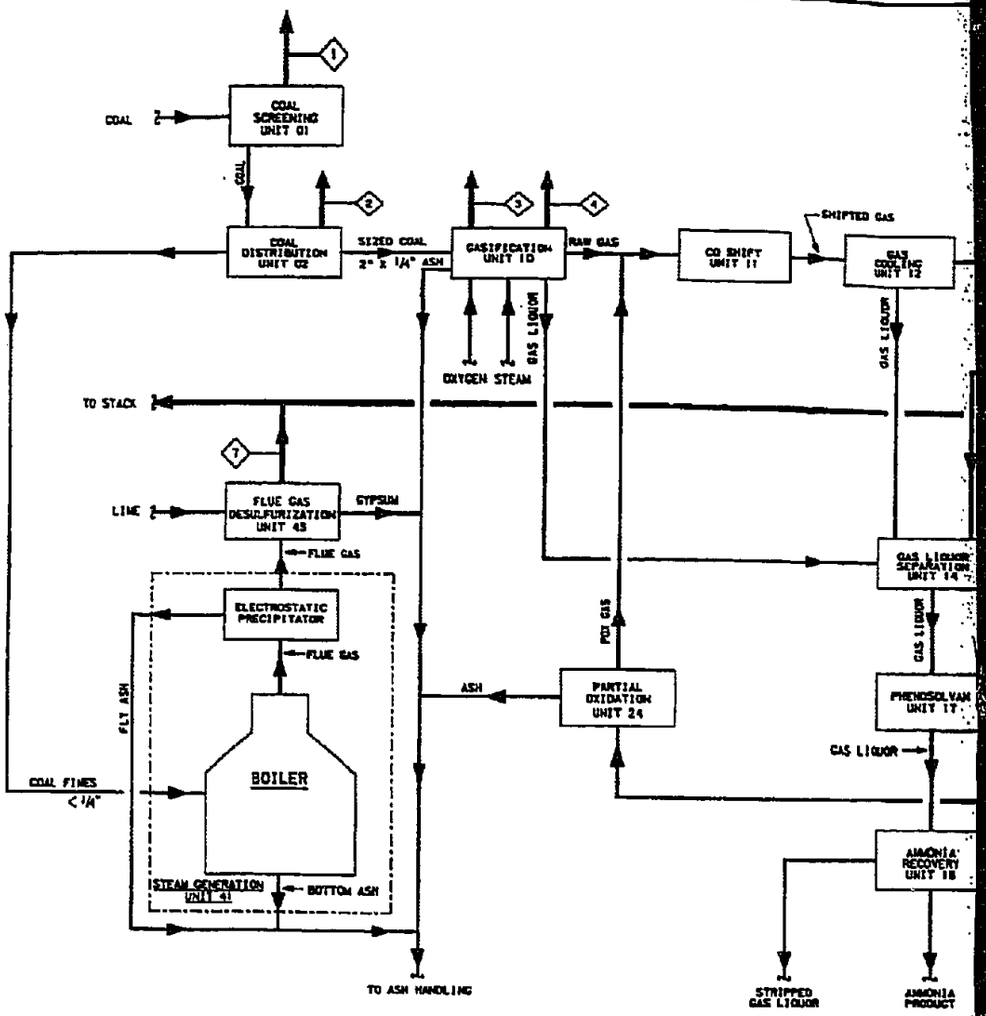
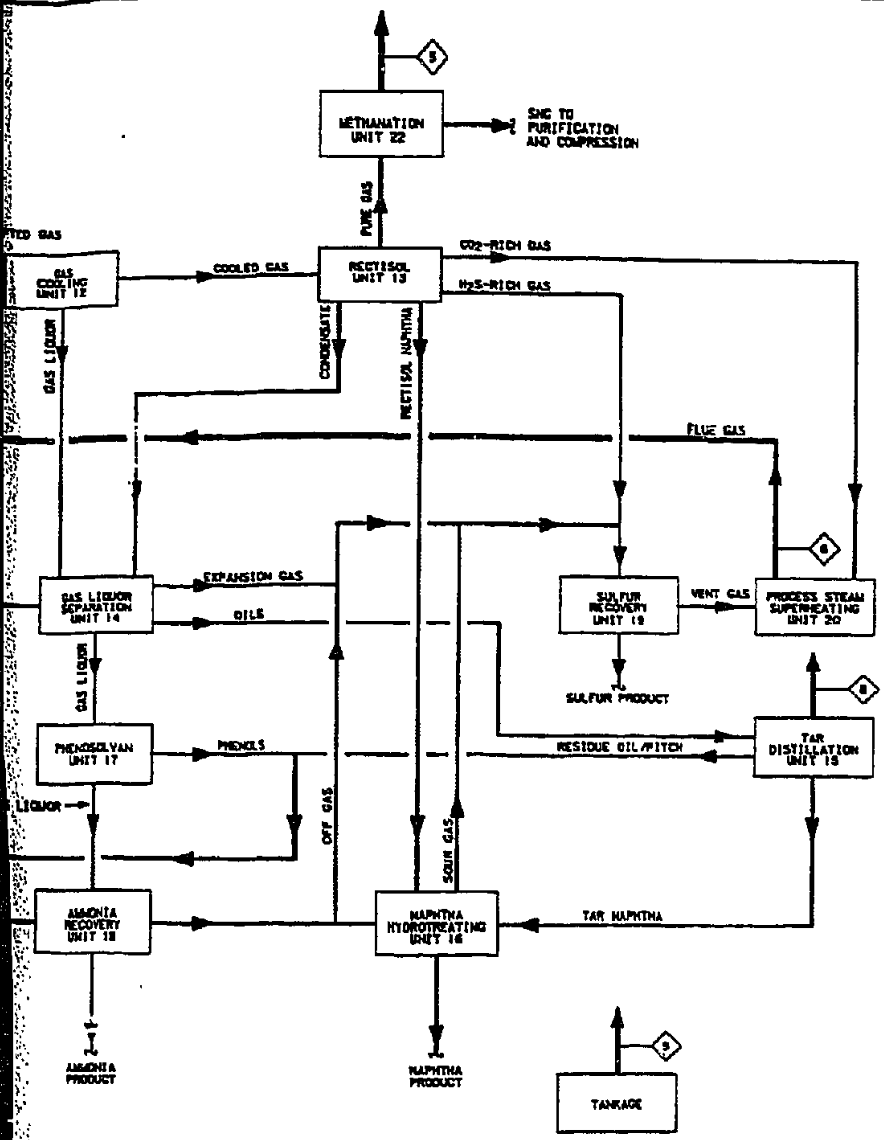


NOTE: NUMBERS IN PARENTHESES REFER TO NOTES AT RIGHT.

		1 COAL SCREENING	2 COAL DISTRIBUTION	3 GASIFICATION LOCK GAS VENT	4 (3) GASIFIER START-UP VENT	5 (4) HEATER FLUE GAS	6 SUPERHEATER FLUE GAS	7 BOILER FLUE GAS	8 (7) HEATER FLUE GAS	9 (8) PRODUCT STORAGE TANK FARM
O_2	LBS/HR				CONFIDENTIAL	842	20,544	88,341	287	
N_2	LBS/HR			1		23,796	312,874	1,257,829	8,751	
CO_2	LBS/HR			263		4,970	550,730	365,521	1,410	
H_2O	LBS/HR			1		4,717	59,934	195,012	1,338	
SO_2	LBS/HR						211	(5) 323		
H_2S	LBS/HR			2						
COS	LBS/HR			TRACE						
NO_x	LBS/HR					22	225	849	6	
CO	LBS/HR			85		2	12	99	TRACE	
CH_4	LBS/HR			33						
H_2	LBS/HR			18						
HYDROCARBONS	LBS/HR			5						5
PARTICULATES	LBS/HR	4	2							
TOTAL FLOW	LBS/HR	4	2	405		34,449	1,344,530	(6) 47 1,908,021	9,172	5
TOTAL FLOW	LBMOL/HR			19		1,253	38,748	66,852	355	
TEMPERATURE	°F	AMB.	AMB.			300	400	128	300	AMB.
ELEVATION OF RELEASE	FT	75	150	200	↑	100	625	625	100	40



NOTES:

1. BOILER DESIGN MEETS EPA CODE OF FEDERAL REGULATIONS-TITLE 40 EMISSION LIMITS:
   SO_X = 1.2 LB/MMBTU
   NO_X = 0.5 LB/MMBTU
   PARTICULATES = 0.03 LB/MMBTU
2. BOILER FEED COAL = 98.6 T/HR (AS RECEIVED).
   GASIFIER FEED COAL = 450 T/HR (AS RECEIVED).
3. COMPOSITION AND DURATION OF GASIFIER START-UP VENT ARE CONFIDENTIAL LURGI INFORMATION.
   MAXIMUM EMISSIONS:
   SO_2 = 372 LBS/HR
   HYDROCARBONS = 468 LBS/HR
4. CATALYST REDUCTION REQUIRES FUEL GAS. FLOW SHOWN IS OF SHORT DURATION.
5. SO_2 VENTED IS BASED ON FGD REMOVAL EFFICIENCY OF 90%.
6. PARTICULATES VENTED ARE BASED ON AN EXIT CONCENTRATION OF 0.013 gr/SCF. OVERALL REMOVAL EFFICIENCY IS 99.7%.
7. HEATER FLUE GAS EMISSIONS ESTIMATED BASED ON THE FOLLOWING HEATER DUTY:
   TAR DISTILLATION 12.2 MMBTU/HR
8. HYDROCARBON EMISSIONS FROM STORAGE TANKS BASED ON FLOATING ROOF DESIGN WITH SECONDARY SEALS AND VAPOR RECOVERY SYSTEMS UTILIZED ON CONE ROOF TANKS.
9. THE TEMPERATURES, FLOW QUANTITIES AND COMPOSITIONS SHOWN ARE TO BE USED SOLELY FOR PROCESS DESIGN PURPOSES AND ARE NOT NECESSARILY THE CONDITIONS WHICH WILL BE ATTAINED DURING ACTUAL OPERATIONS.

FLUOR

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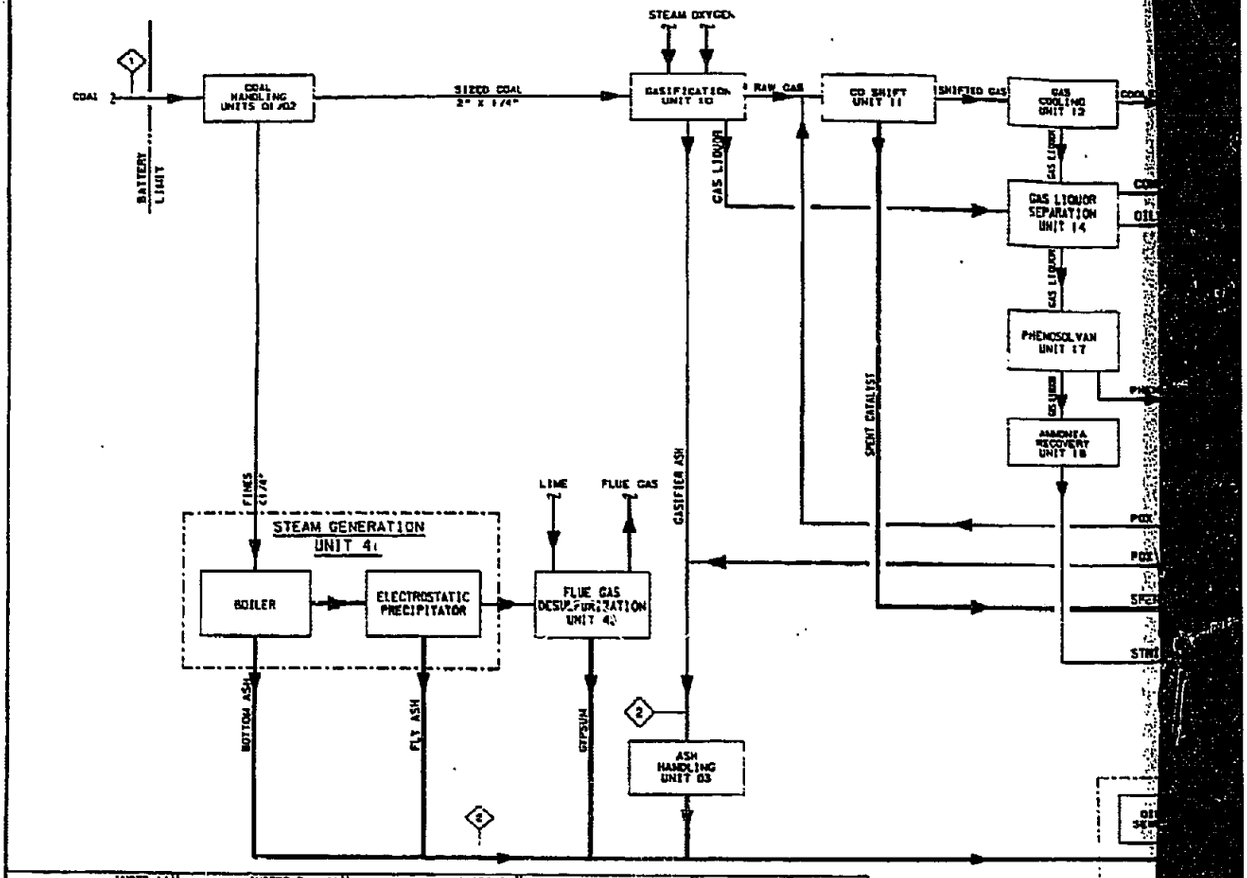
BLOCK FLOW DIAGRAM
AIR EMISSIONS
CASE: WESTMORELAND COAL-POWER SELF-SUFFICIENCY
CROW TRIBE OF INDIANS — SYNFUELS FEASIBILITY STUDY

NONE | 835704-00-4-205 | 1

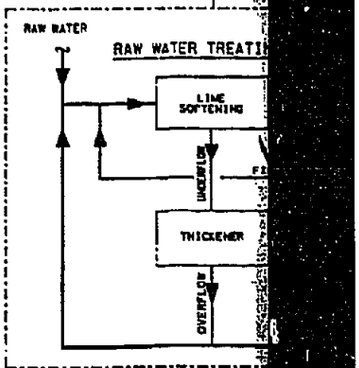
001 35700205

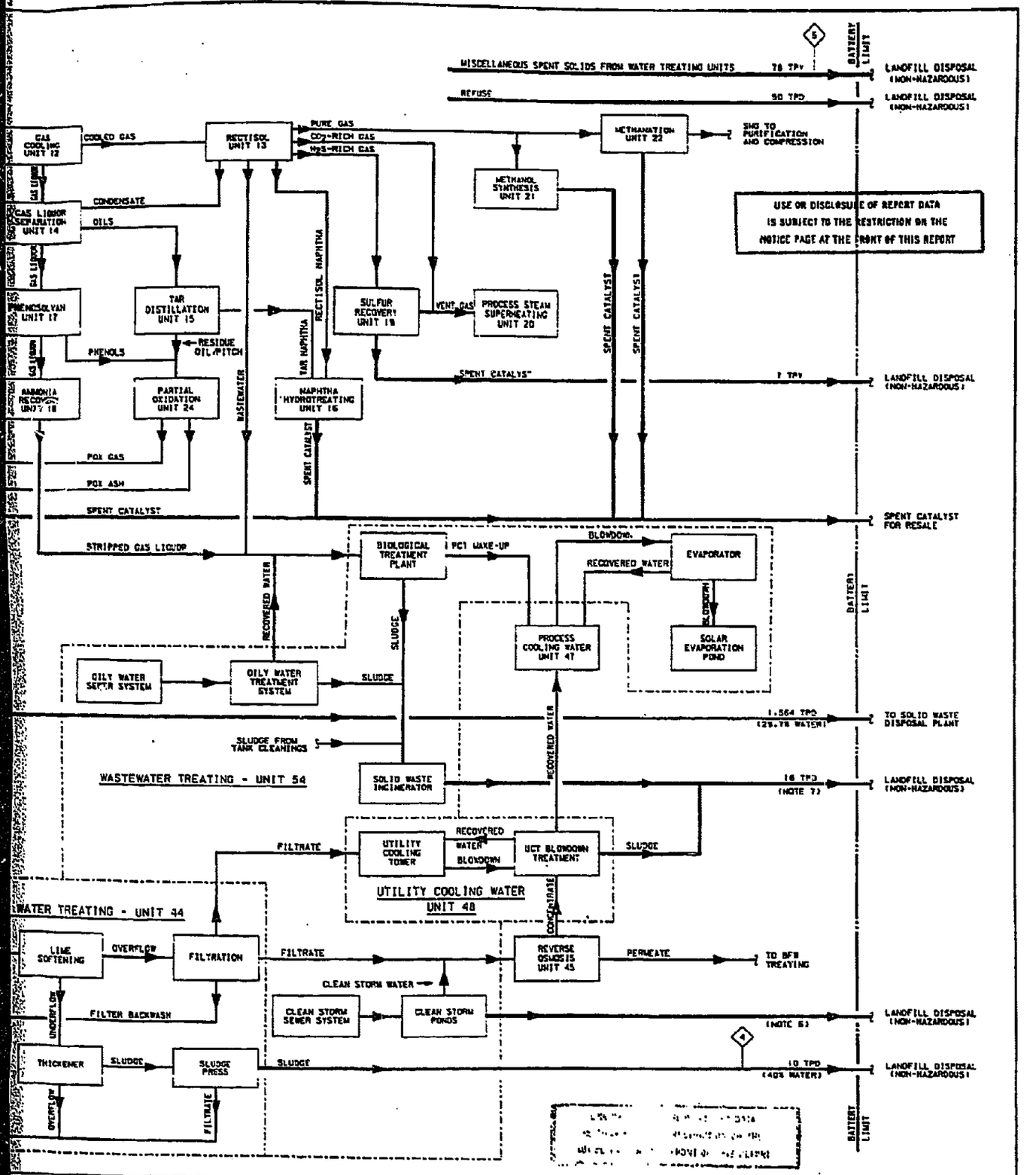


① COAL (NOTE 1)		② ASH (NOTES 2 - 4)		③ FGD GYPSUM (NOTE 5)		④ RAW WATER TREATMENT SLUDGE		⑤ WATER TREATING	
TRACE ELEMENTS	ppm	MINERAL ASH ANALYSIS	WT%		WT%		WT%		WT%
ANTIMONY	0.67	SiO_2	35.9	H_2O	23.0	$CaCO_3$	55.5	SPENT ACTIVATED CARBON	41.9
ARSENIC	1.77	Al_2O_3	19.2	$CaSO_4 \cdot 2H_2O$	75.0	$Mn(OH)_2$	0.9		
BARIUM	181.60	Fe_2O_3	7.5	$CaCl_2$	0.5	H_2O	40.0	SPENT ION EXCHANGE RESIN	58.1
BERYLLIUM	1.25	Na_2O	3.0	INERT SOLIDS	1.5	MISCELLANEOUS	3.6		
BORON	218.60	K_2O	0.18	$Co(OH)_2$	TRACE				
BROMINE	19.35	CaO	14.5	$Co(COOH)_2$	TRACE				
CADMIUM	1.80	MnO	2.4						
CERIUM	17.64	TiO_2	1.2						
CHROMIUM	6.36	P_2O_5	0.28						
COBALT	3.62	SO_3	14.1						
COPPER	21.42	INDETERMINATE	1.74						
FLUORINE	227.40								
LEAD	3.38								
LITHIUM	35.20								
MANGANESE	202.00								
MERCURY	0.08								
NICKEL	7.42								
SELENIUM	1.30								
SILVER	0.09								
STRONTIUM	197.02								
THALLIUM	0.23								
URANIUM	1.43								
VANADIUM	18.48								
ZINC	15.70								
ZIRCONIUM	126.00								

NOTES:

1. TRACE ELEMENT ANALYSIS FROM WESTMORELAND MINE ENVIRONMENTAL IMPACT STATEMENT.
2. MINERAL ASH ANALYSIS BASED ON LURGI DATA. WESTMORELAND MINE. GASIFIER ASH ALSO CONTAINS 4% CARBON.
3. AMOUNT OF GASIFIER ASH CALCULATED BASED ON 450 T/HR GASIFIER COAL CONSUMED.
4. AMOUNT OF BOILER ASH CALCULATED BASED ON 98.6 T/HR BOILER COAL CONSUMED.
5. TOTAL GYPSUM PRODUCED BASED ON FGD LICENSOR INFORMATION.
6. THE CLEAN STORM WATER PONDS ARE CLEANED AS NECESSARY. THE AMOUNT OF SOLIDS REMOVED FROM THESE PONDS IS INDETERMINATE.
7. THE COMPOSITIONS OF THE INCINERATOR WASTE AND UCT BLOWDOWN TREATMENT SLUDGE ARE NOT AVAILABLE.
8. THE FLOW QUANTITIES AND COMPOSITIONS SHOWN ARE TO BE USED SOLELY FOR PROCESS DESIGN PURPOSES AND ARE NOT NECESSARILY THE CONDITIONS WHICH WILL BE ATTAINED DURING ACTUAL OPERATIONS.





FLUOR

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R. McCARTHY
R. LANG

BLOCK FLOW DIAGRAM
SOLID EFFLUENT
CASE: WESTMORELAND COAL - POWER SELF-SUFFICIENCY
CROW TRIBE OF INDIANS
SYNFUELS FEASIBILITY STUDY

NONE | 835704-00-4-206 | 1

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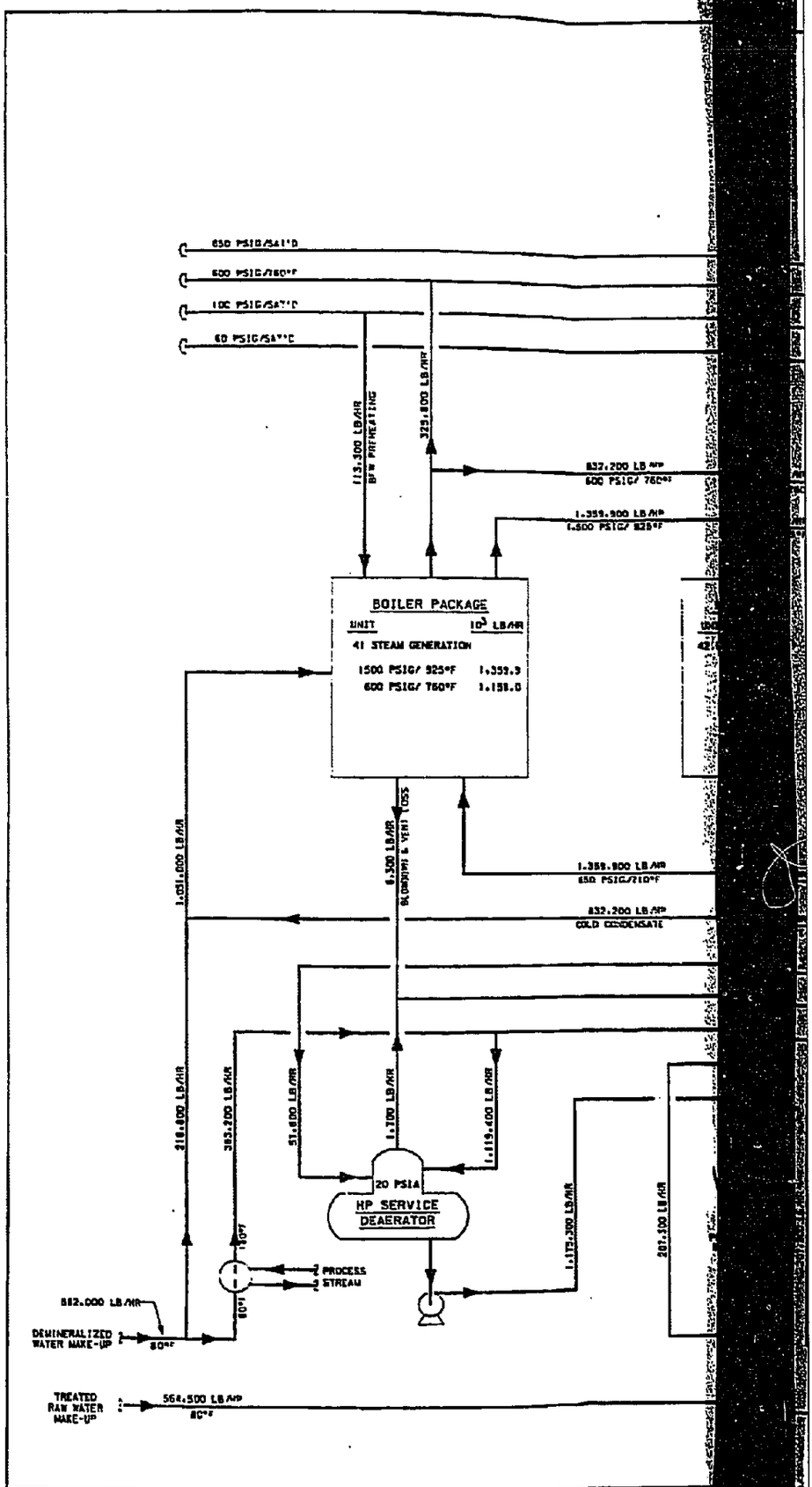
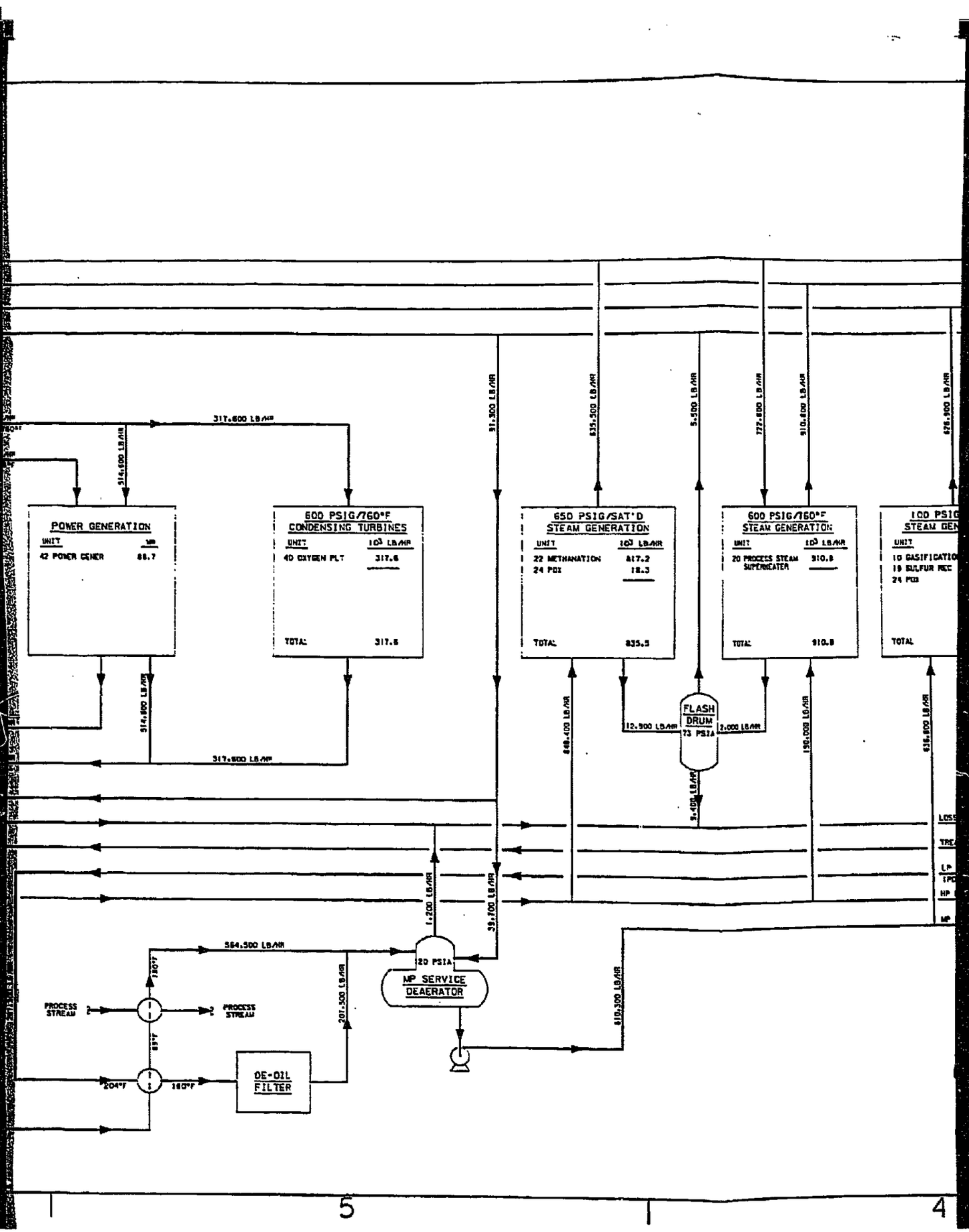
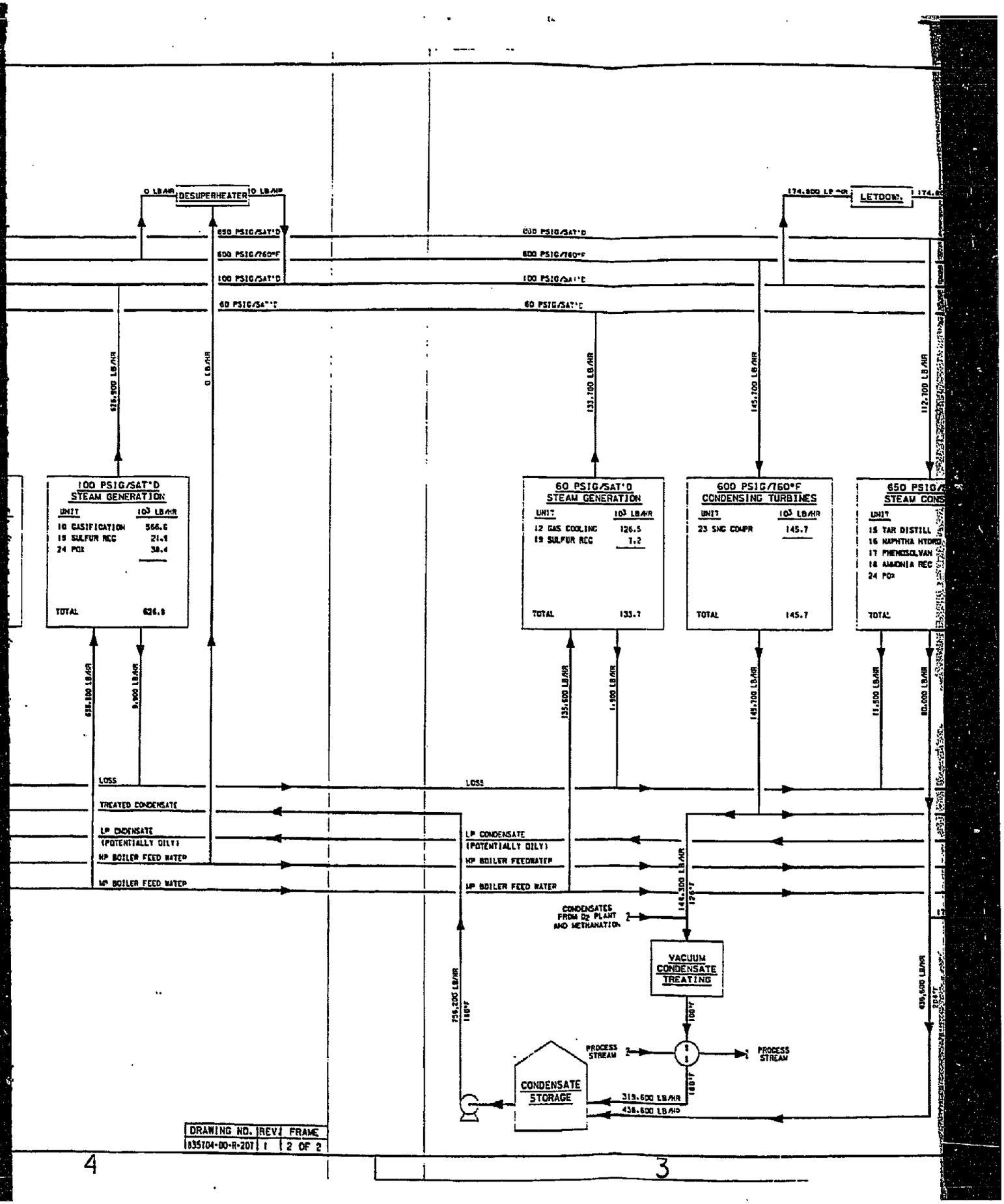
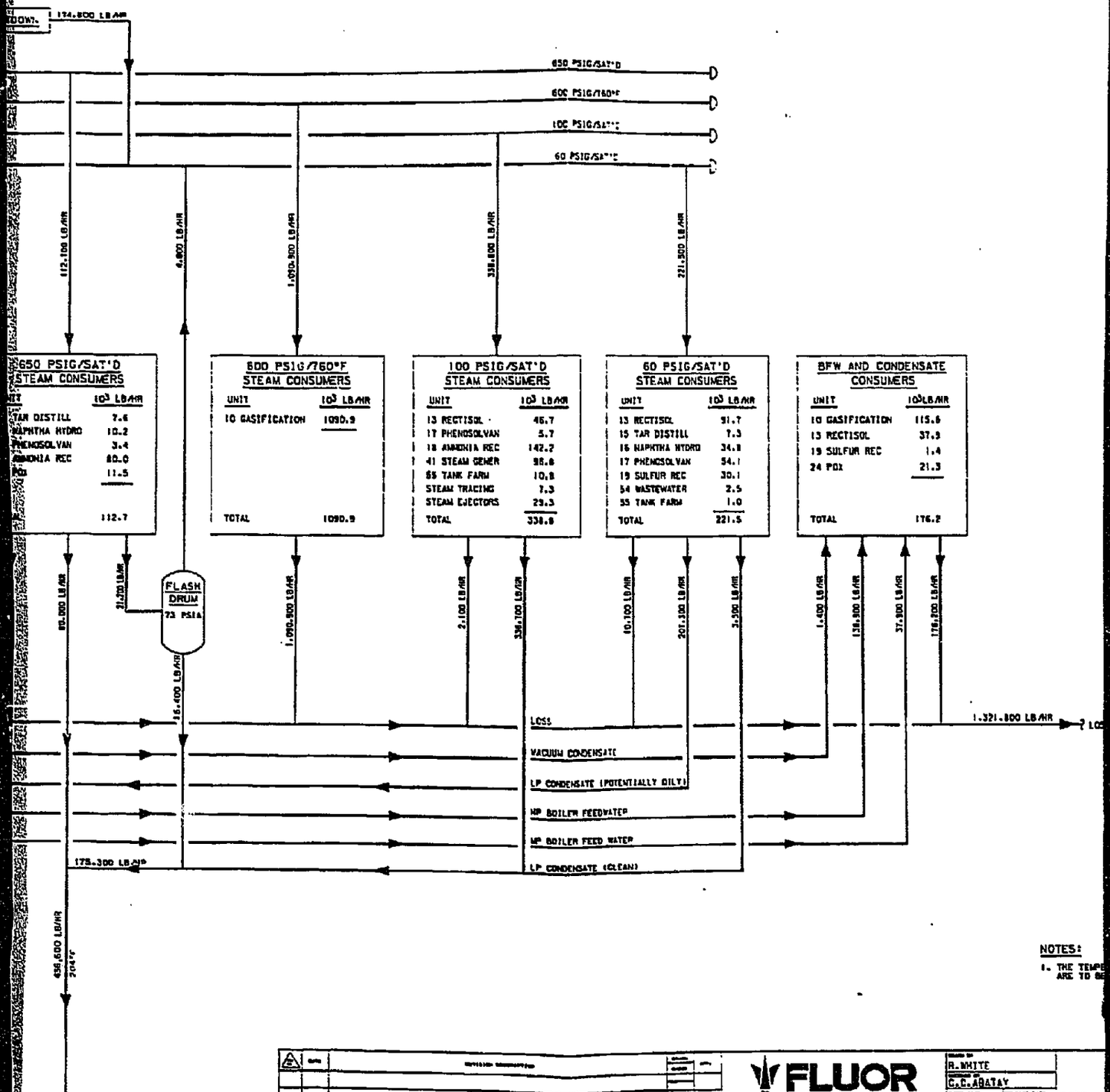

650 PSIG/SAT'D
600 PSIG/760°F
100 PSIG/SAT'D
60 PSIG/SAT'D
113,300 LB/HR
BFW PREHEATING
329,800 LB/HR
832,200 LB/HR
600 PSIG/ 760°F
1,359,900 LB/HR
1,500 PSIG/ 925°F
BOILER PACKAGE
UNIT
10³ LB/HR
41 STEAM GENERATION
1500 PSIG/ 925°F 1,359.9
600 PSIG/ 760°F 1,158.0
1,031,000 LB/HR
8,300 LB/HR
BLOWDOWN & VENT LOSS
1,359,900 LB/HR
650 PSIG/710°F
832,200 LB/HR
COLD CONDENSATE
218,800 LB/HR
383,200 LB/HR
51,800 LB/HR
1,700 LB/HR
1,119,400 LB/HR
20 PSIA
HP SERVICE
DEAERATOR
1,172,300 LB/HR
201,100 LB/HR
110°F
PROCESS
STREAM
882,000 LB/HR
DEMINERALIZED
WATER MAKE-UP
80°F
80°F
TREATED
RAW WATER
MAKE-UP
564,500 LB/HR
80°F


317,600 LB/HR
314,600 LB/HR
POWER GENERATION
UNIT
42 POWER GENER
MW
88.7
600 PSIG/760°F
CONDENSING TURBINES
UNIT
40 OXYGEN PLT
10³ LB/HR
317.6
TOTAL
317.6
314,600 LB/HR
317,600 LB/HR
91,300 LB/HR
835,500 LB/HR
5,500 LB/HR
772,800 LB/HR
910,800 LB/HR
826,900 LB/HR
650 PSIG/SAT'D
STEAM GENERATION
UNIT
22 METHANATION
24 PDI
10³ LB/HR
817.2
18.3
TOTAL
835.5
600 PSIG/760°F
STEAM GENERATION
UNIT
20 PROCESS STEAM SUPERHEATER
10³ LB/HR
910.8
TOTAL
910.8
100 PSIG
STEAM GEN
UNIT
10 GASIFICATIO
19 SULFUR REC
24 PDI
TOTAL
FLASH DRUM
73 PSIA
12,300 LB/HR
7,000 LB/HR
3,400 LB/HR
848,400 LB/HR
190,000 LB/HR
836,800 LB/HR
LOSS
TRE
LP
IPC
HP
MP
1,200 LB/HR
39,100 LB/HR
564,500 LB/HR
20 PSIA
MP SERVICE
DEAERATOR
810,300 LB/HR
207,500 LB/HR
PROCESS STREAM
PROCESS STREAM
280°F
204°F
180°F
DE-OIL FILTER

5 4


DESUPERHEATER
650 PSIG/SAT'D
600 PSIG/760°F
100 PSIG/SAT'D
60 PSIG/SAT'D
LETDOWN
626,900 LB/HR
0 LB/HR
133,700 LB/HR
145,700 LB/HR
112,700 LB/HR
100 PSIG/SAT'D STEAM GENERATION
UNIT
10³ LB/HR
10 GASIFICATION 566.6
19 SULFUR REC 21.9
24 PCU 38.4
TOTAL 626.8
60 PSIG/SAT'D STEAM GENERATION
UNIT
10³ LB/HR
12 GAS COOLING 126.5
19 SULFUR REC 7.2
TOTAL 133.7
600 PSIG/760°F CONDENSING TURBINES
UNIT
10³ LB/HR
23 SNG COMPR 145.7
TOTAL 145.7
650 PSIG/ STEAM CONS
UNIT
15 TAR DISTILL
16 NAPHTHA HYDRO
17 PHENOSOLVAN
18 AMMONIA REC
24 PCU
TOTAL
626,100 LB/HR
9,900 LB/HR
135,600 LB/HR
1,900 LB/HR
145,700 LB/HR
11,800 LB/HR
80,600 LB/HR
LOSS
LOSS
TREATED CONDENSATE
LP CONDENSATE (POTENTIALLY OILY)
HP BOILER FEED WATER
LP CONDENSATE (POTENTIALLY OILY)
HP BOILER FEEDWATER
HP BOILER FEED WATER
146,300 LB/HR
126°F
CONDENSATES FROM O2 PLANT AND METHANATION
VACUUM CONDENSATE TREATING
256,200 LB/HR
180°F
100°F
PROCESS STREAM
PROCESS STREAM
CONDENSATE STORAGE
180°F
319,600 LB/HR
438,600 LB/HR
DRAWING NO. 835704-00-R-207
REV. 1
FRAME 2 OF 2
4
3



NOTES:

1. THE TEMPE
ARE TO BE

FLUOR

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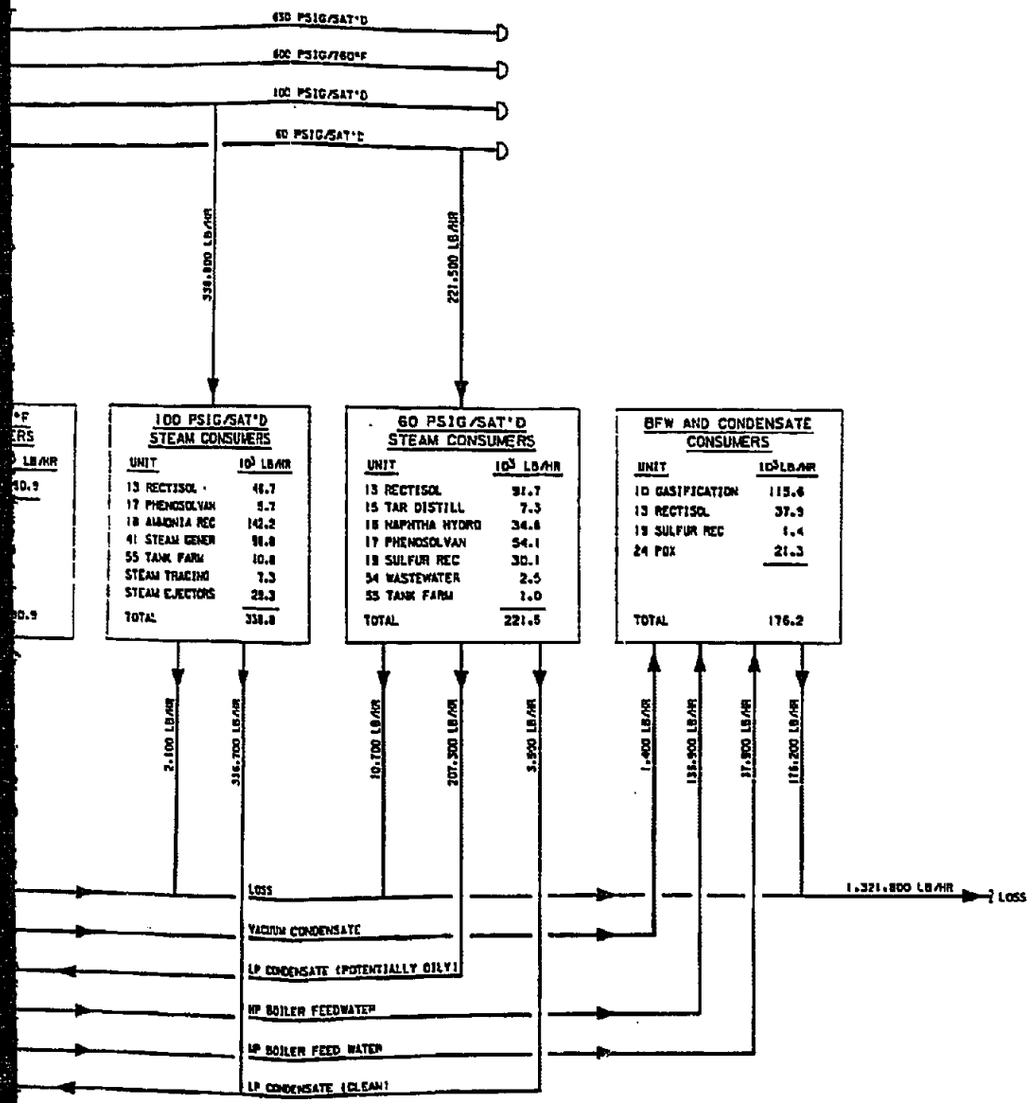
C. C. ABATAY
W. O'BELLIOTTO
R. McCARTHY
R. LANG

CASE:

NON



NOTES:

1. THE TEMPERATURES, PRESSURES, FLOW QUANTITIES SHOWN ARE TO BE USED SOLELY FOR PROCESS DESIGN PURPOSES.

USE OR DISCLOSURE OF REPORT DATA IS SUBJECT TO THE RESTRICTION ON THE NOTICE PAGE AT THE FRONT OF THIS REPORT

FLUOR

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W.O'BELL
R. McCART, JR.
R. LANG

BLOCK FLOW DIAGRAM
PLANT STEAM BALANCE
CASE: WESTMORELAND COAL - POWER SELF-SUFFICIENCY
CROW TRIBE OF INDIANS
SYNFUELS FEASIBILITY STUDY

NONE

835704-00-R-207
MICROFILM FRAME NO. 1 OF 2

1

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6.4.9 UTILITY SUMMARY

Table 6.4.9-1 indicates the utilities generated or consumed by each process or utility unit in the Westmoreland Coal-Power Self-sufficiency Case.

CASE: Westm

Unit		STEAM (M lb/hr)			
		1500 lb	650 lb	600 lb	100 lb
NO.	NAME	925°F	Sat'd	760°F	Sat'd
01	Coal Screening				
02	Coal Distribution				
03	Ash Handling				
10	Coal Gasification			-1090.9	+566.
11	CO Shift				
12	Gas Cooling				
13	Rectisol				-46.
14	Gas Liquor Separation				
15	Tar Distillation		-7.6		
16	Naphtha Hydrotreating		-10.2		
17	Phenosolvan		-3.4		-5.
18	Ammonia Recovery		-80.0		-142.
19	Sulfur Recovery				+21.
20	Process Steam Superheating		-722.8	+910.8	
21	Methanol Synthesis		(+2.8)		
22	Methanation		+817.2		
23	SNG Compression and Purification			-145.7	-4.
24	Partial Oxidation		+6.8		+38.
25	PSA Hydrogen Production				
40	Oxygen Production			-317.6	-9.
41	Steam Generation	+1359.9	-1359.9(1)	+1158.0	-384.
42	Power Generation	-1359.9	+1359.9(1)	-514.6	-15.
43	Flue Gas Desulfurization				
44	Raw Water Treating				
45	BFW and Condensate Treating				

TABLE 6.4.9-1

UTILITY SUMMARY

3: Westmoreland Coal - Power Self-sufficiency

/hr)				Steam and			Electric	
100 lb Sat'd	60 lb Sat'd	Condensate (M lb/hr)	BFW (M lb/hr)	Condensate (M lb/hr)	Cooling Water (MM Btu/hr)	(gpm)	Power (MW)	Fuel Gas (MM Btu/hr)
							-0.7	
							-0.07	
							-0.70	
9 +566.6			-690.7	1215.0	-8.27	-551	-2.40	-0.7
	+126.5		-128.4	1.9	-9.14	-609	-0.35	
-46.7	-91.7	+138.4	-37.9	37.9	-204.40	-13613	-22.90	+329.7
					-83.30	-5548	-0.69	
	-7.3	+14.9			-3.60	-240	-0.19	-12.2
	-34.8	+45.0			-3.10	-206	-0.19	(-1.4)
-5.7	-54.1	+54.4		8.8	-11.7	-779	-0.67	
-142.2		+222.2			-122.6	-8165	-0.48	
+21.9	-22.9	+26.8	-29.3	3.5	-43.4	-2900	-3.00	-11.6
			-190.0	2.0			-2.08	-340.1
			(-2.9)	(0.1)	-1.2	-80	-0.07	+9.1
			-829.5	12.3	-4.4	-293	-4.50	(-43.0)
-4.4		+150.1			-153.2	-10200	0.25	
+38.4			-79.8	34.6	-6.98	-465	-0.17	-0.1
					-0.37	-25	-0.60	+30.4
-9.5		+327.1			-456.3	-30400	-11.30	
-384.9	+180.3	+96.8	-1051.0	0.8			-12.2	
-15.4		+530.0			-477.0	-31800	+88.57	
							-1.70	
							-0.70	
	-92.5	-2947.0	+3036.6	2.9			-6.00	

T

CASE: Westm

Unit		STEAM (M lb/hr)			
NO.	NAME	1500 lb 925°F	650 lb Sat'd	600 lb 760°F	100 lb Sat'd
46	Air and Nitrogen Systems				
47	Process Cooling Water				
48	Utility Cooling Water				
49	Potable Water				
50	Utility Water				
51	Fire Water				
52	Fuel Gas				
53	Flare				
54	Water Treating				
55	Tank Farm and Dispatch				10.
56	Sanitary Sewer(2)				
	Steam Tracing Export				-7.
Total (Process Units)		0	0	-325.8	+427.
Total (Utility Units)		0	0	+325.8	-427.
TOTAL		0	0	0	0

Legend: ( ) indicate intermittent use. Not included in totals.
+ indicates production
- indicates consumption

Note: (1) 650 psig/710°F steam
(2) Include in Wastewater Treating (Unit 54)

TABLE 6.4.9-1 (Continued)

UTILITY SUMMARY

E: Westmoreland Coal - Power Self-sufficiency

b/hr) 100 lb Sat'd	60 lb Sat'd	Condensate (M lb/hr)	BFW (M lb/hr)	Steam and Condensate (M lb/hr)	Cooling Water (MM Btu/hr)	Cooling Water (gpm)	Electric Power (MW)	Fuel Gas (MM Btu/hr)
					-6.5	-433	-3.40	
					+1441.0	+95974	-6.30	
					+156.3	+10407	-0.70	
							-.03	
							-.03	
							-.02	
							-	
							-.03	-2.0
	-2.5	+2.5					-5.60	-2.5
10.8	-1.0	+9.7		2.1	-1.1	-74	0.55	
-7.3		+7.3						
							0	
+427.9	-84.3	+651.8	-1985.6	1316.0	-656.0	-43674	-40.01	+4.5
-427.9	+84.3	-1973.6	+1985.6	5.8	+656.0	43674	+40.01	-4.5
0	0	-1321.8	0	+1321.8	0	0	0	0(1)

totals.

6.4.10 CATALYST AND CHEMICALS SUMMARY

The catalysts and chemicals required for each unit in the Westmoreland Coal-Power Self-sufficiency Case are shown in Table 6.4.10-1. Initial and annual costs are provided.

TABLE 6.4.10-1

CATALYST AND CHEMICAL SUMMARY

CASE: Westmoreland Coal - Power Self-sufficiency

Unit	Item	Initial Cost, $	Annual Cost, $
03	Ash Handling		
	Flocculent	150	1,760
11	CO Shift Conversion		
	Sour Shift Catalyst	1,378,700	1,378,700
13	Rectisol		
	Propylene	36,600	51,600
	Caustic	-	89,400
16	Naphtha Hydrotreating		
	Dimethyl Sulfide	1,400	560
	Confidential Catalyst	58,400	19,500
17	Phenosolvan		
	Isopropylether Solvent	174,600	60,600
	Gravel	1,440	180
	Sand	3,200	400
	Filtrilur	70,300	8,790
18	Ammonia Recovery		
	Phosphoric Acid (100%)	155,500	74,500
	Sodium Hydroxide (50% sol'n)	480,200	160,100

TABLE 6.4.10-1 (Continued)

CATALYST AND CHEMICAL SUMMARY

CASE: Westmoreland Coal - Power Self-sufficiency

Unit	Item	Initial Cost, $	Annual Cost, $
19	Sulfur Recovery		
	Diisopropanolamine	5,130	2,530
	Claus Catalyst	18,800	6,290
	Shell 634 Catalyst	47,700	15,900
	Citric Acid	6,110	13,100
	ADA	61,300	130,900
	Caustic (50%)	5,800	(58,000)( )
	Vanadium	48,300	-
21	Methanol Synthesis		
	Synthesis Catalyst	411,800	137,300
22	Methanation		
	Synthesis Catalyst	2,500,000	2,500,000
41	Steam Generation		
	Hydrazine Hydrate	290	3,160
	Sodium Phosphate	30	280
	Morpholine	2,470	27,300
43	Flue Gas Desulfurization		
	Lime (90% CaO)	7,100	321,400
	Formic Acid (90% soln.)	10,200	94,700
	Anti-Foulant (Nalco 7319)	100	980
	HCl (30% soln.)	1,790	-

TABLE 6.4.10-1 (Continued)

CATALYST AND CHEMICAL SUMMARY

CASE: Westmoreland Coal - Power Self-sufficiency

Unit	Item	Initial Cost, $	Annual Cost, $
44,45 & 49	Raw Water, BFW Treating and Portable Water		
	Poly-electrolyte	2,120	25,300
	Chlorine	3,770	45,500
	Quick Lime	1,760	4,230
	Soda Ash (Dense Bulk)	15,500	579,600
	Alum	1,690	4,720
	Hexametaphosphate	7,650	88,000
	Sulfuric Acid (93%)	20,000	87,000
	Caustic (50% soln.)	110,200	440,800
	Activated Carbon	57,000	28,500
	Hydrazine Hydrate	410	4,530
	Morpholine	3,400	37,600
	Chelant (EDTA)	780	8,660
46	Air and Nitrogen System		
	Activated Alumina	1,150	320
47	Process Cooling Water		
	Cholorine	3,190	37,700
	Sulfuric Acid (93%)	630	199,900
	Inhibitor	7,810	93,700
	Dispersant	2,130	25,500
	Biocide	8,740	42,200
	Nalprep	56,600	150
	Activated Carbon	33,000	16,500
	Hexametaphosphate	2,300	24,500

TABLE 6.4.10-1 (Continued)

CATALYST AND CHEMICAL SUMMARY

CASE: Westmoreland Coal - Power Self-sufficiency

Unit	Item	Initial Cost, $	Annual Cost, $
48	Utility Cooling Water		
	Chlorine	580	7,540
	Sulfuric Acid (93%)	2,800	33,700
	Inhibitor	1,080	12,900
	Dispersant	300	400
	Biocide	860	4,460
	Nalprep	5,900	20
	Poly-electrolyte	240	2,890
	Quick Lime	200	490
	Soda Ash (Dense Bulk)	1,720	66,200
54	Wastewater Treating		
	Caustic (50%)	153,700	3,451,000
	Sulfuric Acid (93%)	4,910	119,200
	Poly-electrolyte	210	25,200
	Phosphoric Acid (100%)	2,650	40,900
55	Tank Farm and Dispatch		
	SNG Odorant (Ethyl/Amyl Mercaptan)	140	1,690
	NaCl	1,200	320,000
TOTAL		$6,004,720	$10,981,430

NOTE:
(1) First year only, not included in total

6.4.11 OPERATING MANPOWER

The operating manpower for the Power Self-sufficiency Case was determined in the same way as the Base Case manpower.

The total operating staff is 392. There are 54 shift operating positions for the Power Self-sufficiency Case versus 58 for the Base Case.

6.4.12 MAINTENANCE MANPOWER

Annual maintenance cost is estimated as a percentage of the plant installed cost. The same procurement for determining maintenance cost as used on the Base Case (Section 6.1.12) was followed for the Power Self-sufficiency Case yielding a cost of $30,900,000, which is 60 percent materials and 40 percent labor.

The labor portion of $12,400,000 is equivalent to 353 maintenance staff positions using the same assumptions as the Base Case.

6.4.13 PROCESS UNITS ENGINEERING DATA

All aspects of the process units including material balance for the Power Self-sufficiency Case are identical to the Base Case except for Units 01, 02, and 03. Coal fines feed to boilers is significantly less than the Base Case due to reduced power generation. This reduces the coal throughput in the Coal Screening and Distribution units (01 and 02). As the coal input to gasifiers remains the same as Base Case, the percentage fines in coal feed changes from 40 percent in Base Case to 18 percent in this case. In the Ash Handling Unit (03), the quantity of boiler ash and FGD sludge are less than the Base Case due to smaller boiler capacity. Gasifier ash remains unaltered from the Base Case. The material balances for the Units 01, 02, and 03 are provided following this description. The process flow diagram, design criteria, and other aspects of the three units are similar to the Base Case and are included in Sections 6.2.1 through 6.2.3.

TABLE 6.4.13-1
MATERIAL BALANCE
COAL SCREENING - UNIT 01

Stream Number	1-1	1-2	1-3
Stream Name	Total Coal Feed	Sized Coal to Gasification	Coal Fines to Boilers
DAF Coal, lb/hr	730,713	599,400	131,313
Moisture, lb/hr	285,264	234,000	51,264
Ash, lb/hr	81,190	66,600	14,590
Total, lb/hr	1,097,167	900,000	197,167
ST/SD	13,166	10,800	2,366

NOTE: Flow quantities shown are for the total unit on a stream-day basis, are to be used solely for process design purposes, and are not necessarily the conditions which will be attained during actual operations.

TABLE 6.4.13-2
MATERIAL BALANCE
COAL DISTRIBUTION - UNIT 02

Stream Number	2-1	2-2
Stream Name	Sized Coal to Gasification	Coal Fines to Boilers
DAF Coal, lb/hr	599,400	131,313
Moisture, lb/hr	234,000	51,264
Ash, lb/hr	66,600	14,590
Total, lb/hr	900,000	197,167
ST/SD	10,800	2,366

NOTE: Flow quantities shown are for the total unit on a stream-day basis, are to be used solely for process design purposes, and are not necessarily the conditions which will be attained during actual operations.

TABLE 6.4.13-3

MATERIAL BALANCE

ASH HANDLING - UNIT 03

Stream Number	3-1	3-2	3-3	3-4	3-5	3-6	3-7
Stream Name	Gasifier Ash(2)	POX Ash(2)	Boiler Bottom Ash(2)	Boiler Fly Ash(2)	Makeup Water	FGD Sludge	Solid Waste to Disposal
Dry Solids, lb/hr	68,931	18	2,908	11,635	-	8,160	91,652
Water, lb/hr					36,220	2,438	38,658
Sludge, lb/hr					-	10,598	130,310
ST/SD					-	127.2	1,563.7
Wt/Solids					-0-	77.0	70.3

NOTES: (1) Flow quantities shown are for the total unit on a stream-day basis, are to be used solely for process design purposes, and are not necessarily the conditions which will be attained during actual operations.

(2) Only dry solids flows are shown.

6.4.14 UTILITY AND OFFSITES UNITS

6.4.14.1 GENERAL

The SNG production from the Power Self-sufficiency Case process plant does not change from the Base Case. The Power Generation unit, however, produces only the power required by the plant and no power for export. The decrease in plant power output is from 405 MW in the Base Case to 84.5 MW in the Power Self-sufficiency Case.

The reduction in power generation changes the following utilities and offsites units:

Unit 40	Oxygen Production
Unit 41	Steam Generation
Unit 42	Power Generation
Unit 43	Flue Gas Desulfurization
Unit 44	Raw Water Treatment
Unit 45	Boiler Feed Water and Condensate Treatment
Unit 47	Process Cooling Water
Unit 48	Utility Cooling Water
Unit 54	Waste Water Treatment

The remaining utilities and offsites units are the same as the Base Case.

6.4.14.2 OXYGEN PRODUCITON - UNIT 40

In the Power Self-sufficiency Case the air compressors within Unit 40 are driven by 600 psig, 760°F condensing steam turbines rather than 1500 psig, 1925°F to 650 psig back-pressure turbines as in the Base Case. The change increases the steam and cooling water requirement to Unit 40. The material balance of the unit is the same as the Base Case.

6.4.14.3 STEAM GENERATION - UNIT 41

Reduction of the power output proportionally reduces the steam requirements of Unit 42 and changes the number of boiler trains in Unit 41, Steam Generation, from three producing 4.1 million lb/hr of steam in the Base Case to two producing 1.4 million lb/hr in the Power Self-sufficiency Case. The steam balance for this alternate case is included as Drawing No. 835704-00-R-201 in Section 6.4.8. The material balance of Unit 41 for the Power Self-sufficiency Case follows as Table 6.4.14-1.

6.4.14.4 POWER GENERATION - UNIT 42

This unit decreases from three to two trains for the Power Self-sufficiency Case just as Unit 41. The material balance follows at Table 6.4.14-2.

6.4.14.5 FLUE GAS DESULFURIZATION - UNIT 43

This unit decreases in size and number of trains exactly as the Steam Generation boilers. The material balance for Unit 43 follows as Table 6.4.14-3.

6.4.14.6 RAW WATER TREATMENT - UNIT 44

The raw water flowing to the plant from the Bighorn River decreases from 6813 gpm in the Base Case to 2953 gpm in the Power Self-sufficiency Case because of reduced 1500 psig boiler feed water and reduced cooling water requirements. The material balance for Unit 44 for this alternate case follows as Table 6.4.14-4.

6.4.14.7 BOILER FEED WATER AND CONDENSATE TREATMENT - UNIT 45

Boiler feed water makeup to the 1500 psig boilers decreases from 6213 gpm in the Base Case to 2102 gpm in the Power Self-sufficiency Case, while the 600 psig and 100 psig boilers are process dependent and do not change in

6.4.14.7 (Continued)

BFW requirement for this case. Similarily, the cold condensate is reduced from 5821 gpm to 1664 gpm with the elimination of export power while the other plant condensate streams remain essentially the same. The material balance from Unit 45 for this alternate case follows as Table 6.4.14-5.

6.4.14.8 PROCESS COOLING WATER - UNIT 47

The Process Cooling Tower (P.C.T.) evaporation rate is critical to the plant water balance in that the equivalent of the flow of process waste water into the water balance must be eliminated here. To accomplish this without the heat load of the export power surface condensers in Unit 42, only the oxygen coolers are left on the Utility Cooling Tower (U.C.T.), and all other cooling load is shifted to the Process Cooling Towers. Even with these changes the cooling water flow in Unit 47 falls from 152,000 gpm in the Base Case to 85,200 gpm in the Power Self-sufficiency Case. As a result of the evaporative loss reduction, some of the Waste Treatment Evaporator condensate must be sent to the Utility Cooling Tower. The material balance for Unit 47 for the Plant Self-sufficiency Case follows as Table 6.4.14-6.

6.4.14.9 UTILITY COOLING TOWER - UNIT 48

For the Power Self-sufficiency Case the U.C.T. provides cooling water for the oxygen coolers only. This reduces its circulation load from 64,900 gpm in the Base Case to 10,400 gpm in this alternate case. The material balance for Unit 48 follows as Table 6.4.14-7.

6.4.14.10 WASTE WATER TREATMENT - UNIT 54

Waste water from the Process Units remains constant for the Power Self-sufficiency Case while utilities waste water from boiler and cooling tower

6.4.14.10 (Continued)

blowdown decrease. The biological treatment section of Waste Water Treatment Unit 54 only drops from 2536 gpm influent in the Base Case to 2518 gpm in the Power Self-sufficiency Case, too small a difference to match the drop in P.C.T. evaporation. Ten percent of the water purified in the waste treatment evaporator is sent to the Utility Cooling Tower as makeup. Also, the Flue Gas Desulfurization makeup water is taken from the treated waste water steam. In mid-winter, when evaporation is the lowest, 1131 gpm of waste water flows into the excess water holding pond to be recycled to the system in the summer. The material balance from Unit 54 for the Power Self-sufficiency Case follows as Table 6.4.14-8.

TABLE 6.4.14-1

MATERIAL BALANCE
STEAM GENERATION - UNIT 41

Stream Number		41-1	41-2	41-3
Stream Name		Coal Fines	Demineralized Water	Cold Condensate
Component		lb mol/hr Mol %	lb mol/hr Mol %	lb mol/hr Mol %
Total Dry Gas				
H_2O				
Total Wet Gas				
H_2O	lb/hr		218,800	832,200
Steam	lb/hr			
Coal	lb/hr	197,160		
Total	lb/hr	197,160	218,800	832,200
Pressure, psia			88	88
Temperature, °F			80	80

NOTE: Flow quantities, pressures, and temperatures shown are for the total unit on a stream-d design purposes, and are not necessarily the conditions which will be attained during actu

TABLE 6.4.14-1

MATERIAL BALANCE
STEAM GENERATION - UNIT 41

41-2		41-3		41-4		41-5	
Demineralized Water		Cold Condensate		HP Exhaust Steam		Reheat Steam	
lb mol/hr	Mol %	lb mol/hr	Mol %	lb mol/hr	Mol %	lb mol/hr	Mol %
218,800		832,200		1,359,900		1,158,000	
218,800		832,200		1,359,900		1,158,000	
88		88		663		613	
80		80		710		760	

ures shown are for the total unit on a stream-day basis, are to be used solely for process the conditions which will be attained during actual operations.

TABLE 6.4.14-1 (Continued)

MATERIAL BALANCE
STEAM GENERATION - UNIT 41

Stream Number	41-6		41-7		4
Stream Name	HHP Steam		Boiler Flue Gas		Proces Super
Component	lb mol/hr	Mol %	lb mol/hr	Mol %	lb mol/
N_2			44,518	80.14	11,169
O_2			2,653	4.78	642
CO			4	0.01	Trace
CO_2			8,307	14.95	21,602
SO_2			50	0.09	3
HCl			1	-	
NO_2			18	0.03	5
Total Dry Gas			55,551	100.0	33,421
H_2O			6,592		3,327
Total Wet Gas			62,143		36,748
Dry Gas lb/hr			1,701,777		1,284,596
H_2O lb/hr			118,760		59,934
Steam lb/hr			1,359,900		
Particulates lb/hr			47		
Total lb/hr	1,359,900		1,820,584		1,344,530
Pressure, psia	1,513		13.3		13
Temperature, °F	930		300		400

TABLE 6.4.14-1 (Continued)

MATERIAL BALANCE
STEAM GENERATION - UNIT 41

41-7		41-8		41-8	
Boiler Flue Gas		Process Steam Superheating		Flue Gas To Stack	
lb mol/hr	Mol %	lb mol/hr	Mol %	lb mol/hr	Mol %
44,518	80.14	11,169	33.42	56,091	62.72
2,653	4.78	642	1.92	3,403	3.80
4	0.01	Trace	-	4	-
8,307	14.95	21,602	64.64	29,909	33.44
50	0.09	3	-	8	0.01
1	-				
18	0.03	5	0.02	23	0.03
55,551	100.0	33,421	100.0	89,438	100.0
6,592		3,327		14,161	
62,143		36,748		103,599	
1,701,777		1,284,596		2,997,557	
118,760		59,934		254,946	
1,359,900					
47				47	
1,820,584		1,344,530		3,252,550	
13.3		13.5		13.1	
300		400		235	

TABLE 6.4.14-2

MATERIAL BALANCE
POWER GENERATION - UNIT 42

Stream Number		42-1	42-2	42-3	42-4
Stream Name		Reheat Steam	HHP Steam	HP Exhaust Steam	Condensate From LP Heaters
H_2O	lb/hr				
Steam	lb/hr	514,60	1,359,900	1,359,900	
MW					
TOTAL	lb/hr	514,600	1,359,900	1,359,900	
Pressure, psia		563	1463	663	
Temperature, °F		756	925	710	

NOTES: (1) Flow quantities, pressures and temperatures shown are for the total unit on a str process design purposes, and are not necessarily the conditions which will be attained

(2) LP Condensate heaters within the Steam Generation Unit 41 utilize 100 psig/sat'd ste from the condensing section of the turbogenerators. The condensate from the LP h Treating Unit 45.

TABLE 6.4.14-2

MATERIAL BALANCE
POWER GENERATION - UNIT 42

42-2	42-3	42-4	42-5	42-10
HHP Steam	HP Exhaust Steam	Condensate From LP Heaters	Cold Condensate	Power Output
,359,900	1,359,900		514,600	88.7
,359,900	1,359,900		514,600	
1463	663		110	
925	710		125	

mperatures shown are for the total unit on a stream-day basis, are to be used solely for not necessarily the conditions which will be attained during actual operations.

Steam Generation Unit 41 utilize 100 psig/sat'd steam for heating instead of extraction steam e turbogenerators. The condensate from the LP heaters is routed to the BFW & Condensate

TABLE 6.4.14-3

MATERIAL BALANCE

FLUE GAS DESULFURIZATION - UNIT 43

Stream Number		43-1		43-2	43-3
Stream		Flue Gas From Unit 41		Lime	Raw Water Makeup
Component		lb mol/hr	mol %	lb mol/hr	
N_2		44,518	80.14		
O_2		2,653	4.78		
CO_2		8,307	14.95		
CO		4	0.01		
NO_2		18	0.03		
HCl		1	0.002		
SO_2		50	0.09		
Total Dry Gas		55,551	100.00		
H_2O		6,592			
Total Wet Gas		62,143			
Dry Gas,	lb/hr	1,701,777			
H_2O,	lb/hr	118,760			80,180
Lime,	lb/hr			2,889	
Dry Gypsum,	lb/hr	47			
Particulates,	lb/hr				
Total,	lb/hr	1,820,584		2,889	80,180
Pressure, psia		13.3			
Temperature, °F		300			

NOTE: Flow quantities, pressures and temperatures shown are for the total unit on a stream-day design purposes, and are not necessarily the conditions which will be attained during actu

TABLE 6.4.14-3

MATERIAL BALANCE

FLUE GAS DESULFURIZATION - UNIT 43

43-2	43-3	43-4		43-5
Lime	Raw Water Makeup	Flue Gas to Unit 41		Gypsum to Unit 03
lb mol/hr		lb mol/hr	mol %	
		44,922	80.19	
		2,761	4.93	
		8,307	14.83	
		4	0.01	
		18	0.03	
		5	0.01	
		56,017	100.00	
		10,834		
		66,851		
		1,712,961		
	80,180	195,012		2,438
2,889				
		47		8,160
2,889	80,180	1,908,020		10,598
		13.1		
		128		

tures shown are for the total unit on a stream-day basis, are to be used solely for process
ly the conditions which will be attained during actual operations.

TABLE 6.4.14-4

MATERIAL BALANCE

RAW WATER TREATMENT - UNIT 44

Stream Number		44-1	44-2	44-3	44-4
Stream Name		Raw Water Makeup	To Potable Water Treatment	To FGD Unit 43	RO Reject From Unit 43
Water	lb/hr (gpm)	1,476,500 (2953)	27,000 (54)	80,180 (160)	1000 (2)
Total	lb/hr	1,476,500	27,000	80,180	1000
Pressure, psia		13.7	63.7	88.7	300
Temperature, °F		60	60	60	80

NOTE: Flow quantitities, pressures and temperatures shown are for the total unit on a stream-da design purposes, and are not necessarily the conditions which will be attained during actua

TABLE 6.4.14-4

MATERIAL BALANCE

RAW WATER TREATMENT - UNIT 44

44-2	44-3	44-4	44-5	44-6
To Potable Water Treatment	To FGD Unit 43	RO Reject From Unit 43	To U.C.T Makeup	To BFW Treatment Unit 45
27,000 (54)	80,180 (160)	1000 (2)	80,500 (161)	1,367,500 (2735)
27,000	80,180	1000	80,500	1,367,500
63.7 60	88.7 60	300 80	43.7 80	33.7 80

atures shown are for the total unit on a stream-day basis, are to be used solely for process
y the conditions which will be attained during actual operations.

TABLE 6.4.14-5

MATERIAL BALANCE

BFW AND CONDENSATE TREATING-UNIT 45

Stream Number		45-1	45-2	45-3
Stream Name		BFW Feed From Unit 44	Demin. to Water Distribution	Cold Condensate for Polishing
Water	lb/hr (gpm)	1,367,500 (2735)	600,500 (1201)	832,000 (1664)
Total	lb/hr	1,367,500	600,500	832,000
Pressure, psia		33.7	88.7	40
Temperature, °F		80	100	285

NOTE: Flow quantities, pressures and temperatures shown are for the total unit on a stream-day design purposes, and are not necessarily the conditions which will be attained during actual

TABLE 6.4.14-5

MATERIAL BALANCE

FW AND CONDENSATE TREATING-UNIT 45

45-2	45-3	45-4	45-5
Demin. to Water Distribution	Cold Condensate for Polishing	Polished Cold Condensate	Vacuum Condensate From Unit 23
600,500 (1201)	832,000 (1664)	832,000 (1664)	144,000 (288)
600,500	832,000	832,000	144,000
88.7 100	40 285	88.7 285	40 285

ures shown are for the total unit on a stream-day basis, are to be used solely for process the conditions which will be attained during actual operation.

TABLE 6.4.14-5 (Continued)

MATERIAL BALANCE

BFW AND CONDENSATE TREATING-UNIT 45

Stream Number		45-6	45-7	45-8
Stream Name		Process Condensate From Unit 22 & Unit 40	Softened Vacuum & Process Condensate	High TDS to Ash Handling
Water	lb/hr (gpm)	175,000 (350)	319,000 (638)	36,000 (72)
Total	lb/hr	175,000	319,000	36,000
Pressure, psia		88.7	78.7	63.7
Temperature, °F		100	100	100

TABLE 6.4.14-5 (Continued)

MATERIAL BALANCE

FW AND CONDENSATE TREATING-UNIT 45

45-7	45-8	45-9	45-10
Softened Vacuum & Process Condensate	High TDS to Ash Handling	Low TDS to UCT Makeup	Softened BFW to LP Deaerator
319,000 (638)	36,000 (72)	10,000 (20)	564,500 (1129)
319,000	36,000	10,000	564,500
78.7 100	63.7 100	63.7 100	88.7 100

M

PROCESS

Stream Number		47-1	
Stream Name		P.C.T to Side Stream Filter	P Bl
Water	lb/hr (gpm)	2,130,000 (4260)	
Total	lb/hr	2,130,000	
Pressure, psia		13.7	
Temperature, °F		110	

NOTE: Flow quantities, pressures and temperatures shown design purposes, and are not necessarily the condit

TABLE 6.4.14-6

MATERIAL BALANCE

PROCESS COOLING WATER-UNIT 47

47-2	47-3	47-4	47-5
P.C.T. Blowdown	Side Stream Filtration to P.C.T	High TDS Effluent to Evaporation	Treated Waste To P.C.T Makeup
8,000 (16)	2,051,500 (4103)	79,000 (158)	1,176,500 (2353)
8,000	2,051,500	79,000	1,176,500
13.7 110	13.7 80	63.7 100	63.7 65

res shown are for the total unit on a stream-day basis, are to be used solely for process the conditions which will be attained during actual operation.

TABLE 6.4.14-6 (Continued)

MATERIAL BALANCE

PROCESS COOLING WATER-UNIT 47

Stream Number		47-6	47-7	47-8
Stream Name		From U.C.T Blowdown Treatment	From Evaporator	From P.C.T Makeup Water Treatment
Water	lb/hr (gpm)	183,500 (367)	313,000 (626)	878,000 (1756)
Total	lb/hr	183,500	313,000	878,000
Pressure, psia		43.7	13.7	13.7
Temperature, °F		80	100	65

TABLE 6.4.14-6 (Continued)

MATERIAL BALANCE

PROCESS COOLING WATER-UNIT 47

47-7	47-8	47-9	47-10
From Evaporator	From P.C.T Makeup Water Treatment	To Process Cooling Tower	To Unit 54 Evaporator
313,000 (626)	878,000 (1756)	1,294,500 (2589)	294,000 (588)
313,000	878,000	1,294,500	294,000
13.7 100	13.7 65	20.7 80	63.7 85

Stream Number		48-1	
Stream Name		U.C.T. Blowdown	R Fr
Water	lb/hr (gpm)	74,000 (148)	
Solids	lb/hr		
Total	lb/hr	74,000	
Pressure, psia		13.7	
Temperature, °F		110	

NOTE: Flow quantities, pressures and temperatures show design purposes, and are not necessarily the cond

TABLE 6.4.14-7

MATERIAL BALANCE

UTILITY COOLING WATER-UNIT 48

48-2	48-3	48-4	48-5
RO Reject From Unit 45	RO Reject From Unit 49	Treated Water to P.C.T. Makeup Pond	Sludge to Land Fill
162,000 (324)	1,500 (3)	183,500 (367)	1,000 (2)
162,000	1,500	183,500	1,064
300 80	300 80	15.7 80	13.7 70

es shown are for the total unit on a stream-day basis, are to be used solely for process the conditions which will be attained during actual operation.

TABLE 6.4.14-8

MATERIAL BALANCE

WASTE WATER TREATING UNIT-54

Stream Number		54-1	54-2	54-3
Stream Name		Storm Water	Oily Water	Oily Condensate
Water	lb/hr (gpm)	104,500 (209)	130,000 (260)	Normally 0
Solids	lb/hr			
Total	lb/hr	104,500	130,000	
Pressure, psia		13.7	13.7	
Temperature, °F		60	60	

NOTE: Flow quantities, pressures and temperatures shown are for the total unit on a stream-day design purposes, and are not necessarily the conditions which will be attained during actual

TABLE 6.4.14-8

MATERIAL BALANCE

WASTE WATER TREATING UNIT-54

54-2	54-3	54-4	54-5
Oily Water	Oily Condensate	1500 lb Boiler Blowdown	U.C.T Makeup Water
130,000 (260)	Normally 0	4,000 (8)	99,000 (198)
130,000		4,000	99,000
13.7 60		53.7 285	38.7 80

es shown are for the total unit on a stream-day basis, are to be used solely for process he conditions which will be attained during actual operation.

TABLE 6.4.14-8 (Continued)

MATERIAL BALANCE

WASTE WATER TREATING-UNIT 54

Stream Number		54-6	54-7	54-8
Stream Name		DAF Effluent To Biotreating	Stripped Gas Liquor	Waste Heat Boiler Blowdown
Water	lb/hr (gpm)	136,000 (272)	942,000 (1884)	21,000 (42)
Total	lb/hr	136,000	942,000	21,000
Pressure, psia		13.7	145	53.7
Temperature, °F		65	100	285

TABLE 6.4.14-8 (Continued)

MATERIAL BALANCE

WASTE WATER TREATING-UNIT 54

54-7	54-8	54-9	54-10
Stripped Gas Liquor	Waste Heat Boiler Blowdown	Treated Water Sanitary Unit 56	Water From Rectisol
942,000 (1884)	21,000 (42)	23,500 (47)	38,500 (77)
942,000	21,000	23,500	38,500
145 100	53.7 285	13.7 80	13.7 63

TABLE 6.4.14-8 (Continued)

MATERIAL BALANCE

WASTE WATER TREATING-UNIT 54

Stream Number		54-11	54-12	54-13
Stream Name		Water From POX Unit 24	Ash to Land Fill	Incinerator Evaporation Loss
Water	lb/hr (gpm)	3,000 (6)		2,500 (5)
Solids	lb/hr		530	
Total	lb/hr	3,000	530	2,500
Pressure, psia		13.7	13.7	13.7
Temperature, °F		100	100	208

TABLE 6.4.14-8 (Continued)

MATERIAL BALANCE

WASTE WATER TREATING-UNIT 54

54-12	54-13	54-14	54-15
Ash to Land Fill	Incinerator Evaporation Loss	Effluent to PCT Treatment	Evap. Feed From NaZ Softener
	2,500 (5)	1,176,500 (2353)	1,500 (3)
530			
530	2,500	1,176,500	1,500
13.7 100	13.7 208	63.7 80	13.7 80

TABLE 6.4.14-8 (Continued)

MATERIAL BALANCE

WASTE WATER TREATING-UNIT 54

Stream Number		54-16	54-17	54-18
Stream Name		Evaporator Feed From PCT-RO Reject	Evaporator Feed From PCT Blowdown	Combined Evaporator Load
Water	lb/hr (gpm)	292,500 (585)	79,000 (158)	373,000 (746)
Solids	lb/hr			
Total	lb/hr	292,500	79,000	373,000
Pressure, psia		300	15.7	13.7
Temperature, °F		80	80	80

TABLE 6.4.14-8 (Continued)

MATERIAL BALANCE

WASTE WATER TREATING-UNIT 54

54-17	54-18	54-19	54-20
Evaporator Feed From PCT Blowdown	Combined Evaporator Load	Evaporator Brine To Solar Pond	Evaporator Effluent To Cooling Towers
79,000 (158)	373,000 (746)	21,500 (43)	351,500 (703)
79,000	373,000	21,500	351,500
15.7 80	13.7 80	13.7 100	13.7 100

6.4.15 CAPACITY FACTORS

The utility requirements and unit costs for all the units in the Power Self-sufficiency Case are capacity factored from the Base Case with a few exceptions. The capacity factors used and their basis for this case are tabulated in Table 6.4.15-1.

NO.	NAME	BASIS	UNIT
01	Coal Screening	Coal, TPD	
02	Coal Distribution	Coal, TPD	
03	Ash Handling	Gasifier Ash, TPD	
10	Coal Gasification	No. of Gasifiers	
11	CO Shift	Catalyst Volume, ft	
12	Gas Cooling	Cooling Duty, MM	
13	Rectisol	Acid Gas Removed	
14	Gas Liquor Separation	Net Gas Liquor Fee	
15	Tar Distillation	Tar/Oil Feed, lb/H	
16	Naphtha Hydrotreating	Naphtha Feed, lb/H	
17	Phenosolvan	Net Gas Liquor Fee	
18	Ammonia Recovery	Ammonia Product R	
19	Sulfur Recovery-ADIP	Gas Feed, lb mol/H	
		H_2S Absorbed, lb	
	Claus	Sulfur Product Rat	
	SCOT	Gas Feed, lb mol/H	
	Stretford	Gas Feed, lb mol/H	
		Sulfur Product Rat	
20	Process Steam Superheating	Vent Gas Feed Rat	
		Fired Duty, MM Bt	
21	Methanol Synthesis	Methanol Production	
22	Methanation	Feed Rate, lb mol/H	
23	SNG Purification & Compression	Feed Rate, lb mol/H	
24	Partial oxidation	Liquids Feed Rate,	
25	PSA H_2 Production	H_2 Production Rate	
40	Oxygen Produciton	O_2 Production Rate	
41	Steam Generation	Steam Production R	
		No. of Boiler	
42	Power Generation	Generation Capacity	
		No of Trains	
43	Flue Gas Desulfurization	Flue Gas Feed Rate	
		OS_2 Removed, lb m	
44	Raw Water Treating	Raw Water Flow Ra	
45	BFW and Condensate Treating	Total BFW Flow Rat	
46	Air and Nitrogen System	N_2 + Air Quantity,	
47	Process Cooling Water	Cooling Water Flow	
48	Utility Cooling Water	Cooling Water Flow	
49	Potable Water	Water Flow, GPM	
50	Utility Water	Design Capacity, G	
51	Fire Water	Design capacity, G	
52	Fuel Gas	Fuel Gas Quantity,	
53	Flare	Design capacity, M	
54	Wastewater Treating	Wastewater Flow Ra	
55	Tank Farm & Dispatch	Working Capacity,	
	- Naphtha		
	- Ammonia		
	- Sulfur		
	- Intermediate		
	- MeOH		
	- PROP/IPE		
	- Inorg. Chemicals		
56	Sanitary Sewer	--	
57	Interconnecting	--	

TABLE 6.4.15-1

UNIT CAPACITY FACTORS

SIS	BASE CASE	WESTMORELAND COAL CAPACITY POWER SELF-SUFFICIENCY CASE	FACTOR
D	18,000	13,166	0.731
D	18,000	13,166	0.731
Ash, TPD	827	827	1.0
asifiers	14	14	1.0
Volume, ft^3	4,055	4,055	1.0
uty, MM Btu/Hr	673.9	673.9	1.0
Removed, lb mol/Hr	19,940	19,940	1.0
Liquor Feed, lb/Hr	1,000,636	1,000,636	1.0
eed, lb/Hr	25,265	25,265	1.0
Feed, lb/Hr	16,380	16,380	1.0
Liquor Feed, lb/Hr	969,596	969,596	1.0
Product Rate, lb/Hr	6,398	6,398	1.0
, lb mol/Hr	690.9	690.0	1.0
rbed, lb mol/H	114.4	114.4	1.0
oduct Rate,	53.5	53.5	1.0
, lb mol/Hr	898.3	898.3	1.0
lb mol/Hr	11,368.7	11,368.7	1.0
oduct Rate, TPD	33.7	33.7	1.0
Feed Rate, lb mol/HR	21,870.2	21,870.2	1.0
y, MM Btu/Hr	320	320	1.0
Production Rate, TPD	30	30	1.0
, lb mol/Hr	43,647.3	43,647.3	1.0
lb mol/Hr	18,207.5	18,207.5	1.0
eed Rate, lb mol/Hr	23,487	23,487	1.0
ction Rate, lb mol/Hr	118.6	118.6	1.0
ction Rate, TPD	2,925	2,925	1.0
duction Rate, M lb/Hr	4,120	1,370	0.333
ller	3	2	
Capacity, MW	405	84.5	0.209
ins	3	2	
Feed Rate, MM SCFM	1.2	0.4	0.333
ved, lb mol/Hr	138	41.4	0.300
Flow Rate, GPM	6813	2953	0.433
Flow Rate, GPM	9977	5869	0.588
Quantity, SCFM	23,100	23,100	1.0
ater Flow, GPM	152,000	85,200	0.561
ater Flow, GPM		400 Account	
, GPM	54	534	1.0
pacity, GPM	500	500	1.0
pacity, GPM	7,500	7,500	1.0
Quantity, MM Btu/Hr	369.2	369.2	1.0
pacity, MM lb/Hr	1,878	1,878	1.0
Flow Rate, GPM	2,536	2,536	0.993
apacity, BBL			
	41,200		1.0
	29,400		1.0
	7,800		1.0
	68,100		1.0
	5,000		1.0
	5,500		1.0
	10,650		1.0
	---	---	1.0
	---	---	1.0