SECTION 10

UTILITIES

The utility summary, which is presented in Table 10-1, tabulates the utility productions and consumptions by type and by unit. The summary is for the total complex including the mine and coal preparation areas.

All utilities required for operation are generated within the complex. The power generation plant is sized to generate approximately 1000 MW of electricity for sale in addition to that required for operation of the complex. The power plant gas turbines can be dual fired, with either fuel gas or fuel oil, or combinations of both. Accordingly, the power plant gas turbine generators with heat recovery steam generators operating in the combined cycle mode can be used, using oil as the fuel, for startup electrical power and steam requirements.

Table 10-1 also shows the interrelation of steam flows between the power plant and the process plant units. Surplus steam from plant heat recovery equipment is transferred to the power generation plant and excess low pressure steam from the power plant is utilized in the process plant areas via steam header systems. Four steam pressure levels are provided, 1250, 600, 150, and 50 psig.

Drawing No. R-38/39/40/41-FS-1, located in Section 6, depicts the combination of utility water systems. A natural draft hyperbolic cooling water system provides cooling water for the power plant steam condensers, oxygen plant process air cooling and some of the plant heat exchangers. Other services are air cooled. A major use, approximately 60% of the total cooling water circulation rate, is for steam turbine-exhaust condensation at 2.5 inches Hg absolute.

Cooling tower blowdown water is reused as quench water for the gasifier slag, as makeup water for the coal preparation plant operations, and as spray water for mine road dust control.

Raw water requirements for supplying cooling tower water makeup is obtained from the nearby river source. It is given the conventional preliminary chemical treatment and sand filtration, with subsequent final treatment as specifically required for the end uses.

Other factors related to serving the utility requirements of the complex include:

- A plant compressed air system at 100 psig is supplied by one of two 20,000 cfm rotary compressors. One of the compressors is motor driven, and the other equipped with steam-turbine drive.

- A portion of the nitrogen produced at the oxygen plant, compressed to 100 psig, is used in lieu of air for operation of pneumatic instrumentation. Since the nitrogen is dry and available, the drying of instrument air is avoided.

- Clean carbon dioxide gas from Unit 20 is used as the inert drying medium in the coal dryers, and also as the inert cover gas in the coal grinding, conveying, and storage bins. A totally inert atmosphere is provided wherever coal fines are predominantly present under confined conditions.

Table 10-1 - Utility Summary

Unit Number	Unit Description	Power (kW)	Steam (lb/hr) 1,250 psig	Steam (lb/hr) 600 psig	Steam (lb/hr) 150 psig	Steam (lb/hr) 50 psig	Fuel Gas (MMBtu/hr)	Cooling Water (gpm)	Quench Water (gpm)	Sour Water (gpm)	Condensate Boiler Feedwater (gpm)
08	Coal mine	(50,000)	-	-	-	-	-	-	-	-	-
09	Coal preparation	(10,000)	-	-	-	-	-	-	-	-	-
10	Coal storage, grinding, and drying	(14,100)	-	-	(378,500)	-	-	-	-	-	-
11	Oxygen plant	(93,300)	-	(1,045,800)	-	-	-	(125,050)	-	-	2,090
12	SRC dissolving	(51,900) 14,100	-	297,900	-	15,500	(730)	(5,370)	-	200	(650)
13	SRC atmospheric distillation	(1,300)	-	-	-	(60,800) 15,900	(720)	-	-	130	(30)
14	SRC vacuum distillation	(1,900)	-	-	(25,000) 438,800	(143,400) 142,700	(530)	(3,500)	-	340	(1,200)
15	Pyrolysis	(6,600)	188,800	-	27,900	29,500	-	(790)	-	80	(510)
16	Pyrolysis atmospheric distillation	(200)	-	-	(1,000)	-	-	-	-	-	-
17	Sour gas compression	(2,100)	-	-	-	-	-	-	-	-	-
18	Process gasification	(900)	256,000	-	-	-	-	-	(730)[a]	-	(530)
19	Shift conversion	(900)	-	(224,100)	-	-	-	(4,910)	1,300	-	(1,540)
20	Selective acid gas removal	(10,600)	-	-	(97,800)	-	-	(12,810)	-	-	(70) 200
21	Heavy liquids hydrotreating	(24,700)	-	-	(4,900)	-	(315)	-	-	310	(200)
22	Thermal cracking	(3,000)	-	-	(10,000)	69,000	(450)	-	-	20	(140)
23	Coking	(1,500)	-	-	(56,000)	-	(240)	(480)	-	-	(100)
24	Naphtha hydrotreating	(5,700)	-	-	-	77,800	(35)	(1,570)	-	90	(160)
25	Naphtha reforming	(17,900)	-	-	-	-	(235)	(790)	-	-	-
26	Olefinic gas/acid gas removal	(700)	-	-	(3,500)	(77,800)	-	(180)	-	-	160
27	Saturate gas/acid gas removal	(2,600)	-	-	(8,700)	(211,100)	-	-	-	-	440
28	Olefin recovery and polymerization	(400)	(38,900)	(3,500)	(9,000)	(3,400)	(25)	(2,550)	-	-	100
29	Hydrogen recovery and purification	(100)	-	(15,000)	-	-	-	(800)	-	-	30
30	SNG purification	(39,600)	-	123,100	-	18,100	(100)	(6,430)	-	-	(290) 150
31	LPG fractionation	(3,000)	-	(416,500)	-	-	-	(55,850)	-	-	930
32	Sulfur plant	(8,300)	-	-	249,100	126,200	(95)	(2,650)	-	-	(800) 30
33	Fuel gas generation	(6,400)	811,800	72,700	-	-	15,055	(3,070)	(610)	830	(2,410)
34	Fuel gas/acid gas removal	(16,000)	-	-	(96,800)	-	-	(21,550)	-	-	(30) 190
35	Steam and power generation	(27,700) 1,392,200	(5,359,500) 4,141,800	1,407,900	(24,600)[b]	240,600	(11,560)	(406,850)	-	-	(1,690)
36	Process waste water treating	(2,200)	-	(196,700)	-	(224,800)	-	(15,650)	-	(2,000)[c]	840
37	Shops and buildings	(12,100)[d]	-	-	-	-	-	-	-	-	-
38	Firewater system	-	-	-	-	-	-	-	-	-	-
39	Potable and sanitary water system	-	-	-	-	-	-	-	-	-	-
40	Raw water system	(20,400)	-	-	-	-	-	(18,700)[e] 18,700[f] 664,830	40	-	5,280
41	Effluent water treating	(200)	-	-	-	-	-	-	-	-	-
42	Product storage	-	-	-	-	(14,000)	-	-	-	-	30
43	Flare system	-	-	-	-	-	-	-	-	-	-
44	Site preparation, roads & railroads	-	-	-	-	-	-	-	-	-	-
45	Instrument and plant air	-	-	-	-	-	-	-	-	-	-
	Total produced	1,406,300	5,398,400	1,901,600	715,800	735,300	15,055	683,530	1,340	2,000	10,350
	Total consumed	436,300	5,398,400	1,901,600	715,800	735,300	15,055	683,530	1,340	2,000	10,350
	Net for sale	970,000									

NOTES: Quantities in parentheses indicate consumption.
Quantities without parentheses indicate production.

[a] Condensate used as quench water.

[b] Letdown to 50 psig.

[c] Stripped sour water consumed in Units 18 and 33.

[d] Includes Unit 42.

[e] Losses from evaporation, windage, and blowdown.

[f] Makeup to cooling tower.