

SECTION 13

MAJOR EQUIPMENT SUMMARY

The major items of equipment in all nonproprietary units are listed in Tables 13-1 through 13-21 of this section.

Items of equipment listed are shown with dimensions and/or capacity; also design pressure, temperature, and, in most cases, 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 which, on all drawings, describe the typical case.

Equipment numbers are included for all equipment. The third digit, 5 or 6, in the four-digit group denotes second-train equipment when two trains are involved.

Units 14, 20, and 21 are proprietary processes. Equipment for these and for a few packaged systems is not listed.

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

Item Number	Description	Size
9-0801-01, 02, 03, 04	Mine Pumping System	
9-1001-01, 02	Hydraulic Crane	15-ton
9-1002-01	Mobile Crane	50-ton
9-2801-01 through 10	Rotary Blasthole Drill	
9-2802-01, 02, 03, 04	Trac-Drills with Compressor	
9-3501-01, 02, 03, 04	Dragline	175-yd ³
9-3502-01, 02, 03, 04	Coal Shovel	15-yd ³
9-3505-01, 02, 03, 04	Front End Loader	
9-3601-01 through 18	Coal Hauler	120-ton
9-3602-01, 02, 03, 04	Dozer with Ripper	
9-3603-01, 02, 03	Reject Hauler	120-ton
9-3604-01, 02, 03, 04	Scraper	35-yd ³
9-3605-01 through 08	Grader	
9-3606-01, 02, 03, 04	Rubber-Tired Dozer	
9-3607-01 through 08	Track Dozer	
9-3608-01, 02, 03, 04	Sprinkler Truck	
9-3609-01, 02	Tire Truck	

Table 13-1 - Major Equipment Summary
Unit 9 - Coal Mine (Contd)

Item Number	Description	Size
9-3610-01, 02	Low Boy with Tractor	50-ton
9-3611-01, 02, 03, 04	Fuel Lube Truck	
9-3612-01 through 04	Flatbed Truck	5-ton
9-3613-01, 02, 03, 04	ANFO Truck	
9-3614-01, 02, 03, 04	Explosive Truck	
9-3615-01 through 40	Pickup Truck	
9-3616-01, 02, 03, 04	Passenger Bus	30-passenger
9-3617-01, 02, 03, 04	Welding Truck	
9-3618-01, 02, 03, 04	Electrical Truck	
9-3619-01, 02, 03	Dump Truck	10-ton

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

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
Feeders				
10-0501, 02	ROM Coal Hopper Feeder	72 in. x 40 ft	amb	CS
10-0503, 04	Coarse Coal Breaker Feeder	72 in. x 100 ft	amb	CS
10-0901	Primary Sampler		amb	CS
Pumps				
10-1501 through 1508	Primary Feed Pump	12 x 10 in. 200-hp Motor	50 psig, amb	CS Rubber-lined
10-1509 through 1512	Secondary Feed Pump	12 x 10 in. 200-hp Motor	50 psig, amb	CS Rubber-lined
10-1513 through 1520	Classifying Pump	12 x 10 in. 200-hp Motor	50 psig, amb	CS Rubber-lined
10-1521, 1522	Polishing Pump	12 x 10 in. 200-hp Motor	50 psig, amb	CS Rubber-lined
10-1523	Sump Pump	12 x 10 in. 200-hp Motor	50 psig, amb	CS Rubber-lined
10-1524	Pond Water Re-circulating Pump	12 x 10 in. 200-hp Motor	50 psig, amb	CS Rubber-lined
10-1525, 1526	Spray Bar Pump	12 x 10 in. 200-hp Motor	50 psig, amb	CS Rubber-lined

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

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
10-1801	Jig Blower	6,000 cfm	3.5 psig, amb	CS
10-1901	Water Head Tank		amb	CS Resin-coated
10-2001, 2002	Breaker Refuse Conveyor	36 in. x 100 ft	amb	
10-2003, 2004, 2005	Raw Coal Conveyor	60 in. x 1,000 ft, 12,500 ft, 1,000 ft	amb	
10-2006	Plant Refuse Conveyor	24 in. x 206 ft	amb	
10-2007	Clean Coal Conveyor	48 in. x 1,000 ft	amb	
10-2101, 2102	Rotary Breaker	14 x 30 ft, 3 in. Openings	amb	CS
10-2103	Middlings Crusher	30 x 72 in.		CS
10-2201 through 2212	Fine Coal Centrifuge	36 in.	amb	CS, 304 SS baskets
10-2273	Coarse Coal Centrifuge	48 in.	amb	CS, 304 SS baskets
10-2601, 2602	Truck Dump Hopper	400-ton, 24 in. Grizzly	amb	CS

Table 13-2 - Major Equipment Summary
Unit 10 - Coal Preparation (Contd)

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
10-2603	Plant Refuse Hopper	300-ton	amb	CS
10-2605, 2606	Breaker Refuse Hopper	300-ton	amb	CS
10-2701	Refuse Screen	8 x 20 ft SD 3/4 in. Screen	amb	CS, 304 SS media
10-2702 through 2706	Raw Coal Screen	8 x 20 ft DD 1-1/2 x 3/4 in.	amb	CS, 304 SS media
10-2707, 2708	Coarse Sieve Bend	8 ft x 32 in. 28-Mesh	amb	CS, 304 SS media
10-2709, 2710	Coarse Coal Screen	8 ft x 20 in. DD 1-1/2 in. and 28-Mesh	amb	CS, 304 SS media
10-2711 through 2716	Fine Sieve Bend	8 x 32 in. 9-Mesh	amb	CS, 304 SS media
10-2717 through 2722	Fine Coal Screen	8 x 20 ft SD 52-Mesh	amb	CS, 304 SS media
10-2723, 2724	Vibrating Grizzly	3 in. Spacing	amb	CS
10-2725 through 2728	Fine Sieve Bend	4 x 8 ft, 65-Mesh	amb	CS, 304 SS media
10-2750 through 2756	Primary Cyclone	26 in.	amb	CS Rubber-lined

Table 13-2 - Major Equipment Summary
Unit 10 - Coal Preparation (Contd)

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
Other Major Equipment				
10-2775 through 2782	Secondary Cyclone	26 in.	amb	CS Rubber-lined
10-27101 through 27196	Classifying Cyclone	10 in.	amb	CS Rubber-lined
10-27201 through 27224	Polishing Cyclone	10 in.	amb	CS Rubber-lined
10-3101	Baum Jig	225 ft ²	amb	CS Resin-coated
10-3201 through 3204	Primary Feed Sump		amb	CS Resin-coated
10-3205, 3206	Secondary Feed Sump		amb	CS Resin-coated
10-3207 through 3210	Classifying Feed Sump		amb	CS Resin-coated
10-3211	Polishing Feed Sump		amb	CS Resin-coated
10-3212	Plant Sump		amb	CS Resin-coated

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

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
11-0501, 0551 through 11-0504, 0554	Vibrating Feeder	0-225 TPH, 2-hp Motor	amb	CS
11-0901	Automatic Belt Sampler	3 in. x 0 Material 7.5-hp Motor	amb	CS
11-0902	Sample Reduction System	100-hp Motor	amb	CS
11-0903, 0953	Automatic Sampler	7.5-hp Motor	amb	CS
11-0904, 0954	Automatic Sampler	7.5-hp Motor	amb	CS
11-2001	Transfer Belt Conveyor	60 in. x 650 ft, 1,600 TPH, 100-hp Motor	amb	CS
11-2002, 2052	Stockpile Belt Conveyor	60 in. x 1,350 ft, 1,600 TPH, 125-hp Motor	amb	CS
11-2003, 2053	Belt Tripper	60 in., 1,600 TPH 20-hp Motor	amb	CS
11-2004	Plant Feed Belt Conveyor	60 in. 975 ft, 1,600 TPH, 250-hp Motor	amb	CS
11-2005, 2055	Train Feed Belt Conveyor	60 in. x 200 ft, 800 TPH, 25-hp Motor	amb	CS
11-2006, 2056	Box Belt Conveyor	48 in. x 100 ft, 10-ft Lift, 800 TPH, 20-hp Motor	amb	CS

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

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
11-2007, 2057	Box Belt Conveyor	36 in. x 100 ft, 5-ft Lift, 375 TPH, 15-hp Motor	amb	CS
11-2008, 2058	Box Belt Conveyor	36 in. x 100 ft, 5-ft Lift, 375 TPH, 15-hp Motor	amb	CS
11-2009, 2059	Belt Elevator	54 in., 110-ft Lift, 60-hp Motor	amb	CS
11-2010, 2060	Belt Elevator	54 in., 110-ft Lift, 60-hp Motor	amb	CS
11-2101, 2151 through 11-2104, 2154	4-Row Cage Mill	72 in., 400- and 600-hp Motor	amb	CS
11-2601	Bifurcated Chute	5-hp Motor	amb	CS
11-2602	Bifurcated Chute	5-hp Motor	amb	CS
11-2603, 2653	Bifurcated Chute	5-hp Motor	amb	CS
11-2604, 2654	Feed Rin	400-ton	amb	CS
11-2605, 2655	Bifurcated Feed Hopper (Double)		amb	CS
11-2606, 2656	Bifurcated Feed Hopper (Double)		amb	CS

Table 13-3 - Major Equipment Summary
 Unit 11 - Coal Storage, Grinding, and Drying (Contd)

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
11-2801, 2851	Stacking/Reclaiming Conveyor	60 in., Crawler-mounted, 300-hp Motor	amb	CS
11-2802	Bucket Wheel Reclaimer	Crawler-mounted, 900-hp Motor	amb	CS
11-2803, 2853	Hopper Mobile	50-hp Motor	amb	CS
11-2804	Belt Magnet		amb	CS
11-2805, 2855	Metal Detector		amb	CS
11-2901, 2951	Dust Collector	10,000 acfm, 10-hp Motor	amb	CS
11-2902, 2952 through 11-2905, 2955	Dust Collector	5,000 acfm, 4-hp Motor	amb	CS
11-3401, 3451	Hydro-Aire Fluidized Steam Tube Dryer System	75 x 10 x 10-ft Unit, 1,125-hp Motor	amb	CS
11-3801, 3851	Belt Scale	0-2,000 TPH	amb	CS
11-3802, 3852	Belt Scale	0-1,000 TPH	amb	CS
11-3803, 3853	Belt Scale	0-1,000 TPH	amb	CS
11-3804, 3854	Belt Scale	0-500 TPH	amb	CS
11-3805, 3855	Belt Scale	0-500 TPH	amb	CS

Table 13-4 - Major Equipment Summary
Unit 12 - Process Gasification

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
Drums				
12-1201, 1251	Steam Drum	4 ft 6 in. id x 20 ft TT (horiz.)	550 psig, 500°F	A516, 1/8 in. CA
12-1202, 1252	Slag Slurry Degasser	9 ft 0 in. id x 20 ft TT (vert.)	50 psig, 200°F	CS 1/4 in. CA
12-1203, 1253	Vent Compressor Suction Pot	6 ft 0 in. id x 18 ft TT (vert.)	50 psig, 200°F	CS 1/4 in. CA
Exchangers				
12-1501, 1351	Steam Oxygen Preheater	17.1 MM Btu/hr, 5,700 ft ² 1 Shell 48/216 in.	550 psig, 650°F-SH 550 psig, 650°F-T	CS 1/6 in. CA; 304 SS Tubes
12-1502, 1352	Steam Oxygen Superheater	40.3 MM Btu/hr, 2,300 ft ² 1 Shell 39/216 in.	550 psig, 1050°F-SH 550 psig, 750°F-T	CS 1/16 in. CA; 304 SS Tubes
12-1503, 1353	Slag Slurry Air Cooler	150 MM Btu/hr, 668,700 ft ² eight 21.6 x 40 ft Bays, 16 Motors 40 hp each	525 psig, 200°F	CS 1/4 in. CA Hdr; CS Tubes
Pumps				
12-1501, 1551	Slag Slurry Circulation Pump	4,616 gpm, 75-hp Motor	500 psi tdh, 200°F	Erosion-resistant
12-1502, 1552	Slag Slurry Circulation Pump (Spare)	4,616 gpm, 75-hp Motor	500 psi tdh, 200°F	Erosion-resistant

Table 13-4 - Major Equipment Summary
 Unit 12 - Process Gasification (Contd)

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
12-1503	Slag Slurry Pump	1,335 gpm, 250-hp Motor	250 psi tdh, 200°F	Common to Train 2
12-1504	Slag Slurry Pump (Spare)	1,335 gpm, 250-hp Motor	250 psi tdh, 200°F	Common to Train 2
12-1505, 1555	Gasifier Steam Generation Circulation Pump	2,900 gpm, 75-hp Motor	575 psi tdh, 550°F	API S-4
12-1506, 1556	Gasifier Steam Generator Circulation Pump (Spare)	2,900 gpm, 75-hp Motor	575 psi tdy, 550°F	API S-4
Other Major Equipment				
12-1802, 1852	Vent Gas Compressor	9 in. -6 in. -4 in. x 9 in., 514 rpm, 150-hp Motor acfm	485 psig, 200°F	SS Valves
12-2001, 2051	Coal Extrusion Feeder	24 in. id x 12 ft Long 2,500-hp Motor (8 Required)	550 psig, 1,000°F	CS, Abrasion-resistant Liners and Flights
12-2002, 2052	Char Extrusion Feeder	24 in. id x 8 ft Long, 750-hp Motor (8 Required)	550 psig, 1,000°F	321 SS Chrome-plated, Abrasion-resistant Liners and Flights
12-2101, 2151	Slag Crusher	15 ft long x 10 ft wide x 8 ft high, 340 rpm, 75-hp Motor	550 psig, 200°F	25-20 Cr-Ni

Table 13-4 - Major Equipment Summary
 Unit 12 - Process Gasification (Contd)

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
Other Major Equipment				
12-2201, 2251	Liquid Cyclone	30-in. dia	550 psig, 200°F	CS, Erosion-resis- tant Liners
12-2401, 2451	Slag Slurry Agitator	25-hp Motor	50 psig, 200°F	
12-2501, 2551	Gasifier	16 ft 9 in. id x 80 ft Upper Stage, 10 ft 6 in. id x 40 ft lower Stage 200 ft Overall Height	550 psig, 2,000°F 550 psig, 3,000°F	A387, Grill, 1/8 in. CA; Refractory- lined

Table 13-5 - Major Equipment Summary
 Unit 13 - Heat Recovery and Gas Cleaning

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
Drums				
13-1201, 1251	Syngas Hot Condensate Receiver	30-ft dia Sphere	500 psig, 325°F	304L SS
13-1202, 1252	Syngas Cold Condensate Receiver	24-ft dia Sphere	500 psig, 150°F	CS Epoxy-lined
Exchangers				
13-1301, 1351	Syngas No. 4 BFW Heater	200 MM Btu/hr, 16,000 ft ² 2 Shells 79/312 in.	1,500 psig, 550°F-SH 500 psig, 750°F-T	A516, 1-1/4 Cr; 1/2 Mo Tubes
13-1302, 1352	Syngas No. 3 BFW Heater	188 MM Btu/hr, 30,300 ft ² 2 Shells 84/480 in.	1,500 psig, 400°F-SH 550 psig, 650°F-T	A516, 1/16 in. CA; CS Tubes
13-1303, 1353	Chemical Separation Reboiler	177 MM Btu/hr, 90,000 ft ² 4 Shells 72/648 in.	100 psig, 550°F-SH 550 psig, 550°F-T	CS 1/16 in. CA; 304L SS Tubes
13-1305, 1355	Syngas No. 1 BFW Heater	143 MM Btu/hr, 143,000 ft ² 6 Shells 65/180 in.	100 psig, 450°F-SH 500 psig, 450°F-T	CS 1/16 in. CA; 304L SS Tubes
13-1306, 1356	Syngas Air Cooler	278 MM Btu/hr, 1,666,000 ft ² Twelve 11.4 x 40 ft Bays, 24 Motors 40 hp each	480 psig, 250°F	304L SS Hdr; 304L SS Tubes
Pumps				
13-1501, 1551	Venturi Scrubber Water Recycle Pump	1,100 gpm, 10-hp Motor	470 psi tdh, 325°F	SS Casing and Impellor

Table 13-5 - Major Equipment Summary
 Unit 13 - Heat Recovery and Gas Cleaning (Contd)

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
Pumps				
13-1502, 1552	Venturi Scrubber Water Recycle Pump (Spare)	1,100 gpm, 10-hp Motor	470 psi tdh, 325°F	304 SS Casing and Impellor
13-1503, 1553	Syngas Separator Recycle Pump	185 gpm, 5-hp Motor	490 psi tdh, 325°F	304 SS Casing and Impellor
13-1504, 1554	Syngas Separator Recycle Pump (Spare)	185 gpm, 5-hp Motor	490 psi tdh, 325°F	304 SS Casing and Impellor
13-1505, 1555	Cold Electrostatic Pre-cipitator Flashing Pump	55 gpm, 5 hp Motor	502 psi tdh, 200°F	304 SS Casing and Impellor
13-1506, 1556	Cold Was Hater Recirculation Pump	1,100 gpm, 10-hp Motor	448 psi tdh, 200°F	304 SS Casing and Impellor
13-1507, 1557	Cold Wash Water Recirculation Pump (Spare)	1,100 gpm, 10-hp Motor	448 psi tdh, 200°F	304 SS Casing and Impellor
Boilers				
13-1601, 1651	500-lb Steam Superheater	148.5 MM Btu/hr, 12,600 ft ² , 1 Shell (vert.) 66/720 in.	600 psig, 1,000°F-SH SA387, Grill, 1/16 in. 500 psig, 1,100°F-T CA; 321 SS, 1/16 in. CA Tubes	

Table 13-5 - Major Equipment Summary
 Unit 13 - Heat Recovery and Gas Cleaning (Contd)

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
Boilers				
13-1602, 1652	1,200-lb Saturated Steam	231.7 MM Btu/hr, 3,650 ft ² , 1 Shell (vert.) 60/360 in.	1,350 psig, 650°F-SH 550 psig, 1,000°F-T	CS 1/16 in. CA; 321 SS 1/16 in. CA Tubes
13-1603, 1653	1,200-lb Syngas Steam Superheater	342 MM Btu/hr, 34,500 ft ² , 4 Shells (vert.) 60/528 in.	1,350 psig, 600°F-SH 550 psig, 700°F-T	A516, 1/16 in. CA; 1-1/4 Cr 1/2 Mo
13-1604, 1654	1,200-lb Steam Superheater	931.8 MM Btu/hr, 45,700 ft ² , 3 Shells (vert.) 72/720 in.	1,350 psig, 950°F-SH 550 psig, 1,000°F-T	SA204, GrB, 1/16 in. CA; 321 SS 1/16 in. CA Tubes
Separation Equipment				
13-2201, 2251	First Stage Coarse Char Cyclone	52 in. ID x 15 ft	525 psig, 975°F	CS 1/8 in. CA; Refractory-lined
13-2202, 2252	Second Stage Coarse Char Cyclone	38 in. ID x 15 ft	525 psig, 975°F	CS 1/8 in. CA; Refractory-lined
13-2203, 2253	Hot Electrostatic Precipitator	31 ft ID x 40 ft 6 in. (Dry)	500 psig, 750°F	CS 1/4 in. CA; 304 SS Internals
13-2204, 2254	Cold Electrostatic Precipitator	23 ft ID x 40 ft 6 in. (Wet)	475 psig, 150°F	CS 1/4 in. CA; 304 SS Internals
13-2205, 2255	Venturi Scrubber	24,200 acfm	500 psig, 375°F	304L SS

Table 13-6 - Major Equipment Summary
 Unit 14 - Acid Gas Separation Plants

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
14-	2 Identical Physical Solvent Extraction Plants for removal of H ₂ S, CO ₂ and organic sulfur from synthesis gas complete with re-generation facilities	1,019.2 million scfd, dry basis	445 psig/Manufacturer's Design	

Table 13-7 - Major Equipment Summary
Unit 15 - Shift Conversion

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
Drums				
15-1201, 1251	Dowtherm Receiver	8 ft ID x 24 ft TT	150 psig, 750°F	CS 1/16 in. CA
15-1202, 1252	Dowtherm Receiver	8 ft ID x 24 ft TT	150 psig, 750°F	CS 1/16 in. CA
15-1203, 1253	Dowtherm Receiver	8 ft ID x 24 ft TT	150 psig, 750°F	CS 1/16 in. CA
Exchangers				
15-1301, 1351	Shift - Dowtherm Steam Generator	60.3 MM Btu/hr, 9,700 ft ² 1 Shell 62/240 in.	150 psig, 750°F-SH 1,500 psig, 650°F-T	CS Tubes
15-1302, 1352	Shift - Dowtherm Steam Generator	60.3 MM Btu/hr, 9,700 ft ² 1 Shell 62/240 in.	150 psig, 750°F-SH 1,500 psig, 650°F-T	CS Tubes
15-1303, 1353	Shift - Dowtherm Steam Generator	60.3 MM Btu/hr, 9,700 ft ² 1 Shell 62/240 in.	150 psig, 750°F-SH 1,500 psig, 650°F-T	CS Tubes
Reactors				
15-2501, 2551	Shift Reactor	60.3 MM Btu/hr, 17,900 ft ² (Bare Tube Surface) 1 Shell 120/720 in.	550 psig, 900°F-SH 150 psig, 750°F-T	CS 304L-Clad; 304L Tubes
15-2502, 2552	Shift Reactor	60.3 MM Btu/hr, 17,900 ft ² (Bare Tube Surface) 1 Shell 120/720 in.	550 psig, 900°F-SH 150 psig, 750°F-T	CS 304L-Clad; 304L Tubes
15-2503, 2553	Shift Reactor	60.3 MM Btu/hr, 17,900 ft ² (Bare Tube Surface) 1 Shell 120/720 in.	550 psig, 900°F-SH 150 psig, 750°F-T	CS 304L-Clad; 304L Tubes

Table 13-8 - Major Equipment Summary
Unit 16 - Fischer-Tropsch Synthesis

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
Columns				
16-1101, 1151	F-T Liquid Scrubber	9 ft dia x 44 ft TT	450 psig, 650°F	CS
16-1102, 1152	F-T CO ₂ Scrubber	12 ft ID x 56 ft 6 in. TT	50 psig, 650°F	CS
Drums				
16-1201-01 through -09, 16-1251-01 through -09	F-T Reactor Steam Drum	4 ft-6 in. ID x 20 ft TT	1500 psig, 650°F	A516, 1/16 in. CA
16-1202, 1252	F-T Hot Product Separator	30-ft ID Sphere	450 psig, 650°F	304L SS
16-1203, 1253	F-T Cold Product Separator	24-ft ID Sphere	450 psig, 325°F	CS 1/4 in. CA
Exchangers				
16-1301-01, 1351-01	F-T Reactor Recycle/Product Exchanger	624 MM Btu/hr, 390,000 ft ² 12 Shells 59/720 in.	460 psig, 650°F-SH 450 psig, 650°F-T	304 SS; 304 SS Tubes
16-1301-02, 1351-02	F-T Reactor Feed/Product Exchanger	368 MM Btu/hr, 230,000 ft ² 8 Shells 59/720 in.	460 psig, 650°F-SH 450 psig, 650°F-T	C 1/2 Mo, 1/8 in. CA; C 1/2 Mo Tubes
16-1302, 1352	F-T Reactor Preheater	35 MM Btu/hr, 39,000 ft ² 6 Shells 60/240 in.	455 psig, 650°F-SH 1,500 psig, 650°F-T	C 1/2 Mo, 1/8 in. CA; C 1/2 Mo Tubes

Table 13-8 - Major Equipment Summary
 Unit 16 - Fischer-Tropsch Synthesis (Contd)

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
Exchangers				
16-1303, 1353	F-T Liquid (Air) Cooler	4 MM Btu/hr, 23,350 ft ² 12.7 x 20 ft Bay 2 Motors 5 hp each	450 psig, 200°F	304L Hdr; 304L SS Tubes
16-1304, 1354	F-T BFW Heater	215 MM Btu/hr, 43,840 ft ² 2 Shells 90/480 in.	450 psig, 550°F-SH 100 psig, 550°F-T	304L 304L SS Tubes
16-1306, 1356	F-T Gas Air Cooler	68 MM Btu/hr, 996,400 ft ² 21.7 x 40 ft Bay 16 Motors, 25 hp each	450 psig, 200°F	304L Hdr; 304L SS Tubes
Pumps				
16-1501, 1551	Salt Solution Recycle Pump	275 gpm, 10-hp Motor	450 psi, 200°F	API, A-7
16-1502, 1552	Salt Solution Recycle Pump (Spare)	275 gpm, 10-hp Motor	450 psi, 220°F	API, A-7
16-1503, 1553	F-T Liquid Scrubber HC Pump	306 gpm, 20-hp Motor	470 psi, 220°F	API, A-7
16-1504, 1554	F-T Liquid Scrubber HC Pump (Spare)	306 gpm, 20-hp Motor	470 psi, 200°F	API, A-7
16-1507, 1557	F-T Condensate Pump	140 gpm, 5-hp Motor	445 psi, 200°F	API, S-6
16-1508, 1558	F-T Condensate Pump (Spare)	140 gpm, 5-hp Motor	445 psi, 200°F	API, S-6

Table 13-8 - Major Equipment Summary
 Unit 16 - Fischer-Tropsch Synthesis (Contd)

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
Exchangers				
16-1509, 1559	F-T CO ₂ Scrubber Alcohol Solution Pump	145 gpm, 50-hp Motor	487 psi, 200°F	API, A-7
16-1510, 1560	F-T CO ₂ Scrubber Alcohol Solution Pump (Spare)	145 gpm, 50-hp Motor	487 psi, 200°F	API, A-7
16-1511, 1561	F-T Caustic Solution Pump	40 gpm, 30-hp Motor	410 psi, 220°F	API, S-4
16-1512, 1562	F-T Caustic Solution Pump (Spare)	40 gpm, 30-hp Motor	410 psi, 220°F	API, S-4
Compressors				
16-1801, 1851	F-T Recycle Gas Compressor	40,700 cfm 4,610-hp at 3,030 rpm	440 psig, 150°F Inlet 460 psig, 200°F Out- let	
Tanks				
16-1901/02, 1951/52	Caustic Solution Tank	14 ft dia x 14 ft	atm, 200°F	CS
Agitators				
16-2401/02 2451/52	F-T Caustic Solution Tank Agitator	40-hp Motor	atm, 200°F	

Table 13-8 - Major Equipment Summary
 Unit 16 - Fischer-Tropsch Synthesis (Contd)

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
Reactors				
16-2501-01 through 09, 2551-01 through 09	F-T Reactors	233.6 MM Btu/hr 14-1/2 ft dia x 60 ft (horiz.) 36,000 ft ² each (bare tube surface) Catalyst-coated Fin Tubes	450 psig, 750°F-SH 1,500 psig, 650°F-T	C 1/2 Mo, 1/8 in. CA; C 1/2 Mo Tubes
16-2502-01 and -02, 2552-01 and -02	F-T Zinc Oxide Guard Reactors	10 ft dia x 32 ft (vert.)	450 psig, 650°F	C 1/2 Mo, 1/8 in. CA
Other Major Equipment				
16-2801, 2851	CO ₂ Removal Unit			Special Package Unit

Table 13-9 - Major Equipment Summary
Unit 17 - Methanation

Item Number	Description	Size	Design		Material/Remarks
			Press./Temp.		
Drums					
17-1201/11/ 21, 1251/61/71	Dowtherm Receivers	8 ft ID x 24 ft TT (horiz.)	150 psig, 750°F		CS 1/16 in. CA
17-1202, 1252	Recycle Compressor Suction Receiver	10 ft ID x 30 ft TT (horiz.)	450 psig, 125°F		CS 1/4 in. CA
17-1203, 1253	SNG Pipeline Compressor Suction Receiver	6 ft ID x 18 ft TT (horiz.)	450 psig, 125°F		CS 1/8 in. CA
17-1204, 1254	Final Methanation Receiver	5 ft ID x 15 ft TT (horiz.)	1,150 psig, 160°F		A516, 1/8 in. CA
Exchangers					
17-1301, 1351	Methanator Reactor Feed/Product Ex- changer	253 MM Btu/hr, 122,960 ft ² 16 Shells 55/240 in.	450 psig, 650°F-SH 450 psig, 650°F-T		C 1/2 Mo, 1/8 in. CA; C 1/2 Mo Tubes
17-1302, 1352	Methanator Reactor Feed Preheater	14 MM Btu/hr, 12,760 ft ² 2 Shells 54/240 in.	450 psig, 650°F-SH 1,500 psig, 650°F-T		C 1/2 Mo, 1/8 in. CA; C 1/2 Mo Tubes
17-1303, 1353	Recycle Compressor Suction (Air) Cooler	87 MM Btu/hr, 442,500 ft ² Four 9.25 x 40 ft Bays 8 Motors 30 hp each	450 psig, 550°F		CS 1/8 in. CA Hdr; CS Tubes
17-1304, 1354	SNG Pipeline Compressor Suction (Air) Cooler	14 MM Btu/hr, 105,100 ft ² 18.4 x 40 ft Bay 2 Motors 40 hp each	450 psig, 550°F		CS 1/8 in. CA Hdr; CS Tubes

Table 13-9 - Major Equipment Summary
Unit 17 - Methanation (Contd)

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
Exchangers				
17-1306, 1356	Final Methanation Reactors Feed/SNG Exchanger	60 MM Btu/hr, 42,814 ft ² 2 Shells 58/576 in.	450 psig, 650°F-SH 450 psig, 700°F-T	C 1/2 Mo, 1/8 in. CA; C 1/2 Mo Tubes
17-1307, 1357	Final Methanation Reactors Startup Heater	14 MM Btu/hr, 8,300 ft ² 1 Shell 53/192 in.	150 psig, 750°F-SH 450 psi, 700°F-T	CS 1/8 in. CA; CS Tubes
17-1308, 1358	SNG Air Cooler	30 MM Btu/hr, 108,300 ft ² 19 x 40 ft Bay 2 Motors 40 hp each	1,200 psig, 550°F	CS 1/8 in. CA; CS Tubes
17-1309/19/29 1359/69/79	Methanator - Dowtherm Steam Generator	149 MM Btu/hr, 82,800 ft ² 1 Shell 85/720 in.	150 psig, 750°F-SH 1,500 psig, 650°F-T	CS 1/8 in. CA; CS Tubes
17-1310, 1360	C ₃ /C ₄ Evaporator	8 MM Btu/hr, 446 ft ² 1 Shell 15/192 in.	150 psig, 400°F-SH 450 psig, 400°F-T	CS 1/8 in. CA; CS Tubes
Pumps				
17-1501, 1551	Condensate Pump	220 gpm, 15-hp Motor	445 psi, 200°F	CS, CI Impellor
17-1502, 1552	Condensate Pump (Spare)	220 gpm, 15-hp Motor	445 psi, 200°F	CS, CI Impellor
Compressors				
17-1801, 1851	Methanator Recycle Compressor, Single-Stage Centrifugal	13,200 acfm, 1,200-hp Motor	400 psig, 125°F Inlet 425 psig, 150°F Outlet	A-357

Table 13-9 - Major Equipment Summary
Unit 17 - Methanation (Contd)

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
Compressors				
17-1802, 1852	SNG Pipeline Compressor 5-Stage Centrifugal	3,700 acfm, 9,500-hp Motor	400 psig, 125°F Inlet CS 1,050 psig, 265°F Outlet	
Reactors				
17-2501/11/ 21, 2551/61/71	Methanator Reactors (Bare Tube Surface)	149 MM Btu/hr, 17,900 ft ² 1 Shell 120/720 in.	450 psig, 750°F-SH 1,500 psig, 650°F	C 1/2 Mo; C 1/2 Mo Tubes
17-2502, 2552	Final Methanation Reactor	10 ft dia x 32 ft TT	420 psig, 650°F	A204 B 1/8 in. CA
17-2503, 2553	Hydrotreater Reactor	12 ft dia x 35 ft-6 in. TT	420 psig, 650°F	A204 B 1/8 in. CA
Dryers				
17-3401, 3451	SNG Dryer, TEG Type	12-1/2 x 40 ft Skid 8 x 30 ft Absorber		Package Unit

Table 13-10 - Major Equipment Summary
Unit 18 - Liquid Product Recovery

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
Columns				
18-1101, 1151	Lean Oil Absorber	9 ft 6 in. ID x 64 ft TT (vert.)	450 psig, -20°F	A 516, 1/8 in. CA Impact-tested to SA 20
18-1102, 1152	Lean Oil Fractionator	15 ft 3 in. ID x 83 ft 15 ft-Skirt (vert.)	80 psig, 440°F	CS 1/8 in. CA
18-1103, 1153	Lean Oil Stripper	5 ft ID x 32 ft TT 15 ft-Skirt (vert.)	70 psig, 315°F	CS 1/8 in. CA
18-1104, 1154	CO Stripper	5 ft ID x 55-1/2 ft TT 15 ft-Skirt (vert.)	440 psig, 255°F	CS 1/8 in. CA
18-1105, 1155	Depropanizer	6 ft ID x 77-1/2 ft TT 15 ft-Skirt (vert.)	330 psig, 343°F	CS 1/8 in. CA
18-1106, 1156	Stabilizer	5 ft 6 in. ID x 74 ft TT	115 psig, 287°F	CSS 1/8 in. CA
18-1107, 1157	Fuels Fractionator	15 ft 9 in. ID x 5 ft 7 in. TT 3 ft 6 in. x 20 ft 6 in. Well (vert.)	Full Vac/50 psig 350°F	CS 1/8 in. CA, 12 Cr Caps
18-1108, 1158	Diesel Stripper	6 ft 6 in. ID x 22 ft 6 in. TT 15 ft-Skirt (vert.)	Full Vac/50 psig 350°F	CS 1/8 in. CA, 12 Cr Caps
Pressure Vessels				
18-1201, 1251	Presaturator Separator	8 ft ID x 36 ft TT (horiz.)	413 psig, -20°F	A516, 1/8 in. CA Impact-tested to SA 20

Table 13-10 - Major Equipment Summary
 Unit 18 - Liquid Product Recovery (Contd)

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
18-1202, 1252	Lean Oil Fractionator Overhead Receiver	7 ft ID x 25 ft TT 3 ft dia x 4 ft 6 in. Well (horiz.)	65 psig, 135°F	CS 1/8 in. CA
18-1203, 1253	CO Stripper Overhead Receiver	5 ft ID x 17 ft TT (horiz.)	424 psig, -20°F	A516, 1/8 in. CA Fine Grain
18-1204, 1254	Depropanizer Overhead Receiver	5 ft 9 in. ID x 30 ft TT (horiz.)	314 psig, 145°F	CS 1/8 in. CA
18-1205, 1255	Naphtha Stabilizer Overhead Receiver	5 ft ID x 15 ft TT (horiz.)	100 psig, 145°F	CS 1/8 in. CA
18-1206, 1256	Fuels Fractionator Overhead Receiver	8 ft ID x 24 ft TT (horiz.)	50 psig, 135°F	CS 1/8 in. CA
18-1207, 1257	Cold Separator	10 ft ID x 50 ft TT (horiz.)	424 psig, -20°F	A516 1/16 in. CA, Impact Tested to SA 20
Exchangers				
18-1301, 1351	F-T Gas/Lean Exchanger	23.5 MM Btu/hr, 17,600 ft ² 1 Shell 53/576 in.	450 psig, 150°F-SH 450 psig, 150°F-T	A516, 1/8 in. CA; CS Killed Tubes
18-1302, 1352	F-T Gas Chiller	15.8 MM Btu/hr, 11,200 ft ² 1 Shell 48/72-480 in.	75 psig, 100°F-SH 450 psig, 100°F-T	A516, 1/16 in. CA; CS Killed Tubes

Table 13-10 - Major Equipment Summary
 Unit 18 - Liquid Product Recovery (Contd)

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
Exchangers				
18-1303, 1353	Lean Oil Pre-saturator	4.2 MM Btu/hr, 6,000 ft ² 1 Shell 46/72-240 in.	75 psig, 100°F-SH 450 psig, 100°F-T	A516, CS Tubes
18-1304, 1354	Lean Oil/Rich Oil Exchanger	20.6 MM Btu/hr, 4,900 ft ² 2 Shells 23/360 in.	500 psig, 350°F-SH 450 psig, 250°F-T	A516, CS Tubes
18-1305, 1355	Lean Oil Fractionator Condenser	32.1 MM Btu/hr, 320,000 ft ² Four 13 x 42 ft Bays 8 Motors 25-hp each	100 psig, 250°F	CS Hdr; CS Tubes
18-1306, 1356	Lean Oil Fractionator Reboiler	64.9 MM Btu/hr, 9,300 ft ² 1 Shell 57/240 in.	100 psig, 450°F-SH 550 psig, 550°F-T	CS 1/8 in. CA; CS Tubes
18-1307, 1357	Lean Oil Stripper Reboiler	4.0 MM Btu/hr, 540 ft ² 1 Shell 17/144 in.	150 psig, 400°F-SH 200 psig, 350°F-T	CS 1/16 in. CA; CS Tubes
18-1308, 1358	C ₆ Plus Saturator	13.0 MM Btu/hr, 12 x 42 ft Bay 2 Motors 25 hp each	450 psig, 300°F	CS 1/4 in. CA Hdr; CS Tubes
18-1309, 1359	C ₆ Stripper Overhead/Reflux Exchanger	0.2 MM Btu/hr, 144 ft ² 4 in. x (7) 3/4 in. x 180 in. Double Pipe	450 psig, 150°F-SH 500 psig, 100°F-T	CS 1/8 in. CA; CS Tubes

Table 13-10 - Major Equipment Summary
 Unit 18 - Liquid Product Recovery (Contd)

Item Number	Description	Size	Design		Material/Remarks
			Press./Temp.		
Exchangers					
18-1310, 1360	Stripper Overhead	1.2 MM Btu/hr, 660 ft ² 1 Shell 19/30-192 in.	75 psig, 100°F-SH 450 psig, 100°F-T		A516 1/16 in. CA; CS Killed Tubes
18-1311, 1361	CO Stripper Re-boiler	8.2 MM Btu/hr, 840 ft ² 1 Shell 21/240 in.	450 psig, 300°F-SH 100 psig, 350°F-T		CS 1/8 in. CA; CS Tubes
18-1312, 1362	Depropanizer Feed/ Bottoms Exchanger	2.7 MM Btu/hr, 700 ft ² 1 Shell 15/240 in.	350 psig, 400°F-SH 300 psig, 450°F-T		CS 1/8 in. CA; CS Tubes
18-1313, 1363	Depropanizer Condenser	18.3 MM Btu/hr, 100,100 ft ² Two 12.5 x 42 ft Bays 4 Motors 25-hp each	350 psig, 250°F		CS 1/4 in. CA Hdr; CS Tubes
18-1314, 1364	Depropanizer Reboiler	16.6 MM Btu/hr, 3,400 ft ²	350 psig, 350°F-SH 150 psig, 400°F-T		CS 1/8 in. CA; CS Tubes
18-1315, 1365	Naphtha Stabi- lizer Condenser	10.3 MM Btu/hr, 82,700 ft ² 13 ft-6 in. x 42 ft Bay 2 Motors 25-hp each	150 psig, 200°F		CS 1/8 in. CA; CS Tubes
18-1316, 1366	Naphtha Stabi- lizer Reboiler	8.7 MM Btu/hr, 810 ft ² 1 Shell 19/240 in.	150 psig, 300°F-SH 150 psig, 400°F-T		CS 1/8 in. CA; CS Tubes

Table 13-10 - Major Equipment Summary
 Unit 18 - Liquid Product Recovery (Contd)

Item Number	Description	Size	Design		Material/Remarks
			Press./Temp.		
Exchangers					
18-1317, 1367	Fuels Fractionator Change Heater	20.0 MM Btu/hr, 8,800 ft ² 1 Shell 52/288 in.	550 psig, 550°F-SH 75 psig, 500°F-T	CS 1/16 in. CA; CS Tubes	
18-1318, 1368	Fuels Fractionator Overhead Condensor	46.9 MM Btu/hr, 682,400 ft ² 13 ft-10 in. x 42 ft Bays 16 Motors 25-hp each	75 psig, 250°F	CS 1/8 in. CA Hdr; CS Tubes	
18-1319, 1369	F-T Liquid/Light Naphtha Exchanger	3.2 MM Btu/hr, 700 ft ² 1 Shell 17/240 in.	100 psig, 300°F-SH 450 psig, 200°F-T	CS 1/8 in. CA; CS Tubes	
18-1320, 1370	F-T Liquid/Diesel Exchanger	2.5 MM Btu/hr, 800 ft ² 1 Shell 19/240 in.	100 psig, 250°F-SH 450 psig, 200°F-T	CS 1/8 in. CA; CS Tubes	
18-1321, 1371	F-T Liquid/Heavy Fuel Exchanger	4.3 MM Btu/hr, 1,100 ft ² 1 Shell 21/240 in.	100 psig, 500°F-SH 450 psig, 250°F-T	CS 1/8 in. CA; CS Tubes	
18-1322, 1372	Light Naphtha Product Cooler	1.0 MM Btu/Hr, 6,400 ft ² 4-1/2 x 18 ft Bay 2 Motors 5 hp each	100 psig, 200°F	CS 1/8 in. CA Hdr; CS Tubes	
18-1323, 1373	Diesel Product Cooler	1.7 MM Btu/hr, 12,400 ft ² 6-1/2 x 22 ft Bay 2 Motors 10 hp each	100 psig, 200°F	CS 1/8 in. CA Hdr; CS Tubes	

Table 13-10 - Major Equipment Summary
 Unit 18 - Liquid Product Recovery (Contd)

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
Exchangers				
18-1324, 1374	Heavy Fuel Product Cooler	0.8 MM Btu/hr, 12,400 ft ² 6-1/2 x 22 ft Bay 2 Motors 10 hp each	100 psig, 250°F	CS 1/8 in. CA Hdr; CS Tubes
Pumps				
18-1501, 1551	Lean Oil Pump	508 gpm, 150-hp Motor	464 psia, 290°F	API S-1
18-1502, 1552	Lean Oil Pump (Spare)	508 gpm, 150-hp Motor	464 psia, 290°F	API S-1
18-1503, 1553	Presaturator Lean Oil Pump	459 gpm, 25-hp Motor	443 psia, -20°F	A352, GrLCl3; V CS Impeller
18-1504, 1554	Presaturator Lean Oil Pump (Spare)	459 gpm, 25-hp Motor	443 psia, -20°F	A352, GrLCl3; V CS Impeller
18-1505, 1555	Lean Oil Fractionator Reflux Pump	412 gpm, 15-hp Motor	115 psia, 135°F	API S-1
18-1506, 1556	Lean Oil Fractionator Reflux Pump (Spare)	412 gpm, 15-hp Motor	115 psia, 135°F	API S-1
18-1507, 1557	Lean Oil Fractionator Overhead Pump	235 gpm, 70-hp Motor	467 psia, 135°F	API S-1

Table 13-10 - Major Equipment Summary
 Unit 18 - Liquid Product Recovery (Contd)

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
Pumps				
18-1508, 1558	Lean Oil Fractionator Overhead Pump (Spare)	235 gpm, 70-hp Motor	467 psia, 135°F	API S-1
18-1509, 1559	CO Stripper Reflux Pump	40 gpm, 3-hp Motor	453 psia, -20°F	API S-1
18-1510, 1560	CO Stripper Reflux Pump (Spare)	40 gpm, 3-hp Motor	453 psia, -20°F	API S-1
18-1511, 1561	Depropanizer Reflux Pump	235 gpm, 15-hp Motor	350 psia, 145°F	API S-1
18-1512, 1562	Depropanizer Reflux Pump (Spare)	235 gpm, 15-hp Motor	350 psia, 145°F	API S-1
18-1513, 1563	Depropanizer Overhead Pump	185 gpm, 20-hp Motor	430 psia, 145°F	API S-1
18-1514, 1564	Depropanizer Overhead Pump (Spare)	185 gpm, 20-hp Motor	430 psia, 145°F	API S-1
18-1515, 1565	Naptha Stabilizer Reflux Pump	203 gpm, 10-hp Motor	153 psia, 145°F	API S-1

Table 13-10 - Major Equipment Summary
 Unit 18 - Liquid Product Recovery (Contd)

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
Pumps				
18-1516, 1566	Naphtha Stabilizer Reflux Pump (Spare)	203 gpm, 10-hp Motor	153 psia, 145°F	API S-1
18-1517, 1567	LPG Product Pump	68 gpm, 5-hp Motor	159 psia, 145°F	API S-1
18-1518, 1568	LPG Product Pump (Spare)	68 gpm, 5-hp Motor	159 psia, 145°F	API S-1
18-1519, 1569	Fuels Fractionator Reflux Pump	620 gpm, 15-hp Motor	36 psia, 135°F	API S-1
18-1520, 1570	Fuels Fractionator Reflux Pump (Spare)	620 gpm, 15-hp Motor	36 psia, 135°F	API S-1
18-1521, 1571	Heavy Naphtha Product Pump	169 gpm, 10-hp Motor	72 psia, 135°F	API S-1
18-1522, 1572	Heavy Naphtha Product Pump (Spare)	169 gpm, 10-hp Motor	72 psia, 135°F	API S-1
18-1523, 1573	Diesel Product Pump	286 rpm, 20-hp Motor	104 psia, 232°F	API S-1
18-1524, 1574	Diesel Product Pump (Spare)	286 rpm, 20-hp Motor	104 psia, 232°F	API S-1
18-1525, 1575	Heavy Fuels Product Pump	104 gpm, 15-hp Motor	164 psia, 431°F	API S-1

Table 13-10 - Major Equipment Summary
 Unit 18 - Liquid Product Recovery (Contd)

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
Pumps				
18-1526, 1576	Heavy Fuels Product Pump (Spare)	104 gpm, 15-hp Motor	164 psia, 431°F	API S-1
18-1527, 1577	Condensate Pump	15 gpm, 7-1/2-hp Motor	86 psia, 135°F	API S-1
18-1528, 1578	Condensate Pump (Spare)	15 gpm, 7-1/2-hp Motor	86 psia, 135°F	API S-1
Compressors				
18-1801, 1851	Lean Oil Fractionator Overhead Compressor	3,294 acfm 2,750-hp Motor	45 psig, 110°F Inlet 405 psig, 130°F Outlet	CS, Reciprocating
Other Major Equipment				
18-2801, 2851	Liquids Recovery Refrigeration Plant	2,083 tons Refrig; 4,550-hp Drive	-30°F	Package Unit
18-2804, 2854	Evacuation Package	10 in., 11,000 lb, 135 psi steam/hr	3 psia, 110°F	Package Unit
18-2805, 2855	Ethylene Glycol Regenerator	10,420 lb, 135 psi steam/hr		Package Unit

Table 13-11 - Major Equipment Summary
Unit 19 - Chemical Recovery

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
Columns				
19-1101, 1151	Alcohol Still	5 ft 6 in. ID x 54 ft 6 in.	50 psig, 650°F	CS 1/8 in. CA; CS Trays; 12 Cr Caps
19-1102, 1152	Alcohol Stripper	5 ft 6 in. ID x 38 ft	50 psig, 650°F	CS 1/8 in. CA; CS Trays; 12 Cr Caps
Drums				
19-1201, 1251	Alcohol Still Overhead Receiver	3 ft ID x 10 ft (horiz.)	50 psig, 650°F	CS 1/8 in. CA
19-1202, 1252	First Effect Condensate Drum	4 ft ID x 14 ft TT (vert.)	65 psig, 325°F	CS 1/8 in. CA
19-1203, 1253	Second Effect Condensate Drum	4 ft ID x 14 ft TT	50 psig, 300°F	CS 1/8 in. CA
19-1204, 1254	Third Effect Condensate Drum	4 ft ID x 14 ft TT (vert.)	25 psig, 260°F	CS 1/8 in. CA
19-1205, 1255	Evaporator Overhead Receiver	5 ft ID x 15 ft TT (horiz.)	50 psig, 150°F	CS 1/8 in. CA
Exchangers				
19-1301, 1351	Alcohol Still Feed/Water Return Exchanger	6.3 MM Btu/hr, 1,360 ft ² 2 Shells 23/192 in.	100 psig, 450°F-SII 100 psig, 450°F-T	CS 1/8 in. CA; CS Tubes

Table 13-11 - Major Equipment Summary
 Unit 19 - Chemical Recovery (Contd)

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
Exchangers				
19-1302, 1352	Alcohol Feed Pre-heater	1.8 MM Btu/hr, 270 ft ² 1 Shell 13/192 in.	100 psig, 450°F-SH 100 psig, 450°F-T	CS 1/8 in. CA; CS Tubes
19-1303, 1353	Alcohol Overhead Air Condenser	42.9 MM Btu/hr, 313,027 ft ² 18.4 x 40 ft Bays 6 Motors 25-hp each	100 psig, 450°F	CS 1/8 in. CA Hdr;
19-1304, 1354	Evaporator Overhead Air Condenser	99.2 MM Btu/hr, 1,085,000 ft ² 23.5 x 40 ft Bays 16 Motors 40-hp each	50 psig, 150°F	CS 1/8 in. CA Hdr; CS Tubes
19-1305, 1355	Water Return Air Cooler	4.7 MM Btu/hr, 32,624 ft ² 2 Motors 25-hp each	100 psig, 450°F	CS 1/8 in. CA Hdr; CS Tubes
19-1306, 1356	Alcohol Stripper Feed/Bottoms Exchanger	0.8 MM Btu/hr, 140 ft ² 1 Shell 10/192 in.	150 psig, 225°F 150 psig, 260°F	CS 1/8 in. CA; CS Tubes
Pumps				
19-1501, 1551	Alcohol Reflux and Product Pump	207 gpm, 15-hp Motor	70 psia, 110°F	API S-1
19-1502, 1552	Alcohol Reflux and Product Pump (Spare)	207 gpm, 15-hp Motor	70 psia, 110°F	API S-1

Table 13-11 - Major Equipment Summary
Unit 19 - Chemical Recovery (Contd)

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
Pumps				
19-1503, 1553	Water Return Pump	205 gpm, 100-hp Motor	500 psia, 235°F	API S-1
19-1504, 1554	Water Return Pump (Spare)	205 gpm, 100-hp Motor	500 psia, 235°F	API S-1
19-1505, 1555	Salt Solution Pump	264 gpm, 15-hp Motor	60 psia, 232°F	API S-1
19-1506, 1556	Salt Solution Pump (Spare)	264 gpm, 15-hp Motor	60 psia, 232°F	API S-1
19-1507, 1557	First Effect Con- densate Pump	220 gpm, 7-1/2-hp Motor	27 psia, 298°F	API S-1
19-1508, 1558	First Effect Con- densate Pump (Spare)	220 gpm, 7-1/2-hp Motor	27 psia, 298°F	API S-1
19-1509, 1559	Second Effect Con- densate Pump	195 gpm, 15-hp Motor	52 psia, 273°F	API S-1
19-1510, 1560	Second Effect Con- densate Pump (Spare)	195 gpm, 15-hp Motor	52 psia, 273°F	API S-1
19-1511, 1561	Third Effect Con- densate Pump	207 gpm, 15-hp Motor	52 psia, 203°F	API S-1
19-1512, 1562	Third Effect Con- densate Pump (Spare)	207 gpm, 15-hp Motor	52 psia, 203°F	API S-1

Table 13-11 - Major Equipment Summary
Unit 19 - Chemical Recovery (Contd)

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
Pumps				
19-1513, 1563	Condensate Pump	214 gpm, 15-hp Motor	91 psia, 125°F	API S-1
19-1514, 1564	Condensate Pump (Spare)	214 gpm, 15-hp Motor	91 psia, 125°F	API S-1
19-1515, 1565	Salt Solution Pump	66 gpm, 2-hp Motor	32 psia, 125°F	API S-1
19-1516, 1566	Salt Solution Pump (Spare)	66 gpm, 2-hp Motor	32 psia, 125°F	API S-1
Compressors				
19-1801, 1851	CO ₂ Recycle Compressor	72 acfm 10-hp Motor	25 psia, 110°F Inlet 30 psia, 125°F Outlet	CS
Evaporators				
19-2301, 2351	First Effect Evaporator	83.9 MM Btu/hr, 8,390 ft ² 8 ft ID x 24 ft TT (Horiz. Kettle) 2 Shells 50/288 in.	150 psig, 325°F-SH 150 psig, 325°F-T	A285C; A285C Tubes
19-2302, 2352	Second Effect Evaporator	76.7 MM Btu/hr, 11,210 ft ² 8 ft 6 in. ID x 24 ft TT (Horiz. Kettle) 1 Shell 56/288 in.	150 psig, 300°F-SH 150 psig, 300°F-T	A285C; A285C Tubes

Table 13-11 - Major Equipment Summary
 Unit 19 - Chemical Recovery (Contd)

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
Evaporators				
19-2303, 2353	Third Effect Evaporator	84.4 MM Btu/hr, 4,260 ft ² 7 ft ID x 24 ft TT (Horiz. Kettle) 1 Shell 37/288 in.	150 psig, 260°F-SH 150 psig, 260°F-T	A285C; A285C Tubes
Other Major Equipment				
19-2801, 2851	Evaporator Jet	2 in., 400 lb/hr, 135 psi steam	1.5 psia, 125°F Inlet	304 SS

Table 13-12 - Major Equipment Summary
Unit 20 Oxygen Plant

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
20-	Ten 2,000 TPD units or equivalent produce 98% purity oxygen. Turnkey installation including filters, dryers, air compressors, columns, pumps, electrical system, and O ₂ compressor to 500 psig. Compressors steam turbine driven.	20,000 TPD	Manufacturer's Design	

Table 13-13 - Major Equipment Summary
Unit 21 - Sulfur Recovery Plant

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
21-	2 Identical Three stage Claus Sulfur Plants	1,600 TPD each	Manufacturer's Design	
	2 Identical Tailgas Beavon Sulfur Removal Plants	37 LTPD each	Manufacturer's Design	
21-1901	Sulfur Product Storage Tank	4,200,000 gal, 120 ft dia x 50 ft	Atm 280°F	CS, Foam Glass Insulated with Steam Heating Coils

Table 13-14 - Major Equipment Summary
Unit 22 - Water Reclamation

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
Columns				
22-1101, 1151	Sour Water Stripper	11 ft ID x 93 ft TT (vert.)	25 psig, 285°F	A-516
22-1103, 1153	Sour Water Extraction Column	11 ft 6 in. ID x 50 ft TT (vert.)	500 psig, 225°F	CS 1/4 in. CA
Vessels				
22-1201, 1251	BFW Settler Overhead Receiver	3 ft ID x 9 ft TT (horiz.)	50 psig, 170°F	CS 1/16 in. CA
Heat Exchangers				
22-1302, 1352	SWS Reboiler	70.4 MM Btu/hr, 5,900 ft ² 1 Shell 46/96-240 in.	25 psig, 325°F-SH CS 1/4 in. CA; 65 psig, 325°F-T Ti Tubes	
22-1303, 1353	Oxidizer Feed/ Effluent	135 MM Btu/hr, 62,240 ft ² 16 Shells 39/240 in.	1,650 psig, 545°F-SH A516, 1/4 in. CA; 1,650 psig, 545°F-T CS Tubes	
22-1304, 1354	Oxidizer Feed Preheater	9.2 MM Btu/hr, 900 ft ² 1 Shell 21/240 in.	1,650 psig, 600°F-SH A516, 1/4 in. CA; 1,330 psig, 600°F-T CS Tubes	
22-1305, 1355	BFW Settler Overhead Air Condenser	21.3 MM Btu/hr, 48,900 ft ² 15 x 32 ft Bay 2 Motors 25-hp each	150 psig, 200°F	CS 1/8 in. CA Hdr; CS Tubes

Table 13-14 - Major Equipment Summary
Unit 22 - Water Reclamation (Contd)

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
Heat Exchangers				
22-1306, 1356	Sour Water Feed/ Cold Syngas Re- ceiver Water Exchanger	50.5 MM Btu/hr, 18,800 ft ² 4 Shells 47/240 in.	490 psig, 300°F-SH 490 psig, 300°F-T	CS 1/4 in. CA; CS Tubes
22-1307, 1357	SWS Feed/Cold Syngas Receiver Water Exchanger	35.8 MM Btu/hr, 24,600 ft ² 5 Shells 48/240 in.	490 psig, 215°F-SH 485 psig, 215°F-T	CS 1/4 in. CA; CS Tubes
22-1308, 1358	BFW Deionizer Feed Air Cooler	41.0 MM Btu/hr, 142,100 ft ² Two 12.9 x 40 ft Bays 4 Motors 30-hp each	25 psig, 200°F	CS 1/4 in. CA Hdr; CS Tubes
Pumps				
22-1501, 1551	Stripped Water Pump	1,237 gpm, 1,250-hp Motor	1,515 psi tdh, 236°F	API S-4
22-1502, 1552	Stripped Water Pump (Spare)	1,237 gpm, 1,250-hp Motor	1,515 psi tdh, 236°F	API S-4
22-1505, 1555	BFW Settler Water Pump	5 gpm, 40-hp Motor	500 psi tdh, 215°F	API S-1
22-1506, 1556	BFW Settler Water Pump (Spare)	5 gpm, 40-hp Motor	500 psi tdh, 215°F	API S-1
22-1507, 1557	BFW Settler Pump	1,174 gpm, 60-hp Motor	63 psi tdh, 215°F	API S-1

Table 13-14 - Major Equipment Summary
Unit 22 - Water Reclamation (Contd)

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
Pumps				
22-1508, 1558	BFW Settler Pump (Spare)	1,174 gpm, 60-hp Motor	63 psi tdh, 215°F	API S-1
22-1509, 1559	BFW Settler Reflux Pump	46 gpm, 5-hp Motor	61 psi tdh, 120°F	API S-1
22-1510, 1560	BFW Settler Reflux Pump (Spare)	46 gpm, 5-hp Motor	61 psi tdh, 120°F	API S-1
22-1511, 1561	BFW Pump	1,174 gpm, 50-hp Motor	61 psi tdh, 215°F	API S-6
22-1512, 1562	BFW Pump (Spare)	1,174 gpm, 50-hp Motor	61 psi tdh, 215°F	API S-6
22-1513, 1563	SWS Oil Skim Pump	60 gpm, 40-hp Motor	520 psi tdh, 210°F	API S-1
22-1514, 1564	SWS Oil Skim Pump (Spare)	60 gpm, 40-hp Motor	520 psi tdh, 210°F	API S-1
Compressors				
22-1801, 1851	Sour Gas Compressor	275 acfm, 500-hp Motor, 14 x 18-1/2 x 4-1/2 x 9 Three Stage	18 psia, 180°F Inlet 470 psia, 955°F Outlet	CS
22-1802, 1852	Oxygen Compressor	4.2 acfm, 40-hp Motor, 7 in. Stroke, Simplex Diaphragm	515 psia, 250°F Inlet 1,515 psia, 506°F Outlet	Monel

Table 13-14 - Major Equipment Summary
Unit 22 - Water Reclamation (Contd)

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
Compressors				
22-1803, 1853	Vent Recovery Compressor	12 acfm, 25-hp Motor, 5-in. Stroke, 2-Stage Diaphragm	15 psia, 120°F Inlet 470 psia, 1,030°F Outlet	Monel
Filters/Settlers				
22-2201, 2251	BFW Settler	12 ft ID x 38 ft 6 in. TT (vert.)	18 psig, 265°F	CS 1/16 in. CA, Center Section - 315 SS-clad
22-2202, 2252	BFW Filter	1,000 gpm	75 psig, 215°F	CS Package Unit
Mixers				
22-2401, 2451	Oxidizer Mixer	3/4 in.	1,500 psig, 236°F	304 SS
22-2402, 2452	BFW Settler Mixer	3/8 in.	20 psig, 253°F	304 SS
Oxidizers				
22-2501, 2551	Oxidizer	10 ft ID x 33 ft 6 in. TT (vert.)	1,650 psig, 570°F	A-516, 1/4 in. CA, Center Section 316 SS-clad
Other Major Equipment				
22-2801, 2851	BFW Deionizer	3,000 gpm	75 psig, 210°F	Package Unit

Table 13-15 - Major Equipment Summary
Unit 26 - Utility Power Generation

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
Turbines - Generators				
26-0101, 0151	Turbine	120,000 kW		
26-0102, 0152	Turbine	120,000 kW		
26-0107, 0157	Generator	120,000 kW		
26-0108, 0158	Generator	120,000 kW		
26-0109	Gas-Turbine Generator (Startup and Emergency Standby)	15,000 kW		Oil-fueled, 48 gpm
26-0110	Gas-Turbine Generator (Startup and Emergency Standby)	15,000 kW		Oil-fueled, 48 gpm
Vessels				
26-1201, 1251	Blowdown Drum	4 ft 6 in. ID x 12 ft 6 in. TT		
26-1202, 1252	Plant Air Receiver	10 ft ID x 25 in. TT	125 psig, 150°F	
26-1203, 1253	N ₂ Receiver	10 ft OD x 25 in. TT		
Exchangers				
26-1301, 1351	Alternator Condenser	461.45 MM Btu/hr		
26-1302, 1352	Alternator Condenser	461.45 MM Btu/hr		

Table 13-15 - Major Equipment Summary
 Unit 26 - Utility Power Generation (Contd)

Item Number	Description	Size	Design Press./Temp.	Material/ Remarks
Exchangers				
26-1307, 1357	No. 1 H.P. BFW Heater	114.36 MM Btu/hr	550 psi, 800°F-SH 600 psi, 500°F-T	
26-1308, 1358	No. 1 H.P. BFW Heater	114.36 MM Btu/hr	550 psi, 800°F-SH 600 psi, 500°F-T	
26-1309, 1359	No. 2 H.P. BFW Heater	142.61 MM Btu/hr	350 psi, 600°F-SH 350 psi, 500°F-T	
26-1310, 1360	No. 2 H.P. BFW Heater	142.61 MM Btu/hr	350 psi, 600°F-SH 350 psi, 500°F-T	
26-1311, 1361	No. 3 H.P. BFW Heater	118.20 MM Btu/hr	200 psi, 500°F-SH 350 psi, 400°F-T	
26-1312, 1362	No. 3 H.P. BFW Heater	118.20 MM Btu/hr	200 psi, 500°F-SH 350 psi, 400°F-T	
26-1313, 1363	Deaerator	38.76 MM Btu/hr	200 psi, 400°F	
26-1314, 1364	Deaerator	38.76 MM Btu/hr	200 psi, 400°F	
26-1315, 1365	Low Pressure Deaerator	100,000 Gal	100 psi, 300°F	CS
Pumps				
26-1501 through 1504, 1551 through 1554	Alternator Condenser Pumps	1,000 gpm, 100-hp motor	100 psi tdh, 100°F	CA6NM

Table 13-15 - Major Equipment Summary
 Unit 26 - Utility Power Generation (Contd)

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
Pumps				
26-1513 through 1516, 1563 through 1566	Deaerator BFW Pumps	4,600 gpm, 5,500-hp Motor	1,515 psi tdh, 300°F	CA6NM
26-1517 through 1520, 1567 through 1570	BFW Booster Pumps	4,200 gpm, 350-hp Motor	100 psi tdh, 510°F	CA6NM
26-1521, 1571	Condensate Transfer Pump	3,000 gpm, 125-hp Motor	45 psi tdh, 110°F	CS
26-1522, 1572	Condensate Transfer Pump (Spare)	3,000 gpm, 125-hp Motor	45 psi tdh, 110°F	CS
26-1523, 1573	Reclaimed Water Transfer Pump	2,450 gpm, 100-hp Motor	45 psi tdh, 110°F	CA6NM
26-1524, 1574	Reclaimed Water Transfer Pump (Spare)	2,450 gpm, 100-hp Motor	45 psi tdh, 110°F	CA6NM
26-1525, 1575	BFW Transfer Pump	2,450 gpm, 125-hp Motor	65 psi tdh, 60°F	CS
26-1526, 1576	BFW Transfer Pump (Spare)	2,450 gpm, 125-hp Motor	65 psi tdh, 60°F	CS
26-1527, 1577	Dowtherm Transfer Pump	400 gpm, 25-hp Motor	100 psi tdh, 60°F	CS

Table 13-15 - Major Equipment Summary
 Unit 26 - Utility Power Generation (Contd)

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
Pumps				
26-1528, 1578	Dowtherm Transfer Pump (Spare)	400 gpm, 25-hp Motor	100 psi tdh, 60°F	CS
26-1529, 1579	Low Pressure BFW Pump	386 gpm, 300 hp Motor 640 gpm	600 psi tdh, 300°F 200 psi tdh, 300°F	CS CS
26-1530, 1580	Low Pressure BFW Pump (Spare)	386 gpm, 300-hp Motor 640 gpm	600 psi tdh, 300°F 200 psi tdh, 300°F	CS
26-1531, 1581	Hot Condensate Return Pump	3500 gpm, 250-hp Motor	100 psi tdh, 300°F	CS
26-1532, 1582	Hot Condensate Return Pump (Spare)	3500 gpm, 250-hp Motor	100 psi tdh, 300°F	CS
Boilers				
26-1601	Startup Boiler	250 MM Btu/hr	1,265 psia, 950°F	
26-1602	Startup Boiler	250 MM Btu/hr	1,265 psia, 950°F	
Compressors				
26-1805	Plant Air Compressor (Motor Drive)	4,200 hp 20,000 cfm	14.7 psia in/90°F 140 psia out	3-stage Centrifugal, CS
26-1806	Plant Air Compressor (Turbine Drive)	4,200 hp 20,000 cfm	14.7 psia in/90°F 140 psia out	
26-1807	Nitrogen Compressor	160 hp 500 cfm	350 psia out/150°F	Reciprocating, CS

Table 13-15 - Major Equipment Summary
 Unit 26 - Utility Power Generation (Contd)

Item Number	Description	Size	Design Press./Temp.	Material/ Remarks
Storage Tanks				
26-1902-01/02	BFW Storage Tank, Cone Roof	100,000 bbl. each, 4,200,000 gal		
26-1903-01/02	Condensate Storage Tank, Cone Roof	50,000 bbl. each, 2,100,000 gal		
26-1904-01 through 04	Reclaimed Water Storage Tank, Cone Roof	50,000 bbl. each, 2,100,000 gal		
26-1905-01/02	Dowtherm Storage Tank, Floating Roof	2,000 bbl. each, 84,000 gal		
26-1907	Deminerlizer Acid Storage Tank	50,000 gal		
26-1908	Deminerlizer Caustic Storage Tank	50,000 gal		
26-1910	Neutralizer Tank	20,000 gal		Concrete
26-1911-01/02	Deminerlizer Storage Tank	50,000 gal		CS with Epoxy Phenolic Lining
26-1912	Sludge Holding Tank	20,000 gal		CS with Coal Tar Epoxy

Table 13-15 - Major Equipment Summary
 Unit 26 - Utility Power Generation (Contd)

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
Mixers				
26-2401	Neutralizer Tank Mixer	50-hp Motor		
26-2402	Sludge Holding Tank Mixer	60-hp Motor		
Other Major Equipment				
26-2802	Deaerator Chemical Feed System			
26-2803	BFW Chemical Feed System			

Table 13-16 - Major Equipment Summary
 Unit 27 - Potable and Sanitary Water System

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
Pumps				
27-1501	Potable Water Pump	75 gpm, 5-hp Motor	75 psi tdh, 60°F	CS
27-1502	Potable Water Pump (Spare)	75 gpm, 5-hp Motor	75 psi tdh, 60°F	CS
27-1503	Deep Well Pump	250 gpm, 10-hp Motor	50 psi tdh, 60°F	CS
Tanks				
27-1901	Potable Water Storage Tank	24,000 gal	atm, amb	CS
Filters				
27-2201	Potable Water Filter	100 gpm	atm, amb	CS
Other Major Equipment				
27-2801	Chlorine Injection Package	1 to 5 lb/day		

Table 13-17 - Major Equipment Summary
Unit 28 - Raw Water System

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
Pumps				
28-1501	Raw Water Pump	15,000 gpm, 300-hp Motor	35 psi tdh, 60°F	CS
28-1502	Raw Water Pump (Spare)	15,000 gpm, 300-hp Motor	35 psi tdh, 60°F	CS
28-1503	Sludge Pump	500 gpm, 20-hp Motor	55 psi tdh, 60°F	CS
28-1504	Sludge Pump (Spare)	500 gpm, 20-hp Motor	55 psi tdh, 60°F	CS
28-1505	Sand Filter Pump Effluent Pump	18,500 gpm, 400-hp Motor	45 psi tdh, 60°F	CS
28-1506	Sand Filter Pump Effluent Pump (Spare)	18,500 gpm, 400-hp Motor	45 psi tdh, 60°F	CS
28-1507	Plant Raw Water Pump	18,500 gpm, 400-hp Motor	45 psi tdh, 60°F	CS
28-1508	Plant Raw Water Pump (Spare)	18,500 gpm, 400-hp Motor	45 psi tdh, 60°F	CS
28-1509 through -1520	Cooling Water Pump	50,000 gpm each 1,250-hp Motor	45 psi tdh, 60°F	CS

Table 13-17 - Major Equipment Summary
Unit 28 - Raw Water System (Contd)

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
Cooling Towers				
28-1701	Cooling Tower	2,206 mm BU/hr, 315,000 gpm, 335 ft dia x 72 ft high	atm, 100°F In 86°F Out	Round mechanical draft cross-flow
28-1702	Cooling Tower	2,206 mm BU/hr, 315,000 gpm, 335 ft dia x 72 ft high	atm, 100°F In 86°F Out	Round mechanical draft cross-flow
Tanks				
28-1901	Raw Water Storage Tank	4,200,000 gal	atm, amb	CS 1/8 in. CA
Filters				
28-2201	River Water Screen	19,000 gpm	atm, amb	CS
28-2202	Clarifier	100,000 gal	atm, amb	CS
28-2203	Raw Water Sand Filter	18,500 gpm	atm, amb	SS
Mixers				
28-2401	Clarifier Rake Drive	7-1/2 hp	atm, amb	CS

Table 13-17 - Major Equipment Summary
 Unit 28 - Raw Water System (Contd)

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
Other Major Equipment				
28-2801	Chlorine and Chemical Injection Package	50 to 250 lb/day Cl ₂		
Sumps				
28-3201	Raw Water Sump	560,000 gal	atm, amb	Concrete
Basins				
28-4101	River Water Basin	300,000 gal	atm, amb	Concrete

Table 13-18 - Major Equipment Summary
Unit 29 - Flare System

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
29-1401, 1451	Self-supported Flare Stack. Includes knockout drum in flare base, 360-deg. access platform at flare tip; ladder to grade with step- offs every 30 ft.	225-ft-high; 72-in. dia Flare Tip		CS Capacity for flow rates to 53 MM scf/hr.

Table 13-19 - Major Equipment Summary
Unit 30 - Tank Farm

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
30-1501	Butane Transfer Pump	450 gpm, 40-hp Motor	200 psi tdh, 145°F	CS API-610, S-1
30-1502	Butane Transfer Pump (Spare)	450 gpm, 40-hp Motor	200 psi tdh, 145°F	CS API-610, S-1
30-1503	Light Naphtha Transfer Pump	1390 gpm, 60-hp Motor	97 psi tdh, 165°F	CS API-610, S-1
30-1504	Light Naphtha Transfer Pump (Spare)	1390 gpm, 60-hp Motor	97 psi tdh, 165°F	CS API-610, S-1
30-1505	Heavy Naphtha Transfer Pump	1365 gpm, 60-hp Motor	90 psi tdh, 135°F	CS API-610, S-1
30-1506	Heavy Naphtha Transfer Pump (Spare)	1365 gpm, 60-hp Motor	90 psi tdh, 135°F	CS API-610, S-1
30-1507	Diesel Transfer Pump	1980 gpm, 100-hp Motor	82 psi tdh, 145°F	CS API-610, S-1
30-1508	Diesel Transfer Pump (Spare)	1980 gpm, 100-hp Motor	82 psi tdh, 145°F	CS API-610, S-1
30-1509	Fuel Oil Transfer Pump	680 gpm, 30-hp Motor	75 psi tdh, 165°F	CS API-610, S-1
30-1510	Fuel Oil Transfer Pump (Spare)	680 gpm, 30-hp Motor	75 psi tdh, 165°F	CS API-610, S-1

Table 13-19 - Major Equipment Summary
Unit 30 - Tank Farm (Contd)

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
30-1513	Solvent Transfer Pump	564 gpm, 25-hp Motor	75 psi tdh, 135°F	CS API-610, S-1
30-1514	Solvent Transfer Pump (Spare)	564 gpm, 25-hp Motor	75 psi tdh, 135°F	CS API-610, S-1
30-1515	Pipeline Pump	1900 gpm, 700-hp Motor	630 psi tdh, 165°F	CS API-610, S-4
30-1516	Pipeline Pump (Spare)	1900 gpm, 700-hp Motor	630 psi tdh, 165°F	CS API-610, S-4
30-1517 -1518	Tank Car Loading Pump	2200 gpm, 100-hp Motor	120 psi tdh, 165°F	CS API-610, S-4
30-1519	Tank Car Loading Pump (Spare)	2200 gpm, 100-hp Motor	120 psi tdh, 165°F	CS API-610, S-4

Table 13-19 - Major Equipment Summary
 Unit 30 - Tank Farm (Contd)
 Product Storage Tank Summary

Item Number	Description	Total Number	Volume per Tank (gal)		Storage Temperature (°F)	Pressure (psia)	Manways No. Dia (in.)	Tank Type
			(bbl)					
30-1901-01 through -04	LPG Rundown Tank	4	1,000	42,000	120	70	2-20	Pressure
30-1951-01 through -04	LPG Rundown Tank	4	1,000	42,000	120	70	2-20	Pressure
30-1907	LPG Product Tank	1	100,000	4,200,000	30	15	2-20	Pressure (a)
30-1902-01, -02	Light Naphtha Rundown Tank	2	10,000	420,000	120	5	2-20	Floating Roof
30-1952-01, -02	Light Naphtha Rundown Tank	2	10,000	420,000	120	5	2-20	Floating Roof
30-1908-01, -02	Light Naphtha Product Tank	2	150,000	6,300,000	120	5	2-20	Floating Roof
30-1903-01, -02	Heavy Naphtha Rundown Tank	2	10,000	420,000	110	2	2-20	Cone Roof
30-1953-01, -02	Heavy Naphtha Rundown Tank	2	10,000	420,000	110	2	2-20	Cone Roof
30-1909-01, -02	Heavy Naphtha Product Tank	2	150,000	6,300,000	110	2	2-20	Cone Roof
30-1904-01, -02	Alcohol Rundown Tank	2	10,000	420,000	110	2	2-20	Cone Roof

(a) Refrigerated.

Table 13-19 - Major Equipment Summary
Unit 30 - Tank Farm (Contd)

Item Number	Description	Total No.	Product Storage Tank Summary				Storage			Tank Type
			Volume Per Tank		(Temp. °F)	(Pressure) (psia)	Manways			
			(bbl)	(gal)			(No. and Dia./In.)			
30-1954-01-02	Alcohol Rundown Tanks	2	10,000	420,000	110	0.2	2-20		Cone Roofs	
30-1910-01-02	Alcohol Product Tank	2	30,000	1,260,000	110	0.2	2-20		Cone Roof	
30-1905-01-02	Diesel Rundown Tank	2	10,000	420,000	120	0.1	2-20		Cone Roof	
30-1955-01-02	Diesel Rundown Tank	2	10,000	420,000	120	0.1	2-20		Cone Roof	
30-1911-01 through -03	Diesel Product Tank	3	150,000	6,300,000	120	0.1	2-20		Cone Roof	
30-1906	Fuel Oil Run-down Tank	1	10,000	420,000	140	0.1	2-20		Cone Roof (b)	
30-1956	Fuel Oil Run-down Tank	1	10,000	420,000	140	0.1	2-20		Cone Roof (b)	
30-1912	Fuel Oil Product Tank	1	150,000	6,300,000	140	0.1	2-20		Cone Roof (b)	
30-1913	Solvent Storage Tank	1	10,000	400,000	Amb	Atm	2-20		Cone Roof	

(b) 2,000 ft² Outlet Area Heater.

Table 13-20 - Major Equipment Summary
Unit 31 - Effluent Water Treating

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
Vessels				
31-1201	Oil/Water Separator	25,000 gal	75 psig, amb	CS
31-1202	Oil Skimmer	10,000 gal	atm 130°F	CS
31-1301	Pump and Compressor Water Air Cooler	5.0 MM Btu/hr, 33,675 ft ² 11.6 x 32 ft Bay 2 Motors 10-hp each	25 psig, 165°F	CS Hdr; CS Tubes
Pumps				
31-1501	Sanitary Lift Pump	100 gpm, 5-hp Motor	35 psi tdh, 60°F	CS
31-1502	Sanitary Lift Pump (Spare)	100 gpm, 5-hp Motor	35 psi tdh, 60°F	CS
31-1505	Oily Water Sump Pump	250 gpm, 10-hp Motor	35 psi tdh, 60°F	CS
31-1506	Oily Water Sump Pump (Spare)	250 gpm, 10-hp Motor	35 psi tdh, 60°F	CS
31-1507	Oil/Water Separator Oil Pump	50 gpm, 3-hp Motor	125 psi tdh, 60°F	CS

Table 13-20 - Major Equipment Summary
 Unit 31 - Effluent Water Treating (Contd)

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
31-1508	Oil/Water Separator Oil Pump (Spare)	50 gpm, 3-hp Motor	125 psi tdh, 60°F	CS
31-1509	Oil/Water Separator Water Pump	250 gpm, 10-hp Motor	125 psi tdh, 60°F	CS
31-1510	Oil/Water Separator Water Pump (Spare)	250 gpm, 10-hp Motor	125 psi tdh, 60°F	CS
31-1511	Slop Tank Pump	50 gpm, 25-hp Motor	465 psi tdh, 60°F	CS
31-1512	Slop Tank Pump (Spare)	50 gpm, 25-hp Motor	465 psi tdh, 60°F	CS
31-1513	Neutralizer Lift Pump	6,000 gpm, 75-hp Motor	30 psi tdh, 100°F	CS
31-1514	Neutralizer Lift Pump (Spare)	6,000 gpm, 75-hp Motor	30 psi tdh, 100°F	CS
31-1515	Pump and Compressor Water Pump	1,000 gpm, 30-hp Motor	50 psi tdh, 130°F	CS
31-1516	Pump and Compressor Water Pump (Spare)	1,000 gpm, 30-hp Motor	50 psi tdh, 130°F	CS

Table 13-20 - Major Equipment Summary
 Unit 31 - Effluent Water Treating (Contd)

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
Pumps				
31-1517	Storm Water Skimmed Oil Pump	50 gpm, 10-hp Motor	50 psi tdh, 60°F	CS
Tanks				
13-1901	Slop Tank	6,000 gal	atm, amb	CS
Filters				
31-2201	Oily Water Sump Sand Filter	125 gpm	atm, amb	CS
31-2202	Oily Water Sump Sand Filter	125 gpm	atm, amb	CS
31-2203	Settler-Clarifier	400,000 gal	atm, amb	CS
Other Major Equipment				
31-2801	Storm Water Roll Skimmer	50 gpm	atm, amb	CS
31-2802	Sewage Treatment Plant	100 gpm	atm, amb	Package Unit

Table 13-20 - Major Equipment Summary
 Unit 31 - Effluent Water Treating (Contd)

Item Number	Description	Size	Design Press./Temp.	Material/Remarks
Flotation Equipment				
31-3101	Floating Aerator	25 hp	atm, amb	CS
31-3102	Floating Aerator	25 hp	atm, amb	CS
Sumps				
31-3201	Oily Water Sump	15,000 gal	atm, amb	Concrete
Basins				
31-4101	Neutralization Basin	180,000 gal	atm, amb	Gunned Excavation
Ponds				
31-5301	Storm Water Pond	5 Acres	atm, amb	Excavated, compacted
31-5302	Bio-Pond	1 Acre	atm, amb	Excavated, compacted

Table 13-21 - Major Equipment Summary
 Unit 24 - Buildings and General Facilities

Facility	Description	Size (ft ²)
Administration Building	Tilt-up concrete, 2-story	30,000
Laboratory	Tilt-up concrete, 1-story	12,000
Control House	Tilt-up concrete, 1-story	8,000
Changehouse	Tilt-up concrete, 1-story	6,000
Cafeteria	Tilt-up concrete, 1-story	8,800
Maintenance Shop	Metal, insulated, 20-ft eave	20,000
Warehouse	Metal, insulated, 12-ft eave	35,000
Chemical Storage	Metal, insulated, 8-ft eave	10,000
Miscellaneous Switch Houses and Operator Field Offices	Metal, insulated, 8-ft eave	10,000
Fire Station	Metal, insulated, 12-ft eave	3,000
Medical Building	Concrete block, 1-story	2,000
Guard Houses	Metal, insulated, 8-ft eave	250
Security	Concrete block, 1-story	2,000