

## SECTION 13

### MAJOR EQUIPMENT SUMMARY

The major items of equipment in all nonproprietary units are listed in Tables 13-1 through 13-20 of this section.

Items of equipment listed are shown with dimensions and/or capacity, as well as design pressure, temperature, and materials of construction. Note that the size and capacity shown are the design requirements for the most demanding condition. These capacity ratings will in most cases exceed the requirements for conditions shown on the process flowsheets that, on all drawings, describe the typical case.

Units 22, 23, 25, and 27 are proprietary processes, and equipment lists are not included. Also, no equipment lists are presented for package systems.

Table 13-1 - Major Equipment Summary  
Unit 9 - Coal Mine

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Mine Equipment					
9-0801-01 through -05	Mine pumping system			Ambient	
9-1001-01, -02	Hydraulic crane	15 ton		Ambient	
9-1002-01	Mobile crane	50 ton		Ambient	
9-2801-01 through -10	Rotary blasthole drill			Ambient	
9-2802-01 through -05	Trac-drill w/compressor			Ambient	
9-3501-01 through -05	Dragline	170 cu yd		Ambient	
9-3502-01 through -05	Coal shovel	12 cu yd		Ambient	
9-3505-01 through -05	Front-end loader	6 cu yd		Ambient	
9-3601-01 through -20	Coal hauler	120 ton		Ambient	
9-3602-01 through -05	Dozer w/ripper			Ambient	

Table 13-1 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Mine Equipment					
9-3603-01 through -05	Reject hauler	120 ton	Ambient	Ambient	
9-3604-01 through -05	Scraper	35 cu yd	Ambient	Ambient	
9-3605-01 through -05	Grader		Ambient	Ambient	
9-3606-01 through -05	R.T. dozer		Ambient	Ambient	
9-3607-01 through -10	Track dozer		Ambient	Ambient	
9-3608-01 through -05	Sprinkler truck		Ambient	Ambient	
9-3609-01, 02	Tire truck		Ambient	Ambient	
9-3610-01, 02	Low boy w/tractor	50 ton	Ambient	Ambient	
9-3611-01 through -05	Fuel lube truck		Ambient	Ambient	
9-3612-01 through -05	Flatbed truck	5 ton	Ambient	Ambient	

Table 13-1 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp. (°F)	
Mine Equipment					
9-3613-01 through -05	ANFO truck				Ambient
9-3614-01 through -05	Explosive truck				Ambient
9-3615-01 through -50	Pickup truck				Ambient
9-3616-01 through -05	Passenger bus	30 passengers			Ambient
9-3617-01 through -05	Welding truck				Ambient
9-3618-01, -02, -03, -04	Electrical truck				Ambient
9-3619-01, -02, -03, -04	Dump truck	10 ton			Ambient

Table 13-2 - Major Equipment Summary  
Unit 10 - Coal Preparation

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Process Feeders					
10-0501/03	Hopper feeders	72" x 40' 50 hp	Ambient		CS
10-0504/06	Breaker feeders	72" x 100' 100 hp	Ambient		CS
Samplers and Analyzers					
10-0901	Primary sampler	10 lb/hr 3 hp	Ambient		CS
Pumps					
10-1501/10	Primary pumps	4,500 gpm 1,800 rpm 200 hp	50	100	12" x 10" slurry pump Variable speed drive
10-1511/15	Secondary pumps	4,400 gpm 1,800 rpm 200 hp	50	100	12" x 10" slurry pump Variable speed drive
10-1516/25	Classifying pumps	4,000 gpm 1,800 rpm 200 hp	50	100	12" x 10" slurry pump Variable speed drive

Table 13-2 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Pumps					
10-1526/28	Polishing pumps	5,250 gpm 1,800 rpm 200 hp	50	100	12" x 10" slurry pump Variable speed drive
10-1529/30	Sump pump	5,500 gpm 200 hp	50	100	12" x 10" Vertical slurry sump pump
10-1531/32	Recirculating pump	4,800 gpm 200 hp	50	100	12" x 10" pumps
10-1533/35	Spray bar pumps	12,000 gpm 400 hp	50	100	CS
Compressors and Blowers					
10-1801/2	Jig blower	4,000 acf/m 100 hp	Ambient		CS
Storage Tanks					
10-1901	Water head tank	25' x 28' x 18' deep	0	100	CS 1/8" CA

Table 13-2 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Material Handling Equipment					
10-2001/2	Raw coal conveyor	60" x 9,250' 1,250 hp	Ambient		CS structure Reinforced rubber belt
10-2003	Raw coal conveyor	60" x 450' 400 hp	Ambient		CS structure Reinforced rubber belt
10-2004/06	Refuse conveyor-breaker	36" x 100' 20 hp	Ambient		CS structure Reinforced rubber belt
10-2007	Plant refuse conveyor	24" x 200' 25 hp	Ambient		CS structure Reinforced rubber belt
10-2008	Clean coal conveyor	48" x 1,000' 200 hp	Ambient		CS structure Reinforced rubber belt
Reduction Equipment					
10-2101/03	Rotary breakers	14' x 30' 200 hp	Ambient		CS -3" perforations
10-2104/05	Middlings crusher	30" x 72" 75 hp	Ambient		CS

Table 13-2 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Separation Equipment					
10-2201/15	Fine coal centrifuges	36" ID 38 hp	Ambient		CS case SS basket
10-2250/51	Coarse coal centrifuges	48" ID 50 hp	Ambient		CS case SS basket
Hoppers					
10-2601/03	Truck dump hoppers	400-ton capacity	Ambient		CS with 2' x 2' grizzly
10-2605	Plant refuse hopper	300-ton capacity	Ambient		CS
10-2606/08	Breaker refuse hopper	300-ton capacity	Ambient		CS with clam gates
Classification and Screening Equipment					
10-2701/02	Refuse screen	8' x 20' 30 hp	Ambient		SD 3/4"
10-2703/05	Vibrating grizzly screens	8' x 20' 40 hp	Ambient		SD 3" bar spacing



Table 13-2 - (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Classification and Screening Equipment					
10-2706/10	Raw coal screens	8' x 20'	40 hp	Ambient	DD 1 1/2" x 3/4"
10-2711/13	Coarse sieve bends	8' x 32'		Ambient	-28 mesh
10-2714/16	Coarse coal washing screens	8' x 20'	40 hp	Ambient	DD 1 1/2" x 28 mesh
10-2717/24	Fine sieve bends	8' x 32"		Ambient	-9 mesh
10-2725/31	Fine coal washing screens	8' x 20'	30 hp	Ambient	SD 9 mesh
10-2750/69	Primary hydroclones	26" dia	- 1,875 gpm	10	CS - hard lined
10-2770-79	Secondary hydroclones	26" dia	- 1,875 gpm	10	CS - hard lined
10-27101/220	Classifying hydroclones	10" dia	- 300 gpm	10	CS - hard lined
10-27250/279	Polishing hydroclones	10" dia	- 300 gpm	10	CS - hard lined

Table 13-2 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Flotation Equipment					
10-3101/2	Baum jig	170 ft <sup>2</sup> 2 x 5 hp	Ambient		Incl. middling and refuse elevators
Launder and Sumps					
10-3201/05	Primary feed sumps	12' x 12' x 16' deep	Ambient		Concrete
10-3206/08	Secondary feed sumps	12' x 12' x 16' deep	Ambient		Concrete
10-3209/13	Classifying feed sumps	12' x 12' x 16' deep	Ambient		Concrete
10-3214/15	Polishing feed sump	12' x 12' x 16' deep	Ambient		Concrete
10-3216	Plant sump	1,000' x 1,000' x 20' deep	Ambient		Excavation with asphaltic membrane

Table 13-3 - Major Equipment Summary  
Unit 11 - Coal Storage, Crushing, and Drying

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Feeders					
11-0501, 0502 0503, 0504 0505	Vibrating feeder	200 TPH	Ambient		CS w/AR liner electromagnet C
Samplers					
11-0901	Automatic belt sampler	3" x 0 material	Ambient		CS
11-0902	Sample reduction system	3" x 0 material	Ambient		CS Incl. crushers, splitters, samplers
Conveyors					
11-2001	Transfer belt conveyor	60" wide x 650' long	Ambient		CS structure reinforced rubber belt
11-2002/52	Stockpile belt conveyor	60" wide x 1,350' long	Ambient		CS structure Reinforced rubber belt
11-2003/53	Belt tripper	60" unit	Ambient		CS structure self-propelled

Table 13-3 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Conveyors					
11-2004	Plant feed belt conveyor	60" wide x 975' long	Ambient		CS structure reinforced rubber belt
11-2005/55	No. 1 train feed belt	48" wide x 200' long	Ambient		CS structure reinforced rubber belt
11-2006/56	Box belt conveyor	48" wide x 125' long	Ambient		Enclosed - reinforced rubber belt - grounded CS structure
11-2007/57	Box belt conveyor	48" wide x 50' long	Ambient		Enclosed CS structure - reinforced rubber belt
11-2008/58	Box belt conveyor	40" wide x 50' long	Ambient		Enclosed CS structure - Reinforced rubber belt
11-2009	Box belt conveyor	36" wide x 35' long	Ambient		Enclosed CS structure - Reinforced rubber belt

Table 13-3 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Conveyors					
11-2010	Box belt conveyor	36" wide x 120' long	Ambient		Enclosed CS structure - reinforced rubber belt
11-2011	Box belt conveyor	36" wide x 145' long	Ambient		Enclosed CS structure - reinforced rubber belt
11-2012/13	Belt elevator	63" wide x 70' high	Ambient		Enclosed CS structure - reinforced rubber belt
11-2031/34	Box belt conveyor	36" wide x 35' long	Ambient		Enclosed CS structure - reinforced rubber belt
11-2032/33	Box belt conveyor	48" wide x 105' long	Ambient		Enclosed CS structure - reinforced rubber belt

Table 15-3 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp. (°F)	
Conveyors					
11-2035/36	Belt elevator	40" wide x 71' high	Ambient		Enclosed CS structure - reinforced rubber belt
11-2069	Box belt conveyor	36" wide x 35' long	Ambient		Enclosed CS structure - reinforced rubber belt
11-2070	Box belt conveyor	36" wide x 120' long	Ambient		Enclosed CS structure - reinforced rubber belt
11-2071	Box belt conveyor	36" wide x 120' long	Ambient		Enclosed CS structure - reinforced rubber belt
11-2072/73 2082/83	Belt elevator	50" wide x 70' high	Ambient		Enclosed CS structure - reinforced rubber belt

Table 13-3 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press, (psig)	Temp (°F)	
Reduction Equipment					
11-2101/02/03 /04 2105/51/52 /53 2154/55	Cage mill	72' dia	Ambient		CS structure grounded, AR liners, Ni-Hard sieves
Hoppers, Bins, etc.					
11-2601	Bifurcated chute		Ambient		CS grounded w/motorized flap
11-2602	Bifurcated chute		Ambient		CS grounded w/motorized flap
11-2603/53	Bifurcated chute		Ambient		CS grounded w/motorized flap
11-2604/54	Feed bin	400 ton	Ambient		CS grounded
11-2605/55	Bifurcated chute		Ambient		CS grounded w/motorized flap
11-2606/07	Bifurcated feed bin, double		Ambient		CS grounded
11-2631/2	Bifurcated feed bin, double		Ambient		CS grounded

Table 13-3 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Hoppers, Bins, etc.					
11-2661/62	Bifurcated feed bin, double			Ambient	CS grounded
11-2663/64/65 2666/67/68	Bifurcated feed bin, double			Ambient	CS grounded
Other Major Equipment					
11-2801/51	Stacking/reclaiming conveyor		MX-TC 2000	Ambient	CS structure, tracked w/reinforced rubber belt
11-2802	Bucket wheel reclaim		MX 3172	Ambient	CS structure, tracked w/reinforced rubber belt
11-2803/53	Hopper, mobile		MX-H	Ambient	CS structure, tracked
11-2804	Belt magnet		Friez SC-H SE-755	Ambient	Electromagnetic w/silicon rectifier



Table 13-3 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Environmental Equipment					
11-2901	Dust collector	10,000 acf/m	10	110	CS structure, grounded
11-2902/03/04/05	Dust collector	5,000 acf/m	10	110	CS structure, grounded
11-2931	Dust collector	10,000 acf/m	10	110	CS structure, grounded
11-2932/33/34/35	Dust collector	5,000 acf/m	10	110	CS structure, grounded
11-2961	Dust collector	10,000 acf/m	10	110	CS structure, grounded
11-2962/63/64/65	Dust collector	5,000 acf/m	10	110	CS structure, grounded
Dryers					
11-3401/31/61	Hydro-air dryer system	10' x 75' x 12'	135 (steam)	170 (exit)	CS structure, includes gas cleaning w/bag house, grounded

Table 13-3 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Weighing Equipment					
11-3801/51	Bolt scale	0-2500 TPH	Ambient	Ambient	Thayer 2 RF
11-3802/52	Bolt scale	0-1250 TPH	Ambient	Ambient	Thayer 2 RF
11-3803/53	Bolt scale	0-1250 TPH	Ambient	Ambient	Thayer 2 RF
11-3804/54	Bolt scale	0-1250 TPH	Ambient	Ambient	Thayer 2 RF
11-3805/55	Bolt scale	0-1250 TPH	Ambient	Ambient	Thayer 2 RF
11-3806	Bolt scale	0-750 TPH	Ambient	Ambient	Thayer 2 RF
11-3807/8	Bolt scale	0-500 TPH	Ambient	Ambient	Thayer 2 RF
11-3837/8	Bolt scale	0-750 TPH	Ambient	Ambient	Thayer 2 RF
11-3866	Bolt scale	0-750 TPH	Ambient	Ambient	Thayer 2 RF
11-3867	Bolt scale	0-250 TPH	Ambient	Ambient	Thayer 2 RF

Table 13-4 - Major Equipment Summary  
Unit 12 - Coal Slurrying and Dissolving

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Vessels					
12-1201	Slurry mix vessel	22'0" D x 42'0" TT	10	451	SA-285C 1/4" CA
12-1202	Slurry vapor flash drum	4'0" D x 16'0" TT	8	260	SA-516 1/8" CA
12-1203	Slurry vapor condensate drum	6'0" D x 12'0" TT	6	100	SA-285C 1/8" CA
12-1204/34/64	High pressure primary separator	9'0" D x 36'0" TT	2,025	850	SA-387 Gr 22 308 SS overlay
12-1207	High pressure inter. flash drum	9'0" D x 27'0" TT	2,005	370	A-516 1/8" CA
12-1208	High pressure condensate flash drum	8'0" D x 24'0" TT	1,995	150	A-516 1/8" CA
12-1209	High pressure condensate surge drum	6'0" D x 15'0" TT	1,960	101	A-516 1/8" CA
12-1210	High pressure vapor expander flash drum	12'0" D Sphere	1,085	84	A-516 1/8" CA
12-1211	High pressure slurry flash drum	11'0" D x 30'0" TT	1,980	550	A-516 1/4" CA
12-1212	1st LP slurry flash drum	11'0" D x 30'0" TT	1,105	548	A-516 1/4" CA

Table 13-4 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Vessels					
12-1213	1st IP slurry vapor condensate drum	4'0" D x 20'0" TT	1,095	120	A-516 1/4" CA
12-1214	1st IP condensate flash drum	6'0" D x 18'0" TT	1,085	102	A-516 1/8" CA
12-1215	2nd IP slurry flash drum	11'0" D x 30'0" TT	530	547	A-516 1/4" CA
12-1216	2nd IP slurry vapor condensate drum	4'0" D x 20'0" TT	520	120	A-516 1/8" CA
12-2117	2nd IP condensate flash drum	6'0" D x 18'0" TT	510	104	A-516 1/8" CA
12-1218	Low pressure slurry flash drum	11'0" D x 30'0" TT	255	546	A-516 1/4" CA
12-1219	Low pressure slurry vapor condensate drum	4'0" D x 20'0" TT	245	120	A-516 1/8" CA
12-1220	Low pressure condensate flash drum	6'0" D x 18'0" TT	235	101	A-516 1/8" CA

Table 13-4 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Exchangers					
12-1301	Slurry vapor air condenser	4,201 MM Btu/hr, 5,650 ft <sup>2</sup> 1 bay, 8' x 8', 2 fans @ 5 hp	10	451	A-285 T
12-1302	Slurry vapor water condenser	48,286 MM Btu/hr, 9,280 ft <sup>2</sup> 2 shells, 42"/20'	8 35	260 120	A-387 Gr 22 SH 321 SS T
12-1303	HP separator vapor - feed gas exchanger	335,904 MM Btu/hr, 45,200 ft <sup>2</sup> 1 shell, 53"/16'	2,015 2,235	831 739	A-387 Gr 22 308L Clad SH 321 SS T
12-1304	HP separator overhead vapor - steam generator	38,304 MM Btu/hr, 5,300 ft <sup>2</sup> 1 shell, 84"/16'	25 2,005	267 370	CS 1/8" CA SH CS T
12-1305	HP separator overhead vapor air condenser	123,277 MM Btu/hr, 335,109 ft <sup>2</sup> 3 bays, 19' x 40' 2 fans @ 40 hp	2,000	300	CS 1/4" CA SH CS T
12-1306	HP separator overhead liquid-steam generator	7,268 MM Btu/hr, 1,130 ft <sup>2</sup> 1 shell, 36"/20'	25 2,005	267 370	CS 1/8" CA SH CS T
12-1307	HP separator overhead liquid air cooler	16,539 MM Btu/hr, 68,898 ft <sup>2</sup> 12' x 40' bay, 2 fans @ 25 hp	2,000	300	CS 1/4" CA SH CS T
12-1308	HP separator overhead liquid water cooler	1,639 MM Btu/hr, 7,880 ft <sup>2</sup> 2 shells, 43"/20'	35 1,995	120 120	CS 1/4" CA SH B111-443 T

Table 13-4 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Exchangers					
12-1309	HP separator overhead condensate water cooler	1.155 MM Btu/hr, 534 ft <sup>2</sup> 1 shell, 17"/20'	35 1,995	120 150	CS 1/4" CA SH B111-443 T
12-1310/40/70	HP separator slurry - feed exchanger	199.650 MM Btu/hr, 32,400 ft <sup>2</sup> 2 shells, 60"/60'	2,025 2,235	850 637	A-387 Gr 11 Clad 308L SH 321 SS T
12-1313	HP separator slurry - overhead condensate exchanger	61.699 MM Btu/hr, 7,590 ft <sup>2</sup> 1 shell, 33"/60'	235 2,010	550 672	A-204 B 308L C1 SH 321 SS T
12-1314	HP separator slurry - steam generator	254.892 MM Btu/hr, 42,680 ft <sup>2</sup> 4 shells, 90"/24'	600 1,990	489 632	CS 1/16" CA SH 410 SS T
12-1315	HP flash vapor - steam generator	6.513 MM Btu/hr, 456 ft <sup>2</sup> 1 shell, 36"/10'	50 1,980	298 550	CS 1/8" CA SH 410 SS T
12-1316	HP flash vapor air condenser	7,799 MM Btu/hr, 23,945 ft <sup>2</sup> 1 bay, 7' x 24', 2 fans @ 25 hp	1,975	330	CS T
12-1317	HP flash vapor water condenser	0.667 MM Btu/hr, 625 ft <sup>2</sup> 1 shell, 19"/16'	35 1,970	120 120	CS 1/4" CA SH B111-443 T
12-1318	1st IP flash vapor - steam generator	3.086 MM Btu/hr, 230 ft <sup>2</sup> 1 shell 30"/10'	50 1,105	298 548	CS 1/16" CA SH CS T

Table 13-4 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Exchangers					
12-1319	1st LP flash vapor air condenser	5,150 MM Btu/hr, 23,397 ft <sup>2</sup> 1 bay, 12' x 20', 2 fans @ 25 hp	1,100	201	CS T
12-1320	2nd IP flash vapor - steam generator	2,105 MM Btu/hr, 200 ft <sup>2</sup> 1 shell, 30"/8'	50 530	298 547	CS 1/16" CA SH CS T
12-1321	2nd IP flash vapor air condenser	2,421 MM Btu/hr, 15,394 ft <sup>2</sup> 1 bay, 10' x 16', 2 fans @ 10 hp	525	161	CS T
12-1322	LP flash vapor air condenser	2,540 MM Btu/hr, 4,434 ft <sup>2</sup> 1 bay, 6' x 8', 2 fans @ 5 hp	255	546	CS T
12-1323	HP vent gas condenser	3,825 MM Btu/hr, 690 ft <sup>2</sup> 1 shell, 17"/20'	1,098 35	211 120	CS 1/4" CA SH B111-443 T
12-1324	LP vent gas condenser	1,894 MM Btu/hr, 900 ft <sup>2</sup> 1 shell, 21"/20'	518 35	216 120	CS 1/4" CA SH B111-443 T
Furnaces					
12-1401/31/61	Dissolver preheaters	169,087 x 10 <sup>6</sup> Btu/hr 12' x 45' x 55' cabin type	2,225	700	521 SS tubes

Table 13-4 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Pumps					
12-1501/31/61	Dissolver feed pump	4,010 gpm, 3,000 ft TDH 7,600 hp	2,235	451	CS, stellite facings
12-1502	Dissolver feed pump spare	4,010 gpm, 3,000 ft TDH 7,600 hp	2,235	451	CS, stellite facings
12-1503/4	Hot HC condensate pump & spare	3.5 gpm, 1/2 hp, 3,600 rpm	40	260	API S-1
12-1505	Cold HC condensate pump	10 gpm, 3 hp, 1,750 rpm	40	100	API S-1
12-1506/7	Sour water pump & spare	91 gpm, 3 hp, 1,750 rpm	35	100	API S-1
12-1508	1st stage slurry hydraulic turbine	12,481 gpm, 3,870 hp	1,980	550	316 SS stellite hard facings
12-1509	2nd stage slurry hydraulic turbine	12,168 gpm, 2,480 hp	1,105	548	316 SS stellite hard facings
12-1510	3rd stage slurry hydraulic turbine	11,980 gpm, 1,170 hp	530	547	316 SS stellite hard facings
12-1511	1st stage condensate hydraulic turbine	564 gpm, 175 hp	1,960	101	316 SS



Table 13-4 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Pumps					
12-1512	2nd stage condensate hydraulic turbine	599 gpm, 125 hp	1,085	102	316 SS
12-1513	3rd stage condensate hydraulic turbine	626 gpm, 60 hp	510	104	316 SS
Compressors					
12-1801	Make-up hydrogen compressor	513.049 x 10 <sup>6</sup> SCFD, 14,000 hp ea. 2 single-stage recip.	2,235	250	SA 4340
12-1802	Recycle hydrogen compressor	296,706 x 10 <sup>6</sup> SCFD, 13,600 hp 1 single-stage recip.	2,235	236	SA 4340
12-1803	HP vent gas compressor	25,094 x 10 <sup>6</sup> SCFD, 900 hp 1 single-stage recip.	1,098	211	SA 4340
12-1804	LP vent gas compressor	4,957 x 10 <sup>6</sup> SCFD, 250 hp 1 single-stage recip.	518	214	SA 4340
12-1805	HP vapor expander	521,411 x 10 <sup>6</sup> SCFD, 10,000 hp Centrifugal	1,960	147	SA 4340

Table 13-4 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Other Major Equipment					
12-2001 through 12-2004	Coal screw feeder	208.33 TPH ca., 200 hp 11 ft long	10	200	CS 1/4" CA
Conveyors					
12-3801	Coal weigh belt conveyor	833.33 TPH, 10 hp ea., 16 ft long		200	CS
Agitators					
12-2401	Slurry agitator	50 hp x 25-40 rpm	10	451	CS 1/4" CA
Reactor					
12-2501/31/61	Dissolver	12'6" x 122'0"	2,025	850	A387 Gr 22 308L overlay

Table 13-5 - Major Equipment Summary  
Unit 13 - Filtration and Filter Cake Drying

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Vessels					
13-1201/21/41/61	Precoat slurry mix tank	9'0" ID x 21'0" TT cone bottom	0	550	CS 1/8" CA
13-1202/22/42/62	Precoat filtrate receiver	6'6" ID x 16'0" TT	-10	550	CS 1/8" CA
13-1203/23/43/63	Drier condensate drum	5'0" ID x 15'0" TT	-6	150	CS 1/8" CA
13-1204/24/44/64	Filtrate receiver	8'0" ID x 16'0" TT	-10	550	CS 1/8" CA
13-1205/25/45/65	Wash liquor receiver	6'0" ID x 20'0" TT	-10	550	CS 1/8" CA
Exchangers					
13-1301/21/41/61	Drier vapor air cooler	15.2 x 10 <sup>6</sup> Btu/hr, 42,772 ft <sup>2</sup> 1 bay, 11' x 40', 2 fans @ 20 hp	-4	330	CS
13-1302/22/42/62	Recycle wash oil preheater	16.7 x 10 <sup>6</sup> Btu/hr, 4,910 ft <sup>2</sup> 2 shells, 9"/60'	10 2,000	550 SH 653 T	CS 1/8" CA

Table 13-5 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Pumps					
13-1501/2/21/22/ 41/42/61/62	Precoat slurry pump & spare	2,000 gpm, 1,750 rpm, 60 hp	35	550	CS
13-1503/4/23/24/ 43/44/63/64	Precoat filtrate circu- lation pump and spare	1,000 gpm, 1,750 rpm, 30 hp	25	550	API S-1
13-1505/6/25/26/ 45/46/65/66	Wash oil recycle pump & spare	143 gpm, 3,600 rpm, 3 hp	10	150	API S-1
13-1507/8/27/28 47/48/67/68	Filtrate pump & spare	1,285 gpm, 1,750 rpm, 15 hp	50	550	API S-1
13-1509/10/29/30/ 49/50/69/70	Wash liquor pump & spare	365 gpm, 1,750 rpm, 100 hp	275	550	API S-1
13-1511/12/31/32/ 51/52/71/72	Water pump & spare	10 gpm, 3,500 rpm, 1.0 hp	15	150	API S-1
13-1513/33/53/73	Filter pumpout pump	350 gpm	275	550	API S-1

Table 13-5 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Boilers					
13-1601/21/41/61	Drier waste heat boiler - I	21.9 x 10 <sup>6</sup> Btu/hr, 5,400 ft <sup>2</sup> 1 shell, 96"/16'	155 0	368 SH 750 T	CS 1/16" CA CS
13-1602/22/42/62	Drier waste heat boiler - II	5.7 x 10 <sup>6</sup> Btu/hr, 3,997 ft <sup>2</sup> 1 shell, 84"/16'	55 -2	303 SH 400 T	CS 3/16" CA CS
Compressors					
13-1801/2/21/22/41/42/61/62	Precoat vacuum pump & spare	675 SCHM, 150 hp, 3,648 CFM	17	550	CS
13-1803/4/23/24/43/44/63/64	Filter vacuum pump & spare	985 SCFM, 200 hp, 3,648 CFM	17	550	CS
13-1805/6/25/26/45/46/65/66	Purge gas blower & spare	20 SCFM, 200 hp, 3,648 CFM	26	150	CS
Materials Handling Equipment					
13-2001	DE pneumatic conveyor	5.1 TPH, 100 hp	0	90	CS
13-2002/22/42/62	DE slurry tank screw feeder	2.3 TPH, 5 hp, 15'0" x 0'12"	0	550	CS
13-2003/23/43/63	Filter cake screw conveyor system	77.0 TPH, 20 hp, 20'0" x 20"	0	550	CS

Table 13-5 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Materials Handling Equipment					
13-2004/24/44/64	Drier effluent pneumatic conveyor	92.5 TPH, 300 hp	0	750	CS
13-2005	Gasifier pneumatic feeder	370.0 TPH, 1,200 hp	0	750	CS
13-2006	Deleted				
Separation Equipment					
13-2201 thru 21 21 thru 32, 41 thru 52, 61 thru 72	Vacuum filters & spares	912 ft <sup>2</sup> , 50 hp	20" Hg	550	316 SS
Agitators					
13-240L/21/41/6	DE slurry tank agitator	25 hp, 75 rpm	0	550	CS

Table 13-5 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Hoppers					
13-2601	DE storage hopper	45'0" D x 105'0" TT cone bottom	0	90	CS
13-2602/22/42/62	Deleted				
13-2602	Drier effluent hopper	16'0" D x 50'0" TT cone bottom	0	750	CS
Kilns					
13-3401/21/41/61	Drier	12'0" D x 120'0" LG, 350 hp	1	1,800	CS kiln refractory lined

Table 13-6 - Major Equipment Summary  
Unit 14 - Product Distillation

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Columns					
14-1101	Main fractionator	12'0" ID x 20'6" 16'0" ID x 21'0" 19'0" ID x 24'0" 20'0" ID x 25'0" Overall TT 97'6" - 26 trays	18.9	765	A516 1/8" CA
14-1102	Light distillate stripper	4'0" ID x 18'0" TT	17.6	460	CS 1/8" CA
14-1103	Heavy distillate stripper	8'0" ID x 19'0" TT	17.0	590	CS 1/8" CA
Vessels					
14-1201	Reflux drum	10'6" ID x 30'0" TT	11.8	280	CS 1/8" CA
14-1202	Fractionator overhead receiver	10'6" ID x 30'0" TT	8.5	120	CS 1/8" CA
14-1203	Overhead vapor knockout drum	4'0" x 14'0" TT	52.5	120	CS 1/8" CA
14-1204	Sour gas knockout drum	4'6" x 14'0" TT	84.5	120	CS 1/8" CA



Table 13-6 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Exchangers					
14-1301	Heavy distillate PA/feed exchanger	75 x 10 <sup>6</sup> Btu/hr, 23,640 ft <sup>2</sup> 4 shells, 54"/20'	235 70	564 SH 690 T	CS 1/8" CA CS tubes
14-1302	Heavy distillate PA/steam generator	7.849 x 10 <sup>6</sup> Btu/hr, 1,330 ft <sup>2</sup> 1 shell, 36"/120'	600 108	494 ST 570 T	CS 1/8" CA CS tubes
14-1303	Light distillate PA/steam generator	51.95 x 10 <sup>6</sup> Btu/hr, 9,726 ft <sup>2</sup> 1 shell, 72"/40'	150 85	366 SH 475 T	CS 1/8" CA CS tubes
14-1304	Fractionator bottoms/feed exchanger	566 x 10 <sup>6</sup> Btu/hr, 577,800 ft <sup>2</sup> 60 shells, 60"/24'	200 212	721 SH 757 T	CS 1/8" CA CS tubes
14-1305	Heavy distillate PA/Lt. distillate reboiler	8.831 x 10 <sup>6</sup> Btu/hr, 2,360 ft <sup>2</sup> 1 shell, 54"/20'	128 70	460 SH 690 T	CS 1/8" CA CS tubes
14-1306	Fractionator bottoms/heavy distillate reboiler	20.36 x 10 <sup>6</sup> Btu/hr, 3,360 ft <sup>2</sup> 1 shell, 66"/20'	200 212	590 SH 757 T	CS 1/8" CA CS tubes
14-1307	Fractionator overhead/steam generator	35.36 x 10 <sup>6</sup> Btu/hr, 19,940 ft <sup>2</sup> 2 shells	25 15.3	267 SH 305 T	CS CS
14-1308	Naphtha air cooler	52.92 x 10 <sup>6</sup> Btu/hr, 246,642 ft <sup>2</sup> 2 bays, 21.5' x 40' 2 fans @ 40 hp	11.8	280	CS 1/8" CA CS tubes

Table 13-6 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Exchangers					
14-1309	Overhead vapor intermediate air cooler	2.105 x 10 <sup>6</sup> Btu/hr, 12,580 ft <sup>2</sup> 2 bays, 6.8' x 12' 4 fans @ 5 hp	54.3	220	CS 1/8" CA
14-1310	Overhead vapor air cooler	1.517 x 10 <sup>6</sup> Btu/hr, 12,560 ft <sup>2</sup> 2 bays, 6.6' x 12' 4 fans @ 5 hp	183.3	214	CS 1/8" CA
14-1311	Deleted				
14-1312	Fuel oil/150-psig steam generator	50.964 x 10 <sup>6</sup> Btu/hr, 6,490 ft <sup>2</sup> 1 shell, 78"/24'	150 180	366 SH 540 T	CS 1/8" CA CS tubes
14-1313	Fuel oil/50-psig steam generator	19,116 x 10 <sup>6</sup> Btu/hr, 573,611 ft <sup>2</sup> 3 bays, 21.7' x 40' 2 fans @ 40 hp	50	298 SH	CS 1/8" CA
14-1314	Fuel oil air cooler	64.654 x 10 <sup>6</sup> Btu/hr	170	302	CS tubes
14-1315	Atmos. bottoms/600-psig steam generator	205.65 x 10 <sup>6</sup> Btu/hr, 43,860 ft <sup>2</sup> 4 shells, 78"/40'	600 170	494 SH 593 T	CS 1/8" CA CS tubes

Table 13-6 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Furnaces					
14-1401	Main fractionator charge furnace	217.833 x 10 <sup>6</sup> Btu/hr 14' x 55' x 60' cabin type	147.3	770	CS 1/8" CA
Pumps					
14-1501/2	Light distillate pump-around pump	3,268 gpm, 125 hp	85	475	API S-1
14-1503/4	Heavy distillate pump-around pump	3,092 gpm, 200 hp	128	690	API S-6
14-1505/6	Fractionator bottoms pump and spare	14,729 gpm, 1,250 hp	212	757	API S-6
14-1507/8	Heavy distillate pump and spare	1,297 gpm, 200 hp	200	590	API S-6
14-1509/10	Light distillate pump and spare	250 gpm, 25 hp	110	460	API S-1
14-1511/12	Reflux pump and spare	477 gpm, 15 hp, 3,600 rpm	70	280	API S-1
14-1513/14	Naphtha pump and spare	300 gpm, 20 hp, 3,600 rpm	75	120	API S-1
14-1515/16	Water condensate pump and spare	250 gpm, 7.5 hp	50	120	API S-1

Table 13-6 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Compressors					
14-1801	Overhead vapor compressor	5,867 SCFM, 1,200 hp	198	220	CS
14-1802	Sour gas compressor	6,490 SCFM, 600 hp	535	218	CS

Table 13-7 - Major Equipment Summary  
Unit 16 - Naphtha Hydrocracker

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Vessels					
16-1101	Stabilizer	4'0" D x 10'6" D x 53'0" TT	192	487	SA 515-70, CA 1/8"
16-1201	Feed surge drum	9'0" D x 20'6" TT	50	100	SA 515-70, CA 1/8"
16-1202	Product separator	7'0" D x 12'0" TT	968	130	AS16-70, CA 1/4"
16-1203	Stabilizer receiver	6'0" D x 10'0" TT	180	130	SA 515-70, CA 1/8"
Exchangers					
16-1301	Feed-effluent exchanger	89.5 x 10 <sup>6</sup> Btu/hr, 10,220 ft <sup>2</sup> 1 shell, 48"/46'	1,075 997	702 SH 800 T	C 1/2 Mo 508L Clad 321 SS
16-1302	Charge heater	14.5 x 10 <sup>6</sup> Btu/hr, 1,590 ft <sup>2</sup> 1 shell, 46"/10'	1,062 2,040	750 SH 850 T	C 1/2 Mo 321 SS
16-1303	Effluent air cooler	22.9 x 10 <sup>6</sup> Btu/hr, 87,515 ft <sup>2</sup> 2 bays, 7.3' x 40', 4 fans @ 40 hp	980	280	SA-179 T
16-1304	Stabilizer feed - bottoms exchanger	13.5 x 10 <sup>6</sup> Btu/hr, 1,610 ft <sup>2</sup> 2 shells, 21"/20'	197 190	350 SH 487 T	SA-515 1/8" CA 5% Cr
16-1305	Stabilizer overhead air cooler	4.6 x 10 <sup>6</sup> Btu/hr, 24,142 ft <sup>2</sup> 2 bays, 3.5' x 24', 4 fans @ 10 hp	184	273	SA-179 T

Table 13-7 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Exchangers					
16-1306	Stabilizer reboiler	17.5 x 10 <sup>6</sup> Btu/hr, 4,850 ft <sup>2</sup> 1 shell, 48"/16'	50 192	590 SH 497 T	CS 1/8" CA CS
16-1307	Product air cooler	9.3 x 10 <sup>6</sup> Btu/hr, 40,650 ft <sup>2</sup> 2 bays, 5.8' x 24', 4 fans @ 20 hp	180	270	SA-179 T
Vessels					
16-1308	Product water trim cooler	1.4 x 10 <sup>6</sup> Btu/hr, 960 ft <sup>2</sup> 1 shell, 21"/20'	50	120	CS 1/8" CA B111-443
Pumps					
16-1501/2	Charge pump & spare	310 gpm, 250 hp, 150 rpm	1,107	100	Reciprocating, CS
16-1503	Wash water pump	20 gpm, 30 hp, 250 rpm	998	100	Reciprocating, CS
16-1504/5	Stabilizer reflux pump & spare	77 gpm, 5 hp, 3,600 rpm	228	150	API S-6
16-1506/7	Stabilizer reboiler pump & spare	920 gpm, 60 hp, 3,600 rpm	267	487	API S-6

Table 13-7 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Compressors					
16-1801/2	Recycle compressor & spare	126.8 x 10 <sup>6</sup> SCFD, 425 hp 7,830 rpm	1,200	160	Centrifugal CS
16-1803/4	High pressure vent gas blower	1.43 x 10 <sup>6</sup> SCFD, 700 hp 9,560 rpm	1,125	130	Centrifugal CS
Reactors					
16-2501	Reactor	11'0" D x 50'0" TT	1,062	800	SA387, Gr11, 308L Overlay

Table 13-8 - Major Equipment Summary  
 Unit 17 - Dissolver Acid Gas Removal

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Columns					
17-1101, 02	Amine contactor	9'6" ID x 75'0" TT 25 trays	1,075	150	A516 CA 1/4 S SS304 trays
17-1103	Amine regenerator	13'6" ID x 70'0" TT 21 trays	19	260	A516 CA 1/4 S SS304 trays
17-1104	Caustic precontactor	5'6" ID x 36'0" TT	1,070	120	A516 CA 1/8
17-1105	Caustic contactor	9'6" ID x 45'0" TT	1,067	120	A516 CA 1/8
17-1106	Water wash column	9'6" ID x 22'0" TT	1,057	100	A516 CA 1/8
Vessels					
17-1201	Rich amine surge drum	12'0" ID x 60'0" IT	75	150	A516 CA 1/8
17-1202	Amine oil separator	5'6" ID x 7'6" IT	75	150	A516 CA 1/8
17-1203	Amine sump	8'0" ID x 6'0" high	atm	60/180	CS
17-1204	Amine reflux drum	7'0" ID x 12'0" IT	11	120	A516 CA 1/4



Table 13-8 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Exchangers					
17-1301	Gas-gas exchanger	10.7 x 10 <sup>6</sup> Btu/hr, 9,600 ft <sup>2</sup> 1 shell, 44"/40'	1,063 1,082	100 SH 105 T	CS 1/8" CA CS
17-1302	Amine air cooler	76.6 x 10 <sup>6</sup> Btu/hr, 435,896 ft <sup>2</sup> 4 bays 19' x 40' 2 fans @ 40 hp	60	182	CS
17-1303	Amine exchanger	98.3 x 10 <sup>6</sup> Btu/hr, 27,720 ft <sup>2</sup> 3 shells, 59"/20'	19 75	260 SH 226 T	A285C CA 1/4 CS
17-1304	Amine condenser	77.8 x 10 <sup>6</sup> Btu/hr, 348,628 ft <sup>2</sup> 3 bays 20.4' x 40' 2 fans @ 30 hp	14	230	CS tubes
17-1305	Amine reboiler	166.5 x 10 <sup>6</sup> Btu/hr, 23,320 ft <sup>2</sup> 4 shells, 84"/20'	19 47.5	260 SH 292 T	A285C CA 1/4 Titanium tubes
17-1306	Amine reclainer	7.14 x 10 <sup>6</sup> Btu/hr, 1,700 ft <sup>2</sup> 1 shell, 78"/20'	20 100	303 SH 338 T	A285C CA 1/8 Titanium tubes
Pumps					
17-1501/2/3	Amine pump and spare	1,410 gpm, 1,150 hp, 3,600 rpm	1,150	120	API S-1
17-1504/5/6	Amine booster pump and spare	1,435 gpm, 75 hp, 3,600 rpm	60	182	API S-1

Table 13-8 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Pumps					
17-1507/8	Amine reflux pump and spare	200 gpm, 15 hp, 3,500 rpm	76	120	API S-6
17-1509/10	Weak caustic pump and spare	80 gpm, 5 hp	1,125	120	CS reciprocating
17-1511/12	Strong caustic pump and spare	250 gpm, 15 hp	1,120	120	CS triplex reciprocating
17-1513/14	Caustic makeup pump and spare	7 gpm, 7.5 hp, 1,800 rpm	1,120	60	API S-1
17-1515/16	Water circulating pump and spare	250 gpm, 15 hp, 1,750 rpm	1,110	100	API S-1
17-1517/18	Amine sump pump and spare	50 gpm, 5 hp, 1,750 rpm	60	60/180	API S-1
17-1519	Amine transfer pump	50 gpm, 3 hp, 1,750 rpm	30	80	API S-1

Table 13-8 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Tanks					
17-1901	Amine surge tank	35'0" D x 22'0" high	atm	182	CS - cone roof, 1/8" CA
17-1902	Amine storage tank	12'0" D x 12'0" high	atm	80	CS - cone roof
17-1903	Caustic storage tank	20'0" D x 20'0" high	atm	60	CS - cone roof
Separation Equipment					
17-2201	Gas filter/separator	556.5 x 10 <sup>6</sup> SCFD	1,085	86	A285C CA 1/8" CA
17-2202	Amine filter	250 gpm	50	160	
Other Major Equipment					
17-2801/02	Inhibitor antifoam injectors	0.1 gpm, 1/4 hp	750	100	SS 316 - pack- age w/diaphragm pump

Table 13-9 - Major Equipment Summary  
Unit 18 - SNG and LNG Production

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Packaged Equipment					
18-0801	Cryogenic H <sub>2</sub> upgrading package	543 x 10 <sup>6</sup> SCFD of 63.5 V% H <sub>2</sub>	1,055	-250	
18-0802	Methanation circulating oil clean-up package	47 gpm C <sub>20</sub> H <sub>42</sub>	486	690	
18-0803	SNG glycol drying package	156.8 x 10 <sup>6</sup> SCFD	1,002	100	
18-0804	C <sub>3</sub> LPG sweetening package	186 gpm LPG	207	100	
18-0805	C <sub>4</sub> LPG sweetening package	131 gpm LPG	88	100	
Columns					
18-1101	Deethanizer column	5'0" ID x 11'6", 5 SF trays	205	141	A516 1/8" CA
18-1102	Depropanizer column	5'6" ID x 49'6", 15 DF trays 61'0" TT	187	191	A516 CA 1/8"
18-1103	Debutanizer column	5'6" ID x 45'0" TT 15 DF trays	71	266	CS CA 1/8"

Table 13-9 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Vessels					
18-1201	Molecular sieve drier	14'0" ID x 26'0" TT	1,061	440	A516 C5CA 1/16"
18-1202	Molecular sieve drier	14'0" ID x 26'0" TT	1,061	440	A516-65 CA 1/16" CA
18-1203	Molecular sieve drier	14'0" ID x 26'0" TT	1,061	440	A516-65 CA 1/16"
18-1204	Regeneration separator	2'6" ID x 7'6" TT	1,066	440	A285C
18-1205	Methanation compressor suction separation	18'6" ID x 49'0" TT	5	95	Split flow vapor outlet A516 CS CA 1/8"
18-1206	Methanation compressor 2nd stage suction separator	14'6" ID x 39'0" TT	37	100	Split flow vapor outlet A516
18-1207	Methanation compressor 3rd stage suction separator	11'6" ID x 30'0" TT	126	100	Split flow vapor outlet CS CA 1/8"
18-1208	Methanator effluent condensate separator	7'0" ID x 17'0" TT	313	132	Split flow vapor outlet CS CA 1/8"
18-1209	SNG compressor suction separator	7'0" ID x 18'0" TT	284	120	Split flow vapor outlet CS CA 1/8"

Table 13-9 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Vessels					
18-1210	SNG compressor 2nd stage suction separator	5'6" ID x 15'0" TT	536	100	Split flow vapor outlet CS CA 1/8"
18-1211	SNG compressor 2nd stage discharge separator	5'0" ID x 13'6" TT	1,002	100	Split flow vapor outlet CS CA 1/8"
18-1212	Deethanizer compressor suction separator	6'6" ID x 16'6" TT	5	95	Split flow vapor outlet CS CA 1/8"
18-1213	Deethanizer compressor 2nd stage suction separator	4'0" ID x 13'6" TT	54	100	Split flow vapor outlet CS CA 1/8"
18-1214	Deethanizer accumulator	4'0" ID x 14'0" TT	196	26	A516 CA 1/8"
18-1215	Depropanizer accumulator	4'6" ID x 15'6" TT	178	100	A285C CA 1/8"
18-1216	Debutanizer accumulator	2'6" ID x 8'6" TT	62	100	CS 1/8" CA

Table 13-9 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Exchangers					
18-1301	Regeneration heater	8.89 x 10 <sup>6</sup> Btu/hr, 385 ft <sup>2</sup> 1 shell, 16"/16'	600 1,071	689 SH 440 T	A285C A285C
18-1302	Regeneration cooler	9.96 x 10 <sup>6</sup> Btu/hr, 1,010 ft <sup>2</sup> 1 shell, 26"/16'	50 1,066	115 SH 440 T	CS B111-443
18-1303	Methanation compressor 1st stage discharge intercooler	31.46 x 10 <sup>6</sup> Btu/hr, 10,640 ft <sup>2</sup> 2 shells, 42"/20'	42 50	292 SH 115 FT	CS B111-443
18-1304	Methanation compressor 2nd stage discharge intercooler	23.66 x 10 <sup>6</sup> Btu/hr, 8,600 ft <sup>2</sup> 2 shells, 38"/20'	131 50	247 SH 115 FT	CS B111-443
18-1305	Methanation feed/effluent exchanger	81.32 x 10 <sup>6</sup> Btu/hr, 14,950 ft <sup>2</sup> 1 shell, 48"/40'	382 335	600 SH 690 T	A285C A285C
18-1306	Methanation circulating oil boiler	143.56 x 10 <sup>6</sup> Btu/hr, 11,700 ft <sup>2</sup> 2 shells, 46"/20'	481 1,250	690 SH 574 FT	A285C CS tubes
18-1308	Methanation effluent air cooler	53.00 x 10 <sup>6</sup> Btu/hr, 244,606 ft <sup>2</sup> 2 bays, 21.2' x 40' 2 fans @ 40 hp	323	305 FT	CS

Table 13-9 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Exchangers					
18-1311	Polish methanation feed/effluent exchanger	130.94 x 10 <sup>6</sup> Btu/hr, 89,440 ft <sup>2</sup> 4 shells, 54"/60'	312 297	804 SH 840 T	CS 1/8" CA CS tubes
18-1313	Polish methanation air cooler	11.76 x 10 <sup>6</sup> Btu/hr, 130,050 ft <sup>2</sup> 1 bay, 22.5' x 40' 2 fans @ 40 hp	291	181 FT	CS
18-1314	Deethanizer compressor 1st stage discharge intercooler	3.62 x 10 <sup>6</sup> Btu/hr, 1,900 ft <sup>2</sup> 1 shell, 30"/16'	54 50	229 SH 115 FT	CS 1/8" CA B111-443
18-1315	SNG compressor 1st stage discharge intercooler	23.10 x 10 <sup>6</sup> Btu/hr, 6,566 ft <sup>2</sup> 2 shells, 54"/16'	50 541	115 SH 255 FT	CS 1/4" CA B111-445
18-1316	SNG compressor 2nd stage discharge cooler	18.48 x 10 <sup>6</sup> Btu/hr, 5,640 ft <sup>2</sup> 2 shells, 50"/16'	50 1,005	115 SH 211 FT	CS 1/4" CA B111-445
18-1317	Deethanizer condenser	8.82 x 10 <sup>6</sup> Btu/hr, 1,230 ft <sup>2</sup> 1 shell, 72"/16'	7 201	-40 SH .55 FT	A516 1/16" CA CS
18-1318	Deethanizer reboiler	15.29 x 10 <sup>6</sup> Btu/hr, 4,580 ft <sup>2</sup> 1 shell, 72"/20'	205 170	141 SH 350 FT	A285C A285C
18-1319	Deopropanizer condenser	16.30 x 10 <sup>6</sup> Btu/hr, 18,710 ft <sup>2</sup> 2 shells, 58"/20'	50 185	100 SH 105 FT	A285C B111-445



Table 13-9 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Exchangers					
18-1320	Depropanizer reboiler	16.61 x 10 <sup>6</sup> Btu/hr, 1,420 ft <sup>2</sup> 1 shell, 48"/16'	187 175	191 SH 499 FT	A285C CA 1/8" A285C
18-1321	Debutanizer condenser	8.13 x 10 <sup>6</sup> Btu/hr, 9,000 ft <sup>2</sup> 3 shells, 34"/20'	50 67	115 SH 123 FT	A285C CA 1/8" B111-443
18-1322	Debutanizer reboiler	6.68 x 10 <sup>6</sup> Btu/hr, 540 ft <sup>2</sup> 1 shell, 36"/16'	71 180	266 SH 546 FT	CS 1/8" CA CS tubes
Furnaces					
18-1401	Liquid phase methanator startup heater	27.1 x 10 <sup>6</sup> Btu/hr	370	600	CS 1/8" CA
18-1402	Polish methanation startup heater	43.7 x 10 <sup>6</sup> Btu/hr	307	804	CS 1/8" CA
Pumps					
18-1501/2	Deethanizer liquid feed pump and spare	350 gpm, 75 hp, 1,750 rpm	224	-37	A352 1/16" CA
18-1503	Methanation compressor condensate pump	15 gpm, 0.75 hp, 1,150 rpm	21	95	API S-1
18-1504/5	Methanation circulating oil pump and spare	9,160 gpm, 900 hp, 1,750 rpm	486	680	API S-4

Table 13-9 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Pumps					
18-1506	Deethanizer compressor No. 1 condensate pump	15 gpm, 3 hp, 750 rpm	215	95	API S-1
18-1507	Deethanizer compressor No. 2 condensate pump	15 gpm, 3 hp, 750 rpm	216	100	API S-1
18-1508/9	Deethanizer reflux pump & spare	260 gpm, 7.50 hp, 3,600 rpm	225	26	API S-4
18-1510/11	Depropanizer overhead pump & spare	560 gpm, 15 hp, 3,600 rpm	202	100	API S-1
18-1512/13	Debutanizer overhead pumps	220 gpm, 5 hp, 3,600 rpm	87	100	API S-1
Compressors					
18-1801	Methanation compressor	169.2 x 10 <sup>6</sup> SCFD, 8,700 rpm 36,000 hp turbine	382	292	CS
18-1802	SNG compressor	157.7 x 10 <sup>6</sup> SCFD, 22,500 rpm 13,000 hp turbine	1,005	255	4140
18-1803	Deethanizer feed compressor	13.6 x 10 <sup>6</sup> SCFD, 22,500 rpm 2,310 hp turbine	203	254	4140
18-1804	SNG spiking compressor	15.3 x 10 <sup>6</sup> SCFD	1,010	168	CS reciprocating

Table 13-9 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Reactors					
18-2502	Zinc oxide guard	6'0" ID x 11'0" TT	370	600	CS 1/8" CA
18-2503	Liquid phase methanator	12'6" ID x 59'0" TT	365	690	CS 1/8" CA
18-2504	Polish methanator	6'4" ID x 20'0" TT	307	840	A515 1/8" CA

Table 13-10 - Major Equipment Summary  
Unit 19 - Methanation

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Vessels					
19-1201	Hydrogen K.O. drum	2'0" ID x 8'0" TT	1,020	100	CS 1/8" CA
Exchangers					
19-1301	Feed-effluent exchanger	3.5 x 10 <sup>6</sup> Btu/hr, 120 ft <sup>2</sup> 1 shell, 7.44"/20'	1,035 1,025	525 SH 850 T	C-1/2 Mo 1/8" CA I 1/4 Cr - 1/2 Mo
19-1302	Effluent cooler	4.0 x 10 <sup>6</sup> Btu/hr, 9,048 ft <sup>2</sup> 1 bay 8.8' x 16', 2 fans @ 5 hp	1,023	450 T	CS tubes
Reactors					
19-2501	Methanator	3'0" ID refractory x 13'0" TT	1,035	850	A516-70 1/8" CA refractory lined

Table 13-11 - Major Equipment Summary  
Unit 20 - Process Gasifier

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Vessels					
20-1201	Gasifier steam drum	16'0" ID x 40'0" TT	985	545	A516-70 304L Clad
20-1202	Slag slurry receiver	9'0" ID x 20'0" TT	10	160	CS 1/4" CA
Exchangers					
20-1301	Steam superheater	226.8 x 10 <sup>6</sup> Btu/hr, 6,600 ft <sup>2</sup> 1 shell, 86"/18'	985	1,050 SH 910 1,700 T	A516-70 refrac. lined Shell & Chan., Incoloy 800 Gr2
20-1302	Oxygen preheater	35.4 x 10 <sup>6</sup> Btu/hr, 1,440 ft <sup>2</sup> 1 shell, 84"/6'	985	600 SH 910 1,500 T	A516-70 304SS Clad 321 SS
20-1303	Quench water air cooler	76.5 x 10 <sup>6</sup> Btu/hr, 462,225 ft <sup>2</sup> 12 bays 12.7' x 32' 2 fans @ 25 hp	990	160 T	CS 1/4" CA

Table 13-11 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Pumps					
20-1501/2	Water circulation pump & spare	6,650 gal/min	1,035	545	API A-7
20-1503/4	Blowdown pump & spare	93 gal/min	1,030	545	API A-7
20-1505/6	Slag quench circ. pump & spare	4,500 gal/min	1,005	160	API A-7
20-1507/8	Slag slurry removal pump & spare	787 gal/min	60	160	API S-6
Boilers					
20-1601	Steam boiler	543.9 x 10 <sup>6</sup> Btu/hr, 14,994 ft <sup>2</sup> 2 shells, 90"/40'	985	545 SH 1,470 T	A516-70 321 SS Clad 321SS
Material Handling Equipment					
20-2001/2/3/4	High pressure coal feeder	3,350 TPD ea, 10,000 TPD total 4,000 hp ea	985	500	Special Design - SS
20-2005	Recycle char feeder	415,600 lb/hr, 20 hp 16 rpm	979	945	SS Feeder - Hopper A387 Gr.22, 321SS Clad

Table 13-11 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Procss. (psig)	Temp (°F)	
Other Major Equipment					
20-2201	Char cyclone	32.6 x 10 <sup>6</sup> SCFH	979	945	CS 1/4" CA, refrac. lined.
20-2202/3	Dust filter and spare	32.6 x 10 <sup>6</sup> SCFH	972	945	CS 1/4" CA, refrac. lined.
20-2204	Slag lump remover	4,500 gpm	1,000	160	SS316
20-2205	Quenched slag hydroclone	4,500 gpm	997	160	CS 1/4" CA
Reactors					
20-2501	High pressure gasifier (incl. slag quench section)	9'9" ID x 10'0" TD Ref. x 104'0" TT	985	3,000 bottom 1,700 top	A387 Gr. II refractory lined

Table 13-12 - Major Equipment Summary  
Unit 21 - Shift Conversion

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Vessels					
21-1201	Feed gas quench pot	9'0" ID x 30'0" TT	965	945	C 1/2 Mo-304L overlay
21-1202	First shift reactor quench pot	9'0" ID x 30'0" TT	955	855	C 1/2 Mo-304L overlay
21-1203	Second shift reactor quench pot	9'6" ID x 30'0" TT	945	660	CS-304L overlay
21-1204	High temp condensate separator	21'0" ID (sphere)	933	400	CS-304L Clad
21-1205	Int. temp condensate separator	18'0" ID (sphere)	929	302	CS-304L Clad
21-1206	Low temp condensate separator	16'0" ID (sphere)	925	100	CS-304L Clad
Exchangers					
21-1301	Boiler feed water preheater	32.3 x 10 <sup>6</sup> Btu/hr, 2,940 ft <sup>2</sup> 1 shell, 64"/14'	933	340 SH	CS
21-1302	Shift gas air cooler	206.6 x 10 <sup>6</sup> Btu/hr, 1,068,000 ft <sup>2</sup> 8 bays 21' x 40', 2 fans @ 40 hp	944	400 T	CS-304L Clad
			928	302 T	304SS



Table 13-12 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Exchangers					
21-1303	Shift gas water trim cooler	26.5 x 10 <sup>6</sup> Btu/hr, 17,700 ft <sup>2</sup> 3 shells, 60"/20'	927	120 T	316SS
Pumps					
21-1501/02	High temp cond. pump & spare	930 gpm, 50 hp	990	400	API A-7
21-1503/04	Int. temp cond. pump & spare	994 gpm, 40 hp	990	302	API A-7
21-1505/06	Low temp cond. pump & spare	500 gpm, 20 hp	950	100	API A-7
Boilers					
21-1601	170-psia waste heat boiler	639.3 x 10 <sup>6</sup> Btu/hr, 34,488 ft <sup>2</sup> 2 shells, 72"/60'	155	368 SH 610 T	CS 430SS
21-1602	40-psia waste heat boiler	482.5 x 10 <sup>6</sup> Btu/hr 54,220 ft <sup>2</sup> 2 shells, 70"/60'	25	267 SH 396 T	CS 304SS
21-1603	25-psia waste heat boiler	97.4 x 10 <sup>6</sup> Btu/hr, 23,547 ft <sup>2</sup> 3 shells, 96"/20'	10	240 SH 302 T	CS

Table 13-12 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Separation Equipment					
21-2201/02	Water filters	1,000 gpm total	1,000	400	CS 1/4" CA Pkg. unit w/valves
22-2203/04	Water filters	1,000 gpm total	1,000	400	CS 1/4" CA Pkg. unit w/valves
Reactors					
21-2501	First shift reactor	30'0" ID refractory (sphere)	965	850	C 1/2 Mo 304L overlay refractory lined
21-2502	Second shift reactor	30'0" D (sphere)	955	660	C 1/2 Mo 304L overlay
21-2503	Third shift reactor	30'0" D (sphere)	945	610	C 1/2 Mo 304L overlay

Table 13-13 - Major Equipment Summary  
Unit 24 - Fuel Gas Gasifier

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Vessels					
24-1201	Gasifier steam drum	7'0" ID x 20'0" TT	1,205	569	A516 1/8" CA
24-1202	1,200-psig steam drum	10' ID x 48' TT	1,205	569	SA285C 1/8" CA
24-1203	150-psig steam drum	6'8" D x 40' TT	155	368	A116 1/8" CA
24-1204	25-psig steam drum	5'0" x 40'0" TT	30	267	A516 1/8" CA
24-1205	Condensate drum	25'0" ID x 50'10" TT	22	100	A516 1/8" CA
Exchangers					
24-1301	Quench water air cooler	3.0 x 10 <sup>6</sup> Btu/hr, 216,500 ft <sup>2</sup> 2 bays, 22' x 40', 4 fans @ 40 hp	15	160	CS
24-1302	Air/fuel gas exchanger No. 1	338.0 x 10 <sup>6</sup> Btu/hr, 55,695 ft <sup>2</sup> 3 shells, 144'/30'	34 29	1,231 SH 1,800 T	SA285C 1/4" CA SS321 refract. lined
24-1303	Fuel gas - 1,200-psi steam generator	502.0 x 10 <sup>6</sup> Btu/hr, 55,000 ft <sup>2</sup> 2 shells, 128'/40'	1,205 28	569 SH 1,400 T	SA285C 1/4" CA 521SS
24-1304	Air/fuel gas exchanger No. 2	137.0 x 10 <sup>6</sup> Btu/hr, 75,440 ft <sup>2</sup> 2 shells, 144'/60'	36 27	580 SH 780 T	SA285C 1/4" CA 521SS

Table 13-13 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Exchangers					
24-1305	Fuel gas - 150-psi steam generator	160 x 10 <sup>6</sup> Btu/hr, 88,500 ft <sup>2</sup> 2 shells, 136"/44'	155 26	368 SH 600 T	A516 1/8" CA CS
24-1306	Fuel gas - 25-psi steam generator	83.0 x 10 <sup>6</sup> Btu/hr, 61,360 ft <sup>2</sup> 2 shells, 132"/44'	30 25	267 SH 400 T	A516 1/8" CA CS
24-1307	Fuel gas air cooler	176.3 x 10 <sup>6</sup> Btu/hr, 734,428 ft <sup>2</sup> 6 bays, 21' x 40', 12 fans @ 40 hp	24	300	CS CS
24-1308	Fuel gas water cooler	48.0 x 10 <sup>6</sup> Btu/hr 2 shells, 120"/40'	50	110	SH A516 Y8' CA T CS
Pumps					
24-1501/2	BFW circulating pump	2,240 gpm, 100 hp	45	569	SS
24-1503/4	Slag quench circulating pump	8,800 gpm, 125 hp	45	160	Ni-iron case & impeller
24-1503	Condensate pump	150 gpm, 1-1/2 hp	20	100	SS
Compressors and Blowers					
24-1801/2	Fuel gasifier air compressor	27,300 bhp, 308.9 x 10 <sup>6</sup> SCFD	20	298	CS

Table 13-13 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Materials Handling Equipment					
24-2001/2/3	Coal feeders zone 2	85 TPH, 75 hp	30	100	Screw feeder CS - stellite lined
25-2004/5/6	Coal feeders zone 1	35 TPH, 50 hp	30	100	Screw feeder CS - stellite lined
24-2007	Char conveyor	208.4 TPH, 150 hp	30	1,800	Gas-propelled entrained piped system
24-2008	Slag settler conveyor	63.0 TPH, 10 hp	0	120	Chain-driven flight conveyor
24-2009	Slag settler elevator	63.0 TPH, 25 hp	0	120	Chain-driven flight conveyor
24-2010	Dust conveyor	11.87 TPH, 5 hp	22	100	CS - rotary gate
Separation Equipment					
24-2201	Char cyclone	880 x 10 <sup>6</sup> SCFD	30	1,800	CS refractory lined
24-2202	Electrostatic precipitator	880 x 10 <sup>6</sup> SCFD gas 11.9 TPD solids	22	100	CS

Table 13-13 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Reactors					
24-2501	Fuel gas gasifiers	44'0" ID ref. x 14'10" ID x 185'6 TT	30	2,500	CS outer shell CS cooling tube membrane SS inner membrane refractory lining
Sumps					
24-3201	Slag slurry sump	15' x 50' x 10' deep	0	120	Concrete

Table 13-14 - Major Equipment Summary  
Unit 26 - Sour Water Treating

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Columns					
26-1101	Stripper	8'0" ID x 103'6" TT 45 trays	16.5	252	Shell A286 Trays 304L SS
26-1151	Ammonia absorber	5'6" ID x 36'0" TT 12 trays	15	212	Shell A286 Trays 304L SS
26-1152	Ammonia stripper	7'0" ID x 60'0" TT 24 trays	225	437	Shell A516 304L SS Clad Trays 304 SS
26-1153	Ammonia fractionator	5'0" ID x 60'0" TT 24 trays	300	428	Shell A516 304L SS Clad Trays 304 SS
Vessels					
26-1201	Ammonia-sulfide water feed drum	8'0" ID x 33'0" TT	5	108	A285C
26-1202	Hydrocarbon accumulator	3'0" ID x 6'0" TT	15	108	A285C
26-1204	Reboiler condensate pot	3'0" ID x 3'6" TT	5	228	A285C
26-1251	Phosphoric acid tank	8'0" ID x 30'0" TT	0	amb	316 SS CA 5/52"

Table 13-14 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Vessels					
26-1252	Flash drum	5'0" ID x 9'0" TT	300	428	A-516 CA 1/8"
26-1253	Caustic feed tank	8'0" ID x 30'0" TT	0	amb	A-516 CA 1/8"
26-1254	Ammonia fractionator feed drum	5'0" ID x 60'0" TT	300	428	A-516 - 304L SS Clad
26-1255	Ammonia reflux drum	2'0" ID x 3'6" TT	300	428	304L SS
Heat Exchangers					
26-1302	Reboiler	54.04 MM Btu/hr 6830 ft <sup>2</sup> 1 shell	17 50	252 SH 298 T	A-285 C Titanium
26-1351	Solution exchanger	530 ft <sup>2</sup> 1 shell	75 225	428 528	304L SS CA 3/32" 304L SS CA 1/8" Except tubes
26-1352	Solution cooler	45,000 ft <sup>2</sup> 1 shell	75 225	428 428	CS CA 3/32" 304L SS CA 3/4" Except tubes
26-1353	Ammonia stripper Condenser	4,320 ft <sup>2</sup> 1 shell	225 225	428 SH 428 T	304L SS CA 3/32" 304L SS CA 1/8" Except tubes



Table 13-14 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Heat Exchangers					
26-1354	Ammonia stripper Cooler	1 shell 2,000 ft <sup>2</sup>	75 225	428 SH 428 T	CS CA 3/32" 304L SS CA 3/32" Except tubes
26-1355	Ammonia stripper Reboiler	1 shell 1,180 ft <sup>2</sup>	605 225	500 SH 428 T	CS CA 1/8" 304L SS CA 3/32" Except tubes
26-1356	Ammonia condenser	1 shell 4,750 ft <sup>2</sup>	300 75	428 SH 428 T	CS CA 3/32" Except tubes
Pumps and Drivers					
26-1501	Ammonia water feed pump	616 gpm, 30 hp	75	108	CS
26-1502, 03	Stripper feed pump & spare	616 gpm, 20 hp	80	108	CS
26-1504, 05	Product water pump & spare	606 gpm, 525 hp	1,200	252	CS
26-1508	Recovered hydrocarbon pump	60 gpm, 5 hp	65	108	CS
26-1551	Phosphoric acid pump	10 gpm, 1-1/2 hp	25	100	516 SS

Table 13-14 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Pumps and Drivers					
26-1552, 53	Absorber solution cooler pump & spare	640 gpm, 60 hp	20	100	304 SS
26-1554, 55	Rich solution pump & spare	605 gpm, 200 hp	300	212	304 SS
26-1556	Caustic pump	0-17 gpm, 2 hp	280	amb	304 SS Teflon diaphragm
26-1557, 58	Fractionator feed pump & spare	145 gpm, 20 hp	140	428	304 SS
26-1559, 60	Fractionator reflux pump & spare	95 gpm, 7-1/2 hp	75	428	CS Case, 304 SS Impeller
Tanks					
26-1901	Feed surge tank	55'0" ID x 48'0" high		Ambient	CS, floating roof API standard

Table 13-15 - Major Equipment Summary  
Unit 29 - Product Tankage

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Exchangers					
29-1301	Wash oil line heater		20	550	
29-1302	Process solvent line heater		20	550	
29-1303/4	Propane line cooler		20	-40	
29-1305/6	Butane line cooler		20	30	
29-1307/8/9	Fuel oil suction heater		atm	200	
Pumps					
29-1501	Wash oil circulating pump	400 gpm	20	550	API S-1
29-1502	Process solvent circulating pump	200 gpm	20	550	API S-1
29-1503/4	Propane LPG loading pump & spare	500 gpm	40	-40	API S-1
29-1505/6	Butane LPG loading pump & spare	500 gpm	40	30	API S-1
29-1507	Naphtha transfer pump	500 gpm	40	90	API S-1

Table 13-15 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Pumps					
29-1508/9	Naphtha loading pump & spare	1,000 gpm	40	90	API S-1
29-1510/11	Fuel oil loading pump & spare	4,000 gpm	40	130	API S-1
29-1901	Wash oil tank	55'0" sphere, 15,000 bbl	4"H <sub>2</sub> O	550	CS 1/8" CA insulated N <sub>2</sub> blanket
29-1902/3	Process solvent tank	65'0" sphere 25,000 bbl ea	4"H <sub>2</sub> O	550	CS 1/8" CA insulated N <sub>2</sub> blanket
29-1904/5	Propane LPG tank	90' x 80' high 90,000 bbl ea	atm	-40	A537 GrA 1/8" CA (inner) double wall, cone roof Perlite insulation API standards
29-1906/7	Butane LPG tank	80' x 80' high 63,000 bbl ea	atm	30	A516-70 1/8" CA (inner) double wall, cone roof Perlite insulation API standards

Table 13-15 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
29-1908	Naphtha rundown tank	45' x 40' high 11,000 bbl	atm	90	CS 1/8" CA floating roof
29-1910/11	Naphtha storage tank	160' x 48' high 165,000 bbl ea	atm	90	CS 1/8" CA floating roof
29-1912/13/14	Fuel oil tank	300' x 48' high 600,000 bbl ea	4"H <sub>2</sub> O	130	CS 1/8" CA cone roof, insulated N <sub>2</sub> blanket
Other Major Equipment					
29-2801	LPG refrigeration unit (Pkg.)				

Table 13-16 - Major Equipment Summary  
 Unit 30 - Plant Air and Instrument Nitrogen

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
30-1201	Nitrogen storage	10'-0" x 25'-0" TT	300	150	A515-70 CA 1/8
30-1202	Air storage	10'-0" x 25'-0" TT	125	150	A516 CA 1/8
30-1801	Plant air compressor and driver	20,000 acf/m 4,200 hp	125	150	Case C.S. Imp Al
30-1802	Plant air compressor and turbine	20,000 acf/m 4,200 hp	125	150	Case C.S. Imp Al
30-1803	Nitrogen compressor	500 acf/m 160 hp	300	150	Reciprocating CS

Table 13-17 - Equipment List  
Unit 31 - Raw Water Treating

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Process Feeders					
31-0501	Lime feeder	2 motors 1 hp ea	atm	60	Rotary gate and weigh belt
31-0502	Aluminum feeder	2 motors 1 hp ea	atm	60	Rotary gate and weigh belt
31-0503	Electrolyte feeder	1/4 hp	atm	60	Diaphragm pump
Packaged Plants					
31-0801	Water filters with backwash controls	3,025 gpm	10	60	CS shell 316 SS internals
31-0802	Deminerlizer with chemicals feeders and controls	3,000 gpm	10	60	Manufacturers standard
Vessels					
31-1201	Deminerlizer acid tank	6' ID x 10'	atm	60	CS 1/8" CA
31-1202	Deminerlizer caustic tank	6' ID x 10'	atm	60	CS 1/8" CA
31-1203	Potable water storage tank	8" ID x 14'	atm	60	CS epoxy-lined

Table 13-17 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (ft)	Temp (°F)	
Pumps and Drivers					
31-1501/2/3	River water pump	8,620 gpm 200 hp	100	60	CI-Vertical
31-1504/5	River water sludge pump	185 gpm 7-1/2 hp	100	60	CI
31-1506	Backwash water pump	350 gpm 5 hp	30	60	CI
31-1507	Vacuum filter feed pump	730 gpm 10 hp	30	60	CA6NM case & impeller
31-1508	Vacuum filter recycle pump	670 gpm 7-1/2 hp	30	60	CI
31-1509	Water filter feed pump	3025 gpm 85 hp	100	60	CI-vertical <sup>a</sup>
31-1510/11	Process water pump	400 gpm 25 hp	230	60	CI-vertical <sup>a</sup>
31-1512/13	Cooling tower makeup pump	14,513 gpm 180 hp	50	60	CI-vertical <sup>a</sup>
31-1514/15	Filtered water pump	3025 gpm 100 hp	100	60	CI
31-1516	Deep well pump	250 gpm 10 hp	130	60	CI-vertical
31-1517/18	Potable water pump	50 gpm 5 hp	230	60	CI
31-1519/20	Demineralized water pump	300 gpm 450 hp	460	60	316 SS
31-1521/22	Gen. service backwash pump	1,000-gpm 25 hp	50	60	CI

<sup>a</sup>Note: 1509 through 1513 are vertical pumps in Clearwell.



Table 13-17 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
31-1901	Lime storage tank	25' ID x 10' high	atm	60	CS, 60° cone bottom
31-1902	Aluminum storage tank	20' ID x 9' high	atm	60	CS, 60° cone bottom
31-1903	Electrolyte storage tank	30' ID x 24' high	atm	60	CS, cone roof epoxy-lined
31-1904/5	Clarifier tank	200' ID x 15' deep	atm	60	Concrete
31-1906	Clearwell	50' square x 20' deep	atm	60	Concrete with cover
31-1907	Backwash water tank	25' ID x 28'	atm	60	CS, epoxy-lined
31-1908	Filtered water tank	125' ID x 30'	atm	60	CS, epoxy-lined cone roof
31-1909	Neutralizer tank	40' x 40' x 10' deep	atm	60	Concrete
31-1910/11	Demineralized water tank	125' ID x 30'	atm	60	CS, epoxy-lined cone roof
31-1912	Sludge holding tank	25' ID x 20'	atm	60	CS, epoxy-lined
31-1913	River water sedimentation basin	216' x 648' x 16' deep	atm	60	Concrete

Table 13-17 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Separation Equipment					
31-2201/2	Clarifier mechanism	200' dia 25 hp	atm	60	Manufacturers standard
31-2203	River water screen	16,000 gpm 10' hp	atm	60	Manufacturers standard
31-2204	Vacuum filter	655 gpm 10 hp	atm	60	Manufacturers standard
Agitators and Mixers					
31-2401	Sludge tank mixer	10 hp	atm	60	316 SS impeller and shaft
31-2402	Neutralizer tank mixer	10 hp	atm	60	316 SS impeller and shaft
Other Major Equipment					
31-2801	River water splitter	16,133 gpm	atm	60	CS

Table 13-18 - Major Equipment Summary  
Unit 32 - Steam and Power Generation

Item Number	Description	Size	Operating		Material and Remarks
			Press (psig)	Temp (°F)	
Power Generators and Drivers					
32-0101/02	Turbine driver	110.0 MW	1,200	950	Extracting at 600, 300 & 150 psig; 2.5 inches Hg abs. condensing
32-0103/04	Generator	110,000 kW, 0.85 PF, 13.8 kV, 60 Hz			
Vessels					
32-1201/02/03/04	Blow-down tank	5'0" ID x 15'0" TT	1,200	570	A516 1/16" CA
Exchangers					
32-1301/02	Power turbine condenser	613.7 x 10 <sup>6</sup> Btu/hr 85,640 ft <sup>2</sup>	2.5" Hg abs 50	109 SH 104 T	Surf. Cond. CS 1/16" CA CS
32-1303/04	Heater No. 1	153.9 x 10 <sup>6</sup> Btu/hr	600 1,200	768 SH 484 T	CS 1/8" CA CS

Table 13-18 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Exchangers					
32-1305/06	Heater No. 2	112.0 x 10 <sup>6</sup> Btu/hr	300 1,200	619 SH 393 T	CS 1/8" CA CS
32-1307/08	Deaerator	535.3 x 10 <sup>6</sup> Btu/hr	150	366	CS 1/8" CA
32-1309/10	Process steam superheater	138.5 x 10 <sup>6</sup> Btu/hr	1,200	450	A 106 1/16" CA
32-1311	Condenser for 18-1801	176.3 x 10 <sup>6</sup> Btu/hr 24,600 ft <sup>2</sup>	2.5" Hg abs 50	109 SH 104	Surface Condenser CS 1/8" CA T B111-443
32-1312	Condenser for 23-1801	176.3 x 10 <sup>6</sup> Btu/hr 24,600 ft <sup>2</sup>	2.5" Hg abs 50	109 SH 104 T	Surface Condenser CS 1/8" CA T B111-443
32-1313	Condenser for 23-1803	413.7 x 10 <sup>6</sup> Btu/hr 57,730 ft <sup>2</sup>	2.5" Hg abs 50	109 SH 104 T	Surface Condenser CS 1/8" CA T/B111-443
32-1314	Condenser for 24-1801	267.3 x 10 <sup>6</sup> Btu/hr 37,300 ft <sup>2</sup>	2.5" Hg abs 50	109 SH 104 T	Surface Condenser CS 1/8" CA T B111-443

Table 13-18 (Contd)

Item Number	Description	Size	Operating		Material and Remarks	
			Press. (psig)	Temp (°F)		
Exchangers						
32-1315	Condenser for 18-1802	82.4 x 10 <sup>6</sup> Btu/hr 11,500 ft <sup>2</sup>	2.5' Hg abs 50	109 SH 104 T	Surface Condenser CS 1/8" CA T B111-443	
32-1316	Condenser for 18-1803	14.0 x 10 <sup>6</sup> Btu/hr 1,954 ft <sup>2</sup>	2.5' Hg abs 50	190 SH 104 T	Surface Condenser CS 1/8" CA T B111-443	
32-1317	Condenser for 22-1803	100.8 x 10 <sup>6</sup> Btu/hr 14,070 ft <sup>2</sup>	2.5' Hg abs 50	190 SH	Surface Condenser CS 1/8" CA T B111-443	
Pumps						
32-1501/2/3/4	Generator condensate pump & spare	1,400 gpm	210 hp	200	109	API S-1
32-1505/6/7/8	Boiler feed water pump & spare	4,100 gpm	4,200 hp	1,500	366	API S-1
32-1509/10	18-1801 cond. pump & spare	380 gpm	60 hp	200	109	API S-1
32-1511/12	23-1801 cond. pump & spare	380 gpm	60 hp	200	109	API S-1

Table 13-18 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Pumps					
32-1513/14	23-1803 cond. pump & spare	890 gpm 135 hp	200	109	API S-1
32-1515/16	24-1801 cond. pump & spare	680 gpm 100 hp	200	109	API S-1
32-1517/18	18-1802 cond. pump & spare	177 gpm 30 hp	200	109	API S-1
32-1519/20	18-1803 cond. pump & spare	30 gpm 10 hp	200	109	API S-1
32-1521/22	22-1803 cond. pump & spare	217 gpm 35 hp	200	109	API S-1
Boilers					
32-1601/2/3/4	Boiler	853.4 x 10 <sup>6</sup> Btu/hr (absorbed)	1,200	950	A178, A179 Tubes in general section low alloy in superheater A516 drums

Table 13-19 - Major Equipment Summary  
 Unit 34 - Effluent Water Treatment

Item Number	Description	Size	Operating		Material and Remarks
			Press. (ft)	Temp (°F)	
Package Plants					
34-0802	Sewage treatment plant	80,000-gpd capacity			Manufacturers standard
Vessels					
34-1201	Oily water separator	13' x 25'	atm	60	CS
Pumps and Drivers					
34-1501/2	Sanitary lift pump	100 gpm	50	60	CI vertical turbine
34-1503/4	Separated oil pump	30 gpm	650	60	CS reciprocating
34-1505/6	Separated water pump	50 gpm	30	60	CI
34-1507/8	Neutralizer lift pump	4,200 gpm	30	60	CI vertical turbine
34-1509/10	Skimmer pump	50 gpm	30	60	CS
34-1511	Fire water pump (motor drive)	4,000 gpm	290	60	CI vertical turbine
34-1512	Fire water pump (turbine drive)	4,000 gpm	290	60	CI vertical turbine

Table 13-19 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (ft)	Temp (°F)	
Pumps and Drivers					
34-1513	Fire water pump (diesel drive)	4,000 gpm	290	60	CI vertical turbine
34-1514	Fire system jockey pump	50 gpm	230	60	CI reciprocating
Separation Equipment					
34-2201	API separator		atm	60	Concrete
34-2202	Settler-clarifier	400,000-gal capacity	atm	60	Concrete basin manufacturers standard internals
Other Major Equipment					
34-2801	Storm water pond roll skimmer		atm	60	CS
Flotation Equipment					
34-3101/2	Floating aerators	25 hp	atm	60	CI



Table 13-19 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (ft)	Temp (°F)	
Concrete Work					
34-4101	Neutralizing basin	37' x 37' x 15' Deep			Concrete with air sparger
Civil Work					
34-5301	Oily water pond	1 acre			Excavation plastic lined
34-5302	Biopond	1 acre			Excavation plastic lined
34-5303	Final polishing pond	8 acres			Excavation plastic lined

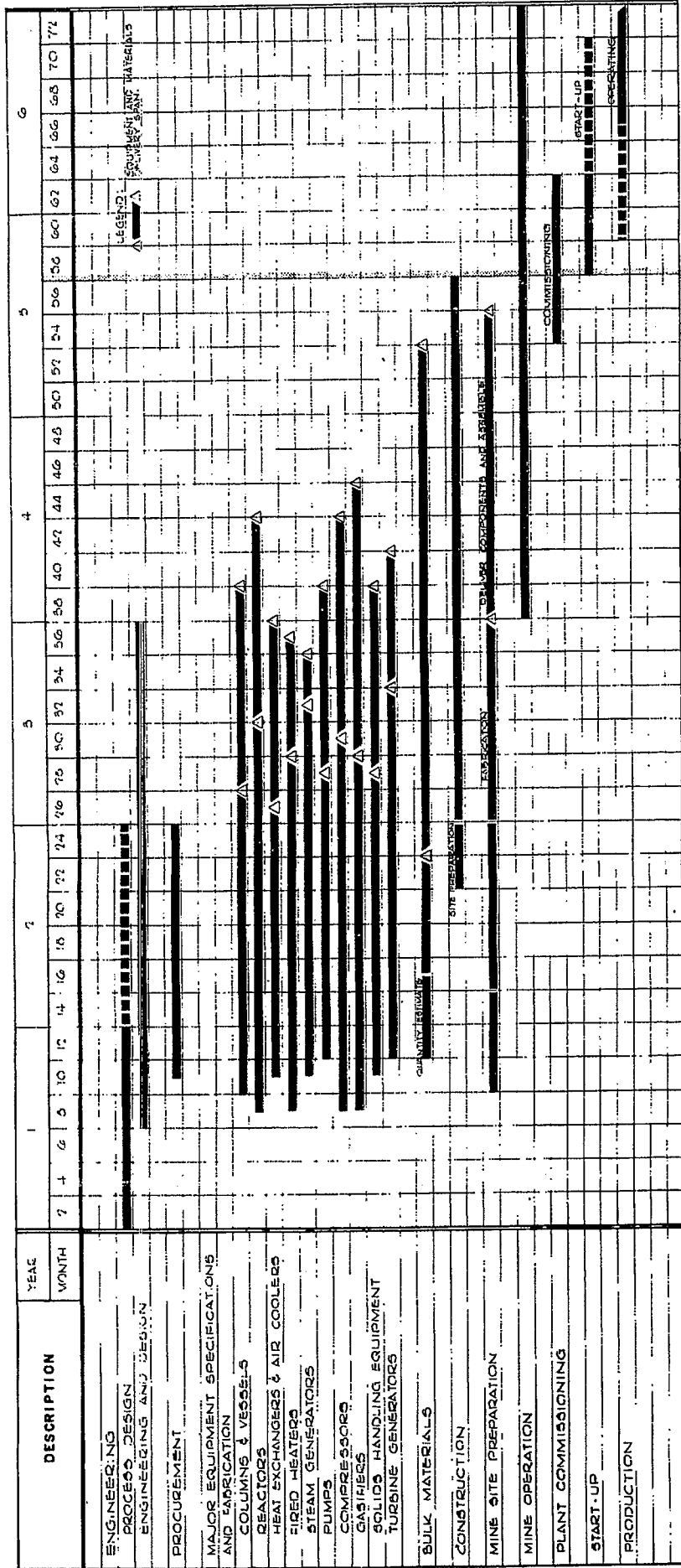
Table 13-20 - Major Equipment Summary  
Unit 35 - General Facilities

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
Package Units					
35-0801	Chemicals addition unit				Manufacturer's standard
Pumps					
35-1501 through 35-1510	Cooling water pump	50,000 gpm, 1,250 hp	45	86	CS
Cooling Towers					
35-1701	Cooling tower	4,800 MM Btu/hr, 400 Mgalpm	ambient	100 in 86 out	Concrete shell and fill Hyperbolic natural draft type
Buildings					
	Administration	36,000 ft <sup>2</sup> - 2 stories			Tilt-up concrete
	Laboratory	10,000 ft <sup>2</sup> - 1 story			Tilt-up concrete

Table 13-20 (Contd)

Item Number	Description	Size	Operating		Material and Remarks
			Press. (psig)	Temp (°F)	
		Buildings			
	Control house	15,000 ft <sup>2</sup> - 1 story			Tilt-up concrete
	Changehouse	6,000 ft <sup>2</sup> - 1 story			Tilt-up concrete
	Cafeteria	9,000 ft <sup>2</sup> - 1 story			Tilt-up concrete
	Maintenance shop	20,000 ft <sup>2</sup> - 20 ft high			Insulated metal
	Warehouse	35,000 ft <sup>2</sup> - 12 ft high			Insulated metal
	Chemicals storage	12,000 ft <sup>2</sup> - 12 ft high			Insulated metal
	Fire station	4,000 ft <sup>2</sup> - 18 ft high			Insulated metal
	First aid	2,000 ft <sup>2</sup> - 1 story			Concrete block
	Security	2,500 ft <sup>2</sup> - 1 story			Concrete block
	Operator field offices (5 required)	10,000 ft <sup>2</sup> Total - 1 story			Insulated metal
	5 guardhouses	750 ft <sup>2</sup> Total - 1 story			Insulated metal

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---COMMISSIONING

START-UP

OPERATING

NMP 350 A-1

Figure 14-1 - Project Schedule

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