GE Nuclear Energy

December 21, 1990

MFN No. 155-90
Docket No. STN 50-605
EEN-9081

Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Charles L. Miller, Director
Standardization and Non-Power Reactor Project Directorate

Subject: **Submittal of Amendment 15 to GE's ABWR SSAR, Figures**

Reference: Submittal of Amendment 15 to GE's ABWR SSAR,
MFN No. 145-9, dated November 30, 1990

Enclosed are thirty-four copies of the Chapter 5 figures changed in Amendment 15. The instructions of filing these figures is noted on the page change instructions supplied with the above reference. A copy of page 2 & 3 of those instructions is attached, the affected pages are identified by the notation "Fig*".

Sincerely,

R.C. Stirn, Acting Manager
Regulatory and Analysis Services
M/C 382, (408) 925-6948

cc: F. A. Ross (DOE)
D. C. Scaletti (NRC)
D. R. Wilkins (GE)
J. F. Quirk (GE)

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1/34

ABWR SSAR

Amendment 15 - Page change instruction

The following pages 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 15.

REMOVE PAGE No.	ADD PAGE No.
CHAPTER 4	
4.0-ii,iii	**4-ii,iii**
4.1-ii,iii	**4.1-ii,iii**
4.1-1,2	**4.1-1,1.1**
Add	**4.1-2**
4.1-5,6	**4.1-5,6**
4.2-ii	**4.2-ii**
4.2-1	**4.2-1**
4.2-2	**4.2-2**
4.3-ii,iii	**4.3-ii,iii**
4.3-1,2	**4.3-1,2**
4.3-3	**4.3-3**
4.3-4	**4.3-4,5**
4.4-ii,iii	**4.4-ii,iii**
4.4-iv	**4.4-iv**
4.4-1,2	**4.4-1,2**
4.4-3,4	**4.4-3,4**
4.4-5,6	**4.4-5,6**
4.4-7,8	**4.4-7,8**
4.4-9,10	**4.4-9,10**
4.4-11	**4.4-11**
4.5-ii	**4.5-ii**
4.5-4a	**4.5-4.1**
4.6-ii,iii	**4.6-ii,iii**
4.6-iv,v	**4.6-iv,v**
4.6-1,1a	**4.6-1,1a**
4.6-9,10	**4.6-9,10**
4.6-11,12	**4.6-11,12**
4.6-13,14	**4.6-13,14**
4.6-15,16	**4.6-15,16**

REMOVE PAGE No.	ADD PAGE No.
4A Cover	**4A Cover**
4A-ii,iii	**4A-ii,iii**
4A-1	**4A-1**
Add	**4B Cover**
Add	**4B-ii**
Add	**4B-1 - 7**
Add	**4C Cover**
Add	**4C-ii**
Add	**4C-1**
CHAPTER 5	
5.0-ii,iii	**5.0-ii,iii**
5.1-ii	**5.1-ii**
5.1-1,2	**5.1-1,2**
5.1-3,4	**5.1-3,4**
5.1-5,6	**5.1-5,6 Fig***
5.1-7,8	**5.1-7,8 Fig***
5.1-9	**5.1-9,9.1 Fig***
Add	**5.1-9.2,9.3 Fig***
Add	**5.1-9.4,9.5 Fig***
Add	**5.1-9.6 Fig***
5.1-10,11	**5.1-10,11**
5.2-ii,iii	**5.2-ii,iii**
5.2-iv,v	**5.2-iv,v**
5.2-vii,viii	**5.2-vii,viii**
5.2-ix	**5.2-ix**
5.2-1,2	**5.2-1,2**
5.2-3,4	**5.2-3,3.1**
Add	**5.2-4**
5.2-5,6	**5.2-5,6**
5.2-7,8	**5.2-7,8**
5.2-10	**5.2-10**

* These figures, 11x17 foldouts, are being sent under separate cover

ABWR SSAR

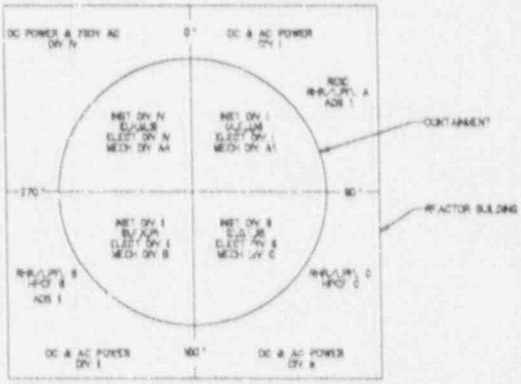
Amendment 15 - Page change instruction

The following pages 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 15.

REMOVE PAGE No.	ADD PAGE No.
5.2-12	5.2-**12**
5.2-13,14	5.2-**13,14**
5.2-15,15.1	5.2-**15,15.1**
5.2-16,17	5.2-**16,17**
5.2-17.1,17.2	5.2-**17.1,17.2**
5.2-18	5.2-**18**
5.2-19,20	5.2-**19,20**
5.2-21,22	5.2-**21,22**
5.2-23,24	5.2-**23,24**
5.2-25,26	5.2-**25,26**
5.2-27,28	5.2-**27,28**
5.2-28a	5.2-**28.1**
5.2-30	5.2-**30**
5.2-31,32	5.2-**31,32**
Add	5.2-**32.1**
5.2-33,34	5.2-**33,34**
5.2-35,36	5.2-**35,36**
5.2-37,38	5.2-**37,38**
5.2-41	5.2-**41**
5.2-42,43	5.2-**42,43**
5.2-44,45	5.2-**44,45** Fig*
5.2-46,47	5.2-**46,47** Fig*
5.2-48,49	5.2-**48,49** Fig*
5.2-50,51	5.2-**50,51** Fig*
Add	5.2-**52,53** Fig*
5.3-1,2	5.3-**1,2**
5.3-2.1	5.3-**2.1**
5.3-2a	--
5.3-3,4	5.3-**3,4**
5.3-5,6	5.3-**5,6**
5.3-6a	5.3-**6.1**
5.3-7,8	5.3-**7,8**
5.3-9,10	5.3-**9.10**
5.3-11,11a	5.3-**11,12**
5.3-12	--
5.3-13,14	5.3-**13,14**
5.4-ii,iii	5.4-**ii,iii**
5.4-vi,vii	5.4-**vi,vii**
5.4-1,2	5.4-**1,2**

REMOVE PAGE No.	ADD PAGE No.
5.4-3,4	5.4-**3,4**
5.4-5,5.1	5.4-**5,5.1**
5.4-6	5.4-**6**
5.4-7,7a	5.4-**7,7.1**
5.4-8	5.4-**8**
5.4-9,10	5.4-**9,10**
5.4-10a	5.4-**10.1**
5.4-11,12	5.4-**11,12**
5.4-13,14	5.4-**13,14**
5.4-14a	5.4-**14.1**
5.4-15,15a	5.4-**15,15.1**
5.4-16,16a	5.4-**16,16.1**
5.4-17,18	5.4-**17,18**
5.4-18a	5.4-**18.1**
5.4-19,20	5.4-**19,20**
5.4-21,21a	5.4-**21,21.1**
5.4-22,22a	5.4-**22,22.1**
5.4-23,24	5.4-**23,24**
5.4-25,26	5.4-**25,26**
5.4-27,28	5.4-**27,28**
5.4-29,30	5.4-**29,30**
5.4-31,31a	5.4-**31,31.1**
5.4-32	5.4-**32**
5.4-33,34	5.4-**33,34**
5.4-35,36	5.4-**35,36**
5.4-37,38	5.4-**37,38**
5.4-39,40	5.4-**39,40**
5.4-41,42	5.4-**41,42**
5.4-43	5.4-**43**
5.4-47,48	5.4-**47,47.1** Fig*
Add	5.4-**48** Fig*
5.4-49,50	5.4-**49,50**
5.4-51,52	5.4-**51,52** Fig*
Add	5.4-**52.1** Fig*
5.4-53,54	5.4-**53,54** Fig*
5.4-55,56	5.4-**55,56** Fig*
5.4-57,58	5.4-**57,58** Fig*
Add	5.4-**58.1,58.2** Fig*
Add	5.4-**58.3** Fig*
5.4-59,60	5.4-**59,60** Fig*
5.4-61,62	5.4-**61,62** Fig*
5.4-63,64	5.4-**63,64** Fig*

14 13 12 11 10



ORIENTATION OF THE NUCLEAR BOILER SYSTEM
INSTRUMENTS TO MEET SEPARATION REQUIREMENTS
(INCLUDES ASSOCIATED INSTRUMENT SUFFIX AND ECCS LOCATION)

NOTES

1. ENCLOSED EQUIPMENT A... THE OTHER STEAMLINES... UNLESS OTHERWISE NOT... EXAMPLE: ... EXAMPLE: ...

2. SEE REFERENCE DOCUM... FLANGE FOR THE SAFET...

3. PIPE SIZE SHOWN ON ... EXCEPT AT POINTS OF ... EQUIPMENT OR PIPING ... CHECK AND ADJUST PIP... HIS PIPING LAYOUT FOR... SYSTEM DESIGN SPECIF...

4. THE GLOBE VALVE ... SHUTOFF VALVE IS SUP... ... IF THE SECOND ... THE DESIGN ... LINE IS 87.9 KG/CM2 ...

5. TO BE CONNECTE... PIPE DOWNSTREA... DOWNSTREAM ST... GIVE AS ACCURA... FLANGE, TAPS... "STEAM TURBINE...

6. AN EXPANSION LEG SHAL... BETWEEN THE CONDENSIN... PENETRATION IN THE RE... AND PIPING INSTALLATIO... THE MAXIMUM CHANGE ... AVOID OVERSTRESSING ... THE INSULATION AROUND ... AT OR ABOVE THE CENT... THE INSTRUMENT LINE ... SHALL BE SLOPED CONT... AS SHORT AS PRACTICA... INSULATED FROM THE ... TO THE CONDENSING PO... CONDUCTANCE OF 0.00...

7. PROVISIONS FOR INSTRUM... BE IN ACCORDANCE WIT... ONE ORIFICE SHALL BE ... LINE CONNECTED TO THE ... BOUNDARY (RCPB). ONE ... MAXIMUM NUMBER OF OR...

8. VALVE MOTOR OPERATO... OPERATED UNLESS OTHE...

9. THE CONDENSING CHAMB... PIPE "TEE" AND EXTENS... COUPLED TO 50A REACT... 50A TO 40A REDUCER, ... IN THE HORIZONTAL PLA... THE 20A BRANCH CONNE... VERTICALLY AND EXTEND... A DOWNWARD SLOPE ... THE CONTAINMENT SHALL ... PENETRATING THE CONTA... BE REDUCED TO 20A ... THE 20A AND 50A PIPE ... MOVES WITH THE REACT... AND CONTRACTS, THERMA... ... INSTRUMENT NOZZLE BY ... CHAMBER TEES AND THE ... INSTRUMENTATION SHALL ...

AN ACCEPTABLE ALTERN... CONDENSING POT IN PLA... AND EXTENSION PIPE WIT...

10. LOCATE THE TEE AS CL... REACTOR VESSEL.

11. THE MAXIMUM OPERATING ... FOR THE PORTION OF TH... HEADER DOWNSTREAM OF ... VALVES F... AND F... ... AND ... TO BE ... OF THE MAIN CONDENSER...

12. LOCATE THE DRAIN LINE... EQUIPMENT FOR DETECT... AS PRACTICAL TO THE ...

13. FOR DETAILS, SEE ...

14. THERMAL SLEEVE IS SH... ACCOMMODATING ... STREAMS. OTHER ME... REQUIREMENTS MAY BE ...

15. SPRING CLOSING CHECK ... POSITION BY AIR PRESS... OTHER CHECK VALVE ... CLAMPS IS DESIGNED TO ... REVERSAL. F003 SHOUL... AUTOMATICALLY IN THE ...

16. TRANSITION FROM 350A ... BY THE PLANT ARRANGE...

17. THE LICENSING BASIS F... SEISMIC CLASS & THE ... DISCHARGE LINE IS SEISM...

18. THE SECTION OF SRV D... BOUNDARY TO BELOW T... IS SPECIFIED AS ... IS SHOWN AND ... IN SERVICE INSPECTION, ... NOT APPLICABLE AND ...

19. WHEN ALL FEEDWATER ... CONTROL VALVE ONE ... TO BE SHUT-OFF TO ... NOZZLES ON THE RPV ... MAY OSCILLATE BETWEE... OPEN CHECK VALVE.

20. ROUTE THE PIPE THROU... DRYWELL AND THE SRV ...

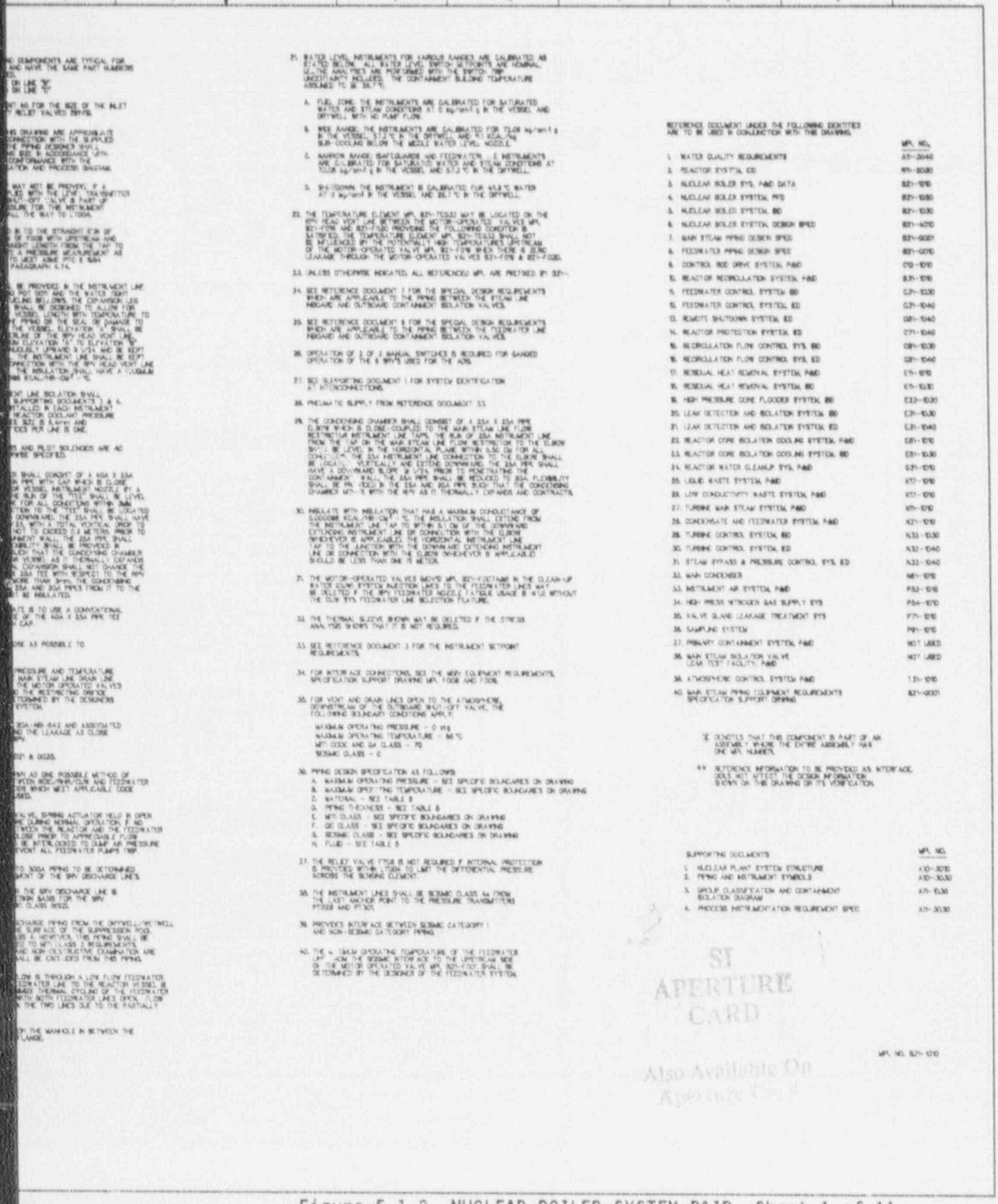


Figure 5.1-3 NUCLEAR BOILER SYSTEM P&ID, Sheet 1 of 11

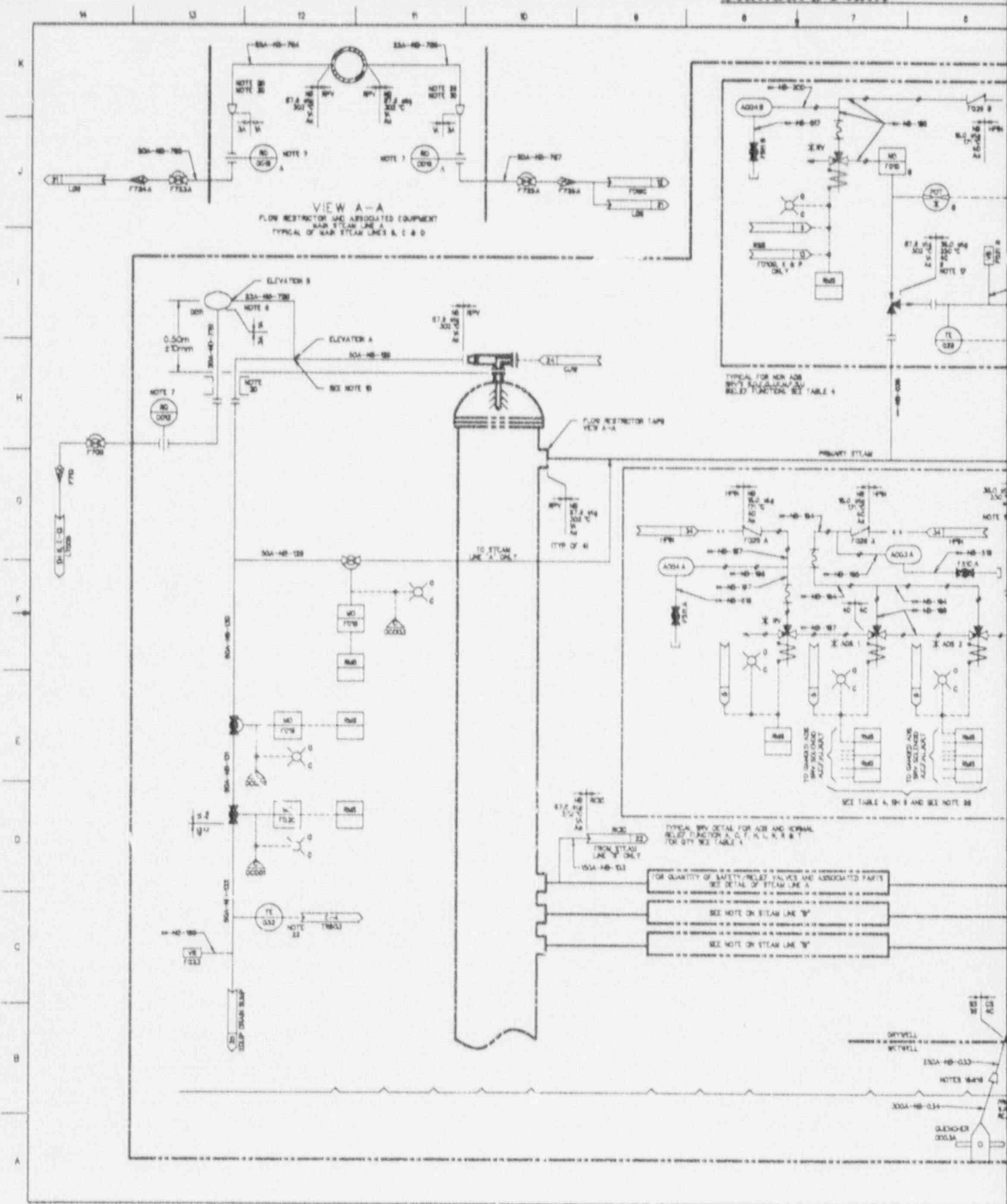
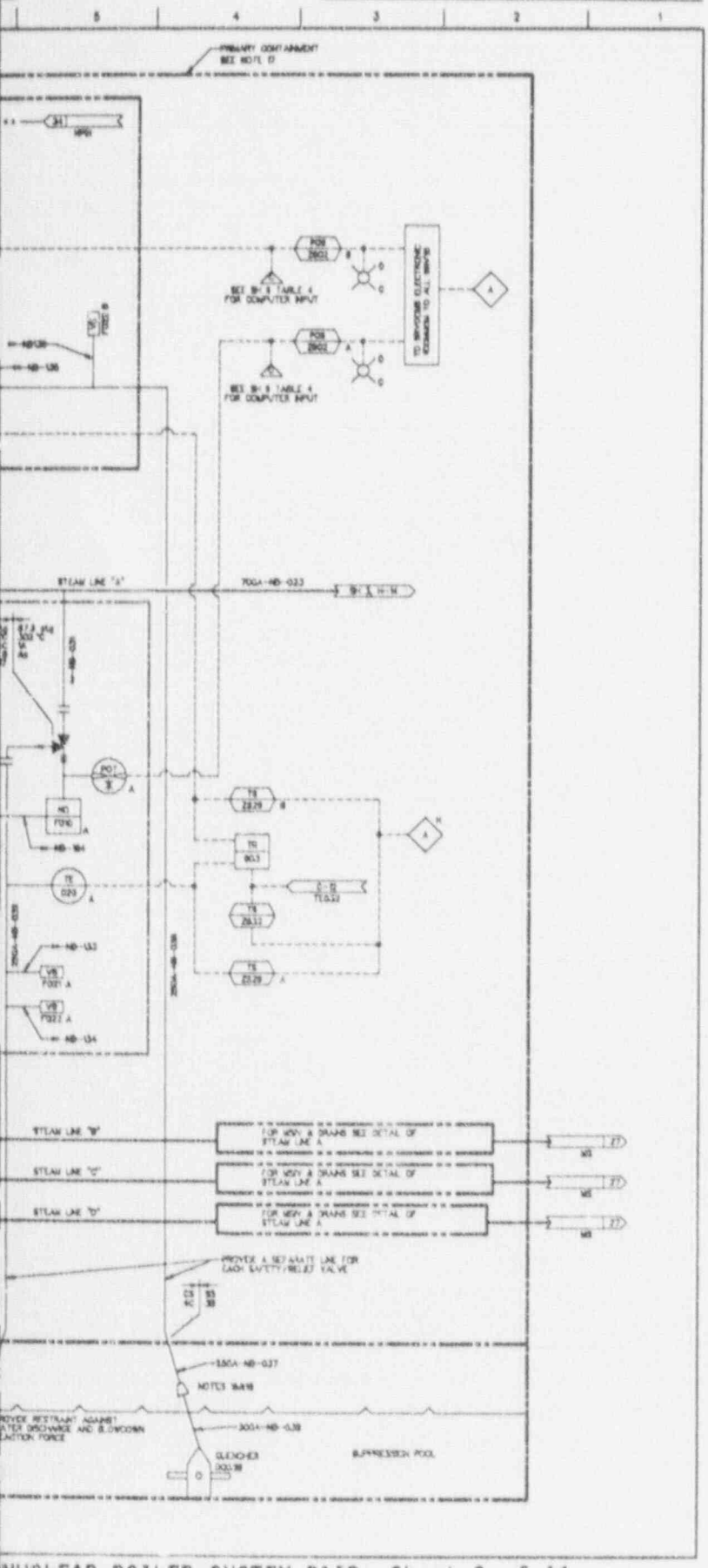
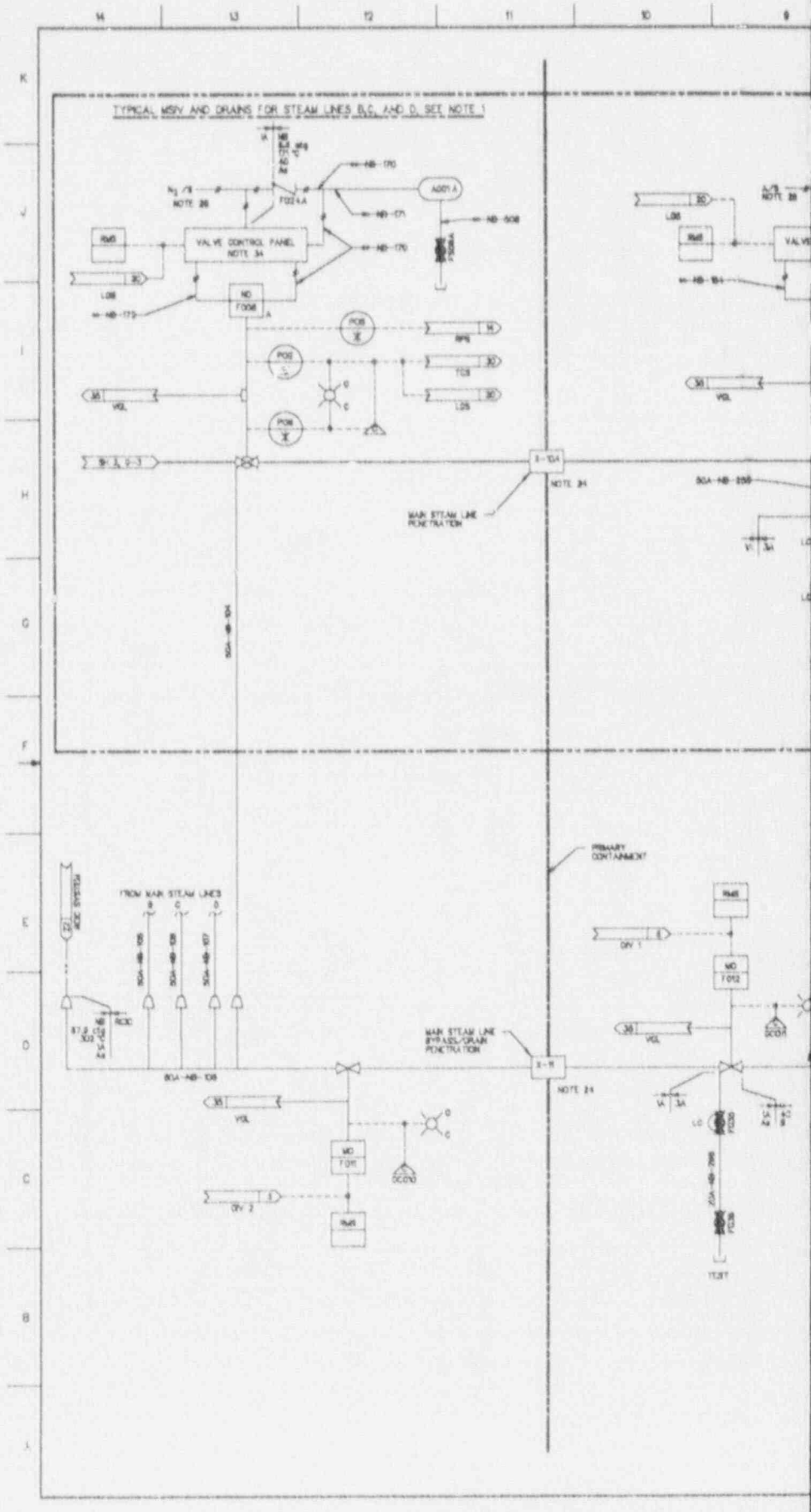

VIEW A-A
FLOW RESTRICTOR AND ASSOCIATED EQUIPMENT
MAIN STEAM LINE A
TYPICAL OF MAIN STEAM LINES B, C & D
ELEVATOR B
ELEVATOR A
FLOW RESTRICTOR TAPS
VIEW A-A
TYP OF 4
TO STEAM LINE A ONLY
TYPICAL FOR ADS AND NORMAL RELIEF FUNCTIONAL SEE TABLE A
PRIMARY STEAM
SEE TABLE A, SH 8 AND SEE NOTE 38
TYPICAL SRV DETAIL FOR ADS AND NORMAL RELIEF FUNCTION A, C, F, H, L, N & T FOR QTY SEE TABLE A
FROM STEAM LINE 'A' ONLY
FOR QUANTITY OF SAFETY RELIEF VALVES AND ASSOCIATED PARTS SEE DETAIL OF STEAM LINE A
SEE NOTE ON STEAM LINE 'B'
SEE NOTE ON STEAM LINE 'B'

Figure 5.1-3



NUCLEAR BOILER SYSTEM P&ID, Sheet 2 of 11


TYPICAL MSIV AND DRAINS FOR STEAM LINES B,C AND D, SEE NOTE 1
VALVE CONTROL PANEL
NOTE 34
MAIN STEAM LINE PENETRATION
NOTE 24
FROM MAIN STEAM LINES
PRIMARY CONTAINMENT
MAIN STEAM LINE BYPASS/DRAIN PENETRATION
DIV 1
DIV 2
TEST

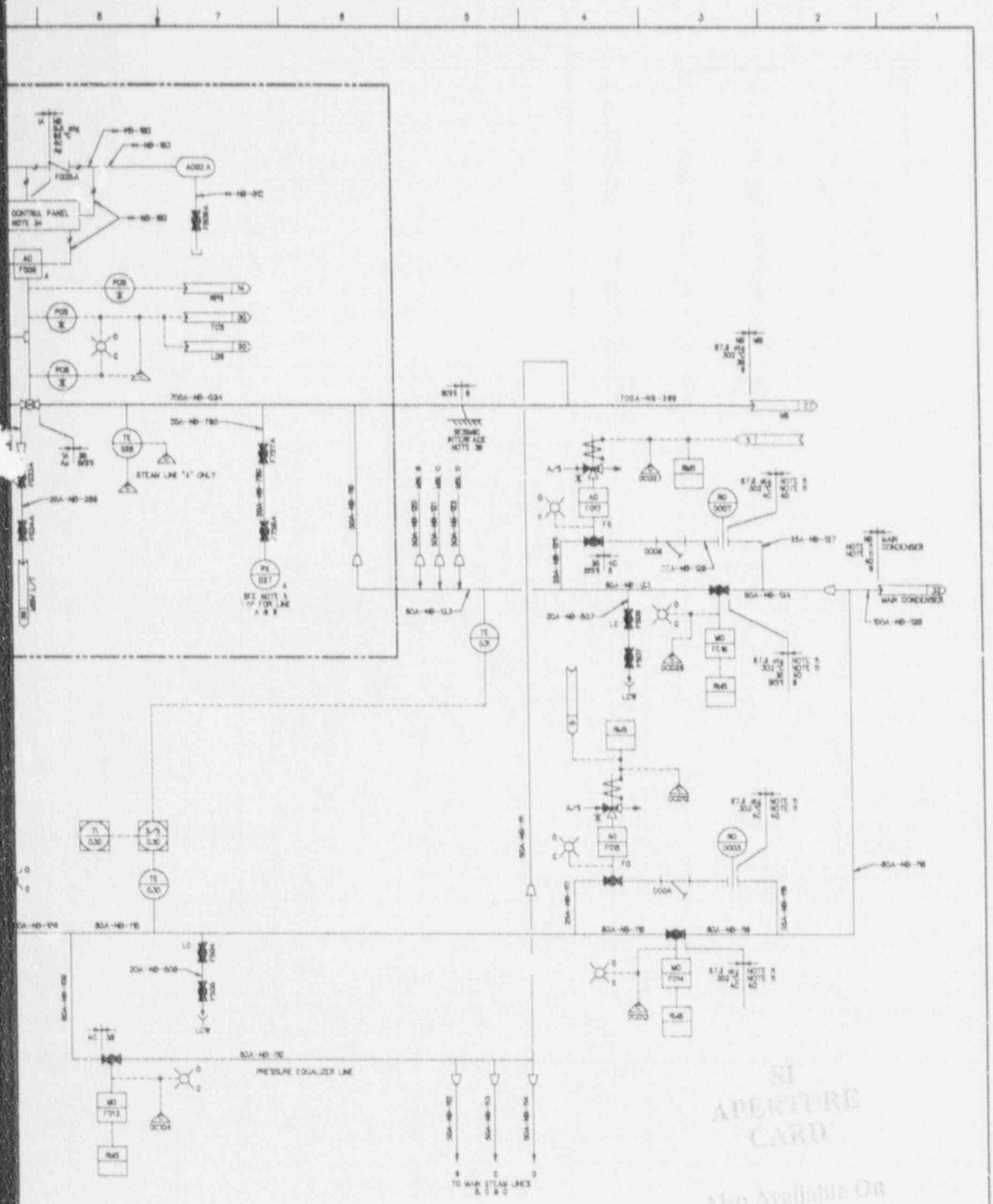
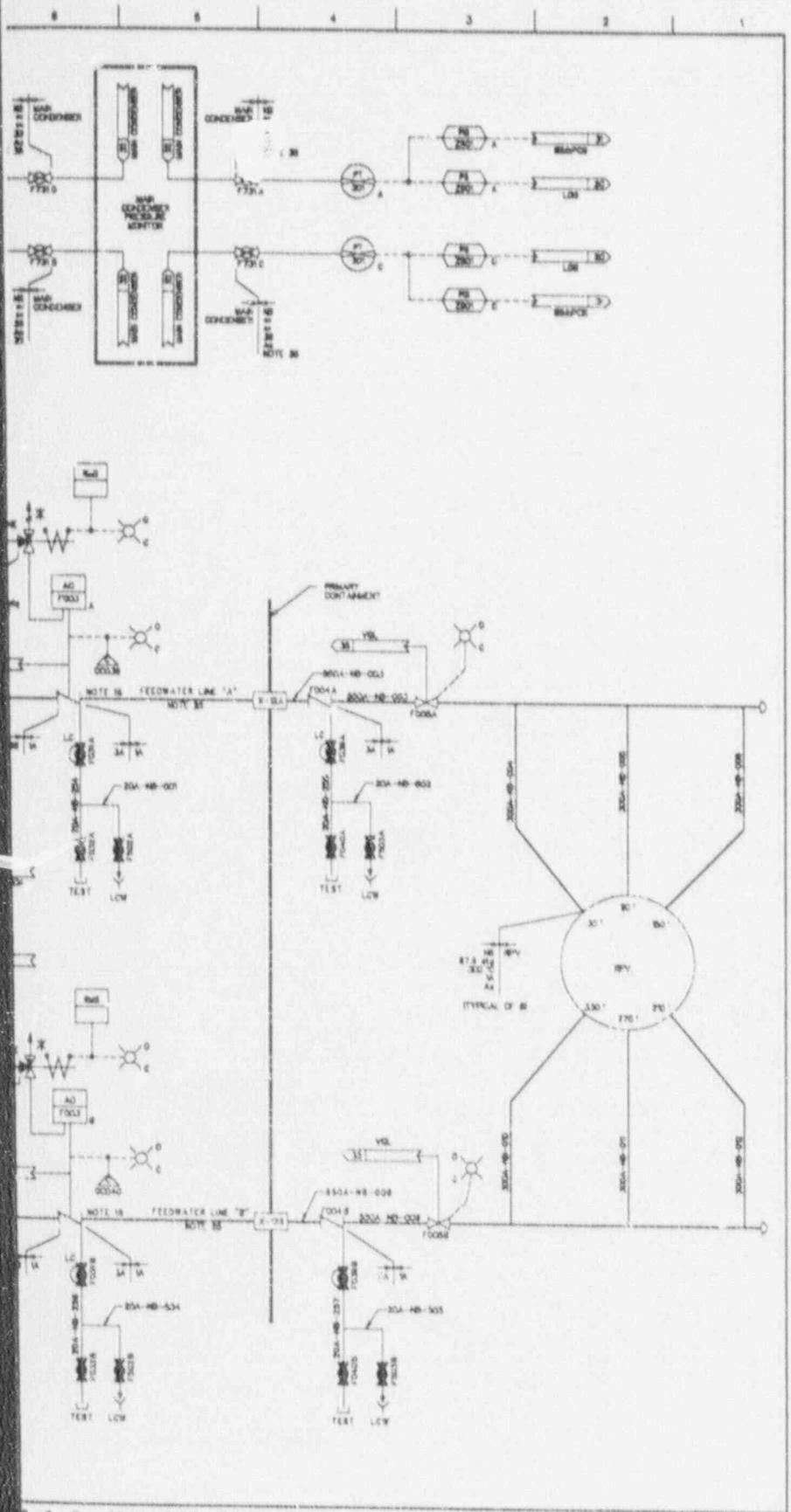
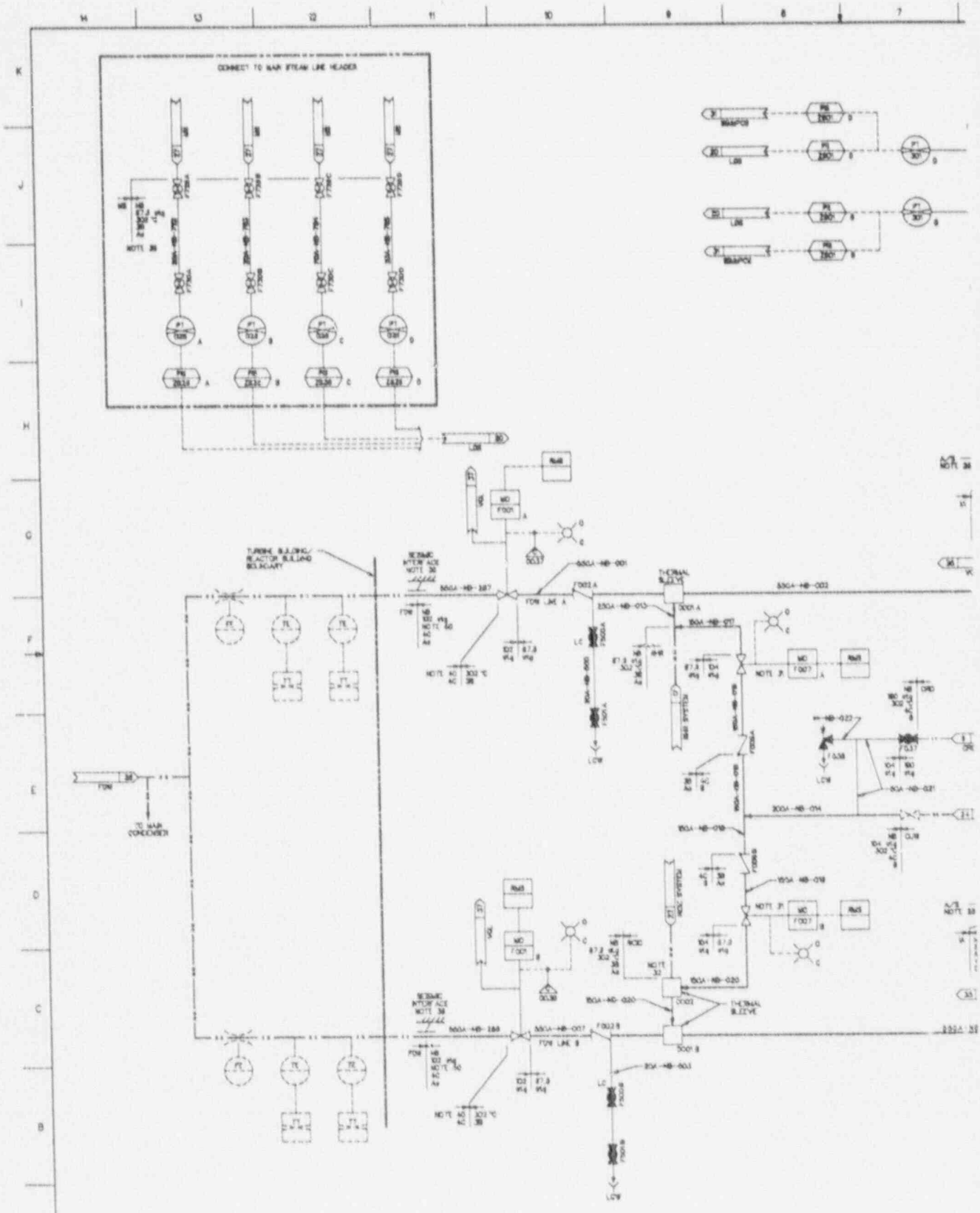


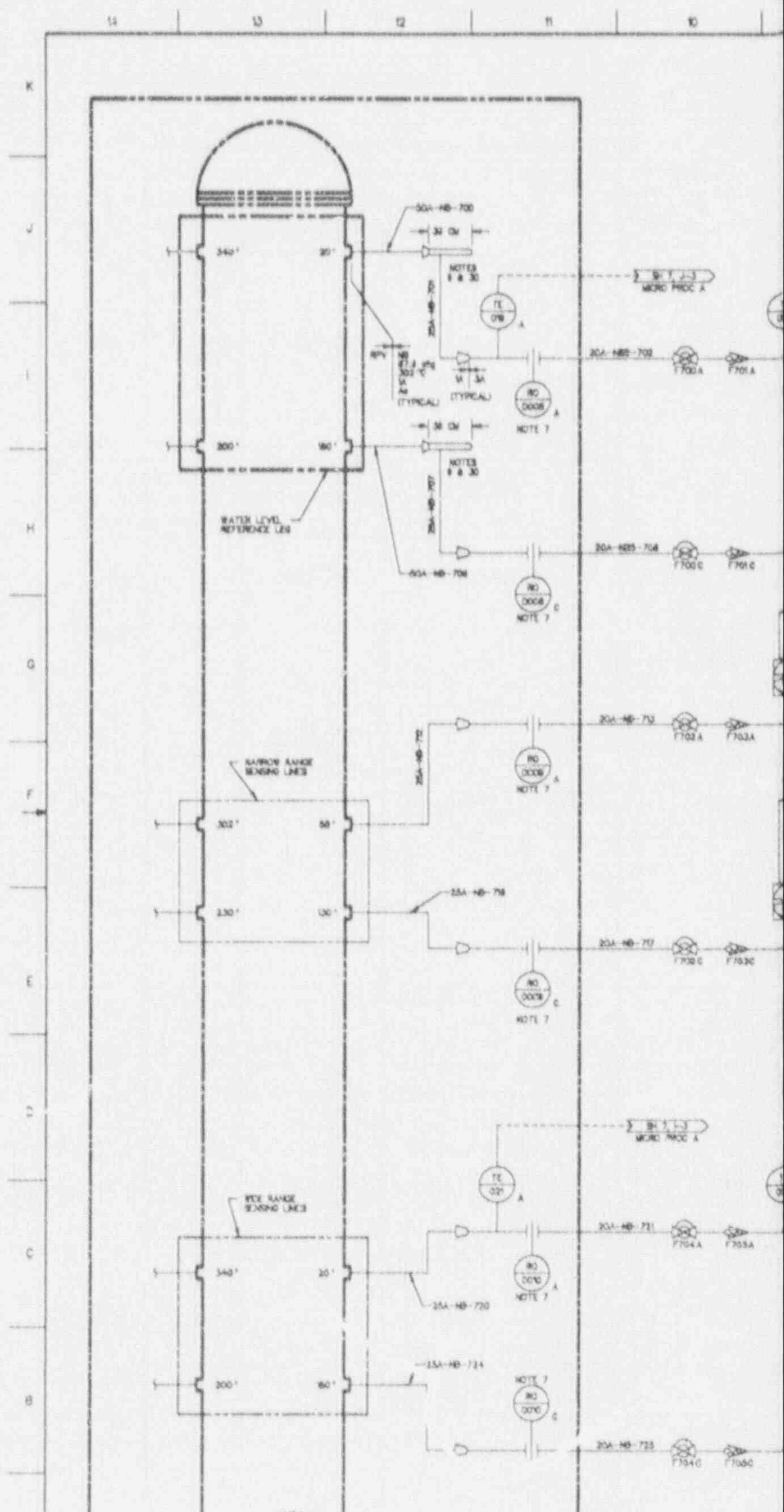
Figure 5.1-3 NUCLEAR BOILER SYSTEM P&ID, Sheet 3 of 11



6.1-3 NUCLEAR BOILER SYSTEM P&ID, Sheet 4 of 11



Figur



WATER LEVEL REFERENCE LEG
NARROW RANGE SENSING LINES
WIDE RANGE SENSING LINES
MICRO PROC A
NOTE 7
(TYPICAL)
20A-HB-702
20A-HB-708
20A-HB-713
20A-HB-717
20A-HB-721
20A-HB-725
25A-HB-720
25A-HB-724

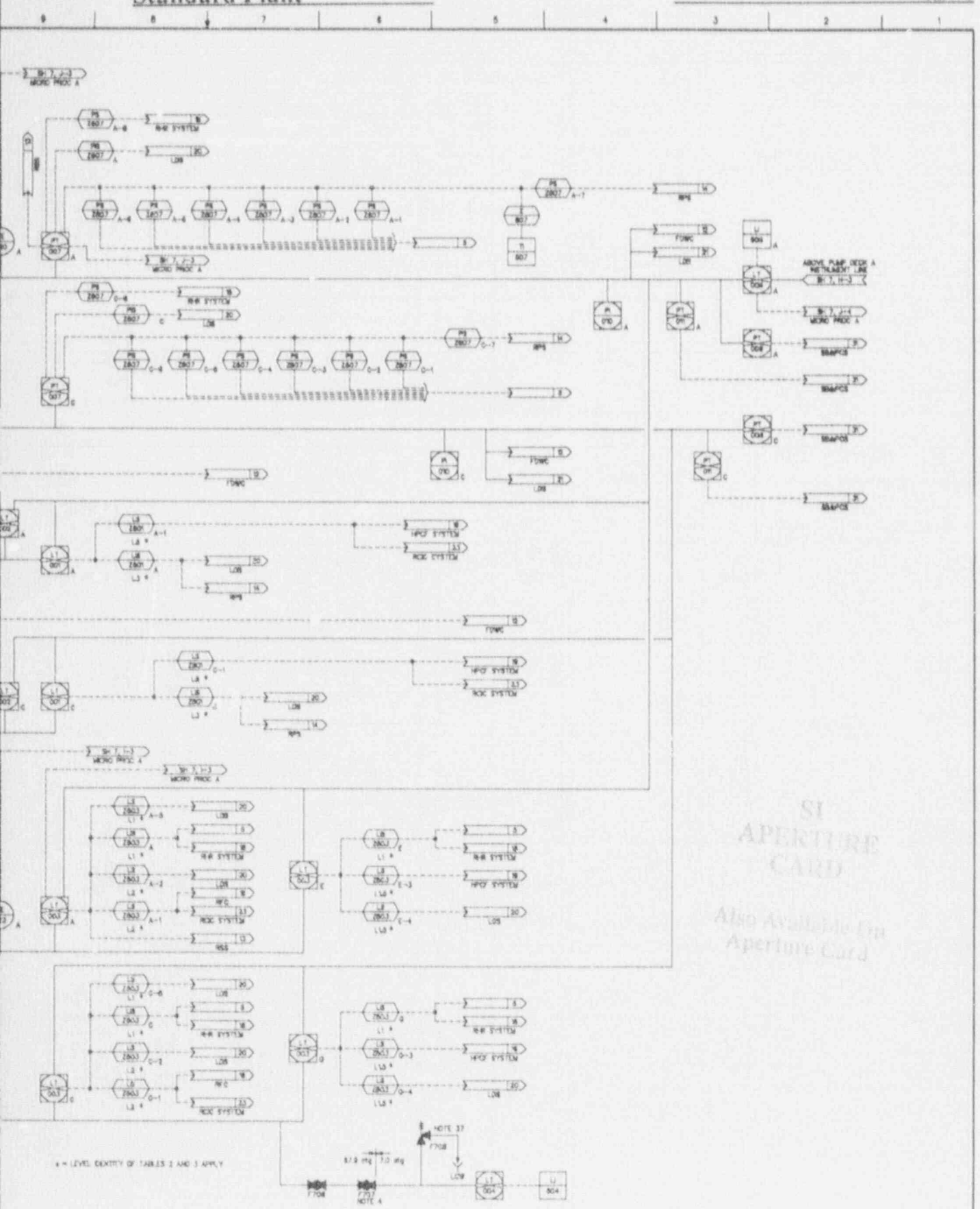


Figure 5.1-3 NUCLEAR BOILER SYSTEM P&ID, Sheet 5 of 11

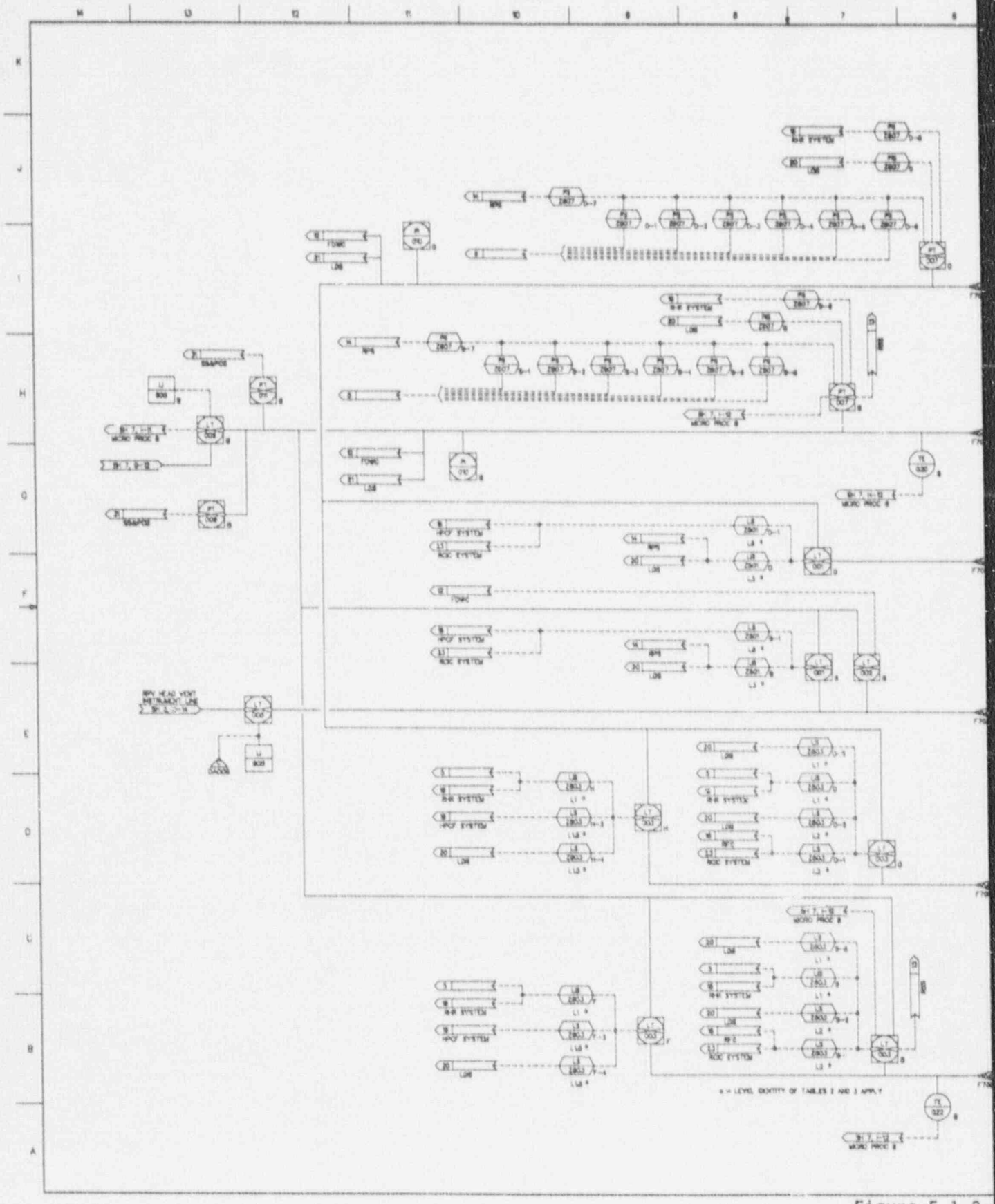
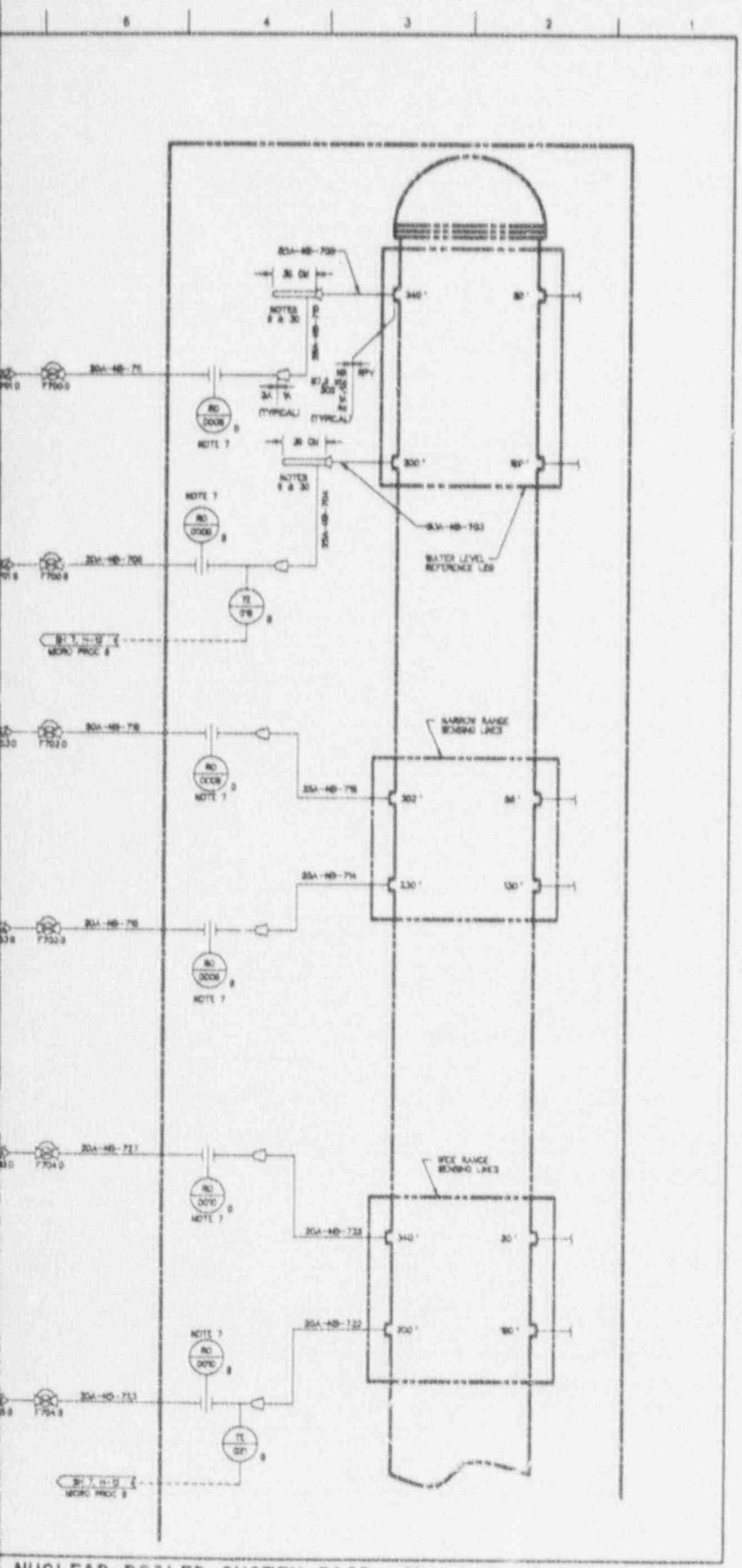
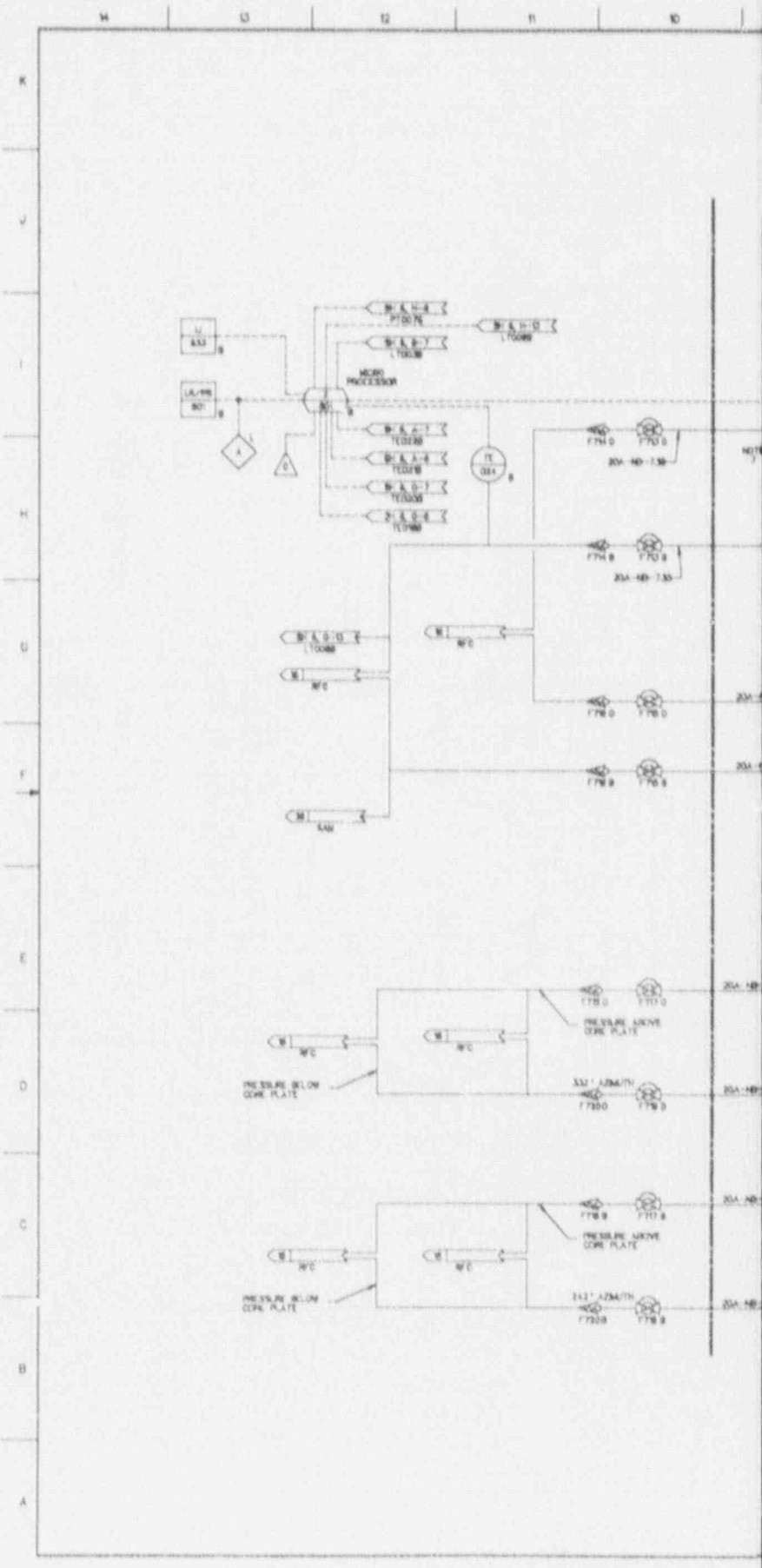


Figure 5.1-3



NUCLEAR BOILER SYSTEM P&ID, Sheet 6 of 11


14
13
12
11
10
K
J
I
H
G
F
E
D
C
B
A
MICRO PROCESSOR
PRESSURE RELIEF DOME PLATE
PRESSURE BELOW DOME PLATE

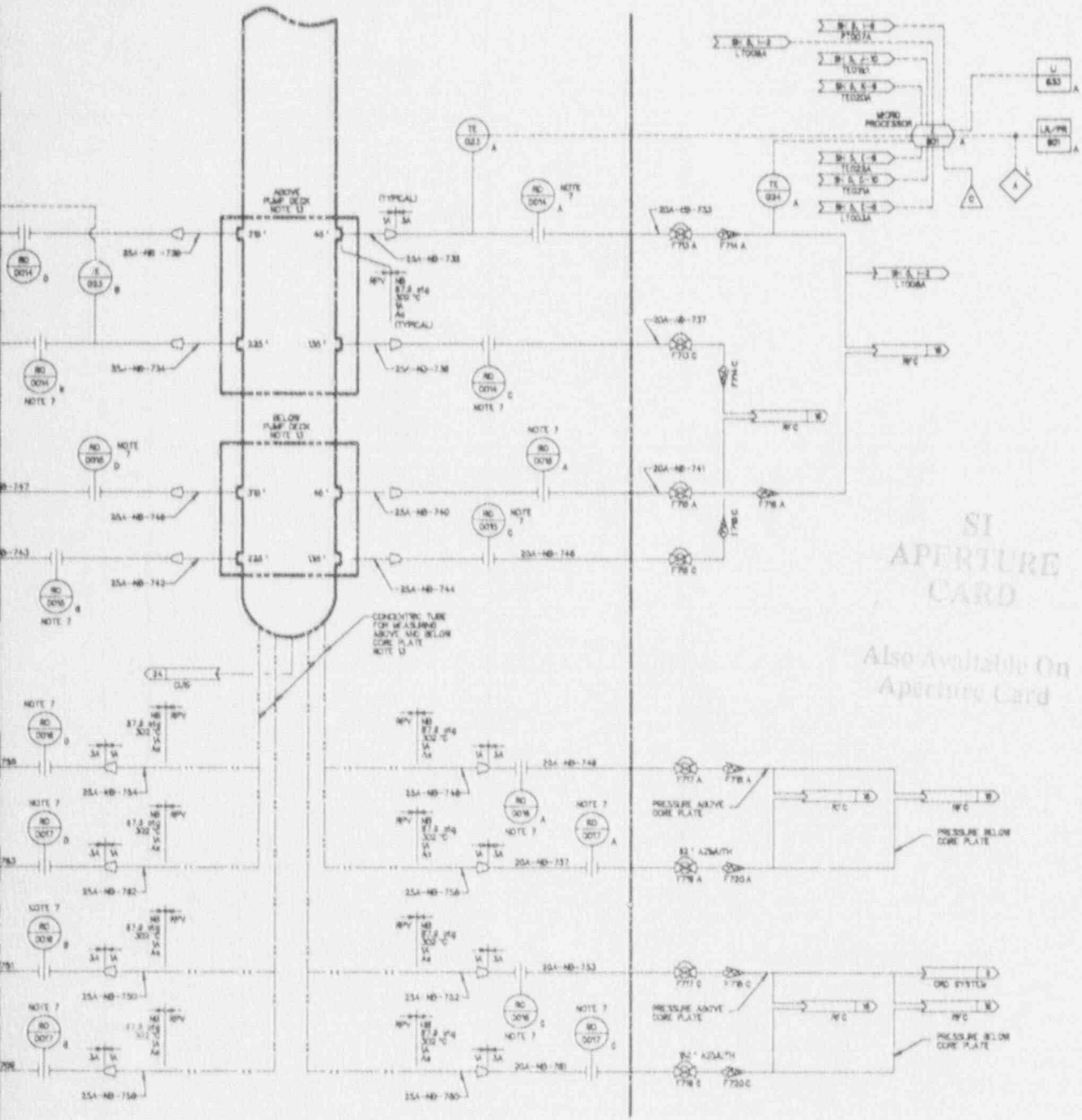


Figure 5.1-3 NUCLEAR BOILER SYSTEM P&ID, Sheet 7 of 11

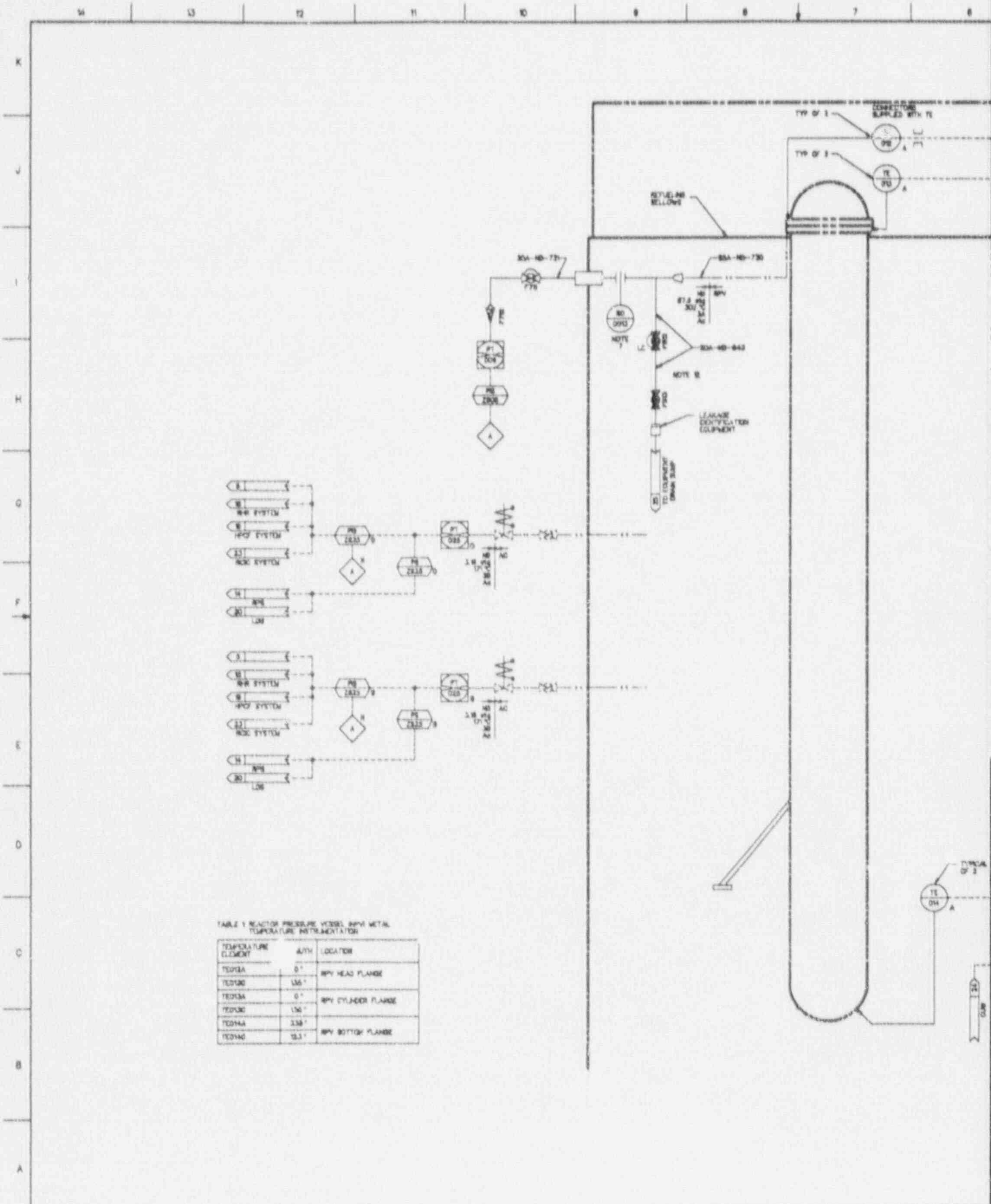
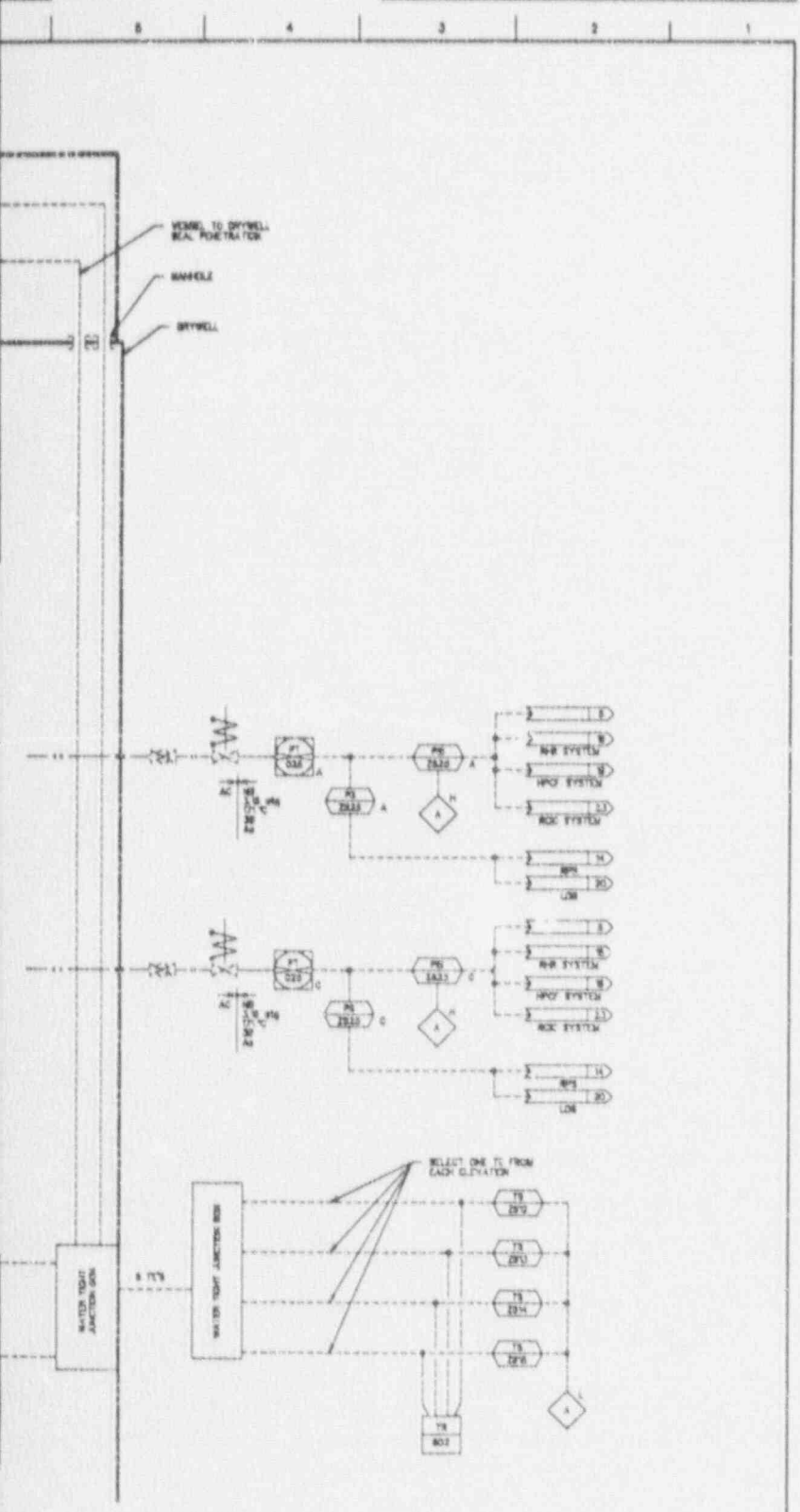


TABLE 1 REACTOR PRESSURE VESSEL (RPV) METAL TEMPERATURE INSTRUMENTATION

TEMPERATURE ELEMENT	AZIM	LOCATION
TE012A	0°	RPV HEAD FLANGE
TE012C	136°	
TE013A	0°	RPV CYLINDER FLANGE
TE013C	136°	
TE014A	338°	RPV BOTTOM FLANGE
TE014C	183°	

Figure 5.1-3



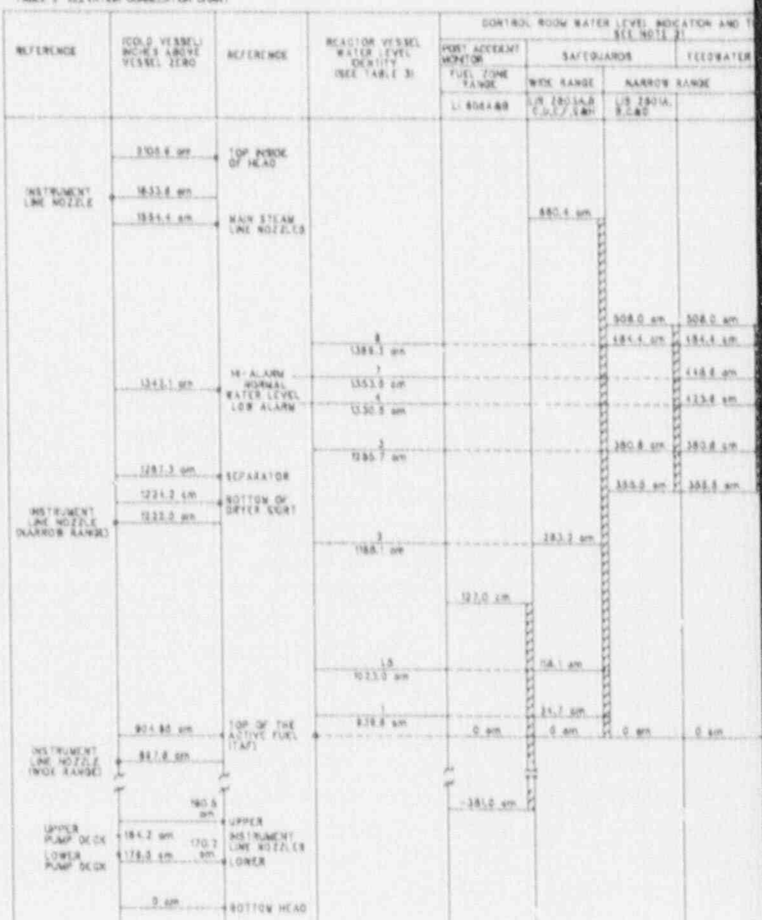
NUCLEAR BOILER SYSTEM P&ID, Sheet 8 of 11

TABLE 1: SUPPTD LETTER ASSIGNMENTS FOR SAFETY/RELIEF VALVES AND ASSOCIATED EQUIPMENT

SAFETY/RELIEF VALVE F010		P	J	M	G	S	B	K	E	U	D	N
TEMPERATURE ELEMENT TE028		P	J	M	G	S	B	K	E	U	D	N
SOLENOID VALVE	A106 1											N
	A106 2											N
	RV	P	J	M	G	S	B	K	E	U	D	N
ACCUMULATOR	A003											N
	A004	P	J	M	G	S	B	K	E	U	D	N
CHECK VALVE	F036											N
	F028	P	J	M	Q	S	B	K	E	V	D	N
BRV OPEN CLOSE MONITORING SYSTEM		P	J	M	Q	S	B	K	E	U	D	N
	COMPUTER INPUT △	NC041	NC042	NC043	NC044	NC045	NC046	NC047	NC048	NC049	NC050	NC051
* COMPUTER INPUT △		B21 NC023	B21 NC024	B21 NC025	B21 NC038	B21 NC027	B21 NC028	B21 NC029	B21 NC030	B21 NC031	B21 NC032	B21 NC033
SPRING SET PRESSURE (kg/cm² g)		80.8	80.8	81.5	81.5	81.5	81.5	82.2	82.2	82.2	82.2	82.9
SPRING RESEAT PRESSURE (kg/cm² g)		75.2	75.2	75.9	75.9	75.9	75.9	76.5	76.5	76.5	76.5	77.1
RELIEF SET PRESSURE (kg/cm² g)		76.5	77.3	78.0	78.0	78.0	78.0	78.7	78.7	78.7	78.7	79.4
RELIEF RESEAT PRESSURE (kg/cm² g)		71.4	72.1	72.8	72.8	72.8	72.8	73.5	73.5	73.5	73.5	74.2
	PT007A THRU D/ PS-2807A-8 THRU D-8	[illegible] OF A,B,C,D										
	PT007A THRU D/ PS-2807A-6 THRU D-6		[illegible] OF A,B,C,D									
	PT007A THRU D/ PS-2807A-4 THRU D-4			← [illegible] OF A,B,C,D →								
	PT007A THRU D/ PS-2807A-3 THRU D-3							← [illegible] OF A,B,C,D →				
	PT007A THRU D/ PS-2807A-2 THRU D-2											←
	PT007A THRU D/ PS-2807A-1 THRU D-1											

* COMPUTER INPUTS FOR BRV POSITION SEE PERFORMANCE MONITORING AND CONTROL SYSTEM C81-4010

TABLE 2 ELEVATION CORRELATION CHART



SI APERTURE CARD

Also Available On Aperture Card

9 8 7 6 5 4 3 2 1

H	T	C	L	F	B	A
NC032	NC033	NC054	NC056	NC056	NC057	NC058
B21 NC034	B21 NC035	B21 NC036	B21 NC037	B21 NC038	B21 NC039	B21 NC040
83.8	82.9	82.9	83.8	83.8	83.8	83.4
77.1	77.1	77.1	77.8	77.8	77.8	77.8
78.4	78.4	78.4	80.1	80.1	80.1	80.1
74.3	74.3	74.3	74.8	74.4	74.8	74.8

B2 OF A,B,C,D

B2 OF A,B,C,D

...IP LEVELS

SHUTDOWN	FOR ... USE
LI 605	LI 604
1282.9 cm	1800.0 cm
351.5 cm	
0 cm	0 cm

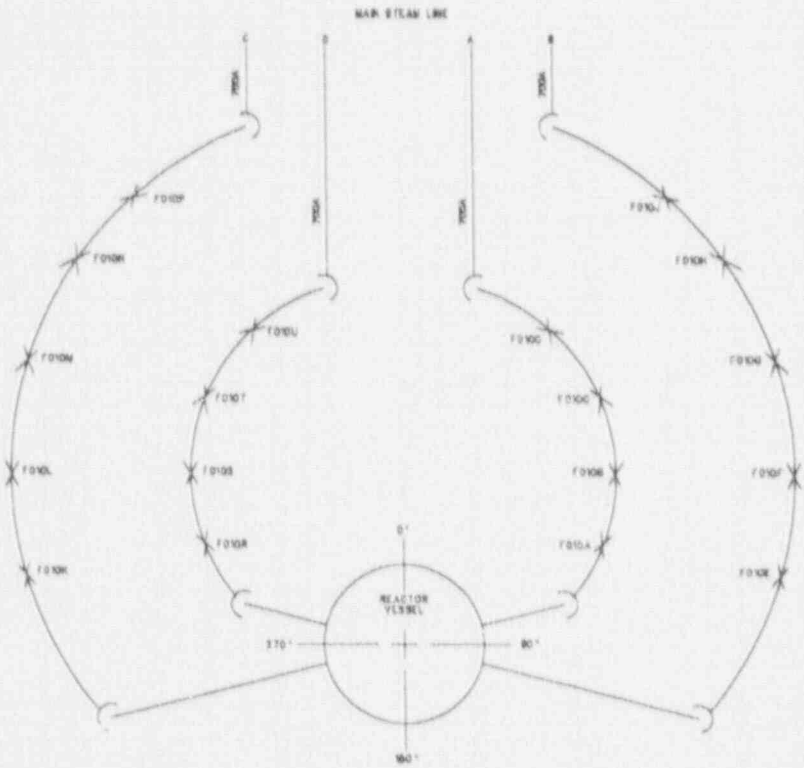


FIG. 3
SAFETY/RELIEF VALVE ORIENTATION
AND STEAM PIPING LINE SIZES

TABLE 3 WATER LEVEL TRIP FUNCTION

REACTOR VESSEL WATER LEVEL	DESCRIPTION OF TRIPS	INSTRUMENT PROVIDING TRIP SIGNAL	NOTES
8	TRIPS RCIC TURBINE	LS-B21-N... (LS-2801A-1 THRU D-1)	NARROW RANGE
	TRIP HPCF INJECTION VALVES	LS-2801A-1 THRU D-1	NARROW RANGE
	CLOSE MAIN TURBINE STOP VALVES TRIPS FEEDWATER PUMPS	SEE REFERENCE DOCUMENT 12	NARROW RANGE
7	HIGH LEVEL ALARM	SEE REFERENCE DOCUMENT 12	NARROW RANGE
4	LOW LEVEL ALARM RIPS FLOW RUN BACK ON TRIP OF FEED PUMPS		NARROW RANGE
3	SCRAMS REACTOR	LS-2801A THRU D	NARROW RANGE
	CLOSE RHR SHUTDOWN COOLING ISOLATION VALVES	LS-2801A THRU D	NARROW RANGE
	CLOSE CONTAINMENT ISOL VALVES LDS EXCEPT DW COOLING AND CUW ISOL VALVES AND MSIV'S	LS-2801A THRU D	NARROW RANGE
	TRIP 4 OF RIPS PUMPS	SEE REFERENCE DOCUMENT 12	NARROW RANGE
2	INITIATES RCIC	LS-2803A-1 THRU D-1	WIDE RANGE
	TRIP REMAINING 6 RIPS PUMPS	LS-2803A-1 THRU D-1	WIDE RANGE
	CLOSE CUW ISOL VALVES	LS-2803A-2 THRU D-2	WIDE RANGE
1.5	INITIATES HPCF B & C	LS-2803E-3 THRU H-3	WIDE RANGE
	CLOSE MSIV'S & DW COOLING SYSTEM ISOL VALVES	LS-2803E-4 THRU H-4	WIDE RANGE
1	INITIATES ADS (WITH CONCURRENT HIGH DRYWELL PRESSURE)	LS-2803A THRU H	WIDE RANGE
	INITIATES RHR/LPFL MODE	LS-2803A THRU H	WIDE RANGE

Figure 5.1-3 NUCLEAR BOILER SYSTEM P&ID, Sheet 9 of 11

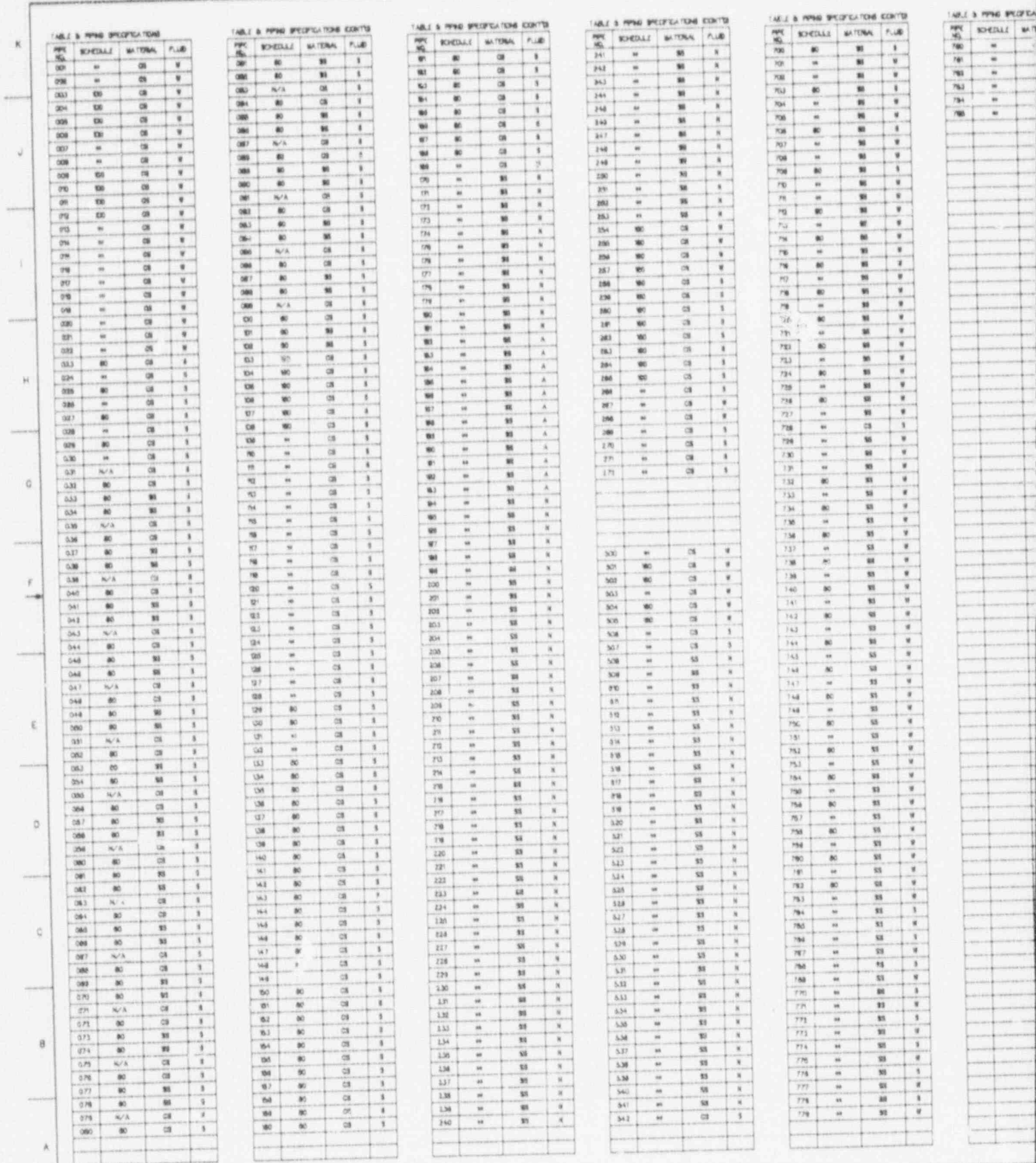
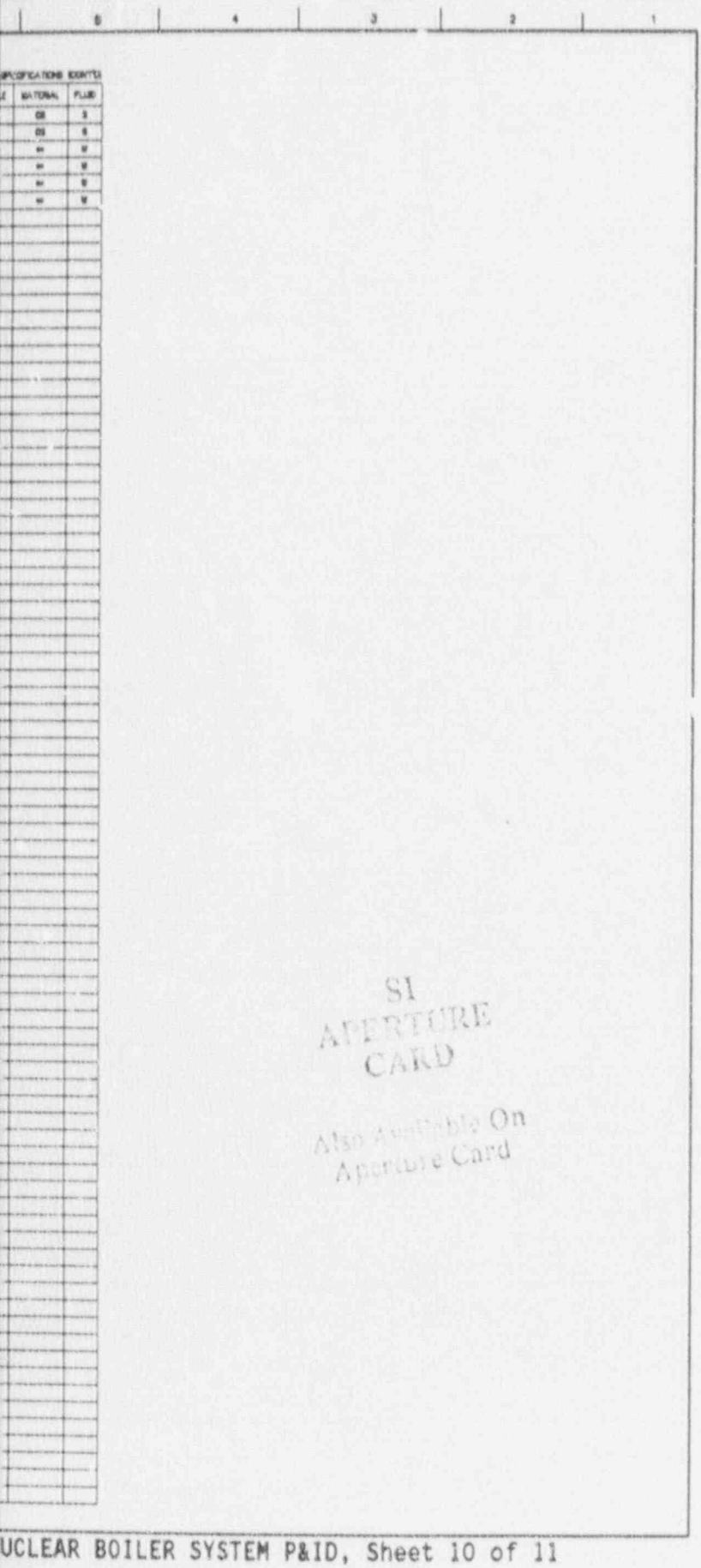


Figure 5.1-3 N



UCLEAR BOILER SYSTEM P&ID, Sheet 10 of 11

TABLE 6 : PIPE NUMBERS FOR THE MAIN STEAM LINES

MAIN STEAM LINE	MSV TO THE OUTBOARD MSIV	OUTBOARD MSIV TO BIOMIC MITIGATE	BIOMIC MITIGATE TO MAIN STEAM SYSTEM	OUTBOARD MSIV TEST LINE	
				OUTBOARD MSIV TO REDUCER	DOWNSTREAM OF REDUCER
A	700A-MB-023	700A-MB-024	700A-MB-286	50A-MB-284	30A-MB-284
B	700A-MB-025	700A-MB-026	700A-MB-270	50A-MB-280	30A-MB-281
C	700A-MB-027	700A-MB-028	700A-MB-271	50A-MB-282	30A-MB-283
D	700A-MB-029	700A-MB-030	700A-MB-272	50A-MB-284	30A-MB-285

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

SRV	SRV DISCHARGE LINE				VACUUM BREAKER LINES	
	MSL TO SRV NOTE 2	SRV TO DIAPHRAGM FLOOR	DIAPHRAGM FLOOR TO REDUCER	REDUCER TO QUENCHER	UPSTREAM	DOWNSTREAM
F010A	150A-MB-031	250A-MB-032	250A-MB-033	300A-MB-034	200A-MB-133	250A-MB-134
F010B	150A-MB-035	250A-MB-036	250A-MB-037	300A-MB-038	200A-MB-135	250A-MB-136
F010C	150A-MB-039	250A-MB-040	250A-MB-041	300A-MB-042	200A-MB-137	250A-MB-138
F010D	150A-MB-043	250A-MB-044	250A-MB-045	300A-MB-046	200A-MB-139	250A-MB-140
F010E	150A-MB-047	250A-MB-048	250A-MB-049	300A-MB-050	200A-MB-141	250A-MB-142
F010F	150A-MB-051	250A-MB-052	250A-MB-053	300A-MB-054	200A-MB-143	250A-MB-144
F010G	150A-MB-055	250A-MB-056	250A-MB-057	300A-MB-058	200A-MB-145	250A-MB-146
F010H	150A-MB-059	250A-MB-060	250A-MB-061	300A-MB-062	200A-MB-147	250A-MB-148
F010J	150A-MB-063	250A-MB-064	250A-MB-065	300A-MB-066	200A-MB-149	250A-MB-150
F010K	150A-MB-067	250A-MB-068	250A-MB-069	300A-MB-070	200A-MB-151	250A-MB-152
F010L	150A-MB-071	250A-MB-072	250A-MB-073	300A-MB-074	200A-MB-153	250A-MB-154
F010M	150A-MB-075	250A-MB-076	250A-MB-077	300A-MB-078	200A-MB-155	250A-MB-156
F010N	150A-MB-079	250A-MB-080	250A-MB-081	300A-MB-082	200A-MB-157	250A-MB-158
F010P	150A-MB-083	250A-MB-084	250A-MB-085	300A-MB-086	200A-MB-159	250A-MB-160
F010R	150A-MB-087	250A-MB-088	250A-MB-089	300A-MB-090	200A-MB-161	250A-MB-162
F010S	150A-MB-091	250A-MB-092	250A-MB-093	300A-MB-094	200A-MB-163	250A-MB-164
F010T	150A-MB-095	250A-MB-096	250A-MB-097	300A-MB-098	200A-MB-165	250A-MB-166
F010U	150A-MB-099	250A-MB-100	250A-MB-101	300A-MB-102	200A-MB-167	250A-MB-168

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

MSIV	OPENING-CHECK VALVE TO MSIV	OPENING-FROM ACCUMULATOR	CLOSING-VALVE CONTROL PANEL TO MSIV	VENT LINE
F008A	** MB-170	** MB-171	** MB-172	** MB-508
F008B	** MB-173	** MB-174	** MB-175	** MB-509
F008C	** MB-176	** MB-177	** MB-178	** MB-510
F008D	** MB-179	** MB-180	** MB-181	** MB-511
F008A	** MB-182	** MB-183	** MB-184	** MB-512
F008B	** MB-185	** MB-186	** MB-187	** MB-513
F008C	** MB-188	** MB-189	** MB-190	** MB-514
F008D	** MB-191	** MB-192	** MB-193	** MB-515

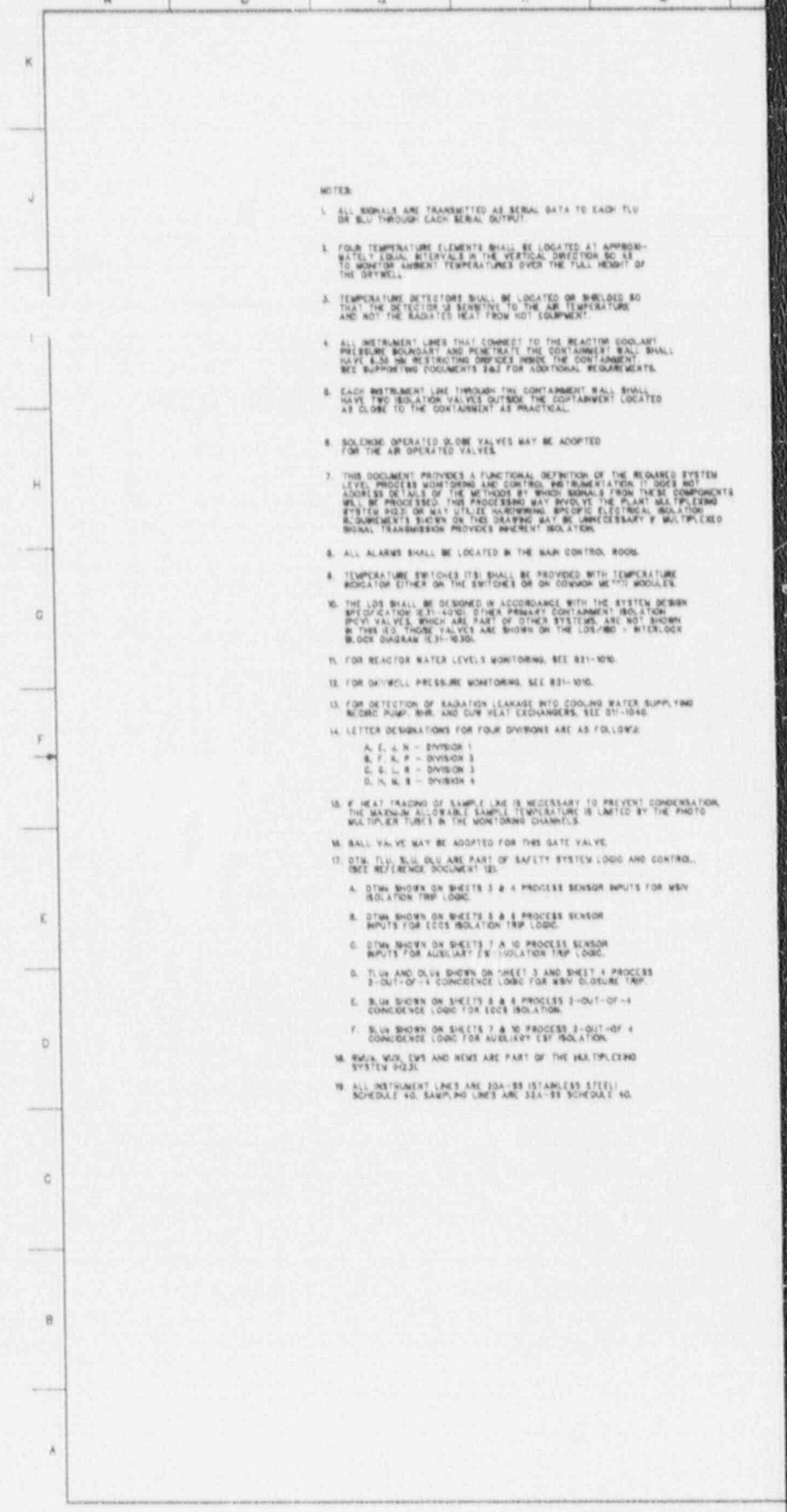
TABLE 10 : PIPE NUMBERS FOR THE MAIN STEAM LINE (MSL) INSTRUMENT LINES

MAIN STEAM LINE	MSL FLOW RESTRICTOR INSTRUMENT LINES				MSL PRESSURE TEST POINT
	INSTRUMENT LINE TO LDS		INSTRUMENT LINE TO LDS & FDWC		
	MSL TO REDUCER	REDUCER TO EXCESS FLOW CHECK VALVE	MSL TO REDUCER	REDUCER TO EXCESS FLOW CHECK VALVE	
A	25A-NB-764	20A-NB-765	25A-NB-766	20A-NB-767	20A-NB-780
B	25A-NB-768	20A-NB-769	25A-NB-770	20A-NB-771	20A-NB-781
C	25A-NB-772	20A-NB-773	25A-NB-774	20A-NB-775	-
D	25A-NB-776	20A-NB-777	25A-NB-778	20A-NB-779	-

TABLE 9 : 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 2" TO SRV	BRANCH LINE FROM ACCUMULATOR	BRANCH LINE THRU SOV "ADS 1" TO SOV "ADS 2"	ACCUMULATOR VENT LINE	CHECK VALVE TO SOV "ADS 1" (ADS SRV) OR SRV (NON-ADS SRV)	BRANCH LINE FROM ACCUMULATOR	ACCUMULATOR VENT LINE
F010A	**-NB-194	**-NB-195	**-NB-196	**-NB-616	**-NB-197	**-NB-198	**-NB-617
F010B					**-NB-199	**-NB-200	**-NB-618
F010C	**-NB-201	**-NB-202	**-NB-203	**-NB-619	**-NB-204	**-NB-205	**-NB-620
F010D					**-NB-206	**-NB-207	**-NB-621
F010E					**-NB-208	**-NB-[illegible]	**-NB-622
F010F	**-NB-210	**-NB-211	**-NB-212	**-NB-623	**-NB-213	**-NB-214	**-NB-624
F010G					**-NB-215	**-NB-216	**-NB-625
F010H	**-NB-217	**-NB-218	**-NB-219	**-NB-626	**-NB-220	**-NB-221	**-NB-627
F010J					**-NB-222	**-NB-223	**-NB-628
F010K					**-NB-224	**-NB-225	**-NB-629
F010L	**-NB-226	**-NB-227	**-NB-228	**-NB-630	**-NB-229	**-NB-230	**-NB-631
F010M					**-NB-231	**-NB-232	**-NB-632
F010N	**-NB-233	**-NB-234	**-NB-[illegible]	**-NB-633	**-NB-236	**-NB-237	**-NB-634
F010P					**-NB-238	**-NB-239	**-NB-635
F010R	**-NB-240	**-NB-241	**-NB-242	**-NB-636	**-NB-243	**-NB-244	**-NB-637
F010S					**-NB-245	**-NB-248	**-NB-638
F010T	**-NB-247	**-NB-248	**-NB-249	**-NB-639	**-NB-250	**-NB-251	**-NB-640
F010U					**-NB-252	**-NB-253	**-NB-641

Figure 5.1-3 NUCLEAR BOILER SYSTEM P&ID, Sheet 11 of 11



NOTES:

1. ALL SIGNALS ARE TRANSMITTED AS SERIAL DATA TO EACH TLU OR SLU THROUGH EACH SERIAL 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 6.56 MM RESTRICTING ORIFICES INSIDE THE CONTAINMENT. SEE SUPPORTING DOCUMENTS 2&3 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 GLOBE VALVES MAY BE ADOPTED FOR THE AIR OPERATED VALVES.

7. THIS DOCUMENT 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 COMPONENTS WILL BE PROCESSED. THIS PROCESSING MAY INVOLVE THE PLANT MULTIPLEXING SYSTEM 9423 OR MAY UTILIZE HARDWIRING. 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. TEMPERATURE SWITCHES (TS) SHALL BE PROVIDED WITH TEMPERATURE INDICATOR EITHER ON THE SWITCHES OR ON COMMON MCC'S MODULES.

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

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

12. FOR DRYWELL PRESSURE MONITORING, SEE B21-1010.

13. FOR DETECTION OF RADIATION LEAKAGE INTO COOLING WATER SUPPLYING RECIRC PUMP, RHR, AND CUW HEAT EXCHANGERS, SEE D11-1040.

14. LETTER DESIGNATIONS FOR FOUR DIVISIONS ARE AS FOLLOWS:

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

15. IF HEAT TRACING OF SAMPLE LINE IS NECESSARY TO PREVENT CONDENSATION, THE MAXIMUM ALLOWABLE SAMPLE TEMPERATURE IS LIMITED BY THE PHOTO MULTIPLIER TUBES IN THE MONITORING CHANNELS.

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

17. DTA, TLU, SLU, OLU ARE PART OF SAFETY SYSTEM LOGIC AND CONTROL. (SEE REFERENCE DOCUMENT 12).

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

    B. DTAs SHOWN ON SHEETS 3 & 4 PROCESS SENSOR INPUTS FOR ECCS ISOLATION TRIP LOGIC.

    C. DTAs SHOWN ON SHEETS 7 & 10 PROCESS SENSOR INPUTS FOR AUXILIARY F/W 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. SLUs SHOWN ON SHEETS 3 & 4 PROCESS 2-OUT-OF-4 COINCIDENCE LOGIC FOR ECCS ISOLATION.

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

18. RMUs, MUX, EWS AND NEMS ARE PART OF THE MULTIPLEXING SYSTEM 9423.

19. ALL INSTRUMENT LINES ARE 33A-SS (STAINLESS STEEL) SCHEDULE 40. SAMPLING LINES ARE 33A-SS SCHEDULE 40.

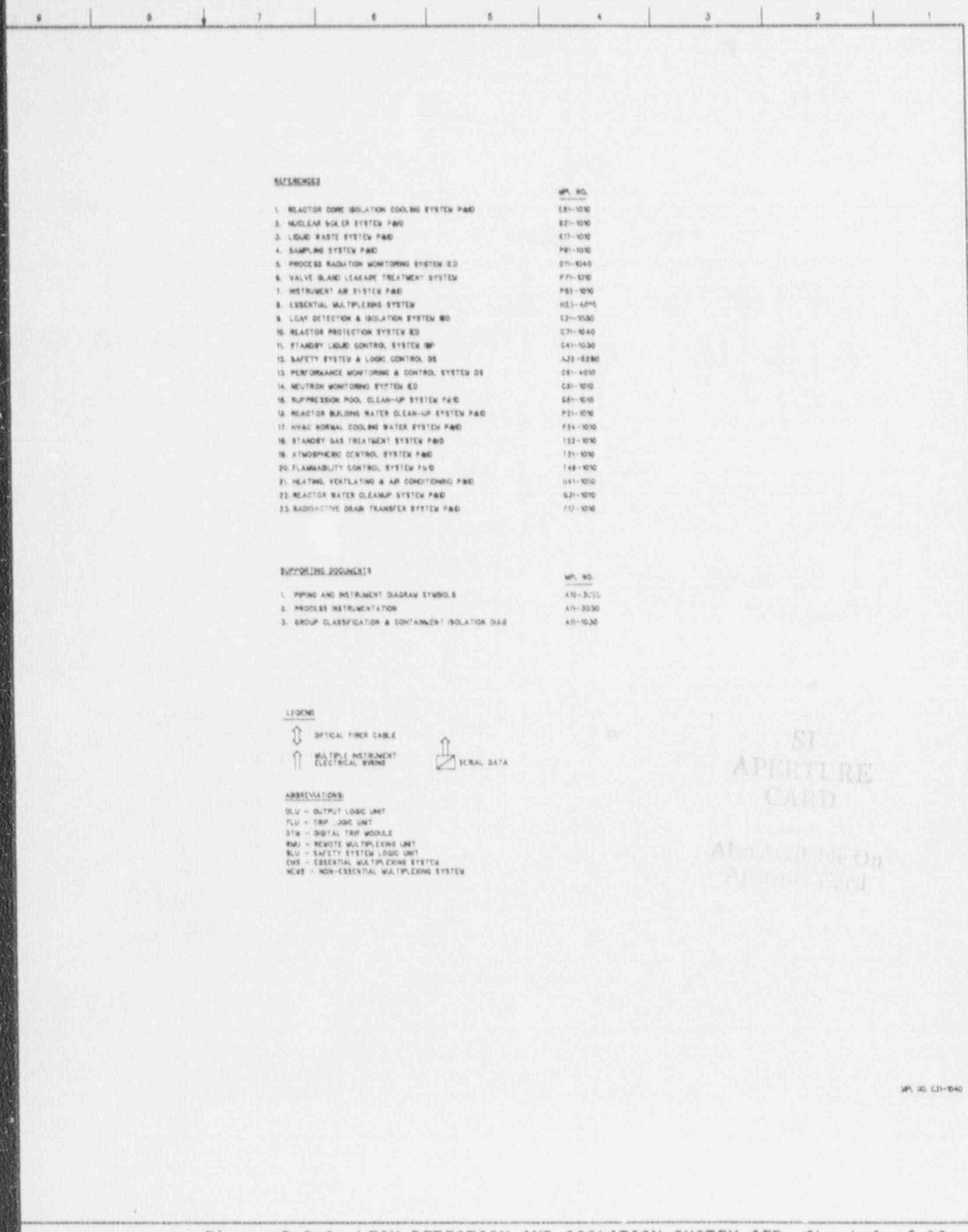


Figure 5.2-8 LEAK DETECTION AND ISOLATION SYSTEM IED, Sheet 1 of 10

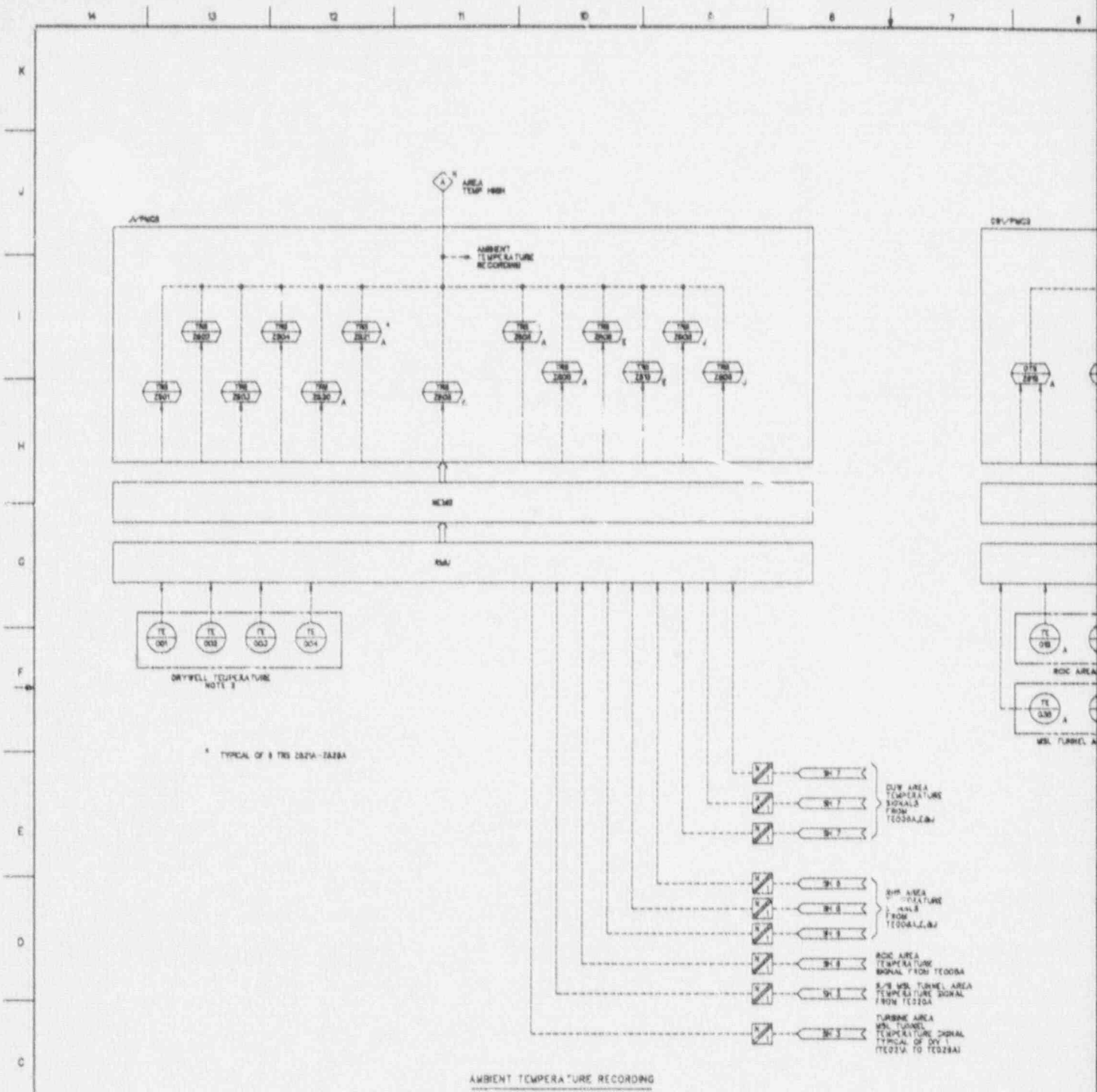
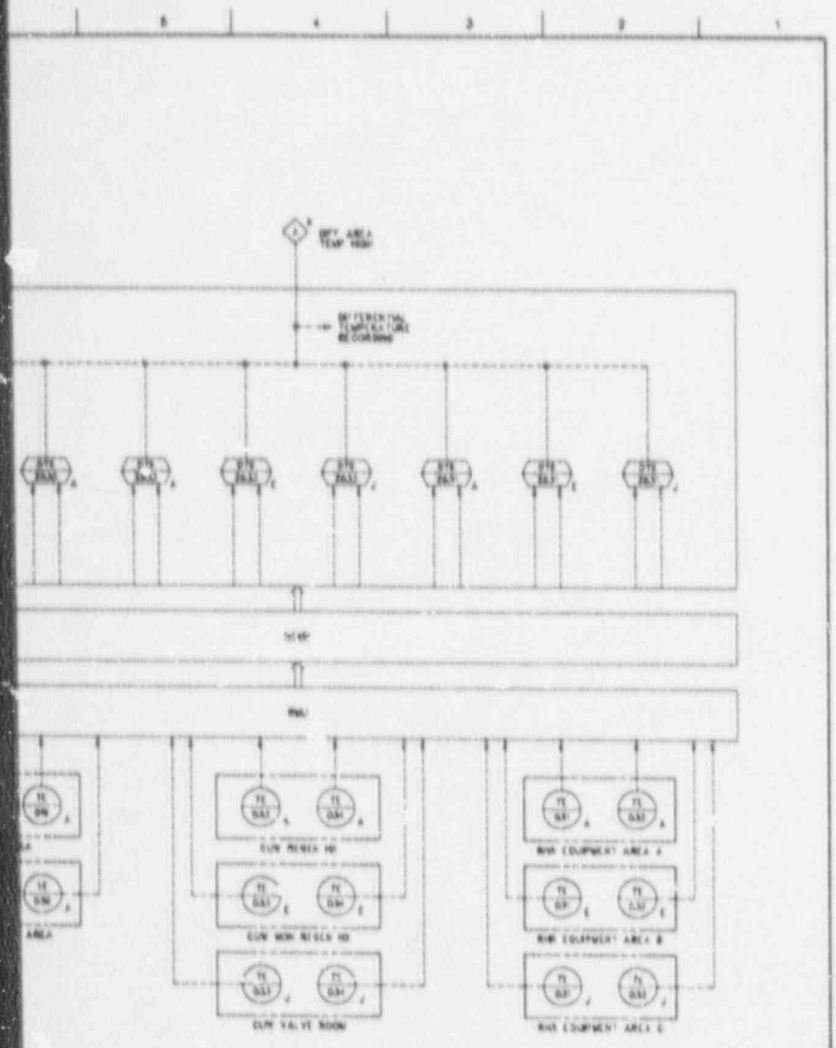
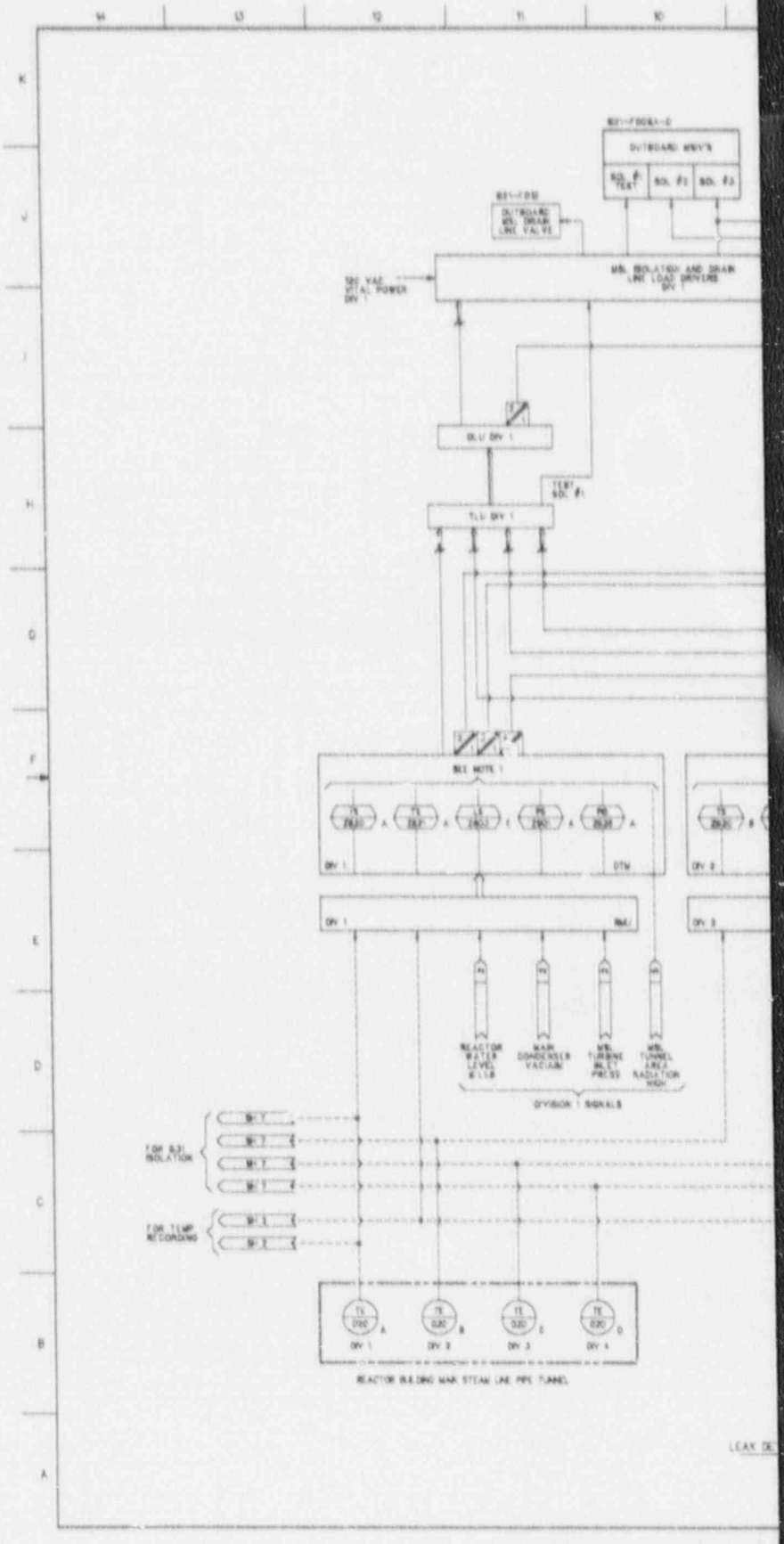


Figure 5.2-8 LEAK



DIFFERENTIAL TEMPERATURE RECORDING


OUTBOARD MSIV'S
SOL #1
SOL #3
MSL ISOLATION AND DRAIN LINE LOGIC DRIVERS DIV 1
DLU DIV 1
TLU DIV 1
DIV 1
DIV 2
DIV 3
DIV 4
REACTOR WATER LEVEL #1 L8
MAIN CONDENSER VACUUM
MSL TURBINE INLET PRESS
MSL TUNNEL AREA RADIATION HIGH
DIVISION 1 SIGNALS
FOR B21 ISOLATION
FOR TEMP. RECORDING
REACTOR BUILDING MAIN STEAM LINE PIPE TUNNEL

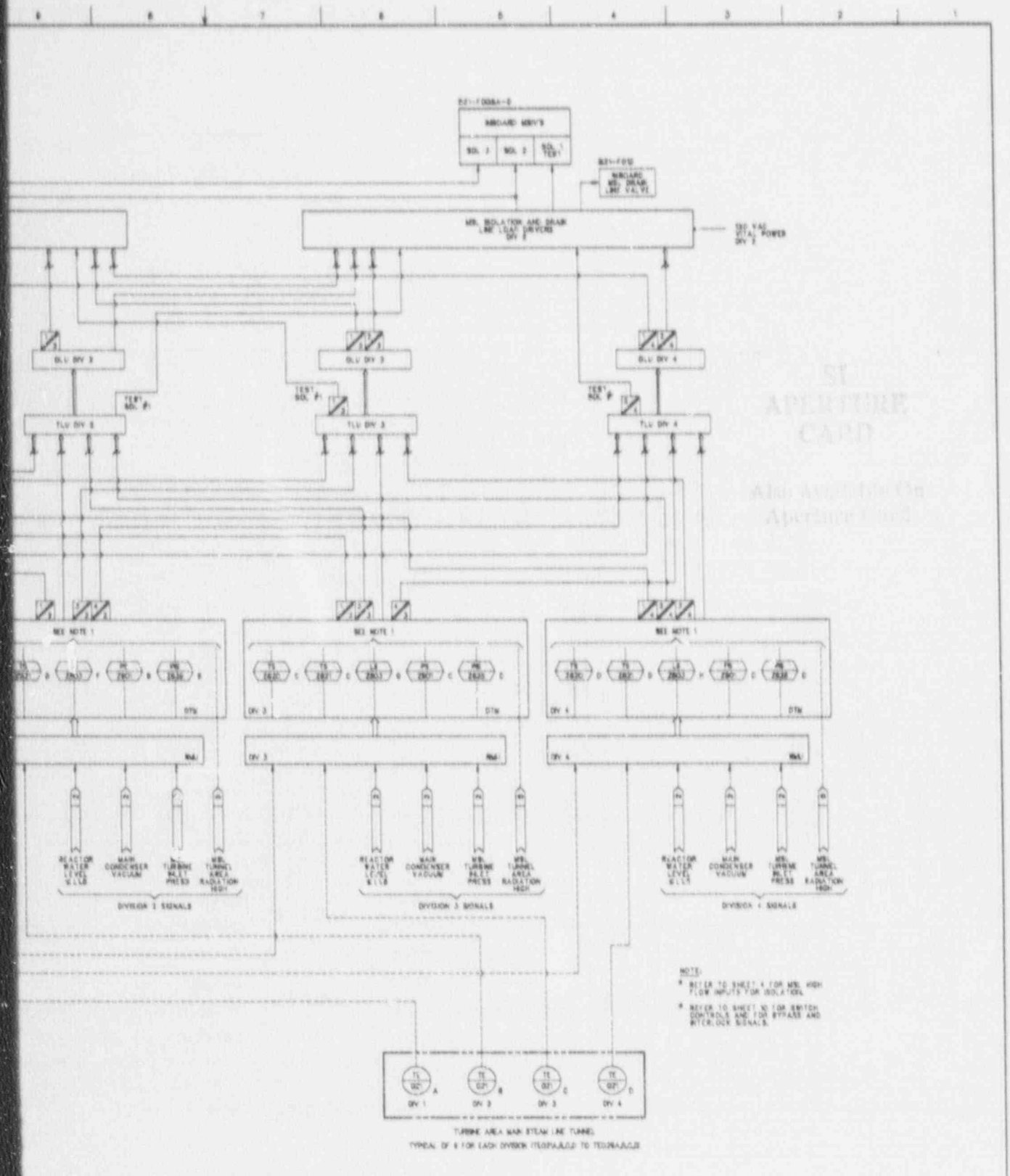


Figure 5.2-8 LEAK DETECTION AND ISOLATION SYSTEM IED, Sheet 3 of 10

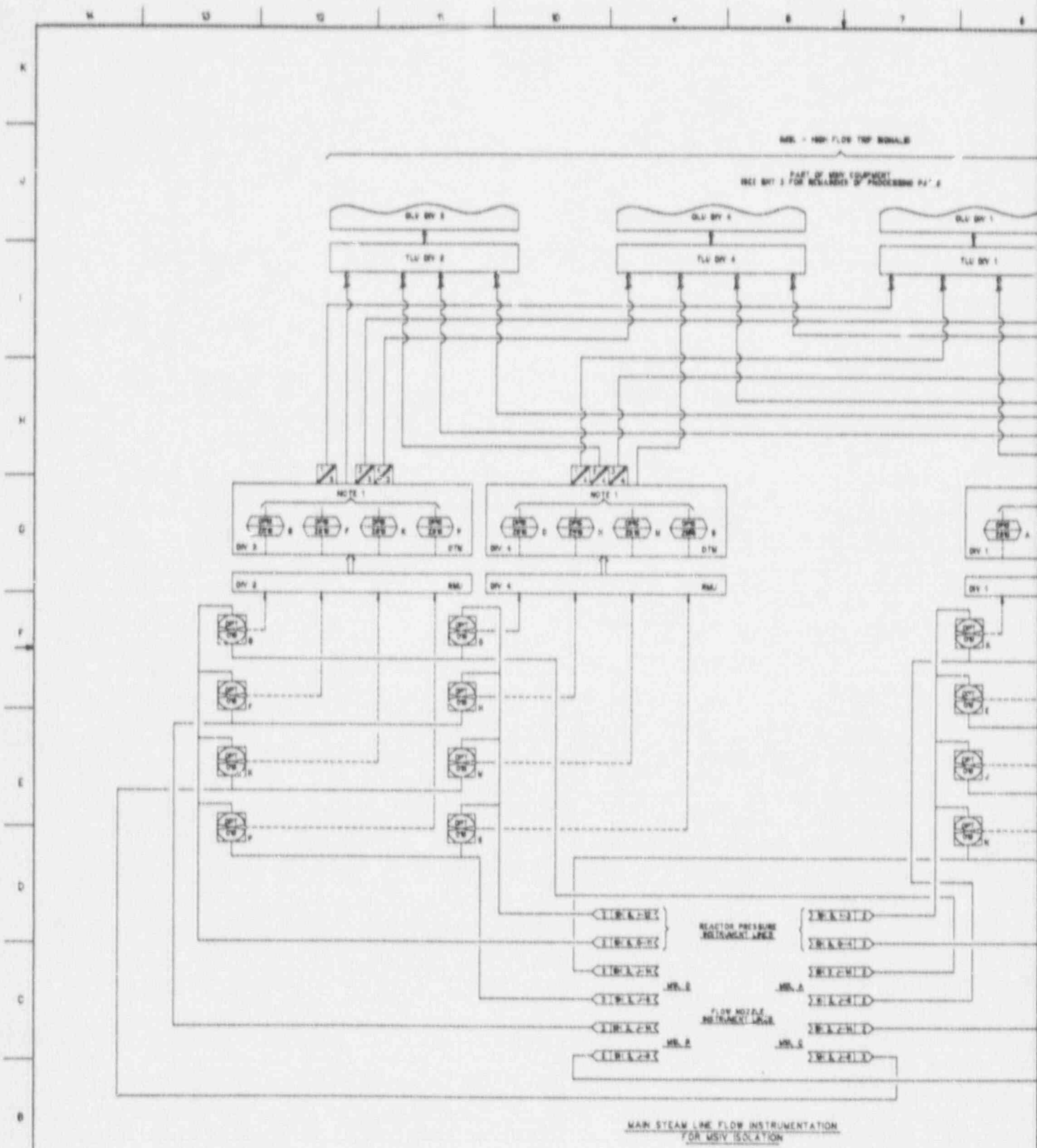
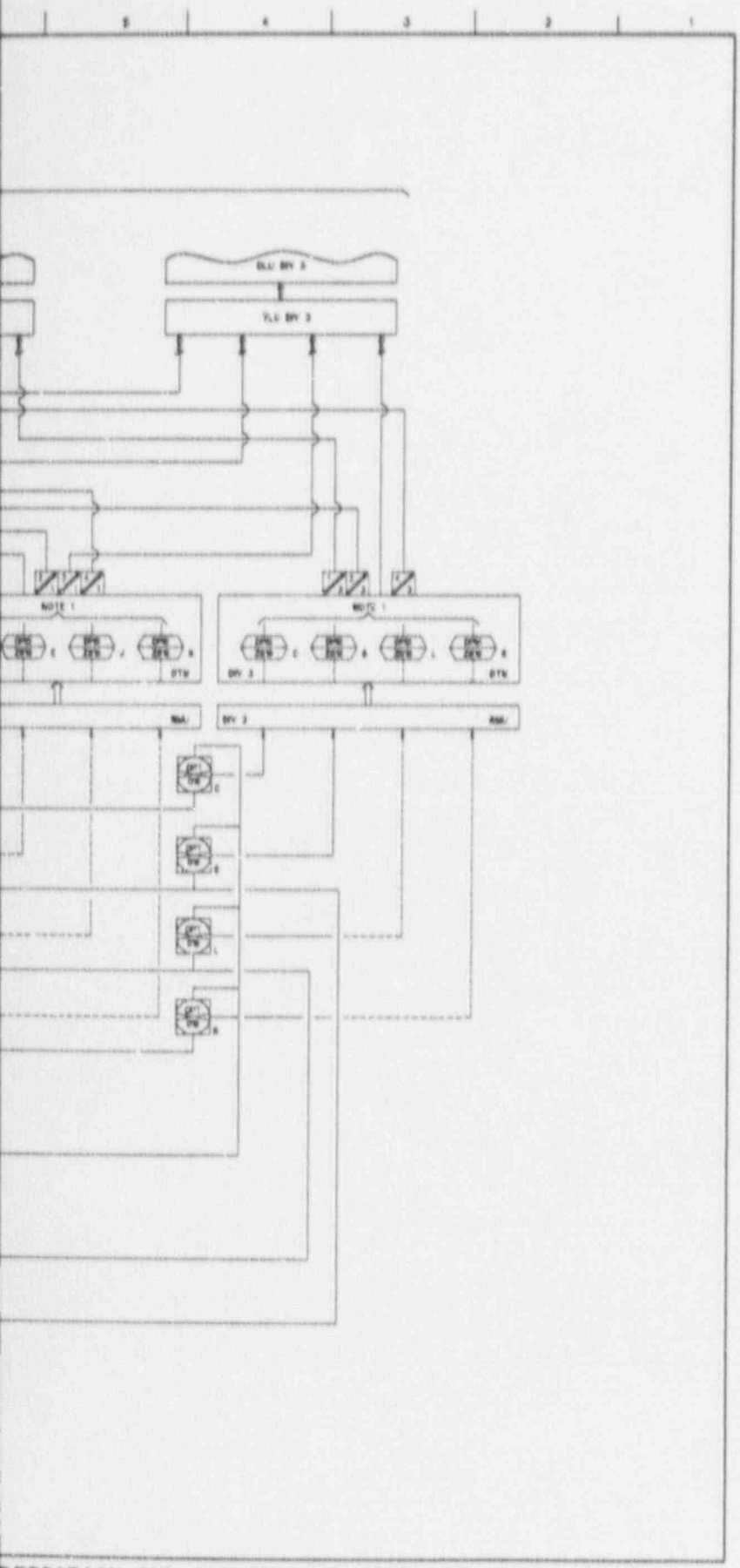
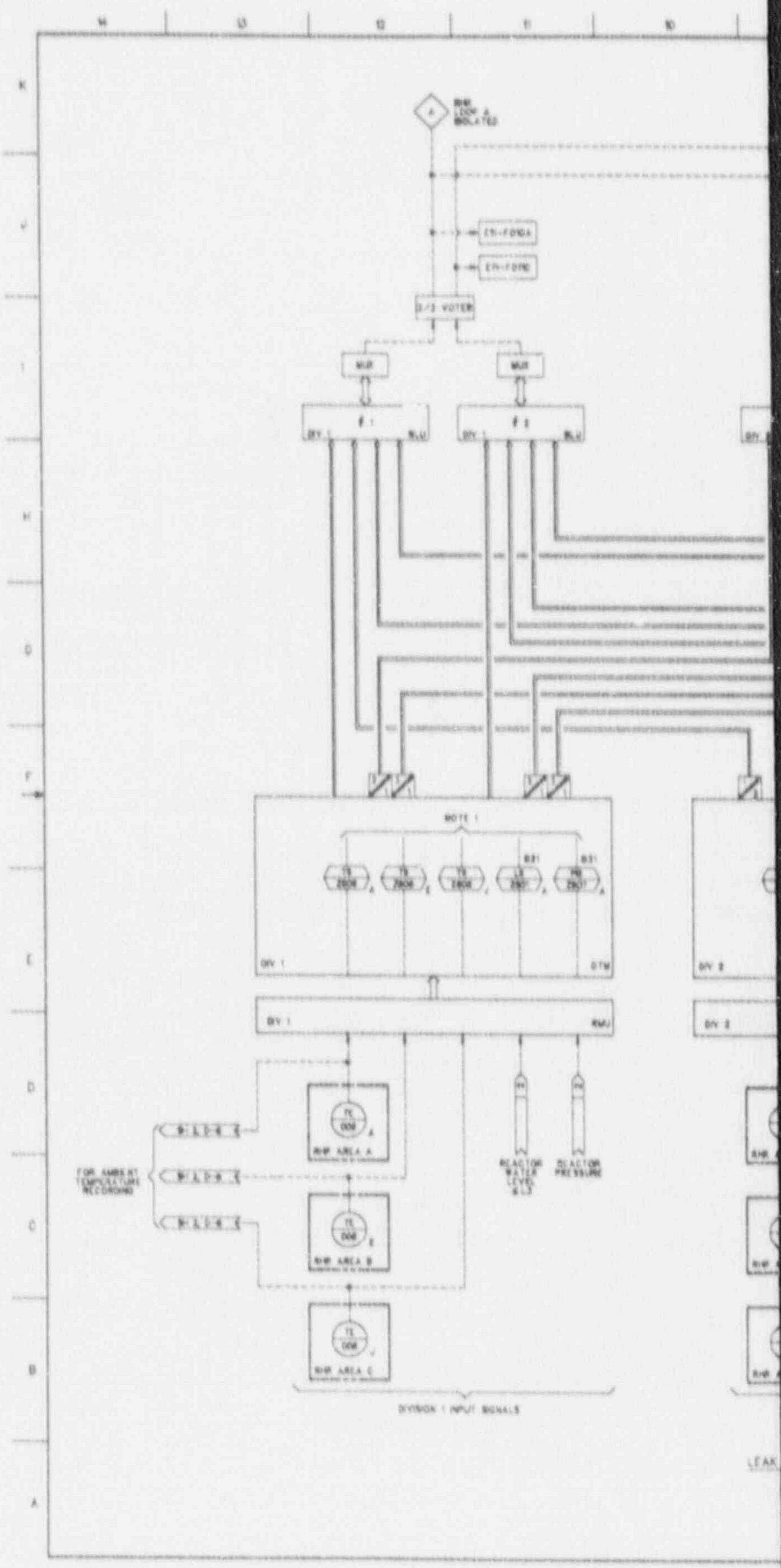


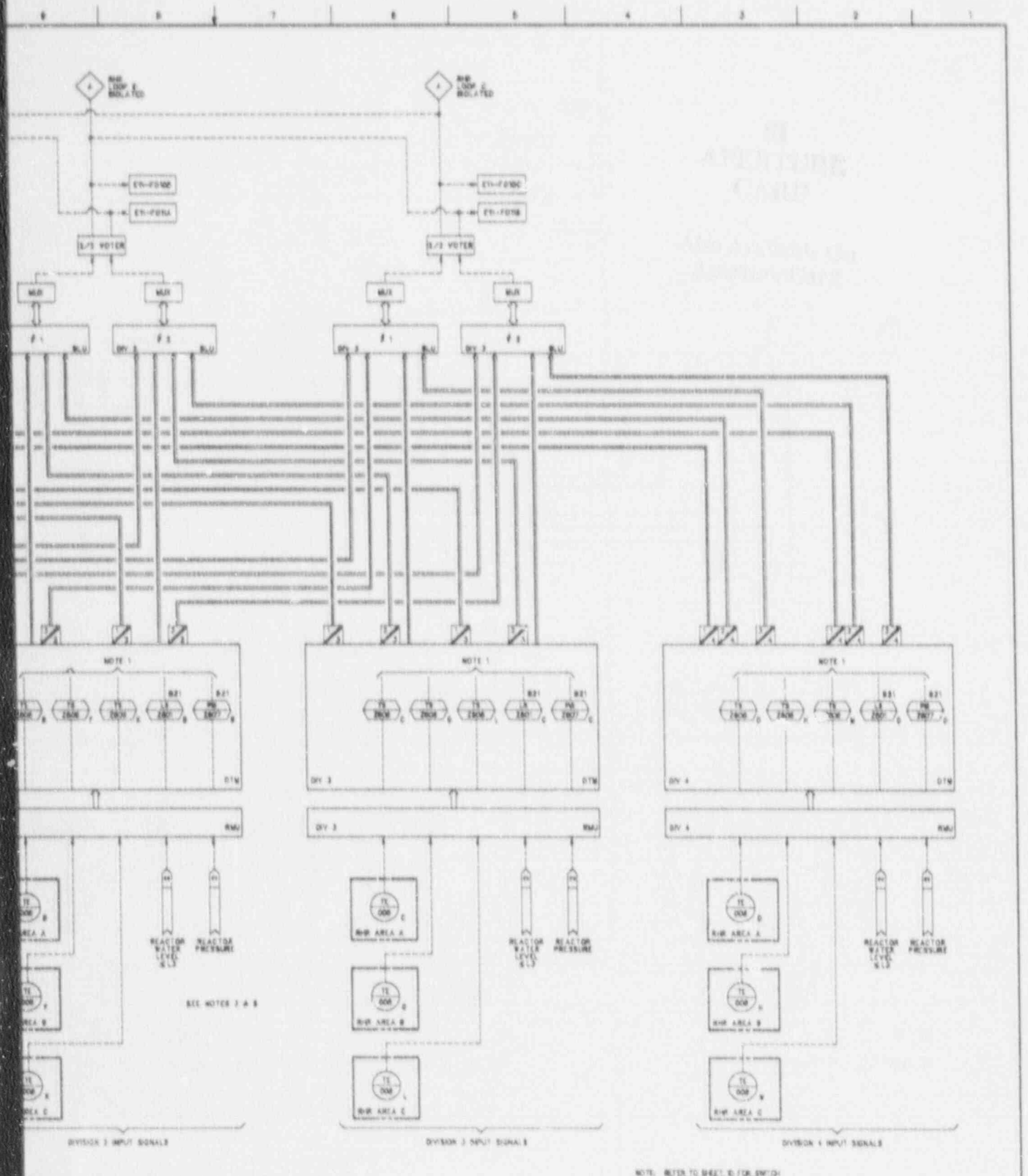
Figure 5.2-8 LEAK



DETECTION AND ISOLATION SYSTEM IED, Sheet 4 of 10



2/3 VOTER
DIV 1
DTM
NOTE 1
RMU
REACTOR PRESSURE
DIVISION 1 INPUT SIGNALS
FOR AMBIENT TEMPERATURE RECORDING



DETECTION AND ISOLATION FOR RHR SHUTDOWN COOLING VALVES

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

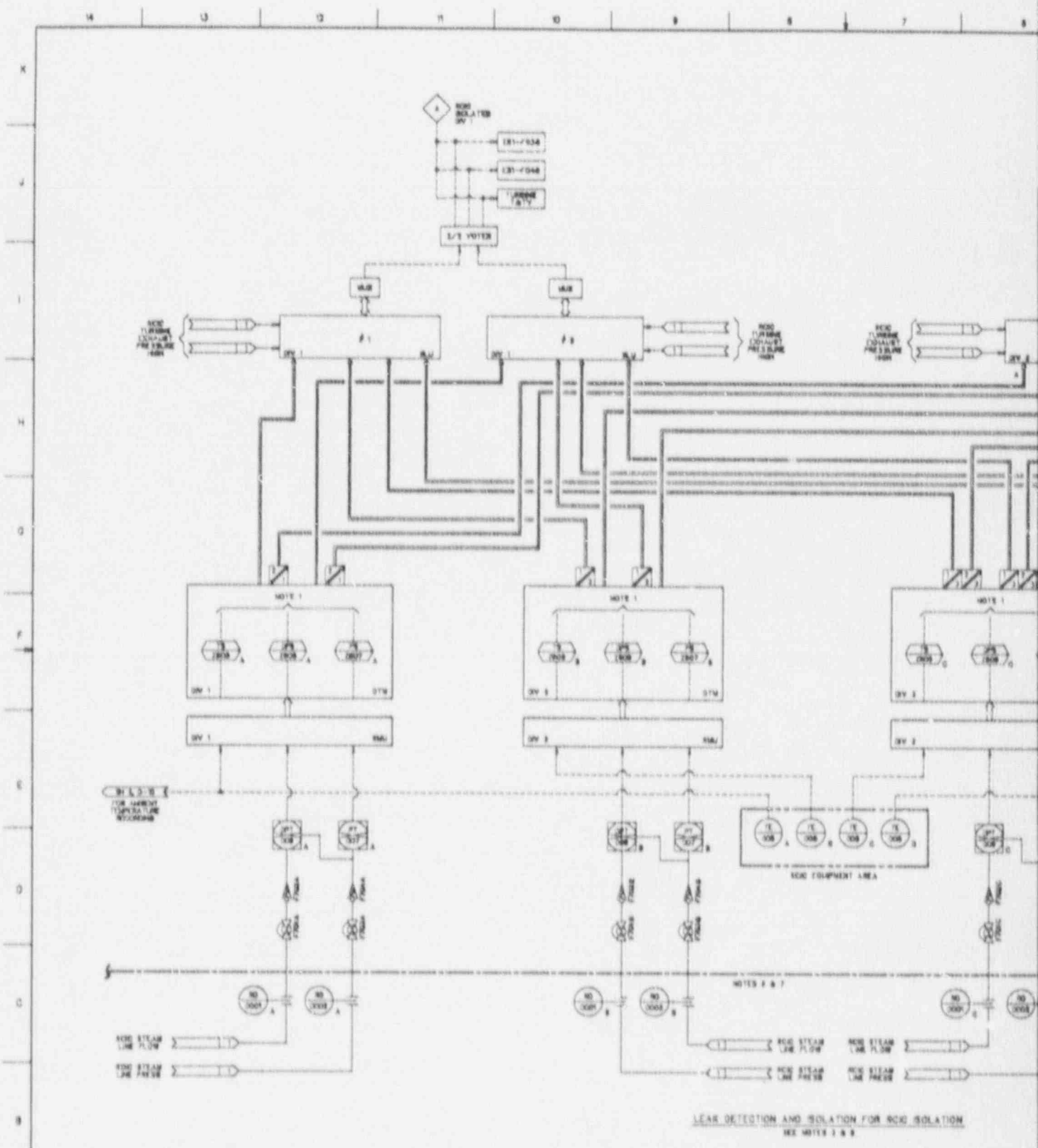
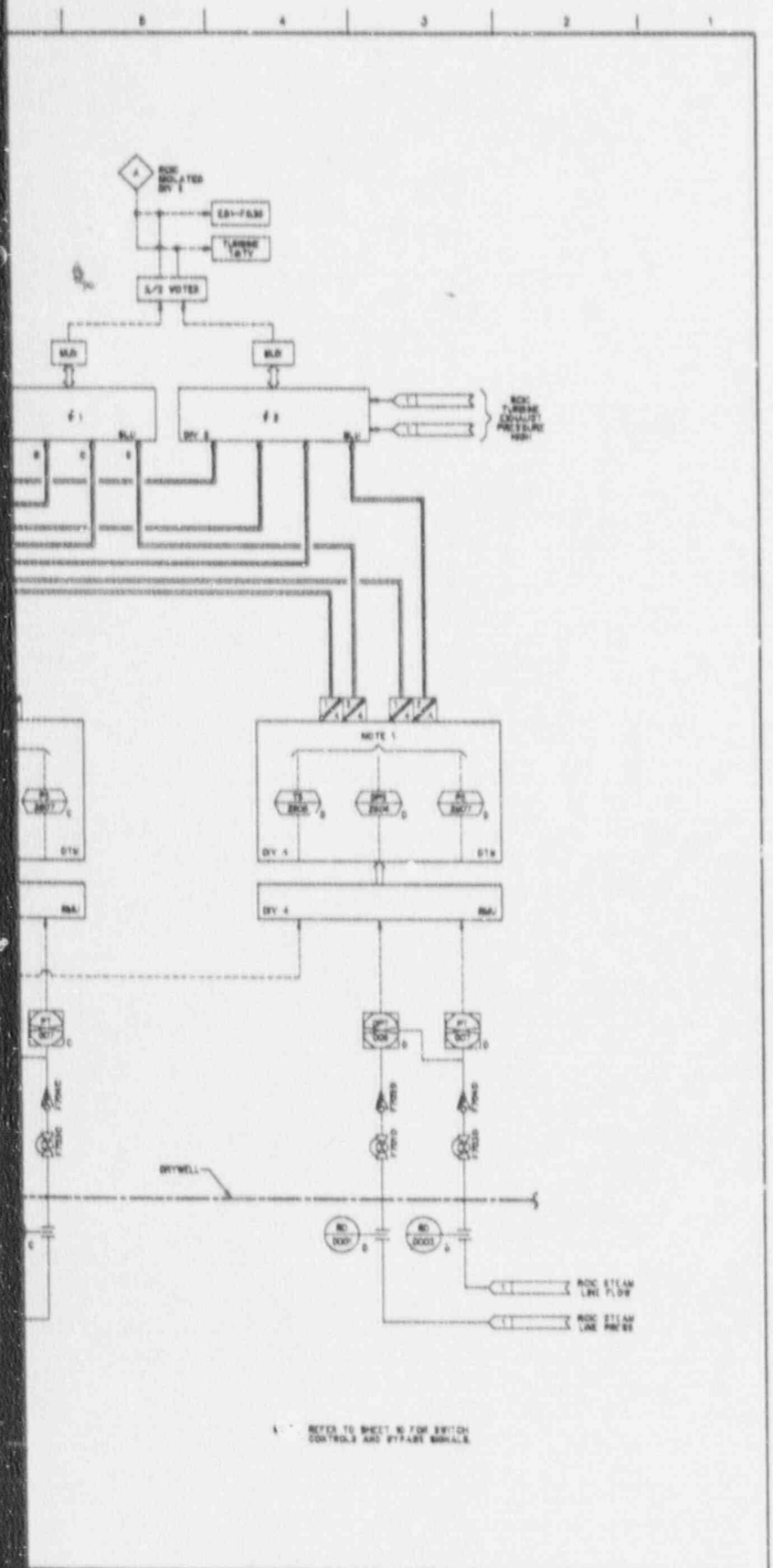
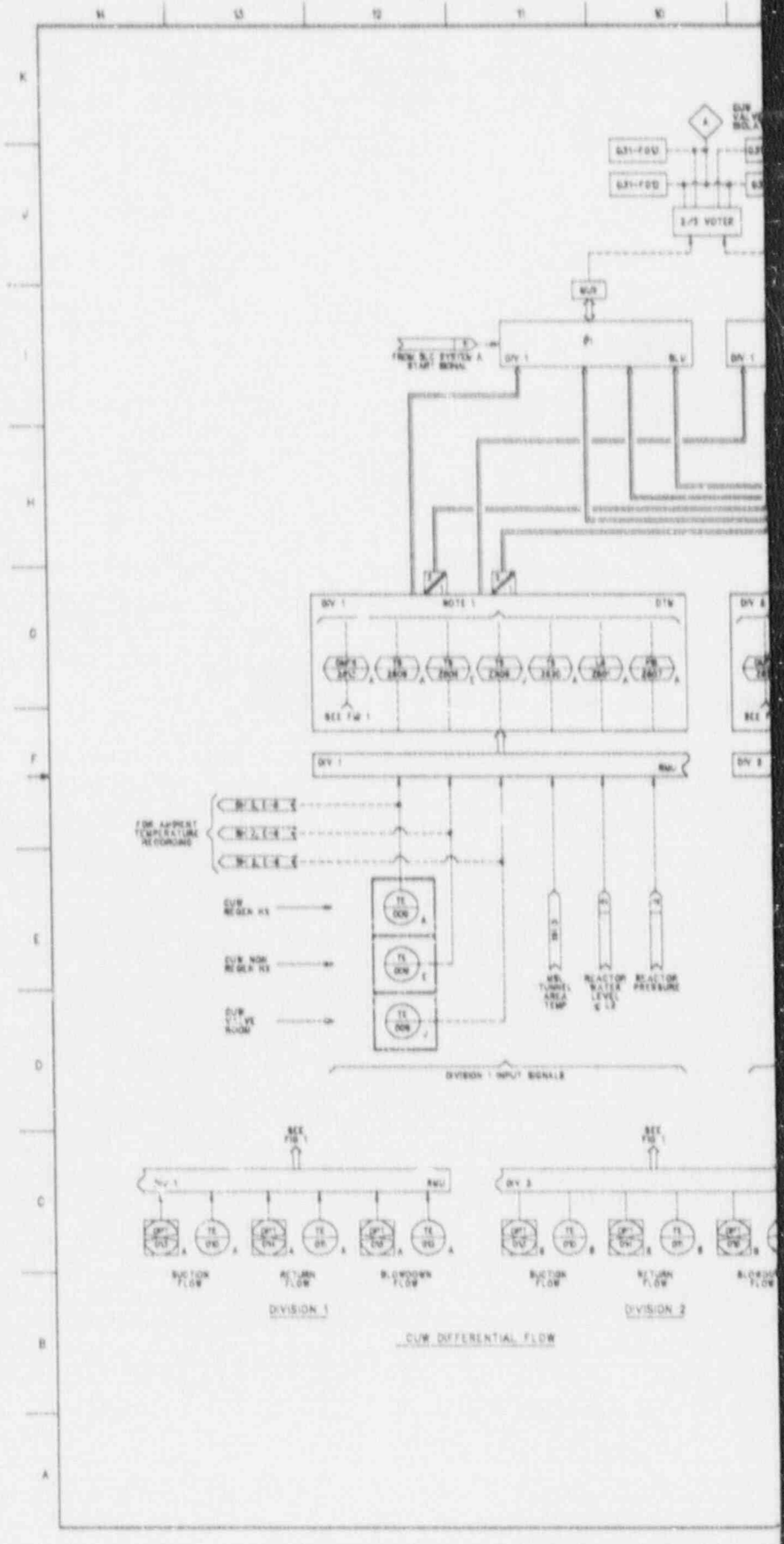
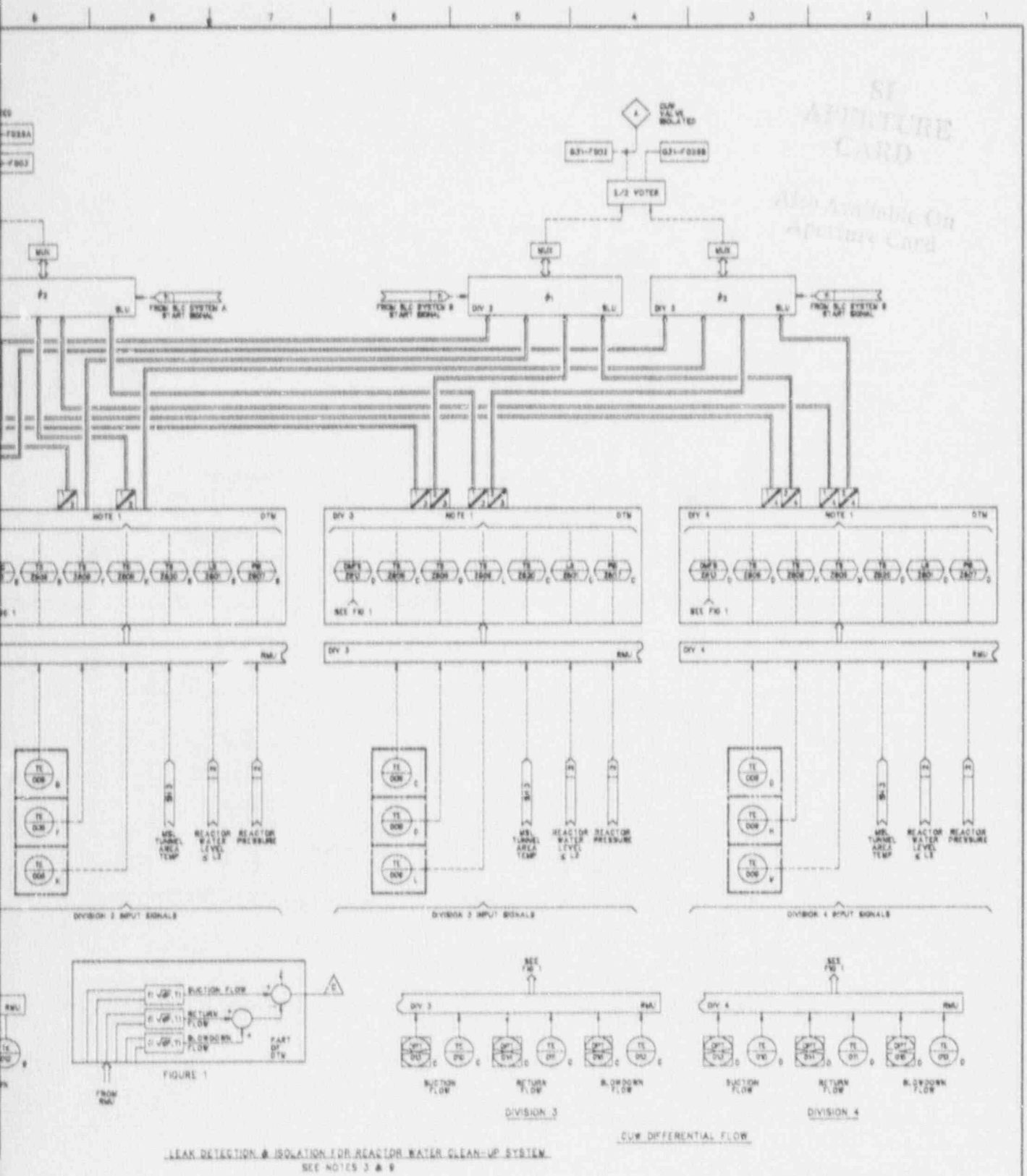


Figure 5.2-8 LEAK



DETECTION AND ISOLATION SYSTEM IED, Sheet 6 of 10


3/3 VOTER
DIVISION 1 INPUT SIGNALS
DIVISION 1
DIVISION 2
CVCW DIFFERENTIAL FLOW



LEAK DETECTION & ISOLATION FOR REACTOR WATER CLEAN-UP SYSTEM
SEE NOTES 3 & 9

NOTE: REFER TO SHEET 10 FOR SWITCH CONTROLS AND BYPASS SIGNALS.

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

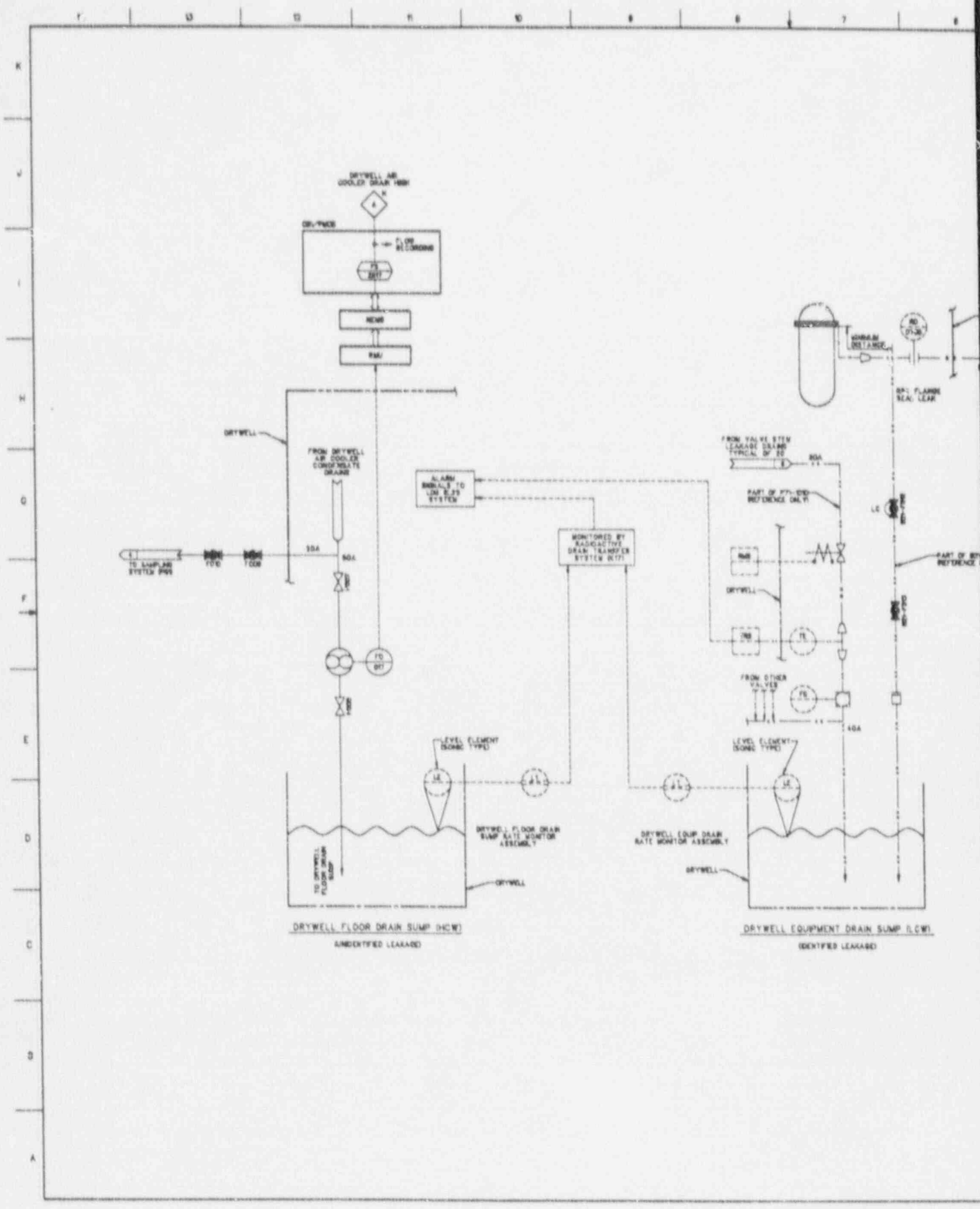
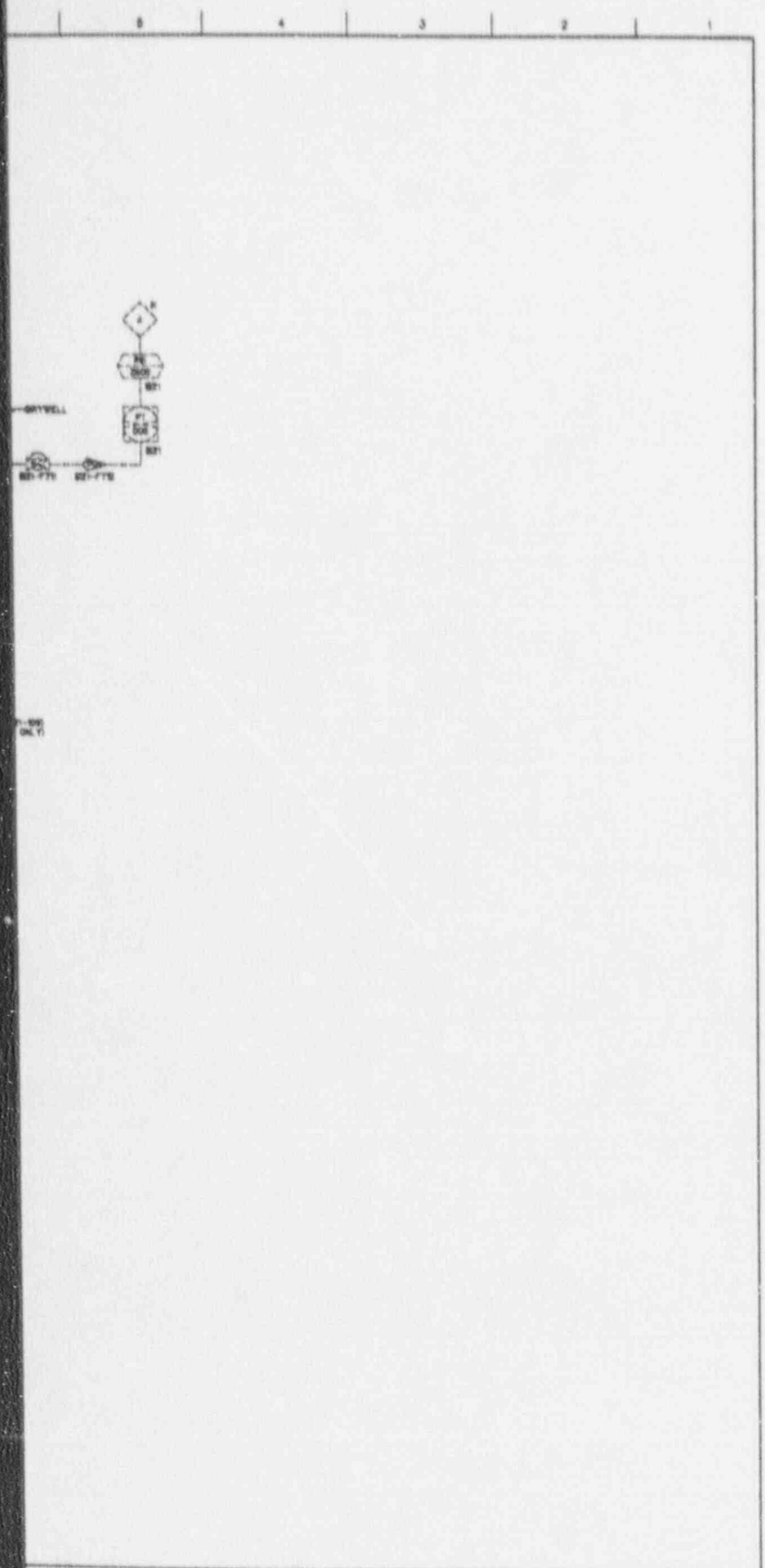
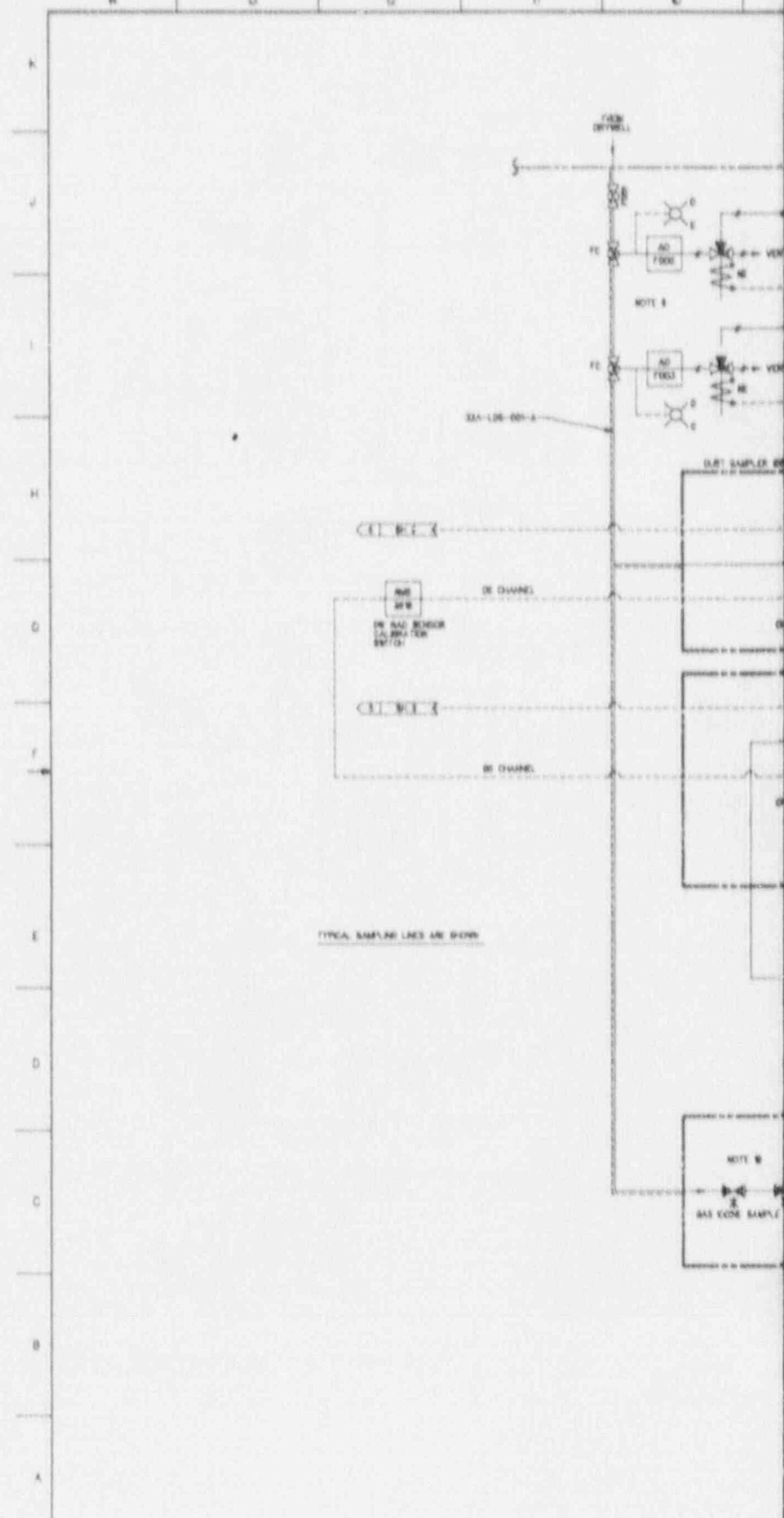


Figure 5.2-8 LEAK



DETECTION AND ISOLATION SYSTEM IED, Sheet 8 of 10


14
13
12
11
10
K
J
I
H
G
F
E
D
C
B
A
FROM DRYWELL
DW RAD SENSOR CALIBRATION SWITCH
TYPICAL SAMPLING LINES ARE SHOWN

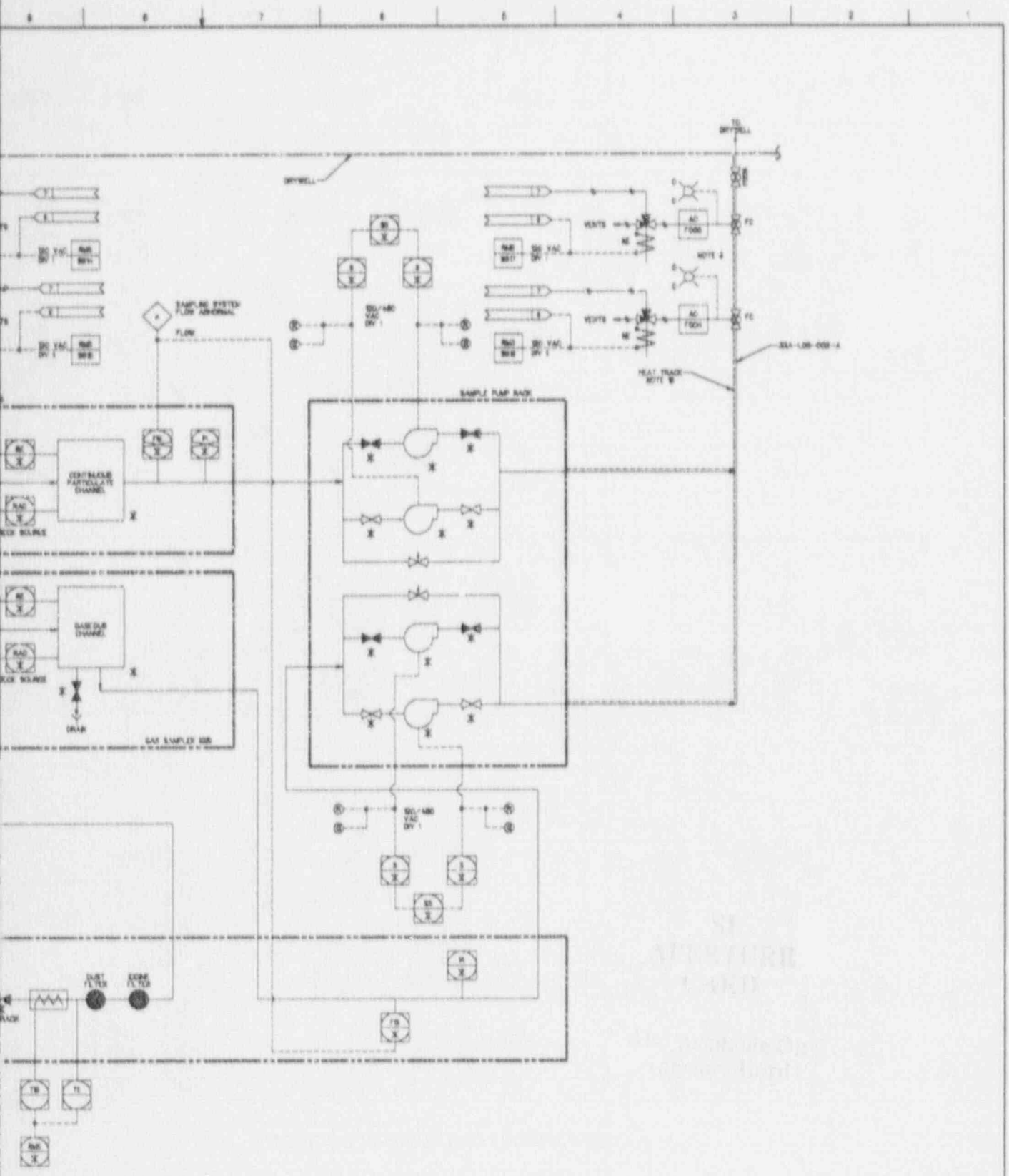


Figure 5.2-8 LEAK DETECTION AND ISOLATION SYSTEM IED, Sheet 9 of 10

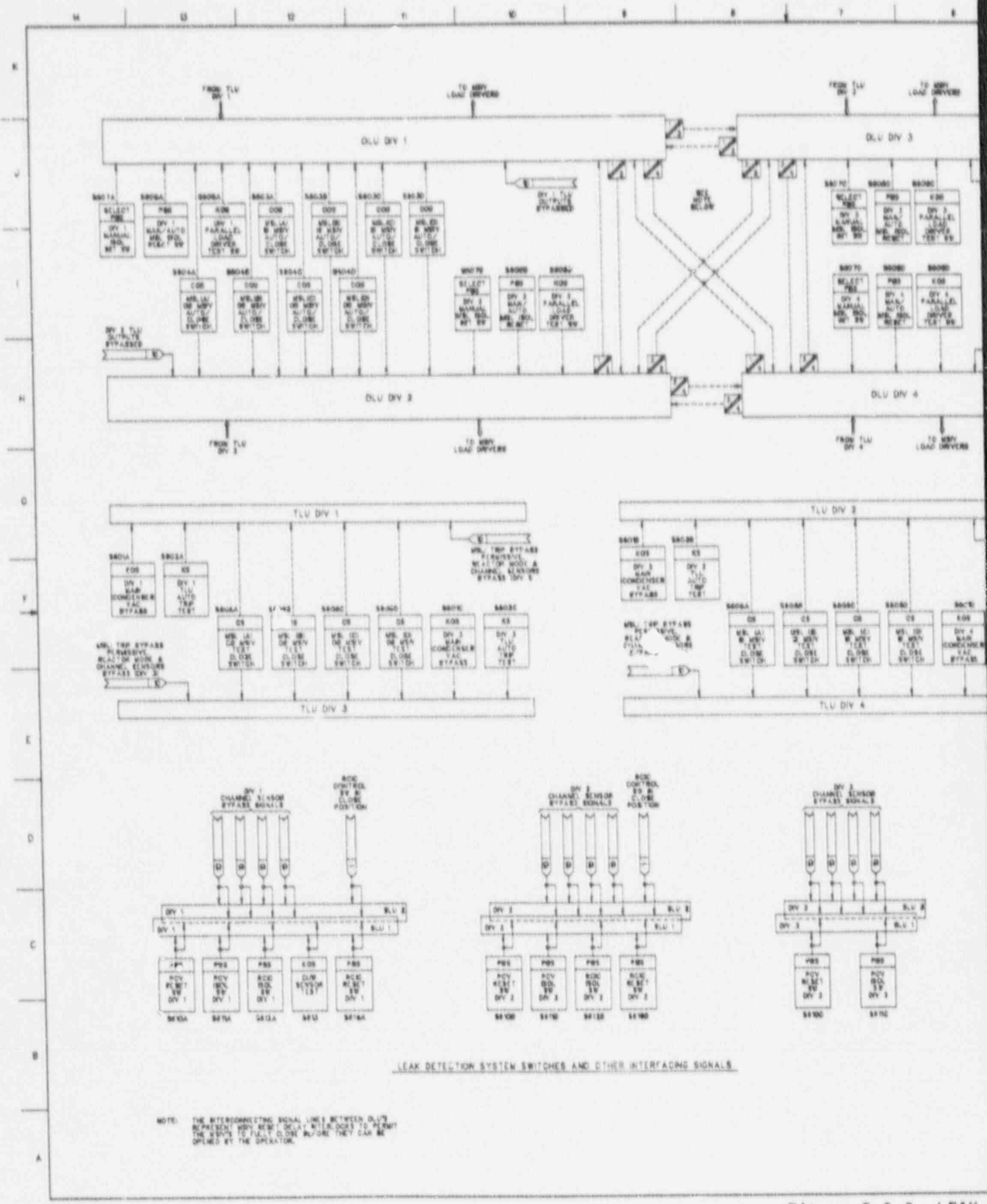
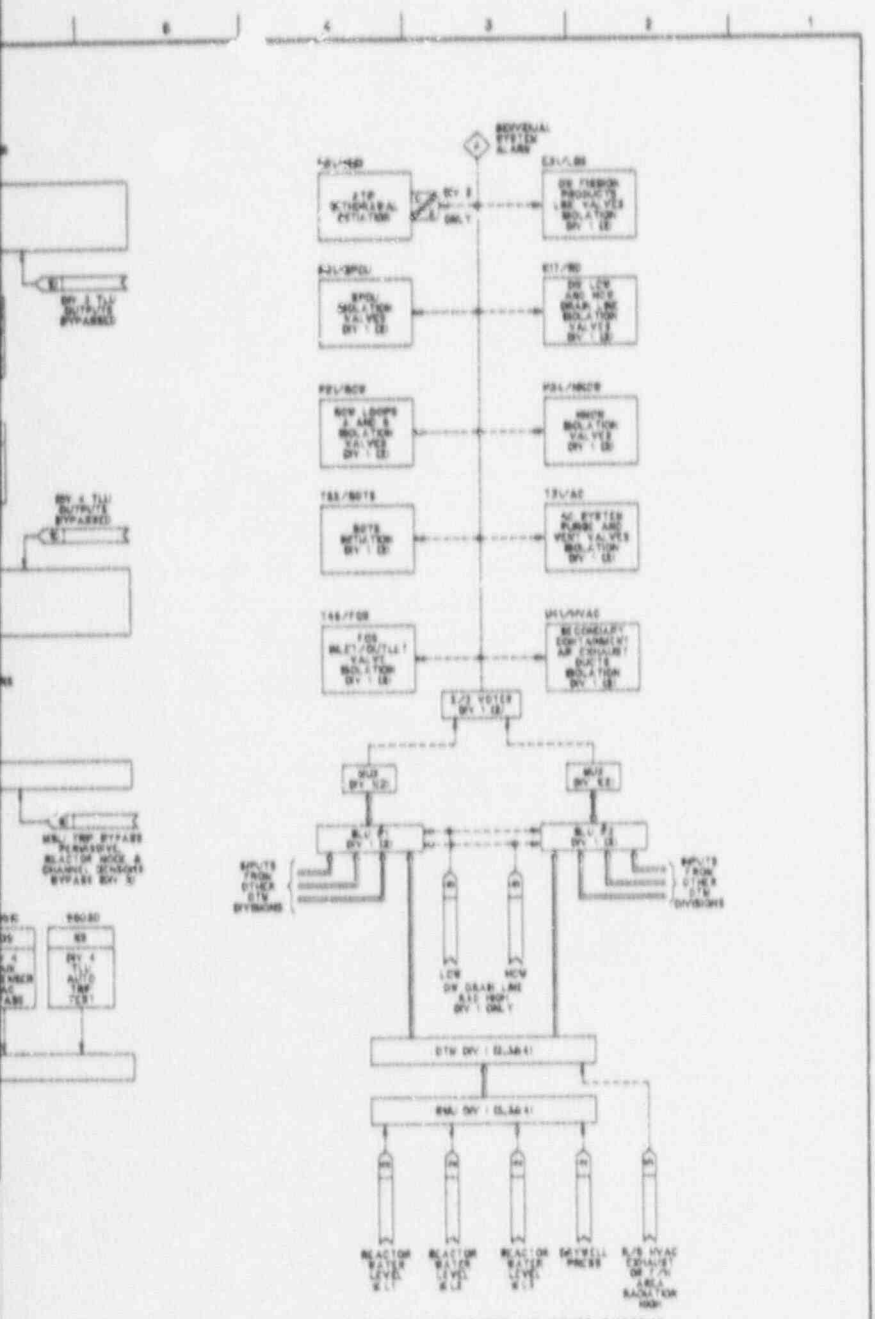
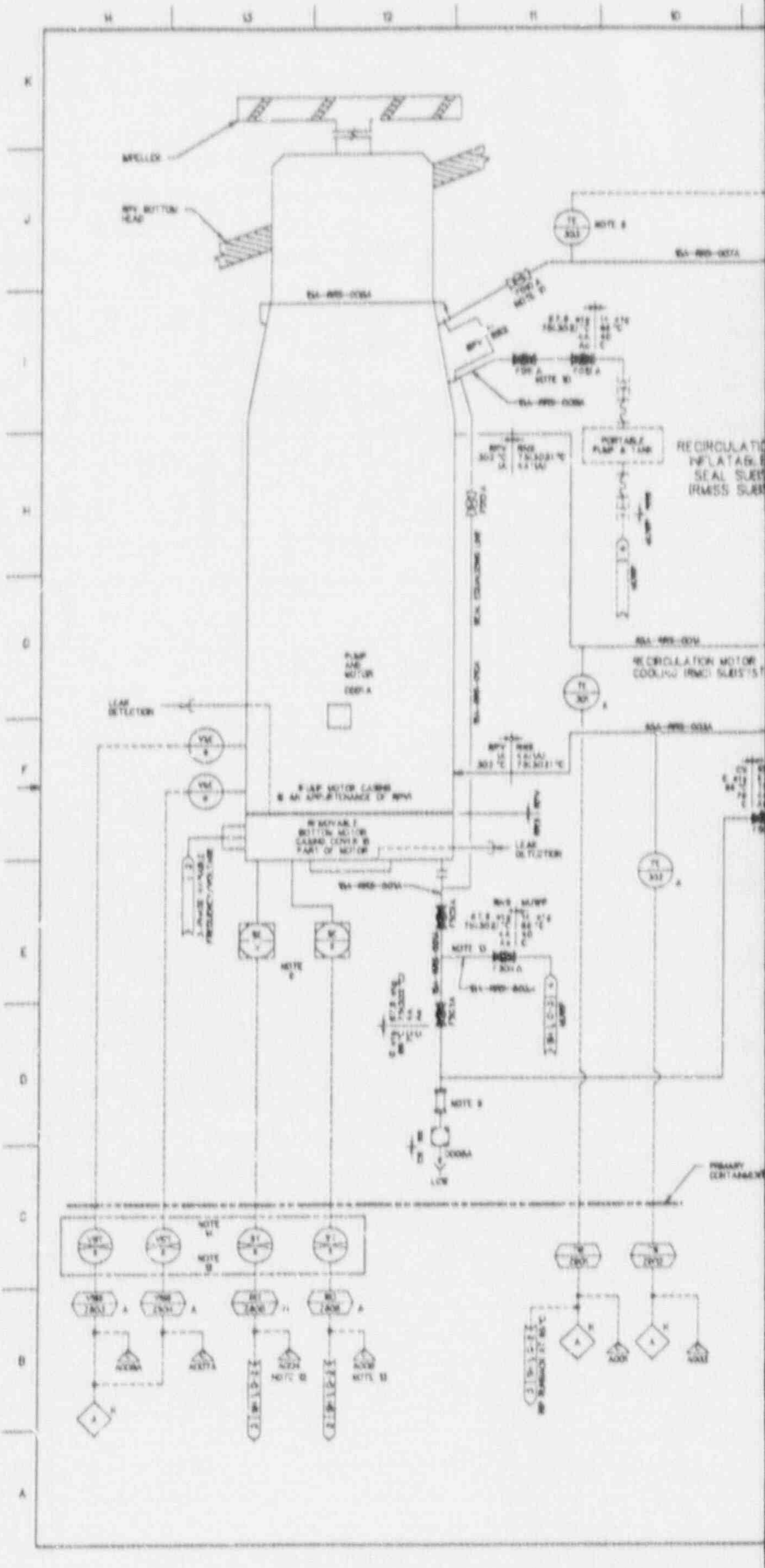


Figure 5.2-8 LEAK D



INPUT SIGNALS TO ESF AND OTHER SYSTEMS
TYPICAL OF FOUR DIVISIONS

K DETECTION AND ISOLATION SYSTEM IED, Sheet 10 of 10


IMPELLER
RPV BOTTOM HEAD
PORTABLE PUMP & TANK
PUMP AND MOTOR
LEAK DETECTION
PUMP MOTOR CASING IS AN APPURTENANCE OF RPV
REMOVABLE BOTTOM MOTOR CASING COVER IS PART OF MOTOR
PRIMARY CONTAINMENT

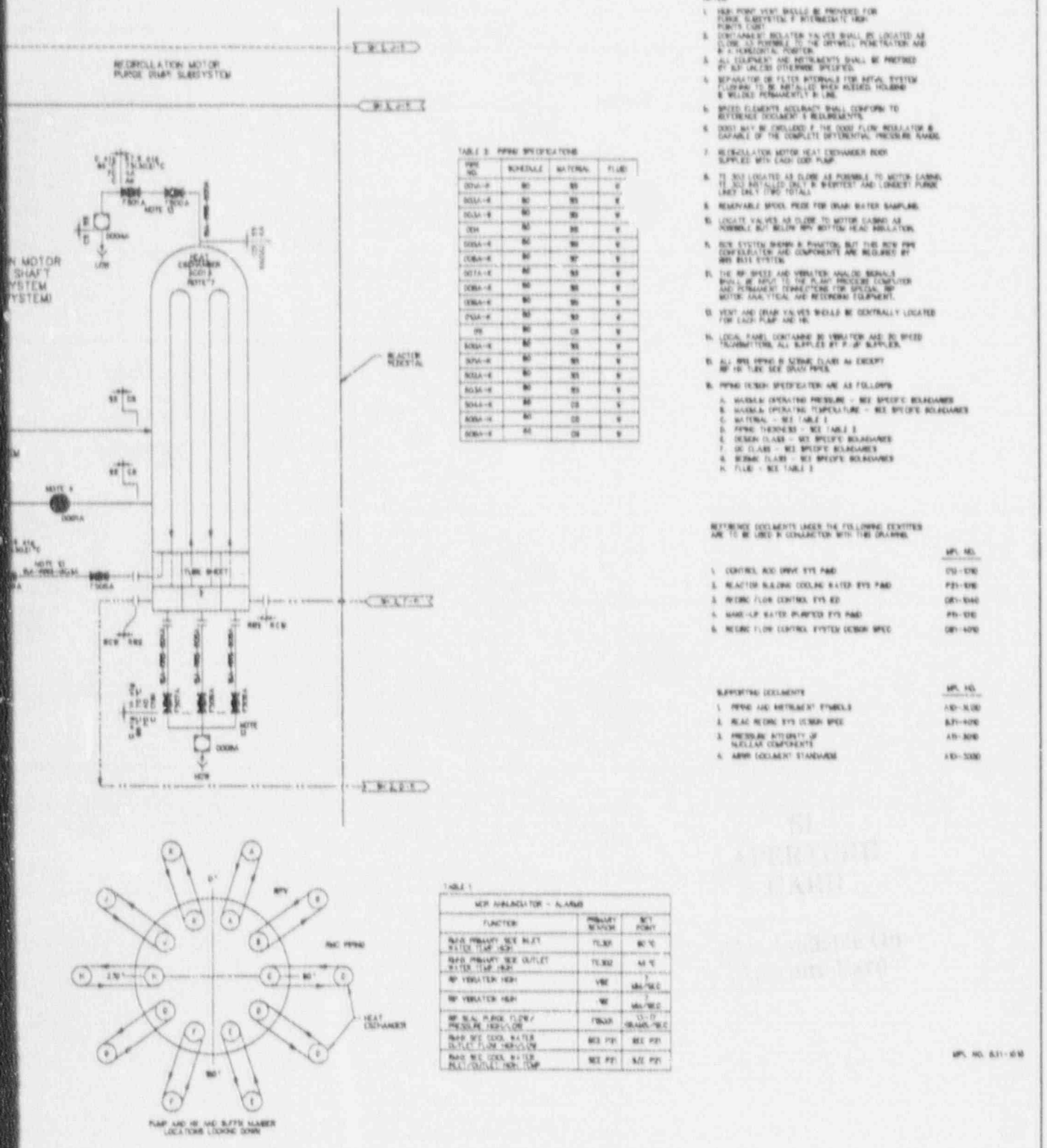


TABLE 3 PIPING SPECIFICATIONS

PIPE NO.	SCHEDULE	MATERIAL	FLUID
001A-K	80	SS	C
002A-K	80	SS	R
003A-K	80	SS	R
004	80	SS	R
005A-K	80	SS	R
006A-K	80	SS	R
007A-K	80	SS	R
008A-K	80	SS	R
009A-K	80	SS	R
010A-K	80	SS	R
011	80	CS	R
012A-K	80	SS	R
013A-K	80	SS	R
014A-K	80	SS	R
015A-K	80	SS	R
016A-K	80	SS	R
017A-K	80	CS	R
018A-K	80	CS	R
019A-K	80	CS	R

NOTES

1. HIGH POINT VENT SHALL BE PROVIDED FOR PURGE SUBSYSTEM IF INTERMEDIATE HIGH POINTS EXIST.
2. CONTAINMENT ISOLATION VALVES SHALL BE LOCATED AS CLOSE TO POSSIBLE TO THE DRYWELL PENETRATION AND IN A HORIZONTAL POSITION.
3. ALL EQUIPMENT AND INSTRUMENTS SHALL BE PROTECTED BY ASF UNLESS OTHERWISE SPECIFIED.
4. SEPARATOR OR FILTER INTERNALS FOR METAL SYSTEM PIPING TO BE METALLIC WHICH ASSURES HOUSING IS WELDED PERMANENTLY IN LINE.
5. BYPASS ELEMENTS ASSEMBLY SHALL CONFORM TO REFERENCE DOCUMENT 5 REQUIREMENTS.
6. DOES NOT APPLY TO CAVITATING FLOW REGULATOR IS CAPABLE OF THE COMPLETE DIFFERENTIAL PRESSURE RANGE.
7. RECIRCULATION MOTOR HEAT EXCHANGER BODY SUPPLIED WITH CASH LOOP PUMP.
8. TE 303 LOCATED AS CLOSE AS POSSIBLE TO MOTOR CASING TE 303 INSTALLED ONLY IN SHORTEST AND LONGEST PURGE LINES ONLY (TWO TOTAL).
9. REMOVABLE SPOOL PIECE FOR DRAIN WATER SAMPLING.
10. LOCATE VALVES AS CLOSE TO MOTOR CASING AS POSSIBLE BUT BELOW ANY BOTTOM HEAD INSULATION.
11. RCIC SYSTEM SHOWN IN PENETRATION BUT THIS RCIC PIPE CONFIGURATION AND COMPONENTS ARE INCLUDED BY RCIC B33 SYSTEM.
12. THE RP SPEED AND VIBRATION ANALOG SIGNALS SHALL BE INPUT TO THE PLANT PROCESS COMPUTER AND PERMANENT CONNECTIONS FOR SPECIAL RP MOTOR ANALYTICAL AND RECORDING EQUIPMENT.
13. VENT AND DRAIN VALVES SHOULD BE CENTRALLY LOCATED FOR EACH PUMP AND MG.
14. LOCAL PANEL CONTAINING RR VIBRATION AND RPM SPEED TRANSMITTERS ALL SUPPLIED BY P.P. OF SUPPLIER.
15. ALL RPV PIPING IS SEISMIC CLASS AS EXCEPT RF 16 TURB SEE DRAIN PIPES.
16. PIPING DESIGN SPECIFICATION ARE AS FOLLOWS
    A. MAXIMUM OPERATING PRESSURE - SEE SPECIFIC BOUNDARIES
    B. MAXIMUM OPERATING TEMPERATURE - SEE SPECIFIC BOUNDARIES
    C. MATERIAL - SEE TABLE 3
    D. PIPING THICKNESS - SEE TABLE 3
    E. DESIGN CLASS - SEE SPECIFIC BOUNDARIES
    F. QC CLASS - SEE SPECIFIC BOUNDARIES
    G. SEISMIC CLASS - SEE SPECIFIC BOUNDARIES
    H. FLUID - SEE TABLE 3

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

	MFL NO.
1. CONTROL ROD DRIVE SYS P&ID	P10-1010
2. REACTOR BUILDING COOLING WATER SYS P&ID	P21-1010
3. RCIC/RC FLOW CONTROL SYS ID	DB1-1040
4. MAKE-UP WATER PURIFIED SYS P&ID	P15-1010
5. RCIC/RC FLOW CONTROL SYSTEM DESIGN SPEC	DB1-1070

SUPPORTING DOCUMENTS	MFL NO.
1. PIPING AND INSTRUMENT SYMBOLS	A10-1000
2. RCIC/RCIC SYS DESIGN SPEC	A71-1070
3. PRESSURE INTEGRITY OF NUCLEAR COMPONENTS	A15-3000
4. ABWR DOCUMENT STANDARDS	A10-3000

TABLE 1

RCIC MANUFACTURER - ALARMS		
FUNCTION	PRIMARY SENSOR	SET POINT
RHR PRIMARY SIDE INLET WATER TEMP HIGH	TE301	80°F
RHR PRIMARY SIDE OUTLET WATER TEMP HIGH	TE302	60°F
RP VIBRATER HIGH	VBE	1 MIL/SEC
RP VIBRATER HIGH	VBE	1 MIL/SEC
RP SEAL PURGE FLOW/ PRESSURE INDICATOR	FE/PE	11-17 GALMIN/SEC
RHR SFC COOL WATER OUTLET FLOW INDICATOR	SEE P21	SEE P21
RHR SFC COOL WATER INLET/OUTLET INDICATOR	SEE P21	SEE P21

MFL NO. A11-010

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

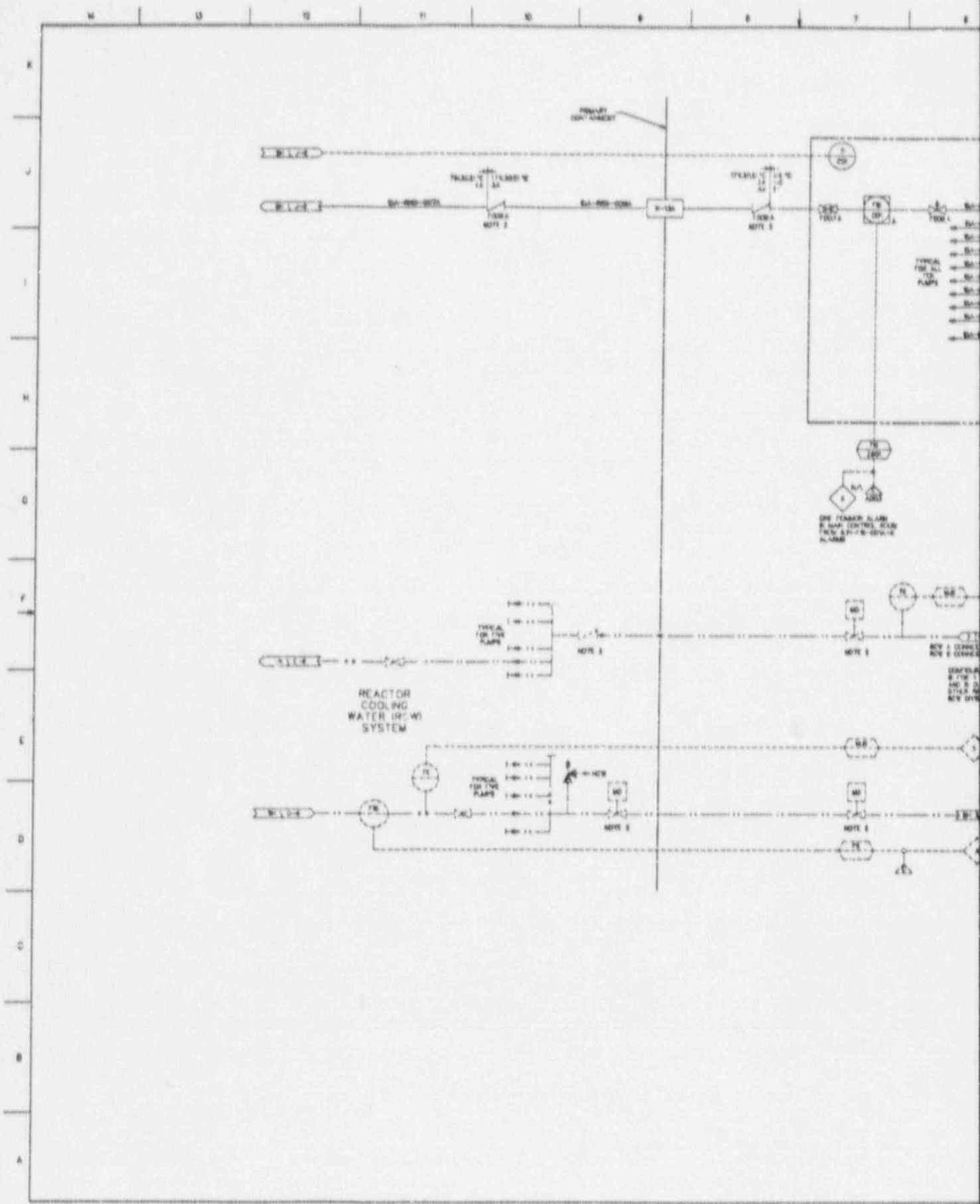


Figure 5.4-4 REA

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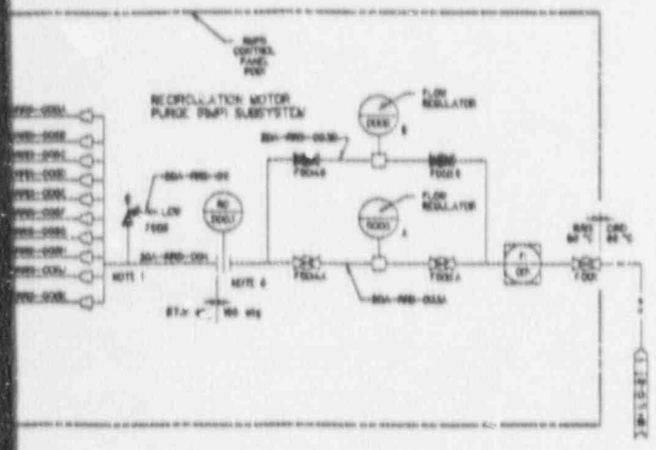
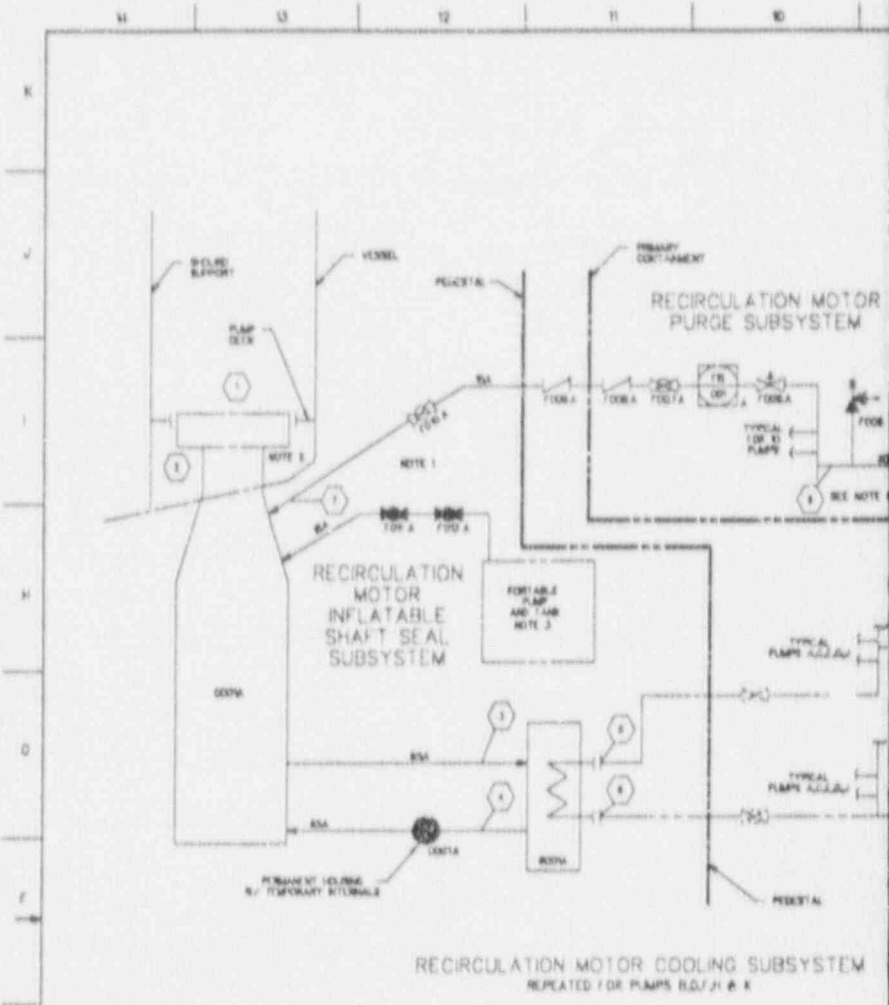
REV C

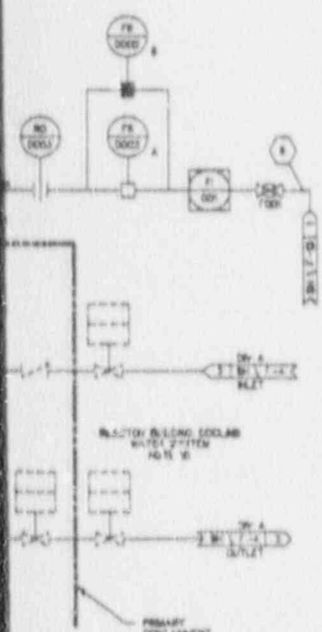


CTOR RECIRCULATION SYSTEM P&ID, Sheet 2 of 2

9207070339-23



RECIRCULATION MOTOR COOLING SUBSYSTEM
REPEATED FOR PUMPS B,D,F,H & K



MODE "A1" REACTOR NORMAL OPERATION 10 PUMPS OPERATING
ALL PUMPS ARE AT SAME SPEED
CORE FLOW = 111% — RATED DESIGN
PUMP SPEED ≤ 100% OF RATED (NOTE 6)
SEE NOTE 5

POSITION	1	2	3	4	5	6	7	8
FLOW M^3/HR	7750	7700	8	8	30 MAX	30 MAX	13/17 NOTES 4&11	130/170 NOTES 4&11
TEMP (°C)	278	278	50	30	30		35/70	40/80
PRESS Kg/cm^2 g	73.8 — 76.8 (ΔP=3.0 Kg/cm²)		76.8	77.2	ΔP = 1.0 MAX			100
AVAILABLE NPSH M	91							

MODE "A2" REACTOR NORMAL OPERATION 10 PUMPS OPERATING
ALL PUMPS ARE AT SAME SPEED
CORE FLOW = 100% — RATED DESIGN
PUMP SPEED ≤ 90% OF RATED (NOTE 6)
SEE NOTE 5

POSITION	1	2	3	4	5	6	7	8
FLOW M^3/HR	6970	6970	7	7	30 MAX	30 MAX	13/17 NOTES 4&11	130/170 NOTES 4&11
TEMP (°C)	278	278	48	30	30		35/70	40/80
PRESS Kg/cm^2 g	73.8 — 76.4 (ΔP=2.6 Kg/cm²)		77.4	77.2	ΔP = 1.0 MAX			100
AVAILABLE NPSH M	134							

MODE "B1" REACTOR NORMAL OPERATION 9 PUMPS OPERATING
ONE PUMP OUT OF SERVICE
CORE FLOW = 100% — (RUNNING PUMP DATA)
PUMP SPEED ≤ 100% OF RATED (NOTE 6)
SEE NOTE 5

POSITION	1	2	3	4	5	6	7	8
FLOW M^3/HR	8391	8391	8	8	30 MAX	30 MAX	13/17 NOTES 4&11	130/170 NOTES 4&11
TEMP (°C)	278	278	50	30	30		35/70	40/80
PRESS Kg/cm^2 g	73.8 — 76.8 (ΔP=3.0 Kg/cm²)		77.4	77.2	ΔP = 1.0 MAX			100
AVAILABLE NPSH M	134							

MODE "B2" REACTOR NORMAL OPERATION — 9 PUMPS OPERATING
DATA SHOWN FOR THE PUMP OUT OF SERVICE
CORE FLOW = 100%
PUMP SPEED = 0.0% OF RATED
SEE NOTE 5

POSITION	1	2	3	4	5	6	7	8
FLOW M^3/HR	-6,170 NOTE 7	-6,170 NOTE 7	NAT. CIRC.		30 MAX	30 MAX	13/17 NOTES 4&11	130/170 NOTES 4&11
TEMP (°C)	278	278			30		35/70	40/80
PRESS Kg/cm^2 g	73.8	76.8	77.4	77.2	ΔP = 1.0 MAX			100
AVAILABLE NPSH M	134							

MODE "C" REACTOR HOT STANDBY — 10 PUMPS OPERATING
ALL PUMPS ARE AT SAME SPEED
CORE FLOW = 33.3%
PUMP SPEED = 450 RPM
SEE NOTE 5

POSITION	1	2	3	4	5	6	7	8
FLOW M^3/HR	2290	2290	2	2	30 MAX	30 MAX	13/17 NOTES 4&11	130/170 NOTES 4&11
TEMP (°C)	280	280	30	30	30		35/70	40/80
PRESS Kg/cm^2 g	66.3 — 66.6 (ΔP=0.3 Kg/cm²)		70.3	70.0	ΔP = 1.0 MAX			100
AVAILABLE NPSH M	16							

MODE "D" REACTOR COLD STARTUP — 10 PUMPS OPERATING
ALL PUMPS ARE AT SAME SPEED
CORE FLOW = 33.3%
PUMP SPEED = 450 RPM
SEE NOTE 5

POSITION	1	2	3	4	5	6	7	8
FLOW M^3/HR	2230	2230	2	2	30 MAX	30 MAX	13/17 NOTES 4&11	130/170 NOTES 4&11
TEMP (°C)	<100	<100	30	30	30		15/70	40/80
PRESS Kg/cm^2 g	1.0 — 1.3 (ΔP=0.3 Kg/cm²)		1.0	2.2	ΔP = 1.0 MAX			100
AVAILABLE NPSH M	30							

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 FROM 7 FLOWS IN TO THE REACTOR AT 3.
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 5 PERCENT MARGIN.
9. POSITION "8" CREATED EXCLUSIVELY FOR DEFINING DESIGN PRESSURE/TEMPERATURE CONDITIONS (NOT PROCESS CONDITIONS).
10. RCW SYS 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.

	MPL NO.
1. CONTROL ROD DRIVE SYS. PFD	C12-1030
2. REAC BUILDING COOLING WATER SYSTEM PFD	P21-1030

SUPPORTING DOCUMENTS	MPL NO.
1. PIPING AND INSTRUMENT SYMBOLS	A10-3030
2. STEADY STATE PERFORMANCE REQUIREMENTS	A11-4020
3. REAC RECIRC SYS P&ID	B31-1010
4. REAC RECIRC SYS DESIGN SPEC	B31-4010
5. ABWR DOCUMENT STANDARDS	A10-3020

Figure 5.4-5 REACTOR RECIRCULATION SYSTEM PFD

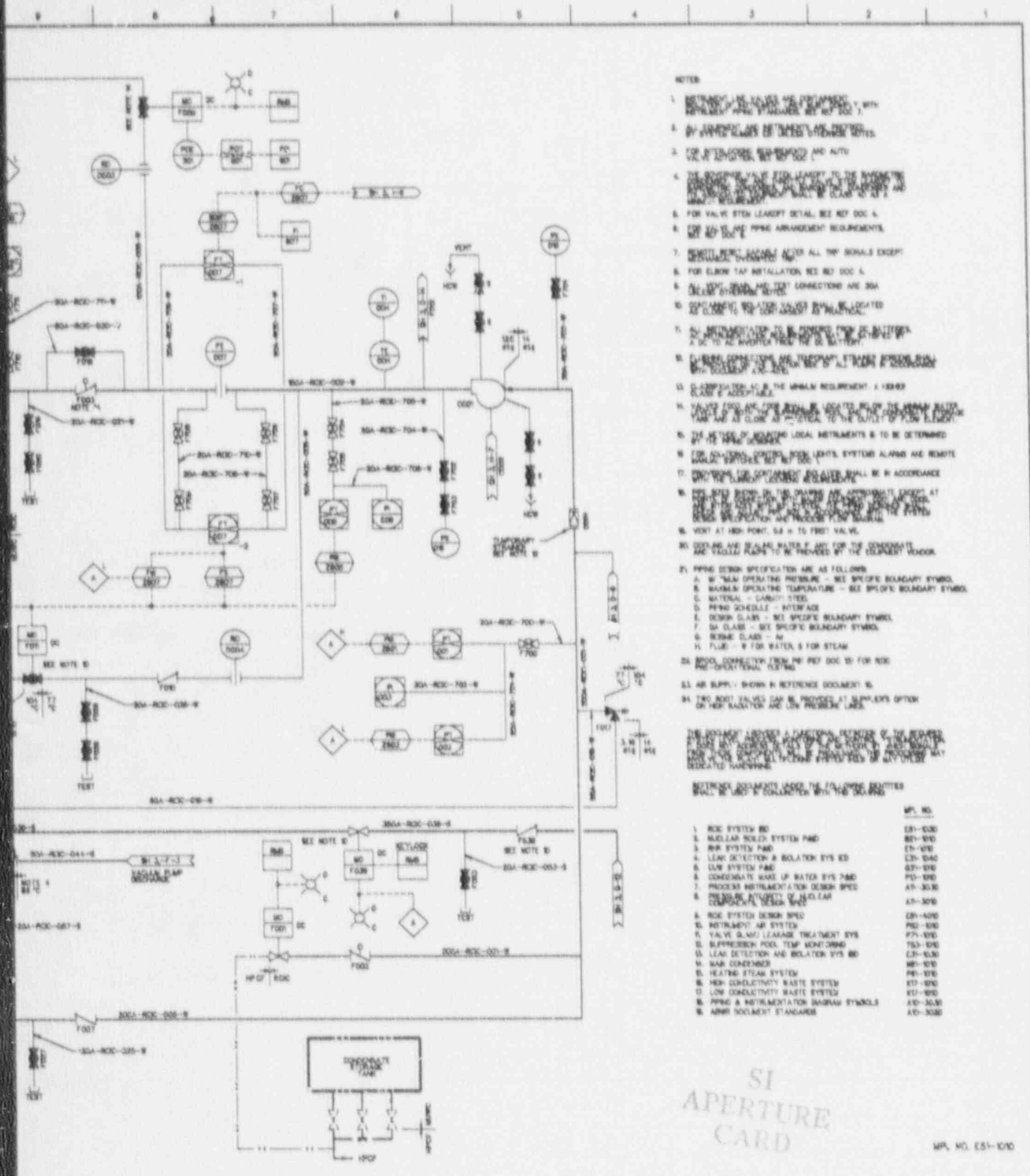


Figure 5.4-8 REACTOR CORE ISOLATION COOLING SYSTEM P&ID, Sheet 1 of 3

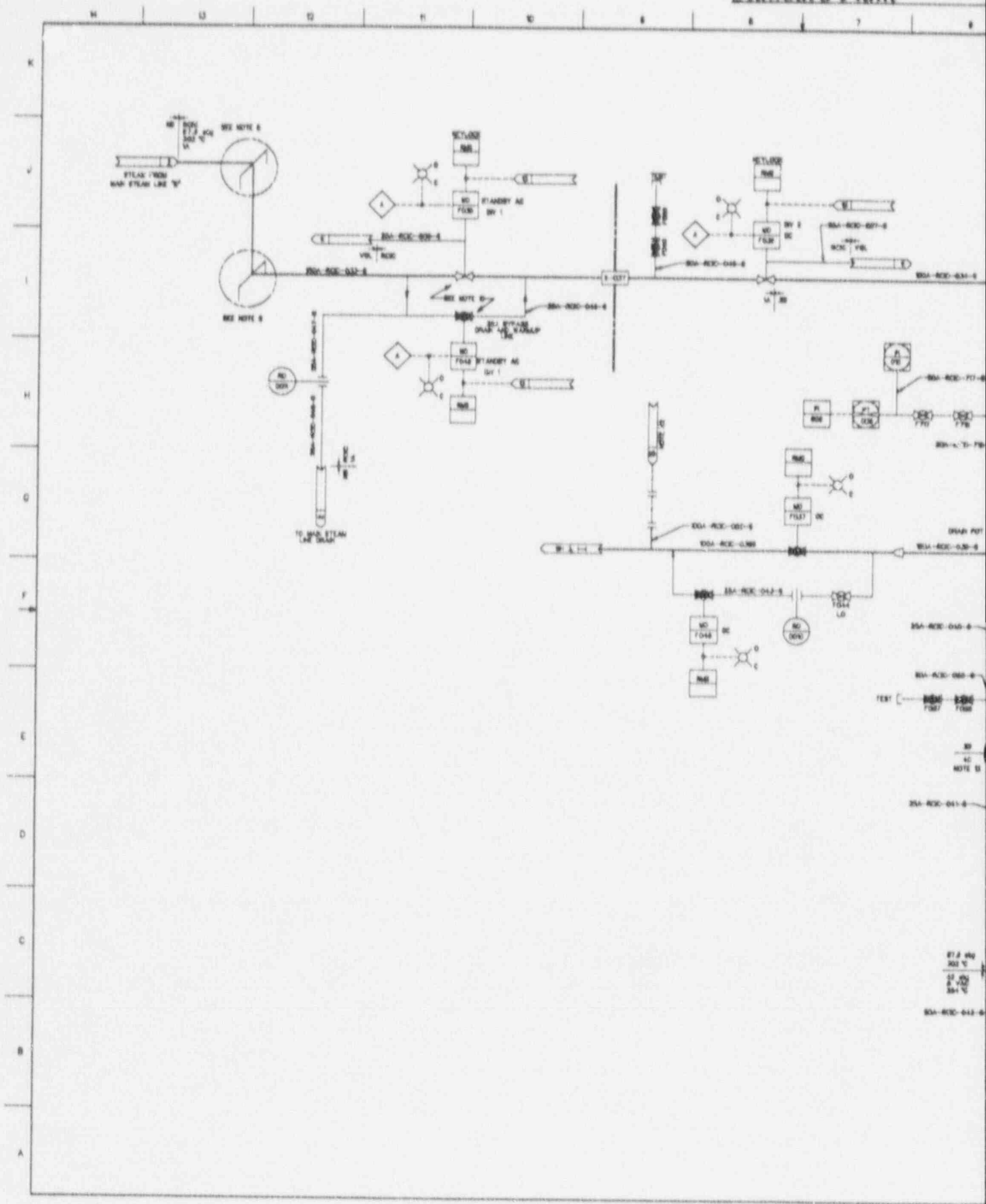


Figure 5.4-8 REACTOR

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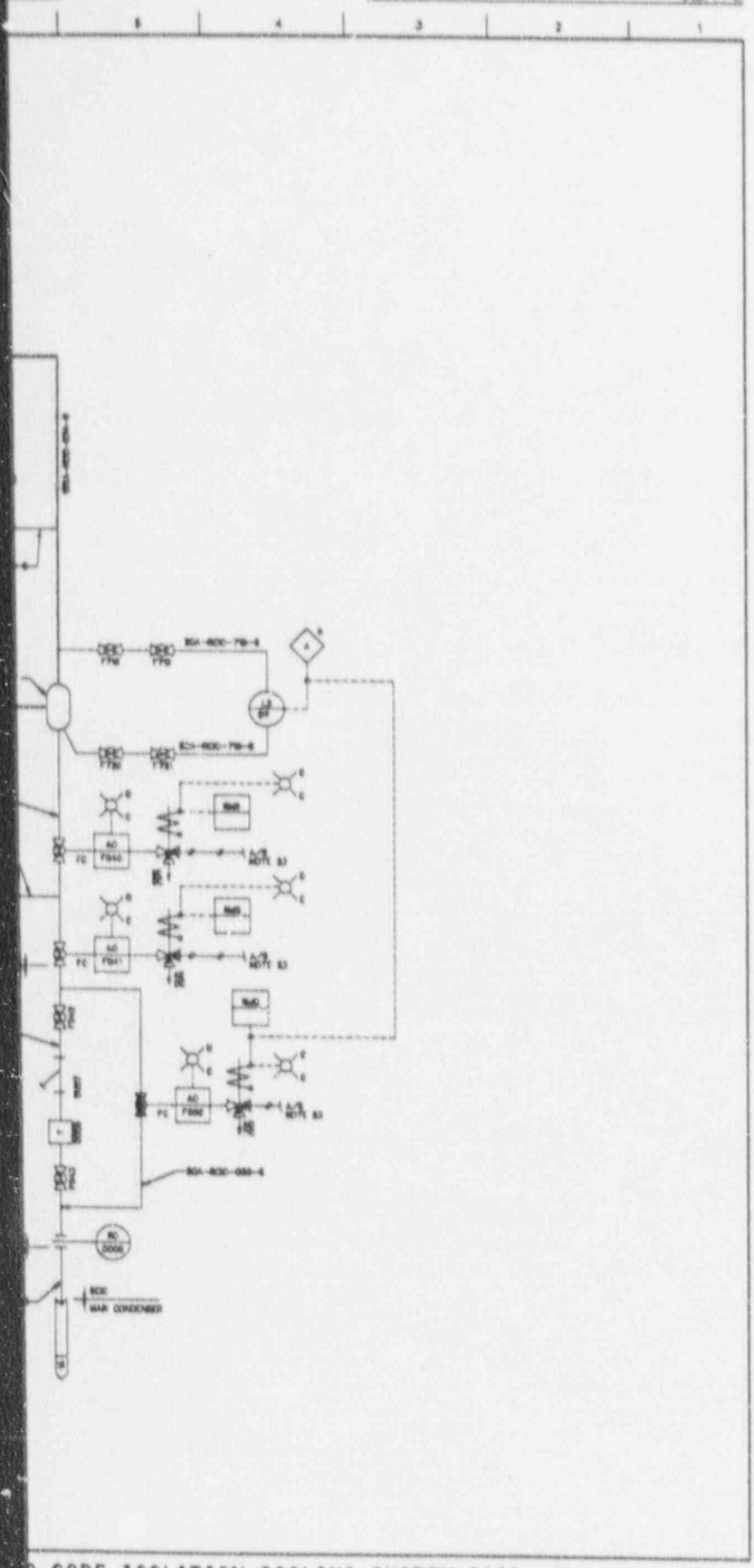
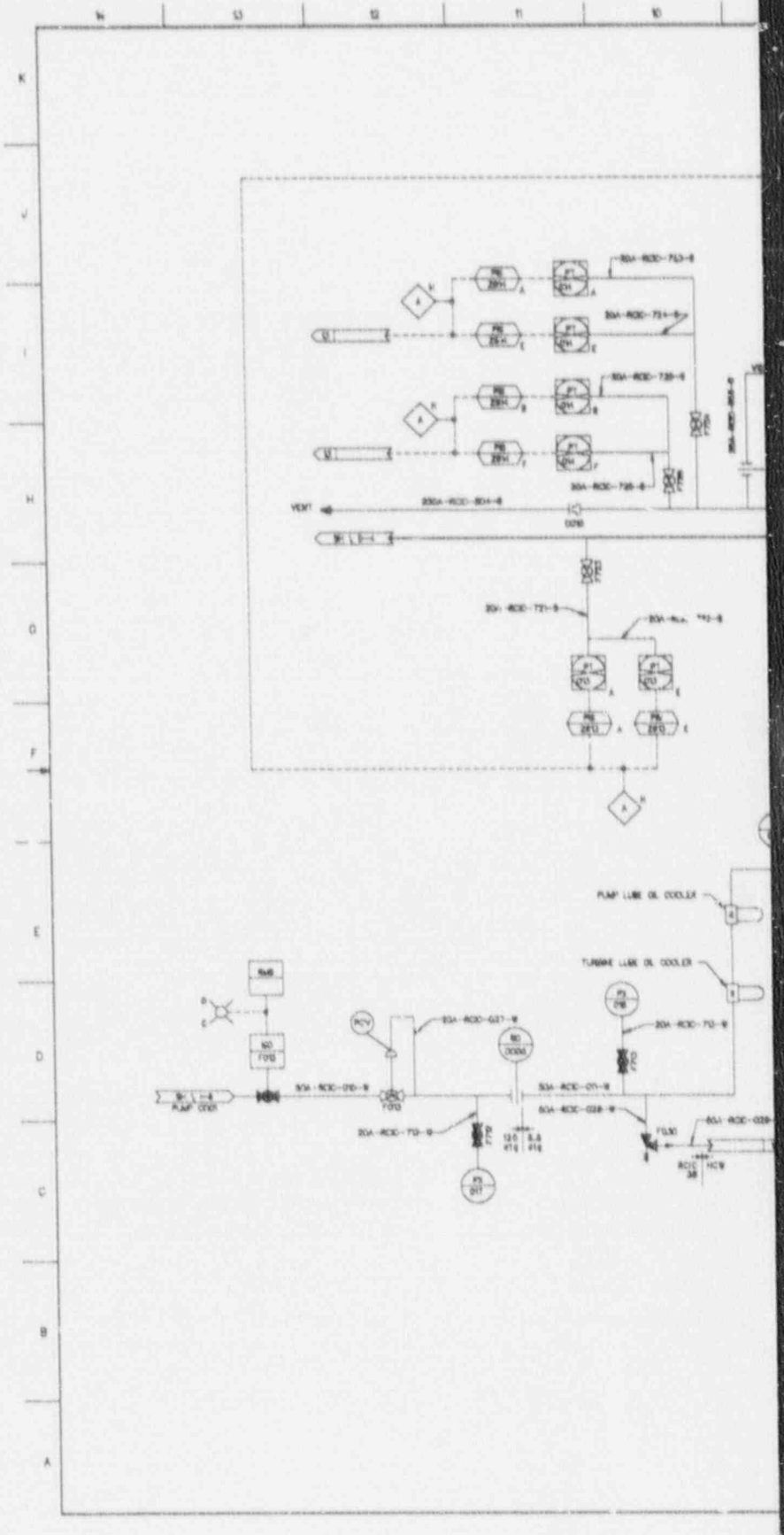
REV. C



R CORE ISOLATION COOLING SYSTEM P&ID, Sheet 2 of 3

5.4-52


PUMP LUBE OIL COOLER
TURBINE LUBE OIL COOLER
VENT
PUMP CASE

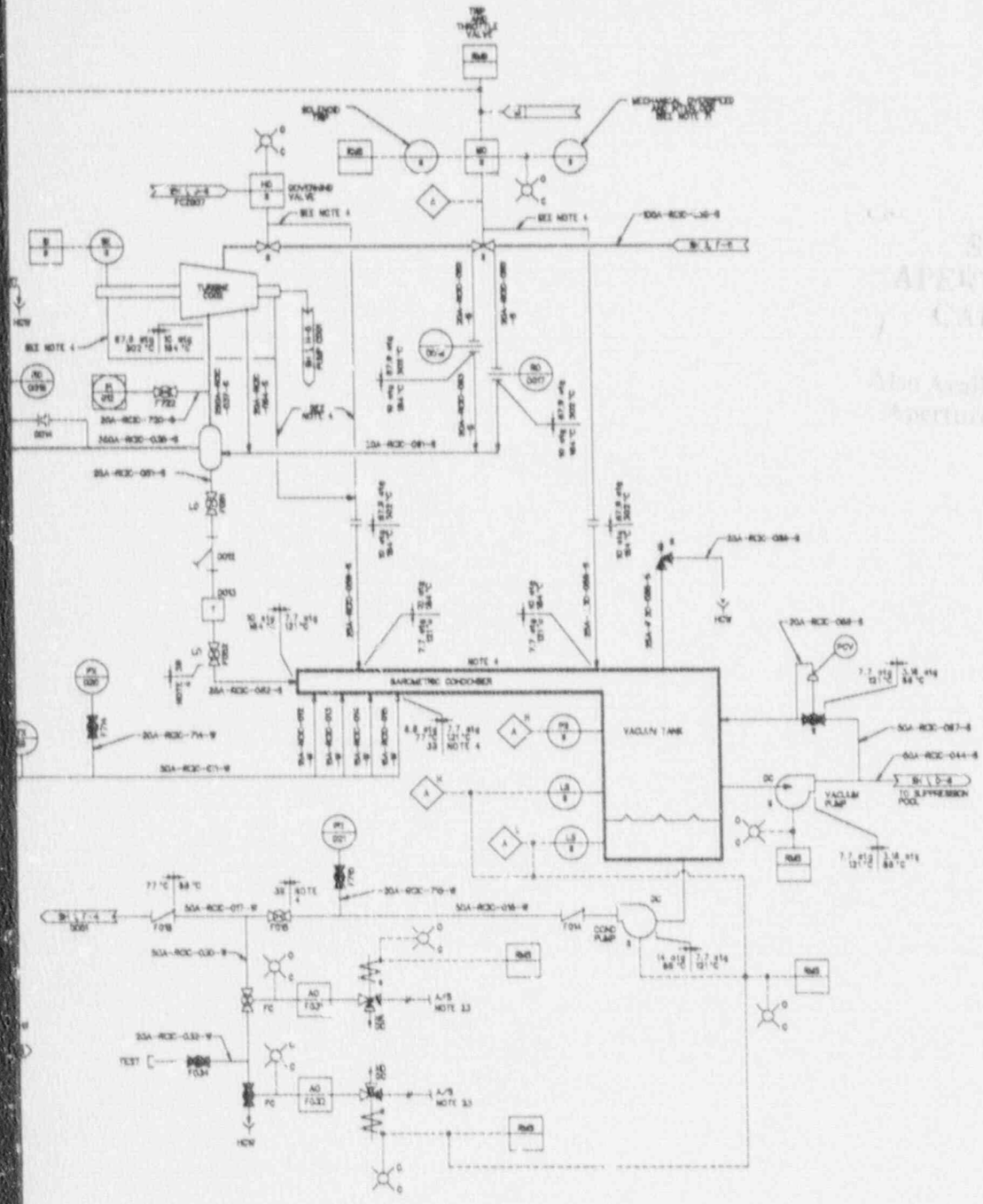
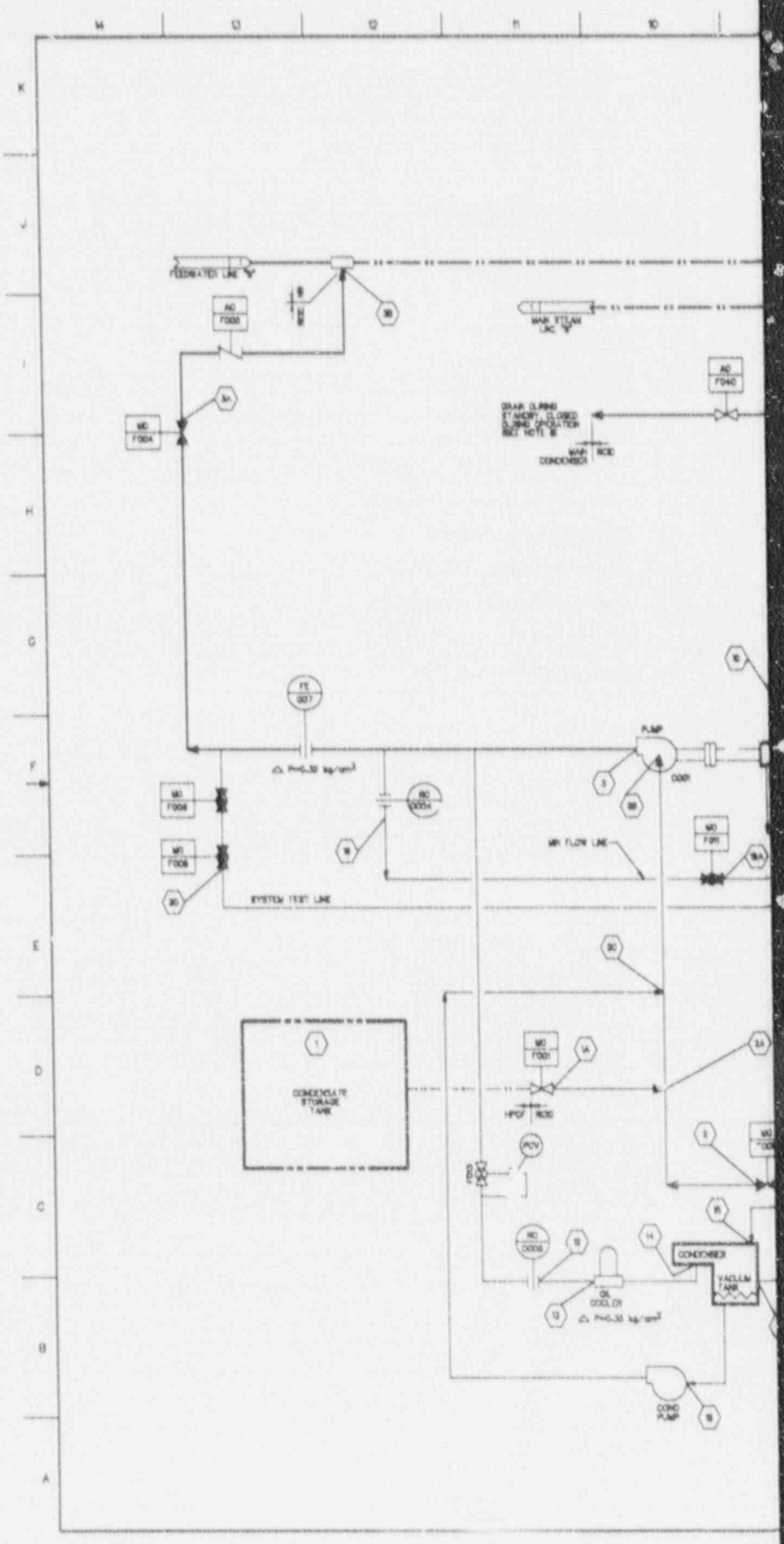
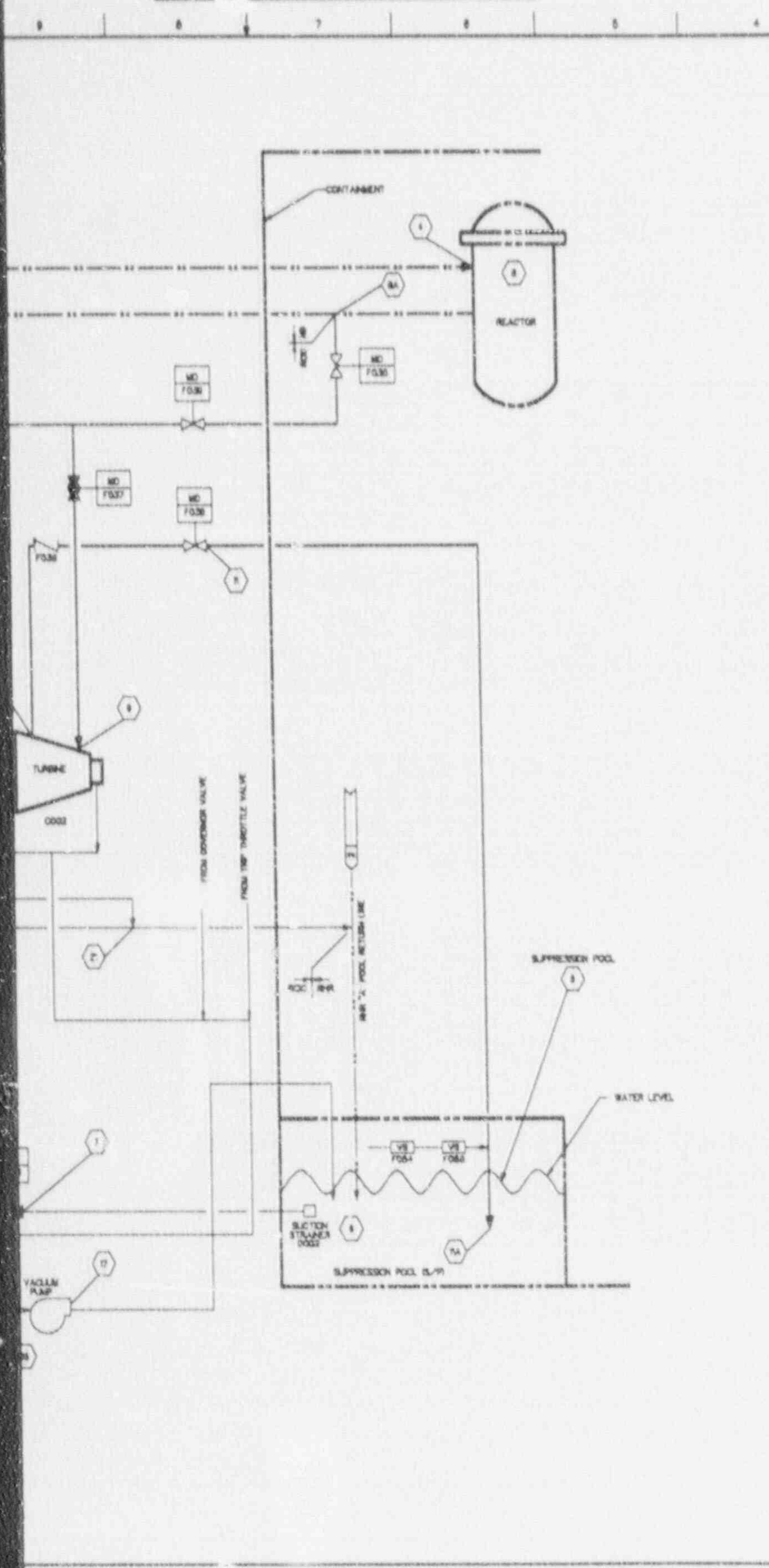


Figure 5.4-8 REACTOR CORE ISOLATION COOLING SYSTEM P&ID, Sheet 3 of 3



14
13
12
11
10
K
J
I
H
G
F
E
D
C
B
A
FEEDWATER LINE "B"
AO
F040
MO
F004
FE
007
PUMP
MO
F008
MO
F011
MIN FLOW LINE
SYSTEM TEST LINE
CONDENSATE STORAGE TANK
MO
F001
PCV
OIL COOLER
CONDENSER
VACUUM TANK
COND PUMP



NOTES:

1. ATMOSPHERIC PRESSURE (= 1.0 kg/cm² abs) WAS USED IN CALCULATIONS.
2. WATER FLOWS ARE SHOWN IN m³/hr. STEAM FLOWS IN 1000 kg/hr.
3. THE UNRECOVERED FLOW ORIFICE PRESSURE DROP OF 3.2 kg/cm² (PER ORIFICE) 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 (13) AND (14)
5. THE CONTROLLING MODES FOR LINE SIZING AND ARRANGEMENT ARE:

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

6. SYSTEM OPERATION IS POSSIBLE WITH INTERMEDIATE PRESSURES IN THE REACTOR VESSEL AND THE SUPPRESSION POOL. HOWEVER, THESE CONDITIONS DO NOT CONTROL PIPE OR VALVE SIZING OR SPECIFICATION, AND NO DATA IS SHOWN.
7. PUMP MINIMUM FLOW REQUIREMENT MAY OCCUR DURING ANY OPERATING MODE. FLOW REQUIREMENT IS 30.4 m³/hr MINIMUM WITH TURBINE/PUMP AT MAXIMUM SPEED (I.E. MODE A).
8. DURING SYSTEM STANDBY EQUIPMENT IS NOT OPERATING. INTERMITTENT FLOW OCCURS THROUGH THE STEAM SUPPLY LINE DRAIN TRAP SYSTEM AT 70 kg/cm² abs AND 285 °C.
9. THIS TABLE IS FOR REFERENCE ONLY. SEE RCIC P&ID (REF DOC 4) FOR REQUIRED VALUES.
10. FLOW VALUES SHOWN IN MODES C & D ARE BASED UPON SUCTION PIPING DESIGN PERMITTING THE MINIMUM REQUIRED NPSH TO CONTINUE TO BE PROVIDED TO THE RCIC PUMP WHEN THE SUPPRESSION POOL SUCTION STRAINER IS 50 PERCENT PLUGGED.
11. STEAM FLOWS FOR TEST MODE AT POSITION (1) (10) (4) AND (9A) ARE BASED UPON A PUMP TDH OF 780 m.
12. DURING RCIC SYSTEM OPERATION A FLOW OF 0.08 m³/hr OCCURS THROUGH THE TURBINE EXHAUST LINE DRAIN POT SYSTEM AT 1.8 kg/cm² abs AND 118 °C.
13. SEE REF DOC 1 FOR PEAK PRESSURE.

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

	MPL NO.
1. NUCLEAR BOILER SYSTEM PFD	B21-1010
2. RESIDUAL HEAT REMOVAL SYSTEM PFD	E11-1020
3. HIGH PRESSURE CORE FLOODER SYS PFD	E22-1020
4. RCIC SYSTEM P&ID	E51-1010
5. PIPING AND INSTRUMENTATION DIAGRAM SYMBOLS	A10-3020
6. ABWR DOCUMENT STANDARDS	A10-3020

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Figure 5.4-9 RCIC SYSTEM PFD, Sheet 1 of 2

MODE A SUCTION FROM CONDENSATE STORAGE, REACTOR AT HIGH PRESSURE, SUPPRESSION POOL AT ELEVATED PRESSURE

POSITION	1	1A	2	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
FLOW (SEE NOTE 3)	-	100	100	100	-	-	0	-	16.4	16.4	16.4	0	0	0	0.03	-	0.005	0	-	0	0
PRESS kg/cm² abs	1.0	*	*	8.4	1.3	-	-	8.4	*	*	1.4	5.3	*	5.3	*	0.7	*	*	*	-	-
TEMP °C	40	40	40	40	80	-	-	288	SAT	SAT	106	40	40	40	70	43	40	40	40	-	-
MAX/MIN TEMP °C	40/-10	40/-10	40/-10	40/-10	71/-10	-	-	286/-10	286/-10	121/-10	121/-10	40/-10	40/-10	40/-10	121/-10	85/-10	85/-10	85/-10	40/-10	-	-

MODE B SUCTION FROM CONDENSATE STORAGE, REACTOR AT LOW PRESSURE, SUPPRESSION POOL AT ELEVATED PRESSURE

POSITION	1	1A	2	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
FLOW (SEE NOTE 3)	-	100	100	100	-	-	0	-	5.4	5.3	5.3	0	0	0	0.03	-	0.005	0	-	0	0
PRESS kg/cm² abs	1.0	*	*	10	1.3	-	-	10	*	*	1.4	5.3	*	5.3	*	0.7	*	*	*	-	-
TEMP °C	40	40	40	40	80	-	-	28	SAT	SAT	108	40	40	40	70	40	40	40	40	-	-
MAX/MIN TEMP °C	40/-10	40/-10	40/-10	40/-10	71/-10	-	-	186/-10	186/-10	121/-10	121/-10	40/-10	40/-10	40/-10	121/-10	85/-10	85/-10	85/-10	40/-10	-	-

MODE C SUCTION FROM SUPPRESSION POOL, REACTOR AT HIGH PRESSURE, SUPPRESSION POOL AT LOW PRESSURE

POSITION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
FLOW (SEE NOTE 3)	-	100	100	100	-	-	100	-	16.4	16.4	16.4	0	0	0	0.03	-	0.005	0	-	0	0
PRESS kg/cm² abs	-	*	*	8.4	1.0	1.4	1.4	8.4	*	*	1.2	5.3	*	5.3	*	0.7	*	*	*	-	-
TEMP °C	-	80	80	80	80	80	80	288	SAT	SAT	103	80	80	80	70	71	71	71	80	-	-
MAX/MIN TEMP °C	-	71/-10	71/-10	71/-10	71/-10	71/-10	71/-10	286/-10	286/-10	121/-10	121/-10	71/-10	71/-10	71/-10	121/-10	71/-10	71/-10	71/-10	71/-10	-	-

MODE D SUCTION FROM SUPPRESSION POOL, REACTOR AT LOW PRESSURE, SUPPRESSION POOL AT LOW PRESSURE

POSITION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
FLOW (SEE NOTE 3)	-	100	100	100	-	-	100	-	5.4	5.3	5.3	0	0	0	0.03	-	0.005	0	-	0	0
PRESS kg/cm² abs	-	*	*	10	1.0	1.4	1.2	10	*	*	1.2	5.3	*	5.3	*	0.7	*	*	*	-	-
TEMP °C	-	80	80	80	80	80	80	180	SAT	SAT	103	80	80	80	70	71	71	71	80	-	-
MAX/MIN TEMP °C	-	71/-10	71/-10	71/-10	71/-10	71/-10	71/-10	186/-10	186/-10	121/-10	121/-10	71/-10	71/-10	71/-10	121/-10	71/-10	71/-10	71/-10	71/-10	-	-

MODE E TEST MODE SUCTION FROM SUPPRESSION POOL, REACTOR AT HIGH PRESSURE, SUPPRESSION POOL AT LOW PRESSURE

POSITION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
FLOW (SEE NOTE 3)	-	100	100	-	-	-	100	-	16.15	16.1	16.1	0	0	0	0.03	-	0.005	0	-	100	100
PRESS kg/cm² abs	-	*	*	-	1.0	1.4	1.4	13.1	*	-	1.2	5.3	*	5.3	*	0.7	*	*	*	*	*
TEMP °C	-	38	38	-	38	38	38	188	SAT	SAT	103	38	38	38	70	44	44	44	38	38	38
MAX/MIN TEMP °C	-	71/-10	71/-10	-	71/-10	71/-10	71/-10	186/-10	186/-10	121/-10	121/-10	71/-10	71/-10	71/-10	121/-10	71/-10	71/-10	71/-10	71/-10	71/-10	71/-10

(SEE NOTE 8)

POSITION	1A-2A	2-3B	3-3A	3A-3B	6-7	6A-6	10-11	11-11A	3-12	12-13	13-14	15	17	19-20	3-8	19-19A	19A-21	3-20	20-21
PEAK PRESS kg/cm² g	N/A	N/A	126.0	NOTE 10	N/A	126.8	7.3	N/A	126.0	N/A	N/A	N/A	N/A	N/A	126.0	126.0	N/A	126.0	N/A
MAX OPERATING PRESS kg/cm² g	14	14	120	87.8	3.19	87.8	10	10	120	8.8	8.8	7.7	3.19	14	120	120	3.19	120	3.19
MAX OPERATING TEMP °C	77	77	77	200	77	300	104	104	77	77	77	121	80	80	77	77	104	77	104
ESTIMATED LIFE SIZE mm/A	200	200	150	150	200	200	500	300	80	80	80	80	40	80	80	80	80	100	100

PEAK PRESSURE - IS THE MAXIMUM PRESSURE ANTICIPATED DURING A TRANSIENT PERIOD WITH ALL OF THE CONTRIBUTING ELEMENTS AT A MAXIMUM. IT WOULD BE EXPECTED TO OCCUR LESS THAN 1% OF SYSTEM OPERATING TIME.

Figure

5 4 3 2 1

* THE PRESSURE AT THIS POSITION DEPENDS ON PIPING ARRANGEMENT AND MAY BE VARIED WITHIN THE FOLLOWING LIMITS.

POSITION

(V) INLET TO PUMP FROM CONDENSATE STORAGE TANK

(1) MINIMUM NPSH = 1.2 m [illegible] METER ABOVE PUMP FLOOR)

(2) MAXIMUM PUMP TOTAL DYNAMIC HEAD
800 m FOR MODES A & C
985 m FOR MODES B & D

(3) MAXIMUM PRESSURE DROP BETWEEN POSITION
(4) AND (5) = 1.1 kg/cm² (SEE NOTE 8)

(6) MAXIMUM PRESSURE ALLOWED FOR RATED SYSTEM PERFORMANCE = 1.8 kg/cm² abs

(10) (12) MAXIMUM PRESSURE ALLOWED = 8.8 kg/cm² abs ±1%

(14) PRESSURE IS 0.35 kg/cm² LESS THAN POSITION (13)

(15) SUFFICIENT VACUUM TO PREVENT TURBINE SHAFT-OUT-LEAKAGE. TO BE SPECIFIED ON TURBINE VENDOR DRAWINGS.

(17) MAXIMUM PRESSURE AVAILABLE = 3.1 kg/cm² abs

(18) MAXIMUM PRESSURE AVAILABLE = 4.2 kg/cm² abs

(19) SUFFICIENT PRESSURE TO RETURN TO SUPPRESSION POOL

(20) (21) SUFFICIENT PRESSURE TO RETURN TO SUPPRESSION POOL

TABLE 1 VALVE POSITION CHART

VALVE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MODE A	O	C	O	O	O	O	O	C	C	C
MODE B	O	C	O	O	O	O	O	C	C	C
MODE C	O	O	C	O	O	O	O	C	C	C
MODE D	O	O	C	O	O	O	O	C	C	C
MODE E	*	O	C	O	O	O	O	C	T	T

O = OPEN C = CLOSE T = THROTTLE

5.4-9 RCIC SYSTEM PFD, Sheet 2 of 2

NOTES:

1. PIPING HIGH POINT VENTS AND LOW POINT DRAINS ARE TO BE ADDED AS NECESSARY.
2. INSTRUMENT LINE DESIGN AND VALVING SHALL BE IN ACCORDANCE WITH INSTRUMENT PIPING SPECIFICATION A11-5030.
3. VALVE F004 IS REQUIRED IF THERE IS POTENTIAL FOR OVERPRESSURE.
4. FOR ADDITIONAL CONTROL ROOM LIGHTS, SYSTEM ALARMS AND REMOTE MANUAL SWITCHES, SEE THE RHR IBD E11-1030.
5. PROVISIONS FOR CONTAINMENT ISOLATION SHALL BE IN ACCORDANCE WITH CURRENT LICENSING REQUIREMENTS.
6. VALVE F008 SHALL BE LOCATED AT AN ELEVATION LOWER THAN THE SUPPRESSION POOL MINIMUM WATER LEVEL.
7. PUMP C001 COOLING WATER, IF REQUIRED, IS SPECIFIED IN P21-1010.
8. VALVES F001, F006 & F011 SHALL BE LOCATED AS CLOSE AS POSSIBLE TO THE CONTAINMENT PENETRATION.
9. ALL MOTOR OPERATED VALVES ARE AC OPERATED UNLESS OTHERWISE NOTED.
10. EQUIPMENT IN SUBSYSTEMS A, B AND C SHALL HAVE THE SUFFIX LETTER A, B AND C RESPECTIVELY AFTER THE EQUIPMENT NUMBER.
11. FLUSHING CONNECTIONS AND TEMPORARY STRAINER SCREENS ON THE SUCTION SIDE OF ALL PUMPS SHALL BE PROVIDED IN ACCORDANCE WITH A70-4010.
12. ALL MOTOR OPERATED VALVES, AIR OPERATED VALVES AND ALL PUMPS SHALL HAVE A LOCAL PANEL REMOTE MANUAL SWITCH AND STATUS LIGHT THAT WILL BE HARD WIRED. IN ADDITION, THERE WILL BE A REDUNDANT REMOTE MANUAL SWITCH AND STATUS LIGHT CONNECTED BY MEANS OF MULTIPLEXING AND LOCATED IN THE MAIN CONTROL ROOM.
13. DRYWELL PIPING RUNS SHALL BE HORIZONTAL OR VERTICAL UPWARDS FROM THE DRYWELL WALL TO THE POINT OF ATTACHMENT WITH THE REACTOR VESSEL.
14. THIS HIGH POINT VENT SHALL BE LOCATED AT THE HIGHEST POINT IN THE PIPING OUTSIDE THE DRYWELL BETWEEN VALVES F017 AND F018.
15. SUBSYSTEM A RETURNS TO RPV THROUGH FEEDWATER LINE A.
16. DISCHARGE LINES FOR COOLING WATER TO BE ROUTED UPSTREAM OF SERVICE WATER RADIATION MONITORS.
17. VALVE F014 SHALL BE AS CLOSE AS POSSIBLE TO THE CONNECTIONS TO THE MAIN LINE.
18. DESIGN LINE SIZE WILL BE FINALIZED AT THE DETAILED DESIGN PHASE. ACTUAL LINE SIZES DETERMINED BY THE PIPING DESIGNER SHALL MEET THE PROCESS DATA HYDRAULIC REQUIREMENTS.
19. CHECK VALVE F008 SHALL BE LOCATED AS CLOSE AS PRACTICAL TO THE REACTOR VESSEL NOZZLE.
20. VALVES F011A, F011B AND F011C ARE IN ELECTRICAL DIVISIONS B, C AND A RESPECTIVELY. THE MANUAL CONTROL SWITCHES FOR VALVES F011A, F011C AND F011C ARE IN ELECTRICAL DIVISIONS A, B AND C RESPECTIVELY.
21. PIPING DESIGN SPECIFICATIONS ARE AS FOLLOWS:
    A. MAXIMUM OPERATING PRESSURE – SEE SPECIFIC BOUNDARY SYMBOL
    B. MAXIMUM OPERATING TEMPERATURE – SEE SPECIFIC BOUNDARY SYMBOL
    C. MATERIAL – CARBON STEEL
    D. PIPING SCHEDULE – INTERFACE
    E. DESIGN CLASS – SEE SPECIFIC BOUNDARY SYMBOL
    F. QC CLASS – SEE SPECIFIC BOUNDARY SYMBOL
    G. SEISMIC CLASS – RHR – As
    H. FLUID – WATER
    I. INTERFACE
22. AIR SUPPLY AND NITROGEN SUPPLY SHOWN IN SUPPLEMENTAL DOCUMENT 16.
23. STRAINER TYPE AS SUPPLIED WITH PUMP C001.
24. FLANGE CONNECTION USED FOR OCCASIONAL SUPPRESSION POOL DRAINING.
25. DRAIN AND VENT PIPING
    MAXIMUM OPERATING PR
    MAXIMUM OPERATING TE
26. UNLESS PIPE NUMBERS
    LOOP RANGES OF NUM
    TYPE OF PIPE AS FOLL

    PROCESS PIPING
    DRAIN AND VENT PIPING
    INSTRUMENT PIPING
27. THE VALVE TYPE FOR
    IN THE FINAL DESIGN.
28. THE RECORDING FUNCT
    RECORDING DEVICE.
29. TWO ROOT VALVES CA
    OPTION ON HIGH RADIA
    VENT LINES.

9 8 7 6 5 4 3 2 1

DESIGN CONDITIONS ARE:

PRESSURE – BASE AS MAIN LINE UPSTREAM OF VALVE (A) DOWNSTREAM PRESSURE FROM LAST VALVE TO TUNNEL)

TEMPERATURE – BASE AS MAIN LINE UPSTREAM OF VALVE (B) "C" FROM LAST VALVE TO TUNNEL)

ARE ASSIGNED SEQUENTIALLY FOR EACH PIPE SIZES ARE ALLOCATED FOR EACH LOOP AND

	LOOP A	LOOP B	LOOP C
	001~199	201~300	301~399
	500~629	630~658	660~689
	700~739	730~764	760~796

7044 AND 7045 WILL BE DECEAD

ON CAN BE ACHIEVED BY A COMMON

BE PROVIDED AT THE SUPPLIERS
OW/LOW PRESSURE DRAIN AND

SUPPLEMENTAL DOCUMENTS (NEED) THE FOLLOWING IDENTITIES ARE TO BE USED IN CONJUNCTION WITH THIS DRAWING

	MFL NO.
1. RESIDUAL HEAT REMOVAL SYSTEM P/D	E5-1030
2. RESIDUAL HEAT REMOVAL SYSTEM ED	E5-1030
3. SAMPLING SYSTEM P&ID	P81-1010
4. REACTOR PRESSURE VESSEL SYSTEM DESIGN SPEC	B1-4010
5. REACTOR WATER CLEANUP SYSTEM P&ID	G31-1010
6. FUEL POOL COOLING AND CLEANUP SYSTEM P&ID	G41-1010
7. VALVE GLAND LEAKAGE TREATMENT SYSTEM P&ID	F71-1010
8. MAKE-UP WATER SYSTEM (CONDENSATE) P&ID	P13-1010
9. REMOTE SHUTDOWN SYSTEM ED	D81-1040
10. HIGH PRESSURE CORE FLOODER P&ID	E22-1010
11. REACTOR CORE ISOLATION COOLING SYSTEM P&ID	E51-1010
12. NUCLEAR BOILER SYSTEM P&ID	B21-1010
13. HIGH CONDUCTIVITY WASTE SYSTEM P&ID	F17-1010
14. REACTOR BUILDING COOLING WATER SYSTEM P&ID	P21-1010
15. INSTRUMENT AIR SYSTEM P&ID	P53-1010
16. FLAMMABILITY CONTROL SYSTEM P&ID	T46-1010
17. NUCLEAR BOILER SYSTEM ED	B21-1030
18. POST ACCIDENT SAMPLING SYSTEM P&ID	P81-1010
19. SUPPRESSION POOL WATER SYS P&ID	NOT USED
20. LOW CONDUCTIVITY WASTE SYSTEM P&ID	F17-1010

SUPPORTING DOCUMENTS
1. PIPING AND INSTRUMENT SYMBOLS A10-3030

MFL NO. E5-1010

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

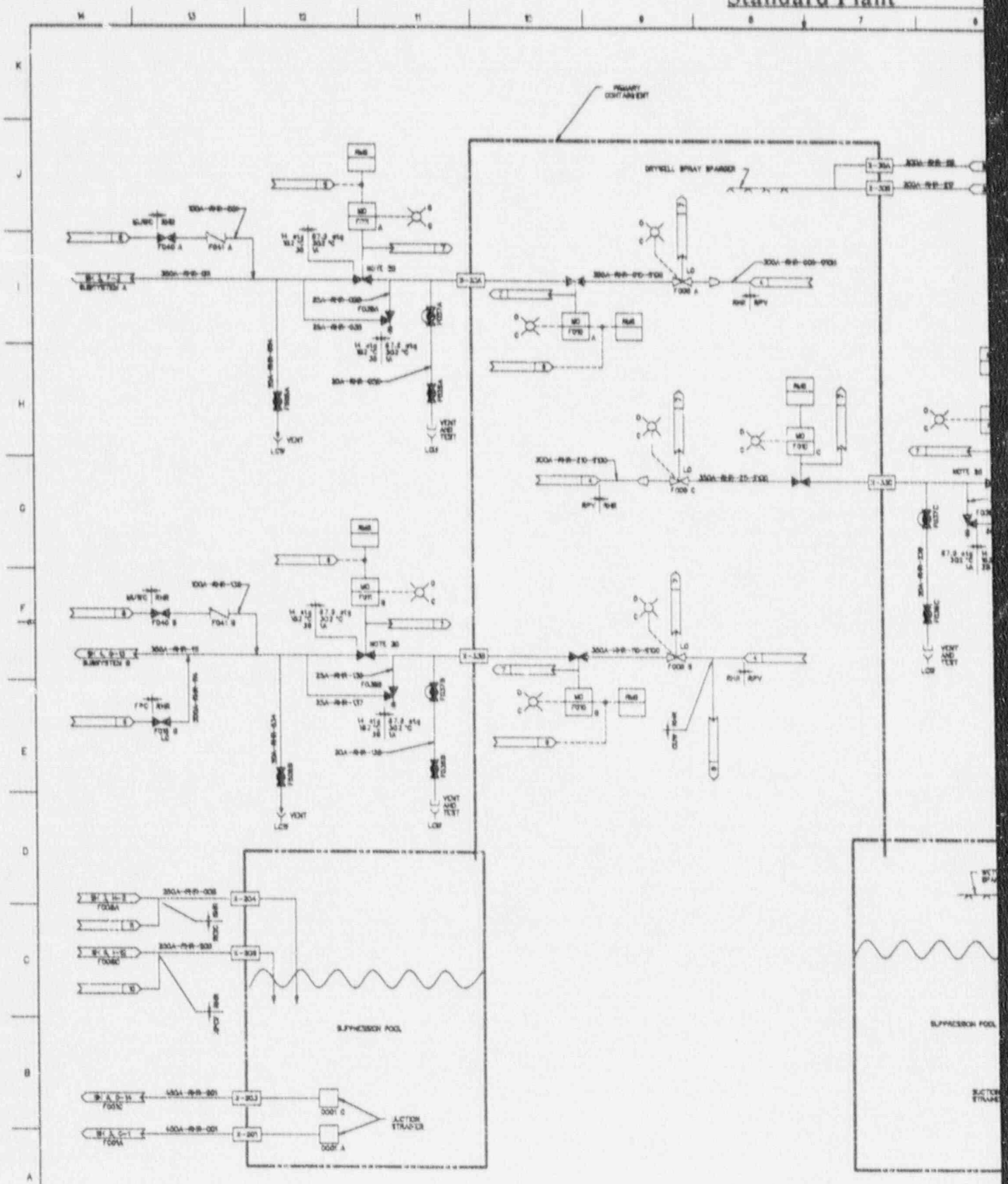
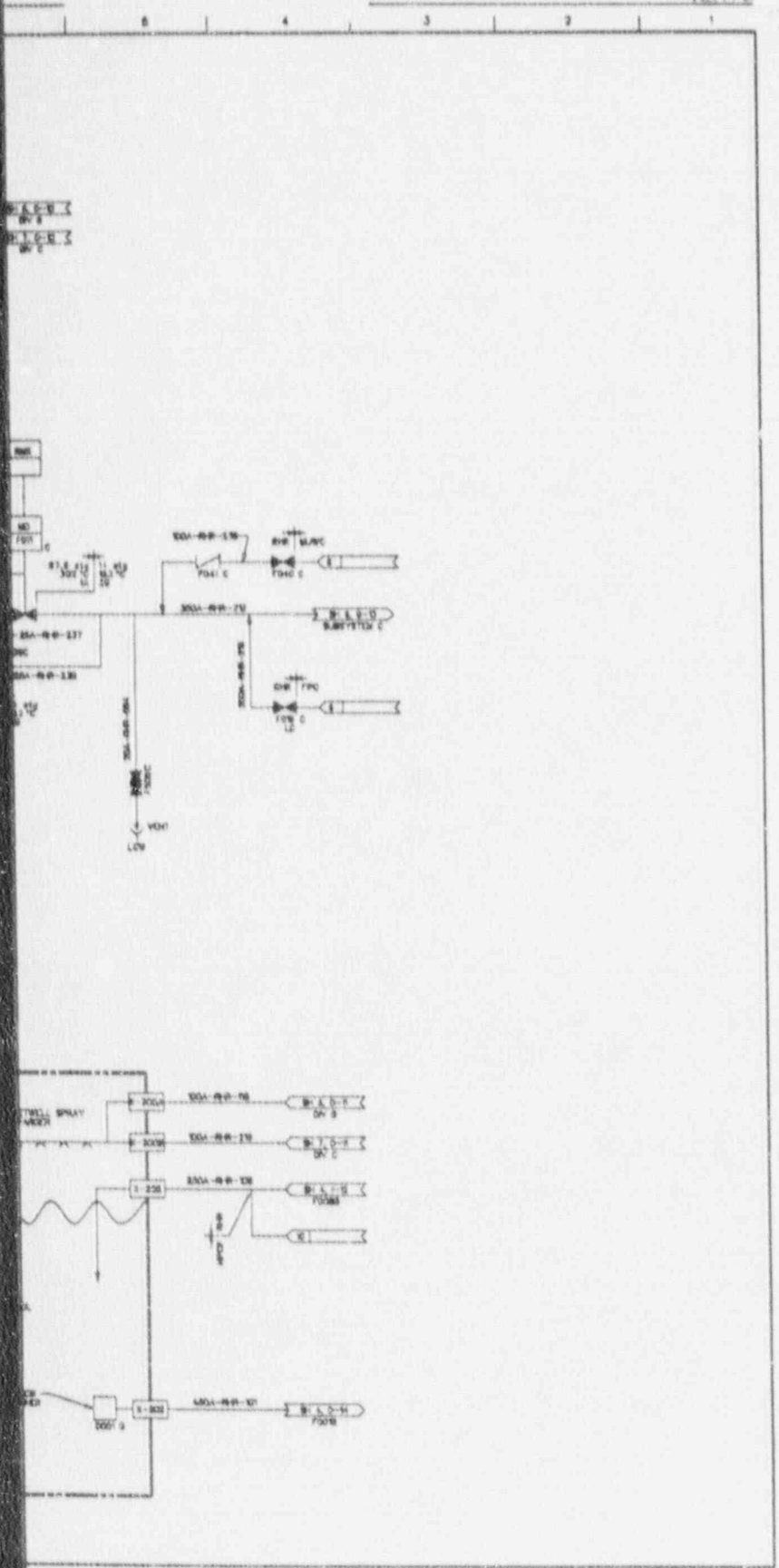
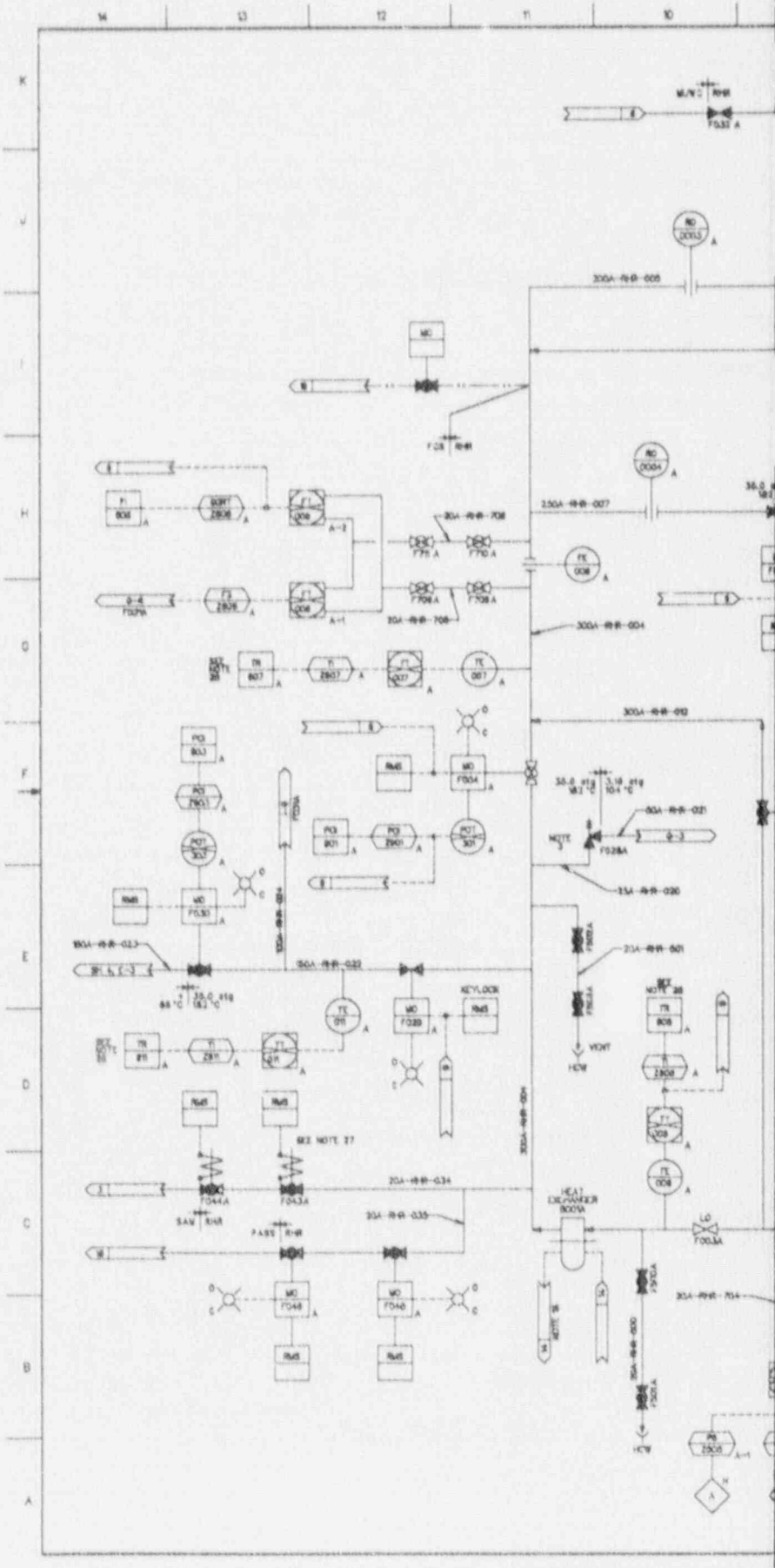


Figure 5.4-10 R



RESIDUAL HEAT REMOVAL SYSTEM P&ID, Sheet 2 of 7



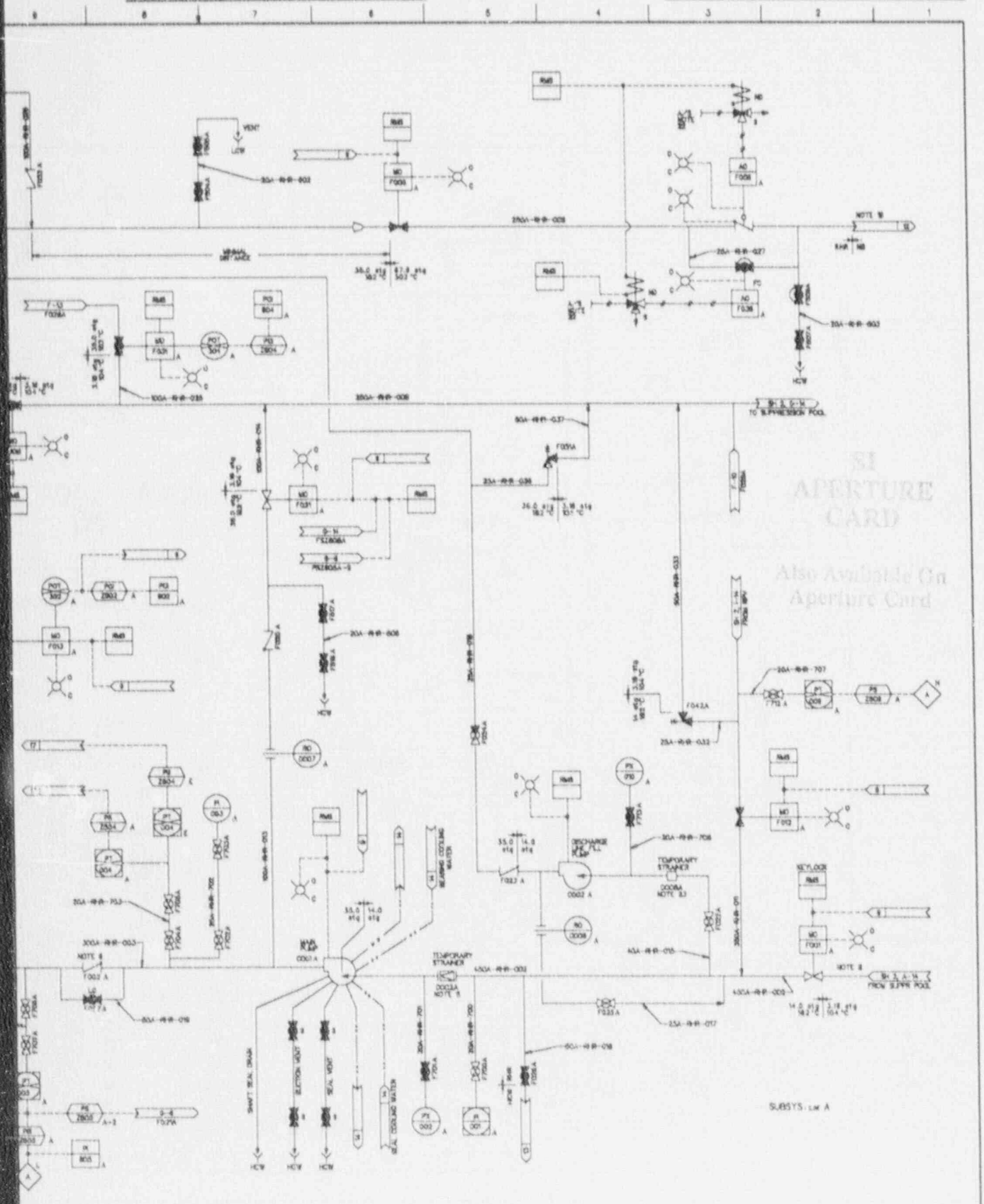


Figure 5.4-10 RESIDUAL HEAT REMOVAL SYSTEM P&ID, Sheet 3 of 7

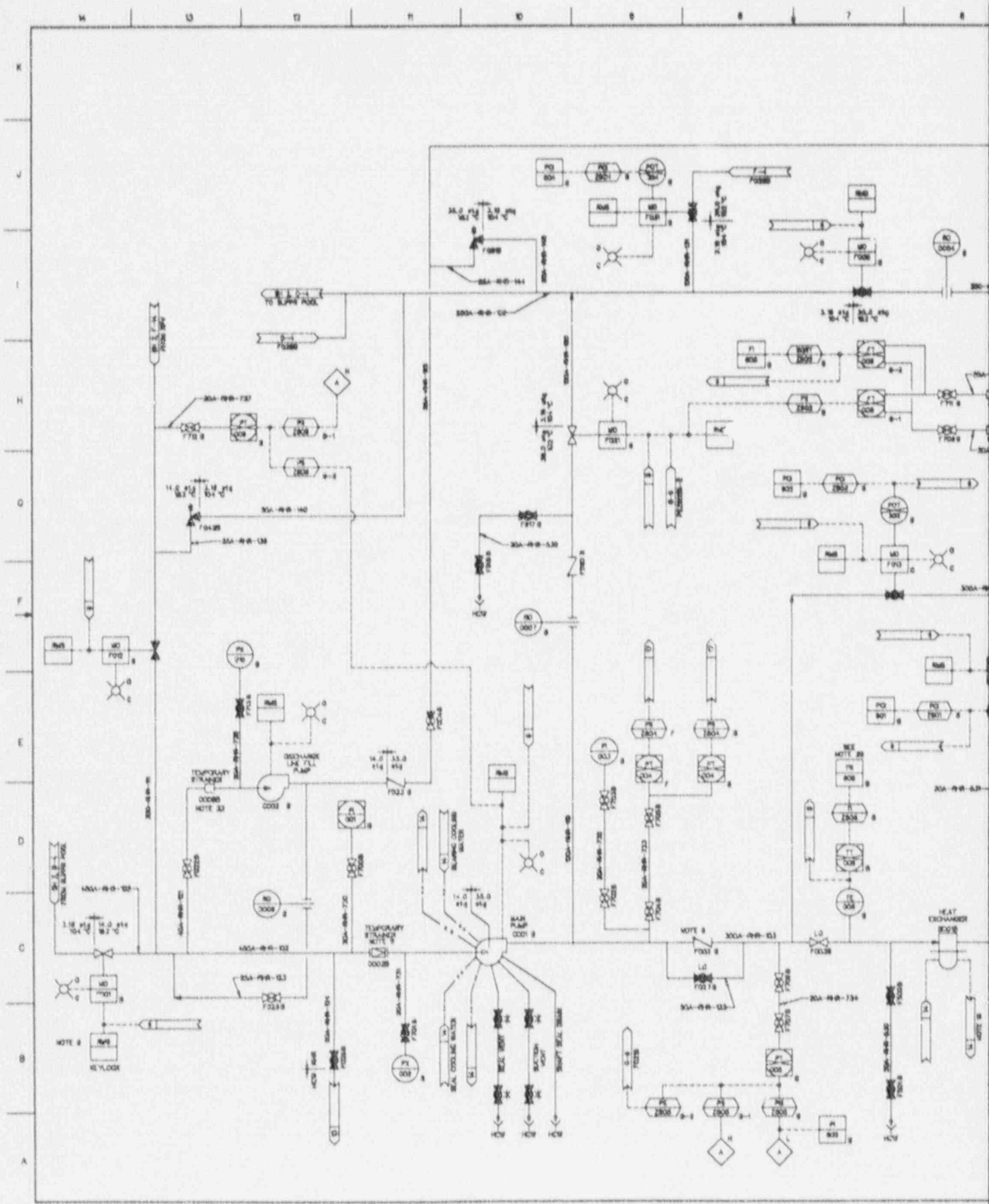
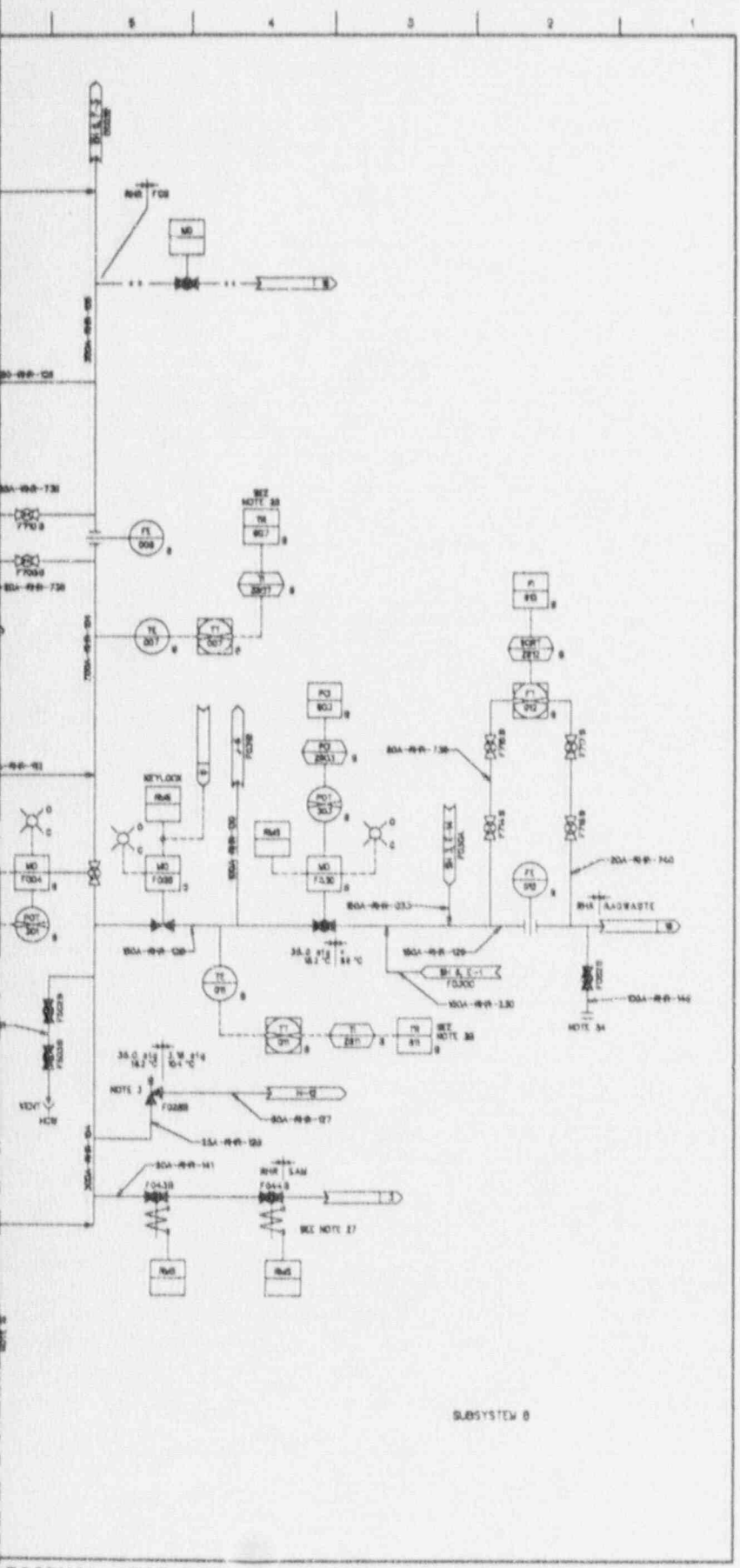
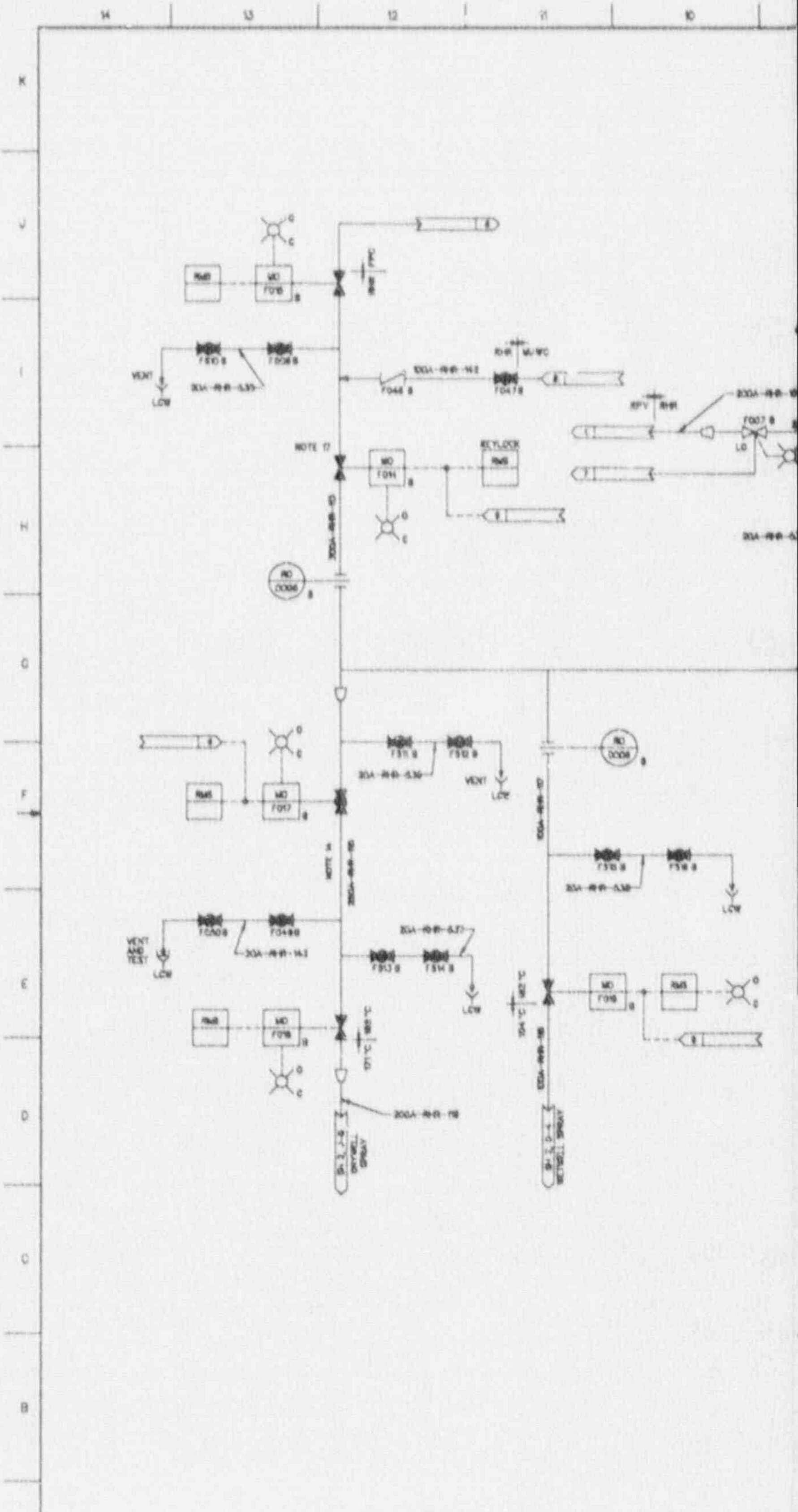


Figure 5.4-10 RE



RESIDUAL HEAT REMOVAL SYSTEM P&ID, Sheet 4 of 7


RMS
MO
F015
VENT
LCW
F046 B
KEYLOCK
RMS
MO
F014
NOTE 17
RO
D006
MO
F017
VENT
LCW
VENT
AND
TEST
MO
F018
F016
DRYWELL
SPRAY
WETWELL SPRAY

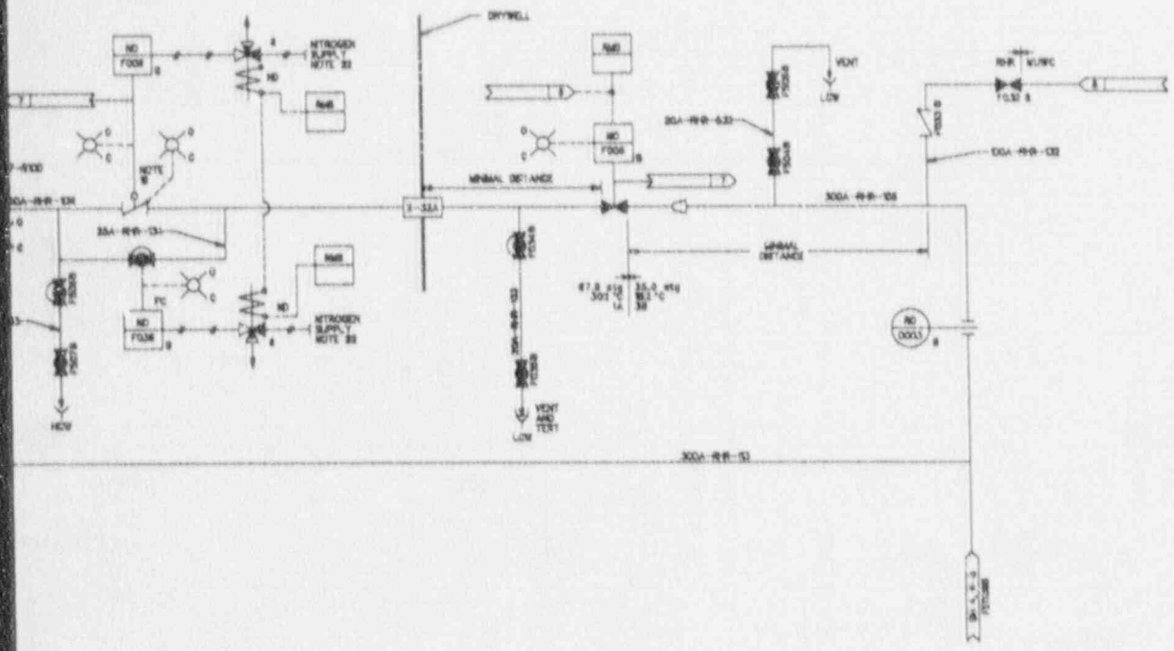


Figure 5.4-10 RESIDUAL HEAT REMOVAL SYSTEM P&ID, Sheet 5 of 7

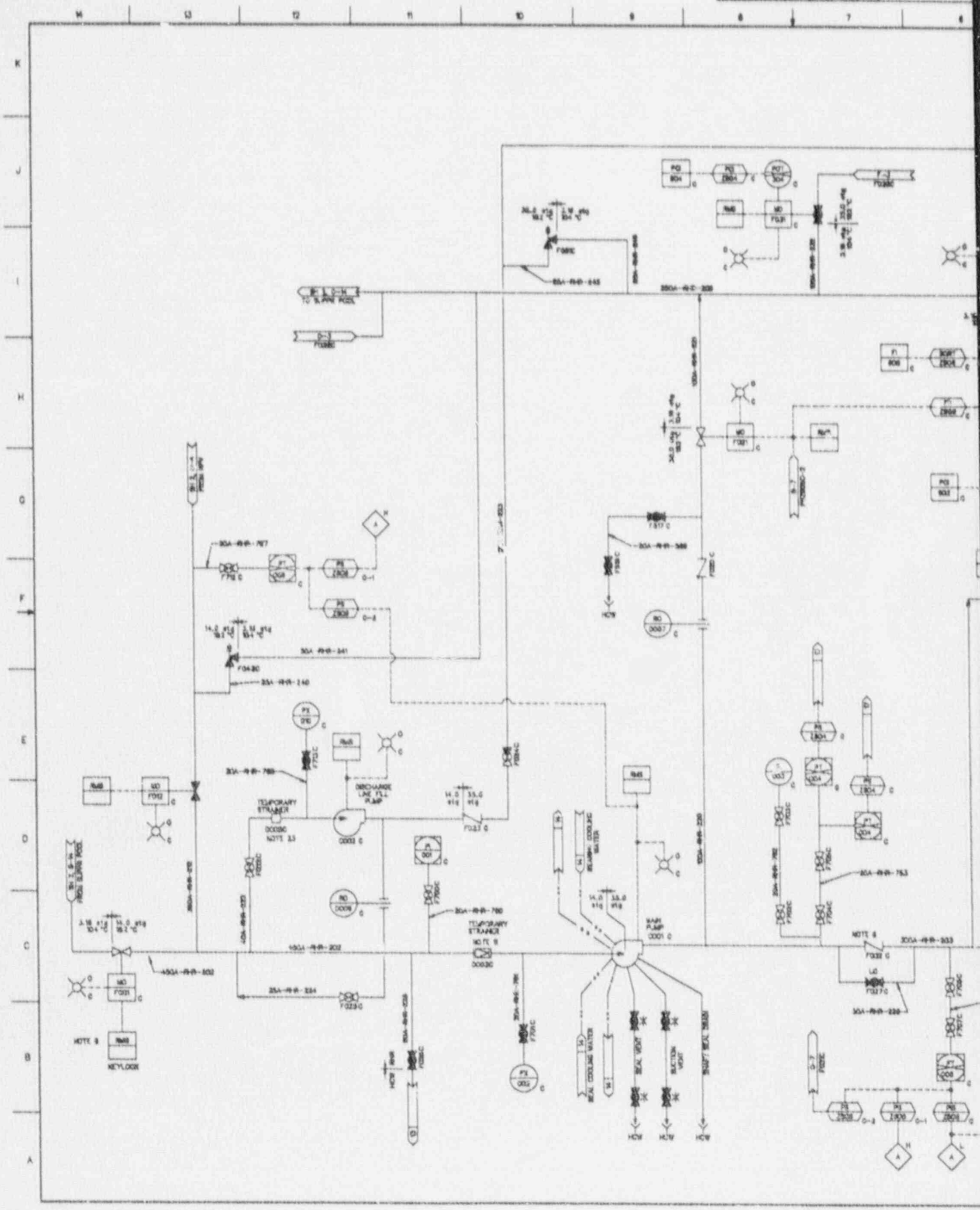
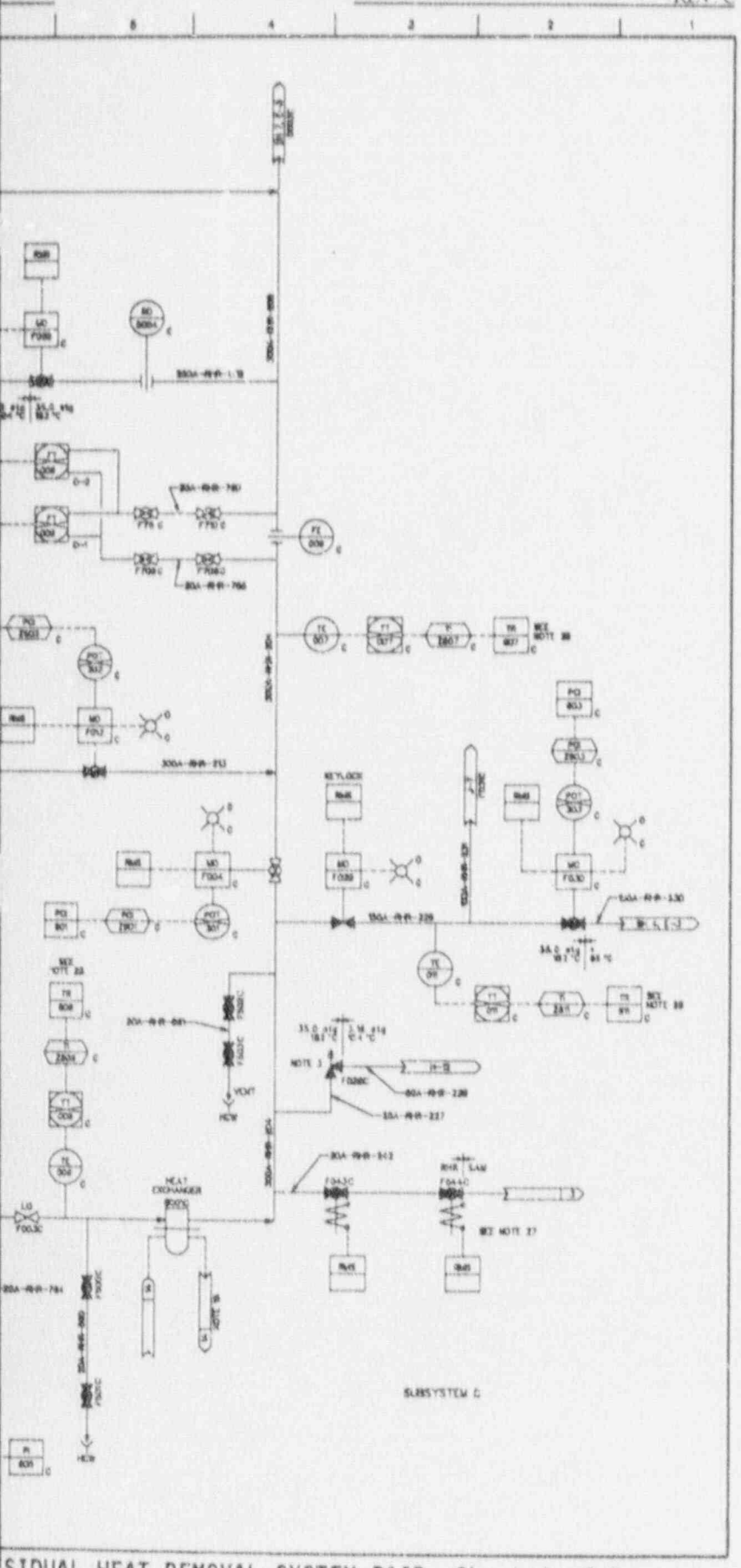
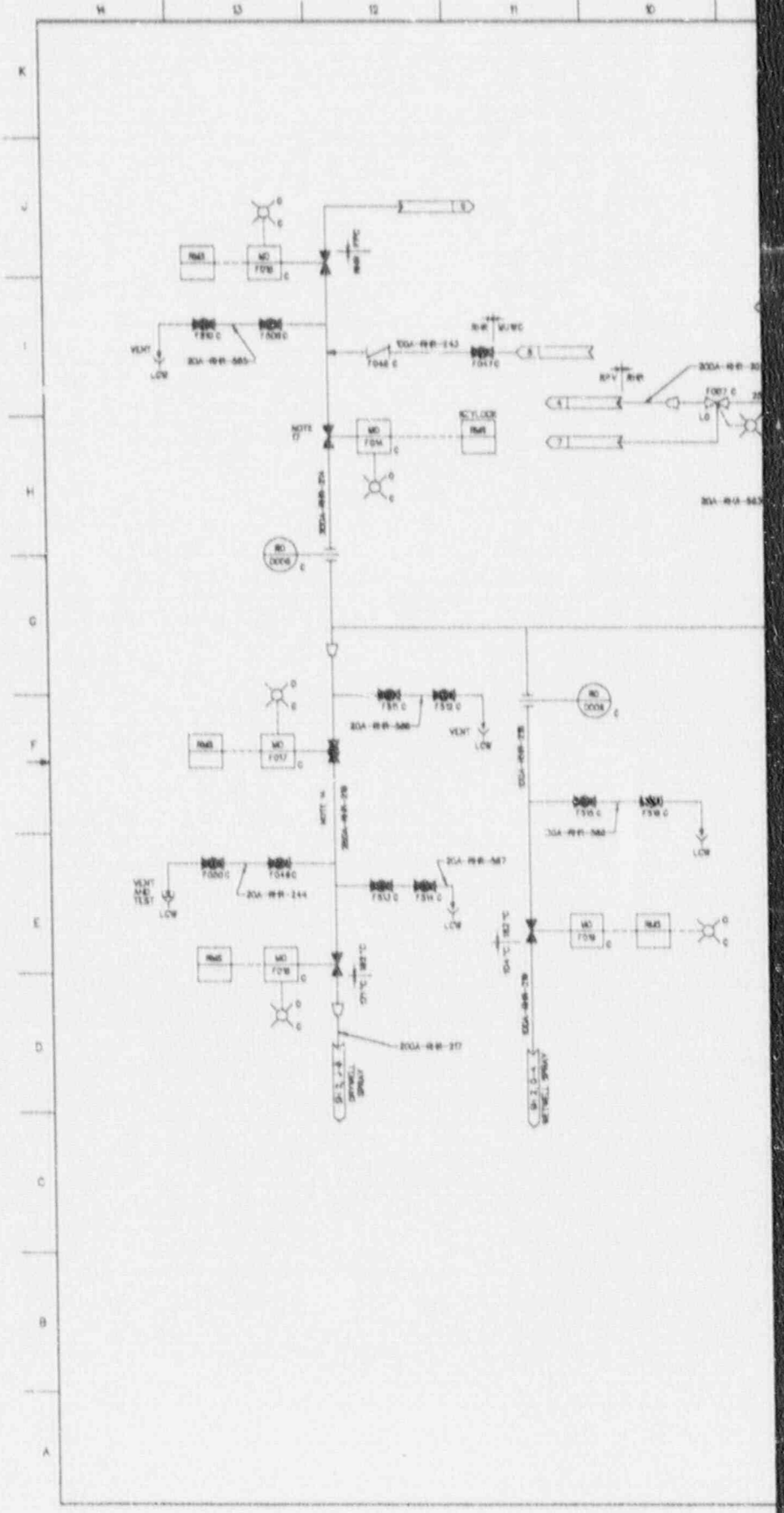


Figure 5.4-10 RE



SIDUAL HEAT REMOVAL SYSTEM P&ID, Sheet 6 of 7



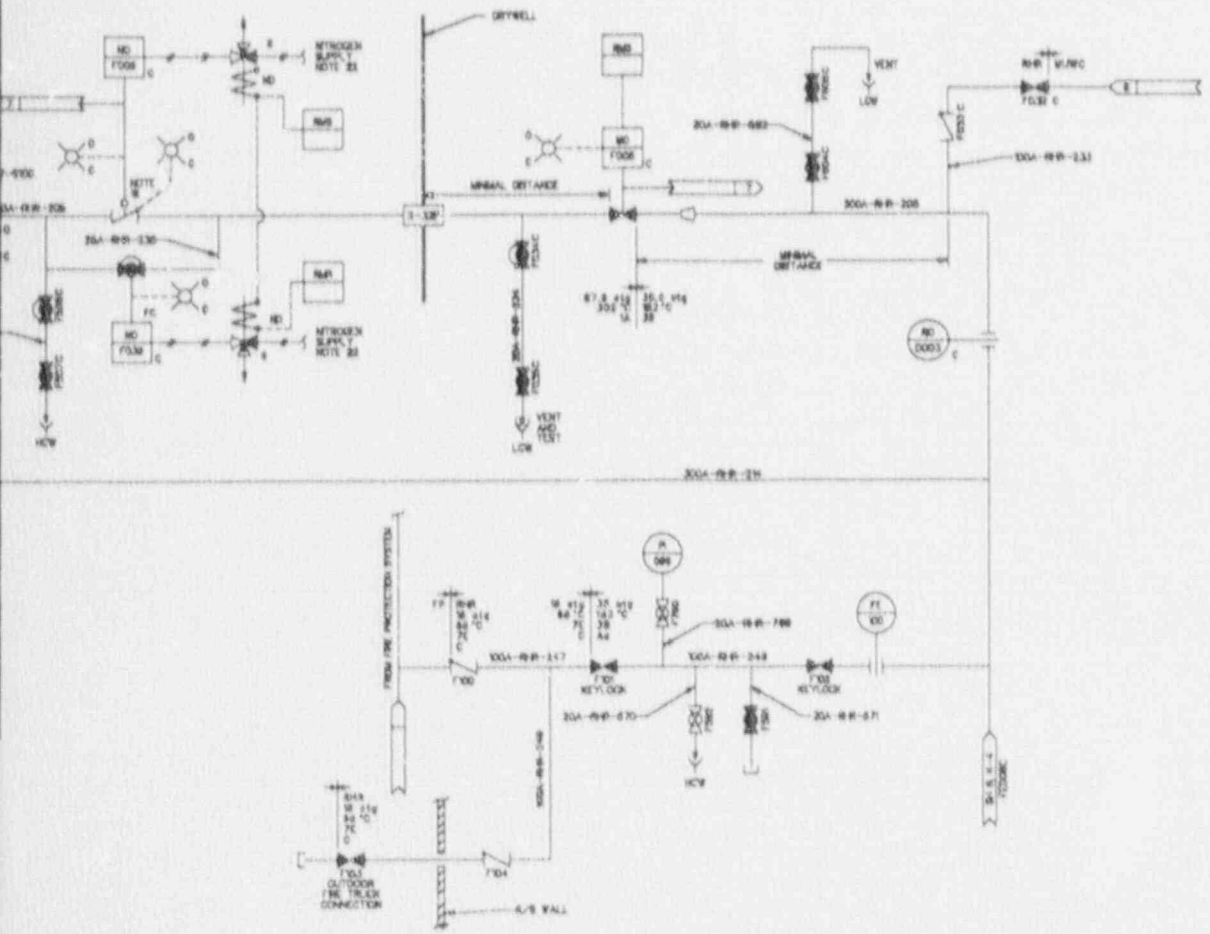
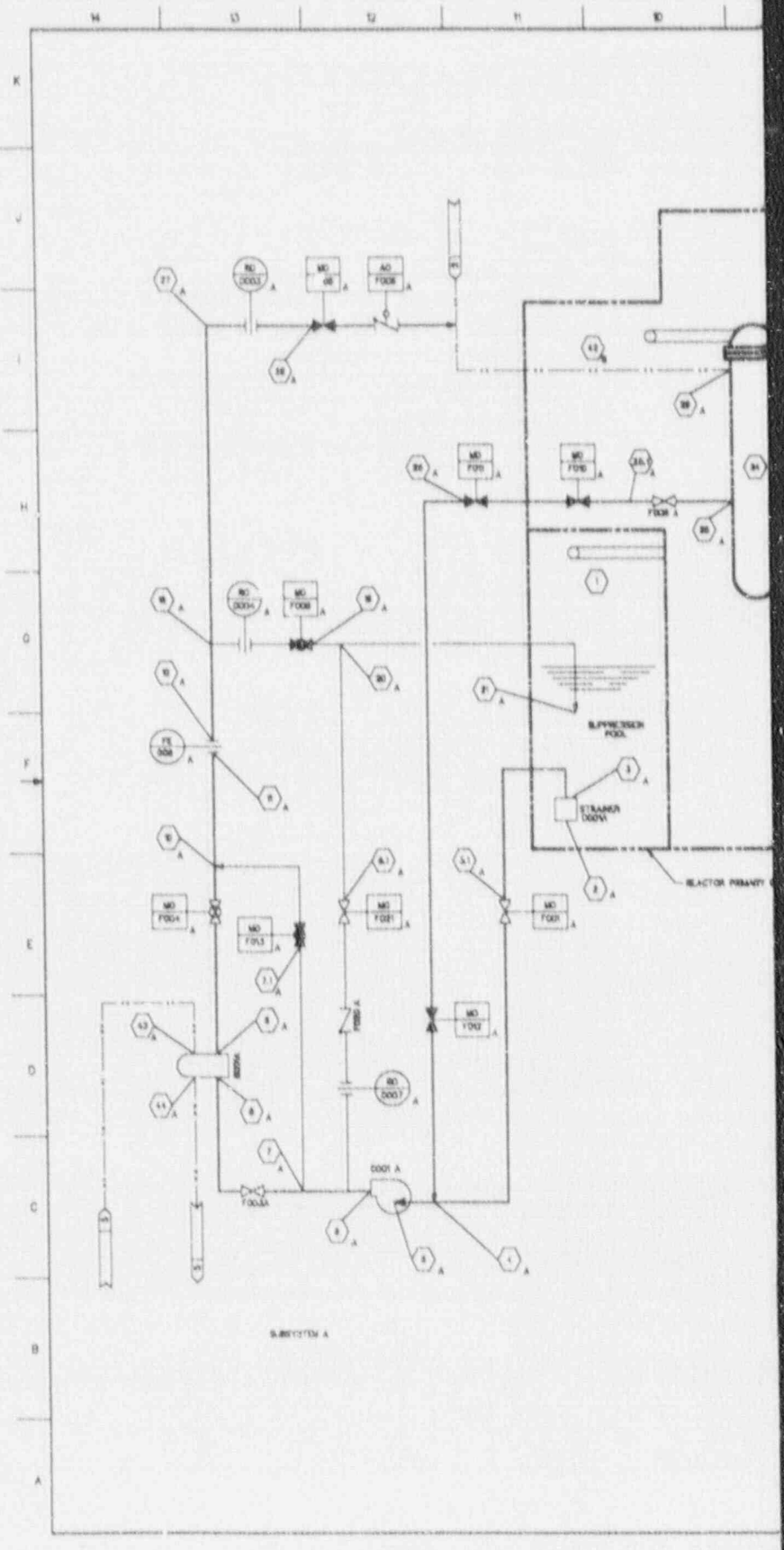
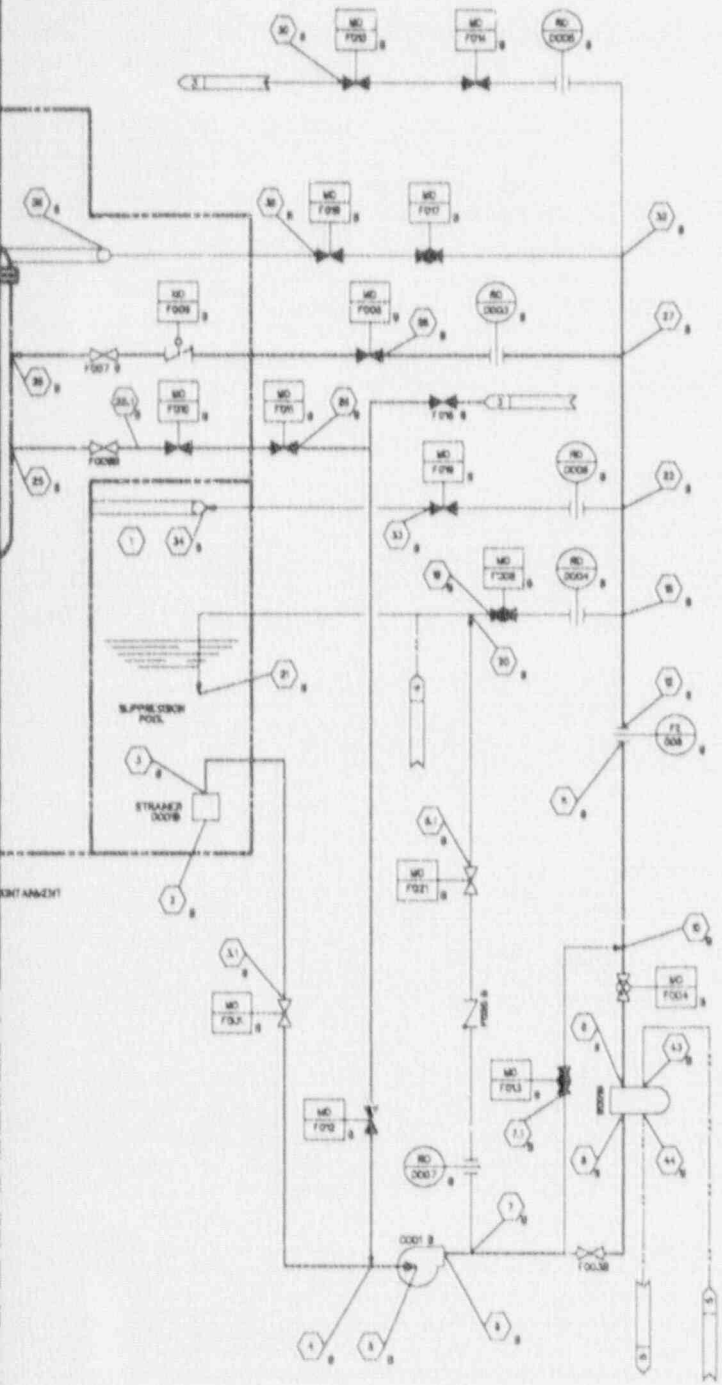


Figure 5.4-10 RESIDUAL HEAT REMOVAL SYSTEM P&ID, Sheet 7 of 7


SUPPRESSION POOL
STRAINER D001A
REACTOR PRIMARY
D001 A
SUBSECTION A



NOTES:

1. SHOWN AS TYPICAL FOR ONE SUBSYSTEM. IF SUBSYSTEMS ARE NOT SYMETRICALLY ARRANGED, VALUES FOR EACH SUBSYSTEM SHALL BE SUBMITTED.
2. PIPING BETWEEN POINTS WITH EMPTY DATA BLANKS SHALL BE SIZED BY OTHERS BASED ON SPECIFIED OPERATING CONDITIONS. EMPTY DATA BLANKS CAN BE FILLED IN BASED ON ACTUAL ARRANGEMENT OR EQUIVALENT HYDRAULIC DATA.

   [ ] —— INDICATES THE DATA IS NOT SIGNIFICANT.
3. MODE B IS THE LIMITING MODE FOR HEAT LOAD, HEAT CAPACITY BASED ON K =84.5 KCAL/°C-SEC.
4. [X / Y] —— INDICATES MAXIMUM (X) AND MINIMUM (Y) VALUES FOR THE MODE SPECIFIED.
5. DASHED LINES INDICATE FLOW DOES NOT PASS THROUGH THESE POINTS.
6. TYPICAL VALUES FOR MAXIMUM SUPPRESSION POOL TEMPERATURE SHOWN. FINAL TEMPERATURE DEPENDS ON INITIAL POOL WATER TEMPERATURE AND POOL WATER VOLUME.
7. THE NPSH AVAILABLE IN MODES A AND C-L AT A REFERENCE LOCATION 1 METER ABOVE THE PUMP MOUNTING FLOOR MUST EQUAL OR EXCEED 3.4 METERS ASSUMING SATURATION TEMPERATURES OF 100°C AND 90.1°C RESPECTIVELY. THE NPSH AVAILABLE AT THE PUMP SUCTION NOZZLE MUST EQUAL OR EXCEED THIS VALUE PLUS THE DIFFERENCE IN ELEVATION BETWEEN THE REFERENCE LOCATION AND THE CENTERLINE OF THE PUMP SUCTION NOZZLE.
8. TABLE 1 INDICATES VALVE POSITIONS DURING VARIOUS MODES OF OPERATION.
9. THIS TABLE IS FOR REFERENCE ONLY; SEE P&ID FOR REQUIRED VALUES.
10. THE WEIGHT OF WATER IN THE SHUTDOWN COOLING SUBSYSTEM PIPING, INCLUDING THE HEAT EXCHANGERS AND PUMPS SHALL NOT EXCEED THE VALUE SPECIFIED (41-4010 IN ORDER TO PREVENT DILUTION OF STANDBY LIQUID CONTROL NEUTRON ABSORBER BELOW MINIMUM REQUIREMENTS.
11. HEAT EXCHANGER HEAT REMOVAL AND SPRAY BASED UPON 65.1 m^3/hr TUBE SIDE FLOW.
12. SOH = 19.5 METERS REQUIRED MINIMUM AND 23.0 METERS MAXIMUM.
13. MAXIMUM TUBE SIDE FLOW RATE IS 1530 m^3/hr WHICH IS MAXIMUM PUMP RUNOUT FLOW.
14. HEAT EXCHANGER HEAT REMOVAL SHOWN FOR FULL FLOW AND MAXIMUM TEMPERATURE DIFFERENCE.
16. ONLY TWO SUBSYSTEMS ARE REQUIRED AT THIS STAGE OF SHUTDOWN.
18. LOCATIONS 19,20,31 AND 21,33,34 SHOW THE FLOW SPLIT ON LOOPS B AND C WHEN THE WETWELL SPRAY FUNCTION IS MANUALLY INITIATED.
17. ONLY ONE SUBSYSTEM IS REQUIRED FOR THIS MODE OF OPERATION, EITHER SUBSYSTEM B OR SUBSYSTEM C.

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

	MFL NO.
1. RESIDUAL HEAT REMOVAL SYSTEM P&ID	E11-1010
2. NUCLEAR BOILER SYSTEM PFD	B21-1020
3. FUEL POOL COOLING & CLEANUP SYS PFD	G41-1030
4. HIGH PRESSURE CORE FLOODER SYS PFD	E22-1030
5. REACTOR BUILDING COOLING WATER SYSTEM PFD	P31-1030
6. STANDBY LIQUID CONTROL SYSTEM DESIGN SPEC	C41-4010

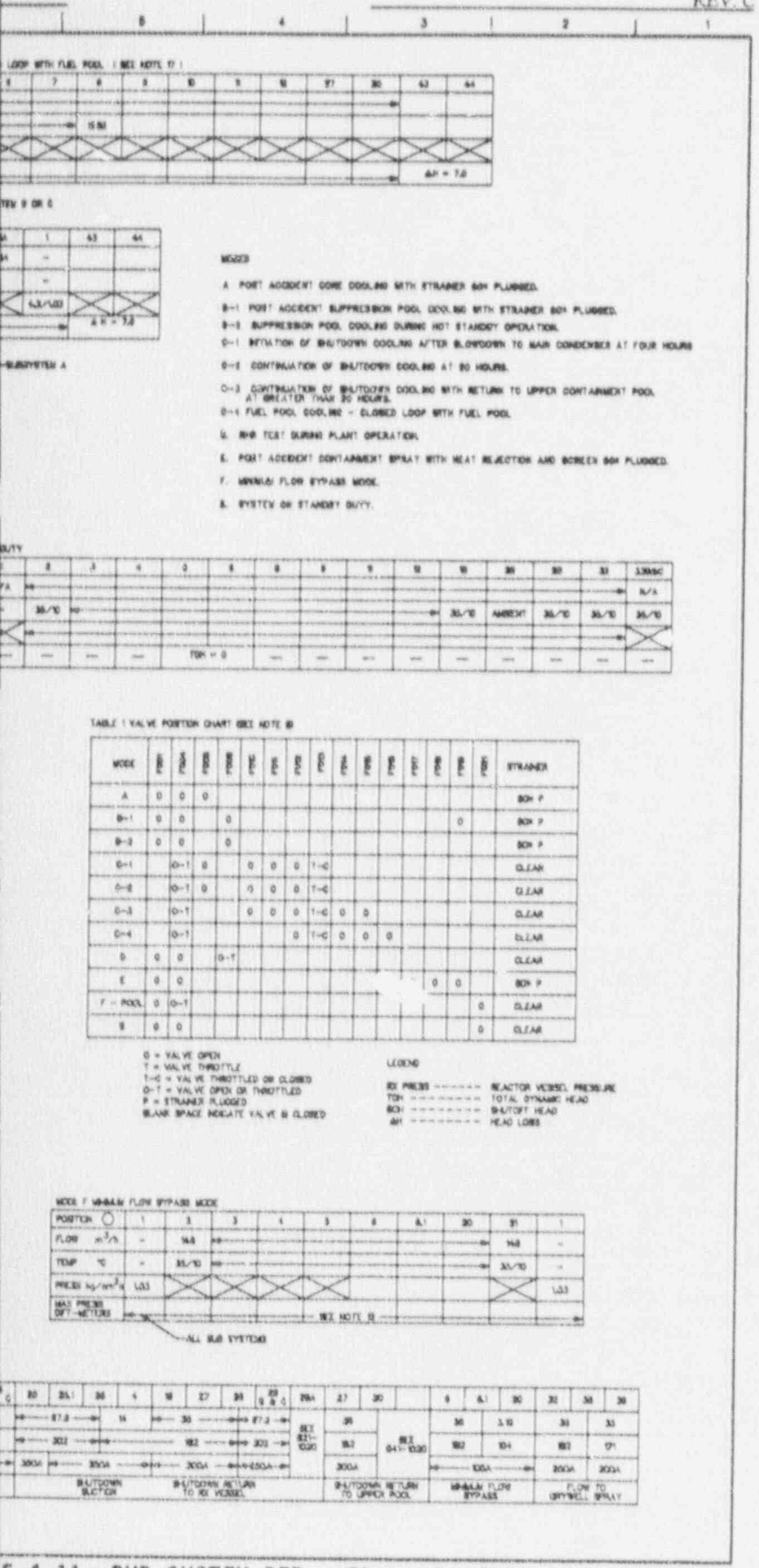
SUPPORTING DOCUMENTS

	MFL NO.
1. PIPING AND INSTRUMENT DIAGRAM SYMBOLS	A10-3030

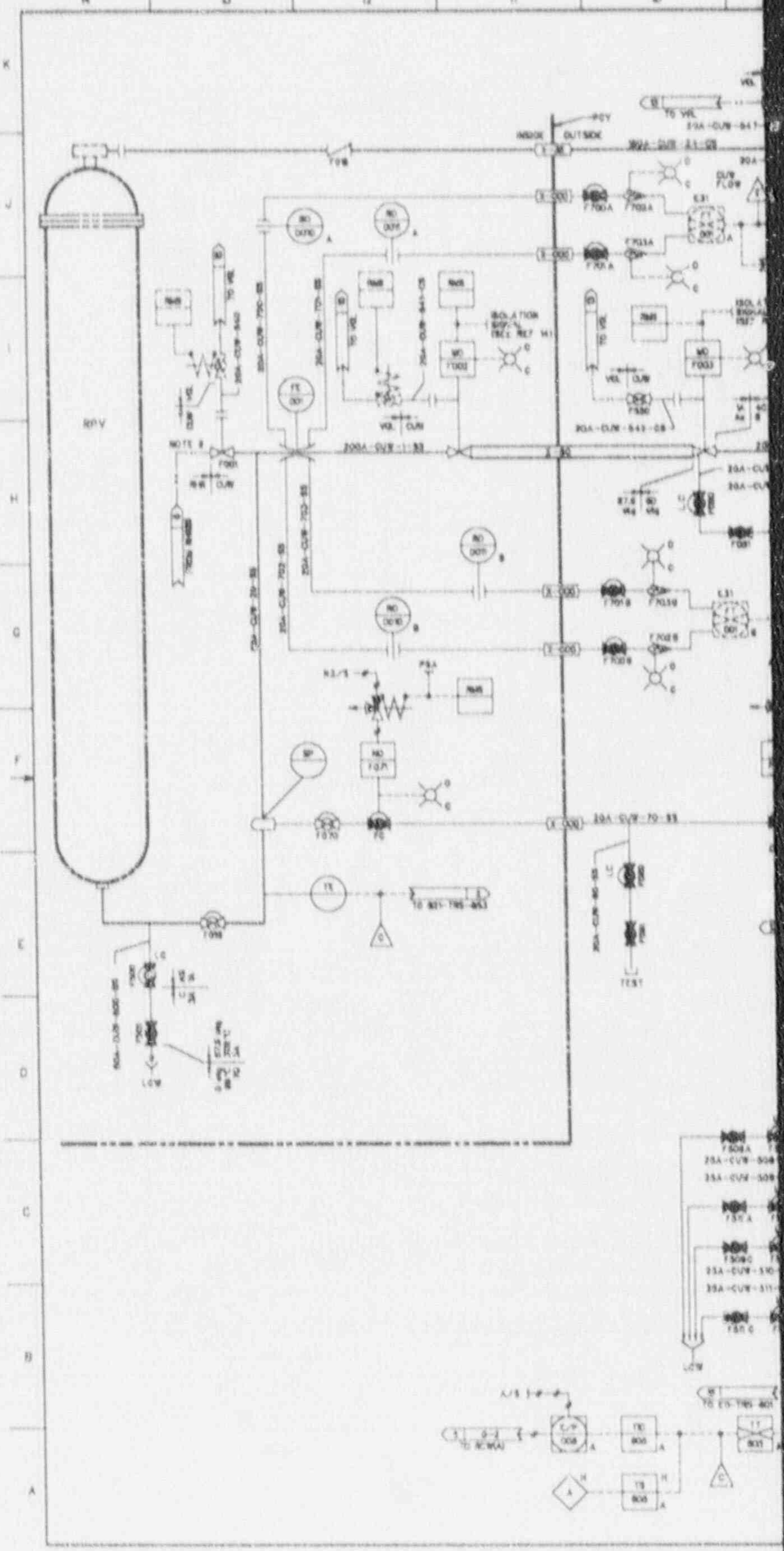
MFL NO. E11-1020

Figure 5.4-11 RHR SYSTEM PFD, Sheet 1 of 2

Figure



5.4-11 RHR SYSTEM PFD, Sheet 2 of 2



RPV
INSIDE
OUTSIDE
ISOLATION
NOTE 9
TEST
LCW

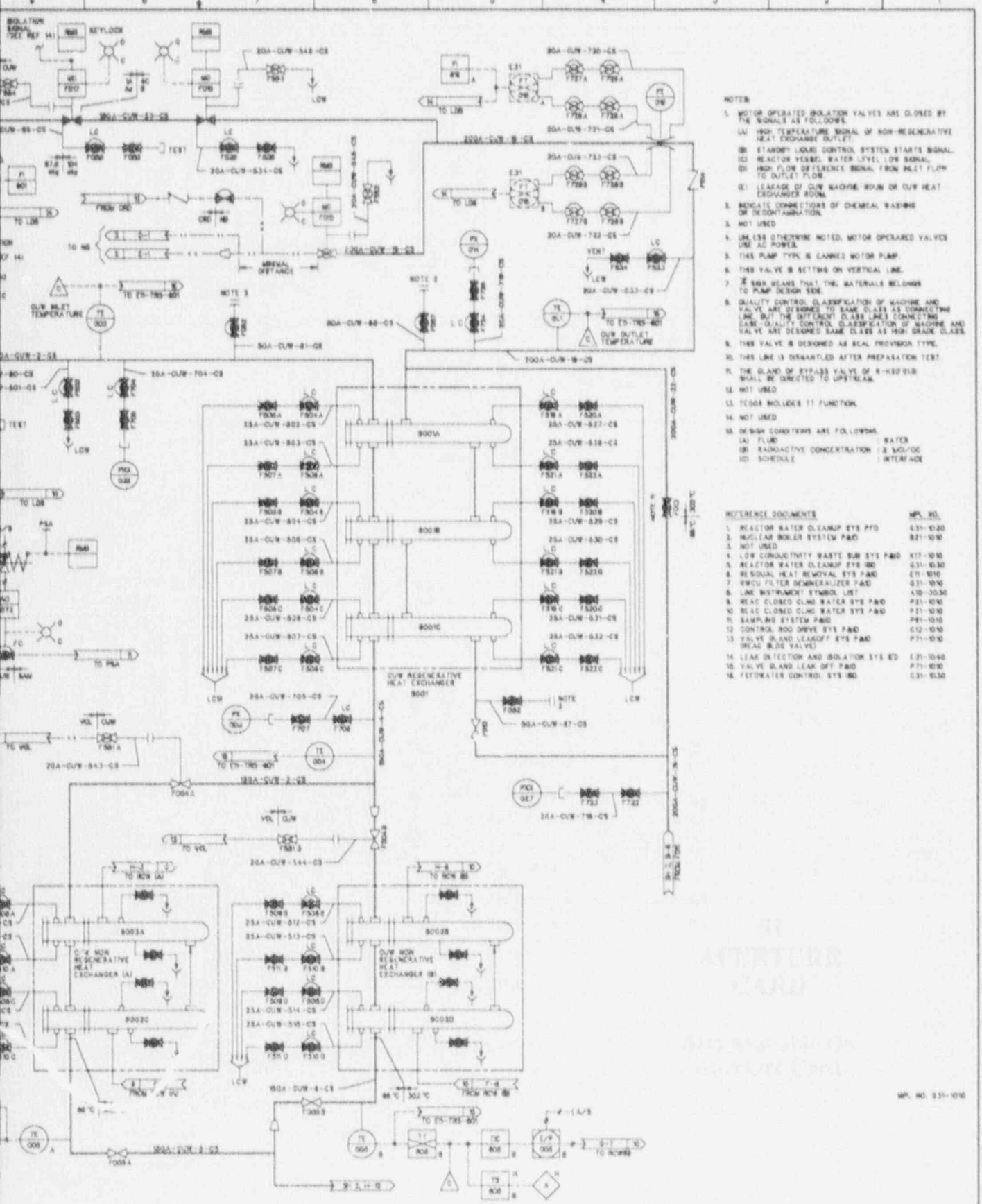


Figure 5.4-12 REACTOR WATER CLEANUP SYSTEM P&ID, Sheet 1 of 2

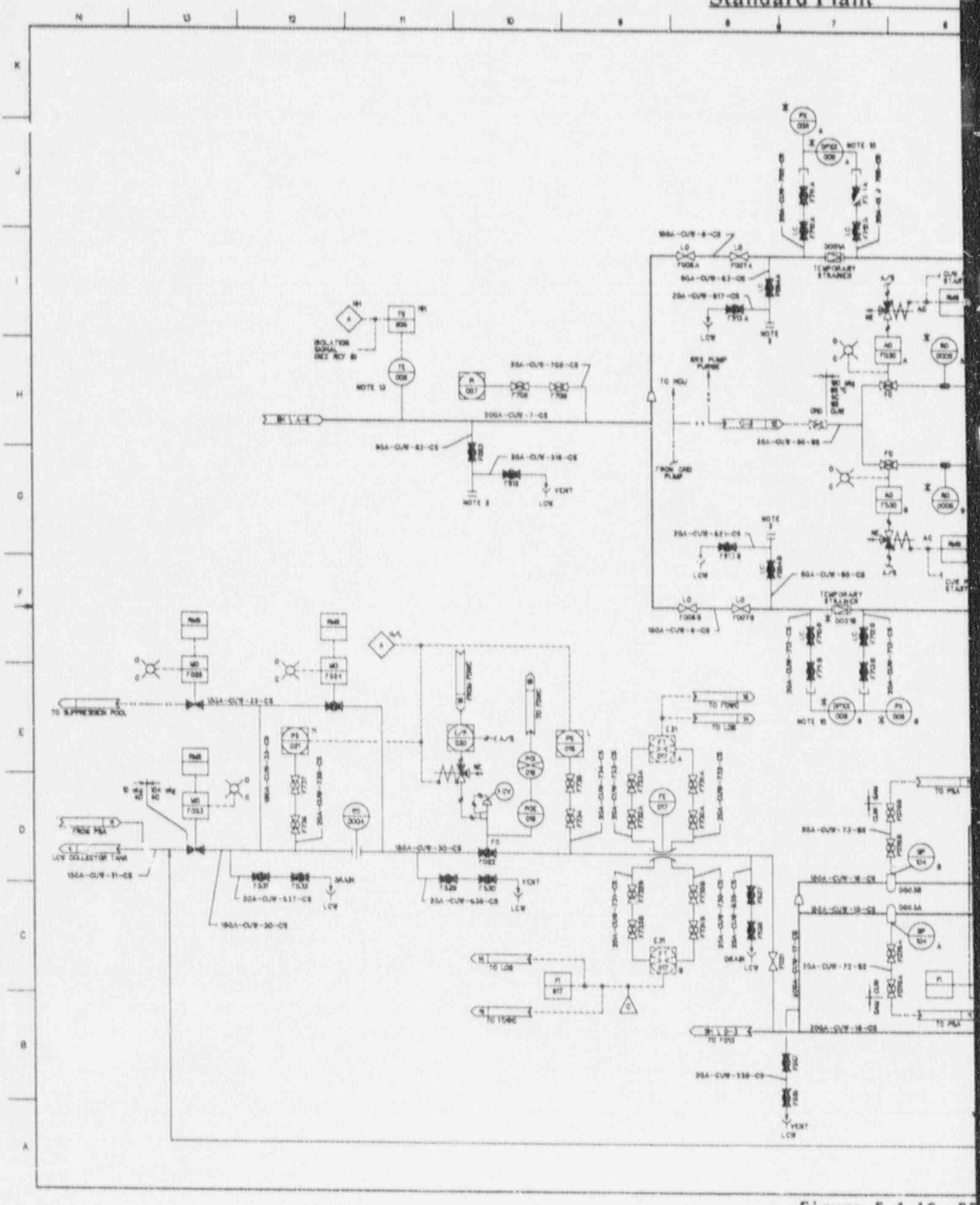
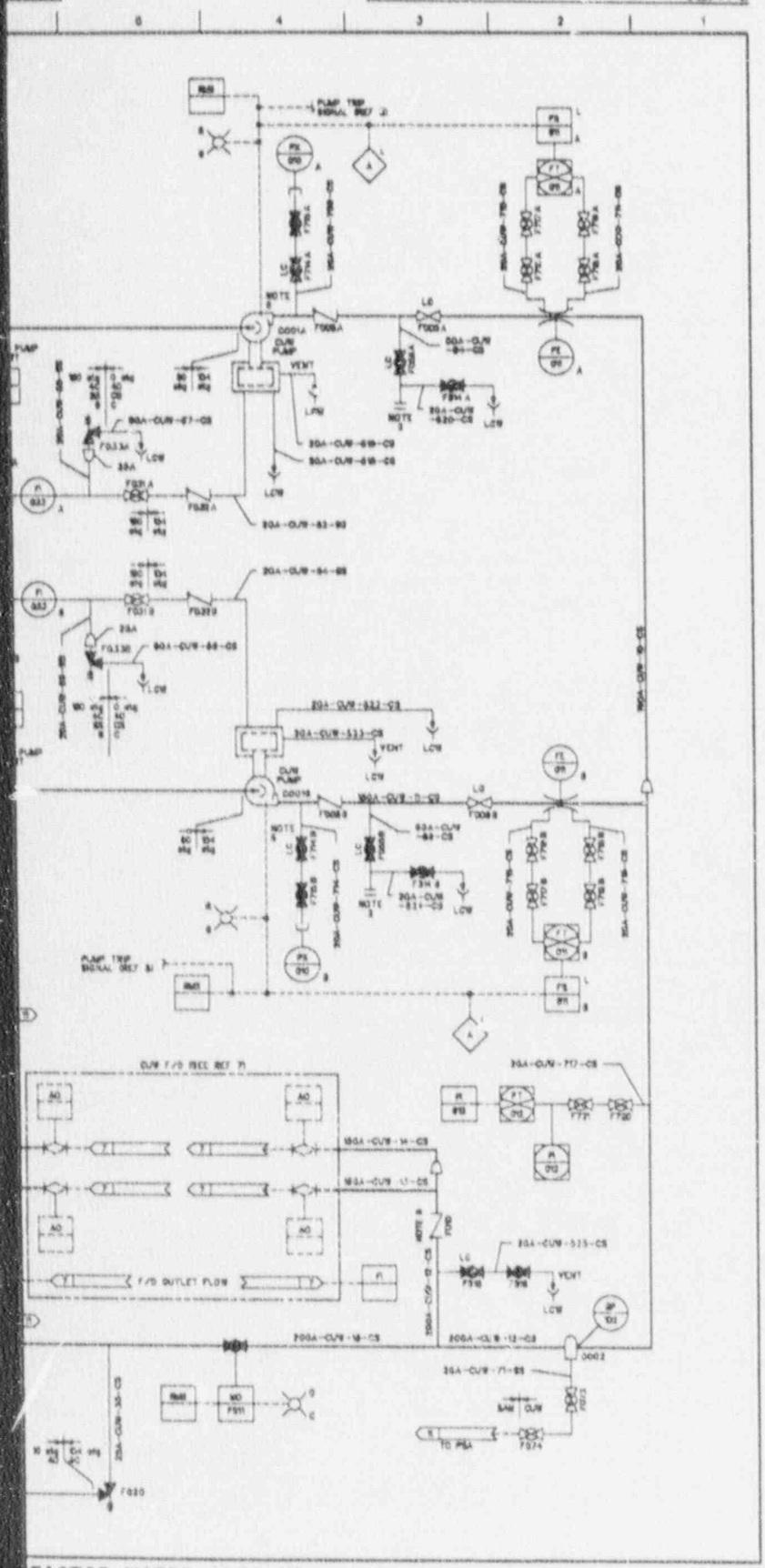
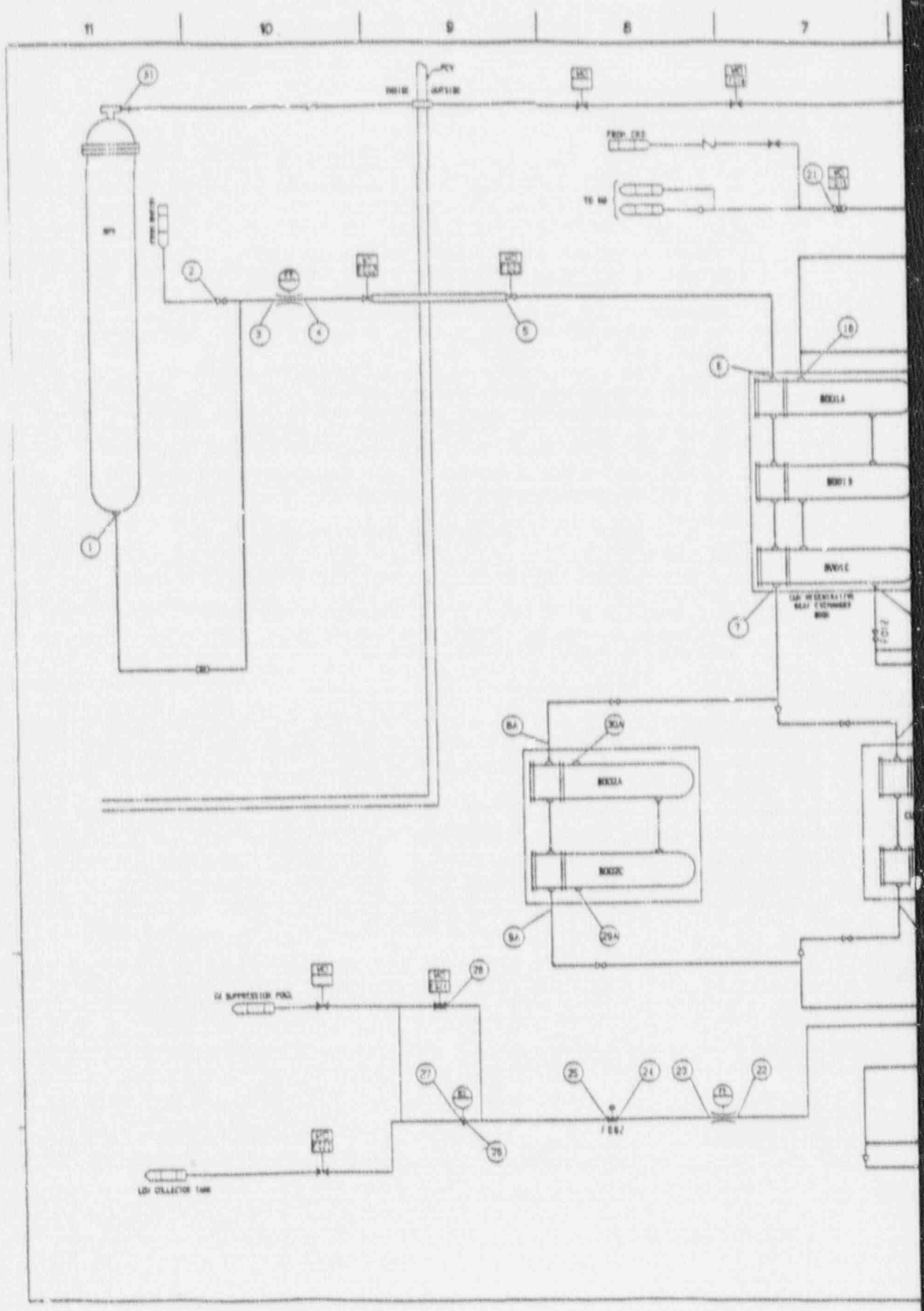


Figure 5.4-12 RE



EACTOR WATER CLEANUP SYSTEM P&ID, Sheet 2 of 2


11
10
9
8
7
FROM CRD
TO RB
MODULE A
MODULE B
MODULE C
MODULE A
MODULE C
TO SUPPRESSION POOL
LDS COLLECTOR TANK

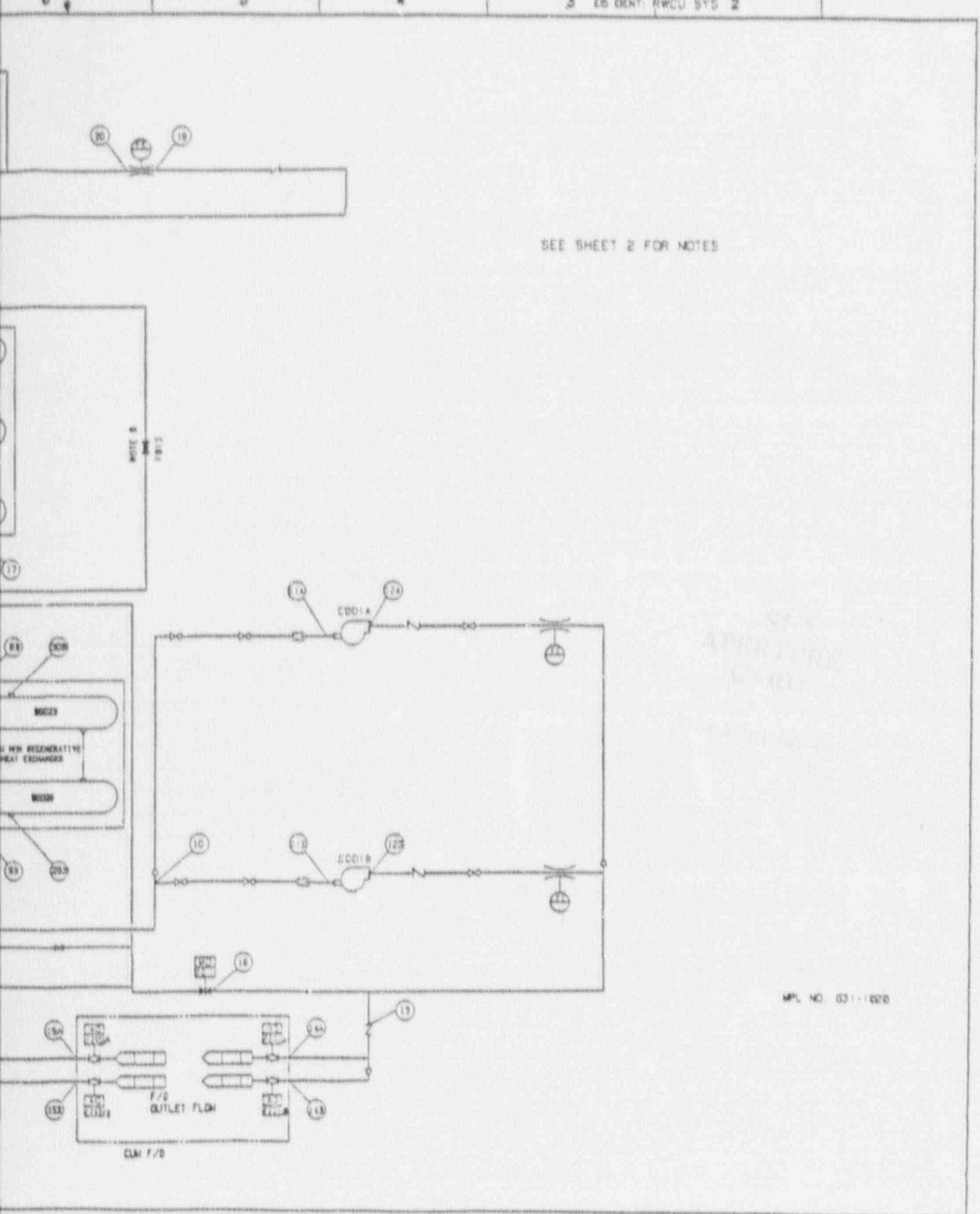


Figure 5.4-13 REACTOR WATER CLEANUP SYSTEM PFD, Sheet 1 of 2

GENERAL NOTES . THE VALVE(F034) AND

1. ▭ SHOWS THE PART WHERE THE FLUID DOES NOT FLOW.
   ▭ SHOWS THE VALVE WHICH IS NOT NEEDED IN BASIC PLANNING OF THIS SYSTEM.
2. CUW PUMP, CUW NON-REGENERATIVE HEAT EXCHANGER AND CUW REGENERATIVE HEAT EXCHANGER SHALL BE INSTALLED TO HAVE ADEQUATE STATIC PRESSURE.
   THE MOST SEVERE OPERATING MODE IS OFF GAS OPERATING MODE AT START-UP OPERATION WHEN REACTOR PRESSURE IS 0ata.
3. MODE A IS THE BASIC DESIGN CONDITION OF HEAT EXCHANGER(REGENERATIVE HEAT EXCHANGER AND NON-REGENERATIVE HEAT EXCHANGER).
4. DURING A STARTUP OPERATION F/D MAY BE BYPASSED WHEN F/D IS OUT OF SERVICE.
5. AT MODE B AND MODE F THE VALVE (F022,F023,F024) SHALL BE OPEN AND THEN THE FLUID IS TRANSFERED TO THE LOW CONDUCTIVITY COLLECTOR TANK.
6. THE TOTAL PRESSURE LOSS OF REGENERATIVE HEAT EXCHANGE(SHELL SIDE AND TUBE SIDE)AND NON-REGENERATIVE HEAT EXCHANGER(TUBE SIDE) IS UNDER $2.1 kg/cm^2$.
7. ALL OF THE SYSTEM FLOW IS SPRAYED FROM RPV SPRAY HEADER AT THE RPV SPRAY MODE.
8. THE TOTAL FLOW RATE FROM RHR AND FROM RPV BOTTOM HEAD DRAIN LINE IS $152.5 \times 10^3 kg/h$.
9. THIS BYPASS LINE MAY BE APPLIED WITH F013 OPENED AND F012 CLOSED CONDITION SO THAT THE DECAY HEAT IS REMOVED BY NON REGENERATIVE HEAT EXCHANGER DURING REFUELING OUTAGE IF REQUIRED.

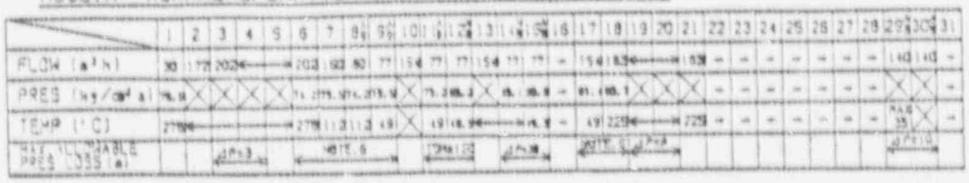
CLOSING CONDITION

F015	F016	F022	F023	F024	F201	F205
O	C	C	C	C	O	O
O	C	T	O	C	O	O
O	C	C	C	C	C	C
O	C	C	C	C	C	C
O	C	C	C	C	O	O
C	C	O	O	O	O	O
C	O	C	C	C	O	O

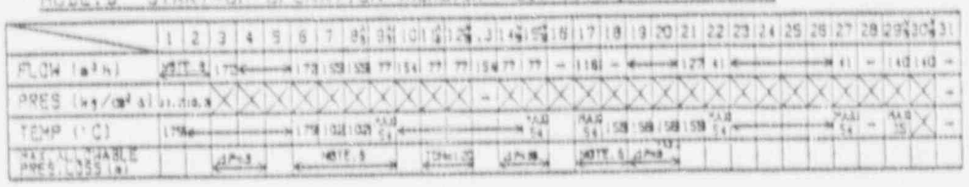
D
D
LED

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

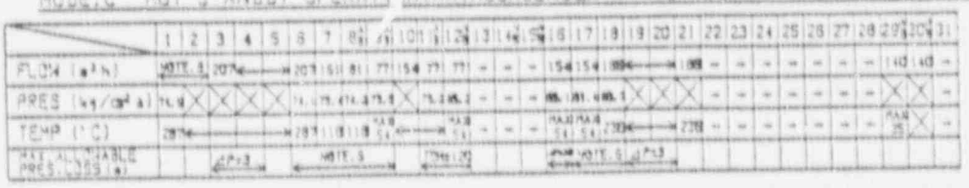
MODE A NORMAL OPERATION (REACTOR PRES. 73. [kg/cm²a])



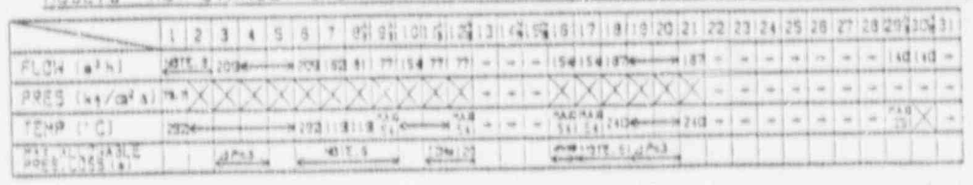
MODE B START-UP OPERATION (REACTOR PRES. 11.0kg/cm²a) NOTES



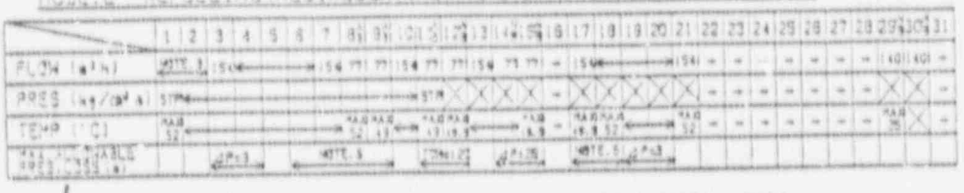
MODE C HOT STANDBY OPERATION (MAIN CONDENSER AVAILABLE) (REACTOR PRES. 73. [kg/cm²a])



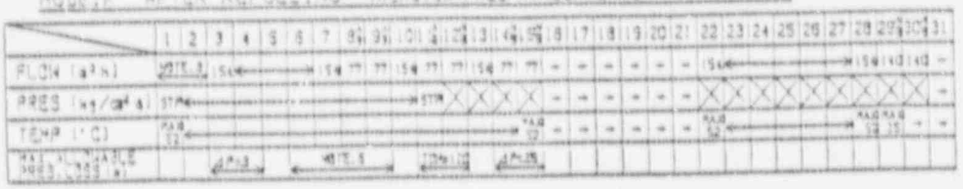
MODE D HOT STANDBY OPERATION (MAIN CONDENSER ISOLATION) (REACTOR PRES. 77.8kg/cm²a)



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



MODE F AFTER REFUELING (REACTOR PRES: ATMOSPHERIC PRES) NOTES



MODE G RPV SPRAY (REACTOR PRES. 10.5kg/cm²a) NOTES

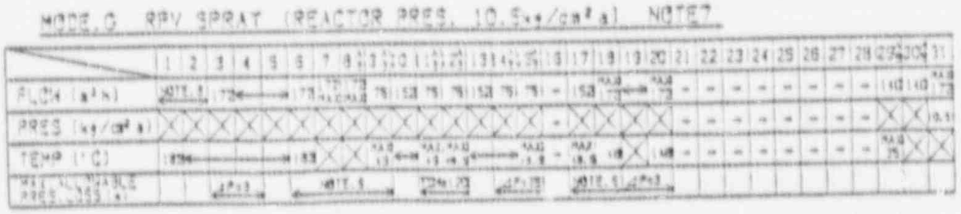


TABLE 1 VALVE OPENING

MODE \ VALVE NO.	FC02	FC03	FC11
A	O	O	C
B	O	O	C
C	O	O	O
D	O	O	O
E	O	O	C
F	O	O	C
G	O	O	C

O : OPENI
C : CLOSI
T : THROT