CHAPTER TWO
FACILITY DESCRIPTION AND LOCATION

2.0 FACILITY DESCRIPTION AND LOCATION

2.1 INTRODUCTION

The proposed San Gabriel Generating Station (SGGS) will consist of a natural gas-fired combined cycle power plant and associated linear facilities. The SGGS will be a (2x1) configuration which will consist of two combustion turbine generators (CTG), two supplementally fired heat recovery steam generators (HRSG), one steam turbine generator (STG), and ancillary equipment. The linear facilities will consist of the natural gas line, makeup water supply line, fire protection water line, potable water line, process wastewater line, and the transmission line that connects to the Southern California Edison Company's (SCE) future Rancho Vista substation. The project will have an average annual electrical output of 656 megawatts (MW) with commercial operation planned for July 2010. The proposed project will be fueled with pipeline-quality natural gas that will be delivered to the power plant site.

2.2 PROJECT LOCATION

Figure 2.2-1 shows the location of the proposed project site as well as nearby roads and other area features. Except for approximately 200 feet of gas line and 400 feet of transmission line, the SGGS will be primarily sited within the existing 60-acre Etiwanda Generating Station (EGS) property located at 8996 Etiwanda Avenue in Rancho Cucamonga, San Bernardino County, California. A small portion of the plant will occupy property currently owned by Inland Empire Utility Agency (IEUA). The proposed project site is approximately 1 mile east of Interstate 15 (I-15) and 1.5 miles north of Interstate 10 (I-10) (see Figure 2.2-1).

The proposed SGGS site is located adjacent to SCE's Rancho Vista substation, which is scheduled to be operational in 2009. The site locale is primarily industrial. EGS generating units are located on Assessor's Parcel Number (APN) 022-928-379. The EGS site is located on Sections 8 and 17, Township 15, Range 6W, on the Fontana U.S. Geological Survey (USGS) Quadrangle Map TCA 0820.

2.3 POWER PLANT SITE DESCRIPTION

When completed, the SGGS will occupy approximately 16.2 acres in the northwestern portion of the EGS site, generally within the footprint of the area previously occupied by the former Units 1 and 2 cooling towers to the west of Units 3 and 4. The balance of the EGS will remain unchanged. The SGGS will also occupy 0.8 acre of the IEUA property to the north of the existing storage tanks on land that is currently part of the tanks' containment berm. San Gabriel Power Generation, LLC (SGPG) has a letter of intent with IEUA to either purchase or lease this property (see Appendix F).

The location of the proposed generating station, associated linear facilities, and offsite construction laydown area is shown on Figure 2.3-1.

2.4 SITE ACTIVITIES THAT ARE NOT PART OF THE PROPOSED PROJECT

The EGS has ongoing activities consistent with maintenance and capital investment in an operating plant. For example in 2006 activities included replacing the Unit 4 feedwater heater, rebuilding the cooling towers for Units 3 and 4, abating the asbestos of Units 1 through 4, and repairing the sodium hypochlorite containment of Units 3 and 4.

The SGGS will be adjacent to the existing EGS and will use some of the EGS facilities. The EGS has ongoing maintenance and capital improvement projects that may occur prior to the development of SGGS. These projects are not directly or indirectly connected to the SGGS and therefore are not part of the project. Descriptions of these projects and activities are described below.

2.4.1 Demolition of EGS Unit 1 and 2 Cooling Towers

The EGS will demolish the existing cooling towers located in the northwestern portion of the EGS property and within the area proposed for development of the SGGS. Historically these cooling towers provided cooling for Units 1 and 2. Units 1 and 2 were retired and their South Coast Air Quality Management District (SCAQMD) Permits To Operate (PTO) were surrendered in 2003. The cooling towers do not serve any of the EGS existing operating units. The cooling towers were constructed in 1952 and require maintenance to prevent them from becoming a fire and safety hazard. For that reason, the EGS has scheduled demolition of the cooling towers in 2008. EGS will be requesting approval of the demolition activities from the City of Rancho Cucamonga. The cooling towers will be demolished regardless of whether the SGGS obtains a license from the California Energy Commission.

2.4.2 Capital and Maintenance Projects for 2007

Additional capital and maintenance projects that will be undertaken in 2007 include maintenance on the Unit 4 cooling tower, maintenance on Unit 3 and 4 condenser tubes, and relocation of the fire pumps, which draw water from the Unit 1 and 2 Cooling Towers. Additionally, EGS will be completing projects begun in 2006, which include maintenance of the Unit 3 and 4 Cooling Towers, rebuilding condensate pumps for Units 3 and 4, and boiler repairs. These activities are not part of the SGGS project and will be completed regardless of whether the SGGS obtains a license from the California Energy Commission.

2.4.3 Capital and Maintenance Projects for 2008

EGS plans to complete the Capitol and Maintenance Projects begun in 2007 in addition to upgrading the existing plant entrance and exit gates. Similarly, these activities will be undertaken regardless of whether the SGGS obtains a license from the California Energy Commission.

2.5 POWER GENERATION FACILITY

The proposed project will consist of a 656-MW combined cycle electric generating facility (see Figure 2.2-1). Each combustion gas turbine and the steam turbine will be connected to one of three separate electric generators. Output of the generators will be connected to step-up transformers and then to a new switchyard to be constructed by SCE. The SGGS will be interconnected to SCE's California transmission grid, and power generated by the facility will be available to serve energy needs throughout California.

The SGGS will use air cooling to reduce consumptive water use. The project will use water supplied by EGS from the existing makeup water reservoir. Water in the reservoir is primarily reclaimed water supplied by the IEUA under an existing water services agreement.

2.5.1 Power Plant Site Arrangement

The following sections describe the power generation facility site arrangement, process flow diagrams, heat and material balances, major equipment, and ancillary systems (including buildings and structures) that constitute the proposed combined cycle power plant. The combined cycle power plant will be designed, constructed, and operated in accordance with applicable laws, ordinances, regulations, and standards (LORS). In addition, the power plant facilities will be designed and constructed in accordance with the design criteria provided in Appendices A through E.

The site arrangement drawings (plot plan, south elevation, east elevation, and an oblique aerial view of the proposed power generation facility) are shown on Figures 2.5-1, 2.5-2, 2.5-3, and 2.5-4, respectively.

2.5.2 Process Description

This section describes the power generation process that will be employed by the SGGS.

The plant power generation facility (power block) will consist of two CTGs equipped with dry low NO_X (DLN) combustors and inlet air evaporative coolers, HRSGs equipped with duct burners, one STG, an air-cooled condenser (ACC), and associated auxiliary systems and equipment. Fuel for the CTGs and duct burners will be pipeline-quality natural gas.

The average net generating capacity of the combined cycle system will be approximately 656 MW. The actual net output of the system will vary in response to ambient air temperature conditions, use of evaporative coolers, amount of auxiliary load, generator power factor, firing conditions of the combustion turbines, the amount of supplemental duct firing to the HRSG, and other operating factors. Full load output (net) of the facility under expected operating conditions will range from approximately 476 MW to 698 MW. Average annual ambient conditions and the assumed operating conditions produce the average rating.

The SGGS can operate at part load with either or both of the CTGs operating down to minimum load (60 percent) while keeping the STG on-line. The CTGs can also operate without the STG, if necessary. Operational modes will be driven by good operating practices, market conditions, and dispatch requirements.

The overall annual availability of the power plant is expected to be in the range of 92 to 96 percent. The power plant's annual output will depend on market conditions and dispatch requirements. The design of the power plant will provide for operating flexibility (i.e., ability to start up, shut down, turn down, and provide peaking output) so that operations may be readily adapted to changing conditions in the energy and ancillary services markets.

Process flow diagrams of the SGGS are shown on Figures 2.5-5 and 2.5-6. Figure 2.5-5 shows the power block. Figure 2.5-6 shows the balance of plant, which includes the auxiliary cooling water system and the water storage and treatment systems. Three different operating cases have been prepared, which vary with ambient temperature, relative humidity, and operating conditions. These cases are summarized in Table 2.5-1, which presents heat and material balance case descriptions. Heat and material balances for the operating conditions listed in Table 2.5-1 are presented in Tables 2.5-2 through 2.5-4. The stream numbers on the heat and material balances (Tables 2.5-2 through 2.5-4) correspond to numbered diamonds on the process flow diagrams.

Table 2.5-1
Heat and Material Balance Case Descriptions

Case	Description	Ambient Temperature (°F)	Relative Humidity (percent)	CTG Load (percent)	Duct Fire Status	Evaporative Cooler Status
1A	Maximum	105	15	100	On	On
1B	Maximum	105	15	100	Off	On
1C	Maximum	105	15	80	Off	Off
1D	Maximum	105	15	60	Off	Off
2A	Yearly Average	63	65	100	On	On
2B	Yearly Average	63	65	100	Off	On
2C	Yearly Average	63	65	80	Off	Off
2D	Yearly Average	63	65	60	Off	Off
3A	Minimum	25	60	100	On	Off
3B	Minimum	25	60	100	Off	Off
3C	Minimum	25	60	80	Off	Off
3D	Minimum	25	60	60	Off	Off

Table 2.5-2
Heat and Material Balances – Case 1

Stream No.	Description	Case 1A					Case 1B					Case 1C					Case 1D				
		105°F – 15% RH					105°F – 15% RH					105°F – 15% RH					105°F – 15% RH				
	GTG Load	100%					100%					80%					60%				
	Duct Burner Status	On					Off					Off					Off				
	Evaporative Cooler Status	On					On					Off					Off				
Stream No.	**Description**	**Flow Per Train**	**kpph Plant Total**	**Pressure psia**	**Temp °F**	**Enthalpy Btu/lbm**	**Flow Per Train**	**kpph Plant Total**	**Pressure psia**	**Temp °F**	**Enthalpy Btu/lbm**	**Flow Per Train**	**kpph Plant Total**	**Pressure psia**	**Temp °F**	**Enthalpy Btu/lbm**	**Flow Per Train**	**kpph Plant Total**	**Pressure psia**	**Temp °F**	**Enthalpy Btu/lbm**
C1	Condensate from Condenser		1,894.66	4.35	147.4	115.32		1,151.57	3.184	131.5	99.5		959.93	2.937	127.3	95.29		859.49	2.815	125.1	93.06
C2	Condensate to HRSG Boundary Limit		1,894.45	92.07	147.9	115.32		1,151.55	65.44	132.4	99.5		959.89	55.11	128.4	95.29		859.48	49.5	126.3	93.06
C3	FW from LP Drum to HP/IP FW Pump	990.22	1,980.44	92.07	264.9	233.88	575.98	1,151.96	65.44	293	262.54	483.04	966.08	55.11	281.9	251.15	434.57	869.14	49.5	274.3	243.4
C4	HP FW Pump Discharge	866.72	1,733.44	2,607.9	269.3	243.4	426.75	853.5	1,423.3	309	281.48	351.41	702.82	1,341.8	299	271.06	314.01	628.02	1,298.7	293.1	264.91
C5	IP FW Pump Bleed	123.5	247	649.2	267.1	237.22	149.23	298.46	358.7	300.9	271.22	131.63	263.26	298	290	259.85	120.56	241.12	266.2	283.3	252.97
C6	Hot IP FW to Fuel Gas Preheater	104.77	209.54	649.2	388.4	363.14	104.01	208.02	358.6	390.8	365.32	87.76	175.52	297.9	375.5	348.94	77.92	155.84	266.1	366	338.82
C7	Cold IP FW from Fuel Gas Preheater	104.77	209.54	652.8	220	189.63	104.01	208.02	358.6	220	188.98	87.76	175.52	297.9	220	188.85	77.92	155.84	266.1	220	188.78
C8	Demin Water Makeup to Condenser		8.57	50	90	58.15		4.75	62	90	58.18		3.86	50	90	58.15		3.35	50	90	58.15
G1	Gas Turbine Inlet Air	3,465.43	6,930.86	13.96	105	25.55	3,465.43	6,930.86	13.96	105	25.55	2,859.17	5,718.34	13.99	105	25.55	2,441.8	4,883.5	14.01	105	25.55
G2	Gas Turbine Exhaust	3,565.13	7,130.26	14.84	1,114	351.13	3,565.13	7,130.26	14.8	1,114	351.13	2,916.7	5,833.4	14.59	1,118	339.32	2,506.9	5,013.84	14.48	1,135	351.39
G3	After HRSG Duct Burners	3,592.04					3,565.13					2,916.7					2,506.9				
G4	HRSG Stack Exit	3,592.04	7,184.08	14.12	204.6	125.61	3,565.13	7,130.26	14.12	220	111.34	2,916.7	5,833.4	14.12	206.5	97.09	2,506.9	5,013.84	14.12	197.3	100.88
F1	Cold Natural Gas Fuel to Plant		205.8					150.2					115.1					95.7			
F2	Cold NG Fuel to CTG	75.1	150.2	400	60		75.1	150.2	400	60		57.5	115.1	400	60		47.9	95.7	400	60	
F3	Hot NG Fuel to CTG	75.1	150.2				75.1	150.2				57.5	115.1				47.9	95.7			
F4	Cold NG Fuel to Duct Burners	27.8	55.6				0.0	0.0				0.0	0.0				0.0	0.0			
S1	HRSG HP Superheater Exit	847.23	1,694.46	2,419.6	1,056	1,496.7	423.04	846.08	1,247.2	1,058	1,531.6	344.72	689.44	1,235.2	1,057	1,531.46	301.28	602.56	1,227	1,057	1,531.46
S2	HRSG Hot Reheat Exit	895.49	1,790.98	596.9	1,049	1,544.2	485.3	970.6	326.2	1,049	1,551.2	401.86	803.72	270.4	1,048	1,552.66	359.09	718.18	241.8	1,048	1,553.4
S3	HRSG IP Superheater Exit	41.31	82.62	648.4	554.1	1,253	64.87	129.74	355.4	532.7	1,271.5	55.57	111.14	295.1	517.9	1,268.98	49.53	99.06	263.5	509	1,267.22
S4	HRSG LP Superheater Exit	43.33	86.66	91.57	548	1,304.2	85.99	171.98	62.97	514.5	1,290.1	74.44	148.88	52.89	500.6	1,284.13	67.47	134.94	47.46	492.1	1,280.5
S5	Cold RH to HRSG from STG	1,677.52	3,355.04	647.7	699	1,348.3	837.62	1,675.24	355.4	728.4	1,381.1	682.54	1,365.08	295.1	725.8	1,382.72	596.53	1,193.06	263.5	726.7	1,384.78
S6	Mixed RH Steam into HRSG Reheater	2,065.75	4,131.5	647.7	691.5	1,343.8	1,662.96	3325.92	355.4	700.9	1,366.4	15,72.82	3,145.64	295.1	695.5	1,366.79	1521.7	3,043.4	263.5	694.6	1,368.04
S7	HP STG Throttle Steam	1,694.47	3,388.94	2,315.6	1,049	1,495.7	846.08	1,692.16	1,194.2	1054	1,530.6	689.44	1,378.88	1,200	1054	1,530.46	602.55	1,205.1	1,200	1,054	1,530.46
S8	STG HP Exhaust as Cold Reheat	1,677.52	3,355.04	677	703.7	1,349.3	837.62	1,675.24	369.7	731.7	1,382.1	682.54	1,365.08	306.5	728.8	1,383.72	596.53	1,193.06	273.4	729.5	1,385.78
S9	Hot Reheat Steam into STG	1,790.98	3,581.96	568.5	1,044	1,542.2	970.61	1,941.22	310.8	1,044	1,549.2	803.72	1,607.44	257.7	1,044	1,550.66	718.18	1,436.36	230.3	1,044	1,551.4
S10	LPSuperheater Steam into STG	82.63	165.26	648.4	554.1	1,253	129.74	259.48	355.4	532.7	1,271.5	111.14	222.28	295.1	517.9	1,268.98	99.07	198.14	263.5	509	1,267.22
S11	STG LP Exhaust Steam to Condenser	1,886.09	3,772.18	3.482	147.4	1,093.9	1,146.82	2,293.64	2.316	131.5	1,106.3	956.07	1,912.14	2.069	127.3	1,111.53	856.13	1,712.26	1.948	125.1	1,115.13
W8	Hot Closed Loop CW		3,500		120			3,500		120			3,500		120			3,500		120	
	Performance Summary																				
	CTG Heat Input, NG mmBtu/h LHV	1,569.4	3,138.8				1,569.4	3,138.8				1,202.2	2,404.4				1,000.4	2,000.7			
	HRSG Duct Burner, NG mmBtu/h LHV	579.0	1,158.0				0.0	0.0				0.0	0.0				0.0	0.0			
	Total Heat Consumption mmBtu/h LHV		4,296.8					3,138.8					2,404.4					2,000.7			
	Gas Turbine Gross Output kW	161,960	323,920				161,960	323,920				113,360	226,720				84,490	168,980			
	Steam Turbine Gross Output kW		308,945					168,930					137,761					121,188			
	Gross Power Output kW		632,865					492,850					364,481					290,168			
	Auxiliary Power kW		19,227					16,916					15,662					14,976			
	Net Power kW		613,638					475,934					348,819					275,192			
	Net Plant Heat Rate Btu/kWh, LHV		7002.1					6595.0					6,892.9					7,270.3			
	Net Plant Heat Rate Btu/kWh, HHV		7,758.4					7,307.3					7,637.3					8,055.5			

Notes:

BTU = British thermal units
CGT = combustion turbine generator
GTG = gas turbine generator
HHV = higher heating value
HP= high pressure
IP = intermediate pressure
KPPH = thousands of pounds per hour
kW = kilowatt
kWh = kilowatt hours
LHV = lower heating value
LP= low pressure
mmBTU = million British thermal units
NG = natural gas
psia = pounds per square inch absolute
RH = relative humidity
STG = steam turbine generator

Table 2.5-3
Heat and Material Balances – Case 2

Stream No.	Description	Case 2A					Case 2B					Case 2C					Case 2D				
		63°F – 65% RH					63°F – 65% RH					63°F – 65% RH					63°F – 65% RH				
	GTG Load	100%					100%					80%					60%				
	Duct Burner Status	On					Off					Off					Off				
	Evaporative Cooler Status	On					On					Off					Off				
Stream No.	**Description**	**Flow Per Train**	**kpph Plant Total**	**Pressure psia**	**Temp °F**	**Enthalpy Btu/lbm**	**Flow Per Train**	**kpph Plant Total**	**Pressure psia**	**Temp °F**	**Enthalpy Btu/lbm**	**Flow Per Train**	**kpph Plant Total**	**Pressure psia**	**Temp °F**	**Enthalpy Btu/lbm**	**Flow Per Train**	**kpph Plant Total**	**Pressure psia**	**Temp °F**	**Enthalpy Btu/lbm**
C1	Condensate from Condenser		1880.78	2.351	115.3	83.27		1,169.48	1.718	96.4	64.36		999.48	1.671	94.5	62.53		881.24	1.76	98	65.95
C2	Condensate to HRSG Boundary Limit		1,880.69	91.3	115.9	83.27		1,169.48	65.81	97.3	64.36		999.48	56.91	95.6	62.53		881.22	50.5	99.1	65.95
C3	FW from LP Drum to HP/IP FW Pump	991.46	1,982.92	91.3	253.9	222.72	590.79	1,181.58	65.81	284.3	253.57	508.43	1,016.86	56.91	275.4	244.53	451.02	902.04	50.5	268.2	237.16
C4	HP FW Pump Discharge	857.24	1,714.48	2,607.4	258.2	232.2	433.42	866.84	1457	309.3	281.77	365.34	730.68	1,370.4	300.8	272.93	321.38	642.76	1,314	294.1	266.04
C5	IP FW Pump Bleed	134.22	268.44	645.2	256	225.93	157.37	314.74	365.6	301.2	271.53	143.09	286.18	311.3	291.9	261.86	129.64	259.28	274.5	284.5	254.17
C6	Hot IP FW to Fuel Gas Preheater	115.87	231.74	645.1	381.1	355.29	108.86	217.72	365.5	391.4	365.94	97.22	194.44	311.2	377.9	351.54	86.18	172.36	274.4	367	339.89
C7	Cold IP FW from Fuel Gas Preheater	115.87	231.74	645.9	220	189.61	108.86	217.72	365.5	220	189	97.22	194.44	311.2	220	188.88	86.18	172.36	274.4	220	188.8
C8	Demin Water Makeup to Condenser		8.59	50	90	58.15		4.8	53.48	90	58.16		4.04	50	90	58.15		3.49	50	90	58.15
G1	Gas Turbine Inlet Air	3,641.9	7,283.8	13.97	63	16.33	3641.9	7,283.8	13.97	63	16.33	3,095.87	6,191.74	14	63	16.33	2,628.64	5,257.28	14.02	63	16.33
G2	Gas Turbine Exhaust	3,725.93	7,451.86	14.89	1,101	341.65	3,725.93	7,451.86	14.85	1,101	341.65	3,160.62	6,321.24	14.66	1,094	335.9	2,681.96	5,363.92	14.53	1,113	339.51
G3	After HRSG Duct Burners	3,752					3,725.93					3,160.62					2,681.96				
G4	HRSG Stack Exit	3,752	7,504	14.12	188.1	115.23	3,725.93	7,451.86	14.12	208.6	103.55	3,160.62	6,321.24	14.12	198.7	97.88	2,681.96	5,363.92	14.12	190.2	94.33
F1	Cold Natural Gas Fuel to Plant		211.6					157.7					129.5					106.6			
F2	Cold NG Fuel to CTG	78.9	157.7	400	60		78.9	157.7	400	60		64.7	129.5	400	60		53.3	106.6	400	60	
F3	Hot NG Fuel to CTG	78.9	157.7				78.9	157.7				64.7	129.5				53.3	106.6			
F4	Cold NG Fuel to Duct Burners	26.9	53.9				0.0	0.0				0.0	0.0				0.0	0.0			
S1	HRSG HP Superheater Exit	851.65	1,703.3	2,418.5	1,045	1,489.87	431.27	862.54	1,269.9	1,056	1,529.9	363.52	727.04	1,239.1	1,056.7	1,531	316.54	633.08	1,229.8	1,057	1,531.5
S2	HRSG Hot Reheat Exit	889.34	1,778.68	592.9	1,049	1,544.3	495.49	990.98	332.2	1,042	1,547.7	420.18	840.36	281.9	1,041.4	1,548.6	369.2	738.4	248.5	1,048	1,553.2
S3	HRSG IP Superheater Exit	44.81	89.62	644.2	557	1,255.68	68.54	137.08	362.1	536.2	1,272.9	60.29	120.58	308	522.8	1,270.5	52.52	105.04	271.6	512	1,268.1
S4	HRSG LP Superheater Exit	42.5	85	90.81	551.7	1,306.13	84.69	169.38	63.42	519.3	1,292.4	75.73	151.46	54.68	506.4	1,286.8	68.09	136.18	48.46	495.9	1,282.3
S5	Cold RH to HRSG from STG	1,686.27	3,372.54	644.1	688.7	1,342.38	853.91	1,707.82	362.1	726.5	1,379.7	719.78	1,439.56	308	724.4	1,381.4	626.75	1,253.5	271.6	723.9	1,382.9
S6	Mixed RH Steam into HRSG Reheater	2,073.46	4,146.92	644.1	681.4	1,338	1,674.87	3,349.74	362.1	698.9	1,364.9	1,596.78	3,193.56	308	694.3	1,365.5	1,540.19	3,080.38	271.6	692.3	1,366.4
S7	HP STG Throttle Steam	17,03.3	3,406.6	2,314.5	1,039	1,488.88	862.53	1,725.06	1,215.9	1,052	1,528.9	727.05	1,454.1	1,200	1,053.1	1,530	633.09	1,266.18	1,200	1,054	1,530.5
S8	STG HP Exhaust as Cold Reheat	16,86.27	3,372.54	673.4	693.5	1,343.38	853.91	1,707.82	376.6	729.8	1,380.7	719.78	1,439.56	320.2	727.5	1,382.4	626.75	1,253.5	282.1	726.8	1,383.9
S9	Hot Reheat Steam into STG	1,778.68	3,557.36	564.7	1,044	1,542.3	990.98	1,981.96	316.5	1,038	1,545.7	840.36	1,680.72	268.6	1,036.9	1,546.6	738.4	1,476.8	236.8	1,044	1,551.2
S10	LPSuperheater Steam into STG	89.62	179.24	644.2	557	1,255.68	137.07	274.14	362.1	536.2	1,272.9	120.58	241.16	308	522.8	1,270.5	105.04	210.08	271.6	512	1,268.1
S11	STG LP Exhaust Steam to Condenser	1,872.19	3,744.38	1.483	115.3	1,053.75	1,164.68	2,329.36	0.8499	96.4	1,056.5	995.45	1,990.9	0.8034	94.5	1,059.6	877.75	1,755.5	0.892	97.9	1,069.2
W8	Hot Closed Loop CW		3,500		80			3,500		80			3,500		80			3,500		80	
	Performance Summary																				
	CTG Heat Input, NG mmBtu/h LHV	1,648.1	3,296.3				1,648.1	3,296.3				1,352.8	2,705.6				1,114.1	2,228.3			
	HRSG Duct Burner, NG mmBtu/h LHV	561.0	11,22.0				0.0	0.0				0.0	0.0				0.0	0.0			
	Total Heat Consumption mmBtu/h LHV		44,18.3					3,296.3					2,705.6					2,228.3			
	Gas Turbine Gross Output kW	172,760	345,520				172,760	345,520				134,810	269,620				100,600	201,200			
	Steam Turbine Gross Output kW		329,067					187,951					158,478					137,195			
	Gross Power Output kW		674,587					533,471					428,098					338,395			
	Auxiliary Power kW		18,507					16,299					14,900					13,395			
	Net Power kW		656,080					517,172					413,198					325,000			
	Net Plant Heat Rate Btu/kWh, LHV		6,734.3					6,373.6					6,548.0					6,856.3			
	Net Plant Heat Rate Btu/kWh, HHV		7,461.6					7,062.0					7,255.2					7,596.8			

Notes:
BTU = British thermal units
CGT = combustion turbine generator
GTG = gas turbine generator
HHV = higher heating value
HP= high pressure
IP = intermediate pressure
KPPH = thousands of pounds per hour
kW = kilowatt
kWh = kilowatt hours
LHV = lower heating value
LP= low pressure
mmBTU = million British thermal units
NG = natural gas
psia = pounds per square inch absolute
RH = relative humidity
STG = steam turbine generator

Table 2.5-4
Heat and Material Balances – Case 3

Stream No.	Description	Case 3A					Case 3B					Case 3C					Case 3D				
		25°F – 60% RH					25°F – 60% RH					25°F – 60% RH					25°F – 60% RH				
	GTG Load	100%					100%					80%					60%				
	Duct Burner Status	On					Off					Off					Off				
	Evaporative Cooler Status	Off					Off					Off					Off				
	Description	Flow Per Train	kpph Plant Total	Pressure psia	Temp °F	Enthalpy Btu/lbm	Flow Per Train	kpph Plant Total	Pressure psia	Temp °F	Enthalpy Btu/lbm	Flow Per Train	kpph Plant Total	Pressure psia	Temp °F	Enthalpy Btu/lbm	Flow Per Train	kpph Plant Total	Pressure psia	Temp °F	Enthalpy Btu/lbm
C1	Condensate from Condenser		1,901.3	1.651	93.6	61.62		1,210.4	1.602	91.6	59.64		1,037.41	1.623	92.5	60.54		903.94	1.689	95.3	63.26
C2	Condensate to HRSG Boundary Limit		1,901.3	91.67	94.2	61.62		1,210.4	68.57	92.5	59.64		1,037.41	59.71	93.5	60.54		903.94	52.34	96.4	63.26
C3	FW from LP Drum to HP/IP FW Pump	1,010.48	2,021	91.67	242.8	211.38	610.78	1,221.56	68.57	286.2	255.5	526.07	1,052.14	59.71	279.1	248.3	463.36	926.72	52.34	270.4	239.37
C4	HP FW Pump Discharge	862.8	1,725.6	2,604.3	246.8	220.8	442.81	885.62	1,496	311.8	284.5	372.4	744.8	1,398	303.8	276.1	325.51	651.02	1,328.9	296.3	268.28
C5	IP FW Pump Bleed	147.68	295.36	647.6	244.6	214.44	167.97	335.94	373.9	303.9	274.3	153.67	307.34	317.6	294.9	265	137.85	275.7	279.4	286.6	256.4
C6	Hot IP FW to Fuel Gas Preheater	129.58	259.16	647.5	374.2	348.02	115.05	230.1	373.8	393.5	368.2	103.52	207.04	317.5	380.4	354.1	92.02	184.04	279.3	368.2	341.11
C7	Cold IP FW from Fuel Gas Preheater	129.58	259.16	648.4	220	189.62	115.05	230.1	373.8	220	189	103.52	207.04	317.5	220	1,88.9	92.02	184.04	279.3	220	188.81
C8	Demin Water Makeup to Condenser		8.64	50	90	58.15		4.93	55.62	90	58.17		4.15	50	90	58.15		3.59	50	90	58.15
G1	Gas Turbine Inlet Air	3,873.98	7748	13.98	25	0.13	3,873.98	7,747.96	13.98	25	0.13	3,313.76	6,627.52	14	25	0.13	2,779.36	5,558.72	14.02	25	0.13
G2	Gas Turbine Exhaust	3,958.41	7,916.8	14.97	1,082	326.58	3,958.41	7,916.82	14.93	1,082	326.6	3,383.8	6,767.6	14.73	1,067	320.6	2,836.75	5,673.5	14.57	1,091	325.94
G3	After HRSG Duct Burners	3,983.97					3,958.41					3,383.8					2,836.75				
G4	HRSG Stack Exit	3,983.97	7,967.9	14.12	183.9	104.73	3,958.41	7,916.82	14.12	211.3	96	3,383.8	6,767.6	14.12	202.8	92.37	2,836.75	5,673.5	14.12	192.9	88.78
F1	Cold Natural Gas Fuel to Plant		221.6					168.8					140.1					114.8			
F2	Cold NG Fuel to CTG	84.4	168.8	400	60		84.4	168.8	400	60		70.0	140.1	400	60		57.4	114.8	400	60	
F3	Hot NG Fuel to CTG	84.4	168.8				84.4	168.8				70.0	140.1				57.4	114.8			
F4	Cold NG Fuel to Duct Burners	26.4	52.8				0.0	0.0				0.0	0.0				0.0	0.0			
S1	HRSG HP Superheater Exit	858.51	1,717	2,414.3	1,025	1,476.79	440.61	881.22	1,288	1,039	1,519	370.55	741.1	1,240	1,032	1,517	323.89	647.78	1,231.2	1,057	1,531.46
S2	HRSG Hot Reheat Exit	899.11	1,798.2	595.1	1,030	1,533.75	509.57	1,019.14	339.6	1,025	1,538	431.91	863.82	287.4	1,018	1,536	375.95	751.9	252.5	1,042	1,549.58
S3	HRSG IP Superheater Exit	49.18	98.36	646.4	561.1	1,258.48	73.37	146.74	370	540.7	1,275	65.07	130.14	313.9	527.1	1,272	55.29	110.58	276.3	514.6	1,269.09
S4	HRSG LP Superheater Exit	42.93	85.86	91.16	556.3	1,308.42	90.96	181.92	65.95	522.7	1,294	82.87	165.74	57.2	509.4	1,288	72.61	145.22	50.12	497.6	1,282.95
S5	Cold RH to HRSG from STG	1,699.85	3,399.7	646.2	672.9	1,332.72	872.41	1,744.82	370	713	1,372	733.68	1,467.36	313.9	705.5	1,371	641.31	1,282.62	276.3	723.3	1,382.36
S6	Mixed RH Steam into HRSG Reheater	2084.7	4,169.4	646.2	666.3	1,328.66	1,689.74	3,379.48	370	687	1,358	1,609.43	3,218.86	313.9	677.5	1,356	1,550.93	3,101.86	276.3	691.4	1,365.7
S7	HP STG Throttle Steam	1,717.02	3,434	2,310.6	1,018	1,475.79	881.22	1,762.44	1,234	1,034	1,518	741.09	1,482.18	1,200	1,028	1,516	647.79	1,295.58	1,200	1,054	1,530.46
S8	STG HP Exhaust as Cold Reheat	1,699.85	3,399.7	675.4	677.8	1,333.72	872.41	1,744.82	384.6	716.3	1,373	733.68	1,467.36	326.1	708.6	1,372	641.31	1,282.62	287.1	726.2	1,383.36
S9	Hot Reheat Steam into STG	1,798.22	3,596.4	566.8	1,025	1,531.75	1,019.14	2,038.28	323.5	1,021	1,536	863.82	1,727.64	273.9	1,013	1,534	751.9	1,503.8	240.6	1,037	1,547.58
S10	LPSuperheater Steam into STG	98.36	196.72	646.4	561.1	1,258.48	146.73	293.46	370	540.7	1,275	130.14	260.28	313.9	527.1	1,272	110.59	221.18	276.3	514.6	1,269.09
S11	STG LP Exhaust Steam to Condenser	1,892.67	3,785.3	0.7832	93.7	1,039.84	1,205.47	2,410.94	0.735	91.6	1,051	1,033.26	2,066.52	0.755	92.5	1,053	900.35	1,800.7	0.8216	95.3	1,063.97
W8	Hot Closed Loop CW		3,500		55			3,500		55			3,500		55			3,500		55	
	Performance Summary																				
	CTG Heat Input, NG mmBtu/h LHV	1764.2	3,528.4				1,764.2	3,528.4				1,463.6	2,927.2				1,199.2	2,398.4			
	HRSG Duct Burner, NG mmBtu/h LHV	550.0	1,100.0				0.0	0.0				0.0	0.0				0.0	0.0			
	Total Heat Consumption mmBtu/h LHV		4,628.4					3,528.4					2,927.2					2,398.4			
	Gas Turbine Gross Output kW	187,880	375,760				187,880	375,760				149,960	299,920				111,970	223,940			
	Steam Turbine Gross Output kW		332,939					192,167					161,153					140,961			
	Gross Power Output kW		708,699					567,927					461,073					364,901			
	Auxiliary Power kW		17,978					14,809					13,405					12,283			
	Net Power kW		690,721					553,118					447,668					352,618			
	Net Plant Heat Rate Btu/kWh, LHV		6,700.8					6,379.1					6,538.8					6,801.7			
	Net Plant Heat Rate Btu/kWh, HHV		7,424.5					7,068.0					7,245.0					7,536.3			

Notes:
BTU = British thermal units; CGT = combustion turbine generator; GTG = gas turbine generator
HHV = higher heating value; HP= high pressure; IP = intermediate pressure
KPPH = thousands of pounds per hour; kW = kilowatt; kWh = kilowatt hours
LHV = lower heating value; LP= low pressure; mmBTU = million British thermal units
NG = natural gas; psia = pounds per square inch absolute; RH = relative humidity
STG = steam turbine generator

The proposed SGGS's thermodynamic cycle is described briefly below.

Air will flow through the CTG inlet air filter, evaporative coolers, and associated ductwork to the CTG compressor section. The compressed air from the compressor section flows to the CTG combustor section, where it is mixed with compressed natural gas and ignited. The hot combustion gases flow through the CTG turbine expander section, which drives both the CTG compressor section and the electric generator. The combustion gases exit the turbine expander section and enter the inlet duct of the HRSG. They then enter the HRSG steam generation section, which is equipped with duct burners placed between superheat elements, and the burners increase the temperature of the exhaust gases.

In the HRSG's steam generation section, heat from the combustion turbine gases is transferred to water pumped through the HRSG steam generation components (economizers, evaporators, drums, superheaters, etc.). Additional heat can be added within the HRSG through natural gas-fired duct burners. The water is converted to steam at three pressures (high pressure [HP], intermediate pressure [IP], and low pressure [LP]), is superheated, and is delivered to the STG. HP is steam admitted to the HP section of the STG, expands through the HP section, and exits the HP section as "cold" reheat steam. The "cold" reheat steam is combined with superheated IP steam and returned to the reheater section of the HRSG, where it is reheated and returned to the STG, continuing its expansion and driving the generator. Reheating the intermediate pressure steam improves the overall steam cycle efficiency. Exhaust steam from the STG enters an ACC, where it is condensed into water and recycled back to the HRSG as boiler feed water. The absorbed heat from the ACC is rejected to the atmosphere.

2.5.3 Combustion Turbine Generators, HRSGs, and Steam Turbine Generator

This section describes the major components and systems of the proposed project: the CTGs, HRSGs, STG, and heat rejection (cooling) system. A list of major mechanical equipment is provided in Table 2.5-5.

2.5.3.1 Combustion Turbine Generators

Thermal energy will be produced in both of the two CTGs through the combustion of natural gas and be converted into mechanical energy in the CTG turbine that drives the CTG compressor and electric generator. The CTGs are model Siemens SGTG-5000F (Siemens 5000F) machines and will be supplied by Siemens.

Each CTG will consist of a heavy-duty, single-shaft CTG and associated auxiliary equipment. The CTGs will be equipped with DLN combustors designed for natural gas and are designed to meet the following functional requirements:

- Air emissions at the gas turbine exhaust shall not exceed the levels described in Section 7.1, Air Quality.
- Noise emissions shall not exceed the near-field and property line levels described in Section 7.5, Noise.
- Each CTG shall be capable of operating at a 60 percent load while meeting the required air emission performance.

The CTGs will be equipped with the following accessories required to provide efficient, safe, and reliable operation:

- Inlet air filters and on-line filter cleaning system
- Inlet air evaporative coolers
- On-line and off-line compressor wash system

Table 2.5-5
Major Mechanical Equipment

Equipment	Qty	Size/Capacity	Service/Remarks
Combustion Turbine Generators (CTGs)	2	Siemens SGT6-5000F	DLN combustion control with inlet air evaporative coolers
Steam Turbine Generator (STG)	1	Alstom 340 MW	Condensing reheat STG
Heat Recovery Steam Generators (HRSGs)	2	2,400 psig HP Steam	Three pressure with reheat and supplemental duct firing
Auxiliary Boiler	1	56 MMBtu/hr	Natural gas fired for startup
Aqueous Ammonia Storage	1	15,000 gal, each	NO_X control (29.4 wt % ammonia solution)
SCR Catalyst	2		NO_X control
Oxidation Catalyst	2		VOC and CO control
HRSG Stacks	2	19 feet in diameter × 150.5 feet high	Includes silencers and damper
Continuous Emissions Monitoring System (CEMS)	2		NO_X, CO, and O_2
HP Boiler Feedwater Pumps	4	1,200 gpm	HP feed (2 × 100% (unfired) per HRSG)
Air-Cooled Condenser	1	1,900 mmBtu/h	40 cells (estimated)
Condensate Pumps	3	1,900 gpm	Horizontal (3 × 50% capacity)
Auxiliary Cooling Water Pumps	3	3,500 gpm	Generator and lube oil cooling (3 × 50% capacity)
Natural Gas Compressor	3	85,000 lbs/hr	Combustion Turbine Fuel (3 × 50%)
Combustion Turbine Fuel Gas Filter Separators	2	85,000 lbs/hr	Natural gas fuel
HRSG Duct Burner Fuel Gas Filter Separators	2	30,000 lbs/hr	Natural gas fuel
Evaporative Coolers Storage Tank	1	250,000 gal	Gas turbine evaporative cooler makeup water
Demineralized Water Storage Tank	1	250,000 gal	HRSG makeup water

- Metal acoustical enclosures
- Fire detection and protection system
- Lubrication oil system, including oil coolers and filters
- Generator coolers
- Starting system, auxiliary power system, and control system

The metal acoustical enclosures that contain the CTGs and accessory equipment will be located outdoors.

2.5.3.2 Heat Recovery Steam Generators

The HRSGs will transfer heat from the CTG exhaust gases to condensate and feedwater to produce steam.

The HRSGs will be multipressure, natural circulation boilers equipped with transition ducts, duct burners and 19-foot-diameter exhaust stacks approximately 150.5 feet tall. The stack height is based on air quality modeling results. Pressure components of each HRSG include an LP economizer, LP evaporator, LP drum, LP superheater, IP economizer, IP evaporator, IP drum, IP superheater, HP economizer, HP evaporator, HP drum, HP superheater, and reheaters.

Superheated high-pressure steam is produced in the HRSG and flows to the steam turbine throttle inlet. The exhausted cold reheat steam from the steam turbine is mixed IP steam from the HRSG and is reintroduced into the HRSG through the reheaters. The hot reheat steam flows back from the HRSG into the STG. LP superheated steam from the HRSG is admitted to the LP sections of the STG.

Steam that is exhausted from the STG is condensed in an ACC. The condensate is pumped from the ACC by condensate pumps to the HRSG. Boiler feedwater pumps send the feedwater through economizers and into the boiler drums of the HRSG, where steam is produced, thus completing the steam cycle.

Duct burners are installed in the HRSG between the HP superheater and reheat sections. Through the combustion of natural gas, the duct burners heat the CTG exhaust gases to generate additional steam.

Each HRSG is equipped with a selective catalytic reduction (SCR) system that uses aqueous ammonia in conjunction with a catalyst bed to reduce oxides of nitrogen (NO_X) in the CTG exhaust gases. The catalyst bed is contained in a catalyst chamber located within each HRSG. Ammonia is injected upstream of the catalyst bed. The subsequent catalytic reaction converts NO_X to nitrogen and water, resulting in a reduced concentration of NO_X in the exhaust gases exiting the stack.

An oxidation catalyst located within each HRSG reduces the concentration of carbon monoxide in the exhaust gases exiting the stack. The oxidation catalyst also reduces the concentration of volatile organic compound emissions.

2.5.3.3 Steam Turbine Generator

The STG system will include a reheat STG; a governor system; a steam admission system; a gland steam system; a lubrication oil system, including oil coolers and filters; and generator coolers. Steam from the HP superheater, reheater, and LP superheater sections of the HRSG will enter the corresponding sections of the STG, where it expands and drives the steam turbine and its generator. Upon exiting the turbine, the steam will enter the deaerating ACC, where it will be condensed to water.

Cooling System for Heat Rejection

The heat rejection system of the steam cycle will consist of a deaerating-type ACC and closed air-cooled auxiliary cooling water system. The ACC receives exhaust steam from the LP section of the STG and condenses it to liquid, then deaerates the condensate for return to the HRSGs. The ACC will be a multicell tubular heat exchanger with wet, saturated steam condensing on the tube side and air flowing across the outside of the tubes to provide cooling. The tube side of the condenser is designed to operate under a full vacuum, with an absolute pressure of 8 inches of mercury (in. Hg) at design ambient conditions.

The STG exhaust steam will enter the ACC through a main duct and be distributed among multiple cells. Each cell will have a multi-speed mechanical draft fan that forces air across finned tubes containing the steam. The air condenses the steam, and the condensate flows down to a collection header. The collection header empties into a condensate tank where makeup water is also added. A steam jet air ejector removes oxygen and any noncondensable gases from the condensate. The condensate is pumped back into the HRSGs via the condensate pumps.

The closed (air-cooled) auxiliary cooling water system will provide for cooling of the CTG and STG lube oil and hydraulic oil systems and the CTG and STG generators. The auxiliary system will consist of pumps that circulate the cooling medium (water/glycol mixture) through the heat exchangers that transfer heat from plant equipment and an air-cooled, finned-fan heat exchanger, where the heat is rejected to the atmosphere.

2.5.3.4 Project Noise Control Features

As part of the facilities design, specific noise control equipment will be incorporated that includes:

- CTG inlet air silencers
- CTG enclosures
- CTG accessory compartment enclosures
- Acoustical barrier walls around the CTG exhaust diffusers and ducts
- Gas compressors sound attenuation, as required
- STG enclosure

The incorporation of these noise control devices has been included in the formulation of equipment noise generation values used in the noise analysis (see Section 7.5).

2.5.4 Major Electrical Systems and Equipment

This section describes the major electrical systems and equipment for the proposed project. Single-line electrical diagrams of the major and auxiliary plant electrical systems are presented on Figure 2.5-7.

Power will be generated at 16.5 kilovolts (kV) by the two CTGs and at 21 kV by the one STG, and then stepped up by the main transformers to 525 kV for delivery to the SGGS's interconnection with SCE. Each of the plant's combustion turbine generators will be connected by a 16.5-kV isolated phase bus duct to a dedicated 16.5–525-kV oil-filled, step-up transformer. The steam turbine will be connected by a 21-kV isolated phase bus duct to a dedicated 21–525-kV oil-filled step-up transformer. Each step-up transformer is installed on a concrete pad/pit designed to contain the transformer oil in the event of a leak or spill. The pit will be sized to provide retention capacity for 100 percent of the volume of oil plus the volume of water that would flow in 10 minutes from a fire hose with a capacity of 500 gallons per minute.

The plant will be interconnected with SCE's future Rancho Vista substation via a single-circuit, 525-kV transmission line. A 525-kV, motor-operated disconnect switch will be provided on the high side of each transformer.

2.5.4.1 Electrical System For Plant Auxiliaries

Power for plant auxiliaries will be supplied at 4,160 volts (V) from either the plant generators or 525-kV transmission system. Each unit auxiliary transformer will be connected to the isolated phase bus duct between the generator circuit breaker and the step-up transformer. This arrangement provides power to the plant auxiliaries regardless of whether the CTGs or STG is on-line or off-line. The auxiliary transformers will rest on concrete pads designed to contain the transformer oil in the event of a leak or spill, using the same criteria noted above for containing oil spilled from the step-up transformers.

The 4,160-V switchgear distributes power to the plant's 4,000-V motors, to the CTG starting systems, and to 4,160–480-V auxiliary transformers. The low voltage side of the 4,160–480-V transformers is connected to 480-V switchgear. The 480-V switchgear distributes power to the plant's large 480-V loads and to 480-V motor control centers (MCCs). The MCCs distribute power to the plant's intermediate 480-V loads and to power panels serving small 480-V loads.

The MCCs also distribute power to 480–277-V isolation transformers serving 277-V single-phase loads and to 480–208/120 dry-type transformers serving 208-V and 120-V loads.

2.5.4.2 DC Power Supply System

The SGGS's DC power supply system will consist of a 125-V DC battery, two 125-V DC battery chargers, metering, ground detectors, and distribution panels. In addition, a similar DC power supply system will be provided as part of each CTG's auxiliary power system.

Under normal operating conditions, the battery charger supplies DC power to the DC loads. The battery charger receives 480-V, three-phase AC power from the electrical system serving plant auxiliaries. The battery charger continuously charges the battery bank while supplying DC power to the DC loads. Under abnormal or emergency conditions when AC power is not available, the battery bank supplies DC power to the DC loads. The battery bank will be sized to power the DC loads for a sufficient amount of time to provide for safe and damage-free shut down of the power plant. Recharging of the battery bank will occur whenever AC power becomes available.

The DC power supply system will provide power for critical control circuits, power for control of the 4,160-V and 480-V switchgear, and power for DC emergency backup systems. Emergency backup systems will include DC lighting, DC lube oil, and seal oil pumps for the CTGs and STG.

2.5.4.3 Essential Service AC System

An essential service AC system (120-V, single-phase) will provide power to essential instrumentation, critical equipment loads, safety systems, and equipment protection systems that require uninterruptible AC power. The essential service AC system and the DC power supply system will be designed to ensure that critical safety and equipment protection control circuits are always energized and able to function in the event of unit trip or loss of AC power.

The essential service AC system will consist of a rectifier, an inverter, a solid-state transfer switch, a manual bypass switch, an alternative AC source transformer and voltage regulator, and AC panelboards.

Normal AC power is rectified to DC. The DC power supply system is the normal source of power to the essential service AC system. Power will flow from the DC power supply system through the inverter to the AC panelboards. If normal AC supply is lost, the plant 125V-DC battery supplies DC power to the inverter. The solid-state transfer switch continuously monitors both the inverter output and the alternate AC source. Upon loss of the inverter output and without interruption of power, the transfer switch automatically transfers essential service AC loads from the inverter output to the alternative AC source. The manual bypass switch enables isolation of the inverter and transfer switch for testing and maintenance without interruption of power to the essential service AC loads.

2.5.5 Fuel Gas Supply and Consumption Use

This section describes the quantity of fuel gas required, its source, and its expected quality. The estimated fuel consumption at base load and 25°F ambient without duct firing is 84,681 million British thermal units (MMBtu) per day, lower heating value. The estimated fuel consumption at the same conditions with duct firing is 112,473 MMBtu per day. For other estimated fuel consumption data, see Tables 2.5-2 through 2.5-4.

Table 2.5-6 presents the expected constituents of the natural gas to be supplied by Southern California Gas Company (SoCalGas). The natural gas pressure will be increased by gas compressors to a pressure of approximately 550 pounds per square inch gauge (psig), filtered, and pressure-regulated before entering the CTG. The duct burner systems will be supplied with gas fuel pressure regulated to 30 psig. Safety pressure relief valves will be provided to protect the natural gas system components from overpressurization. Each CTG fuel gas system will include a fuel gas preheater that uses hot water from the HRSGs to heat the CTG fuel to improve plant efficiency.

Table 2.5-6
Natural Gas Analysis

Constituent	Percent by Volume
Methane	96.31
Ethane	1.42
Propane	0.23
n-Butane	0.04
i-Butane	0.04
n-Pentane	0.01
i-Pentane	0.01
Hexane+	0.01
Oxygen	0.00
Nitrogen	0.32
Carbon dioxide	1.50
Total	**99.89**
Sulfur (grains per 100 scf)	<0.10
Higher Heating Value (Btu per lb.)[1]	22,760

Source: Gas composition from SoCalGas average of daily reading from July 1, 2004 through March 7, 2005.

[1] Heat content calculated from gas composition (ASTM D3588-98)
Btu = British thermal units, scf = standard cubic feet.

Natural gas will be supplied to the combined cycle unit by SoCalGas, the current supplier of natural gas to the EGS. Natural gas will be provided using a new 20-inch-diameter gas line connection from transmission line 4002 that will continue generally westward to the new SGGS metering station on the EGS property. Approximately less than 200 feet of this gas line connection will be offsite, with the remainder on the EGS property. The offsite portion of the gas line would cross under Etiwanda Avenue.

2.5.6 Water Supply and Consumptive Requirements

This section provides estimated consumptive use of water and describes its source, quality, and proposed water treatment systems. The power plant's various water uses will include makeup for the HRSGs, water for the CTG inlet air evaporative coolers, service water system users, potable water, and fire protection water. A water balance diagram is presented on Figure 2.5-8.

2.5.6.1 Water Consumptive Requirements

Daily and annual water consumptive requirements of the proposed SGGS are summarized in Table 2.5-7. Average daily requirements are based on a plant operation scenario that averages the water consumption rate at 105°F ambient temperature, 15 percent relative humidity with duct burners in operation (Case 1A Table 2.5-8), and the water consumption rate at 63°F ambient temperature, 65 percent relative humidity with duct burners in operation (Case 2A Table 2.5-8). Maximum daily requirements are based on water consumption at maximum operating conditions of 105ºF and 15 percent relative humidity (i.e., maximum hot summer day) with both CTG inlet air evaporative coolers in service and maximum duct firing (Case 1A Table 2.5-8). The annual water consumption value is the estimated total amount of water that will be used by the plant, in acre-feet. The annual water use is estimated to be the average daily water consumption rate for 274 days (75 percent capacity factor). Table 2.5-8 provides the estimated daily continuous water flow rates in gallons per minute corresponding to the heat and material balance case descriptions presented in Table 2.5-1. The stream numbers shown on Table 2.5-1 correspond to the flow streams as labeled on Figure 2.5-5.

Table 2.5-7
Daily and Annual Average Water Consumption and Wastewater Discharge Requirements

Water Service/Use	Average Daily Use[1] (gpm)	Maximum Daily Use[1] (gpm)	Annual Use[1] (acre-feet)
Demineralized Water to Steam Cycle Makeup	40	40	48
Water to CTG Evaporative Coolers	74	123	90
Miscellaneous Uses	37	37	44
Makeup Water to Plant[2]	182	240	220
Total Plant Makeup Water Usage Requirements	**182**	**240**	**220**
Well Water to Potable Water System	0.7	5	1
Process Wastewater	109	128	132

CTG = combustion turbine generator
gpm = gallons per minute
Notes: 1. See Section 2.5.6.1, above, for basis.
2. Water supply source is discussed in Chapter 6, Water Supply.

2.5.6.2 Water Source and Quality

Process makeup water will be supplied to the SGGS by the existing EGS makeup water system. SGGS makeup water will be pumped from the EGS makeup water reservoir. Two new pumps will be installed in an existing water intake structure (previously used for the EGS Units 1 and 2 cooling tower makeup pumps). The reservoir's primary water source is reclaimed water supplied by the IEUA under the existing water services agreement. The proposed SGGS will not require additional sources of water because the current allotments are sufficient to meet the demands of the proposed project. No new offsite pipelines or wells will need to be constructed for this project.

Table 2.5-8
Water Balances

		Case 1A	Case 1B	Case 1C	Case 1C	Case 2A	Case 2B	Case 2C	Case 2C	Case 3A	Case 3B	Case 3C	Case 3C
		105°F – 15% RH	105°F – 15% RH	105°F – 15% RH	105°F – 15% RH	63°F – 65% RH	63°F – 65% RH	63°F – 65% RH	63°F – 65% RH	25°F – 60% RH	25°F – 60% RH	25°F – 60% RH	25°F – 60% RH
	GTG Load	100%	100%	80%	60%	100%	100%	60%	60%	100%	100%	60%	60%
	Duct Burner Status	On	Off	Off	Off	On	Off	Off	Off	On	Off	Off	Off
	Evaporative Cooler Status	On	On	Off	Off	On	On	Off	Off	Off	Off	Off	Off
Stream No.	**Description**	Flow gpm	Flow gpm	Flow gpm	Flow gpm	Flow gpm	Flow gpm	Flow gpm	Flow gpm	Flow gpm	Flow gpm	Flow gpm	Flow gpm
S1	CTG Evaporative Cooler Makeup	123	123	0	0	26	26	0	0	0	0	0	0
S2	Makeup Water	240	205	50	46	124	90	52	47	94	60	53	48
S3	Makeup Water to Evaporative Coolers	61	61	0	0	13	13	0	0	0	0	0	0
S4	Makeup Water to HRSG Blowdown Cooling	27	15	12	11	27	15	13	11	27	15	13	11
S5	Makeup Water to Misc. Users	10	10	10	10	10	10	10	10	10	10	10	10
S6	Water from WT System Filters	135	113	27	24	70	49	28	25	54	33	29	26
S7	RO Water to Evaporative Coolers	61	61	0	0	13	13	0	0	0	0	0	0
S8	RO Water to Mixed Bed Polishers	40	24	20	18	40	24	21	19	40	25	21	19
S9	Demin Water to HRSGs	40	24	20	18	40	24	21	19	40	25	21	19
S10	Evaporative Cooler Evaporation	98	98	0	0	21	21	0	0	0	0	0	0
S11	Evaporative Cooler Blowdown	25	25	0	0	5	5	0	0	0	0	0	0
S12	HRSG / Steam Cycle Loses	4	4	4	4	4	4	4	4	4	4	4	4
S13	HRSG Blowdown	36	20	16	14	36	20	17	15	36	21	17	15
S14	HRSG Blowdown Tank Vent	9	5	4	4	9	5	4	4	9	5	4	4
S15	Cooled Blowdown to Waste	53	29	24	21	54	30	25	22	54	31	26	23
S16	RO Reject to Waste	34	28	7	6	18	12	7	6	13	8	7	6
S17	WT System Filter Backwash to Waste	7	6	1	1	4	2	1	1	3	2	1	1
S18	Water to Misc. Users	10	10	10	10	10	10	10	10	10	10	10	10
S19	Oil Separator to Waste	10	10	10	10	10	10	10	10	10	10	10	10
S20	Total Waste to Inland Empire	128	98	42	38	90	60	44	40	81	51	45	40
S21	Well/Potable Water	1	1	1	1	1	1	1	1	1	1	1	1
S22	Sanitary Waste	1	1	1	1	1	1	1	1	1	1	1	1

gpm = gallons per minute
HRSG = heat recovery system generator
RH = relative humidity
RO = water treatment reverse osmosis system

Chapter 6, Water Supply, includes a more extensive discussion of the proposed project's water supply and conveyance. A water analysis of the water supply is summarized in Table 2.5-9.

The water balance diagram (Figure 2.5-8) shows the proposed SGGS's water treatment processes and the distribution of treated water. Water treatment will vary according to the quality required for each of the plant's water uses: CTG inlet air evaporative coolers, HRSG makeup water, and closed cooling water system fill water. The following sections describe the proposed plant's water uses and treatment.

Table 2.5-9
Water Analysis Results for Reclaimed Water

Water Quality Parameter	Units	Reclaimed Water[1] Grab Sample
pH		7.49
Total Suspended Solids	mg/L	10.0
Total Dissolved Solids	mg/L	447
Calcium	mg/L	49.5
Magnesium	mg/L	7.6
Sodium	mg/L	96.4
Potassium	mg/L	14.5
Total Alkalinity	mg/L	225
Sulfate	mg/L	44.7
Chloride	mg/L	100.0
Nitrate	mg/L	0.74J
Fluoride	mg/L	ND
Arsenic	mg/L	ND
Mercury	mg/L	0.00026J
Iron	mg/L	0.13
Boron	mg/L	0.38
Silica	mg/L	14.0
Biological Oxygen Demand	mg-O_2/L	1.4J
Chemical Oxygen Demand	mg-O_2/L	1.2J

Notes:
[1] It is assumed that the water supply characteristics are similar to the reclaimed water characteristics, since reclaimed water is the primary water source for the EGS and proposed project.
[2] Water Analysis by Applied P & CH Laboratories April 19, 2005

J: Reported between Practical Quantitation Limit and Method Detection Limit
mg/L = milligrams per liter
ND = Not Detectable
NTU = nephelometric turbidity units
mg-O_2/L= milligrams of oxygen per liter

2.5.6.3 CTG Evaporative Coolers

Makeup water for the CTG evaporative coolers will be a blend of makeup water (50 percent) and effluent from the water treatment reverse osmosis system (50 percent). The blended water will be stored in the 250,000-gallon evaporative water storage tank, from which it is pumped to the evaporative coolers. Water evaporates in the CTG evaporative coolers and passes through the CTG. Since evaporation will concentrate minerals in the remaining water that is not evaporated, a quantity of water will be removed continuously as blowdown to prevent minerals from concentrating to levels above the CTG design limits. The blowdown will maintain the water in the evaporative cooler sump at approximately five cycles of concentration. The blowdown will be discharged to the plant wastewater sump for discharge to the IEUA system. As required, water will be added to the evaporative cooler to replace the water that is lost to evaporation and blowdown.

2.5.6.4 HRSG Makeup

Water for the HRSGs must meet stringent specifications for suspended and dissolved solids. To meet these specifications, HRSG makeup water will be processed through the plant water treatment system. Demineralization is accomplished using a micofiltration and reverse osmosis water treatment process followed by a mixed bed polishing demineralizer. Demineralized product water will be stored in a 250,000-gallon demineralized water storage tank, which provides sufficient capacity for approximately 7.5 days of peak load operation coinciding with an outage of the water treatment system.

Additional conditioning of the condensate and feedwater circulating in the steam cycle will be provided by means of a chemical feed system. To minimize corrosion, an amine will be injected into the condensate system downstream of the condensate pumps and directly upstream of the HRSG preheaters. Additionally, a caustic solution will be fed into both the HP and IP steam drums of the HRSG. The chemical feed system includes one caustic container for each HRSG. Amine will be supplied from the plant's 15,000-gallon ammonia tank that also is used to supply ammonia to the HRSG SCRs used for NO_X emission control. Two full-capacity metering pumps will be provided for each chemical. A steam cycle sampling and analysis system will monitor the water quality at various points in the proposed plant's steam cycle. The resulting water quality data are used to guide adjustments in the water treatment processes and to determine the need for other corrective operational or maintenance measures. Steam and water samples will be routed to a sample panel, where steam samples are condensed and the pressure and temperature of all samples are reduced as necessary. The samples are then directed to automatic analyzers for continuous monitoring of conductivity and pH. All monitored values are indicated at the sample panel, and critical values are transmitted to the plant control room. Grab samples will be obtained periodically at the sample panel for chemical analyses that provide information on a range of water quality parameters.

2.5.6.5 Service Water

Utility stations at various locations around the SGGS facility will provide service water to wash down tools, equipment, and areas adjacent to the utility station.

Demineralized water will be combined with a propylene glycol (anti-freeze) solution and a corrosion inhibitor for filling of the closed cooling system.

2.5.6.6 Potable Water

Potable water will be obtained by treating well water supplied from the existing EGS well water system. The SGGS potable water treatment system will consist of filtration and chlorination as well as associated tanks and pumps. The SGGS potable water system will distribute potable water to the plant's washrooms, safety eyewash showers, and other potable water uses. The potable water treatment system will be located inside the water treatment building, as shown on Figure 2.5-1.

Well water used for SGGS potable water will be supplied from a tie-in to the EGS well water system located to the west of the makeup water reservoir. The well water pipeline will be routed primarily underground, running east to west along the EGS entry road north of the Metropolitan Water District (MWD) aqueduct right-of-way. The 3-inch-diameter pipeline will be installed in a trench (see Figure 2.5-9). All applicable state and local regulations concerning the routing of water piping used for potable services will be followed in the design of this system.

2.5.7 Waste Management

This section describes the waste management processes leading to proper collection, treatment, and disposal of wastes. Wastes include process wastewater, solid nonhazardous waste, and hazardous waste. Additional information on waste management is provided in Section 7.13, Waste Management.

2.5.7.1 Wastewater

Figure 2.5-8 shows the proposed SGGS's wastewater streams and the disposition of wastewater. There will be two separate wastewater collection systems: (1) the plant process wastewater system, which will collect wastewater from the CTG evaporative coolers, HRSG blowdown, water treatment system, chemical feed area drains, and general plant drains; and (2) the sanitary system, which will collect sanitary wastewater from sinks, toilets, and other sanitary facilities and discharge to an onsite sanitary waste septic system. The septic system will include a septic tank and leachfield. Plant process wastewater streams will be collected in the plant wastewater sump. Waste streams that have the potential for oil contamination will be processed through an oil-water separator before being transferred to the plant wastewater sump. From the sump the wastewater will be pumped to the existing 21-inch pipeline to the IEUA system under the existing plant's Industrial User's permit. Daily and average annual wastewater discharge rates are shown on Table 2.5-7.

The composition of the SGGS wastewater is shown in Table 2.5-10. The parameters presented in this table are based on plant operation at maximum ambient conditions with duct burners in operation (Case 1A presented in Table 2.5-8), since this is the case that would generate the highest wastewater flow. The wastewater composition is also based on all plant makeup water being reclaimed water, as this is the expected mode of operation.

The plant's wastewater streams and treatments are described below.

2.5.7.2 Evaporative Cooler Blowdown

The blowdown stream from the CTG evaporative coolers will be sent directly to the plant process wastewater sump.

2.5.7.3 HRSG Blowdown

Water circulating in the proposed plant's steam cycle will accumulate dissolved solids, which must be maintained below given limits to prevent deposition of solid particles on the steam turbine blading. The concentration of dissolved solids is maintained below such limits by withdrawing a portion of the water from the HRSG steam drums (i.e., HRSG blowdown) and replacing it with product water from the demineralization process described previously in Section 2.5.6.4. HRSG blowdown is cooled by mixing with makeup water and routed directly to the plant wastewater sump.

Table 2.5-10
Process Wastewater Composition

Parameters	Wastewater Composition
Calcium (Ca)	76.3
Magnesium (Mg)	18.6
Sodium (Na)	211.6
Potassium (K)	N/A
Alkalinity ($CaCO_3$)	212
Chloride (Cl)	194
Sulfate (SO)	129.5
Phosphate (PO_4)	1.4
Nitrite (NO_2)	0.030
Nitrate (NO_3)	19.2
Fluoride (F)	0.40
Silica (SiO_2)	N/A
pH	6.0 – 9.0
TDS	974
Turbidity (NTU)	1.9
Residual Chlorine	N/A
Aluminum	N/A
Antimony	0.010
Arsenic	0.010
Barium	0.03
Beryllium	0.002
Boron	0.599
Cadmium	0.002
Chromium	0.002
Cobalt	0.010
Copper	0.007
Iron	0.136
Lead	0.004
Lithium	N/A
Manganese	0.013
Mercury	0.0004
Molybdenum	N/A
Nickel	0.006
Selenium	0.010
Silver	0.004
Strontium	N/A
Thallium	0.010
Tin	N/A
Titanium	N/A
Vanadium	N/A
Zinc	0.049

Notes:
All concentrations in ppm as substance unless indicated otherwise.
N/A = data for a particular water quality parameter is not available
NTU = nephelometric turbidity units

2.5.7.4 Water Treatment System Demineralizer

Wastewater from the demineralizer system's microfiltration and reverse osmosis systems will be discharged directly to the plant wastewater sump. The mixed bed demineralizer will be regenerated off-site and, consequently, will not generate onsite wastes.

2.5.7.5 Chemical Feed Area Drainage

The chemical feed area will be provided with a containment area to keep any spilled chemicals out of the proposed plant drainage system. Spilled chemicals will be cleaned up or neutralized before being discharged to the plant wastewater sump.

2.5.7.6 General Plant Drainage

General plant drainage will consist of wastewater collected by sample drains, equipment drains, equipment leakage, and area washdowns. Wastewater collected in the general plant drainage system will be routed to the plant wastewater sump. General plant drainage that potentially contains oil or grease will be routed through the oil-water separator.

2.5.7.7 Solid Nonhazardous Waste

The construction, operation, and maintenance of the proposed SGGS will generate nonhazardous solid wastes typical of power generation facilities. Wastes generated during construction generally include soil, scrap wood, excess concrete, empty containers, scrap metal, and insulation. Typical wastes generated during operation and maintenance include scrap metal and plastic, insulation material, paper, glass, empty containers, and other miscellaneous solid wastes. These materials are collected for recycling or transfer to landfills in accordance with applicable regulatory requirements. A description of the types of wastes likely to be generated and their related quantities is included in Section 7.13, Waste Management, and shown in Tables 7.13-1 and 7.13-4.

2.5.7.8 Hazardous Waste

Hazardous wastes will be generated as a result of proposed project construction, operation, and maintenance. The majority of hazardous waste generated during construction will be liquid wastes such as waste oil and other lubricants from machinery operations, solvents used for cleaning and materials preparation, waste paints, and other material coatings. A description of the types and quantities of hazardous wastes that are likely to be generated is given in Section 7.13, Waste Management, and shown in Tables 7.13-1 and 7.13-4.

The methods used to properly collect and dispose or recycle hazardous waste generated by the proposed plant will depend on the nature of the waste. Hazardous wastes generated by the proposed SGGS will include spent SCR and oxidation catalyst, used oil filters, used oil, and chemical cleaning wastes. Spent SCR and oxidation catalyst will be recycled by the catalyst supplier. Used oil filters will be recycled or disposed of in an offsite disposal facility. Used oil will be recovered and recycled by a waste oil recycling contractor.

Chemical cleaning wastes consist of acid and alkaline cleaning solutions used for pre-operational chemical cleaning of the HRSG pressure parts and steam cycle piping systems; acid cleaning solutions used for periodic chemical cleaning of the HRSGs; and wash water used in periodic cleaning of the HRSG, CTG, and STG. These wastes, which may have elevated concentrations of metals, will be tested. If hazardous, they will be disposed of in accordance with all applicable laws, ordinances, regulations, and standards. These and all other hazardous solid and liquid wastes will be disposed of in accordance with applicable laws, ordinances, regulations, and standards.

Workers will be trained to handle waste generated at the site as described in Section 7.7, Worker Safety and Health.

2.5.8 Hazardous Material Management

A variety of hazardous materials will be used and stored during construction and operation of the proposed project. All hazardous materials will be stored in appropriate storage facilities. Bulk materials will be stored in tanks, and other materials will be stored in delivery containers. All hazardous material storage and use areas will be designed to contain leaks and spills. Containment structures will be provided with sufficient volume to contain the spill of a full tank without overflow. For multiple tanks located within a single containment structure, the largest single tank will be used to size the containment volume.

The aqueous ammonia storage tank for the SCR system will be provided with a containment structure and other safety features, as described in Section 2.6.9, Ammonia Storage Facility.

Hydrogen cylinders will be stored outside, away from electric lines and other potential ignition sources, in secured areas as required by applicable building and fire codes. The hydrogen will be stored in U.S. Department of Transportation–approved cylinders in maximum quantities of 24,000 standard cubic feet. The cylinders will be secured to prevent physical upset and damage.

Safety showers and eyewashes will be provided in the chemical feed areas. Service water hose connections will be provided near the chemical feed areas to facilitate flushing of leaks and spills of materials that are not reactive in water to the chemical feed area drains. Appropriate safety gear will be provided for plant personnel for use during the handling, use, and cleanup of hazardous materials. Plant personnel will be properly trained in the handling, use, and cleanup of hazardous materials used at the plant and procedures to be followed in the event of a leak or spill. Adequate supplies of appropriate cleanup materials will be stored on site.

All electric equipment will be specified to be free of polychlorinated biphenyls (PCBs). A list of the hazardous materials anticipated to be used at the plant is provided in Table 2.5-11. Each material is identified by type, intended use, and estimated quantity to be stored on site. Additional information on hazardous material management is provided in Section 7.12, Hazardous Materials Handling.

2.5.9 Air Emissions Control and Monitoring

Air emissions from the combustion of natural gas in the CTGs and in the HRSGs duct burners will be controlled by state-of-the-art systems. Controlled emissions will include NO_X, carbon monoxide (CO), volatile organic compounds (VOCs), fine particulate matter (PM_{10}), and sulfur dioxide (SO_2). Continuous emissions monitoring system will be installed to monitor the stack emissions. All emissions values stated in the following subsections are based on parts per million by volume, dry basis (ppmvd) corrected to 15 percent oxygen (O_2). Complete information on air quality matters, including startup emissions, is provided in Section 7.1, Air Quality.

2.5.9.1 NO_X Emissions Control

Dry low NO_X (DLN) combustors in the CTGs followed by SCR in the HRSGs will control stack emissions of NO_X to a maximum 2.0 parts per million by volume, dry (ppmvd) (corrected to 15 percent O_2, 3-hour average excluding startups). The DLN combustors control NO_X emissions to approximately 9 ppmvd at the CTG exhausts by pre-mixing fuel and air immediately before combustion. Pre-mixing inhibits NO_X formation by minimizing the flame temperature and the concentration of oxygen at the flame front.

Table 2.5-11
Anticipated Hazardous Materials Used and Stored During Operation
(Page 1 of 2)

Material	CAS Number	Location/ Application	Hazardous Characteristics [1]	Maximum Quantity on Site[2]	Regulatory Thresholds (lbs)		
					Federal RQ	Federal TPQ	Federal TQ
Aqueous Ammonia 29.4 wt%	7664-41-7	NO_X emissions Control, HRSG Feed Chemical Addition	Acute, chronic, fire, pressure	15,000 gals	100	500	20,000
Oxygen Scavenger		HRSG & Aux Boiler Feed Chemical Addition	Acute, chronic	500 gals	—	—	—
Mineral Insulating Oil	None	Electrical transformers	Acute, chronic, fire	55,000 gal[3]	—	—	—
Lubricating/Hydraulic Oil	None	Mechanical equipment	Acute, chronic, fire	25,000 gal[3]	—	—	—
Propylene Glycol / Water Mixture	57-55-6	Antifreeze for closed cooling water system	Acute, chronic, fire	1,500 gal	—	—	—
Sodium Hydroxide 25%	1310-73-2	Water Treatment	Acute, chronic	400 gals	—	—	—
Permatreat PC-191 Antiscalant		Water Treatment	Acute, chronic	400 gals	—	—	—
Polyelectrolite (Nalco 8103)		Water Treatment	Acute, chronic	200 gals	—	—	—
Sodium Hypochlorite	10022-70-5	Water Treatment	Acute, chronic	500 gals	—	—	—
Sulfuric Acid 66 Be	7664-93-9	Water Treatment	Acute, chronic, reactive	550 gals	1,000	1,000	
Bisulfate (Nalco 7408)		Water Treatment	Acute, chronic	400 gals	—	—	—
Trisodium Phosphate	7601-54-9	Aux Boiler feedwater scale control	Acute, chronic	100 gals	—	—	—
Hydrochloric Acid	7647-01-0	HRSG chemical cleaning	Acute, chronic	Temporary	—	—	—

Table 2.5-11
Anticipated Hazardous Materials Used and Stored During Operation
(Page 2 of 2)

Material	CAS Number	Location/ Application	Hazardous Characteristics [1]	Maximum Quantity on Site[2]	Regulatory Thresholds (lbs)		
					Federal RQ	Federal TPQ	Federal TQ
Ammonium Biflouride		HRSG chemical cleaning	Acute, chronic	Temporary	—	—	—
Citric Acid	77-92-9	HRSG chemical cleaning	Acute, chronic	Temporary	—	—	—
EDTA Chelant		HRSG chemical Cleaning		Temporary	—	—	—
Sodium Nitrite	7632-00-0	HRSG chemical cleaning	Acute	Temporary	—	—	—
Carbon Dioxide (g)	124-38-9	Generator purging	Acute, fire, pressure	25,200 scf	—	—	—
Carbon Dioxide (l)	124-38-9	Fire suppression	Acute, fire, pressure	24,000 lb	—	—	—
Hydrogen	1333-74-0	Generator cooling	Acute, fire, pressure reactive	24,000 scf	—	—	—
Nitrogen	7727-37-9	Blanketing	Pressure	200 lb	—	—	—
Natural Gas	None	Gas turbine generator	Acute, fire, pressure	1,300 lbs[3]	—	—	—
CEMS Gases CO, O_2, and NO_X		CEMS system calibration	Pressure	10 bottles (1,500 in^3 each)	—	—	—

CAS Number = Chemical Abstract Services
Federal RQ = Reportable Quantity
Federal TPQ = Threshold Planning Quantity
Federal TQ = Threshold Quantity

lbs = pounds
scf = standard cubic feet
US gal = US gallons
— = Not Applicable

Notes:

[1] Hazard categories are defined by 40 CFR 370.2. Health hazards include acute (immediate) and chronic (delayed). Physical categories include fires, sudden release of pressure, and reactive.
[2] All quantities are approximate.
[3] In the equipment and pipelines.
[4] Sulfuric acid fails the evaluation pursuant to Section 25532(g)(2) of the HSC as it does not meet the following conditions: 1) if concentrated with greater than 100 pounds of sulfur trioxide or the acid meet the definition of oleum; or 2) if in a container with flammable hydrocarbons.

The SCR process will use aqueous ammonia (NH_3) as a reagent. Stack emissions of ammonia, referred to as "ammonia slip," will not exceed 5 ppmvd. The SCR system includes a catalyst chamber located within each HRSG, catalyst bed, ammonia storage system, and ammonia injection system. The catalyst chamber contains the catalyst bed and is located in a temperature zone of the HRSG where the catalyst is most effective over the range of loads at which the proposed plant will operate. The ammonia injection grid is located upstream of the catalyst chamber. It is expected that the 15,000-gallon aqueous ammonia storage tank will have a 19-day storage capacity.

2.5.9.2 CO and VOC Emissions Control

An oxidation catalyst will be provided in the HRSG to limit CO and VOC emissions to less than 2 ppmvd (corrected to 15 percent O_2). These emission levels correspond to current California best available control technology (BACT). This catalytic system will promote the oxidation of CO to carbon dioxide and VOC to carbon dioxide and water vapor without the need for additional reagents such as ammonia.

2.5.9.3 PM_{10} and SO_2 Emissions Control

PM_{10} emissions consist primarily of hydrocarbon particles formed during combustion. PM_{10} emissions will be controlled by inlet air filtration and by the use of natural gas fuel, which contains essentially zero particulate matter.

SO_2 emissions will be controlled by the use of pipeline quality natural gas fuel, which contains only trace quantities of sulfur.

2.5.9.4 Emissions Monitoring

The continuous emissions monitoring system (CEMS) will sample, analyze, and record NO_X, CO, and O_2 concentrations in the stack exhaust; SO_2 and CO_2 are calculated with standard emission factors for natural gas and the quantity of fuel consumed. The CEMS will generate a log of emissions data for compliance documentation and activate an alarm in the plant control room when stack emissions exceed specified limits.

2.5.10 Fire Protection

Fire protection systems will be provided at the proposed project site to limit personnel injury, property loss, and plant down time resulting from a fire. The systems will include a fire protection water system, carbon dioxide fire suppression systems for the CTGs, and portable fire extinguishers.

Water for the new power plant facility's fire protection system will be provided by interconnecting the new plant's underground fire loop with the existing EGS plant's fire loop. The design of the new plant's fire loop and the interconnection to the existing EGS fire loop will be designed and installed in accordance with National Fire Protection Association (NFPA) 24. A new 10-inch-diameter, high-density polyethylene (HDPE) fire water line will be added to tie in the SGGS fire loop with the EGS fire loop near the EGS plant fire pumps, located in southwestern corner of the makeup water reservoir. This new line will be added to ensure that there is sufficient underground fire loop capacity to supply the requirements of the new plant. This line will be primarily routed from the east side of the existing plant along the existing entrance road, north of the MWD aqueduct right of way. The new fire water line will be routed along with the new natural gas and makeup water pipelines being installed for the SGGS. Hydraulic calculations will be performed to demonstrate that the underground fire protection loop has sufficient capacity to provide all the required fire-fighting water for the existing and new power plants.

Fire-suppression equipment supplied by the piping network will include fire hydrants and sprinkler systems. Fire hydrants will be located at intervals throughout the power plant site. Sprinkler systems will be provided in the administration building, control building, and warehouse.

The carbon dioxide (CO_2) fire-suppression system provided for each CTG will include a CO_2 storage tank, CO_2 piping and nozzles, fire detection sensors, and a control system. The control system will automatically shut down the CTG, turn off ventilation, close ventilation openings, and release CO_2 upon detection of a fire. The CO_2 fire-suppression systems will cover the turbine enclosure and accessory equipment enclosure of each CTG.

Portable fire extinguishers of appropriate sizes and types will be located throughout the power plant site.

2.5.11 Plant Auxiliary and Safety Systems

The plant auxiliary systems described below will support, protect, and control the proposed power plant.

2.5.11.1 Lighting System

The lighting system will provide operations and maintenance personnel with illumination in both normal and emergency conditions. The system will consist primarily of AC lighting and include DC lighting for activities or emergency egress required during an outage of the plant's AC electrical system. Lighting fixtures will be shielded to minimize offsite migration of light, where possible. The lighting system will provide AC convenience outlets for portable lamps and tools.

2.5.11.2 Grounding System

The proposed power plant's electrical systems and equipment will be susceptible to ground faults, switching surges, and lightning, which can impose hazardous voltage and current on plant equipment and structures. To protect against personnel injury and equipment damage, the grounding system will provide an adequate path to dissipate hazardous voltage and current under the most severe conditions. Bare conductor will be installed below grade in a grid pattern, and each junction of the grid will be bonded together by welding or mechanical clamps. The grid spacing will be designed to maintain safe voltage gradients. Ground resistivity readings will be used to determine the necessary grid spacing and numbers of ground rods. Steel structures and non-energized parts of plant electrical equipment will be connected to the grounding grid.

2.5.11.3 Distributed Control System

The distributed control system (DCS) will provide control, monitoring, alarm, and data storage functions for the proposed power plant systems. The following functions will be provided:

- Control of the CTGs, STG, HRSGs, and balance-of-plant systems in a coordinated manner;
- Monitoring of operating parameters from plant systems and equipment and visual display of the associated operating data to control operators and technicians;
- Detection of abnormal operating parameters and parameter trends and provision of visual and audible alarms to apprise control operators of such conditions; and
- Storage and retrieval of historical operating data.

The DCS is a microprocessor-based system. Redundant capability is provided for critical DCS components such that no single component failure will cause a plant outage. The DCS consists of the following major components:

- CRT-based control operator interface (redundant),
- CRT-based control technician workstation,
- Multi-function processors (redundant),
- Input/output processors (redundant for critical control parameters),
- Field sensors and distributed processors (redundant for critical control parameters),
- Historical data archive, and
- Printers, data highways, data links, control cabling, and cable trays.

The DCS is linked to the control systems furnished by the CTG and STG suppliers. These data links provide CTG and STG control, monitoring, alarm, and data storage functions via the CRT-based control operator interface and control technician work station of the DCS.

2.5.11.4 Cathodic Protection System

The cathodic protection system will be used as required to protect against electrochemical corrosion of underground metal piping and structures.

2.5.11.5 Freeze Protection Systems

The freeze protection system will allow the proposed plant to operate in freezing weather and go through periods of freezing weather without damage while shut down. The design ambient temperature for freeze protection is 25°F.

2.5.11.6 Service Air System

The service air system will supply compressed air to hose connections located at intervals throughout the proposed power plant. Compressors deliver compressed air at a regulated pressure to the service air piping network.

2.5.11.7 Instrument Air System

The instrument air system will provide dry, filtered air to pneumatic operators and devices throughout the proposed power plant. Air from the service air system is dried, filtered, and pressure regulated before delivery to the instrument air piping network.

2.6 POWER PLANT CIVIL/STRUCTURAL FEATURES

The following sections describe civil/structural features of the proposed SGGS, as illustrated in the site plan presented on Figure 2.3-1. Figures 2.6-1 and 2.6-2 illustrate the site's existing topography, existing facilities, proposed stormwater management and erosion control plan, and access roads. Table 2.6-1 lists the major structures of the power plant and gives their dimensions. In addition to the features described in this section, descriptions of the electric transmission interconnection, gas supply pipeline and water supply pipeline are provided in Chapters 4, 5, and 6, titled Transmission Facilities, Natural Gas Supply, and Water Supply, respectively.

2.6.1 CTGs, HRSGs, STG, ACC, and Balance-of-Plant Equipment

The CTGs, HRSGs, and STG will be supported at grade elevation on reinforced concrete mat foundations. The unit auxiliary and the main transformers are also supported at grade elevation on reinforced concrete mat foundations. The ACC will be supported at grade elevation on reinforced concrete spread footings. Balance-of-plant mechanical and electrical equipment will be supported at grade elevation on individual reinforced concrete foundation pads. The concrete foundation design will be finalized as required by the final geotechnical report.

Table 2.6-1
Major Structures
(Page 1 of 2)

Equipment	Qty	Size, L×W×H (feet)	Service/Remarks	Visual
Combustion Turbine Generators	2	100 × 46 × 80 (top of inlet air filter)	DLN combustion control with evaporative inlet air coolers	Industrial equipment, primarily steel painted gray
Steam Turbine Generator	1	112 × 40 × 46 (includes support structure)	Condensing reheat STG	Industrial equipment located inside metal panel enclosure, painted gray Concrete support structure
Heat Recovery Steam Generators	2	156 × 45 × 100	Three pressure w/ reheat and supplemental duct firing	Industrial equipment Casing and ducting steel painted gray Steam drums on top, silver metal insulation
Aqueous Ammonia Storage	1	50 × 9 DIA × 12	NO_X control	Steel horizontal tank, painted white
Fin-Fanned Coolers	1	120 × 67 × 17	Lube oil cooling	Industrial equipment, silver (galvanized) coil and fan assembly on steel columns painted gray
HRSG Stacks	2	19 DIA × 150.5	Self-supported	Steel vertical cylinder, painted gray
Air-Cooled Condenser	1	425 × 216 × 110	40 Cells	Industrial equipment, coil and fan assembly with painted gray steel side (wind) walls on steel support structure, painted gray.
Pipe Rack		500 × 20 × 45		Steel structure painted gray Insulated pipes on top, aluminum insulation covering
Auxiliary Boiler	1	52 × 25 × 30	Startup steam generator	Industrial equipment Steel casing painted gray
Auxiliary Boiler Stack	1	3 DIA × 100		Steel vertical cylinder, painted gray

Table 2.6-1
Major Structures
(Page 2 of 2)

Equipment	Qty	Size, L×W×H (feet)	Service/Remarks	Visual
Natural Gas Compressors	3	40 × 65 × 30	Compress Fuel Gas	Industrial equipment, painted gray, or gray insulation (possibly inside steel sided enclosure, gray siding)
Admin/Control Building	1	260 × 90 × 24		Steel-sided building, gray siding
Water Treatment Building	1	50 × 30 × 20		Steel-sided building, gray siding
Main Transformer	3	35 × 15 × 20		Electrical equipment backed by concrete fire wall
Closed Cooling Water Tank	1	6 DIA × 40	Expansion tank for closed cooing water system	Steel tank 6 feet in diameter by 7 feet high Steel support structure Painted gray
Evaporative Cooler Tank	1	35 DIA × 35	250,000-gallon tank water supply to evaporative coolers	Steel tank, painted gray
Demineralized Water Storage Tank	1	35 DIA × 35	250,000-gallon tank boiler makeup	Steel tank, painted gray
Transmission Structure	4	65 High A-Frame		Steel structure, painted gray
Transmission Structure	1	110 High A-Frame		Steel structure, painted gray
Transmission Structure	1	120.5 High Pole		Steel structure, painted gray

DLN = dry low NO_x
HRSG = heat recovery steam generator
NO_x = oxides of nitrogen
STG = steam turbine generator
Note: Gray is ANSI 61 or similar

2.6.2 Stacks

Each HRSG will be provided with a self-supporting steel stack. The stacks will be approximately 19 feet in diameter and 150.5 feet tall. Each stack will include U.S. Environmental Protection Agency (EPA) sampling ports, ladders, side-step platforms, and electrical grounding.

2.6.3 Buildings

Plant buildings and enclosures will include the control room/administration, warehouse and shop building, bulk storage building, water treatment building, and balance-of-plant mechanical and electrical equipment enclosures. Building columns will be supported on reinforced concrete mat foundations or individual spread footings. Ground floors will consist of reinforced concrete slabs. Twenty parking spaces will be provided on site to accommodate all employees and visitor vehicles.

2.6.4 Water Storage Tanks

Water storage tanks will include an evaporative cooler water tank with a capacity of 250,000 gallons and a demineralized water storage tank with a capacity of 250,000 gallons. Each water storage tank will consist of a vertical, cylindrical field-erected steel tank supported on a suitable foundation consisting of either a reinforced concrete mat or a reinforced concrete ring wall with an interior bearing layer of compacted sand supporting the tank bottom.

2.6.5 Roads and Fencing

The proposed power plant site will be accessed by the existing EGS entrance on Etiwanda Avenue. Plant perimeter road and parking areas, and miscellaneous access drives will be paved with asphalt for the first 100 feet, then covered with crushed stone. Figure 2.6-3 shows a conceptual design cross section of the plant access road.

Chain-link security fencing is already in place around the existing plant site. Additional fencing will enclose the towers and transmission lines to the SCE switchyard.

2.6.6 Sanitary Wastewater System

The sanitary wastewater system will include a septic tank and leachfield. The system will be sized for use by a peak of 25 people at a rate of 50 gallons per day (gpd) per person. The inlet into the septic tank will have a depth of cover of 2.5 feet. The septic tank will be approximately 2,000 gallons, based on a peak usage of 25 people using 50 gpd, with a factor of 1.5. The tank will be approximately 4.75 feet deep, 10.5 feet long, and 5.25 feet wide. The septic tank will have two compartments: the septic tank and a smaller siphon tank. The outlet from the siphon tank will discharge to a distribution box. Wastewater will be discharged from the distribution box to the leachfield via five 4-inch-diameter perforated PVC pipes. It is anticipated that the leachfield will be approximately 30 feet wide by approximately 40 feet long, based on an application rate of 1.6 gpd per square foot.

2.6.7 Site Drainage

The preconstruction site drainage is shown on Figure 2.6-1. Stormwater will be collected in the plant site area using catch basins and a storm drain system, as is shown on Figure 2.6-2. The storm drain system will terminate in a sedimentation/detention basin in the far southeastern corner of the plant next to Chadwick Channel. The sedimentation/detention basin will be designed in accordance with San Bernardino County Detention Basin Design Criteria. Preliminary calculations to size the basin are provided in Appendix G. Figure 2.6-4 shows a cross section of the detention basin. Stormwater runoff will flow into the basin and be detained. It then will be pumped slowly out of the basin using three 450-gpm pumps and released to Chadwick Channel via a 36-inch-diameter reinforced concrete pipe (RCP). The 36-inch-diameter pipe will drain from a second bay downstream of the detention basin. If the basin becomes full, it will overflow a broadcrested spillway into the second bay and flow into Chadwick Channel via the RCP pipe. Erosion protection will be provided where the 36-inch-diameter pipe enters the channel.

2.6.8 Earthwork

Earthwork on the proposed power plant site will consist of removal of topsoil, disposal of vegetation and debris, excavation and compaction of earth to create the plant grade, and excavation for foundations and underground systems. Materials suitable for compaction will be stored in stockpiles at designated locations using proper erosion prevention methods. Materials unsuitable for compaction, such as topsoil and large rocks, will be disposed of at an acceptable location. Any contaminated materials encountered during excavation will be disposed of in accordance with applicable laws, ordinances, regulations, and standards.

Compaction will be performed in uniform layers of specified thickness. Materials in each layer will be moistened properly to facilitate compaction to the specified density. To verify compaction, representative density and moisture content tests will be performed in the field during compaction. Structural fill material supporting foundations, roads, parking areas, etc., will be compacted. Before fill materials are placed, subgrades will be examined for loose or soft areas and further excavated as necessary.

No fill will be imported to or exported from the SGGS site, since cut and fill will be balanced.

2.6.9 Ammonia Storage Facility

Operation of the SCR NO_X emission control system will include the use of aqueous ammonia, a solution consisting of water and 29.4 percent ammonia. This solution will be stored in the aqueous ammonia storage facility on site, which will include a 15,000-gallon storage tank located within a dedicated concrete containment area and a tanker truck offloading facility located within a containment berm. The general design of the storage and receiving facility is shown on Figure 2.6-5. As shown on Figure 2.6-5, the horizontally mounted storage tank (the use of a vertical tank will also be considered) will be placed in a containment, which will be sized to contain the entire volume of the tank and the rainfall that could collect within the containment over a 24-hour maximum recorded rainfall. This design specification assumes a worst-case failure event of complete rupture and drainage of the tank at the end of the worst 24-hour-long rainstorm that has occurred in the site locality within the past 25 years.

Adjacent to the storage facility will be a tanker truck offloading facility to receive aqueous ammonia deliveries. The offloading facility will include a spill containment to collect any ammonia solution spilled during offloading. Any offloading spills will be contained within the offloading containment.

2.7 PROJECT CONSTRUCTION

Engineering, procurement, construction (EP&C), and start-up of the proposed SGGS are estimated to take approximately 31 months. The project construction schedule, construction staff and craft manpower, and average frequency of vehicle traffic are detailed in the sections below.

2.7.1 Power Generation Facility

Site mobilization of the proposed project is expected to ensue immediately upon receipt of certification. Onsite construction would commence in September 2008 or earlier and construction and startup would be completed by July 2010, a total of 22 months, as shown on Figure 2.7-1. The schedule has been estimated based on a single shift, 10-hour day and 50-hour week. The majority of construction operations are expected to take place between 6:00 a.m. and 6:00 p.m. However, longer workdays or work weeks may be necessary to make up schedule deficiencies or complete critical construction activities. During the start-up and testing phase of the project, some activities may continue 24 hours per day, 7 days per week. Mitigation activities will be scheduled to minimize noise.

Projected construction staff by month is shown in Table 2.7-1 and on Figure 2.7-2. The onsite workforce will consist of laborers, craftsmen, supervisory personnel, support personnel, and construction

Table 2.7-1
Construction Staff by Trade

Combined Cycle	Year 2008				Year 2009												Year 2010					
	Sep-08	**Oct-08**	**Nov-08**	**Dec-08**	**Jan-09**	**Feb-09**	**Mar-09**	**Apr-09**	**May-09**	**Jun-09**	**Jul-09**	**Aug-09**	**Sep-09**	**Oct-09**	**Nov-09**	**Dec-09**	**Jan-10**	**Feb-10**	**Mar-10**	**Apr-10**	**May-10**	**Jun-10**
Craft/Trade	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**
Ironworker	0	0	9	10	9	6	8	9	13	25	54	96	97	52	17	11	11	3	3	3	3	3
Millwright								10	34	69	83	160	96	86	82	52	26	26	0	0	0	0
Boilermaker						23	39	71	70	93	107	178	134	97	110	70	71	37	20	20	15	15
Cement Mason			11	25	24	17	9	10	3	4	0	0	0	0	0	0	0	0	0	0	0	0
Operators	49	44	38	51	60	43	56	74	64	68	23	39	20	18	20	13	13	13	15	15	15	15
Pipefitter		33	33	26	40	29	53	80	86	114	105	140	79	71	68	34	26	17	13	13	13	13
Electrician		36	70	72	80	55	43	56	81	129	158	330	298	248	255	130	43	3	19	19	18	18
Painters															8	25	26	25	4	4	4	4
Sprinkler Fitter														23	32	39	17	17	0	0	0	0
Carpenter			12	25	24	17	22	35	25	16	14	17	5	2	0	0	0	0	0	0	0	0
Laborer	39	41	54	42	47	34	52	29	8	7	6	7	0	0	0	0	0	0	0	0	0	0
Teamster				2	5	3	4	6	3	4	4	7	5	2	3	0	0	0	0	0	0	0
Total Craft	87	154	227	253	287	227	287	380	387	527	554	974	734	600	594	374	233	140	73	73	67	67
Contractor Staff	4	6	8	8	12	12	20	20	25	28	30	40	42	42	42	42	35	30	25	15	5	5
Total Site Staff	91	160	235	261	299	239	307	400	412	555	584	1,014	776	642	636	416	268	170	98	88	72	72

management personnel. The estimated construction workforce (craft) by trade is shown in Table 2.7-1. The onsite workforce is expected to reach its peak of 974 individuals during the twelfth month of construction. Construction access to the site will be primarily via and the temporary access road from 6th Street. The estimated average and peak numbers of construction staff (passenger) vehicle round trips per day and the estimated number of average and peak truck deliveries per day are shown in Table 2.7-2 and on Figure 2.7-3. Truck deliveries normally will be on weekdays between 7:00 a.m. and 5:00 p.m.

Table 2.7-2
Average and Peak Construction Traffic

Vehicle Type	Average Daily Round Trips	Peak Daily Round Trips[1]
Construction Worker Vehicles[2]	400	900
Delivery Vehicles (including heavy trucks)	15	30
Total	**415**	**930**

Notes:

[1] "Peak" refers to the scheduled peak construction month. Peak workforce during this month is expected to be 974 persons.

[2] Assumes that a small portion of the workforce will carpool

2.7.2 Construction Plan

An EP&C contractor will be selected for the design, procurement, construction, and start-up of the facility. The EP&C contractor will select subcontractors for certain specialty work as required.

2.7.2.1 Mobilization

The EP&C contractor construction force will mobilize in approximately September 2008. Site preparation work will include site grading and stormwater control. Crushed rock will be used for temporary roads, laydown, and work areas.

2.7.2.2 Construction Offices, Parking, and Laydown Areas

Mobile trailers or similar suitable facilities (e.g., modular offices) will be used as construction offices for contractor and subcontractor personnel. Construction laydown and parking areas are shown on Figure 2.7-4A and 2.7-4B and described below. Site access will be controlled for personnel and vehicles. As necessary, temporary security fences will be installed around the construction laydown areas and along the temporary access road from 6th Street.

Onsite Construction Laydown Areas

The proposed SGGS will use several areas within the EGS property for temporary construction laydown areas. In addition, approximately 4.5 acres of land currently owned by IEUA will be used for construction laydown.[1] These areas are shown on Figure 2.7-4A and described below. Access between the onsite laydown areas and the proposed project site will be on internal plant roads, unless noted otherwise. A bridge will be constructed across Chadwick Channel on the main accessway into the proposed plant. Currently, the existing proposed project site area can be approached by either of two bridges located farther north within the EGS property. However, neither of those bridges is wide enough or has the carrying capacity required to move heavy equipment. The new clear-span bridge will be

[1] For purposes of this AFC, the 4.5-acre laydown area on IEAU land is included as "onsite" laydown areas.

30 feet wide by 100 feet long. The bridge will constructed of reinforced concrete and will be designed to carry a transformer moved using a multi-axle carrier. The conceptual design for the new bridge is shown on Figure 2.7-5. Deliveries to the onsite laydown areas will be primarily via the temporary access road. Occasional deliveries may be made from Etiwanda Avenue.

Area Number 1

Area Number 1 is occupied by two former oil tanks and a tank spill containment area. The property is owned by IEUA. The oil tanks no longer are used to store oil but are being converted for use as water storage tanks. The area, which has 4.5 acres of usable space around the tanks, is immediately south of the proposed project site (see Figure 2.7-4A).

The tank spill containment area has gunite-surfaced berms. The area inside the berms is not surfaced. The berms will be demolished, and the gunite will be removed and disposed of offsite at a permitted disposal facility. The dirt used to construct the berms will be pushed into the center of the spill containment area and compacted in 12-inch-thick lifts to 90 percent American Society for Testing and Materials (ASTM) D-1557 standards. The dirt will be placed to within 20 feet of each tank, which will leave the tanks in a shallow hole. Twelve-inch-high berms will be built around the top of the hole to prevent stormwater from entering the area around the tanks.

This laydown area will be fenced on the southern side. The fence will connect to the EGS property line fencing on the west and to new property line fencing on the east that will be installed around the plant. No gates will be required. This area will be open on the north side facing the power plant.

The area will be surfaced with 4 inches of crushed rock and potentially will be used during construction to park construction trailers, as a space to store construction materials, and as a space for fabrication shops (such as rebar fabrication and pipe fabrication).

After construction of the SGGS is complete, the fence on the south side of the laydown area will be removed and new fencing will be placed immediately south of the plant along the new plant boundary. The tank area will be cleaned up, but the crushed rock surfacing and the run-on diversion dikes around the tanks will remain in place. The crushed rock surfacing will provide erosion protection. No additional restoration will be required at the end of construction. Approximately 0.8 acre of the IEUA land will be acquired by SGPG for the SGGS project; the remainder will be returned to IEUA.

Area Number 2

Area Number 2 is a small area about 0.5 acre in size immediately south of the Unit 4 cooling tower (see Figure 2.7-4A). The area is covered with compacted natural soil. No grading, surfacing, or fencing will be required. The area will be used for laydown of materials such as pipe, structural steel, spools of electrical wire, or small equipment. Materials will be received at the laydown area and delivered to the plant using the internal plant roads. No restoration of the area will be required after the end of construction.

Area Number 3

Area Number 3 is 2.2 acres inside the EGS property just south of the Unit 3 cooling tower and just north and east of retired Units 1 and 2 (see Figure 2.7-4A). The area is fully asphalt paved and was used as a laydown area for Units 1 and 2 and later used as a parking area.

No grading or surfacing of this area will be required. There is no fencing now at this area, but the entire area will be fenced. A 20-foot-wide double swing gate will be added at the northwest corner of the western fence and in two places in the eastern fence to provide access into and out of the area. The area will be used for laydown of materials such as structural steel and pipe until they are ready to be used in the plant. Materials will be shipped to and from the laydown area using internal plant roads. The area will be restored after construction is complete by removing the fence; no additional restoration will be required.

Area Number 4

Area Number 4 is a long, narrow strip of approximately 0.3 acre about 45 feet wide by 290 feet long. As shown on Figure 2.7-4A, this area is located parallel to Chadwick Channel that bisects the EGS site. It is covered with compacted natural soil, which is coarse sand with some gravel. No grading or surfacing will be required for this area, which will be used for laydown of materials such as structural steel or pipe. This area may also be used to park construction trailers. Materials will be transported to and from the laydown area using internal plant roads. The area will be cleaned up after construction and left in its current state; no additional restoration will be required.

Area Numbers 5 and 6

Area Number 5 and Area Number 6 are across the EGS access road from each other (see Figure 2.7-4A). Area Number 5 is about 0.35 acre, and Area Number 6 is about 0.3 acre; together they total 0.65 acre. Both areas are compacted natural soils. No grading, surfacing, or fencing will be required. The areas will be used for laydown of materials such as structural steel, pipe, and other construction materials. Area 5 will be a prime area for construction trailers because of its proximity to phone and power lines. Materials delivered to Areas 5 and 6 will be trucked to the plant using internal plant roads. The areas will be cleaned up after construction and left in their current state; no additional restoration will be required.

Area Number 7

Area Number 7 is a long, thin piece of about 0.7 acre of property. This area is inside the EGS property just north of the SCE switchyard and just south of the main plant access road (see Figure 2.7-4A). This area is fully surfaced with crushed rock and currently is fenced on the south side only. No grading or surfacing of the area will be required. A fence will be added along the northern, eastern, and western boundaries of the area. Two 20-foot-wide double swing gates will be added to the northern fence to provide access into and out of this area. Materials will be received at the laydown area and delivered to the plant using internal plant roads. After construction is complete, the fencing will be removed and the area cleaned up; no additional restoration will be required.

Area Number 8

Area Number 8 is 1.4 acres in size and located inside the EGS property next to Etiwanda Avenue (see Figure 2.7-4A). The property line fence runs along the eastern side of this area, and there is an existing fence about halfway along the northern side of the area. The property line fence bordering Etiwanda Avenue has a 20-foot-wide double swing gate. This area is completely rock surfaced and drains slightly toward the south and will not require any grading or surfacing. The remaining portion of the northern side will be fenced as well as the western and the southern sides of this area. The fence would be 6-foot-high chain-link topped with three strands of barbed wire. A new 20-foot-wide, double swing gate will be provided in the northern fence. This area would be used for laydown of materials and perhaps a pipe fabrication shop. After construction is complete the northern, western, and southern fences will be removed, and no additional restoration will be required.

Area Number 9

Area Number 9, which is 1.4 acres, is inside the EGS property immediately south of Area Number 8 (see Figure 2.7-4A). An abandoned geomembrane-lined pond and an abandoned (former) oil tank, which is surrounded by a spill containment dike, currently occupy the area.

The double geomembrane liner for the pond is still in place. The liner, including any concrete used at the inlet pipe and all steel pipes draining into the pond, will be removed. The soil already has been tested to make sure that it is not contaminated. The pond dikes will be pushed to the inside and compacted in 12-inch lifts to 90 percent ASTM D-1557.

The oil tank spill containment area has gunite-lined dikes but no interior lining. The tank, any concrete used for the tank foundation, and any remaining piping will be removed. Any oil-contaminated soil that is found will be hauled to a solid waste disposal area designed to receive contaminated solid waste. The gunite used on the outside of the dikes will be removed and disposed offsite at a permitted disposal facility, and then the dikes will be pushed to the inside and compacted in lifts to 90 percent ASTM D-1557. Some of the dike fill may be used to fill the pond. After the material has been spread and compacted, the entire area will be surfaced with 4 inches of crushed rock. The area naturally drains to the southwestern corner and exits from the site into a ditch.

This area is fenced on its eastern side, which is the existing plant boundary fence along Etiwanda Avenue, and along the southern and western sides, which are also plant boundary fences. Fencing will be added along the northern side, with a 20-foot-wide double swing gate added. This area will be used to store construction materials such as structural steel and pipe and equipment such as pumps and ducts. After construction is completed, the fence on the northern side of Area 9 will be removed. The crushed rock surfacing will be left in place, and no other restoration will be required.

Offsite Construction Parking and Laydown Area

The proposed offsite construction laydown area is approximately 11.2 acres within a 15-acre site approximately 1,300 feet due west of the proposed SGGS site (see Figure 2.7-4B). This site is bounded on the north by the Burlington Northern Santa Fe (BNSF) Railroad main east-west line, on the east by a BNSF spur track, on the south by a dirt road, and on the west by a dirt road. The dirt road to the south is 300 feet north of new warehouses that exit to 6th Street. The dirt road to the west is 380 feet east of Day Creek.

About 7.1 acres of this property would be used to park approximately 800 cars. Access is via 6th Street to the temporary plant access road and then north on the temporary plant access road to the parking lot. Two entrances would be provided into the parking lot. The remaining acreage, which is about 4.1 acres, would be used for construction laydown (temporary storage of equipment, pipe, and structural steel until those materials and equipment are required for plant construction).

To ensure worker safety without compromising railroad activities, the Applicant has engaged in conversations with BNSF to discuss what measures may be incorporated to support a safe railroad crossing. Since the rail line is a dead end spur serving very few trains (one per day) traveling at a very low speed (approximately 5 mph), BNSF requested signals and permanent crossing arms and a concrete crossing. A conceptual drawing of the crossing is shown on Figure 2.7-6. The Applicant will continue to work with BNSF and will provide periodic updates to the CEC when the actual crossing measures are approved by BNSF.

The first 100 feet of the temporary access road north of 6th Street would be asphalt paved. The remainder of the road would be surfaced with crushed rock, and the construction parking area and the laydown space would be surfaced with crushed rock.

Drainage onto the property is via six 48-inch-diameter corrugated metal pipe culverts that drain beneath the railroad tracks in the far northeastern corner of the site. The culverts appear to convey stormwater runoff from the metal smelting operation north of the BNSF tracks. Drainage from the culverts has eroded and enlarged the channel downstream of the railroad tracks and created a deep hole in the northeastern corner of the site. Most of this area is covered with fine sand that has been deposited since the culverts were installed.

Storm water runoff collects in the northeastern portion of the site and either percolates to the subsurface or flows south via a shallow drainage ditch that winds south to the warehouse area, where it discharges into a 72-inch-diameter concrete culvert that crosses under the warehouse road. Approximately 11.2 acres of the offsite property is on high ground and would be useable for construction parking and as a construction laydown area (see Figure 2.7-4B). The portion of the property to be used for construction parking and laydown area would be stripped to remove the vegetation, rough graded to achieve a uniform slope, wetted to optimum moisture content, and then compacted to stabilize the sand. The area would then be covered with 6 inches of crushed rock.

The natural drainage that crosses through the property would be straightened. At each of the three road crossings (see Figure 2.7-4B), a 24-inch-diameter culvert would be installed. Each road crossing would be designed to be overtopped during large storm events.

The offsite construction laydown area property would be fenced with 6-foot-high chain-link fence topped with three strands of barbed wire on 45 degrees facing out. A 36-foot-wide double swing gate would be installed at each entrance road.

The property would be used only during construction of the proposed power plant. After construction was completed and the land no longer was required, the fence around the property would be removed and fencing on the west side of the property along the BNSF Railroad right-of-way would be replaced. The crushed rock would be removed, the culverts beneath the roads would be removed, the ditch would be relocated to its original alignment, and the entire area would be seeded.

2.7.2.3 Emergency Facilities

Emergency services will be coordinated with the City of Rancho Cucamonga Fire Department and San Antonio Community Hospital. A physician’s assistant or nurse with adequate facilities will be stationed at the proposed project site for incident case management. An urgent care facility will be contacted to set up nonemergency physician referrals. At least one person trained in first aid will be part of construction staff. Fire extinguishers will be located throughout the site at strategic locations at all times during construction.

2.7.2.4 Construction Utilities and Site Services

During construction, temporary utilities will be provided for the construction offices, the laydown area, and the proposed project site. Temporary construction power will be furnished by EGS. Area lighting will be provided and strategically located for safety and security.

Construction water will be supplied by the existing EGS makeup water system. Average daily use of construction water is estimated to be about 8,000 gallons. The maximum daily water usage is estimated at 85,000 gallons during hydrotesting of the HRSGs and associated piping. The hydrotest water will be tested and, if suitable for discharge, will be routed to the sedimentation/detention basin. If the water quality is not suitable for discharge, it will be transported by trucks to an approved offsite disposal facility.

The following site services will be provided by the EP&C contractor:

- Environmental health and safety training
- Site security
- Site first aid
- Construction testing
- Site fire protection and extinguisher maintenance
- Furnishing and servicing of sanitary facilities
- Trash collection and disposal
- Disposal of hazardous materials and waste in accordance with local, state, and federal regulations

2.7.2.5 Construction Materials and Heavy Haul

Construction materials such as concrete, pipe, wire and cable, fuels, reinforcing steel, and small tools and consumables will be delivered to the proposed SGGS site by truck. Most of the heavy equipment and its components will be transported by rail to the existing spur at the site. Rail deliveries will be offloaded and transported to the site by a heavy haul contractor. Truck deliveries and trucks per day per month for the duration of project construction are shown on Figure 2.7-7.

2.7.3 Offsite Roadway Improvements

The temporary access road will be approximately 3,120 feet long (see Figure 2.7-4B). The first 100 feet of the temporary access road north of 6th Street will be asphalt paved; the remainder of the road will consist of 30-foot-wide, 12-inch crushed rock surface over 6 oz/sy geotextile.

2.7.4 Construction Land Disturbance Control Measures

The proposed SGGS site is primarily on the existing EGS property. The EP&C contractor will implement the following fugitive dust control measures during construction at the proposed project site to minimize the formation of fugitive dust:

- Water unpaved roads and disturbed areas frequently (at least twice a day). Frequency of watering will be increased when wind speeds exceed 15 miles per hour (mph).

- Limit speed of vehicles within construction areas to no more than 10 mph.

- Sweep paved interval roads after the evening peak period.

- Sweep public roadways adjacent to the proposed project site that are used by construction and worker vehicles as necessary.

- Treat the entrance roadways to the construction site with soil stabilization compounds.

- Install windbreaks (optional and as necessary) at the windward sides on construction areas before soil is disturbed. The windbreaks shall remain in place until the soil is stabilized or permanently covered. Watering of excavation areas before, during, and after excavation should make use of windbreaks unnecessary.

- Replace ground cover in disturbed areas as quickly as possible.

- Use gravel ramps before entering a public roadway to limit accumulated mud and dirt deposited on public roadways.

- Cover all trucks hauling dirt, sand, soil, or other loose materials and maintain a minimum of six inches of freeboard between the top of the load and the top of the trailer.
- Limit equipment idle times (no more than 15 consecutive minutes).
- Use electric motor–driven construction equipment when feasible.
- Apply covers or dust suppressants to soil storage piles and disturbed areas that remain inactive for more than two weeks.
- Pre-wet soil to be excavated during construction.
- Designate a person to oversee the implementation of the fugitive dust control program.

As discussed in Section 7.1, Air Quality, the fugitive dust mitigation measures listed above are expected to control more than 90 percent of the fugitive dust that occurs during onsite construction.

The project also will employ oxidizing soot filters on all large suitable offroad construction equipment with an engine rating of at least 100 brake horsepower (bhp).

In addition, a construction Stormwater Pollution Prevention Plan (SWPPP) will be prepared and implemented. A draft construction SWPPP is provided in Appendix H. This plan includes best management practices (BMPs) to be used to minimize erosion.

2.7.4.1 Site-Specific Heath and Safety Plan

A site-specific health and safety plan (HSP) will be developed by the EP&C contractor for its scope of work. The HSP will incorporate information and procedures to be followed by onsite personnel for the completion of the work. The HSP will outline requirements and provide guidance for control of construction safety hazards in compliance with safety standards and protection of public health.

2.7.4.2 Air Monitoring and Dust Control Measures

Personal monitoring and Occupational Safety and Health Administration (OSHA) standards are addressed in the HSP. Dust control will comply with the following:

- All structure and building materials will be wet continually for the duration of the demolition to control dust generated during the course of the demolition.
- To control fugitive dust or particles, the operation will conform to South Coast Air Quality Management District rules and regulations.
- Personnel protective measures will be implemented and monitored as needed.

2.7.5 Construction Security Plan

It is a customary practice for a construction company's employees to work in and around existing facilities and not enter areas designated as unauthorized. Accordingly, contractors typically have established work rules and consequences for being in an unauthorized area.

As indicated in Figure 2.7-4A, there are a number of proposed construction laydown areas (Areas 2 and 3 and 6 through 9) in and around existing EGS areas. It will be necessary to control the entry of construction personnel into these EGS areas. The number of workers requiring access into the laydown areas will be in the range of 8 to 16 construction employees on a somewhat routine basis—particularly in the early stages of construction—for unloading, loading, and trucking materials into the project work site.

2.7.5.1 Security Plan for These Areas

A fence will be installed as necessary to cordon off the SGGS area from other existing EGS areas. Gates will be included as necessary for personnel and truck movement into and out of the new plant areas. A guard will be stationed at the designated gates to log in and log out employees as they enter and leave the laydown areas.

2.7.5.2 Training

All construction employees will be trained on the requirements for entry and exit into the laydown areas, and the requirement to stay out of unauthorized areas. A map of the plant site (similar to Figure 2.7-4A) will be provided to construction personnel showing the areas they can access. All other areas are unauthorized for entry unless special permission granted by the Applicant's onsite representative. All employees will be trained on the requirements for entry into unauthorized areas.

2.7.5.3 Work Rules

If the construction companies do not have an established work rule for entry into unauthorized areas, such a rule will be created. Typical disciplinary techniques will include a written warning, suspension, and termination for the first, second, and third offense, respectively.

2.8 FACILITY OPERATION

The SGGS operation will be controlled and monitored by highly trained operators during each operating shift. In addition, maintenance and supervisory personnel generally will be present during the day shift and, as required by specific operations or maintenance activities, during night shifts. Plant operation will require approximately 18 full-time permanent personnel (Table 2.8-1) with 11 employees during the day shift. The plant will be operated 7 days a week, 24 hours a day. When the plant is not operating, personnel will be present as necessary for maintenance and to prepare the plant for start-up.

Table 2.8-1
Plant Operation Workforce

Department	Personnel	Shift	Workdays
Operations	9 Plant Operators	Rotating 12-hour shift, 2 employees per shift	7 days a week
Production	1 Operations Specialist 0.5 Operations Supervisor	Standard 8-hour days Shared with existing unit	5 days a week with additional coverage as required.
Administration	0.5 Plant Manager 0.5 Administrative Assistant 1 Plant Engineer 1 Planner/Scheduler	Shared with existing unit Standard 8-hour days	5 days a week with additional coverage as required.
Maintenance	0.5 Maintenance Supervisor 2 I&C Technicians 1 Electrician 1 Mechanic	Shared with existing unit Standard 8-hour days	5 days a week with additional coverage as required.
Total	18 Personnel		

I&C = instrumentation and control

Power produced by the proposed SGGS will be sold into the wholesale energy market. Depending on market demand and the provisions of bilateral sales, in any given hour the plant may be operating at peak load, base load, or part load with both or with one CTG running. Peak load operation most likely will occur during summer peak hours, and minimum load operation during nonsummer off-peak hours. Shutdown periods for annual maintenance will be scheduled during extended periods of low demand, which typically occur in the winter or early spring.

Ancillary services provided by the plant will be sold to market participants. These services include regulation, operation reserves to the extent the plant is not operating at full load, and reactive power production. Black start capability will not be provided.

The design of the SGGS provides for a wide range of operating flexibility, i.e., an ability to start up quickly and operate efficiently in both turn down and peaking modes. Overall annual availability of the power plant is expected to be in the range of 92 to 96 percent. The power plant’s output will depend on market conditions and dispatch requirements.

2.9 SAFETY AND RELIABILITY

2.9.1 Facility Safety

The SGGS will be designed for safe operation. Potential hazards that could affect project facilities include earthquake, flood, and fire. Safe operation includes safety for the plant operating personnel, who will be trained to provide the proper response to hazards and to avoid unsafe operating conditions.

2.9.1.1 Natural Hazards

A summary of geologic hazards in the proposed SGGS vicinity is provided in Section 7.15, Geologic Hazards and Resources. This summary includes a review of potential geologic hazards, seismic ground motion, and soil liquefaction. The principal natural hazard associated with the site is the potential seismic hazard; the site is located in Seismic Zone 4. All project structures will be designed in conformance with California Building Code (CBC, 2001, and the 2003 Emergency Supplement) criteria for Seismic Zone 4 to ensure safety for operating personnel and adequate protection against structural and equipment damage. The proposed project site is within 5 miles of an earthquake fault. The structural and seismic design criteria for project buildings and equipment are provided in Appendix B.

The proposed project site elevation is approximately 1,120 feet above mean sea level.

2.9.1.2 Onsite Fire Protection Systems

Onsite fire protection systems will be provided to the SGGS to limit personnel injury, property loss, and plant downtime resulting from a fire. The fire protection systems are described in Section 2.5.10, Fire Protection. The facility will have a Fire Protection Plan as outlined in Section 7.7, Worker Safety and Health.

2.9.1.3 Local Fire Protection Services

The SGGS will receive fire protection services from the nearest fire station, which is 3.9 miles away. The project’s Risk Management Plan described in Section 7.12, Hazardous Materials Handling, will provide necessary information on hazardous materials to ensure that safe and effective fire-fighting measures are used. Additional information on local emergency services can be found in Section 7.8, Socioeconomics.

2.9.1.4 Personnel Safety Programs

The SGGS will implement the personnel safety programs described in Section 7.7 to provide for personnel safety and ensure compliance with federal and state occupational safety and health requirements.

2.9.2 Transmission Line Safety and Nuisance

2.9.2.1 Transmission Lines

A single circuit line will connect the SGGS switchyard with the future SCE Rancho Vista substation.

2.9.2.2 Audible Noise and Radio and Television Interference

When a transmission line is in operation, an electric field is generated in the air surrounding the conductors, forming a "corona." Corona results from the partial breakdown of the electrical insulating properties of the air surrounding the conductors. When the intensity of the electric field at the conductor surface exceeds the insulating strength of the surrounding air, a corona discharge occurs at the conductor surface. Corona discharge represents a small dissipation of heat and energy. Some of the energy may dissipate in the form of small local pressure changes that result in audible noise or in the form of a discharge that results in radio or television interference. Audible noise generated by corona discharge can be characterized as a hissing or crackling sound which, under certain conditions, is accompanied by a 120-hertz hum.

The conductors of high-voltage transmission lines are designed to be free of corona under ideal conditions. However, slight irregularities or water droplets on the conductor surface accentuate the strength of the electric field near the conductor surface, making corona discharge and the associated audible noise more likely. The Electric Power Research Institute (EPRI, 1987) has conducted several studies of these effects. During rainfall, the proposed transmission line will produce corona discharge noise levels roughly equivalent to those found inside a residence at night, and the transmission line noise will be largely masked by the noise of the rain. The transmission line will not run along any public right-of-ways, is only 400 feet long and will run through the existing EGS, IEUA, and future SCE substation properties, where there are no public receptors. Therefore, the addition of the transmission line would therefore have no significant noise impacts and should not cause any radio or television interference.

2.9.2.3 Electromagnetic Fields

Whenever electricity is used or transmitted, electric and magnetic fields are created by the electric charges. Electric charges of opposite signs attract each other, while those of the same sign repel each other. These forces of attraction and repulsion—when not moving—create electric fields. The strength of these fields is related to the voltage in the circuit. When electric charges are in motion, they create magnetic fields. The strength of the magnetic field is proportional to the magnitude of the current in the circuit. The strength of the electric and magnetic fields generally falls off rapidly with distance from the source.

The voltage, electric, and magnetic field strengths induced by high-voltage transmission lines are provided in the *EPRI Transmission Line Reference Book – 345 kV and Above* (EPRI, 1987).

2.9.2.4 Induced Voltage and Current

Hazardous shocks could be caused by a high-voltage transmission line if the line is not properly constructed. The 525-kV interconnecting lines constructed for the proposed project will be built in conformance with California Public Utilities Commission (CPUC) General Order 95 (GO-95) and

California Code of Regulations (CCR), Section 2700 requirements; therefore, hazardous shocks are unlikely to occur as a result of the project operation.

Nuisance shocks can be caused by touching ungrounded metallic objects under or near a transmission line. Assuming a large object remains under the 525-kV interconnecting line for a lengthy period and also assuming the maximum value of electric field, the induced short-circuit currents would be negligible. Any permanent metal object, such as a metallic fence built near the transmission line, will be grounded.

The 525-kV interconnecting line will be constructed in accordance with National Electric Safety Code (NESC) requirements, including the provisions for proper grounding of structures. The NESC requirements are intended to minimize the potential for direct or indirect contact with energized lines; therefore, no significant transmission line impacts will occur to the public.

2.9.2.5 Fire Prevention

The SGGS will comply with Title 14, CCR, Section 1250, Article 4, which establishes fire prevention standards for electric power generation facilities.

2.9.3 Reliability and Availability

This section discusses plant reliability and availability, equipment redundancy, fuel availability, water availability, and project quality control measures.

2.9.3.1 Plant Reliability and Availability

The planned operational life of the proposed SGGS is 30 years. For this operational life to be realized and the plant to operate reliably, a preventive maintenance program will be implemented for the project. This program will begin during engineering and procurement for the project, when designs and specifications will be reviewed for reliability and maintainability of plant systems and equipment. During the operational phase of the project, the preventive maintenance program will consist of monitoring, record-keeping, and maintenance work to detect and rectify deterioration in systems and equipment before such deterioration results in a forced outage or prolonged maintenance outage.

It is expected that the preventive maintenance program will result in high plant availability. Plant availability refers to the plant's available generating capability during a given period of time and is assessed using the equivalent availability factor (EAF). The EAF is a weighted average measure of plant availability considering both full and partial outages. In determining the EAF, outages are weighted by magnitude (i.e., fractional reduction in available generating capacity) and duration. Outages consist of planned overhauls, maintenance outages, and forced outages. The SGGS's annual EAF is expected to be in the range of 92 to 96 percent.

2.9.3.2 Equipment Redundancy

The following subsections identify equipment redundancy as it applies to project availability. Equipment redundancy provides a means for avoiding outages and reducing the magnitude of outages. For example, because the proposed SGGS will include three auxiliary cooling water pumps each of which has 50 percent capacity, an outage of a single pump would not result in a plant outage or derating. Also, because the ACC will consist of multiple cells, loss of one fan would result in only a minor partial outage (i.e., minor reduction in available generating capacity) rather than a full outage. Redundancy of major equipment is shown in Table 2.9-1. Note that some elements may be subject to modification in final design.

2.9.3.3 Combined Cycle Power Block

Two separate combustion turbine generator/HRSG trains will operate in parallel within the combined cycle power block. Each combustion turbine generator/HRSG train will provide approximately 26 percent of the combined cycle power block output. The heat input from the exhaust gas from each combustion turbine will be used in the HRSG to produce steam. Heat input to each HRSG can be supplemented by firing the HRSG duct burners, which will increase steam generation, resulting in an increase in plant electrical output. Thermal energy in the steam from the HRSG will be converted to mechanical energy and ultimately into electrical energy in the steam turbine generator. The expanded steam from the steam turbine generator will be condensed and recycled to the feedwater system. Power from the steam turbine generator will contribute approximately 48 percent of the total combined cycle power block output.

Table 2.9-1
Major Equipment Redundancy

Description	Number	Notes
CTG, HRSG, and CTG Main Transformer	Two trains	Either train can operate independently. Also, a bypass system is provided around the STG to allow both CTG/HRSG trains to operate at full load.
STG	One	Refer to note related to CTG/HRSG trains.
STG Main Transformer	One	Refer to note related to CTG/HRSG trains.
Boiler Feedwater Pump	Two at 100% per train (unfired HRSG) Or One at 100% per train (fired HRSG)	One boiler feedwater pump per train can be down and the plant will be able to operate at full load with HRSG unfired.
Condensate Pump	Three at 50%	One condensate pump can be down and the plant will be able to operate at full load.
Air-Cooled Condenser	One	Eight bays and five fans per bay. Loss of one fan would result in loss of about 1/40th of the total cooling capacity.
Auxiliary Air Cooler	One	The auxiliary air cooler has 16 fans. Two fans can be down and the plant will be able to operate at full load.
Auxiliary Cooling Water Pump	Three at 50%	One auxiliary cooling water pump can be down and the plant will be able to operate at full load.
Air Compressors	Two at 100%	One air compressor can be down and the plant will be able to operate at full load.

CTG = combustion turbine generator
HRSG = heat recovery steam generator
STG = steam turbine generator

Major components of the combined cycle power block will consist of the following subsystems:

- **CTG.** The CTG subsystems will include the combustion turbine, inlet air filtration and evaporative cooling system, generator and excitation systems, and turbine control and instrumentation. The combustion turbine will produce thermal energy through the combustion of natural gas and conversion of the thermal energy into mechanical energy through rotation of the combustion turbine, which drives the compressor and the generator, which then converts the mechanical energy into electrical energy. Exhaust gas from the combustion turbine will be used to produce steam in the associated HRSG. The generator will be air-cooled. The generator excitation system will be a solid state static system. Combustion turbine control and instrumentation (interfaced with the DCS) will cover the turbine governing system, the protective system, and sequence logic.

- **HRSG.** The HRSG subsystems will consist of the HRSG and blowdown systems. The HRSG system will provide for the transfer of heat from the exhaust gas of a combustion turbine and from supplemental combustion of natural gas in the HRSG duct burners for the production of steam. This heat transfer will produce steam at the pressures and temperatures required by the STG. Each HRSG system will consist of ductwork, duct burners, heat transfer sections, an SCR system, and an oxidation catalyst module. The blowdown system will provide drains for each HRSG boiler drum and include a continuous and intermittent blowdown drum for each HRSG to control boiler feedwater quality.

- **STG.** The STG will convert the thermal energy in the steam to mechanical energy to drive the generator, which converts the mechanical energy into electrical energy. The basic subsystems will include the steam turbine and auxiliary system, turbine lube oil system, generator, and generator exciter system. The generator will be hydrogen cooled.

- **Boiler Feedwater.** The boiler feedwater system will transfer feedwater from the LP drum to the HP and IP sections of the HRSGs. The system will consist of two 100 percent boiler feed pumps per CTG/HRSG train (based on no duct firing). The pumps will be multistage, electric motor-driven with intermediate bleed-off, and include regulation of control valves, minimum flow recirculation control, and other associated piping and valves.

- **Condensate.** The condensate system will provide a flow path from the condensate storage tank of the air-cooled condenser to the HRSG LP steam drums. The condensate system will include a multiple fan ACC; a condensate storage tank; and three 50 percent capacity, motor-driven condensate pumps.

Balance of Plant Systems include:

- **Distributed Control System.** The DCS (sometimes referred to as Integrated Control System, or ICS) will be a redundant microprocessor-based system that will provide control, monitoring, and alarm functions for plant systems and equipment. Redundancy will be such that no single processor failure can cause or prevent a unit trip. The DCS will interface with the control systems furnished by the CTG and STG suppliers and the existing water treatment system to provide remote control capabilities, data acquisition, annunciation, and historical storage of turbine and generator operating information. Plant operation will be controlled from the operator panel, which will be in the control room. The operator control panel will consists of individual CRT/keyboard consoles and an engineering workstation.

- **Demineralized Water System and Power Cycle Makeup.** The demineralized water system is designed to provide demineralized water for the power cycle makeup on a continuous basis. It also will be used to mix with makeup water to improve the quality of the water used in the combustion turbine evaporative coolers. A storage tank will provide additional demineralized water capacity for several days of HRSG makeup water if the demineralized water system is down.

- **Auxiliary Cooling Water System.** The auxiliary cooling water system will provide cooling water from the auxiliary cooling water finned-fan heat exchanger to the CTG and STG, hydraulics, and lube oil subsystems. The water will then be returned to the auxiliary cooling water finned-fan heat exchanger for cooling. Major components for this subsystem will include auxiliary cooling water finned-fan heat exchanger; three 50 percent, motor-driven pumps; and associated piping and valves.

- **Compressed Air.** The compressed air system will consist of two 100 percent skids containing the instrument air and service air subsystems. The service air subsystem will have service air headers, and distribution piping and hose connections. The instrument air subsystem will supply dry compressed air at the required pressure and capacity for all control air demands, including pneumatic controls, transmitters, instruments, and valve operators. The instrument air system will include one dual tower air dryer with prefilters and after filters, an air receiver, instrument air headers, and distribution piping.

2.9.3.4 Power Plant Maturation

The anticipated maturation period of the proposed SGGS will range between 6 and 12 months. The plant's first year EAF is estimated to be 85 to 89 percent. Functional testing, performance testing, punchlist resolution, reliability runs, and warranty claims will accelerate the maturation process, as well as extensive quality assurance and control during the commission and start-up of the facility.

2.9.3.5 Commercially Proven Technology

The proposed SGGS design incorporates commercially proven technologies from major equipment suppliers, including Siemens combustion turbines. These frame turbine designs are used throughout the world in this application. Steam turbine design has been proven for several decades and is well known for excellent reliability.

2.9.3.6 Special Design Features

A special design feature of the proposed SGGS is the ACC, which will entail significant capital expenditure and minor performance impacts but greatly reduce source water requirements.

2.9.3.7 Fuel Availability

The proposed SGGS will be fueled with pipeline-quality natural gas delivered by SoCalGas.

2.9.3.8 Water Availability

Water will be supplied to the SGGS from the existing EGS makeup water reservoir, which contains primarily reclaimed water from the IEUA supplied under an existing water services agreement. The proposed project will not require additional sources of water; current allotments are sufficient to meet the demands of the project. No new offsite pipelines for well or reclaimed water will be constructed to supply the needs of the proposed facility.

2.9.3.9 Project Quality Control Measures

The proposed project will require quality control measures to be implemented by suppliers and contractors providing equipment and services to the project. This requirement will apply to the engineering, procurement, construction, and start-up phases of the project. It is expected that such measures will be part of quality assurance programs established by the suppliers and contractors. The project will audit the quality assurance programs and supplement the programs with independent design reviews, shop inspections, and construction site inspections.

2.9.4 Applicable Plant Safety and Reliability Laws, Ordinances, Regulations, and Standards

Design, construction, and operation of the SGGS, including transmission lines, pipelines, and ancillary facilities, will be conducted in accordance with all LORS pertinent to facility safety, transmission line safety and nuisance, and reliability and availability. The applicable LORS are discussed in the following sections.

2.9.4.1 Power Plant Reliability

The following LORS are applicable to the proposed SGGS in the context of power plant reliability and availability.

2.9.4.2 Industry Codes and Standards

Currently, there are no industry codes or standards that govern power plant reliability; however, there are trade organizations and associations that are generally recognized as authorities and leaders in the field of power plant availability and reliability. Definitions used by these organizations have become generally accepted as a common means of communicating, and the data published have been found to be useful. The organizations are:

- The EPRI. Copies of reports can be obtained from the Research Reports Center:

  3412 Hillview Avenue
  Palo Alto, California 94304-1395
  (650) 855-2000

- North American Electric Reliability Corporation (NERC):

  Princeton Forrestal Village
  116-390 Village Boulevard
  Princeton, New Jersey 08540
  (609) 452-8060

2.9.4.3 SGGS Compliance with Power Plant Reliability LORS

The SGGS will be designed for reliable operations for an expected project life of 30 years. To create and maintain reliable operations, the SGGS will include a maintenance program, equipment redundancy, dependable fuel source, and water supply.

Efficiency

CEQA requires that a power plant or another new project not waste energy. CEQA also requires that the project be more efficient in energy use than alternatives to the project. CEC is the administering agency.

2.9.4.4 Transmission Line Safety and Nuisance

Federal Authorities and Administering Agencies

47 USC § 15.25. This authority requires mitigation for any device that causes communications interference.

The administering agency for the above authority is the Federal Aviation Administration.

State Authorities and Administering Agencies

California Public Resources Code §25000 et seq., Warren-Alquist Act, §25520 Subdivision (g). This authority requires a detailed description of the transmission line, including all rights-of-way.

The administering agency for the above authority is the CEC.

General Order 52(GO-52) CPUC. This authority requires the prevention or mitigation of any inductive interference caused by the transmission lines.

The administering agency for the above authority is the California Public Utilities Commission **(CPUC)**.

General Order 95 (GO-95) CPUC. This authority establishes rules and guidelines for transmission line construction.

The administering agencies for the above authority are the CPUC and CEC.

Local Authorities and Administering Agencies

San Bernardino County. The San Bernardino County General Plan describes general policies regarding energy development in the county.

The administering agency for the above authority is the San Bernardino County Planning and Community Development Department.

Industry Codes and Standards

Radio and Television Interference (RI/TVI) Criteria. Criteria are established to determine whether any mitigation is necessary.

The administering agency for the above authority is the CEC.

SGGS Compliance with Transmission Line Safety and Nuisance LORS

The SGGS's design will comply with all audible noise, communication interference, and hazards LORS.

2.10 APPLICABLE LAWS, ORDINANCES, REGULATIONS AND STANDARDS

LORS applicable to the proposed project are shown in Table 2.10-1. Note that the design of all structures and facilities will be based on building codes, specifications, industry standards, and regulations. All building permits will be reviewed during the building permit approval process by San Bernardino County.

Table 2.10-1
Compliance with Project Facility Design Laws, Ordinances, Regulations, and Standards
(Page 1 of 6)

Engineering Activity	Laws, Ordinances, Regulations, and Standards	Administering Agency	Applicability/Compliance	AFC Section
Federal				
Engineering Geology	Occupational Safety and Health Act, 29 United States Code (USC) §651 et seq.; 29 Code of Federal Regulations (CFR) §§1901.1-1910, 1500, 29 CFR, Part 1926	Federal Occupational Safety and Health Administration (OSHA); Cal OSHA (per 29 CFR §1952.70-1952.175)	Specific occupational safety and health standards. SGPG will meet all standards.	Appendix A, Civil Engineering Design Criteria; Appendix B, Structural Engineering Design Criteria; Section 7.7, Worker Safety and Health
Engineering Geology	Clean Water Act (CWA), 33 USC §1342 et seq.	Central Valley Regional Water Quality Control Board (SARWQCB)	Requires permits for specified discharges into waters of the United States. SGPG will provide notice of intent to SARWQCB to operate under and will comply with all General Industrial Activity Storm Water Permit requirements.	Appendices A and B; Section 7.14, Water Resources
State				
Engineering Geology	Business and Professions Code §6700 et seq.; 6730, 6736	Board of Professional Engineers and Land Surveyors	Requires state registration to practice as a civil or structural engineer in California and that all plans, specifications, reports, or documents be prepared by or under the direction of a registered engineer. SGPG will comply with all requirements.	Appendices A and B; Section 7.15, Geologic Hazards and Resources
Engineering Geology	California Occupational Safety and Health Act, Labor Code §6500 et seq.	California Occupational Safety and Health Administration (Cal OSHA)	Requires a permit for construction of trenches or excavation 5 feet or deeper into which personnel have to descend.	Appendices A and B; Section 7.7, Worker Safety and Health

Table 2.10-1 Compliance with Project Facility Design Laws, Ordinances, Regulations, and Standards (Page 2 of 6)				
Engineering Activity	**Laws, Ordinances, Regulations, and Standards**	**Administering Agency**	**Applicability/Compliance**	**AFC Section**
Engineering Geology	California Building Code (CBC) (latest edition available)	CEC	Sets building standards and requirements. SGPG will comply with all CBC requirements.	Appendices A and B; Section 7.15, Geologic Hazards and Resources
Engineering Geology	Labor Code §6300 et seq.; 8 CCR 1500 et seq.; 2300 et seq., §3200 et seq.	Cal OSHA	Prescribes construction safety orders, industrial safety orders, and work safety requirements. SGPG will comply with all safety requirements.	Appendices A and B; Section 7.7, Worker Safety and Health
Engineering Geology	Vehicle Code §35780 et seq.	California Department of Transportation (Caltrans)	Requires a permit for transportation of oversize or overweight vehicles over state highways. SGPG will obtain all necessary permits.	Section 7.10, Traffic and Transportation
Local				
Engineering Geology	Code of Building Regulations	City of Rancho Cucamonga	Sets building standards and requirements.	Appendices A and B; Section 7.15, Geologic Hazards and Resources
Federal				
Civil and Structural Engineering	29 USC §651 et seq.; 29 CFR §§1901.1-1910, 1500; 29 CFR, Part 1926.	OSHA; Cal OSHA (per 29 CFR §§1952.70-1952.175)	Specific occupational safety and health standards. SGPG will meet all standards.	Appendices A and B; Section 7.7, Worker Safety and Health
Civil and Structural Engineering	33 USC §1342 et seq.	SARWQCB	Requires permits for specified discharges into waters of the United States. SGPG will provide notice of intent to SARWQCB to operate under and will comply with all General Industrial Activity Storm Water Permit requirements.	Section 7.14, Water Resources

Table 2.10-1
Compliance with Project Facility Design Laws, Ordinances, Regulations, and Standards
(Page 3 of 6)

Engineering Activity	Laws, Ordinances, Regulations, and Standards	Administering Agency	Applicability/Compliance	AFC Section
State				
Civil and Structural Engineering	Business and Professions Code §6700 et seq.; §§6730, 6736	Board for Professional Engineers and Land Surveyors	Requires state registration to practice as a civil or structural engineer in California and that all plans, specifications, reports, or documents be prepared by or under the direction of a registered engineer. SGPG will comply with all requirements.	Appendices A and B
Civil and Structural Engineering	Labor Code §6500 et seq.	Cal OSHA	Requires a permit for construction of trenches or excavation 5 feet or deeper into which personnel have to descend.	Appendices A and B; Section 7.7, Worker Safety and Health
Civil and Structural Engineering	California Building Code (CBC)	CEC	Sets building standards and requirements. SGPG will comply with all CBC requirements.	Appendices A and B; Section 7.7, Worker Safety and Health
Civil and Structural Engineering	Labor Code §6300 et seq.; 8 CCR 1500 et seq.; 2300 et seq.; §3200 et seq.	Cal OSHA	Prescribes construction safety orders, industrial safety orders, and work safety requirements. SGPG will comply with all safety requirements.	Appendices A and B; Section 7.7, Worker Safety and Health
Civil and Structural Engineering	Vehicle Code §35780 et seq.	Caltrans	Requires a permit for transportation of oversize or overweight vehicles over state highways. SGPG will obtain all necessary permits.	Section 7.10, Traffic and Transportation

Table 2.10-1
Compliance with Project Facility Design Laws, Ordinances, Regulations, and Standards
(Page 4 of 6)

Engineering Activity	Laws, Ordinances, Regulations, and Standards	Administering Agency	Applicability/Compliance	AFC Section
Local				
Civil and Structural Engineering	Code of Building Regulations	City of Rancho Cucamonga	Sets building standards and requirements for San Bernardino County.	Appendices A and B; Section 7.15, Geologic Hazards and Resources
Civil and Structural Engineering	Hydrology Manual	San Bernardino County Flood Control District	Specifies drainage requirements. SGPG will comply with all drainage requirements.	Appendices A and B; Section 7.14, Water Resources
Federal				
Mechanical Engineering	29 USC §651 et seq.; 29 CFR §§1901.1-1910, 1500; 29 CFR, Part 1926.	Federal OSHA; Cal OSHA (per 29 CFR §§1952.70-1952.175)	Specific occupational safety and health standards. SGPG will meet all standards.	Appendices C and D; Section 7.7, Worker Safety and Health
State				
Mechanical Engineering	CBC, California Plumbing Code	CEC	Sets building standards and requirements. SGPG will comply with all CBC requirements.	Appendices C and D; Section 7.15, Geologic Hazards and Resources
Mechanical Engineering	Labor Code §6500 et seq.; 8 CCR 1500 et seq.; 2300 et seq.; §3200 et seq.	Cal OSHA	Prescribes construction safety orders, industrial safety orders, and work safety requirements. SGPG will comply with all safety requirements.	Appendices C and D; Section 7.7, Worker Safety and Health
Mechanical Engineering	8 CCR Chapters 4-7	CEC	Prescribes requirements for flammable liquids, gases, and vapors. SGPG will comply with all requirements.	Appendices C and D; Section 7.12, Hazardous Materials Handling

Table 2.10-1
Compliance with Project Facility Design Laws, Ordinances, Regulations, and Standards
(Page 5 of 6)

Engineering Activity	Laws, Ordinances, Regulations, and Standards	Administering Agency	Applicability/Compliance	AFC Section
Mechanical Engineering	Business and Professions Code §6700 et seq., 6730, 6735 and 6736	Board of Professional Engineers and Land Surveyors	Requires state registration to practice as a mechanical engineer and that all plans, specifications, reports, or documents be prepared by a registered engineer. SGPG will use registered engineers.	Appendices C and D
Federal				
Electrical Engineering	29 USC §651 et seq.; 29 CFR §§1901.1-1910, 1500, 29 CFR, Part 1926	Federal OSHA; Cal OSHA (per 29 CFR §§1952.70-1952.175)	Specific occupational safety and health standards. SGPG will meet all standards.	Appendices D and E; Section 7.7, Worker Safety and Health
State				
Electrical Engineering	CBC, California Electrical Code	CEC	Sets building standards and requirements. SGPG will comply with all CBC requirements.	Appendices D and E; Section 7.15, Geologic Hazards and Resources
Electrical Engineering	Labor Code §6500 et seq.; 8 CCR 1500 et seq.; 2300 et seq.; §3200 et seq.	Cal OSHA	Prescribes construction safety orders, industrial safety orders, and work safety requirements. SGPG will comply with all safety requirements.	Appendices D and E; Section 7.7, Worker Safety and Health
Electrical Engineering	8 CCR Chapters 4-7	CEC	Prescribes requirements for flammable liquids, gases, and vapors. SGPG will comply with all requirements.	Appendices D and E; Section 7.12, Hazardous Materials Handling
Electrical Engineering	Business and Professions Code §6700 et seq., 6730, 6735 and 6736	Board of Professional Engineers and Land Surveyors	Requires state registration to practice as an electrical engineer and also requires all plans, specifications, reports, or documents be prepared by a registered engineer. SGPG will use registered engineers.	Appendices D and E;

Table 2.10-1
Compliance with Project Facility Design Laws, Ordinances, Regulations, and Standards
(Page 6 of 6)

Engineering Activity	Laws, Ordinances, Regulations, and Standards	Administering Agency	Applicability/Compliance	AFC Section
Local				
Electrical Engineering	Code of Building Regulations	San Bernardino County Department of Building	Sets building standards and requirements for San Bernardino County.	Appendices D and E; Section 7.15, Geologic Hazards and Resources
Industry				
Power Plant Reliability	EPRI, NERC		EPRI and NERC trade association standards will be followed	Appendix E; Section 2.9, Safety and Reliability
Federal				
Public Health/Worker Safety Protection	OSHA, 29 USC §651 et seq.; 29 CFR 1910 et seq.; and 29 CFR 1926 et seq.	Federal OSHA and Cal OSHA	Project will meet employee health and safety standards for employer-employee communications, electrical operations, and chemical exposures.	Section 7.7.7, Worker Safety
Public Health/Worker Safety Protection	Department of Labor, Safety and Health Regulations for Construction promulgated under Section 333 of the Contract Work Hours and Safety Standards Act, 40 USC 327 et seq.	Federal OSHA and Cal OSHA	Project will meet employee health and safety standards for construction activities. Requirements addressed by CCR Title 8, General Construction Safety Orders.	Section 7.7.7, Worker Safety

CEC = California Energy Commission
CalOSHA = California Occupational Safety and Health Administration

2.10.1 Engineering Geology

Unless specifically stated otherwise, the design of all structures and facilities will be based on the laws, ordinances, codes, specifications, industry standards, regulations, and other reference documents in effect at the time of design. Applicable codes and industry standards with respect to the project's engineering geology are summarized in sections of Appendix A, Civil Engineering Design Criteria, and Appendix B, Structural Engineering Design Criteria.

2.10.2 Civil and Structural Engineering

Unless specifically stated otherwise, the design of all structures and facilities will be based on the laws, ordinances, codes, specifications, industry standards and regulations, and other reference documents in effect at the time of design. Applicable codes and industry standards with respect to the project's engineering design criteria, construction and operation are summarized in Appendix A, Civil Engineering Design Criteria, and Appendix B, Structural Engineering Design Criteria.

2.10.3 Mechanical Engineering

Unless specifically stated otherwise, the design of all structures and facilities will be based on the laws, ordinances, codes, specifications, industry standards and regulations, and other reference documents in effect at the time of design. Applicable codes and industry standards with respect to the project's mechanical engineering design criteria, construction, and operation are summarized in Appendix C, Mechanical Engineering Design Criteria.

2.10.4 Electrical and Control Systems Engineering

Unless specifically stated otherwise, the design of all structures and facilities will be based on the laws, ordinances, codes, specifications, industry standards and regulations, and other reference documents in effect at the time of design. Applicable sections of Appendix D, Control Systems Engineering Design Criteria, will also be considered. Applicable codes and industry standards with respect to the project's electrical engineering design criteria, construction, and operation are summarized in Appendix E, Electrical Engineering Design Criteria.

2.10.5 Seismic Design

The proposed project site is in Seismic Risk Zone 4. Structures, their foundations, and equipment will be designed in accordance with the 2001 California Building Code. Electrical substation equipment will be designed to meet the requirements of Institute of Electrical and Electronics Engineers (IEEE) 693-1997 Recommended Practice for Seismic Design Substations.

2.11 INVOLVED AGENCIES AND AGENCY CONTACTS

Agency contacts regarding facility design of the SGGS are as follows:

Agency	Contact/Title	Telephone
South Coast Air Pollution Control District 21865 Copley Drive Diamond Bar, CA 91765	Mike Mills, Senior Air Quality Engineering Manager	(909) 396-2578

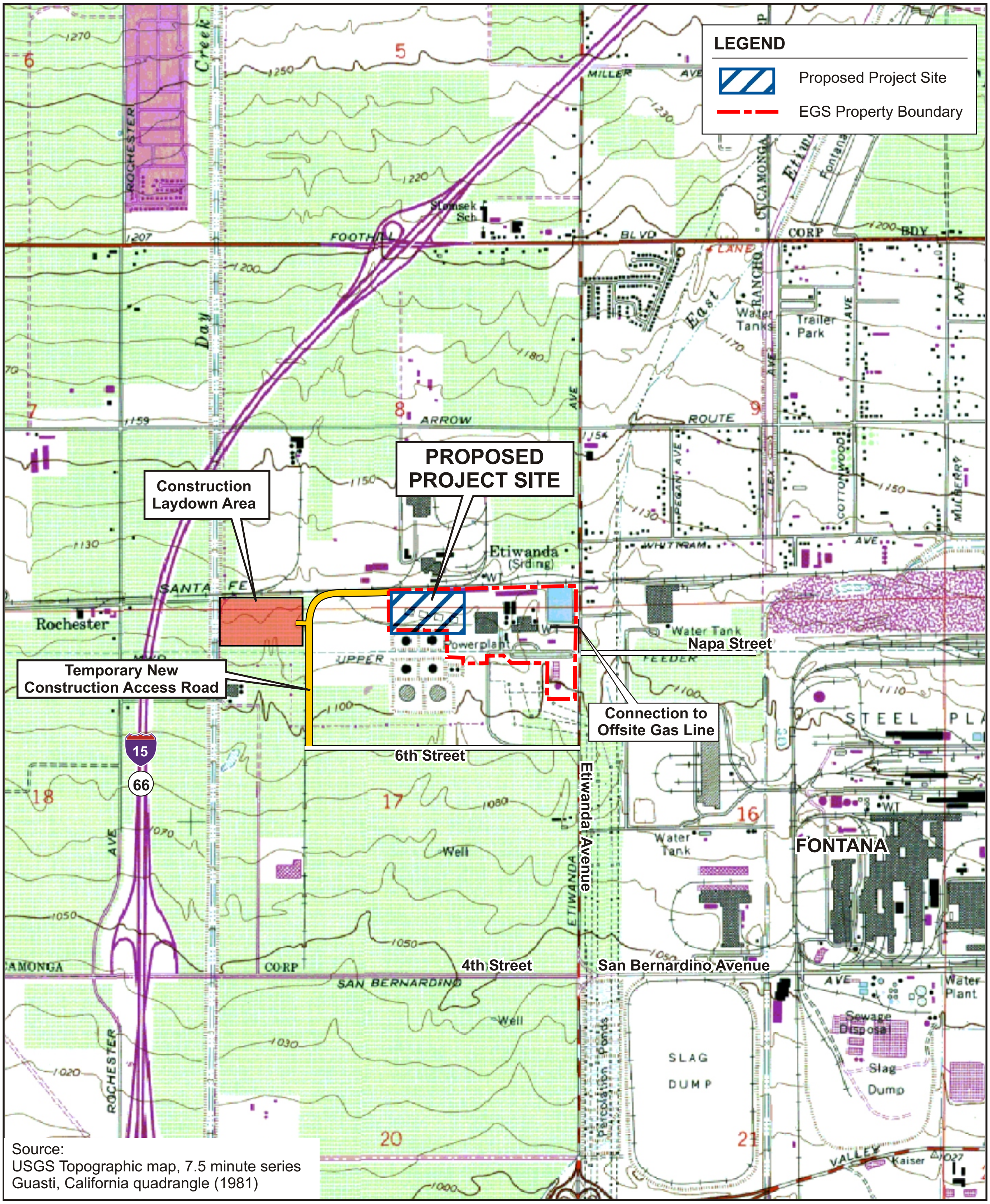
Agency	Contact/Title	Telephone
U.S. Environmental Protection Agency 75 Hawthorne Street San Francisco, CA 94105	Gerardo Rios, Chief, New Source Review Section	(415) 744-1500
Santa Ana Regional Water Quality Control Board 3737 Main Street, Suite 500 Riverside, CA 92501-3348	Mark Smythe, Section Chief, Stormwater Unit	(909) 782-4998
City of Rancho Cucamonga 10500 Civic Center Drive Rancho Cucamonga, CA 91730	William J. O’Neill, City Engineer	(909) 477-2740
City of Rancho Cucamonga 10500 Civic Center Drive Rancho Cucamonga, CA 91730	William Makshanoff, Building Official Department of Building and Safety	(909) 477-2710
County of San Bernardino Department of Public Health, Division of Environmental Health Services 385 North Arrowhead Ave., 2nd Floor San Bernardino, CA 92415-0160	Joan Mulcare, REHS Program Manager, Water/Wastewater Management and Land Uses	(909) 884-4056

2.12 REFERENCES

CBC (California Building Code), 2001, and the 2003 Emergency Supplement.

EPRI (Electric Power Research Institute), 1987. Transmission Line Reference Book, 345 kV and Above. Second Edition.

WRCC (Western Regional Climate Center), 1948-2000. Climate Historical Summaries, Daily Records for Station 041948, Etiwanda 2 SSW.



PROJECT LOCATION MAP

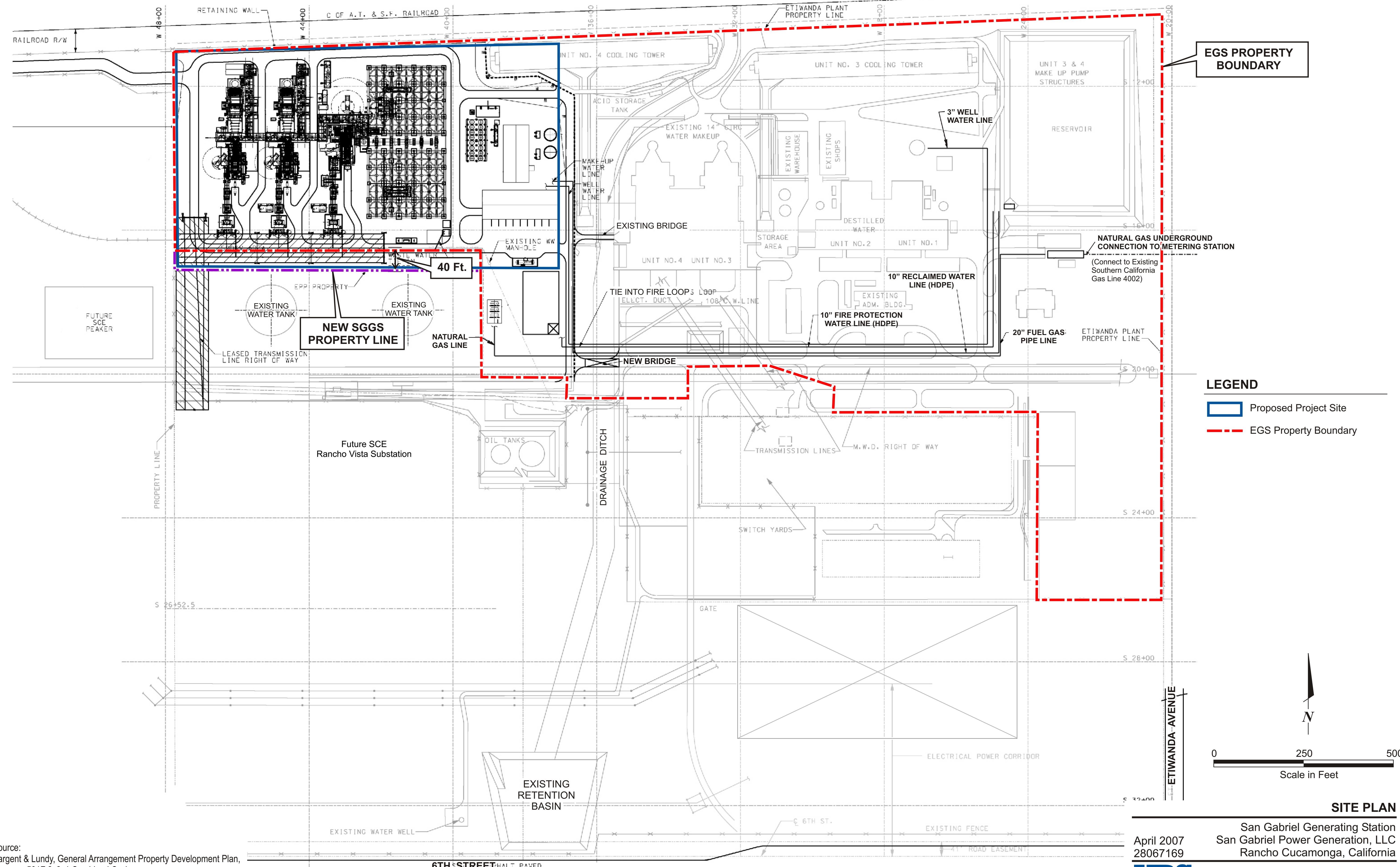
April 2007
28067169

San Gabriel Generating Station
San Gabriel Power Generation, LLC
Rancho Cucamonga, California

URS

FIGURE 2.2-1

4/03/07 vsa ..\Reliant Etiwanda\Graphics\2.0 Facility Description\2.2-1_plm.cdr



Source:
Sargent & Lundy, General Arrangement Property Development Plan,
Siemens 501F 2x2x1 Combined Cycle
Drawing No. GA-06-2 (Rev. 3), 03-12-2007 (ga-06aa.dgn)

SITE PLAN

San Gabriel Generating Station
San Gabriel Power Generation, LLC
Rancho Cucamonga, California

April 2007
28067169

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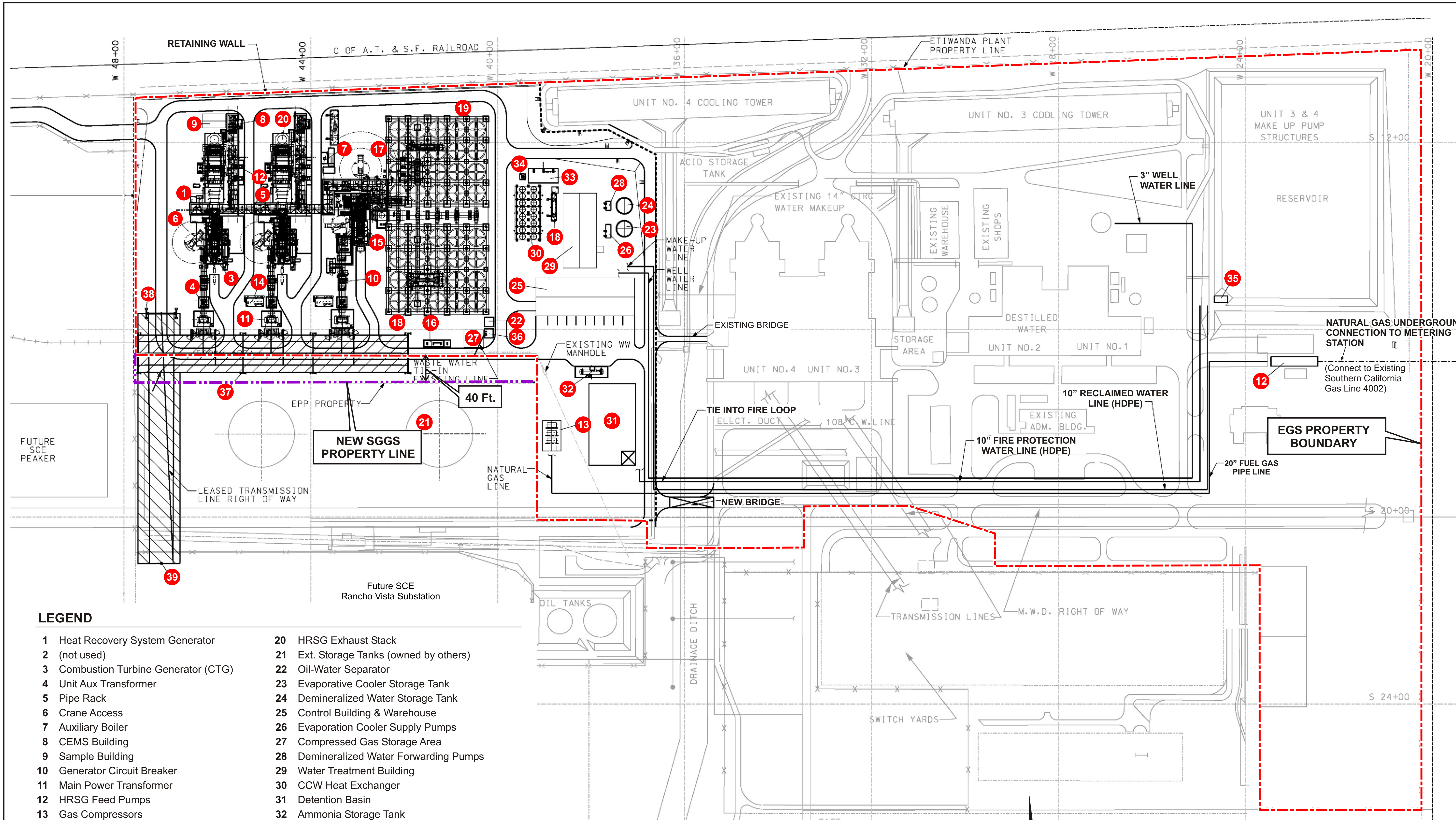
FIGURE 2.3-1

4/03/07 vsa ..\Reliant Etiwanda\Graphics\2.0 Facility Description\2.3-1_siteplan.cdr



LEGEND

1	Heat Recovery System Generator	20	HRSG Exhaust Stack
2	(not used)	21	Ext. Storage Tanks (owned by others)
3	Combustion Turbine Generator (CTG)	22	Oil-Water Separator
4	Unit Aux Transformer	23	Evaporative Cooler Storage Tank
5	Pipe Rack	24	Demineralized Water Storage Tank
6	Crane Access	25	Control Building & Warehouse
7	Auxiliary Boiler	26	Evaporation Cooler Supply Pumps
8	CEMS Building	27	Compressed Gas Storage Area
9	Sample Building	28	Demineralized Water Forwarding Pumps
10	Generator Circuit Breaker	29	Water Treatment Building
11	Main Power Transformer	30	CCW Heat Exchanger
12	HRSG Feed Pumps	31	Detention Basin
13	Gas Compressors	32	Ammonia Storage Tank
14	4.16 kV Switchgear Building	33	CCW Pumps
15	Steam Turbine Generator (STG)	34	CCW Head Tank
16	Bulk Storage Building	35	Make-Up Water Pumps
17	Condensate Pumps	36	Waste Water Sump Pumps
18	MCC Enclosure	37	65' A-Frame Transmission Tower
19	Air Cooled Condenser	38	110' A-Frame Transmission Tower
		39	Transmission Dead End Pole

Source:
Sargent & Lundy, General Arrangement Property Development Plan,
Siemens 501F 2x2x1 Combined Cycle
Drawing No. GA-06-2 (Rev. 3), 03-12-2007 (ga-06aa.dgn)

PLOT PLAN

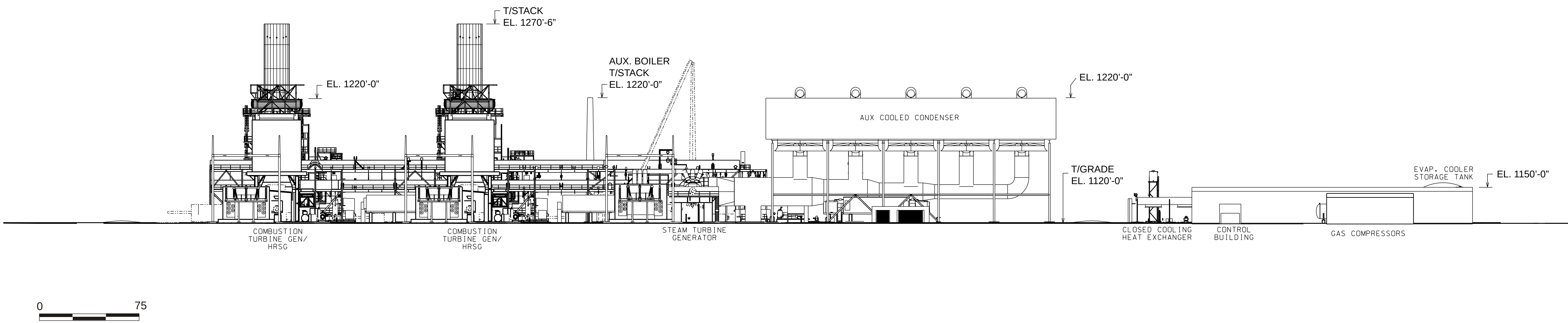
April 2007
28067169

San Gabriel Generating Station
San Gabriel Power Generation, LLC
Rancho Cucamonga, California

URS

FIGURE 2.5-1

4/03/07 vsa ..\Reliant Etiwanda\Graphics\2.0 Facility Description\2.5-1_plotplan.cdr



Source:
Sargent & Lundy; South Elevation 500 MW Combined Cycle Plant,
Drawing No: Figure 3.4-2, Rev. 0, 12/13/2006 (fig3.4-2combined 121306.dgn)

SOUTH ELEVATION

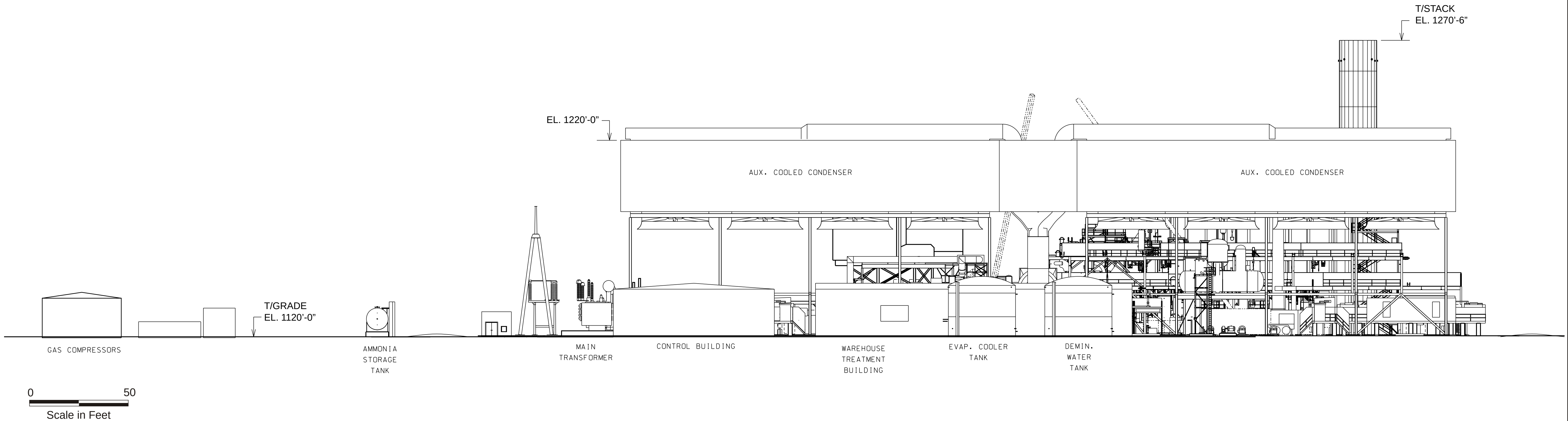
April 2007
28067169

San Gabriel Generating Station
San Gabriel Power Generation, LLC
Rancho Cucamonga, California

URS

FIGURE 2.5-2

4/09/07 vsa ..\Reliant Etiwanda\Graphics\2.0 Facility Description\2.5-2_south elevation.ai



Source:
Sargent & Lundy; East Elevation 500 MW Combined Cycle Plant,
Drawing No: Figure 3.4-3 Rev. 0, 12/13/2006 (fig3.4-3combined 121306.dgn)

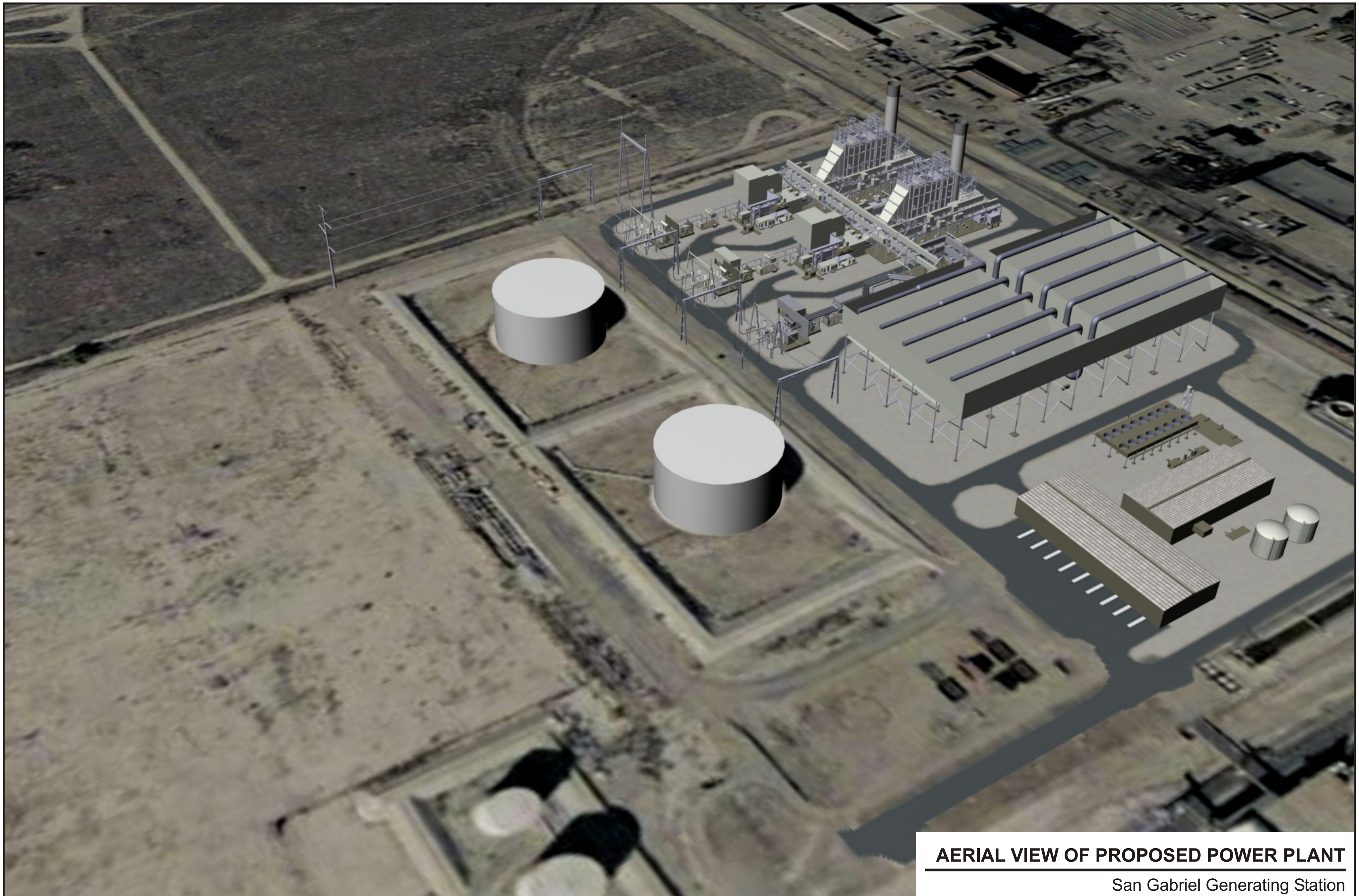
EAST ELEVATION

San Gabriel Generating Station
San Gabriel Power Generation, LLC
Rancho Cucamonga, California

April 2007
28067169

URS

FIGURE 2.5-3



AERIAL VIEW OF PROPOSED POWER PLANT

April 2007
28067169

San Gabriel Generating Station
San Gabriel Power Generation, LLC
Rancho Cucamonga, California

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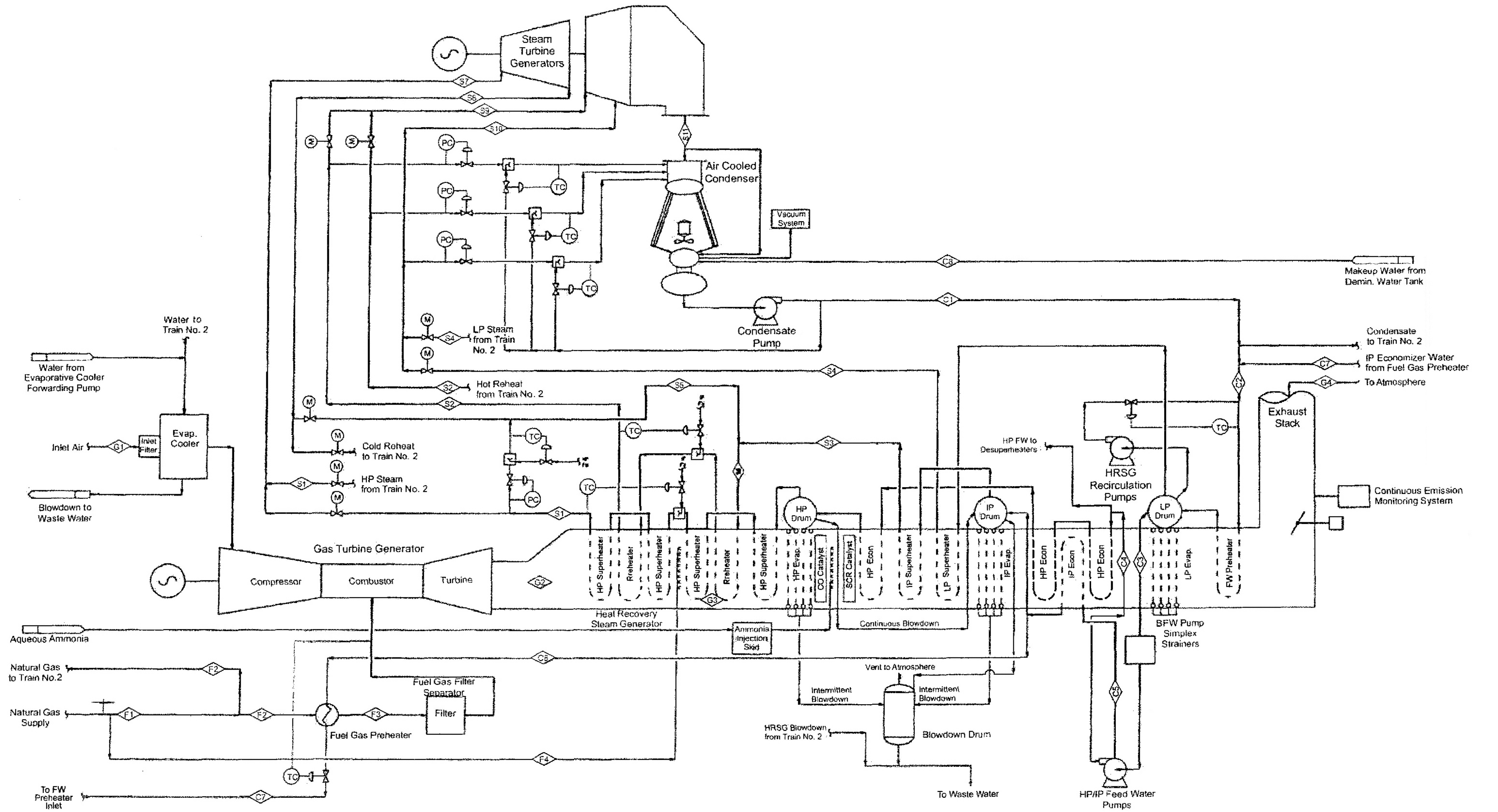
FIGURE 2.5-4



Source:
Sargent & Lundy; 12/04/06; etiwanda_p&id.dgn

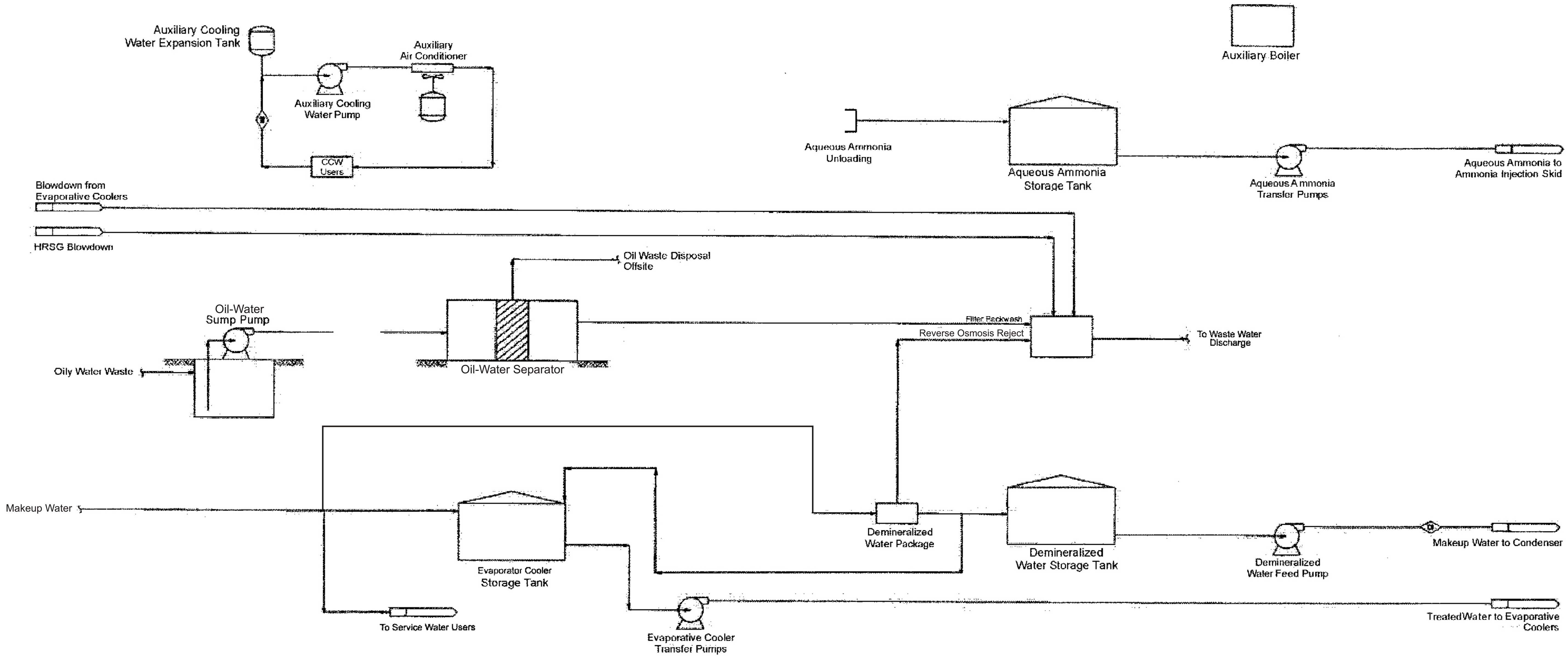
PROCESS FLOW DIAGRAM
POWER BLOCK

April 2007
28067169

San Gabriel Generating Station
San Gabriel Power Generation, LLC
Rancho Cucamonga, California

URS

FIGURE 2.5-5



Source:
Sargent & Lundy; 12/01/06; etiwanda_p&id.dgn,
revised 3/27/07

PROCESS FLOW DIAGRAM
BALANCE OF PLANT

April 2007
28067169

San Gabriel Generating Station
San Gabriel Power Generation, LLC
Rancho Cucamonga, California

URS

FIGURE 2.5-6

4/10/07 vsa ..\Reliant Etiwanda\Graphics\2.0 Facility Description\2.5-6_proc flow_balance.cdr

PROTECTIVE FUNCTION			UNITS ST-2	UNIT ST (SHEET 2)		UNITS 1,2 (SHEETS 3,4)	
SERVICE	FUNCTION	DESCRIPTION	LOCNS	MFR	TYPE	MFR	TYPE
MPT	50N	NEUTRAL INSTANTANEOUS OVERCURRENT	■	BECKWITH	M-3425	NA	NA
MPT	51N	NEUTRAL INVERSE TIME OVERCURRENT	■	BECKWITH	M-3425	BASLER	BE1-51
MPT	63S-1	SUDDEN PRESSURE RELAY	XFMR	------	------	------	------
MPT	63S-2	SUDDEN PRESSURE RELAY	XFMR	------	------	------	------
MPT	87T	MPT DIFFERENTIAL CURRENT	■	BASLER	BE1-87T	BASLER	BE1-87T
21/18KV BUS	59N	GROUND FAULT OVERVOLTAGE	■	BASLER	BE1-59N	BASLER	BE1-59N
21/18KV BUS	87B	OVERALL BUS DIFFERENTIAL CURRENT	■	BASLER	BE1-87T	BASLER	BE1-87T
UAT	50	INSTANTANEOUS OVERCURRENT	■	BASLER	BE1-50	BASLER	BE1-50
UAT	51	INVERSE TIME OVERCURRENT	■	BASLER	BE1-51	BASLER	BE1-51
UAT	51N	NEUTRAL INVERSE TIME OVERCURRENT	■	BASLER	BE1-51	BASLER	BE1-51
UAT	63	SUDDEN PRESSURE RELAY	XFMR	------	------	------	------
UAT	87U	UAT DIFFERENTIAL CURRENT	■	BASLER	BE1-87T	BASLER	BE1-87T
EXCITATION TRANSF	50/51	PHASE OVERCURRENT	■/△	BASLER	BE1-51	BASLER	BE1-51
GENERATOR - GROUP 1	21	PHASE DISTANCE	■/△	BECKWITH	M-3425	BECKWITH	M-3425
GENERATOR - GROUP 1	24	VOLT/HERTZ PROTECTION	■/△	BECKWITH	M-3425	BECKWITH	M-3425
GENERATOR - GROUP 1	27	UNDER VOLTAGE	■/△	BECKWITH	M-3425	BECKWITH	M-3425
GENERATOR - GROUP 1	27TN	3RD HARMONIC UNDERVOLTAGE (STATOR GND FLT)	■/△	BECKWITH	M-3425	BECKWITH	M-3425
GENERATOR - GROUP 1	32	REVERSE POWER	■/△	BECKWITH	M-3425	BECKWITH	M-3425
GENERATOR - GROUP 1	40	LOSS OF FIELD	■/△	BECKWITH	M-3425	BECKWITH	M-3425
GENERATOR - GROUP 1	46	NEGATIVE PHASE SEQUENCE	■/△	BECKWITH	M-3425	BECKWITH	M-3425
GENERATOR - GROUP 1	50	INSTANTANEOUS OVERCURRENT	■/NA	BECKWITH	M-3425	NA	NA
GENERATOR - GROUP 1	50BF	BREAKER FAILURE	■/△	BECKWITH	M-3425	BECKWITH	M-3425
GENERATOR - GROUP 1	50/27	INADVERTENT ENERGIZATION	■/△	BECKWITH	M-3425	BECKWITH	M-3425
GENERATOR - GROUP 1	51V	INVERSE TIME OVERCURRENT	■/△	BECKWITH	M-3425	BECKWITH	M-3425
GENERATOR - GROUP 1	59	PHASE OVERVOLTAGE	■/△	BECKWITH	M-3425	BECKWITH	M-3425
GENERATOR - GROUP 1	59GN	GROUND FAULT BACKUP (95% WINDING)	■/△	BECKWITH	M-3425	BECKWITH	M-3425
GENERATOR - GROUP 1	60FL	VOLTAGE BALANCE	■/△	BECKWITH	M-3425	BECKWITH	M-3425
GENERATOR - GROUP 1	78	OUT OF STEP	■/△	BECKWITH	M-3425	BECKWITH	M-3425
GENERATOR - GROUP 1	81	OVER/UNDER FREQUENCY	■/△	BECKWITH	M-3425	BECKWITH	M-3425
GENERATOR - GROUP 1	87	GENERATOR DIFFERENTIAL CURRENT	■/△	BECKWITH	M-3425	BECKWITH	M-3425
GENERATOR - GROUP 2	21	PHASE DISTANCE	■/△	BECKWITH	M-3430	BECKWITH	M-3425
GENERATOR - GROUP 2	24	VOLT/HERTZ PROTECTION	■/△	BECKWITH	M-3430	BECKWITH	M-3425
GENERATOR - GROUP 2	27	UNDER VOLTAGE	■/△	BECKWITH	M-3430	BECKWITH	M-3425
GENERATOR - GROUP 2	27TN	3RD HARMONIC UNDERVOLTAGE (STATOR GND FLT)	■/△	BECKWITH	M-3430	BECKWITH	M-3425
GENERATOR - GROUP 2	32	REVERSE POWER	■/△	BECKWITH	M-3430	BECKWITH	M-3425
GENERATOR - GROUP 2	40	LOSS OF FIELD	■/△	BECKWITH	M-3430	BECKWITH	M-3425
GENERATOR - GROUP 2	46	NEGATIVE PHASE SEQUENCE	■/△	BECKWITH	M-3430	BECKWITH	M-3425
GENERATOR - GROUP 2	50BF	BREAKER FAILURE	■/△	BECKWITH	M-3430	BECKWITH	M-3425
GENERATOR - GROUP 2	50/27	INADVERTENT ENERGIZATION	■/△	BECKWITH	M-3430	BECKWITH	M-3425
GENERATOR - GROUP 2	51V	INVERSE TIME OVERCURRENT	NA/△	NA	NA	BECKWITH	M-3425
GENERATOR - GROUP 2	59	PHASE OVERVOLTAGE	■/△	BECKWITH	M-3430	BECKWITH	M-3425
GENERATOR - GROUP 2	59GN	GROUND FAULT BACKUP (95% WINDING)	■/△	BECKWITH	M-3430	BECKWITH	M-3425
GENERATOR - GROUP 2	60FL	VOLTAGE BALANCE	■/△	BECKWITH	M-3430	BECKWITH	M-3425
GENERATOR - GROUP 2	78	OUT OF STEP	NA/△	NA	NA	BECKWITH	M-3425
GENERATOR - GROUP 2	81	OVER/UNDER FREQUENCY	■/△	BECKWITH	M-3430	BECKWITH	M-3425
GENERATOR - GROUP 2	87	GENERATOR DIFFERENTIAL CURRENT	■/△	BECKWITH	M-3430	BECKWITH	M-3425
4.16KV SWGR MN	27	UNDERVOLTAGE	⊛	NA	NA	MULTILIN	SR750
4.16KV SWGR MN	50	INSTANTANEOUS OVERCURRENT	⊛	NA	NA	MULTILIN	SR750
4.16KV SWGR MN	51	INVERSE TIME OVERCURRENT	⊛	NA	NA	MULTILIN	SR750
4.16KV SWGR MN	51N	NEUTRAL INVERSE TIME OVERCURRENT	⊛	NA	NA	MULTILIN	SR750
4.16KV SWGR FDR	50	INSTANTANEOUS OVERCURRENT	⊛	NA	NA	MULTILIN	SR735/737
4.16KV SWGR FDR	50N	NEUTRAL INSTANTANEOUS OVERCURRENT	⊛	NA	NA	MULTILIN	SR735/737
4.16KV SWGR FDR	51	INVERSE TIME OVERCURRENT	⊛	NA	NA	MULTILIN	SR735/737
4.16KV SWGR MTR FDR	46	NEGATIVE PHASE SEQUENCE	⊛	NA	NA	MULTILIN	SR469
4.16KV SWGR MTR FDR	50	INSTANTANEOUS OVERCURRENT	⊛	NA	NA	MULTILIN	SR469
4.16KV SWGR MTR FDR	50G	GROUND FAULT INSTANTANEOUS OVERCURRENT	⊛	NA	NA	MULTILIN	SR469
4.16KV SWGR MTR FDR	51	INVERSE TIME OVERCURRENT	⊛	NA	NA	MULTILIN	SR469
480V SUS	59L	GROUND FAULT DETECTION	■	NA	NA	BASLER	BE1-59N

DEVICE LOCATION KEY

- ■ PROTECTIVE RELAY PANEL
- △ COMBUSTION TURBINE GENERATOR
- ◇ STEAM TURBINE GENERATOR
- ⊛ 4.16KV SWITCHGEAR
- ● 480V SUS

INSTRUMENT LEGEND

- (A)
- (F) FREQUENCY METER
- (V)
- (PF) POWER FACTOR METER
- (W)
- (VAR) VARMETER
- (WH) WATTHOUR METER
- (WX) WATT TRANSDUCER
- (VARX) VAR TRANSDUCER
- (BUS DMM) BUS DIGITAL MULTI-METER MANUAL SELECTABLE DISPLAYS VOLTS PRIMARY, VT SECONDARY, FREQ.

- AMMETER OR VOLTMETER SWITCH
- Hz HERTZ
- TX TRANSDUCER

- □ 3 NUMBER EXTERNAL TO RELAY SYMBOL INDICATES QUANTITY OF RELAYS IF MORE THAN ONE
- UEL UNDER EXCITATION LIMITER
- OEL OVER EXCITATION LIMITER
- V/HZ LIM VOLTS/HERTZ LIMITER
- RCC REACTIVE CURRENT COMPENSATOR

NOTES:
1.) RELAY TYPES SHOWN ARE TYPCAL.

Source:
Sargent & Lundy; Single Line Diagram Relay Schedule and Device Legend
Drawing No: ESK ESL-1001 Rev. A, 12/4/2006 (ESK-ESL-1001_SH01.dgn)

SINGLE-LINE DIAGRAM
RELAY SCHEDULE AND DEVICE LEGEND

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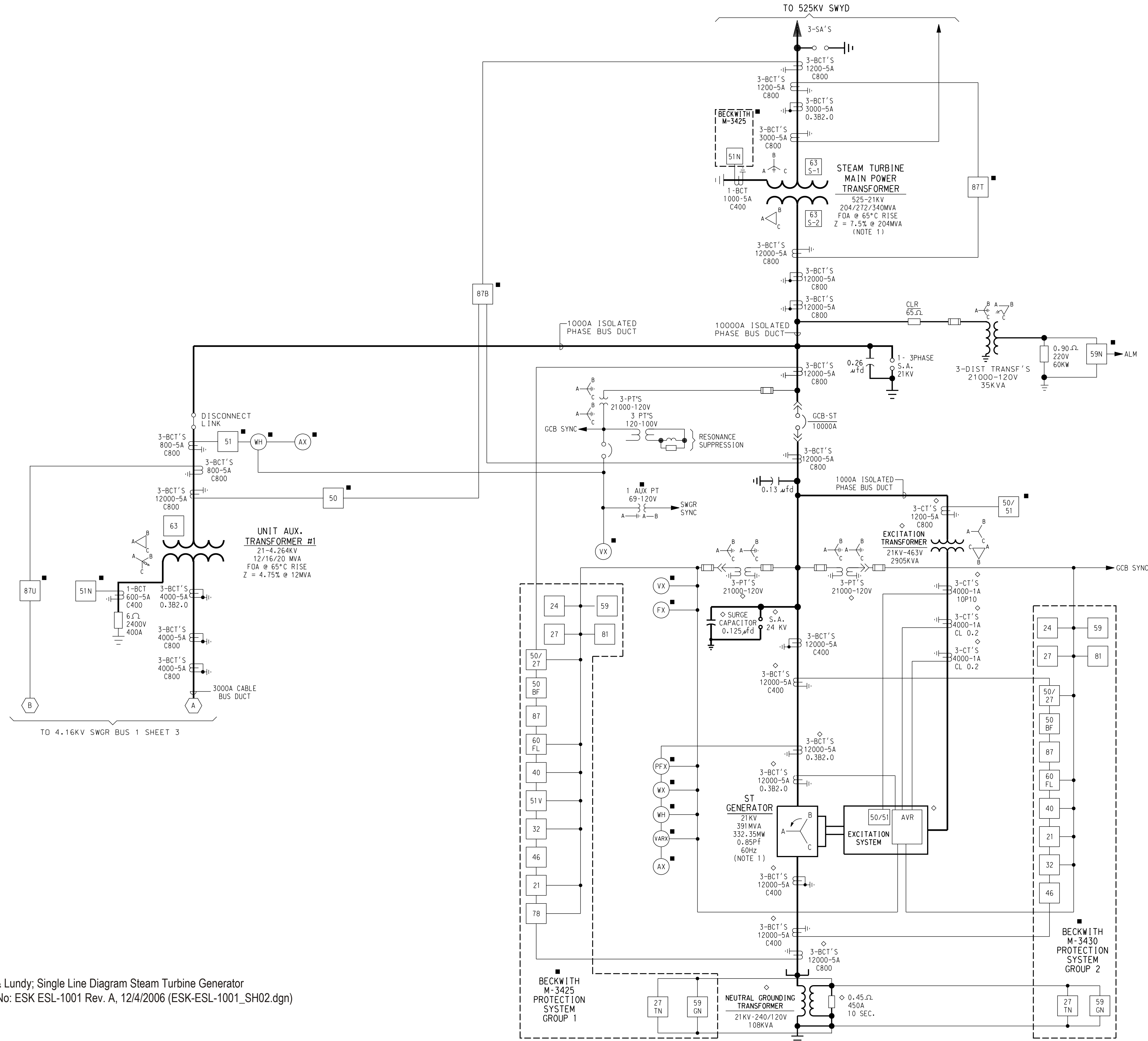
FIGURE 2.5-7 (SHEET 1)



Source:
Sargent & Lundy; Single Line Diagram Steam Turbine Generator
Drawing No: ESK ESL-1001 Rev. A, 12/4/2006 (ESK-ESL-1001_SH02.dgn)

NOTES:

1. STEAM TURBINE MAXIMUM OUTPUT IS 280MW AT 114° FAHRENHEIT. ST MAIN POWER TRANSFORMER IS SIZED TO ACCOMMODATE MAXIMUM OUTPUT OF STEAM TURBINE.
2. IMPEDANCE VALUES SHOWN ARE TYPICAL.
3. EQUIPMENT RATINGS ARE PRELIMINARY & SUBJECT TO CHANGE.

SINGLE-LINE DIAGRAM
STEAM TURBINE GENERATOR

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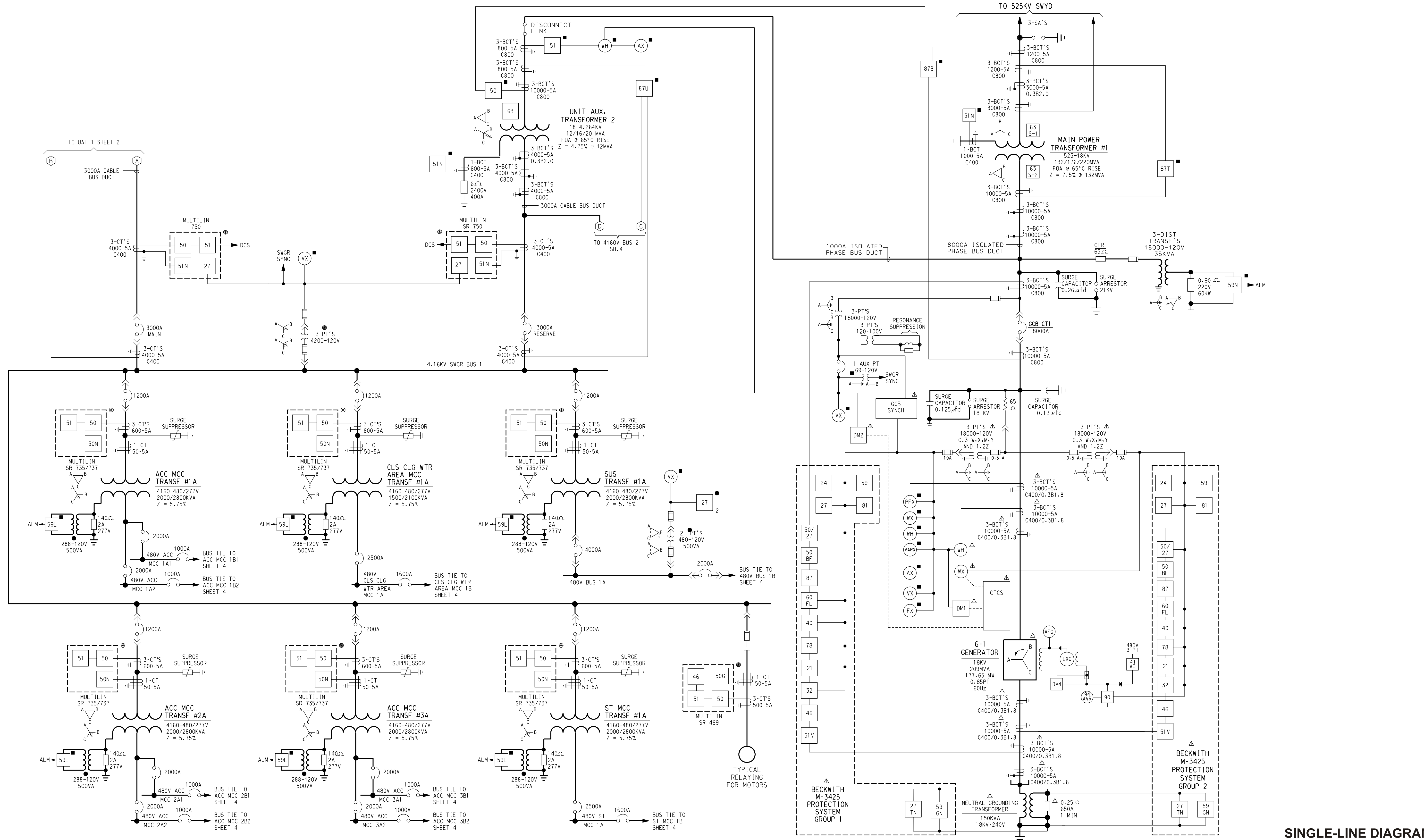
FIGURE 2.5-7 (SHEET 2)



SINGLE-LINE DIAGRAM
COMBUSTION TURBINE GENERATOR 6-1

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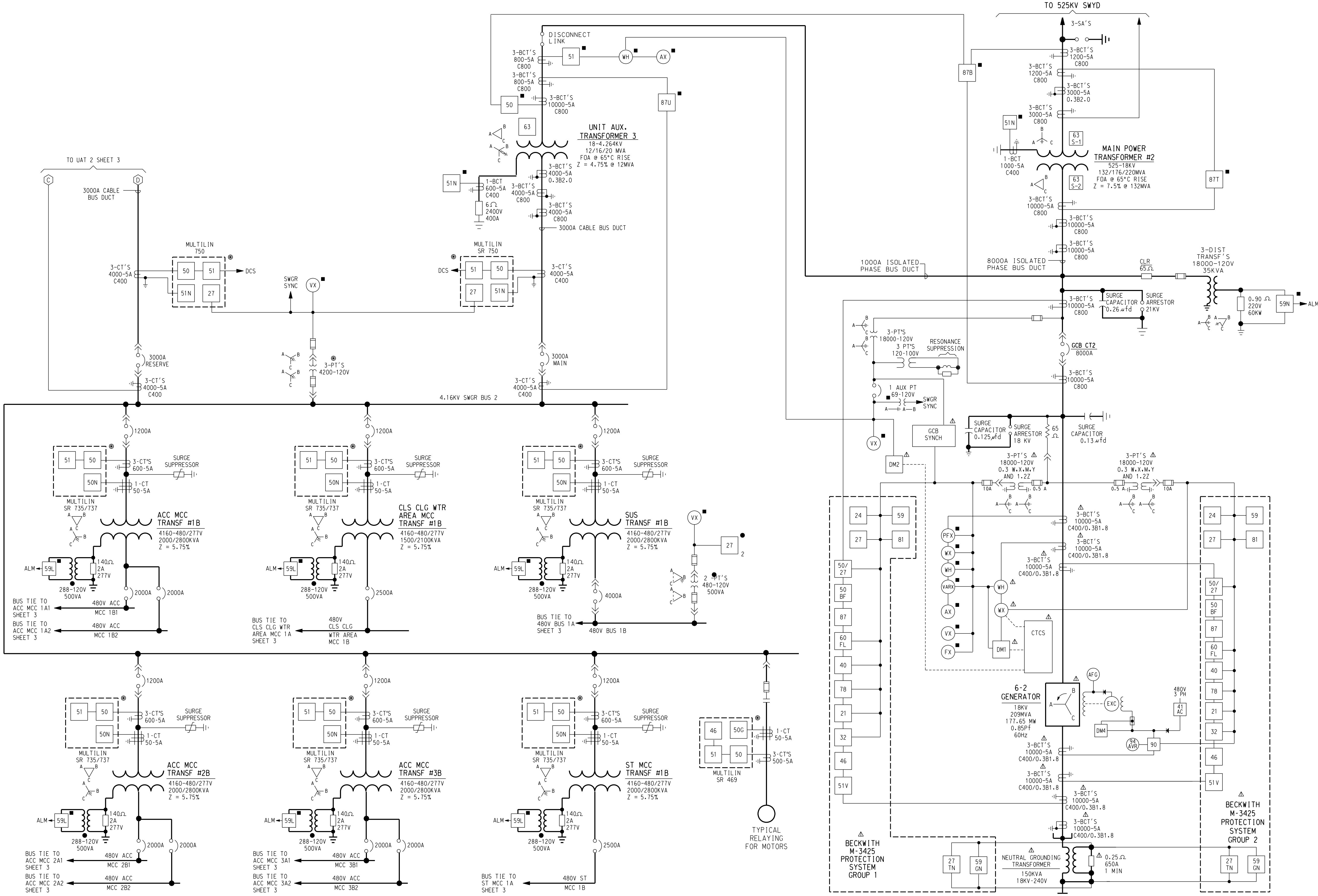
FIGURE 2.5-7 (SHEET 3)

Source:
Sargent & Lundy; Single Line Diagram Combustion Turbine Generator 6-1
Drawing No: ESK ESL-1001 Rev. A, 12/4/2006 (ESK-ESL-1001_SH03.dgn)



SINGLE-LINE DIAGRAM
COMBUSTION TURBINE GENERATOR 6-2

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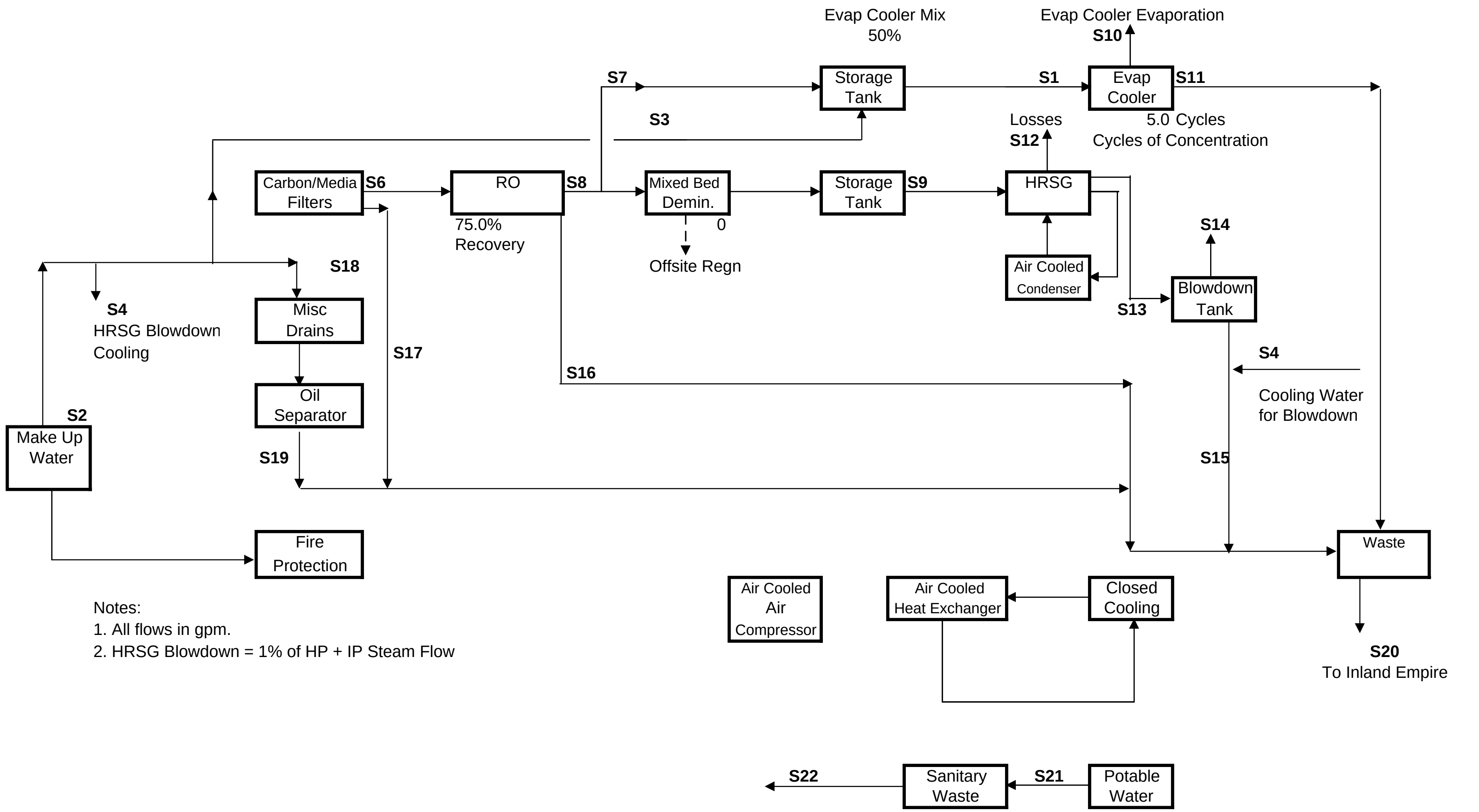
FIGURE 2.5-7 (SHEET 4)

Source:
Sargent & Lundy; Single Line Diagram Combustion Turbine Generator 6-2
Drawing No: ESK ESL-1001 Rev. A, 12/4/2006 (ESK-ESL-1001_SH04.dgn)

4/05/07 vsa ..\Reliant Etiwanda\Graphics\2.0 Facility Description\2.5-7_sheet 4_combustion 6-2.ai



Notes:
1. All flows in gpm.
2. HRSG Blowdown = 1% of HP + IP Steam Flow

Source:
Sargent & Lundy, 3/07/07

WATER BALANCE DIAGRAM

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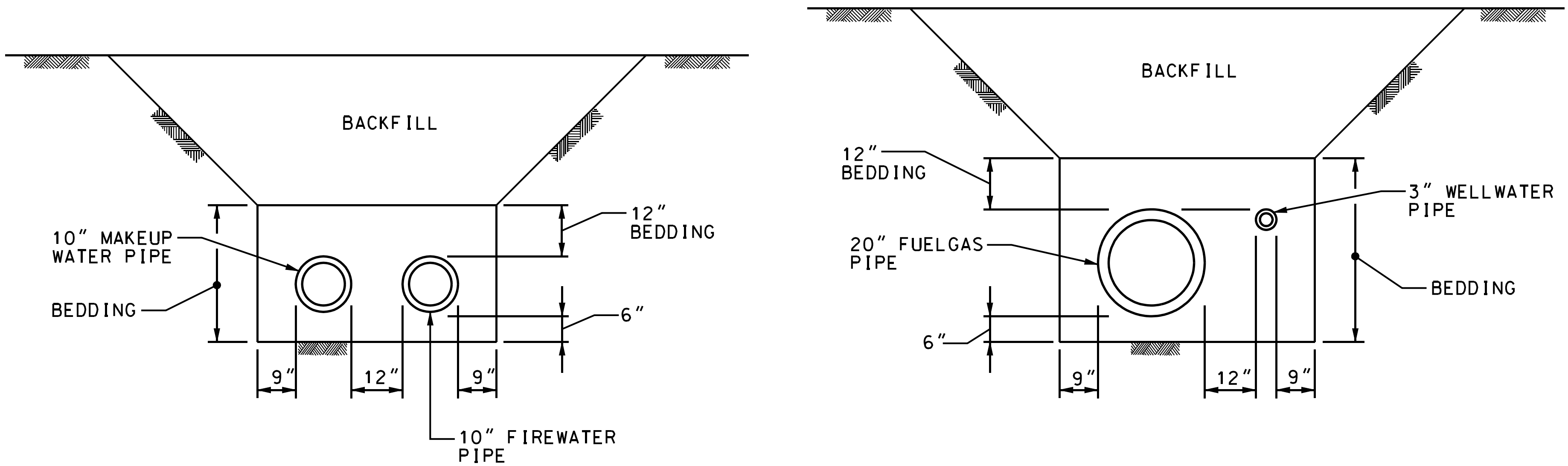
FIGURE 2.5-8

4/09/07 vsa ..\Reliant Etiwanda\Graphics\2.0 Facility Description\2.5-8_WB.ai



No Scale

Source:
Sargent & Lundy, Typical Underground Pipe Installation
Figure 3.5-7 031907 (A) (03-19-2007)

TYPICAL UNDERGROUND PIPE INSTALLATION

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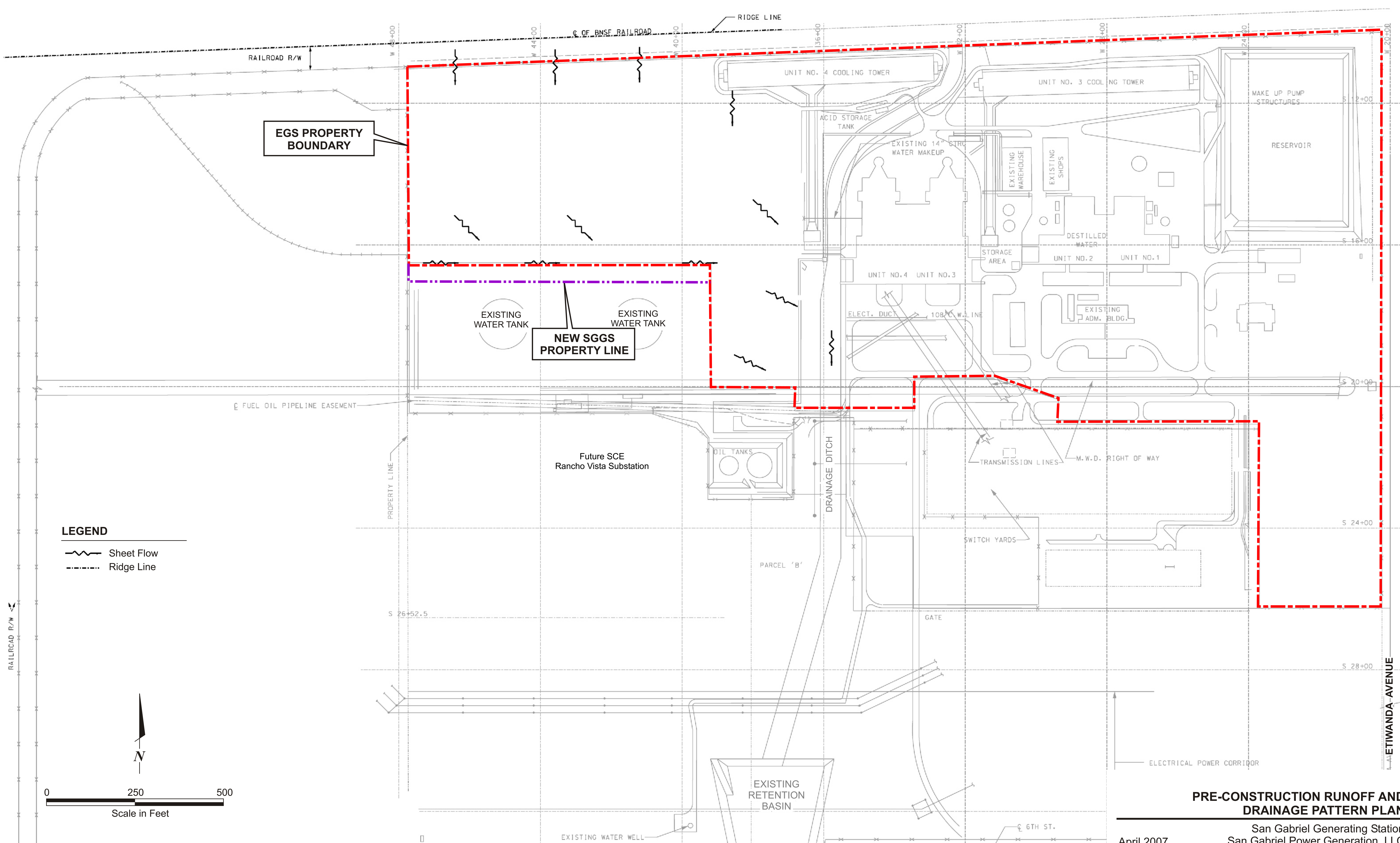
FIGURE 2.5-9

4/05/07 vsa ..\Reliant Etiwanda\Graphics\2.0 Facility Descriptio\2.5-9_undergrnd pipe.cdr



Source:
Sargent & Lundy, Pre-Construction Runoff and Drainage Pattern Plan Existing Plant figure 3.5-1B.dgn, 03-13-2007

PRE-CONSTRUCTION RUNOFF AND DRAINAGE PATTERN PLAN

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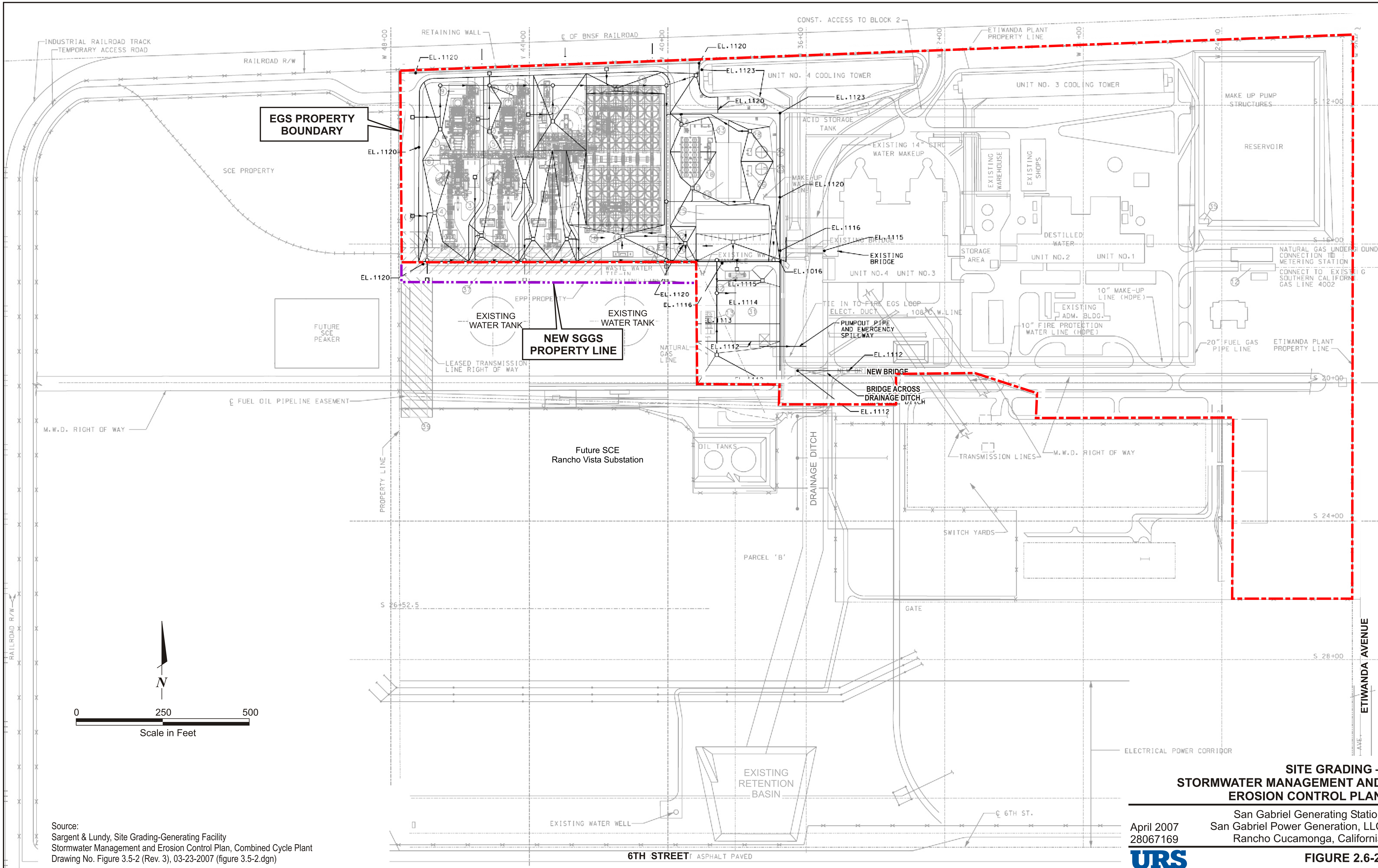
FIGURE 2.6-1

4/03/07 vsa ..\Reliant Etiwanda\Graphics\2.0 Facility Description\2.6-1_runoff-drainage.cdr



Source:
Sargent & Lundy, Site Grading-Generating Facility
Stormwater Management and Erosion Control Plan, Combined Cycle Plant
Drawing No. Figure 3.5-2 (Rev. 3), 03-23-2007 (figure 3.5-2.dgn)

SITE GRADING – STORMWATER MANAGEMENT AND EROSION CONTROL PLAN

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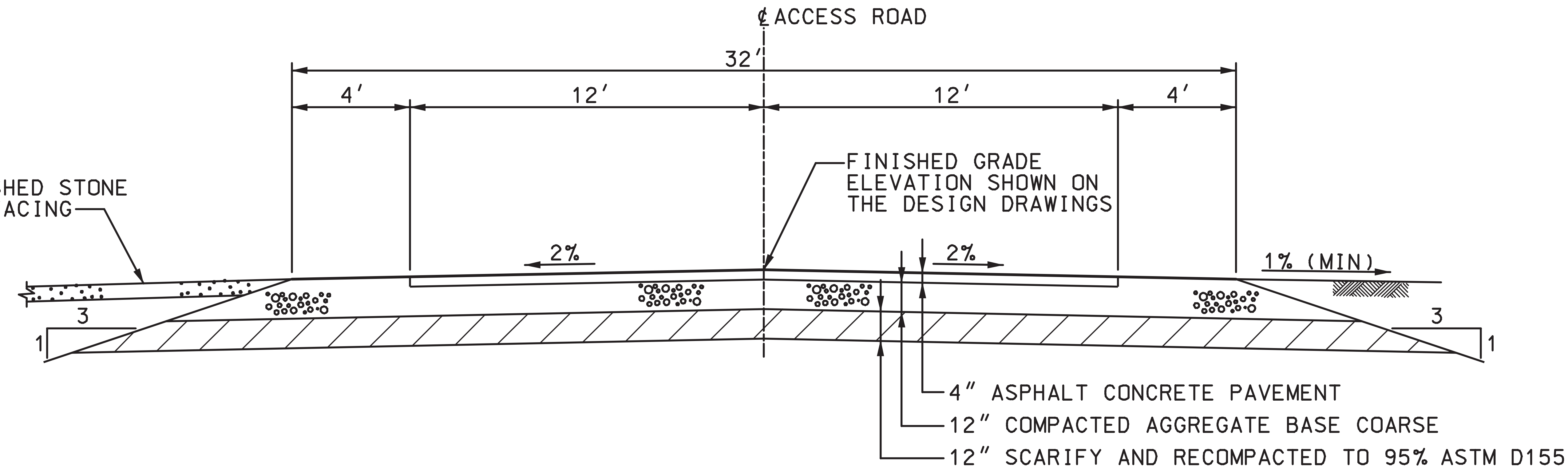
FIGURE 2.6-2

4/03/07 vsa ..\Reliant Etiwanda\Graphics\2.0 Facility Description\2.6-2_grading.cdr



PLANT ROAD

NTS

Source:
Sargent & Lundy; Conceptual Design Plant Access Road
Drawing No: Figure 3.5-4 Rev. 0, 12/18/2006

CONCEPTUAL DESIGN – PLANT ROAD

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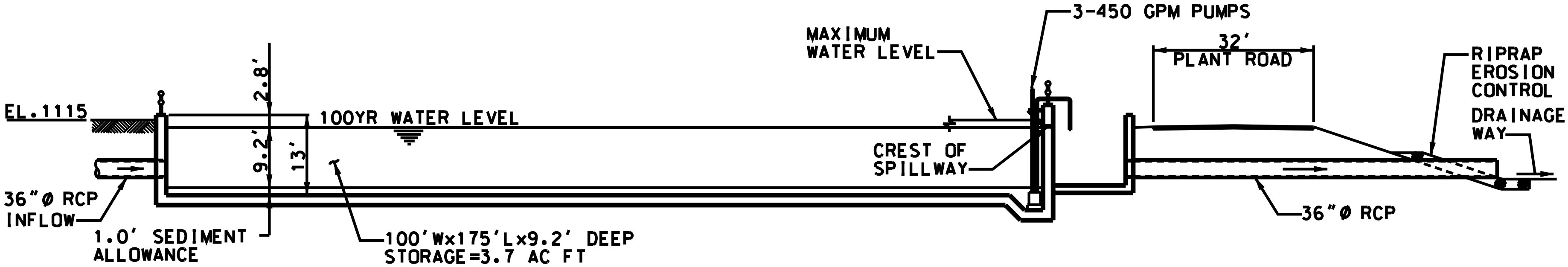
FIGURE 2.6-3

4/03/07 vsa ..\Reliant Etiwanda\Graphics\2.0 Facility Description\2.6-3_plant rd.ai



NOTE: INLET AND OUTLET PIPES ARE TURNED FOR CLARITY.

Source:
Sargent & Lundy; Conceptual Design Sedimentation/Detention Basin
Drawing No: Figure 3.5-5 (Rev. B) 3/15/07 (figure 3.5-3.dgn)

CONCEPTUAL DESIGN SEDIMENTATION/DETENTION BASIN

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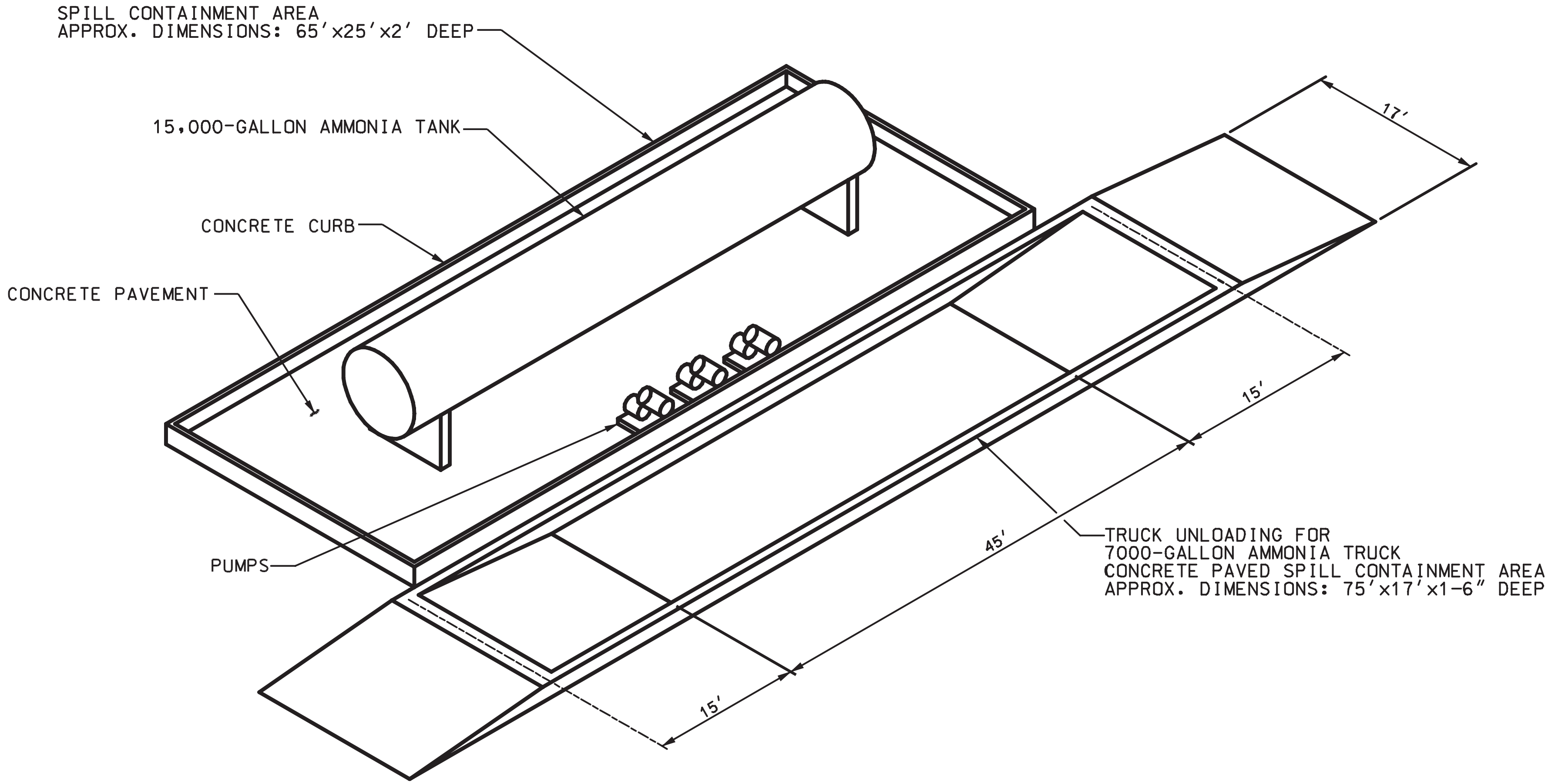
FIGURE 2.6-4



Source:
Sargent & Lundy; Aqueous Ammonia Storage & Spill Containment
Drawing No: Figure 3.5-6 Rev. 0, 12/18/2006

AQUEOUS AMMONIA STORAGE AND SPILL CONTAINMENT

San Gabriel Generating Station
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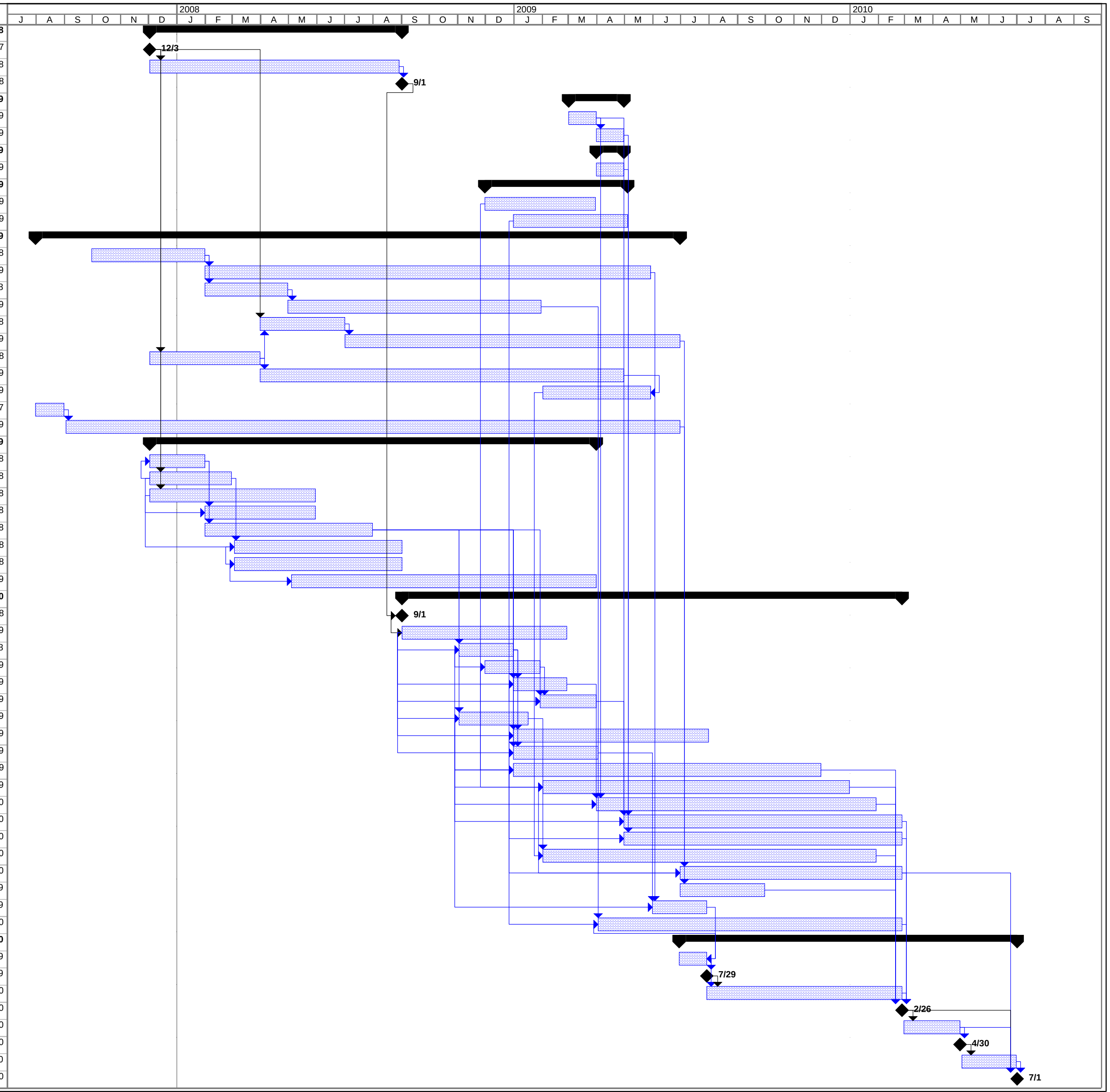
FIGURE 2.6-5

ID	Task Name	Duration	Start	Finish
1	**PERMITTING**	**196 days**	**Mon 12/3/07**	**Mon 9/1/08**
2	Engineering Notice to Proceed	0 days	Mon 12/3/07	Mon 12/3/07
3	Agency Review	195 days	Mon 12/3/07	Fri 8/29/08
4	Receive Permit	0 days	Mon 9/1/08	Mon 9/1/08
5	**COMBUSTION TURBINE PROCUREMENT**	**44 days**	**Mon 3/2/09**	**Thu 4/30/09**
6	Deliver on Site CT1	22 days	Mon 3/2/09	Tue 3/31/09
7	Deliver on Site CT2	22 days	Wed 4/1/09	Thu 4/30/09
8	**STEAM TURBINE PROCUREMENT**	**22 days**	**Wed 4/1/09**	**Thu 4/30/09**
9	Fabricate / Deliver Steam Turbine	22 days	Wed 4/1/09	Thu 4/30/09
10	**HRSG PROCUREMENT**	**111 days**	**Mon 12/1/08**	**Mon 5/4/09**
11	Deliver HRSGs	86 days	Mon 12/1/08	Mon 3/30/09
12	Deliver HRSGs	88 days	Thu 1/1/09	Mon 5/4/09
13	**BOP PROCUREMENT**	**500 days**	**Wed 8/1/07**	**Tue 6/30/09**
14	Procure Transformers	89 days	Mon 10/1/07	Thu 1/31/08
15	Fabricate / Deliver Transformers	346 days	Fri 2/1/08	Fri 5/29/09
16	Procure Electrical Equipment	64 days	Fri 2/1/08	Wed 4/30/08
17	Fabricate / Deliver Electrical Equipment	197 days	Thu 5/1/08	Fri 1/30/09
18	Procure Gas Compressor	66 days	Tue 4/1/08	Tue 7/1/08
19	Fabricate / Deliver Gas Compressor	260 days	Wed 7/2/08	Tue 6/30/09
20	Procure Air Cooled Condenser	86 days	Mon 12/3/07	Mon 3/31/08
21	Fabricate Air Cooled Condenser	283 days	Tue 4/1/08	Thu 4/30/09
22	Deliver Air Cooled Condenser	85 days	Mon 2/2/09	Fri 5/29/09
23	Mill Order Alloy Pipe	23 days	Wed 8/1/07	Fri 8/31/07
24	Lead Time / Mill Order / Fabricate Alloy Pipe	477 days	Mon 9/3/07	Tue 6/30/09
25	**ENGINEERING / DESIGN**	**347 days**	**Mon 12/3/07**	**Tue 3/31/09**
26	Site Survey & Geotech Investigation	44 days	Mon 12/3/07	Thu 1/31/08
27	Site / General Arrangements	65 days	Mon 12/3/07	Fri 2/29/08
28	P&ID's	130 days	Mon 12/3/07	Fri 5/30/08
29	Site Work / Civil Design	86 days	Fri 2/1/08	Fri 5/30/08
30	Foundations Design	130 days	Fri 2/1/08	Thu 7/31/08
31	Piping Design	130 days	Tue 3/4/08	Mon 9/1/08
32	Electrical Physical Design	130 days	Tue 3/4/08	Mon 9/1/08
33	Electrical Wiring Design	237 days	Mon 5/5/08	Tue 3/31/09
34	**CONSTRUCTION**	**389 days**	**Mon 9/1/08**	**Fri 2/26/10**
35	Site Mobilization	0 days	Mon 9/1/08	Mon 9/1/08
36	Sitework / Underground Elec & Piping	129 days	Tue 9/2/08	Fri 2/27/09
37	Foundations - HRSG 1	43 days	Mon 11/3/08	Wed 12/31/08
38	Foundations - HRSG 2	44 days	Mon 12/1/08	Thu 1/29/09
39	Foundations - CTG 1	42 days	Thu 1/1/09	Fri 2/27/09
40	Foundations - CTG 2	43 days	Fri 1/30/09	Tue 3/31/09
41	Foundations - ACC	55 days	Mon 11/3/08	Fri 1/16/09
42	Foundations - ST	152 days	Thu 1/1/09	Fri 7/31/09
43	Foundations - Transformers	66 days	Thu 1/1/09	Thu 4/2/09
44	Install HRSG-1	238 days	Thu 1/1/09	Mon 11/30/09
45	Install HRSG-2	239 days	Mon 2/2/09	Thu 12/31/09
46	Install CT-1	218 days	Wed 4/1/09	Fri 1/29/10
47	Install CT-2	216 days	Fri 5/1/09	Fri 2/26/10
48	Install Steam Turbine	216 days	Fri 5/1/09	Fri 2/26/10
49	Erect Air Cooled Condenser	260 days	Mon 2/2/09	Fri 1/29/10
50	Install Alloy Pipe	173 days	Wed 7/1/09	Fri 2/26/10
51	Install Gas Compressor	66 days	Wed 7/1/09	Wed 9/30/09
52	Install Transformers	43 days	Mon 6/1/09	Wed 7/29/09
53	Install Electrical Equipment / Cabling	236 days	Fri 4/3/09	Fri 2/26/10
54	**STARTUP**	**263 days**	**Tue 6/30/09**	**Thu 7/1/10**
55	HV Equipment Checkout	22 days	Tue 6/30/09	Wed 7/29/09
56	Backfeed Power	0 days	Wed 7/29/09	Wed 7/29/09
57	Equipment Checkout	152 days	Thu 7/30/09	Fri 2/26/10
58	First Fire CTs	0 days	Fri 2/26/10	Fri 2/26/10
59	Steam Blow / Restore	45 days	Mon 3/1/10	Fri 4/30/10
60	First Steam to Turbine	0 days	Fri 4/30/10	Fri 4/30/10
61	Fine Tune HRSGs / CTs / ST	43 days	Mon 5/3/10	Wed 6/30/10
62	Commercial Operation	0 days	Thu 7/1/10	Thu 7/1/10



PROJECT SCHEDULE

San Gabriel Generating Station
San Gabriel Power Generation, LLC
Rancho Cucamonga, California

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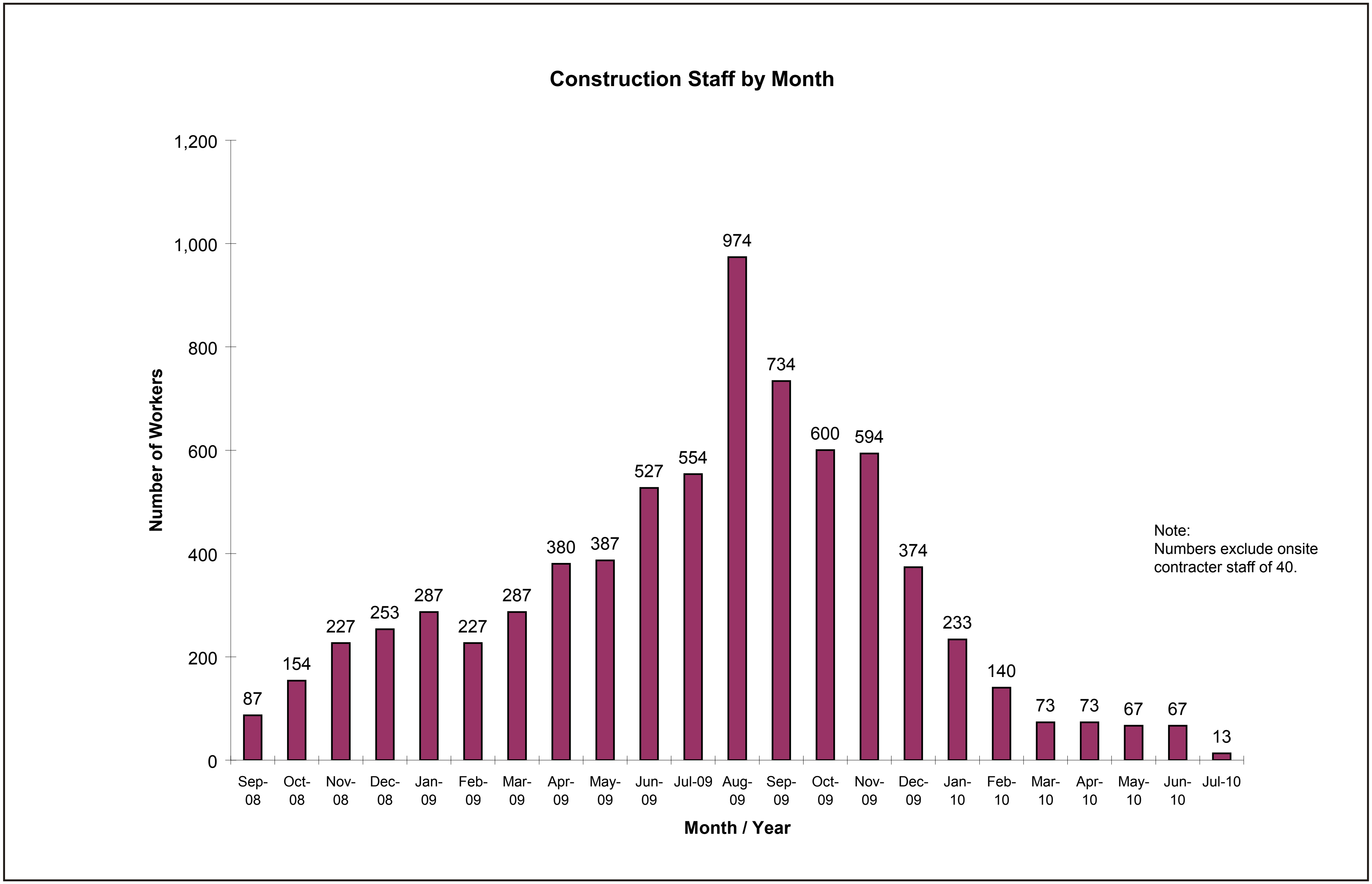
FIGURE 2.7-1

3/26/07 vsa ..\Reliant Etiwanda\Graphics\2.0 Facility Description\2.7-1_schedule.ai



Source: Sargent & Lundy; 2/07/07

CONSTRUCTION STAFF BY MONTH

San Gabriel Generating Station
San Gabriel Power Generation, LLC
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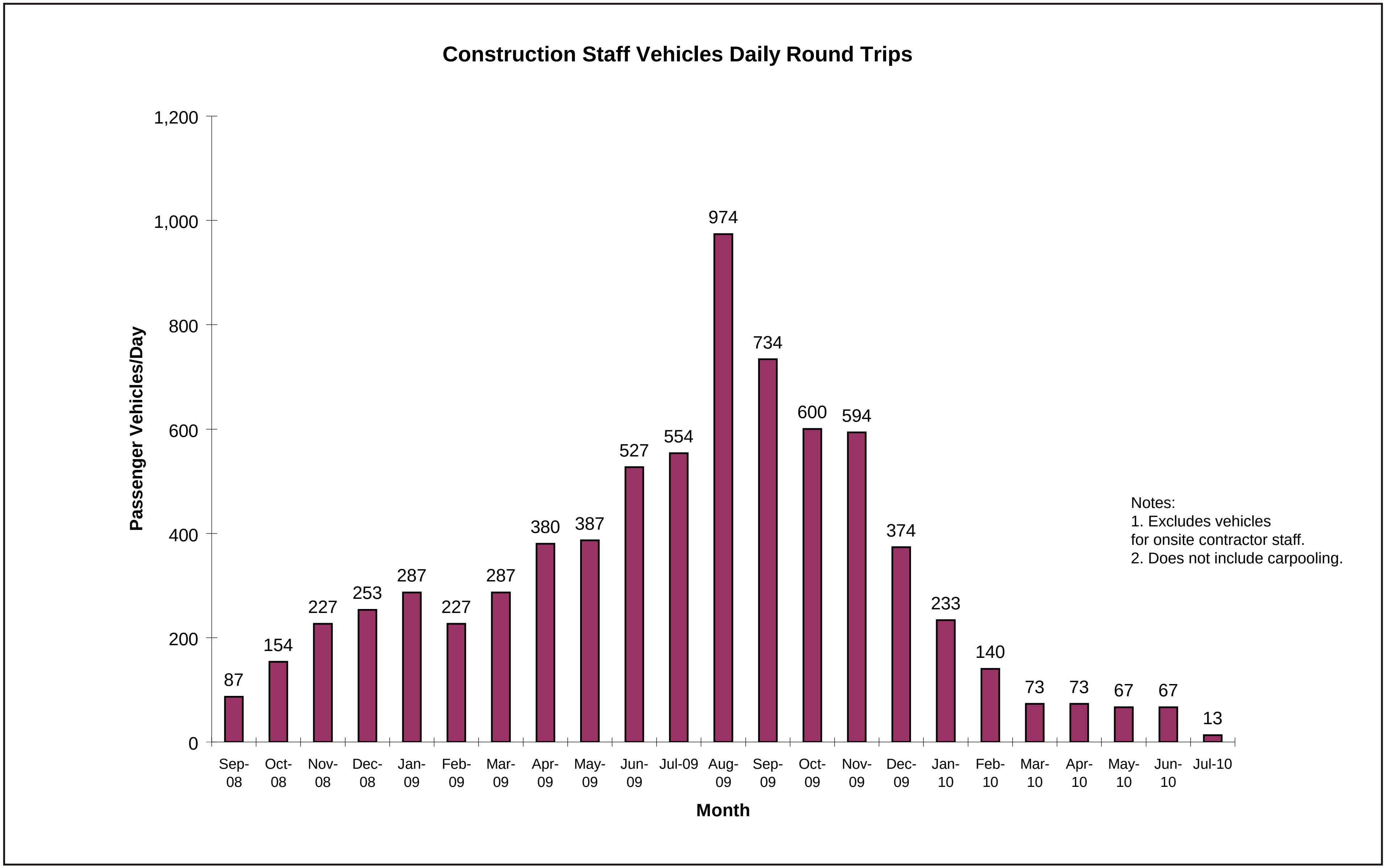
FIGURE 2.7-2

3/28/07 vsa ..\Reliant Etiwanda\Graphics\2.0 Facility Description\2.7-2_const staff.ai



Source: Sargent & Lundy; 2/07/07

CONSTRUCTION STAFF VEHICLES DAILY ROUND TRIPS

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San Gabriel Power Generation, LLC
Rancho Cucamonga, California

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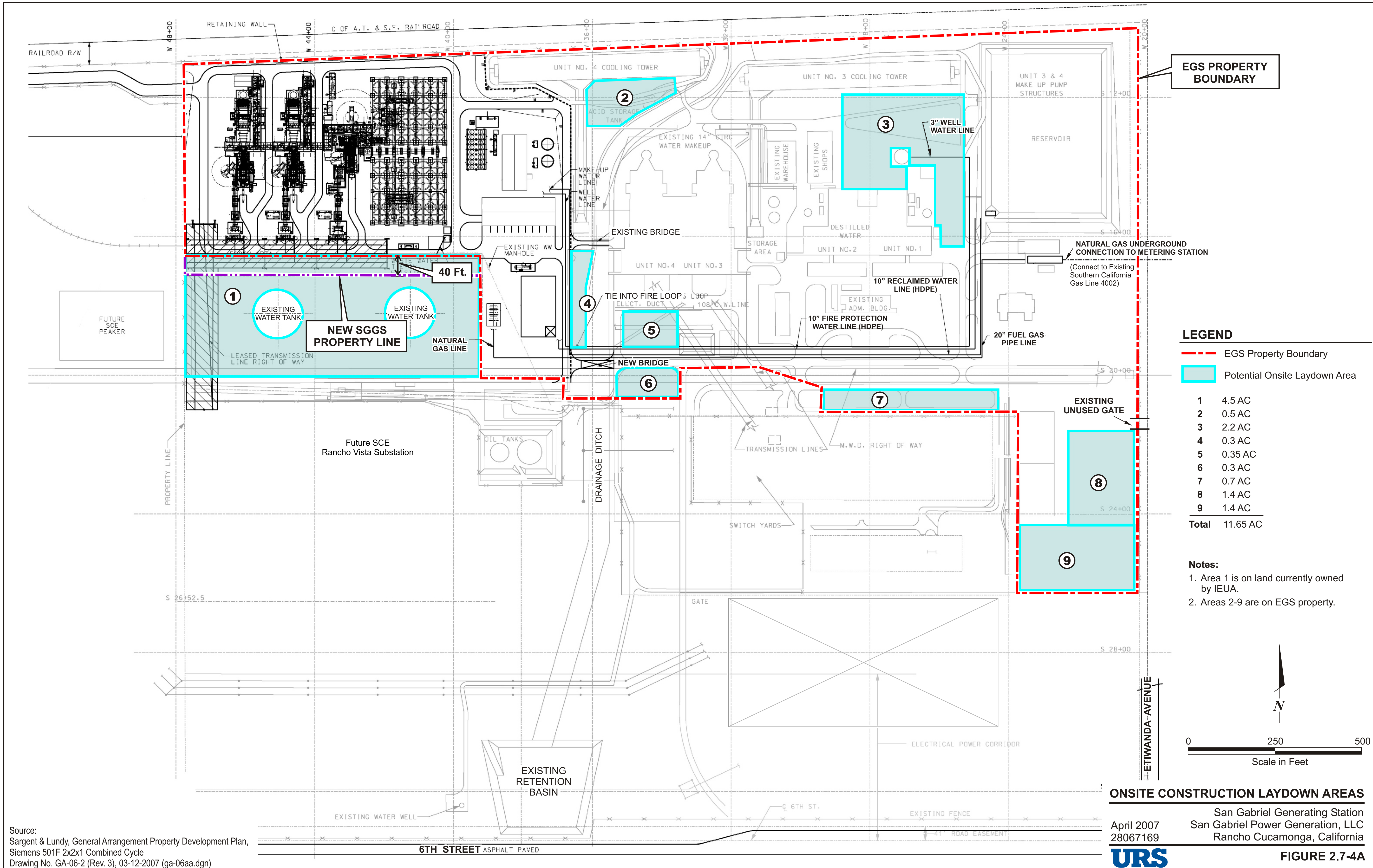
FIGURE 2.7-3

4/09/07 vsa ..\Reliant Etiwanda\Graphics\2.0 Facility Description\2.7-3_const vehicles.ai



ONSITE CONSTRUCTION LAYDOWN AREAS

San Gabriel Generating Station
San Gabriel Power Generation, LLC
Rancho Cucamonga, California

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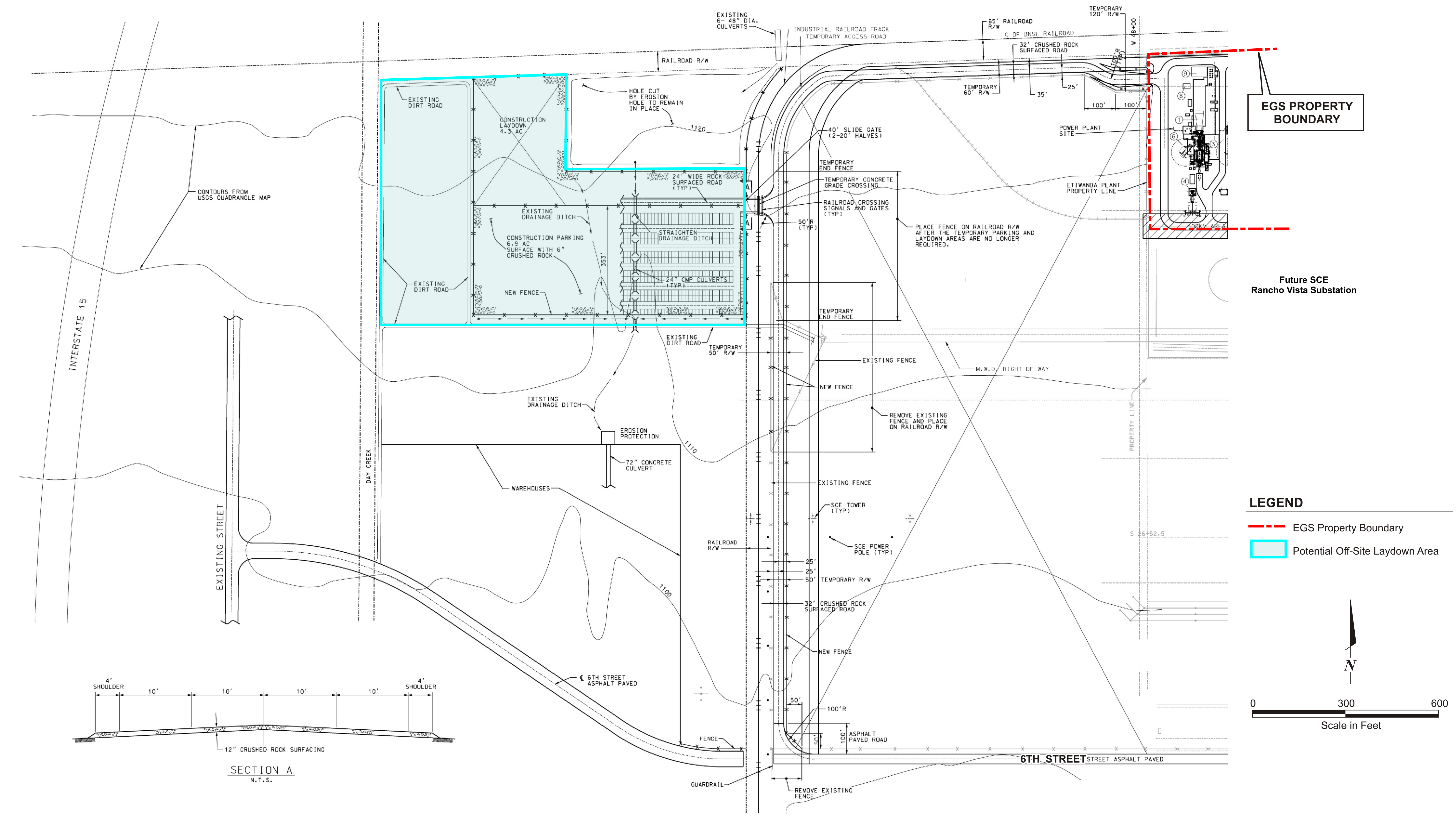
FIGURE 2.7-4A

4/09/07 vsa ..\Reliant Etiwanda\Graphics\2.0 Facility Description\2.7-4A_onsite laydown.cdr



OFFSITE CONSTRUCTION LAYDOWN AREA, GRADING, DRAINAGE, AND SURFACING

San Gabriel Generating Station
San Gabriel Power Generation, LLC
Rancho Cucamonga, California

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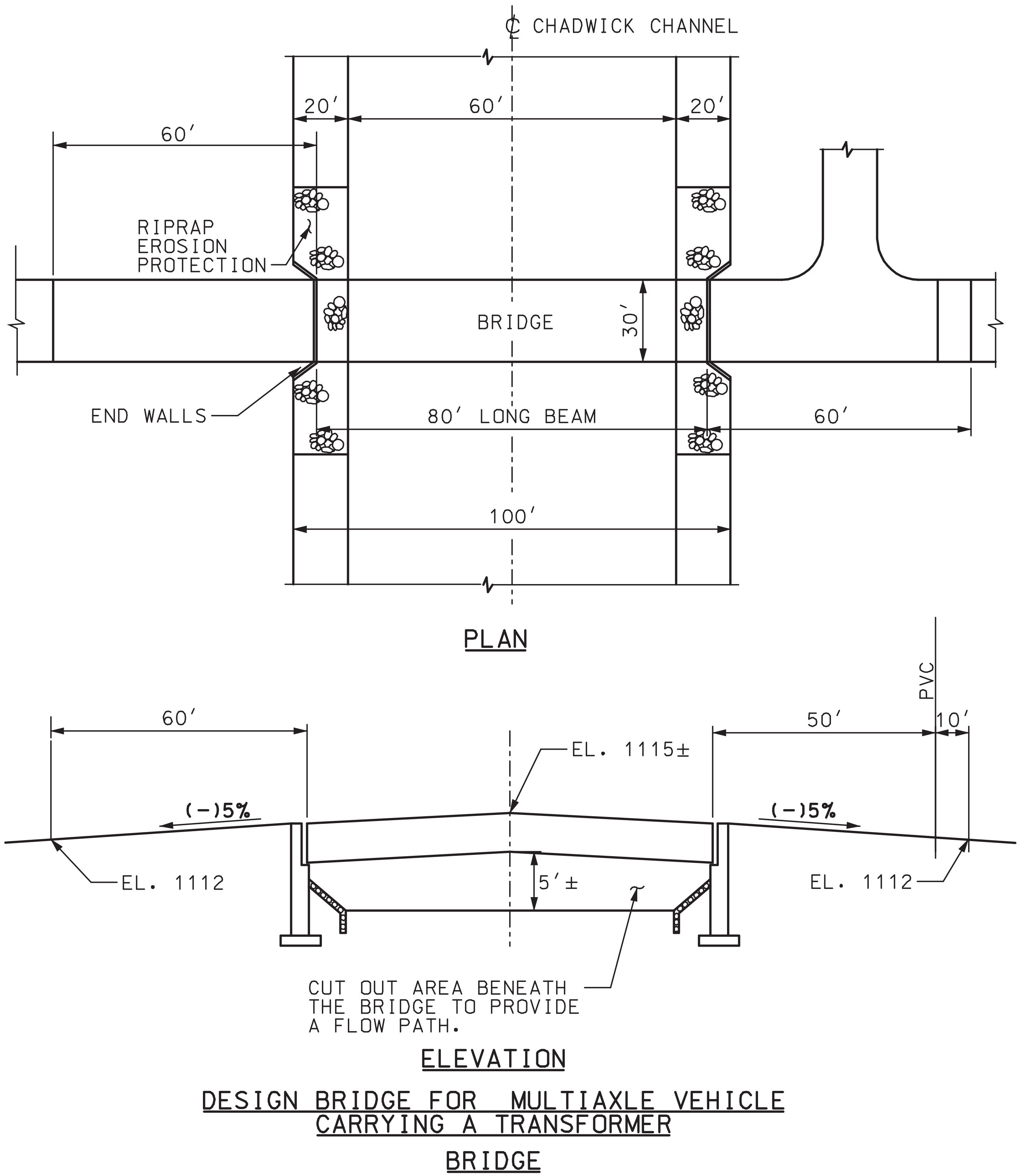
FIGURE 2.7-4B

Source:
Sargent & Lundy, Alternate B Grading, Drainage and Surfacing
Drawing No. CSK-022 (Rev. 2), 04-02-2007 (csk022.dgn)

4/04/07 vsa ..\Reliant Etiwanda\Graphics\2.0 Facility Description\2.7-4B_offsite laydown-grading.cdr



CONCEPTUAL DESIGN – CHADWICK CHANNEL BRIDGE

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Rancho Cucamonga, California

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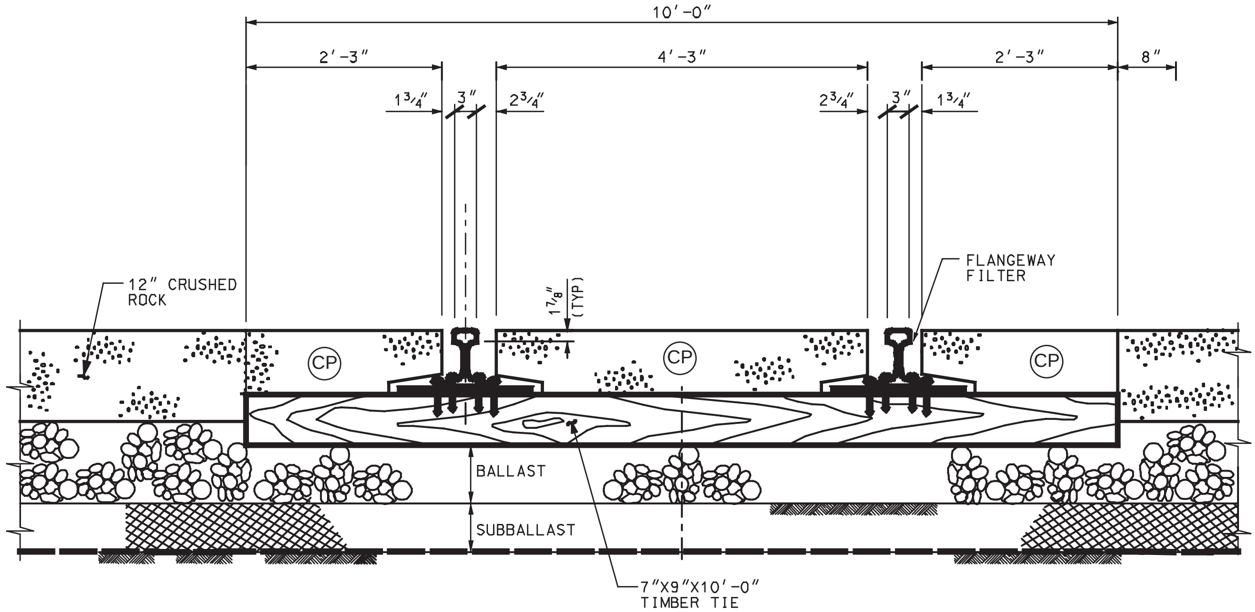
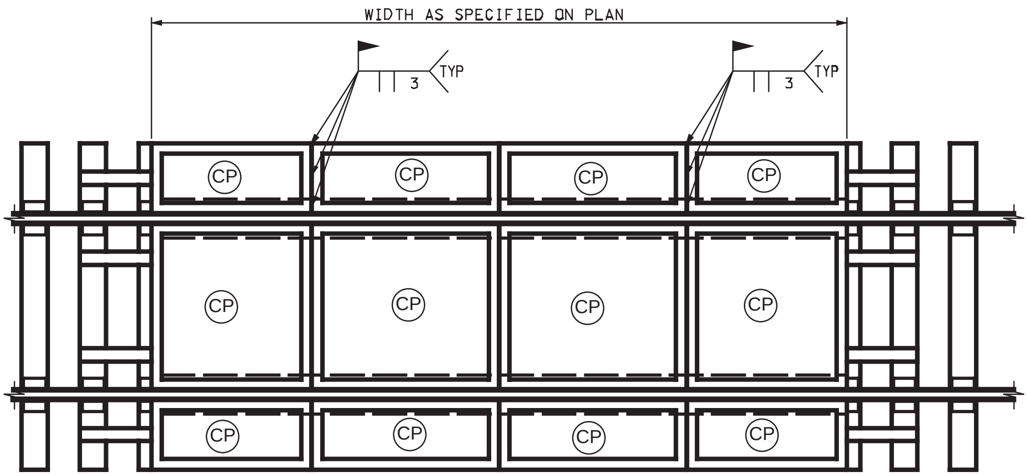
FIGURE 2.7-5

Source:
Sargent & Lundy; Conceptual Design Bridge
Drawing No: Figure 3.5-6 (Rev. A) 2/27/07 (exibit bridge3.5-6.dgn)

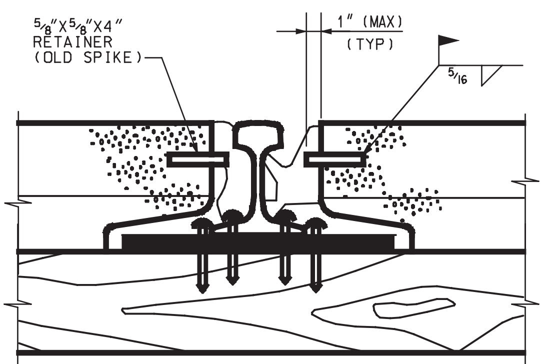


TYPICAL SECTION
THROUGH CROSSING WITH TIMBER TIES

CP	Precast Grade Crossing Segments



PLAN VIEW OF PANEL AND JOINT WELD LOCATION WITH TIMBER TIES



DETAIL
INCLUDING FLANGEWAY RETAINER

Source:
Sargent & Lundy; Fig 2.7-6, 04-02-2007 (upr.dgn)

RAILROAD CROSSING

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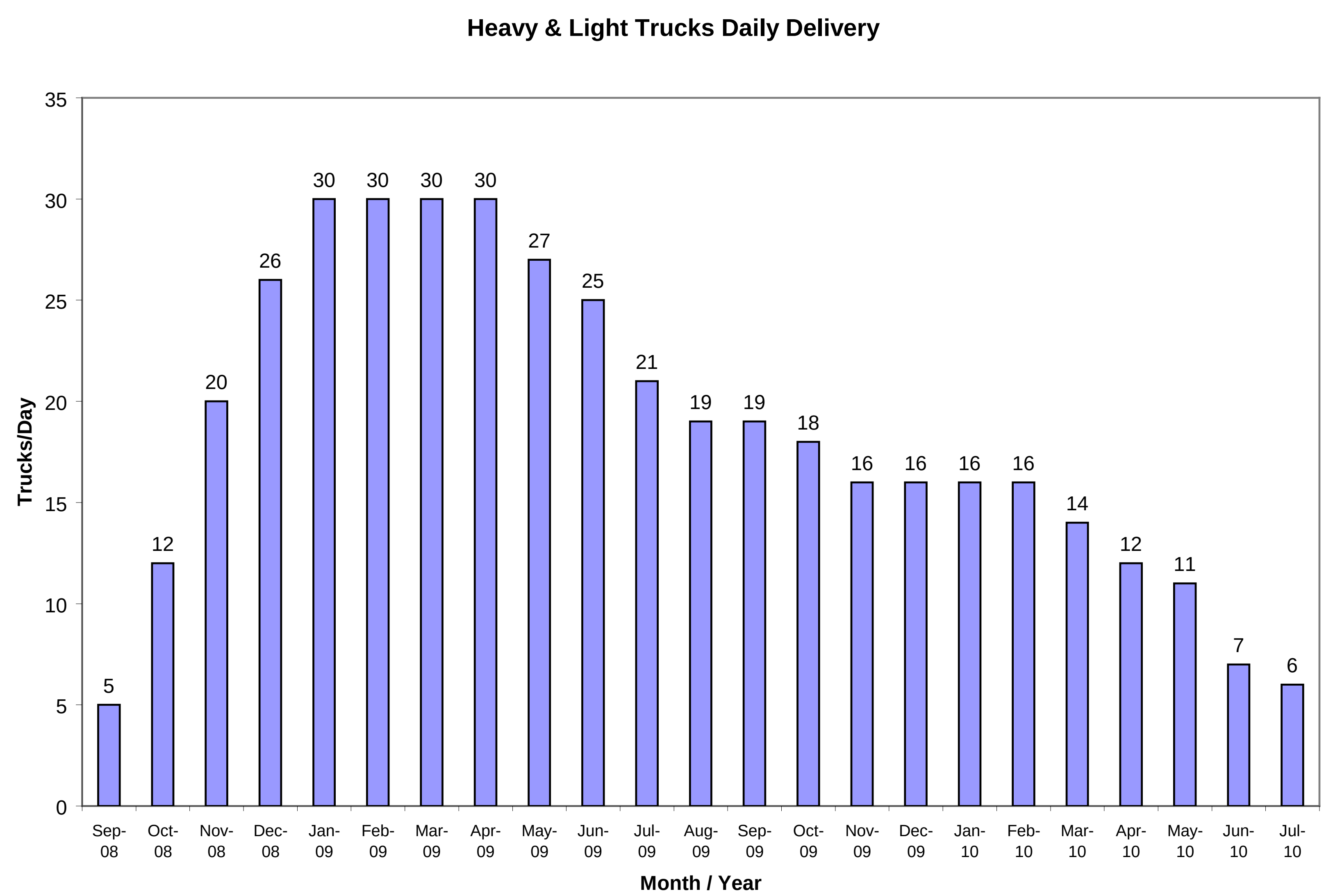
FIGURE 2.7-6

4/09/07 vsa ..\Reliant Etiwanda\Graphics\2.0 Facility Description\2.7-6_RR crossing.ai



Source: Sargent & Lundy; 2/07/07

HEAVY AND LIGHT TRUCKS DAILY DELIVERIES

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Rancho Cucamonga, Californiaa

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FIGURE 2.7-7

3/26/07 vsa ..\Reliant Etiwanda\Graphics\2.0 Facility Description\2.7-7_trucks.ai