4.4 WATER RESOURCES

The environmental setting for the proposed project discussed in Sections 4.4.1 and 4.4.2, below, relies heavily on the regional and local regulatory requirements described in Section 4.4.3, Applicable Plans and Policies. The reader is referred to that section for additional discussion of permit conditions.

4.4.1 REGIONAL SETTING

The Potrero, Pittsburg, and Contra Costa Power Plants are each located either adjacent to San Francisco Bay or upstream of the Bay, adjacent to Suisun Bay or the San Joaquin River. The plants require a water source and a wastewater discharge location for various processes, which generally include plant cooling water, heat treatments, boiler blowdown, water demineralizing, boiler fireside and wall cleaning, and sanitary waste storage and treatment.

The most common plant cooling method for water-cooled thermal power plants is once-through cooling using seawater or riverwater. This method is used for units of each of the subject fossil-fueled plants, with the exception of Unit 7 at the Pittsburg Power Plant, which is a "closed-cycle" system. With once-through cooling systems, water is drawn into an intake structure, screened to minimize entrainment of fish and debris, and then delivered into the condenser chamber, where the cooling water absorbs heat. The most significant effect on water quality from once-through cooling is the change in water temperature. Water temperature increases of up to 20-25 degrees Fahrenheit (°F) are common for many thermal electric power plants. This water is then discharged back into the water body. The closed-cycle system for Pittsburg Unit 7 recycles the cooling water after it condenses in a cooling tower or is cooled in a canal. The initial cooling water, and water to replace water that is lost through evaporation or other losses ("make-up" water), is obtained through the plant's intake structure. Wastewater from various plant processes and portions of stormwater runoff from the plants are also discharged through the plant's outfall.

The U.S. Environmental Protection Agency (EPA) through the Clean Water Act regulates discharges to waters of the United States. The act requires all dischargers to obtain permits through the National Pollution Discharge Elimination System (NPDES). In California, permits are issued by the local Regional Water Quality Control Board (RWQCB). Each of the plants that discharge cooling water or stormwater runoff (Potrero, Pittsburg, and Contra Costa Power Plants) have existing permits. The permits take into account the design temperature of the plants and the natural variation of surface water temperatures in the vicinity of the plants. The NPDES permits establish upper thermal limits that are based on the plant's maximum generation capacity (Table 4.4-1) and the provisions in the state's Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California (Thermal Plan). Some plants have been granted an exception to the thermal limits in the Thermal Plan because the limits were found to be more restrictive than necessary to protect wildlife in the vicinity of the discharge.

TABLE 4.4-1
PG&E FOSSIL-FUELED POWER PLANT NPDES PERMITS SUMMARY

Power Plant	Permit Number/ Order Number	Expire Date	Outfall Location Number	Receiving Water	Discharge Type	Allowable Maximum Flow (million gallons/day)	Allowable Maximum Temperatures (°F)
Potrero	CA0005657/ 94-056	5/18/99	001	San Francisco Bay	Cooling water, intake screen wash, boiler blowdown, bioassay lab waste, stormwater runoff	Limited by effluent constituent limits and receiving-water conditions	86 °F (110 °F during demusseling)
			002	San Francisco Bay	Thermal demusseling	See above	86 °F (110 °F during demusseling)
			003-005	San Francisco Bay	Stormwater runoff	Variable	Not applicable
Pittsburg	CA0004880/ 95-225	11/15/2000	001	Suisun Bay	Once-through cooling	Limited by effluent constituent limits and receiving-water conditions	Discharge to surface water at flood tide shall be no more than 28 °F (14.5 °C) above the natural temperature of the receiving water. The discharge shall not create a zone of more than 1 °F that exceeds 25% of the cross-sectional area of the main river channel. The discharge shall not cause more than 125 acres of surface water to rise greater than 4 °F above the natural temperature of the receiving water.
			001A	Suisun Bay	Intake screen wash	See 001 above	Same as above
			001B	Suisun Bay	Clarifier and filter blowdown, reverse osmosis brine	See 001 above	Same as above
			001C	Suisun Bay	Reverse osmosis brine	See 001 above	Same as above
			001D	Suisun Bay	Boiler blowdown	See 001 above	Same as above
	CA0004880/ 95-225	11/15/2000	001E	Suisun Bay	Ion exchange regeneration waste	See 001 above	Same as above
			001F	Suisun Bay	Fire/air preheater washes	See 001 above	Same as above

TABLE 4.4-1 (Continued)
PG&E FOSSIL-FUELED POWER PLANT NPDES PERMITS SUMMARY

Power Plant	Permit Number/ Order Number	Expire Date	Outfall Location Number	Receiving Water	Discharge Type	Allowable Maximum Flow (million gallons/day)	Allowable Maximum Temperatures (°F)
Pittsburg (cont.)			001F	Suisun Bay	Fire/air preheater washes	See 001 above	Same as above
			001G	Suisun Bay	Stormwater runoff	Variable	Not applicable
			001H	Suisun Bay	Cooling-tower blowdown	See 001 above	Same as 001 above
			001I	Suisun Bay	Chemical cleaning	See 001 above	Same as 001 above
			002	Suisun Bay	Stormwater runoff	Variable	Not applicable
			003	Suisun Bay	Stormwater runoff	Variable	Not applicable
			004	Suisun Bay	Stormwater runoff	Variable	Not applicable
			005	Suisun Bay	Stormwater runoff	Variable	Not applicable
			006	Suisun Bay	Cooling-tower blowdown	See 001 above	Discharge to surface water at flood tide shall be no more than 28 °F (14.5 °C) above the natural temperature of the receiving water.
Contra Costa	CA0004863/ 95-234	10/1/2000	001	San Joaquin River	Reverse osmosis blowdown, intermittent filter boiler blowdown, oil/water separator system, intermittent make-up demineralizer and regeneration waste, once-through cooling water, stormdrain discharge	560	Discharge to surface water shall be no more than 37 °F above the natural temperature of the receiving water at the dock at high flood tide. The discharge shall not create a zone of more than 1 °F above natural receiving waters that exceeds 25% of the cross-sectional area of the main channel. The discharge shall not cause an area of surface water temperature to rise greater than 4 °F above the natural water temperature for an area greater than 125 acres.

TABLE 4.4-1 (Continued)
PG&E FOSSIL-FUELED POWER PLANT NPDES PERMITS SUMMARY

Power Plant	Permit Number/ Order Number	Expire Date	Outfall Location Number	Receiving Water	Discharge Type	Allowable Maximum Flow (million gallons/day)	Allowable Maximum Temperatures (°F)
Contra Costa (cont.)			002	San Joaquin River	Low-volume waste, boiler blowdown, intermittent intake screen wash, once-through cooling water, intermittent washwater from chemical cleaning operations, (preheater and fireside)	440	Discharge to surface water shall be no more than 39 °F above the natural temperature of the receiving water the dock at high flood tide. The discharge shall not create a zone of more than 1 °F above natural receiving waters that exceeds 25% of the cross sectional area of the main channel.
	CA0004863/ 95-234	10/1/2000	002	San Joaquin River		440	The discharge shall not cause an area of surface water temperature to rise greater than 4 °F above the natural water temperature for an area greater than 125 acres.
			003	San Joaquin River	Intermittent intake screen wash	Not applicable	Not applicable
			004	San Joaquin River	Seasonal storm drainage	Variable	Not applicable
			005	San Joaquin River	Fish pump	Not applicable	Not applicable
			006	San Joaquin River	Stormwater	Variable	Not applicable
			007	San Joaquin River	Stormwater	Variable	Not applicable
			008	San Joaquin River	Stormwater	Variable	Not applicable
			009	San Joaquin River	Stormwater	Variable	Not applicable
			010	San Joaquin River	Stormwater	Variable	Not applicable

NOTES: mgd = million gallons per day.

The plants occasionally use heat treatment to control marine organisms (e.g., mussels) that grow inside conduits and can inhibit the flow of water to the plant. Heat treatment, sometimes called demusseling, is a reverse-flow process in which water heated in the plant's condenser is returned through the plant's intake system to dislodge biological organisms that have accumulated in the intake system. Sodium hypochlorite is regularly applied in the condensers to minimize growth of biological organisms and is then discharged.

Some plants discharge water from the intake system back to the vicinity of the intake headworks to discourage the entrainment of fish in the intake. Intake water is also used to remove debris from the intake screens.

The plants also discharge boiler blowdown, which is a watery residue of excess steam in boilers and a source of increased salts. The boiler blowdown is typically a low volume wastestream that is discharged through the outfall. Chemical concentrations must be below those specified in the NPDES permit before the wastewater can be discharged to the bay or stream. A method of monitoring for certain constituents in the wastewater is to test the mortality of specific aquatic species when exposed to the wastewater, a test referred to as a bioassay. The water used within the boiler must be very pure, so water from a river or canal or city water system is typically treated with a reverse osmosis and/or ion exchange system to remove minerals. The brine created by demineralization of boiler water is monitored as described above before it can be discharged to receiving waters. There are typically some losses of boiler water through discharge of boiler blowdown and through leaks in the system, so boiler make-up water is regularly produced.

Sodium hypochlorite is regularly added to the cooling water to reduce the growth of microorganisms that may foul the condenser unit. This process is performed as-needed and varies seasonally, but typically may be conducted one to three times a week. The sodium hypochlorite is discharged with the cooling water. A variety of chemicals is used to clean the boiler ("fireside" and "preheater" walls), including hydrochloric, formic, and hydroacetic acids. The wastes from boiler cleaning are typically conveyed to a storage pond, where lime or sodium hydroxide is added to adjust pH levels and to precipitate dissolved metals. The sludge generated from this process typically has low concentrations of heavy metals and is considered a hazardous waste. These wastes are disposed of off-site according to hazardous waste regulations.

Oils, greases, and other lubricants are used for lubricating pump bearings. Special pipe systems carry oily residues and waters to a central storage pond at most plants, where a mechanical oil/water separator is used to recover the oil. These types of waste materials, and other wastes such as boiler washwater and brine from demineralizers, are often collectively called "low-volume" wastes.

Sanitary wastes from the Potrero and Pittsburg plants are discharged to a sewer system (POTW). At the Contra Costa plant, they are discharged to an on-site leachfield. Wastewater from domestic and sanitary uses at the Geysers is discharged to a gray water or septic tank and then sent to a steam supplier for reinjection into the steam field.

The Geysers Power Plant is a geothermal energy plant located in the Geysers area of the Mayacmas Mountains in Sonoma and Lake Counties. Several watercourses flow through the Geysers area, including Big Sulphur Creek, Little Sulphur Creek, Hot Springs Creek, Bear Canyon Creek, Squaw Creek, and Anderson Creek. The Geysers plant is fueled with natural steam from geothermal steam wells, condensate from the cooling towers and stormwater runoff from the sites that are reinjected into deep injection wells, and from water and wastewater imported from off-site and injected. In contrast to the fossil-fueled plants, steam condensate and stormwater runoff are contained and reinjected into the steam wells, and no cooling water is required or discharged from the geothermal units, so no NPDES permits are currently required.

4.4.2 LOCAL SETTING

Maps showing each of the plants and the various outfalls are presented in Chapter 2, Project Description.

POTRERO POWER PLANT

The Potrero Power Plant is located on the western shoreline of San Francisco Bay. Surface water in the vicinity of the Potrero Power Plant includes the Central Basin inlet to the north, Warm Water Cove immediately to the south, and San Francisco Bay to the east. Stormwater on the plant generally flows overland to the east and south toward the Bay. With the exception of stormwater runoff, no other surface water is present on the site.

Two distinct groundwater regimes are present beneath the Potrero Power Plant. The first groundwater regime is present within the fractures of the bedrock complex. Four groundwater monitoring wells, MW-2 and MW-POT-9, 10 and 14 have been constructed in the western portion of the site. Groundwater depth in these wells ranged from approximately 2 to 11 feet below ground surface in April 1991; yield was reportedly very low (CDM, 1997b).

The second groundwater regime is present in the fill material and Bay Mud in the eastern half of the site. The groundwater in this area is present within the sands, gravels, silts, and clays of the Bay Mud and artificial fill. Depth to groundwater ranged from 3 to 14.5 feet on April 18, 1991. Yield in the fill material was reported to be low to moderate. Yield in the Bay Mud was reported to be lower than in the fill material or the bedrock. The Bay Mud may serve as an aquitard or confining layer. Five wells, MW-1 and MW-POT-11, 12, 13 and 15, were constructed in fill material (CDM, 1997b).

Groundwater flow beneath the site is towards the southeast in the western portion of the site, transitioning towards the east in the eastern portion of the site. Flow velocity in the bedrock zone is approximately 0.1 feet per day. In the fill material and Bay Mud, flow is highly variable and estimated to be from 0.2 to 7 feet per day. Groundwater is influenced by tidal activity in the San Francisco Bay (i.e., groundwater levels rise and fall in direct response to tidal fluctuations), with effects observed in wells within 250 feet of the shoreline (CDM, 1997b).

Groundwater quality in both the bedrock complex and tidally influenced Bay Mud and artificial fill is likely nonpotable due to a high concentration of dissolved salts. The nearest potable water well is located four miles from the site (CDM, 1997b).

Cooling water is taken from a shoreline surface water intake structure in Lower San Francisco Bay. The cooling water is circulated once through condensers and then discharged back to the Bay. Discharge structures for the plant are located on the San Francisco Bay shore. Discharge Outfall 001 has historically carried an annual average flow of 266 million gallons per day (mgd) of once-through cooling water and minor volumes of process water and stormwater runoff. Outfall 002 has historically carried a minor amount of thermal demusseling water. Outfalls 003 through 005 carry stormwater runoff. The Potrero Power Plant discharge is regulated under NPDES Permit No. CA0005657, Order No. 94-056, issued by the RWQCB, San Francisco Bay Region. The EPA and RWQCB have classified the existing discharge as a minor discharge. Discharge temperatures were determined by a thermal effects study to be relatively low, and the potential impacts on aquatic resources were minimal (SFBRWQCB, 1994b).

Certain wastewaters from various processes at the plant are discharged to the sewer. The discharge is permitted by the City and County of San Francisco, Industrial Wastewater Discharger – Class I Permit No. 95-0524. The permit establishes limitations on various pollutants (City and County of San Francisco, 1995b).

PITTSBURG POWER PLANT

Surface water in the vicinity of the Pittsburg Power Plant includes Suisun Bay along the northern boundary and the Unit 7 cooling water canal located west of the switchyard. Willow Creek is located between the switchyard and the Unit 7 cooling water canal. As a wind blown dust-control measure, the Shell Pond to the west of the plant remains flooded by approximately 1 to 3 feet of water. The majority of the non-operational area located north of the Shell Pond and the Unit 7 cooling water canal is tidally influenced, flooded marshland. Mallard Slough, located between the Unit 7 cooling water canal and the Shell Pond, serves as a drinking water source for Contra Costa County.

Two distinct groundwater zones have been identified at the site. The shallowest zone has been referred to as the Trough, which includes perched groundwater, and the second, deeper zone is referred to as the Upper Aquifer (CDM, 1997c).

The perched groundwater zone underlies the area of the oily water treatment system. This zone consists of a peat and clay deposit that infilled a paleochannel. Groundwater within this zone is not substantially influenced by tidal fluctuations (CDM, 1997c).

The Upper Aquifer is comprised of a sand and gravel deposit that ranges in thickness from 26 to 50 feet. The groundwater flow direction is generally north, from the topographic highs in the south toward the low-lying regions along Suisun Bay. A portion of the Upper Aquifer along the edge of Suisun Bay is tidally influenced. Groundwater pump test data from wells located

adjacent to the surface impoundments indicate that the perched groundwater is not hydraulically connected to the Upper Aquifer (CDM, 1997c).

Depth to groundwater in the Upper Aquifer generally ranges from 7 to 10.5 feet bgs. Because the Pittsburg Power Plant is located in a historical tidal marshland near the brackish/freshwater interface in Suisun Bay, the groundwater is brackish (1,000 to 10,000 milligrams per liter dissolved solids) and is of poor quality with respect to drinking water standards (CDM, 1997c).

Cooling water is taken from two shoreline intakes in Suisun Bay. The cooling water is circulated through the condensers and then discharged along with low-volume waste and stormwater runoff back to the Bay. Discharge Outfall 001 carries an annual historical average of 1.018 billion gallons per day (gpd) of once-through cooling water, process water, and stormwater runoff. Outfall 002 carries an annual historical average of 5,600 gpd of stormwater. Outfall 003 discharges an annual historical average of 48,000 gpd of stormwater. Outfall 004 discharges an average of 5,000 gpd of stormwater. Outfall 005 discharges an annual historical average of 200 gpd of stormwater. Outfall 006 discharges an annual historical average of 17 mgd of cooling-tower blowdown from Unit 7 as an alternative to this water discharging through Outfall 001. Discharges from the plant are regulated under NPDES Permit No. CA0004880, Order No. 95-225, issued by the RWQCB, San Francisco Bay Region. The EPA and RWQCB have classified the discharge as a major discharge. A toxicity study submitted to the RWQCB showed that the discharges were not toxic to the receiving water environment. Discharge temperatures were determined by a thermal effects study to have no adverse effects on anadromous fish or other aquatic species in the area (SFBRWQCB, 1995). Impingement and entrainment of striped bass, Delta smelt, winter-run Chinook salmon, and other species have been a concern, as discussed in Section 4.7, Biological Resources.

The permit requires the plant to operate a Resources Management Program (RMP) during the entrainment period (approximately between May 1 and mid-July). The RMP requires coordination of the operation of the Pittsburg plant with the operation of the Contra Costa plant in order to minimize impacts to the fishery. It requires the dispatch of Pittsburg Unit 7 (closed-cycle system) prior to dispatching other units at either plant and provides other provisions to minimize environmental impacts. For this reason, PG&E is proposing to sell both plants in a "bundle" so that the new owner will have control over both plants (PG&E, 1998).

The processes at the plant include boiler chemical cleaning (fireside and preheater walls), stack washing, and the demineralization of intake water. Wastewaters from these processes are conveyed to lined evaporation ponds on site. Some of the liquids from these ponds are treated and discharged to the Bay. The solids collected in the ponds are disposed of in appropriate landfills. The ponds are regulated under Board Order 94-166 (SFBRWQCB, 1994c).

CONTRA COSTA POWER PLANT

The San Joaquin River is the main body of surface water and the only natural perennial surface water within one mile of the Contra Costa Power Plant. The river is tidally influenced in the vicinity of the plant; saltwater intrusion is evident up to the plant. The San Joaquin River is used

for industrial, commercial, and domestic purposes as well as for irrigation and recreational purposes. The Flood Hazard Boundary for the area shows a small portion of the plant, north and east of Units 6 and 7, as subject to potential flooding.

Regionally, the site is located in the Pittsburg Plain, a groundwater basin 20 to 30 square miles in area. The basin is comprised of Pleistocene and Holocene alluvium deposited by the San Joaquin and Sacramento Rivers and minor streams draining the Los Medanos Hills to the south (CDM, 1997d). The aquifer, which is composed of fine- to coarse-grained sands with minor interfingered layers of fine-grained and organic deposits, is approximately 125 to 140 feet thick beneath the site. Silt, clay, and peat layers are interbedded with the aquifer sands, resulting in significant lateral changes in the geologic stratification across the site. These fine-grained sediments become more prevalent along the San Joaquin River and the northeastern portion of the site. These less permeable layers can produce localized perched water zones that may not be in direct hydraulic communication with the main aquifer. The aquifer rests above the Montezuma Formation (CDM, 1997d).

Eight groundwater monitoring wells exist at the site. These are identified as Wells 1, 2, 3, 4, 5, 5a, 6a and 7a. Water level data from 1987 indicate that the shallow groundwater is tidally influenced. Depths to groundwater varied from 5.4 feet to 7.0 feet bgs during the tidal study. Results from monitoring of Wells 1, 2, 3, 4, 5a, 6a and 7a performed in 1990 showed water-table elevations ranging from 2.11 feet to 2.51 feet above mean sea level (msl) during low tide and ranging from 2.27 feet to 2.61 feet above msl during high tide. PG&E is no longer required to monitor these wells under regulatory agency oversight (CDM, 1997d).

The water table beneath the plant varies from 6 feet to 10 feet bgs, depending on tidal and seasonal influences. Measurements indicate that the groundwater flow direction is north-northwest. The regional groundwater flow direction is assumed to be northward, with discharge to the San Joaquin River (CDM, 1997d).

Cooling water is taken from two intakes in the San Joaquin River (Units 1-5 intake is approximately 250 feet from the southern shoreline; the intake for Units 6 and 7 are on the southern shoreline). The cooling water is circulated through the condensers and then discharged along with low-volume waste and stormwater runoff back to the river. Discharge Outfall 001 carries an annual historical average of 38 mgd of once-through cooling water and minor volumes of process water and stormwater runoff. Outfall 002 carries an annual historical average of 340 mgd of once-through cooling water, boiler blowdown, and washwater. Outfall 003 discharges intake screen wash. Outfall 004 and Outfalls 006 through 010 carry stormwater runoff. Outfall 005 carries fish pump water. Discharges from the plant are regulated under NPDES Permit No. CA0004963, Order No. 95-234, issued by the RWQCB, Central Valley Region. The EPA and RWQCB have classified the discharges as major discharges. A toxicity study submitted to the RWQCB showed that the discharges were not toxic to the receiving water environment. Discharge temperatures were determined by a thermal effects study to have no adverse effects on anadromous fish or other species in the area (CVRWQCB, 1995). Impingement and entrainment of striped bass, Delta smelt, winter-run Chinook salmon, and other species have been a concern, as discussed in Section 4.7, Biological Resources.

As described above, the permit requires the plant to operate an RMP during the entrainment period, which calls for coordination with the Pittsburg plant. For this reason, PG&E is proposing to sell both plants in a "bundle" so that the new owner will have control over both plants (PG&E, 1998).

One of the processes at the plant is the treatment of raw water through a clarifier, which generates a sludge material. Under RWQCB Order 79-193, total capacity of the disposal site is 29,000 cubic yards (CVRWQCB, 1979).

PG&E has recently changed the configuration of the Contra Costa plant. Units 1-3 have been retired. Units 4 and 5 have been converted to synchronous condenser units; the boiler and turbine have been disconnected, and the generator operates from electricity from the power network. The condensers serve to provide voltage support to the system. Cooling water is still required for the generators, but the volume is small compared to the previous operation. Units 6 and 7 are still in normal operation. When the plant's NPDES permit is renewed in 2000, it is anticipated that the volume of intake and discharge water described in the permit will be greatly reduced, and the quality of the discharge will be modified to reflect this operating configuration (Kino, 1998).

GEYSERS POWER PLANT

Several perennial and intermittent creeks are located in the vicinity of the Geysers plant. The most prominent perennial creeks are Big Sulphur Creek, Little Sulphur Creek, and Squaw Creek. With the exception of the groundwater springs discussed below, no other surface waters are located within the vicinity of the Geysers plant. The units and facilities presented in Table 4.4-2 are located within one-quarter mile of a perennial creek.

Groundwater in the Geysers area occurs in consolidated rocks and unconsolidated surficial deposits. No regional groundwater aquifers of any significant yield have been identified in the underlying rock formations in the Geysers area. An apparent perched groundwater zone is found near the surface in some bedrock areas at the lower boundary of the zone of weathering. However, the quantity of water in the perched groundwater zone appears to be low. Groundwater also accumulates in the more pervious volcanic rocks that cap the Franciscan Formation in some areas such as Cobb Mountain and Caldwell Pines. Apart from a thin soil mantle, the underlying Franciscan rocks are generally classified as nonwater-bearing. These rocks are considered impermeable except along fracture zones, which may yield small quantities of water to wells and springs. Because of the high thermal gradient, groundwater is generally not encountered at depth in the steam field production area.

Groundwater can be found with more consistency in areas of unconsolidated surficial materials, especially landslide deposits and valley alluvium. Larger quantities of water can more likely be found in these deposits than in bedrock fracture zones. Significant groundwater basins do exist in the valley alluvium at the base of either side of the Mayacmas Mountain Range.

TABLE 4.4-2
SURFACE WATERS

Units	Perennial Creek
Unit 1-2	Big Sulphur Creek
Unit 3-4	Big Sulphur Creek
Unit 5-6	Big Sulphur Creek
Unit 11	Squaw Creek
Unit 14	Big Sulphur Creek
Unit 17	Squaw Creek
Unit 18	Big Sulphur Creek
Cook Shack	Big Sulphur Creek
Eagle Rock Substation	Squaw Creek

SOURCE: Camp Dresser & McKee, 1998.

Groundwater in the Geysers area is expected to approximate the surface topography and flow toward the local drainage channels, such as Big Sulphur Creek and Squaw Creek. Groundwater conditions are expected to fluctuate with seasonal and annual rainfall.

Groundwater depths, based on results of subsurface investigations at selected units, are presented in Table 4.4-3.

TABLE 4.4-3
GROUNDWATER DEPTHS

Units	Groundwater Depths
Unit 7-8	Depth to water level measurements in monitoring wells have ranged from approximately 70 to 150 feet.
Unit 9-10	Depth to water level measurements in monitoring wells have ranged from approximately 30 to 40 feet.
Unit 14	Depth to water measured in monitoring well MW-1 is approximately 8 feet. Five foundation relief wells are located in the turbine building basement, which reportedly always contains water.

SOURCE: Camp Dresser & McKee, 1998.

Groundwater seeps and springs can be observed throughout the year in the Geysers area and in the immediate vicinity of specific units and facilities. In the Geysers area, groundwater springs result where groundwater is contained against a less permeable layer, typically against impervious Franciscan rocks and volcanic flows. Groundwater springs or conditions indicative of springs have been observed at the sites presented in Table 4.4-4.

TABLE 4.4-4
GROUNDWATER SPRINGS

Units/Facility	Groundwater Springs Description
Unit 11	Standing water and reeds were observed at the base of the retaining wall along the northeast corner of the site.
Unit 14	In a July 1989 draft work plan, PG&E staff noted the existence of a network of horizontal drains beneath Unit 14.
General Construction Warehouse	Standing water was observed in the northwest corner of the site. In addition, a narrow drainage channel was observed along the western site boundary.
East Administration Center	Active groundwater seepage was observed in two areas in the northeast corner of the site. A sump pump was observed in a hand-excavated pit between the hazardous waste accumulation area and a portable trailer.

SOURCE: Camp Dresser & McKee, 1998

As mentioned previously, there are no discharges from the units, so no NPDES permits or waste discharge requirements are needed for plant operation. Stormwater runoff at each unit is captured and reinjected. The RWQCB, North Coast Region, issued Order 90-35, which includes requirements for water quality management and established the Geysers Power Plant Zero Discharge Program/Emergency Accidental Spill and Discharge Control Plan for the Sonoma County units. These requirements were subsequently adopted by the RWQCB, Central Valley Region, for the Lake County units. If rainfall volumes were such that excess runoff were to flow from the units, or if there were accidental spills or releases of stormwater, the flow would be subject to the water quality control plan and requirements of the North Coast RWQCB (Sonoma County units) or Central Valley RWQCB (Lake County units), as applicable. Groundwater contamination is discussed in Section 4.9, Hazards.

Applicable Plans and Policies

The National Pollutant Discharge Elimination System (NPDES) was developed by the EPA in response to the amended Clean Water Act. In California, the NPDES program is implemented by the local RWQCB. NPDES permits are required for both stormwater runoff and for direct discharges. The RWQCB grants stormwater NPDES permits on an individual, systemwide, or jurisdictional basis for industries, municipalities, and construction sites.

Construction activities that disturb over five acres of soil require a General Construction Activity Stormwater NPDES permit from the local RWQCB. When the federal Phase II Stormwater Program is implemented, which is anticipated by 2002, a permit would be required if the disturbance is more than one acre. The construction NPDES stormwater permit requires implementation of a Stormwater Pollution Prevention Plan (SWPPP) and use of Best Management Practices (BMPs) for construction activities. The BMPs provide erosion and sedimentation controls and govern contractor activities to minimize the potential for spills and other means of contamination. A monitoring program is also incorporated into the permit.

Direct discharges of wastewater are governed by the California Porter-Cologne Water Quality Control Act, which is implemented by the State Water Resources Control Board and nine Regional Water Quality Control Boards. This act allows for the state to implement the requirements of the federal Clean Water Act. The State Water Board carries out its water quality protection authority through the adoption of specific Water Quality Control Plans (Basin Plans), which establish water quality standards for particular bodies of water. Dischargers are required to obtain NPDES permits, which limit the amount and quality of the wastewater flow. The Basin Plan for the Central Valley Region sets forth water quality standards for discharges to surface and groundwaters at the Contra Costa Power Plant and is administered by the Central Valley RWQCB. The plan for the San Francisco Bay region governs the Pittsburg and Potrero Power Plants and is administered by the San Francisco Bay RWQCB.

Groundwater resources at the Geysers are regulated by the California Division of Oil, Gas and Geothermal Resources (DOGGR) and by Sonoma and Lake Counties. Permits for injection are obtained through the DOGGR with appropriate review from the Central Valley RWQCB. Additional regulation is provided by the U.S. Bureau of Land Management (BLM), with delegated authority under the Federal Land Policy and Management Act and Geothermal Steam Act. The BLM, under these and other federal laws, is also responsible for protection and management of water resources on BLM lands and may issue injection permits.

4.4.3 SIGNIFICANCE CRITERIA

An impact on water resources would be considered significant if the proposed project would result in any of the following, adapted from CEQA Guidelines, Appendix G:

- cause substantial flooding, erosion, or siltation;
- expose people or structures to flood hazards;
- generate substantial stormwater runoff;
- contaminate a public water supply;

- substantially degrade water quality; or
- substantially degrade or deplete groundwater resources.

4.4.4 IMPACTS AND MITIGATION MEASURES

Impact 4.4-1: The divestiture of the power plants would involve only minor construction at the plants. Therefore, no significant impacts to water resources from construction activities are anticipated. (Less than Significant)

Minor construction envisioned at each power plant includes only minor facilities, such as fencing and access improvements to separate the new owner's generation facilities from the remaining PG&E facilities. This construction would not be expected to result in any substantial changes to the amount of impermeable surfaces at the plants and thus would not have measurable effects on existing absorption rates, drainage patterns, or surface runoff.

Each fossil-fueled power plant has requirements for stormwater control written into its discharge permit issued by the local RWQCB. The project would not be expected to result in additional significant contamination of stormwater runoff or additional significant runoff volume. However, the project could potentially advance the cleanup of contaminated soils at several of the sites. The remediation activities would disturb soils and may result in short-term erosion and contamination of runoff. More information on site contamination is provided in Section 4.9, Hazards.

Contamination of runoff from soil remediation activities has the potential to affect surface water quality, but permits would be obtained prior to any remediation work, and a remediation plan would be prepared before such work begins. Remediation plans, and sometimes permits themselves, require that specified precautions be taken during remediation in order to protect human health and the environment. Examples of procedural and operational controls that typically are implemented during remediation activities include covering soil stockpiles to prevent erosion and reduce infiltration; installing a leachate-control system to capture any leachate generated; constructing a containment cell to prevent runoff; installing treatment systems for treating groundwater, surface water, or air containing hazardous substances; collecting and analyzing test samples; watering disturbed areas to reduce dust generation; and wearing proper protective equipment to prevent worker contact with contaminated soil or groundwater. Many of these controls are contained in permit requirements that are issued by the regulatory agencies overseeing remediation activities. The entities that own these plants—whether PG&E or a future purchaser—would be subject to the same environmental and worker safety laws, rules, and regulations. The plants, under whatever ownership, would be expected to conform to all pertinent environmental and safety requirements. Therefore, no significant impacts are anticipated from the project.

Mitigation Measures Proposed as Part of Project

None.

Mitigation Measures Identified in This Report

None required.

Impact 4.4-2: The project could increase the amount of water used at, and discharged from, the plants. (Less than Significant)

Discharges caused by the project would be significant if they would result in violations of state or federal numerical effluent limitations or other criteria presented in Section 4.4.3. Discharges from the plants include water used for cooling, which is raised in temperature, and various wastes from industrial processes, termed "low-volume" wastes.

Low-volume wastes typically include air preheater and boiler fireside washwater, boiler cleaning effluents, oily-water separator wastes, zeolite softener wastes, condensate polishing and makeup demineralizer water, boiler blowdown, and in-plant drainage. The production of most of these wastes occurs as part of scheduled maintenance (Kino, 1998). With higher production rates, maintenance may be conducted at more frequent intervals. Therefore, the project may result in the increased discharge of these wastes. However, the discharge of these wastes is regulated by the NPDES permit limitations. Therefore, impacts would be less than significant.

Each of the fossil-fueled power plants is regulated by the local RWQCB by NPDES permits for both direct discharge to receiving waters and for stormwater runoff (Stormwater Pollution Prevention Plans). The NPDES permits for each of the fossil-fueled plants allow for discharges up to the amount of water required to operate the plant at design capacity. Cooling water discharges from the fossil-fueled power plants are the predominant sources of thermal loading to San Francisco Bay, Suisun Bay, and the San Joaquin River.

The project could result in additional generation of energy and, therefore, require additional water for cooling. Cooling water, however, is controlled at the plants by the use of variable-speed drive pumps that operate at different levels depending on the generation rate of the plant, or the use of multiple pumps, some of which turn off when not operating at maximum capacity. Therefore, the amount of thermal discharge from the plants has some relationship to the level of electricity being generated at the plants. If the unit is completely off, some or all of the unit's circulation pumps are typically off, although at times a volume of water that is less than full-operation volume is kept circulating for various process needs. Therefore, additional energy generation would likely require additional time when the pumps are in full operation. The pumps would extract and subsequently discharge additional water. The additional amount of water would not correlate directly with the increase in generation, but, in general, higher generation rates would result in higher volumes of intake water and higher volumes of heated discharge water. However, these discharges would have to comply with the existing NPDES permit conditions for flow quantity, thermal limits, and effluent constituent limits.

Although operation by new owners could result in additional discharges of cooling water, the operation of the plants would be constrained by the existing effluent limitations in NPDES

permits, which would be transferred to the new owner and would continue to be enforced by the local RWQCB. No significant impacts would be expected, since the permit limits account for operation at full design capacity. In the event that permit violations were to occur, the local RWQCB, which monitors discharges from the plants monthly, would take action to eliminate chronic violations.

Changes in production at the Geysers would not be expected to affect water quality or quantity. Increased condensation from the generating units would continue to be reinjected, and no off-site impacts would occur.

Mitigation Measures Proposed as Part of Project

None.

Mitigation Measures Identified in This Report

None required.

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