MARKED-UP TECHNICAL SPECIFICATION BASES PAGES

Remove Page	Insert Page
B 3/4 4-2	B 3/4 4-2
B 3/4 4-2a	B 3/4 4-2a
	INSERT B 3/4 4-2a
B 3/4 4-2b	B 3/4 4-2b

9905270208 990521
PDR ADOCK 05000275
P PDR

Attachment D
PG&E Letter DCL-99-071

TECHNICAL SPECIFICATION BASES PAGES

SAFETY VALVES (Continued)

In the event that no safety valves are OPERABLE, an operating RHR loop, connected to the RCS, provides overpressure relief capability and will prevent RCS overpressurization. In addition, the Overpressure Protection System (relief valves) provides a diverse means of protection against RCS overpressurization at low temperatures.

During operation, all pressurizer Code safety valves must be OPERABLE to prevent the RCS from being pressurized above its Safety Limit of 2735 psig. The combined relief capacity of all of these valves is greater than the maximum surge rate resulting from a complete loss of load assuming no Reactor trip until the first Reactor Trip System Trip Setpoint is reached (i.e., no credit is taken for a direct Reactor trip on the loss-of-load) and also assuming no operation of the power-operated relief valves or steam dump valves.

Demonstration of the safety valves' lift settings will occur only during shutdown and will be performed in accordance with the provisions of Section XI of the ASME Boiler and Pressure Code.

3/4.4.3 PRESSURIZER

The limit on the maximum water volume in the pressurizer assures that the parameter is maintained within the normal steady-state envelope of operation assumed in the SAR. The limit is consistent with the initial SAR assumptions. The 12-hour periodic surveillance is sufficient to ensure that the parameter is restored to within its limit following expected transient operation. The maximum water volume also ensures that a steam bubble is formed and thus the RCS is not a hydraulically solid system. The requirement that a minimum number of pressurizer heaters be OPERABLE enhances the capability of the plant to control Reactor Coolant System pressure and establish natural circulation.

3/4.4.4 RELIEF VALVES

In MODES 1, 2, and 3 the power-operated relief valves (PORVs) provide an RCS pressure boundary, RCS pressure control for mitigation of accidents, and automatic RCS pressure relief to minimize challenges to the safety valves.

The functions of providing an RCS pressure boundary and RCS pressure control for mitigation of accidents such as steam generator tube rupture are the safety-related function of the PORVs in MODES 1, 2, and 3. The capability of the PORV to perform its function of providing an RCS pressure boundary requires that the PORV or its associated block valve is closed. The automatic RCS pressure control function of the PORVs is not a safety-related function in MODES 1, 2, and 3. The automatic pressure control function limits the number of challenges to the safety valves, but the safety valves perform the safety function of RCS overpressure

RELIEF VALVES (Continued)

protection, except for the spurious operation of the safety injection system at power event.

Each PORV has a remotely operated block valve to provide a positive shutoff capability should a relief valve become inoperable. Operation with the block valves opened is preferred. This allows the PORVs to perform automatic RCS pressure relief should the RCS pressure actuation setpoint be reached. However, operation with the block valve closed is permissible since automatic RCS pressure relief is not a safety-related function of the PORVs.

The OPERABILITY of the PORVs and block valves in MODES 1, 2, and 3 is based on their being capable of performing the following functions:

1. Maintaining the RCS pressure boundary,

2. Control RCS pressure as required for accident mitigation,

3. Manual closing of a block valve to isolate a stuck open PORV,

4. Manual closing of a block valve to isolate a PORV with excessive seat leakage, and

5. Manual opening of a block valve to unblock an isolated PORV to allow it to be used to control RCS pressure for accident mitigation.

For the PORVs to be OPERABLE, pressurizer channel selector switch P/455A shall be aligned to the PT455/PT456 position during normal operation, so that a single transmitter or instrument channel failure cannot prevent all three PORVs from opening. P/455A may be aligned to either the PT457/PT456 position or the PT455/PT474 position in order to perform surveillance testing or maintenance. If P/455A is aligned to either the PT457/PT456 position or the PT455/PT474 position, or a PORV is inoperable, ACTION statement "b" shall be entered.

The non-Class 1 PORV and block valve are used only as a backup to the two redundant Class 1 PORVs and block valves to control RCS pressure for accident mitigation. Therefore continued operation with the non-Class 1 PORV unavailable for RCS pressure control is allowed as long as the block valve or PORV can be closed to maintain the RCS pressure boundary.

Surveillance Requirements provide the assurance that the PORVs and block valves can perform their safety functions. Surveillance Requirement 4.4.4.1 addresses the PORVs and Surveillance Requirement 4.4.4.2 addresses the block valves.

Surveillance Requirement 4.4.4.1.a provides assurance the PORV is capable of opening and closing. The associated block valve should be closed prior to stroke testing a PORV to preclude depressurization of the RCS.

RELIEF VALVES (Continued)

Surveillance Requirement 4.4.4.1.b provides assurance the actuation instrumentation for automatic PORV actuation is calibrated such that the automatic PORV actuation signal is within the required pressure range.

Surveillance Requirements 4.4.4.1.c and 4.4.4.1.d provide assurance of operability of the Backup Air/Nitrogen system and that the Backup Air/Nitrogen system is capable of supplying sufficient air to operate the PORV(s) if they are needed for RCS pressure control and normal instrument air is not available.

Surveillance Requirement 4.4.4.2 addresses the block valves. The block valves are exempt from the surveillance requirements to cycle the valves when they have been closed to comply with ACTION statements "b" or "c." This precludes the need to cycle the valves with a full system differential pressure or when maintenance is being performed to restore an inoperable PORV to OPERABLE status.

3/4.4.5 STEAM GENERATORS

The Surveillance Requirements for inspection of the steam generator tubes ensure that the structural integrity of this portion of the RCS will be maintained. The program for inservice inspection of steam generator tubes is based on a modification of Regulatory Guide 1.83, Revision 1. Inservice inspection of steam generator tubing is essential in order to maintain surveillance of the conditions of the tubes in the event that there is evidence of

PORV INSTRUMENT LOOP DIAGRAMS

(Instrument Schematics - Dwg. No. 102036, Sheets 7, 7A, 7B, 7F, 7H, 7I; Functional Loop Diagrams - Dwg. No. 109807, Sheets 31, 71, 72, 73, 74, 75, 85, 89, 92; Electrical Schematic - Dwg. No. 437587; and Functional Logic Diagram - Dwg. No. 495851; Drawings are for Unit 1 and are typical for Unit 2)

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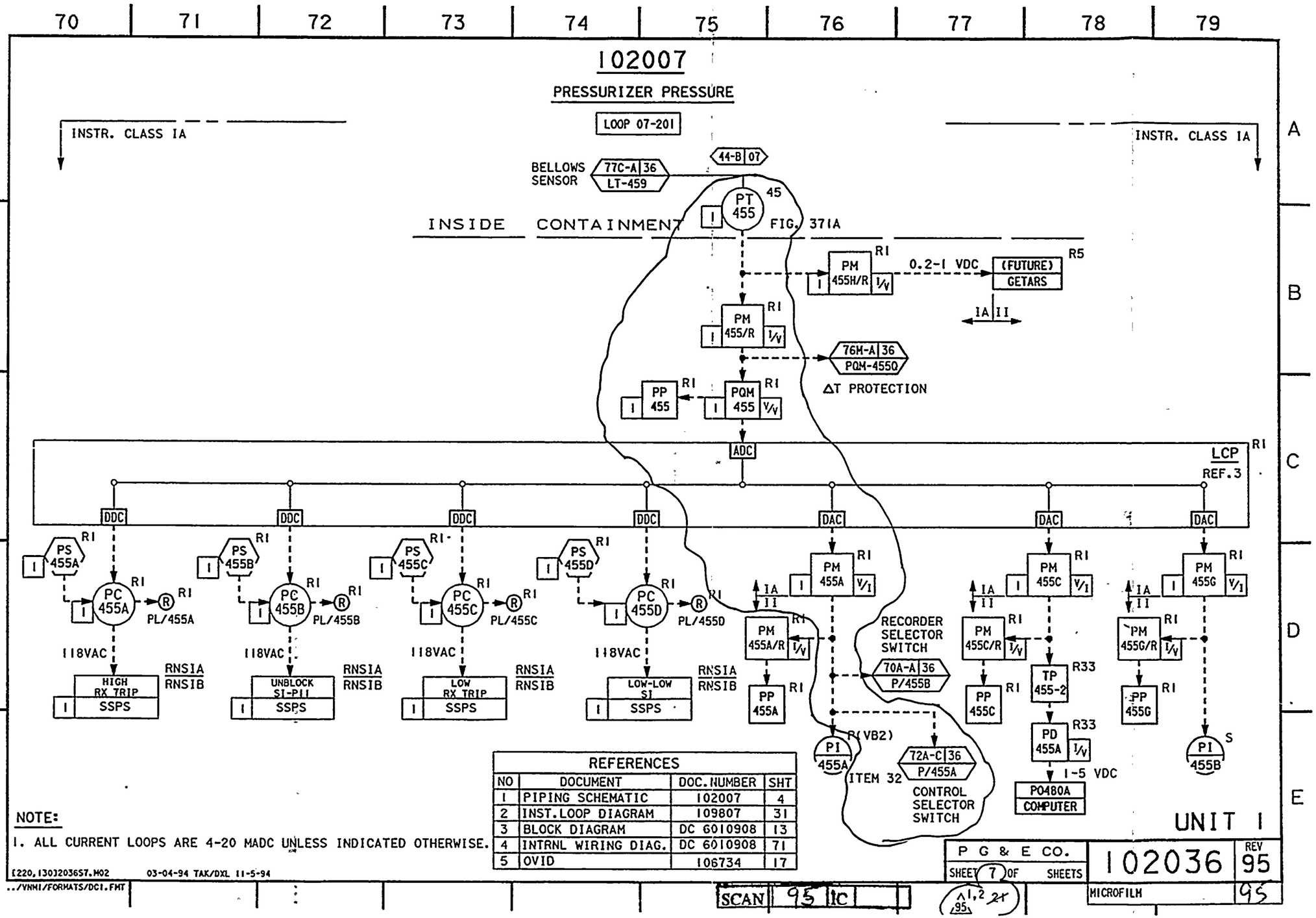
PRESSURIZER PRESSURE



REFERENCES			
NO	DOCUMENT	DOC. NUMBER	SHT
1	PIPING SCHEMATIC	102007	4
2	INST. LOOP DIAGRAM	109807	31
3	BLOCK DIAGRAM	DC 6010908	13
4	INTRNL WIRING DIAG.	DC 6010908	71
5	OVID	106734	17

NOTE:

1. ALL CURRENT LOOPS ARE 4-20 MADC UNLESS INDICATED OTHERWISE.

UNIT 1

P G & E CO.	102036	REV 95
SHEET 7 OF SHEETS	MICROFILM	95

[220,1301203657.M02 03-04-94 TAK/DXL 11-5-94
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SCAN 95 IC

95 1,2 2r

APERTURE CARD
Also Available on Aperture Card

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70A | 71A | 72A | 73A | 74A | 75A | 76A | 77A | 78A | 79A

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PRESSURIZER PRESSURE CONTROL

INSTR. CLASS II

INSTR. CLASS II

77-D | 36 PM-455A

77H-D | 36 PM-456A

75I-E | 36 PM-457A

74B-E | 36 PM-474A

P/ 455B CC1

ITEM 78

NOTE 2

1-5 VDC PEN 1

PR 455 CC2

ITEM 9

PC 455E/R R19 I/V

1-5 VDC

PM 455D R19 Σ

PM 455D/R R19 I/V

1-5 VDC

PC 455L/R R19 I/V

1-5 VDC

PC 455L R19 Σ

PZR VARIABLE HTR CONTROL (SCR)

TP 455-8 R33

Q CC2 HC 455F ITEM 12

PD 455D R33 I/V 1-5 VDC Y2022A COMPUTER

PC 455E R19

118 VAC RNASA PC 455EX 1:1

I1 IA

125 VDC 70F-A | 36 PCV-455C PORV

PC 455H R19 118 VAC PK 05-16 SOE-0363 ANNUN

PZR HI PRESS FROM P REF

PC 455J

118 VAC PC 455JX 1:1 RNARA 125 VDC PK 05-17 SOE-0536 ANNUN

PZR LO PRESS BACK-UP HTR ON

125 VDC PZR HEATER CONTROL

75B-E | 36 PM-474A

77H-E | 36 PM-456A

77-E | 36 PM-455A

76I-E | 36 PM-457A

PC 455F/R R19 I/V 1-5 VDC PC 455F R19

73E-A | 36 PM-455E SPRAY VALVE PCV-455B

TP 455-6 R33

Q CC2 HC 455G ITEM 13

PD 455B R33 I/V 1-5 VDC F0483A COMPUTER

P/ 455A CC1

NOTE 2

ITEM 77

Q CC2 HC 455K ITEM 14

1-5 VDC 1-5 VDC PC 455K R19

PC 455G/R R19 I/V 1-5 VDC PC 455G R19

76E-A | 36 PM-455F SPRAY VALVE PCV-455A

R24 PC 456E 118 VAC PC 456EX RNASA 125 VDC 77F-A | 36 PCV-474 PORV

I1 IA

125 VDC 73F-A | 36 PCV-456 PORV

TP 455-7 R33

PD 455C R33 I/V 1-5 VDC F0484A COMPUTER

PK 05-16 SOE-0329 ANNUN 118 VAC PC 456F

PZR HI PRESS FROM SET PT

NOTES:

1. ALL CONTROL LOOPS ARE 4-20 MADC UNLESS INDICATED OTHERWISE.
2. I/V PERFORMED BY DROPPING RESISTORS INTEGRAL TO SWITCHES P/455A & P/455B.

REFERENCES			
NO	DOCUMENT	DOC. NUMBER	SHT
1	PIPING SCHEMATIC	102007	4
2	INST. LOOP DIAGRAM.	108807 109847	4 5
3	BLOCK DIAGRAM	N/A	
4	INTRNL WIRING DIAG.	DC 663224	152
5	OVID	106734	17

UNIT 1

SCAN 95 IC

P G & E CO. | SHEET 7A OF SHEETS | 102036 | REV 95

MICROFILM 95

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APERTURE CARD

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70B | 71B | 72B | 73B | 74B | 75B | 76B | 77B | 78B | 79B

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NOTE:

1. ALL CURRENT LOOPS ARE 4-20 MADC UNLESS INDICATED OTHERWISE.

PRESSURIZER PRESSURE

LOOP 07-206

INSTR. CLASS IA

INSTR. CLASS IA

44-B | 07

BELLOWS SENSOR — 77C-A | 36 | LT-459

PT 474 — 4 — 57

INSIDE CONTAINMENT

FIG. 371A

PM 474D/R — 4 — I/V — R15 — 0.2-1 VDC — (FUTURE) GETARS — R14

IA | II

PM 474/R — 4 — I/V — R15

76Y-A | 36 | PQM-474Q — ΔT PROTECTION

PP 474 — 4 — R15

PQM 474 — 4 — V/V — R15

ADC

LCP REF. 3

DDC | DDC | DDC | DAC | DAC

PS 474A — 4 — R15

PC 474A — 4 — R15 — PL/474A

118VAC — LOW RX TRIP — 4 | SSPS — RNSIA RNSIB

PS 474C — 4 — R15

PC 474C — 4 — R15 — PL/474C

118VAC — HIGH RX TRIP — 4 | SSPS — RNSIA RNSIB

PS 474D — 4 — R15

PC 474D — 4 — R15 — PL/474D

118VAC — LOW-LOW SI — 4 | SSPS — RNSIA RNSIB

PM 474A — 4 — V/1 — R15

IA | II

PP 474A — R15

PM 474A/R — I/V — R15

PC 474B/R — I/V — R30 — 1-5 VDC — PC 474B — R30

118VAC — RNASA

PC 474BX — 1:1 — 125 VDC

125 VDC | II | IA

PK 05-17 | SOE-0534 | ANNUN — PZR PRESS LO

72A-B | 36 | P/455B — RECORDER SELECTOR SWITCH

70A-C | 36 | P/455A — CONTROL SELECTOR SWITCH

PI 474 — P(VB2) — ITEM 35

71F-A | 36 | PCV-455C — PZR PORV

PM 474C — 4 — V/1 — R15

IA | II

PM 474C/R — I/V — R15

PP 474C — R15

TP 474-2 — R34

PD 474 — I/V — R34

1-5 VDC — P0483A COMPUTER

REFERENCES

NO	DOCUMENT	DOC. NUMBER	SHT
1	PIPING SCHEMATIC	102007	4
2	INST. LOOP DIAGRAM	109807	92
3	BLOCK DIAGRAM	DC 6010908	14
4	INTRNL WIRING DIAG.	DC 6010908	253
5	OVID	106734	17

SCAN | 95 | IC

P G & E CO. | SHEET (7B) OF SHEETS | 102036 | REV 95

UNIT 1 | MICROFILM | 95

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APERTURE CARD

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A B C D E

LTOP 102007

77A-C | 36 PC-455EX
77B-E | 36 PC-474BX
RC PRESSURE 79A-D | 34 PC-403DX
LOOP 3 COLD LEG 65F-D | 35 TC-433AX
73A-E | 36 PC-456EX
76I-E | 36 PC-457EX
RC PRESSURE 78B-D | 34 PC-405DX
LOOP 2 COLD LEG 65E-D | 35 TC-423AX
73A-E | 36 PC-456EX
78I-E | 36 PC-457EX

NOTE 1 — NOTE 4 — CUT IN / CUT OUT (VB2) ITEM 280 — CUT IN / CUT OUT (VB2) ITEM 281

INSTR. CL II / INSTR. CL IA

AUTO CLOSE OPEN P (VB2) ITEM 205 — VB1 — 2/24/4 ERFDS — FROM POS

AUTO CLOSE OPEN P (VB2) ITEM 206 — VB1 — 3/12/4 ERFDS — FROM POS

AUTO CLOSE OPEN P (VB2) ITEM 204 — VB1 — 1/23/4 ERFDS — FROM POS

100* AIR 25 51-E — 100* AIR 25 50-E — 25 50-E

EMER NORMAL CLOSE S

RV-160 — PCV-802B 80* — PCV-801A 55* — FILTER — RV-355 — BACK-UP N_2 SUPPLY — SV 455C — VM — V

RV-161 — PCV-799A 80* — PCV-798A 55* — FILTER — RV-354 — BACK-UP N_2 SUPPLY — SV 276 — VM — N_2 SUPPLY 09 36-E

PCV-797A 55* — SV 474 — VM — INSTR. CL. ID

102 2 FIG 613C DE-ENERGIZE TO VENT — NOTE 2 — 65* (TYP) — RV-422

102 2 FIG 613E DE-ENERGIZE TO VENT — 65* — RV-421

102 2 FIG 613D DE-ENERGIZE TO VENT

INSTR. CLASS IB, TYPE D, CAT. 2 — INDICATIONS CL OP — POS-35 — POS-16 — Y0481D ANNUN — NOTE 3

INSTR. CLASS IB, TYPE D, CAT. 2 — INDICATIONS CL OP — POS-36 — POS-17 — Y0482D ANNUN — NOTE 3

INSTR. CLASS IB, TYPE D, CAT. 2 — INDICATIONS CL OP — POS-37 — POS-18 — Y0483D ANNUN — NOTE 3

INSTR. CLASS IA — ATO/FC — PCV 455C PRESSURIZER POWER RELIEF VALVE 40-C | 07

INSTR. CLASS IA — ATO/FC — PCV 456 PRESSURIZER POWER RELIEF VALVE 40-B | 07

INSTR. CL. II / INSTR. CL. IC NOTE 5 — ATO/FC — PCV 474 PRESSURIZER POWER RELIEF VALVE 40-C | 07

NOTES:

1. PRESSURIZER PC CONTACTS ARE IN SERIES THROUGH AUXILIARY RELAY RACK.
2. SEE INSTRUMENT AIR PIPING REQUIREMENTS DWG. 102 2 * 049096, SH. 12C (SPECIAL AIR REQUIREMENT).
3. ALARMS ON OPEN & INTERMEDIATE (NOT FULLY CLOSED) VALVE POSITION.
4. CONTACTS OF PC 403DX & TC 433AX ARE IN SERIES LIKEWISE WITH PC 405DX & TC 423AX.
5. VALVE OPERATOR IS INSTRUMENT CLASS IC, BECAUSE IT IS REQUIRED TO MAINTAIN THE STRUCTURAL INTEGRITY OF THE VALVE ASSY.

UNIT 1

P G & E CO.	102036	REV. 103
SHEET 7F	PAGE 0	

4/1/99	LITI	FJCI	AGB2	ALAN GLEN BARTA	ELECTRICAL	E 9271	9/30/2001	Revised per FCT-23891 (AR A0432626)
DATE	DWN	RE	IV	PROFESSIONAL ENGINEER	PE DISC.	PE#	PE EXP.	

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APERTURE CARD
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102007

PRESSURIZER PRESSURE

LOOP 07-202

INSTR. CLASS IA

INSTR. CLASS IA

BELLOWS SENSOR 77G-A 36 LT-460

42-B 07

PT 456 49

2

INSIDE CONTAINMENT FIG. 372

PM 456D/R 1/V — RIO — 0.2-1 VDC — (FUTURE) GETARS — R9

IA II

PM 456/R 1/V — RIO

76Q-A 36 PQM-4560

ΔT PROTECTION

PP 456 — RIO — PQM 456 2/V — RIO

ADC

LCP REF. 3

DDC | DDC | DDC | DDC | DAC | DAC

PS 456A — PC 456A — PL/456A

PS 456B — PC 456B — PL/456B

PS 456C — PC 456C — PL/456C

PS 456D — PC 456D — PL/456D

118VAC — RNSIA / RNSIB

HIGH RX TRIP SSPS

UNBLOCK SI-PIP SSPS

LOW RX TRIP SSPS

LOW-LOW SI SSPS

PM 456A/R 1/V — PP 456A

PM 456A 2/V1

RECORDER SELECTOR SWITCH

70A-B 36 P/455B

PI 456 — P(VB2) — ITEM 33

70A-C 36 P/455A

CONTROL SELECTOR SWITCH

PM 456C 2/V1

PM 456C/R 1/V — PP 456C

TP 456-2 — R34

PD 456 1/V — R34 — 1-5 VDC

P0481A COMPUTER

SCAN 95 IC

UNIT 1

REFERENCES			
NO	DOCUMENT	DOC. NUMBER	SHT
1	PIPING SCHEMATIC	102007	4
2	INST. LOOP DIAGRAM	109807	71
3	BLOCK DIAGRAM	DC 6010908	13
4	INTRNL WIRING DIAG.	DC 6010908	199
5	OVID	106734	17

NOTE:

1. ALL CURRENT LOOPS ARE 4-20 MADC UNLESS INDICATED OTHERWISE.

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P G & E CO. | 102036 | REV 95

SHEET 7H OF SHEETS | MICROFILM 95

1,2 95 23

APERTURE CARD

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70I | 71I | 72I | 73I | 74I | 75I | 76I | 77I | 78I | 79I

102007

PRESSURIZER PRESSURE

NOTE:

1. ALL CURRENT LOOPS ARE 4-20 MADC UNLESS INDICATED OTHERWISE.

INSTR. CLASS IA

LOOP 07-204

BELLOWS SENSOR 77J-A | 36 LT-461

41-B | 07

3 PT 457 20

INSIDE CONTAINMENT FIG. 373

3 PM 457D/R 1/V — R13 — 0.2-1 VDC — (FUTURE) GETARS — R12

IA | II

3 PM 457/R 1/V — R13

76U-A | 36 PQM-4570 — ΔT PROTECTION

3 PP 457 — R13

3 PQM 457 1/V — R13

ADC

LCP REF. 3

DDC | DAC

	PS	PC	PL	118VAC		
A	3 PS 457A R13	3 PC 457A R13	R13 PL/457A	HIGH RX TRIP 3 SSPS	RNSIA	RNSIB
B	3 PS 457B R13	3 PC 457B R13	R13 PL/457B	UNBLOCK SI-P11 3 SSPS	RNSIA	RNSIB
C	3 PS 457C R13	3 PC 457C R13	R13 PL/457C	LOW RX TRIP 3 SSPS	RNSIA	RNSIB
D	3 PS 457D R13	3 PC 457D R13	R13 PL/457D	LOW-LOW SI 3 SSPS	RNSIA	RNSIB

3 PM 457A 1/I — R13 — IA II

3 PP 457A — R13 — 3 PM 457A/R 1/V — R13

3 PC 457E/R 1/V — R26 — 1-5 VDC — PC 457E — R26

IA II — 118VAC — RNASA — 125 VDC

PC 457EX 1:1

125 VDC — 74F-A | 36 PCV-456 — PZR PORV

125 VDC — 78F-A | 36 PCV-474 — PZR PORV

72A-A | 36 P/455B — RECORDER SELECTOR SWITCH

72A-C | 36 P/455A — CONTROL SELECTOR SWITCH

PI 457 P(VB2) ITEM 34

PK 05-17 SOE 0535 ANNUN — PZR PRESS LO

3 PM 457C 1/I — R13 — IA II

3 PM 457C/R 1/V — R13 — 3 PP 457C — R13

3 TP 457-2 — R33

3 PD 457 1/V — R33

1-5 VDC — P0482A COMPUTER

UNIT 1

REFERENCES

NO	DOCUMENT	DOC. NUMBER	SHT
1	PIPING SCHEMATIC	102007	4
2	INST. LOOP DIAGRAM	109807	75
3	BLOCK DIAGRAM	DC 6010908	14
4	INTRNL WIRING DIAG.	DC 6010908	235
5	OVID	106734	17

P G & E CO. | SHEET 71 OF SHEETS | 102036 | REV 95

MICROFILM 93

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SCAN 95 1C

A1.2 95 ~~23A~~

APERTURE CARD

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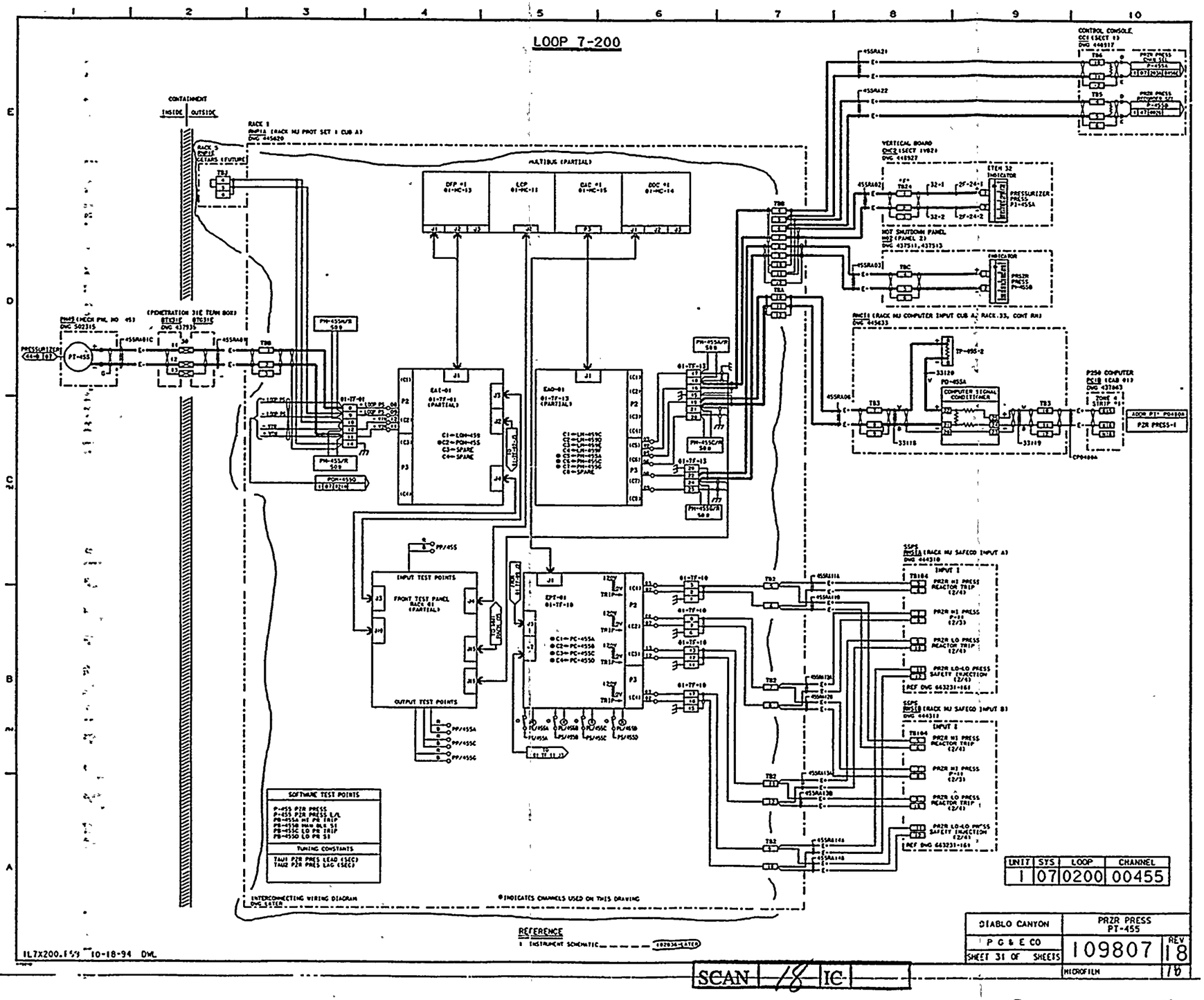

UNIT	SYS	LOOP	CHANNEL
1	07	0200	00455

DIABLO CANYON	PRZR PRESS PT-455	
P G & E CO	109807	REV 18
SHEET 31 OF SHEETS	MICROFILM	10

SCAN 18 IC

APERTURE CARD

Also Available on Aperture Card

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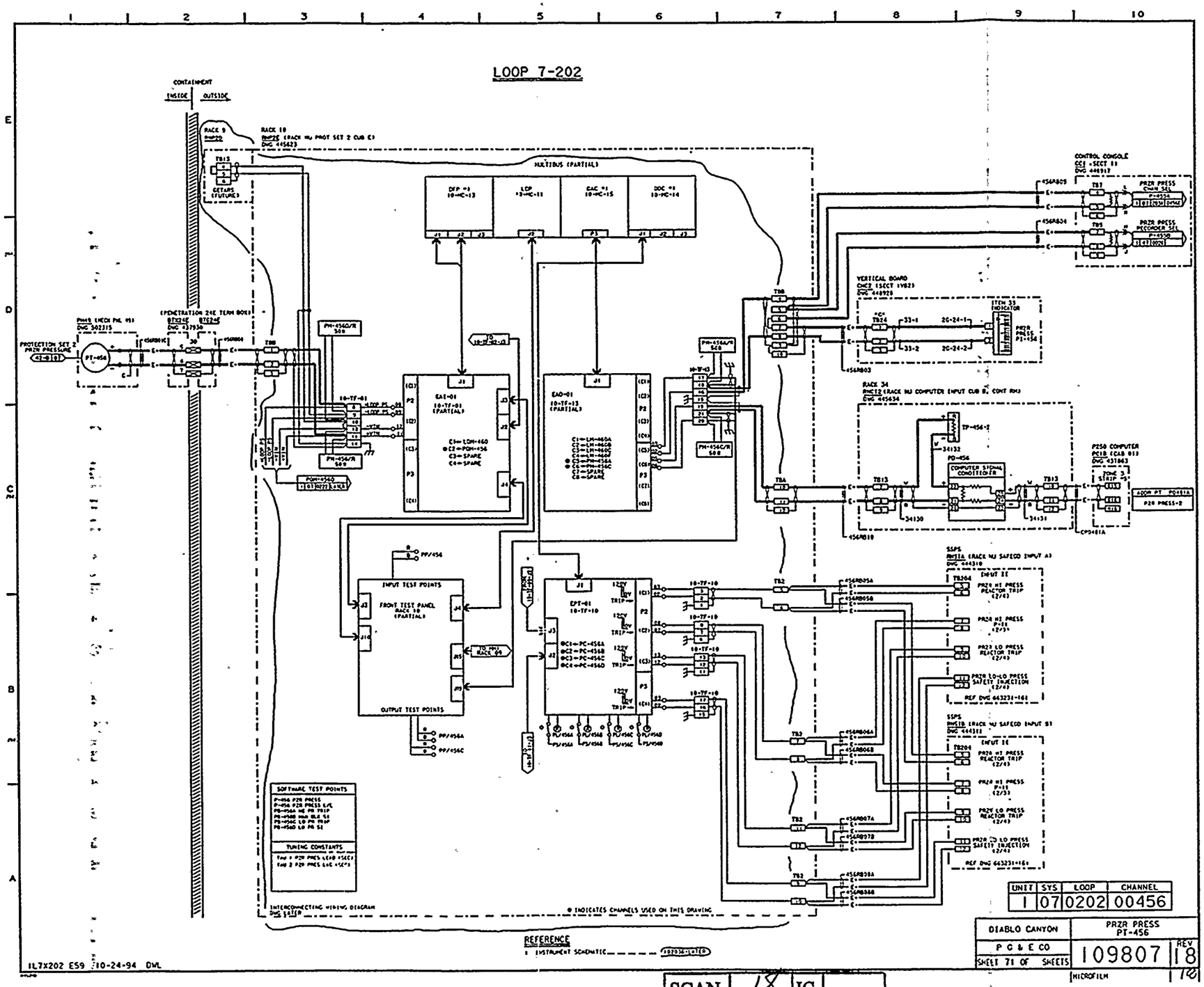

UNIT	SYS	LOOP	CHANNEL
1	07	0202	00456

DIABLO CANYON	PRZR PRESS PT-456	
P G & E CO	109807	REV 18
SHEET 71 OF SHEETS	MICROFILM	70

SCAN | 18 | IC

APERTURE CARD

Also Available on Aperture Card

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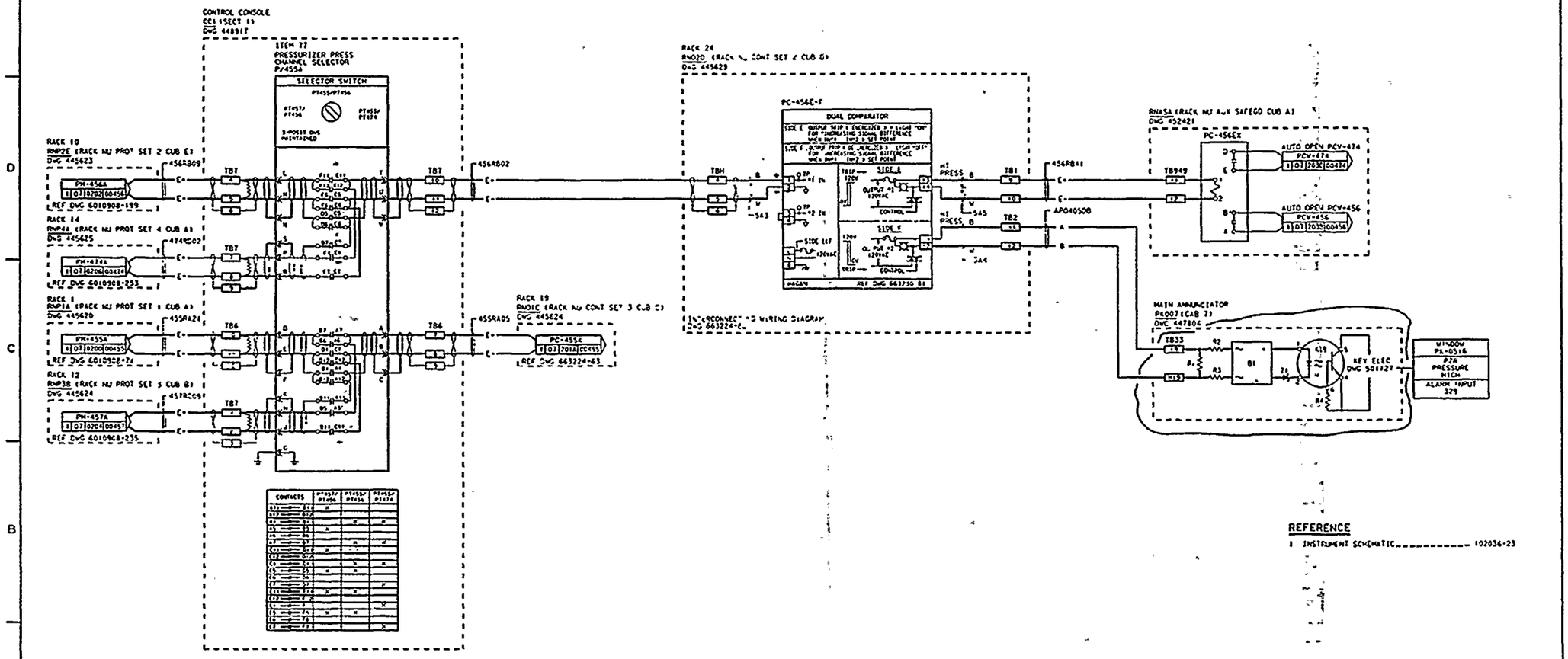
LOOP 7-203A



REFERENCE

1 INSTRUMENT SCHEMATIC 102036-23

UNIT	SYS	LOOP	CHANNEL
1	07	203A	0456E

DIABLO CANYON	PRZR PWR RLF CTRL PC-456E	
P G & E CO	109807	REV 19
SHEET 72 OF SHEETS	MICROFILM	19

IL7X203A.E59 01-26-95 VAL

APERTURE CARD

Also Available on Aperture Card

SCAN | 19 | IC |

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1 of 1

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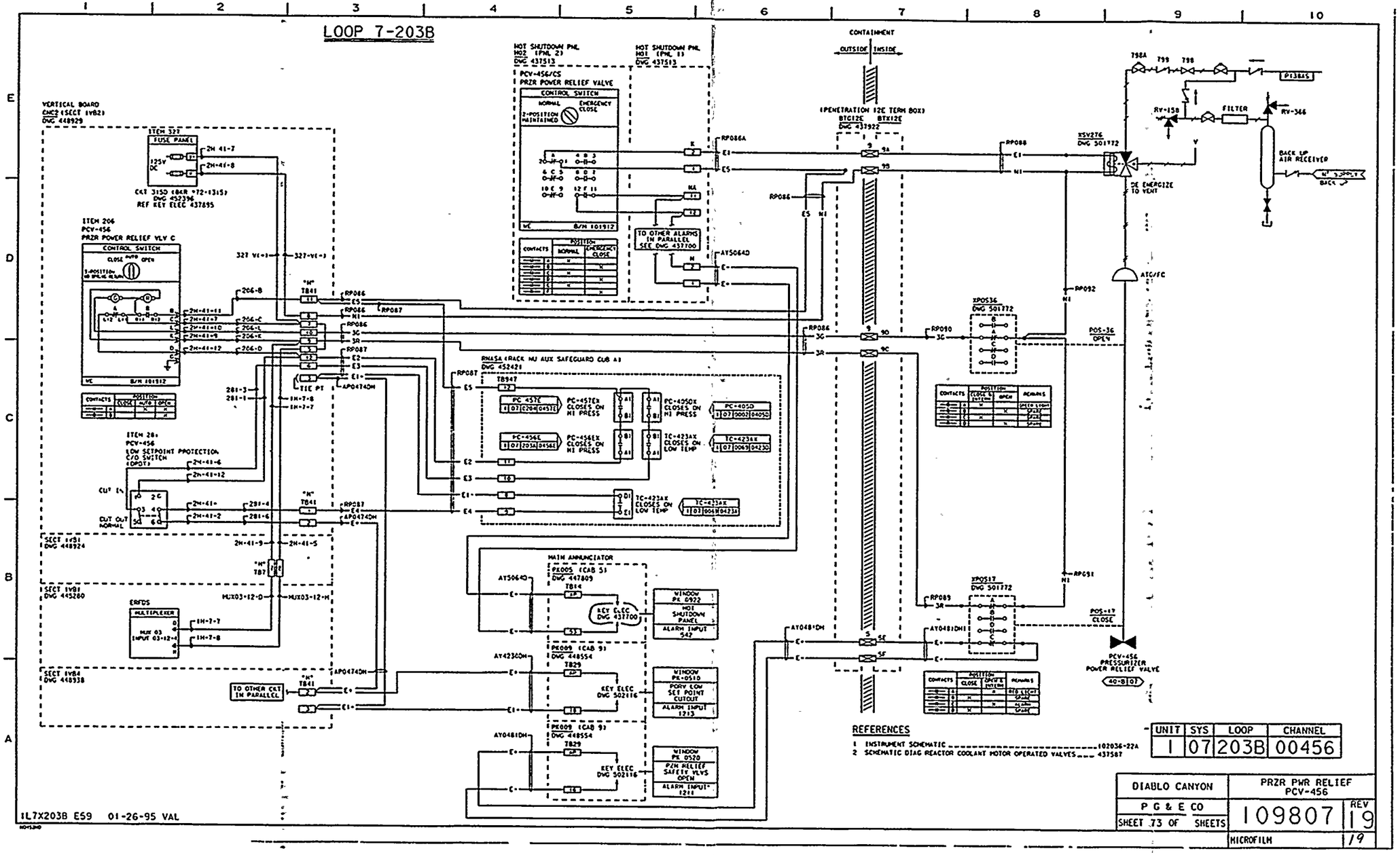
LOOP 7-203B



APERTURE CARD

Also Available on Aperture Card

SCAN | 19 | IC

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LOOP 7-203C

VERTICAL BOARD
CHC2 (SECT 1VB2)
DWG 448527

ITEM 327
FUSE PANEL
125V DC
2F-40-7
2F-40-8
CKT #1190 (BAR #72-1189)
DWG #452394
REF REV ELEC #437895
327-00(+)
327-00(-)

ITEM 204
PCV-474
PRZR POWER RELIEF VLV A
CONTROL SWITCH
CLOSE AUTO OPEN
5-POSITION SPRING RETURN
CONTACTS | POSITION: CLOSE | A/B | OPEN

2F-40-11
2F-40-7
2F-40-2
2F-40-10
2F-40-9
204-B
204-C
204-D
204-L
204-K
F
TB40
TB41
TB15
2F-15-11
2F-15-12
2F-40-9
2F-41-7
MUX01-23-D
MUX01-23-M

SECT 1VB1
DWG 445240
ERFDS
MULTIPLEXER
MUX C INPUT D-23
2F-15-11
2F-15-12

HOT SHUTDOWN PNL
M02 (PNL 2)
DWG 437513
PCV-474/CS
PRZR POWER RELIEF VALVE
CONTROL SWITCH
NORMAL
EMERGENCY CLOSE
2-POSITION MAINT'A NED
CONTACTS | POSITION: NORMAL | EMERGENCY CLOSE
A 4 B 3
20-#F-0 0-11-0
6 C 5 8 D 7
0-#F-0 0-11-0
10 E 9 12 F 11
0-#F-0 0-11-0
41
45
NA
TO OTHER ALARMS IN PARALLEL SEE DWG 437700
AY50640
E+
E-
RP093
RP093A
E1
E5
E2
3C
3B
ES
NI

RHASA RACK MJ AUX SAFEGUARD CUB A3
DWG 452421
RP094
TB39
PC-457EX
PC-457E
PC-456EX
PC-456E
PC-457EX CLOSES ON HI PRESS
PC-456EX CLOSES ON HI PRESS
1 07 203A 0454E
1 07 203A 0455E

MAIN ANNUNCIATOR
PK005 (CAB 5)
DWG 447869
TB14
KEY ELEC DWG 5011129
WINDOW PK-0522
HOT SHUTDOWN PANEL
ALARM INPUT 542
AY50640
PK005 (CAB 5)
DWG 448554
TB27
KEY ELEC DWG 5021 6
WINDOW PK-0520
PZR RELIEF SAFETY VLVS OPEN
ALARM INPUT 50
AY04830F

CONTAINMENT
OUTSIDE INSIDE
(PENETRATION 26E TERM BOX)
BTG26E BTX26E
DWG 437932
5
5B
5C
4C
3C
3B
8F
8C
RP095
RP097
RP096
RP099
E1
N1
3C
3B
3A

797A
797
A5
XSV474
DWG 501772
DE-ENERGIZE TO VENT
ATO/FC
XPOS37
DWG 501772
POS-37 OPEN
XPOS18
DWG 501772
POS-18 CLOSE
CONTACTS | POSITION: CLOSE | OPEN | REMARKS
PRESSURIZER PRESSURE POWER SPLY A, E
40-C 07

REFERENCES
INSTRUMENT SCHEMATIC 437536-1
SCHEMATIC AC REACTOR COOLANT WATER OPERATED VLV E 437538

UNIT	SYS	LOOP	CHANNEL
1	07	203C	0474

DIABLO CANYON — PRZR PWR RELIEF PCV-474
PG&E 50 | 109807 | SH 11
SHEET 74 OF SHEET

RH INCHED REV —

SCAN | 11 | IC

APERTURE CARD

Also Available on Aperture Card

9905270208-11

1 of 1

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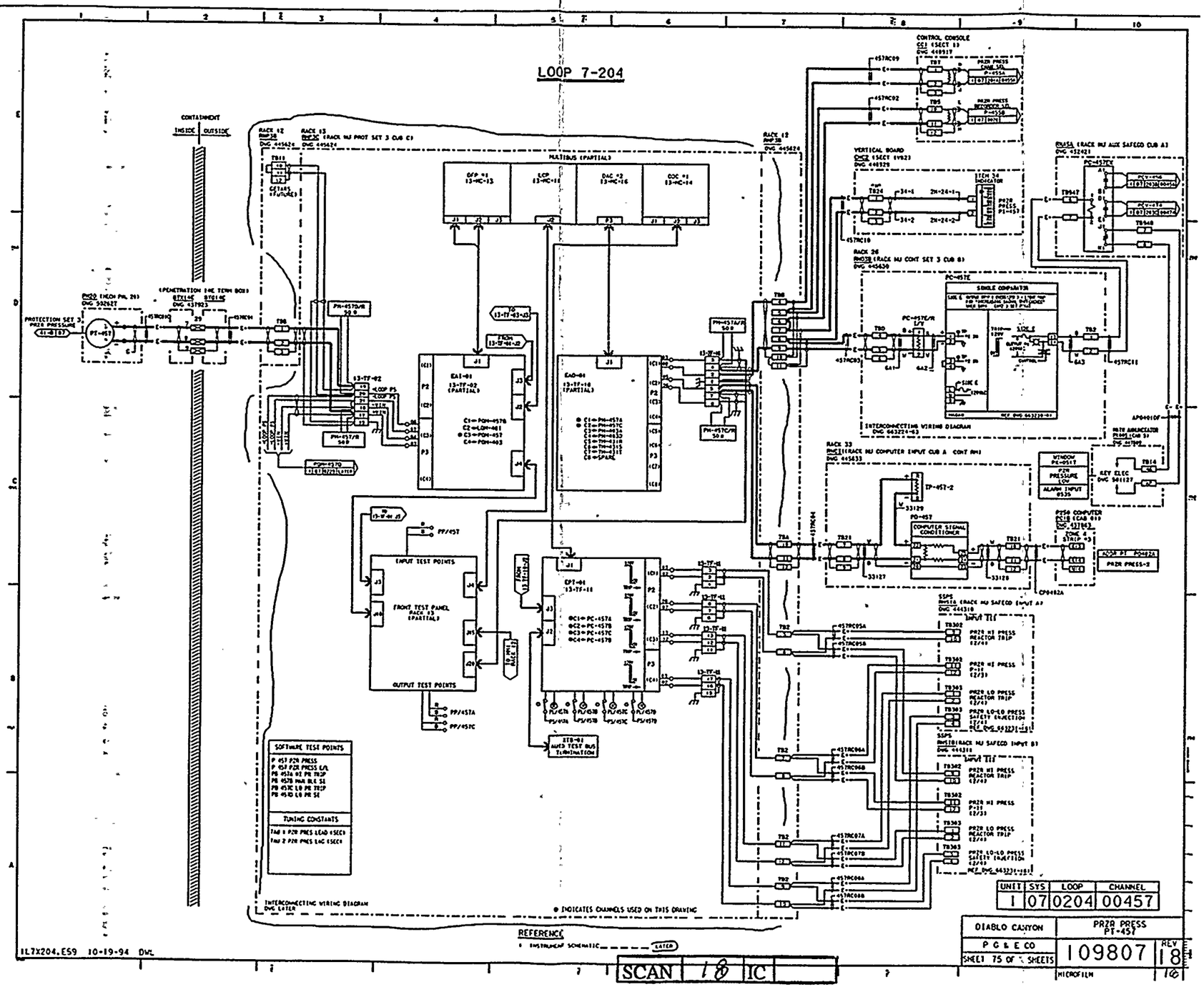

APERTURE CARD

Also Available on Aperture Card

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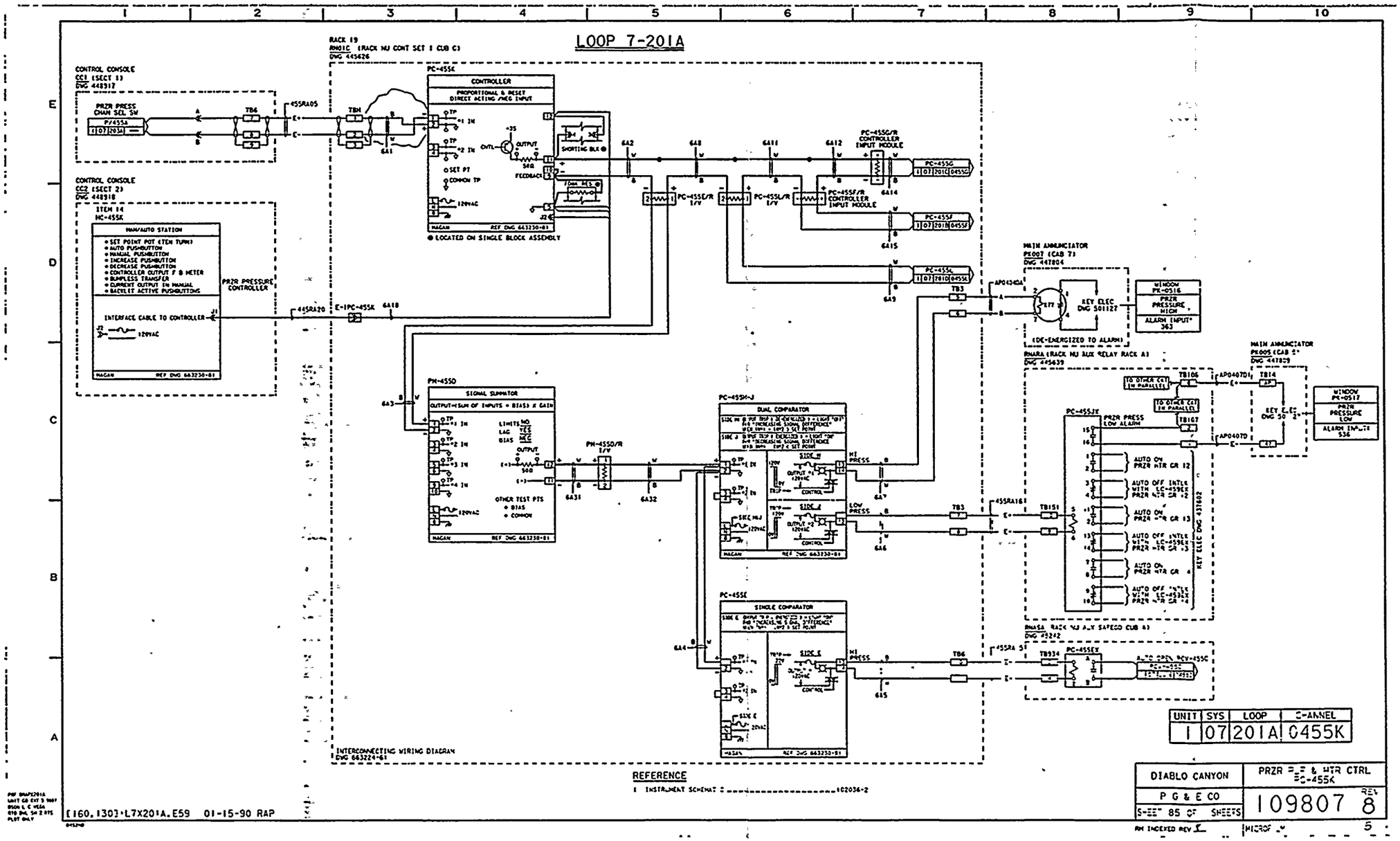
LOOP 7-201A



UNIT	SYS	LOOP	CHANNEL
1	07	201A	C455K

DIABLO CANYON	PRZR PZR & HTR CTRL PC-455K
P G & E CO	109807 REV 8
SHEET 85 OF SHEETS	

RM INDEXED REV K MICROF 5

SCAN 8 IC 8

APERTURE CARD

Also Available on Aperture Card

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LOOP 7-201E

VERTICAL BOARD
CNC2 (SECT 1VB2)
DWG 448928

ITEM 327
FUSE PANEL
125V DC
2C-16-7
2C-16-8
CKT 217D (BKR #72-1217)
DWG 452395
REF KEY ELEC 437695
327-MK(+)

ITEM 205
PCV-455C
PRZR POWER RELIEF VLV B
CONTROL SWITCH
CLOSE AUTO OPEN
3-POSITION NO SPRING RETURN
B/M 801912

CONTACTS	POSITION CLOSE	AUTO	OPEN
A			X
B		X	

205-B
205-C
2C-16-11
2C-16-7
2C-16-12
2C-16-10
2C-16-9
205-D
205-L
205-K
280-3
280-5
1C-39-11
1C-39-12
C TB16
C TB15
C TB17
TIE PT
E1-
AP04730C

ITEM 280
PCV-455C
LOW SETPOINT PROTECTION
C/O SWITCH
(CPD11)
CUT IN
CUT OUT NORMAL
2C-16-6
2C-16-12
2C-17-11
2C-17-12
280-4
280-6
C TB17
E4
E+

SECT 1VB1
DWG 448924
2C-16-9
2C-15-7
C TB39

SECT 1VB1
DWG 445280
ERFDS
MULTIPLEXER
MUX 02 INPUT 02-24-4
1C-39-11
1C-39-12
MUX02-24-O
MUX02-24-H

SECT 1VB4
DWG 448939
C TB41
TO OTHER CIRCUITS

HOT SHUTDOWN PANEL
M02 (PNL 2)
DWG 437513
PCV-455/CS
PRZR POWER RELIEF VALVE
CONTROL SWITCH
NORMAL EMERGENCY CLOSE
2-POSITION MAINTAINED
B/M E01912

CONTACTS	POSITION NORMAL	EMERGENCY CLOSE
A		
B		X
C	X	
D		
E		X
F	X	

B
A
NA
TO
TO OTHER ALARMS IN PARALLEL SEE DWG 437700
N

RP100A
E1
E5
RP100
RP101
E3
E2
3G
3R
AT5064D
C-
E+

RNASA (RACK NU AUX SAFEGUARD CUB A)
DWG 452421
RP101
TB935
E5
PC-474B
PC-474BX CLOSES ON HI PRESS
PC-455E
PC-455EX CLOSES ON HI PRESS
PC-4030X CLOSES ON HIGH PRESS
PC-4030
TC-433AX CLOSES ON LOW TEMP
TC-433AX
E2
E3
E1-
E4
E+
TC-433AX CLOSES ON LOW TEMP

MAIN ANNUNCIATOR
PK005 (CAB 5)
DWG 447809
TB14
AY5064D
KEY ELEC DWG 501129
WINDOW PK-0522
HOT SHUTDOWN PANEL
ALARM INPUT 542
PK009 (CAB 9)
DWG 448554
TB28
AY43300G
KEY ELEC DWG 502116
WINDOW PK-0510
PORV LOW SET POINT CUTOUT
ALARM INPUT 1193
PK009 (CAB 9)
DWG 448554
TB28
AY04820G
KEY ELEC DWG 502116
WINDOW PK-0520
PZR RELIEF SAFETY VLVS OPEN
ALARM INPUT 1189

CONTAINMENT
OUTSIDE INSIDE
(PENETRATION 19E TERM BOX)
BTG19E BTX19E
DWG 437928
14
14A
14B
14D
14C
4
4E
4F
AY04820G
AY04820G1

801A 802 801
P138AS
RV-158
FILTER
RV-366
BACK UP AIR RECEIVER
N2 SUPPLY BACK UP
XSV455C
DWG 501772
DE-ENERGIZE TO VENT
ATO/FC
RP102
RP104
XPOS35
DWG 501772
POS-35
OPEN

CONTACTS	POSITION CLOSE & INTERM	OPEN	REMARKS
A	X		GRN LIGHT
B		X	SPARE
C	X		SPARE
D		X	SPARE

RP103
RP105
RP106
XPOS16
DWG 501772
POS-16
CLOSE
PCV-455C
PRESSURIZER POWER RELIEF VALVE
40-C 07

CONTACTS	POSITION CLOSE	OPEN & INTERM	REMARKS
A		X	GRN LIGHT
B	X		SPARE
C		X	ALARM
D	X		SPARE

REFERENCES

1 INSTRUMENT SCHEMATIC 102036-22A
2 SCHEMATIC DIAG REACTOR COOLANT MOTOR OPERATED VALVES 437587

UNIT	SYS	LOOP	CHANNEL
1	07	201E	0455C

DIABLO CANYON	PRZR PWR RELIEF PCV-455C	
P G & E CO	109807	REV 17
SHEET 89 OF SHEETS	MICROFILM	17

IL7X201E.E59 05-09-94 DWL

SCAN 17 IC 17

APERTURE CARD

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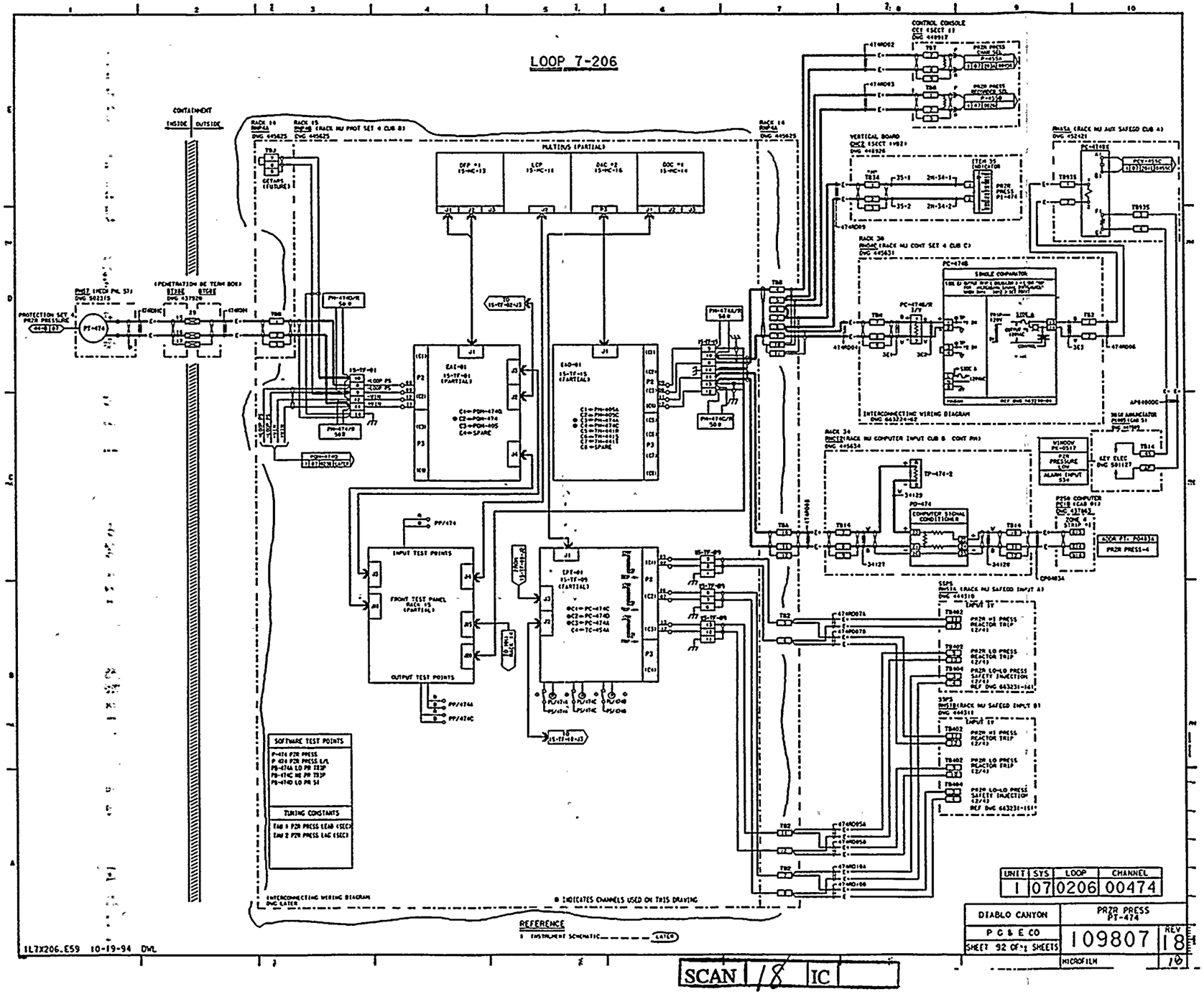
LOOP 7-206



UNIT	SYS	LOOP	CHANNEL
1	07	0206	00474

DIABLO CANYON	PRZR PRESS PT-474	
P G & E CO	109807	REV 18
SHEET 92 OF 93 SHEETS	MICROFILM	10

SCAN 18 IC

APERTURE CARD

Also Available on Aperture Card

9905270208-15

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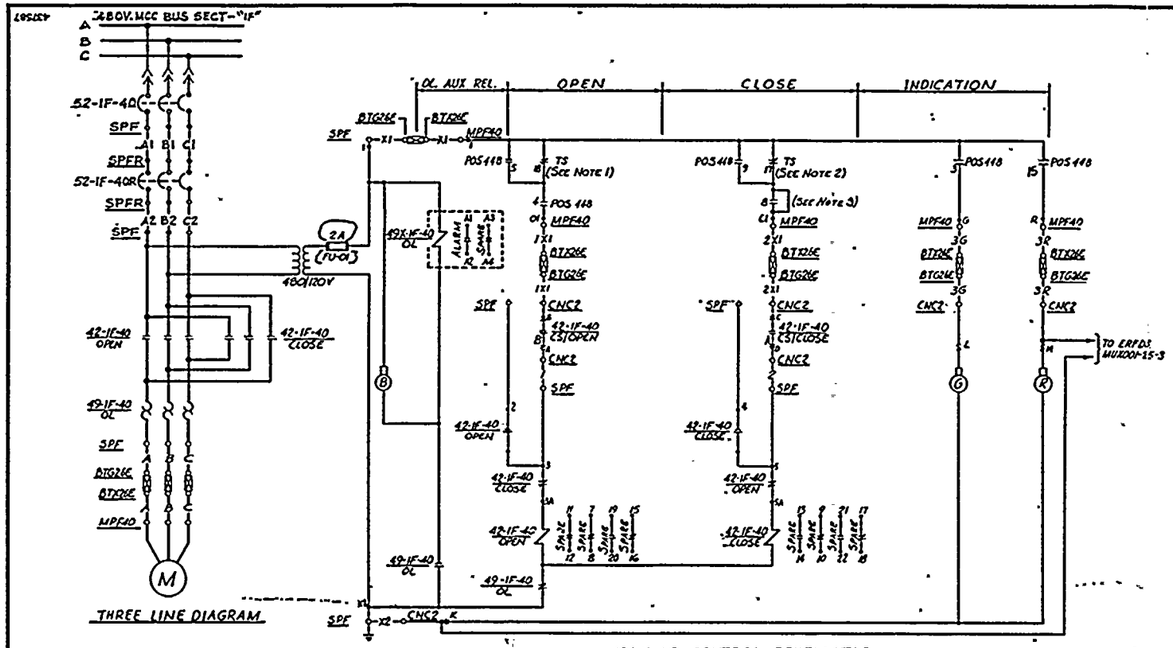
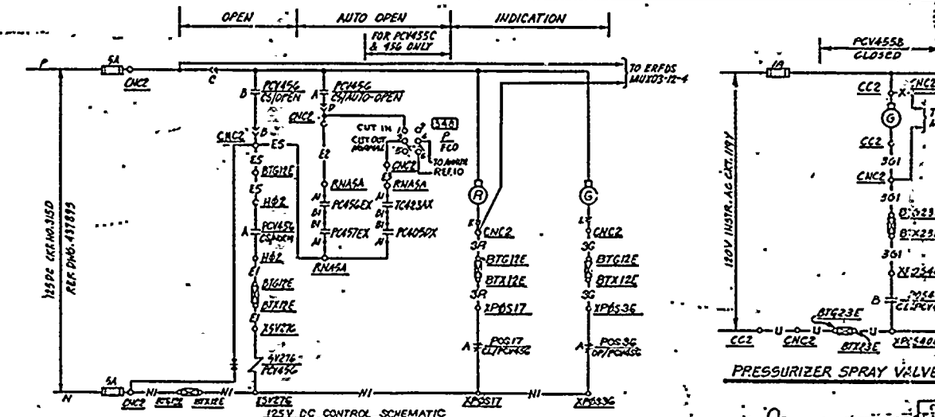


8000A PRESSURIZER POWER RELIEF STOP VALVE II-CKT Nº F40P00

PRESSURIZER RELIEF VALVES SIMILAR EXCEPT AS SHOWN IN TABLE

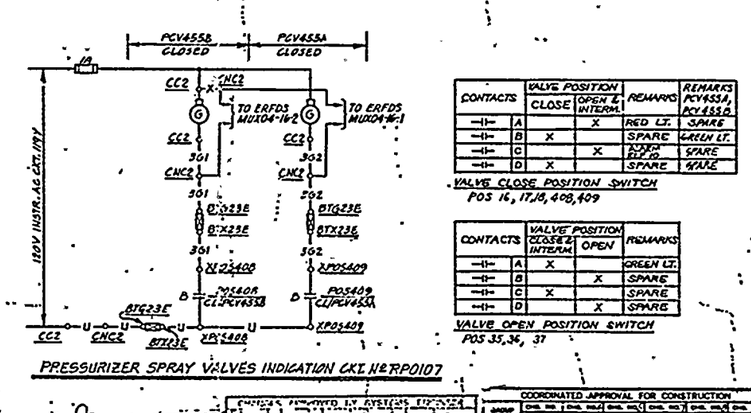
VALVE NO.	DESCRIPTION	CIRCUIT BKR NO. PRIMARY	CIRCUIT BKR NO. BACK-UP	CIRCUIT No.	BUS SECT	NORMAL POSITION	ENGINEER SAFETY VITAL FUNCTION	VALVE POSITION SWITCH-(POS) POS No.	ERFDS INPUT	ALARM CKT Nº OVER-CURRENT	PENETR Nº	MOTOR Nº
▲8000A	PRESSURIZER PWR RELIEF STOP VLV I	52-1F-40	52-1F-40R	F40P00	1F	Open		448	MUX01-25-3	A1440BDF	26E	MPF40
▲8000B	2	52-16-46	52-16-46R	G46P00	1G			455	MUX02-25-4	A1430BDG	19E	MPF46
▲8000C	3	52-1H-33	52-1H-33R	H33P00	1H			462	MUX03-22-1	A1420BDH	12E	MPH33



PCV456 PRESSURIZER POWER RELIEF VALVE - CKT. Nº RP0866

PRESSURIZER POWER RELIEF VALVES SIMILAR EXCEPT AS SHOWN IN TABLE

VALVE NO.	PEN. NO.	DESCRIPTION	ERFDS INPUT	P.C. CKT NO.	CIRCUIT NO.	VALVE NO.	SOL. VLV. NO.	SOL VLV LOC.	NORMAL POSITION	VALVE POSITION SWITCH(POS) CLOSE	OPEN	OPEN ALARM CKT NO.	PRESSURE CONTROL AUX. REL. LOC. OF RELAYS RNASA DEVICE	CONT	DEVICE	CONT	TEMPERATURE CONTROL AUX. REL LOC OF RELAYS RNASA DEVICE	CONT	FCO SWITCH LOC. CNC2 DEVICE	CONT
PCV456	12E	PRESS PWR RELIEF VLV	MUX03-24-4	3ND	RP0866	A	PCV456	456	CLOSED	17	36	MUX03-17-1	PC456EX	4-6	PC457EX	4-6	TC483AX	4-6	FCO456	1-4-3
PCV474	26E		MUX01-23-4	1ND	RP0933	A	PCV474	474		18	37	MUX01-20-1	PC456EX	4-6	PC457EX	4-6	TC483AX	4-6	FCO474	1-4-3
PCV455C	19E		MUX02-24-4	2ND	RP1000A	A	PCV455C	455C		16	35	MUX04-19-3	PC455EX	4-6	PC456EX	4-6	TC483AX	4-6	FCO455C	1-4-3



CONTACTS	VALVE POSITION CLOSE	OPEN & INTERM.	REMARKS	REMARKS PCV455A, PCV455B
A		X	RED LT.	SPARE
B	X		SPARE	GREEN LT.
C		X	SPARE	SPARE
D	X		SPARE	SPARE

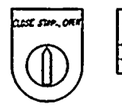
VALVE CLOSE POSITION SWITCH

POS 16, 17, 18, 408, 409

CONTACTS	VALVE POSITION CLOSE & INTERM.	OPEN	REMARKS
A	X		GREEN LT.
B		X	SPARE
C	X		SPARE
D		X	SPARE

VALVE OPEN POSITION SWITCH

POS 35, 36, 37



CONTACTS	POSITION CLOSE	STOP	OPEN	REMARKS
A	X			THIS DWG
B			X	THIS DWG

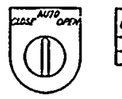
CONTROL SWITCH 42-1F-40 CS, 42-16-46 CS, 42-1H-33 CS

USED AT LOCATION CNC2, NO SPRING RETURN

CONTACTS	VALVE POSITION FULL OPEN				FULL CLOSED	FUNCTION
1						SPARE
2						SPARE
3						CAGEN LIGHT
4						OPEN LIMIT
5						BYPASS INTLK
6						SPARE
7						SPARE
8						(SPARE) PCV455 BYPASS INTLK
9						BYPASS INTLK
10						SPARE
11						SPARE
12						SPARE
13						SPARE
14						SPARE
15						RED LT
16						SPARE

TYPICAL VALVE POSITION SWITCH CONTACT DEVELOPEMENT

* POS 448, POS 445, POS 462 ACTUAL SETPOINTS ARE IN PMS.



CONTACTS	POSITION CLOSE	AUTO	OPEN	REMARKS
A		X	X	THIS DWG.
B			X	THIS DWG.

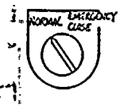
CONTROL SWITCH PCV456 CS, PCV474 CS, PCV455C CS

USED AT LOCATION CNC2

NO SPRING RETURN

TABLE OF DEVICES

DEVICE NO	FUNCTION	RATING	MFR.	TYPE	CAT/DWG*	REMARKS
42-1F-40, 16-46, 1H-33	480V AC MOTOR STARTER REVERSIBLE, SIZE 1	—	WECORP	—	REF DWG #1,2	
49:1F-40, 1G-46, 1H-33	MOTOR OVERLOAD RELAY	—	WE CORP	—	—	PART OF MOTOR STARTER
49X 1F-40, 1G-46, 1H-33	MOTOR OVERLOAD AUXILIARY RELAY	—	WE CORP	—	—	PART OF MOTOR STARTER
52 1F-40, 1G-46, 1H-33	480V AC AIR CIRCUIT BREAKER	—	WE CORP	—	REF DWG #1,2	
52-1F-40R, 52-16-46R, 52-1H-33R	480V AIR CIRCUIT BREAKER		WE CORP		REF DWG #1,2&8	BACK-UP BREAKER
FCV	FLOW CONTROL VALVE	—	—	—	—	SEE TABLE FOR VALVE NOS
PCA455EX	PRESSURE CONTROLLER AUX. REL.	—	—	—	REF DWG #11	
POS	FCV POSITION SWITCH	—	—	—	—	SEE TABLE FOR SW NOS
TC483AX-EX	TEMPERATURE CONTROLLER AUX. REL			—	REF DWG #11	
SV....	SOLENOID VALVE					
EN. SW.	ENABLE TOGGLE SWITCH					
TS	TORQUE SWITCH					



CONTACTS	POSITION NORMAL	EMERGENCY CLOSE	REMARKS
A	X		THIS DWG
B		X	SPARE
C	X		
D		X	
E	X		
F		X	NRMA REF. 13

CONTROL SWITCH PCV456 CS, PCV474 CS, PCV455C CS

USED AT LOCATION H02

NO SPRING RETURN

EQUIPMENT LOCATION NUMBERS

SPF - 480V MOTOR CONTROL CENTER BUS SECTION 1F

MPF40 - MOTOR OPERATED VALVE 8000A

CNC2 - CONTROL BOARD, REACTOR COOLANT

BTG26E - TERMINAL BOX, AREA G, No 26E

RNASA - RACK NUCLEAR AUX. SAFEGUARD CUBICLE A

SPER - 480V MCC BUS SECTION 1F, BACK-UP O.C.

LEGEND:

▲ MOV'S PROVIDED WITH FIELD INSTALLED "QUICKTEST" CABLE ASSEMBLIES. SEE APPLICABLE DIAGRAM OF CONNECTIONS.

NOTES:

1- SWITCH OPENS ON MECHANICAL TORQUE DURING OPENING CYCLE (18)

2- SWITCH OPENS ON MECHANICAL TORQUE DURING CLOSING CYCLE OR FULLY CLOSED VALVE (17)

3- FIELD TO INSTALL JUMPER FOR TORQUE

REFERENCES:

12. BLOCK DIAG. ERFDS TECH. SUPPORT CENTER & CONTROL ROOM	DWG. 445278
13. SCHEMATIC DIAGRAM-MAIN ANNUNCIATOR	" 437700
1-SINGLE LINE METER & RELAY DIAGRAM 480V SYSTEM, BUS SECT "1G"	DWG. 437542
2- " " " " " " "1H"	437543
3-DESCRIPTION OF ELECT. SCHEMATIC DIAGS SYMBOLS & CKT DESIGNATIONS	050083
4-EQUIPMENT LOCATION NUMBERS LIST	101900
5-PIPING SCHEMATIC REACTOR COOLANT SYSTEM	102007
6-INSTRUMENT SCHEMATIC FLOW INSTRUMENT SYSTEMS	102032
7- " " MULTIVARIABLE INSTRUMENT SYSTEMS	102036
8-SINGLE LINE METER & RELAY DIAGRAM 480V SYSTEM BUS SECT "1F"	437916
9-SINGLE LINE DIAG. MAIN CONT. BD 1V81 & 1V82 FUSE PANELS	437895
10-SCHEMATIC DIAG MAIN ANNUNCIATOR 211 26	502116
11-WESTINGHOUSE ELEMENTARY WIRING DIAGRAM	REG.#669193-227,297

DIVISION:	13	14	15	16	17	18	11	12
SS ENGR								
SUPRV ENGR.								

NUCLEAR SAFETY RELATED

*VALVE Nos. 8000A, 8000B, 8000C

PCV455C, PCV456, PCV474, PCV455A, PCV455B

UNIT 1

P.G.&E. SYSTEM PHASE SEQUENCE A-C-B

APERTURE CARD

Also Available on Aperture Card

APPROVED	GM 107077	SCHEMATIC DIAGRAM REACTOR COOLANT MOTOR OPERATED VALVES	
DRAWN		DIABLO CANYON	
CHECKED		DEPARTMENT OF ENGINEERING	
SUPERVISED		PACIFIC GAS AND ELECTRIC COMPANY	
SUPERVISED BY		SAN FRANCISCO, CALIFORNIA	
DATE	12-5-69	SCALE None	DRAWING NO. 437587 SHEET NO. 19

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PRESSURIZER PRESSURE CHANNELS

IV III II I

AUX. F.P. STATION

PRESSURE CHANNEL SELECTOR SWITCH (POSITION 2 NORMALLY SELECTED)

ADJUSTABLE PRESSURE REFERENCE SETPOINT WITHIN CONTROLLER

(P-P REF)

$K_{21}\left(1+\frac{1}{T_{21}S}+T_{22}S\right)$

INTERLOCK

PC 474B | PC 457E | PC 456E | PC 456F | PC 455E | PC 455H | PC 455J

POWER RELIEF VALVE CONTROL MODE SELECTOR SWITCH (OPEN AUTO CLOSE)

PCV-456 | PCV-474 | PCV-455C

POWER RELIEF VALVE 1 (NOTE 3) | POWER RELIEF VALVE 2 (NOTE 3) | POWER RELIEF VALVE 3 (NOTE 3)

TO TURN-ON ALL BACK-UP HEATERS (SHEET 12)

TO VARIABLE HEATER CONTROL SIGNAL (SHEET 12)

MODULATE SPRAY VALVE #1 PCV-455A

MODULATE SPRAY VALVE #2 PCV-455B

AUCTIONEERED Tavg (SHEET 9)

ADJUSTABLE NO LOAD Tavg. SETPOINT WITHIN CONTROLLER

LEVEL PROGRAM CONTROLLER

$L_{REF.}$

SPRAY CONTROLLER | SPRAY CONTROLLER

AUTO-MANUAL CONTROL STATION (CONTROL ROOM) | AUTO-MANUAL CONTROL STATION (CONTROL ROOM)

AUTO-MANUAL CONTROL STATION (LOCAL)

NOTE 2

CHARGING FLOW CONTROL

AUX. F.P. STATION | CHARGING PUMP STATION

PRESSURIZER LEVEL CHANNELS

I III II

LEVEL CHANNEL SELECTOR SWITCH (POSITION 2 NORMALLY SELECTED)

(L-L REF)

$K_{21}\left(1+\frac{1}{T_{23}S}+T_{24}S\right)$

LC 459G | LC 459F | LC 459E | LC 459C | LC 460C | LC 460D

CLOSE ALL ORIFICE ISOLATION VALVES (NOTE 3)

TO TURN-ON ALL BACK-UP HEATERS (SHEET 12)

TO HEATER INTERLOCK (BLOCK ALL EXCEPT LOCAL CONTROL) (SHEET 12)

ALL ORIFICE ISOLATION VALVES CLOSED

LETDOWN LINE ISOLATION VALVE CONTROL SELECTOR SWITCH (CLOSE / OPEN MOMENTARY)

LETDOWN ISOLATION VALVE 459 (CLOSE / OPEN) — NOTE 3 — VALVE OPEN SIGNAL — 33c0

LETDOWN LINE ISOLATION VALVE CONTROL SELECTOR SWITCH (CLOSE / OPEN MOMENTARY)

LETDOWN ISOLATION VALVE 460 (CLOSE / OPEN) — NOTE 3 — VALVE OPEN SIGNAL — 33c0

REFERENCES	W.E. DWG	PG&E DWG
1. FUNCTIONAL LOGIC DIAGRAM INDEX AND SYMBOLS	5653074-1	495841
2. FUNCTIONAL LOGIC DIAGRAM REACTOR TRIP SIGNALS	5653074-2	495842
3. FUNCTIONAL LOGIC DIAGRAM NUCLEAR INSTR AND MANUAL TRIP SIGNALS	5653074-3	495843
4. FUNCTIONAL LOGIC DIAGRAM NUCLEAR INSTR PERMISSIVES AND BLOCKS	5653074-4	495844
5. FUNCTIONAL LOGIC DIAGRAM PRIMARY COOLANT SYSTEM TRIP SIGNALS	5653074-5	495845
6. FUNCTIONAL LOGIC DIAGRAM PRESSURIZER TRIP SIGNALS	5653074-6	495846
7. FUNCTIONAL LOGIC DIAGRAM STEAM GENERATOR TRIP SIGNALS	5653074-7	495847
8. FUNCTIONAL LOGIC DIAGRAM SAFEGUARDS ACTUATION SIGNALS	5653074-8	495848
9. FUNCTIONAL LOGIC DIAGRAM ROD CONTROLS AND ROD BLOCKS	5653074-9	495849
10. FUNCTIONAL LOGIC DIAGRAM STEAM DUMP CONTROL	5653074-10	495850
11. FUNCTIONAL LOGIC DIAGRAM PRESSURIZER PRESSURE AND LEVEL CONTROL	5653074-11	495851
12. FUNCTIONAL LOGIC DIAGRAM PRESSURIZER HEATER CONTROL	5653074-12	495852
13. FUNCTIONAL LOGIC DIAGRAM FEEDWATER CONTROL AND ISOLATION	5653074-13	495853
14. FUNCTIONAL LOGIC DIAGRAM FEEDWATER CONTROL AND ISOLATION	5653074-14	495854
15. FUNCTIONAL LOGIC DIAGRAM AUXILIARY FEEDWATER PUMPS STARTUP	5653074-15	495855
16. FUNCTIONAL LOGIC DIAGRAM TURBINE TRIPS, RUNBACKS & SIGNALS	5653074-16	495856
17. FUNCTIONAL LOGIC DIAGRAM AMSAC SIGNALS	5653074-17	495857
18. FUNCTIONAL LOGIC DIAGRAM SEISMIC TRIP	8759077	495858
19. FUNCTIONAL LOGIC DIAGRAM DIGITAL FW CONT SYS INPUT SIGNAL VALIDATION	5653074-18	495859
20. FUNCTIONAL LOGIC DIAGRAM DIGITAL FW CONT SYS FW FLOW CONTROLLER & C_v DEMAND	5653074-19	495860
21. FUNCTIONAL LOGIC DIAGRAM DIGITAL FW CONT SYS CONT VCV SEQ & TRACKING LOGIC	5653074-20	495861
22. FUNCTIONAL LOGIC DIAGRAM DIGITAL FW CONT SYS SIGNAL SELECTOR LOGIC	5653074-21	495862
23. DRAWING INDEX SOLID STATE PROTECTION SYS INTERCONNECTION & SCHEM. DIAGRAM	1080442-1	458862

NOTES:

1. ALL CIRCUITS ON THIS SHEET ARE NOT REDUNDANT.
2. LOCAL CONTROL OVERRIDES ALL OTHER SIGNALS. LOCAL OVERRIDE ACTUATES ALARM IN CONTROL ROOM.
3. OPEN/SHUT INDICATION IN CONTROL ROOM.
4. SHEET NUMBERS REFER TO THE REFERENCE NUMBERS BELOW.
5. WHENEVER A PROCESS SIGNAL IS USED FOR CONTROL AND DERIVED FROM A PROTECTION CHANNEL, ISOLATION MUST BE PROVIDED.
6. THIS ILLUSTRATES THE FUNCTIONAL REQUIREMENTS OF THE REACTOR CONTROL AND PROTECTION SYSTEM. THIS DRAWING DOES NOT REPRESENT ACTUAL HARDWARE IMPLEMENTATION. FOR HARDWARE IMPLEMENTATION, REFER TO APPLICABLE SCHEMATIC.

NUCLEAR SAFETY RELATED

KEY DWG--SECTION 3 UNIT 1

FUNCTIONAL LOGIC DIAGRAM PRESSURIZER PRESSURE & LEVEL CONTROL

DIABLO CANYON
DEPARTMENT OF ENGINEERING
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

COAST VALLEYS DIVISION

RH INDEXED REV 1

DRAWING NO. 495851 SHEET 1

REVISIONS

APERTURE CARD

Also Available on Aperture Card

9905270208-17

INPUT PARAMETERS AND ASSUMPTIONS USED IN ANALYSIS; DCPP MAXIMUM ECCS INJECTION FLOW VERSUS RCS PRESSURE

Table 1

Inadvertent Safety Injection at Power Analysis
Input Parameters and Assumptions

Input PARAMETER /Assumption	CASE 1	CASE 2	CASE 3
Offsite Power	Available	Available	Available
Initial RCS Pressure	2190 psia	2190 psia	2190 psia
Initial Pressurizer Level	67.4%	67.4%	67.4%
Initial Power	102%	102%	102%
RCS Flow	350,800 gpm	350,800 gpm	350,800 gpm
Initial RCS Tavg	568.6°F	568.6°F	568.6°F
RWST Temp	35°F	35°F	35°F
Pressurizer Sprays	ON in Auto	OFF	OFF
Pressurizer Heaters	ON in Auto	ON in Auto	ON in Auto
PORV Lift Setpoint	N/A[1]	2257 psia[2]	2298 psia
PORV ResetSetpoint	N/A[1]	2237 [2]	2278 psia
PORV opening time delay	N/A[1]	1.49 seconds	0.80 seconds
PORV closing time delay	N/A[1]	1.72 seconds	1.20 seconds
PORV Flow - Water	N/A[1]	1246 gpm	1246 gpm
PORV Flow - Steam	N/A[1]	197,000 lbm/hr	197,000 lbm/hr
PSV Lift Setpoint	2437.5 psia	2437.5 psia	2437.5 psia
Terminate PDP Flow	11.5 minutes	6.5 minutes	6.5 minutes
Charging Flow Reduced	N/A[3]	28 minutes	N/A
Reduced Charging Flow	N/A[3]	52 gpm	52 gpm
Event End Time	Per analysis results	30 minutes	24 minutes
Analysis Output	Time for third PSV liquid relief with water temp. > 613 °F	Number of MPC PORV open/close cycles	Number of non-MPC PORV open/close cycles

[1]Case 1 does not model Pressurizer PORV.
[2]Case 2 PORV uses fixed lower setpoint to bound dynamic compensated pressure response of MPC circuit.
[3] Case 1 is terminated prior to charging flow reduction.

Table 2

DCPP Maximum ECCS Injection Flow versus RCS Pressure

RCS PRESSURE	MAX ECCS, 2 CCP'S + PDP	MAX ECCS, 2 CCP'S
2000 psig	447.9 gpm	418.5 gpm
2100 psig	419.0 gpm	387.4 gpm
2200 psig	386.6 gpm	355.1 gpm
2300 psig	347.9 gpm	321.4 gpm
2400 psig	299.0 gpm	283.1 gpm
2500 psig	225.3 gpm	not available

TRANSIENT RESULTS AND SEQUENCE OF EVENTS FOR THE SPURIOUS OPERATION OF THE SAFETY INJECTION SYSTEM AT POWER EVENT

Diablo Canyon Inadvertent ECCS Analysis
Case 1

PSV Assumptions

PSV opening pressure (nom -2.5% tolerance):	2437.5 psia
PSV closing pressure (-5% blowdown):	2315.6 psia
PSV water relief flow rate:	≈ 252 - 256 lbm/sec

Important Transient Results

Time of 4th PSV water relief:	679.8 sec
Minimum Final Water Relief Temp (3 cycles):	631.5°F

Time Sequence of Events

Event	Time (sec)
SI actuation (2 CCPs + PDP), Reactor Trip	0.0
Pressurizer fills with water	535.0
PSV opens - cycle #1	577.4
PSV closes - cycle #1	580.3
PSV opens - cycle #2	613.2
PSV closes - cycle #2	616.1
PSV opens - cycle #3	647.3
PSV closes - cycle #3	650.3*
PSV opens - cycle #4	679.8

* Time of final water relief (assuming 4th opening is avoided)

Diablo Canyon Inadvertent ECCS Analysis
Case 2

PORV Assumptions

PORV opening pressure:	2257 psia
PORV closing pressure:	2237 psia
Minimum PORV opening delay:	1.4894 seconds
Minimum PORV closing delay:	1.7255 seconds
PORV steam relief flow rate:	54.7 lbm/sec
PORV water relief flow rate:	1246 gpm

Important Transient Results

Total PORV open/close cycles:	134

Time Sequence of Events

Event	Time (sec)
SI actuation (2 CCPs + PDP), Reactor Trip	0.0
PORV opens - cycle #1 (steam relief)	55.9
PDP Flow terminated by operator action	390.0
Pressurizer fills with water	727.0
PORV opens - cycle #42 (1st water relief)	727.0
Charging flow minimized (52 gpm)	1680.0
PORV opens - cycle #134 (final water relief)	1782.7
Event termination	1800.0

Diablo Canyon Inadvertent ECCS Analysis
Case 3

PORV Assumptions

PORV opening pressure:	2298 psia
PORV closing pressure:	2278 psia
Minimum PORV opening delay:	0.80 seconds
Minimum PORV closing delay:	1.20 seconds
PORV steam relief flow rate:	54.7 lbm/sec
PORV water relief flow rate:	1246 gpm

Important Transient Results

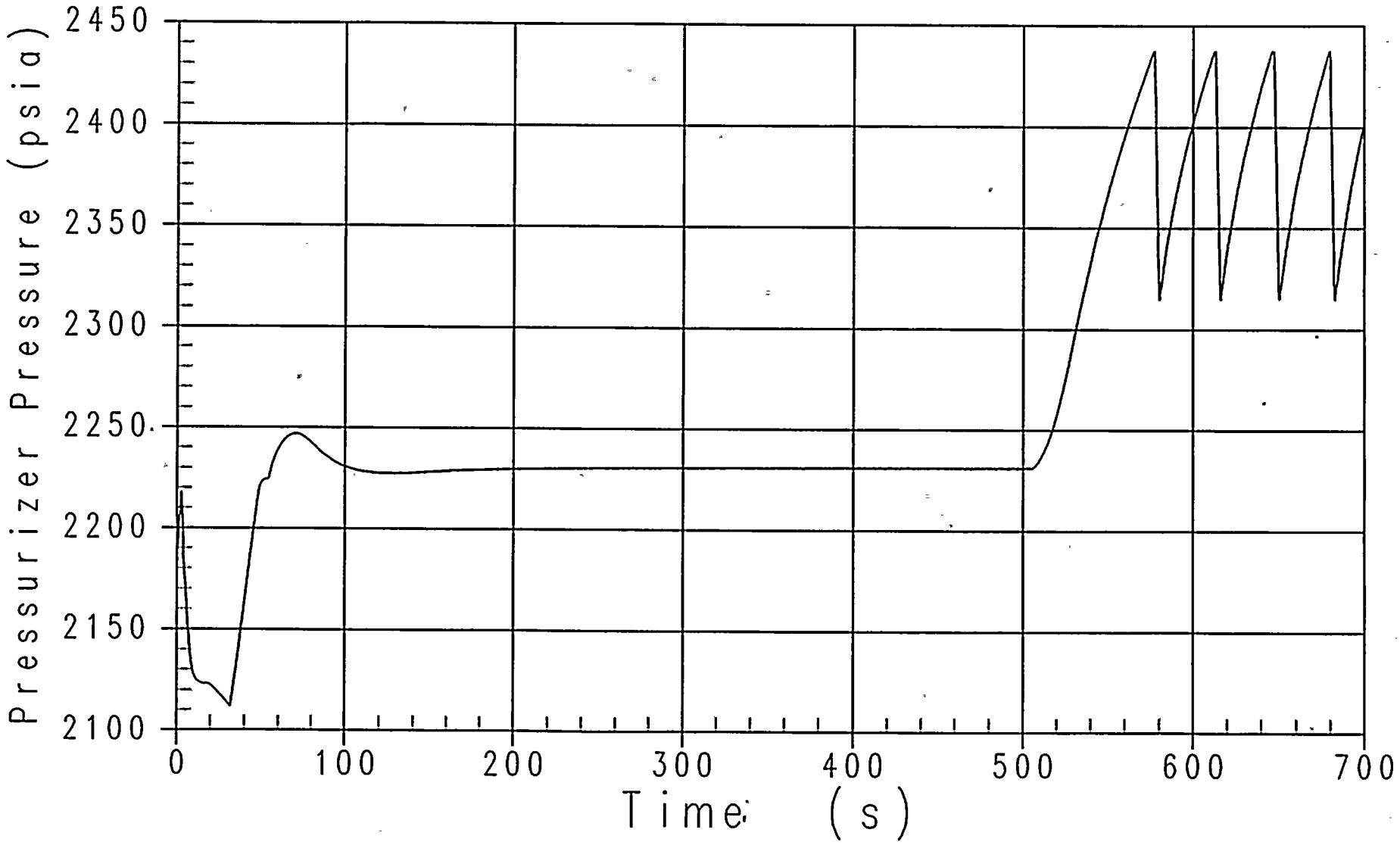
Total PORV open/close cycles:	134

Time Sequence of Events

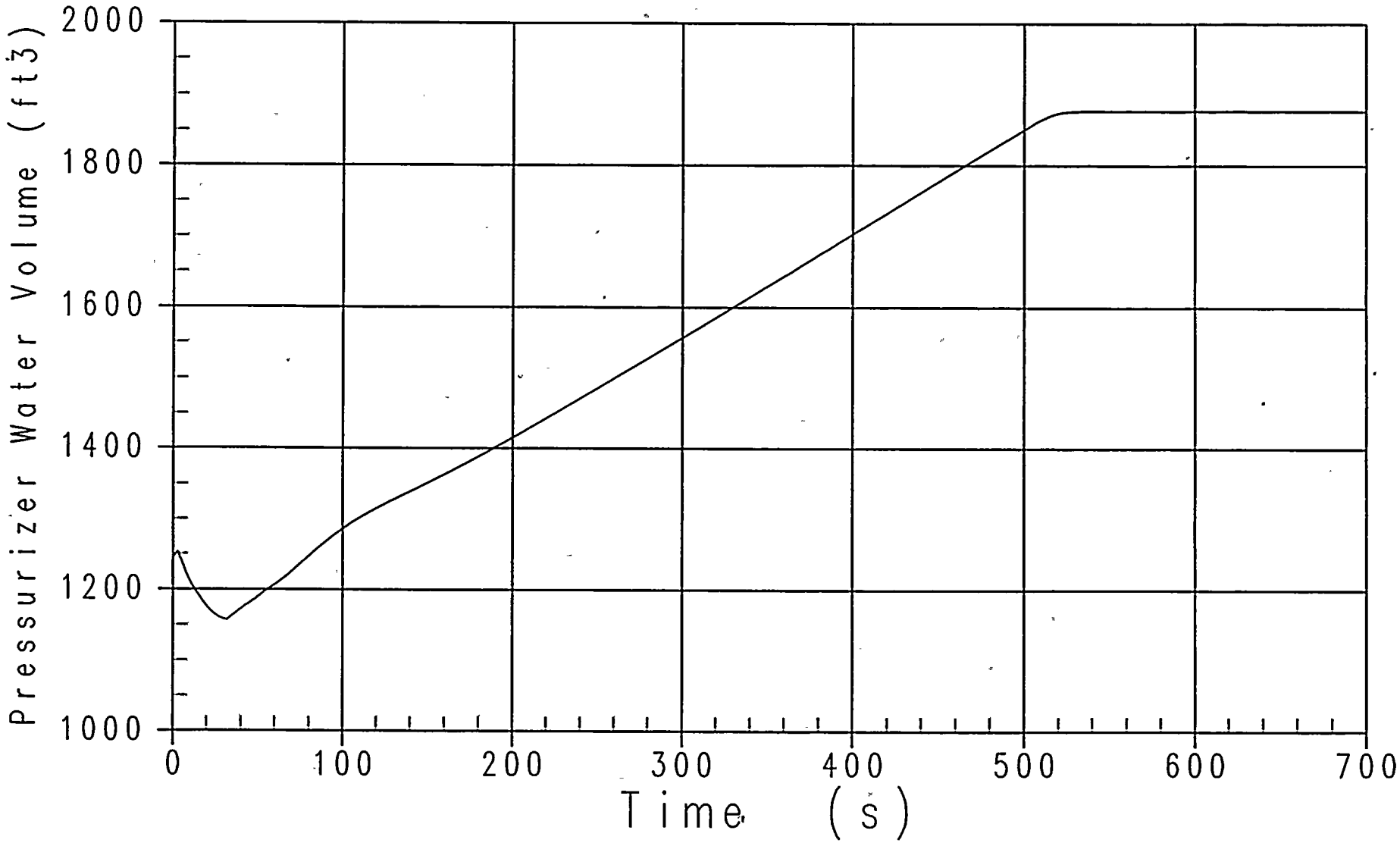
Event	Time (sec)
SI actuation (2 CCPs + PDP), Reactor Trip	0.0
PORV opens - cycle #1 (steam relief)	62.0
PDP Flow terminated by operator action	390.0
Pressurizer fills with water	768.6
PORV opens - cycle #54 (1st water-only relief)	774.0
PORV opens - cycle #134 (final water relief)	1439.5
Event termination	1440.0

TRANSIENT PLOTS FOR THE SPURIOUS OPERATION OF THE SAFETY INJECTION SYSTEM AT POWER EVENT

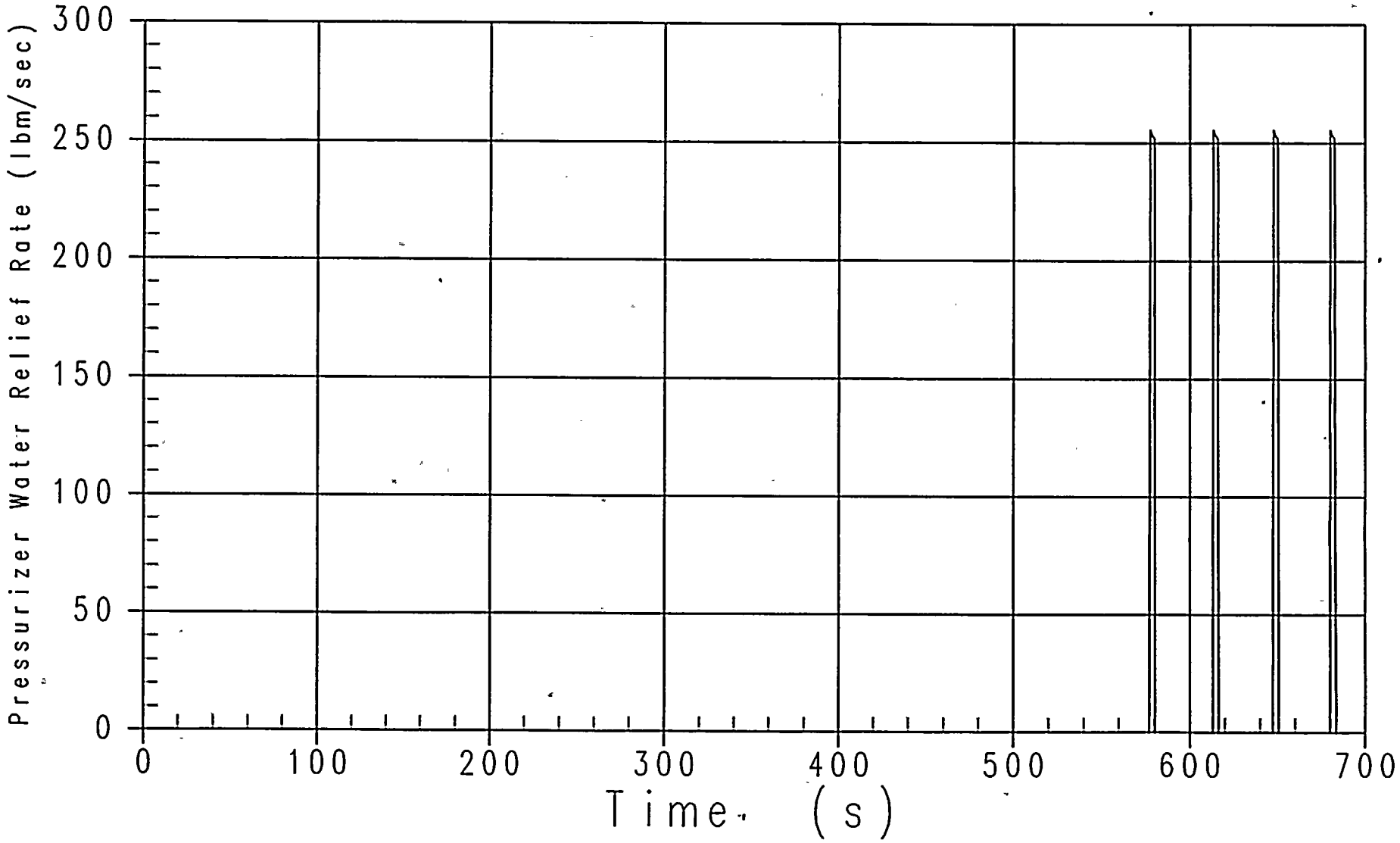
DCPP Units 1 and 2 Inadvertent SI Event
CASE 1
(with Pzr Spray, PDP Flow Terminated at 11.5 Minutes)
(used to determine operator action time)



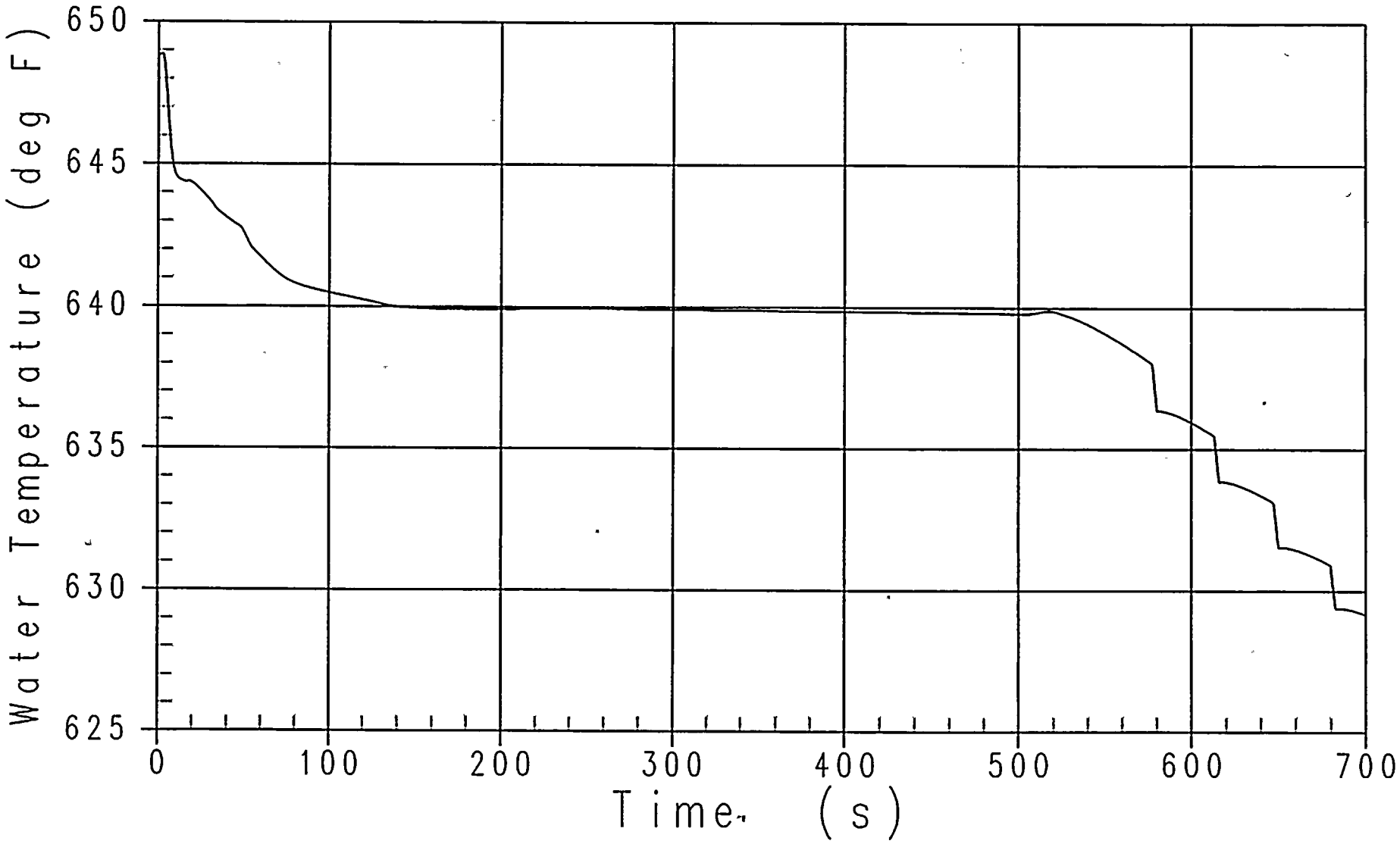
DCPP Units 1 and 2 Inadvertent SI Event
CASE 1
(with Pzr Spray, PDP Flow Terminated at 11.5 Minutes)
(used to determine operator action time)



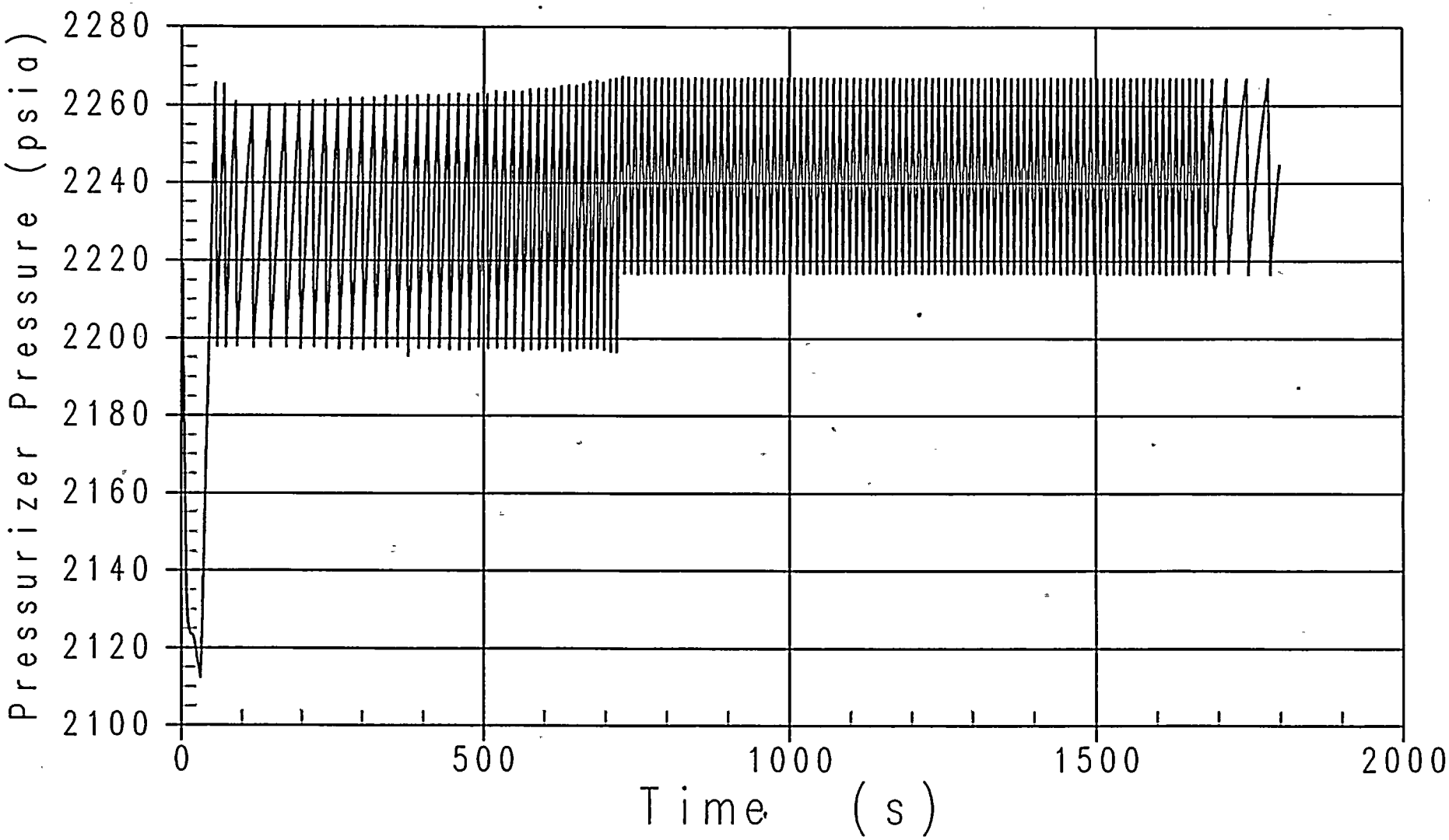
DCPP Units 1 and 2 Inadvertent SI Event
CASE 1
(with Pzr Spray, PDP Flow Terminated at 11.5 Minutes)
(used to determine operator action time)



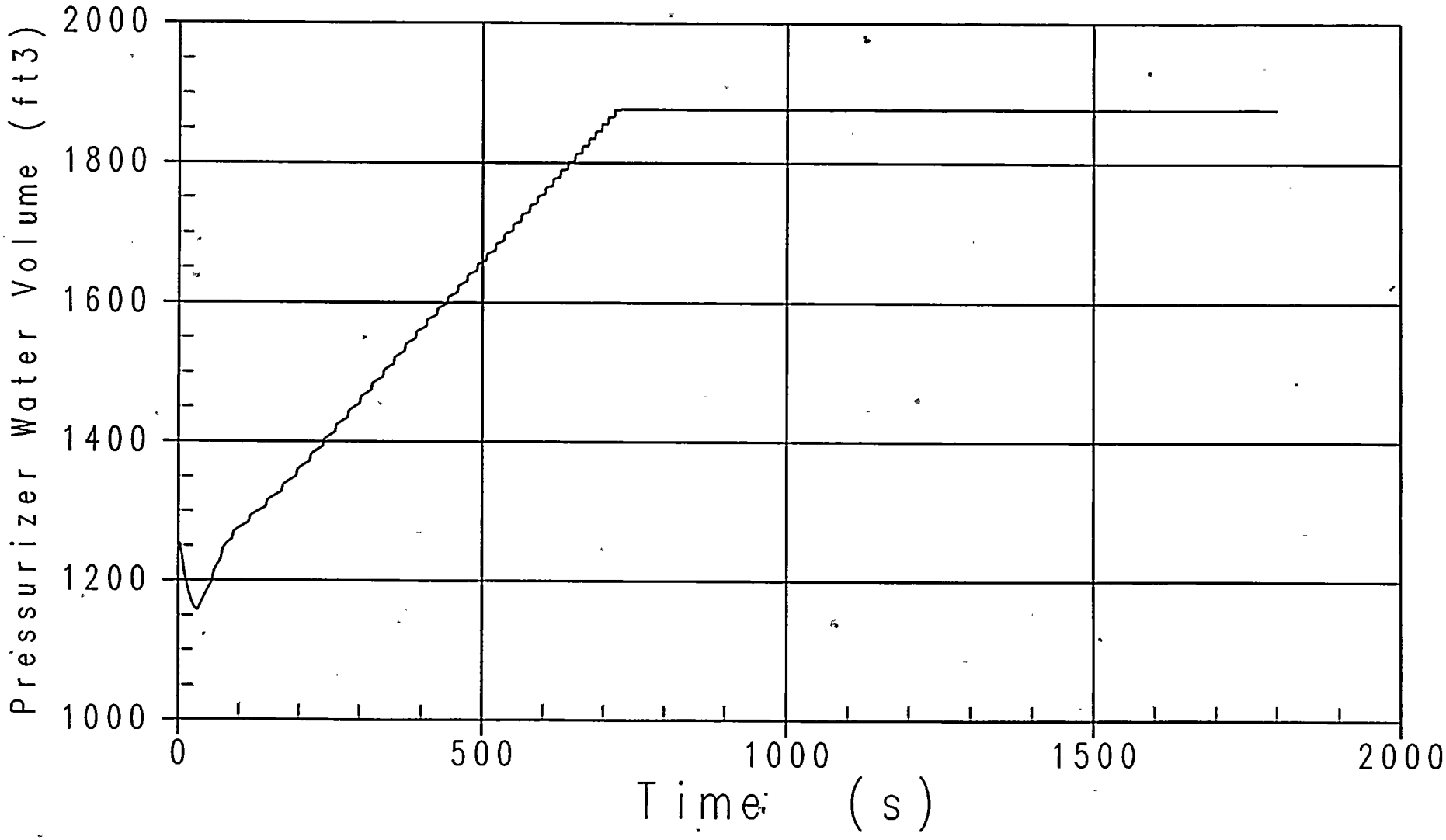
DCPP Units 1 and 2 Inadvertent SI Event
CASE 1
(with Pzr Spray, PDP Flow Terminated at 11.5 Minutes)
(used to determine operator action time)



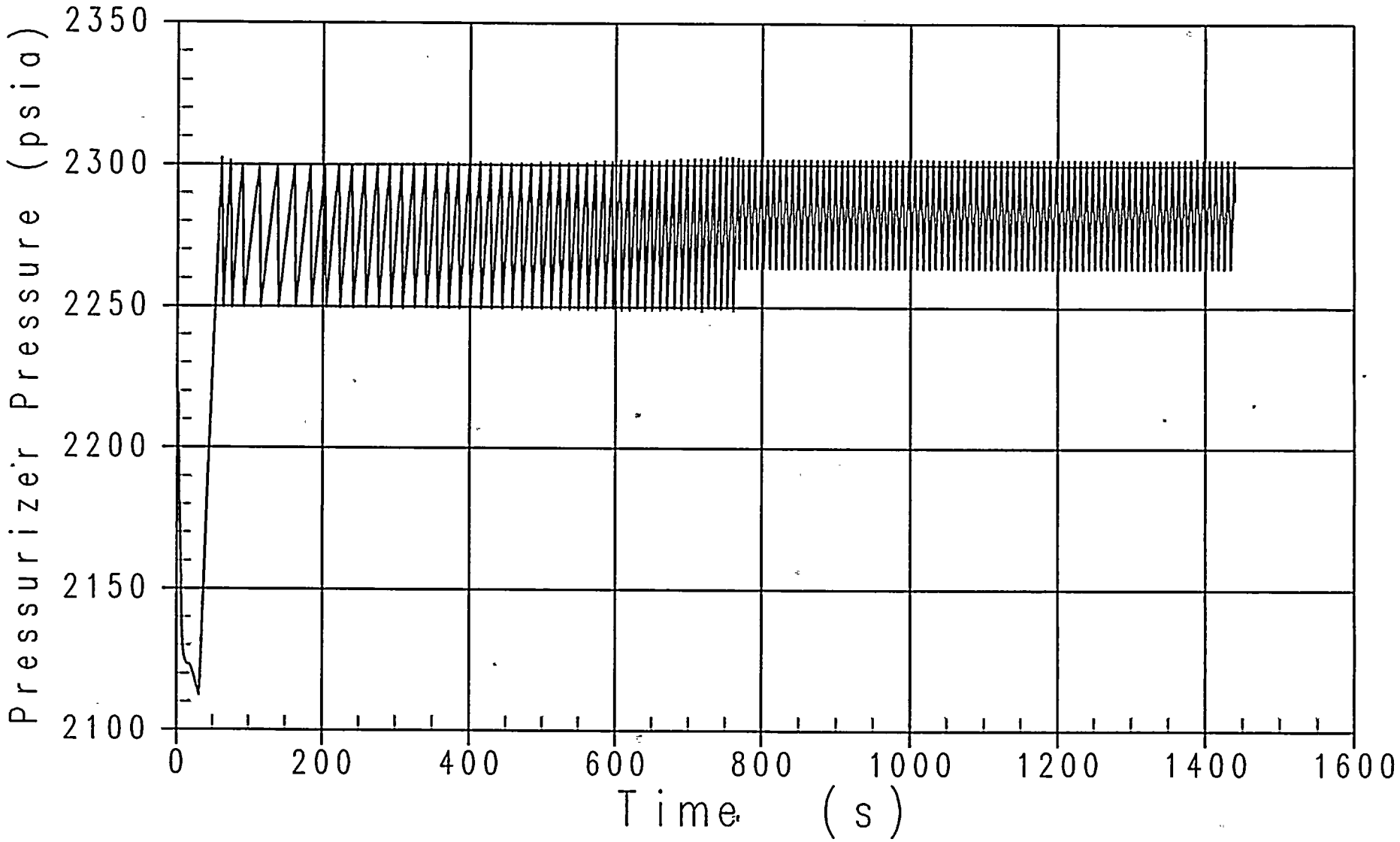
DCPP Units 1 and 2 Inadvertent SI Event
CASE 2
(without Pzr Spray, PDP flow terminated at 6.5 minutes)
(Reduction of flow to 52 gpm at 28 minutes)
(Increased PORV Opening/Closing Range)



DCPP Units 1 and 2 Inadvertent SI Event
CASE 2
(without Pzr Spray, PDP flow terminated at 6.5 minutes)
(Reduction of flow to 52 gpm at 28 minutes)
(Increased PORV Opening/Closing Range)



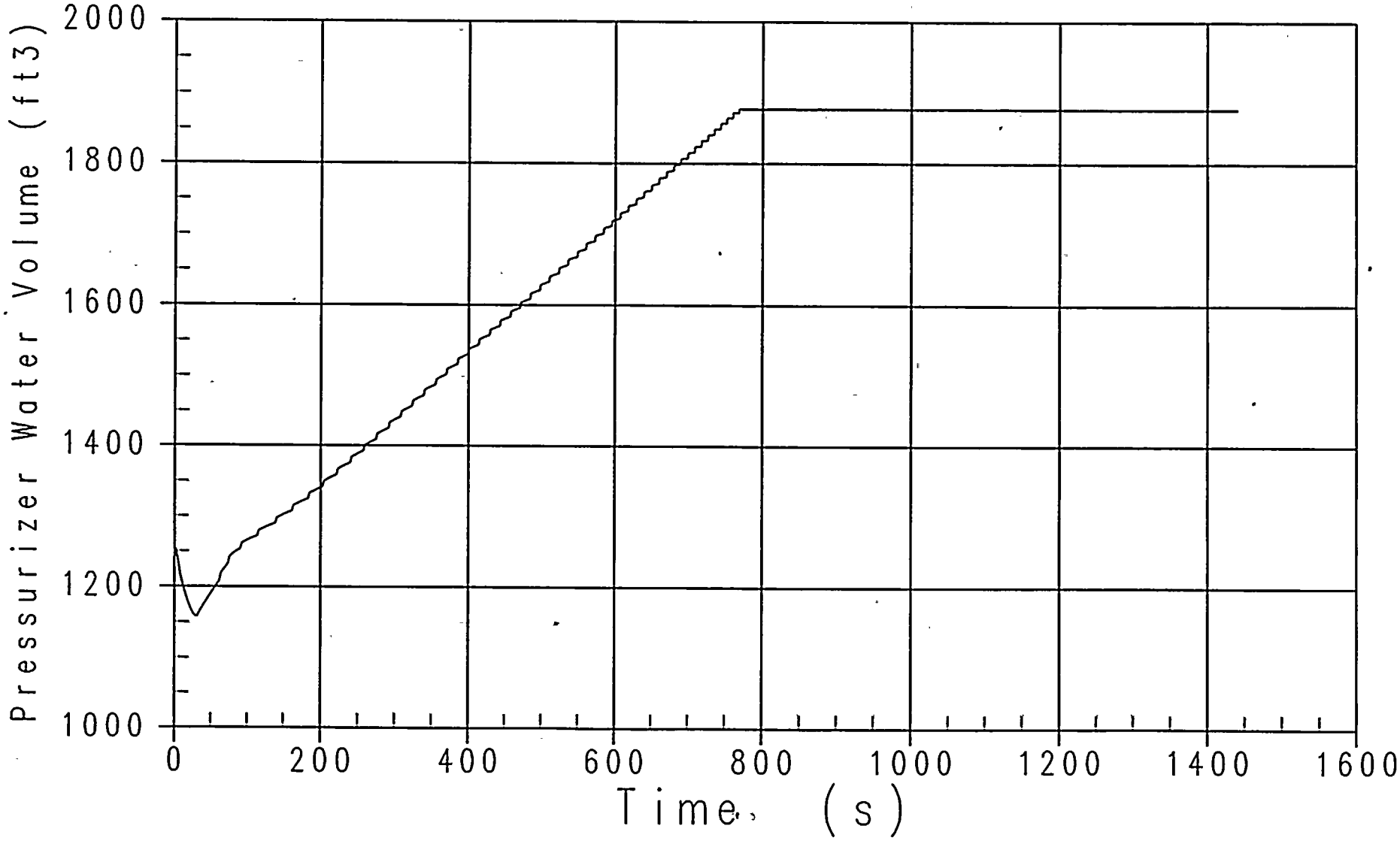
DCPP Units 1 and 2 Inadvertent SI Event
CASE 3
(without Pzr Spray, PDP flow terminated at 6.5 minutes)
(Increased PORV Opening/Closing Range)



DCPP Units 1 and 2 Inadvertent SI Event

CASE 3

(without Pzr Spray, PDP flow terminated at 6.5 minutes)
(Increased PORV Opening/Closing Range)



INADVERTENT SI - CREW SIMULATOR PERFORMANCE
October 1998

CREW	#1	#2	#3	#4	#5	#6	#7	#8
DATE	10/9/98	10/9/98	10/16/98	10/16/98	10/23/98	10/23/98	10/30/98	10/30/98
Terminate PDP (attempt)	0:05:15	0:03:30	0:03:45	0:02:59	0:05:00	0:05:45	0:05:30	0:06:30
Terminate PDP (at breaker)	0:07:25	0:04:45	0:06:34	0:05:22	0:06:35	0:08:15	0:19:55	0:05:55
Unblock PORV	0:10:10	0:06:15	0:05:25	0:07:21	0:08:45	0:10:10	0:05:55	0:05:55
Restore Cont Air	0:20:15	0:14:40	0:12:45	0:15:00	0:20:00	0:23:45	0:14:30	0:16:00
Terminate CCP	0:21:45	0:16:20	0:13:22	0:16:00	0:21:10	0:25:35	0:17:30	0:17:00
Adjust Charging Flow	0:25:30	0:23:00	0:16:25	0:19:22	0:24:15	0:28:00	0:24:40	0:20:00
Open Letdown	0:29:55	0:27:30	0:20:11	0:23:21	0:31:15	0:33:30	0:29:25	0:24:50

Notes:

Crew #1
- PORV unblock - left with only PORV PCV-474 unblocked.
- Containment air restoration time is an estimate

Crew #2
- Crew tailboarded prior to event that PORVs were to be immediately unblocked on any transient
- Containment air restoration time is an estimate

Crew #3
- PORV unblock - left with only PORV PCV-474 unblocked.
- Containment air restoration time is an estimate.

Crew #4
- PORV unblock - left with only PORV PCV-474 unblocked.
- Containment air restoration time is an estimate.

Crew #5
- Initial shift tailboard instructed crew to unblock PORVs and shut down PDP on SI. Times listed are the times when the appropriate step in the procedure was reached.

Crew #6
- Assigned a continuous action to unblock all PORVs if pressure approached 2235 psig.

Crew #7
- PORV unblock - left with only PORV PCV-474 unblocked.
- PDP shut down after CCP stopped.

Crew #8
- PDP termination and opening block valves were done via early request (not when procedure step was reached).
- Time for PDP attempt is approximate time to reach step in procedure.
- Time for PDP termination at breaker and PORV unblock are actual.