

SPECIFICATION
 FOR
 TEST REQUIREMENTS
 FOR
 DYNAMIC TRANSIENT TESTING
 OF
 ASME SECTION III NUCLEAR CLASS
 1,2,3 AND ANSI B31.1 BECHTEL PIPING
 FOR THE
 LIMERICK GENERATING STATION
 UNITS 1 & 2
 PHILADLEPHIA ELECTRIC COMPANY
 POTTSTOWN, PENNSYLVANIA

Bechtel Power Corporation
 San Francisco, California

NO.	DATE	REVISIONS	APPROVALS
	5/29/84	Addition number 1 To Rev 1	<i>[Signature]</i>
1	4-16-84	Revised as noted on sheet i	<i>[Signature]</i>
0	12-16-83	Issued for Use	<i>[Signature]</i>
NO.	DATE	REVISIONS	APPROVALS

P-115(b)/10

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

- 5.2 The instrumentation system (Transducers, signal conditioning equipment and recorders) shall be capable of providing data within the ranges and accuracies specified below:

<u>Transducer Type</u>	<u>Frequency Range</u>	<u>Amplitude Range</u>	<u>Span** Error</u>	<u>Residual Error</u>
Acceleration*	2 - 150 hz	+ 30 g's	± 5% of reading	0.01g
Pressure*	2 - 1000 ^{change} 150 hz	400 psig	± 5% of reading	10 psig
Load*	2 - 500 ³⁰⁰ hz	***	"	0.1% of range
Strain Gage*	2 - 200 hz	5000 μ strain	"	20 μ strain
Displacement	2 - 30 hz	***	"	0.05 in.

* Dynamic response error only

** Span error for the piezoelectrics applies only for instrument temperatures below 400°F.

*** \pm 2 times expected value (see Appendix E)

- 5.3 The data shall be provided on magnetic tape and in chart form.

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

5.3.2 The acceleration test data shall be in a format suitable for single or double integration and spectrum analysis.

5.3.3 The pressure test data shall be in a format suitable for spectrum analysis.

- 5.4 Instrumentation shall not be removed or disconnected prior to final system Dynamic Transient Test Acceptance and/or reconciliation.

- 5.5 It is anticipated that some parameters measured might not be within the acceptance limits. Should this situation occur, it shall be up to the Test

DYNAMIC TRANSIENT TEST INSTRUMENTATION
LOCATION AND DESCRIPTION LIST

System ID.	System	Location	Nos. of Instruments
A	Main Steam	O/C	change 15 17
B	Feedwater	I/C	5
C	Feedwater	O/C	6
D	HPCI Steam Supply	I/C	5
E	HPCI Steam Supply	O/C	change 5 6
R	MSRV Discharge	I/C	10
S	Feedwater Heater Drain	O/C	14
Total Instruments Outside Containment (O/C) =			48 43
Total Instruments Inside Containment (I/C) =			20
Total			68 63

14 of the instruments are also used for steady state vibration testing per 8031-P-363

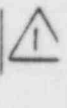
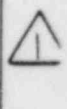
TEST POINT INFORMATION

System : A - MAIN STEAM

Location : *Outside Containment*

Isometric : SK-M-1502 Rev.L

Calculation No.: 1-01-226



QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS ³	
	REMOTE INSTRUMENTATION ¹	VISUAL INSPECTION ²			
PRESSURE	DP. - . A. 03		PP101A	-	PRESS. TAP
<i>Load</i>	<i>DL.X.A.14</i>		<i>S43</i>	<i>X</i>	<i>EBB-103-H16</i>
<i>Load</i>	<i>DL.X.A.15</i>		<i>S43</i>	<i>X</i>	<i>EBB-103-H16</i>
					<i>Add</i>

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			
PRESSURE	DP. - . A. 01		PP101B	-	PRESS. TAP
PRESSURE	DP. - . A. 02		PP138B	-	PRESS. TAP
LOAD	DL. Z. A. 09		B18	Z	EBB-104-H15
LOAD	DL. S. A. 07		B23	SKEW(+X,+Y)	EBB-104-H10
LOAD	DL. S. A. 08		B23	SKEW(+X,-Y)	
LOAD	DL. Z. A. 06		B30	Z	Deleted
LOAD	DL. X. A. 05		B40	X	Deleted
LOAD	DL. X. A. 02		B46	X	Deleted
LOAD	DL. Y. A. 01		B49	Y	Deleted
LOAD	DL. S. A. 03		B41	SKEW(+Y,-Z)	EBB-104-H12
LOAD	DL. S. A. 04		B41	SKEW(+Y,+Z)	
Load	DL. Y. A. 13		B33	Y	EBB-104-H2
Displ.	DD. - . A. 01		-	-	MSV-4 stop valve closure Travel Add



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			
LOAD	DL. Z. A. 10		P3A	Z	EBB-107 - 56 Change <u>H</u> EBB-107- H5
LOAD	DL. S. A. 11		P56	SKEW(-X,+Y)	
LOAD	DL. S. A. 12		P56	SKEW(-X,-Y)	

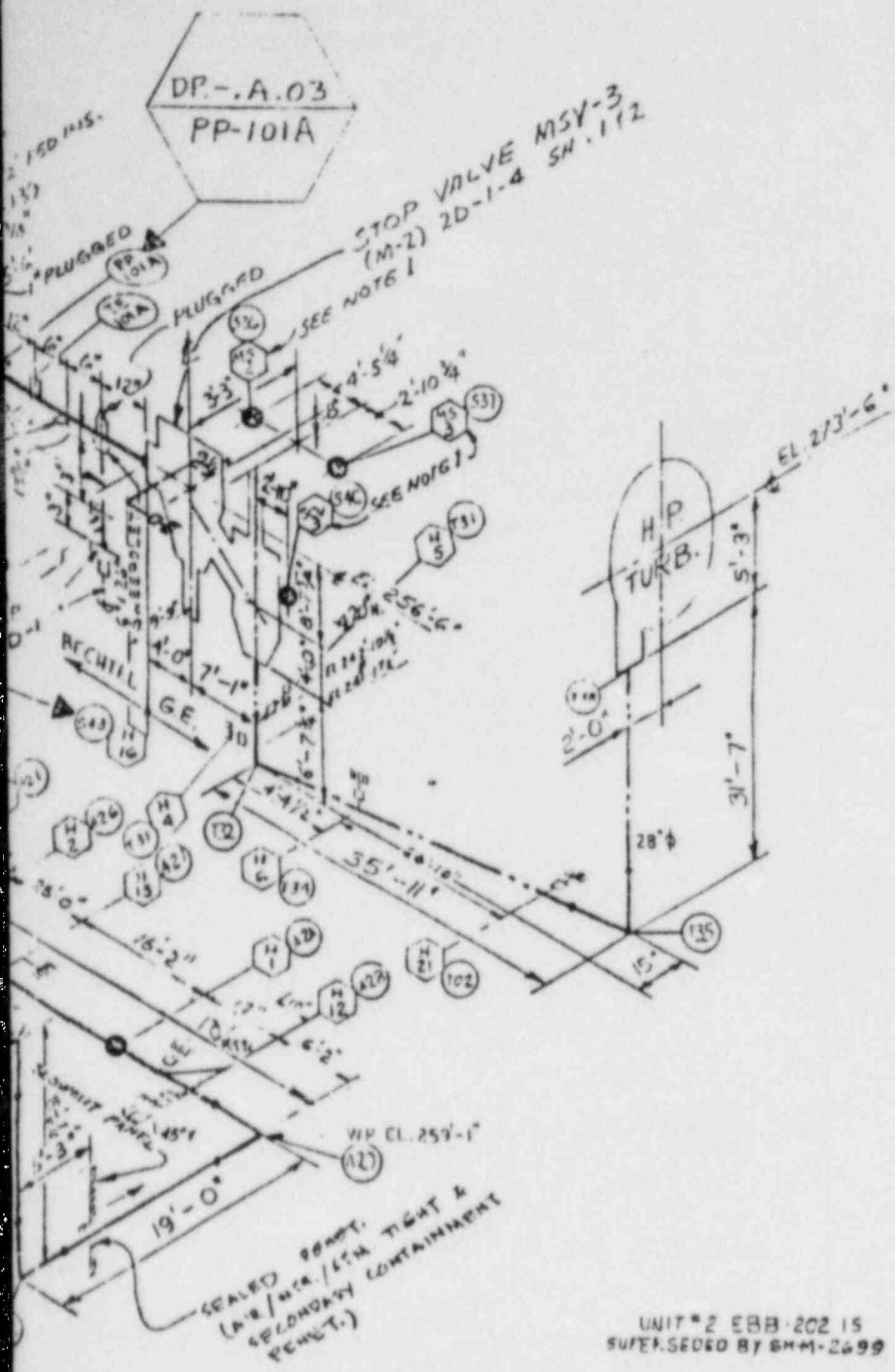
TEST POINT INFORMATION

System : E-HPCI steam supply
 Location : Outside Containment
 Isometric : SK-M-1556B Rev. N
 Calculation No.: P1-24-51

QUANTITY MEASURED	MEASUREMENT			DATA POINT	AXIS ³	REMARKS
	METHOD		VISUAL INSPECTION ²			
	REMOTE INSTRUMENTATION ¹					
Load	DL.X.E.01			22	X	EBB-108-H38
Load	DL.Z.E.02			63	Z	EBB-108-H5
Load	DL.X.E.03			22	X	EBB-108-H38

← Add





STRESS APPROVALS		
REV	THERMAL	SEISMIC
3	RAY #-29-74	

REV 1 Note:
 ADDED PIPE SUPPORTS & DATA POINTS FOR RECONCILIATION
 DELETED VALVE, TEMP & PRESS DATA FOR STRESS GROUP 1 & 2

DESIGNED BY	CHKD BY	DATE	APP'D BY	DATE
C.W.	J.S.	1-13-74		

REFERENCE

M-01 P & ID
 M-368 PIPING PLAN
 EBB-103-1 REV. 22 FAB 1960
 STRESS CALC # 1-01-226
 MODE DESCRIPTION
 MODE I - DESIGN
 MODE II - MAXIMUM

NOTE:

1. G.E. HANGERS, SEE DWG NO
 8031-M-2D-1(1)-6 SHT. 1.

L	DESCRIPTION	REV	DATE	BY	CHKD	APP'D
K	SEE REV 1 NOTE INC. FORM 6796F	1		JY		
S	ADDED PT IN NOISE ENCL. TO ENCL. NOISE	2		JB		
P	ADDED PT IN NOISE ENCL. TO ENCL. NOISE	3		JA		
E	ADDED PT IN NOISE ENCL. TO ENCL. NOISE	4		JW		
J	CORR. INST. NOS	5		JW		
D	RELOCATED LMB-133	6		JW		
G	REMOVED FOR UNIT 2 ADDS	7		JW		
A	ISSUED FOR STRESS ANALYSIS	8		JW		

Q - LISTED

DATA	REV	DATE	BY	REV	DATE	BY	LEGEND
G. E. PIPING							● SPRING HANGER
							■ RIGID HANGER
							▲ ANCHOR
							≡ GUIDE
2B							⊥ SNUBBER
I							⊥ RESTRAINT
							○ HANGER NUMBER
							○ STRESS DATA POINT

BECHTEL
 SAN FRANCISCO

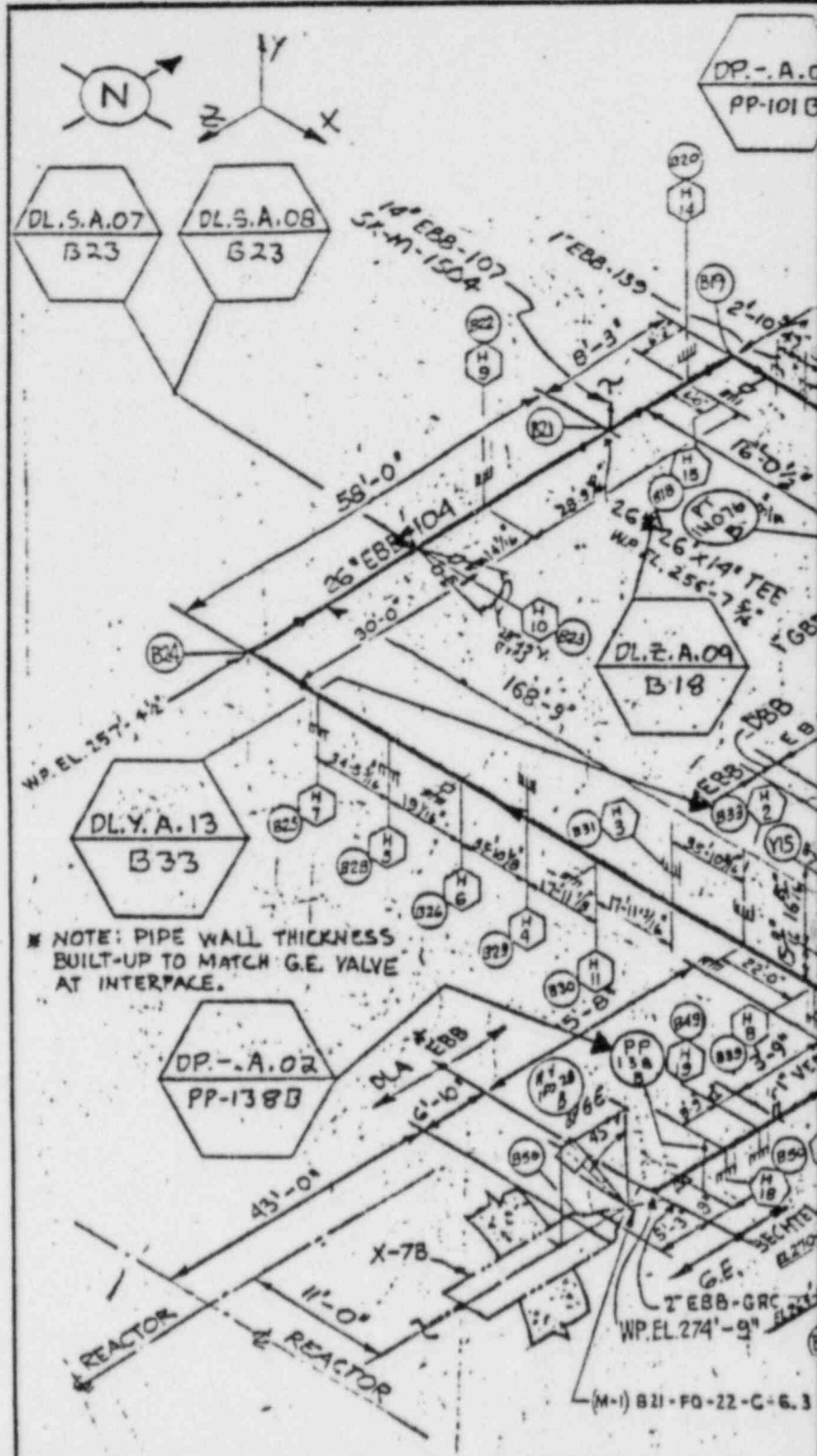
LIMERICK GENERATING STATION
 UNITS 1 & 2
 PHILADELPHIA ELECTRIC COMPANY

ISOMETRIC TURBINE BLDG. UNIT #1
 MAIN STEAM PIPING (LINE 'A')

JOB NO.	8031	DRAWING NO.	SK-M-1502	REV.	L
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Specification
8031-P-364

Appendix C



NOTE: PIPE WALL THICKNESS BUILT-UP TO MATCH G.E. VALVE AT INTERFACE.

Also Available On
Aperture Card

TI
APERTURE
CARD

Pg 9 of 14

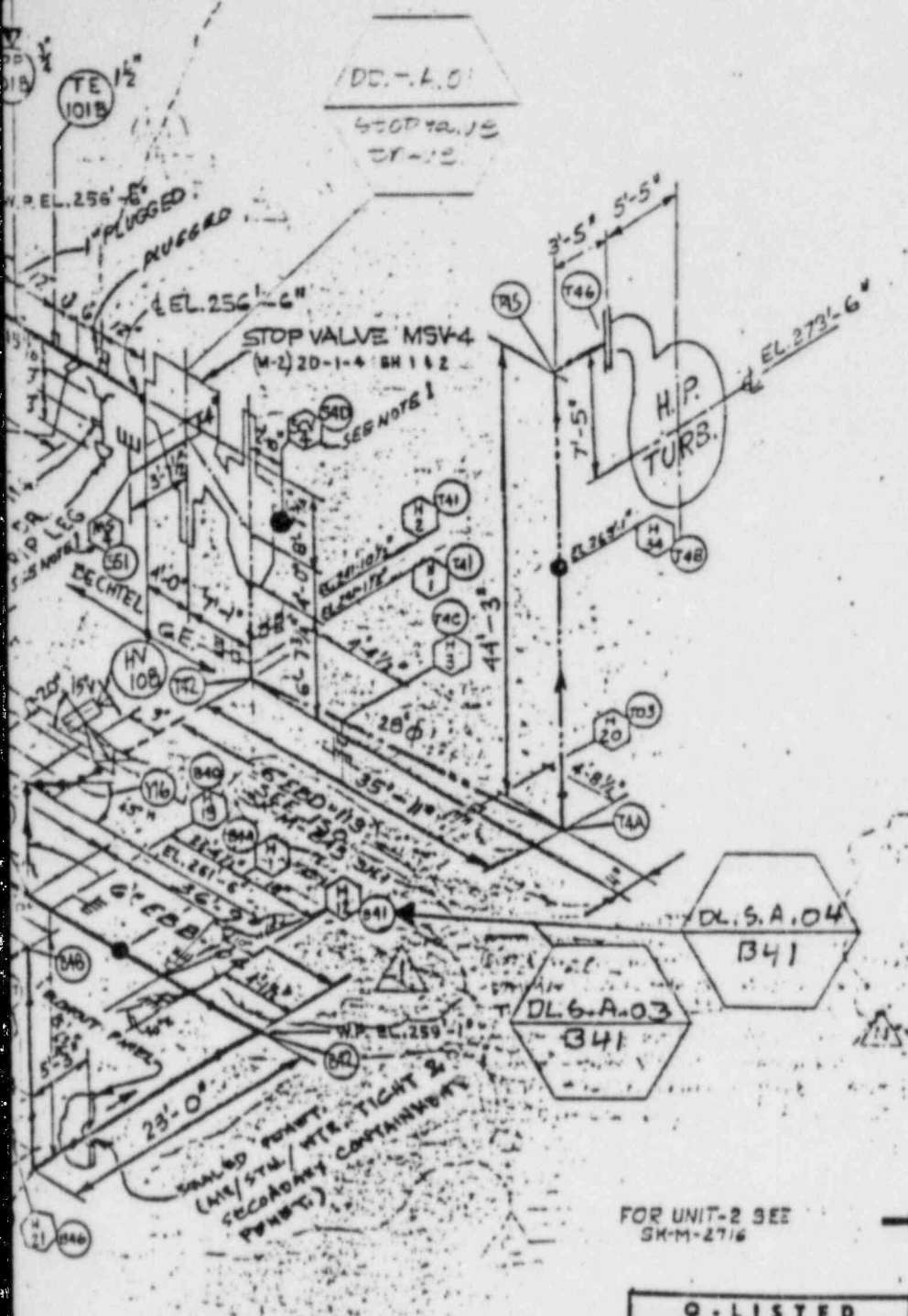
C-12

Rev. 1

8408140326-02

Appendix C S.M. 293

		DATA	REV	DATE	BY	REV	DATE
PIPING ENGINEER	LINE No.	EBB-104	A	8/2/73	gbd	B	2/4/76
	MATERIAL	26" SA-106 GR. C SA-106 GR. B				E	
	LINE THICKNESS (IN)	1.63 MIN 1.18 MIN				E	
MECHANICAL ENGINEER	LINE O.D. (IN)	26 6.625	A	4/24/73	10/1/73	E	
	MODE	I II III					
	PRESS. PSIG	1200 1000 1350					
	TEMP	200 270 280				N	
STRESS ENGINEER	EXP. COEFF. IN/100FT						
	EXP. COEFF. MIL-IN/IN						
	MOD. OF ELAS. E PSI						



STRESS APPROVALS		
REV	THERMAL	SEISMIC
2	R/24 8-27-74	

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

THIS STRESS LOG APPLIES AS FOLLOWS:			
UNIT No. 1 AS SHOWN	UNIT No. 2 OFF. H/ND		
EBB-104	EBB-101		
DES.	CHKD	DATE	
CH.	NS	11-11-74	

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

REFERENCE
 M-41 PIPING PLAN
 M-01 PIPING PLAN
 M-368 PIPING PLAN
 EBB-104-1 REV. 26, FAB. 150.
 EBB-104-2 REV. 2, FAB. 150.
 CALC. 1-01-226
MODE DESCRIPTION
 MODE I - DESIGN
 MODE II - MAXIMUM

NOTE:
 1. G.E. HANGERS, SEE DWG. NO.
 8031-M-2D-1 (1)-6 SHT. 1..

FOR UNIT-2 SEE
 SK-M-2716

Q-LISTED

NO.	DESCRIPTION	REV.	DATE	BY	CHKD	APPD
1	REORIENTED "HV+08" 16" V. BAYING TO "W" TYPE FOR MISC. REV. 1.					
2	SEE REV. K NOTE.					
3	REVALVE IMPROVED W/REINFORCED PERMISSIBLE. SEE REV. N NOTE.					
4	REVALVE REQUIRED FOR UNIT 2 ADDED.					
5	ISSUED FOR STRESS ANALYSIS.					

DATA	REV	DATE	BY	REV	DATE	BY	LEGEND
G. E. PIPING							● SPRING HANGER
							⊠ RIGID HANGER
							▲ ANCHOR
28							≡ GUIDE
I	II	III					⊞ SHUBBER
							⊞ RESTRAINT
							○ HANGER NUMBER
							○ STRESS DATA POINT

BECHTEL
 SAN FRANCISCO

LIMERICK GENERATING STATION
 UNITS 1 & 2
 PHILADELPHIA ELECTRIC COMPANY

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

8031	SK-M-1503
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Specification
6031-F-364

Appendix C

Also Available On
Aperture Card

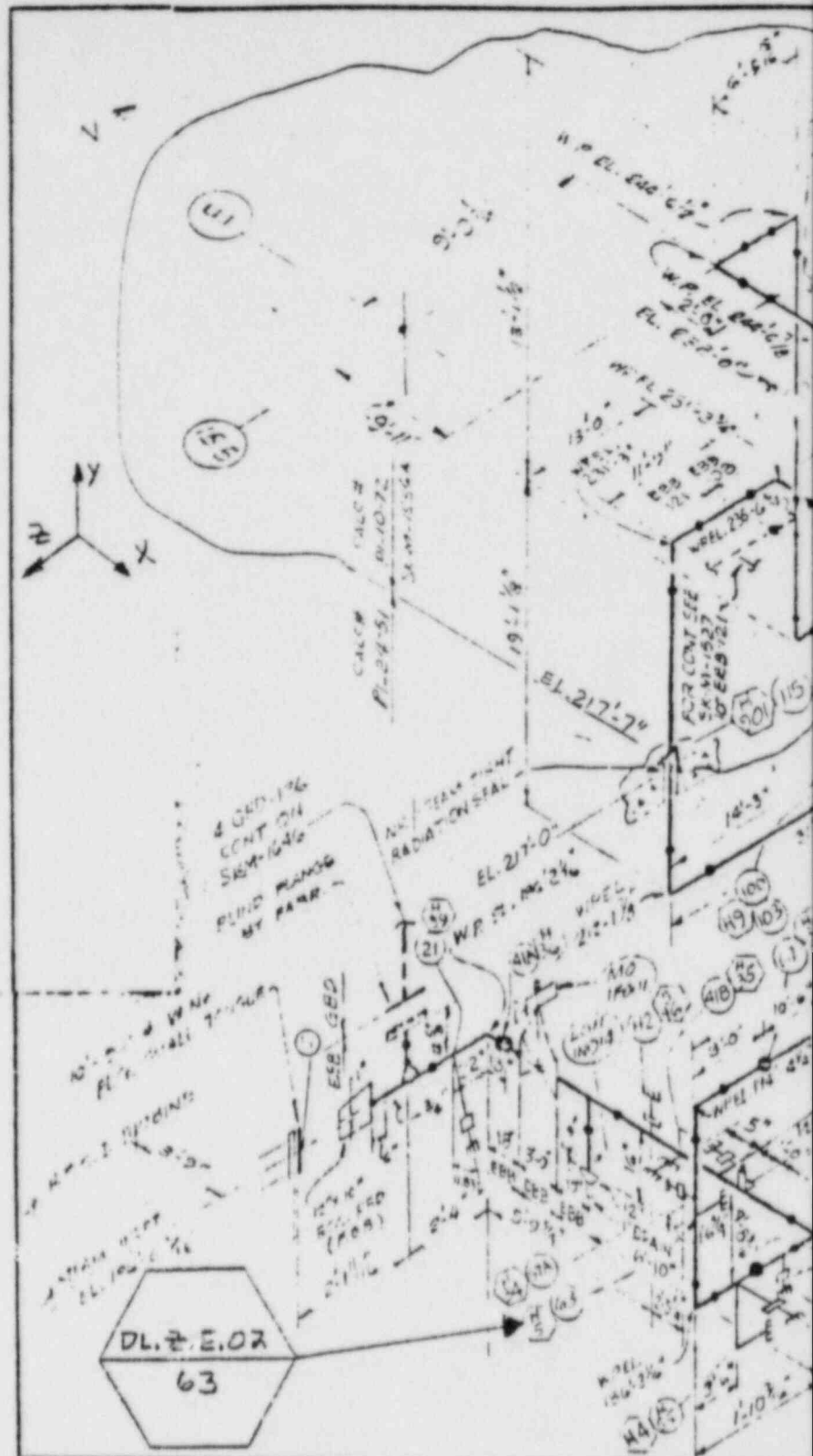
TI
APERTURE
CARD

Pg 10 of 14

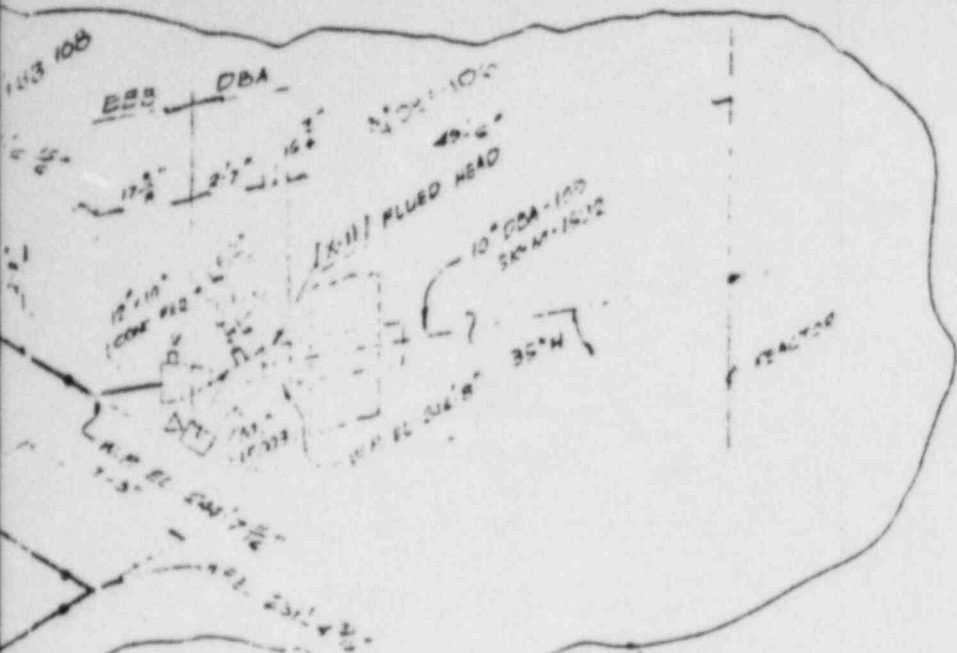
C-19

Adm. 1
Rev. 1

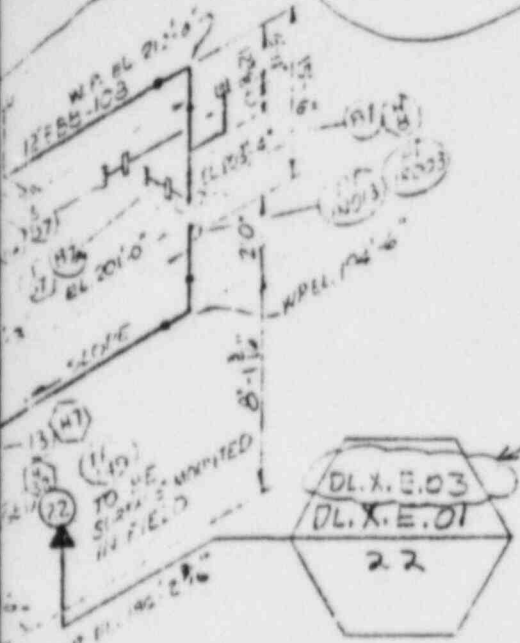
8408140326-03



		DATA		REV	DATE	BY	REV	DATE
PIPING ENGINEER	LINE No.	5015-109		E	2-17-77	111		
	MATERIAL	VAL ALUM SA-105 GR B		BT	2-17-77	111		
	LINE THICKNESS (IN)	.675	.574	BT	2-17-77	111		
MECHANICAL ENGINEER	LINE D. (IN)	11.750	10.750	BT	2-17-77	111		
	MODE	I	II	III				
	PRESS PSIG							
STRUCTURE ENGINEER	TEMP							
	EXP COEFF. IN/100F							
	EXP COEFF. MIL-IN/IN							
	MOD. OF ELAS. PSI							



CLOUDED PORTION OF ISO IS FOR REF. ONLY. FOR LATEST DIMENSIONS SEE SK-M 1556A.



CCN REV 0
CALC.
NO PI-24-51

STR. & 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 AND REV. W.P. ELEVATIONS AS NOTED. DIM. 8'-1 1/2" WAS 8'-3 1/2"

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

REFERENCE

- M-55 P&ID
- M-227 PIPING PLAN
- M-228
- M-229
- E88-108-1 REV 14 FAB-150
- F88-108-2 REV 00 " " "

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

N	1/4"	SEE REV N NOTE	AV	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"
M	1/2"	PER PER P&ID, M-50	AV	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"
△	1/2"	SEE REV L NOTE	AV	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"
△	1/2"	ADDED 1" COUPLER ON 2" 10' LONG RFD.	PV	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"
△	1/2"	INC FOR M-4034F	JBR	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"
M	1/2"	RELEASED HOLD DPR ENR 4737	BY	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"
G	1/2"	PER REV L NOTE	BY	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"
F	1/2"	PER REV L NOTE	SAL	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"
E	1/2"	PER REV L NOTE	LTL	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"

DATA	REV	DATE	BY	REV	DATE	BY	LEGEND
I	II	III					○ SPRING HANGER
							□ RIGID HANGER
							△ ANCHOR
							≡ GUIDE
							HOE SNUBBER
							⊥ RESTRAINT

BECHTEL
SAN FRANCISCO

LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

ISOMETRIC - REACTOR BUILDING
HIGH PRESSURE COOLANT INJECTION
UNIT 1

	JOB NO 8031	DRAWING NO SK-M-1556 B	REV N
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(O/C) HPCI STEAM

TEST POINT INFORMATION

System : R ^{change} MSRV DISCHARGE
 Location : ~~Outside~~ ^{Inside} Containment
 Isometric : SK-M-1794 Rev. N
 Calculation No.: 1-01-01



QUANTITY MEASURED	MEASUREMENT			REMARKS	
	METHOD		DATA POINT		AXIS ³
	REMOTE INSTRUMENTATION ¹	VISUAL INSPECTION ²			
LOAD	DL. S. R. 01		330	SKEW(+X,+Y,-Z) GBC-101-H166	
LOAD	DL. S. R. 02		335	SKEW(-X,-Z) GBC-101-H159	
LOAD	DL. Z. R. 03		355	Z GBC-101-H182	
LOAD	DL. Y. R. 04		357	Y GBC-101-H106	
LOAD	DL. Y. R. 05		365	Y GBC-101-H92	
LOAD	DL. S. R. 06		372	SKEW(+X,+Z) GBC-101-H179	
LOAD	DL. Z. R. 07		373	Z GBC-101-H178	
LOAD	DL. S. R. 08		380	SKEW(-X,-Z) GBC-101-H87	
LOAD	DL. S. R. 09		381	SKEW(X,-Z) GBC-101-H82	
LOAD	DL. Y. R. 10		390	Y GBC-101-H174	
DISPLACEMENT	DD.-. R. 01		312	- Deleted	
PRESSURE	DP.-. R. 01		340	- Deleted	



STARTUP TRANSIENT TEST INSTRUMENTS FOR
MAIN STEAM LINE B AND BYPASS TO VALVES

<u>Instrument Number</u>	<u>Location or Data Point</u>	<u>SK-M- No.</u>	<u>Axis Dir.</u>	<u>Design Acceptance Maximum Response</u>	<u>Comment</u>
DL.Y.A.01	B49	1503	Y	-	Deleted
DL.X.A.02	B46	1503	X	-	Deleted
DL.S.A.03	B41	1503	SKEW(1)	+ 9300 lb.	+50°V skew
DL.S.A.04	B41	1503	SKEW(2)	+11100 lb.	+40°V skew
DL.X.A.05	B40	1503	X	-	Deleted
DL.Z.A.06	B30	1503	Z	-	Deleted
DL.S.A.07	B23	1503	SKEW(1)	+ 5500 lb.	+28.82°V skew
DL.S.A.08	B23	1503	SKEW(2)	+ 5500 lb.	-28.82°V skew
DL.Z.A.09	B18	1503	Z	+60000 lb.	
DL.Z.A.10	P3A	1504	Z	+26300 lb.	
DL.S.A.11	P56	1504	SKEW(1)	+ 6000 lb.	+25.54°V skew
DL.S.A.12	P56	1504	SKEW(2)	+ 6000 lb.	-25.54°V skew
DL.Y.A.13	B33	1503	Y	+ 2300 lb.	
DL.X.A.14	S43	1502	X	+ 110000 lb.	Total
DL.X.A.15	S43	1502	X		
DP.-.A.01	PP101B	1503	NONE	+ 140 psig	delete
DP.-.A.02	PP138B	1503	NONE	+ 140 psig	
DP.-.A.03	PP101A	1502	NONE	+ 140 psig	
DP.-.A.04	PP101C	1500	NONE	+ 140 psig	
DP.-.A.05	PP101D	1501	NONE	+ 140 psig	
DD.-.A.01	MSV-4	1503	AXIAL	-	Deleted

Notes: 1. See Appendix 'B'

2. Dynamic pressure transient not for test acceptance. Measuring device shall have capacity 400psig full scale dynamic pressure.

Adn.1
Rev. 1

STARTUP TRANSIENT TEST INSTRUMENTS FOR
HPCI STEAM SUPPLY PIPING, OUTSIDE CONTAINMENT

<u>Instrument</u> ¹ <u>Number</u>	<u>Location</u> or <u>Data Point</u>	<u>SK-M-</u> <u>No.</u>	<u>Axis</u> <u>Dir.</u>	<u>Design Acceptance</u> ^{2,3} <u>Maximum Response</u>	<u>Comment</u> ⁴
DL.X.E.01	22	1556B	X	1.5 Kips Total	Snubber
DL.X.E.03	22	1556B	X		
DL.Z.E.02	63	1556B	Z	1.5 Kips Add	Snubber
VA.X.E.02	47	1556A	X	2.83 in/sec.	
VA.X.E.03	75A	1556A	X	2.83 in/sec.	
VA.X.E.01	16	1556A	X	2.83 in/sec.	Valve operator

- NOTES: 1. See Appendix 'B'
2. No dynamic analysis performed for this system. Small (1.5 kip) loads representative of small expected response
3. Peak velocity; obtained from velocity time-history to be derived from accelerometer test records.
4. Accelerometers are also used for steady state vibration testing per 8031-P-363.

STARTUP TRANSIENT TEST INSTRUMENTS DATA
FOR MSRV DISCHARGE LINE J

<u>Instrument Number</u> ¹	<u>Location or Data Point</u>	<u>SK-M- No.</u>	<u>Axis Dir.</u>	<u>Design Acceptance Maximum Response</u>	<u>Comment</u>	
DL.S.R.01	330	1794	SKEW	+ 6700 lb. 6800	← change	
DL.S.R.02	335	1794	SKEW	+ 5700 lb. 6100		
DL.Z.R.03	355	1794	Z	+ 6700 lb. 5500		
DL.Y.R.04	357	1794	Y	+ 5600 lb. 8700		
DL.Y.R.05	365	1794	Y	+24400 lb. 21300		
DL.S.R.06	372	1794	SKEW	+12600 lb. 18200		⚠
DL.Z.R.07	373	1794	Z	+ 4800 lb. 4200		
DL.S.R.08	380	1794	SKEW	+ 5400 lb. 5700		
DL.S.R.09	381	1794	SKEW	+ 6800 lb.		
DL.Y.R.10	390	1794	Y	+ 7000 lb. 6500		
DD.-.R.01	312	1794	AXIAL	-	Deleted ⚠	
DP.-.R.01	340	1794	None	-	Deleted	

NOTE: 1. See Appendix 'B'

STARTUP TRANSIENT TEST INSTRUMENTS DATA
FOR FEEDWATER HEATER DRAIN

<u>Instrument Number</u> ¹	<u>Location or Data Point</u>	<u>SK-M No.</u>	<u>Axis Dir.</u>	<u>Design Acceptance Maximum Response</u>	<u>Comment</u>
DD.X.S.01	25B	332	X	3.0 6.8 in/sec	Note 2
DD.Y.S.03	75B	332	Y	3.0 6.8 in/sec	"
DD.Z.S.04	75E	332	Z	3.0 6.8 in/sec	"
DD.Y.S.05	90E	332	Y	3.0 6.8 in/sec	"
DS.-.S.01	TS1	332	-	+ 400 μ e	change
DS.-.S.02	TS1	332	-	+ 200 μ e	
DS.-.S.03	TS1	332	-	+ 200 μ e	
DS.-.S.04	TS1	332	-	+ 140 μ e	
DS.-.S.05	TS2	332	-	+ 400 μ e	
DS.-.S.06	TS2	332	-	+ 200 μ e	
DS.-.S.07	TS2	332	-	+ 200 μ e	
DS.-.S.08	TS2	332	-	+ 200 μ e	
DS.-.S.09	TS2	332	-	+ 200 μ e	
DS.-.S.10	TS1	332	-	+ 140 μ e	

NOTES: 1. See Appendix 'B'

2. Peak velocity; obtained from velocity time-history to be derived from displacement transducers test records.

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	C-1	1	D-1	0	E-1	1
ii	1	2	1			B-2	1	C-2	1	D-2	0	E-2	0
iii	0	3	1			B-3	1	C-3	1	D-3	0	E-3	0
		4	1			B-4	1	C-4	1	D-4	0	E-4	0
		5	1			B-5	1	C-5	1	D-5	1	E-5	1
		6	1			B-6	1	C-6	1	D-6	0	E-6	1
						B-7	1	C-7	1	D-7	0	E-7	1
						B-8	1	C-8	1				
						B-9	0	C-9	1				
						B-10	1	C-10	1				
						B-11	1	C-11	1				
						B-12	1	C-12	1				
						B-13	1	C-13	1				
						B-14	1	C-14	1				
						B-15	1	C-15	1				
						B-16	1	C-16	1				
						B-17	1	C-17	1				
						B-18	1	C-18	1				
								C-19	1				
						B-19	1	C-20	1				
						B-20	1	C-21	1				
								C-22	1				

1	4/16/84	Revised sheets i, ii, 1 To 6, A-1, B-1 To B-8, B-10 To B-18, C-1 To C-19, D-5, E-1, E-5 To E-7. Added sheets C-20 To C-22, B-19, B-20	KCB	AK	RP								
0	11/6/83	Issued for Use	KCB	AK	RP								
NO.	DATE	REVISIONS	BY	CHK'D	APP'D	NO.	DATE	REVISIONS	BY	CHK'D	APP'D		


	FACING SHEET LIMERICK GENERATING STATION, UNITS 1 & 2 PHILADELPHIA ELECTRIC COMPANY		JOB No 8031 8031-P-364 ;	REV. 1

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1.0 OBJECTIVES/SCOPE

1.1 The objective of the test is to verify that the piping listed in Section 1.2 is adequately designed and restrained to withstand the transient loading condition listed.

1.2 Test Scope and Transient Loading Condition

1.2.1 Those BOP (Balance of Plant) systems within the scope of testing are listed below with their corresponding transient loading. Only those portions of the system identified in the Stress Isometric Drawings in Appendix C and in the scoping P&ID's in Appendix D are within the testing scope.

1.2.1.1 Main Steam (MS) - Main Turbine Stop/Control Valves Closure

1.2.1.2 Main Steam Relief Valve Discharge (MSRVD) - Main Steam Relief Valve Actuation

1.2.1.3 High Pressure Coolant Injection (HPCI) - High Pressure Coolant Injection Turbine Stop Valve Closure


1.2.1.4 Feedwater (FW) - Reactor Feed Pump Trip/Coastdown

1.2.1.5 Feedwater Heater Drain-Dump and Drain Valve Actuation



2.0 ACCEPTANCE CRITERIA

2.1 The acceptance criteria are that

- a. The maximum measured loads, displacements, velocities and strains are less than or equal to the values listed in Appendix E and
- b. A post-transient walkdown of the piping shown in Appendix C and associated branch lines up to the first anchor, shows no signs of excessive piping response (such as damaged insulation, markings on piping, structural or hanger steel, or walls, damaged pipe supports, etc.)

- 2.2 Piping systems exceeding the acceptance criteria listed in Appendix E shall be designated as test exceptions in the test results and will require a detailed evaluation by Project Engineering. | 

3.0 PRECAUTIONS AND NOTES

- 3.1 The main steam Main Stop/Control valves closure dynamic transient test should be performed at test conditions that correspond to 20%-25%, 60-80% and at 95-100% power. | 
- 3.1.1 The transient loading condition shall be initiated by
- a. A generator load rejection at 20-25% power, where the Control Valves closure initiate the transient.
 - b. A turbine trip at 60-80% power, where the Stop Valves closure initiate the transient. | 
 - c. A generator load rejection at 95-100% power, where the Control Valves closure initiate the transient.
- 3.1.2 In this test, the instrumentation shall be monitored for conformance to the acceptance criteria of Appendix E. The accelerometers for main steam line B which are used for steady state vibration testing (8031-P-363) shall be monitored for information only.
- 3.2 The Feedwater System Reactor Feed Pump Trip/Coast-down Dynamic Transient Test shall be performed in the following operating conditions; Pumps A only, B only and C only.
- 3.2.1 The transient loading conditions can be initiated in any manner resulting in the specified reactor feed pump trips (at normal pump flowrate). The testing may be performed in conjunction with other scheduled testing resulting in the desired pump trips.
- 3.3 The High Pressure Coolant Injection Dynamic Transient Test can be performed at any time resulting in a HPCI turbine trip at normal HPCI steam supply flow.

- 3.4 The Main Steam Relief Valve Dynamic Transient Test shall be performed at normal operating main steam temperatures and pressures and at normal suppression pool water level.
- 3.4.1 During testing, the relief valve being actuated must open at least 90% and must remain open long enough to reach steady state discharge (at least 10 seconds). | △
- 3.5 The feedwater heater drain transient test shall be conducted at 45-55% and 96-104% power.
- 3.5.1 With the feedwater heater string "A" in normal operation, the opening and closing sequence of the feedwater heater drain and dump valves between the third and fourth point heaters shall be as described below so that a dynamic transient loading will be generated on the associated drain and dump piping. | △
- a. Rapidly close the drain valve and open the dump valve.
- b. Close the dump valve and reopen the drain valve.
- The Test Data shall include at least 20 seconds of piping strain and displacement recordings during the transients.
- 3.6 Load sensors on pipe restraints shall measure and record the dynamic load only. The static load shall not be included in the data.
- 3.7 Transient data recorded shall continue for at least 20 seconds after initiation of the transient loading condition.
- 3.8 Any transient data recorded which exceed the acceptance criteria in Appendix E shall be documented in the test procedure and shall be reconciled in accordance with plant administrative procedures. | △
- 3.9 The isometrics provided in Appendix C are used to show instrument locations and pipe routing only.

Other sources must be consulted for pipe support location, types, piping operating conditions, layout dimensions etc.

3.10 The test engineer | △

- a. shall be qualified to make a visual determination of the dynamic transient 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. | △

4.0 PREREQUISITES

- 4.1 Construction of the piping system, including insulation, penetration sealing etc. must be complete and all pipe supports installed, inspected and adjusted per Reference 6.4.
- 4.2 The test equipment listed in Section 5.0 shall be calibrated within the specified ranges and accuracies.

5.0 INSTRUMENTATION

- 5.1 The location, types and directions of the 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. Displacement transducers and strain gages must be located within one pipe diameter of the position shown in Appendix C.

- 5.2 The instrumentation system (Transducers, signal conditioning equipment and recorders) shall be capable of providing data within the ranges and accuracies specified below:

<u>Transducer Type</u>	<u>Frequency Range</u>	<u>Amplitude Range</u>	<u>Span** Error</u>	<u>Residual Error</u>
Acceleration*	2 - 150 hz	+ 30 g's	5% of reading	0.01g
Pressure*	2 -1000 hz	400 psig	"	10 psig
Load*	2 - 500 hz	***	"	0.1% of range
Strain Gage*	2 - 200 hz	5000 μ strain	"	20 μ strain
Displacement	2 - 30 hz	***	"	0.05 in.

* Dynamic response error only

** Span error for the piezoelectrics applies only for instrument temperatures below 400°F.

*** + 2 times expected value (see Appendix E)

- 5.3 The data shall be provided on magnetic tape and in chart form.

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

5.3.2 The acceleration test data shall be in a format suitable for single or double integration and spectrum analysis.

5.3.3 The pressure test data shall be in a format suitable for spectrum analysis.

- 5.4 Instrumentation shall not be removed or disconnected prior to final system Dynamic Transient Test Acceptance and/or reconciliation.

- 5.5 It is anticipated that some parameters measured might not be within the acceptance limits. Should this situation occur, it shall be up to the Test

Director, after consultation with the cognizant Test Engineer whether or not to continue the testing or proceed to further testing until the test parameters levels are reconciled. Project Engineering shall be informed immediately of any test results that exceed the acceptance criteria. |△

- 5.6 All original charts and tapes shall be properly identified, dated and signed by the Test Director and stored in accordance with Plant Administrative Procedures.
- 5.7 A copy of each chart shall be provided to Project Engineering for information and action as necessary.
- 5.8 The instrument installation shall not affect the operation or integrity of the piping within the test scope or adjacent piping and equipment. |△
- 5.9 Prior to testing, a system walkdown shall be conducted to verify that the instrument installation is in conformance with this specification.

6.0 REFERENCES

- 6.1 ASME Boiler and Pressure Vessel Code, Division 1, Section III, 1971 issue with all addenda issued through winter 1972.
- 6.2 ANSI Power Piping, Code B31.1, 1973.
- 6.3 Piping Class Sheets, Summary Sheets and Standards 8031-P-300.
- 6.4 Technical Specification for Installation, Inspection and Documentation of Pipe Supports, Hangers and Restraints, 8031-P-319.
- 6.5 Final Safety Analysis Report Chapter 3, Section 3.9 and Chapter 14.
- 6.6 Stress Isometrics (Included in Appendix C).
- 6.7 Piping and Instrument Diagrams (Included in Appendix D).

APPENDIX A
Instrumentation

DYNAMIC TRANSIENT TEST INSTRUMENTATION
 LOCATION AND DESCRIPTION LIST

System ID.	System	Location	Nos. of Instruments
A	Main Steam	O/C	15
B	Feedwater	I/C	5
C	Feedwater	O/C	6
D	HPCI Steam Supply	I/C	5
E	HPCI Steam Supply	O/C	5
R	MSRV Discharge	I/C	10
S	Feedwater Heater Drain	O/C	14

Total Instruments Outside Containment (O/C) = 40
 Total Instruments Inside Containment (I/C) = 20
 Total = 60

14 of the instruments are also used for steady state vibration testing per 8031-P-363

APPENDIX B
Test Point Information

TEST POINT INFORMATION

System : A - MAIN STEAM

Location : *Outside Containment*

Isometric : SK-M-1500 Rev. M

Calculation No.: 1-01-226



QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS ³	
	REMOTE INSTRUMENTATION ¹	VISUAL INSPECTION ²			
PRESSURE	DP. - . A. 04		PP101C	-	PRESS. TAP

TEST POINT INFORMATION

System : A- MAIN STEAM

Location : *Outside Containment*

Isometric : SK-M-1501 Rev. L

Calculation No.: 1-01-226



QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS ³	
	REMOTE INSTRUMENTATION ¹	VISUAL INSPECTION ²			
PRESSURE	DP.-.A.05		PP101D	-	PRESS. TAP

TEST POINT INFORMATION

System : A - MAIN STEAM

Location : *Outside Containment*

Isometric : SK-M-1502 Rev.L

Calculation No.: 1-01-226



QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS ³	
	REMOTE INSTRUMENTATION ¹	VISUAL INSPECTION ²			
PRESSURE	DP. -- A.03		PP101A	-	PRESS. TAP
<i>Load</i>	<i>DLX.A.14</i>		<i>543</i>	<i>X</i>	<i>EBB-103-H16</i>



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			
PRESSURE	DP. - . A . 01		PP101B	-	PRESS. TAP
PRESSURE	DP. - . A . 02		PP138B	-	PRESS. TAP
LOAD	DL. Z . A . 09		B18	Z	EBB-104-H15
LOAD	DL. S . A . 07		B23	SKEW(+X,+Y)	EBB-104-H10
LOAD	DL. S . A . 08		B23	SKEW(+X,-Y)	
LOAD	DL. Z . A . 06		B30	Z	Deleted
LOAD	DL. X . A . 05		B40	X	Deleted
LOAD	DL. X . A . 02		B46	X	Deleted
LOAD	DL. Y . A . 01		B49	Y	Deleted
LOAD	DL. S . A . 03		B41	SKEW(+Y,-Z)	EBB-104-H12
LOAD	DL. S . A . 04		B41	SKEW(+Y,+Z)	
Load	DL. Y . A . 13		B33	Y	EBB-104-H2



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			
LOAD	DL. Z. A. 10		P3A	Z	EBB-107-E6
LOAD	DL. S. A. 11		P56	SKEW(-X,+Y)	} EBB-107-H5
LOAD	DL. S. A. 12		P56	SKEW(-X,-Y)	

TEST POINT INFORMATION

System : B - FEEDWATER

Location : Inside Containment

Isometric : SK-M-1552 Rev. J

Calculation No.: 1-12-01



QUANTITY MEASURED	MEASUREMENT			DATA POINT	AXIS ³	REMARKS
	METHOD		REMARKS			
	REMOTE INSTRUMENTATION ¹	VISUAL INSPECTION ²				
ACCELERATION	VA.X.B.04		145B	X	Was VA.X.B.01	
ACCELERATION	VA.X.B.05		165	X	DLA-107-H21. Was VA.X.B.02	
ACCELERATION	VA.X.B.02		96	X	Was VA.X.B.03	
ACCELERATION	VA.Y.B.03		107	Y	Was VA.Y.B.04	
ACCELERATION	VA.Z.B.01		603	Z	Was VA.Z.B.05	

Accelerometers are also used for steady state vibration testing per 8031-P-363.

TEST POINT INFORMATION

System : C - FEEDWATER

Location : *Outside Containment*

Isometric : SK-M-1554 Rev. M

Calculation No.: *P1-15-51*

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-109A)

Accelerometers are also used for steady state vibration testing per 8031-P-363.

TEST POINT INFORMATION

System : C - FEEDWATER

Location : *Outside Containment*

Isometric : SK-M- 1555 Rev. F

Calculation No.: P1-1551



QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS ³	
	REMOTE INSTRUMENTATION ¹	VISUAL INSPECTION ²			
ACCELERATION	VA.X.C.01		13	X	VALVE OPERATOR (MO-1F032 B)
ACCELERATION	VA.Z.C.02		15E	Z	

Accelenometers are also used for steady state vibration testing per 8031-P-363.

TEST POINT INFORMATION

System : C - FEEDWATER

Location : OUTSIDE CONTAINMENT

Isometric : SK-M- NONE. See vendor print 8031-M4-10-13BC

Calculation No.: NONE

QUANTITY MEASURED	MEASUREMENT			REMARKS	
	METHOD		DATA POINT		AXIS ³
	REMOTE INSTRUMENTATION ¹	VISUAL INSPECTION ²			
PRESSURE	DP. - .C.01		PPI18A	PRESSURE TAPS ON EQUIPMENT NOZZLE. (FEEDWATER HEATER PAID M-6)	
PRESSURE	DP. - .C.02		PPI18B		
PRESSURE	DP. - .C.03		PPI18C		

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			DATA POINT	AXIS ³	REMARKS
	METHOD		DATA POINT			
	REMOTE INSTRUMENTATION ¹	VISUAL INSPECTION ²				
LOAD	DL.S.D.01		217	SKW(-x,-z)	DBA-106-H6	
LOAD	DL.Y.D.02		316	Y	DBA-106-H10	
ACCELERATION	VA.X.D.01		200E	X	ELBOW END	
ACCELERATION	VA.X.D.02		212	X		
ACCELERATION	VA.Y.D.03		400	Y	VALVE OPERATOR	

Accelerometers are also used for steady state vibration testing per 8031-P-363.

TEST POINT INFORMATION

System : E - HPCI Steam Supply
 Location : Outside Containment
 Isometric : SK-M- 1556A 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. 02		47	X	Was VA.X.E.01
ACCELERATION	VA. X. E. 03		75A	X	Was VA.X.E.02
ACCELERATION	VA. X. E. 01		16	X	VALVE OPERATOR Was VA.X.E.03

Accelerometers are also used for steady state vibration testing per 8031-P-363.

TEST POINT INFORMATION

System : E-HPCI steam supply
 Location : Outside Containment
 Isometric : SK-M-1556 B Rev. N
 Calculation No.: P1-24-51

QUANTITY MEASURED	MEASUREMENT			REMARKS	
	METHOD		DATA POINT		AXIS ³
	REMOTE INSTRUMENTATION ¹	VISUAL INSPECTION ²			
Load	DL.X.E.01		22	X	EBB-108-H38
Load	DL.Z.E.02		63	Z	EBB-108-H5



TEST POINT INFORMATION

System : R - MSR V DISCHARGE

Location : *Outside Containment*

Isometric : SK-M-1794 Rev. N

Calculation No.: 1-01-01

QUANTITY MEASURED	MEASUREMENT			REMARKS	
	METHOD		DATA POINT		AXIS ³
	REMOTE INSTRUMENTATION ¹	VISUAL INSPECTION ²			
LOAD	DL. S. R. 01		330	SKEW(+X,+Y,-Z) GBC-101-H166	
LOAD	DL. S. R. 02		335	SKEW(-X,-Z) GBC-101-H159	
LOAD	DL. Z. R. 03		355	Z GBC-101-H182	
LOAD	DL. Y. R. 04		357	Y GBC-101-H106	
LOAD	DL. Y. R. 05		365	Y GBC-101-H92	
LOAD	DL. S. R. 06		372	SKEW(+X,+Z) GBC-101-H179	
LOAD	DL. Z. R. 07		373	Z GBC-101-H178	
LOAD	DL. S. R. 08		380	SKEW(-X,-Z) GBC-101-H87	
LOAD	DL. S. R. 09		381	SKEW(X,-Z) GBC-101-H88	
LOAD	DL. Y. R. 10		390	Y GBC-101-H174	
DISPLACEMENT	DD.-. R. 01		312	- Deleted	
PRESSURE	DP.-. R. 01		340	- Deleted	



TEST POINT INFORMATION

System : S- Feedwater Heater Drain

Location : Outside Containment

Isometric : SK-M- 332 Rev. H

Calculation No.: 1-14-202

QUANTITY MEASURED	MEASUREMENT				REMARKS
	METHOD		DATA POINT	AXIS ³	
	REMOTE INSTRUMENTATION ¹	VISUAL INSPECTION ²			
Displacement ↓ Stress	DD.X.S.01		25B	X	Deleted
	DD.X.S.02		90E	X	
	DD.Y.S.03		75B	Y	
	DD.Z.S.04		75E	Z	
	DS.-.S.01		TS1	-	
	DS.-.S.02		TS1	-	
	DS.-.S.03		TS1	-	
	DS.-.S.04		TS1	-	
	DS.-.S.05		TS2	-	
	DS.-.S.06		TS2	-	
Displacement ↓ Stress	DS.-.S.07		TS2	-	
	DS.-.S.08		TS2	-	
	DS.-.S.09		TS2	-	
	DD.Y.S.05		90E	Y	
	DS.-.S.10		TS1	-	



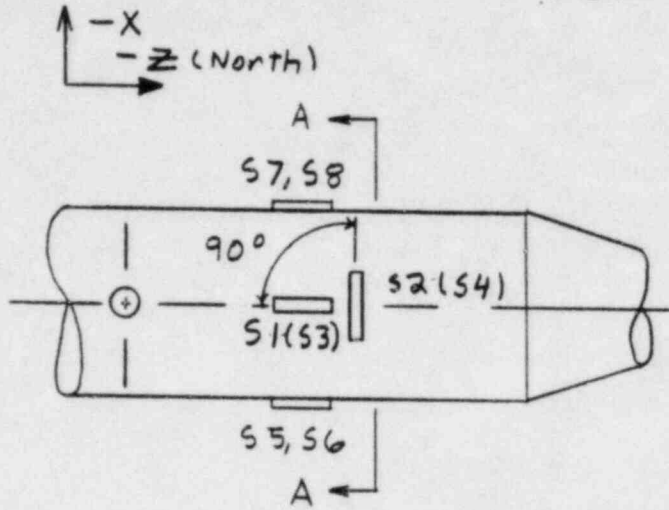
TEST POINT INFORMATION

System : S-Feedwater Heater Drain

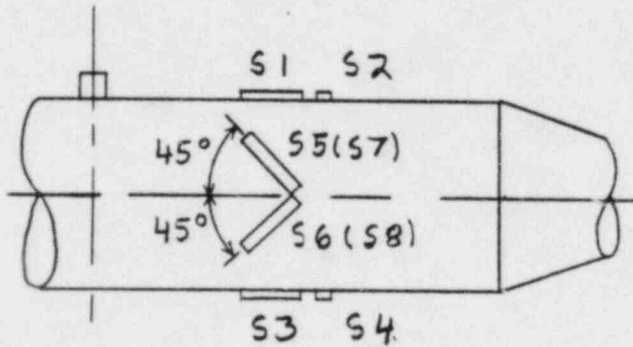
Location : Outside Containment

Isometric : SK-M- 332 Rev. H Test section 1 (TS1)

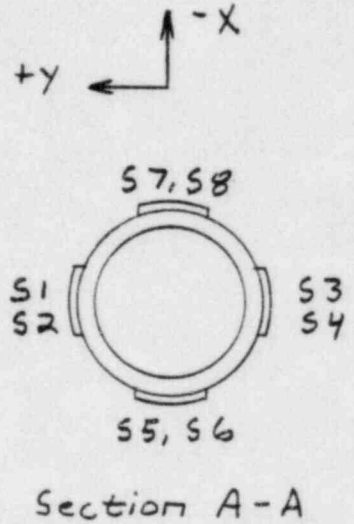
Calculation No.: 1-14-202



Top View



Side View



Section A-A



TEST POINT INFORMATION

System : S- Feedwater Heater Drain

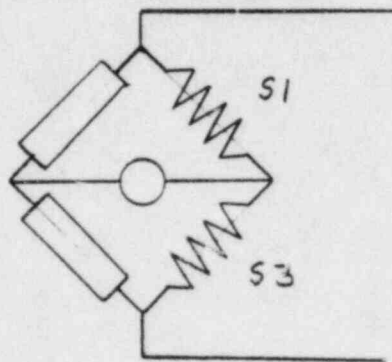
Location : Outside Containment

Isometric : SK-M-332 Rev. H Test Section 1 (TS1)

Calculation No.: 1-14-202



DS.-S.01 - Longitudinal gages S1 and S3 are to be connected in a half bridge configuration as shown below



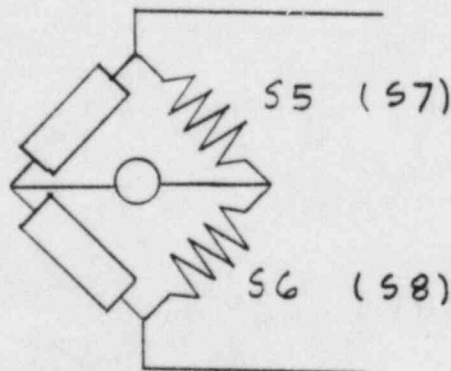
DS.-S.02 - Circumferential gage S2 is to be connected as a single active gage



DS.-S.03 - Circumferential gage S4 is to be connected as a single active gage



DS.-S.04 - Shear gages S5 and S6 are to be connected in a half bridge configuration as shown below



TEST POINT INFORMATION

System : S- Feedwater Heater Drain

Location : Outside Containment

Isometric : SK-M- 332 Rev. H Test section 1 (TS1)

Calculation No.: 1-14-202


DS.-.S.10 - Shear gages S7 and S8 are to be
connected in a half bridge as
shown for DS.-.S.04



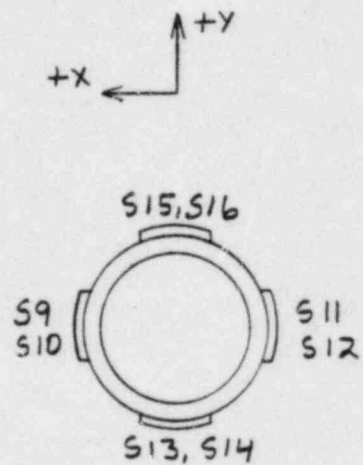
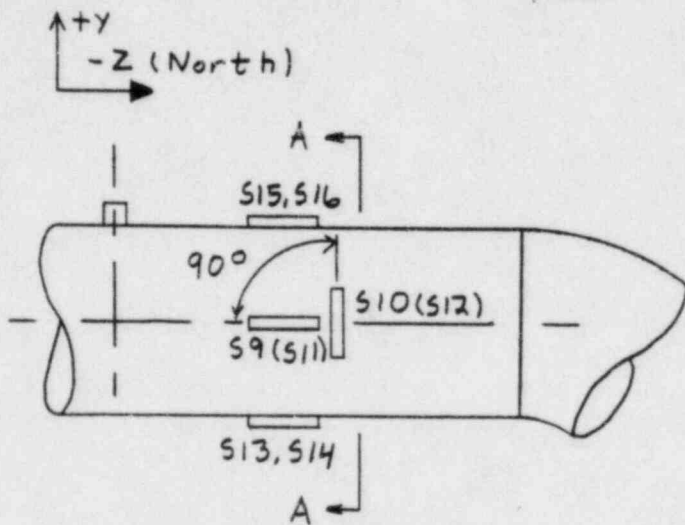
TEST POINT INFORMATION

System : S- Feedwater Heater Drain

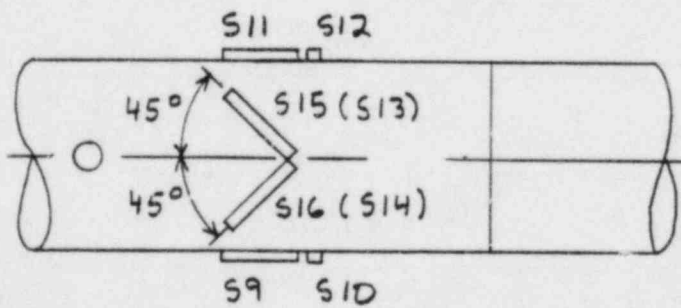
Location : Outside Containment

Isometric : SK-M- 332 Rev. H Test Section 2 (TS2) | 

Calculation No.: 1-14-202



Side View



Top View



TEST POINT INFORMATION

System : S- Feedwater Heater Drain

Location : Outside Containment

Isometric : SK-M-332 Test Section 2 (TS2)

Calculation No.: 1-14-202



DS.-.S.05- Longitudinal gages S9 and S11 are to be connected in a half bridge configuration identical to that used for DS.-.S.01 on page B-16



DS.-.S.06- Circumferential gage S10 is to be connected as a single active gage.



DS.-.S.07- Circumferential gage S12 is to be connected as a single active gage.



DS.-.S.08- Shear gages S13 and S14 are to be connected in a half bridge configuration identical to that used for DS.-.S.04 on page B-16



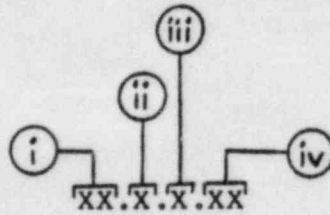
DS.-.S.09- Shear gages S15 and S16 are to be connected in a half bridge configuration identical to that used for DS.-.S.04 on page B-16



TEST POINT INFORMATION

NOTES:

1.



(i) DL = Dynamic Load Transducer (Strainsert load sensing clevis pins)



VA = Vibration Accelerometer

DP = Dynamic Pressure Transducer

DD = Dynamic Displacement Transducer

DS = Dynamic Stress (Strain Gauge)

(ii) Sensitive Axis

(iii) System Identification

(iv) Instrument No.

2. Visual inspection not required

3. X = East
Y = Up
Z = South

APPENDIX C

Stress

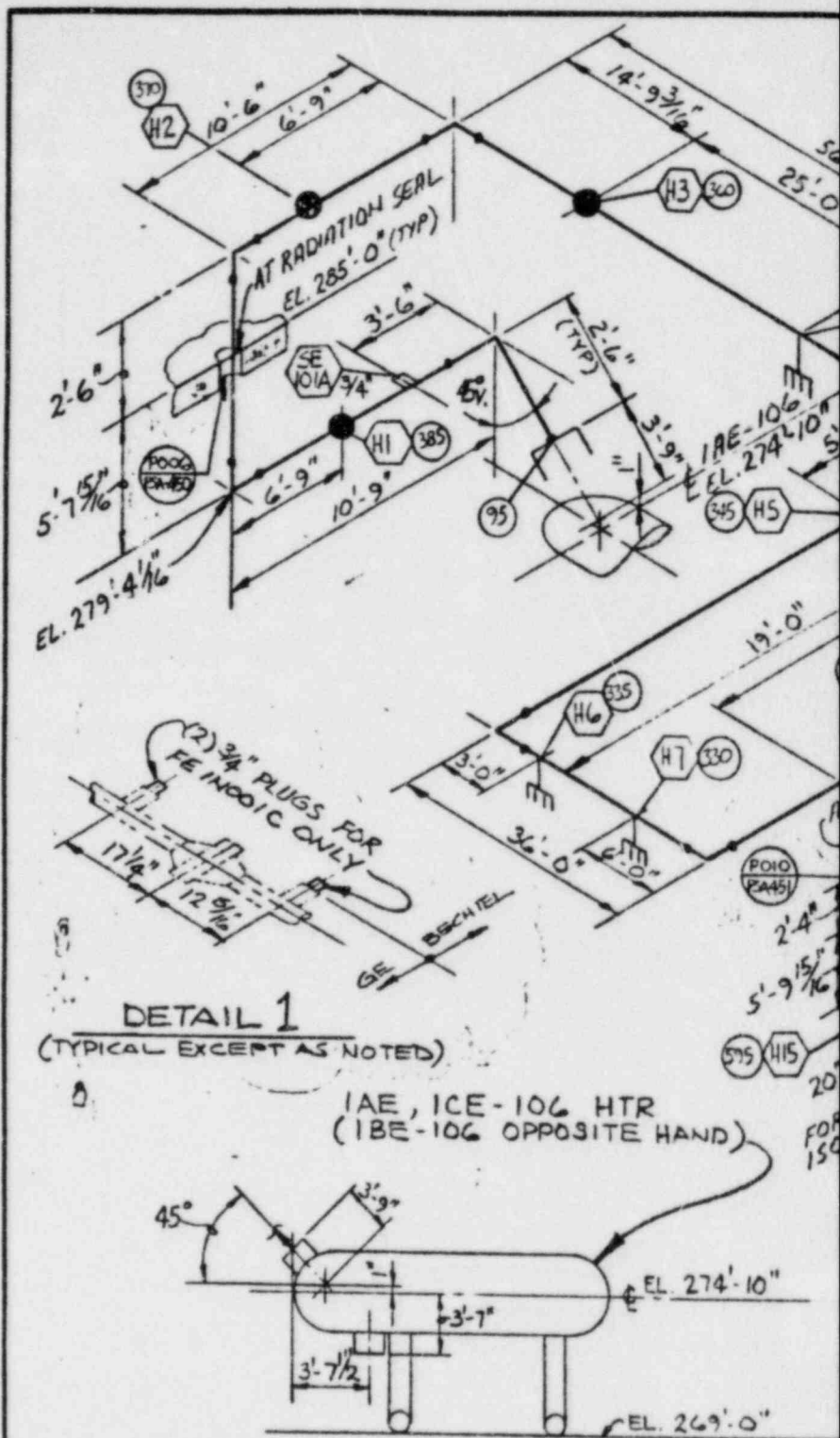
Isometrics

LIST OF STRESS ISOMETRICS:

<u>Drawing No.</u>	<u>Revision</u>
SK-M-298	J
SK-M-299A	R
SK-M-299B	R
SK-M-332	H
SK-M-383	E
SK-M-384	E
SK-M-385	F
SK-M-1500	M
SK-M-1501	L
SK-M-1502	L
SK-M-1503	N
SK-M-1504	H
SK-M-1552	J
SK-M-1553	G
SK-M-1554	M
SK-M-1555	F
SK-M-1556A	P
SK-M-1556B	N
SK-M-1592	L
SK-M-1794	N
8031-M-4-10-13BC	-



Specification
 8031-P-364
 Appendix C



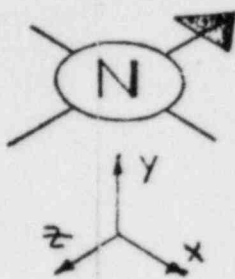
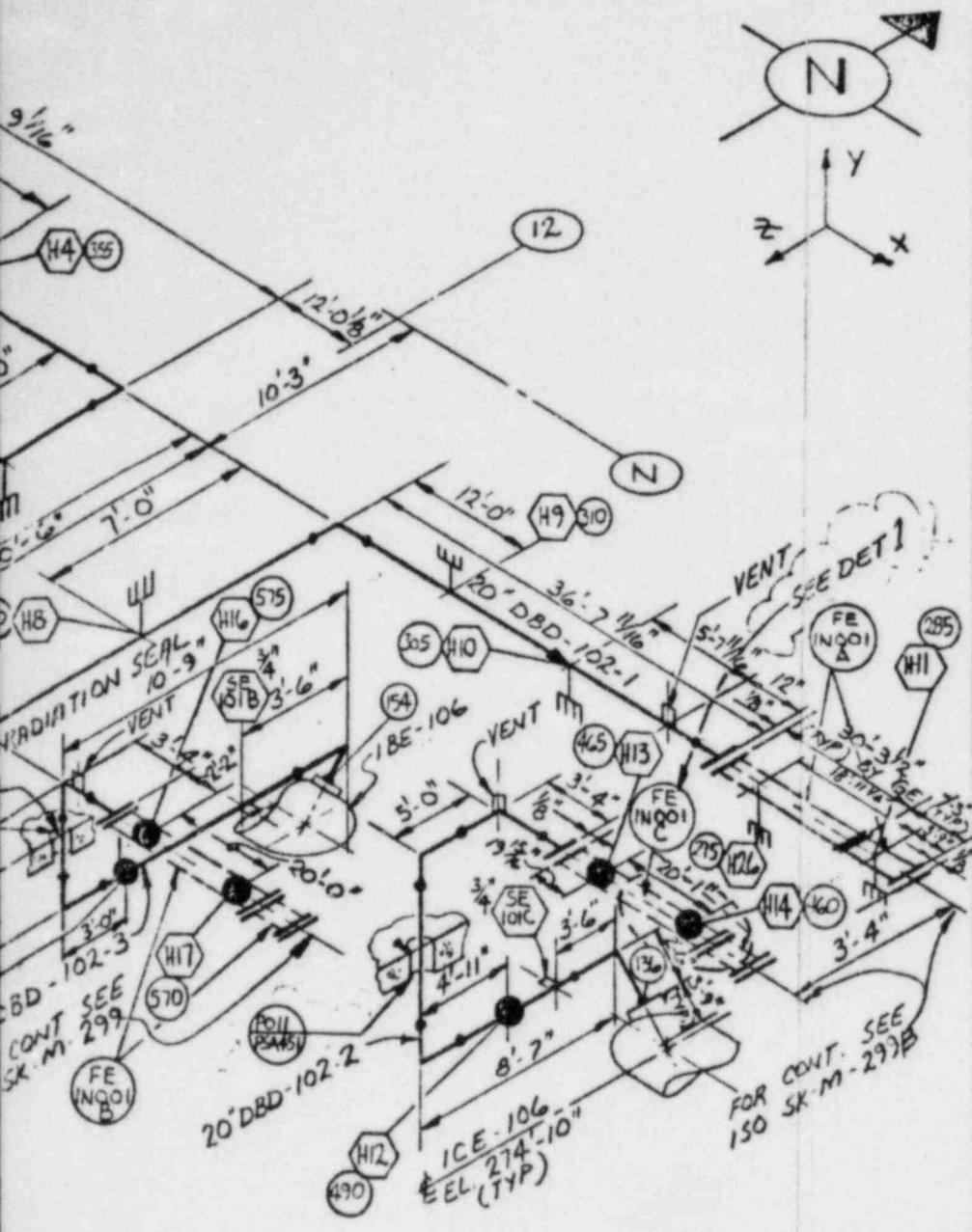
Also Available On
 Aperture Card

TI
 APERTURE
 CARD

C-2

Rev. 1

		DATA	REV	DATE	BY	REV	DATE
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						



STRESS APPROVALS

REV	THERMAL	SEISMIC

REV. J NOTE:

REDRAWN (SEE NOTE 1)
 ADDED PLUGS TO FE INQ01C
 CONNECTIONS PER FAB ISO,
 ADDED PENETRATION IDENTIFICATION
 NOS, 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" x 17")

REFERENCE

- M-06 P:10
- 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

8408140326-04

REV	DATE	REVISIONS	BY	CHKD	DESIGN	ENGR	PROJ	APPR

DATA	REV	DATE	BY	REV	DATE	BY
I						
II						
III						

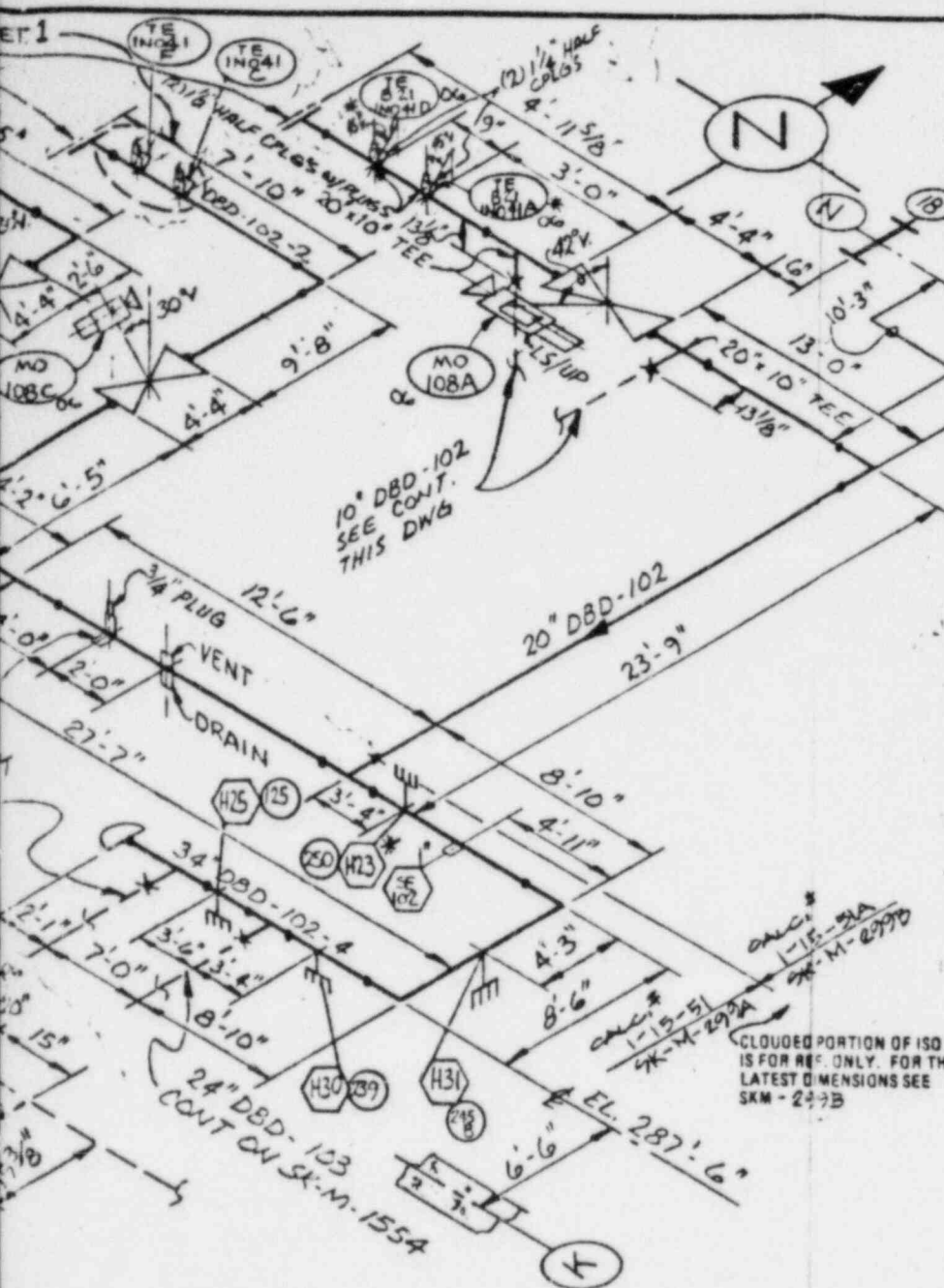
LEGEND
SPRING HANGER
RIGID HANGER
ANCHOR
GUIDE
SNUBBER
RESTRAINT
HANGER NUMBER
STRESS DATA POINT

BECHTEL
 SAN FRANCISCO

LIMERICK GENERATING STATION
 UNITS 1 & 2
 PHILADELPHIA ELECTRIC COMPANY

FW. FROM HEATERS IAE-106,
 IBE-106 & ICE-106 TO
 REACTOR BLDG.

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



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

8408140326-05

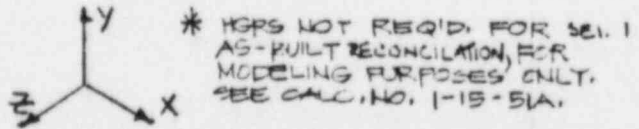
NO.	DATE	REVISIONS	BY	CHKD	DESIGN	ENGR	PROJ	APPV
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BECHTEL
 SAN FRANCISCO
LIMERICK GENERATING STATION
 UNITS 1 & 2
 PHILADELPHIA ELECTRIC COMPANY

FEED WATER SYSTEM FROM
 *6 HEATERS TO REACTOR
 PEN

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

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



DATA	REV	DATE	BY	REV	DATE	BY	LEGEND
							● SPRING HANGER
							■ RIGID HANGER
							★ ANCHOR
							≡ GUIDE
I							⊥ SNUBBER
II							⊥ RESTRAINT
III							○ HANGER NUMBER
							○ STRESS DATA POINT

Specification
 9031-P-364
 Appendix C

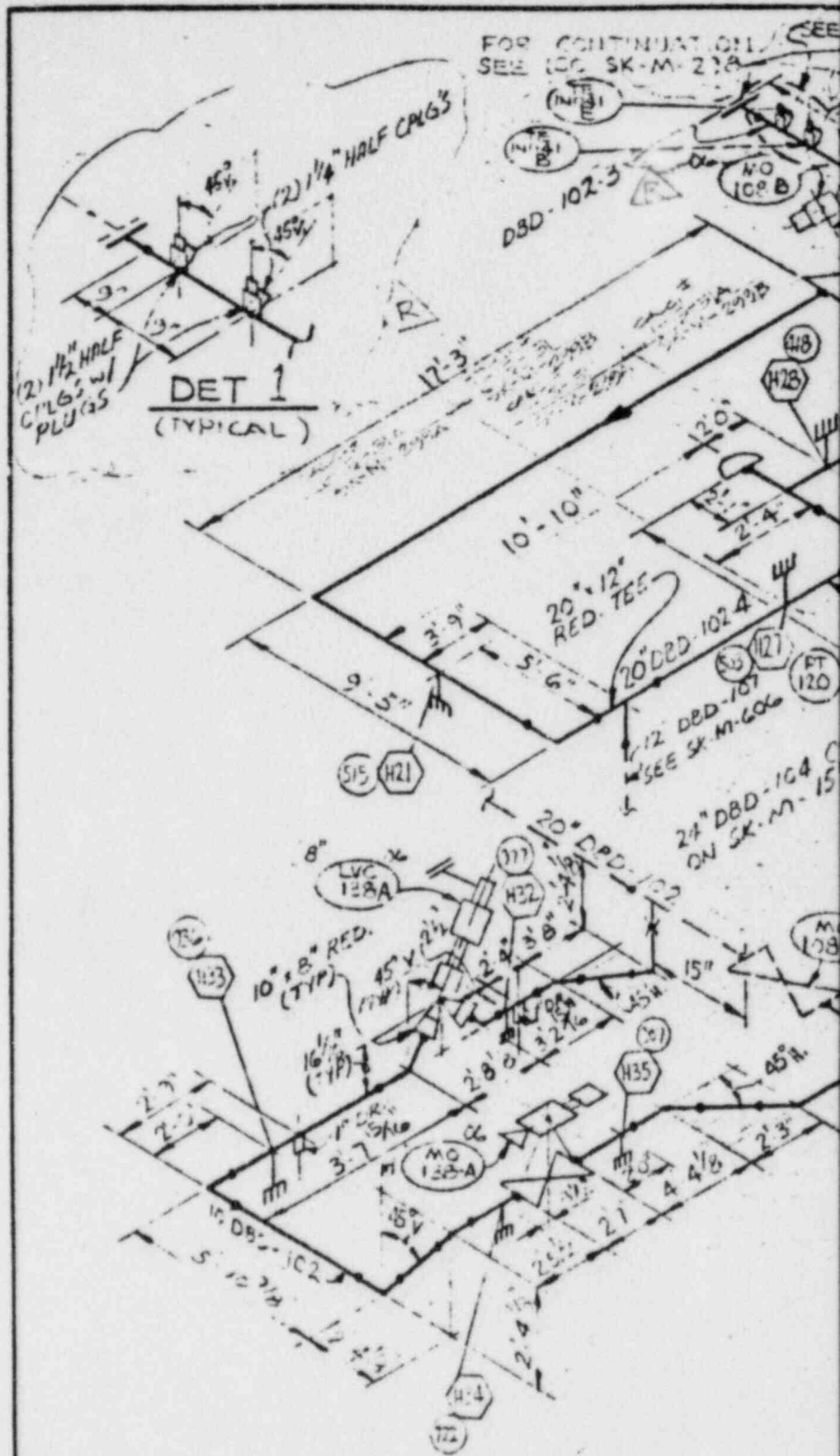
Also Available On
 Aperture Card



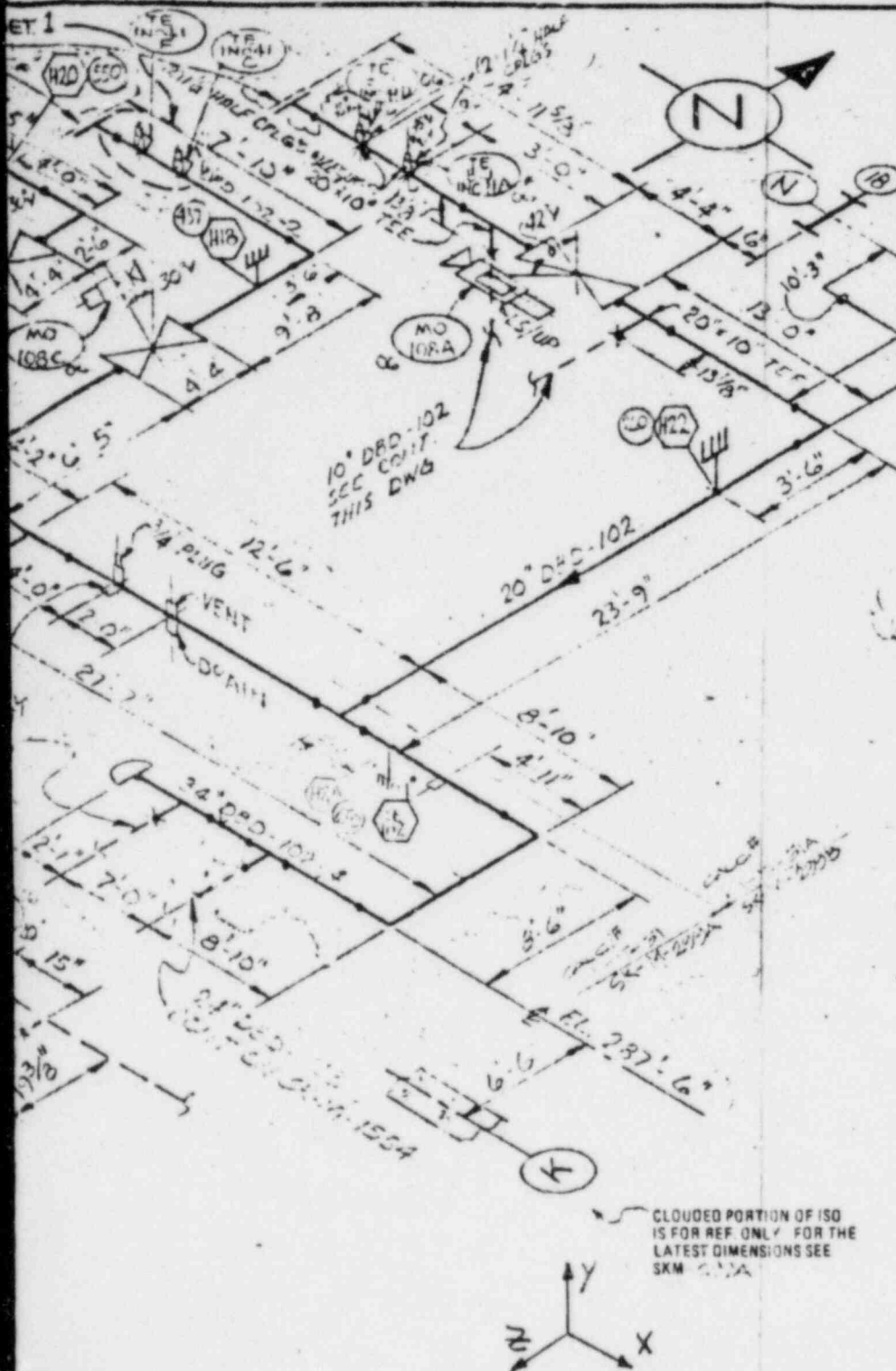
TI
 APERTURE
 CARD

C-4

Rev. 1



		DATA	REV	DATE	BY	REV	DATE
PIPING ENGINEER	LINE No.	DBD-102					
	MATERIAL	SAE A133					
MECHANICAL ENGINEER	LINE THICKNESS (IN)	3/4	I				
	LINE O. (IN)	10.50	20.00	24.00			
	MODE	I	II	III			
STRESS ENGINEER	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

REV. R. 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-291B WAS CALC. 1-15-51A. CHANGED FROM NUMERICAL TO ALPHA NUMERICAL.

NOTE

1. THIS DWG SUPERCEDED SK-M-277 RE/17 (11/17)

REFERENCE

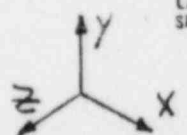
- M-06 P&ID.
- M-187 DRAINING PLAN AREA 7
- DED-102-1 FAB ISO
- DED-102-2
- DED-102-3
- DED-102-4
- DED-102-5
- CALC. NR 1-15-51A

MODE DESCRIPTION

- MODE I
- MODE II
- MODE III

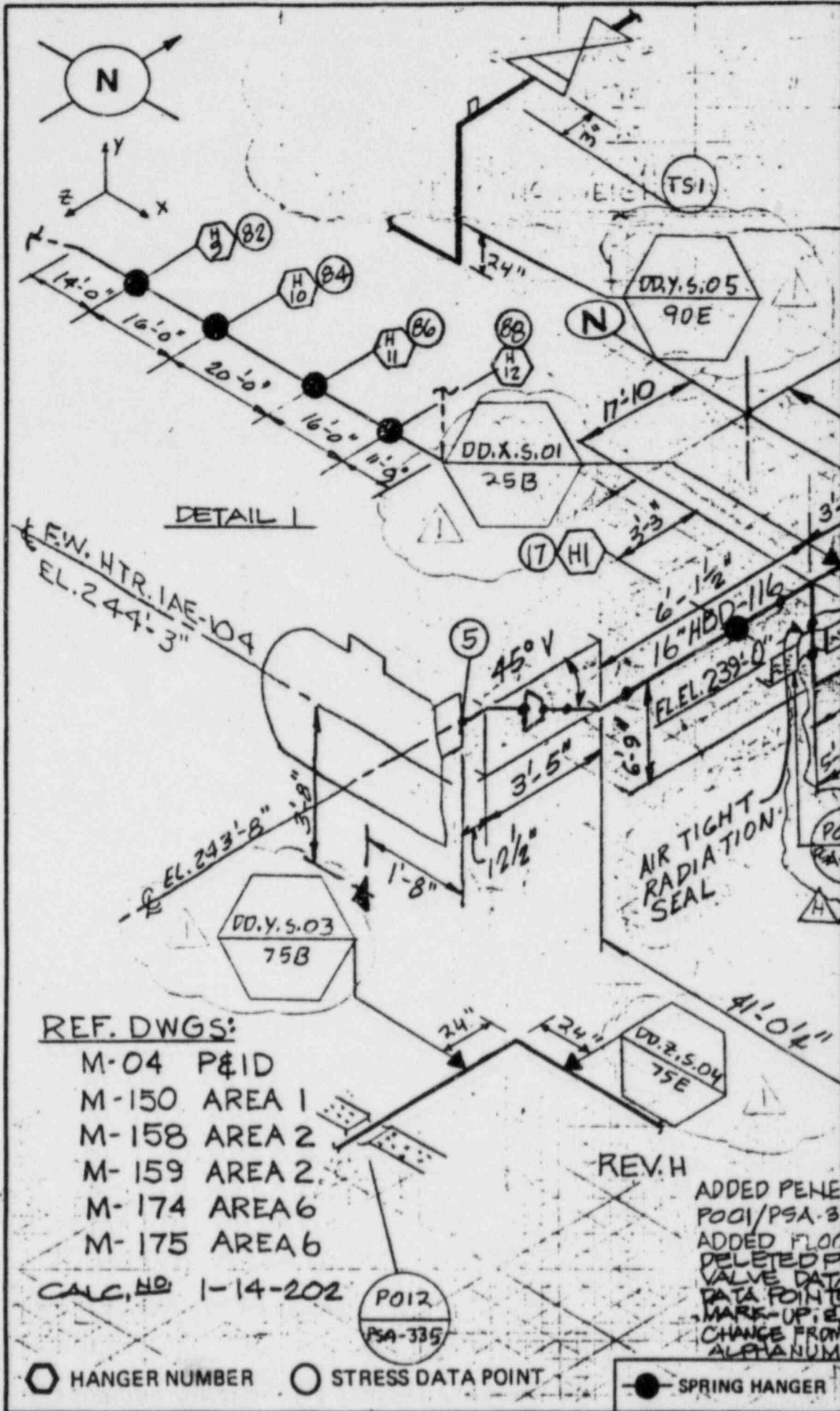
8408140326-06

CLOUDED PORTION OF ISO IS FOR REF. ONLY FOR THE LATEST DIMENSIONS SEE SKM 612A



DATA	REV	DATE	BY	REV	DATE	BY	LEGEND
							● SPRING HANGER
							■ RIGID HANGER
							★ ANCHOR
							≡ GUIDE
I							⊥ SNUBBER
							⊥ RESTRAINT
							○ HANGER NUMBER
							○ STRESS DATA POINT

<p>BECHTEL SAN FRANCISCO</p> <p>LIMERICK GENERATING STATION UNITS 1 & 2 PHILADELPHIA ELECTRIC COMPANY</p> <p>FIELD WATER SYSTEM FROM *6 HEATERS TO REACTOR PEN</p>			
	JOB NO 8031	DRAWING NO SK-M-299B	REV R



P010
75B

Also Available On
Aperture Card

DETAIL 1

REF. DWGS:

- M-04 P&ID
- M-150 AREA 1
- M-158 AREA 2
- M-159 AREA 2
- M-174 AREA 6
- M-175 AREA 6

CALC. NO. 1-14-202

P012
PSA-335

TI
APERTURE
CARD



C-5 Rev 1

8408140326-07

ECHEL. They are merely loaned and on the borrower's express agreement that they will not be limited way and private use permitted by any written consent given by the lender to the borrower.

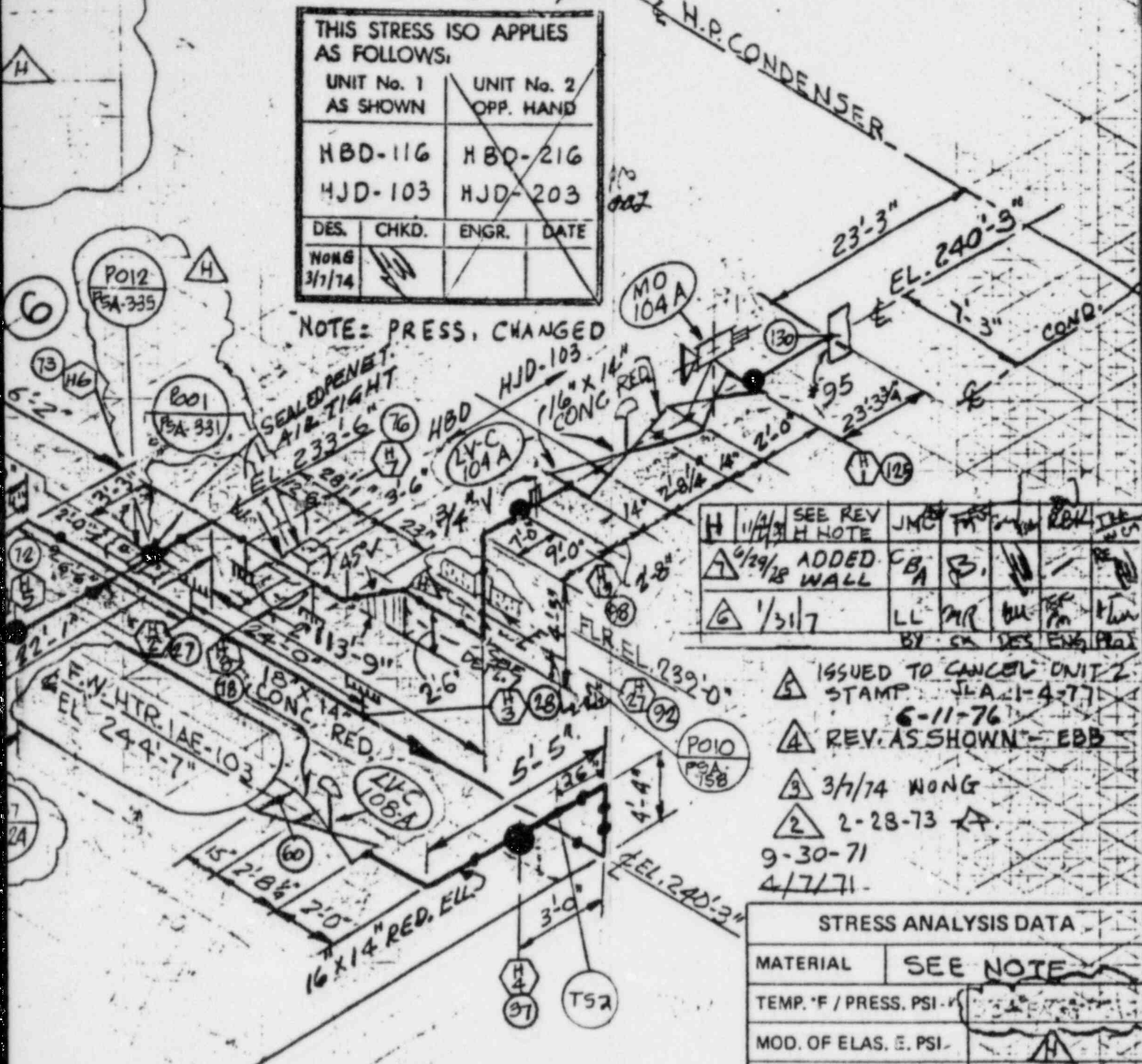
Specification 8031-P-364
Appendix C

POIL UNIT 2 - SK-M-2549 \$2500

THIS STRESS ISO APPLIES AS FOLLOWS:			
UNIT No. 1 AS SHOWN	UNIT No. 2 OPP. HAND		
HBD-116	HBD-216		
HJD-103	HJD-203		
DES.	CHKD.	ENGR.	DATE
WONG			3/7/74

NOTE: PRESS. CHANGED

SEALED PENET.
AIR-TIGHT



H	11/1/73	SEE REV H NOTE	JMC	FR	REK	TR
A	9/29/75	ADDED WALL	CA	B		
G	1/31/7		LL	MR	BU	TR

BY: CA DES ENR PRG

- 5 ISSUED TO CANCEL UNIT 2 STAMP JLA-1-4-77 6-11-76
- 4 REV. AS SHOWN - EBB
- 3 3/7/74 WONG
- 2 2-28-73 9-30-71 4/7/71

STRESS ANALYSIS DATA

MATERIAL	SEE NOTE
TEMP. °F / PRESS. PSI	
MOD. OF ELAS. E. PSI	
EXP. COEFF. IN / 100 FT.	
EXP. COEFF. MIL-IN/IN	
LINE O. D. (IN)	16000
LINE THICKNESS (IN)	.375



DRAIN FROM F.W. HTR. IAE-103 TO F.W. HTR. IAE-103 & H.P. COND.

JOB No.	8031	DRAWING No.	SK-M-333	REV.	H
---------	------	-------------	----------	------	---

NOTE: CLASS HBD MATERIAL: SEAMLESS ASTM A-106 GR. B CLASS HJD MATERIAL: SEAMLESS ASTM A-335 GR. D5

I. D. P007/PSA-424 & P012/PSA-335 PENET. TEMP. & ADDED HANGERS PER STRESS GRP. GR. GUIDANCE NUMERICAL TO SIGNAL

- RIGID HANGER
- ▲ ANCHOR
- ≡ GUIDE

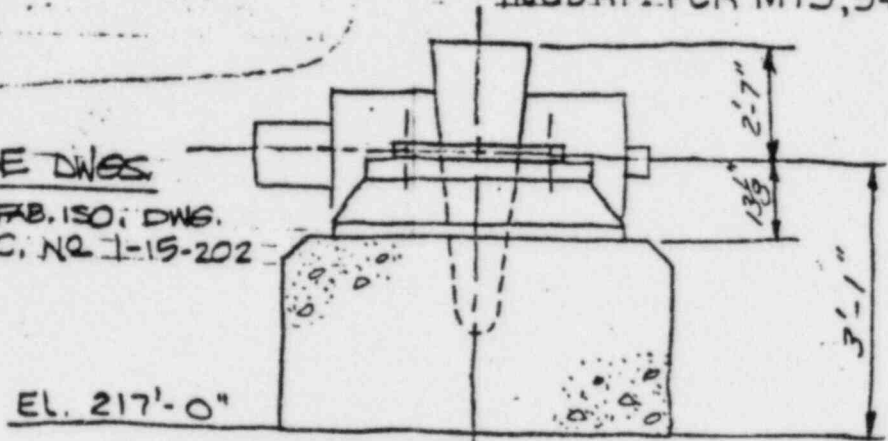
BECHTEL. They are merely loaned and on the borrower's express agreement that they will not be used in any limited way and private use permitted by any written consent given by the lender to the borrower.

C-6

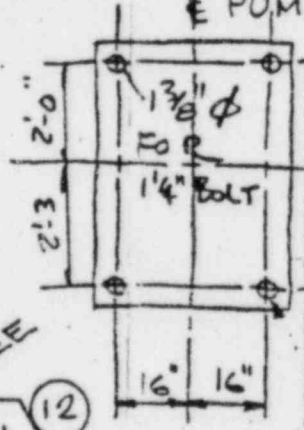
specification
8031-P-364
Appendix C Rev. 1

REV. 4 NOTE
ADDED PENET. I.D. P003/PSA-451,
P006/PSA-425 & P007/PSA-493
INCORP. FCR M15,546F SH.20F4

REFERENCE DWGS
DBD-101-1 FAB. ISO. DWG.
STRESS CALC. NO. J-15-202



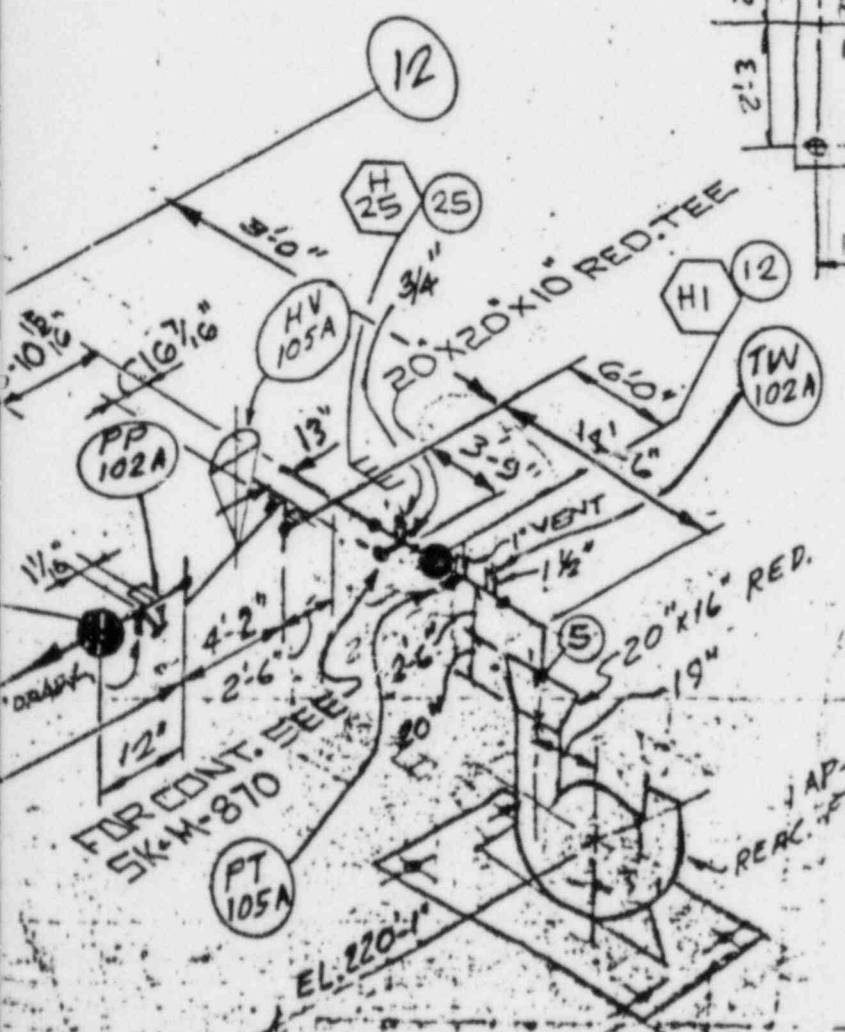
E PUMP & PUMP BASE



DESIGN	REV. 1	FOR	BC	REV. 1	TICK
DESIGN	REV. 2	FOR	FM	REV. 1	TICK
DESIGN	REV. 3	FOR	ALL	REV. 1	TICK
DESIGN	REV. 4	FOR	DES	REV. 1	TICK
DATE	3/31/7	BY	CK	DES	ENG

REV. E NOTE:
ADDED HGAS. & D.P. PER
STRESS CAMP. & PER GUIDANCE
MARK-UP, DELETED PRESS. TEMP.
& VALVE DATA, REVISED FROM
NUMERICAL TO ALPHANUMERICAL

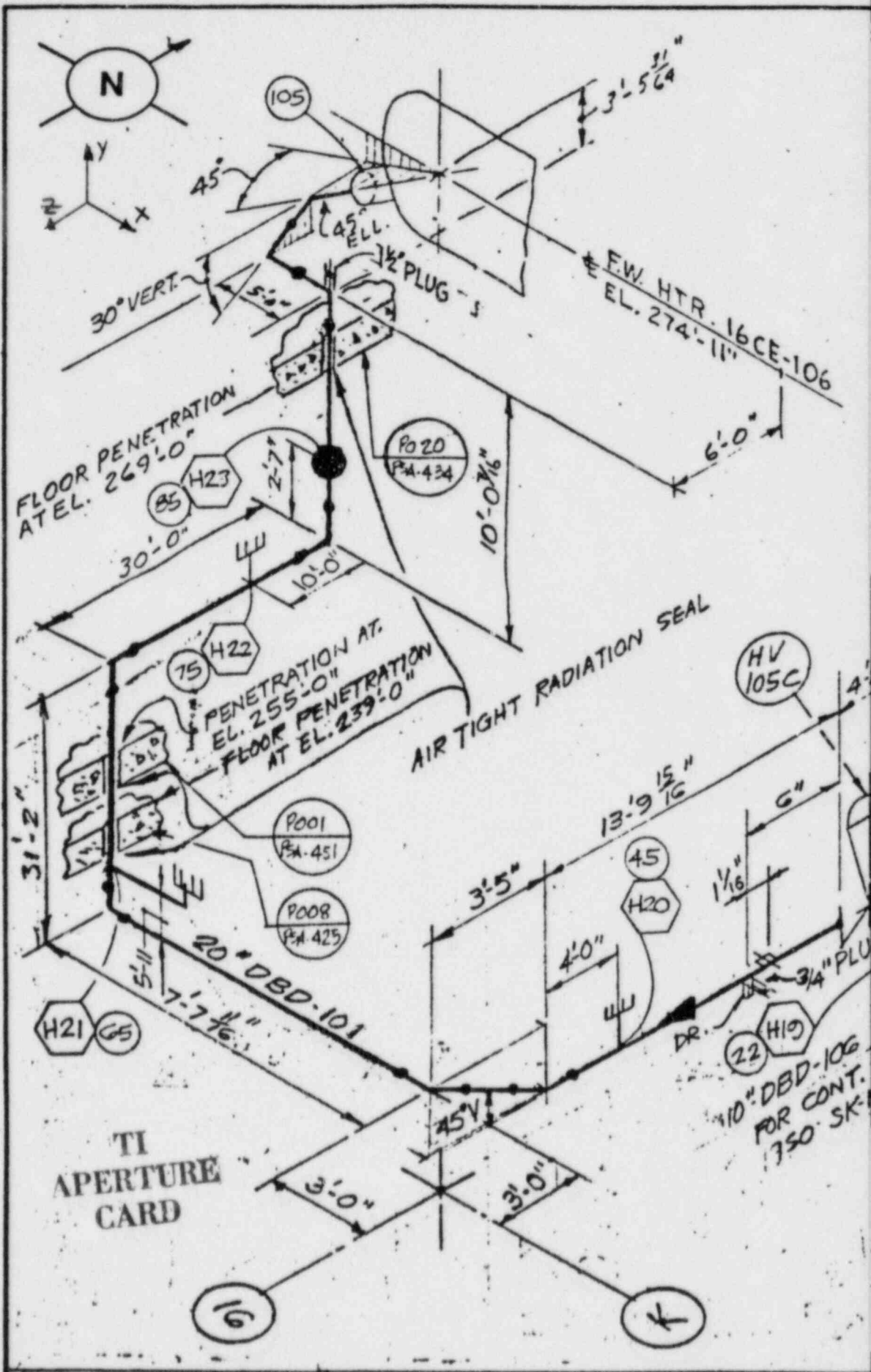
ON SEAL



STRESS ANALYSIS DATA		
MATERIAL	SEAMLESS ASTM A-106-GR. B	
TEMP. °F / PRESS. PSI	/ /	
MOD. OF ELAS. E. PSI	/	
EXP. COEFF. IN / 100 FT.	/	
EXP. COEFF. MIL-IN-IN	/	
LINE O. D. (IN)	20"	
LINE THICKNESS (IN)	SCH 120	
	FEEDWATER FROM RFP 1AP-101 TO FWATR. 1AE-106	
	JOB No.	DRAWING No.
	8031	SK-M-383
	REV.	E

○ STRESS DATA POINT	○ HANGER NUMBER
■ RIGID HANGER	▲ ANCHOR
— GUIDE	

15



○ STRESS DATA POINT

○ HANGER NUMBER

● SPRING HANGER

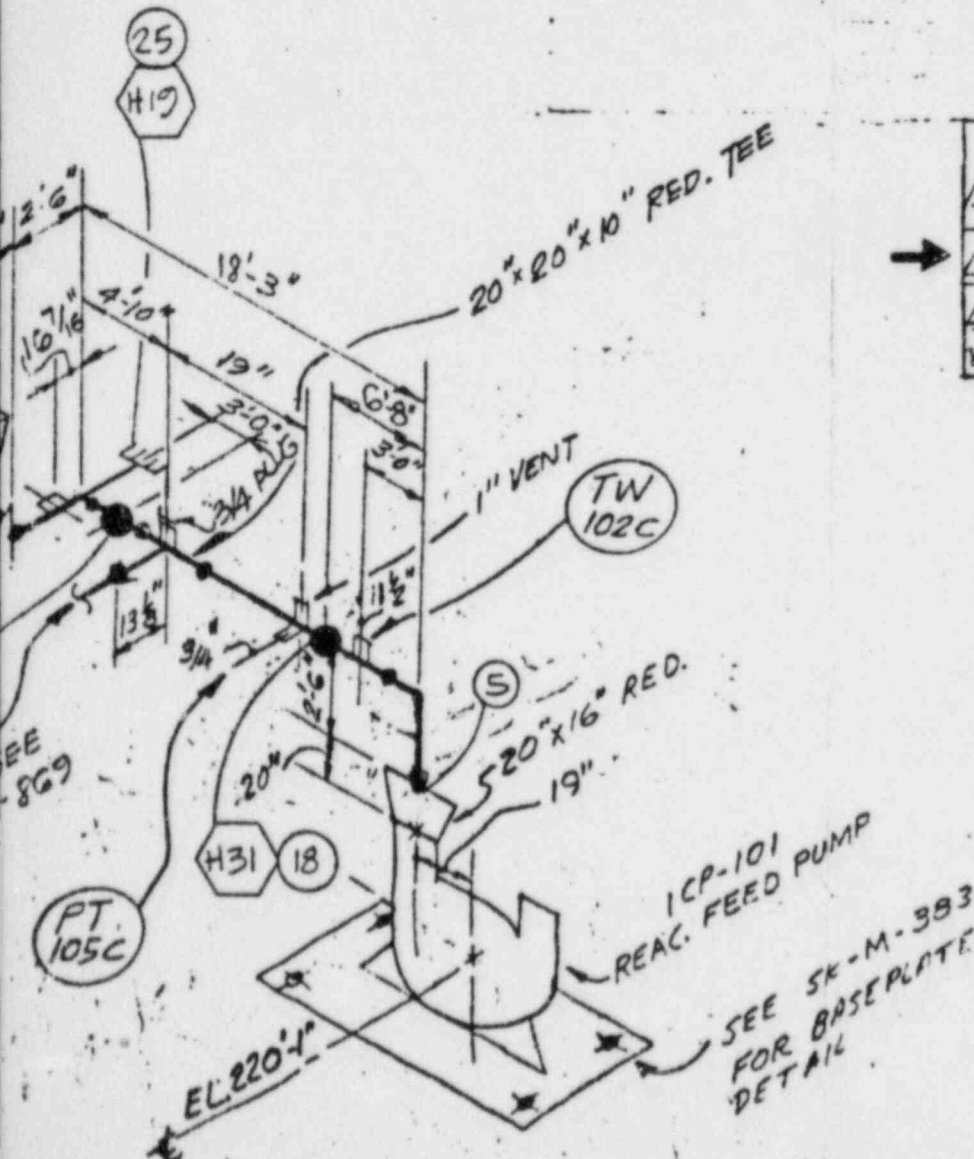
REV. F. NOTES:

ADDED HGR. & D.P. PER STRESS GRF.
 & HGR. GUIDANCE MARK-UP, DELETED
 PRESS. / TEMP. & VALVA DATA.
 CHANGED FROM NUMERICAL TO ALPHA NUMERICAL

REFERENCE DWGS.

- M-06 P&ID
- M-185 PIPING PLAN
- M-186 " "
- M-187 " "
- M-188 " "
- DBD-101-3 REV. 13
- STRESS CALC. 1-15-204

Also Available On Aperture Card



9/14/83	ISS. FOR LINE 546A ADDED PENET. I.D. Pook PSA-451, P008/PSA-425 P020/PSA-434	JMC	FM	FSM	MSC	TJC
10/2/82	SEE REV. F NOTE	RVR	FSM	RGB	TJC	
5/77	REV. AS SHOWN	LT	WISL	CM	FSM	
NO DATE	REV	BY CK	DES	ENG	PROJ	

8408140326-10

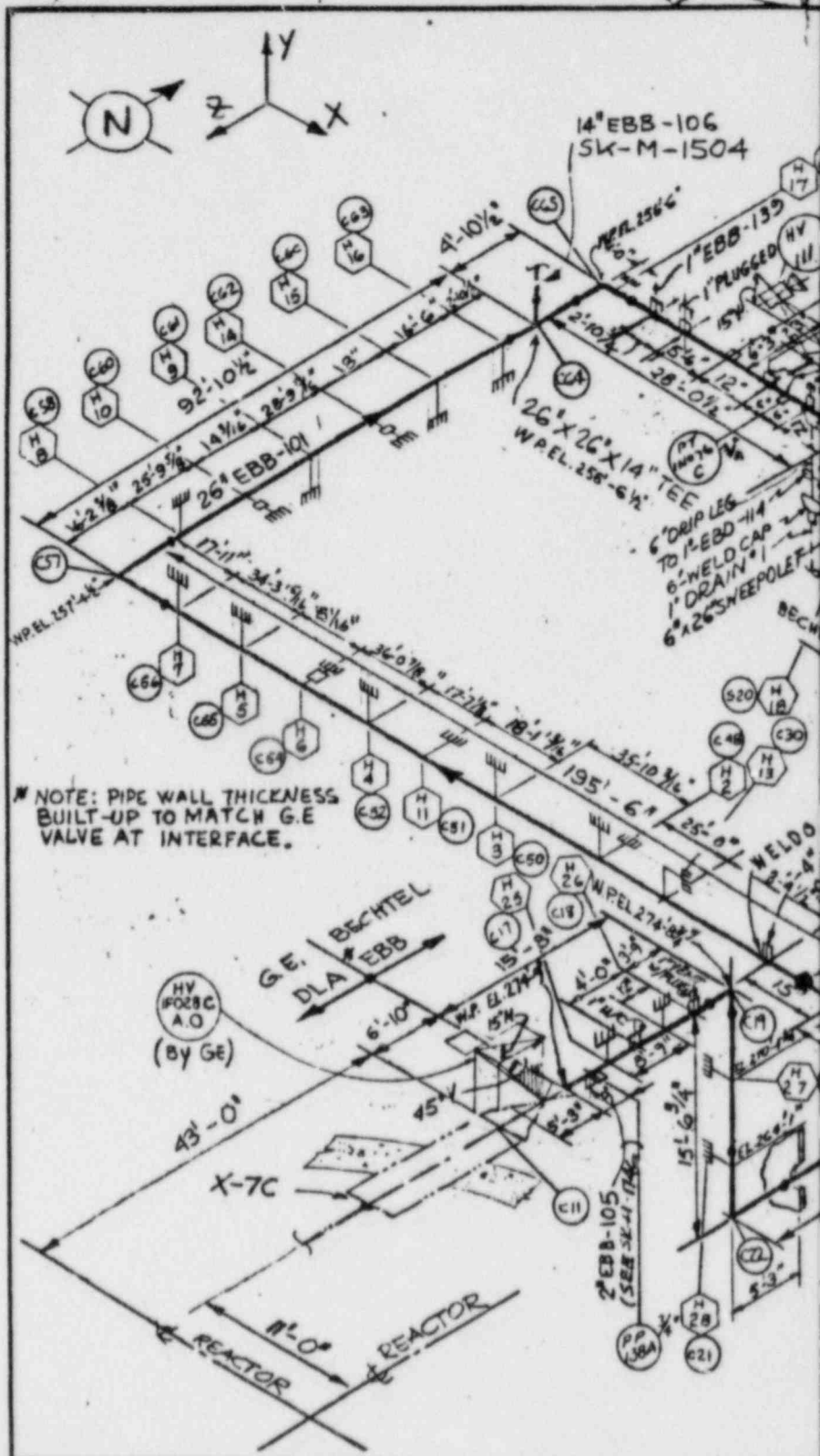
STRESS ANALYSIS DATA			
MATERIAL	SEAMLESS AETM A-106 GR. B		
TEMP. °F / PRESS. PSI			
MOD. OF ELAS. E. PSI			
EXP. COEFF. IN / 100 FT.			
EXP. COEFF. MIL-IN-IN			
LINE O. D. (IN)	20"		
LINE THICKNESS (IN)	SCH 120 ← 1.500		
	FEEDWATER FROM RFP. ICP-101 TO FW HTR. ICE-106		
	JOB No.	DRAWING No.	REV.
B031	SK-M-385	F	

RIGID HANGER
 ANCHOR
 GUIDE

specification

8031-P-364

Appendix C



NOTE: PIPE WALL THICKNESS BUILT-UP TO MATCH G.E. VALVE AT INTERFACE.



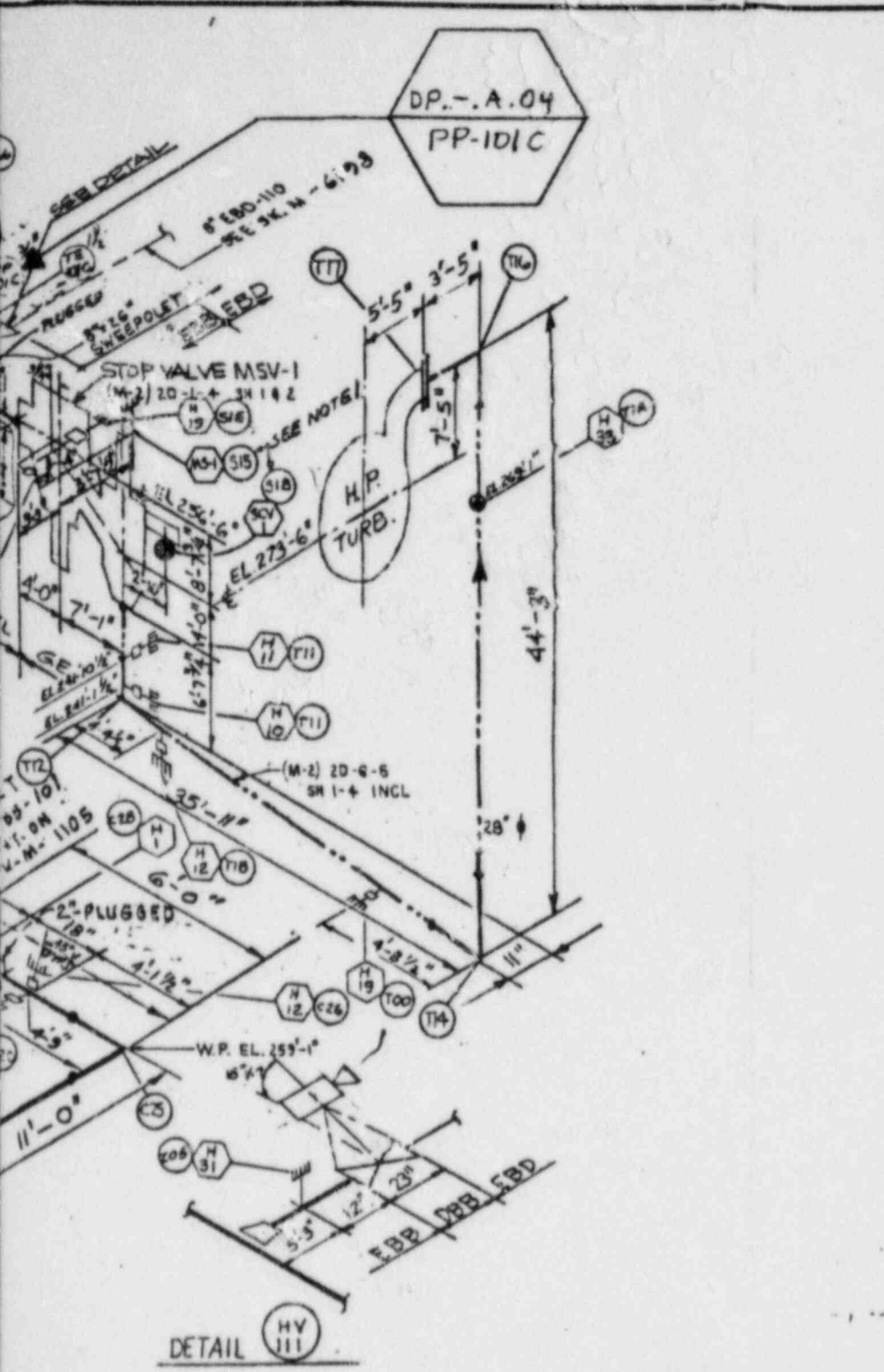
Also Available On Aperture Card

TI APERTURE CARD

C-9

8408140326-11 Rev.1

		DATA	REV	DATE	BY	REV	DATE
PIPING ENGINEER	LINE No.	EBB-101	A	8/24/73	gbd		
	MATERIAL	26" SA-106 GR C 3" SA-106 GR B					
	LINE THICKNESS (IN)	LO 2 NOM - .328 MIN					
MECHANICAL ENGINEER	LINE O.D. (IN)	26	A	8/24/73	gbd		
	MODE	I II III					
	PRESS. PSIG						
	TEMP F	M					
STRESS ENGINEER	EXP. COEFF. IN/100FT						
	EXP. COEFF. MIL-IN/IN						
	MOD. OF ELAS. E PSI						



DP.-A.04
PP-101C

STRESS APPROVALS

REV	THERMAL	SEISMIC
8	RRR 8-27-74	

UNIT 2 EBB-204 IS SUPERSEDED BY SK-M-2757

THIS STRESS ISO APPLIES AS FOLLOWS:			
UNIT No. 1 AS SHOWN	UNIT No. 2 OPP. HAND		
EBB-101	EBB-204		
DES.	CHKD.	ENGR.	DATE
G.W. 1-8-74	W.S. 1-8-74		

REV. M NOTE

ADDED 1" PLUG TO EXISTING 1" CONN. 1" HALF CPLG, PER FAB ISO.
ADDED PIPE SUPPORTS & DATA POINTS FOR RECONCILIATION.
DELETED VALVE TEMP & PRESS DATA PER STRESS GROUP MARK-UP.

REFERENCE:

- M-01 P.I.D.
- M-41 P.I.D.
- M-368 PIPING PLAN
- EBB-101-1 FAB. ISO. REV. 30
- STRESS CALC # 1-01 E226

NOTE:

- 1. G.E. HANGERS, SEE DWG. NO. 8031-M-2D-1(1)-6 SHT. 1

MODE DESCRIPTION

- MODE I - DESIGN
- MODE II - MAXIMUM

NO.	DATE	REVISIONS	BY	CHKD.	ENGR.	DATE	APP.
M		SEE REV. M NOTE	HSN	AS			
L	7/1/71	ING. FOR M-6796F	FY				
G	7/2/71	ADDED PT. IN 70A DELETED PS. IN 70SA	J.B.				
F	8/1/71	DIM. 6'-3" HAS 4'-3 1/2"	ALG				
K	2/14/72	SEE REV. K NOTE	CAL				
	8/79	REV. INST. H.P. PER P.I.D. M-01 REV. 15, ROTATED W.P. III 15' UP FROM MCP-735					
	7/1/74	RELOCATED EBB-139					
	8/1/74	REISSUED FOR UNIT 2 ADDL					
	8/1/74	ISSUED FOR STRESS ANALYSIS					

Q-LISTED

DATA	REV	DATE	BY	REV	DATE	BY	LEGEND
G.E. PIPING							● SPRING HANGER
							■ RIGID HANGER
							▲ ANCHOR
							□ GUIDE
28		8/24/74	WJ/CJA				⊞ SNUBBER
I	II						⊞ RESTRAINT
							○ HANGER NUMBER
							○ STRESS DATA POINT

BECHTEL
SAN FRANCISCO

LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

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

8031 SK-M-1500

Specification

8031-P-364

Appendix C

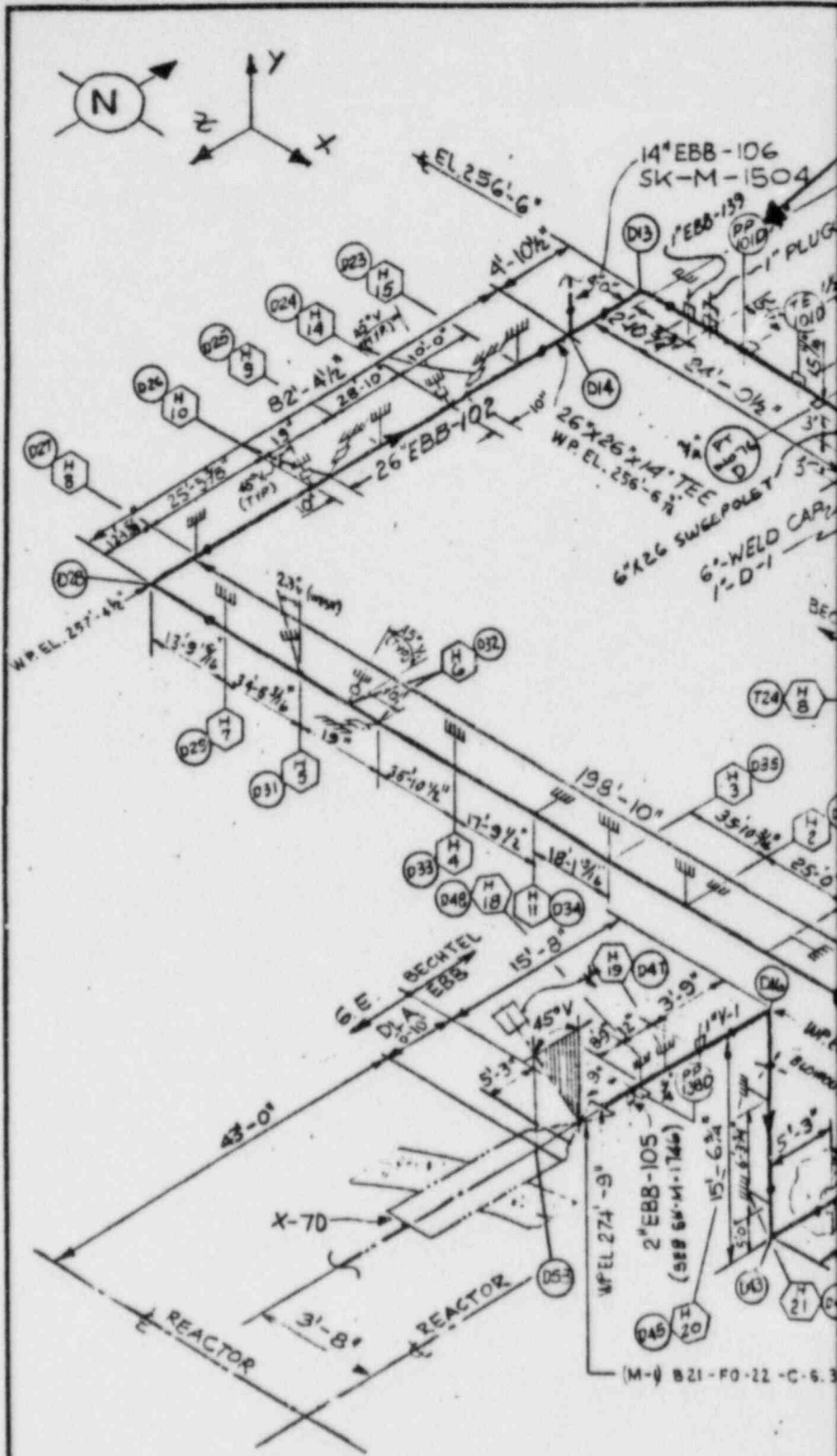
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Also Available On
Aperture Card

C-10

8408140326-12

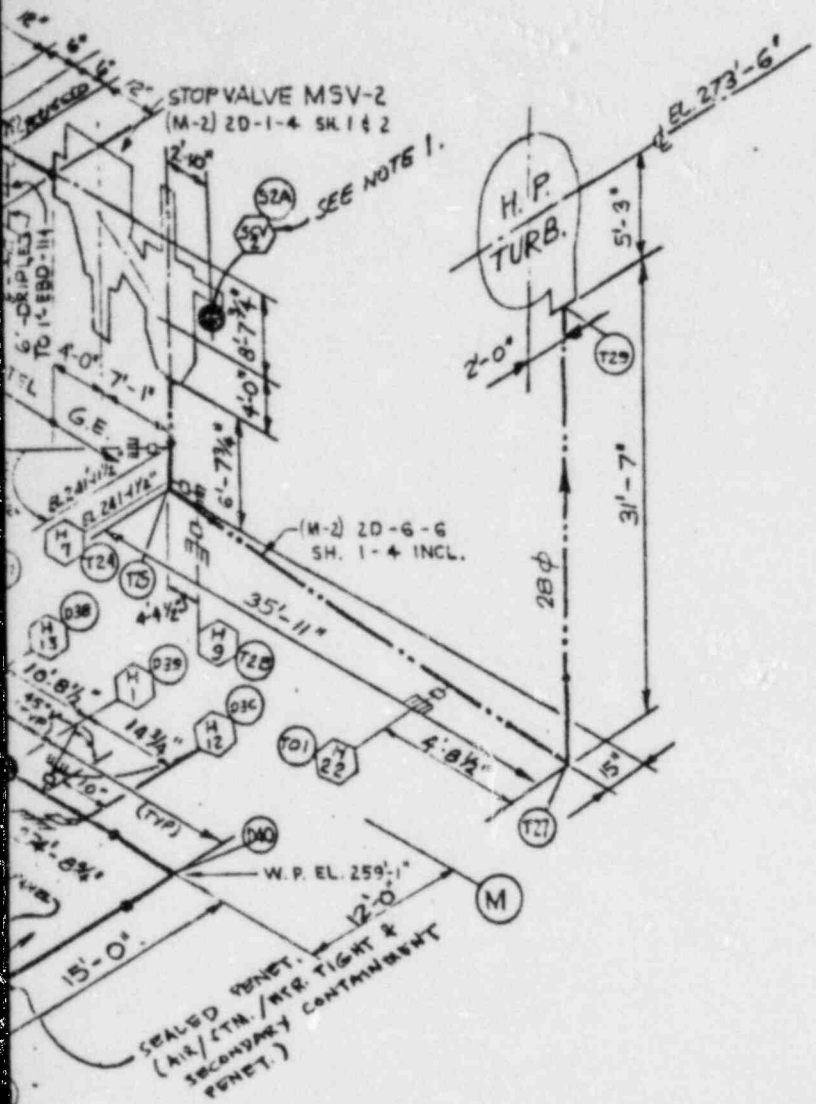
Rev. 1



		DATA			REV	DATE	BY	REV	DATE	B
PIPING ENGINEER	LINE No.	EBB - 102			A	8/2/73	gbl	D	2/4/76	RR
	MATERIAL	26" SA-106 Gr C (AS BUILT) 2" SP-106 Gr B								
	LINE THICKNESS (IN)	1.02 NOM 0.928 MIN	.432					E		
MECHANICAL ENGINEER	LINE O.D. (IN)	26	6.625		A	8/26/73	res/lsr			
	MODE	I	II	III						
	PRESS. PSIG									
	TEMP F									
STRESS ENGINEER	EXP. COEFF. IN/100FT									
	EXP. COEFF. MIL-IN/IN									
	MOD. OF ELAS. E PSI									

JA-41-29

DP-.A.05
PP-101D



STRESS APPROVALS		
REV	THERMAL	SEISMIC
3	RQ4 8-27-74	

UNIT 2 EBB-203 IS SUPERSEDED BY SK-M-2756

THIS STRESS ISO APPLIES AS FOLLOWS:			
UNIT No. 1 AS SHOWN	UNIT No. 2 OPP. HAND		
EBB-102	EBB-203		
DES.	CHKD.	ENGR.	DATE
C.W.	1-2-74		1-11-74

REV L NOTE:
ADDED PIPE SUPPORTS & DATA POINTS FOR RECONCILIATION
DELETED PRESS & TEMP. VALVE DATA PER STRESS GROUP MAKE-UP
ADDED PENET. NO.

REFERENCE
M-01 P&ID
M-368 PIPING PLAN
EBB-102-1 REV. 22 FEB. 1970
STRESS CALC# 1-01-226

NOTE
1. G.E. HANGER, SEE DWG NO 8081-M-2D-1(1)-6 SHT. 1.

MODE DESCRIPTION
MODE I - DESIGN
MODE II - MAXIMUM

NO.	DATE	REVISIONS	BY	CHKD.	DESIGN SUPP.	ENGR.	PROJ. ENGR.	APPR.
K	9/7/74	LINE FOR M-6796 F	FY					
G	8/27/74	ADDED PT. NO. 76 B DELETED PT. NO. 98 B						
L		SEE REV L NOTE						
H	1/11/74	RELOCATED 1 EBB-199						
B	9/27/74	REISSUED FOR UNIT 2 ADD						
A	8/27/74	ISSUED FOR STRESS ANALYSIS						

Q-LISTED

DATA	REV	DATE	BY	REV	DATE	BY	LEGEND
G.E. PIPING							● SPRING HANGER
							■ RIGID HANGER
							★ ANCHOR
28							≡ GUIDE
I	II	III					⊥ SNUBBER
							⊥ RESTRAINT
							○ HANGER NUMBER
							○ STRESS DATA POINT

SCALE: DESIGNED: DRAWN: CHECKED: ENGR.

BECHTEL
SAN FRANCISCO

LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

ISOMETRIC TURBINE BLDG. UNIT #1
MAIN STEAM PIPING (LINE 'D')

JOB NO.	DRAWING NO.	REV.
8031	SK-M-1501	L

specification
8031-P-364

Appendix C

Also Available On
Aperture Card

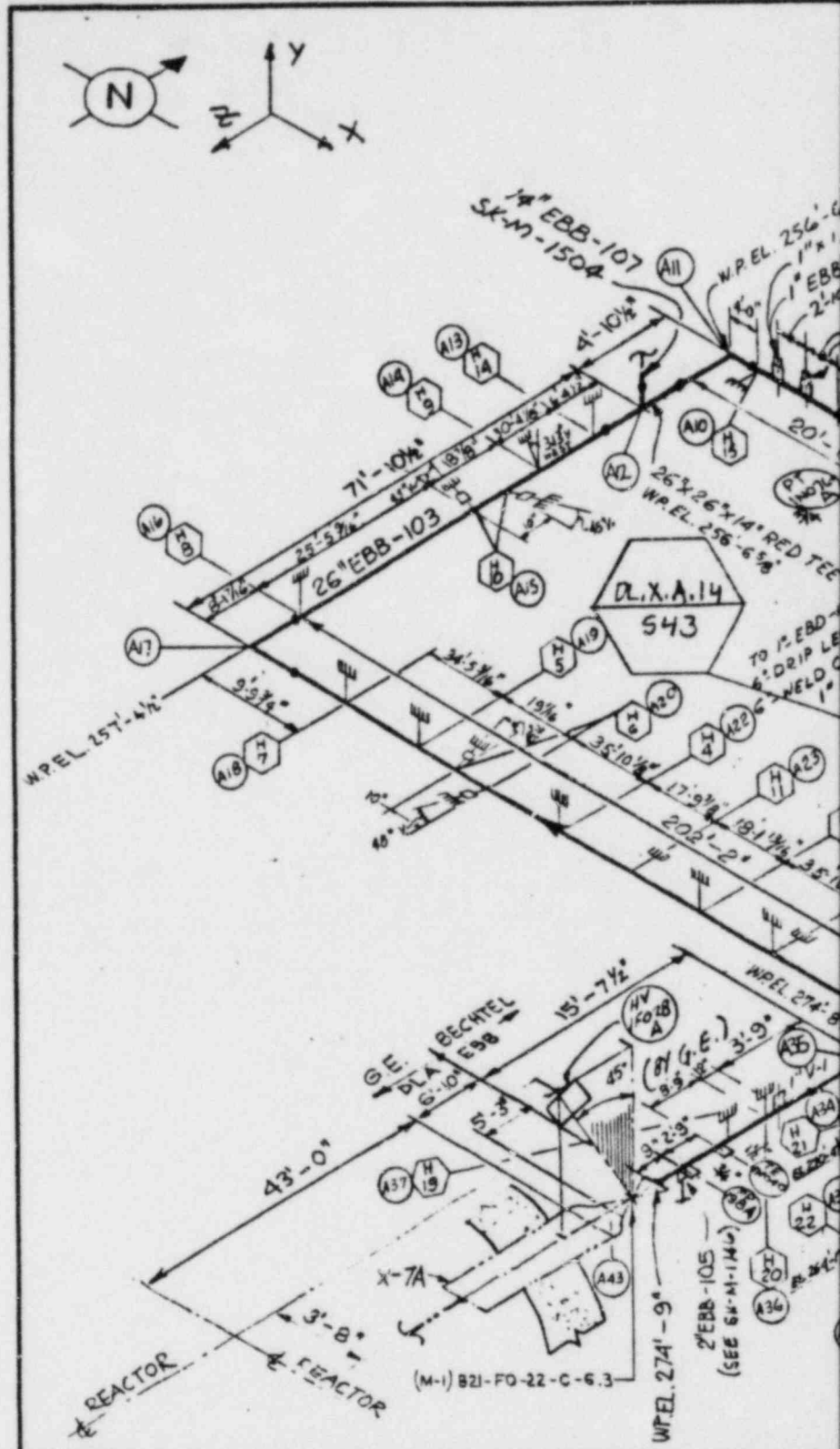


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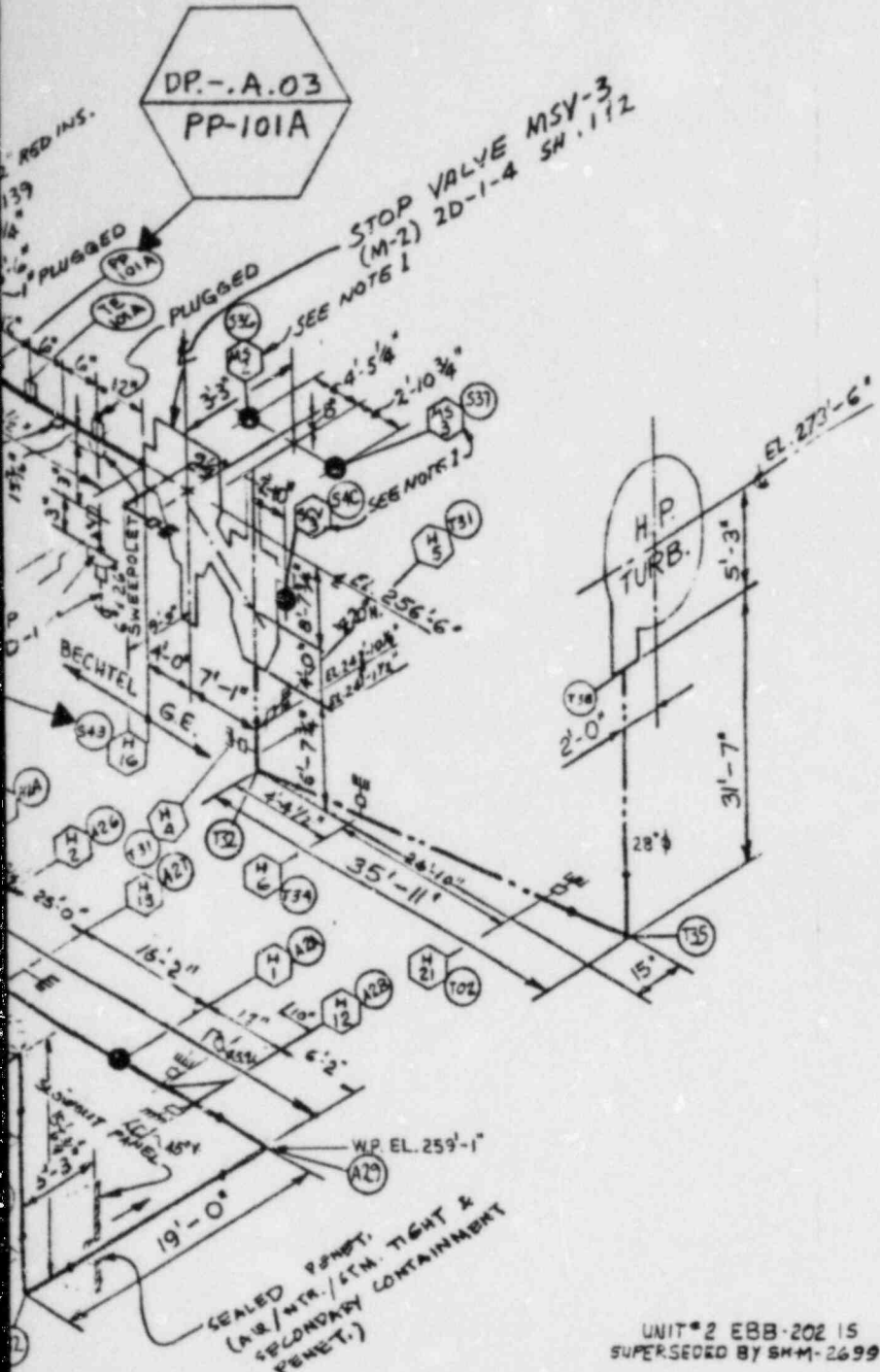
C-11

Rev. 1

Appendix 54M-294



	DATA	REV	DATE	BY	REV	DATE	B
PIPING ENGINEER	LINE No.	EBB-103		A	8/4/73	gbl	D
	MATERIAL	26" SA106 Gr C 6" SA106 Gr B					E
	LINE THICKNESS (IN)	LSE NOM .328 MIN					
MECHANICAL ENGINEER	LINE O.D. (IN)	26	6.625	A	8/4/73	CO/LSE	
	MODE	I	II	III			
	PRESS. PSIG						
	TEMP F						
STRESS ENGINEER	EXP. COEFF. IN/100FT						
	EXP. COEFF. MIL-IN/IN						
	MOD. OF ELAS. E PSI						



UNIT #2 EBB-202 IS
SUPERSEDED BY SH-M-2699

Q-LISTED

DATA	REV	DATE	BY	REV	DATE	BY	LEGEND
G.E. PIPING							● SPRING HANGER
							■ RIGID HANGER
							▲ ANCHOR
							≡ GUIDE
28							⊕ SNUBBER
I	II	III					⊥ RESTRAINT
							○ HANGER NUMBER
							○ STRESS DATA POINT

STRESS APPROVALS		
REV	THERMAL	SEISMIC
B	RDY 8-29-74	

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

THIS STRESS ISO APPLIES AS FOLLOWS:			
UNIT No. 1 AS SHOWN	UNIT No. 2 OPP. HAND		
EBB-103	EBB-202		
DES.	CHKD.	ENGR.	DATE
C.W.	1-1-74		

REFERENCE
M-01 P & ID
M-368 PIPING PLAN
EBB-103-1 REV. 22 FAB ISO
STRESS CALC # 1-01-226
MODE DESCRIPTION
MODE I - DESIGN
MODE II - MAXIMUM

NOTE:
1. G.E. HANGERS, SEE DWG NR
8031-M-2D-1(1)-6 SH. 1.

8408140826-13

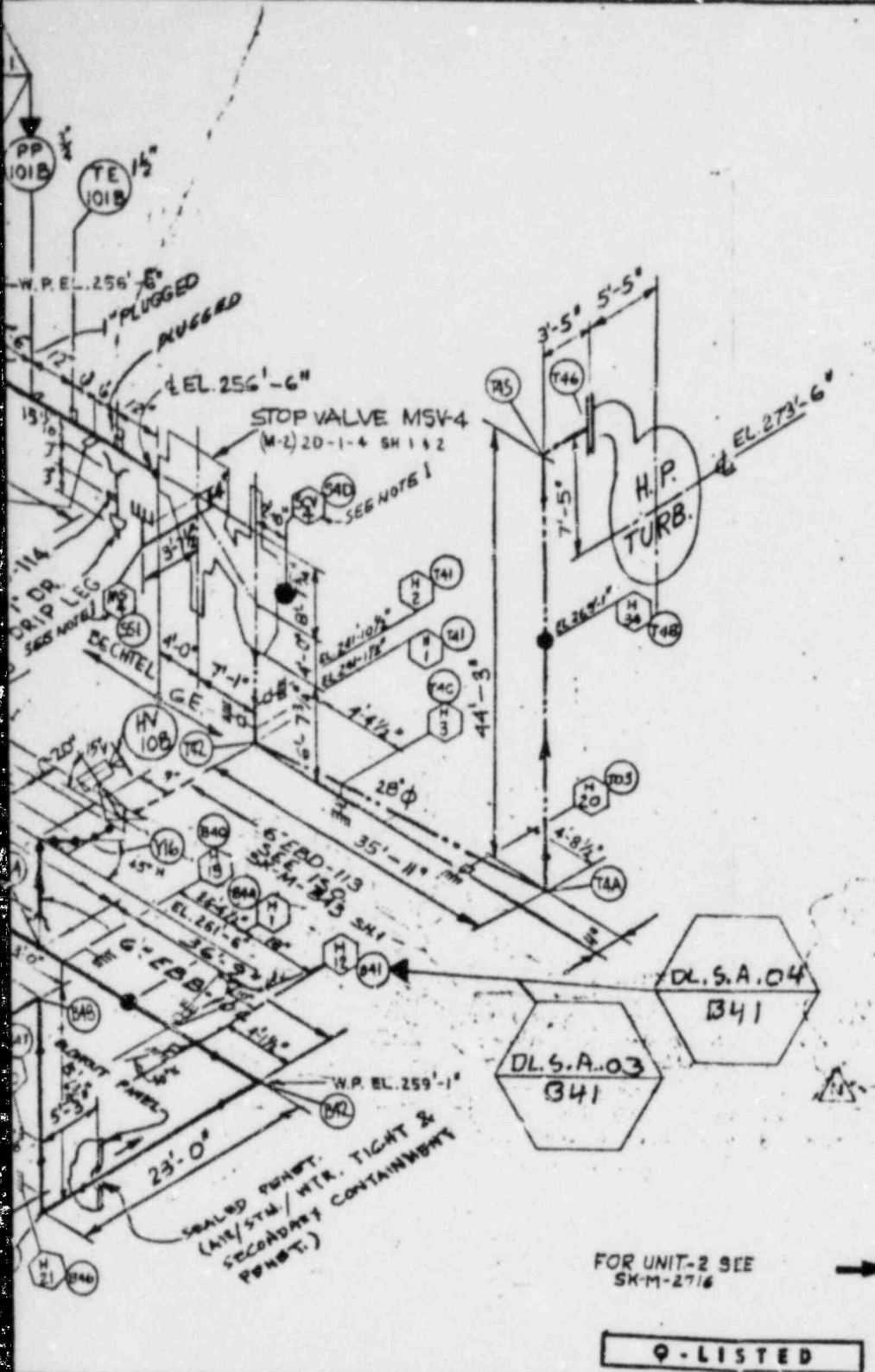
NO.	DATE	REVISIONS	BY	CHKD.	DESIGN SUPT.	ENGR.	PROJ. ENGR.	APPR.
L		SEE REV L NOTE	HGH.					
K	1/16/74	ING. FORM-6796F	FY					
G	2/2/74	ADDED PT INOTGC DELETED PS INOISC DELETED UNIT 2 STAMP	JB					
F	4/11/74	ADDED WTE, DS, & VALVE TABLE,	for					
E	5/1/74	CORR. INST. NOS						
J	4/17/74	RELOCATED 1' EBB-103						
S	9/17/74	REMOVED FOR UNIT 2 ADDET						
A	12/17/74	ISSUED FOR STRESS ANALYSIS						

BECHTEL
SAN FRANCISCO

LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

ISOMETRIC TURBINE BLDG. UNIT #1
MAIN STEAM PIPING (LINE 'A')

JOB No.	DRAWING No.	REV.
8031	SK-M-1502	L'



STRESS APPROVALS		
REV	THERMAL	SEISMIC
R	R24	2-27-74

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		
DES.	CHKD	ENGR	DATE
C.H.			1-3-74 / 1-11-74

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

REFERENCE
 M-41 PIPING PID
 M-01 PIPING PID
 M-368 PIPING PLAN
 EBB-104-1 REV. 26, FAB. 150
 EBB-104-2 REV. 2, FAB. 150
 CALC. 1-01-224
MODE DESCRIPTION
 MODE I - DESIGN
 MODE II - MAXIMUM

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

NO.	DATE	REVISIONS	BY	CHKD	DESIGN SUPT	CHIEF ENGR	APPV
1		INC. FCR M-6196F12V	FY				
2		REORIENTED "HV108" 16" V. FB. BATHING TO WESTSIDE PER FOR M-6196F REV. 1.	R	P.W.			
3		SEE REV. K NOTE	SAL	BJS			
4		REVALVE IMPROVED PENETLID. SEE REV N NOTE	FY	NWH			
5		ISSUED FOR UNIT 2 ADDED	WMB				
6		ISSUED FOR STRESS ANALYSIS	JT	PP	PP		

FOR UNIT-2 SEE SK-M-2716

9-LISTED

DATA	REV	DATE	BY	REV	DATE	BY	LEGEND
G.E. PIPING							● SPRING HANGER
							■ RIGID HANGER
							★ ANCHOR
28							≡ GUIDE
I							⊞ 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.	8031	DATE	1-11-74
DESIGN NO.	SK-M-1503	REV.	1

Specification
8031-P-364

Appendix C

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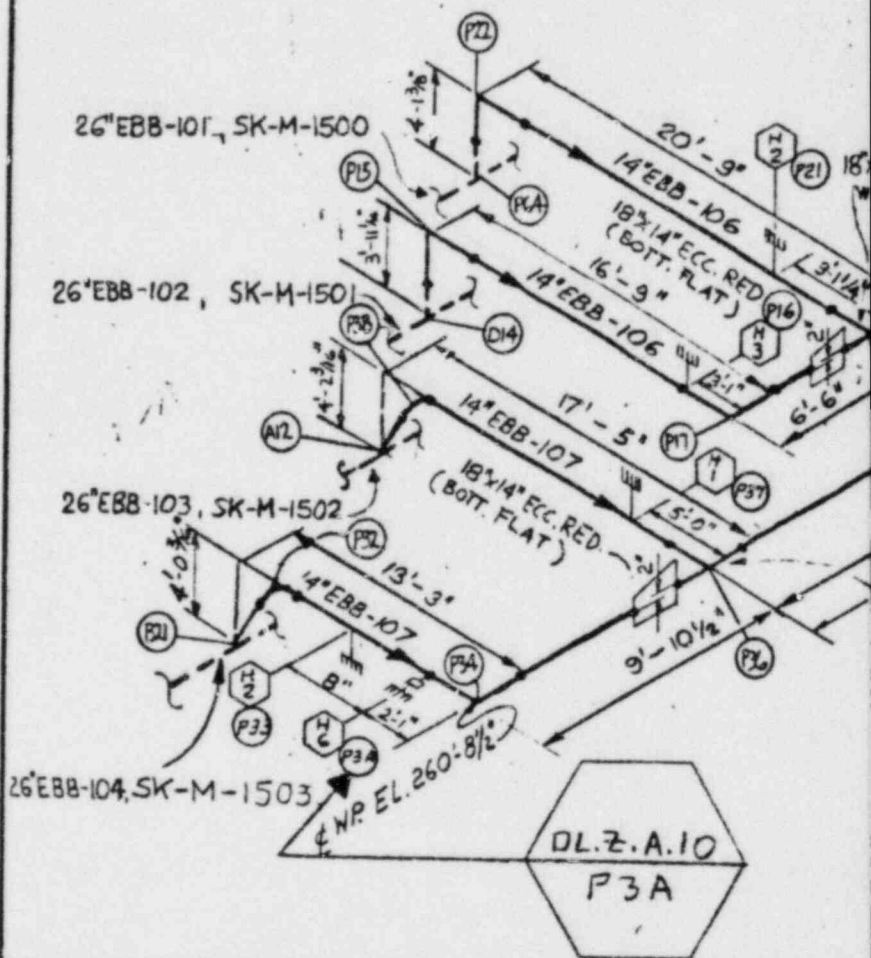
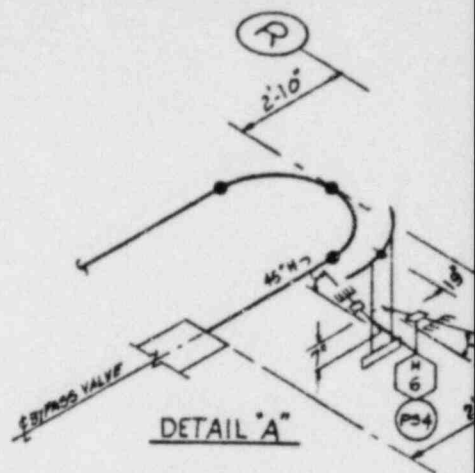
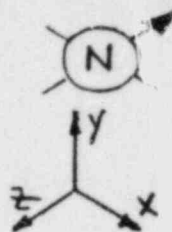
Also Available On
Aperture Card

C-13

Rev. 1

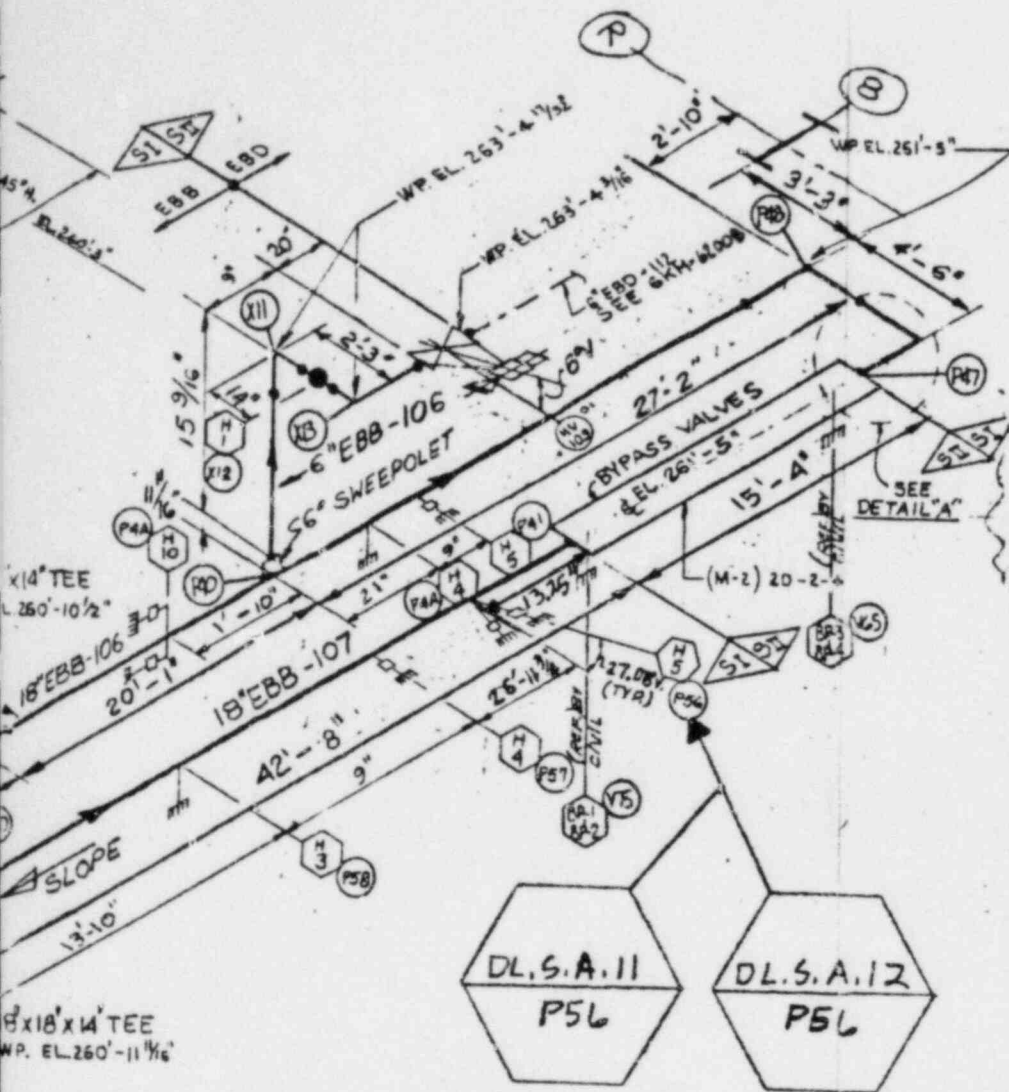
8408140326-15

①



		DATA			REV	DATE	BY	REV	DATE
PIPING ENGINEER	LINE No.	EBB-106			A	8/21/75	gbd		
	MATERIAL	SML A SME SA-106 GR B							
	LINE THICKNESS (IN)	.750	.938	.432					
MECHANICAL ENGINEER	LINE O.D. (IN)	14	18	6.625	A	8/24/75	CS/LZK		
	MODE	I	II	III					
	PRESS. PSIG								
	TEMP F								
STRESS ENGINEER	EXP. COEFF. IN/100FT								
	EXP. COEFF. MIL-IN/IN								
	MOD. OF ELAS. E PSI								

564.27



UNIT 2 EBB-206 IS SUPERSEDED
BY SKM-2752 EBB-207 BY SKM-2748

Q-LISTED

DATA	REV	DATE	BY	REV	DATE	BY	LEGEND
EBB -107	A	8/1/79	gbs				● SPRING HANGER
SML ASME SA-106 Gr B							■ RIGID HANGER
.750 .938							▲ ANCHOR
14 18	A	8/1/79	gbs				≡ GUIDE
I II III							⊥ SNUBBER
							⊥ RESTRAINT
							○ HANGER NUMBER
							○ STRESS DATA POINT

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

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

THIS STRESS ISO APPLIES AS FOLLOWS:			
UNIT No. 1 AS SHOWN	UNIT No. 2 OPP. HAND		
EBB-106	EBB-207		
EBB-107	EBB-208		
DES.	CHKD.	ENGR.	DATE
C.W.	W		
1-2-74	1-11-74		

- REFERENCE
- M-01 REV 3 P&ID
 - M-152 PIPING PLAN
 - M-368 " "
 - EBB-106-1 REV. B FAB 150
 - EBB-106-2 REV. 6 FAB 150
 - EBB-107-1 REV. 10 FAB 150
 - STRESS CALC 1-01-226

MODE DESCRIPTION

- MODE I DESIGN
- MODE II MAXIMUM

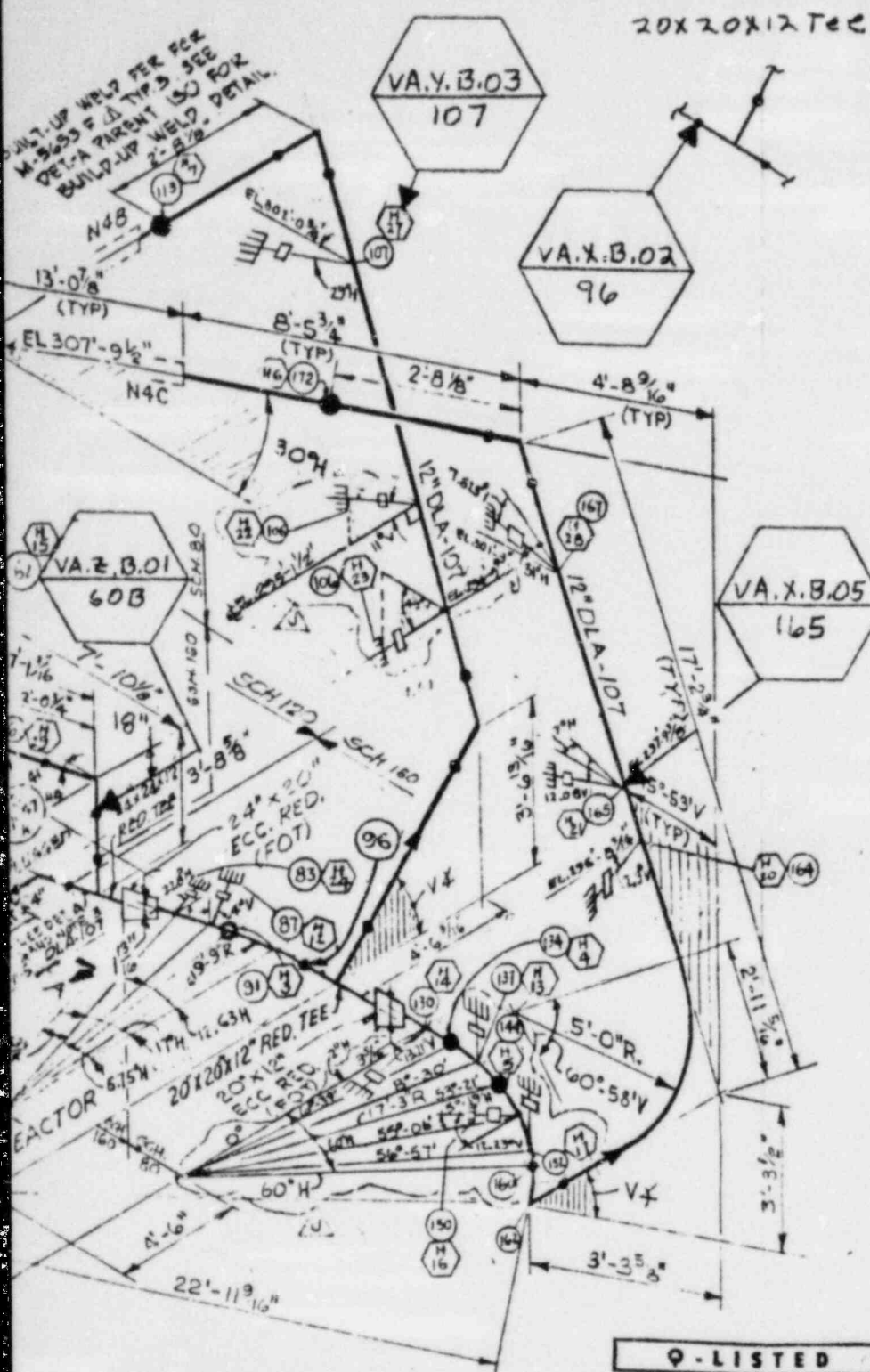
NO.	DATE	REVISIONS	BY	CHKD.	DESIGN SUPP	ENGR.	PROJ. ENGR.	APPR.
1	8/1/79	REV. 6" EBB-106 PER FCR M-6710 OF REV. 1.	FY	BR				
2	8/1/79	ROTATED HV-109 15° UPWARD PER NCD-735 ADDED SEISMIC FLAG CONTN ISO REV	W	AM				
3	8/1/79	DELETED UNIT 2 STAMP	BR	JA				
4	8/1/79	REVISED AS SHOWN	BR	W				
5	8/1/79	SEE REV H NOTE	NSH					
6	8/1/79	ISSUED FOR UNIT 2 ADDED	W	W				
7	8/1/79	ISSUED FOR STRESS ANALYSIS	W	W				

BECHTEL
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LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

ISOMETRIC TURBINE BLDG UNIT #1
MAIN STEAM BYPASS PIPING

8031 SK-M-1504 H



STRESS APPROVALS		
REV	THERMAL	SEISMIC
3	RRB	1-25-74

REV. H NOTE:

PIPE SCH. REVISED AS SHOWN PER PIPE SPOOL SHEETS. REVISED CONFIGURATION TO MATCH FAB 162 & ADDED HANGER SYMBOLS PER HANGER GROUP MARK-UP. DELETED VALVE DATA/PRESS/TEMP DATA. ADDED VALVE NO IFOIDA PER P&ID M-41 REV 22. ADDED REF FOR M14815F 8 NOTE 2 INCORP. WCA NO. 6621 REV. 1 DELETED NOTE 1. ADDED NOTE 3.

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 —

REV	DATE	DESCRIPTION	BY	CHKD	DESIGN	ENGR	APPV
J		REVISED AS SHOWN	AS	SR			
H	1/28/73	SEE REV. H NOTE	ASH	RRR	RRR	JSB	TEP
G	1/29/73	REV PERFORM 19175P	JL	WP	PP		
F	1/24/73	INCORP FCR M-5653P	SP	BJS	CHW		
E	1/24/73	SHOWN AS PER IFOIDA FOR DEM #4 (S-18-73)	ACO	CH	THU	TCR	RS
D	1/24/73	RECORRECTED NO-IFOIDA DATE INCORP. AS PER IFOIDA	SAL	ADC	THU		
C	1/24/73	REVISED NO-IFOIDA ADDED TEMP 22	AOC	AK	THU		
B	1/24/73	REVISED P&ID HEAD	J.O.	EB	PP		
A	1/25/73	ISSUED FOR STRESS ANALYSIS	J.O.	EB	PP		

Q-LISTED

DATA	REV	DATE	BY	REV	DATE	BY	LEGEND
DLA-107							● SPRING HANGER
SML ASME SA-393.07 CO	A	1/17/74	RRR				■ RIGID HANGER
1.215 1.84 1.031 .688	H						★ ANCHOR
24000 20000 12.750	A	1/17/74	RRR				≡ GUIDE
I	II	III					⊥ SNUBBER
							⊥ RESTRAINT
							○ HANGER NUMBER
							○ STRESS DATA POINT

MADE — DESIGNED — DRAWN J.O. CHECK ENGR

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

FW (1/c)

specification
8031-P-364

Appendix C

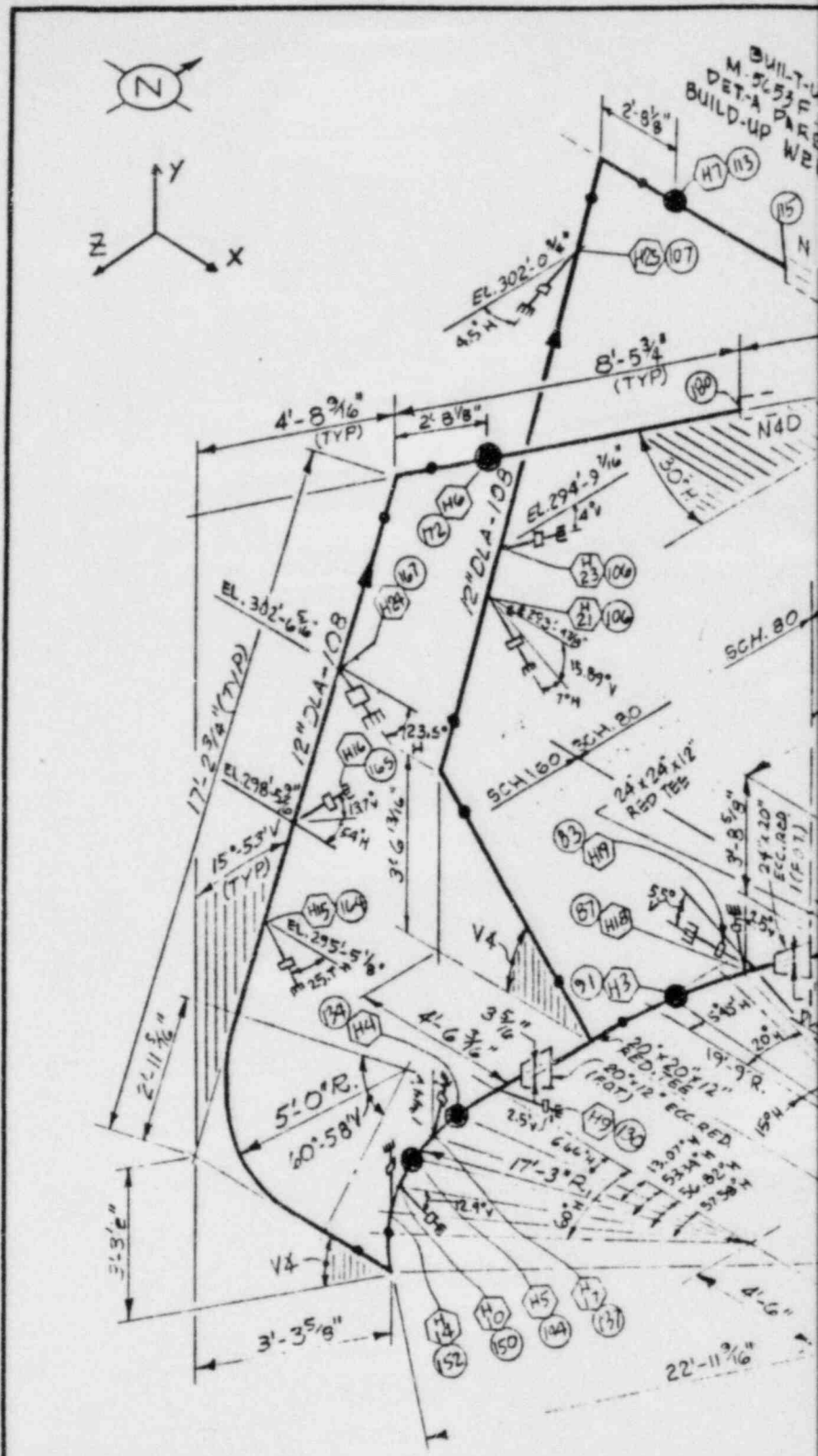
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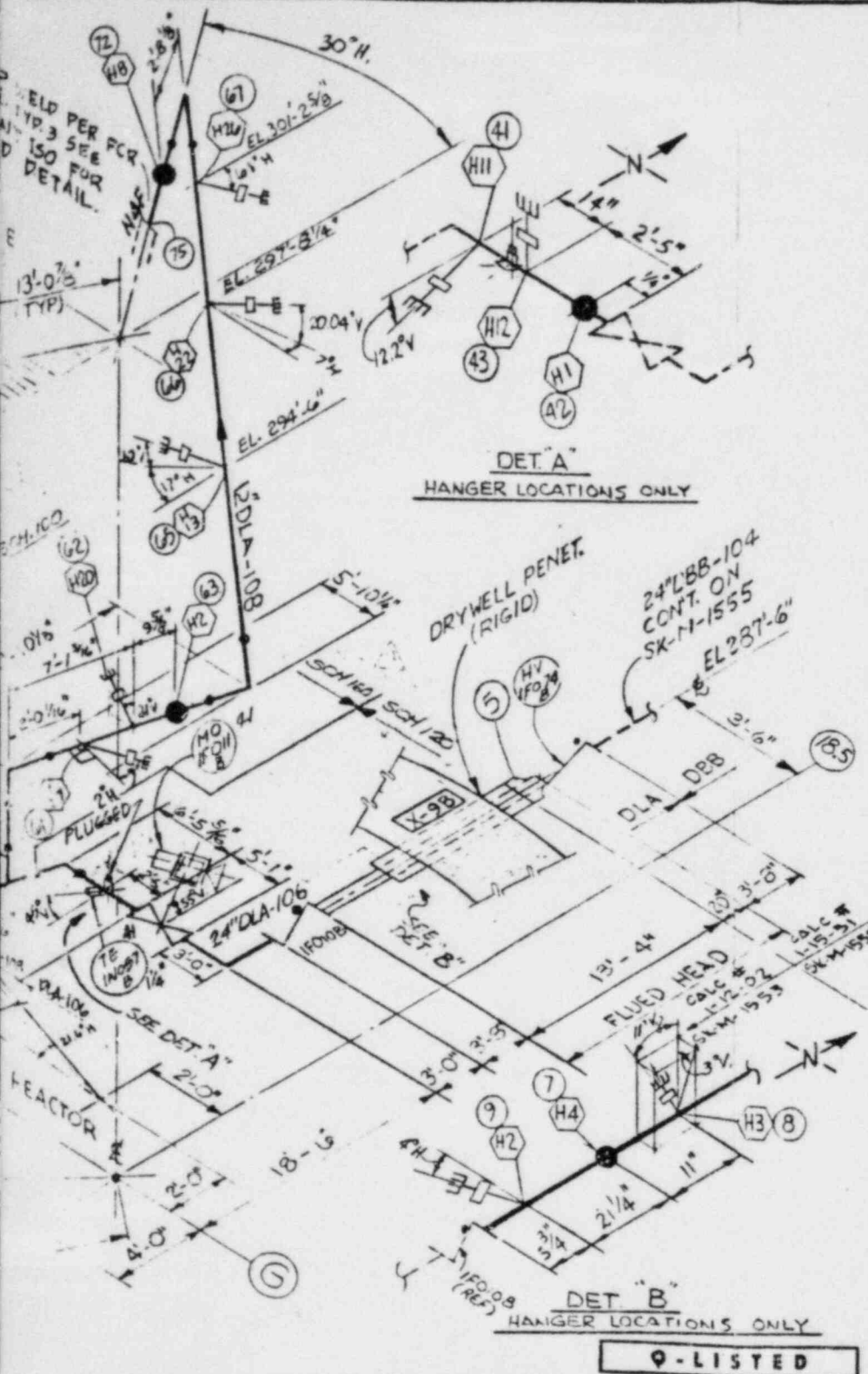
Also Available On
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C-15

Rev. 1



		DATA	REV	DATE	BY	REV	DATE
PIPING ENGINEER	LINE No.	DLA-106					
	MATERIAL	SML KNE SA-333 Gr G					
	LINE THICKNESS (IN)	1.812			A	1/17/74	202
MECHANICAL ENGINEER	LINE O. D. (IN)	24.000			A	1/17/74	202
	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	KRS	
	4-11-74	

REV. G NOTE:
 ADDED PIPE SUPPORTS & DATA POINTS FOR RECONCILIATION. DELETED PRESS./TEMP & VALVE DATA PER STRESS MARK-UP.
 INCORP. UCR 6021, ADDED VALVE N2,

CCN REV. 0
 CALC.
 NO. 1-12-02

REFERENCE

- M-41 P&ID
- M-234 PIPING PLAN
- M-235 " "
- DLA-108-1 FAB ISO REV. 17
- DLA-106-1 FAB ISO REV. 10
- STRESS CALC # 1-12-02

MODE DESCRIPTION

- MODE I - NORMAL CONDITIONS
- MODE II - MAXIMUM CONDITIONS

8408140326-17

NO.	DATE	REVISIONS	BY	CHKD	DESIGN SUPP	ENGR	POOL ENGR	APPR
G	1/11/74	SEE REV. G NOTE	FOR	RJA	JLV	JLV	JLV	JLV
F	1/11/74	REV. PER FORM 1517AF	JL	VW	JLV	JLV	JLV	JLV
E	1/11/74	INCORP. FROM 5039F (1)	SP	EJS	JLV	JLV	JLV	JLV
D	1/11/74	REORIENTED MOIFOLI & RELOCATED TRINCP7P	SAL	ADC	JLV	JLV	JLV	JLV
C	1/11/74	REVISED VLV'S AS SHOWN	AOC	JLV	JLV	JLV	JLV	JLV
B	1/11/74	REVISED FLUED HEAD & PIPING	J.O.	JLV	JLV	JLV	JLV	JLV
A	1/11/74	ISSUED FOR STRESS ANL	J.O.	JLV	JLV	JLV	JLV	JLV

9-LISTED

DATA	REV	DATE	BY	REV	DATE	BY	LEGEND
DLA-108							● SPRING HANGER
SMC ASME SA-337 Gr. G	A	1/11/74	JLV				■ RIGID HANGER
1.218 1.031 .687	G						▲ ANCHOR
24.000 20.000 12.750	A	1/11/74	JLV				≡ GUIDE
I II III							⊞ SNUBBER
							⊞ RESTRAINT

SCALE ———

DESIGNED ——— DRAWN J.O. CHIEF ENGR

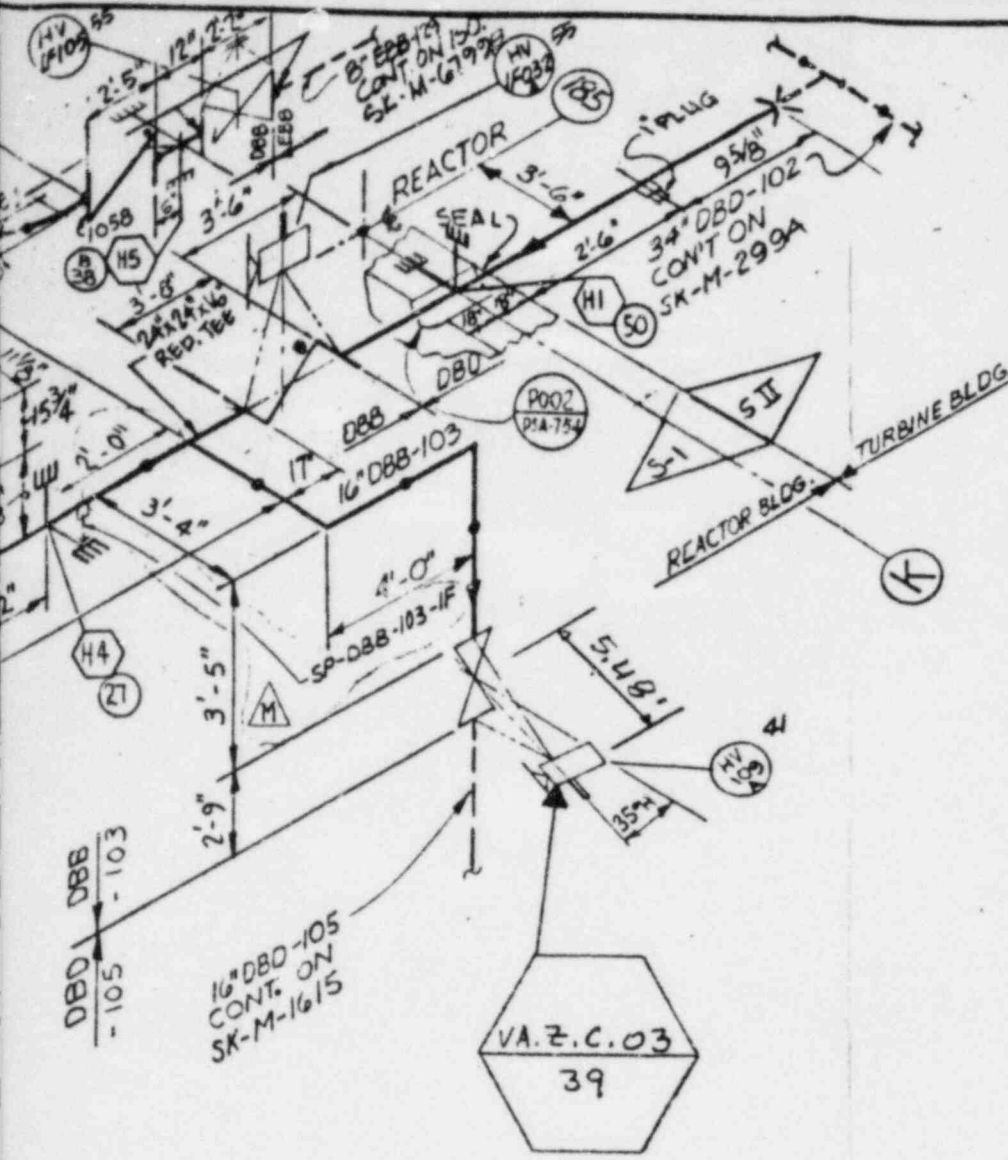
BECHTEL
 SAN FRANCISCO

LIMERICK GENERATING STATION
 UNITS 1 & 2
 PHILADELPHIA ELECTRIC COMPANY

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

JOB NO.	DRAWING NO.	REV.
8031	SK-M-1553	G

FW (1/C)



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Q-LISTED

DATA	REV	DATE	BY	REV	DATE	BY	LEGEND
DBD-103							● SPRING HANGER
SML ASTM A-106 Gr B	B	4/15/74	ABZ				■ RIGID HANGER
1.812	—	—	B	4/15/74	ABZ		⊕ ANCHOR
24.000	—	—	B	4/15/74	ABZ		≡ GUIDE
I	II	III					⊞ SNUBBER
							⊞ RESTRAINT
							○ HANGER NUMBER
							○ STRESS DATA POINT

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 1/4"), 2'-11 1/8" (WAS 2'-3 1/8"), 3'-8 3/8" (WAS 4'-8 7/8").
 INCORP FOR M-15, 304F

REV. M NOTE:
 REVISED DATA POINT B-38 (WAS 38) 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-i REV 9 FAB ISO
 - DBB-103-i REV 14 FAB ISO

MODE DESCRIPTION

MODE I—NORMAL CONDITIONS

MODE II—MAXIMUM CONDITIONS

MODE III —

8408140326-18

REV	DATE	REVISIONS	BY	CHKD	DESIGN	ENGR	APPV
H	1/14	REVISED AT CHECKS	JB	ALG	ES		
M		SEE REV. M NOTE		ES			
L		SEE REV. L NOTE	DD	PF	ES		
K		INCORP FOR MISDBB	SS	YB	ES		
J		INCORP FOR MISDBB	PLD	NY	ES		
A		REQUIRED FOR STRESS ANAL	J.O.	VB	ES		

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LIMERICK GENERATING STATION
 UNITS 1 & 2
 PHILADELPHIA ELECTRIC COMPANY

ISOMETRIC - REACTOR BUILDING
 FEEDWATER UNIT #1

JOB NO.	8031	DRAWING NO.	SK-M-1554	REV.	M
				FW STM TUNNEL	

specification

8031-P-364

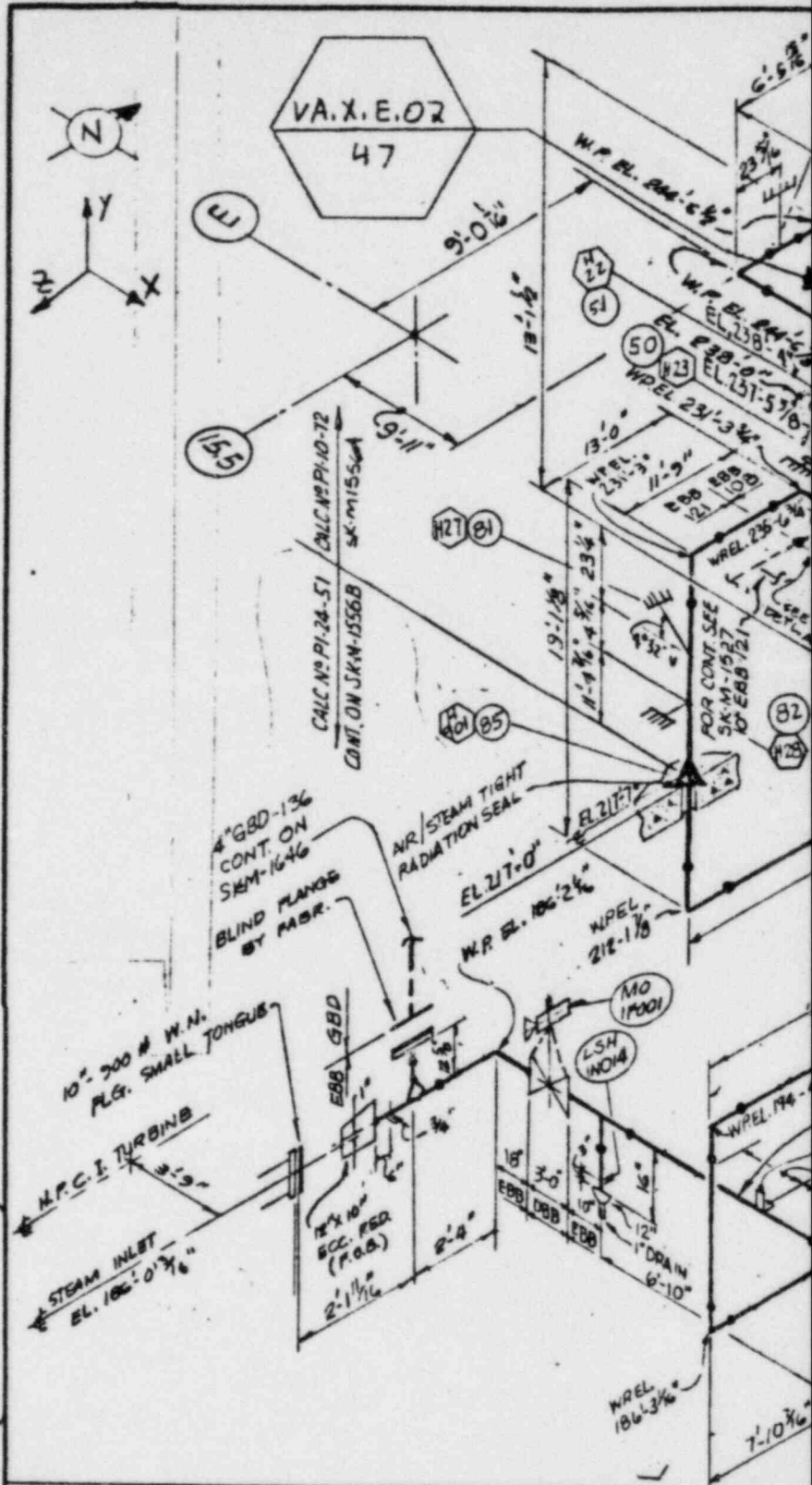
Appendix C

Also Available On
Aperture Card

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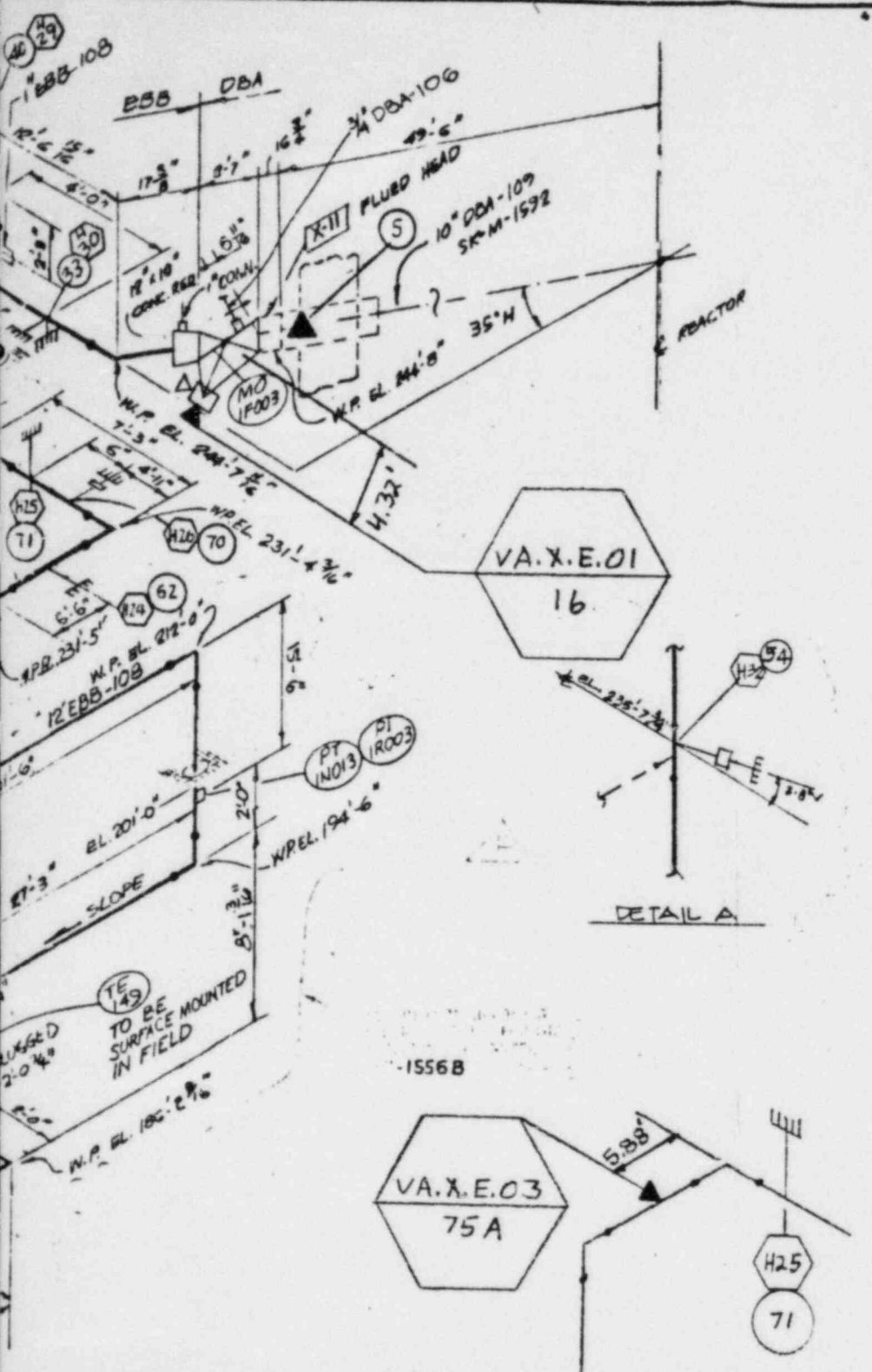
C-18

Rev. 1



CCN REV 0
CALC. PI-10-72
NO

		DATA		REV	DATE	BY	REV	DATE
PIPING ENGINEER	LINE No.	EBB-108		E	2-17-77	RPK		
	MATERIAL	SML. ASME SA-106, ER B		E	2-17-77	RPK		
	LINE THICKNESS (IN)	.688	.594	E	2-17-77	RPK		
MECHANICAL ENGINEER	LINE O.D. (IN)	12.750	10.750	E	2-17-77	RPK		
	MODE	I	II	III				
	PRESS. PSIG							
STRESS ENGINEER	TEMP F							
	EXP. COEFF. IN/100FT							
	EXP. COEFF. MIL-IN/IN							
	MOD. OF ELAS. E PSI							



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 1/4" WAS 8'-3 1/4"

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 PI-10-72.

M-55 P&ID
M-227 PIPING PLAN
M-228 " "
M-229 " "

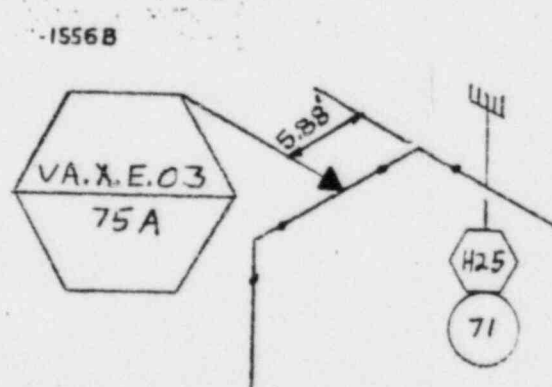
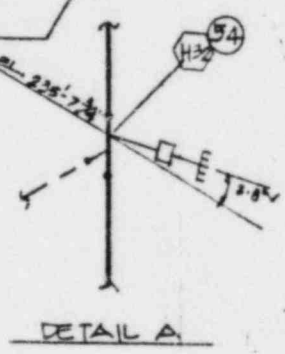
EBB-108-1 REV.14 FAB.150.
EBB-108-2 REV.20 " "

MODE DESCRIPTION

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

8408140326-20

P	Y	REVISED PER	BY	SR	REV.	DATE	CHK	DATE
N	11/90	SEE REV N NOTE	OL	REV	11/90	11/90		
M	2/88	REV PER P&ID M-55	SRT	REV	2/88	2/88		
L	4/81	SEE REV L NOTE	SP	REV	4/81	4/81		
A	9/79	ADDED 1" CONN ON 12" x 10" CONC. RED.	PV	REV	9/79	9/79		
A	8/78	INC. FOR M-4034F	JBR	REV	8/78	8/78		
M	1/77	RELEASED HOLD PER EMP-4737	BT	REV	1/77	1/77		
B	10/76	PUT IN HOLD FOR CONC. RED.	JBR	REV	10/76	10/76		
F	3/75	SEE REV F NOTE	SAL	REV	3/75	3/75		
E	1/77	RE-DRAWN, ADDED INST'N & REV. VALVE DATA	LTL	REV	1/77	1/77		



BY	DATA	REV	DATE	BY	REV	DATE	BY	LEGEND
								● SPRING HANGER
								■ RIGID HANGER
								▲ ANCHOR
								≡ GUIDE
I	II	III						⊕ SNUBBER
								⊥ RESTRAINT
								○ HANGER NUMBER
								○ STRESS DATA POINT

SCALE: DESIGNED: DRAWN: L. LABAGO

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LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

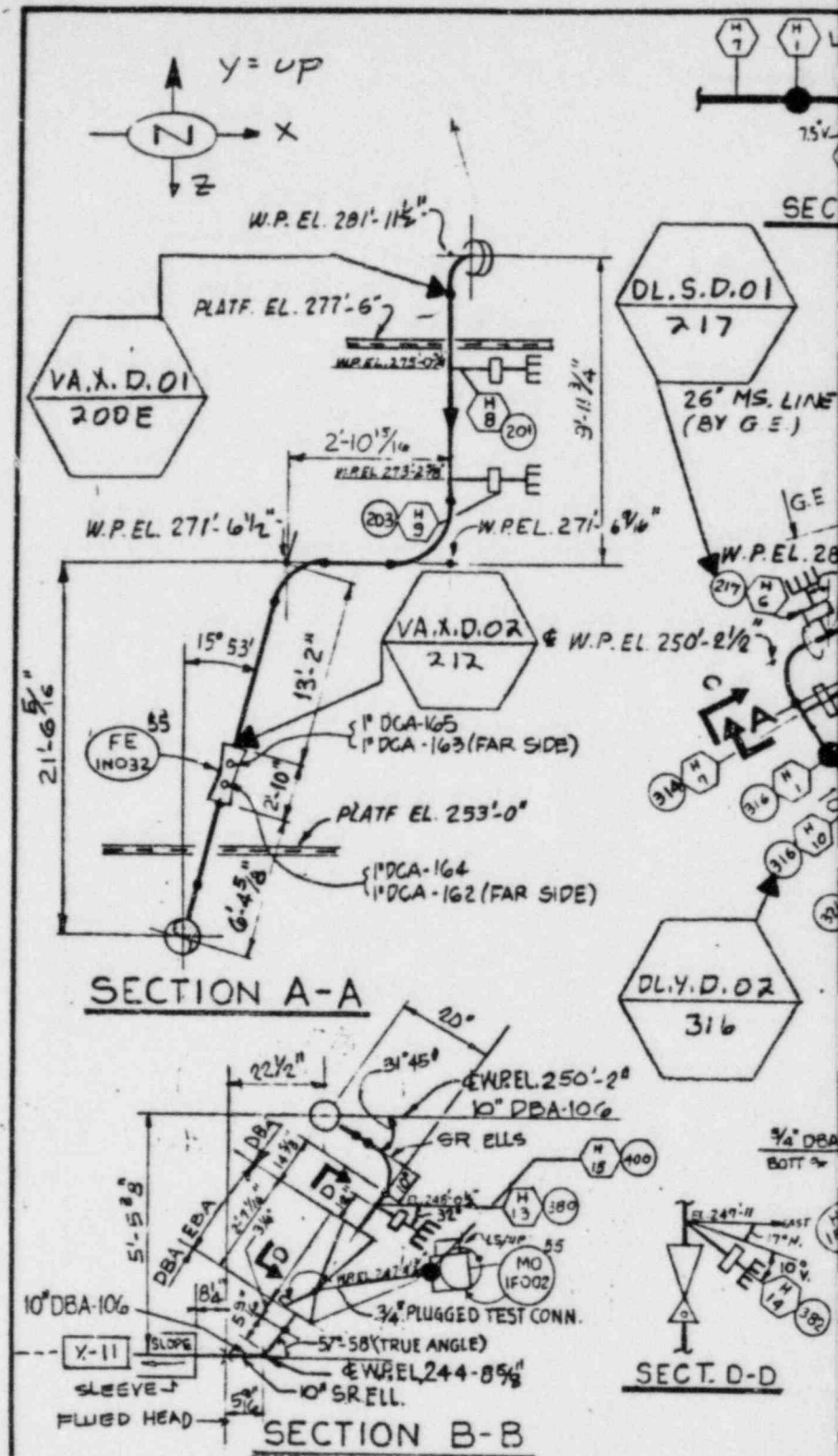
ISOMETRIC - REACTOR BUILDING
HIGH PRESSURE COOLANT INJECTION
UNIT I

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

(O/C) HPCI STEAM

Specification
8031-P-364

Appendix C



Also Available On
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C-20

8408140326-22

Rev. 1

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

Specification
8031-P-364

Appendix C

Also Available On
Aperture Card

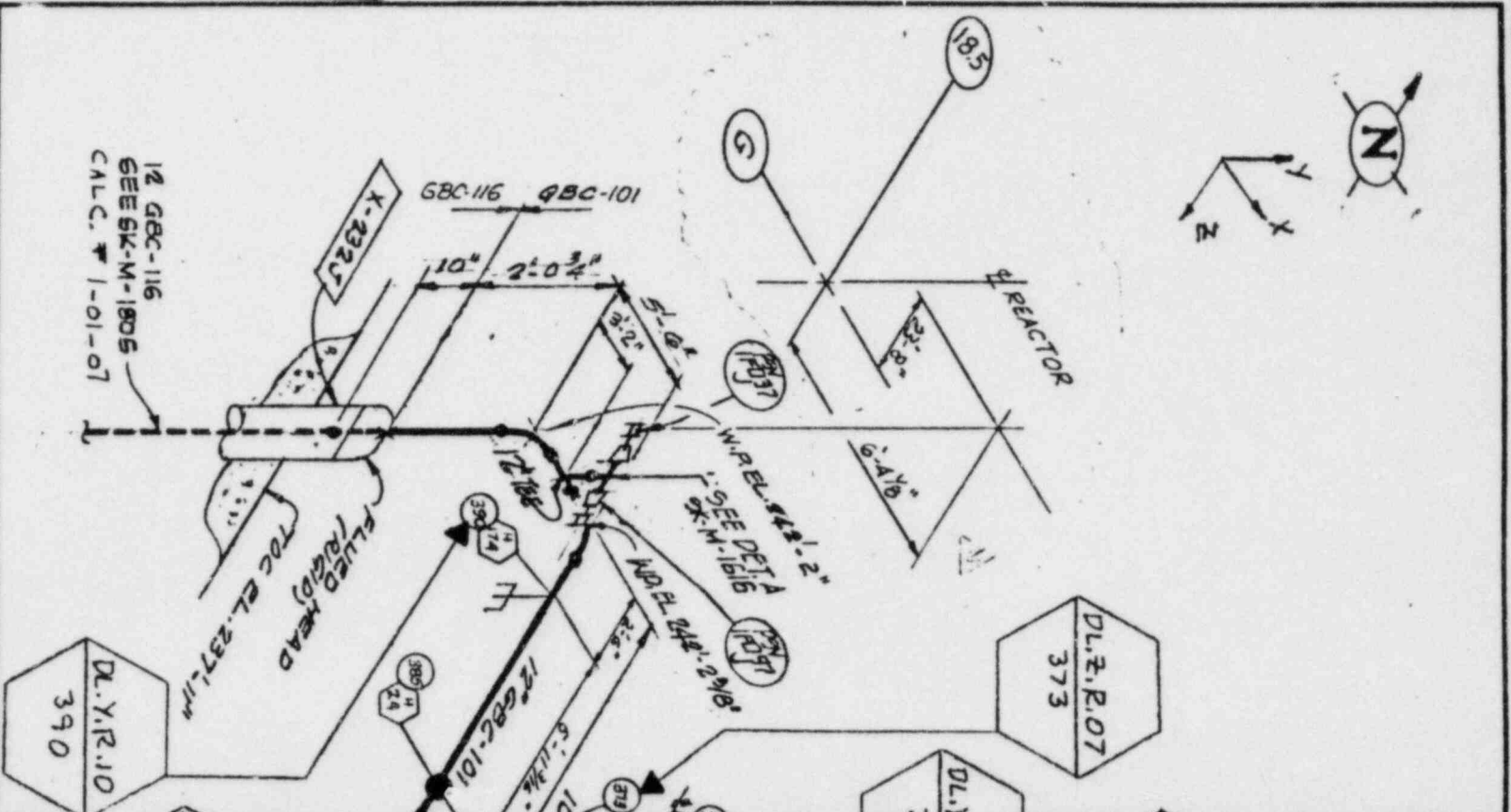
TI
APERTURE
CARD

C-21

Rev. 1

Supersedes SK-M-996

CCN REV 0
CALC.
NO 1-01-01



STRESS ENGINEER		MECHANICAL ENGINEER		PIPING ENGINEER		DATA		REV	DATE	BY	REV	DATE
LINE NO.		LINE NO.		LINE NO.		LINE NO.	GBC-101					
MATERIAL		MATERIAL	SM L AGME SA-106 GRB	MATERIAL		MATERIAL						
LINE THICKNESS (IN)		LINE THICKNESS (IN)	.375	LINE THICKNESS (IN)		LINE THICKNESS (IN)						
LINE O.D. (IN)		LINE O.D. (IN)	18.750	LINE O.D. (IN)		LINE O.D. (IN)						
MODE		MODE	I II III	MODE		MODE						
PRESS. PSIG		PRESS. PSIG		PRESS. PSIG		PRESS. PSIG						
TEMP F		TEMP F		TEMP F		TEMP F						
EXP. COEFF. IN/100FT		EXP. COEFF. IN/100FT		EXP. COEFF. IN/100FT		EXP. COEFF. IN/100FT						
EXP. COEFF. MIL-IN/IN		EXP. COEFF. MIL-IN/IN		EXP. COEFF. MIL-IN/IN		EXP. COEFF. MIL-IN/IN						
MOD. OF ELAS. E PSI		MOD. OF ELAS. E PSI		MOD. OF ELAS. E PSI		MOD. OF ELAS. E PSI						

DL.Y.R.10
390

DL.E.P.07
373



STRESS APPROVALS		
REV	THERMAL	SEISMIC

REV. H NOTE:
REV. CONT ISO FROM GCC-104 TO GBC-116.

REV. L NOTE:
REVISED DIMENSIONS TO AGREE WITH FAB. ISO.

REV. M. NOTE:
REV. PER FCR M-11840F.

REV. N. NOTE:
ADDED PIPE SUPPORTS AND DATA POINTS FOR RECONCILIATION, DELETED PRESS. & TEMP. DATA PER STRESS GROUP MARK-UP. REVISED AS INDICATED. ADDED REF. FCR M16484F.

REV. F NOTE:
2'-11" WAS 2'-9". ADDED REV IF037J & IF037J PER PAID M-41 REV. 8.

REV. G NOTE:
REVISED DIM. 3'-2" WAS 2'-11" PER FIELD REQUEST. REFERENCE

M-41 P & ID
M-213 PIPING PLAN
M-225 PIPING PLAN
M-226 PIPING PLAN
GBC-101-12, REV. 13) FAB. 160.
FCR M16484F

CALL NO. 1-01-01

MODE DESCRIPTION
MODE I - NORMAL RELIEF VALVE OPERATION
MODE II - MAXIMUM

8408140326-23

N	SEE REV. N NOTE	ASH					
H	SEE REV. H NOTE	FY					
M	SEE REV. M. NOTE	FY					
L	SEE REV. L NOTE	SP					
K	REV. PRESS & TEMP PER P-300	SP					
C	ISSUED FOR VOID PER ETE-1089 12-1-76	BW					
B	ISSUED FOR VOID PER REV. 1 11-1-76	MEA					
A	ISSUED FOR STRESS ANALYSIS	EB					

Q-LISTED

BY	DATA	REV	DATE	BY	REV	DATE	BY	LEGEND
								● SPRING HANGER
								■ RIGID HANGER
								★ ANCHOR
								≡ GUIDE
I	II	III						⊕ SNUBBER
								⊥ RESTRAINT
								○ HANGER NUMBER
								○ STRESS DATA POINT

SCALE NONE

DESIGNED BY CHOK

DRAWN C.B. BAYLOT

CHECKED

BECHTEL
SAN FRANCISCO

LIMERICK GENERATING STATION
UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

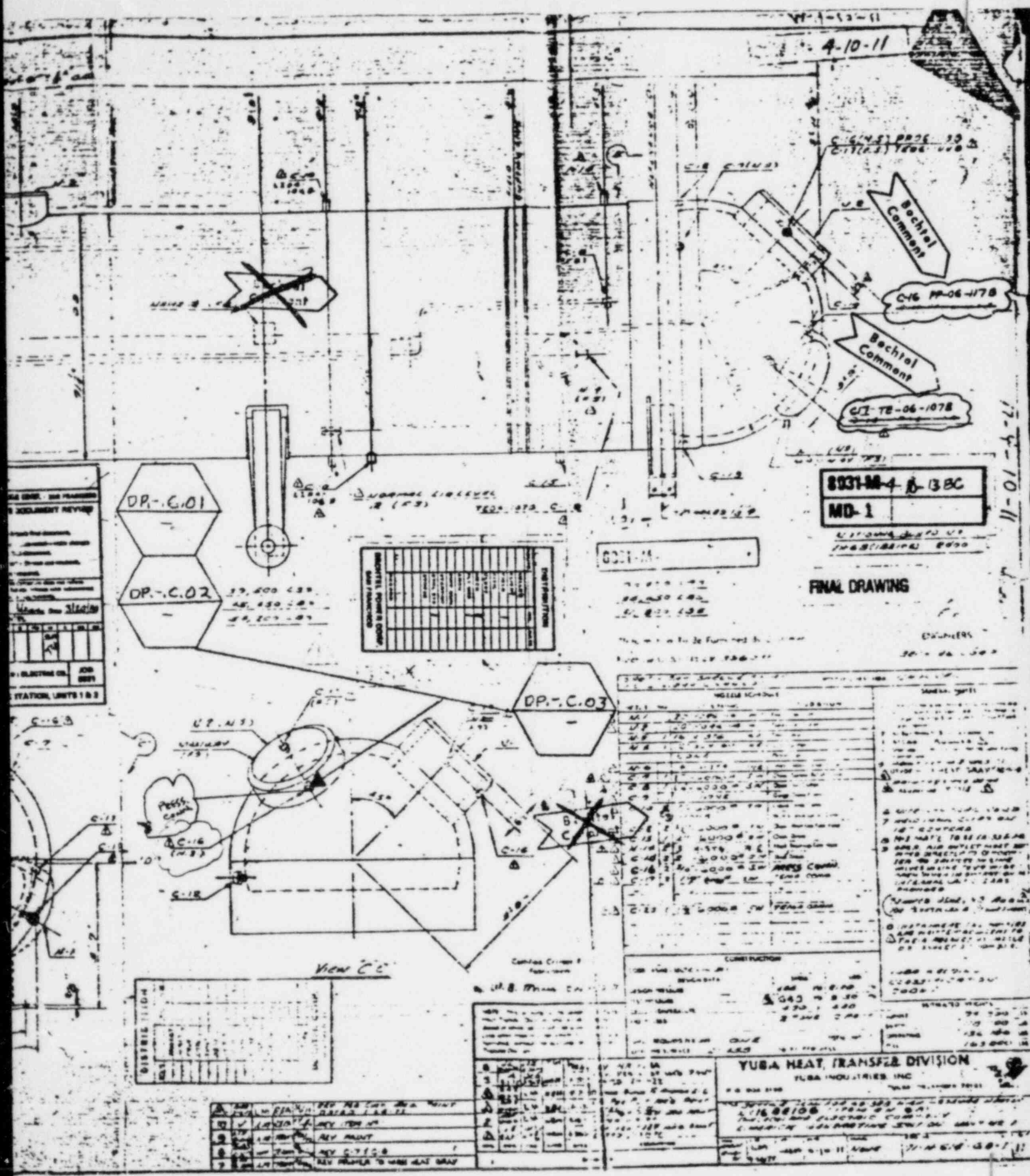
ISOMETRIC - REACTOR BLDG.
MAIN STEAM UNIT #1

JOB NO.	DRAWING NO.	REV.
8031	GK-M-1794	N

MSRVD

Specification 8031-P-364
Appendix - C

4-10-11



8031-P-4-B-3BC
MD-1

FINAL DRAWING

NO.	DESCRIPTION	QUANTITY	UNIT	REMARKS
1	PIPE 1/2" SCH 40	100	FT	
2	PIPE 3/4" SCH 40	50	FT	
3	PIPE 1" SCH 40	20	FT	
4	PIPE 1 1/2" SCH 40	10	FT	
5	PIPE 2" SCH 40	5	FT	
6	PIPE 3" SCH 40	2	FT	
7	PIPE 4" SCH 40	1	FT	
8	PIPE 6" SCH 40	1	FT	
9	PIPE 8" SCH 40	1	FT	
10	PIPE 10" SCH 40	1	FT	
11	PIPE 12" SCH 40	1	FT	
12	PIPE 14" SCH 40	1	FT	
13	PIPE 16" SCH 40	1	FT	
14	PIPE 18" SCH 40	1	FT	
15	PIPE 20" SCH 40	1	FT	
16	PIPE 24" SCH 40	1	FT	
17	PIPE 30" SCH 40	1	FT	
18	PIPE 36" SCH 40	1	FT	
19	PIPE 42" SCH 40	1	FT	
20	PIPE 48" SCH 40	1	FT	
21	PIPE 54" SCH 40	1	FT	
22	PIPE 60" SCH 40	1	FT	
23	PIPE 72" SCH 40	1	FT	
24	PIPE 84" SCH 40	1	FT	
25	PIPE 96" SCH 40	1	FT	
26	PIPE 108" SCH 40	1	FT	
27	PIPE 120" SCH 40	1	FT	
28	PIPE 144" SCH 40	1	FT	
29	PIPE 168" SCH 40	1	FT	
30	PIPE 192" SCH 40	1	FT	
31	PIPE 216" SCH 40	1	FT	
32	PIPE 240" SCH 40	1	FT	
33	PIPE 270" SCH 40	1	FT	
34	PIPE 300" SCH 40	1	FT	
35	PIPE 324" SCH 40	1	FT	
36	PIPE 360" SCH 40	1	FT	
37	PIPE 408" SCH 40	1	FT	
38	PIPE 456" SCH 40	1	FT	
39	PIPE 504" SCH 40	1	FT	
40	PIPE 540" SCH 40	1	FT	
41	PIPE 576" SCH 40	1	FT	
42	PIPE 612" SCH 40	1	FT	
43	PIPE 648" SCH 40	1	FT	
44	PIPE 684" SCH 40	1	FT	
45	PIPE 720" SCH 40	1	FT	
46	PIPE 756" SCH 40	1	FT	
47	PIPE 792" SCH 40	1	FT	
48	PIPE 828" SCH 40	1	FT	
49	PIPE 864" SCH 40	1	FT	
50	PIPE 900" SCH 40	1	FT	
51	PIPE 936" SCH 40	1	FT	
52	PIPE 972" SCH 40	1	FT	
53	PIPE 1008" SCH 40	1	FT	
54	PIPE 1044" SCH 40	1	FT	
55	PIPE 1080" SCH 40	1	FT	
56	PIPE 1116" SCH 40	1	FT	
57	PIPE 1152" SCH 40	1	FT	
58	PIPE 1188" SCH 40	1	FT	
59	PIPE 1224" SCH 40	1	FT	
60	PIPE 1260" SCH 40	1	FT	
61	PIPE 1296" SCH 40	1	FT	
62	PIPE 1332" SCH 40	1	FT	
63	PIPE 1368" SCH 40	1	FT	
64	PIPE 1404" SCH 40	1	FT	
65	PIPE 1440" SCH 40	1	FT	
66	PIPE 1476" SCH 40	1	FT	
67	PIPE 1512" SCH 40	1	FT	
68	PIPE 1548" SCH 40	1	FT	
69	PIPE 1584" SCH 40	1	FT	
70	PIPE 1620" SCH 40	1	FT	
71	PIPE 1656" SCH 40	1	FT	
72	PIPE 1692" SCH 40	1	FT	
73	PIPE 1728" SCH 40	1	FT	
74	PIPE 1764" SCH 40	1	FT	
75	PIPE 1800" SCH 40	1	FT	
76	PIPE 1836" SCH 40	1	FT	
77	PIPE 1872" SCH 40	1	FT	
78	PIPE 1908" SCH 40	1	FT	
79	PIPE 1944" SCH 40	1	FT	
80	PIPE 1980" SCH 40	1	FT	
81	PIPE 2016" SCH 40	1	FT	
82	PIPE 2052" SCH 40	1	FT	
83	PIPE 2088" SCH 40	1	FT	
84	PIPE 2124" SCH 40	1	FT	
85	PIPE 2160" SCH 40	1	FT	
86	PIPE 2196" SCH 40	1	FT	
87	PIPE 2232" SCH 40	1	FT	
88	PIPE 2268" SCH 40	1	FT	
89	PIPE 2304" SCH 40	1	FT	
90	PIPE 2340" SCH 40	1	FT	
91	PIPE 2376" SCH 40	1	FT	
92	PIPE 2412" SCH 40	1	FT	
93	PIPE 2448" SCH 40	1	FT	
94	PIPE 2484" SCH 40	1	FT	
95	PIPE 2520" SCH 40	1	FT	
96	PIPE 2556" SCH 40	1	FT	
97	PIPE 2592" SCH 40	1	FT	
98	PIPE 2628" SCH 40	1	FT	
99	PIPE 2664" SCH 40	1	FT	
100	PIPE 2700" SCH 40	1	FT	

YUBA HEAT TRANSFER DIVISION
YUBA INDUSTRIES, INC.
11688106
YUBA HEAT TRANSFER DIVISION

APPENDIX D
Scoping P&ID's

LIST OF SCOPING P&ID's:

<u>P&ID's No.</u>	<u>Title</u>
M-01	Main Steam
M-04	Vents and Drains Heaters 3, 4, 5 and 6
M-06	Feedwater
M-41	Nuclear Boiler
M-55	High Pressure Coolant Injection
M-56	HPCI Pump Turbine

COMMENTS
 8-27/57/57

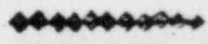
CHANGES LISTED IN-80-1074/R/C FROM
 DIAGRAMS RETURNED TO PISTON
 MOUNTED. SHOWN THE HEATERS
 RETURNED FOR ABOVE VALUES. PER
 SEP 2011 WITH 1003 000.
 MAJOR NOTE: 1 PER SEP 2011 WITH
 1003 000.

C-3

9-31 1217/80

specification
 8031-P-364
 Appendix D

Note: Piping subject
 to Dynamic
 Transient
 testing is
 denoted as
 follows.

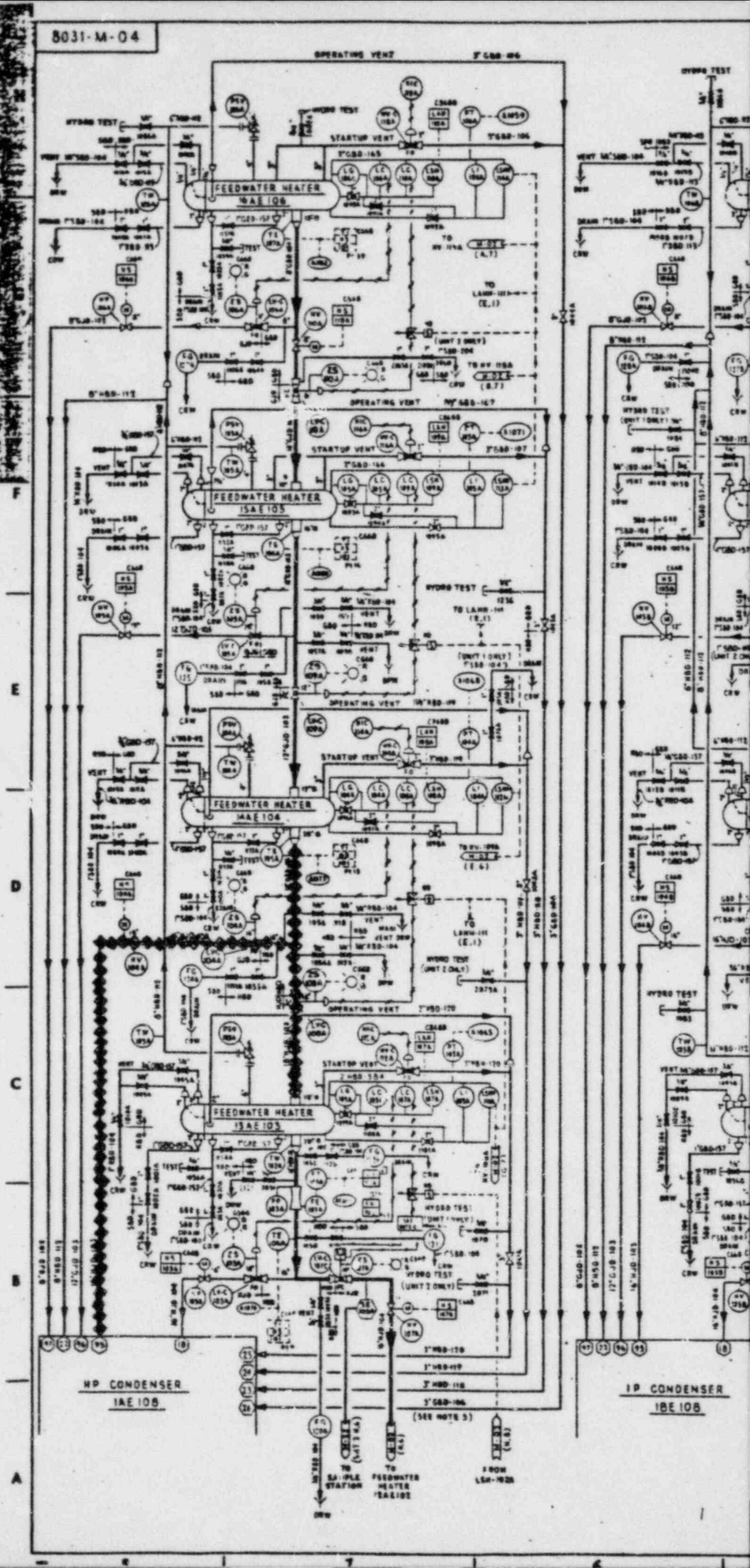


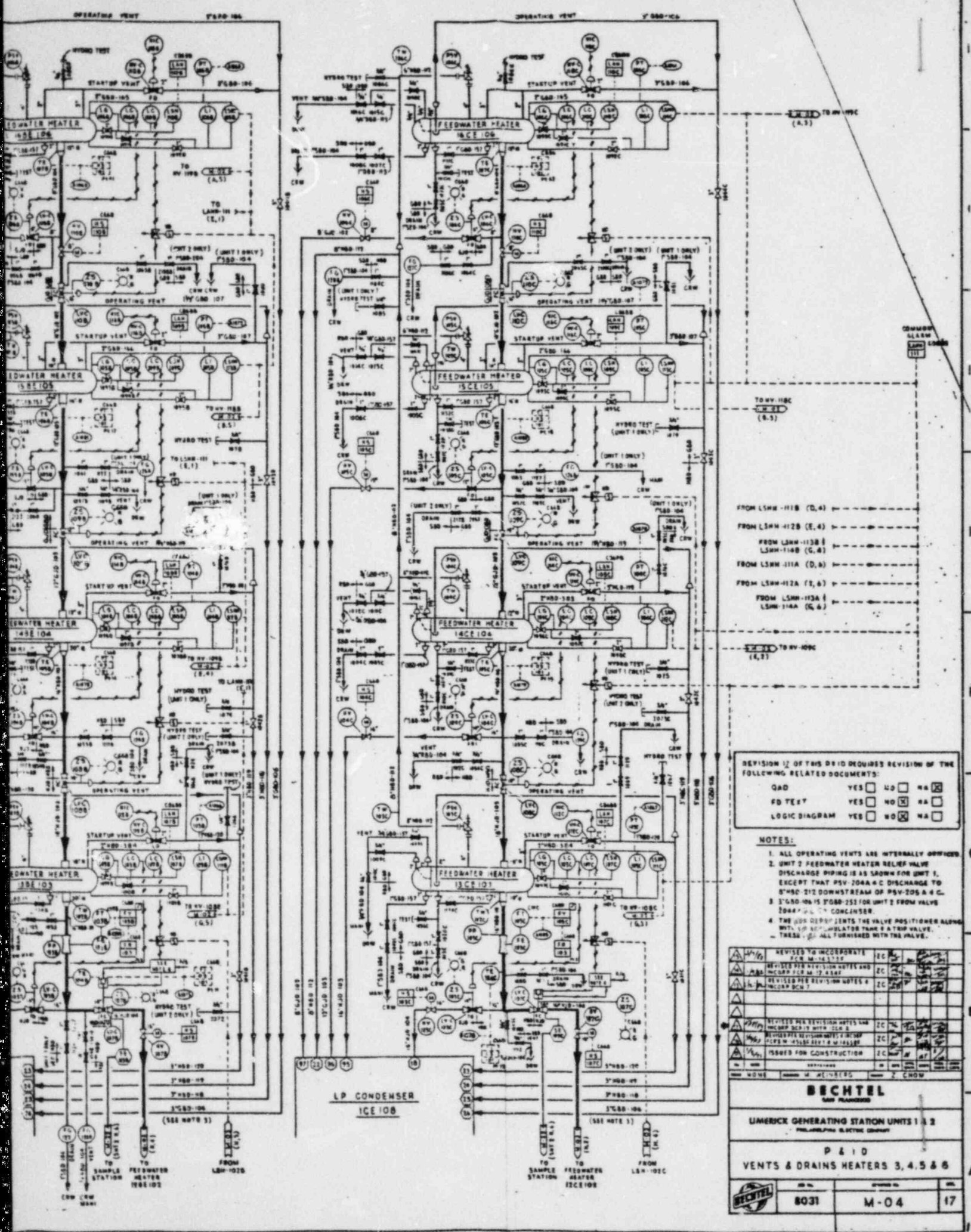
Also Available On
 Aperture Card

TI
 APERTURE
 CARD

8408140326-26

D-3 Rev. 0





TO HY-106 (A.3)

TO HY-106 (B.3)

- FROM LSH-111B (D.4)
- FROM LSH-112B (E.4)
- FROM LSH-113B & LSH-114B (G.4)
- FROM LSH-111A (D.4)
- FROM LSH-112A (E.4)
- FROM LSH-113A & LSH-114A (G.4)

TO HY-106 (L.3)

REVISION 12 OF THIS P&ID REQUIRES REVISION OF THE FOLLOWING RELATED DOCUMENTS:

QAD	YES	<input type="checkbox"/>	NO	<input type="checkbox"/>	NA	<input checked="" type="checkbox"/>
FD TEST	YES	<input type="checkbox"/>	NO	<input type="checkbox"/>	NA	<input type="checkbox"/>
LOGIC DIAGRAM	YES	<input type="checkbox"/>	NO	<input checked="" type="checkbox"/>	NA	<input type="checkbox"/>

- NOTES:
- ALL OPERATING VENTS ARE INTERNALLY ORIFITED
 - UNIT 2 FEEDWATER HEATER RELIEF DISCHARGE PIPING IS AS SHOWN FOR UNIT 1, EXCEPT THAT PSV-204A & C DISCHARGE TO 5"HD-212 DOWNSTREAM OF PSV-205 & 4 C.
 - 5"HD-106 IS 5"OD-252 FOR UNIT 2 FROM VALVE 204A & C CONCISER.
 - THE 100% RELIEF VALVE POSITIONER ALONG WITH 5"HD-212 OPERATOR TRAMP & A TRIP VALVE, TRAMP & ALL FURNISHED WITH THE VALVE.

NO.	REVISION	DESCRIPTION	DATE	BY	CHKD.
1	REVISED TO INCORPORATE FOR M-10-100	EC			
2	REVISED FOR REVISION NOTES AND RECORD FOR M-10-100	EC			
3	REVISED FOR REVISION NOTES & RECORD FOR M-10-100	EC			
4	REVISED FOR REVISION NOTES AND RECORD FOR M-10-100	EC			
5	REVISED FOR REVISION NOTES AND RECORD FOR M-10-100	EC			
6	ISSUED FOR CONSTRUCTION	EC			

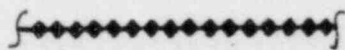
BECHTEL
SAY PLANNING

UMERCK GENERATING STATION UNITS 1 & 2
PHILADELPHIA ELECTRIC COMPANY

P & I D
VENTS & DRAINS HEATERS 3, 4, 5 & 6

NO. 8031	M-04	17
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NOTE: Piping subjected to
 DYNAMIC TRANSIENT
 testing is denoted as
 follows:

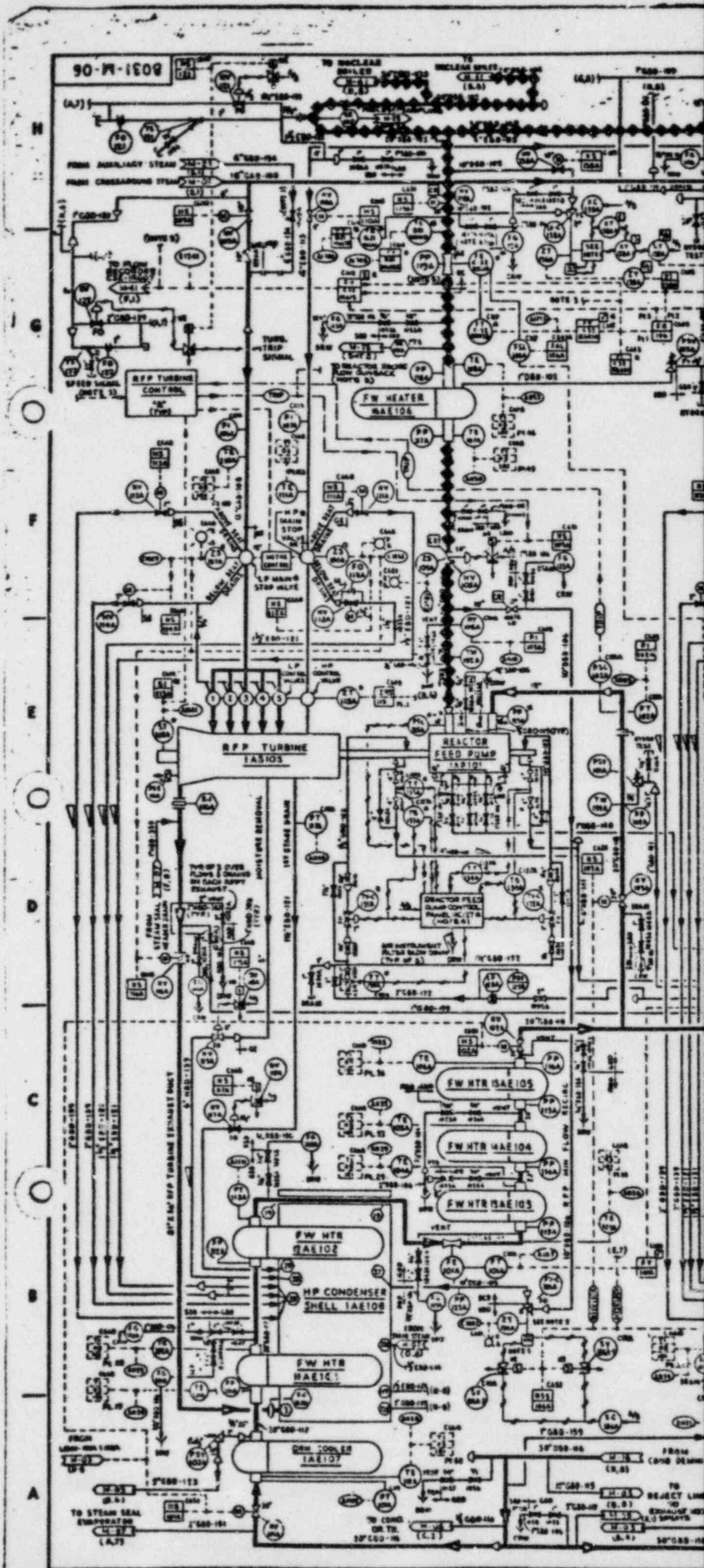


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 APERTURE
 CARD

Also Available On
 Aperture Card

D-4 Rev. 0

8408140326-27

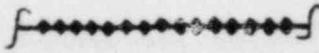


8031-M-41

TABLE III

VALVE	INPUT NO.	VALVE	INPUT NO.
W013A	E1052	W023	E1276
W013B	E1053	W024	E1275
W013C	E1054	W025	E1274
W013D	E1055	W026	E1273
W013E	E1056	W027	E1272
W013F	E1057	W028	E1271
W013G	E1058	W029	E1270
W013H	E1059	W030	E1269
W013I	E1060	W031	E1268
W013J	E1061	W032	E1267
W013K	E1062	W033	E1266
W013L	E1063	W034	E1265
W013M	E1064	W035	E1264
W013N	E1065	W036	E1263
W013O	E1066	W037	E1262
W013P	E1067	W038	E1261
W013Q	E1068	W039	E1260
W013R	E1069	W040	E1259
W013S	E1070	W041	E1258
W013T	E1071	W042	E1257
W013U	E1072	W043	E1256
W013V	E1073	W044	E1255
W013W	E1074	W045	E1254
W013X	E1075	W046	E1253
W013Y	E1076	W047	E1252
W013Z	E1077	W048	E1251

NOTE: Piping subjected to DYNAMIC TRANSIENT testing is denoted as follows:



Also Available On Aperture Card

TI APERTURE CARD

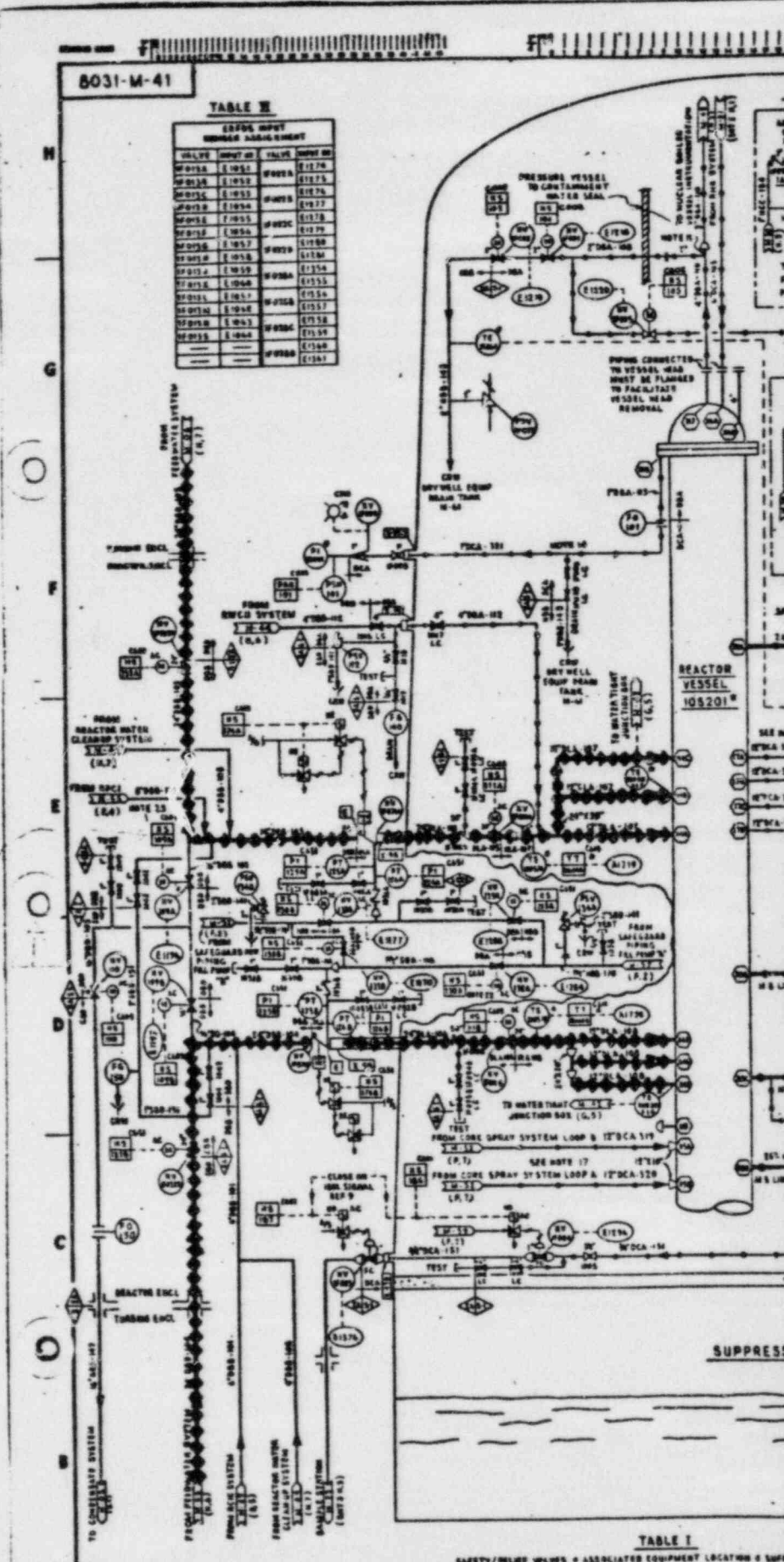
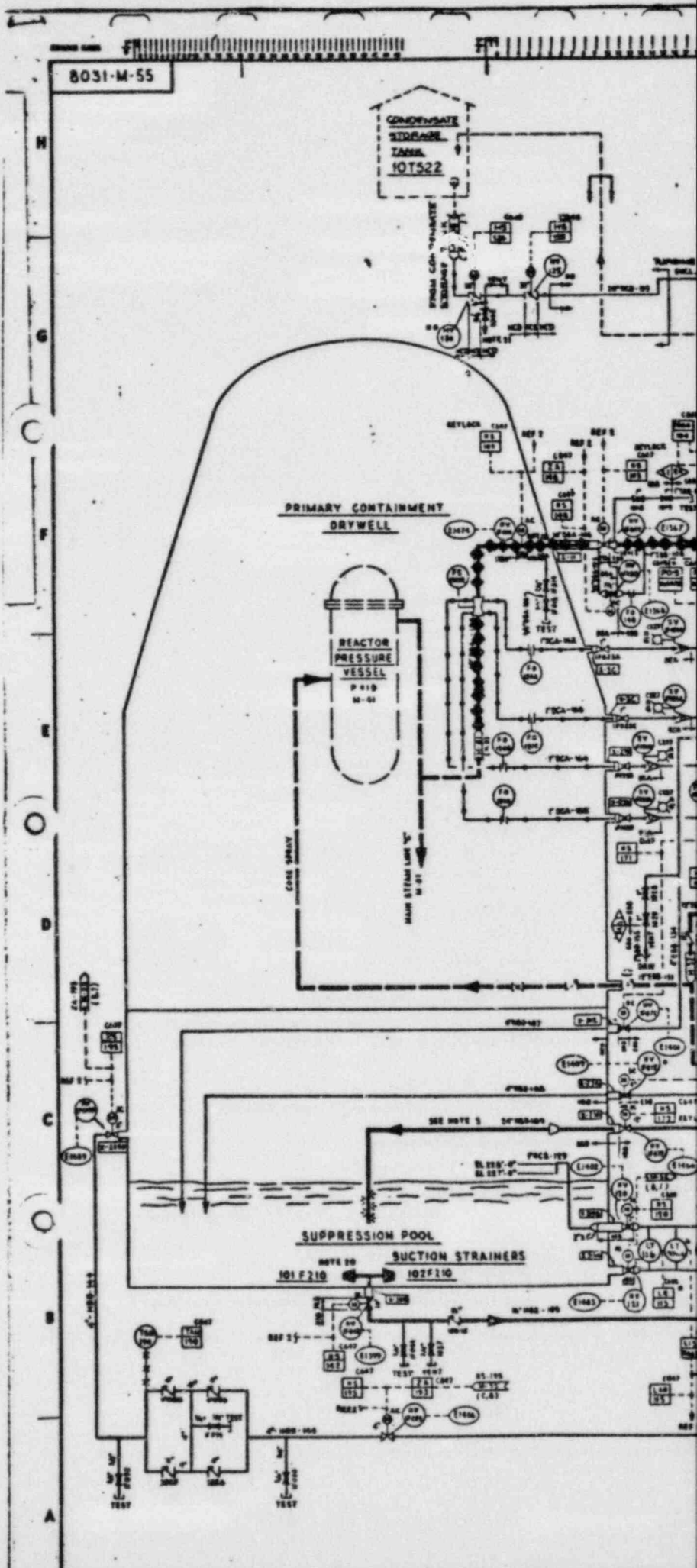


TABLE I

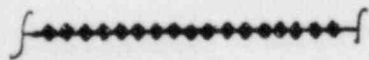
LINE NO.	VALVE NO.	VALVE TYPE	LOCATION	ASSOCIATED EQUIPMENT
A	W013A	RELIEF	FROM REACTOR WATER CLEARUP SYSTEM	...
B	W013B	RELIEF	FROM REACTOR WATER CLEARUP SYSTEM	...
C	W013C	RELIEF	FROM REACTOR WATER CLEARUP SYSTEM	...
D	W013D	RELIEF	FROM REACTOR WATER CLEARUP SYSTEM	...
E	W013E	RELIEF	FROM REACTOR WATER CLEARUP SYSTEM	...
F	W013F	RELIEF	FROM REACTOR WATER CLEARUP SYSTEM	...
G	W013G	RELIEF	FROM REACTOR WATER CLEARUP SYSTEM	...
H	W013H	RELIEF	FROM REACTOR WATER CLEARUP SYSTEM	...
I	W013I	RELIEF	FROM REACTOR WATER CLEARUP SYSTEM	...
J	W013J	RELIEF	FROM REACTOR WATER CLEARUP SYSTEM	...
K	W013K	RELIEF	FROM REACTOR WATER CLEARUP SYSTEM	...
L	W013L	RELIEF	FROM REACTOR WATER CLEARUP SYSTEM	...
M	W013M	RELIEF	FROM REACTOR WATER CLEARUP SYSTEM	...
N	W013N	RELIEF	FROM REACTOR WATER CLEARUP SYSTEM	...
O	W013O	RELIEF	FROM REACTOR WATER CLEARUP SYSTEM	...
P	W013P	RELIEF	FROM REACTOR WATER CLEARUP SYSTEM	...
Q	W013Q	RELIEF	FROM REACTOR WATER CLEARUP SYSTEM	...
R	W013R	RELIEF	FROM REACTOR WATER CLEARUP SYSTEM	...
S	W013S	RELIEF	FROM REACTOR WATER CLEARUP SYSTEM	...
T	W013T	RELIEF	FROM REACTOR WATER CLEARUP SYSTEM	...
U	W013U	RELIEF	FROM REACTOR WATER CLEARUP SYSTEM	...
V	W013V	RELIEF	FROM REACTOR WATER CLEARUP SYSTEM	...
W	W013W	RELIEF	FROM REACTOR WATER CLEARUP SYSTEM	...
X	W013X	RELIEF	FROM REACTOR WATER CLEARUP SYSTEM	...
Y	W013Y	RELIEF	FROM REACTOR WATER CLEARUP SYSTEM	...
Z	W013Z	RELIEF	FROM REACTOR WATER CLEARUP SYSTEM	...

RELIEF VALVES FOR AUTO DEPRESSURIZING SYSTEM (ADS), VALVES E.A.A. CONTROL PROVIDED IN REMOTE SHUTDOWN SYSTEM VALVES A.C.C.

8408140326-28
D-5 Rev. 1



NOTE: Piping subjected to
DYNAMIC TRANSIENT
testing is denoted as
follows:



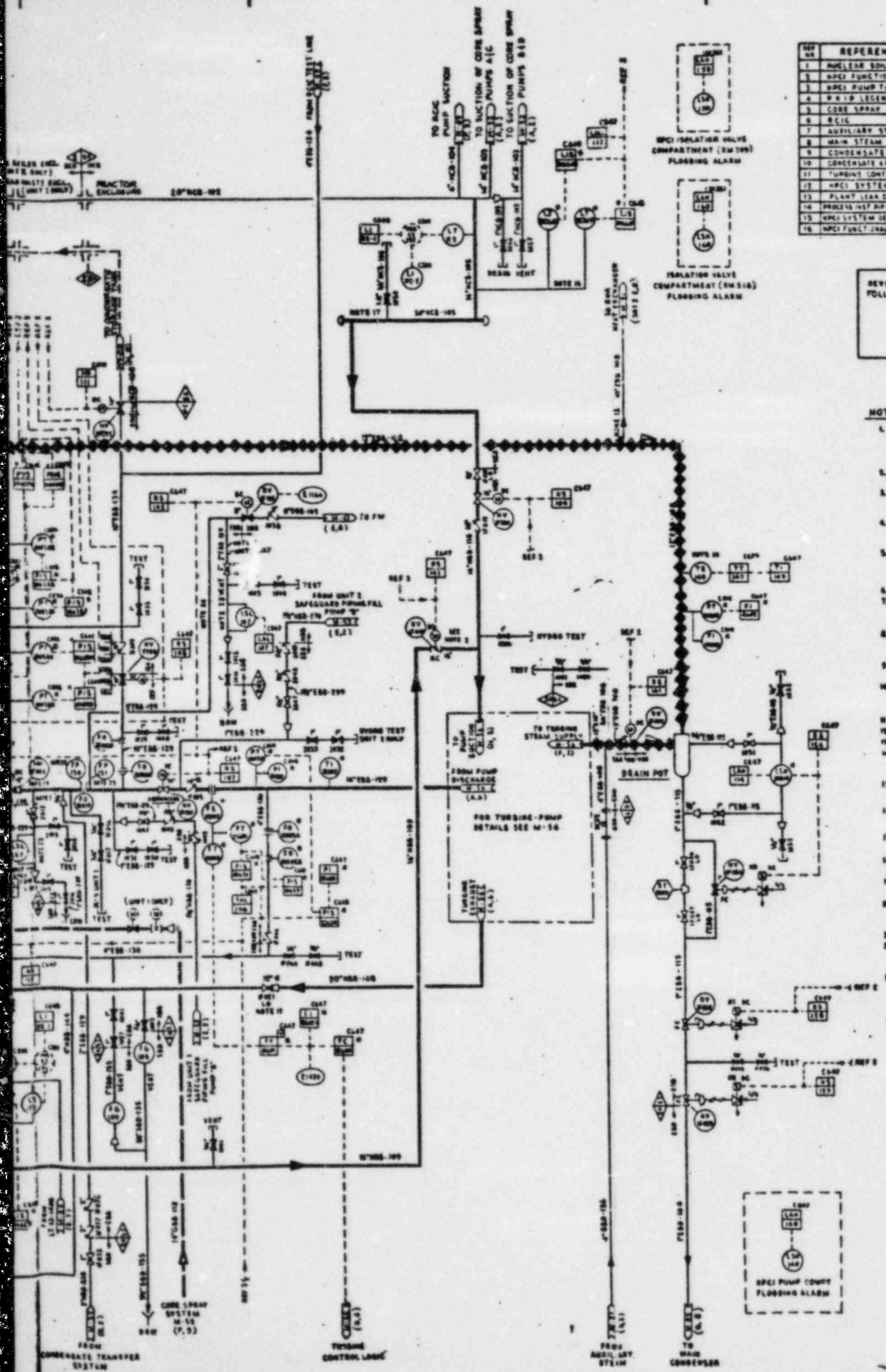
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CARD

8408140326-29

D-6

Rev. 0



NO.	REFERENCE DRAWINGS	BECHTEL NO.	GE NO.
1	NUCLEAR ISOLS	M-01	
2	HPCI FUNCTIONAL CONTROL DIAGRAM	M-55	788127AD
3	HPCI PUMP TURBINE	M-56	
4	P & ID LEGEND	M-08	
5	CORE SPRAY	M-57	
6	RCIC	M-49	
7	AUXILIARY STEAM	M-21	
8	MAIN STEAM	M-01	
9	CONDENSATE	M-05	
10	CONDENSATE REFUELING WATER STORAGE	M-06	
11	TURBINE CONTROLS DIAGRAM	M-58	JPP 1763 18-1
12	HPCI SYSTEM P & ID	M-55	TAL 1132AD
13	PLANT LEAK DETECTION	M-75	
14	PROCESS INST. PIPING & TUBING DESIGN SPEC	M-55	788117D
15	HPCI SYSTEM DESIGN SPEC	M-55	788122D
16	HPCI FUNCTIONAL DESCRIPTION	M-55	

REVISION 2 OF THIS P&ID REQUIRES REVISION OF THE FOLLOWING RELATED DOCUMENTS:

QAB	YES	<input checked="" type="checkbox"/>	NO	<input type="checkbox"/>	NA	<input type="checkbox"/>
FD TEST	YES	<input type="checkbox"/>	NO	<input type="checkbox"/>	NA	<input checked="" type="checkbox"/>
LOGIC DIAGRAM	YES	<input checked="" type="checkbox"/>	NO	<input type="checkbox"/>	NA	<input type="checkbox"/>

- NOTES:**
- THE HPCI IS CLASS 2 SEISMIC SYSTEM EXCEPT AS NOTED. CLASS 1 SEISMIC CLASSIFICATION SHALL EXTEND UP TO THE FIRST WALL PENETRATION POINT INDICATED AND SHALL INCLUDE THE FIRST HATCHER POINT IN OR BEYOND THIS WALL.
 - LOCATE VALVE (P&ID) (ZONE 2-4) AS CLOSE AS POSSIBLE TO PUMP SUCTION LINE FROM CONDENSATE STORAGE TANK.
 - PENETRATION LOCATION TO BE ABOVE MAXIMUM EXPECTED WATER LEVEL, WITH SPARGER LOCATED 4 FEET BELOW LOW WATER LEVEL (ZONE 2-7).
 - 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 BOC SYSTEM.
 - THE GE LOG NUMBER FOR THIS SYSTEM IS E-41.
 - VENT CONNECTION SHOULD BE LOCATED AT HIGH POINT.
 - TEMPERATURE LEAK DETECTION FOR THIS SYSTEM IS SHOWN ON REF 15. THE TEMPERATURE INSTRUMENTS ARE INDEXED AS PART OF P&ID M-55.
 - ALL INSTRUMENT PIPING & TUBING SHALL BE INSTALLED IN ACCORDANCE WITH REFERENCE 14.
 - ALL STEAM LINES SHALL BE SLOPED. ALL LIQUID LINES INSIDE THE PRIMARY CONTAINMENT SHALL BE SLOPED WHERE PRACTICAL.
 - VALVE (P&ID) SHOULD BE LOCATED AT HIGH POINT (C,4).
 - ~~DELETED~~
 - UNIT 2 PIPING HAS TWO CONNECTIONS.
 - TEMPERATURE ELEMENT TO BE MOUNTED IN OUTSIDE JUNCTION.
 - REMOVE SPOOL PIECE AND REPLACE WITH BLIND FLANGES AFTER INITIAL TESTING.
 - LT INCH 5, F SHOULD BE LOCATED ABOVE EL 107'-0" ON M-56-105.
 - 7" SECTION OF PIPING SHALL CONTAIN AT LEAST 1100 GALLONS.
 - INSTALL VALVE IN FLOW DIRECTION SUCH THAT FLOW IS OVER THE SEAT.
 - VALVE (P&ID) TO BE LOCATED AS CLOSE AS POSSIBLE TO JUNCTION WITH CORE SPRAY LINE.
 - THE MAXIMUM SP ACROSS THE SUCTION STRAINERS SHALL NOT EXCEED THE AVAILABLE MARGIN ABOVE THE REQUIRED HEAD WHEN THE STRAINERS ARE 50% PLUGGED.
 - TO BE DRAINED WITH DNE AREA.
 - NON-2 DRAIN AND VENT LINES AND CAPPED ENDS EXTENDING FROM SEISMIC CATEGORY 1 PIPING ARE SEISMIC CATEGORY 2A DOWNSTREAM OF THE LAST ISOLATION VALVE.
 - THE POSITION OF (P&ID) SHALL BE A VERTICAL SECTION ABOVE THE PROCESS LINE, JOINTS SHALL BE IDENTICAL SECTION ABOVE THE PROCESS LINE, JOINTS SHALL BE IDENTICAL SECTION ABOVE THE PROCESS LINE. THE LINE FROM THE BOTTOM OF THE VERTICAL SECTION SHALL SLOPE DOWN TOWARDS THE PROCESS LINE.
 - PENETRATION INTO STEAM TUNNEL AT COLUMN LINE J.
 - FLOW TAPS ARE PROVIDED ONLY FOR STARTUP FLOW VERIFICATION THE INSTRUMENTATION WILL BE PROVIDED BY P&ID.

NO.	REVISION	DATE	BY	CHKD
1	ISSUED FOR CONSTRUCTION	11/15/78	J. Y. PARK	Z. CHAN
2	REVISED PER GE - SUBMITTER'S REVIEW	12/15/78	J. Y. PARK	Z. CHAN
3	REVISED PER GE - SUBMITTER'S REVIEW	1/15/79	J. Y. PARK	Z. CHAN
4	REVISED AND REISSUED FOR CONSTRUCTION	2/15/79	J. Y. PARK	Z. CHAN
5	ISSUED FOR CONSTRUCTION	3/15/79	J. Y. PARK	Z. CHAN

BECHTEL
SAN FRANCISCO

LIMERICK GENERATING STATION UNITS 1 & 2
INDUSTRIAL ELECTRIC COMPANY

P & ID
HIGH PRESSURE COOLANT INJECTION

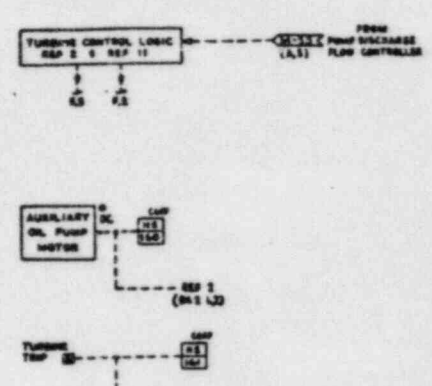
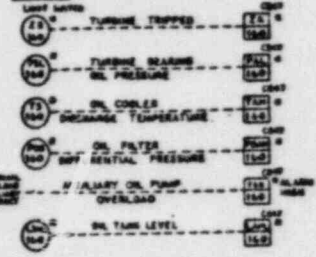
NO.	8031	REVISION NO.	M-55	SHEET	21
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95-M-1309

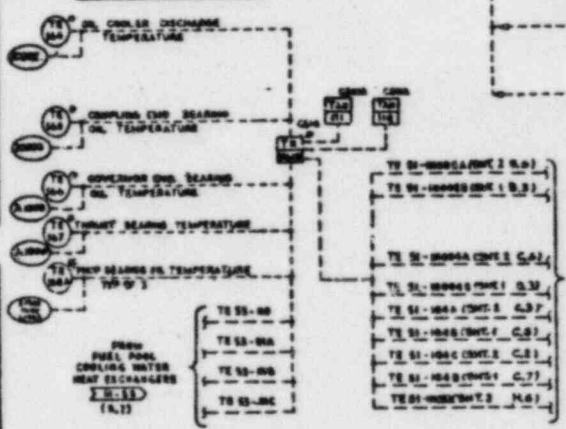
TURBINE SUPERVISORY INSTRUMENTATION

TURBINE HYDRAULIC CONTROL SYSTEM

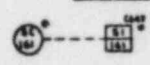
ALARMS



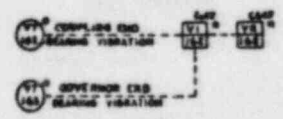
TEMPERATURE RECORDING



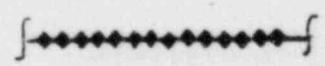
TURBINE SPEED



SHAFT VIBRATION



NOTE: Piping subjected to DYNAMIC TRANSIENT testing is denoted as follows:

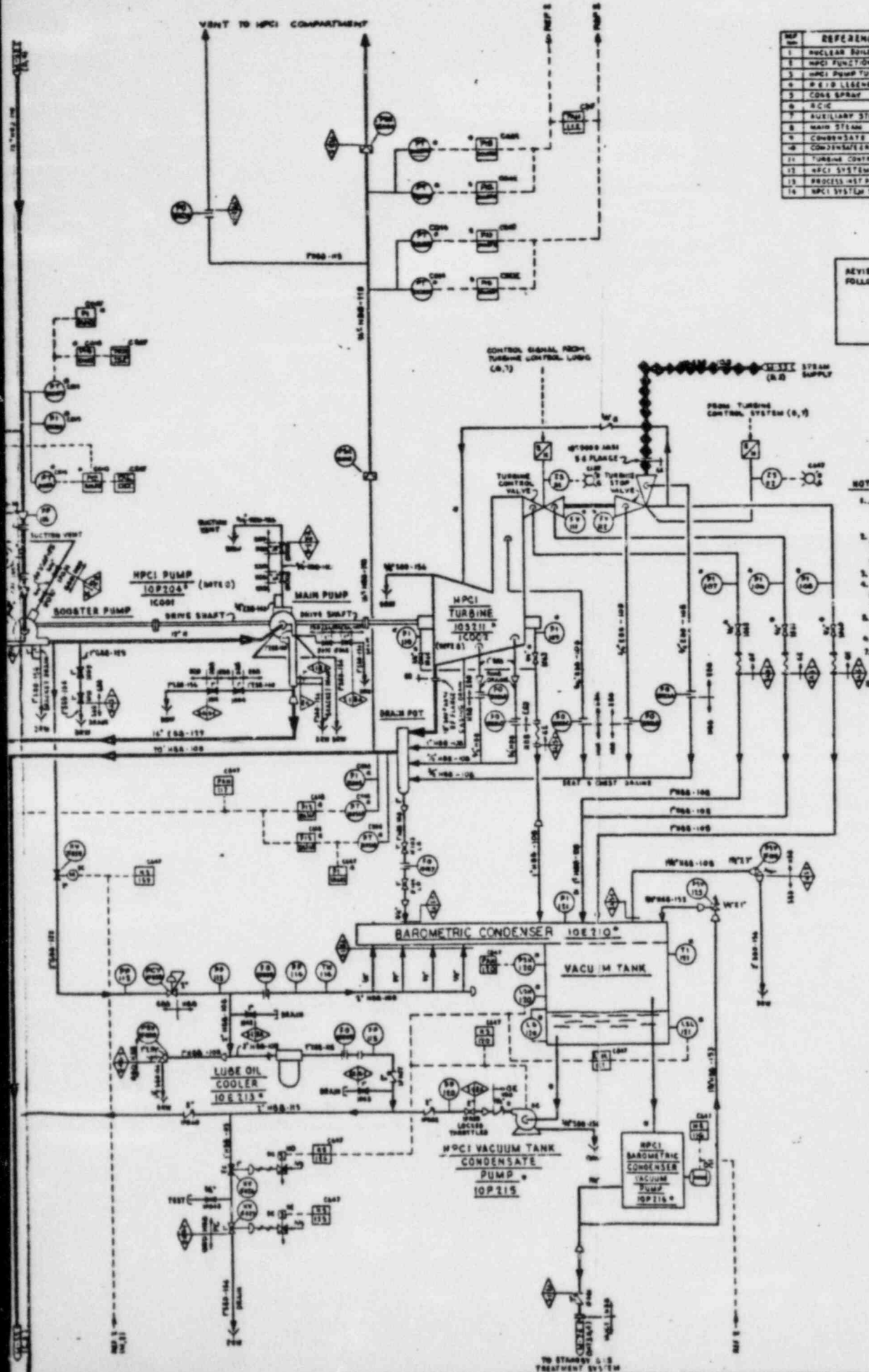


Also Available On Aperture Card

TI APERTURE CARD

8408140326-30

D-7 Rev.0



REF. NO.	REFERENCE DRAWINGS	BECHTEL No.	GE No.
1	NUCLEAR SCOPE	M-61	
2	HPCI FUNCTIONAL CONTROL DIAGRAM	REVISED PER 8031-P-364	7558 67749
3	HPCI Pump Turbine	M-75	
4	P&ID LEGEND	M-80	
5	CONDENSATE	M-81	
6	SCHEMATIC	M-82	
7	AUXILIARY STEAM	M-83	
8	MAIN STEAM	M-84	
9	CONDENSATE	M-85	
10	CONDENSATE (REPELLING MAIN STORAGE)	M-86	
11	TURBINE CONTROL DIAGRAM	REVISED PER 8031-P-364	7558 67749
12	HPCI SYSTEM P&ID	REVISED PER 8031-P-364	7558 67749
13	PROCESS AND PIPING & TURBINE DESIGN SPEC	REVISED PER 8031-P-364	7558 67749
14	HPCI SYSTEM DESIGN SPEC	REVISED PER 8031-P-364	7558 67749

REVISION 12 OF THIS P&ID REQUIRES REVISION OF THE FOLLOWING RELATED DOCUMENTS:

QA	YES	<input checked="" type="checkbox"/>	NO	<input type="checkbox"/>	NA	<input type="checkbox"/>
PD TEST	YES	<input type="checkbox"/>	NO	<input type="checkbox"/>	NA	<input type="checkbox"/>
LOGIC DIAGRAM	YES	<input type="checkbox"/>	NO	<input checked="" type="checkbox"/>	NA	<input type="checkbox"/>

- NOTES:
- HPCI IS A CLASS 2 SYSTEM EXCEPT AS NOTED.
 - DC POWER FOR HPCI INSTRUMENTS SHALL BE DERIVED FROM THE PLANT DC POWER SYSTEM, PER AS NOTED. THE DC SOURCE IS TO BE SEPARATE FROM THAT WHICH SUPPLIES THE HPCI SYSTEM.
 - THE 85 GPM NUMBER FOR THIS SYSTEM IS 85-G.
 - THE BAROMETRIC CONDENSER AND VACUUM TANK SHALL BE LOCATED SO THAT ITS WATER LEVEL IS BELOW THE BOTTOM OF THE TURBINE EXHAUST.
 - ALL INSTRUMENT PIPING & TUBING SHALL BE INSTALLED IN ACCORDANCE WITH REFERENCE IS.
 - ALL STEAM LINES SHALL BE TRAPPED WHERE PRACTICAL.
 - DRIP-DRAIN AND VENT LINES AND CAPS THIS EXTENDING FROM SEISMIC CATEGORY I PIPING ARE SEISMIC CATEGORY II. THIS EQUIPMENT IS BEING MONITORED BY THE VIBRATION MONITORING SYSTEM (VMS). FOR THE TYPE OF SENSORS BEING USED, SEE THE VIBRATION SUMMARY, V.P. 8031-P-207-100.

NO.	DESCRIPTION	DATE	BY	CHKD.
1	REVISED PER 8031-P-364	10/1/80	J. J. ...	
2	REVISED PER 8031-P-364	10/1/80	J. J. ...	
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BECHTEL
SAN FRANCISCO

LIMBERG GENERATING STATION UNITS 1 & 2
INDUSTRIAL ELECTRIC DIVISION

P & ID
HPCI PUMP TURBINE

NO. 8031	REVISION NO. M-56	SHEET 16
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APPENDIX E
Acceptance Criteria

STARTUP TRANSIENT TEST INSTRUMENTS FOR
MAIN STEAM LINE B AND BYPASS TO VALVES

<u>Instrument Number</u>	<u>Location or Data Point</u>	<u>SK-M- No.</u>	<u>Axis Dir.</u>	<u>Design Acceptance Maximum Response</u>	<u>Comment</u>
DL.Y.A.01	B49	1503	Y	-	Deleted
DL.X.A.02	B46	1503	X	-	Deleted
DL.S.A.03	B41	1503	SKEW(1)	+ 9300 lb.	+50°V skew
DL.S.A.04	B41	1503	SKEW(2)	+11100 lb.	+40°V skew
DL.X.A.05	B40	1503	X	-	Deleted
DL.Z.A.06	B30	1503	Z	-	Deleted
DL.S.A.07	B23	1503	SKEW(1)	+ 5500 lb.	+28.82°V skew
DL.S.A.08	B23	1503	SKEW(2)	+ 5500 lb.	-28.82°V skew
DL.Z.A.09	B18	1503	Z	+60000 lb.	
DL.Z.A.10	P3A	1504	Z	+26300 lb.	
DL.S.A.11	P56	1504	SKEW(1)	+ 6000 lb.	+25.54°V skew
DL.S.A.12	P56	1504	SKEW(2)	+ 6000 lb.	-25.54°V skew
DL.Y.A.13	B33	1503	Y	+ 2300 lb.	
DL.X.A.14	S43	1503	X	+ 110000 lb.	
DP.-.A.01	PP101B	1503	NONE	+ 140 psi	
DP.-.A.02	PP138B	1503	NONE	+ 140 psi	
DP.-.A.03	PP101A	1502	NONE	+ 140 psi	
DP.-.A.04	PP101C	1500	NONE	+ 140 psi	
DP.-.A.05	PP101D	1501	NONE	+ 140 psi	
DD.-.A.01	MSV-4	1503	AXIAL	-	Deleted

Notes: 1. See Appendix 'B'



STARTUP TRANSIENT TEST INSTRUMENTS FOR
FEEDWATER LOOP A (I/C)

<u>Instrument Number</u> ¹	<u>Location or Data Point</u>	<u>SK-M- No.</u>	<u>Axis Dir.</u>	<u>Design Expected² Maximum Response</u>	<u>Comment³</u>
VA.X.B.04	145B	1552	X	3.76 in/sec.	On 20" header
VA.X.B.05	165	1552	X	3.76 in/sec.	On 12" riser
VA.X.B.02	96	1552	X	3.76 in/sec.	On 20" header
VA.Y.B.03	107	1552	Y	3.76 in/sec.	On 12" riser
VA.Z.B.01	60B	1552	Z	3.76 in/sec.	On 12" riser

NOTES: 1. See Appendix 'B'

2. Peak velocity; from time-history to be derived from accelerometer test records

3. Accelerometers are also used for steady state vibration testing per 8031-P-363

STARTUP TRANSIENT TEST INSTRUMENTS FOR
FEEDWATER LINES AND HEADER (O/C)

<u>Instrument Number</u> ¹	<u>Location or Data Point</u>	<u>SK-M- No.</u>	<u>Axis Dir.</u>	<u>Design Acceptance^{2,3} Maximum Response</u>	<u>Comment⁵</u>
VA.X.C.01	13	1555	X	4.05 in/sec.	at valve operator
VA.Z.C.02	15 E	1555	Z	4.05 in/sec.	at elbow end
VA.Z.C.03	39	1554	Z	4.05 in/sec.	at valve operator
DP.-.C.01	PP118A	Note 4	NONE	---	pressure tap
DP.-.C.02	PP118B	Note 4	NONE	---	pressure tap
DP.-.C.03	PP118C	Note 4	NONE	---	pressure tap

Notes: 1. See Appendix 'B'

2. Accelerometer output to provide velocity transient time-history
3. Dynamic pressure transient not for test acceptance. Measuring device should have capacity ~~400~~ psi full scale dynamic pressure.
4. Feedwater Heater vendor print #8031-M-4-10-13BC. P&ID No. M-6, Rev. 16
5. Accelerometers are also used for steady state vibration testing per 8031-P-363.

STARTUP TRANSIENT TEST INSTRUMENTS FOR
HPCI STEAM SUPPLY PIPING, INSIDE CONTAINMENT

<u>Instrument</u> ¹ <u>Number</u>	<u>Location</u> <u>or</u> <u>Data Point</u>	<u>SK-M-</u> <u>No.</u>	<u>Axis</u> <u>Dir.</u>	<u>Design Acceptance</u> ^{2,3} <u>Maximum Response</u>	<u>Comment</u> ⁴
DL.S.D.01	217	1592	SKEW	1.0 Kips	
DL.Y.D.02	316	1592	Y	1.0 Kips	
VA.X.D.01	200 E	1592	X	2.48 in/sec.	Elbow end
VA.X.D.02	212	1592	X	2.48 in/sec.	
VA.Y.D.03	400	1592	Y	2.48 in/sec.	Valve operator

NOTES: 1. See Appendix 'B'

2. No dynamic analysis performed for this system. Small (1.0 kip) loads representative of low expected response.
3. Peak velocity obtained from velocity time-history to be derived from the accelerometer test records.
4. Accelerometers are also used for steady state vibration testing per 8031-P-363.

STARTUP TRANSIENT TEST INSTRUMENTS FOR
HPCI STEAM SUPPLY PIPING, OUTSIDE CONTAINMENT

<u>Instrument</u> ¹ <u>Number</u>	<u>Location</u> or <u>Data Point</u>	<u>SK-M-</u> <u>No.</u>	<u>Axis</u> <u>Dir.</u>	<u>Design Acceptance</u> ^{2,3} <u>Maximum Response</u>	<u>Comment</u> ⁴
DL.X.E.01	22	1556B	X	1.5 Kips	Snubber
DL.Z.E.02	63	1556B	Z	1.5 Kips	Snubber
VA.X.E.02	47	1556A	X	2.83 in/sec.	
VA.X.E.03	75A	1556A	X	2.83 in/sec.	
VA.X.E.01	16	1556A	X	2.83 in/sec.	Valve operator



NOTES: 1. See Appendix 'B'

2. No dynamic analysis performed for this system. Small (1.5 kip) loads representative of small expected response
3. Peak velocity; obtained from velocity time-history to be derived from accelerometer test records.
4. Accelerometers are also used for steady state vibration testing per 8031-P-363.

STARTUP TRANSIENT TEST INSTRUMENTS DATA
FOR MSRV DISCHARGE LINE J

<u>Instrument</u> ¹ <u>Number</u>	<u>Location</u> or <u>Data Point</u>	<u>SK-M-</u> <u>No.</u>	<u>Axis</u> <u>Dir.</u>	<u>Design Acceptance</u> <u>Maximum Response</u>	<u>Comment</u>
DL.S.R.01	330	1794	SKEW	+ 6700 lb.	
DL.S.R.02	335	1794	SKEW	+ 5700 lb.	
DL.Z.R.03	355	1794	Z	+ 6700 lb.	
DL.Y.R.04	357	1794	Y	+ 5600 lb.	
DL.Y.R.05	365	1794	Y	+24400 lb.	
DL.S.R.06	372	1794	SKEW	+12600 lb.	Δ
DL.Z.R.07	373	1794	Z	+ 4800 lb.	
DL.S.R.08	380	1794	SKEW	+ 5400 lb.	
DL.S.R.09	381	1794	SKEW	+ 6800 lb.	
DL.Y.R.10	390	1794	Y	+ 7000 lb.	
DD.-.R.01	312	1794	AXIAL	-	Deleted Δ
DP.-.R.01	340	1794	None	-	Deleted

NOTE: 1. See Appendix 'B'

STARTUP TRANSIENT TEST INSTRUMENTS DATA
FOR FEEDWATER HEATER DRAIN

<u>Instrument Number</u> ¹	<u>Location or Data Point</u>	<u>SK-M- No.</u>	<u>Axis Dir.</u>	<u>Design Acceptance Maximum Response</u>	<u>Comment</u>
DD.X.S.01	25B	332	X	6.0 in/sec	Note 2
DD.Y.S.03	75B	332	Y	6.0 in/sec	"
DD.Z.S.04	75E	332	Z	6.0 in/sec	"
DD.Y.S.05	90E	332	Y	6.0 in/sec	"
DS.-.S.01	TS1	332	-	+ 400 μ E	
DS.-.S.02	TS1	332	-	+ 200 μ E	
DS.-.S.03	TS1	332	-	+ 200 μ E	
DS.-.S.04	TS1	332	-	+ 140 μ E	
DS.-.S.05	TS2	332	-	+ 400 μ E	
DS.-.S.06	TS2	332	-	+ 200 μ E	
DS.-.S.07	TS2	332	-	+ 200 μ E	
DS.-.S.08	TS2	332	-	+ 200 μ E	
DS.-.S.09	TS2	332	-	+ 200 μ E	
DS.-.S.10	TS1	332	-	+ 140 μ E	



- NOTES: 1. See Appendix 'B'
2. Peak velocity; obtained from velocity time-history to be derived from displacement transducers test records.