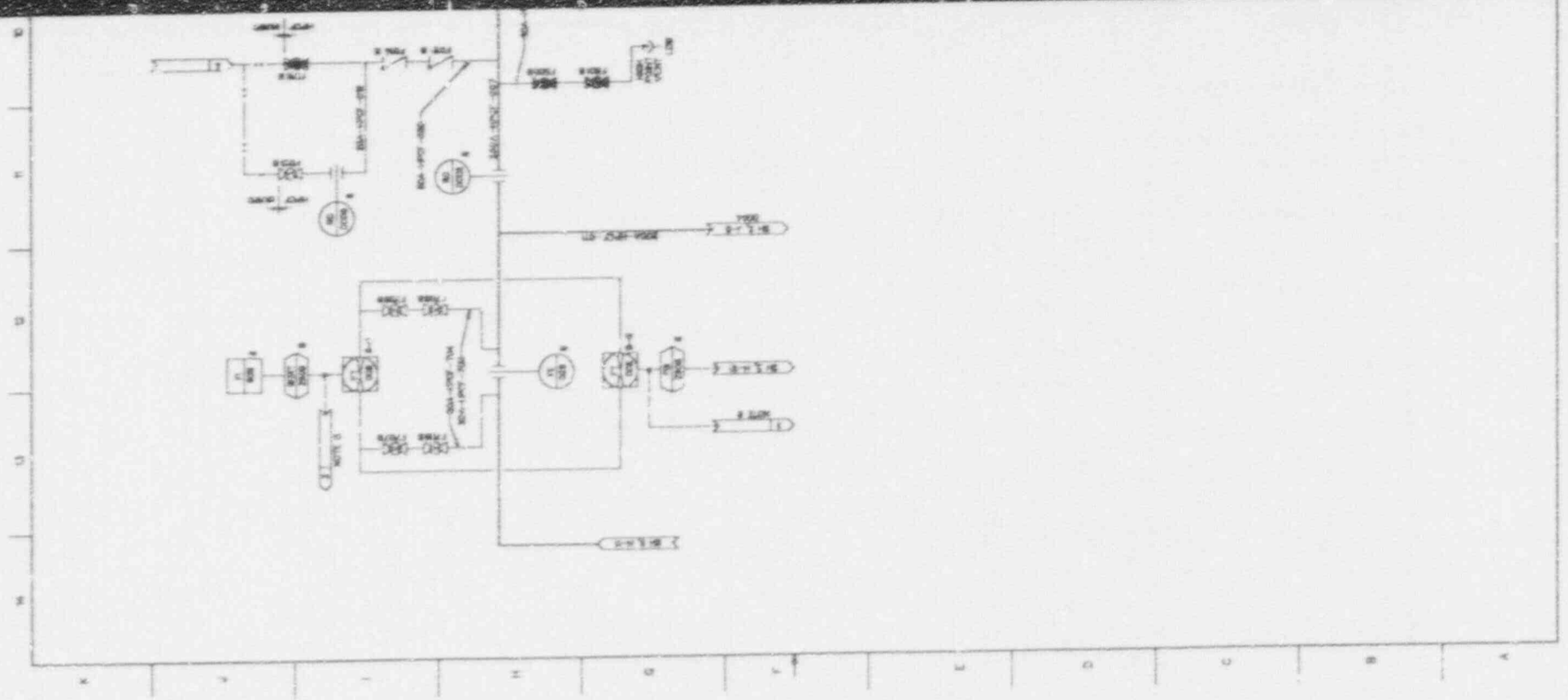

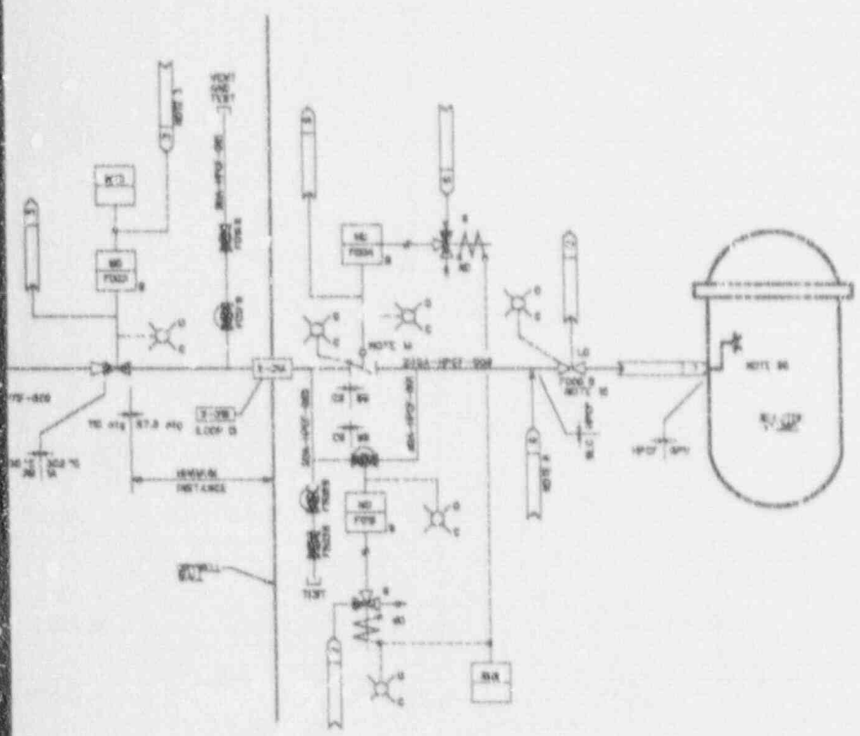

NOTES:

1. PIPING HIGH POINT VENTS AND LOW POINT DRAINS ARE TO BE AS SHOWN ON SECONDARY.
2. INSTRUMENT LINE DESIGN AND VALVING REQUIRE BE IN ACCORDANCE WITH INSTRUMENT PIPING SPECIFICATION A31-J0130.
3. THE METHOD OF MOUNTING LOCAL INSTRUMENTS IS TO BE DETERMINED BY PIPING DESIGNER.
4. VENT, DRAIN AND REJECT VALVES - ISOLATING SYSTEM TO LCV AND HCV OR SUPPRESSION POOL ARE BY PIPING SUBGRADE.
5. FOR ADDITIONAL CONTROL ROOM INDICATOR LIGHTS, SYSTEMS ALARMS AND REMOTE MANUAL SWITCHES, SEE THE HPCF LOGIC DIAGRAMS.
6. PROVISIONS FOR CONTAINMENT ISOLATION SHALL BE IN ACCORDANCE WITH THE CONTAINMENT LOCKSHIM REQUIREMENTS.
7. EQUIPMENT AND INSTRUMENTS ARE PREFIXED BY SYSTEM NUMBER E22 UNLESS OTHERWISE NOTED.
8. THIS SIS V.L. IS USED FOR LOOP B ONLY.
9. DRYWELL PIPING RUNS SHALL BE HORIZONTAL OR VERTICAL UPWARDS FROM THE DRYWELL WALL TO THE POINT OF ATTACHMENT WITH THE REACTOR VESSEL.
10. [illegible]
11. SCHEMATIC LINE SIZE WILL BE ANALYZED AT THE DETAILED DESIGN PHASE. ACTUAL LINE SIZES DETERMINED BY THE PIPING DESIGNER SHALL MEET THE PROCESS DATA HYDRAULIC REQUIREMENTS.
12. VALVES FOR MAINTENANCE AND/OR LEAK RATE TESTING.
13. PUMP SUCTION COOLING WATER IS SUPPLIED FROM SYSTEM P21.
14. SUCTION VALVES F004AC AND F005AC SHALL BE LOCATED AS CLOSE AS PRACTICAL TO THE REACTOR PRESSURE VESSEL NOZZLE.
15. VALVES F004AC AND F005AC SHALL BE LOCATED AS CLOSE AS PRACTICAL TO THE CONTAINMENT PENETRATION OF THE SUCTION LINE TO THE SUPPRESSION POOL.
16. ALL MOTOR OPERATED VALVES ARE AC OPERATED UNLESS OTHERWISE NOTED.
17. COMMON LINE FOR HPCF-A, HPCF-C, F006, AND RPV(L).
18. [illegible]
19. FOR LOOP A REPLACE SUFFIX F WITH A, SUFFIXES D AND E ARE SUFFIX.
20. HPCF DESIGN SPECIFICATION ARE AS FOLLOWS:
    A. MAXIMUM OPERATING PRESSURE - SEE SPECIFIC BOUNDARY SYMBOL
    B. MAXIMUM OPERATING TEMPERATURE - SEE SPECIFIC BOUNDARY SYMBOL
    C. MATERIAL - CARBON STEEL EXCEPT AS SPECIFIED
    D. [illegible]
    E. DESIGN CLASS - SEE SPECIFIC BOUNDARY SYMBOL
    F. QA CLASS - SEE SPECIFIC BOUNDARY SYMBOL
    G. SEISMIC CLASS - As
    H. FLUID - WATER
21. [illegible]
22. DRAIN AND VENT HPCF DESIGN CONDITIONS ARE:
    MAXIMUM OPERATING PRESSURE - SAME AS MAIN LINE
    MAX OPERATING TEMPERATURE - SAME AS MAIN LINE
23. [illegible]
24. [illegible]
25. [illegible]

	MPL NO.
1. REACTOR BUILDING COOLING WATER SYSTEM P40	P21-1010
2. AUXILIARY BOILER SYSTEM P50	P21-1020
3. REMOTE SHUTDOWN SYSTEM E51	P21-1040
4. MAKE-UP WATER SYSTEM DEMINERALIZED P400	P21-1050
5. HIGH PRESSURE NITROGEN SUPPLY SYSTEM P43	P21-1060
6. VALVE STEAM LEAKAGE TREATMENT, RADWASTE SYS P400	P21-1070
7. REACTOR PRESSURE VESSEL SYSTEM	P21-1080
8. HIGH CONDUCTIVITY WASTE SYSTEM P400	P21-1090
9. STANDBY LIQUID CONTROL SYSTEM P400	P21-1100
10. RESIDUAL HEAT REMOVAL SYSTEM P400	P21-1110
11. HIGH PRESSURE CORE FLOODER SYSTEM P70	P22-1000
12. HIGH PRESSURE CORE FLOODER P73	P22-1010
13. SUPPRESSION POOL TEMPERATURE MONITORING SYSTEM P80	P22-1030
14. REACTOR CORE ISOLATION COOLING SYSTEM P60	P22-1040
15. SUPPRESSION POOL CLEAN-UP SYSTEM P400	P22-1050
16. LOW CONDUCTIVITY WASTE, RADWASTE SYSTEM P40	P21-1060

SUPPORTING DOCUMENT	MPL NO.
1. PIPING AND INSTRUMENT DIAGRAM SYMBOLS	A31-J0130

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Figure 6.3–7 HIGH PRESSURE CORE FLOODER SYSTEM P&ID (Sheet 1 of 2)

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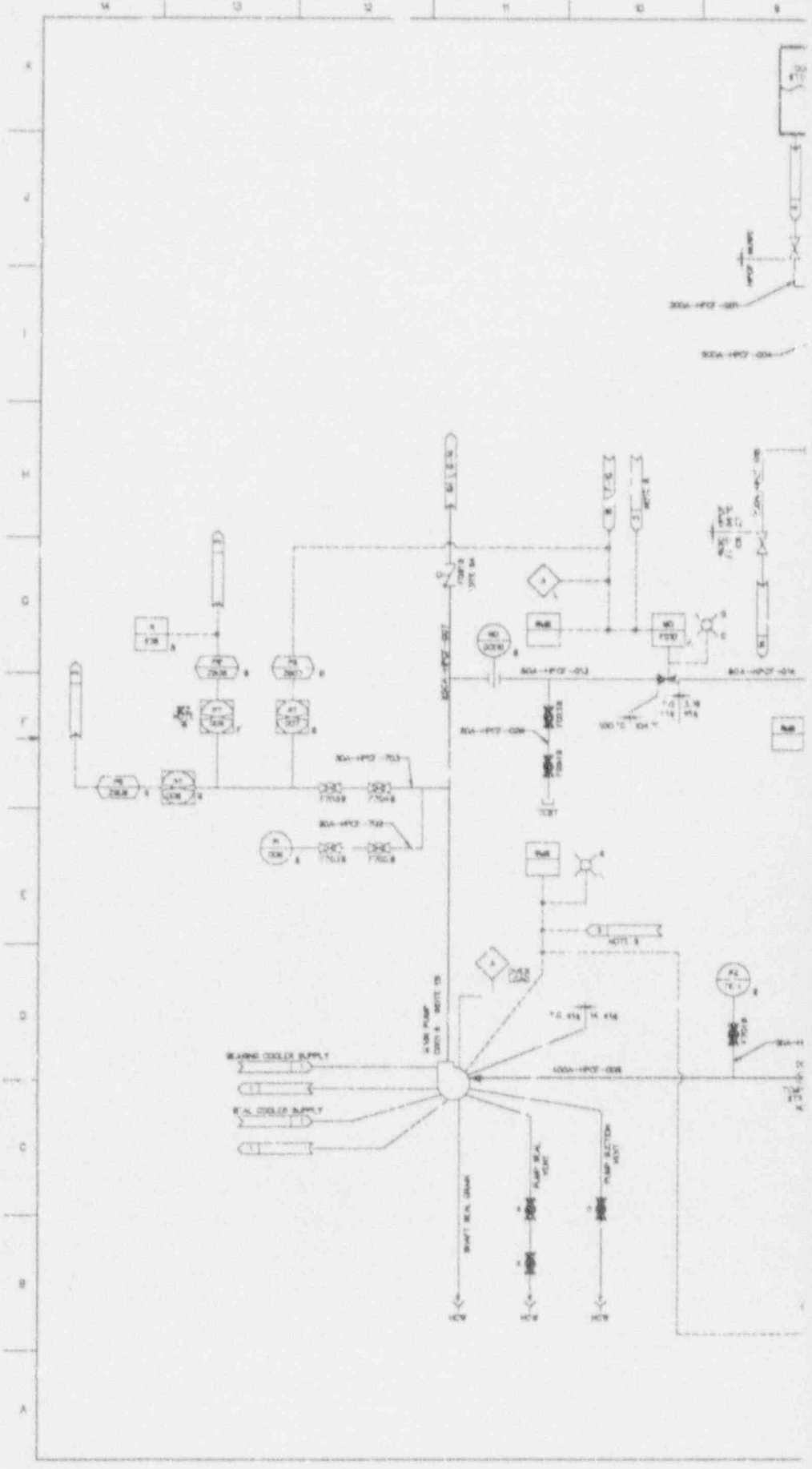


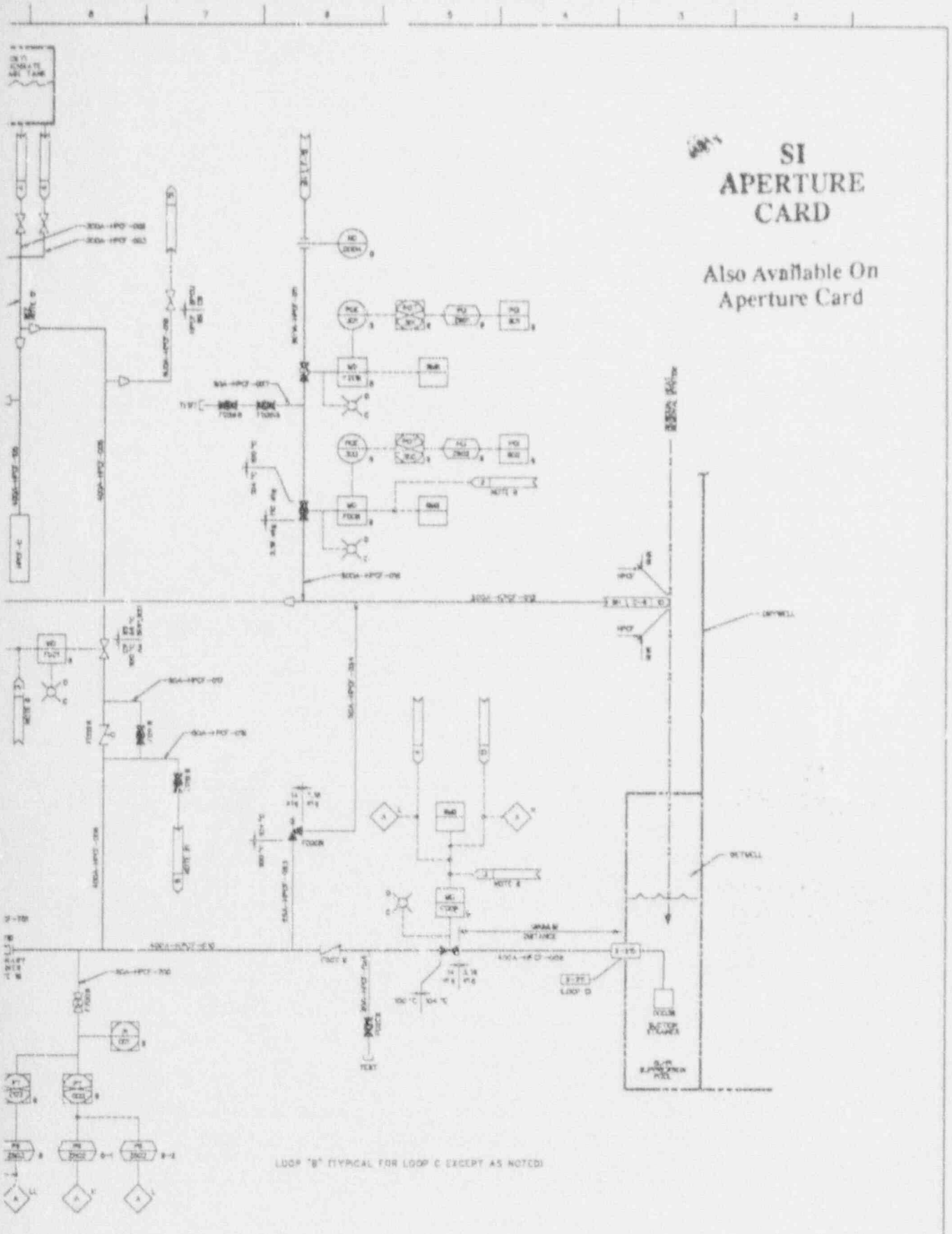
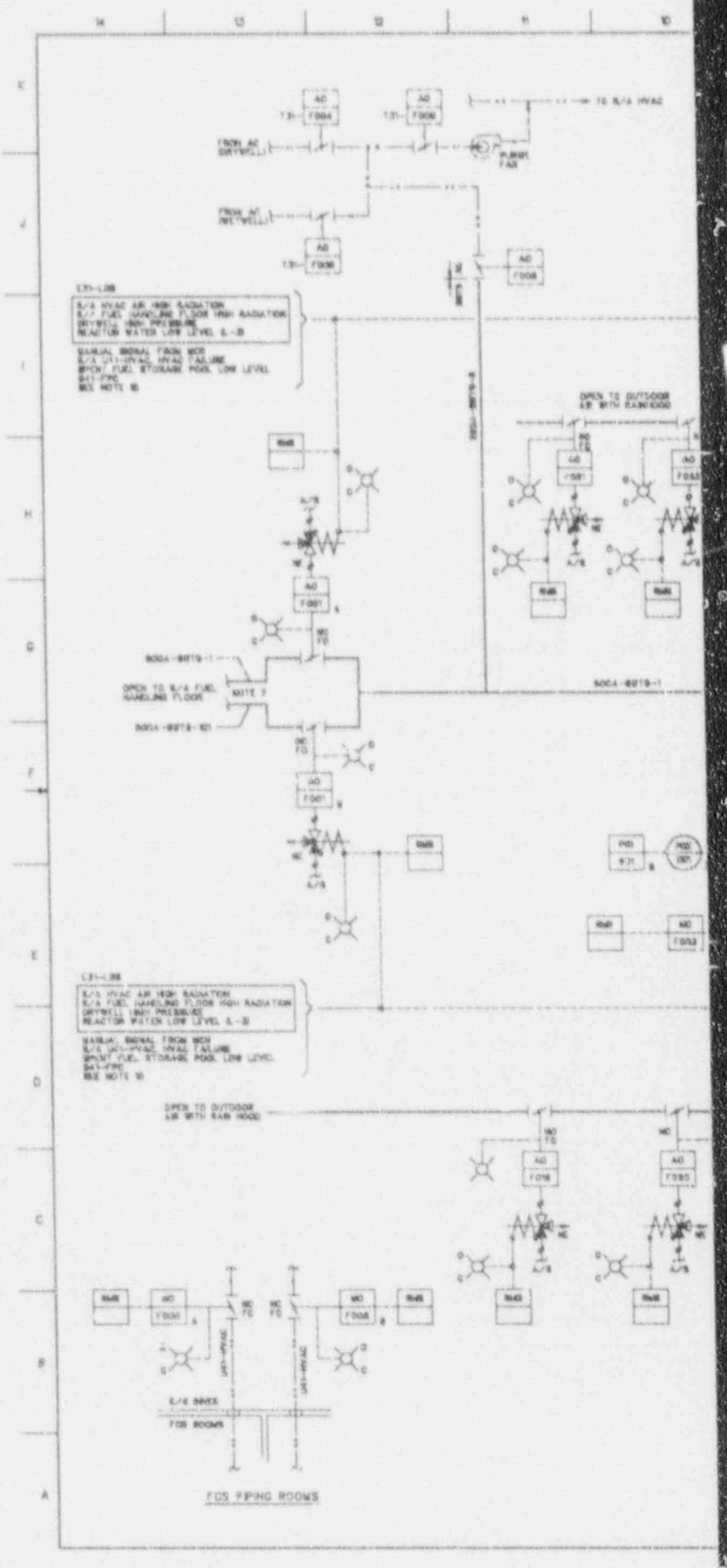


Figure 6.3–7 HIGH PRESSURE CORE FLOODER SYSTEM P&ID (Sheet 2 of 2)

9204160195-68



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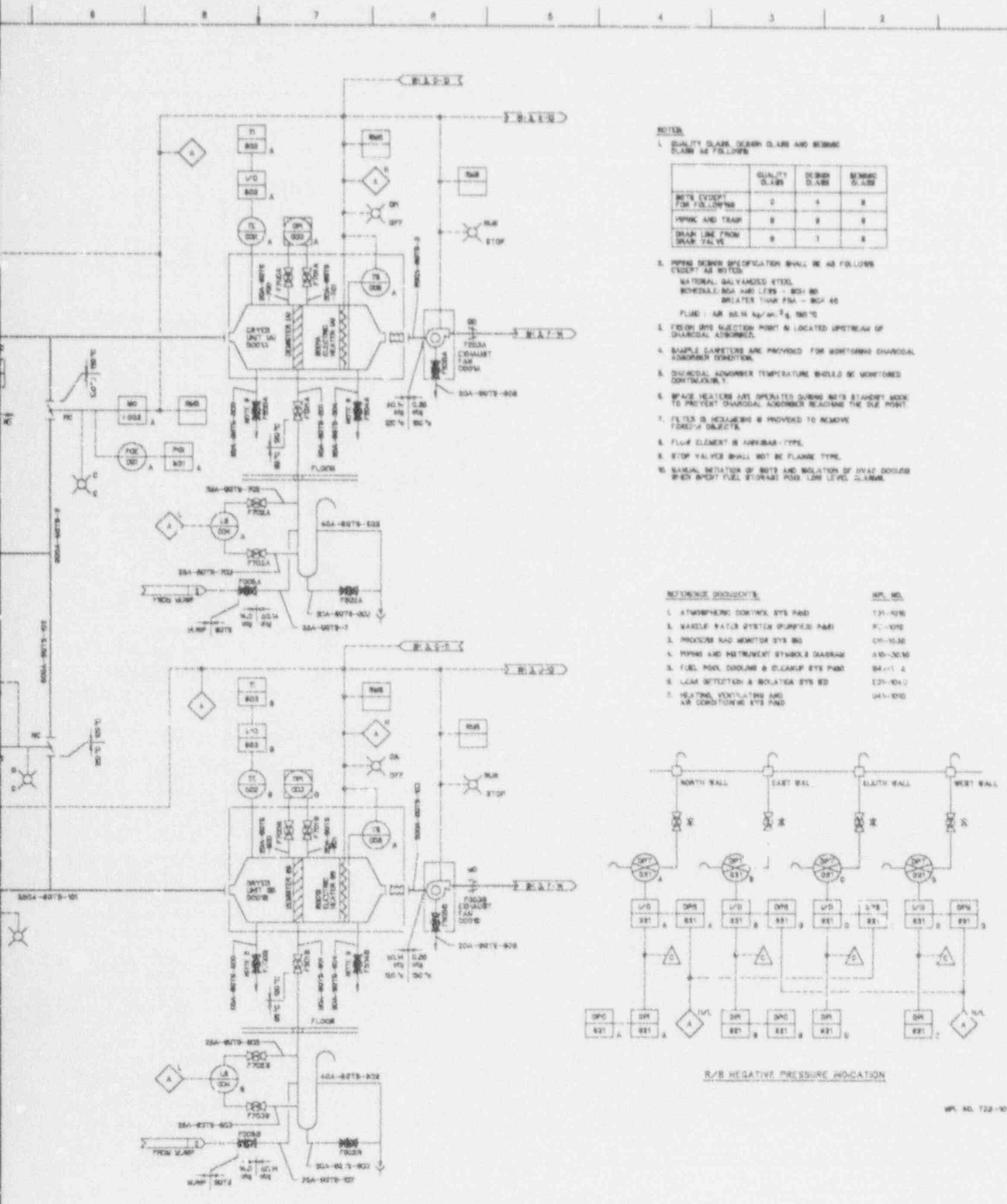
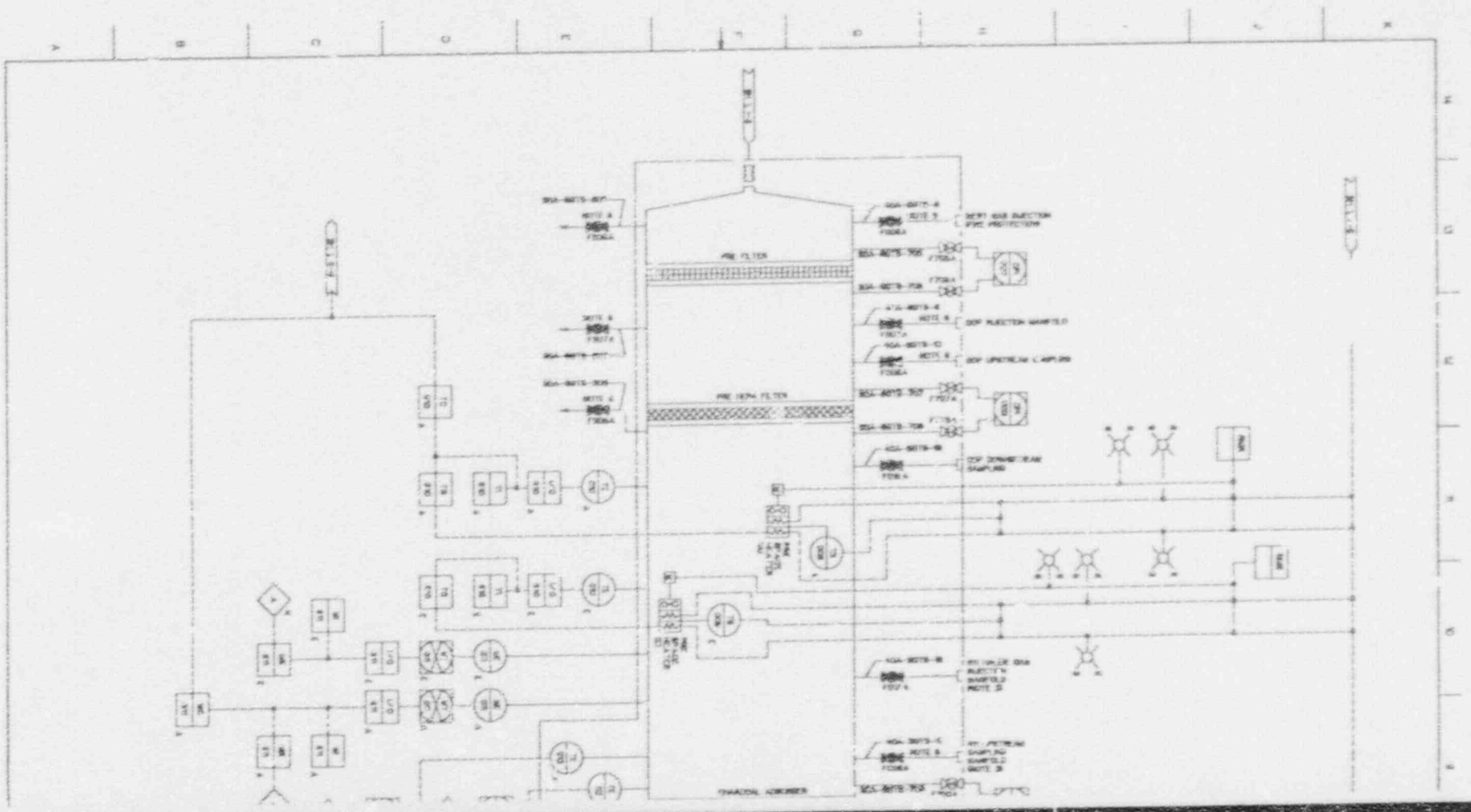


Figure 6.5–1 STANDBY GAS TREATMENT SYSTEM P&ID (Sheet 1 of 3)

9204160195-69



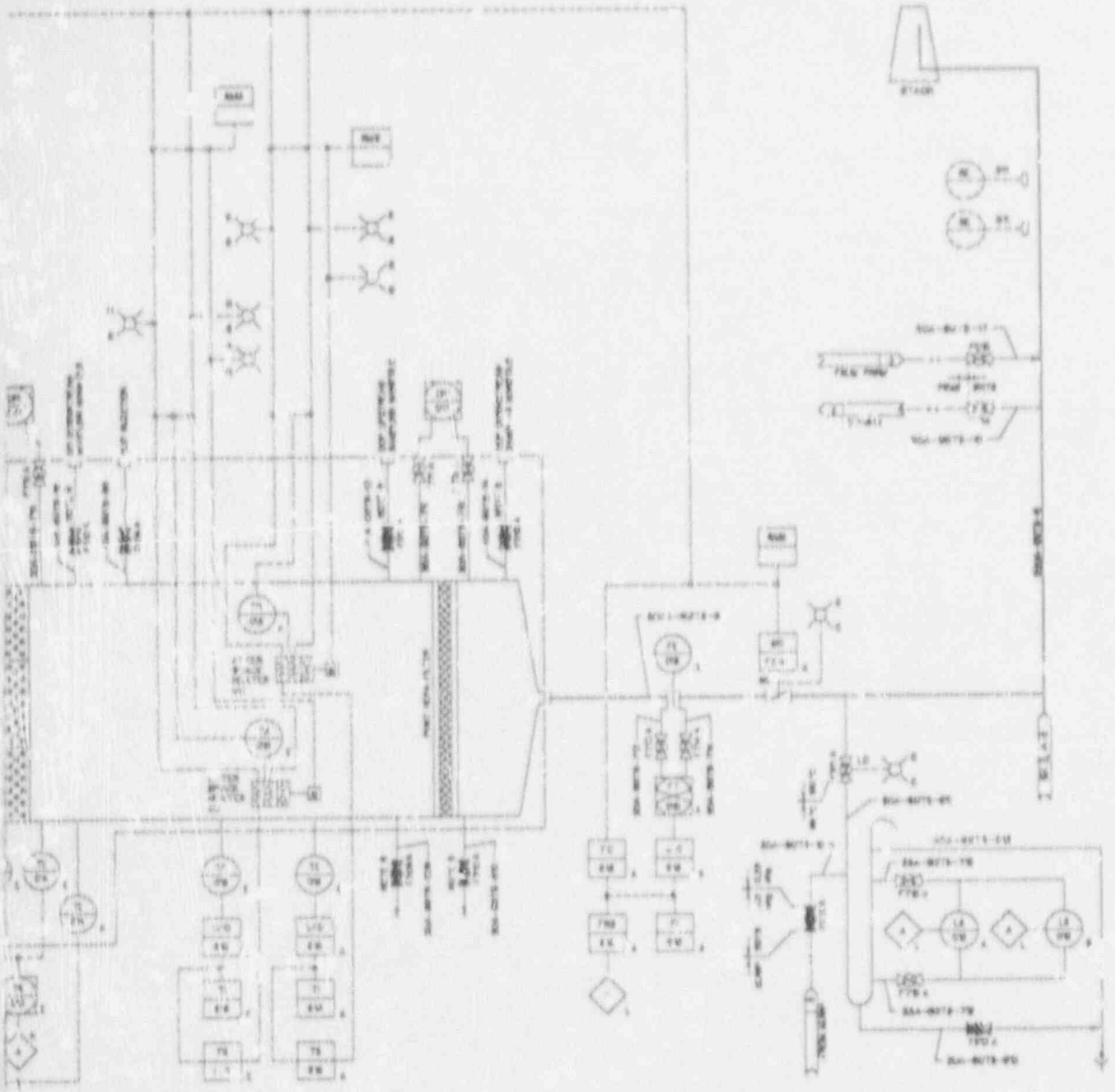


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Figure 6.5-1 STANDBY GAS TREATMENT SYSTEM P&ID (Sheet 2 of 3)

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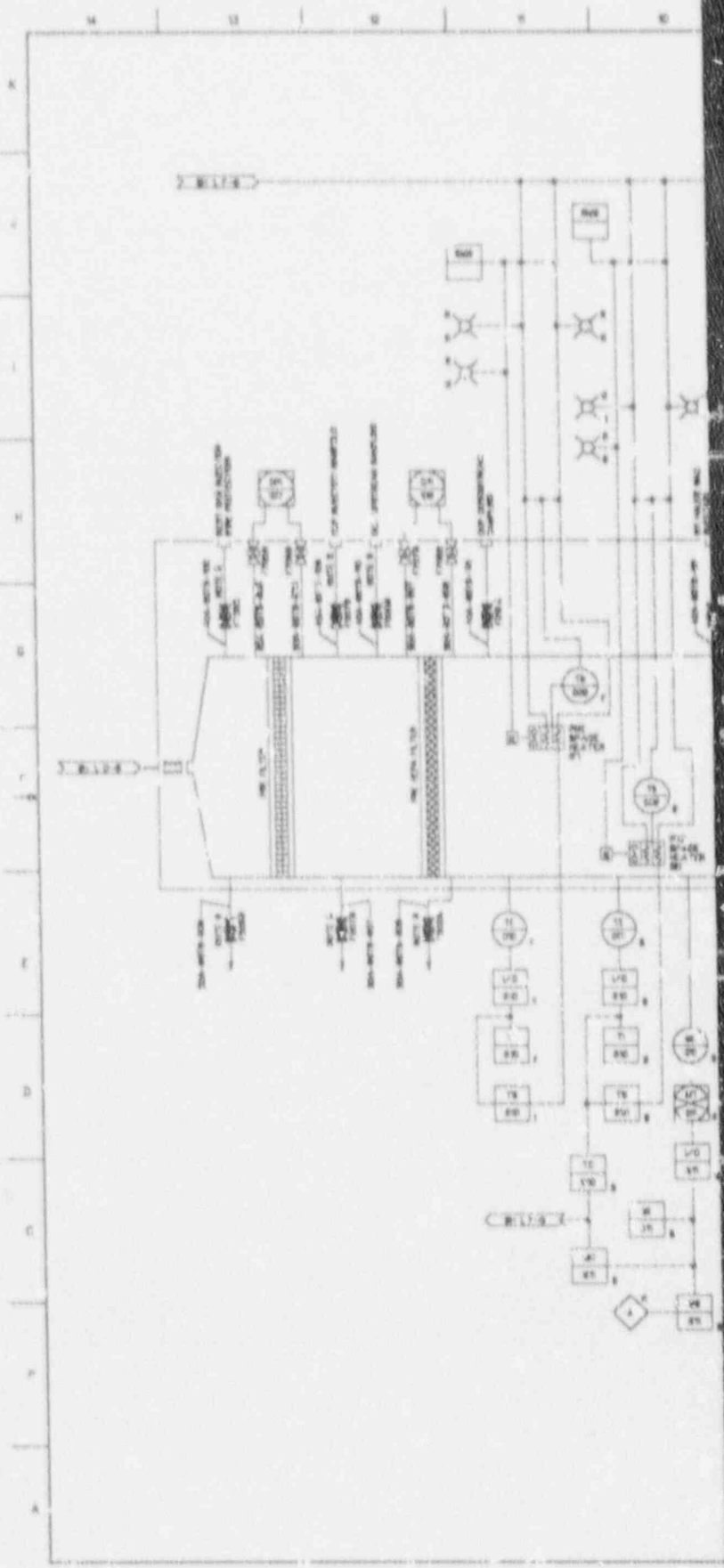

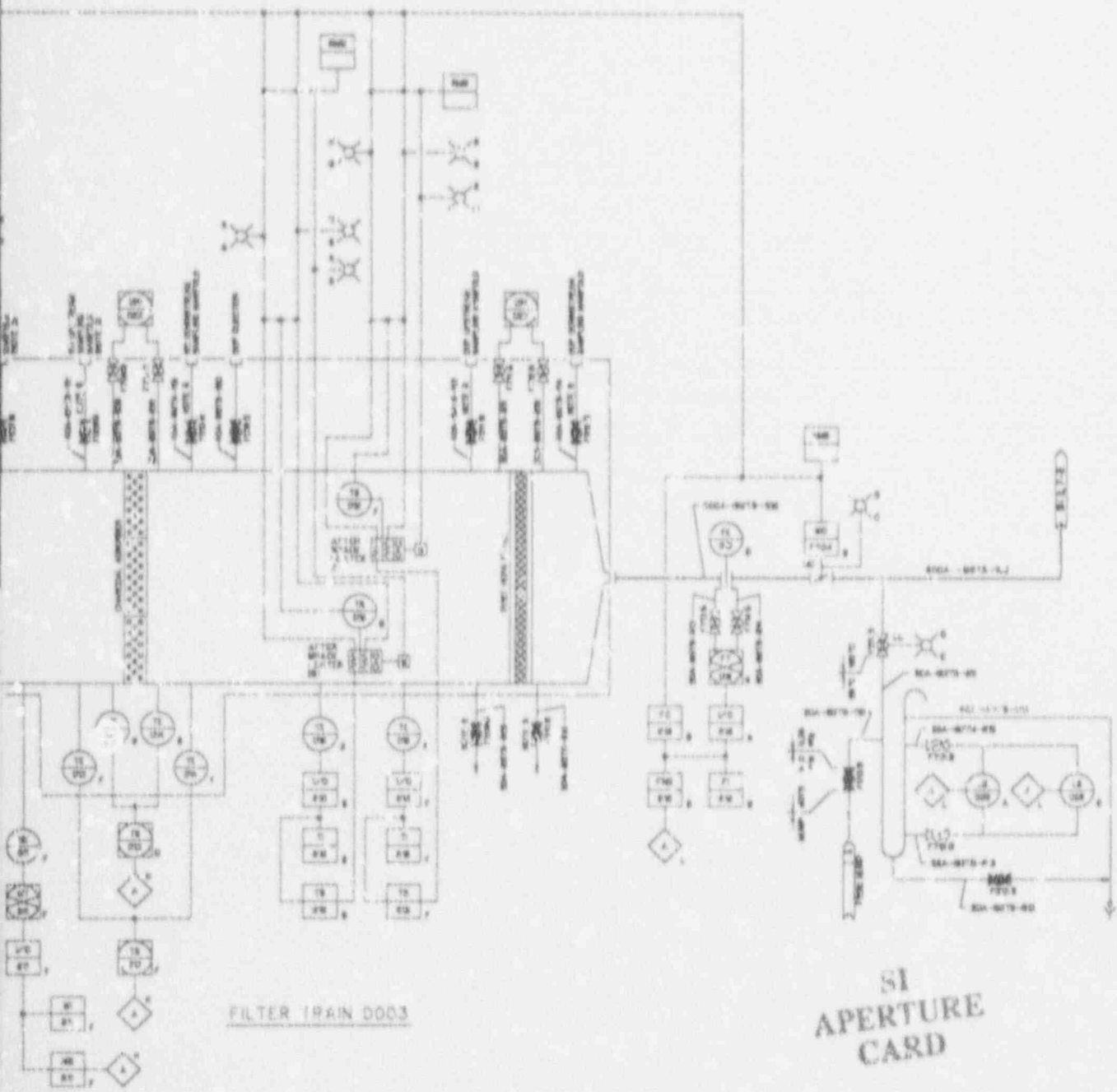

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Figure 6.5-1 STANDBY GAS TREATMENT SYSTEM P&ID (Sheet 3 of 3)

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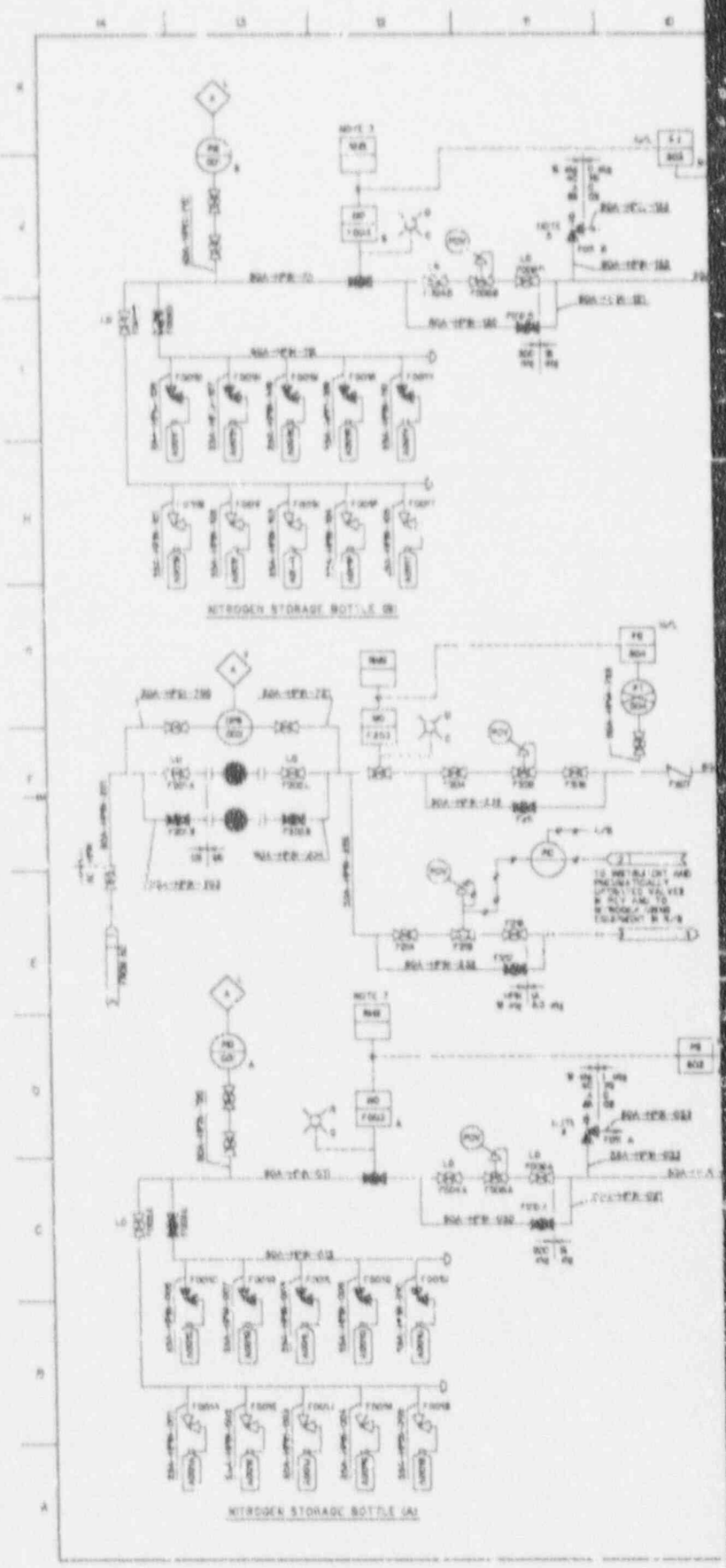
NITROGEN STORAGE BOTTLE (B)
NITROGEN STORAGE BOTTLE (A)

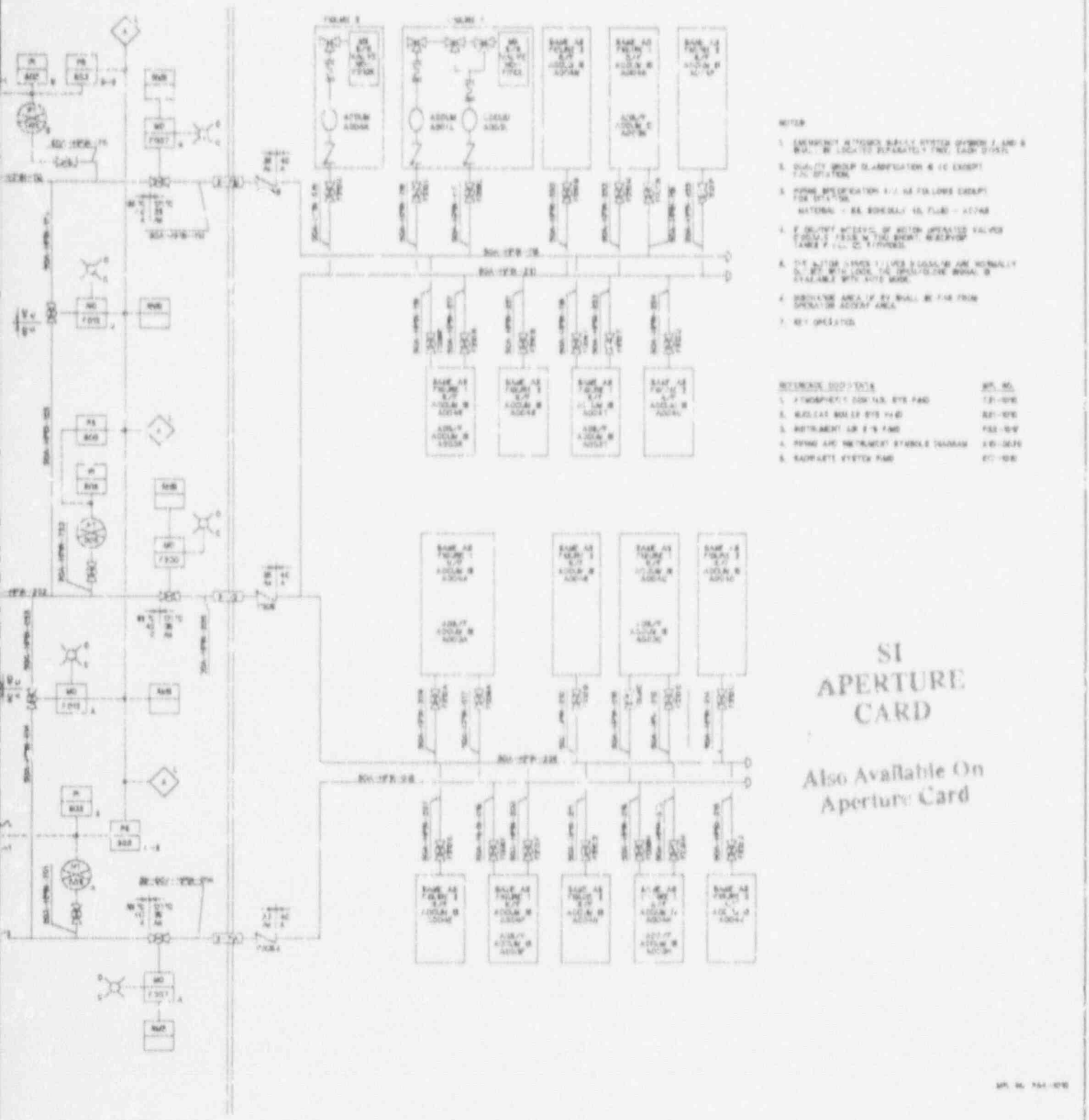

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Figure 6.7-1 NITROGEN GAS SUPPLY SYSTEM P&ID

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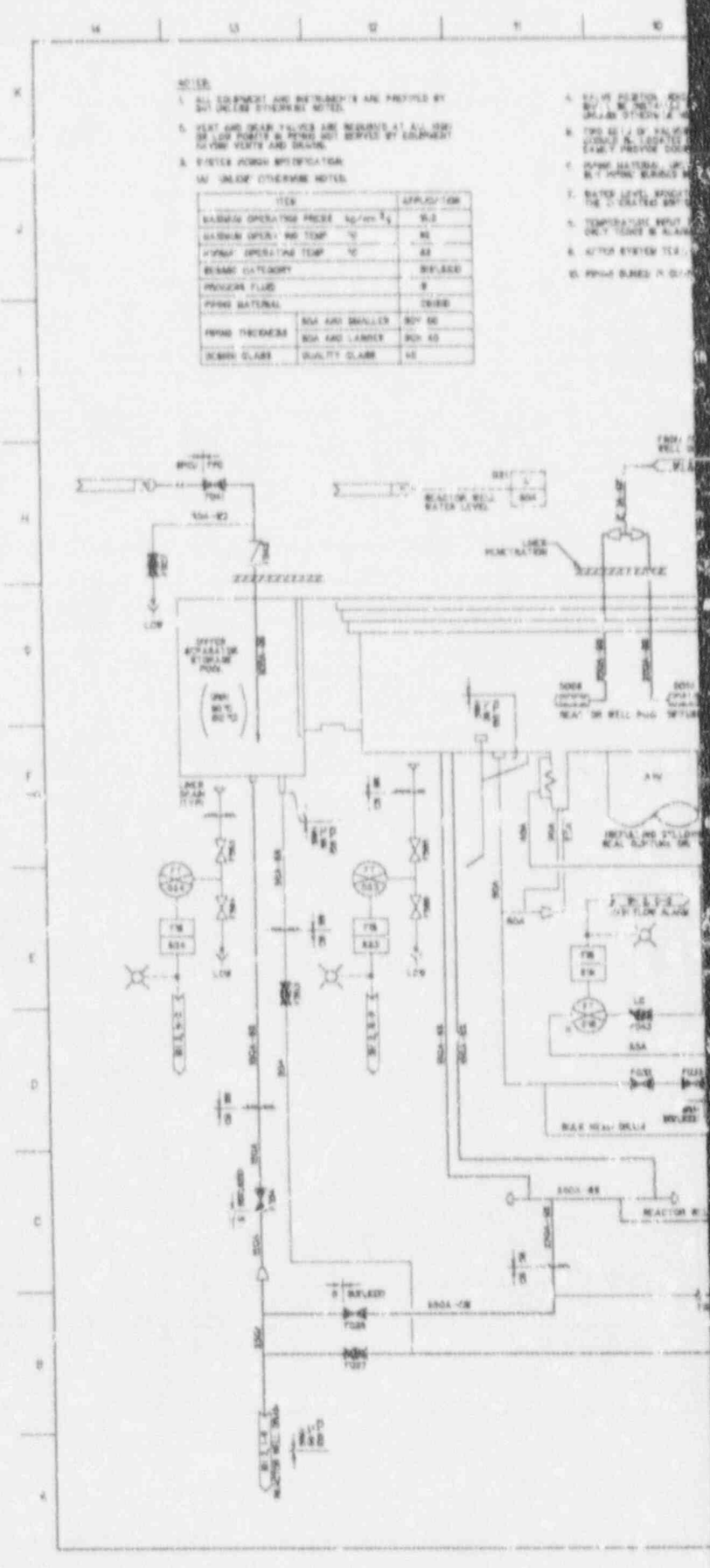

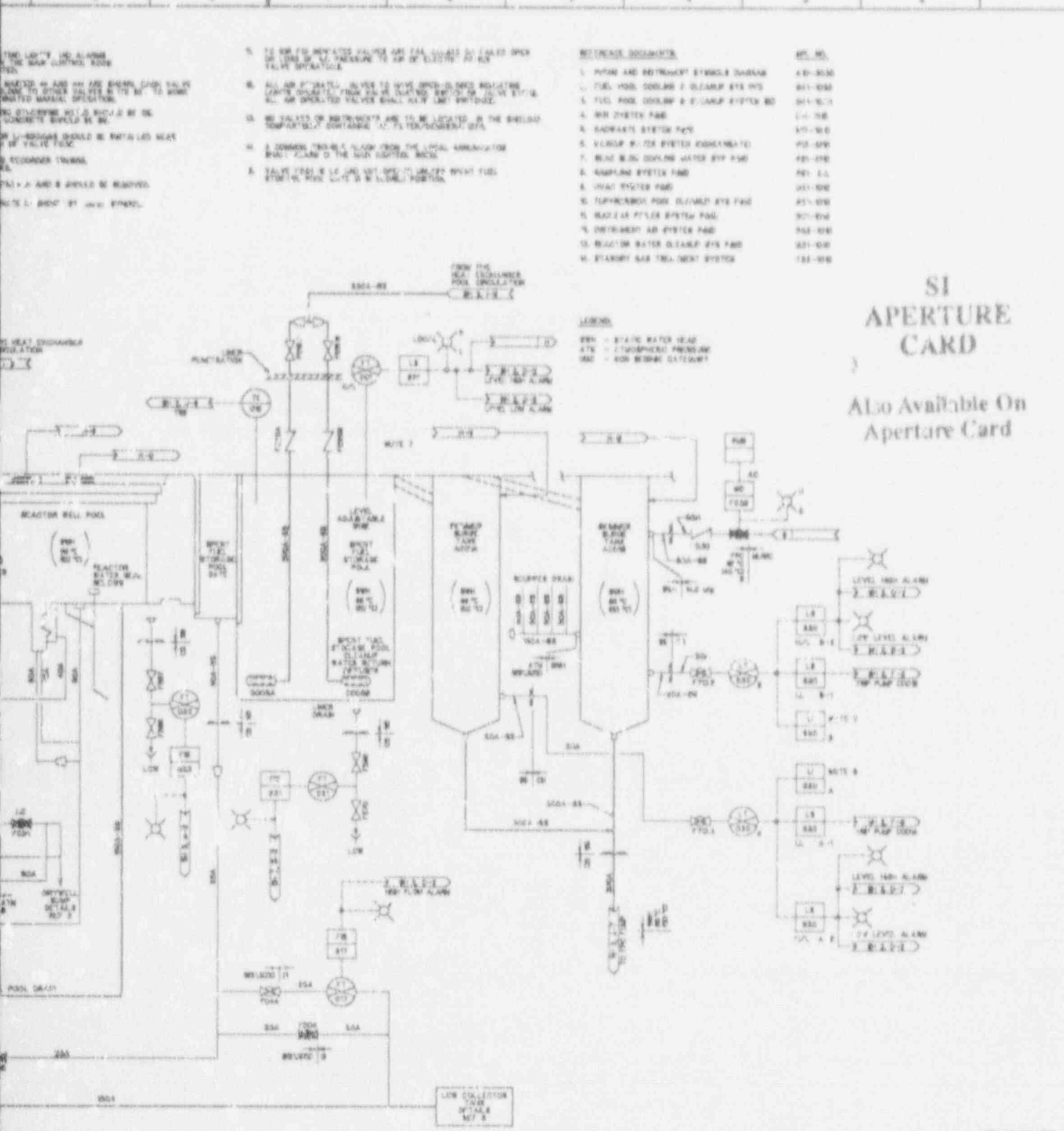

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Figure 9.1-1 FUEL POOL COOLING AND CLEANUP SYSTEM P&ID (Sheet 1 of 3)

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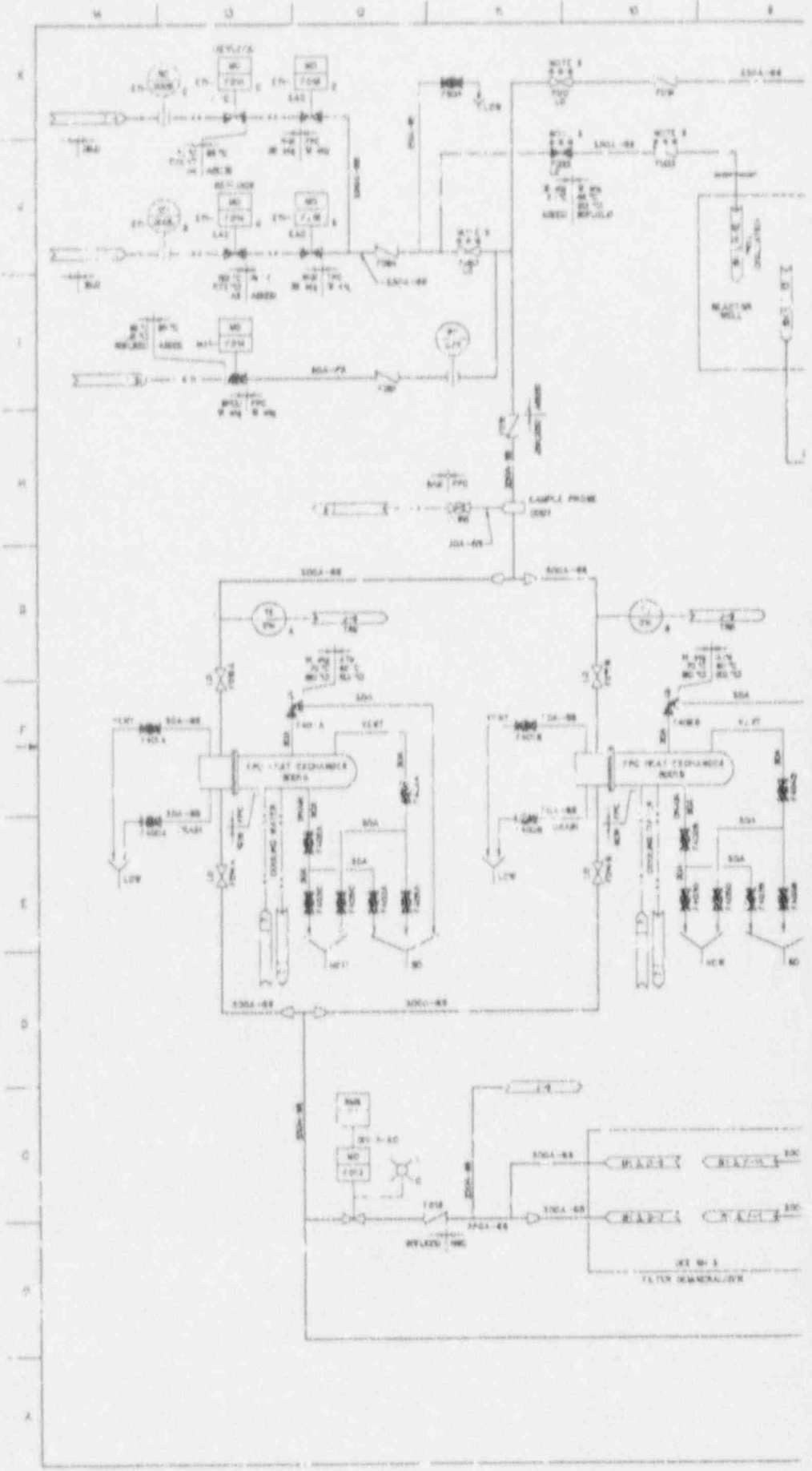

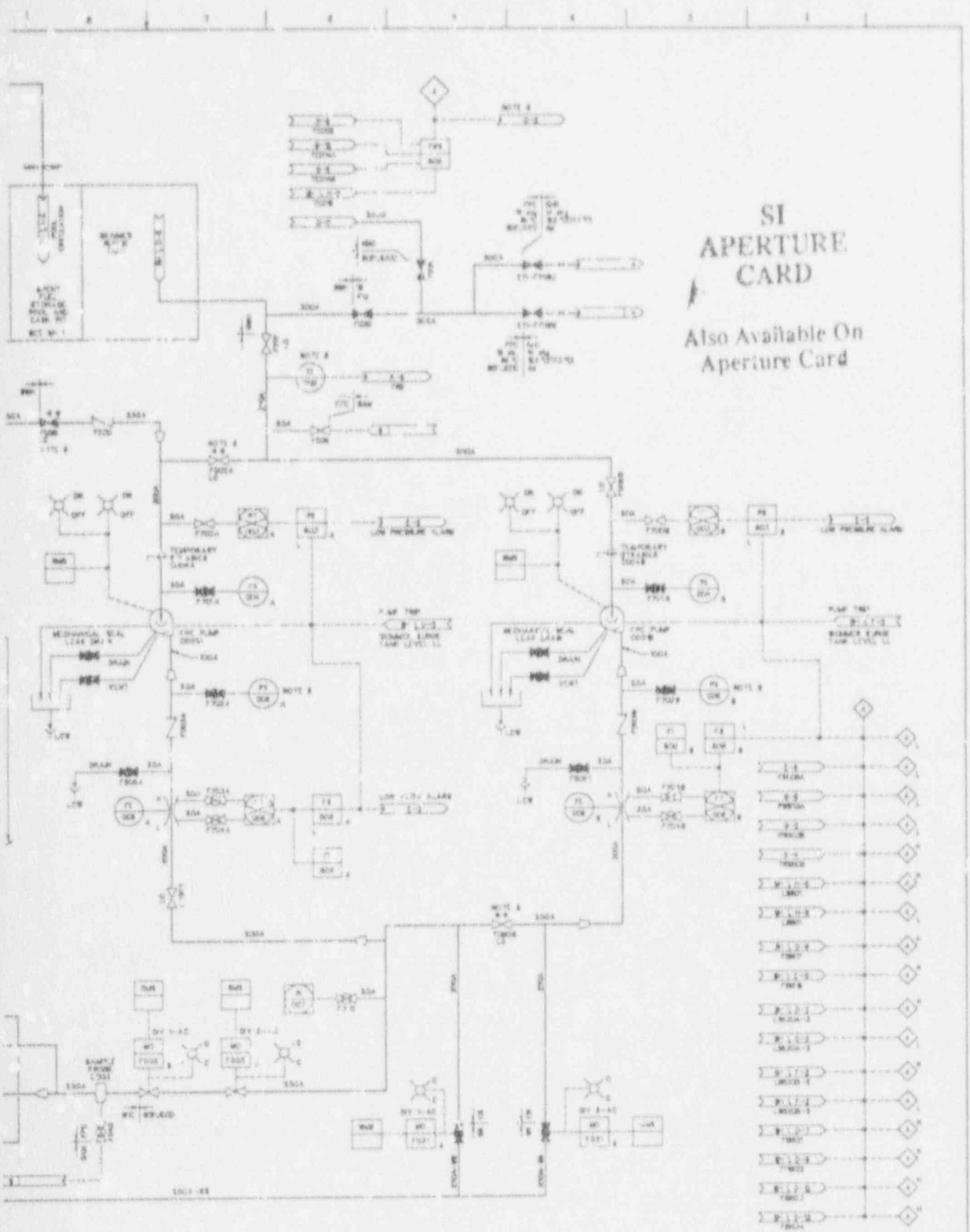

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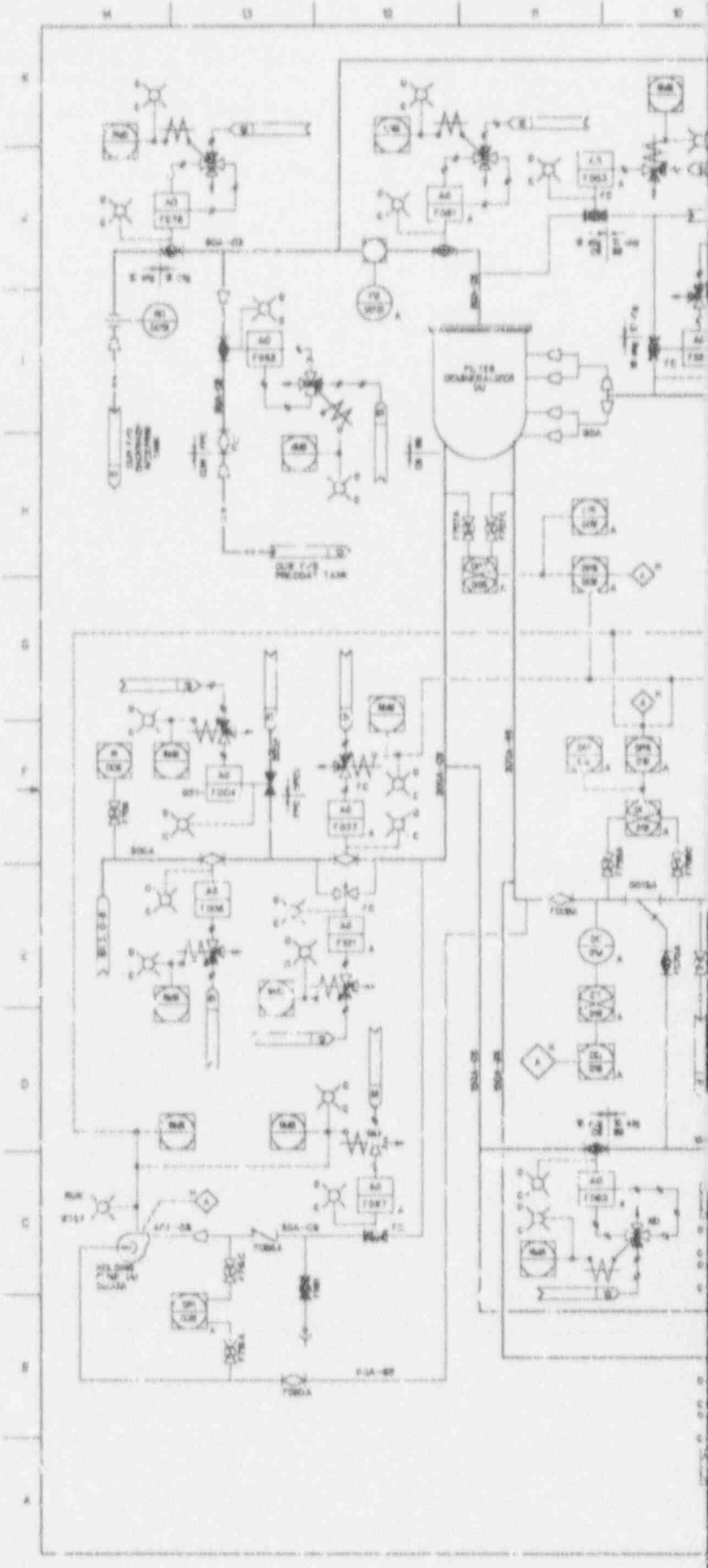
Figure 9.1–1 FUEL POOL COOLING AND CLEANUP SYSTEM P&ID (Sheet 2 of 3)

9204160195 -74



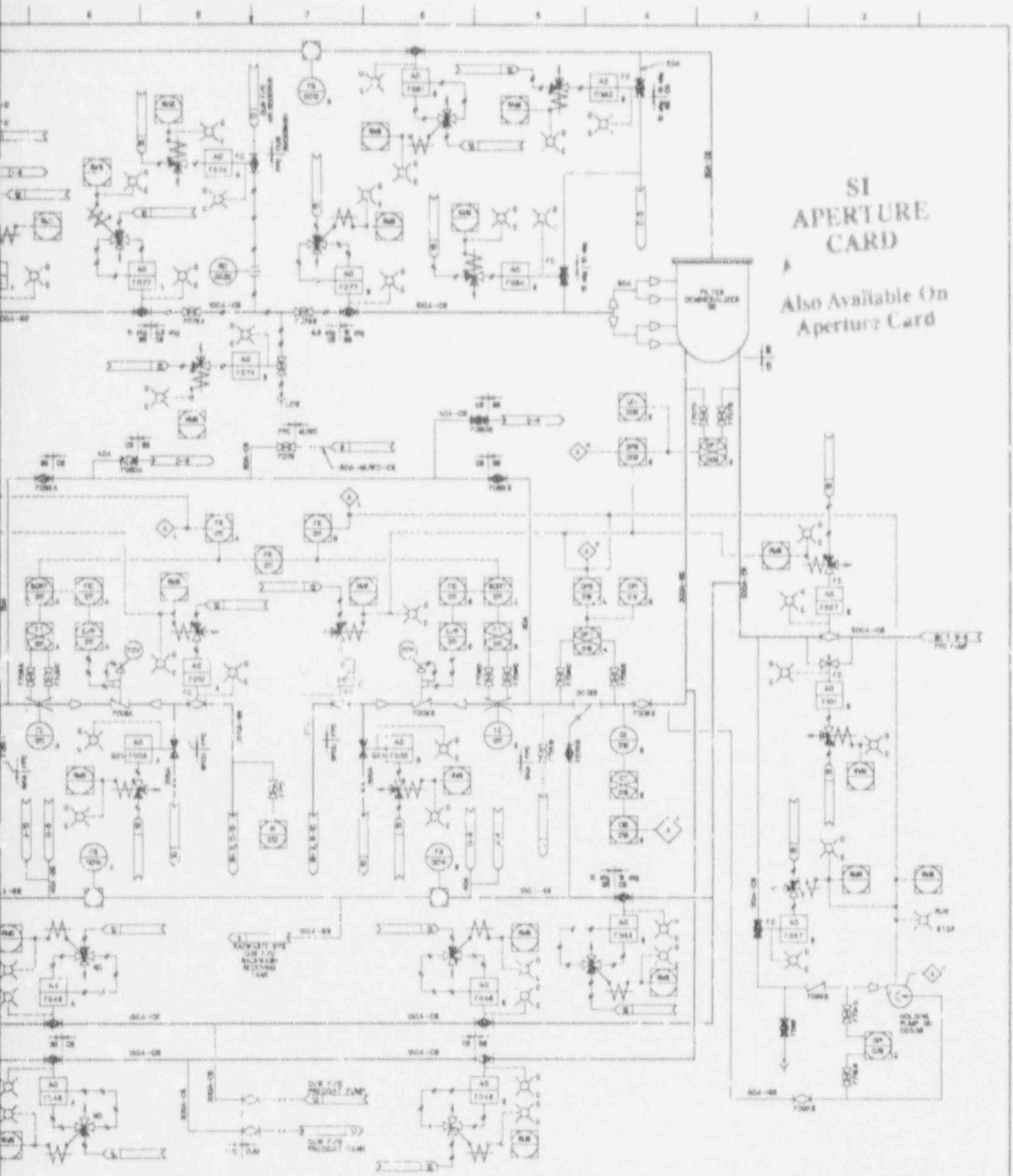
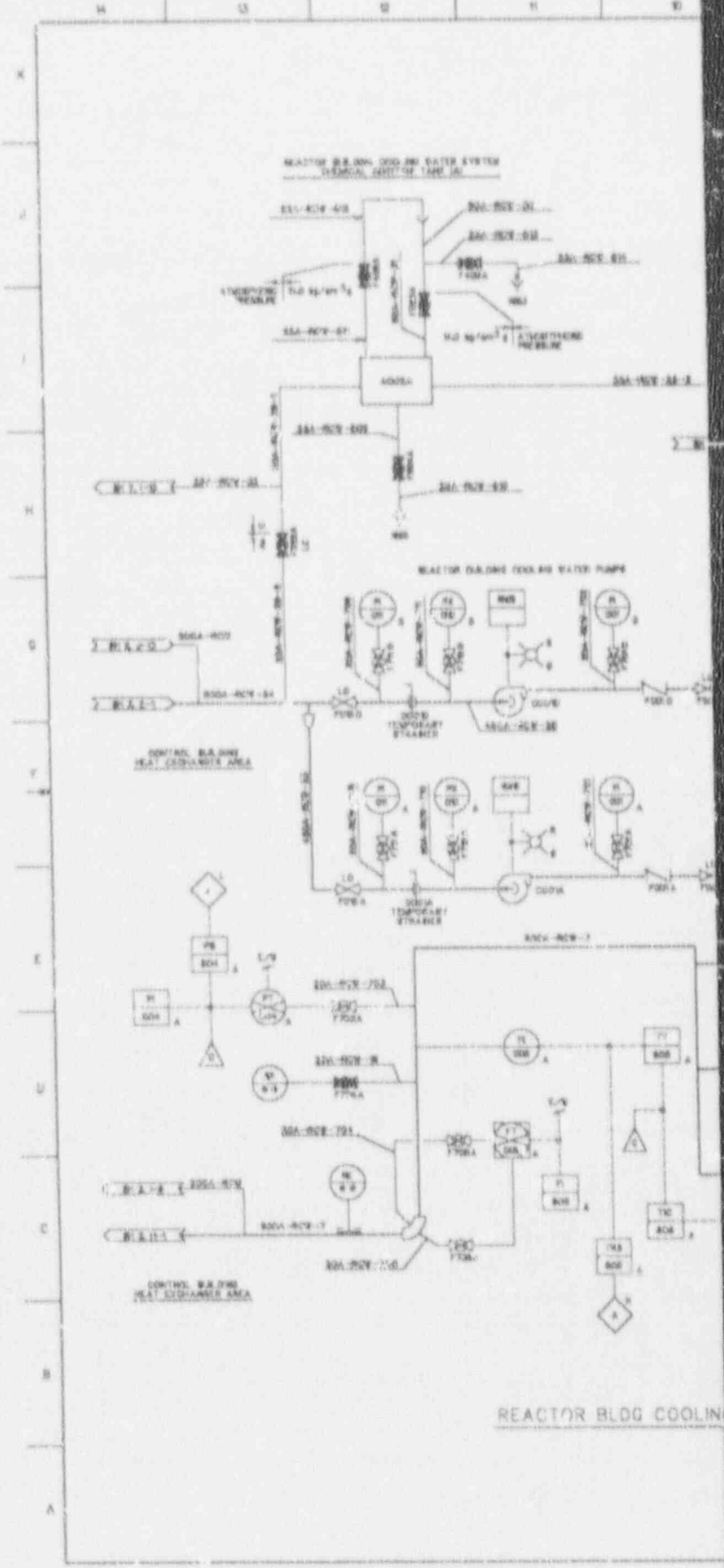


Figure 9.1-1 FUEL POOL COOLING AND CLEANUP SYSTEM P&ID (Sheet 3 of 3)

9204160195 - 75


REACTOR BLDG COOLIN

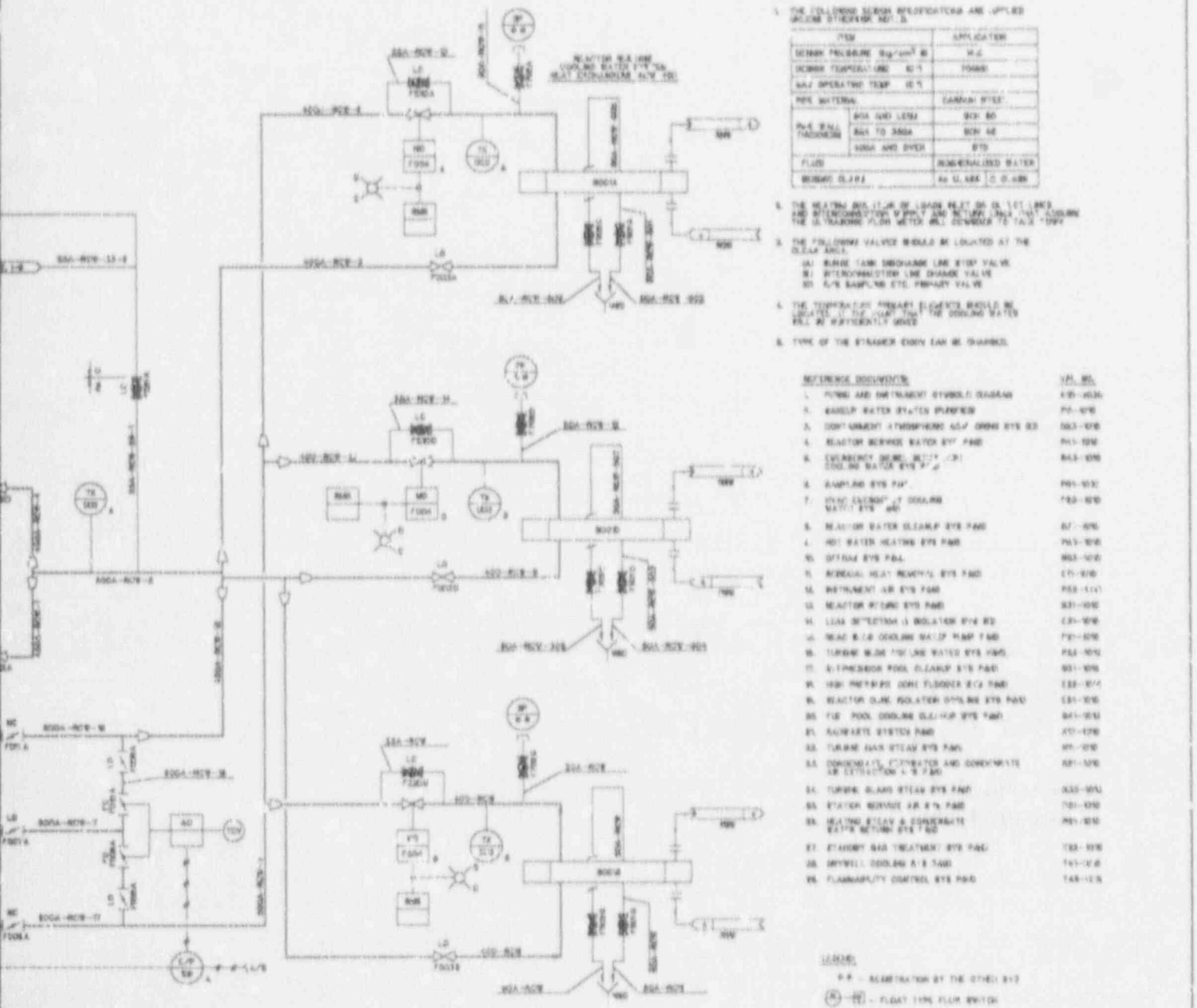


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Figure 9.2-1 REACTOR BUILDING COOLING WATER SYSTEM P&ID (Sheet 1 of 9)

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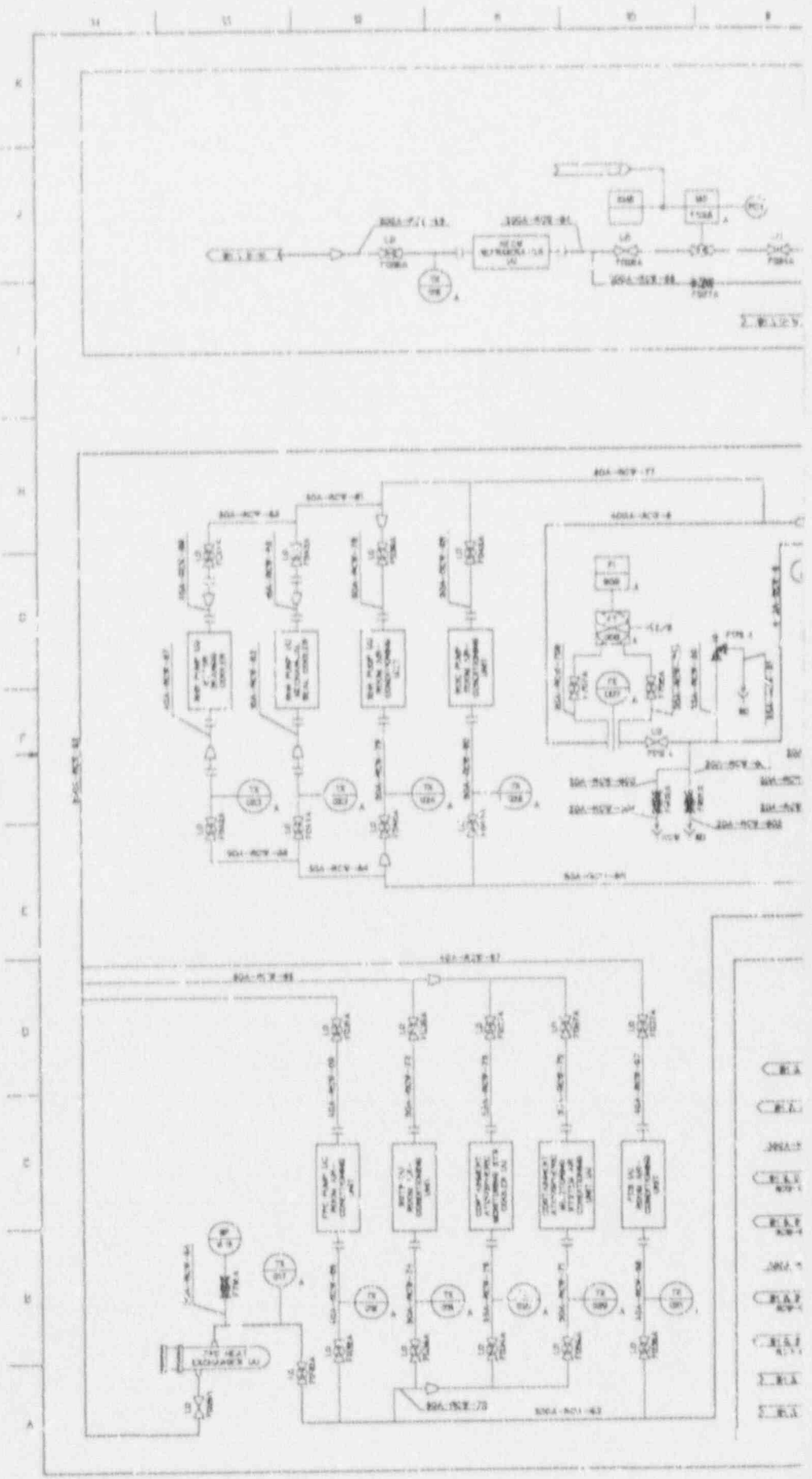


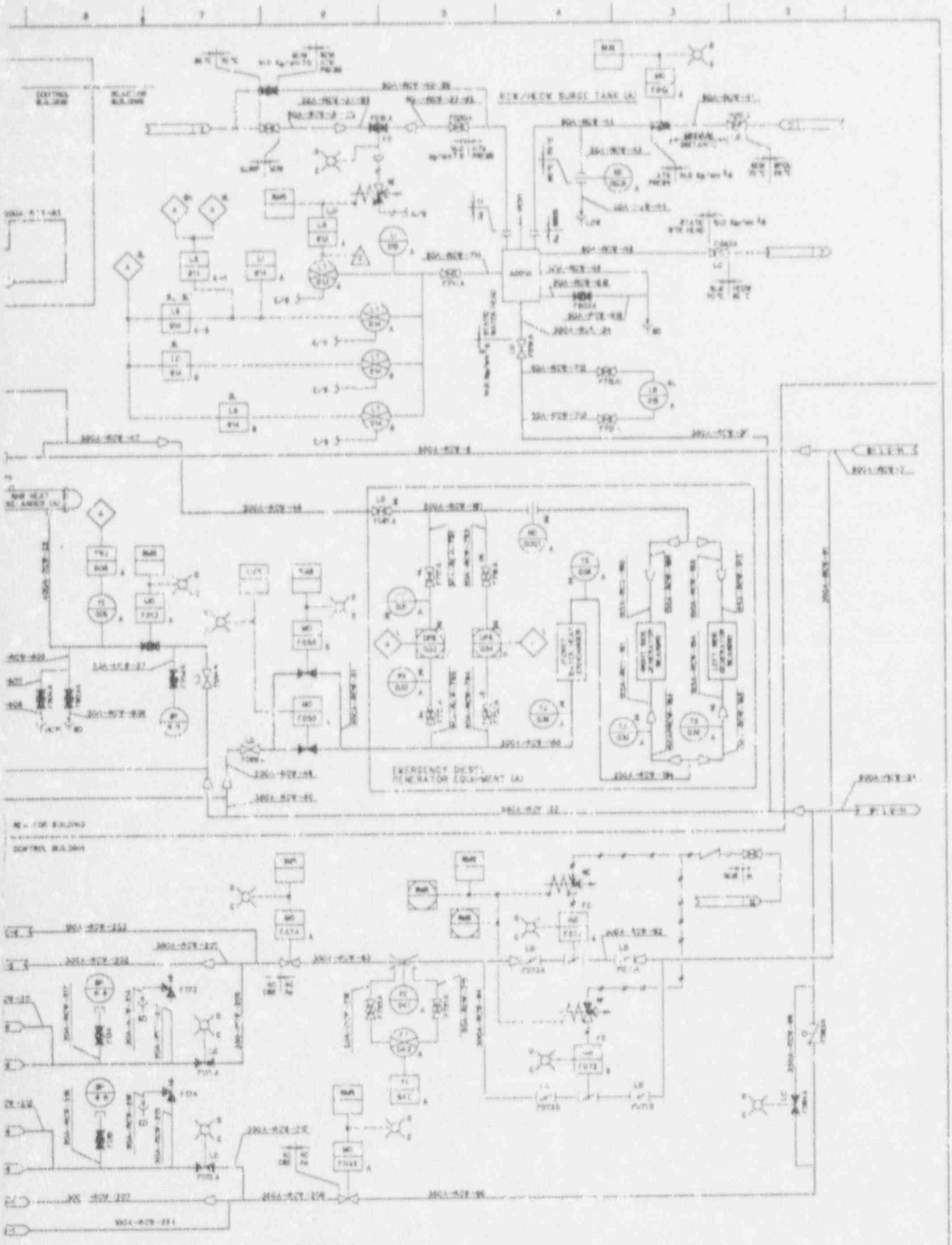
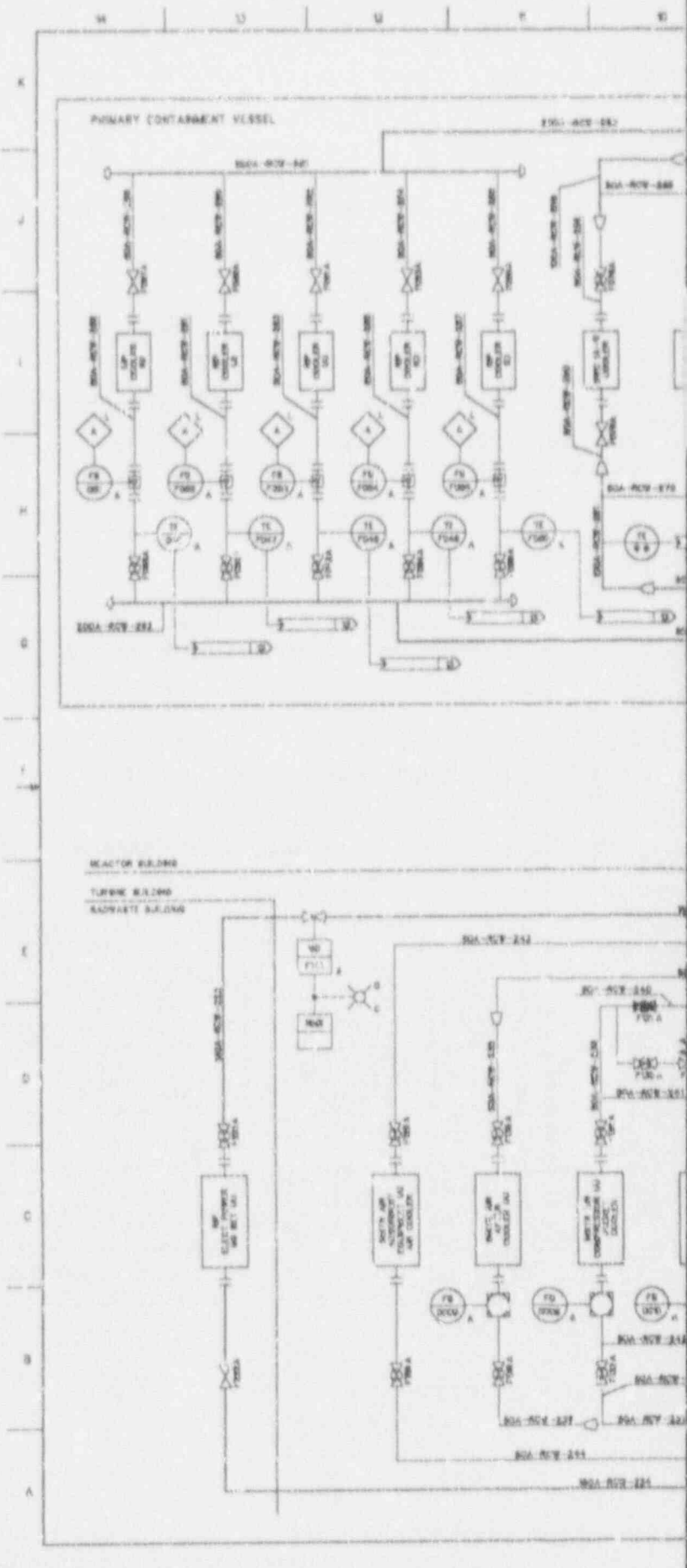


Figure 9.2-1 REACTOR BUILDING COOLING WATER SYSTEM P&ID (Sheet 2 of 3)

9204160195 -77


PRIMARY CONTAINMENT VESSEL
REACTOR BUILDING
TURBINE BUILDING
RADWASTE BUILDING

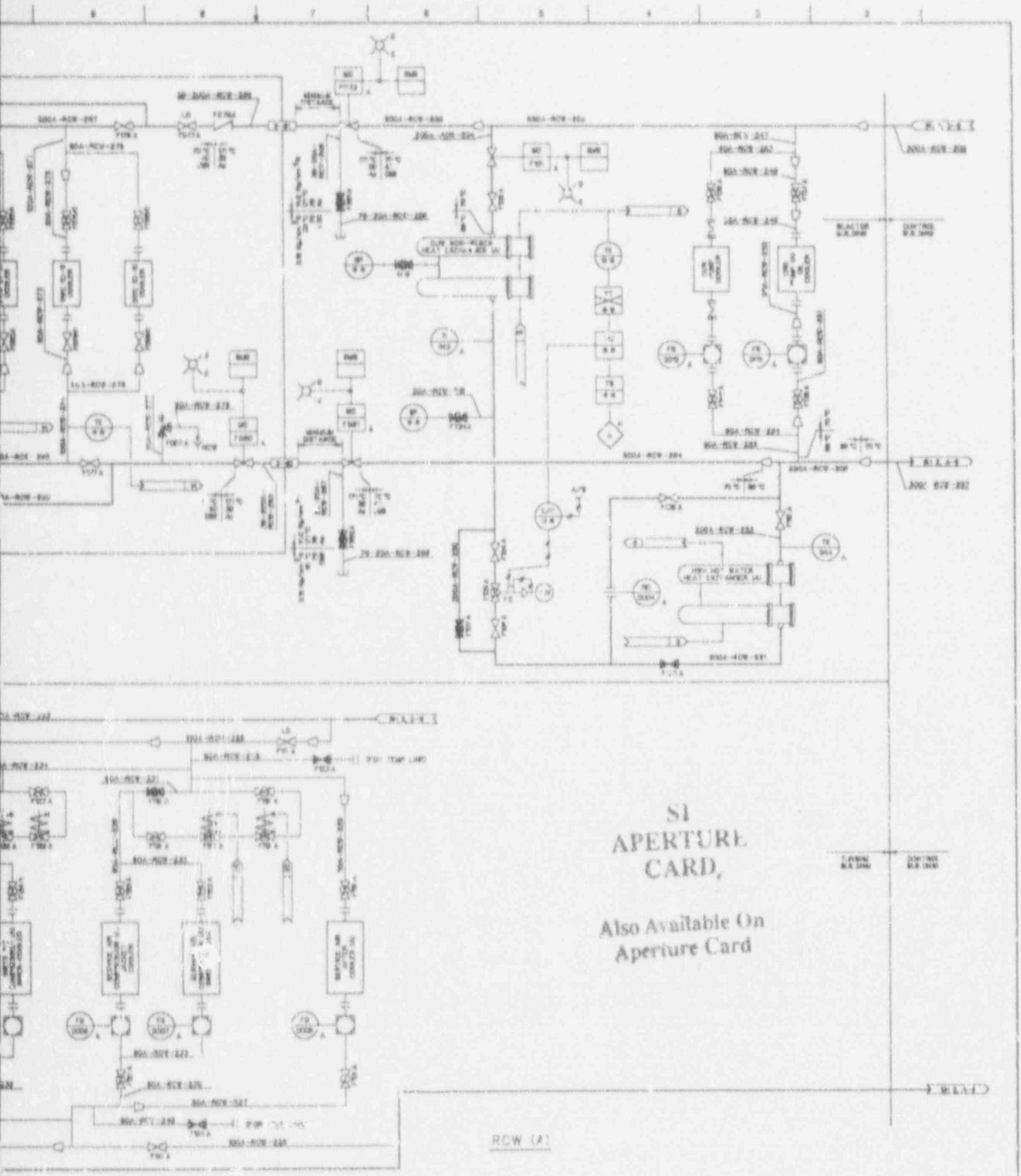
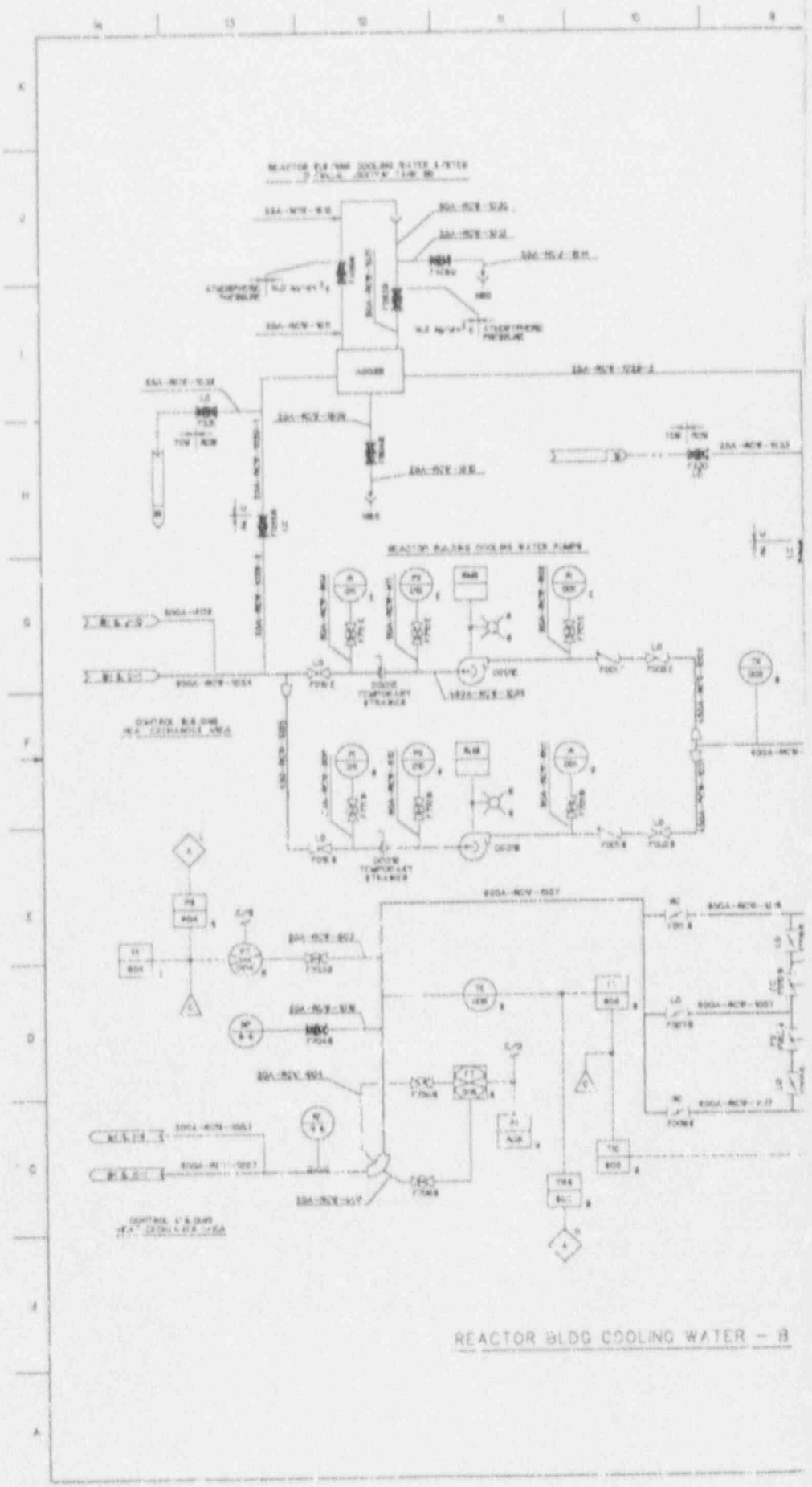


Figure 9.2-1 REACTOR BUILDING COOLING WATER SYSTEM P&ID (Sheet 3 of 9)

9204160195 - 78



REACTOR BLDG COOLING WATER – B

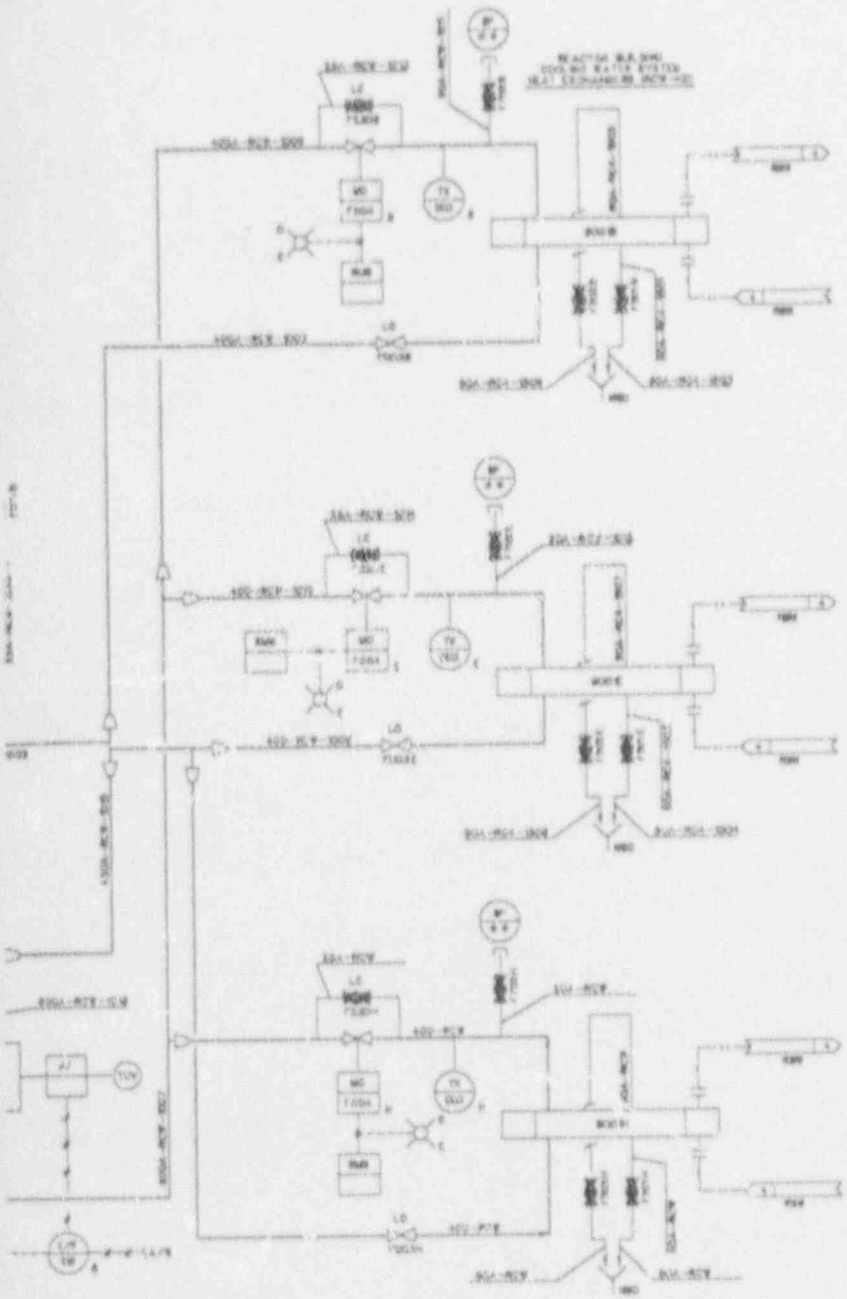


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Figure 9.2-1 REACTOR BUILDING COOLING WATER SYSTEM P&ID (Sheet 4 of 9)

9204160195 - 79

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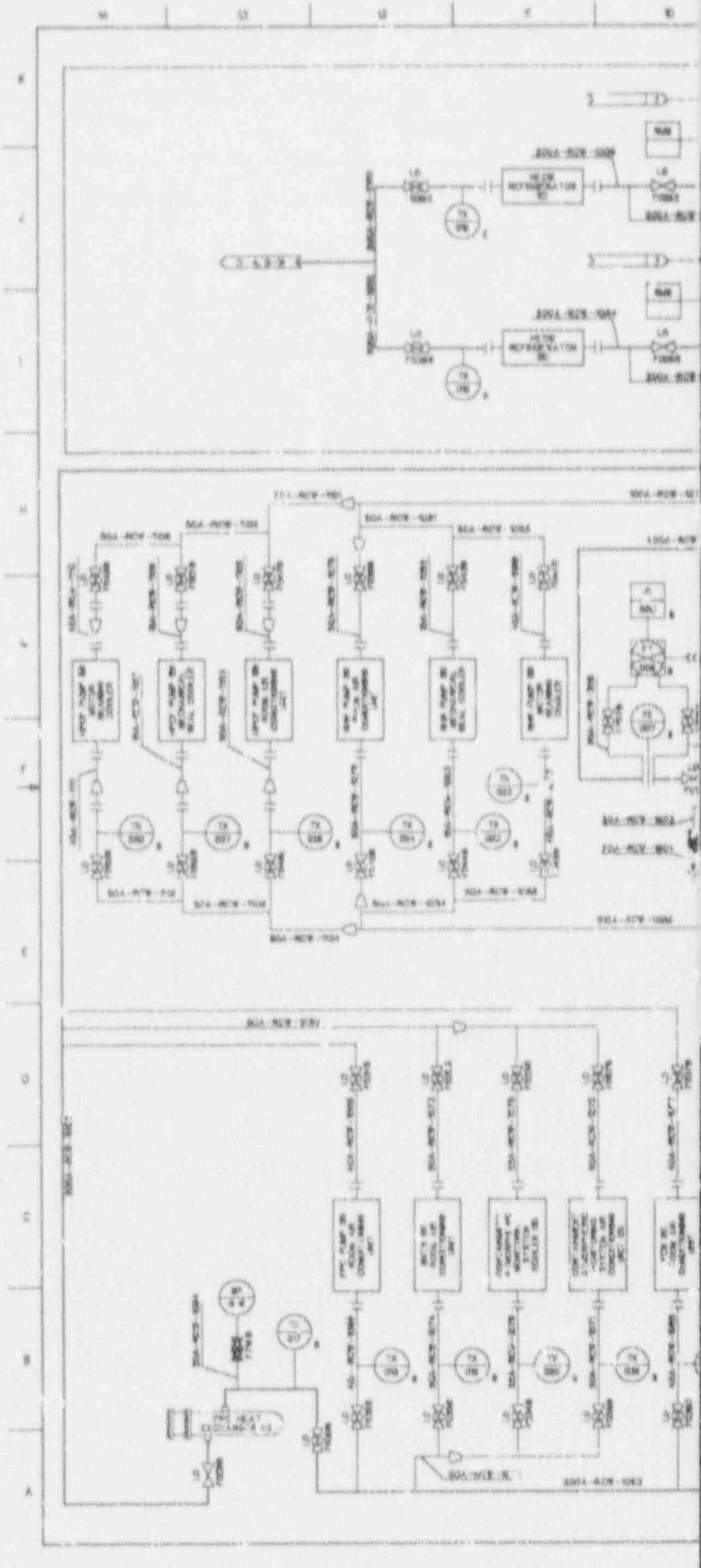


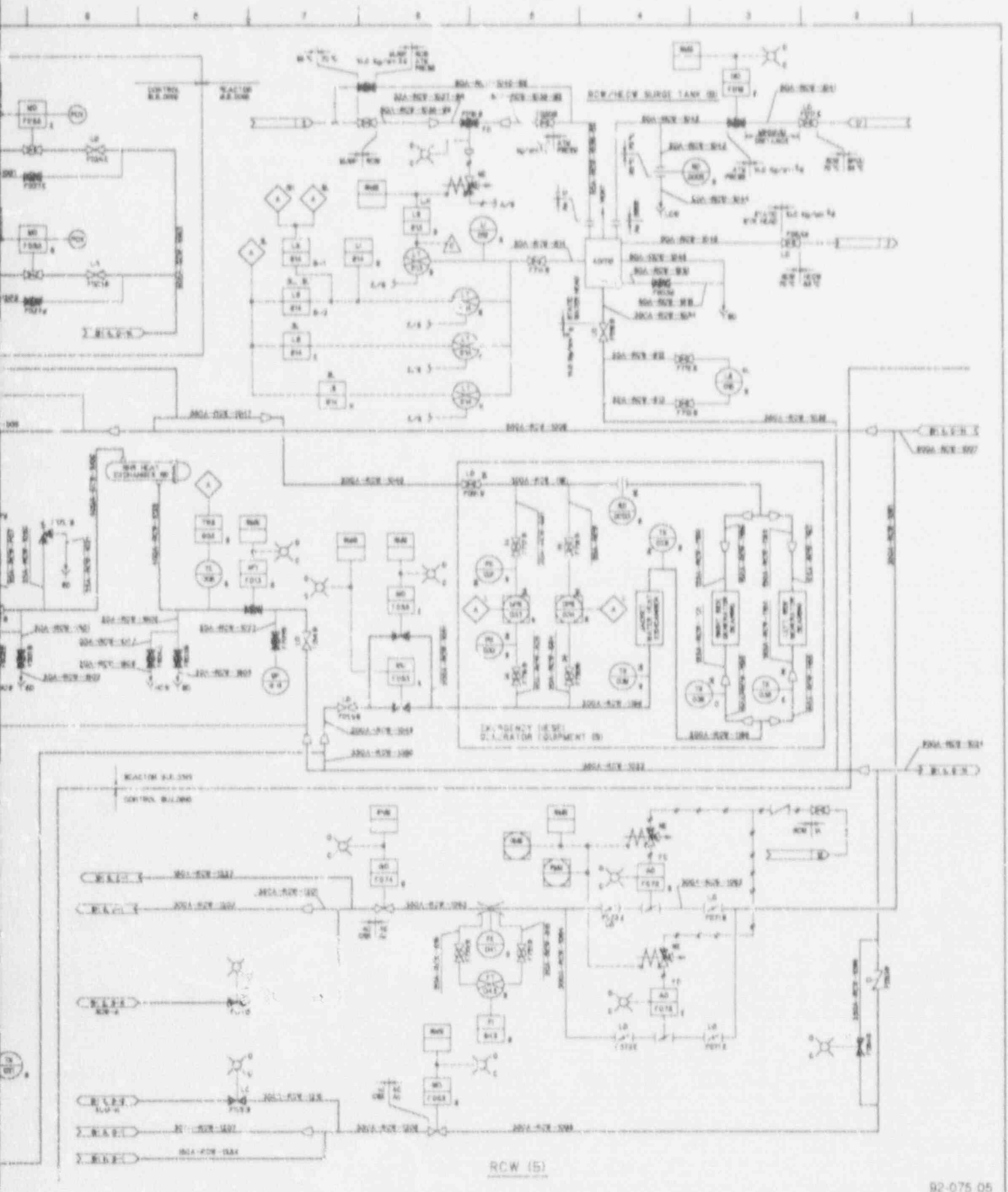
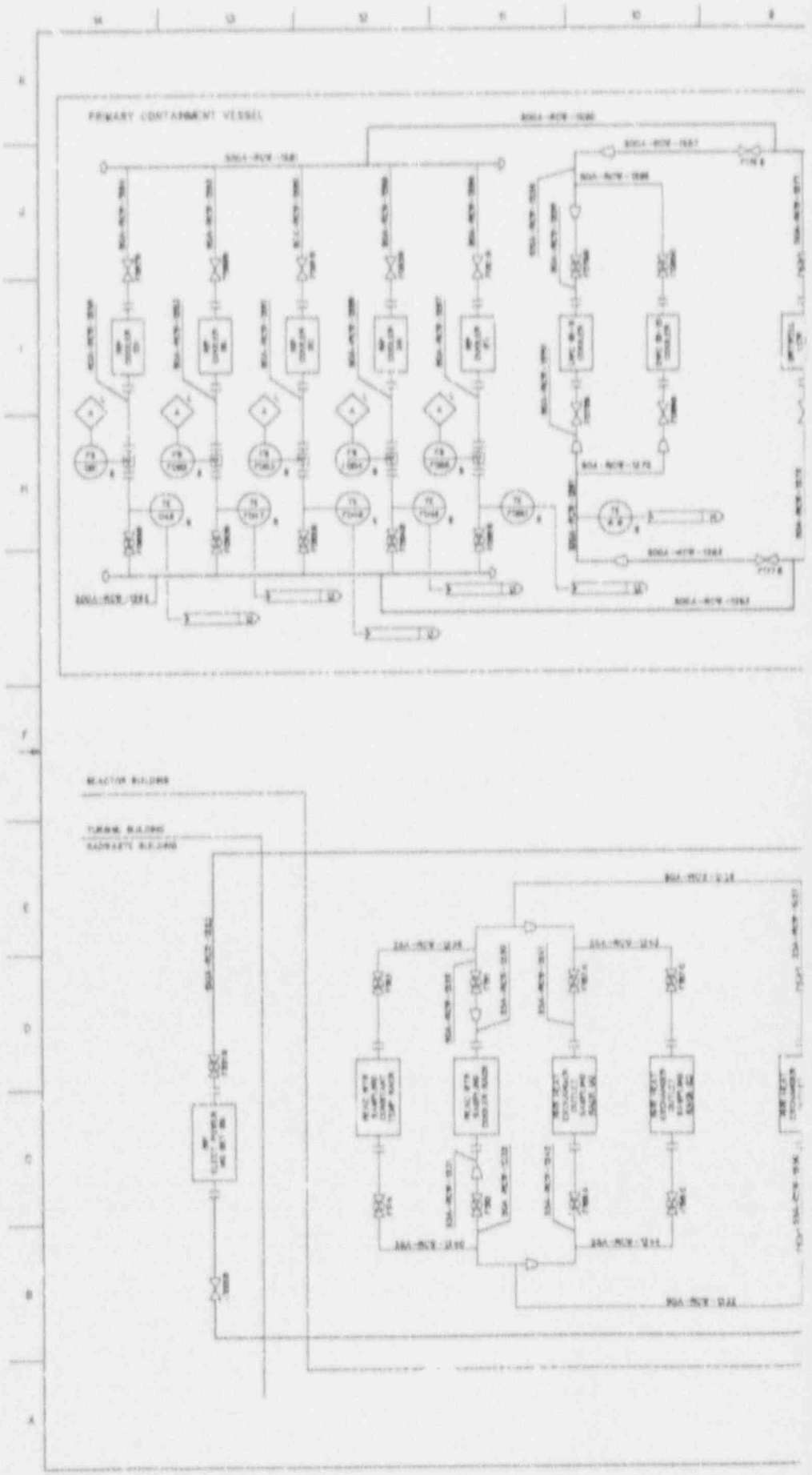


Figure 9.2-1 REACTOR BUILDING COOLING WATER SYSTEM P&ID (Sheet 5 of 9)

9204160195 - 80


PRIMARY CONTAINMENT VESSEL
REACTOR BUILDING
TURBINE BUILDING
RADWASTE BUILDING

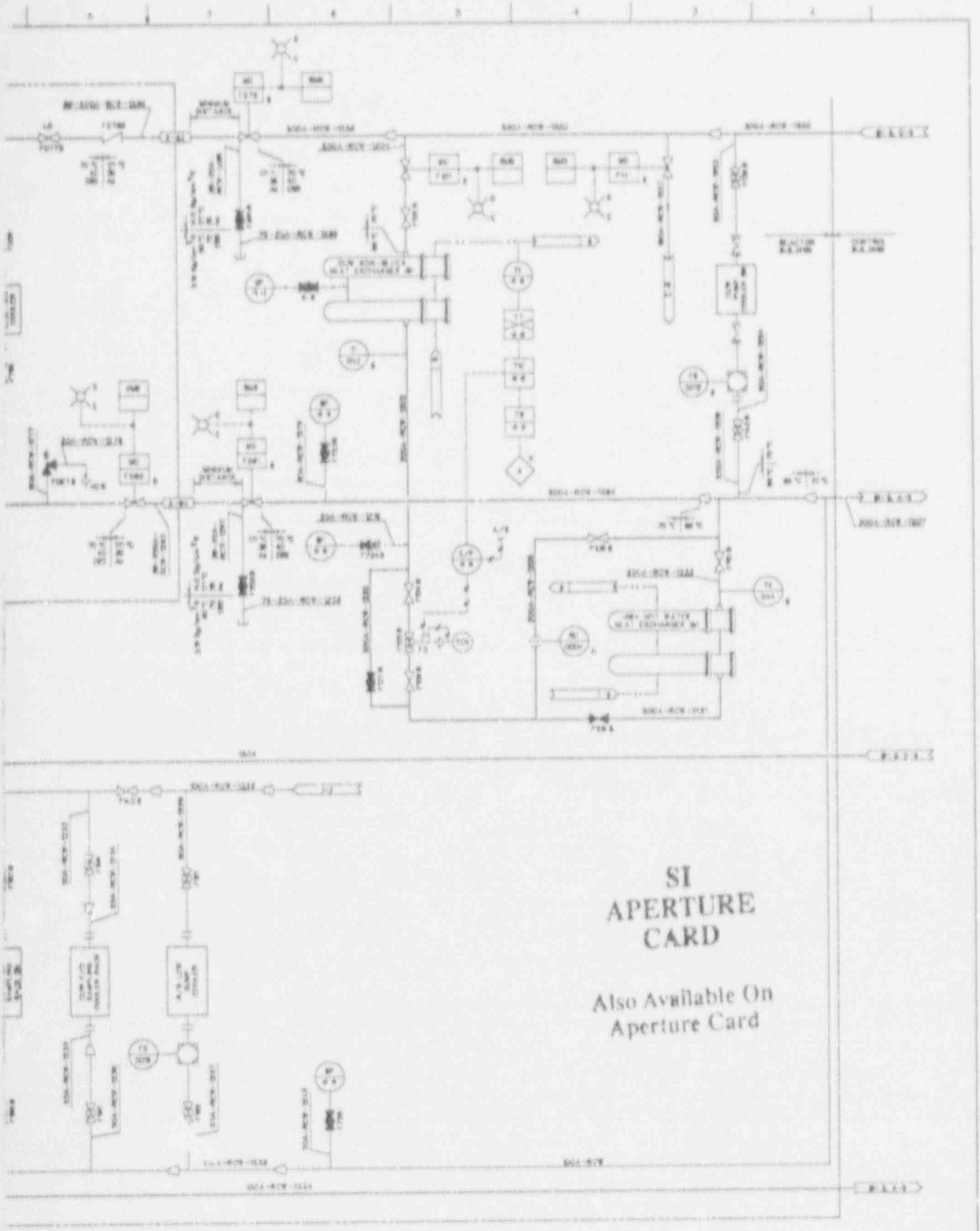
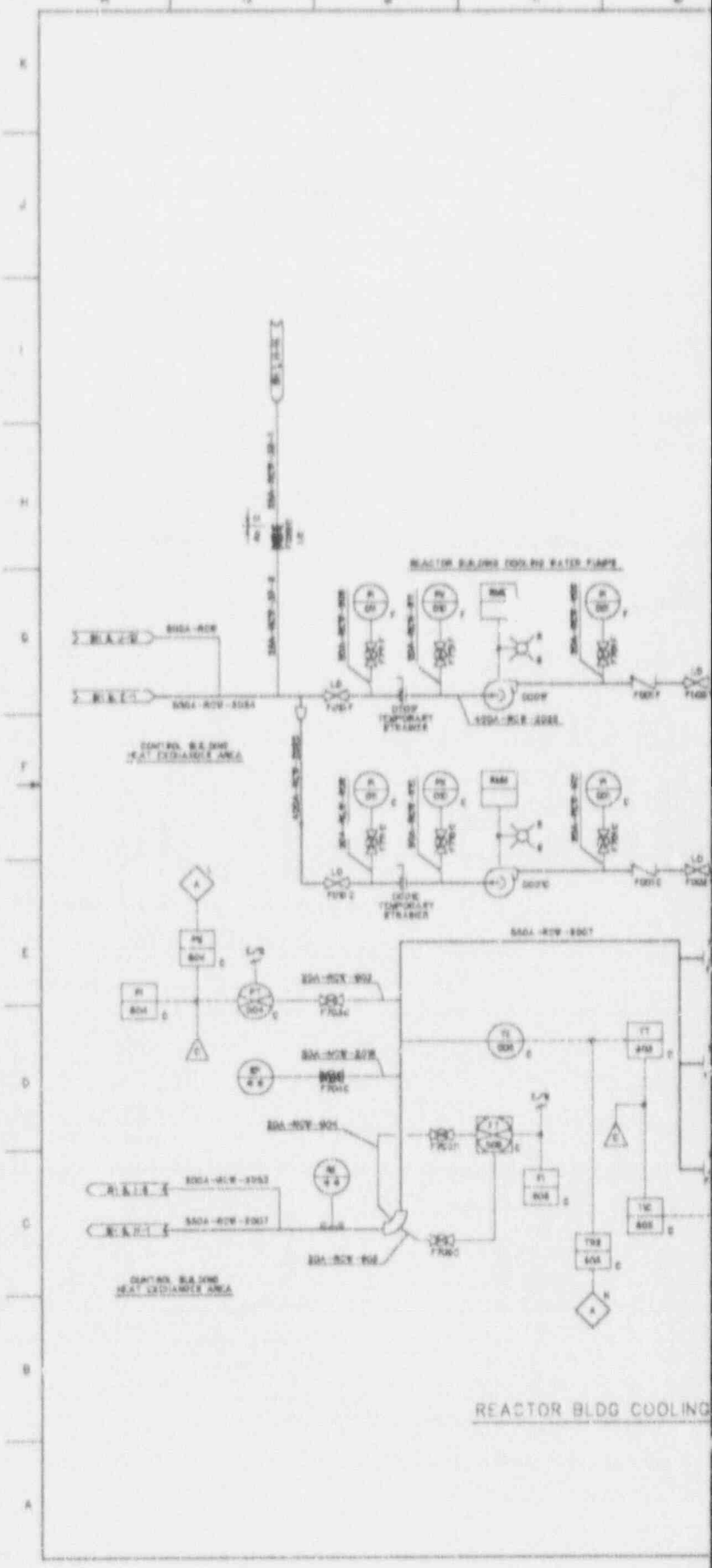


Figure 9.2-1 REACTOR BUILDING COOLING WATER SYSTEM P&ID (Sheet 6 of 9)

9204160185 -81


REACTOR BUILDING COOLING WATER PUMPS
REACTOR BLDG COOLING

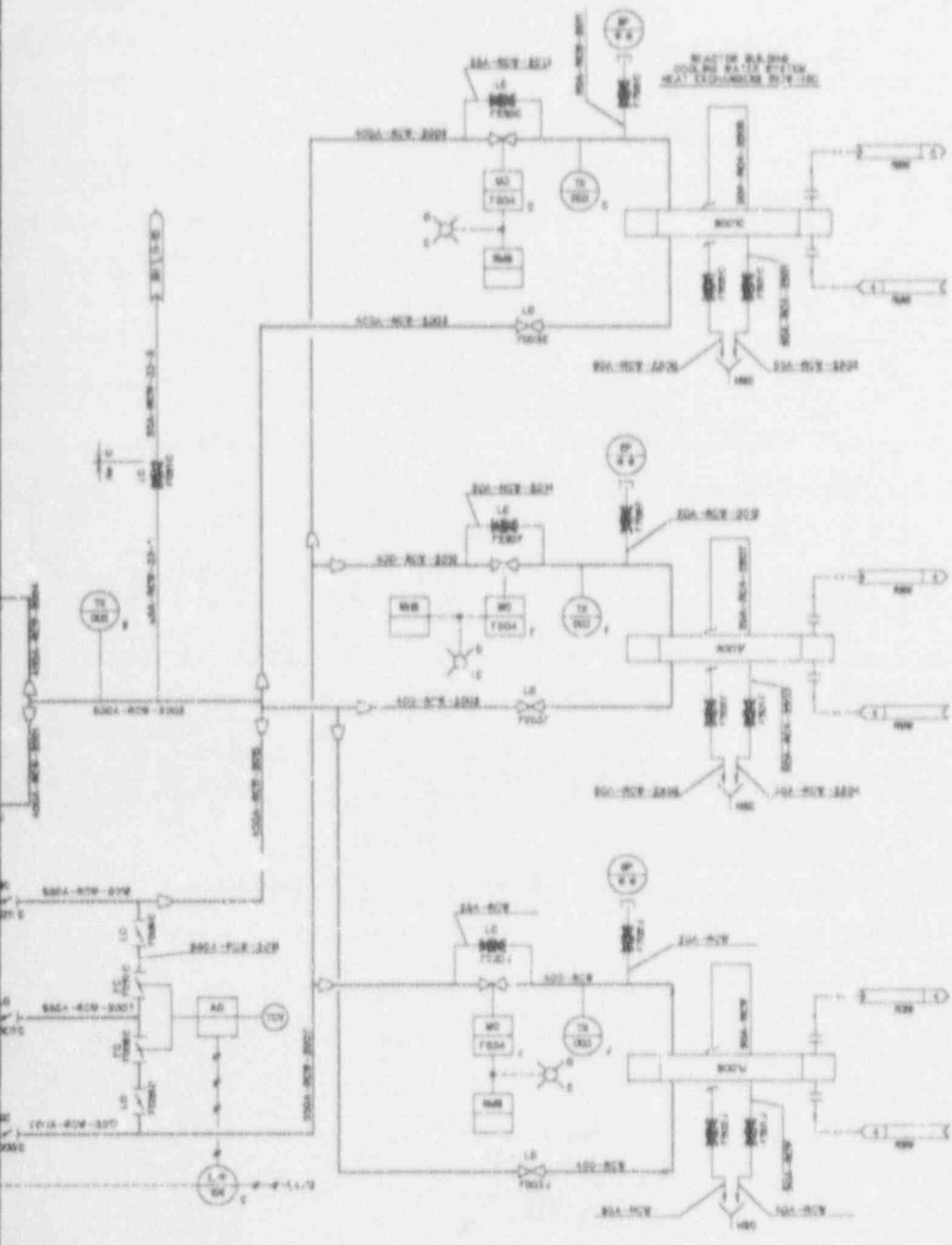


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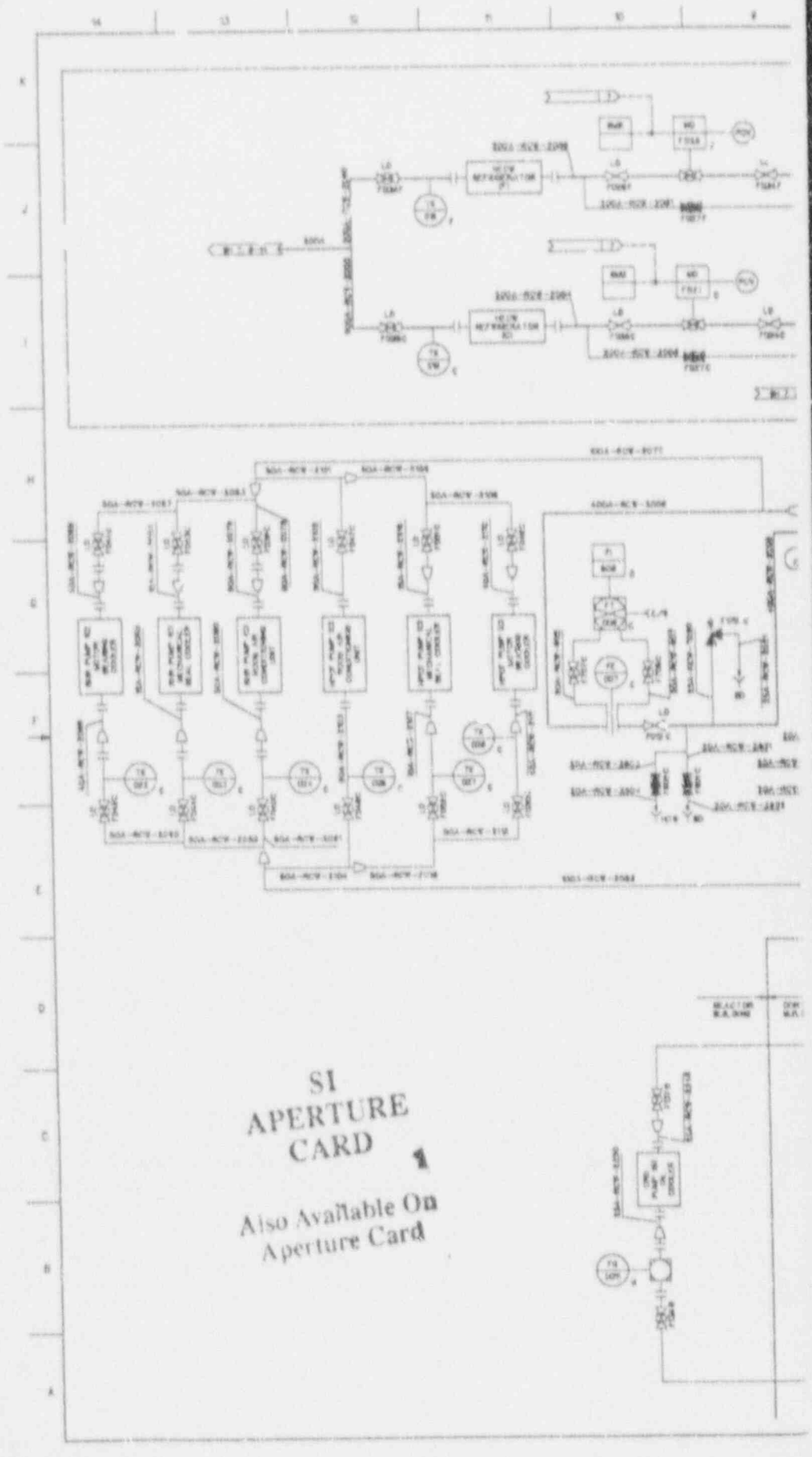
Figure 9.2-1 REACTOR BUILDING COOLING WATER SYSTEM P&ID (Sheet 7 of 9)

9204160195-82



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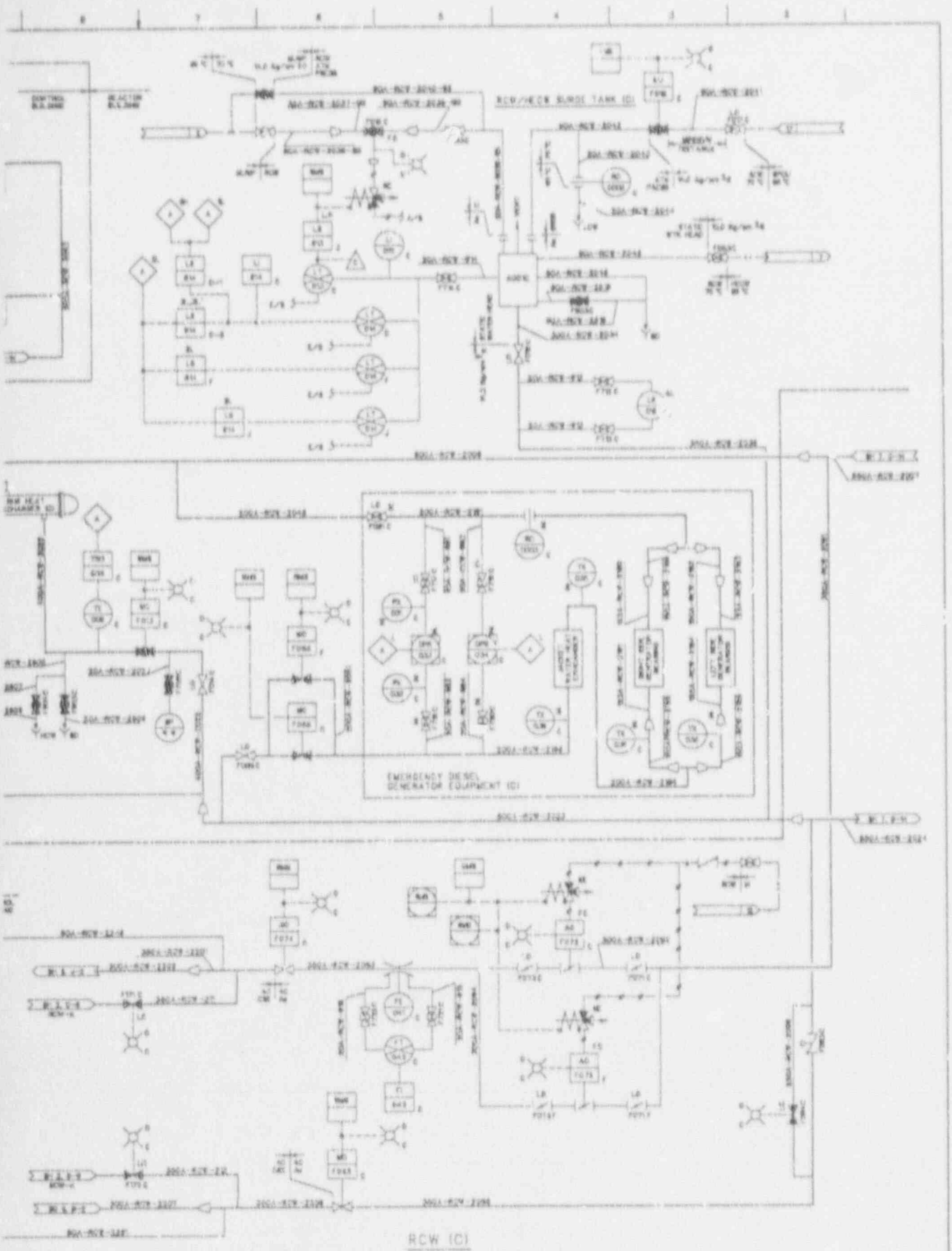
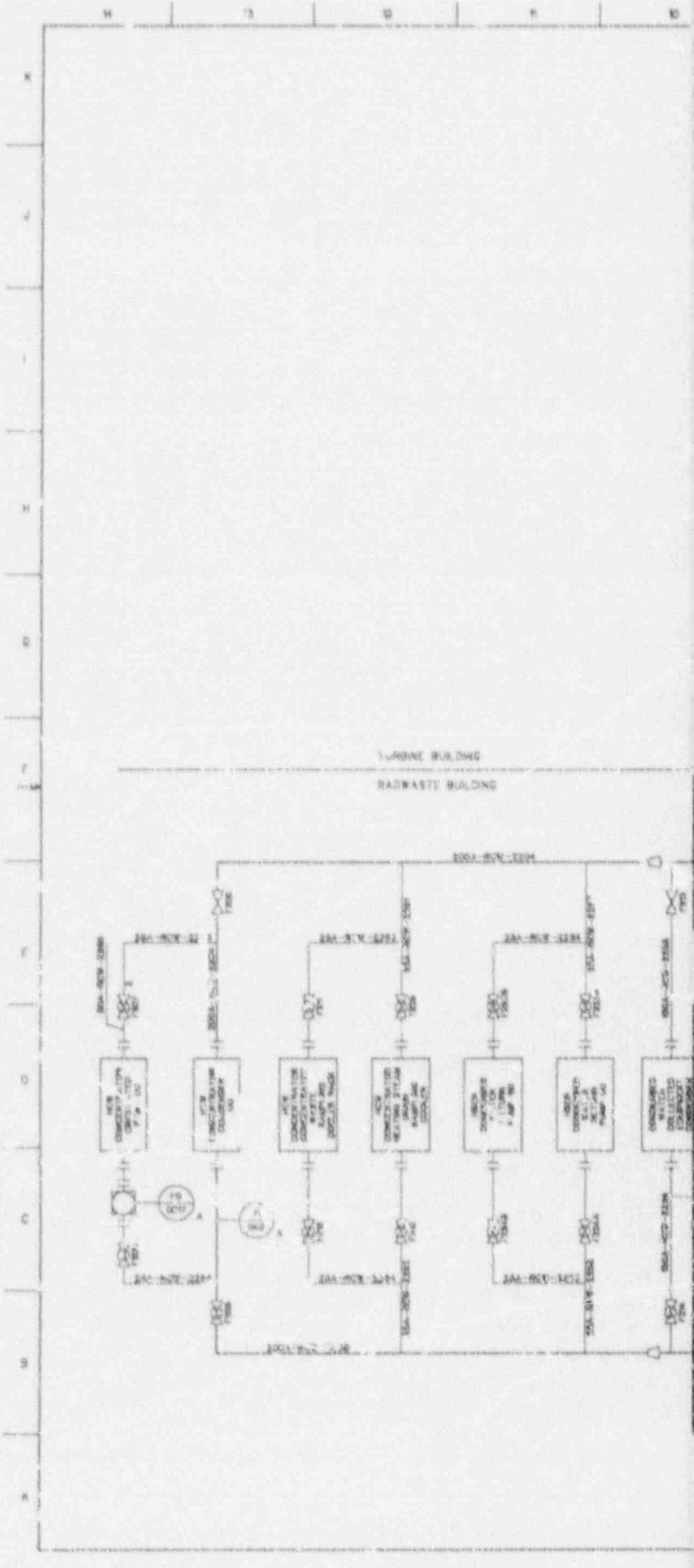


Figure 9.2-1 REACTOR BUILDING COOLING WATER SYSTEM P&ID (Sheet 8 of 9)

9204160195 -83


TURBINE BUILDING
RADWASTE BUILDING

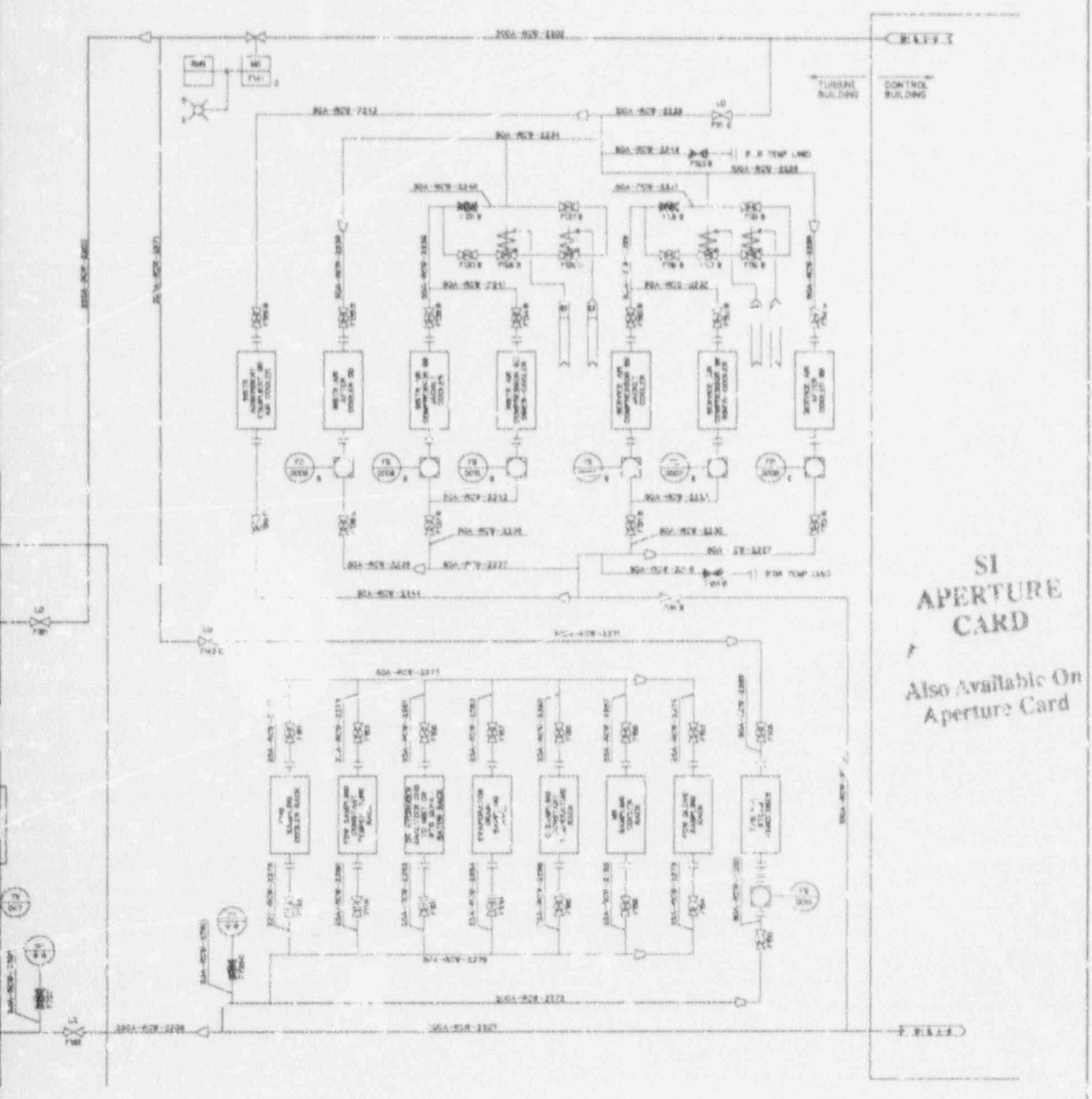


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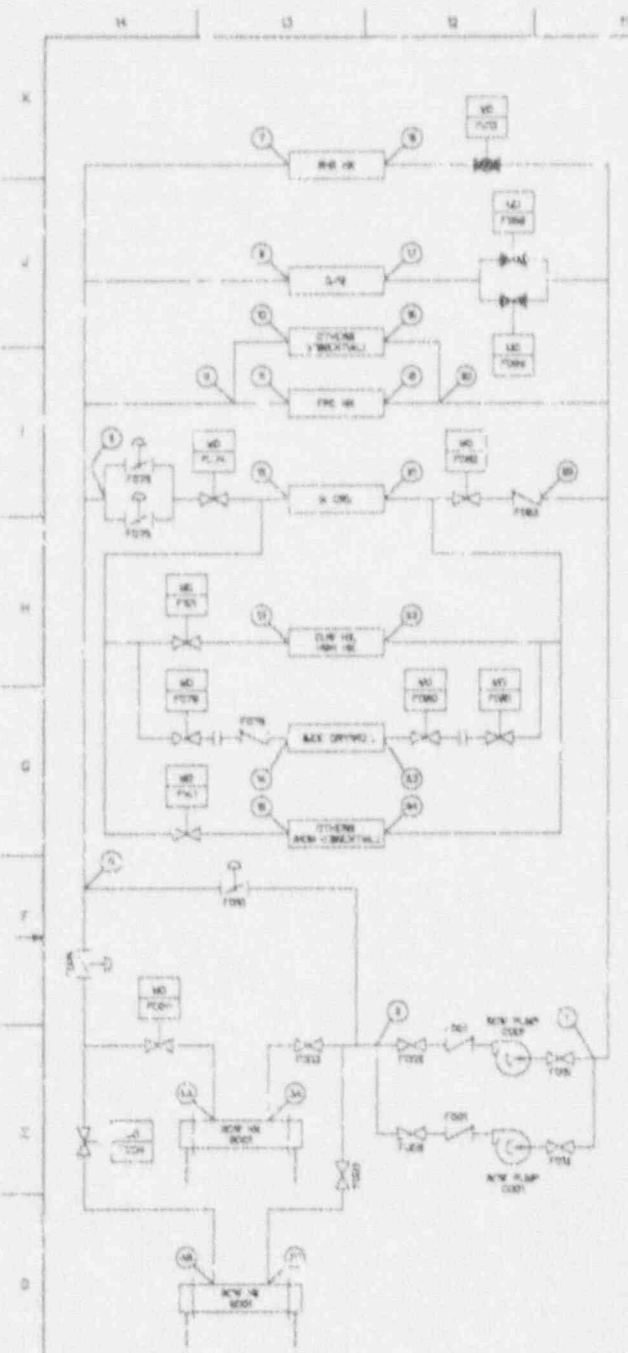
Figure 9.2-1 REACTOR BUILDING CCOLING WATER SYSTEM P&ID (Sheet 9 of 9)

9204160105 -84



MODE A NORMAL OPERATION

POSITION		
FLOW m^3/h	RCW VAL 88	12
	RCW 82	7
PRESSURE kg/cm^2 a	RCW VAL 88	3
	RCW 82	3
TEMPERATURE °C	RCW VAL 88	43
	RCW 83	43

MODE B REACTOR SHUTDOWN

POSITION		
FLOW m^3/h	RCW VAL 88	23
	RCW 82	18
PRESSURE kg/cm^2 a	RCW VAL 88	3
	RCW 82	
TEMPERATURE °C	RCW VAL 88	43
	RCW 83	53

MODE C REACTOR SHUTDOWN

POSITION		
FLOW m^3/h	RCW VAL 88	23
	RCW 82	18
PRESSURE kg/cm^2 a	RCW VAL 88	3
	RCW 83	3
TEMPERATURE °C	RCW VAL 88	43
	RCW 83	53

MODE D HOT STAND-BY

POSITION		
FLOW m^3/h	RCW VAL 88	12
	RCW 83	7
PRESSURE kg/cm^2 a	RCW VAL 88	3
	RCW 82	3
TEMPERATURE °C	RCW VAL 88	43
	RCW 83	43

MODE E HOT STAND-BY LO

POSITION		
FLOW m^3/h	RCW VAL 88	23
	RCW 82	18
PRESSURE kg/cm^2 a	RCW VAL 88	3
	RCW 83	3
TEMPERATURE °C	RCW VAL 88	43
	RCW 83	43

MODE F SUPPRESSION POOL

POSITION		
FLOW m^3/h	RCW VAL 88	23
	RCW 82	18
PRESSURE kg/cm^2 a	RCW VAL 88	3
	RCW 83	3
TEMPERATURE °C	RCW VAL 88	43
	RCW 83	53

MODE G SUPPRESSION POOL

POSITION		
FLOW m^3/h	RCW VAL 88	43
	FDA 03	18
PRESSURE kg/cm^2 a	RCW VAL 88	3
	RCW 82	3
TEMPERATURE °C	RCW VAL 88	43
	RCW 83	53

TABLE : RCW VALVE POSITI

	F004	F010	F013
MODE A	O→T	O→T	C
MODE B	O→T	C→T	O→T
MODE C	C→T	O→T	C
MODE D	O→T	O→T	C
MODE E	O→T	C→T	O→T
MODE F	O	C	O
MODE G	O	C	O

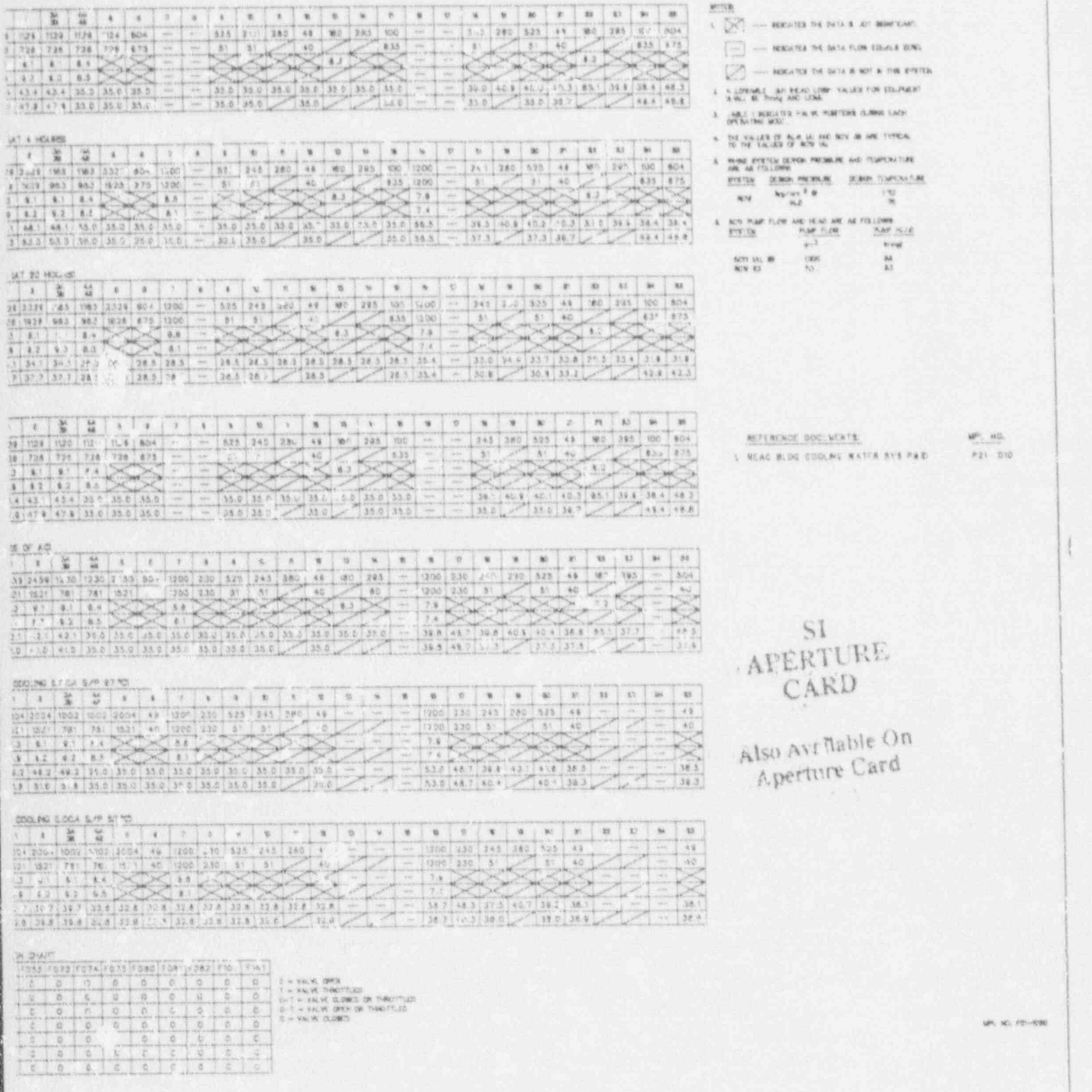


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Figure 9.2-1A REACTOR BUILDING COOLING WATER SYSTEM PROCESS FLOW DIAGRAM

9204100195 - 85

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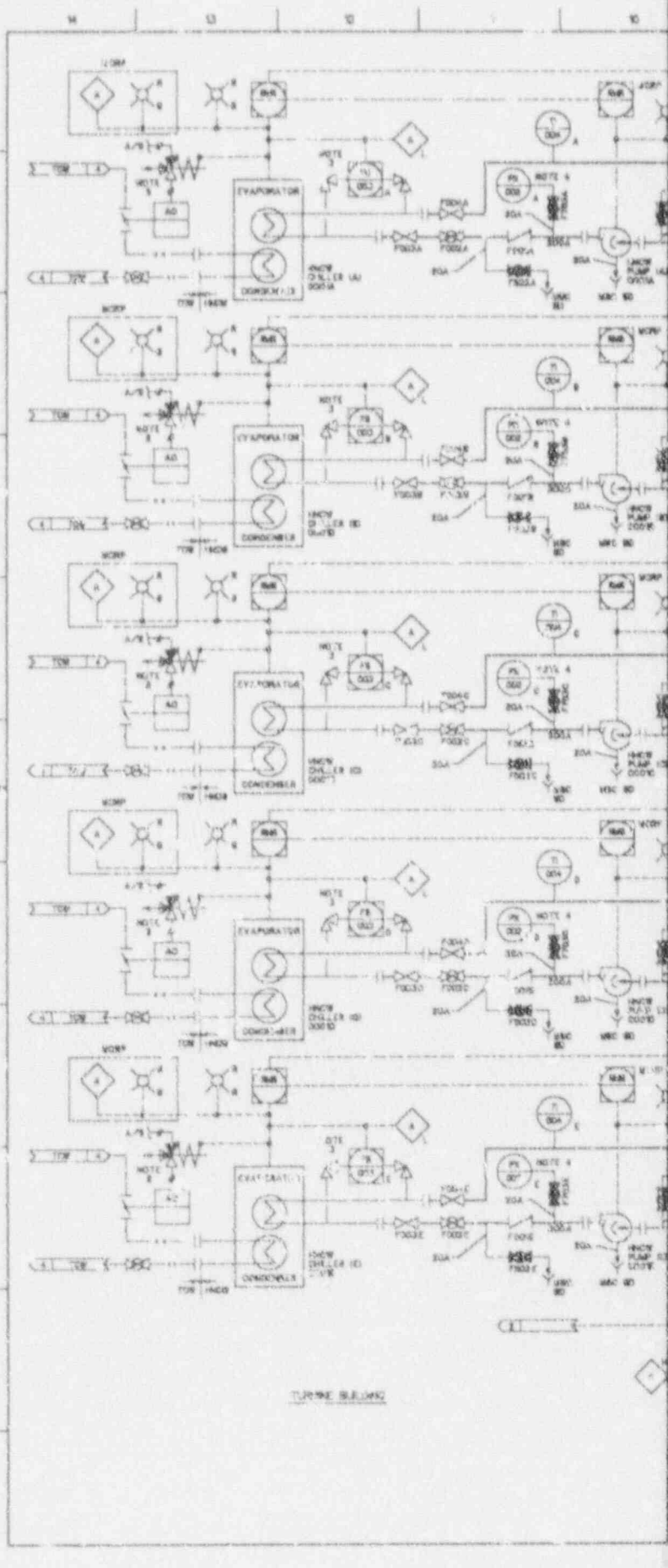


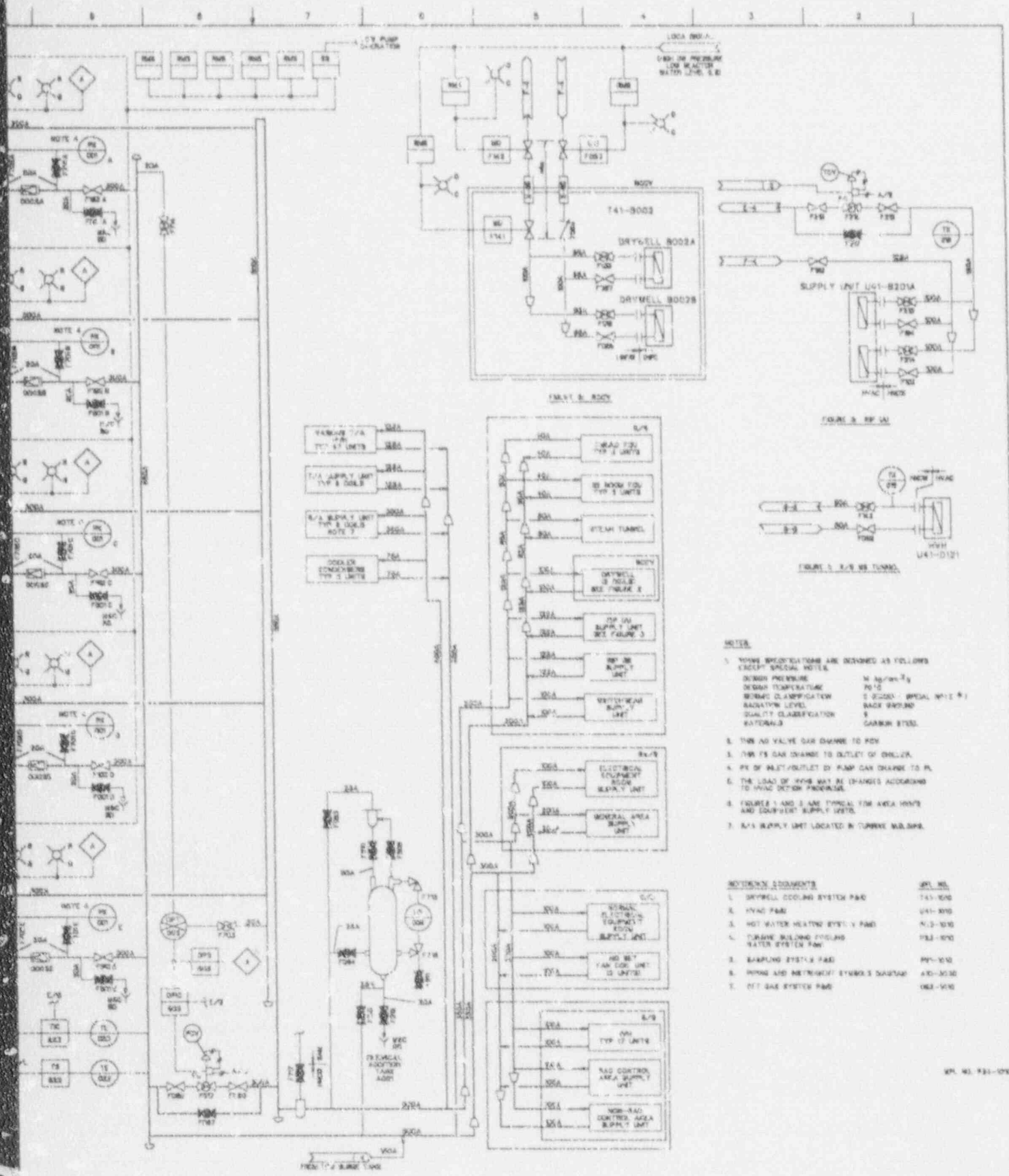
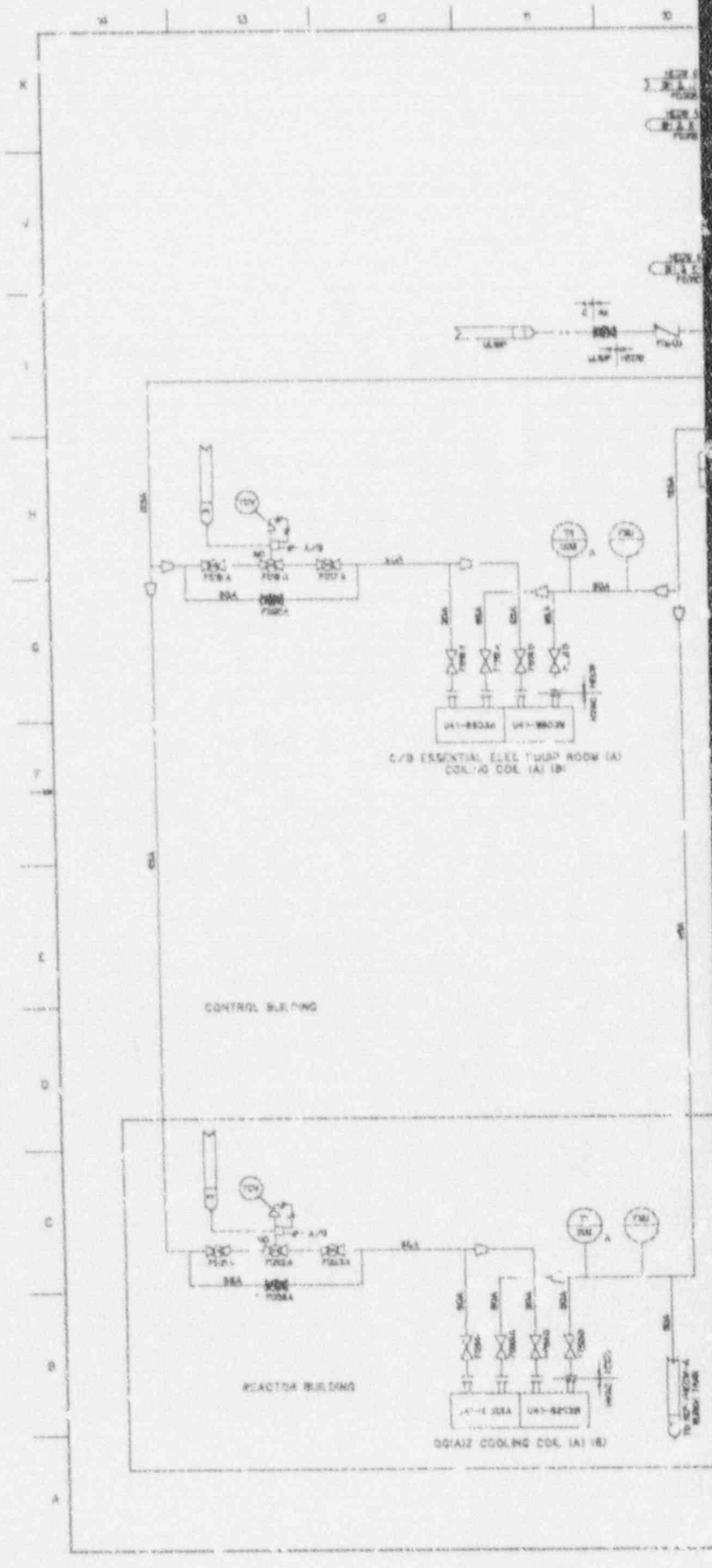
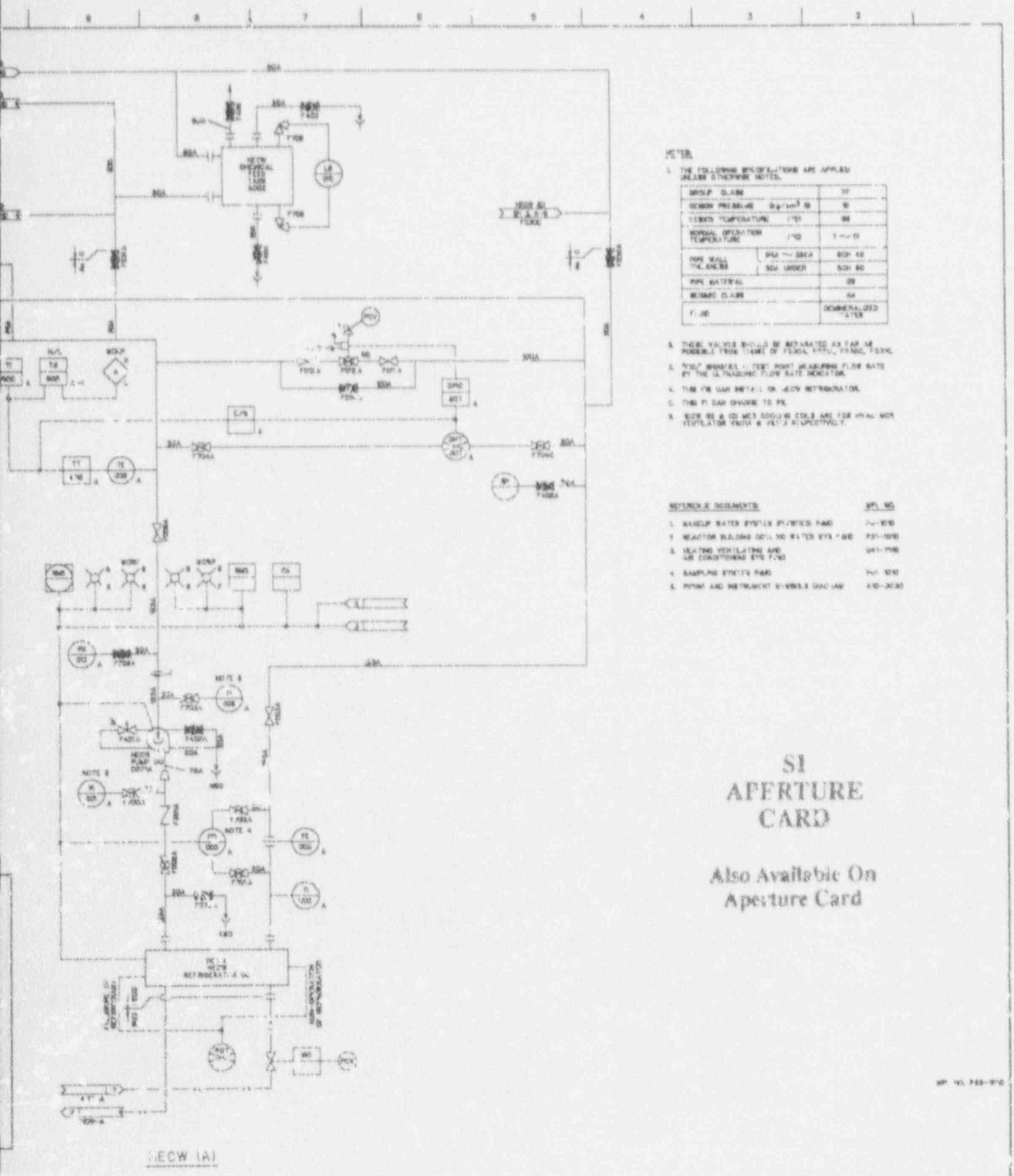


Figure 9.2-2 HVAC NORMAL COOLING WATER SYSTEM P&ID

9204160195 - 86


CONTROL BUILDING
REACTOR BUILDING



NOTES:

1. THE FOLLOWING SPECIFICATIONS ARE APPLIED UNLESS OTHERWISE NOTED.

GROUP CLASS		3
DESIGN PRESSURE	kg/cm² G	10
DESIGN TEMPERATURE	°C	66
NORMAL OPERATION TEMPERATURE	°C	5 ~ 49
PIPE WALL THICKNESS	65A ~ 350A	SCH 40
	400A UP/OVER	SCH 80
PIPE MATERIAL		CS
INSULATION CLASS		AA
FLUID		DEMINERALIZED WATER

2. THESE VALVES SHOULD BE ARRANGED AS FAR AS POSSIBLE FROM THOSE OF F030A, F070A, F230C, F031A.
3. "FIQ" INDICATES FLOW RATE MEASURING POINT BY THE ULTRASONIC FLOW RATE INDICATOR.
4. THIS FOR MAIN INSTALL OF ADDITIONAL REFRIGERATOR.
5. THIS IS DAM CHANGE TO PIE.
6. BOTH RB & TB MCR EMERGENCY COILS ARE FOR HVAC NOT VENTILATOR WHICH ARE SUPPLIED SEPARATELY.

REFERENCE DOCUMENTS:

1. MAKEUP WATER SYSTEM (PURIFIED) P&ID	M-1010
2. REACTOR BUILDING COOLING WATER SYSTEM P&ID	P21-1010
3. HEATING VENTILATING AND AIR CONDITIONING SYS P&ID	M41-1010
4. SAMPLING SYSTEM P&ID	M41-1010
5. PIPING AND INSTRUMENT DIAGRAM	A10-3030

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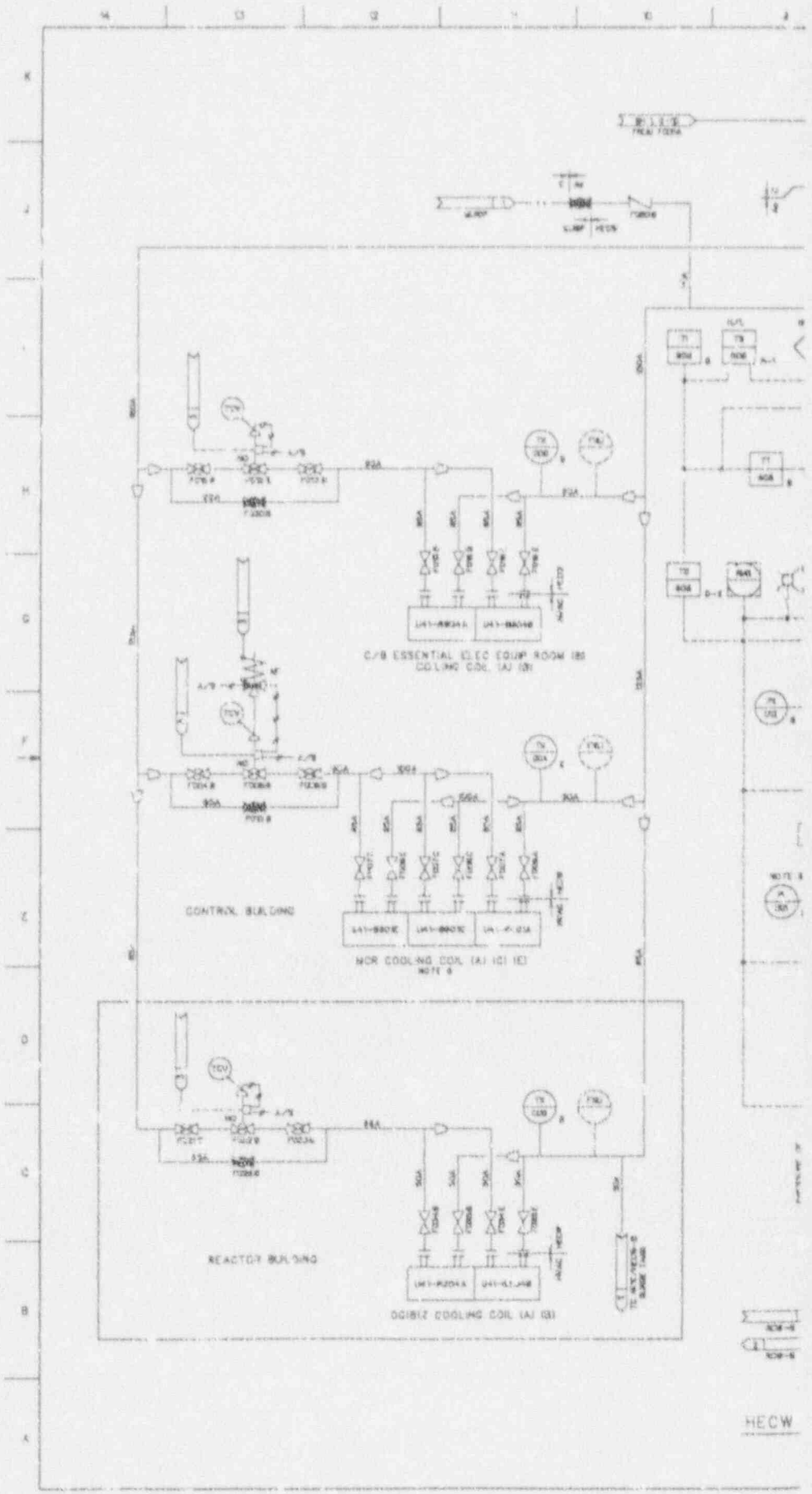
(ECW (A)

92-073-49

Figure 9.2-3 HVAC EMERGENCY COOLING WATER SYSTEM P&ID (Sheet 1 of 3)

9204100195 -87


C/B ESSENTIAL ELEC EQUIP ROOM (B)
COOLING COIL (A) (B)
CONTROL BUILDING
NOR COOLING COIL (A) (C) (E)
NOTE 6
REACTOR BUILDING
OGIB1Z COOLING COIL (A) (B)
HECW

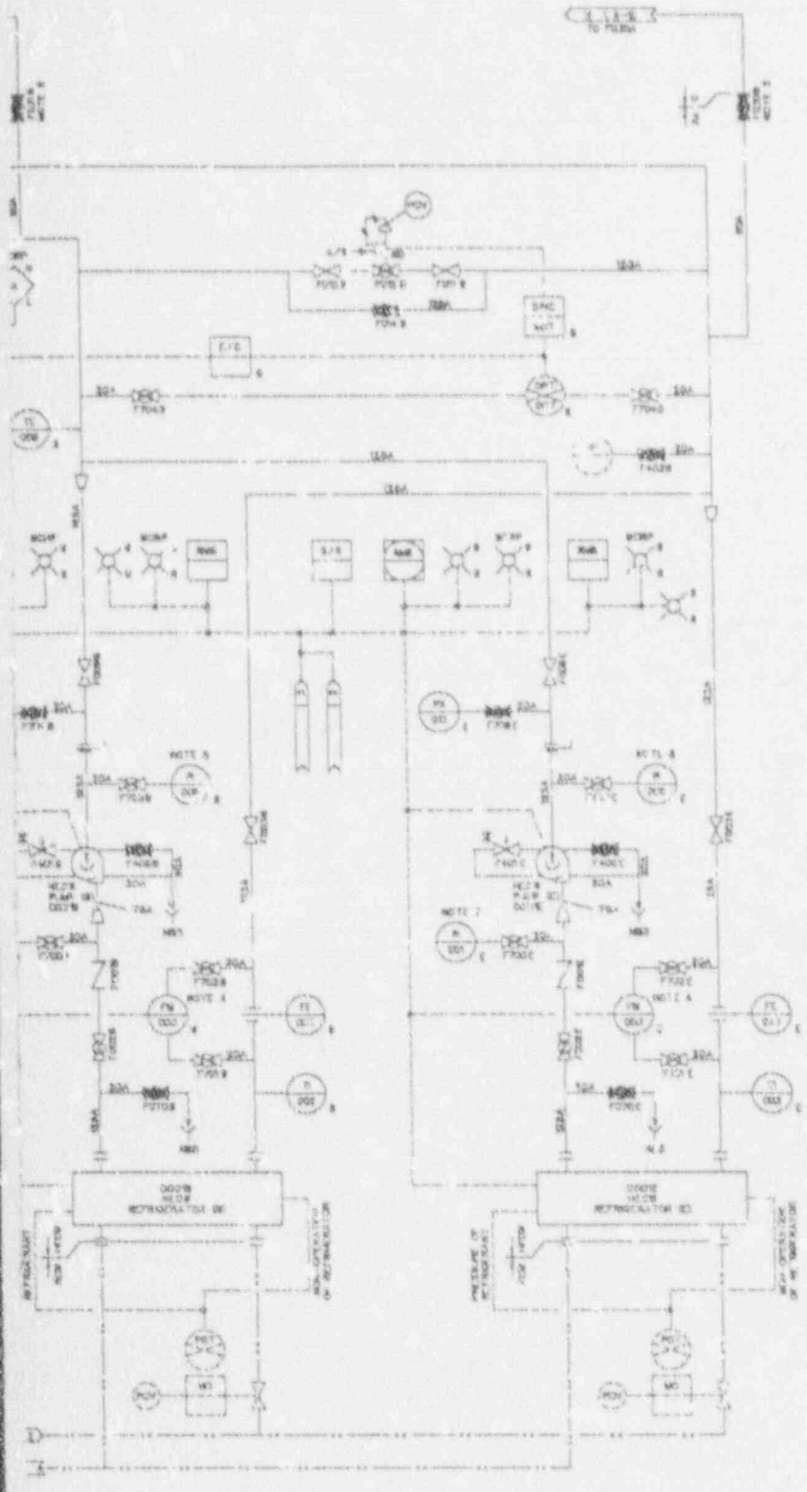


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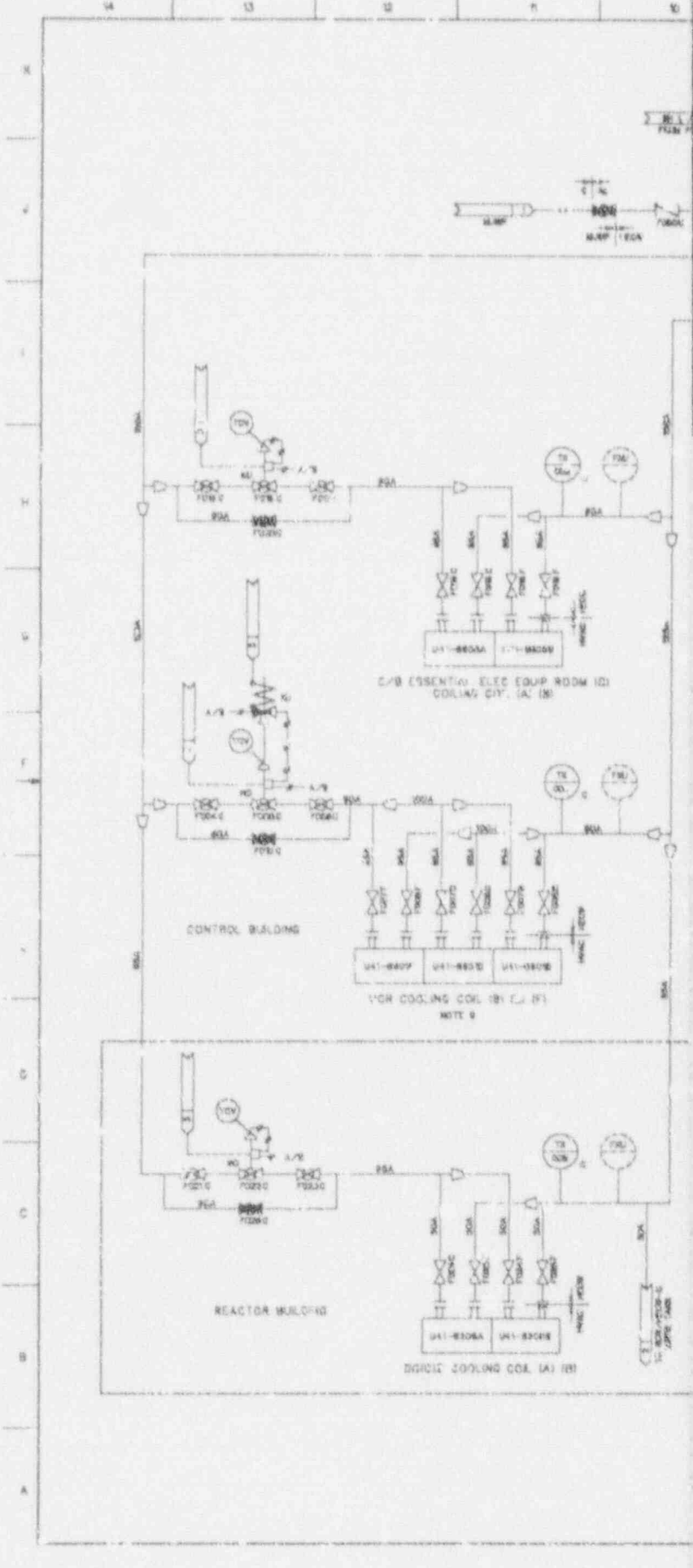
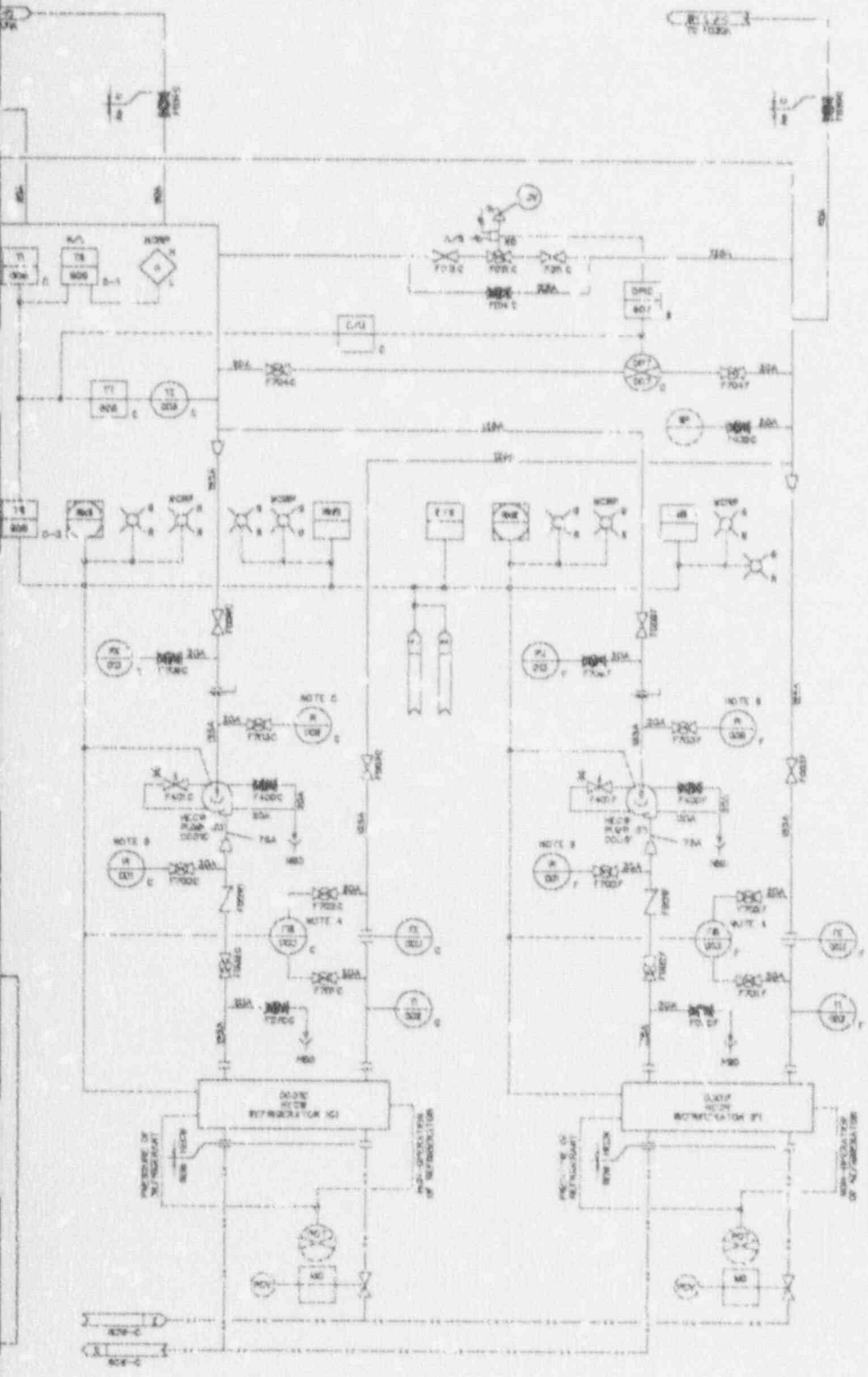
Figure 9.2-3 HVAC EMERGENCY COOLING WATER SYSTEM P&ID (Sheet 2 of 3)

9204160195 - 88


CONTROL BUILDING
REACTOR BUILDING



HECW (C)

92-073-5

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Figure 9.2-3 HVAC EMERGENCY COOLING WATER SYSTEM P&ID (Sheet 3 of 3)

9204160195 - 89

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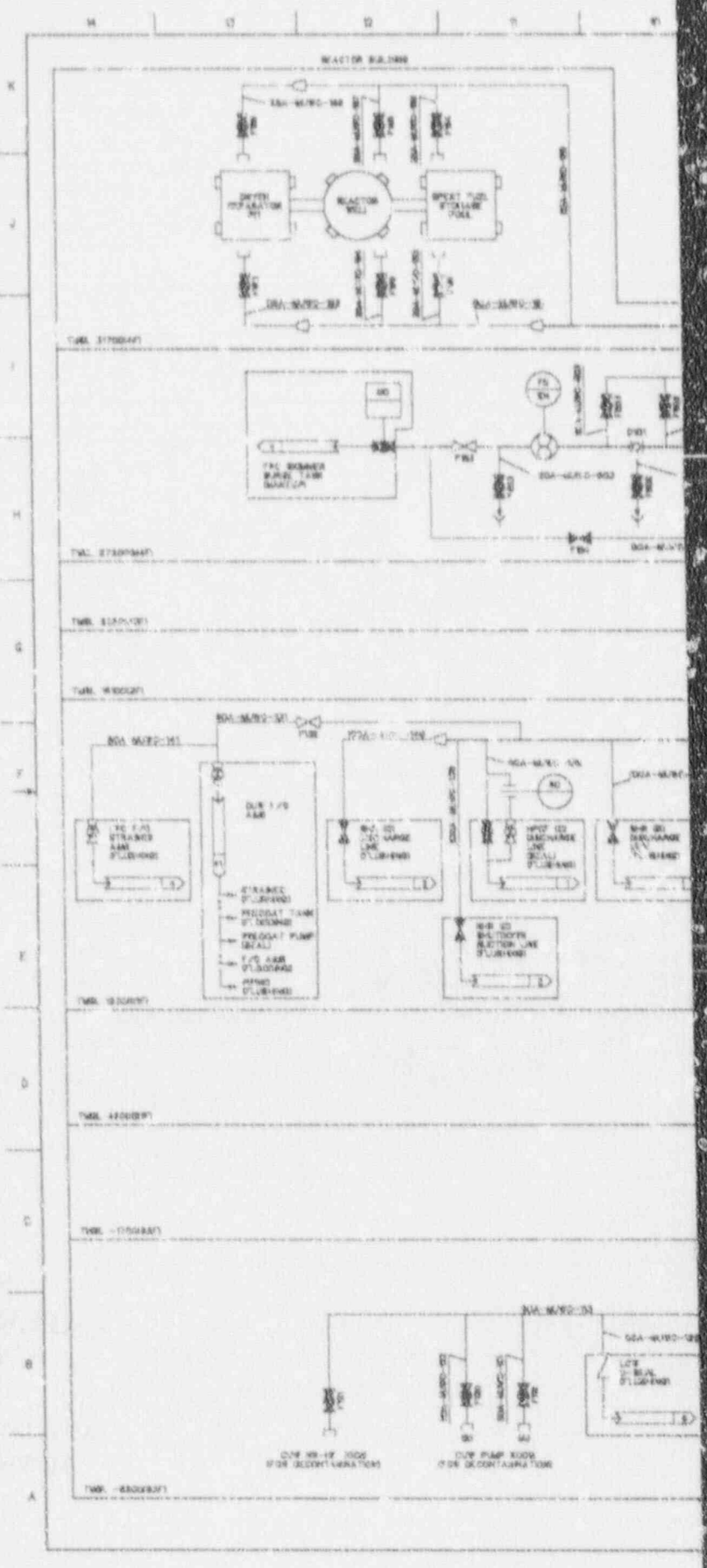
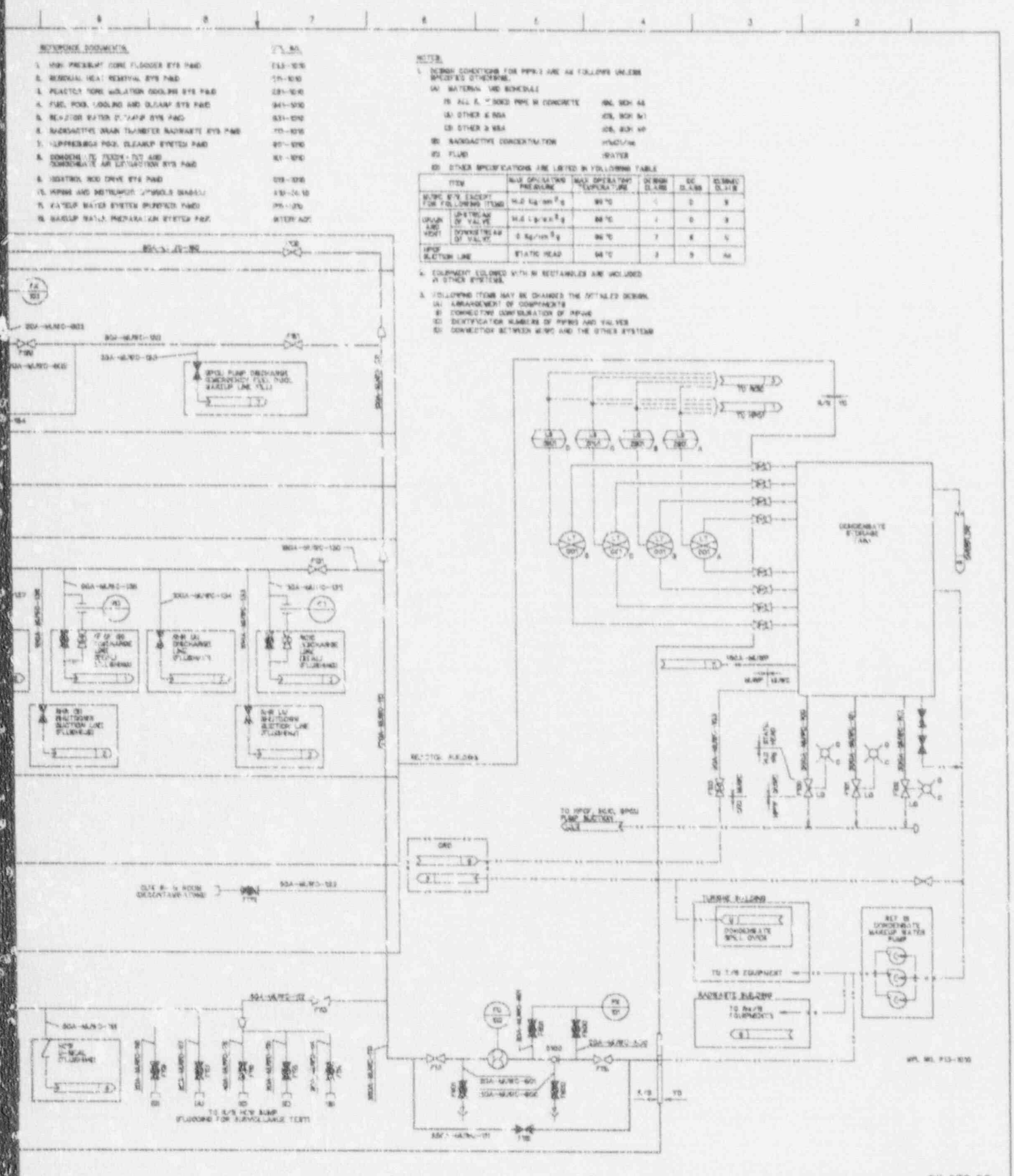
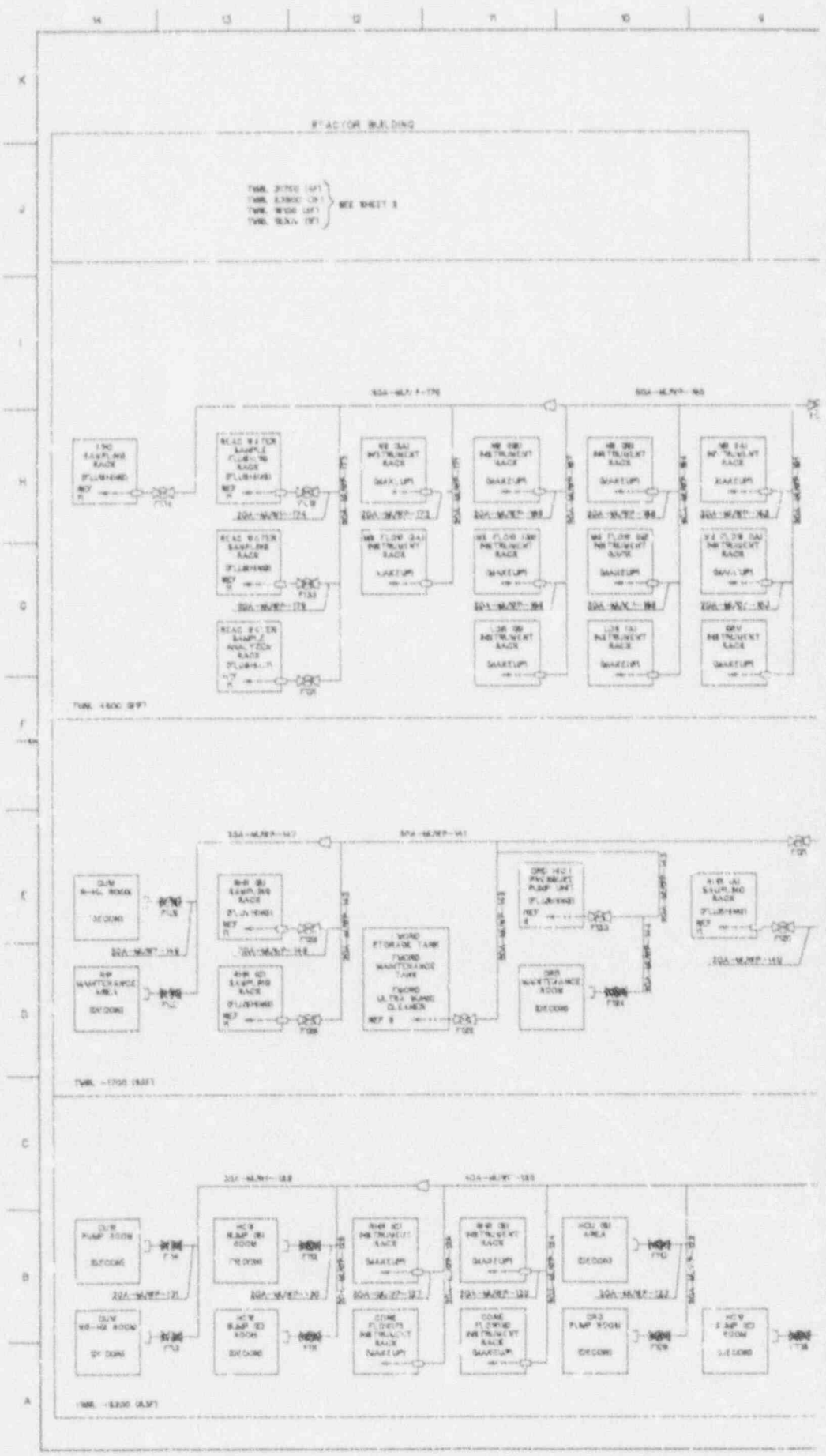




92-073-52

Figure 9.2-4 MAKEUP WATER (CONDENSATE) P&ID


14
13
12
11
10
9
K
J
I
H
G
F
E
D
C
B
A
REACTOR BUILDING
SEE SHEET 3
TUBE 4600 (LEFT)
TUBE 4700 (RIGHT)
TUBE 4800 (LEFT)

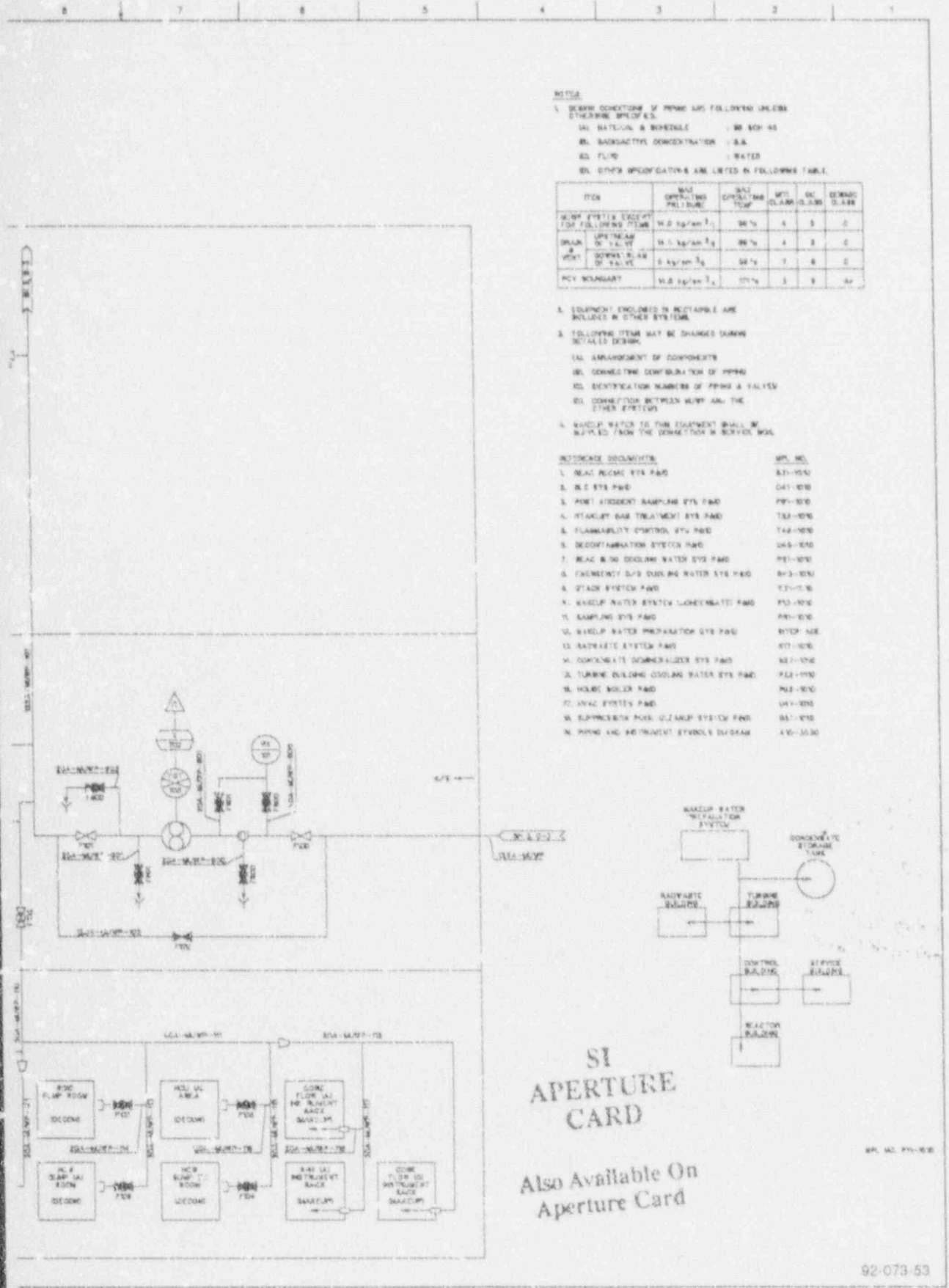


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Figure 9.2-5 MAKEUP WATER (PURIFIED) P&ID (Sheet 1 of 3)

9204160195 -9/

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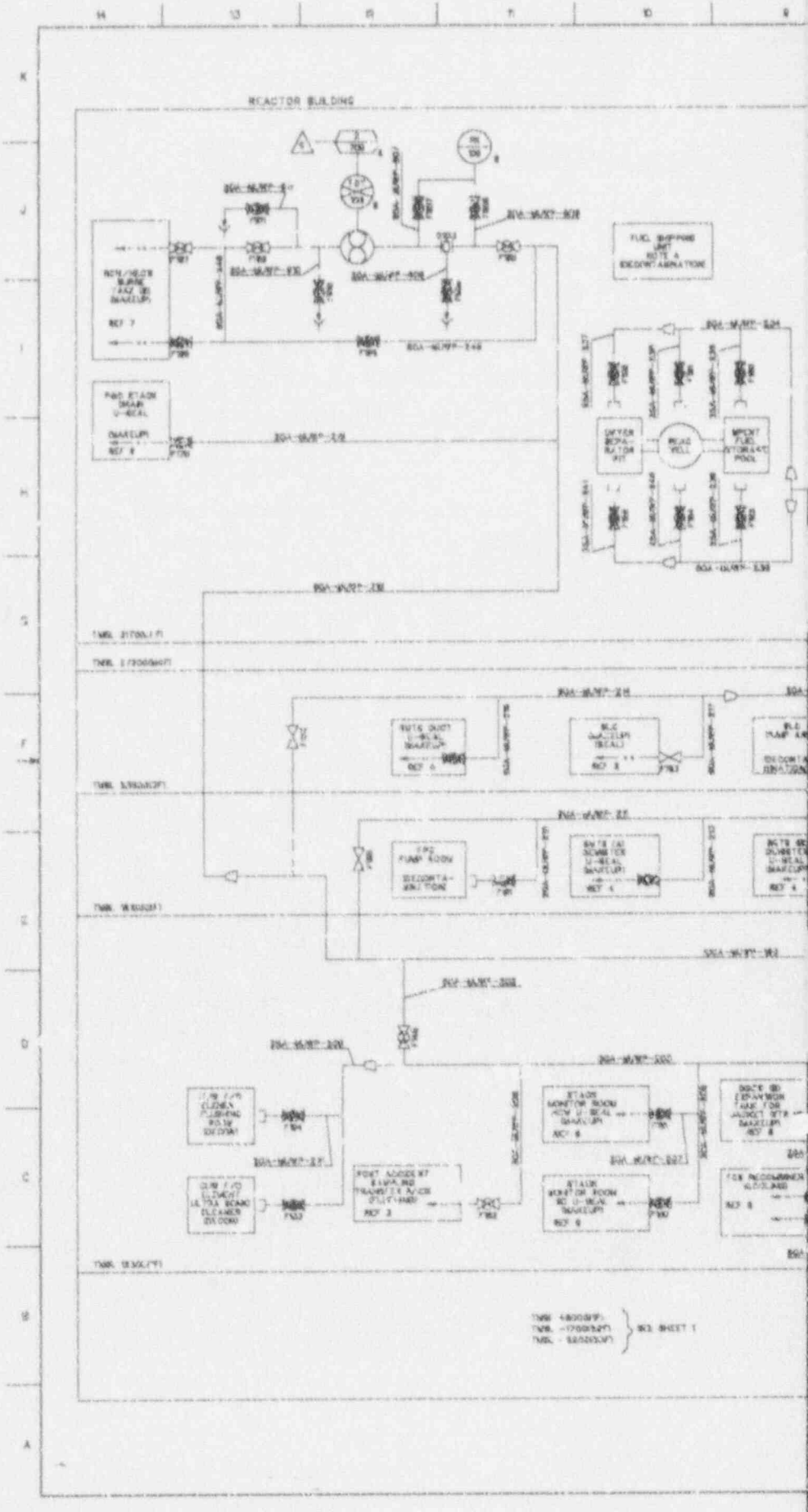
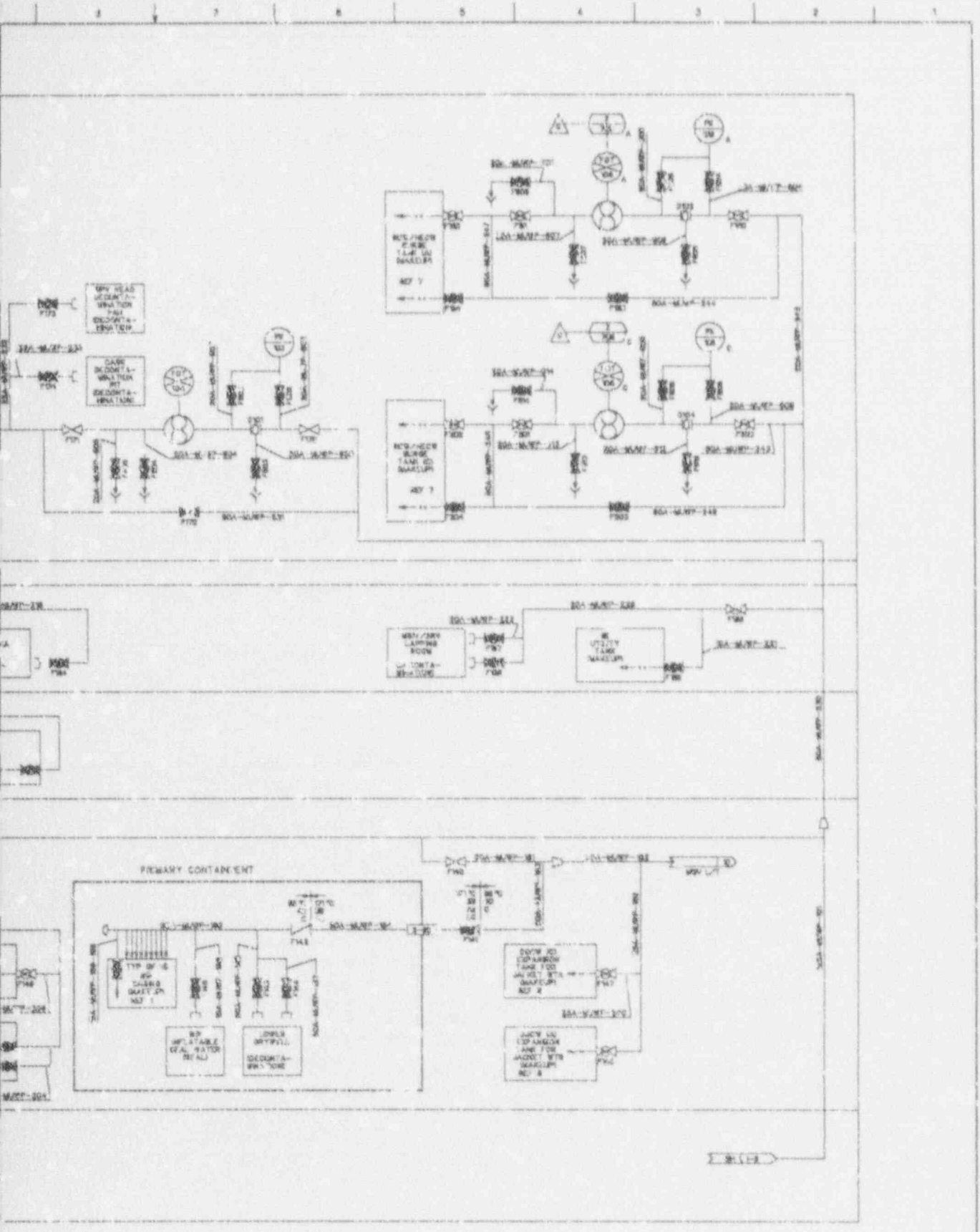
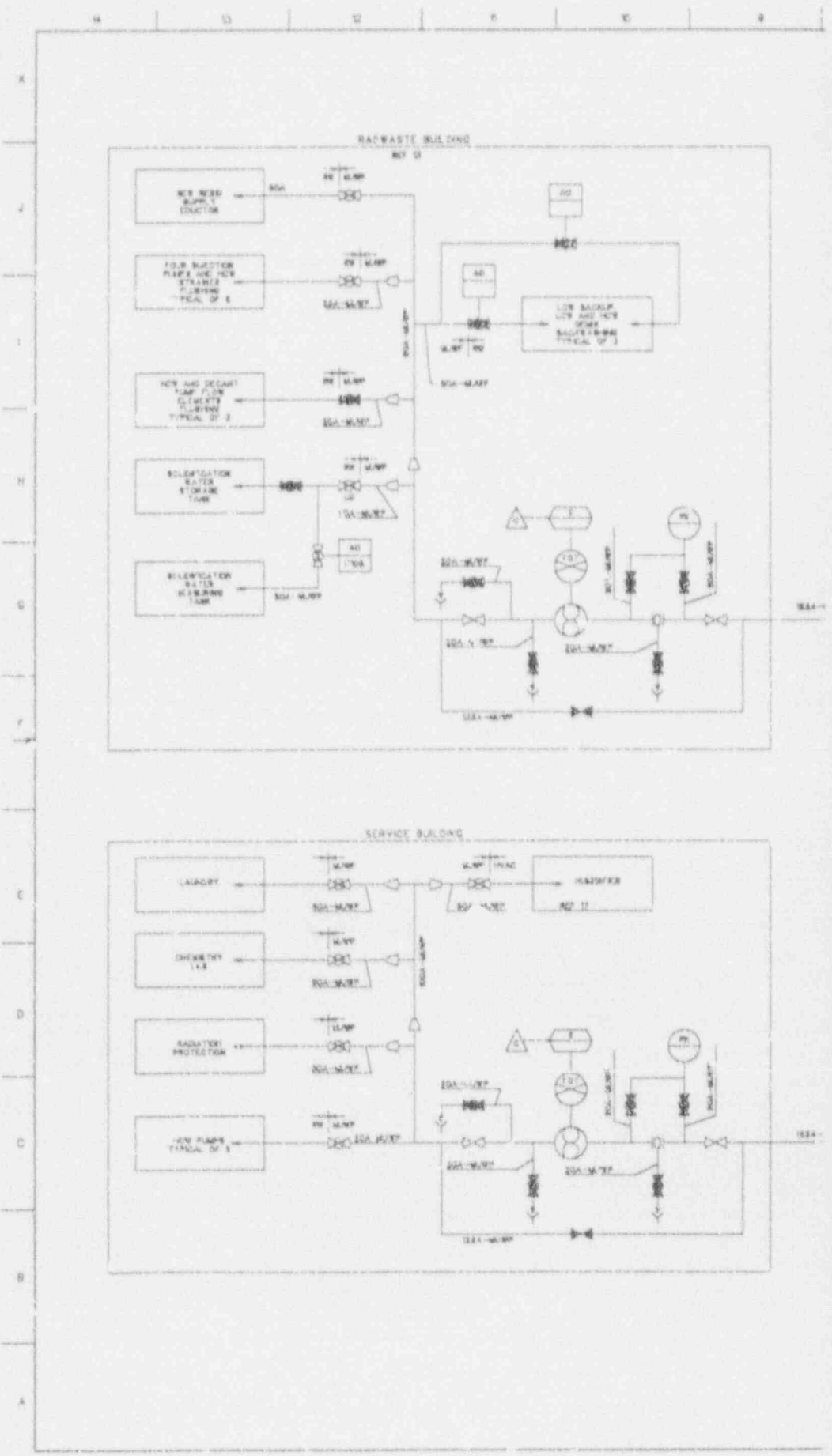




92-073-54

Figure 9.2-5 MAKEUP WATER (PURIFIED) P&ID (Sheet 2 of 3)

9204160195 - 92


RADWASTE BUILDING
SERVICE BUILDING

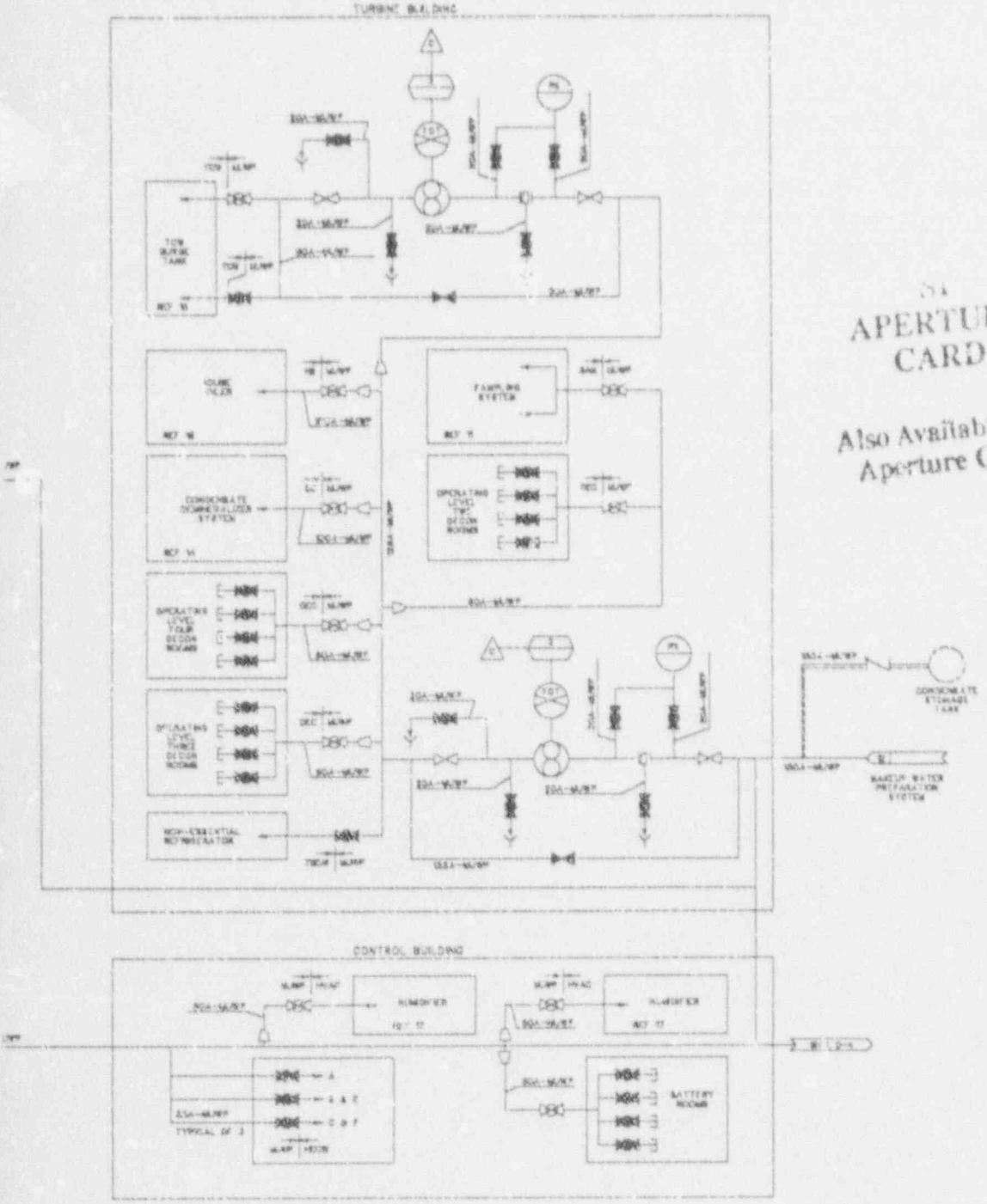


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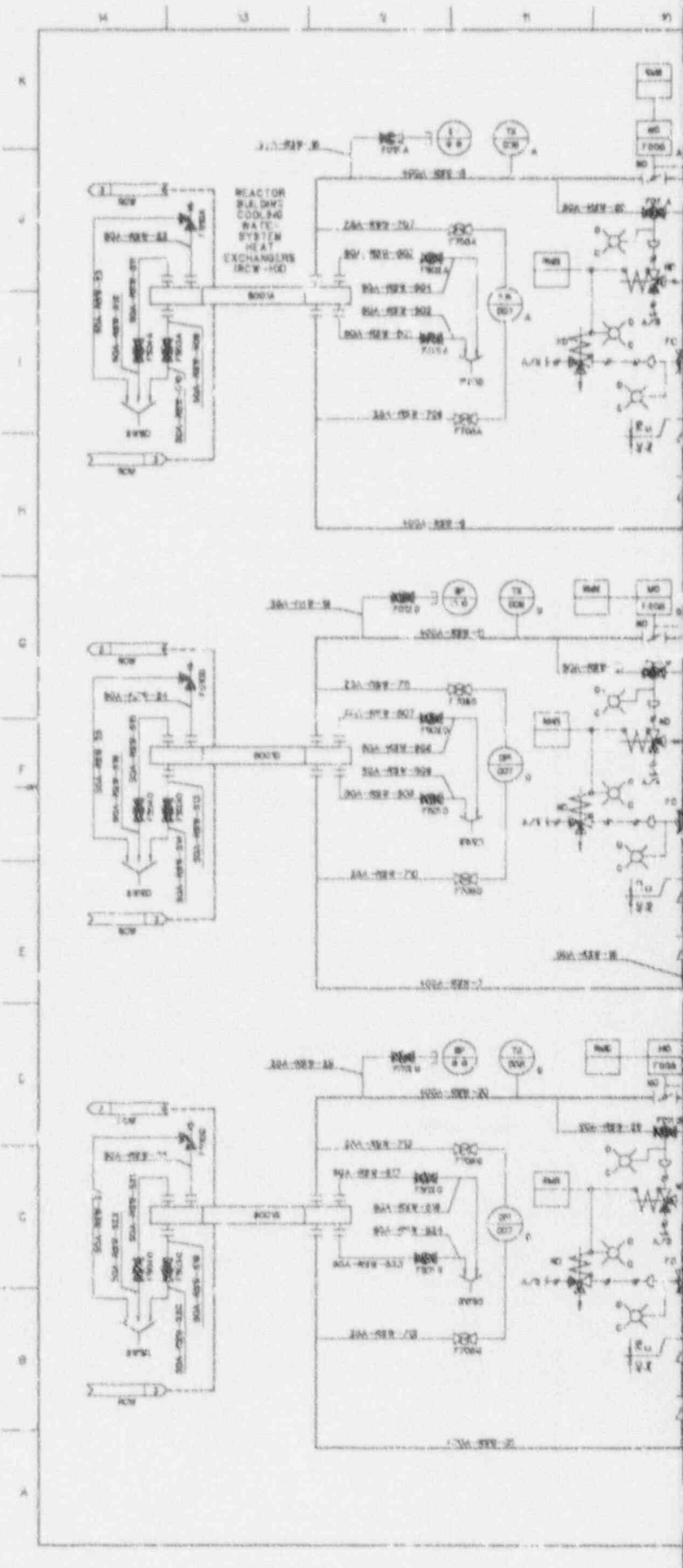
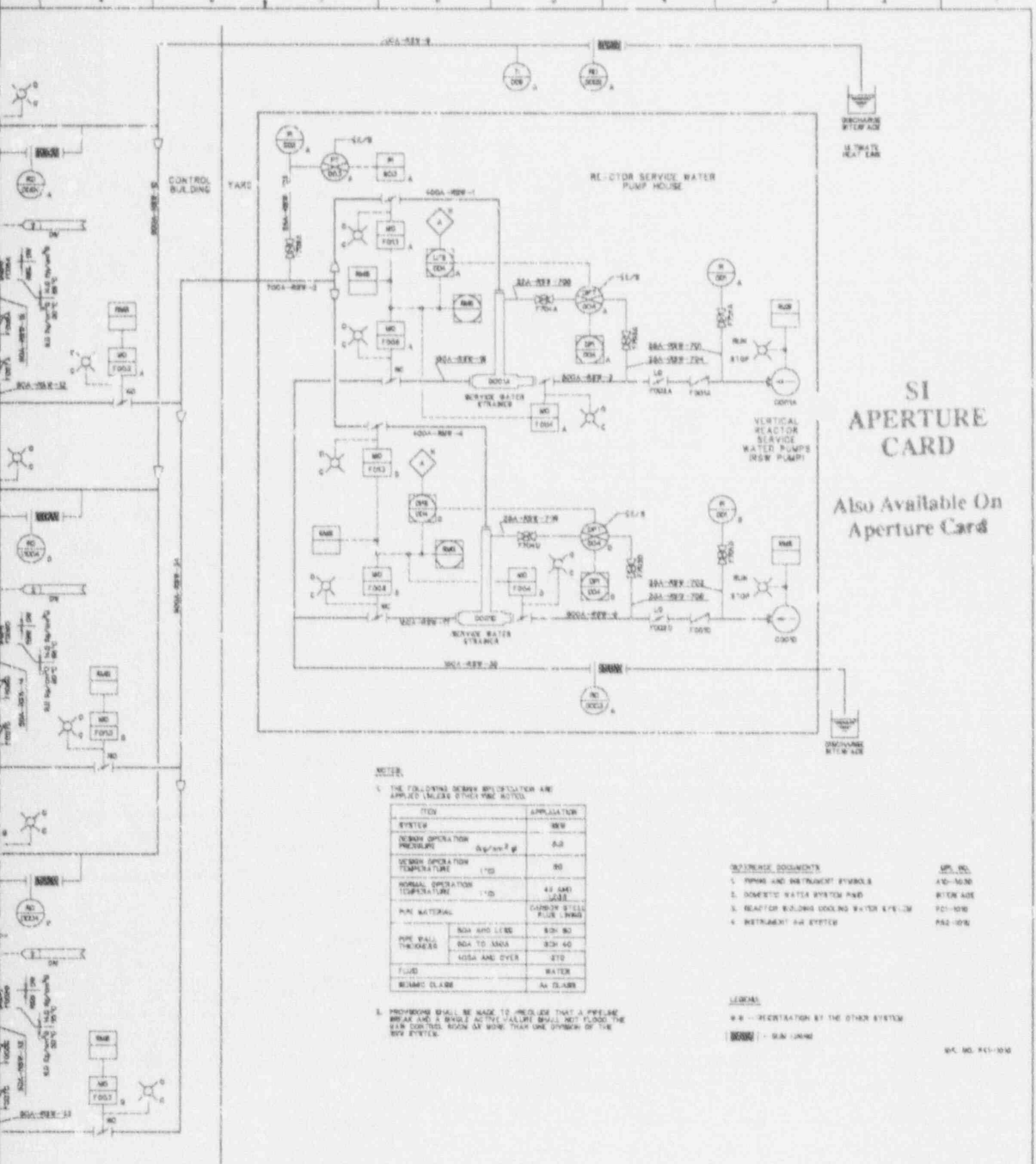
Figure 9.2-5 MAKEUP WATER (PURIFIED) P&ID (Sheet 3 of 3)

9204100195 -93


REACTOR BUILDING COOLING WATER SYSTEM HEAT EXCHANGERS (RCW-H00)



NOTES:

1. THE FOLLOWING DESIGN APPLICATION ARE APPLIED UNLESS OTHERWISE NOTED.

ITEM		APPLICATION
SYSTEM		RSW
DESIGN OPERATION PRESSURE	kg/cm² g	6.0
DESIGN OPERATION TEMPERATURE	(°C)	50
NORMAL OPERATION TEMPERATURE	(°C)	40 AND LESS
PIPE MATERIAL		CARBON STEEL PIPE LINING
PIPE WALL THICKNESS	50A AND LESS	SCH 80
	80A TO 350A	SCH 40
	400A AND OVER	STD
FLUID		WATER
SEISMIC CLASS		As CLASS

3. PROVISIONS SHALL BE MADE TO PRECLUDE THAT A PIPE LINE BREAK AND A SINGLE ACTIVE FAILURE SHALL NOT FLOOD THE MAIN CONTROL ROOM OR MORE THAN ONE DIVISION OF THE RSW SYSTEM.

REFERENCE DOCUMENTS

1. PIPING AND INSTRUMENT SYMBOLS	A10-1030
2. DOMESTIC WATER SYSTEM P&ID	WTCM-A0E
3. REACTOR BUILDING COOLING WATER SYSTEM	P21-1010
4. INSTRUMENT AIR SYSTEM	P52-1010

LEGEND

W.B. — INDICATION BY THE OTHER SYSTEM

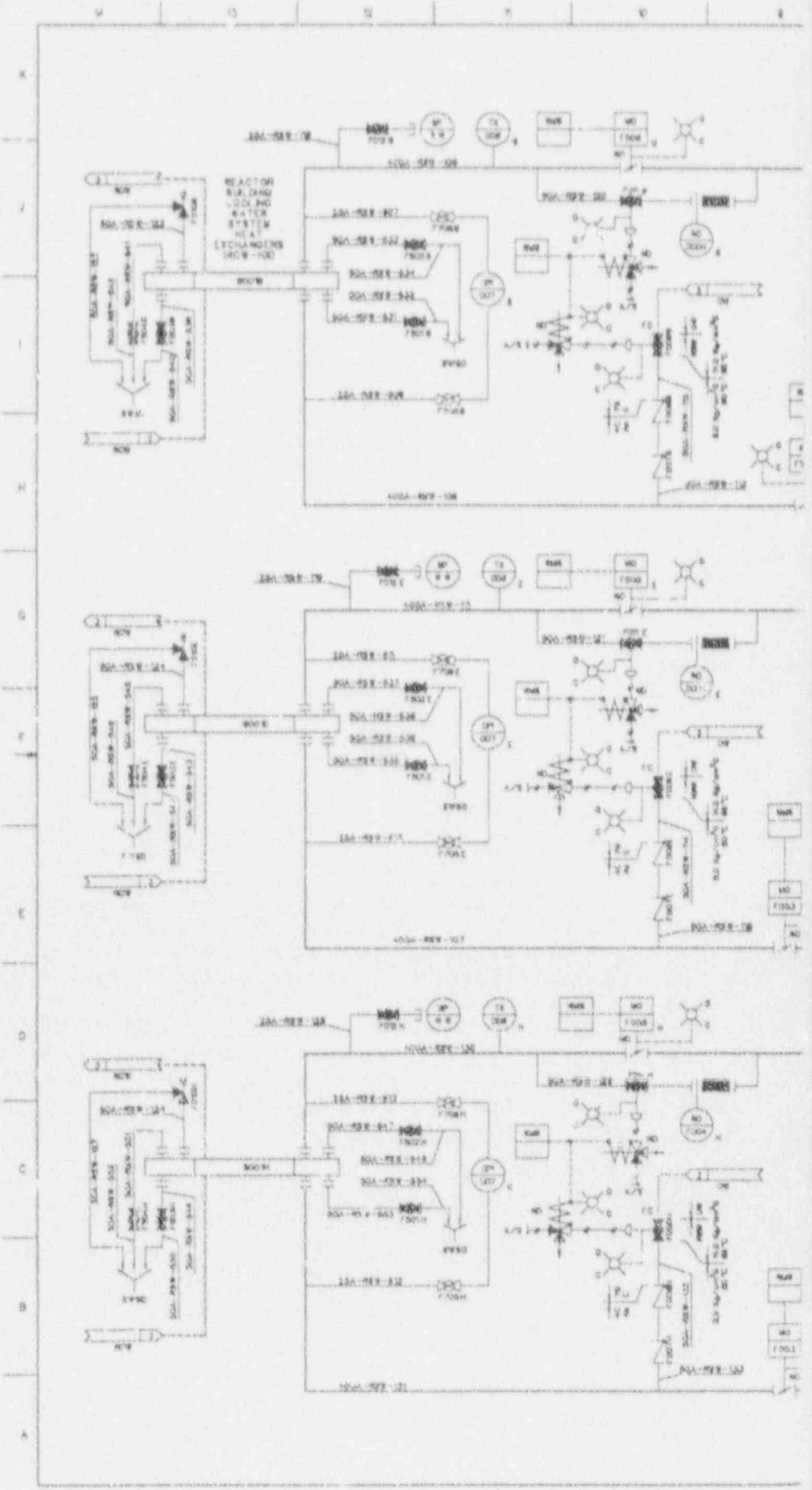
RSW — RUN LINE

DWG. NO. P21-1010

92-073-56

Figure 9.2-7 REACTOR SERVICE WATER P&ID (Sheet 1 of 3)

9204160195 -94


REACTOR BUILDING LOOP NO 4 WATER SYSTEM HEAT EXCHANGERS (HDR - YDD)

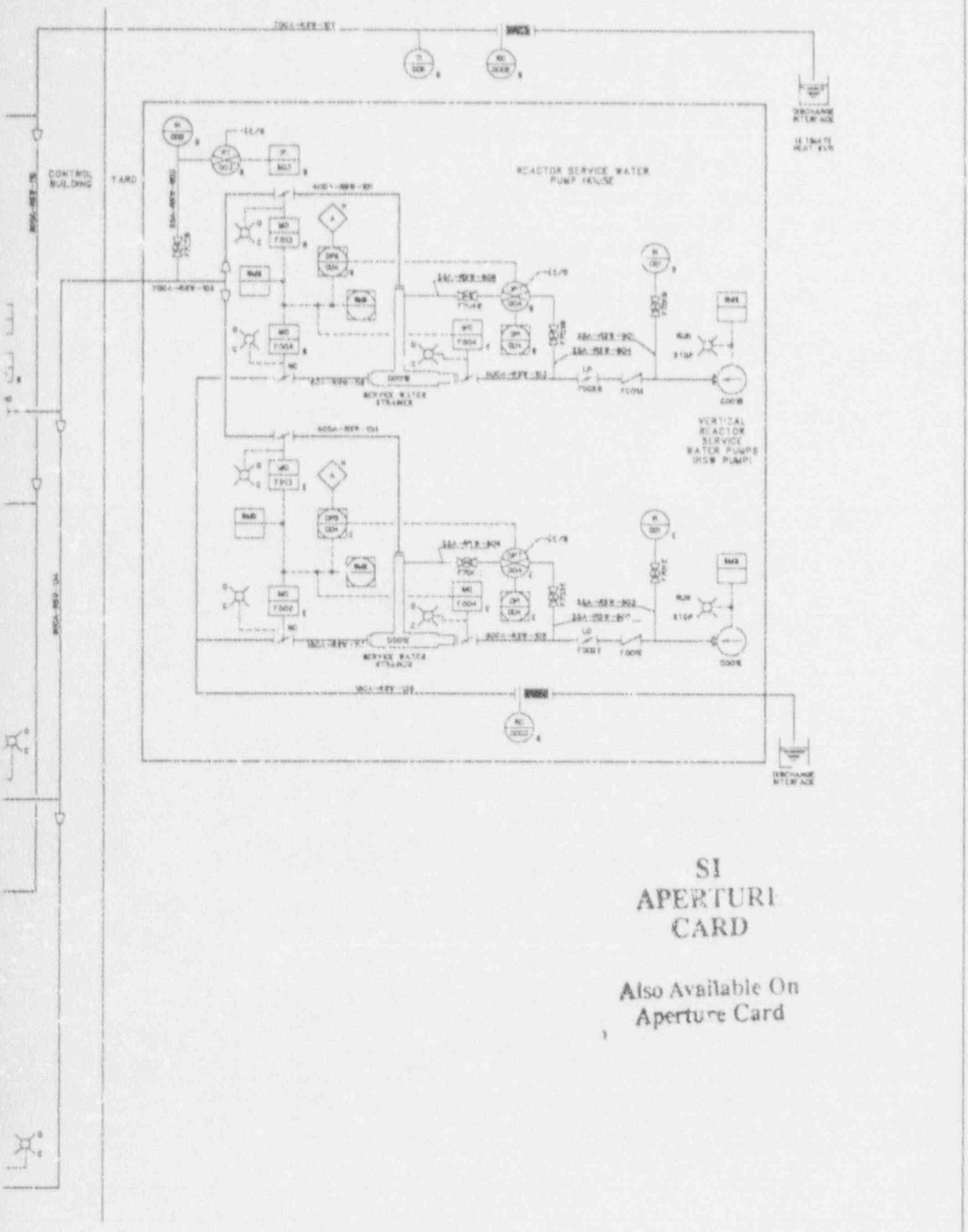


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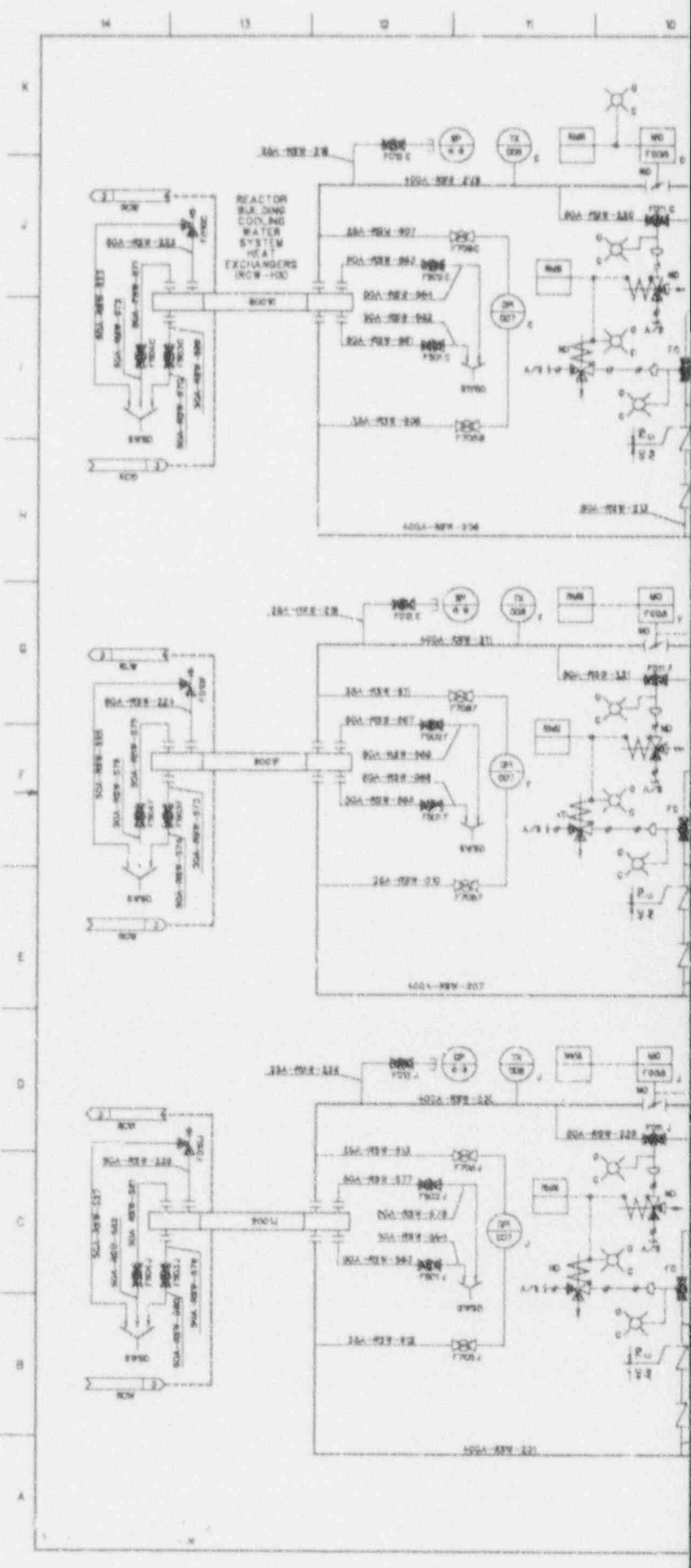
Figure 9.2–7 REACTOR SERVICE WATER P&ID (Sheet 2 of 3)

9204160195 – 95


REACTOR BUILDING COOLING WATER SYSTEM HEAT EXCHANGERS (ROW - H30)

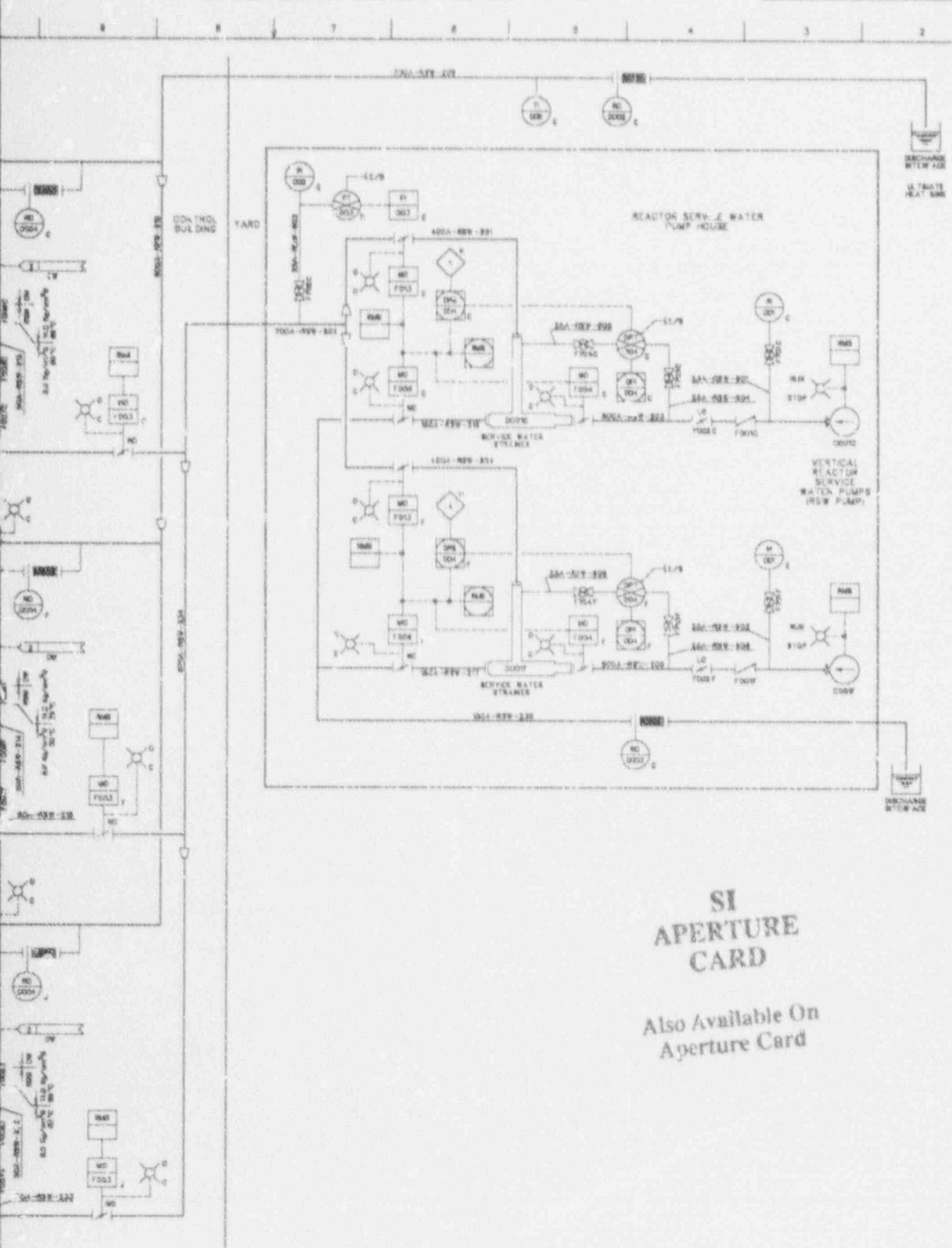


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Figure 9.2–7 REACTOR SERVICE WATER P&ID (Sheet 3 of 3)

9204160195 – 96

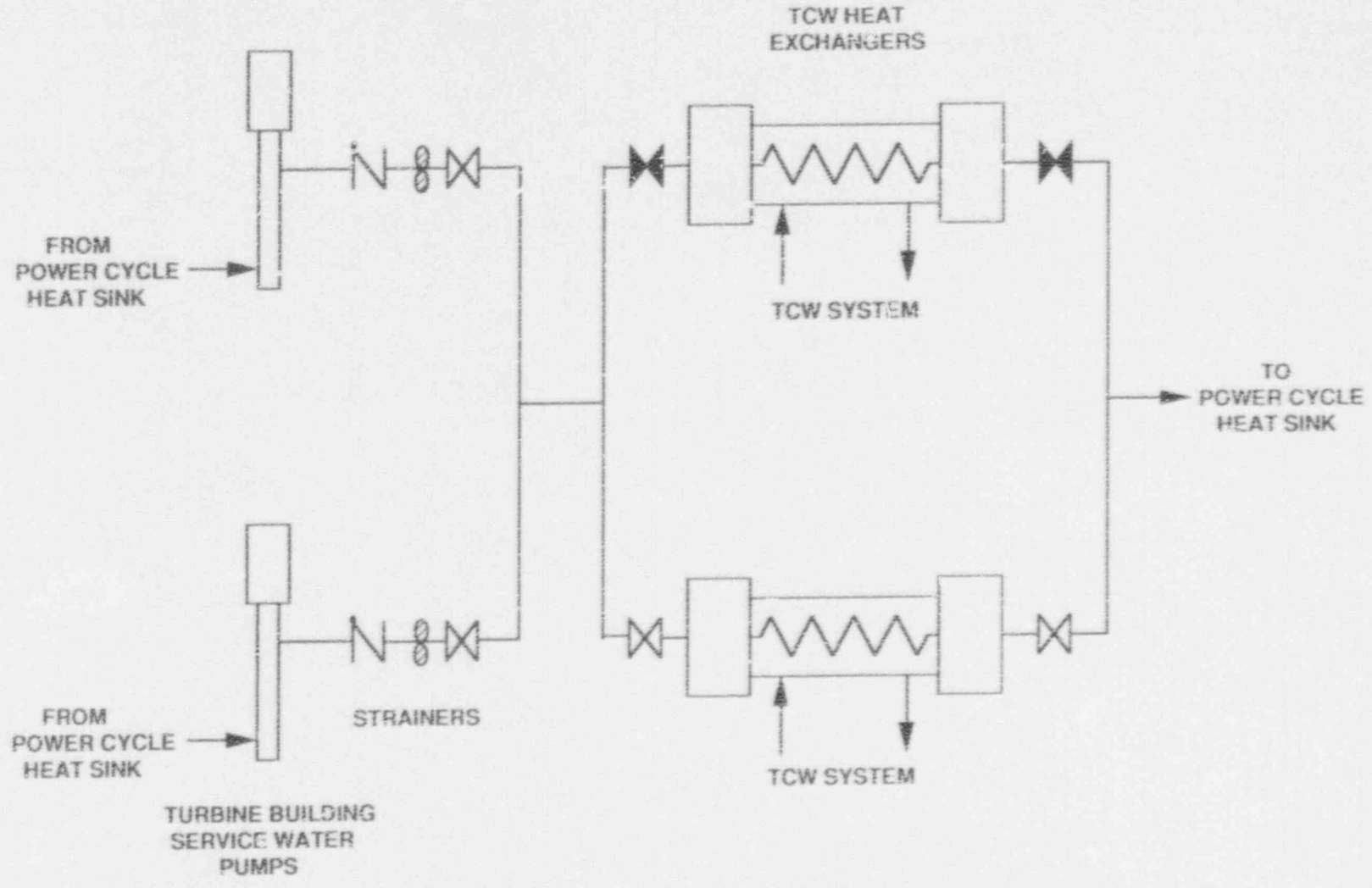

Figure 9.2-8 TURBINE SERVICE WATER SYSTEM

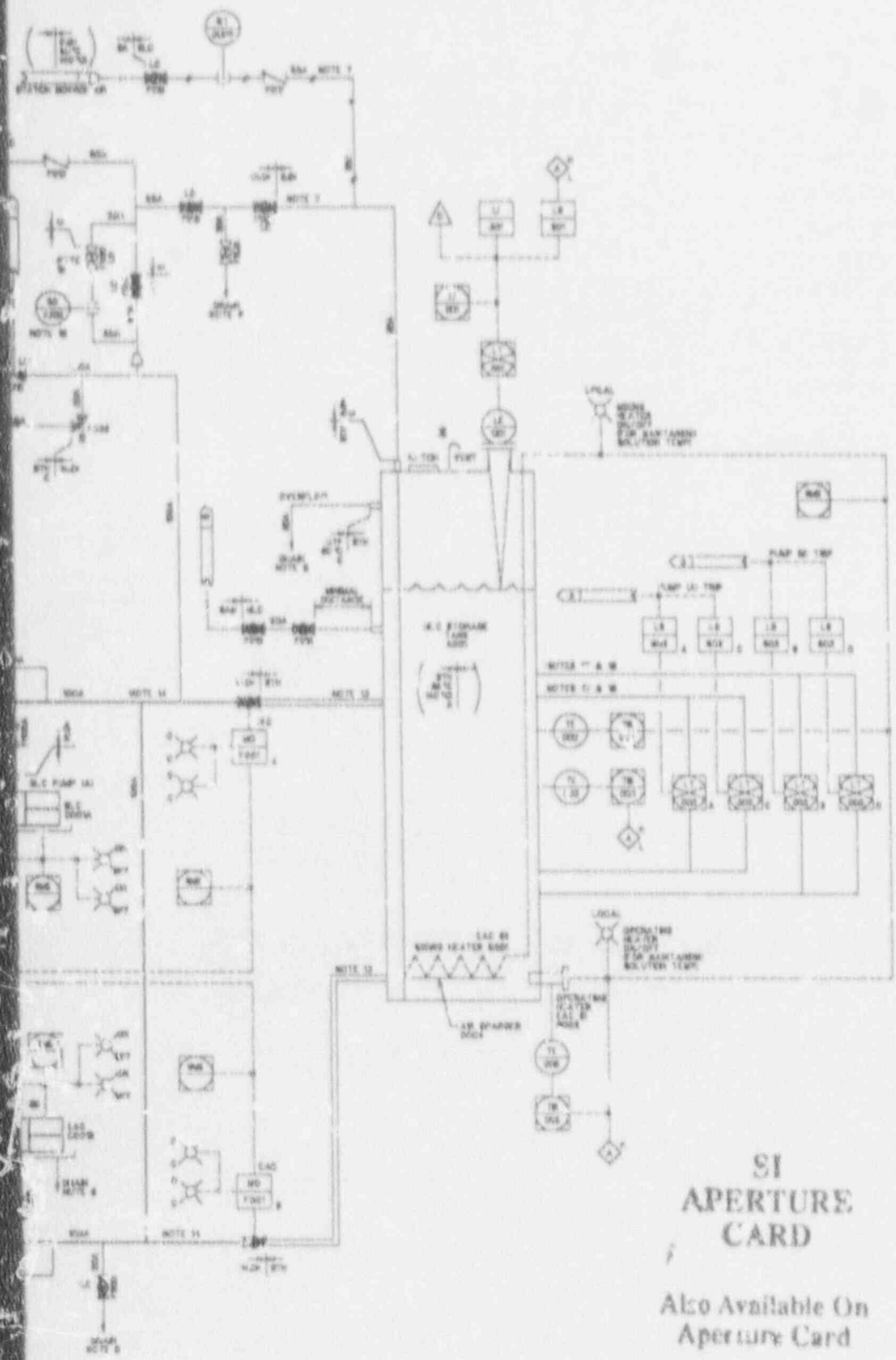

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Figure 9.3-1 STANDBY LIQUID CONTROL SYSTEM P&ID

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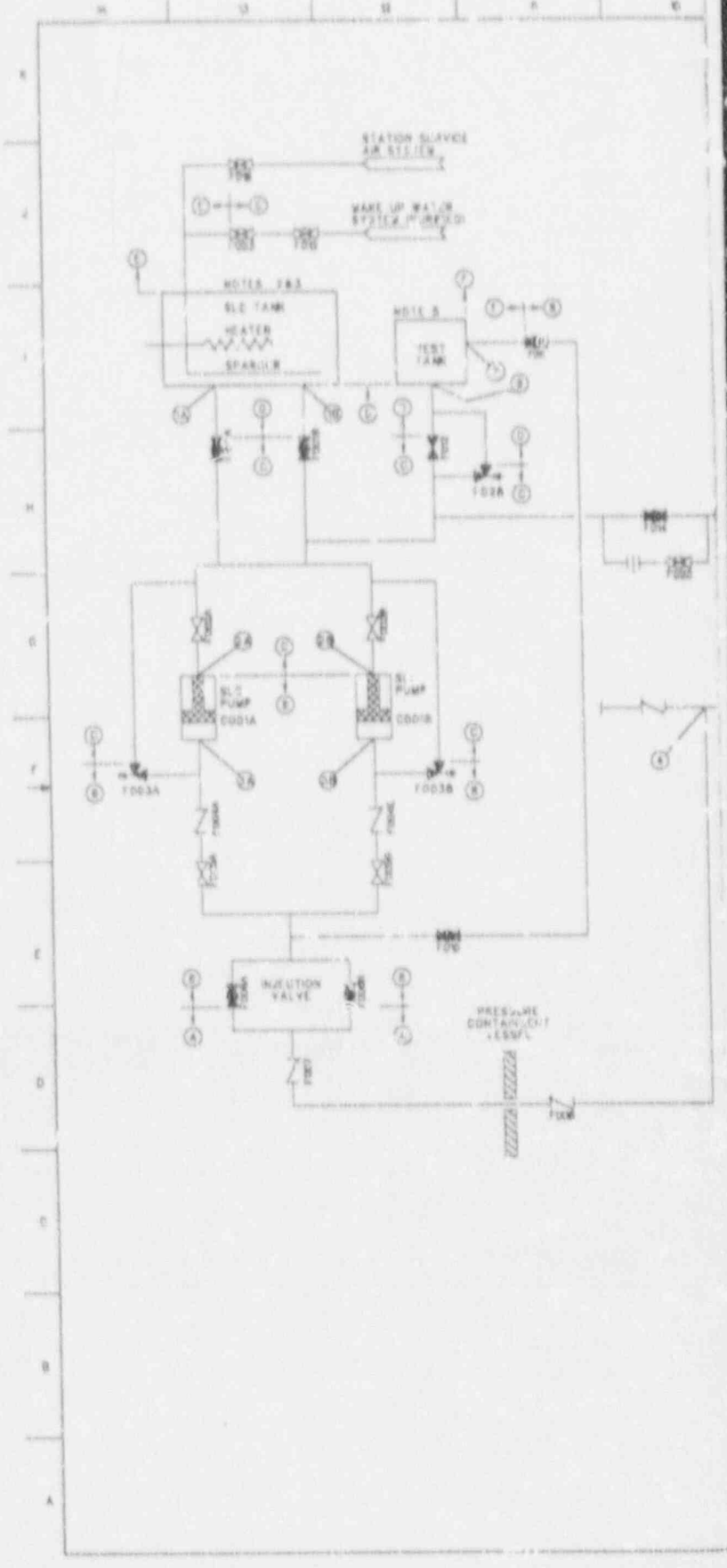
STATION SERVICE AIR SYSTEM
WATER SYSTEM
NOTES 7&3
SLC TANK
HEATER
SPARGER
NOTE 8
TEST TANK
SLC PUMP
C001A
SLC PUMP
C001B
INJECTION VALVE
PRESSURE CONTAINMENT LESS

MODE A	REACTOR INJECTION MODE					NOTE 8	
LOCATION	1	2	3	4	5	6	7
FLOW (L/min)	189	189	189	189	189	0	0
PRESS (kg/cm^2g)	STH	-0.1	MAX 8.8 MIN 8.0	R+3	R+8	STH	ATP
TEMP (°C)	30	30	30	30	30	AMT	AMT
MAX ALLOWABLE PRESS LOSS (m)	← → * PEAK PRESS 100 kg/cm^2g						
	0.13						

MODE B	RCIC INJECTION TEST MODE					NOTE 8	
LOCATION	8	9	1	3	5	4	6
FLOW (L/min)	189	189	189	189	0	0	0
PRESS (kg/cm^2g)	STH	-0.1	MAX 8.8 MIN 8.0	ATP	STH	R+P	R+T
TEMP (°C)	DWT	DWT	DWT	DWT	30	R+T	R+T
MAX ALLOWABLE PRESS LOSS (m)	← → * PEAK PRESS 100 kg/cm^2g						
	0.13						

MODE C	INJECTION TEST MODE					NOTE 8	
LOCATION	8	1	3	4	5	1	7
FLOW (L/min)	189	189	189	189	189	0	0
PRESS (kg/cm^2g)	STH	-0.1	R	R	R+P	STH	ATP
TEMP (°C)	DWT	DWT	DWT	DWT	R+T	0	AMT
MAX ALLOWABLE PRESS LOSS (m)	← →						
	0.13						

MODE D	STANDBY MODE						
LOCATION	1	2	3	4	5	6	7
FLOW (L/min)	0	0	0	0	0	0	0
PRESS (kg/cm^2g)	STH	DWT	DWT	R+T	R+P	ATP	ATP
TEMP (°C)	30	AMT	AMT	R+T	R+T	AMT	AMT
MAX ALLOWABLE PRESS LOSS (m)							

	A	B	C	D	E	F
MAX OPERATING PRESSURE (kg/cm^2g)	8.8	10	14.5	STH	8.8	ATP
MAX OPERATING TEMPERATURE (°C)	128	66	66	66	66	66

VALVE OPENING/CLOSING CONDITION — NOTE 8

	1 001 (A)	2 003 A&B	2 004 A&B	2 005 A&B	2 006 A&B	2 007	2 008	2 017	1 011	2 CSV	2 014
MODE A	O	O	O	O	O	O	O	X	X	X	X
MODE B	X	O	O	-	X	X	X	P	O	C	X
MODE C	X	O	C	O	X	O	C	X	X	O	X
MODE D	X	O	X	O	X	X	X	X	X	X	X

O: FULL OPEN P: PARTIALLY OPEN X: CLOSE

1 (13) MAKE UP WATER SYSTEM (PURIFIED)

MPSS (1)

REACTOR PRESSURE VESSEL

NOTES:

1. [ ] SHOWS THE VALVE WHICH IS NOT NEEDED IN A BASIC PLANNING OF THIS SYSTEM.
2. SOLUTION TEMP IN S.L.C. T. NK SHALL BE MAINTAINED AT 33.3°C DURING NORMAL PLANT OPERATION.
3. S.L.C. TANK SHALL BE LOCATED SUC... S.L.C. PUMP SUCTION PIPING IS ALWAYS FILLED WITH THE SOLUTION.
4. S.L.C. PUMP SHALL BE ABLE TO INJECT BORON SOLUTION AT REACTOR PRESSURE OF 80.8 kg/cm^2g.
5. TEST TANK SHALL BE LOCATED SUCH THAT PUMP SUCTION PIPING IS ALWAYS FILLED WITH WATER.
6. DURING OPERATING MODE A,B OR C, ONLY ONE PUMP IS RUN.

REFERENCE DOCUMENTS	MPL ITEM NO.
1. STANDBY LIQUID CONTROL SYS (BD	C41-1011
2. STANDBY LIQUID CONTROL SYS P&ID	C41-1015

ABBREVIATION:

STH : STATIC WATER HEAD
ATP : ATMOSPHERIC PRESSURE
AMT : AMBIENT TEMPERATURE
DWT : SUPPLIED SEAWATER TEMPERATURE
DWP : SUPPLIED SEAWATER PRESSURE
R+P : REACTOR PRESSURE
R+T : REACTOR TEMPERATURE

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02.073-79

Figure 9.3–1A STANDBY LIQUID CONTROL SYSTEM PROCESS FLOW DIAGRAM

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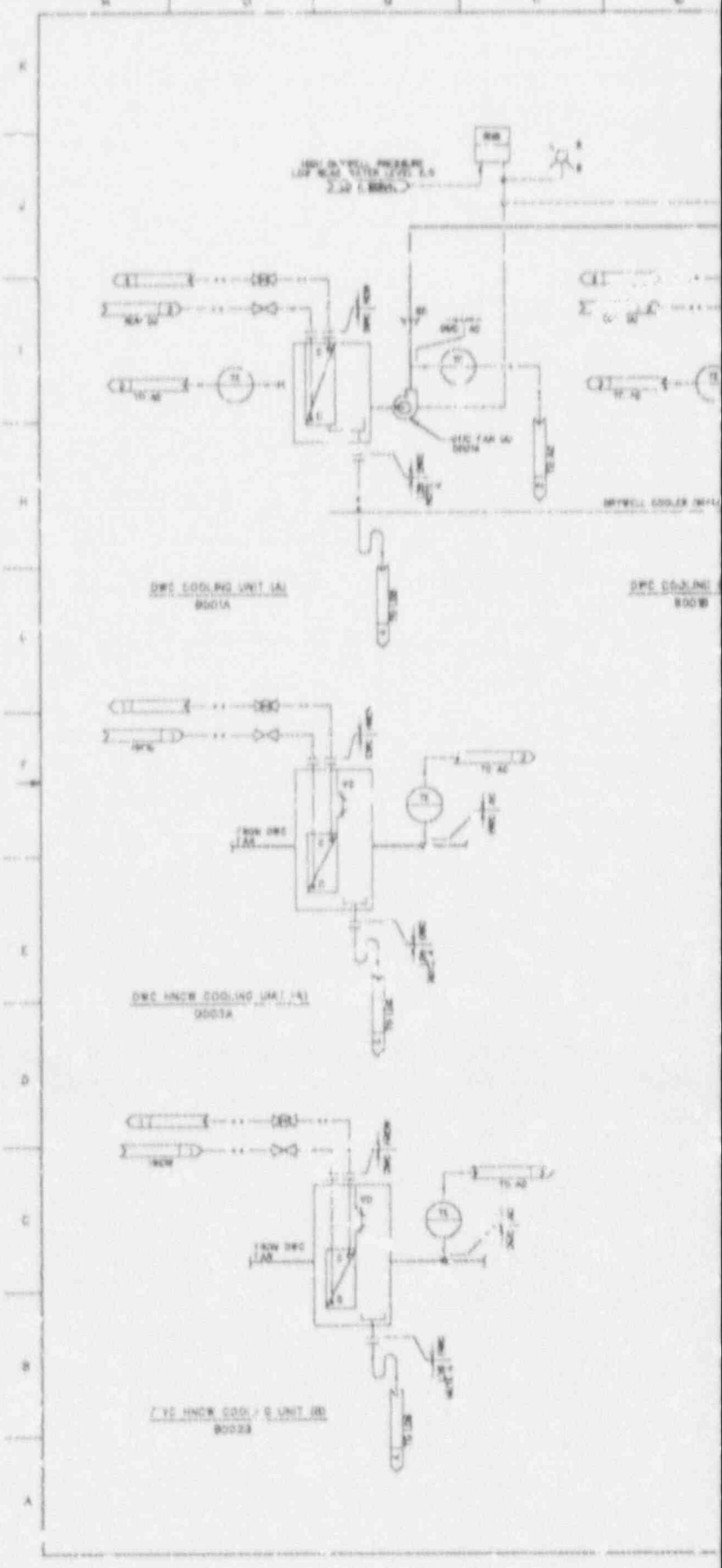
DWC COOLING UNIT 1A1
DWC HNCW COOLING UNIT 1A1
DWC HNCW COOLING UNIT 1B

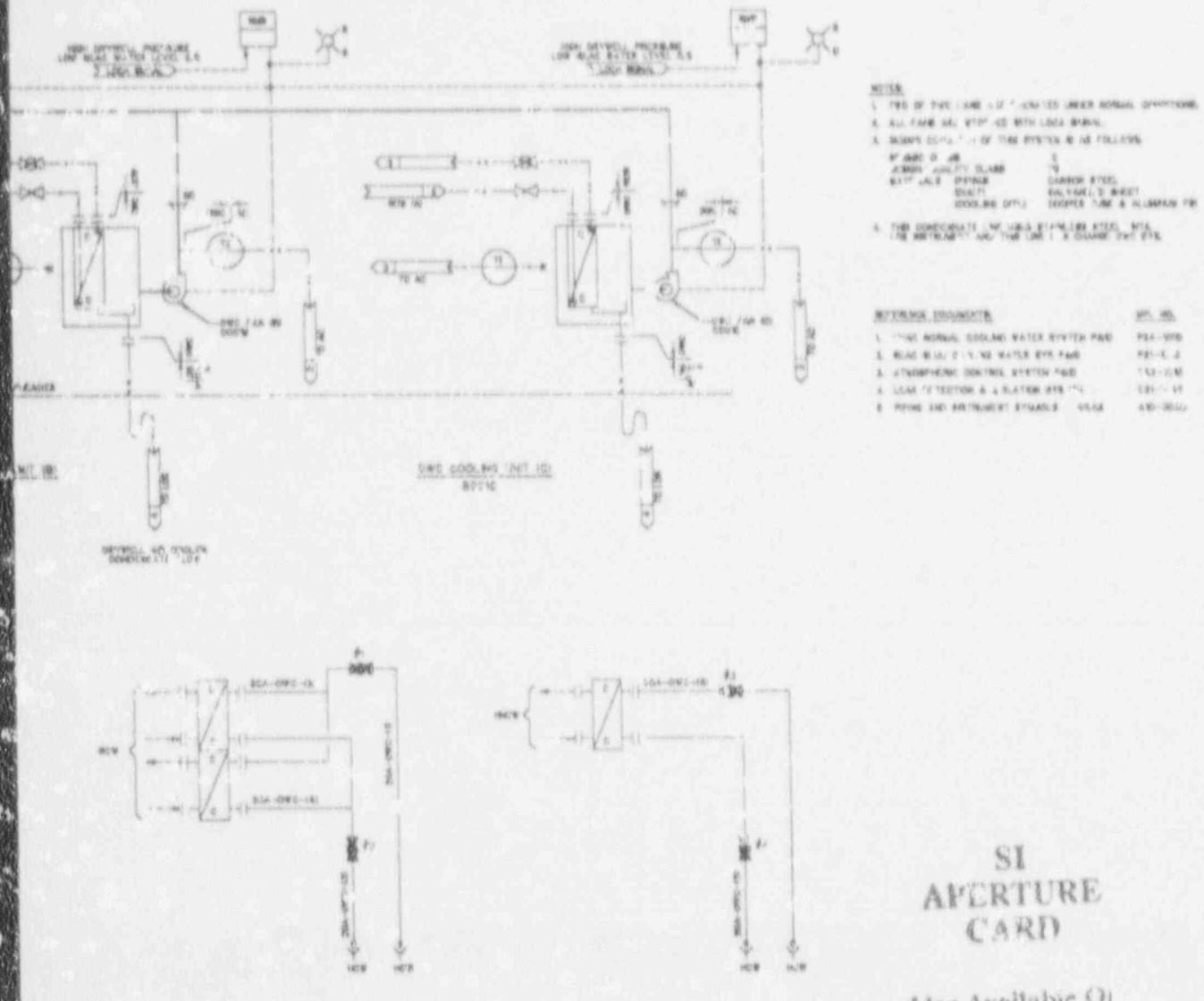

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Figure 9.4-8 DRYWELL COOLING SYSTEM P&ID

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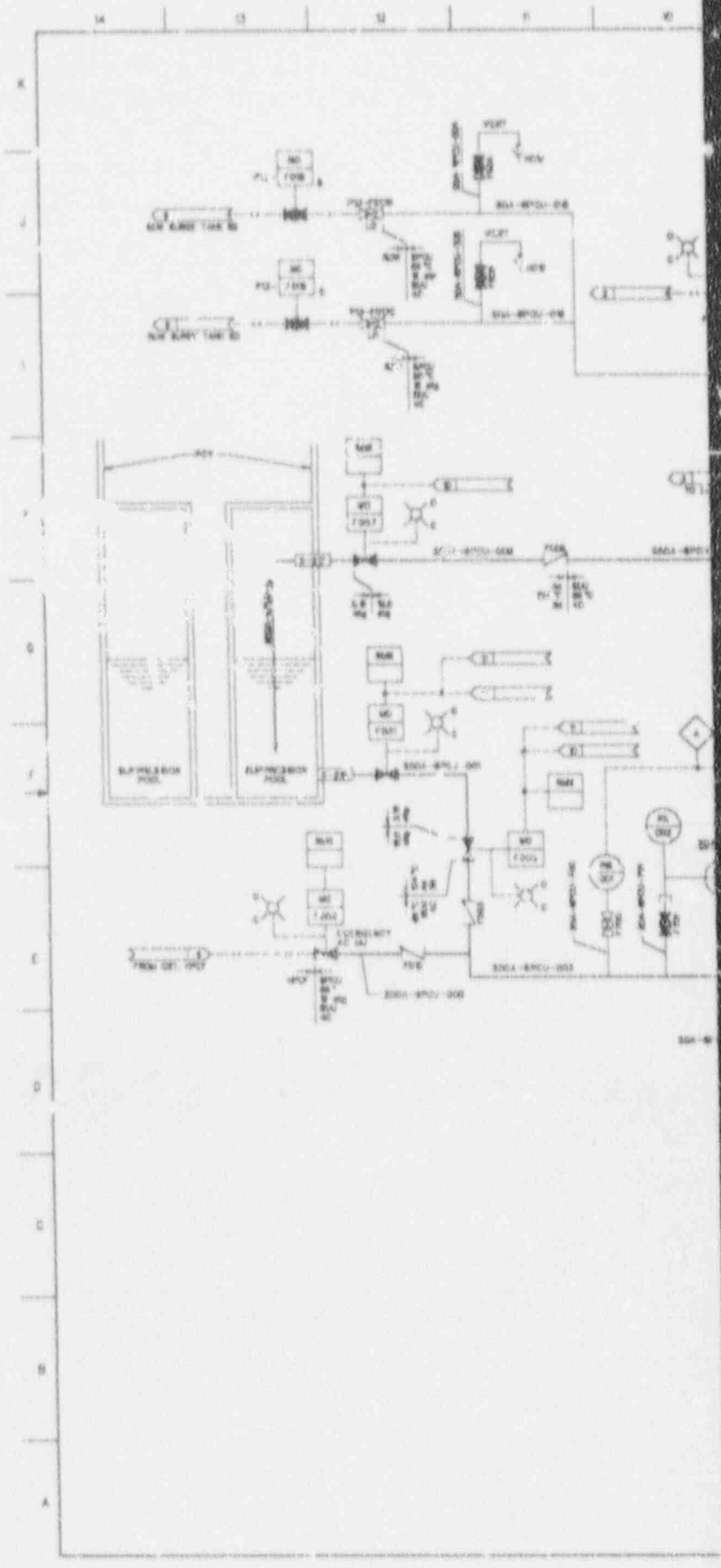

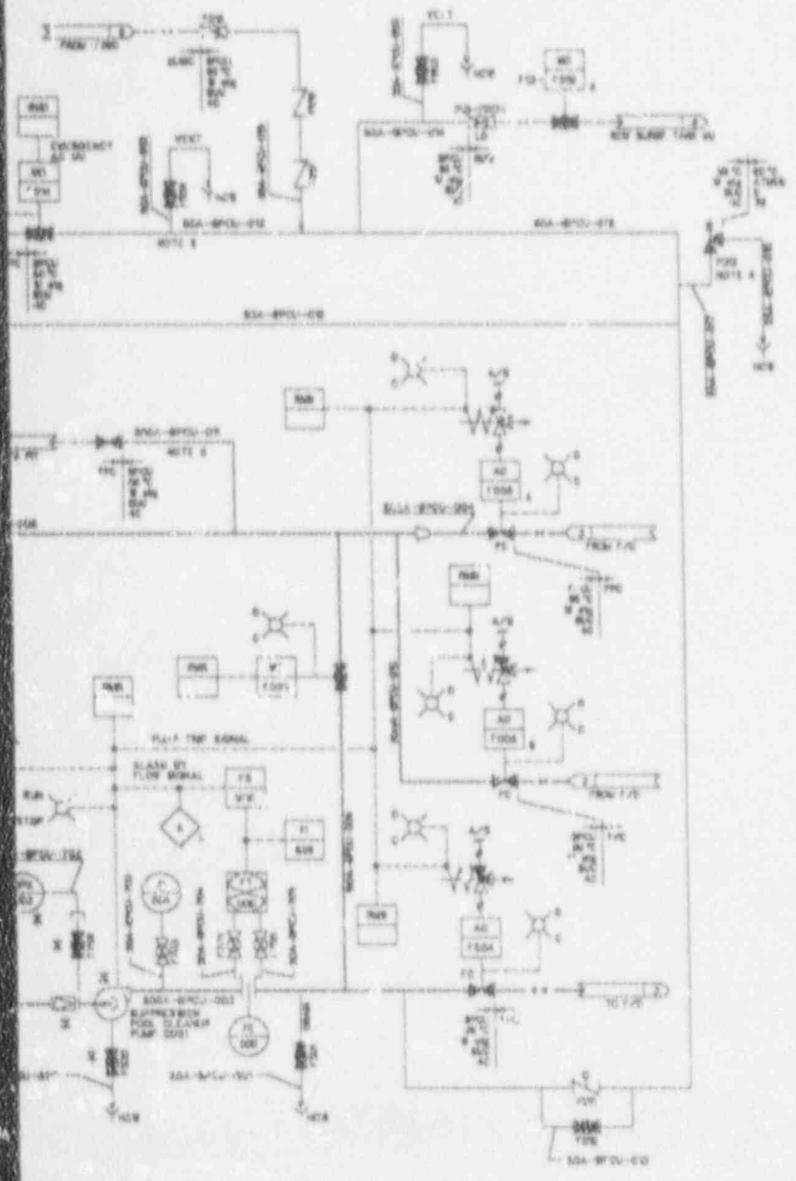

NOTES

1. BOUNDARY CONDITION OF THIS SYSTEM IS AS FOLLOWS EXCEPT OF SPECIAL NOTES.

DESIGN PRESSURE	8.62 kg/cm² g
DESIGN TEMPERATURE	66°C
DESIGN CLASS	4
BOUNDARY CLASS	BOUNDARY CLASS AT DR BOUNDARY CLASS BEA
QUALITY CONTROL CLASS	C
RATEMAKER	DB

LINE AND VALVE DESIGN CONDITION FOR SIGNAL LEVEL AT INSTRUMENT ASSEMBLY MAIN LINE DESIGN CONDITION.

3. TANK REFILL MAY BE USED FOR FUEL POOL MAKEUP AT LOSS OF THE NORMAL MAKEUP FUNCTION.
5. ALARMS GENERATED BY THIS SYSTEM ARE INDICATED AT THE PSC PANEL IN THE MAIN CONTROL ROOM.
6. VALVE DESIGN CONDITION IS DETERMINED BY THE MORE SEVERE CONDITION AT VALVE INLET OR OUTLET.
8. ELECTRIC POWER TO THIS SYSTEM IS SUPPLIED FROM CLASS 1E POWER SOURCE DIVISION (A).
9. MO-57 VALVE SHALL BE INSTALLED DUE TO HEAT INPUT TO THE CLOSED POOL SECTION.

NOTES FOR EQUIPMENT	EPS No.
1. PIPING AND INSTRUMENT DIAGRAM	A10-3030
2. PRIMARY SAMPLING SYSTEM P&ID	P50-1010
3. FUEL POOL COOLING AND CLEANUP SYSTEM P&ID	D41-1010
4. HIGH CONDUCTIVITY WASTE, RADWASTE SYSTEM P&ID	P17-1013
5. SUPPRESSION POOL CLEANUP SYSTEM P&ID	C41-1010
6. HIGH PRESSURE CORE FLOODER SYSTEM P&ID	E22-1010
7. MAKEUP WATER SYSTEM CONDENSATE P&ID	P11-1010
8. MAKEUP WATER SYSTEM (DEMINERALIZED) P&ID	P13-1010
9. REACTOR BUILDING CLOSED COOLING WATER SYSTEM P&ID	P21-1010
10. LEAK DETECTION AND ISOLATION SYSTEM P&ID	E31-1010
11. ATMOSPHERIC CONTROL SYSTEM P&ID	T31-1010

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Figure 9.5-1 SUPPRESSION POOL CLEANUP SYSTEM P&ID

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