

RIEDEL

SAN/0499-80
MDC G9704

10 MWe Solar Thermal
Central Receiver Pilot Plant

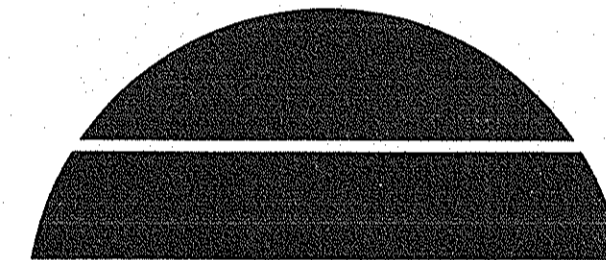
SOLAR FACILITIES DESIGN INTEGRATION

**INTEGRATED (OPERATIONAL)
PIPING AND INSTRUMENTATION DIAGRAMS
(RADL ITEM 2-38)**

June 1981

WORK PERFORMED UNDER CONTRACT
DE-AC03-79SF10499

MCDONNELL DOUGLAS ASTRONAUTICS COMPANY
5301 BOLSA AVENUE
HUNTINGTON BEACH, CA 92647



U.S. Department of Energy



Solar Energy

10 MWe Solar Thermal
Central Receiver Pilot Plant
Solar Facilities Design Integration

**INTEGRATED (OPERATIONAL)
PIPING AND INSTRUMENTATION DIAGRAMS
(RADL ITEM 2-38)**

June 1981

DISCLAIMER

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**MCDONNELL DOUGLAS AERONAUTICS COMPANY
5301 BOLSA AVENUE
HUNTINGTON BEACH, CA 92647**

**PREPARED FOR THE
U.S. DEPARTMENT OF ENERGY
SOLAR ENERGY
UNDER CONTRACT DE-AC03-79SF10499**

PREFACE

This document is provided by the McDonnell Douglas Astronautics Company (MDAC) in accordance with Department of Energy Contract Number DE-AC03-79SF10499, Change Order No. 15, as Reports and Deliverables List Item 2-38. The material is presented in a format which combines information from the construction piping and instrumentation diagrams previously prepared by the both the SFDI and Southern California Edison into an integrated set for training and operational use by Southern California Edison Operating Personnel.

Technical questions concerning this RADL Item should be directed to Mr. R. G. Riedesel at (714) 896-3357.

TABLE OF CONTENTS

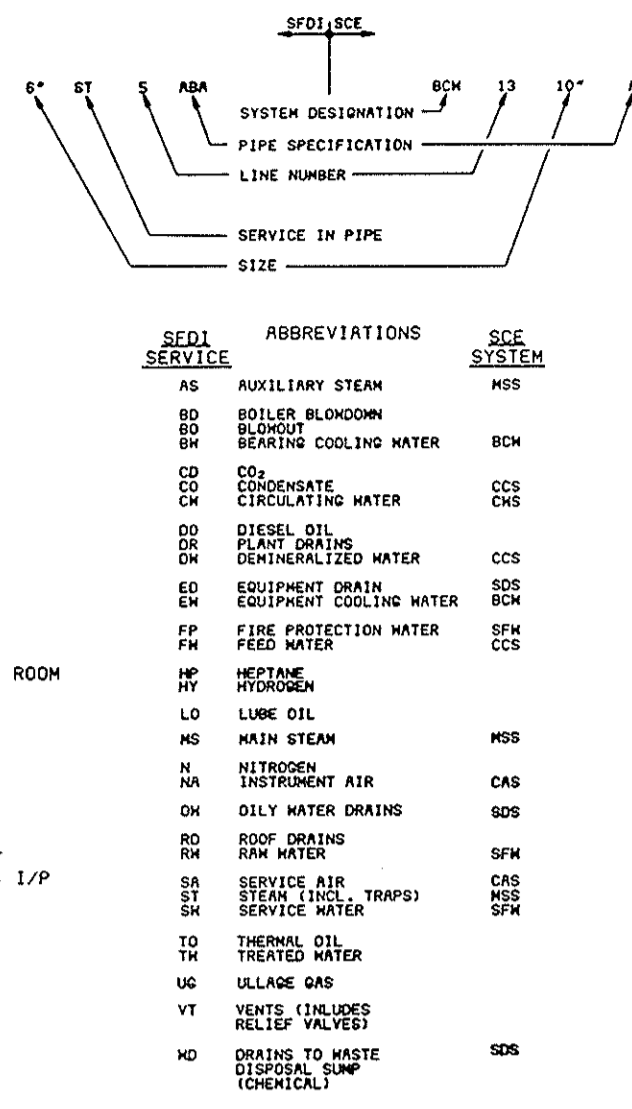
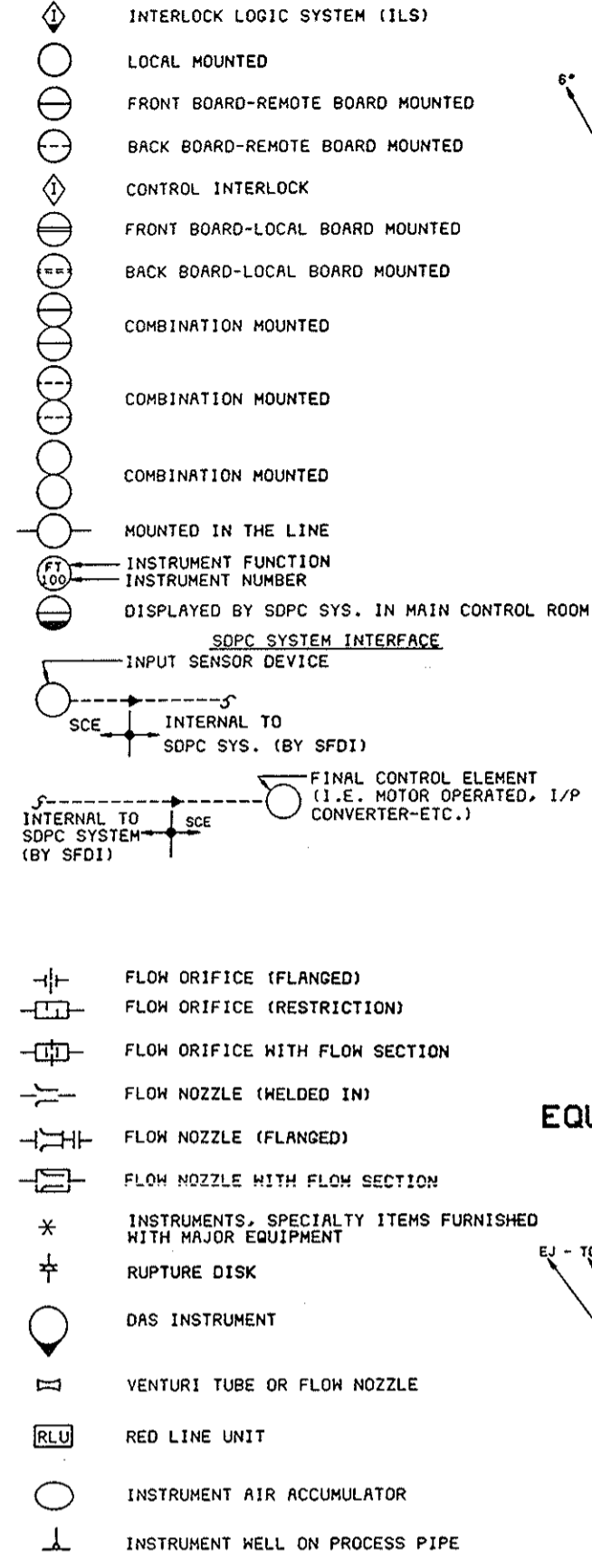
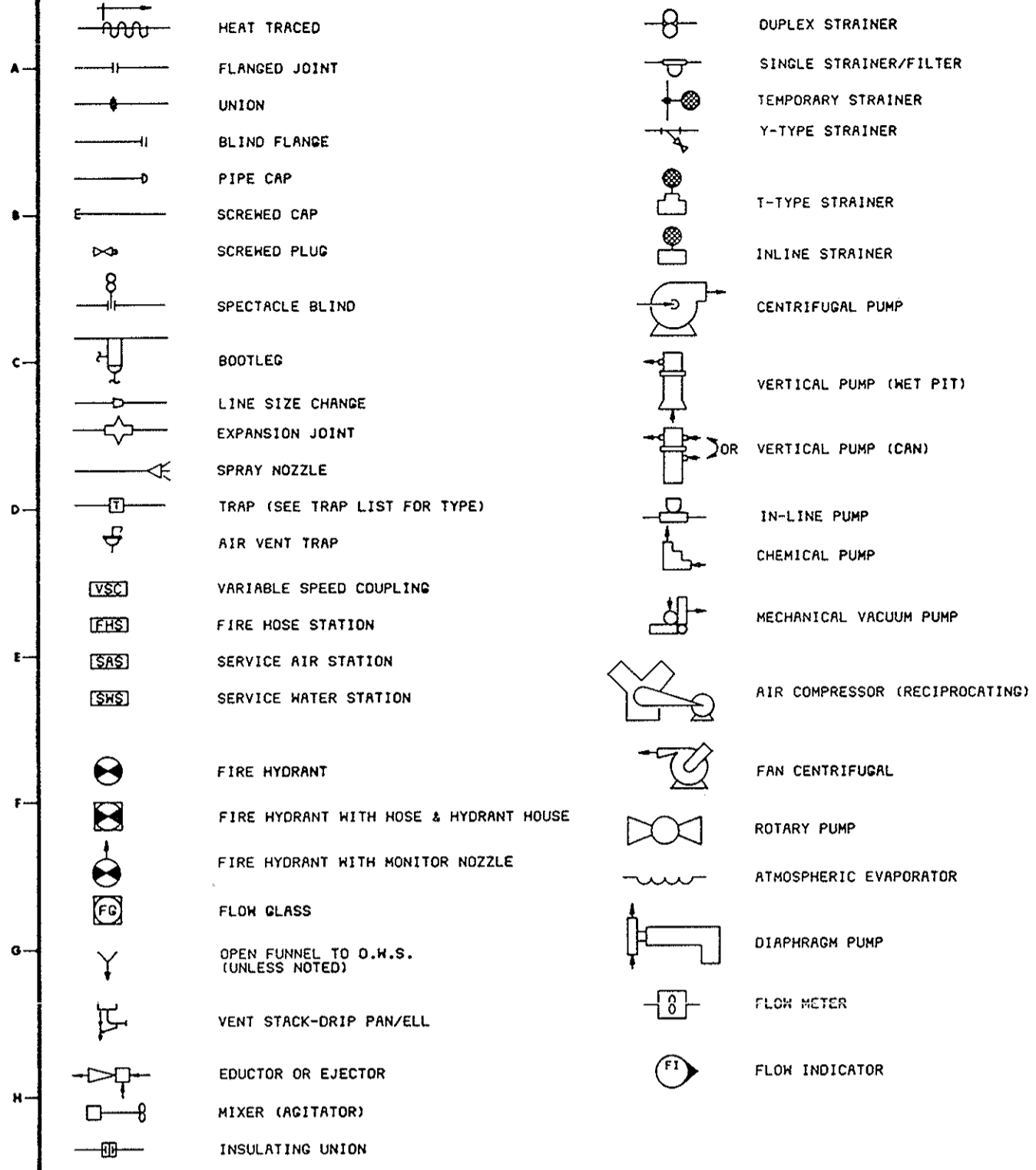
<u>Drawing No.</u>	<u>Revision</u>	<u>Title</u>	<u>Page</u>
40P8005163130	0	Piping, Instrument and Equipment Symbols and Nomenclature	1
40P8005163131	0	Composite Operational Piping and Instrumentation Diagram--Plant	2
40P8005163132	0	Composite Operational Piping and Instrumentation Diagram--Receiver System	3
40P8005163133	0	Receiver Preheat Panel Feedwater	4
40P8005163134	0	Receiver Boiler Panels RB-204 thru RB206	5
40P8005163135	0	Receiver Boiler Panels RB-207 thru RB-209	6
40P8005163136	0	Receiver Boiler Panels RB-210 thru RB-212	7
40P8005163137	0	Receiver Boiler Panels RB-213 thru RB-215	8
40P8005163138	0	Receiver Boiler Panels RB-216 thru RB-218	9
40P8005163139	0	Receiver Boiler Panels RB-219 thru RB-221	10
40P8005163140	0	Receiver System Main Steam Manifold, GN ₂ , and Drain Systems	11
40P8005163141	0	Composite Operational Piping and Instrumentation Diagram--Thermal Storage System	12
40P8005163142	0	Thermal Storage System Charging Oil	13
40P8005163143	0	Thermal Storage System Charging Steam and Condensate (P3-1302)	14
40P8005163144	0	Thermal Storage System Charging Steam and Condensate (P3-1303)	15
40P8005163145	0	Thermal Storage System Extraction Oil	16
40P8005163146	0	Thermal Storage System Extraction Steam and Condensate	17
40P8005163147	0	Thermal Storage Unit and Ullage Maintenance Unit	18
40P8005163148	0	Composite Operational Piping and Instrumentation Diagram--Electrical Power Generation System	19
40P8005163149	0	Steam System	20
40P8005163150	0	Turbine System	21
40P8005163151	0	Feedwater and Condensate System	22
40P8005163152	0	Condenser and Condensate Drains	23
40P8005163153	0	Equipment Cooling Water System	24
40P8005163154	0	Circulating Water System	25
40P8005163155	0	Sumps and Drains System	26
40P8005163156	0	Turbine Control Oil and Lube Oil System	27
40P8005163157	0	Sampling System	28
40P8005163158	0	Condensate Polishing System	29
40P8005163159	0	Service Water System	30
40P8005163160	0	Water Treatment System	31
40P8005163161	0	Fire Protection System	32
40P8005163162	0	Instrument Air and Service Air Systems	33
40P8005163163	0	Miscellaneous Systems	34

PIPING AND EQUIPMENT SYMBOLS

INSTRUMENTATION SYMBOLS

PIPE LINE NUMBERING SYSTEM

INSTRUMENT IDENTIFICATION LETTERS



FIRST LETTER	MEASURED OR INITIATING VARIABLE	MODIFIER	SUCCEEDING LETTERS	
			READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION
A	ANALYSIS		ALARM	
B	BURNER FLAME			
C	CONDUCTIVITY			CONTROL
D	DENSITY OR SPECIFIC GRAVITY	DIFFERENTIAL		
E	VOLTAGE		PRIMARY ELEMENT	
F	FLOW RATE	RATIO		
G	GRAVING		GLASS	
H	HAND			HIGH
I	CURRENT		INDICATE	
J	POWER	SCAN		CONTROL STATION
K	TIME OR TIME SCHEDULE		LIGHT	
L	LEVEL			LOW
M	MOISTURE OR HUMIDITY			MIDDLE OR INTERMEDIATE
N	NON RETURN		NOZZLE	
O	DEFLECTION		ORIFICE	HALF-MONITOR
P	PRESSURE OR VACUUM		POINT	
Q	QUANTITY OR EVENT	INTEGRATE OR TOTALIZE		
R	RADIOACTIVITY		RECORD OR PRINT	
S	SPEED OR FREQUENCY	SAFETY		SWITCH
T	TEMPERATURE			TRANSMIT/TRANSMITTER
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION
V	VISCOSITY			VALVE, DAMPER OR LOUVER
W	HEIGHT OR FORCE		MELL	
X	VIBRATION			DAS
Y	HEAT			RELAY OR COMPUTE
Z	POSITION			DRIVE OR ACTUATE

NOTES: CONFORMS TO ISA-95.1 DATED 1973

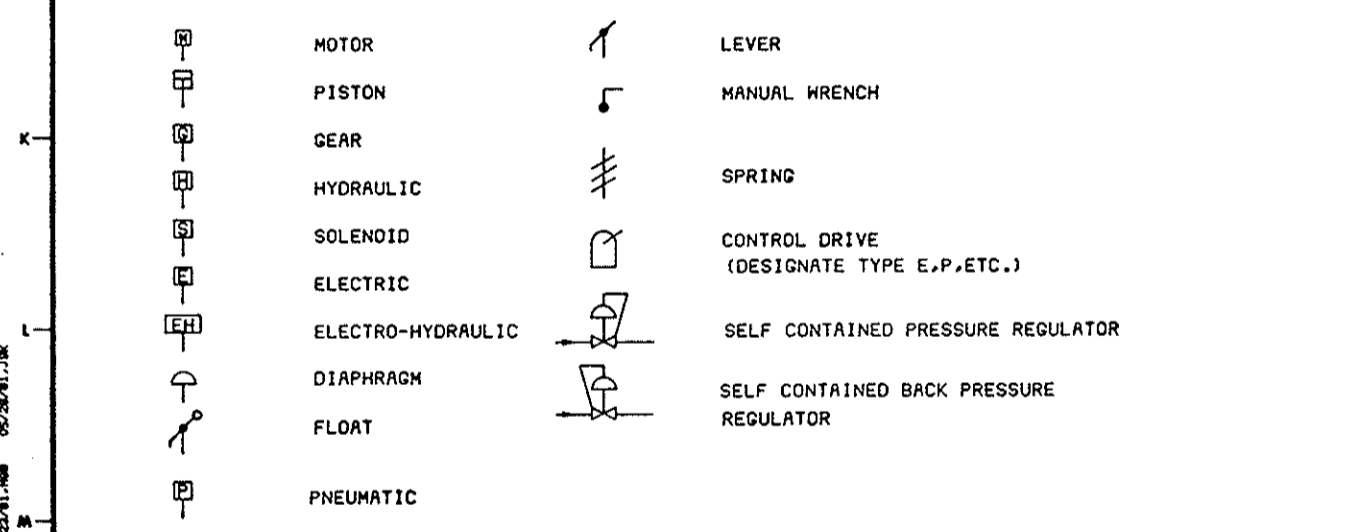
ABBREVIATIONS

A.S.	INSTRUMENT AIR SUPPLY	PIV	POST INDICATING VALVE
DAS	DATA ACQUISITION SYSTEM	MOV	MOTOR OPERATED VALVE
FPV	FIRE PROTECTION VENDOR	ADV	AIR OPERATED VALVE
L.C.	LOCK CLOSED	SOV	SOLENOID OPERATED VALVE
L.O.	LOCK OPEN	PV	PRESSURE VALVE
R	ROCKETDYNE	TV	TEMPERATURE VALVE
SCE	SOUTHERN CALIFORNIA EDISON	FV	FLOW VALVE
S-R	STEAM-ROGER	LV	LEVEL VALVE
VE	VENDOR EQUIPMENT	UV	MULTIVARIABLE VALVE
MTV	WATER TREATMENT VENDOR	F.O.	FAIL OPEN
TSU	THERMAL STORAGE UNIT	F.A.I.	FAIL AS IS
SCU	INSTRUMENT SIGNAL CONDITIONING UNIT BY ROCKETDYNE	SDPC	SUBSYSTEM DISTRIBUTED PROCESS CONTROL
RLU	RED LINE UNIT-PROTECTIVE CONTROL EQUIPMENT FOR RS AND ISS BY ROCKETDYNE	MS	MOISTURE SEPARATOR
D.W.S.	OIL WATER SUMP	RP	RECEIVER PREHEATER
P.D.S.	POLISHING DIMEN. SUMP	RB	RECEIVER BOILER

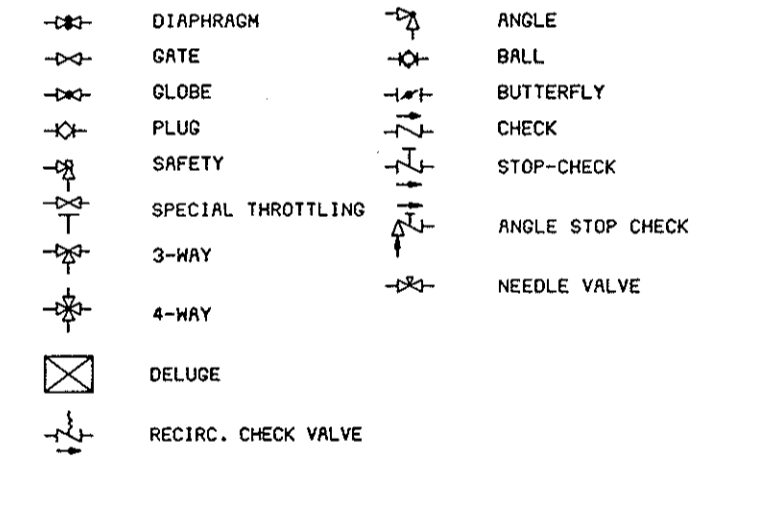
GENERAL NOTES

- ALL OCS INSTRUMENTS BY ROCKETDYNE TO GO TO THE SCU FOR SIGNAL CONDITIONING AND DISTRIBUTION.
- ALL CONTROL VALVES ARE FAIL CLOSED UNLESS NOTED F.O. WHICH IS "FAIL OPEN" OR F.A.I. WHICH IS "FAIL AS IS".
- THE SUBSCRIPT ON THE DAS DEFLECTION TRANSMITTER'S (O.T.S.) REFER TO THE FOLLOWING:
A = AXIAL DEFLECTION
Q = QUANT DEFLECTION
L = LATERAL DEFLECTION
- ALL PRESSURE, FLOW, OR LEVEL TRANSMITTERS, GAUGES AND INDICATORS ARE FURNISHED WITH ONE (1) ROOT VALVE.

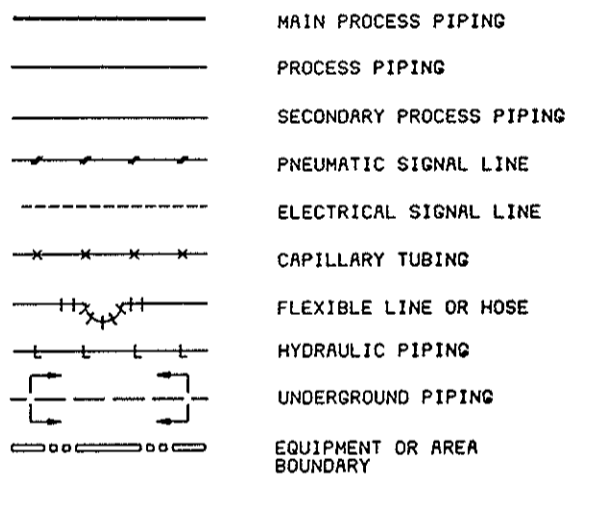
OPERATOR SYMBOLS



FLOW SHEET VALVE SYMBOLS



LINE SYMBOLS

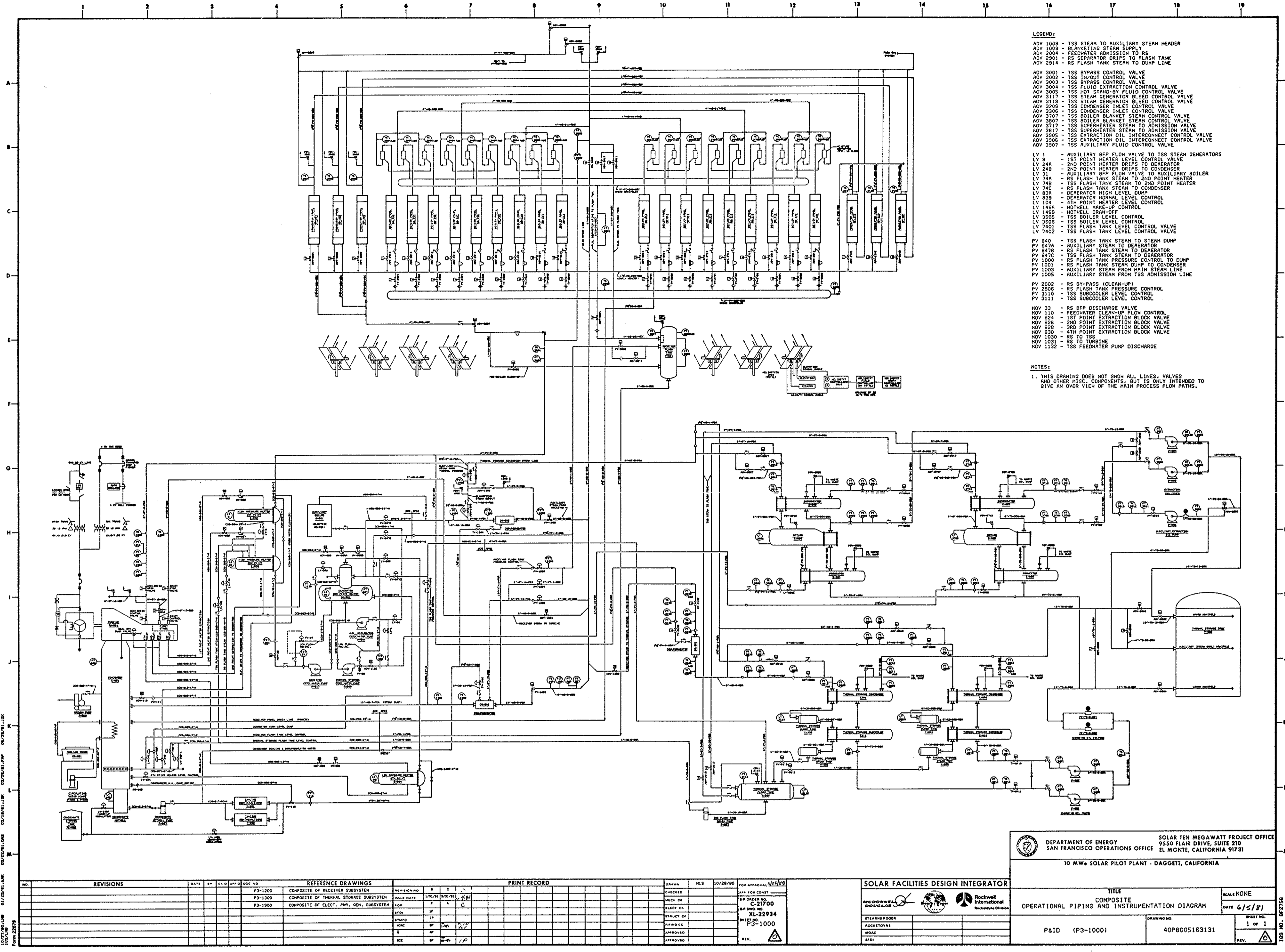


REVISIONS				REFERENCE DRAWINGS				PRINT RECORD				SOLAR FACILITIES DESIGN INTEGRATOR			
NO.	DATE	BY	CHKD	NO.	DATE	BY	CHKD	NO.	DATE	BY	CHKD	NO.	DATE	BY	CHKD

DEPARTMENT OF ENERGY
SAN FRANCISCO OPERATIONS OFFICE
10 MW SOLAR PILOT PLANT - DAGGETT, CALIFORNIA

SOLAR TEN MEGAWATT PROJECT OFFICE
9550 FLAIR DRIVE, SUITE 210
EL MONTE, CALIFORNIA 91731

TITLE: OPERATIONAL PIPING, INSTRUMENT AND EQUIPMENT SYMBOLS AND NOMENCLATURE
SCALE: NONE
DATE: 6/5/81
SHEET NO: 1 OF 1
DRAWING NO: 40P8005163130
REV.:



- LEGEND:**
- ADV 1008 - TSS STEAM TO AUXILIARY STEAM HEADER
 - ADV 1009 - BLANKETING STEAM SUPPLY
 - ADV 2004 - FEEDWATER ADMISSION TO RS
 - ADV 2901 - RS SEPARATOR DRIPS TO FLASH TANK
 - ADV 2914 - RS FLASH TANK STEAM TO DUMP LINE
 - ADV 3001 - TSS BYPASS CONTROL VALVE
 - ADV 3002 - TSS IN/OUT CONTROL VALVE
 - ADV 3003 - TSS BYPASS CONTROL VALVE
 - ADV 3004 - TSS FLUID EXTRACTION CONTROL VALVE
 - ADV 3005 - TSS HOT STAND-BY FLUID CONTROL VALVE
 - ADV 3117 - TSS STEAM GENERATOR BLEED CONTROL VALVE
 - ADV 3118 - TSS STEAM GENERATOR BLEED CONTROL VALVE
 - ADV 3208 - TSS CONDENSER INLET CONTROL VALVE
 - ADV 3209 - TSS CONDENSER INLET CONTROL VALVE
 - ADV 3307 - TSS BOILER BLANKET STEAM CONTROL VALVE
 - ADV 3307 - TSS BOILER BLANKET STEAM CONTROL VALVE
 - ADV 3717 - TSS SUPERHEATER STEAM TO ADMISSION VALVE
 - ADV 3805 - TSS SUPERHEATER STEAM TO ADMISSION VALVE
 - ADV 3905 - TSS EXTRACTION OIL INTERCONNECT CONTROL VALVE
 - ADV 3907 - TSS EXTRACTION OIL INTERCONNECT CONTROL VALVE
 - ADV 3907 - TSS AUXILIARY FLUID CONTROL VALVE
 - LV 1 - AUXILIARY BFP FLOW VALVE TO TSS STEAM GENERATORS
 - LV 8 - 1ST POINT HEATER LEVEL CONTROL VALVE
 - LV 24A - 2ND POINT HEATER DRIPS TO DEAERATOR
 - LV 24B - 2ND POINT HEATER DRIPS TO CONDENSER
 - LV 31 - AUXILIARY BFP FLOW VALVE TO AUXILIARY BOILER
 - LV 74 - RS FLASH TANK STEAM TO 2ND POINT HEATER
 - LV 74B - TSS FLASH TANK STEAM TO 2ND POINT HEATER
 - LV 74C - RS FLASH TANK STEAM TO 2ND POINT HEATER
 - LV 83A - DEAERATOR HIGH LEVEL DUMP
 - LV 83B - DEAERATOR HIGH LEVEL CONTROL
 - LV 104 - 4TH POINT HEATER LEVEL CONTROL
 - LV 148B - HOTWELL MAKE-UP CONTROL
 - LV 148B - HOTWELL DRAIN-OFF CONTROL
 - LV 3505 - TSS BOILER LEVEL CONTROL
 - LV 3505 - TSS BOILER LEVEL CONTROL
 - LV 7401 - TSS FLASH TANK LEVEL CONTROL VALVE
 - LV 7402 - TSS FLASH TANK LEVEL CONTROL VALVE
 - PV 840 - TSS FLASH TANK STEAM TO STEAM DUMP
 - PV 847A - AUXILIARY STEAM TO DEAERATOR
 - PV 847B - RS FLASH TANK STEAM TO DEAERATOR
 - PV 847C - TSS FLASH TANK STEAM TO DEAERATOR
 - PV 1000 - RS FLASH TANK PRESSURE CONTROL TO DUMP
 - PV 1001 - RS FLASH TANK STEAM DUMP TO CONDENSER
 - PV 1002 - AUXILIARY STEAM FROM MAIN STEAM LINE
 - PV 1005 - AUXILIARY STEAM FROM TSS ADMISSION LINE
 - PV 2902 - RS BY-PASS (CLEAN-UP)
 - PV 2908 - RS FLASH TANK PRESSURE CONTROL
 - PV 3110 - TSS SUBCOOLER LEVEL CONTROL
 - PV 3111 - TSS SUBCOOLER LEVEL CONTROL
 - MOV 33 - RS BFP DISCHARGE VALVE
 - MOV 110 - FEEDWATER CLEAN-UP FLOW CONTROL
 - MOV 624 - 1ST POINT EXTRACTION BLOCK VALVE
 - MOV 626 - 2ND POINT EXTRACTION BLOCK VALVE
 - MOV 628 - 3RD POINT EXTRACTION BLOCK VALVE
 - MOV 630 - 4TH POINT EXTRACTION BLOCK VALVE
 - MOV 1030 - RS TO TSS
 - MOV 1031 - RS TO TURBINE
 - MOV 1132 - TSS FEEDWATER PUMP DISCHARGE
- NOTES:**
1. THIS DRAWING DOES NOT SHOW ALL LINES, VALVES AND OTHER MISC. COMPONENTS, BUT IS ONLY INTENDED TO GIVE AN OVER VIEW OF THE MAIN PROCESS FLOW PATHS.

DEPARTMENT OF ENERGY
 SAN FRANCISCO OPERATIONS OFFICE
 9550 FLAIR DRIVE, SUITE 210
 EL MONTE, CALIFORNIA 91731

SOLAR TEN MEGAWATT PROJECT OFFICE
 10 MW SOLAR PILOT PLANT - DAGGETT, CALIFORNIA

SOLAR FACILITIES DESIGN INTEGRATOR

MCDONNELL DOUGLAS
 ROCKWELL INTERNATIONAL
 ROCKWELL DESIGN

TITLE
 COMPOSITE OPERATIONAL PIPING AND INSTRUMENTATION DIAGRAM

SCALE NONE

DATE 6/5/81

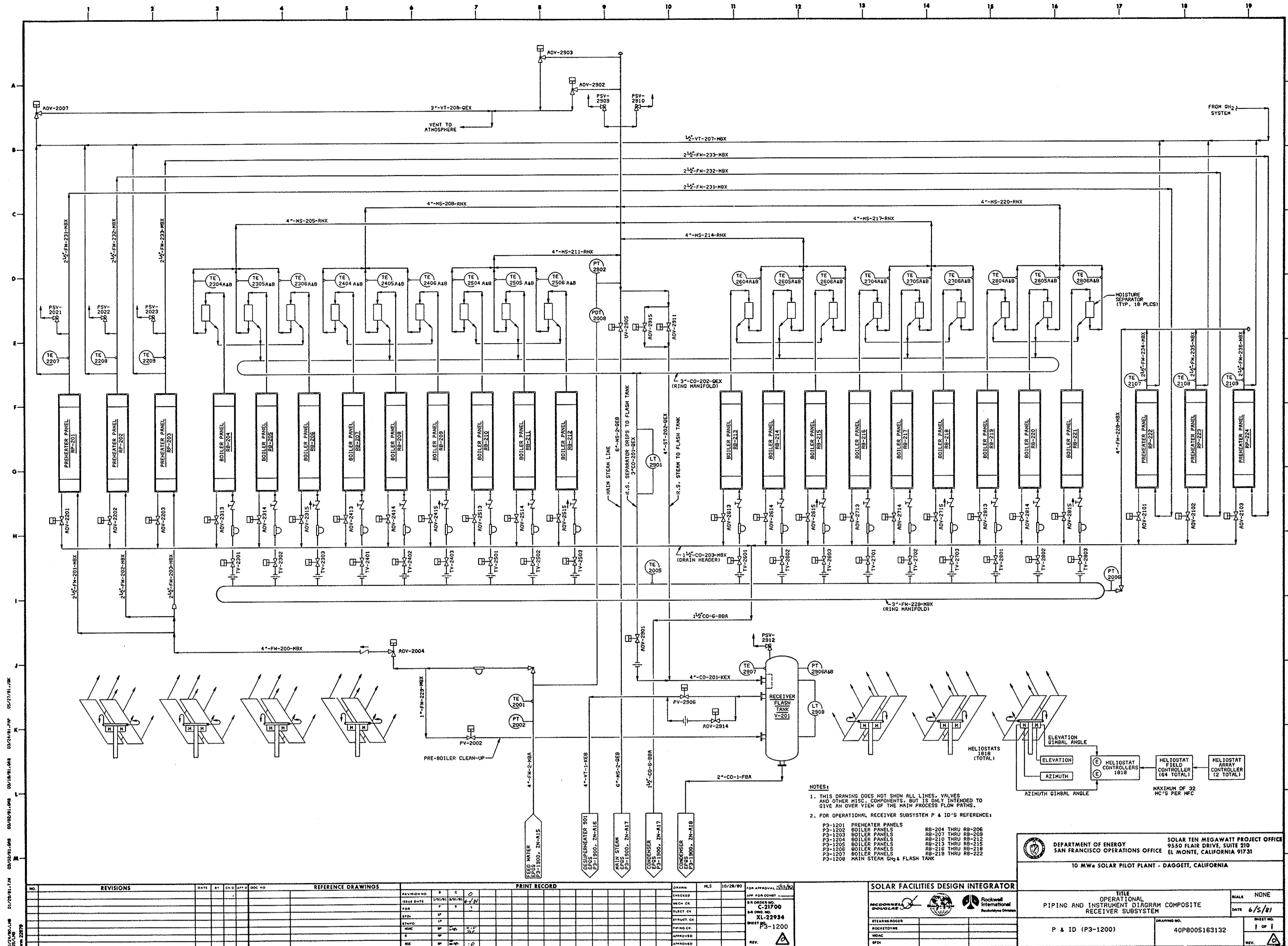
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DRAWING NO. 40P8005163131

SHEET NO. 1 of 1

REV.

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										P3-1200	COMPOSITE OF RECEIVER SUBSYSTEM	ISSUE DATE			CHECKED							APP FOR CONST
										P3-1200	COMPOSITE OF THERMAL STORAGE SUBSYSTEM	ISSUE DATE			WCH CK							SA DAVIS
										P3-1300	COMPOSITE OF ELECT. PH. GEN. SUBSYSTEM	ISSUE DATE			ELECT CK							C-21900
												BY			STRUCY CK						XL-22994	
												BY			APPROVED							
												BY			APPROVED							
												BY			APPROVED							
												BY			APPROVED							



- NOTES:**
- THIS DRAWING DOES NOT SHOW ALL LINES, VALVES AND OTHER MISC. COMPONENTS, BUT IS ONLY INTENDED TO GIVE AN OVER VIEW OF THE MAIN PROCESS FLOW PATHS.
 - FOR OPERATIONAL RECEIVER SUBSYSTEM P & ID'S REFERENCE:
 - P3-1201 PREHEATER PANELS RB-204 THRU RB-206
 - P3-1202 BOILER PANELS RB-207 THRU RB-209
 - P3-1203 BOILER PANELS RB-210 THRU RB-212
 - P3-1204 BOILER PANELS RB-213 THRU RB-215
 - P3-1205 BOILER PANELS RB-216 THRU RB-218
 - P3-1206 BOILER PANELS RB-219 THRU RB-221
 - P3-1207 BOILER PANELS RB-222
 - P3-1208 MAIN STEAM DRG & FLASH TANK

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 EL MONTE, CALIFORNIA 91731

SOLAR TEN MEGAWATT PROJECT OFFICE
 9550 FLAIR DRIVE, SUITE 210
 EL MONTE, CALIFORNIA 91731

10 MW SOLAR PILOT PLANT - DAGGETT, CALIFORNIA

NO.	REVISIONS	DATE	BY	CHKD	APP'D	DOC NO.

REVISED NO.	B	C	D

NO.	DATE	BY	CHKD	APP'D	DOC NO.

NO.	DATE	BY	CHKD	APP'D	DOC NO.

NO.	DATE	BY	CHKD	APP'D	DOC NO.

SOLAR FACILITIES DESIGN INTEGRATOR

NEEDHAM DOUGLAS
 ROCKWELL INTERNATIONAL
 ROCKWELL DESIGN

STEVEN ROOZE
 ROCKWELL
 MICHAEL
 RFA

TITLE
 OPERATIONAL
 PIPING AND INSTRUMENT DIAGRAM COMPOSITE
 RECEIVER SUBSYSTEM

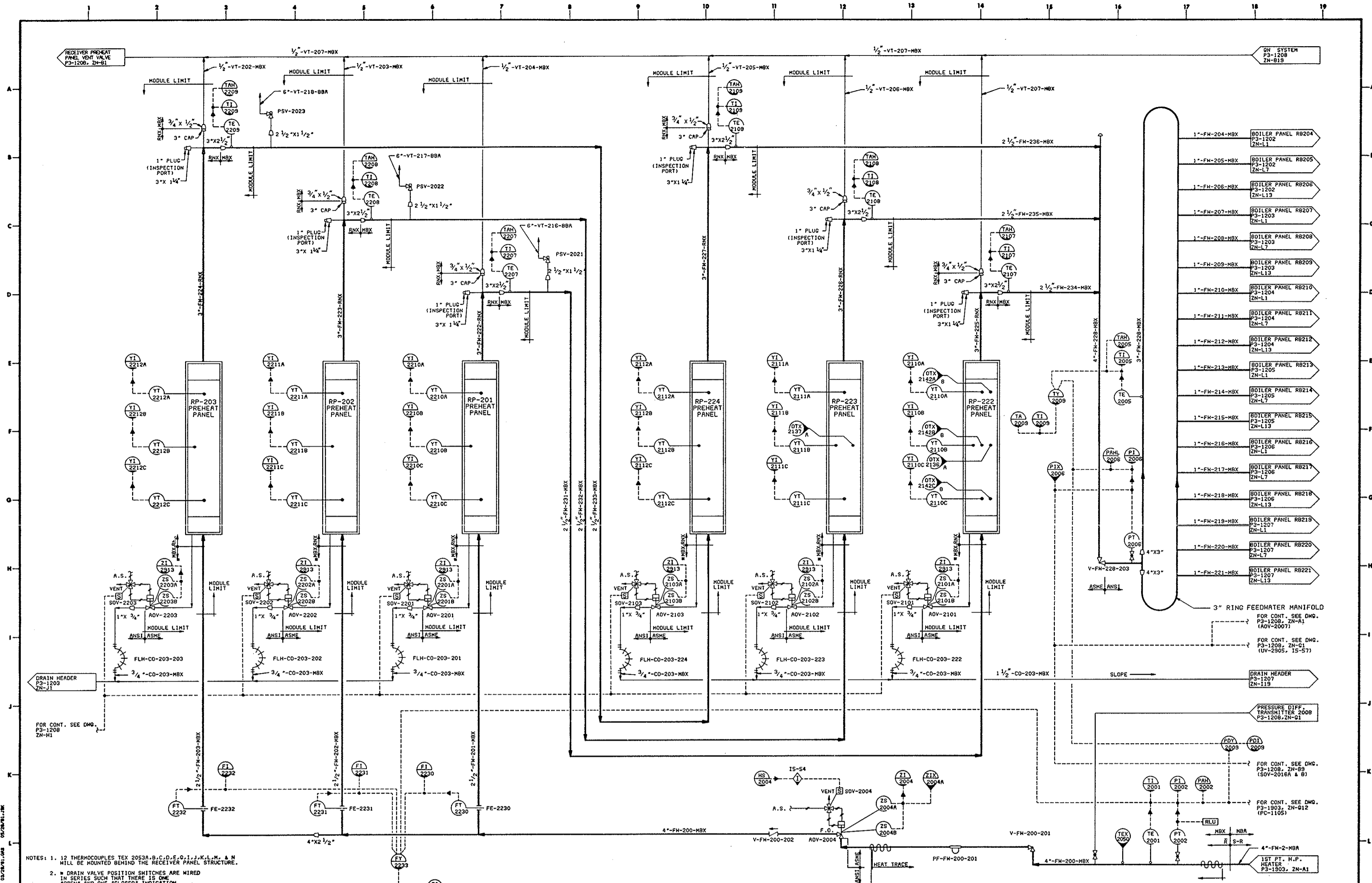
SCALE
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DATE
 6/5/81

SHEET NO.
 1 of 1

PROJECT NO.
 P & ID (P3-1200)

DRAWING NO.
 40P8005163132



NOTES: 1. 12 THERMOCOUPLES TEX 2053A-B,C,D,E,G,I,J,K,L,M, & N WILL BE MOUNTED BEHIND THE RECEIVER PANEL STRUCTURE.
 2. DRAIN VALVE POSITION SWITCHES ARE WIRED IN SERIES SUCH THAT THERE IS ONE "OPEN" AND ONE "CLOSED" INDICATION.

DEPARTMENT OF ENERGY
 SOLAR TEN MEGAWATT PROJECT OFFICE
 SAN FRANCISCO OPERATIONS OFFICE
 9550 FLAIR DRIVE, SUITE 210
 EL MONTE, CALIFORNIA 91731

NO.	REVISIONS	DATE	BY	CHK'D	APP'D	DOC. NO.

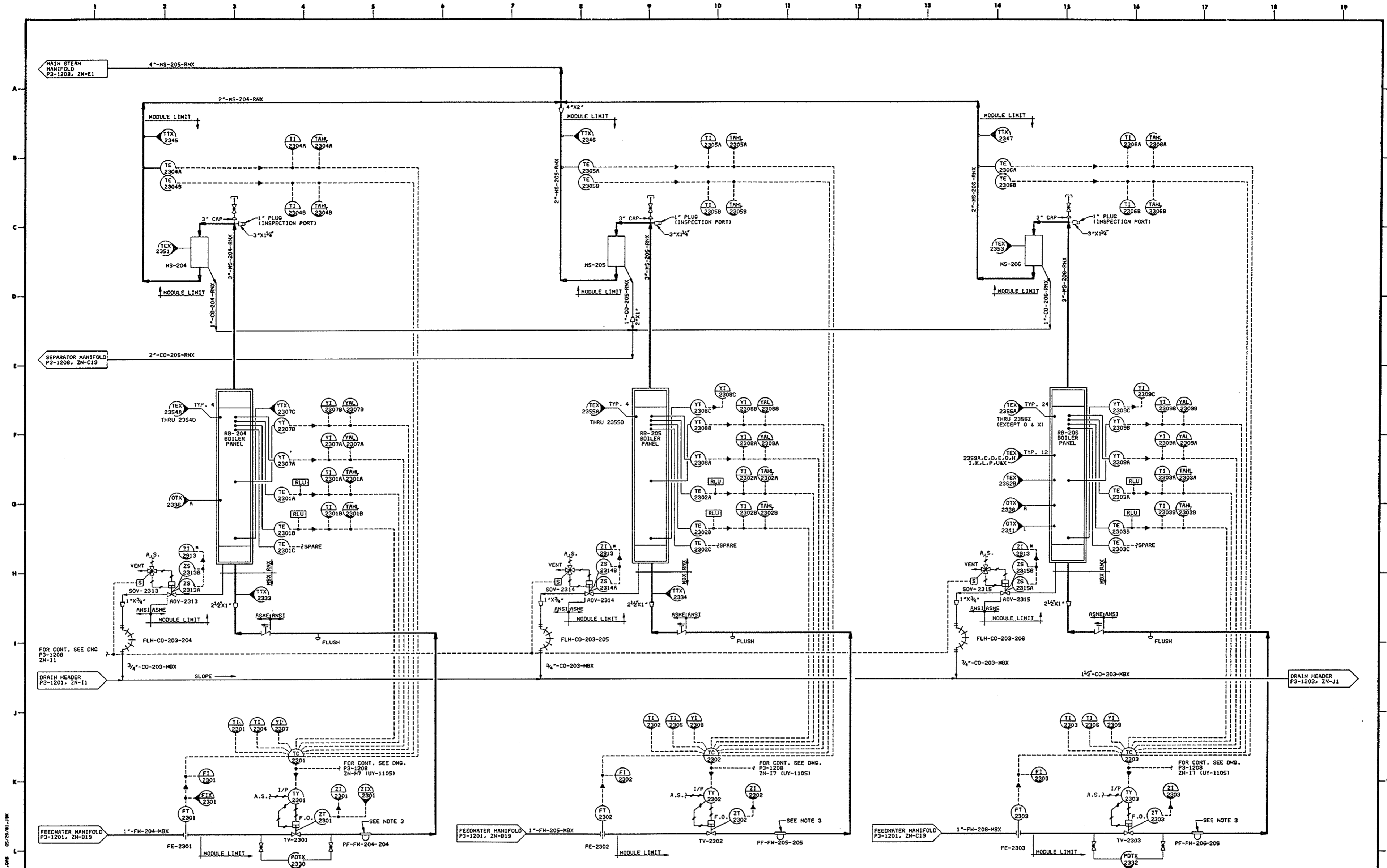
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NO.	PRINT RECORD

NO.	APPROVALS

NO.	APPROVALS

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RECEIVER SUBSYSTEM (RS)		RECEIVER PREHEAT PANEL FEEDWATER	
P & ID (P3-1201)		40P8005163133	
SCALE NONE		DATE 6/5/01	
SHEET NO. 1 of 1		REV.	



- NOTES:
1. SYMBOL MODULE LIMIT INDICATES CONSTRUCTION CONTRACTOR INTERFACE.
 2. * DRAIN VALVE POSITION SWITCHES ARE WIRED IN SERIES SUCH THAT THERE IS ONE "OPEN" AND ONE "CLOSED" INDICATION.
 3. BODY OF STRAINER TO BE INSULATED AND HEAT TRACED.

REVISIONS			REFERENCE DRAWINGS			PRINT RECORD			DRAWING		
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CHECKED		
DRAWN		
APPROVED		

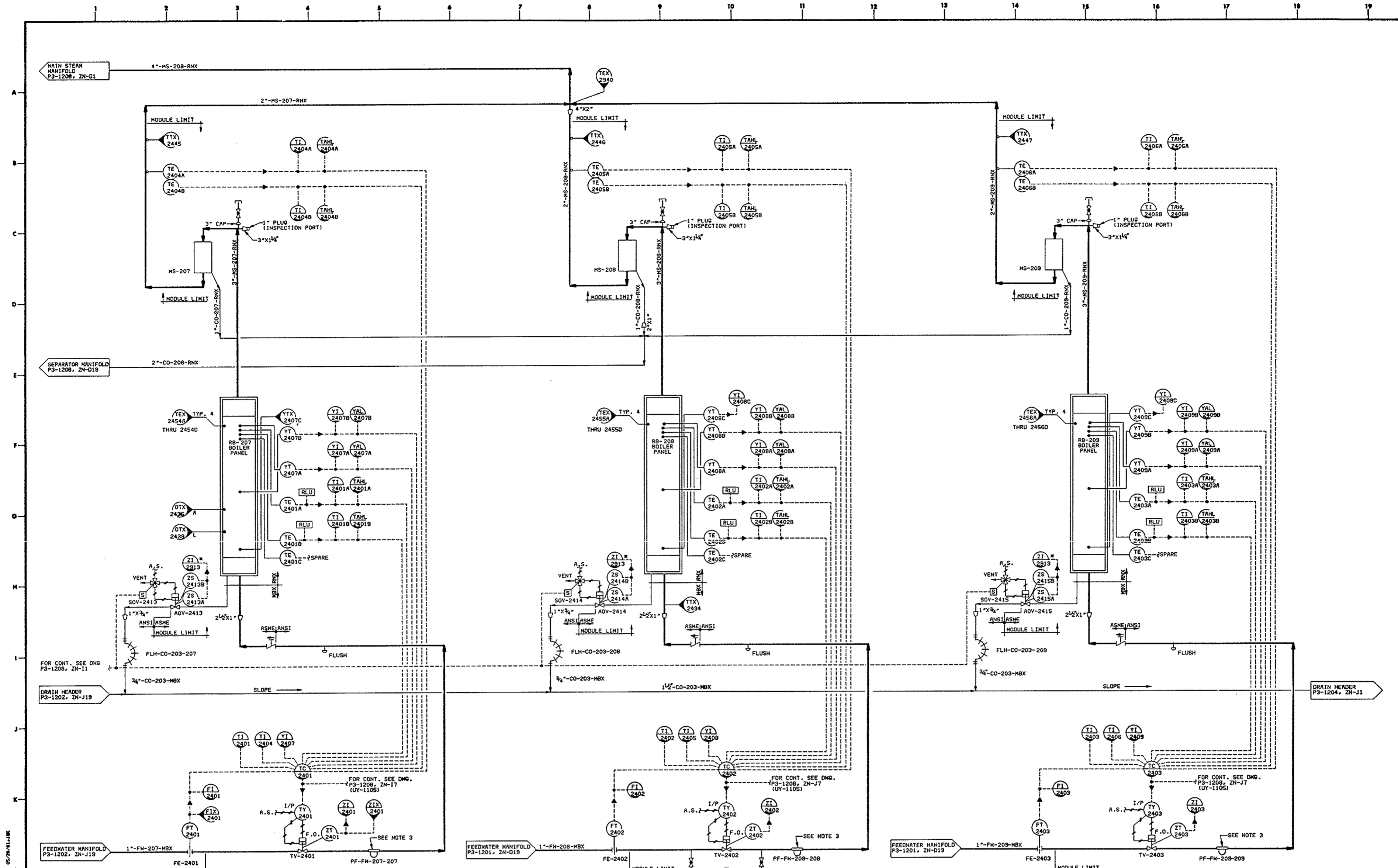
DEPARTMENT OF ENERGY SOLAR TEN MEGAWATT PROJECT OFFICE
 SAN FRANCISCO OPERATIONS OFFICE 9550 FLAIR DRIVE, SUITE 210
 EL MONTE, CALIFORNIA 91731

10 MW SOLAR PILOT PLANT - DAGGETT, CALIFORNIA

TITLE: OPERATIONAL PIPING AND INSTRUMENT DIAGRAM
 RECEIVER SUBSYSTEM (RS)
 RECEIVER BOILER PANELS RB-204 THRU RB-206

SCALE: NONE
 DATE: 6/5/81
 SHEET NO: 1 of 1

P & ID (P3-1202) 40P8005163134



- NOTES:
1. SYMBOL MODULE LIMIT INDICATES CONSTRUCTION CONTRACTOR INTERFACE.
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 3. BODY OF STRAINER TO BE INSULATED AND HEAT TRACED.

REVISIONS				REFERENCE DRAWINGS				PRINT RECORD				DRAWING			
NO.	DATE	BY	CHKD.	NO.	DATE	BY	CHKD.	NO.	DATE	BY	CHKD.	NO.	DATE	BY	CHKD.

SOLAR FACILITIES DESIGN INTEGRATOR	
ROCKWELL INTERNATIONAL	ROCKWELL INTERNATIONAL
STANLEY ROBINSON	ROCKWELL INTERNATIONAL
ROCKETTYME	ROCKWELL INTERNATIONAL
MOORE	ROCKWELL INTERNATIONAL
WOLFE	ROCKWELL INTERNATIONAL

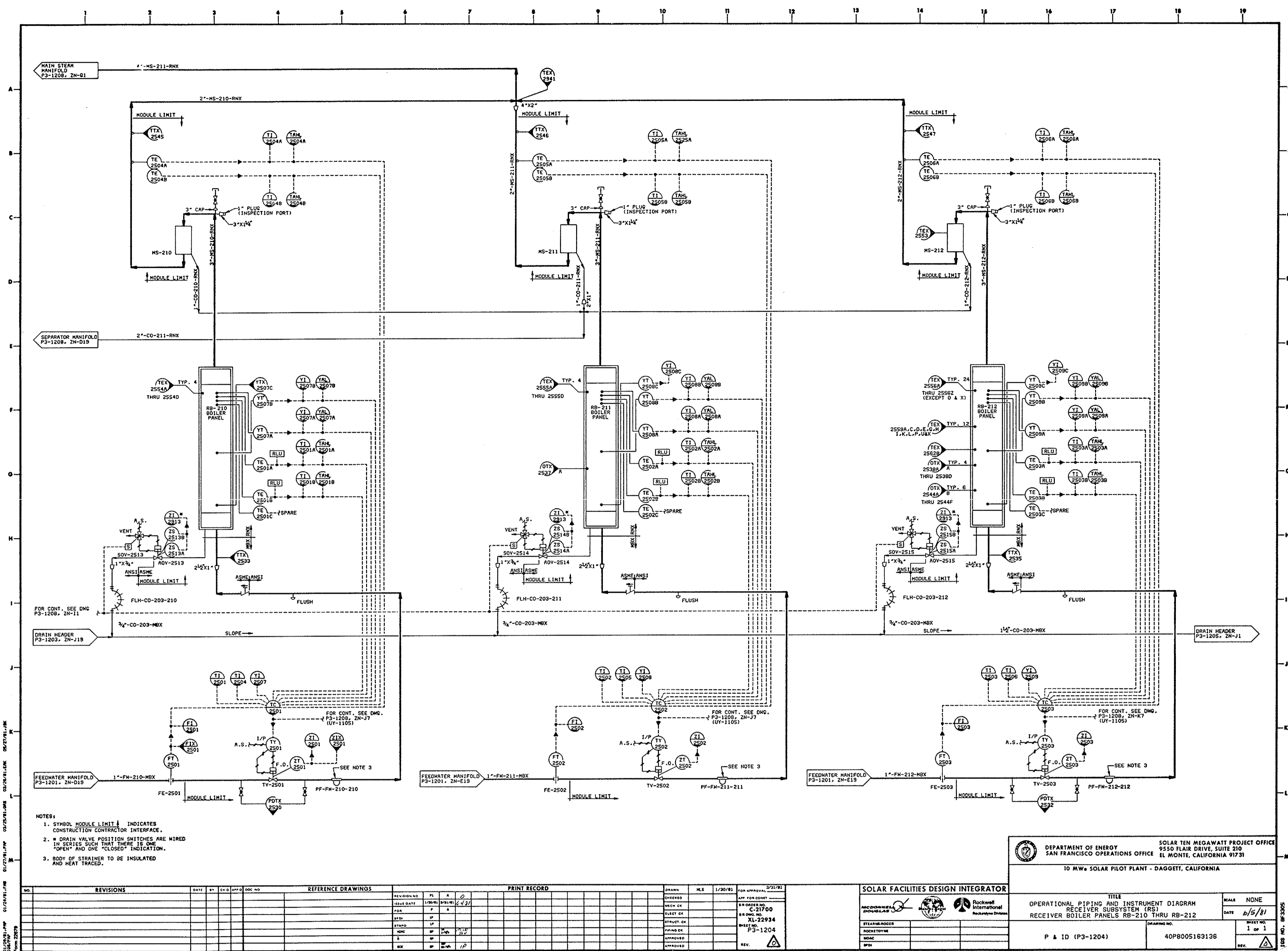
DEPARTMENT OF ENERGY SOLAR TEN MEGAWATT PROJECT OFFICE
 SAN FRANCISCO OPERATIONS OFFICE 9550 FLAIR DRIVE, SUITE 210
 EL MONTE, CALIFORNIA 91731

10 MW SOLAR PILOT PLANT - DAGGETT, CALIFORNIA

TITLE: OPERATIONAL PIPING AND INSTRUMENT DIAGRAM
 RECEIVER SUBSYSTEM (RS)
 RECEIVER BOILER PANELS RB-207 THRU RB-209

SCALE: NONE
 DATE: 6/5/81
 SHEET NO.: 1 of 1
 REV.:

DRAWING NO.: 40P8005163135



- NOTES:
1. SYMBOL MODULE LIMIT \square INDICATES CONSTRUCTION CONTRACTOR INTERFACE.
 2. * DRAIN VALVE POSITION SWITCHES ARE WIRED IN SERIES SUCH THAT THERE IS ONE "OPEN" AND ONE "CLOSED" INDICATION.
 3. BODY OF STRAINER TO BE INSULATED AND HEAT TRACED.

NO.	REVISIONS	DATE	BY	CHKD	APP'D	DOC NO.

NO.	REFERENCE DRAWINGS

NO.	PRINT RECORD

NO.	DRAMA	MLS	1/30/81	FOR APPROVAL	3/31/81

SOLAR FACILITIES DESIGN INTEGRATOR

OPERATIONAL PIPING AND INSTRUMENT DIAGRAM
RECEIVER SUBSYSTEM (RS)
RECEIVER BOILER PANELS RB-210 THRU RB-212

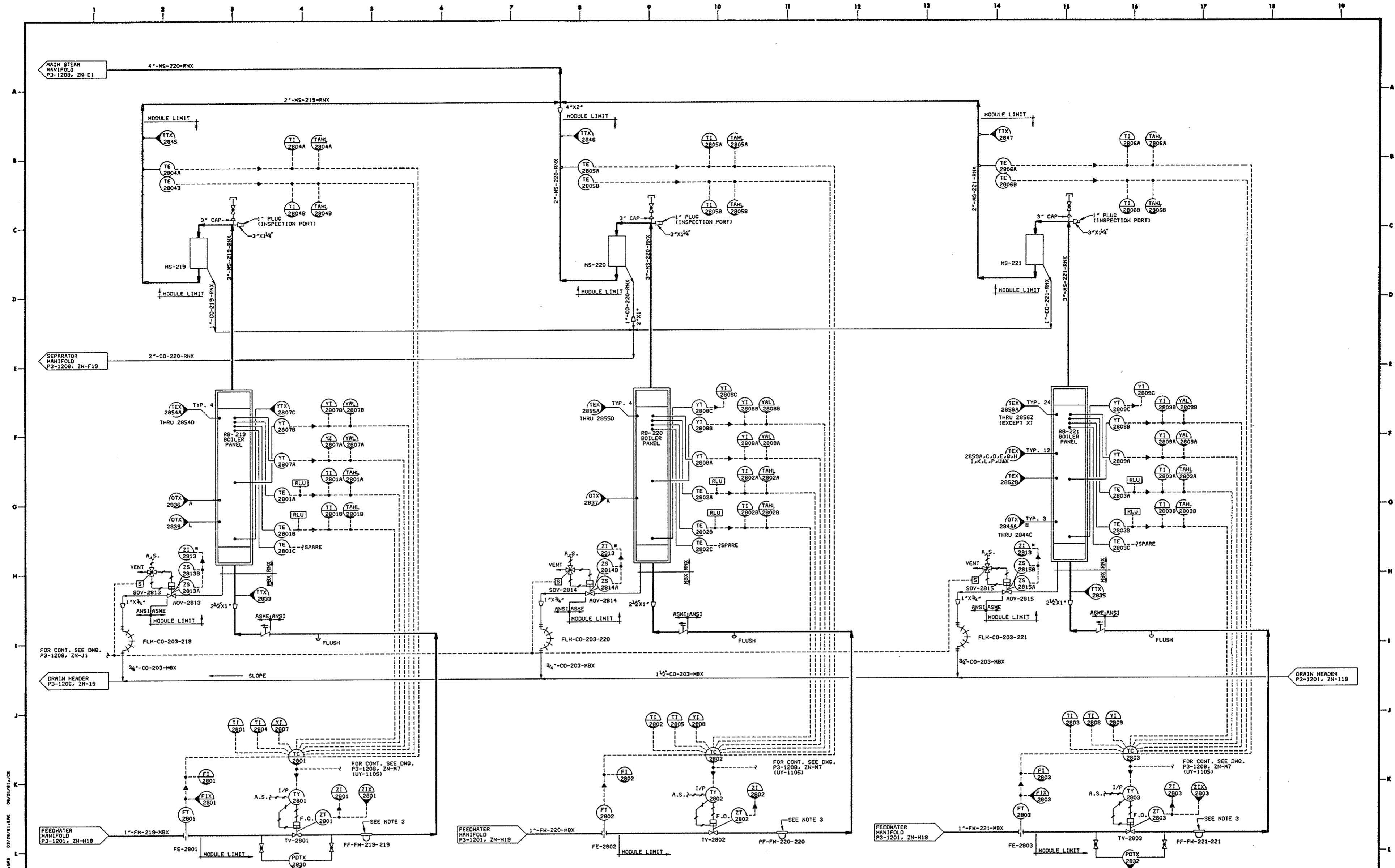
P & ID (P3-1204)

40P8005163136

DEPARTMENT OF ENERGY SOLAR TEN MEGAWATT PROJECT OFFICE
SAN FRANCISCO OPERATIONS OFFICE 9550 FLAIR DRIVE, SUITE 210
EL MONTE, CALIFORNIA 91731

10 MW SOLAR PILOT PLANT - DAGGETT, CALIFORNIA

SCALE NONE
DATE 8/5/81
SHEET NO. 1 of 1
REV.



- NOTES:
1. SYMBOL MODULE LIMIT INDICATES CONSTRUCTION CONTRACTOR INTERFACE.
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 3. BODY OF STRAINER TO BE INSULATED AND HEAT TRACED.

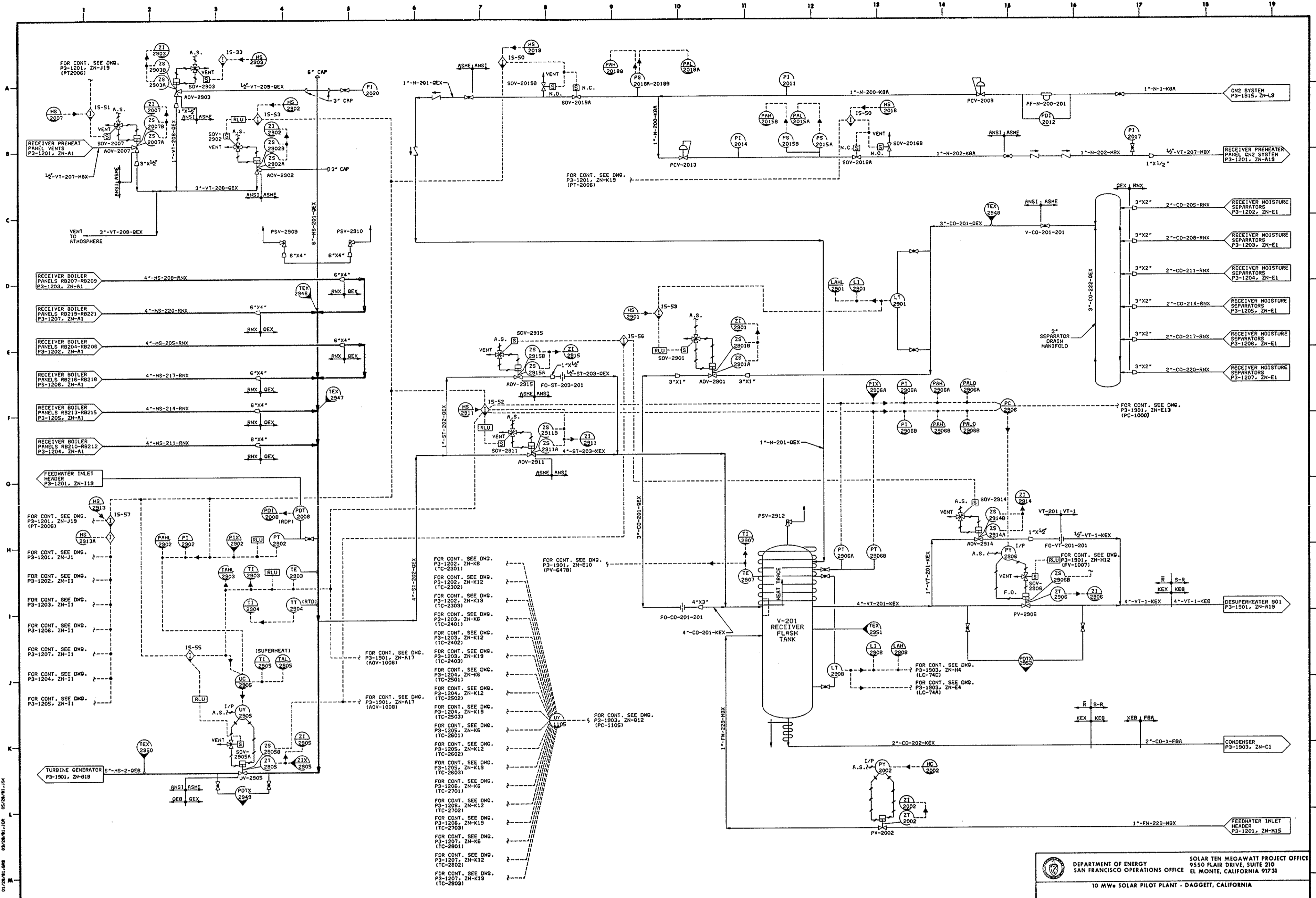
DEPARTMENT OF ENERGY
 SAN FRANCISCO OPERATIONS OFFICE
 9550 FLAIR DRIVE, SUITE 210
 EL MONTE, CALIFORNIA 91731

SOLAR TEN MEGAWATT PROJECT OFFICE
 10 MW SOLAR PILOT PLANT - DAGGETT, CALIFORNIA

REVISIONS				REFERENCE DRAWINGS				PRINT RECORD			
NO.	DATE	BY	CHKD.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.

SOLAR FACILITIES DESIGN INTEGRATOR			

TITLE		SCALE
OPERATIONAL PIPING AND INSTRUMENT DIAGRAM RECEIVER SUBSYSTEM (RS) RECEIVER BOILER PANELS RB-219 THRU RB-221	NONE	NONE
P & ID (P3-1207)	40P8005163139	1 of 1



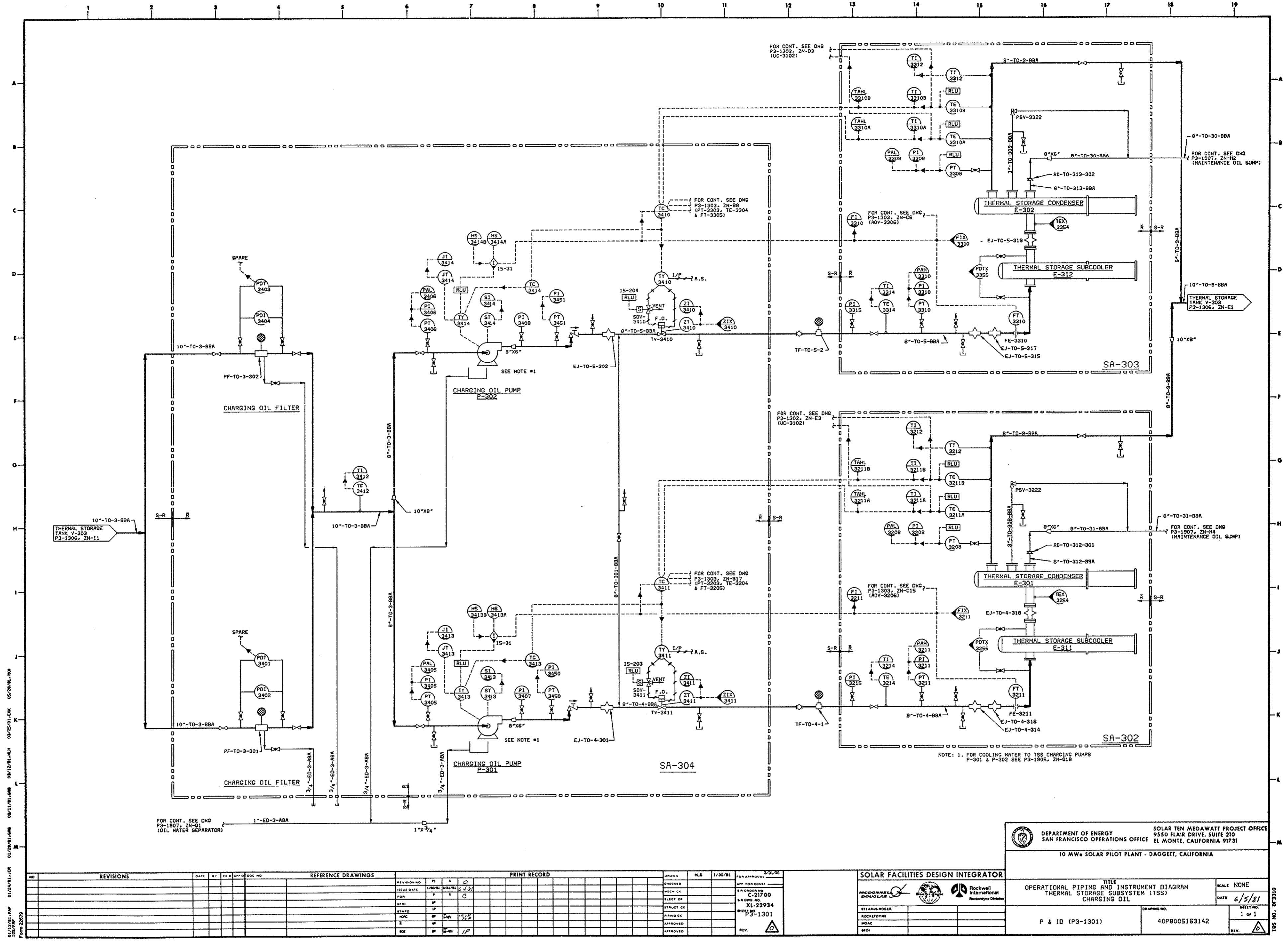
REVISIONS				REFERENCE DRAWINGS				PRINT RECORD				SOLAR FACILITIES DESIGN INTEGRATOR				
NO.	DATE	BY	CHKD	DWG NO.	REVISION NO.	PI	A	O	DATE	ISSUE	BY	CHKD	DATE	ISSUE	BY	CHKD

DEPARTMENT OF ENERGY SOLAR TEN MEGAWATT PROJECT OFFICE
 SAN FRANCISCO OPERATIONS OFFICE EL MONTE, CALIFORNIA 91731
 10 MW SOLAR PILOT PLANT - DAGGETT, CALIFORNIA

SOLAR FACILITIES DESIGN INTEGRATOR
 MICRONALP
 ROCKWELL INTERNATIONAL
 STEVENS ROGER
 ROCKWELL
 HOK

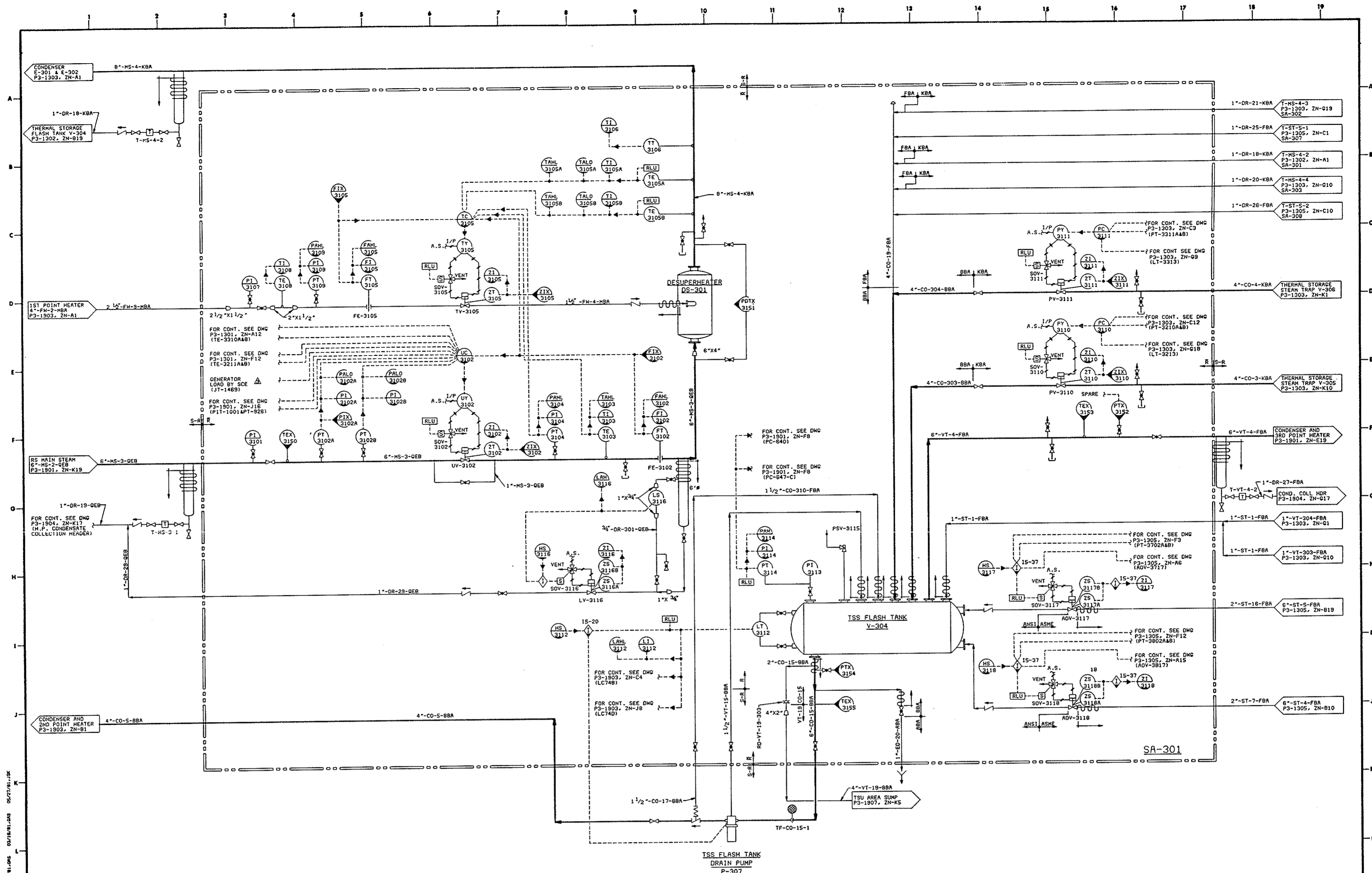
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 OPERATIONAL PIPING AND INSTRUMENT DIAGRAM
 RECEIVER SUBSYSTEM (RS)
 MAIN STEAM MANIFOLD, GN2 & DRAIN SYSTEMS

SCALE NONE
DATE 6/5/81
DRAWING NO. P & ID (P3-1208)
SHEET NO. 1 of 1
REV.



DEPARTMENT OF ENERGY SOLAR TEN MEGAWATT PROJECT OFFICE
 SAN FRANCISCO OPERATIONS OFFICE 9550 FLAIR DRIVE, SUITE 210
 EL MONTE, CALIFORNIA 91731
 10 MW SOLAR PILOT PLANT - DAGGETT, CALIFORNIA

REVISIONS		REFERENCE DRAWINGS		PRINT RECORD		SOLAR FACILITIES DESIGN INTEGRATOR		TITLE		SCALE	
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									THERMAL STORAGE SUBSYSTEM (TSS)		
									CHARGING OIL		
										DATE 6/5/81	
										SHEET NO. 1 of 1	
									P & ID (P3-1301)	40P8005163142	
										REV. 1	



10/27/81 JPM 01/27/81 JMS 02/27/81 JMS 03/27/81 JMS 04/27/81 JMS 05/27/81 JMS 06/27/81 JMS 07/27/81 JMS 08/27/81 JMS 09/27/81 JMS 10/27/81 JMS 11/27/81 JMS 12/27/81 JMS 13/27/81 JMS 14/27/81 JMS 15/27/81 JMS 16/27/81 JMS 17/27/81 JMS 18/27/81 JMS 19/27/81 JMS

DEPARTMENT OF ENERGY SOLAR TEN MEGAWATT PROJECT OFFICE
 SAN FRANCISCO OPERATIONS OFFICE EL MONTE, CALIFORNIA 91731
 10 MW SOLAR PILOT PLANT - DAGGETT, CALIFORNIA

NO.	REVISIONS	DATE	BY	CHKD BY	APP'D BY	DESCRIPTION

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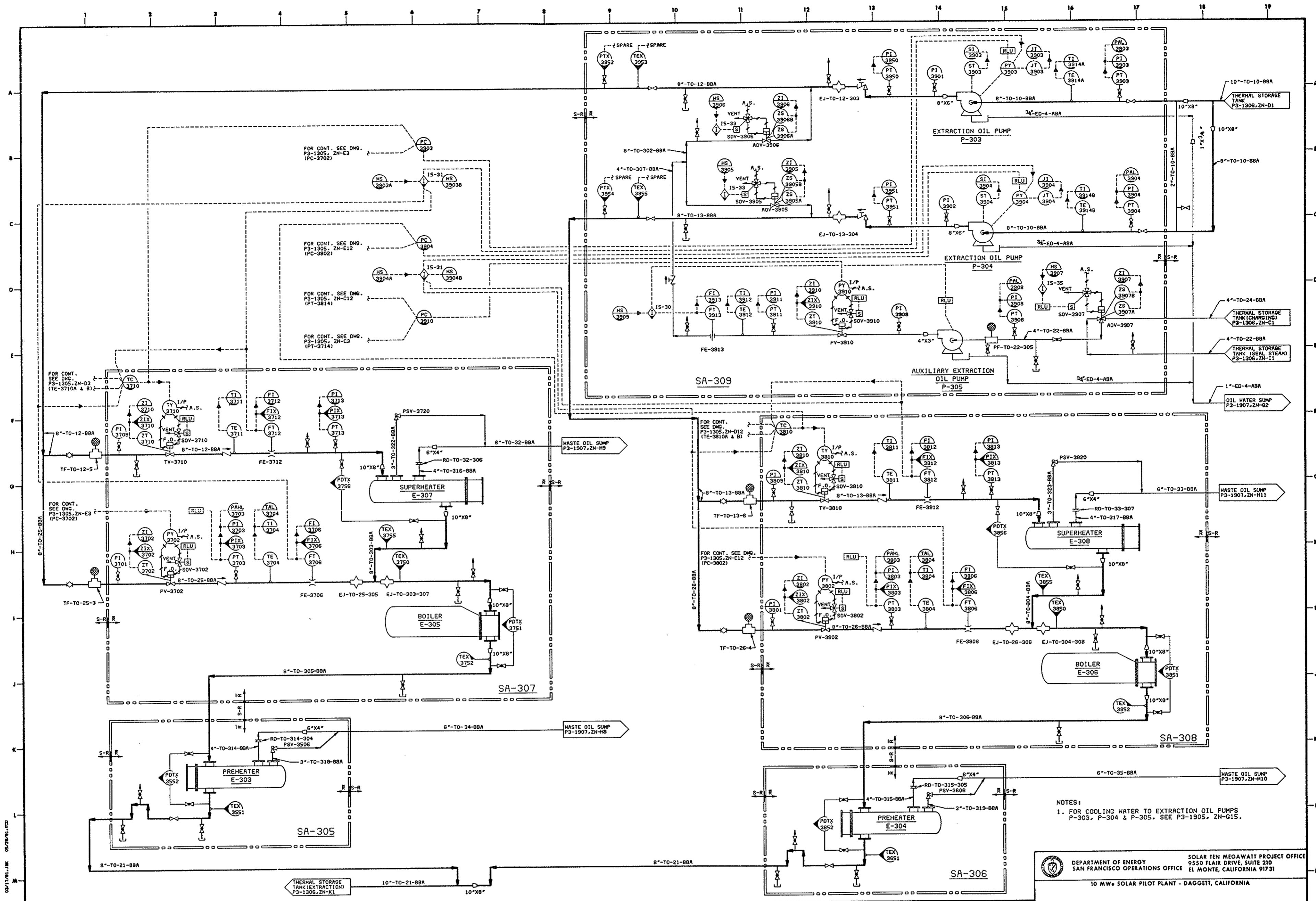
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NOTES:
 1. FOR COOLING WATER TO EXTRACTION OIL PUMPS P-303, P-304 & P-305, SEE P3-1905, ZN-G15.

DEPARTMENT OF ENERGY SOLAR TEN MEGAWATT PROJECT OFFICE
 SAN FRANCISCO OPERATIONS OFFICE 9550 FLAIR DRIVE, SUITE 210
 EL MONTE, CALIFORNIA 91731
 10 MW SOLAR PILOT PLANT - DAGGETT, CALIFORNIA

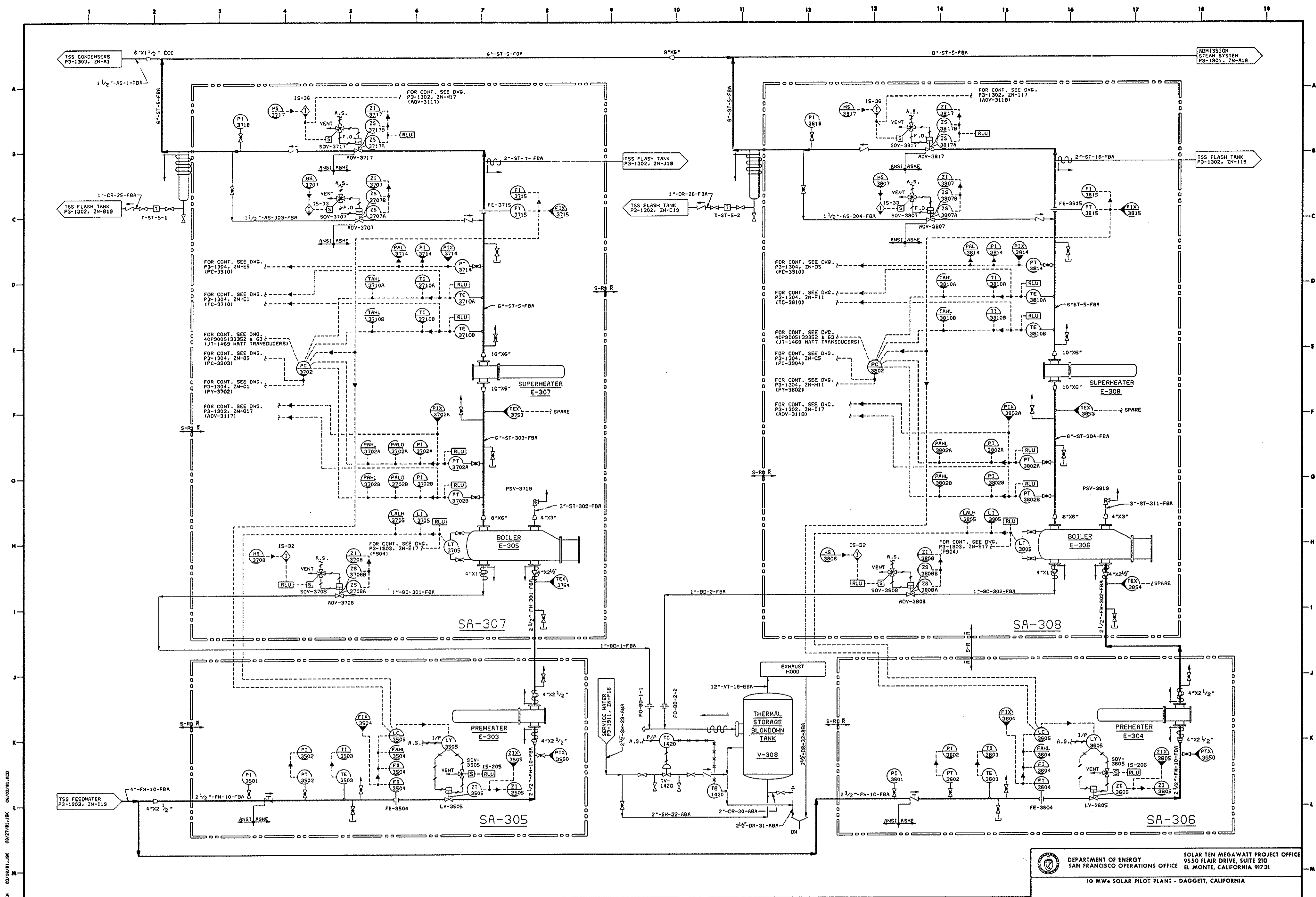
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DEPARTMENT OF ENERGY SOLAR TEN MEGAWATT PROJECT OFFICE
 9550 BLAIR DRIVE, SUITE 210
 SAN FRANCISCO OPERATIONS OFFICE EL MONTE, CALIFORNIA 91731
 10 MW SOLAR PILOT PLANT - DAGGETT, CALIFORNIA

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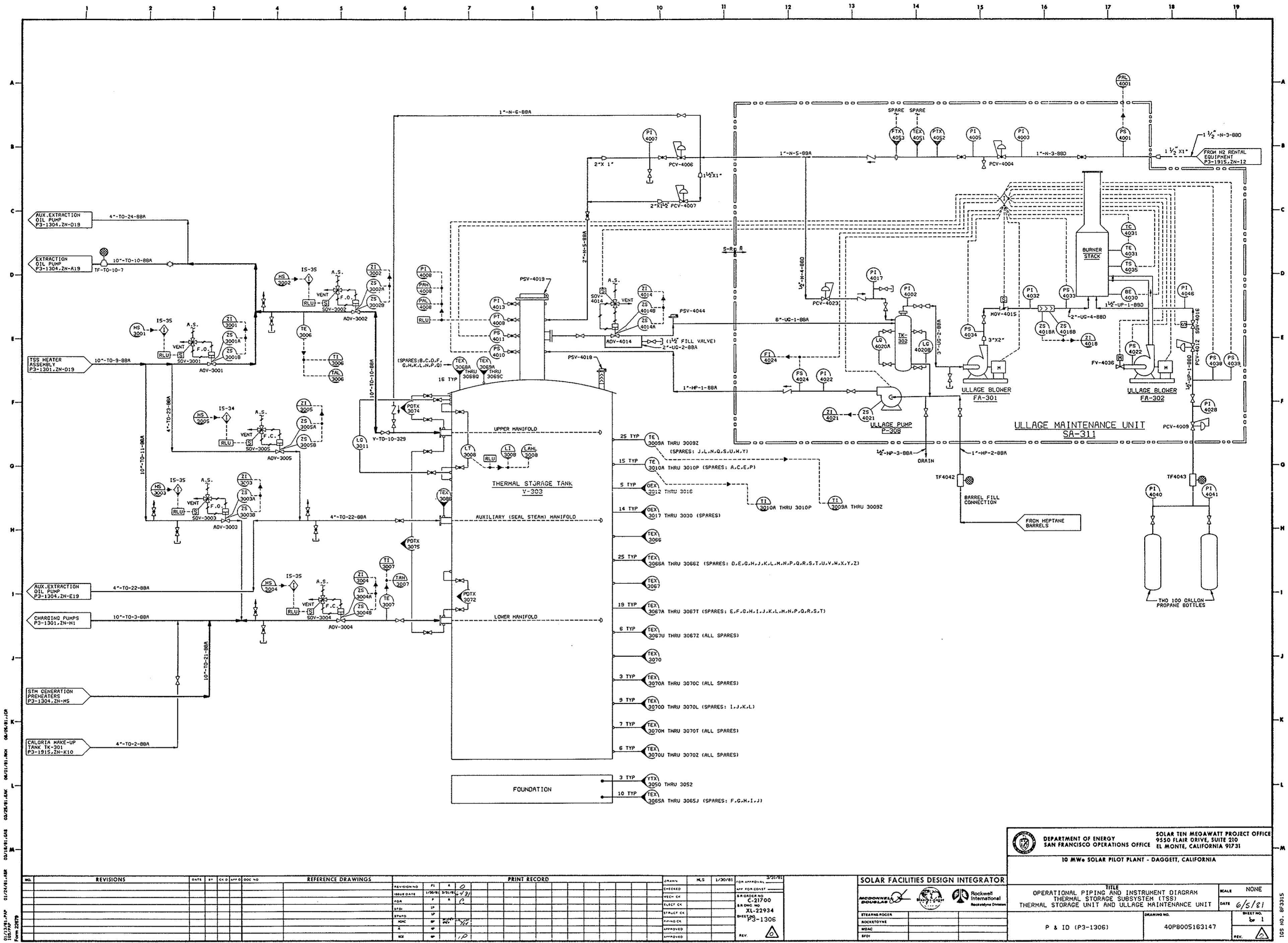
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SOLAR FACILITIES DESIGN INTEGRATOR

ACORNWELL ENGINEERING INC. Rockwell International

STEVEN ROGER
 MICHELE TORRE
 MORGAN
 MFR

TITLE OPERATIONAL PIPING AND INSTRUMENT DIAGRAM THERMAL STORAGE SUBSYSTEM (TSS) EXTRACTION STEAM AND CONDENSATE		SCALE NONE
P & ID (P3-1305)	DATE 6/5/81	REV. 1 of 1
PROJECT NO. 40P8005163146		REV.



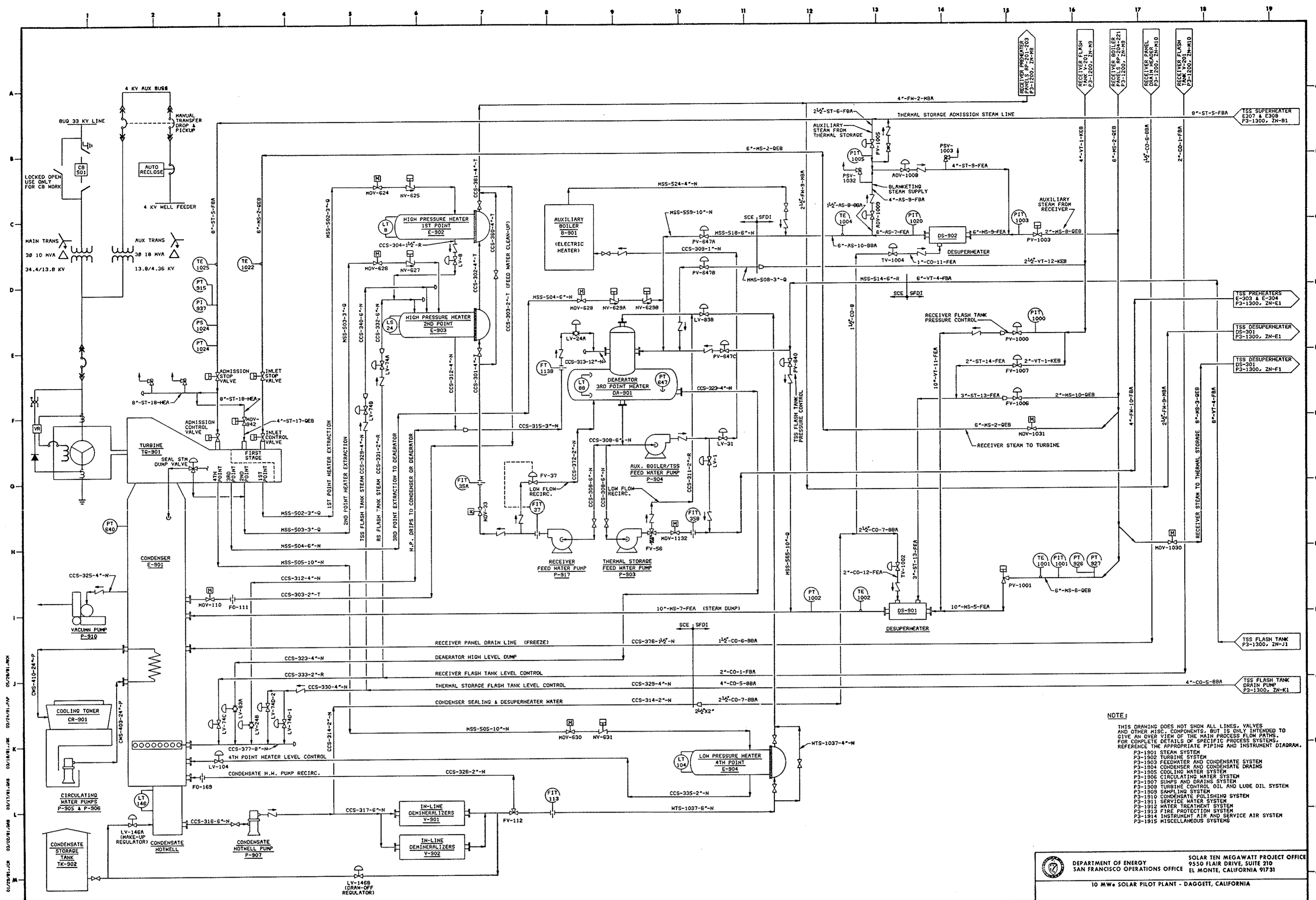
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 SAN FRANCISCO OPERATIONS OFFICE 9550 FLAIR DRIVE, SUITE 210
 EL MONTE, CALIFORNIA 91731
10 MW SOLAR PILOT PLANT - DAGGETT, CALIFORNIA

NO.	REVISIONS	DATE	BY	CHKD	APP'D	DOC NO.	REFERENCE DRAWINGS	PRINT RECORD	DESIGN	PLS	1/30/81	FOR APPROVAL	DATE	BY	FOR APPROVAL	DATE	BY
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SOLAR FACILITIES DESIGN INTEGRATOR

OPERATIONAL PIPING AND INSTRUMENT DIAGRAM
 THERMAL STORAGE SUBSYSTEM (TSS)
 THERMAL STORAGE UNIT AND ULLAGE MAINTENANCE UNIT

SCALE: NONE
 DATE: 6/5/81
 SHEET NO.: 1
 DRAWING NO.: P & ID (P3-1306)
 40P8005163147



NOTE:
 THIS DRAWING DOES NOT SHOW ALL LINES, VALVES AND OTHER MISC. COMPONENTS, BUT IS ONLY INTENDED TO GIVE AN OVER VIEW OF THE MAIN PROCESS FLOW PATHS. FOR COMPLETE DETAILS OF SPECIFIC PROCESS SYSTEMS, REFER TO THE APPROPRIATE PIPING AND INSTRUMENT DIAGRAM.

- P-1801 STEAM SYSTEM
- P-1802 TURBINE SYSTEM
- P-1803 FEEDWATER AND CONDENSATE SYSTEM
- P-1804 CONDENSER AND CONDENSATE DRAINS
- P-1805 COOLING WATER SYSTEM
- P-1806 CIRCULATING WATER SYSTEM
- P-1807 SUMP AND DRAINS SYSTEM
- P-1808 CONDENSATE FLOWING SYSTEM
- P-1809 SAMPLING SYSTEM
- P-1810 SERVICE WATER SYSTEM
- P-1811 WATER TREATMENT SYSTEM
- P-1812 FIRE PROTECTION SYSTEM
- P-1813 INSULANT AIR AND SERVICE AIR SYSTEM
- P-1814 MISCELLANEOUS SYSTEMS

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10 MW SOLAR PILOT PLANT - DAGGETT, CALIFORNIA

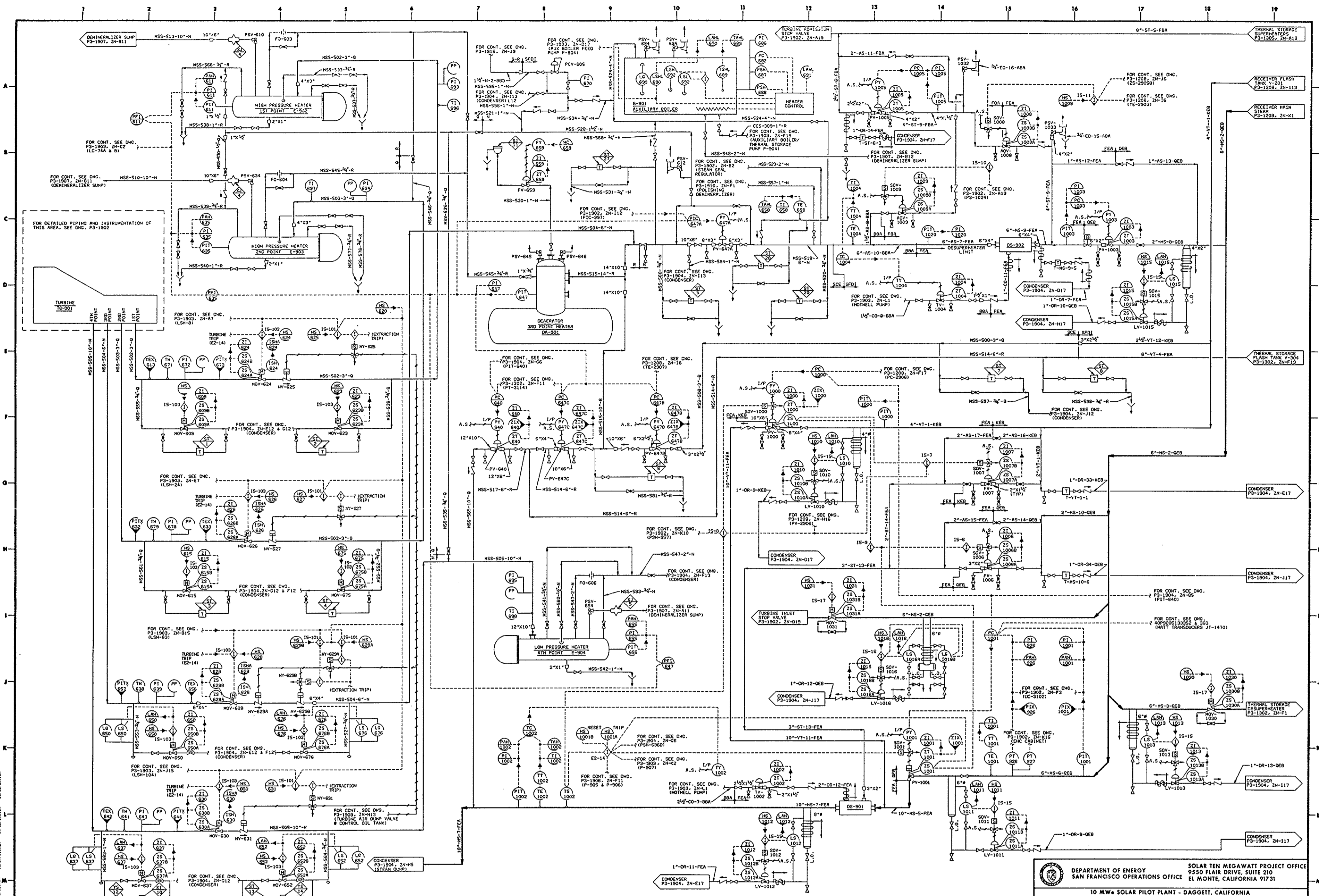
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DEPARTMENT OF ENERGY SOLAR TEN MEGAWATT PROJECT OFFICE
 SAN FRANCISCO OPERATIONS OFFICE 9550 FLAIR DRIVE, SUITE 210
 EL MONTE, CALIFORNIA 91731

TITLE
 COMPOSITE
 OPERATIONAL PIPING AND INSTRUMENT DIAGRAM
 ELECTRICAL POWER GENERATION SYSTEM

SCALE NONE
DATE 6/5/81
REV. 1 of 1

P & ID (P3-1900) 40P8005163148



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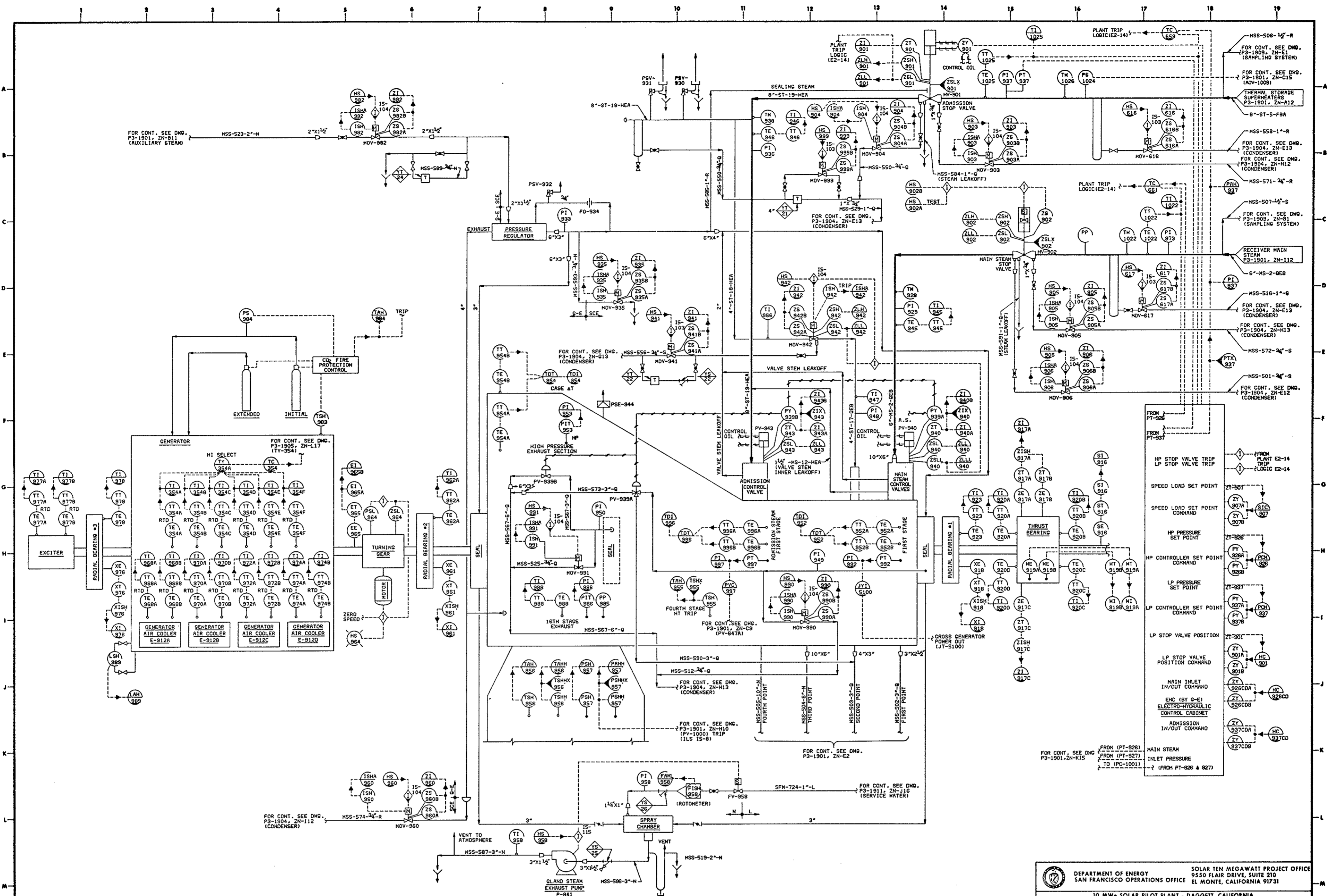
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DEPARTMENT OF ENERGY
 SOLAR TEN MEGAWATT PROJECT OFFICE
 SAN FRANCISCO OPERATIONS OFFICE
 9550 FLAIR DRIVE, SUITE 210
 EL MONTE, CALIFORNIA 91731

10 MW SOLAR PILOT PLANT - DAGGETT, CALIFORNIA

TITLE	SCALE
OPERATIONAL PIPING & INSTRUMENT DIAGRAM STEAM SYSTEM	NONE

DATE: 6/5/81
 DRAWING NO.: P & ID (P3-1901)
 SHEET NO.: 1 OF 1
 PROJECT NO.: 40P8005163149



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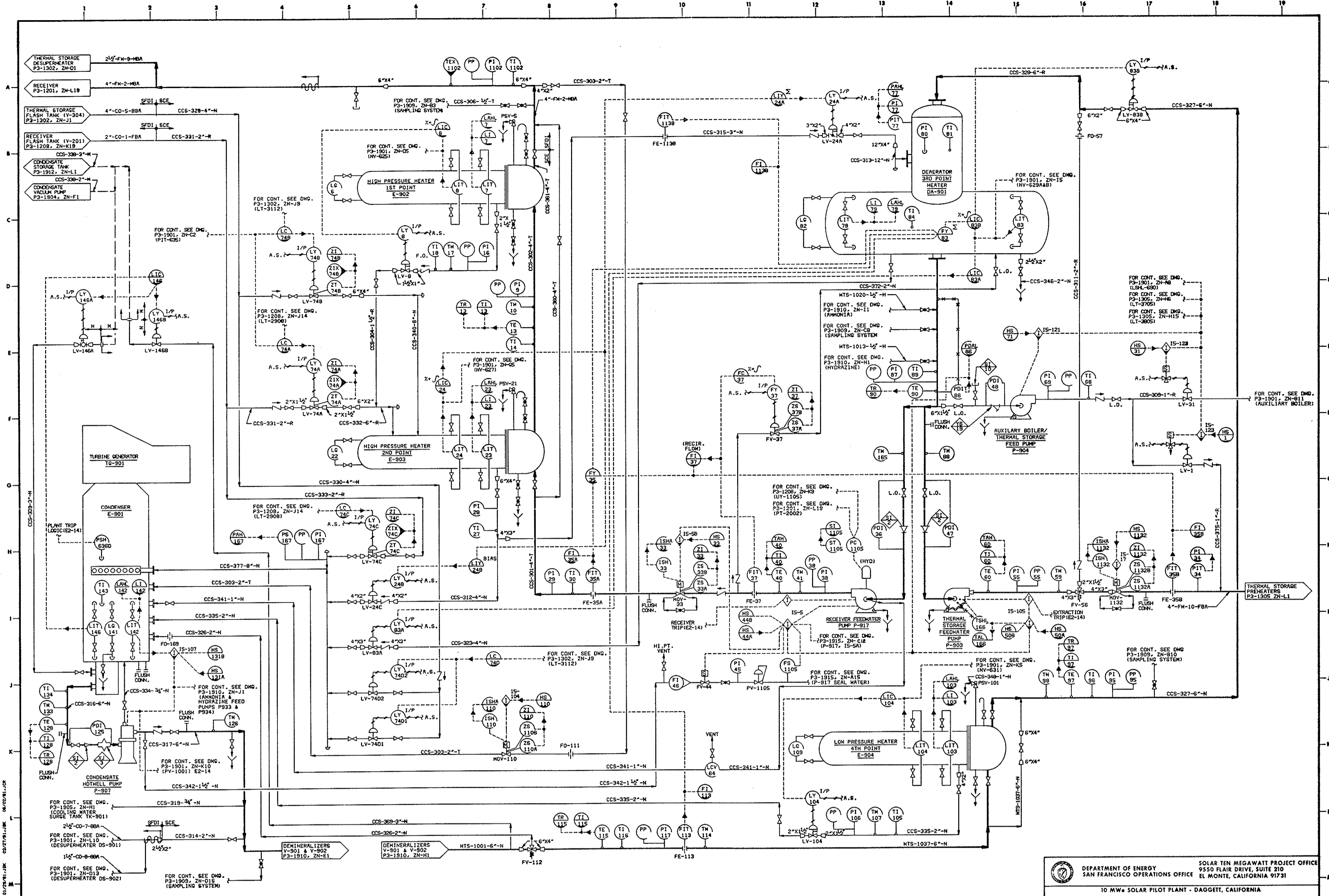
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DEPARTMENT OF ENERGY
 SOLAR TEN MEGAWATT PROJECT OFFICE
 SAN FRANCISCO OPERATIONS OFFICE
 9550 FLAIR DRIVE, SUITE 210
 EL MONTE, CALIFORNIA 91731

10 MW SOLAR PILOT PLANT - DAOGETT, CALIFORNIA

SOLAR FACILITIES DESIGN INTEGRATOR
 OPERATIONAL PIPING AND INSTRUMENT DIAGRAM
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TITLE: P & ID (P3-1902)
 SHEET NO.: 1 of 1
 DATE: 6/5/81
 DRAWING NO.: 40P8005163150



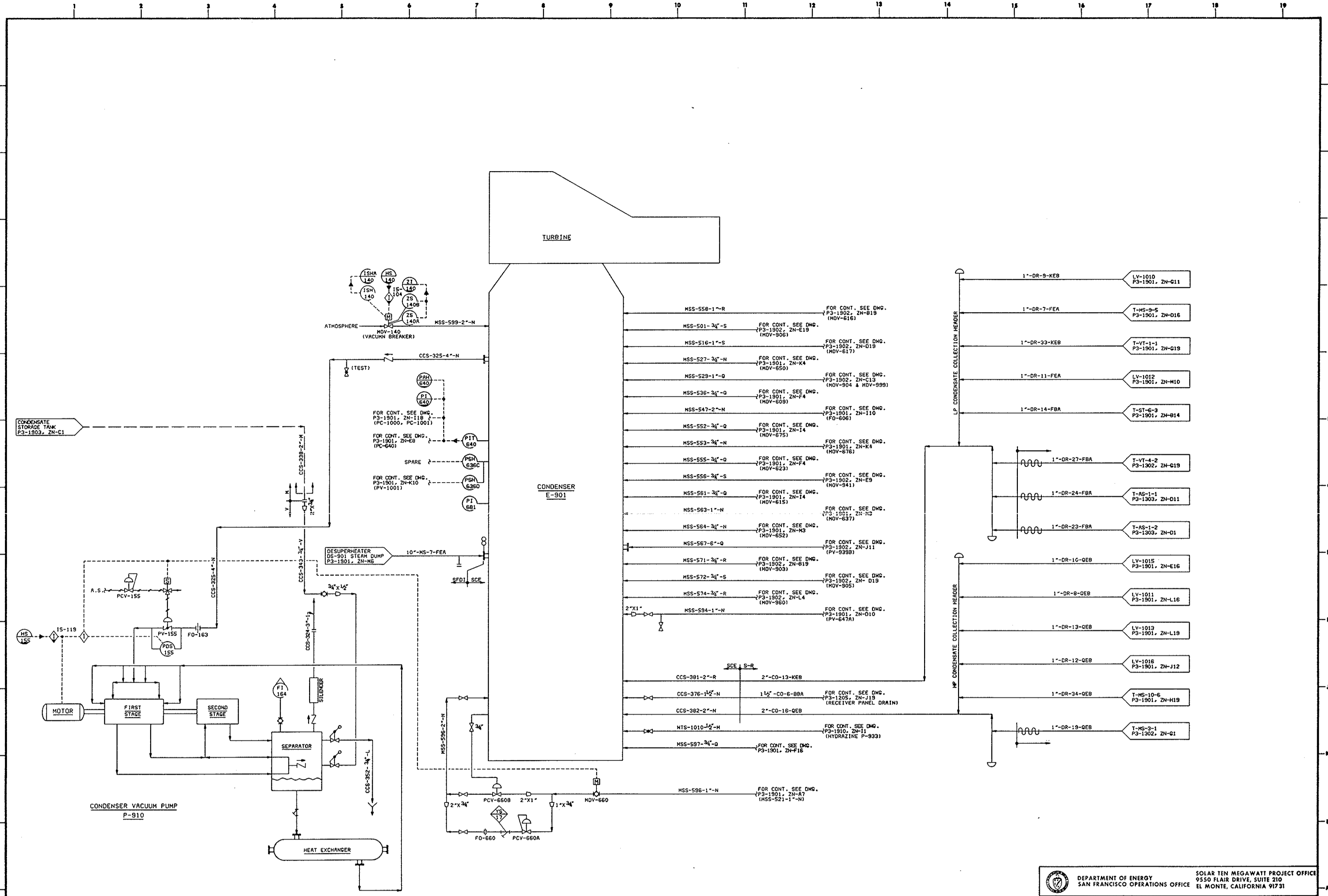
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DEPARTMENT OF ENERGY SOLAR TEN MEGAWATT PROJECT OFFICE SAN FRANCISCO OPERATIONS OFFICE EL MONTE, CALIFORNIA 91731		SOLAR FACILITIES DESIGN INTEGRATOR ROCKWELL INTERNATIONAL ROCKWELL INTERNATIONAL ROCKWELL INTERNATIONAL	
TITLE OPERATIONAL PIPING AND INSTRUMENT DIAGRAM FEEDWATER AND CONDENSATE SYSTEM		SCALE NONE	
P & ID (P3-1903)		DRAWING NO. 40P8005163151	
DATE 6/5/81		SHEETS 1 of 1	



DEPARTMENT OF ENERGY SOLAR TEN MEGAWATT PROJECT OFFICE
 SAN FRANCISCO OPERATIONS OFFICE 9550 FLAIR DRIVE, SUITE 210
 EL MONTE, CALIFORNIA 91731
 10 MW SOLAR PILOT PLANT - DAGGETT, CALIFORNIA

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SOLAR FACILITIES DESIGN INTEGRATOR

McDONNELL
 ROGERS
 STEINBOGER
 ROCKWELL
 M&C
 BPH

TITLE
 OPERATIONAL PIPING AND INSTRUMENT DIAGRAM
 CONDENSER AND CONDENSATE DRAINS

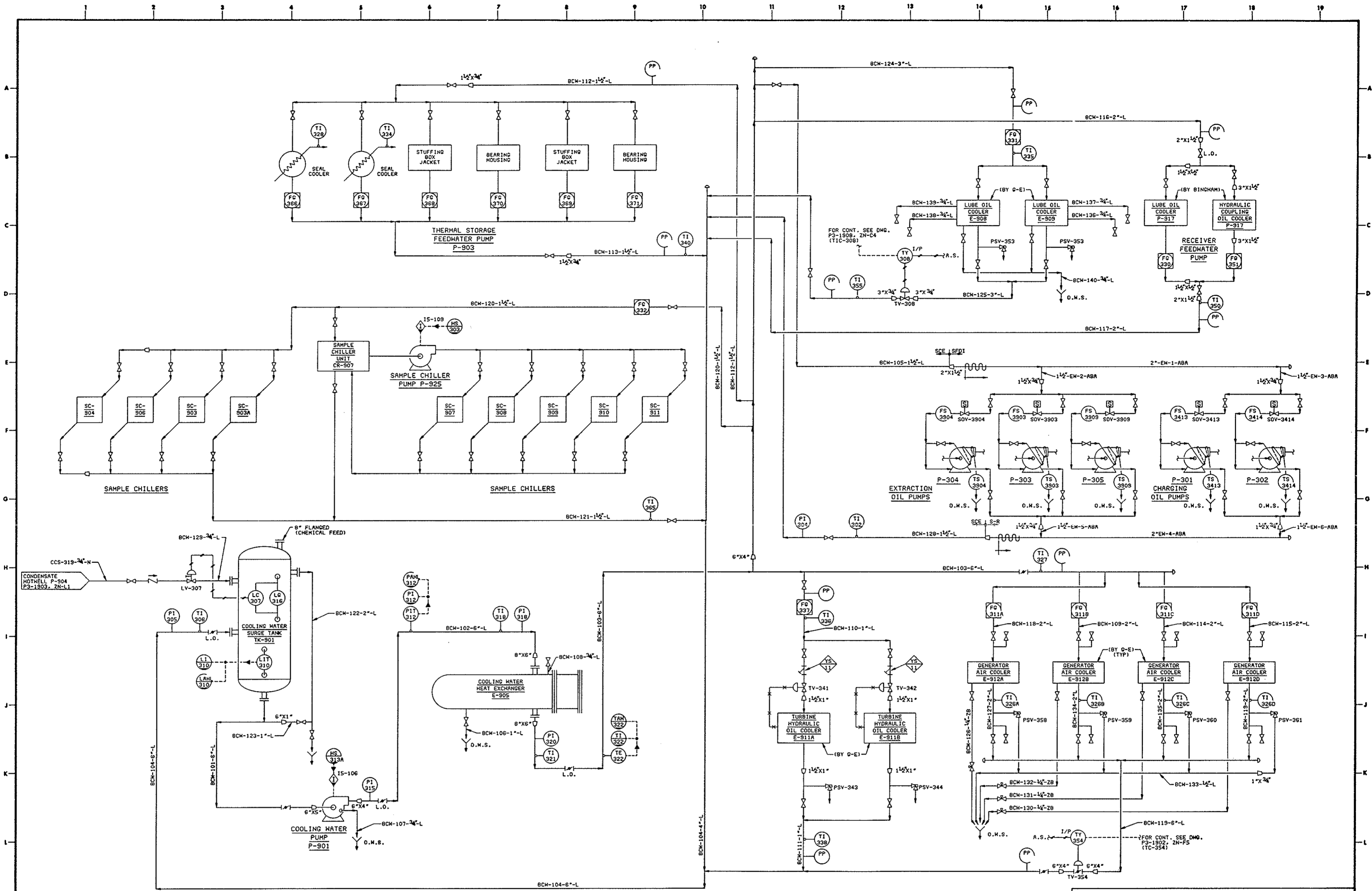
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DATE 6/5/91

P & ID (P3-1904)

DRAWING NO. 40P8005163152

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DEPARTMENT OF ENERGY
 SOLAR TEN MEGAWATT PROJECT OFFICE
 SAN FRANCISCO OPERATIONS OFFICE
 9550 FLAIR DRIVE, SUITE 210
 EL MONTE, CALIFORNIA 91731

10 MW SOLAR PILOT PLANT - DAGGETT, CALIFORNIA

TITLE
 OPERATIONAL PIPING AND INSTRUMENT DIAGRAM
 EQUIPMENT COOLING WATER SYSTEM

SCALE NONE

DATE 4/5/81

SHEET NO. 1 OF 1

REV.

SOLAR FACILITIES DESIGN INTEGRATOR

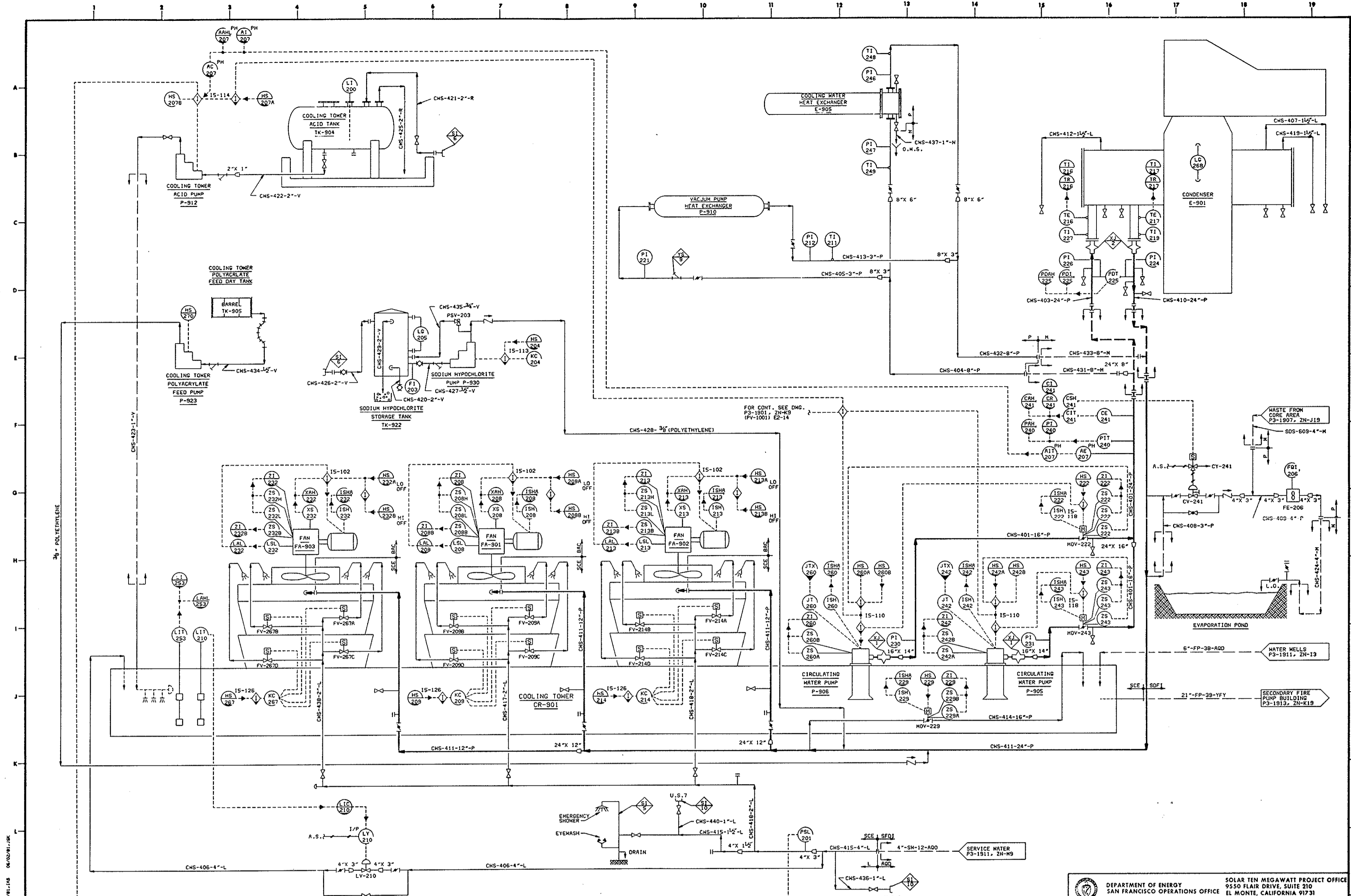
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ROCKWELL INTERNATIONAL

PROJECT NO. P3-1905

DRAWING NO. 40P8005163153



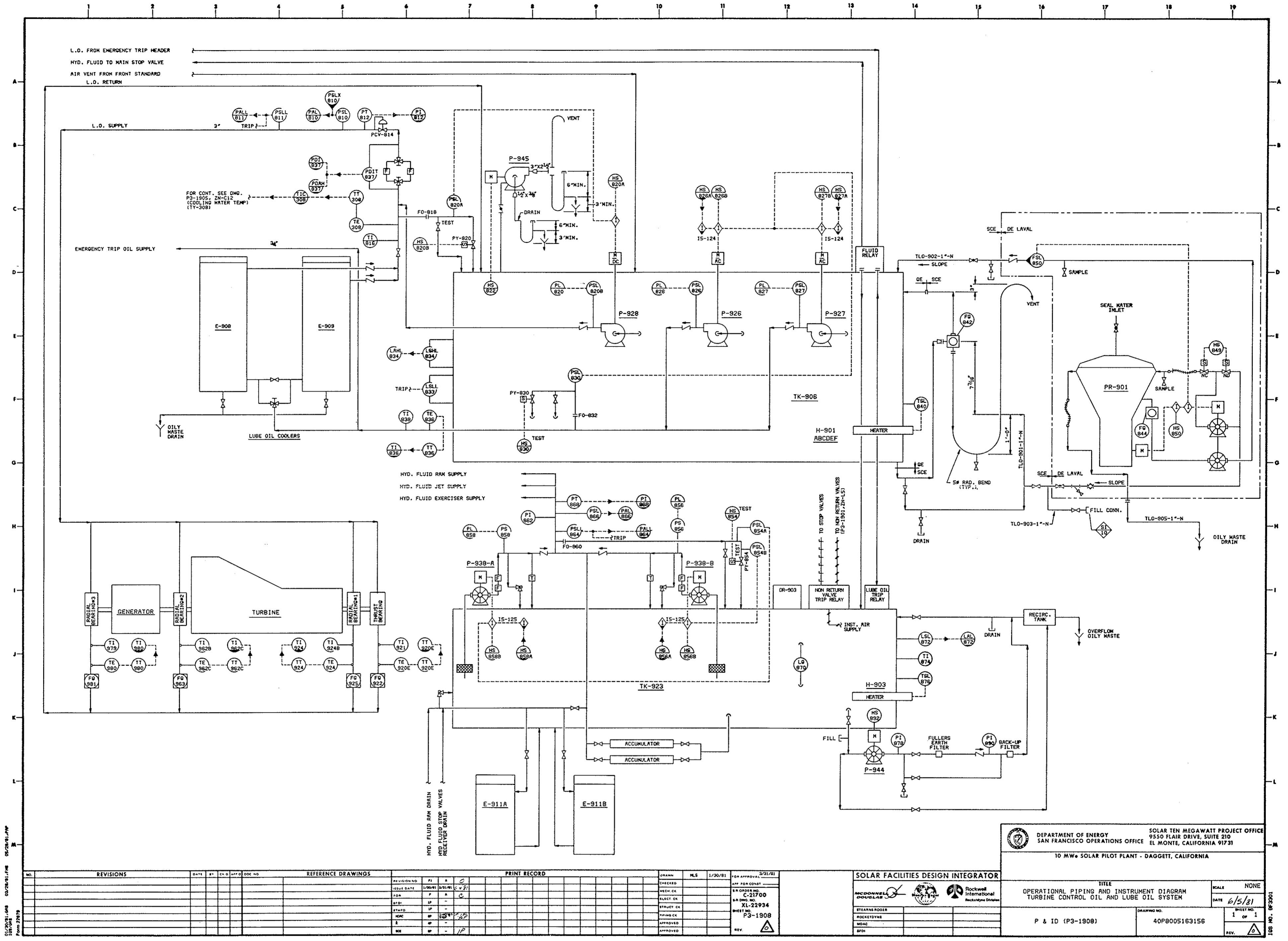
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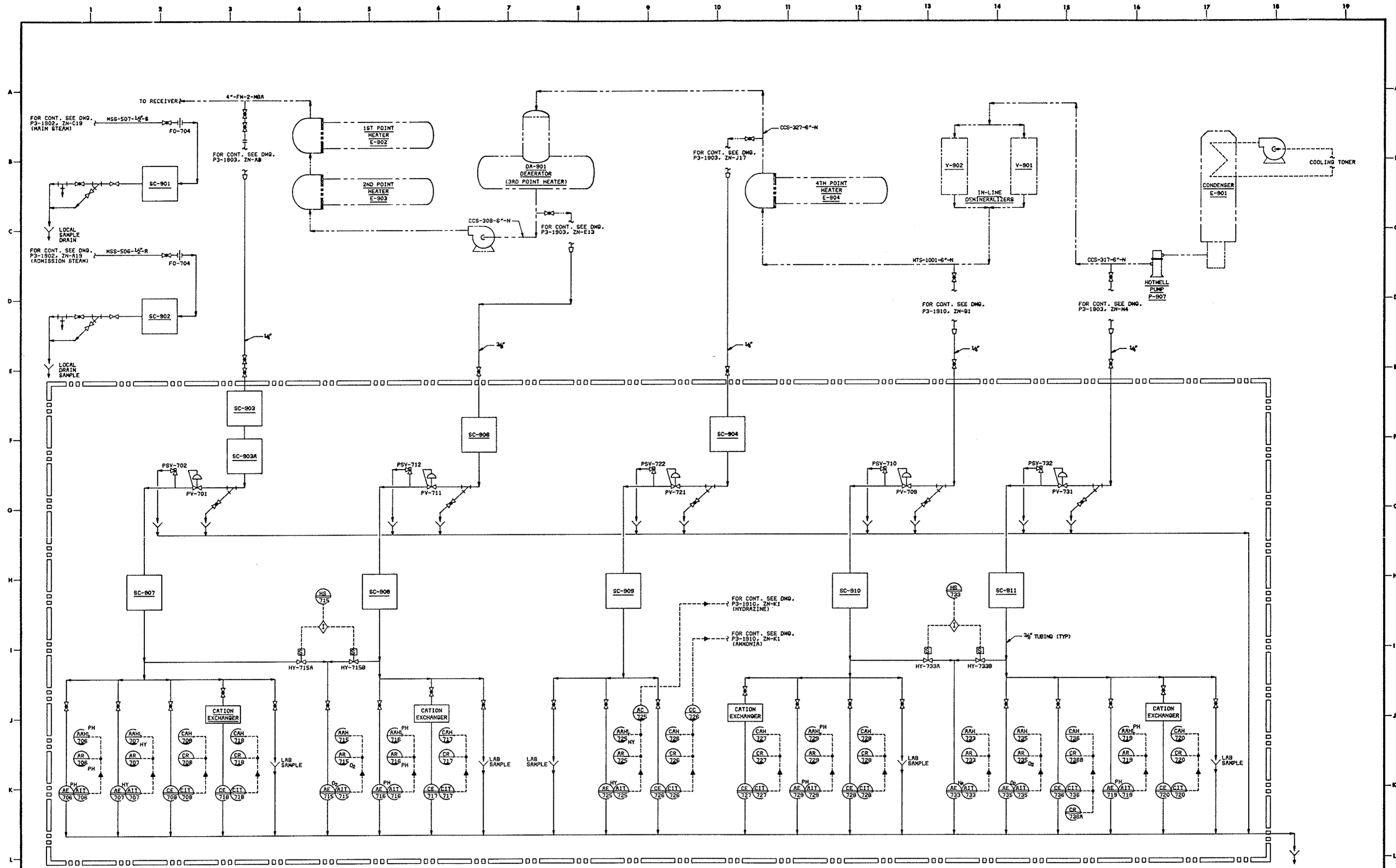
SOLAR TEN MEGAWATT PROJECT OFFICE
 9550 FLAIR DRIVE, SUITE 210
 EL MONTE, CALIFORNIA 91731

10 MW SOLAR PILOT PLANT - DAGGETT, CALIFORNIA

SOLAR FACILITIES DESIGN INTEGRATOR 	TITLE OPERATIONAL PIPING AND INSTRUMENT DIAGRAM CIRCULATING WATER SYSTEM
SCALE NONE DATE 6/5/91	SHEET NO. 1 of 1 REV.

P & ID (P3-1906) **40P8005163154**





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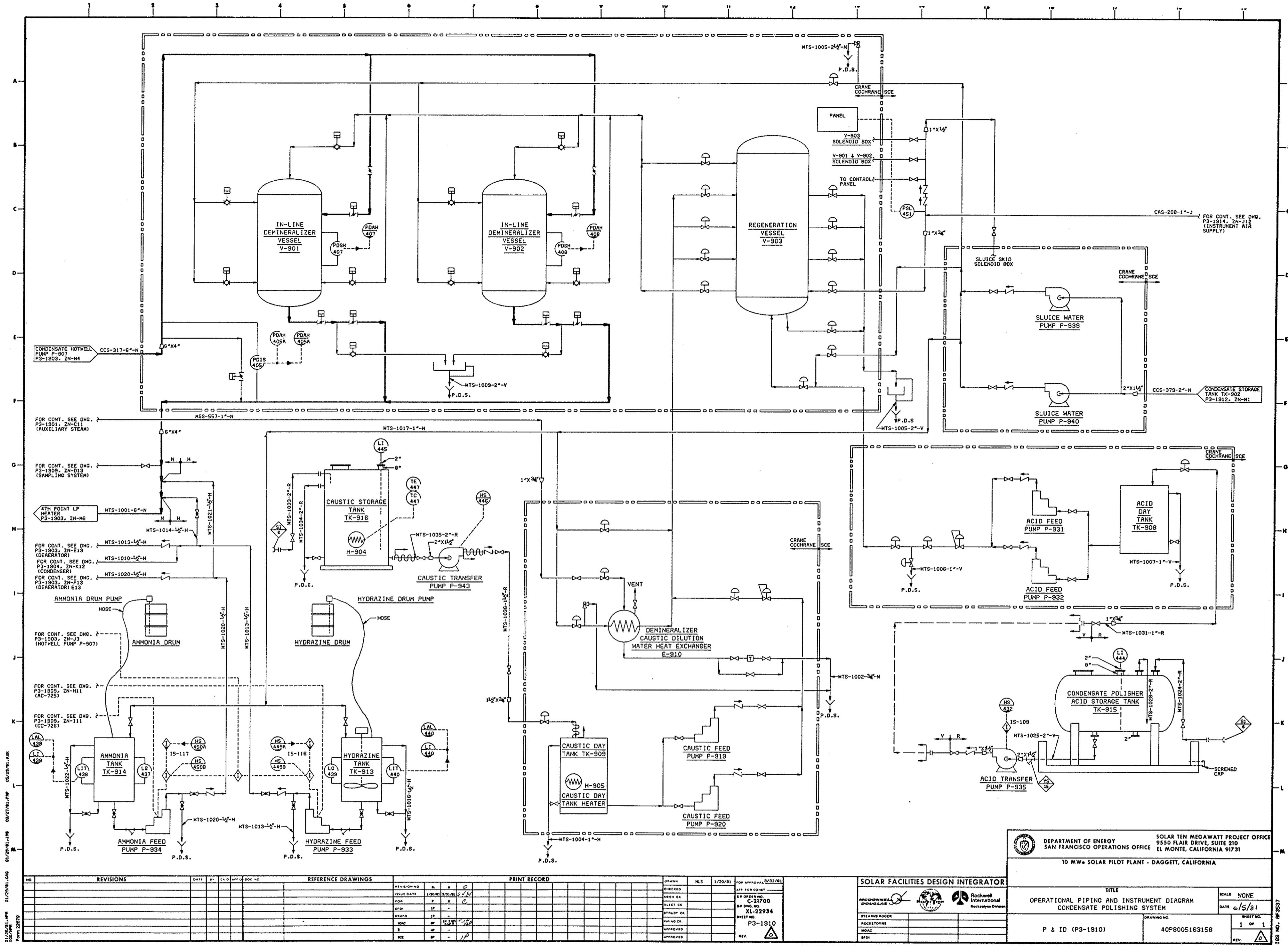
DEPARTMENT OF ENERGY
 SOLAR TEN MEGAWATT PROJECT OFFICE
 9550 FLAIR DRIVE, SUITE 210
 SAN FRANCISCO OPERATIONS OFFICE
 EL MONTE, CALIFORNIA 91731
 10 MW SOLAR PILOT PLANT - DAGGETT, CALIFORNIA

SOLAR FACILITIES DESIGN INTEGRATOR
 MODONALLO
 STEARNS RODIA
 MORGAN
 BPH

TITLE
 OPERATIONAL PIPING AND INSTRUMENT DIAGRAM
 SAMPLING SYSTEM

SCALE NONE
DATE 6/5/81
SHEET NO. 1 of 1
REV.

P & ID (P3-1909)
DRAWING NO. 40P8005163157

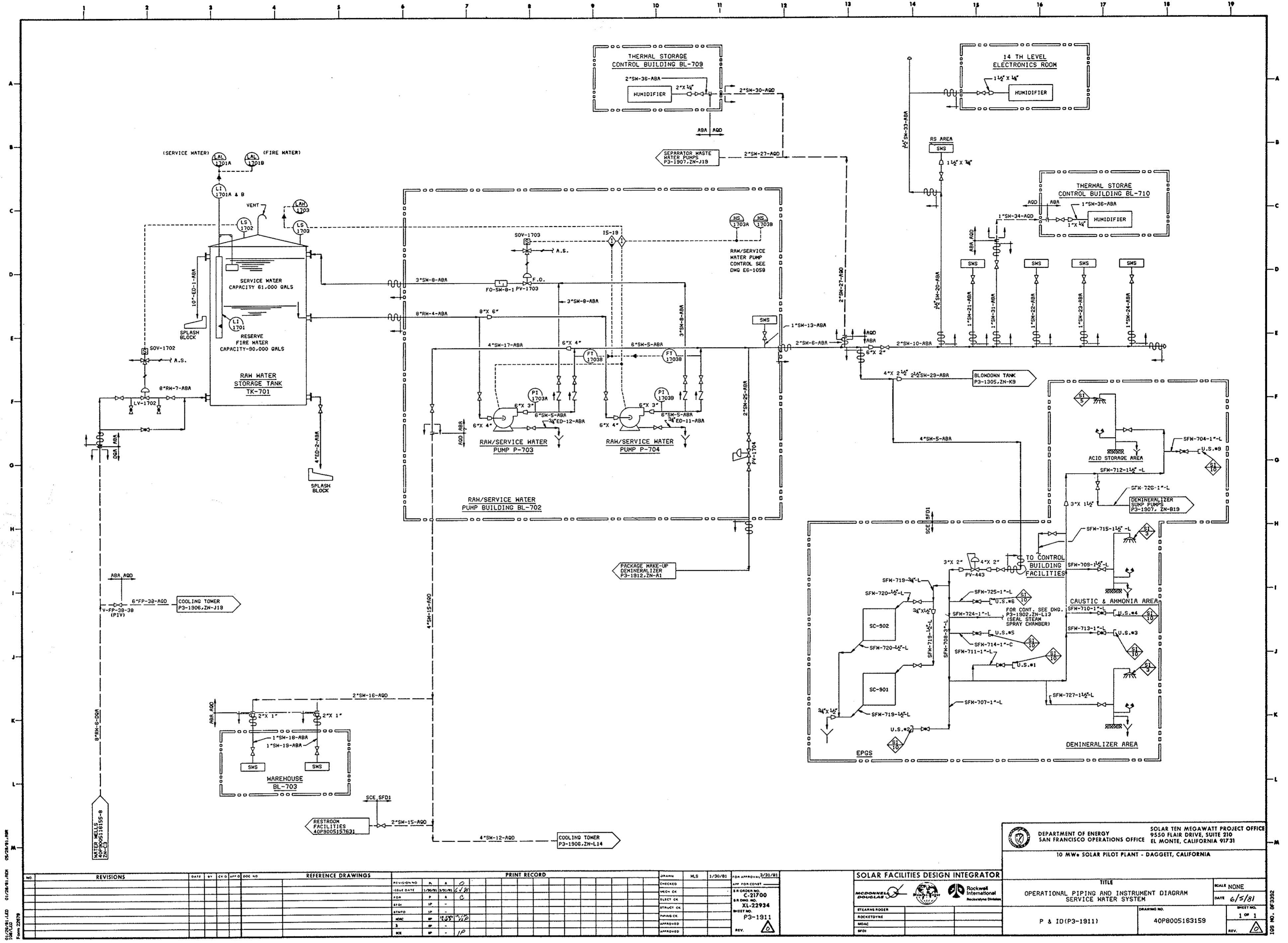


DEPARTMENT OF ENERGY SOLAR TEN MEGAWATT PROJECT OFFICE
 SAN FRANCISCO OPERATIONS OFFICE 9550 FLAIR DRIVE, SUITE 210
 EL MONTE, CALIFORNIA 91731
 10 MW SOLAR PILOT PLANT - DAGGETT, CALIFORNIA

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SOLAR FACILITIES DESIGN INTEGRATOR
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 SOLGAR
 Rockwell
 International
 Rockwell
 Division

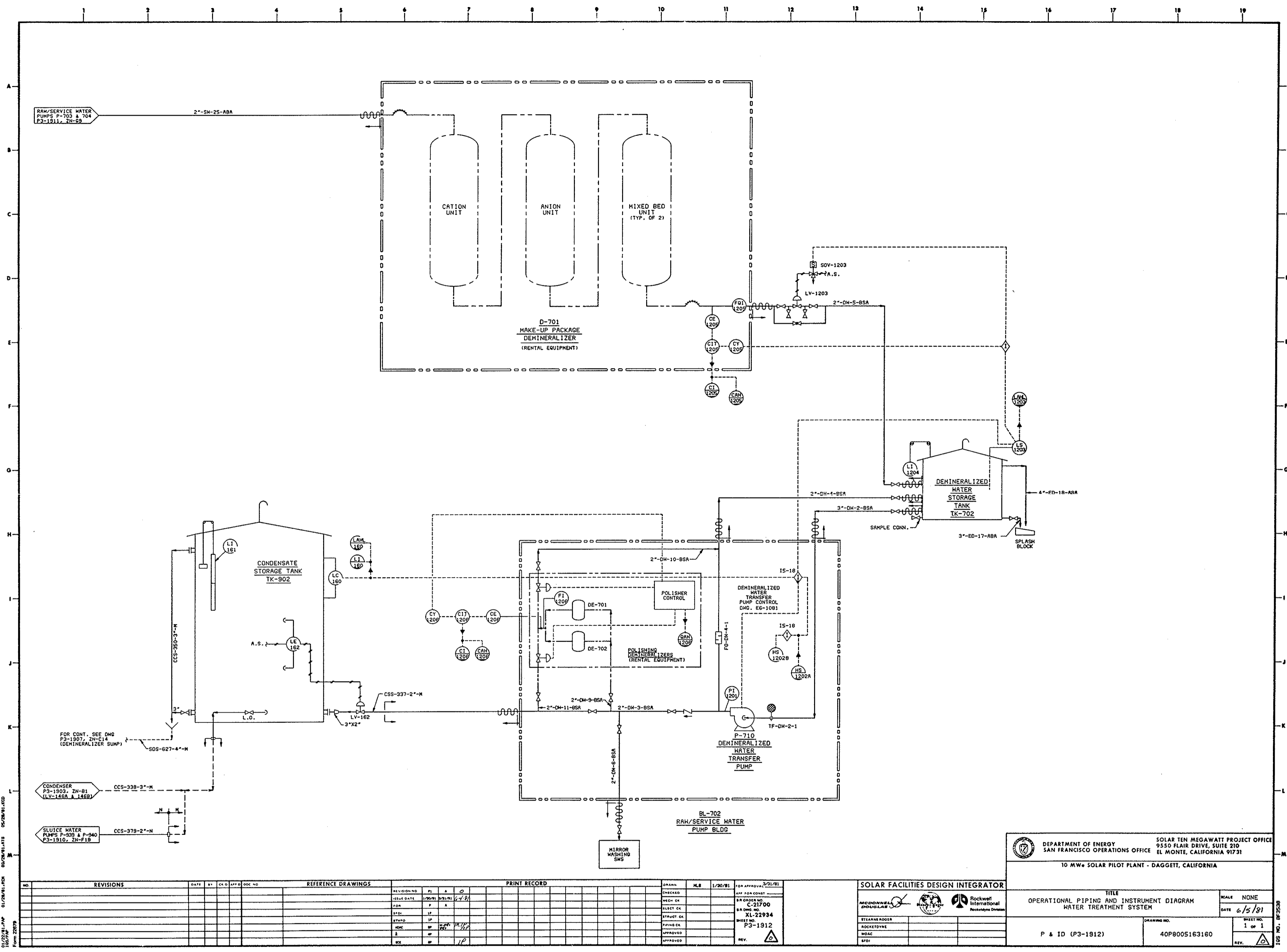
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 CONDENSATE POLISHING SYSTEM
 SCALE NONE
 DATE 6/5/81
 SHEET NO. 1 OF 1
 DRAWING NO. 40P8005163158
 REV.



DEPARTMENT OF ENERGY SOLAR TEN MEGAWATT PROJECT OFFICE
 SAN FRANCISCO OPERATIONS OFFICE 9550 FLAIR DRIVE, SUITE 210
 EL MONTE, CALIFORNIA 91731
 10 MW SOLAR PILOT PLANT - DAGGERT, CALIFORNIA

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TITLE: OPERATIONAL PIPING AND INSTRUMENT DIAGRAM SERVICE WATER SYSTEM
 SCALE: NONE
 DATE: 6/5/81
 SHEET NO.: 1 OF 1
 DRAWING NO.: P & I 01(P3-1911)
 40P8005163159



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NO.	REVISIONS	DATE	BY	CHK'D	APP'D	DOC NO.

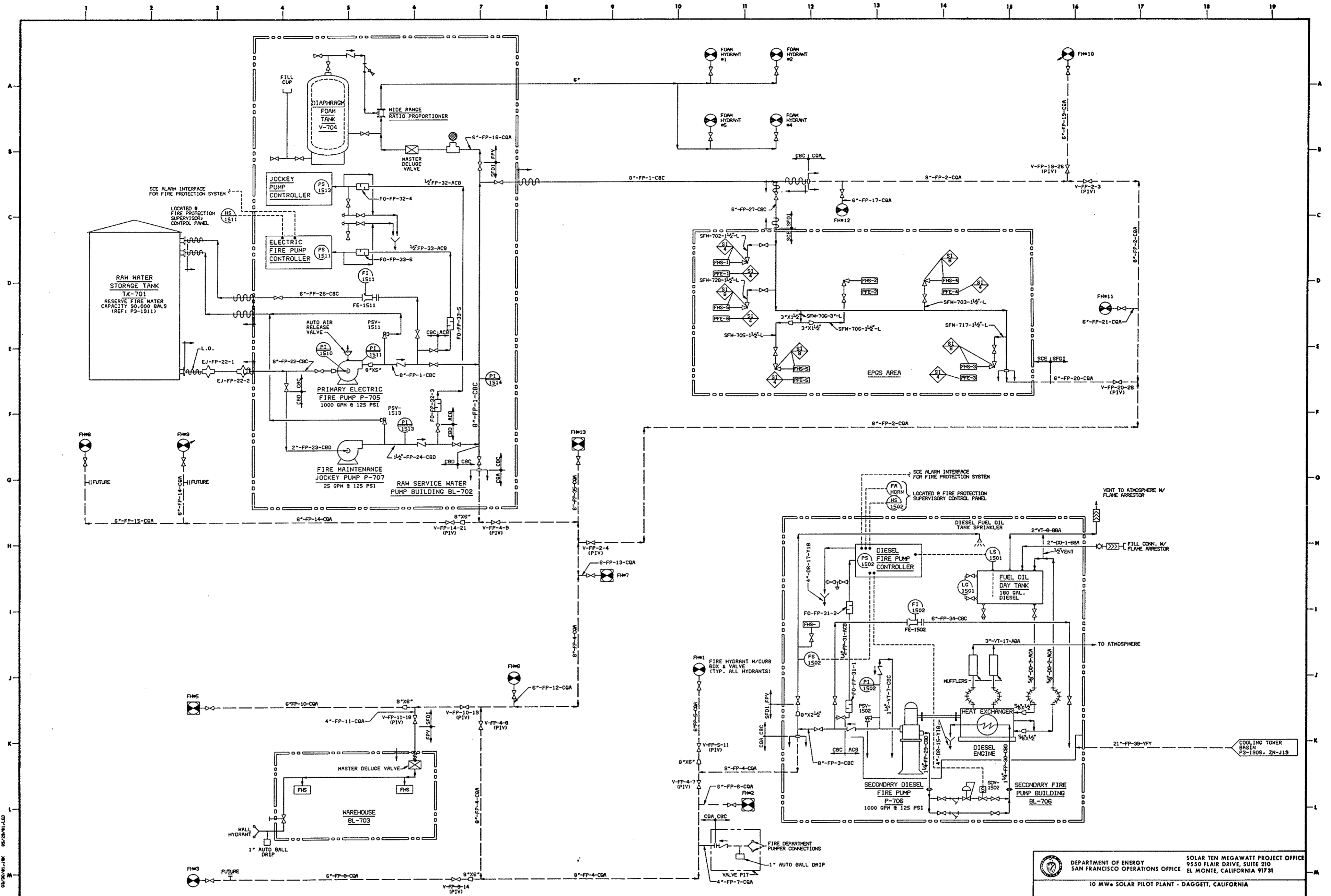
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PRINT RECORD	

NO.	DATE	BY	CHK'D	APP'D

SOLAR FACILITIES DESIGN INTEGRATOR
 ROCKWELL INTERNATIONAL
 Rockwell International
 Rockwell Division

DEPARTMENT OF ENERGY SAN FRANCISCO OPERATIONS OFFICE		SOLAR TEN MEGAWATT PROJECT OFFICE 9550 FLAIR DRIVE, SUITE 210 EL MONTE, CALIFORNIA 91731	
10 MW SOLAR PILOT PLANT - DAGGETT, CALIFORNIA			
TITLE OPERATIONAL PIPING AND INSTRUMENT DIAGRAM WATER TREATMENT SYSTEM		SCALE NONE	DATE 6/5/81
P & ID (P3-1912)		DRAWING NO. 40P8005163160	SHEET NO. 1 of 1



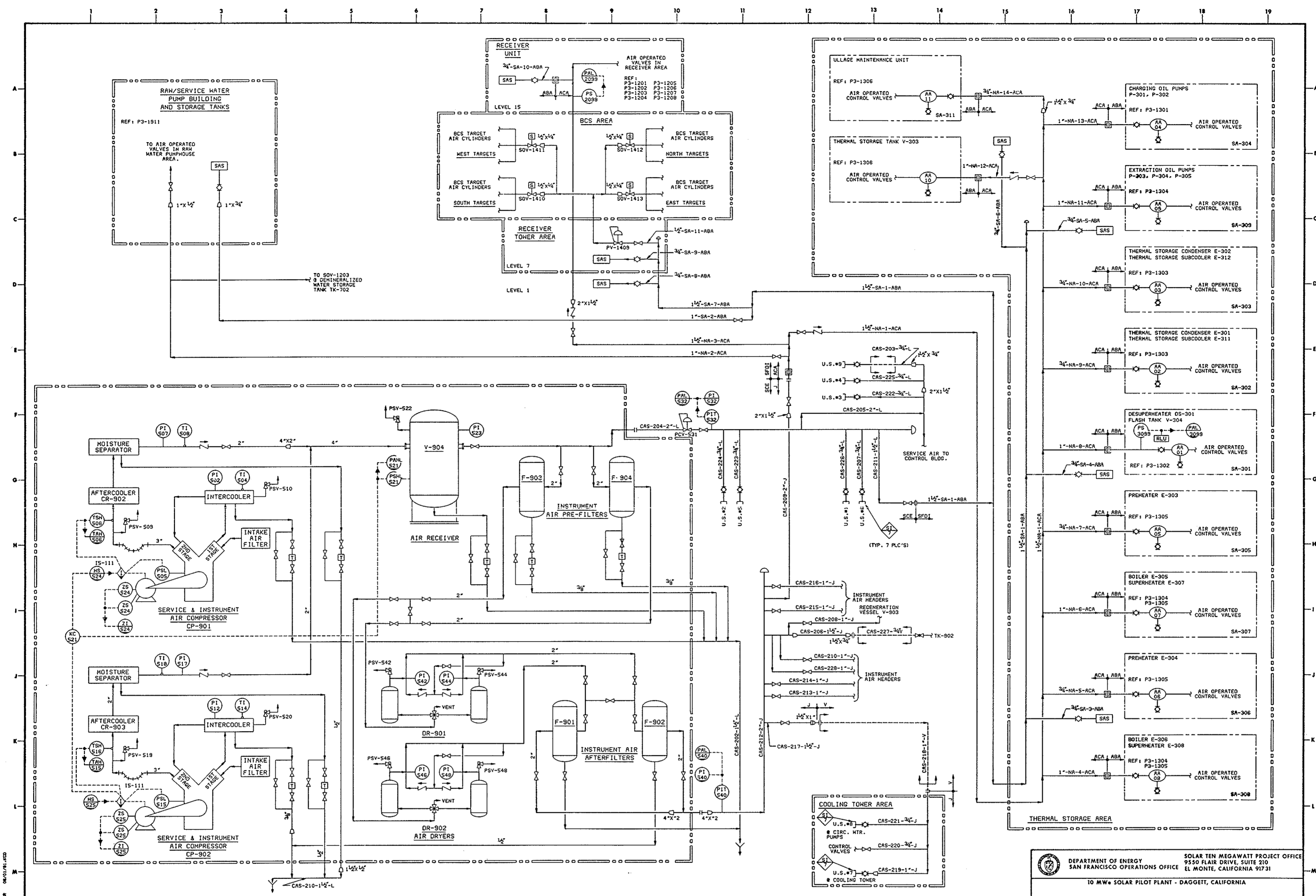
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DEPARTMENT OF ENERGY
 SAN FRANCISCO OPERATIONS OFFICE
 9550 FLAIR DRIVE, SUITE 210
 EL MONTE, CALIFORNIA 91731

SOLAR TEN MEGAWATT PROJECT OFFICE
 10 MW SOLAR PILOT PLANT - DAGGETT, CALIFORNIA

TITLE: OPERATIONAL PIPING AND INSTRUMENT DIAGRAM
 FIRE PROTECTION SYSTEM

SCALE: NONE
 DATE: 4/5/01
 SHEET NO.: 1 of 1
 P & ID (P3-1913)
 DRAWING NO.: 40P8005163161

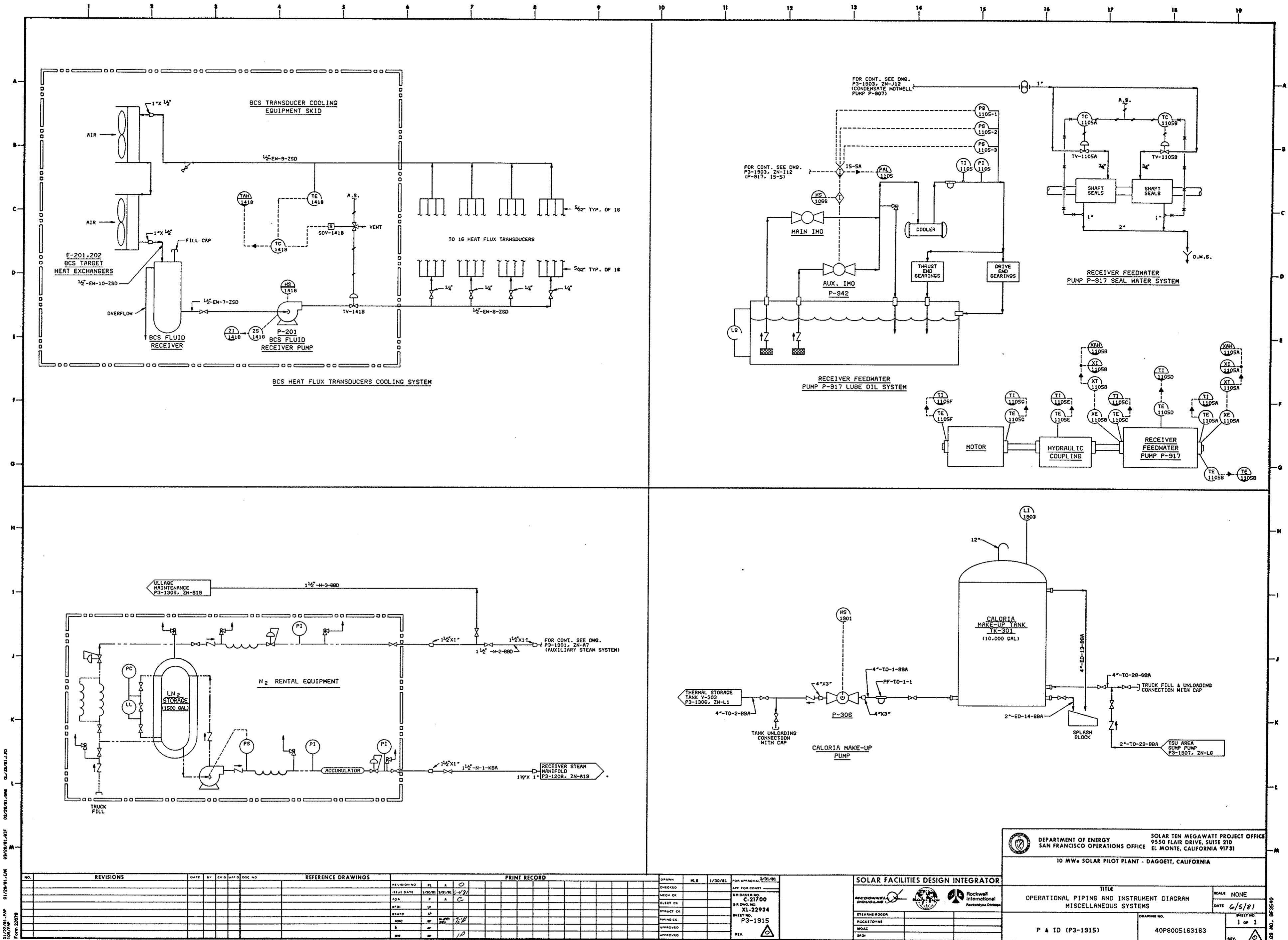


NO.	REVISIONS	DATE	BY	CHK	APP'D	DOC NO.	REFERENCE DRAWINGS	PRINT RECORD	DRWN	PLS	L/30/81	ISA APPROVAL	DATE
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DEPARTMENT OF ENERGY SOLAR TEN MEGAWATT PROJECT OFFICE
 SAN FRANCISCO OPERATIONS OFFICE 9550 FLAIR DRIVE, SUITE 210
 EL MONTE, CALIFORNIA 91731
 TO MW SOLAR PILOT PLANT - DAGGETT, CALIFORNIA

SOLAR FACILITIES DESIGN INTEGRATOR
 OPERATIONAL PIPING & INSTRUMENT DIAGRAM
 INSTRUMENT AIR & SERVICE AIR SYSTEMS

P & ID (P3-1914) 40P8005163162
 SCALE NONE DATE 6/5/81
 SHEET NO. 1 of 1
 REV.



15/07/91 PMP 01/07/91 LK 03/09/91 JAW 04/29/91 LLD
 Form 12079

REVISIONS				REFERENCE DRAWINGS				PRINT RECORD				FOR APPROVAL/REVISE			
NO.	DATE	BY	CHKD BY	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.		

DEPARTMENT OF ENERGY SAN FRANCISCO OPERATIONS OFFICE		SOLAR TEN MEGAWATT PROJECT OFFICE 9550 FLAIR DRIVE, SUITE 210 EL MONTE, CALIFORNIA 91731	
10 MW SOLAR PILOT PLANT - DAGGETT, CALIFORNIA			
TITLE OPERATIONAL PIPING AND INSTRUMENT DIAGRAM MISCELLANEOUS SYSTEMS		SCALE NONE	
P & ID (P3-1915)		DATE 6/5/91	
SHEET NO. 1 OF 1		REV.	