SPECIFICATION

FOR

TEST REQUIREMENTS

FOR

STEADY STATE VIBRATION TESTING

OF

ASME SECTION III NUCLEAR CLASS

1, 2, 3 AND ANSI B31.1 BECHTEL PIPING

FOR THE

LIMERICK GENERATING STATION

UNITS 1 AND 2

PHILADELPHIA ELECTRIC COMPANY

POTTSTOWN, PENNSYLVANIA

Bechtel Power Corporation

San Francisco, California

NO.	DATE	REVISIONS	APPROVALS
	5/25/84	Addition number 2 To Rev 1	
	4/15/84	Addition number 1 To Rev 1	
1	4/6/84	Revised as noted on sheet i, ii	
		Issued for Use	
0	12/[illegible]	Issued for Use	

STEADY STATE VIBRATION INSTRUMENTATION

LOCATION AND DESCRIPTION LIST

System ID.	System	Location	Nos. of Instruments
A	Main Steam	O/C	6
B	Feedwater	I/C	5
C	Feedwater	O/C	3
D	HPCI Steam Supply	I/C	3
E	HPCI Steam Supply	O/C	~~3~~ 6
F	HPCI Turbine Exhaust	O/C	3
G	RCIC Steam Supply	I/C	3
H	RCIC Steam Supply	O/C	4
J	RCIC Turbine Exhaust	O/C	~~2~~ 3
K	Core Spray	I/C	Deleted
L	RHR Shutdown Return	I/C	2
M	RHR LPCI	I/C	Deleted
N	RHR Head Spray	I/C	Deleted
P	RWCU	I/C	8
Q	RHR Shutdown Supply	I/C	3

Change

Total Instruments Outside Containment (O/C) = ~~21~~ 25
Total Instruments Inside Containment (I/C) = 24
Total = ~~45~~ 49

Change

14 of the instruments are also used for Dynamic Transient testing per 8031-P-364.

Add Typ 2012

Adm. 2
Rev. 1

Pg 1 of 2

STEADY STATE VIBRATION INSTRUMENTATION

LOCATION AND DESCRIPTION LIST

System ID.	System	Location	Nos. of Instruments
A	Main Steam	O/C	6
B	Feedwater	I/C	5
C	Feedwater	O/C	3
D	HPCI Steam Supply	I/C	3
E	HPCI Steam Supply	O/C	3
F	HPCI Turbine Exhaust	O/C	3
G	RCIC Steam Supply	I/C	3
H	RCIC Steam Supply	O/C	4
J	RCIC Turbine Exhaust	O/C	~~2~~ 3
K	Core Spray	I/C	Deleted
L	RHR Shutdown Return	I/C	2
M	RHR LPCI	I/C	Deleted
N	RHR Head Spray	I/C	Deleted
P	RWCU	I/C	8
Q	RHR Shutdown Supply	I/C	3

Change

Total Instruments Outside Containment (O/C) = ~~21~~ 22
Total Instruments Inside Containment (I/C) = 24
Total = ~~45~~ 46

Change

14 of the instruments are also used for Dynamic Transient testing per 8031-P-364.

Delete this page

Adm. 2
~~Adm. 1~~
Rev. 1

TEST POINT INFORMATION

System : E - HPCI Steam Supply
Location : Outside Containment
Isometric : SK-M-1556B Rev. N
Calculation No.: PI-24-51

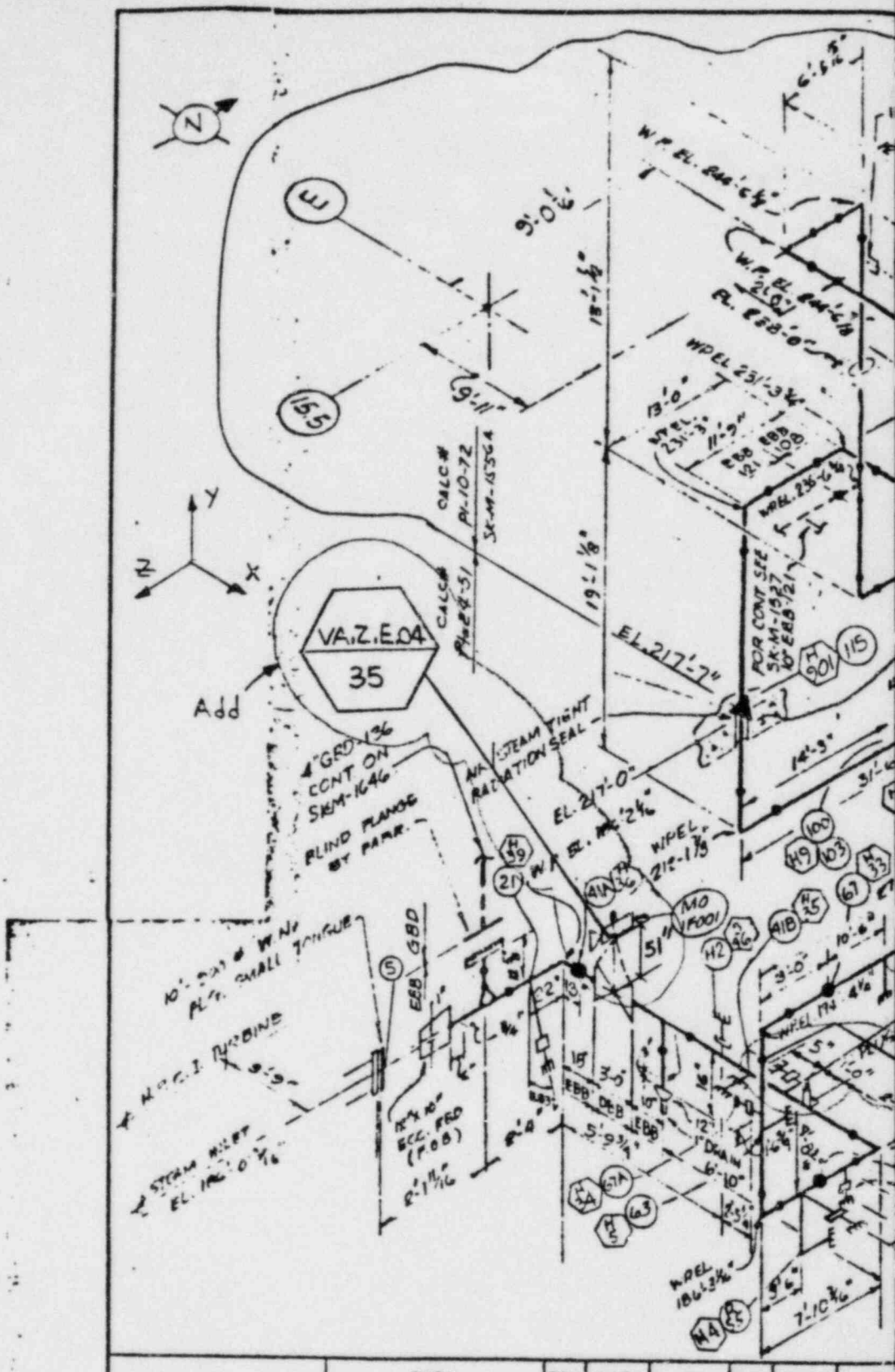
QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
~~Acceleration~~	~~Later~~		~~Later~~	~~later~~	← Delete
Acceleration	VA,Z,E,04		35	Z	Valve operator MO-1F001
Acceleration	VA,Z,E,05		65B	Z	
Acceleration	VA,X,E,06		90E	X	← Add

1

Specification
8031-P-363

Appendix C

TI
APERTURE
CARD



		DATA			REV	DATE	BY	REV	DATE	BY
PIPING ENGINEER	LINE No.	EBB-108			E	2-17-77	[illegible]			
	MATERIAL	SMLS. ASME SA-106, GR B			E	2-17-77	[illegible]			
	LINE THICKNESS (IN)	.687	.594		E	2-17-77	[illegible]			
MECHANICAL ENGINEER	LINE O.D. (IN)	12.750	10.750		E	2-17-77	[illegible]			
	MODE	I	II	III						
	PRESS. PSIG									
	TEMP F									
STRESS ENGINEER	EXP. COEFF. IN/100FT									
	EXP. COEFF. MIL-IN/IN									
	MOD. OF ELAS. E PSI									

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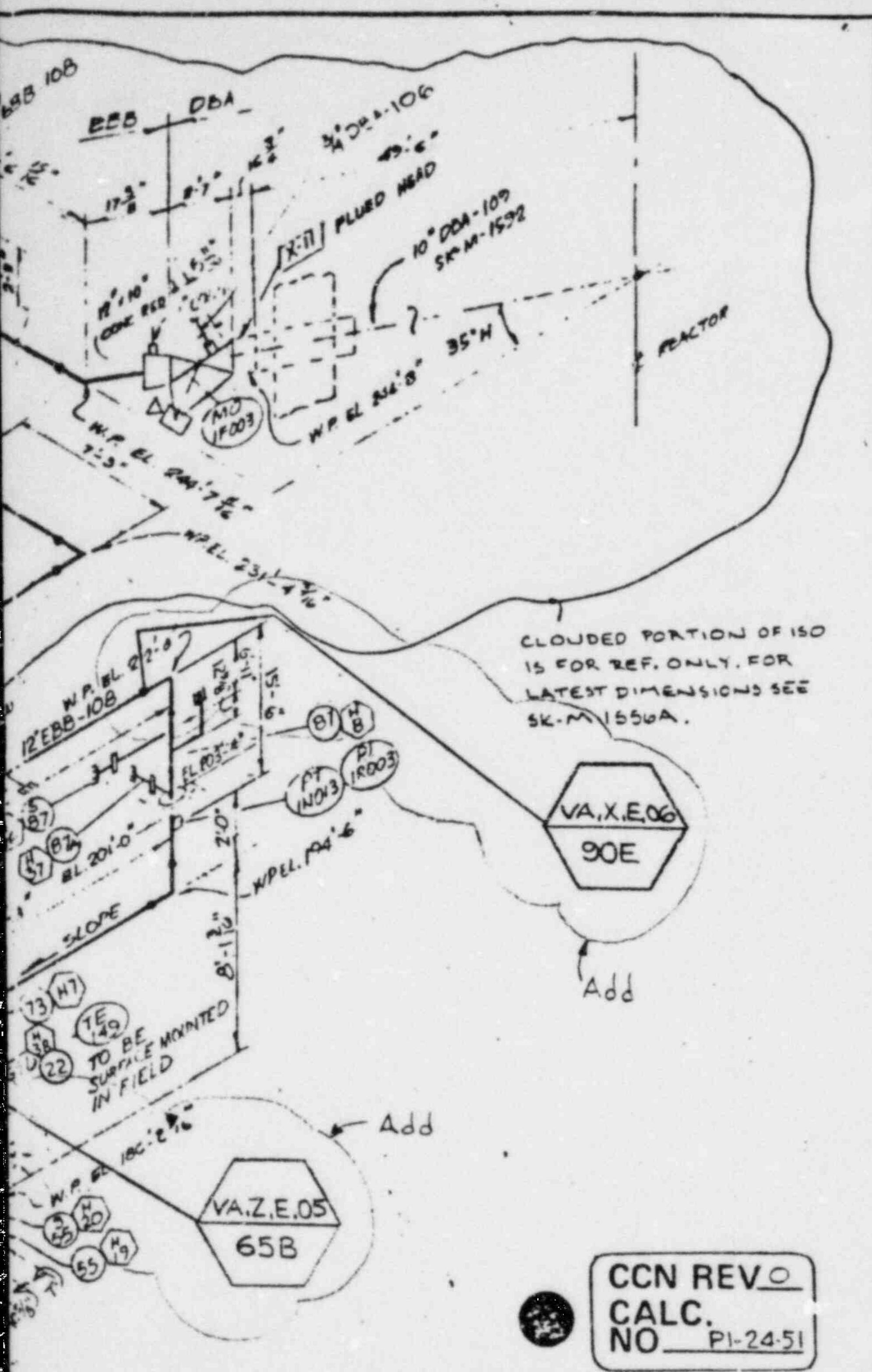
Pg 4 of 8

Adm. 2
Rev. 1



CCN REV. 0
CALC. NO. P1-24-51

STRESS APPROVALS		
REV	THERMAL	SEISMIC

NOTE:
THIS DWG. SUPERSEDES SK-M-362

REV. F NOTE:
ADDED NORTH ARROW, COLUMN REF. & TE-149. ADDED CONT'D STRESS ISO REV. W.P. ELEVATIONS AS NOTED. DIM. 8'-1 3/16" WAS 8'-3 1/16"

REV. N NOTE
ADDED HANGER SYMBOLS & DATA POINTS PER HANGER MARK-UPS.
SK-M-1556B WAS SK-M-1556

REFERENCE

M-55	P&ID		
M-227	PIPING PLAN		
M-228	" "		
M-229	" "		
EBB-108-1	REV 14	FAB. ISO.	
EBB-108-2	REV 20	" "	

MODE DESCRIPTION

MODE I - NORMAL SYSTEM NON-OPERATING CONDITIONS.
MODE II - MAXIMUM DESIGN CONDITIONS
MODE III - ACCIDENT SYSTEM OPERATING CONDITIONS.

STRESS CALC. # P1-24-51

NO.	DATE	REVISIONS	BY	CHKD	[illegible]	[illegible]	[illegible]	[illegible]
N	[illegible]	SEE REV. N NOTE	AV	[illegible]	[illegible]	[illegible]	[illegible]	
M	[illegible]	REV PER P&ID M-55	SRY	[illegible]	[illegible]	/	[illegible]	
L	[illegible]	SEE REV L NOTE	SP	[illegible]	[illegible]	/	[illegible]	
K	[illegible]	ADDED 1" CONN ON 12"x10" CONC. RED.	PV	[illegible]	[illegible]	/	[illegible]	
J	[illegible]	INC. FCR-M-4034F	JBR	[illegible]	[illegible]	/	[illegible]	
H	[illegible]	RELEASED HOLD PER ENP 4737	ET	VR	[illegible]	/	[illegible]	
G	[illegible]	[illegible]	JBR	[illegible]	[illegible]	/	[illegible]	
F	[illegible]	SEE REV. F NOTE	SAL	[illegible]	[illegible]	/	[illegible]	
E	[illegible]	[illegible] REV. [illegible] VALVE DATA	LTL	[illegible]	[illegible]	[illegible]	[illegible]	

SCALE | DESIGNED | DRAWN L. LABAGO | CHECKED

DATA			REV	DATE	BY	REV	DATE	BY
I	II	III						

LEGEND
- SPRING HANGER
- RIGID HANGER
- ANCHOR
- GUIDE
- SNUBBER
- RESTRAINT

BECHTEL
SAN FRANCISCO

LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

ISOMETRIC - REACTOR BUILDING
HIGH PRESSURE COOLANT INJECTION
UNIT 1

8031 | SK-M-1556 B | N

8408140820-01

System: E-HPCI Steam Supply
Location: Outside Containment
Isometric: SK-M-1556B Rev. N
Calculation No: PI-24-51 ⚠1

Instrument No.	Data Point	Axis	Remark
Later	Later	Later	Instrument sensitivity multiplier later

Delete this page

INSTRUMENT SENSITIVITY MULTIPLIER, M_{in}

CALC. NO. P1-24-51 LINE NOS. 12" EBB-108
PIPE SYSTEM HPCI STEAM (O/C) FROM: LINE ANC. 115 TO: HPCI TURB NOZZ.
ISO NOS. SK-M-1556 B Rev N

VIBRATION MODE (*)		(**) ACCELEROMETER (i) number/pipe node-direction							
NUMBER (n)	FREQ. (Hz)	VA.Z.E.04 35-Z	VA.Z.E.05 65B-Z	VA.X.E.06 90E-X	———	———	———	———	———
1	5.78			1.307					
2	12.52			1.000					
3	14.17	1.351							
4	17.71	1.071							
5	17.80			1.965					
7	20.54		2.584						
9	21.40		1.633						
10	22.66	1.657							
12	25.17			3.448					
13	26.20	2.703							
15	28.89		10.24	3.427					
16	29.38			1.191					
17	31.15		7.874						
19	33.15								
21	35.95			2.639					
22	37.30	9.496		7.000					
24	43.35								
25	43.50								
26	44.69		5.737						
27	46.44	4.463							
30	53.04			1.436					
31	54.01		7.014	6.824					
33	56.42	11.37	9.284						
34	62.43			2.793					
35	65.41			1.541					
38	70.77		7.164						
39	79.79								
41	88.95								
43	97.15			6.536					

(*) SKIPPED MODES NOT SIGNIFICANT FOR SCOPE OF TEST
(**) BLANK ENTRIES SIGNIFY LOW SENSITIVITY ($M_{in} > 10$)

Add this page

System: E - HPCI Steam Supply
Location: Outside Containment
Isometric: SK-M-1556B Rev. N
Calculation No: PI-24-51

⚠

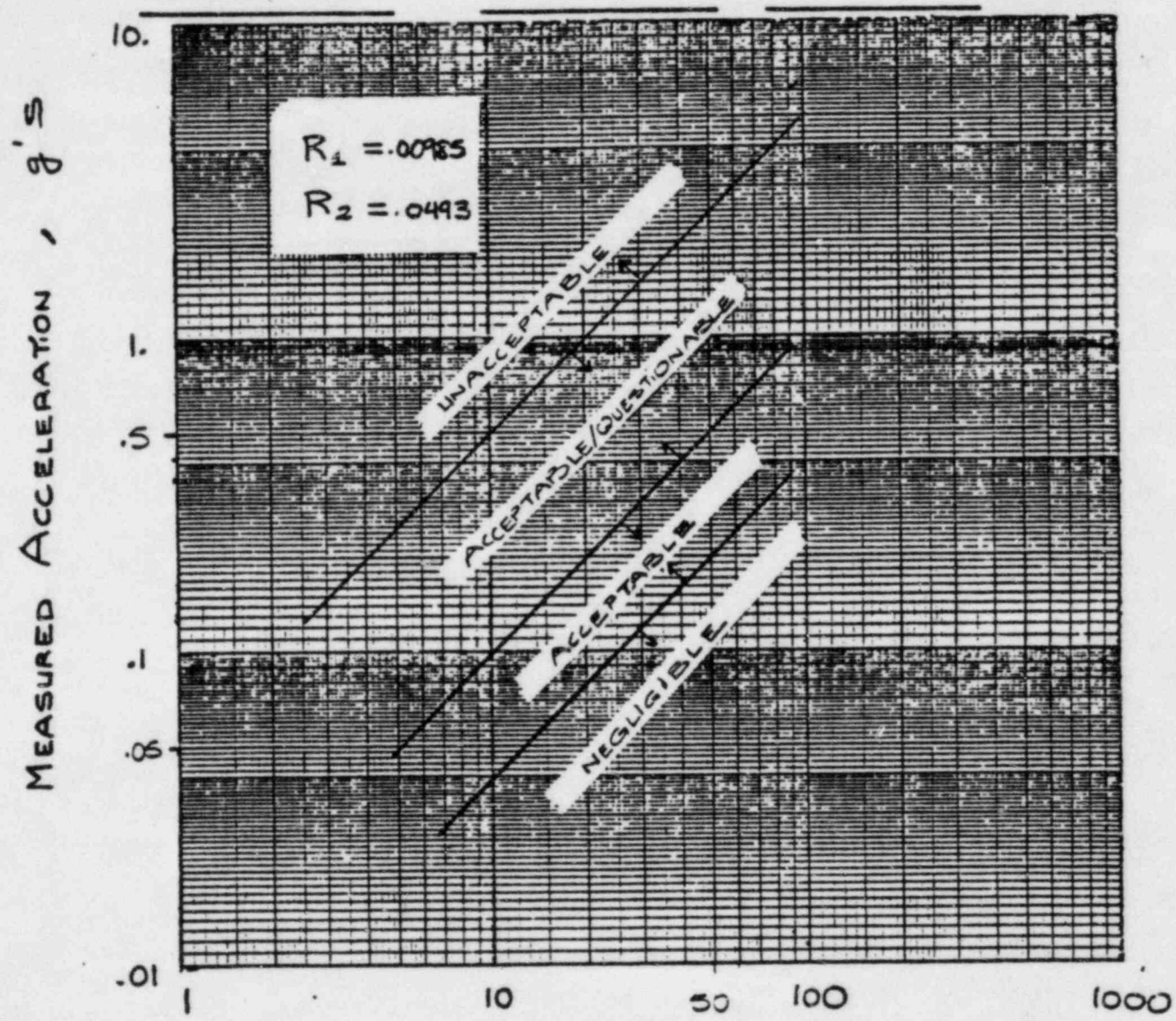
Instrument No	Data Point	Axis	Remark
Later	Later	Later	Acceptable measured acceleration later

Delete this page

Adtn. 2
Rev. 1

Specification 8031-P-363
Appendix-E

SYSTEM: HPCI (O/C) STEAM SUPPLY	INSTRUMENT NO.	NODE POINT	LINE NO.
FROM: IN-LINE ANCHOR AT D.P. 115	VA.Z.E.04	35-Z	
TO: STEAM INLET NOZZLE	VA.Z.E.05	65B-Z	12"-EBB-108
	VA.X.E.06	90E-X	
CALC NO: PI-24-51			
ISO. NO: SK-M-1556B Rev N			



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LGS STARTUP TEST - INSTRUMENTED VIBRATION LIMITS

STEADY STATE VIBRATION INSTRUMENTATION

LOCATION AND DESCRIPTION LIST

System ID.	System	Location	Nos. of Instruments
A	Main Steam	O/C	6
B	Feedwater	I/C	5
C	Feedwater	O/C	3
D	HPCI Steam Supply	I/C	3
E	HPCI Steam Supply	O/C	3
F	HPCI Turbine Exhaust	O/C	3
G	RCIC Steam Supply	I/C	3
H	RCIC Steam Supply	O/C	4
J	RCIC Turbine Exhaust	O/C	~~2~~ 3 (Change)
K	Core Spray	I/C	Deleted
L	RHR Shutdown Return	I/C	2
M	RHR LPCI	I/C	Deleted
N	RHR Head Spray	I/C	Deleted
P	RWCU	I/C	8
Q	RHR Shutdown Supply	I/C	3

Total Instruments Outside Containment (O/C) = ~~21~~ 22
Total Instruments Inside Containment (I/C) = 24 (Change)

Total = ~~45~~ 46

14 of the instruments are also used for Dynamic Transient testing per 8031-P-364.

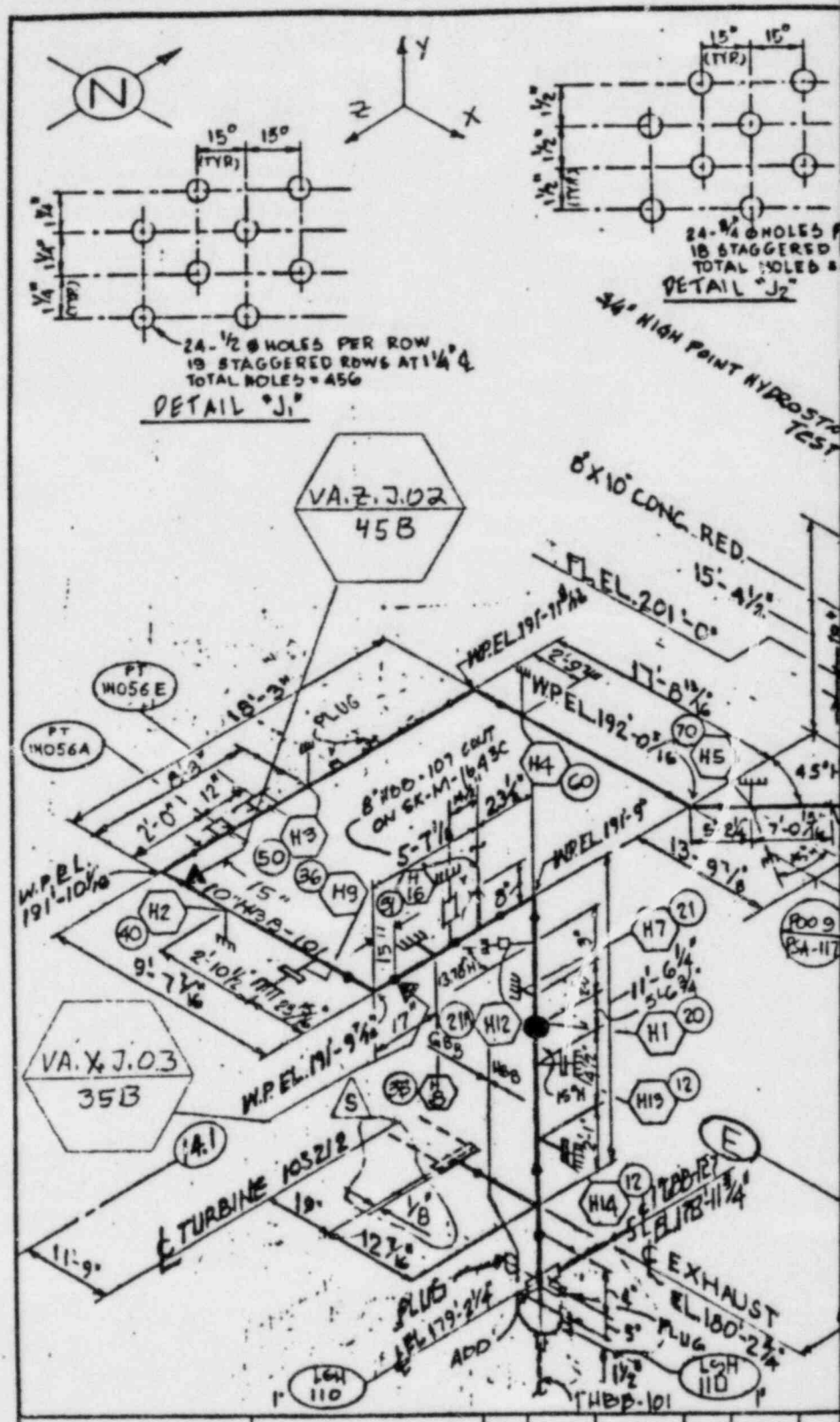
TEST POINT INFORMATION

System : J- RCIC Turbine Exhaust
Location : OUTSIDE CONTAINMENT
Isometric : SK-M- 1645A Rev. S
Calculation No.: P1-22-55

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
ACCELERATION	VA. X. J. 01		35B	X	Deleted
ACCELERATION	VA. Z. J. 02		45B	Z	
Acceleration	VA. X. J. 03		35B	X	
Acceleration	VA. Y. J. 04		75E	Y	Add

Specification
5031-P-363

Appendix C



		DATA			REV	DATE	BY	REV	DATE
PIPING ENGINEER	LINE No.	HBB-101							
	MATERIAL	SMI ASME SA-106 Gr B			A	12/18/79	[illegible]		
	LINE THICKNESS (IN)	.322	.365		A	12/18/79	[illegible]		
MECHANICAL ENGINEER	LINE O.D. (IN)	8.625	10.750		A	12/18/79	[illegible]		
	MODE	I	II	III					
	PRESS. PSIG								
	TEMP F			-					
STRESS ENGINEER	EXP. COEFF. IN/100FT								
	EXP. COEFF. MIL-IN/IN								
	MOD. OF ELAS. X PSI								

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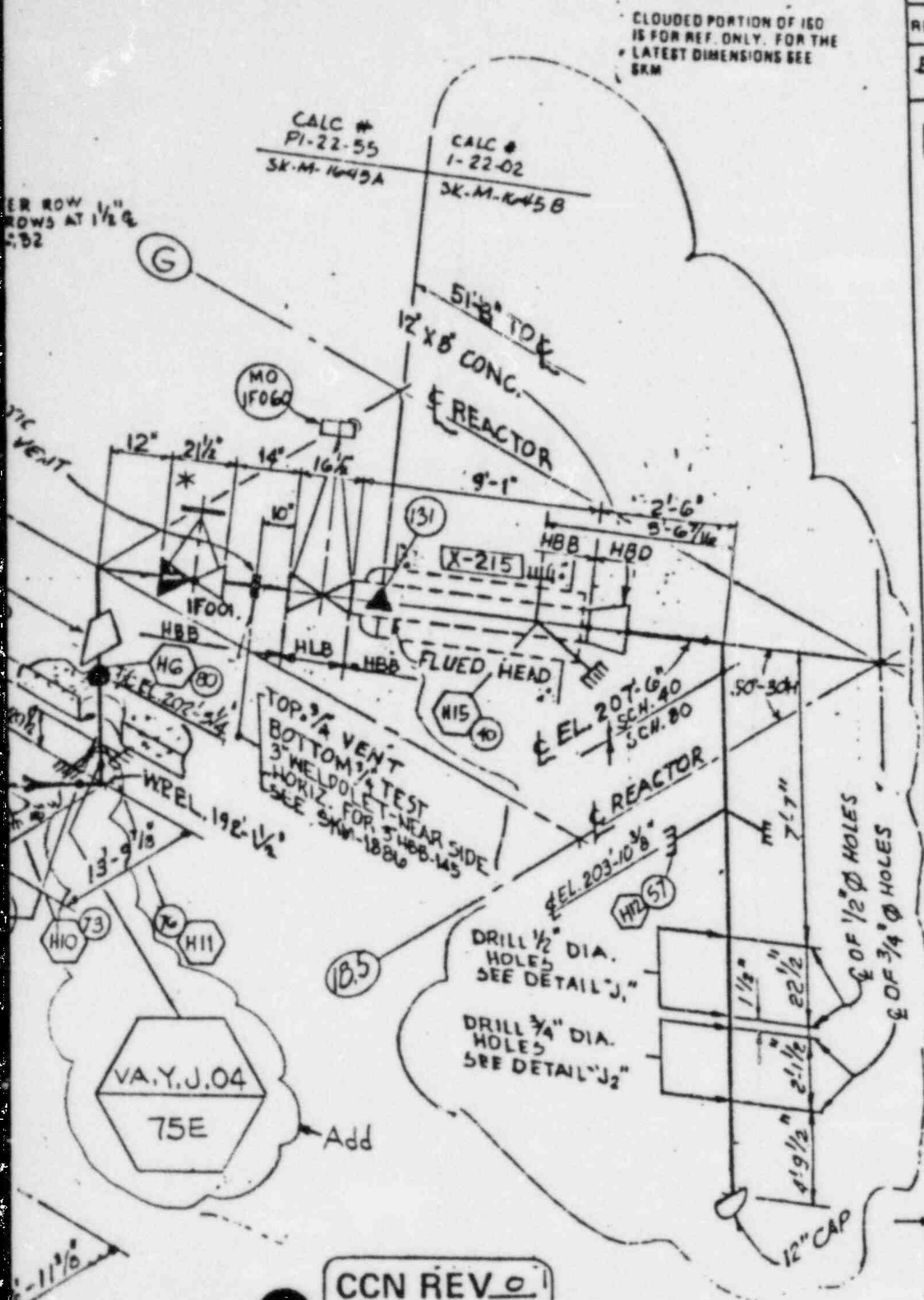
Adtn. 1

Rev. 1



CCN REV 0
CALC. NO PI-22-55

Q-LISTED

STRESS APPROVALS		
REV	THERMAL	SEISMIC
B	RPJ 4-4-74	

REV. M NOTE:
REV. PER FCR M-7766F & LATEST FIELD INFORMATION.

REV Q NOTE
REVISED HOLE ELEVATIONS PER MECH. REQUEST, PIPE SCH, & CAP EL. PER STRESS REQUEST

REV R NOTE
ADDED PIPE SUPPORTS & DATA POINTS FOR RECONCILIATION. DELETED PRESS/TEMP. AND VALVE DATA PER STRESS GROUP MARKUP.

REFERENCE
M-60 P.&I.D.
M-49 "
M-227 PIPING PLAN-EL.177-AREA 1
M-228 " " EL.201 " "
HBB-101-1 REV. 17 FAB. 150
HBD-173-1 REV.15 FAB. 150

CALC # PI-22-55

MODE DESCRIPTION
MODE I NORMAL CONDITIONS
MODE II MAXIMUM DESIGN CONDITIONS
MODE III

No.	DATE	REVISIONS	BY	CHKD			
M		SEE REV M NOTE		RR			
S		INCORP. FCR NO. M11,711F	JAM		ESA	BC	
R		SEE REV R NOTE					
Q		SEE REV Q NOTE		WP			
P		REV. PER FCR 0040		WP			
N		REV PER FCR M-11042		WP			
A		ISSUED FOR STRESS ANALYSIS	T.S.				

	DATA			REV	DATE	BY	REV	DATE	BY
	HBD-173								
	SML ASTM A-106 Gr. B			A	11/8/73	RPJ			
	.375	.688		A	11/8/73	RPJ			
	12.750	12.750		A	11/8/73	RPJ			
	I	II	III						

LEGEND
- SPRING HANGER
- RIGID HANGER
- ANCHOR
- GUIDE
- SNUBBER
- RESTRAINT

DRAWN Jim Sullivan

BECHTEL
SAN FRANCISCO

LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

ISOMETRIC - REACTOR BLDG.
REACTOR CORE ISOLATION COOLING-UNIT

JOB No.	DRAWING No.
8031	SK-M-1645A

Rev. S

E.1 Acceptance Criteria for Remotely Monitored Inaccessible Piping

E.1.1 As required by Section 4.8 the Test Engineer shall identify as test exceptions those systems in which he determines that vibration is unacceptable for continued operation.

E.1.2 Criteria for identification and evaluation of test exceptions are provided in the graphs and tables on page E-7 through E-50. These criteria identify test exceptions at four different levels of evaluation described as follows. 1

Criterion A: A steady state single or multiple mode vibration producing measured acceleration lying within the NEGLIGIBLE region of the criteria shall be considered acceptable for long-term operation.

Criterion B: A ~~single~~ simple ← change harmonic motion (single frequency) vibration producing measured acceleration lying within the ACCEPTABLE region of the criteria shall be considered acceptable for long term operation.

Criterion C: A multiple mode vibration producing measured acceleration outside the NEGLIGIBLE region shall be evaluated as follows.

The frequency distribution of measured acceleration shall be determined and the modal components of measured acceleration a_n and the associated frequencies f_n shall be combined according to the following rule:

$$\sum_{n=1}^{N} \left(\frac{a_n}{f_n}\right) \leq R_1 \quad \text{Criterion C}$$

(2) suppress the vibration by means of fluid dynamic energy absorbing devices,

(3) modify the dynamic response of the piping system by adding or deleting piping restraints and mechanical energy absorbers, or; (in accordance with 4.3) ← Add

(4) other unspecified means.

E.4 Final Disposition of Test Exceptions

Following adoption of any of the measures noted in E.3 the piping system shall again be tested and re-evaluated under the same plant operating conditions that produced the unacceptable vibration.

The procedures specified in E.1 or E.2 as appropriate shall be repeated.

Specification 8031-P-363
Appendix E

SYSTEM: RCIC (O/C: Turbine Exh) | INSTRUMENT No. | NODE POINT | LINE No.

FROM: Flued Head X-215

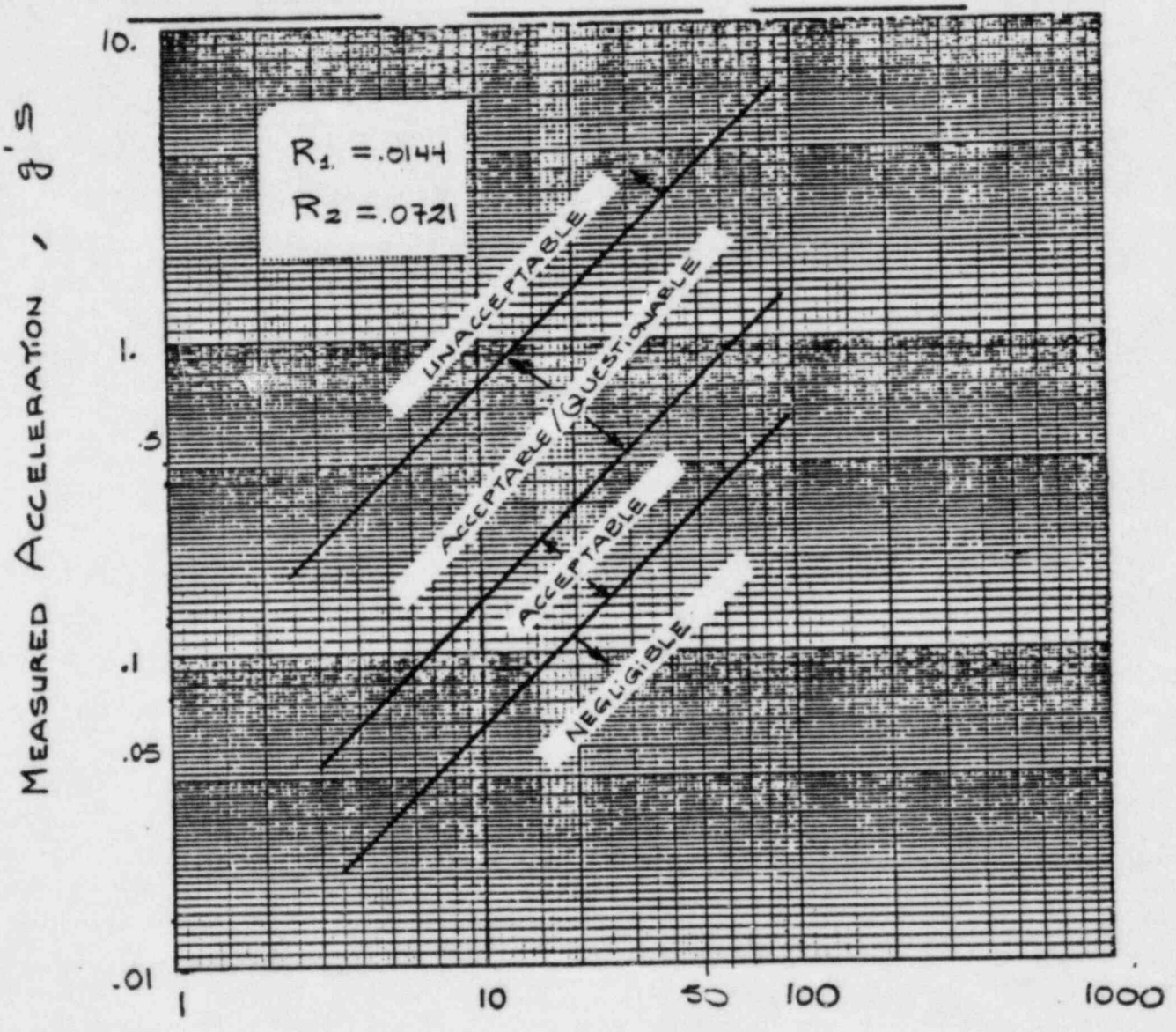
TO: Turbine Exhaust

CALC No: P1-22-55

ISO. No: SK-M-1645A Rev. 5

INSTRUMENT No.	NODE POINT	LINE No.
VA.X.J.03 (change to VA.X.J.01)	35B-X	10" HBB 101
VA.Z.J.02	45B-Z	10" HBB 101
VA.Y.J.04	75E-Y	10" HBB-101

Add



LGS STARTUP TEST - INSTRUMENTED VIBRATION LIMITS

Addn. 1
Rev. 1

Appendix-E Specification 8031-P-363

SYSTEM: RWCU (I/C)
6inch, 4inch, 2½inch & 2inch portions

FROM: RPV NOZZLE N15

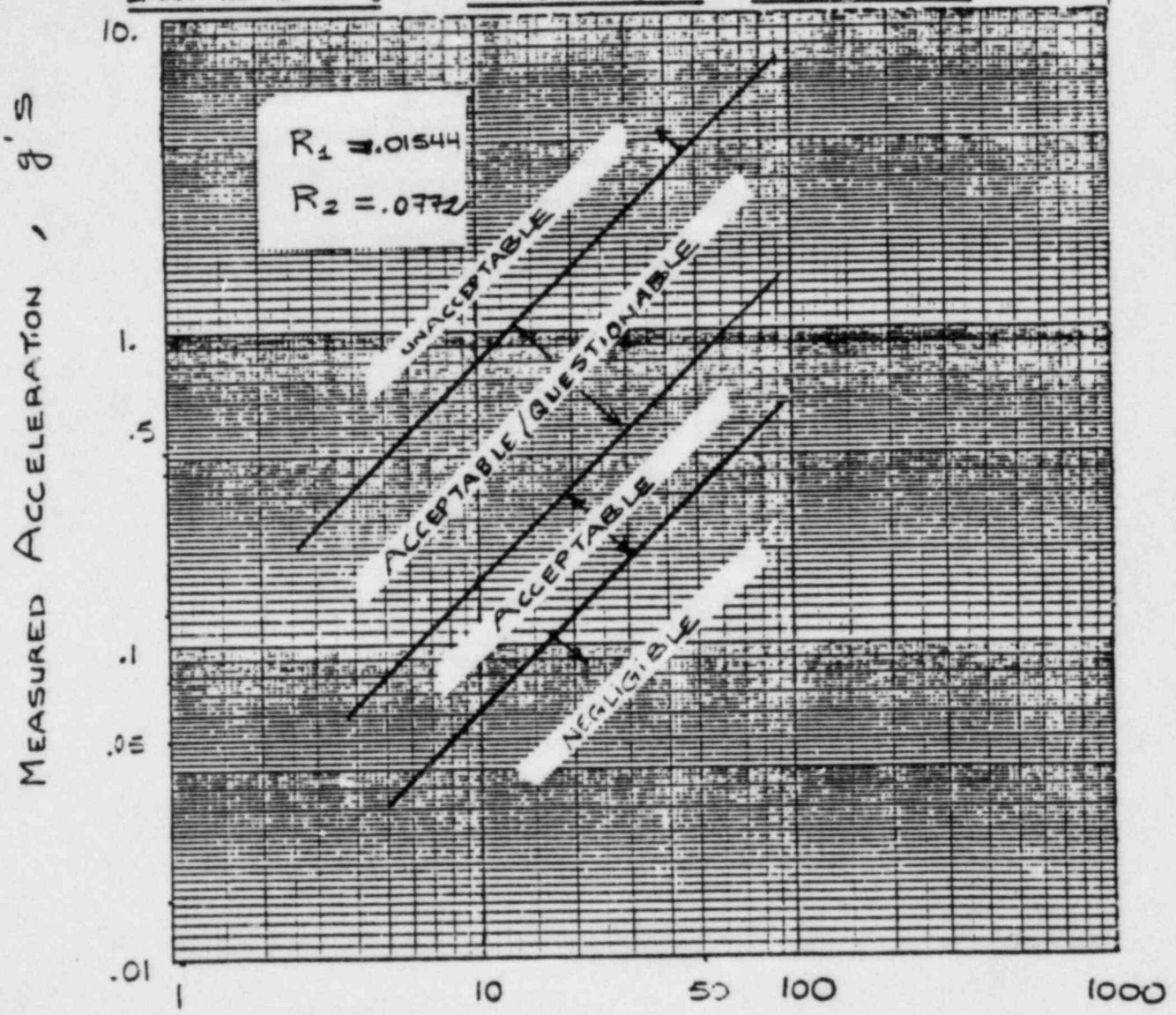
TO: FWD HEAD X-14

CALC NO: H10-11B

ISO. NO: SK-M-1551 B Rev M
SK-M-6455 Rev G
SP.DCA-115-E1-Rev 5

	Instrument No.	Node Point	Line No.
Add	VA.Y.P.09	847-Y	
	VA.Z.P.01	75-Z	6" DCA-101
	VA.X.P.02	87-X	4" DCA-101
	VA.Y.P.03	87-Y	2½" DCA-113
	VA.X.P.04	560B-X	2" DCA-113
	VA.Z.P.05	560B-Z	
	VA.X.P.06	640B-X	
	VA.Z.P.07	810E-Z	
	~~VA.Y.P.08~~	~~847B-Y~~	

1



FREQUENCY, Hz.

VA.Y.P.08 Deleted

LGS STARTUP TEST - INSTRUMENTED VIBRATION LIMITS

System: P-Reactor Water Clean up
Location: Inside Containment
Isometric: SP-DCA-113-E1 Rev. 5
Calculation No: 1-10-11B

Instrument No	Data Point	Axis	Remark
VA.Y.P.09	847	Y	Acceptable measured acceleration ~~lateral~~ see E-23 change

Specification 8031-P-363
Appendix-E

INSTRUMENT SENSITIVITY MULTIPLIER, M_{in}

CALC. NO. P1-22-55 LINE NOS. 10", 8" HBB-101 |1
PIPE SYSTEM RCIC TURB. EXH. FROM: TURB. EXH. TO: X-215
ISO NOS. SK-M-1645A REV. 8 |1

VIBRATION MODE (*)		(**) ACCELEROMETER (i) number/pipe node-direction							
NUMBER (n)	FREQ. (Hz)	VA.X.J.01 35.B-X	VA.Z.J.02 45.B-Z	———	———	———	———	———	———
1	9.53	1.14	8.70						
3	13.70		3.69						
5	16.12		5.51						
6	17.72	3.15	1.72						
7	20.06	4.61	5.18						
11	25.68	2.05	1.63						
13	30.16	3.60	4.11						
15	33.43		7.11						
16	37.44		5.55						
18	39.25		7.25						
20	45.13		4.53						
21	47.15		7.89						
24	53.31	5.18	5.95						

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(*) SKIPPED MODES NOT SIGNIFICANT FOR SCOPE OF TEST
(**) BLANK ENTRIES SIGNIFY LOW SENSITIVITY ($M_{in} > 10$)

Adtn. 1
REV. 1

INSTRUMENT SENSITIVITY MULTIPLIER, M_{in}

CALC. NO. P1-22-SS LINE NOS. 2" & 10" HBB-101
PIPE SYSTEM RCIC TURB STM EXH FROM: TURB EXH. TO: X-215 PENETR.
ISO NOS. SK-M-1645A REV. S

VIBRATION MODE (*)		(**) ACCELEROMETER (i) number/pipe node-direction							
NUMBER (n)	FREQ. (Hz)	VA.X.J.03 35.8-X	VA.Z.J.02 45.8-Z	VA.Y.J.04 75.E-Y	____	____	____	____	____
1	9.53	1.14	8.70	—					
2	12.56	—	—	1.00					
3	13.70	—	3.69	—					
4	14.22	—	—	—					
5	16.12	—	5.51	2.27					
6	17.72	3.37	1.84	5.87					
7	20.06	4.61	5.18	4.61					
8	21.88	9.31	6.97	—					
9	22.31	—	—	—					
11	25.68	2.05	1.63	—					
12	27.76	—	—	—		Add	This page		
13	30.16	3.60	4.11	—					
15	33.43	—	[illegible]	6.12					
16	37.44	—	5.55	—					
17	37.49	—	—	—					
18	39.85	—	7.25	5.41					
19	42.28	—	—	—					
20	45.13	—	4.48	—					
21	47.15	—	7.89	—					
22	48.84	—	—	—					
23	50.15	—	—	8.10					
24	53.31	5.18	5.95	—					
25	65.10	6.52	7.43	—					
26	74.1	—	—	—					
27	75.1	6.76	1.82	—					
28	75.5	6.17	4.44	—					
29	80.8	—	—	—					
30	86.5	5.32	—	—					
31	92.8	—	7.85	—					
32	95.0	—	—	—					

(*) SKIPPED MODES NOT SIGNIFICANT FOR SCOPE OF TEST
(**) BLANK ENTRIES SIGNIFY LOW SENSITIVITY ($M_{in} > 10$)

INSTRUMENT SENSITIVITY MULTIPLIER, M_{in}

CALC. NO. 1-10-11B LINE NOS. 6"& 4"-DCA-101, 2½"& 2"-DCA-113 1

PIPE SYSTEM RWCU (I/C) FROM: PECIRC. PUMP. TO: X-14 1

ISO NOS. SK-M-1551 Rev M, -6433 REV G, SP-DCA-113-E1 REV 5

VIBRATION MODE (*)		(**) ACCELEROMETER (i) number/pipe node-direction							
NUMBER (n)	FREQ. (Hz)	VA.Z.P.01 75-Z	VA-X.P.02 87-X	VA.Y.P.03 87-Y	VA.X.P.04 560,B-X	VA.Z.P.05 560,B-Z	VA.X.P.06 642,B-X	VA.Z.P.07 810,E-Z	VA.Y.P.08 847B-Y
7	13.48		1.41						
8	13.69								5.05
10	14.13							7.69	2.13
14	15.44						1.00		
20	17.46							1.72	
23	18.38							1.14	7.57
24	19.08	1.37	4.76	7.14					
27	19.64					3.06	2.74		
29	19.86							3.92	8.50
34	19		Delete this page					3.16	
35	22.67							2.60	
38	23.39				4.04	2.35	9.18		
39	24.80				3.92				
40	24.89				4.64				
41	24.91							1.92	
42	25.09				6.25				
47	26.05						2.86		
48	26.33							1.59	1.78
50	27.43				2.32	6.52			
53	28.18				9.18				
54	28.53				3.26	5.94			
55	29.28							9.21	8.06
57	29.86			2.42					
60	31.06			9.09					
61	31.08							3.58	3.37
62	31.20							3.47	2.41
63	31.35	8.14		1.90					
69	33.18				2.44	8.47			
70	33.30							8.58	1.03
72	34.16				6.00				

(*) SKIPPED MODES NOT SIGNIFICANT FOR SCOPE OF TEST

(**) BLANK ENTRIES SIGNIFY LOW SENSITIVITY ($M_{in} > 10$)

VA.Y.P.08 Deleted Adtn. 1 Rev. 1

BECHTEL

INSTRUMENT SENSITIVITY MULTIPLIER, M_{in}

CALC. NO. 1-10-11B LINE NOS. 6" & 4" DCA-101, 8 1/2" & 2" DCA-113
PIPE SYSTEM RWCU (I/C) FROM: RECIRC. PMP. TO: X-14
ISO NOS. SK-M-1551B R0/M-6433 Rev 6a - SP-DCA-113-E1 Rev 5

VIBRATION MODE (*)		(**) ACCELEROMETER (i) number/pipe node-direction							
NUMBER (n)	FREQ. (Hz)	VA.Z.P.01 75-Z	VA-X.P.02 87-X	VA.Y.P.03 87-Y	VA.X.P.04 560^B-X	VA.Z.P.05 560^B-Z	VA.X.P.06 640^B-X	VA.Z.P.07 810^E-Z	VA.Y.P.09 847-Y
7	13.48		1.41						
9	13.69								2.34
10	14.13							7.69	1.03
14	15.44						1.00		
20	17.46							1.72	9.07
23	18.38							1.14	4.27
24	19.08	1.37	4.76	7.14					
27	19.64					3.06	2.74		
29	19.86							3.92	5.60
34	22.19							3.16	
35	22.67							2.60	
36	23.39				4.04	2.35	9.18		
39	24.80				3.92				
40	24.89				4.64				
41	24.91							1.92	5.32
42	25.09				6.25				
47	26.05						2.86		
48	26.33							1.59	2.18
50	27.43				2.32	6.52			
53	28.18				9.18				
54	28.53				3.26	5.94			
55	29.28							9.21	
57	29.86			2.42					
60	31.06			9.09					
61	31.08							3.58	
62	31.28							3.47	8.25
63	31.35	8.14		1.90					
69	33.18				2.44	8.47			
70	33.30							8.58	7.86
72	34.16				6.00				

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(*) SKIPPED MODES NOT SIGNIFICANT FOR SCOPE OF TEST

(**) BLANK ENTRIES SIGNIFY LOW SENSITIVITY ($M_{in} > 10$)

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Adtn. 1
Rev 1

BECHTEL

INSTRUMENT SENSITIVITY MULTIPLIER, M_{in} ⚠1

CALC. NO. 1-10-11B LINE NOS. 6"& 4"DCA-101, 2½"& 2" DCA-113
PIPE SYSTEM RWCU (I/C) FROM: RECIRC. PMP. TO: X-14 ⚠1
ISO NOS. SK-M-1551B2sh1, -6433 REV G2 SP-DCA-113-E1 REV 5

VIBRATION MODE (*)		(**) ACCELEROMETER (i) number/pipe node-direction							
NUMBER (n)	FREQ. (Hz)	VA.Z.P.01 75-Z	VA-X.P.02 87-X	VA.Y.P.03 87-Y	VA.X.P.04 560₁B-X	VA.Z.P.05 560₁B-Z	VA.X.P.06 642₁B-X	VA.Z.P.07 810₁E-Z	VA.Y.P.08 647B-Y
77	34.96				1.05	9.27			
78	35.71			4.16					
80	36.32							3.93	5.25
82	37.28	Delete This page						5.89	2.26
91	41.06							4.11	
94	42.63							2.36	3.13
95	43.33				7.29	1.07			
96	43.63				9.27	1.07			
103	46.25		1.55	1.60					
106	47.73	7.75	1.63	4.96					
108	49.15							4.12	
111	50.32				2.97	1.59			
112	50.71							6.93	
113	50.91				2.87	1.53			
115	51.69	5.88							
119	54.74	5.83	4.77	1.05					
128	57.54								3.92
130	57.93				3.16	3.74			
131	58.78						5.15		
133	58.97							4.64	7.85
144	63.02							6.31	5.32
147	63.73							2.64	
152	67.32				9.09	3.57			
162	74.45	4.81		6.18					
163	74.68	3.32		5.94					
175	83.26				2.79	9.90			
177	84.13				4.24	4.81			
181	85.30							2.54	4.18
184	89.19					6.06			
186	91.14							1.83	5.09

(*) SKIPPED MODES NOT SIGNIFICANT FOR SCOPE OF TEST
(**) BLANK ENTRIES SIGNIFY LOW SENSITIVITY ($M_{in} > 10$)

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Adm. 1
Rev. 1

BECHTEL

INSTRUMENT SENSITIVITY MULTIPLIER, M_{in}

CALC NO I-10-118 LINE NOS 6"& 4"DCA-101, 8½"& 2" DCA-113
PIPE SYSTEM PWCU (I/C) FROM: RECIRC. PMP TO: X-14
ISO NOS. SK-M-1551B Rev M, -6433 Rev 03, SF-DCA-113-E1 Rev 5

VIBRATION MODE (*)		(**) ACCELEROMETER (i) number/pipe node-direction							
NUMBER (n)	FREQ. (Hz)	VA.Z.P.01 75-Z	VA-X.P.02 87-X	VA.Y.P.03 87-Y	VA.X.P.04 560,B-X	VA.Z.P.05 560,B-Z	VA.X.P.06 640,B-X	VA.Z.P.07 810,E-Z	VA.Y.P.09 647-Y
77	34.96				1.05	9.27			
78	35.71			4.16					
80	36.32							3.93	
82	37.28		Add this page					5.89	
91	41.06							4.11	
94	42.63							2.36	7.81
95	43.33				7.29	1.07			
96	43.63				9.27	1.07.			
103	46.25		1.55	1.60.					
106	47.73	7.75	1.63	4.96					
108	49.15							4.12	
111	50.32				2.97	1.59			
112	50.71							6.93	
113	50.91				2.87	1.53			
115	51.69	5.88							
119	54.74	5.83	4.77	1.05					
128	57.54								6.84
130	57.93				3.16	3.74			
131	58.78						5.15		
133	58.97							4.64	6.22
144	63.02							6.31	
147	63.73							2.64	7.00
152	67.32				9.09	3.57			
162	74.45	4.81		6.18					
163	74.68	3.32		5.94					
175	83.26				2.79	9.90			
177	84.13				4.24	4.81			
181	88.30							2.54	3.16
184	89.19					6.06			
186	91.14							1.83	4.18

(*) SKIPPED MODES NOT SIGNIFICANT FOR SCOPE OF TEST
(**) BLANK ENTRIES SIGNIFY LOW SENSITIVITY ($M_{in} > 10$)

Adtn.1
Rev 1

INSTRUMENT SENSITIVITY MULTIPLIER, M_{in} 1

CALC. NO. 1-10-11B LINE NOS. 6"& 4"DCA-101, 2½"& 2" DCA-113
PIPE SYSTEM RWCU (=/c) FROM: RECIRC. PMP. TO: X-14 1
ISO NOS. SK-M-1551BRevM, -6433 REV G, SP-DCA-113-E1 REV 5

VIBRATION MODE (*)		(**) ACCELEROMETER (i) number/pipe node-direction							
NUMBER (n)	FREQ. (Hz)	VA.Z.P.01 75-Z	VA-X.P.02 87-X	VA.Y.P.03 87-Y	VA.X.P.04 560,B-X	VA.Z.P.05 560,B-Z	VA.X.P.06 640,B-X	VA.Z.P.07 810,E-Z	~~VA.Y.P.08 647B-Y~~
188	91.84	6.44							
190	94.84							4.17	1.18
191	96.09							4.35	3.70
192	97.30	4.25		9.27					
195	99.45								7.77

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(*) SKIPPED MODES NOT SIGNIFICANT FOR SCOPE OF TEST
(**) BLANK ENTRIES SIGNIFY LOW SENSITIVITY ($M_{in} > 10$)

VA.Y.P.08 Deleted

INSTRUMENT SENSITIVITY MULTIPLIER, M_{in}

CALC. NO. L-10-118 LINE NOS. 6"& 4"DCA-101, 8 1/2"& 2" DCA-113
PIPE SYSTEM RWCU (I/C) FROM: REC.RC. PMP. TO: X-14
ISO NOS. SK-M-1548 Rev M, -6433 Rev B2, EP-DCA-113-E1 Rev 5

VIBRATION MODE (*)		(**) ACCELEROMETER (i) number/pipe node-direction							
NUMBER (n)	FREQ. (Hz)	VA.Z.P.01 75-Z	VA-X.P.02 87-X	VA.Y.P.03 87-Y	VA.X.P.04 560,B-X	VA.Z.P.05 560,B-Z	VA.X.P.06 642,B-X	V..Z.P.07 810,E-Z	VA.Y.P.08 847.-Y
188	91.84	6.44							
190	94.84							4.17	1.05
191	96.09							4.35	3.37
192	97.30	4.25		9.27					
195	99.45								9.62

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(*) SKIPPED MODES NOT SIGNIFICANT FOR SCOPE OF TEST
(**) BLANK ENTRIES SIGNIFY LOW SENSITIVITY ($M_{in} \geq 10$)

Adm. 1
Rev 1

SHEET	LATEST REV.	SHEET	LATEST REV	SHEET	LATEST REV.	SHEET	LATEST REV.	SHEET	LATEST REV.	SHEET	LATEST REV.	SHEET	LATEST REV
i	1	1	1	A-1	1	B-1	1	B-26	1	C-1	1	C-26	1
ii	1	2	1			B-2	1	B-27	1	C-2	1	C-27	1
iii	1	3	1			B-3	1	B-28	1	C-3	1	C-28	1
iv	0	4	1			B-4	1	B-29	1	C-4	1	C-29	1
		5	1			B-5	1	B-30	1	C-5	1	C-30	1
		6	1			B-6	1	B-31	1	C-6	1	C-31	1
		7	1			B-7	1	B-32	1	C-7	1	C-32	1
						B-8	1	B-33	1	C-8	1	C-33	1
						B-9	1	B-34	1	C-9	1	C-34	1
						B-10	1	B-35	1	C-10	1	C-35	1
						B-11	1	B-36	1	C-11	1	C-36	1
						B-12	1	B-37	1	C-12	1	C-37	1
						B-13	1	B-38	1	C-13	1	C-38	1
						B-14	1	B-39	1	C-14	1	C-39	1
						B-15	1	B-40	1	C-15	1	C-40	1
						B-16	1	B-41	1	C-16	1	C-41	1
						B-17	1	B-42	1	C-17	1	C-42	1
						B-18	1	B-43	1	C-18	1	C-43	1
						B-19	1	B-44	1	C-19	1	C-44	1
						B-20	1	B-45	1	C-20	1	C-45	1
						B-21	1	B-46	1	C-21	1	C-46	1
						B-22	1	B-47	1	C-22	1		
						B-23	1	B-48	1	C-23	1		
						B-24	1	B-49	1	C-24	1		
						B-25	1			C-25	1		

NO.	DATE	REVISIONS	BY	CHK'D	APP'D	NO.	DATE	REVISIONS	BY	CHK'D	APP'D
1		Revised sheets i, ii, iii, 1 to 7, A-1, B-1 to B-49, C-1 to C-46, Deleted sheet 8	KLB								
0	12/16/83	Issued for Use	KLB								

BECHTEL POWER DIVISION

FACING SHEET
LIMERICK GENERATING STATION, UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

JOB No 8031

8031-P-363
Sheet i

REV. 1

SHEET	LATEST REV.	SHEET	LATEST REV	SHEET	LATEST REV.	SHEET	LATEST REV.	SHEET	LATEST REV.	SHEET	LATEST REV.	SHEET	LATEST REV
D-1	0	E-1	1	E-26	1	B-50	1						
D-2	0	E-2	1	E-27	1	B-51	1						
D-3	0	E-3	1	E-28	1	B-52	1						
D-4	0	E-4	1	E-29	1	B-53	1						
D-5	0	E-5	1	E-30	1	B-54	1						
D-6	0	E-6	0	E-31	1	B-55	1						
D-7	0	E-7	1	E-32	1	B-56	1						
D-8	0	E-8	1	E-33	1								
D-9	0	E-9	1	E-34	1	C-47	1						
D-10	0	E-10	1	E-35	1	C-48	1						
D-11	0	E-11	1	E-36	1	C-49	1						
D-12	0	E-12	1	E-37	1	C-50	1						
D-13	0	E-13	1	E-38	1	C-51	1						
D-14	0	E-14	1	E-39	1	C-52	1						
		E-15	1	E-40	1	C-53	1						
		E-16	1	E-41	1	C-54	1						
		E-17	1	E-42	1								
		E-18	1	E-43	1	E-49	1						
		E-19	1	E-44	1								
		E-20	1	E-45	1								
		E-21	1	E-46	1								
		E-22	1	E-47	1								
		E-23	1	E-48	1								
		E-24	1										
		E-25	1										

NO.	DATE	REVISIONS	BY	CHK'D	APP'D	NO.	DATE	REVISIONS	BY	CHK'D	APP'D
1		Revised sheets E-1 to E-5, E-7 to E-48. Added sheets B-50 to B-56, C-47 to C-54, E-49	KCB	[illegible] KSS	WCM [illegible]						
0	12/6/83	Issued for Use	KCB	[illegible]	[illegible]						

BECHTEL POWER DIVISION

FACING SHEET
LIMERICK GENERATING STATION, UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

JOB No 8031
8031-P-363
Sheet ii

REV. 1

TABLE OF CONTENTS

1.0 OBJECTIVES

1.1 The objective of the test is to verify that the steady state vibratory levels of the piping systems listed in Section 2.0 are within acceptable limits.

2.0 SCOPE

2.1 Those BOP (Balance Of Plant) systems within the scope of the testing are listed below. Only those portions identified in the Stress Isometric Drawings in Appendix C and in the scoping P&ID's in Appendix D are within the testing scope.

2.1.1 Main Steam (MS)

2.1.2 Feedwater (FW)

2.1.3 High Pressure Coolant Injection (HPCI)

2.1.4 Reactor Core Isolation Cooling (RCIC) △1

2.1.5 Reactor Water Clean-Up (RWCU)

2.1.6 Residual Heat Removal (RHR)

2.1.7 Core Spray (CS)

2.1.8 Standby Liquid Control (SLC)

2.2 The piping systems included within the scope of the testing shall be tested during start-up testing under all normal modes. Testing during plant pre-operational modes may be substituted wherever practical and equivalent to operational modes.

3.0 ACCEPTANCE CRITERIA

3.1 Instrumented Piping

3.1.1 The acceptance criterion for instrumented piping is that the maximum measured amplitude of the piping response shall not induce a stress in the pipe more than: a) 80% of the endurance limit for 10^6 cycles of the material for carbon steel piping; b) 60% of the endurance limit for 10^6 cycles of the material for stainless steel piping.

3.1.2 The graphs included in Appendix E show pipe acceleration acceptance criteria as a function of frequency. Methods for applying the criteria are also described in Appendix E.

3.1.3 The Test Engineer will implement only Criterion A of Appendix E. Test results not satisfying this Criterion will be evaluated by Project Engineering. 

3.2 Visual Inspection

3.2.1 The piping may be qualified as acceptable, if upon visual examination a qualified test engineer judges the vibratory response to be within acceptable limits. Visual examination includes visual observation, tactile evaluation and measurement using hand held instruments. 

3.2.2 Piping which cannot be judged acceptable, based on a visual review by a qualified test engineer, will require further testing as necessary (to be determined by the qualified Test Engineer), to assure that the maximum steady state vibration induced stress is less than that specified in Section 3.1.1.

3.3 Small Piping and Instrument Lines

3.3.1 Small pipe and instrument lines as described below are inaccessible during start-up. These lines shall receive a pre start-up review in accordance with Reference 7.10 to ascertain that the restraint system is satisfactory to limit vibration and stress induced by process pipe or equipment to acceptable levels. 

a. Reactor pressure vessel water level indicator instrumentation lines

b. Main steam instrumentation lines used to monitor high steam flow

c. Reactor core isolation cooling lines used to monitor high steam flow

d. Control rod drive lines inside containment required for SCRAM

Lines found to be unacceptable during the review must be added to the instrumented piping test scope.

3.3.2 Small pipe and instrument lines connected to the piping described in Section 2.1 shall be evaluated as follows:

a. Lines accessible during testing shall be visually inspected for excessive vibration.

b. Lines not accessible during testing shall receive a pre start-up review in accordance with Reference 7.10 to ascertain that the restraint system is satisfactory to limit vibration and stress induced by the process pipe to acceptable levels. Lines found to be unacceptable during the review must be added to the instrumented piping test scope. 

Based on a satisfactory evaluation of the review, these lines are considered acceptable if the vibration levels in the connecting process pipe are within the acceptance criteria given in Section 3.1.

3.4 Piping systems exceeding the acceptance criteria given in this specification shall be designated as test exceptions in the test results. Test exceptions shall be addressed and resolved in accordance with Appendix E.

4.0 PRECAUTIONS AND NOTES

4.1 Vibration amplitude measurements in terms of root mean square (RMS) values must first be corrected to zero to peak values before comparison with the acceptance criteria of Appendix E. 

4.2 For lines inspected visually during testing, if in the judgement of the Test Engineer, the piping vibrations are negligible, he may so indicate this in the test results without any measurements made by hand held instruments. 

When measurements are made by hand held instruments they shall be indicated in the test results and shall include

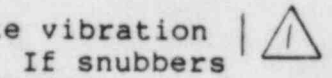
a. the vibration quantity measured i.e; displacement, velocity or acceleration.

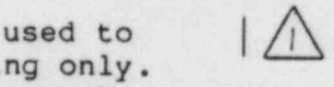
b. the frequency of vibration associated with each measured quantity

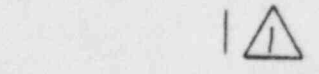
c. the isometric node point where the measurement was taken and

d. the measurement axis with respect to global coordinates.

The acceptance criteria shall be in accordance with Reference 7.9 and the methodology of Reference 7.8.

4.3 Snubbers shall not be used for steady state vibration control without prior approval from PECo. If snubbers are used to correct such conditions they shall be evaluated for acceptability in accordance with NRC MEB Question No. 77 against FSAR Section 3.9.3.4.1c. | 

4.4 The isometrics provided in Appendix C are used to show instrument locations and piping routing only. Other sources must be consulted for pipe support location, types, piping operating conditions, layout dimensions, etc. | 

4.5 The Test Engineer | 

a. shall be qualified to make a visual determination of the steady state vibration response of the piping system based on the test results

b. must be familiar with the piping stress analysis from a static and dynamic response point of view

c. must be familiar with the operation of the system being tested, or similar systems, and understand any unique operational characteristics of the system being tested

d. must be familiar with the instrumentation and acceptance criteria for the test being performed.

e. must be familiar with the applicable technical procedures and specifications.

It is acceptable that a team of personnel with the above qualifications perform the testing.

Project Engineering shall designate those individuals qualified to perform visual examination. △1

4.6 Piping systems that can't be qualified as acceptable based upon visual examination or instrument readings shall be noted by the Test Engineer as test exceptions in the test results.

5.0 PREREQUISITES

5.1 Construction of the piping system, including insulation, penetration sealing, etc., must be complete and all pipe supports installed, inspected and adjusted per Reference 7.4

5.2 The test equipment listed in Section 6.0 shall be calibrated within the specified ranges and accuracies.

5.3 Prior to testing a system walkdown shall be conducted to verify that the instrument locations are in conformance with this specification. △1

6.0 INSTRUMENTATION

6.1 Those portions of the piping system inaccessible for visual examination by the qualified Test Engineer require remote instrumentation, signal conditioning, and recording instrumentation.

6.2 The location, types, and directions of remote instrumentation transducers are shown in Appendices B and C.

Accelerometers must be located within one pipe diameter of the position shown in Appendix C and the sensitive axis must be within 15° of the axis specified in Appendix B.

6.3 The transducers, signal conditioning equipment, and recorders shall be capable of providing a peak measured acceleration amplitude of 30 g's between 2 Hz and 150 Hz. △1

Accelerometers shall have a dynamic response accuracy which equals or exceeds ± .01g residual error and ± 5% of reading at temperatures less than or equal to 400°F. (1)

6.3.1 The test data shall be displayed for each test in the form of acceleration amplitude as a function of frequency. At the test engineers request, the test data shall also be displayed by one or more of the following charts:

1) displacement, velocity or acceleration amplitude as a function of time.

2) displacement or velocity amplitude as a function of frequency.

6.4 The test data shall be provided on magnetic tape and in chart form.

6.4.1 The tape recording speed and gains and chart scales shall be such that there is no loss of data within the specified ranges and accuracies.

6.4.2 The data shall be in a format suitable for, but not limited to; 1) single or double integration, 2) spectrum analysis.

6.4.3 Factors for conversion of RMS data to peak values shall be provided. (1)

6.5 Instrumentation shall not be removed or disconnected prior to final system acceptance and/or reconciliation.

6.6 It is anticipated that some piping system steady state vibratory levels might not be within the acceptance criteria limits. Should this situation occur, it will be up to the Test Director, after consultation with the Test Engineer(s), whether or not to continue the test. Project Engineering shall be informed immediately of any test acceptance criteria exceedance.

6.7 All original charts and recorder tapes shall be properly identified, dated, and signed by the Test Director and stored in accordance with Plant Administrative procedures.

6.8 All test data recorded in the Test Results shall be signed and dated by the Test Director and stored in accordance with Plant Administrative procedures.

6.9 A copy of each chart shall be provided to Project Engineering for information and action as necessary.

6.10 The instrument installation shall not affect the operation or integrity of the piping within the test scope or adjacent piping and equipment.

6.11 When visual inspection is used the Test Engineer shall be provided with a portable vibration measurement instrument suitable for measurement of both frequency and amplitude of vibration. The measuring instrument shall incorporate filtering capability so that steady state vibrations at discrete frequencies can be isolated and measured.

7.0 REFERENCES

7.1 ASME Boiler and Pressure Vessel Code, Division 1, Section III, 1971 issue with all addenda issued through winter 1972.

7.2 ANSI Power Piping, Code B31.1, 1973.

7.3 Piping Class Sheets, Summary Sheets and Standards 8031-P-300.

7.4 Technical Specification for Installation, Inspection and Documentation of Pipe Supports, Hangers and Restraints, 8031-P-319.

7.5 Final Safety Analysis Report Chapter 3, Section 3.9 and Chapter 14.

7.6 Stress Isometrics (Included in Appendix C).

7.7 Piping and Instrument Diagrams (Included in Appendix D).

7.8 ASME Paper 83-PVP-11. Criteria for Evaluating Steady State Piping Vibrations of Nuclear Power Piping.

7.9 ANSI/ASME OM3-1982. Requirements for Preoperational and Initial Startup Vibration Testing of Nuclear Power Plant Piping Systems.

7.10 Stress Group Design Criteria for Piping Stress Analysis, 8031-P-403. 

APPENDIX A

Instrumentation

STEADY STATE VIBRATION INSTRUMENTATION

LOCATION AND DESCRIPTION LIST

System ID.	System	Location	Nos. of Instruments	
A	Main Steam	O/C	6	
B	Feedwater	I/C	5	1
C	Feedwater	O/C	3	
D	HPCI Steam Supply	I/C	3	
E	HPCI Steam Supply	O/C	3	
F	HPCI Turbine Exhaust	O/C	3	
G	RCIC Steam Supply	I/C	3	
H	RCIC Steam Supply	O/C	4	
J	RCIC Turbine Exhaust	O/C	2	
K	Core Spray	I/C	Deleted	1
L	RHR Shutdown Return	I/C	2	
M	RHR LPCI	I/C	Deleted	1
N	RHR Head Spray	I/C	Deleted	
P	RWCU	I/C	8	1
Q	RHR Shutdown Supply	I/C	3	

Total Instruments Outside Containment (O/C) = 21
Total Instruments Inside Containment (I/C) = 24

Total = 45

14 of the instruments are also used for Dynamic Transient tesding per 8031-P-364.

APPENDIX B

Test Point Information

Instrumented Piping

TEST POINT INFORMATION

System : A — MAIN STEAM
Location : Outside Containment
Isometric : SK-M- 1503 Rev. N
Calculation No.: 1-01-226

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
ACCELERATION	VA.Y.A.01		B23B	Y	
ACCELERATION	VA.Z.A.02		B25A	Z	
ACCELERATION	VA.Z.A.03		B40A	Z	

TEST POINT INFORMATION

System : A – MAIN STEAM
Location : OUTSIDE CONTAINMENT
Isometric : SK-M- 1504 Rev. H
Calculation No.: 1-01-226

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
ACCELERATION	VA.X.A.04		P37	X	EBB-107-H1
ACCELERATION	VA.Y.A.05		P35	Y	
ACCELERATION	VA.X.A.06		P56B	X	

TEST POINT INFORMATION

System : B - FEEDWATER
Location : INSIDE CONTAINMENT
Isometric : SK-M- 1552 Rev. J
Calculation No.: 1-12-01

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
ACCELERATION	VA.Z.B.01		60B	Z	
ACCELERATION	VA.X.B.02		96	X	
ACCELERATION	VA.Y.B.03		107	Y	DLA-107-H27
ACCELERATION	VA.X.B.04		145B	X	
ACCELERATION	VA.X.B.05		165	X	DLA-107-H21

Accelerometers are also used for dynamic transient testing per 8031-P-364.

TEST POINT INFORMATION

System : C - FEEDWATER
Location : Outside Containment
Isometric : SK-M- 1554 Rev. M
Calculation No.: F1-15-51

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
ACCELERATION	VA.Z.C.03		39	Z	VALVE OPERATOR MO 103A

Accelerometers are also used for dynamic transient testing per 8031-P-364

TEST POINT INFORMATION

System : C - FEEDWATER
Location : Outside Containment
Isometric : SK-M-1555 Rev. F
Calculation No.: P1-15-51

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
ACCELERATION	VA.X.C.01		13	X	VALVE OPERATOR M10-1FC32B
ACCELERATION	VA.Z.C.02		15E	Z	

Accelerometers are also used for dynamic transient testing per 8031-P-364.

TEST POINT INFORMATION

System : D - HPCI Steam Supply
Location : INSIDE CONTAINMENT
Isometric : SK-M- 1592 Rev. L
Calculation No.: 1-01-03

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
ACCELERATION	VA . X . D . 01		200E	X	
ACCELERATION	VA . X . D . 02		212	X	
ACCELERATION	VA . Y . D . 03		400	Y	VALVE OPERATOR MO-1F002 DBA-106-H15

Accelerometers are also used for dynamic transient testing per 8031-P-364

TEST POINT INFORMATION

System :E - HPCI Steam Supply
Location : OUTSIDE CONTAINMENT
Isometric : SK-M- 1556 A Rev. P
Calculation No.: P1-10-72

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
ACCELERATION	VA.X.E.01		16	X	VALVE OPERATOR M10-1FC03
ACCELERATION	VA.X.E.02		47	X	
ACCELERATION	VA.X.E.03		75A	X	

Accelerometers are also used for dynamic transient testing per 8031-P-364

TEST POINT INFORMATION

System : E - HPCI Steam Supply
Location : Outside Containment
Isometric : SK-M-1556B Rev. N
Calculation No.: PI-24-51

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
Acceleration	Later		Later	Later	

TEST POINT INFORMATION

System : F - HPCI Turbine Exhaust
Location : OUTSIDE CONTAINMENT
Isometric : SK-M- 1589 Rev, E
Calculation No.: P1-24-52

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
ACCELERATION	VA.Y.F.03		85	Y	HBB-108-H4

TEST POINT INFORMATION

System : F - HPCI Turbine Exhaust
Location : OUTSIDE CONTAINMENT
Isometric : SK-M-1590 Rev. J
Calculation No.: P1-24-52

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
ACCELERATION	VA.X.F.01		45B	X	
ACCELERATION	VA.Z.F.02		65A	Z	

TEST POINT INFORMATION

System : G - RCIC Steam Supply
Location : INSIDE CONTAINMENT
Isometric : SK-M- 1593 Rev. L
Calculation No.: 1-01-02

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
ACCELERATION	VA . X . G . 01		326B	X	
ACCELERATION	VA . Z . G . 02		332B	Z	
ACCELERATION	VA . X . G . 03		332C	X	

TEST POINT INFORMATION

System :H-RCIC Steam Supply
Location : OUTSIDE CONTAINMENT
Isometric : SK-M- 1565 Rev. G
Calculation No.: P1-22-51

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
ACCELERATION	VA. Z. H. 03		100E	Z	
ACCELERATION	VA. Z. H. 04		110A	Z	

TEST POINT INFORMATION

System : H - RCIC Steam Supply
Location : OUTSIDE CONTAINMENT
Isometric : SK-M-1566 Rev. J
Calculation No.: P1-22-51

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
ACCELERATION	VA. X. H. 01		51AB	X	
ACCELERATION	VA. X. H. 02		70A	X	

TEST POINT INFORMATION

System : J- RCIC Turbine Exhaust
Location : OUTSIDE CONTAINMENT
Isometric : SK-M- 1645A Rev. 5
Calculation No.: P1-22-55

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
ACCELERATION	VA. X. J. 01		35B	X	Deleted
ACCELERATION	VA. Z. J. 02		45B	Z	
Acceleration	VA. X. J. 03		35B	X	

TEST POINT INFORMATION

System : K - CORE SPRAY
Location : INSIDE CONTAINMENT
Isometric : SK-M- 1610 Rev. Q
Calculation No.: 1-20-02

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
ACCELERATION	VA. Z. K. 01		30E	Z	Deleted
ACCELERATION	VA. Y. K. 02		45	Y	Deleted

TEST POINT INFORMATION

System : L-RHR Shutdown Return
Location : INSIDE CONTAINMENT
Isometric : SK-M- 1548 A Rev. H
Calculation No.: 1-10-11A

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
ACCELERATION	VA. X. L. 01		135	X	VALVE OPERATOR 20" DCA - GT (ZS 177)
ACCELERATION	VA. Z. L. 02		135	Z	
					This piping must be tested at normal operating temperature.

TEST POINT INFORMATION

System : M - RHR LPCI
Location : INSIDE CONTAINMENT
Isometric : SK-M- 1542 Rev. L
Calculation No.: 1-10-05

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
ACCELERATION	VA. Z. M. 01		3C	Z	Deleted
ACCELERATION	VA. Y. M. 02		5	Y	Deleted
ACCELERATION	VA. Z. M. 03		120	Z	Deleted

TEST POINT INFORMATION

System :N-RHR Head Spray
Location : INSIDE CONTAINMENT
Isometric : SK-M- 1549 Rev. F
Calculation No.: 1-10-22

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
ACCELERATION	VA.Z.N.04		70E	Z	Deleted
ACCELERATION	VA.Y.N.05		70E	Y	Deleted

TEST POINT INFORMATION

System :N- RHR Head Spray
Location : INSIDE CONTAINMENT
Isometric : SK-M- 1550 Rev. P
Calculation No.: 1-10-09

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
ACCELERATION	VA.X.N.01		2208	X	Deleted
ACCELERATION	VA.Y.N.02		254	Y	Deleted

TEST POINT INFORMATION

System : N- RHR Head Spray
Location : INSIDE CONTAINMENT
Isometric : SK-M- 6794 A Rev. D
Calculation No.: 1 - 10 - 09

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
ACCELERATIO	VA. X. N. 03		174	X	Deleted

TEST POINT INFORMATION

System : P- RWCU
Location : INSIDE CONTAINMENT
Isometric : SK-M- 1551 B Rev. M
Calculation No.: 1-10-11B

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
ACCELERATION	VA. Z. P. 01		75	Z	
ACCELERATION	VA. X. P. 02		87	X	VALVE OPERATOR 1P-1F027
ACCELERATION	VA. Y. P. 03		87	Y	
					This piping must be tested at normal operating temperature.

TEST POINT INFORMATION

System : P-RWCU
Location : INSIDE CONTAINMENT
Isometric : SK-M- 6433 Rev. G
Calculation No.: 1-10-11B

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
ACCELERATION	VA.X.P.04		560B	x	This piping must be tested at normal operating temperature.
ACCELERATION	VA.Z.P.05		560B	z	
ACCELERATION	VA.X.P.06		640B	x	

TEST POINT INFORMATION

System :P- RWCU
Location : INSIDE CONTAINMENT
Isometric : SK-M- SP - DCA - 113 - E1 Rev. 5
Calculation No.: 1 - 10 - 11B

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
ACCELERATION	VA. Z.P. 07		810E	Z	
ACCELERATION	VA. Y. P. 08		847B	Y	Deleted
Acceleration	VA. Y. P. 09		847	Y	This piping must be tested at normal operating temperature.

TEST POINT INFORMATION

System : Q- RHR Shutdown Supply
Location : INSIDE CONTAINMENT
Isometric : SK-M- 1546 Rev. J
Calculation No.: 1-10-10

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
ACCELERATION	VA.X.Q.01		292	X	DCA-104-H26
ACCELERATION	VA.Z.Q.02		314B	Z	
ACCELERATION	VA.Z.Q.03		342	Z	VALVE OPERATOR 1F060A
					This piping must be tested at normal operating temperature.

Visually Monitored Piping

TEST POINT INFORMATION

System : FEEDWATER
Location : OUTSIDE CONTAINMENT
Isometric : SK-M- 298 Rev. J
Calculation No.: 1-15-51A

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
Acceleration		✓			

TEST POINT INFORMATION

System : FEEDWATER
Location : OUTSIDE CONTAINMENT
Isometric : SK-M- 299 A Rev. R
Calculation No.: 1-15-51

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
Acceleration		✓			

TEST POINT INFORMATION

System : Feedwater
Location : Outside Containment
Isometric : SK-M-299B Rev. R
Calculation No.: 1-15-51A

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
Acceleration		✓			

TEST POINT INFORMATION

System : Residual Heat Removal
Location : Outside Containment
Isometric : SK-M- 1608 A Rev. B1 |1|
Calculation No.: 1-10-56

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
Acceleration		✓			

TEST POINT INFORMATION

System : Residual Heat Removal
Location : OUTSIDE CONTAINMENT
Isometric : SK-M- 1511A Rev. H
Calculation No.: P1-10-60

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
ACCELERATION		✓			

TEST POINT INFORMATION

System : Residual Heat Removal
Location : Outside Containment
Isometric : SK-M-1511C Rev. H
Calculation No.: P1-10-59

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
Acceleration		✓			

TEST POINT INFORMATION

System : Residual Heat Removal
Location : Outside Containment
Isometric : SK-M-1514 A Rev. L
Calculation No.: P1-10-56 1

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
Acceleration		✓			

TEST POINT INFORMATION

System : Residual Heat Removal
Location : Outside Containment
Isometric : SK-M-1514 B Rev. K
Calculation No.: P1-10-56

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
Acceleration		✓			

TEST POINT INFORMATION

System : - RESIDUAL HEAT REMOVAL
Location : OUTSIDE CONTAINMENT
Isometric : SK-M- 1515 A Rev. F
Calculation No.: P1-10-60

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
ACCELERATION		✓			

TEST POINT INFORMATION

System : -RESIDUAL HEAT REMOVAL
Location : OUTSIDE CONTAINMENT
Isometric : SK-M- 1519 A Rev. P
Calculation No.: P1-10-65A

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
ACCELERATION		✓			

TEST POINT INFORMATION

System : Residual Heat Removal
Location : Outside Containment
Isometric : SK-M-1519 B Rev. Q
Calculation No.: P1-10-62

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
Acceleration		✓			

TEST POINT INFORMATION

System : - RESIDUAL HEAT REMOVAL
Location : OUTSIDE CONTAINMENT
Isometric : SK-M- 1524 A Rev. K
Calculation No.: P1-10-62

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
ACCELERATION		✓			

TEST POINT INFORMATION

System : Residual Heat Removal
Location : Outside Containment
Isometric : SK-M-1524C Rev. J
Calculation No.: P1-10-67

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
Acceleration		✓			-

TEST POINT INFORMATION

System : RESIDUAL HEAT REMOVAL
Location : OUTSIDE CONTAINMENT
Isometric : SK-M-1534 Rev. E
Calculation No.: P1-10-99 1

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
ACCELERATION		✓			

TEST POINT INFORMATION

System : Residual Heat Removal
Location : Inside Containment
Isometric : SK-M- 1542 Rev. L
Calculation No.: 1-10-05

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
Acceleration		✓			

TEST POINT INFORMATION

System : Residual Heat Removal
Location : Inside Containment
Isometric : SK-M-1549 Rev. F
Calculation No.: 1-10-22

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
Acceleration		✓			

TEST POINT INFORMATION

System : Residual Heat Removal
Location : Inside Containment
Isometric : SK-M- 1550 Rev. P
Calculation No.: 1-10-09

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
Acceleration		✓			

TEST POINT INFORMATION

System : CORE SPRAY
Location : OUTSIDE CONTAINMENT
Isometric : SK-M- 1574 Rev. J
Calculation No.: P1-20-57

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
ACCELERATION		✓			

TEST POINT INFORMATION

System : CORE SPRAY
Location : OUTSIDE CONTAINMENT
Isometric : SK-1-1575A Rev. N
Calculation No.: P1-20-56 ⚠1

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
ACCELERATION		✓			

TEST POINT INFORMATION

System : Core Spray
Location : Outside Containment
Isometric : SK-M-1575B Rev. N
Calculation No.: P1-20-57 (1)

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
Acceleration		✓			

TEST POINT INFORMATION

System : Core Spray
Location : Inside Containment
Isometric : SK-M- 1610 Rev. Q
Calculation No.: 1-20-02

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
Acceleration		✓			

TEST POINT INFORMATION

System : Residual Heat Removal
Location : Inside Containment
Isometric : SK-M- 6794 A Rev. D
Calculation No.: 1-10-09

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
Acceleration		✓			

TEST POINT INFORMATION

System : Residual Heat Removal
Location : Inside Containment
Isometric : SK-M-6794 B Rev D
Calculation No.: P1-10-22

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
Acceleration		✓			

TEST POINT INFORMATION

System : STAND-BY LIQUID CONTROL
Location : OUTSIDE CONTAINMENT
Isometric : SK-M- SP-ECB-114-E1 Rev. 1
Calculation No.: SP-G-780 ⚠1

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
ACCELERATION		✓			

TEST POINT INFORMATION

System : STAND-BY LIQUID CONTROL
Location : OUTSIDE CONTAINMENT
Isometric : SK-M- SP-ECB-114-E2 Rev. 1
Calculation No.: SP-G-780 1

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
ACCELERATION		✓			

TEST POINT INFORMATION

System : STAND-BY LIQUID CONTROL
Location : OUTSIDE CONTAINMENT
Isometric : SK-M- SP-ECB-114-E4 Rev 5 ⚠1
Calculation No.: SP-G-780

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
ACCELERATION		✓			

TEST POINT INFORMATION

System : STAND-BY LIQUID CONTROL
Location : OUTSIDE CONTAINMENT
Isometric : SK-M- SP-ECB-114-E5 Rev.1
Calculation No.: SP-6-780 ⚠1

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
ACCELERATION		✓			

TEST POINT INFORMATION

System : STAND-BY LIQUID CONTROL
Location : OUTSIDE CONTAINMENT
Isometric : SK-M- SP-ECB-114-E8 Rev.0
Calculation No.: SP-G-780 | 1

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
ACCELERATION		✓			

TEST POINT INFORMATION

System : STAND-BY LIQUID CONTROL
Location : OUTSIDE CONTAINMENT
Isometric : SK-M- SP-ECB-114-E9 Rev. 0
Calculation No.: SP-G-780 | 1

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
ACCELERATION		✓			

TEST POINT INFORMATION

System : STAND-BY LIQUID CONTROL
Location : OUTSIDE CONTAINMENT
Isometric : SK-M- SP-ECE-114-E11 Rev. 0
Calculation No.: SP-6-780 1

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
ACCELERATION		✓			

TEST POINT INFORMATION

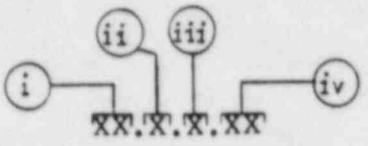
System : STAND-BY LIQUID CONTROL
Location : OUTSIDE CONTAINMENT
Isometric : SK-M- SP-ECB-114-E12 Rev.0
Calculation No.: SP-G-780 ⚠1

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS[3]	
	REMOTE INSTRUMENTATION[1]	VISUAL INSPECTION[2]			
ACCELERATION		✓			

TEST POINT INFORMATION

NOTES:

1.



(i) VA - Vibration Accelerometer

(ii) Sensitive axis

(iii) System Identification

(iv) Instrument No.

2. Visual inspection of vibration will be conducted by the Test Engineer by means of a walkdown.

   If vibration measurements are required hand held instruments may be used and if necessary remote instrumentation may be installed.

3. X = East
   Y = UP
   Z = South

APPENDIX C

Stress Isometrics

LIST OF STRESS ISOMETRICS

Drawing No.	Rev.
SP-DCA-113-E1	5
SP-ECB-114-E1	1
SP-ECB-114-E2	1
SP-ECB-114-E4	5
SP-ECB-114-E5	1
SP-ECB-114-E8	0
SP-ECB-114-E9	0
SP-ECB-114-E11	0
SP-ECB-114-E12	0
SK-M-298	J
SK-M-299A	R
SK-M-299B	R
SK-M-1503	N
SK-M-1504	H
SK-M-1508A	B1
SK-M-1511A	H
SK-M-1511C	H

Drawing No.	Rev.
SK-M-1514A	L
SK-M-1514B	K
SK-M-1515A	F
SK-M-1519A	P
SK-M-1519B	Q
SK-M-1524A	K
SK-M-1524C	J
SK-M-1534	E
SK-M-1542	L
SK-M-1546	J
SK-M-1548A	H
SK-M-1549	F
SK-M-1550	P
SK-M-1551B	M
SK-M-1552	J
SK-M-1554	M
SK-M-1555	F
SK-M-1556A	P
SK-M-1556B	N
SK-M-1565	G
SK-M-1566	J
SK-M-1574	J
SK-M-1575A	N

Drawing No.	Rev.
SK-M-1575B	N
SK-M-1589	E
SK-M-1590	J
SK-M-1592	L
SK-M-1593	L
SK-M-1610	Q
SK-M-1645A	S
SK-M-6433	G
SK-M-6522	F
SK-M-6794A	D
SK-M-6794B	D

Specification 8031-P-363
Appendix C

Also Available On
Aperture Card

TI
APERTURE
CARD

VENDOR PR. NO.

REF. DWG. NO.
SK-M-6434-B

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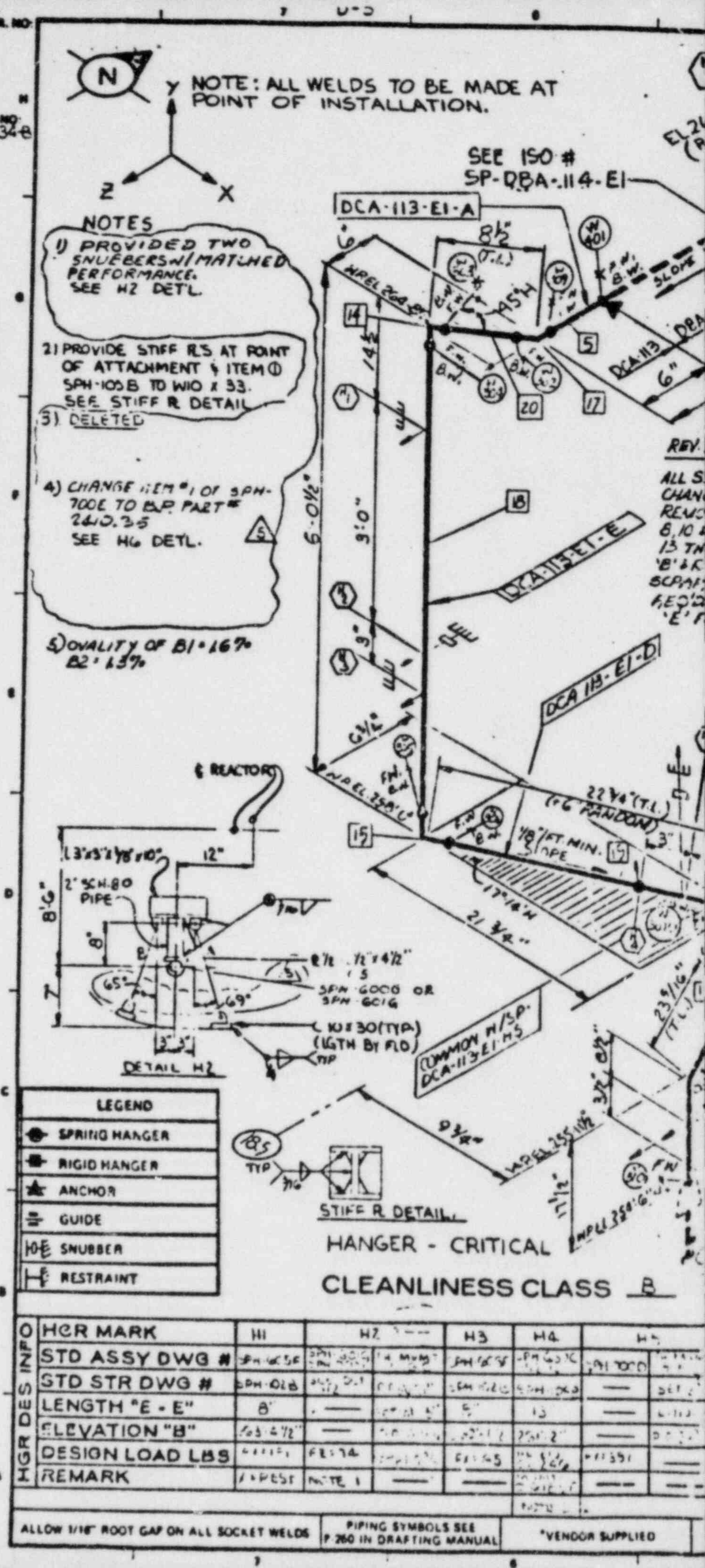
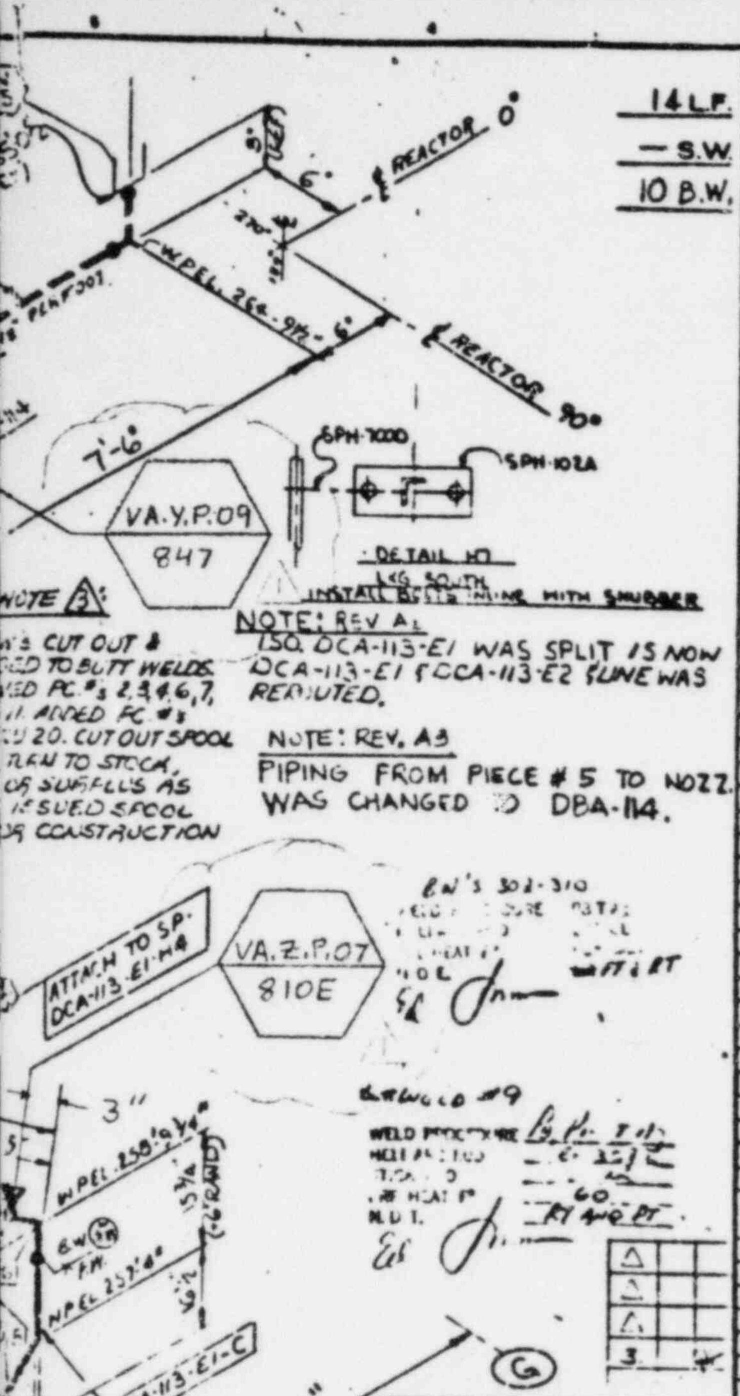


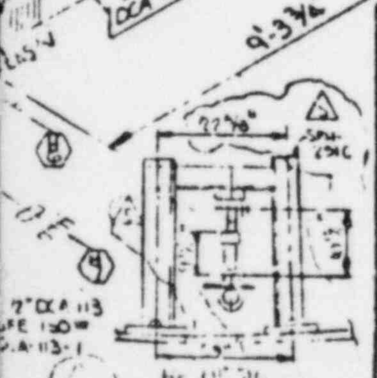
C-4

Rev. 1

8408140320-03



COLOR CODE NO. / STOCK CODE NO.	PC No.	QTY	SIZE AND DESCRIPTION	ASME ASTM	GR	HEAT No.
COLOR RED & WHITE			NUCLEAR CLASS 1			
P4710-0035-1			DCA PIPE SMLS			
	1					462713
	2					
	3					
	4					
	5	1	TRANSITION PIECE			
COLOR RED & WHITE			DCA FITTINGS SCH BW			
P4730-7167-1	14		2" 90° ELL			E1201
	15					
	16					
P4730-7168-1	17		2" 45° ELL.			E1214



PROBLEM NO. SP.	
SPECIAL CALC YES ( ) NO (✓)	
TEMP. 552 °F	PRESS. 1265 PSIG
MAXIMUM STRESS (PSI)	ALLOW STRESS (PSI)
PIPE SIZE 2"	
MAX GRAVITY SPAN	
MAX GRAVITY LOAD	119
MAX SEISMIC SPAN	
MAX SEISMIC LOAD	

NO.	DESCRIPTION
	SEE NOTE REV A3
	ISSUED FOR FIELD FABRICATION

REFERENCES

LINE CLASSIFICATION: Q ■ / A / B / BOP — SEISMIC CLASS: I ■ / II / IIA

62A — IM — 2½

M-43 (F-5) SPM-225/42, SPM-247/12

FOR DOCUMENTATION PROCEDURE WD-1 FOR SMALL PIPE WELDING AND NONDESTRUCTIVE EXAMINATION, SEE BECHTEL QUALITY CONTROL MANUAL ASME III VOL. A, SEC. 8

H = HORIZONTAL, V = VERTICAL | B = BEND | F.T.F. = FIELD TO FIT | F.W. FIELD WELD

BECHTEL
SAN FRANCISCO

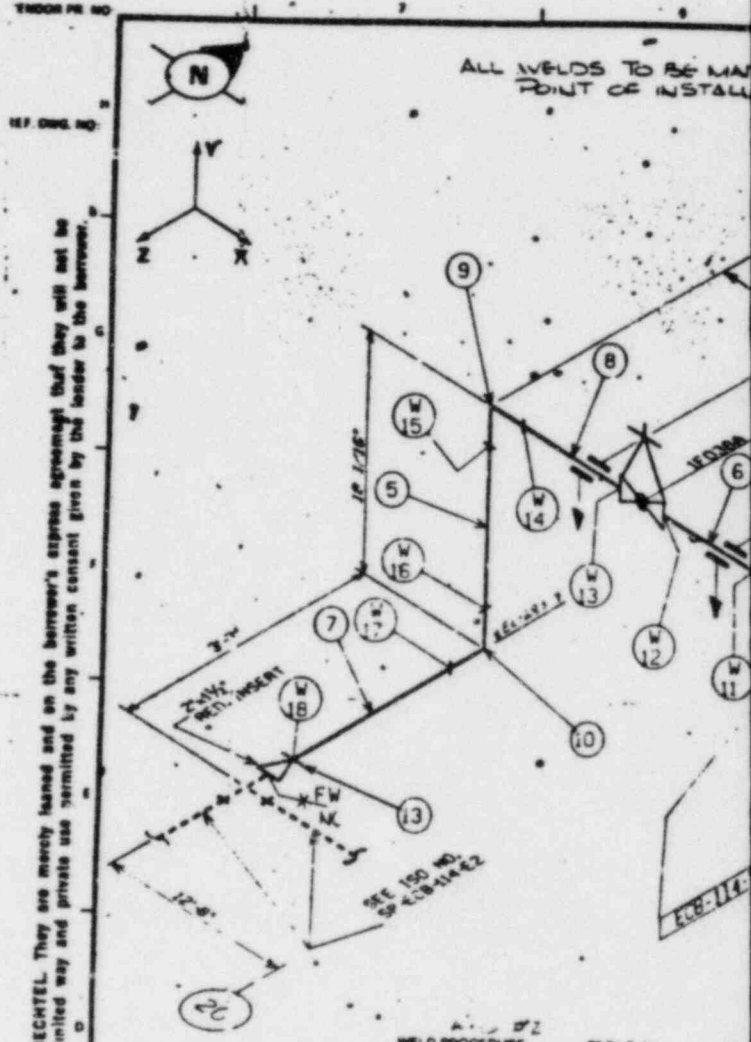
LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

REACTOR VESSEL DRAIN
THRU VALVE 1F030

JOB NO.	DRAWING NO.	REV.
8031	SP-DCA-113-E1	5

Also Available On
Aperture Card

TI
APERTURE
CARD



NOTES:
1. FIELD TO SHIM AS REQ'D

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HGR DESIGN INFO		HGR. NUMBER	H1	H2	H3
		STD. ASSY. SPH DWG. NO.	601D	601E	601E
		STD. STR. SPH DWG. NO.	103B	163A	163A
		LENGTH "E E"	20	27 1/16	27 1/16
		ELEVATION "A"			
	FX	DESIGN LOAD	329		
	FY		220	206	200
	FZ	LOSS		206	398
		REMARKS		ALT CONN.	ALT CONN.

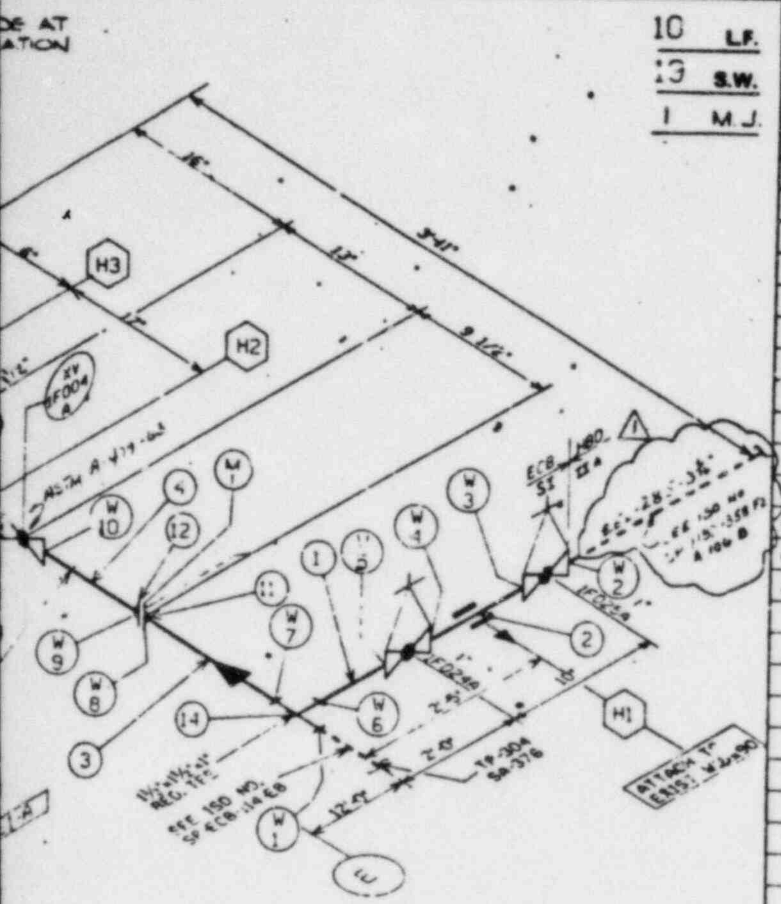
LEGEND: SPRING HANGER | RIGID HANGER | ANCHOR | GUI

ALLOW 1/16" ROOT GAP ON ALL SOCKET WELDS | PIPING SYMBOLS SEE P 250 IN DRAFTING MANUAL | *VENDOR SI

C-5 | 1 Rev. 1

Specification 8031 P-363

Appendix C



10	L.F.
13	S.W.
1	M.J.

BILL OF MATERIAL

PC	QTY/LGTH	SIZE	DESCRIPTION	CLASS SCH	MATERIAL CODE COLOR/STOCK CODE NUMBER	HEAT NO.
1	1'-8 3/16"	1"	PIPE	ECB 80S	ASME SA-376 TP304 BLU/BLK P4710600322	
2	0'-7 3/8"	1"	PIPE	ECB 80S	ASME SA-376 TP304 BLU/BLK P471060032-2	
3	0'-7 3/16"	1½"	PIPE	ECB 80S	ASME SA-376 TP304 BLU/BLK P471060034-2	
4	0'-7 3/16"	1½"	PIPE	ECB 80S	ASME SA-376 TP304 BLU/BLK P471060034-2	
5	1'-3 3/16"	1½"	PIPE	ECB 80S	ASME SA-376 TP304 BLU/BLK P471060034-2	
6	0'-8 3/8"	1½"	PIPE	ECB 80S	ASME SA-376 TP304 BLU/BLK P471060034-2	
7	3'-4 1/8"	1½"	PIPE	ECB 80S	ASME SA-376 TP304 BLU/BLK P471060034-2	
8	1'-0 1/2"	1½"	PIPE	ECB 80S	ASME SA-376 TP304 BLU/BLK P471060034-2	
9	1	1½"	90 DEG ELBOW 3000 SW	ECB	ASME SA-182 GR F304 BLU/BLK P473060312-2	
10	1	1½"	90 DEG ELBOW 3000 SW	ECB	ASME SA-182 GR F304 BLU/BLK P473060312-2	
11	1	1½"	FLANGE LG TG 600 SW	ECB 80S	ASME SA-182 GR F316 BLU/BLK P473060463-2	
12	1	1½"	FLANGE LG TG 600 SW	ECB 80S	ASME SA-182 GR F316 BLU/BLK P473060463-2	
13	1	2"x1½"	RED INSERT 3000 SW	ECB	ASME SA-182 GR F304 BLU/BLK P473060342-2	
14	1	1½"x1"	RED TEE 3000 SW	ECB	ASME SA-182 GR F304 BLU/BLK P473062248-2	
[illegible]	1	1"	Y GLOBE VLV 1500 SW	CCA 80S	ASME SA-182 F316L P482060079-4	
[illegible]	1	1"	Y GLOBE VLV 1500 SW	CCA 80S	ASME SA-182 F316L P482060079-4	
[illegible]	1	1½"	Y GLOBE VLV 1500 SW	CCA 80S	ASME SA-182 F316L P482060080-4	
	4	3/4"x4¼"	HEX HD BOLTS		ASME SA-193 GR B7 BLUE Y530760013-2	
	4	3/4"	NUT		ASME SA-194 GR 2H BLUE Y531060004-2	
	1	1½"	RJ GASKET		SS ASBESTOS WOUND Y533060013	
			VENDOR SUPPLIED			
48-XV-1F004A			EXSPLOSIVE VALVE (G.E)			

PROCEDURE P8-T-Ag
ARC ROD ER308
HEAT F° 60° MIN
APPROVED

HANGER CRITICAL

CLEANLINESS CLASS B

PROBLEM No. SP.
SPECIAL CALC YES ( ) NO ( )
TEMP = 150 °F (P 300/16) E = 28.3 x 10⁶ PSI
EXP COEF = .003 IN/FT PRESS = 1600 PSIG
MAXIMUM STRESS (PSI) ALLOW STRESS (PSI)

PIPE SIZE	1½"	1"
MAX GRAVITY SPAN	10'-0"	9'-0"
MAX GRAVITY LOAD		
MAX SEISMIC SPAN		
MAX SEISMIC LOAD		

NO | DATE | DESCRIPTION | DRAWN | CHK'D | APPR | WELD APPR | PROJ ENG'G APPR

REFERENCES

LINE CLASSIFICATION: Q [X] R [ ] S [ ] BOP [ ] RG 1.29 [ ]
SEISMIC CLASS: I [X] II [ ] IIA [ ]

STARTUP No	SYSTEM No	INSUL CL	THICK
53A	21		NONE

P&ID REV	PLANT DESIGN DWG REV
M-48/10	SPM-241/22

UNIT	ELEV	AREA
1	253'-0"	16

FOR DOCUMENTATION PROCEDURE WD - 1 FOR SMALL PIPE WELDING AND NONDESTRUCTIVE EXAMINATION. SEE BECHTEL QUALITY CONTROL MANUAL ASME III, VOL. A, SEC. 9

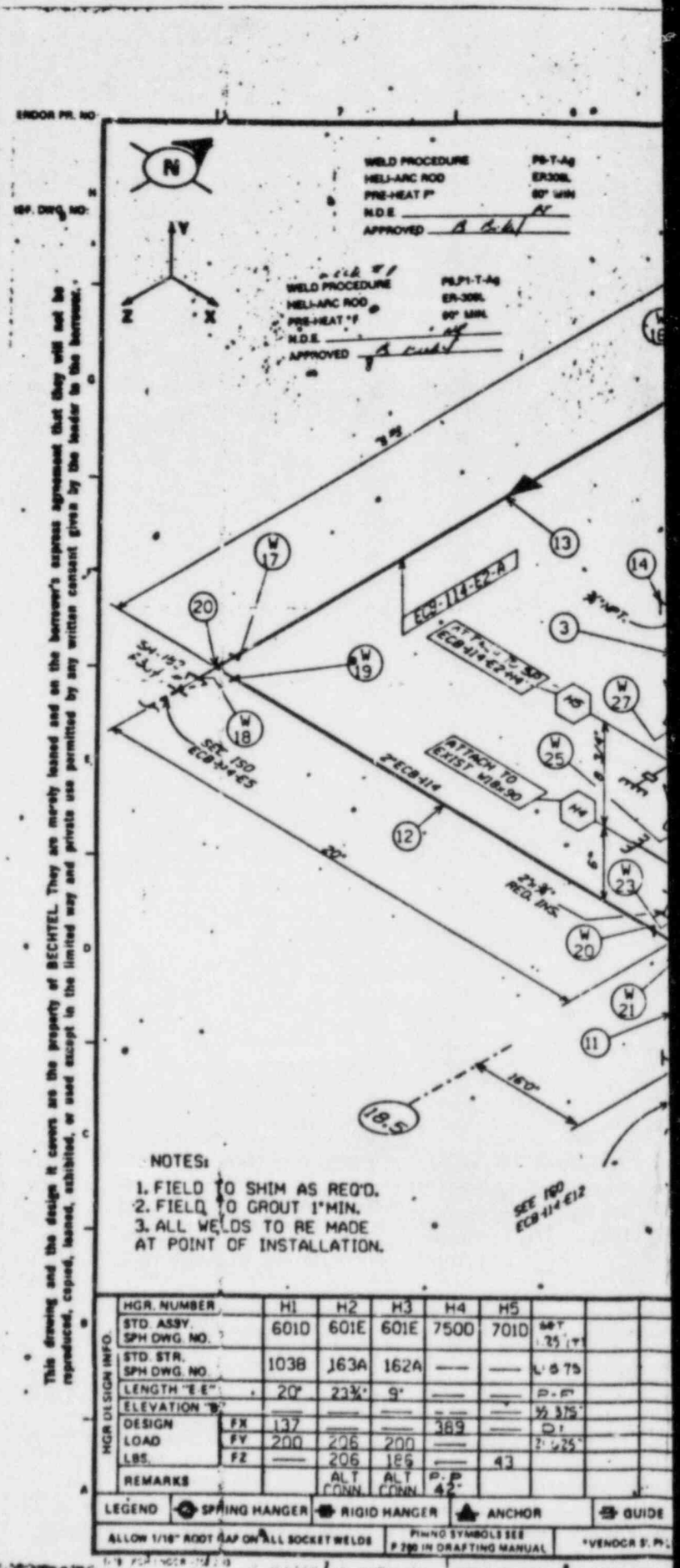
SNUBBER | RESTRAINT
H = HORIZONTAL V = VERTICAL | B = BEND | F.T.F. = FIELD TO FIT | F.W. FIELD WELD

BECHTEL
SAN FRANCISCO

LIMERICK GENERATING STATION UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

REACTOR ENCLOSURE
STAND-BY LIQ. CONTR. INJECT.
PUMP 1AP-201 DISCHARGE

JOB No.	DRAWING No.	REV.
8031	SP-ECB-114-E1	1

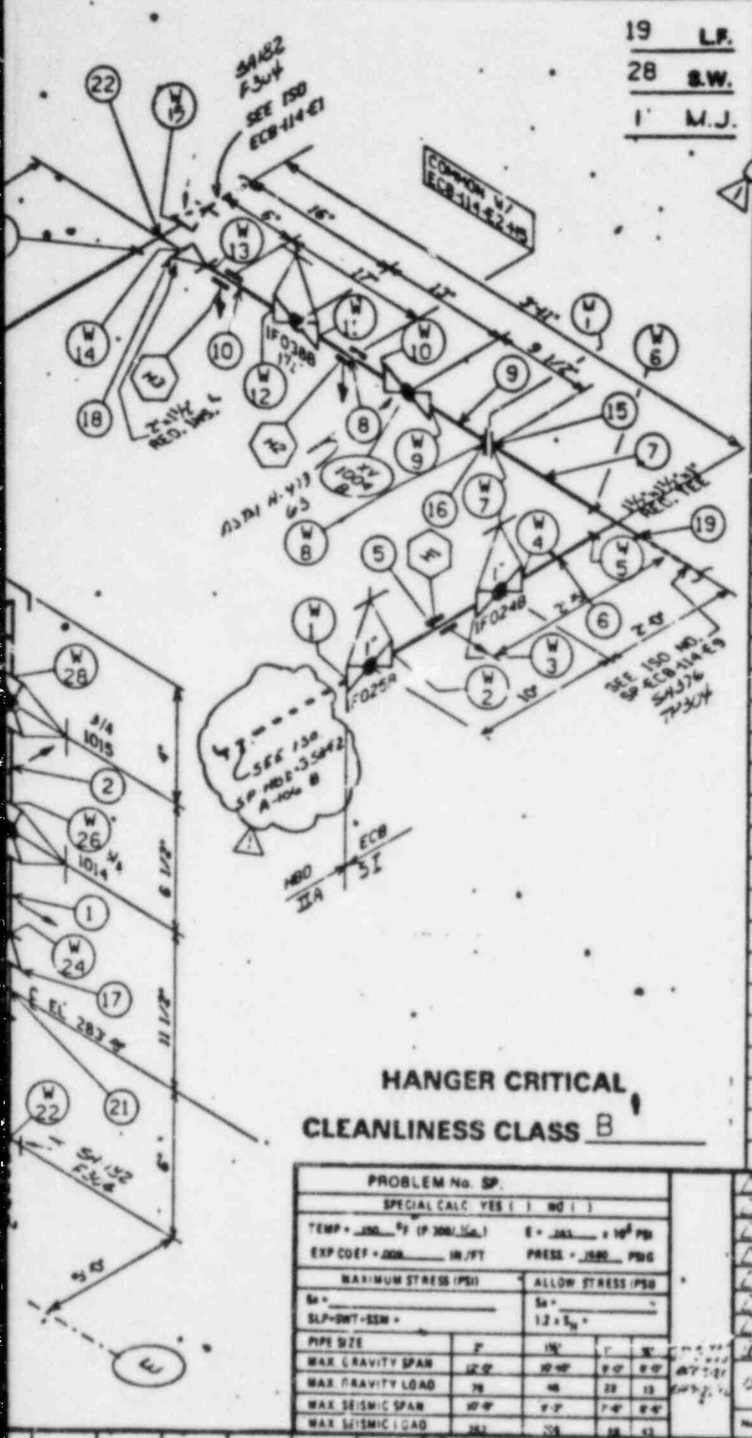


Rev. 1

C-6 | 1

Specification 8031- P-363

Appendix · C



PC	QTY/LGH	SIZE	DESCRIPTION	CLASS SCH	MATERIAL CODE COLOR/STOCK CODE NUMBER	HEAT NO.
1	0'-8 3/8"	3/4"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P471060031-2	
2	0'-4 7/8"	3/4"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P471060031-2	
3	0'-2 15/16"	3/4"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P471060031-2	
5	0'-7 5/8"	1"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P471060032-2	
6	1'-8 3/16"	1"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P471060032-2	
7	0'-2 15/16"	1½"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P471060034-2	
8	0'-8 5/8"	1½"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P471060034-2	
9	0'-4 1/8"	1½"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P471060034-2	
10	1'-0 1/4"	1½"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P471060034-2	
11	0'-4 7/16"	2"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P471060035-2	
12	1'-4 3/8"	2"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P471060035-2	
13	3'-1 3/8"	2"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P471060035-2	
14	1	3/4"	CAP 3000 THRD	SBO	ASTM A-105 P473060277	
15	1	1½"	FLANGE LG TG 600 SW	ECB 80S	ASME SA-182 GR.F316 BLU-BLK P473060463-2	
16	1	1½"	FLANGE LG TG 600 SW	ECB 80S	ASME SA-182 GR.F316 BLU-BLK P473060463-2	
17	1	2"x3/4"	RED INSERT 3000 SW	ECB	ASME SA-182 GR F304 BLU-BLK P473060345-2	
18	1	2"x1½"	RED INSERT 3000 SW	ECB	ASME SA-182 GR F304 BLU-BLK P473060342-2	
19	1	1½"x1"	RED. TEE 6000 SW	ECB 6000	ASME SA-[illegible] GR F304 BLU-BLK P473062234-2	
20	1	2"	TEE 3000 SW	ECB	ASME SA-182 GR.F304 BLU-BLK P473060327-2	
21	1	2"	TEE 3000 SW	ECB	ASME SA-182 GR.F304 BLU-BLK P473060327-2	
22	1	2"	TEE 3000 SW	ECB	ASME SA-182 GR.F304 BLU-BLK P473060327-2	
	1	3/4"	Y GLOBE VLV 1500 SW	CCA 80S	ASME SA-182 F316L P482060078-1	
	1	3/4"	Y GLOBE VLV 1500 SW	CCA 80S	ASME SA-182 F316L P482060078-1	
	1	1"	Y GLOBE VLV 1500 SW	CCA 80S	ASME SA-182 F316L P482060079-1	
	1	1"	Y GLOBE VLV 1500 SW	CCA 80S	ASME SA-182 F316L P482060079-1	
	1	1½"	Y GLOBE VLV 1500 SW	CCA 80S	ASME SA-182 F316L P482060080-1	
	4	3/4"x4½"	HEX HD BOLTS		ASME SA-193 GR B7 BLUE Y530760013-2	
	4	3/4"	NUT		ASME SA-194 GR 2H BLUE Y531060004-2	
	1	1½"	RJ GASKET		SS ASBESTOS WOUND Y533060013	
			VENDOR SUPPLIED			
	48-XV-1F004B		EXPLOSIVE VLV.(G.E.)			

HANGER CRITICAL

CLEANLINESS CLASS B

PROBLEM No. SP.

SPECIAL CALC YES ( ) NO ( )

TEMP = 150 °F (P 300/ [illegible]) E = [illegible] x 10⁶ PSI

EXP COEF = .008 IN/FT PRESS = 1580 PSIG

MAXIMUM STRESS (PSI)	ALLOW STRESS (PSI)
Se =	Sa =
SLP+DWT+SSM =	1.2 x S_h =

PIPE SIZE	2"	1½"	1"	3/4"
MAX GRAVITY SPAN	12'-0"	10'-6"	9'-0"	8'-0"
MAX GRAVITY LOAD	79	46	22	13
MAX SEISMIC SPAN	10'-8"	9'-3"	7'-6"	8'-6"
MAX SEISMIC LOAD	[illegible]	[illegible]	[illegible]	[illegible]

No	DATE	DESCRIPTION	DRAWN	CHK'D	APPR	WELD APPR	FLD [illegible] APPR	PROJ ENG'G APPR
1	[illegible]	[illegible]	[illegible]	[illegible]	—	[illegible]	[illegible]	—
0	[illegible]	[illegible]	[illegible]	[illegible]	—	[illegible]	[illegible]	—

REFERENCES

LINE CLASSIFICATION: Q ☒ R ☐ S ☐ BOP ☐ RG 1.29 ☐

SEISMIC CLASS: I ☒ II ☐ IIA ☐

STARTUP No	SYSTEM No	INSUL CL	THICK
53A	23		NONE

P&ID REV	PLANT DESIGN DWG REV
M-48/10	SPM-241/22

UNIT	ELEV	AREA
1	283'-0"	16

FOR DOCUMENTATION PROCEDURE WD - 1 FOR SMALL PIPE WELDING AND NONDESTRUCTIVE EXAMINATION SEE BECHTEL QUALITY CONTROL MANUAL ASME III VOL. A, SEC. 5

SNUBBER | RESTRAINT

H = HORIZONTAL, V = VERTICAL | B = BEND | F.T.F. = FIELD TO FIT | F.W. FIELD WELD

BECHTEL
SAN FRANCISCO

LIMERICK GENERATING STATION UNITS 1 & 2

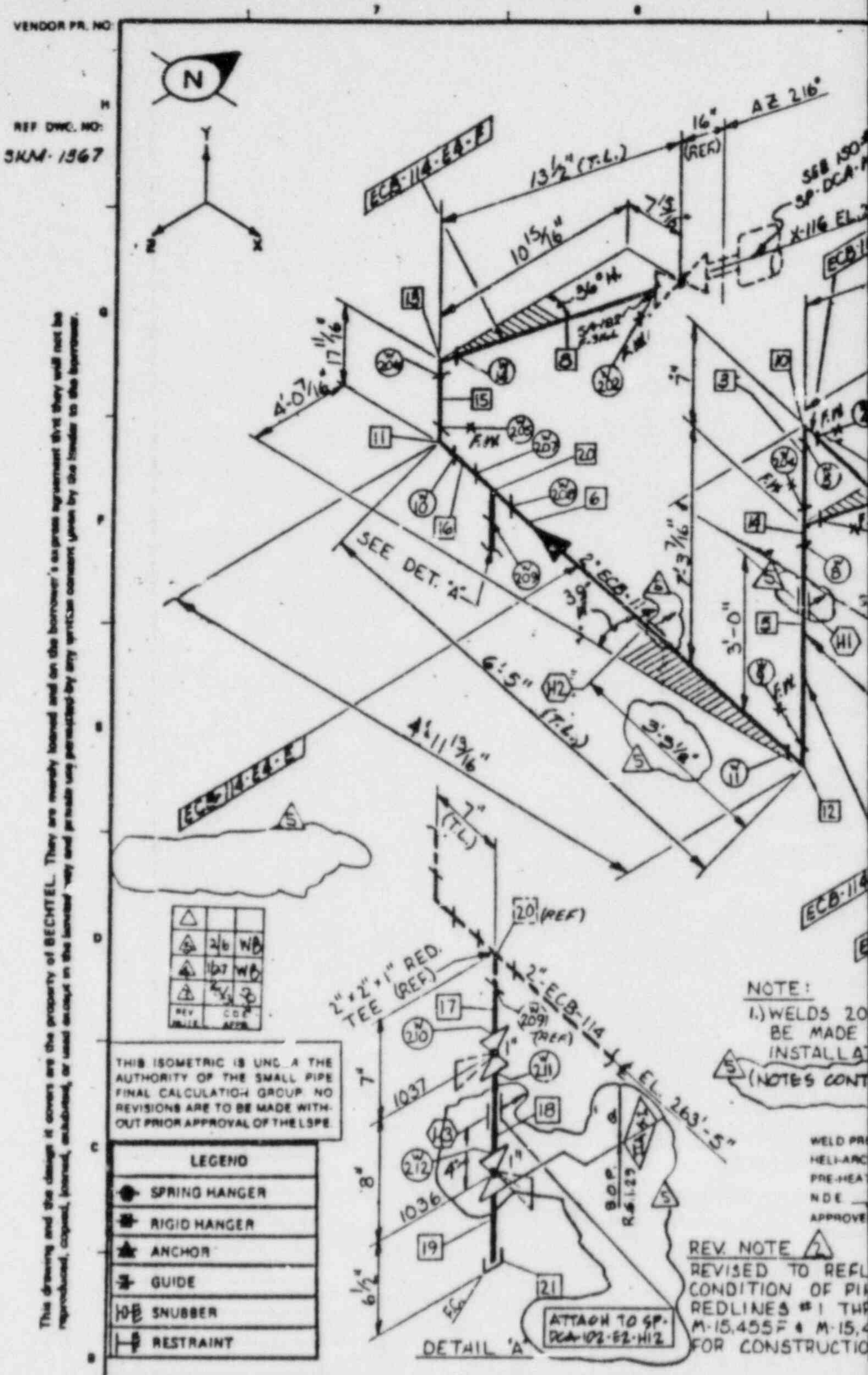
PHILADELPHIA ELECTRIC COMPANY

REACTOR ENCLOSURE
STAND-BY LIQ. CONTR. INJECT
PUMP 1BP-201 DISCHARGE

JOB No.	DRAWING No.	REV.
8031	SP-ECB-114-E2	1

Specification
8031-P-363

Appendix C



HGR DES INFO	H1	H2	H3	H4	
HGR MARK	H1	H2	H3	H4	
STD ASSY DWG #	SEE SP-	SEE SP-	SPH-601F	800L	
STD STR DWG #	ECB-114-	ECB-114-	SEE SP-DCA-102-	DET. 1	
LENGTH "Z - Z"	E4-H1-	E4-H2-	E1-H2-HGR DET	—	
ELEVATION "B"	HGR. DET	HGR. DET	—	—	
DESIGN LOAD LBS	—	—	—	Fx:1373 Fy:613	[illegible]
REMARK	—	—	DET A1+2	Fz:882	[illegible]

ALLOW 1/16" ROOT GAP ON ALL SOCKET WELDS | PIPING SYMBOLS SEE P-350 IN DRAFTING MANUAL | *VENDOR SUPPLIED

Also Available On
Aperture Card

C-7

Rev. 1

16X

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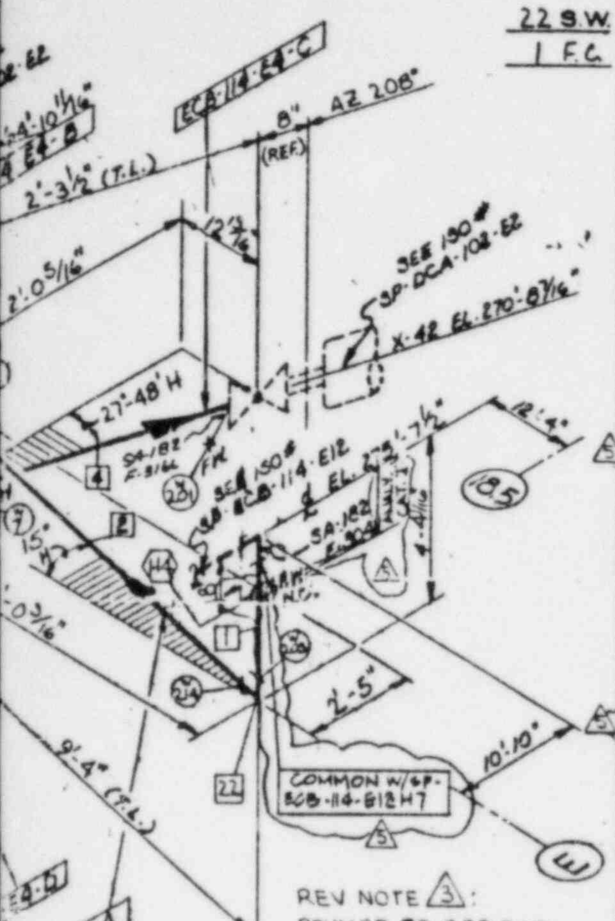
Signed [signature] Camera Operator Date 12 8 84 Signed [signature] Microfilm …

FA 35 L.F.

22 S.W.

1 F.C.



REV NOTE 3:
REVISED TO REFLECT AS BUILD CONDITIONS FOR HANGERS. PIPE REMAINS AS BUILT.

CALC NO. SRG-180 #1-20-2-6
HANGER CRITICAL

CLEANLINESS CLASS "B"

THRU 214 TO
AT POINT OF
TION
, ON SHT. 2)

ECT FIELD AS-BUILT
E ONLY, INCORPORATED
U#S AND FCR#S
70F ISSUED HANGERS
1 PER SFHO REV. 1A.

REV. NOTE 5
REV'D DET. 1 (H4) TO SHOW GIRDER G4L IN PHANTOM. ADDED NOTES 2,3,4 & 5. DELETED HGR LOADS FOR H1,H2 & H3. ADDED SPEC BREAK & SEISMIC BREAK, REV. DIM. TO 3'-3½ WAS 2'-8¼, ADDED DIM'S 7⅛ ON SECT. B-B, 3'-7⅛ ON DET. 1, REV DIM OF WELD TO 3¾ WAS 6" ON DET. 1, ADDED DET 2 (H3) PER PCN 7110M. REV. BILL OF MATL. DELETED W23, 150 REVISED TO REFLECT FIELD AS-BUILT COND. FOR HGRS AND REMAINS FIELD AS-BUILT FOR PIPE.

BILL OF MATERIAL

COLOR CODE AND STOCK CODE NO.	PC No	QTY	SIZE AND DESCRIPTION	ASME ASTM	GR	HEAT No
COLOR: BLUE & BLK			ECB PIPE: SMLS, S.S. SCH. 80S	SA 376	TP304	
P4710600033-2	1	8⅞	2"			463742
	2	10⅝	2"			
	3	1½	2"			
	4	2½	2"			
	5	8⅞	2"			
	6	6½	2"			
	15	2½	2"			462176
	8	1½	2"			463742
	16	1½F	2"			
COLOR: BLUE & BLK			ECB FITTINGS: 3000 # S.W.	SA 182	F304	
P4730603163-2	2_	1	2" 90° ELL.			JR
	10	1	2"			M535
	11	1	2"			
	12	1	2"			
	13	1	2"			
P4730603327-2	14	1	2" TEE			P534-052
P4730622246-2	20	1	2" x 2" x 1" RED TEE			M182
P473063083	21	1	1 THR'D. CAP	A-182	F-304	
			VALVES: 1500 # S.W.	SA 182	F316L	
P4870600079-1	48-1361		1" GLOBE-CCA- Y-TYPE			33263
	48-1037					69610
COLOR: BLUE & BLACK			ECB PIPE: SMLS, SS, SCH-80S	SA 376	TP304	
P4710600032-2	17	1½F	1"			M0276
	18	1½F	1"			
P471060003?	19	1½F	1" (T.O.E.)	A376	TP304	

PER STRESS CALC. 1-20-02-176 REV. 1
THE LOADS FOR THE UPSTREAM SIDE ONLY OF ANCHOR H-4 ARE AS FOLLOWS

FX = 1.459K MX = 16.393 K-IN
FY = .267K MY = 4.511 K-IN
FZ = .736K MZ = 31.059 K-IN

ANCHOR H4 SHALL BE ATTACHED TO REACTOR BLDG. STEEL @ ELEV. 283'-0"

NO	DATE	DESCRIPTION	DRAWN	CHK'D	APPR
5	1-2-83	SEE REV. NOTE 5			
4		INCORP. SFHO HGR. REV. 3A	W.F.		JK
3		SEE REV. NOTE 3	TM		
2		SEE REV. NOTE 2	CD		
1		REVISED TO SHOW SHOP & FIELD ASBUILT CONDITION OF PIPE ONLY	ISA		
0		REDRAWN & SUPERSEDES ALL PREVIOUS REVS. REV. 0 BY PLO & ISS. 0 FOR CONSTR.			

REFERENCES

R.A. 1.29

LINE CLASSIFICATION: Q, R, S, SOP

SEISMIC CLASS: I, II, IIA

START UP NO. 53A	COST CODE	HOUSE EL. NONE
P&I.D. M-48/13 (D-8)	PLANT DESIGN DWG SPM-250/22, 240/20	
UNIT 1	ELEV. 253'-0"	AREA 13	DRAWING 409

FOR DOCUMENTATION PROCEDURE WD-1 FOR SMALL PIPE WELDING AND NONDESTRUCTIVE EXAMINATION SEE BECHTEL QUALITY CONTROL MANUAL ASME III, VOL. A, SEC. 5.

HORIZONTAL, V = VERTICAL B = BEND F.T.F. = FIELD TO FIT F.W. FIELD WELD

BECHTEL
SAN FRANCISCO

LIMERICK GENERATING STATION UNITS 1 & 2

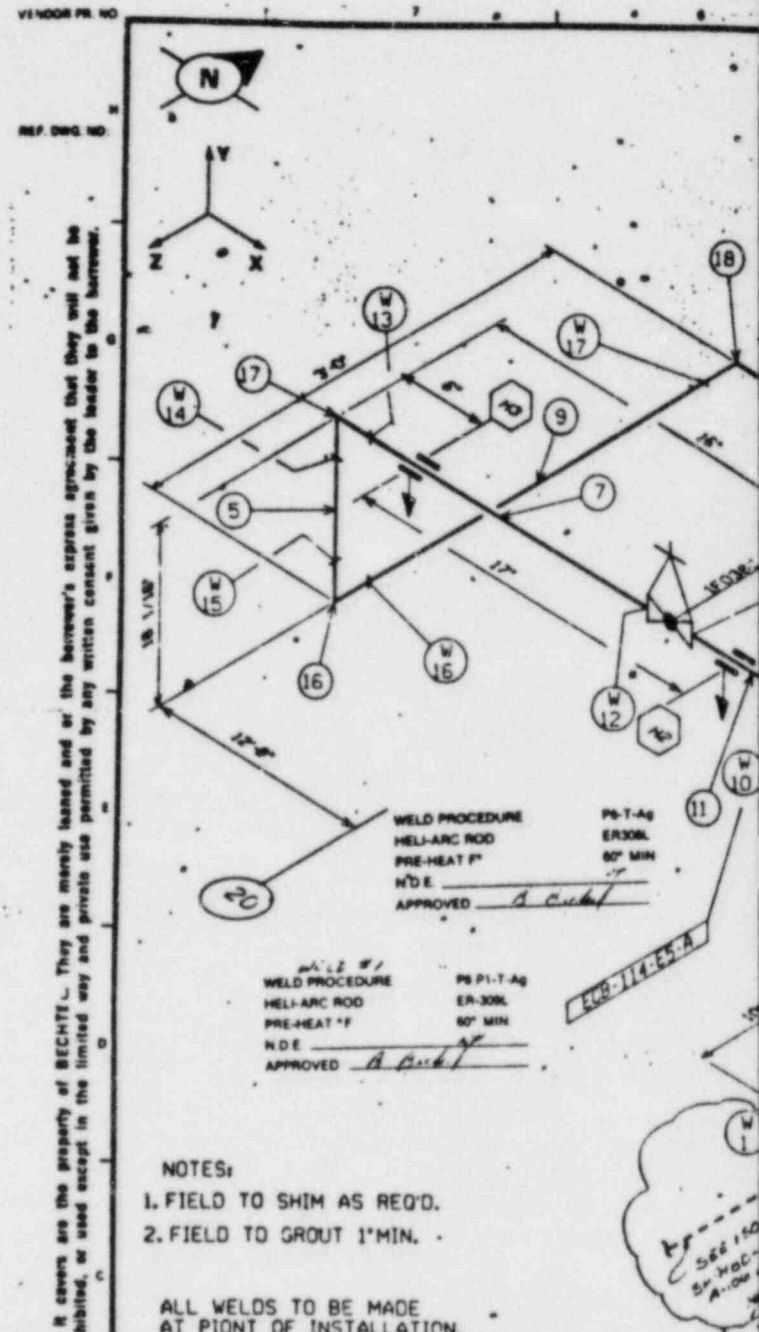
PHILADELPHIA ELECTRIC COMPANY

REACTOR BUILDING
STAND BY LIQUID CONTROL PUMP DISCH. TO VALVES HV-1F006 A & B

JOB No.	DRAWING No.	REV
8031	SP-ECB-114-E4 SHEET 1 OF 2	5

TI APERTURE CARD

8408140320-06



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HGR DESIGN INFO.	HGR NUMBER		H1	H2	H3	H4			
	STD. ASSY. SPH DWG. NO.		601E	601E	601E	601E 20E9			
	STD. STR. SPH DWG. NO.		163A	163A	163A	803C			
	LENGTH "L E"		27¼"	27¼"	27¼"	9"			
	ELEVATION "B"		—	—	—	—			
	DESIGN LOAD LBS.	FX	170	—	—	164			
		FY	200	206	213	207			
		FZ	—	206	245	359			
	REMARKS		ALT CONN.	ALT CONN.	ALT CONN.				

LEGEND: SPRING HANGER | RIGID HANGER | ANCHOR

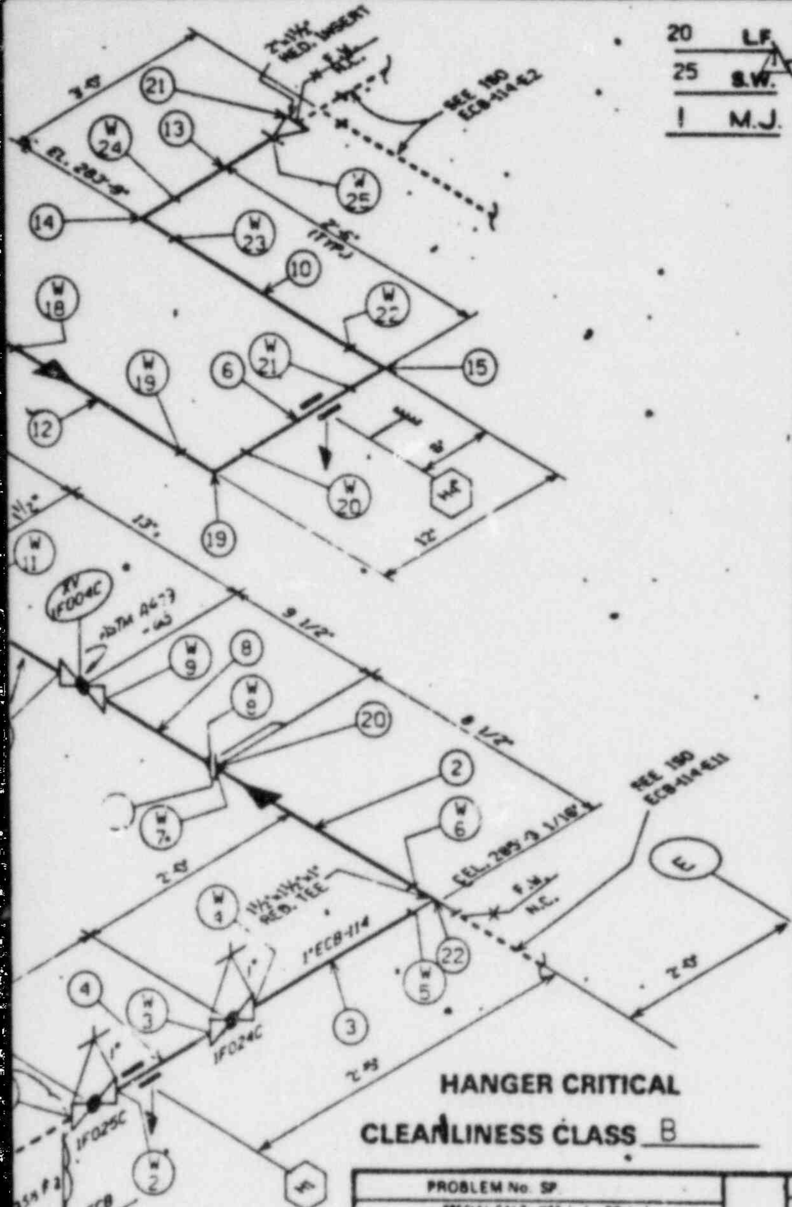
ALLOW 1/16" ROOT GAP ON ALL SOCKET WELDS

PIPING SYMBOLS SEE P-250 IN DRAFTING MANUAL

*VENDO

C-8/1 Rev. 1

Specification 8031-P-363
Appendix - C



PC	QTY/LEN	SIZE	DESCRIPTION	CLASS SCH	MATERIAL CODE COLOR/STOCK CODE NUMBER	HEAT NO.
2	0'-7 3/16"	1 1/2"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P4710600342	
3	1'-9 1/2"	1"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P4710600322	
4	0'-7 3/8"	1"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P4710600322	
5	1'-3 3/16"	1 1/2"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P4710600342	
6	0'-9 3/8"	1 1/2"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P4710600342	
7	1'-0 1/2"	1 1/2"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P4710600342	
8	0'-4 1/8"	1 1/2"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P4710600342	
9	2'-9 3/8"	1 1/2"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P4710600342	
10	2'-3 3/8"	1 1/2"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P4710600342	
11	0'-8 3/8"	1 1/2"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P4710600342	
12	1'-9 3/8"	1 1/2"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P4710600342	
13	2'-9 3/8"	1 1/2"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P4710600342	
14	1	1 1/2"	90 DEG ELBOW 3000 SW	ECB	ASME SA-182 GR.F304 BLU-BLK P4730603122	
15	1	1 1/2"	90 DEG ELBOW 3000 SW	ECB	ASME SA-182 GR.F304 BLU-BLK P4730603122	
16	1	1 1/2"	90 DEG ELBOW 3000 SW	ECB	ASME SA-182 GR.F304 BLU-BLK P4730603122	
17	1	1 1/2"	90 DEG ELBOW 3000 SW	ECB	ASME SA-182 GR.F304 BLU-BLK P4730603122	
18	1	1 1/2"	90 DEG ELBOW 3000 SW	ECB	ASME SA-182 GR.F304 BLU-BLK P4730603122	
19	1	1 1/2"	90 DEG ELBOW 3000 SW	ECB	ASME SA-182 GR.F304 BLU-BLK P4730603122	
20	1	1 1/2"	FLG T&G SET 600 SW	ECB 600	SA182 P4730604632	
21	1	1 1/2"	RED INSERT 3000 SW	ECB	ASME SA-182 GR F304 BLU-BLK P4730603492	
22	1	1 1/2"x1"	RED TEE 3000 SW	ECB	ASME SA-182 GR F304 BLU-BLK P4730622482	
48-1F025C	1	1"	Y GLOBE, VLV 1500 SW	CCA 80S	ASME SA-182 F316L P4820600794	
48-1F024C	1	1"	Y GLOBE VLV 1500 SW	CCA 80S	ASME SA-182 F316L P4820600794	
48-1F038C	1	1 1/2"	Y GLOBE VLV 1500 SW	CCA 80S	ASME SA-182 F316L P4820600804	
	4	3/4"x4 1/4"	HEX HD BOLTS		ASME SA-193 GR B7 BLUE Y5307600132	
	4	3/4"	NUT		ASME SA-194 GR 2H BLUE Y5310600042	
	1	1 1/2"	RJ GASKET		SS ASBESTOS WOUND Y533060013	
			SPECIAL ITEMS			
	48-XV-1F004C		EXPLOSIVE VALVE (GE)			

HANGER CRITICAL

CLEANLINESS CLASS B

PROBLEM No. SP
SPECIAL CALC YES ( ) NO ( )
TEMP = 150 °F (P 300) E = 28.3 x 10^6 PSI
EXP COEF = .008 IN/FT PRESS = 1425 PSIG

MAXIMUM STRESS (PSI)	ALLOW STRESS (PSI)
Sa =	Sa =
SLP+SWT+SSM =	1.2 x Sh =

PIPE SIZE	1 1/2	1
MAX GRAVITY SPAN	10-10	9-0
MAX GRAVITY LOAD	48	22
MAX SEISMIC SPAN	9-3	7-4
MAX SEISMIC LOAD	26	6

NO	DATE	DESCRIPTION	DRAWN	CHK'D	APPR			PROJ ENG'G APPR
1		REVISED PER ...	JF					

REFERENCES

LINE CLASSIFICATION: Q [X] R [ ] S [ ] BOP [ ] RG 1.29 [ ]
SEISMIC CLASS: I [X] II [ ] IIA [ ]

STARTUP No	SYSTEM No	ISSUE CL	THICK
53A	23		NONE

P&ID REV	PLANT DESIGN DWG REV
M-48/10	SPM-241/22

UNIT	ELEV	AREA
	283'-06	16

FOR DOCUMENTATION PROCEDURE NO - 1 FOR SMALL PIPE WELDING AND NONDESTRUCTIVE EXAMINATION, SEE BECHTEL QUALITY CONTROL MANUAL ASME III, VOL. A, SEC 8

GUIDE | SNUBBER | RESTRAINT
SUPPLIED | H = HORIZONTAL, V = VERTICAL | B = BEND | F.T.F = FIELD TO FIT | F.W. FIELD WELD

BECHTEL
SAN FRANCISCO

LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

REACTOR ENCLOSURE
STAND-BY LIQ. CONTR. INJECT.
PUMP 1CP-201 DISCHARGE

JOB NO.	DRAWING NO.	REV.
8031	SP-ECB-114-E5	1

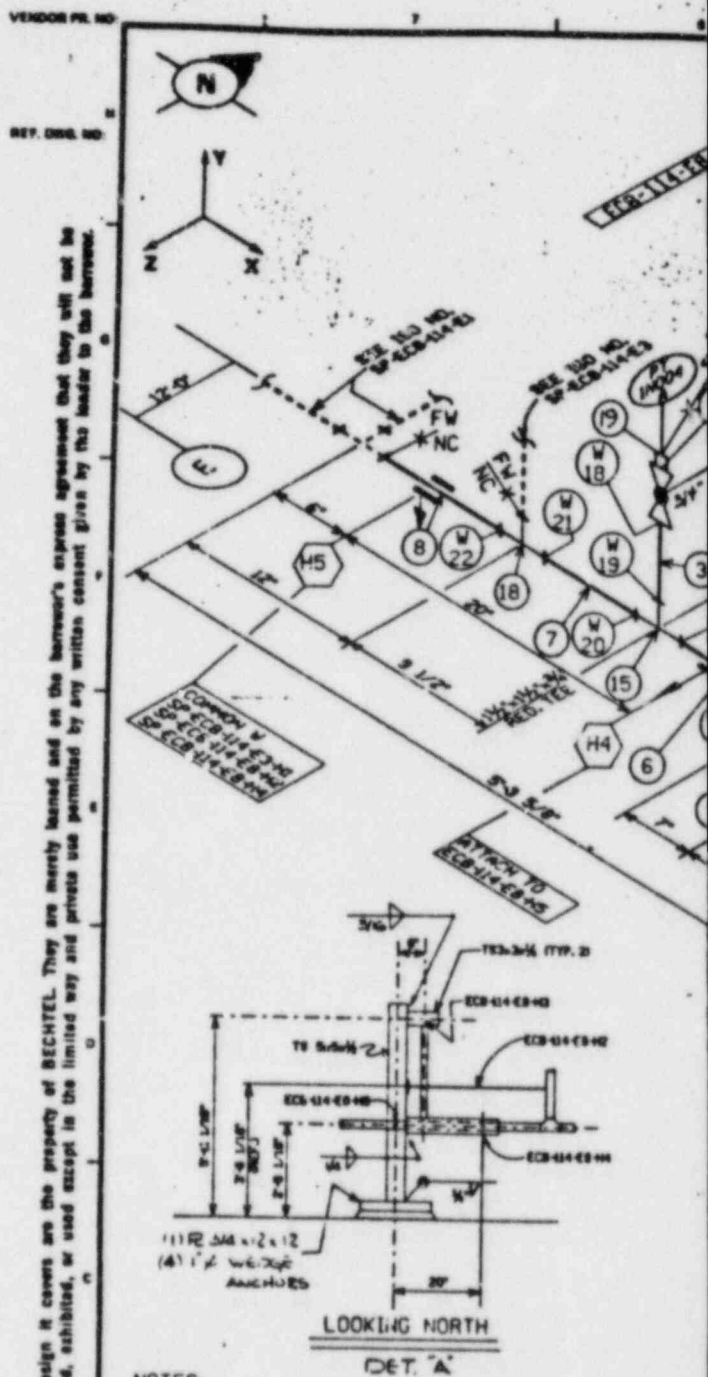
8408140320-07

Also Available On
Aperture Card

TI
APERTURE
CARD

8408140320-08

C-9 | 1 Rev. 1



NOTES:
1. ALL WELDS TO BE MADE AT POINT OF INSTALLATIO
2. FIELD TO SHIM AS REQUIRED
3. FIELD TO GROUT 1" MIN.

HGR DESIGN INFO	HGR. NUMBER		H1	H2	H3	H4	H5	H6
	STD. ASSY. SPH DWG. NO.		7500	7500	601E	601E	601E	601E 5050
	STD. STR. SPH DWG. NO.		—	—	164A	—	—	—
	LENGTH "E-E"		—	—	D=27⅝	—	—	—
	ELEVATION "B"		—	—	—	—	—	—
	DESIGN LOAD LBS.	FX	—	331	—	—	—	110
		FY	—	—	347	206	230	249
		FZ	93	—	206	206	415	47
	REMARKS		P-P 42	P-P 43	ALT CONN.		DET 'A'	DET 'A'

LEGEND: SPRING HANGER | RIGID HANGER | ANCHOR

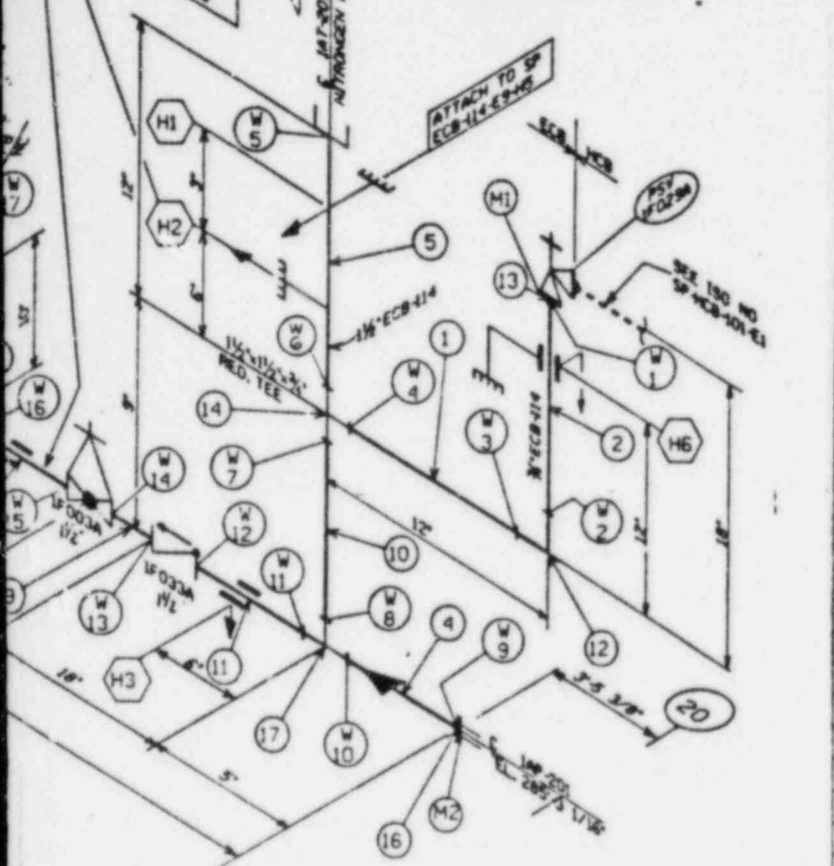
ALLOW 1/16" ROOT GAP ON ALL SOCKET WELDS

PIPING SYMBOLS SEE P-280 IN DRAFTING MANUAL

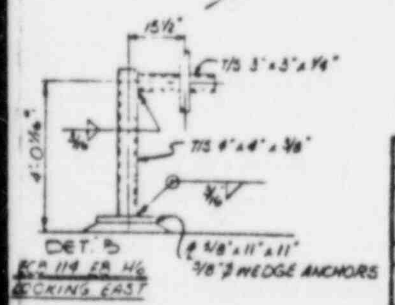
Specification 8031-P-363

Appendix C

WELD PROCEDURE	P8-T-Ag	8 L.F.
HELI-ARC ROD	ER308L	26 S.W.
PRE-HEAT F°	60° MIN	2 M.J.
N.D.E.	PT	
APPROVED	A Budd	



PC	QTY/LGH	SIZE	DESCRIPTION	CLASS SCH	MATERIAL CODE COLOR/STI XR CODE NUMBER	HEAT NO.
1	0'-9 ⅜"	¾"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P471060031-2	
2	1'-5 ⅜"	¾"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P471060031-2	
3	0'-7 ⅜"	¾"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P471060031-2	
4	0'-3 11/16"	1½"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P471060034-2	
5	0'-10 11/16"	1½"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P471060034-2	
6	0'-8 ⅜"	1½"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P471060034-2	
7	0'-6 ⅜"	1½"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P471060034-2	
8	0'-9 ⅜"	1½"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P471060034-2	
9	0'-4 13/16"	1½"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P471060034-2	
10	0'-6 ⅜"	1½"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P471060034-2	
11	1'-4 11/16"	1½"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P471060034-2	
12	1	¾"	90 DEG ELBOW 3000 SW	ECB	ASME SA-182 GR F304 BLU-BLK P473060309-2	
48-1F033A	1	1½"	CHECK VALVE 1500 SW	CCA 80S	ASME SA-182 GR F316L P482060150-4	
13	1	¾"	FLANGE LG TG 600 SW	ECB 80S	ASME SA-182 GR F316 BLU-BLK P473060460-2	
14	1	1½"x¾"	RED TEE 3000 SW	ECB	ASME SA-182 GR F304 BLU-BLK P473062249-2	
15	1	1½"x¾"	RED TEE 3000 SW	ECB	ASME SA-182 GR F304 BLU-BLK P473062249-2	
16	1	1½"	T&G SW,FLG. 600 SW	ECB 600	SA182 P473060463-2	
17	0	1½"	TEE 3000 SW	ECB	ASME SA-182 GR F304 BLU-BLK P473060326-2	
18	1	1½"	TEE 3000 SW	ECB	ASME SA-182 GR F304 BLU-BLK P473060326-2	
	1	¾"	Y GLOBE VLV 1500 SW	CCA 80S	ASME SA-182 F316L P482060078-4	
48-1F003A	1	1½"	Y GLOBE VLV 1500 SW	CCA 80S	ASME SA-182 F316L P482060080-4	
	4	¾x3¾	HEX HD BOLTS		ASME SA-193 GR B7 BLUE Y530760018-2	
	4	¾"	NUT		ASME SA-194 GR 2H BLUE Y531060003-2	
	1	¾"	RJ GASKET		SS ASBESTOS WOUND Y533060010	
	48-PSV 029A		PRESS. SFTY. VALVE			
	48-PT-1N004A		PRESS. TRANSMITTER			
	48-1AT-207		NITROGEN ACCUMULATOR			
19	1	¾x38	ROOT VALVE STEM		ASME SA 479-304L P-472060910	
	4	3/4	NUT		ASME SA 194 GR 2H BLUE Y531060004-2	
	1	1½"	25 GASKET		SS ASBESTOS WOUND Y533060013	



HANGER CRITICAL

CLEANLINESS CLASS B

PROBLEM No. SP	
SPECIAL CALC YES ( ) NO ( )	
TEMP = ___ °F (P 300/___)	E = ___ x 10⁶ PSI
EXP COEF = ___ IN/FT	PRESS = ___ PSIG
MAXIMUM STRESS (PSI)	ALLOW STRESS (PSI)
SA =	SA =
SLP+DWT+SSM =	1.2 x Sh =
PIPE SIZE	
MAX GRAVITY SPAN	
MAX GRAVITY LOAD	
MAX SEISMIC SPAN	
MAX SEISMIC LOAD	

NO	DATE	DESCRIPTION	DRAWN	CHK'D	APPR			PROJ ENGG APPR
0	1/4/79	THIS ISO HAS BEEN REDRAWN & SUPERSEDES ALL OTHER REVS. REV'D PER PEGS AND ISSUE FOR CONSTR.			–		–	–

REFERENCES

LINE CLASSIFICATION: G ☒ R ☐ S ☐ BOP ☐ RG 1.29 ☐

SEISMIC CLASS: I ☒ II ☐ IIA ☐

STARTUP No	SYSTEM No	INSUL CL	THICK
53A	21		NONE

P&ID REV	PLANT DESIGN DWG, REV
M-48/10	SPM-241/22

UNIT	ELEV	AREA
1	283'-0"	16

FOR DOCUMENTATION PROCEDURE WD - 1 FOR SMALL PIPE WELDING AND NONDESTRUCTIVE EXAMINATION, SEE BECHTEL QUALITY CONTROL MANUAL ASME III, VOL. A, SEC. 6

GUIDE | SNUBBER | RESTRAINT

H = HORIZONTAL, V = VERTICAL | B = BEND | F.T.F. = FIELD TO FIT | FW FIELD WELD

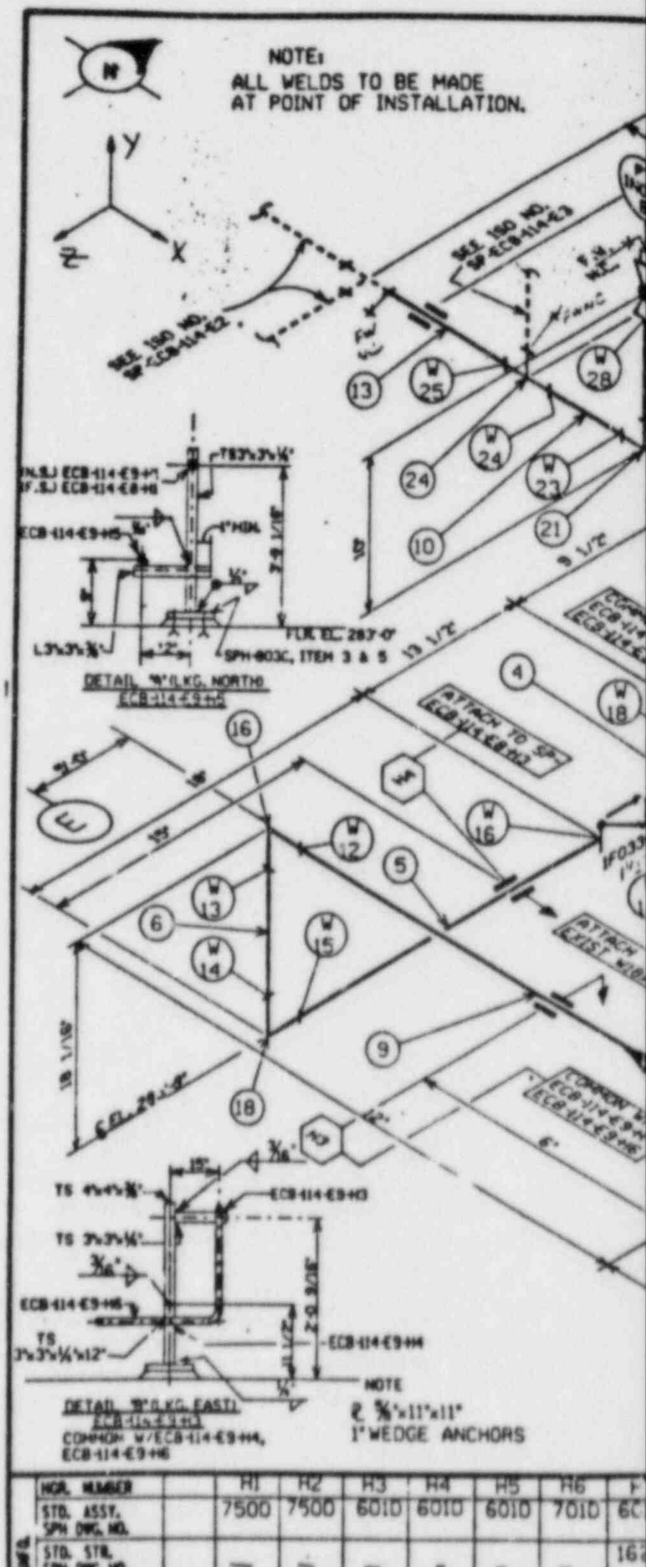
BECHTEL
SAN FRANCISCO

LIMERICK GENERATING STATION UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

REACTOR ENCLOSURE
STAND-BY LIQ. CONTR. INJECT. PUMP 1AP-201 DISCHARGE

JOB No.	DRAWING No.	REV
8031	SP-ECB-114-E8	0

Also Available On
Aperture Card



			H1	H2	H3	H4	H5	H6	[illegible]
HGR. NUMBER			H1	H2	H3	H4	H5	H6	[illegible]
STD. ASSY. SPH DWG. NO.			7500	7500	6010	6010	6010	7010	6C
STD. STR. SPH DWG. NO.			—	—	—	-	-	-	16
LENGTH "C-C"			—	—	-	-	-	-	0
ELEVATION "P"			-	—	-	-	-	-	-
DESIGN LOAD LBS.	FX		-	351	-	254	561	-	-
	FY		-	-	503	757	206	-	20
	FZ		93	-	416	—	—	93	41
REMARKS			P.P 2' 2'	P.P 2'-7 1/2	DET. "B"		DET. "A"	W.T.E 5	[illegible]

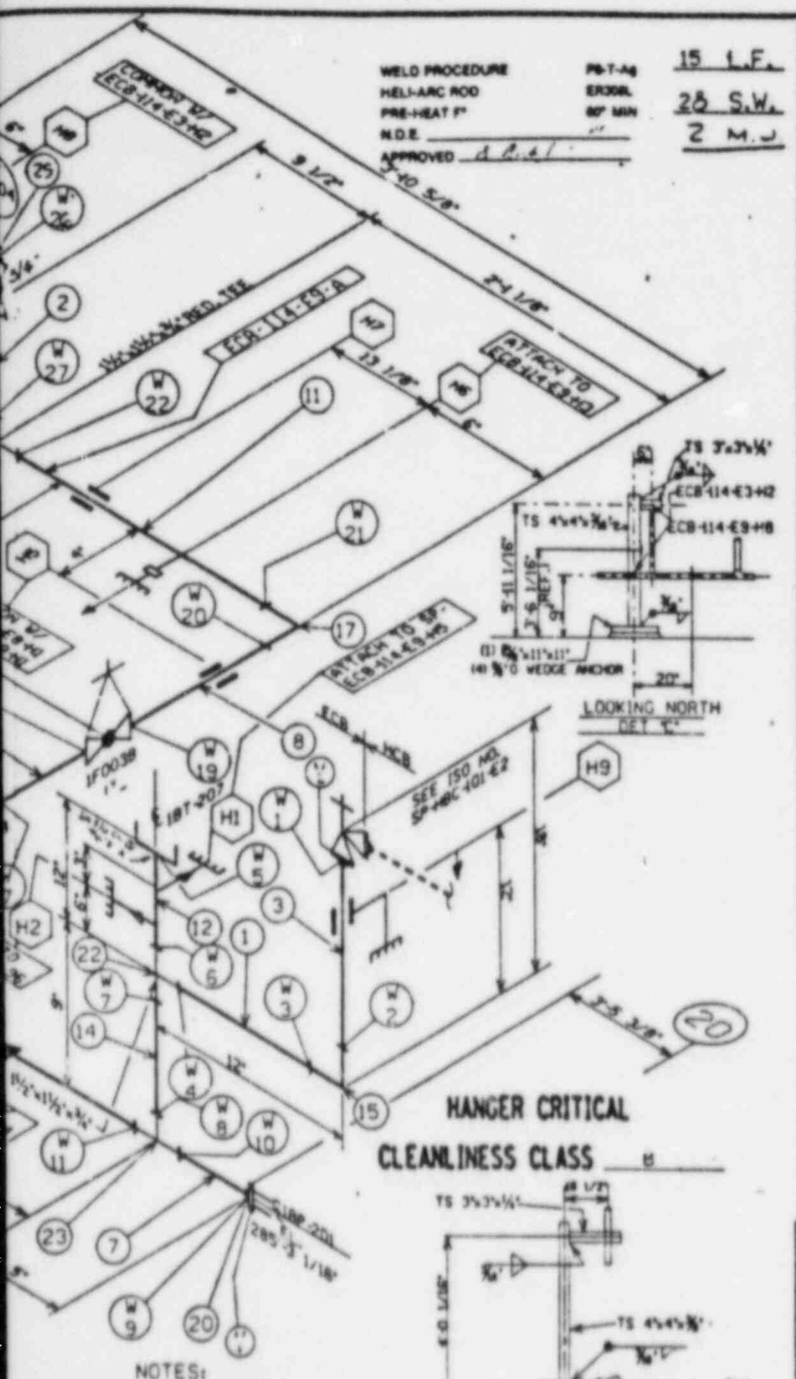
LEGEND — SPRING HANGER — RIGID HANGER — ANCHOR

TI
APERTURE
CARD

C-10 /1\ Rev. 1

Specification 8031-P-363

Appendix C



NOTES:

1. FIELD TO SHIM AS REQ'D.
2. FIELD TO GROUT 1" MIN.

BILL OF MATERIAL

PC	QTY LGH	SIZE	DESCRIPTION	CLASS SCH	MATERIAL CODE COLOR/STOCK CODE NUMBER	HEAT NO.
1	0'-9 7/8"	3/4"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P4710600031-2	
2	0'-7 3/8"	3/4"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P4710600031-2	
3	1'-5 3/16"	3/4"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P4710600031-2	
4	0'-11 5/16"	1½"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P4710600034-2	
5	1'-4 11/16"	1½"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P4710600034-2	
6	1'-3 7/16"	1½"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P4710600034-2	
7	0'-3 11/16"	1½"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P4710600034-2	
8	0'-6 0"	1½"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P4710600034-2	
9	0'-9 3/8"	1½"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P4710600034-2	
10	0'-6 7/8"	1½"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P4710600034-2	
11	1'-10 ½"	1½"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P4710600034-2	
12	0'-10 11/16"	1½"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P4710600034-2	
13	0'-9 3/8"	1½"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P4710600034-2	
14	0'-6 3/8"	1½"	PIPE	ECB 80S	ASME SA-376 TP304 BLU-BLK P4710600034-2	
15	1	3/4"	90 DEG ELBOW 3000 SW	ECB	ASME SA-182 GR.F304 BLU-BLK P4730600309-2	
16	1	1½"	90 DEG ELBOW 3000 SW	ECB	ASME SA-182 GR.F304 BLU-BLK P4730600312-2	
17	1	1½"	90 DEG ELBOW 3000 SW	ECB	ASME SA-182 GR.F304 BLU-BLK P4730600312-2	
18	1	1½"	90 DEG ELBOW 3000 SW	ECB	ASME SA-182 GR.F304 BLU-BLK P4730600312-2	
	1	1½"	CHECK VALVE 1500 SW	CCA 80S	ASME SA-182 GR.F316L P4820601504	
19	1	3/4"	FLANGE LG TG 600 SW	ECB 80S	ASME SA-182 GR.F316 BLU-BLK P4730600460-2	
20	1	1½"	FLG. T&G.MAL 600 SW	ECB 600	ASME SA182 F316 BLU-BLK P4730600463-2	
21	1	1½x3/4"	RED TEE 3000 SW	ECB	ASME SA-182 GR F304 BLU-BLK P4730622249-2	
22	1	1½x3/4"	RED TEE 3000 SW	ECB	ASME SA-182 GR F304 BLU-BLK P4730622 19-2	
23	1	1½"	TEE 3000 SW	ECB	ASME SA-182 GR.F304 BLU-BLK P4730600326-2	
24	1	1½"	TEE 3000 SW	ECB	ASME SA-182 GR.F304 BLU-BLK P4730600326-2	
	1	3/4"	Y GLOBE VLV 1500 SW	CCA 80S	ASME SA-182 F316L P4820600784	
	1	1½"	Y GLOBE VLV 1500 SW	CCA 80S	ASME SA-182 F316L P4820600804	
25	1	[illegible]	[illegible]		[illegible]	
	4	5/8	NUT		[illegible]	
	1	[illegible]	[illegible]		[illegible]	
48-1BT207			NITROGEN ACCUMULATOR			
48-PSV-1F029B			PRESSURE SAFETY VALVE			
48-PT-1N004B			PRESSURE TRANSMITTER			
	4	[illegible]	HEX HD BOLT		[illegible]	
	4	5/8	NUT		[illegible]	
	1	1½	RS GASKET		[illegible]	

REFERENCES		
53A	23	NONE
M-48/10	SPH-241/22	
1	283'-0"	16

H8	H9
601E	[illegible]
-	-
-	-
-	-
240	[illegible]
261	88
DET. "C"	DET. "D"

GUIDE | SNUBBER | RESTRAINT

BECHTEL
SAN FRANCISCO

LIMERICK GENERATING STATION UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

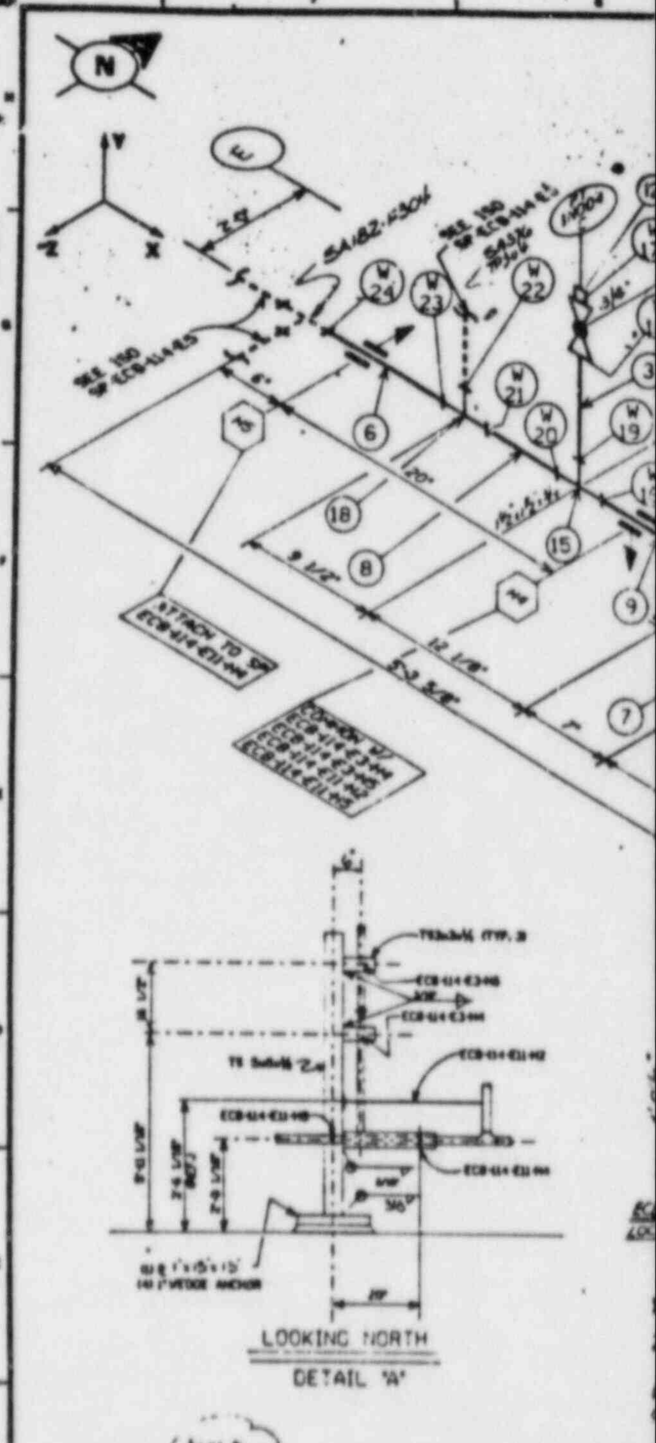
REACTOR ENCLOSURE
STAND-BY LIQ. CONTR. INJECT.
PUMP 1BP-201 DISCHARGE

JOB NO.	DRAWING NO.	REV
8031	SP-ECB-114-E9	0

8408140320-09

VENDOR PR. NO.

REF. DWG. NO.



(HOLD

HGR DESIGN INFO			H1	H2	H3	H4	H5	H6
	HGR. NUMBER		H1	H2	H3	H4	H5	H6
	STD. ASSY. SPH DWG. NO.		7500	7500	601E	601E	601E	601E 7050
	STD. STR. SPH DWG. NO.		—	—	164A	—	—	—
	LENGTH "E.E"		—	—	1⅞"	—	—	—
	ELEVATION "B"		—	—	—	—	—	—
	DESIGN	FX	—	331	—	—	—	110
	LOAD	FY		—	347	206	315	200
	LBS.	FZ	93	—	206	206	206	47
	REMARKS			45°	ALT CONN	DET W		DET B

LEGEND	SPRING HANGER	RIGID HANGER	ANCHOR

ALLOW 1/16" ROOT GAP ON ALL SOCKET WELDS | PIPING SYMBOLS SEE P 290 IN DRAFTING MANUAL | "VEND

8408140320 -10

C-11 | ⚠1

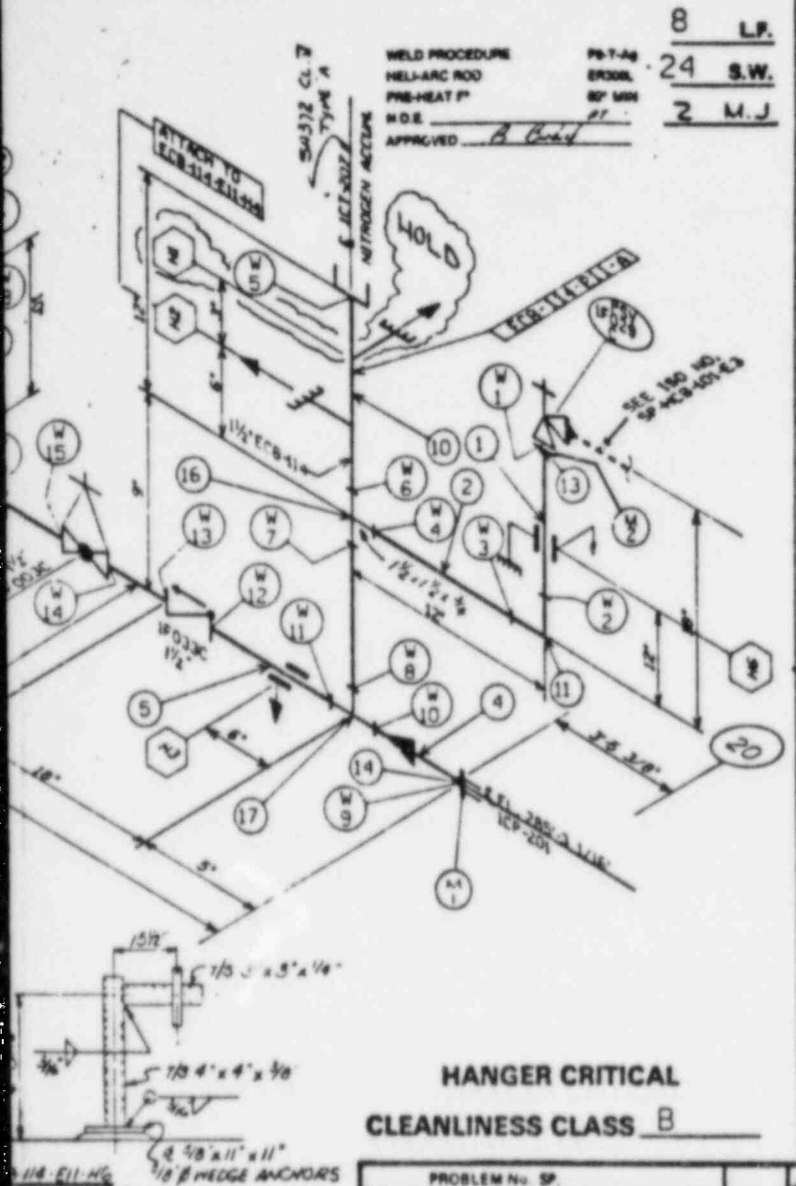
Rev. 1

Specification 8031-P-363

Appendix - C

WELD PROCEDURE	P8-T-Ag
HELI-ARC ROD	ER308L
PRE-HEAT F°	80° MIN
N.D.E.	PT
APPROVED	B Bird

8 L.P.
24 S.W.
2 M.J.



HANGER CRITICAL

CLEANLINESS CLASS B

BILL OF MATERIAL						
PC	QTY/LEN	SIZE	DESCRIPTION	CLASS SCH	MATERIAL CODE	HEAT NO.
1	1'-5 ⅜"	¾"	PIPE	ECB 80S	ASME SA-376 TP304 BLU/BLK P471060031-2	
2	0'-9 ⅜"	¾"	PIPE	ECB 80S	ASME SA-376 TP304 BLU/BLK P471060031-2	
3	0'-7 ⅜"	¾"	PIPE	ECB 80S	ASME SA-376 TP304 BLU/BLK P471060031-2	
4	0'-3 ⁹⁄₁₆"	1½"	PIPE	ECB 80S	ASME SA-376 TP304 BLU/BLK P471060034-2	
5	1'-4 ⁹⁄₁₆"	1½"	PIPE	ECB 80S	ASME SA-376 TP304 BLU/BLK P471060034-2	
6	0'-9 ⅜"	1½"	PIPE	ECB 80S	ASME SA-376 TP304 BLU/BLK P471060034-2	
7	0'-4 ¹³⁄₁₆"	1½"	PIPE	ECB 80S	ASME SA-376 TP304 BLU/BLK P471060034-2	
8	0'-6 ⅜"	1½"	PIPE	ECB 80S	ASME SA-376 TP304 BLU/BLK P471060034-2	
9	0'-8 ⅜"	1½"	PIPE	ECB 80S	ASME SA-376 TP304 BLU/BLK P471060034-2	
10	0'-10 ⁹⁄₁₆"	1½"	PIPE	ECB 80S	ASME SA-376 TP304 BLU/BLK P471060034-2	
11	1	¾"	90 DEG ELBOW 3000 SW	ECB	ASME SA-182 GR.F304 BLU/BLK P473060309-2	
48-1F033C	1	1½"	CHECK VALVE 1500 SW	CCA 80S	ASME SA-182 GR.F316L P4820601504	
13	1	¾"	FLANGE LG TG 600 SW	ECB 80S	ASME SA-182 GR.F316 BLU/BLK P473060460-2	
14	1	1½"	FLANGE LG TG 600 SW	ECB 80S	ASME SA-182 GR.F316 BLU/BLK P473060463-2	
15	1	1½"x¾"	RED TEE 3000 SW	ECB	ASME SA-182 GR F304 BLU/BLK P473062249-2	
16	1	1½"x¾"	RED TEE 3000 SW	ECB	ASME SA-182 GR F304 BLU/BLK P473062249-2	
17	1	1½"	TEE 3000 SW	ECB	ASME SA-182 GR.F304 BLU/BLK P473060126-2	
18	1	1½"	TEE 3000 SW	ECB	ASME SA-182 GR.F304 BLU/BLK P473060126-2	
48-1F003C	1	1½"	Y GLOBE VLV 1500 SW	CCA 80S	ASME SA-182 F316L P4820600784	
	1	¾"	Y GLOBE VLV 1500 SW	CCA 80S	ASME SA-182 F316L P4820600804	
			SPECIAL ITEMS			
48-PSV-1F029C			PRESSURE SAFTY VLV.			
48-PT-1N004C			PRESSURE TRANS.			
48-1CT-207			NITROGEN ACCUM.			
12	1	3/4x5/8	ROOT VALVE STEM		ASME SA 479 TP 316L P473060009-B	
	4	3/4x3¾	BOLTS		ASME SA-193 GR B7 BLUE Y553060015-2	
	4	3/4	NUTS		ASME SA-194 GR 2H BLUE Y553060009-2	
	4	5/8"	NUTS		ASME SA-194 GR 2H BLUE Y553060008-2	
	1	1½"	RS GASKET		SS ASBESTOS WOUND Y553060015	
	1	3/4"	RS GASKET		SS ASBESTOS WOUND Y553060010	

ECB-114-E11-H6
LOOKING EAST
DET. B

NOTES:
1. FIELD TO SHIM AS REQ'D.
2. FIELD TO GROUT 1" MIN.
3. ALL WELDS TO BE MADE AT POINT OF INSTALLATION.

PROBLEM No. SP.			
SPECIAL CALC YES ( ) NO ( )			
TEMP = 180 °F (P 300 lb)		E =	
EXP COEF =	IN/FT	PRESS = 1880 PSIG	
MAXIMUM STRESS (PSI)		ALLOW STRESS (PSI)	
Sa =		Sc =	
SLP+DWT+SSM =		1.2 x Sh =	
PIPE SIZE	1½"		¾"
MAX GRAVITY SPAN	10'-0"		8'-0"
MAX GRAVITY LOAD	40		14
MAX SEISMIC SPAN	9'-0"		8'-0"
MAX SEISMIC LOAD	109		14

No	DATE	DESCRIPTION	DRAWN	CHK'D	APPR	WELD APPR	FLD ENG	PROJ ENG'G APPR
0	4/4/83	THIS SU HAS BEEN REDRAWN AND SUPERSEDES ALL OTHER REVS. REV'D BY FIELD & ISSUED FOR CONSTR.	JR		—			—

REFERENCES			
LINE CLASSIFICATION: Q [X] R [ ] S [ ] B/OP [ ] RG 1.29 [ ]		SEISMIC CLASS: I [X] II [ ] IIA [ ]	
STARTUP No. 53A	SYSTEM No. 23	INSUL CL	THICK NONE
P&ID/REV M-48/10		PLANT DESIGN DWG REV SPM-241/22	
UNIT 1	ELEV 283'-0"	AREA 16	

FOR DOCUMENTATION PROCEDURE WD – 1 FOR SMALL PIPE WELDING AND NONDESTRUCTIVE EXAMINATION, SEE BECHTEL QUALITY CONTROL MANUAL ASME III, VOL. A, SEC. 9.

GUIDE | SNUBBER | RESTRAINT

SUPPLIED | H = HORIZONTAL, V = VERTICAL | B = BEND | F.T.F. = FIELD TO FIT | F.W. FIELD WELD

BECHTEL
SAN FRANCISCO

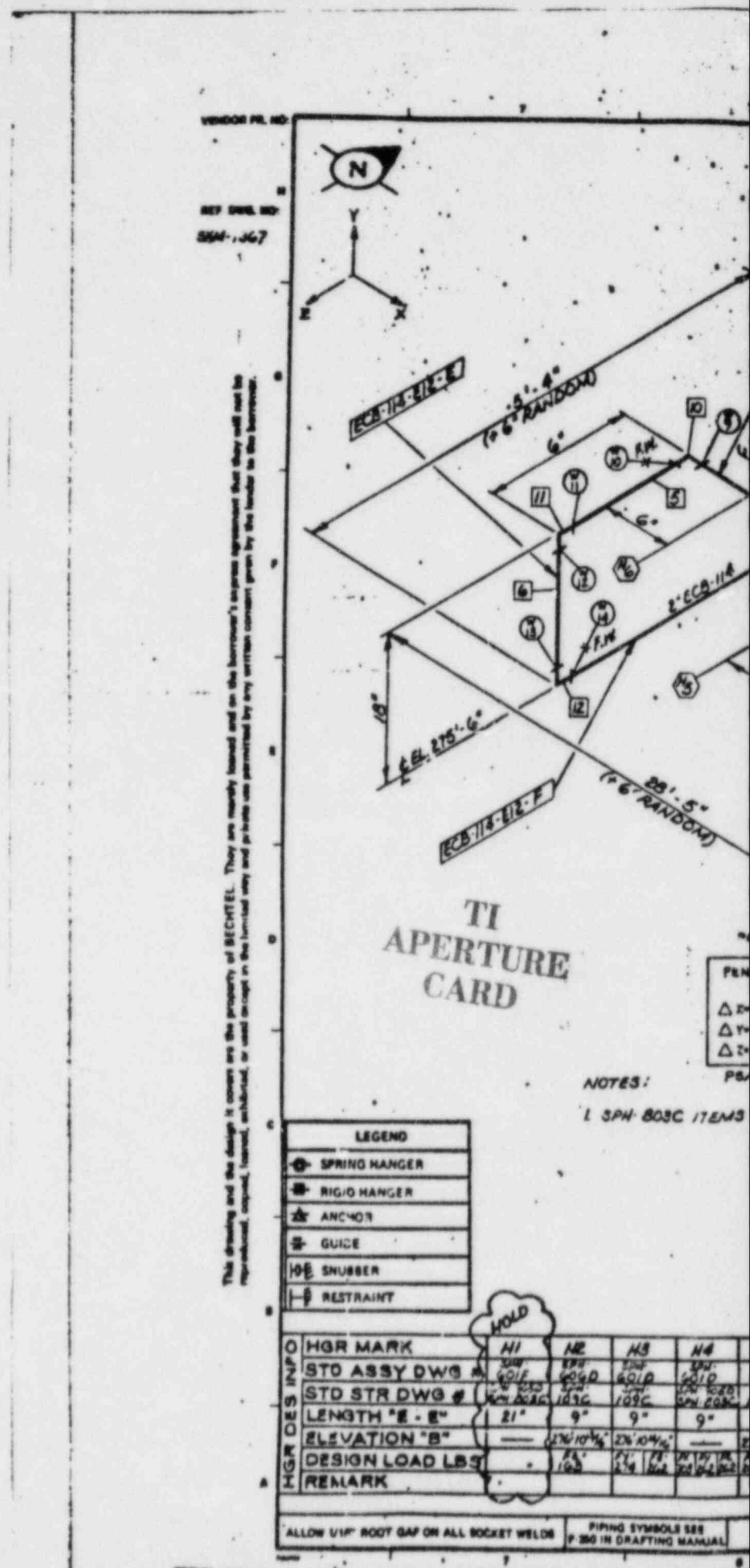
LIMERICK GENERATING STATION UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

REACTOR ENCLOSURE
STANDBY LIQ. CONTR. INJECT.
PUMP ICP-201 DISCHARGE

JOB No.	DRAWING No.	REV.
8031	SP-ECB-114-E11	0

I certify that the microfilmed image contained on this microform were made

Also Available On
Aperture Card

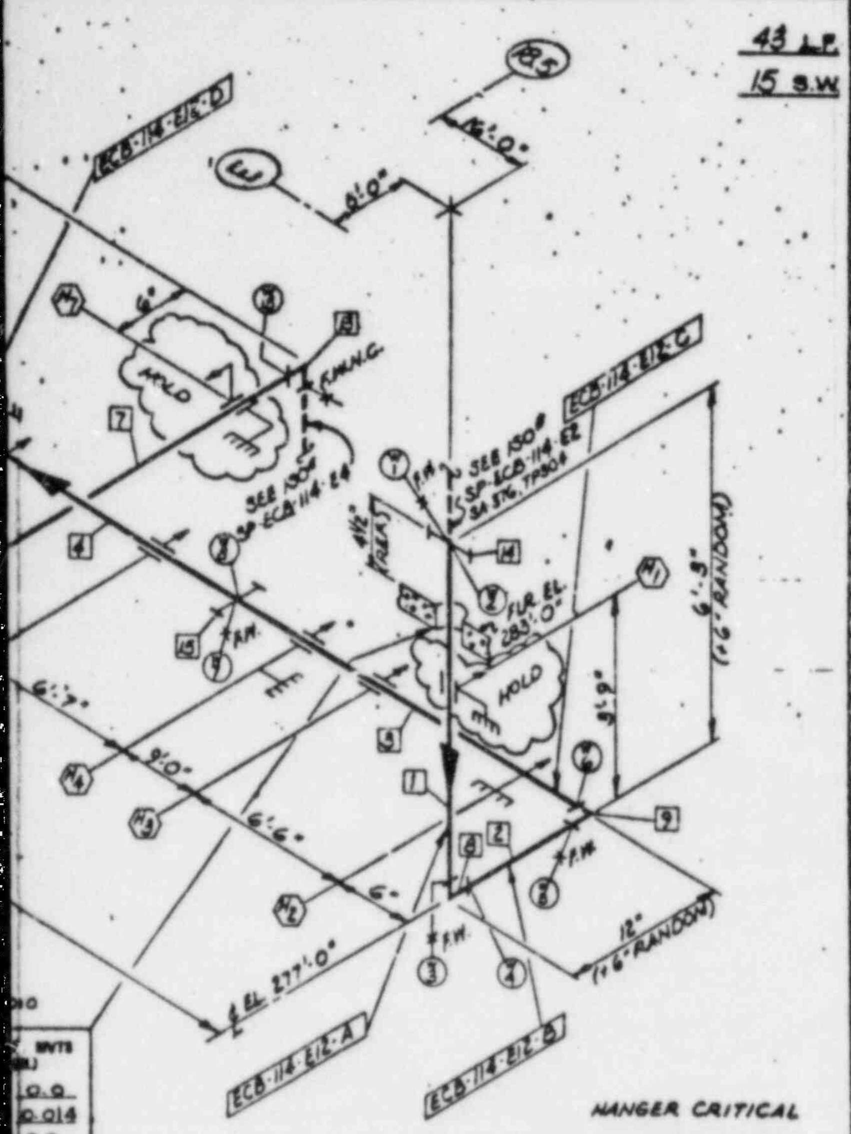


8408140320-11

C-12/1 Rev. 1

Sp-cification 8c21-P363

Appendix C



COLOR CODE AND STOCK CODE NO.	PC NO.	QTY	SIZE AND DESCRIPTION	ASME ASTM	GR	HEAT No.
COLOR: BLUE/BLK	ECB		PIPE: SMLS, S.S., SCH. 80S	SA376	TP304	
P471060038-2	1	7½'	2"			
	2	1½'	2"			
	3	20½'	2"			
	4	9½'	2"			
	5	1½'	2"			
	6	2½'	2"			
	7	6½'	2"			
COLOR: BLUE/BLK	ECB		FITTINGS: 3000# S.W.	SA182	F304	
P473060913-2	8	1	2" 90° ELL.			
	9	1	2"			
	10	1	2"			
	11	1	2"			
	12	1	2"			
	13	1	2"			
P473060334-2	14	1	2" COUPLING			
P473060334-2	15	1	2" COUPLING			

PROBLEM NO. SP

SPECIAL CALC: YES [ ] NO [✓]

TEMP = 5?? °F (F.S.W./C.L.) E = ? x 10⁶ PSI

EXP COEF = .009 IN/FT PRESS. = 1630 PSIG

MAXIMUM STRESS (PSI)	ALLOW. STRESS (PSI)
Sa =	Sa =
SLP+SWT+SSR =	1.2 x Sh =

PIPE SIZE	2"
MAX. GRAVITY SPAN	12'-0"
MAX. GRAVITY LOAD	7/FT
MAX. SEISMIC SPAN	10'-3"
MAX. SEISMIC LOAD	[illegible]

WELD PROCEDURE P8-T-Ag
HELI-ARC ROD ER308L
PRE-HEAT F° 60° MIN
N.D.E.
APPROVED

NO	DATE	DESCRIPTION	DRAWN	CHK'D	APPR
0	[illegible]	REV 0 BY FLO & ISS'D FOR CONST.	[illegible]		[illegible]

REFERENCES

LINE CLASSIFICATION: Q ■, R □, S □, B.O.P. □ — SEISMIC CLASS: I ■, II □, IIA □

START UP No. 53A	COST CODE ~	INSUL. CL. NONE
P&ID M-48/10	PLANT DESIGN DWG SPN-230/19; 240/19	
UNIT 1	ELEV. 253'-0"	AREA 15 & 16

FOR DOCUMENTATION PROCEDURE WD-1 FOR SMALL PIPE WELDING AND NONDESTRUCTIVE EXAMINATION, SEE BECHTEL QUALITY CONTROL MANUAL ASME III, VOL. A, SEC. 8.

BECHTEL
SAN FRANCISCO

LIMERICK GENERATING STATION UNITS 1 & 2

PHILADELPHIA ELECTRIC COMPANY

REACTOR BUILDING
STAND-BY LIQUID CONTROL PUMP DISCH. TO VALVES HV-1F006 A & B

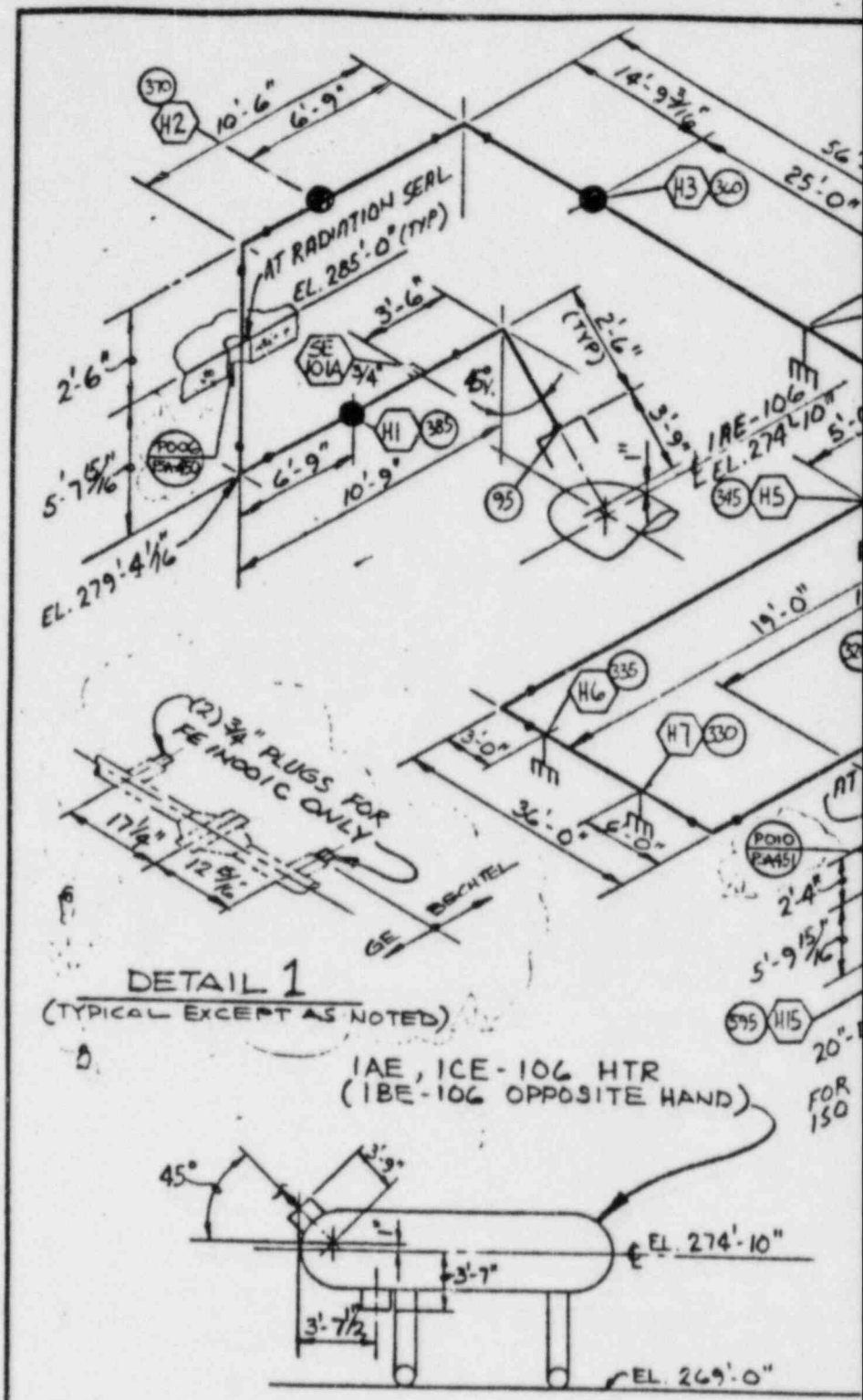
JOB No.	DRAWING No.	REV
8031	SP-ECB-114-E12	0

H5	H6	H7
[illegible] 010	408D	
109C	109C	
9"	9"	
[illegible]	22'10 9/16"	
[illegible] 159	204	

VENDOR SUPPLIED — H = HORIZONTAL, V = VERTICAL — B = BEND — F.T.F. = FIELD TO FIT — F.W. FIELD WELD

Specification
8031-P-363

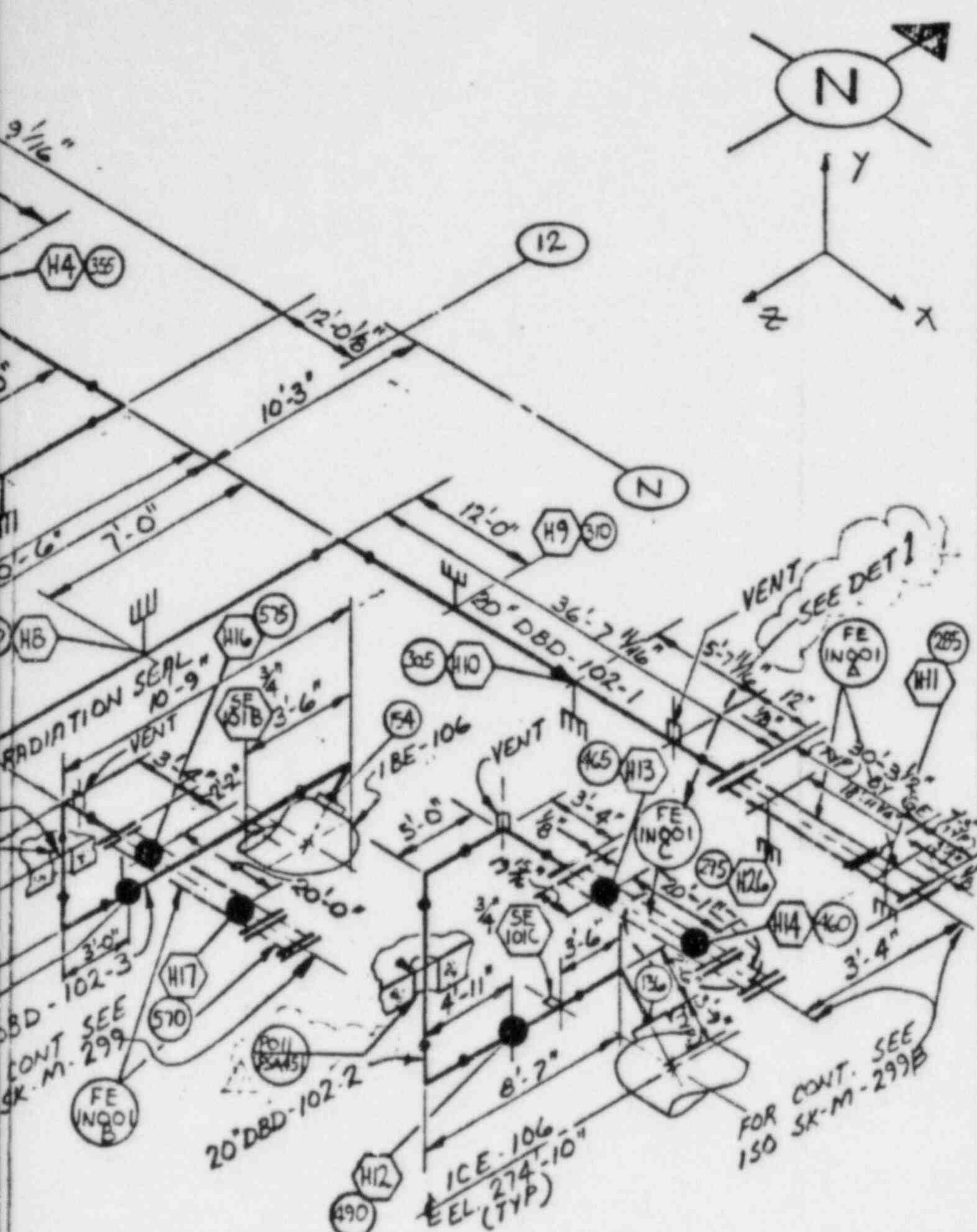
Appendix C



DETAIL 1
(TYPICAL EXCEPT AS NOTED)

		DATA			REV	DATE	BY	REV	DATE	BY
PIPING ENGINEER	LINE No.	DBD-102								
	MATERIAL	A106 GR B								
	LINE THICKNESS (IN)	1.500"								
MECHANICAL ENGINEER	LINE O.D. (IN)	20.00"								
	MODE	I	II	III						
	PRESS. PSIG									
	TEMP F									
STRESS ENGINEER	EXP. COEFF. IN/100FT									
	EXP. COEFF MIL-IN/IN									
	MOD. OF ELAS. E PSI									

Rev. 1



STRESS APPROVALS		
REV	THERMAL	SEISMIC

REV. J NOTE:

REDRAWN (SEE NOTE 1)
ADDED PLUGS TO FE IN001C CONNECTIONS PER FAB ISO.
ADDED PENETRATION IDENTIFICATION NO'S, ADDED PIPE SUPPORTS & DATA POINTS.
DELETED PRESS/TEMP DATA PER STRESS GROUP MARK-UP.
CALC. # 1-15-51A WAS CALC. NO. 1-15-51.
SEISMIC I CHANGED TO SEISMIC II,
CHANGED FROM NUMERICAL TO ALPHA NUMERICAL

NOTE:

1. THIS DWG. SUPERCEDED SK-M-298 REV 9 (11"x17")

REFERENCE
M-06 P&ID
M-189 PIPING PLAN AREA 7
M-178 PIPING PLAN AREA 6
DBD-102-1 FAB ISO
DBD-102-2 "
DBD-102-3 "

CALC Nº 1-15-51A

MODE DESCRIPTION

MODE I
MODE II
MODE III

TI APERTURE CARD

8408140320-12

REV	DATE	REVISION	BY					
J		SEE REV J NOTE						

DATA			REV	DATE	BY	REV	DATE	BY
I	II	III						

LEGEND
- SPRING HANGER
- RIGID HANGER
- ANCHOR
- GUIDE
- SNUBBER
- RESTRAINT
- HANGER NUMBER
- STRESS DATA POINT

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SAN FRANCISCO

LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

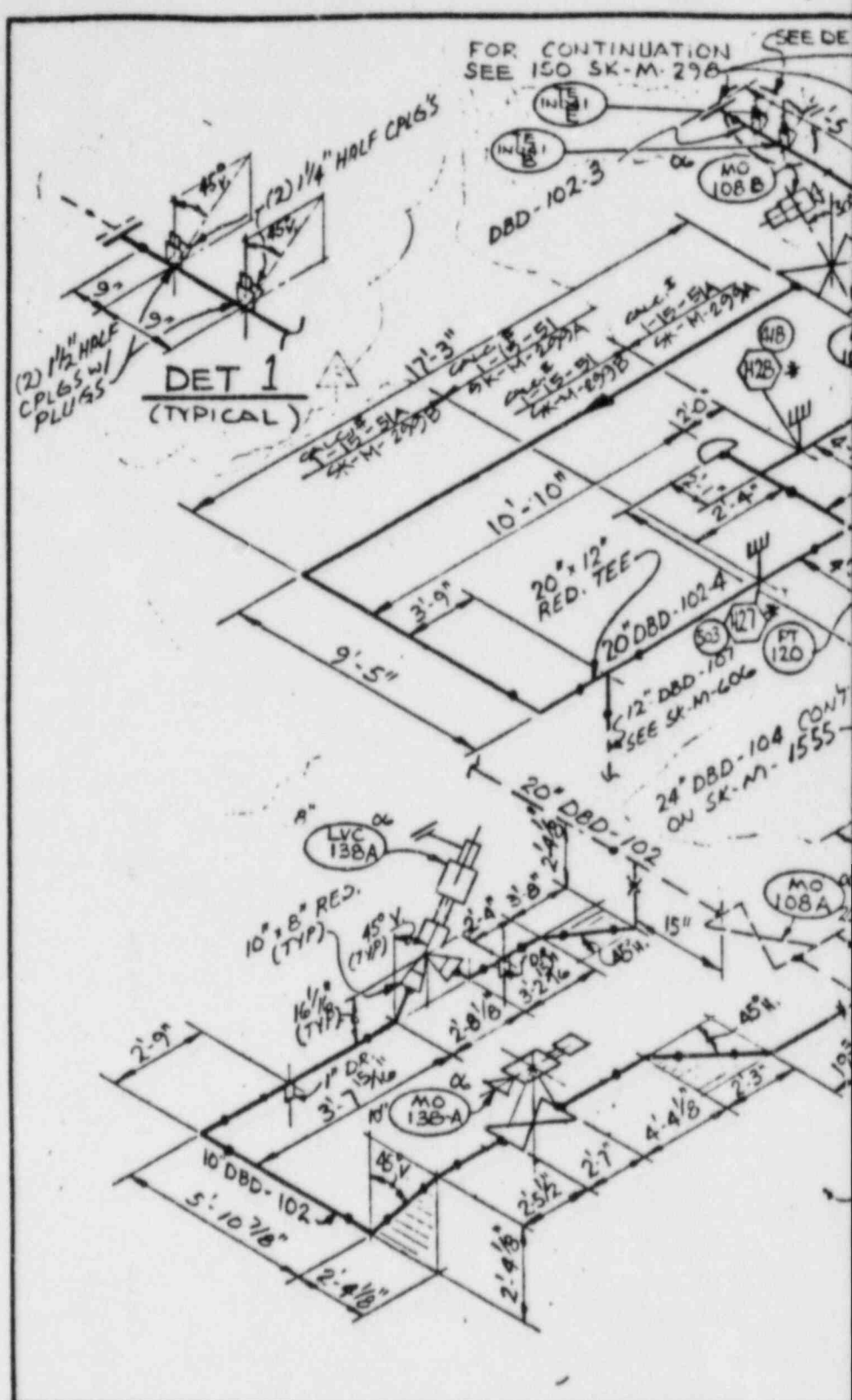
F.W. FROM HEATERS 1AE-106, 1BE-106 & 1CE-106 TO REACTOR BLDG.

JOB No.	DRAWING No.	REV
8031	SK-M-298	J

Specification
SDS-F-363

Appendix C

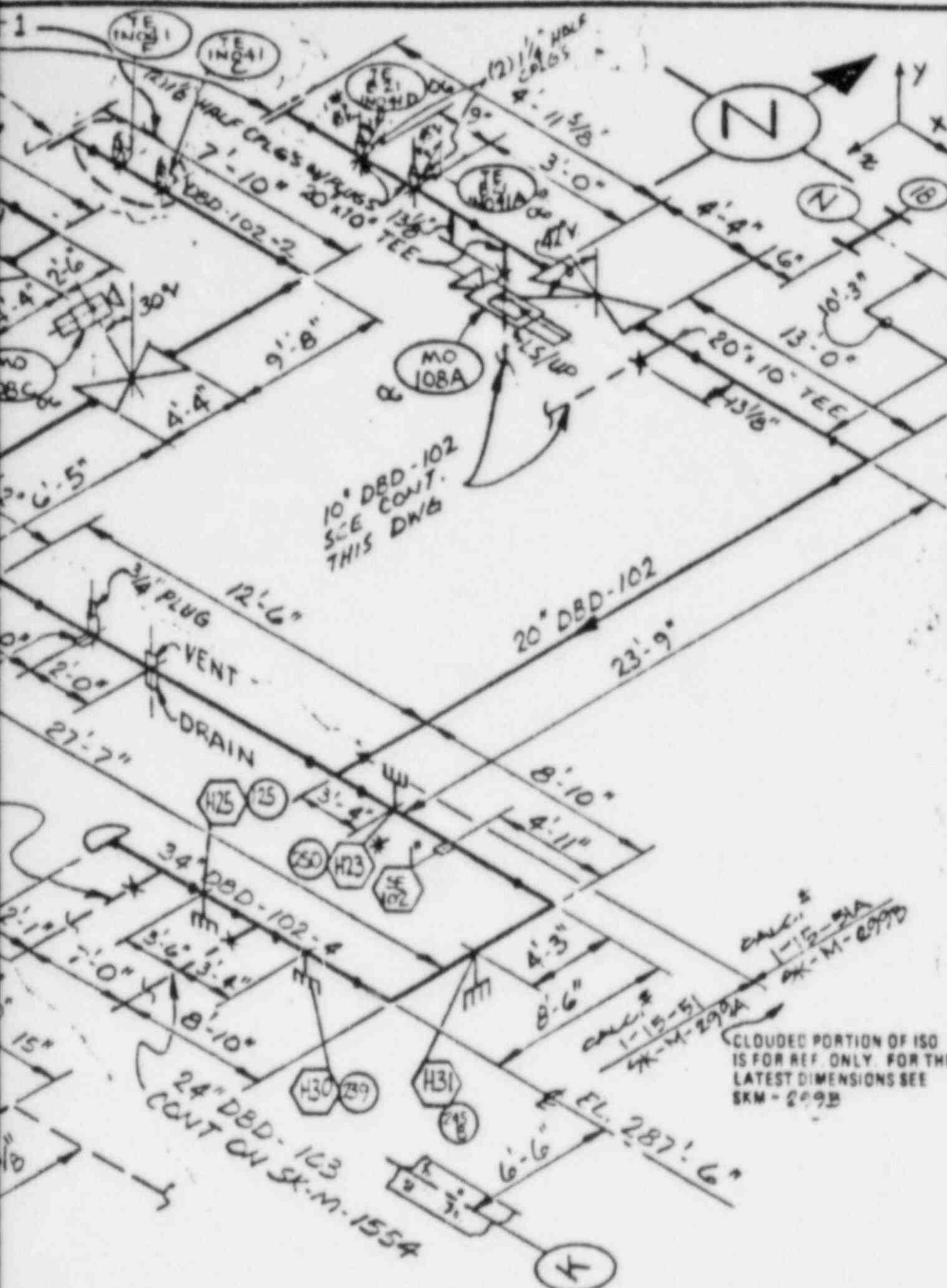
Also Available On
Aperture Card



		DATA			REV	DATE	BY	REV	DATE	BY
PIPING ENGINEER	LINE No.	DBD-102								
	MATERIAL	(20") SMLS ASTM A 106 GR B, 34") ASTM A 135 GR BC-30, CL 1								
	LINE THICKNESS (IN)	.844"	1.500"	1.740" min						
MECHANICAL ENGINEER	LINE O.D. (IN)	10.750"	20.00"	34.00"						
	MODE	I	II	III						
	PRESS. PSIG									
	TEMP F									
STRESS ENGINEER	EXP. COEFF. IN/100FT									
	EXP. COEFF. MIL-IN/IN									
	MOD. OF ELAS. E PSI									

C-14

Rev. 1



CLOUDED PORTION OF ISO IS FOR REF. ONLY. FOR THE LATEST DIMENSIONS SEE SKM-299B

TI APERTURE CARD

* HGRS NOT REQ'D. FOR SEI. I AS-BUILT RECONCILATION, FOR MODELING PURPOSES ONLY. SEE CALC. NO. 1-15-51A.

STRESS APPROVALS

REV	THERMAL	SEISMIC

REV. R NOTE:

REDRAWN (SEE NOTE 1)
ADDED TE CONNECTIONS & PLUGS PER FAB ISO.
ADDED PIPE SUPPORTS & DATA POINTS FOR RECONCILIATION
DELETED VALVE PRESS/TEMP DATA PER STRESS GROUP MARK-UP.
CHANGED REV. NO. FROM NUMERICAL TO ALPHA NUMERICAL. SK-M-299A WAS SK-M-299.

NOTE
1. THIS DWG SUPERCEDED SK-M-299 REV 17 (11"x17"),

REFERENCE
- M-06 P&I.D.
- M-189 PIPING PLAN AREA 7
- DBD-102-1 FAB ISO.
- DBD-102-2 " "
- DBD-102-3 " "
- DBD-102-4 " "
- DBD-102-5 " "

CALC. NR 1-15-51

MODE DESCRIPTION

MODE I
MODE II
MODE III

8408140320-13

NO	DATE	REVISIONS	BY	CHKD				
R		SEE REV R NOTE						

DATA			REV	DATE	BY	REV	DATE	BY
I	II	III						

LEGEND
- SPRING HANGER
- RIGID HANGER
- ANCHOR
- GUIDE
- SNUBBER
- RESTRAINT
- HANGER NUMBER
- STRESS DATA POINT

SCALE —

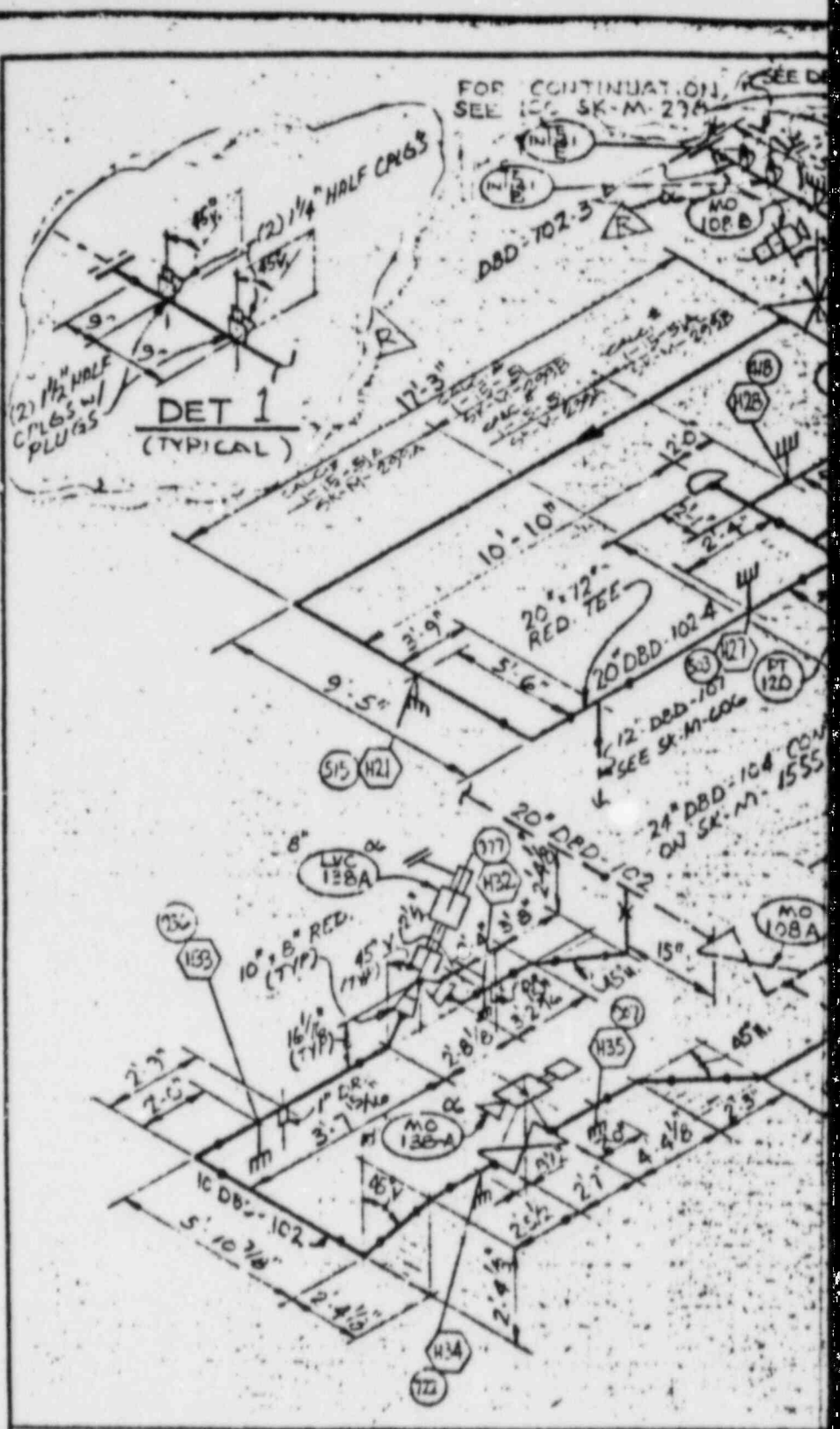
BECHTEL
SAN FRANCISCO

LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

FEED WATER SYSTEM FROM #6 HEATERS TO REACTOR PEN

JOB No.	DRAWING No.	REV
3031	SK-M-299A	R

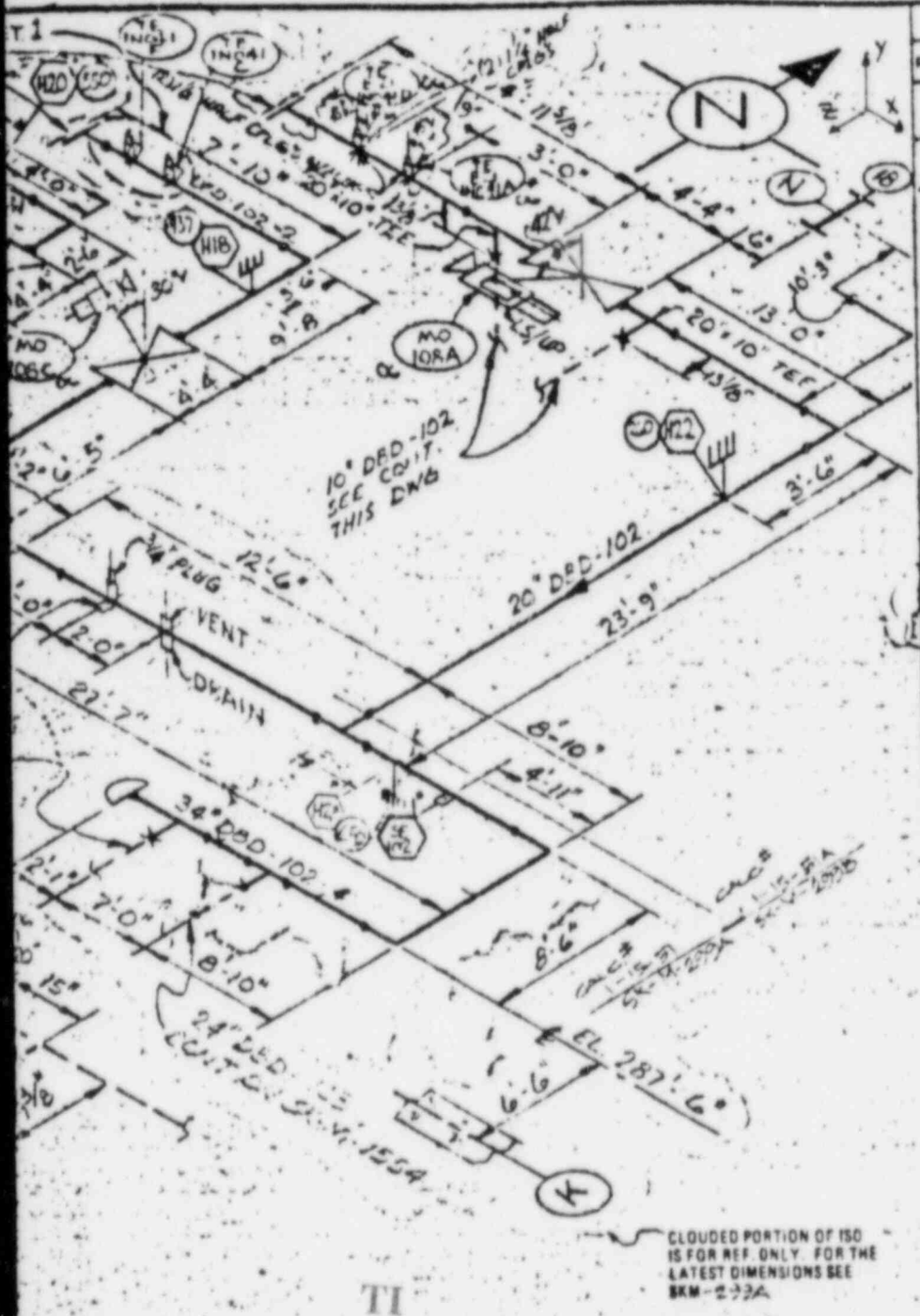
Specification
8031-P-363
Appendix C



		DATA			REV	DATE	BY	REV	DATE	BY
PIPING ENGINEER	LINE No.	DBD-102								
	MATERIAL									
	LINE THICKNESS (IN)	.844	1.375	1.740 min						
MECHANICAL ENGINEER	LINE O.D. (IN)	10.750	20.00	34.00						
	MODE	I	II	III						
	PRESS PSIG									
	TEMP F									
STRESS ENGINEER	EXP. COEFF. IN/100FT									
	EXP. COEFF MIL-IN/IN									
	MOD. OF ELAS E PSI									

C-15

Rev. 1



STRESS APPROVALS		
REV	THERMAL	SEISMIC

REV. P NOTE:

REDRAWN (SEE NOTE 1)
ADDED TE CONNECTIONS & PLUGS PER FAB ISO.
ADDED PIPE SUPPORTS & DATA POINTS.
DELETED VALVE PRESS / TEMP DATA PER STRESS GROUP MARK-UP.
SK-M-299B WAS SK-M-299. CALC. NO. 1-15-51A WAS CALC 1-15-51. CHANGED SEISMIC I TO SEISMIC II. CHANGED FROM NUMERICAL TO ALPHA NUMERICAL.

NOTE
1. THIS DWG. SUPERCEDED SK-M-299 REV 17 (11"x17").

REFERENCE

M-06	P & I D.
M-187	PIPING PLAN AREA 7
DBD-102-1	FAB ISO.
DBD-102-2	"
DBD-102-3	"
DBD-102-4	"
DBD-102-5	"
CALC. NO	1-15-51A

MODE DESCRIPTION

MODE I
MODE II
MODE III

DATA	REV	DATE	BY	REV	DATE	BY
-1 II III						

LEGEND
SPRING HANGER
RIGID HANGER
ANCHOR
GUIDE
SNUBBER
RESTRAINT
HANGER NUMBER
STRESS DATA POINT

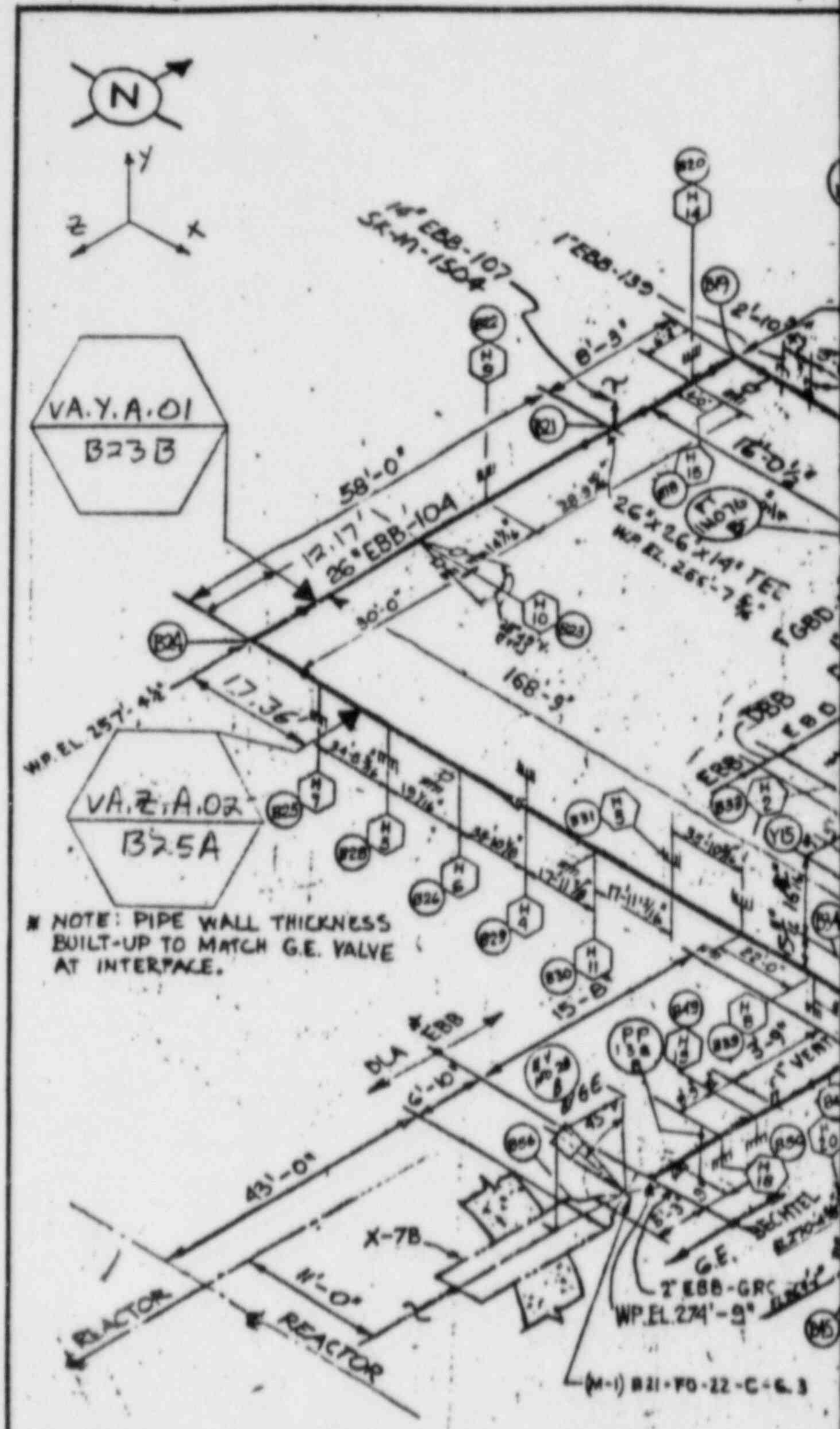
BECHTEL
SAN FRANCISCO

LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

FEED WATER SYSTEM FROM #6 HEATERS TO REACTOR PEN

JOB NO.	DRAWING NO.	REV
8031	SK-M-299B	R

Specification
8031-P-363
Appendix C



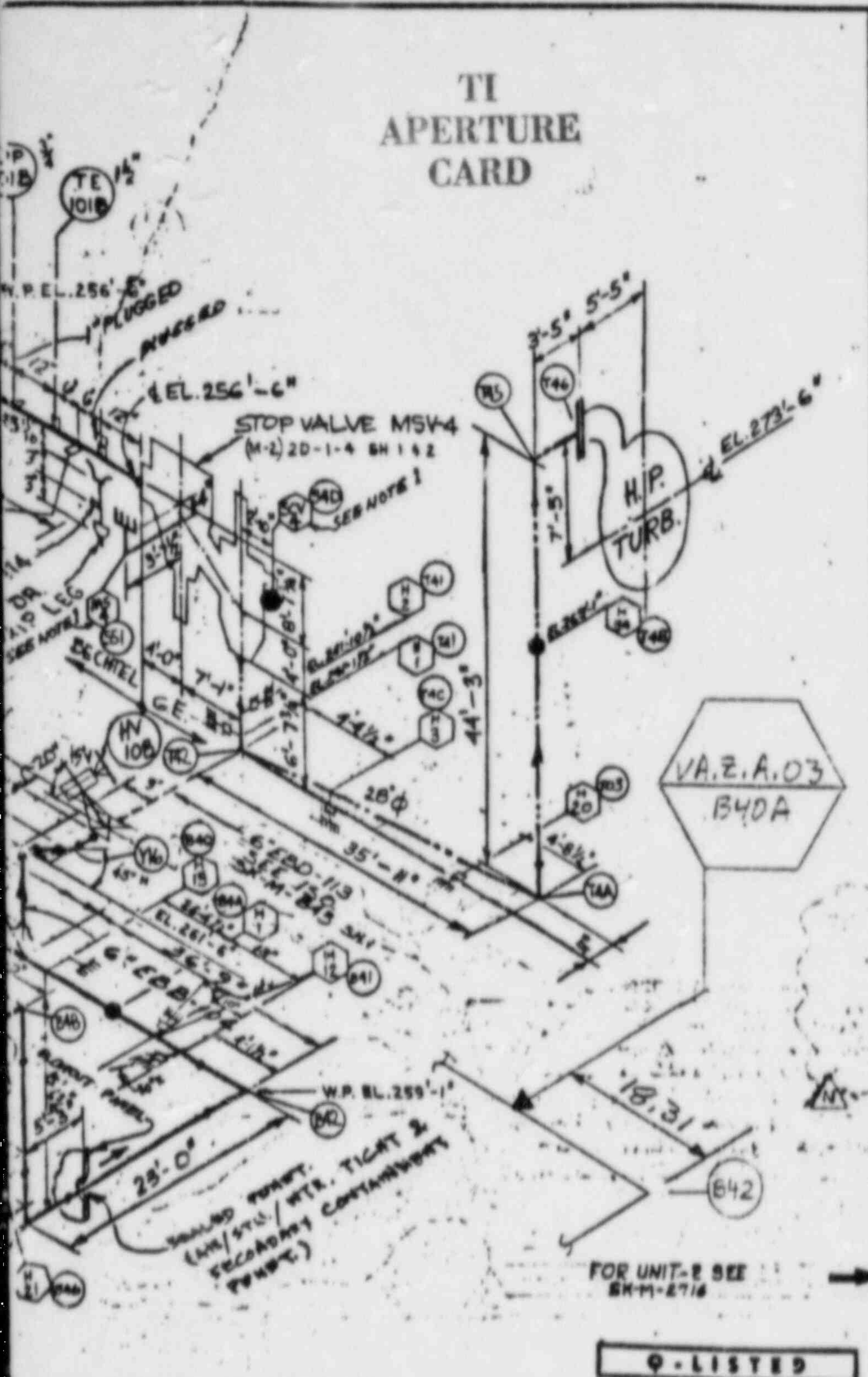
		DATA			REV	DATE	BY	REV	DATE	BY
PIPING ENGINEER	LINE No.	EBB-104			A	[illegible]/73	gbl	B	2/4/76	RRK
	MATERIAL	26" • SA-106 GRC, 6" • SA-106 GRB						E		
	LINE THICKNESS (IN)	1.03 NOM .924 MIN	.432					E		
MECHANICAL ENGINEER	LINE O.D. (IN)	26	6.625		A	[illegible]	[illegible]	E		
	MODE	I	II	III						
	PRESS. PSIG	[illegible]	[illegible]	[illegible]						
	TEMP F	[illegible]	[illegible]	[illegible]			N			
STRESS ENGINEER	EXP. COEFF. IN/100FT									
	EXP. COEFF. MIL-IN/IN									
	MOD. OF ELAS. E PSI									

Also Available On
Aperture Card

8408140320-15
C-16

Rev. 1

TI APERTURE CARD



STRESS APPROVALS		
REV	THERMAL	SEISMIC
E	RPA 8-27-94	

REV. N NOTE:
ADDED PIPE SUPPORTS & DATA POINTS FOR RECONCILIATION. DELETED VALVE, PRESS & TEMP DATA PER STRESS GROUP MARK-UP

THIS STRESS ISO APPLIES AS FOLLOWS:

UNIT No. 1 AS SHOWN	UNIT No. 2 OPP. HAND
EBB-104	~~EBB-104~~

REV. K NOTE:
ADDED NOTE AT G.E./BECHTEL INTERFACE (REF: FCR-M-4419F)

REFERENCE
- M-41 P&ID
- M-01 P&ID
- M-368 PIPING PLAN
- EBB-104-1 REV. 26 TAB. 150
- EBB-104-2 REV. C TAB. 150
- CALC 1-01-226

MODE DESCRIPTION
- MODE I - DESIGN
- MODE II - MAXIMUM

NOTE:
1. GE HANGERS, SEE DWG. No. 8031-M-2D-1(1)-6 SHT. 1.

REV	DATE	REVISIONS	BY	CHKD			
		NC FCR M-6706F	F.Y.				
		REROTATED "HV-108" 16"V PP ANYTHING TO ...					
K		SEE REV. K NOTE	SAL				
		... VALVE ... REMARKED SEE REV N NOTE	FY				
		REISSUED ... UNIT 2 ADDED					
		ISSUED FOR STRESS ANALYSIS		PP	PP		

DATA			REV	DATE	BY	REV	DATE	BY
G.E. PIPING								
28								
I	II	III						

LEGEND
- SPRING HANGER
- RIGID HANGER
- ANCHOR
- GUIDE
- SNUBBER
- RESTRAINT
- HANGER NUMBER
- STRESS DATA POINT

BECHTEL
SAN FRANCISCO

LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

ISOMETRIC TURBINE BLDG. UNIT 1 & UNIT 2
MAIN STEAM PIPING (LINE B)

JOB No.	DRAWING No.	REV
8031	SK-M-1503	N

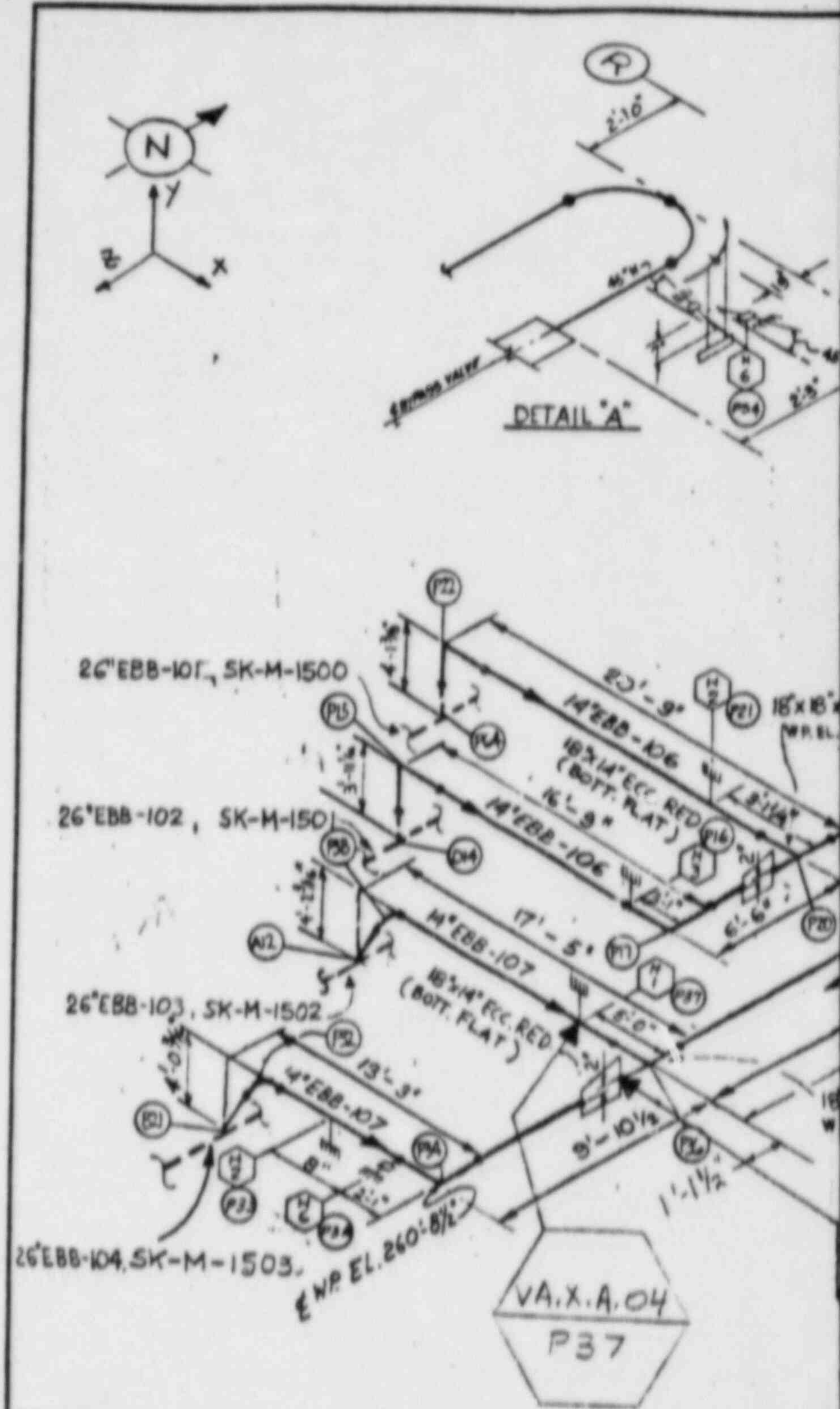
Specification
8031-P-363
Appendix C

Also Available On
Aperture Card

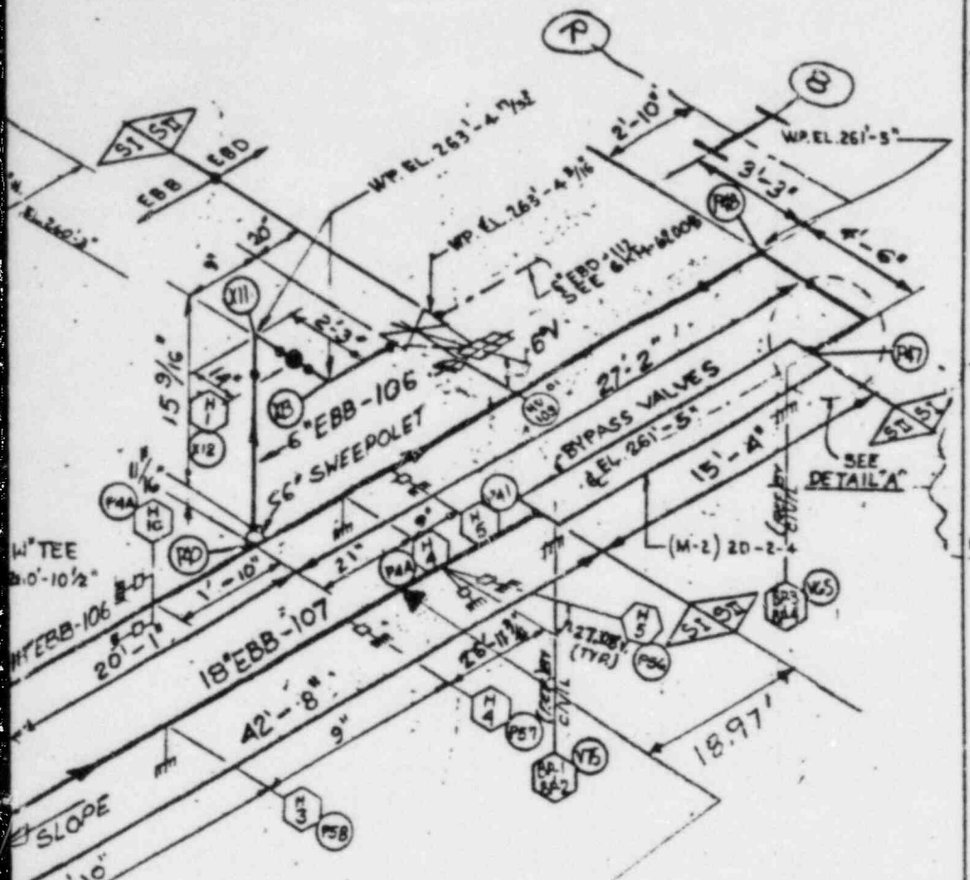
△1

8408140320-16
C-17

Rev. 1



		DATA			REV	DATE	BY	REV	DATE	BY
PIPING ENGINEER	LINE No.	EBB-106			△	[illegible]/73	JDL			
	MATERIAL	SML ASME SA-106 GR.B								
	LINE THICKNESS (IN)	.750	.538	.432						
MECHANICAL ENGINEER	LINE O.D. (IN)	14	18	6.625	△	[illegible]/73	[illegible]			
	MODE	I	II	III						
	PRESS. PSIG									
	TEMP F						△			
STRESS ENGINEER	EXP. COEFF. IN/100FT									
	EXP. COEFF. MIL-IN/IN									
	MOD. OF ELAS. E PSI									



STRESS APPROVALS		
REV	THERMAL	SEISMIC
B	RRS 8-23-74	

REV. H NOTE:
ADDED PIPE SUPPORTS & DATA POINTS FOR RECONCILIATION
DELETED VALVE, PRESS & TEMP DATA PER STRESS GROUP MARK-UP

THIS STRESS ISO APPLIES AS FOLLOWS:	
UNIT No. 1 AS SHOWN	UNIT No. 2 ORP MARK
EBB-106 EBB-107	EBD-207 EBB-206

DES.	CHKD.	ENGR.	DATE
C.M 12-74	1-14-74		

REFERENCE

M-01 [illegible] P&ID
M-152 " PIPING PLAN
M-368 " "
EBB-106-1 REV. B PAB 150
EBB-106-2 REV. B PAB 150
EBB-107-1 REV. B PAB 150
STRESS CALC. 1:01-226

MODE DESCRIPTION

MODE I DESIGN
MODE II MAXIMUM

NO.	DATE	REVISIONS	BY	CHKD	ENGR SUPV	ENGR	PROJ ENGR	APPD
6	8/14/74	REV. 6"EBB-106 PER FCR M-671 OF REV. 1.	F.Y	SK		/		
5	8/7/74	ROTATED HV-109 15° UPWARD PER NCD-755 ADDED SEISMIC FLAG CONTN 13'-0" REV				/		
4	7/11/74	DELETED UNIT 2 STAMP		JA				
3	6/14/74	REVISED AS SHOWN	BR					
2		SEE REV H NOTE						
1	5/30/74	REISSUED FOR UNIT 2 ADDED						
A	3/14/74	ISSUED FOR STRESS ANALYSIS						

9-LISTED

DATA			REV	DATE	BY	REV	DATE	BY
EBB-107			A	8/14/74				
SML ASME SA-106 Gr B								
.750	.938					C		
14	18		A	8/14/74				
I	II	III						

LEGEND
- SPRING HANGER
- RIGID HANGER
- ANCHOR
- GUIDE
- SNUBBER
- RESTRAINT
- HANGER NUMBER
- STRESS DATA POINT

BECHTEL
SAN FRANCISCO

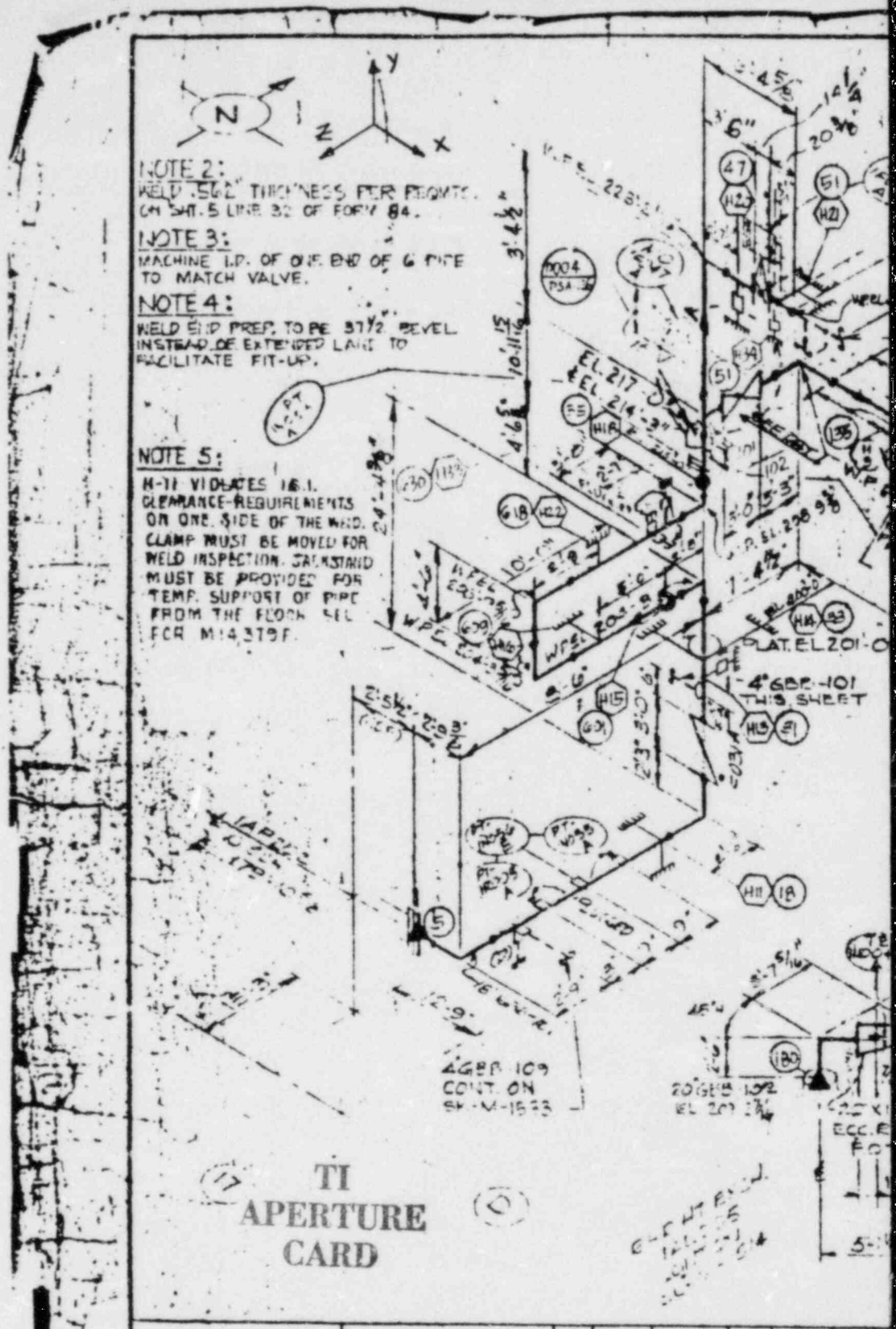
LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

ISOMETRIC TURBINE BLDG UNIT #1
MAIN STEAM BYPASS PIPING

JOB NO.	DRAWING NO.	REV
8031	SK-M-1504	H

Specification
9031-P-363

Appendix C



		DATA			REV	DATE	BY	REV	DATE	BY
PIPING ENGINEER	LINE No	GHB-101								
	MATERIAL				A	9/5/				
	LINE THICKNESS (IN)	.375	.237		A	9/26/73		11	5/12/75	
MECHANICAL ENGINEER	LINE O.D. (IN)	12	4.5		A	9/26/73				
	MODE	I	II	III						
	PRESS. PSIG									
	TEMP.°									
STRESS ENGINEER	EXP. COEFF. IN/100FT									
	EXP. COEFF. MIL-IN/IN									
	MOD OF ELAS. E PSI									

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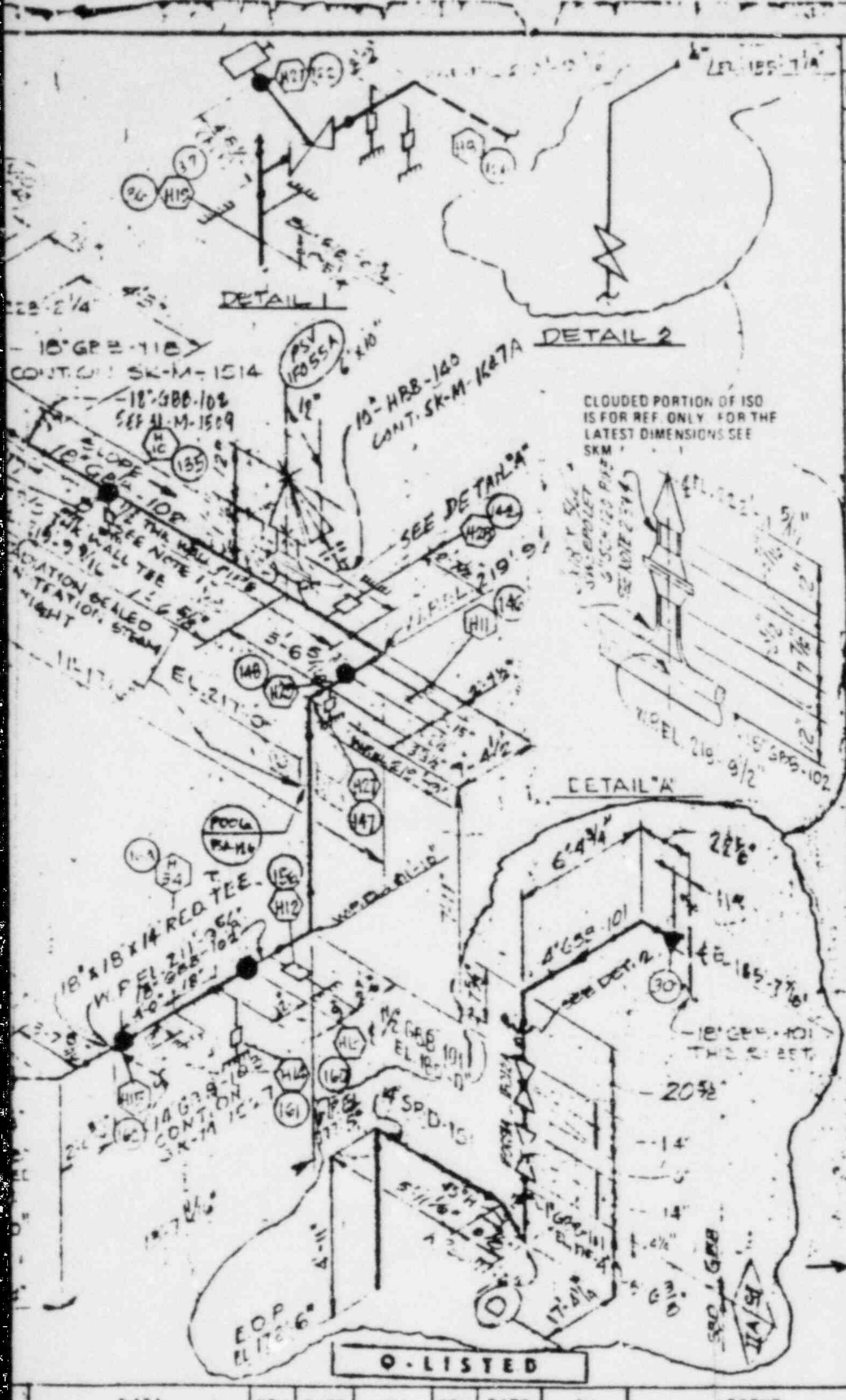
Rev. 1



STRESS APPROVALS		
REV	THERMAL	SEISMIC

GBB-101 MODE DESCRIPTION

MODE I NORMAL SYSTEM OPERATION
MODE II MAXIMUM SYSTEM OPERATION
MODE III LPCI, F047 OPEN
MODE IV SYSTEM IDLE

GBB-102 MODE DESCRIPTION

MODE I NORMAL SYSTEM OPERATION F047 OPEN
MODE II MAXIMUM SYSTEM OPERATION F047 OPEN
MODE III LPCI, F047 OPEN
MODE IV LPCI, F047 CLOSED
MODE V ~~SHUT DOWN~~, F047 OPEN

REV. A NOTE:
ADDED PIPE SUPPORTS & DATA POINTS FOR RECONCILIATION. DELETED PRESS/TEMP/VALVE DATA PER STRESS MARK-UP. REVISED SK-M-1508 TO 1508A

REFERENCE
STRESS CALC.
M-21 P&ID SHT.
M-227 PIPING PLAN
M-228
M-229
M-245
FAD 130 GBB-102-1 REV.
GBB-101-
GBB-101-

NOTES:
1. COUNTERBORE W/ THK WALL ... MATCH I/D THK WALL ...

REV	DATE	DESCRIPTION					
Z		ADD PER NOTE ...					
X		REV PER FCR ...					
W		REV PER FCR ...					
V		REV PER FCR M-7929 ...					
U		...					
Y		ADDED PENETR. ... / P1A-H6					
S		...					
B1		REVISED ISO ... AND ADDED DETAIL A	H.D.				
P		RELOC. ...					
B		...					
A		...					

DATA			REV	DATE	BY	REV	DATE	BY
GBB-102								
			A					
500	375	500	A			Q		
70	15	122	A			Q		
I	II	III						

LEGEND
- SPRING HANGER
- RIGID HANGER
- ANCHOR
- GUIDE
- SNUBBER
- RESTRAINT
- HANGER NUMBER
- STRESS DATA POINT

BECHTEL
SAN FRANCISCO

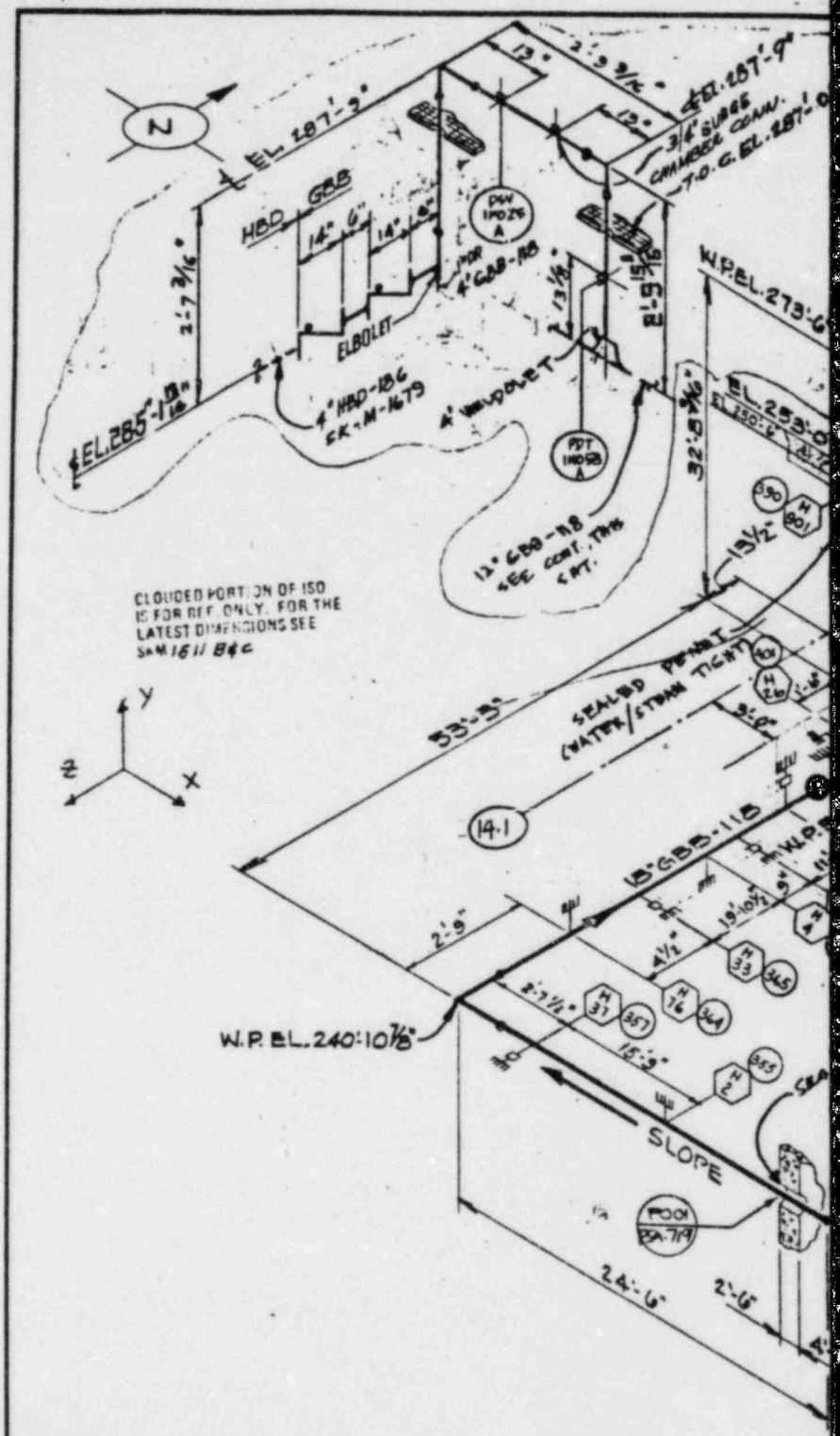
LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

ISOMETRIC - REACTOR BUILDING
RESIDUAL HEAT REMOVAL PIPING

8031 SK-M-1508A B1

Specification
8031-P-363

Appendix C



		DATA			REV	DATE	BY	REV	DATE	B
PIPING ENGINEER	LINE No.	GBB-118								
	MATERIAL	SMLS ASME SA-106, GRB			A	7/27/73	[illegible]			
	LINE THICKNESS (IN)	.375	.375	.237	A	7/27/73	[illegible]			
MECHANICAL ENGINEER	LINE O.D. (IN)	18	12.75	4.5	A	7/27/73	[illegible]			
	MODE	I	II	III						
	PRESS. PSIG									
	TEMP F			14						
STRESS ENGINEER	EXP. COEFF. IN/100FT									
	EXP. COEFF. MIL-IN/IN									
	MOD. OF ELAS. E PSI									

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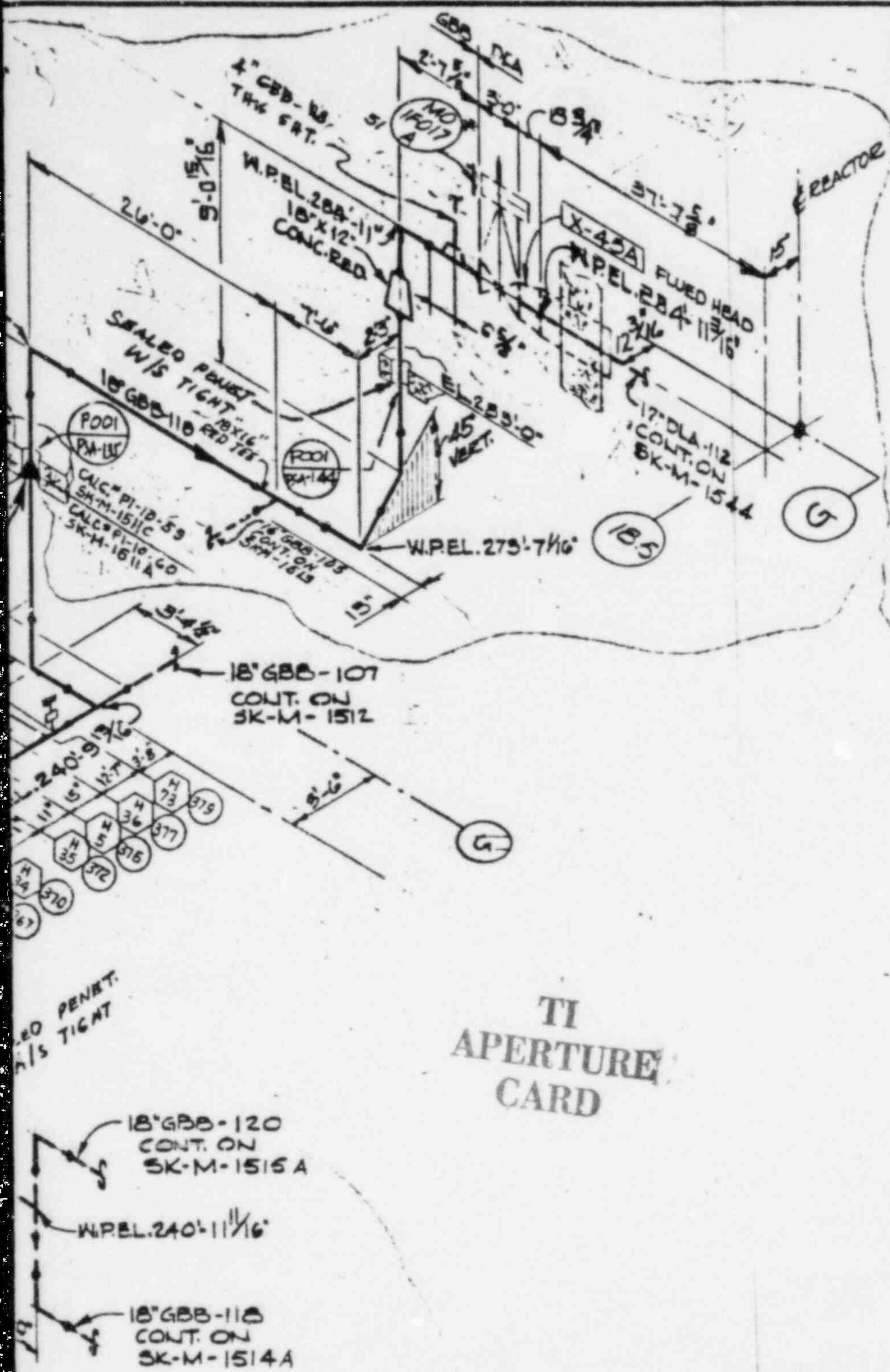


Q-LISTED

STRESS APPROVALS		
REV	THERMAL	SEISMIC

REV. F NOTE:
REV. AS SHOW TO AGREE WITH FAB ISO REF. FME 3136.

REV. H. NOTE:
ADDED PIPE SUPPORTS & DATA POINTS FOR RECONCILIATION & DELETED VALVE, TEMP & PRESS DATA PER STRESS GROUP MARK-UP. SK-M-1511A (WAS SK-M-1511)

REFERENCE

- M-51 P&ID
- M-229 PIPING PLAN
- M-230 " "
- M-231 " "
- GBB-118-2 FAB ISO REV. 18
- STRESS CALC# P1-10-60

MODE DESCRIPTION

MODE I - NORMAL (P-300)

MODE II - MAXIMUM (P-300)

MODE III - NORMAL SHUT DOWN, MODE D

No.	DATE	REVISIONS	BY	CHKD	DESIGN SUPV	ENGR	PROJ ENGR	APPD
H		SEE REV. H NOTE	[illegible]	[illegible]		[illegible]		
G	12/29/82	ADDED PENET I.D. P001/PSA-135	JMC	[illegible]	[illegible]	/	[illegible]	
F	[illegible]	SEE REV F NOTE	JBR	[illegible]	[illegible]	/	[illegible]	
E	6/12/78	ADDED 1" CONN. DLA-112 WAS DCA-116 REM. REVS. TO REF.	J.B.	[illegible]	[illegible]	/	[illegible]	
D	6/11/76	REV. PIPING TO MEET STRESS REQUIREMENTS AND AS NOTED	EBB	ALG	[illegible]	[illegible]	[illegible]	
C	[illegible]	[illegible]	WCP	[illegible]	[illegible]	[illegible]	AT	
B	[illegible]	ADDED MODE DESCRIPTION	T.S.	[illegible]	PP	[illegible]	AT	
A	[illegible]	ISSUED FOR STRESS ANALYSIS	[illegible]	[illegible]	PP		AT	

DATA			REV	DATE	BY	REV	DATE	BY
I	II	III						

LEGEND
- SPRING HANGER
- RIGID HANGER
- ANCHOR
- GUIDE
- SNUBBER
- RESTRAINT

SCALE — | DESIGNED | DRAWN Willson | CHIEF ENGR

BECHTEL
SAN FRANCISCO

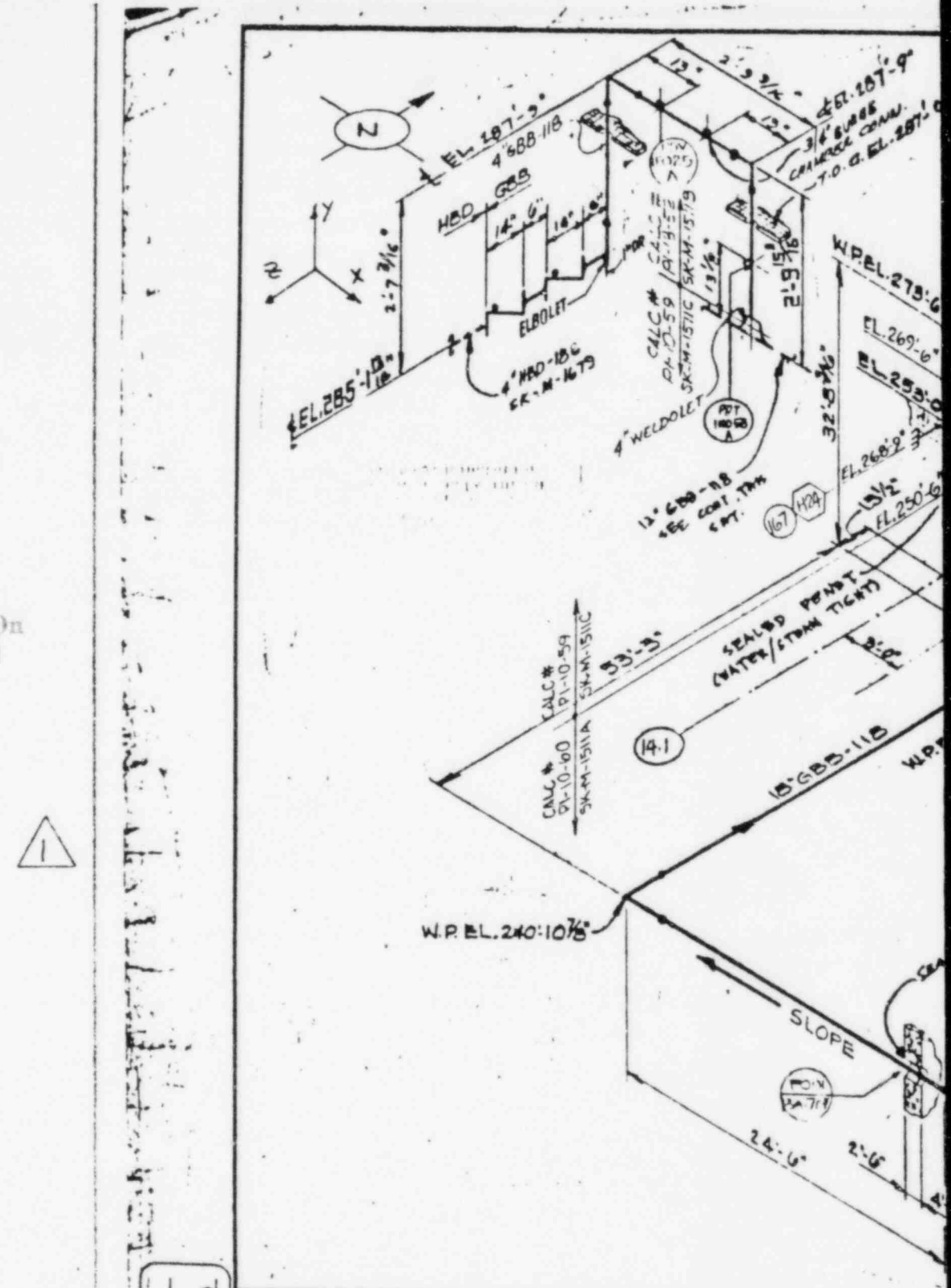
LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

ISOMETRIC - REACTOR BUILDING
RESIDUAL HEAT REMOVAL - UNIT #1

JOB No.	DRAWING No.	REV.
8031	SK-M-1511A	H

Specification
8031-P-363

Appendix C



		DATA			REV	DATE	BY	REV	DATE	BY
PIPING ENGINEER	LINE No.	GBB-118								
	MATERIAL	SMLS ASME SA-106, GRB			A	9/27/79	[illegible]			
	LINE THICKNESS (IN)	.875	.375	.237	A	9/27/79	[illegible]			
MECHANICAL ENGINEER	LINE O.D. (IN)	18	12.75	4.5	A	9/27/79	[illegible]			
	MODE	I	II	III						
	PRESS. PSIG									
	TEMP F									
STRESS ENGINEER	EXP. COEFF. IN/100FT									
	EXP. COEFF. MIL-IN/IN									
	MOD. OF ELAS. E PSI									

CCN REV 0
CALC. NO PI-10-59

1

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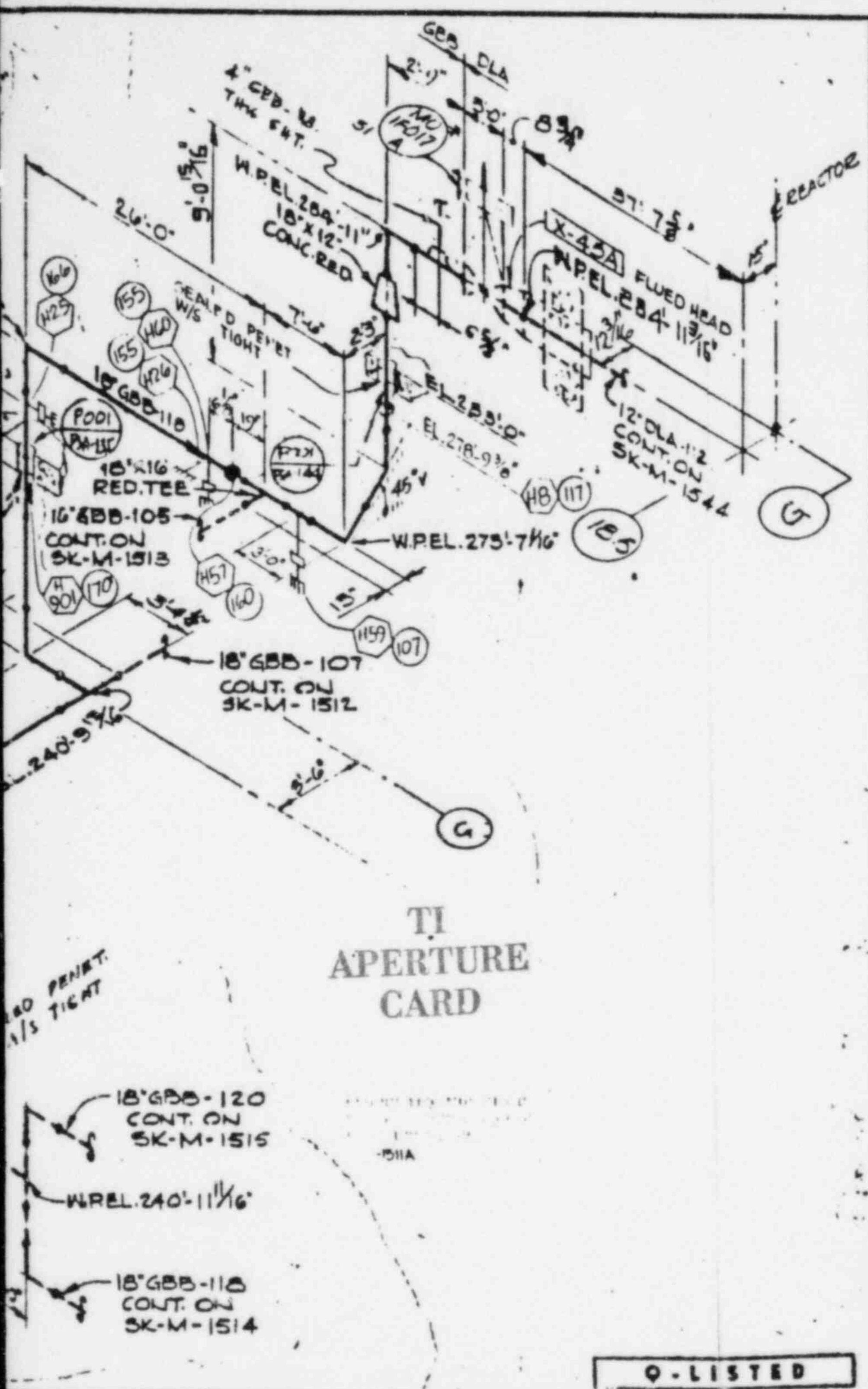
Rev. 1



TI
APERTURE
CARD

Q-LISTED

STRESS APPROVALS		
REV	THERMAL	SEISMIC

REV. F NOTE:
REV. AS SHOW TO AGREE WITH FAB ISO REF. FME 3136.

REV. H NOTE:
ADDED PIPE SUPPORTS & DATA POINTS FOR RECONCILIATION. DELETED PRESS./TEMP. & VALVE DATA PER STRESS MARK-UP. SK-M-1511C (WAS SK-M-1511).

REFERENCE
M-51 P&ID
M-229 PIPING PLAN
M-230 " "
M-231 " "
GBB-118-2 FAB ISO REV. 18
CALC# P1-10-59

MODE DESCRIPTION
MODE I - NORMAL (P-300)
MODE II - MAXIMUM (P-300)
MODE III - NORMAL SHUT DOWN, MODE D

H		SEE REV. H NOTE						
G		ADDED PENET. I.D. P001/	JMC					
F		SEE REV. F NOTE	JBR					
E		ADDED 1" CONN. DLA-112 WAS ... REM. REVS. TO REF.						
D		REV. PIPING TO MEET STRESS REQUIREMENTS AND AS NOTED						
C		[illegible]						
B		ADDED MODE DESCRIPTION	T.S.					
A		[illegible]						

DATA			REV	DATE	BY	REV	DATE	BY
I	II	III						

LEGEND
- SPRING HANGER
- RIGID HANGER
- ANCHOR
- GUIDE
- SNUBBER
- RESTRAINT
- HANGER NUMBER
- STRESS DATA POINT

Nillson

BECHTEL
SAN FRANCISCO

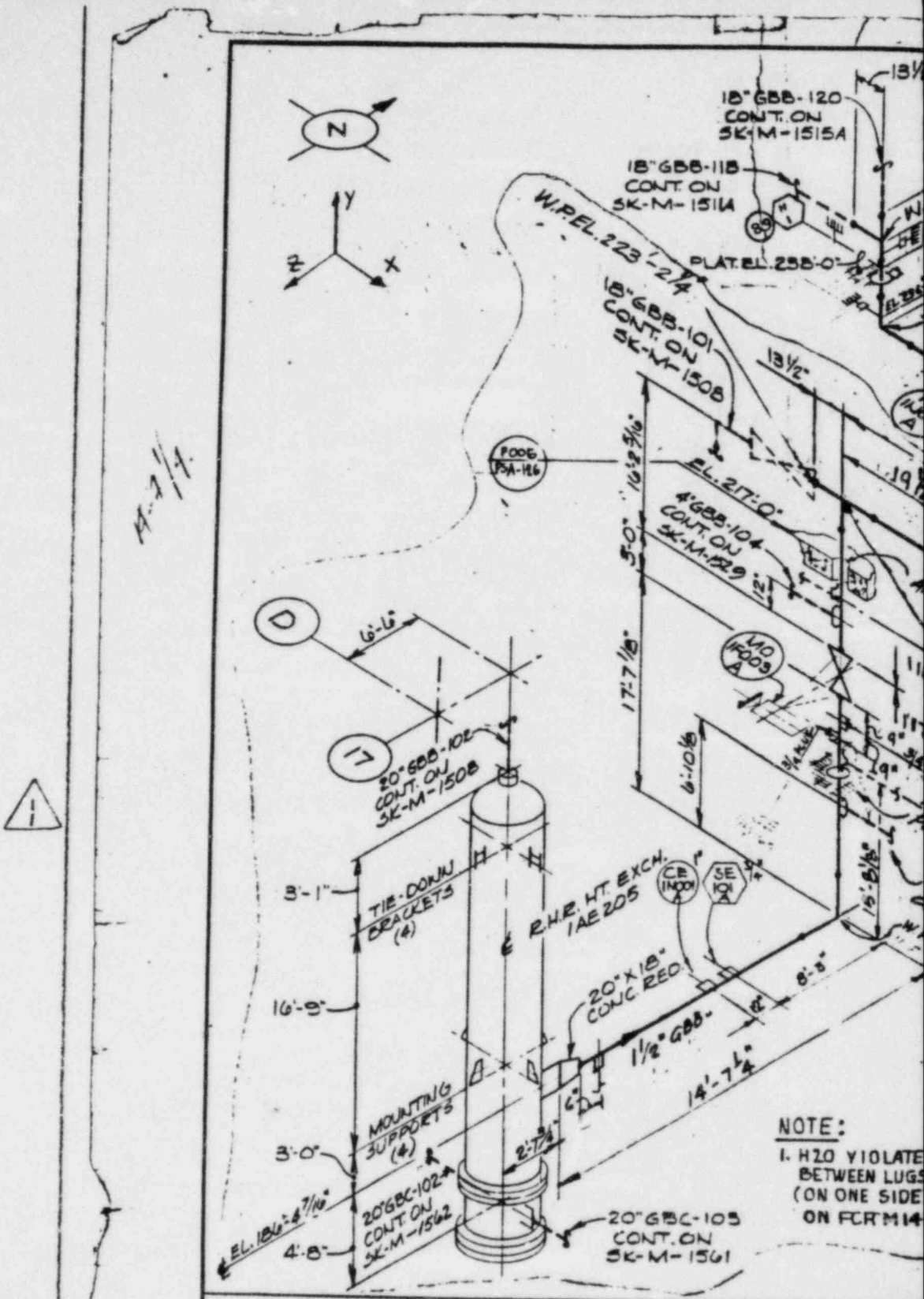
LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

ISOMETRIC - REACTOR BUILDING
RESIDUAL HEAT REMOVAL - UNIT 1

8031 | SK-M-1511 C | H

Specification
8031-P-363

Appendix C



		DATA			REV	DATE	BY	REV	DATE	B
PIPING ENGINEER	LINE No.	GBB-117						E	1/20/78	
	MATERIAL	SMLS ASME SA-106, GR.B			A	7/27/73		E	1/20/78	
	LINE THICKNESS (IN)	.375	.322		A	7/27/73		E	1/20/78	
MECHANICAL ENGINEER	LINE O.D. (IN)	18	8.625		A	7/27/73		E	1/20/78	
	MODE	I	II	III						
	PRESS. PSIG									
	TEMP F									
STRESS ENGINEER	EXP. COEFF. IN/100FT									
	EXP. COEFF. MIL-IN/IN									
	MOD. OF ELAS. E PSI									

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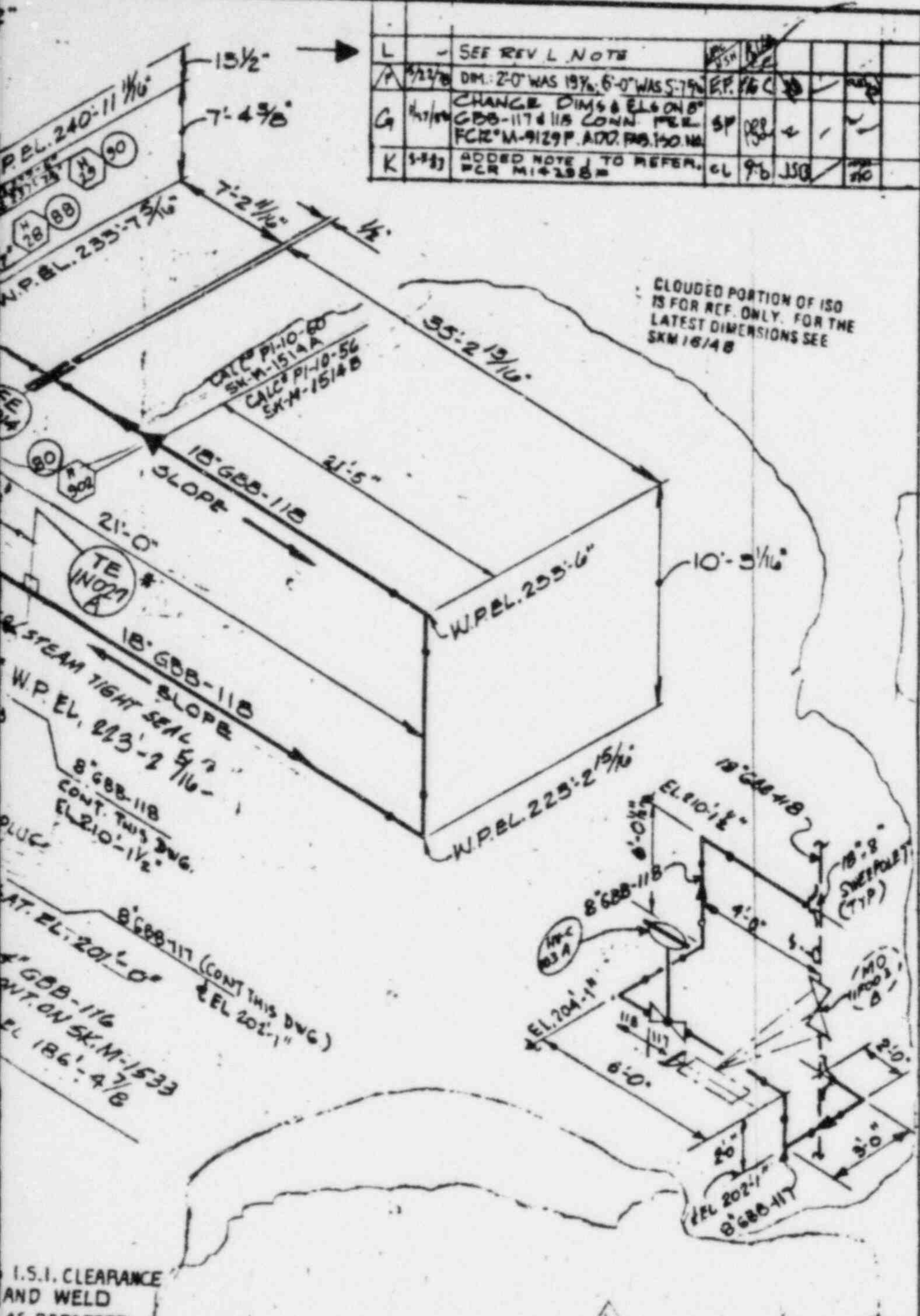
Rev. 1

L	-	SEE REV L NOTE						
F	9/22/78	DIM.: 2'-0" WAS 19¾; 6'-0" WAS 5'-7¾	E.F.					
G		CHANGE DIMS & EL'S ON 8" GBB-117 & 118 CONN. PER FCR M-9129 F. ADD FAB. 150 NO.	SP					
K		ADDED NOTE 1 TO REFER. FCR M14298F	CL		ISO			



Q-LISTED

STRESS APPROVALS

REV	THERMAL	SEISMIC

REV. L NOTE: ADDED PIPE SUPPORTS & DATA POINTS FOR RECONCILIATION & DELETED VALVE, TEMP. & PRESS DATA PER STRESS GROUP MARK-UP & ADDED REF. FCR M-15154F FCR M16382F △, FCR M16448F.

TI APERTURE CARD △L

REFERENCE STRESS CALC# PI-10-60
FCR M14298F M-15154F REF FCR

M-51-2	P&ID	REV. 7
M-227	PIPING PLAN	" 38
M-228	"	" 39
M-229	"	" 10
M-246	"	" 11
GBB-117-1	FAB. 150	REV. 10
GBB-118-1	" "	REV. 17

GBB-117 MODE DESCRIPTION

MODE I NORMAL SYSTEM OPERATION F003 OPEN
MODE II MAXIMUM SYSTEM OPERATION F003 CLOSED
MODE III LPCI, F003 OPEN
MODE IV LPCI, F003 CLOSED

GBB-118 MODE DESCRIPITION

MODE I NORMAL SYSTEM OPERATION F003 OPEN
MODE II MAXIMUM SYSTEM OPERATION F003 OPEN
MODE III LPCI
MODE IV SYSTEM IDLE

NO.	DATE	REVISIONS	BY	CHKD	DESIGN SUPV	ENGR	PROJ ENGR	APPR
J		ADDED PENE. I.D. P005/PSA-126	JMO	FM				
H		REV CONN. TO REFLECT PER ...	FY	WP				
B		ADDED MODE DESCRIPTION	T.S.		PP			
A		ISSUED FOR STRESS ANALYSIS	Rw		PP			

	DATA			REV	DATE	BY	REV	DATE	BY	LEGEND
	GBB-118						E	1/20/75		SPRING HANGER
	SMLS ASME SA-106, GR. B			A	9/27/73	BAZ	E	1/20/75		RIGID HANGER
	.375	.322		A	9/27/73	BAZ	E	1/20/75		ANCHOR
	18	8.625		A	9/27/73	BAZ	E	1/20/75		GUIDE
	I	II	III							SNUBBER
										RESTRAINT

SCALE — DESIGNED — DRAWN Willson CHIEF ENGR

BECHTEL
SAN FRANCISCO

LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

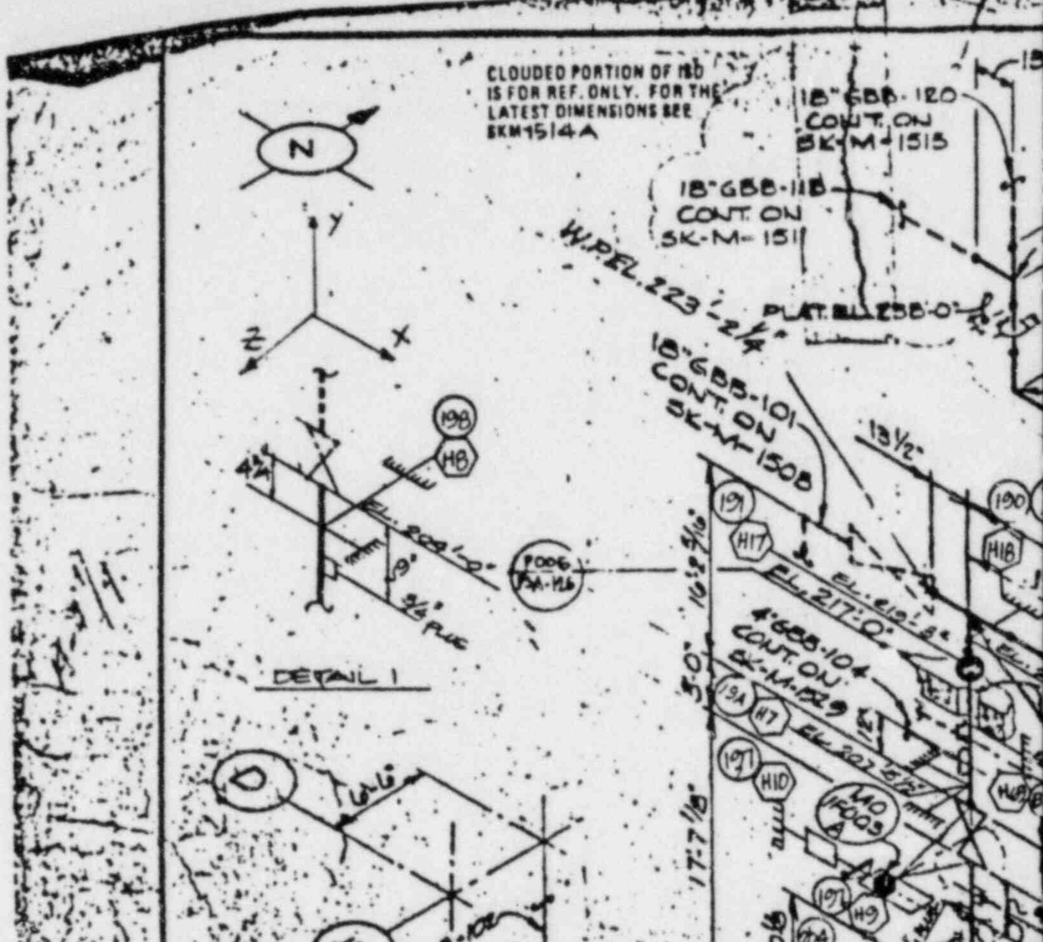
ISOMETRIC - REACTOR BUILDING
RESIDUAL HEAT REMOVAL - UNIT #1

JOB No.	DRAWING No.	REV.
8031	SK-M-1514A	E

Specification
8031-P-363

Appendix C

Also Available On
Aperture Card



		DATA			REV	DATE	BY	REV	DATE
PIPING ENGINEER	LINE No.	GBB-117						E	1/20/75
	MATERIAL	[illegible] ASME SA-106, GR.B			A	7/30/73	[illegible]	E	1/20/75
	LINE THICKNESS (IN)	.375	.322		A	7/31/73	[illegible]	E	1/20/75
MECHANICAL ENGINEER	LINE O.D. (IN)	18	8.625		A	7/31/73	[illegible]	E	1/20/75
	MODE	I	II	III					
	PRESS. PSIG								
	TEMP F								
STRESS ENGINEER	EXP. COEFF. IN/100FT								
	EXP. COEFF. MIL-IN/IN								
	MOD. OF ELAS. E PSI								

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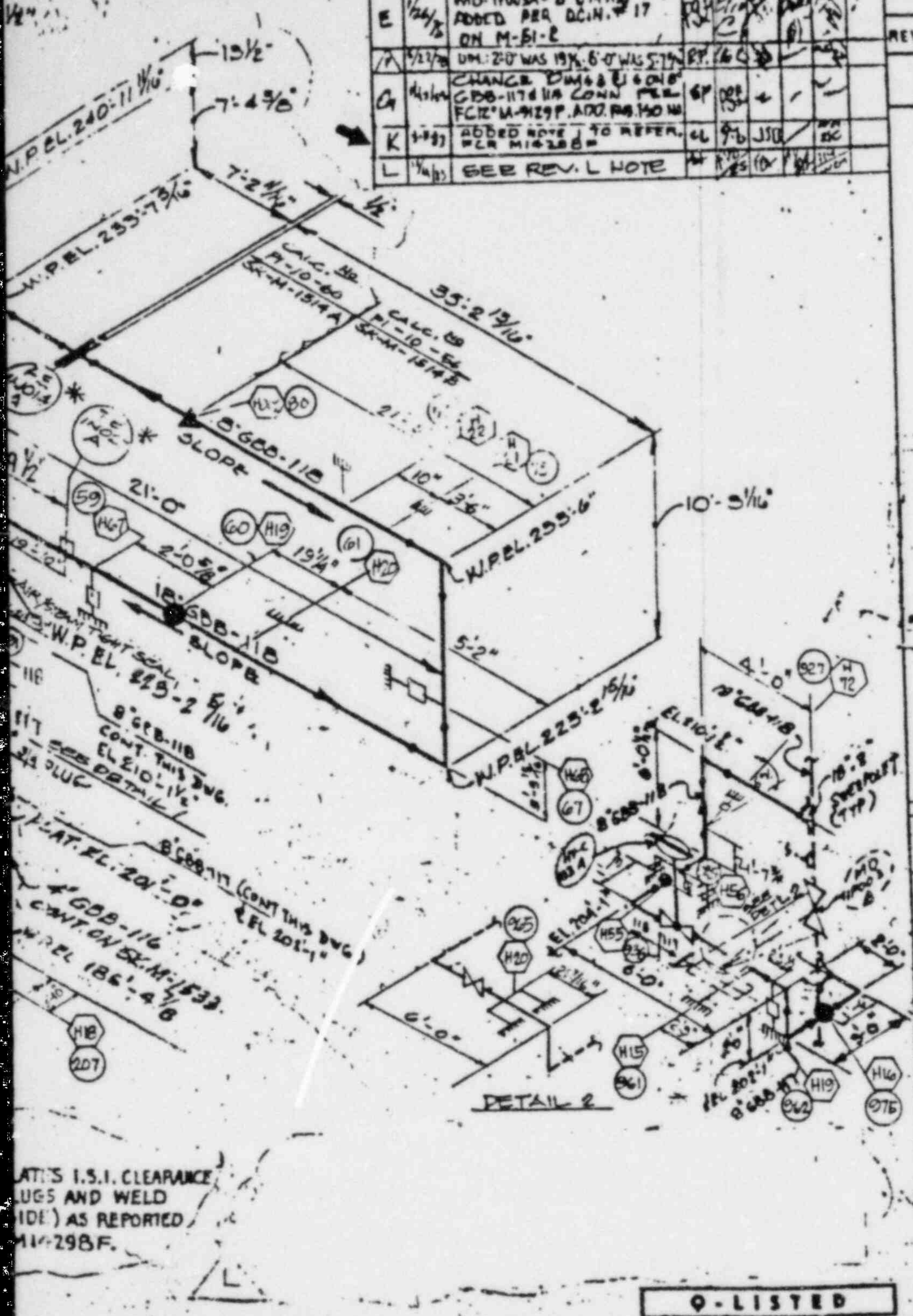
Rev. 1

E	1/24/78	MO-1F003A - 8" E47(N) ADDED PER DCN. # 17 ON M-51-2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
F	5/22/79	DIM. 2'-0" WAS 19%, 8'-0" WAS 5'-7%	RP	[illegible]	[illegible]		
G	[illegible]	CHANGE DIMS & EL ON 8" GBB-117 & 118 CONN PER FCR 14-9129P, ADD PAB 140	GP	[illegible]			
K	[illegible]	ADDED NOTE 1 TO REFER. FCR M14298F	[illegible]	[illegible]	JSD		
L	[illegible]	SEE REV. L NOTE					

STRESS APPROVALS

REV	THERMAL	SEISMIC

REV. L NOTE:
ADDED PIPE SUPPORTS & DATA POINTS FOR RECONCILIATION. DELETED PRESS./TEMP./VALVE DATA PER STRESS MARK-UP.



...LATES I.S.I. CLEARANCE ...LUGS AND WELD ...IDE) AS REPORTED ...M14298F.

TI APERTURE CARD

REFERENCE		
STRESS CALC PI-10-56		
FCR M14298F		
M-51-2	P&ID	REV. 7
M-227	PIPING PLAN	31
M-228	"	17
M-229	"	10
M-246	"	11
GBB-117-1	PAB. 140	REV. 10
GBB-118-1	" "	REV. 17

GBB-117 MODE DESCRIPTION

MODE I NORMAL SYSTEM OPERATION F003 OPEN
MODE II MAXIMUM SYSTEM OPERATION F003 CLOSED
MODE III LPCI, F003 OPEN
MODE IV LPCI, F003 CLOSED

GBB-118 MODE DESCRIPTION

MODE I NORMAL SYSTEM OPERATION F003 OPEN
MODE II MAXIMUM SYSTEM OPERATION F003 OPEN
MODE III LPCI
MODE IV SYSTEM IDLE

J	[illegible]	ADDED SHEET ...	[illegible]	[illegible]
H	[illegible]	[illegible]	PY	[illegible]
B	[illegible]	ADDED MODE DESCRIPTION	T.S.	[illegible]
A	[illegible]	ISSUED FOR STRESS ANALYSIS	[illegible]	PP

Q-LISTED

BY	DATA			REV	DATE	BY	REV	DATE	BY
[illegible]	GBB-118						E	4/20/76	[illegible]
[illegible]	SMLS ASME SA-106, GR.B			A	7/20/73	BRZ	E	4/20/76	[illegible]
[illegible]	.375	.822		A	7/20/73	BRZ	E	[illegible]	[illegible]
[illegible]	18	8.625		A	7/20/73	BRZ	E	4/20/76	[illegible]
	I	II	III						

LEGEND
- SPRING HANGER
- RIGID HANGER
- ANCHOR
- GUIDE
- SNUBBER
- RESTRAINT
- HANGER NUMBER
- STRESS DATA POINT

BECHTEL
SAN FRANCISCO

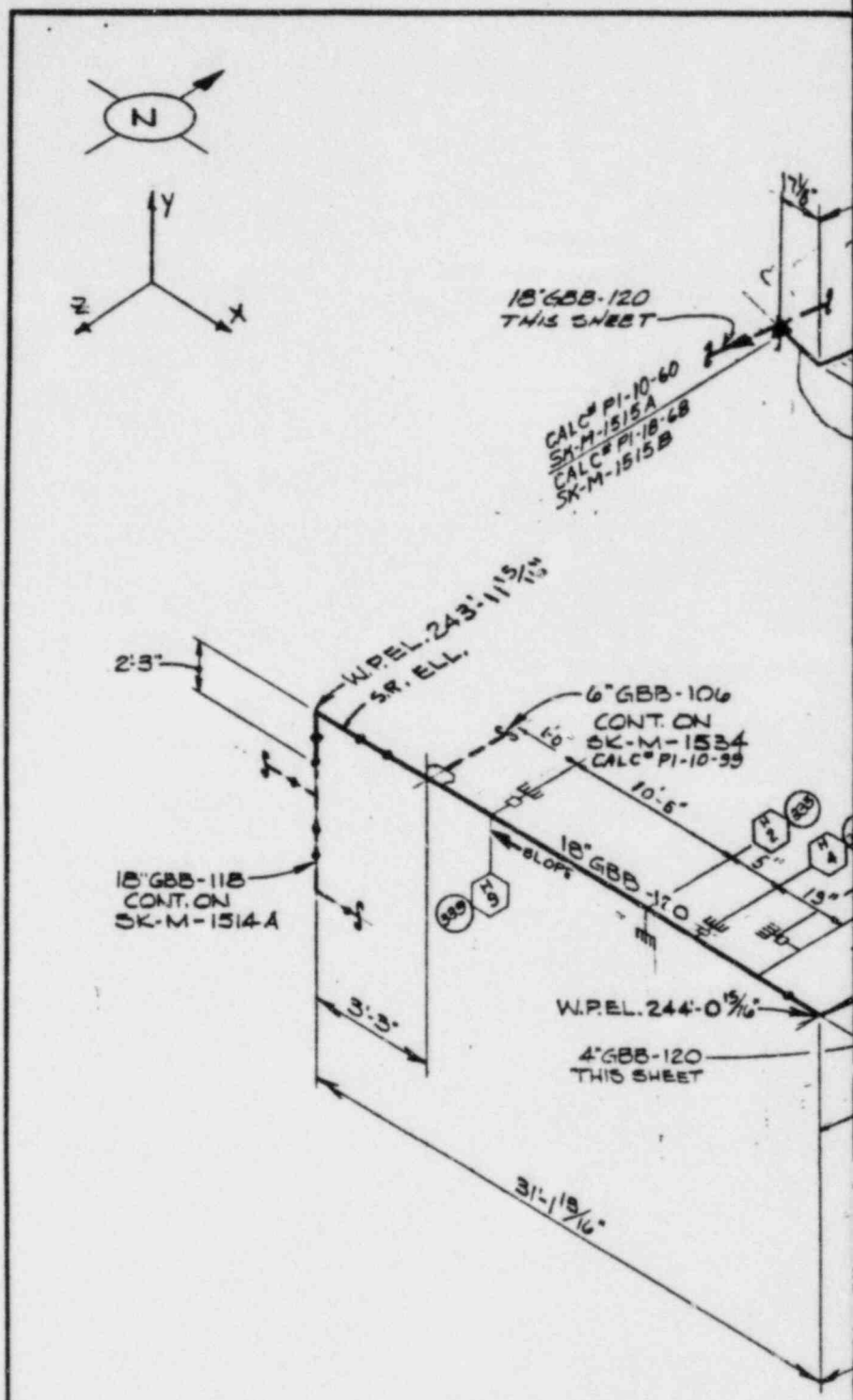
LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

ISOMETRIC - REACTOR BUILDING
RESIDUAL HEAT REMOVAL - UNIT 1

8031 SK-M-1514 B
Rev K

Specification
8031-P-363

Appendix C



		DATA			REV	DATE	BY	REV	DATE
PIPING ENGINEER	LINE No.	GBB-120							
	MATERIAL	SMLS ASME SA-106, GR.B			A	7/27/73	DAZ		
	LINE THICKNESS (IN)	.375	SCH.40		A	7/27/73	DAZ		
MECHANICAL ENGINEER	LINE O.D. (IN)	18	4.5		A	7/27/73	DAZ		
	MODE	I	II	III					
	PRESS. PSIG								
	TEMP F								
STRESS ENGINEER	EXP. COEFF. IN/100FT	—	—	—			—		
	EXP. COEFF. MIL-IN/IN								
	MOD. OF ELAS. E PSI								

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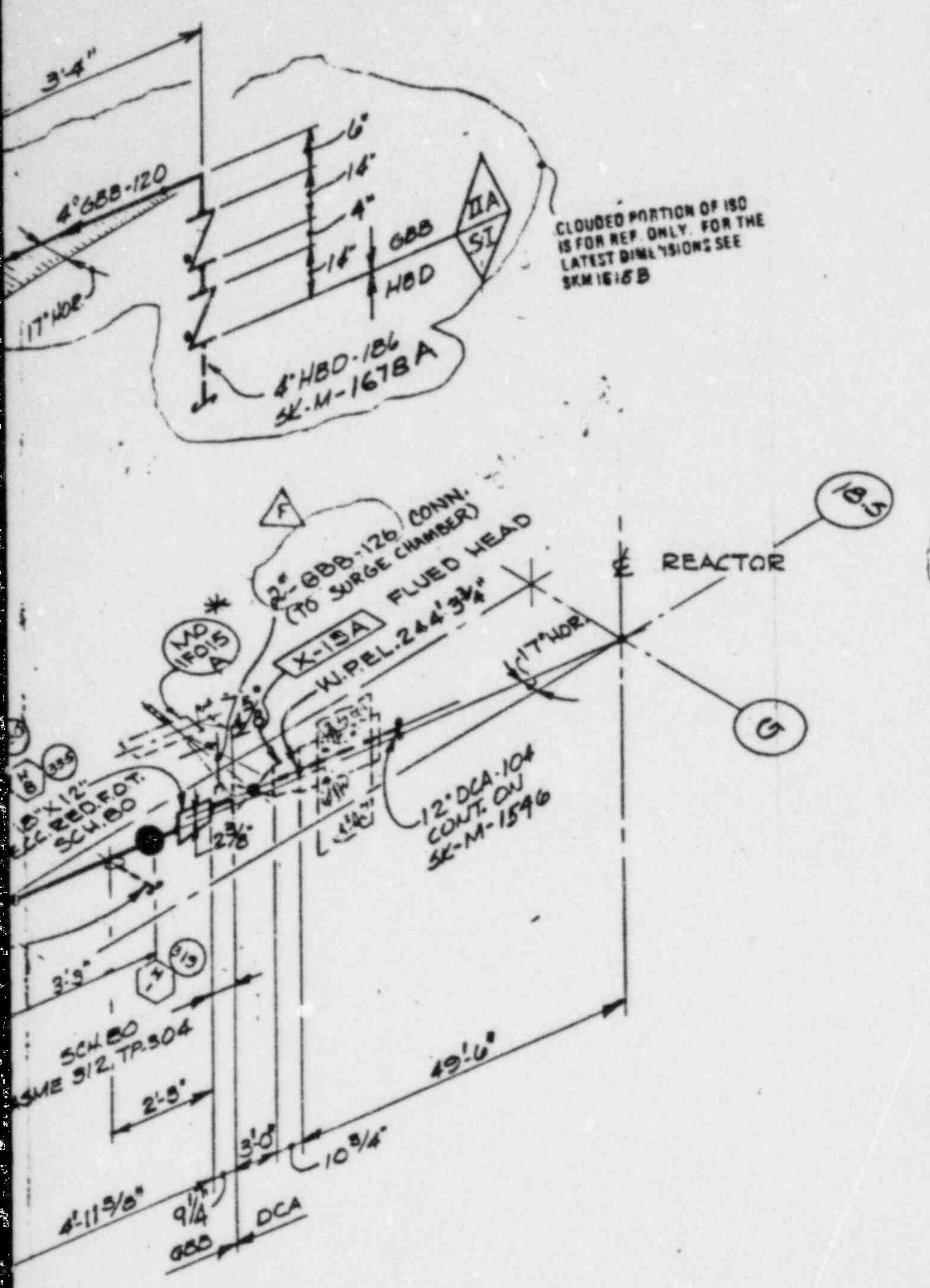
Rev. 1



STRESS APPROVALS

REV	THERMAL	SEISMIC

REV. F NOTE:
CHANGED DIM. 3'-5" TO 3'-4" PER FAB ISO & ADDED PIPE SUPPORTS & DATA POINTS FOR RECONCILIATION & DELETED VALVE, TEMP & PRESS DATA PER STRESS GROUP MARK-UP. INCORP. FCR M12,108F REV. 1.

TI
APERTURE
CARD

REFERENCE
M-51 P&ID SHT. 2 REV. 2
M-229 PIPING PLAN
GBB-120-1 FAB. 190 REV. 14

CALC P1-10-60

MODE DESCRIPTION
MODE I – NORMAL (P-300)
MODE II – MAXIMUM (P-300)
MODE III – NORMAL SHUTDOWN, MODE "D"

No.	DATE	REVISIONS	BY	CHKD				
F		SEE REV. F NOTE	MSH					
E		INCORP FCR M-1210 BF	TL	WP				
D	7/29	REV. PER FCR M-7115F	JB					
C		ADDED SI FLAG & DATA ¾" GBB-126 CONN.	SAL					
B		ADDED MODE DESCRIPTION	T.S.		PP			
A		ISSUED FOR STRESS ANALYSIS			PP			

Q-LISTED

DATA			REV	DATE	BY	REV	DATE	BY
I	II	III						

LEGEND
- SPRING HANGER
- RIGID HANGER
- ANCHOR
- GUIDE
- SNUBBER
- RESTRAINT

DRAWN Willson

BECHTEL
SAN FRANCISCO

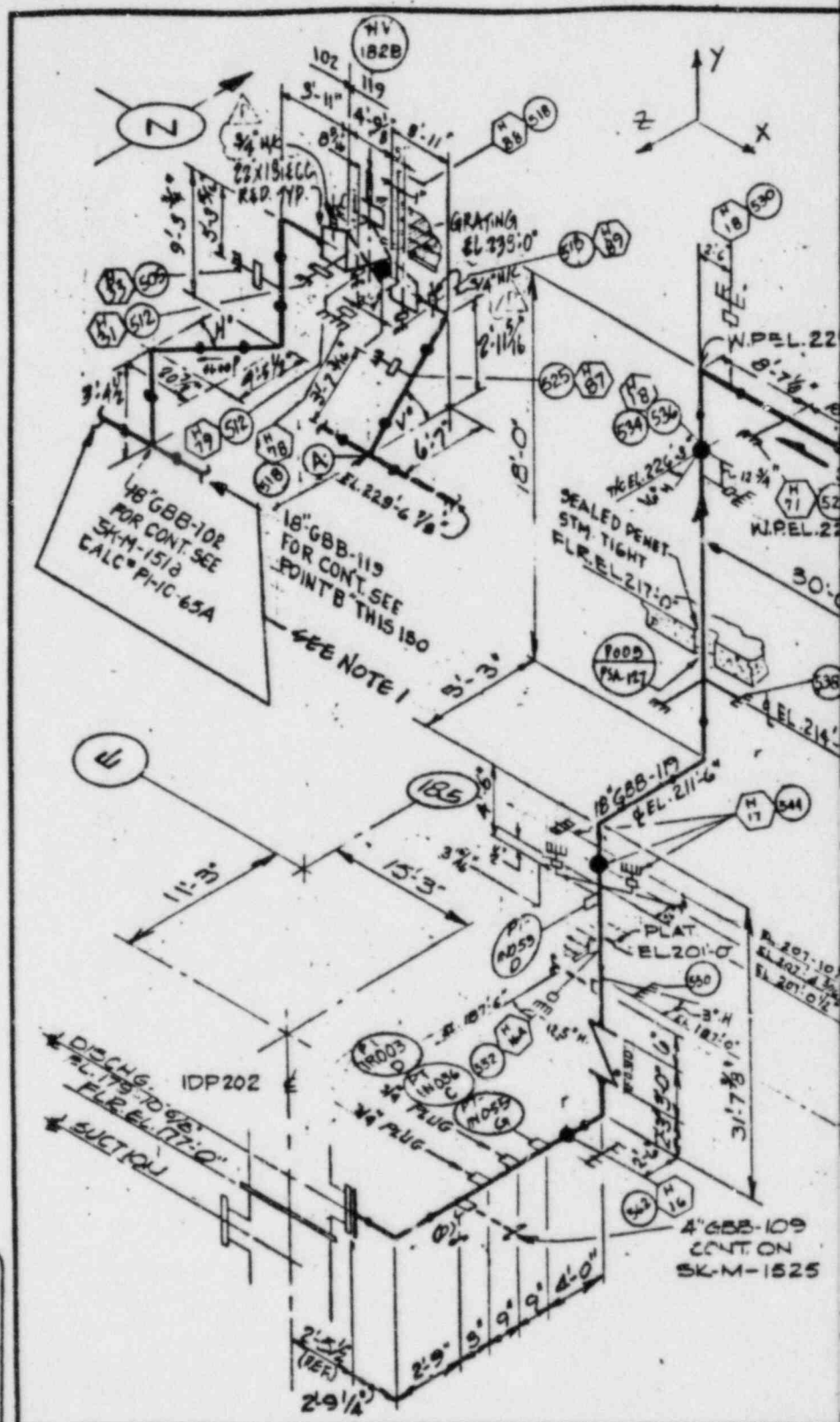
LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

ISOMETRIC - REACTOR BUILDING
RESIDUAL HEAT REMOVAL - UNIT #1

JOB No.	DRAWING No.	REV.
8031	SK-M-1515A	F

Specification
8031-P-363

Appendix C



		DATA			REV	DATE	BY	REV	DATE	B
PIPING ENGINEER	LINE No.	GBB-119								
	MATERIAL	SMLS ASME SA-106, GR B			A	7/27/73	[illegible]			
	LINE THICKNESS (IN)	.375	SCH. 40	.500	A	7/27/73	[illegible]	H	[illegible]	[illegible]
MECHANICAL ENGINEER	LINE O.D. (IN)	18	4.5	22	A	7/27/73	[illegible]	H	[illegible]	[illegible]
	MODE	I	II	III						
	PRESS. PSIG									
	TEMP F									
STRESS ENGINEER	EXP. COEFF. IN/100FT									
	EXP. COEFF. MIL-IN/IN									
	MOD. OF ELAS. X PSI									

CCN REV 0
CALC. NO PI-10-65A

Also Available On Aperture Card

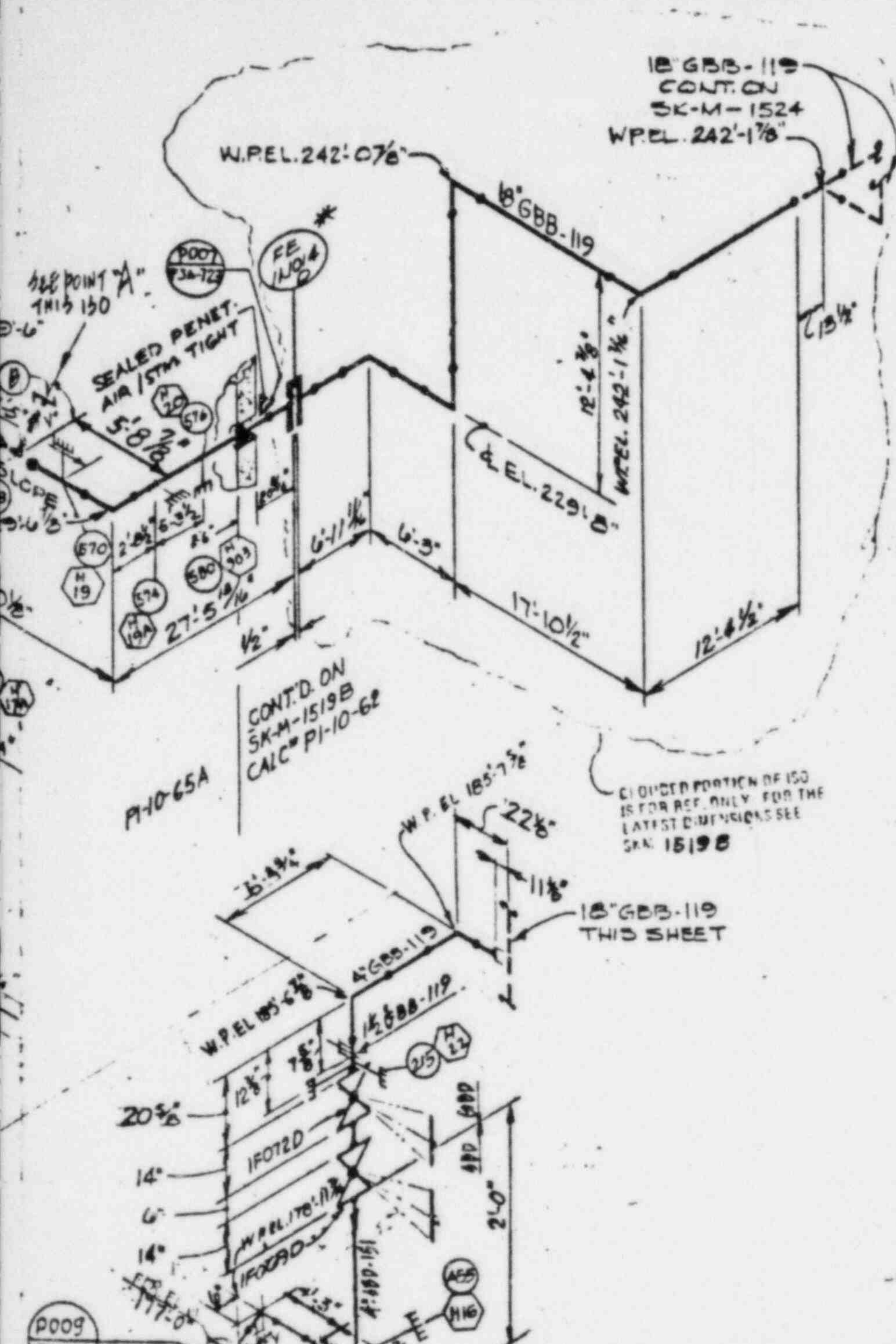
TI APERTURE CARD

8408140320-23

C-24

Rev. 1

STRESS APPROVALS		
REV	THERMAL	SEISMIC
B	RRB	RRB



Q - LISTED

NOTES:

1. COUNTERBORE 1/2" THK WALL PIPE ENDS TO MATCH 3/8" THK WALL TEE.
2. VALVES ARE A351 GR CF8M, SCH. 80 ENDS.
3. WELD 22" SCH 80 JOINTS PER GBB RULES IN SPEC. 8031-P-305 EXCEPT MAX. WALL IS 1.200".
4. "C" BORE FOR SCH. 80 22" CONN. = 19.990" $^{+.010}_{-.000}$
5. FOR 22" SIZE FITTINGS USE SCH 80 CARBON STL
6. STAINLESS STEEL TRANSITIONS NOT REQUIRED DUE TO LIMITED FREQUENCY AND DEGREE OF THERMAL TRANSIENTS.
7. COUNTERBORE 18" END OF REDUCERS TO STD. WALL (SHT 72.2 OF P-300).

REV. P NOTE:

ADDED PIPE SUPPORTS & DATA POINTS FOR RECONCILIATION, DELETED PRESS, TEMP & VALVE DATA PER STRESS GROUP MARK-UP
ADDED REF. FCR M 16435F.
ADDED 3/4" HALF CPLGS PER FAB ISO.

STRESS CALC# P1-10-65A

M-51	P&ID	SH 1 OF 2
M-237	PIPING PLAN	
M-238	"	"
M-239	"	"
M-246	"	"
FAB-ISO	GBB-119-11	REV. 3
	GBB-102-4	REV 3
	GBB-119-5	REV 18
	GBB-119-7	REV. 12
	GBB-119-4	REV 7

REFERENCE FCR: M-11647F, FCR-M16435F

MODE DESCRIPTION

MODE I—NORMAL (P-300)

MODE II-MAXIMUM (P-300)

MODE III-LPCI MODE A-1

REV	DATE	REVISIONS	BY	CHKD	DESIGN SUPV	STRESS	PROJ ENGR	APPD
P		SEE REV. P NOTE	WSH					
N	1-6-83	ADDED REF. FCR M-8647F & PENET. ID. P009/PSA127, P007/PSA-123 & P008 PSA-128.	BY JMC	WP FM				
M		REV. GBB-119 PLX FCRM ... 6BB-119 PER P&ID ...	FY					
L		DELETED REFERENCE TO NOTE 1	FY					
K		ADDED NOTES 1-7 PER PIPING REQUEST	TL					
G		REV. SPEC. CHG.	JB.					
A		ISSUED FOR STRESS ANALYSIS						

DATA			REV	DATE	BY	REV	DATE	BY
I	II	III						

LEGEND

- SPRING HANGER
- RIGID HANGER
- ANCHOR
- GUIDE
- SNUBBER
- RESTRAINT
- HANGER NUMBER
- STRESS DATA POINT

SCALE — DESIGNED — DRAWN ALLISON — CHECKED

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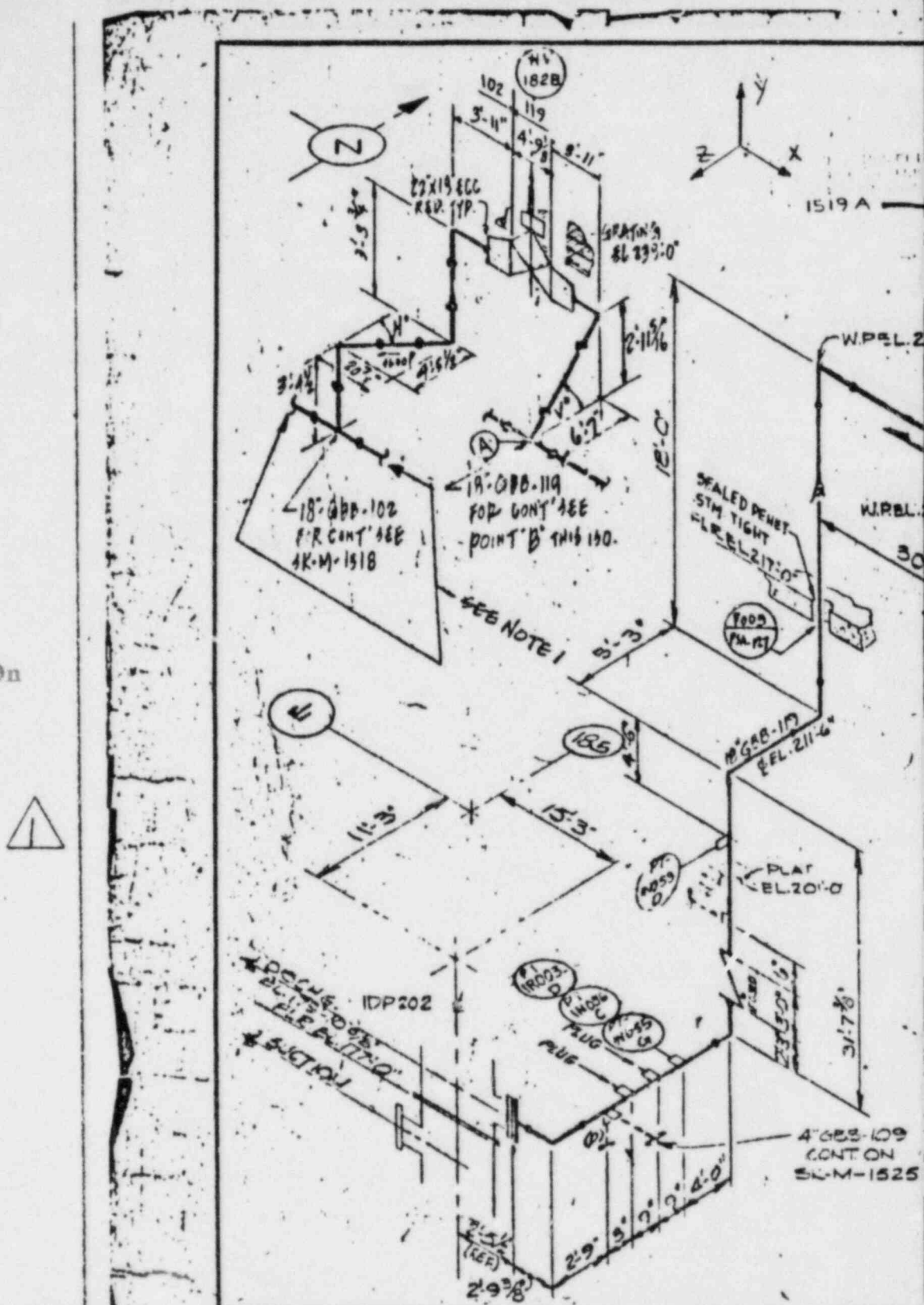
LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

ISOMETRIC - REACTOR BUILDING
RESIDUAL HEAT REMOVAL - UNIT #1

JOB No.	DRAWING No.	REV
8031	SK-M-1519A	P

specification
8031-P-363

Appendix C

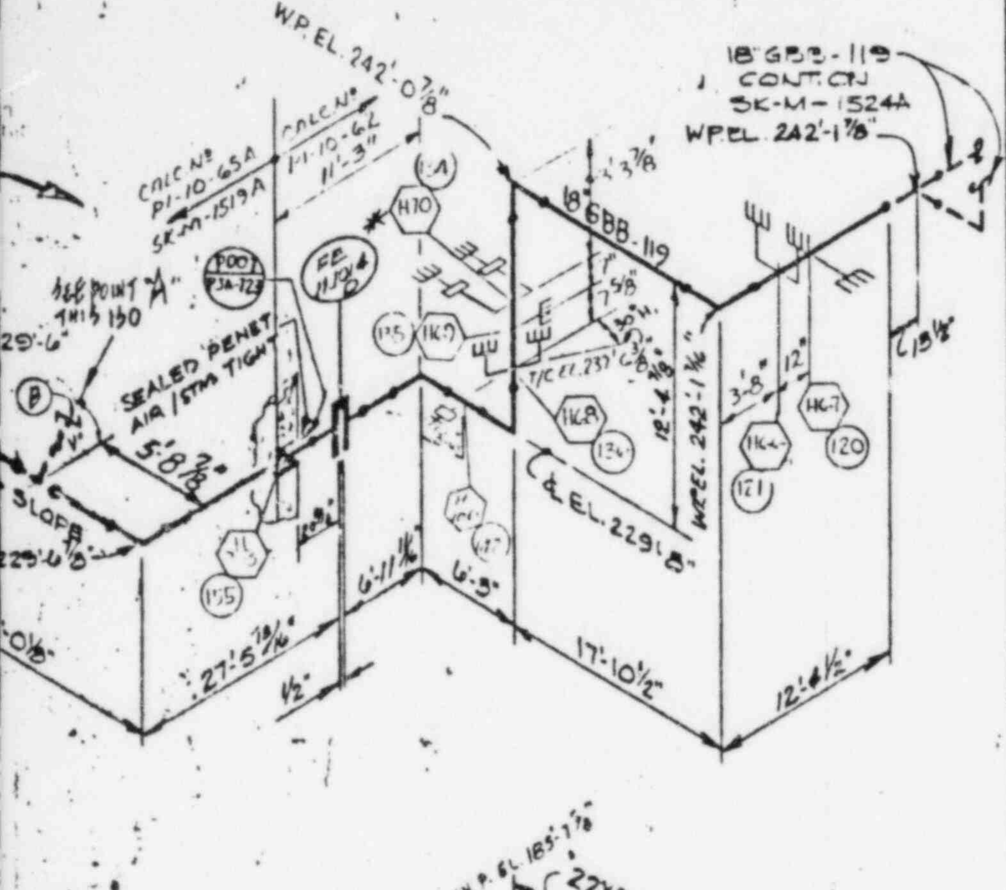


		DATA			REV	DATE	BY	REV	DATE	
PIPING ENGINEER	LINE No.	GBB-119								
	MATERIAL	SMLS ASA'E SA-106, GR.B			A	7/3/70	[illegible]			
	LINE THICKNESS (IN)	.375	SCH.40	.500	A	7/3/70	[illegible]	H	[illegible]	
MECHANICAL ENGINEER	LINE O.D. (IN)	18	4.5	22	A	7/3/70	[illegible]	H	[illegible]	
	MODE	I	II	III						
	PRESS. PSIG	1[illegible]								
	TEMP F									
STRESS ENGINEER	EXP. COEFF. IN/100FT									
	EXP. COEFF. MIL-IN/IN									
	MOD. OF ELAS. E PSI									

C-25

8408140320-24

Rev. 1



Q - LISTED

STRESS APPROVALS		
REV	THERMAL	SEISMIC
B	[illegible]	[illegible]

NOTES:

1. COUNTERBORE 1/2" THK WALL PIPE ENDS TO MATCH 3/8" THK WALL TEE.
2. VALVES ARE A351 GR CF8M, SCH. 80 ENDS.
3. WELD 22" SCH 80 JOINTS PER GBB RULES IN SPEC. 8031-P-303 EXCEPT MAX. WALL IS 1.200".
4. "C" BORE FOR SCH. 80 22" CONN. = 19.990" +.010/-.000
5. FOR 22" SIZE FITTINGS USE SCH 80 CARBON STL
6. STAINLESS STEEL TRANSITIONS NOT REQUIRED DUE TO LIMITED FREQUENCY AND DEGREE OF THERMAL TRANSIENTS.
7. COUNTERBORE 18" END OF REDUCERS TO STD. WALL (SHT 72.2 OF P-300).

REV. P NOTE: SK-M-1519B WAS SK-M-1519
ADDED PIPE SUPPORTS & DATA POINTS FOR RECONCILIATION, DELETED PRESS, TEMP & VALVE DATA PER STRESS GROUP MARK-UP

M-51 P&ID
M-237 PIPING PLAN
M-238 "
M-239 "
M-246 "
FAB-150 GBB-119-5 REV. 17
CALC NO: PI-10-62

REFERENCE
M-1164TF
M-16435F

MODE : DESCRIPTION

MODE I - NORMAL (P-300)

MODE II - MAXIMUM (P-300)

MODE III - LPCI MODE A-1

REV	DATE	REVISIONS	BY	CHKD	[illegible]	[illegible]	[illegible]
Q	[illegible]	ADDED REF. FOR M-16435F	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
P	[illegible]	SEE REV. P NOTE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
N	6 83	ADDED REF. FOR M-11641F, PENET. 10, P009/P3A-127, P007/P3A-128 & P008 P3A-1 8	B.T. JWG	[illegible]	[illegible]	[illegible]	[illegible]
M	[illegible]	REV. 4 GBB-PIPING FROM [illegible] GBB-119 PER P&ID [illegible]	F.Y.	[illegible]	[illegible]	[illegible]	[illegible]
L	[illegible]	DELETED REFERENCE TO NOTE	F.Y.	[illegible]	[illegible]	[illegible]	[illegible]
K	[illegible]	[illegible]	TL	[illegible]	[illegible]	[illegible]	[illegible]
G	[illegible]	REV. SPEC. CHG.	J.B.	[illegible]	[illegible]	[illegible]	[illegible]
A	[illegible]	Issued for Stress Analysis	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

BY	DATA			REV	DATE	BY	REV	DATE	BY
	I	II	III						

LEGEND
- SPRING HANGER
- RIGID HANGER
- ANCHOR
- GUIDE
- SNUBBER
- RESTRAINT
- HANGER NUMBER
- STRESS DATA POINT

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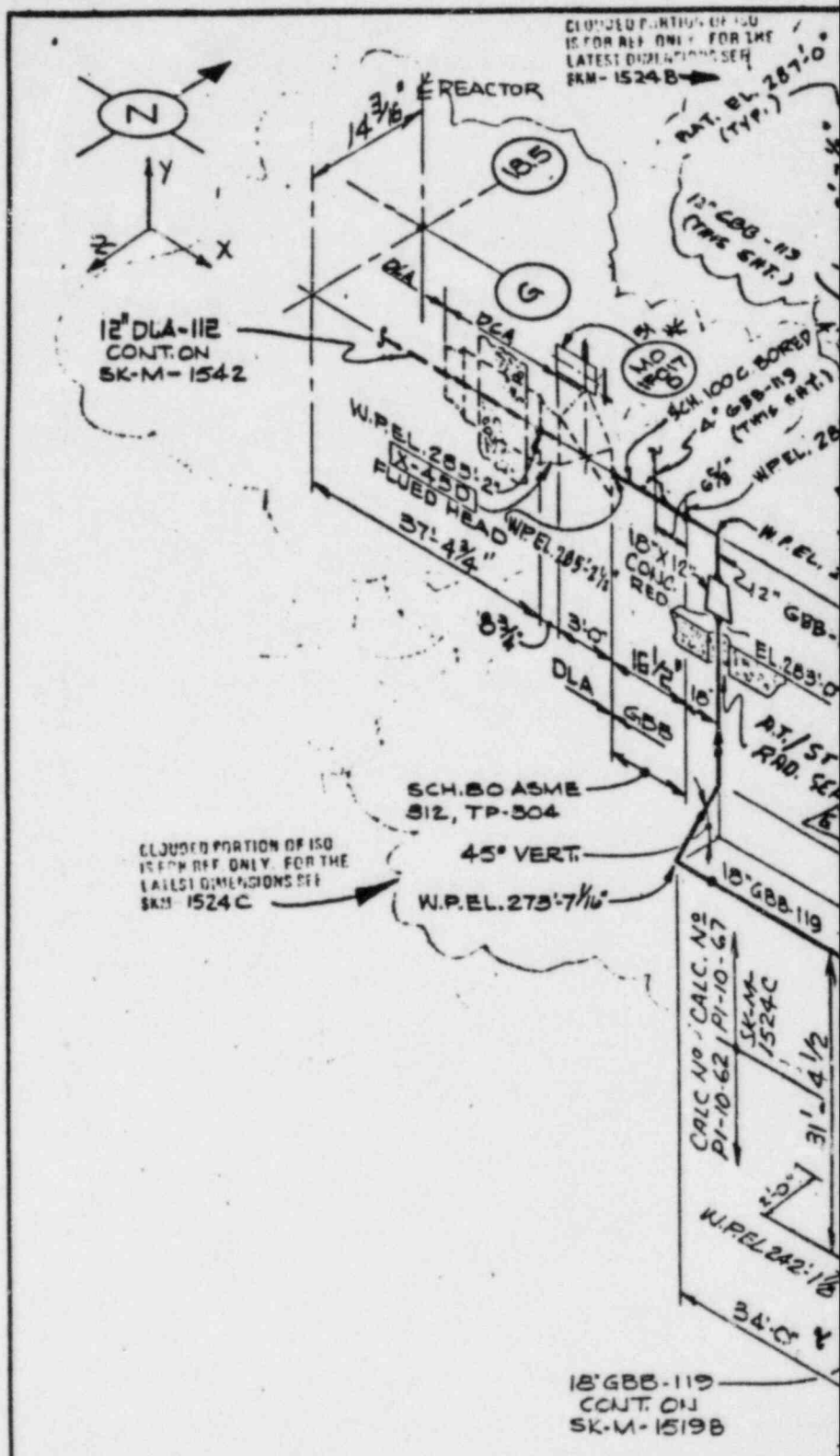
ISOMETRIC - REACTOR BUILDING
RESIDUAL HEAT REMOVAL - UNIT #1

JOB NO. 8031 | DRAWING NO. SK-M-1519B | REV. Q

Specification
8031-P-363

Appendix C



		DATA			REV	DATE	BY	REV	DATE	
PIPING ENGINEER	LINE No.	GBB-119						E	11/24/76	RA
	MATERIAL	SMLS ASME SA-106, GR.B			A	7/27/73	BAZ	E	11/24/76	RA
	LINE THICKNESS (IN)	.875	.375	.237	A	7/27/73	BAZ	E	11/24/76	RA
MECHANICAL ENGINEER	LINE O.D. (IN)	18.000	12.750	4.500	A	7/27/73	BAZ	E	11/24/76	RA
	MODE	I	II	III						
	PRESS. PSIG	1/1								
	TEMP F	\								
STRESS ENGINEER	EXP. COEFF. IN/100FT	\	\	\						
	EXP. COEFF. MIL-IN/IN									
	MOD. OF ELAS. E PSI									

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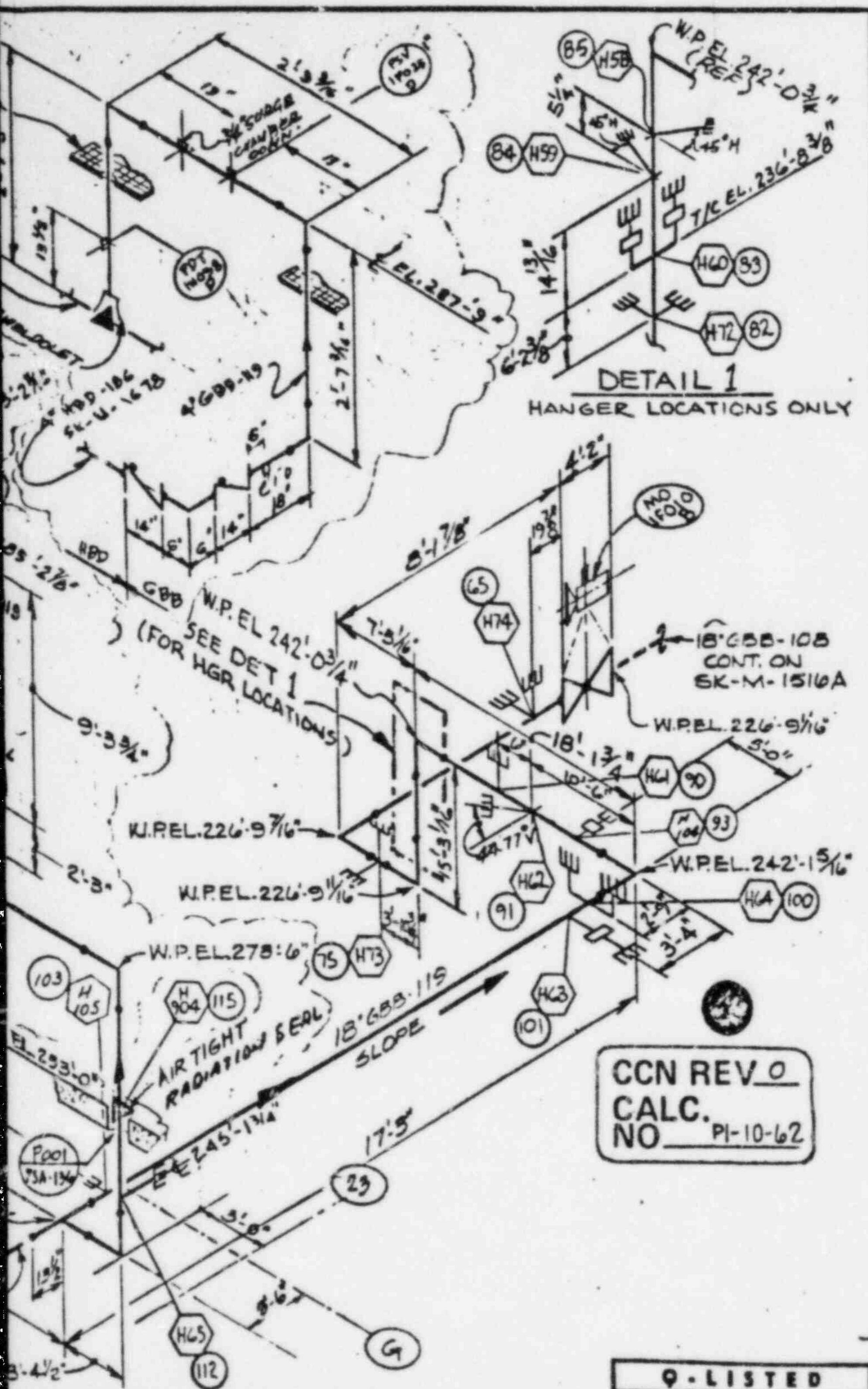
Rev. 1



REV	STRESS APPROVALS THERMAL	SEISMIC

REV. F NOTE

REV. AS SHOWN TO AGREE WITH FAB ISO. REF. FME 3136.

REV. G NOTE:

REVISED PER LATEST FAB ISO & FCR #M-6247 F. ADDED FAB ISO NOTE.

REV. J NOTE: SK-M-1524A WAS SK-M-1524
ADDED PIPE SUPPORTS & DATA POINTS FOR RECONCILIATION.
DELEATED VALVE & PRESS/TEMP DATA PER STRESS GROUP MARK-UP.

REFERENCE
CALC. Nº PI-10-62
M-51 P&ID
M-239 PIPING PLAN
M-240 " "
M-241 " "
M-220 " "
M-209 " "
M-210 " "
GBB-119-5 FAB ISO REV. 18
GBB-119-6 FAB ISO REV. 14
FCR-M16435P
NOTE: THIS IS A SEISMIC CLASS I SYSTEM

MODE DESCRIPTION

MODE I-NORMAL (P-300)

MODE II-MAXIMUM (P-300)

MODE III-LPCI, MODE A-1

NO.	DATE	REVISIONS	BY	CHKD	DESIGN SUPV	ENGG	PROJ ENGR	APPD
J	[illegible]	SEE REV. J NOTE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
H	[illegible]	ADDED [illegible] I.D. P001/ PSA-136	JMC	[illegible]	[illegible]		[illegible]	
G	[illegible]	SEE REV. G NOTE	SF	[illegible]	[illegible]		[illegible]	
F		SEE REV F NOTE	JBR	[illegible]	[illegible]		[illegible]	
E	[illegible]	ADDED VALVE DATA & SEALS	SAL	[illegible]	[illegible]	[illegible]	[illegible]	
D	[illegible]	REV. PIPING TO MEET STRESS REQUIREMENTS AND AS NOTED	EBB	ALG	[illegible]	[illegible]	[illegible]	—
C	[illegible]	REVISED AS NOTED.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
K	[illegible]	ADDED REF. FCR-M16435F	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A	[illegible]	ISSUED FOR STRESS ANALYSIS	[illegible]	[illegible]	PP		[illegible]	

BY	DATA			REV	DATE	BY	REV	DATE	BY
	I	II	III						

LEGEND
- SPRING HANGER
- RIGID HANGER
- ANCHOR
- GUIDE
- SNUBBER
- RESTRAINT
- HANGER NUMBER
- STRESS DATA POINT

SCALE — DESIGNED DRAWN [illegible] CHKD

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UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

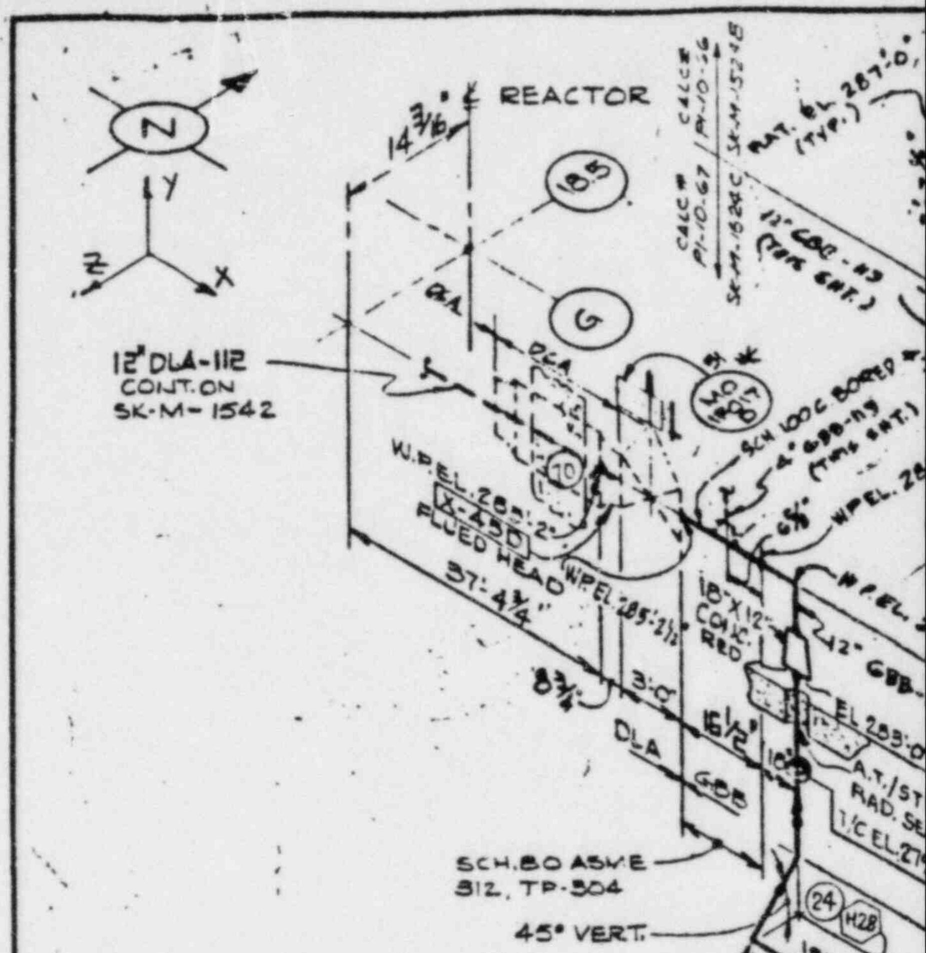
ISOMETRIC - REACTOR BUILDING
RESIDUAL HEAT REMOVAL - UNIT #1

JOB No.	DRAWING No.	REV.
8031	SK-M-1524A	K

Specification 8031-P-363

Appendix C

Also Available On Aperture Card



TI APERTURE CARD

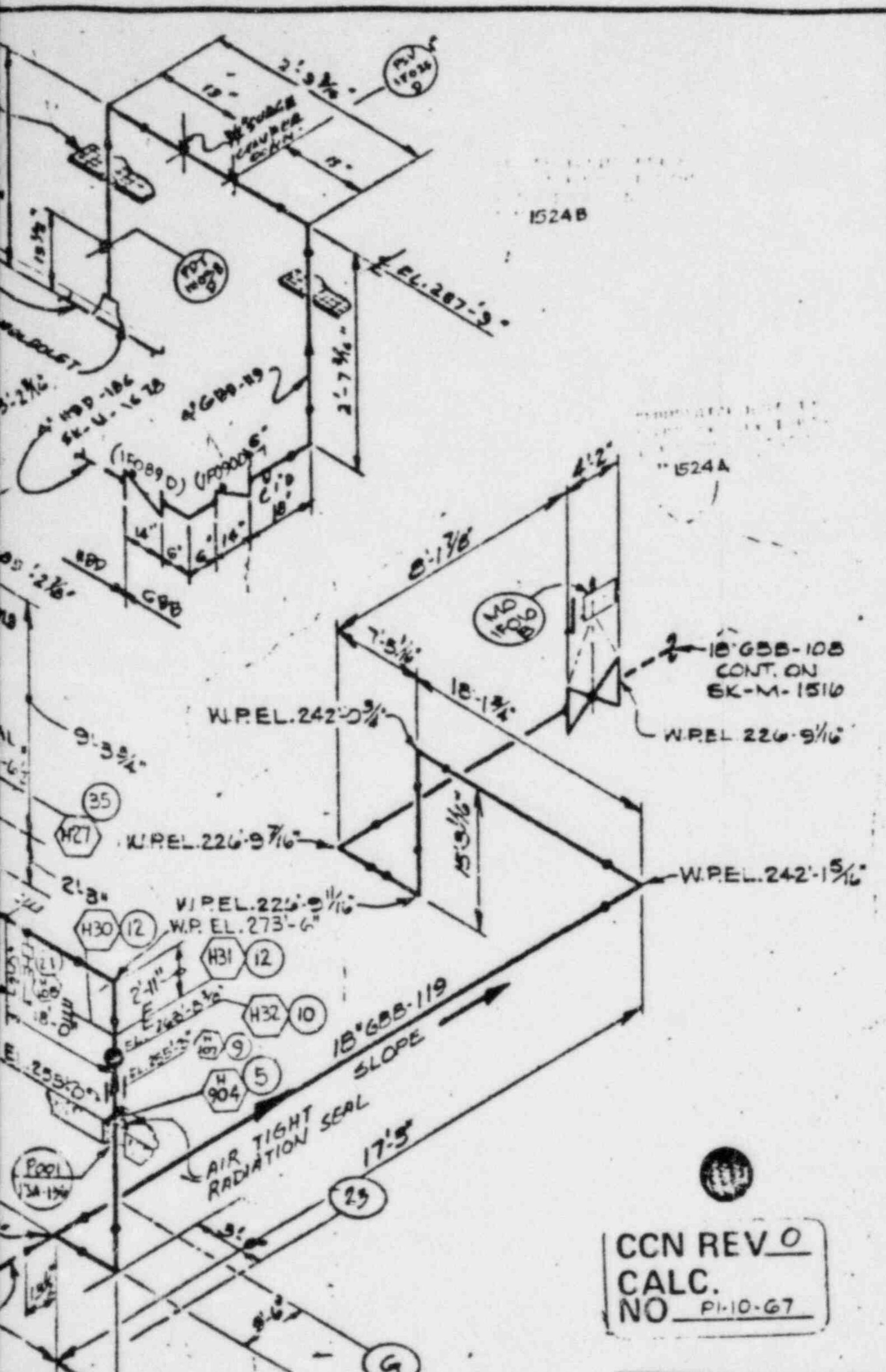
		DATA			REV	DATE	BY	REV	DATE
PIPING ENGINEER	LINE No	GBB-119						E	11/24/76
	MATERIAL	SMLS ASME SA-106, GR. B			A	7/27/73	BAR	E	11/24/76
	LINE THICKNESS (IN)	.375	.375	.237	A	7/27/73	BAR	E	11/24/76
MECHANICAL ENGINEER	LINE O.D. (IN)	18.000	12.750	4.500	A	7/27/73	BAR	E	11/24/76
	MODE	I	II	III					
	PRESS. PSIG								
	TEMP F								
STRESS ENGINEER	EXP. COEFF. IN/100FT								
	EXP. COEFF. MIL-IN/IN								
	MOD. OF ELAS. E PSI								

⚠ 1

8408140320-26

C-27

Rev 1



CCN REV 0
CALC.
NO PI-10-67

Q-LISTED

STRESS APPROVALS		
REV	THERMAL	SEISMIC

REV. F NOTE

REV. AS SHOWN TO AGREE WITH FAB ISO. REF. FME 31:6.

REV. G NOTE:

REVISED PER LATEST FAB ISO & FCR #N-6247 F △. ADDED FAB ISO NOTE.

REV. J NOTE

ADDED PIPE SUPPORTS & DATA POINTS FOR RECONCILIATION; ADDED VALVE 123. DELEATED VALVE & PRESS/TEMP DATA PER STRESS GROUP MARK-UP.

REFERENCE

M-51 P&ID SHT 1
M-239 PIPING PLAN
M-240 " "
M-241 " "
M-220 " "
M-209 " "
M-210 " "
GBB-119-6 FAB ISO REV. 14

NOTE
THIS IS A SEISMIC CLASS I SYSTEM
STRESS CALC NO PI-10-67.

MODE DESCRIPTION

MODE I - NORMAL (P-300)

MODE II MAXIMUM (P-300)

MODE III - LPCI, MODE A-1

NO.	DATE	DESCRIPTION	BY					
J	[illegible]	SEE REV J NOTE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
H	[illegible]	ADDED [illegible] BA-136	JMC	[illegible]	[illegible]	[illegible]	[illegible]	
G	[illegible]	SEE REV. G NOTE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
F		SEE REV F NOTE	JBR	[illegible]	[illegible]	[illegible]	[illegible]	
E	[illegible]	ADDED VALVE DATA & SEALS	SAL	[illegible]	[illegible]	[illegible]	[illegible]	
D	[illegible]	REV. PIPING TO MEET STRESS REQUIREMENTS AND AS NOTED	EDB	[illegible]	[illegible]	[illegible]	[illegible]	
C	[illegible]	REVISED AS NOTED	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
B	[illegible]	ADD MODE DESCRIPTION	T.S.	[illegible]	[illegible]	[illegible]	[illegible]	
A	[illegible]	ISSUED FOR STRESS ANALYSIS	[illegible]	[illegible]	[illegible]		[illegible]	

BY	DATA			REV	DATE	BY	REV	DATE	BY
	I	II	III						

LEGEND

- SPRING HANGER
- RIGID HANGER
- ANCHOR
- GUIDE
- SNUBBER
- RESTRAINT
- STRESS DATA POINT
- HANGER NUMBER

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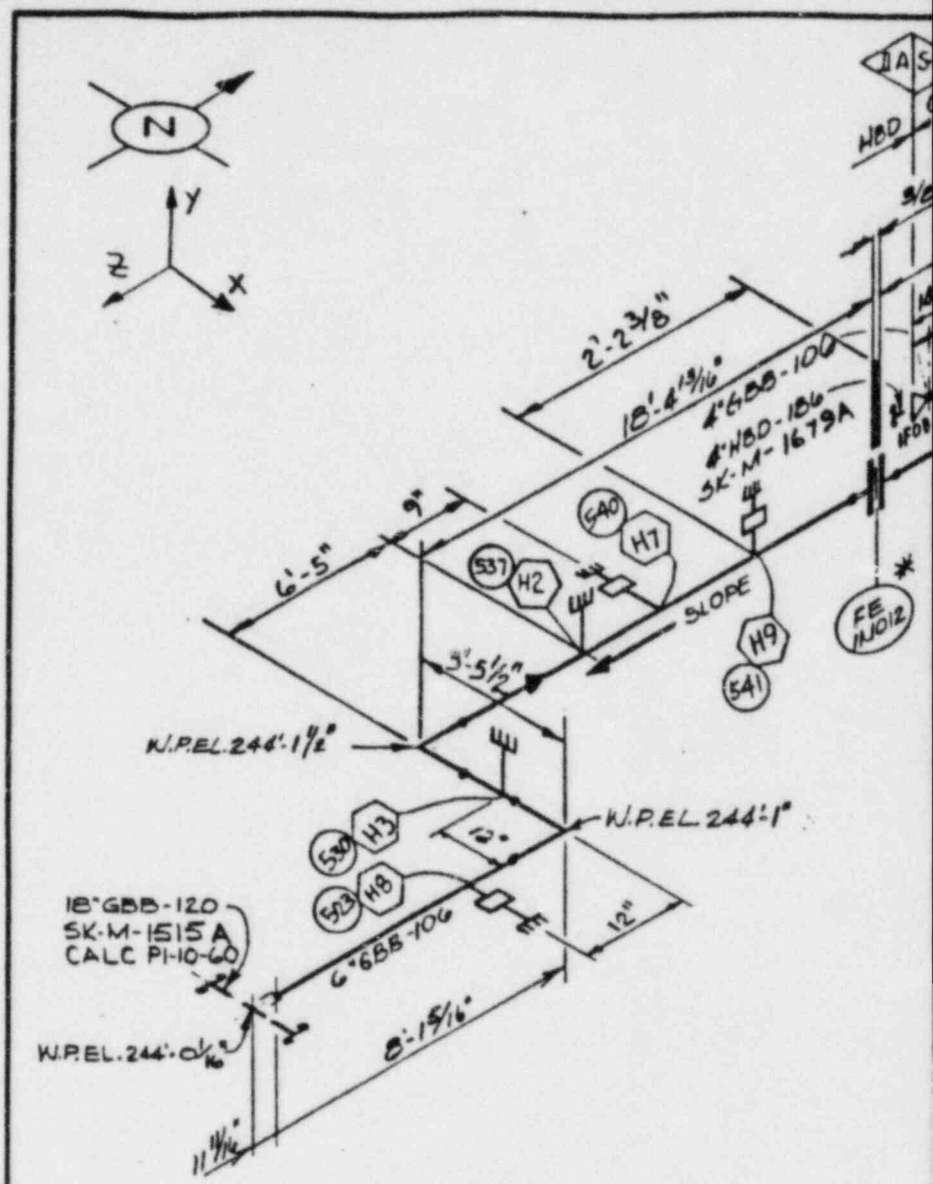
PHILADELPHIA ELECTRIC COMPANY

ISOMETRIC REACTOR BUILDING
RESIDUAL HEAT REMOVAL UNIT 1

8031 | SK-M-1524C | J

Specification
8031-P-363

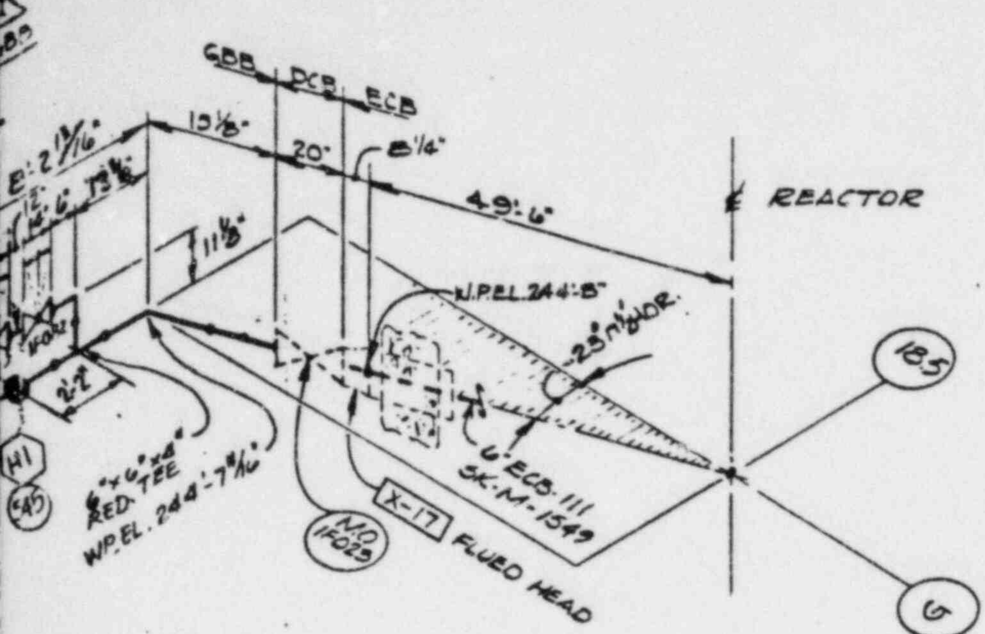
Appendix C



		DATA			REV	DATE	BY	REV	DATE	
PIPING ENGINEER	LINE No.	GBB-106								
	MATERIAL	SMLS ASME SA-106, GR.B			A	7/27/79	BJ2			
	LINE THICKNESS (IN)	.280	.237		A	7/27/79	BJ2			
MECHANICAL ENGINEER	LINE O.D. (IN)	6.625	4.5		A	7/27/79	BJ2			
	MODE	I	II	III						
	PRESS. PSIG									
	TEMP F									
STRESS ENGINEER	EXP. COEFF. IN/100FT									
	EXP. COEFF. MIL-IN/IN									
	MOD. OF ELAS. E PSI									

C-28

Rev 1



STRESS APPROVALS		
REV	THERMAL	SEISMIC

REV. D NOTE:

ADDED PIPE SUPPORTS & DATA POINTS FOR RECONCILIATION.
DELEATED VALVE & PRESS/TEMP DATA PER STRESS MARK-UP.
ADDED VALVE NOS 1F081 1F082 & TRANSITION BETWEEN CLASS I SEISMIC AND CLASS IIA SEISMIC SYSTEM TO REF. P&ID M-51 SHT. 2.

REFERENCE

M-51 P&ID
M-229 PIPING PLAN AREA 15
GBB-106-1 FAB ISO REV. 17
CALC NO P1-10-99
REF. NCR-8197
E

MODE DESCRIPTION

MODE I - NORMAL (P-300)

MODE II - MAXIMUM (P-300)

MODE III - REACTOR ISOLATION, MODE C-1

CCN REV 0
CALC. NO P1-10-99

TI APERTURE CARD

8408140320-27

NO.	DATE	REVISIONS	BY					APPD
E	5/13/84	REVISED TO REF. NCR 8197		WF				
D	9/6/83	SEE REV. D NOTE				JSB		
C		INC. FCR M-6510F REV. 1 REV. AS SHOWN	F.Y. J.B.					
B		ADD MODE DESCRIPTION	T.S.			PP		
A		ISSUED FOR STRESS ANALYSIS				PP		

Q-LISTED

DATA			REV	DATE	BY	REV	DATE	BY
I	II	III						

LEGEND

- SPRING HANGER
- RIGID HANGER
- ANCHOR
- GUIDE
- SNUBBER
- RESTRAINT

DRAWN WILLSON

BECHTEL
SAN FRANCISCO

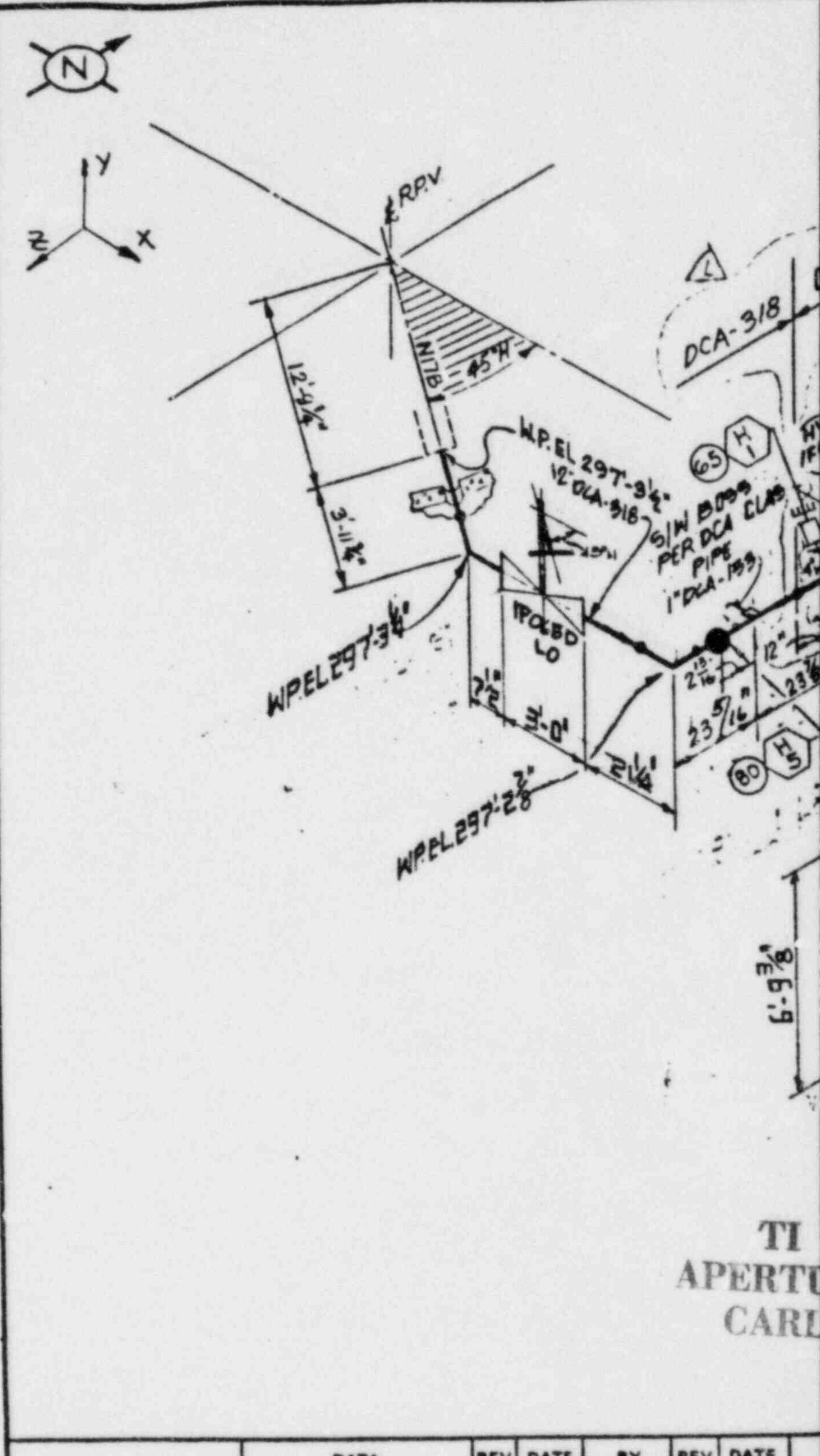
LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

ISOMETRIC - REACTOR BUILDING
RESIDUAL HEAT REMOVAL - UNIT #1

JOB NO.	DRAWING NO.	REV
8031	SK-M-1534	E

Specification
8031-P-363

Appendix C



		DATA			REV	DATE	BY	REV	DATE
PIPING ENGINEER	LINE No.	DLA-112						C	8/5/76
	MATERIAL SMLS	ASME SA-333 Gr 6			A	11/6/73	AAZ	C	8/5/76
	LINE THICKNESS (IN)	.688			A	11/6/73	A[illegible]	C	8/5/76
MECHANICAL ENGINEER	LINE O.D. (IN)	12.750			A	11/6/73	A[illegible]	C	8/5/76
	MODE	I	II	III					
	PRESS. PSIG								
	TEMP F								
STRESS ENGINEER	EXP. COEFF. IN/100FT								
	EXP. COEFF. MIL-IN/IN								
	[illegible]								

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Rev. 1

CCN REV. 0
CALC.
NO. 1-10-05

STRESS APPROVALS		
REV	THERMAL	SEISMIC
B	RRG 4-11-79	

REV J NOTE:

REVISED TO INCORP FCR M-8773F.

REV. L NOTE:

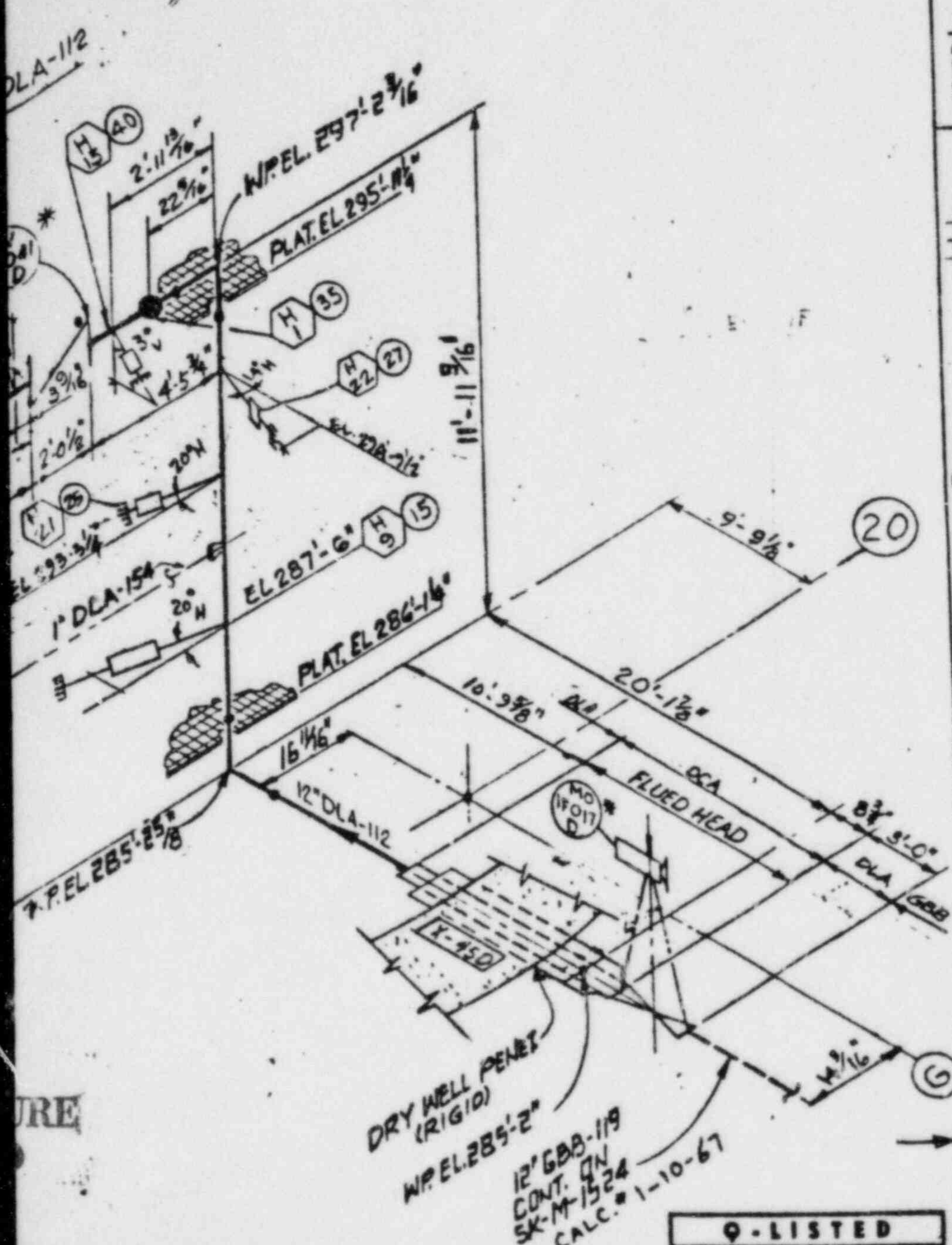
ADDED HANGERS AND DATA POINTS FOR RECON. DELETED VALVE/PRESS./TEMP. DATA. CORRECTED LOCATION OF CLASS BREAK PER FAB. ISO.

REV. G NOTE:

REVISED DIMS. TO AGREE W/ FAB ISO. REF PLB 9464 DATED 4-11-79 & VENDOR DWG. M-1-E21-F006-C-1.1.

REV. H NOTE:

REV. 12" DCA-6T WAS 12" DLA-GT. REV DIMS 4'-5 3/4" WAS 6'-0 1/16", 3'-11 1/16" WAS 2'-4 3/16", 23 1/16" WAS 6" TO AGREE WITH FAB. ISO.



REFERENCE

M-41	P&ID	CALC NO. 1-10-05
M-51	"	
M-234	PIPING PLAN	
M-235	" "	
M-241	" "	
DLA-112-1	REV. 17	FAB. ISO.
DCA-318-1	REV. 12	" "

MODE DESCRIPTION

MODE I - NORMAL REACTOR OPERATION

MODE II - MAXIMUM REACTOR CONDITIONS

MODE III - LPCI MODE OF RHR (A-1)

REV	DATE	REVISIONS	BY					
H		SEE REV. H NOTE	DTO	BJS				
G		SEE REV G NOTE	JBR					
F		SEE REV. F NOTE	JBR					
E		ISSUED FOR HOLD PER PLB-186-C 4-7-78 ADDED B/W BOSS FOR 1" DCA CONN	BW LTL					
L		SEE REV. L NOTE	SG					
K		INCORP. FCR M-5474P 1M-15AS16						
J		SEE REV J NOTE						
A		ISSUED FOR STRESS ANAL.	J.O.					

DRAWN J.O.

Q-LISTED

	DATA			REV	DATE	BY	REV	DATE	BY
	DCA-318			F					
	SEAMWELD ASME SA358 CL1 TP316L SCH 80			F	3/19/79				
	.688			F	3/19/79				
	12.750			F	3/19/79				
	I	II	III						

LEGEND

- SPRING HANGER
- RIGID HANGER
- ANCHOR
- GUIDE
- SNUBBER
- RESTRAINT
- HANGER NUMBER
- STRESS DATA POINT

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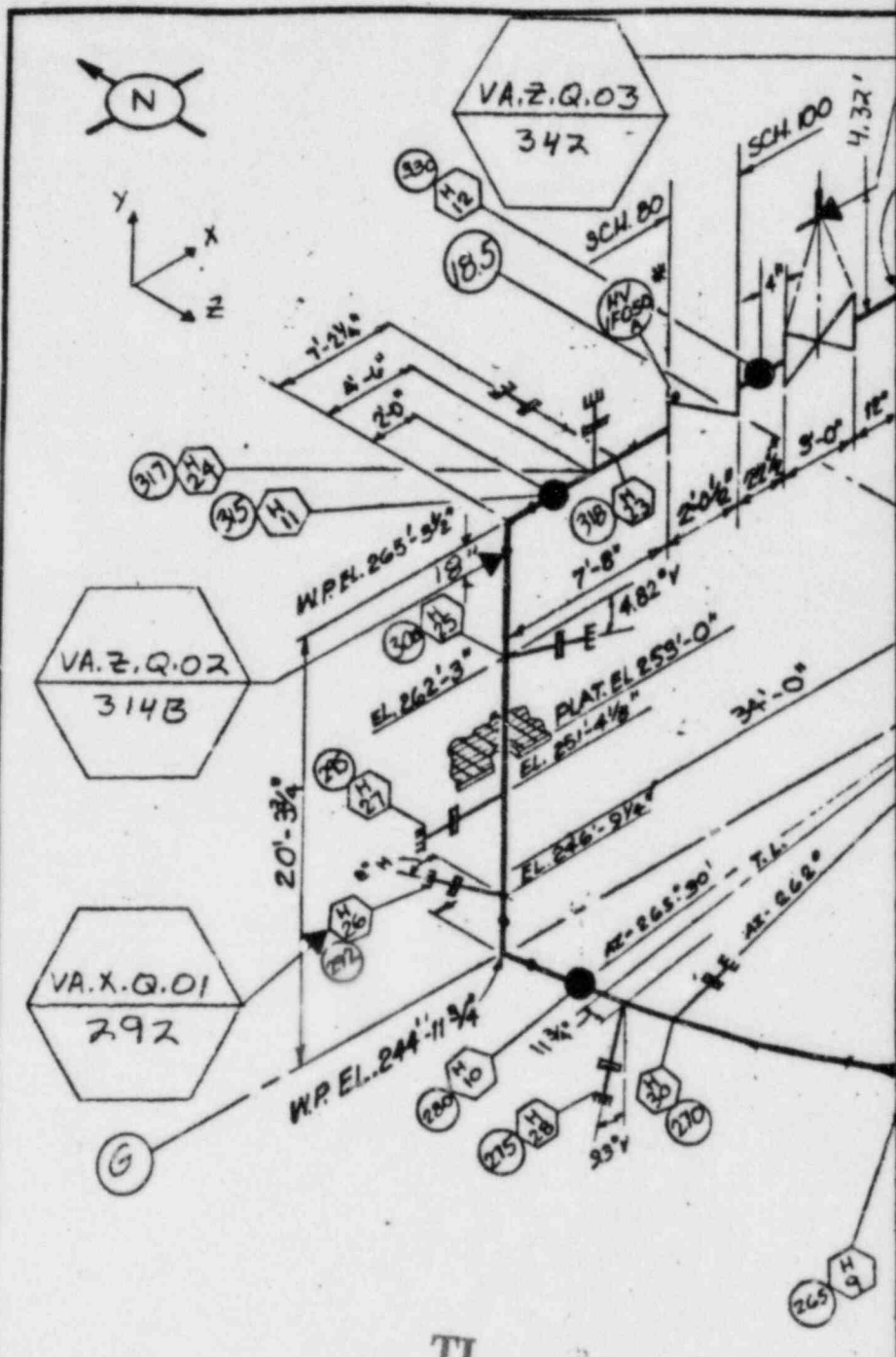
LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

ISOMETRIC-REACTOR BUILDING (DRYWELL)
RESIDUAL HEAT REMOVAL - UNIT #1

JOB No. 8031 | DRAWING No. SK-M-1542 | REV L

Specification
8031-P-363

Appendix C

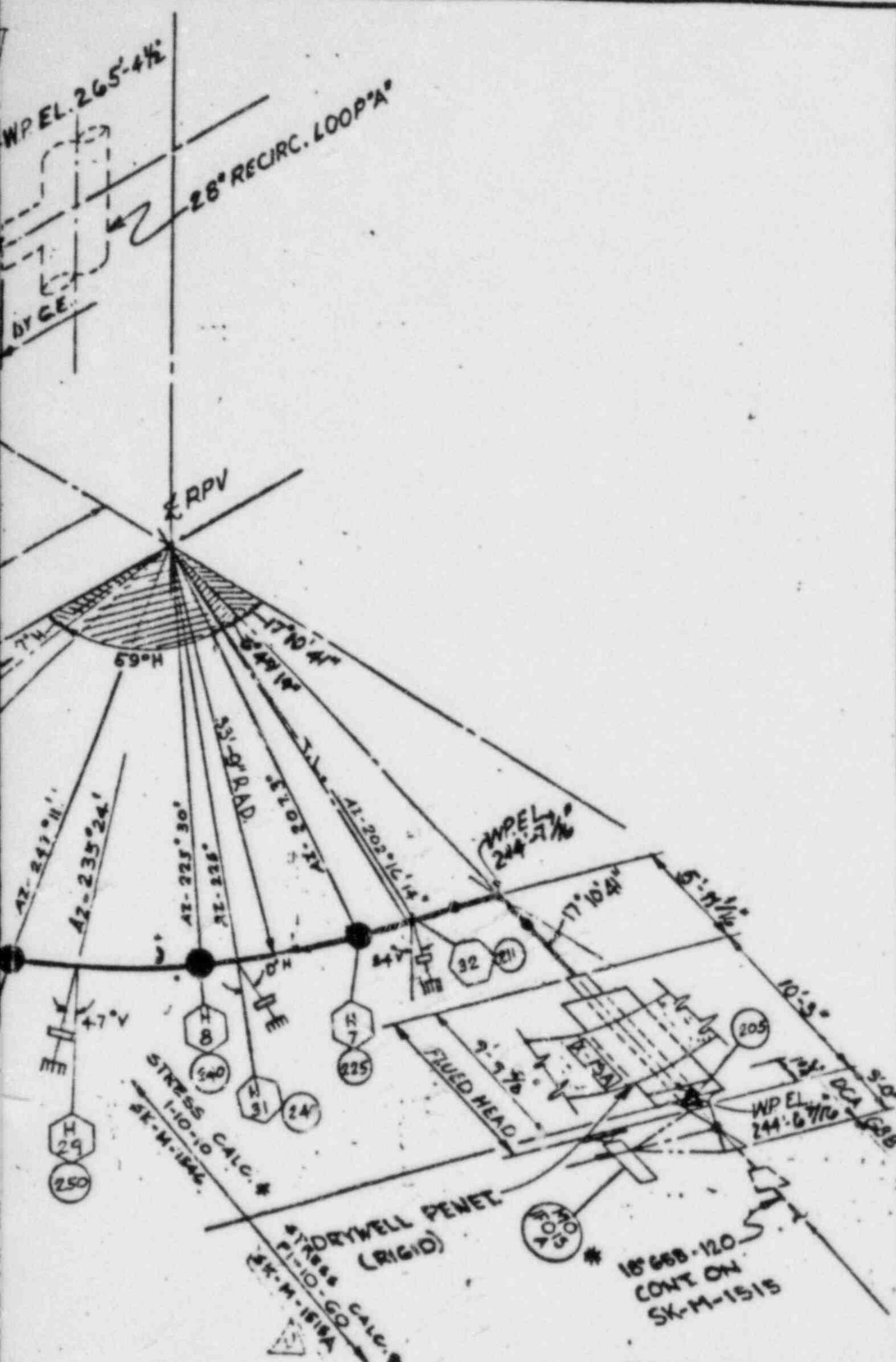


		DATA			REV	DATE	BY	REV	DATE	BY
PIPING ENGINEER	LINE No.	DCA-104								
	MATERIAL	SMLS SA-312 TP 304 SCH			A	11-13-73	AAZ	C	9/4/74	RRS
	LINE THICKNESS (IN)	.687			A	11-13-73	AZ			
MECHANICAL ENGINEER	LINE O.D. (IN)	12.750			A	11-13-73	AAZ			
	MODE	I	II	III						
	PRESS. PSIG									
	TEMP F									
STRESS ENGINEER	EXP. COEFF. IN/100FT									
	EXP. COEFF. MIL-IN/IN									
	MOD. OF ELAS. E PSI									

CCN REV 1
CALC. NO 110-10

8408140320-29
C-30

Rev. 1



Q-LISTED

STRESS APPROVALS		
REV	THERMAL	SEISMIC

REV. F NOTE:
REV. TO AGREE WITH FAB. ISO RELEASED "HOLD." REF. FME 3136.
ADDED MATERIAL SPECS.

REV. G NOTE:
REV. TO REF. FCR-M14698F ONLY

REV. H NOTE:
ADDED HANGERS AND DATA POINTS FOR RECONCILIATION. DELETED VALVE/PRESS./TEMP. DATA, PER STRESS GROUP MARK-UP.

REFERENCE

M-51	P&ID	REV. 2
M-213	PIPING PLAN	REV. 2
M-225	" "	REV. 4
M-229	" "	REV. 10
DCA-104-2	FAB. ISO.	REV. 13
REF. FCR-M14698F		
DCA-104-4	FAB ISO	REV 3

STRESS CALC. # 1-10-10

MODE DESCRIPTION

MODE I - NORMAL (P-300)
MODE II - MAXIMUM (P-300)
MODE III - SHUTDOWN COOLING (RHR PROCESS DIAGRAM)

NO.	DATE	REVISIONS	BY					
H		SEE REV. H NOTE						
G		SEE REV. G NOTE	AT		DS			
F		SEE REV F NOTE	JBR					
E		17" DCA-104 ISSUED FOR HOLD PER ...	BW					
J		REV. REF. CALC. NO. AND STRESS ISO.	AD					
C		REV DIM, VLV INFO, & PIPE SPECS	B.R.					
B		ADDED WEIGHT OF VALVE	J.O.					
A		ISSUED FOR STRESS ANAL.	J.O.					

	DATA	REV	DATE	BY	REV	DATE	BY
	DCA-104	F					
	SEAMWELD ASME SA-376 CL1 TP 316L SCH100	F	3/19/79	[illegible]			
	.843	F	3/19/79	[illegible]			
	12.750	F	3/19/79	[illegible]			
	I II III						

LEGEND
- SPRING HANGER
- RIGID HANGER
- ANCHOR
- GUIDE
- SNUBBER
- RESTRAINT
- STRESS DATA POINT
- HANGER NUMBER

DRAWN J.O.

BECHTEL
SAN FRANCISCO

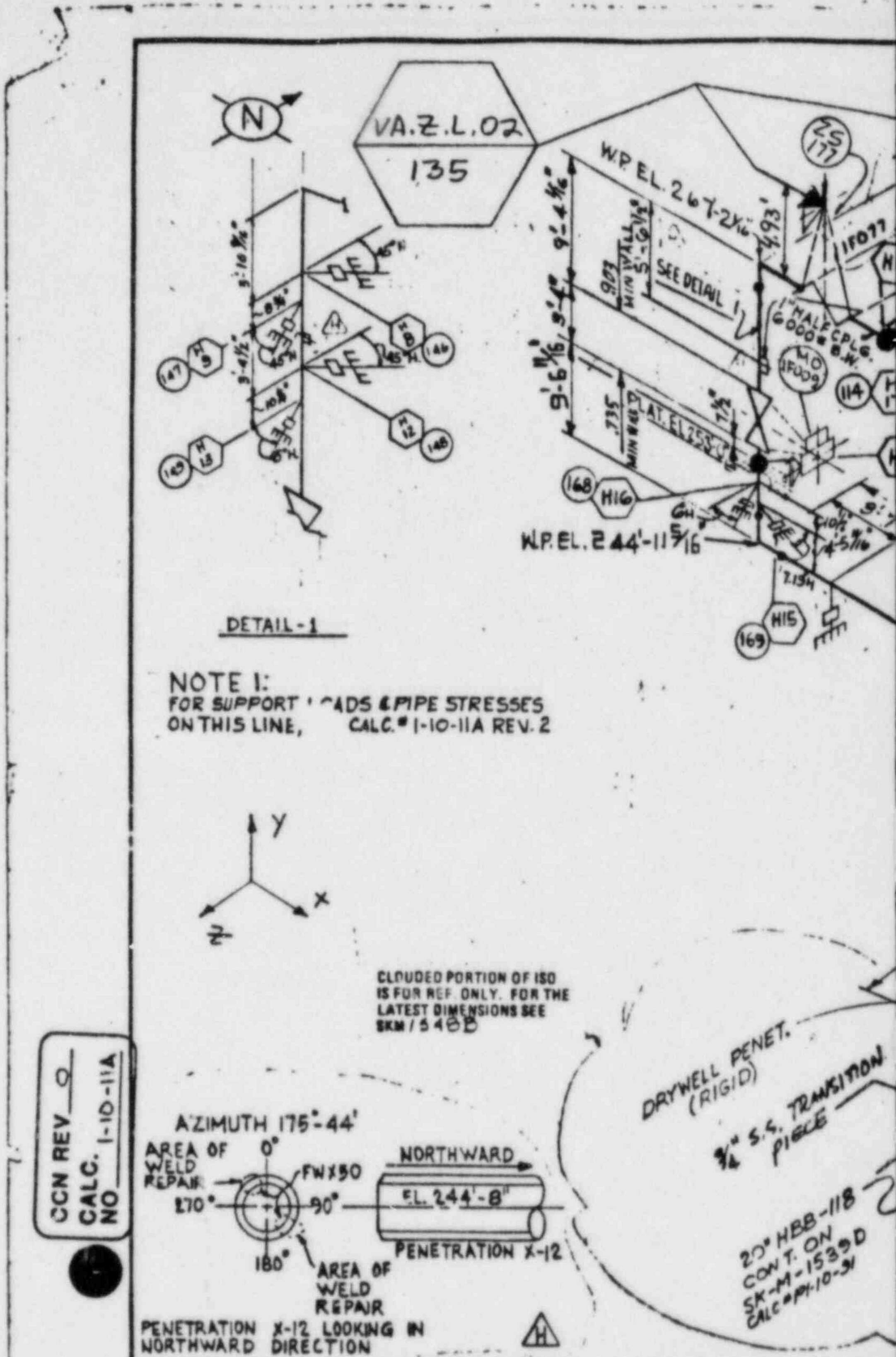
LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

ISOMETRIC - REACTOR BUILDING (DRYWELL)
RESIDUAL HEAT REMOVAL - UNIT #1

JOB NO.	DRAWING NO.	REV
8031	SK-M-1546	J

Specification
8031-P-363

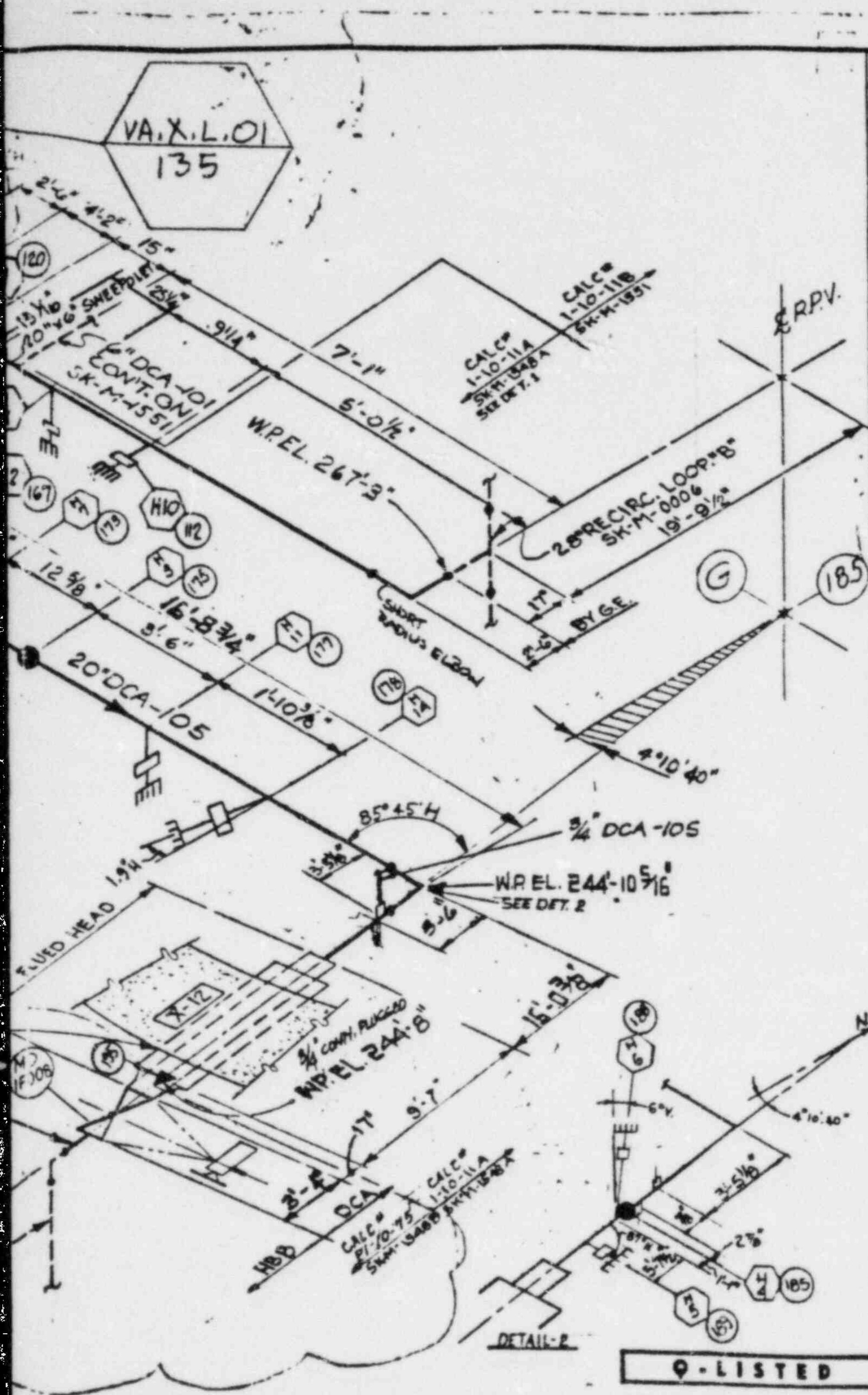
Appendix C



		DATA			REV	DATE	BY	REV	DATE	B
PIPING ENGINEER	LINE No.	DCA-105								
	MATERIAL	SMLS SA-312 TP304			A	11-13-73	APZ	C	3/1/76	[illegible]
	LINE THICKNESS (IN)	.735 MIN WALL			A	11-13-73	APZ			
MECHANICAL ENGINEER	LINE O.D. (IN)	20.000			A	11-13-73	APZ			
	MODE	I	II	III						
	PRESS. PSIG									
	TEMP F			/H						
STRESS ENGINEER	EXP. COEFF. IN/100FT									
	EXP. COEFF. MIL-IN/IN									

8408140320-30

C-31



Q-LISTED

STRESS APPROVALS		
REV	THERMAL	SEISMIC
B	KDY 8-13-74	

REV. H NOTE:
ADDED PIPE SUPPORTS & DATA POINTS FOR RECONCILIATION, DELETED PRESS, TEMP & VALVE DATA PER STRESS GROUP MARK-UP
INCORP. FCR M16, 233F, INCORP. FSK SHT. 1 REV. 0.

REV. G NOTE:
13 1/16" WAS 12 11/16" PER VENDOR REQUEST
ADDED FAB 150 REFERENCE. PLUGGED 3/4" CONN. PER P&ID M-51 SHEET 2 REV. 8.

REV. F NOTE
ADDED 1" CONN PER FCR M13694F.

TI APERTURE CARD

REFERENCE

M-43	P&ID	[illegible]
M-51	"	
M-213	PIPING PLAN	[illegible]
M-225	" "	[illegible]
M-239	"	
DCA-105-3	REV 4 FAB 150	[illegible]
DCA-105-1	REV 15 "	[illegible]
STRESS CALC. # 1-10-11A		

MODE DESCRIPTION

MODE I - NORMAL REACTOR OP. (P-300)
MODE II - MAXIMUM " " "
MODE III - SHUTDOWN COOLING

No.	DATE	REVISIONS	BY	CHKD	DESIGN SUPV	ENGR	PROJ ENGR	APPR
H		SEE REV. H NOTE	[illegible]	[illegible]	[illegible]	[illegible]		
G	[illegible]	SEE REV G NOTE	[illegible]	BJS	[illegible]		[illegible]	
F	[illegible]	SEE REV. F NOTE	JBR	[illegible]	[illegible]	[illegible]	[illegible]	
E	11/9	ISSUED FOR "HOLD" PER PLB-196-C. ADDED 3/4" DCA-105 PER P&ID 51 SHT 2 REV. 8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
D	[illegible]	3'-4" WAS 4'-6" ADDED S.C. TRANSITION PIECE	HR	[illegible]	[illegible]		[illegible]	
C	[illegible]	ADDED & REV DIMS, VLV NO., & REV MATERIAL	B.R.	[illegible]	[illegible]	[illegible]	[illegible]	
B	[illegible]	CHAN. SCHALES [illegible] FLUED HEAD DIM.	T.S.	[illegible]	[illegible]	[illegible]	[illegible]	
A	[illegible]	ISSUED FOR STRESS ANAL.	J.O.	[illegible]	[illegible]	[illegible]	[illegible]	

	DATA	REV	DATE	BY	REV	DATE	BY
	DCA-105	E					
	SEAMWELD ASME SA-358 CL. 1 TP-316L	E	3/9/79	[illegible]			
	.903 MIN WALL	E	3/9/79	[illegible]			
	20.000	E	3/9/79	[illegible]			
	I II III						

LEGEND
- SPRING HANGER
- RIGID HANGER
- ANCHOR
- GUIDE
- SNUBBER
- RESTRAINT

SCALE | DESIGNED | DRAWN J.O. | SHEET CHKD

BECHTEL
SAN FRANCISCO

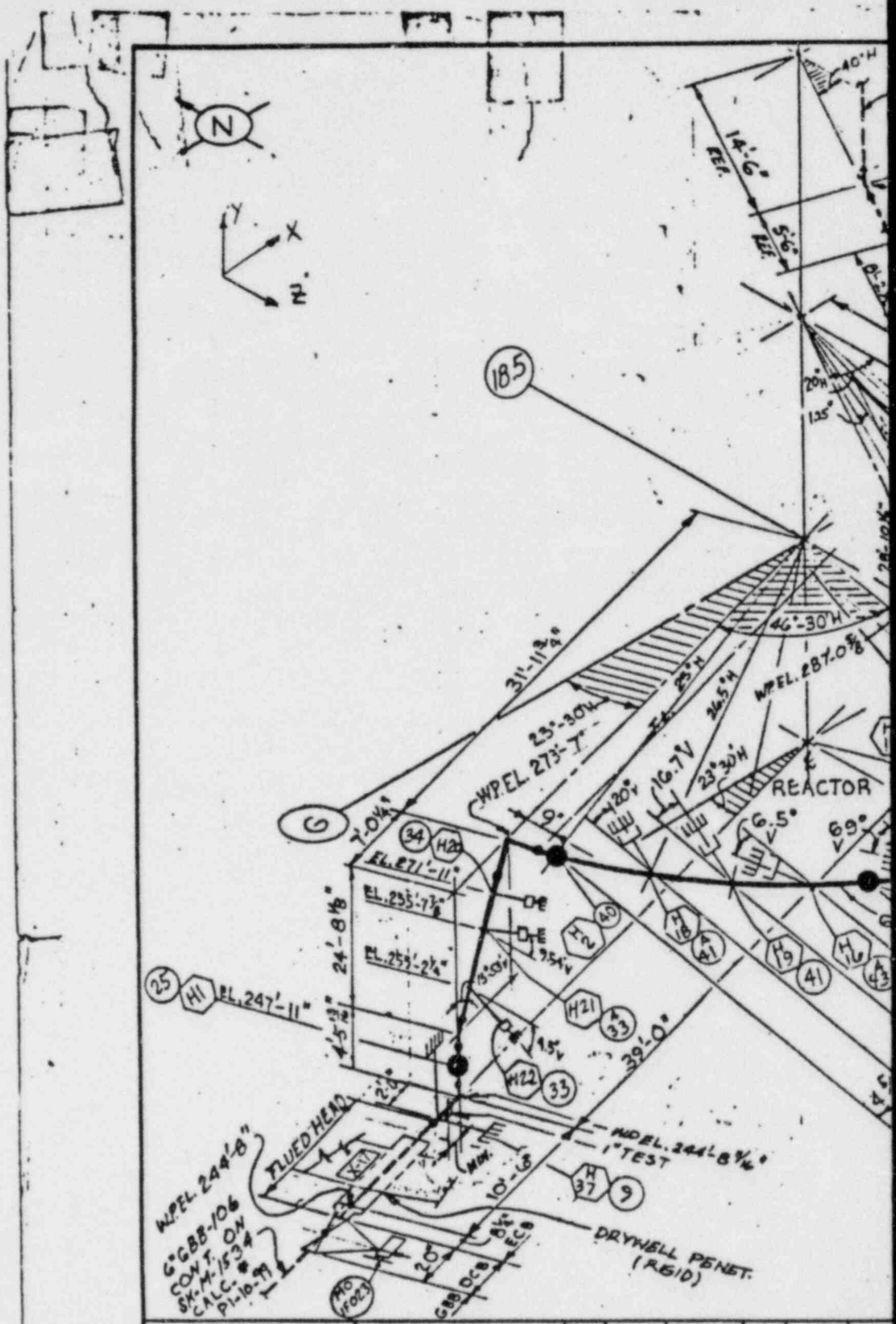
LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

ISOMETRIC - REACTOR BUILDING (DRYWELL)
RESIDUAL HEAT REMOVAL - UNIT #1

JOB No.	DRAWING No.	REV
8031	SK-M-1548A	H

Specification
8031-P-363

Appendix C



		DATA			REV	DATE	BY	REV	DATE	B
PIPING ENGINEER	LINE No.	ECB-111								
	MATERIAL	SML ASME SA-312 OR SA-376 TP304			A	11-13-73	AJZ			
	LINE THICKNESS (IN)	.280			A	11-13-73	AJZ			
MECHANICAL ENGINEER	LINE O.D. (IN)	6.625			A	11-13-73	AJZ			
	MODE	I	II	III						
	PRESS. PSIG	1								
	TEMP F									
STRESS ENGINEER	EXP. COEFF. IN/100FT									
	EXP. COEFF. MIL-IN/IN									
	MOD. OF ELAS. E PSI									

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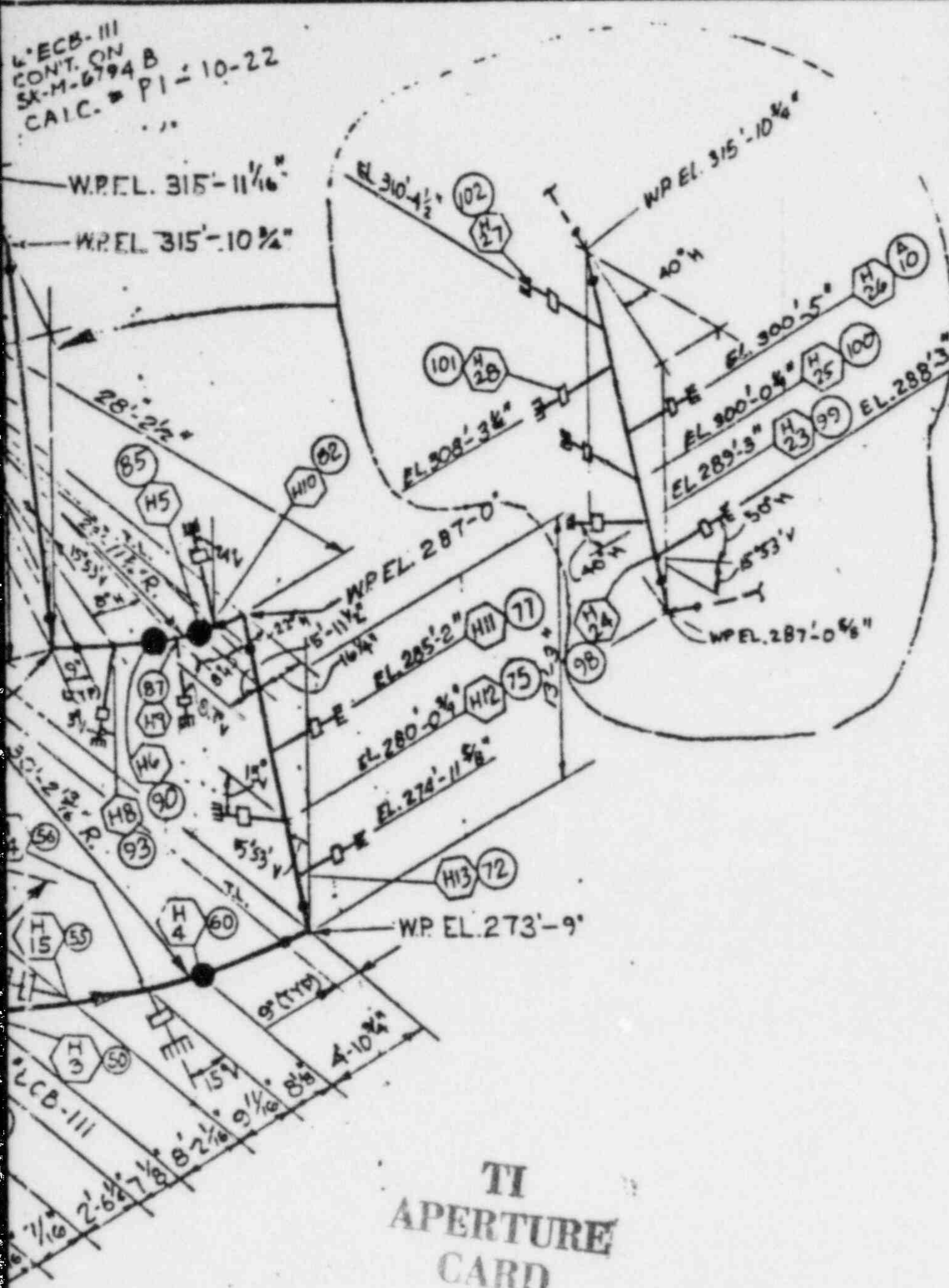
C-32

Rev 1



STRESS APPROVALS		
REV	THERMAL	SEISMIC
B	RRJ 8-13-79	

REV E NOTE:

RELOCATED GATE VALVE MO-1F022 PER STRESS GROUP REWORK NOTICE LP-DW-2 & LP-DW-3. ALSO REVISE CONT. ISO TO SK-M-6794.

REV. F NOTE:

ADDED HANGERS AND DATA POINTS FOR RECONCILLATION. DELETED VALVE & PRESS. TEMP. DATA PER STRESS GROUP MARK-UP.

REFERENCE

STRESS CALC NO. 1-10-22

M-51	P&ID
M-213	PIPING PLAN
M-225	" "
M-226	" "
M-229	" "
M-234	" "
M-235	" "
M-236	" "
ECB-111-1	FAB. ISO REV. 9

MODE DESCRIPTION

MODE I - NORMAL REACTOR OP. (P-300)

MODE II - MAXIMUM " " "

MODE III - SHUT DOWN COOLING (RHR PROCESS DIAGRAM)

CCN REV 0
CALC. NO 1-10-22

Q-LISTED

NO.	DATE	REVISIONS	BY	CHKD	DESIGN SUPV	ENGR	PROJ ENGR	APPR
F	1/3/8?	SEE REV. F NOTE	SG		KB			
E		SEE REV E NOTE	SP					
D		ISSUED FOR "HOLD" PER PIB-196C 6-7-78	BW					
C		REVISED PER PHB. BD.	WP					
B		REVISED AS NOTED	T.S.		PP			
A		ISSUED FOR STRESS ANAL	J.O.		PP			

SCALE | DESIGNED | DRAWN J.O. | CHKD

DATA			REV	DATE	BY	REV	DATE	BY
I	II	III						

LEGEND

- SPRING HANGER
- RIGID HANGER
- ANCHOR
- GUIDE
- SNUBBER
- RESTRAINT

BECHTEL
SAN FRANCISCO

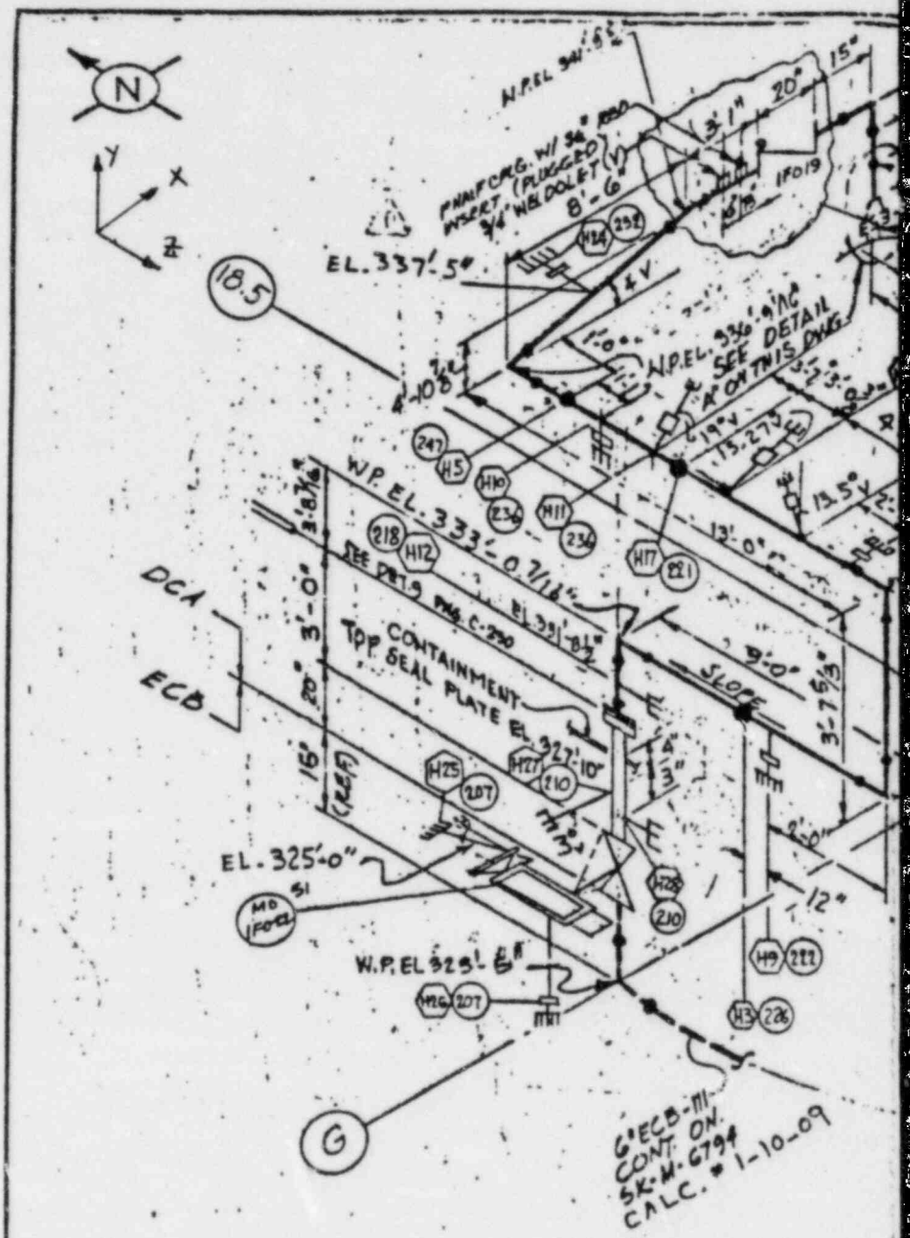
LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

ISOMETRIC - REACTOR BUILDING (DRYWELL)
RESIDUAL HEAT REMOVAL - UNIT #1

JOB No.	DRAWING No.	REV
8031	SK-M-1549	F

Specification
8031-P-363

Appendix C



		DATA			REV	DATE	BY	REV	DATE	BY
PIPING ENGINEER	LINE No.	DCA-103								
	MATERIAL	SMLASTM SA 312 TP 316L			N	[illegible]	[illegible]	B	[illegible]	[illegible]
	LINE THICKNESS (IN)	.432			A	11-13-73	[illegible]			
MECHANICAL ENGINEER	LINE O.D. (IN)	6.625			A	11-13-73	[illegible]			
	MODE	I	II	III						
	PRESS. PSIG	[illegible]	[illegible]	[illegible]	A	[illegible]				
	TEMP F	550	[illegible]	140	A	[illegible]				
STRESS ENGINEER	EXP. COEFF. IN/100FT									
	EXP. COEFF. MIL-IN/IN									
	MOD. OF ELAS. E PSI									

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C-33

Rev 1

STRESS APPROVALS		
REV	THERMAL	SEISMIC
A	RRD 11-19-73	

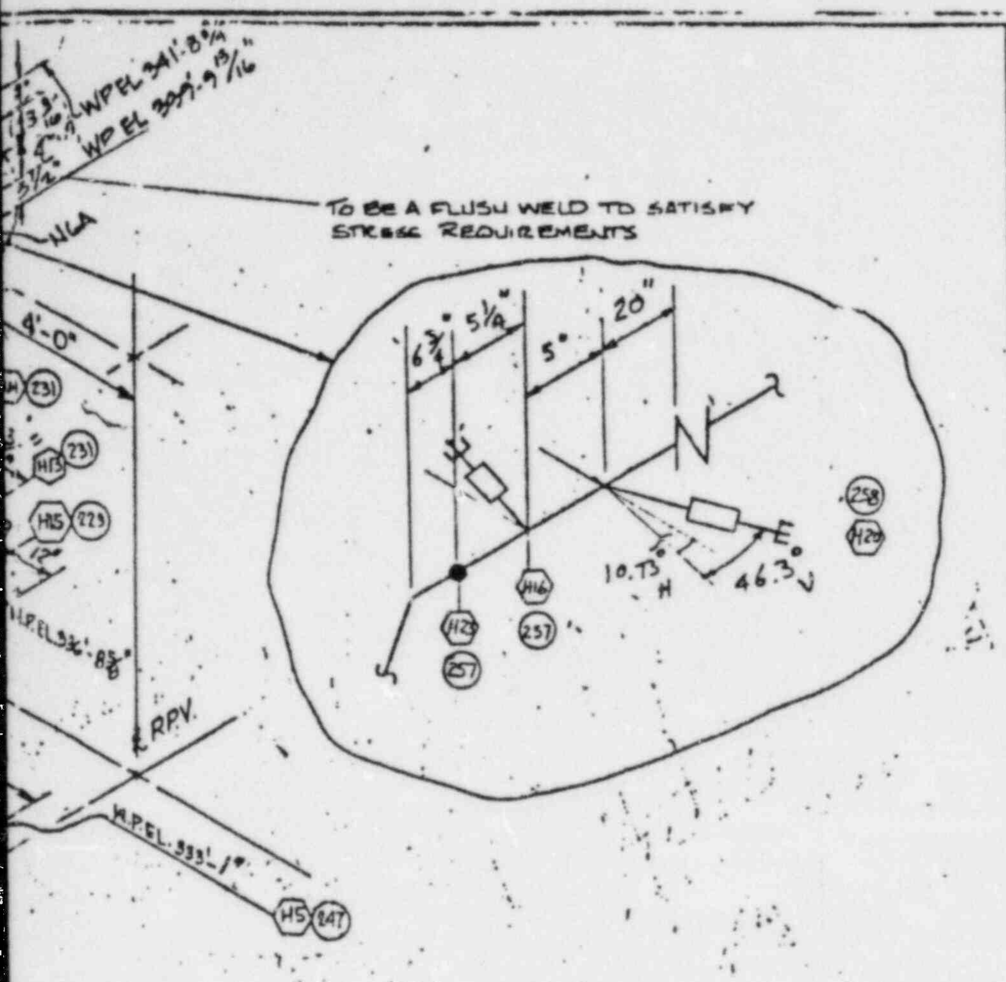
REV. J NOTE:
REVISED DIMENSIONS PER DET. 9 DWG. C-290
RELOCATED 3/4" VENT CONN. PER STRESS GRP. REQUEST R/N IA-DW-81.

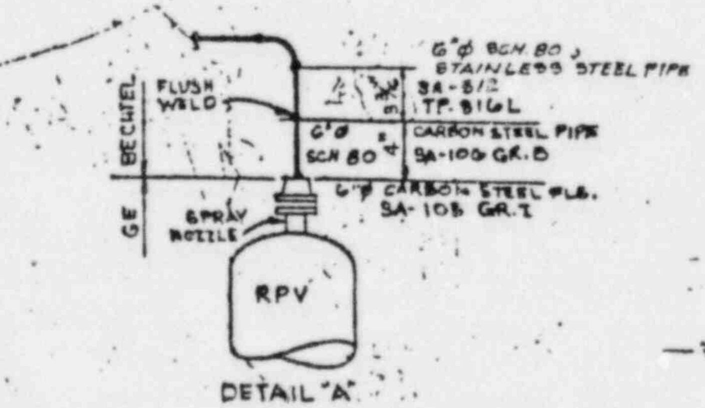
REV N NOTE:
ADDED FLUSH WELD TO SATISFY STRESS REQUIREMENTS - REVISED MATERIAL PER SPEC P-300., ADDED DETAIL "A"

REV. P NOTE
ADDED HGRS, DATA POINTS & VALVE NO. FOR RECONCILIATION, INCORP. DCP #0239.

STRESS CALC. # 1410-09

REFERENCE
M-51 2 of 2 P&ID
M-236 PIPING PLAN
DCA-103-1 FAB 130. REV 15
C-290 CIVIL DETAIL . PENET. THRU CONST. SEAL PLATE





DETAIL "A"

MODE DESCRIPTION
MODE I-NORMAL REACTOR OP. (P-300)
MODE II-MAXIMUM " "
MODE III-SHUT DOWN COOLING (RHR PROCESS DIAGRAM)

TI APERTURE CARD

Q-LISTED

REV	DATE	REVISIONS	BY	CHKD				APPR
P		SEE REV P NOTE	JMC					
N		SEE REV N NOTE	P.D.					
A		ISSUED FOR STRESS ANAL	J.O.					

DATA	REV	DATE	BY	REV	DATE	BY
I II III	E	3/9/79				

LEGEND
- SPRING HANGER
- RIGID HANGER
- ANCHOR
- GUIDE
- SNUBBER
- RESTRAINT

DRAWN J.O.

BECHTEL
SAN FRANCISCO

LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

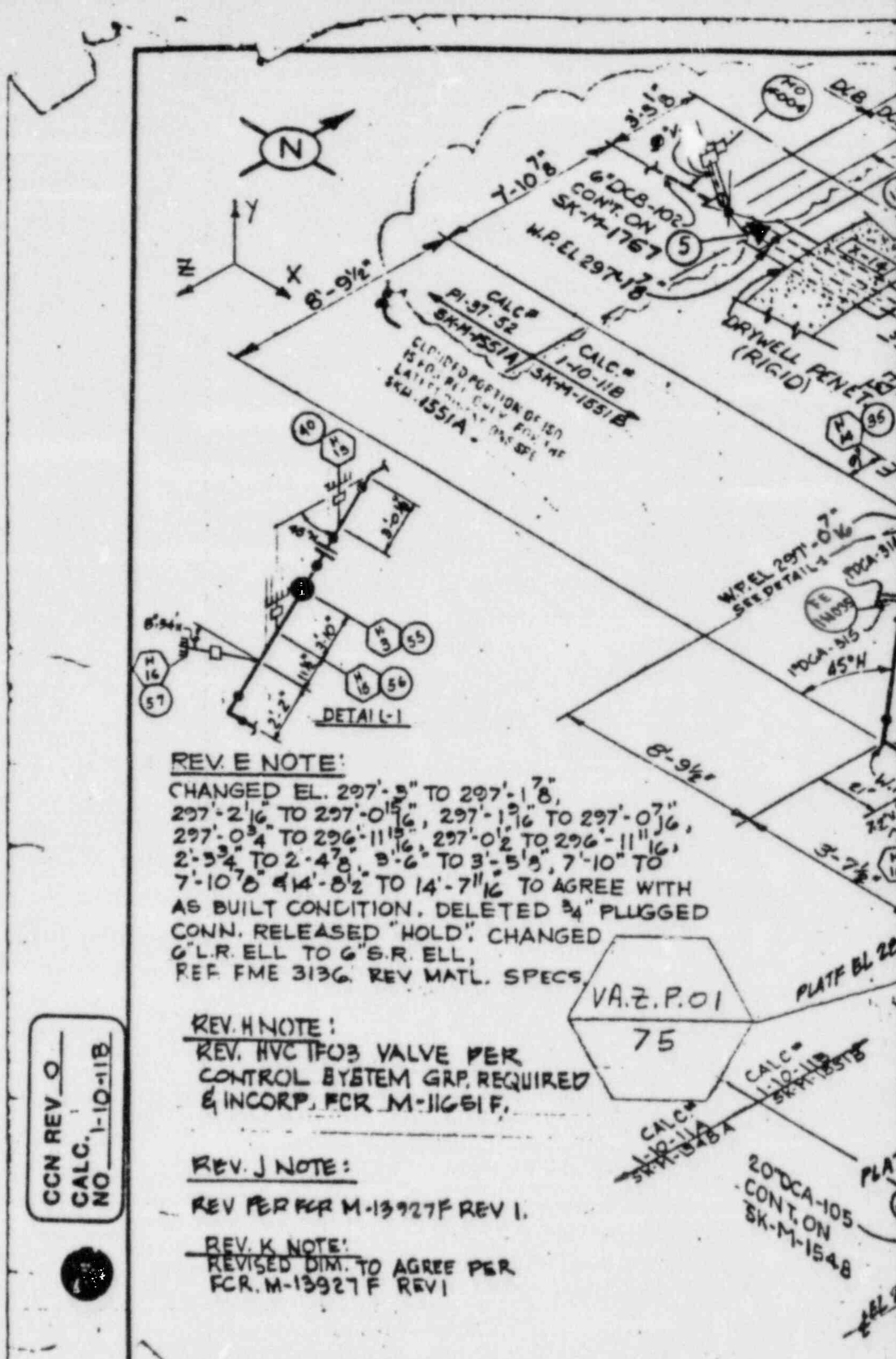
ISOMETRIC - REACTOR BUILDING (DRYWELL)
RESIDUAL HEAT REMOVAL - UNIT #1

JOB NO.	DRAWING NO.	REV
8031	SK-M-1550	P

Specification
8031-P-363

Appendix C

Also Available On
Aperture Card


N
Y
X
Z
7'-10 7/8"
8'-9 1/2"
6"DCB-102 CONT. ON SK-M-1767
W.P. EL 297'-1 7/8"
DRYWELL PENET. (RIGID)
CALC# PI-37-52 SK-M-1551A
CALC# 1-10-11B SK-M-1551B
DETAIL L-1
W.P. EL 297'-0 7/16" SEE DETAIL L-1
45° H
8'-9 1/2"
REV. E NOTE:
CHANGED EL. 297'-3" TO 297'-1 7/8", 297'-2 1/16" TO 297'-0 15/16", 297'-1 5/16" TO 297'-0 7/16", 297'-0 3/4" TO 296'-11 15/16", 297'-0 1/2 TO 296'-11 11/16", 2'-3 3/4 TO 2'-4 7/8, 3'-6" TO 3'-5 5/8", 7'-10" TO 7'-10 7/8" & 14'-8 1/2 TO 14'-7 11/16 TO AGREE WITH AS BUILT CONDITION. DELETED 3/4" PLUGGED CONN. RELEASED "HOLD". CHANGED 6" L.R. ELL TO 6" S.R. ELL, REF FME 3136. REV MATL. SPECS.
VA.Z.P.01
75
REV. H NOTE:
REV. HVC 1F03 VALVE PER CONTROL SYSTEM GRP. REQUIRED & INCORP. FCR M-11661 F.
REV. J NOTE:
REV PER FCR M-13927F REV 1.
REV. K NOTE:
REVISED DIM. TO AGREE PER FCR. M-13927F REV 1
CALC# 1-10-11A SK-M-1548A
CALC# 1-10-11B SK-M-1551B
20"DCA-105 CONT. ON SK-M-1548
CCN REV 0
CALC. NO 1-10-11B

		DATA			REV	DATE	BY	REV	DATE	B
PIPING ENGINEER	LINE No.	DCA-101								
	MATERIAL	SML ASME SA-312 TP-316L SCH80S			A	1/17/74	[illegible]	E	3/19/79	[illegible]
	LINE THICKNESS (IN)	.432			A	1/17/74	[illegible]			
MECHANICAL ENGINEER	LINE O.D. (IN)	6.625			A	1/17/74	[illegible]			
	MODE	I	II	III						
	PRESS. PSIG									
	TEMP F									
STRESS ENGINEER	EXP. COEFF. IN/100FT									
	EXP. COEFF. MIL-IN/IN									
	MOD. OF ELAS. E PSI									

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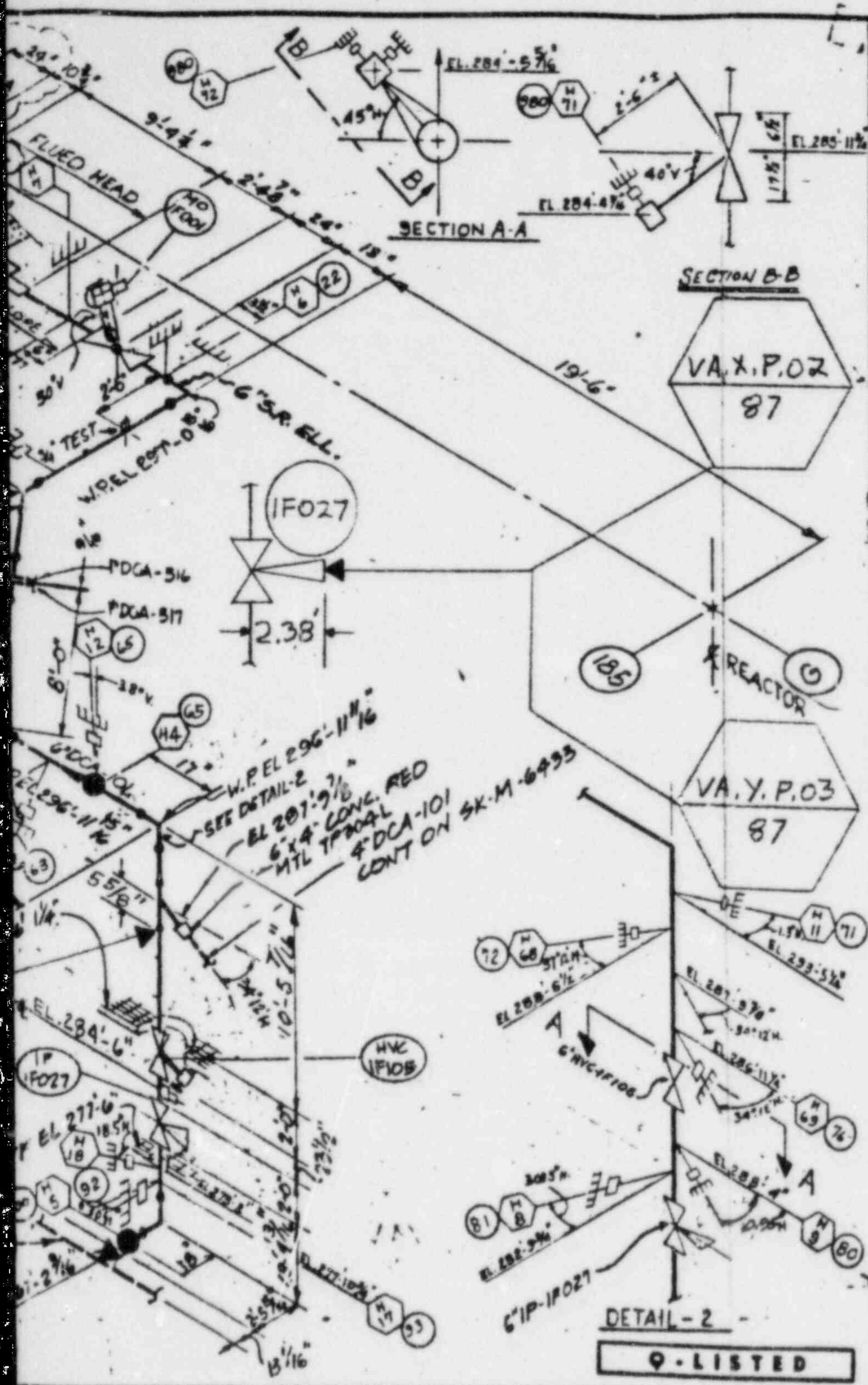
C-34

Rev. 1



STRESS APPROVALS		
REV	THERMAL	SEISMIC
A	RRG 1-25-74	

NOTE: THIS DRAWING SUPERCEDES SK-M-966 FOR DCA-202 SK-M-2437

REV. G NOTE:

4" DCA-101 CONN. WAS 2", DELETED 6" DCA-GT REPLACED BY 6" MO "HVC-1F105" PER NCR 7819.

REV. M NOTE:

ADDED PIPE SUPPORTS & DATAPOINTS FOR RECONCILIATION, DELETED PRESS, TEMP. & VALVE DATA PER STRESS GROUP MARK-UP

TI APERTURE CARD

REFERENCE

M-43	P&ID	
M-44	"	
M-225	PIPING PLAN	
M-226	"	
M-231	"	
M-234	"	
M-235	"	
DCA-101-1	REV. 17	FAB ISO
STRESS CALC Nº 1-10-11B		

MODE DESCRIPTION

MODE I—NORMAL CONDITIONS

MODE II—MAXIMUM CONDITIONS

MODE III—

REV	DATE	REVISIONS	BY					
L		INC. FCR M14609F	CL					
G		SEE REV. G NOTE	SP					
F		SEE REV. F NOTE			DJS			
K		SEE REV. K NOTE						
J		SEE REV. J NOTE						
M		SEE REV. M NOTE						
B		REV. VENDOR VA. & I.D.	LTL / SAL					
A	1/28	ISSUED FOR STRESS ANAL.	J.O.					

DRAWN J.O.

DATA			REV	DATE	BY	REV	DATE	BY
I	II	III						

LEGEND

- SPRING HANGER
- RIGID HANGER
- ANCHOR
- GUIDE
- SNUBBER
- RESTRAINT
- HANGER NUMBER
- STRESS DATA POINT

BECHTEL
SAN FRANCISCO

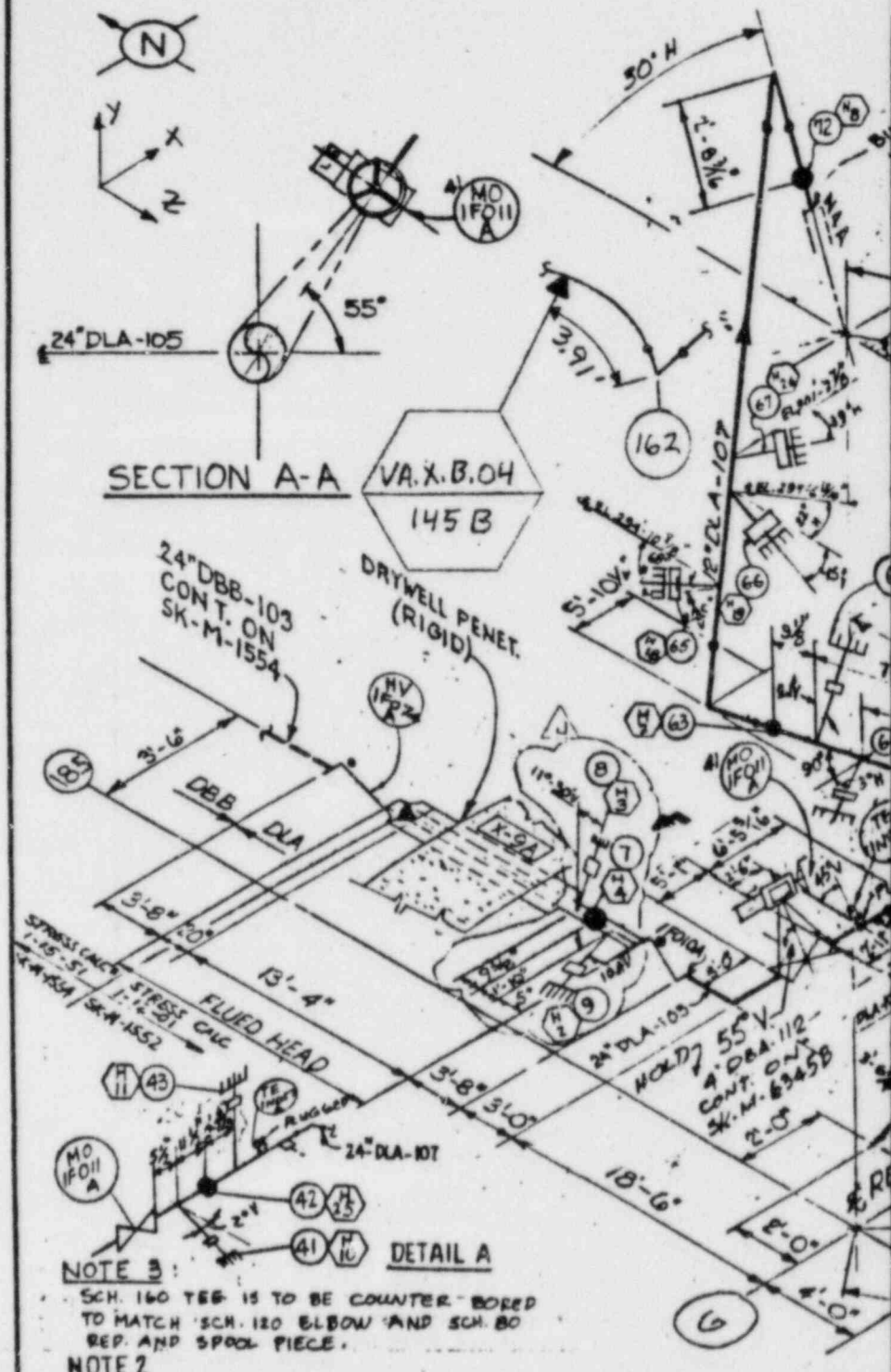
LIMERICK GENERATING STATION UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

ISOMETRIC - REACTOR BUILDING (DRYWELL)
REACTOR WATER CLEAN-UP & FILTER DEMIN.-UNIT 1

JOB No.	DRAWING No.	REV
8031	SK-M-1551B	M

Specification
8031-P-363

Appendix C



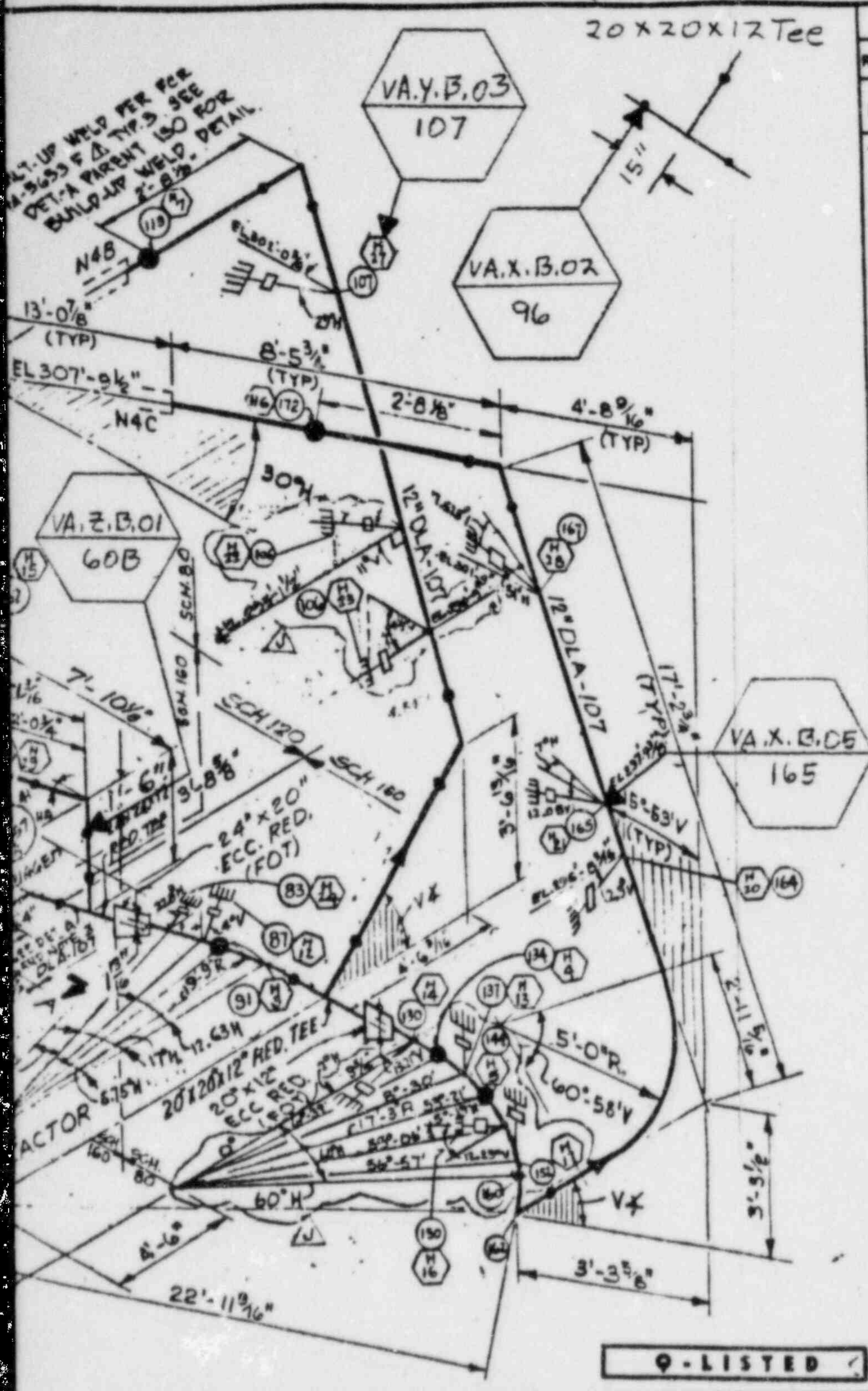
NOTE 3:
SCH. 160 TEE IS TO BE COUNTER-BORED TO MATCH SCH. 120 ELBOW AND SCH. 80 RED. AND SPOOL PIECE.

NOTE 2
M-11 VIOLATES ISI CLEARANCE REQUIREMENT ON ONE SIDE OF THE WELD AS REPORTED ON FCR M14815F.

		DATA			REV	DATE	BY	REV	DATE	BY
PIPING ENGINEER	LINE No.	DLA-105								
	MATERIAL	SML ASME SA-333 Gr 6			A	1/17/84	ARZ			
	LINE THICKNESS (IN)	1.812			A	1/17/84	ARZ			
MECHANICAL ENGINEER	LINE O.D. (IN)	24.000			A	1/17/84	ARZ			
	MODE	I	II	III						
	PRESS. PSIG									
	TEMP F									
STRESS ENGINEER	EXP. COEFF. IN/100FT									
	EXP. COEFF. MIL-IN/IN									

8408140320-34
C-35

Rev. 1



STRESS APPROVALS		
REV	THERMAL	SEISMIC
B	RRR 1-25-74	

REV. H NOTE:

PIPE SCH. REVISED AS SHOWN PER PIPE SPOOL SHEETS.
REVISED CONFIGURATION TO MATCH FAB 160 & ADDED HANGER SYMBOLS PER HANGER GROUP MARK-UP. DELETED VALVE DATA/PRESS/TEMP. DATA. ADDED VALVE NO 1F010A PER P&ID M-41 REV 22. ADDED REF FCR M14815F & NOTE 2. INCORP. NCR NO. 6621 REV. 1 DELETED NOTE 1. ADDED NOTE 3.

TI APERTURE CARD

REFERENCE — STRESS CALC. NO 1-12-01

M-41 P&ID
M-234 PIPING PLAN
M-235 " "
DLA-107-1 FAB. 150 — REV. 21
DLA-105-1 FAB. 150 — REV. 11
FCR M14815

MODE DESCRIPTION

MODE I—NORMAL CONDITIONS
MODE II—MAXIMUM CONDITIONS
MODE III —

NO.	DATE	REVISIONS	BY					APPD
J		REVISED AS SHOWN						
H	7/28/83	SEE REV. H NOTE			SJB			
G		REV PER FCR M-13175F						
F		INCORP FCR-M-5633F △	SD	BUS				
E		SHOWN 2" DBA-113 CONN. PER DCN "A (9-18-77)		EH.				
D		REORIENTED NO-1F011A & TE NO57A WAS TE NO57A	SAL	ADC				
C		REVISED NO-1F011 ADDED TE NO 57 A	ADC					
B		REVISED ...	J.O		PP			
A		ISSUED FOR STRESS ANALYSIS	J.O.		PP			

DRAWN J.O.

DATA			REV	DATE	BY	REV	DATE	BY
DLA-107								
SML ASME SA-333 Gr 6			A	1/17/74	RRZ			
1.219	1.031	.688	H					
24000	20000	12.750	A	1/17/74	RRZ			
I	II	III						

LEGEND

- SPRING HANGER
- RIGID HANGER
- ANCHOR
- GUIDE
- SNUBBER
- RESTRAINT
- HANGER NUMBER
- STRESS DATA POINT

BECHTEL
SAN FRANCISCO

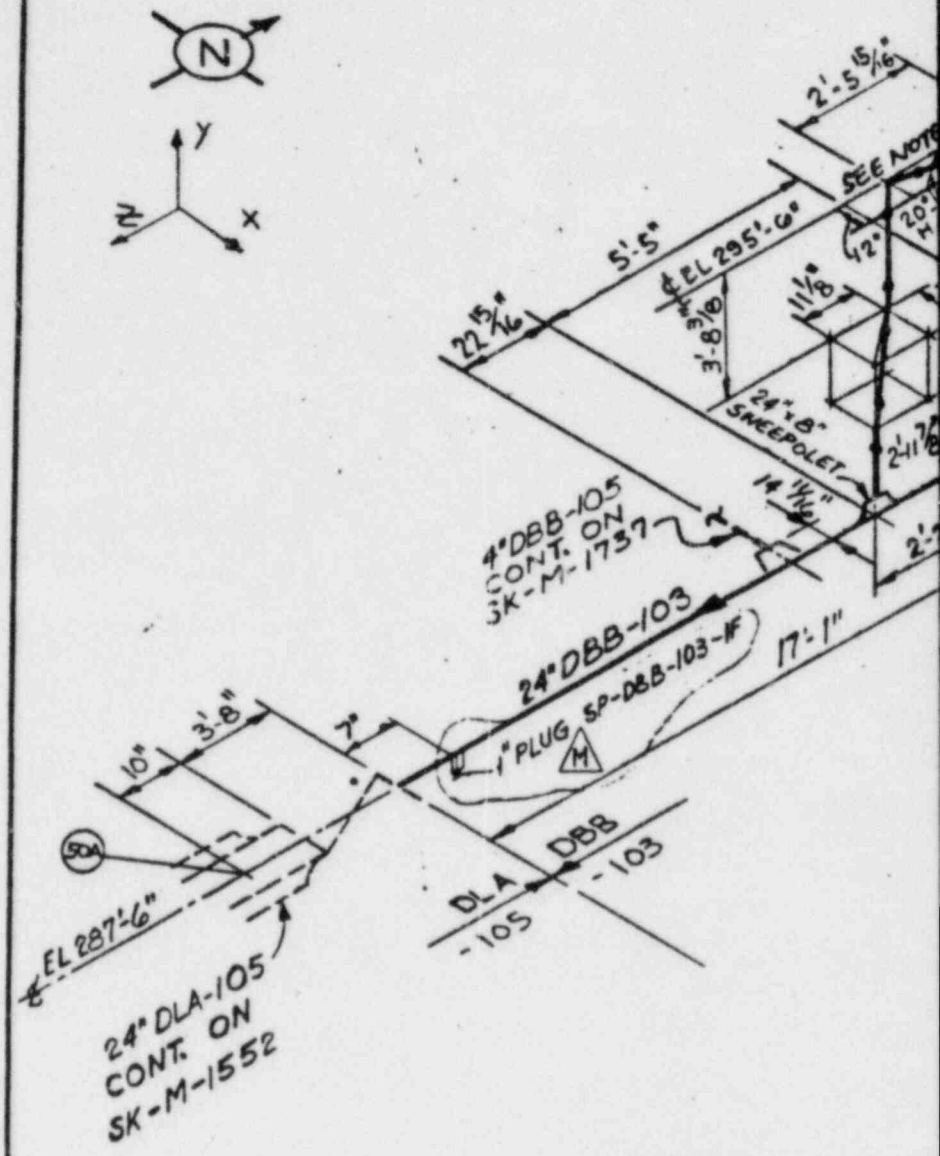
LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

ISOMETRIC - REACTOR BUILDING (DRYWELL)
FEEDWATER - UNIT #1

JOB No.	DRAWING No.	REV
8031	SK-M-1552	J

Specification
8031-P-363

Appendix C

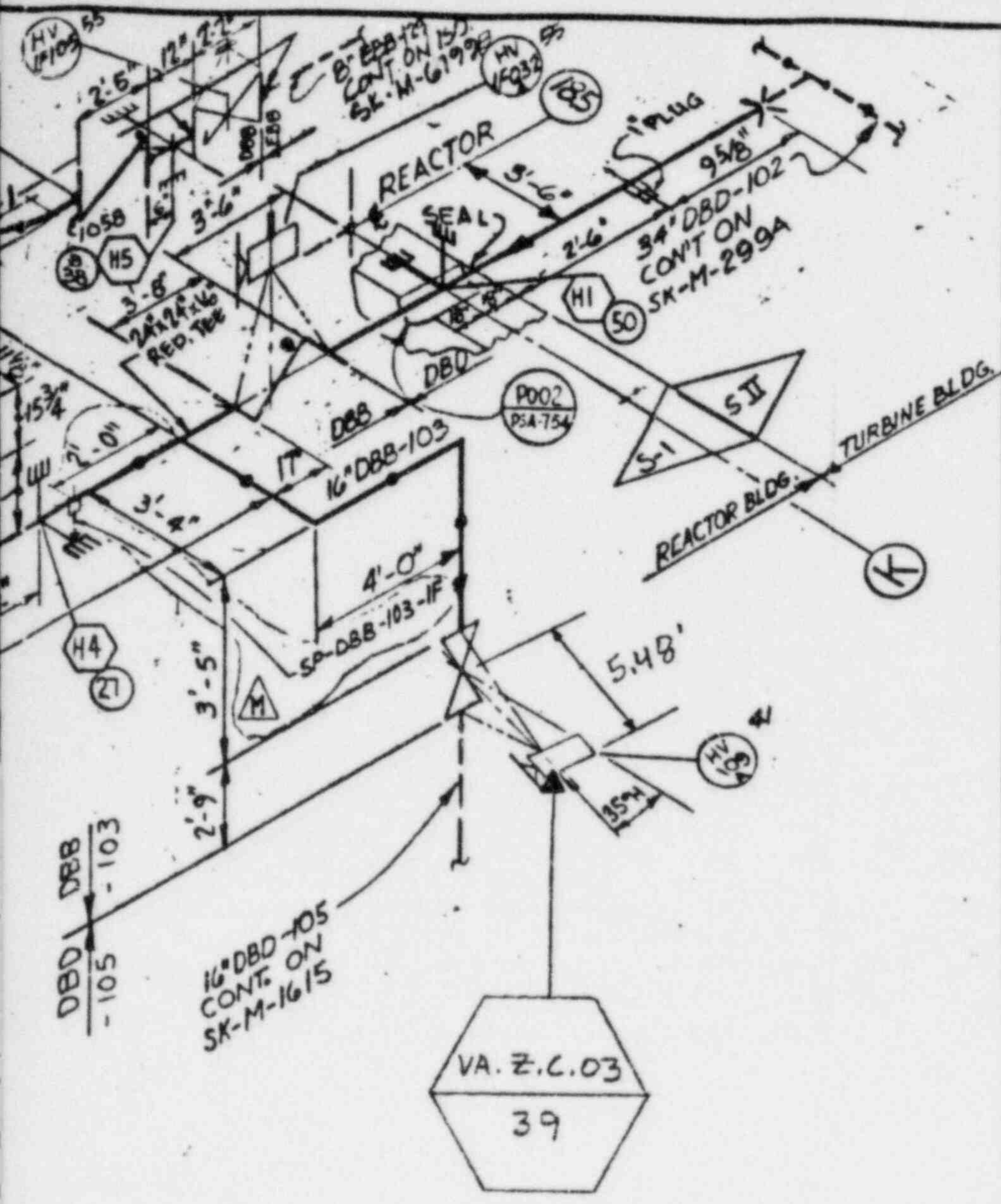


NOTE :

1. FIELD TO BUILD UP PIPE ON BOTH SIDES OF VALVE HV-1F105 TO MAINTAIN MIN. WALL THICKNESS OF 0.568 ON DBB SIDE OF 0.546" ON SBB SIDE.

		DATA			REV	DATE	BY	REV	DATE	
PIPING ENGINEER	LINE No.	DBB-103								
	MATERIAL	SML ASME SA-106 Gr. B			A	1/9/84	DMZ			
	LINE THICKNESS (IN)	1.812	1.219	—	A	1/9/84	DMZ			
MECHANICAL ENGINEER	LINE O.D. (IN)	24.000	16.000	—	A	1/9/84	DMZ			
	MODE	I	II	III						
	PRESS. PSIG									
	TEMP F									
STRESS ENGINEER	EXP. COEFF. IN/100FT									
	EXP. COEFF. MIL-IN/IN									
	MOD. OF ELAS. X PSI									

1



TI APERTURE CARD

Q-LISTED

STRESS APPROVALS		
REV	THERMAL	SEISMIC

REV. L NOTE:

ADDED PIPE SUPPORTS & DATA POINTS FOR RECONCILIATION. DELETED VALVE & PRESS/TEMP DATA PER STRESS GROUP MARK-UP. REVISED OFFSET PIPE CONFIGURATION PER FAB ISO. 5'-5" (WAS 4'-9 15/16"), 2'-11 1/8" (WAS 2'-3 1/8"), 3'-8 3/8" (WAS 4'-8 7/8").
INCORP. FCR. M-15, 504F A

REV. M NOTE

REVISED DATA POINT B-88 (WAS 88)
9 5/8" DIM (WAS 7") PER FAB ISO
ADDED DATA POINT 50A & LINE No.
ADDED 2 SP-HALF CPLGS PER FAB ISO.

REFERENCE

M-41 P&ID
M-226 PIPING PLAN
M-234 " "
M-189 " "
DBD-103-1 REV 9 FAB. ISO
DBB-103-1 REV 14 FAB. ISO.
CALC No P1-15-51

MODE DESCRIPTION

MODE I—NORMAL CONDITIONS
MODE II—MAXIMUM CONDITIONS
MODE III ——

No.	DATE	REVISIONS					
H	[illegible]	REVISED AS SHOWN & ADDED NOTE 1	JB	[illegible]	[illegible]	-	[illegible]
M		SEE REV. M NOTE	[illegible]	ES		[illegible]	
L	[illegible]	SEE REV. L NOTE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
K	[illegible]	INCORP. FCR M15DBBF	SG	[illegible]	JSB	[illegible]	[illegible]
J	[illegible]	INCORP FCR M18815F	PLD	[illegible]	[illegible]		[illegible]
A	[illegible]	ISSUED FOR STRESS ANL	J.O.	[illegible]	[illegible]	[illegible]	[illegible]

DATA			REV	DATE	BY	REV	DATE	BY	LEGEND
DBD-103									SPRING HANGER
SML ASTM A-106 Gr B			B	4/15/74	[illegible]				RIGID HANGER
1.812	—	—	B	4/15/74	[illegible]				ANCHOR
24.000	—	—	B	4/15/74	[illegible]				GUIDE
I	II	III							SNUBBER
									RESTRAINT
									HANGER NUMBER
									STRESS DATA POINT

SCALE — | DRAWN J.O.

BECHTEL
SAN FRANCISCO

LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

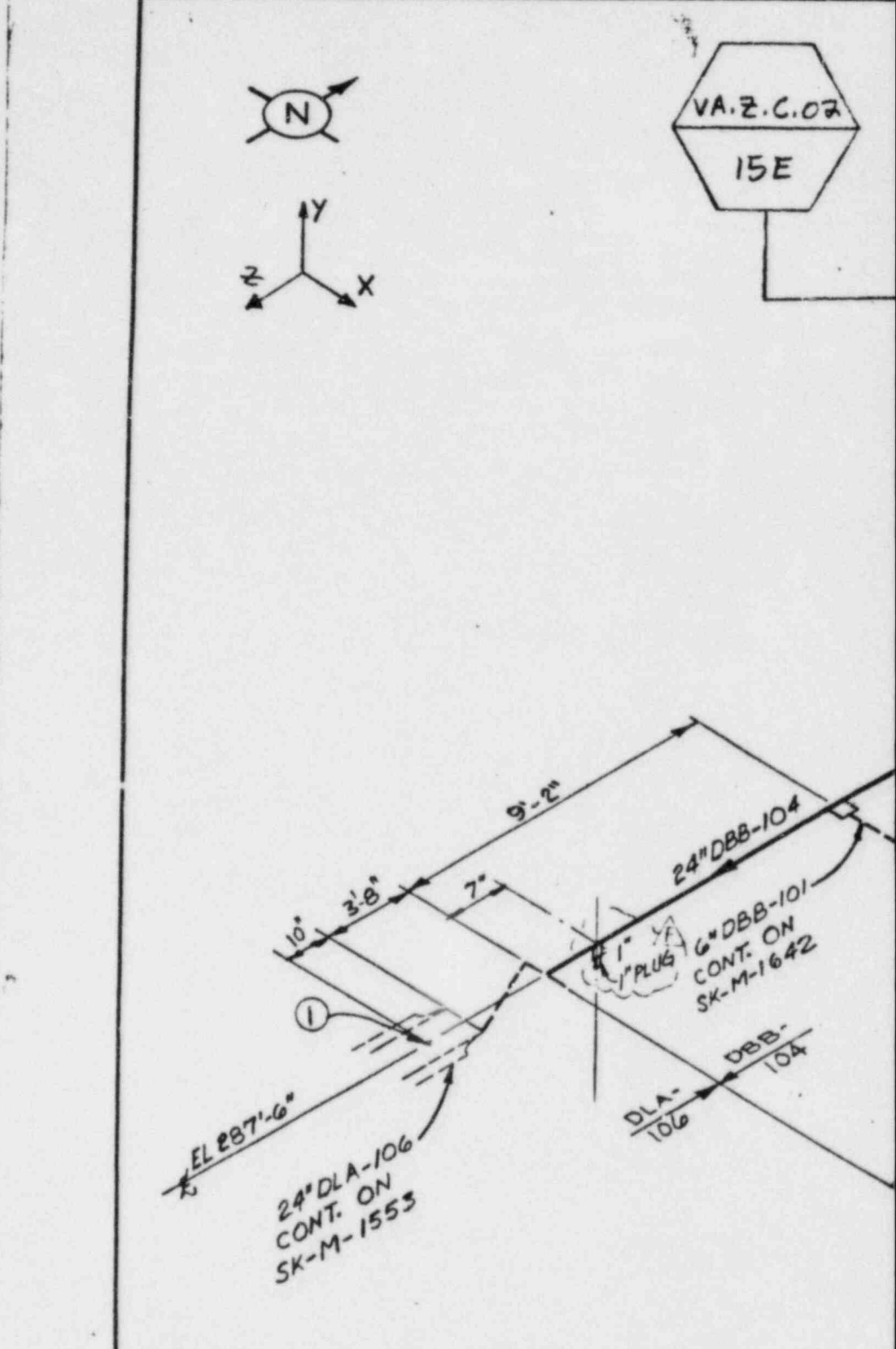
ISOMETRIC - REACTOR BUILDING
FEEDWATER UNIT #1

JOB No.	DRAWING No.	REV
8031	SK-M-1554	M

Specification
8031-P-363

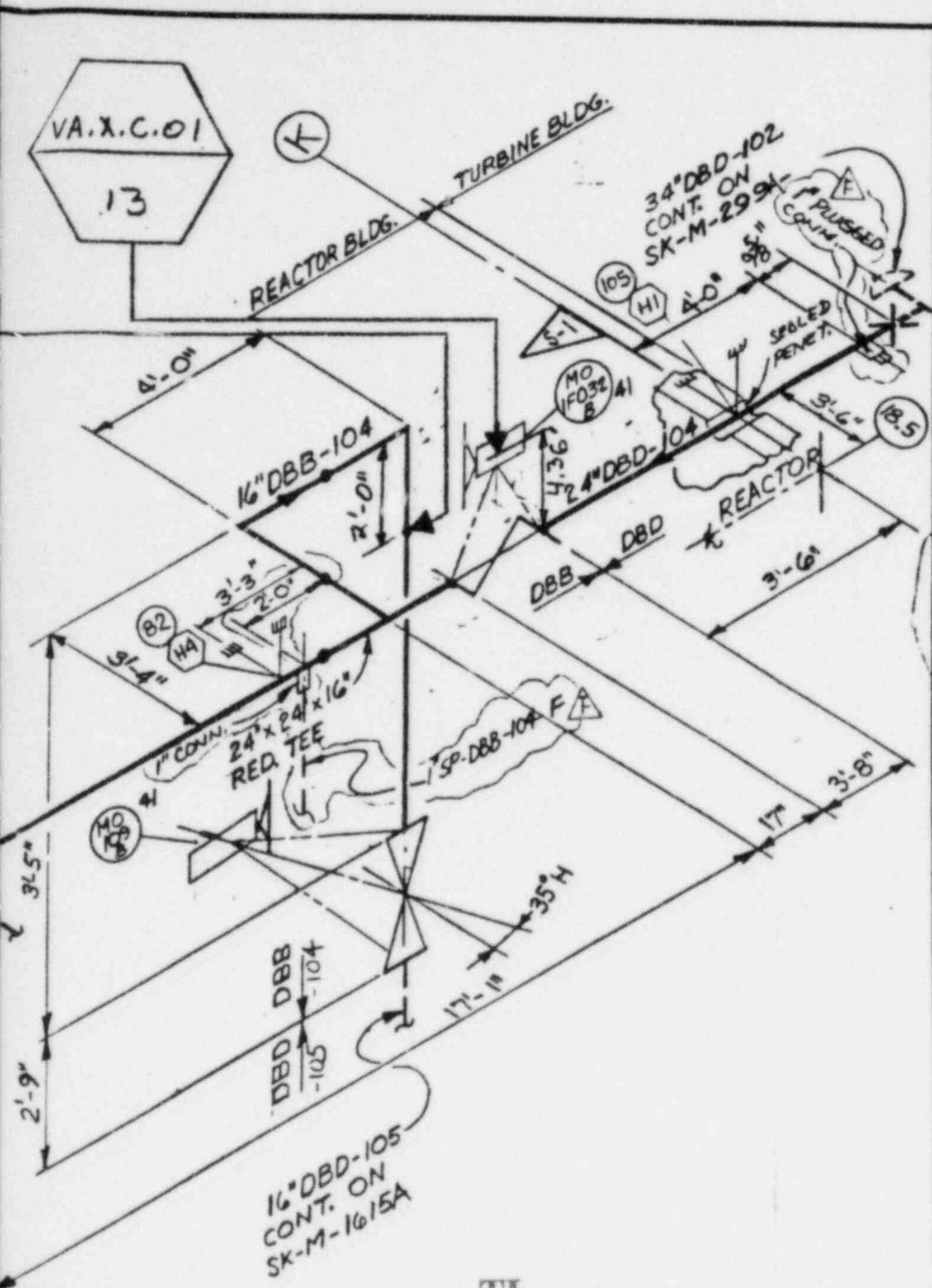
Appendix C

Also Available On
Aperture Card



		DATA			REV	DATE	BY	REV	DATE	B
PIPING ENGINEER	LINE No.	DBB-104								
	MATERIAL	SML ASME SA-106 Gr. B			A	1/17/74	DDZ			
	LINE THICKNESS (IN)	1.812	1.219	—	A	1/17/74	DDZ			
MECHANICAL ENGINEER	LINE O.D. (IN)	24.000	16.000	—	A	1/17/74	DDZ			
	MODE	I	II	III	—	—	—	—	—	—
	PRESS. PSIG									
	TEMP F								F	
STRESS ENGINEER	EXP. COEFF. IN/100FT									
	EXP. COEFF. MIL-IN/IN									
	MOD. OF ELAS. E PSI									

Rev. 1



TI
APERTURE
CARD

Q-LISTED

STRESS APPROVALS		
REV	THERMAL	SEISMIC

REV. F NOTE:

ADDED PIPE SUPPORTS & DATA POINTS FOR RECONCILIATION. DELETED PRESS/TEMP & VALVE DATA PER STRESS GROUP MARK-UP. ADDED PLUGS & 1" CONN. PER FAB ISO. INCORP. FCR-M1620BF.

REFERENCE

M-41	P&ID	[illegible]
M-226	PIPING PLAN	REV. 3
M-234	" "	REV. G
M-189	" "	REV. B

CALC # PI-15-51
DBD-104-1 FAB 150 REV. 9
DBB-104-1 FAB 150 REV. 11

MODE DESCRIPTION

MODE I — NORMAL CONDITIONS
MODE II — MAXIMUM CONDITIONS
MODE III —

8408140320-36

No.	DATE	REVISIONS	BY	CHKD	DESIGN SUPV	CHKD	PROJ ENGR	APPD
F		SEE REV. F NOTE						
E		REV 8" TO 8" TO CLR. VALVE ON DISASSEMBLY PER VENDOR DWG P-104 B-29-4	BW					
D		GEN REV AS NOTED	JC					
C		REVISED AS SHOWN	EO	ALG				
B		ADDED DBD-104 (REISSUE) FOR STRESS ANALYSIS	J.O.					
A	4/15/74	ISSUED FOR STRESS ANAL	J.O.					

DATA			REV	DATE	BY	REV	DATE	BY
DBD-104			-					
SML ASTM A-106 Gr B			B	4/15/74				
1.812	—	—	B	4/15/74				
24,000	—	—	B	4/15/74				
I	II	III						

LEGEND

- SPRING HANGER
- RIGID HANGER
- ANCHOR
- GUIDE
- SNUBBER
- RESTRAINT
- HANGER NUMBER
- STRESS DATA POINT

SCALE — DESIGNED DRAWN J.O. CHECKED

BECHTEL
SAN FRANCISCO

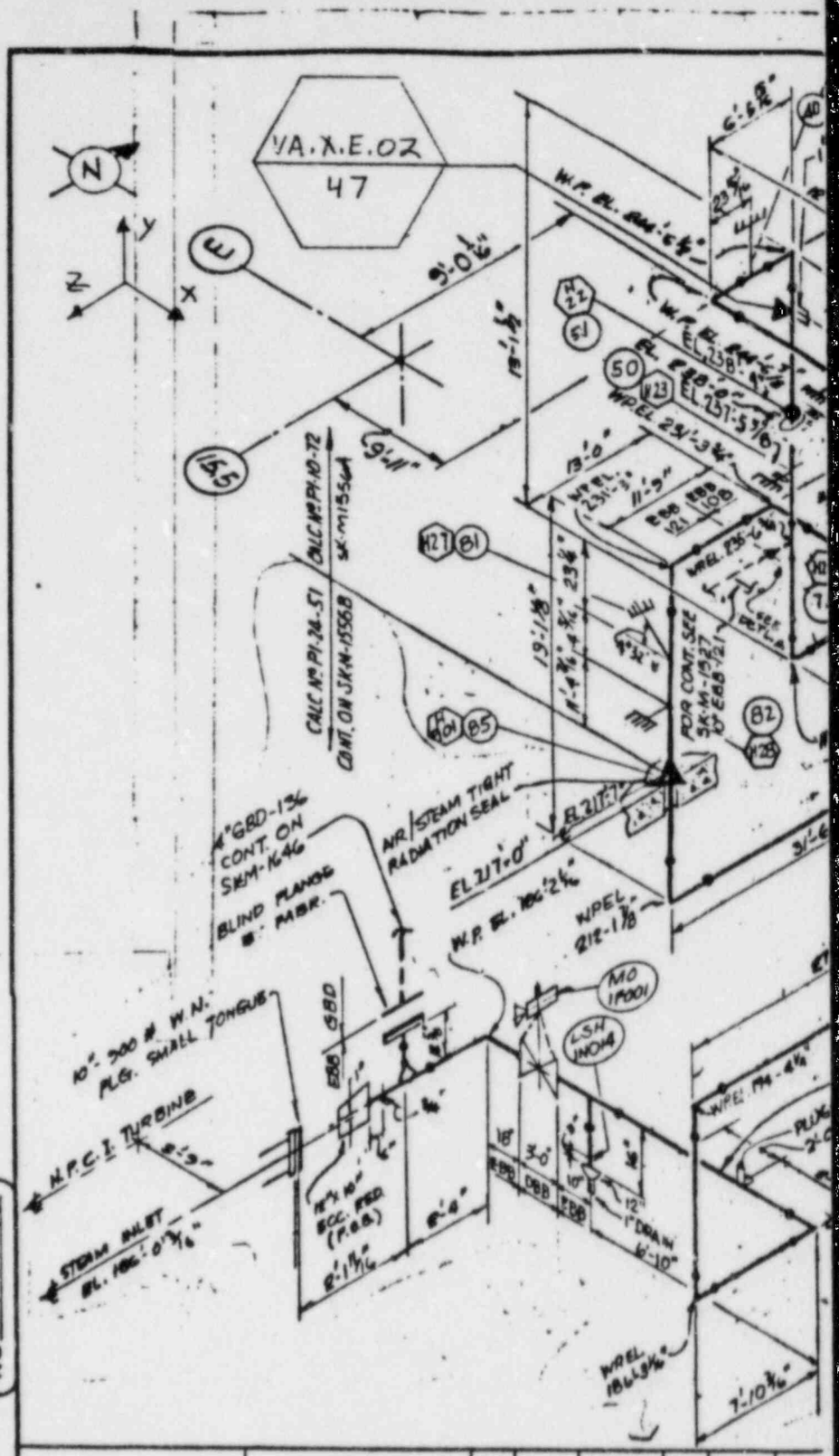
LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

ISOMETRIC — REACTOR BUILDING
FEEDWATER UNIT #1

JOB No.	DRAWING No.	REV
8031	SK-M-1555	F

specification
8031-P-363

Appendix C



		DATA			REV	DATE	BY	REV	DATE	BY
PIPING ENGINEER	LINE No.	EBB-108			E	2-17-77	RRK	1		
	MATERIAL	SML. ASME SA-106, GR. B			E	2-17-77	RRK			
	LINE THICKNESS (IN)	.688	.824		E	2-17-77	RRK			
MECHANICAL ENGINEER	LINE O.D. (IN)	18.750	10.750		E	2-17-77	RRK			
	MODE	I	II	III						
	PRESS. PSIG									
	TEMP F									
STRESS ENGINEER	EXP. COEFF. IN/100FT									
	EXP. COEFF MIL.-IN/IN									
	MOD. OF ELAS. E PSI									

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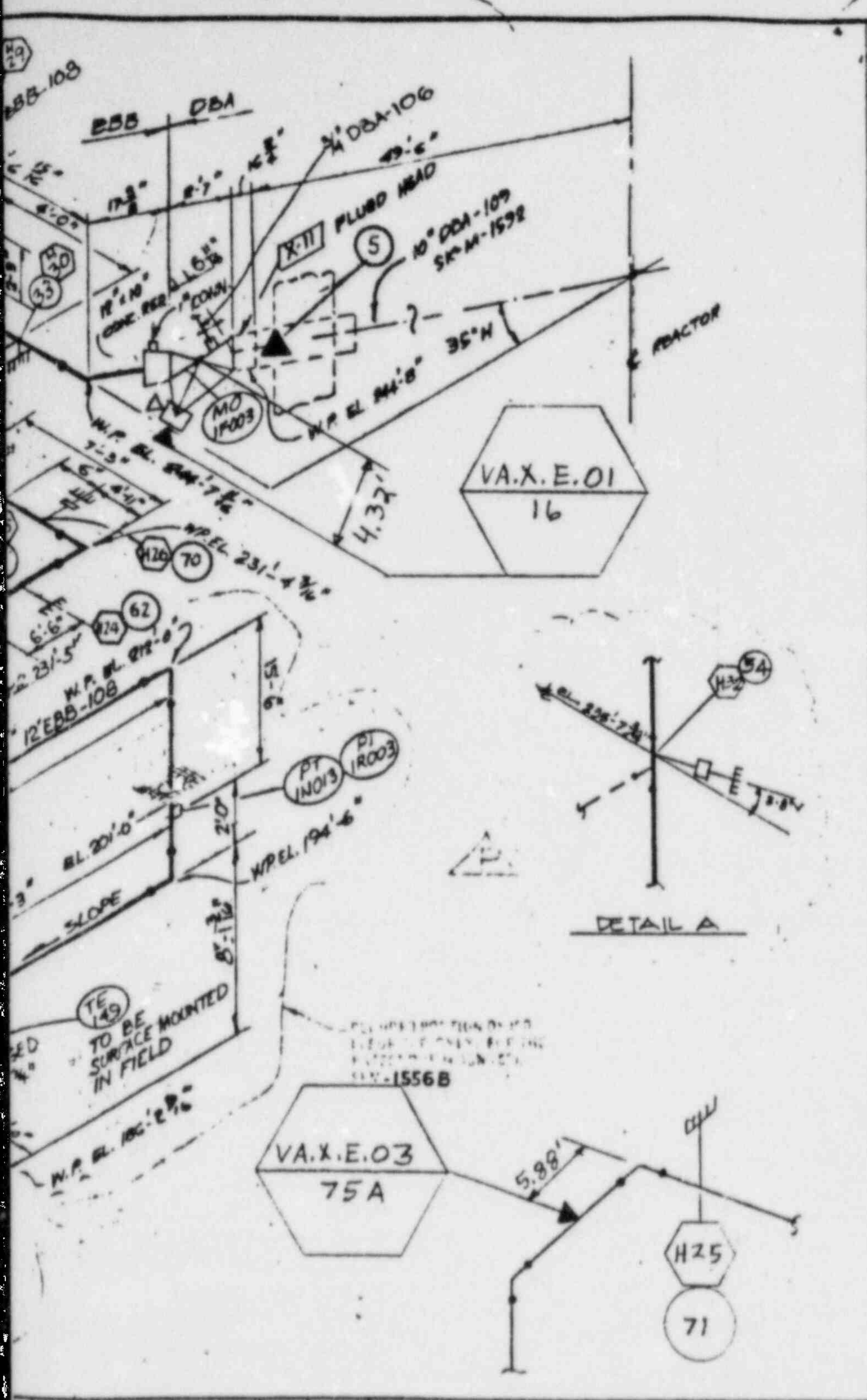
8408140320-37
Rev. 1



STRESS APPROVALS		
REV	THERMAL	SEISMIC

NOTE:

THIS DWG. SUPERSEDES SK-M-362

REV. F NOTE:

ADDED NORTH ARROW, COLUMN REF. & TE-149. ADDED CONT'D STRESS ISO REV. W.P. ELEVATIONS AS NOTED. DIM. 8'-1 3/16" WAS 8'-3 7/16"

REV N NOTE:

DELETED VALVE DATA / PRESS / TEMP. DATA, SK-M-1556A WAS SK-M-1556, ADDED PIPE SUPPORTS & DATA POINTS FOR RECONCILIATION.

REFERENCE STRESS CALC. Nº P1-10-72.

M-55 P&ID
M-227 PIPING PLAN
M-228 " "
M-229 " "
EBB-108-1 REV. 14 [illegible] FAB. ISO.
EBB-108-2 REV. 20 " " "

MODE DESCRIPTION

MODE I - NORMAL SYSTEM NON-OPERATING CONDITIONS.
MODE II - MAXIMUM DESIGN CONDITIONS
MODE III - ACCIDENT SYSTEM OPERATING CONDITIONS.

No.	DATE	REVISIONS	BY	CHKD				APPD
P	[illegible]	REVISED PER H32 REV. 1	AJ	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
N	[illegible]	SEE REV N NOTE	OL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
M	[illegible]	REV PER P&ID M-55	SRY	[illegible]	[illegible]			[illegible]
L	[illegible]	SEE REV. L NOTE	SP	[illegible]	[illegible]			[illegible]
K	[illegible]	ADDED 1" CONN ON 12"x10" CONC. RED.	PV	[illegible]	[illegible]			[illegible]
J	[illegible]	INC. FCR-M-4034F	JBR	[illegible]	[illegible]			[illegible]
H	[illegible]	RELEASED HOLD PER EMF-4797	BY	VE	[illegible]			[illegible]
G	[illegible]	[illegible]	JBR	[illegible]				[illegible]
F	[illegible]	SEE REV. F NOTE	SAL	J.B.	[illegible]		[illegible]	[illegible]
E	[illegible]	[illegible] VALVE DATA	LTL	[illegible]				[illegible]

DATA			REV	DATE	BY	REV	DATE	BY
I	II	III						

LEGEND
- SPRING HANGER
- RIGID HANGER
- ANCHOR
- GUIDE
- SNUBBER
- RESTRAINT
- HANGER NUMBER
- STRESS DATA POINT

DRAWN L. LABAGO

BECHTEL
SAN FRANCISCO

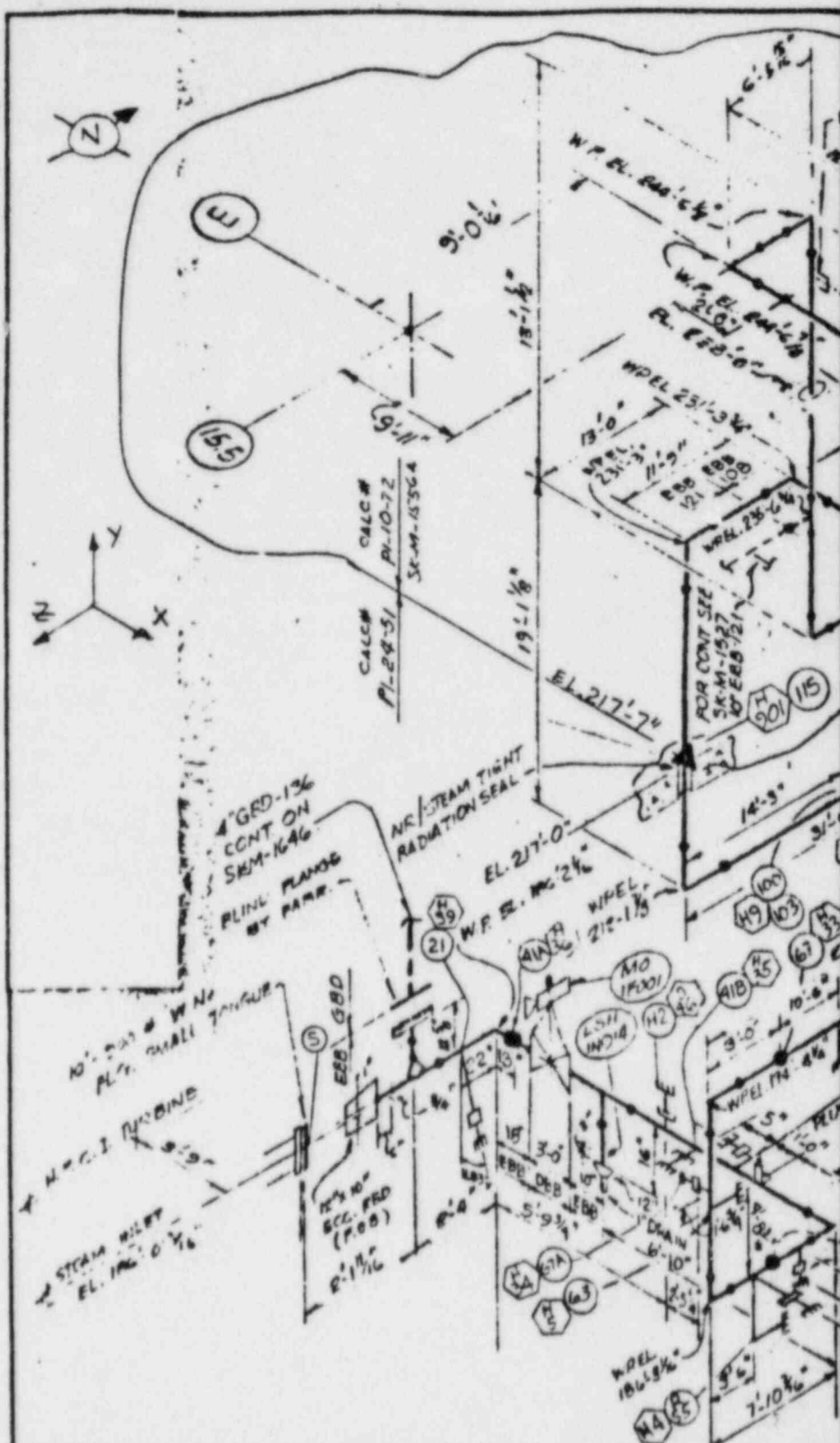
LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

ISOMETRIC - REACTOR BUILDING
HIGH PRESSURE COOLANT INJECTION
UNIT 1

JOB No.	DRAWING No.	REV
8031	SK-M-1556 A	P

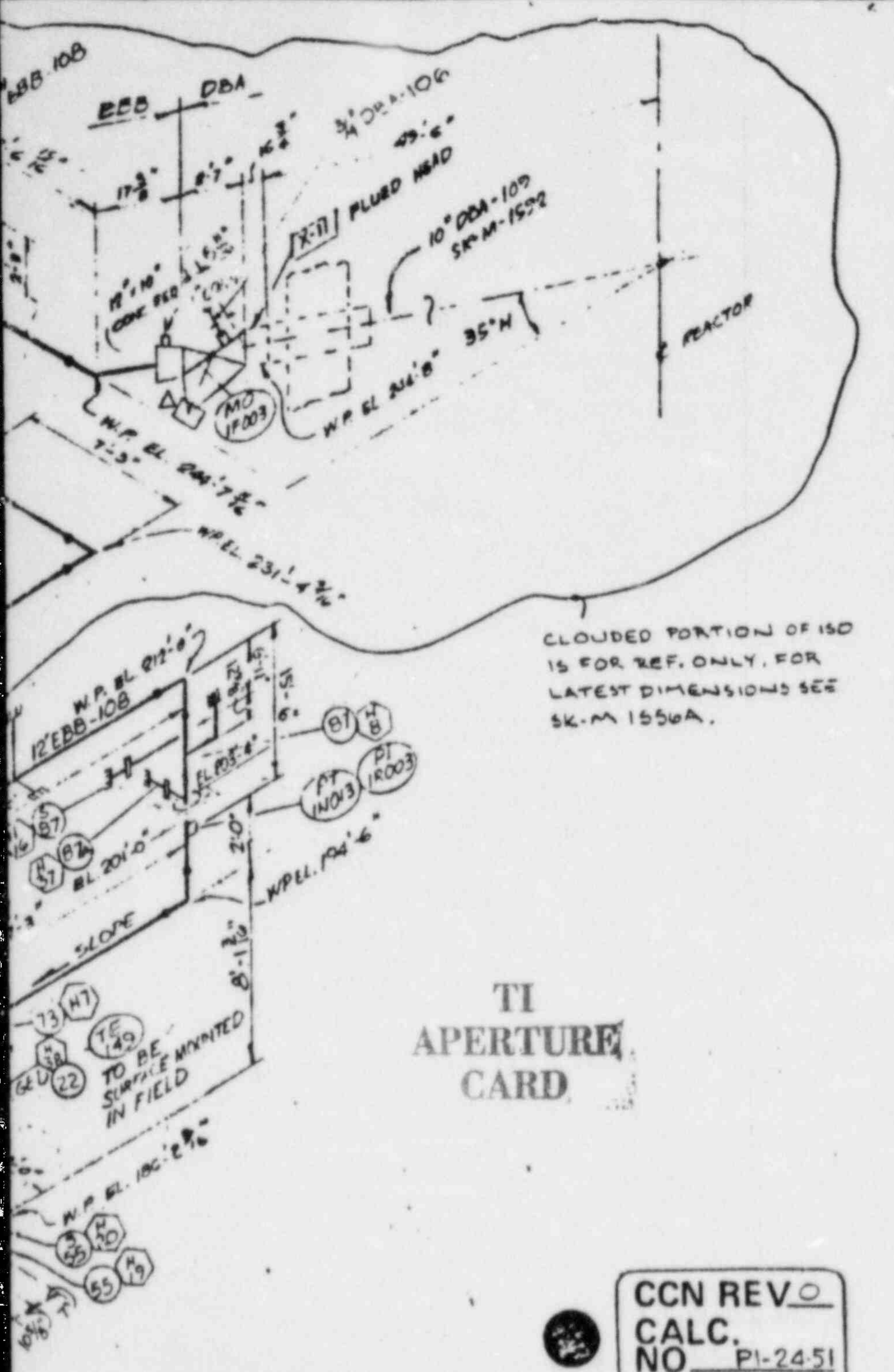
Specification
8031-P-363

Appendix C



		DATA			REV	DATE	BY	REV	DATE	BY
PIPING ENGINEER	LINE No.	EBB-108			E	2-17-77	FJK			
	MATERIAL	SML. ASME SA-106, GR B			E	2-17-77	FJK			
	LINE THICKNESS (IN)	.687	.524		E	2-17-77	FJK			
MECHANICAL ENGINEER	LINE O.D. (IN)	12.750	10.750		E	2-17-77	FJK			
	MODE	I	II	III						
	PRESS. PSIG									
	TEMP. F									
STRESS ENGINEER	EXP. COEFF. IN/100FT									
	EXP. COEFF. MIL-IN/IN									

C-39



TI APERTURE CARD

STRESS APPROVALS		
REV	THERMAL	SEISMIC

NOTE

THIS DWG. SUPERSEDES SK-M-362

REV. F NOTE:

ADDED NORTH ARROW, COLUMN REF. & TE-149. ADDED CONT'D STRESS ISO REV. W.P. ELEVATIONS AS NOTED. DIM. 8'-1 3/16" WAS 8'-3 3/16"

REV. N NOTE

ADDED HANGER SYMBOLS & DATA POINTS PER HANGER MARK-UPS. SK-M-1556B WAS SK-M-1556

REFERENCE

M-55	P&ID	
M-227	PIPING PLAN	
M-228	" "	
M-229	" "	
EBB-108-1	REV 14	FAB. ISO.
EBB-108-2	REV 20	" "

MODE DESCRIPTION

MODE I - NORMAL SYSTEM NON-OPERATING CONDITIONS

MODE II - MAXIMUM DESIGN CONDITIONS

MODE III - ACCIDENT SYSTEM OPERATING CONDITIONS.

STRESS CALC. # PI-24-51

NO	DATE	REVISIONS	BY	CHKD	DESIGN SUPV	ENGR	PROJ ENGR	APPD
N	[illegible]	SEE REV. N NOTE	AV	[illegible]	[illegible]	[illegible]	[illegible]	
M	[illegible]	REV PER P&ID M-56	SRT	[illegible]	[illegible]		[illegible]	
L	[illegible]	SEE REV L NOTE	SP	[illegible]	[illegible]		[illegible]	
K	[illegible]	ADDED 1" CONN ON 12"x10" CONC. RED.	PV	[illegible]	[illegible]		[illegible]	
J	[illegible]	INC. FCR-M-4034F	JBR	[illegible]	[illegible]		[illegible]	
H	[illegible]	RELEASED HOLD PER ENF 4737	BT	V.R.	[illegible]		[illegible]	
G	[illegible]	[illegible]	JBR	[illegible]	[illegible]		[illegible]	
F	[illegible]	SEE REV. F NOTE	SAL	J.B.	[illegible]		[illegible]	
E	[illegible]	[illegible] REV. [illegible] VALVE DATA	LTL	[illegible]	[illegible]	[illegible]	[illegible]	

SCALE	DESIGNED	DRAWN L. LABAGO	CHKD

CCN REV 0
CALC. NO PI-24-51

DATA			REV	DATE	BY	REV	DATE	BY
I	II	III						

LEGEND

- SPRING HANGER
- RIGID HANGER
- ANCHOR
- GUIDE
- SNUBBER
- RESTRAINT

BECHTEL
SAN FRANCISCO

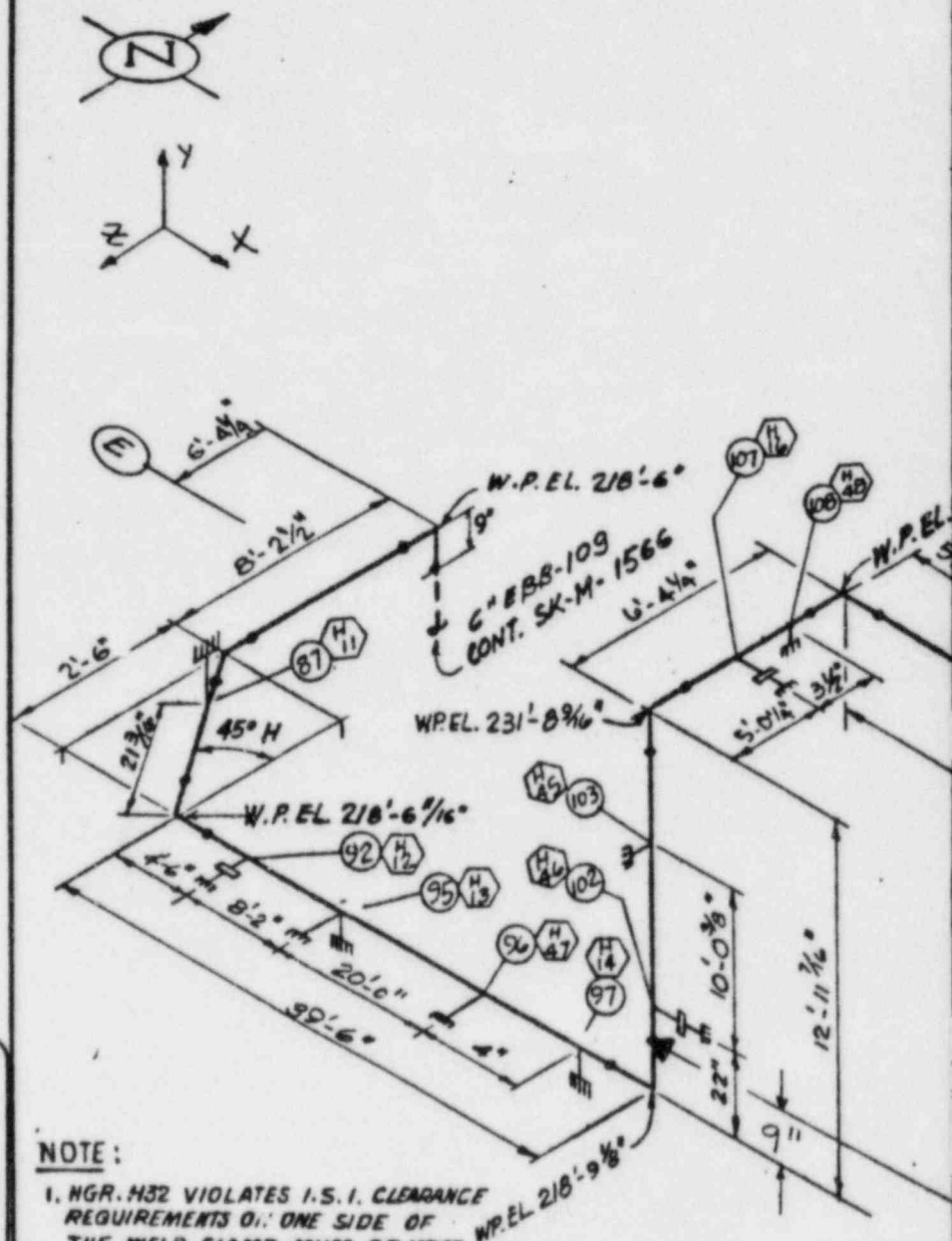
LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

ISOMETRIC - REACTOR BUILDING
HIGH PRESSURE COOLANT INJECTION
UNIT I

JOB No.	DRAWING No.	REV.
8031	SK-M-1556 B	N

specification
8031-P-363

Appendix C



NOTE:

1. HGR. H32 VIOLATES I.S.I. CLEARANCE REQUIREMENTS O.: ONE SIDE OF THE WELD. CLAMP MUST BE MOVED FOR WELD INSPECTION, TEMP. SUPPORT PROVIDED AS REPORT ON FCR M14304F.

CCN REV 0
CALC. NO P1-22-51

		DATA			REV	DATE	BY	REV	DATE	BY
PIPING ENGINEER	LINE No.	EBB-109								
	MATERIAL	SML ASME SA-106 Gr.B			A	11-4-73	BDZ			
	LINE THICKNESS (IN)	.432			A	11-9-73	BDZ			
MECHANICAL ENGINEER	LINE O.D. (IN)	6.625			A	11-9-73	BDZ			
	MODE	I	II	III						
	PRESS. PSIG									
	TEMP F									
STRESS ENGINEER	EXP. COEFF. IN/100FT				—	—	—	1		
	EXP. COEFF. MIL-IN/IN									
	MOD. OF ELAS. PSI									

C-4D

Rev. 1

STRESS APPROVALS		
REV	THERMAL	SEISMIC
A	RR [illegible] 4-9-79	

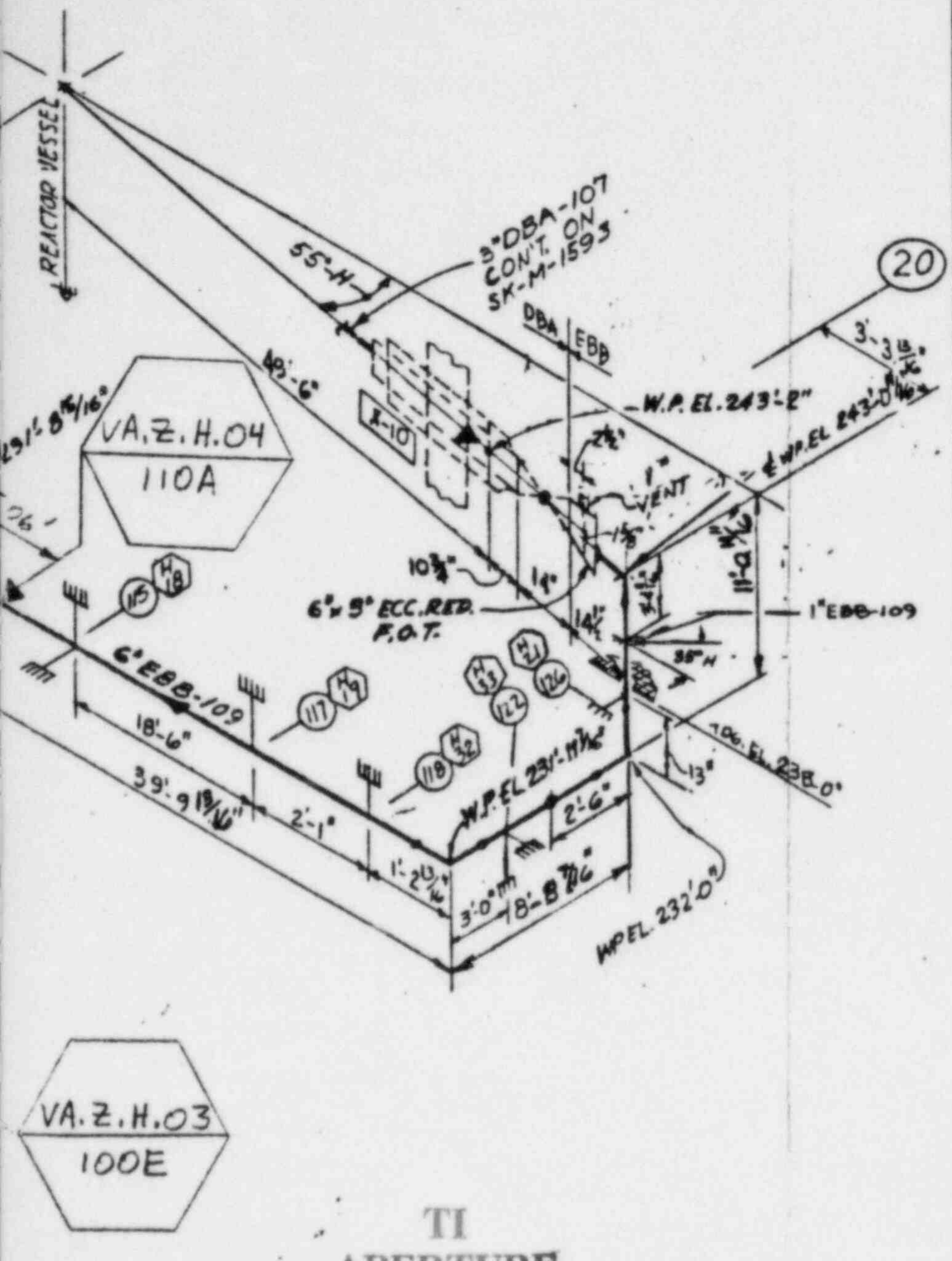
REV. F NOTE:

ADDED HANGER SYMBOLS & DATA POINTS PER HANGER MARK-UPS.
ADDED HANGER NOTE 1 TO REF. FCR M14304F.

REV. G NOTE:

DELETED TEMP & PRESS. DATA PER STRESS REQUEST.

ADDED HANGER NO'S & DATA POINTS FOR RECONCILIATION.
INCORP. FCR # M 17.128 F



TI APERTURE CARD

REFERENCE

FCR # M17.128F
STRESS CALC NO. P1-22-51
FCR M14304F
M-49 P&ID
M-216 SECTION
M-229 PIPING PLAN
M-239 "
M-208 "
EBB-109-1 FAB. 150 REV 22

MODE DESCRIPTION

MODE I – NORMAL CONDITIONS (SYSTEM NOT OPERATING)
MODE II – MAXIMUM DESIGN CONDITIONS (MAX. REACTOR PRESSURE)
MODE III – OPERATING CONDITIONS (DURING ACCIDENT)

G	[illegible]	SEE REV. G NOTE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
F	3-1-82	SEE REV. F NOTE	ALG BR	[illegible]	JSB	/	[illegible]	
E	[illegible]	INC FCR-M-4102 F	R	[illegible]		/	[illegible]	
D	[illegible]	PLUGGED 1" V-CONN.	ALG	[illegible]	[illegible]	[illegible]	[illegible]	
C	[illegible]	ADDED VENT	RJS	[illegible]	[illegible]	[illegible]	[illegible]	
B	[illegible]	[illegible] EBB-109 DELETED VENT	EBB	[illegible]	[illegible]	[illegible]	[illegible]	
A	[illegible]	ISSUED FOR STRESS ANALYSIS	T.S	[illegible]	PT	[illegible]	[illegible]	
No.	DATE	REVISIONS	BY	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Q-LISTED

DATA			REV	DATE	BY	REV	DATE	BY
I	II	III						

LEGEND

- SPRING HANGER
- RIGID HANGER
- ANCHOR
- GUIDE
- SNUBBER
- RESTRAINT
- HANGER NUMBER
- STRESS DATA POINT

SCALE — DESIGNED — DRAWN SHAMIAN

BECHTEL
SAN FRANCISCO

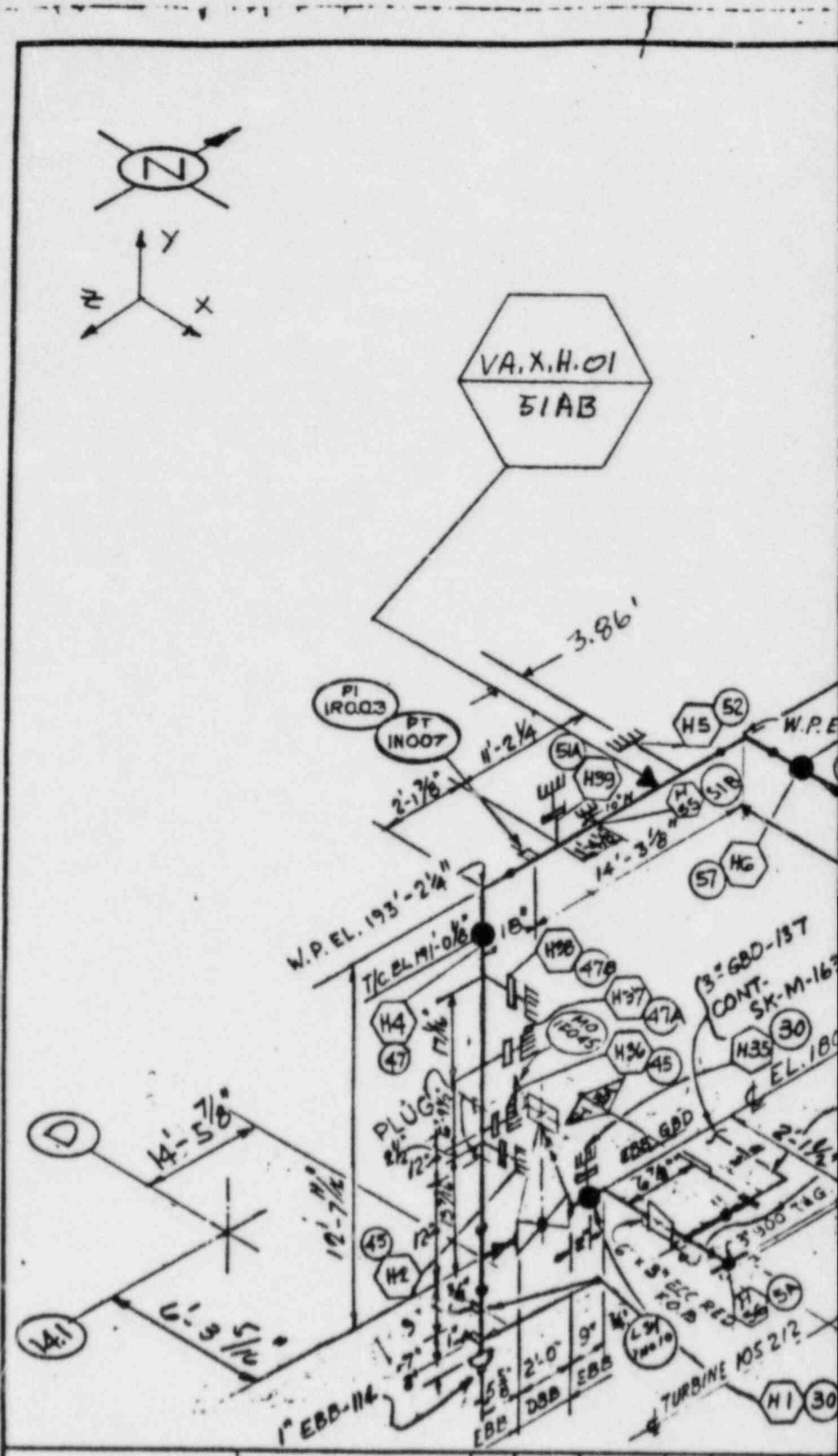
LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

ISOMETRIC REACTOR BUILDING – REACTOR CORE ISOLATION COOLING - UNIT # 1

JOB No.	DRAWING No.	REV.
8031	SK-M-1565	G

Specification
8031-P-363

Appendix C

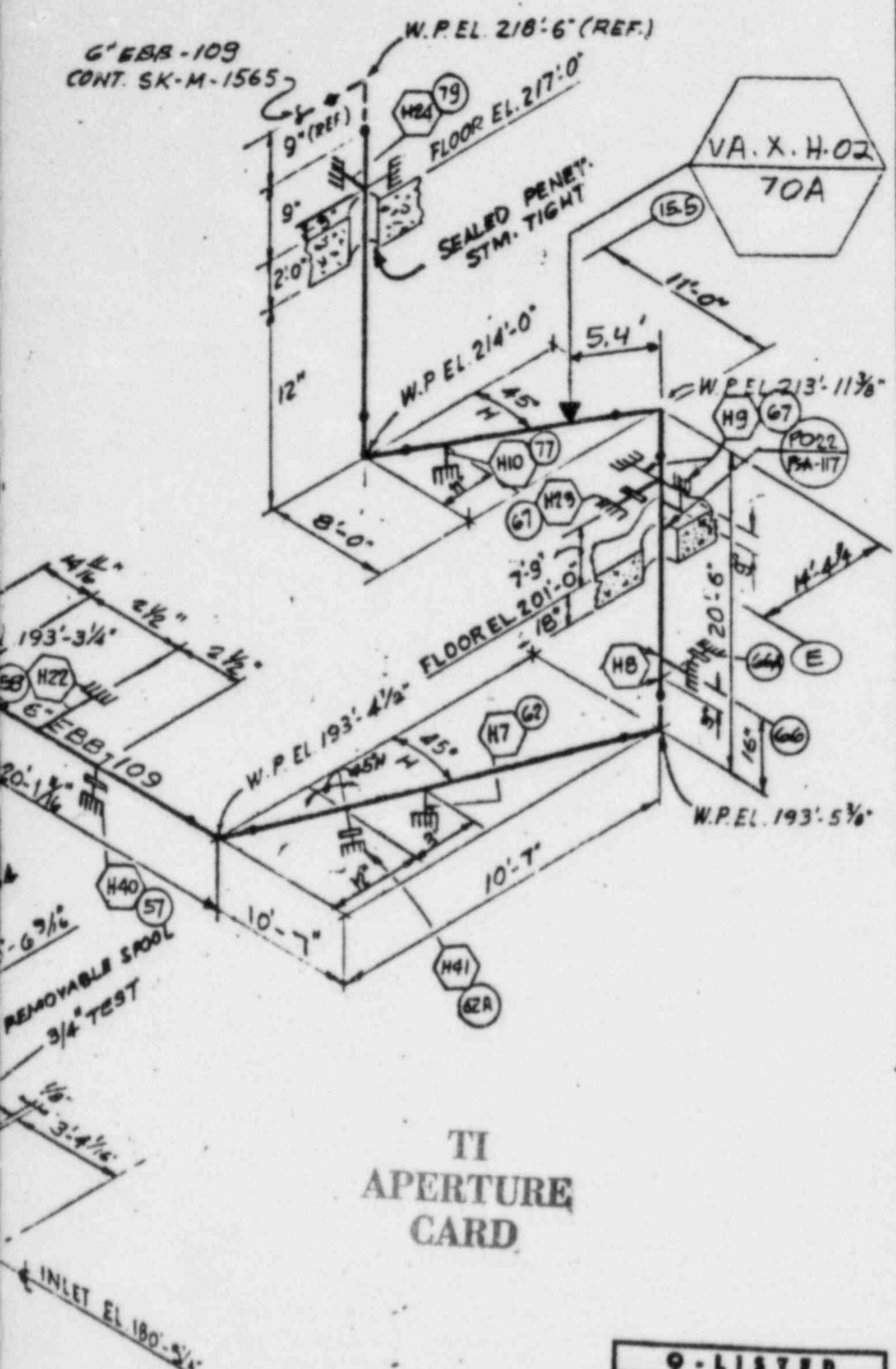


CCN REV 0
CALC. NO PI-22-81

		DATA			REV	DATE	BY	REV	DATE	BY
PIPING ENGINEER	LINE No.	EBB-109								
	MATERIAL	SML ASME SA-106 Gr B			A	11-4-73	BAZ			
	LINE THICKNESS (IN)	.432	.438		A	11-4-73	BAZ			
MECHANICAL ENGINEER	LINE O.D. (IN)	6.625	3.500		A	11-4-73	BAZ			
	MODE	I	II	III						
	PRESS. PSIG									
	TEMP F									
STRESS ENGINEER	EXP. COEFF. IN/100FT									
	EXP. COEFF MIL-IN/IN								J1	
	MOD. OF ELAS. E PSI									

C-41

8408140320-40
Rev. 1



STRESS APPROVALS		
REV	THERMAL	SEISMIC
A	RR 4-9-74	

REV. J NOTE:

REV. CONFIGURATION TO MATCH FAB 150 & ADDED HANGER SYMBOLS & DATA POINTS PER HANGER GROUP MARK-UP
DELETED TEMP., PRESS & VALVE DATA PER STRESS REQUEST.
INCORP. FCR # M 17. 128F

REFERENCE
M-49 P&ID
M-50 "
M-214 PIPING SECT.
M-216 " "
M-228 " PLAN
EBB-109-1 FAB 150. REV. 21
STRESS CALC NO P1-22-5
FCR# M 17 128F

MODE DESCRIPTION
MODE I - NORMAL CONDITIONS (SYSTEM NOT OPERATING)
MODE II - MAXIMUM DESIGN CONDITIONS (MAX REACTOR PRESSURE)
MODE III - OPERATING CONDITIONS (DURING ACCIDENT)

No.	DATE	REVISIONS	BY	CHKD	DESIGN SUPV	ENGR	PROJ ENGR
J	[illegible]	SEE REV. J NOTE	B.S.	[illegible]	[illegible]	[illegible]	[illegible]
H	[illegible]	ADDED PENET ID P022/PSA-117	JMC	[illegible]	BL		[illegible]
G	[illegible]	REV. PER FCR M-7778F	PB	[illegible]	[illegible]		[illegible]
F	[illegible]	ADDED FLOOR AT ELEV. 201'-0"	C.S.	[illegible]	[illegible]		[illegible]
E	[illegible]	REVISED AS SHOWN	ALG	[illegible]	[illegible]	[illegible]	[illegible]
D	[illegible]	REV. VALVE DATA & PT	GHG	[illegible]	[illegible]	[illegible]	[illegible]
C	[illegible]	REV. AS SHOWN	EBB	ALG	[illegible]	[illegible]	[illegible]
B	[illegible]	[illegible]	ALG	[illegible]	[illegible]	[illegible]	[illegible]
A	[illegible]	ISSUED FOR STRESS ANALYSIS	T.S.	[illegible]	PP		[illegible]

DATA			REV	DATE	BY	REV	DATE	BY
I	II	III						

LEGEND
- SPRING HANGER
- RIGID HANGER
- ANCHOR
- GUIDE
- SNUBBER
- RESTRAINT
- HANGER NUMBER
- STRESS DATA POINT

SCALE — DESIGNED — DRAWN SHACTAK

BECHTEL
SAN FRANCISCO

LIMERICK GENERATING STATION UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

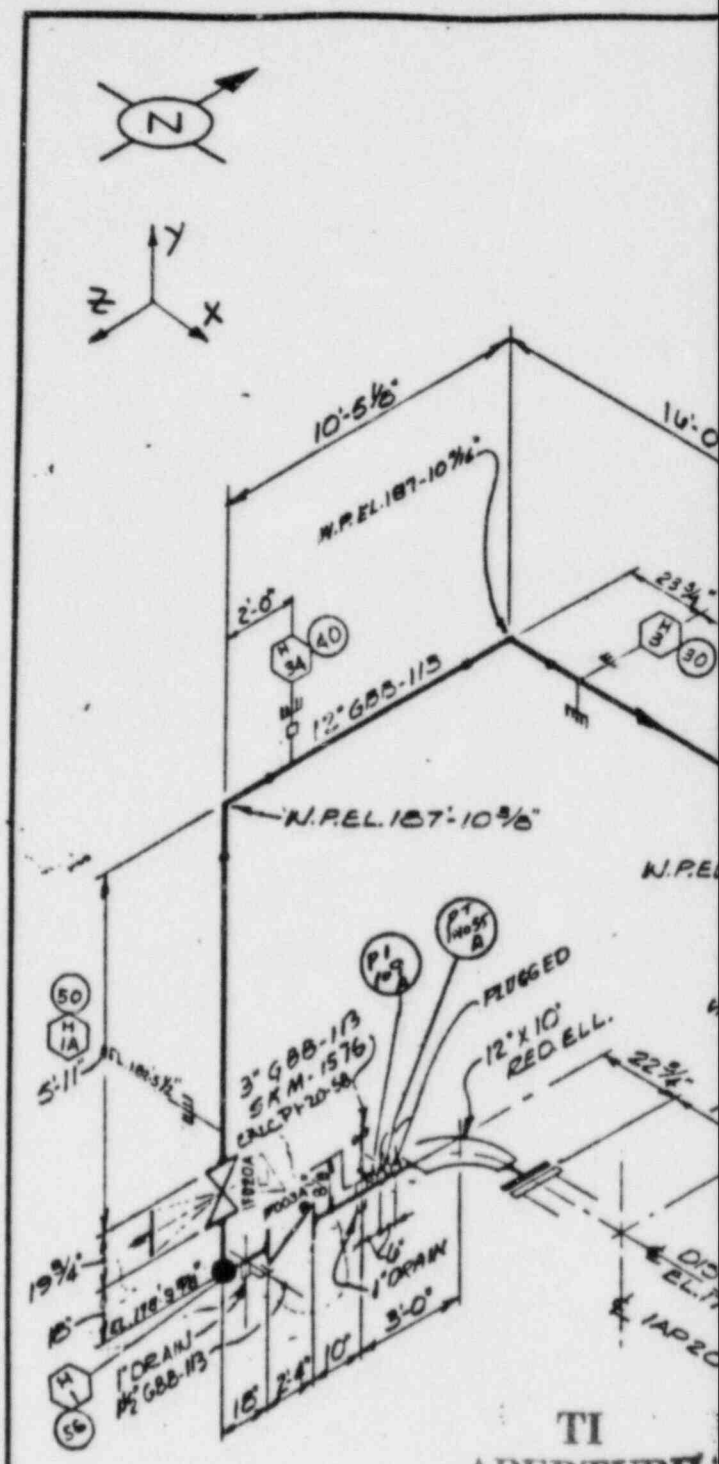
ISOMETRIC REACTOR BUILDING
REACTOR CORE ISOLATION COOLING - UNIT 1

JOB No.	DRAWING No.	REV.
8031	SK-M-1566	J

specification
8031-P-363

Appendix C

Also Available On
Aperture Card



TI APERTURE CARD

		DATA			REV	DATE	BY
PIPING ENGINEER	LINE No.	GBB-113					
	MATERIAL	SMLS. ASME SA-106, GRB			A	10/4/82	[illegible]
	LINE THICKNESS (IN)	.375	.375	.365	A	10/4/82	[illegible]
MECHANICAL ENGINEER	LINE O.D. (IN)	14.000	12.750	10.750	A	10/4/82	[illegible]
	MODE	I	II	III			
	PRESS. PSIG						
	TEMP F						
STRESS ENGINEER	EXP. COEFF. IN/100FT						
	EXP. COEFF. MIL.-IN/IN						
	MOD. OF ELAS. E PSI						

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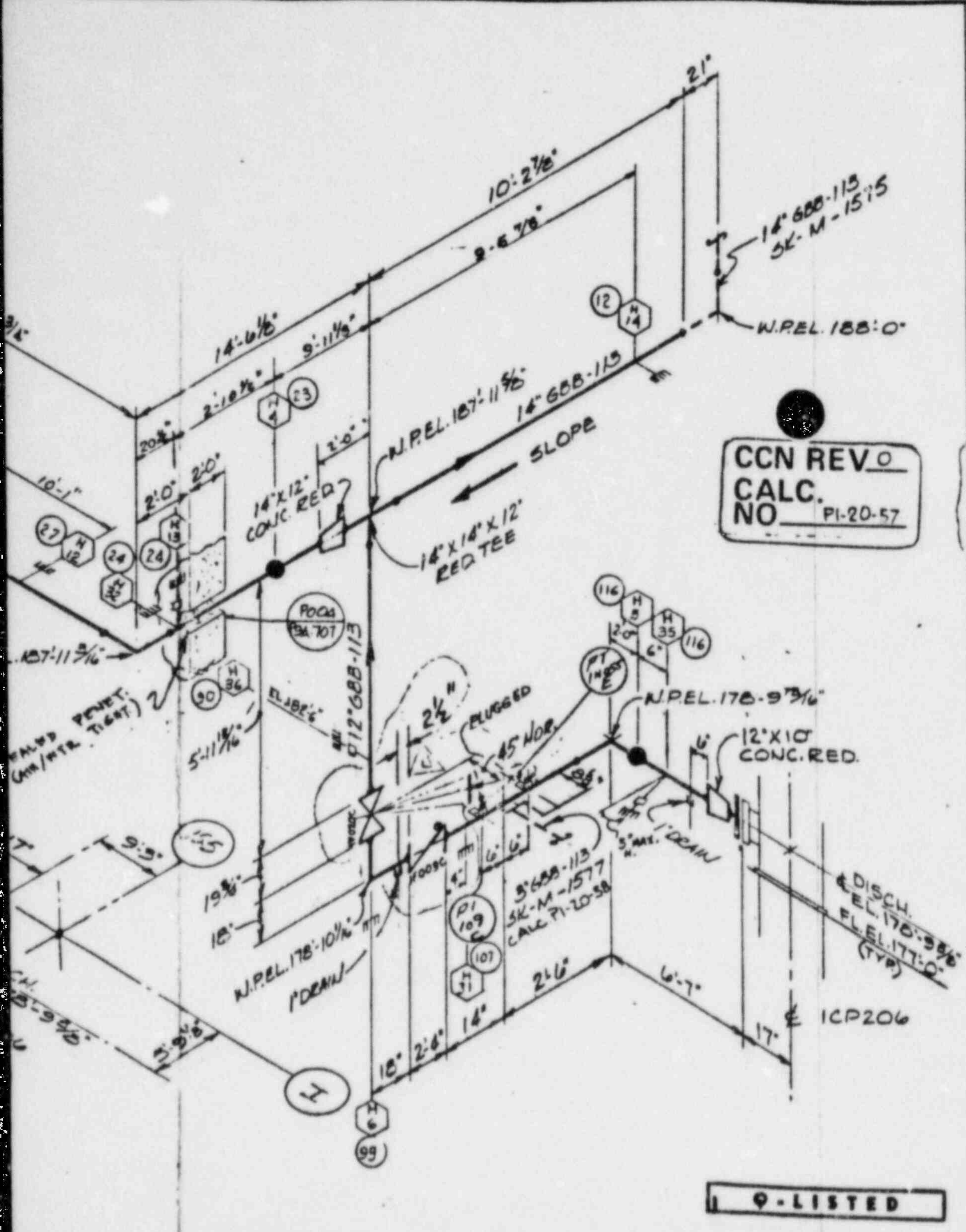
8408140320-41

Rev 1



	STRESS APPROVALS		
REV	THERMAL		
B	RRA		RR

Rev. J Note:

ADDED PIPE SUPPORTS & DATA POINTS ... CILIATION & DELETED VALVE, TEMP & ... PER STRESS GROUP MARK-UP & ADD ... PER P&ID M-52 REV. 22

CCN REV 0
CALC. NO P1-20-57

J

REFERENCE

M-52 P&ID 2
M-206 PIPING PLAN
GBB-113-2 FAB 130 REV
GBB-113-1 FAB. 160. REV.
STRESS CALC# P1-20-57

MODE DESCRIPTION

MODE I - NORMAL SYSTEM ... CONDITIONS (DURING ACCI...
MODE II - MAXIMUM SHUTOFF ... (CLOSE DISCHARGE VALVE)

REV	DATE	REVISION	BY		
J	8/83	SEE REV. J NOTE	HSN		
H	1/81	ADDED DIM'N PER ECR M-1342EF. ADDED PENET. I.D. P004/PSA-707	JMC	RP F	
G	4/80	REISSUED WITH CONN PER ... AND ADDED ... CONN PER ...	DTO		
F		INCORP FCR M-...	R	TB	
E		REORIENTED PT & P1			
D		ADDED BRANCH ...	EBB		
C		ADDED ...			
B		ADD MODE DESCRIPTION	TS		
A		ISSUED FOR STRESS ANALYSIS			

9-LISTED

REV	DATE	BY	DATA			REV	DATE	BY	REV	DATE	BY
			I	II	III						

LEGEND

- SPRING HANGER
- RIGID HANGER
- ANCHOR
- GUIDE
- SNUBBER
- RESTRAINT
- HANGER NUMBER
- STRESS DATA POINT

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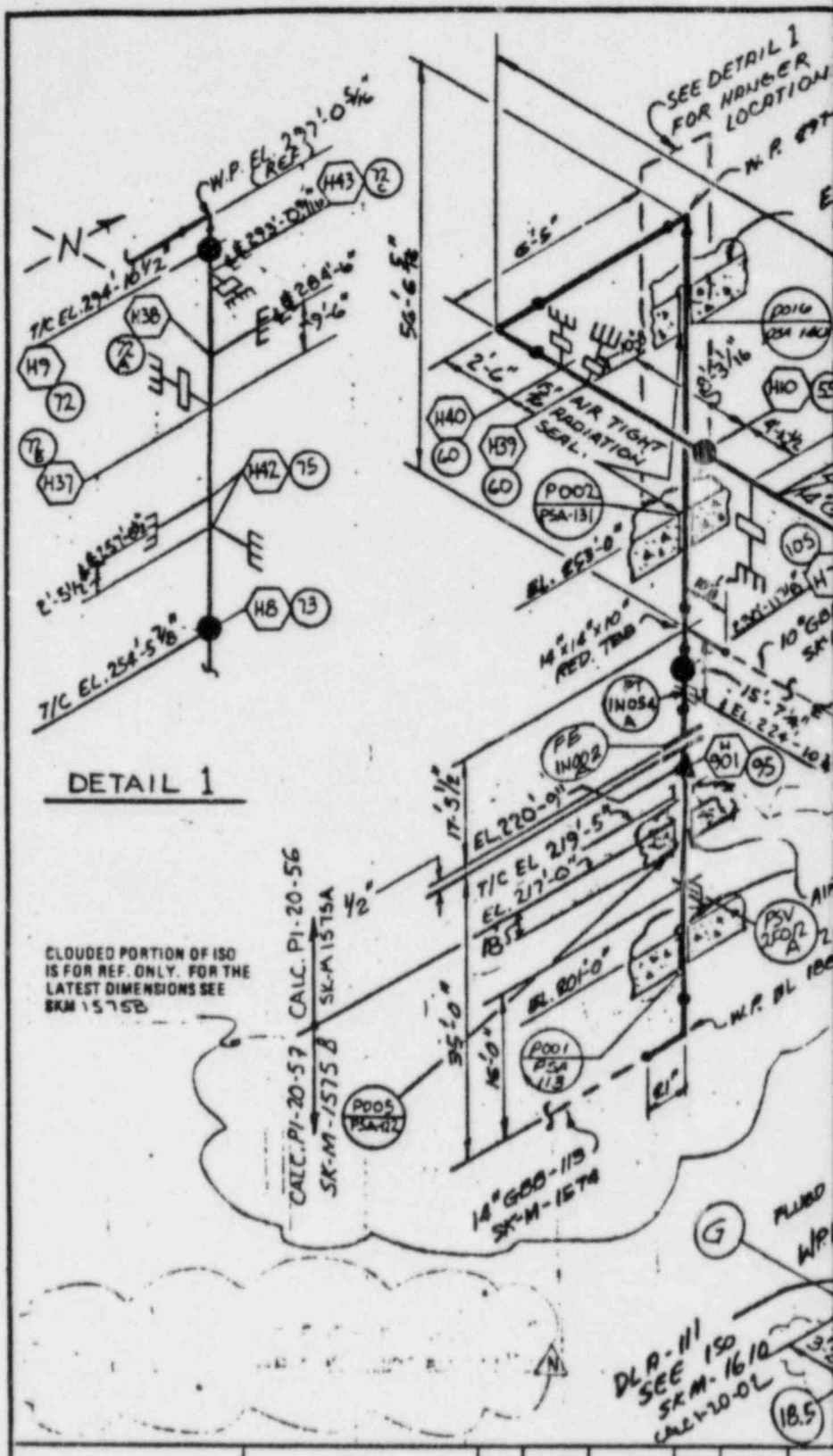
LIMERICK GENERATING ...
UNITS 1 & 2
PHILADELPHIA ELECTRIC CO...

ISOMETRIC - REACTOR ...
CORE SPRAY SYSTEM - ...

8031 SK-M...

Specification
8031-P-363

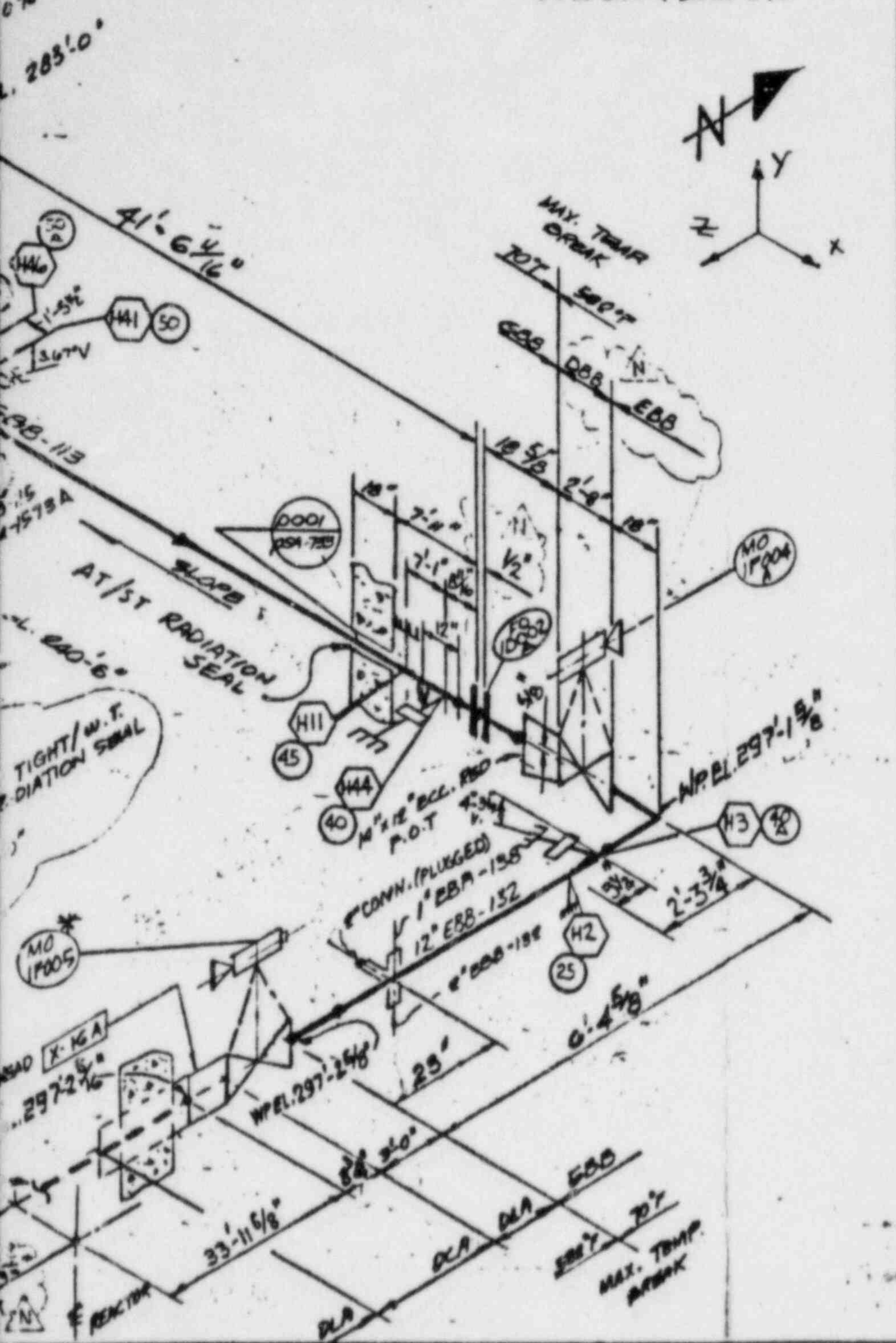
Appendix C



		DATA			REV	DATE	BY	REV	DATE	
PIPING ENGINEER	LINE No.	GBB-113			E	2-17-77	RRK			
	MATERIAL	SML. ASME SA-106, GR.B			E	2-17-77	RRK			
	LINE THICKNESS (IN)	.375			E	2-17-77	RRK			
MECHANICAL ENGINEER	LINE O.D. (IN)	14.000			E	2-17-77	RRK			
	MODE	I	II	III						
	PRESS. PSIG									
	TEMP F									
STRESS ENGINEER	EXP. COEFF. IN/100FT									
	EXP. COEFF. MIL-IN/IN									
	MOD. OF ELAS. PSI									

C-43

NOTE:
THIS DWG SUPERSEDES SK-M-344 & SK-M-346



STRESS APPROVALS		
REV	THERMAL	SEISMIC

REFERENCE:
- M-52 P&ID
- M-206 PIPING PLAN
- M-207 " "
- M-208 " "
- M-209 " "
- M-210 " "
- EBB-132-1 FAB ISO. REV. 16
- GBB-113-3 FAB ISO. REV. 18
- REF. FCR M-1426BF
- STRESS CALC NO PI-20-56

MODE DESCRIPTION GBB-113

MODE I: NORMAL SYSTEM OPERATING
MODE II: MAXIMUM SHUTOFF CONDITION (C.S.)
MODE III: C.S. SYSTEM NON-OPERATING
FILL SYSTEM NON-OPERATING

MODE DESCRIPTION EBB-132

MODE I: NORMAL SYSTEM OPERATING (RPV)
MODE II: MAXIMUM DESIGN OPERATING COND (F004 CLOSED, F005 OPENED)
MODE III: C.S. SYSTEM NON-OPERATING
FILL SYSTEM NON-OPERATING (F005 CLOSED, F004 OPENED)

GBB-113 \ EBB-132	I	II	III
I			
II			
III	X	X	X

REV. J. NOTE

ADDED 3/4" CONN FOR PT-1N064A PER P&ID M-52 REV.9

REV. K NOTE:

REV. PER FCR M-7585F

REV. N NOTE:

ADDED PIPE SUPPORTS & DATA POINTS FOR RECONCILIATION; DELETED PRESS/TEMP. DATA PER STRESS GROUP MARK-UP; CORRECTED PIPE CLASS AT VALVE & DIM'S AT F.O.; REVISED Col LINE DIM 3'-2 3/16" (WAS 3'-0 1/2").

N		SEE REV. N NOTE	[illegible]	[illegible]	[illegible]	[illegible]		
M	[illegible]	ADDED REF. FCR M-1426BF	EG	[illegible]	JSB			[illegible]
L	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			[illegible]
K	[illegible]	SEE REV. K NOTE	PG	[illegible]	[illegible]			[illegible]
E	[illegible]	[illegible] REV.	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]
NO.	DATE	REVISIONS	BY	[illegible]	[illegible]	[illegible]	[illegible]	APPD

SCALE NONE | DESIGNED | DRAWN L. LABADO

DATA	REV	DATE	BY	REV	DATE	BY	LEGEND
EBB-132	E	2-17-77	RRK				SPRING HANGER
SML. ASME SA-106, GR.B	E	2-17-77	RRK				RIGID HANGER
.688	E	2-17-77	RRK				ANCHOR
12.750	E	2-17-77	RRK				GUIDE
I II III							SNUBBER
							RESTRAINT
							STRESS DATA POINT
							HANGER NUMBER

BECHTEL
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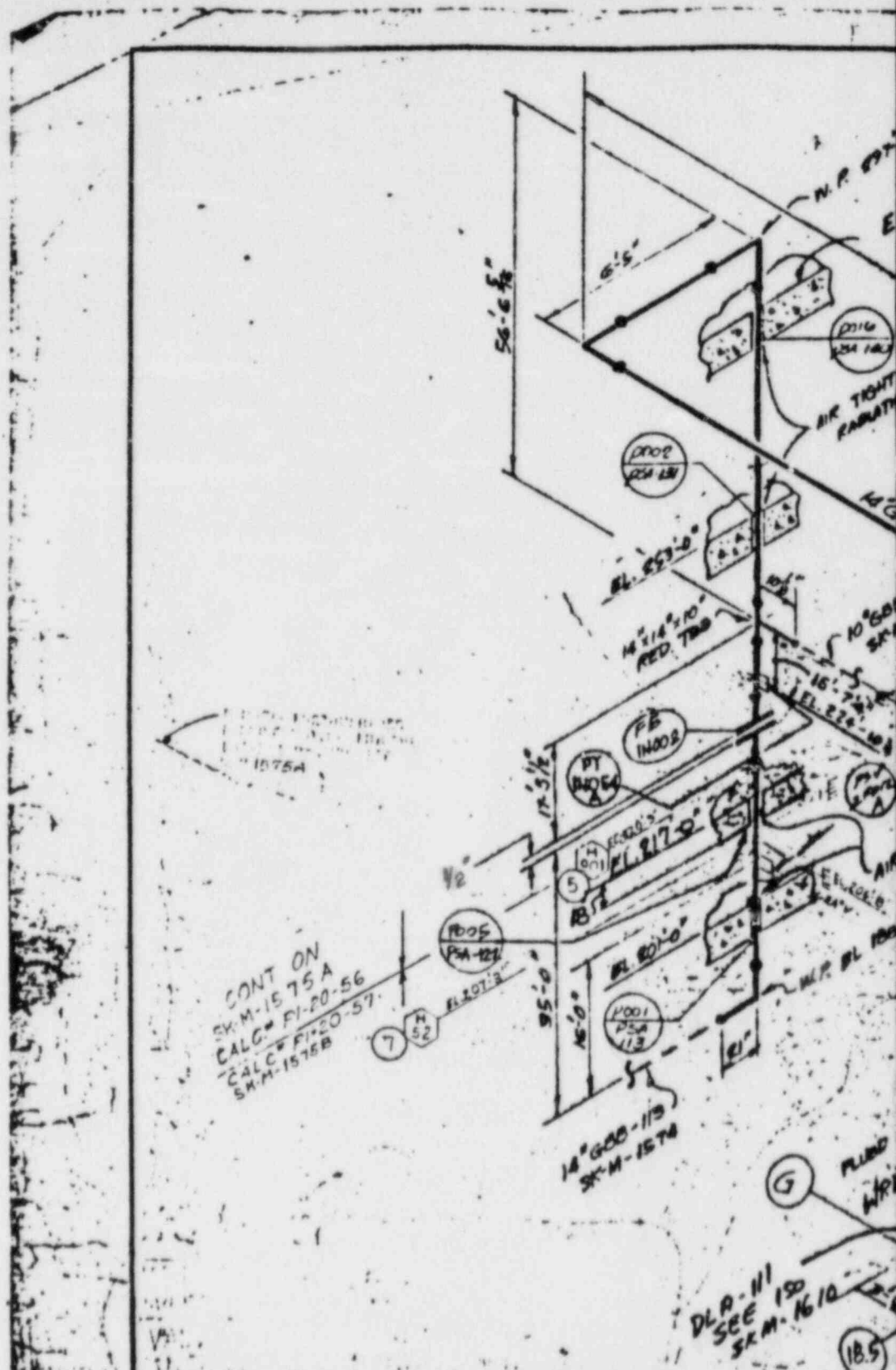
LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

ISOMETRIC - REACTOR BUILDING
CORE SPRAY SYSTEM - UNIT # 1

JOB No.	DRAWING No.	REV
8031	SK-M-1575A	N

Specification
8031-P-363

Appendix C



		DATA			REV	DATE	BY	REV	DATE	
PIPING ENGINEER	LINE No.	GBB-113			E	2-17-77	RRK			
	MATERIAL	SWL. ASME SA-106, GR.B			E	2-17-77	RRK			
	LINE THICKNESS (IN)	.375			E	2-17-77	RRK			
MECHANICAL ENGINEER	LINE O.D. (IN)	14.000			E	2-17-77	RRK			
	MODE	I	II	III ●						
	PRESS. PSIG									
	TEMP F									
STRESS ENGINEER	EXP. COEFF. IN/100FT									
	EXP. COEFF. MIL-IN/IN									
	MOD. OF ELAS. X PSI									

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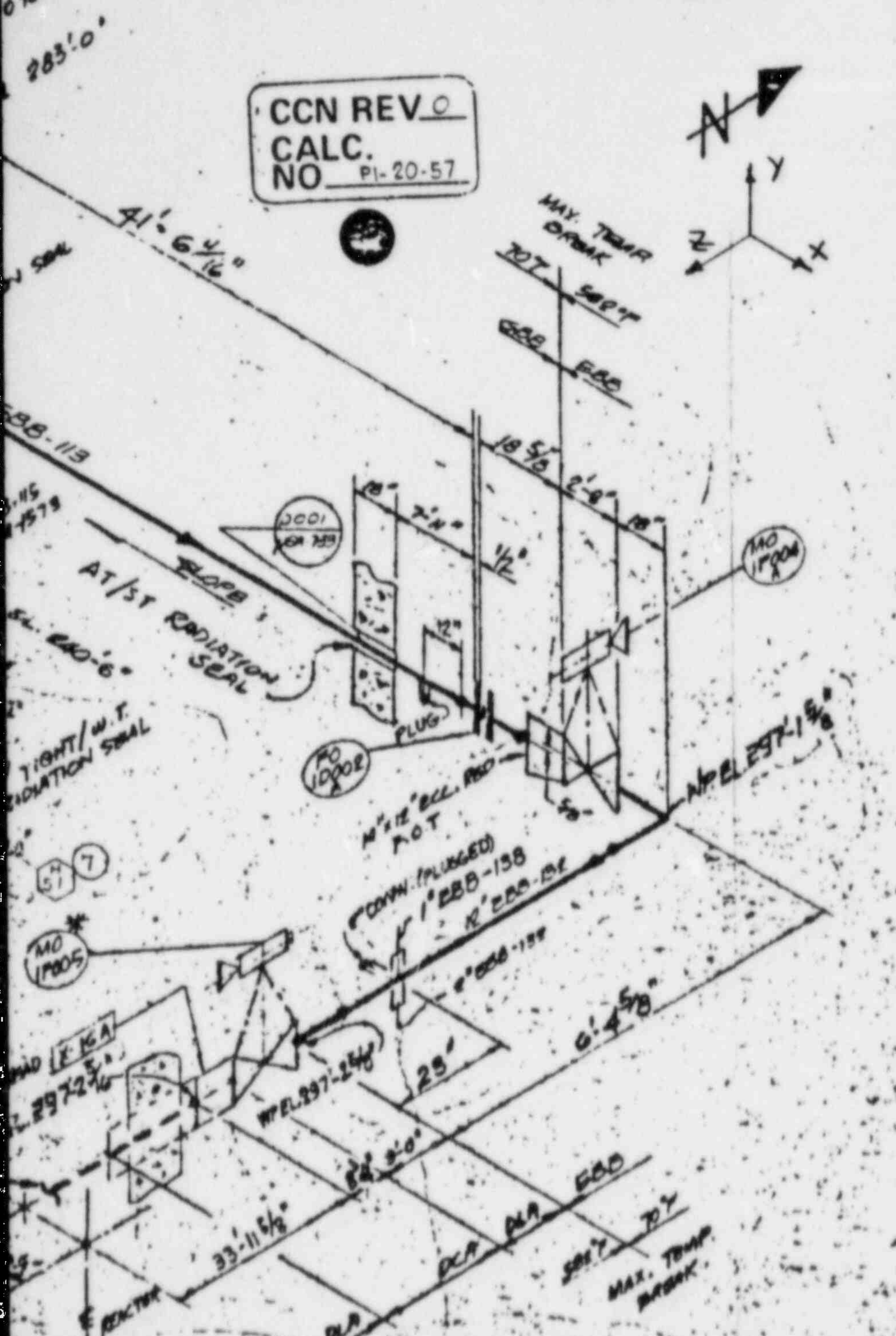
Rev 1

NOTE:

THIS DWG SUPERSEDES SK-M-344 & SK-M-346

CCN REV 0
CALC. NO PI-20-57



STRESS APPROVALS		
REV	THERMAL	SEISMIC

REFERENCE: STRESS CALC# PI-20-57
M-52 P&ID
M-206 PIPING PLAN
M-207 " "
M-208 " "
M-209 " "
M-210 " "
EBB-132-1 FAB ISO. REV. 14
GBB-113-B FAB ISO. REV. 13
REF. FCR M-1426 BF

MODE DESCRIPTION: GBB-113

MODE I: NORMAL SYSTEM OPERATING
MODE II: MAXIMUM SHUTOFF CONDITION (C.S.
MODE III: C.S. SYSTEM NON-OPERATING
FILL SYSTEM NON-OPERATING

MODE DESCRIPTION EBB-132

MODE I: NORMAL SYSTEM OPERATING (RPV)
MODE II: MAXIMUM DESIGN OPERATING COND (F004 CLOSED, F005 OPENED)
MODE III: C.S. SYSTEM NON-OPERATING FILL SYSTEM NON-OPERATING (F005 CLOSED, F004 OPENED)

REV. N NOTE
ADDED PIPE SUPPORTS & DATA POINTS FOR RECONCILIATION. DELETED VALVE, TEMP & PRESS. DATA PER STRESS GROUP MARK-UP SK-M-1575B WAS SK-M-1575

REV. J. NOTE
ADDED 3/4" CONN FOR PT-INDICATOR PER P&ID-M-52 REV 9

REV. K NOTE:
REV. PER FCR M-7385F

REV. H NOTE:
REV. W.P. ELEVATIONS TO AGREE WITH AS-BUILT CONDITIONS PER FCR M-4272F. PLUGGED 2" CONNECTION PER DCN [illegible] P&ID M-52 REV [illegible]

N	[illegible]	SEE REV. N NOTE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
M	[illegible]	ADDED REF. FCR M-[illegible]	[illegible]	[illegible]	JSO	[illegible]	[illegible]	[illegible]
L	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
K	[illegible]	SEE REV. K NOTE	PQ	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
E	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

DATA			REV	DATE	BY	REV	DATE	BY	LEGEND
EBB-132			E	2-17-77	RRK				SPRING HANGER
SML. ASME SA-106, GR. B			E	2-17-77	RRK				RIGID HANGER
.688			E	2-17-77	RRK				ANCHOR
12.750			E	2-17-77	RRK				GUIDE
I	II	III							SNUBBER
									RESTRAINT
									HANGER NUMBER
									STRESS DATA POINT

SCALE NONE

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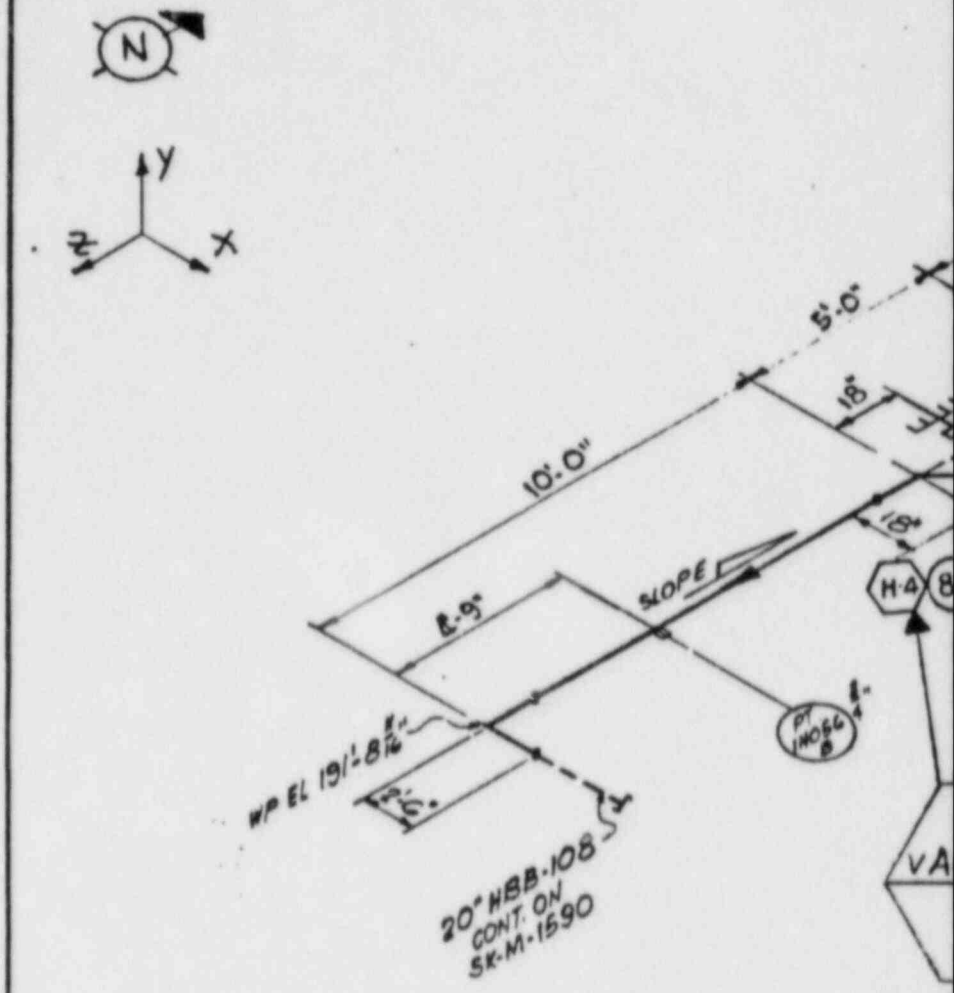
LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

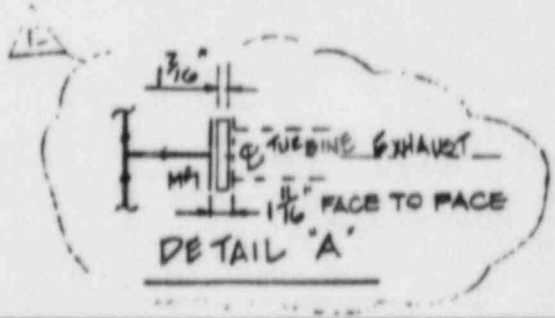
ISOMETRIC - REACTOR BUILDING
CORE SPRAY SYSTEM - UNIT # 1

8031 SK-M-1575B N

Specification
8031-P-363

Appendix C

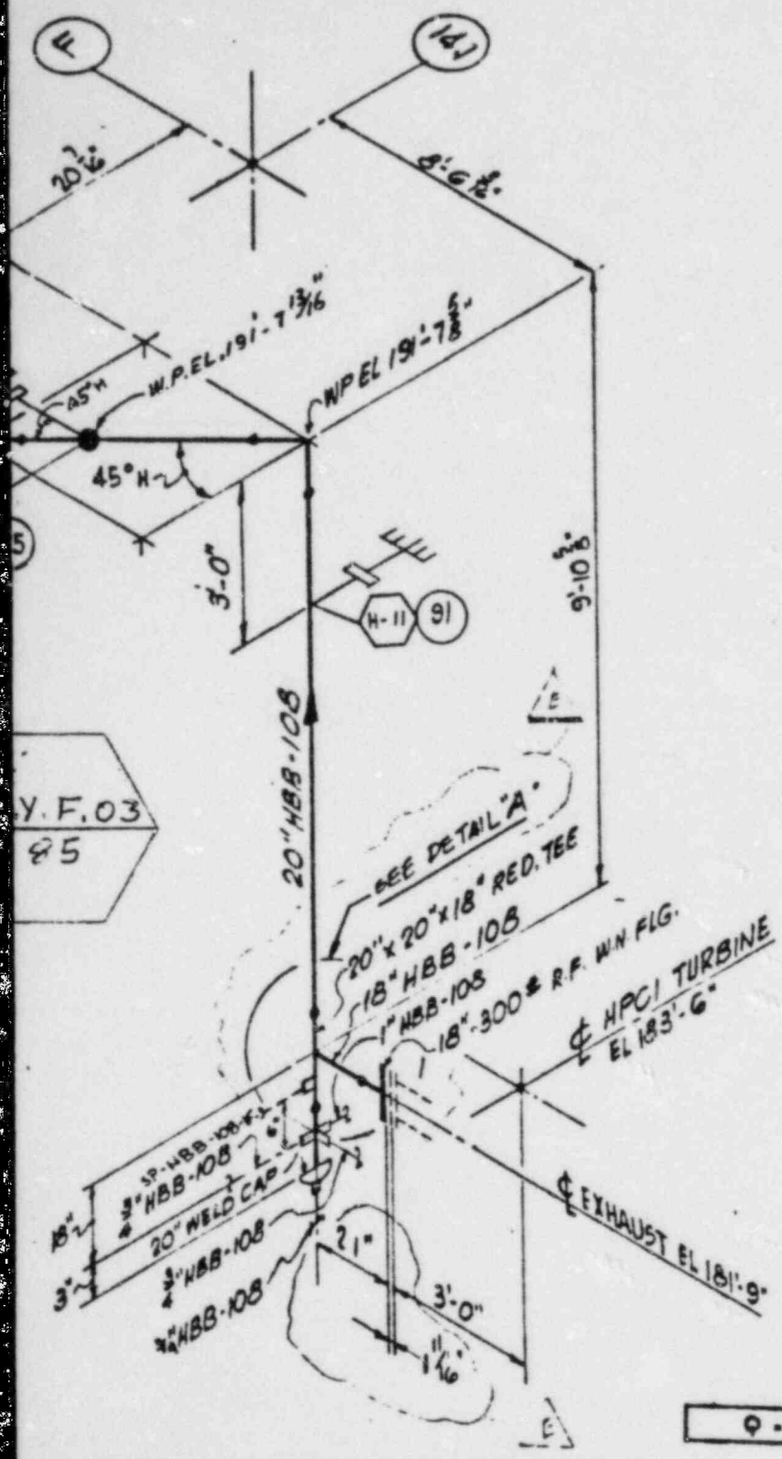




CCN REV 0
CALC.
NO PI-24-52

		DATA			REV	DATE	BY	REV	DATE	BY
PIPING ENGINEER	LINE No.	HBB-108			C	10/19/77	ORIGINAL SIGNED	D	9/21/77	RLL
	MATERIAL	SMLS ASME SA-106 GR.B			C	10/19/77		D	9/21/77	RLL
	LINE THICKNESS (IN)	0.875	0.312		C	10/19/77		D	9/21/77	RLL
MECHANICAL ENGINEER	LINE O.D. (IN)	20.000	18.000		C	10/19/77		D	9/21/77	RLL
	MODE	I	II	III						
	PRESS. PSIG									
	TEMP F									
STRESS ENGINEER	EXP. COEFF. IN/100FT									
	EXP. COEFF. MIL-IN/IN									
	MOD. OF ELAS. E PSI									

Rev 1



Q-LISTED

STRESS APPROVALS		
REV	THERMAL	SEISMIC

REV. D NOTE:

1. DELETED PSH-IN017A, PSH-IN017B, PT-IN016 & PE-1R005.
2. ADDED PT-IN056 J WAS PSH-IN017B.
3. DELETED LSH-IN018
4. 1" HBB-108 WAS 2" HBB-108
5. DELETED PRESS./TEMP DATA, ADDED PIPE SUPPORTS & DATA POINTS FOR RECONCILIATION.

REV. E NOTE:
ADDED DETAIL "A" AND REV. AS INDICATED

REFERENCE STRESS CALC. Nº PI-24-52

M-55 P & ID

M-56 P & ID

M-227 PIPING PLAN

M-216 SECTION

HBB-108-1 FAB. ISO. REV. 14

MODE DESCRIPTION

MODE I - ACCIDENT OPERATING CONDITIONS (SUPPRESSION POOL AT LOW PRESSURE)

MODE II - MAXIMUM DESIGN CONDITIONS.

MODE III - ACCIDENT OPERATING CONDITIONS (SUPPRESSION POOL AT HIGH PRESSURE)

8408140320 -44

NO.	DATE	REVISIONS	BY	CHKD	DESIGN SUPV	ENGR	PROJ ENGR	APPD
E		SEE REV. E NOTE	LG	VIP				
D		SEE REV. D NOTE	CBA					

DATA	REV	DATE	BY	REV	DATE	BY
I II III						

LEGEND
- SPRING HANGER
- RIGID HANGER
- ANCHOR
- GUIDE
- SNUBBER
- RESTRAINT
- STRESS DATA POINT
- HANGER NUMBER

SCALE — DESIGNED — DRAWN CBA — CHKD

BECHTEL
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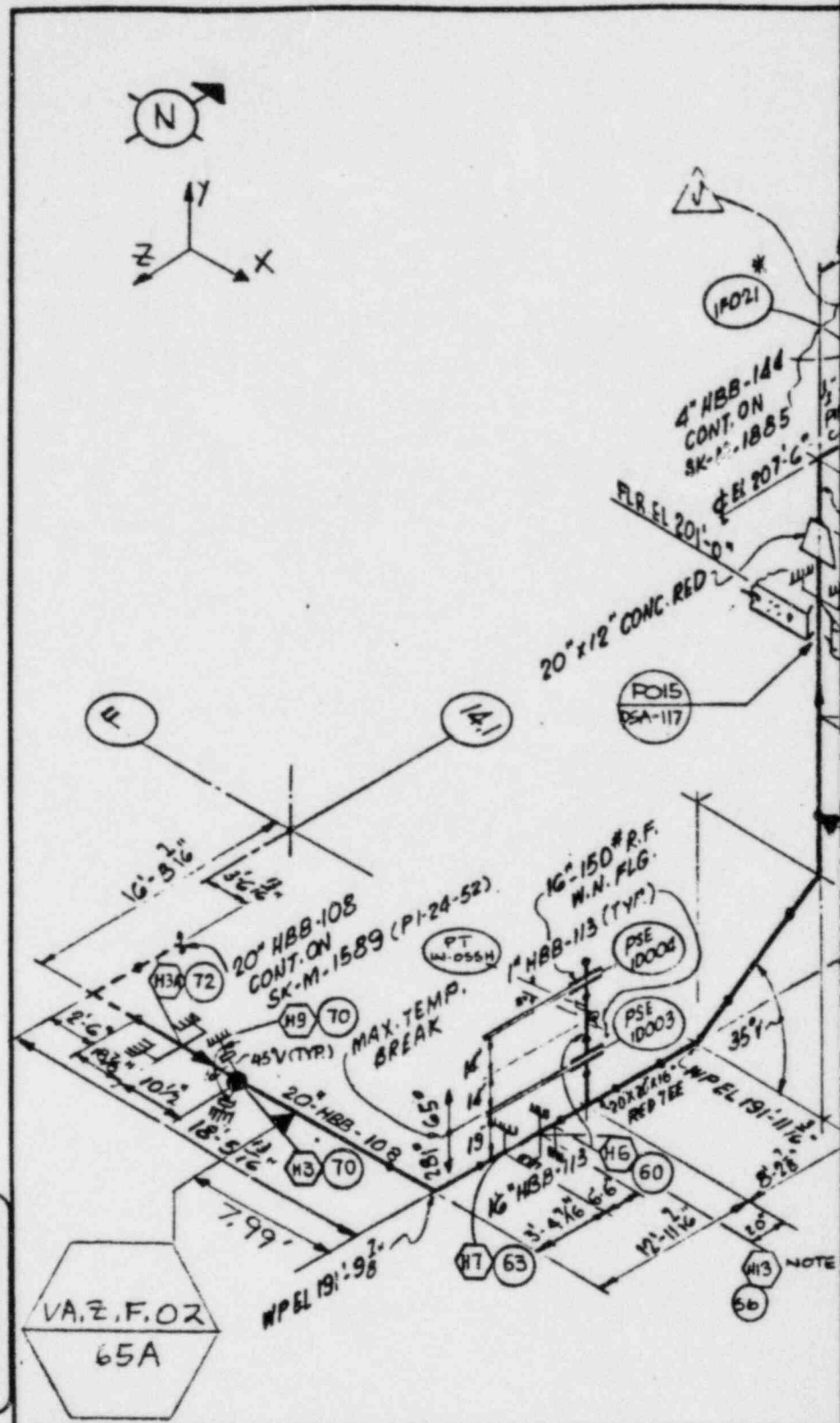
LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

ISOMETRIC - REACTOR BLDG.
HIGH PRESSURE COOLANT INJECTION - UNIT 1

JOB No.	DRAWING No.	TYPE
8031	SK-M-1589	E

Specification
8031-P-363

Appendix C



CCN REV 0
CALC.
NO P1-24-52

		DATA			REV	DATE	BY	REV	DATE	B
PIPING ENGINEER	LINE No.	HBB-108			A	10/19/73	ORIGINAL SIGNED	G	9/21/77	KL
	MATERIAL	SMLS. ASME SA-106 GR B			A	10/19/73	"	G	9/21/77	KL
	LINE THICKNESS (IN)	0.375	0.375		A	10/19/73	"	G	9/21/77	KL
MECHANICAL ENGINEER	LINE O.D. (IN)	20.000	12.750		A	10/19/73	"	G	9/21/77	KL
	MODE	I	II	III						
	PRESS. PSIG									
	TEMP F									
STRESS ENGINEER	EXP. COEFF. IN/100FT									
	EXP. COEFF. MIL-IN/IN									

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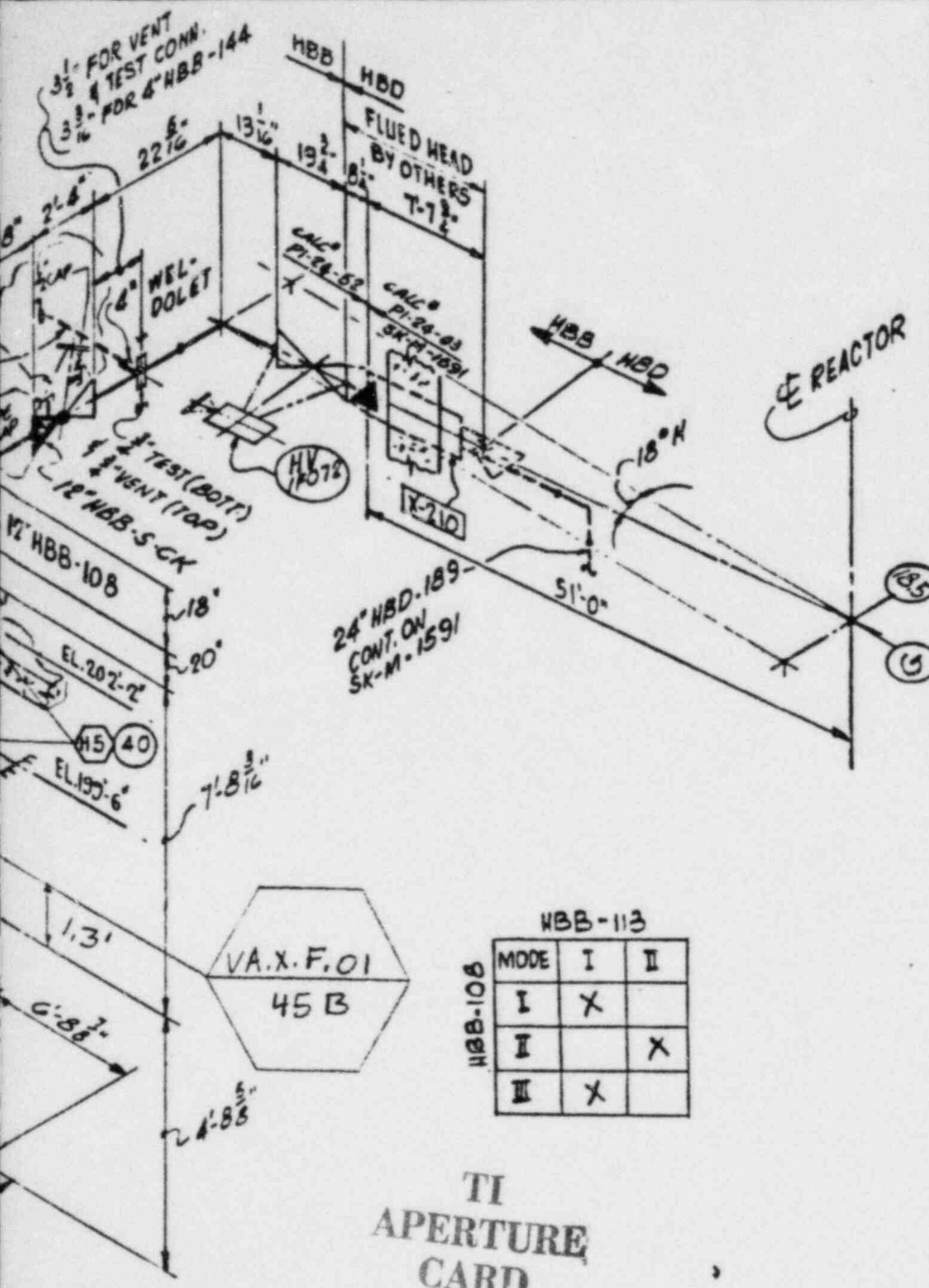
Rev 1



HBB-113

HBB-108 MODE	I	II
I	X	
II		X
III	X	

BUMPER SUPPORT IN DOWNWARD, (Y), DIRECTION ONLY. RUPTURE SUPPORT ONLY.

STRESS APPROVALS		
REV	THERMAL	SEISMIC

REV. G NOTE:

1. RELOCATED ¾" VENT & ¾" TEST AS SHOWN.
2. ADDED COLUMN REFERENCES.
3. ADDED 12" HBB-5-CK & DATA. (1P021)
4. RELOCATED MODE GRID AS SHOWN.

REVISED TO REFERENCE FCR M14,G77F ADDED PENET. I.D. P015/PSA417 & REDRAWN / REV. D AS NOTED.

REV. H NOTE:

DELETED VALVE DATA / PRESS./ TEMP. DATA. ADDED PIPE SUPPORTS & DATA POINTS FOR RECONCILIATION. ADDED TT IN-055H

REV J NOTE:

ADDED CAPS ON EXISTING INTER GASKET & LANTERN RING LEAK OFF CONNECTIONS PER FAB 150. REV. 16

REFERENCE STRESS CALC. № PI-24-52.
M-55 P&ID
M-227 PIPING PLAN
M-228 " "
M-216 SECTIONS
HBB-108-1 FAB. 150. REV. 16
HBB-113-1 FAB. 150. REV. 4

MODE DESCRIPTION HBB-108

MODE I - ACCIDENT OPERATING CONDITIONS. (SUPPRESSION POOL AT LOW PRESSURE)
MODE II - MAXIMUM DESIGN CONDITIONS.
MODE III - ACCIDENT OPERATING CONDITIONS. (SUPPRESSION POOL AT HIGH PRESSURE)

MODE DESCRIPTION HBB-113

MODE I - NORMAL OPERATING CONDITIONS (HPIC PUMP ROOM ATMOSPHERE)
MODE II - MAXIMUM CONDITIONS (DISC. 1D003 RUPTURED)

8408140320-45

REFERENCE FCR M14,G77F

No	DATE	REVISIONS	BY	CHKD	DESIGN SUPV	PROJ	PROJ ENGR	APPD
J		SEE REV. J NOTE	LG	VP				
H		SEE REV. H NOTE	CE		AK			
G		SEE REV. G NOTE	CL		KB			

Q-LISTED

	DATA			REV	DATE	BY	REV	DATE	BY	LEGEND
	HBB-113			A	10/19/77	ORIGINAL SIGNED	G	9/21/77	RKK	SPRING HANGER
	SMLS. ASME SA-106 GR. B			A	10/19/77		G	9/21/77	RKK	RIGID HANGER
	0.375			A	10/19/77		G	9/21/77	RKK	ANCHOR
	16.000			A	10/19/77		G	9/21/77	RKK	GUIDE
	I	II	III							SNUBBER
										RESTRAINT
										STRESS DATA POINT
										HANGER NUMBER

SCALE — DESIGNED DRAWN CBA

BECHTEL
SAN FRANCISCO

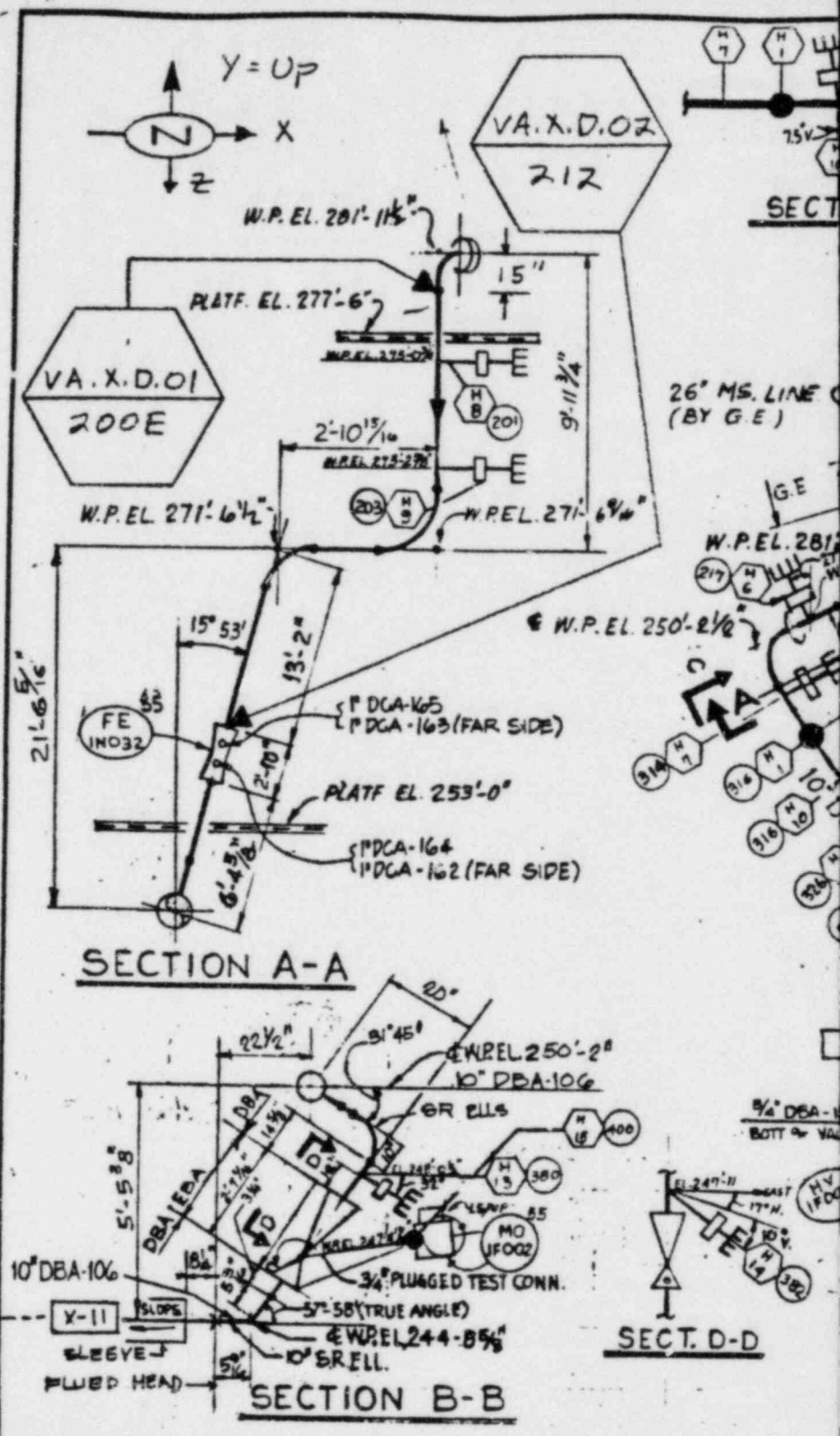
LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

ISOMETRIC - REACTOR BLDG. HIGH PRESSURE COOLANT INJECTION - UNIT 1

JOB No.	DRAWING No.	REV
8031	SK-M-1590	J

Specification
8031-P-363

Appendix C



		DATA			REV	DATE	BY	REV	DATE	BY
PIPING ENGINEER	LINE No.	DBA-106								
	MATERIAL	SML ASME SA-106 Gr.B				10/17/78	BDZ			
	LINE THICKNESS (IN)	.594				10/17/78	BDZ			
MECHANICAL ENGINEER	LINE O.D. (IN)	10.750				10/17/78	BDZ			
	MODE	I	II	III						
	PRESS. PSIG									
	TEMP F									
STRESS ENGINEER	EXP. COEFF. IN/100FT									
	EXP. COEFF. MIL-IN/IN									
	MOD. OF ELAS. E PSI									

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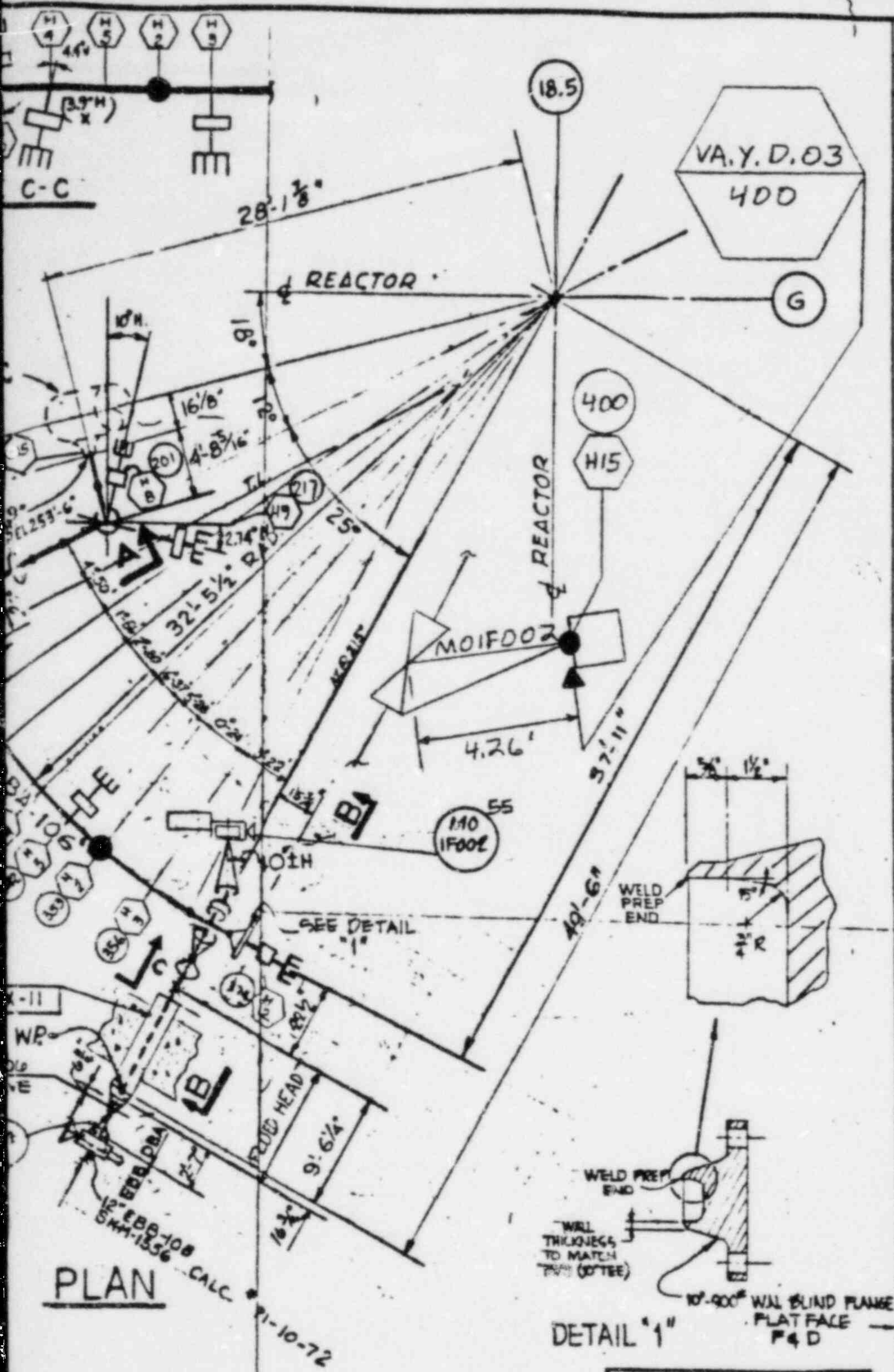
Rev 1



	STRESS APPROVALS	
REV	THERMAL	SEISMIC
B	RRZ 11-27-72	

REV. J NOTE;
REORIENTED VALVE M01F002 PER FCR M-7840F. INCORP. FCR M-8001F REV. 1.

REV. H NOTE:
REVISED LINE NUMBER FROM 10"-DLA-109 TO 10" DBA-106 PER DCN # 17, P&ID M-55 REV. 9. REVISED 45° ELBOW TO 10" TEE ADDED FLANGE PER STRESS REQUEST AND RELEASED HOLD # 7 PER IOM # 072907. ALL MATERIA TO BE IMPACT TESTED TO THE REQUIREMENTS OF CLASS DLA. FIELD WELDING TO BE IN ACCORDANCE WITH PIPING CLASS DLA.

REV. L NOTE:
ADDED PIPE SUPPORTS & DATA POINTS FOR RECONCILIATION. DELETED PRESS/TEMP. DATA AND VALVE TABULATION DATA, PER STRESS GROUP MARK-UP. ADDED REF. FCR-M14691F.

REFERENCE CALC 1-01-03
M-55 P&ID
M-213 PIPING PLAN
M-225 " "
M-226 " "
DBA-106-1 FAB. ISO REV. 17
DBA-106-2 " " " 11
REF. FCR-M14691F

MODE DESCRIPTION

MODE I-NORMAL NON-OPERATING CONDITIONS (REACTOR AT NORMAL PRESSURE)
MODE II-MAXIMUM DESIGN CONDITIONS (REACTOR AT MAXIMUM PRESSURE)
MODE III-MAXIMUM OPERATING CONDITIONS (REACTOR AT ACCIDENT CONDITIONS)

No.	DATE	REVISIONS	BY	CHKD				
J		SEE REV. J NOTE	SRF					
H		SEE REV. H NOTE	DO	BJS				
G		REROUTED LINE	ADC					
F		REV. VALVE WTS						
E		SEE REV. NOTE	HR					
D		REV. AS SHOWN	WP					
L		SEE REV L NOTE	HSH					
K		INCORP FCR M 14051F	PD					
A		ISSUED FOR STRESS ANALYSIS	T.S.					

Q-LISTED

DATA			REV	DATE	BY	REV	DATE	BY
I	II	III						

LEGEND
- SPRING HANGER
- RIGID HANGER
- ANCHOR
- GUIDE
- SNUBBER
- RESTRAINT
- HANGER NUMBER
- STRESS DATA POINT

SCALE — DRAWN S MARTINEZ

BECHTEL
SAN FRANCISCO

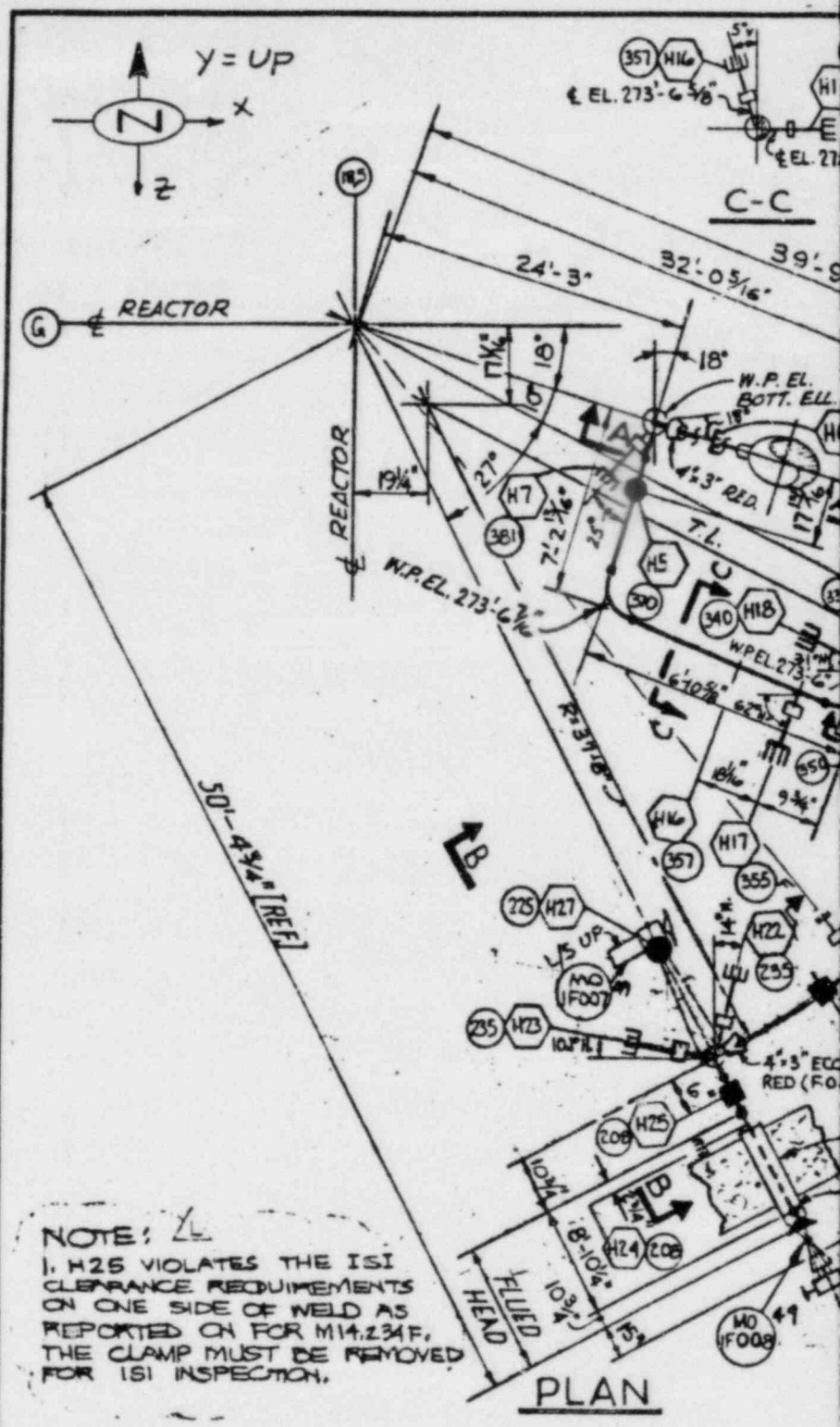
LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

PLAN & SECTIONS - REACTOR BLDG.
HIGH PRESSURE COOLANT INJECTION

JOB No.	DRAWING No.	REV
8031	SK-M-1592	L

Specification
8031-P-363

Appendix C



CCN REV 0
CALC.
NO 1-01-02

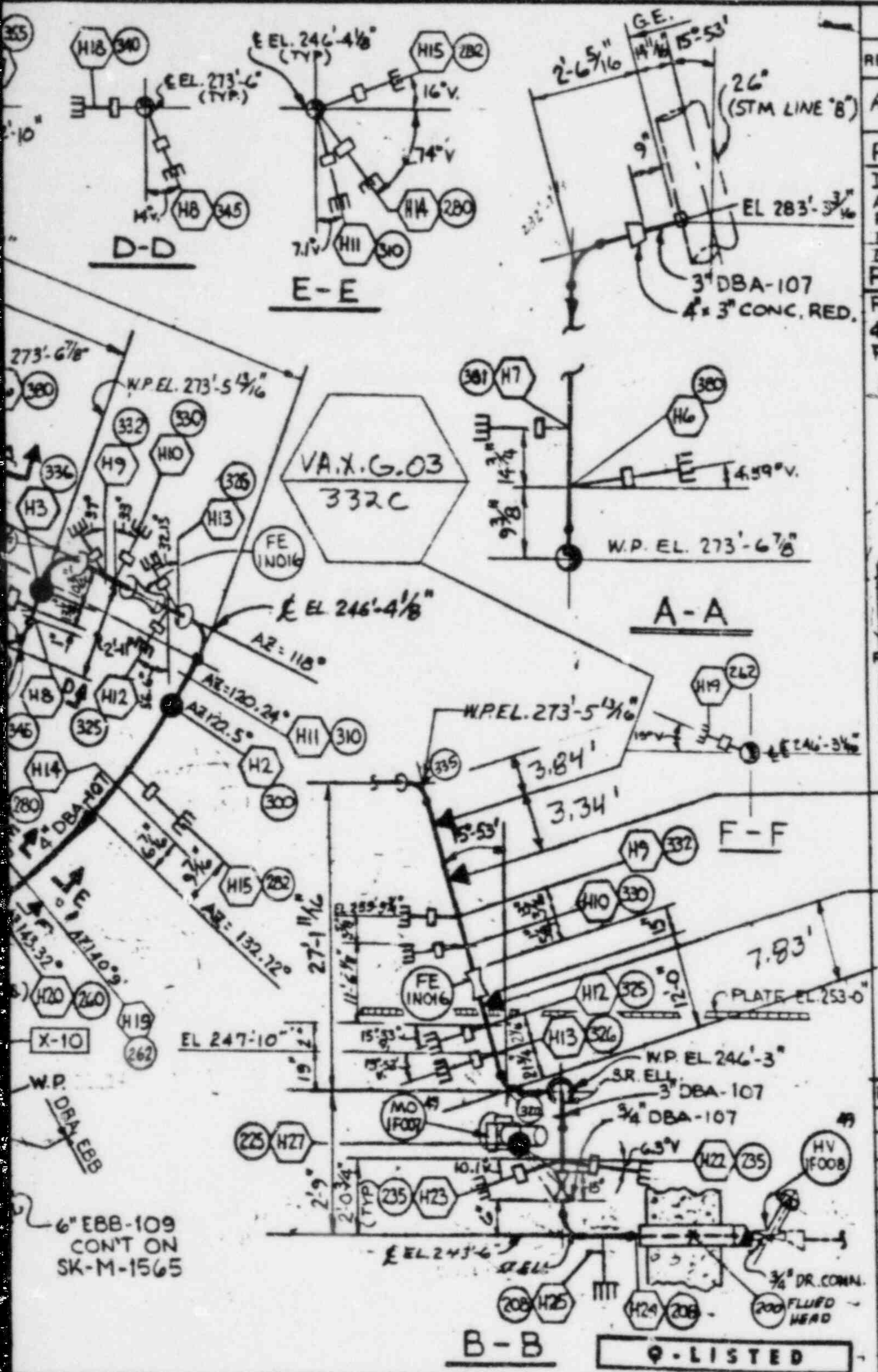
1

		DATA			REV	DATE	BY	REV	DATE	
PIPING ENGINEER	LINE No.	DBA-107								
	MATERIAL	SML ASME SA-106 Gr B			A	11-9-73	BAZ			
	LINE THICKNESS (IN)	.337	.438		A	11-9-73	BAZ			
MECHANICAL ENGINEER	LINE O.D. (IN)	4.500	3.500		A	11-9-73	BAZ			
	MODE	I	II	III						
	PRESS. PSIG									
	TEMP F								L	
STRESS ENGINEER	EXP. COEFF. IN/100FT									
	EXP. COEFF. MIL-IN/IN									
	MOD. OF ELAS. E PSI									

C-48

8408140320-47

Rev. 1



STRESS APPROVALS

REV	THERMAL	SEISMIC
A	RRH 11-9-73	

REV. L NOTE:
INCORP. FCR M 14234F (SEE NOTE 1.). ADDED PIPE SUPPORTS & DATA POINTS FOR RECONCILIATION. DELETED PRESS. & TEMP. DATA & VALVE DATA & VALVE DATA PER STRESS GROUP MARK-UP

REV. F NOTE:
REV. 4"X3" RED. ELL. WAS STD. ELL & 4"X3" REDUCER PER SPOOL DWG. & FIELD REQUEST.

REV. G NOTE:
REINSTATED 4"X3" ECC. RED & S.R. ELL. IN LIEU OF 4"X3" REDUCING ELL. PER STRESS GRP.

VA.Z.G.02
332B

VA.X.G.01
326B

REFERENCE
M-41 P&ID.
M-49 P&ID.
M-213 PIPING PLAN
M-226 " "
M-215 " SECT.
M-225 " PLAN
DBA-107-1 FAB. ISO REV. 2
STRESS CALC NO. L-01-02

MODE DESCRIPTION
MODE I - NORMAL CONDITIONS (SYSTEM NOT OPERATING)
MODE II - MAXIMUM DESIGN CONDITIONS (MAX REACTOR PRESSURE)
MODE III - OPERATING CONDITIONS (DURING ACCIDENT)

NO.	DATE	REVISIONS	BY	CHKD	DESIGN SUPV	ENGR	PROJ ENGR	APPD
L		SEE REV. L NOTE	ARR					
K		INCORP. FCR M-[illegible]		BJS				
J		REVISED 1/2" TEST CONN TO 3/4" DBA-107	PV	BJS				
H		ADDED LOCATIONAL DIM. PER FIELD REQUEST	DIO	BJS				
G		SEE REV. G NOTE	BW					
F		SEE REV. F NOTE	JB					
E		REROUTED LINE						
D	77	SEE REV. D NOTE	WR					
C		REV. AS SHOWN	WP					
B		DELETED 1" DRAIN UPSTREAM FROM 1F007	TS					
A	6-9-73	ISSUED FOR STRESS ANALYSIS	T.S.		PP			

DATA			REV	DATE	BY	REV	DATE	BY
I	II	III						

LEGEND
- SPRING HANGER
- RIGID HANGER
- ANCHOR
- GUIDE
- SNUBBER
- RESTRAINT

SCALE — DESIGNED DRAWN [illegible] CHECKED

BECHTEL
SAN FRANCISCO

LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

PLAN & SECTIONS - REACTOR BLDG.
REACTOR CORE ISOLATION COOLING - UNIT 1

JOB No. 8031 DRAWING No. SK-M-1593 REV. L

Specification
8031-P-363

Appendix C

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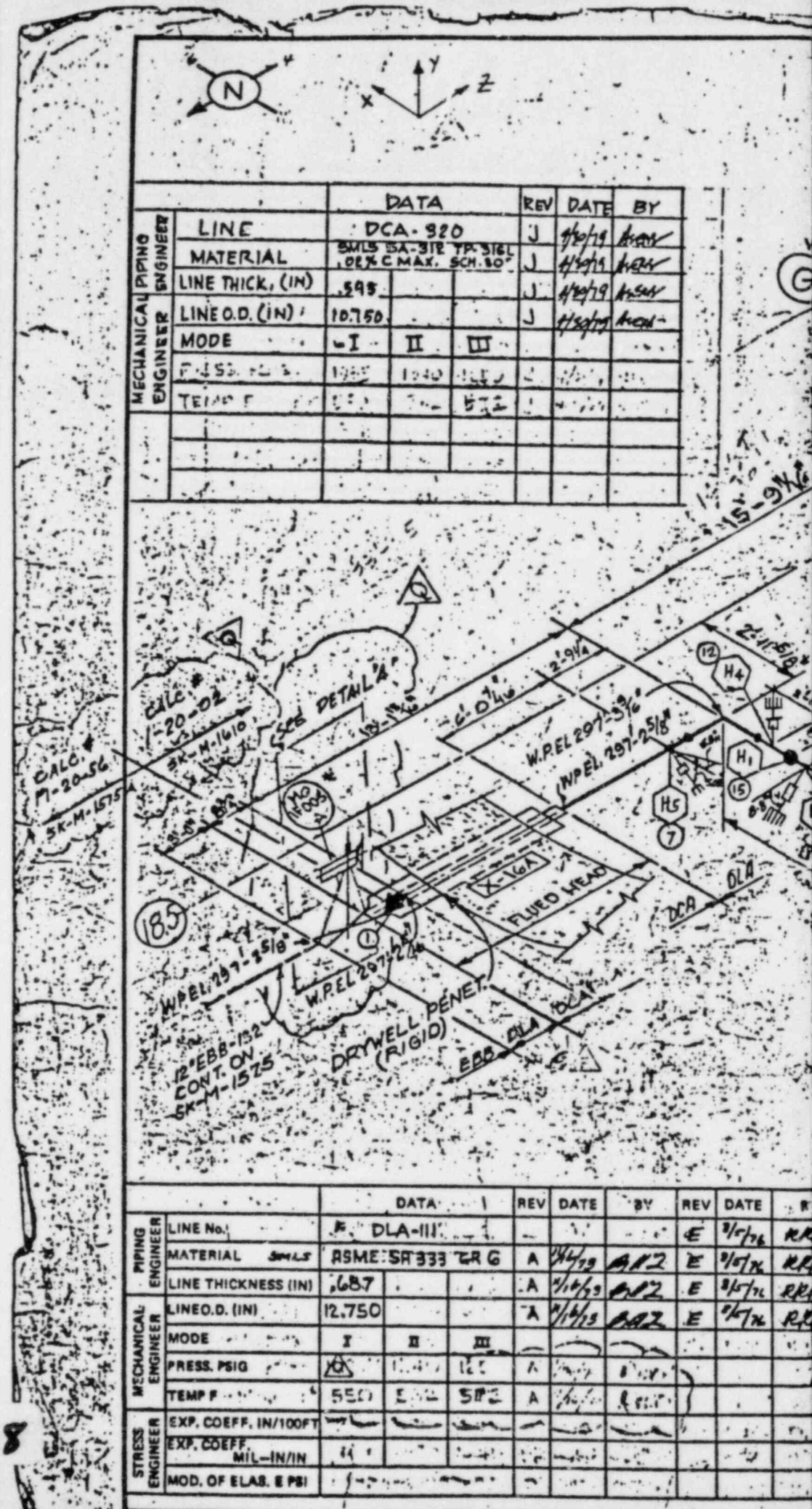
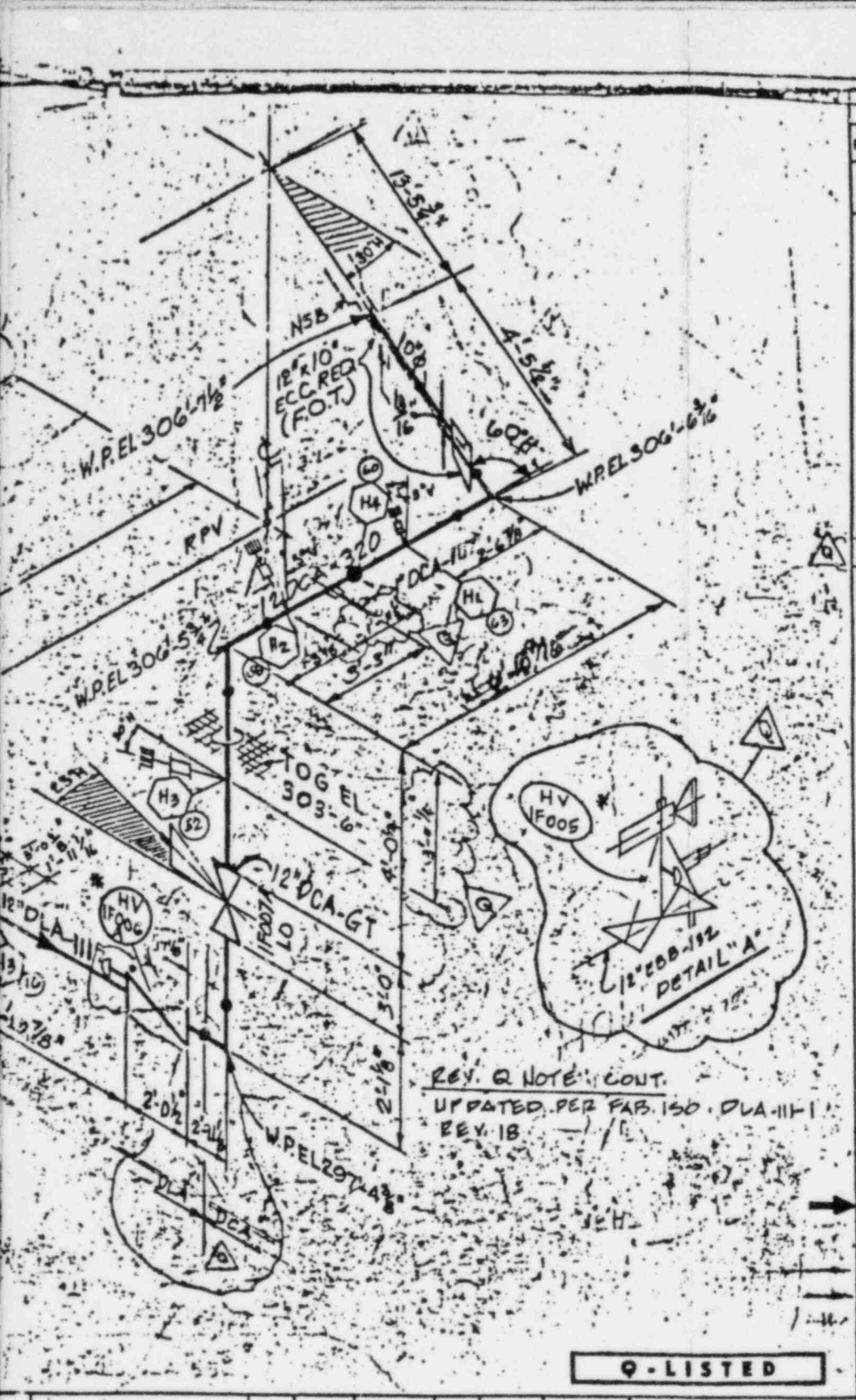
Rev. 1





STRESS APPROVALS

REV	THERMAL	SEISMIC

REV. K NOTE:
REV. VALVE CLASS PER FIELD REQUEST.
REV. VALVE SIZE 3'-0" WAS 3'-2" PER VENDOR PRINT M-1-E21-F005-C-2.5

REV P NOTE:
REV PER FCR M-1249IF & CHANGED 575 TO 582 IN TEMP MODE III PER MECH. CALC.

REV. L NOTE:
REVISED DIMENSIONS "D" 10'8" WAS 8'-2½", 2'-11⅝" WAS 2'-8⅜" PER FCR 4474F. ADDED AS BUILT W.P. ELEVATIONS PER FCR 4474F

REV. Q NOTE
ADDED PIPE SUPPORTS & DATA POINTS FOR RECONCILIATION & DELETED PRESS. & TEMP. DATA & VALVE DATA PER STRESS MARK-UP. ADDED STRESS CALC. #'S. ADDED DETAIL-A 3'-0¼" WAS 8'-5½" AND ADDED DIM. 1-11½"

REFERENCE STRESS CALC. 1-80105

M-52	P&ID	REV. D
M-210	PIPING PLAN	REV. 12
M-235	PIPING PLAN	REV. F
DCA-320-1	REV. 12	FAB. 150
DLA-111-1	REV. 18	
M-7976F (REF. FCR)		

MODE DESCRIPTION

MODE I - NORMAL SYSTEM NON-OPERATING CONDITIONS (NORMAL REACTOR PRESSURE)
MODE II - MAXIMUM DESIGN CONDITIONS (MAX. REACTOR PRESSURE)
MODE III - SYSTEM OPERATING CONDITIONS

REV. Q NOTE: CONT.
UPDATED PER FAB. ISO. DLA-111-1 REV. 18

Q - LISTED

NO.	DATE	REVISIONS	BY	CHKD	DESIGN SUPV.	ENGR.	PROJ. ENGR.	APPD.
Q	[illegible]	SEE REV. Q NOTE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
P	[illegible]	SEE REV P NOTE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
N	[illegible]	ADDED REF FOR M-7976F	SRF	RP	[illegible]	[illegible]	[illegible]	[illegible]
M	[illegible]	INCORP FCR #-5166F	SP	BJS	[illegible]	[illegible]	[illegible]	[illegible]
L	[illegible]	SEE REV. L NOTE	PSL	BJS	[illegible]	[illegible]	[illegible]	[illegible]
K	[illegible]	SEE REV. K NOTE	DJO	BJS	[illegible]	[illegible]	[illegible]	[illegible]
B	[illegible]	REVISED & REISSUED	J.O.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
A	7/16/[illegible]	ISSUED FOR STRESS ANAL	J.O.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

	DATA			REV	DATE	BY	REV	DATE	BY
K	DCA-320			H	[illegible]				
K	SEAMWELD ASME SA358 CL.1 TP316L SCH. 80			H	5/19/89	[illegible]			
K	.687			H	5/19/89	[illegible]			
K	18.750			H	5/19/89	[illegible]			
	I-1	II	III						
	[illegible]	[illegible]	[illegible]	H					
				H					
				H					

LEGEND
- SPRING HANGER
- RIGID HANGER
- ANCHOR
- GUIDE
- SNUBBER
- RESTRAINT

SCALE —— DESIGNED —— DRAWN J.O. —— STRESS ENGR. ——

BECHTEL SAN FRANCISCO

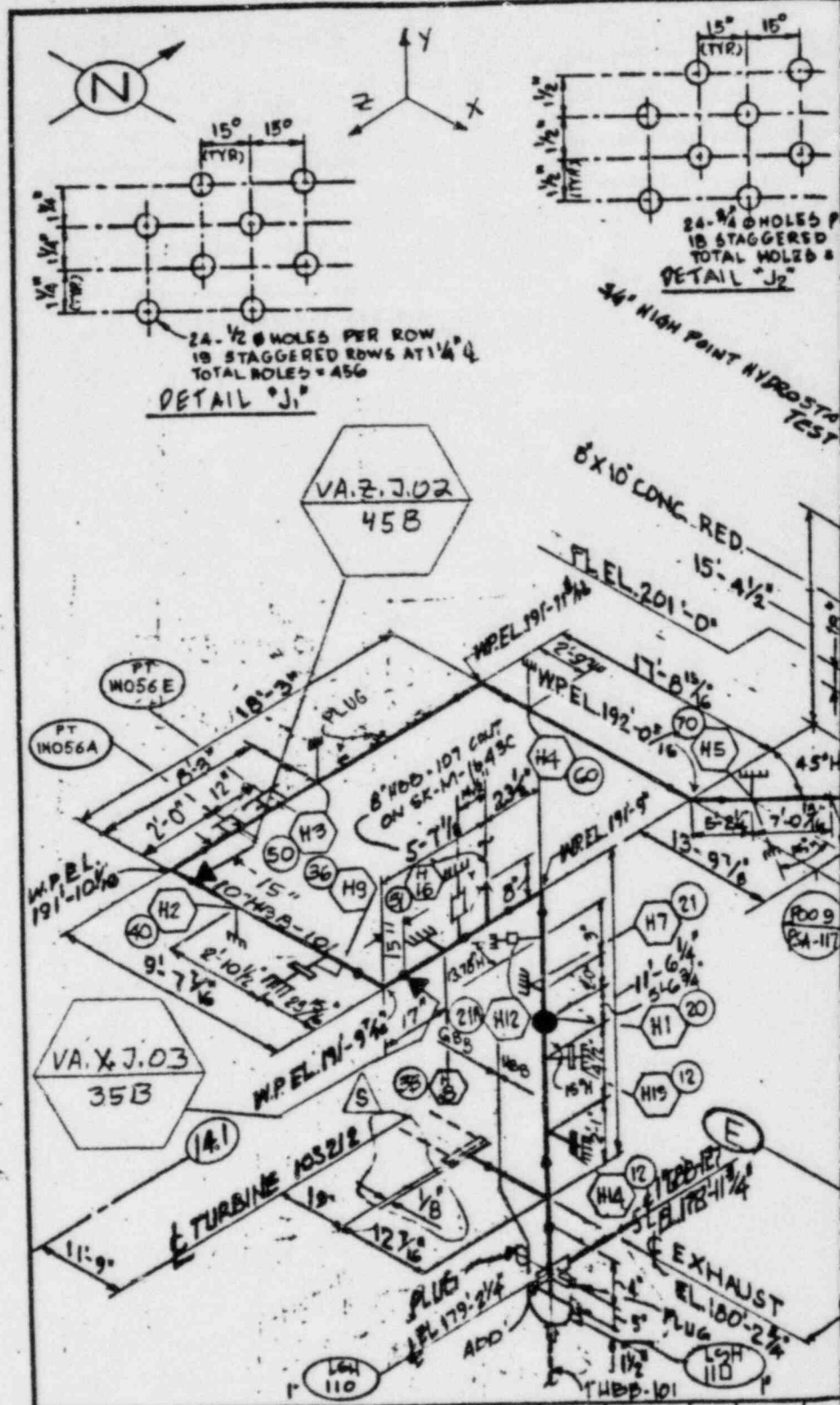
LIMERICK GENERATING STATION UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

ISOMETRIC - REACTOR BUILDING (DRY WELL)
CORE SPRAY SYSTEM - UNIT 1

JOB NO.	DRAWING NO.	REV.
8031	SK-M-1610	Q

Specification
8031-P-363

Appendix C



		DATA			REV	DATE	BY	REV	DATE
PIPING ENGINEER	LINE No.	HBB-101							
	MATERIAL	SMLS ASME SA-106 Gr B			A	11/18/79	BBZ		
	LINE THICKNESS (IN)	.322	.365		A	12/19/79	BBZ		
MECHANICAL ENGINEER	LINE O.D. (IN)	8.625	10.750		A	11/18/79	BBZ		
	MODE	I	II	III					
	PRESS. PSIG								
	TEMP F								
STRESS ENGINEER	EXP. COEFF. IN/100FT								
	EXP. COEFF. MIL-IN/IN								

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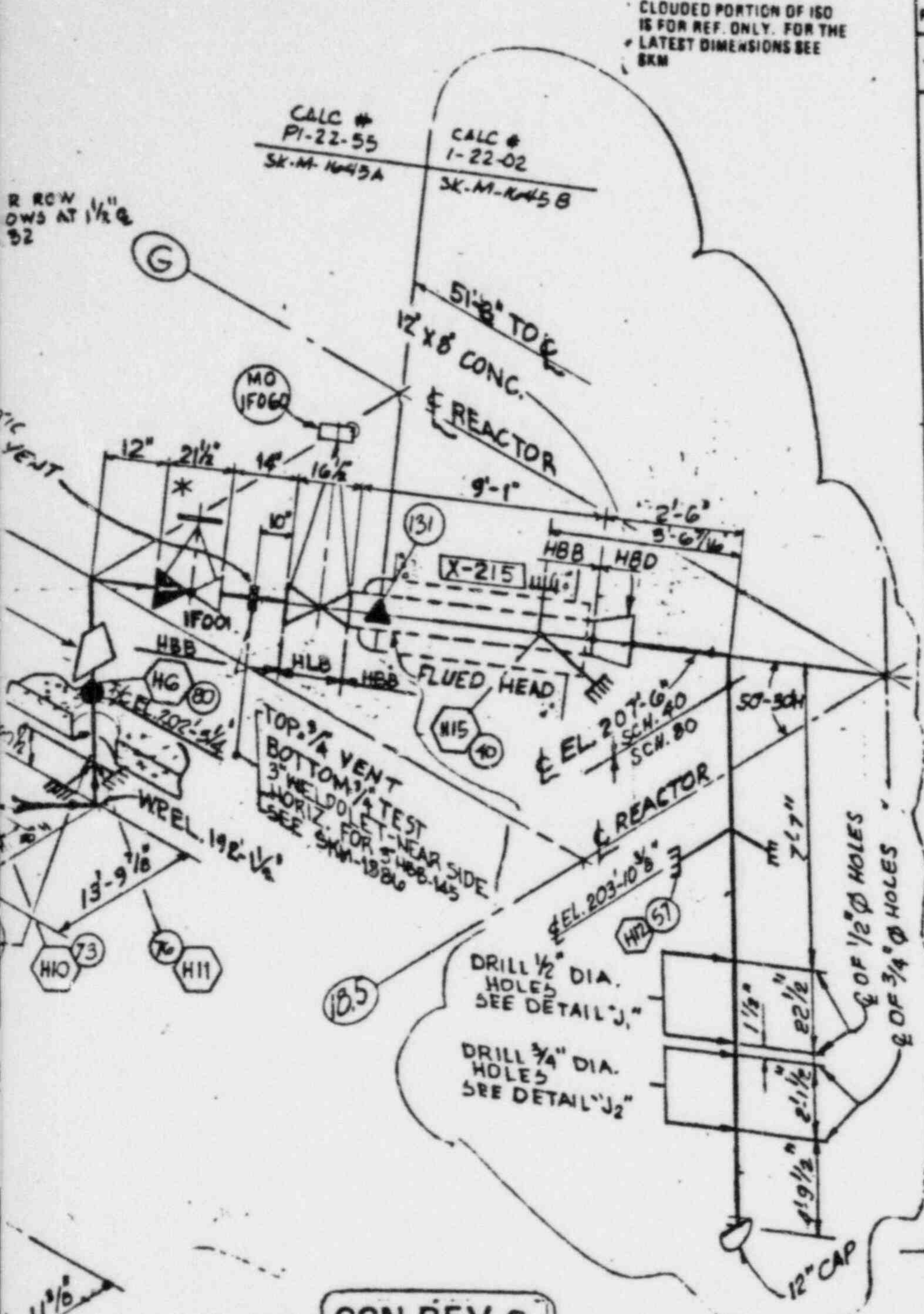
8408140320-49

Rev. 1

CLOUDED PORTION OF ISO IS FOR REF. ONLY. FOR THE LATEST DIMENSIONS SEE SKM

STRESS APPROVALS		
REV	THERMAL	SEISMIC
B	RR 4-4-74	



REV. M NOTE:
REV. PER FCR M-7766F & LATEST FIELD INFORMATION.

REV Q NOTE
REVISED HOLE ELEVATIONS PER MECH. REQUEST, PIPE SCH. & CAP EL. PER STRESS REQUEST

REV R NOTE
ADDED PIPE SUPPORTS & DATA POINTS FOR RECONCILIATION. DELETED PRESS/TEMP. AND VALVE DATA PER STRESS GROUP MARK-UP.

TI APERTURE CARD

REFERENCE
- M-60 P.&I.D.
- M-49 "
- M-227 PIPING PLAN-EL.177-AREA
- M-228 " " EL.201 " "
- HBB-101-1 REV. 17 FAB. ISO
- HBD-173-1 REV.15 FAB. ISO.

CALC # PI-22-55

MODE DESCRIPTION
- MODE I NORMAL CONDITIONS
- MODE II MAXIMUM DESIGN CONDITIONS
- MODE III

M		SEE REV M NOTE					
S		INCORP. FCR NO. M111, 791F	JAM			BC	
R		SEE REV R NOTE					
Q		SEE REV Q NOTE		WP			
P		REV. PER FCR 0040		WP			
N		REV PER FCR M-11842F		WP			
A		ISSUED FOR STRESS ANALYSIS	T.S.				
NO.	DATE	REVISIONS	BY	CHKD	DESIGN SUPV	ENGR	PROJ ENGR

CCN REV 0
CALC. NO PI-22-55

Q-LISTED

DATA			REV	DATE	BY	REV	DATE	BY
HBD-173								
SML ASTM A-106 Gr. B			A	12/8/73				
.375	.688		A	12/8/73				
12.750	12.750		A	12/8/73				
I	II	III						

LEGEND
- SPRING HANGER
- RIGID HANGER
- ANCHOR
- GUIDE
- SNUBBER
- RESTRAINT

SCALE — DESIGNED — DRAWN Tom Sullivan — CHIEF ENGR

BECHTEL
SAN FRANCISCO

LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

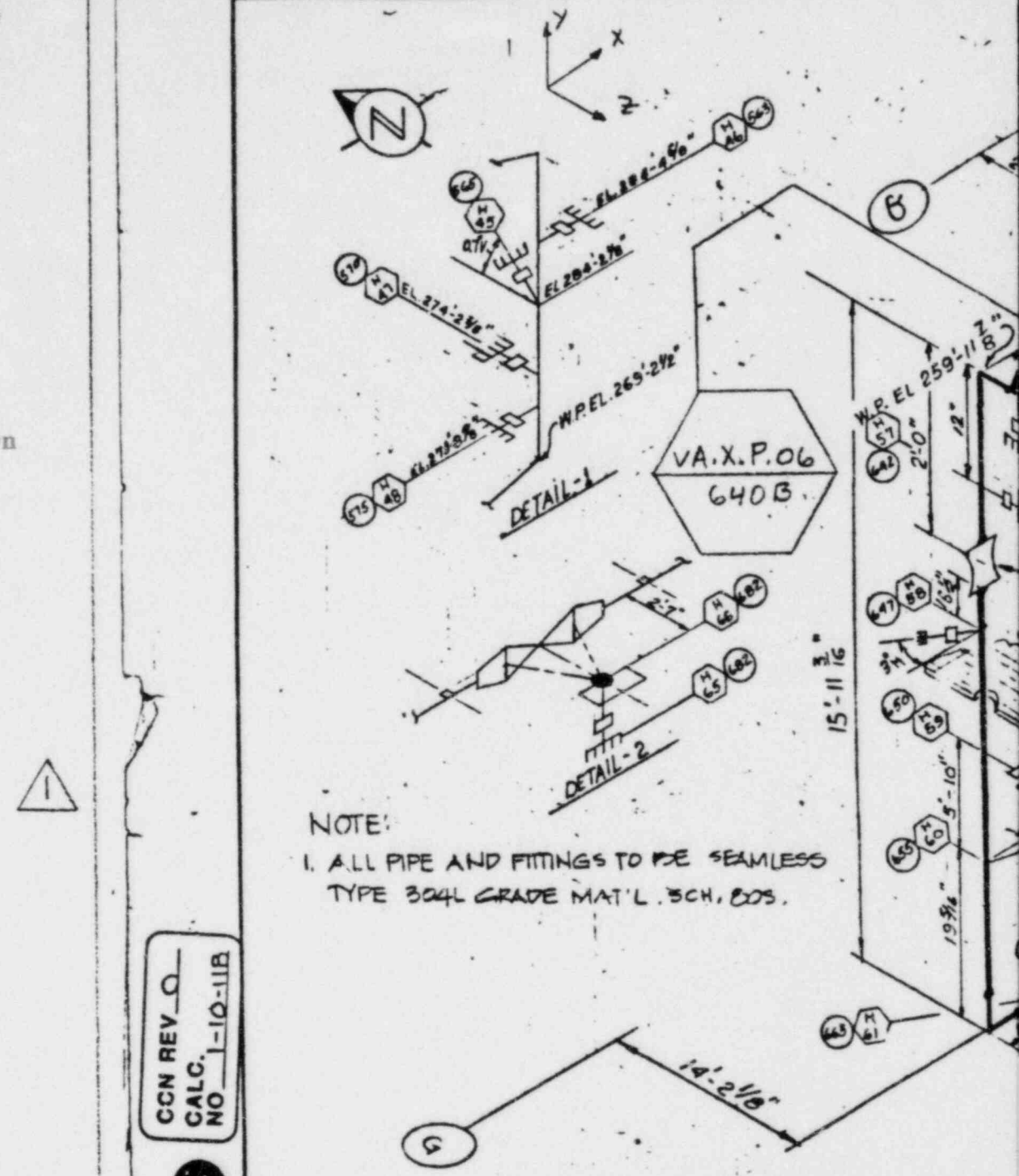
ISOMETRIC - REACTOR BLDG.
REACTOR CORE ISOLATION COOLING-UNIT 1

JOB No.	DRAWING No.
8031	SK-M-1645A

Rev. S

specification
8031-P-363

Appendix C



NOTE:

1. ALL PIPE AND FITTINGS TO BE SEAMLESS TYPE 304L GRADE MAT'L. SCH. 80S.

1

CCN REV 0
CALC. NO 1-10-118

		DATA			REV	DATE	BY	REV	DATE	
PIPING ENGINEER	LINE No.	DCA-101								
	MATERIAL	SEAMLESS ASME SA-312 TP-316L SCH. 80S			A					
	LINE THICKNESS (IN)	0.218			A					
MECHANICAL ENGINEER	LINE O.D. (IN)	2.375			A					
	MODE	I	II	III						
	PRESS. PSIG									
	TEMP.°F									
STRESS ENGINEER	EXP. COEFF. IN/100FT									
	EXP. COEFF. MIL-IN/IN									
	MOD. OF ELAS. E PSI									

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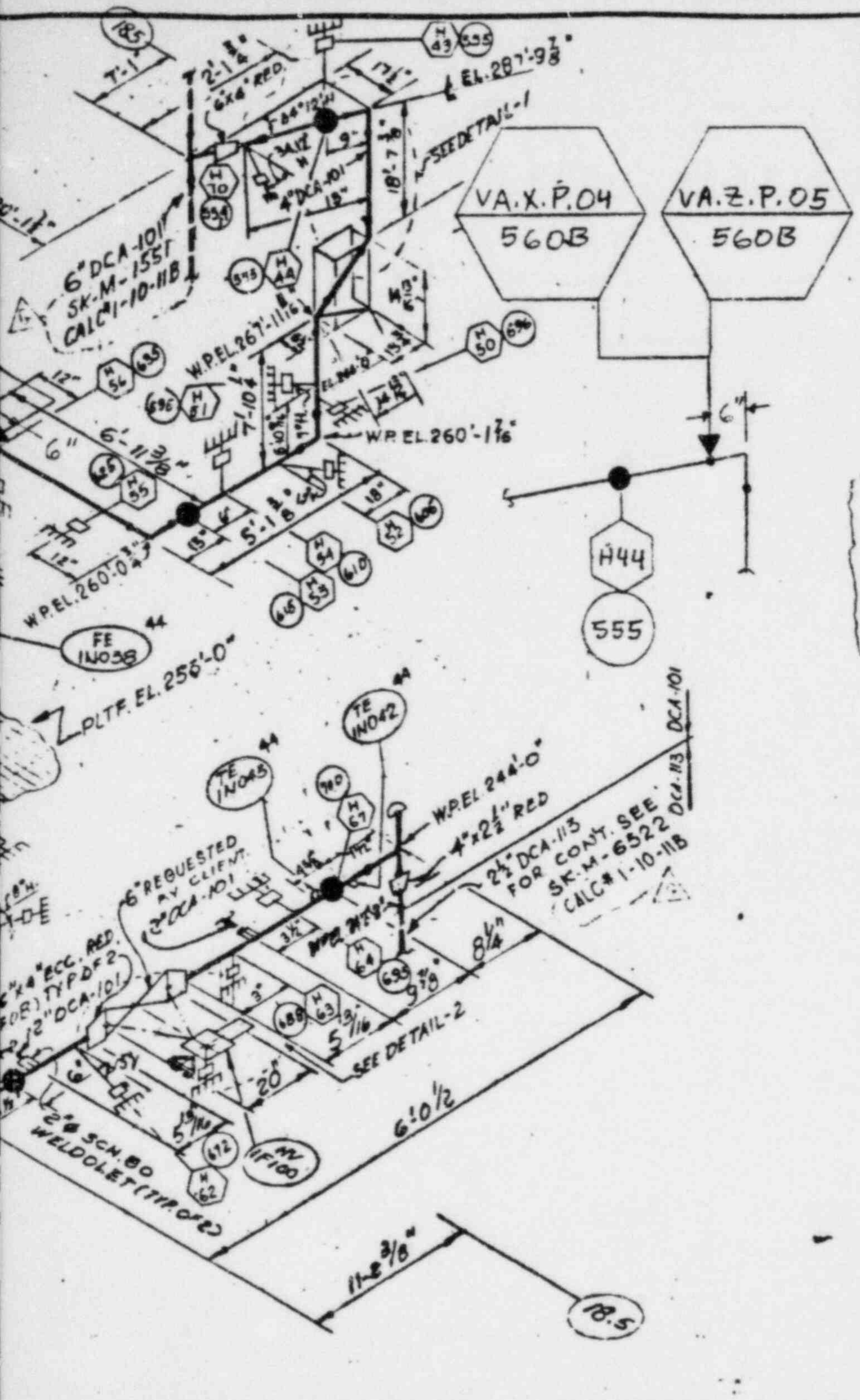


STRESS APPROVALS		
REV	THERMAL	SEISMIC

REV. D NOTE:
REV. & REROUTED THE LINE PER FCR'S M-11643FΔ & M-11650FΔ.

REV. G. NOTE:
ADDED PIPE SUPPORTS & DATA POINTS FOR RECONCILIATION & DELETED PRESS, TEMP. & VALVE DATA PER STRESS GROUP MARK-UP. ADDED 6"x4" REDUCER PER FAB. ISO.

REV. F NOTE:
RELOCATED 4"x2" WELDOLET DUE TO HV-1F100 OPERATOR INTERFERENCE W/BY-PASS LINE PER FCR.M-13942 F REV.1 & ADDED NOTE 1. PER FCR.M-13994F

REFERENCE

M-43	P&ID	REV. [illegible]
M-44	P&ID	REV. [illegible]
M-213	PIPING PLAN	[illegible]
M-225	"	[illegible]
M-226	"	[illegible]
M-217	SECT. AREA DWG.	[illegible]
DCA-101-4	FAB. ISO.	REV. B
DCA-101-5	FAB. ISO.	REV. C

STRESS CALC. NO. 1-10-118

TI APERTURE CARD

MODE DESCRIPTION

MODE I - NORMAL
MODE II - MAXIMUM
MODE III - —

NO.	DATE	REVISIONS	BY	CHKD	DESIGN SUPV			
G	[illegible]	SEE REV G NOTE	HGH	[illegible]	[illegible]			
F	[illegible]	SEE REV. F NOTE	[illegible]	WP	JSB			
E	[illegible]	REV PER FCR M-12508F	GP	JSB	[illegible]			
D	[illegible]	SEE REV. D NOTE	F.Y.	WP	[illegible]			
C	[illegible]	SEE REV. C NOTE	GP	PW	[illegible]			
B	[illegible]	REV. [illegible] STRESS ANALYSIS	[illegible]	BUS	[illegible]			
A	[illegible]	ISSUED FOR STRESS ANALYSIS	REG	EMC	[illegible]			

DATA			REV	DATE	BY	REV	DATE	BY
DCA-101								
SEAMLESS ASME SA-312 OR SA-376 TP-304L SCH.80			C	[illegible]	[illegible]			
0.337			C	[illegible]	[illegible]			
4.5			C	[illegible]	[illegible]			
I	II	III	—	—	—			

LEGEND
- SPRING HANGER
- RIGID HANGER
- ANCHOR
- GUIDE
- SNUBBER
- RESTRAINT
- HANGER NUMBER
- STRESS DATA POINT

BECHTEL
SAN FRANCISCO

LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

ISOMETRIC - REACTOR BLDG.
REACTOR WATER CLEANUP
PIPING UNIT 1

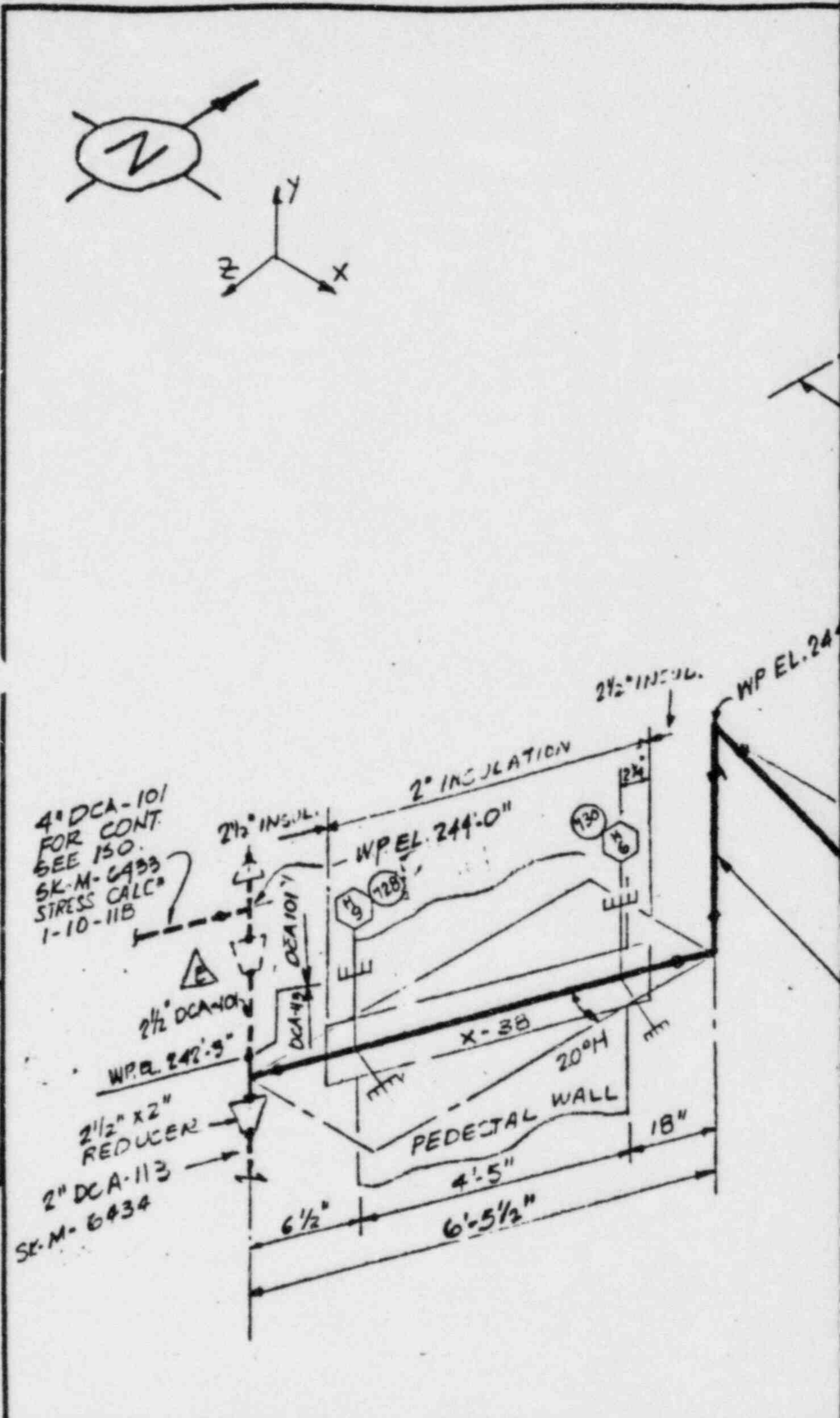
JOB No.	DRAWING No.	REV
8031	SK-M-6433	G

specification
8031-P-363

Appendix C

No measurement required. For information only.

CCN REV 0
CALC. NO 1-10-11B



		DATA			REV	DATE	BY	REV	DATE	BY
PIPING ENGINEER	LINE No.	DCA-113								
	MATERIAL	SEAMLESS ASME SA 312 TP 304L, SCH 40			A	[illegible]	[illegible]			
	LINE THICKNESS (IN)	0.203			A	[illegible]	[illegible]			
MECHANICAL ENGINEER	LINE O.D. (IN)	2.875			A	[illegible]	[illegible]			
	MODE	I	II	III						
	PRESS. PSIG									
	TEMP F									
STRESS ENGINEER	EXP. COEFF. IN/100FT									
	EXP. COEFF. MIL-IN/IN									
	MOD. OF ELAS. E PSI									

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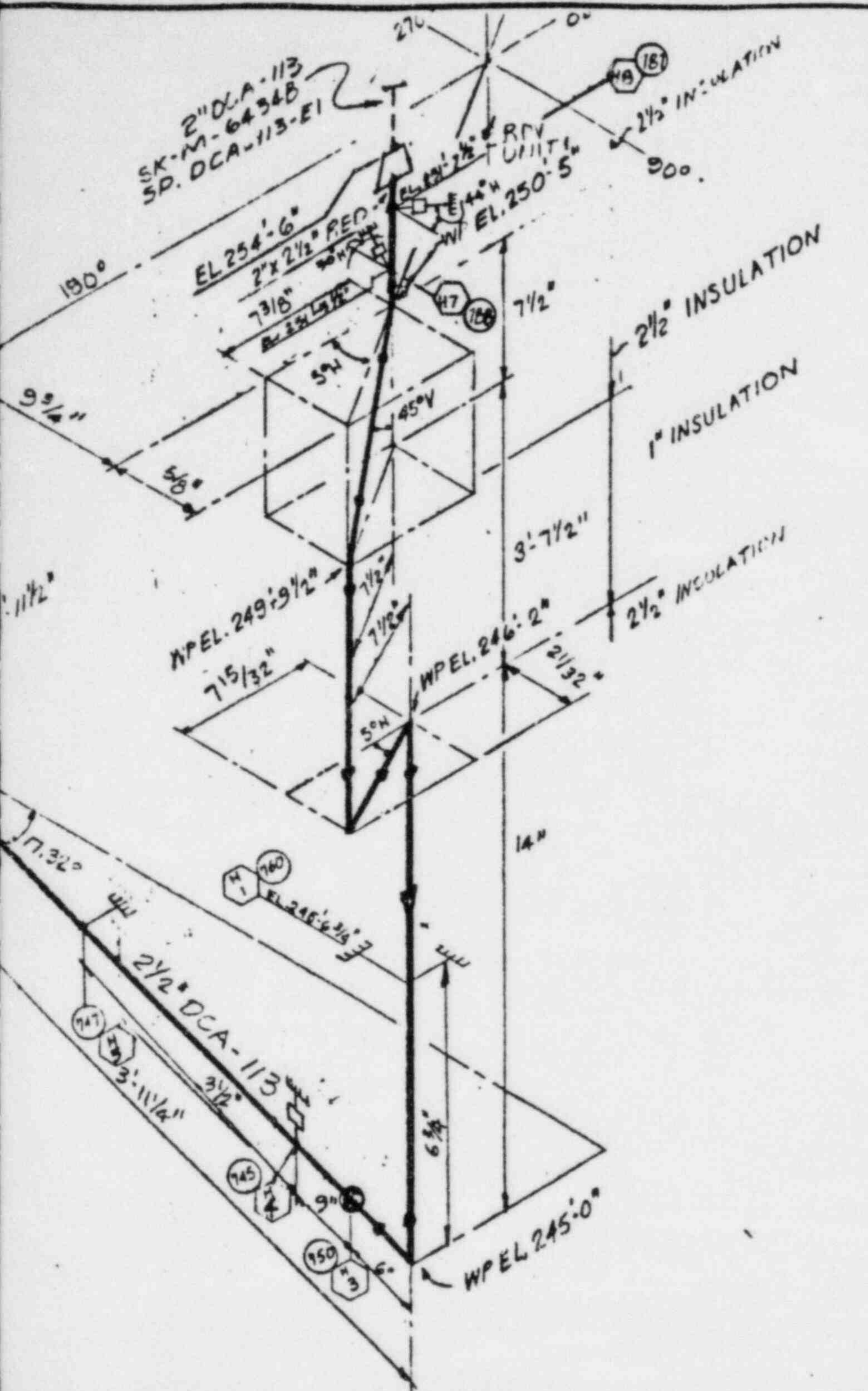
8408140320-51
Rev. 1



STRESS APPROVALS

REV	THERMAL	SEISMIC

REV. F. NOTE:
ADDED PIPE SUPPORTS & DATA POINTS FOR RECONCILIATION & DELETED PRESS & TEMP. DATA PER STRESS GROUP MARK-UP

TI APERTURE CARD

REFERENCE

- M-48 P&ID
- M-225 PIPING PLAN
- M-213 PIPING PLAN
- M-247 PIPING SECTION
- DCA-113-1 FAB 160 REV.5
- STRESS CALC. NO. 1-10-118

MODE DESCRIPTION

1. MODE I - NORMAL
2. MODE II - MAXIMUM
3. MODE III - —

No.	DATE	REVISIONS	BY				
F		SEE REV. F NOTE	HSN				
E		REV. TO REFLECT [illegible]	TL	WP			
D		REV. PER [illegible]		JSB			
C		REV. PER FCR M-9261F	SRF				
B		REV. PER NCD [illegible]					
A		ISSUED FOR STRESS ANALYSIS					

DATA			REV	DATE	BY	REV	DATE	BY
I	II	III						

LEGEND

- SPRING HANGER
- RIGID HANGER
- ANCHOR
- GUIDE
- SNUBBER
- RESTRAINT
- STRESS DATA POINT
- HANGER NUMBER

BECHTEL
SAN FRANCISCO

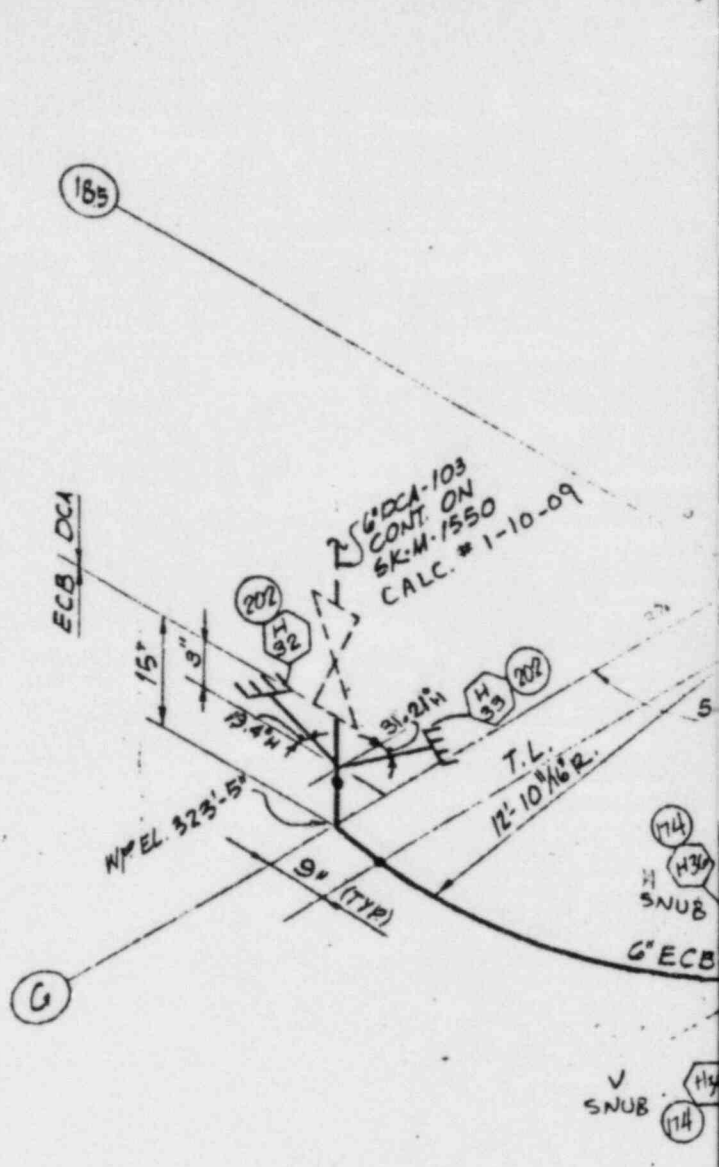
LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

ISOMETRIC - REACTOR ENCLOSURE
RPV DRAIN LINE

JOB No.	DRAWING No.	REV
8031	SK-M-6522	F

Specification
8031-P-363

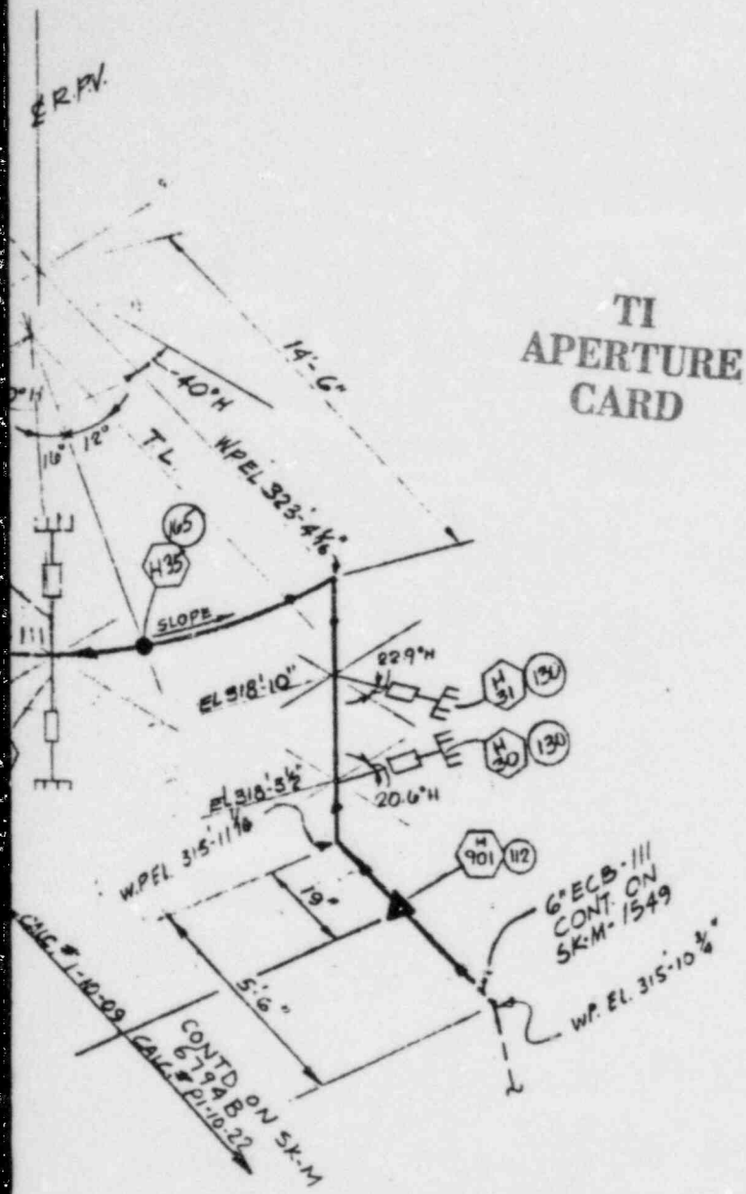
Appendix C



		DATA			REV	DATE	BY	REV	DATE	BY	
PIPING ENGINEER	LINE No.	ECB-111			A						
	MATERIAL	SMLS. ASME SA-312 OR SA-376 TP. 304			A	11/23/82	[illegible]				
	LINE THICKNESS (IN)	0.280			A	11/23/82	[illegible]				
MECHANICAL ENGINEER	LINE O.D. (IN)	6.625			A	11/23/82	[illegible]				
	MODE	I	II	III							I
	PRESS. PSIG										
	TEMP F										
STRESS ENGINEER	EXP. COEFF. IN/100FT										
	EXP. COEFF. MIL-IN/IN										
	MOD. OF ELAS. E PSI										

C-53

Rev. 1



STRESS APPROVALS		
REV	THERMAL	SEISMIC

REV. A NOTE:
DUE TO THE RELOCATION OF VALVE MO-1F022 THIS ISO. SUPERSEDES PORTION OF PIPING ON SK-M-1550 THAT WAS PREVIOUSLY DCA-103 PER STRESS GROUP REQUEST REWORK NOTICE LP-DW-2 & LP-DW-3.

REV. B NOTE:
REVISED ELEVATIONS PER STRESS GROUP REQUEST.

REV. D NOTE
ADDED HANGERS AND DATA POINT FOR RECONCILIATION.

REFERENCE

M-51 SHT. 2/2	P & ID
M-236	PIPING PLAN - DRYWELL
ECB-111-2	FAB. ISO. REV. 4

STRESS CALC. # 1-10-09.

MODE DESCRIPION.

MODE I - NORMAL REACTOR OPER. (P-300)
MODE II - MAXIMUM " "
MODE III - SHUT DOWN COOLING (RHR. PROCESS DIAGRAM)

NO.	DATE	REVISIONS	BY	CHKD	DESIGN ENGR	ENGR	PROJ ENGR	APPR
D		SEE REV. D NOTE	JMC					
C		REV PER FCR "M-1184"	SP	WP				
B		SEE REV. B NOTE	SP					
A		SEE REV. A NOTE	SP					

SCALE: 1/16" DESIGNED DRAWN SP CHIEF ENGR

DATA		REV	DATE	BY	REV	DATE	BY
II	III						

LEGEND
- SPRING HANGER
- RIGID HANGER
- ANCHOR
- GUIDE
- SNUBBER
- RESTRAINT

BECHTEL
SAN FRANCISCO

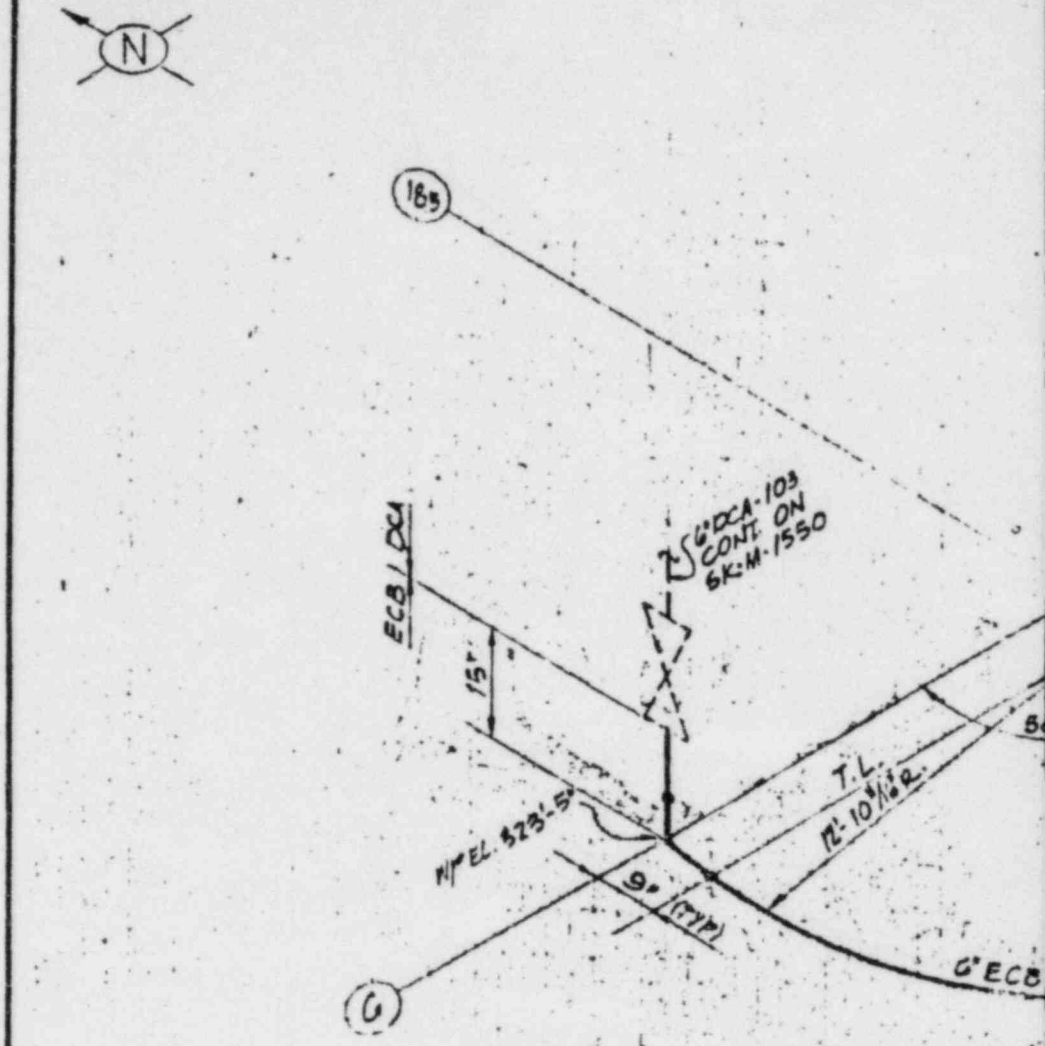
LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

ISOMETRIC - REACTOR BLDG. UNIT-1 (DRYWELL) RESIDUAL HEAT REMOVAL

JOB No.	DRAWING No.	REV
8031	SK-M-6794A	D

Specification
8031-P-363

Appendix C



1

Also Available On
Aperture Card

		DATA			REV	DATE	BY	REV	DATE	BY	
PIPING ENGINEER	LINE No.	ECP-111			A						
	MATERIAL	SMLS. ASME SA-312 GR. TP304 SA-376 TP 304			A	1/23/92					
	LINE THICKNESS (IN)	0.280			A	1/29/92					
MECHANICAL ENGINEER	LINE O.D. (IN)	6.625			A	1/29/92					
	MODE	I	II	III							I
	PRESS. PSIG										
	TEMP F										
STRESS ENGINEER	EXP. COEFF. IN/100FT										
	EXP. COEFF. MIL-IN/IN										
	MOD. OF ELAS. E PSI										

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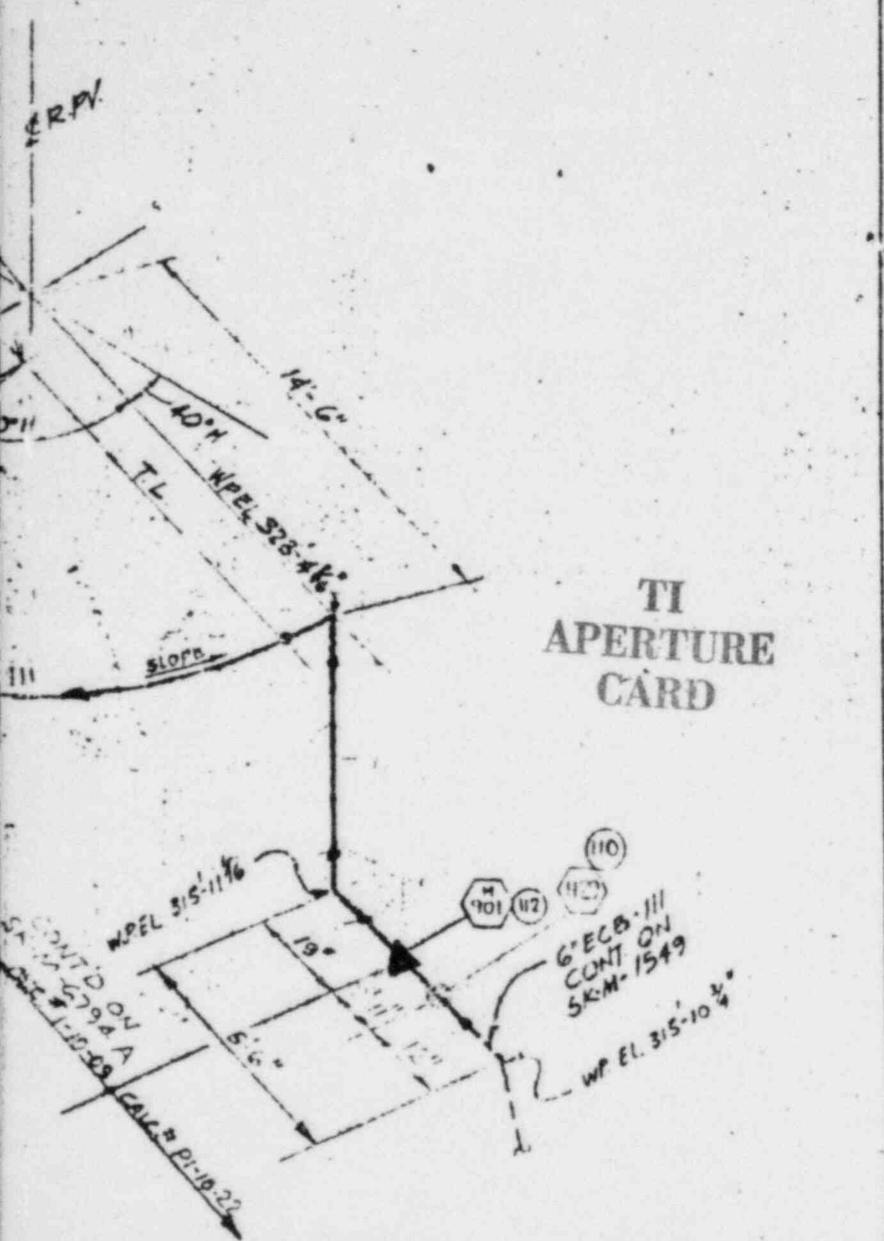
Rev. 1

CCN REV 0
CALC. NO 1-10-22



TI APERTURE CARD

STRESS APPROVALS

REV	THERMAL	SEISMIC

REV A NOTE:
DUE TO THE RELOCATION OF VALVE MO-1F022 THIS ISO. SUPERSEDES PORTION OF PIPING ON SK-M-1330 THAT WAS PREVIOUSLY DCA-105 PER STRESS GROUP REQUEST REWORK NOTICE LP-DW-2 & LP-DW-3.

REV. B NOTE:
REVISED ELEVATIONS PER STRESS GROUP REQUEST.

REV. D NOTE
ADDED HANGERS AND DATA POINT FOR RECONCILIATION.

REFERENCE

M-51 SHT. 2/2	P&ID
M-236	PIPING PLAN - DRYWELL
ECB-111-2	FAB. ISO REV. 4
CALC.# 1-10-22	

MODE DESCRIPTION

MODE I - NORMAL REACTOR OPER. (P-300)
MODE II - MAXIMUM
MODE III - SHUT DOWN COOLING (RHR PROCESS DIAGRAM)

NO	DATE	REVISION	BY	CHKD				
D		SEE REV. D NOTE	JMC					
C		REV PER FCR M-1134	SP	WP				
B		SEE REV. B NOTE	SP					
A		SEE REV. A NOTE	SP					

DATA		REV	DATE	BY	REV	DATE	BY
I	III						

LEGEND
- SPRING HANGER
- RIGID HANGER
- ANCHOR
- GUIDE
- SNUBBER
- RESTRAINT

SCALE NONE | DRAWN SP

BECHTEL
SAN FRANCISCO

LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

ISOMETRIC - REACTOR BLDG. UNIT-1 (DRYWELL) RESIDUAL HEAT REMOVAL

JOB NO.	DRAWING NO.	REV
8031	SK-M-6794 B	D

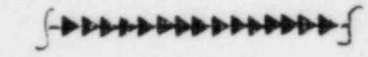
APPENDIX D

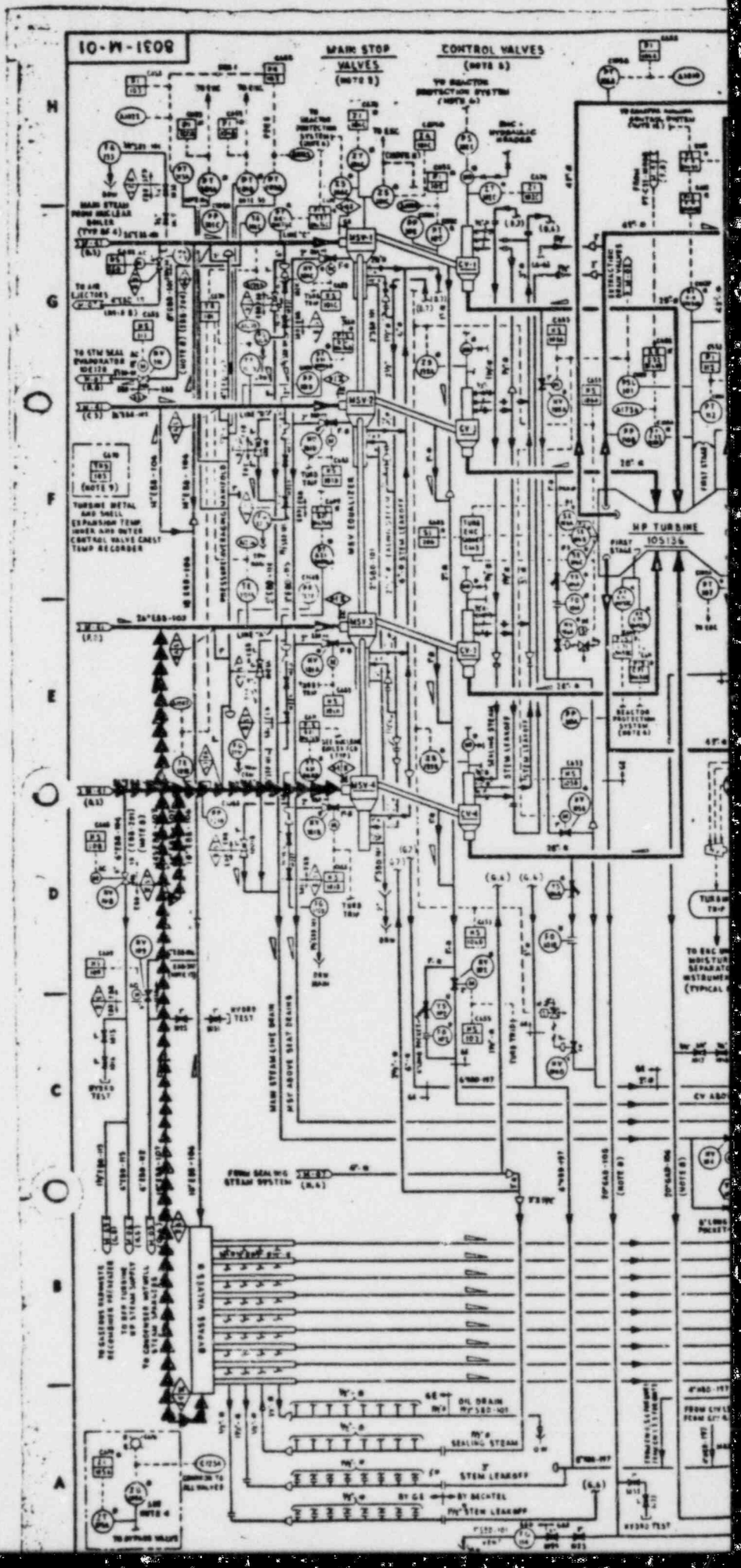
Scoping P&ID's

LIST OF SCOPING P&ID's:

P&ID's No.	Title
M-01	Main Steam
M-06	Feedwater
M-41	Nuclear Boiler
M-43	Reactor Recirculation Pump
M-44	Reactor Water Clean-Up
M-48	Standby Liquid Control
M-49	Reactor Core Isolation Cooling
M-50	RCIC Pump Turbine
M-51 (Sheets 1 & 2)	Residual Heat Removal
M-52	Core Spray
M-55	High Pressure Coolant Injection
M-56	HPCI Pump Turbine

NOTE: Piping subjected to STEADY STATE VIBRATION testing is denoted as follows:





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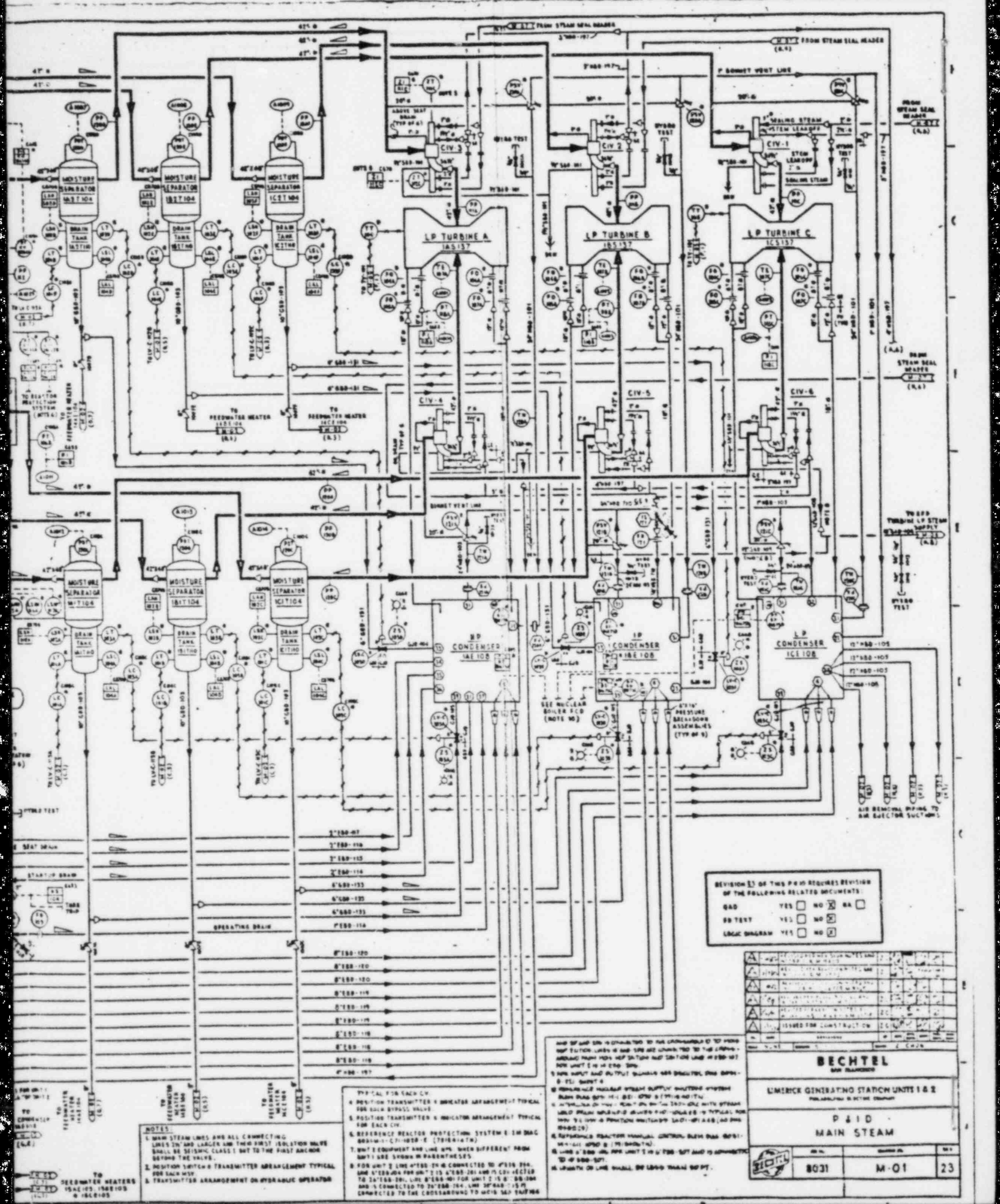
D-2 Rev. 0

Specification 8031-P-363
Appendix D



NOTES:
1. MAIN STEAM LINES AND ALL CONNECTING LINES 24" AND LARGER AND THEIR FIRST ISOLATION VALVE SHALL BE SEISMIC CLASS I BUT TO THE FIRST ANCHOR BEYOND THE VALVE.
2. POSITION SWITCH & TRANSMITTER ARRANGEMENT TYPICAL FOR EACH MSV.
3. TRANSMITTER ARRANGEMENT ON HYDRAULIC OPERATOR

TYPICAL FOR EACH CIV:
4. POSITION TRANSMITTER & INDICATOR ARRANGEMENT TYPICAL FOR EACH BYPASS VALVE.
5. POSITION TRANSMITTER & INDICATOR ARRANGEMENT TYPICAL FOR EACH CIV.
6. REFERENCE REACTOR PROTECTION SYSTEM E-SM DRAG DRAWING: C71-1050-E (79N641A7N).
7. BWT EQUIPMENT AND LINE NOS. WHEN DIFFERENT FROM UNIT 1 ARE SHOWN IN PARENTHESES.
8. FOR UNIT 2 LINE 8"EBB-104 IS CONNECTED TO 8"EBB-204, LINE 24"EBB-204 FOR UNIT 2 IS 6"EBB-204 AND IS CONNECTED TO 24"EBB-304, LINE 8"EBB-101 FOR UNIT 2 IS 8"EBB-304 AND IS CONNECTED TO 24"EBB-304. LINE 24"EBB-105 IS CONNECTED TO THE CROSSAROUND TO MSR SEP EQUIPMENT

REVISION 23 OF THIS P&ID REQUIRES REVISION OF THE FOLLOWING RELATED DOCUMENTS:

QAD	YES ☐	NO ☒ QA ☐
PB TEST	YES ☐	NO ☒
LOGIC DIAGRAM	YES ☐	NO ☒

REV	DESCRIPTION	DATE	APPROVED
A			
B			
C			
D			
E			
23	ISSUED FOR CONSTRUCTION		

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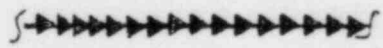
LIMERICK GENERATING STATION UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

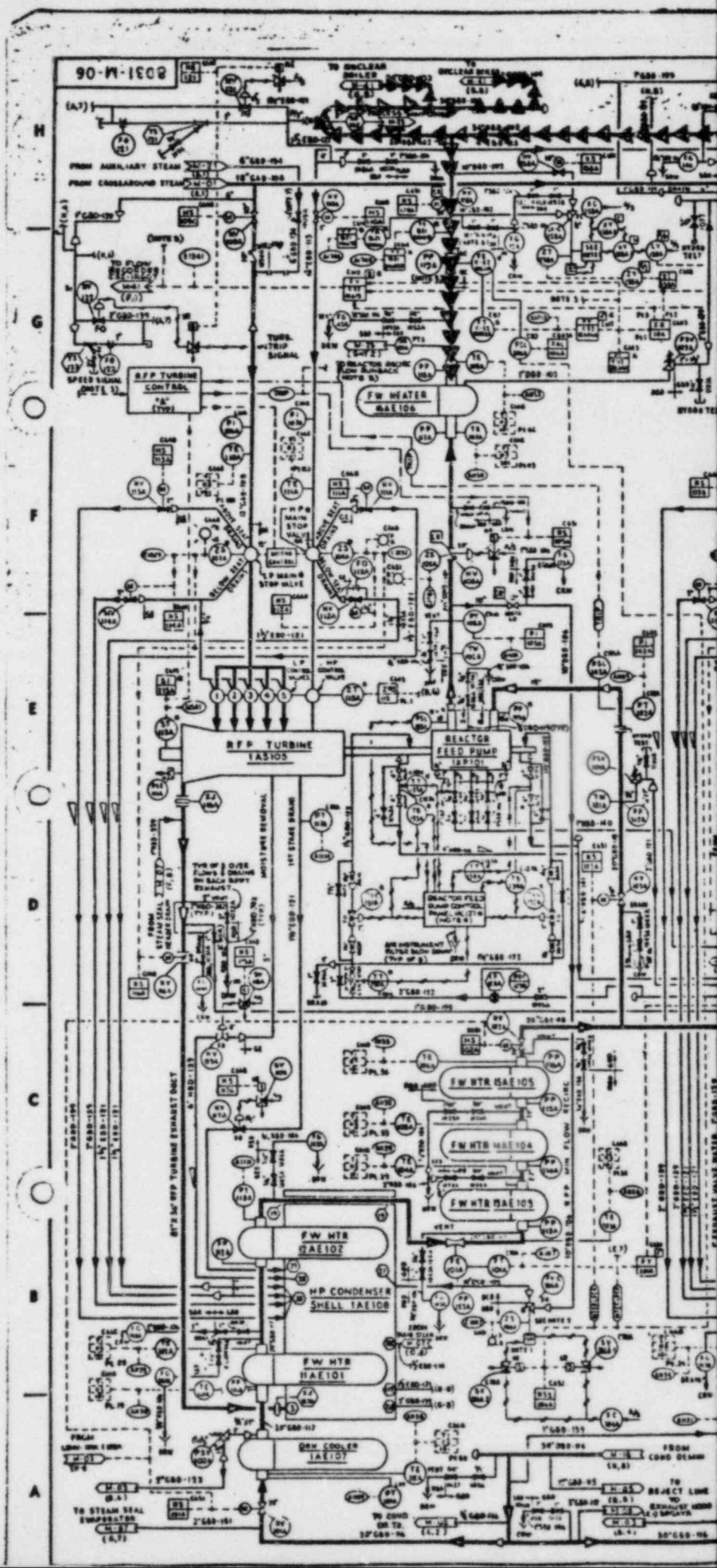
P & I D
MAIN STEAM

8031	M-01	23

Also Available On
Aperture Card

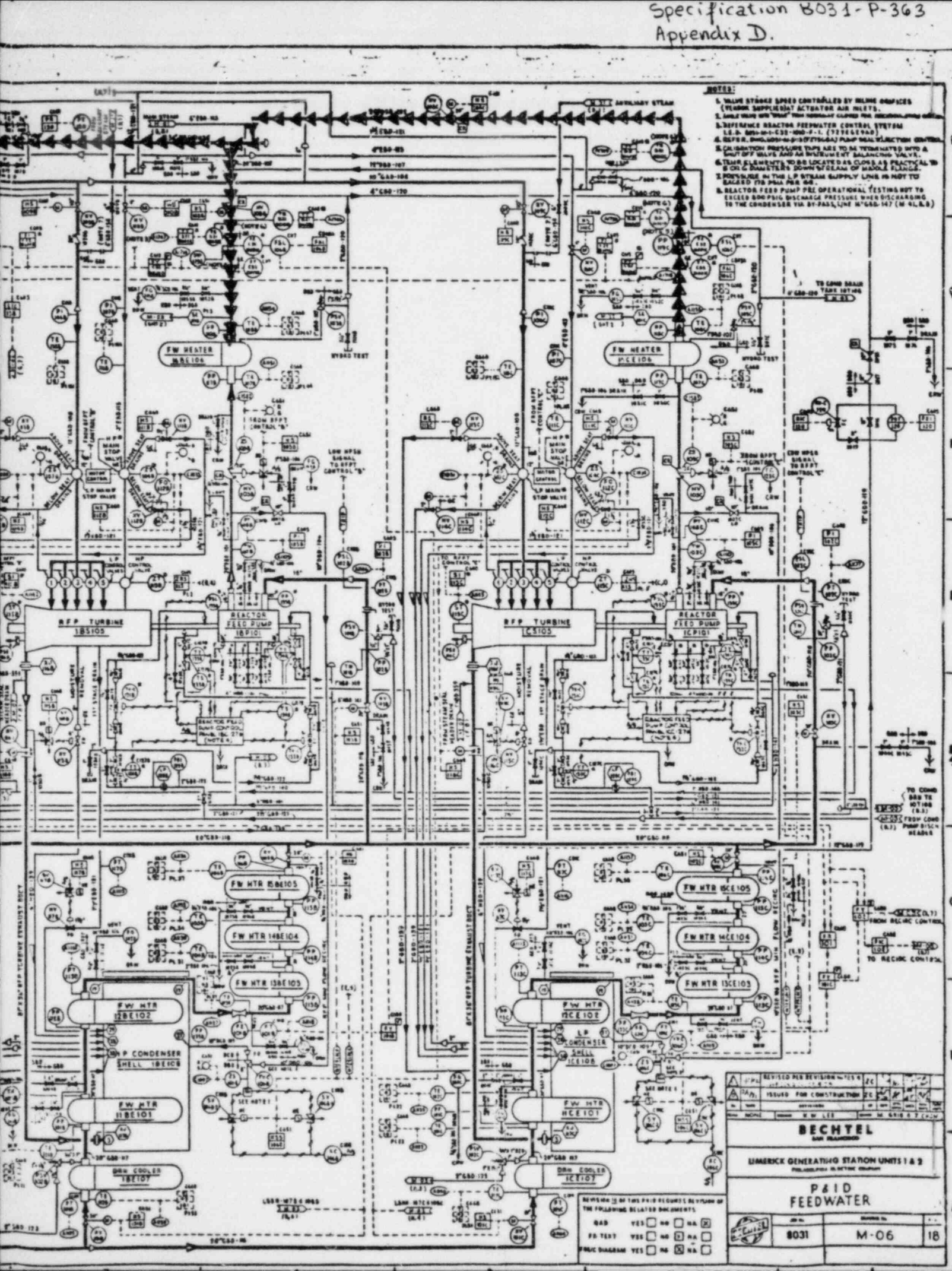
NOTE: Piping subjected to STEADY STATE VIBRATION testing is denoted as follows:





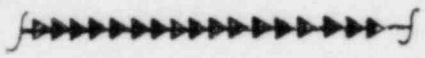
D-3 Rev. 0

Specification 8031-P-363
Appendix D.



Also Available On
Aperture Card

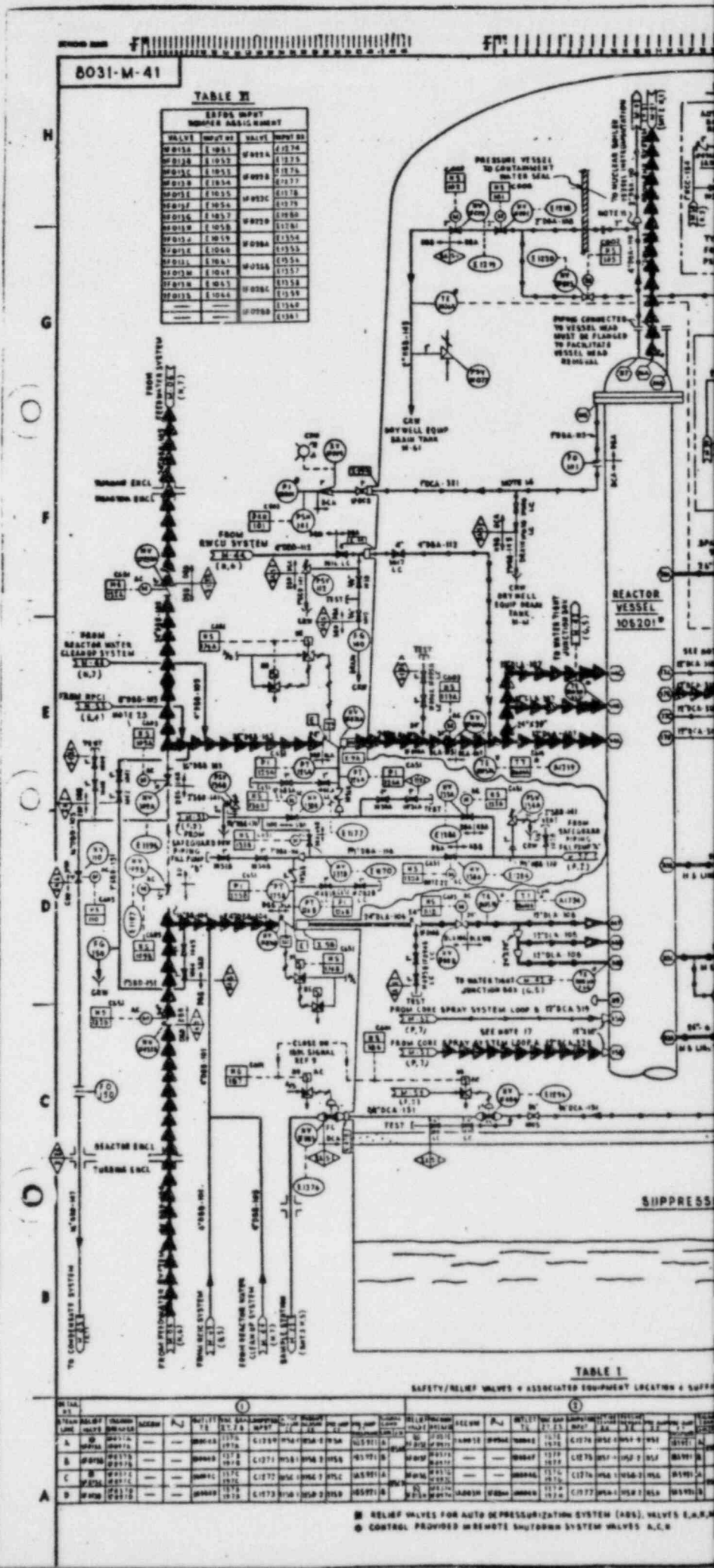
NOTE: Piping subjected to STEADY STATE VIBRATION testing is denoted as follows:



TI
APERTURE
CARD

D-4 Rev. 0

8408140320-56



Specification 8031-P-50.
Appendix D.

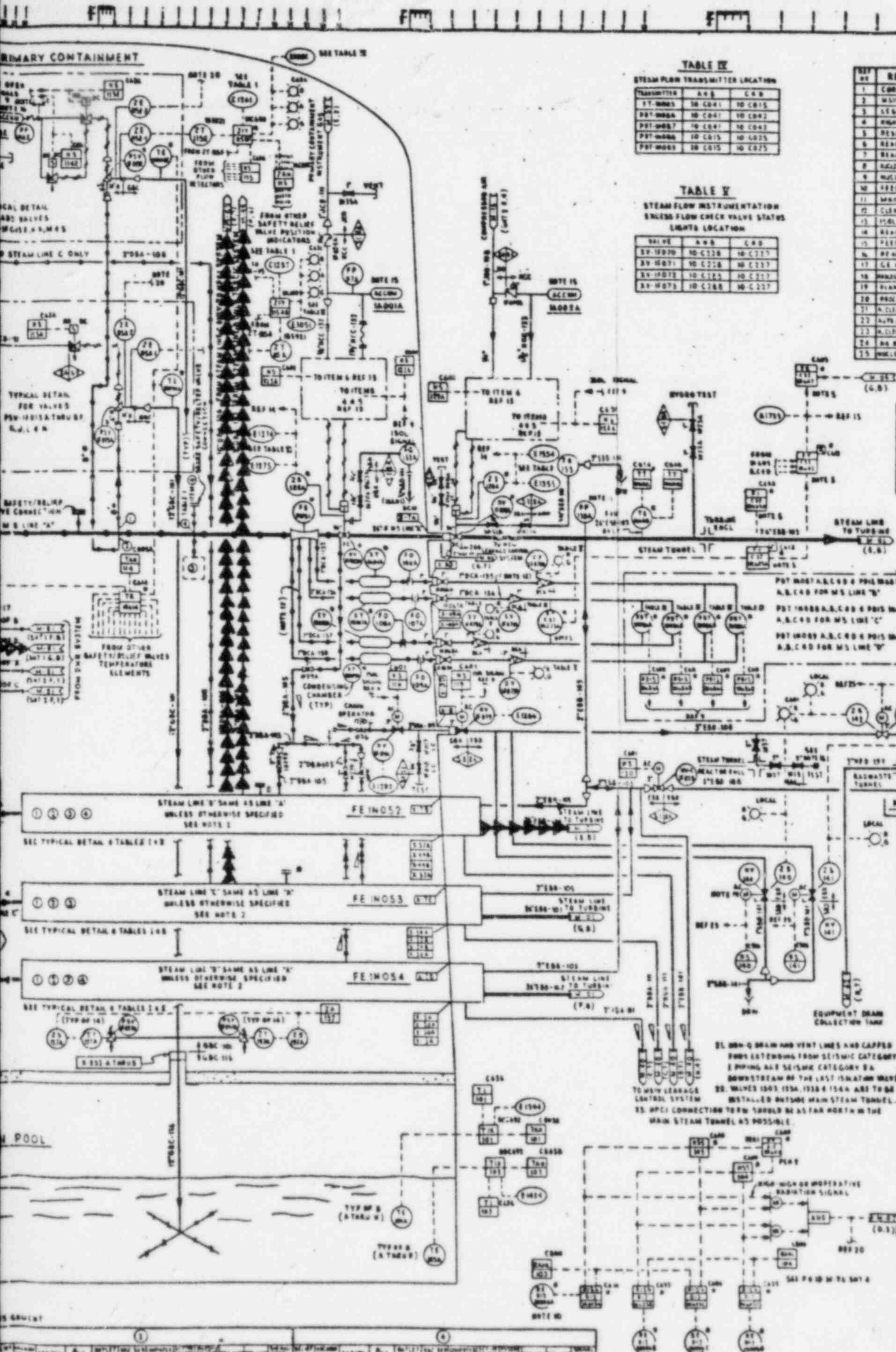


TABLE IV

STEAM FLOW TRANSMITTER LOCATION

TRANSMITTER	A & B	C & D
FT-1N085	10-C041	10-C015
PDT-1N086	10-C041	10-C042
PDT-1N087	10-C041	10-C042
PDT-1N088	10-C015	10-C025
PDT-1N085	10-C015	10-C025

TABLE V

STEAM FLOW INSTRUMENTATION EXCESS FLOW CHECK VALVE STATUS LIGHTS LOCATION

VALVE	A & B	C & D
XV-1F070	10-C228	10-C237
XV-1F071	10-C228	10-C237
XV-1F072	10-C125	10-C237
XV-1F073	10-C268	10-C237

REF NO	REFERENCE DRAWINGS	BECHTEL NO	G NO
1	CORE SPRAY	M-52	
2	MSIV LEAKAGE CONTROL	M-40	
3	LEGEND	M-00	
4	HIGH PRESSURE COOLANT INJECTION	M-55	
5	RESIDUAL HEAT REMOVAL	M-51	
6	REACTOR CORE ISOLATION COOLING	M-49	
7	REACTOR WATER CLEANUP	M-44	
8	NUCLEAR BOILER VESSEL INSTRUMENTATION	M-42	
9	NUCLEAR BOILER PCD	M-B21-[illegible]	761E557AD
10	FEEDWATER	M-06	
11	MAIN STEAM	M-01	
12	CLEANING OF PIPING AND EQUIPMENT	M-A61-0020-2A	22A1900809
13	ISOL VLV SCHEMATIC CONTR DIAGRAM	B21-F022-C-2	732E150
14	REACTOR	M-C71-1040-F-1	729E614AD
15	FEEDWATER CONTROL SYSTEM IED	M-C32-1040-F-4	729E617AD
16	REACT BLDG LINER PLATE PENET	C-279 & 280	
17	GE NUCLEAR BOILER SYSTEM P&ID	M-B21-1010-F-1	761E250AD
18	PROCESS INST PIPING & TUBING DESIGN SPEC	M-A61-4020-C-1	22A2844
19	PLANT LEAK DETECTION	M-25	
20	PROCESS RADIATION MONITORING IED	M-D12-1040-F-1	761E346
21	N. CLEAR BOILER PR. LESS INSTR. ELEM DIA.	[illegible]	761E421TN
22	AUTO DEPRESSURIZATION SYSTEM ELEM DIA.	[illegible]	761E423TN
23	N. CLEAR STEAM SUPPLY SHUTOFF SYS ELEM DIA.	[illegible]	761E421TN
24	RV NOZZLE THERMOCOUPLE PADS	M-B21-4001-C-20	SPF 22A4144
25	NUCLEAR BOILER FUNCTIONAL DESCRIPTION	8031-M-41FD	

REVISION 21 OF THIS P&ID REQUIRES REVISION OF THE FOLLOWING RELATED DOCUMENTS:

Q&D	YES ☒	NO ☐	NA ☐
FD TEXT	YES ☐	NO ☐	NA ☒
LOGIC DIAGRAM	YES ☒	NO ☐	NA ☐

DETAIL A

TEMPORARY IN LINE FLUSH CONNECTION

UNIT 2 ONLY

FOR UNIT 1 OPERATION/UNIT 2 CONSTRUCTION SEPARATION. LOCATE AS CLOSE AS POSSIBLE TO REACTOR ENCLOSURE PENETRATION

TO COMMON (RADWASTE)

NOTES:

1. NUCLEAR BOILER IS A CLASS I SEISMIC SYSTEM EXCEPT AS NOTED.
2. STEAM LINES & ASSOCIATED EQUIPMENT ENCLOSED IN BOXES SHALL HAVE PART NOS CORRESPONDING TO THEIR RESPECTIVE LINE LETTER UNLESS OTHERWISE NOTED. EXAMPLE: XXXXX B IS ON LINE B, YYYYY C IS ON LINE C
3. THE GE MPL NUMBER FOR THIS SYSTEM IS B21.
4. LOCATE PRESSURE TEST POINTS PP 158 A,B,C,D AS CLOSE AS POSSIBLE TO VALVES 1F086 C,D,A & B RESPECTIVELY.
5. THESE INSTRUMENTS ARE IN GE MPL SYSTEM C32, REF 15.
6. TEMPERATURE MAIN STEAM LINE LEAK DETECTION IS SHOWN ON REF NO 19. THE INSTRUMENTS ARE NOTED AS PART OF THIS P&ID (M-41)
7. ALL STEAM LINES SHALL BE SLOPED. WHERE PRACTICAL ALL LIQUID LINES INSIDE THE PRIMARY CONTAINMENT SHALL BE SLOPED.
8. ALL INSTRUMENT PIPING AND TUBING SHALL BE INSTALLED IN ACCORDANCE WITH REF 18.
9. AIR FAILURE WILL NOT CLOSE THIS VALVE AGAINST NORMAL FLOW.
10. THESE INSTRUMENTS ARE IN G.E. MPL SYSTEM D12, REF NO 20 AND ARE LOCATED IN STEAM LINE TUNNEL AS CLOSED AS PRACTICAL TO THE PRIMARY CONTAINMENT.
11. LOCATED TEE AS CLOSE AS POSSIBLE TO RPV.
12. STEAM FLOW INSTRUMENT LINES ARE TO BE NUMBERED IN ACCORDANCE WITH TABLE III.
13. THE SAFETY/RELIEF VALVE BONNET VENT SHALL BE PIPED WITH ABOUT 5FT. UNINSULATED PIPE. THE THERMOWELL SHALL BE INSTALLED IN THE PIPE NEAR ITS END. THE PIPE SHALL BE SLOPE DOWN FROM SAFETY/RELIEF VALVE TO PERMIT CONDENSATE DRAINAGE.
14. DRAIN CONNECTION SHOULD BE LOCATED AT LOW POINT.
15. CAP OF THE MSIV ACCUM 1A001A,B,C & D IS 105 GAL AND 1A001A,B,C & D IS 35 GAL MINIMUM. THE ASSOCIATED CHECK VALVES FOR THESE ACCUMULATORS ARE SPRING LOADED WITH SOFT SEATS.
16. CAPACITY OF THE MSRV ACCUMULATORS 1A005 E,H,K,M AND S 10 GALLON MINIMUM. THE ASSOCIATED CHECK VALVES FOR THESE ACCUMULATORS ARE SPRING LOADED WITH SOFT SEATS.
17. THIS PORTION OF DCA PIPE IS 316L SS WITH 0.02% CARBON MAXIMUM
18. LOCATE FLEXIBLE HOSE CONNECTION TO BE ACCESSIBLE FROM REACTOR ENCLOSURE FLOOR ELEVATION 217FT
19. VALVES MUST BE SEISMIC I AND Q LISTED. THE ISOLATION SIGNALS MUST CLOSE THE BLOCK VALVES AND OPEN THE VENT VALVES.
20. PASSIVE CHANNEL SIGNAL TERMINATED AT 27 ENCLOSURE TO ALLOW FOR ACTIVE & PASSIVE FT INTERCONNECTION DURING PLANT OPERATION
21. NON-Q DRAIN AND VENT LINES AND CAPPED PORTS EXTENDING FROM SEISMIC CATEGORY I PIPING ARE SEISMIC CATEGORY IIA DOWNSTREAM OF THE LAST ISOLATION VALVE.
22. VALVES 1503, 1534, 1538 & 1544 ARE TO BE INSTALLED OUTSIDE MAIN STEAM TUNNEL.
23. HPCI CONNECTION TO RPV SHOULD BE AS FAR NORTH IN THE MAIN STEAM TUNNEL AS POSSIBLE

21	[illegible]	REVISED PER [illegible]	ZC
20	[illegible]	REVISED PER [illegible]	ZC
0	[illegible]	ISSUED FOR CONSTRUCTION	ZC

TABLE II

VALVE PRESSURE SETTING

SET PRESS (PSIG)	RELIEF VALVE (MRS)
830	H,J,L,R
990	B,E,M,S
990	A,C,F,G

TABLE III

STEAM FLOW INSTRUMENTATION LINE

MS LINE "A"	"B"	"C"	"D"
FDCA-135	-139	-143	-147
FDCA-136	-140	-144	-148
FDCA-137	-141	-145	-149
FDCA-138	-142	-146	-150

	1								4							
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	E1378	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	E1379	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	E1382	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	E1380	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	E1381	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	E1383	[illegible]	[illegible]	[illegible]

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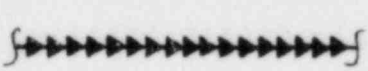
LIMERICK GENERATING STATION UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

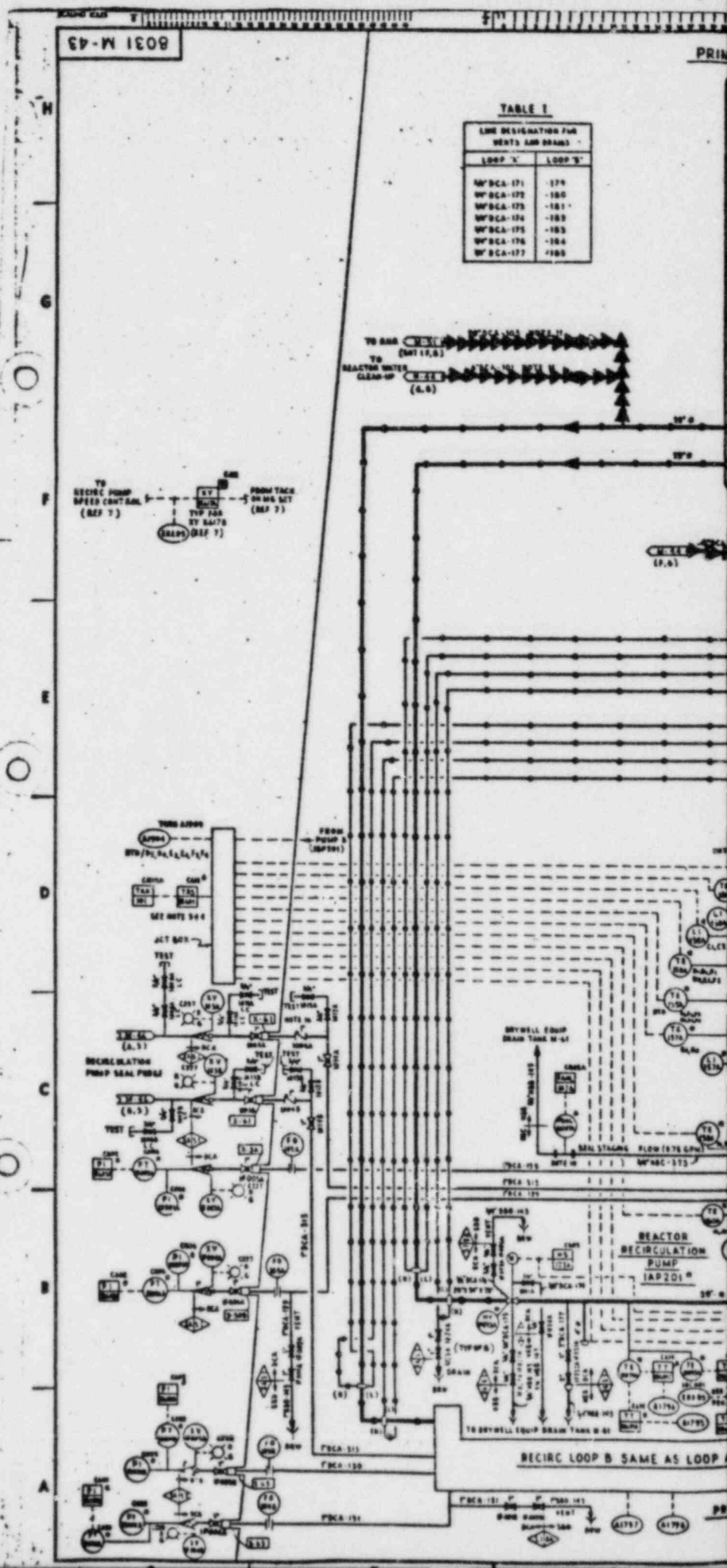
P & ID
NUCLEAR BOILER

JOB No.	DRAWING No.	REV.
8031	M-41	21

Also Available On
Aperture Card

NOTE: Piping subjected to STEADY STATE VIBRATION testing is denoted as follows:

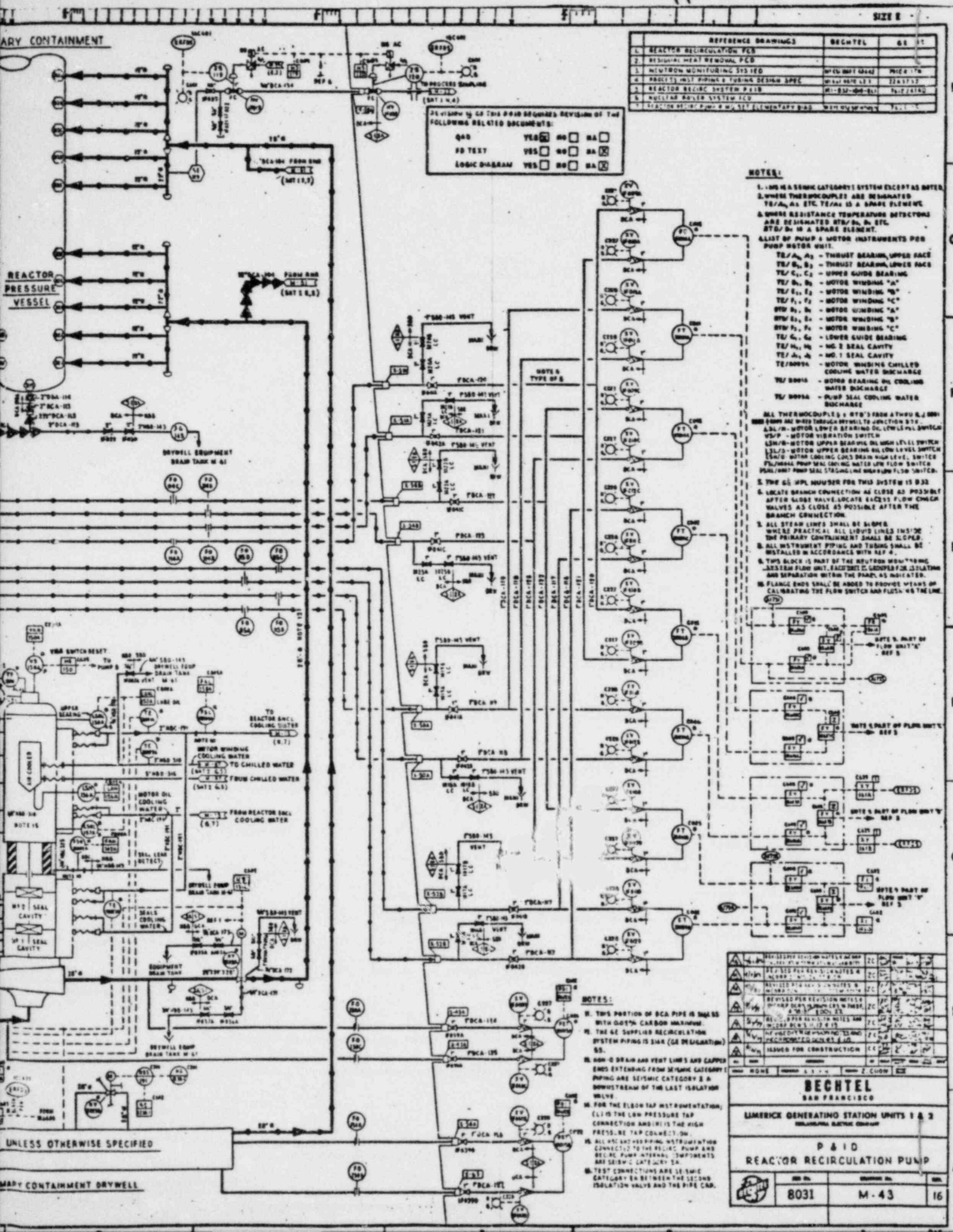




D.5 Rev. 0

8408140320-57

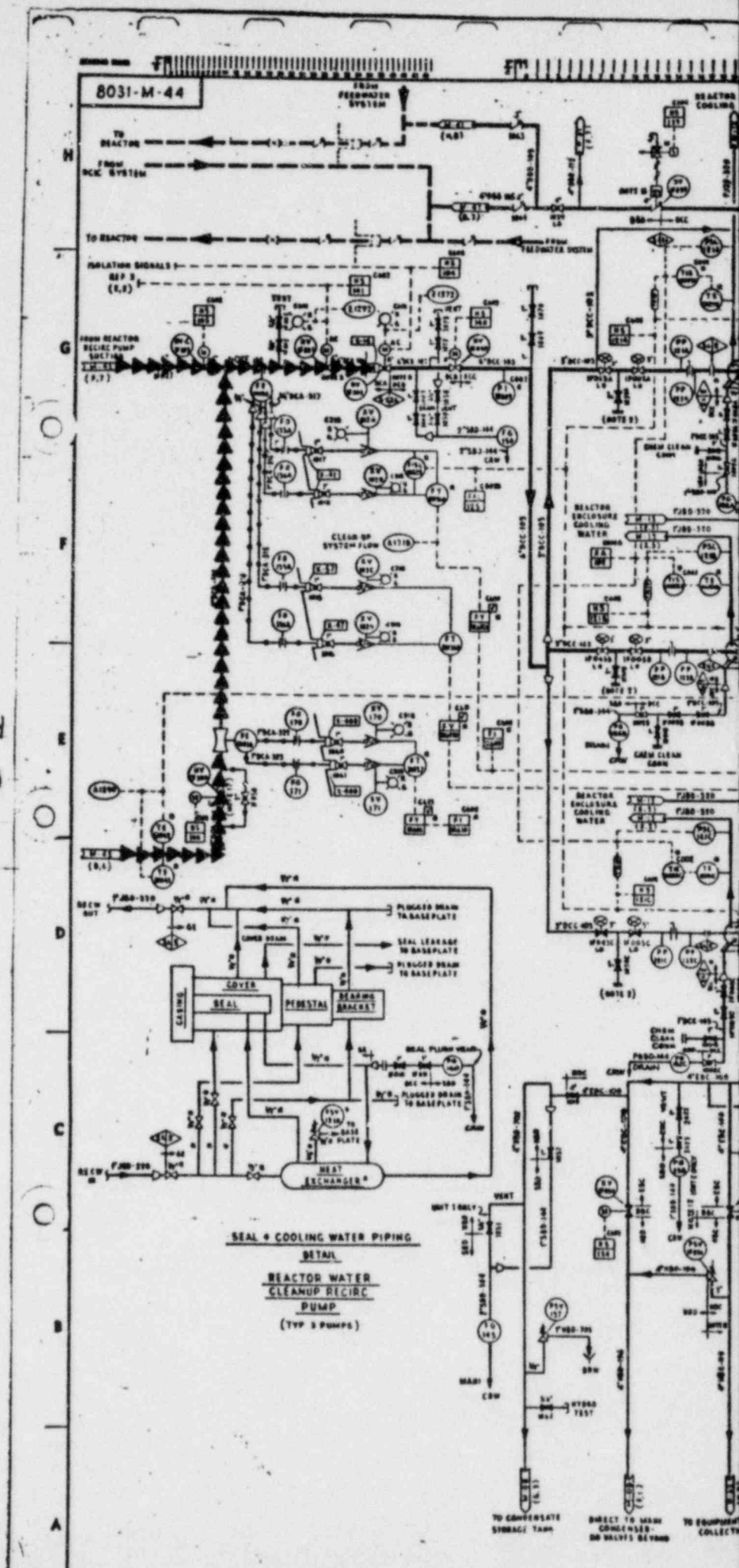
Specification 8031-P-363
Appendix D.



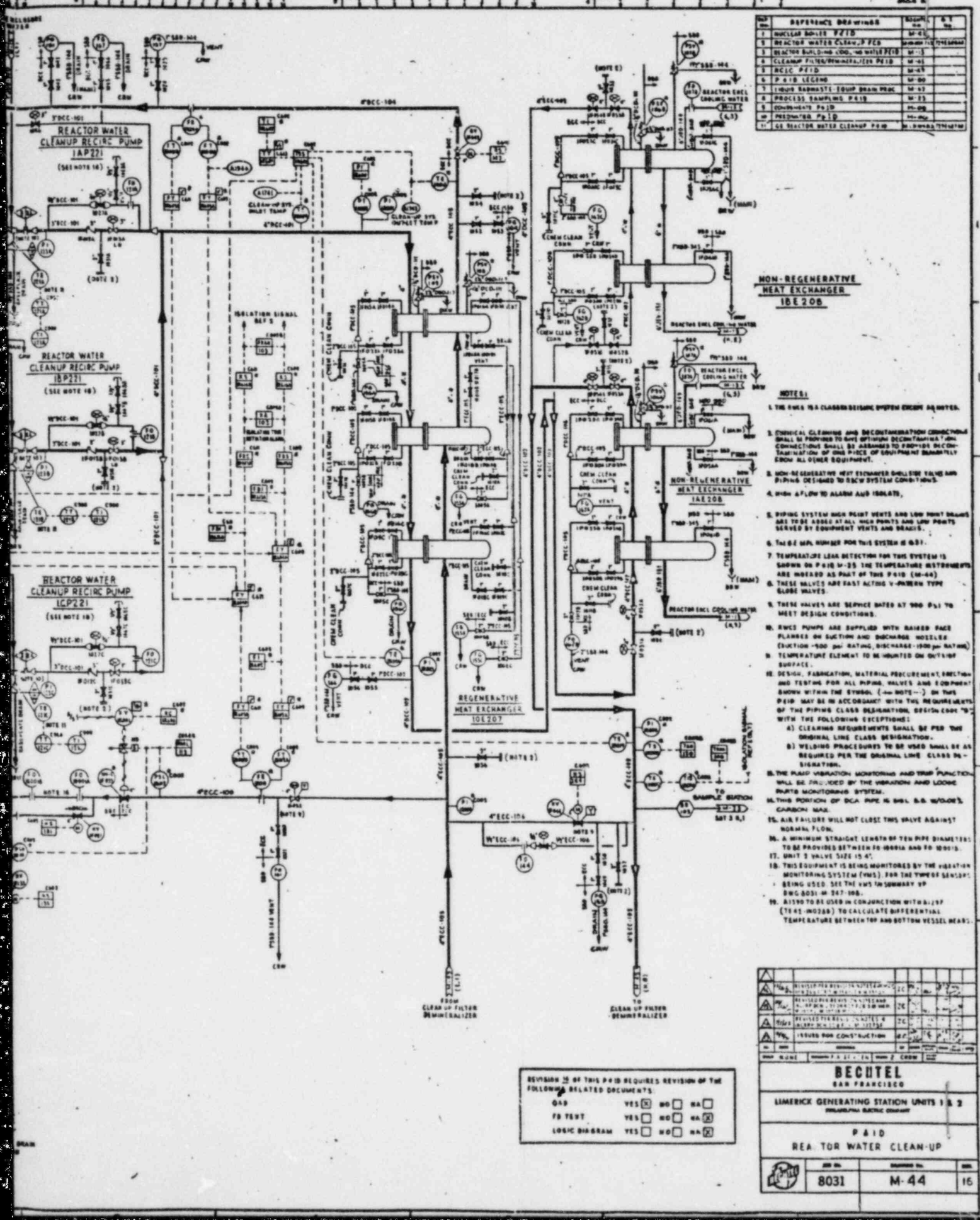
NOTE: Piping subjected to STEADY STATE VIBRATION testing is denoted as follows:

D-6

Rev 0



Specification 8031-P-363
Appendix D.



No.	REFERENCE DRAWINGS	Report No.	G.E. No.
1	NUCLEAR BOILER P&ID	M-45	
2	REACTOR WATER CLEAN-UP P&ID	M-44	
3	REACTOR BUILDING CLOSED COOLING WATER P&ID	M-13	
4	CLEANUP FILTER/DEMINERALIZER P&ID	M-46	
5	RCIC P&ID	M-49	
6	P & ID LEGEND	M-50	
7	LIQUID RADWASTE-EQUIP DRAIN P&ID	M-52	
8	PROCESS SAMPLING P&ID	M-53	
9	CONTAINMENT P&ID	M-09	
10	PRESSURE P&ID	M-06	
11	GE REACTOR WATER CLEANUP P&ID		

NOTES:

1. THE RWCU IS A CLASS(B) SEISMIC SYSTEM EXCEPT AS NOTED.
2. CHEMICAL CLEANING AND DECONTAMINATION CONNECTIONS SHALL BE PROVIDED TO GIVE OPTIMUM DECONTAMINATION. CONNECTIONS SHALL BE ARRANGED TO PROVIDE DECONTAMINATION OF ONE PIECE OF EQUIPMENT INDEPENDENTLY FROM ALL OTHER EQUIPMENT.
3. NON-REGENERATIVE HEAT EXCHANGER SHELL SIDE VALVES AND PIPING DESIGNED TO RCCW SYSTEM CONDITIONS.
4. HIGH ΔFLOW TO ALARM AND ISOLATE.
5. PIPING SYSTEM HIGH POINT VENTS AND LOW POINT DRAINS ARE TO BE ADDED AT ALL HIGH POINTS AND LOW POINTS SERVED BY EQUIPMENT VENTS AND DRAINS.
6. THE QA CAT. NUMBER FOR THIS SYSTEM IS A31.
7. TEMPERATURE LEAK DETECTION FOR THIS SYSTEM IS SHOWN ON P&ID M-25. THE TEMPERATURE INSTRUMENTS ARE NOTED AS PART OF THIS P&ID (M-44).
8. THESE VALVES ARE FAST ACTING V-PATTERN TYPE GLOBE VALVES.
9. THESE VALVES ARE SERVICE RATED AT 900 PSI TO MEET DESIGN CONDITIONS.
10. RWCU PUMPS ARE SUPPLIED WITH RAISED FACE FLANGES ON SUCTION AND DISCHARGE NOZZLES (SUCTION -900 psi RATING, DISCHARGE -1500 psi RATING)
11. TEMPERATURE ELEMENT TO BE MOUNTED ON OUTSIDE SURFACE.
12. DESIGN, FABRICATION, MATERIAL PROCUREMENT, ERECTION AND TESTING FOR ALL PIPING, VALVES AND EQUIPMENT SHOWN WITHIN THE SYMBOL (—NOTE—) ON THIS P&ID MAY BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE PIPING CLASS DESIGNATION, DESIGN CODE "B" WITH THE FOLLOWING EXCEPTIONS:
    a) CLEANING REQUIREMENTS SHALL BE PER THE ORIGINAL LINE CLASS DESIGNATION.
    b) WELDING PROCEDURES TO BE USED SHALL BE AS REQUIRED PER THE ORIGINAL LINE CLASS DESIGNATION.
13. THE P&ID VIBRATION MONITORING AND TRIP FUNCTION WILL BE PROVIDED BY THE VIBRATION AND LOOSE PARTS MONITORING SYSTEM.
14. THIS PORTION OF DCA PIPE IS SMLS. A.S. W/LOW % CARBON MAX.
15. AIR FAILURE WILL NOT CLOSE THIS VALVE AGAINST NORMAL FLOW.
16. A MINIMUM STRAIGHT LENGTH OF TEN PIPE DIAMETERS TO BE PROVIDED BETWEEN FE-1B001A AND FE-1B001B.
17. UNIT 2 VALVE SIZE IS 4".
18. THIS EQUIPMENT IS BEING MONITORED BY THE VIBRATION MONITORING SYSTEM (VMS). FOR THE TYPES OF SENSORS BEING USED, SEE THE VMS TAG SUMMARY BY DWG. 8031-M-347-1001.
19. A1390 TO BE USED IN CONJUNCTION WITH A1397 (TE-42-1N028A) TO CALCULATE DIFFERENTIAL TEMPERATURE BETWEEN TOP AND BOTTOM VESSEL HEADS.

REVISION	DESCRIPTION	BY	CHK	APP	DATE
1	REVISED P&ID PER VALVES AND ELEV. OF PIPE PER DCN-1	JE			7/26/83
2	REVISED P&ID PER VALVES AND ELEV. OF PIPE PER DCN-2	JE			8/26/83
3	REVISED P&ID PER VALVES & ELEV. PER DCN-3	JE			11/1/83
4	ISSUED FOR CONSTRUCTION	JE			12/9/83

REVISION 4 OF THIS P&ID REQUIRES REVISION OF THE FOLLOWING RELATED DOCUMENTS:

QAD	YES [X]	NO [ ]	NA [ ]
FD TEXT	YES [ ]	NO [ ]	NA [X]
LOGIC DIAGRAM	YES [ ]	NO [ ]	NA [X]

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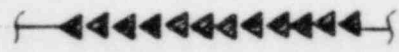
LIMERICK GENERATING STATION UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

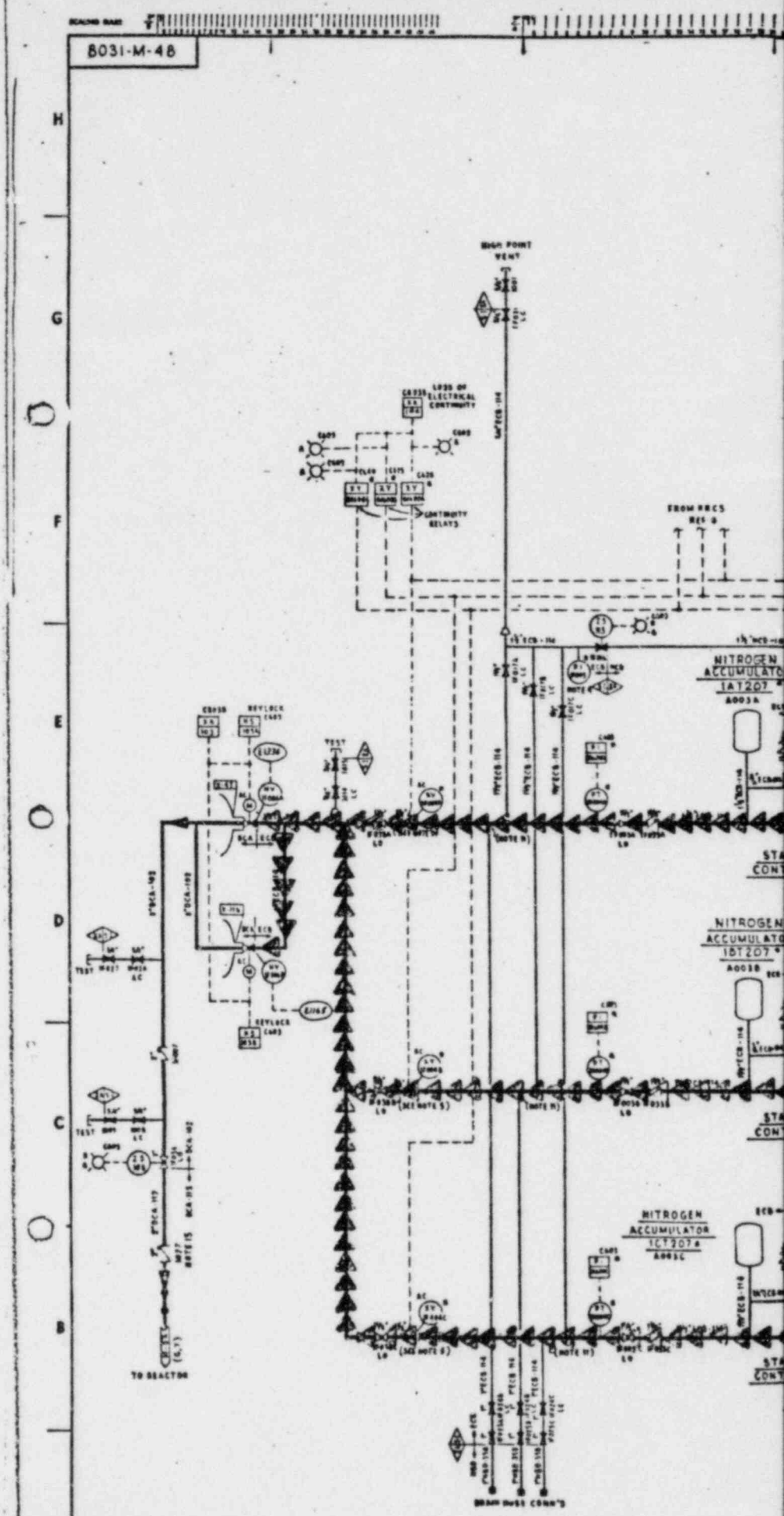
P & I D
REACTOR WATER CLEAN-UP

JOB NO.	DRAWING NO.	REV.
8031	M-44	16

Also Available On
Aperture Card

NOTE :- PIPING SUBJECTED TO STEADY STATE VIBRATION TESTING IS DENOTED AS FOLLOWS:





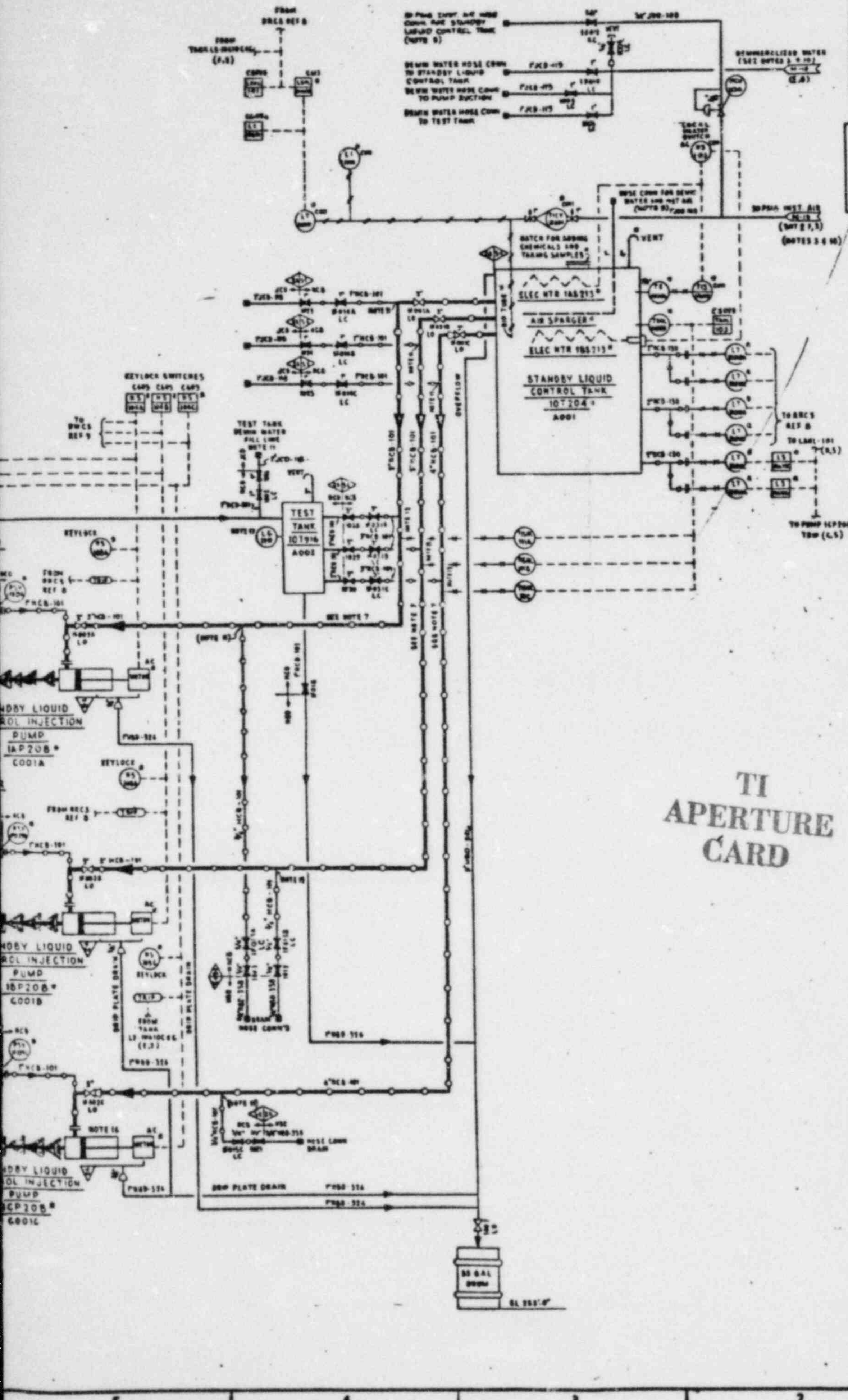
D-7 REV. 0
8408140320-59

Specification 8031-P-362
Appendix-D SIZE 1

REF NO	REFERENCE DRAWING	BECHTEL	G.E.
1	CORE SPRAY SYSTEM P&ID	[illegible]	[illegible]
2	STANDBY LIQUID CONTROL FCD	[illegible]	[illegible]
3	COMPRESSED AIR P&ID	M-15	
4	MAKE-UP DEMINERALIZER P&ID	M-18	
5	P&ID LEGEND	M-00	
6	STANDBY LIQUID CONTROL P&ID	[illegible]	[illegible]
7	[illegible]	[illegible]	[illegible]
8	REDUNDANT REACTIVITY CONTROL SYS [illegible]	[illegible]	[illegible]
9	REACTOR WATER CLEANUP SYS ELEM	[illegible]	[illegible]

REVISION 13 OF THIS P&ID REQUIRES REVISION OF THE FOLLOWING RELATED DOCUMENTS:

QAD	YES ☒	NO ☐	NA ☐
FD TEXT	YES ☐	NO ☒	NA ☐
LOGIC DIAGRAM	YES ☐	NO ☒	NA ☐



TI APERTURE CARD

NOTES:

1. THIS IS A CLASS I SEISMIC SYSTEM EXCEPT AS NOTED.
2. STANDBY LIQUID CONTROL SYSTEM SHALL BE TESTED USING DEMINERALIZED WATER FROM THE SYSTEM TEST TANK ONLY.
3. THE ELEVATION OF THE DEMINERALIZED WATER AND INSTR AIR SUPPLY LINES SHALL BE ABOVE THE TOP OF THE STORAGE TANK.
4. ORIENT PRESSURE INDICATOR 1R013 SO THAT IT CAN BE READ FROM VALVE 1F016 LOCATION (ZONE E-6)
5. IN ORDER TO SERVICE THESE VALVES AFTER FIRING, IT IS NECESSARY TO REMOVE A 6" SPOOL PIECE IMMEDIATELY UPSTREAM OF THE RESPECTIVE VALVE. EACH EXPLOSIVE VALVE IS FURNISHED WITH A MATING SOCKET WELDING TYPE FLANGE FOR SOCKET WELDING TO A 6" SPOOL PIECE.
6. THE GE MPL NUMBER FOR THIS SYSTEM IS C-41
7. STANDBY LIQUID CONTROL SYSTEM SHALL HAVE THERMOSTATICALLY CONTROLLED HEAT TRACING FROM TANK 10T204 UP TO AND INCLUDING INJECTION PUMPS.
8. WHERE PRACTICAL ALL LIQUID LINES INSIDE THE PRIMARY CONTAINMENT SHALL BE SLOPED IN THE DIRECTION OF FLOW
9. ALL INSTRUMENT PIPING AND TUBING SHALL BE INSTALLED IN ACCORDANCE WITH REF. 7.
10. DEMINERALIZED WATER (INSTRUMENT AIR LINES ARE SEISMIC CLASS II-A
11. FLUSHING CONNECTIONS (SUPPLY AND DRAIN) SHALL BE LOCATED TO ALLOW FOR MAXIMUM SYSTEM FLUSH & DRAIN.
12. PROVIDE CURB AROUND EQUIPMENT TO CONTAIN POSSIBLE SPILLAGE OR LEAKAGE OF SODIUM PENTABORATE SOLUTION.
13. TEST TANK CONNECTION TO PUMP SUCTION SHOULD BE AS NEAR TO DRAIN CONNECTION AS POSSIBLE TO SATISFY PUMP SUCTION HEAD REQUIREMENTS.
14. NON-Q VENT AND DRAIN LINES AND CAPPED ENDS EXTENDING FROM SEISMIC CATEGORY I PIPING ARE SEISMIC CATEGORY IIA DOWNSTREAM OF THE LAST ISOLATION VALVE.
15. LOCATE VALVE 1027 AS CLOSE TO CONNECTION TO DCA-317 AS PRACTICAL
16. INJECTION PUMP 1CP208 AND MOTOR PROVIDED BY PECO.
17. LEVEL GAUGE LG-110 TO BE PROVIDED BY TANK VENDOR WITH TEST TANK 10T916.

REV	DATE	DESCRIPTION
		REVISED PER REVISION NOTES & INCORP DCN'S [illegible]
		REVISED PER REVISION NOTES & INCORP DCN'S [illegible]
		REVISED PER REVISION NOTES & [illegible]
		REVISED PER REVISION NOTES & INCORP DCN [illegible]
		PLACED SYSTEM ON HOLD
		REVISED PER REVISION NOTES [illegible]
		REVISED PER REVISION NOTES [illegible]
		REVISED PER REVISION NOTES AND SYSTEM DESIGN REVIEW
		REVISED PER REVISION NOTES
		REVISED AND ISSUED FOR [illegible]
		REVISED PER REVISION NOTES AND INCORP DCN'S [illegible]
		ISSUED FOR CONSTRUCTION

NONE | S. DENNY | Z. CHON

BECHTEL
SAN FRANCISCO

LIMERICK GENERATING STATION UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

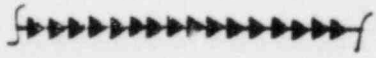
P & ID
STANDBY LIQUID CONTROL

JOB NO.	DRAWING NO.	REV.
8031	M-48	13

5 4 3 2 1

Also Available On
Aperture Card

NOTE: Piping subjected to STEADY STATE VIBRATION testing is denoted as follows:



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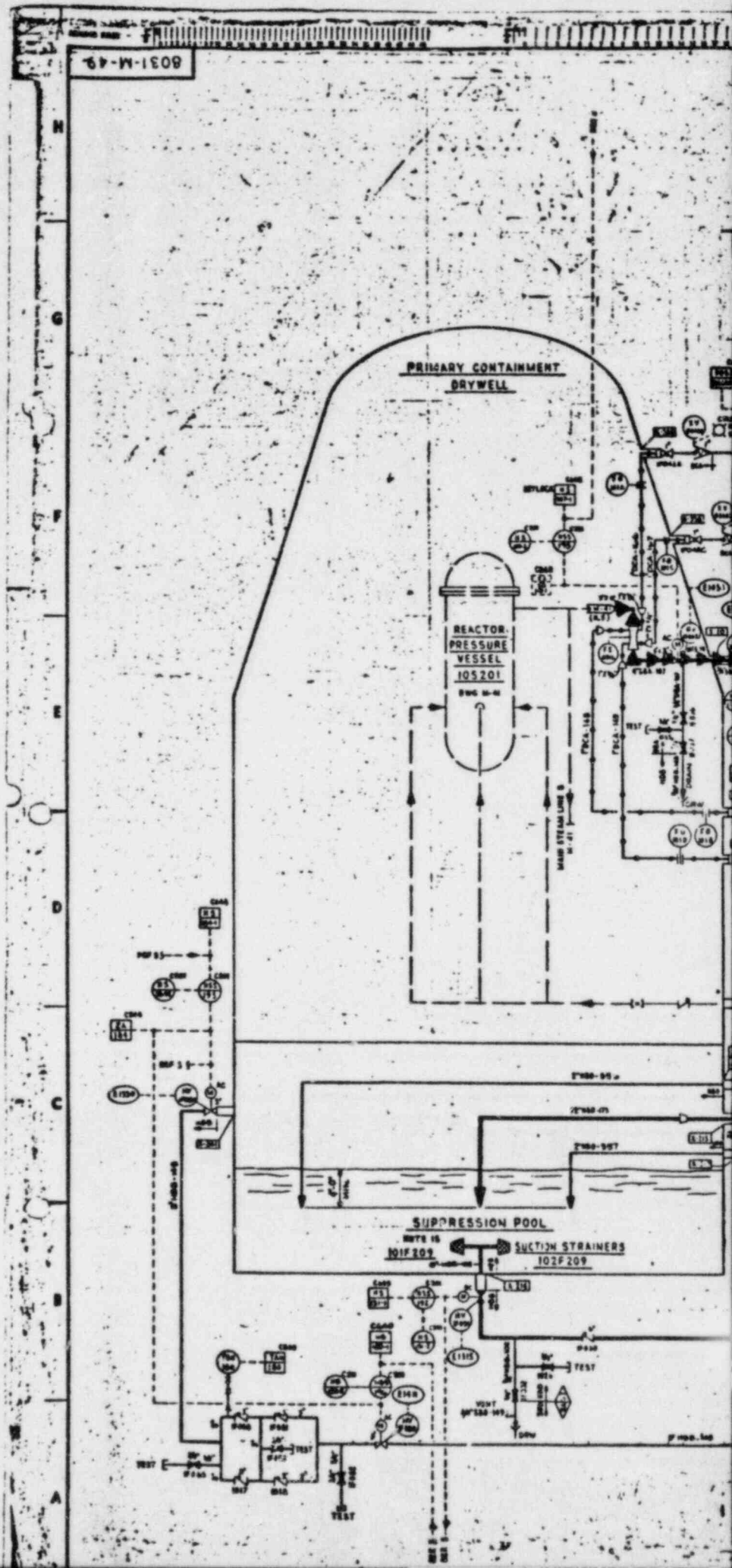
APERTURE
CARD



D-8 Rev. 0

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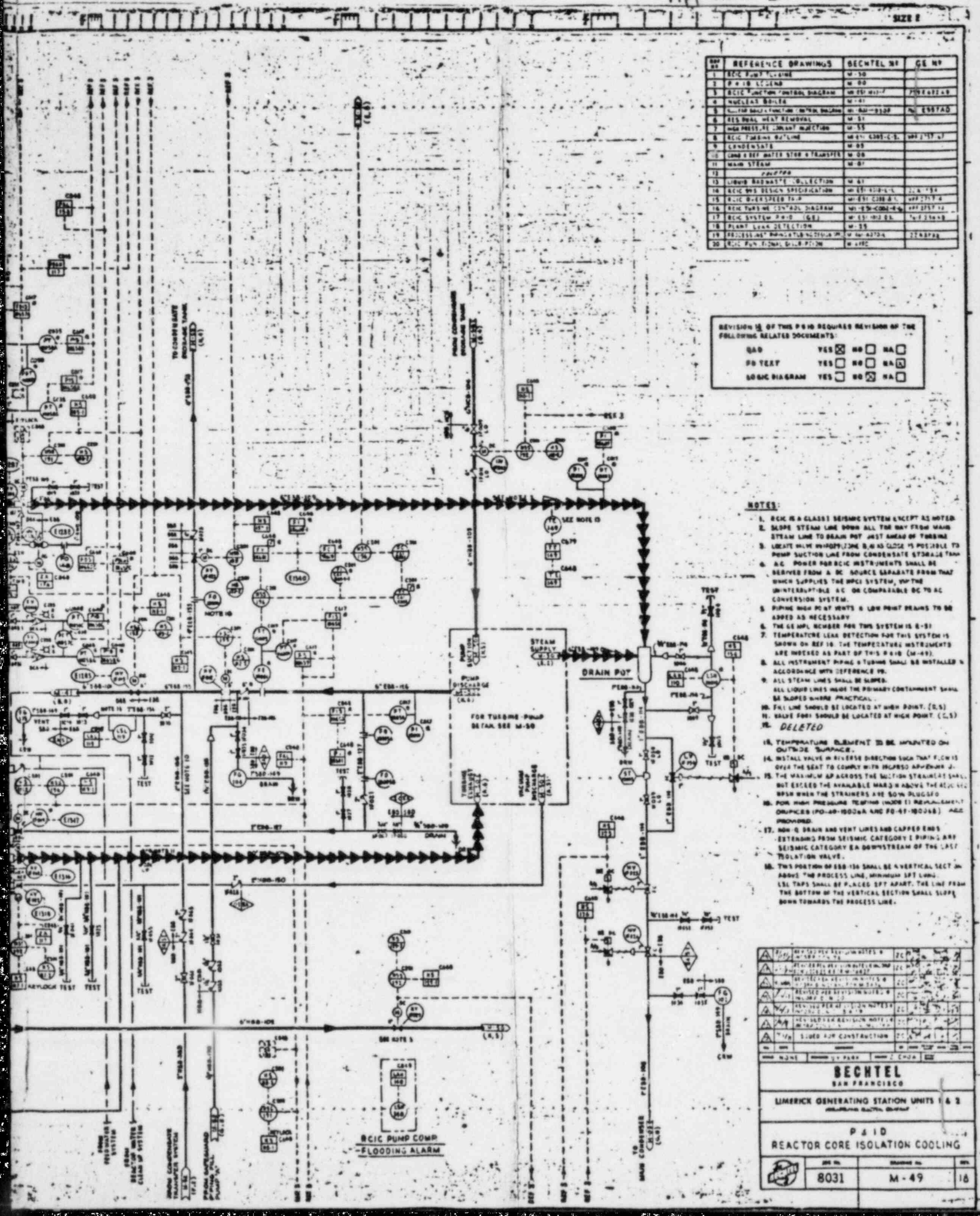
Specification 8031-P-363
Appendix D.



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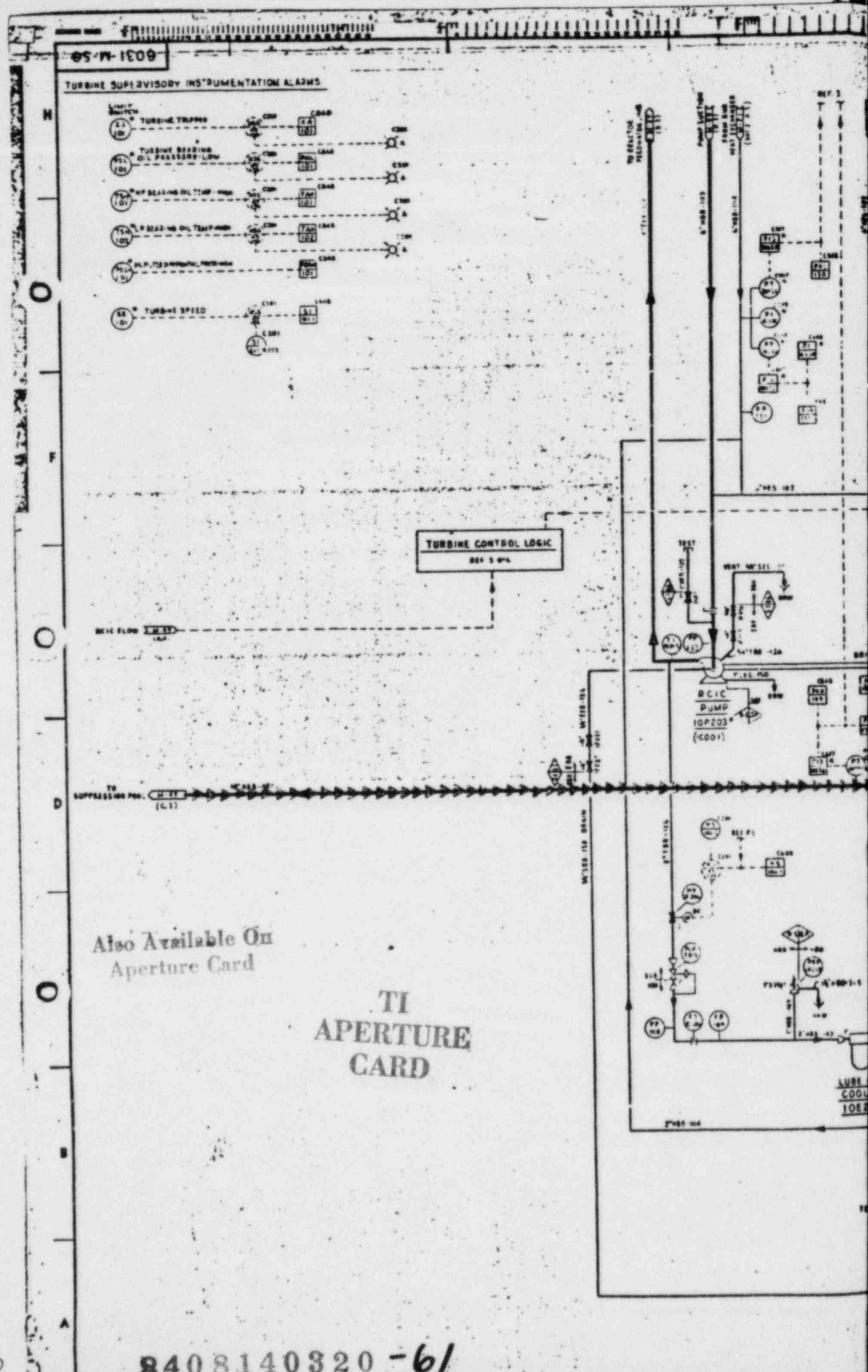
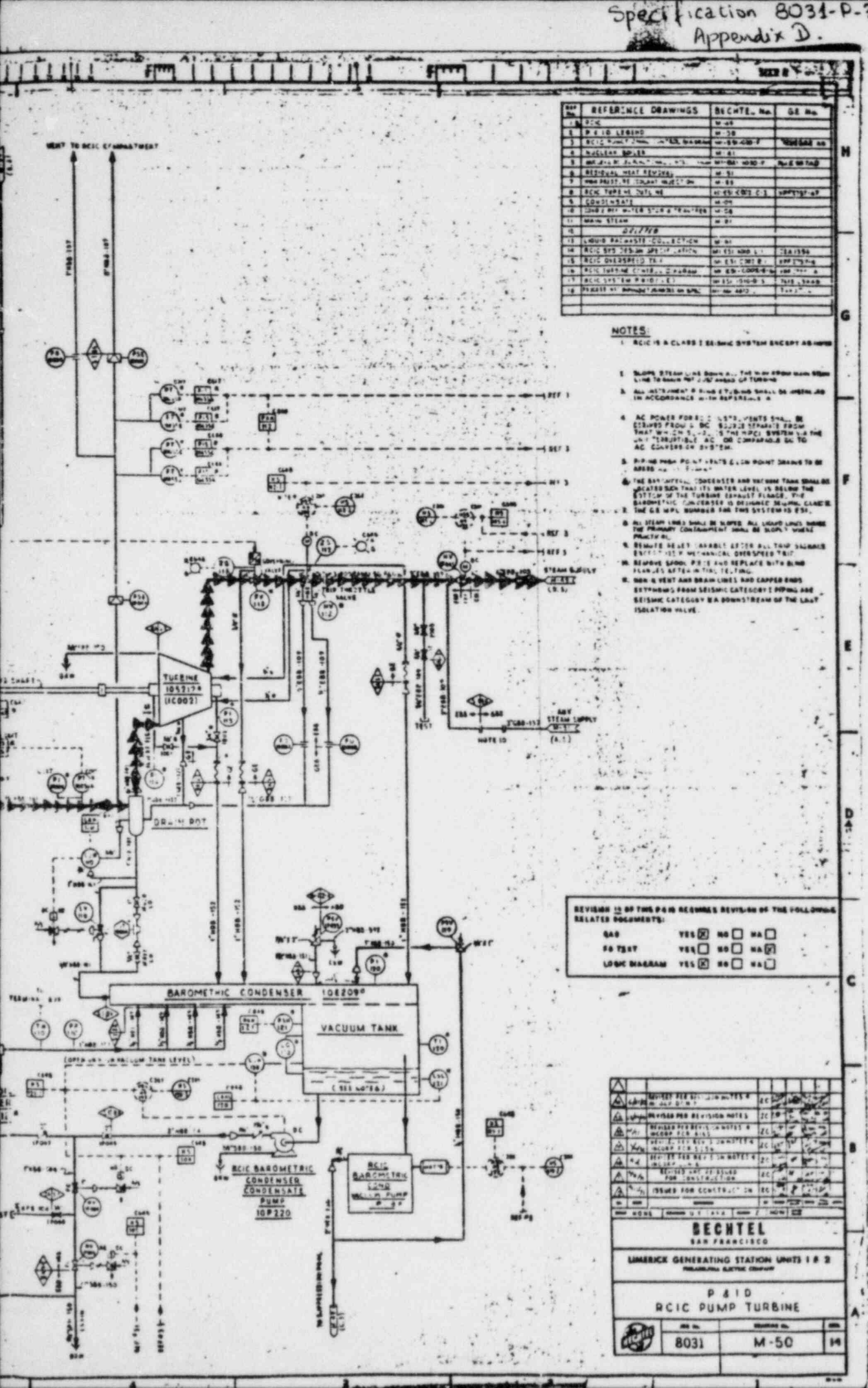
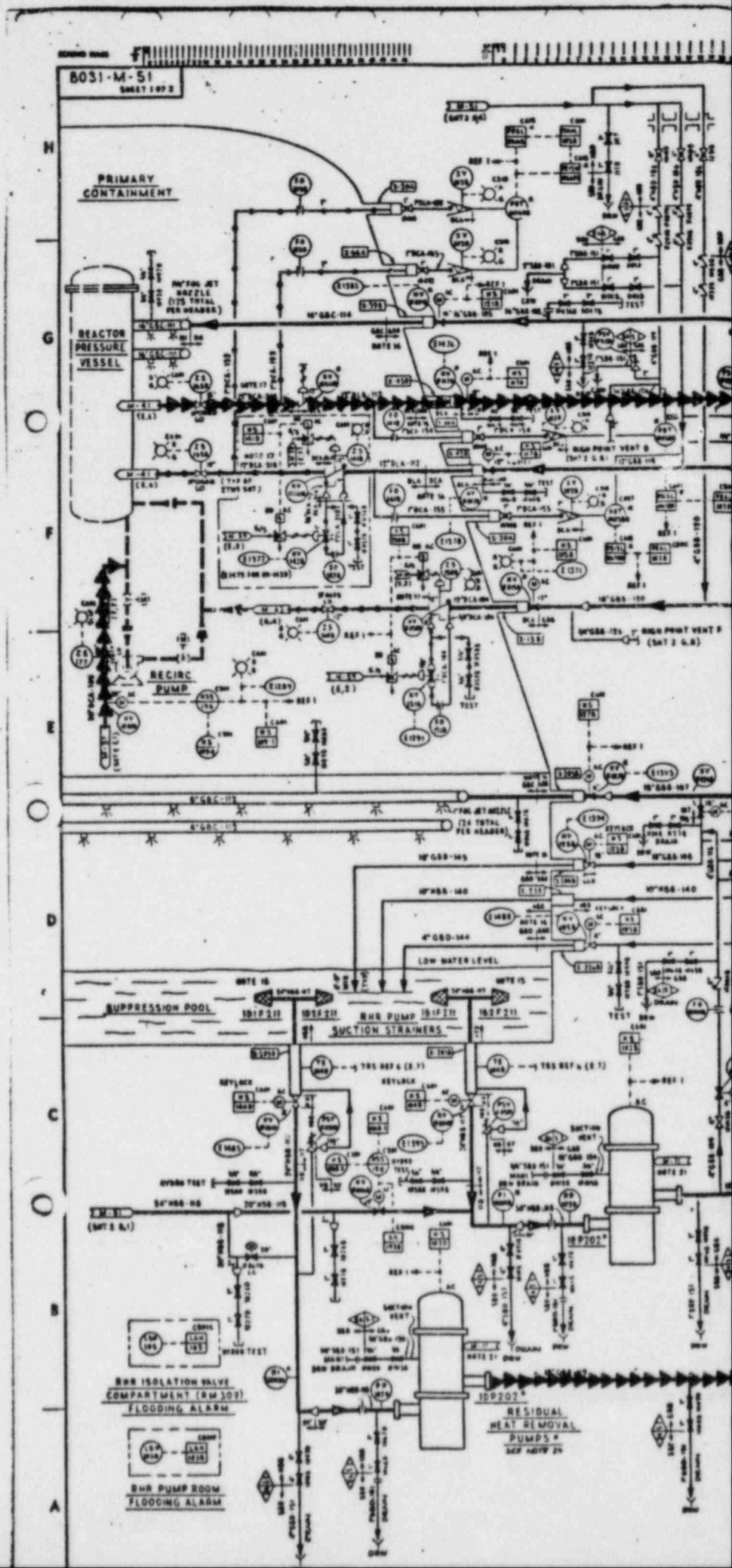


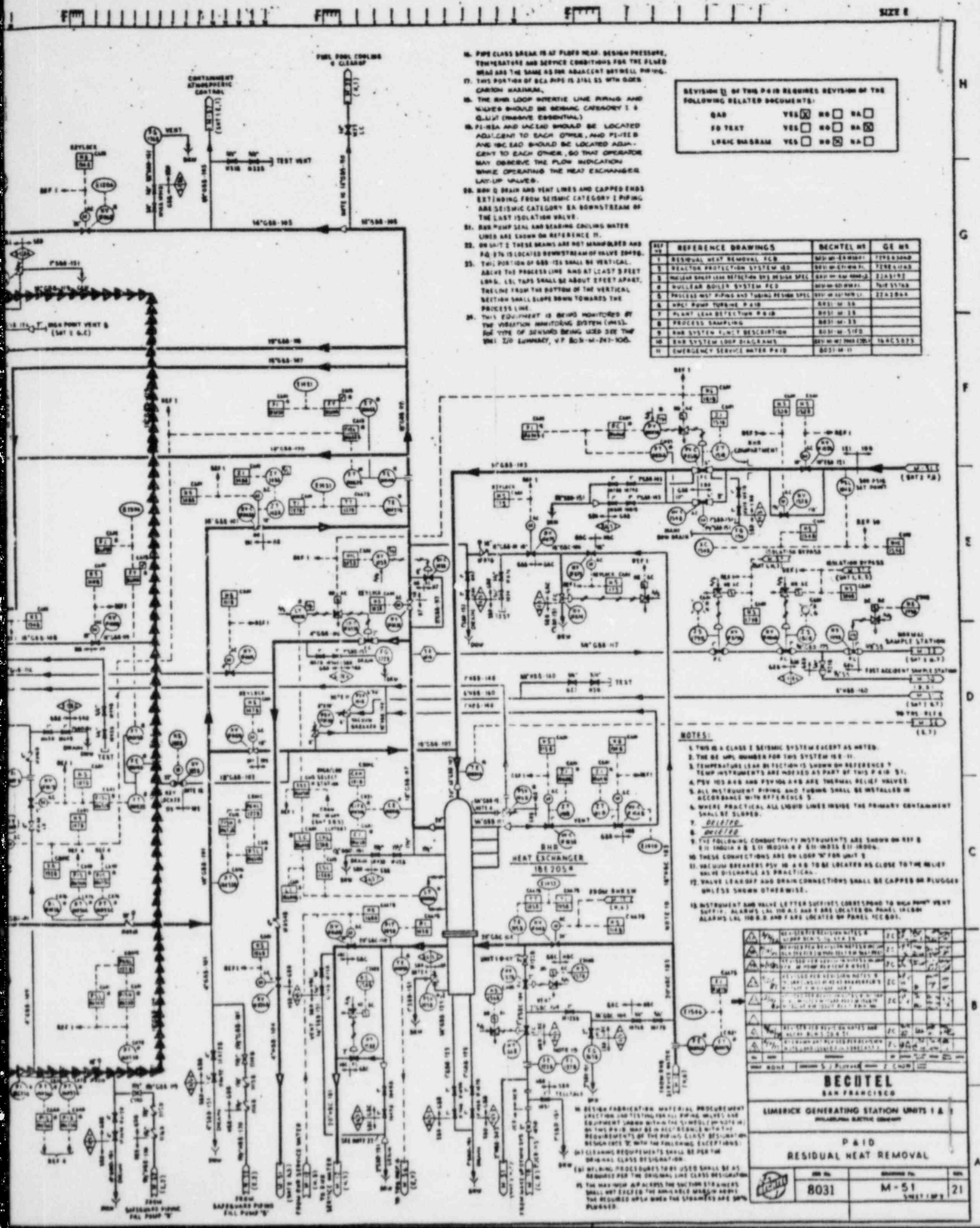
Specification 8031-P-363
Appendix D.





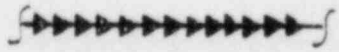
NOTE: Piping subjected to STEADY STATE VIBRATION testing is denoted as follows:

Specification 8031-M-563
Appendix D.



Also Available On
Aperture Card

NOTE: Piping subjected to STEADY STATE VIBRATION testing is denoted as follows:



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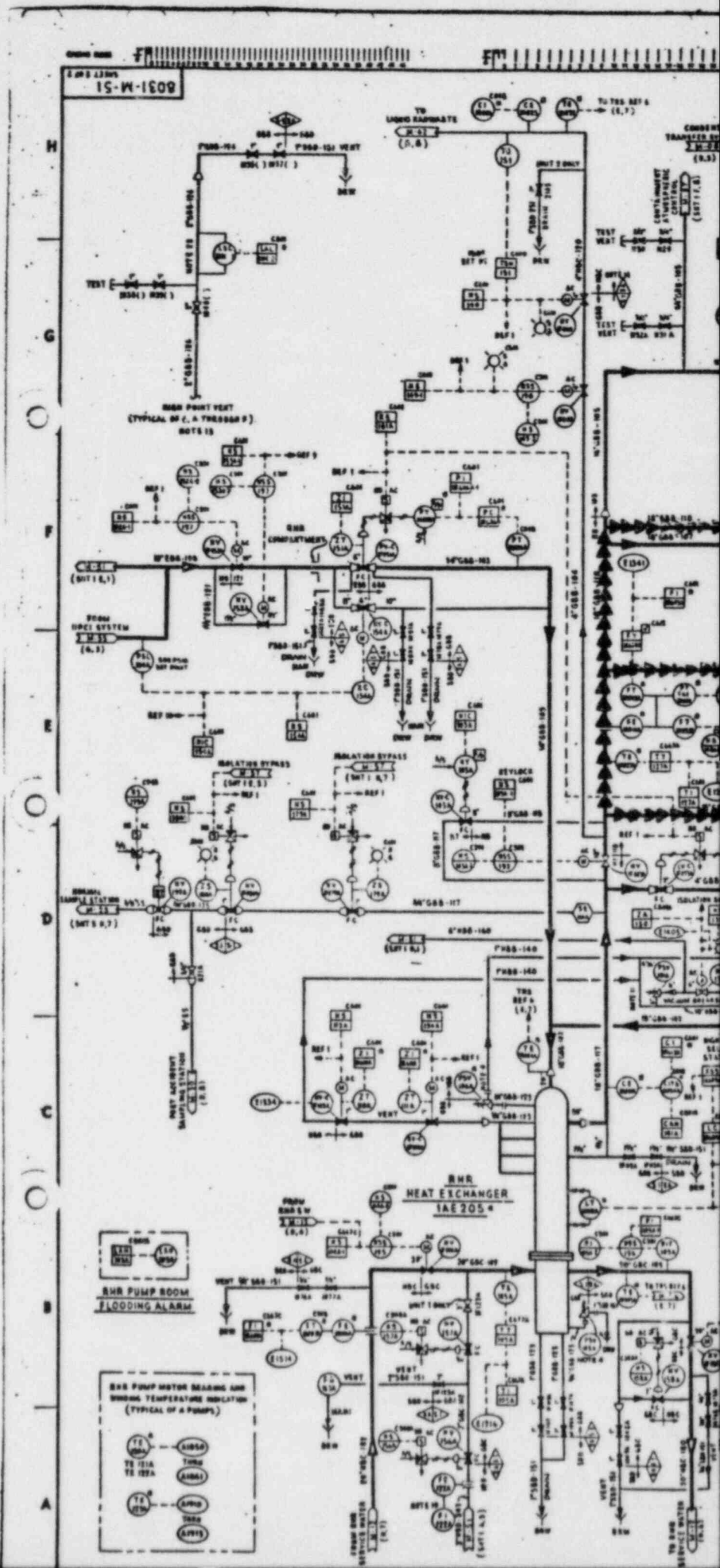
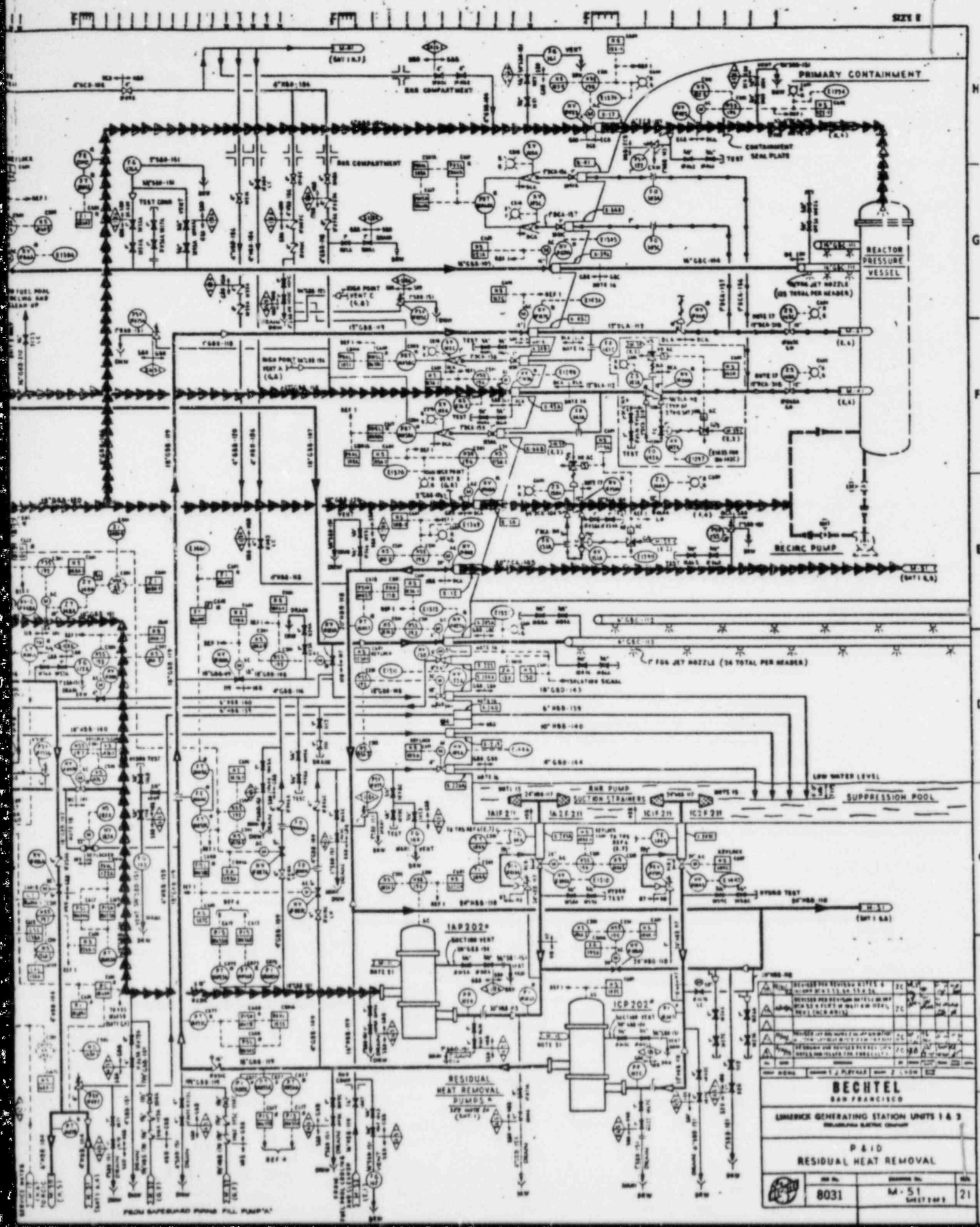


D-11 Rev. 0

Specification 8031-P-363
Appendix D.



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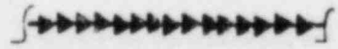
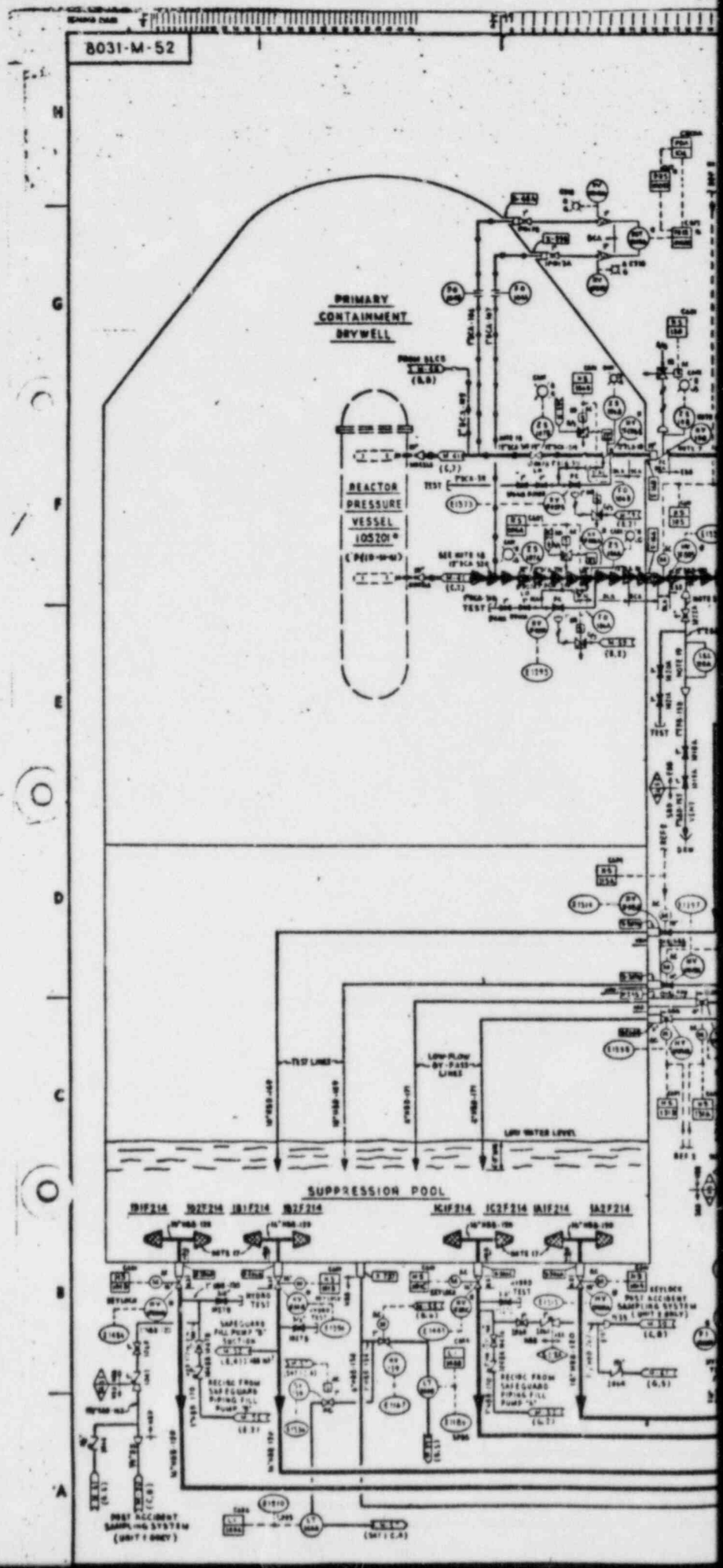
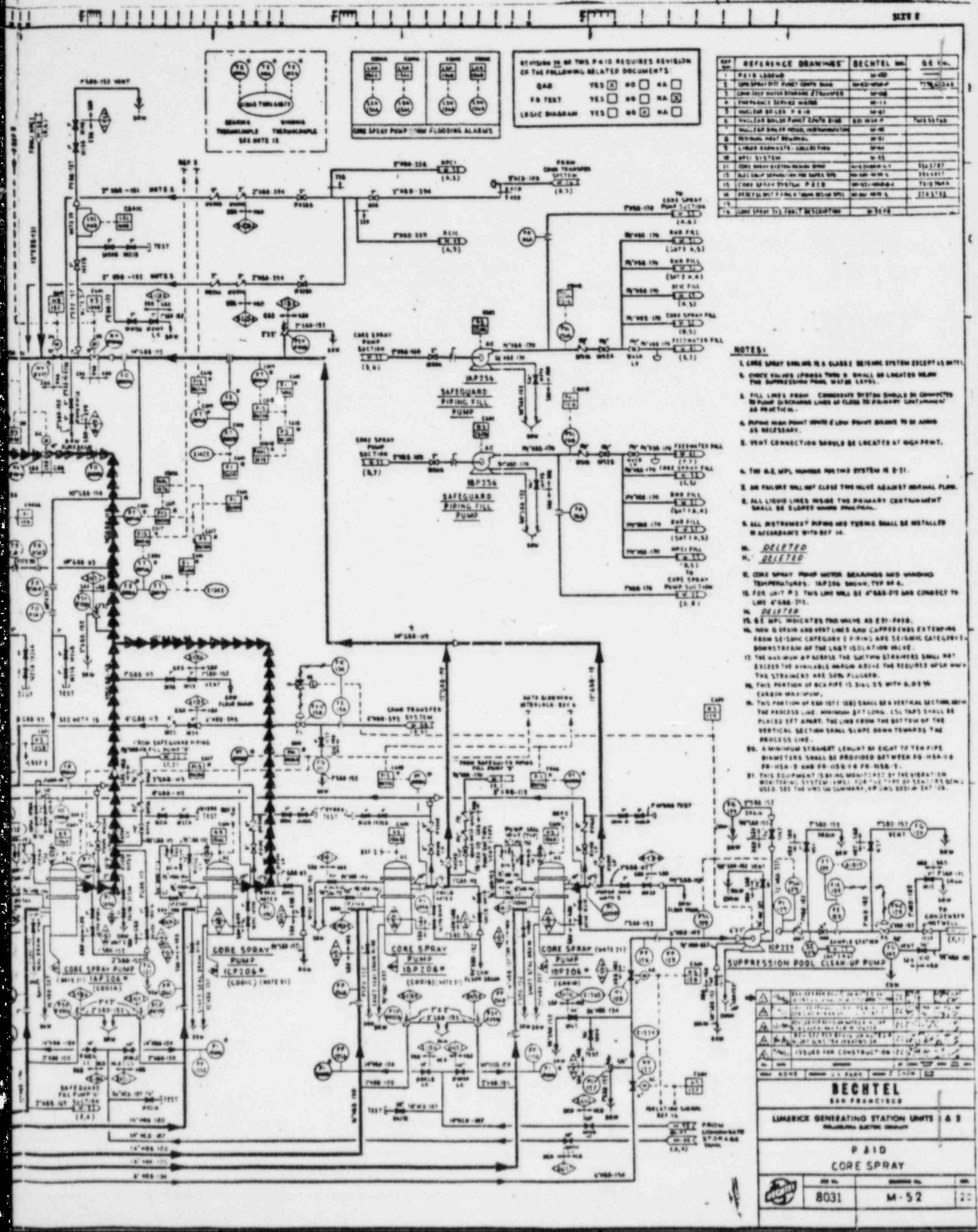




D-12

Rev. 0

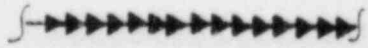
Specification 8031-P-363
Appendix D.



Also Available On
Aperture Card

Also Available On
Aperture Card

NOTE: Piping subjected to STEADY STATE VIBRATION testing is denoted as follows:



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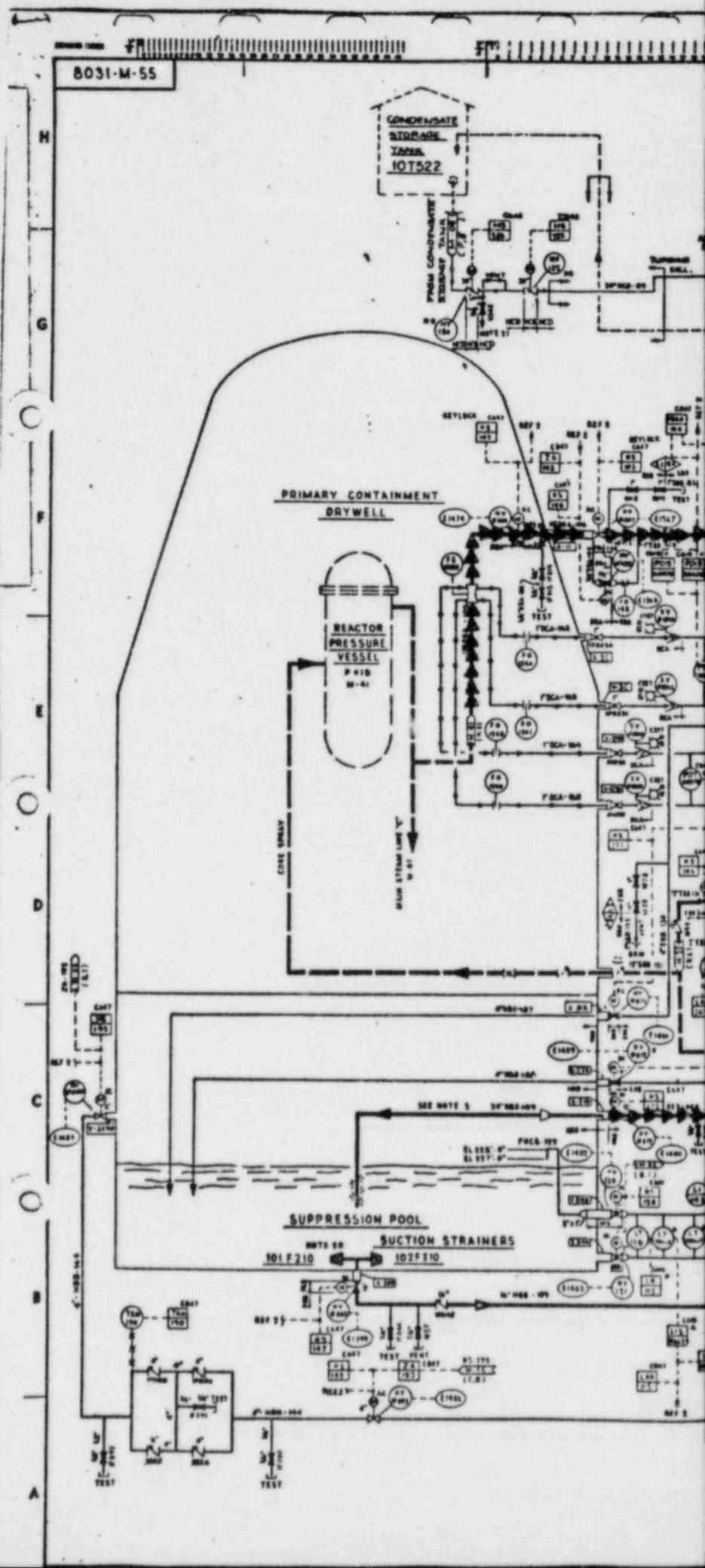
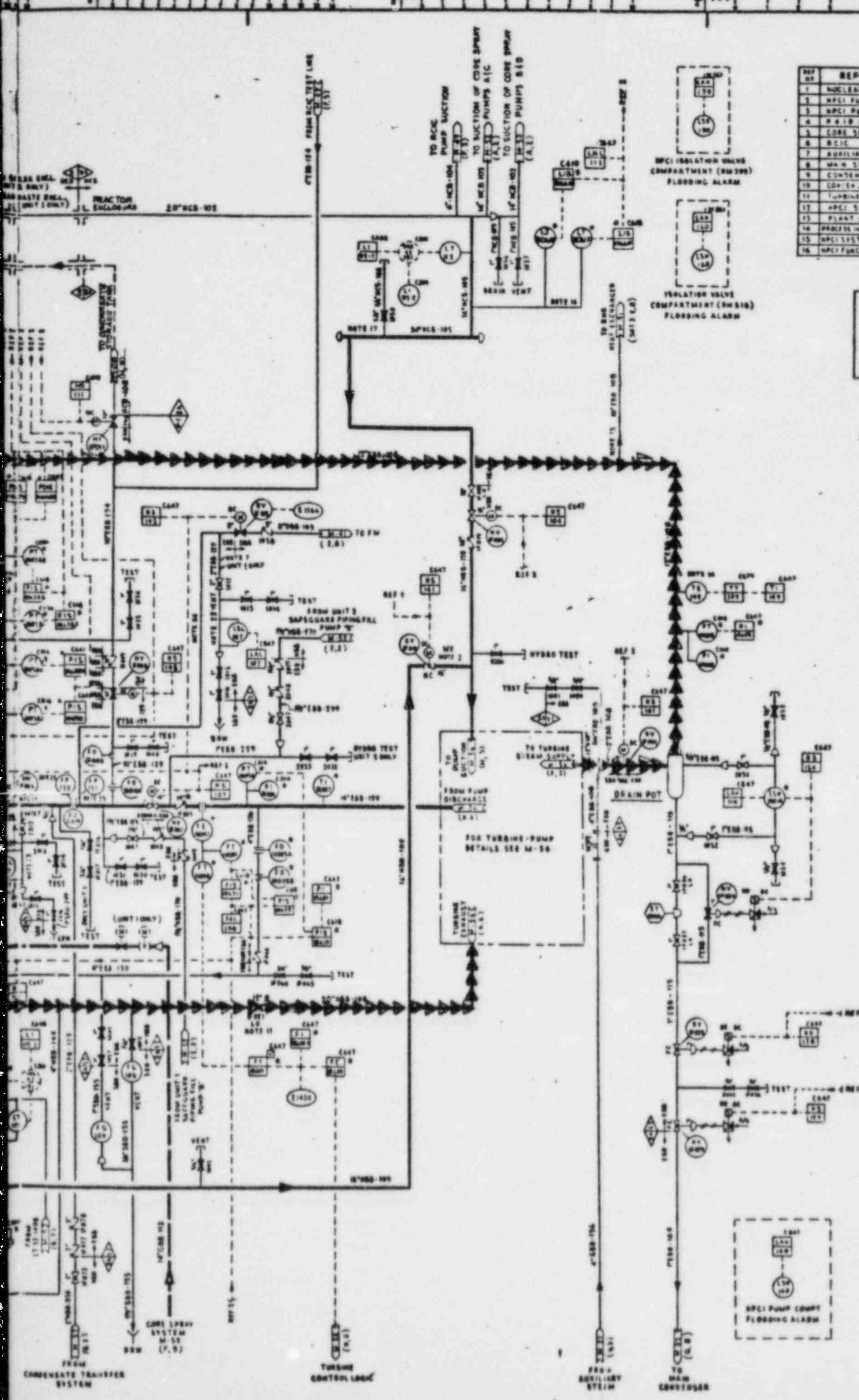


D-13 Rev. 0

8408140320-65

Specification 8031-P-363
Appendix D.

SIZE E



REF NO	REFERENCE DRAWINGS	BECHTEL Nº	G E Nº
1	NUCLEAR BOILER	M-41	
2	HPCI FUNCTIONAL CONTROL DIAGRAM	[illegible]	729E617AB
3	HPCI PUMP TURBINE	M-56	
4	P & I D LEGEND	M-00	
5	CORE SPRAY	M-52	
6	RCIC	M-49	
7	AUXILIARY STEAM	M-21	
8	MAIN STEAM	M-01	
9	CONDENSATE	M-05	
10	CONDENSATE & REFUELING WATER STORAGE	M-08	
11	TURBINE CONTROLS DIAGRAM	[illegible]	[illegible]
12	HPCI SYSTEM P & I D	[illegible]	761E330AD
13	PLANT LEAK DETECTION	M-25	
14	PROCESS INST PIPING & TUBING DESIGN SPEC	[illegible]	22A3733
15	HPCI SYSTEM DESIGN SPEC	[illegible]	22A3027
16	HPCI FUNCTIONAL DESCRIPTION	M 55FD	

REVISION 21 OF THIS P&ID REQUIRES REVISION OF THE FOLLOWING RELATED DOCUMENTS:

QAD	YES ☒	NO ☐	NA ☐
FD TEXT	YES ☐	NO ☐	NA ☒
LOGIC DIAGRAM	YES ☒	NO ☐	NA ☐

NOTES:

1. THE HPCI IS CLASS I SEISMIC SYSTEM EXCEPT AS NOTED. CLASS I SEISMIC CLASSIFICATION SHALL EXTEND UP TO THE FIRST WALL PENETRATION BEYOND POINT INDICATED AND SHALL INCLUDE THE FIRST ANCHOR POINT IN OR BEYOND THIS WALL.
2. LOCATE VALVE F041 (ZONE E-4) AS CLOSE AS POSSIBLE TO PUMP SUCTION LINE FROM CONDENSATE STORAGE TANK.
3. PENETRATION LOCATION TO BE ABOVE MAXIMUM EXPECTED WATER LEVEL, WITH SPARGER LOCATED 4 FEET BELOW LOW WATER LEVEL (ZONE C-7).
4.
5. AC POWER FOR HPCI INSTRUMENTS SHALL BE DERIVED FROM THE PLANT DC POWER SYSTEM, VIA AN INVERTER. THE DC SOURCE IS TO BE SEPARATE FROM THAT WHICH SUPPLIES THE RCIC SYSTEM.
6. THE GE MPL NUMBER FOR THIS SYSTEM IS E-41.
7. VENT CONNECTION SHOULD BE LOCATED AT HIGH POINT.
8. TEMPERATURE LEAK DETECTION FOR THIS SYSTEM IS SHOWN ON REF 13. THE TEMPERATURE INSTRUMENTS ARE INDEXED AS PART OF P & I D M-55.
9. ALL INSTRUMENT PIPING & TUBING SHALL BE INSTALLED IN ACCORDANCE WITH REFERENCE 14.
10. ALL STEAM LINES SHALL BE SLOPED. ALL LIQUID LINES INSIDE THE PRIMARY CONTAINMENT SHALL BE SLOPED WHERE PRACTICAL.
11. VALVE F021 SHOULD BE LOCATED AT A HIGH POINT (C,6)
12. *DELETED*
13. UNIT 2 PIPING HAS TWO CONNECTIONS.
14. TEMPERATURE ELEMENT TO BE MOUNTED ON OUTSIDE SURFACE.
15. REMOVE SPOOL PIECE AND REPLACE WITH BLIND FLANGES AFTER INITIAL TESTING.
16. LT (NOW) 5,F SHOULD BE LOCATED ABOVE EL 201'-0" ON 16" HCB-105.
17. "34" SECTION OF PIPING SHALL CONTAIN AT LEAST 1100 GALLONS.
18. INSTALL VALVE IN REVERSE DIRECTION SUCH THAT FLOW IS OVER THE SEAT.
19. VALVE F006 TO BE LOCATED AS CLOSE AS POSSIBLE TO JUNCTURE WITH CORE SPRAY LINE.
20. THE MAXIMUM ΔP ACROSS THE SUCTION STRAINERS SHALL NOT EXCEED THE AVAILABLE MARGIN ABOVE THE REQUIRED NPSH WHEN THE STRAINERS ARE 50% PLUGGED.
21. TO BE DRAINED WITHIN DIKE AREA.
22. NON-Q DRAIN AND VENT LINES AND CAPPED ENDS EXTENDING FROM SEISMIC CATEGORY I PIPING ARE SEISMIC CATEGORY IIA DOWNSTREAM OF THE LAST ISOLATION VALVE.
23. THIS PORTION OF EBB-129 SHALL BE A VERTICAL SECTION ABOVE THE PROCESS LINE, MINIMUM 5FT LONG. LSL TAPS SHALL BE PLACED 5FT APART. THE LINE FROM THE BOTTOM OF THE VERTICAL SECTION SHALL SLOPE DOWN TOWARDS THE PROCESS LINE.
24. PENETRATION INTO STEAM TUNNEL AT COLUMN LINE J.
25. FLOW TAPS ARE PROVIDED ONLY FOR STARTUP FLOW VERIFICATION. THE INSTRUMENTATION WILL BE PROVIDED BY FIELD.

NO	DATE	REVISION	BY					
	[illegible]	[illegible]	ZC	[illegible]				
	[illegible]	[illegible]	ZC	[illegible]				
	[illegible]	REVISED PER [illegible] & INCORP [illegible]	ZC	[illegible]				
	[illegible]	REVISED AND RE-ISSUED FOR CONSTRUCTION	ZC	[illegible]				
	[illegible]	ISSUED FOR CONSTRUCTION	ZC	[illegible]				

SCALE: NONE — DRAWN: J.Y. PARK — CHECKED: Z. CHOW

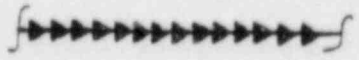
BECHTEL
SAN FRANCISCO

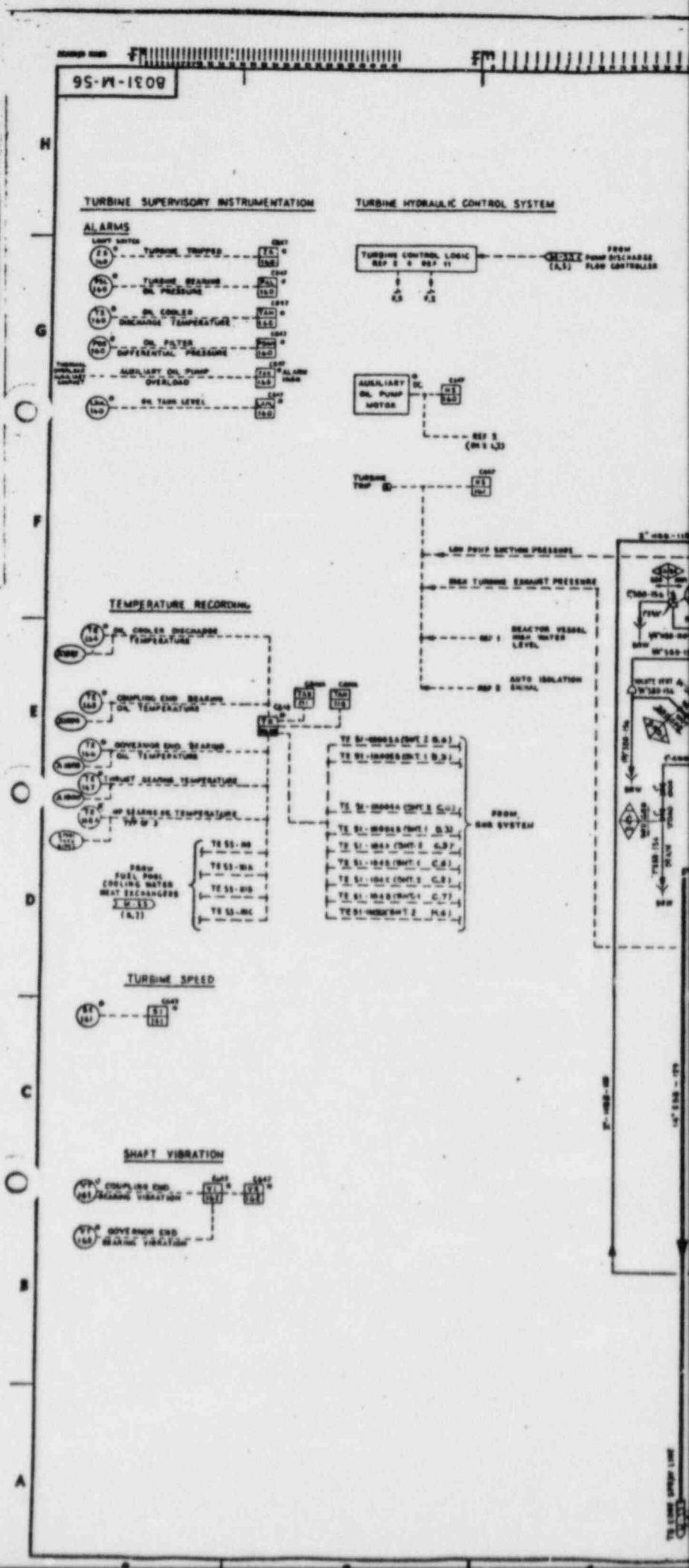
LIMERICK GENERATING STATION UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

P & I D
HIGH PRESSURE COOLANT INJECTION

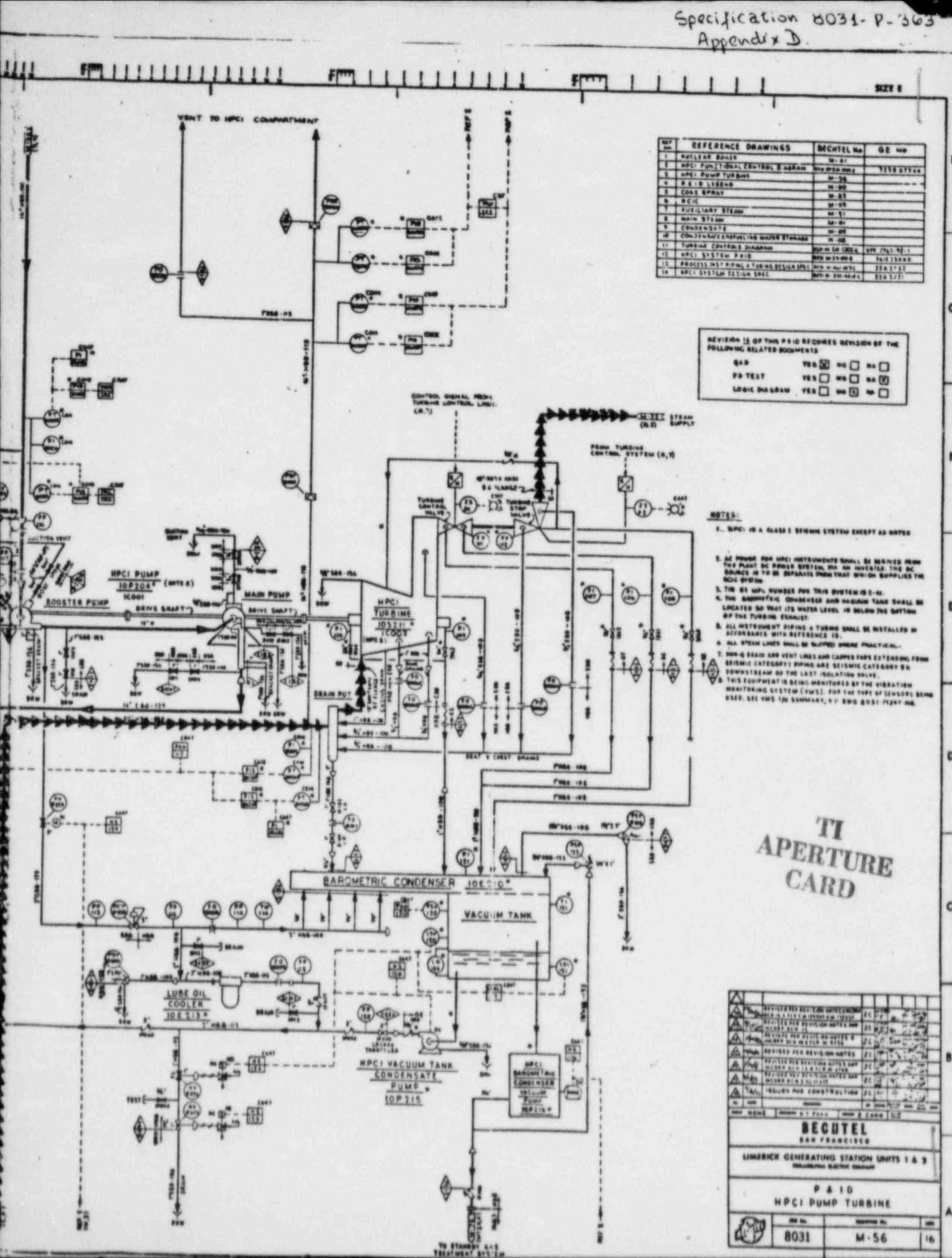
JOB No.	DRAWING No.	REV.
8031	M-55	21

NOTE: Piping subjected to STEADY STATE VIBRATION testing is denoted as follows:





Specification 8031-P-363
Appendix D.



APPENDIX E

Acceptance Criteria

E.1 Acceptance Criteria for Remotely Monitored Inaccessible Piping

E.1.1 As required by Section 4.8 the Test Engineer shall identify as test exceptions those systems in which he determines that vibration is unacceptable for continued operation.

E.1.2 Criteria for identification and evaluation of test exceptions are provided in the graphs and tables on page E-7 through E-50. These criteria identify test exceptions at four different levels of evaluation described as follows. 

Criterion A: A steady state single or multiple mode vibration producing measured acceleration lying within the NEGLIGIBLE region of the criteria shall be considered acceptable for long-term operation.

Criterion B: A single harmonic motion (single frequency) vibration producing measured acceleration lying within the ACCEPTABLE region of the criteria shall be considered acceptable for long term operation.

Criterion C: A multiple mode vibration producing measured acceleration outside the NEGLIGIBLE region shall be evaluated as follows.

The frequency distribution of measured acceleration shall be determined and the modal components of measured acceleration a_n and the associated frequencies f_n shall be combined according to the following rule:

$$\sum_{n=1}^{N} \left(\frac{a_n}{f_n}\right) \leq R_1 \quad \text{Criterion C}$$

Vibrations satisfying Criterion C shall be considered acceptable for long term operation. Values of R_1 are provided in the graphs on pages E-7 through E-26. |1|

Criterion D: A multiple mode vibration producing measured acceleration not complying with Criterion C shall be re-evaluated by Criterion D, using instrument (i) and mode (n) multiplication factors (m_{in}) as follows:

$$\sum_{n=1}^{N} \left(\frac{m_{in} a_n}{f_n} \right) \leq R_2 \text{ Criterion D}$$

Vibrations satisfying Criterion D shall be considered acceptable for long term operation. Values of R_2 and m_{in} are provided in the graphs and tables on pages E-7 through E-50. In applications requiring Criterion D, Project Engineering should be notified and consulted regarding the apropriate procedures. |1|

E.1.3 Pipe vibrations failing to satisfy any of the criteria A through D shall be reported by the Test Engineer as a test exception. After consultation with the Test Director and with Project Engineering he may elect to either:

(1) Recommend that the vibration amplitude be reduced to acceptable levels by pursuing the procedures outlined in E.3 or;

(2) Supply Project Engineering with the complete test record for the unacceptable system vibration, including frequency distribution of all instrument acceleration measurements and procure and forward to Project Engineering additional test information as requested by them.

E.1.4 Project Engineering shall evaluate the test exceptions as required in E.1.3, employing the test records of E.1.3(2). The methods used shall conform to widely accepted methods for modal analysis of piping systems and the material endurance limits provided in the ASME Section III Code. Criterion E shall be applied, as follows:

(a) For Carbon Steel Piping

$S \leq .8Sa$

(b) For Stainless Steel Piping

$S \leq .6Sa$

Criterion E ⚠1

⚠1

where S = calculated multi-mode vibration stress according to the rules of the appropriate ASME Code classification and ANSI/ASME E-3 OM3-1982 requirements for vibration testing stress intensification factors.

S_a = ASME Code Section III design fatigue stress for 10^6 cycles of vibration.

E.1.1.5 Systems satisfying Criterion E shall be considered acceptable for long-term operation. Systems failing to satisfy Criterion E shall be reported as unacceptable and categorized as follows:

a. Normal operation may be continued for a specified number of days while the procedures outlined in E.3 are being developed and implemented;

b. The system must be shut down without delay in order to avoid excessive accumulation of fatigue damage. Procedures described in E.3 must be

developed and implemented to reduce the vibration to acceptable levels before operation is resumed.

E.2 Acceptance Criteria for Visually Monitored Accessible Piping

E.2.1 As required by Section 4.8 the Test Engineer shall identify as test exceptions those sytems which he determines that vibration is unacceptable for continued operation. After consultation with the Test Director and with Project Engineering he may elect to either:

(1) Recommend that the unacceptable vibration amplitude be reduced to acceptable levels by pursuing the procedures outlined in E.3.

(2) Supply Project Engineering with the complete test information record for the unacceptable system vibration and procure and forward to Project Engineering additional test information as requested by them.

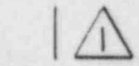
E.2.2 Project Engineering shall evaluate the test exception, employing the test records in E.2.1.(2). The methods used shall conform to widely accepted methods for modal analysis of piping systems and the material endurance limits provided in the ASME Section III Code. The criteria to be used by Project Engineering for evaluating pipe vibration stress as acceptable are as follows:

(a) For Carbon Steel Piping

$S \leq .8Sa$ 

(b) For Stainless Steel Piping

$$S \leq .6Sa$$



where S = calculated multi-mode vibration stress according to the rules of the appropriate ASME Code pipe classification and ANSI/ASME OM3-1982 requirements for vibration testing stress intensification factors.

S_a = ASME Code Section III design fatigue stress for 10^6 cycles of vibration.

E.2.3 Systems satisfying the criteria of E.2.1 or E.2.2 shall be considered acceptable for long-term operation.

Systems failing to satisfy either criterion shall be reported as unacceptable and categorized as follows:

a. Normal operation may be continued for a specified number of days while the procedures outlined in E.3 are being developed and implemented.

b. The system must be shut down without delay in order to avoid excessive accumulation of fatigue damage. Procedures described in E.3 must be developed and implemented to reduce the vibration to acceptable levels before operation is resumed.

E.3 Procedures for Correcting Excessive Vibration

E.3.1 Systems in which vibration remains unacceptable shall be modified in accordance with procedures adopted to:

(1) eliminate or reduce source of the vibration, or

(2) suppress the vibration by means of fluid dynamic energy absorbing devices,

(3) modify the dynamic response of the piping system by adding or deleting piping restraints and mechanical energy absorbers, or;

(4) other unspecified means.

E.4 Final Disposition of Test Exceptions

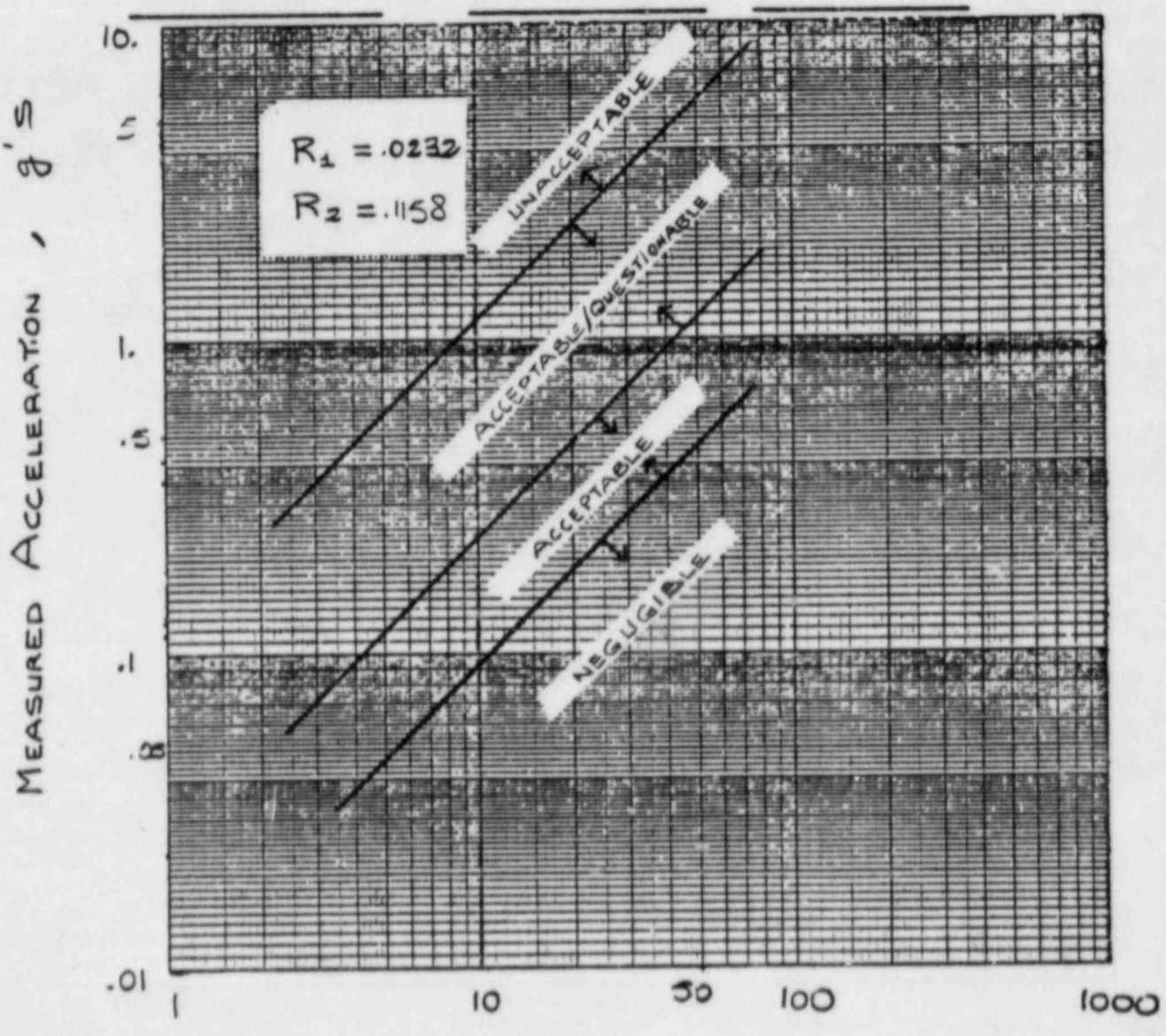
Following adoption of any of the measures noted in E.3 the piping system shall again be tested and re-evaluated under the same plant operating conditions that produced the unacceptable vibration.

The procedures specified in E.1 or E.2 as appropriate shall be repeated.

Steady State Vibration Expected (Maximum Allowable) Acceleration vs. Frequency Charts

Specification 8031-P-363
Appendix E

SYSTEM: MAIN STEAM LINE B (O/C)	INSTRUMENT NO.	NODE POINT	LINE NO.
FROM: FLUED HEAD X-7B	VA.Y.A.01	B23B -Y	26" EBB-104
TO: H.P. TURB / and Bypass vlv. chest	VA.Z.A.02	B23A -Z	12" EBB-107
	VA.Z.A.03	B40A -Z	14" EMB-107
CALC NO: 1-01-226	VA.X.A04	P37 - X	
ISO. NO: SK-M-1503 Rev N	VA.Y.A05	P35 - Y	
-1504 Rev H	VA.X.A.06	P56B - X	



LGS STARTUP TEST - INSTRUMENTED VIBRATION LIMITS

Specification 8031-P-363
Appendix E

SYSTEM: FEEDWATER (F/C)	INSTRUMENT NO.	NODE POINT	LINE NO.
FROM: X-9A	VA.Z.B.01	60B-Z	DLA-107
TO: RPV	VA.X.B.02	96-X	
CALC NO: 1-12-01	VA.Y.B.03	107-Y	
ISO. NO: SK-M-1552 Rev J	VA.X.B.04	145B-X	
	VA.X.B.05	165-X	

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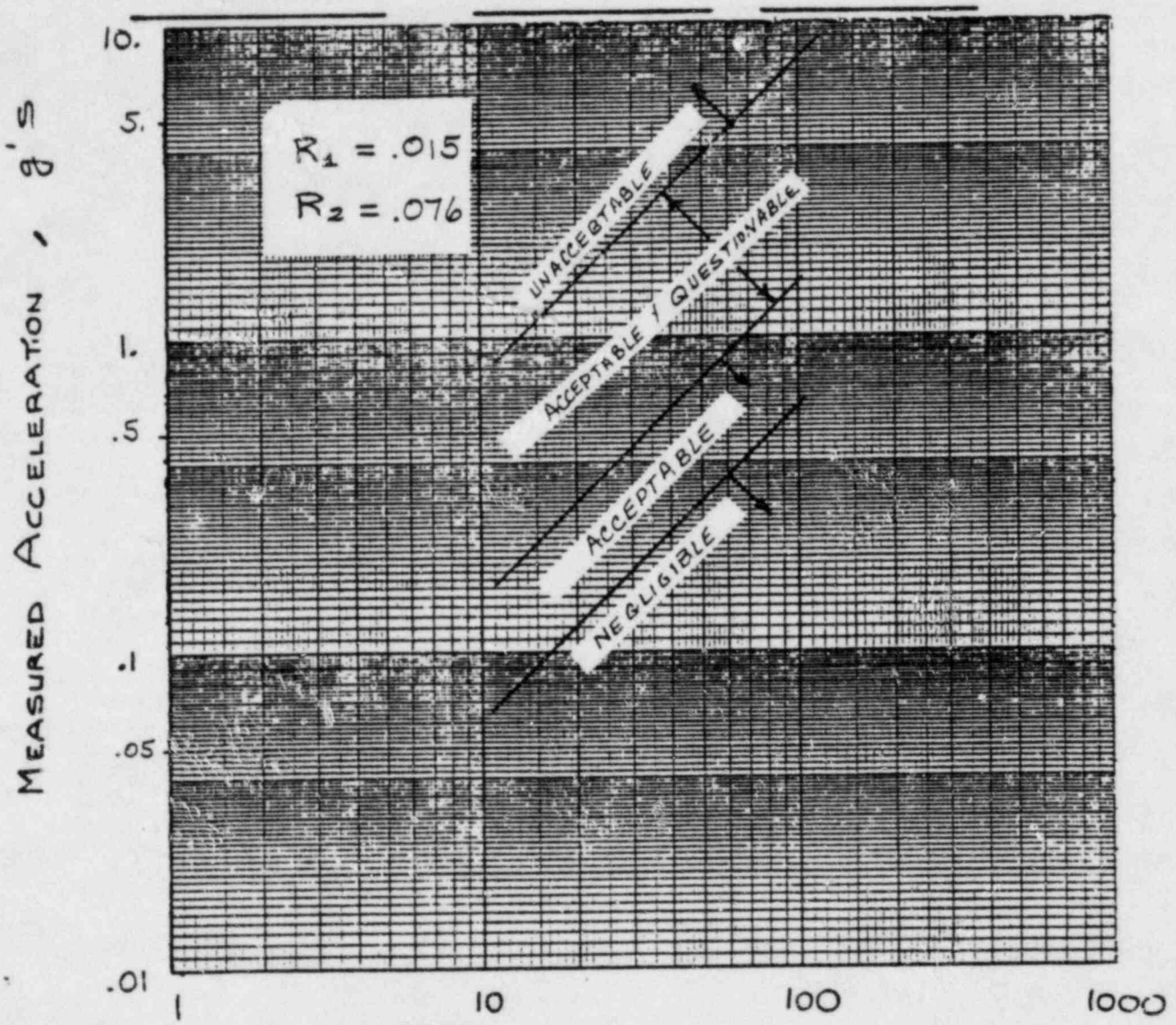
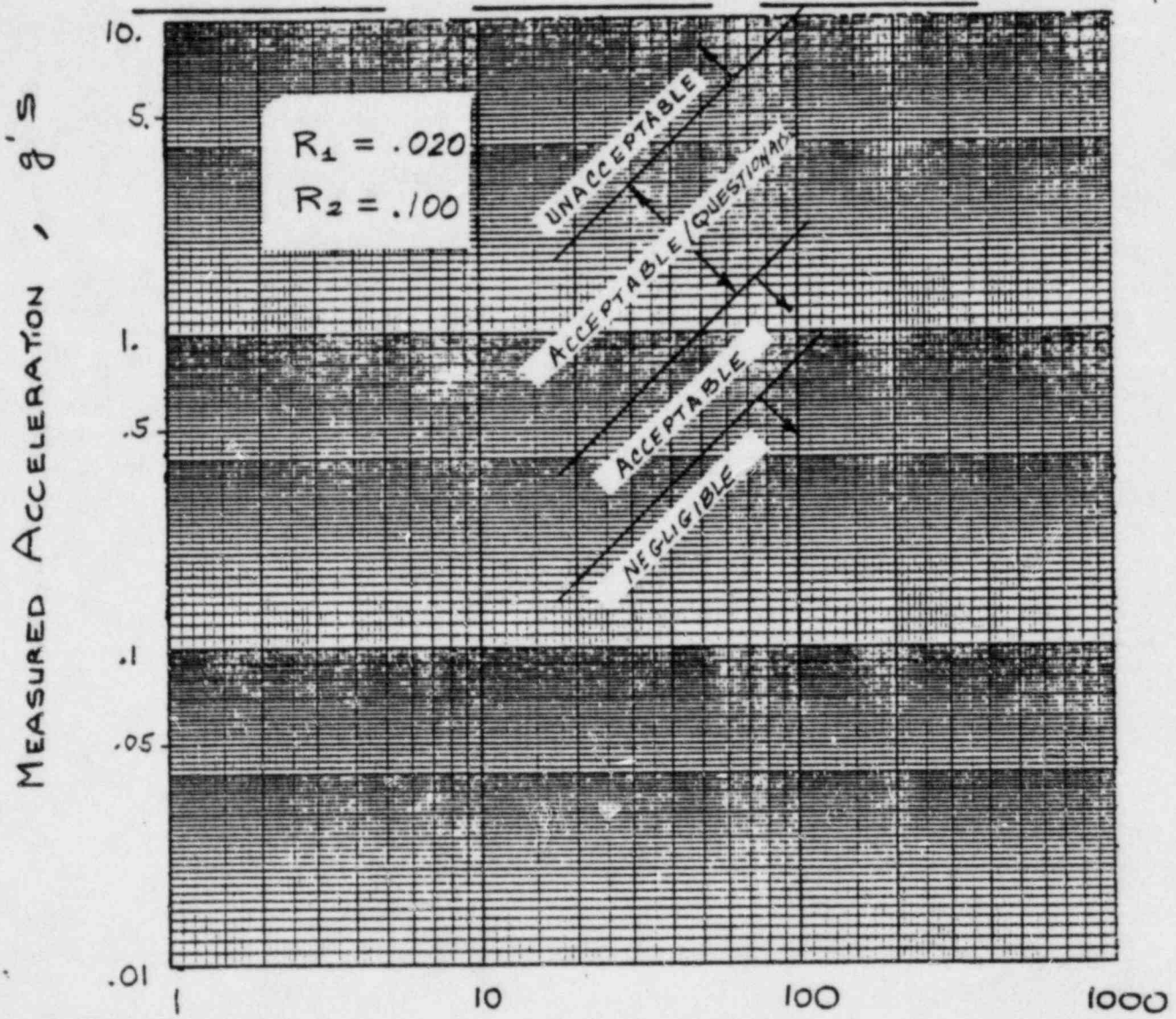


LGS STARTUP TEST - INSTRUMENTED VIBRATION LIMITS

Specification 8031-P-363
Appendix E

System: FEEDWATER (O/C)	Instrument No.	Node Point	Line No.
From: TURBINE BUILDING	VA.X.C.01	13-X	24"DBB-104
To: X-9A	VA.Z.C.02	15,E-Z	24"DBB-103
Calc No: P1-15-51	VA.Z.C.03	39-Z	16"DBB-103
Iso. No: SK-M-1554 Rev M			
-1555 Rev F			

1

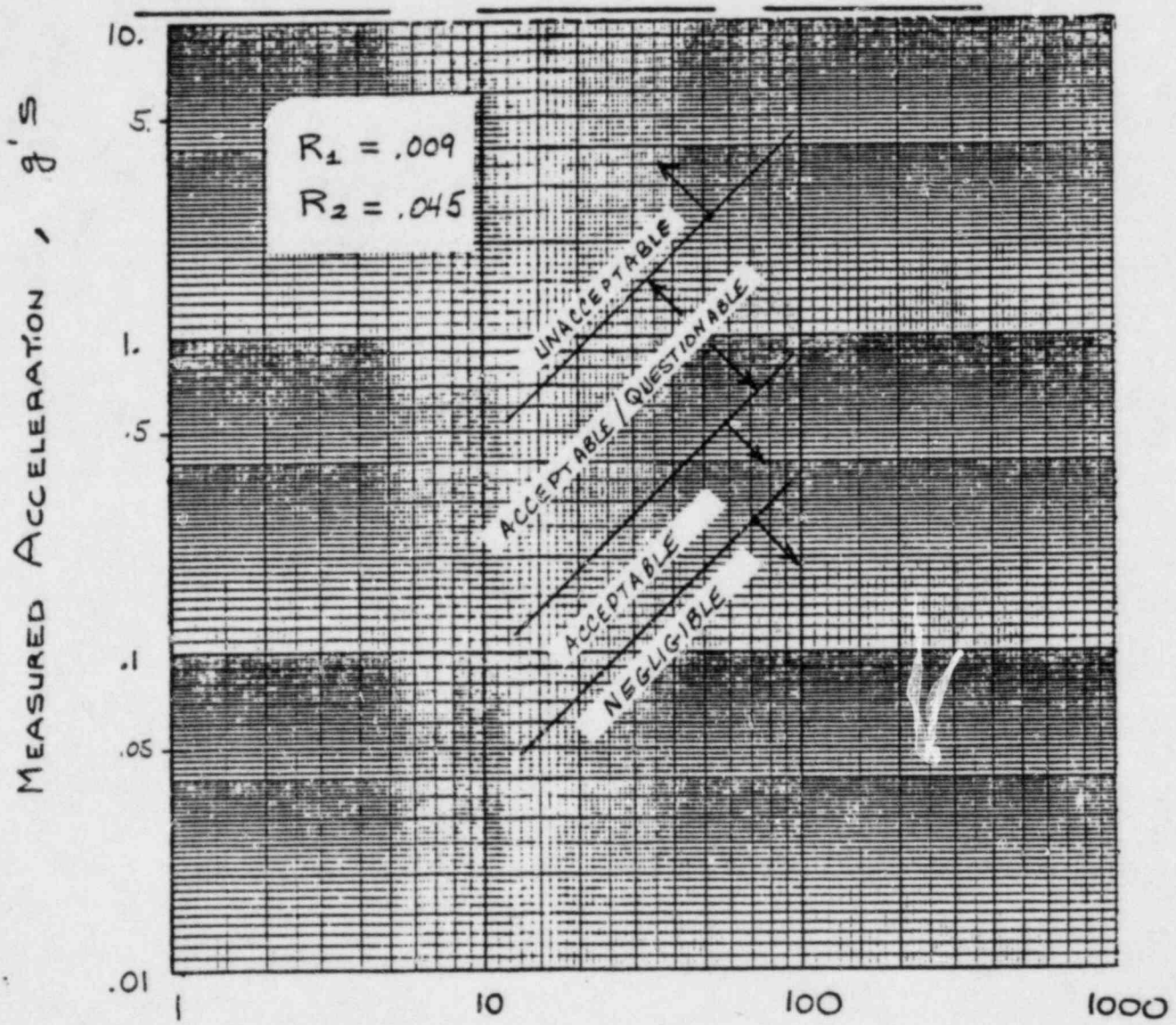


LGS STARTUP TEST - INSTRUMENTED VIBRATION LIMITS

Specification 8031-P-363
Appendix E

SYSTEM: HPCI STM. (I/C)	INSTRUMENT NO.	NODE POINT	LINE NOS.
FROM: MAIN STM. LINE C	VA.X.D.01	200E-X	10"DBA-106
TO: PEN. X-11	VA.X.D.02	212-X	
CALC NO: 1-01-03	VA.Y.D.03	400-Y	
ISO. NO: SK-M-1592 Rev. L			

1



FREQUENCY, HZ.

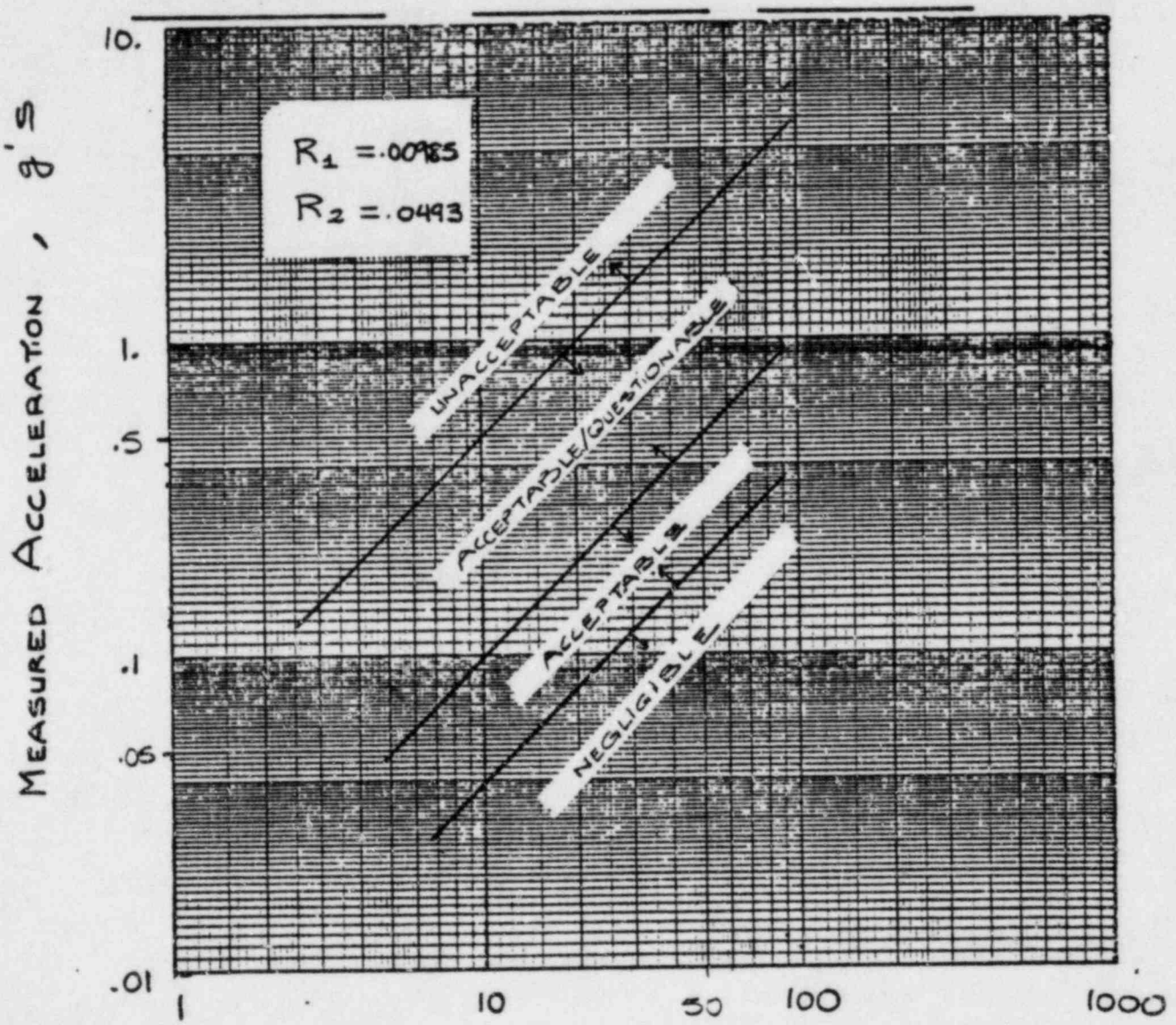
LGS STARTUP TEST - INSTRUMENTED VIBRATION LIMITS

Specification 8031-P-363
Appendix-E

SYSTEM: HPCI (O/C) STEAM SUPPLY	INSTRUMENT NO.	NODE POINT	LINE NO.
FROM: FLUED HEAD X-11	VA.X.E.01	16-X	10"-EBB-121
TO: IN-LINE ANCHOR AT DP85.	VA.X.E.02	47-X	10"-EBB-108
	VA.X.E.03	75A-X	

CALC NO: P1-10-7%

ISO. NO: SK-M-1556A Rev.P



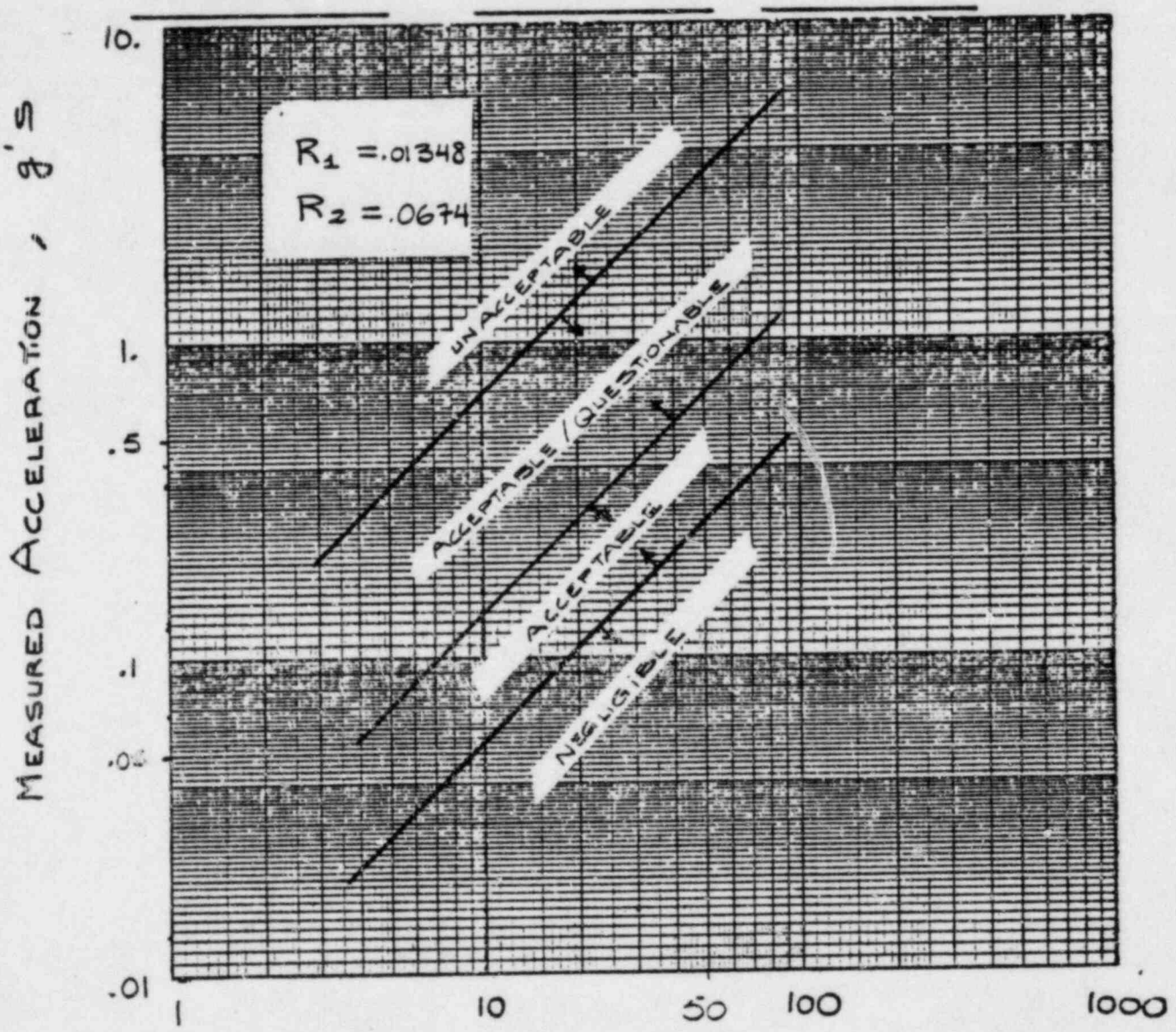
LGS STARTUP TEST - INSTRUMENTED VIBRATION LIMITS

System: E - HPCI Steam Supply
Location: Outside Containment
Isometric: SK-M-1556B Rev. N
Calculation No: PI-24-51

Instrument No.	Data Point	Axis	Remark
Later	Later	Later	Acceptable measured acceleration later

Specification 8031-P-363
Appendix-E

SYSTEM: HPCI (O/C) TURBINE EXHAUST	INSTRUMENT NO.	NODE POINT	LINE NO.
FROM: FLUED HEAD X-210	VA.X.F.01	45B - X	12" HBB108
	VA.Z.F.02	65A - Z	16" HBB-113
TO: HPCI TURBINE EXHAUST	VA.Y.F.03	85 - Y	20" HBB-108
			18" HBB-108
CALC NO: P1-24-52			
ISO. NO: SK-M-1589 REV E			
- 1590 REV J			

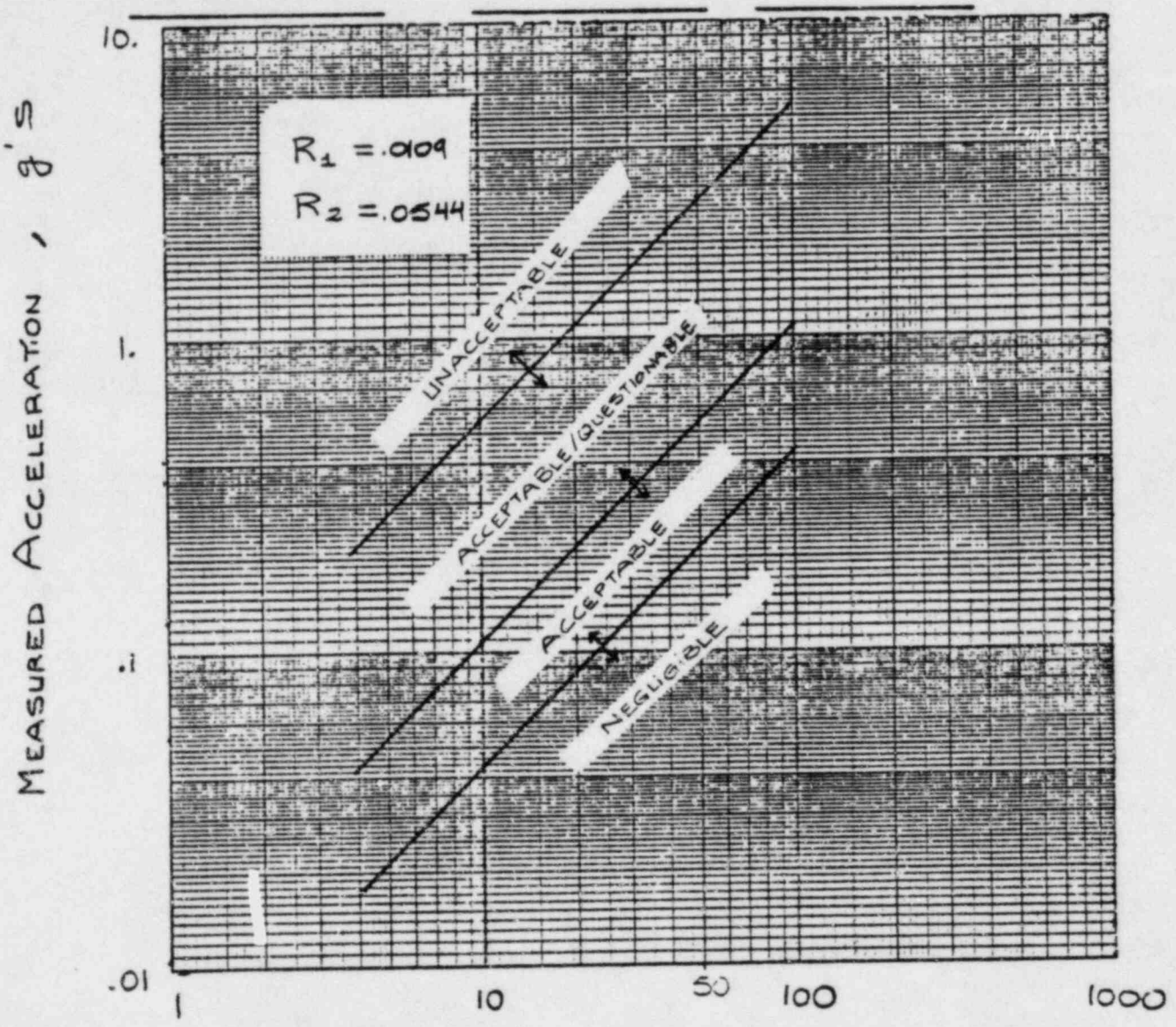


LGS STARTUP TEST - INSTRUMENTED VIBRATION LIMITS

Specification 8031-P-363 Appendix-E

SYSTEM: RCIC (I/C)	INSTRUMENT NO.	NODE POINT	LINE NO.
FROM: FLUED HEAD X-10	VA.X.G01	326 B -X	4" DBA-107
TO: 26" MAIN STEAM LINE B.	VA.Z.G.02	332B -Z	3" DBA-107
CALC NO: 1-01-02	VA.X.G.03	332C -X	
ISO. NO: SK-M-1593 REV.L			

1 △



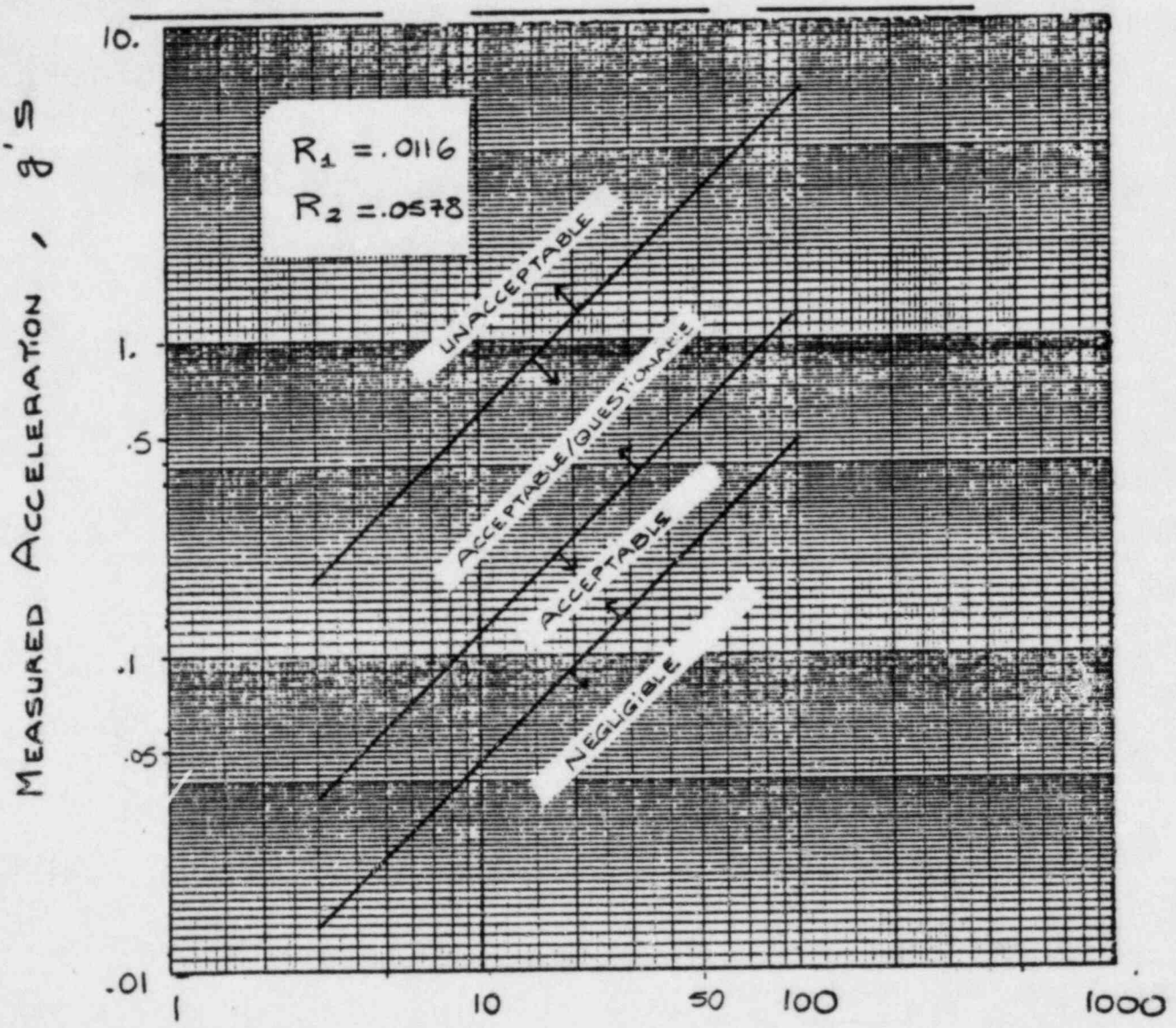
MEASURED ACCELERATION, g's

FREQUENCY, Hz.

LGS STARTUP TEST - INSTRUMENTED VIBRATION LIMITS

Specification 8031-P-363
Appendix - E

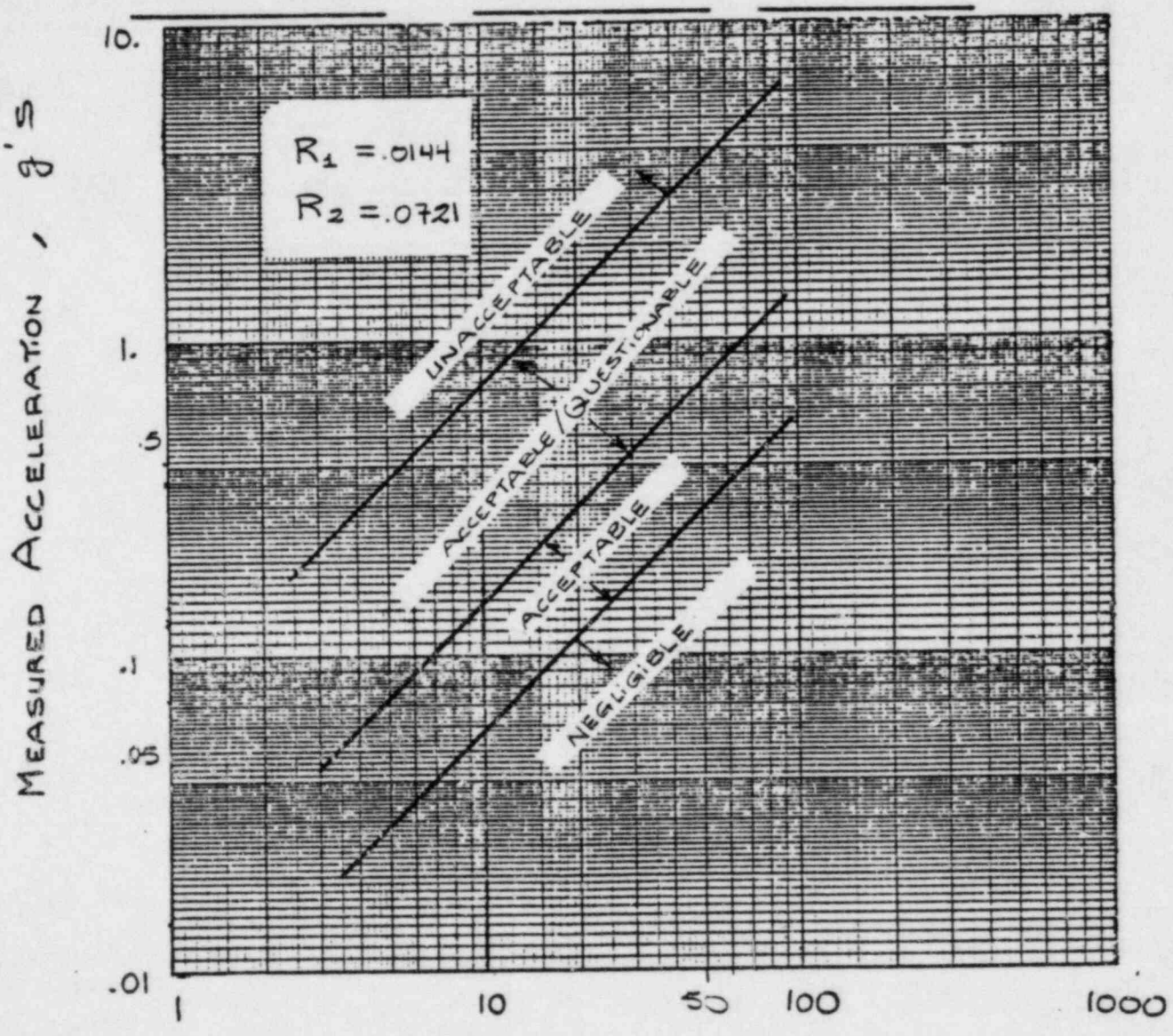
SYSTEM: RCIC (O/C) Steam Supply	INSTRUMENT NO.	NODE POINT	LINE NO.
FROM: FLUED HEAD X-10	VA . X . H.01	51AB-X	6"EBB-109
TO: TURBINE STOP VALVE	VA . X . H.02	70A - X	
CALC NO: P1-22-51	VA . Z . H.03	100A-E-Z	
ISO. NO: Sk-M-1565 REV. G	VA . Z . H.04	110A - Z	
Sk. M-1566 REV. J			



LGS STARTUP TEST - INSTRUMENTED VIBRATION LIMITS

Specification 8031-P-363
Appendix E

SYSTEM: RCIC (O/C: TURBINE EXH)	INSTRUMENT NO.	NODE POINT	LINE NO.
FROM: FLUED HEAD X-215	VA.X.J.01	35B-X	8" HBB 101
TO: TURBINE EXHAUST	VA.Z.J.02	45B-Z	10" HBB 101
CALC NO: P1-22-55			
ISO. NO: SK-M-1645A Rev. S			



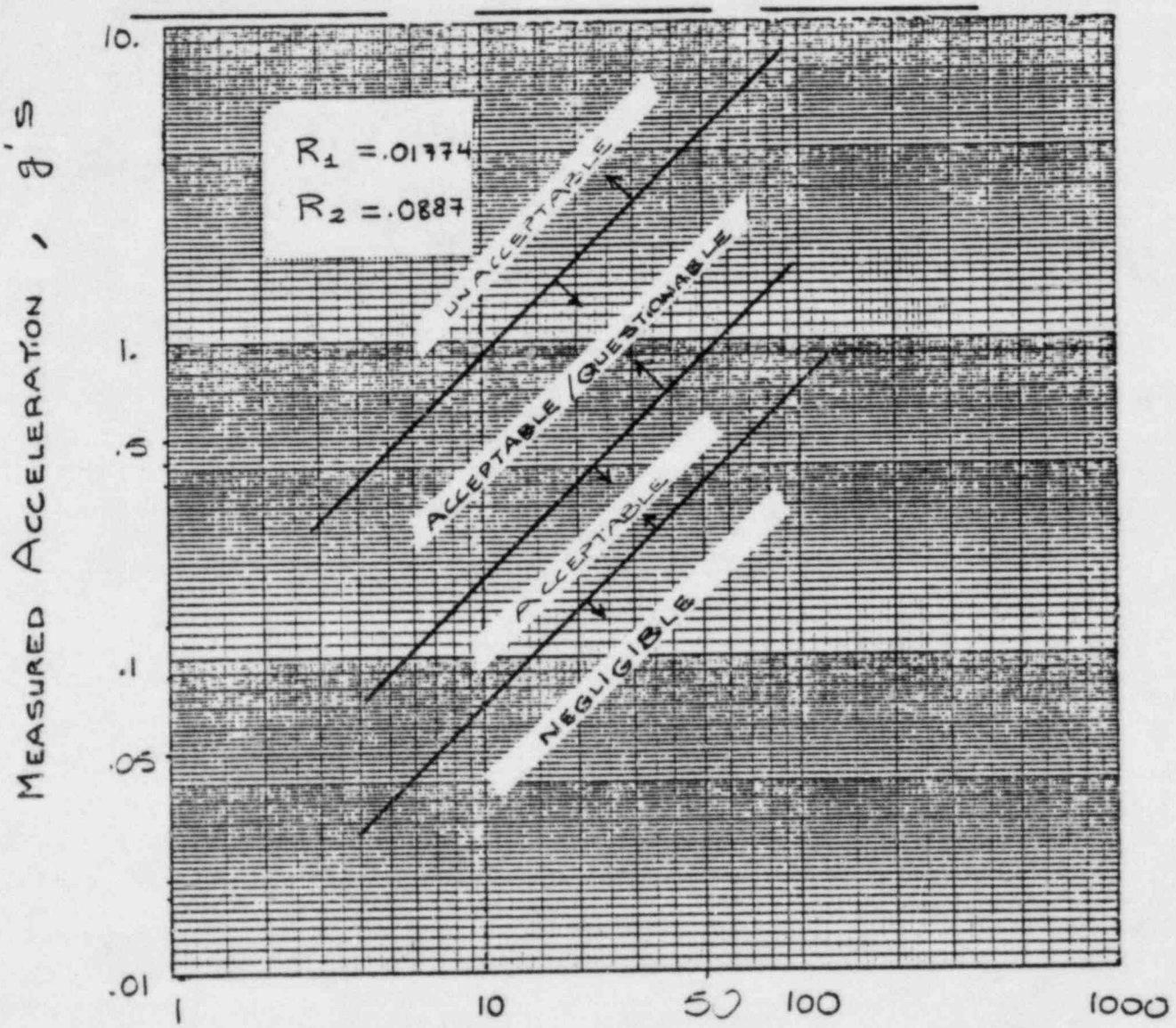
LGS STARTUP TEST - INSTRUMENTED VIBRATION LIMITS

System: K-Core Spray
Location: Inside Containment
Isometric: SK-M-1610 Rev. Q
Calculation No: 1-20-02

Instrument No.	Data Point	Axis	Remark
VA.Z.K.01	30E	Z	Deleted
VA.Y.K.02	45	Y	Deleted

Specification 8031-P-363
Appendix - E

SYSTEM: RHR (I/C) SHUTDOWN SUPPLY	INSTRUMENT NO.	NODE POINT	LINE NO.
FROM: FLUED HEAD X-12	VA.X.L.01	135 - X	20" DCA-105
TO: 36" RECIRC. LOOP "B"	VA.Z.L.02	135 - Z	
CALC NO: 1-10-11A			
ISO. NO: SK-M 1548 A Rev. H			



LGS STARTUP TEST - INSTRUMENTED VIBRATION LIMITS

System: M-RHR LPCI
Location: Inside Containment
Isometric: SK-M-1542 Rev. L
Calculation No: 1-10-05

Instrument No.	Data Point	Axis	Remark
VA.Z.M.01	3C	Z	Deleted
VA.Y.M.02	5	Y	Deleted
VA.Z.M.03	120	Z	Deleted

System: N - RHR Head Spray
Location: Inside Containment
Isometric: SK-M-1549 Rev. F
Calculation No: 1-10-22

Instrument No.	Data Point	Axis	Remark
VA.Z.N.04	70E	Z	Deleted
VA.Y.N.05	70E	Y	Deleted

System: N- RHR Head Spray
Location: Inside Containment
Isometric: 6K-M-1550 Rev. P
Calculation No: 1-10-09

Instrument No.	Data Point	Axis	Remark
VA.X.N.01	2203	X	Deleted
VA.Y.N.02	254	Y	Deleted

System: N-RHR Head Spray
Location: Inside Containment
Isometric: SK-M-6794A Rev. D
Calculation No: 1-10-09

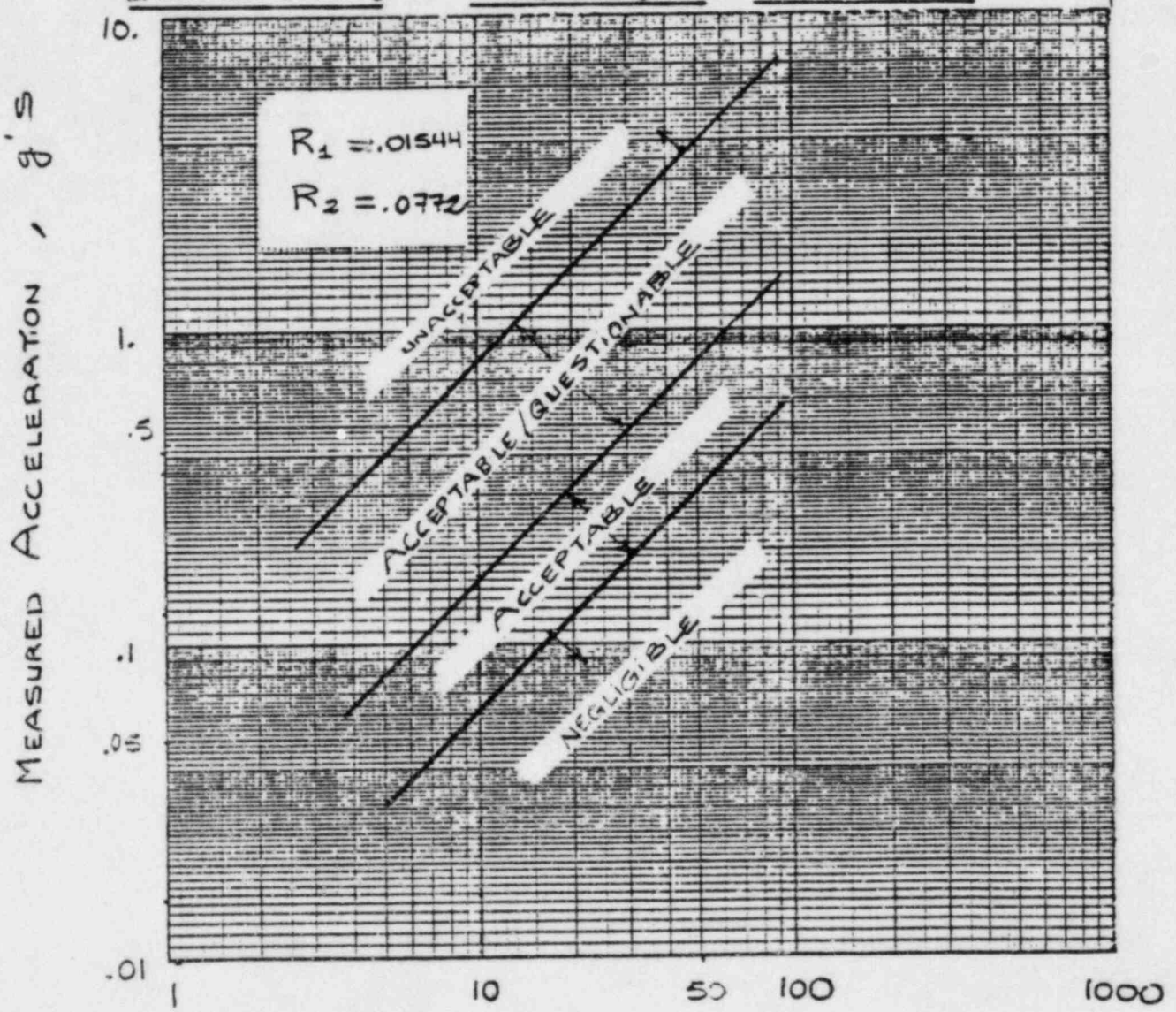
Instrument No.	Data Point	Axis	Remark
VA.X.N.03	174	X	Deleted

Appendix-E Specification 8031-P-363

SYSTEM: RWCU (I/C)
6 inch, 4 inch, 2½ inch & 2 inch portions

FROM	TO	CALC NO	ISO. NO	INSTRUMENT NO.	NODE POINT	LINE NO.
RPV NOZZLE N15	FWD HEAD X-14	H-10-11 B	SK-M-1551 B Rev. M SK-M-6455 Rev G SP-DCA-115-E1-Rev. 5	VA. Z. P. 01	75 - Z	6" DCA-101
				VA. X. P. 02	87 - X	4" DCA-101
				VA. Y. P. 03	87 - Y	2½" DCA-113
				VA. X. P. 04	560B - X	2" DCA-113
				VA. Z. P. 05	560B - Z	
				VA. X. P. 06	640B - X	
				VA. Z. P. 07	810E - Z	
				~~VA. Y. P. 08~~	~~847B - Y~~	

△1



VA. Y. P. 08 Deleted

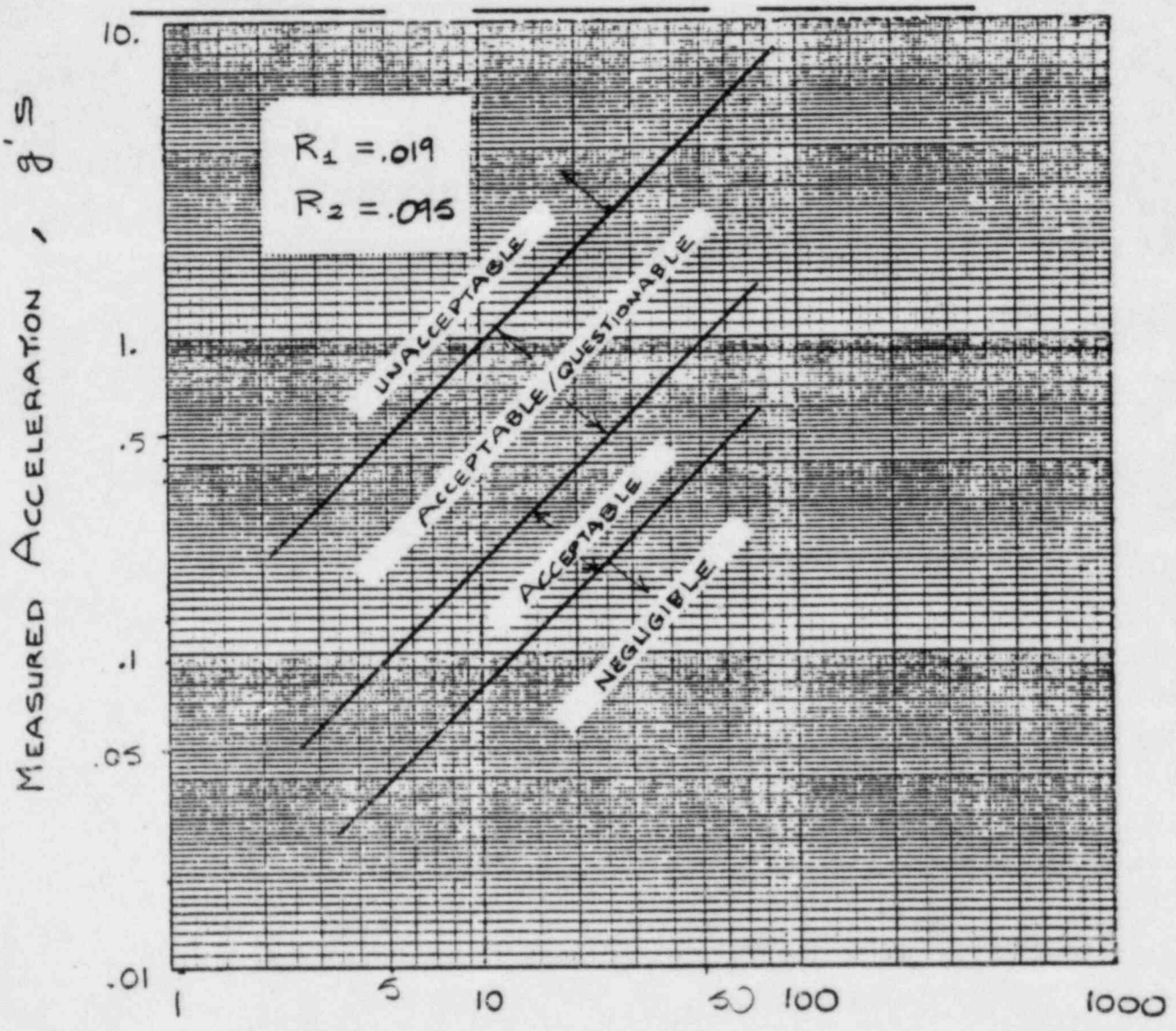
LGS STARTUP TEST - INSTRUMENTED VIBRATION LIMITS

System: P-Reactor Water Clean up
Location: Inside Containment
Isometric: SP-DCA-113-E1 Rev. 5
Calculation No: 1-10-11B

Instrument No.	Data Point	Axis	Remark
VA.Y.P.09	847	Y	Acceptable measured acceleration later.

Specification 8031-P-363
Appendix -E

SYSTEM: RHR (I/C) SHUTDOWN RET.	INSTRUMENT NO.	NODE POINT	LINE NO.
FROM: FLUED HEAD X15-A	VA.X.Q.01	292-X	12" DCA-107
TO: 28" RECIRC. LOOP "A"	VA.Z.Q.02	314, B-Z	
	VA.Z.Q.03	342-Z	
CALC NO: 1-10-10			
ISO. NO: SK-M-1546 REV. J			



LGS STARTUP TEST - INSTRUMENTED VIBRATION LIMITS

Table of Instrument Sensitivity Factor (M_{in}) for Vibration Accelerometers

INSTRUMENT SENSITIVITY MULTIPLIER, M_{in}

CALC. NO. I-01-226 LINE NOS. 26"EBB-104, 14"EBB-107, 18"EBB-107 & 6"EBB-2104
PIPE SYSTEM MAIN STM & BYP. FROM: X-78 TO: SV-4
ISO NOS. SK-M-1503 REV N, -1504 REV H 1

VIBRATION MODE (*)		(**) ACCELEROMETER (i) number/pipe node-direction							
NUMBER (n)	FREQ. (Hz)	VA.Y.A.01 B23B-Y	VA.Z.A.02 B25A-Z	VA.Z.A.03 B40A-Z		VA.X.A.04 P37-X	VA.Y.A.05 P35-Y	VA.X.A.06 P56B-X	
1	7.842		3.51						
3	11.784		1.80	4.21					
6	12.438					4.95			
8	14.088		1.40	1.31					
9	14.668		1.40	1.63					
10	15.932	6.47	1.84			3.54			
11	16.138	2.18	5.68						
12	17.376	2.65							
14	18.734					5.43	3.64		
15	20.379		5.94						
16	20.778					3.90	2.68	9.35	
18	24.157					2.19	1.13	2.87	
20	25.821		8.41			1.46	2.35	1.23	
21	26.342			1.69		3.79		2.29	
22	26.521			8.76		2.04		1.08	
23	27.135					5.67		1.88	
24	28.533	2.23					4.67	5.38	
25	28.870	1.64				6.11	3.00	1.41	
27	29.519			3.77				6.06	
28	29.651					2.22	2.39	1.11	
29	30.169	1.15				5.75	2.00	3.30	
30	30.309	1.19					1.72		
31	30.599	5.68					7.16		
32	31.161						8.40		
33	31.529	8.79				2.62	1.10	3.10	
34	32.059						8.33		
36	33.084			2.72					
38	35.246						9.80		
39	35.701			1.40					
41	38.551					2.72	7.94	6.99	

(*) SKIPPED MODES NOT SIGNIFICANT FOR SCOPE OF TEST
(**) BLANK ENTRIES SIGNIFY LOW SENSITIVITY ($M_{in} > 10$)

INSTRUMENT SENSITIVITY MULTIPLIER, M_{in}

CALC. NO. L-C1-226 LINE NOS. 6"EBB-104, 14"EBB-107, 18"EBB-107 & 6" EBB-104
PIPE SYSTEM MAIN STM 3 #3 1/2 FROM: X-78 TO: SV-4
ISO NOS. SK-M-1503 REV N, -1504 REV H △1

VIBRATION MODE (*)		(**) ACCELEROMETER (i) number/pipe node-direction							
NUMBER (n)	FREQ. (Hz)	VA.Y.A.01 B23B-Y	VA.Z.A.02 B25A-Z	VA.Z.A.03 B40A-Z	____	VA.X.A.04 F37-X	VA.Y.A.05 P35-Y	VA.X.A.06 P56B-X	____
42	41.031			3.67					
47	42.906		2.09						
48	43.584					3.59			
51	49.815			4.59					
54	55.292		3.61	2.01					
55	56.135		1.36	5.75					
57	60.239	4.74							
58	61.915	2.34							
59	62.013	3.06							
60	64.482			2.83					
61	65.270						8.77		
64	67.778		5.49						
65	69.178		3.34						
66	69.327		4.03						
67	71.150							1.15	
69	73.049		4.88						
80	87.864						5.63		
87	95.216	5.26							
88	97.626		3.53						

(*) SKIPPED MODES NOT SIGNIFICANT FOR SCOPE OF TEST
(**) BLANK ENTRIES SIGNIFY LOW SENSITIVITY ($M_{in} > 10$)

INSTRUMENT SENSITIVITY MULTIPLIER, M_{in}

CALC. NO. L-12-01 LINE NOS. 24"DLA-105; 24", 20" & 12" DLA-107
PIPE SYSTEM FEEDWATER A (I/C) FROM: RPV TO: X-9A
ISO NOS. SK-M-1552 REV J 1

VIBRATION MODE (*)		(**) ACCELEROMETER (i) number/pipe node-direction							
NUMBER (n)	FREQ. (Hz)	VA.Z.B.01 608-Z	VA.X.B.02 96-X	VA.Y.B.03 107-Y	VA.X.B.04 145B-X	VA.X.B.05 165-X	____	____	____
1	12.57	1.88			1.31	7.26			
2	13.20	2.92		6.33	2.24	7.60			
6	19.03	6.38		1.40	2.68				
7	19.64			1.02					
10	21.12	6.5		3.71	1.65				
20	32.25		3.23						
22	32.59					3.96			
23	32.91				4.76	4.00			
25	34.24		5.80						
26	34.60		2.70						
27	35.86		3.61		3.61	5.94			
31	40.00	9.45		4.00					
32	42.22	4.34	4.55						
34	45.23				4.24	1.06			
44	53.23				9.83	4.07			
47	56.99				1.76	6.80			
56	68.41	5.67				4.75			
61	78.59				6.10	3.76			
65	83.04	7.11	2.37		4.32				
66	84.56		7.85			3.09			
72	95.80	3.24							

(*) SKIPPED MODES NOT SIGNIFICANT FOR SCOPE OF TEST
(**) BLANK ENTRIES SIGNIFY LOW SENSITIVITY ($M_{in} > 10$)

INSTRUMENT SENSITIVITY MULTIPLIER, M_{in} ⚠1

CALC. NO. P1-15-51 LINE NOS. 24"DBB-104, 24" & 16" DBB-103
PIPE SYSTEM FEEDWATER (D/C) FROM: X-9L TO: TURB. BLDG. ⚠1
ISO NOS. SK-M-1554 Rev. M-1555 Rev. E, ——

VIBRATION MODE (*)		(**) ACCELEROMETER (i) number/pipe node-direction							
NUMBER (n)	FREQ. (Hz)	VA.X.C.01 13-X	VA.Z.C.02 45E-Z	VA.Z.C.03 39-Z	——	——	——	——	——
5	18.80		4.00	1.04					
7	22.36		9.09	2.22					
8	22.94	8.62		1.12					
10	24.59		6.12	2.97					
11	24.78		4.90	2.34					
13	27.76		5.53	1.05					
14	28.01			4.17					
16	32.75	4.17	9.09	1.61					
17	35.48			1.21					
18	36.73	7.69		2.17					
19	37.48	1.92							
21	42.43	1.52		1.89					
23	47.12	7.85		8.50					
25	48.76	2.82	7.26	1.45					
26	51.33	1.00		7.14					
27	51.73	1.00		8.33					
28	52.35	7.69							
29	53.83	4.04							
30	54.95	1.50	3.71	1.91					
33	62.11	1.47		6.67					
34	63.38	2.54	3.47						
35	63.93	1.02		2.13					
36	70.40	5.67	3.19						
43	78.57			5.26					
44	85.30		8.50						
45	85.41		1.68						
46	87.65	2.14	5.00						
47	88.37	6.12	4.95						
48	88.95	7.69	6.25						

(*) SKIPPED MODES NOT SIGNIFICANT FOR SCOPE OF TEST
(**) BLANK ENTRIES SIGNIFY LOW SENSITIVITY ($M_{in} > 10$)

INSTRUMENT SENSITIVITY MULTIPLIER, M_{in}

CALC. NO. 1-01-03 LINE NOS. 10" DBA-106
PIPE SYSTEM HPCI STM. (I/C) FROM: MS(C) TO: X-11 ⚠1
ISO NOS. SK-M-1592 REV. L

VIBRATION MODE (*)		(**) ACCELEROMETER (i) number/pipe node-direction							
NUMBER (n)	FREQ. (Hz)	VA.X.D.01 200E-X	VA.X.D.02 212-X	VA.Y.D.03 400-Y	____	____	____	____	____
3	13.90		1.15	9.92					
4	14.99		1.58	1.16					
6	16.69	8.77	2.65	2.19					
7	17.79	6.29	3.96	5.63					
8	20.24			2.94					
11	21.81	4.39	2.89						
29	30.78			6.10					
35	35.18		3.35						
42	37.97	1.41	4.86						
43	39.12	2.38	6.69						
45	43.05	1.09	2.79						
51	45.87	1.04							
54	50.28	1.10	7.86						
59	55.59	1.95	3.69						
63	58.45	1.12	2.11						
65	59.54	3.12	2.40						
69	63.75	1.03		4.76					
70	63.89	5.00		4.76					
82	72.33	1.91							
85	77.27	1.04	3.85						
91	81.14	7.94	2.81						
93	82.85	8.92	4.46						
98	85.93	6.65	1.88						

(*) SKIPPED MODES NOT SIGNIFICANT FOR SCOPE OF TEST
(**) BLANK ENTRIES SIGNIFY LOW SENSITIVITY ($M_{in} > 10$)

Specification 8031-P-363
Appendix - E

INSTRUMENT SENSITIVITY MULTIPLIER, M_{in} 1

CALC. NO. P1-10-72 LINE NOS. 12" EBB-108

PIPE SYSTEM HPCI STM. (O/C) FROM: X-11 TO: TSV 1

ISO NOS. SK-M-1556A Rev. P

VIBRATION MODE (*)		(**) ACCELEROMETER (i) number/pipe node-direction							
NUMBER (n)	FREQ. (Hz)	VA.X.E.01 16-X	VA.X.E.02 47-X	VA.X.E.03 754-X	____	____	____	____	____
1	10.68		5.95	2.25					
3	13.80	2.55	2.43						
4	13.96	1.40	1.20	6.35					
5	14.24			7.63					
6	14.45		4.00						
7	15.11	2.94	9.64	5.89					
9	15.57	5.40							
10	16.56		2.83	4.25					
11	17.32	1.92	7.81	5.95					
14	20.89	2.68	1.31	9.08					
16	21.75	3.55	1.91	4.04					
17	23.18	4.90	1.81						
18	23.70		5.35	1.71					
20	25.00		2.53						
21	25.79		4.00						
23	28.29		3.96						
26	34.36		2.89						
29	38.86		1.39						
31	42.18	1.67	1.85	3.78					
34	44.51	7.13	6.33	2.07					
37	47.26			2.44					
38	48.52		9.09	1.32					
39	48.89			3.70					
49	62.78			4.12					
53	70.52	6.94							
54	70.75	2.56							
55	72.73	7.69							
58	89.34			1.02					

(*) SKIPPED MODES NOT SIGNIFICANT FOR SCOPE OF TEST

(**) BLANK ENTRIES SIGNIFY LOW SENSITIVITY ($M_{in} > 10$)

REV. 1

System: E- HPCI Steam Supply
Location: Outside Containment
Isometric: SK-M- 1556B Rev. N
Calculation No: PI-24-51 ⚠1

Instrument No.	Data Point	Axis	Remark
Later	Later	Later	Instrument sensitivity multiplier later

Specification 8031-P-363
Appendix - E

INSTRUMENT SENSITIVITY MULTIPLIER, M_{in} 1

CALC. NO. P1-24-52 LINE NOS. 20" HBB-108
PIPE SYSTEM HPCI TURB EXH. FROM: TURB. EX. TO: X-21D 1
ISO NOS. SK-M-1589 REV E -1590 REV. J

VIBRATION MODE (*)		(**) ACCELEROMETER (i) number/pipe node-direction							
NUMBER (n)	FREQ. (Hz)	VA.X.F.01 45A-X	VA.Z.F.02 65A-Z	VA.Y.F.03 85-Y	____	____	____	____	____
1	8.12	1.89							
2	11.92		2.08						
3	16.14			1.62					
4	18.22	6.73		7.77					
7	22.64		2.53						
8	25.55	2.17							
9	27.41	4.20	5.25	1.54					
10	29.08	1.80	6.73	3.88					
11	31.82		7.14	2.94					
12	39.81	2.15	5.72						
13	40.56	6.73	4.81	2.30					
14	46.42	4.04	4.21	1.94					
15	51.23		1.19						
16	57.45	2.22	1.30	8.00					
17	59.96	3.43	6.44						
18	65.83	8.00	1.70						
19	66.55	2.64	1.69						
20	70.66	6.20	8.86						
21	81.46	4.59		2.73					
22	84.04	6.67		3.33					
23	90.57	3.80		9.50					
24	98.73		4.65						

(*) SKIPPED MODES NOT SIGNIFICANT FOR SCOPE OF TEST
(**) BLANK ENTRIES SIGNIFY LOW SENSITIVITY ($M_{in} > 10$)

REV. 1

INSTRUMENT SENSITIVITY MULTIPLIER, M_{in}

CALC. NO. 1-01-C2 LINE NOS. 4"DBA-107 3"DBA-107
PIPE SYSTEM RCIC STM-I/C FROM: MS "B" TO: X-10
ISO NOS. SK-M-1593 Rev. L

P. 1 OF 2

VIBRATION MODE (*)		(**) ACCELEROMETER (i) number/pipe node-direction							
NUMBER (n)	FREQ. (Hz)	VA.X.601 326B-X	VA.Z.602 332B-Z	VA.X.603 332C-X	———	———	———	———	———
3	11.77	8.0	2.81	4.0					
5	14.21		1.018						
7	14.73	1.23		1.38					
10	18.05	1.26	4.05	3.07					
12	18.43								
13	19.66	1.07	1.80	1.71					
18	21.95	1.40	2.67	1.62					
20	22.36	5.64	2.82	5.98					
25	25.21		1.01						
26	25.23		1.01						
28	25.86		1.45						
30	26.52								
33	27.35	3.49	5.08						
34	27.59	3.74							
35	27.68	3.85	5.86						
51	35.86								
52	36.67		2.54	8.19					
54	36.93		2.55	7.15					
55	37.34								
58	38.98			5.19					
59	39.45			1.58					
60	39.75								
66	43.44								
71	45.54								
72	46.03								
75	48.55			5.00					
79	50.27			4.36					
81	50.76	2.85							
83	52.09								
87	56.82	7.04		3.77					

(*) SKIPPED MODES NOT SIGNIFICANT FOR SCOPE OF TEST
(**) BLANK ENTRIES SIGNIFY LOW SENSITIVITY ($M_{in} > 10$)

INSTRUMENT SENSITIVITY MULTIPLIER, M_{in} 1

CALC. NO. I-01-02 LINE NOS. 4"DBA-107 3"DBA-107
PIPE SYSTEM RCIC STM-I/C FROM: MS "B" TO: X-10
ISO NOS. SK-M-1593 REV. L 1

P. 2 OF 2

VIBRATION MODE (*)		(**) ACCELEROMETER (i) number/pipe node-direction							
NUMBER (n)	FREQ. (Hz)	VA.X.G01 326B-X	VA.Z G 02 332 B-Z	VA X G03 332C-X	———	———	———	———	———
91	57.73			2.11					
95	61.57	9.06	6.68	2.27					
98	63.07			5.18					
99	63.48			2.98					
100	64.02			4.41					
112	75.25		5.9						
113	76.83	3.70	4.76						
118	78.00	1.80		1.77					
120	79.97	8.63		8.05					
122	80.28	4.76		4.57					
123	81.37	6.84	5.87						
132	86.19	2.49	8.23	2.02					
134	87.21	3.51	5.66	2.61					
135	87.91	2.87	9.66	2.53					

(*) SKIPPED MODES NOT SIGNIFICANT FOR SCOPE OF TEST
(**) BLANK ENTRIES SIGNIFY LOW SENSITIVITY ($M_{in} > 10$)

INSTRUMENT SENSITIVITY MULTIPLIER, M_{in} 1

CALC. NO. P1-22-51 LINE NOS. 6" ERB-109

PIPE SYSTEM P.I.C. STM. (D/C) FROM: X-10 TO: TSV 1

ISO NOS. SK-M-0665 REV. G, -1566 REV. J

VIBRATION MODE (*)		(**) ACCELEROMETER (i) number/pipe node-direction							
NUMBER (n)	FREQ. (Hz)	VA.X.H.01 51AB-X	VA.X.H.02 70A-X	VA.Z.H.03 100AE-Z	VA.Z.H.04 110A-Z	____	____	____	____
1	6.98			1.01					
2	7.42			3.57					
4	10.20			1.00					
5	11.78				3.03				
6	11.80	4.79							
8	12.76		9.09	5.88	1.96				
9	13.03		4.76		2.44				
10	13.66		1.75		9.09				
11	14.39		1.41		3.37				
12	14.60	2.54							
14	15.23	1.95							
15	15.59		1.60	8.41	1.58				
17	16.67			1.61					
18	16.98	2.55							
19	17.18	1.98							
21	17.57		5.00		2.63				
22	18.36	4.66							
23	18.45		5.71						
24	18.92	4.62							
26	19.89	4.77							
27	20.55			5.69					
33	26.12		4.00						
34	26.95				1.92				
35	27.07		5.56						
36	29.14	2.13	4.53						
43	33.85	1.09							
44	34.35	1.47	9.11						
45	35.45			10.00	1.69				
47	38.45			7.18	3.80				
48				3.03	10.00				

(*) SKIPPED MODES NOT SIGNIFICANT FOR SCOPE OF TEST

(**) BLANK ENTRIES SIGNIFY LOW SENSITIVITY ($M_{in} > 10$)

INSTRUMENT SENSITIVITY MULTIPLIER, M_{in} 1

CALC NO. P1-22-51 LINE NOS. 6" EBB-109
PIPE SYSTEM RCIC STM. (O/C) FROM: X-10 TO: TSV 1
ISO NOS. SK-M-1565 REV. G, -1566 REV. J

VIBRATION MODE (*)		(**) ACCELEROMETER (i) number/pipe node-direction							
NUMBER (n)	FREQ. (Hz)	VA.X.H.01 51A B-X	VA.Y.H.02 70A-X	VA.Z.H.03 100A E-Z	VA.Z.H.04 110A-Z	———	———	———	———
49	40.34			1.70	1.86				
51	41.41			1.98	2.71				
52	44.09	5.27							
53	44.44				4.57				
56	45.82	4.52	3.32						
57	46.44	2.08	3.64						
60	49.44	3.46							
61	49.67				1.33				
62	49.78		9.09		2.50				
63	50.79				2.10				
64	50.87	7.41							
65	51.99		5.44						
67	53.58	8.33	2.27						
69	57.45		1.04						
71	62.02		1.79						
72	63.75			2.17					
76	69.48			10.00	1.00				
78	74.77		5.90	5.02	5.02				
81	81.13		6.44		8.92				
83	83.88			3.12	8.58				
84	84.69	1.33	5.68						
85	85.22	1.73							
87	87.64	3.14	2.64						
88	88.47	2.01	3.82	3.69					
91	92.39	4.96	8.15						
92	95.46		9.55		1.88				
93	96.10			5.15	1.61				

(*) SKIPPED MODES NOT SIGNIFICANT FOR SCOPE OF TEST
(**) BLANK ENTRIES SIGNIFY LOW SENSITIVITY ($M_{in} > 10$)

REV. 1

INSTRUMENT SENSITIVITY MULTIPLIER, M_{in} 1

CALC. NO. P1-22-55 LINE NOS. 10", 8" HBB-101 1
PIPE SYSTEM RCIC TURB. EXH. FROM: TURB. EXH. TO: X-215
ISO NOS. SK-M-1645A REV. 5 1

VIBRATION MODE (*)		(**) ACCELEROMETER (i) number/pipe node-direction							
NUMBER (n)	FREQ. (Hz)	VA.X.J.01 35 B-X	VA.Z.J.02 45 B-Z	———	———	———	———	———	———
1	9.53	1.14	8.70						
3	13.70		3.69						
5	16.12		5.51						
6	17.72	3.15	1.72						
7	20.06	4.61	5.18						
11	25.68	2.05	1.63						
13	30.16	3.60	4.11						1
15	33.43		7.11						
16	37.44		5.55						
18	39.85		7.25						
20	45.13		4.53						
21	47.15		7.89						
24	53.31	5.18	5.95						

(*) SKIPPED MODES NOT SIGNIFICANT FOR SCOPE OF TEST
(**) BLANK ENTRIES SIGNIFY LOW SENSITIVITY ($M_{in} > 10$)

System: K-Core Spray
Location: Inside Containment
Isometric: SK-M-1610 Rev. Q
Calculation No: 1-20-02

Instrument No.	Data Point	Axis	Remark
VA.Z.K.01	30E	Z	Deleted
VA.Y.K.02	45	Y	Deleted

INSTRUMENT SENSITIVITY MULTIPLIER, M_{in} 1

CALC. NO. 1-10-11A LINE NOS. 20" DCA-105
PIPE SYSTEM RHR SHUTDN SUPP. FROM: X-12 TO: RECIRC. B 1
ISO NOS. SK-M-1548A REV H

VIBRATION MODE (*)		(**) ACCELEROMETER (i) number/pipe node-direction							
NUMBER (n)	FREQ. (Hz)	YA.X.L.01 135-X	YA.Z.L.02 135-Z	____	____	____	____	____	____
3	11.22	1.49							
11	15.03	1.96	1.60						
13	15.35	6.14	1.56						
18	16.48	2.89	1.07						
19	16.94		1.00						
21	17.98	2.05	1.15						
26	19.43		2.66						
46	25.73		4.95						
76	34.76	6.29	2.59						
117	52.60		1.01						
148	64.00	5.40							
154	68.66	5.37	1.02						
159	73.66	2.39	1.11						
162	74.45	1.11	2.31						
164	76.27	1.00							
178	85.23	1.23	2.74						
187	91.25	1.17	1.95						
188	91.84	2.33	1.22						
194	97.90	1.99	1.16						

(*) SKIPPED MODES NOT SIGNIFICANT FOR SCOPE OF TEST
(**) BLANK ENTRIES SIGNIFY LOW SENSITIVITY ($M_{in} > 10$)

System: M-RHR LPCI
Location: Inside Containment
Isometric: SK-M-1542 Rev. L
Calculation No: 1-10-05

Instrument No.	Data Point	Axis	Remark
VA.Z.M.01	3C	Z	Deleted
VA.Y.M.02	5	Y	Deleted
VA.Z.M.03	120	Z	Deleted

System: N-RHR Head Spray
Location: Inside Containment
Isometric: SK-M-1549 Rev. F
Calculation No: 1-10-22

Instrument No.	Data Point	Axis	Remark
VA.Z.N.04	70E	Z	Deleted
VA.Y.N.05	70E	Y	Deleted

System: N-RHR Head Spray
Location: Inside Containment
Isometric: SK-M-1550 Rev. P
Calculation No: 1-10-09

Instrument No.	Data Point	Axis	Remark
VA.X.N.01	2203	X	Deleted
VA.Y.N.02	254	Y	Deleted

System: N-RHR Head Spray 1 ⚠1
Location: Inside Containment
Isometric: SK-M-6794A Rev. D ⚠1
Calculation No: 1-10-09

Instrument No.	Data Point	Axis	Remark
VA.X.N.03	174	X	Deleted

INSTRUMENT SENSITIVITY MULTIPLIER, M_{in}

CALC. NO. 1-10-11B LINE NOS. 6"& 4"DCA-101, 2½"& 2" DCA-113 ⚠1
PIPE SYSTEM RWCU (I/C) FROM: RECIRC. PMP. TO: X-14 ⚠1
ISO NOS. SK-M-1551BRevM, -6433 REV G, SP-DCA-113-E1 REV 5

VIBRATION MODE (*)		(**) ACCELEROMETER (i) number/pipe node-direction							
NUMBER (n)	FREQ. (Hz)	VA.Z.P.01 75-Z	VA-X.P.02 87-X	VA.Y.P.03 87-Y	VA.X.P.04 560,1B-X	VA.Z.P.05 560,1B-Z	VA.X.P.06 642,2B-X	VA.Z.P.07 810,1E-Z	VA.Y.P.08 647B-Y
7	13.48		1.41						
8	13.69								5.05
10	14.13							7.69	2.13
14	15.44						1.00		
20	17.46							1.72	
23	18.38							1.14	7.57
24	19.08	1.37	4.76	7.14					
27	19.64					3.06	2.74		
29	19.86							3.92	8.50
34	22.19							3.16	
35	22.67							2.60	
38	23.39				4.04	2.35	9.18		
39	24.80				3.92				
40	24.89				4.64				
41	24.91							1.92	
42	25.09				6.25				
47	26.05						2.86		
48	26.33							1.59	1.78
50	27.43				2.32	6.52			
53	28.18				9.18				
54	28.53				3.26	5.94			
55	29.28							9.21	8.06
57	29.86			2.42					
60	31.06			9.09					
61	31.08							3.58	3.37
62	31.28							3.47	2.41
63	31.35	8.14		1.90					
69	33.18				2.44	8.47			
70	33.30							8.58	1.03
72	34.16				6.00				

(*) SKIPPED MODES NOT SIGNIFICANT FOR SCOPE OF TEST
(**) BLANK ENTRIES SIGNIFY LOW SENSITIVITY ($M_{in} > 10$)

VA.Y.P.08 Deleted

Specification 8031-P-363
Appendix -E

INSTRUMENT SENSITIVITY MULTIPLIER, M_{in} 1

CALC. NO. 1-10-11B LINE NOS. 6"& 4"DCA-101, 2½"& 2" DCA-113

PIPE SYSTEM RWCU (I/C) FROM: RECIRC. PMP. TO: X-14

ISO NOS. SK-M-1551B Rev M, -6433 Rev G, SP-DCA-113-E1 Rev 5 1

VIBRATION MODE (*)		(**) ACCELEROMETER (i) number/pipe node-direction							
NUMBER (n)	FREQ. (Hz)	VA.Z.P.01 75-Z	VA-X.P.02 87-X	VA.Y.P.03 87-Y	VA.X.P.04 560,B-X	VA.Z.P.05 560,B-Z	VA.X.P.06 640,B-X	VA.Z.P.07 810,E-Z	VA.Y.P.08 647B-Y
77	34.96				1.05	9.27			
78	35.71			4.16					
80	36.32							3.93	5.25
82	37.28							5.89	2.26
91	41.06							4.11	
94	42.63							2.36	3.13
95	43.33				7.29	1.07			
96	43.63				9.27	1.07			
103	46.25		1.55	1.60					
106	47.73	7.75	1.63	4.96					
108	49.15							4.12	
111	50.32				2.97	1.59			
112	50.71							6.93	
113	50.91				2.87	1.53			
115	51.69	5.88							
119	54.74	5.83	4.77	1.05					
128	57.54								3.92
130	57.93				3.16	3.74			
131	58.78						5.15		
133	58.97							4.64	7.85
144	63.02							6.31	5.32
147	63.73							2.64	
152	67.32				9.09	3.57			
162	74.45	4.81		6.18					
163	74.68	3.32		5.94					
175	83.26				2.79	9.90			
177	84.13				4.24	4.81			
181	85.30							2.54	4.18
184	89.19					6.06			
186	91.14							1.83	5.09

(*) SKIPPED MODES NOT SIGNIFICANT FOR SCOPE OF TEST

(**) BLANK ENTRIES SIGNIFY LOW SENSITIVITY ($M_{in} > 10$)

VA.Y.P.08 Deleted

INSTRUMENT SENSITIVITY MULTIPLIER, M_{in} 1

CALC. NO. 1-10-11B LINE NOS. 6"& 4"DCA-101 ; 2½"& 2" DCA-113 1

PIPE SYSTEM RWCU (=/c) FROM: RECIRC. PMP. TO: X-14 1

ISO NOS. SK-M-1551BRevM, -6433 REV G, SP-DCA-113-E1 REV 5

VIBRATION MODE (*)		(**) ACCELEROMETER (i) number/pipe node-direction							
NUMBER (n)	FREQ. (Hz)	VA.Z.P.01 75-Z	VA-X.P.02 87-X	VA.Y.P.03 87-Y	VA.X.P.04 560,B-X	VA.Z.P.05 560,B-Z	VA.X.P.06 640,B-X	VA.Z.P.07 810,E-Z	~~VA.Y.P.08 847B-Y~~
188	91.84	6.44							
190	94.84							4.17	1.18
191	96.09							4.35	3.70
192	97.30	4.25		9.27					
195	99.45								7.77

(*) SKIPPED MODES NOT SIGNIFICANT FOR SCOPE OF TEST

(**) BLANK ENTRIES SIGNIFY LOW SENSITIVITY ($M_{in} > 10$)

VA.Y.P.08 Deleted

System: P- Reactor Water Clean up
Location: Inside Containment
Isometric: SP-DCA-113-E1 Rev. 5
Calculation No: 1-10-11B

Instrument No.	Data Point	Axis	Remark
VA.Y.P.09	847	Y	Instrument sensitivity multiplier later.

BECHTEL

INSTRUMENT SENSITIVITY MULTIPLIER, M_{in}

CALC. NO. 1-10-10 LINE NOS. 12" DCA-104
PIPE SYSTEM PHP SHUTD. PET. B FROM: FECIRC. 5 TO: X-12 |⚠1
ISO NOS. SK-M-•1546 Rev. J

VIBRATION MODE (*)		(**) ACCELEROMETER (i) number/pipe node-direction							
NUMBER (n)	FREQ. (Hz)	VA.X.O.01 292 -X	VA.ZO.02 314B-Z	VA.Z.O.03 342-Z					
4	12.99		1.04	3.23					
5	13.59	6.46	4.30	2.35					
7	15.08	4.55	1.09						
10	19.14	2.64	2.57						
11	19.83	1.22	4.77						
12	19.90	1.25							
15	20.98	1.29		6.51					
18	23.82		5.16						
19	26.38	1.58	2.66						
20	26.80		4.85						
22	29.62	3.58	3.34						
23	30.05		3.84						
26	33.16	3.52	1.13	2.92					
29	36.18		2.56	4.76					
32	39.10			1.06					
34	41.19			1.11					
38	47.03			1.00					
42	52.33			3.33					
45	53.50	1.75		1.01					
47	54.87			1.01					
49	57.69			3.38					
53	61.25	7.15		8.34					
60	68.43	1.01		2.95					
62	70.43	2.64							
66	74.33		1.10	1.16					
68	83.10	2.49		9.73					
69	86.87		7.17	3.72					
73	91.51		1.89	1.00					
75	99.32	7.69							

(*) SKIPPED MODES NOT SIGNIFICANT FOR SCOPE OF TEST
(**) BLANK ENTRIES SIGNIFY LOW SENSITIVITY (M_{in} > 10)