4.12 UTILITIES AND SERVICE SYSTEMS

4.12.1 SETTING

ELECTRICITY

Typically, the analysis of impacts concerning electricity-related issues is concerned with the question of whether or not the proposed project will use large amounts of electrical energy and whether sufficient electrical supply exists. For this project, which concerns the change of ownership of the electricity supply itself, this question is not applicable. The project concerns the production of electricity rather its consumption. The germane question thus becomes the impact the project could have on the reliability of the electric supply system. The issues involved in reliable electric service are described below.

Reliability

Electrical service is an integral part of modern society and its interruption can cause severe adverse consequences. The health, safety and welfare of the public depend on a reliable uninterrupted supply of electricity. Without electricity, police and fire services are disrupted, electrical mass transit systems are halted (potentially stranding people in tunnels), inhabitants of high rise buildings are deprived of ventilation and elevator service, hospitals and medical clinics' capabilities are limited, perishable food cannot be preserved, and many businesses are unable to operate. The consequences of a long-term electrical system failure can be particularly catastrophic. For example, in February 1998 the central commercial downtown of Auckland, New Zealand's largest city, lost power due to multiple concurrent failures of buried transmission cables sharing a single transmission corridor. Repairs took many weeks and included constructing a major new overhead transmission interconnection from scratch. In the interim, hundreds of businesses and residential buildings were forced to shut down in a many-block area.

The importance of a reliable electrical supply has long been a primary consideration in the design and construction of electrical generation, transmission and distribution systems, as well as a paramount concern of public utilities and their regulators. In determining whether to approve PG&E's divestiture application, the CPUC must ensure that facilities needed to maintain the reliability of the electric supply remain available and operational. This must be done, to the extent possible, consistent with maintaining open competition and avoiding an over concentration of market power.

It is useful to understand what the term "reliability" means in the electrical service context and how it relates to the major components of the electrical service system. Utilities and regulators alike recognize that it is impossible to provide an electric power supply that is 100 percent reliable. Given this inherent limitation, the reliability of the electrical service system may be defined several ways. From an electric service customer's perspective, it is the answer to the simple question, "Is the power on?" From the utilities' and regulators' perspective, system reliability is determined by several critical criteria. Reliability criteria include the availability of sufficient electric power generation to meet growing customer demand; the time required to

restore power to customers following an outage; and the degree of built-in system redundancy to handle unexpected problems.

The electric service system consists of essentially three components (see Figure 1.1):

- Electric generation facilities – fossil, nuclear, geothermal, wind, solar, and hydroelectric generators;
- Transmission systems – long distance transmission systems and substations that move the generated power from the source to the local distribution systems; and
- Local distribution systems – local networks of substations, transformers, and wires that deliver the electrical power to the customer.

Each of these parts has distinct norms for reliability. For generation, the available electric generation capacity is generally considered adequate when available capacity is less than demand not more than one day in every ten years (Weatherwax, 1998). (Such a case would cause a blackout or loss of electricity within the service system.) For transmission systems, reliability is generally treated as qualitative criteria that preclude single outages from endangering the system. Generally speaking, in the Western Systems Coordinating Council (WSCC),[1] most significant disturbances occur due to these failures.

The reliability of local distribution systems is judged with the understanding that outages of electric services do occur as much as about one hour per year and that the most important criterion is the quick restoration of service. The current CPUC standard for local distribution reliability requires utilities to maintain sufficient resources to restore power within 24 hours to 90 percent of customers who lose service in an outage; within 48 hours to another 5 percent of customers who lose power; and within 72 hours to the remaining 5 percent of customers who lose power (D.98-03-036).

It is also important to understand that reliability, as it relates to the proposed project (divestiture of fossil and geothermal power plants) is primarily concerned with the generation portion of these three major electric service system components since, except in very limited instances, the proposed sales would not involve transmission or distribution lines.

In addition to these statewide electric service system norms, three additional reliability criteria sets apply to one or more of the power plants being divested:

- The San Francisco Reliability Requirements – address the specific needs for City generation to support load within the City. These requirements directly affect the Hunters Point and Potrero Power Plants. Of particular importance to these requirements are the San Francisco Operating Criteria (SFOC), which are followed by PG&E and the ISO to support these requirements. The SFOC are important because without local generation, there is insufficient transmission into the City to support San Francisco loads.

[1] The WSCC region is comprised of California, the Pacific northwestern, the mountain states and inland southwestern states extending as far as western Texas, the Mexican state of Baja California del Norte and the Provinces of British Columbia and Alberta.

- The Bay Area Reliability Requirements – protect electrical service for the San Francisco Bay Area. These requirements affect all the project plants, including the Geysers power plant.

- The North Geysers Unit Loading Instructions – address specific electrical service for the Lake and Mendocino County areas. These requirements affect Geysers Plants Nos. 5-8 and are expected to soon apply to No. 11 as well.

These three sets of reliability criteria are discussed below. Additional considerations involving electrical system reliability are also addressed in Chapters 5 and 6 of this report.

San Francisco Reliability Requirements

Under the regulatory supervision of the CPUC, PG&E has designed and constructed an electrical system for San Francisco that, taking into account the unique geographical features of the City, provides reliability of electrical service at least equal to that provided other cities served by PG&E.

Transmission and Distribution Service

San Francisco is located at the end of a peninsula. Surrounded by water on three sides, the only overland approach is from the south. Overhead transmission lines, consisting of five 115-kv circuits, and one underground 230-kv cable, share a common corridor from a single node, the San Mateo Substation (San Mateo), north to the Martin Substation (Martin) (see Figure 4.12-1). North of Martin, the system consists of two underground 230-kv circuits, which extend to the Embarcadero Substation, in the heart of downtown, and a 115-kv underground network which extends to the Hunters Point, Potrero, Bayshore, Mission, and Larkin Substations.

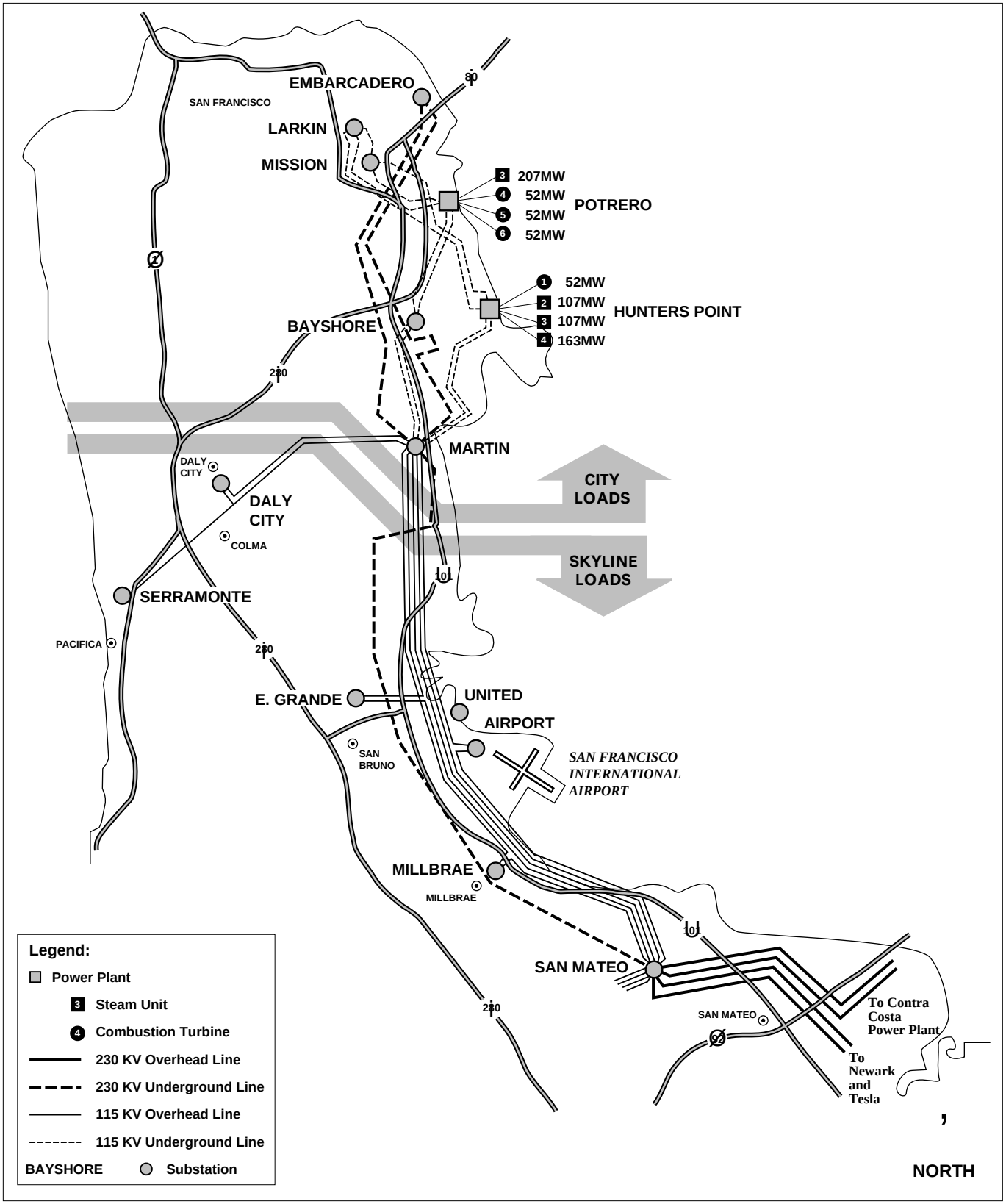
The transmission corridor serves San Francisco and the former Skyline District (in both San Francisco and San Mateo County) loads (i.e., the aggregate demand for electricity from inhabitants of these areas) and is rated at about 730 MW. The San Francisco portion of this corridor is rated to at least 400 MW, depending on coincident Skyline loads. The peak demand for electricity in San Francisco in 1997 was 909 MW. Therefore, San Francisco's electrical needs cannot be met by transmission alone and the City relies on electricity generated from facilities within the City to meet at least part of its demand. In addition, generation in the City provides dynamic voltage support to the electricity that arrives in the City via the transmission lines.

The limiting feature of the City's transmission interconnection with the rest of the PG&E system is the single transmission corridor, the San Mateo–Martin corridor. If this corridor is severed, the only generation available to San Francisco is that which can be supplied from within the City.

San Francisco Generating Units

There are eight electric power generators located within San Francisco at two different locations, Potrero and Hunters Point. The approximately 584 MW of steam boilers (Potrero 3 and Hunters Point 2-4) are designed to run continuously for long periods. The 200 MW or so[2] of

[2] Ratings vary several percent depending upon ambient temperature.



Divestiture of Electric Generation Assets / 980125 ■

SOURCE: Sierra Energy and Risk Assessment, Inc.

Figure 4.12-1
San Francisco Peninsula Electric
Transmission System

distillate-fired combustion turbines (CTs) (Hunters Point 1 and Potrero 4-6) are designed to meet emergency conditions and/or back up the steam units.[3] While the CTs are all the same size and make, the three Potrero units are used more because distillate fuel must be trucked to the Hunters Point Plant where only limited tank storage is available.

The Martin Separation Scheme

The SFOC tell the operators how much in-city generation is required to serve load north of the Martin Substation without overloading the transmission system feeding the City. The SFOC also serve to protect the City from two types of electrical supply interruptions: short-term, and long-term. Both may arise from total or partial loss of the San Mateo-Martin transmission interconnection.

Fundamental to the SFOC is the "Martin Separation Scheme" that is used to "island" San Francisco. This is a procedure employed by PG&E to avoid a complete blackout in San Francisco. "Islanding" is either the anticipatory or consequential separation of transmission grid areas due to system disturbances (such as electrical system outages and abnormal fluctuations of the electric current). It is automatically triggered or can be ordered to contain disturbances or protect vulnerable locations. At the time of separation, the islanded area becomes independent of the remaining transmission grid and must immediately support local loads with local generation.

Islanding requires two essential components, on-line generation on the "island" and rapidly acting load dumping relays. The changeover between loads and generating resources must be achieved in a few cycles (milliseconds). Typically, electrical generators can only "ramp up" (i.e., increase electrical generation output) at only one percent of on-line generating capacity per minute. This time span is much too long to offset a disturbance leading to separation. Once the generators ramp up, they can be very valuable in restoring load after a separation event or helping during moderate overloads of the transmission system. Therefore, only that load equal to the amount of generation which is up and operating at the time of the disturbance can be supported without interruption. CTs are useful in quickly restoring load in this way for the duration of an islanding event.

San Francisco is designed to become an electrical island when the electrical frequency deteriorates on the transmission system grid. PG&E has had in place both the automatic and operational capability to island the San Francisco peninsula north of the Martin Substation. Since the advent of electric restructuring (April 1998), control of this islanding capability has been transferred to the ISO, which will maintain this control regardless of power plant divestiture.

Should a severe system disturbance occur that causes the frequency at the Martin Substation to fall below specified thresholds and power is flowing out of the City, all of the 115-kv and 230-kv transmission lines from the San Mateo Substation are automatically opened at the Martin Substation to protect the in-city on-line generation from potential crippling damage. This completely disconnects the electrical service system in San Francisco from the rest of the outside electrical system.

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[3] Potrero Units 1 and 2 are no longer in existence.

Since its inception, the Martin Separation Scheme has been triggered at least twice. According to PG&E:

> The San Francisco Operating Criterion *[sic]* protection scheme was tested during the October 17, 1989 earthquake. The initial loss of transmission into the City automatically initiated the protection scheme. However, the subsequent loss of local area generation,[4] which tripped shortly after the earthquake struck, interrupted the remaining City loads…
>
> …[A] PG&E system disturbance also tested the San Francisco Operating Criterion *[sic]* protection scheme in December 1982. Low frequency on the system due to loss of generation outside the Bay Area caused the under-frequency relays throughout the PG&E system to shed load, including slightly over 50 percent of the City load. As the system frequency continued to fall, the City protection scheme separated San Francisco from the rest of the PG&E system. The remaining San Francisco Operating Criterion *[sic]* prevented a total power outage to the San Francisco area (PG&E, 1994).

This separation scheme for San Francisco could be triggered by a system disturbance originating as far away as Alberta, Canada, Colorado or Baja California, Mexico. In 1996, for example, a fully loaded transmission line in the Pacific Northwest sagged due to high ambient air temperatures. The line touched a tree beneath it and short-circuited. The operator in the Pacific Northwest did not notify PG&E that a critical line had failed or PG&E would have reduced purchases from the Pacific Northwest and increased indigenous generation throughout the PG&E service territory. Next, a second transmission line importing power from the Pacific Northwest failed and a cascading power outage ensued that affected customers throughout California as far away as San Diego. In this instance, San Francisco was not islanded and PG&E was able to restore electrical service by isolating its entire electrical service system throughout the State of California from the interstate electrical network. However, if this power outage had progressed differently and it had become necessary to island San Francisco, the San Francisco in-city generation units were ready to carry the load.

The Downtown Network

Upon electrical separation (or islanding) of San Francisco, loads are or will have already been dropped and/or shed until remaining loads equal the current on-line generation being output *at that instant* from the Hunters Point and Potrero power plants. Once stability (i.e., load and generation balance) has been achieved, the slow and meticulous process of restoring load, by adding supplemental generation and reconnecting lost or shed loads, can begin on an incremental basis. The Hunters Point and Potrero Power Plants thus ensure that up to 40 percent of the load is sustained in San Francisco. Without these power plants, San Francisco cannot have electrical power while it is separated from the rest of the grid.

Certain loads in San Francisco are considered more important to serve, without even a short-term interruption, than others. These are referred to as "uninterruptible" loads. According to PG&E, about 40 percent of the San Francisco peak load is carried on a distribution grid consisting of ten large distribution networks in the downtown area which is collectively referred to as the "network

[4] This specifically means here the loss of both the Hunters Point and Potrero power plants due to the 1989 earthquake. In this instance all electrical service was lost in San Francisco.

loads" or the "downtown network." This downtown system is different from typical distribution systems, which are radial in nature and capable of being quickly sectionalized to facilitate quicker restoration of service. By contrast, the downtown network is composed of a "ring" of old substations that are less readily connected to or disconnected from the system. While reestablishing service to the downtown network after an outage event is more involved, PG&E now suggests that even in a peak load situation, such load could be restored in a few hours (PG&E, 1998).

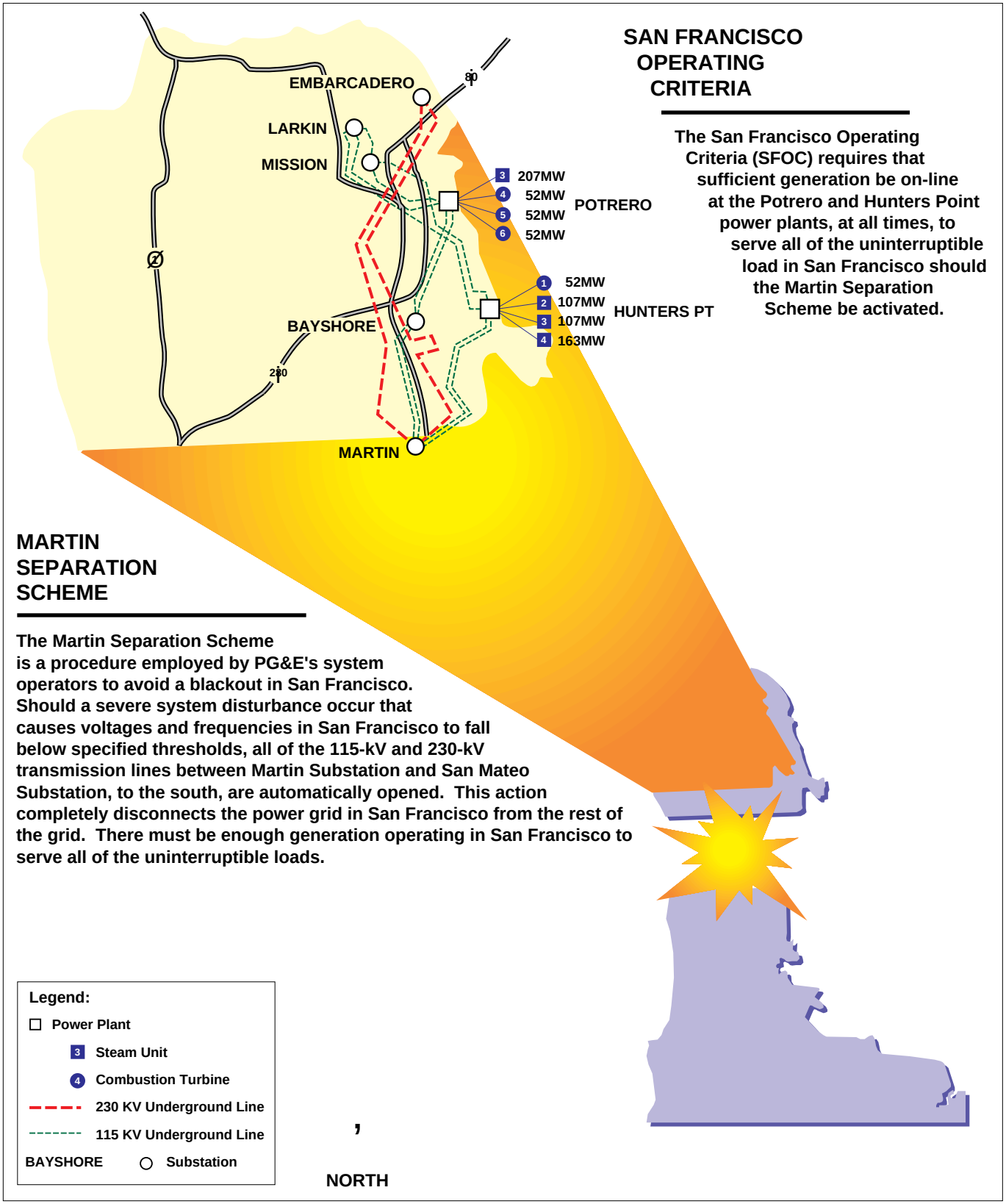
The network load includes City Hall, PG&E headquarters, the CPUC, BART and Municipal transit loads, and many of the skyscrapers of the financial district. Many of these loads cannot be interrupted, even momentarily, without possible significant health and safety impacts (e.g., trapping people in elevators and in BART trains under the bay), and too, it may prove a difficult and lengthy task to re-energize this older non-radial network.

PG&E long ago recognized the limited transmission into the City and the need to preserve some services even in a severe disturbance, and established the SFOC to protect service to downtown electricity users (see Figure 4.12-2). The SFOC establishes the protocols that control the operations of both the Potrero and Hunters Point power plants and the San Francisco peninsula transmission system. The CPUC has relied upon the SFOC to meet the reliability needs of San Francisco. PG&E has estimated that typical annual operational costs of the SFOC are as much as $3-15 million directly resulting from increased in-city generation (PG&E, 1988).

If islanding occurs, in order to protect the network loads from even momentary interruption, there must be enough generation operating at that moment in San Francisco to serve the entire downtown network. The SFOC require the System Dispatcher to load the San Francisco generation at the Potrero and Hunters Point Power Plants to supply 40 percent (PG&E, 1994) of the San Francisco load during all peak and partial peak hours (i.e., anytime local San Francisco loads exceed about 500 MW, which typically occurs Monday through Saturday between 7AM and 9PM). In 1997, peak loading on the San Francisco substations totaled 909 MW. If San Francisco were to separate from the rest of the grid at peak City loads, almost 400 MW of steam capacity must be available within milliseconds to maintain the downtown network. During off-peak periods, the SFOC is not intended to sustain even the much-reduced downtown loads.

Since a transmission network disturbance can occur at any time, the amount of local generation available to serve the downtown must include an allowance for units that may be out for maintenance at the time of a disturbance. PG&E handles this contingency by requiring the availability of additional local generation capacity equal to or larger than the largest unit currently in service. Potrero Unit 3 and Hunters Point Unit 4 are routinely on-line to provide the electrical power needed to meet the SFOC; if one of these is out of service, the remainder of the network load is protected by running Hunters Point Units 2 and/or 3 or, if necessary, one or more CTs.

Absent a new transmission corridor and distribution system upgrades, there is and will continue to be an unequivocal need for in-city generation in San Francisco. Without in-city generation, given the transmission configuration, the downtown network could lose power, with potentially



SOURCE: Sierra Energy and Risk Assessment, Inc.

Figure 4.12-2
San Francisco Operating Criteria

severe and costly consequences. Additionally, without in-city generation, given the transmission configuration, there would be a citywide blackout if and when the single interconnection between San Francisco and the outside power transmission grid were lost.

San Francisco Corridor Protection Scheme

In addition to protecting against short-term blackouts of the downtown network, the SFOC protects San Francisco against long-term blackouts when certain transmission outages occur in the San Mateo corridor. The worst single contingency on this corridor -- the worst single transmission line loss that is considered likely by itself -- is the loss of the 230 kV underground cable. This could be caused by such diverse factors as operator error or a transformer outage.

In the event of such a partial transmission outage, little or no San Francisco load need necessarily be shed, because the remaining lines can support the remaining electrical energy for a brief interval without overheating -- perhaps 30 minutes. Before that time, either the excess loads must be dropped to prevent losing the remainder of the transmission interconnection, or generation must be brought on-line north of Martin to carry it and take the load off the interconnection.

Unlike the Martin Separation Scheme that requires on-line generation equal to the load to be saved, partial loss of the transmission corridor may be protected with initially idle in-city generating capacity -- either any idle capacity of currently-running steam boilers which are already running, or CTs, which can spin up well within 30 minutes.

For example, if 30 MW of the 108-MW Hunters Point Unit 3 were idle because only 78 MW are being generated, Unit 3 could then contribute 30 MW to a partial transmission outage protection scheme. The over 200 MW of CTs in San Francisco are quite expensive to run and are limited in annual hours of operation due to air quality concerns, but are ideal for this purpose. Although they typically sit idle over 95 percent of the time each year, when needed in emergencies, CTs require only about ten minutes to start. PG&E assumes for SFOC purposes that only three of the four combustion turbine units will reliably come on line when called upon in a “Capacity Required Within 30-minute” contingency invoked by the SFOC.

Recent Upgrades in the Transmission System Serving San Francisco

PG&E has just completed installation of shunt capacitors at the Metcalf Substation near south San Jose and during June 1998, began replacement of two, approximately 100 MVA (MegaVolt-Amperes) 230 to 115 kV transformers at the San Mateo Substation and replacement of 430 MVA transformers. These upgrades will permit more power to flow from the south to serve Martin Substation loads. With these changes, the amount of transfer capability into San Francisco will be elevated by about 50 MW and the new bottleneck limiting generation into the City will be underground portions of the 115 kV line near the San Francisco International Airport. These transmission upgrades could permit reduction of the SFOC-dictated minimum generation levels by up to 50 MW, depending upon the City’s total load, in order to reduce operational costs caused by out-of-order commitment and dispatch of City generation. To reduce the SFOC-dictated minimum generation levels, would require reducing by a corresponding amount the remaining uninterruptable (through upgrades to the downtown distribution network) load so that the in-city

generation and total uninterruptable load would be in balance should a separation occur during the peak of mid-peak periods.

The replacement of, and increase in, the San Mateo Substation 230 to 115 kV transformer capacity provides additional operating flexibility and the ability to accommodate additional load growth in San Francisco. The transformer upgrades do not eliminate the need to maintain each unit for reliability purposes.

Reliability Requirements Beyond San Francisco

Special electrical system reliability requirements outside of San Francisco also exist. The Bay Area unit commitment Reliability Requirements (BARR) affect all PG&E power plants being divested (Potrero, Pittsburg, Contra Costa, and the Geysers) and the North Geysers loading instructions concern Geysers Plants Nos. 5-8 and, soon, No. 11.

Bay Area Reliability Requirements

The BARR represent a set of coordinated internal PG&E operational requirements that were established to ensure that 1) all Bay Area transmission equipment is operated within normal ratings and voltages are maintained at acceptable levels; and 2) following a loss of any critical transmission circuit or generating unit serving the Bay Area, transmission equipment loadings do not exceed emergency ratings and sufficient reactive margins are available to avoid area voltage collapse (PG&E, 1997). The BARR protects electrical service for the loads primarily in the City and County of San Francisco, the former Skyline District south of San Francisco, the remainder of San Mateo County, and the counties of Alameda, Contra Costa and Santa Clara. The BARR mandates that at least minimum levels of Bay Area and nearby generation always be committed and synchronized with the electric service system. These requirements were adopted by the ISO when the ISO assumed responsibility for electrical system reliability in April 1998.

Generation that falls within the scope of the BARR includes all of the fossil-fueled and geothermal plants proposed for divestiture except for Geysers Nos. 5 through 8, (see *North Geysers Loading Instructions* below). (A current construction project will, when completed, connect Geysers No. 11 to the 115-kV system as well, and remove it from the BARR.) Also included in the BARR are PG&E's Moss Landing plant, sold to Duke Power during the first divestiture phase (A.96-11-020), and many municipal and independent power producer projects, including those among the Geysers connected to the Bay Area 230 kV system. The SFOC and San Francisco plants are fully incorporated into the BARR and observance of the SFOC is a key element in BARR compliance, especially under high Bay Area load conditions. The level of committed generation varies with temperature and is highest when the average of high temperatures in Concord, San Jose and San Francisco are expected to exceed 90°F. This reliability requirement, like most such, occasionally results in the use of less economic generation. The resulting excess operating cost can be viewed as an insurance premium against blackouts.

North Geysers Unit Loading Instructions

PG&E Geysers Plants Nos. 5-8 are not on PG&E's Bay Area 230 kV system, but instead on its Lake County 115-kV system. PG&E dispatches these "North Geysers" plants in a special fashion on a seasonal basis to avoid line overloads and instability problems in the Mendocino area (PG&E, 1997). During the summer, when the average peak temperature is expected to exceed 80°F, all four units are to be committed and their total generation held above 80 MW during the peak periods and 70 MW in non-peak periods. Non-summer requirements call for two of these Geysers units to be on-line and generating at all times. In instances of these Geysers units not being available, or being less than minimum required levels, the flows on certain 115 kV lines in the vicinity of the North Geysers must be curtailed to protect the integrity of the system.

Compliance with this requirement will be easier in the near future when transmission and substation construction is completed and Geysers No. 11 is taken off the 230 kV system and interconnected with the 115 kV system. The ISO, which adopted utilities' local reliability criteria and operating procedures wholesale when it assumed control and responsibility over its transmission as of April 1998, should continue to observe North Geysers loading instructions and modify them appropriately when No. 11's modifications are complete.

WATER

Potrero Power Plant

The San Francisco Water Department delivers water to about 2.3 million people in four counties. It receives about 85 percent of its water from the Hetch Hetchy system and about 15 percent from other sources (including groundwater and surface water from Bay Area watersheds). Water is conveyed to the San Francisco Bay Area from Hetch Hetchy reservoir across the San Joaquin Valley through a series of aqueducts, tunnels and transmission mains, with open reservoirs providing storage at multiple points along the way.

Transmission mains from the Peninsula deliver water into one or more of four terminal distribution reservoirs in San Francisco. From these reservoirs, water is gravity fed or pumped into eight covered distribution reservoirs and smaller storage tanks. From these reservoirs and tanks, water is distributed throughout the City using a network of about 1,190 miles of pipeline of diameter ranging from 2 to 60 inches.

At capacity, the City's twelve municipal reservoirs can hold approximately 414 million gallons (1,271 acre feet), about a five day supply. Lake Merced can provide an additional 2.5 billion gallons of emergency supply. The City's three largest municipal reservoirs are Sunset (174.8 million gallons), located in the Sunset District, University Mound (140.9 million gallons), located in the Portola District, and Sutro (31.4 million gallons), located between Mount Sutro and Twin Peaks. A 75-million gallon reservoir, Balboa North Basin reservoir, is planned and would be the third largest City reservoir. The City operates an ongoing program of pipe repair and replacement of about 30,000 feet of deteriorated pipe per year.

Water treatment is provided at multiple points along the water supply system from the Sierra to San Francisco. All water passing through each reservoir is chlorinated. The City operates a system-wide sampling and testing program to monitor water quality. The two water treatment plants in the system are the 160 million gallon per day (mgd) Sunol Filtration Plant, and the 180 mgd Harry W. Tracy Water (San Andreas) Treatment Plant (City and County of San Francisco, 1997b).

Contra Costa/Pittsburg Power Plants

The Contra Costa Water District (CCWD) currently provides raw (untreated) water to the Cities of Antioch, Pittsburg, and Martinez, the Diablo Water District and Southern California Water Company (serving the Bay Point community), major industrial customers, smaller industrial and business customers, and agricultural customers. In total, the CCWD provides water to approximately 400,000 people throughout north-central and eastern Contra Costa County.

CCWD obtains raw water primarily from the U.S. Bureau of Reclamation's (Reclamation) Contra Costa Canal, an element of the Central Valley Project, for the purpose of reselling the water to agriculture, industrial, and domestic users. CCWD operates raw water conveyance, water treatment, and treated water distribution facilities. The District is currently pursuing the purchase of Reclamation's Contra Costa and Ygnacio Canals, as well as other features of the Central Valley Project operated and maintained by the District.

The CCWD's primary raw water source comes from Rock Slough, east of Oakley, whose source is the Sacramento-San Joaquin Delta. The water is pumped the first seven miles of the Contra Costa Canal and then flows by gravity approximately 20 miles to Mallard Reservoir. The Mallard Reservoir, north of the City of Concord, provides raw water storage for the adjacent Bollman Water Treatment Plant, which supplies the Treated Water Service Area. CCWD also maintains a river intake at Mallard Slough near Bay Point.

CCWD delivers treated water to the Contra Costa and Pittsburg plants for restrooms, safety showers and one water fountain. Drinking water for the plants is supplemented by delivered bottled water.

Geysers Power Plant

The Geysers is not served by public water supply and distribution infrastructure. PG&E uses a private water service for delivery of potable water (in bottles) on a periodic basis. Depending on the unit site, domestic water for toilet facilities, plant cooling make-up water, and plant service areas is either provided by nearby sources, including on-site surface waters, water wells, natural springs, rain water, nearby mine shaft drains and fill subdrains, or trucked to the unit sites.

SANITARY/STORM SEWERS

Potrero Power Plant

The City and County of San Francisco Department of Public Works operates and maintains the City's sanitary and storm sewer infrastructure. The City's wastewater collection, treatment and

disposal system consists of a combined sewer system (which collects both sewage and stormwater) and three water pollution control plants (WPCP). The collection and conveyance system consists of approximately 900 miles of various sizes of underground sewer pipes and transport structures located throughout the City. Two of the City's water pollution control plants, the Southeast WPCP and the Oceanside WPCP, operate year-round, while the third plant, the North Point WPCP, operates only during wet weather. Ultimate disposal of treated wastewater effluent is currently through outfalls to both the San Francisco Bay and the Pacific Ocean.

The Southeast WPCP is located on the east side of the City, on Jerrold Avenue between Quint Street and Phelps Street. It provides secondary-level treatment for all of the east side sewage flows during dry weather. Treated dry-weather effluent from the Southeast WPCP is discharged through the Pier 80 Outfall, located east of Pier 80, to San Francisco Bay. The Oceanside WPCP, located on the Great Highway south of the San Francisco Zoo, replaced the Richmond-Sunset WPCP in Golden Gate Park which provided wastewater treatment from 1938 to 1994. It provides primary and secondary-level treatment prior to discharge to the Pacific Ocean through the 4.5-mile Southwest Ocean Outfall. Currently, the City discharges a total of about 87 mgd of treated wastewater during dry weather to San Francisco Bay and the Pacific Ocean. The North Point WPCP, located on Bay and Kearny Streets in the Embarcadero, a primary treatment facility operating only during wet weather, discharges treated wet-weather effluent to the San Francisco Bay through outfalls located under Pier 33 and Pier 45 (City and County of San Francisco, 1997b).

The City recently completed a Recycled Water Master Plan (RWMP) and a Groundwater Master Plan (GWMP). The purpose of the RWMP is to develop and use recycled water for non-potable uses within the City to preserve high quality drinking water for potable uses and at the same time improve the overall water supply reliability of the City, particularly during drought periods. The GWMP would develop local groundwater resources for both potable and non-potable uses.

The Potrero plant currently discharges certain wastewaters into the City's combined sanitary/sewer system, pursuant to a City industrial wastewater discharge permit (described in Section 4.4). However, the Potrero plant does not utilize the City's sewer infrastructure for stormwater collection. Stormwater runoff at the Potrero plant is collected by on-site PG&E-maintained stormwater collection facilities, and discharged to the San Francisco Bay, pursuant to National Pollution Discharge Elimination System (NPDES) permits (described in Section 4.4).

Contra Costa/Pittsburg Power Plants

Sanitary sewer service for the Cities of Antioch, Pittsburg and the portions of unincorporated East Contra Costa County is provided by the Delta Diablo Sanitation District (DDSD). DDSD serves approximately 150,000 East County residents. The DDSD wastewater treatment plant is located in Antioch, north of the Pittsburg-Antioch Highway. The DDSD sewage treatment plant processed an average of 12.8 mgd of wastewater flows in 1997; and provides a treatment capacity of 16 million gpd. The treated effluent is discharged into New York Slough and the Sacramento-San Joaquin system. DDSD has responsibility for interceptor (main) pipelines in the Cities of Antioch and Pittsburg, with local collection within those cities provided by their respective public works departments (Delta Diablo Sanitation District, 1998).

Storm sewer service within unincorporated Contra Costa County is provided by the Contra Costa Public Works Department and the Contra Costa Flood Control and Water Conservation District (CCFCD). Storm sewer service within the Antioch and Pittsburg are provided by the Antioch Public Works Department and the City of Pittsburg Public Services Department, respectively.

The Contra Costa plant is not served by public sanitary sewer or stormsewer collection infrastructure. Domestic sewage at the Contra Costa plant is disposed of via on-site septic tank and leachfield systems. Stormwater runoff at the Contra Costa and Pittsburg plants is collected by on-site PG&E-maintained stormwater collection facilities, and discharged to the San Joaquin River, and Sacramento River, respectively, pursuant to NPDES permits (described in Section 4.4).

The Pittsburg plant is served by DDSD for sanitary sewer service, but is not served by public storm sewer collection infrastructure. Wastewater other than for sanitary purposes is treated by the on-site wastewater treatment system. Stormwater runoff at the Pittsburg plant is collected by on-site PG&E-maintained stormwater collection facilities, and discharged to the Sacramento River, pursuant to NPDES permits (described in Section 4.4).

Geysers Power Plant

The Geysers is not served by public sanitary and storm sewer collection infrastructure. Wastewater from the domestic and sanitary uses is discharged to on-site gray water or septic tank facilities, and then sent to the steam supplier for reinjection into the steam field. Stormwater is captured by on-site berms located around the units and also reinjected into the steam field.

SOLID WASTE

Potrero Power Plant

The City of San Francisco is served by two permitted haulers of non-hazardous waste, Sunset Scavenger Company, which serves the local neighborhoods (including the Potrero plant), and Golden Gate Disposal and Recycling Company, which serves the downtown area. Both companies are subsidiaries of Norcal Waste Systems, Inc. Waste is transported to a transfer station at the San Francisco-Brisbane border, where it is hauled by the Sanitary Fill Company to the Altamont Landfill, located northeast of Livermore in Alameda County.

San Francisco has a contract for disposal of all of its solid waste, up to a total of 15,000,000 tons, at the Altamont Landfill until 2015. That is the year the tonnage limit is expected to be reached, assuming present rates of waste generation and diversion. Approximately 4,400,000 tons of San Francisco's solid waste has been deposited in the Altamont Landfill since 1989. The City is not currently considering disposal solutions beyond those for 2015 (City and County of San Francisco, 1997a).

Approximately 35 percent of the solid waste stream in San Francisco is currently diverted from landfill disposal. Since the majority of waste produced is in the commercial and industrial sectors, much of the City's ability to reach the State mandated 50 percent diversion goal will rely

on the reduction and diversion of commercial and industrial waste. Various activities are in progress that may further reduce the volumes going to landfill. Norcal Waste Systems is in the process of developing a new materials recovery facility at the Norcal Solid Waste Recycling & Transfer Facility located at Tunnel Road and Beatty Avenue (within San Francisco) that would divert residential and commercial waste now being landfilled.

At the Potrero plant, lighting waste (e.g., flourescent, high-intensity discharge lamps) is transported off-site by Allied Technology Group; recyclable oil is transported off-site by Evergreen Oil Company; and oily solids waste, waste oil, and insulation material are transported off-site by Phillips Services Corporation.

Contra Costa/Pittsburg Power Plants

In Contra Costa County, the public sector has traditionally been responsible for solid waste collection and disposal. Non-hazardous solid waste collected in the East County Area is disposed of at Keller Canyon Landfill, located in unincorporated Contra Costa County south of Bay Point.

At the Contra Costa and Pittsburg plants, non hazardous waste is transported off-site by Browning Ferris Industries, recyclable wood waste is transported off-site by Universal Engineering; and recyclable non-hazardous metal waste is transported off-site by Levin Metals Corporation.

Geysers Power Plants

Solid waste generated in Lake County is disposed of at the privately-owned Clearlake Highlands Landfill, located off State Route 53. Solid waste in Sonoma County is disposed of at Central Landfill. Non-hazardous waste generated at the Geysers is transported off-site by Empire Waste Management; and recyclable non-hazardous metal waste is transported by Levin Metals Corporation.

COMMUNICATIONS

Public telephone service at the plants is provided by Pacific Bell. A number of other companies, including GTE, AT&T, and Cellular One, are used for cell phone and pager communication services.

NATURAL GAS

PG&E is the only provider of natural gas transmission services to the plants. Natural gas is provided via PG&E's intrastate pipelines operating at transmission level pressures.

Potrero Power Plant

Natural gas is delivered to the Potrero Power Plant via transmission pipelines ranging from 24 to 36 inches, which connect to PG&E's 30-inch service pipeline originating at the San Francisco Load Center.

Contra Costa Power Plant

Natural gas is delivered to the Contra Costa Plant directly from PG&E's Antioch Gas Terminal Station through a 20-inch main transmission line.

Pittsburg Power Plant

The Pittsburg Power Plant receives natural gas from two transmission lines, a 24-inch primary line and a 20-inch secondary line. These lines merge into one 24-inch line that feeds the plant's primary regulating station, from which a 36-inch service line feeds the plant.

Geysers Power Plant

Since the Geysers Power Plant utilizes geothermal steam as its source of "fuel," natural gas is not an issue at the Geysers.

4.12.2 SIGNIFICANCE CRITIERIA

Appendix G of the CEQA Guidelines states that a project may be deemed to have a significant effect on the environment if it would:

- encourage activities which result in the use of large amounts of fuel, water, or energy;
- use fuel, water or energy in a wasteful manner;
- extend a sewer trunk line with capacity to serve new development;
- breach published national, state, or local standards relating to solid waste or litter control; or
- by interruption of electrical service, interfere with emergency response plans or emergency evacuation plans.

Appendix I of the CEQA Guidelines indicates that a project could have a significant effect on the environment if it would result in a need for new utility systems, or result in substantial alterations to the existing utility systems.

4.12.3 IMPACTS AND MITIGATION MEASURES

ELECTRICITY

Impact 4.12-1: The project would not result in the need for new or substantially altered electric power systems or supplies. (Less than Significant)

The project involves the generation of electricity, rather than its use. The plants being divested would not be expected to consume substantially more electricity than they do currently. Thus, the project would not result in a need for new or substantial altered electric power systems or supplies.

The project would result in changes to the electrical power systems such that the owners of the divested plants would not be owners of the transmission and distribution systems. Presently, the

IOUs operate their power plants so as to protect their assets – the power plants and the transmission and distribution systems. Under divestiture, new owners would also operate the power plants so as to protect their assets, but in this case, they would only own the power plant and not the transmission and distribution system (the only exception to this is at the Geysers were a small, non-significant portion of the transmission lines are being divested). The IOUs occasionally need to make a decision regarding what is an acceptable electrical system failure (e.g., whether to "blow out" a transformer and let a portion of the electric grid fail, or to accept failure at a power plant and let the power plant shut down). Although the new owners would be dependent on the transmission grid, they would not necessarily have the same incentive to protect the grid, and could be inclined to primarily protect their own newly acquired resources.

The ISO, which was created by AB 1890, now coordinates the scheduling and dispatch of electricity, and ensures that the reliability of the transmission system is maintained. The ISO controls and operates the state's transmission system to schedule delivery of electric power supplies, and ensure that all standards for transmission and reliability service are met. The ISO charges a FERC-regulated tariff to cover the cost of operating the system to ensure reliability. Entities that meet the reliability standards established by the WSCC and CPUC will be able to "ship" electricity on the transmission system. Additionally, the CPUC will continue to have some statutory responsibilities for system reliability.

Because the project would not substantially alter existing power systems or result in a need for new systems or supplies, impacts related to electric power systems would be less than significant.

Mitigation Measures Proposed as Part of Project

None.

Mitigation Measures Identified in this Report

None required.

WATER

Impact 4.12-2: Potential operational changes at the plants could increase the need for public water demand at the plants. (Less than Significant)

The project could result in increased operations at the plants and, therefore, require additional water for cooling. Cooling water for the Potrero plant is supplied by the San Francisco Bay, which does not serve as a resource for raw water supply for local water districts. Cooling water for the Contra Costa and Pittsburg plants, however, is supplied by the San Joaquin and Sacramento Rivers, which are raw water supply resources for the Contra Costa Water District. Since the great majority of water for the cooling processes at the fossil-fueled plants is returned to the water bodies from where it is drawn, any potential increase in use of these water resources by the plants for cooling purposes would not have a significant effect on the quantity of raw water

supplies for affected water utility districts. (Impacts to surface and groundwater quality are discussed in Section 4.4, Water Resources, of this EIR.)

The water for domestic use at the fossil-fueled plants is supplied by the local water systems. Additional electrical generation at the fossil-fueled plants could result in an increase in domestic water demand for drinking, sanitary and cleaning purposes at the site. However, the fossil-fueled plant operations do not currently use large amounts of domestic water, nor would they under a potential increase in operation. Therefore, the project would not be expected to substantially increase demand for, or require alterations to, the domestic water supply or distribution facilities for affected water utility districts.

Additional production at the Geysers would also not significantly affect the quantity of water supplies. As discussed in Section 4.4, any increase in condensation from the generating units would be reinjected back into the steam field. Any incremental increase in water for domestic uses would not be expected to be significant. As is practiced currently, the subsequent owner would likely contract with a private water supplier for delivery of potable water for drinking purposes.

Mitigation Measures Proposed as Part of Project

None.

Mitigation Measures Identified in this Report

None required.

SANITARY/STORM SEWERS

Impact 4.12-3: The project could result in an increase in wastewater disposal to the public sanitary sewer systems and increase the need for wastewater treatment. (Less than Significant)

The project could result in increased operations at the plants. The potential increase in operations and employees at the Potrero plant could incrementally increase the volume of wastewater disposed of in the City of San Francisco's combined sanitary and storm sewer system. The potential increase in wastewater generation would not be expected to require extensions of new sewer infrastructure, or alterations to existing sewer lines. All future wastewater disposal would be subject to the City's industrial wastewater discharge permit with the subsequent owner. In addition, the potential wastewater increase would not be expected to significantly decrease the capacity of the City's wastewater treatment facilities.

At the Pittsburg plant, a potential increase in employees at the Pittsburg plant could incrementally increase the volume of wastewater disposed of in Delta Diablo Sanitation District's sanitary sewer system. However, no wastewater other than for sanitary purposes is disposed of in this system; other wastewaters related to plant operations would continue to be treated on-site and

subject to the discharge requirements of the NPDES permits with the subsequent owner. Therefore, the project would not be expected to result in the need for altered sanitary sewer collection or treatment services.

The Contra Costa plant is not served by public sanitary sewer infrastructure, nor is it proposed to be under the project. Therefore, any potential incremental increase in sanitary wastewater generation from an increase in employees at these plants would continue to be disposed of using on-site septic tanks and leachfields for sanitary wastewater. Any future increases in wastewaters from increased plant operations would be subject to treatment and discharge requirements of the NPDES permits with the subsequent owner.

The Potrero, Contra Costa and Pittsburg plants do not discharge stormwater into public stormwater collection infrastructure, nor are such discharges proposed under the project. Therefore, future stormwater collection at the sites would continue to occur using on-site facilities, and stormwater discharge would be subject to requirements of the NPDES permits with the subsequent owner.

The Geysers plant is not served by public sanitary and stormsewer collection infrastructure, nor is it proposed to be under the project. Therefore, any potential incremental increase in wastewater generation from an increase in operations and employees at this plant would continue to be collected, treated, and reinjected to the steam field. Stormwater would also continue to be captured by on-site berms located around the units and also reinjected into the steam field.

Mitigation Measures Proposed as Part of Project

None.

Mitigation Measures Identified in this Report

None required.

SOLID WASTE

Impact 4.12-4: The project could result in an increase in demand for solid waste services. (Less than Significant)

The project may cause a slight increase in solid waste disposal as a result of minor construction associated with ownership transition. Potential increases in solid waste disposal related to any potential construction would be small and temporary.

An increase in operations and addition of employees at the plants under new owners would result in an incremental increase in the need for solid waste collection and disposal. Accommodating the potential increase in operational solid waste would not adversely affect solid waste disposal service or significantly affect the estimated lifetime of the landfills serving the plants. Because

anticipated increases in solid waste disposal would be relatively small, and some would be only temporary, impacts to solid waste disposal would be less than significant.

Mitigation Measures Proposed as Part of Project

None.

Mitigation Measures Identified in this Report

None required.

COMMUNICATIONS

Impact 4.12-5: The project would not increase the need for communications systems. (Less than Significant)

There are no foreseeable communications systems effects that would result from the project. None of the power plants to be divested would have a direct impact on communication systems, and communication services serving the plants and surrounding areas would continue after project implementation.

Mitigation Measures Proposed as Part of Project

None.

Mitigation Measures Identified in this Report

None required.

NATURAL GAS

Impact 4.12-6: The project would not result in the need for new or substantially altered natural gas systems or supplies. (Less than Significant)

Although with divestiture new owners may have a tendency to operate these plants more, thus potentially increasing the amount of natural gas used, it is unknown how much more natural gas could be needed or, if this potential increased consumption would be anymore significant than non-project-related increases in consumption of natural gas due to increased demand for electrical power. Therefore, project is not expected to result in a need for new natural gas systems or supplies, nor is it expected to substantially alter existing natural gas systems of supplies.

Mitigation Measures Proposed as Part of Project

None.

Mitigation Measures Identified in this Report

None required.

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