SECTION 6

PROCESS FLOW DIAGRAMS

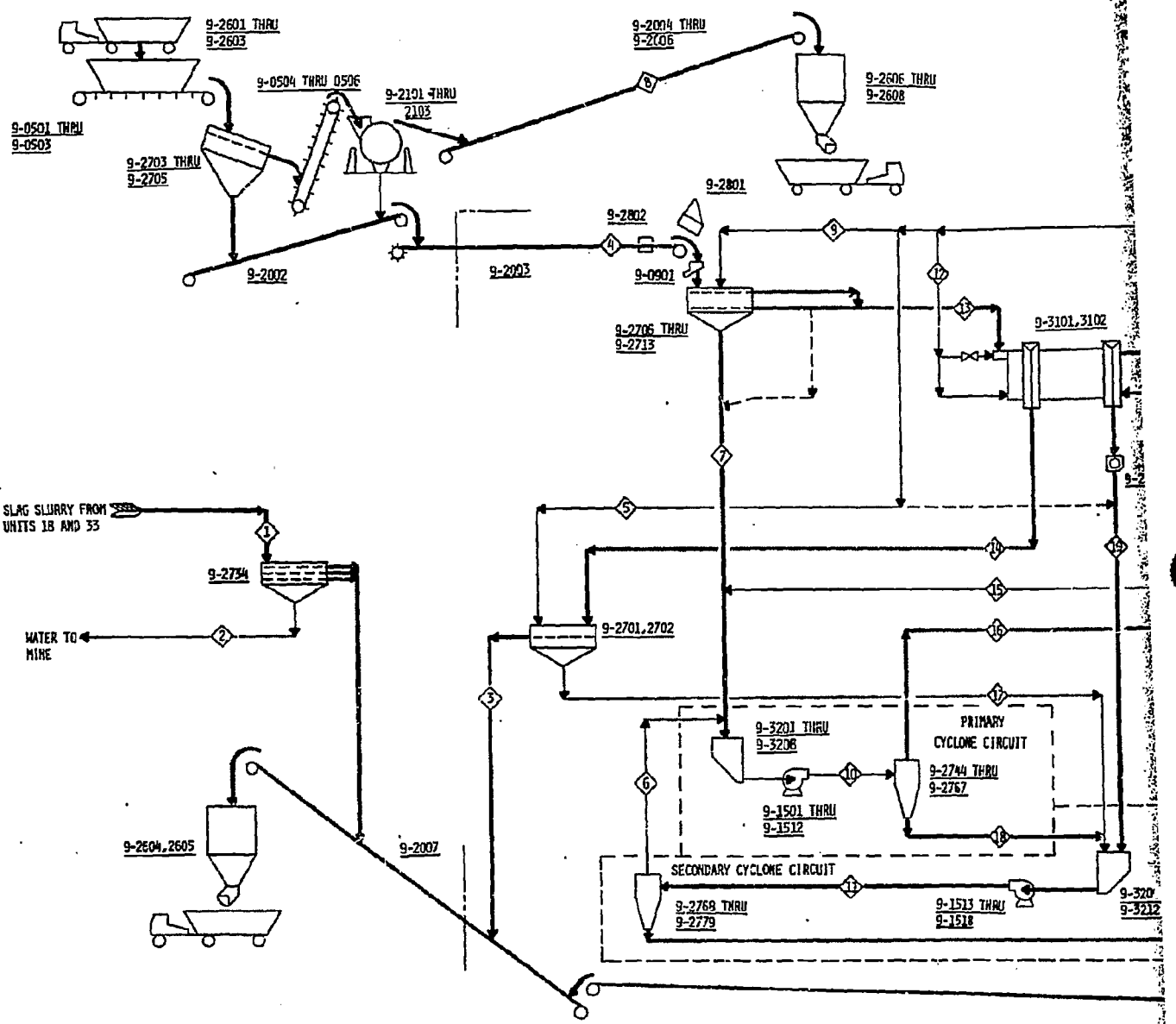
The flow diagrams for the operating units described in Section 5 are shown on the drawings contained in this section. A list of these drawings appears on pages 5-1 and 5-2 in Section 5.

These drawings show the process flows, design material balances, and characteristics of the major process equipment. Control instruments critical for the process are also shown.

The flow diagrams shown in this section are preliminary in nature; refinements characteristic of a final design have, in some cases, not been made. Material balance values for economic analysis have been taken from the overall block flow diagram, Figure 4-1 contained in Section 4.

The flow diagrams for proprietary processes are shown in a simplified form and contain only the material balances in and out of the units.

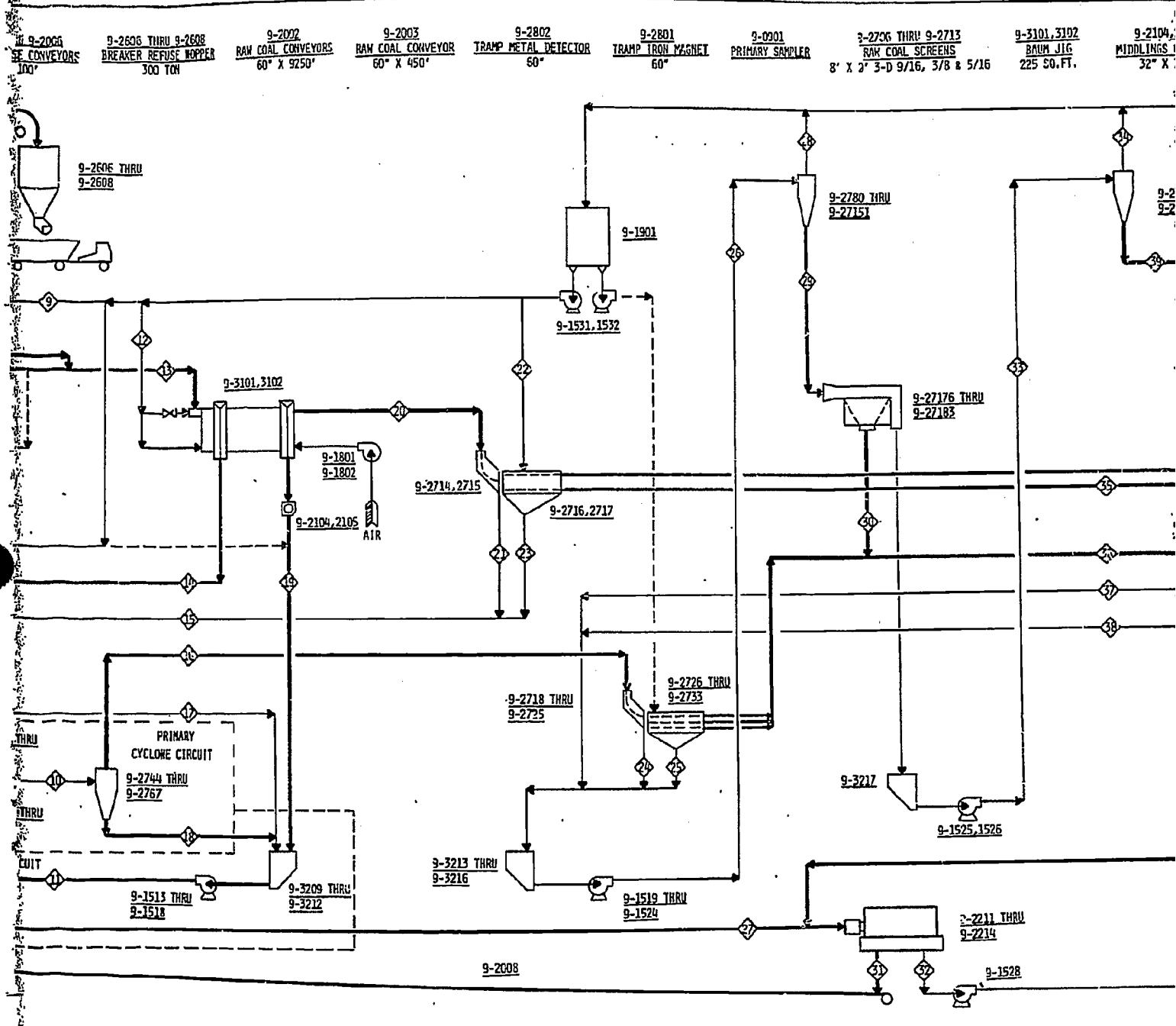
9-2601 THRU 9-2603	9-0501 THRU 9-0503	9-2703 THRU 9-2705	9-0504 THRU 9-0506	9-2101 THRU 9-2103	9-2004 THRU 9-2006	9-2606 THRU 9-2608	9-20
TRUCK DUMP HOPPERS	HOPPER FEEDERS	VIBRATING SCREENS	BREAKER FEEDERS	ROTARY BREAKERS	BREAKER REFUSE CONVEYORS	BREAKER REFUSE HOPPER	RAW COAL C
400 TON 24" GRIZZLY	72" X 40'	3" BAR SPACING	72" X 100'	16' X 36' 3" OPENINGS	36" X 100'	300 TON	60" X



9-2734	9-2604,2605	9-2007	9-2008	9 2701,2702	9-3201 THRU 9-3208	9-1501 THRU 9-1512	9-2744 THR
SLAG DEWATERING SCREEN	PLANT REFUSE HOPPERS	PLANT REFUSE CONVEYOR	PLANT TAILINGS CONVEYOR	JIG REFUSE SCREENS	PRIMARY FEED SUMPS	PRIMARY CYCLONE PUMPS	PRIMARY HYT
8'X20' 3D 1/4X1/8X28M	300 TON	36" X 250'	36" X 150'	8' X 20' D-D 3/8,28M		12" X 10"	26"

STREAM NO.		①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫
SOLIDS	DTPH	137	44.4	390	3060		628	1800	100		2459	1225	
SOLIDS	S.G.	1.85		2.6	2.24		1.5	2.24	2.6		1.77	2.49	
WATER	TPH	320	274	35	180	100	2010	3272		3200	8235	3410	2596
SOLIDS	%	30		91	94		24.2	35.5			23.2	24.2	
SLURRY	GPM				6070		9700	16280			37925	17270	
SLURRY	S.G.				2.148		1.088	1.24			1.114	1.167	
SOLIDS	SIZE-INCHES	1/4x28M	28Mx0	3x5/16	3x0		5/16x0	5/16x0	24x3		5/16x0	5/16x0	
COAL LOSS	DTPH			14.0					3.5				

A

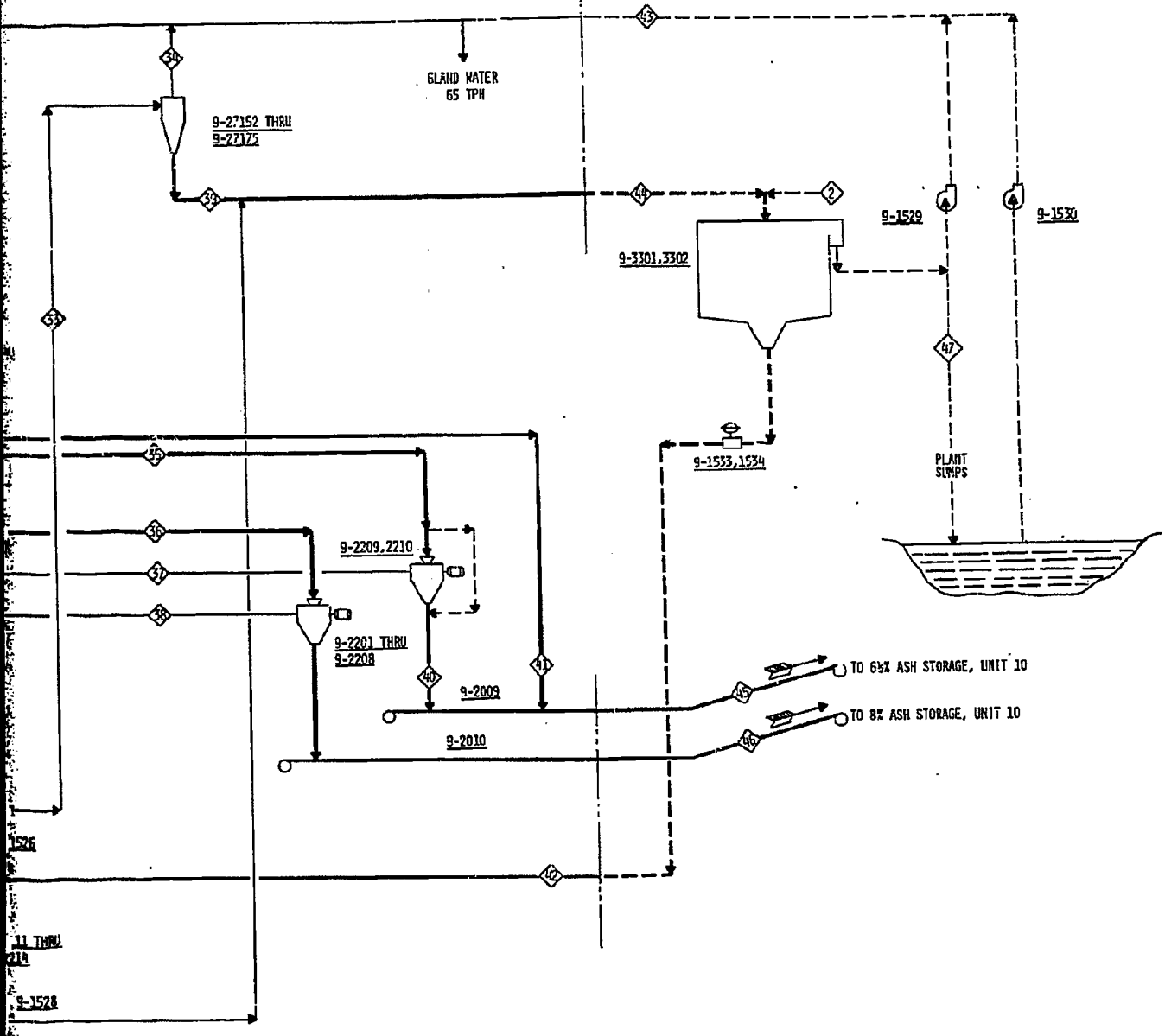


W 9-2066 SE CONVEYORS 100'	9-2606 THRU 9-2608 BREAKER REFUSE HOPPER 300 TON	9-2002 RAW COAL CONVEYORS 60" X 9250'	9-2003 RAW COAL CONVEYOR 60" X 450'	9-2802 TRAMP METAL DETECTOR 60"	9-2801 TRAMP IRON MAGNET 60"	9-0901 PRIMARY SAMPLER	9-2706 THRU 9-2713 RAW COAL SCREENS 8' X 2' 3-D 9/16, 3/8 & 5/16	9-3101,3102 BAUM JIG 225 SQ.FT.	9-2104, MIDDLINGS 32" X

201 THRU 9-3208 MARY FEED SUMPS	9-1501 THRU 9-1512 PRIMARY CYCLONE PUMPS 12" X 10"	9-2744 THRU 9-2767 PRIMARY HYDROCYCLONES 26" Ø	9-3209 THRU 9-3212 SECONDARY FEED SUMPS	9-1513 THRU 9-1518 SECONDARY CYCLONE PUMPS 12" X 10"	9-2768 THRU 9-2779 SECONDARY HYDROCYCLONES 26" Ø	9-2718 THRU 9-2725 FINE SIEVE BENDS 8' X 32" - 28M	9-2726 THRU 9-2733 FINE COAL SCREENS 8' X 20' 3-D 3/16 -8M - 28M	9- CLAS

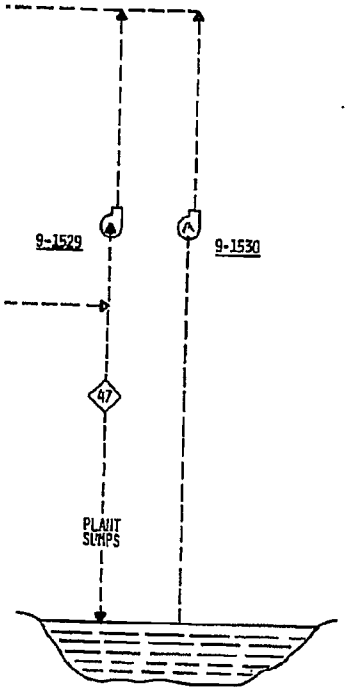
8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
100		2459	1226		1200	390	5	1332		1106	120	780			5	253		253
2.6		1.77	2.49		2.24	2.6	1.5	1.5		1.57	1.8	1.5			1.5	1.89		1.89
	3200	8235	3410	2596	108	117	2879	4867	182	3294	24	2563	1050	390	1829	3276	1393	4959
		23.2	24.2		91.7	77.3	0.2	21.5		25.1	83.3	23.3			0.27	7.17		4.85
		37925	17270		2570		11515	22990		14857	350	12315			7310	13760		20345
		1.114	1.167		1.985		1.001	1.077		1.10	1.603	1.085			1.001	1.035		1.023
24x3		5/16x0	5/16x0		3x5/16	3x5/16	28Mx0	5/16x0		5/16x0	5/16x0	3x5/16			28Mx0	28Mx0		28Mx0
3.5																		

9-3101,3102 BAUM JIG	9-2104,2105 MIDDLINGS CRUSHER	9-2714,2715 JIG SIEVE BENDS	9-271E,2717 JIG COAL SCREENS	9-1901 WATER HEAD TANK	9-1531,1532 SPRAY BAR PUMPS	9-2780 THRU 9-27151 CLASSIFYING HYDROCYCLONES	9-27176 THRU 9-27183 "VOR-SIVS" MODEL 2000	9-27152 THRU 9-27175 POLISHING HYDROCYCLO
225 SQ.FT.	32" X 72"	8' X 32' - 28M	5' X 20' D-D 5/8 & 28M	25'W X 28'L X 18'D	12' X 10'	10" Ø	1/4MM	10" Ø



9-2726 THRU 9-2733 FINE COAL SCREENS		9-3213 THRU 9-3216 CLASSIFYING FEED SUMPS	9-1519 THRU 9-1524 CLASSIFYING PUMPS 12" X 10"		9-3217 POLISHING FEED SUMP		9-1525,1526 POLISHING PUMPS 12" X 10"		9-2211 THRU 9-2214 TAILINGS CENTRIFUGES		9-1528 CENTRATE PUMP 12" X 10"	9-2201 THRU 9-2208 FINE COAL CENTRIFUGES 56"		9-2209,2210 JIG COAL CENTRIFU 56"	
X 20' 3-D 3/16 -8M - 28M															
24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
253		253	572		253	165	681	2	88		70	1232		5	88	70	705
1.89		1.89	2.6		1.89	1.5	2.24	2.2	2.2		1.5	1.5		1.5	2.2	1.5	1.5
3276	1393	4959	1490	3223	2077	122	28	1597	1614	1049	18	323	15	275	565	3	56
7.17		4.85	27.7		10.86	57.5	96.0		5.17		79.5	13.5			13.5		92.6
13760		20345	6830		8830				6610						2420		
1.035		1.023	1.178		1.054				1.029						1.08		
28MxO		28MxO	5/16xO		28MxO	28MxlOOM	22.5		100MxO		3/8x28M	5/16x28M		28MxO	100MxO	3/8x28M	3x3/8

9-2780 THRU 9-27151 CLASSIFYING HYDROCYCLONES 10" Ø	9-27176 THRU 9-27183 "VOR-SIVS" MODEL 2000 1/4MM	9-27152 THRU 9-27175 POLISHING HYDROCYCLONES 10" Ø	9-3301,3302 LAMELLA SETTLER-THICKENER 41'X 41'X 36'	9-1533,1534 THICKENER U'FLOW PUMPS 800 GPM	9-1529,1530 RECIRC. WATER PUMPS 12" X 10"



ASSUMED RAW COAL SCREEN ANALYSIS

	SIZE-INCHES	WEIGHT %	DTPH
	3 X 1-1/2	4.6	138
	1-1/2 X 1	7.3	234
	1 X 9/16	12.4	373
	9/16 X 3/8	11.4	341
	3/8 X 5/16	3.8	114
TOTAL JIG FEED	3 X 5/16	40.0	1200
	5/16 X 3/16	15.5	465
	3/16 X 28M	33.0	990
	28M X 100M	7.5	225
	100M X 0	4.0	120
TOTAL CYCLONE FEED	5/16 X 0	60.0	1800
TOTAL PLANT FEED	3 X 0	100.0	3000

WATER BALANCE

INTO PLANT CIRCUITS	TPH H_2O	EX PLANT CIRCUITS	TPH H_2O
5	100	28	3223
9	3200	34	1049
17	2596	45	2027
22	390	3	35
2	274	31	28
	6560	GLANDS @ 8 GPM x 32	65
			6427
47	1529 SUMP & O'FLO TO POND		133

% ASH STORAGE, UNIT 10

% ASH STORAGE, UNIT 10

0	3/3/77	ISSUED FOR REPORT						
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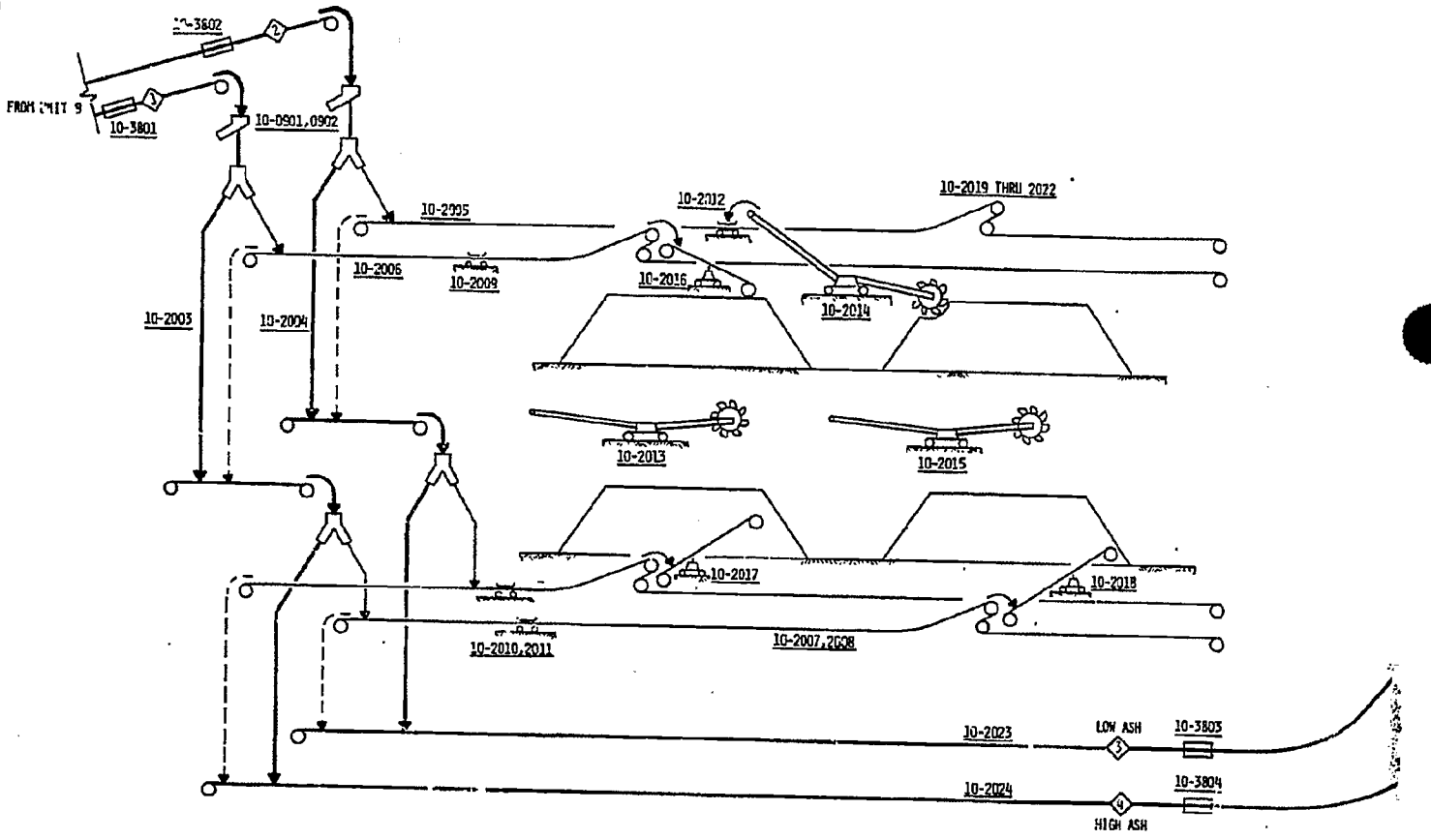
DEPARTMENT OF ENERGY - DIVISION OF COAL CONVERSION
POGO PLANT
PROCESS FLOW DIAGRAM
COAL PREPARATION - UNIT 9

THE RALPH M. PARSONS COMPANY PASADENA, CALIFORNIA	JOB NO. 5435-4	DRWG NO. R-9-FS-1	REV. 0

1N GES	9-1528 CENTRATE PUMP 12" X 10"	9-2201 THRU 9-2208 FINE COAL CENTRIFUGES 56"		9-2209,2210 JIG COAL CENTRIFUGES 56"			9-2009 HIGH ASH COAL CONVEYOR 36" X 1000'	9-2010 LOW ASH COAL CONVEYOR 36" X 1000'		9-1801,1802 JIG BLOWERS 4000 CFM 3.5 PSIG
36	37	38	39	40	41	42	43	44	45	46
1232		5	88	70	705	90		90	775	1207
1.5		1.5	2.2	1.5	1.5	2 ?		2.2	1.5	1.5
323	15	275	565	3	56	135	2027	2162	59	48
13.5			13.5		92.6	40.0		4.0	92.9	96.0
			2420							
			1.08							
3x28M		28Mx0	100Mx0	3/8x28M	3x3/8	100Mx0		100Mx0	3x5/16	5/16x100M

10-3801 48" BELT SCALE | 10-2003 CONVEYOR 48" X 800' | 10-0901, 0902 SAMPLERS | 10-3802 48" BELT SCALE | 10-2004 CONVEYOR 48" X 300' | 10-2005 CONVEYOR 48" X 1600' | 10-2006 CONVEYOR 48" X 1600' | 10-2007 & 2008 CONVEYORS 48" X 1600' | 10-2009 S.P. HOPPER | 10-2010, 2011 S.P. HOPPERS | 10-2012 S.P. HOPPER | 10-2019 THRU 2022 TRIPPERS-TYPICAL

10-2016 S.P. TRANSFER CONV. | 10-2014 B.W. STACKER-RECLAIMER | 10-2013 B.W. STACKER-RECLAIMER | 10-2015 B.W. STACKER-RECLAIMER | 10-2017 S.P. TRANSFER CONV. | 10-2018 S.P. TRANSFER CONV. | 10-2023 CONVEYOR 48" X 800' | 10-2024 CONVEYOR 48" X 800'



THRU 2022
-TYPICAL

10-2801
METAL DETECTOR

10-2803
MAGNET

10-0903
SAMPLER
10-0905
SAMPLER
10-0906
SAMPLER

10-2501
1100 T. BIN

10-0501, 0502, 0503
FEEDERS

10-2101, 2102, 2103
2 ROW MILLS

10-2025
CONVEYOR
48" X 50'

10-2027
CONVEYOR
48" X 100'

10-3805,3807
48" BELT SCALES

10-3402
HYDRO-ATRE DRYER
75' X 13' X 12'

10-2028
CONVEYOR
48" X 100

2023
VEYOR
X 800'

10-2024
CONVEYOR
48" X 800'

10-3803,3804
48" BELT SCALES

10-2802
METAL DETECTOR

10-2804
MAGNET

10-0904
SAMPLER

10-2602
675 T. BIN

10-0504 THRU 0508
FEEDERS

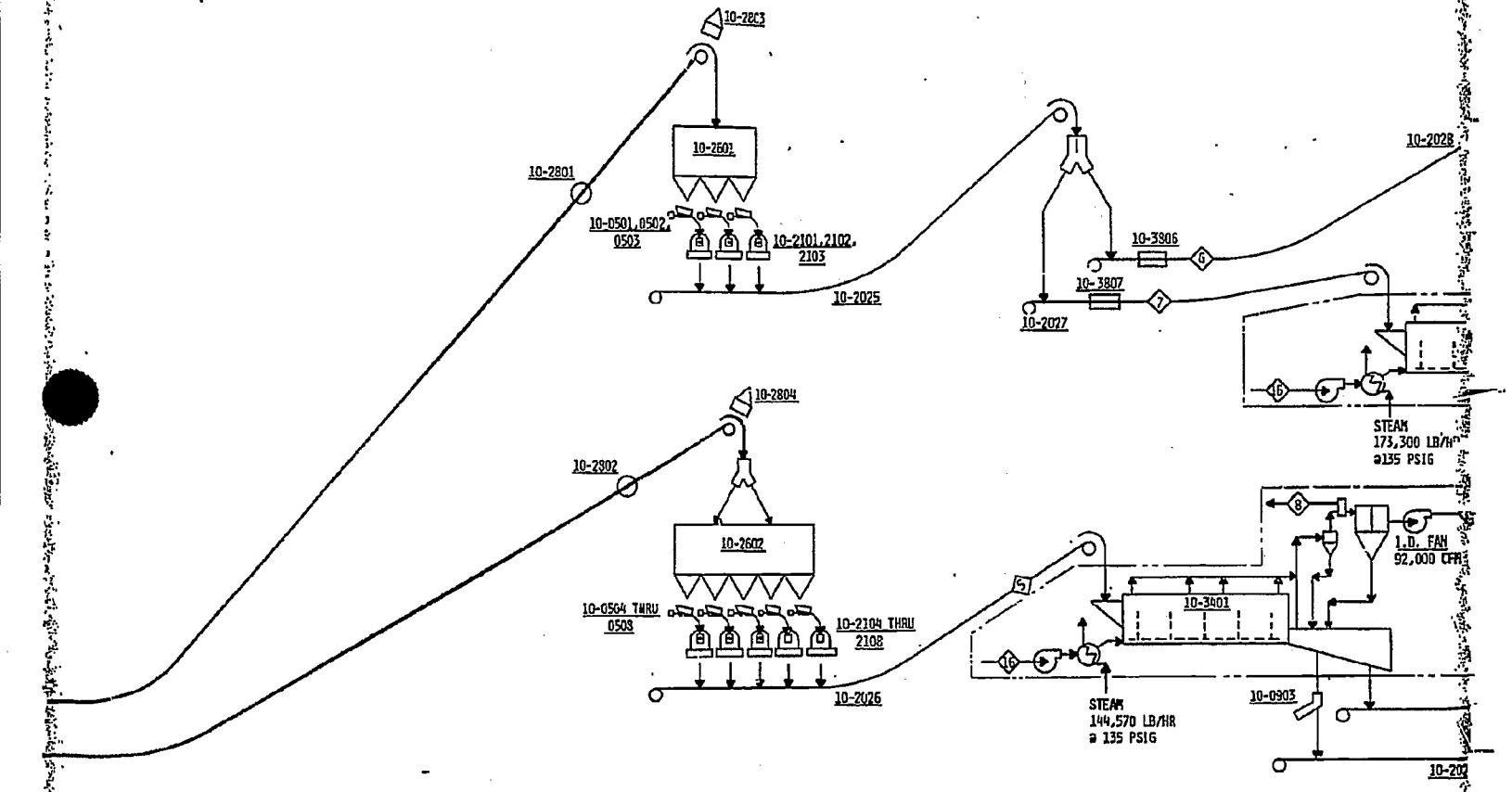
10-2104 THRU 2108
4 ROW MILLS

10-2025
CONVEYOR
48" X 100'

10-3401
HYDRO-ATRE DRYER
75' X 11' X 32'

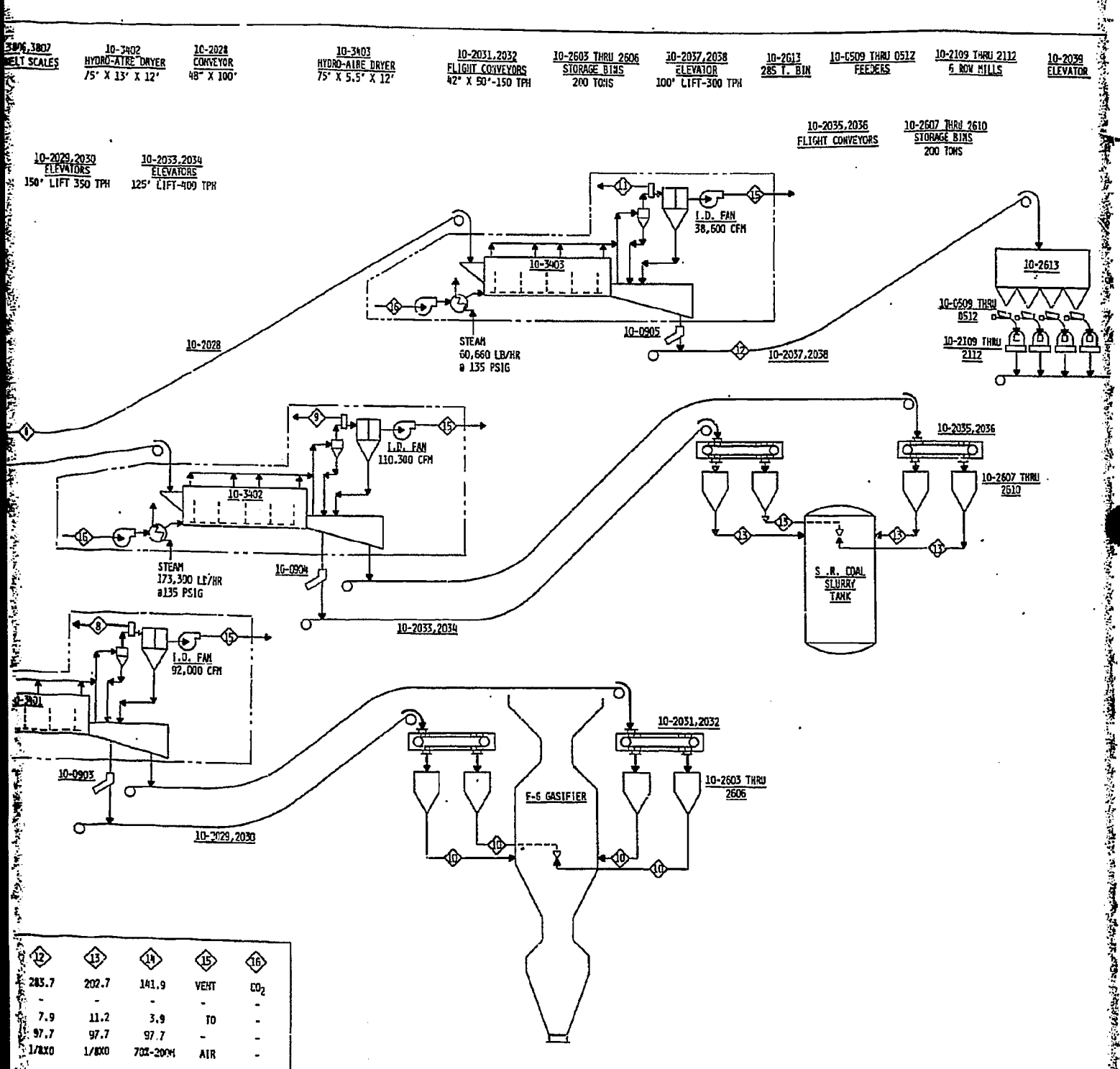
10-2029,2030
ELEVATORS
150' LIFT 350 TPH

10-2033,2034
ELEVATORS
125' LIFT-400 TPH



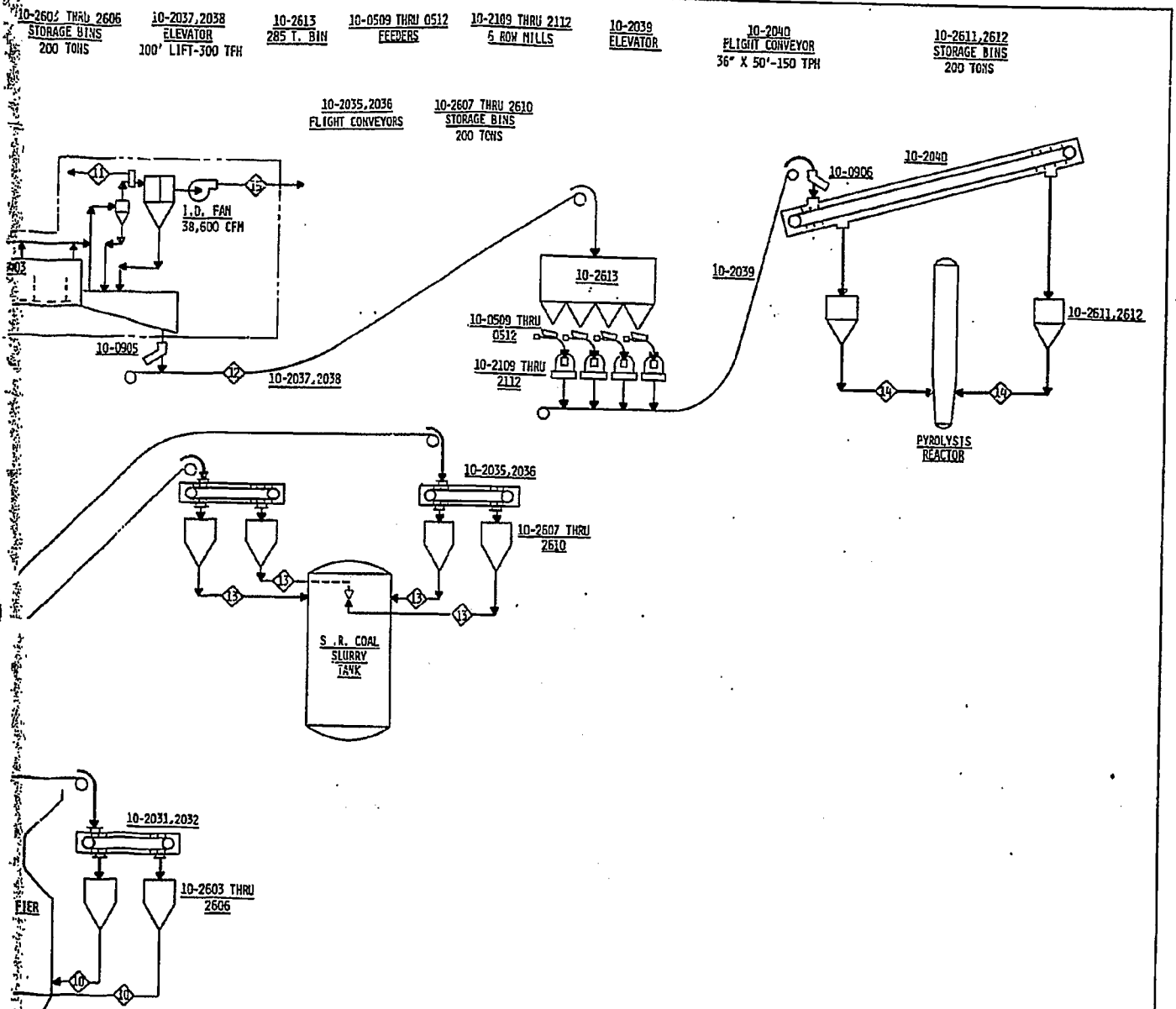
STREAM NO.	1	2	3	4	5	6	7	8
SOLIDS DTPH	775	1207	1094.1	676.1	676.1	283.7	810.8	-
SOLIDS S.G.	1.5	1.5	1.5	1.5	-	-	-	-
WATER TPH	59.0	48.0	91.3	56.4	56.4	23.5	67.3	36.6
SOLIDS %	92:9	96.0	92.3	92.3	92.3	92.3	92.3	-
SOLIDS SIZE	3X5/16	5/16X0	5/16X0	3X5/16	20MX0	1/8X0	1/8X0	-

STREAM NO.	9	10	11	12	13	14	15
SOLIDS DTPH	-	169	-	283.7	202.7	141.9	VENT
SOLIDS S.G.	-	-	-	-	-	-	-
WATER TPH	44.0	9.9	15.4	7.9	11.2	3.9	TO
SOLIDS %	-	97.7	-	97.7	97.7	97.7	-
SOLIDS SIZE	-	20MX0	-	1/8X0	1/8X0	70X-200M	AIR



12	13	14	15	16
283.7	202.7	141.9	VENT	CO_2
-	-	-	-	-
7.9	11.2	3.9	TO	-
97.7	97.7	97.7	-	-
1/8X0	1/8X0	70Z-200M	AIR	-

C



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REV. NO.	ENT. APPR.	DATE	REVISIONS		BY	PROJ. ENGR.	MECH.	ELEC.	PROJ. MGR.	PROJ. ENGR. COAL

DEPARTMENT OF ENERGY - DIVISION OF COAL CONVERSION
POGO PLANT
PROCESS FLOW DIAGRAM
COAL STORAGE, GRINDING & DRYING-UNIT 10

THE RALPH M. PARSONS COMPANY PASADENA, CALIFORNIA	JOB NO. 5435-4	DWG. NO. R-10-FS-1	REV. 0

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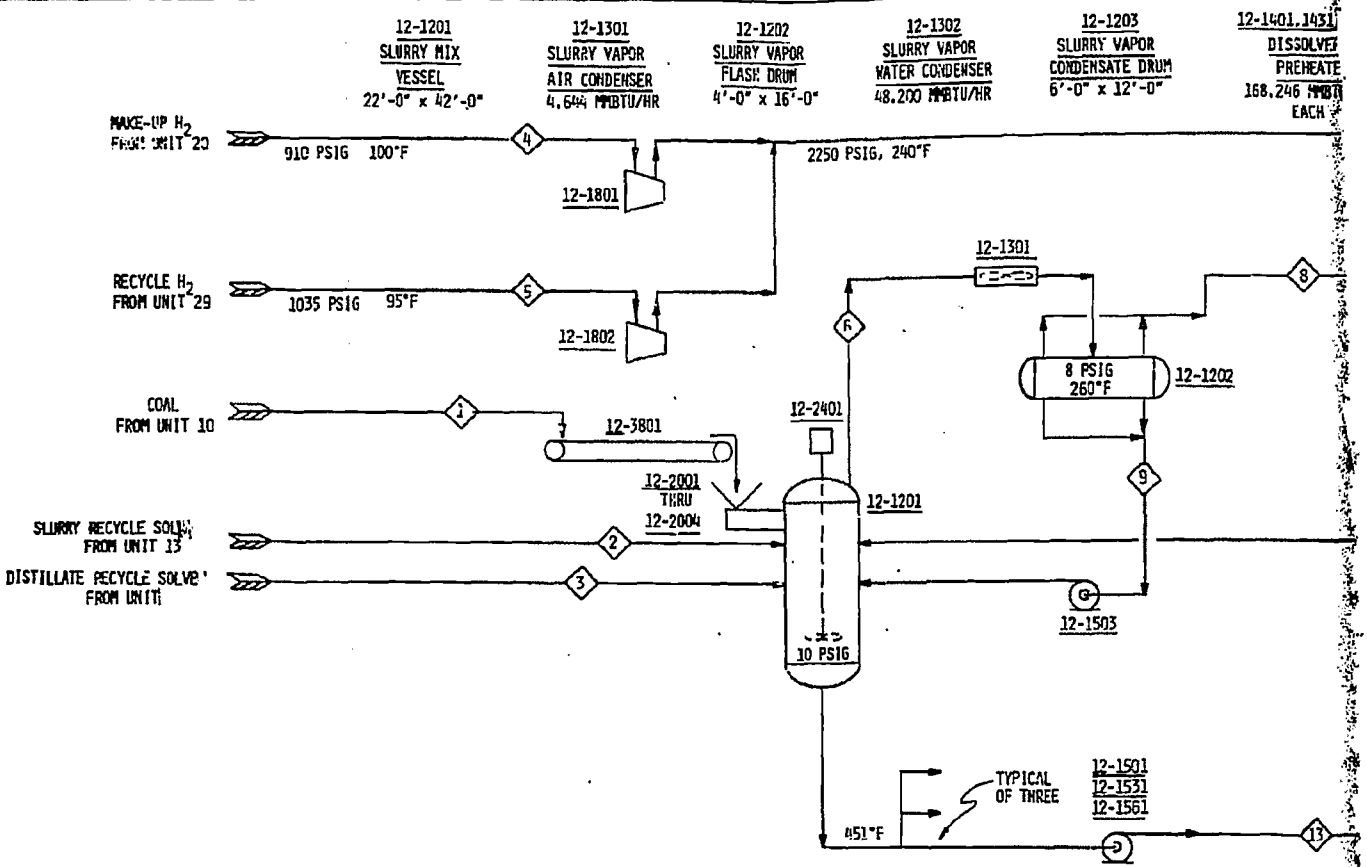


12-3301
COAL WEIGH
BELT CONVEYOR
833.33 TPH

12-1801
MAKE-UP HYDROGEN
COMPRESSOR
519,302 MMSCFD

12-1802
RECYCLE HYDROGEN
COMPRESSOR
265,616 MMSCFD

12-2001 THRU 2004
COAL SCREW FEEDER
208.33 TPH EACH

12-2401
SLURRY AGITATOR

12-1501,1531,1561,
1502 (SPARE)
DISSOLVER FEED PUMP
4010 GPM NORMAL
4410 GPM DESIGN

STREAM NO.	1	2	3	4	5	6	8	9	11	12
COMPONENT	FEED COAL	SLURRY SOLVENT	FILTRATE SOLVENT	MAKEUP HYDROGEN	RECYCLE HYDROGEN	SLURRY VAPOR	VAPOR FROM 12-1202	LIQUID FROM 12-1202	HC LIQUID TO 12-1201	WATER TO UNIT 36
MOLES/HR										
H_2	-	-	-	52,418.98	27,938.16	-	-	-	-	-
N_2	-	-	-	778.99	277.90	-	-	-	-	-
CO	-	-	-	2,995.00	717.45	-	-	-	-	-
CO_2	-	-	-	66.01	-	-	-	-	-	-
NH_3	-	-	-	-	-	-	-	-	-	-
H_2S	-	-	-	33.01	-	-	-	-	-	-
H_2O	2,497.78	-	-	56.99	-	2,457.49	2,457.31	0.19	0.01	2,457.30
C_1	-	-	-	667.00	227.42	-	-	-	-	-
C_2	-	-	-	-	-	-	-	-	-	-
C_3	-	-	-	-	-	-	-	-	-	-
nC_4	-	-	-	-	-	-	-	-	-	-
IBP-200	-	-	-	-	-	-	-	-	-	-
200-400	-	-	-	-	-	-	-	-	-	-
400-450	-	-	-	-	-	-	-	-	-	-
450-500	-	-	-	-	-	-	-	-	-	-
500-650	-	367.76	227.65	-	-	7.72	1.16	6.62	1.10	-
650+	-	8,619.95	4,966.20	-	-	10.90	0.20	10.69	0.20	-
RESIDUE	-	14.74	-	-	-	-	-	-	-	-
ASH	10.53	13.25	-	-	-	-	-	-	-	-
COAL (MAF)	151.63	-	-	-	-	-	-	-	-	-
TOTAL, MOLES/HR	2,659.95	9,015.70	5,193.85	57,015.97	29,162.94	2,476.11	2,458.61	17.50	1.31	2,457.30
LB/HR	1,666,666.67	3,333,333.33	1,666,666.67	227,147.50	87,909.17	46,614.44	44,548.73	4,065.71	278.06	44,270.66
BPD	-	193,679.	98,765.	-	-	-	-	256.	18.	3,038.
MMSCFD	-	-	-	519.302	265.616	22.552	22.393	-	-	-
MW	-	-	320.89	3.98	3.01	19.63	18.12	232.39	211.70	18.02
LB/GAL 60	-	9.835	9.643	-	-	-	-	9.064	9.847	8.324

12-1203
CURRY VAPOR
NDENSATE DRUM
0" x 12'-0"

12-1401,1431,1461
DISSOLVER
PREHEATER
168.246 MMBTU/HR
EACH

12-2501,2531,2561
DISSOLVER
12'-6" x 122'-0"

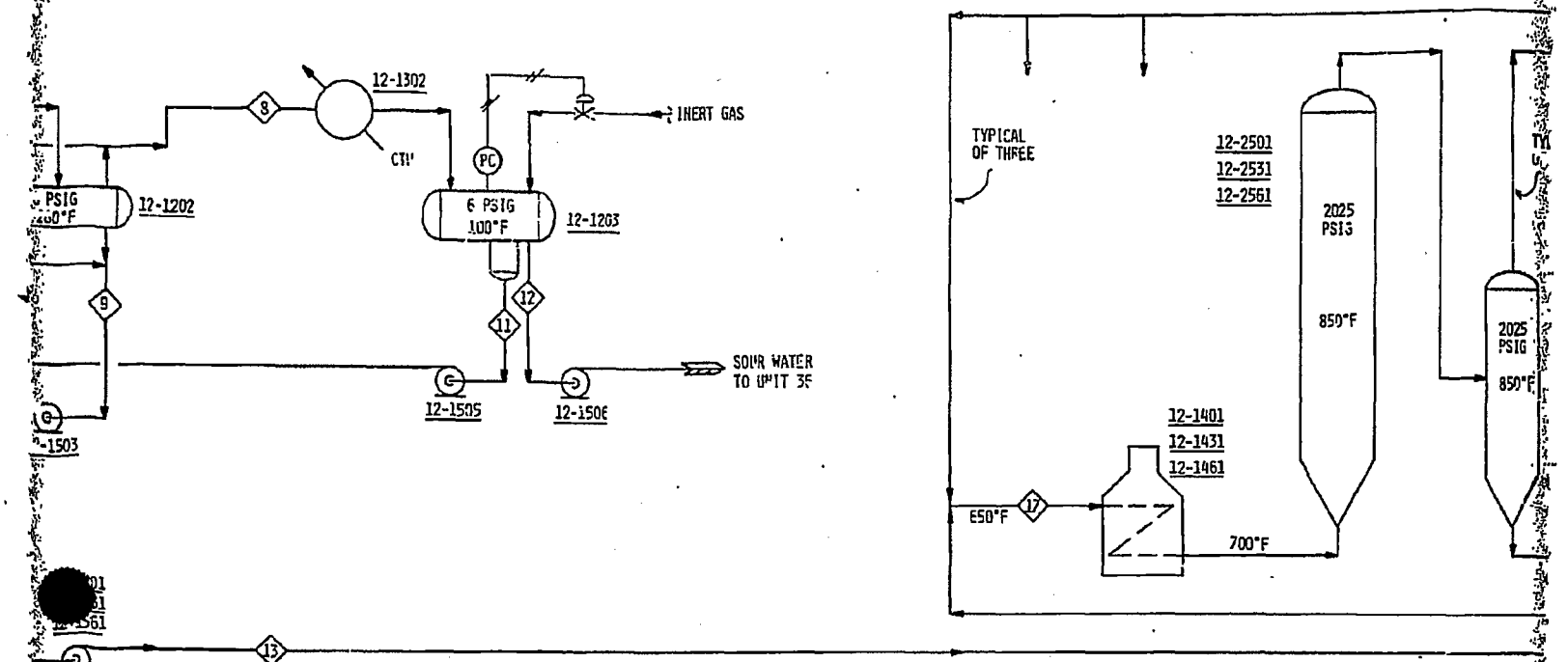
12-1204,1234,1264
HIGH PRESSURE
PRIMARY SEPARATOR
9'-0" x 36'-0"

12-1308,1338,1368
HP SEPARATOR SLURRY
FEED EXCHANGER
210.275 MMBTU/HR
EACH

12-1309
HP SEPARATOR SLURRY
OH CONDENSATE EXCHANGER
68.398 MMBTU/HR

12-1310
HP SEPARATOR
SLURRY-STEAM
GENERATOR
296.50F MMBTU/HR

12-1303
HP SEPARATOR
VAPOR-FEED
GAS EXCHANGER
305.329 MMBTU/HR



-1501,1531,1561,
-02 (SPARE)
LVER FEED PUMP
110 GPM NORMAL
110 GPM DESIGN

12-1503
12-1504 (SPARE)
HOT HC CONDENSATER PUMP
8 GPM NORMAL
9 GPM DESIGN

12-1505
COLD HC CONDENSATE PUMP
10 GPM DESIGN

12-1506
12-1507 (SPARE)
SOUR WATER PUMP
91 GPM NORMAL
100 GPM DESIGN

STREAM NO.	11	12	13	15	17	24	25	29	30	34	35
COMPONENT	HC LIQUID TO 12-1201	WATER TO UNIT 36	SLURRY TO DISSOLVER	TOTAL HYDROGEN GAS	SLURRY & GAS TO FURNACE	HP SEPARATOR VAPOR	HP SEPARATOR SLURRY	VAPOR FROM 12-1205	LIQUID FROM 12-1205	VAPOR FROM 12-1206	LIQUID FROM 12-1206
MOLES/HR											
H_2	-	-	-	80,357.14	80,357.14	35,206.05	4,972.52	35,070.31	135.74	35,046.62	23.69
N_2	-	-	-	1,058.89	1,058.89	482.93	575.96	477.61	5.32	477.01	0.60
CO	-	-	-	3,712.45	3,712.45	2,105.70	1,606.75	2,081.20	24.50	2,077.85	3.25
CO_2	-	-	-	66.01	66.01	386.31	96.27	381.65	4.66	329.60	2.74
NH_3	-	-	-	-	-	204.55	40.09	199.72	4.83	-	4.69
H_2S	-	-	-	33.01	33.01	1,160.46	212.46	1,142.52	17.94	981.89	15.92
H_2O	0.01	2,457.30	40.46	58.99	97.47	2,586.78	73.22	2,569.42	17.36	137.20	1.91
C1	-	-	-	894.42	894.42	5,088.62	855.04	5,039.88	48.74	5,024.67	15.01
C2	-	-	-	-	-	1,270.28	409.25	1,252.09	18.18	1,241.45	10.63
C3	-	-	-	-	-	1,156.71	355.21	1,130.30	26.41	1,105.92	24.38
nC4	-	-	-	-	-	413.85	145.33	398.33	15.53	379.35	18.98
180-200	-	-	-	-	-	98.31	45.35	90.29	8.02	76.82	13.47
200-400	-	-	-	-	-	537.30	589.64	298.17	239.13	55.90	242.27
400-450	-	-	-	-	-	120.26	217.00	25.08	95.18	0.33	24.75
450-500	-	-	-	-	-	79.81	201.92	9.41	70.40	0.04	9.37
500-650	1.10	-	595.41	-	595.41	245.17	1,054.94	7.68	237.48	-	7.67
650+	0.20	-	13,586.15	-	13,586.15	553.20	14,976.21	1.64	551.57	-	1.73
RESIDUE	-	-	14.74	-	14.74	-	26.46	-	-	-	-
ASH	-	-	23.79	-	23.79	-	23.79	-	-	-	-
COAL (MAF)	-	-	151.63	-	151.63	-	-	-	-	-	-
TOTAL, MOLES/HR	1.31	2,457.30	14,412.20	86,178.91	100,591.11	51,696.29	26,477.86	50,175.30	1,520.99	46,933.86	421.06
LB/HR	278.06	44,270.66	6,622,396.00	315,056.67	6,937,452.67	742,024.39	6,195,428.27	486,852.15	255,172.25	393,652.42	38,946.74
BPD	18.	1,038.	374,743.	-	-	-	380,044.	-	17,096.	-	3,186.
MMSCFD	-	-	-	784.918	-	470.850	-	456.997	-	427.474	-
MW	211.70	18.02	459.50	3.66	-	14.35	233.99	9.70	167.77	8.39	92.50
LB/FT3 60	8.867	8.328	10.098	-	-	-	9.315	-	8.529	-	6.984

12-1310
SEPARATOR
SLURRY-STEAM
GENERATOR
506 MMBTU/HR

12-1307
HP SEPARATOR
VAPOR-FEED
GAS EXCHANGER
305,329 MMBTU/HR

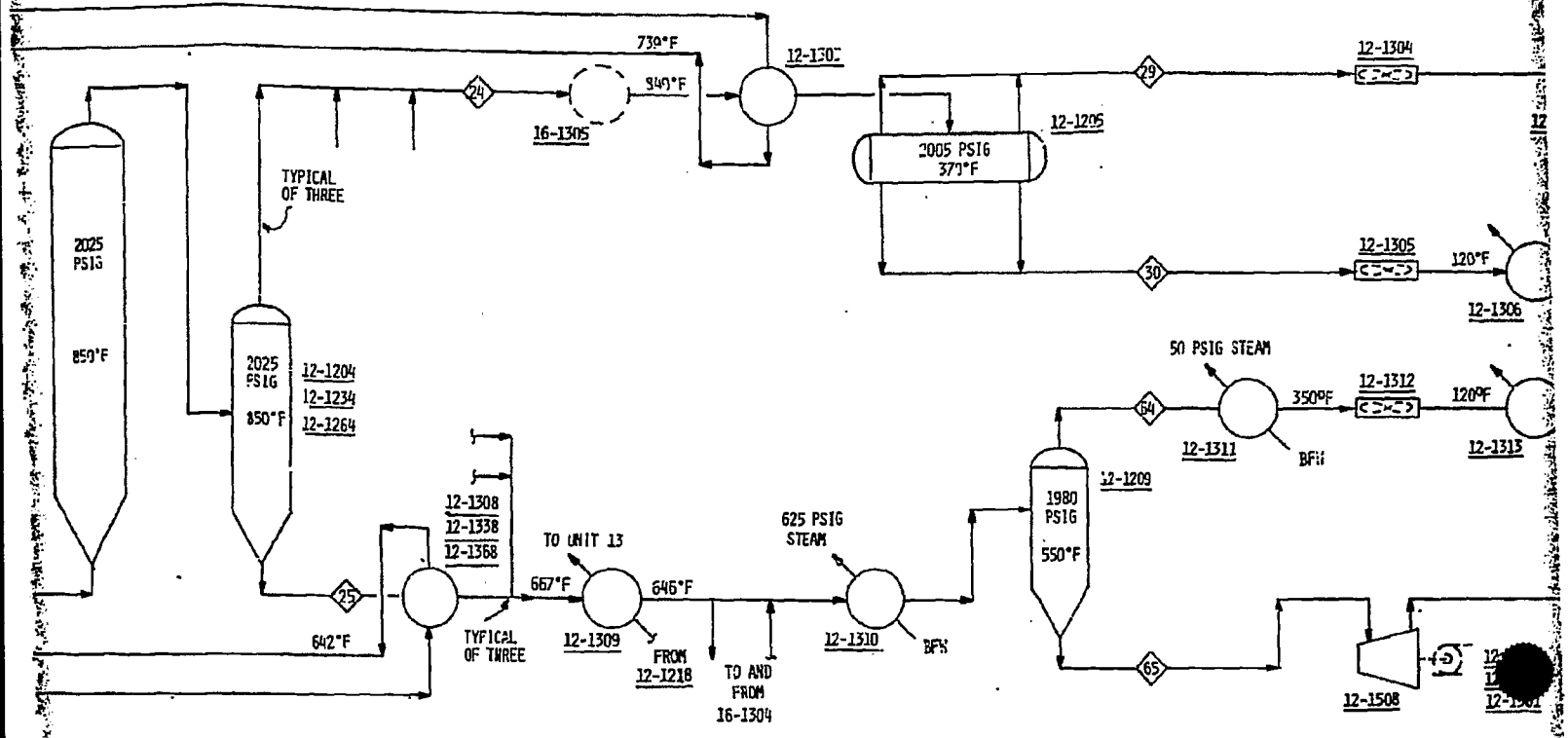
12-1205
HIGH PRESSURE
INTERMEDIATE
FLASH DRUM
9'-0" x 27'-0"

12-1209
HIGH PRESSURE
SLURRY FLASH
DRUM
11'-0" x 30'-0"

12-1304
HP SEPARATOR
OVERHEAD VAPOR
AIR CONDENSER
147.465 MMBTU/HR

12-1305
HP SEPARATOR
OVERHEAD LIQUID
AIR COOLER
27.694 MMBTU/HR

12-1306
HP SEPARATOR
OVERHEAD LIQUID
WATER COOLER
1,707 MMBTU/HR



12-1508
1ST STAGE SLURRY
HYDRAULIC TURBINE
13,073 GPM

34	35	36	49	50	51	52	53	54	64	STREAM NO.	65	75
VAPOR FROM 12-1206	LIQUID FROM 12-1206	WATER FROM 12-1206	VAPOR FROM 12-1207	LIQUID FROM 12-1207	HP GAS TO EXPANDER	ACID GAS TO UNIT 27	LIQUID FROM 12-1208	WATER FROM 12-1208	VAPOR FROM 12-1209	COMPONENT	SLURRY FROM 12-1209	VAPOR FROM 12-1210
										MOLES/HR		
15,046.62	23.69	-	3,012.26	57.74	38,058.88	38,057.04	1.85	-	2,910.58	H_2	2,061.94	1,087.21
877.01	0.60	-	265.62	8.20	742.62	742.56	0.07	-	267.89	N_2	308.06	135.13
2,077.85	3.25	-	748.33	32.56	2,826.19	2,825.83	0.36	-	753.04	CO	853.71	370.69
328.60	2.74	50.32	33.35	11.00	361.95	359.62	0.41	1.91	36.96	CO_2	59.31	19.08
-	4.89	195.03	7.45	14.17	7.45	-	0.03	7.42	12.10	NH_3	27.89	6.81
981.89	15.92	144.71	67.58	46.33	1,049.47	1,041.34	2.62	5.50	80.05	H_2S	132.41	41.45
137.20	1.91	2,430.31	4.05	65.35	141.26	32.20	0.10	108.96	50.14	H_2O	23.08	14.18
5,024.87	15.01	-	450.58	48.35	5,475.45	5,473.64	1.81	-	435.17	C_1	419.87	197.83
1,241.46	10.6	-	121.4	45.32	1,363.08	1,361.02	2.06	-	138.13	C_2	271.12	73.32
1,195.92	24.38	-	77.55	73.03	1,183.47	1,178.21	5.27	-	99.78	C_3	256.42	55.01
378.35	18.98	-	18.78	46.84	398.13	392.66	5.47	-	31.12	nC_4	114.22	18.00
74.92	13.47	-	2.11	25.79	78.93	72.87	6.06	-	6.41	IBP-200	38.94	3.88
55.93	242.27	-	0.80	498.54	56.71	20.80	35.91	-	17.95	200-400	571.69	11.67
0.33	24.75	-	0.02	122.63	0.34	-	0.33	-	2.71	400-450	214.29	1.70
F.0F	9.37	-	-	81.35	0.04	-	0.04	-	1.58	450-500	200.34	0.99
-	7.67	-	-	247.58	-	-	-	-	2.43	500-650	1,052.51	1.53
-	1.73	-	-	555.43	-	-	-	-	2.22	650+	14,974.45	1.38
-	-	-	-	-	-	-	-	-	-	RESIDUE	26.46	-
-	-	-	-	-	-	-	-	-	-	ASH	23.79	-
-	-	-	-	-	-	-	-	-	-	COAL (MAF)	-	-
46,833.66	621.06	2,870.37	4,810.11	1,980.21	51,743.97	51,557.79	62.39	123.79	4,848.26	TOTAL, MOLES/HR	21,629.60	2,549.84
3C,852.-	38,946.54	54,252.78	54,103.62	301,528.85	447,756.04	440,274.84	5,120.07	2,361.13	61,571.28	LB/HR	6,133,914.99	70,360.69
-	3,186.	3,693.	-	20,742.	-	-	456.	172.	-	BPD	367,712.	-
427.4--	-	-	43,180	-	471,284	469,588	-	-	44,158	MMSCFD	-	-
5.39	92.50	19.26	11.25	152.27	8.65	8.54	82.06	19.07	12.69	MW	283.59	-
-	6.984	7.765	-	8.307	-	-	6.413	7.832	-	LB/GAL 60	9.543	-

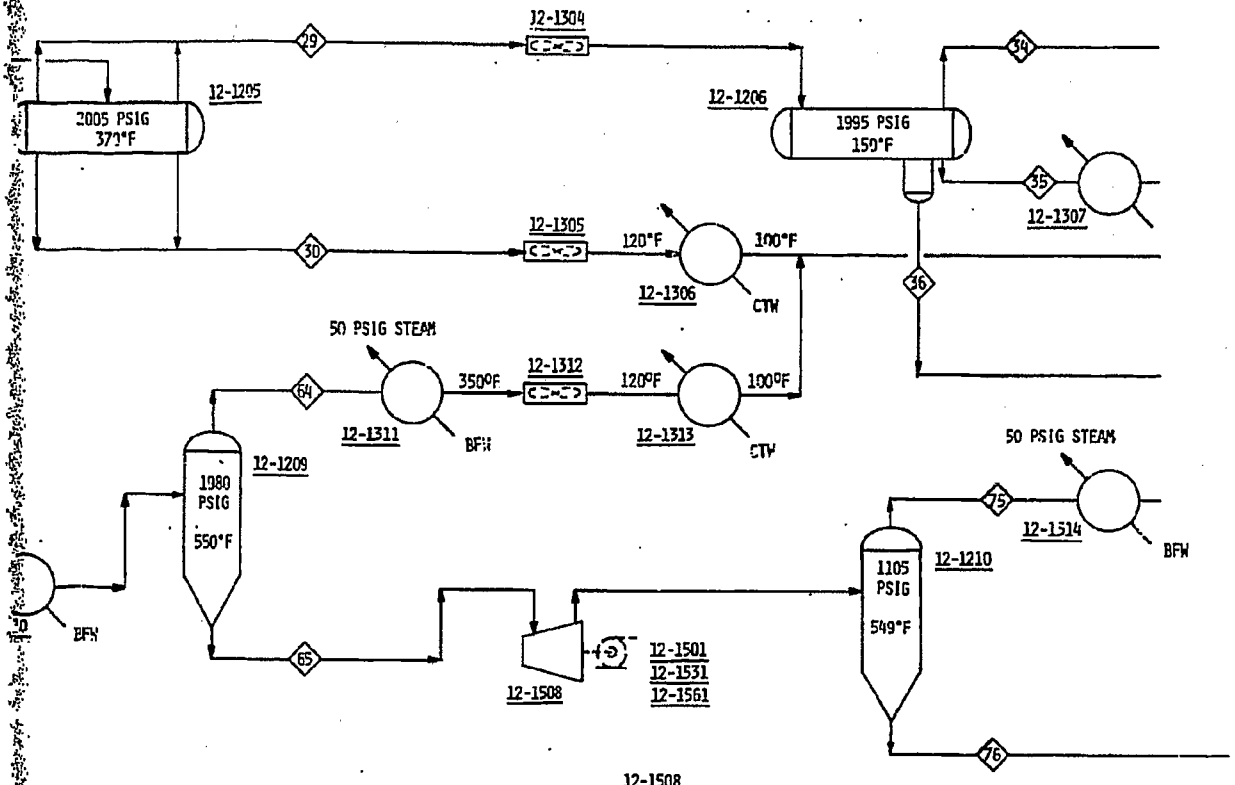
12-1304
HP SEPARATOR
OVERHEAD VAPOR
AIR CONDENSER
147.465 MMBTU/HR

12-1305
HP SEPARATOR
OVERHEAD LIQUID
AIR COOLER
27.694 MMBTU/HR

12-1306
HP SEPARATOR
OVERHEAD LIQUID
WATER COOLER
1.707 MMBTU/HR

12-1307
HP SEPARATOR
OVERHEAD CONDENSATE
WATER COOLER
0.927 MMBTU/HR

12-1205
HIGH PRESSURE
CONDENSATE
FLASH DRUM
8'-0" x 24'-0"



12-1508
1ST STAGE SLURRY
HYDRAULIC TURBINE
13,073 GPM

53	54	64	STREAM NO.	65	75	76	81	82	83
LIQUID FROM 12-1208	WATER FROM 12-1208	VAPOR FROM 12-1209	COMPONENT	SLURRY FROM 12-1209	VAPOR FROM 12-1210	SLURRY FROM 12-1210	VAPOR FROM 12-1211	LIQUID FROM 12-1211	WATER FROM 12-1211
			MOLES/HR						
1.85	-	2,910.58	H_2	2,061.94	1,087.21	974.73	1,086.74	0.47	-
0.07	-	267.89	N_2	308.06	135.13	172.93	135.04	0.09	-
0.36	-	753.04	CO	853.71	270.69	583.01	370.34	0.35	-
0.41	1.91	36.96	CO_2	59.31	19.06	40.25	18.32	0.43	50.63
0.03	7.42	12.10	NH_3	27.56	6.81	21.18	-	5.61	196.23
2.62	5.50	80.05	H_2S	132.41	41.45	90.96	38.20	2.36	145.60
0.10	108.96	50.14	H_2O	23.08	14.18	8.90	5.51	0.12	2,438.86
1.81	-	435.17	C_1	419.87	187.83	232.04	187.40	0.42	-
2.06	-	138.13	C_2	271.12	73.32	197.81	72.78	0.54	-
5.27	-	99.78	C_3	255.42	55.01	200.42	53.95	1.06	-
5.47	-	31.12	nC_4	114.22	18.00	96.22	17.14	0.86	-
8.06	-	6.41	IBP-200	38.94	3.88	35.06	3.21	0.67	-
35.91	-	17.95	200-400	571.69	11.67	560.02	1.45	10.22	-
0.33	-	2.71	400-450	214.29	1.70	212.58	0.01	1.69	-
0.04	-	1.58	450-500	200.34	0.99	199.35	-	0.99	-
-	-	2.43	500-650	1,052.51	1.53	1,050.98	-	1.53	-
-	-	2.22	650+	14,974.45	1.38	14,973.06	-	1.38	-
-	-	-	RESIDUE	26.46	-	26.46	-	-	-
-	-	-	ASH	23.79	-	23.79	-	-	-
-	-	-	COAL (MAF)	-	-	-	-	-	-
62.39	173.79	4,848.26	TOTAL, MOLES/HR	21,629.60	2,029.84	19,599.75	1,990.09	28.80	2,831.33
5,120.07	2,361.13	61,513.28	LB/HR	6,133,914.99	30,360.69	6,103,554.30	27,543.73	2,598.37	56,471.38
456.	132.	-	APD	367,312.	-	361,756.	-	201.	4,009.
-	-	44.158	MMSCFD	-	18.488	-	18.126	-	-
82.06	19.07	12.69	MW	283.59	14.96	311.41	13.84	90.21	19.24
6.413	7.832	-	LB/GAL @	9.543	-	9.641	-	7.373	7.764

12-1311
HIGH PRESSURE FLASH VAPOR STEAM GENERATOR
8.837 MMBTU

12-1312
HP FLASH VAPOR AIR CONDENSER
10.748 MMBTU/HR

12-1313
HP FLASH VAPOR WATER CONDENSER
0.917 MMBTU/HR

12-1207
HIGH PRESSURE CONDENSATE SURGE DRUM
6'-0" x 15'-0"

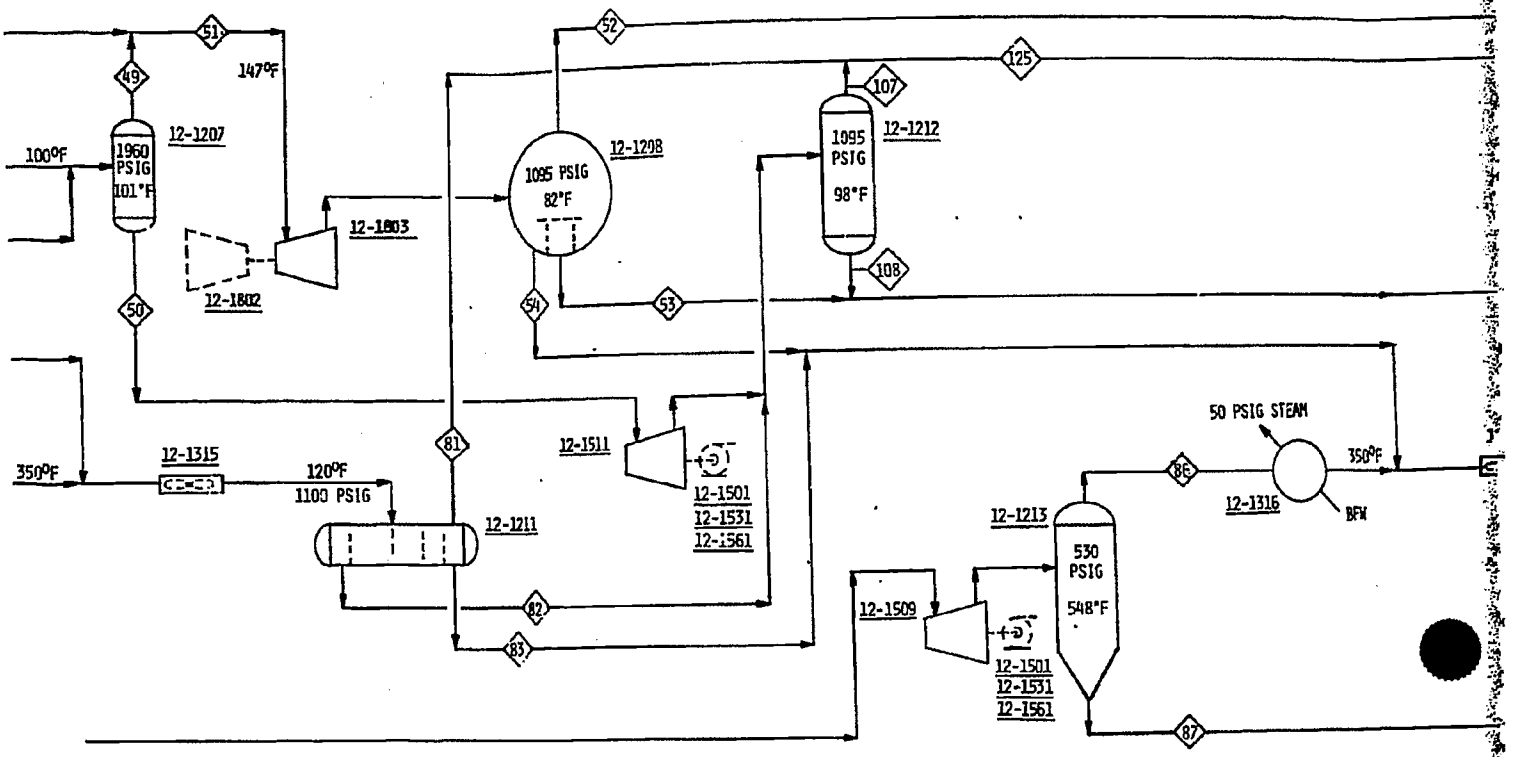
12-1210
1ST IP SLURRY FLASH DRUM
11'-0" x 30'-0"

12-1314
1ST IP FLASH VAPOR-STEAM GENERATOR
3.984 MMBTU/HR

12-1315
1ST IP FLASH VAPOR AIR CONDENSER
6.240 MMBTU/HR

12-1208
HIGH PRESSURE VAPOR EXPANDER FLASH DRUM
12'-0" DIA.

12-1211
1ST IP SLURRY VAPOR CONDENSATE DRUM
4'-0" x 20'-0"



12-1803
HP VAPOR EXPANDER
471.284 MMSCFD

12-1511
1ST STAGE CONDENSATE HYDRAULIC TURBINE
616 GPM

12-1509
2ND STAGE SLURRY HYDRAULIC TURBINE
12,654 GPM

96	87	92	93	94	97	98	103	STREAM NO.	104	105	106
VAPOR FROM 12-1213	SLURRY FROM 12-1213	VAPOR FROM 12-1216	LIQUID FROM 12-1216	WATER FROM 12-1214	VAPOR FROM 12-1216	SLURRY FROM 12-1216	VAPOR FROM 12-1217	COMPONENT	LIQUID FROM 12-1217	WATER TO UNIT 36	VAPOR FROM 12-1212
								MOLES/HR			
581.33	393.40	581.16	0.17	-	233.85	159.55	233.81	H_2	0.04	-	30.88
91.52	81.41	91.48	0.04	-	43.70	37.70	43.69	N_2	0.01	-	3.46
250.87	232.14	250.70	0.17	-	121.73	110.42	121.68	CO	0.05	-	18.34
15.23	25.02	14.61	0.33	52.83	9.32	15.70	8.94	CO_2	0.20	53.01	0.61
6.13	15.05	-	6.00	264.78	4.25	10.80	-	NH_3	3.57	205.46	0.18
33.44	57.52	20.72	1.88	151.95	20.75	36.77	19.06	H_2S	1.18	162.45	1.23
5.93	2.98	6.36	0.13	2,547.26	1.95	1.02	7.05	H_2O	0.11	2,542.05	0.07
119.42	112.62	119.22	0.20	-	57.53	55.09	57.47	C_1	0.06	-	7.48
62.55	135.26	62.16	0.38	-	41.61	93.65	41.44	C_2	0.17	-	2.47
50.03	150.38	49.19	0.84	-	35.99	114.39	35.57	C_3	0.42	-	1.46
17.49	78.74	16.68	0.80	-	13.53	65.21	13.06	nC4	0.46	-	0.68
3.99	31.08	3.29	0.70	-	3.28	27.80	2.82	IBP-200	0.46	-	-
13.09	546.94	1.47	11.61	-	11.70	535.24	1.54	200-400	10.17	-	-
1.83	210.75	0.02	1.82	-	1.60	209.15	0.01	400-450	1.59	-	-
1.05	198.30	0.01	1.05	-	0.91	197.39	-	450-560	0.91	-	-
1.67	1,049.31	-	1.67	-	1.47	1,047.85	-	500-650	1.47	-	-
1.48	14,971.56	-	1.48	-	1.31	14,970.25	-	650+	1.32	-	-
-	26.46	-	-	-	-	26.46	-	RESIDUE	-	-	-
-	23.79	-	-	-	-	23.79	-	ASH	-	-	-
-	-	-	-	-	-	-	-	COAL (MAF)	-	-	-
1,257.05	18,342.71	1,227.07	28.27	2,956.82	604.48	17,738.23	586.14	TOTAL, MOLES/HR	22.19	2,952.98	58.1
22,738.91	6,080,815.39	19,910.32	2,777.89	56,883.21	13,459.66	6,067,355.73	11,165.28	LB/HR	2,351.65	56,825.92	712.68
-	358,068.	-	211.	4,187.	-	356,111.	-	BPD	175.	4,184.	-
11.449	-	11.176	-	-	5.506	-	5.338	MMSCFD	-	-	0.351
18.09	331.51	16.23	98.25	19.24	22.27	342.05	19.05	MW	105.97	19.24	13.3
-	9.704	-	7.510	7.764	-	9.736	-	LB/GAL 60	7.663	7.762	-

A

12-1211
1ST IP SLURRY VAPOR CONDENSATE DRUM
4'-0" x 20'-0"

12-1212
1ST IP CONDENSATE FLASH DRUM
6'-0" x 18'-0"

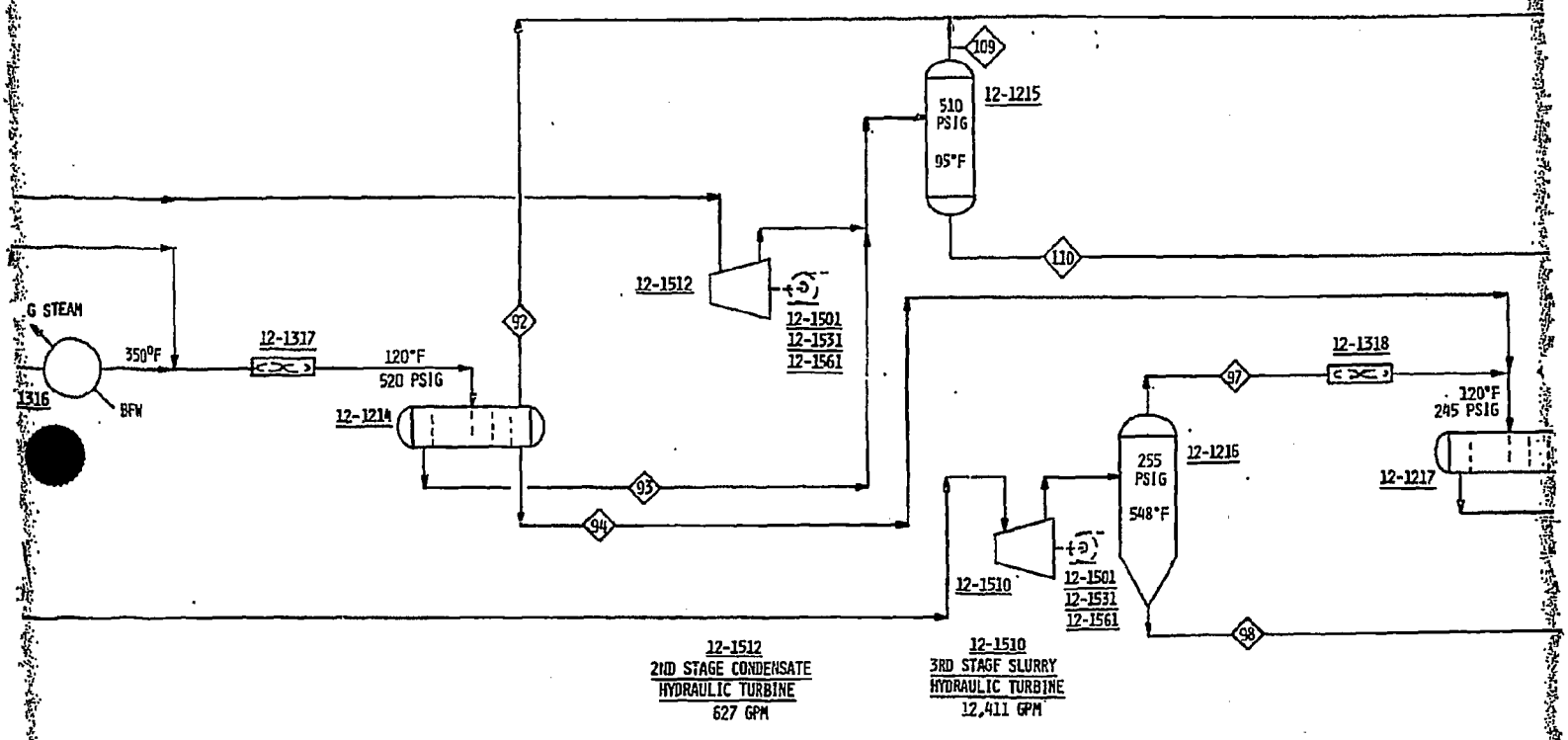
12-1213
2ND IP SLURRY FLASH DRUM
11'-0" x 30'-0"

12-1316
2ND IP FLASH VAPOR STEAM GENERATOR
2.676 MMBTU/HR

12-1317
2ND IP FLASH VAPOR AIR CONDENSER
3.087 MMBTU/HR

12-1214
2ND IP SLURRY VAPOR CONDENSATE DRUM
4'-0" x 20'-0"

12-1215
2ND IP CONDENS
FLASH DRUM
6'-0" x 18'-0"



12-1512
2ND STAGE CONDENSATE HYDRAULIC TURBINE
627 GPM

12-1510
3RD STAGE SLURRY HYDRAULIC TURBINE
12,411 GPM

06	07	08	09	10	11	12	13	20	25
WATER TO UNIT 36	VAPOR FROM 12-1212	LIQUID FROM 12-1212	VAPOR FROM 12-1215	LIQUID FROM 12-1215	VAPOR FROM 12-1218	LIQUID TO UNIT 13	L.P. GAS TO UNIT 27	M.P. GAS TO UNIT 27	H.P. GAS TO UNIT 27
-	30.69	27.33	19.48	9.86	7.44	2.46	241.25	600.84	1,117.63
-	3.45	4.85	2.74	2.22	1.45	0.77	45.14	94.22	138.49
-	10.84	22.08	10.30	11.31	6.69	5.47	128.56	261.00	381.17
53.01	0.61	10.82	0.92	10.65	1.78	9.67	10.13	15.53	18.93
235.45	0.18	19.60	0.32	24.31	0.47	27.39	0.49	0.32	0.18
162.45	1.23	47.46	1.81	50.05	2.57	48.66	21.63	37.63	39.42
2,542.05	0.07	65.40	0.09	65.54	0.12	65.53	7.18	5.45	5.56
-	7.45	41.33	9.65	33.69	9.89	23.86	67.36	126.87	194.35
-	2.07	43.80	3.01	43.22	3.83	39.57	45.26	69.18	74.84
-	1.25	72.83	1.80	77.14	2.30	75.26	37.87	40.99	55.20
-	0.29	47.41	0.40	53.28	0.50	53.25	13.56	17.09	17.43
-	0.02	26.43	0.05	33.14	0.06	33.54	2.88	3.34	3.24
-	-	568.75	0.02	556.27	0.02	566.41	1.55	1.50	1.46
-	-	124.32	-	126.48	-	128.07	0.02	-	0.01
-	-	82.34	-	83.42	-	84.33	-	-	0.01
-	-	249.12	-	250.80	-	252.27	-	-	-
-	-	556.79	-	558.26	-	559.58	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
2,952.98	58.35	1,950.66	50.69	1,990.64	36.74	1,976.09	622.80	1,277.75	2,040.44
58,825.92	792.68	303,334.54	870.64	310,361.86	809.62	311,904.00	11,974.80	20,760.97	0,336.41
4,184.	-	20,767.	-	21,304.	-	21,355.	-	-	-
-	0.531	-	0.462	-	0.335	-	5.673	11.638	18.657
19.24	13.58	155.50	17.18	155.91	22.03	157.84	19.22	16.26	13.83
7.782	-	8.339	-	8.324	-	8.346	-	-	-

12-1214
IP SLURRY VAPOR
CONDENSATE DRUM
4'-0" x 20'-0"

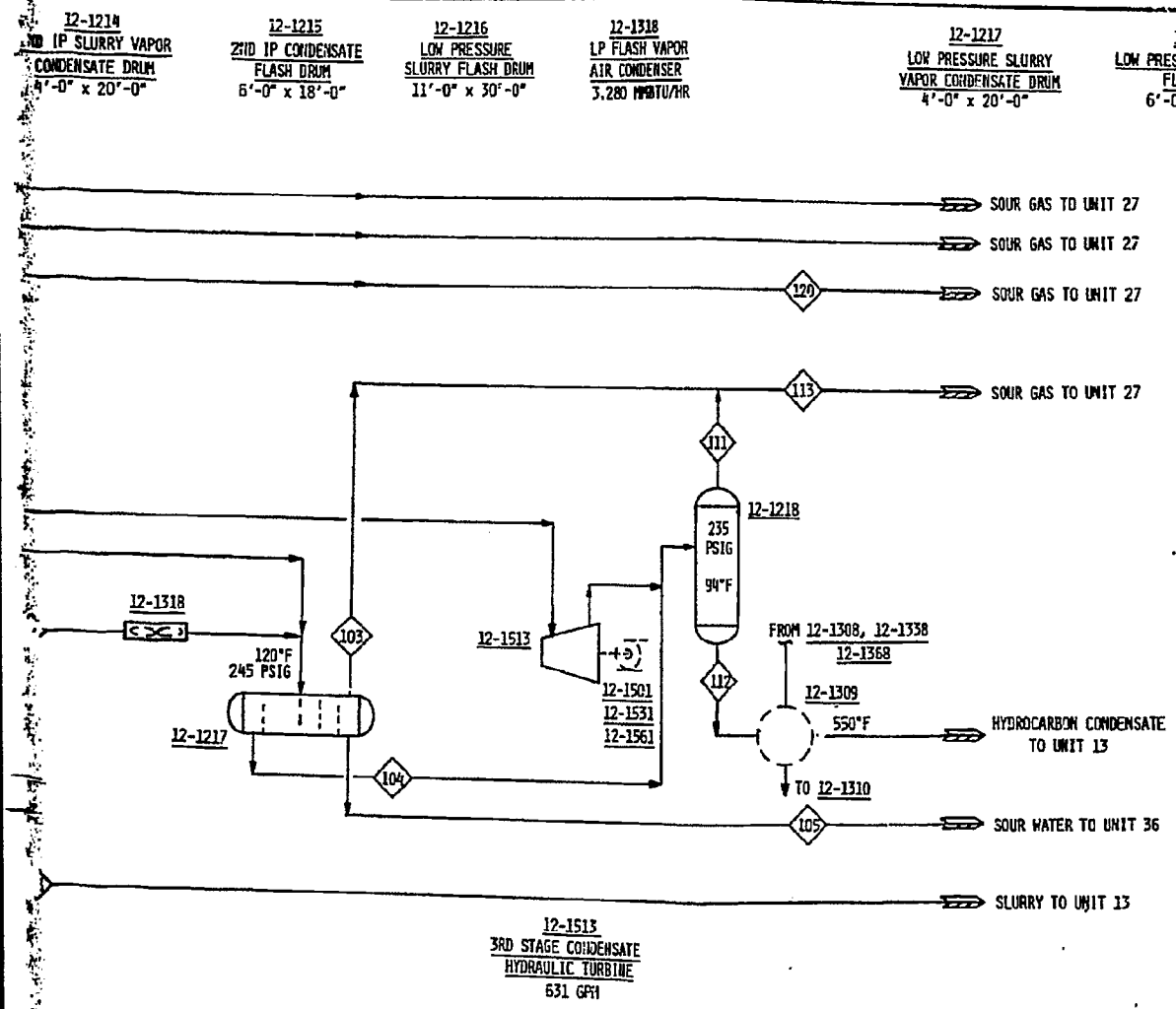
12-1215
2ND IP CONDENSATE
FLASH DRUM
6'-0" x 18'-0"

12-1216
LOW PRESSURE
SLURRY FLASH DRUM
11'-0" x 30'-0"

12-1318
LP FLASH VAPOR
AIR CONDENSER
3,280 MMBTU/HR

12-1217
LOW PRESSURE SLURRY
VAPOR CONDENSATE DRUM
4'-0" x 20'-0"

12-1218
LOW PRESSURE CONDENSATE
FLASH DRUM
6'-0" x 18'-0"

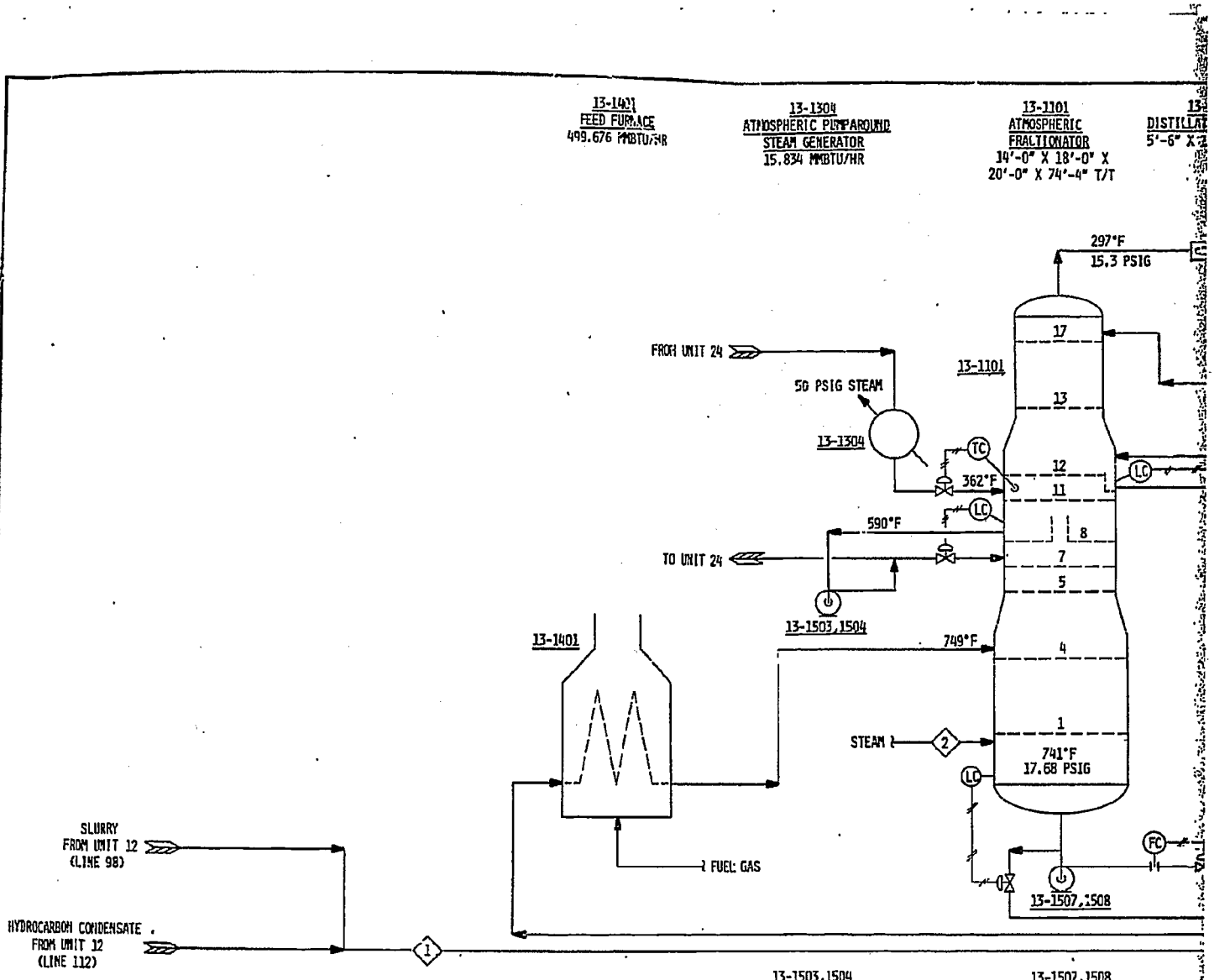


12-1513
3RD STAGE CONDENSATE
HYDRAULIC TURBINE
631 GPM

REV. NO.	CHKT APPR.	DATE	REVISION	BY	ORIG. CHKD.	AMD REF	DRAWING PREPD. CHKD.	CHKD. APPD.	PROJ. ENGR.
0			ISSUED FOR REPORT	MDS					

DEPARTMENT OF ENERGY - DIVISION OF COAL CONVERSION
POGO PLANT
PROCESS FLOW DIAGRAM
SCR DISSOLVING - UNIT 12

THE RALPH M. PARSONS COMPANY PASADENA, CALIFORNIA	JOB NO. 5435-4	DWG. NO. R-12-FS-1	REV. 0



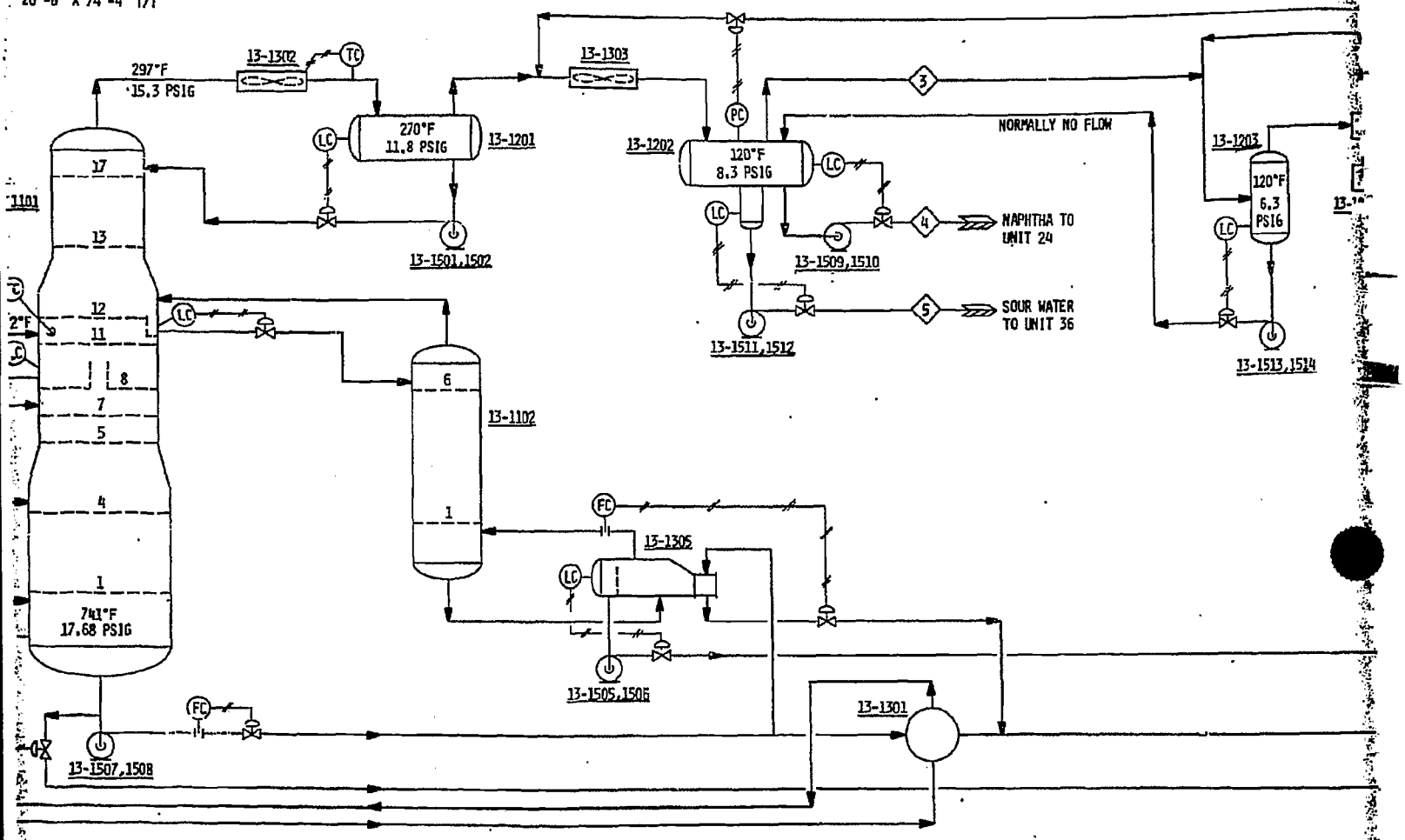
13-1503,1504
PUMPAROUND PUMP & SPARE
1870 GPM, NORMAL - 2057 GPM, DESIGN

13-1507,1508
SLURRY RECYCLE PUMP & SPARE
7626 GPM, NORMAL - 8389 GPM, DESIGN

STREAM NO.	1	2	3	4	5
STREAM NAME	TOTAL FEED	STEAM	VENT GAS	NAPHTHA	SOUR WATER
H_2	162.01	-	161.91	0.10	-
N_2	39.44	-	38.44	0.04	-
CO	115.89	-	115.71	0.17	-
CO_2	25.36	-	15.81	0.33	9.
NH_3	38.19	-	-	2.40	35.
H_2S	85.43	-	56.53	2.35	26.
H_2O	66.55	3376.41	74.95	4.39	3363.
C_1	78.95	-	78.62	0.33	-
C_2	133.22	-	130.92	2.30	-
C_3	189.66	-	179.94	9.72	-
IC_4	118.46	-	100.85	17.61	-
IBP-200	61.33	-	33.09	28.24	-
200-400	1101.65	-	24.65	875.76	-
400-450	337.22	-	0.01	14.93	-
450-500	281.73	-	-	-	-
500-650	1300.10	-	-	-	-
650-700	1675.39	-	-	-	-
700-750	1830.68	-	-	-	-
750-900	4587.13	-	-	-	-
900-1050	3958.12	-	-	-	-
1050-1200	2739.09	-	-	-	-
1200+	739.13	-	-	-	-
RESIDUE	26.46	-	-	-	-
ASH	23.79	-	-	-	-
TOTAL MPH	19,714.32	3376.41	1011.43	958.67	3435.
LB/HR	6,339,259.72	60,829.40	32,930.06	104,737.27	62,519.
BPD	377,466.00	-	-	8,126.00	4,290.
MMSCFD	-	30.752	9.212	-	-
MW	-	18.02	32.56	109.25	18.
LB/GAL @ 60	9.657	-	-	7.365	8.

A

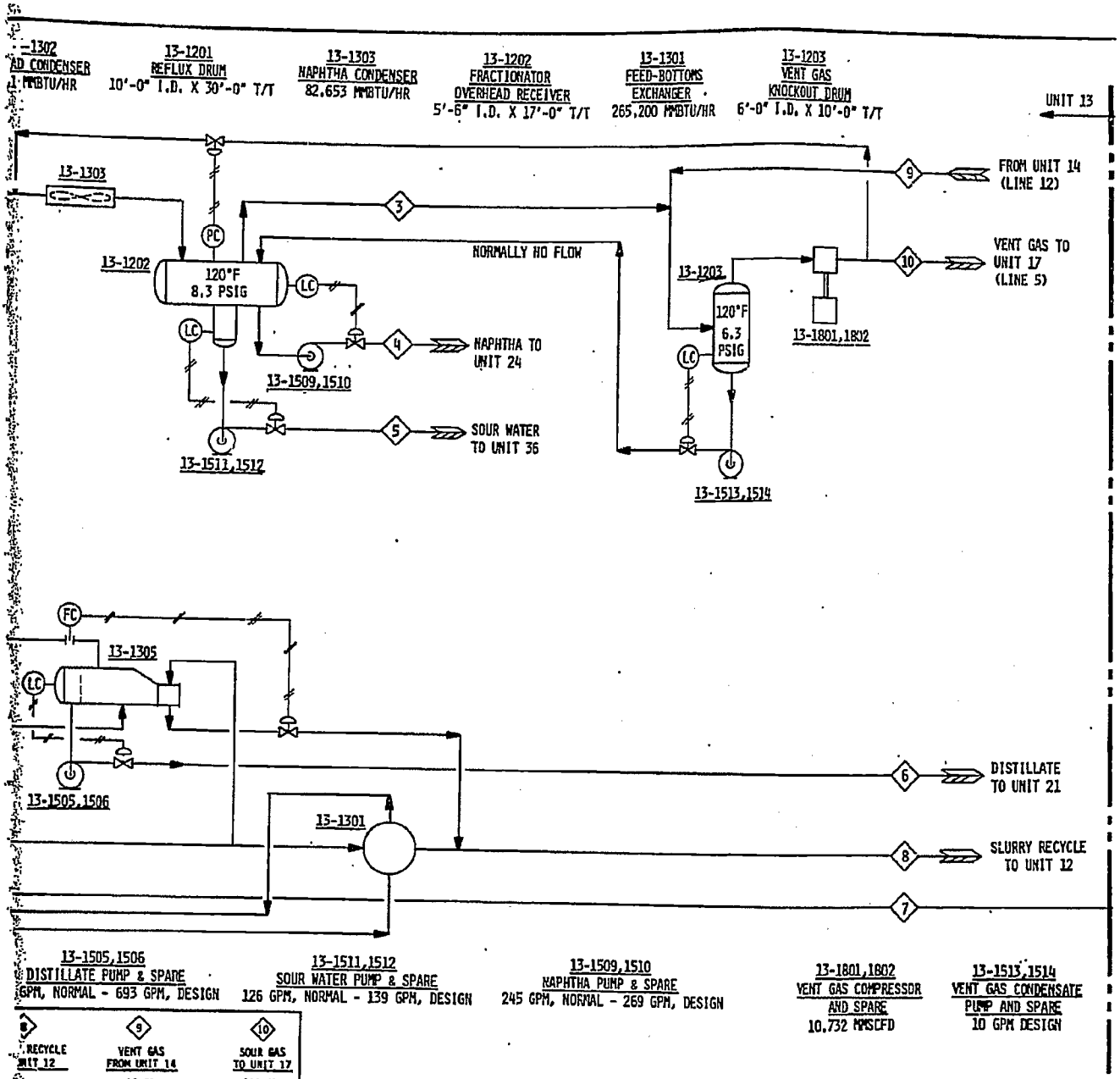
13-1101 ATMOSPHERIC FRACTIONATOR	13-1102 DISTILLATE STRIPPER	13-1305 DISTILLATE STRIPPER REBOILER	13-1302 OVERHEAD CONDENSER	13-1201 REFLUX DRUM	13-1303 NAPHTHA CONDENSER	13-1202 FRACTIONATOR OVERHEAD RECEIVER	13-1301 FEED-BOTTOMS EXCHANGER	13-1 VENT G
14'-0" X 18'-0" X 20'-0" X 74'-4" T/T	5'-6" X 17'-0" T/T	6,343 MMBTU/HR	55,901 MMBTU/HR	10'-0" I.D. X 30'-0" T/T	82,653 MMBTU/HR	5'-6" I.D. X 17'-0" T/T	265,200 MMBTU/HR	6'-0" I.D. X 1



13-1507,1508 SLURRY RECYCLE PUMP & SPARE	13-1501,1502 REFLUX PUMP & SPARE	13-1505,1506 DISTILLATE PUMP & SPARE	13-1511,1512 SOUR WATER PUMP & SPARE	13-1509,1510 NAPHTHA PUMP & SPARE
GPM, NORMAL - 8389 GPM, DESIGN	838 GPM, NORMAL - 1006 GPM, DESIGN	630 GPM, NORMAL - 693 GPM, DESIGN	126 GPM, NORMAL - 139 GPM, DESIGN	245 GPM, NORMAL - 269 GPM, DESIGN

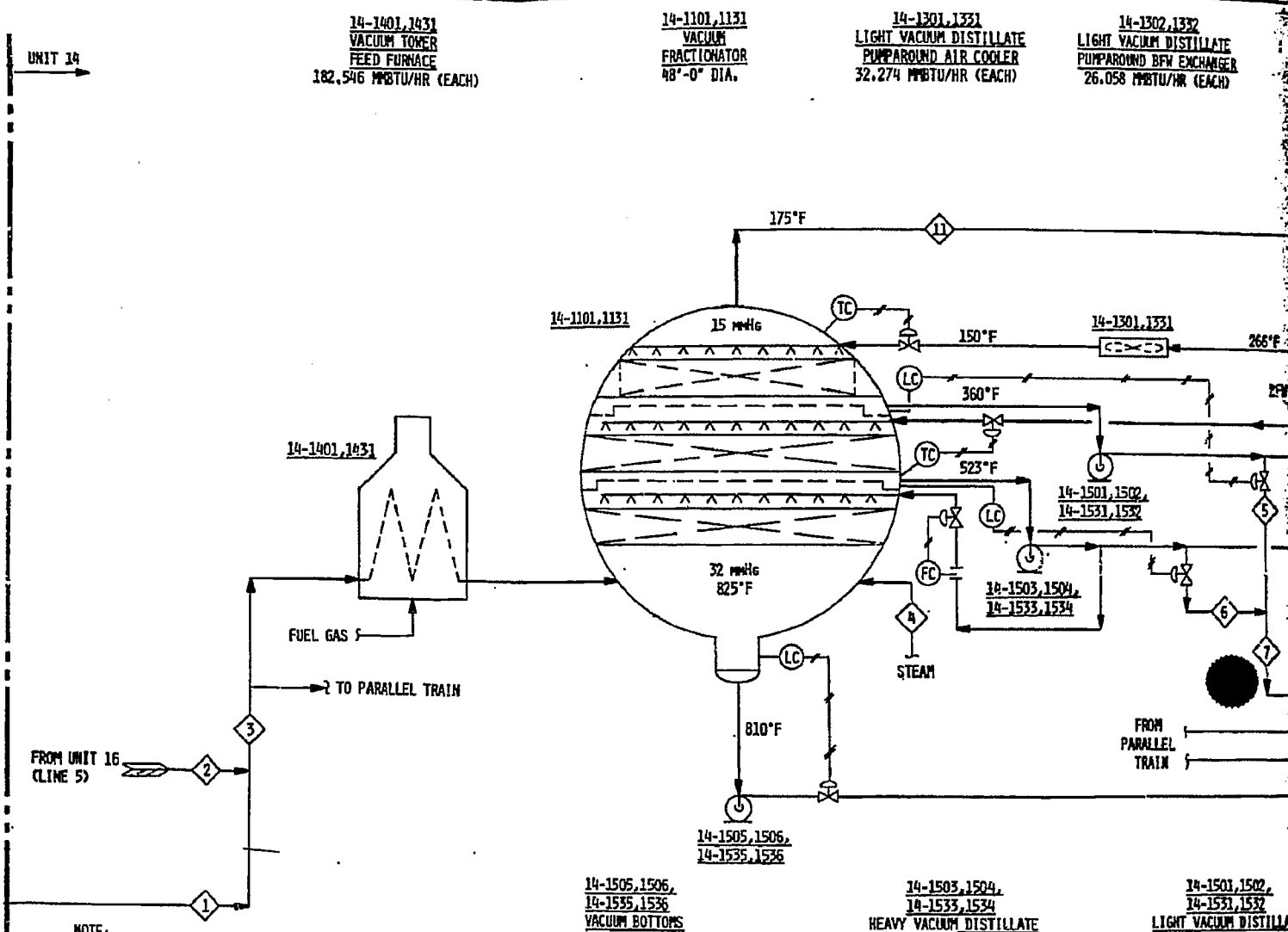
3 VENT GAS	4 NAPHTHA	5 SOUR WATER	6 DISTILLATE	7 BOTTOMS TO UNIT 14	8 SLURRY RECYCLE TO UNIT 1	9 VENT GAS FROM UNIT 14	10 SOUR GAS TO UNIT 17
161.91	0.10	-	-	-	-	19.69	181.60
38.44	0.04	-	-	-	-	-	38.44
115.71	0.17	-	-	-	-	-	115.71
15.81	0.33	9.23	-	-	-	-	15.81
-	2.40	35.78	-	-	-	14.30	70.83
56.63	2.35	26.55	-	-	-	7.92	82.87
34.95	4.39	3363.62	-	-	-	30.92	109.54
28.82	0.33	-	-	-	-	28.86	159.78
130.92	2.30	-	-	-	-	24.56	204.50
179.54	9.72	-	-	-	-	18.63	119.48
100.85	17.61	-	-	-	-	21.72	54.81
33.08	28.24	-	-	-	-	0.32	24.97
24.55	875.76	-	201.25	-	-	-	0.01
0.01	14.93	-	322.29	-	-	-	-
-	-	-	281.73	-	-	-	-
-	-	-	649.08	292.26	367.76	-	-
-	-	-	59.60	715.61	900.48	-	-
-	-	-	-	810.64	1020.04	-	-
-	-	-	-	2031.20	2555.93	-	-
-	-	-	-	1752.68	2205.44	-	-
-	-	-	-	1212.88	1526.21	-	-
-	-	-	-	327.29	411.84	-	-
-	-	-	-	11.72	14.74	-	-
-	-	-	-	10.53	13.25	-	-
121.43	958.67	3435.18	1,504.95	7,164.81	9,015.69	166.92	1,178.35
100.86	104,737.37	62,519.47	257,555.60	2,649,012.50	3,333,333.33	6,044.95	38,975.81
-	8,126.00	4,290.00	17,281.00	153,917.00	193,679.00	-	-
9.212	-	-	-	-	-	1.448	10.732
92.86	109.25	18.20	171.14	-	-	36.21	33.08
-	7.365	8.30	8.517	9.835	9.835	-	-

B



13-1505,1506	13-1511,1512	13-1509,1510	13-1801,1802	13-1513,1514
DISTILLATE PUMP & SPARE	SOUR WATER PUMP & SPARE	NAPHTHA PUMP & SPARE	VENT GAS COMPRESSOR AND SPARE	VENT GAS CONDENSATE PUMP AND SPARE
GPM, NORMAL - 693 GPM, DESIGN	126 GPM, NORMAL - 139 GPM, DESIGN	245 GPM, NORMAL - 269 GPM, DESIGN	10,732 MMSCFD	10 GPM DESIGN

8 RECYCLE UNIT 12	9 VENT GAS FROM UNIT 14	10 SOUR GAS TO UNIT 17
	12.69	181.60
	-	38.44
	-	115.71
	-	15.81
	-	-
	14.30	70.83
	7.92	82.87
	30.92	109.54
	28.86	159.78
	24.56	204.50
	18.63	119.48
	21.72	54.81
	0.32	24.97
	-	0.01
	-	-
	-	-
	-	-
	-	-
	-	-
	-	-
	-	-
	-	-
	-	-
	-	-
	-	-
	-	-
	-	-
	166.92	1,178.35
	6,044.95	38,975.81
	-	-
	1.448	10.732
	36.21	33.08
	-	-



NOTE:
MATERIAL BALANCE
IS TOTAL FOR TWO
PARALLEL TRAINS

14-1505,1506,
14-1535,1536
VACUUM BOTTOMS
PUMP AND SPARE
551 GPM NORMAL (EACH)
600 GPM DESIGN (EACH)

14-1503,1504,
14-1533,1534
HEAVY VACUUM DISTILLATE
PUMP AND SPARE
11,349 GPM NORMAL (EACH)
12,484 GPM DESIGN (EACH)

14-1501,1502,
14-1531,1532
LIGHT VACUUM DISTILLA
PUMP AND SPARE
1,848 GPM NORMAL (EA
2,033 GPM DESIGN (EA

STREAM NO.	1	2	3	4	5	6	7	8	9
STREAM NAME	SRC BOTTOMS	PYROLYSIS BOTTOMS	TOTAL FEED	STEAM	LIGHT VAC. DISTILLATE	HEAVY VAC. DISTILLATE	TOTAL VAC. DISTILLATE	DISTILLATE TO UNIT 21	DISTILLATE TO UNIT 32
COMPONENT									
H2	-	-	-	-	-	-	-	-	-
N2	-	-	-	-	-	-	-	-	-
O2	-	-	-	-	-	-	-	-	-
H2S	-	-	-	-	-	-	-	-	-
NH3	-	-	-	-	-	-	-	-	-
CO	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-
C1	-	-	-	-	-	-	-	-	-
C2	-	-	-	-	-	-	-	-	-
C3	-	-	-	-	-	-	-	-	-
IC4	-	-	-	-	-	-	-	-	-
NC4	-	-	-	-	-	-	-	-	-
IC5	-	-	-	-	-	-	-	-	-
NC5	-	-	-	-	-	-	-	-	-
C6	-	-	-	-	-	-	-	-	-
C7	-	-	-	-	-	-	-	-	-
C8	-	-	-	-	-	-	-	-	-
C9	-	-	-	-	-	-	-	-	-
C10	-	-	-	-	-	-	-	-	-
C11	-	-	-	-	-	-	-	-	-
C12	-	-	-	-	-	-	-	-	-
C13	-	-	-	-	-	-	-	-	-
C14	-	-	-	-	-	-	-	-	-
C15	-	-	-	-	-	-	-	-	-
C16	-	-	-	-	-	-	-	-	-
C17	-	-	-	-	-	-	-	-	-
C18	-	-	-	-	-	-	-	-	-
C19	-	-	-	-	-	-	-	-	-
C20	-	-	-	-	-	-	-	-	-
IBP-200	-	-	-	-	-	-	-	-	-
200-400	-	-	-	-	-	-	-	-	-
400-450	-	-	-	-	-	-	-	-	-
450-500	-	-	-	-	-	-	-	-	-
500-650	292.26	10.53	302.79	-	297.18	-	297.18	69.53	227.65
650-700	715.61	40.53	756.14	-	633.14	94.24	727.38	170.17	557.21
700-750	810.64	32.87	843.51	-	462.06	361.73	823.79	192.73	631.06
750-900	2031.20	67.45	2098.65	-	593.92	1468.37	2,062.29	482.47	1,579.82
900-1050	1752.68	44.38	1797.06	-	120.88	1642.37	1,763.25	412.51	1,350.74
1050-1200	1212.88	17.14	1230.02	-	-	1103.33	1,103.33	258.13	845.20
1200 +	327.29	-	327.29	-	-	-	-	-	-
RESIDUE	11.72	0.65	12.37	-	-	2.83	2.83	0.66	2.17
ASH	10.53	0.07	10.60	-	-	-	-	-	-
TOTAL MPH	7,164.81	213.62	7,378.43	7,961.32	2,107.18	4,672.87	6,780.05	1,586.20	5,193.85
LB/HR	2,649,012.50	70,088.39	2,719,100.89	143,431.14	548,784.85	1,628,876.76	2,175,661.61	508,994.94	1,666,666.67
BPD	153,917.00	4,162.00	158,079.00	-	33,794.00	95,134.00	128,928.00	30,163.00	98,765.00
MMSCFD	-	-	-	72.510	-	-	-	-	-
MW	-	-	-	18.02	-	-	-	-	-
LB/GAL @ 60	9.835	9.623	9.829	-	259.49	348.58	320.89	320.89	320.89
					9.246	9.784	9.643	9.643	9.643

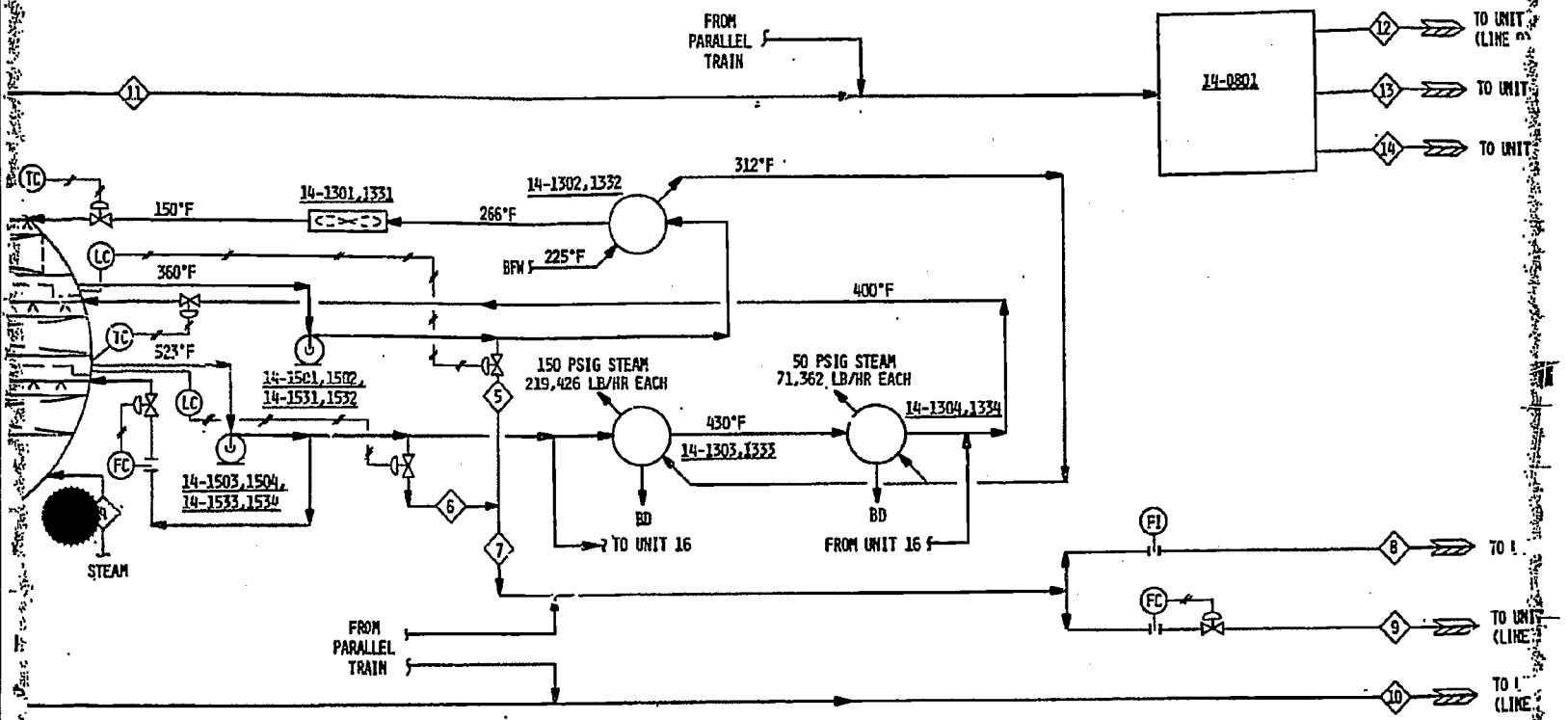
14-1301,1331
LIGHT VACUUM DISTILLATE
PUMPAROUND AIR COOLER
32.274 MMBTU/HR (EACH)

14-1302,1332
LIGHT VACUUM DISTILLATE
PUMPAROUND BFW EXCHANGER
26.058 MMBTU/HR (EACH)

14-1303,1333
HEAVY VACUUM DISTILLATE PUMPAROUND
-150 PSIG STEAM GENERATOR
201.443 MMBTU/HR (EACH)

14-1304,1334
HEAVY VACUUM DISTILLATE PUMPAROUND
-50 PSIG STEAM GENERATOR
64.290 MMBTU/HR (EACH)

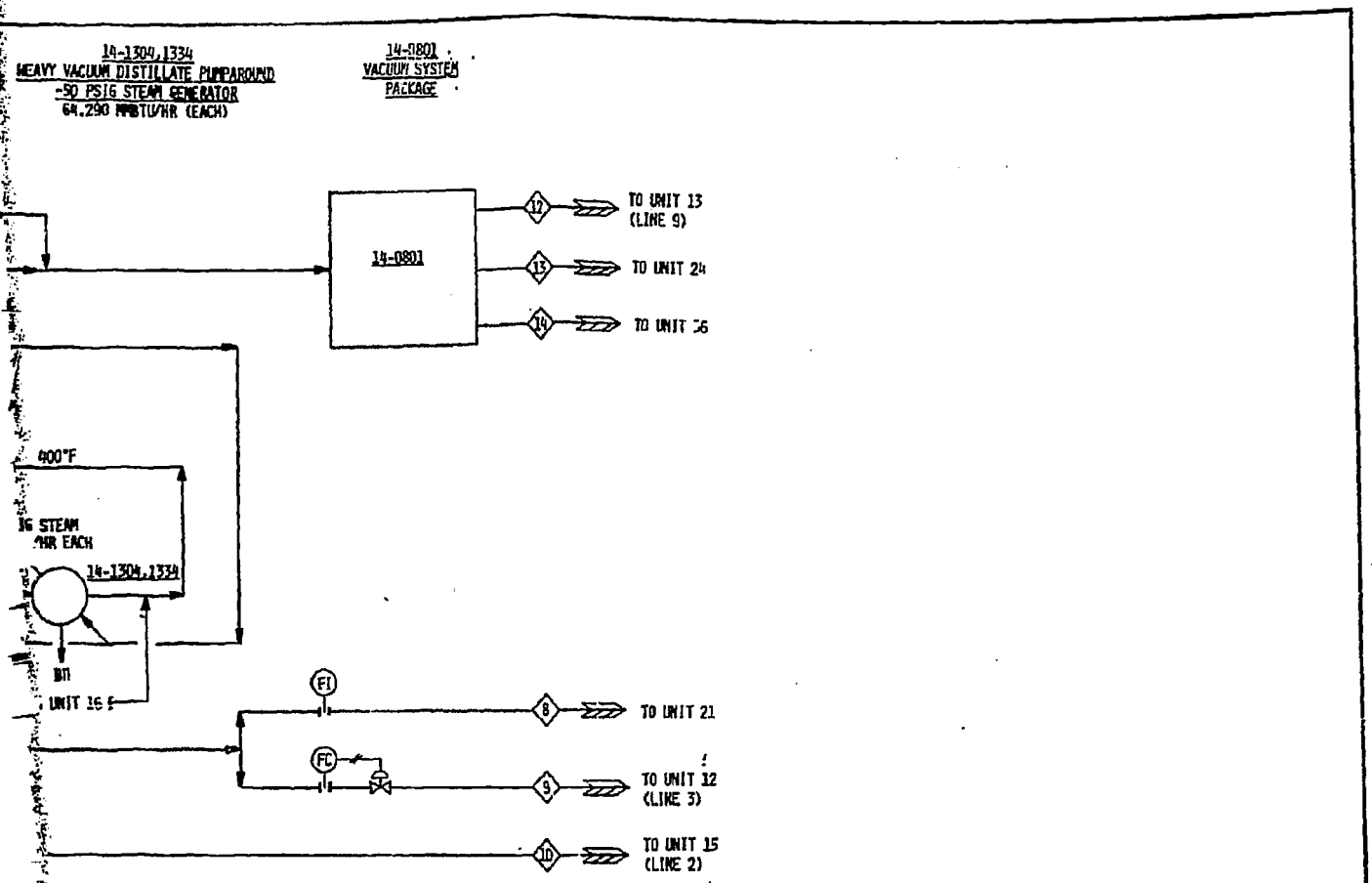
14-0801
VACUUM SYSTEM
PACKAGE



14-1503,1504,
14-1533,1534
HEAVY VACUUM DISTILLATE
PUMP AND SPARE
11,349 GPM NORMAL (EACH)
12,484 GPM DESIGN (EACH)

14-1501,1502,
14-1531,1532
LIGHT VACUUM DISTILLATE
PUMP AND SPARE
1,848 GPM NORMAL (EACH)
2,033 GPM DESIGN (EACH)

6 HEAVY VAC. DISTILLATE	7 TOTAL VAC. DISTILLATE	8 DISTILLATE TO UNIT 21	9 DISTILLATE TO UNIT 12	10 VAC. BOTTOMS TO UNIT 15	11 STEAM AND GAS TO JETS	12 VENT GAS	13 NAPHTHA TO UNIT 24	14 NET WATER
-	-	-	-	-	19.69	19.69	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	15.03	14.30	0.73	-
-	-	-	-	-	7,961.32	7.92	0.66	7,952.74
-	-	-	-	-	31.14	30.92	0.22	-
-	-	-	-	-	29.99	28.86	1.13	-
-	-	-	-	-	27.70	24.56	3.14	-
-	-	-	-	-	26.53	18.63	7.90	-
-	-	-	-	-	97.91	21.72	76.19	-
-	-	-	-	-	25.18	0.32	24.86	-
-	-	-	-	-	27.64	-	27.64	-
-	-	-	-	-	-	-	-	-
-	297.18	69.53	227.65	3.33	-	-	-	-
94.24	727.38	170.17	557.21	22.18	-	-	-	-
61.73	823.79	192.73	631.06	12.12	-	-	-	-
68.37	2,062.29	482.47	1,579.82	16.77	-	-	-	-
12.37	1,763.25	412.51	1,350.74	10.66	-	-	-	-
03.33	1,103.33	258.13	845.20	116.75	-	-	-	-
2.83	2.83	0.66	2.27	324.44	-	-	-	-
-	-	-	-	12.37	-	-	-	-
-	-	-	-	10.61	-	-	-	-
4,672.87	0,780.05	1,586.20	5,193.85	535.23	8,262.13	166.92	142.47	7,952.74
1,628,676.76	2,175,661.61	508,994.94	1,666,668.67	523,837.55	163,032.90	6,044.95	13,711.39	143,276.56
95,134.00	128,928.00	30,163.00	98,765.00	27,989.00	-	-	1,060.00	9,831.00
-	-	-	-	-	75.250	1.448	-	-
348.58	320.89	320.89	320.89	-	19.73	36.21	96.24	18.02
9.784	9.643	9.643	9.643	10.695	-	-	7.388	8.33



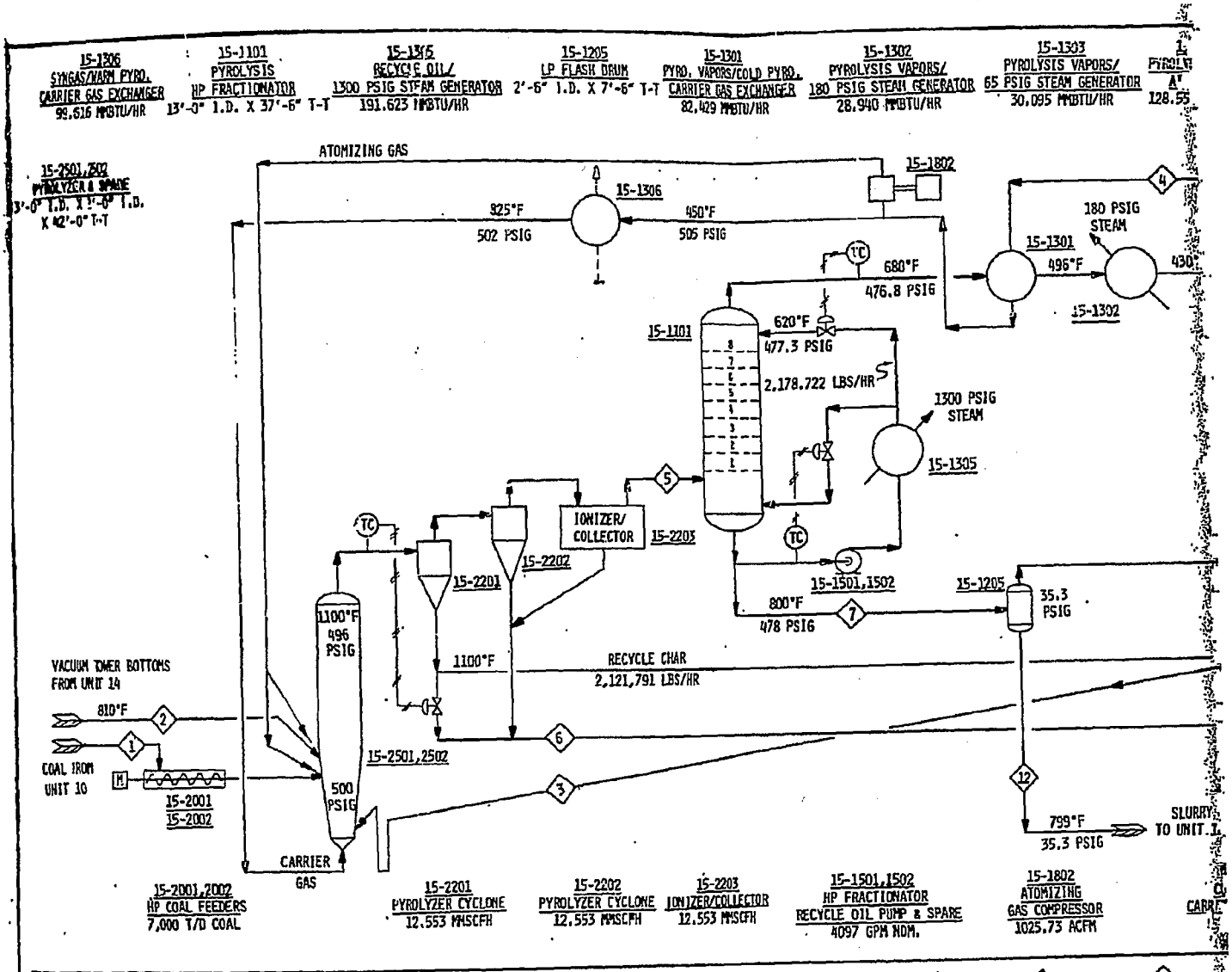
13 NAPHTHA TO UNIT 24	14 RET WATER
-	-
-	-
-	-
-	-
0.73	-
0.64	7,952.74
0.22	-
1.13	-
3.14	-
7.90	-
26.19	-
24.86	-
27.64	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-
142.47	7,952.74
13,711.39	143,276.56
1,060.00	9,831.00
-	-
96.24	18.02
7.388	8.33

REV. NO.	DEPT APPR.	DATE	REVISION	BY	PROJ. ENGR.	CHECKED	QUALITY ASSUR.	CONST. MGR.	OPERATIONS SUP.
0			ISSUED FOR REPORT						

DEPARTMENT OF ENERGY - DIVISION OF COAL CONVERSION
POGO PLANT
PROCESS FLOW DIAGRAM
SRC ATMOSPHERIC DISTILLATION - UNIT 13
SRC VACUUM DISTILLATION - UNIT 14

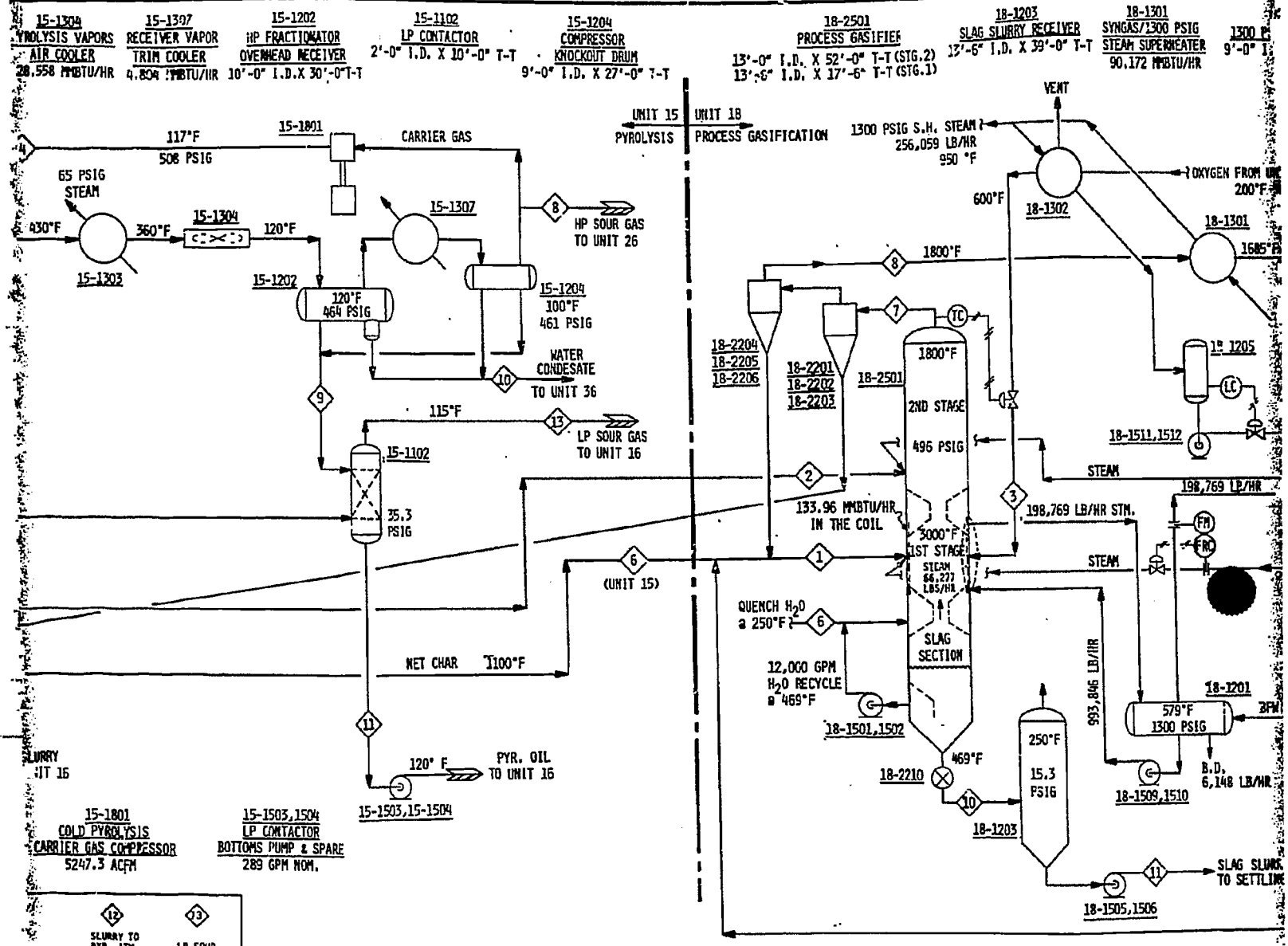
THE RALPH M. PARSONS COMPANY PASADENA, CALIFORNIA	JOB NO. 5435-4	DWG. NO. R-13/24-FS-1	REV. 0

BC- BT-



STREAM NO.	1	2	3	4	5	6	7	8	9	10	12
STREAM NAME	COAL	VACUUM TOWER BOTTOMS	CHAR RECYCLE	PYROLYSIS CARRIER GAS	HP FRACT. FEED	GASIFIER FEED CHAR	HP FRACT. BOTTOMS	HP SOUR GAS	OVERHEAD RECEIVER LIQUID	WATER CONDENSATE	LP CONTACTOR BOTTOMS
FLOW MPH											
H_2	-	-	-	6965.41	8343.55	-	1.09	1373.3	3.25	-	0.14
N_2	-	-	-	621.05	744.22	-	0.20	122.44	0.53	-	0.03
CO	-	-	-	1186.95	1422.76	-	0.34	234.02	1.45	-	0.08
CO_2	-	-	-	2227.50	2688.50	-	0.69	439.17	21.14	-	3.98
NH_3	-	-	-	-	96.58	-	0.03	-	-	96.55	0.03
H_2S	-	-	-	431.92	622.44	-	0.15	85.16	8.66	96.55	3.03
H_2O	874.22	-	-	58.89	2051.79	-	0.11	11.61	8.12	1973.06	5.40
C_1	-	-	-	11109.82	13337.62	-	2.02	2190.41	35.37	-	2.33
$C_2^=$	-	-	-	435.77	530.97	-	0.19	86.7	4.31	-	0.89
C_2	-	-	-	850.51	1028.55	-	0.35	167.69	10.00	-	2.39
$C_3^=$	-	-	-	472.23	580.16	-	0.23	93.19	14.60	-	7.02
C_3	-	-	-	434.93	535.30	-	0.22	85.76	14.40	-	7.25
$C_4^=$	-	-	-	98.22	116.60	-	0.05	17.79	8.53	-	6.60
nC_4	-	-	-	40.75	98.17	-	0.13	8.04	49.25	-	48.34
180-200	-	-	-	14.38	301.19	-	1.01	2.83	282.97	-	283.15
200-400	-	-	-	0.15	98.24	-	0.65	0.03	97.40	-	97.65
400-450	-	-	-	0.02	82.69	-	0.80	-	81.87	-	82.32
450-500	-	-	-	-	188.95	-	4.22	-	184.73	-	185.49
500-650	-	3.33	-	-	79.18	-	6.02	-	73.16	-	73.60
650-750	-	34.30	-	-	23.91	-	3.79	-	20.12	-	20.26
750-800	-	4.45	-	-	105.06	-	60.61	-	44.45	-	44.84
800-1200	-	145.73	-	-	-	-	-	-	-	-	-
1200 +	-	324.44	-	-	-	-	77.97	-	-	-	-
Solids: Char (TPD)	-	1483.97	19754.09	-	77.97	6736.10	8.83	-	-	-	-
Ash (TPD)	442.4	1272.83	4245.91	-	8.83	1447.84	-	-	-	-	-
MAF Coal (TPD)	6368.6	-	-	-	-	-	-	-	-	-	-
Flow Total MPH*	-	512.25	-	24946.50	33076.43	-	82.93	4918.04	964.81	2166.16	874.71
Flow Total LBS/HR	583333.34	523837.46	2000000.00	443881.67	747265.67	681994.80	32947.00	87513.53	142441.07	40481.70	140242.71
M.W.	-	574.142	-	17.795	22.37	-	310.06	17.79	147.64	18.69	160.33
API°	-	16005.37	-	-	-	-	1880.91	-	10307.09	2911.11	9659.88
MMSCFD	-	-	-	227.194	301.260	-	-	44.793	-	-	-
LB/Gal 60	-	10.5002	-	-	-	-	10.009	-	8.1337	7.9463	8.2960

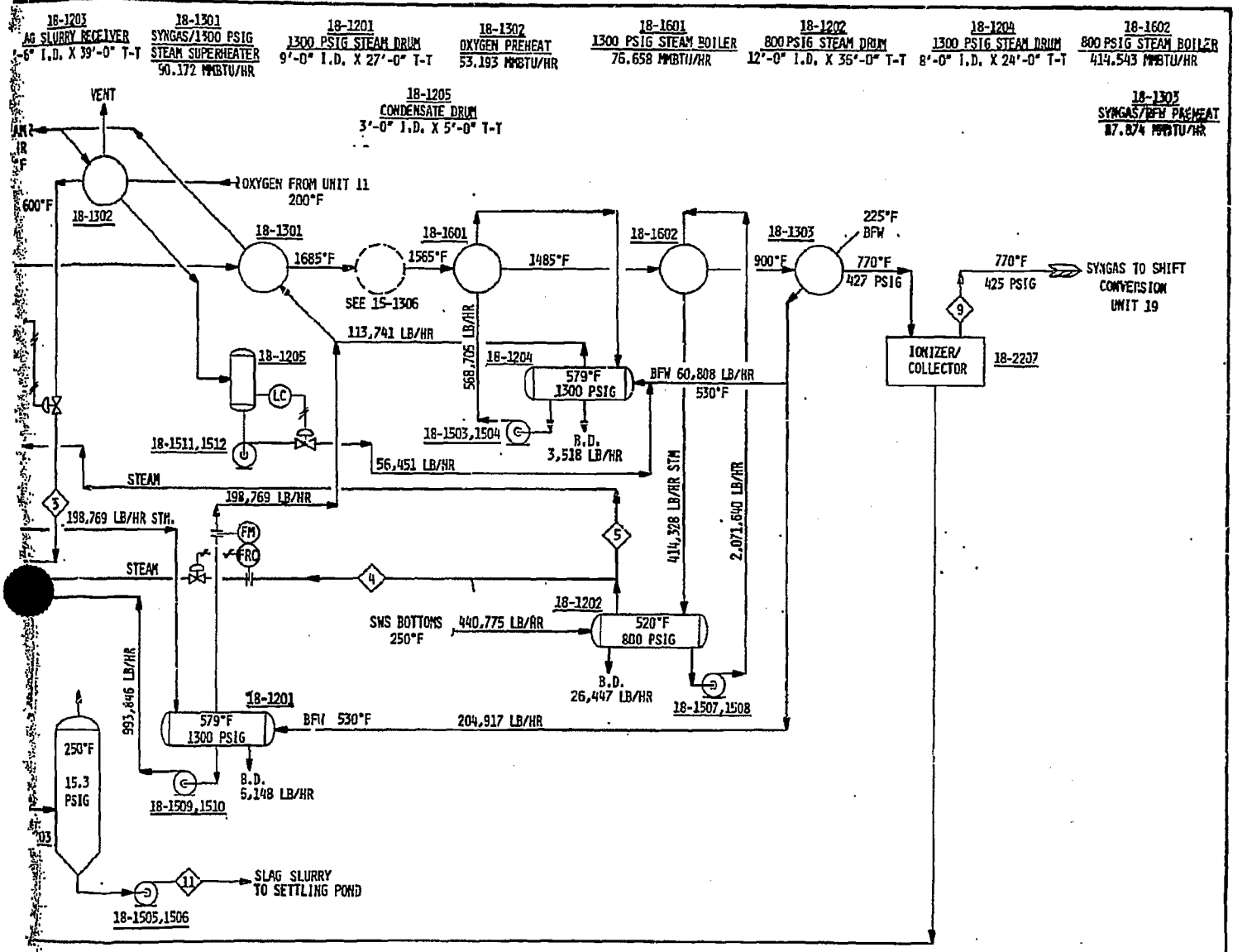
*Solids are not included.



	⑫ SLURRY TO PYR. ATM. FRACT.	⑬ LP SOUR GAS
	0.06	4.64
	0.03	0.67
	0.05	1.66
	0.07	17.78
	-	-
	0.01	5.77
	-	2.74
	0.12	34.94
	0.03	3.58
	0.06	7.91
	0.03	7.78
	0.03	7.34
	0.01	1.98
	0.04	1.00
	0.50	0.33
	0.41	-
	0.55	-
	3.46	-
	5.58	-
	3.65	-
	60.22	-
	-	-
	77.97	-
	8.83	-
	-	-
	74.90	98.12
	32250.30	2806.76
	334.14	29.4
	1446.02	-
	-	0.894
	9.8900	

STREAM NO.	① GASIFIER FEED CHAR	② PYR. REC. CHAR	③ OXIGEN	④ STEAM TO 1ST STAGE	⑤ STEAM TO 2ND STAGE	⑥ SLAG QUENCH H_2O
FLOW MPH						
O_2	-	-	11.23	-	-	-
H_2	-	-	-	-	-	-
N_2	-	-	359.41	-	-	-
CO	-	-	-	-	-	-
CO_2	-	-	-	-	-	-
NH_3	-	-	-	-	-	-
H_2S	-	-	-	-	-	-
H_2O	-	-	-	2241.9	20755.88	1163
COS	-	-	-	-	-	-
C_1	-	-	-	-	-	-
Solids:Char (TPD)	7939.03	20951.01	-	-	-	-
Ash (TPD)	1706.4	4504.47	-	-	-	-
Flow Total MPH*	-	-	17970.64	2241.9	20755.80	20303.63
Flow Total LBS/HR	803785.8	2121791.00	573628.66	40390.05	373938.03	365708.4
M.W.	-	-	31.92	18.016	18.016	18.016
MMSCFD*	-	-	-	-	-	-

*Solids are not included.



18-2205,2206 CYCLONES	18-1501,1502 SLAG SECTION WATER RECYCLE PUMP & SPARE	18-2210 SLAG LUMP REMOVER	18-1505,1506 SLAG SLURRY PUMP & SPARE	18-1509,1510 WATER CIRCULATION PUMP & SPARE	18-1503,1504 WATER CIRCULATION PUMP & SPARE	18-1507,1508 WATER CIRCULATION PUMP & SPARE	18-2207 SYNGAS IONIZER/COLLECTOR	18-1511,1512 CONDENSATE PUMP & SPARE
MSCFH	12,000 GPM NOM.	1770 TPD	464 GPM NOM.	2782 GPM NOM.	1591 GPM NOM.	5182 GPM NOM.	30,463 MSCFH	149 GPM NOM.

	④ STEAM TO 1ST STAGE	⑤ STEAM TO 2ND STAGE	⑥ SLAG QUENCH H_2O	⑦ GASIFIER OFF GAS	⑧ RAW SYNGAS	⑨ SYNGAS TO SHIFT UNIT	⑩ QUENCHED SLAG	⑪ SLAG SLURRY TO DISPOSAL
	-	-	-	-	-	-	-	-
	-	-	-	22739.52	22739.52	22739.52	-	-
	-	-	-	779.24	779.24	779.24	-	-
	-	-	-	32622.70	32622.70	32622.70	-	-
	-	-	-	10705.26	10705.26	10705.26	-	-
	-	-	-	17.00	17.00	17.00	-	-
	-	-	-	1026.09	1026.09	1026.09	-	-
	2241.9	20755.88	20303.53	11693.83	11693.83	11693.83	299511.56 LB/HR	218153.69 LB/HR
	-	-	-	21.46	21.46	21.46	-	-
	-	-	-	666.91	666.91	666.91	-	-
	-	-	-	20957.01	259.11	0.31	-	-
	-	-	-	4504.47	55.69	0.07	147520.60 LB/HR	147520.60 LB/HR
	2241.9	20755.88	20303.53	80272.01	80272.01	80272.01		
	40390.05	373930.03	365788.4	3832289.76	1736732.54	1710530.59	447032.18	365774.28
	18.016	18.016	18.016	21.31	21.31	21.31		
	-	-	-	731.117	731.117	731.117	-	-

REV NO	REVISED APPR.	DATE	REVISION	BY	PROJ ENGR.	CHK BY	DRAFT ENGR & DATE	CHIEF ENGR & DATE	PROJ DIR.
0			ISSUED FOR REPORT	LOS	MVE				

DEPARTMENT OF ENERGY - DIVISION OF COAL CONVERSION
POGO PLANT
PROCESS FLOW DIAGRAM
PYROLYSIS - UNIT 15
PROCESS GASIFICATION - UNIT 18

THE RALPH M. PARSONS COMPANY PASADENA, CALIFORNIA	JOB NO. 5435-4	DWG. NO. R-15/18-FS-1	REV. 0

DR RM. REV. R 7/15/77

16-1303
HY. VAC. DIST. PA./
WARM FRACT. FEED EXCHANGER
10.091 MMBTU/HR

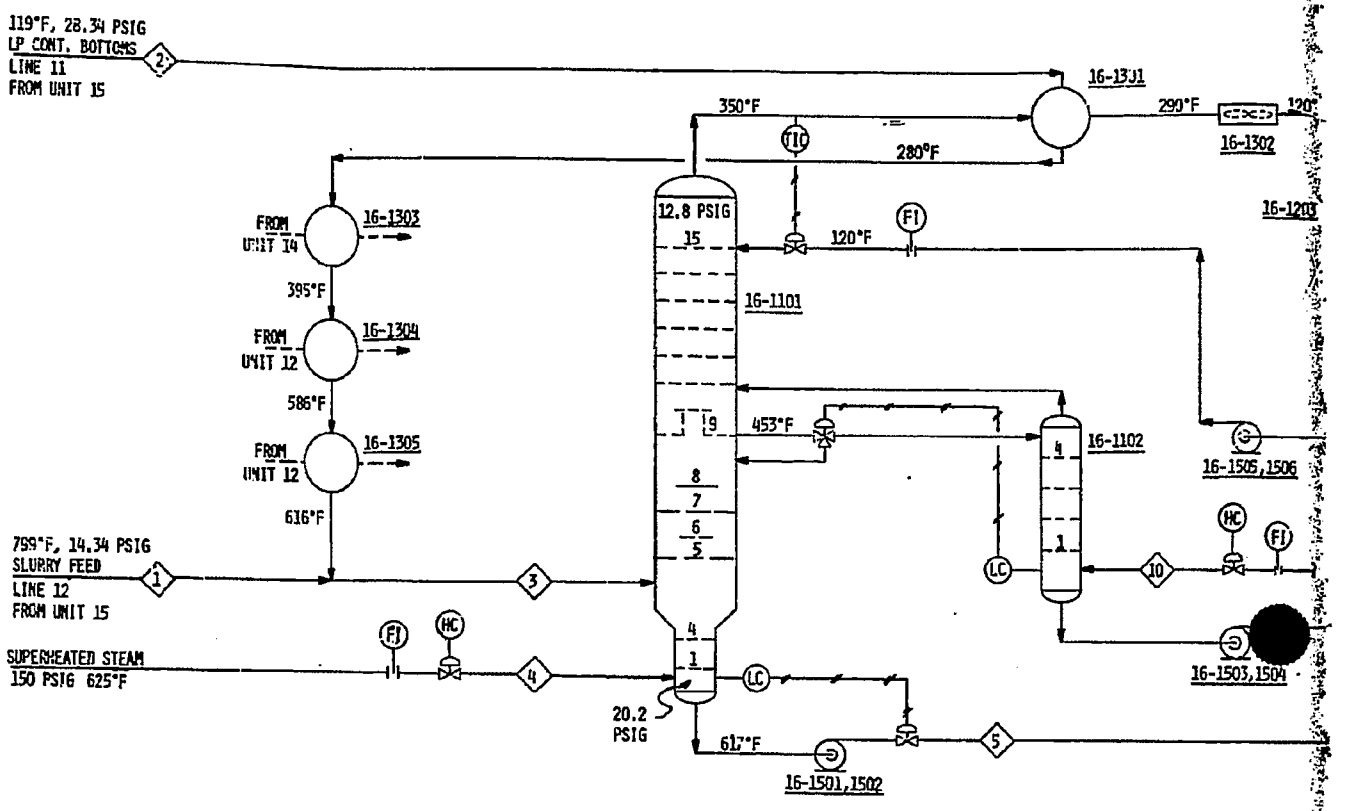
16-1304
HP FRACT. SLURRY/
FRACT. FEED EXCHANGER
16,412 MMBTU/HR

16-1305
HP FRACT. VAPOR/
FRACT. FEED EXCHANGER
6.411 MMBTU/HR

16-1101
MAIN FRACTIONATOR
6'-0" I.D. X 3'-0" I.D.
X 63'-0" T-T

16-1301
OVERHEAD VAPOR/
COLD FRACT. FEED EXCHANGER
9.955 MMBTU/HR

16-1102
MID-DISTILLATE STRIPPER
3'-0" I.D. X 17'-0" T-T



16-1501,1502
PYROLYSIS ATM. BOTTOMS
PUMP & SPARE
142.61 GPM

16-1503,1504
PYROLYSIS MID-DISTILLATE
PUMP & SPARE
151.07 GPM

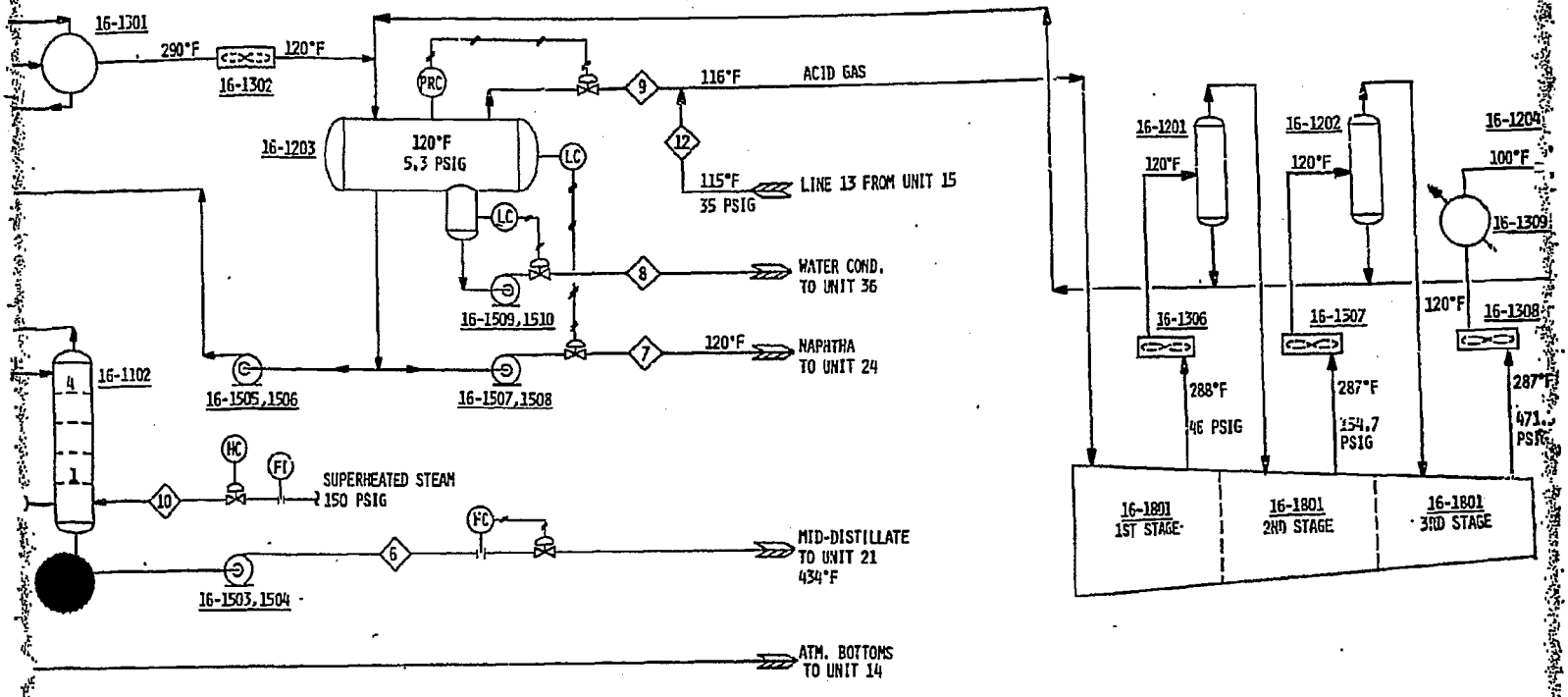
16-1505
REFLUX PUM
132.0*

STREAM NO.	1	2	3	4	5	6	7	8	9
COMPONENT	SLURRY FROM PYROLYSIS	CONTACTOR BOTTOMS FROM PYROLYSIS	FRACTIONATOR FEED	FRACTIONATOR STRIPPING STEAM	PYROLYSIS ATM. BOTTOMS	PYROLYSIS MID-DISTILLATE	PYROLYSIS NAPHTHA	WATER CONDENSATE	NCG
FLOW, MPH									
H_2	0.06	0.14	0.20	-	-	-	0.02	-	0.20
N_2	0.03	0.03	0.06	-	-	-	-	-	0.06
CO	0.05	0.08	0.13	-	-	-	0.01	-	0.13
CO_2	0.07	3.98	4.05	-	-	-	1.45	0.03	3.43
NH_3	-	0.03	0.03	-	-	-	-	0.03	-
H_2S	0.01	3.03	3.04	-	-	-	1.50	0.03	2.16
H_2O	-	5.49	5.49	36.32	-	-	1.44	64.09	2.80
C_1	0.12	2.33	2.45	-	-	-	0.20	-	2.32
$C_2^=$	0.03	0.89	0.92	-	-	-	0.34	-	0.77
C_2	0.05	2.39	2.44	-	-	-	1.02	-	1.96
$C_3^=$	0.03	7.02	7.05	-	-	-	4.33	-	4.20
C_3	0.03	7.25	7.26	-	-	-	4.70	-	4.15
nC_4	0.01	6.60	6.61	-	-	-	5.84	-	1.93
IBP-200	0.04	48.34	48.38	-	-	-	48.76	-	1.53
200-400	0.50	283.15	283.65	-	-	13.57	270.38	-	0.55
400-450	0.41	97.65	98.06	-	-	92.06	6.00	-	-
450-550	1.44	162.59	164.03	-	-	164.03	-	-	-
550-600	1.01	54.88	55.89	-	1.25	54.64	-	-	-
600-650	1.56	50.14	51.70	-	9.28	42.42	-	-	-
650-700	2.37	42.34	44.71	-	40.53	4.18	-	-	-
700-750	3.21	31.26	34.47	-	32.87	1.60	-	-	-
750-900	17.11	50.34	67.45	-	67.45	-	-	-	-
900-1040	30.36	14.02	44.38	-	44.38	-	-	-	-
1040-1200	16.40	0.74	17.14	-	17.14	-	-	-	-
SOLIDS: CHAR (TPD)	77.97	-	77.97	-	77.97	-	-	-	-
ASH (TPD)	8.83	-	8.83	-	8.83	-	-	-	-
FLOW TOTAL MPH*	74.90	874.71	949.61	36.32	212.90	372.50	346.49	64.18	20.
FLOW TOTAL LBS/HR	32350.3	140242.71	172503.01	654.28	70088.39	64920.90	36950.89	1157.50	0.
MW*	334.14	160.33	174.04	18.016	295.24	174.28	106.64	18.03	0.
BPD*	1446.02	9659.88	11105.90	-	3738.75	4379.01	2920.43	76.88	0.
MMSCFD	-	-	-	-	-	-	-	-	0.
LB/GAL 60*	9.8900	8.2960	8.5036	-	9.6067	8.4737	7.2300	8.5977	0.14

*FOR STREAMS WITH SOLIDS THE VOLUMETRIC FLOW AND THE PROPERTIES ARE FOR THE LIQUID PORTION ONLY.

A

EXCHANGER NR.	16-1102 MID-DISTILLATE STRIPPER	16-1302 OVERHEAD VAPOR AIR COOLER	16-1203 OVERHEAD RECEIVER	16-1306 COMPRESSOR INTERM. AIR COOLER	16-1201 COMPRESSOR 2ND STAGE K.O. DRUM	16-1307 COMPRESSOR INTERM. AIR COOLER	16-1202 COMPRESSOR 3RD STAGE K.O. DRUM	16-1308 ACID GAS AIR COOLER	ACID GA
	3'-0" I.D. X 17'-0" T-T	11.251 MMBTU/HR	5'-6" I.D. X 22'-0" T-T	0.268 MMBTU/HR.	2'-0" I.D. X 8'-0" T-T	0.300 MMBTU/HR	2'-0" I.D. X 8'-0" T-T	0.317 MMBTU/HR.	0.0



16-1503,1504 PYROLYSIS MID-DISTILLATE PUMP & SPARE	16-1505,1506 REFLUX PUMP & SPARE	16-1507,1508 PYROLYSIS NAPHTHA PUMP & SPARE	16-1509,1510 WATER CONDENSATE PUMP & SPARE
151.07 GPM	132.09 GPM	87.15 GPM	2.08 GPM

16-1801
ACID GAS COMPRESSOR
1ST STAGE - 636 ACFM
2ND STAGE - 220 ACFM
3RD STAGE - 74.14 ACFM

⑦ PYROLYSIS NAPHTHA	⑧ WATER CONDENSATE	⑨ ACID GAS	⑩ STEAM TO STRIPPER	⑪ HP ACID GAS	⑫ UNIT 15 ACID GAS
0.02	-	0.20	-	4.82	4.64
-	-	0.06	-	0.73	0.67
0.01	-	0.13	-	1.78	1.66
1.45	0.03	3.43	-	20.35	17.78
-	0.03	-	-	-	-
1.50	0.03	2.16	-	7.28	5.77
1.44	64.09	2.00	21.27	0.23	2.74
0.70	-	2.32	-	36.69	34.94
0.34	-	0.77	-	4.16	3.58
1.02	-	1.96	-	9.33	7.91
4.33	-	4.20	-	10.50	7.78
4.70	-	4.15	-	9.92	7.34
5.84	-	1.91	-	2.75	1.98
48.76	-	1.53	-	0.62	1.00
270.38	-	0.55	-	6.03	0.33
6.00	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
346.49	64.18	25.39	21.27	109.25	98.12
6950.89	1157.50	1041.93	383.16	3309.53	2686.76
[illegible]	18.03	41.04	18.016	30.29	29.42
	76.88	-	-	-	-
	-	189.614	-	995.050	893.677
	8.5977	-	-	-	-

REV NO	CUST APPR.	DATE
0		ISS

DEPARTMENT
PYROLYSIS

THE RALPH M. P... COMPA...
PASADENA, C...

DR.RM. REV. A...

EIVER
'-0" T-T

16-1306
COMPRESSOR INTERM. AIR COOLER
0.268 MMBTU/HR.

16-1201
COMPRESSOR 2ND STAGE K.O. DRUM
2'-0" I.D. X 8'-0" T-T

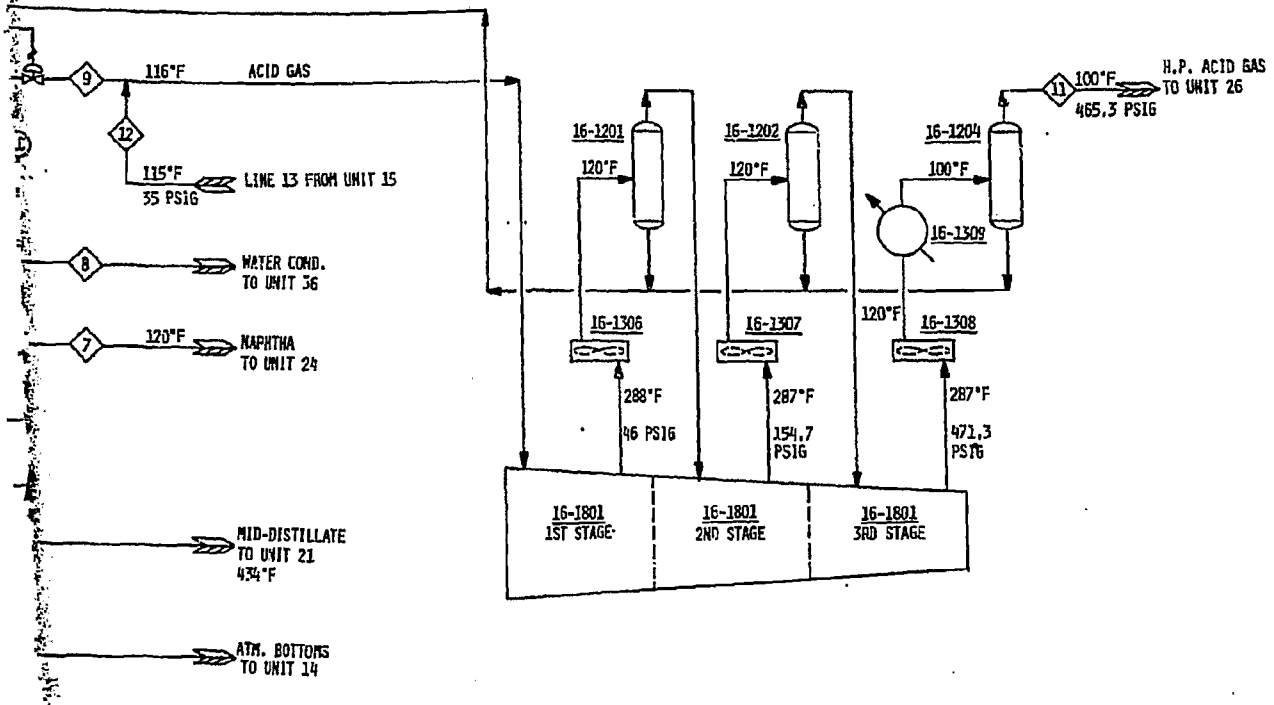
16-1307
COMPRESSOR INTERM. AIR COOLER
0.300 MMBTU/HR

16-1202
COMPRESSOR 3RD STAGE K.O. DRUM
2'-0" I.D. X 8'-0" T-T

16-1308
ACID GAS AIR COOLER.
0.317 MMBTU/HR.

16-1309
ACID GAS TRIM COOLER
0.038 MMBTU/HR.

16-1204
ACID GAS K.O. DRUM
2'-0" I.D. X 8'-0" T-T



16-1801
ACID GAS COMPRESSOR
1ST STAGE - 636 ACFM
2ND STAGE - 220 ACFM
3RD STAGE - 74.14 ACFM

16-1509,1510
ER CONDENSATE
P & SPARE
2.08 GPM

12
UNIT 15 ACID GAS
4.64
0.67
1.66
17.78
-
5.77
2.74
34.94
3.58
7.91
7.78
7.34
1.98
1.00
0.33
-
-
-
-
-
-
-
-
-
-
8.12
.76
9.42
-
.677
-

B

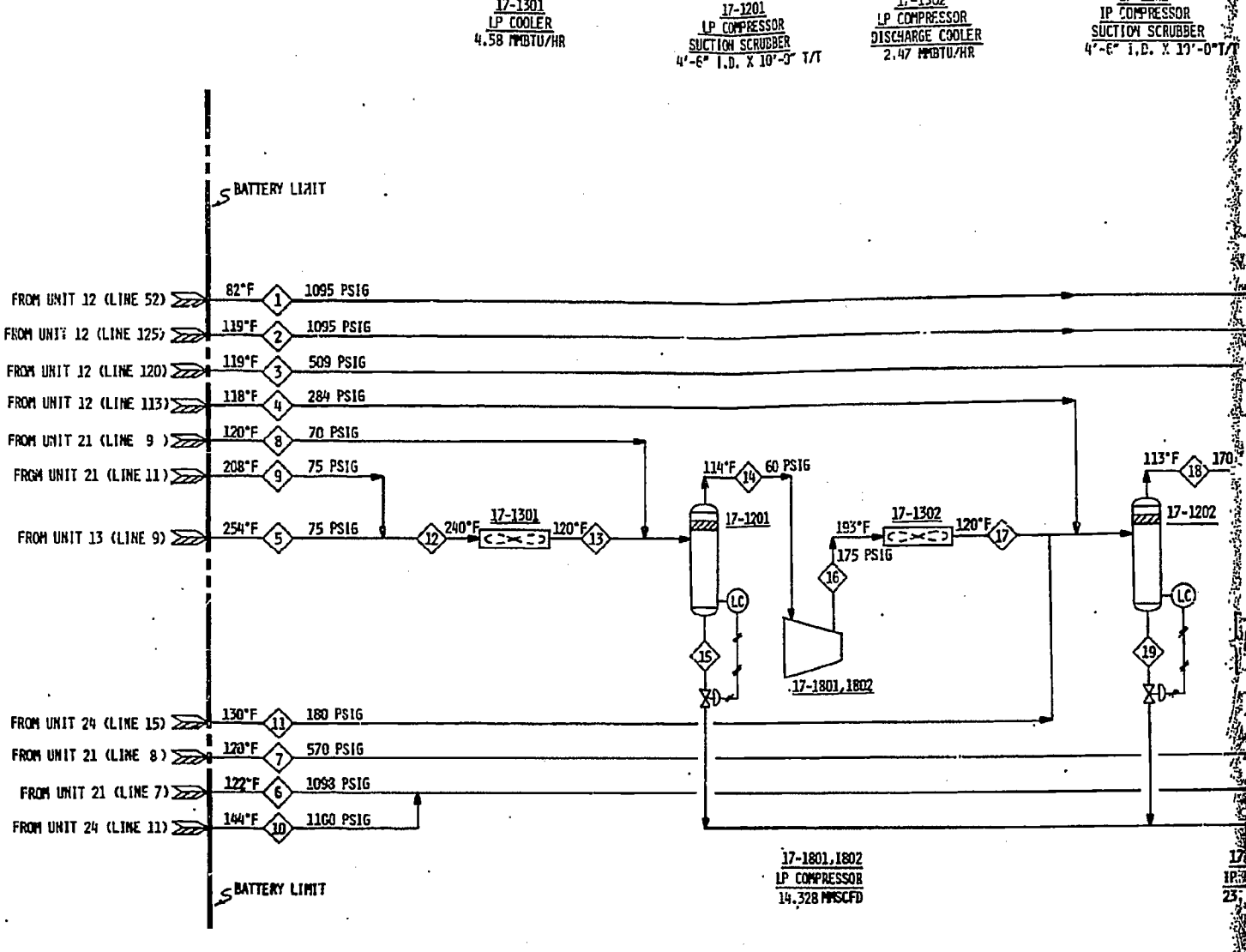
0			ISSUED FOR REPORT	[illegible]	[illegible]				
REV NO	[illegible]	DATE	REVISION	BY	PROC. ENGR.	CHECK	CHIEF PROC. ENGR.	CHIEF OPER. ENGR.	PROC. DIR.

DEPARTMENT OF ENERGY - DIVISION OF COAL CONVERSION
POGO PLANT
PROCESS FLOW DIAGRAM
PYROLYSIS ATMOSPHERIC DISTILLATION - UNIT 16

THE RALPH M. PARSONS COMPANY PASADENA, CALIFORNIA	JOB NO 5435-4	DWG. NO. R-16-FS-1	REV. 0

C

DR.RM. REV. A
DC-
ST-



STREAM NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	
STREAM NAME	UNIT 12 ACID GAS	UNIT 12 HP GAS	UNIT 12 MP GAS	UNIT 12 LP GAS	COMPRESSOR DISCHARGE	UNIT 21 HP GAS EXPANDED	UNIT 21 IP SEP VAPOR	UNIT 21 LP SEP VAPOR	UNIT 21 FRACT OVHD	UNIT 24 HP ACID GAS	UNIT 24 LP ACID GAS	GAS TO COOLER	GAS FROM COOLER	
COMP., MPH														
N2	38,057.04	1,117.63	600.64	247.25	161.91	591.15	330.39	50.28	2.07	206.37	47.20	163.98	163.98	
CO2	742.56	138.49	94.22	45.14	36.44	51.81	50.23	13.28	0.98	35.78	14.52	39.42	39.42	
C1	2,825.83	381.17	261.00	128.56	115.71	1.29	1.48	0.52	0.06	0.00	0.06	115.77	115.77	
C2	359.62	18.93	15.53	10.13	15.81	1.15	2.52	3.73	2.79	0.00	0.00	18.60	18.60	
H2S	0.00	0.18	0.32	0.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
C3	1,041.34	39.42	32.63	21.63	56.53	0.00	0.00	0.00	0.00	1.96	0.00	56.53	56.53	
IC4	32.20	5.58	6.45	7.18	74.95	0.97	2.42	6.53	21.13	1.96	0.50	96.08	96.08	
NC4	5,473.64	194.95	228.87	67.36	78.62	178.48	263.37	205.52	52.48	125.45	135.33	131.10	131.10	
IC5	1,361.02	74.84	65.18	45.26	130.92	12.29	24.98	41.78	42.49	15.65	61.31	173.41	173.41	
NC5	1,178.21	55.20	50.99	37.87	179.84	5.59	11.99	27.77	72.67	11.98	117.29	252.61	252.61	
C6	392.66	17.43	17.08	13.56	100.85	2.16	4.22	10.45	56.62	7.58	27.24	157.37	157.37	
180-200	72.87	3.24	3.34	2.88	23.09	1.18	2.17	5.46	48.35	0.98	0.00	81.44	81.44	
200-300	19.71	1.22	1.28	1.33	20.51	0.12	0.20	0.47	5.00	0.00	0.00	25.51	25.51	
300-350	1.01	0.19	0.18	0.18	3.65	0.02	0.02	0.05	0.59	0.00	0.00	4.24	4.24	
350-400	0.08	0.05	0.04	0.04	0.49	0.01	0.01	0.02	0.10	0.00	0.00	0.59	0.59	
400-450	0.00	0.02	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.01	
TOTAL, MPH	51,557.79	2,048.54	1,277.75	622.87	1,011.43	846.23	714.00	365.85	305.23	409.74	409.39	1,316.66	1,316.66	1,5
LB/HR	440,274.41	28,339.43	20,780.49	11,974.13	32,930.86	6,466.80	8,544.91	7,657.38	13,763.64	5,059.05	11,280.36	46,694.50	46,694.50	49,0
MSCFH	19,566	727	485	236	384	321	275	139	116	155	153	500	500	
BPD	-	-	-	-	-	-	-	-	-	-	-	-	-	
M.W.	8.54	13.83	16.26	18.22	32.56	7.64	11.97	20.96	45.09	12.35	27.96	35.46	35.46	
LB/GAL @ 60°F	1.8819	2.9471	3.3791	3.5848	4.3730	1.6792	2.2646	3.0456	4.4888	4.1185	3.4682	4.4065	4.4065	

A

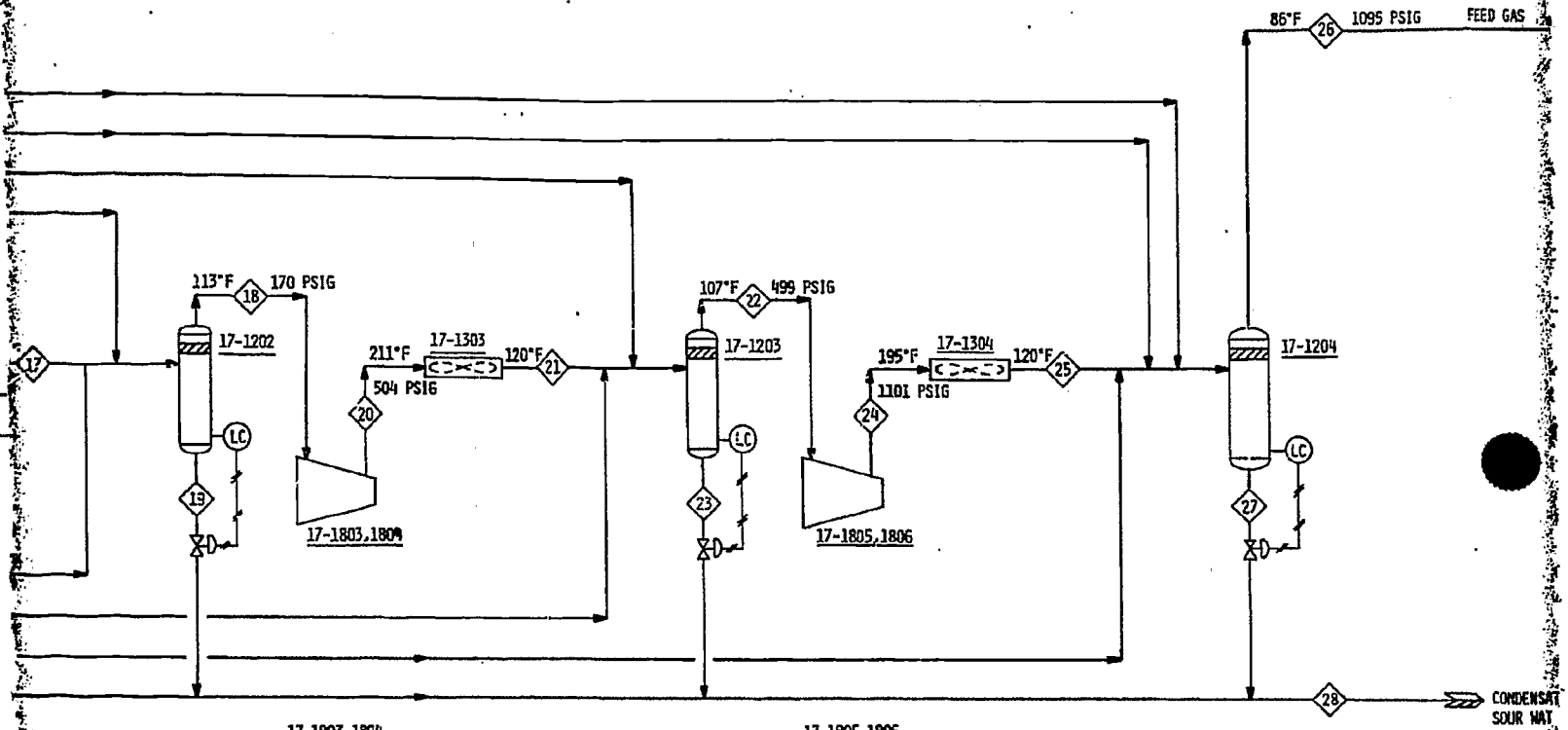
17-1202
IP COMPRESSOR
SUCTION SCRUBBER
4'-6" I.D. X 10'-0" T/T

17-1303
IP COMPRESSOR
DISCHARGE COOLER
4.70 MMBTU/HR

17-1203
HP COMPRESSOR
SUCTION SCRUBBER
4'-6" I.D. X 10'-0" T/T

17-1304
HP COMPRESSOR
DISCHARGE COOLER
4.65 MMBTU/HR

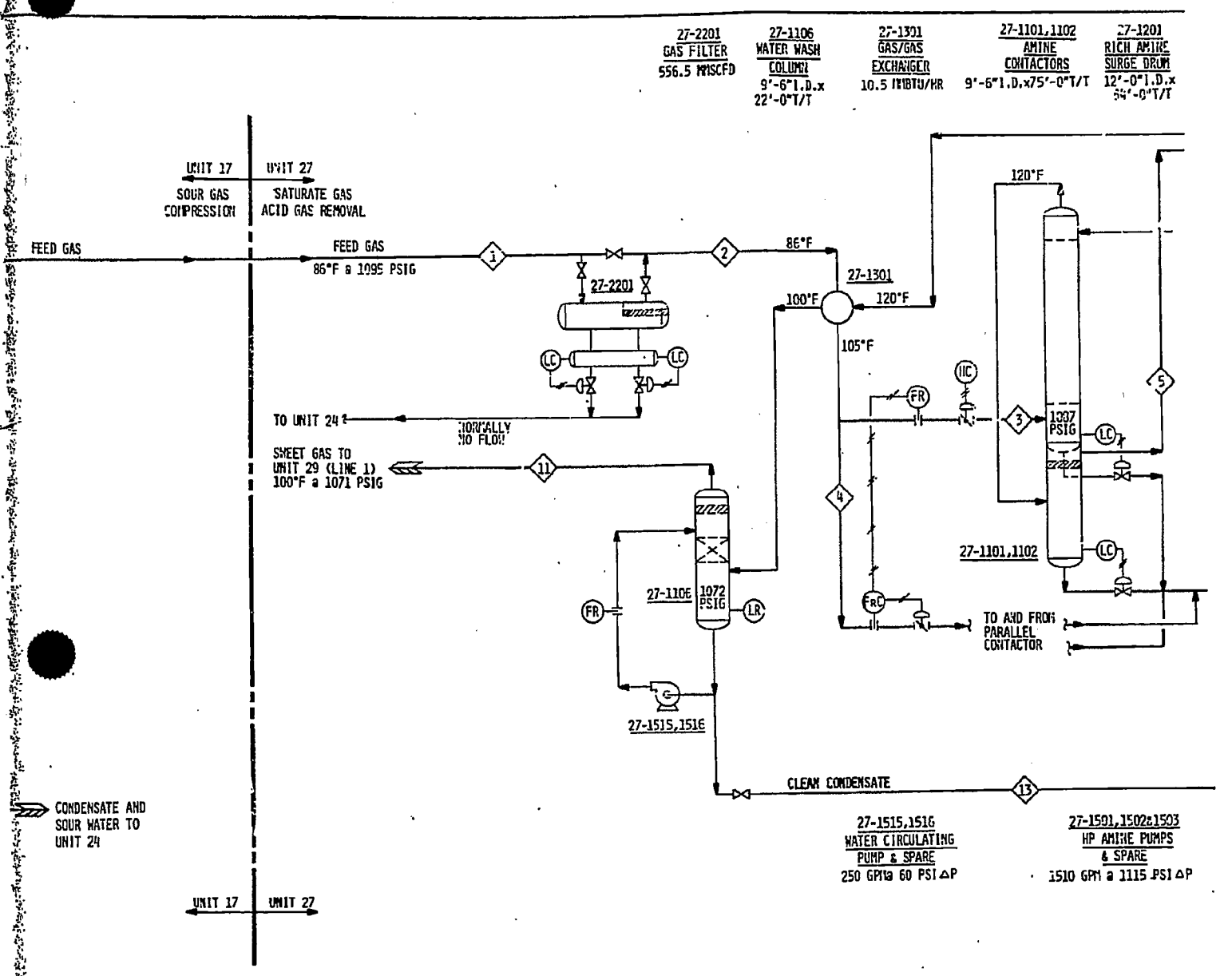
17-1204
HP GAS SCRUBBER
8'-6" I.D. X 11'-6" T/T



17-1803,1804
IP COMPRESSOR
23.291 MMSCFD

17-1805,1806
HP COMPRESSOR
40.509 MMSCFD

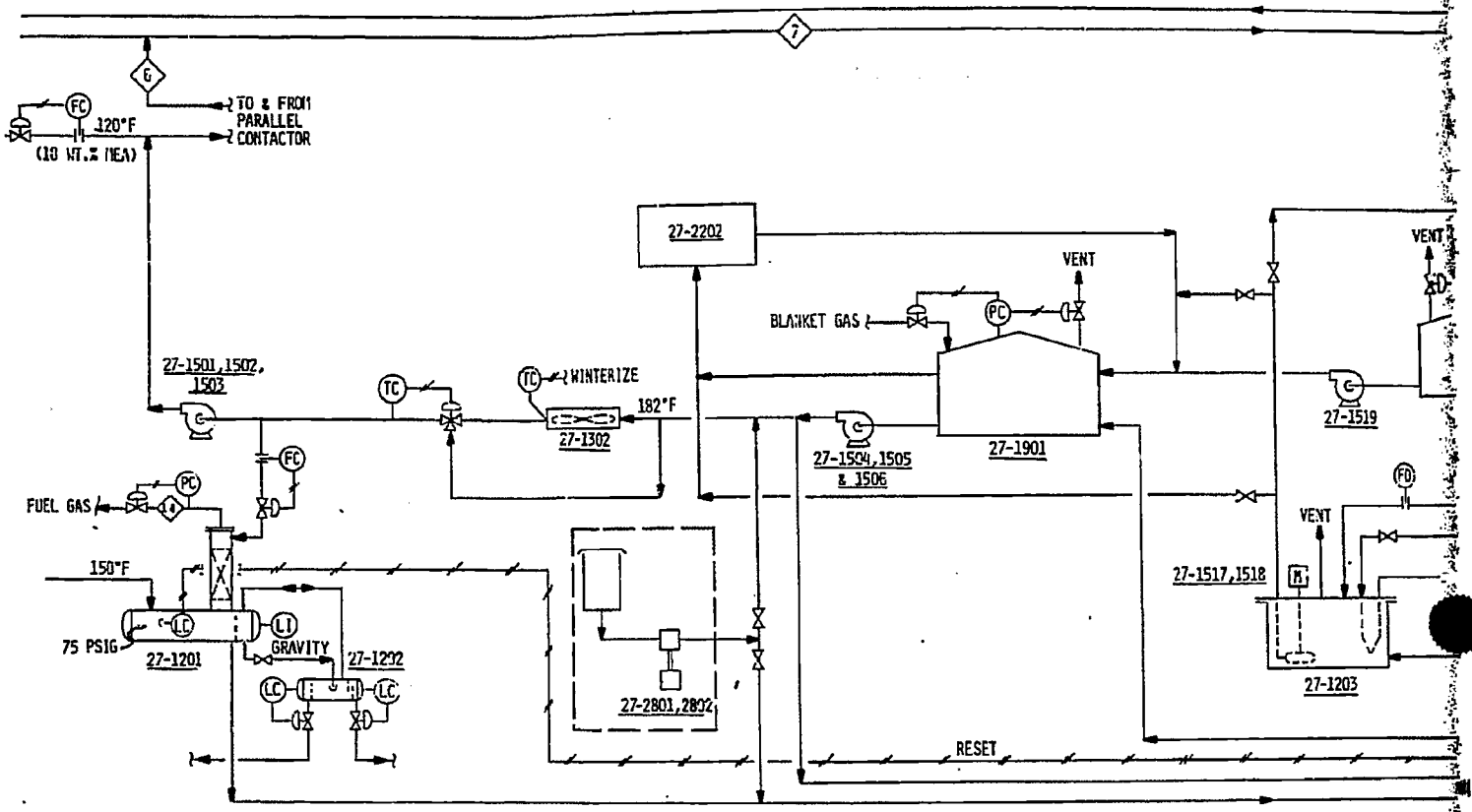
	12	13	14	15	16	STREAM NO.	17	18	19	20	21	22	23	24	25	26
TAG	GAS TO COOLER	GAS FROM COOLER	GAS TO LP COMP	LIQUID FROM SUCT DRUM	LP COMP DISCHARGE	STREAM NAME	LP COOLER TOTAL OUTLET	GAS OFF IP SUCT DRUM	LIQ OFF IP SUCT DRUM	IP COMP DISCHARGE	IP COOLER TOTAL OUTLET	HP SUCT DRUM VAPOR	HP SUCT DRUM LIQUID	HP COMP DISCHARGE	HP COOLER TOTAL OUTLET	AMINE TO PLT FEED
						COMP., MPH										
	163.98	163.98	214.23	0.01	214.23	H_2	214.23	502.66	0.02	502.66	502.66	1,433.14	0.55	1,433.14	1,433.14	41,406.98
	39.42	39.42	52.69	0.01	52.69	N_2	52.69	112.33	0.02	112.33	112.33	256.46	0.32	256.46	256.46	1,225.86
	115.77	115.77	116.27	0.02	116.27	CO	116.27	244.77	0.06	244.77	244.77	506.40	0.84	506.40	506.40	3,714.52
	18.60	18.60	22.31	0.02	22.31	CO_2	22.31	32.40	0.03	32.40	32.40	50.15	0.31	50.15	50.15	429.7
	0.00	0.00	0.00	0.00	0.01	NH_3	0.00	0.49	0.00	0.49	0.49	0.78	0.03	0.78	0.78	0.96
	56.53	56.53	56.31	0.22	56.31	H_2S	56.31	77.65	0.29	77.65	77.65	108.35	1.93	108.35	108.35	1,190.08
	96.08	96.08	28.70	73.91	28.70	H_2O	28.70	19.03	17.35	19.03	19.03	10.93	16.97	10.93	10.93	35.26
	131.10	131.10	336.47	0.15	336.47	C1	336.47	538.87	0.29	538.87	538.87	947.99	3.12	947.99	947.99	6,919.77
	173.41	173.41	214.70	0.49	214.70	C2	214.70	320.47	0.80	320.47	320.47	405.04	5.58	405.04	405.04	1,867.88
	252.61	252.61	278.38	2.00	278.38	C3	278.38	430.27	3.27	430.27	430.27	474.62	18.63	474.62	474.62	1,722.44
	157.37	157.37	164.14	3.68	164.14	N_4	164.14	200.34	4.60	200.34	200.34	199.40	22.24	199.40	199.40	615.58
	81.44	81.44	77.66	9.24	77.66	180-200	77.66	72.57	7.57	72.57	72.57	53.02	25.07	53.02	53.02	127.46
	25.51	25.51	10.07	15.81	10.07	200-300	10.07	5.25	6.15	5.25	5.25	1.35	5.38	1.35	1.35	16.02
	4.24	4.24	0.48	3.81	0.48	300-350	0.48	0.11	0.56	0.11	0.11	0.02	0.29	0.02	0.02	0.48
	0.59	0.59	0.02	0.59	0.02	350-400	0.02	0.00	0.06	0.00	0.00	0.00	0.05	0.00	0.00	0.02
	0.01	0.01	0.00	0.02	0.00	400-450	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1,316.66	1,316.66	1,572.43	110.08	1,572.43	TOTAL, MPH	1,572.43	2,557.21	41.48	2,557.21	2,557.21	4,447.65	101.31	4,447.65	4,447.65	2.06
	46,694.50	46,694.50	49,801.44	4,560.44	49,801.44	LB/HR	49,801.44	70,930.25	2,125.69	70,930.25	70,930.25	94,830.92	5,424.73	94,830.92	94,830.92	573,125.48
	500	500	597	-	597	MSCFH	597	970	-	970	970	1,688	-	1,688	1,688	22,494
	-	-	-	38	-	BPD	-	-	203	-	-	-	600	-	-	-
	35.46	35.46	31.67	41.43	31.67	M.W.	31.67	27.74	51.25	27.74	27.74	21.32	53.55	21.32	21.32	9.61
	4.4065	4.4065	4.0007	6.8470	4.0087	LB/GAL @ 60°F	4.0087	3.7961	5.9755	3.7961	3.7961	3.4178	5.7687	3.4178	3.4178	2.0098



	26	27	28
	AMINE PLT FEED	LIQUID FROM KO DRUM	CONDENSATE TO UNIT 24
.14	41,406.98	0.34	0.93
	1,225.06	0.04	0.39
.40	3,714.52	0.10	1.10
.16	429.76	0.10	0.46
.278	0.96	0.00	0.03
.215	1,190.01	1.06	3.50
.53	35.26	16.39	124.61
.99	6,919.77	0.74	4.30
.04	1,867.81	1.06	7.54
.62	1,722.44	3.16	27.06
.40	615.58	3.65	34.17
.02	127.45	3.84	46.11
.35	16.03	6.37	33.81
.82	0.41	0.82	5.48
.00	9.02	0.12	0.82
.11	0.00	0.02	0.05
.65	59,272.06	37.89	210.76
	3,155.49	1,815.12	13,915.97
	22,494	-	-
	-	171	1,354
.32	9.67	47.91	47.90
	2.0690	6.0721	5.8753

C

27-1202 AMINE/OIL SEPARATOR	27-1203 AMINE SUMP	27-2801,2802 INHIBITOR/ANTIFOAM INJECTORS	27-1302 AMINE COOLER	27-2202 AMINE FILTER (PACKAGE)	27-1901 AMINE SURGE TANK	27-1902 AMINE STORAGE TANK	27-1303 AMINE EXCHANGER
3'-6"I.D.x 3'-0"T/T	8'-0"I.D.x6'-0"	0.083 GPH @ 200 PSIG	80.9 MMBTU/HR	270 GPM	35'-0"I.D.x 24'-0"	12'-0"I.D.x12'-0"	105.2 MMBTU/HR



27-1504,1505,1506
AMINE BOOSTER PUMP & SPARE
1535 GPM @ 60 PSI ΔP

27-1517,1518
AMINE SUMP PUMP & SPARE
50 GPM @ 60 PSI ΔP

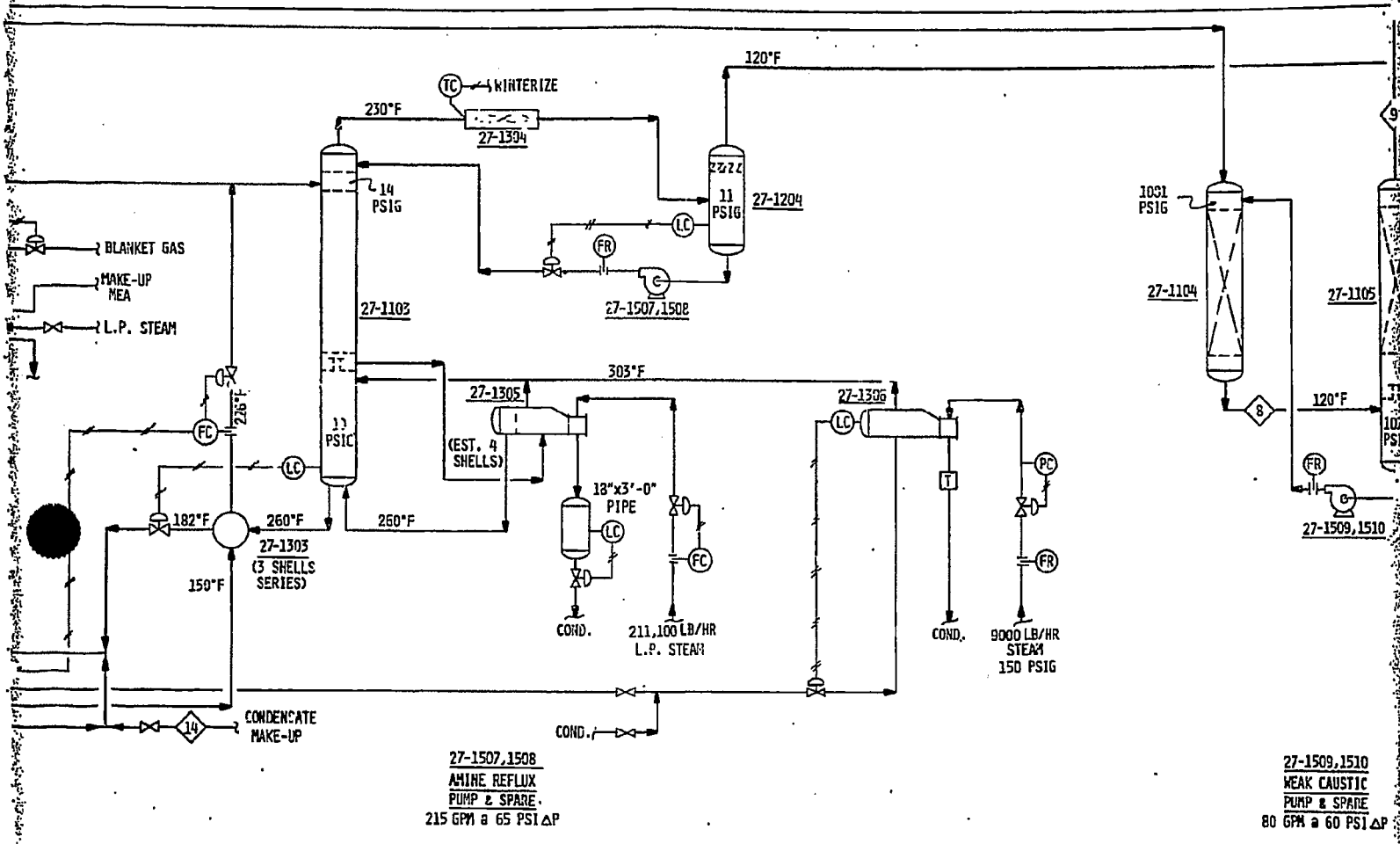
AMINE

50 GP

STREAM NO.	1	2	3	4	5	6	7	8	
STREAM NAME	TOTAL FEED GAS	TOTAL FEED GAS	AMINE CONTACTOR FEED	AMINE CONTACTOR FEED	AMINE CONTACTOR EFFLUENT	AMINE CONTACTOR EFFLUENT	CAUSTIC PRECONTACTOR FEED	CAUSTIC PRECONTACTOR EFFLUENT	CAUS CONTA EFFL
COMP., MPH									
H_2	41,406.98	41,406.98	20,703.49	20,703.49	20,672.02	20,672.02	41,344.04	41,344.04	41,34
N_2	1,225.06	1,225.06	612.53	612.53	611.35	611.34	1,222.69	1,222.69	1,22
CO	3,714.51	3,714.51	1,857.26	1,857.25	1,855.49	1,855.50	3,710.99	3,710.99	3,71
CO_2	430.22	430.22	215.11	215.11	-	-	-	-	
NH_3	0.96	0.96	0.48	0.48	-	-	-	-	
H_2S	1,193.51	1,193.51	596.75	596.76	-	-	-	-	
H_2O	35.26	35.26	17.63	17.63	44.04	44.04	88.08	88.08	
C_1	6,919.77	6,919.77	3,459.89	3,459.88	3,454.12	3,454.12	6,908.23	6,808.24	6,90
C_2	1,867.81	1,867.81	933.90	933.91	932.42	932.42	1,864.84	1,864.84	1,86
C_3	1,722.44	1,722.44	861.22	861.22	860.16	860.16	1,720.32	1,720.32	1,72
C_4	615.58	615.58	307.79	307.79	307.38	307.37	614.75	614.75	61
180-200°F	127.45	127.45	63.73	63.72	63.49	63.49	126.98	126.98	
200-300°F	16.03	16.03	8.01	8.02	8.01	8.02	16.03	16.03	
300-350°F	0.41	0.41	0.20	0.21	0.20	0.21	0.41	0.41	
350-400°F	0.02	0.02	0.01	0.01	0.01	0.01	0.02	0.02	
400-450°F	-	-	-	-	-	-	-	-	
TOTAL, MPH	59,276.01	59,276.01	29,633.00	29,633.01	28,808.69	28,808.70	57,617.39	57,617.39	
LB/HR	573,295	573,295	286,647	286,648	256,836	256,836	513,672	513,672	
MSCFH	22,495	22,495	11,247	11,248	10,947	10,947	21,894	21,894	
BPD	-	-	-	-	-	-	-	-	
M.W.	9.672	9.672	9.672	9.672	8.915	8.915	8.915	8.915	
LB/GAL @ 60°F	-	-	-	-	-	-	-	-	

NOTE: STREAM 1 IN UNIT 27 INCLUDES 0.46 MOLS/HR OF CO_2 AND 3.50 MOL/HR OF H_2S REC
UNIT 24 IN CONDENSATES FROM UNIT 17.

27-1103 AMINE REGENERATOR	27-1304 AMINE CONDENSER	27-1305 AMINE REBOILER	27-1204 AMINE REFLUX DRUM	27-1306 AMINE RECLAIMER	27-1104 CAUSTIC PRECONTACTOR	27-1105 CAUSTIC CONTACTOR
14'-0"I.D.x 70'-0"T/T	83.3 MMBTU/HR	178.2 MMBTU/HR	7'-6"I.D.x12'-0"T/T	7.64 MMBTU/HR	5'-6"I.D.x36'-0"	9'-6"I.D.x45'-0"

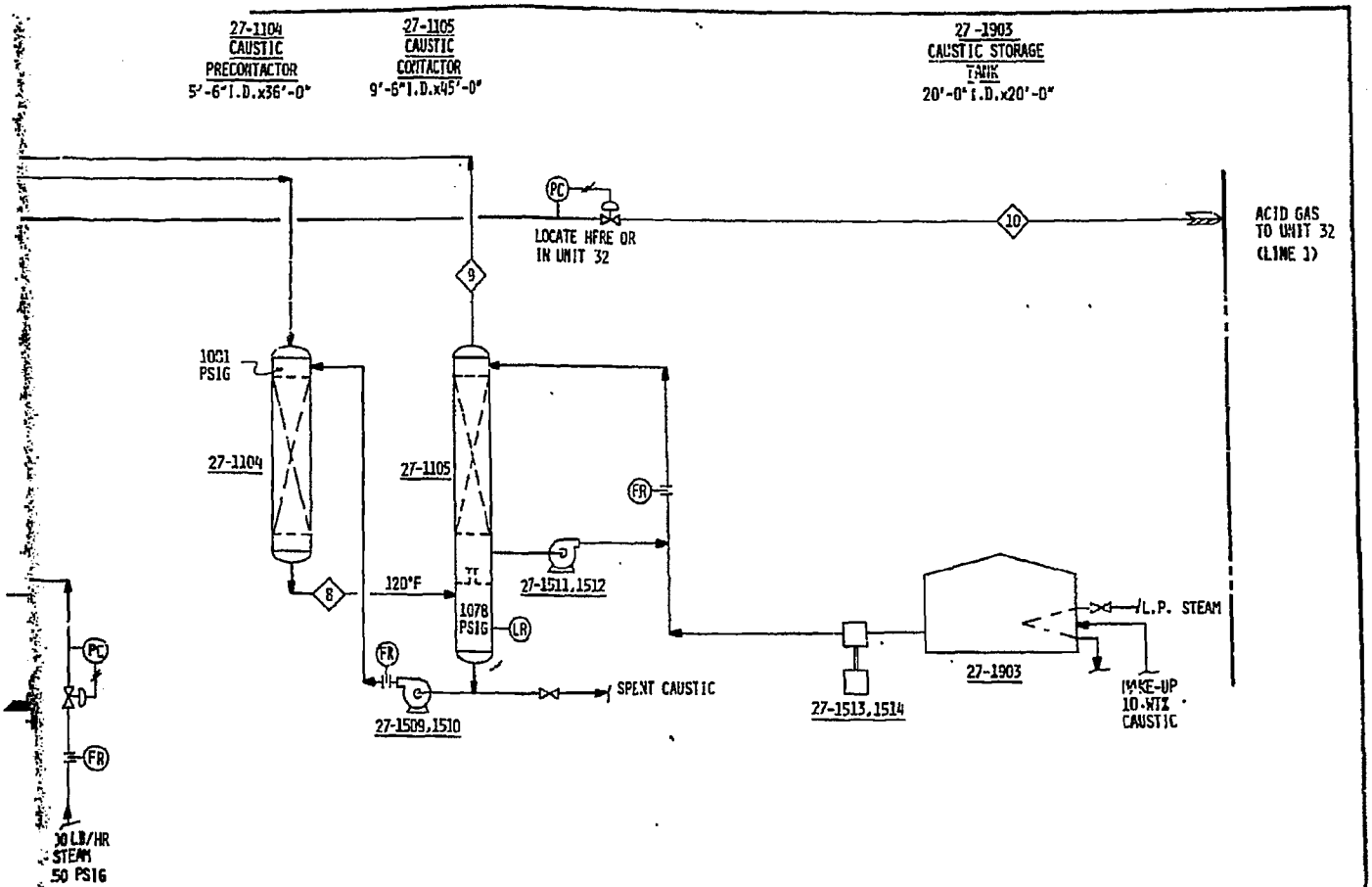


27-1507,1508
AMINE REFLUX PUMP & SPARE.
215 GPM @ 65 PSI ΔP

27-1509,1510
WEAK CAUSTIC PUMP & SPARE
80 GPM @ 60 PSI ΔP

⟨11⟩ SWEET GAS	⟨12⟩ FUEL GAS	⟨13⟩ COND. RECYCLE	⟨14⟩ COND. MAKEUP
81,344.04	57.89	-	-
1,222.69	2.19	-	-
3,710.99	3.26	-	-
-	-	-	-
-	-	-	-
50.37	3.32	37.71	131.00
6,908.24	10.60	-	-
1,864.84	2.73	-	-
1,720.32	1.94	-	-
614.75	0.77	-	-
126.38	0.45	-	-
16.03	-	-	-
0.41	-	-	-
0.02	-	-	-
-	-	-	-
[illegible]	83.15	37.71	131.00
[illegible]993	949	679	2,360
21,880	32	-	-
-	-	47	162
8.909	9.009	18.016	18.016
-	-	8.329	8.329

B



27-1509,1510
WEAK CAUSTIC
PUMP & SPARE
80 GPM @ 60 PSI ΔP

27-1511,1512
STRONG CAUSTIC
PUMP & SPARE
250 GPM @ 60 PSI ΔP

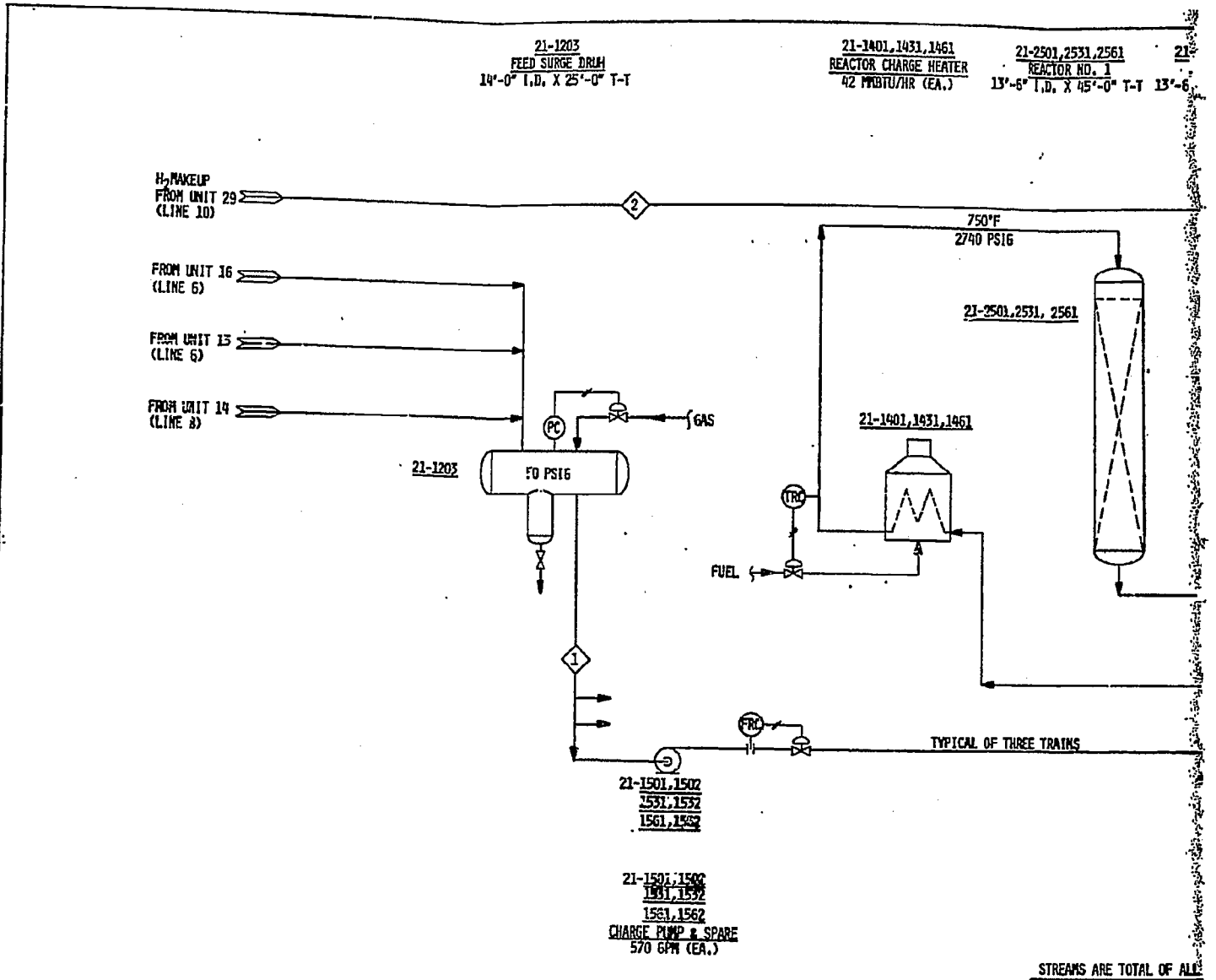
27-1513,1514
CAUSTIC MAKE-UP
PUMP & SPARE
7 GPM @ 1120 PSI ΔP

			ISSUED FOR REPORT								
0				LOS							
DRY NO.	CHKD APPD	DATE	REVISIONS	BY	PROJ ENGR	CHK ENGR	PROJ MGR	CHKD MGR	PROJ DIR		

DEPARTMENT OF ENERGY - DIVISION OF COAL CONVERSION
POGO PLANT
PROCESS FLOW DIAGRAM
SOUR GAS COMPRESSION - UNIT 17 &
SATURATE GAS ACID GAS REMOVAL - UNIT 27

THE RALPH M. PARSONS COMPANY PASADENA, CALIFORNIA	JOB NO. 5435-4	DRWG NO. R-17/27-FS-1	REV 0

BY
BY-


21-1203
FEED SURGE DRUM
14'-0" I.D. X 25'-0" T-T
21-1401,1431,1461
REACTOR CHARGE HEATER
42 MMBTU/HR (EA.)
21-2501,2531,2561
REACTOR NO. 1
13'-6" I.D. X 45'-0" T-T
13'-6
H2 MAKEUP
FROM UNIT 29
(LINE 10)
FROM UNIT 16
(LINE 6)
FROM UNIT 15
(LINE 6)
FROM UNIT 14
(LINE 8)
750°F
2740 PSIG
21-2501,2531, 2561
21-1401,1431,1461
PC
GAS
21-1203
FO PSIG
TRC
FUEL
FRC
TYPICAL OF THREE TRAINS
21-1501,1502
1531,1532
1561,1562
21-1501,1502
1531,1532
1561,1562
CHARGE PUMP & SPARE
570 GPM (EA.)
STREAMS ARE TOTAL OF ALL
STREAM NO.
STREAM NAME
FEED
TOTAL
LB/HR
MSCFD
LB/GAL (60)

21-2501,2531,2561
REACTOR NO. 1
-6" I.D. X 45'-0" T-T

21-2502,2532,2562
REACTOR NO. 2
13'-6" I.D. X 45'-0" T-T

21-1302,1332,1362
COMBINED CHARGE/EFFLUENT
HEAT EXCHANGER
185 MMBTU/HR (EA.)

21-1301,1331,1361
RECYCLE/EFFLUENT
HEAT EXCHANGER
189 MMBTU/HR (EA.)

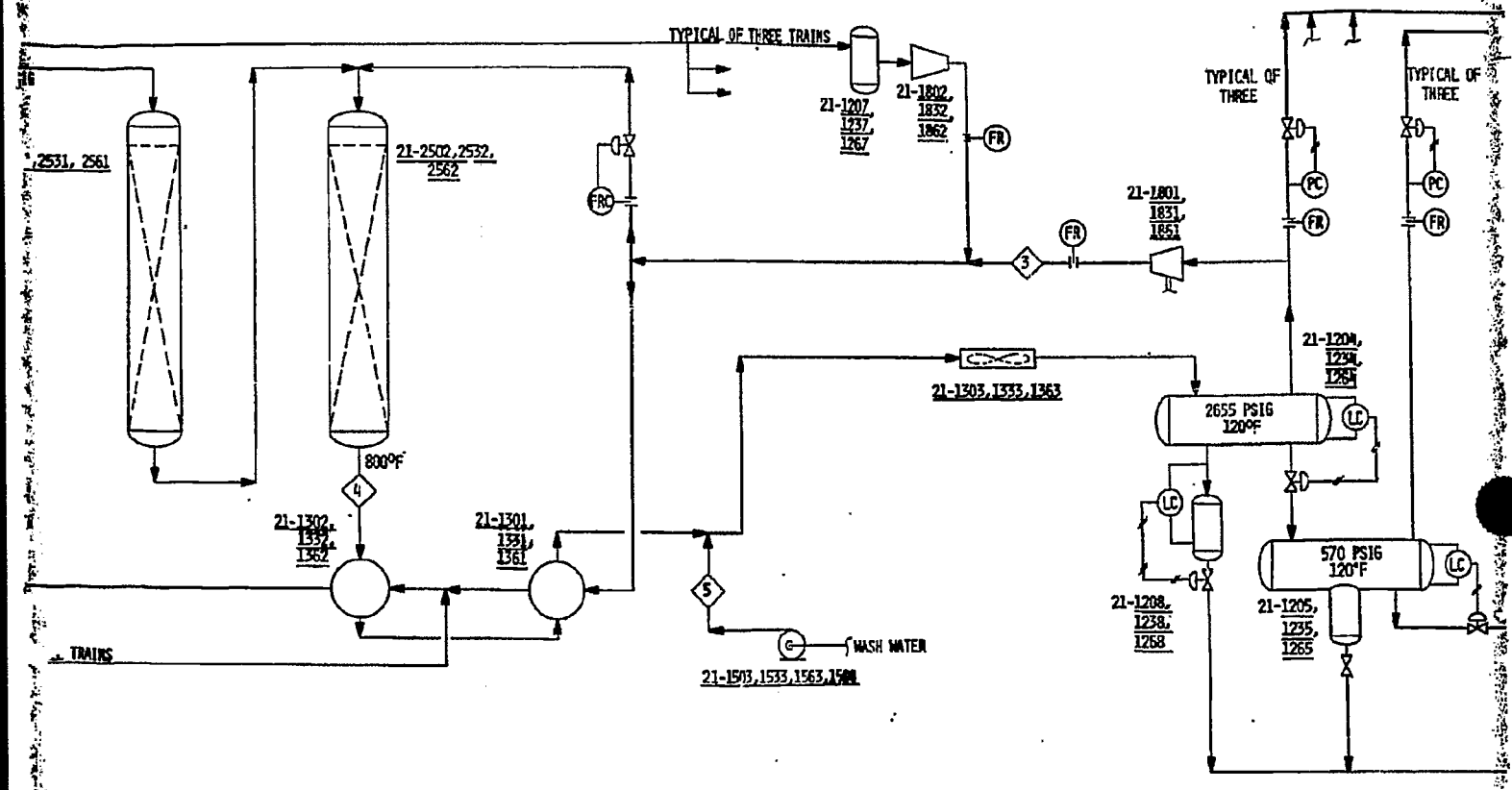
21-1207,1237,1267
SUCTION K.O. DRUM
3'-0" ID X 10'-0" T-T

21,1303,1333,1363
EFFLUENT AIR COOLER
140 MMBTU/HR (EA.)

21-1208,1238,1268
SOUR WATER DRUM
3'-0" ID X 7'-6" T/T

21-1204,1234,1264
HIGH PRESS SEPARATOR
6'-8" ID X 17'-0" T/T

21,1205,12
INTER PRESS
5'-6" ID X



21-1503,1533,1563 & 21-1508
WASH WATER PUMP & SPARE
69 GPM (EA.)

21-1602,1832,1862
MAKE-UP COMPRESSOR
33.1 MMSCFD (EA.)

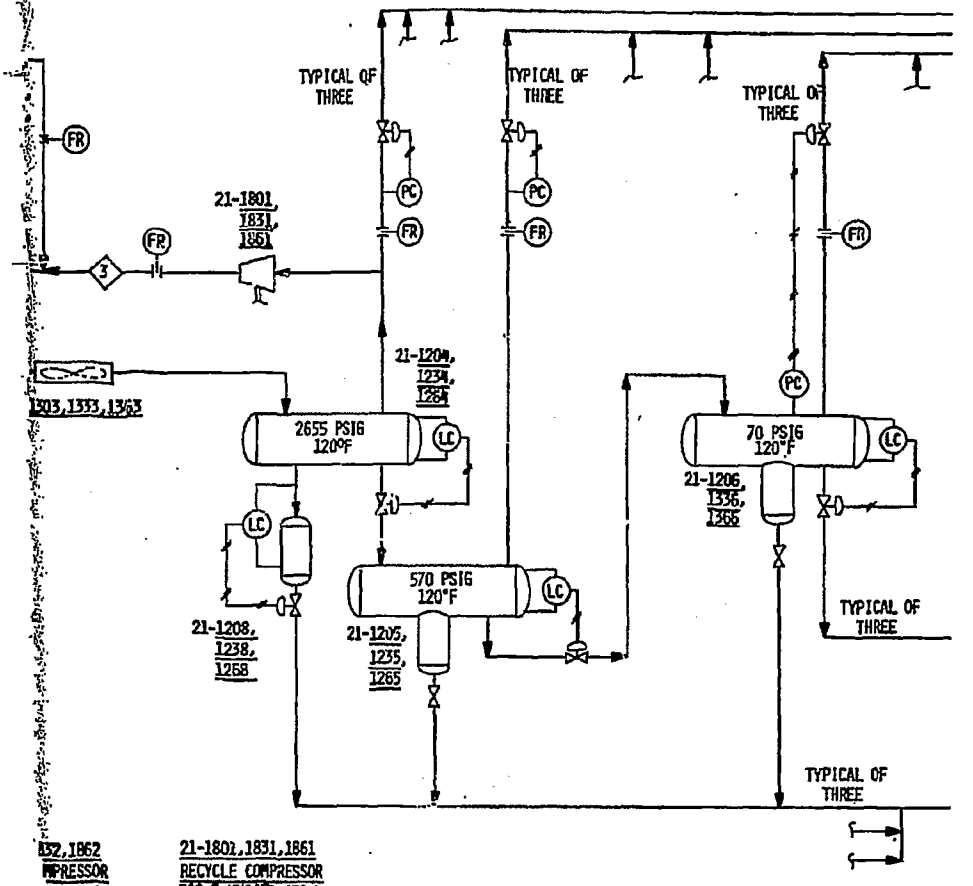
21-1801,1831,1861
RECYCLE COMPRESSOR
566.5 MMSCFD (EA.)

STREAMS ARE TOTAL OF ALL TRAINS

STREAM NO.	①	②	③	④	⑤	⑥	⑦	⑧	STREAM NO.	⑨	⑩	⑪	⑫	⑬
STREAM NAME	FEED	H_2 MAKEUP	RECYCLE	TOTAL REACTOR EFFLUENT	WASH WATER	SOUR WATER	HP SEPARATOR WATER VAPOR	IP SEPARATOR VAPOR	STREAM NAME	LP SEPARATOR VAPOR	FRACTIONATOR FEED	FRACTIONATOR OFF-GAS	NAPHTHA	DISTILLATE
H_2	-	10,404.82	130,139.35	131,285.35	-	-	574.23	338.93	H_2	48.82	2.82	2.81	0.81	-
C_1	-	112.97	11,424.05	11,537.03	-	-	50.33	48.79	C_1	12.90	0.96	0.96	0.81	-
C_2	-	-	283.91	287.16	-	-	1.26	1.44	C_2	0.81	0.86	0.86	-	-
C_3	-	-	256.83	266.95	-	-	1.13	2.66	C_3	3.62	2.90	2.71	0.19	-
C_4	-	-	-	446.00	-	445.02	-	-	C_4	-	-	-	-	-
C_5	-	-	-	129.75	-	129.75	-	-	C_5	-	-	-	-	-
C_6	-	4.72	212.94	2,327.76	5,671.88	8,014.78	0.94	2.36	C_6	6.34	47.83	28.53	12.78	-
C_7	-	361.28	39,352.46	40,061.91	-	-	173.37	276.28	C_7	195.54	52.17	50.98	1.19	-
C_8	-	-	2,719.08	2,832.38	-	-	11.84	24.52	C_8	40.88	46.51	41.27	4.24	-
C_9	-	-	1,233.11	1,370.31	-	-	8.43	11.86	C_9	25.95	99.16	78.98	22.57	-
C_{10}	-	-	475.36	803.48	-	-	2.18	4.38	C_{10}	10.15	111.71	53.98	56.80	-
180-200	-	-	260.98	619.14	-	-	1.16	2.11	180-200	5.38	340.59	46.97	302.62	-
200-400	214.82	-	31.20	930.86	-	-	0.14	0.72	200-400	0.83	888.73	5.53	879.35	283.99
400-450	414.36	-	0.89	344.17	-	-	-	-	400-450	0.01	343.66	-	10.31	333.25
450-500	364.90	-	0.21	388.82	-	-	-	-	450-500	-	398.61	-	-	398.61
500-650	888.03	-	0.08	1,080.87	-	-	-	-	500-650	-	1,000.00	-	-	903.97
650-700	233.96	-	-	283.87	-	-	-	-	650-700	-	283.87	-	-	85.16
700+	1,348.10	-	-	466.01	-	-	-	-	700+	-	466.00	-	-	-
TOTAL	3,443.65	10,983.79	186,581.14	195,371.60	5,671.88	8,589.56	822.01	693.87	TOTAL	366.38	6,287.47	326.48	1,080.99	1,926.98
LB/HR	831,471.64	30,342.65	1,423,426.23	2,285,203.30	102,184.42	156,394.15	8,271.10	8,281.20	LB/HR	7,398.06	780,784.28	12,963.58	116,588.82	369,137.45
GAL/HR (60)	90,689.85	-	-	-	12,269.88	-	-	-	GAL/HR (60)	-	103,088.86	-	16,486.10	47,281.48
MSCFD	-	99,311.74	1,699,581.06	-	-	-	7,467.07	6,316.98	MSCFD	3,236.83	-	2,700.56	-	-
PH	240.86	2.78	7.83	11.70	10.02	-	7.66	11.94	PH	20.82	164.63	43.72	102.49	191.73
LB/GAL (60)	9.168	-	-	-	8.329	-	-	-	LB/GAL (60)	-	7.571	-	6.764	7.807

B

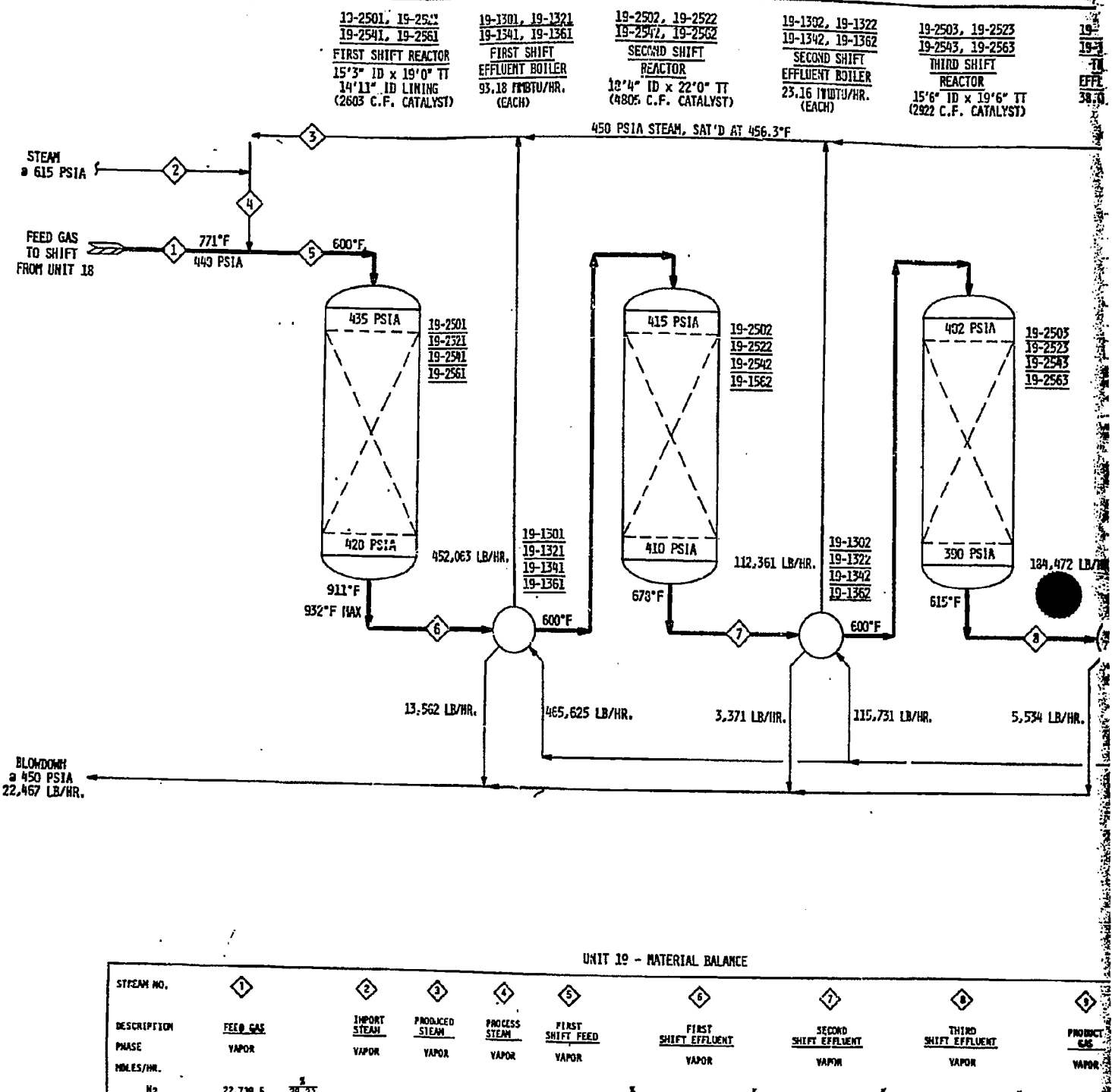
03,1333,1363 AIR COOLER MBTU/HR (EA.)	21-1208,1238,1268 SOUR WATER DRUM 3'-0" ID X 7'-6" T/T	21-1209,1234,1264 HIGH PRESS SEPARATOR 6'-8" ID X 17'-0" T/T	21,1205,1235,1265 INTER PRESS SEPARATOR 5'-6" ID X 13'6" T/T	21-1206,1236,1266 LOW PRESS SEPARATOR 5'-6" ID X 18'-6" T/T



852,1862 MPRESSOR D (EA.)	21-1801,1831,1861 RECYCLE COMPRESSOR 566.5 MMSCFD (EA.)

STREAMS ARE TOTAL OF ALL TRAINS

⑨ LP SEPARATOR VAPOR	⑩ FRACTIONATOR FEED	⑪ FRACTIONATOR OFF-GAS	⑫ NAPHTHA	⑬ DISTILLATE	⑭ BOTTOMS	⑮ STEAM TO FRACTIONATOR	⑯ STEAM TO STRIPPER
46.82	2.02	2.01	0.01	-	-	-	-
12.95	0.86	0.85	0.01	-	-	-	-
0.81	0.08	0.08	-	-	-	-	-
3.62	2.90	2.71	0.19	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
6.34	47.83	29.33	18.78	-	-	170.70	99.97
199.64	52.17	50.98	1.19	-	-	-	-
40.58	46.81	41.27	4.26	-	-	-	-
26.98	93.16	70.59	22.57	-	-	-	-
10.15	111.71	54.90	56.80	-	-	-	-
5.38	349.89	46.97	302.92	-	-	-	-
0.83	888.73	5.53	879.25	203.99	-	-	-
0.01	343.54	-	10.31	333.25	-	-	-
-	398.81	-	-	398.81	-	-	-
-	1,000.80	-	-	903.97	96.84	-	-
-	283.87	-	-	85.16	198.71	-	-
-	646.00	-	-	-	646.01	-	-
365.30	4,257.47	296.49	1,089.99	1,924.98	941.56	170.70	99.97
7,299.86	790,794.28	12,943.59	110,556.82	369,137.45	297,877.72	3,075.12	1,800.86
-	103,088.86	-	15,486.10	47,281.48	36,486.00	-	-
3,236.83	-	2,700.56	-	-	-	-	-
20.82	184.43	43.72	102.49	191.75	309.78	18.016	18.016
-	7.671	-	6.706	7.607	8.164	-	-



UNIT 19 - MATERIAL BALANCE

STREAM NO.	1		2	3	4	5	6		7		8		9
DESCRIPTION	FEED GAS		IMPORT STEAM	PRODUCED STEAM	PROCESS STEAM	FIRST SHIFT FEED	FIRST SHIFT EFFLUENT		SECOND SHIFT EFFLUENT		THIRD SHIFT EFFLUENT		PRODUCT GAS
PHASE	VAPOR		VAPOR	VAPOR	VAPOR	VAPOR	VAPOR		VAPOR		VAPOR		VAPOR
MOLES/HR.		%						%		%		%	
H_2	22,739.5	28.33				22,739.5	16.93	45,683.7	34.02	51,336.7	38.23	52,429.3	39.04	52,422.6
CH_4	666.9	.83				666.9	.50	666.9	.50	666.9	.50	666.9	.50	666.9
CO	32,622.7	40.64				32,622.7	24.30	9,678.6	7.21	4,025.5	3.00	2,932.9	2.18	2,932.5
CO_2	10,705.3	13.33				10,705.3	7.97	33,660.5	25.07	39,318.5	29.28	40,412.4	30.10	40,246.3
N_2	775.2	.07				779.2	.58	779.2	.58	779.2	.58	779.2	.58	779.2
NH_3	17.0	.02				17.0	.01	17.0	.01	17.0	.01	17.0	.01	-
H_2S	1,026.1	1.28				1,026.1	.76	1,037.1	.77	1,042.2	.78	1,043.5	.78	1,030.2
COS	21.5	.03				21.5	.02	10.4	.007	5.4	.004	4.1	.003	-
H_2O	11,693.8	14.57	12,440.1	41,568.4	54,008.5	65,702.3	48.93	42,747.1	31.83	37,089.1	27.62	35,995.2	26.81	243.9
TOTAL MOL/HR.	80,272.0	100.00	12,440.1	41,568.4	54,008.5	134,280.5	100.00	134,280.5	100.00	134,280.5	100.00	134,280.5	100.00	130.9
TOTAL LBA/HR.	1,710,499		224,120	748,896	973,016	2,683,515		2,683,515		2,683,515		2,683,515		1,253
MOLECULAR WT.	21.31		18.016	18.016	18.016	19.98		19.98		19.98		19.98		20,66
MSCFD	731,117		113,304	378,605	491,909	1,223,027		1,223,027		1,223,027		1,223,027		895,598

-1302, 19-1322
-1342, 19-1362
SECOND SHIFT
UENT BOILER
16 MMBTU/HR.
(EACH)

19-2503, 19-2523
19-2543, 19-2563
THIRD SHIFT
REACTOR
15'6" ID x 19'6" TT
(2322 C.F. CATALYST)

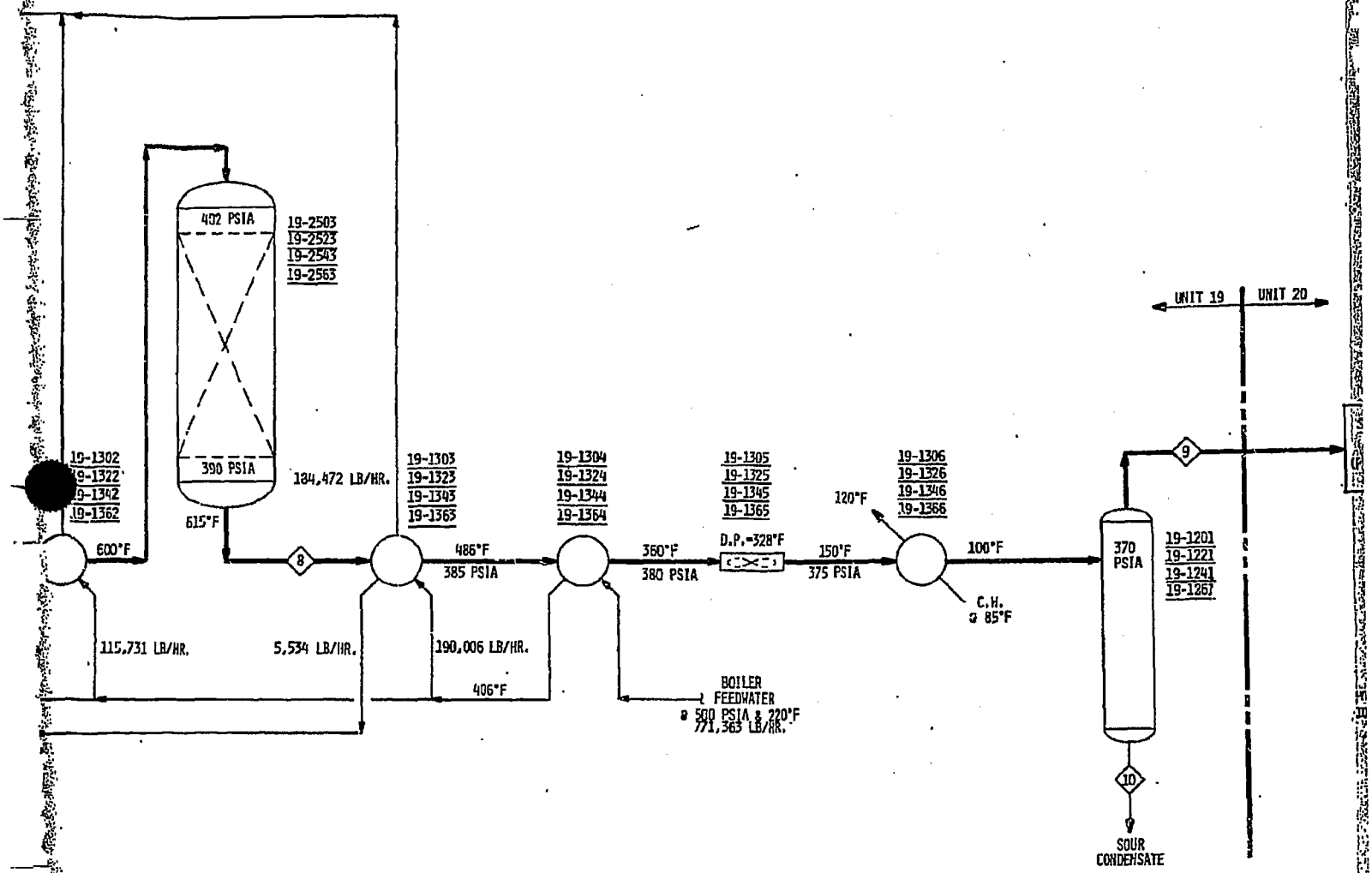
19-1303, 19-1323
19-1343, 19-1363
THIRD SHIFT
EFFLUNT BOILER
38.03 MMBTU/HR.
(EACH)

19-1304, 19-1324
19-1344, 19-1364
BOILER FEEDWATER
HEATER
37.35 MMBTU/HR.
(EACH)

19-1305, 19-1325
19-1345, 19-1365
SHIFT EFFLUENT
AIR COOLER
215.11 MMBTU/HR.
(EACH)

19-1306, 19-1326
19-1346, 19-1366
SHIFT EFFLUENT
WATER COOLER
21.46 MMBTU/Hr.
(EACH)

19-1201, 19-1221
19-1241, 19-1261
SHIFT EFFLUENT
K.O. DRUM
8'0" ID x 16'0" TT



UNIT 20 - MATERIAL BALANCE

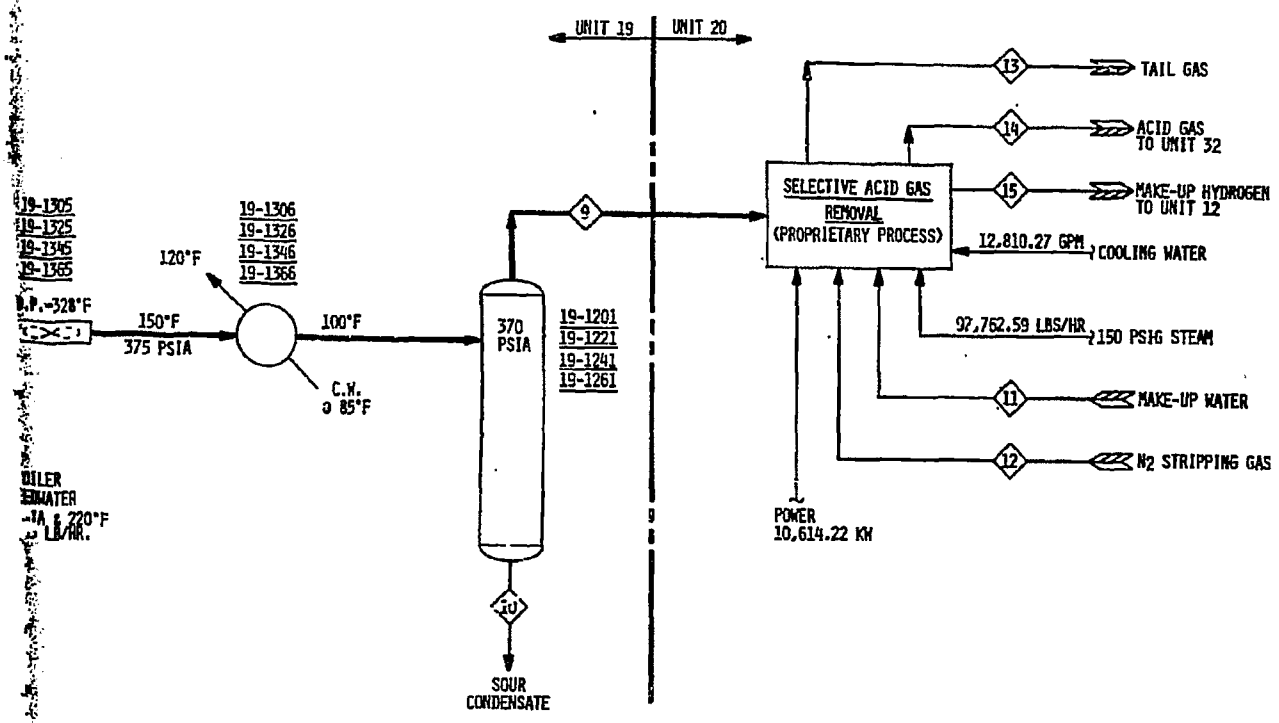
⑦ SECOND SHIFT EFFLUENT VAPOR		⑧ THIRD SHIFT EFFLUENT VAPOR		⑨ PRODUCT GAS VAPOR		⑩ SOUR CONDENSATE LIQUID	⑪ MAKE-UP WATER	⑫ N_2 STRIPPING GAS	⑬ TAIL GAS	⑭ ACID GAS	⑮ MAKE-UP HYDROGEN
	%		%		%						
1036.7	38.21	52,429.3	39.04	52,422.8	53.31	6.5	---	---	3.82	---	52,418.98
666.9	.50	666.9	.50	666.9	.68		---	---	16.67	---	650.23
025.5	3.00	2,932.9	2.18	2,932.5	2.98	.4	---	---	48.95	---	2,883.55
318.5	29.28	40,412.4	30.10	40,246.3	40.93	166.1	---	---	37,741.38	2,438.93	66.01
779.2	.58	779.2	.58	729.2	.79		---	3,140.30	3,097.40	43.11	778.99
17.0	.01	17.0	.01	-		17.0	---	---	---	---	---
042.2	.78	1,743.5	.78	1,030.2	1.05	13.3	---	---	---	997.20	33.00
5.4	.004	6.1	.003	-		6.1	---	---	---	---	---
089.1	27.62	35,995.2	26.81	253.0	.26	35,742.2	1,999.96	---	2,036.70	159.27	56.99
0.5	100.00	134,280.5	100.00	98,330.9	100.00	35,949.6	1,999.96	3,140.30	42,944.93	3,638.51	56,687.75
,515		2,683,515		2,031,253	•	652,262	36,031.37	87,978.73	1,786,105.43	145,401.06	223,756.61
19.90		19.90		20.66		18.14	18.016	28.016	41.59	39.96	3.93
,027		1,223,027		895,598			---	28,601.85	391,142.15	33,139.55	518,133.63

19-1305, 19-1325
19-1345, 19-1365
SHIFT EFFLUENT
AIR COOLER
215.11 MMBTU/HR.
(EACH)

19-1306, 19-1326
19-1346, 19-1366
SHIFT EFFLUENT
WATER COOLER
21.46 MMBTU/HR.
(EACH)

19-1201, 19-1221
19-1241, 19-1261
SHIFT EFFLUENT
K.O. DRUM
8'0" ID x 16'0" TT

NOTES:
1. FOUR IDENTIAL SHIFT CONVERSION TRAINS ARE REQUIRED - EACH OPERATING WITH 25 PERCENT OF THE TOTAL FLOWS LISTED.
2. MATERIAL BALANCE IS ON A NO-LOSS BASIS.
3. THE CO-MO SHIFT CATALYST MUST BE RAISED TO REACTION TEMPERATURE (+500°F) AT A RATE OF NOT OVER 100°F PER HOUR. PRESSURE DURING THE HEAT-UP PERIOD MAY BE FROM ATMOSPHERIC TO THE DESIGN OPERATING PRESSURE.
4. LINES FOR HEATUP, VENT AND FLARE ARE NOT SHOWN.



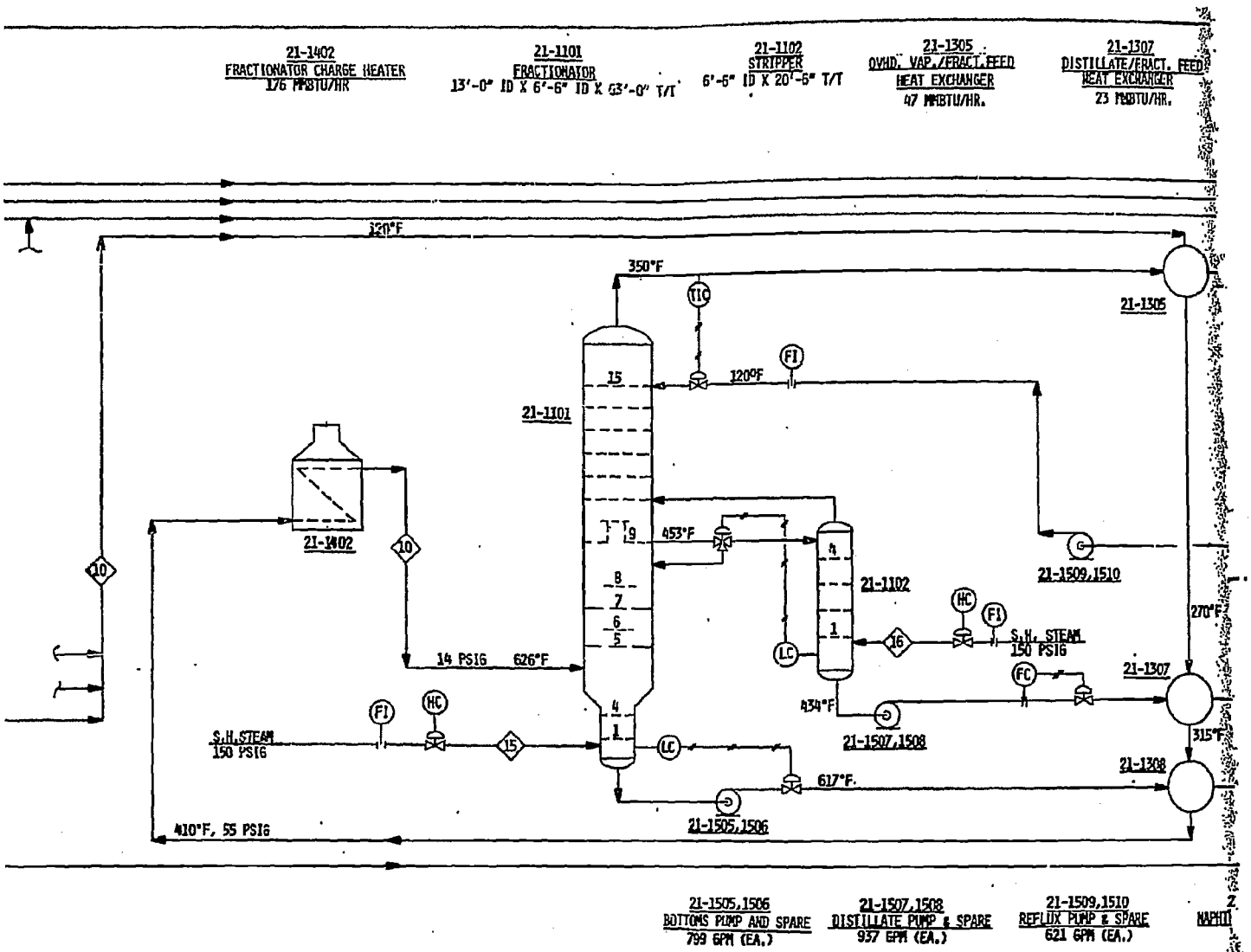
UIT 20 - MATERIAL BALANCE

⟨13⟩ TAIL GAS	⟨14⟩ ACID GAS	⟨15⟩ MAKE-UP HYDROGEN
3.82	---	52,418.98
16.67	---	650.23
46.95	---	2,883.55
37,741.36	2,438.93	66.01
3,097.40	43.11	778.99
---	---	---
---	997.20	33.00
---	---	---
2,036.70	159.27	56.99
42,946.90	3,638.51	56,887.75
1,786,185.43	145,401.06	223,756.61
41.59	39.96	3.93
391,142.15	33,139.55	518,133.63

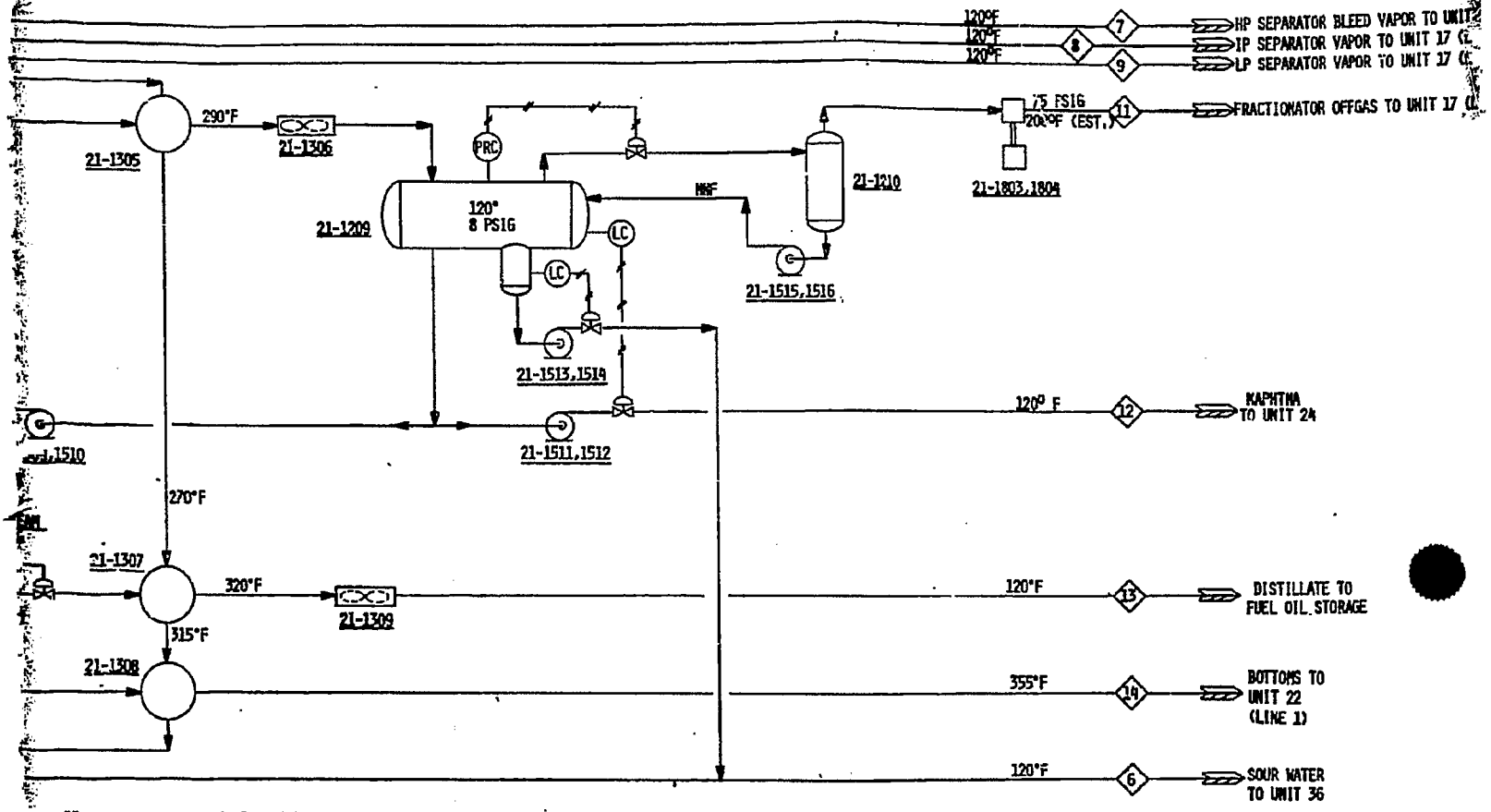
REV NO.	CUST APPR.	DATE	REVISION	BY	PROJ ENGR.	CHECK	MANUF PROC. ENGR.	MANUF SPEC ENGR.	PROJ MGR.
0		9/21/77	ISSUED FOR REPORT	LDS					

DEPARTMENT OF ENERGY - DIVISION OF COAL CONVERSION
POGO PLANT
PROCESS FLOW DIAGRAM
SHIFT CONVERSION - UNIT 19
SELECTIVE ACID GAS REMOVAL - UNIT 20

THE RALPH M. PARSONS COMPANY PASADENA, CALIFORNIA	JOB NO. 5435-4	DWG. NO. R-19/20-FS-1	REV 0

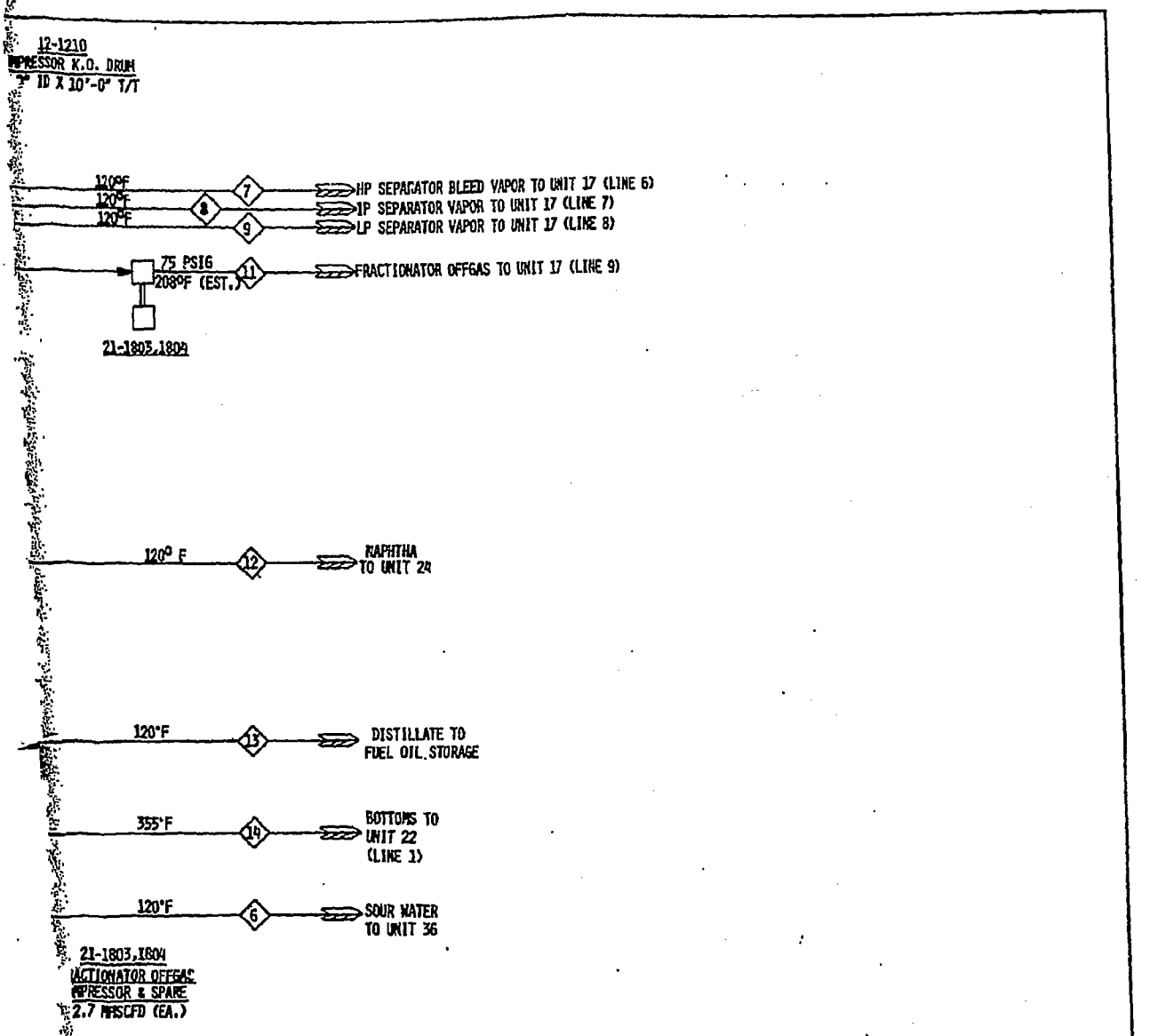

21-1402
FRACTIONATOR CHARGE HEATER
176 MMBTU/HR
21-1101
FRACTIONATOR
13'-0" ID X 6'-6" ID X 63'-0" T/T
21-1102
STRIPPER
6'-6" ID X 20'-6" T/T
21-1305
OVHD. VAP./FRACT. FEED
HEAT EXCHANGER
47 MMBTU/HR.
21-1307
DISTILLATE/FRACT. FEED
HEAT EXCHANGER
23 MMBTU/HR.
320°F
350°F
TIC
FI
120°F
21-1305
21-1101
15
9
8
7
6
5
4
1
453°F
21-1402
10
14 PSIG 626°F
21-1102
21-1509,1510
HC
FI
S.H. STEAM
150 PSIG
16
LC
270°F
FC
21-1307
434°F
21-1507,1508
315°F
S.H.STEAM
150 PSIG
FI
HC
15
LC
21-1308
617°F.
21-1505,1506
410°F, 55 PSIG
21-1505,1506
BOTTOMS PUMP AND SPARE
799 GPM (EA.)
21-1507,1508
DISTILLATE PUMP & SPARE
937 GPM (EA.)
21-1509,1510
REFLUX PUMP & SPARE
621 GPM (EA.)
NAPHTH

21-1307	21-1308	21-1306	21-1309	21-1209	12-1210
DISTILLATE/FRACT. FEED HEAT EXCHANGER	BOTTOMS/FRACT. FEED HEAT EXCHANGER	OVHD. VAPOR AIR COOLER	DISTILLATE AIR COOLER	OVERHEAD RECEIVER	COMPRESSOR K.O. DRUM
23 MMBTU/HR.	46 MMBTU/HR.	47 MMBTU/HR.	34 MMBTU/HR	10'-0" ID X 31'-0" T/T	5'-0" ID X 10'-0" T/T



21-1510	21-1511,1512	21-1513,1514	21-1515,1516	21-1803,1804
PUMP & SPARE	NAPHTHA PUMP & SPARE	CONDENSED WATER PUMP & SPARE	CONDENSED OFFGAS RECYCLE PUMP & SPARE	FRACTIONATOR OFFGAS COMPRESSOR & SPARE
(EA.)	331 GPM (EA.)	10 GPM (EA.)	10 GPM DESIGN (EA.)	2.7 MMSCFD (EA.)

B



0		9/30/81	ISSUED FOR REPORT										
CODE NO.	ENGR. APPR.	DATE	REVISION	BY	PROJ. APPR.								

DEPARTMENT OF ENERGY - DIVISION OF COAL CONVERSION
POGO PLANT
HEAVY LIQUIDS HYDROTREATING - UNIT 21

THE RALPH M. PARSONS COMPANY PASADENA, CALIFORNIA	JOB NO. 5435-8	DWG. NO. R-21-FS-1	REV. 0.

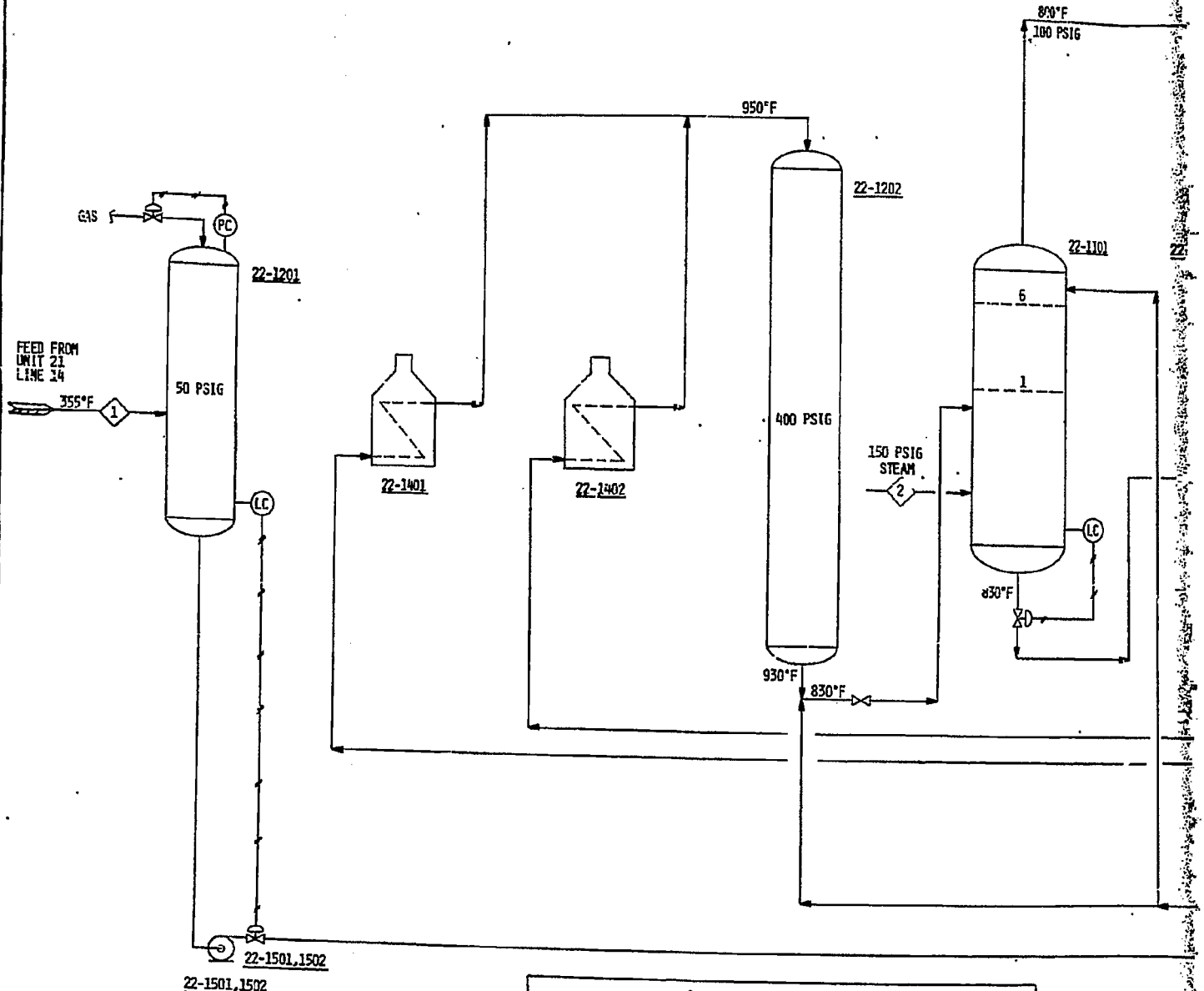
[illegible] SURGE DRUM
3'-0" ID X 54'-0" T/T

22-1401,1402
F.O. & G.O.
FURNACES
TOTAL 312.864 MMBTU/HR.

22-1202
REACTION CHAMBER
9'-0" ID X 56'-0" T/T

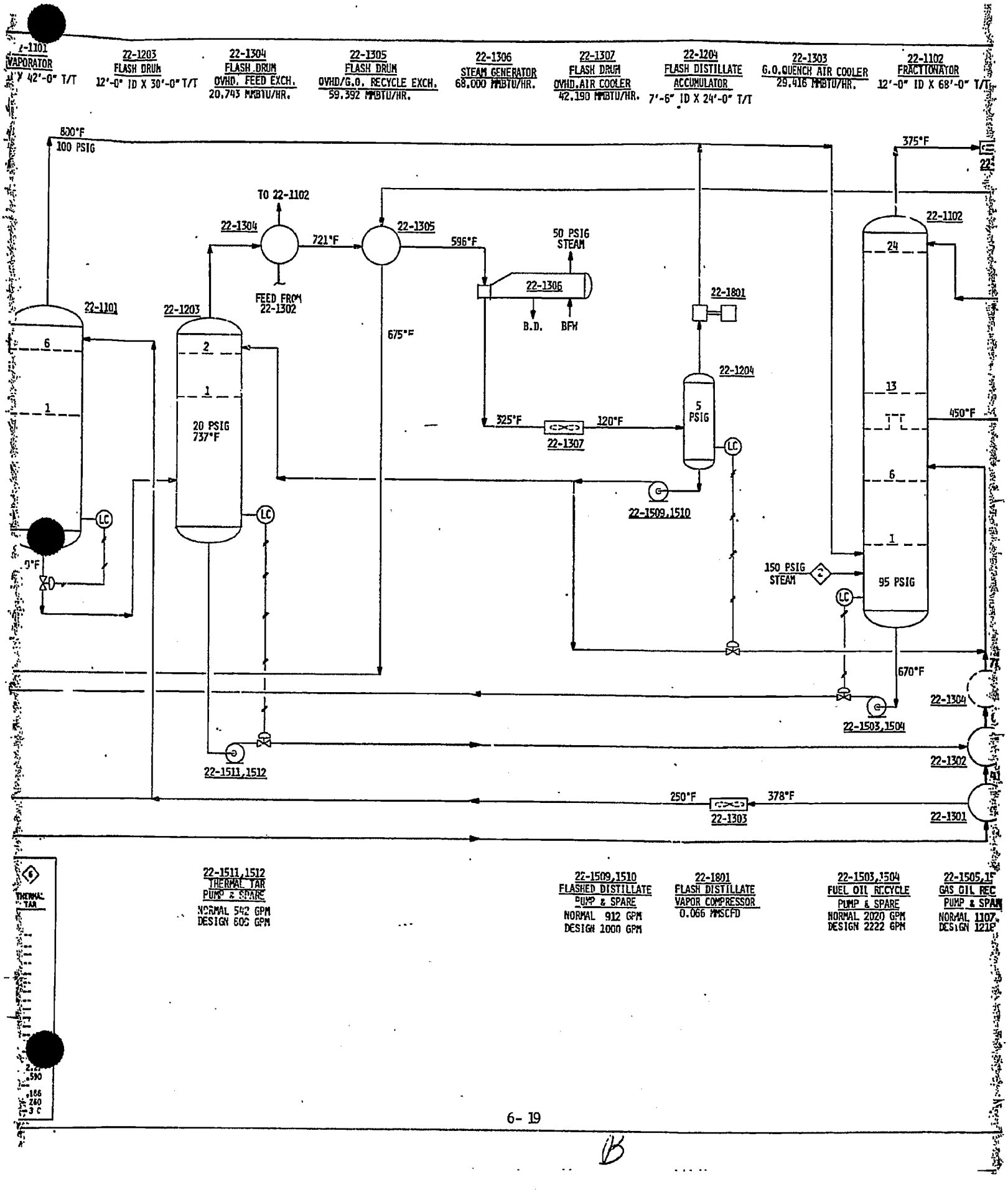
22-1101
EVAPORATOR
15'-6" ID X 42'-0" T/T

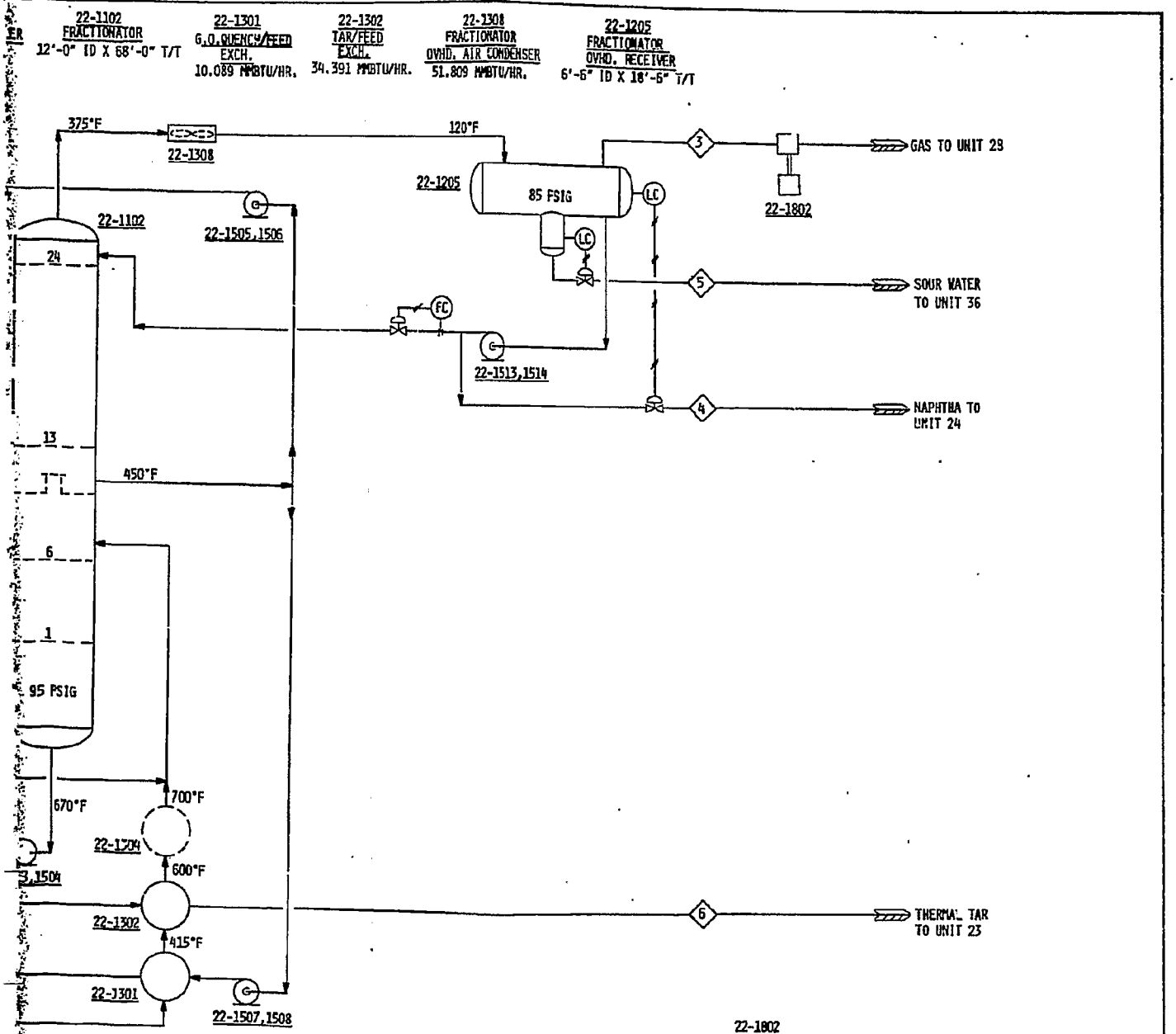
22-1203
FLASH DRUM
12'-0" ID X 30'-



22-1501,1502
FEED PUMP & SPARE
NORMAL 700 GPM
DESIGN 770 GPM

STREAM NO.	1	2	3	4	5	6
STREAM NAME	FEED	EVAP.& FRACT. TOTAL STEAM	GAS	NAPHTHA	SOUR WATER	THERMAL TAR
FLOW, MPH						
H_2	--	--	835.96	1.92	--	--
NH_3	--	--	--	0.60	4.19	--
H_2S	--	--	--	0.07	0.79	--
H_2O	--	555.06	23.26	7.92	555.06	--
C_1	--	--	145.04	2.07	--	--
C_2	--	--	127.89	7.89	--	--
C_3	--	--	119.04	5.70	--	--
$C_3^=$	--	--	73.86	14.06	--	--
C_4	--	--	113.39	19.14	--	--
$C_4^=$	--	--	49.36	29.86	--	--
18P-400	--	--	51.93	26.87	--	--
400+	--	--	16.63	704.15	--	--
650+	980.68	--	--	--	--	752.27
TOTAL	980.68	555.06	1556.35	820.25	560.04	752.27
LB/HR	306,953	10,000	27,284	83,981	10,096	195,590
MMSCFD	--	5.056	14.175	--	--	--
BPD	21,464	--	--	6,941	--	12,186
M.W.	313	18	17.52	102.39	18.03	260
API	12.7	--	--	38.9	--	-3.0


z-1101
VAPORATOR
y 42'-0" T/T
22-1203
FLASH DRUM
12'-0" ID X 30'-0" T/T
22-1304
FLASH DRUM
OVHD. FEED EXCH.
20,743 MMBTU/HR.
22-1305
FLASH DRUM
OVHD/G.O. RECYCLE EXCH.
59,392 MMBTU/HR.
22-1306
STEAM GENERATOR
68,000 MMBTU/HR.
22-1307
FLASH DRUM
OVHD.AIR COOLER
42,190 MMBTU/HR.
22-1204
FLASH DISTILLATE
ACCUMULATOR
7'-6" ID X 24'-0" T/T
22-1303
G.O.QUENCH AIR COOLER
29,416 MMBTU/HR.
22-1102
FRACTIONATOR
12'-0" ID X 68'-0" T/T
800°F
100 PSIG
TO 22-1102
22-1304
721°F
22-1305
596°F
50 PSIG
STEAM
22-1306
B.D.
BFW
FEED FROM
22-1302
22-1101
22-1203
675°F
22-1801
22-1204
20 PSIG
737°F
5
PSIG
325°F
120°F
22-1307
22-1509,1510
375°F
22-1102
24
13
450°F
6
1
150 PSIG
STEAM
95 PSIG
670°F
22-1304
22-1503,1504
22-1302
22-1511,1512
250°F
378°F
22-1303
22-1301
THERMAL TAR
22-1511,1512
THERMAL TAR
PUMP & SPARE
NORMAL 542 GPM
DESIGN 605 GPM
22-1509,1510
FLASHED DISTILLATE
PUMP & SPARE
NORMAL 912 GPM
DESIGN 1000 GPM
22-1801
FLASH DISTILLATE
VAPOR COMPRESSOR
0.066 MMSCFD
22-1503,1504
FUEL OIL RECYCLE
PUMP & SPARE
NORMAL 2020 GPM
DESIGN 2222 GPM
22-1505,15
GAS OIL REC
PUMP & SPAR
NORMAL 1107
DESIGN 1218



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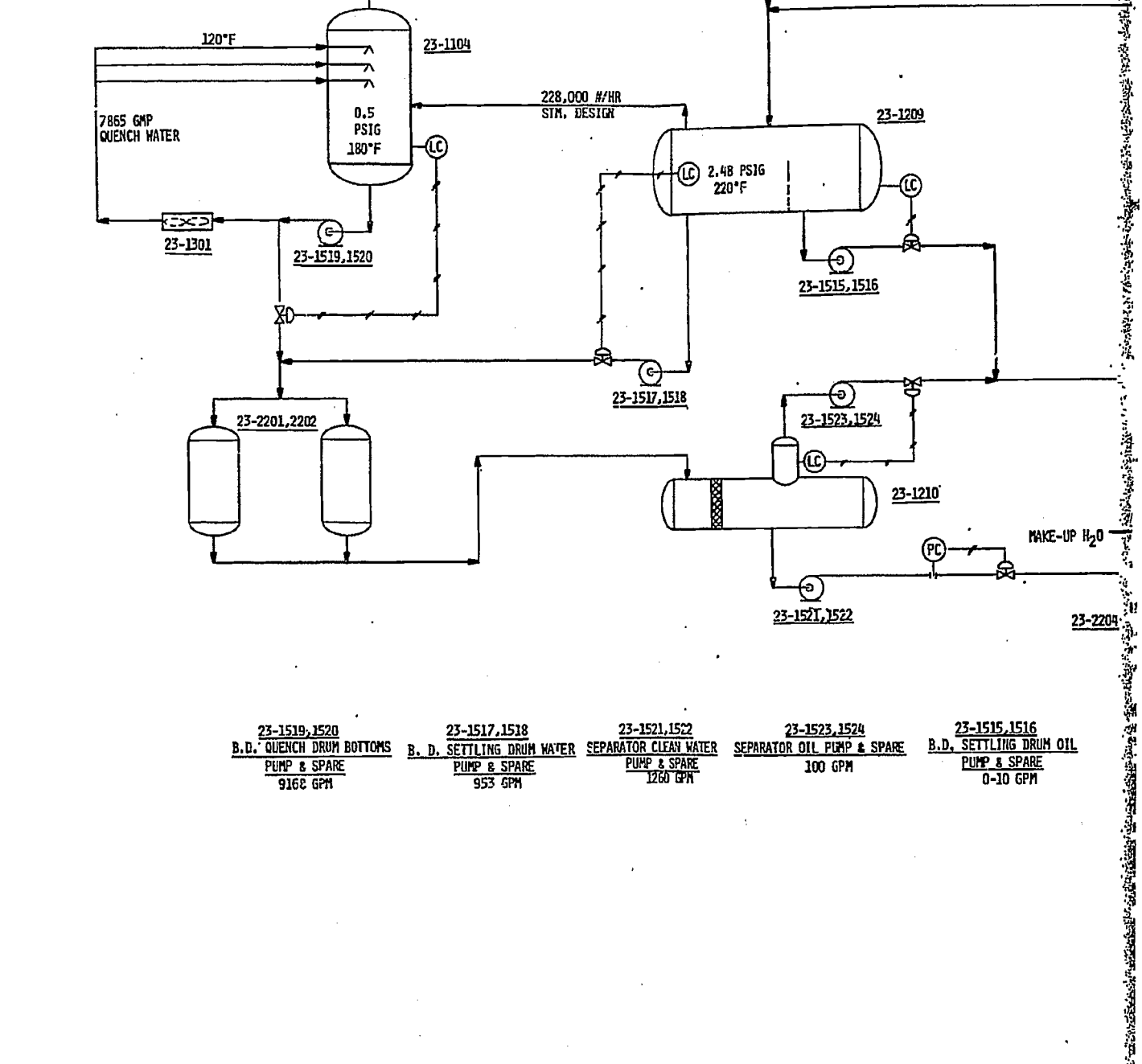
DSN. BY	CHKD. APPD.	DATE	REVISION		BY	PROJ. ENGR.	MANAGER	PROJ. MGR.	PROJ. ENGR.	PROJ. ENGR.

DEPARTMENT OF ENERGY - DIVISION OF COAL CONVERSION
POGO PLANT
PROCESS FLOW DIAGRAM
THERMAL CRACKING - UNIT 22

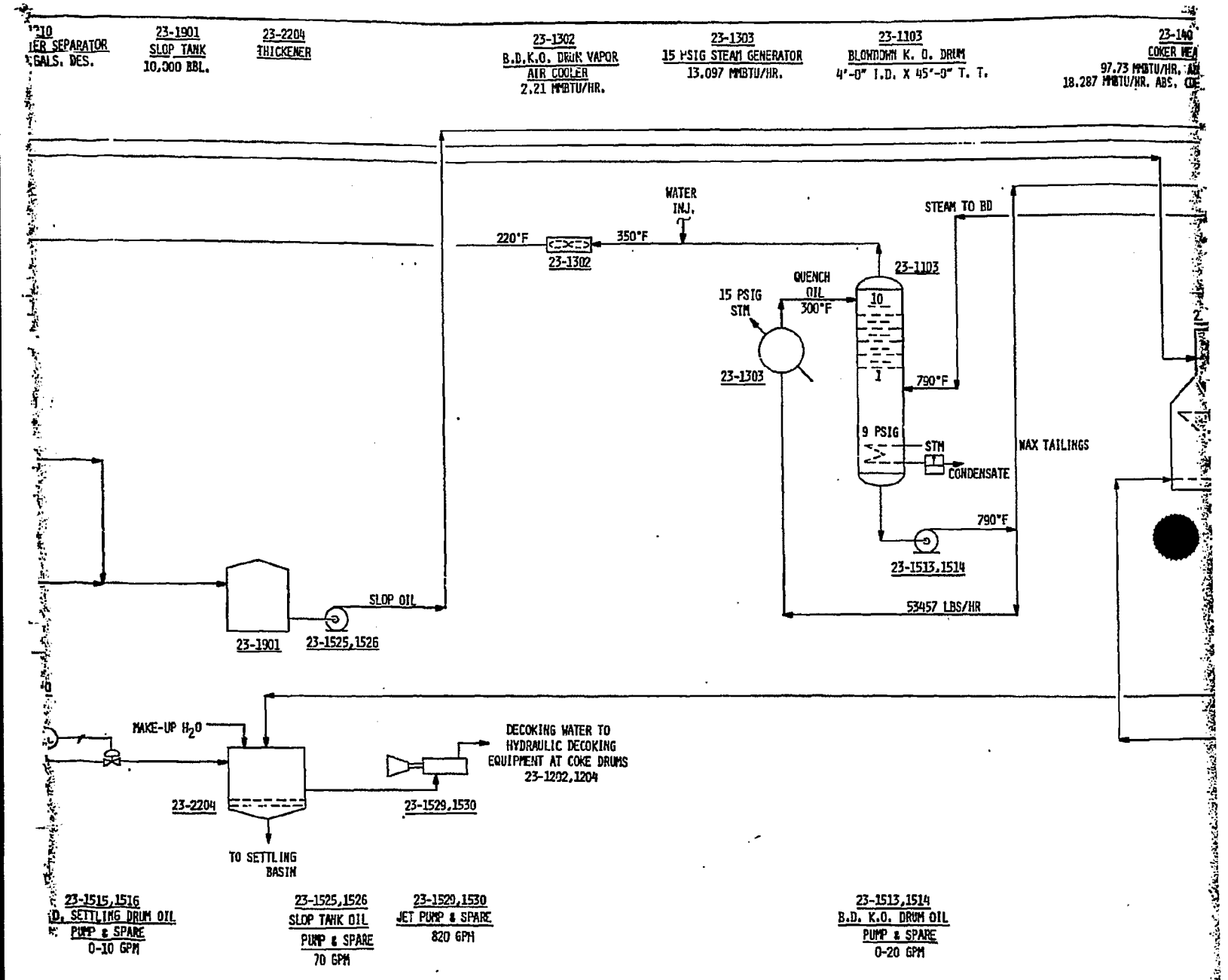
THE RALPH M. PARSONS COMPANY PASADENA, CALIFORNIA	JOB NO. 5435-4	DWG. NO. R-22-FS-1	REV. 0

DC- DT-

23-1301	23-2201,2202	23-1104	23-1209	23-1210	23-1901
QUENCH WATER AIR COOLER	OILY WATER SAND FILTERS	BLOWDOWN QUENCH DRUM	BLOWDOWN SETTLING DRUM	OIL WATER SEPARATOR	SLOP TANK
229,269 MMBTU/HR.	1336 GPM MAX. DESIGN	12'-0" I.D. X 20'-0" T. T.	14'-0" I.D.X 42'-0 T.T.	13,600 GALS. DES.	10,000 BBL.



23-1519,1520	23-1517,1518	23-1521,1522	23-1523,1524	23-1515,1516
B.D. QUENCH DRUM BOTTOMS	B. D. SETTLING DRUM WATER	SEPARATOR CLEAN WATER	SEPARATOR OIL PUMP & SPARE	B.D. SETTLING DRUM OIL
PUMP & SPARE	PUMP & SPARE	PUMP & SPARE	100 GPM	PUMP & SPARE
9162 GPM	953 GPM	1260 GPM		0-10 GPM


23-1901
SLOP TANK
10,000 BBL.
23-2204
THICKENER
23-1302
B.D.K.O. DRUM VAPOR
AIR COOLER
2.21 MMBTU/HR.
23-1303
15 PSIG STEAM GENERATOR
13,097 MMBTU/HR.
23-1103
BLOWDOWN K. O. DRUM
4'-0" I.D. X 45'-0" T. T.
97.73 MMBTU/HR.
18.287 MMBTU/HR. ABS.
WATER INJ.
220°F
350°F
23-1302
STEAM TO BD
23-1103
QUENCH OIL 300°F
15 PSIG STM
23-1303
10
1
790°F
9 PSIG
STM
CONDENSATE
WAX TAILINGS
790°F
23-1513,1514
53457 LBS/HR
SLOP OIL
23-1901
23-1525,1526
MAKE-UP H_2O
DECOKING WATER TO HYDRAULIC DECOKING EQUIPMENT AT COKE DRUMS 23-1202,1204
23-2204
23-1529,1530
TO SETTLING BASIN
23-1515,1516
D. SETTLING DRUM OIL
PUMP & SPARE
0-10 GPM
23-1525,1526
SLOP TANK OIL
PUMP & SPARE
70 GPM
23-1529,1530
JET PUMP & SPARE
820 GPM
23-1513,1514
B.D. K.O. DRUM OIL
PUMP & SPARE
0-20 GPM

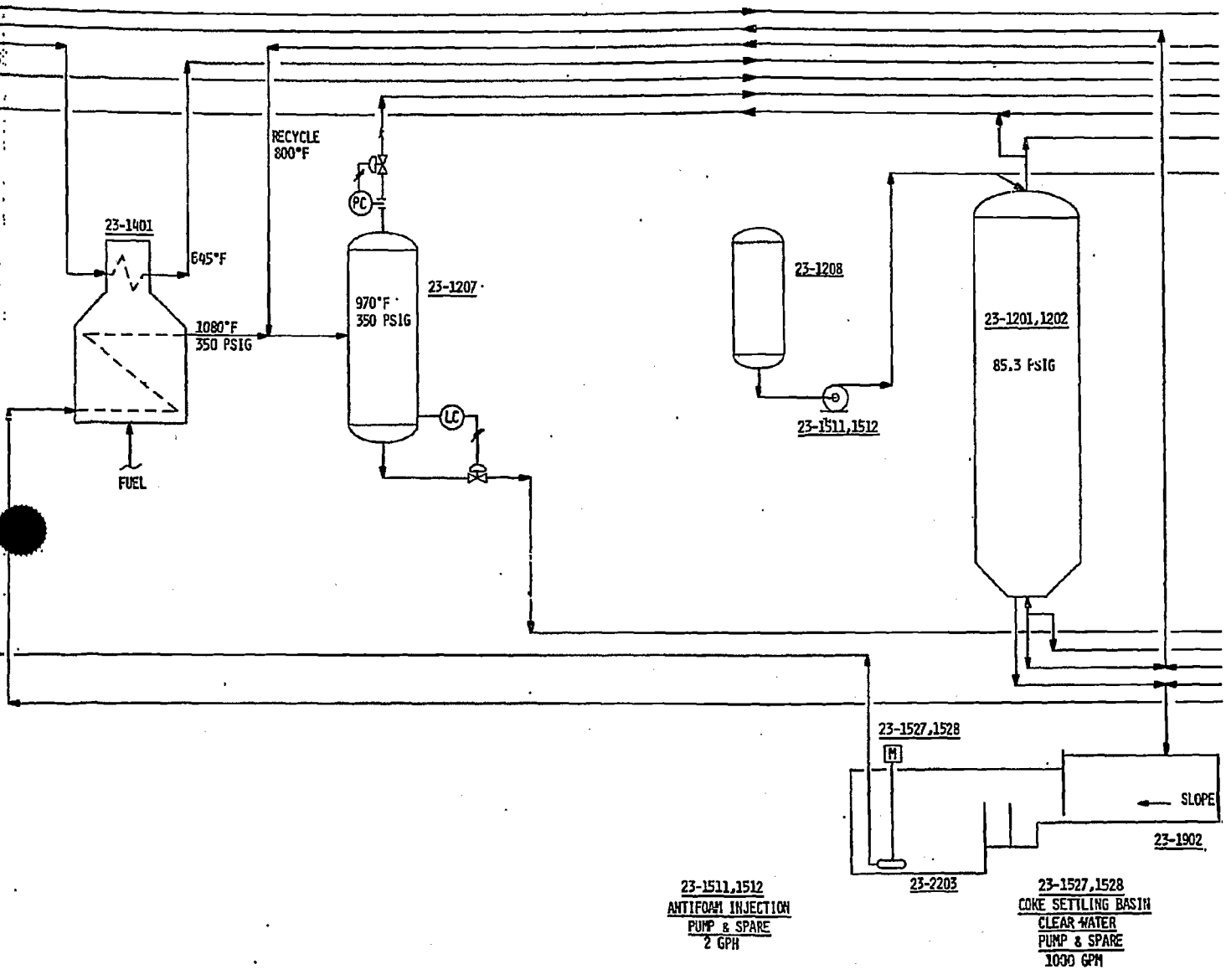
23-1401
COKER HEATER
97.73 MMBTU/HR. ABS. (DESIGN)
MMBTU/HR. ABS. (DESIGN)-FEED PREHEAT

23-1207
SOAKING DRUM
7'-6" I.D. X 15'-0" T.T.

23-1208
ANTIFOAM DRUM
3'-6" I.D. X 14'-0" T.T.

23-2203
COKE, SETTLING BASIN

23-1201,1202,1203,1204
COKE DRUMS
21'-0" I.D. X 94'-0" T. T.



23-1511,1512
ANTIFOAM INJECTION
PUMP & SPARE
2 GPH

23-1527,1528
COKE SETTLING BASIN
CLEAR-WATER
PUMP & SPARE
1030 GPM

STREAM NO.	1	2	3	4	5	6
STREAM NAME	THERMAL TAR	COKER NAPHTHA	COKER GAS	MAX WATER CONDENSATE	GREEN COKE LBS/HR	CALCINED COKE LBS/HR
FLOW						
CO_2	-	0.01	0.88	-	-	-
H_2S	-	-	-	3,150	21,497	137
C1	-	4.31	795.6	-	-	-
C2	-	2.2	130.2	-	-	-
C2=	-	4.15	189.1	-	-	-
C3	-	4.09	65.1	-	-	-
C3=	-	0.92	5.6	-	-	-
C4	-	5.52	29.91	-	-	-
IBP-400	-	72.95	23.84	-	-	-
400+	752	-	-	-	-	-
COKE	-	-	-	-	157,646	137,084
TOTAL MPH	752	94.15	1240.23	3,150	-	-
TOTAL LBS/HR	195,590	9,110	28,834	56,753	179,143	137,221
MW	260	96.76	23.25	18.016	-	-
BPD	12,187	782	-	-	-	-
MSCFD	-	-	11296	-	-	-
LB/GAL	9.1708	6.0569	-	8.328	-	-

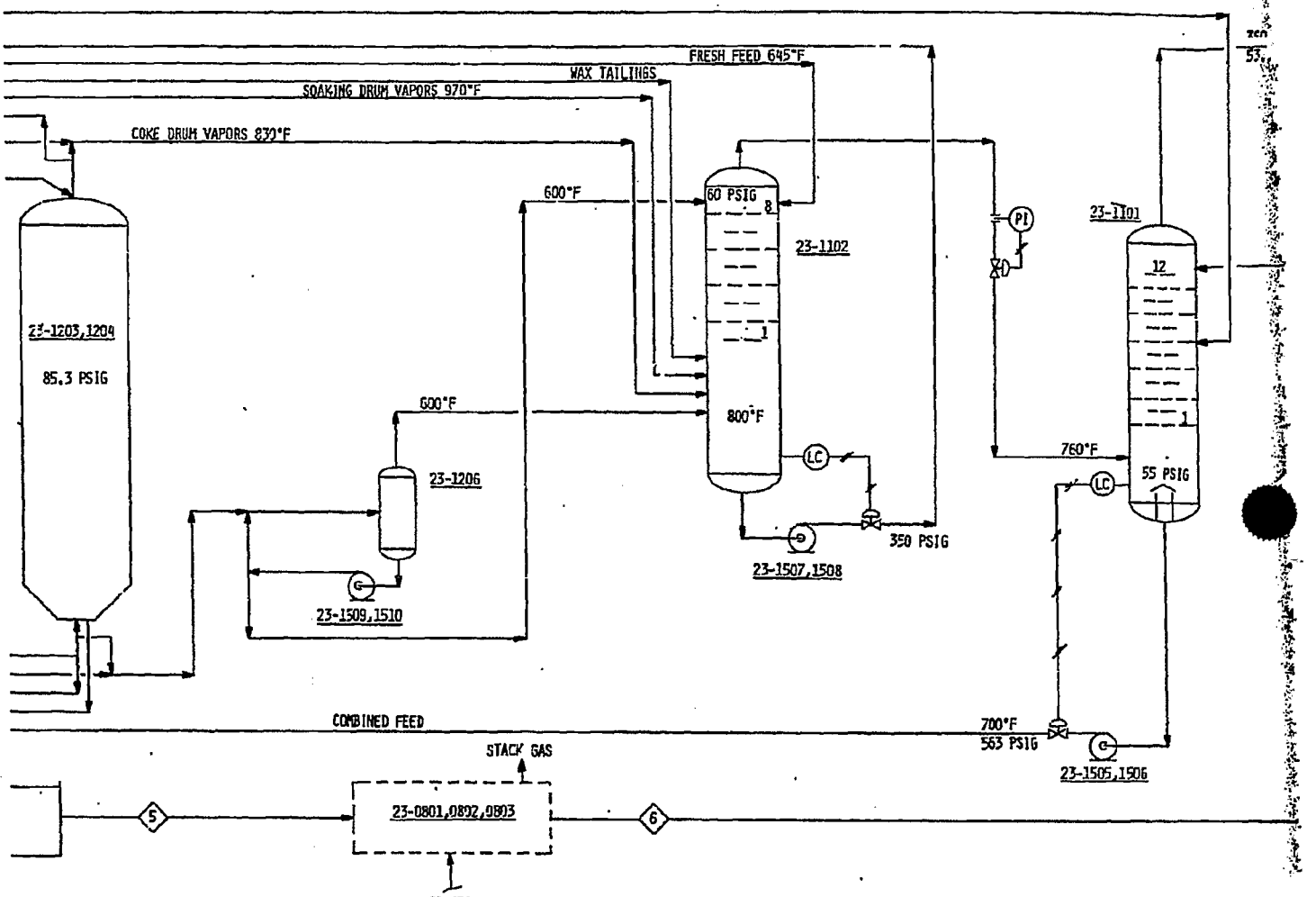
23-1902
COKE STORAGE PIT

23-1206
WARM-UP SEPARATOR
3'-6" I.D. X 7'-0" T.T.

23-0801,0802,0803
COKE CALCINING SYSTEM
(PROPRIETARY)
CALCINERS: 13'-0" ID X 180'

23-1102
EVAPORATOR
8'-6" I.D. X 37'-0" T.T.

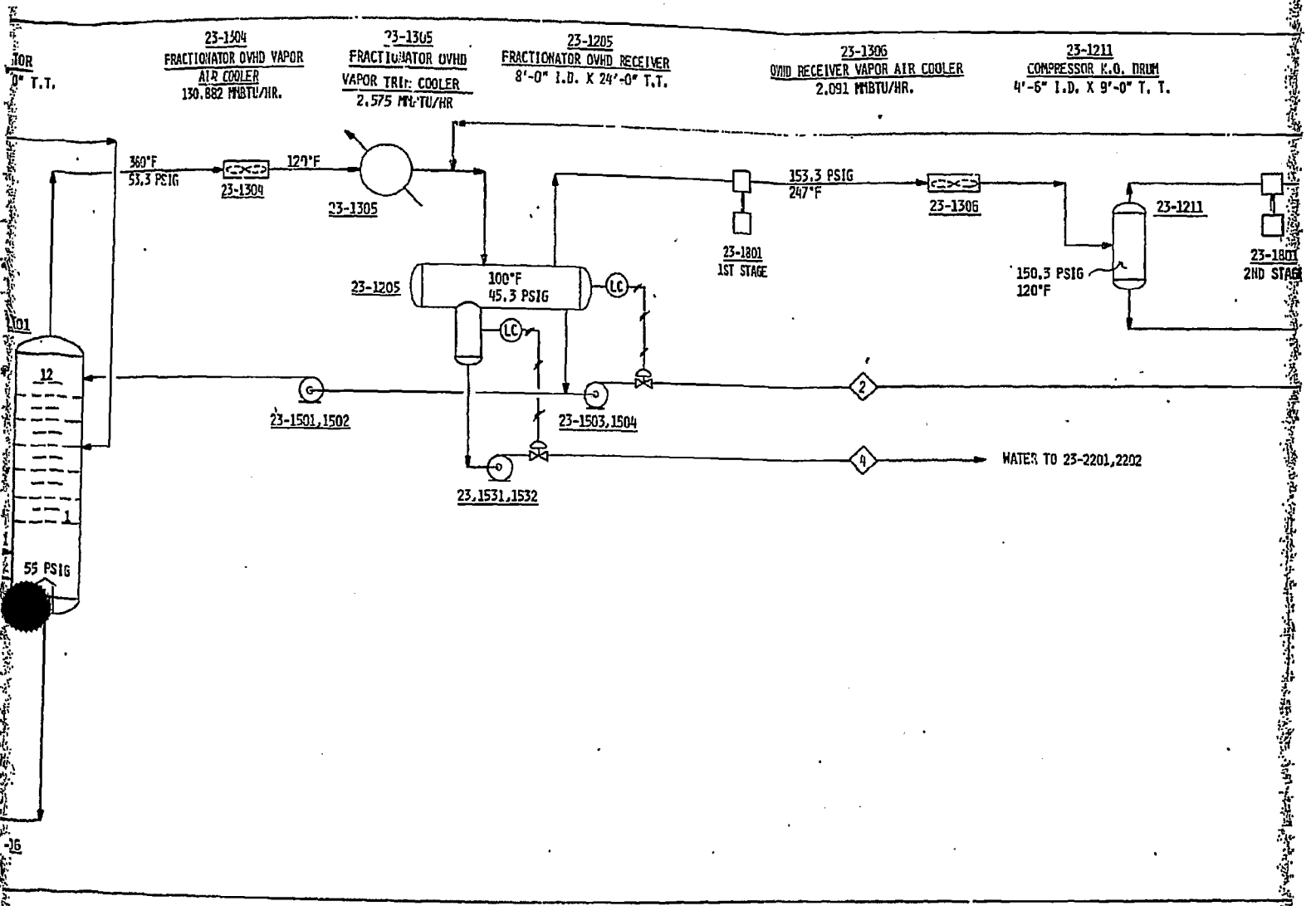
23-1101
MAIN FRACTIONATOR
7'-0" I.D. X 57'-0" T.T.



23-1509,1510
WARM-UP SEPARATOR
PUMP & SPARE
26 GPM

23-1507,1508
EVAPORATOR BOTTOMS
PUMP & SPARE
203 GPM

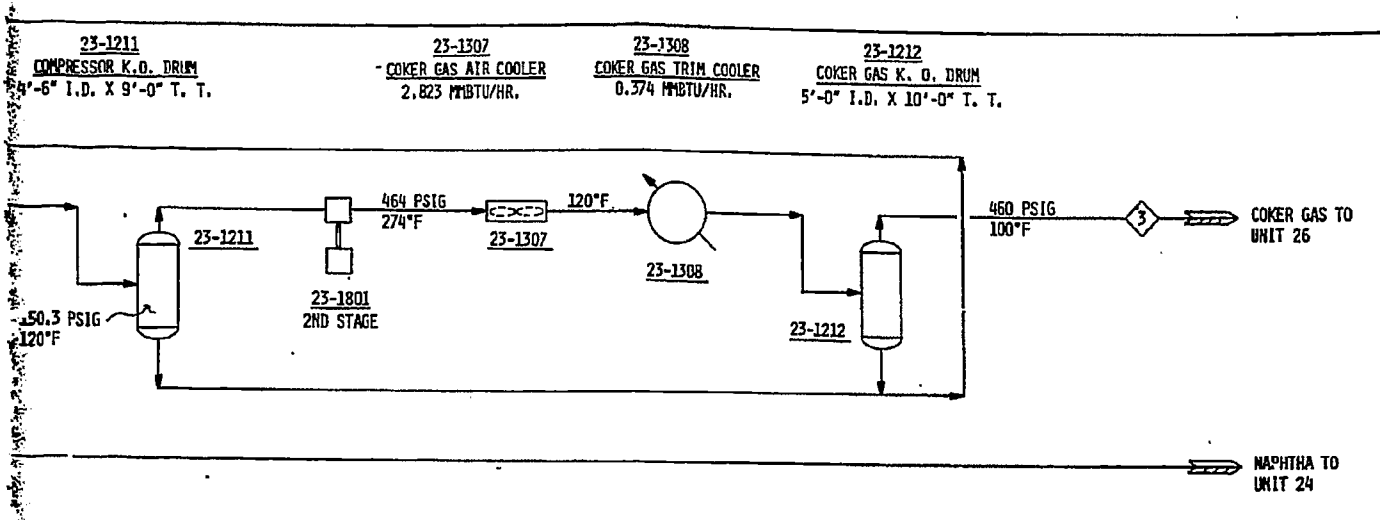
23-1505,1506
FRACTIONATOR BOTTOMS
PUMP & SPARE
799 GPM



23-1531,1532
FRACTIONATOR OVHD.
RECEIVER H_2O
PUMP & SPARE
125 GPM

23-1503,1504
NAPHTHA PUMP & SPARE
26 GPM

23-1801
OVHD RECEIVER VAPOR COMPRESSOR
1ST STAGE 2137 ACFM
2ND STAGE 803 ACFM



TER TO 23-2201,2202

NOTE.
THREE IDENTICAL CALCINER TRAINS ARE REQUIRED EACH OPERATING WITH 1/3 OF THE TOTAL FLOWS LISTED.

CALCINED COKE TO STORAGE

1
JR COMPRESSOR
37 ACFM
13 ACFM

0			ISSUED FOR REPORT			SCO	PMK			
DSN. INI.	DSGT. APPR.	DATE	REVISIONS		BY	CHKD	APPD.			

DEPARTMENT OF ENERGY - DIVISION OF COAL CONVERSION
POGO PLANT
PROCESS FLOW DIAGRAM
COKING - UNIT 23.

THE RALPH M. PARSONS COMPANY PASADENA, CALIFORNIA	JOB NO. 5435-4	DWG. NO. R-23-FS-1	REV. 0

24-1201
FEED SURGE DRUM
10'-6"I.D. x 37'-0" T/T

24-1308
STABILIZER
BOTTOMS/NAPHTHA
FEED EXCHANGER
18.455 MMBTU/HR

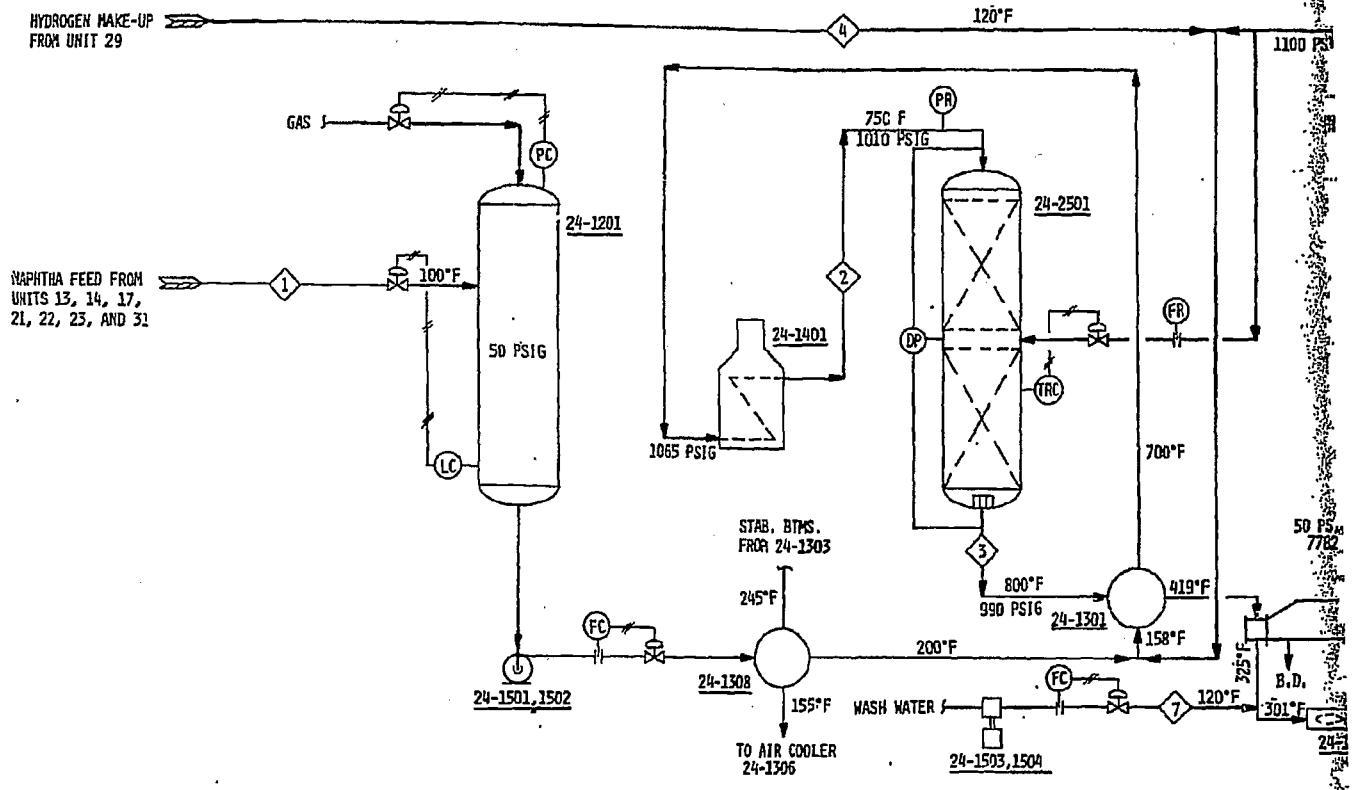
24-1401
NAPHTHA
HYDROTREATER
HEATER
27.116 MMBTU/HR

24-2501
REACTOR
12'-0"I.D. x 55'-0" T/T

24-1301
REACTOR EFFLUENT/
FEED EXCHANGER
303.088 MMBTU/HR

24-1302
REACTOR EFFLUENT
AIR COOLER
184.908 MMBTU/HR

24-1
REACTOR
STEAM GENE
77.103 MM



24-1501,1502
FEED PUMP & SPARE

	GPM(EA)@PT.	SP.GR.@PT.
NORM:	926	0.825
DES:	1020	0.825

24-1503,1504
WASH WATER PUMP
& SPARE

	GPM(EA)@PT	SP.GR.@PT
NORM:	53	0.99
DES:	61	0.99

24-1
REC...
COMPRESSO

NORM:
DES:

STREAM NO.	1	2	3	4	5	6	7	8	9
STREAM NAME	TOTAL NAPHTHA FEED	REACTOR FEED	REACTOR EFFLUENT	H_2 MAKE-UP	RECYCLE GAS	HP VENT GAS	WASH WATER	SOUR WATER	STABILIZER FEED
FLOW MPH									
H_2	TR	33,801.51	29,787.79	4,385.75	29,415.76	385.89	-	-	66.18
N_2	0.30	3,308.83	3,308.83	47.59	3,260.94	33.91	-	-	13.93
CO	1.49	87.09	87.09	-	85.60	0.89	-	-	0.60
CO_2	2.46	57.27	57.27	-	54.81	0.57	-	-	1.89
NH_3	2.94	2.94	85.13	-	-	TR	-	85.13	-
H_2S	8.07	8.07	33.01	-	-	TR	-	33.01	-
H_2O	151.72	244.81	2,411.40	4.62	88.47	0.92	1,506.07	2,322.01	-
C_1	12.47	17,607.61	17,811.76	160.52	17,434.62	181.30	-	-	195.84
C_2	7.72	350.07	350.07	-	342.35	3.56	-	-	4.16
C_3	28.55	2,240.33	2,325.13	-	2,211.78	23.00	-	-	90.35
C_4	22.97	479.75	479.75	-	456.78	4.75	-	-	10.22
C_5	84.67	1,102.09	1,143.29	-	1,017.42	10.58	-	-	115.29
C_6	27.18	256.05	256.05	-	228.87	2.38	-	-	24.80
C_7	173.20	806.92	832.02	-	633.72	6.59	-	-	191.71
IBP-200	417.85	597.68	589.99	-	179.83	1.87	-	-	408.19
200-300	835.00	889.65	874.46	-	53.95	0.56	-	-	820.25
300-350	953.93	953.93	936.18	-	-	-	-	-	936.18
350-400	918.96	918.96	901.85	-	-	-	-	-	901.85
400-450	59.5	59.50	-	-	-	-	-	-	-
TOTAL	3,709.78	63,773.06	62,271.17	4,598.48	55,464.80	576.77	1,506.07	2,440.15	3,789.45
LBS/HR	382,666.45	1,042,206	422,635.31	12,833.25	646,706.3	6,725.00	27,133.33	44,408.31	371,500.0
MMSCFD	-	-	-	41.883	505.173	5.235	-	-	-
BPP	32,020.6	-	-	-	-	-	-	-	34,338.62
MW	103.15	-	-	2.791	11.66	11.66	18.016	18.20	98.03
API	41.1	-	-	-	-	-	-	-	59.30

24-1302
REACTOR EFFLUENT
AIR COOLER
[illegible].308 MMBTU/HR

24-1309
REACTOR EFFLUENT
STEAM GENERATOR
77.103 MMBTU/HR.

24-1202
PRODUCT SEPARATOR
8'-0"I.D. x 39'-9" T/T

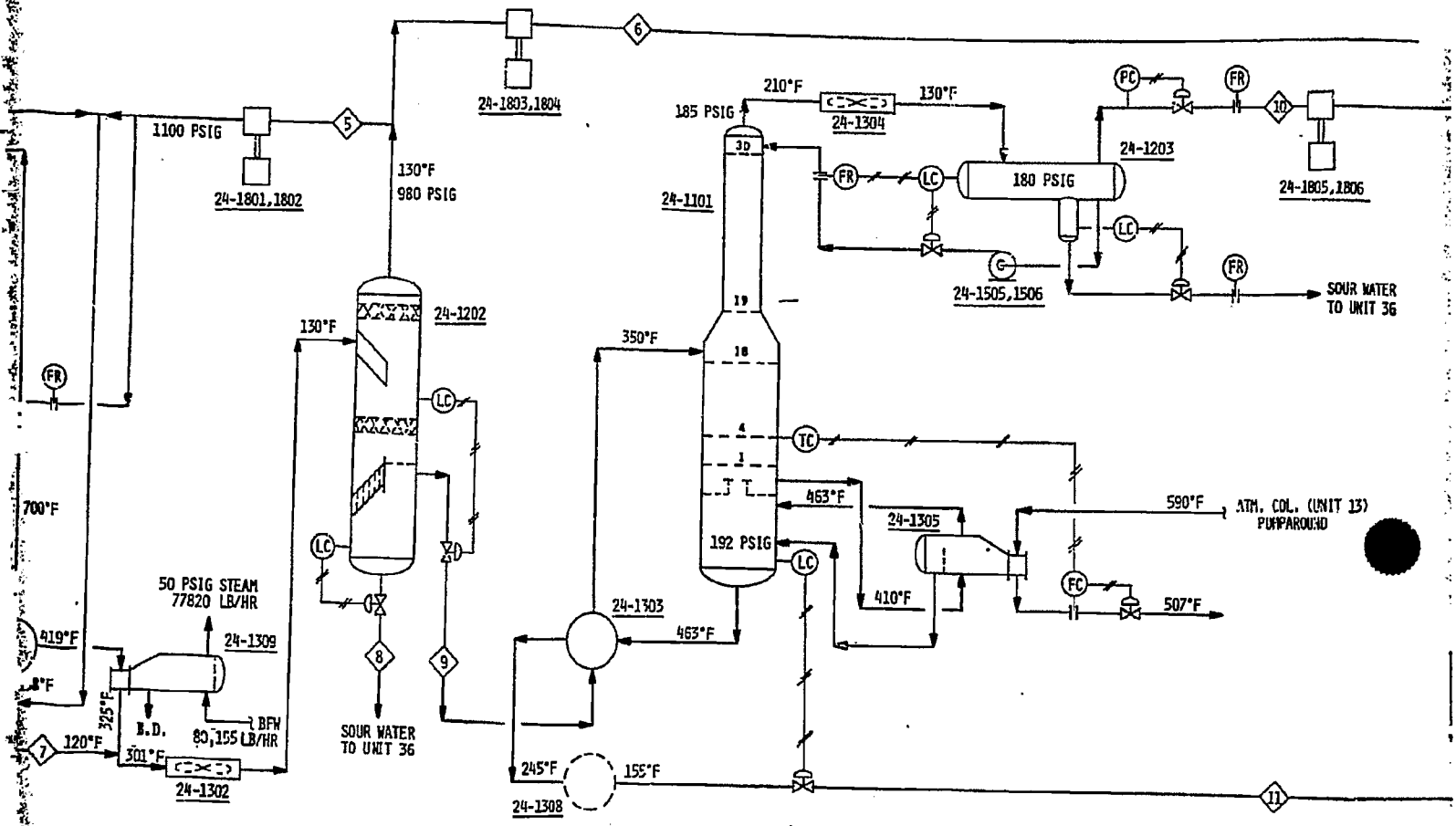
24-1303
STABILIZER
FEED/BTMS.
EXCHANGER
74.683 MMBTU/HR

24-1101
STABILIZER
6'-6"I.D. x
12'-0" I.D. x
78'-0" T/T

24-1304
STABILIZER
OVHD CONDENSER
9.535 MMBTU/HR

24-1305
STABILIZER
REBOILER
34.038 MMBTU/HR

24-1203
STABILIZER
REFLUX DRUM
6'-0"I.D. x 15'-0" T/T



24-1801,1802
RECYCLE GAS
COMPRESSOR & SPARE

	MMSCFD(EA)
NORM:	476.011
DES:	476.011

24-1803,1804
H.P. ACID GAS
COMPRESSOR & SPARE

	MMSCFD(EA)
NORM:	3.752
DES:	3.752

24-1505,1506
STABILIZER REFLUX
PUMP & SPARE

	GPM(EA)@PT.	SP.GR.@PT.
NORM:	143	0.70
DES:	172	0.70

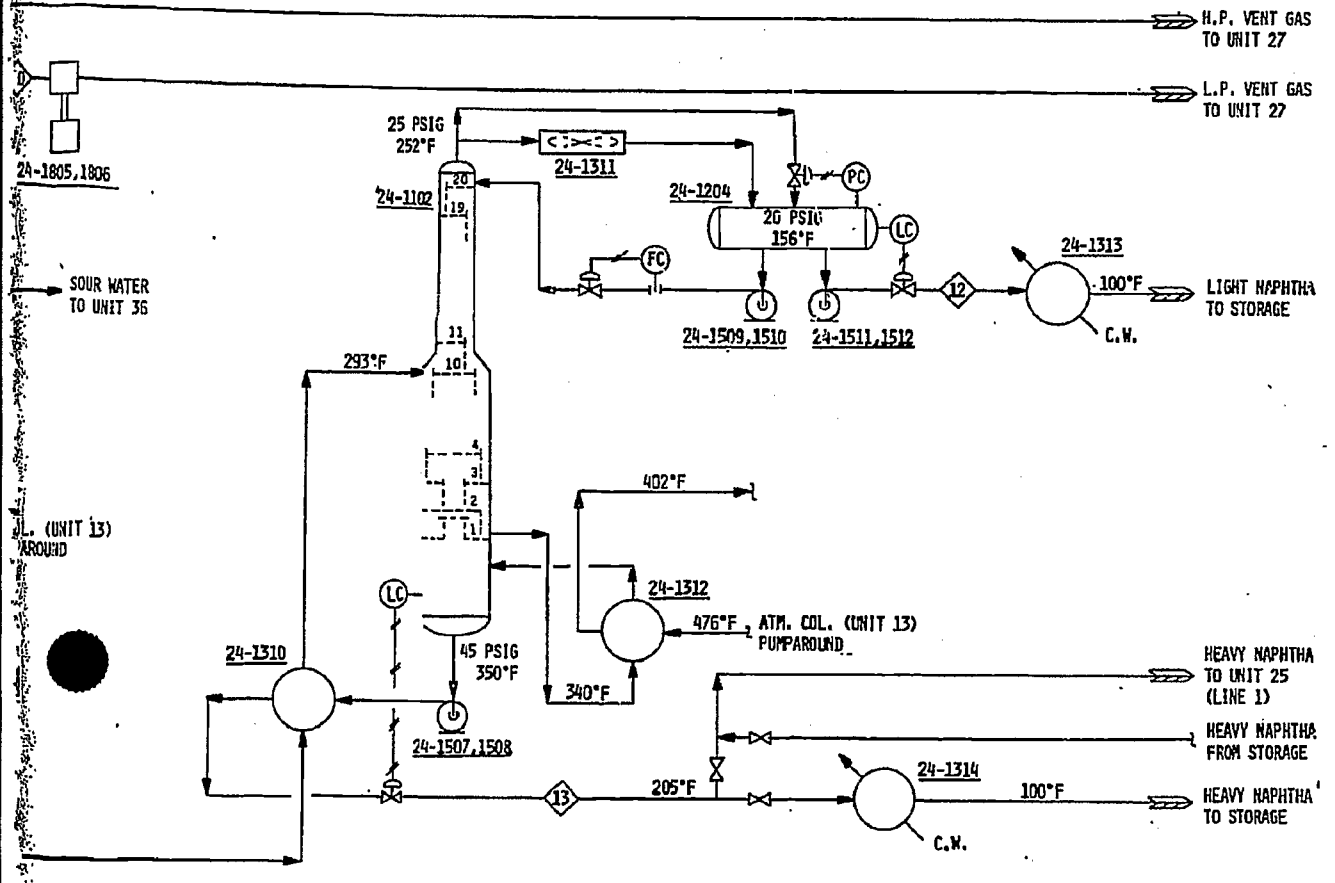
24-1805,1806
L.P. ACID GAS
COMPRESSOR & SPARE

	MMSCFD(EA)
NORM:	3.674
DES:	3.674

	⑨ STABILIZER FEED	⑩ LP VENT GAS	⑪ NAPHTHA PRODUCT	⑫ LIGHT NAPHTHA	⑬ HEAVY NAPHTHA
	66.14	66.14	-	-	-
	13.98	13.98	-	-	-
	0.60	0.60	-	-	-
5.13	7.89	1.89	-	-	-
33.81	-	-	-	-	-
22.01	-	-	-	-	-
	195.84	195.84	-	-	-
	4.16	4.16	-	-	-
	90.35	90.35	-	-	-
	10.22	18.22	-	-	-
	115.29	115.29	-	-	-
	24.80	24.8	-	-	-
	191.71	9.62	-	-	-
	408.19	-	182.09	182.09	-
	820.25	-	408.19	395.17	13.02
	936.18	-	820.25	13.01	807.24
	901.85	-	936.18	-	936.18
	-	-	901.85	-	901.85
3.15	3,789.45	540.89	-	-	-
.31	371,500.0	14,400.00	3,248.56	590.27	2,658.29
	-	4.926	357,100.0	43,575.0	313,525.00
	34,338.62	-	-	-	-
	98.03	26.62	31,943.22	4,378.87	27,564.35
	59.30	-	109.83	73.82	117.95
			53.00	75.73	49.80

B

24-1310 SPLITTER FEED-BOTTOMS EXCHANGER	24-1102 NAPHTHA SPLITTER	24-1311 SPLITTER OVERHEAD CONDENSER	24-1312 SPLITTER REBOILER	24-1204 SPLITTER REFLUX DRUM	24-1313 LIGHT NAPHTHA COOLER	24-1314 HEAVY NAPHTHA COOLER
28.45 MMBTU/HR	5'-6" I.D. x 10'-0" I.D. x 66'-6" T/T	21.03 MMBTU/HR	29.15 MMBTU/HR	4'-6" I.D. x 13'-0" T/T	1.16 MMBTU/HR	17.26 MMBTU/HR



15,1806
ACID GAS
DR & SPARE
MSCFD(EA)
3.674
3.674

24-1507,1508 SPLITTER BOTTOMS PUMP & SPARE	GPM(EA)@PT.	SP.GR.@PT.
NORM:	983	0.65
DES:	1081	0.65

24-1509,1510 SPLITTER REFLUX PUMP & SPARE	GPM(EA)@PT.	SP.GR.@PT.
NORM:	196	0.61
DES:	235	0.61

24-1511,1512 SPLITTER OVERHEAD PUMP & SPARE	GPM(EA)@PT.	SP.GR.@PT.
NORM:	146	0.61
DES:	161	0.61

NO.	CHK'D APPD.	DATE	REVISION	BY	PROD. ENGR.	PROJ. ENGR.	CHIEF PROC. ENGR.	CHIEF INST. ENGR.	PROJ. DIR.
0			ISSUED FOR REPORT	LOS					

DEPARTMENT OF ENERGY - DIVISION OF COAL CONVERSION
POGO PLANT
PROCESS FLOW DIAGRAM
NAPHTHA HYDROTREATER - UNIT 24

THE RALPH M. PARSONS COMPANY PASADENA, CALIFORNIA	JOB NO. 5435-4	DWG. NO. R-24-FS-1	REV. NO. 0

DR.RM.REV. B 11/9/77

25-1401
REFORMER HEATER NO. 1
62,000 MMBTU/HR

25-2501
REFORMER REACTOR NO. 1
CATALYST 7,589 LB

25-1402
REFORMER HEATER NO. 2
65,000 MMBTU/HR

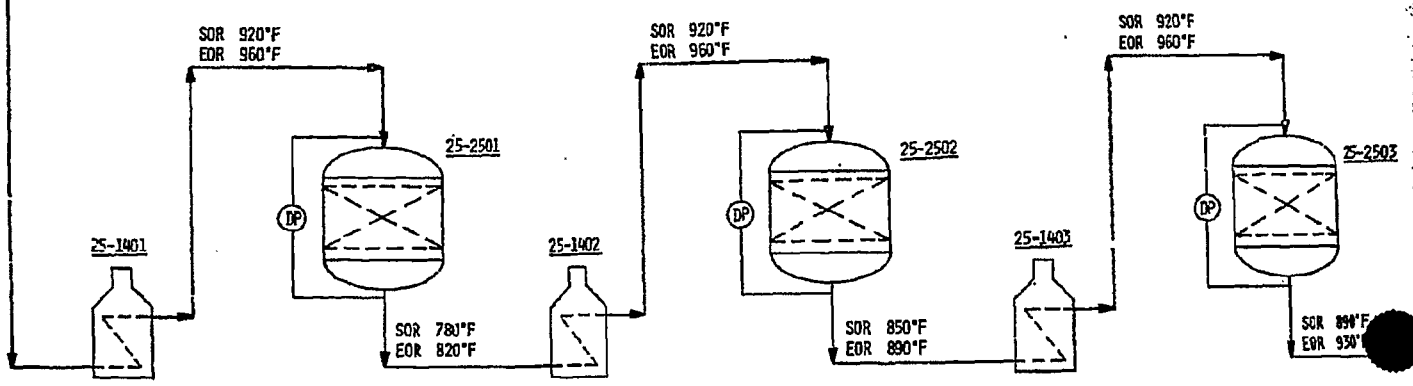
25-2502
REFORMER REACTOR NO. 2
CATALYST 10,119 LB

25-1403
REFORMER HEATER NO. 3
29,000 MMBTU/HR

25-2503
REFORMER REACTOR NO. 3
CATALYST 20,173 LB

REFOI
12,

START OF RUN (SOR) 780°F
END OF RUN (EOR) 823°F



TREATED NAPHTHA
FROM UNIT 24

25-1501,1502

25-1501,1502
NAPHTHA FEED
PUMP & SPARE
NORMAL 821 GPM
DESIGN 903 GPM

25-2503
REACTOR NO. 3
40,173 LB

25-1404
REFORMER HEATER NO. 4
12.000 MMBTU/HR

25-2504
REFORMER REACTOR NO. 4
CATALYST 53,442 LB

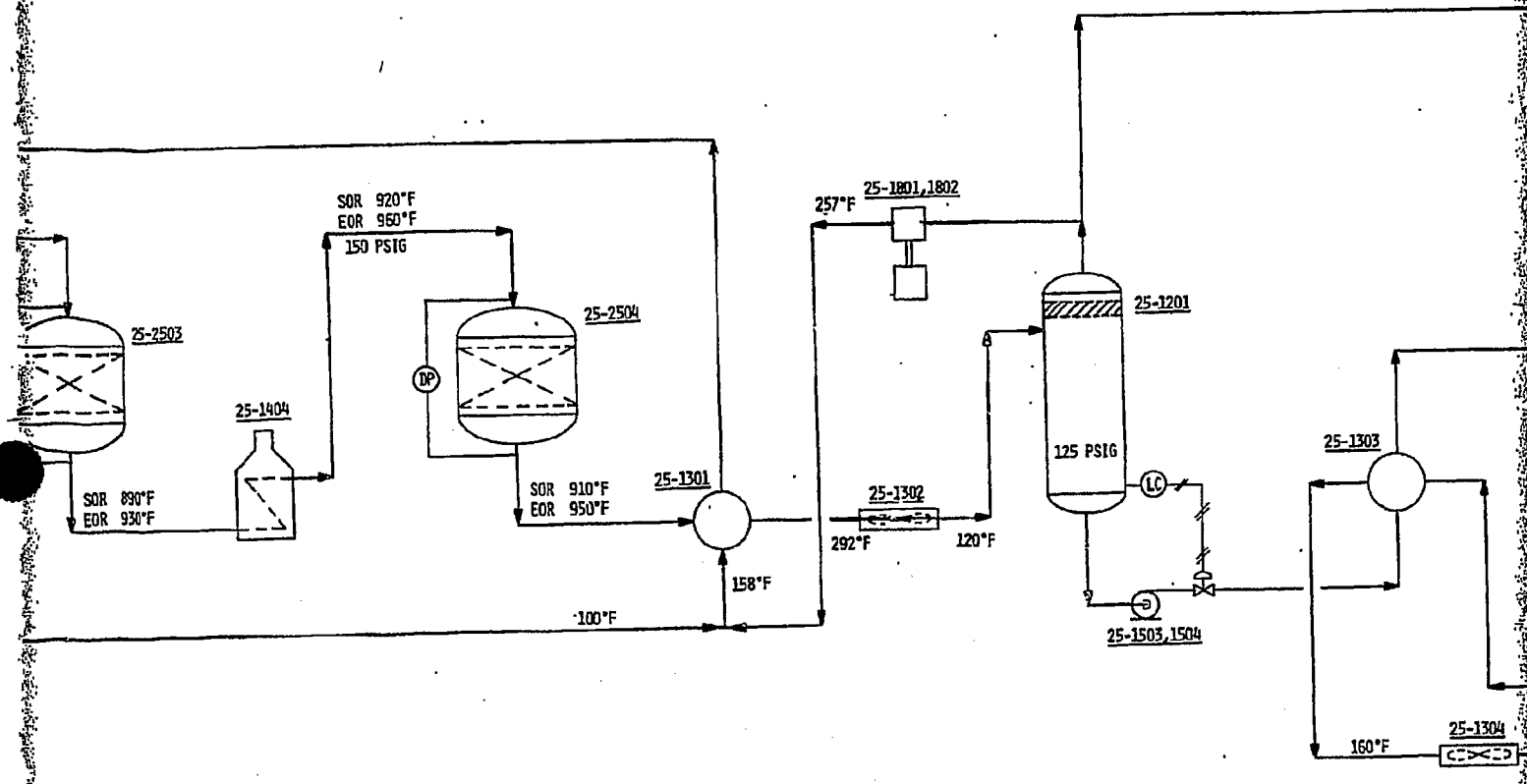
25-1301
REACTOR EFFLUENT/
FEED EXCHANGER
284.029 MMBTU/HR

25-1302
REACTOR EFFLUENT
AIR COOLER
96.000 MMBTU/HR

25-1201
FLASH SEPARATOR
11'-0" I.D. X 27'-6" T-T

25-1303
STABILIZER FEED/
BOTTOMS EXCHANGER
42.603 MMBTU/HR

25-1304
STABILIZER BOTT
AIR COOLER
5.686 MMBTU/H

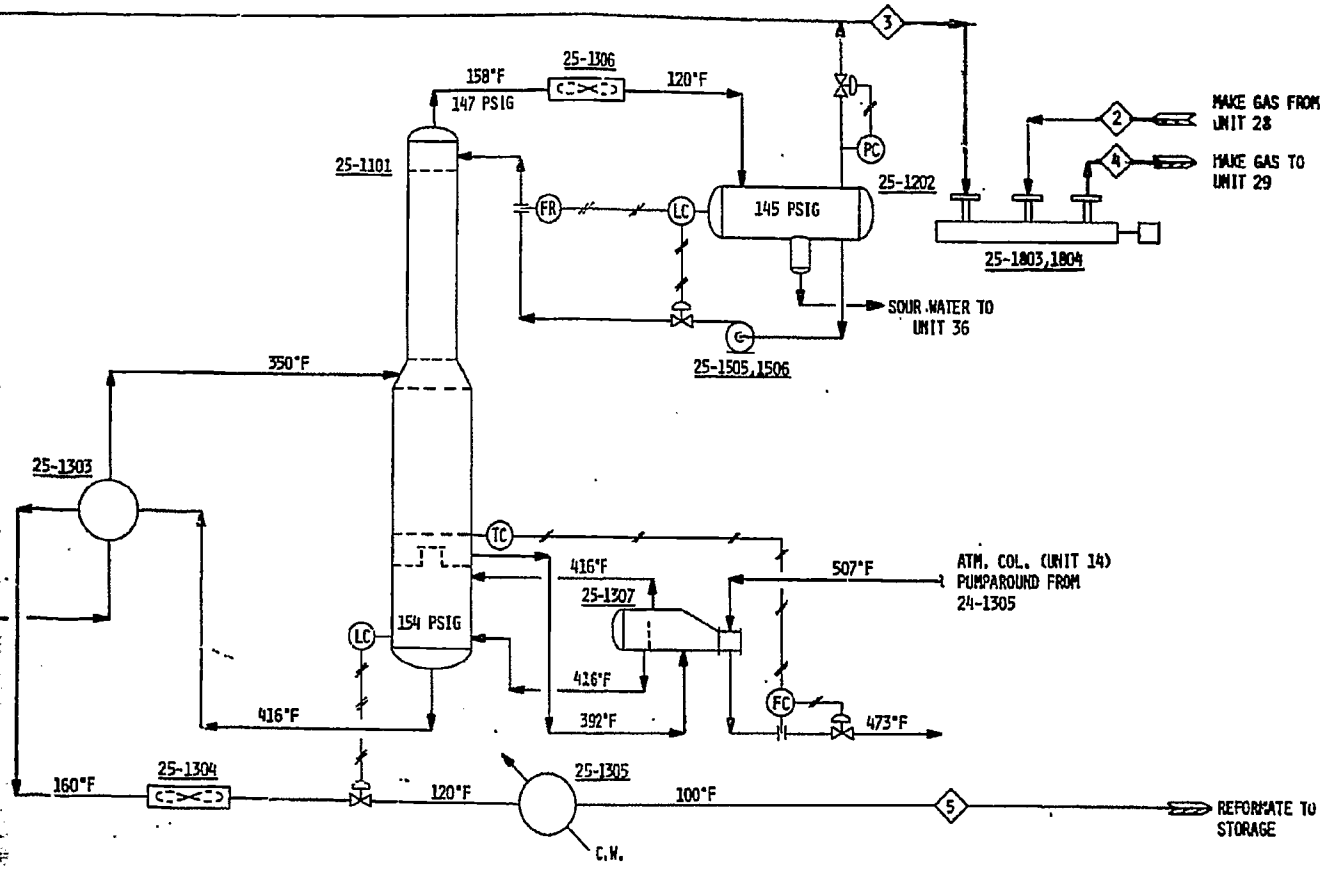


25-1801,1802
RECYCLE GAS
COMPRESSOR & SPARE
173.706 MMSCFD

25-1503,1504
STABILIZER FEED
PUMP & SPARE
NORMAL 750 GPM
DESIGN 823 GPM

STREAM NO.	◇1
STREAM NAME	TREATED NAPHTHA FEED
FLOW, MPH	
H_2	-
N_2	-
C_1	-
C_2	-
C_3	-
iC_4	-
nC_4	-
iC_5	-
nC_5	-
IBP TO 400	2,724.55
TOTAL	2,724.55
LB/HR	319,627.43
MMSCFD	-
P20	28.140
M.W.	117.310
°API	50.04

5-1303	25-1304	25-1101	25-1305	25-1306	25-1307	25-1202
ILIZER FEED/ OMS EXCHANGER 05 MMBTU/HR	STABILIZER BOTTOMS AIR COOLER 5,686 MMBTU/HR	STABILIZER 10'-9" I.D. X 6'-6" I.D. X 82'-6" T-T	STABILIZER BOTTOMS WATER COOLER 2,806 MMBTU/HR	STABILIZER OVERHEAD CONDENSER 6,566 MMBTU/HR	STABILIZER REBOILER 11,200 MMBTU/HR	STABILIZER REFLUX DRUM 6'-6" I.D. X 18'-0" T-T



25-1505,1506 STABILIZER REFLUX PUMP & SPARE	25-1803,1804 MAKE GAS COMPRESSORS
NORMAL 267 GPM	STAGE 1 47.902 MMSCFD
DESIGN 322 GPM	STAGE 2 108.183 MMSCFD

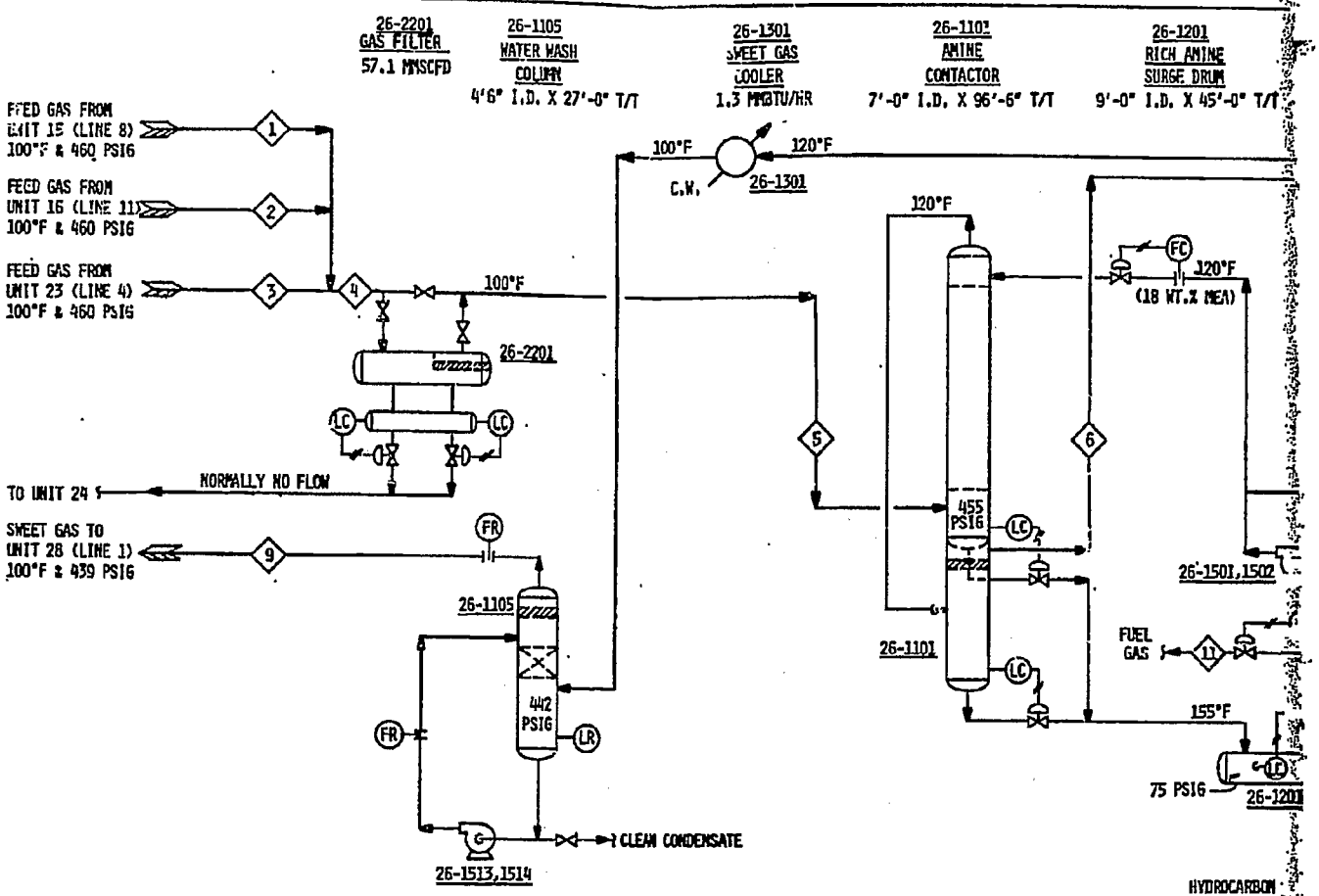
STREAM NO.	1 TREATED NAPHTHA FEED	2 MAKE GAS FROM UNIT 28	3 REFORMER MAKE GAS	4 TOTAL MAKE GAS	5 REFORMATE
STREAM NAME					
, MPa					
N2	-	2,216.02	4,439.27	6,655.29	-
	-	123.17	-	123.17	-
	-	235.81	-	235.81	-
	-	3,174.84	249.04	3,423.88	-
	-	348.18	-	348.18	-
	-	491.79	247.67	739.46	-
	-	18.18	-	18.18	-
	-	9.97	247.89	257.86	-
	-	0.16	-	0.16	-
TO 400	2,724.55	0.02	65.72	65.74	44.81
		0.33	9.70	10.03	2,152.60
	2,724.55	6,618.47	5,259.29	11,877.76	2,203.41
MMSCFD	319,627.43	91,259.32	36,404.47	127,663.79	283,222.54
PD	-	60.281	47.902	108.183	-
M,	28,140	-	-	-	23,742
	117,310	13.789	6.922	10.748	128,538
	50.04	-	-	-	41.28

REV. NO.	CHKD APPD.	DATE	REVISION	BY	PROD. ENGR.	ENGR.	SENIOR PROJ. ENGR.	CHIEF ENGR.	PROJ. DIR.
0		4/27/77	ISSUED FOR REPORT	LOG	AMT	AMT			

DEPARTMENT OF ENERGY - DIVISION OF COAL CONVERSION
POGO PLANT
PROCESS FLOW DIAGRAM
NAPHTHA REFORMER - UNIT 25

THE RALPH M. PARSONS COMPANY PASADENA, CALIFORNIA	JOB NO. 5435-4	DWG. NO. R-25-FS-1	REV. 0

DR.RM. REV. A 7/7/77 BC- BT-

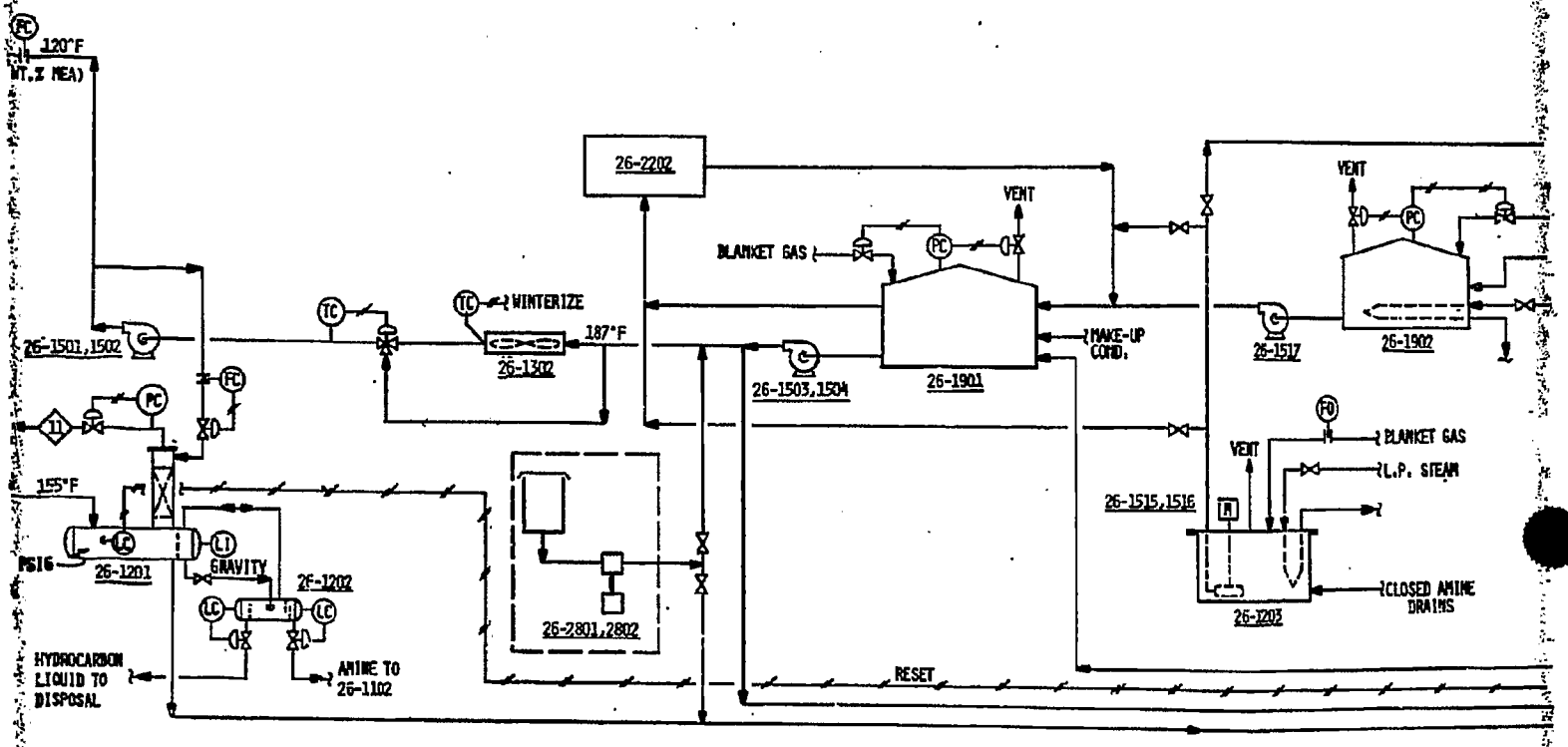


26-1513,1514
WATER CIRCULATING
PUMP & SPARE
80 GPM @ 60 PSIΔP

STREAM NO.	1	2	3	4	5	6	7	8	9	10	11
STREAM NAME	FEED GAS FROM UNIT 15	FEED GAS FROM UNIT 16	FEED GAS FROM UNIT 23	TOTAL FEED GAS TO GAS FILTER	FEED GAS TO AMINE CONTACTOR	TREATED GAS TO CAUSTIC PRECONTACTOR	TREATED GAS TO CAUSTIC CONTACTOR	TREATED GAS FROM CAUSTIC CONTACTOR	TREATED GAS TO UNIT 28	ACID GAS TO SULFUR PLANT	FLASH GAS
COMP., MPH											
	1,373.30	4.82	-	1,378.12	1,378.12	1,378.08	1,378.08	1,378.08	1,378.08	0.02	
	122.44	0.72	-	123.16	123.16	123.01	123.01	123.01	123.01	0.06	
	234.02	1.77	-	235.79	235.79	235.36	235.36	235.36	235.36	0.16	
	439.17	20.13	0.88	460.18	460.18	0.57	0.34	0.03	0.03	459.61	
	85.16	7.12	-	92.28	92.28	0.01	-	-	-	92.27	
	11.61	0.29	-	11.90	11.90	19.43	20.98	21.02	11.88	39.24	
	2,190.41	36.56	795.69	3,022.67	3,022.67	3,015.71	3,015.71	3,015.71	3,015.71	2.66	
	86.70	4.12	130.20	221.02	221.02	219.92	219.92	219.92	219.92	0.42	
	167.69	9.19	189.10	365.98	365.98	365.06	365.06	365.06	365.06	0.36	
	93.10	10.16	-	103.26	103.26	102.46	102.46	102.46	102.46	0.32	
	85.75	9.57	65.10	160.42	160.42	160.17	160.17	160.17	160.17	0.18	
	-	-	5.60	5.60	5.60	5.55	5.55	5.55	5.55	0.02	
	17.79	2.55	29.91	50.25	50.25	50.12	50.12	50.12	50.12	0.06	
IBP-200°F	8.04	0.55	21.60	30.20	30.20	30.07	30.07	30.07	30.07	0.06	
200-300°F	2.35	0.05	2.20	4.64	4.64	4.62	4.62	4.62	4.62	-	
300-350°F	0.33	-	0.03	0.36	0.36	0.36	0.36	0.36	0.36	-	
350-400°F	0.11	-	0.01	0.12	0.12	0.12	0.12	0.12	0.12	-	
400-450°F	0.03	-	-	0.03	0.03	0.03	0.03	0.03	0.03	-	
TOTAL, MPH	4,918.04	107.61	1,240.23	6,265.88	6,265.88	5,710.65	5,711.96	5,711.69	5,702.55	595.36	6
LB/HR	87,515.23	3,241.32	28,834.00	119,590.55	119,590.55	96,101.12	96,116.58	96,105.66	95,940.99	24,178.08	156
MSCFH	1,866.40	40.84	470.67	2,377.91	2,377.91	2,167.19	2,167.69	2,167.59	2,164.12	225.94	2
BPD @ 60° F	-	-	-	-	-	-	-	-	-	-	
M.W.	17.795	30.121	23.249	19.086	19.086	16.828	16.828	16.826	16.824	40.611	23
LB/GAL @ 60° F	-	-	-	-	-	-	-	-	-	-	

A

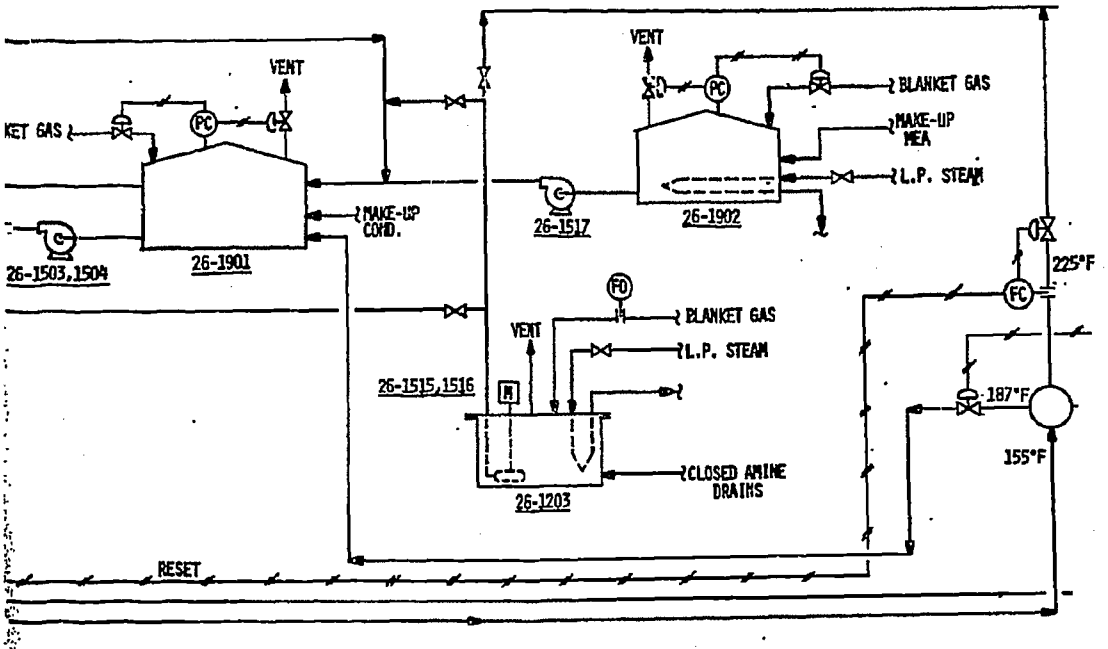
-1201 ICH AMINE DRUM	26-1202 AMINE OIL SEPARATOR	26-1302 AMINE COOLER	26-2801,2802 INHIBITOR/ANTIFOAM INJECTORS	26-2202 AMINE FILTER (PACKAGE)	26-1901 AMINE SURGE TANK	26-1203 AMINE SUMP	26-1902 AMINE STORAGE TANK
X 45'-0" T/T	2'-6" I.D. X 6'-6" T/T	34.5 MMBTU/HR.	0.05 GPM @ 200 PSI△P	110 GPM	23'-0" I.D. X 22'-0" HT.	5'-6" I.D. X 6'-0" HT.	12'-0" I.D. X 12'-0" HT.



26-1501, 1502 HP AMINE PUMP & SPARE	26-1503,1504 AMINE BOOSTER PUMP & SPARE	26-1515, 1516 AMINE SUMP PUMP & SPARE	26-1517 AMINE TRANSFER PUMP
1,189 GPM @ 495 PSI △P	1,222 GPM @ 60 PSI △P	25 GPM @ 60 PSI△P	50 GPM @ 30 PSI △P

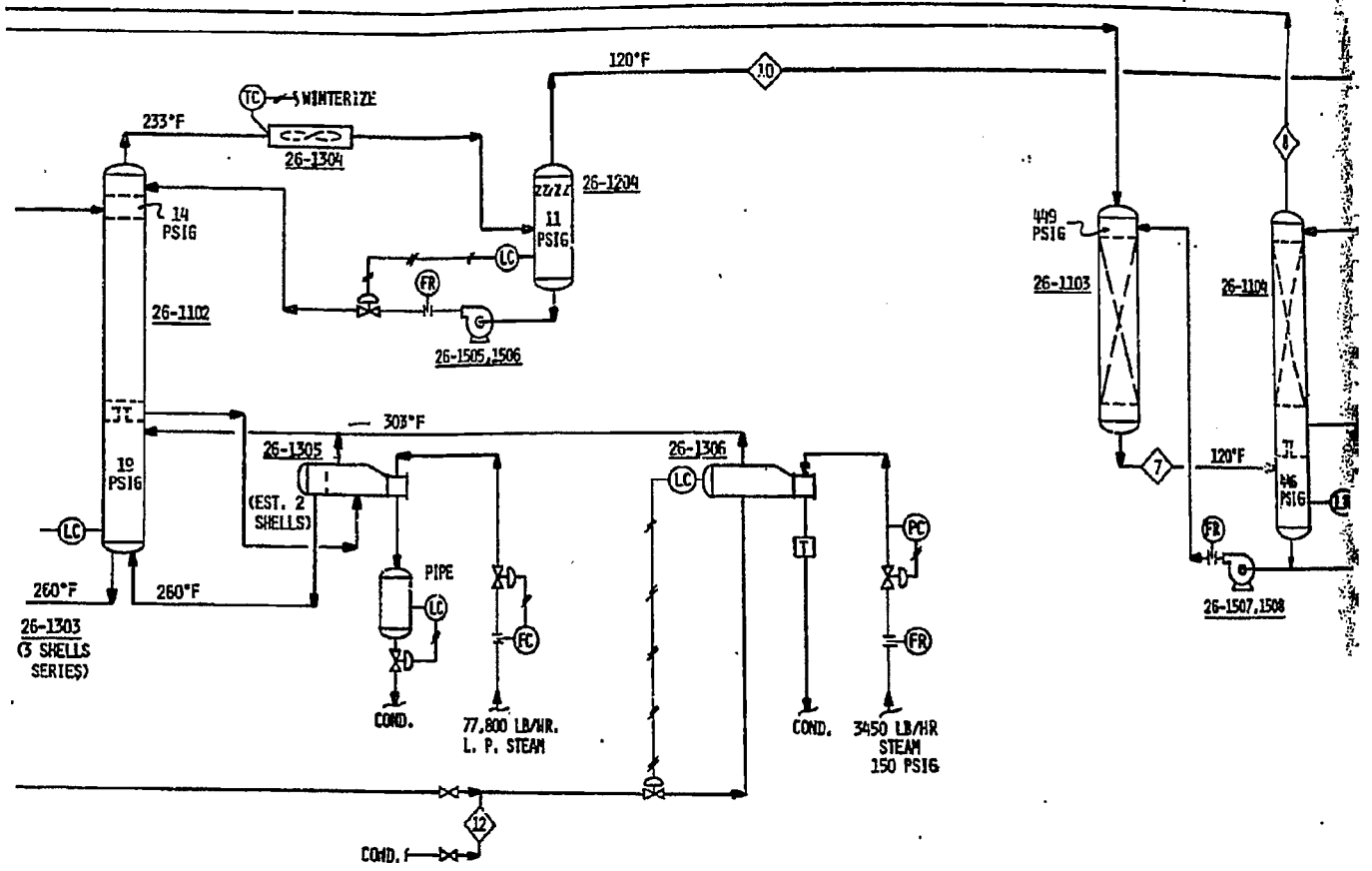
⑩ ACID GAS TO SULFUR PLANT	⑪ FLASH GAS	⑫ CONDENSATE TO RECLAIMER
0.02	0.02	-
0.06	0.09	-
0.16	0.27	-
61	-	-
27	-	-
24	0.12	46.89
2.66	4.20	-
0.42	0.68	-
0.36	0.56	-
0.32	0.48	-
0.10	0.15	-
0.02	0.03	-
0.04	0.07	-
0.06	0.07	-
-	0.02	-
-	-	-
-	-	-
88.36	6.76	46.89
270.08	156.05	844.70
385.94	1 +2.57	-
-	-	57.9
.611	23.084	18.016
-	-	8.338

26-2202	26-1901	26-1203	26-1902	26-1303
MINE FILTER (PACKAGE) 110 GPM	AMINE SURGE TANK 23'-0" I.D. X 22'-0" HT.	AMINE SUMP 5'-6" I.D. X 6'-0" HT.	AMINE STORAGE TANK 12'-0" I.D. X 12'-0" HT.	AMINE EXCHANGER 38.5 MMBTU/HR



26-1503,1504	26-1515, 1516	26-1517
AMINE BOOSTER PUMP & SPARE	AMINE SUMP PUMP & SPARE	AMINE TRANSFER PUMP
222 GPM @ 60 PSI ΔP	25 GPM @ 60 PSI ΔP	50 GPM @ 30 PSI ΔP

26-1102 AMINE REGENERATOR	26-1304 AMINE CONDENSER	26-1305 AMINE REBOILER	26-1204 AMINE REFLUX DRUM	26-1306 AMINE RECLAIMER	26-1103 CAUSTIC PRECONTACTOR	26-1104 CAUSTIC CONTACTOR
13'-6" I.D. X 70'-0" T/T	34.7 MMBTU/HR.	71.1 MMBTU/HR.	4'-6" I.D. X 12'-0" T/T	3.04 MMBTU/HR.	2'-6" I.D. X 41'-0" T/T	4'-6" I.D. X 63'



26-1505,1506
AMINE REFLUX
PUMP & SPARE
25 GPM @ 60 PSI ΔP

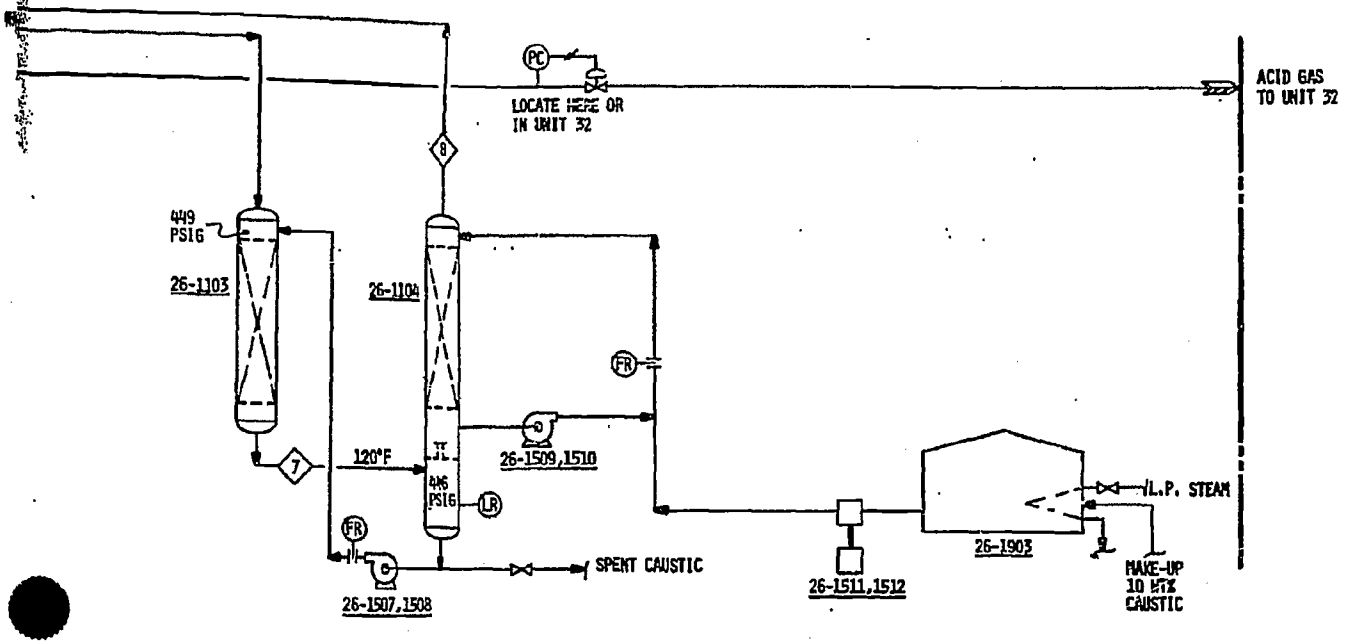
26-1507, 1508
WEAK CAUSTIC
PUMP & SPARE
30 GPM @ 60 PSI ΔP

A

26-1103
CAUSTIC
PRECONTACTOR
2'-6" I.D. X 41'-0" T/T

26-1104
CAUSTIC
CONTACTOR
4'-6" I.D. X 63'-6" T/T

26-1903
CAUSTIC STORAGE
TANK
10'-6" I.D. X 20'-0" HT.



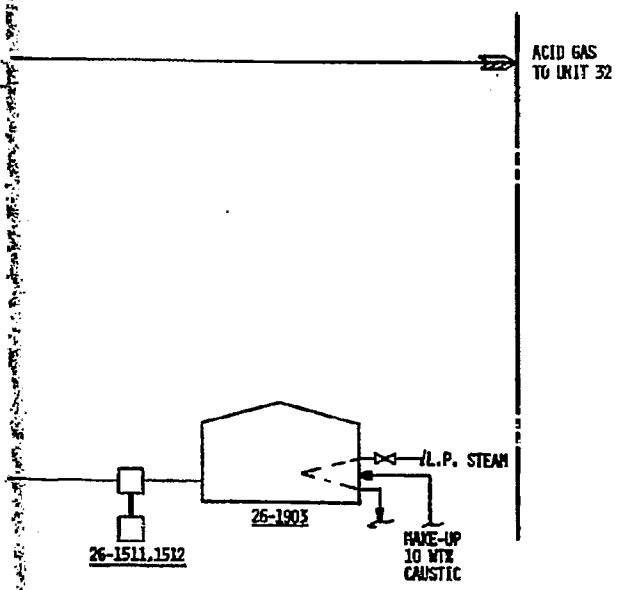
26-1507, 1508
WEAK CAUSTIC
PUMP & SPARE
30 GPM @ 60 PSI ΔP

26-1509,1510
STRONG CAUSTIC
PUMP & SPARE
100 GPM @ 60 PSI ΔP

26-1511, 1512
CAUSTIC MAKE-UP
PUMP & SPARE
2 GPM @ 499 PSI ΔP

B

26-1903
CAUSTIC STORAGE
TANK
10'-6" I.D. X 20'-0" HT.



26-1511, 1512
CAUSTIC MAKE-UP
PUMP & SPARE
2 GPM @ 499 PSI ΔP

0			ISSUED FOR REPORT		LCG					
MARK NO.	QUANT. ASSD.	DATE	REVISIONS		BY	APPROVED				

DEPARTMENT OF ENERGY - DIVISION OF COAL CONVERSION
POGO PLANT
PROCESS FLOW DIAGRAM
OLEFINIC GAS ACID GAS REMOVAL - UNIT 26

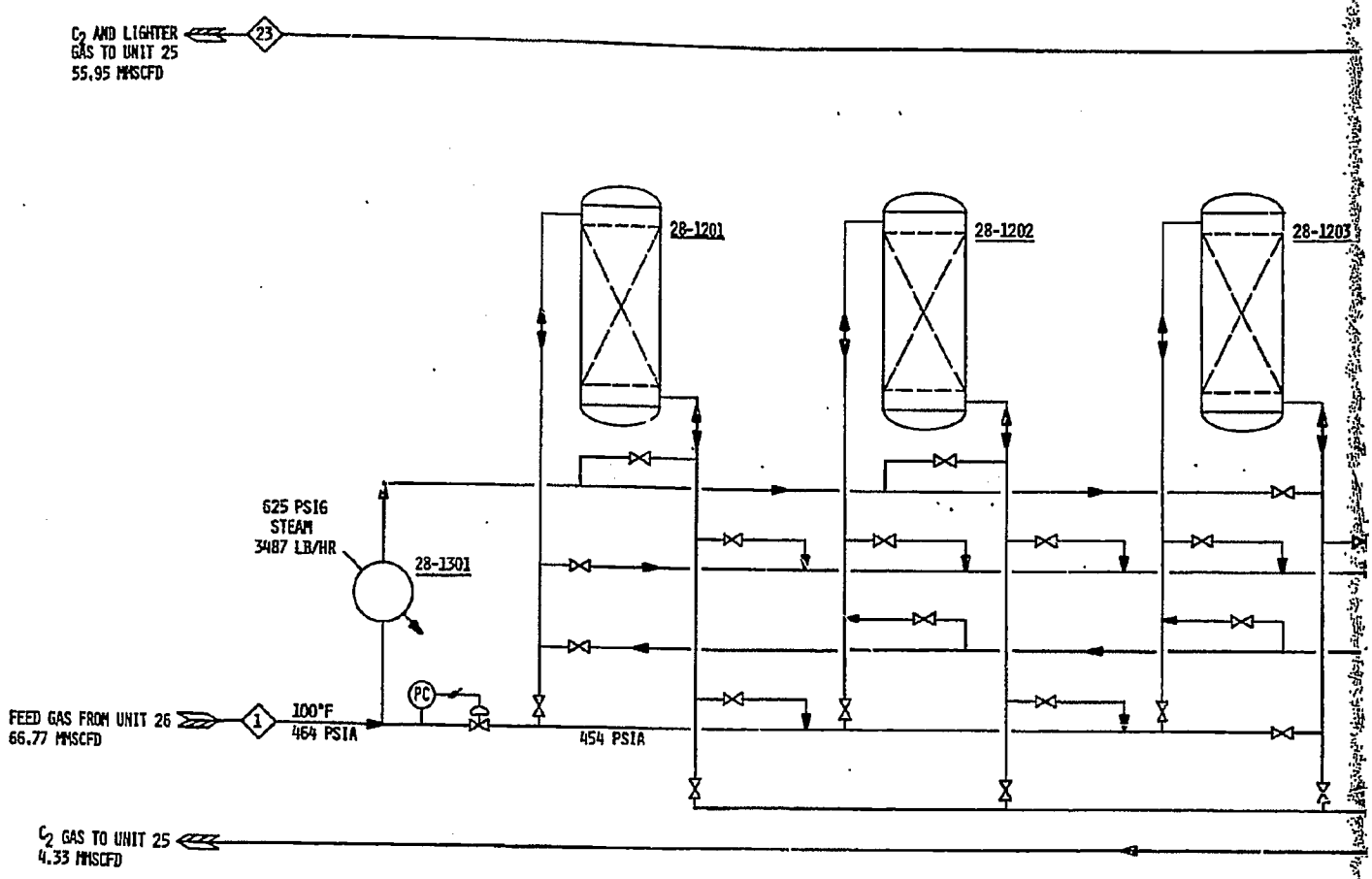
THE RALPH M. PARSONS COMPANY PASADENA, CALIFORNIA	JOB NO. 5135-1	DWG. NO. R-26-FS-1	REV. 0

B C

28-1301
REGENERATION HEATER
2.52 MMBTU/HR

28-1201,1202,1203
MOLECULAR SIEVE DRIERS
3 EA. 7'-6" I.D. X 23'-0" T-T

28-1
REGENERATION
2.83 MMBT



STREAM NO.	1	2	3	4	5	6
STREAM NAME	FEED GAS TO MOLE SIEVES	FEED GAS FROM MOLE SIEVES	GAS + LIQUID TO FEED CHILLER	GAS + LIQUID TO R.O. SEPARATOR	FEED GAS TO ABSORBER	LIQUID FROM R.O. SEPARATOR
COMP., MPH						
H_2	2216.02	2216.02	2216.02	2217.90	2213.71	4.19
N_2	123.17	123.17	123.17	123.79	122.35	1.44
CO_2	235.81	235.81	235.81	237.66	233.33	4.33
CO	-	-	-	-	-	-
NH_3	-	-	-	-	-	-
H_2S	-	-	-	-	-	-
H_2O	15.16	-	-	-	-	-
C_1	3174.84	3174.84	3174.84	3247.10	3074.58	172.52
C_2	348.34	348.34	348.34	386.68	289.00	97.68
C_3	507.07	507.07	507.07	587.81	377.54	210.27
C_4	240.47	240.47	240.47	316.70	94.34	222.36
C_5	257.48	257.48	257.48	335.16	87.61	247.55
C_6	85.32	85.32	85.32	93.64	7.67	85.97
C_7	141.15	141.15	141.15	158.18	16.55	141.63
IBP-200	-	-	-	60.94	0.01	60.93
200-400	-	-	-	487.53	0.11	487.42
TOTAL, MPH	7344.83	7329.67	7329.67	8253.09	6516.80	1736.29
LB/HR	125207.69	124934.51	124934.51	197651.39	92445.61	105205.69
MSCFD	66896.71	66758.63	66758.63	-	59355.01	-
API @ 60°F	-	-	-	-	-	11585.14
M.W.	17.05	17.05	17.05	23.95	14.19	60.59
LB/GAL @ 60°F	-	-	-	-	-	5.1887

28-1302
REGENERATION COOLER
2.83 MMBTU/HR

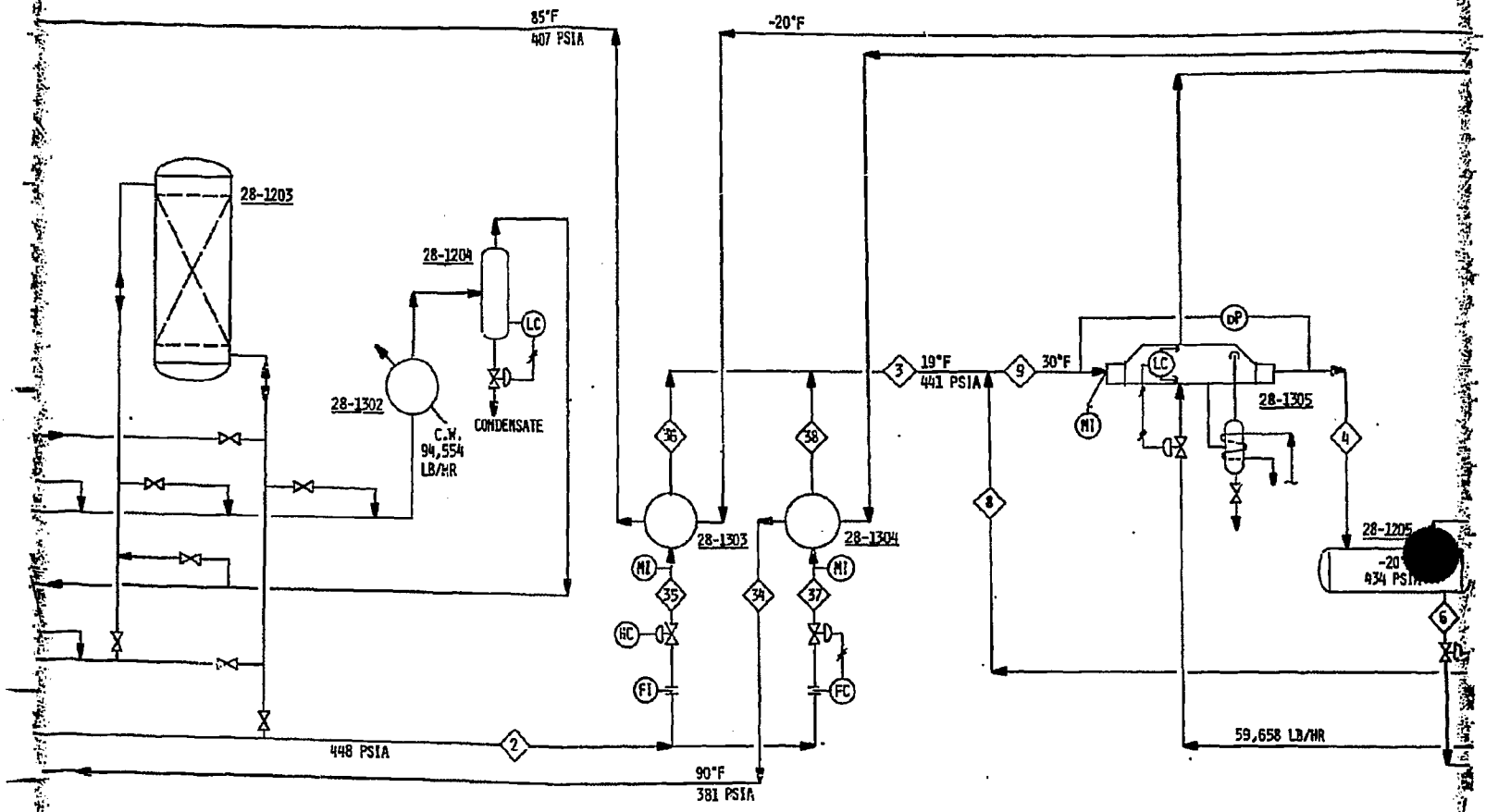
28-1204
REGENERATION SEPARATOR
2'-6" I.D. X 5'-0" T-T

28-1303
GAS/GAS EXCHANGER
5.39 MMBTU/HR

28-1304
GAS/DEETHANIZER RESIDUE EXCHANGER
0.48 MMBTU/HR

28-1305
FEED CHILLER
7.56 MMBTU/HR

28-1205
FEED GAS R.O. SEPARATOR
5'-0" I.D. X 21'-8" T-T



	5	6	7	8	9	10	11	12	13	14	STREAM NO.	15	16	17	18
JID	FEED GAS TO ABSORBER	LIQUID FROM R.O. SEPARATOR	ABSORBER OVERHEAD	ABSORBER BOTTOMS	GAS + LIQUID TO FEED CHILLER	REFLUX TO ABSORBER	DEC_2 L.O. PRESATR. OVERHEAD	DEC_2 OVERHEAD	PRESAT. L.O. TO DEC_2	R.O. STILL OVERHEAD GAS	STREAM NAME	R.O. STILL BOTTOMS	DEC_2 BOTTOMS	L.O. TO PRESATR. CHILLER	R.O. STILL REFLUX
	2213.71	4.19	2213.11	1.88	2217.90	1.28	4.19	4.26	0.07	-	COMP., MPH				
	122.35	1.44	122.21	0.62	123.79	0.48	1.44	1.57	0.13	-	N_2	-	-	-	-
	233.33	4.33	232.99	1.85	237.66	1.51	4.33	4.91	0.58	-	CO	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	CO_2	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	NH_3	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	H_2S	-	-	-	-
	3074.58	172.52	3066.54	72.26	3247.10	64.22	172.52	235.31	62.79	-	CH_4	-	-	-	-
	289.80	97.68	285.67	38.34	386.68	35.21	97.52	271.40	173.88	0.58	C_2H_4	-	0.16	-	0.42
	377.54	210.27	356.10	80.74	587.81	69.30	194.99	734.30	539.31	56.70	C_2H_6	-	15.28	-	41.42
	84.34	222.36	36.02	76.23	316.70	17.91	0.07	1.46	1.39	825.53	C_3H_6	-	222.29	-	603.24
	87.61	247.55	21.38	77.68	335.16	11.45	0.03	0.70	0.67	919.02	C_3H_8	0.01	247.52	0.01	671.51
	7.67	85.97	0.20	8.32	93.64	0.85	-	0.04	0.53	316.12	C_4H_8	1.30	86.46	0.81	238.98
	16.55	141.63	0.34	17.03	158.18	0.82	-	0.10	0.40	525.60	C_4H_{10}	0.78	141.33	0.50	384.45
	0.01	60.93	0.04	60.94	60.94	60.97	-	0.03	36.61	-	IBP-200	97.51	97.51	60.96	-
	0.11	487.42	0.33	487.53	487.53	487.75	-	0.20	292.83	-	200-400	780.05	780.05	487.72	-
	6516.80	1736.29	6345.13	923.42	8253.09	751.75	475.09	1254.28	1109.19	2841.55	TOTAL, MPH	879.65	1591.20	550.00	1930.00
	92445.61	105205.69	85161.87	72716.82	197651.39	65433.14	11540.50	31782.52	58236.14	126152.31	LB/HR	95946.79	129659.40	59990.09	-
	59355.01	-	57791.44	-	-	-	4327.12	11423.98	-	24039.24	MSCFD	-	-	-	5040.72
	-	11586.14	-	6997.76	-	6008.92	-	-	7088.31	-	BPD @ 60°F	8061.97	12401.03	5040.72	109.07
	14.19	60.59	13.42	78.75	23.95	87.04	24.29	20.93	52.50	47.38	M.W.	109.07	81.49	109.07	81.49
	-	5.1887	2.3513	5.9380	-	6.2225	-	-	4.6947	-	LB/GAL @ 60°F	6.8007	5.9746	6.8006	4.4396

13

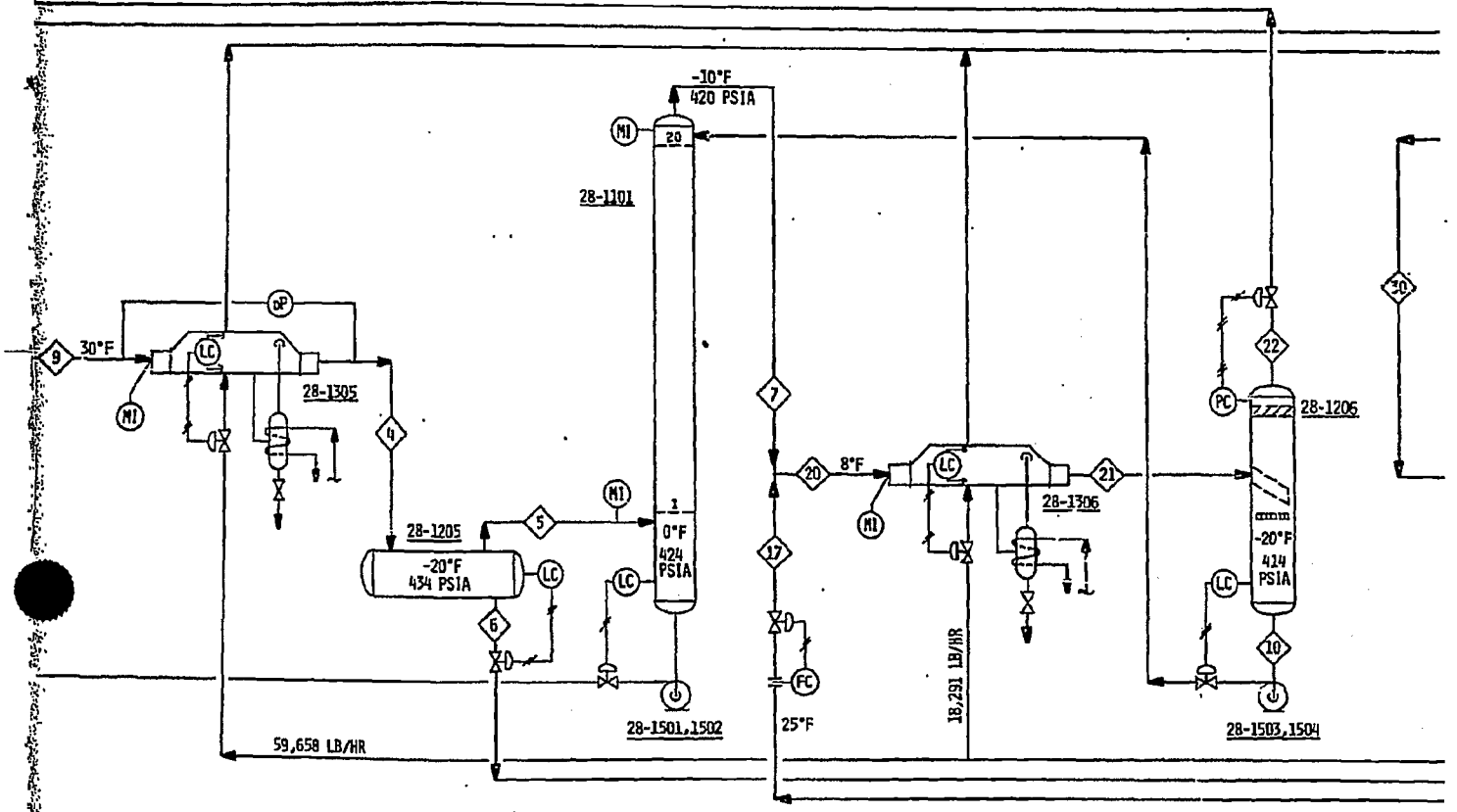
28-1305
FEED CHILLER
7.56 MMBTU/HR

28-1205
FEED GAS R.O.
SEPARATOR
5'-0" I.D. X 21'-8" T-T

28-1101
ABSORBER
3'-6" I.D. X 50'-0" T-T
20 SINGLE PASS TRAYS
AT 24" TRAY SPACING

28-1306
PRESATURATOR
CHILLER
2.41 MMBTU/HR

28-1206
ABSORBER
PRESATURATOR
5'-0" I.D. X 15'-9" T-T'



28-1501,1502
R.O. PUMP & SPARE
2 EA. 196 GPM
SP.GR. = 0.742

28-1503,1504
PRESATURATED
L.O. PUMP & SPARE
2 EA. 168 GPM
SP.GR. = 0.783

STREAM NO.	15	16	17	18	19	20	21	22	23	24	25	26
STREAM NAME	R.O. STILL BOTTOMS	DEC$_2$ BOTTOMS	L.O. TO PRESATR. CHILLER	R.O. STILL REFLUX	R.O. STILL LIQ. DYNO. PRODUCT	GAS + LIQUID FEED TO PRESATR. CHILR.	GAS + LIQUID TO ABSORBER PRESATR.	ABSORBER PRESATR. OVERHEAD	GAS FROM G/G EXCHANGER	L.O. TO DEC$_2$ SIDE REBOILER	L.O. TO LEAN OIL COOLER	L.O. TO L.O./DEC$_2$ FEED EXCHANGER
COMP., MPH												
H_2	-	-	-	-	-	2213.11	2213.11	2211.83	2211.83	-	-	-
N_2	-	-	-	-	-	122.21	122.21	121.73	121.73	-	-	-
C_1	-	-	-	-	-	232.99	232.99	231.48	231.48	-	-	-
CO_2	-	-	-	-	-	-	-	-	-	-	-	-
NH_3	-	-	-	-	-	-	-	-	-	-	-	-
H_2S	-	-	-	-	-	-	-	-	-	-	-	-
H_2O	-	-	-	-	-	-	-	-	-	-	-	-
C_2	-	-	-	-	-	-	-	-	-	-	-	-
C_3	-	-	-	-	-	3066.54	3066.54	3002.32	3002.32	-	-	-
C_4	-	0.16	-	0.42	0.16	285.87	285.87	250.66	250.66	-	-	-
C_5	-	15.28	-	41.42	15.28	366.10	366.10	296.80	296.80	-	-	-
C_6	-	222.29	-	603.24	222.29	36.02	36.02	18.11	18.11	-	-	-
C_7	0.01	247.52	0.01	671.51	247.51	21.39	21.39	9.94	9.94	0.01	0.01	0.01
C_8	1.30	86.46	0.81	228.96	85.16	1.01	1.01	0.16	0.16	1.30	1.30	1.30
C_9	0.78	141.93	0.50	384.45	141.15	0.84	0.84	0.02	0.02	0.80	0.80	0.80
C_{10}	97.51	97.51	60.96	-	-	61.00	61.00	0.03	0.03	97.54	97.54	97.54
IBP-200	780.05	780.05	487.72	-	-	488.05	488.05	0.30	0.30	780.35	780.35	780.35
200-400	879.65	1591.20	550.00	1910.00	711.55	5895.13	6895.13	6143.38	6143.38	880.00	880.00	880.00
TOTAL, MPH												
LB/HR	95946.79	129659.40	59990.09	91439.70	33712.61	145151.96	145151.96	79718.62	79718.82	95984.20	95984.20	95984.20
MSCFD	-	-	-	-	-	-	-	55953.91	55953.91	-	-	-
GPM @ 60°F	8061.97	12401.03	5040.72	11769.98	4339.05	-	-	-	-	8065.15	8065.15	8065.15
	109.07	81.49	109.07	47.38	47.38	21.05	21.05	12.98	12.98	109.07	109.07	109.07
SP. GR. @ 60°F	6.9007	5.9746	6.8006	4.4394	4.4398	-	-	-	-	6.8006	6.8006	6.8006

28-1207
DEETHANIZER LEAN OIL CHILLER
3.37 MMBTU/HR

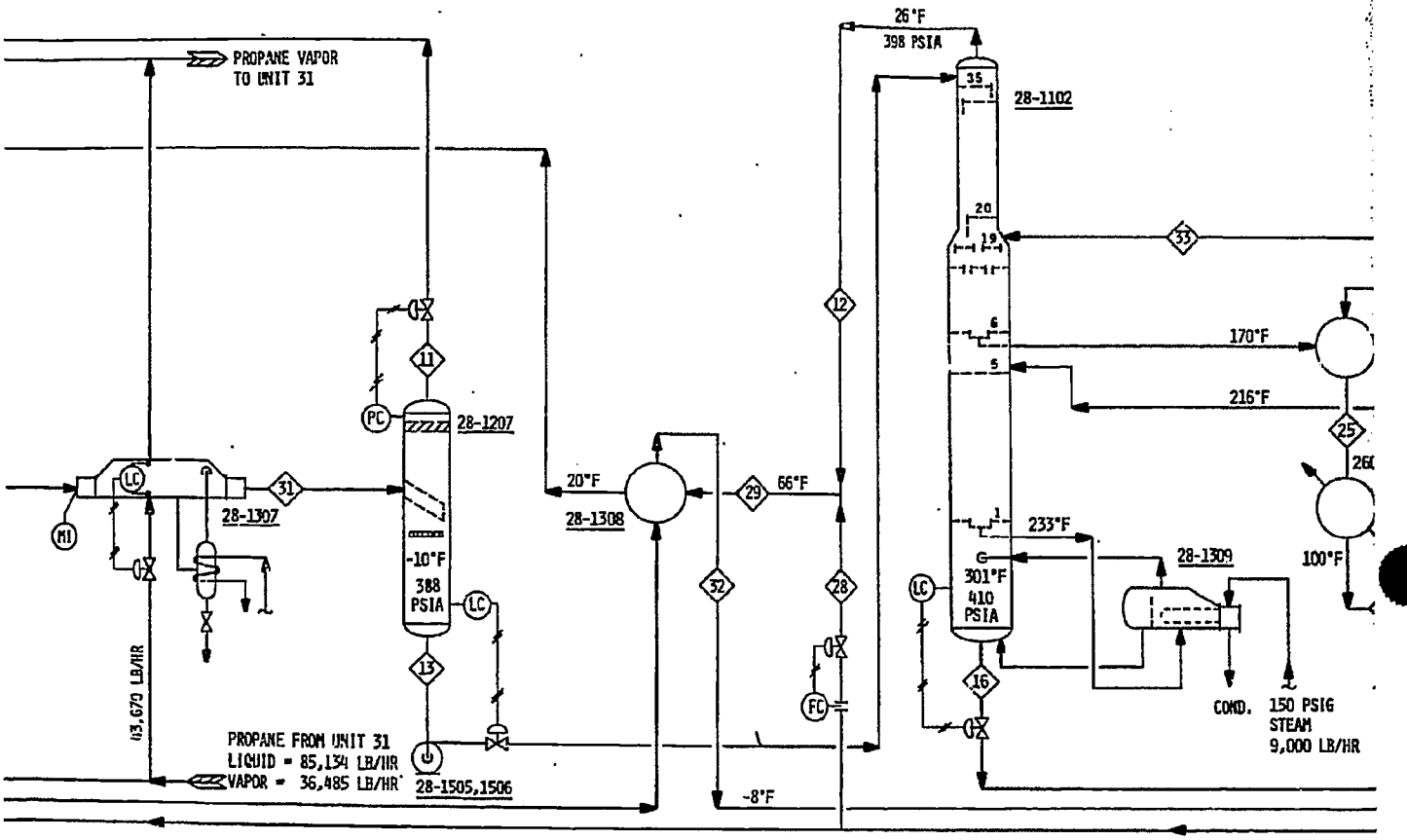
28-1207
DEETHANIZER LEAN OIL PRESATURATOR
5'-0" I.D. X 15'-10" T-T

28-1308
LEAN OIL PRESATURATOR/ DEETHANIZER FEED EXCHANGER
0.54 MMBTU/HR

28-1102
RICH OIL DEETHANIZER
TOP - 3'-6" I.D. X 27'-0" T-S
15 TRAYS AT 24" SPACING-1 PASS
BOT.- 5'-6" I.D. X 45'-0" T-S
19 TRAYS AT 24" SPACING-2 PASS

28-1309
DEETHANIZER REBOILER
7.72 MMBTU/HR

28-13
DEETHAN
SIDE REB
14.70 M



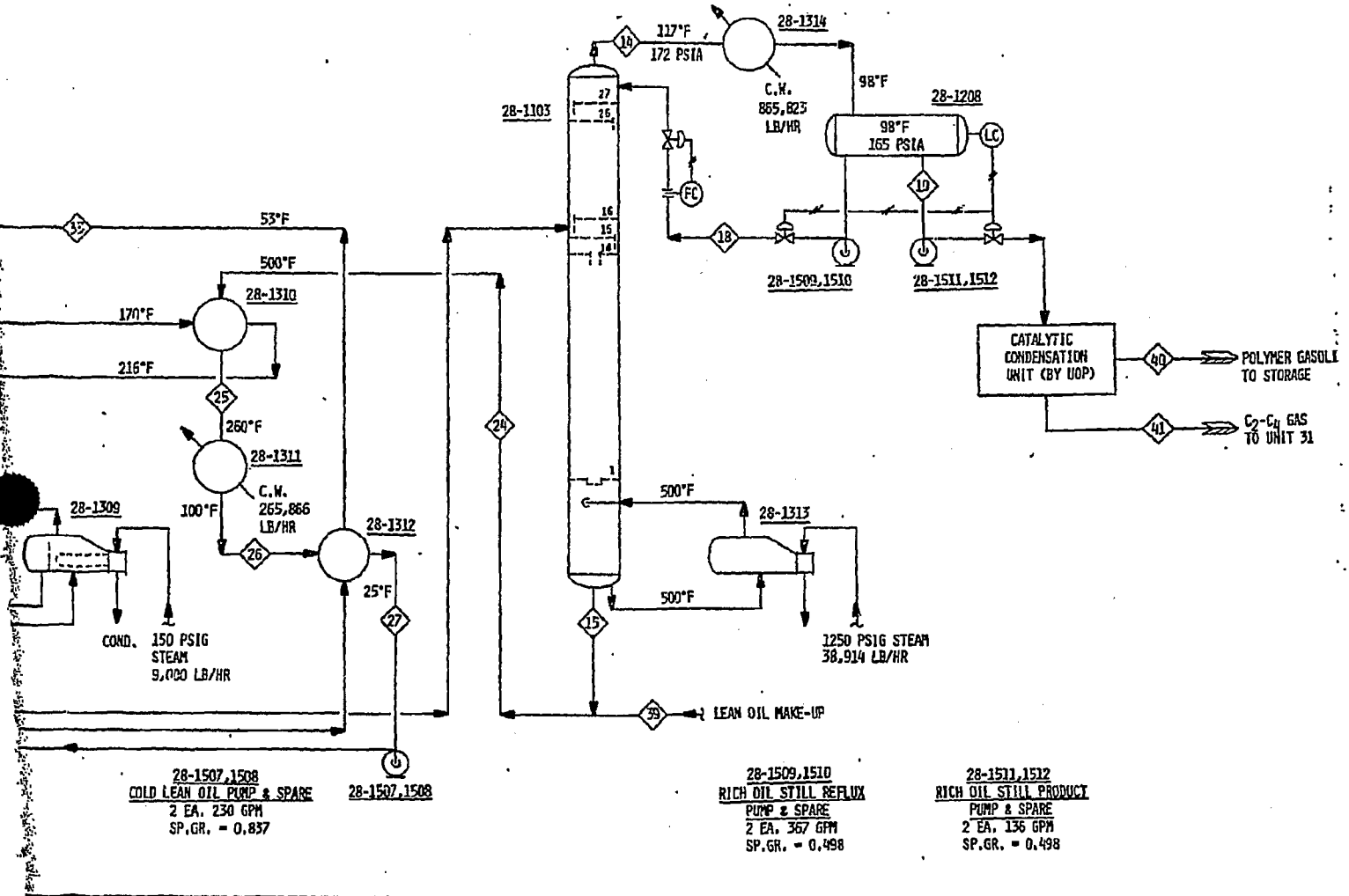
28-1505,1506
PRESATURATED LEAN OIL PUMP & SPARE
2 EA. 215 GPM
SP.GR. = 0.610

28-1507,15
COLD LEAN OIL PU
2 EA. 230
SP.GR. = 0.

27	28	STREAM NO.	29	30	31	32	33	34	35	36	37
L.O. FROM L.O./DEC_2 FEED EXCHANGER	L.O. TO L.O. PRESATR/DEC_2 FEED EXCHANGER	STREAM NAME	FEED TO PRESATR/DEC_2 FEED EXCHR.	FEED TO DEC_2 L.O. CHILLER	FEED TO DEC_2 L.O. PRESATR.	DEC_2 FEED TO L.O./DEC_2 FEED EXCHANGER	DEC_2 FEED TO DEC_2	DEC_2 GAS PRODUCT	FEED GAS TO G/G EXCHANGER	FEED GAS FROM G/G EXCHANGER	FEED GAS TO GAS/DEC_2 RE EXCHANGER
		COMP., MPH									
-	-	H_2	4.26	4.26	4.26	4.19	4.19	4.19	1992.37	1992.37	223.65
-	-	N_2	1.57	1.57	1.57	1.44	1.44	1.44	110.74	110.74	12.43
-	-	CO	4.91	4.91	4.91	4.33	4.33	4.33	212.01	212.01	23.80
-	-	CO_2	-	-	-	-	-	-	-	-	-
-	-	NH_3	-	-	-	-	-	-	-	-	-
-	-	H_2S	-	-	-	-	-	-	-	-	-
-	-	SO_2	-	-	-	-	-	-	-	-	-
-	-	CH_4	235.31	235.31	235.31	172.52	172.52	172.52	2854.42	2854.42	320.42
-	-	C_2H_4	271.40	271.40	271.40	97.68	97.68	97.52	313.18	313.18	35.16
-	-	C_2H_6	734.30	734.30	734.30	210.27	210.27	194.99	455.89	455.89	51.18
-	-	C_3H_6	1.46	1.46	1.46	222.36	222.36	0.07	216.20	216.20	24.27
0.01	-	C_3H_8	0.70	0.70	0.70	247.55	247.55	0.03	231.49	231.49	25.99
1.30	0.49	C_4H_8	0.53	0.53	0.53	85.97	85.97	-	76.71	76.71	8.61
0.80	0.30	C_4H_{10}	0.40	0.40	0.40	141.63	141.63	-	126.90	126.90	14.25
97.54	36.58	IBP-200	36.61	36.61	36.61	60.93	60.93	-	-	-	-
780.35	292.63	200-400	292.83	292.83	292.83	487.42	487.42	-	-	-	-
880.00	330.00	TOTAL, MPH	1584.28	1584.28	1584.28	1736.29	1736.29	475.09	6589.91	6589.91	739.76
95984.20	35994.11	LB/HR	69776.63	69776.63	69776.63	105205.69	105205.69	11540.50	112324.89	112324.89	12609.62
-	-	MSCFD	-	-	-	-	-	4327.12	60020.90	60020.90	6737.73
8065.15	3024.43	BPD @ 60°F	-	-	-	11586.14	11586.14	-	-	-	-
109.07	109.07	M.W.	44.04	44.04	44.04	60.59	60.59	24.29	17.04	17.04	17.04
.8006	6.8006	LB/GAL @ 60°F	-	-	-	5.1887	5.1887	-	-	-	-

28-1309 DEETHANIZER REBOILER	28-1310 DEETHANIZER SIDE REBOILER	28-1311 LEAN OIL COOLER	28-1312 LEAN OIL/DEETHANIZER FEED EXCHANGER	28-1103 RICH OIL STILL	28-1313 RICH OIL STILL REBOILER	28-1314 RICH OIL STILL CONDENSER	28-1208 RICH OIL STILL REFLUX DRUM
7.72 MMBTU/HR	14.70 MMBTU/HR	7.68 MMBTU/HR	3.11 MMBTU/HR	5'-6" I.D. X 80'-0" T/T TOP 13 TRAYS @ 24" SPACING-1 PASS BOT. 14 TRAYS @ 24" SPACING-2 PASS	23.33 MMBTU/HR	18.14 MMBTU/HR	5'-0" I.D. X 17'-0" T-T

S-S PASS
S-S PASS



36 FEED GAS FROM O/G EXCHANGER	37 FEED GAS TO GAS/DEC$_2$ RES. EXCHANGER	38 FEED GAS FROM GAS/DEC$_2$ RES. EXCHANGER	39 FRESH L.O. TO PLANT	40 POLYMER GASOLINE PRODUCT	41 C_2-C_4 GAS TO UNIT 31
1992.37	223.65	223.65	-	-	-
110.74	12.43	12.43	-	-	-
212.01	23.80	23.80	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
2854.42	320.42	320.42	-	-	-
313.13	35.16	35.16	-	-	0.16
455.89	51.18	51.18	-	-	15.28
216.70	24.27	24.27	-	-	127.06
231.49	25.99	25.99	-	-	143.64
76.71	8.61	8.61	-	-	46.67
126.90	14.25	14.25	0.02	-	98.84
-	-	-	0.03	-	-
-	-	-	0.30	-	-
8589.91	739.76	739.76	0.35	119.77	431.65
112324.89	12609.62	12609.62	37.41	13654.00	10058.61
60020.90	6737.73	6737.73	-	-	-
-	-	-	3.18	1275	2849
17.04	17.04	17.04	106.88	114	46.47
-	-	-	6.7212	6.1190	4.3269

28-1313
RICH OIL STILL
REBOILER
23.33 MMBTU/HR

28-1314
RICH OIL STILL
CONDENSER
18.14 MMBTU/HR

28-1208
RICH OIL STILL
REFLUX DRUM
5'-0" I.D. X 17'-0" T-T

ASS
SS

-1314

98°F

28-1208

98°F
165 PSIA

LC

19

,1510

28-15II,1512

CATALYTIC
CONDENSATION
UNIT (BY HOP)

40 → POLYMER GASOLINE PRODUCT TO STORAGE

41 → C_2-C_4 GAS TO UNIT 31

1250 PSIG STEAM
,914 LB/HR

EFLUX

28-1511,1512
RICH OIL STILL PRODUCT
PUMP & SPARE
2 EA. 136 GPM
SP.GR. = 0.498

NOTES:

THE SYMBOL (M) → USED ON THIS DRAWING MEANS POINT OF METHANOL INJECTION.

REV. NO.	CHIEF APPR.	DATE	REVISION	BY	PROJ. CHIEF	CHECK	CHIEF PROC. ENGR.	CHIEF MECH. ENGR.	PROJ. ENG.
0		4/8/77	ISSUED FOR REPORT	WL	MEC	DH			

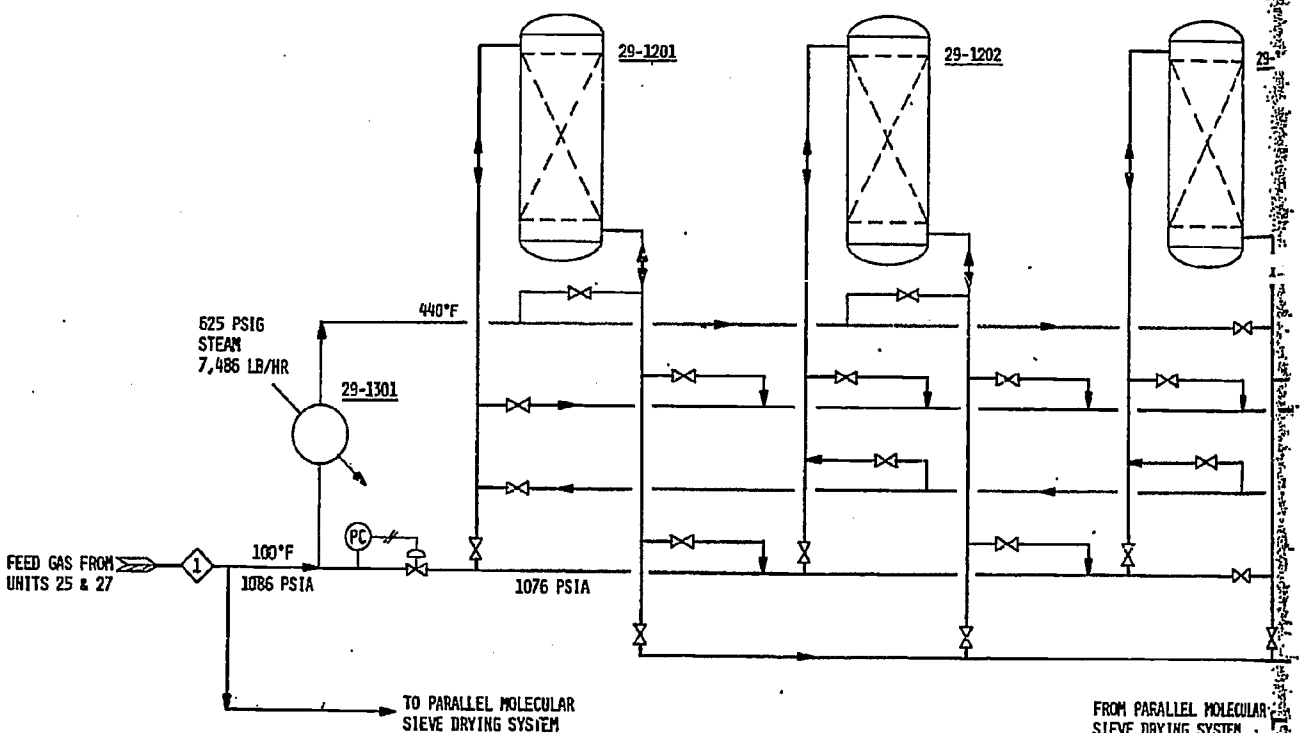
DEPARTMENT OF ENERGY - DIVISION OF COAL CONVERSION
POCO PLANT
PROCESS FLOW DIAGRAM
OLEFIN RECOVERY & POLYMERIZATION - UNIT 28

THE RALPH M. PARSONS COMPANY PASADENA, CALIFORNIA	JOB NO. 5435-4	DWG. NO. R-28-FS-1	REV. 0

DC- BY-

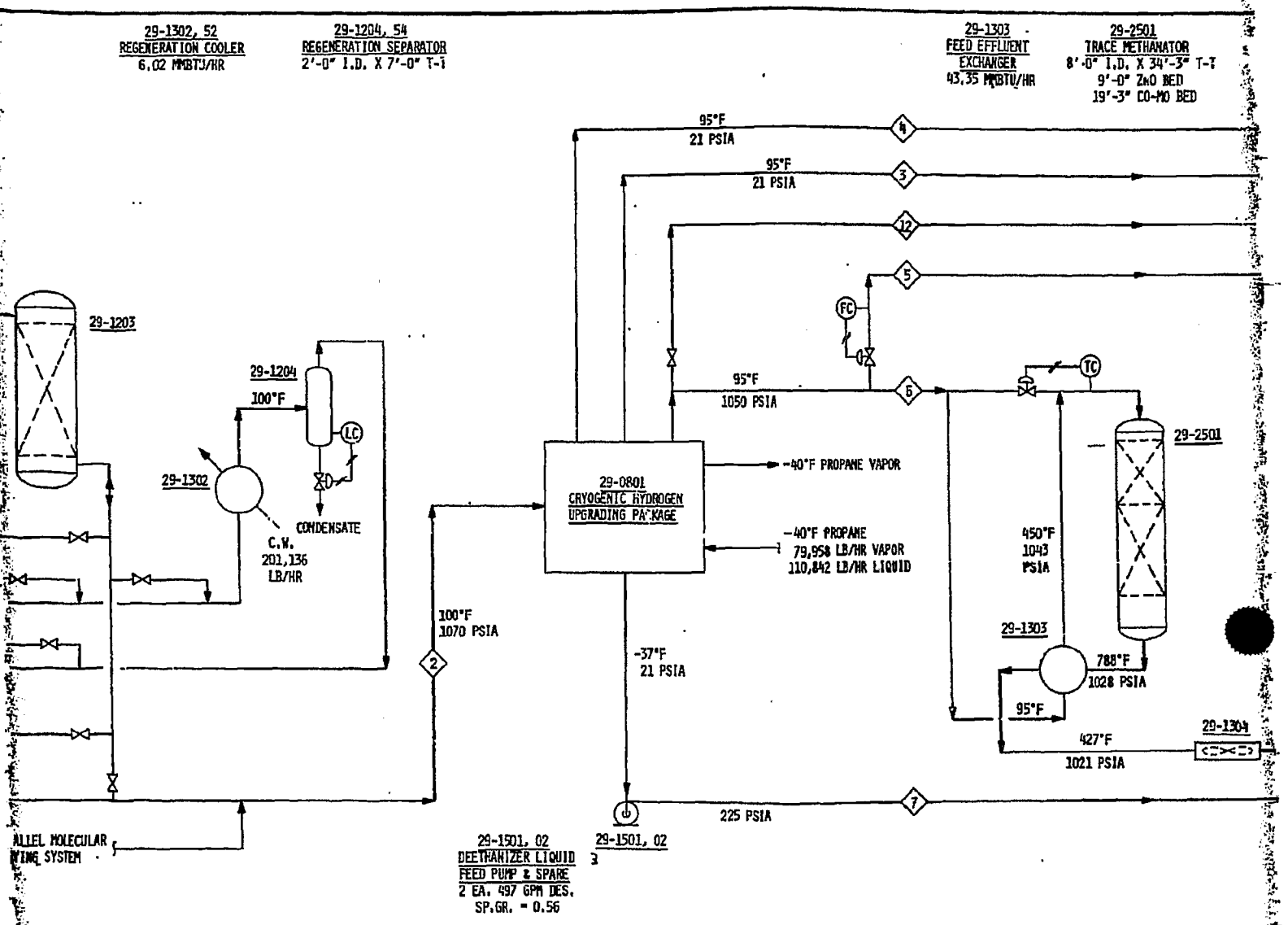
29-1301, 51
REGENERATION HEATER
5.41 MMBTU/HR

29-1201,02,03,51,52,53
MOLECULAR SIEVE DRIERS
11'-0" I.D. X 21'-0" T-T

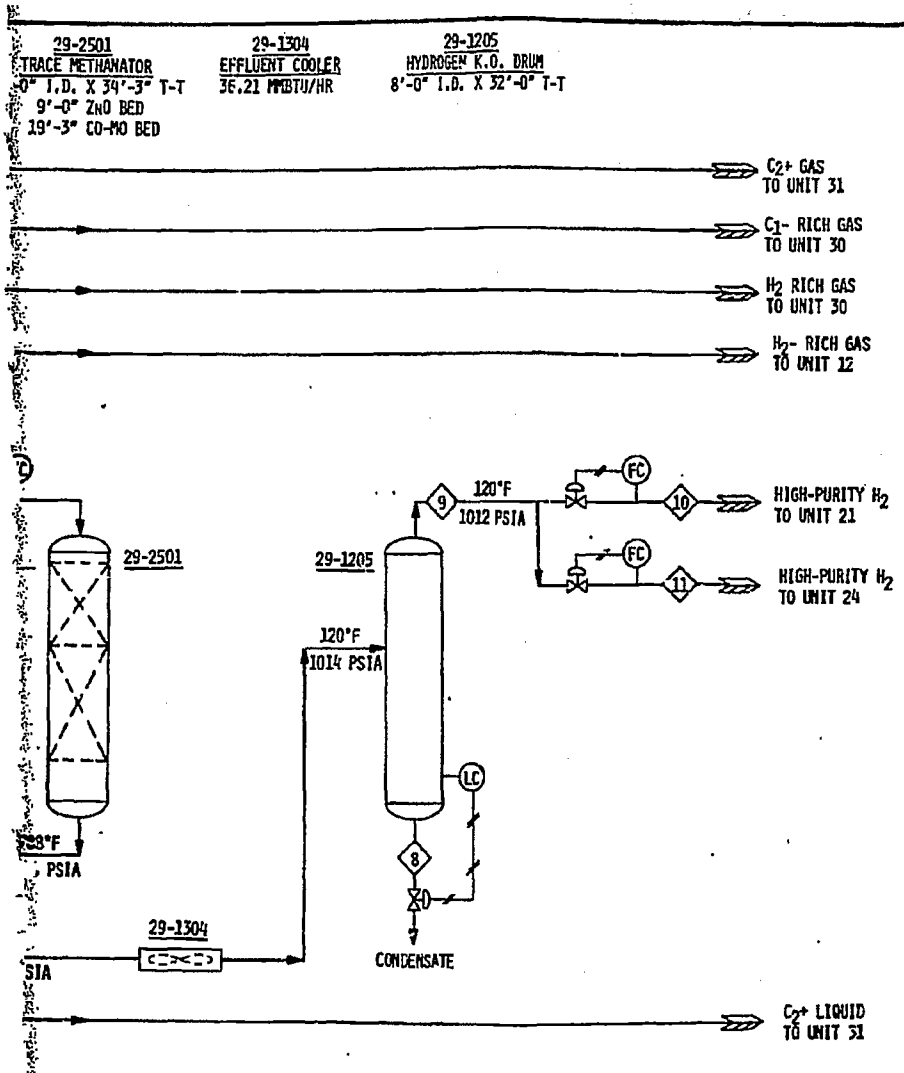


STREAM NO.	1	2	3	4	5
STREAM NAME	FEED	DRY FEED	C_2-RICH GAS	C_3+ GAS TO UNIT 31	H_2-RICH GAS TO UNIT 13
COMP., MPH					
H_2	48,577.25	48,577.25	2,807.05	-	27,910.83
N_2	1,346.34	1,346.34	748.57	-	384.67
CO	3,948.00	3,948.00	2,741.10	-	736.77
H_2O	60.69	-	-	-	-
C_1	10,103.05	10,103.05	9,728.23	115.83	157.19
C_2	487.92	487.92	188.77	292.88	-
$C_2^=$	2,397.89	2,397.89	467.59	1,860.41	-
C_3	158.58	158.58	3.89	130.40	-
$C_3^=$	1,639.57	1,639.57	28.37	1,303.36	-
C_4	0.16	0.16	-	0.08	-
$C_4^=$	554.63	554.63	-	296.22	-
IBP-200	97.19	97.19	-	5.28	-
200-300	20.82	20.82	-	0.03	-
	69,392.09	69,331.40	16,713.97	4,004.49	29,200.26
LB/HR	616,605.09	615,511.70	280,250.14	146,633.98	89,715.31
MSCFD	632,023.16	631,470.39	152,230.84	36,472.81	265,955.97
BPD	-	-	-	-	-
M.W.	8.89	8.88	16.77	36.62	3.07
LB/GAL @ 60°F	-	-	-	-	-

A



	⑤ H_2-RICH GAS TO UNIT 12	⑥ H_2-RICH GAS TO METH.	⑦ C_2+ LIQUID TO UNIT 31	⑧ K.O. DRUM CONDENSATE	⑨ K.O. DRUM OVERHEAD	⑩ HIGH PURITY H_2 TO UNIT 21	⑪ HIGH PURITY H_2 TO UNIT 24	⑫ EXCESS H_2-RICH GAS	⑬ C_1-RICH GAS TO UNIT 30
F	27,940.93	16,665.85	-	-	15,347.50	10,712.45	4,635.05	1,163.42	3,970.47
	364.67	217.51	-	-	217.51	151.82	65.69	15.19	156.16
	736.77	439.45	-	-	-	-	-	30.68	2,771.78
	-	-	-	413.42	25.83	18.03	7.80	-	-
	157.89	94.18	0.35	-	533.63	372.47	161.16	6.57	9,734.80
	-	-	6.27	-	-	-	-	-	188.77
	-	-	59.89	-	-	-	-	-	467.59
	-	-	24.25	-	-	-	-	-	3.89
	-	-	307.84	-	-	-	-	-	28.37
	-	-	0.08	-	-	-	-	-	-
	-	-	253.41	-	-	-	-	-	-
	-	-	91.91	-	-	-	-	-	-
	-	-	20.79	-	-	-	-	-	-
	29,200.26	17,416.99	779.63	413.92	16,124.47	11,254.77	4,869.70	1,215.86	17,329.83
	99,715.31	53,511.94	41,564.57	7,451.83	46,060.12	32,121.82	13,898.55	3,735.76	283,985.90
	265,955.97	158,633.84	-	-	147,000.31	102,440.77	44,323.99	11,074.05	163,304.69
	-	-	5,200.73	511.29	-	-	-	-	-
	3.07	3.07	53.46	18.02	2.85	2.86	2.86	3.07	15.84
	-	-	4.6[illegible]	8.3283	-	-	-	-	-

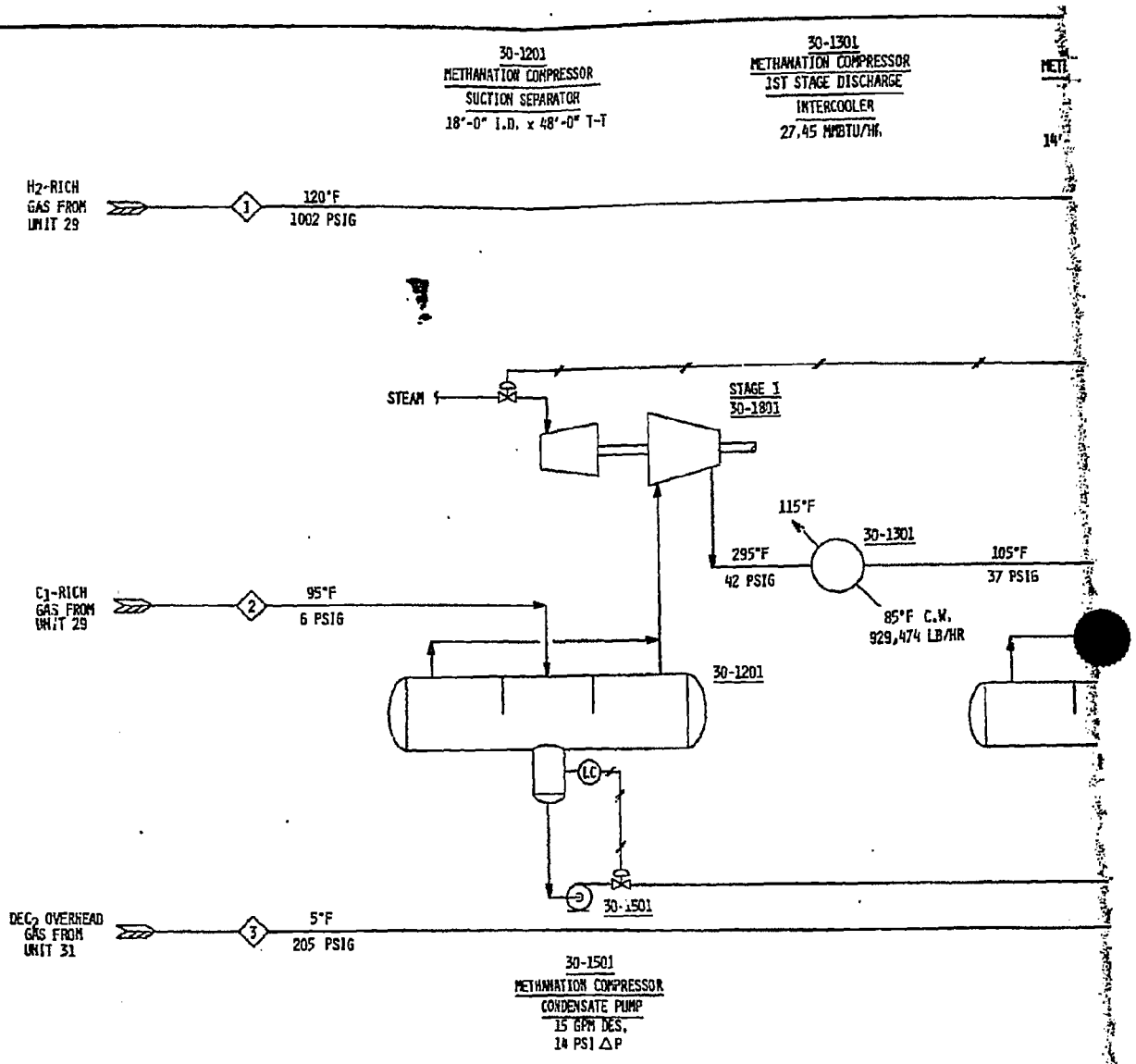


0		9/21/81	ISSUED FOR REPORT		LOS	ASE					
REV. NO.	CHKD APPD	DATE	REVISION		BY	PROJ. ENGR.	ENGR	PROJ. MGR.	PROJ. SPEC. ENGR.	PROJ. SPEC.	PROJ. SUP.

DEPARTMENT OF ENERGY - DIVISION OF COAL CONVERSION
POGO PLANT
PROCESS FLOW DIAGRAM
HYDROGEN RECOVERY & PURIFICATION - UNIT 29

THE RALPH M. PARSONS COMPANY PASADENA, CALIFORNIA	JOB NO. 5435-4	DWG. NO. R-29-FS-1	REV. 0

DC- ST-



STREAM NO.	1	2	3	4	5	6	7	8	
STREAM NAME	H_2 RICH GAS FM UNIT 29	C_1 RICH GAS FM UNIT 29	DEC_2 OVHD GAS FM UNIT 31	METH. COMPR. EFFLUENT	LPM EFFLUENT	POLISH METH. FEED	POLISH METH. EFFLUENT	SNG COMPR. FEED	CI EFFLU
COMPONENT, MPH									
H_2	1071.38	2807.05	-	2807.05	274.10	274.10	-	-	-
N_2	15.19	748.97	-	748.97	748.97	748.97	748.97	748.97	7
CO	-	2741.10	-	2741.10	137.05	137.05	-	-	-
CO_2	-	-	-	-	1319.80	1319.80	1354.06	1354.06	1354
H_2S	-	-	-	-	-	-	-	-	-
NH_3	-	-	-	-	-	-	-	-	-
H_2O	1.80	-	-	-	3692.84	105.98	67.14	67.14	-
C_1	37.25	9728.23	117.79	9728.23	11012.48	11012.48	11115.27	11233.06	11233
C_2H_4	-	188.77	212.23	188.77	188.77	188.77	188.77	401.00	401
C_2H_6	-	467.59	1869.87	467.59	467.59	467.59	467.59	2337.46	2337
C_3H_6	-	3.89	1.98	3.89	3.89	3.89	3.89	5.87	-
C_3H_8	-	28.37	74.38	28.37	28.37	28.37	28.37	102.75	-
TOTAL	1125.62	16713.97	2276.25	16713.97	17873.86	14287.00	13974.06	16250.31	
LB/HR	3215.47	280250.14	67429.34	280250.14	347420.81	282799.97	280665.58	348294.92	3477221
MSCFD	10252.34	152230.84	20732.09	152230.84	162795.12	130126.01	127275.74	148007.82	147717
DPD	-	-	-	-	-	-	-	-	-
M.W.	2.83	16.77	29.62	16.77	19.44	19.79	20.10	21.43	21
LB/CAL @ 60°F	-	-	-	-	-	-	-	-	-

30-1202
METHANATION COMPRESSOR
2ND STAGE SUCTION
SEPARATOR
'-0" I.D. x 39'-0" T-T

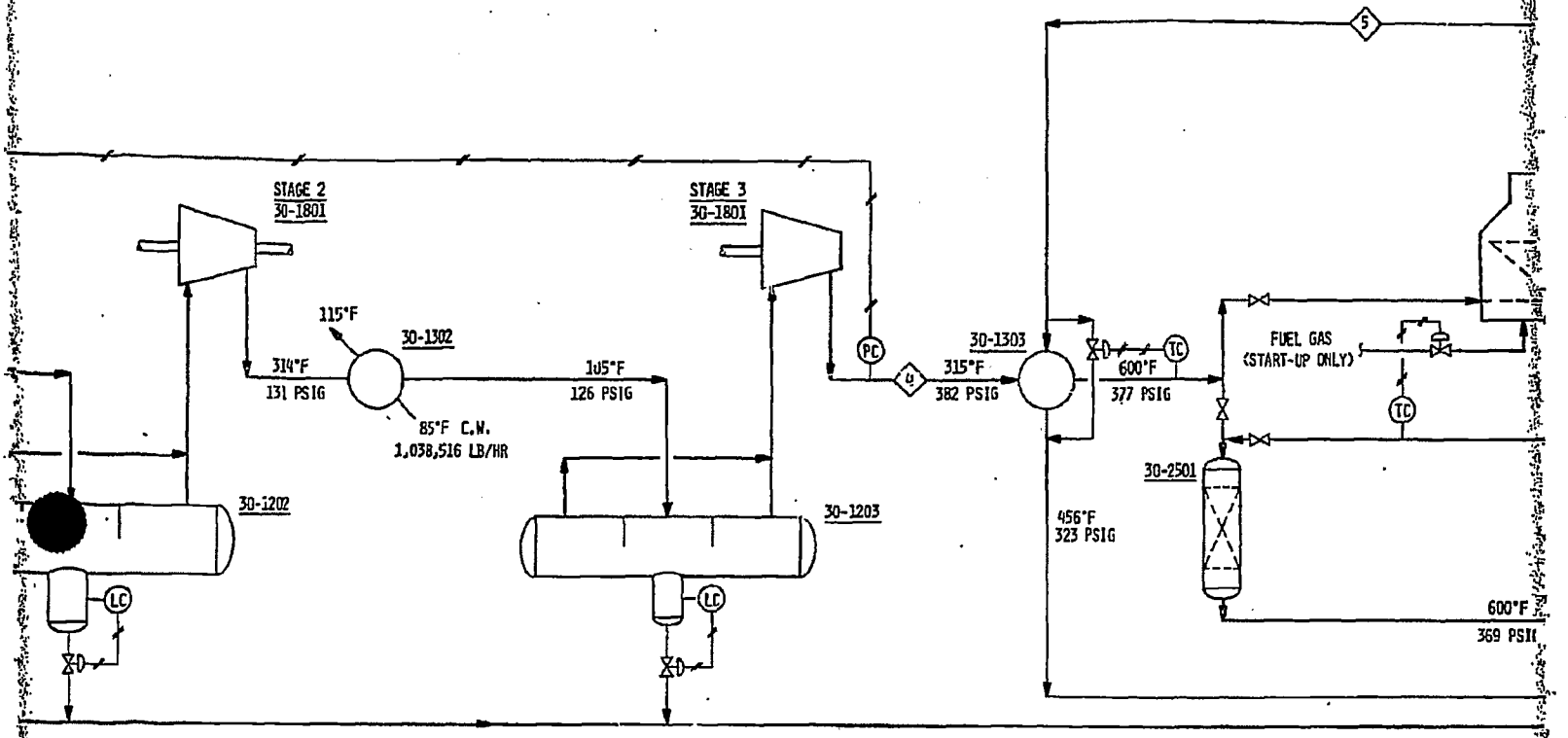
30-1302
METHANATION COMPRESSOR
2ND STAGE DISCHARGE
INTERCOOLER
30.67 MMBTU/HR

30-1203
METHANATION COMPRESSOR
3RD STAGE SUCTION
SEPARATOR
11'-0" I.D. x 30'-6" T-T

30-1303
METHANATION
FEED/EFFLUENT
EXCHANGER
48.11 MMBTU/HR

30-2501
ZINC OXIDE
GUARD REACTOR
5'-6" I.D. x 12'-6" T-T

30-1
METHANA
START
HEATE
16.05 M



30-1801
METHANATION COMPRESSOR
156.80 MMSCFD

9	10	11	12	13	14	15	16	17	18
SNG R. EFFLUENT	DISCHARGE SEPARATOR EFFLUENT	CO_2 REMOVAL BYPASS	CO_2 REMOVAL FEED	CO_2 OFF-GAS	CO_2 REMOVAL EFFLUENT	FEED TO GLYCOL DRIER	SNG PRODUCT	METH. COMPR. COND.	SNG COMPR. COND.
-	-	-	-	-	-	1071.38	1071.38	-	-
748.97	748.97	243.42	505.55	-	748.97	764.16	764.16	-	-
-	-	-	-	-	-	-	-	-	-
1354.06	1354.06	440.07	913.99	812.60	541.46	541.46	541.46	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
35.29	25.49	8.28	17.20	198.67	141.63	143.43	1.04	-	3628.51
11233.06	11233.06	3650.74	7582.32	17.10	11215.96	11253.23	11253.21	-	-
401.00	401.00	130.33	270.68	1.45	399.56	399.56	399.56	-	-
2337.46	2337.46	759.67	1577.79	2.60	2334.86	2334.86	2334.86	-	-
5.87	5.87	1.91	3.96	-	5.87	5.87	5.87	-	-
102.75	102.75	33.39	69.36	-	102.75	102.75	102.75	-	-
-	16208.66	5267.81	10940.84	1032.42	15491.06	16616.68	16474.29	-	3628.51
-	347544.48	112951.96	234592.52	39734.94	313481.55	316697.01	314130.96	-	65385.75
-	147628.44	47979.24	99649.19	9403.28	141092.60	151344.75	150047.83	-	-
-	-	-	-	-	-	-	-	-	4518.63
21.44	21.44	21.44	21.44	38.49	20.24	19.06	19.07	-	18.02
-	-	-	-	-	-	-	-	-	8.33

30-2501
ZINC OXIDE
GUARD REACTOR
5'-6" I.D. x 12'-6" T-T

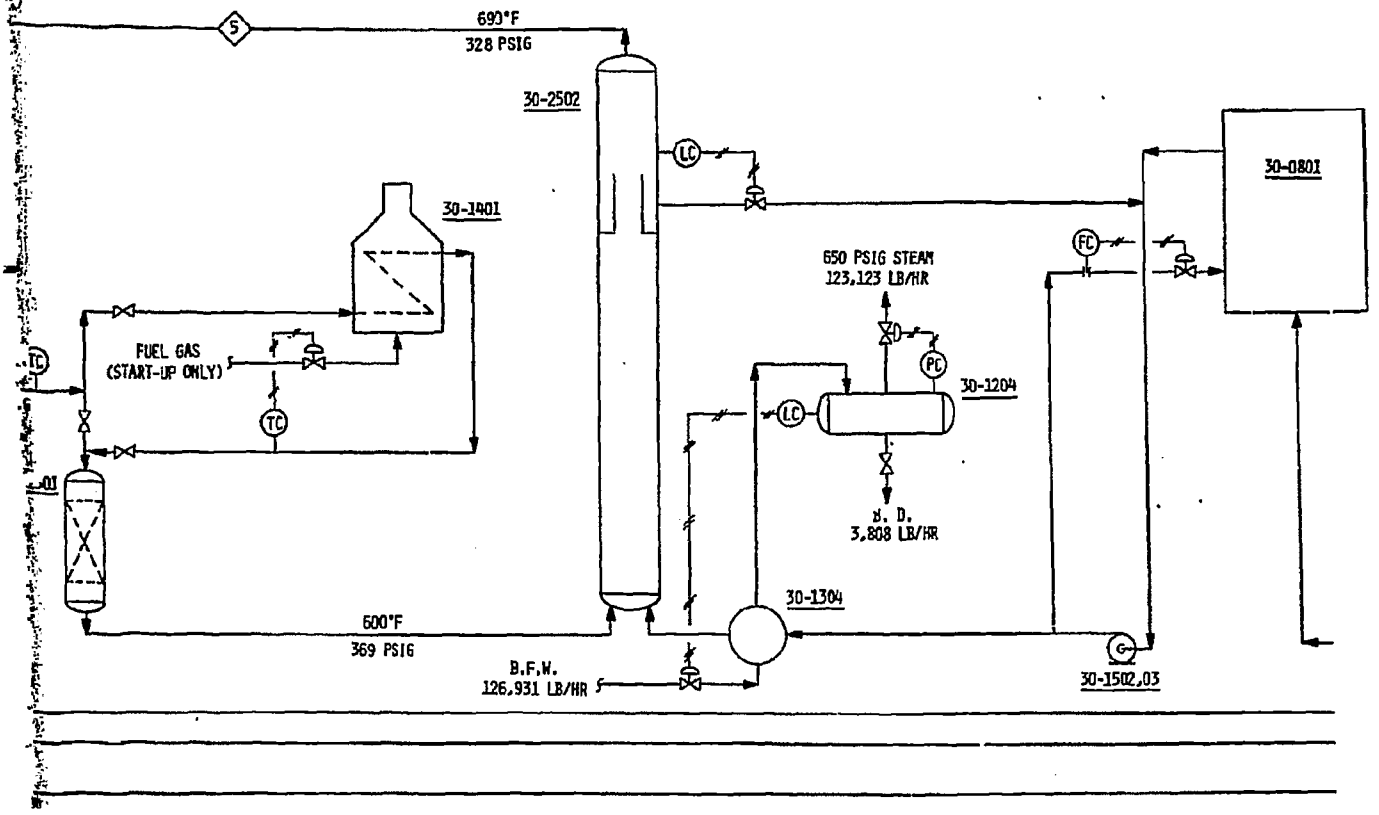
30-1401
METHANATION
START-UP
HEATER
16.05 MMBTU/HR

30-2502
LIQUID PHASE
METHANATOR
11'-0" I.D. x 92'-6" T-T

30-1304
METHANATION
CIRCULATING OIL
BOILER
123.10 MMBTU/HR

30-1204
METHANATION
HIGH-PRESSURE
STEAM DRUM
4'-0" I.D. x 10'-6" T-T

30-0801
METHANATION
CIRCULATING OIL
CLEAN UP PACKAGE



30-1502,03
METHANATION CIRCULATING
OIL PUMP & SPARE

2 EA. 6133 GPM DES.
150 PSI ΔP

31-1201
DEETHANIZER
COMPRESSOR
1ST STAGE SUCTION DRUM
5'-6"IDx15'-0" T/T

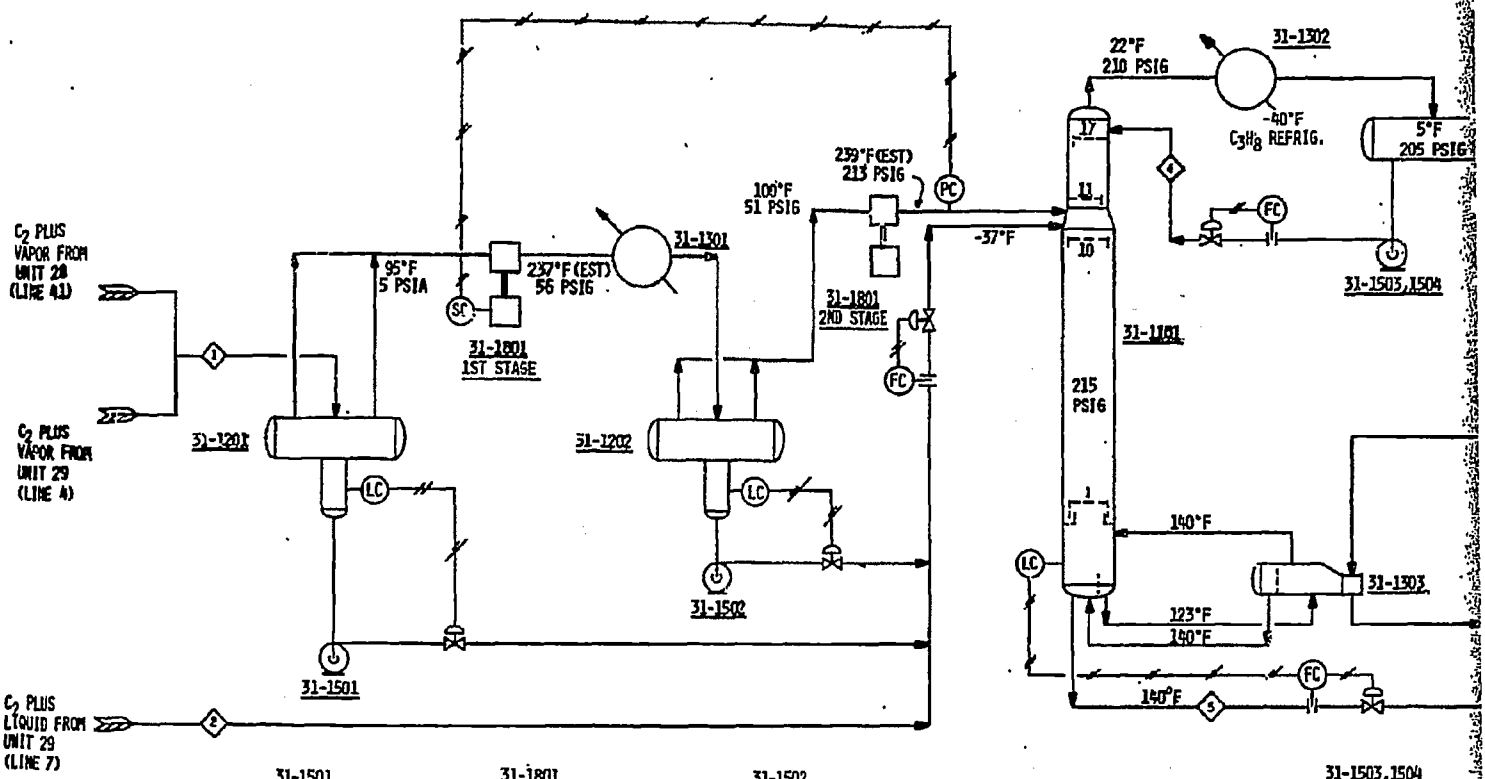
31-1301
DEETHANIZER
COMPRESSOR
1ST STAGE DISCHARGE
INTERCOOLER
4,675 MBTU/HR

31-1202
DEETHANIZER
COMPRESSOR
2ND STAGE SUCTION DRUM
9'-0"IDx12'-0" T/T

31-1101
DEETHANIZER
7'-0"IDx17'-0" T/S
8'-0"IDx34'-6" T/S
OVERALL 55'-6" T/T

31-1302
DEETHANIZER
CONDENSER
25.617 MMBTU/HR

31-1203
DEETHANIZE
ACCUMULATOR
7'-0"IDx22'-0"



31-1501
DEETHANIZER
COMPRESSOR NO. 1
CONDENSATE PUMP
10 GPM 260 PSIΔP

31-1801
DEETHANIZER
FEED COMPRESSOR
20.77 MMSCFD

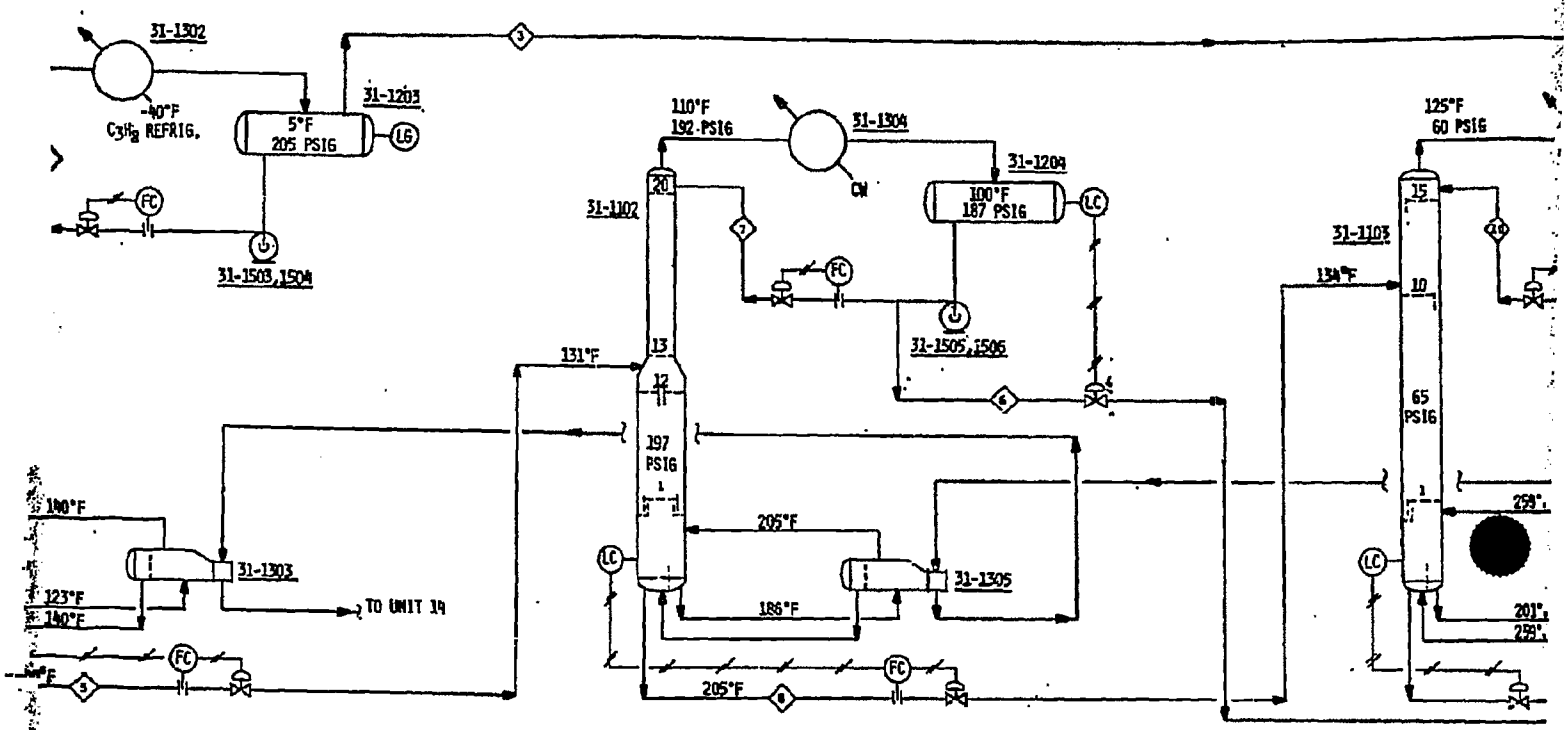
31-1502
DEETHANIZER
COMPRESSOR NO. 2
CONDENSATE PUMP
10 GPM 214 PSIΔP

31-1503,1504
DEETHANIZER
REFLUX PUMP & SPARE
668 GPM 42 PSIΔP

STREAM NO.	①	②	③	④
COMPOSITION				
CH_4	113.70	4.09	117.79	42.89
C_2H_4	170.86	42.71	212.23	335.86
C_2H_6	1,389.42	555.45	1,869.87	4,470.93
C_3H_6	8.21	15.25	1.96	18.18
C_3H_8	547.51	1,336.47	74.38	878.29
C_4H_8	0.60	7.93	-	0.05
nC_4H_{10}	50.31	809.77	0.06	2.19
IBP-200°F	-	103.78	-	-
200-300°F	-	36.46	-	-
TOTAL	2,280.61	2,961.91	2,276.31	5,545.38
LB/HR	75,839	139,558	67,433	775,218
MMSCFD	20.76	-	20.74	-
BPD	-	18,459	-	30,473
MW	33.25	47.12	29.62	31.60
LB/GAL @ 60°F	-	4.320	-	3.286

A

31-1302 DEETHANIZER CONDENSER	31-1203 DEETHANIZER ACCUMULATOR	31-1303 DEETHANIZER REBOILER	31-1102 DEPROPANIZER	31-1304 DEPROPANIZER CONDENSER	31-1204 DEPROPANIZER ACCUMULATOR	31-1305 DEPROPANIZER REBOILER	31-1103 DEBUTANIZER
25,617 MMBTU/HR	7'-0"IDx22'-0" T/T	30,538 MMBTU/HR	6'-0"IDx17'-0" T/S 7'-0"IDx34'-0" T/S OVERALL 57'-0" T/T	24,453 MMBTU/HR	7'-6"IDx21'-0"	25,071 MMBTU/HR	4'-0"IDx41'-6" T/T



31-1503,1504
DEETHANIZER
REFLUX PUMP & SPARE
668 GPM 42 PSIΔP

31-1505,1506
DEPROPANIZER
OVERHEAD PUMP & SPARE
7306 GPM 45 PSIΔP

2	3	4	6	6	7	8	9	10	11
.00	117.79	42.99	-	-	-	-	-	-	-
.71	212.23	336.86	1.34	1.34	1.50	-	-	-	-
.48	1,869.87	4,479.93	75.00	74.98	83.70	-	-	-	-
.25	1.98	15.18	21.48	20.77	23.18	0.02	0.02	-	-
.47	74.38	678.29	1,859.80	1,726.77	1,927.44	0.71	0.71	0.12	-
.93	-	0.05	0.53	0.68	0.76	132.83	132.74	22.13	0.09
.77	0.08	2.19	860.02	29.86	33.36	7.85	7.75	1.29	0.10
.78	-	-	103.78	-	-	830.14	813.54	135.60	16.60
.46	-	-	36.46	-	-	103.78	10.00	1.67	93.78
						36.46	0.03	0.01	36.43
.81	2,276.31	5,545.36	2,966.21	1,854.43	2,069.93	1,111.78	964.78	160.82	147.00
.868	67,433	175,218	147,964	81,081	90,564	66,883	54,414	9,070	12,469
	20.74	-	-	-	-	-	-	-	-
.89	-	30,473	18.810	11,943	12,327	7,767	6,486	1,081	1,281
.12	29.62	31.60	49.88	45.72	43.72	60.16	56.40	56.40	84.82
.30	-	3.268	4.495	4.196	4.196	4.921	4.794	4.794	5.562

B

1-1103
DEBUTANIZER
Dx41'-6" T/T

31-1306
DEBUTANIZER
CONDENSER
9.929 MMBTU/HR

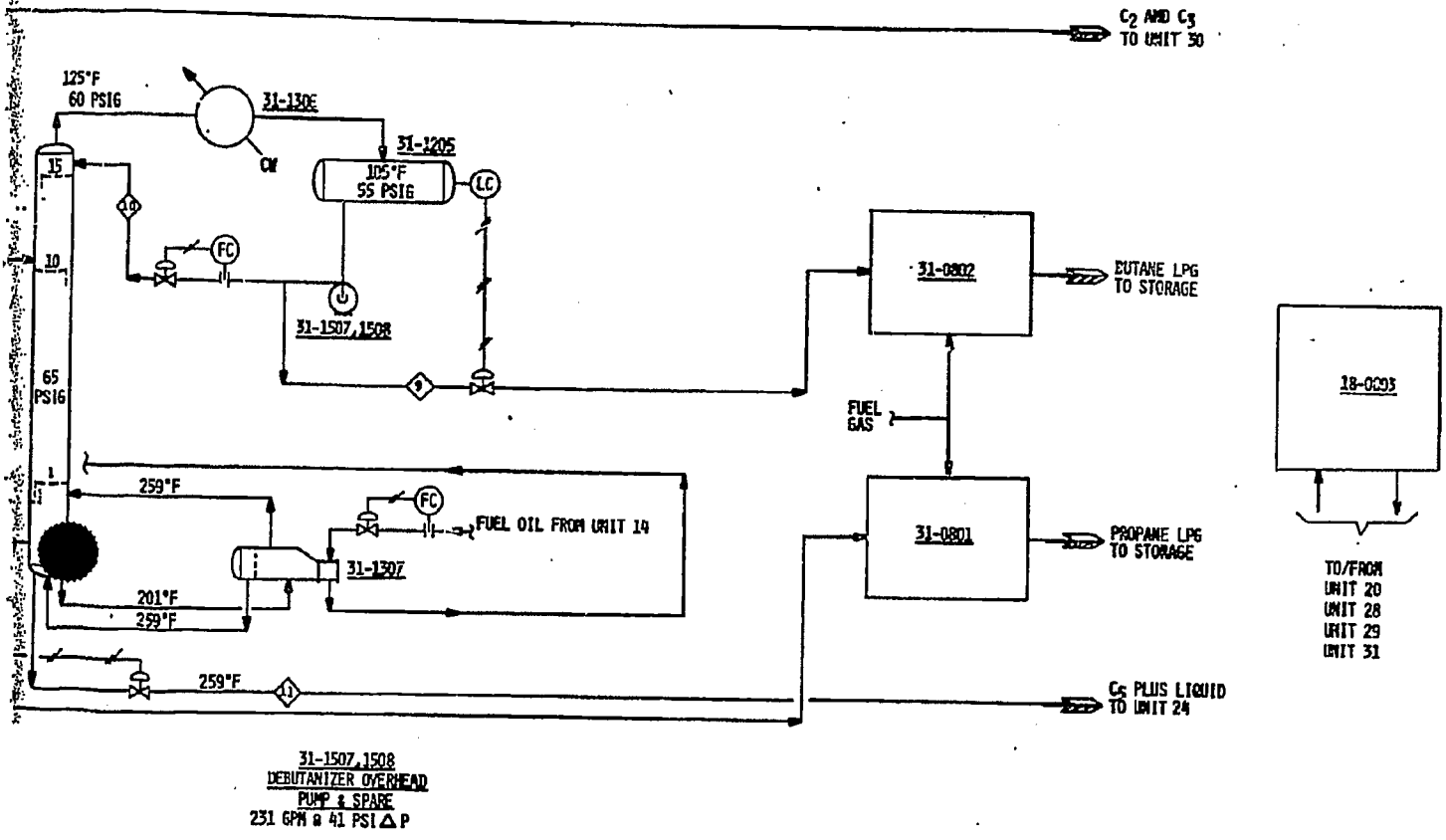
31-1205
DEBUTANIZER
ACCUMULATOR
5'-0"IDx15'-0" T/T

31-1307
DEBUTANIZER
REBOILER
7.044 MMBTU/HR

31-0801
PROPANE
SWEETENING
PACKAGE
322 GPM
@ 100°F

31-0802
BUTANE
SWEETENING
PACKAGE
189 GPM
@ 100°F

18-0803
REFRIGERATION
PACKAGE
11,000 TONS @ -40°F



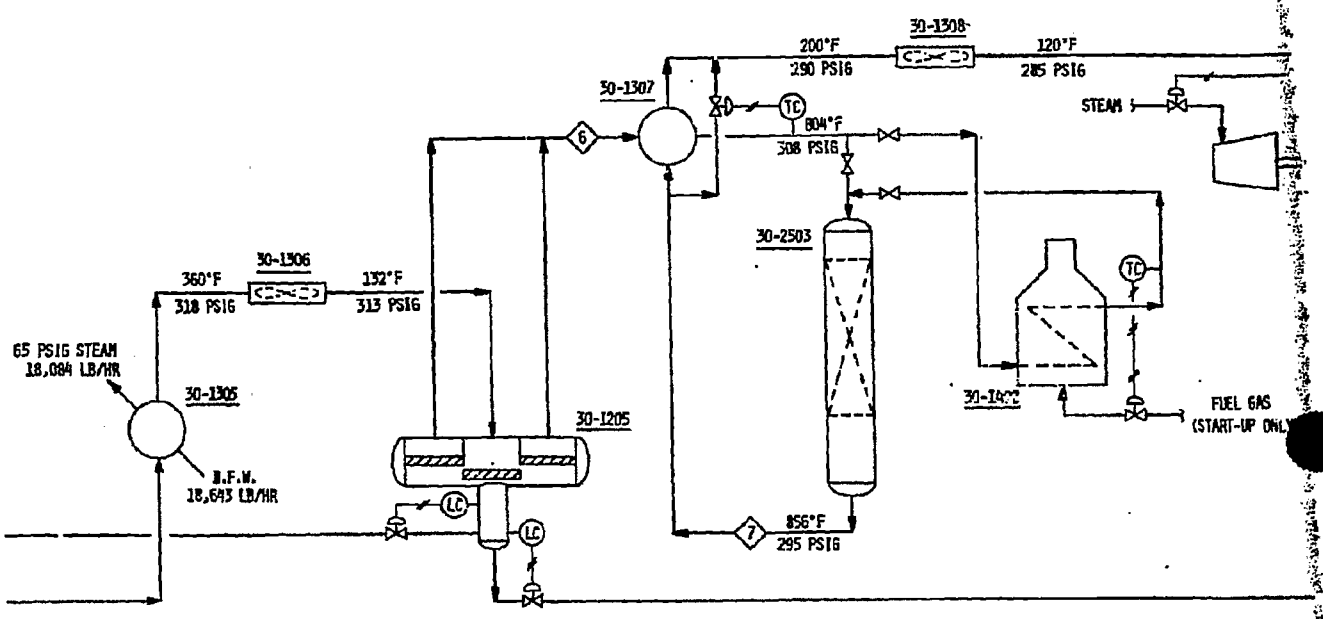
31-1507,1508
DEBUTANIZER OVERHEAD
PUMP & SPARE
231 GPM @ 41 PSI Δ P

0			ISSUED FOR REPORT							
REV. NO.	CHKD. APPD.	DATE	REVISIONS	BY	PROJ. ENGR.	CHECK	DISCIP. PROJ. ENGR.	LEAD DISCIP. ENGR.	PROJ. ENGR.	DATE

DEPARTMENT OF ENERGY - DIVISION OF COAL CONVERSION
POGO PLANT
PROCESS FLOW DIAGRAM
LPG FRACTIONATION - UNIT 31

THE RALPH M. PARSONS COMPANY PASADENA, CALIFORNIA	JOB NO. 5455-4	DWG. NO. R-31-FS-1	REV. 0

30-1305	30-1306	30-1205	30-1307	30-2503	30-1308	30-1402
METHANATION EFFLUENT STEAM GENERATOR	METHANATION EFFLUENT AIR COOLER	METHANATION EFFLUENT CONDENSATE SEPARATOR	POLISH METHANATOR FEED/EFFLUENT EXCHANGER	POLISH METHANATOR	POLISH METHANATOR AIR COOLER	POLISH METHANATOR START-UP HEATER
17.95 MMBTU/HR	106.82 MMBTU/HR	6'-6" I.D. x 19'-0" T-T	109.89 MMBTU/HR	6'-4" I.D. x 31'-0" T-T	10.59 MMBTU/HR	36.63 MMBTU/HR



30
DEC 2.1
COMPS
21.35

A

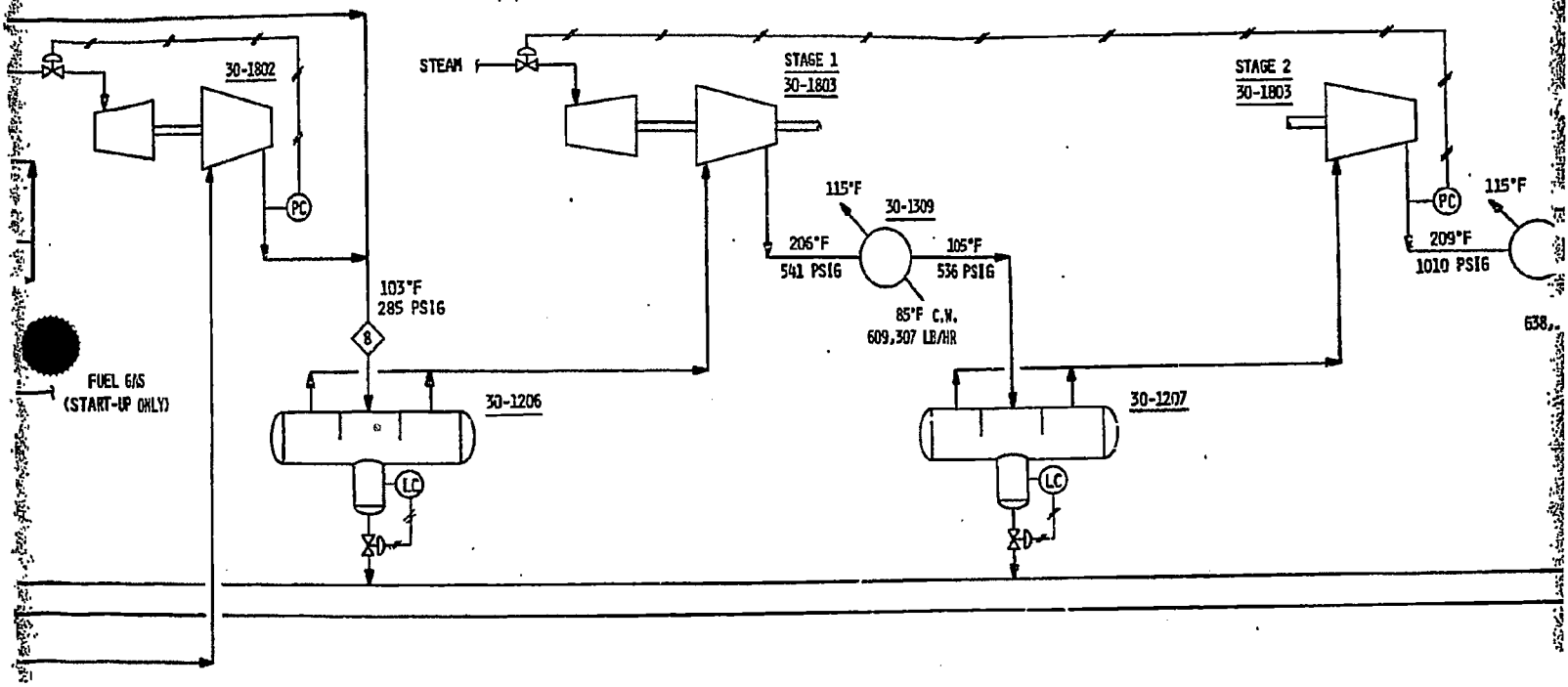
30-1402
JLISH METHANATOR
START-UP HEATER
36.63 MMBTU/HR

30-1206
SNG COMPRESSOR
SUCTION SEPARATOR
5'-6" I.D. x 19'-6" T-T

30-1309
SNG COMPRESSOR
1ST STAGE DISCHARGE
INTERCOOLER
17.99 MMBTU/HR

30-1207
SNG COMPRESSOR
2ND STAGE SUCTION
SEPARATOR
5'-6" I.D. x 15'-0" T-T

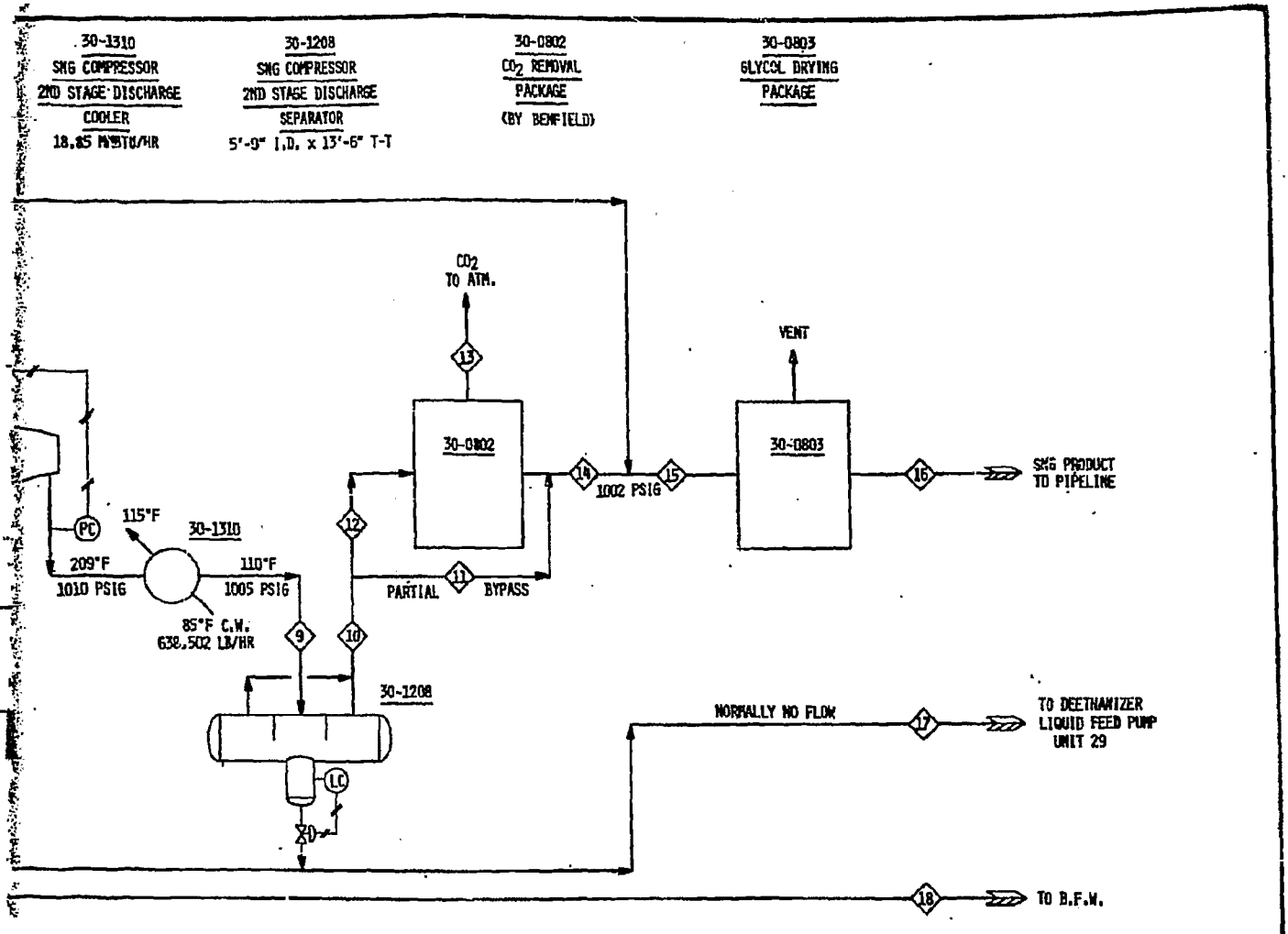
30-1310
SNG COMPRESSOR
2ND STAGE DISCHARGE
COOLER
18.85 MMBTU/HR



30-1802
DEL_2 OVERHEAD
COMPRESSOR
21.35 MMSCFD

30-1803
SNG COMPRESSOR
152.35 MMSCFD

B

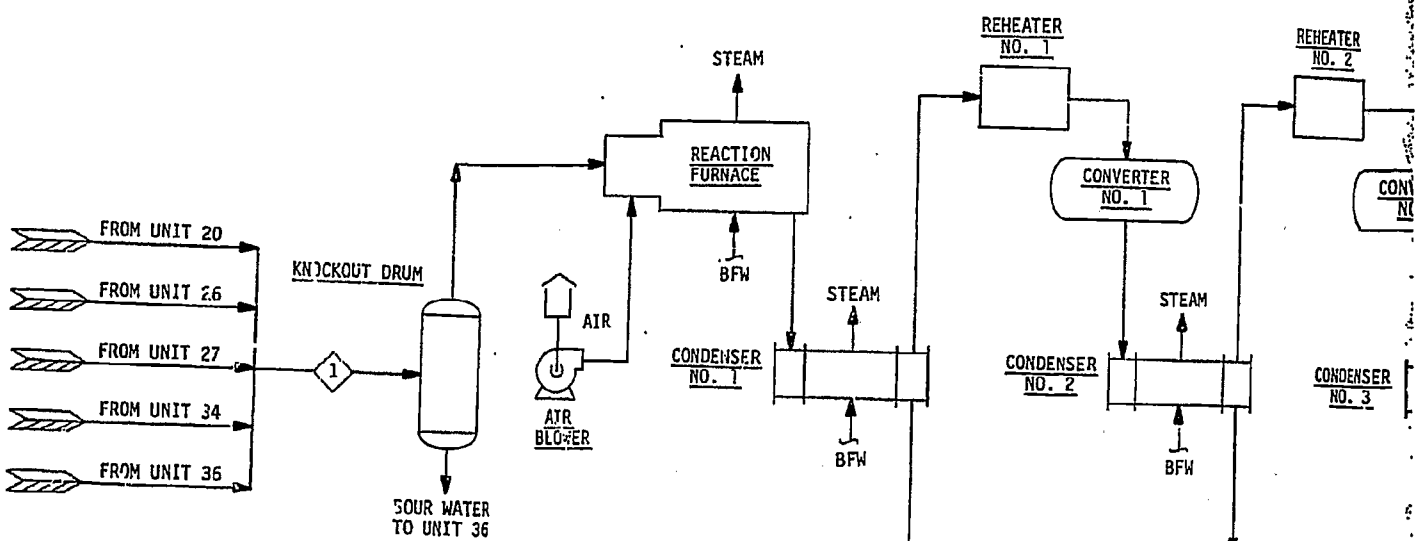


0			ISSUED FOR REPORT		D_S								
MARK NO.	CHEC. APPR.	DATE	REVISIONS		BY								

DEPARTMENT OF ENERGY - DIVISION OF COAL CONVERSION
POGO PLANT
PROCESS FLOW DIAGRAM
SNG PURIFICATION - UNIT 30

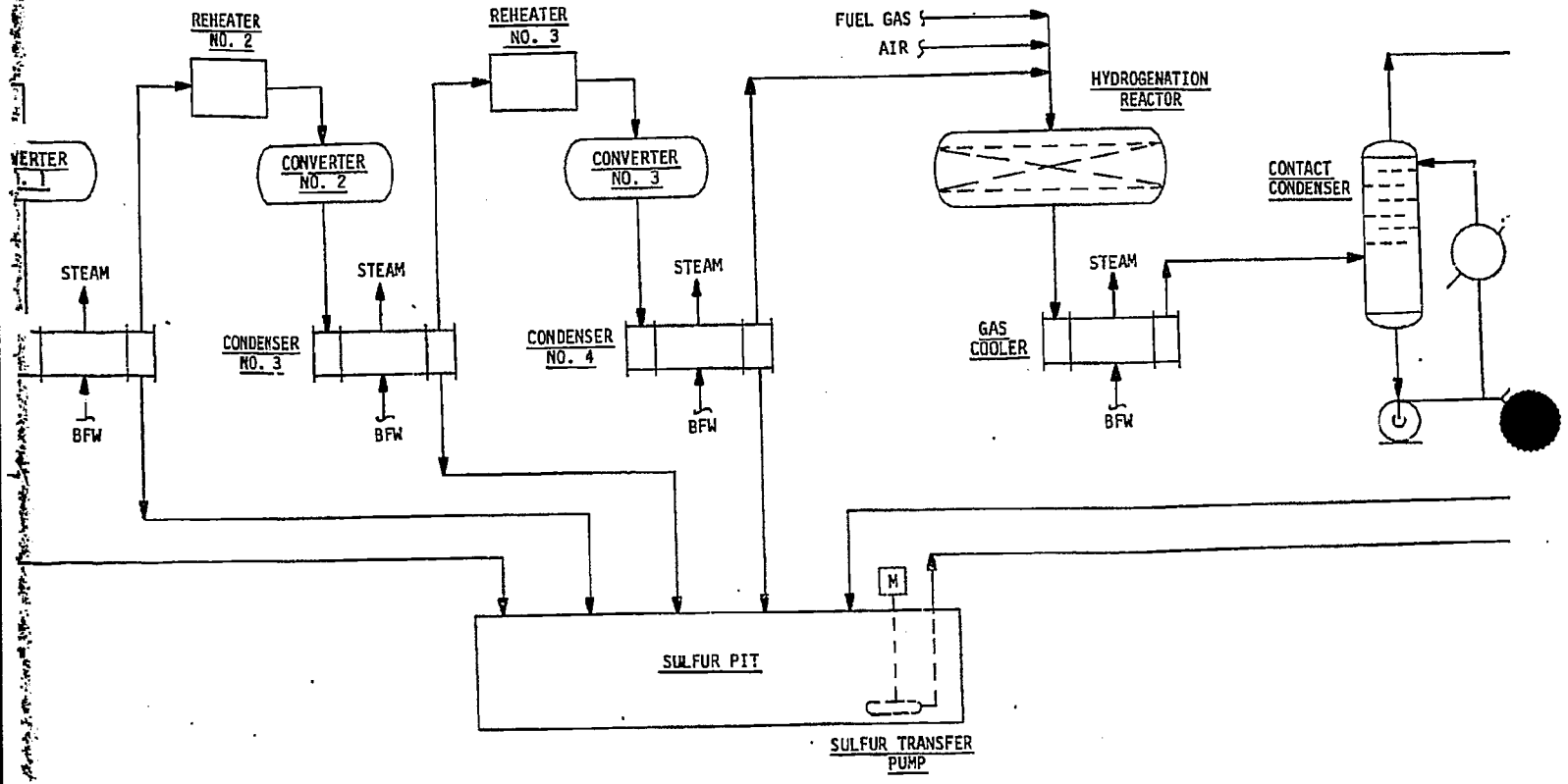
THE RALPH M. PARSONS COMPANY PASADENA, CALIFORNIA	JOB NO. 5435-4	DWG. NO. R-30-FS-1	REV. 0

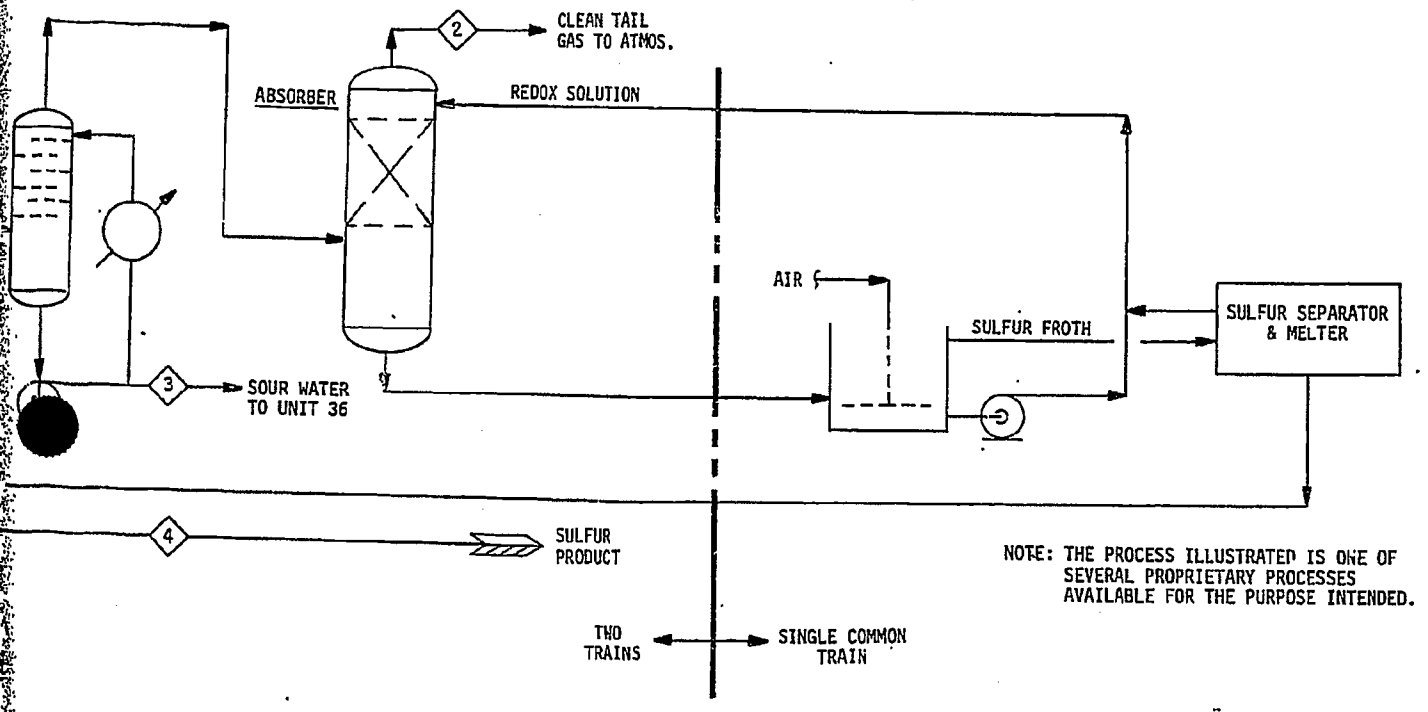
C



STREAM NO.	1	2	3	4
NAME	ACID GAS FEED	CLEAN TAIL GAS	SOUR WATER	SULFUR PRODUCT
COMPOSITION, MPH				
H_2S	4,424.08	0.02	0.02	-
COS	25.05	2.54	-	-
CO_2	9,414.86	10,045.39	0.22	-
CO	210.04	30.17	-	-
N_2	45.85	9,366.70	-	-
H_2	33.91	283.54	-	-
NH_3	0.96	-	-	-
CH_4	17.94	30.88	-	-
C_2 & Heavier	1.84	1.34	-	-
H_2O	794.07	1,160.83	2,164.17	-
S_8	-	-	-	555.82
TOTAL	14,968.60	20,924.41	2,164.41	555.82
LB/HR	588,551	727,581	39,000	142,583

A


REHEATER NO. 2
REHEATER NO. 3
FUEL GAS
AIR
HYDROGENATION REACTOR
CONTACT CONDENSER
CONVERTER NO. 2
CONVERTER NO. 3
STEAM
STEAM
STEAM
STEAM
CONDENSER NO. 3
CONDENSER NO. 4
GAS COOLER
BFW
BFW
BFW
BFW
M
SULFUR PIT
SULFUR TRANSFER PUMP



NOTE: THE PROCESS ILLUSTRATED IS ONE OF SEVERAL PROPRIETARY PROCESSES AVAILABLE FOR THE PURPOSE INTENDED.

REV. NO	CUST APPR	DATE	REVISION	BY	PROJ ENGR	CHECK	CHIEF PROC. ENGR	CHIEF OPER. ENGR.	PROJ DIR.
0		9/14/77	ISSUED FOR REPORT	L-OS	BHE		CJS		

DEPARTMENT OF ENERGY-
DIVISION OF COAL CONVERSION
POGO PLANT
PROCESS FLOW DIAGRAM
SULFUR PLANT-UNIT 32

THE RALPH M. PARSONS COMPANY PASADENA, CALIFORNIA	JOB NO. 5435-4	DWG. NO. R-32-FS-1	REV 0

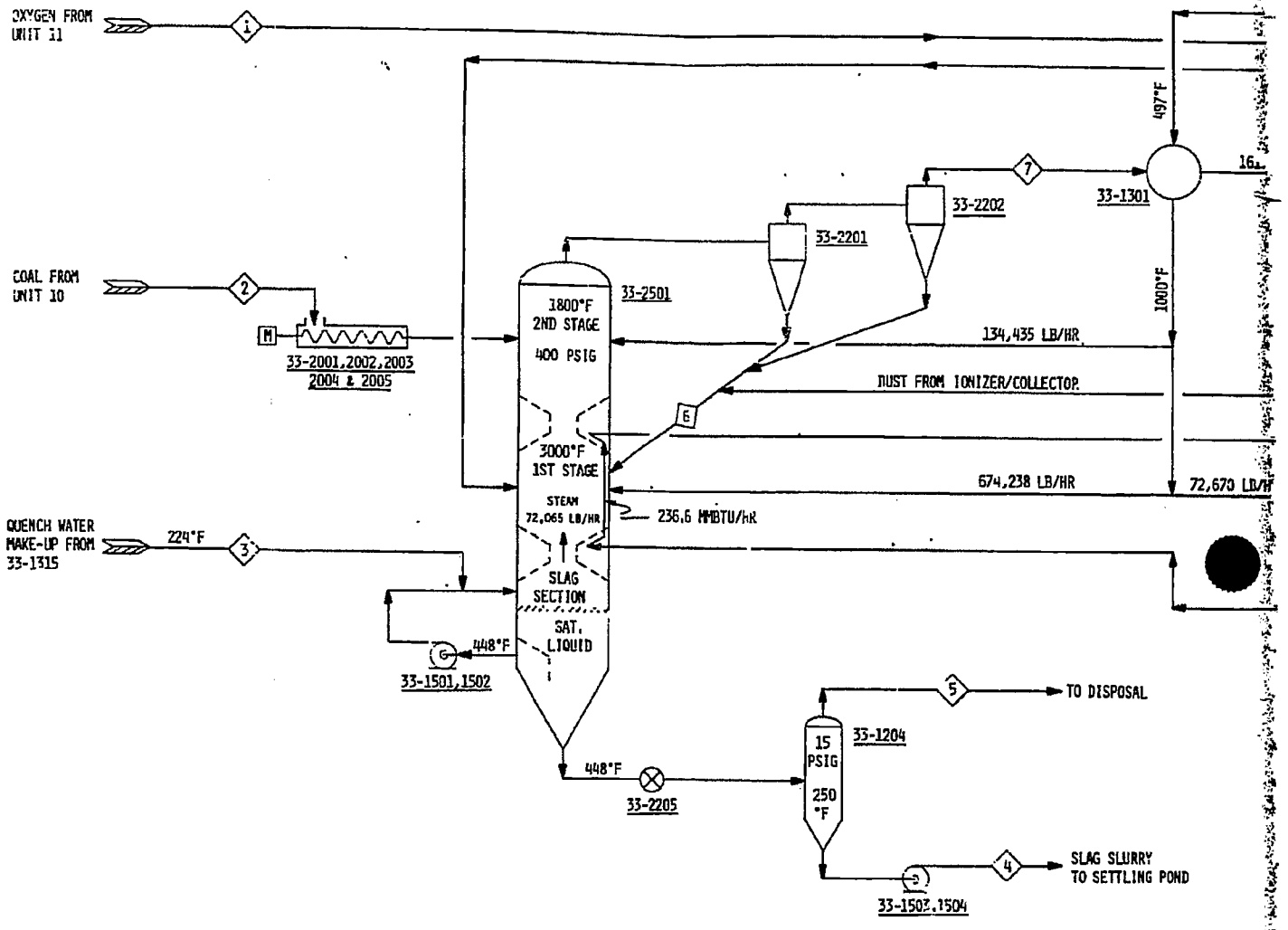
DC- DY-

33-2501
FUEL GAS GASIFIER
28'-0" I.D. X 64'-0" T/T (STAGE 2)
25'-0" I.D. X 24'-0" T/T (STAGE 1)

33-1204
SLAG SLURRY RECEIVER
8'-0" I.D. X 19'-0" T/T

33-1301
RAW FUEL GAS /S.H. STEAM
HEAT EXCHANGER
274.8 MMBTU/HR

33-1302
RAW FUEL GAS /S.H. ST.
HEAT EXCHANGER
90.6 MMBTU/HR



33-2001,2002,2003,2004,2005
HP COAL FEEDERS
3,340 TPD (EACH)

33-1501,1502
QUENCH RECYCLE
PUMP AND SPARE
5000 GPM (EACH)
S.G. 0.83 @ PT.

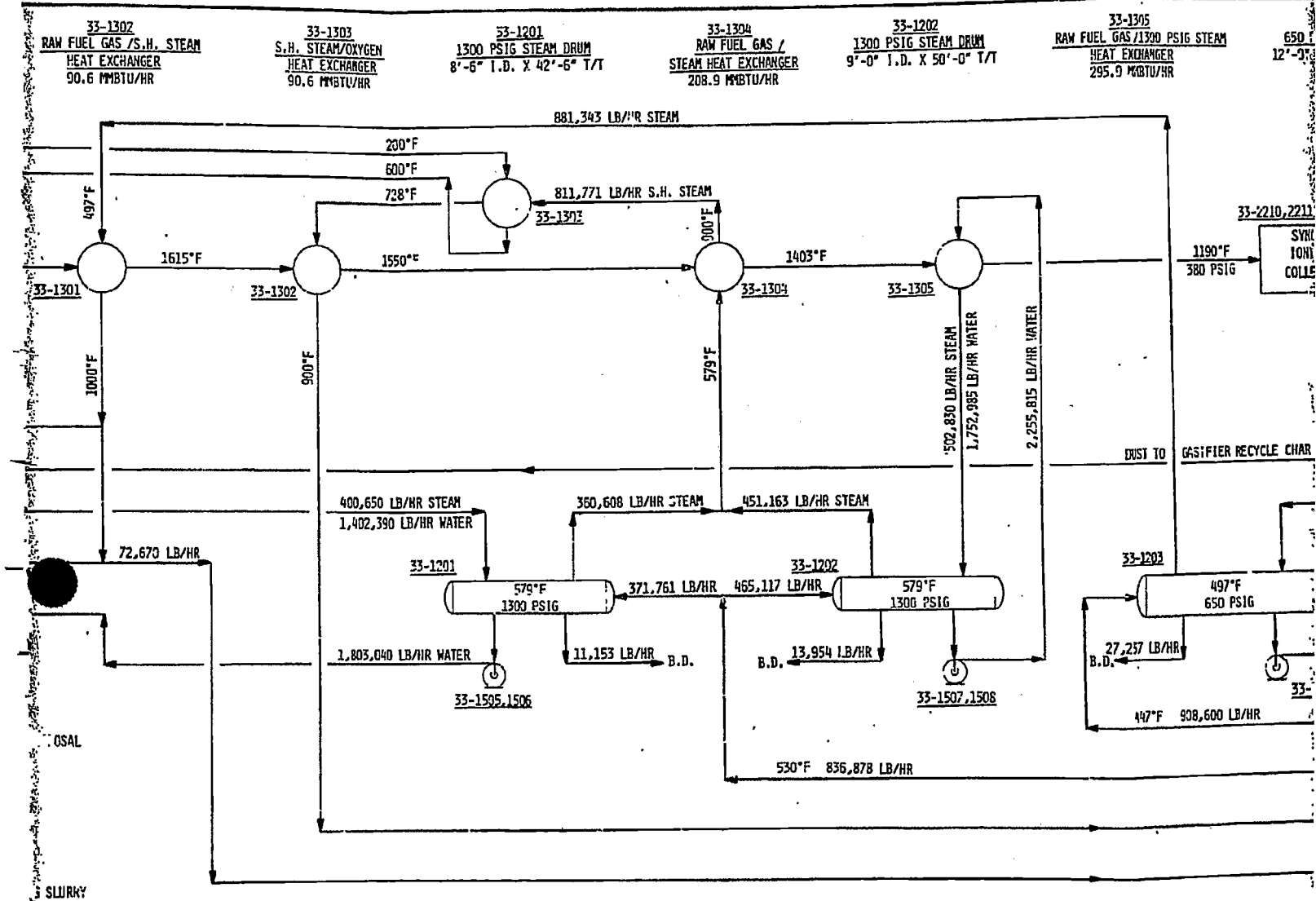
33-2205
SLAG LUMP REMOVER
14" INLET

33-2201
PRIMARY CHAR CYCLONES
SIX UNITS
6'-0" I.D. X 27'-6" L
(EACH)

33-2202
SECONDARY CHAR CYCLONES
TWELVE UNITS
4'-0" I.D. X 19'-0" L
(EACH)

33-1
SLAG SLU
523 GPM (EACH)
S.G.

STREAM NO.	1	2	3	4	5	6	7	8
STREAM NAME	OXYGEN	COAL	QUENCH WATER MAKE-UP	SLAG SLURRY	FLASHED VAPOR	RECYCLE CHAR	RAW GAS	GAS TO UNIT 34
COMPONENT								
H_2	-	-	-	-	-	-	57,683.19	57,683.19
N_2	620.00	-	-	-	-	-	1,277.55	1,277.55
CO	-	-	-	-	-	-	63,460.00	63,460.00
CO_2	-	-	-	-	-	-	16,417.49	16,417.49
H_2S, MPH	-	-	-	-	-	-	1,644.95	1,625.47
NH_3	-	-	-	-	-	-	19.48	-
COS	-	-	-	-	-	-	25.05	25.05
H_2O	-	-	16,886.00	9,830.37	3,043.46	-	23,385.59	405.54
CH_4	-	-	-	-	-	-	815.52	815
O_2	30,380.00	-	-	-	-	-	-	-
SOLIDS: COAL (TPD)	-	16,700.00	-	-	-	-	-	-
CHAR (TPD)	-	-	-	-	-	11,945.51	-	-
SLAG (TPD)	-	-	-	1,416.83	-	-	-	-
TOTAL, MPH	31,000.00	-	16,886.00	9,830.37	3,043.46	-	164,728.80	141,709.81
LB/HR	989,503	1,391,667	304,000	295,173	54,931	995,459	3,144,447	2,729,448
MW	31.92	-	18.02	-	18.02	-	19.09	19.26
MMSCFD	282.35	-	-	-	27.72	-	1500.35	1220.69



33-1503,1504	33-1505,1506	33-1507,1508	33-1509,1510
SLAG SLURRY PUMP AND SPARE	WATER CIRCULATION	WATER CIRCULATION	WATER CIRCULATION
523 GPM (EACH); INCLUDING SLAG	PUMP AND SPARE	PUMP AND SPARE	PUMP AND SPARE
S.G. 1.13 @ PT.	5116 GPM (EACH)	6316 GPM (EACH)	11,175 GPM (EACH)
	S.G. 0.71 @ PT.	S.G. 0.71 @ PT.	S.G. 0.79 @ PT.

⑦	⑧	⑨
	GAS TO UNIT 34	SOUR WATER
13.19	57,683.19	-
277.55	1,277.55	-
0.00	63,460.00	-
417.49	16,417.49	-
	1,625.47	19.48
	-	19.48
	25.05	-
	405.56	22,980.05
815.52	815.52	-
-	-	-
-	-	-
-	-	-
728.60	141,709.81	23,019.01
447	2,729,448	414,636
19.09	19.26	18.02
1.35	1290.63	-

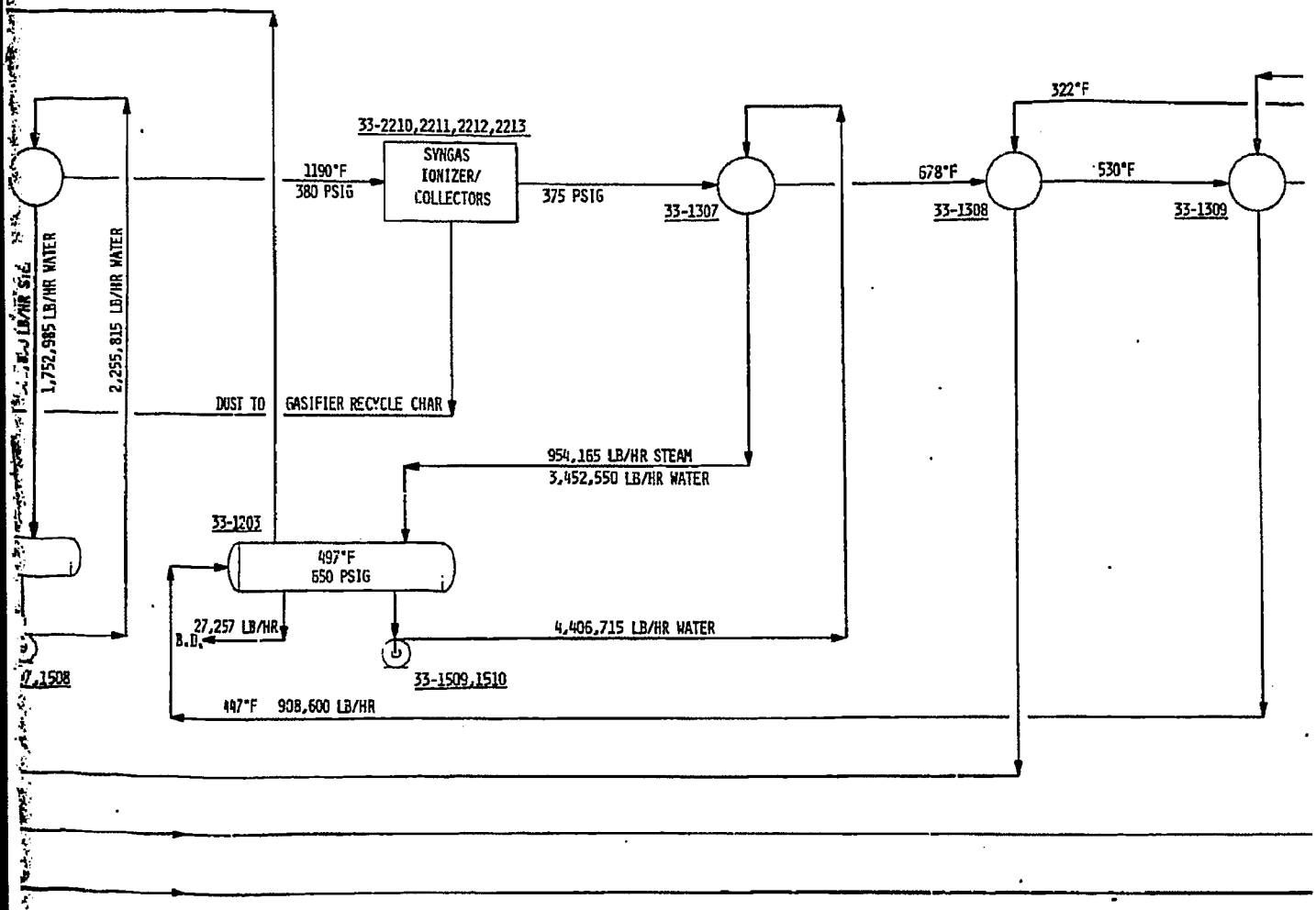
EAM DRUM
-0" T/T

33-1305
RAW FUEL GAS /1390 PSIG STEAM
HEAT EXCHANGER
295.9 MMBTU/HR

33-1203
650 PSIG STEAM DRUM
12'-0" I.D. X 60'-0" T/T

33-1307
RAW FUEL GAS /650 PSIG STEAM
HEAT EXCHANGER
685.2 MMBTU/HR

33-1308
RAW FUEL GAS /1300 PSIG BFW
HEAT EXCHANGER
194.0 MMBTU/HR

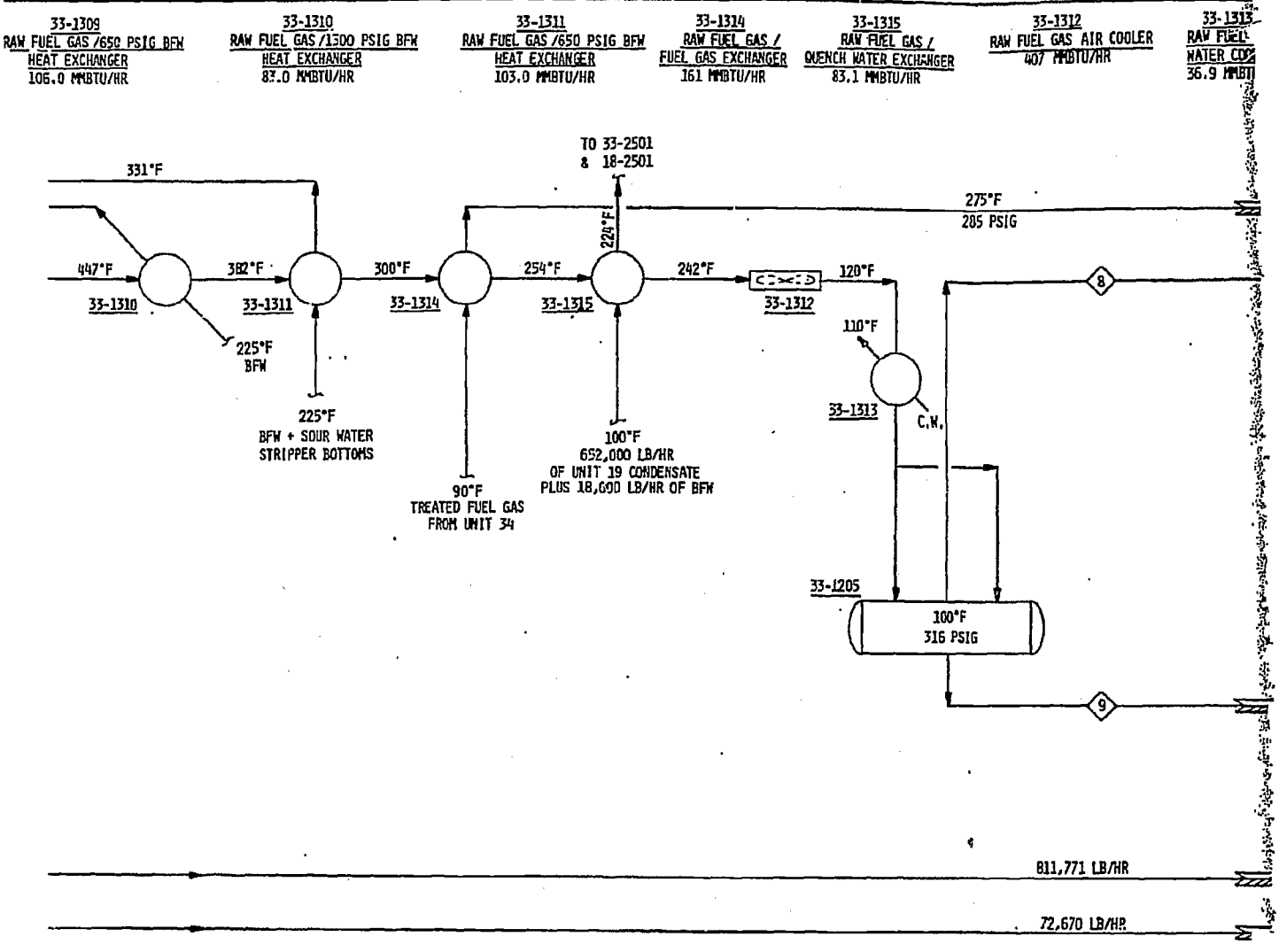


7,1508

ATION
ARE
ACH)
PT.

33-1509,1510
WATER CIRCULATION
PUMP AND SPARE
11,175 GPM (EACH)
S.G. 0.79 @ PT.

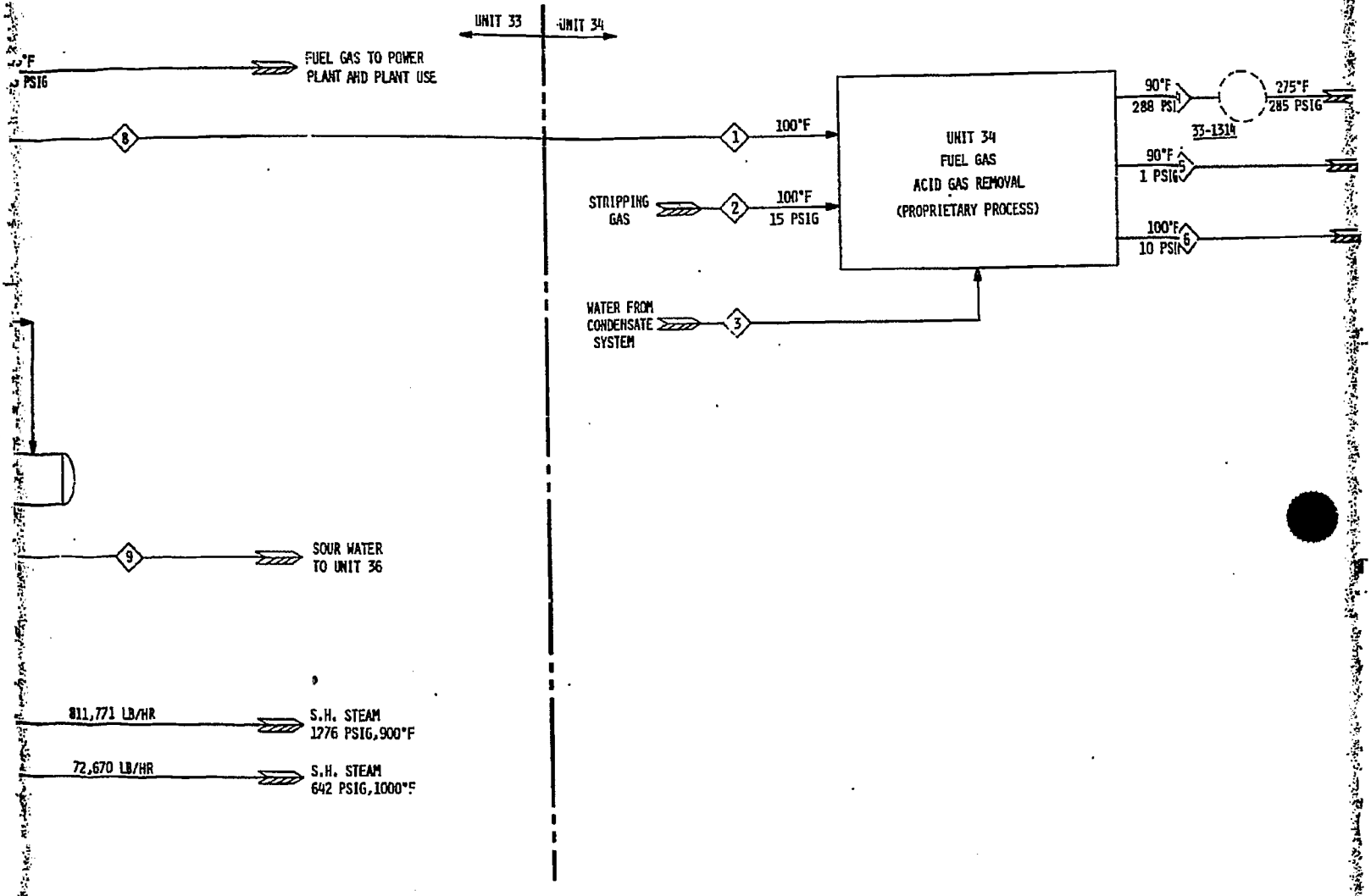
33-2210,2211,2212,2213
SYNGAS IONIZER/COLLECTORS
15' W X 20' L X 25' H
(EACH)


33-1309
RAW FUEL GAS /650 PSIG BFW
HEAT EXCHANGER
106.0 MMBTU/HR
33-1310
RAW FUEL GAS /1300 PSIG BFW
HEAT EXCHANGER
87.0 MMBTU/HR
33-1311
RAW FUEL GAS /650 PSIG BFW
HEAT EXCHANGER
103.0 MMBTU/HR
33-1314
RAW FUEL GAS /
FUEL GAS EXCHANGER
161 MMBTU/HR
33-1315
RAW FUEL GAS /
QUENCH WATER EXCHANGER
83.1 MMBTU/HR
33-1312
RAW FUEL GAS AIR COOLER
407 MMBTU/HR
33-1313
RAW FUEL
WATER COO
36.9 MMBTU
TO 33-2501
& 18-2501
331°F
447°F
382°F
300°F
254°F
224°F
242°F
275°F
285 PSIG
120°F
110°F
33-1310
33-1311
33-1314
33-1315
33-1312
33-1313
C.W.
225°F
BFW
225°F
BFW + SOUR WATER
STRIPPER BOTTOMS
90°F
TREATED FUEL GAS
FROM UNIT 34
100°F
652,000 LB/HR
OF UNIT 19 CONDENSATE
PLUS 18,000 LB/HR OF BFW
8
9
33-1205
100°F
316 PSIG
811,771 LB/HR
72,670 LB/HR

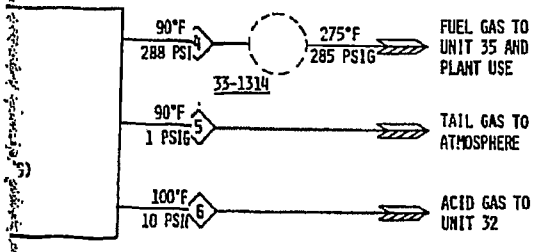
33-1312
RAW FUEL GAS AIR COOLER
407 MMBTU/HR

33-1313
RAW FUEL GAS
WATER COOLER
36.9 MMBTU/HR

33-1205
SOUR WATER KNOCK-OUT DRUM
16'-0" I.D. X 40'-0" T/T



STREAM NO.	1	2	3	4	5	6
STREAM NAME	FEED GAS	STRIPPING GAS	WATER	FUEL GAS	TAIL GAS	ACID GAS
COMPONENT						
H_2	57,683.19	-	-	57,619.74	34.61	2
N_2	1,277.55	4,521.74	-	1,270.04	4,526.75	283
CO	63,460.00	-	-	62,933.28	317.30	5,857
CO_2	16,417.49	-	-	1,559.66	9,000.07	1,625
H_2S	1,625.47	-	-	0.12	-	25
COS	25.05	-	-	-	-	306
H_2O	405.54	-	868.99	289.61	878.52	1
CH_4	815.52	-	-	779.80	21.37	1
TOTAL, MPH	141,709.81	4,521.74	868.99	124,452.25	14,578.62	8,098
LB/HR	2,729,448	126,681	15,655	2,000,876	544	326
MMSCFD	1,290.69	41.18	-	1,133.48	1	2
MW	19.26	28.02	18.02	16.08	-	40



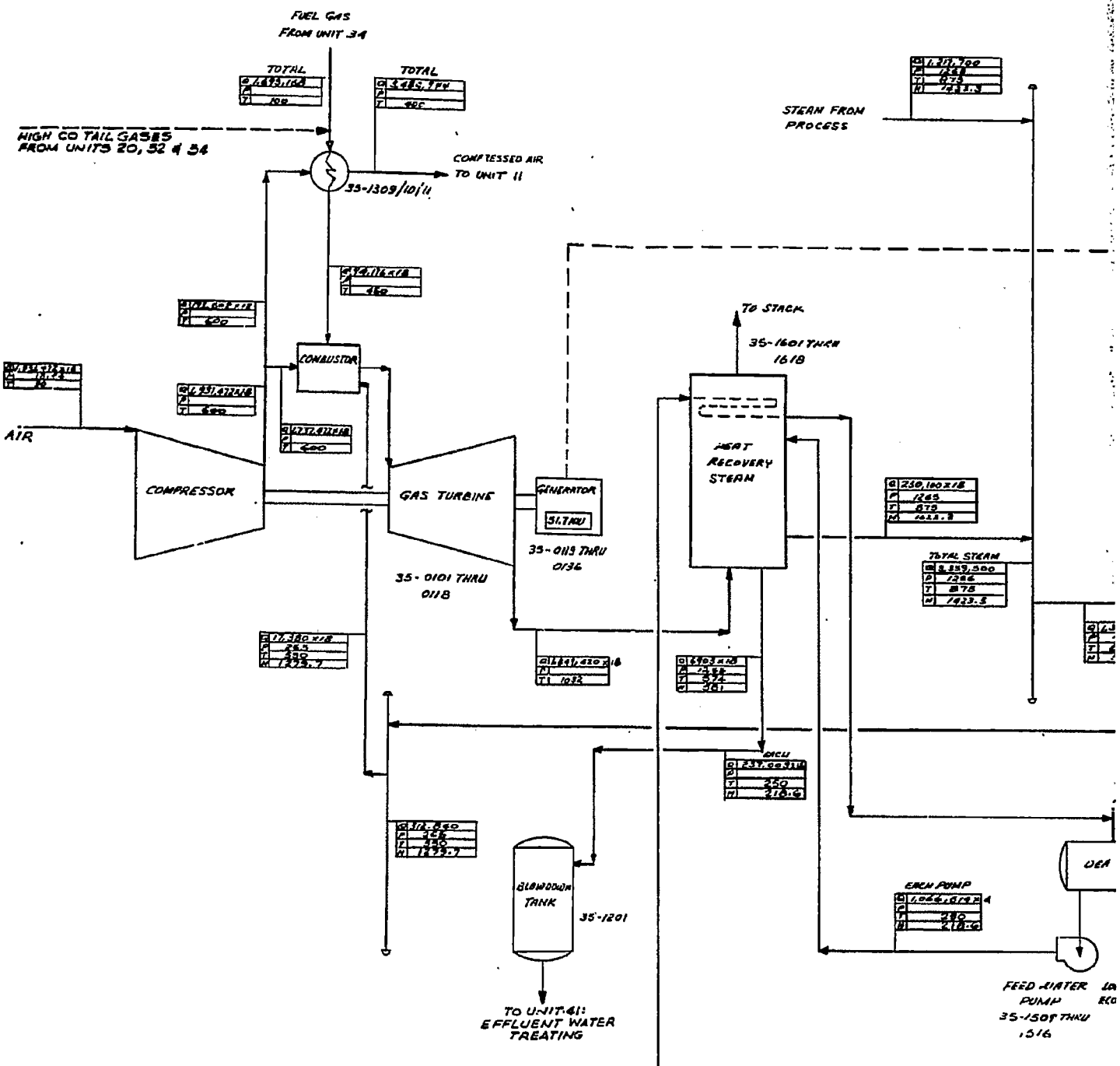
	3	4	5	6
	WATER	FUEL GAS	TAIL GAS	ACID GAS
	-	57,619.74	34.61	28.84
.74	-	1,270.04	4,526.75	2.50
	-	62,933.28	317.30	209.42
	-	1,559.66	9,000.07	5,857.76
	-	0.12	-	1,625.35
	-	-	-	25.05
	868.99	289.61	678.52	306.40
	-	779.80	21.37	14.35
.74	868.99	124,452.25	14,578.62	8,069.67
.1	15,655	2,000,876	544,439	326,444
	-	1,133.48	132.78	73.50
02	18.02	16.08	37.34	40.45

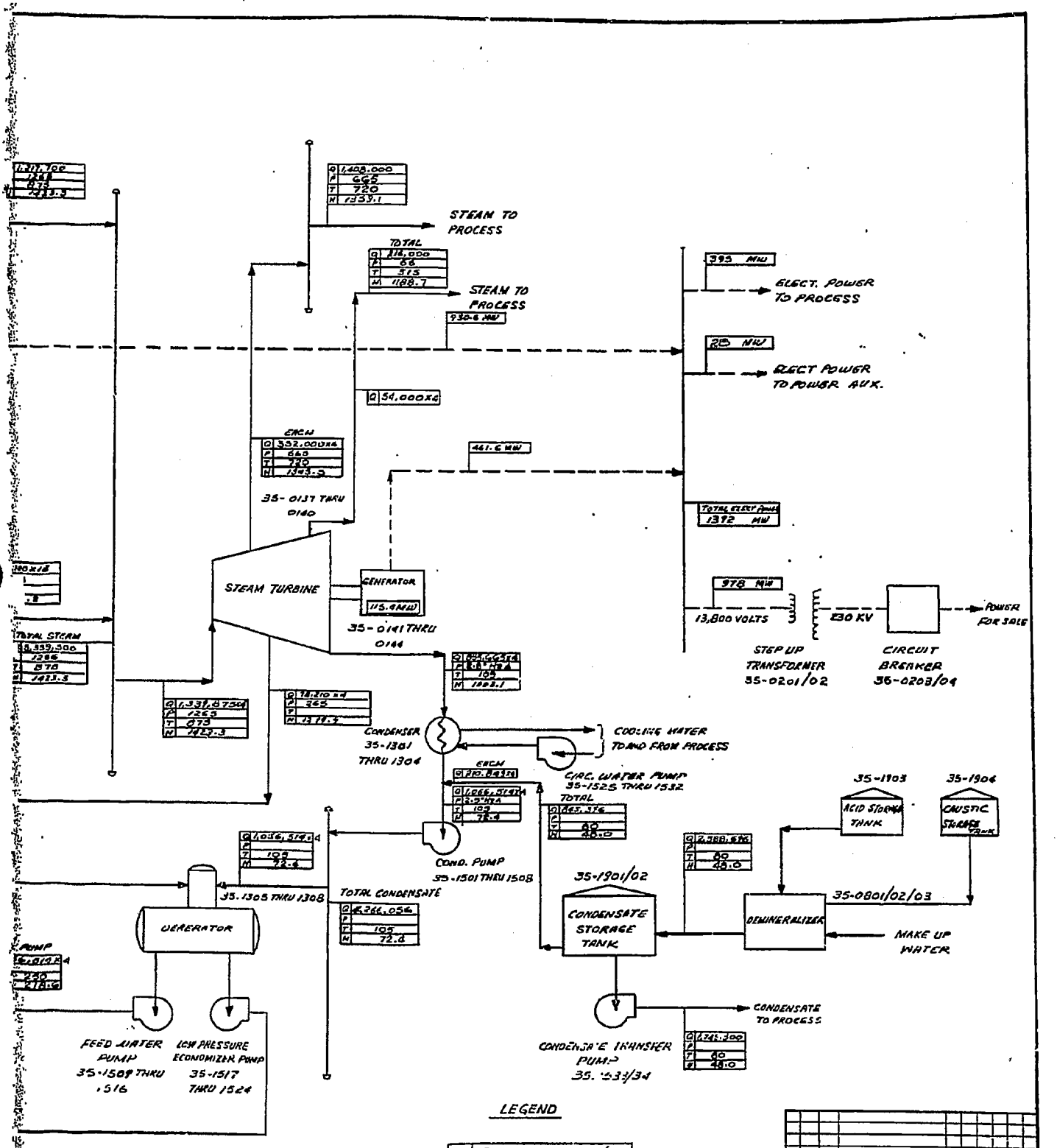
REV NO	CHKD APPD.	DATE	REVISION	BY	PROC ENGR	CHECK	CHIEF PROC. ENGR	CHIEF DIV. ENGR	PROC. DIR.
0			ISSUED FOR REPORT	LOS					

DEPARTMENT OF ENERGY - DIVISION OF COAL CONVERSION
POGO PLANT
PROCESS FLOW DIAGRAM
FUEL GAS GENERATION - UNIT 33
FUEL GAS ACID GAS REMOVAL - UNIT 34

THE RALPH M. PARSONS COMPANY PASADENA, CALIFORNIA	JOB NO. 5435-4	DWG. NO. R-33/34-FS-1	REV. 0

DR.RM. REV. A 8/2/77 DC- BT-


FUEL GAS
FROM UNIT 34
TOTAL
TOTAL
HIGH CO TAIL GASES
FROM UNITS 20, 32 & 34
COMPRESSED AIR
TO UNIT 11
35-1309/1011
STEAM FROM
PROCESS
TO STACK
35-1601 THRU
1618
AIR
COMPRESSOR
COMBUSTOR
GAS TURBINE
GENERATOR
35-0113 THRU
0136
35-0101 THRU
0118
HEAT
RECOVERY
STEAM
TOTAL STEAM
BLOWDOWN
TANK
35-1201
TO UNIT 41:
EFFLUENT WATER
TREATING
DEA
FEED WATER
PUMP
35-1509 THRU
1516



LEGEND

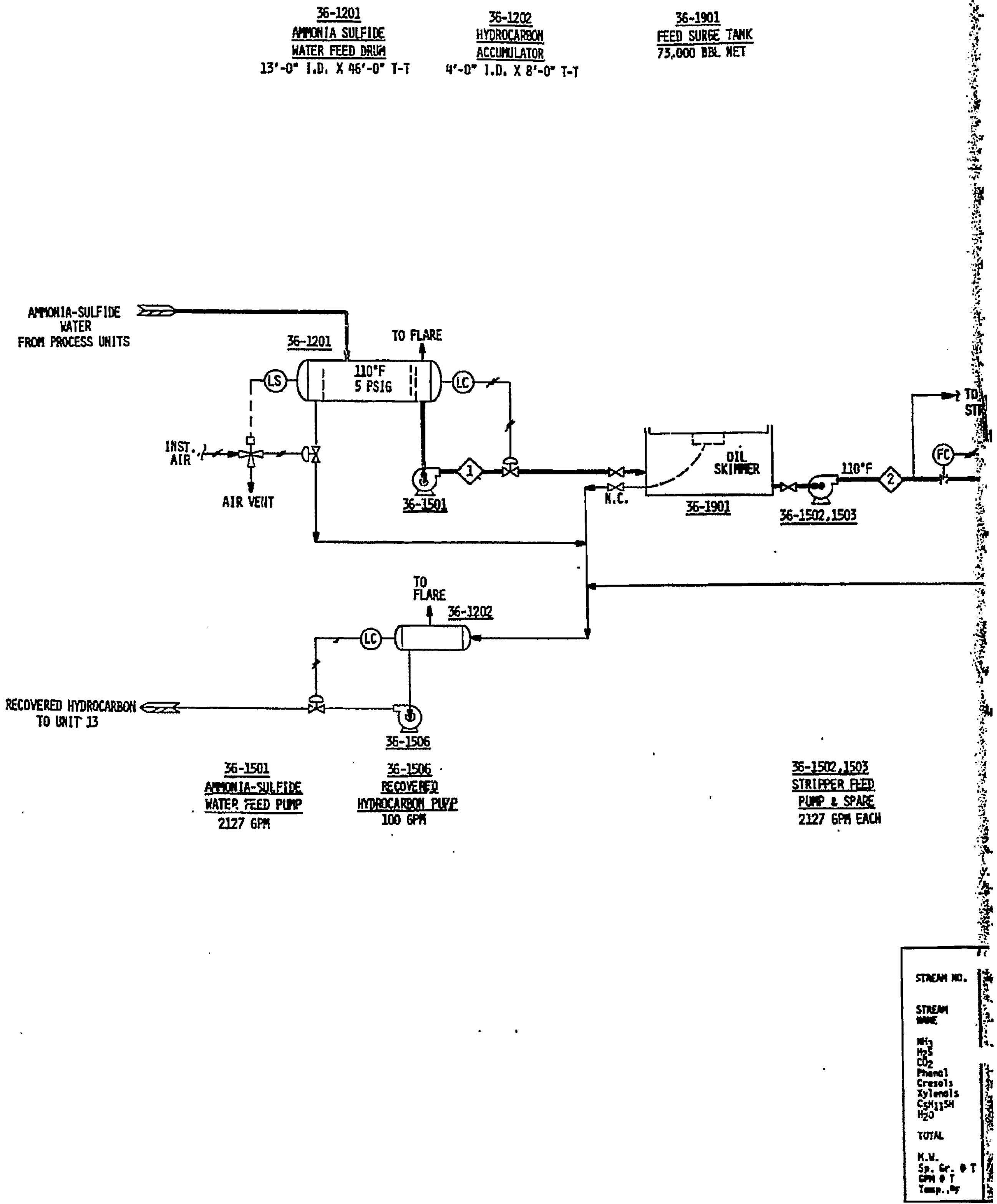
Q	FLOW	LBS/HR
P	PRESSURE	PSIA
T	TEMPERATURE	°F.
H	ENTHALPY	BTU/LB

0	ISSUED FOR REPORT	

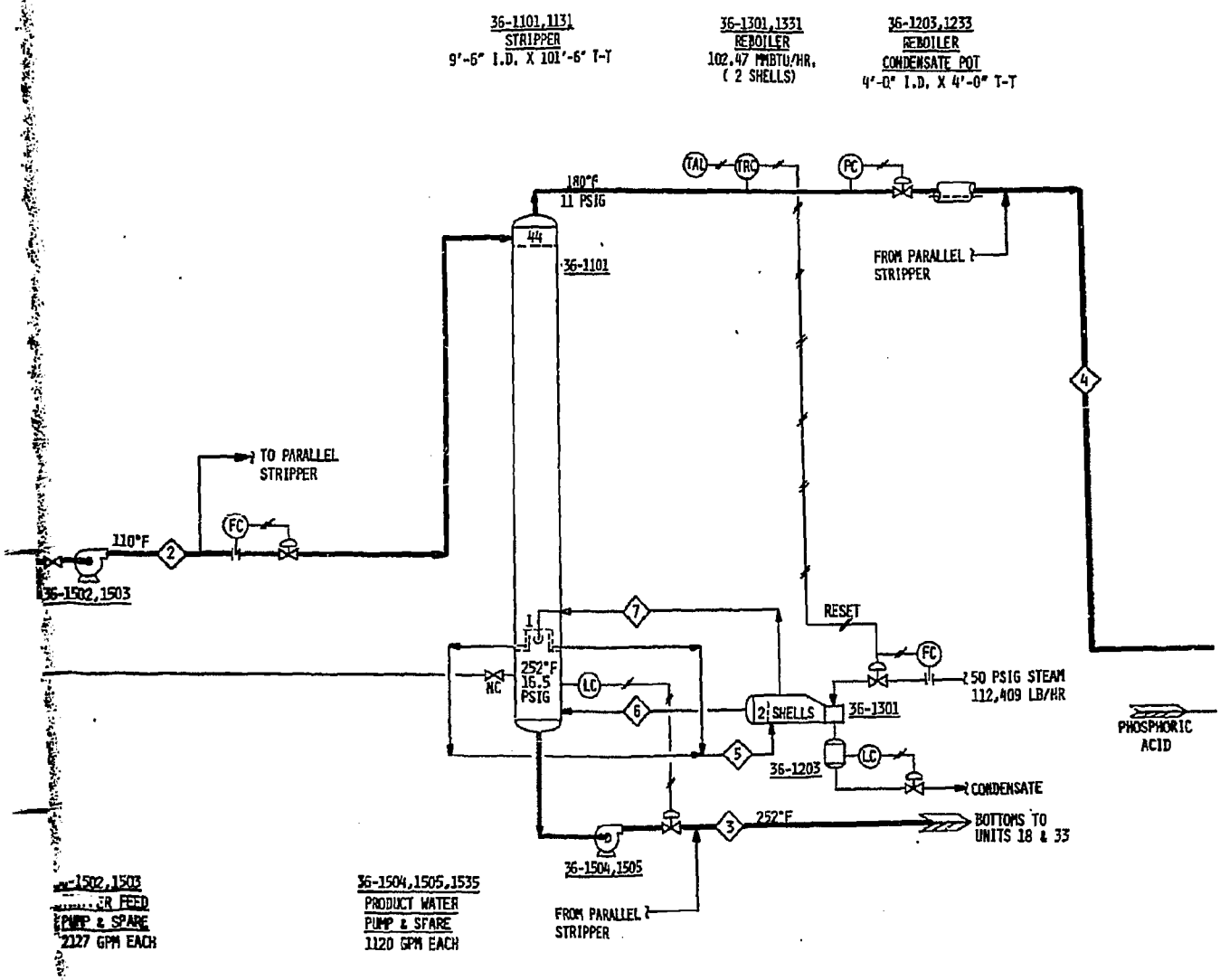
DEPARTMENT OF ENERGY
-DIVISION OF COAL CONVERSION-
POGO PLANT
MASS FLOW HEAT BALANCE DIAGRAM
STEAM AND POWER GENERATION - UNIT 35

THE RALPH M. PARSONS COMPANY PASADENA, CALIFORNIA | 5435-8 | R-35-FS-1 | 0

B


36-1201
AMMONIA SULFIDE
WATER FEED DRUM
13'-0" I.D. X 46'-0" T-T
36-1202
HYDROCARBON
ACCUMULATOR
4'-0" I.D. X 8'-0" T-T
36-1901
FEED SURGE TANK
73,000 BBL NET
AMMONIA-SULFIDE
WATER
FROM PROCESS UNITS
36-1201
TO FLARE
110°F
5 PSIG
LS
LC
INST.
AIR
AIR VENT
1
36-1501
N.C.
OIL
SKIMMER
36-1901
110°F
2
FC
TO
STR
36-1502,1503
TO
FLARE
36-1202
LC
RECOVERED HYDROCARBON
TO UNIT 13
36-1506
36-1501
AMMONIA-SULFIDE
WATER FEED PUMP
2127 GPM
36-1506
RECOVERED
HYDROCARBON PUMP
100 GPM
36-1502,1503
STRIPPER FEED
PUMP & SPARE
2127 GPM EACH
STREAM NO.
STREAM
NAME
NH_3
H_2S
CO_2
Phenol
Cresols
Xylenols
$C_5H_{11}SH$
H_2O
TOTAL
M.W.
Sp. Gr. @ T
GPM @ T
Temp., °F

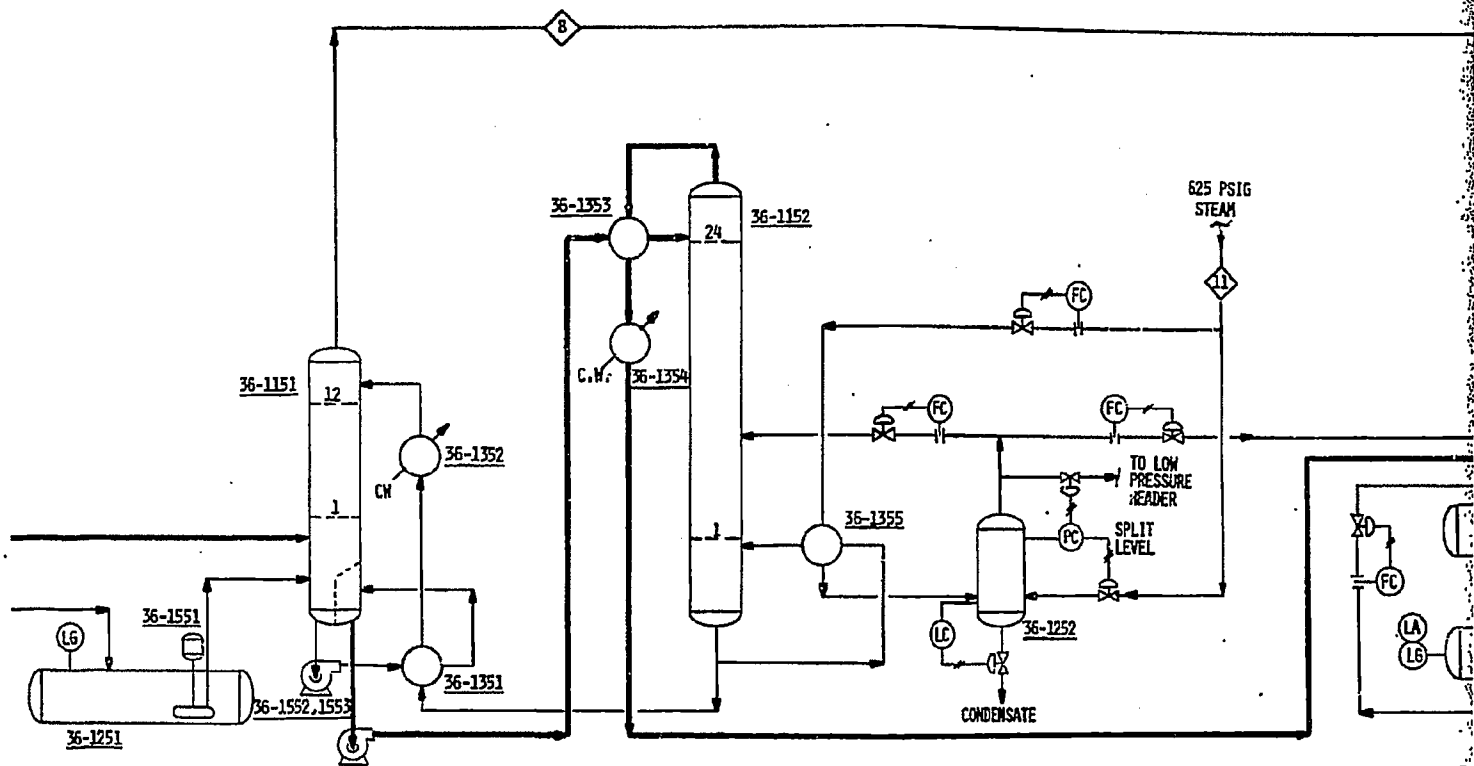
A



STREAM NO.	1	2	3	4	5	6	7	8	9	10	11
STREAM NAME	FEED LB/HR	STRIPPER FEED LB/HR	STRIPPED WATER LB/HR	STRIPPER GAS LB/HR	REBOILER FEED LB/HR	REBOILER LIQUID LB/HR	REBOILER VAPOR LB/HR	ACID GAS LB/HR.	AMMONIA PRODUCT LB/HR	WASTE WATER LB/HR	STEAM LB/HR
NH_3	15,608.00	15,608.00	31.56	15,576.44	15.78	15.78	-	-	15,576.44	-	-
H_2S	17,248.00	17,248.00	3.16	17,244.84	1.58	1.58	-	17,244.84	-	-	-
CO_2	2,738.00	2,738.00	0.00	2,738.00	0.00	0.00	-	2,738.00	-	-	-
Phenol	1,218.00	1,218.00	1,035.30	182.70	917.65	917.65	-	182.70	-	-	-
Cresols	1,938.00	1,938.00	1,938.00	0.00	969.00	969.00	-	0.00	-	-	-
Xylenols	1,098.00	1,098.00	1,098.00	0.00	549.00	549.00	-	0.00	-	-	-
$C_6H_{11}SH$	1.00	1.00	0.00	1.00	0.00	0.00	-	1.00	-	-	-
H_2O	1,069,144.00	1,059,144.00	1,048,093.12	11,050.88	632,574.56	524,046.56	108,528.00	2,494.34	-	131,818.34	196,700.00
TOTAL	1,098,993.00	1,098,993.00	1,052,199.14	46,793.86	634,627.57	526,099.57	108,528.00	22,660.88	15,576.44	131,818.34	196,700.00
M.W.	18.225	18.225	18.078	22.303	18.068	18.078	18.020	31.981	17.032	18.020	18.020
Sp. Gr. @ T	1.025	1.025	0.944	-	0.944	0.943	-	-	0.594	0.860	-
GPM @ T	2,144	2,144	2,229	-	1,344	1,116	-	-	52	307	-
Temp.,°F	110	110	252	110	252	252	252	159	100	403	493

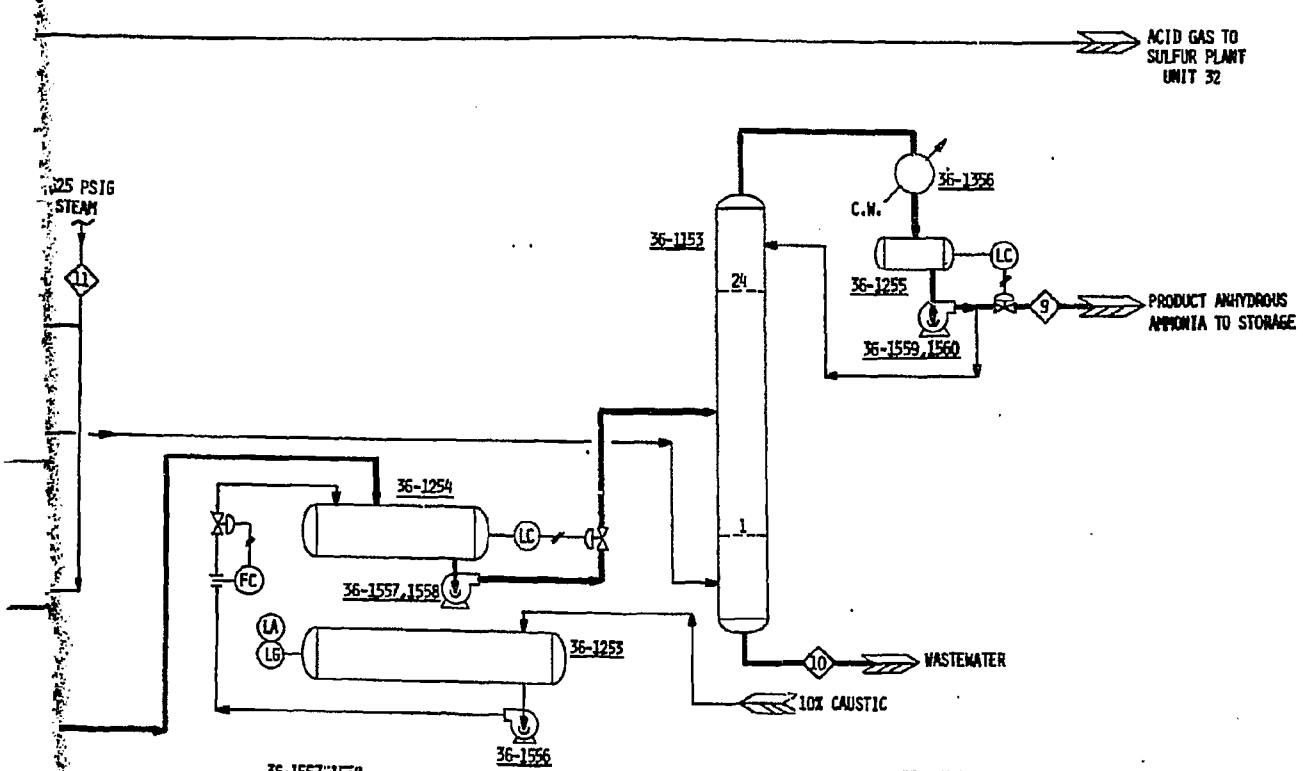
B

36-1251 PHOSPHORIC ACID TANK	36-1151 AMMONIA ABSORBER	36-1351 SOLUTION EXCHANGER	36-1352 SOLUTION COOLER	36-1353 AMMONIA STRIPPER CONDENSER	36-1354 AMMONIA STRIPPER COOLER	36-1152 AMMONIA STRIPPER	36-1355 AMMONIA STRIPPER REBOILER	36-1252 FLASH DRUM
10'-0" I.D. X 40'-0" T-T	8'-0" I.D. X 36'-0" T-T	930 FT2	9700 FT2	9000 FT2	4159 FT2	10'-0" I.D. X 60'-0" T-T	2540 FT2	7'-0" I.D. X 9'-6" T-T



36-1551 PHOSPHORIC ACID PUMP	36-1552,1553 ABSORBER SOLUTION COOLER PUMP & SPARE	36-1554,1555 RICH SOLUTION PUMP & SPARE	36-1557 FRACTIC FEED PUMP
10 GPM	1330 GPM DESIGN	1255 GPM DESIGN	300 GPM

-1355	36-1252	36-1254	36-1253	36-1153	36-1255	36-1356
REBOILER 0 FT2	FLASH DRUM 7'-0" I.D. X 9'-6" T-T	AMMONIA FRACTIONATOR FEED DRUM 7'-6" I.D. X 25'-0" T-T	CAUSTIC FEED TANK 11'-0" I.D. X 33'-0" T-T	AMMONIA FRACTIONATOR 7'-6" I.D. X 60'-0" T-T	AMMONIA REFLUX DRUM 3'-0" I.D. X 3'-6" T-T	AMMONIA CONDENSER 9,250 FT2



36-1557;1558
FRACTIONATOR
FEED PUMP & SPARE
300 GPM DESIGN

36-1556
CAUSTIC PUMP
0-17 GPM

36-1559,1560
FRACTIONATOR
REFLUX PUMP & SPARE
200 GPM DESIGN

THE AMMONIA SEPARATION PROCESS ILLUSTRATED IS ONE OF SEVERAL PROPRIETARY PROCESSES AVAILABLE.

0		8/6/79	ISSUED FOR REPORT		SKD	RKC	JEK			
REV. NO.	CHKT. APPR.	DATE	REVISIONS		BY					

DEPARTMENT OF ENERGY - DIVISION OF COAL CONVERSION
POGO PLANT
PROCESS FLOW DIAGRAM
PROCESS WASTEWATER TREATING UNIT 36

THE RALPH M. PARSONS COMPANY PASADENA, CALIFORNIA	JOB NO. 5935-4	DWG. NO. A-36-PW-1	REV. 0

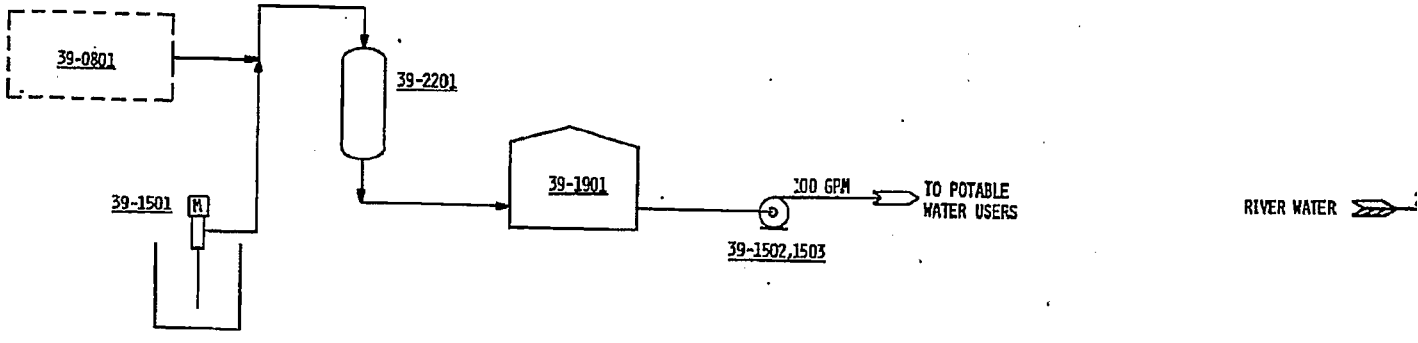
13

39-0801
CHLORINE INJECTION
PACKAGE

39-2201
POTABLE WATER
FILTER

39-1901
POTABLE WATER
STORAGE TANK

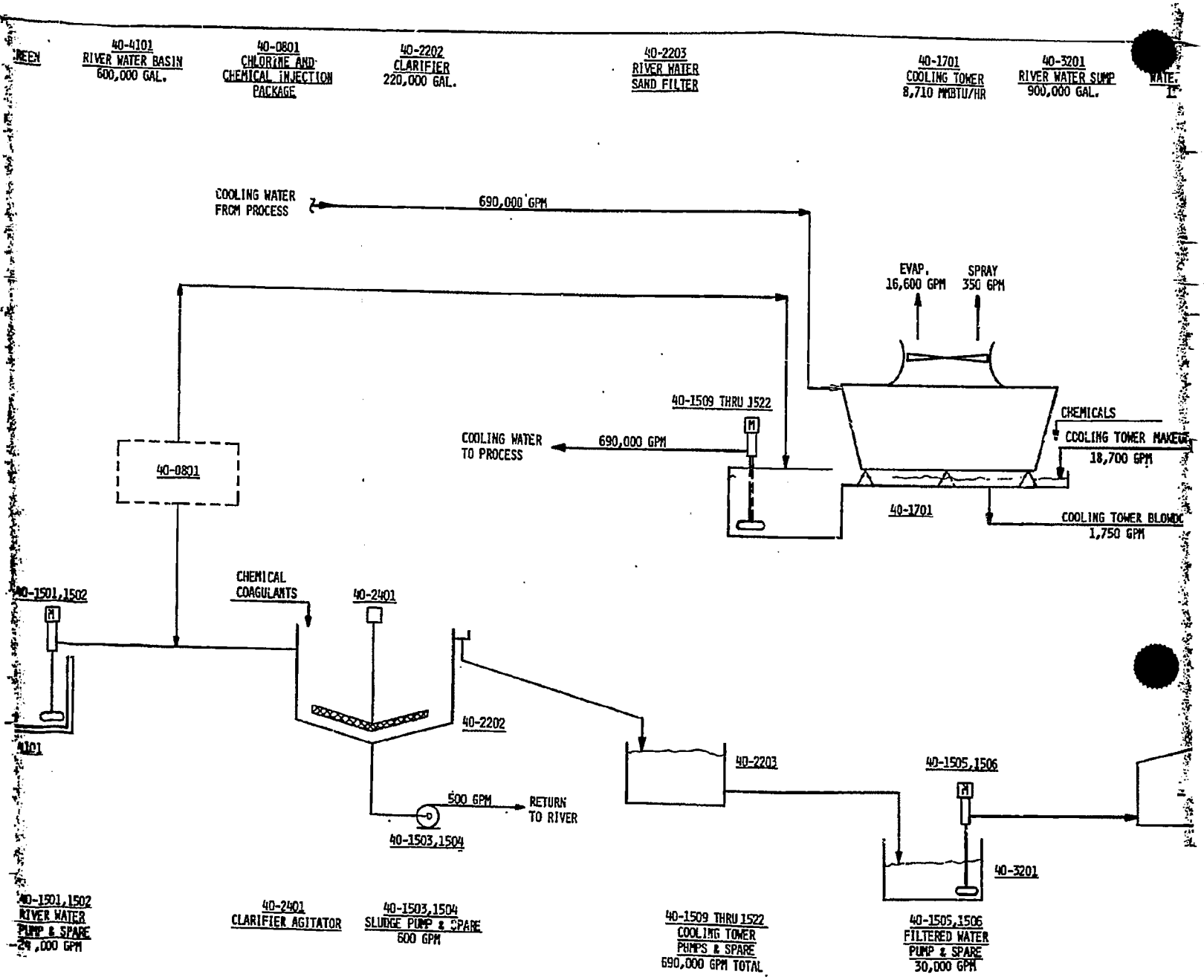
UNIT 39 | UNIT 40



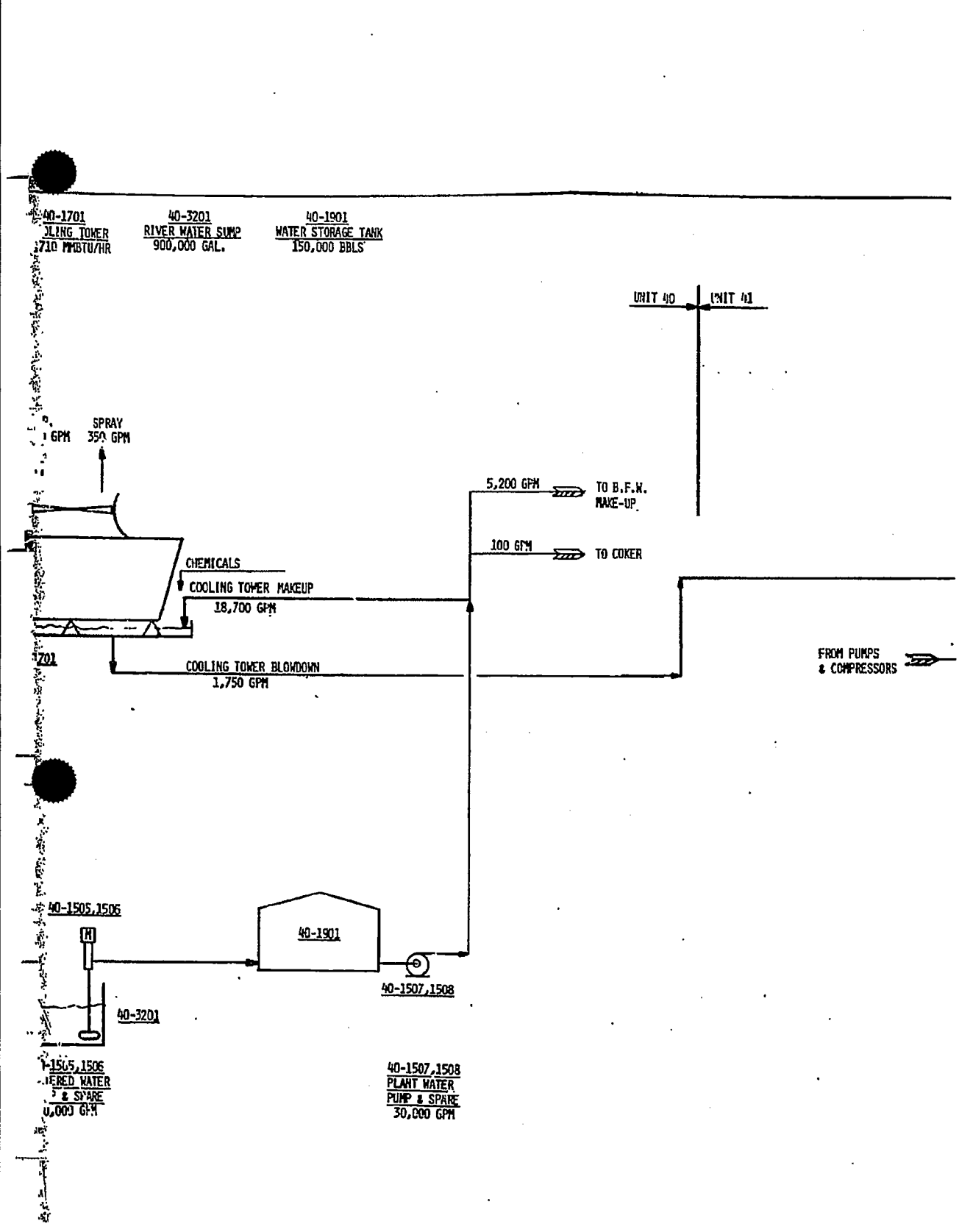
39-1501
POTABLE WATER
DEEP WELL PUMP
250 GPM

39-1502,1503
POTABLE WATER
PUMP & SPARE
100 GPM

A


40-4101
RIVER WATER BASIN
600,000 GAL.
40-0801
CHLORINE AND
CHEMICAL INJECTION
PACKAGE
40-2202
CLARIFIER
220,000 GAL.
40-2203
RIVER WATER
SAND FILTER
40-1701
COOLING TOWER
8,710 MMBTU/HR
40-3201
RIVER WATER SUMP
900,000 GAL.
COOLING WATER
FROM PROCESS
690,000 GPM
EVAP.
16,600 GPM
SPRAY
350 GPM
40-1509 THRU 1522
COOLING WATER
TO PROCESS
690,000 GPM
CHEMICALS
COOLING TOWER MAKEUP
18,700 GPM
40-0801
40-1701
COOLING TOWER BLOWDOWN
1,750 GPM
40-1501,1502
CHEMICAL
COAGULANTS
40-2401
40-2202
500 GPM
RETURN
TO RIVER
40-1503,1504
40-2203
40-1505,1506
40-3201
40-1501,1502
RIVER WATER
PUMP & SPARE
40,000 GPM
40-2401
CLARIFIER AGITATOR
40-1503,1504
SLUDGE PUMP & SPARE
600 GPM
40-1509 THRU 1522
COOLING TOWER
PUMPS & SPARE
690,000 GPM TOTAL
40-1505,1506
FILTERED WATER
PUMP & SPARE
30,000 GPM

B


40-1701
LING TOWER
710 MMBTU/HR
40-3201
RIVER WATER SUMP
900,000 GAL.
40-1901
WATER STORAGE TANK
150,000 BBLS
UNIT 40
UNIT 41
GPM
SPRAY
350 GPM
5,200 GPM
TO B.F.W.
MAKE-UP
100 GPM
TO COKER
CHEMICALS
COOLING TOWER MAKEUP
18,700 GPM
701
COOLING TOWER BLOWDOWN
1,750 GPM
FROM PUMPS
& COMPRESSORS
40-1505,1506
40-1901
40-1507,1508
40-3201
1505,1506
ERED WATER
& SPARE
0,000 GPM
40-1507,1508
PLANT WATER
PUMP & SPARE
30,000 GPM

41-1301
PUMPS & COMPRESSORS
WATER AIR COOLER
5.0 MMBTU/HR

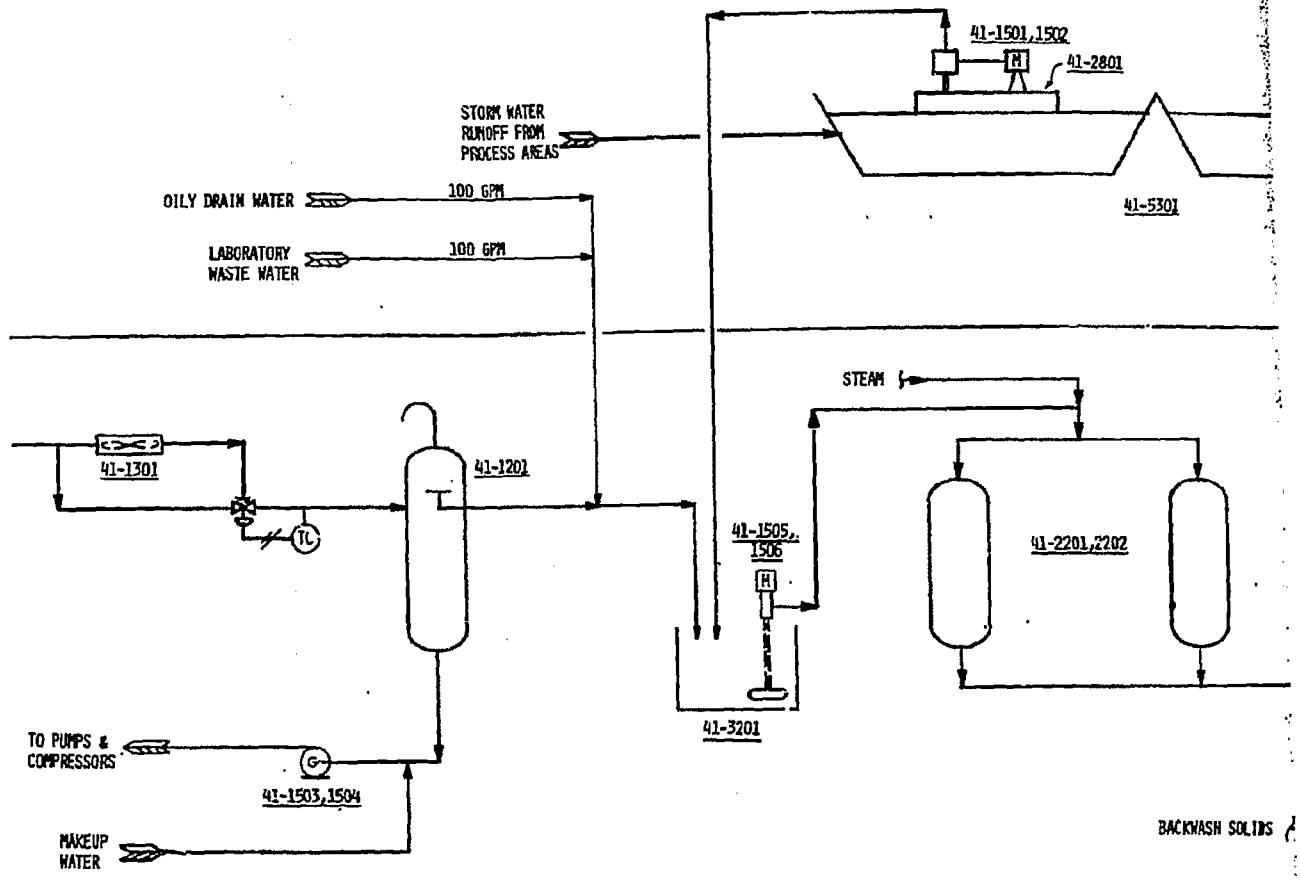
41-1201
OIL SKIMMER
10,000 GAL

41-3201
OILY WATER SUMP
15,000 GAL

41-2201,2202
OILY WATER SUMP
SAND FILTERS

41-2801
STORM WATER
ROLL SKIMMER

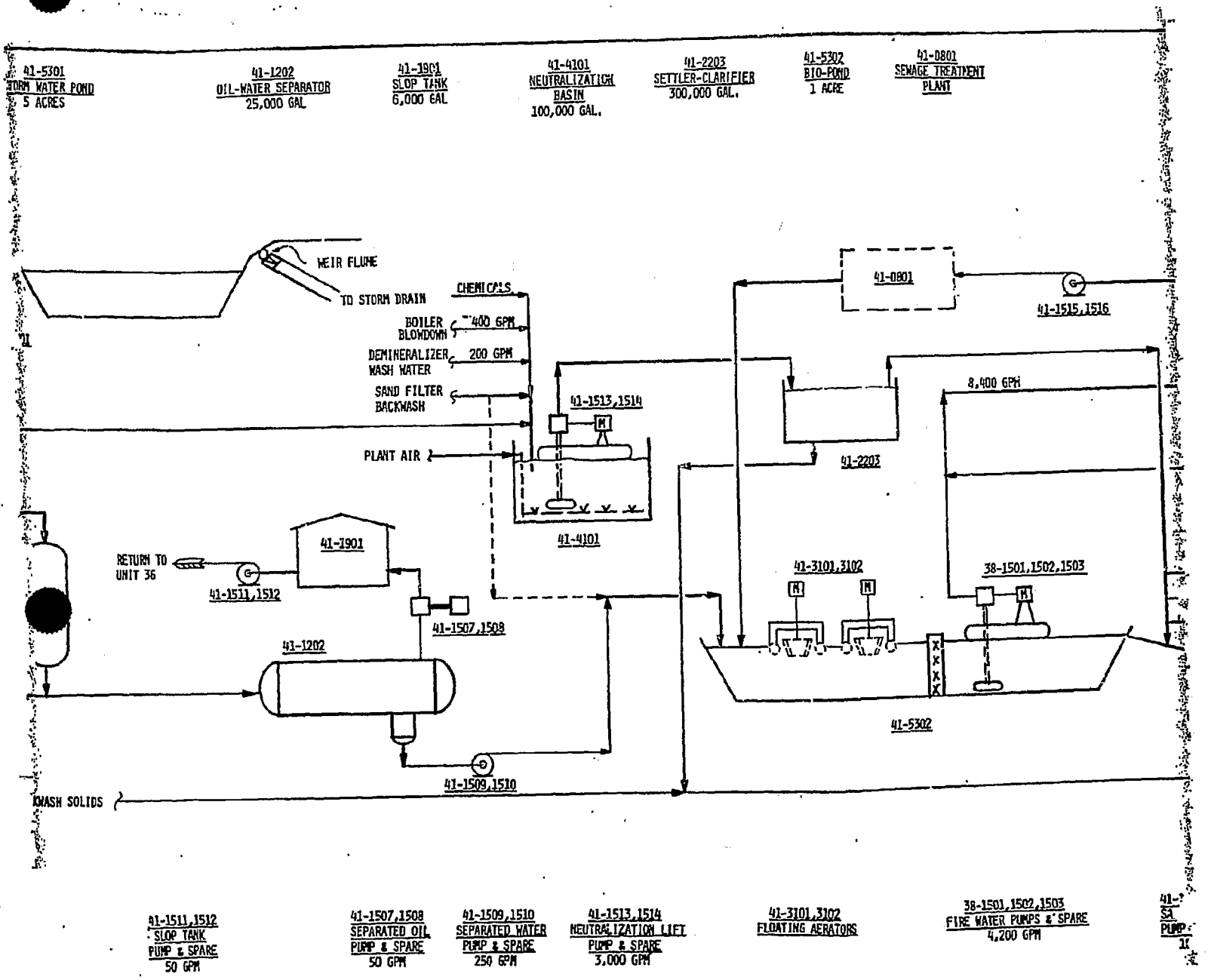
41-5301
STORM WATER POND
5 ACRES

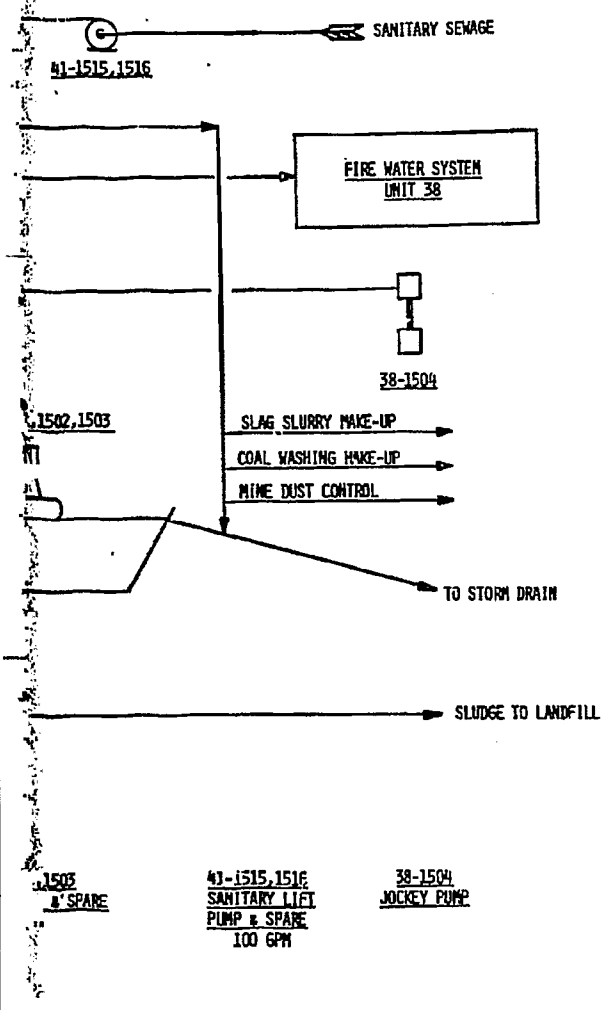


41-1503,1504
PUMPS & COMPRESSORS
WATER PUMP & SPARE
1,000 GPM

41-1505,1506
OILY WATER SUMP
PUMP & SPARE
250 GPM

41-1501,1502
STORM WATER SKIMMED-OIL
PUMP & SPARE
50 GPM


41-5301
STORM WATER POND
5 ACRES
41-1202
OIL-WATER SEPARATOR
25,000 GAL
41-1901
SLOP TANK
6,000 GAL
41-4101
NEUTRALIZATION
BASIN
100,000 GAL.
41-2203
SETTLER-CLARIFIER
300,000 GAL.
41-5302
BIO-POND
1 ACRE
41-0801
SEWAGE TREATMENT
PLANT
WEIR FLUME
TO STORM DRAIN
CHEMICALS
BOILER BLOWDOWN
400 GPM
DEMINERALIZER WASH WATER
200 GPM
SAND FILTER BACKWASH
PLANT AIR
41-1513,1514
41-4101
41-0801
41-1515,1516
8,400 GPM
41-2203
41-3101,3102
38-1501,1502,1503
41-5302
RETURN TO UNIT 36
41-1511,1512
41-1901
41-1507,1508
41-1202
41-1509,1510
WASH SOLIDS
41-1511,1512
SLOP TANK
PUMP & SPARE
50 GPM
41-1507,1508
SEPARATED OIL
PUMP & SPARE
50 GPM
41-1509,1510
SEPARATED WATER
PUMP & SPARE
250 GPM
41-1513,1514
NEUTRALIZATION LIFT
PUMP & SPARE
3,000 GPM
41-3101,3102
FLOATING AERATORS
38-1501,1502,1503
FIRE WATER PUMPS & SPARE
4,200 GPM



1503
& SPARE

41-1515,1516
SANITARY LIFT
PUMP & SPARE
100 GPM

38-1504
JOCKEY PUMP

NOTES:

1. CAPACITY SHOWN ON EQUIPMENT IS MAXIMUM FOR DESIGN.

0			ISSUED FOR REPORT						
REVISION NO.	ENGR APPR.	DATE	REVISIONS	BY	PROJ ENGR	CHKD	ENGR MGR	PROJ MGR	APPROVAL DATE

DEPARTMENT OF ENERGY - DIVISION OF COAL CONVERSION
POGO PLANT
PROCESS FLOW DIAGRAM
FIRE WATER SYSTEM UNIT 38
POTABLE AND SANITARY WATER SYSTEM UNIT 39
RAW WATER SYSTEM UNIT 40
EFFLUENT WATER TREATING UNIT 41

THE RALPH M. PARSONS COMPANY PASADENA, CALIFORNIA	JOB NO. 5435-4	DRG. NO. R-38/39/40/41-FS-1	REV. 0

DR. MH. REV. A

ENC- BY-