SECTION 2.0

Project Description

The Contra Costa Generating Station (CCGS or project) will be a natural gas-fired, combined-cycle electrical generating facility rated at a nominal generating capacity of 624 megawatts (MW)[1].

Principal design elements of the project include the following:

- Two General Electric (GE) Frame 7FA combustion turbine-generators (CTGs) with a nominal rating of 213 MW each[2] and equipped with metallurgical enhancements to improve efficiency
- A single condensing steam turbine generator (STG)
- Heat recovery steam generators (HRSGs) of the horizontal, natural circulation type
- An air-cooled condenser to provide process cooling
- CTGs equipped with evaporative coolers on the inlet air system and dry low oxides of nitrogen (NO_x) combustors
- An emission reduction system that will include a selective catalytic reduction (SCR) unit to control NO_x stack emissions and an oxidation catalyst to control carbon monoxide and volatile organic compounds emissions
- A 230-kilovolt (kV) onsite switchyard to deliver the project's power directly to the grid through a 2.4-mile-long, single-circuit, 230-kV transmission line that will connect the project site with the Pacific Gas and Electric Company (PG&E) Contra Costa Substation
- Direct connection with the adjacent PG&E Antioch natural gas terminal for natural gas supply
- Connection to an existing onsite potable water line
- Connection to an existing onsite sanitary sewer pipeline

2.1 Facility Description, Design, and Operation

2.1.1 Site Arrangement and Layout

Primary access to the project site will be provided via a new entrance lane extending from Bridgehead Road, just south of the intersection of Bridgehead Road and Wilbur Avenue. Figure 2.1-1 shows the facility site plan, Figure 2.1-2 shows the general arrangement and

[1] Approximate facility net output with both combustion turbines operating at 100 percent load with inlet air evaporative cooling at ISO conditions (59 degrees Fahrenheit, 60 percent relative humidity). The facility will have a maximum net output of 638 MW minimum design ambient conditions (34 degrees Fahrenheit, 83 percent relative humidity).

[2] Nominal output at ISO conditions. At minimum design ambient conditions (34 degrees Fahrenheit, 83 percent relative humidity), combustion turbine output we be approximately 220 MW.

layout of the facility, and Figure 2.1-3a and 2.1-3b show typical elevation views of the project.

The project site is bounded to the west by the PG&E Antioch Terminal, a large natural gas transmission hub, to the north by DuPont property that is either industrial or vacant industrial, to the east by DuPont's titanium dioxide landfill area, and to the south by the Atchison, Topeka and Santa Fe railroad. Immediately south of the railroad is a large parcel currently in agriculture. A 74.6-acre commercial development, the Rivers Oaks Crossing, has been proposed for this parcel.

2.1.2 Process Description

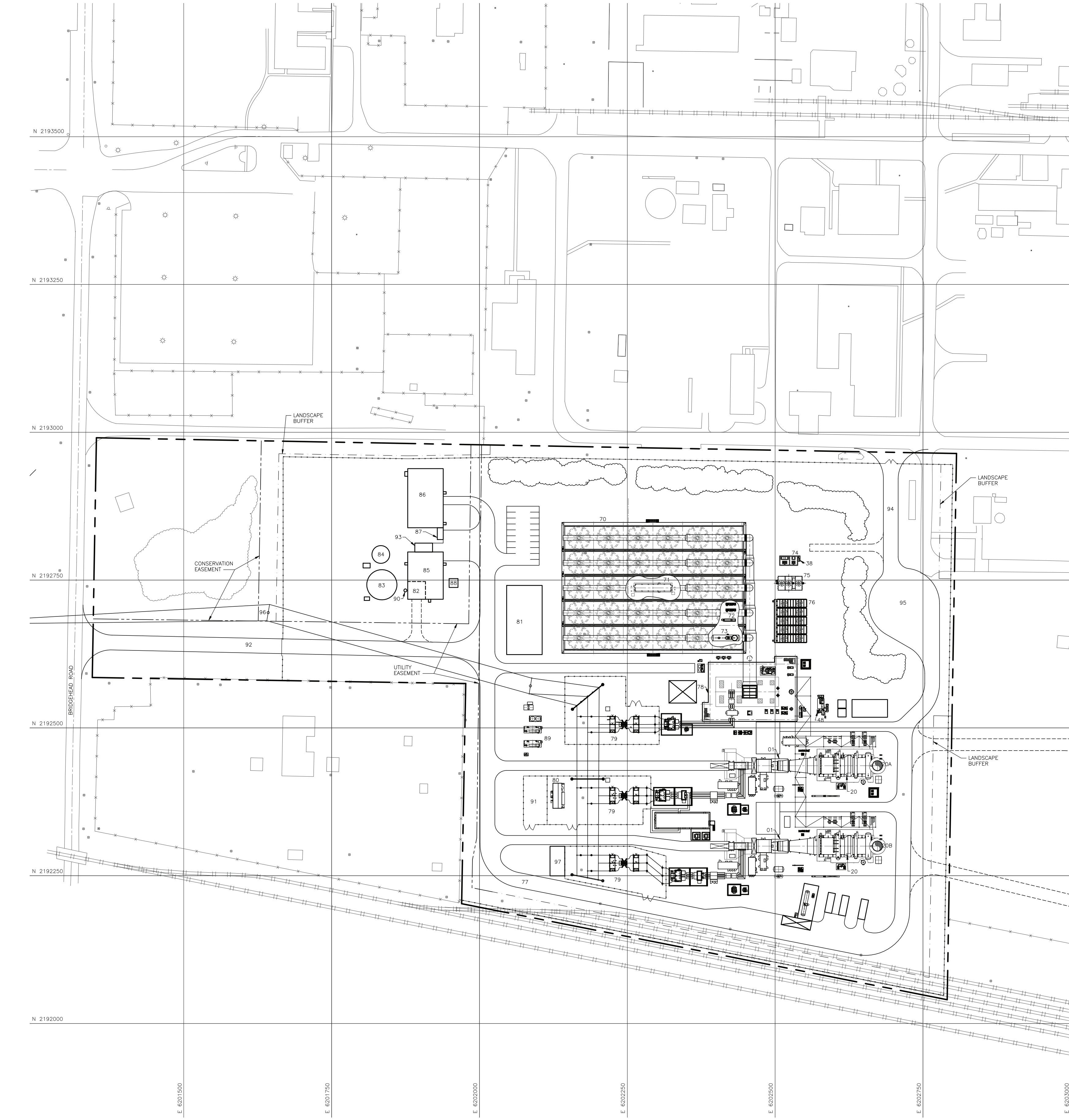
The CCGS power train will consist of the following equipment: two GE Frame 7FA CTGs equipped with dry low-NO_x combustors to control NO_x and evaporative coolers for reducing inlet air temperatures; two HRSGs with SCR and oxidation catalyst equipment to control NO_x, carbon monoxide, and volatile organic compound emissions, respectively; a single GE D-11 condensing STG; an air-cooled condenser; and associated support equipment. The CTGs, HRSGs, and STG will be provided by GE as a 207FA Expedited Rapid Response Engineered Equipment Package (EEP).

Each CTG will generate approximately 213 MW (gross) at ISO conditions (59 degrees Fahrenheit [°F], 60 percent relative humidity)[3]. The CTG exhaust gases will be used to generate steam in the HRSGs. The HRSGs will employ a triple-steam-pressure reheat design. Steam from the HRSGs will be admitted to a condensing STG. The STG will produce approximately 218 MW (gross) under ISO conditions. The project is expected to have an overall annual availability of more than 97 percent.

The heat balance for the project's baseload operation is shown in Figure 2.1-4. This balance is based on operation at ISO conditions, with evaporative cooling of the CTG inlet air to 53°F. Heat balances for additional operating cases are presented in Appendix 2A. The predicted net electrical output of the facility under these conditions is approximately 624 MW at a heat rate of approximately 6,752 British thermal units per kilowatt hour (Btu/kWh) on a higher heating value (HHV) basis. This corresponds with an efficiency of about 50.5 percent on an HHV basis.

The combustion turbines and associated equipment will include the use of best available control technology (BACT) to limit emissions of criteria pollutants and hazardous air pollutants. NO_x will be controlled to 2.0 parts per million by volume, dry basis (ppmvd), corrected to 15 percent oxygen through the use of dry low-NO_x combustors and SCR. Good combustion practices and an oxidation catalyst also will be utilized to control carbon monoxide emissions to 2.0 ppmvd at 15 percent oxygen. Emissions of volatile organic compounds also will be controlled to 2.0 ppmvd at 15 percent oxygen. BACT for particulate matter with a diameter less than 10 microns (PM_{10}) and sulfur dioxide will be the exclusive use of natural gas. Ammonia slip will be limited to 5.0 ppmvd at 15 percent oxygen.

3 ISO conditions are deemed to be representative of the average ambient conditions which are 59.6 degrees Fahrenheit, 58.2 percent relative humidity, based on the nearest ASHRAE station (Travis AFB, Fairfield, CA).



FACILITIES LEGEND

ID	FACILITY	STRUCTURE HEIGHT	TIEDOWN LOCATION NORTH	TIEDOWN LOCATION EAST	REMARKS
01	COMBUSTION TURBINE	70'	–	–	–
20	HEAT RECOVERY STEAM GENERATOR (HRSG)	103'	–	–	–
20A	HRSG EXHAUST STACK A	155'	2192436.00	6202665.00	CL EXHAUST STACK
20B	HRSG EXHAUST STACK B	155'	2192300.00	6202665.00	CL EXHAUST STACK
38	SAFETY SHOWER EYEWASH STATION	–	–	–	–
48	AUXILIARY BOILER	50'	2192527.61	6202572.26	CL EXHAUST STACK
70	AIR COOLED CONDENSER (ACC)	124'	–	–	–
71	ACC ELECTRICAL ENCLOSURE	14'	–	–	–
72	CONDENSER AIR EXTRACTION SKIDS	6'	–	–	–
73	ACC CONDENSATE COLLECTION TANK	28'	–	–	–
74	WET SURFACE AIR COOLER CHEMICAL FEED SKIDS	8'	–	–	–
75	WET SURFACE AIR COOLER	23'	2192744.67	6202523.00	CL COOLER
76	CLOSED CYCLE COOLING WATER HEAT EXCHANGER	19'	–	–	–
77	LOOP ROAD	–	–	–	–
78	STEAM TURBINE FOUNDATION	–	–	–	–
79	SWITCHYARD	18' & 45'	–	–	–
80	SWITCHYARD CONTROL ENCLOSURE	12'	–	–	–
81	CONTROL & ADMIN BUILDING	14'	–	–	–
82	FIRE WATER PUMP ROOM	20'	–	–	–
83	FIRE/SERVICE WATER STORAGE TANK	32'	–	–	–
84	DEMIN WATER STORAGE TANK	24'	–	–	–
85	WATER TREATMENT BUILDING	20'	–	–	–
86	WAREHOUSE/MAINTENANCE BUILDING	16'	–	–	–
87	LUBRICANT STORAGE SHED	10'	–	–	–
88	WASTE WATER LIFT STATION (IF REQUIRED)	–	–	–	–
89	GAS COMPRESSORS & GAS CONDITIONING	13'	–	–	–
90	DIESEL FIRE PUMP EXHAUST	16'	2192732.52	6201874.72	CL EXHAUST STACK
91	GAS METERING STATION	–	–	–	–
92	ACCESS ROAD	–	–	–	–
93	LEASED MIX BED EXCHANGER CONCRETE SLAB	–	–	–	–
94	EMERGENCY ACCESS ROAD	–	–	–	–
95	CUL DA SAC (TURNAROUND)	–	–	–	–
96	230KV POWER POLE	106'	–	–	–
97	OUTAGE MAINTENANCE TRAILERS AREA	–	–	–	–

NOTES

1. COORDINATES ARE BASED ON CALIFORNIA COORDINATE SYSTEM CCS83, ZONE 3. ELEVATION ARE BASED ON, NGVD 29 DATUM. BENCHMARK IS NATIONAL GEODETIC SURVEY BENCH MARK "W 563", LOCATED ADJACENT TO THE FLAGPOLE AT THE DUPONT PLANT ENTRANCE, ELEVATION = 11.168 FEET. TO OBTAIN DUPONT PLANT DATUM ELEVATION, ADD 0.70 FEET TO THE ELEVATIONS SHOWN. TOPOGRAPHIC DATA IS BASED ON AERIAL PHOTOGRAPH DATED JUNE 11, 2001. AERIAL SURVEY INFORMATION WAS OBTAINED BY RONALD GREENWELL & ASSOCIATES, INC.
2. SEE PLANT ARRANGEMENT DRAWING SM–2001, FOR LEGEND OF MAIN POWER BLOCK.
3. PROPERTY AND EASEMENT BOUNDARY INFORMATION IS BASED UPON DRAWING EXHIBIT D, BY RONALD GREENWELL & ASSOCIATES, INC. REVISION DATED 05/FEB/09.

GENERAL LEGEND

- NEW FENCE
- EXISTING FENCE
- PROPERTY BOUNDRY (SEE NOTE 3)
- EASEMENT BOUNDARY (SEE NOTE 3)
- LANDSCAPE BUFFER

NOT TO BE USED FOR CONSTRUCTION

Source: Black & Veatch Holding Company, 03/26/09, Drawing 163994-SS-1002 R1

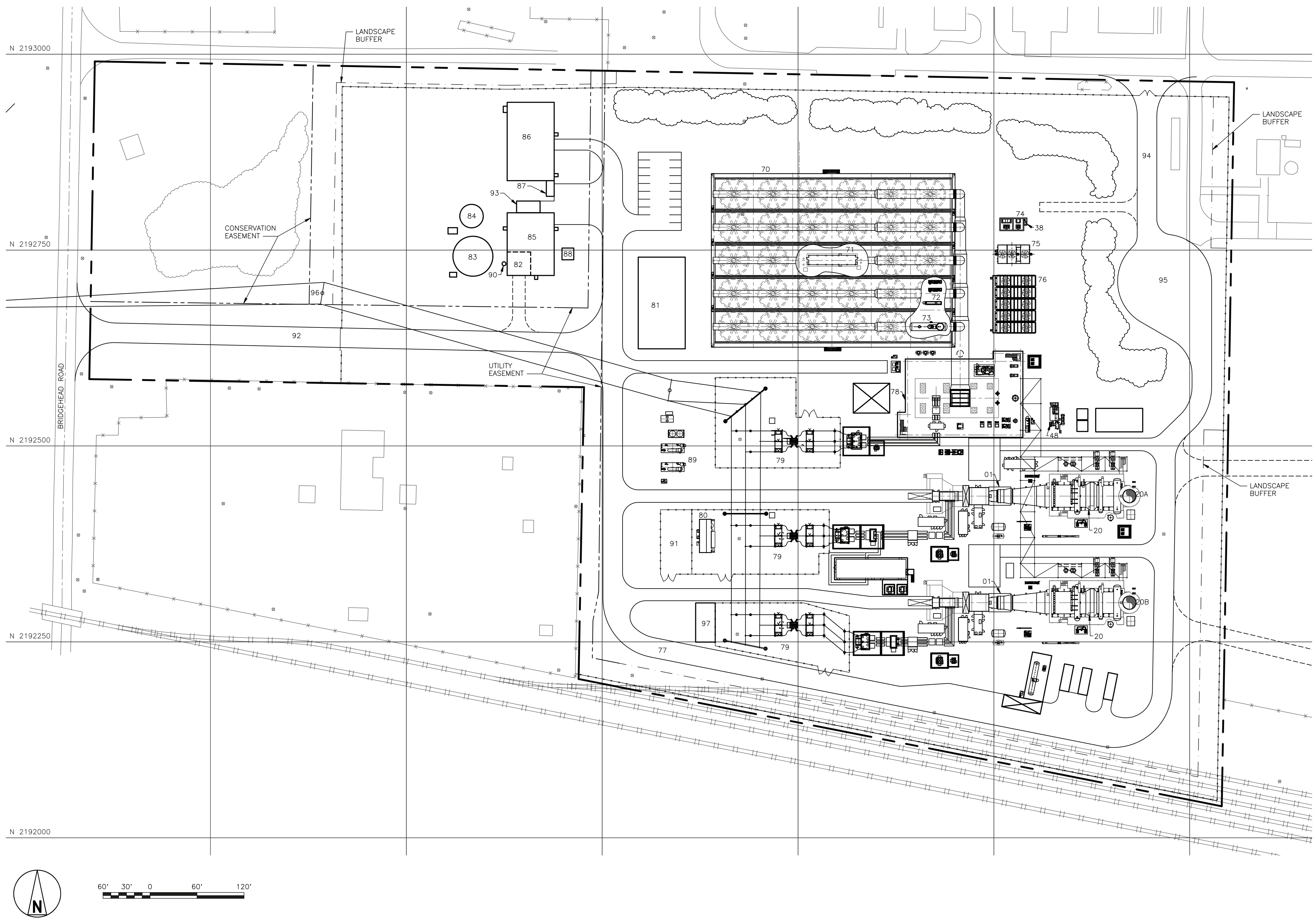
60' 30' 0 60' 120'

FIGURE 2.1-1
FACILITY LAYOUT

CONTRA COSTA GENERATING STATION
OAKLEY, CALIFORNIA

EY042009002SAC Figure_2.1-1.ai 06.12.09 tdaus

CH2MHILL



FACILITIES LEGEND

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20B	HRSG EXHAUST STACK B	155'	2192300.00	6202665.00	CL EXHAUST STACK
38	SAFETY SHOWER EYEWASH STATION	–	–	–	–
48	AUXILIARY BOILER	50'	2192527.61	6202572.26	CL EXHAUST STACK
70	AIR COOLED CONDENSER (ACC)	124'	–	–	–
71	ACC ELECTRICAL ENCLOSURE	14'	–	–	–
72	CONDENSER AIR EXTRACTION SKIDS	6'	–	–	–
73	ACC CONDENSATE COLLECTION TANK	28'	–	–	–
74	WET SURFACE AIR COOLER CHEMICAL FEED SKIDS	8'	–	–	–
75	WET SURFACE AIR COOLER	23'	2192744.67	6202523.00	CL COOLER
76	CLOSED CYCLE COOLING WATER HEAT EXCHANGER	19'	–	–	–
77	LOOP ROAD	–	–	–	–
78	STEAM TURBINE FOUNDATION	–	–	–	–
79	SWITCHYARD	18' & 45'	–	–	–
80	SWITCHYARD CONTROL ENCLOSURE	12'	–	–	–
81	CONTROL & ADMIN BUILDING	14'	–	–	–
82	FIRE WATER PUMP ROOM	20'	–	–	–
83	FIRE/SERVICE WATER STORAGE TANK	32'	–	–	–
84	DEMIN WATER STORAGE TANK	24'	–	–	–
85	WATER TREATMENT BUILDING	20'	–	–	–
86	WAREHOUSE/MAINTENANCE BUILDING	16'	–	–	–
87	LUBRICANT STORAGE SHED	10'	–	–	–
88	WASTE WATER LIFT STATION (IF REQUIRED)	–	–	–	–
89	GAS COMPRESSORS & GAS CONDITIONING	13'	–	–	–
90	DIESEL FIRE PUMP EXHAUST	16'	2192732.52	6201874.72	CL EXHAUST STACK
91	GAS METERING STATION	–	–	–	–
92	ACCESS ROAD	–	–	–	–
93	LEASED MIX BED EXCHANGER CONCRETE SLAB	–	–	–	–
94	EMERGENCY ACCESS ROAD	–	–	–	–
95	CUL DA SAC (TURNAROUND)	–	–	–	–
96	230KV POWER POLE	106'	–	–	–
97	OUTAGE MAINTENANCE TRAILERS AREA	–	–	–	–

NOTES

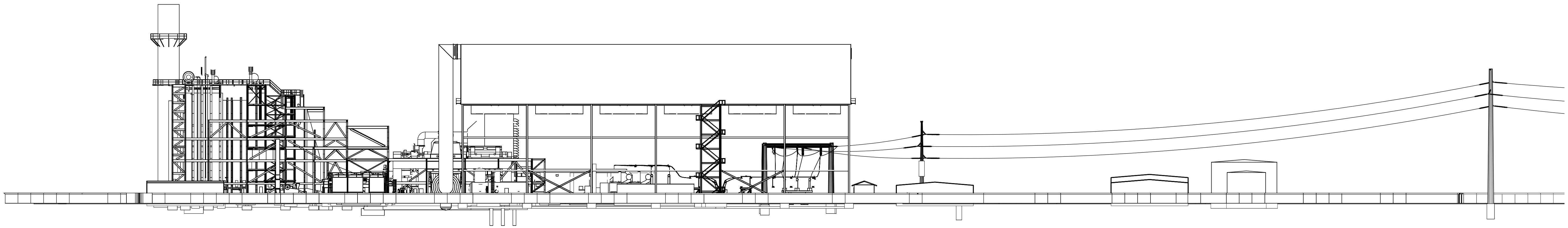
1. COORDINATES ARE BASED ON CALIFORNIA COORDINATE SYSTEM CCS83, ZONE 3. ELEVATION ARE BASED ON, NGVD 29 DATUM. BENCHMARK IS NATIONAL GEODETIC SURVEY BENCH MARK "W 563", LOCATED ADJACENT TO THE FLAGPOLE AT THE DUPONT PLANT ENTRANCE, ELEVATION = 11.168 FEET. TO OBTAIN DUPONT PLANT DATUM ELEVATION, ADD 0.70 FEET TO THE ELEVATIONS SHOWN. TOPOGRAPHIC DATA IS BASED ON AERIAL PHOTOGRAPH DATED JUNE 11, 2001. AERIAL SURVEY INFORMATION WAS OBTAINED BY RONALD GREENWELL & ASSOCIATES, INC.
2. SEE PLANT ARRANGEMENT DRAWING SM–2001, FOR LEGEND OF MAIN POWER BLOCK.
3. PROPERTY AND EASEMENT BOUNDARY INFORMATION IS BASED UPON DRAWING EXHIBIT D, BY RONALD GREENWELL & ASSOCIATES, INC. REVISION DATED 05/FEB/09.

GENERAL LEGEND

NEW FENCE
EXISTING FENCE
PROPERTY BOUNDRY (SEE NOTE 3)
EASEMENT BOUNDARY (SEE NOTE 3)
LANDSCAPE BUFFER

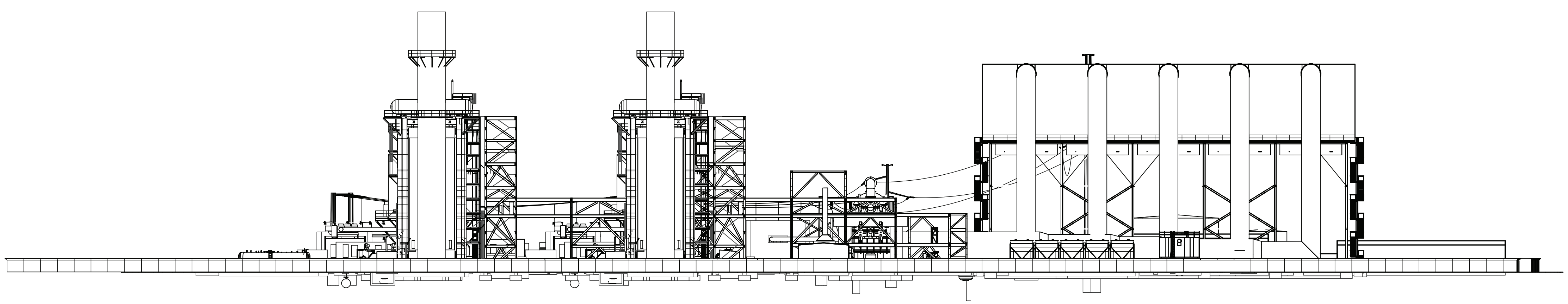
FIGURE 2.1-2
GENERAL ARRANGEMENT
CONTRA COSTA GENERATING STATION
OAKLEY, CALIFORNIA

Source: Black & Veatch Holding Company, 03/26/09, Drawing 163994-SS-1002 R1



NORTH ELEVATION
LOOKING SOUTH

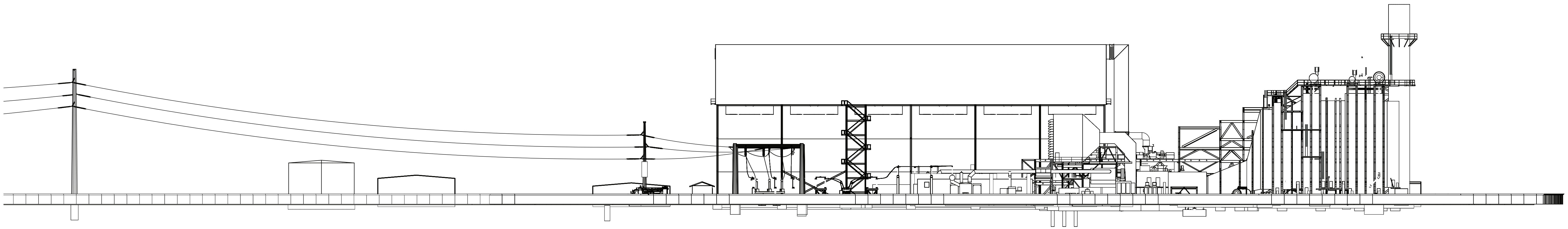
30' 20' 10' 0 30' 60'



EAST ELEVATION
LOOKING WEST

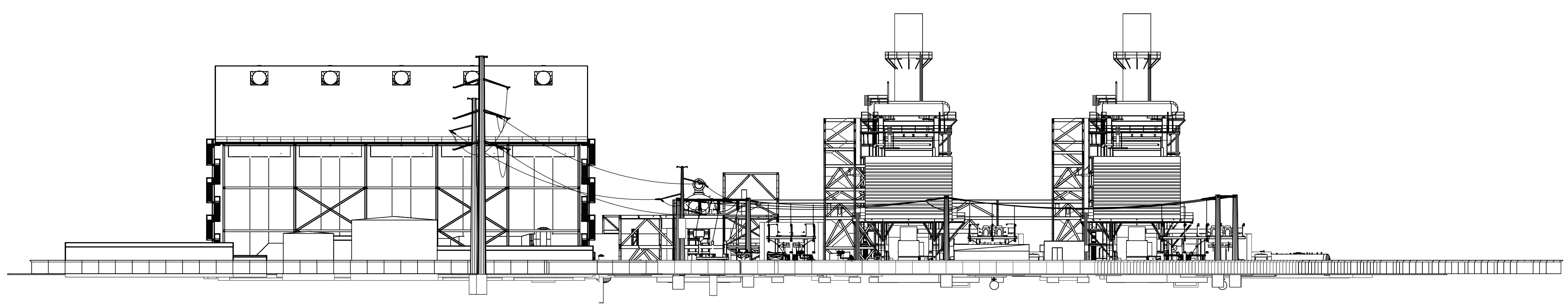
FIGURE 2.1-3A
PLANT ELEVATION
CONTRA COSTA GENERATING STATION
OAKLEY, CALIFORNIA

Source: Black & Veatch Holding Company, 03/26/09, Drawing 163994-SM-2501 R1



SOUTH ELEVATION
LOOKING NORTH

30' 20' 10' 0 30' 60'



WEST ELEVATION
LOOKING EAST

FIGURE 2.1-3B
PLANT ELEVATION
CONTRA COSTA GENERATING STATION
OAKLEY, CALIFORNIA

Source: Black & Veatch Holding Company, 03/26/09, Drawing 163994-SM-2501 R1

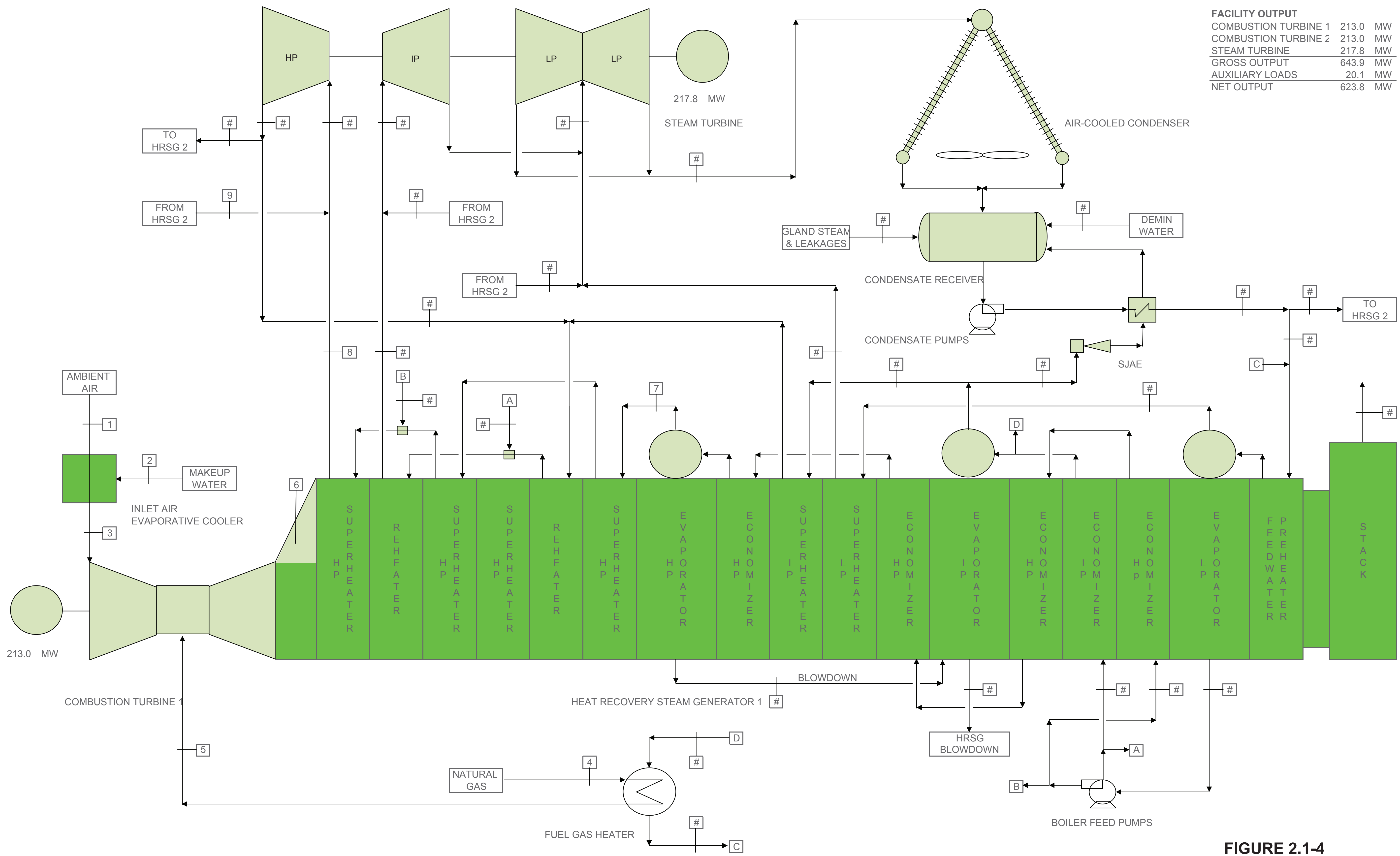


FIGURE 2.1-4
HEAT BALANCE SCHEMATIC
CONTRA COSTA GENERATING STATION
OAKLEY, CALIFORNIA

2.1.3 Power Plant Cycle

CTG combustion air will flow through the inlet air filters, evaporative coolers, and associated air inlet ductwork; be compressed in the CTG compressor section; and then enter the CTG combustion sections. Natural gas fuel will be injected into the compressed air in the combustion sections and ignited. The hot combustion gases will expand through the power turbine section of the CTGs, causing them to rotate and drive the electric generators and CTG compressors. The hot combustion gases will exit the turbine sections and enter the HRSGs, where they will heat water (feedwater) that is pumped into the HRSGs. The feedwater will be converted to superheated steam and delivered to the steam turbine at high pressure (HP), intermediate pressure (IP), and low pressure (LP). The use of multiple steam delivery pressures will permit an increase in cycle efficiency. High-pressure steam will be delivered to the HP section of the steam turbine. Steam exiting the HP section of the STG (cold reheat steam) will be returned to the HRSG for additional heating. The hot reheat steam with then be combined with the HRSG IP steam and delivered to the IP section of the STG. The steam exiting the IP section of the STG will be combined with the HRSG LP steam and injected into the LP section of the steam turbine. Steam leaving the LP section of the steam turbine will enter the air-cooled condenser and transfer heat to the ambient air, which will cause the steam to condense to water. The condensed water, or condensate, will be delivered to the HRSG feedwater system.

2.1.4 Major Generating Facility Components

The following paragraphs describe the major components of the generating facility.

2.1.4.1 Combustion Turbine Generators

Thermal energy will be produced in the CTGs through the combustion of natural gas, which will be converted into mechanical energy required to drive the combustion turbine compressors and electric generators. Each CTG system will consist of a CTG with supporting systems and associated auxiliary equipment. The GE 7FA CTGs use dry low-NO_x combustors to control NO_x emissions.

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

- Inlet air filters and evaporative coolers
- Metal acoustical enclosure
- Lube oil system for the combustion turbine and the generator
- Dry low-NO_x combustion system
- Compressor wash system—both online and offline
- Fire detection and protection system (using carbon dioxide)
- Fuel gas system, including flow meter, strainer, and duplex filter
- Starter system
- Turbine controls
- Hydrogen-cooled synchronous generators
- Generator controls, protection, excitation, power system stabilizer, and automatic generation control

The CTGs and accessory equipment will be contained in metal acoustical enclosures.

2.1.4.2 Heat Recovery Steam Generators

The HRSGs will transfer heat from the exhaust gases of the CTGs to the feedwater, which will become steam. The HRSGs will be triple-pressure, reheat natural circulation units equipped with inlet and outlet ductwork, insulation, lagging, and separate exhaust stacks.

Major heat transfer components of each HRSG will include LP economizer, LP evaporator, LP drum, LP superheater, IP economizer, IP evaporator, IP drum, IP superheater, HP economizers, HP evaporator, HP drum, and HP superheaters and reheat sections. The LP economizer will receive condensate from the condenser hot well via the condensate pumps. The LP economizer will be the final heat transfer section to receive heat from the combustion gases before they are exhausted to the atmosphere.

Condensate will be directed through the LP economizer and into the LP drum, where a saturated liquid state will be maintained. Next, the saturated water will flow from the steam drum through downcomers to the inlet headers of the LP evaporator. The saturated water will flow upward through the LP evaporator tubes by natural circulation. Saturated steam will form in the tubes while energy from the CTG exhaust gas is absorbed. The LP-saturated liquid/vapor mixture will then return to the steam drum, where the two phases will be separated by the steam separators in the drum. The saturated water will return to the IP evaporator while the vapor passes to the LP superheater inlet. The saturated steam (vapor) will pass through the LP superheater and the superheated LP steam will be directed to the inlet of the LP section of the STG.

The HP/IP boiler feedwater pumps, drawing suction from the LP drum, will provide additional pressure to serve the HP and IP sections of the HRSG. Similarly, as described above for LP steam, IP and HP steam will be produced for supply to the steam turbine.

IP feedwater from an intermediate-stage tap on the HP/IP boiler feedwater pumps will flow through the IP economizers to the IP steam drum, where a saturated liquid state will be maintained. Next, the saturated water will flow from the steam drum through downcomers to the inlet headers of the IP evaporator. The saturated water will flow upward through the IP evaporator tubes by natural circulation. Saturated steam will form in the tubes while energy from the CTG exhaust gas is absorbed. The IP-saturated liquid/vapor mixture will then return to the steam drum, where the two phases will be separated by the steam separators in the drum. The saturated water will return to the IP evaporator while the vapor passes to the IP superheater inlet. The saturated steam (vapor) will pass through the IP superheaters and the superheater IP steam will be combined with cold reheat steam exiting the HP section of the STG. The combined steam flow will then pass through several reheat (superheater) sections within the HRSG before being admitted to the IP section of the STG. An attemperator will be provided upstream of the final reheater for control of the steam temperature entering the STG.

HP feedwater from the discharge of the HP/IP boiler feedwater pumps will flow through multiple HP economizers to the HP steam drum, where a saturated liquid state will be maintained. Next, the saturated water will flow from the steam drum through downcomers to the inlet headers of the HP evaporator. The saturated water will flow upward through the HP evaporator tubes by natural circulation. Saturated steam will form in the tubes while energy from the CTG exhaust gas is absorbed. The HP-saturated liquid/vapor mixture will then return to the steam drum, where the two phases will be separated by the steam separators in the drum. The saturated water will return to the HP evaporator while the vapor passes to the first HP superheater inlet. The saturated steam (vapor) will pass through multiple HP superheaters prior to being admitted to the inlet of the HP section of the STG. An attemperator will be provided upstream of the final HP superheater for control of the steam temperature entering the STG.

The HRSGs will be equipped with an SCR emission control system that will use ammonia vapor in the presence of a catalyst to reduce the NO_x concentration in the exhaust gases. The catalyst module will be located in the HRSG casing. Diluted ammonia vapor will be injected into the exhaust gas stream through a grid of nozzles located upstream of the catalyst module. The subsequent chemical reaction will reduce most of the NO_x to nitrogen and water. An oxidation catalyst will control carbon monoxide emissions.

2.1.4.3 Steam Turbine System

The steam turbine system will consist of a condensing steam turbine, gland steam system, lubricating oil system, hydraulic control system, and steam admission/induction valving. The steam turbine will be a GE D-11 with a single casing HP/IP section and separate double-flow LP section. The steam turbine will drive a hydrogen-cooled synchronous generator.

Steam from the HRSG HP, IP, and LP superheaters will enter the respective steam turbine sections through the inlet steam system. The steam will expand through the turbine blading, driving the generator. On exiting the turbine, the steam will flow into the condenser.

2.1.4.4 Auxiliary Boiler

A 34,000 pound per hour (lb/hr) auxiliary boiler will be provided to produce auxiliary steam when the plant is offline and during startups. When the plant is offline, the auxiliary steam will be used for condensate sparging and STG seal steam to maintain the plant in a warm state and expedite startups. The auxiliary boiler will include an SCR for NO_x control and an oxidation catalyst to control carbon monoxide emissions.

2.1.5 Major Electrical Equipment and Systems

The bulk of the electric power produced by the facility will be transmitted to the electrical grid through a 230-kV connection to PG&E’s Contra Costa Substation. Power from the CCGS will flow through a 230-kV generation tie line from the CCGS switchyard to the Contra Costa Substation. A small amount of electric power will be used onsite to power auxiliaries such as pumps and fans, control systems, and general facility loads including lighting, heating, and air conditioning. A station battery system also will be used to provide direct current (DC) voltage as backup power for control systems and other critical uses. Transmission and auxiliary uses are discussed in the following subsections.

2.1.5.1 Alternating Current (AC) Power—Transmission

Power will be generated by the two CTGs and the STG at 18-kV and stepped up by three fan-cooled generator step-up (GSU) transformers to 230-kV for transmission to the grid. Auxiliary power will be fed from the 18-kV bus of the two CTGs through separate station unit service transformers, which will step the power down to 4.16 kV. Each CTG will have an 18-kV generator circuit breaker, located on the generator output, to isolate and synchronize the CTG to the grid during startup. Surge arresters will be provided at the high-voltage bushings to protect the transformers from surges on the 230-kV system caused by lightning strikes or other system disturbances. The transformers will be set on concrete pads within berms designed to contain the transformer oil in the event of a leak or spill. The high-voltage side of the GSU transformers will be connected to gas-insulated (SF6) circuit breakers and then radially connected to the outgoing generation tie line to the Contra Costa Substation. The generation tie-line will be approximately 2.4 miles long and will use tubular steel support towers. Section 3.0, Electrical Transmission, presents additional information regarding the electrical transmission system. Figure 2.1-5 is a one-line diagram of the facility's electrical system.

2.1.5.2 AC Power—Distribution to Auxiliaries

Auxiliary power to the CTGs will be supplied at 4.16-kV and 480 volts AC by a double-ended 4.16-kV switchgear lineup and a double-ended 480-volt load center substation arrangement. Two oil-filled, 18kV/4.16-kV station unit service transformers will supply primary power to the switchgear and then subsequently to large motor loads including the fuel gas compressors and to the 4.16 kV side of the 4.16-kV/480-volt, oil-filled load center transformers. The high-voltage side of the station unit service transformers will be connected to a tap on the isolated phase bus duct connecting the generator to the respective GSU transformer low voltage (secondary) winding. This connection will allow the switchgear to be powered from the local grid via the GSU transformer whenever the CTGs are not running or directly from the CTGs when the CTGs are running. The 4.16-kV switchgear lineup will supply power to the fuel gas compressors, other large motor loads, the combustion turbine starting system, and to the load center transformers for 480-volt power distribution. The 4.16-kV switchgear will have vacuum interrupter circuit breakers for the main incoming feeds and for power distribution.

Each load center transformer will be oil-filled and will supply 480-volt, three-phase power to the CTG and balance-of-plant 480-volt motor control centers (MCCs).

The MCCs will provide power through feeder breakers to the various 480-volt motor loads, and other low-voltage plant loads, including 480-volt power distribution panels, and lower voltage lighting and distribution panel transformers. Power for the AC power supply (240-volt/120-volt) system will be provided by the 480-volt MCCs and 480-volt power panels. Dry-type transformers will transform 480-volt power to 240/120-volt power.

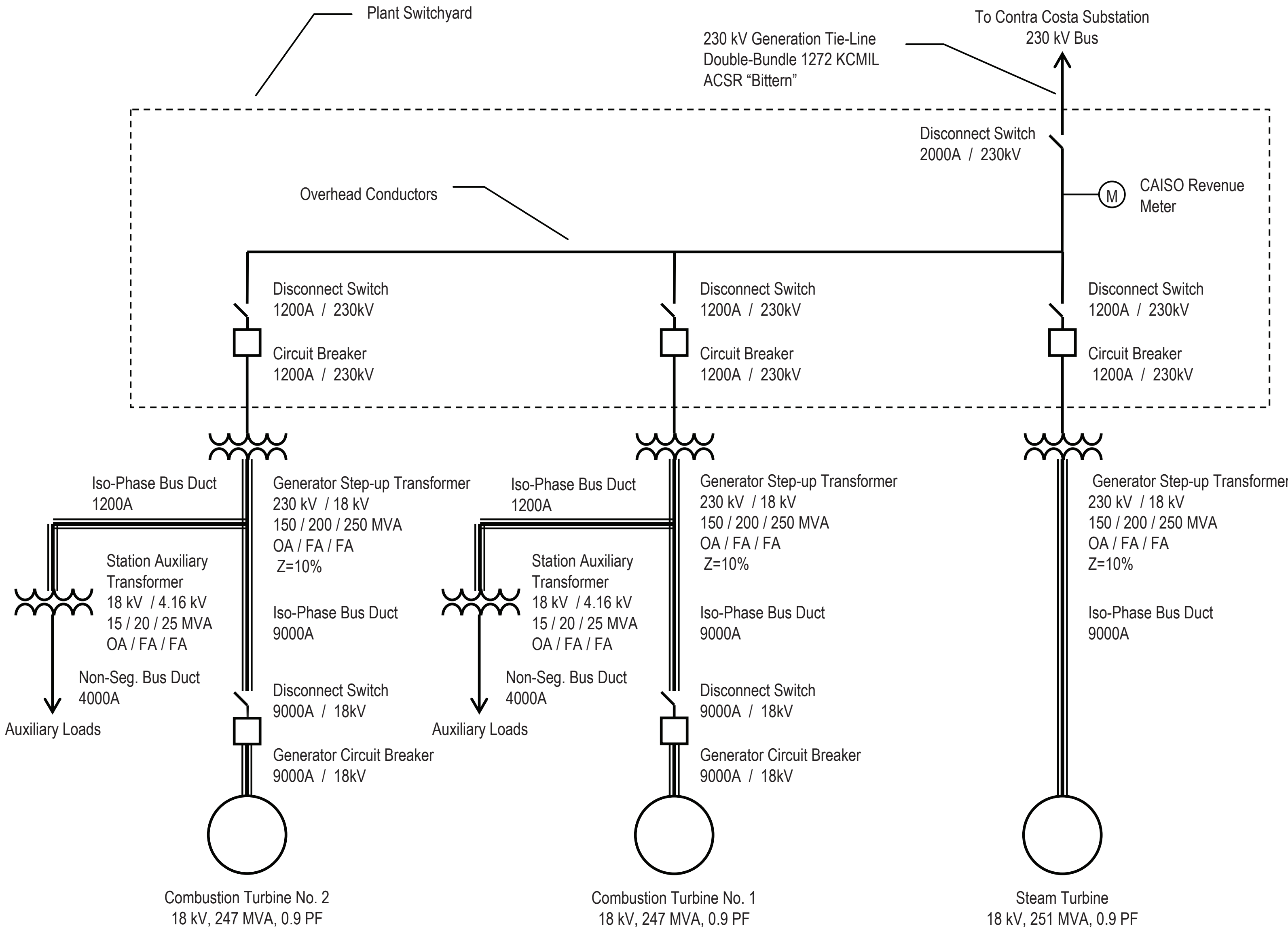


FIGURE 2.1-5
ELECTRICAL ONE-LINE DIAGRAM
CONTRA COSTA GENERATING STATION
OAKLEY, CALIFORNIA

2.1.5.3 125-volt DC Power Supply System

A 125-volt DC power supply system consisting of a minimum of two battery banks, two battery chargers per battery bank, and one or more distribution panels will be supplied for balance-of-plant equipment. Each CTG and the plant switchyard will be provided with its own separate battery systems, chargers, and panel boards.

Under normal operating conditions, the balance-of-plant battery chargers supply DC power to the DC loads. The battery chargers receive 480-volt, three-phase AC power from the AC power supply system and continuously charge the battery banks while supplying power to the DC loads.

Under abnormal or emergency conditions, when power from the AC power supply system is unavailable, the batteries supply DC power to the DC system loads. Recharging of a discharged battery occurs whenever 480-volt power becomes available from the AC power supply system. The rate of charge depends on the characteristics of the battery, battery charger, and the connected DC load during charging. The anticipated maximum recharge time will be 24 hours.

2.1.5.4 Uninterruptible Power Supply System

The combustion turbines and power block also will have an essential service 120-volt AC, single-phase, 60-hertz uninterruptible power supply (UPS) to supply AC power to essential instrumentation, critical equipment loads, and unit protection and safety systems that require uninterruptible AC power.

A UPS inverter will supply 120-volt AC single-phase power to the UPS panel boards that supply critical AC loads. The UPS inverter will be fed from the station 125-volt DC power supply system. The UPS system will consist of one full-capacity inverter, a static transfer switch, a manual bypass switch, an alternate source transformer, and one or more panel boards.

The normal source of power to the system will be from the 125-volt DC power supply system through the inverter to the UPS panelboard. A solid-state static transfer switch will continuously monitor the inverter output and the alternate AC source. The transfer switch will automatically transfer essential AC loads without interruption from the inverter output to the alternate source upon loss of the inverter output. The distributed control system (DCS) operator stations will be supplied from the UPS. The continuous emission monitoring system equipment, DCS controllers, and input/output (I/O) modules will be fed using either UPS or 125-volt DC power directly.

2.1.5.5 Alternate Power Source

The CCGS will include an alternate power source fed from the PG&E local distribution system and provided with a circuit breaker, transformer, and meter. The transformer will step-down the voltage from the associated distribution voltage (e.g., 12 kV) to 480 volts. The alternate power feed will be connected to the 480-volt plant essential service MCC to provide power to those plant loads that require AC power to allow for a safe shutdown in the event of a loss of the 230 kV and plant power. The alternate power source will power loads such as the plant battery chargers; STG turning gear; CTG turning gears; plant essential lighting system; fire protection system; DCS (plant computer system); and heating, ventilation, and air conditioning systems in the event of the loss of facility power. In the event of a loss of power at the 230-kV level, the alternate power source will be manually activated via a transfer switch that interrupts the normal 480-volt feed to the plant essential service MCC.

2.1.6 Fuel System

The CTGs will be designed to burn natural gas only. The natural gas requirement during base load operation at ISO conditions is approximately 4,212 MMBtu/hr (HHV basis, total for two CTGs).

Natural gas will be delivered to the site via a new 140-foot-long, 6- to 10-inch-diameter connection to PG&E Line 303, located near the southwest corner of the project site, adjacent to PG&E's Antioch Terminal. The project owner may also choose to include a secondary natural gas supply via a 6- to 10-inch-diameter connection to PG&E's Line 400, located near the west edge of the project site, near the northeast corner of PG&E's Antioch Terminal. At the plant site, the natural gas will flow through a flow-metering station, a gas pressure control station, gas compression equipment, gas scrubber/filtering equipment, and a fuel gas heater prior to entering the CTGs. The natural gas for the auxiliary boiler and building heating systems will flow through the flow-metering station and gas pressure control station, but will not require compression, filtering, or heating.

2.1.7 Plant Cooling Systems

The steam turbine cycle heat rejection system will consist of an air-cooled condenser. The heat rejection system will receive exhaust steam from the low-pressure section of the steam turbine and condense it to water (condensate) for reuse. The condenser will be designed to operate at a pressure of approximately 2.1 inches of mercury, absolute at during base load operation at ISO conditions. It will transfer approximately 1,249 MMBtu/hr from to the ambient air as a result of condensing steam at these operating conditions.

2.1.8 Water Supply and Use

Figures 2.1-6a and 2.1-6b are water balances representing two operating conditions. Figure 2.1-6a represents operation under ISO conditions with both CTGs at 100 percent load with CTG inlet air evaporative cooling. Figure 2.1-6b represents operation at peak July conditions (104°F dry bulb temperature and 18 percent relative humidity) with both CTGs operating at 100 percent load with CTG inlet evaporative cooling.

The CCGS will use potable water provided by the Diablo Water District for process and potable uses. The project will access this water through a tap from an existing 27-inch-diameter distribution pipeline that runs north-south through the CCGS site (just east of PG&E's Antioch Terminal). Process and sanitary wastewater from the CCGS will be discharged to an existing Ironhouse Sanitary District (ISD) sewer line located in Bridgehead Road.

Notes: 1. All flow rates are in gallons/minute unless otherwise noted.
2. Fire protection flow rate shown is for normal operation.
3. Landscape irrigation, potable water, service water, plant washdown, and CT washwater demands shown are averages. Maximum instantaneous demands will be greater.
4. ISO conditions are deemed to be representative of the average ambient conditions which are 59.6 degrees Fahrenheit, 58.2 percent relative humidity, based on the nearest ASHRAE station (Travis AFB, Fairfield, CA).

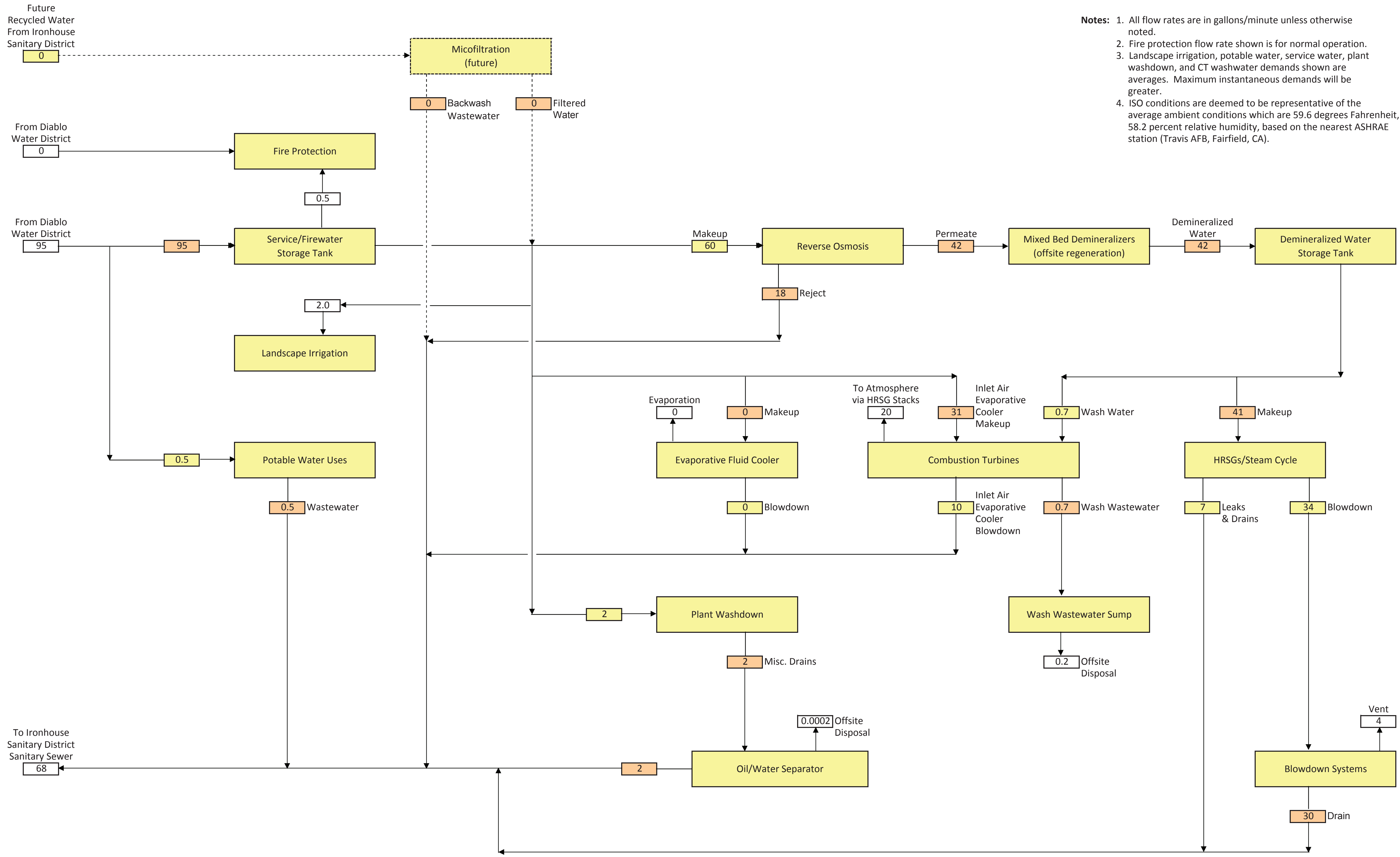
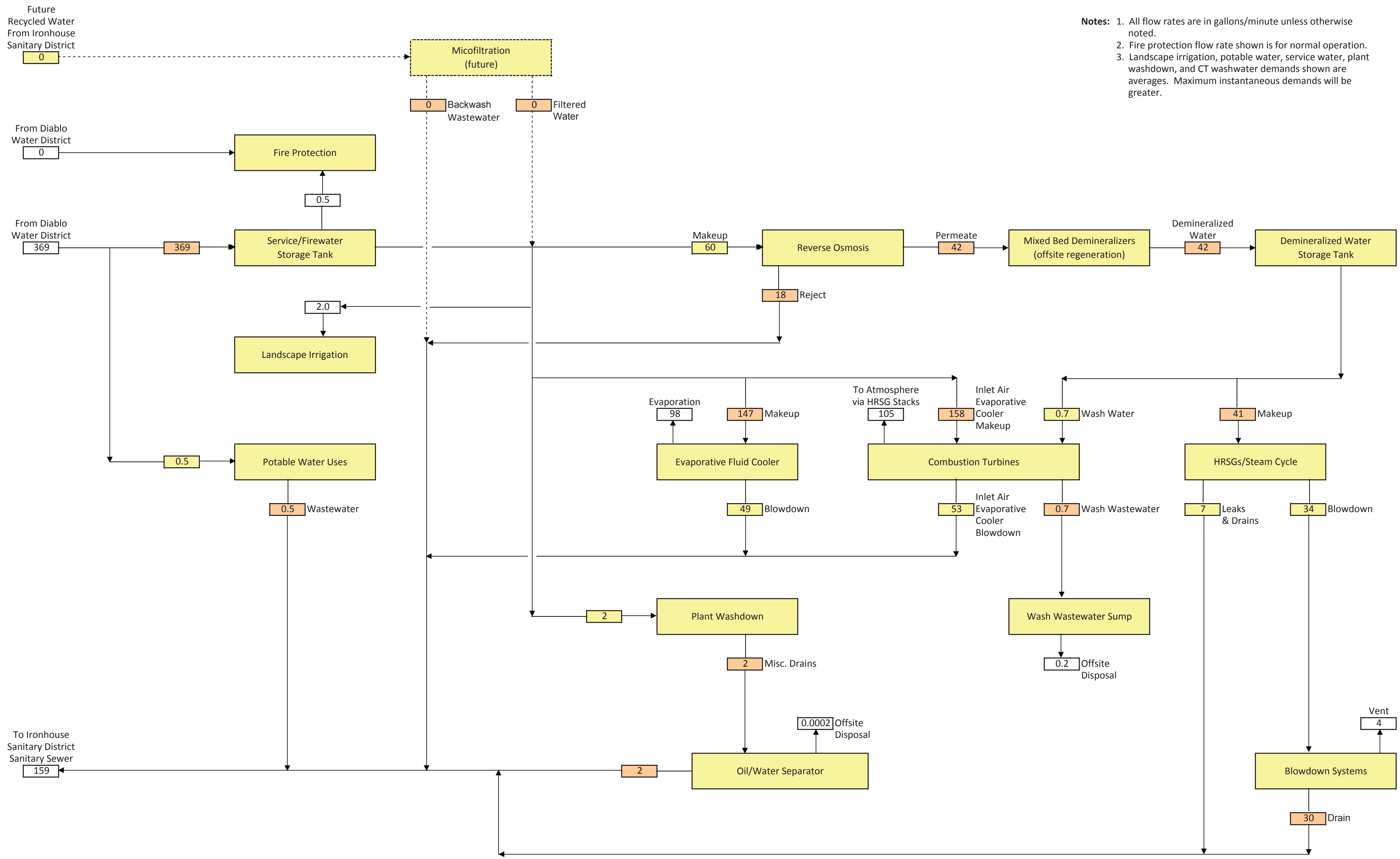


FIGURE 2.1-6A
WATER BALANCE UNDER ISO CONDITIONS
CONTRA COSTA GENERATING STATION
OAKLEY, CALIFORNIA

CH2MHILL



Notes:
1. All flow rates are in gallons/minute unless otherwise noted.
2. Fire protection flow rate shown is for normal operation.
3. Landscape irrigation, potable water, service water, plant washdown, and CT washwater demands shown are averages. Maximum instantaneous demands will be greater.

FIGURE 2.1-6B
WATER BALANCE UNDER PEAK JULY CONDITIONS
CONTRA COSTA GENERATING STATION
OAKLEY, CALIFORNIA

2.1.8.1 Water Requirements

Under ISO conditions while operating at base load (both CTGs at 100 percent load with inlet air evaporative cooling), potable water use will be about 95 gallons per minute (gpm). Under peak July conditions (104°F dry bulb temperature and 18 percent relative humidity) with both CTGs operating at 100 percent load and CTG inlet evaporative cooling, potable water use will be about 369 gpm. On an average annual basis, the total water use is estimated to be approximately 240 acre-feet per year (Table 2.1-1). Plant makeup water will be fed directly from the Diablo Water District's service main through metering and an air gap into the service water/fire water storage tank (400,000 gallons). Water from the fire/service water tank will be used as plant service water, irrigation water, makeup to the combustion turbine inlet air evaporative coolers, and makeup to the cycle makeup water treatment system. The fire/service water storage tank will provide approximately 8 hours of operational storage and 2 hours of fire protection storage in the event of a disruption in the supply.

TABLE 2.1-1
Estimated Daily and Annual Water Use for CCGS Operations

Water Use	Average Daily Use Rate (gpm)	Maximum Daily Use Rate (gpm)	Average Annual Use* (acre-feet per year)
Potable water	959	369	240

*Assumes 8,449 hours of operation, of which 1,500 hours are peak use.

2.1.8.2 Wastewater Requirements

Under ISO conditions while operating at base load (both CTGs at 100 percent load with inlet air evaporative cooling), discharge to the sanitary sewer will be about 68 gpm. Under peak July conditions (104°F dry bulb temperature and 18 percent relative humidity) with both CTGs operating at 100 percent load with CTG inlet evaporative cooling, discharge to the sanitary sewer will be about 159 gpm (Table 2.1-2). On an average annual basis, the total wastewater discharged from the CCGS is estimated to be approximately 43 million gallons per year. Wastewater discharge from the CCSG will be to an existing ISD sewer line located in Bridgehead Road.

TABLE 2.1-2
Estimated Daily and Annual Wastewater Discharge for CCGS Operations

Wastewater Use	Average Daily Discharge Rate (gpm)	Maximum Daily Discharge Rate (gpm)	Average Annual Use* (million gallons per year)
Wastewater to sewer	68	159	43

*Assumes 8,449 hours of operation, of which 1,500 hours are at peak discharge.

2.1.8.3 Water and Wastewater Treatment

Makeup water for the steam cycle will be demineralized by passing service water through a reverse osmosis system followed by offsite-regenerated mixed-bed demineralizer bottles. The reject stream from the reverse osmosis system will be discharged to the plant process drain system and the demineralized water will be sent to a 130,000-gallon storage tank. The demineralized water storage tank will provide approximately 48 hours of storage at peak demand. Demineralized water will be used for steam cycle makeup and for combustion turbine washwater. Cycle makeup water will be deaerated and fed to the condensate receiver. Blowdown from the HRSGs will be discharged to an atmospheric flash tank where the flash steam will be vented to atmosphere and the condensate will be cooled prior to discharge to the plant process drain system. Wastewater from combustion turbine water washes will be collected in combustion turbine drain tanks and then trucked offsite for disposal.

Service water will be used for makeup to the combustion turbine evaporative coolers, equipment washdown, and other miscellaneous plant uses. Blowdown from the combustion turbine evaporative coolers will be discharged to the plant process drain system and ultimately discharged to the sanitary sewer. Wastewater from process areas that could potentially include oil or other lubricants will be directed to an oil-water separator for removal of accumulated oil that may result from equipment leakage or small spills and large particulate matter that may be present from equipment washdowns. Effluent from the oil-water separator will be combined with other process wastewater and sanitary wastewater and discharged to the ISD sewer, located in Bridgehead Road. ISD is in the process of constructing a new wastewater treatment plant that will include processes to produce recycled water meeting Title 22 requirements. Accordingly, the CCGS will be designed to accommodate the potential future use of recycled water by providing space in the water treatment building to add a microfiltration system. The microfilters will provide additional filtering of the recycled water prior to use as service water and makeup to the demineralized water system. Backwash water from the microfilters will be discharged to the plant process drain system and ultimately the sanitary sewer.

2.1.8.4 Air-cooled Condenser System

Exhaust steam from STG will be condensed in an air-cooled condenser. The use of an air-cooled condenser as opposed to a conventional surface condenser/cooling tower arrangement eliminates the significant water demand normally associated with condensing the STG exhaust steam. To condense steam, the air-cooled condenser will use large fans to blow ambient air across finned tubes through which the steam flows. Condensed steam (condensate) will be collected and drained to a receiver located under the air-cooled condenser. Condensate pumps will recycle the condensate from the receiver back to the HRSGs to repeat the cycle.

2.1.8.5 Evaporative Fluid Cooler

A closed-loop cooling system will provide cooling water to various plant equipment, including the CTG and STG generator coolers, CTG and STG lube oil coolers, and boiler feedwater pumps. The primary means of heat rejection for this closed-loop system will be an air-cooled heat exchanger. The air-cooled heat exchanger will use large fans to blow ambient air across finned tubes through which the closed-loop cooling water will flow. The air-cooled heat exchanger will consume no water.

When ambient temperatures are high, the air-cooled heat exchanger will not be able to cool the closed-loop cooling water to the required temperature. During these periods, an evaporative fluid cooler (wet surface air cooler) will be used to supplement the cooling provided by the air-cooled heat exchanger. The evaporative fluid cooler will contain finned-tubes through which the cooling water will flow. Instead of using ambient air to directly remove the heat, however, water will be sprayed over the tubes to take advantage of the additional cooling provided through evaporation. Water that is not evaporated will be captured in a sump at the bottom of the evaporative fluid cooler and circulated back to the top of the unit. A small blowdown stream will be discharged to the plant drain system to control the level of dissolved solids in the circulating water. Service water will be added to replace the water lost to evaporation and blowdown.

2.1.9 Emission Control and Monitoring

Air emissions from the combustion of natural gas in the CTGs, HRSGs, and auxiliary boiler will be controlled using state-of-the-art systems. To ensure that the systems perform correctly, continuous emission monitoring for NO_x and carbon monoxide will be performed. Section 5.1, Air Quality, includes additional information on emission control and monitoring.

2.1.9.1 NO_x Emission Control

Selective catalytic reduction will be used to control NO_x concentrations in the exhaust gas emitted to the atmosphere to 2 ppmvd from the HRSG stacks and 9 ppmvd from the auxiliary boiler stack. The SCR process will use aqueous ammonia. Ammonia slip, or the concentration of unreacted ammonia in the exiting exhaust gas, will be limited to 5 ppmvd from the HRSG stacks and auxiliary boiler stack. The SCR equipment will include a reactor chamber, catalyst modules, ammonia storage system, ammonia vaporization and injection system, and monitoring equipment and sensors. The project will make use of the ammonia delivery system, which consists of a single 18,000-gallon ammonia tank, a spill containment basin, and a refilling station with a spill containment basin and sump.

2.1.9.2 Carbon Monoxide and Volatile Organic Compounds

An oxidizing catalytic converter will be used to reduce the carbon monoxide concentration in the exhaust gas emitted to the atmosphere from the HRSG stacks to 2 ppmvd and volatile organic compounds to 2 ppmvd. The auxiliary boiler oxidizing catalytic converter will reduce the carbon monoxide concentration in the exhaust gas emitted to the atmosphere to 50 ppmvd and volatile organic compounds to 4 ppmvd.

2.1.9.3 Particulate Emission Control

Particulate emissions will be controlled by the use of best combustion practices; the use of natural gas, which is low in sulfur, as the sole fuel for the CTGs, and auxiliary boiler; and high-efficiency CTG inlet air filtration. The evaporative fluid cooler will use high-efficiency drift eliminators.

2.1.9.4 Continuous Emission Monitoring

Continuous emission monitors will sample, analyze, and record fuel gas flow rate, NO_x and carbon monoxide concentration levels, and percentage of oxygen in the exhaust gas from each of the two HRSG stacks and the auxiliary boiler stack. This system will generate reports of emission data in accordance with permit requirements and will send alarm signals to the plant supervisory control system when emissions approach or exceed pre-selected limits.

2.1.10 Waste Management

Waste management is the process whereby all wastes produced at the CCGS are properly collected, treated if necessary, and disposed of. Wastes include process and sanitary wastewater, nonhazardous waste (liquid and solid), and hazardous waste (liquid and solid). Waste management is discussed in more detail in Section 5.14.

2.1.10.1 Stormwater Collection, Treatment, and Disposal

Stormwater that falls within process equipment containment areas will be collected and discharged to the plant process drain system. Wastewater having the potential for contamination with oil or grease will be routed to the oil/water separator. Stormwater that falls outside the process equipment containment areas will either percolate directly into the soil or drain over the surface into a series of bio-swales that will provide treatment for the removal of suspended solids, oils, and grease that may have accumulated on paved surfaces. Effluent from the oil/water separator will be combined with other process wastewater and sanitary wastewater and pumped via a wastewater lift station to the ISD sanitary sewer located in Bridgehead Road. The water balance diagrams, Figures 2.1-6a and 2.1-6b, show the expected wastewater streams. Table 2.1-2 shows the flow rates for CCGS for the annual average and maximum conditions, respectively.

2.1.10.2 Plant Drains and Oil/Water Separator

General plant drains will collect containment area washdown, sample drains, and drainage from facility equipment drains. Water from these areas will be collected in a system of floor drains, hub drains, sumps, and piping and routed to the process drain collection system. Drains that potentially could contain oil or grease will first be routed through an oil/water separator. Wastewater streams that are unlikely to contain oil and grease, including CTG inlet air evaporative cooler blowdown, HRSG blowdown, blowdown from the auxiliary cooling system evaporative fluid cooler, and reverse osmosis reject will bypass the oil/water separator. Miscellaneous wastewaters, including those from combustion turbine water washes and from some water treatment membrane-based system's cleaning operations, will be collected in holding tanks or sumps and will be trucked offsite for disposal at an approved wastewater disposal facility.

2.1.10.3 Sanitary Wastewater

Sanitary wastewater from such uses as sinks, toilets, showers, dishwashers, and other sanitary facilities will be discharged to the facility's sanitary sewer collector system. Effluent from the oil/water separator will be combined with other process wastewater and sanitary wastewater and then pumped via a wastewater lift station to the ISD sanitary sewer located in Bridgehead Road. The water balance diagrams, Figures 2.1-6a and 2.1-6b, show the expected wastewater streams. Table 2.1-2 shows the flow rates for CCGS for the annual average and maximum conditions, respectively.

2.1.10.4 Solid Wastes

The CCGS will produce maintenance and plant wastes typical of power generation operations. Generation plant wastes include oily rags, broken and rusted metal and machine parts, defective or broken electrical materials, empty containers, and other solid wastes, including the typical refuse generated by workers. Solid wastes will be trucked offsite for recycling or disposal (see Section 5.14).

2.1.10.5 Hazardous Wastes

Several methods will be used to properly manage and dispose of hazardous wastes generated by the CCGS. Waste lubricating oil will be recovered and recycled by a waste oil recycling contractor. Spent lubrication oil filters will be disposed of in a Class I landfill. Spent SCR and oxidation catalysts will be recycled by the supplier or disposed of in accordance with regulatory requirements. Workers will be trained to handle hazardous wastes generated at the site.

Chemical cleaning wastes will consist of alkaline and acid cleaning solutions used during pre-operational chemical cleaning and turbine wash waters. These wastes, which are subject to high metal concentrations, will be temporarily stored onsite in portable tanks or sumps, and disposed of offsite in accordance with applicable regulatory requirements.

2.1.11 Management of Hazardous Materials

A variety of chemicals will be stored and used during construction and operation of the CCGS. The storage, handling, and use of all chemicals will be conducted in accordance with applicable laws, ordinances, regulations, and standards (LORS). Chemicals will be stored in appropriate chemical storage facilities. Bulk chemicals will be stored in storage tanks, and most other chemicals will be stored in returnable delivery containers. Chemical storage and chemical feed areas will be designed to contain leaks and spills. Concrete containment pits and drain piping design will allow a full-tank capacity spill without overflowing the containment area. For multiple tanks located within the same containment area, the capacity of the largest single tank will determine the volume of the containment area and drain piping. Containment areas subject to rainfall will be provided additional containment volume sufficient to contain the rainfall from a 25-year, 24-hour storm event. Drain piping for reactive chemicals will be trapped and isolated from other drains to eliminate noxious or toxic vapors.

The aqueous ammonia storage and delivery area will have spill containment and ammonia vapor detection equipment.

Safety showers and eyewashes will be provided adjacent to, or in the vicinity of, chemical storage and use areas. Plant personnel will use approved personal protective equipment during chemical spill containment and cleanup activities. Personnel will be properly trained in the handling of these chemicals and instructed in the procedures to follow in case of a chemical spill or accidental release. Adequate supplies of absorbent material will be stored onsite for spill cleanup.

A list of the chemicals anticipated to be used at the CCGS and their storage locations is provided in Section 5.5, Hazardous Materials Handling. The list identifies each chemical by type, intended use, and estimated quantity to be stored onsite.

2.1.12 Fire Protection

The fire protection system will be designed to protect personnel and limit property loss and plant downtime in the event of a fire. The primary source of fire protection water will be supplied via a connection to the Diablo Water District potable water distribution system. The secondary source of fire protection water will be supplied from an onsite fire/service water storage tank, sized in accordance with National Fire Protection Association (NFPA) guidelines to provide 2 hours of protection for the onsite worst-case single fire. Electric motor-driven and a diesel engine-driven fire pumps will be provided to pump water from the onsite storage tank.

Fire protection water from the Diablo Water District connection and onsite fire/service water storage tank will be provided to a dedicated underground fire loop piping system. The fire hydrants and the fixed suppression systems will be supplied from the fire-water loop. Fixed fire suppression systems will be installed at determined fire risk areas. Sprinkler systems also will be installed in the administration/maintenance building as required by NFPA and local code requirements. The CTG units will be protected by a carbon dioxide fire protection system. Hand-held fire extinguishers of the appropriate size and rating will be located in accordance with NFPA 10 throughout the facility.

Section 5.5, Hazardous Materials Handling, includes additional information on fire and explosion risk, and Section 5.10, Socioeconomics, provides information on local fire protection capability.

2.1.13 Plant Auxiliaries

The following systems will support, protect, and control the generating facility.

2.1.13.1 Lighting

The lighting system provides personnel with illumination for operation under normal conditions and for egress under emergency conditions. The system also provides 120-volt convenience outlets for portable lamps and tools.

2.1.13.2 Grounding

The electrical system is susceptible to ground faults, lightning, and switching surges that result in high voltage that constitutes a hazard to personnel and electrical equipment. The station grounding system provides an adequate path to permit the dissipation of current created by these events.

The station grounding grid will be designed for adequate capacity to dissipate the ground fault current from the ground grid under the most severe conditions in areas of high ground fault current concentration. The grid spacing will maintain safe voltage gradients. Bare conductors will be installed below grade in a grid pattern. Each junction of the grid will be bonded together by an exothermic weld. Ground resistivity readings will be used to determine the necessary numbers of ground rods and grid spacing to ensure safe step and touch potentials under severe fault conditions. Grounding conductors will be brought from the ground grid to connect to building steel and non-energized metallic parts of electrical equipment.

2.1.13.3 Distributed Control System

The DCS provides modulating control, digital control, monitoring, and indicating functions for the plant power block systems.

The DCS will provide the following functions:

- Coordinate control of the STG, CTGs, HRSGs, and other systems
- Control the balance-of-plant systems in response to plant demands
- Monitor controlled plant equipment and process parameters and deliver this information to plant operators
- Provide control displays (printed logs, LCD video monitors) for signals generated within the system or received from I/O
- Provide consolidated plant process status information through displays presented in a timely and meaningful manner
- Provide alarms for out-of-limit parameters or parameter trends, display on alarm video monitor(s), and record on an alarm log printer
- Provide storage and retrieval of historical data

The DCS will be a redundant microprocessor-based system and will consist of the following major components:

- PC-based operator consoles with LCD video monitors
- I/O cabinets
- Historical data unit
- Printers
- Data links to the combustion turbine and steam turbine control systems

The DCS will have a functionally distributed architecture allowing integration of balance-of-plant equipment that may be controlled locally via a programmable logic controller. The DCS will interface with the CTG and STG control systems to provide remote control capabilities, as well as data acquisition, annunciation, and historical storage of turbine and generator operating information. The system will be designed with sufficient redundancy to preclude a single device failure from significantly affecting overall plant control and operation. This also will allow critical control and safety systems to have redundancy of controls and a UPS. As part of the quality control program, daily operator logs will be available for review to determine the status of the operating equipment.

2.1.13.4 Cathodic Protection

The cathodic protection system will be designed to control the electrochemical corrosion of designated metal piping buried in the soil. Depending on the corrosion potential and the site soils, either passive or impressed current cathodic protection may be provided.

2.1.13.5 Service Air

The service air system will supply compressed air to hose connections for general plant use. Service air headers will be routed to hose connections located at various points throughout the facility. The instrument air system will provide the source of air for the service air system. Each service air header will include a backpressure regulating valve to maintain a minimum instrument air system pressure, regardless of service air use.

2.1.13.6 Instrument Air

The instrument air system will provide dry air to pneumatic operators and devices. An instrument air header will be routed to locations within the facility equipment areas and within the water treatment facility where pneumatic operators and devices will be located.

2.1.14 Interconnection to the Electrical Grid

The two CTGs and the STG will each be connected to separate two-winding, three-phase, step-up transformers that will be connected to the 230-kV switchyards. Separate switchyards will be provided for each the three units. Each switchyard will consist of a 230-kV, SF6 circuit breaker and air break disconnect switches and will be connected to the generation tie line in a radial feed scheme. From the switchyard, the generated power will be transmitted via the single-circuit, 230-kV generation tie line approximately 2.4 miles to PG&E's Contra Costa Substation. Refer to Section 3.0 for additional information on the switchyards and generation tie line.

2.2 Project Construction

2.2.1.1 Schedule

Construction of the generating facility, from site preparation and grading to commercial operation, is expected to take place from the first quarter of 2011 to the fourth quarter of 2013 (33 months total). Major milestones are listed in Table 2.2-1.

TABLE 2.2-1
CCGS Project Schedule Major Milestones

Activity	Date
Begin Construction	First quarter 2011
Startup and Test	Second quarter 2013
Commercial Operation	Fourth quarter 2013

There will be an average and peak workforce of approximately 303 and 729, respectively, of construction craft people, supervisory, support, and construction management personnel on site during construction (see Table 5.10-8 in Section 5.10, Socioeconomics).

Typically, noisy construction will be scheduled to occur between 6:00 a.m. and 7:00 p.m. Monday through Saturday. Additional hours may be necessary to make up schedule deficiencies or to complete critical construction activities (for example, pouring concrete at night during hot weather, working around time-critical shutdowns and constraints). During some construction periods and during the startup phase of the project, some activities will continue 24 hours per day, 7 days per week.

2.2.1.2 Workforce

The peak construction site workforce level is expected to last from month 10 through month 30 of the 33-month construction period, with the peak being month 23. Table 2.2-2 provides an estimate of the average and peak construction traffic during the 33-month construction period.

TABLE 2.2-2
Estimated Average and Peak Construction Traffic for the CCGS

Vehicle Type	Average Daily Round Trips	Peak Daily Round Trips
Construction Workers	303	729
Deliveries	5	25
Total	308	754

2.2.1.3 Laydown

Construction laydown and parking areas will be within existing site boundaries, on a 20-acre parcel east of the plant site (see Figure 1.1-3). Construction access will generally be from Bridgehead Road. Large or heavy equipment, such as the turbines, generators, step-up transformers, and HRSG modules will be delivered by rail to the existing rail siding located on the project site. Other materials and equipment will be delivered by truck.

2.2.1.4 DuPont Soil Stockpiles

DuPont has requested the use of any excess soils resulting from initial leveling and grading of the CCGS site. Figure 1.1-2 shows the locations of the three soils stockpile areas where DuPont proposes to store the stockpiled soil. DuPont plans to use this material during build-out of the DuPont Oakley Specific Plan. The Applicant will move the soils and create and stabilize these soil piles in accordance with all applicable BMPs. After this takes place, stockpiled, the soil stockpiles will be owned and maintained by DuPont in accordance with all applicable BMPs.

2.3 Facility Operation

The facility will be capable of being dispatched throughout the year and will have annual availability in the general range of 92 to 98 percent. It will be possible for plant availability to exceed 98 percent for a given 12-month period.

The CCGS will employ a staff of 22, including plant operation technicians, supervisors, administrative personnel, mechanics, engineers, chemists, and electricians (Table 2.3-1), in three rotating shifts. The facility will be capable of operating 24 hours per day, 7 days per week.

TABLE 2.3-1
Operating Employees

Classification	Number
Plant Manager	1
Operations Supervisor	1
Maintenance Supervisor	1
Plant Engineer	1
Chemistry Technician	1
Power Plant Technicians	10
Mechanical Specialty Power Plant Technicians	2
Electrical Specialty Power Plant Technician	1
Controls Specialty Power Plant Technician	1
Power Plant Assistant	1
Maintenance Planner	1
Operational Buyer	1
Total	**22**

The CCGS is designed as a base-load facility with the added capabilities of rapid startup, high turndown capability (i.e., ability to turn down to a low load), and high ramp rates. Because the combined-cycle configuration will be more efficient than any of the aging gas-fired steam generation facilities in northern California, the CCGS will be frequently dispatched and will be expected to operate at approximately a 60 to 80 percent annual capacity factor. The actual capacity factor in any month or year will depend on weather-related customer demand, load growth, hydroelectric/renewable energy supplies, generating unit retirements and replacements, the level of generating unit and transmission outages, and other factors. The exact operational profile of the plant will depend on weather conditions and the power purchaser’s economic dispatch decisions.

The facility could be operated in one or all of the following modes:

- **Base Load**. The facility would be operated at maximum continuous output for as many hours per year as dispatched by load dispatch.
- **Load Following**. The facility would be available at contractual load but operated at less than maximum available output at low load times of the day. The output of each unit would therefore be adjusted periodically, either by schedule or automatic generation control, to meet whatever load proved profitable to the power purchaser or necessary by California Independent System Operator (CAISO).
- **Partial Shutdown**. One of the CTGs/HRSGs would be shut down and the other would be operating at full load or in load following mode. If the shutdown unit is not undergoing maintenance, it will in most cases be available to the power purchaser and the CAISO as non-spinning reserve. This mode of operation can be expected to occur during average- to low-load hours (off-peak hours, weekends).

- **Full Shutdown**. This would occur if forced by economics, equipment malfunction, fuel supply interruption, transmission line disconnect, or scheduled maintenance of equipment common to all units.

As California's renewable energy portfolio continues to grow, operating in either load following or partial shutdown mode will become more and more common, thus placing an increased importance upon the rapid startup, high turndown, and high ramp rate features of the CCGS.

In the unlikely event of a situation that causes a longer-term cessation of operations, security of the facilities will be maintained on a 24-hour basis, and the California Energy Commission (CEC) will be notified. Depending on the length of shutdown, a contingency plan for the temporary cessation of operations may be implemented. Such a contingency plan will be in conformance with all applicable LORS and protection of public health, safety, and the environment. The plan, depending on the expected duration of the shutdown, could include the draining of all chemicals from storage tanks and other equipment and the safe shutdown of all equipment. All wastes will be disposed of according to applicable LORS. If the cessation of operations becomes permanent, the plant will be decommissioned (see Section 2.7, Facility Closure).

2.4 Engineering

In accordance with CEC regulations, this section, together with the engineering appendixes and Section 4.0 (Gas Supply), presents information concerning the design and engineering of the CCGS. The LORS applicable to the engineering of the CCGS are provided, along with a list of agencies that have jurisdiction, the contact persons within those agencies, and a list of the permits that will be required.

Descriptions of the design criteria are included in the following appendixes to the Application for Certification (AFC):

- Appendix 2B, Civil Engineering Design Criteria
- Appendix 2C, Structural Engineering Design Criteria
- Appendix 2D, Mechanical Engineering Design Criteria
- Appendix 2E, Electrical Engineering Design Criteria
- Appendix 2F, Control Engineering Design Criteria
- Appendix 2G, Chemical Engineering Design Criteria
- Appendix 2H, Geological and Foundation Engineering Design Criteria

Design and engineering information and data for the following systems are found in the following subsections of this AFC:

- **Power Generation**—See Section 2.1.3, Power Plant Cycle; Section 2.1.4.1, Combustion Turbine-Generators; and Section 2.1.4.3, Steam Turbine System. Also see Appendix 2D and Sections 2.1.5 through 2.1.13, which describe the various plant auxiliaries.

- **Heat Dissipation**—See Appendix 2D.

- **Cooling Water Supply System**—See Section 2.1.8, Water Supply and Use.

- **Air Emission Control System**—See Section 2.1.9, Emission Control and Monitoring, and Section 5.1, Air Quality.
- **Waste Disposal System**—See Section 2.1.10, Waste Management, and Section 5.14, Waste Management.
- **Noise Abatement System**—See Section 5.7, Noise.
- **Switchyards/Transformer Systems**—See Section 2.1.5, Major Electrical Equipment and Systems; Section 2.1.13.2, Grounding; Section 2.1.5.1, AC Power—Transmission; Section 2.1.14, Interconnection to Electrical Grid; Section 3.0, Electric Transmission; and Appendix 2E.

2.4.1 Facility Safety Design

The CCGS will be designed to maximize safe operation. Potential hazards that could affect the facility include earthquake, flood, and fire. Facility operators will be trained in safe operation, maintenance, and emergency response procedures to minimize the risk of personal injury and damage to the plant.

2.4.2 Natural Hazards

The principal natural hazards associated with the CCGS site are earthquakes and floods. The site is located in Seismic Risk Zone 4. Structures will be designed to meet the seismic requirements of California Code of Regulations Title 24 and the California Building Code. Section 5.4, Geologic Hazards and Resources, discusses the geological hazards of the area and site. This section includes a review of potential geologic hazards, seismic ground motions, and the potential for soil liquefaction caused by ground shaking. Appendix 2C includes the structural seismic design criteria for the buildings and equipment.

According to the Federal Emergency Management Agency (see Section 5.15), the site is not within the 100-year floodplain. Section 5.15, Water Resources, includes additional information on the potential for flooding.

2.4.3 Emergency Systems and Safety Precautions

This section discusses the fire protection systems, emergency medical services, and safety precautions to be used by project personnel. Section 5.10, Socioeconomics, includes additional information on area medical services, and Section 5.16, Worker Safety, includes additional information on safety for workers. Appendixes 2B through 2H contain the design practices and codes applicable to safety design for the project. Compliance with these requirements will minimize project effects on public and employee safety.

2.4.3.1 Fire Protection Systems

The project will rely on onsite fire protection systems and local fire protection services.

2.4.3.1.1 Onsite Fire Protection Systems

The fire protection systems are designed to protect personnel and limit property loss and plant downtime from fire or explosion. The project will have the following fire protection systems.

Carbon Dioxide and Dry Chemical Fire Protection Systems. These systems protect the CTGs and certain accessory equipment compartments from fire. The system will have fire detection sensors in all protected compartments. Actuating one sensor will provide a high-temperature alarm on the CTG control panel. Actuating a second sensor will trip the CTG, turn off ventilation, close ventilation openings, and automatically release the gas and chemical agents. The gas and chemical agents will be discharged at a design concentration adequate to extinguish the fire.

Sprinkler and Deluge Systems. These systems protect STG equipment, buildings, and large transformers and specific electrical equipment rooms. The STG pedestal area will be protected by an automatic dry pipe sprinkler system. The STG lube oil reservoir will be protected by dry pilot sprinklers, and the STG bearing areas will be protected with pre-action sprinkler systems. Buildings will generally be protected by automatic wet-type sprinkler systems. Large transformers (e.g., the generator step-up and auxiliary transformers) will be protected by automatic water spray (deluge) systems. Electrical equipment and battery rooms will be protected with pre-action sprinkler systems.

Fire Hydrants/Hose Stations. This system will supplement the plant's fixed fire suppression systems. Water will be supplied from the plant fire water system.

Fire Extinguisher. The plant administrative/control/warehouse/maintenance building, water treatment building, and other structures will be equipped with portable fire extinguishers as required by the local fire department.

2.4.3.1.2 Local Fire Protection Services

In the event of a major fire, the plant personnel will be able to call upon the East Contra Costa Fire Protection District for assistance. The Hazardous Materials Business Plan (see Section 5.5, Hazardous Materials Handling) for the plant will include all information necessary to allow firefighting and other emergency response agencies to plan and implement safe responses to fires, spills, and other emergencies.

2.4.3.2 Personnel Safety Program

The CCGS project will operate in compliance with federal and state occupational safety and health program requirements. Compliance with these programs will minimize project effects on employee safety. These programs are described in Section 5.16, Worker Safety.

2.5 Facility Reliability

This section discusses the expected facility availability, equipment redundancy, fuel availability, water availability, and project quality control measures.

2.5.1 Facility Availability

The facility will be designed to operate between about 25 and 100 percent of base load to support dispatch service in response to customer demands for electricity.

The CCGS will be designed for an operating life of 30 years. Reliability and availability projections are based on this operating life. Operation and maintenance procedures will be consistent with industry standard practices to maintain the useful life status of plant components.

The percent of time that the combined-cycle power plant is projected to be operated is defined as the “service factor.” The service factor considers the amount of time that a unit is operating and generating power, whether at full or partial load. The projected service factor for the combined-cycle power block, which considers projected percent of time of operation, differs from the equivalent availability factor (EAF), which considers the projected percent of energy production capacity achievable.

The EAF may be defined as a weighted average of the percent of full energy production capacity achievable. The projected equivalent availability factor for the CCGS is estimated to be approximately 92 to 98 percent. The EAF differs from the “availability of a unit,” which is the percent of time that a unit is available for operation, whether at full load, partial load, or standby.

2.5.2 Redundancy of Critical Components

The following subsections identify equipment redundancy as it applies to project availability. Specifically, redundancy in the combined-cycle power block and in the balance-of-plant systems that serve it is described. The combined-cycle power block will be served by the following balance-of-plant systems: fuel supply system, DCS, boiler feedwater system, condensate system, demineralized water system, power cycle makeup and storage, steam condensing system, closed-cycle cooling water system, and compressed air system. Major equipment redundancy is summarized in Table 2.5-1.

2.5.2.1 Combined-cycle Power Block

Two separate CTG/HRSG power generation trains will operate in parallel within the combined-cycle power block. Each train will be powered by a CTG. Each CTG will provide approximately 28 to 34 percent of the total unfired combined-cycle power block output (assuming both trains operating). The heat input from the exhaust gas from each CTG will be used in the steam generation system to produce steam. Thermal energy in the steam from the steam generation system will be converted to mechanical energy and then to electrical energy in the STG subsystem. The expanded steam from the STG will be condensed and recycled to the feedwater system. Power from the STG subsystem will contribute approximately 33 to 44 percent of the total unfired combined-cycle power block output (assuming both CTG/HRSG trains operating). Major equipment redundancies are listed in Table 2.5-1.

TABLE 2.5-1
Major Equipment Redundancy

Description	Number	Note
Combined-Cycle CTGs and HRSGs	2 – 50% trains	Steam turbine bypass system allows both CTG/HRSG trains to operate at base load with the steam turbine out of service
STG	1 – 100%	See note above pertaining to CTGs and HRSGs
HRSG Feedwater pumps	2–100% per HRSG	—
Condensate Pumps	3 – 50%	—

TABLE 2.5-1
Major Equipment Redundancy

Description	Number	Note
Air-Cooled Condenser	1 – 100%	Condenser must be in operation for plant to operate, however, it will include approximately 30 cells, thus there is a level of redundancy in fans, gearboxes, and motors.
Auxiliary Cooling Water Pumps	2 – 100%	—
Air-Cooled Heat Exchanger (Auxiliary Cooling Water)	1 – 100%	Redundancy will be provided by evaporative fluid cooler.
Evaporative Fluid Cooler (Auxiliary Cooling Water)	1 – 100%	Redundancy will be provided by air-cooled heat exchanger except on hot days when the evaporative fluid cooler will be required to operate.
Air Compressors	2 – 100% or 3 – 50%	—
Fuel Gas Compressors	2 – 50%	Delivery pressure is such that gas compressors are expected to rarely operate.
Reverse Osmosis Units	2 – 100%	—
Mixed Bed Demineralizers	100% spare capacity	Rack space for offsite regenerated bottles or skids.

2.5.2.2 CTG Subsystems

The CTG subsystems will include the combustion turbine, inlet air filtration, cooling/heating system, turbine and generator lubrication oil systems, starting system, fuel system, generator and excitation systems, and turbine control and instrumentation. The combustion turbine will produce thermal energy through the combustion of natural gas. The thermal energy will be converted into mechanical energy through rotation of the combustion turbine, which drives the compressor and generator. Exhaust gas from the combustion turbine will be used to produce steam in the associated HRSG. 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 the sequence logic.

2.5.2.3 HRSG Subsystems

The steam generation system 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 for the production of steam. This heat transfer will produce steam at the pressures and temperatures required by the steam turbine. The HRSG system will consist of ductwork, heat transfer sections, an SCR system, and an oxidation catalyst module, as well as safety and auto relief valves and processing of continuous and intermittent blowdown drains.

2.5.2.4 STG Subsystems

The steam turbine will convert the thermal energy to mechanical energy to drive the STG shaft to make electrical energy in the generator. The basic subsystems will include the steam turbine and auxiliary systems, turbine and generator lubrication oil systems, generator/exciter system, and turbine control and instrumentation.

2.5.2.5 Plant Distributed Control System

The DCS will be a redundant microprocessor-based system and will have a functionally distributed architecture comprising a group of similar redundant processing units; these units will be linked to a group of operator consoles and an engineer work station by redundant data highways. Each processor will be programmed to perform specific dedicated tasks for control information, data acquisition, annunciation, and historical purposes. Because they will be redundant, no single processor failure can cause or prevent a unit trip.

The DCS will interface with the control systems furnished by the CTG, STG, HRSG, fuel gas compressors, and zero-liquid discharge system suppliers to provide remote control capabilities, as well as data acquisition, annunciation, and historical storage of turbine and generator operating information.

The system will be designed with enough redundancy to preclude a single device failure from significantly affecting overall plant control and operation. Consideration will be given to the action performed by the control and safety devices in the event of control circuit failure. Controls and controlled devices will move to the safest operating condition upon failure.

Plant operation will be controlled from the operator panel in the control room. The operator panel will consist of five individual CRT/keyboard consoles, one engineering workstation, and one historian workstation. Each CRT/keyboard console will be an independent electronic package so that failure of a single package will not disable more than one CRT/keyboard. The engineering workstation will allow the control system operator interface to be revised by authorized personnel.

2.5.2.6 Boiler Feedwater System

The boiler feedwater system will transfer feedwater from the LP steam drum to the HP and IP sections of the HRSGs. The system will consist of two, 100-percent-capacity pumps for supplying each HRSG. Each pump will be multistage, horizontal, and motor-driven and will include regulating control valves, minimum flow recirculation control, and other associated pipes and valves. LP system will receive feedwater directly from the LP economizer using the pressure supplied by the condensate pumps.

2.5.2.7 Condensate System

The condensate system will provide a flow path from the condensate receiver to the HRSG LP economizers. The condensate system will include three, 50-percent-capacity, multistage, vertical, motor-driven condensate pumps.

2.5.2.8 Power Cycle Makeup Water Treatment System

The cycle makeup will include two, 100-percent-capacity trains of two-pass reverse osmosis equipment followed by offsite-regenerated mixed bed demineralizer bottles. Sufficient bottle rack space will be provided to accommodate 200 percent of the required capacity of mixed bed demineralizer bottles or skids.

2.5.2.9 Power Cycle Makeup and Storage

The power cycle makeup and storage subsystem provides demineralized water storage and pumping capabilities to supply high purity water for system cycle makeup, CTG water wash, and chemical cleaning operations. The major components of the system are a single demineralized water storage tank and two 100-percent-capacity, horizontal, centrifugal, cycle makeup water pumps.

2.5.2.10 Compressed Air System

The compressed air system will be designed to supply service and instrument air for the facility. Dry, oil-free instrument air will be provided for pneumatic operators and devices throughout the plant. Compressed service air will be provided to appropriate areas of the plant as utility stations consisting of a ball valve and quick disconnect fittings.

The instrument air system will be given demand priority over the service air system. A backpressure control valve will cut off the air supply to the service air header so as to maintain the minimum required instrument air pressure.

Two, 100-percent-capacity or three, 50-percent-capacity, oil free, rotary screw package air compressors will supply compressed air to the service and instrument air systems. Two, 100-percent capacity, heat-less desiccant air dyers will be provided to dry the service and instrument air.

2.5.3 Fuel Availability

Fuel will be delivered via a new 140-foot-long pipeline that will connect into PG&E's Line 303 natural gas transmission line immediately west of the project site (see Section 4.0). The project owner may include a secondary connection to also deliver fuel to the CCGS via a 230-foot long pipeline from PG&E's Line 400 natural gas transmission line, which is also located just west of the project site. PG&E has confirmed that its system has enough capacity to supply the CCGS from this location via either of these pipelines. Because the Antioch Terminal is adjacent to the CCGS, neither of these pipelines would extend offsite into public right-of-way.

2.5.4 Water Availability

The CCGS will use, on average, 240 acre-feet per year of potable water provided by the Diablo Water District for power plant cooling and process water, fire protection, and potable uses.

The availability of water to meet the needs of the CCGS is discussed in more detail in Section 5.15, Water Resources. A will-serve letter from the Diablo Water District is included in Appendix 2I.

2.5.5 Sewer and Wastewater Treatment Availability

The CCGS will discharge, on average, 4341 million gallons per year of wastewater, consisting of process and sanitary wastewater, to the ISD sewer system.

The availability of wastewater collection and treatment capacity to meet the needs of the CCGS is discussed in more detail in Section 5.15, Water Resources. A will-serve letter from the ISD is included in Appendix 2J.

2.5.6 Project Quality Control

The quality control program that will be applied to the CCGS is summarized in this subsection. The objective of the quality control program is to ensure that all systems and components have the appropriate quality measures applied, whether during design, procurement, fabrication, construction, or operation. The goal of the quality control program is to achieve the desired levels of safety, reliability, availability, operability, constructability, and maintainability for generating electricity.

The required quality assurance for a system is obtained by applying controls to various activities, according to the activity being performed. For example, the appropriate controls for design work are checking and review, and the appropriate controls for manufacturing and construction are inspection and testing. Appropriate controls will be applied to each of the various activities for the project.

2.5.6.1 Project Stages

For quality assurance planning purposes, the project activities have been divided into the following stages that apply to specific periods during the project:

- **Conceptual Design Criteria.** Activities such as definition of requirements and engineering analyses.
- **Detail Design.** Activities such as the preparation of calculations, drawings, and lists needed to describe, illustrate, or define systems, structures, or components.
- **Procurement Specification Preparation.** Activities necessary to compile and document the contractual, technical, and quality provisions for procurement specifications for plant systems, components, or services.
- **Manufacturer's Control and Surveillance.** Activities necessary to ensure that the manufacturers conform to the provisions of the procurement specifications.
- **Manufacturer Data Review.** Activities required to review manufacturers' drawings, data, instructions, procedures, plans, and other documents to ensure coordination of plant systems and components, and conformance to procurement specifications.
- **Receipt Inspection.** Inspection and review of product at the time of delivery to the construction site.
- **Construction/Installation.** Inspection and review of storage, installation, cleaning, and initial testing of systems or components at the facility.
- **System/Component Testing.** Actual operation of generating facility components in a system in a controlled manner to ensure that the performance of systems and components conform to specified requirements.

- **Plant Operation.** As the project progresses, the design, procurement, fabrication, erection, and checkout of each generating facility system will progress through the stages defined above.

2.5.6.2 Quality Control Records

The following quality control records will be maintained for review and reference:

- Project instructions manual
- Design calculations
- Project design manual
- Quality assurance audit reports
- Conformance to construction records drawings
- Procurement specifications (contract issue and change orders)
- Purchase orders and change orders
- Project correspondence

For procured component purchase orders, a list of qualified suppliers and subcontractors will be developed. Before contracts are awarded, the subcontractors' capabilities will be evaluated. The evaluation will consider suppliers' and subcontractors' personnel, production capability, past performance, and quality assurance program.

During construction, field activities are accomplished during the last four stages of the project: receipt inspection, construction/installation, system/component testing, and plant operations. The construction contractor will be contractually responsible for performing the work in accordance with the quality requirements specified by the contract.

The subcontractors' quality compliance will be surveyed through inspections, audits, and administration of independent testing contracts.

A plant operation and maintenance program, typical of a project this size, will be implemented by the CCGS to control operation and maintenance quality. A specific program for this project will be defined and implemented during initial plant startup.

2.6 Thermal Efficiency

The maximum gross thermal efficiency that can be expected from a natural gas-fired, air-cooled, combined-cycle plant using two F-class combustion turbine units is approximately 50.5 percent on a HHV basis. This level of efficiency is achieved when a facility is base-loaded. Other types of operations, particularly those at less than full gas turbine output, will result in lower efficiencies. The basis of the CCGS operations will be system dispatch within California's power generation and transmission system. It is expected that the CCGS will be primarily operated in load-following or cycling service. The number of startup and shutdown cycles is expected to range between 50 and 300 per year per CTG.

Plant fuel consumption will depend on the operating profile of the power plant. It is estimated that the range of fuel consumed by the power plant will be from a minimum of near zero Btus per hour to a maximum of approximately 4,300 MMBtu/hr (HHV basis) at minimum ambient conditions.

The net annual electrical production of the CCGS cannot be accurately forecasted at this time because of uncertainties in the system load dispatching model and the associated policies. However, because of the efficiency of the plant, its operating characteristics will be as described above. The maximum annual generation possible from the facility is estimated to be approximately 5,300 gigawatt hours per year (based on an annual average facility base load MW rating of 624 MW and 97 percent capacity factor).

2.7 Facility Closure

Facility closure can be temporary or permanent. Temporary closure is defined as a shutdown for a period exceeding the time required for normal maintenance, including closure for overhaul or replacement of the combustion turbines. Causes for temporary closure include a disruption in the supply of natural gas or damage to the plant from earthquake, fire, storm, or other natural acts. Permanent closure is defined as a cessation in operations with no intent to restart operations because of plant age, damage to the plant beyond repair, economic conditions, or other reasons. The following sections discuss temporary and permanent facility closure.

2.7.1 Temporary Closure

For a temporary facility closure, where there is no release of hazardous materials, security of the facilities will be maintained on a 24-hour basis, and the CEC and other responsible agencies will be notified. Depending on the length of shutdown necessary, a contingency plan for the temporary cessation of operations will be implemented. The contingency plan will be conducted to ensure conformance with all applicable LORS and the protection of public health, safety, and the environment. The plan, depending on the expected duration of the shutdown, may include the draining of all chemicals from storage tanks and other equipment and the safe shutdown of all equipment. All wastes will be disposed of according to applicable LORS, as discussed in Section 5.14.

Where the temporary closure includes damage to the facility, and there is a release or threatened release of regulated substances or other hazardous materials into the environment, procedures will be followed as set forth in a Risk Management Plan and a Hazardous Materials Business Plan to be developed as described in Section 5.5. Procedures will include methods to control releases, notification of applicable authorities and the public, emergency response, and training for plant personnel in responding to and controlling releases of hazardous materials. Once the immediate problem is solved, and the regulated substance/hazardous material release is contained and cleaned up, temporary closure will proceed as described above for a closure where there is no release of hazardous materials.

2.7.2 Permanent Closure

The planned life of the generation facility is 30 years. However, if the generation facility were still economically viable, it could be operated longer. It is also possible that the facility could become economically noncompetitive in less than 30 years, forcing early decommissioning. Whenever the facility is permanently closed, the closure procedure will follow a plan that will be developed as described below.

The removal of the facility from service, or decommissioning, may range from "mothballing" to the removal of all equipment and appurtenant facilities, depending on conditions at the time. Because the conditions that would affect the decommissioning decision are largely unknown at this time, these conditions would be presented to the CEC when more information is available and the timing for decommissioning is more imminent.

To ensure that public health and safety and the environment are protected during decommissioning, a decommissioning plan would be submitted to the CEC for approval prior to decommissioning. The plan would address the following:

- Proposed decommissioning activities for the facility and all appurtenant facilities constructed as part of the facility
- Conformance of the proposed decommissioning activities to all applicable LORS and local/regional plans
- Activities necessary to restore the site if the plan requires removal of all equipment and appurtenant facilities
- Decommissioning alternatives other than complete restoration
- Associated costs of the proposed decommissioning and the source of funds to pay for the decommissioning

In general, the decommissioning plan for the facility will attempt to maximize the recycling of all facility components. If possible, unused chemicals will be sold back to the suppliers or other purchasers or users. All equipment containing chemicals will be drained and shut down to ensure public health and safety and to protect the environment. All nonhazardous wastes will be collected and disposed of in appropriate landfills or waste collection facilities. All hazardous wastes will be disposed of according to all applicable LORS. The site will be secured 24 hours per day during decommissioning activities.