2. PROJECT DESCRIPTION

2.1 INTRODUCTION

On September 30, 1999, Pacific Gas and Electric Company filed an application (Application 99-09-053) with the California Public Utilities Commission (CPUC, or the Commission) to sell its hydroelectric generating facilities and related assets at auction to the highest bidder. This auction would meet Public Utilities Code Section 367's requirement that the CPUC determine the market value of all of Pacific Gas and Electric Company's non-nuclear generating assets by the end of year 2001. The market value can also be determined by appraisal, other forms of sale, or other divestiture. Section 367 was added to the Public Utilities Code by AB 1890, California's electric restructuring legislation.

Pacific Gas and Electric Company proposes to sell all of its hydroelectric generation facilities. These facilities are located in northern and central California (see Figure 2-1). Except where noted, much of the information in this chapter comes primarily from Pacific Gas and Electric Company's Proponent's Environmental Assessment (PEA) (PG&E Co., 1999b; 2000b, 2000c). The proposal also includes the sale of approximately 140,000 acres of land associated with the generation facilities. This includes land within Federal Energy Regulatory Commission (FERC) license boundaries, as well as adjacent land that is within the watershed of the facilities. (See Section 2.8.2 for a more complete description of the land assets proposed for sale.)

The Pacific Gas and Electric Company proposes to divest (sell):

- 68 powerhouses;
- 110 generating units totaling a normal maximum operating capacity of 3,896 megawatts (MW);
- Approximately 2.3 million acre-feet of reservoir capacity;
- 26 FERC licenses;
- Three hydroelectric facilities not covered by FERC licenses;
- 99 reservoirs;
- 76 diversions[1];
- 174 dams;
- 184 miles of canals;
- 44 miles of flumes;
- 135 miles of tunnels;
- 19 miles of pipe;
- Five miles of natural waterways;
- Certain land and non-consumptive water rights associated with the powerhouses;
- Consumptive water rights; and
- Approximately 140,000 acres of land associated with the hydroelectric generation facilities.

[1] A diversion is a barrier or structure built to divert water into a canal, flume or tunnel, typically with no storage.

The system also includes switching centers that remotely control the generation facilities, centralized facility service centers, fleet vehicles, multiple modes of communications, materials and supplies inventories, office equipment, and other miscellaneous instrumentation and monitoring equipment. The locations of the generation facilities are shown in Figure 2-1. These facilities are described in detail in Section 2.9.

For purposes of this Environmental Impact Report (EIR), the "project" is the auction of assets and the transfer of asset ownership. The project raises the possibility that ownership change could result in changed future operation of Pacific Gas and Electric Company's hydroelectric generation assets, and changed management of associated lands. The new owner(s) would not be regulated by the CPUC unless the new owner is a California jurisdictional investor-owned utility.

The fundamental question to be addressed in the EIR is whether the change in ownership of Pacific Gas and Electric Company's hydroelectric generation assets, and attendant changes in operation—including potential cessation of regulation by CPUC and changed management of the lands—would create environmental impacts locally or regionally that would not occur should the assets be retained by the utility. Chapter 3 of this EIR, explains the assumptions about how the new owners might operate the facilities and use associated lands.

2.2 PROJECT OBJECTIVES

In September 1996, California's electric industry restructuring legislation, Assembly Bill 1890 (AB 1890), was signed into law. AB 1890 supported the establishment of a competitive generation industry separate from electric power transmission and distribution operations. As part of AB 1890's transition to generation competition, Public Utilities Code Section 367 requires that Pacific Gas and Electric Company's generation assets be valued for the purpose of calculating the stranded costs associated with the assets. Sale is one method of measuring the market value of generation assets. Public Utilities Code Section 367 requires the CPUC to determine the market value of all of Pacific Gas and Electric Company's non-nuclear generating assets by the end of year 2001. Net value in excess of the book value of the assets is to be credited to ratepayers, while any net value less than the book value may be collected from the ratepayers, through what are generally referred to as Competition Transition Charges (CTC). The CPUC has recently determined the market value of Pacific Gas and Electric Company's fossil-fuel and geothermal generating facilities through competitive auctions that resulted in transferring the facilities to the highest bidders in those auctions.

Pacific Gas and Electric Company proposes to use a similar auction process to market value its hydroelectric generating facilities and related assets, and to transfer ownership to the highest bidder(s). Pacific Gas and Electric Company is not required by the new law or Commission decisions to divest its hydroelectric generation assets. While valuation methods other than a price-only auction, such as appraisal, could be employed to comply with Public Utilities Code

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Figure 2-1

Pacific Gas & Electric Company's Hydroelectric Facilities

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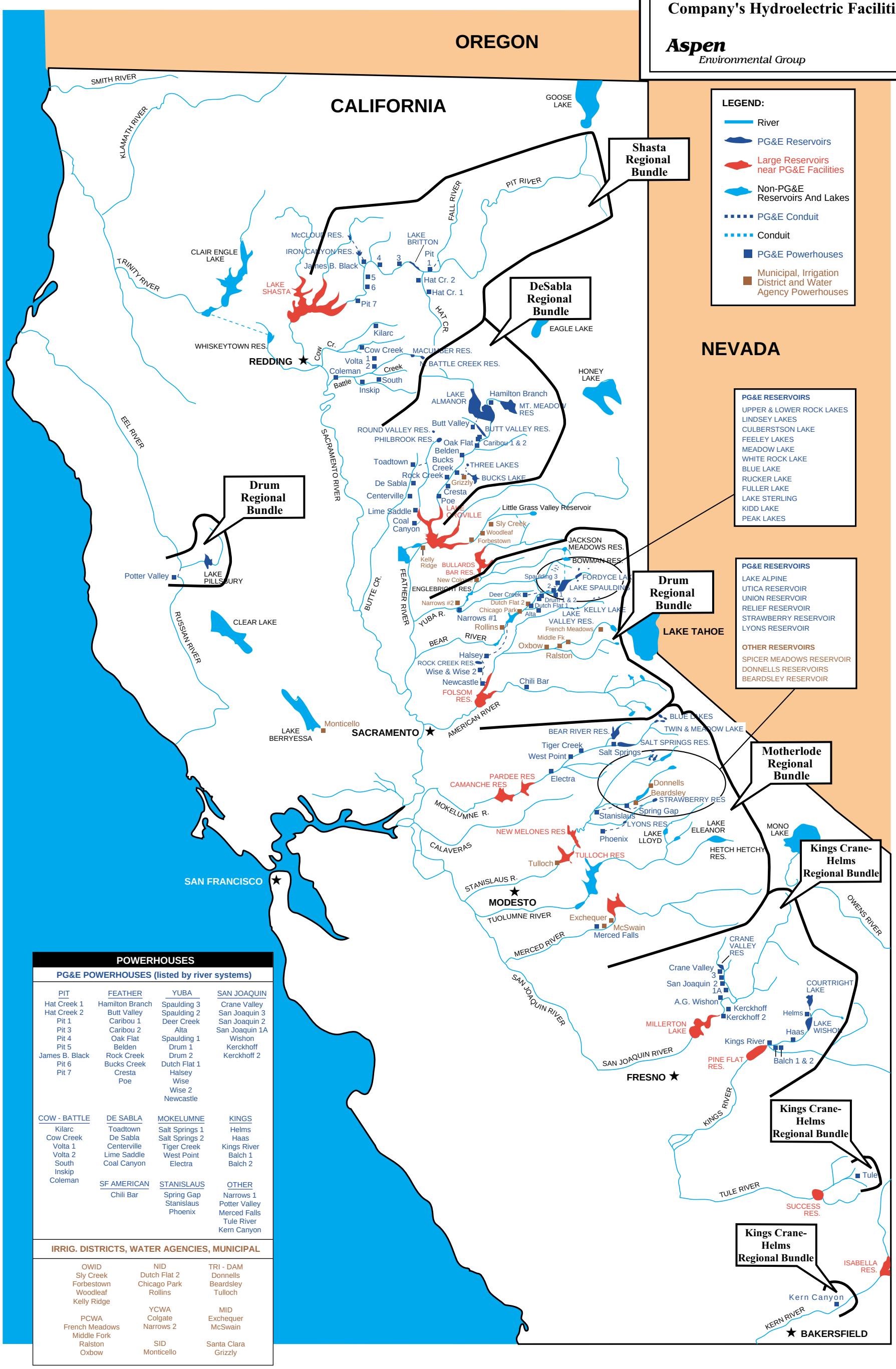

Source: Pacific Gas & Electric Company's PEA (Proponent's Environmental Assessment) October 1999, Volume 2, modified by Aspen Environmental Group, 2000.

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Section 367, Pacific Gas and Electric Company's proposal relies on a price-only auction. Other methods of valuing the Company's hydroelectric assets are also being considered by the CPUC, and are discussed in this EIR's analysis of alternatives.

Under CEQA, the alternatives to the project should be feasible and attain most of the basic objectives of the project while avoiding or substantially lessening any of the significant effects of the project. It is useful at this time to reiterate the objectives of the project. Pacific Gas and Electric Company's objectives are narrower in scope than the Commission's, though some of its objectives are coincident with the Commission's objectives.

The Commission's objective in this proceeding is to follow its statutory mandate to balance a number of factors to protect the broad public interest. The Commission must ensure the safe, reliable, and environmentally sensitive provision of reasonably priced energy services, pursuant to the Public Utilities Code and CEQA. For this project, that means the Commission must:

- Ensure the facilities are operated safely, in accordance with existing permits and licenses, and in accordance with Public Utilities Code Section 363;
- Avoid the potential for the exercise of undue market power by the new owners of the facilities;
- Maintain system reliability;
- Assign a market value to the generating assets by the end of 2001 through appraisal, sale, or other divestiture, as required by Public Utilities Code Section 367(b), pursuant to which Pacific Gas and Electric Company filed its application;
- Ensure the valuation placed on the generation facilities and Project Lands reflects their true market value; and
- Protect environmental resources affected by the change in ownership in the hydroelectric generation assets and Project Lands.

Pacific Gas and Electric Company's objectives with respect to the proposed sales, as identified in the PEA (PEA, Volume 2, p. 2-2), are as follows:

- Provide a measure of the market value of the hydroelectric assets by December 31, 2001, as required by AB 1890;
- Preserve asset values by requiring a "price-only" final bid that will result in the assets going to the bidders that place the highest economic value on the assets;
- Further AB 1890's goal of separating monopoly utility transmission functions from generation functions;

- Ensure that system reliability is maintained by requiring facilities essential to reliability to continue to operate under "must run" contracts with the Independent System Operator (ISO), and requiring certain units that have historically maintained distribution reliability to operate under "islanding agreements";
- Ensure that the facilities continue to operate in accordance with existing contractual obligations, particularly water supply and delivery commitments;
- Ensure that the hydroelectric facilities continue to operate safely and reliably under conditions established by FERC and other applicable laws and regulations;
- Ensure that the facilities continue to be operated by trained, experienced personnel during the two-year operations and maintenance period;
- Ensure that soil and groundwater contamination, and any eventual decommissioning activities, will be addressed as required by law; and
- Ensure continued knowledgeable and responsible stewardship of natural resources.

2.3 DESCRIPTION OF THE PROPOSED AUCTION AND DIVESTITURE

Pacific Gas and Electric Company is a regulated utility that provides natural gas and electric service to customers in Northern and Central California. It is a wholly-owned subsidiary of PG&E Corporation, a holding company headquartered in San Francisco, California. PG&E Corporation also owns PG&E National Energy Group (NEG)[2], a Maryland corporation that builds, acquires, and operates independent generating facilities in various parts of the country. The hydroelectric assets that Pacific Gas and Electric Company proposes to auction include powerhouses, reservoirs, water conveyances, buildings, land, and other physical assets that directly support the hydroelectric generation function. Pacific Gas and Electric Company will also transfer FERC licenses, water rights and other permits, agreements and authorizations relating to each hydroelectric project, and additional lands that do not directly support hydroelectric generation.

2.3.1 ASSET BUNDLING

Pacific Gas and Electric Company proposes to have all of its assets related to its hydroelectric facilities (including the powerhouses, water systems, the land interests, support facilities, and water rights) market valued, and transferred to new owners as integrated bundles of assets rather than as discrete assets in themselves. Pacific Gas and Electric Company currently manages the assets in five administrative groupings. For purposes of the auction, these five administrative groupings of assets are considered as regional "bundles": the Shasta Regional Bundle, the DeSabla Regional Bundle, the Drum Regional Bundle, the Motherlode Regional Bundle, and the Kings Crane-Helms Regional Bundle. The regional bundles are designed to capture other operational efficiencies and economies of scale. These are primarily geographic, and may promote operational and staffing efficiencies. Pacific Gas and Electric Company believes that value would be enhanced by transferring all the facilities and land within a regional bundle to the same owner.

2 PG&E National Energy Group (NEG) was formerly known as PG&E Generating Company.

Recognizing, however, that others may have different views about the desirability of grouping the assets into regional bundles, Pacific Gas and Electric Company has identified what it believes are the smallest bundles in which the assets could be separately transferred as part of the project. It has identified 20 smaller bundles within the five regional bundles that would keep FERC licenses together and most water rights intact. Table 2-1 shows the assets within each regional bundle and each of the 20 smaller bundles. Given the bundling options, the auction may result in a transfer to a single owner, to a few owners, or to many separate owners. Any individual bidder could bid on any one of the 20 smaller bundles, the five regional bundles, or any combination of the regional or smaller bundles. Pacific Gas and Electric Company's PEA states that if the system is sold to multiple owners, there will be a need for shared services contracts and the potential need to construct switching centers, service centers, or telecommunications infrastructure.

Pacific Gas and Electric Company proposes that bidders be allowed to bid on any or all of the bundles it has identified. Pacific Gas and Electric Company also proposes that its non-utility affiliate, PG&E NEG, be allowed to bid on assets under the same terms and conditions as any other prospective owner. It also proposes that the bundles be sold to the owner or owners whose collective bids result in the highest overall value for the auctioned assets. For example, if a single bid for a regional bundle were higher than the aggregate total of the highest bids for the smaller bundles in the region, then the regional bundle would go to one owner, if all approvals were granted. However, if the bids in aggregate for the smaller bundles are higher than any single bid for the entire regional bundle, there could be multiple owners in the regional bundle (assuming all approvals were granted). The CPUC will evaluate the size and nature of the bundles proposed by Pacific Gas and Electric Company, and will consider alternative bundling approaches in this EIR.

2.3.1.1 Closing Conditions

In the proposed auction, the bids would need to be free of any contingencies, such as financing availability. If the facilities were held by special-purpose entities set up by the winning bidder, the bidder would need to provide a guarantee of obligations. The sale would be contingent upon CPUC approval, and upon FERC's approval of the license transfers. The buyer(s) would be responsible for obtaining transfer or reissuance of other environmental permits, including special use permits from the U.S. Forest Service (PG&E Co., 1999b).

2.3.1.2 Closing Timing

For the auction, Pacific Gas and Electric Company has stated that it would endeavor to close all of the sales in roughly the same time frame, subject to receipt of CPUC and FERC approvals. However, the closing for each bundle of assets would be independent of the other bundles, and a prospective owner may be required to close even if other bundles upon which the owner individually bid were not ready to close. If the winning bid were for a group of assets as a package only (i.e., a regional bundle), the buyer(s) would not have to close unless the package of assets bid

upon was available. Pacific Gas and Electric Company has stated it would try to close all sales by the end of year 2001 (PG&E Co., 1999b).

2.4 OVERVIEW OF THE HYDROELECTRIC POWER SYSTEM AND GENERATING PROCESS

Pacific Gas and Electric Company's hydroelectric power system consists of a complex and extensive system of facilities. This section describes the elements of the system, the operation of the system, and the constraints on the system.

Hydroelectric powerhouses generate electricity by converting the potential and kinetic energy of pressurized and falling water into mechanical energy used to drive a turbine generator. To create and capture the energy of falling water, the powerhouse (the generating portion of the facility) must be located at a lower elevation than the source of water. Appendix I provides monthly unimpaired flows (average, wet year, and critically dry year) on rivers in the regional bundles. Large water flows and large differences in elevation increase the energy output of the production facilities. Engineers, therefore, site and size the hydroelectric facilities in response to river flows and the natural topography of mountainous regions. Each facility is uniquely designed, and there are great variations in the size and configuration of systems for storing and conveying water to the powerhouse, as well as wide variations in the powerhouses and turbine generator equipment. These physical differences—location, size and type of storage and conveyance system—affect the facilities' maximum generating capacities, as well as the ability to exercise control over the amount and timing of generation.

2.4.1 TYPICAL HYDROELECTRIC GENERATION FACILITIES

Hydroelectric generation facilities generally fall into two categories: those that do not have significant amounts of reservoir storage, and those that do. Facilities without significant storage capacity are known as run-of-the-river facilities. This type of facility uses streamflow to generate electricity at the time the water is available in the stream channel. A facility that includes storage has more flexibility in the timing of operation, because stored water can be released at specified times.

Figure 2-2 shows a schematic flow diagram of the basic components of a typical hydroelectric generation facility that includes reservoir storage. Figures 2-3 to 2-12 show photographs of typical hydroelectric generating facilities and surrounding watershed lands. A typical facility with a storage reservoir consists of:

- A dam that impounds and stores streamflow in a reservoir;
- Conveyance facilities to move water from the reservoir to the powerhouse, including an intake structure, canals, flumes, tunnels, and/or pipes;
- A penstock, which is a pressure pipe that slopes steeply to the powerhouse. Pressure progressively increases as water descends the penstock;
- Gates and valves for controlling the flow of water in the system;

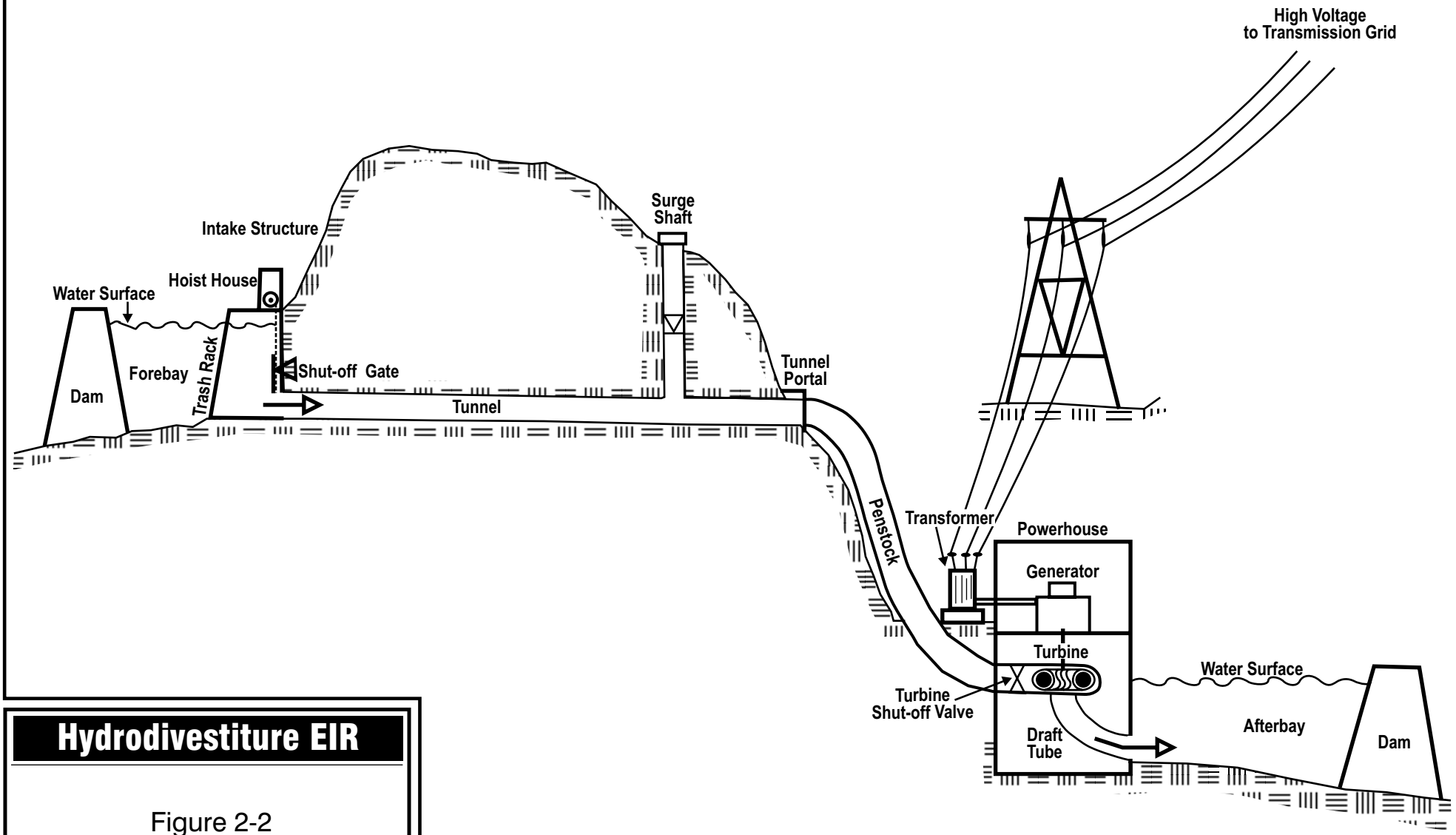

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Figure 2-2

Typical Features of a Hydroelectric Plant

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- A powerhouse that contains the hydraulic turbines, generators, other mechanical equipment, and controls[3];
- A tailrace that channels the powerhouse discharge flow back to the stream;
- A forebay, which is a reservoir upstream from the powerhouse from which water is drawn into a tunnel or penstock for delivery to the powerhouse;
- A transformer bank to increase generator output voltage to transmission levels; and
- A switchyard connecting the powerhouse to the transmission grid.

Where powerhouses are located at the base of dams, the conveyance facilities are short and consist of only intake structures and penstocks. In other cases, the conveyance system may include several miles of tunnels, flumes, pipes or canals, and intermediate flow-regulation reservoirs before reaching the penstock. "Stop-log" gates are usually located in the intake structures at the reservoirs to regulate flow, and to de-water tunnels and canals for maintenance. Trash racks are installed at intake structures to collect large debris that could harm the turbine. Shutoff valves are sometimes installed at the upstream end of penstocks. Turbine shutoff valves are always installed at the lower end of the penstocks ahead of the turbines. Surge shafts are provided in tunnels near their downstream ends to dampen any pressure transients due to sudden changes in flow. Surge shafts protect the penstocks from failure due to over-pressurization. Also, open standpipes or air-admitting valves are provided at the upper ends of penstocks to prevent collapse of the pipe by negative pressure (vacuum) that can result under certain abnormal conditions. A number of powerhouses are also equipped with bypass valves and energy dissipaters that allow water to be shunted past turbines, and to be slowly shut off in the event of a sudden interruption of generation. Shutting down flows too quickly can result in a sharp spike in pressure, known as water hammer, in the penstock and turbine case. If generation is interrupted and flow through the turbine is not shutdown or diverted, the unit would over-speed and damage the generator and other equipment.

A reservoir that supplies water to the conveyance facilities leading directly to powerhouses is called a "forebay." Forebays modulate the flow of water into the powerhouse. Most of the Pacific Gas and Electric Company system forebays are small, with water levels cycled on a daily or weekly basis in response to system load demands. Water levels in large storage reservoirs are raised and lowered on a seasonal basis. The larger storage reservoirs may also act as forebays, but short-term cycling of generation would not significantly affect water levels. Many of Pacific Gas and Electric Company's powerhouses also have "afterbay" reservoirs downstream of the tailrace. Afterbays serve to modulate rapid changes in discharge flow, dampening stream flow surges that could endanger people or damage environmental resources. Also, afterbays may be needed to maintain tailwater levels above the draft tubes of the turbines to ensure efficient operation and prevent cavitation damage. In many cases, the afterbay of one powerhouse is the forebay for the next powerhouse in a series along a stream. For example, on the North Fork Feather River system,

3 Each turbine-generator pair and associated equipment is referred to as a generating "unit." Pacific Gas and Electric Company's powerhouses have one to four units. Powerhouses with multiple units offer greater flexibility of operation and maintenance.

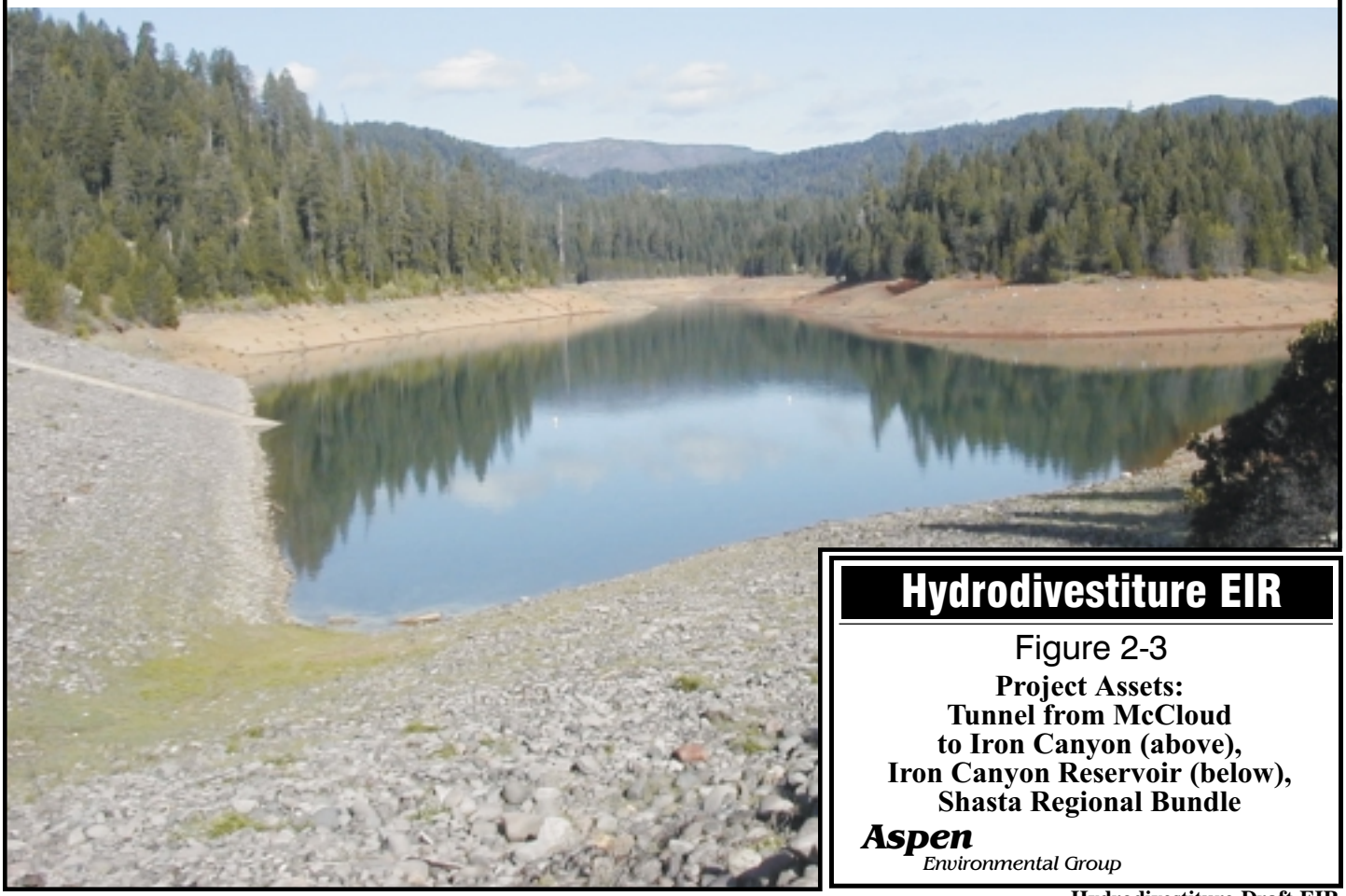

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Figure 2-3

**Project Assets:
Tunnel from McCloud
to Iron Canyon (above),
Iron Canyon Reservoir (below),
Shasta Regional Bundle**

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Figure 2-4

Project Assets:
Penstocks leading to
Pit 5 Powerhouse (left),
Pit River below Lake Britton (right),
Shasta Regional Bundle

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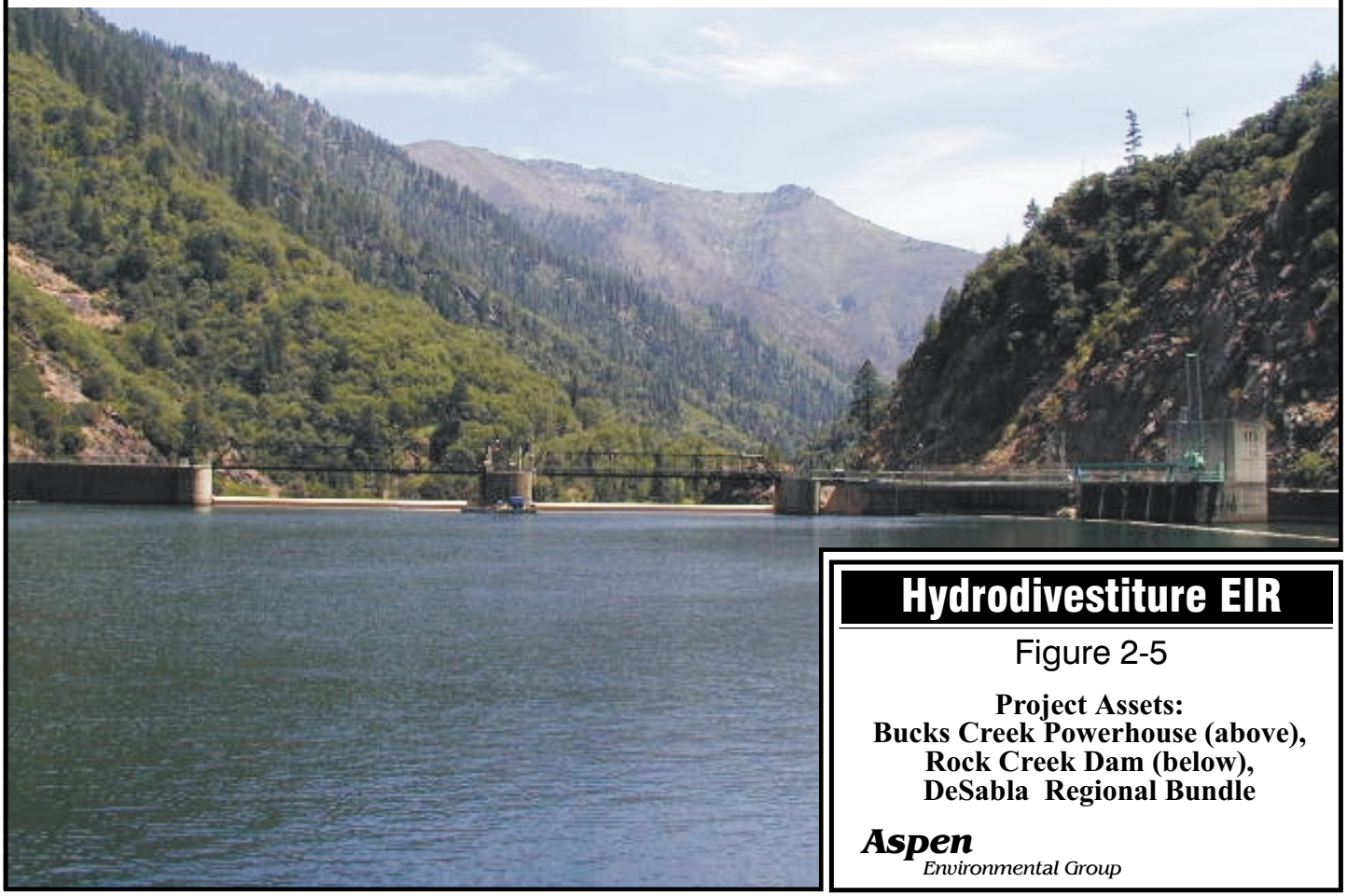

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Figure 2-5

Project Assets:
Bucks Creek Powerhouse (above),
Rock Creek Dam (below),
DeSabla Regional Bundle

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Figure 2-6

Project Assets:
Mountain Meadow Reservoir (above),
Water Conveyance Pipes
to Cresta Powerhouse (below),
DeSabla Regional Bundle

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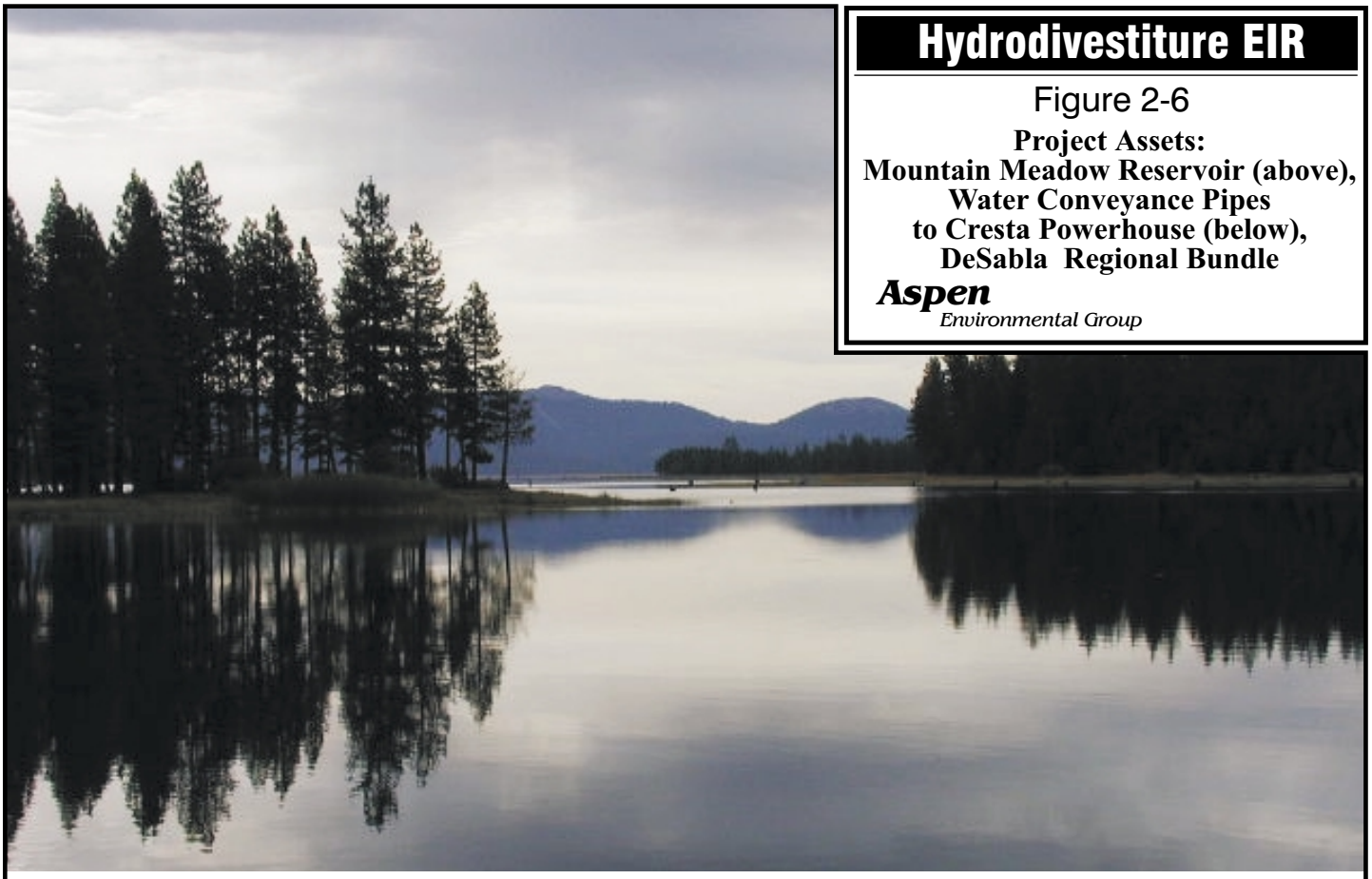

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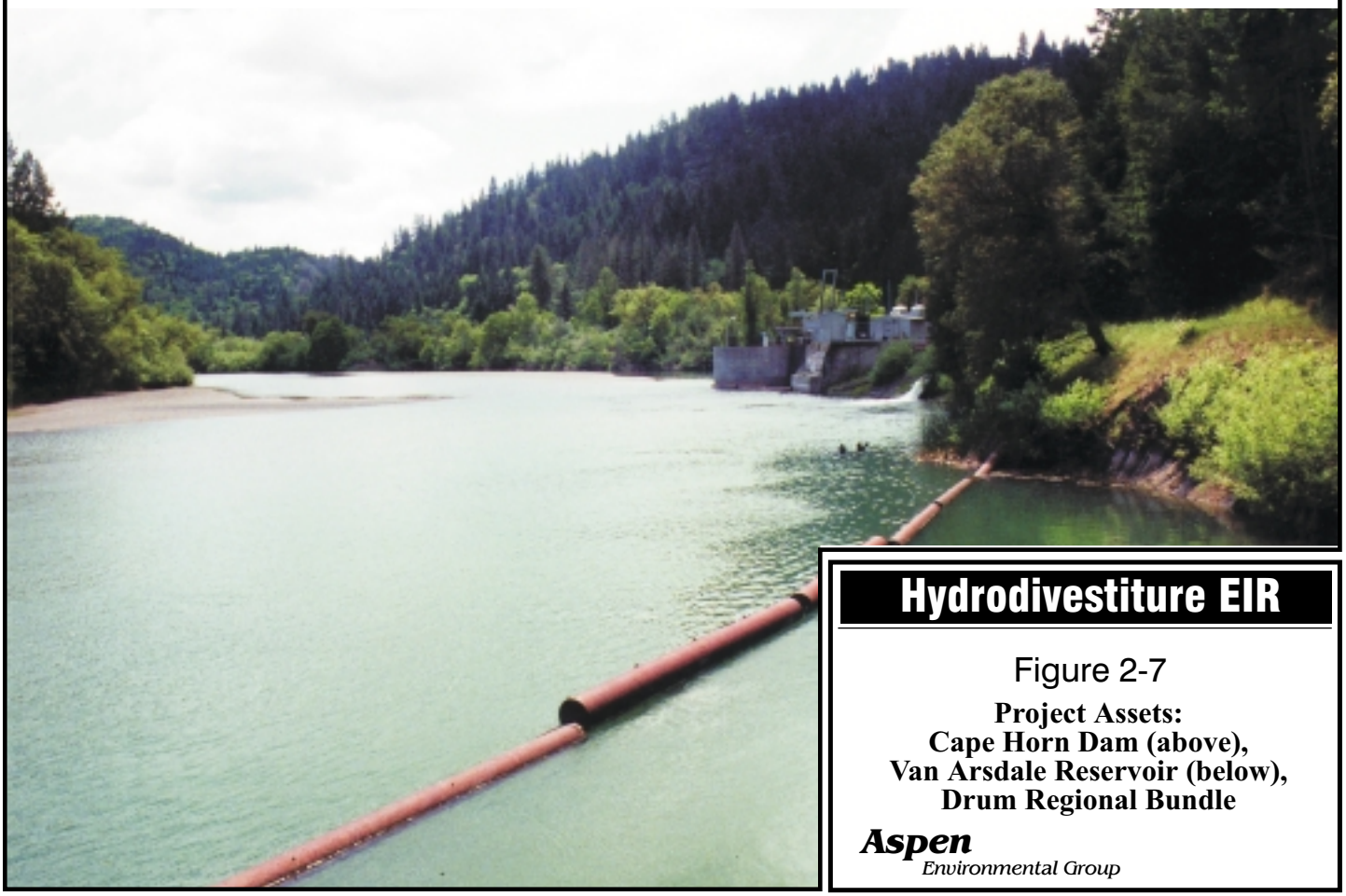

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Figure 2-7

Project Assets:
Cape Horn Dam (above),
Van Arsdale Reservoir (below),
Drum Regional Bundle

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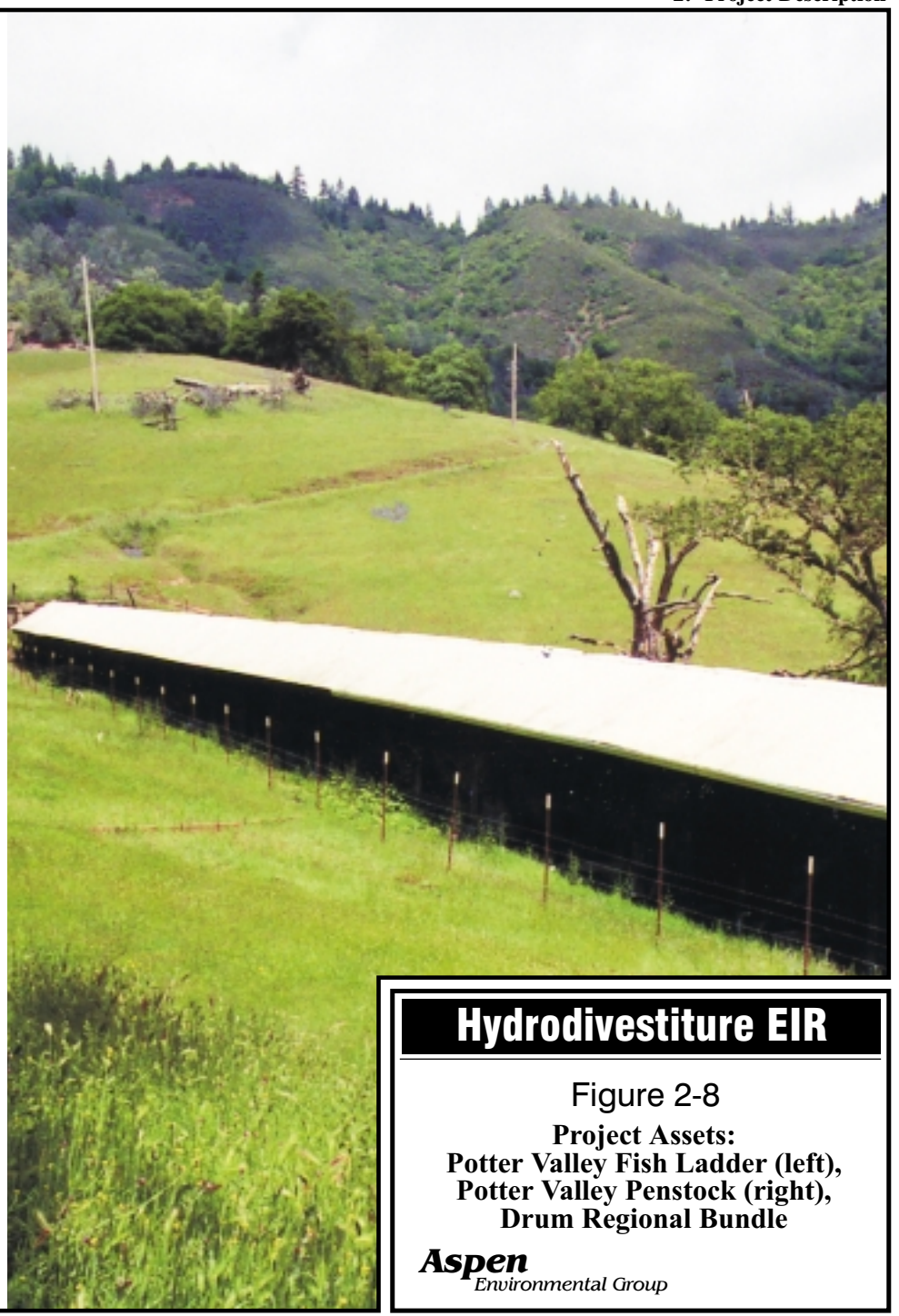

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Figure 2-8

Project Assets:
Potter Valley Fish Ladder (left),
Potter Valley Penstock (right),
Drum Regional Bundle

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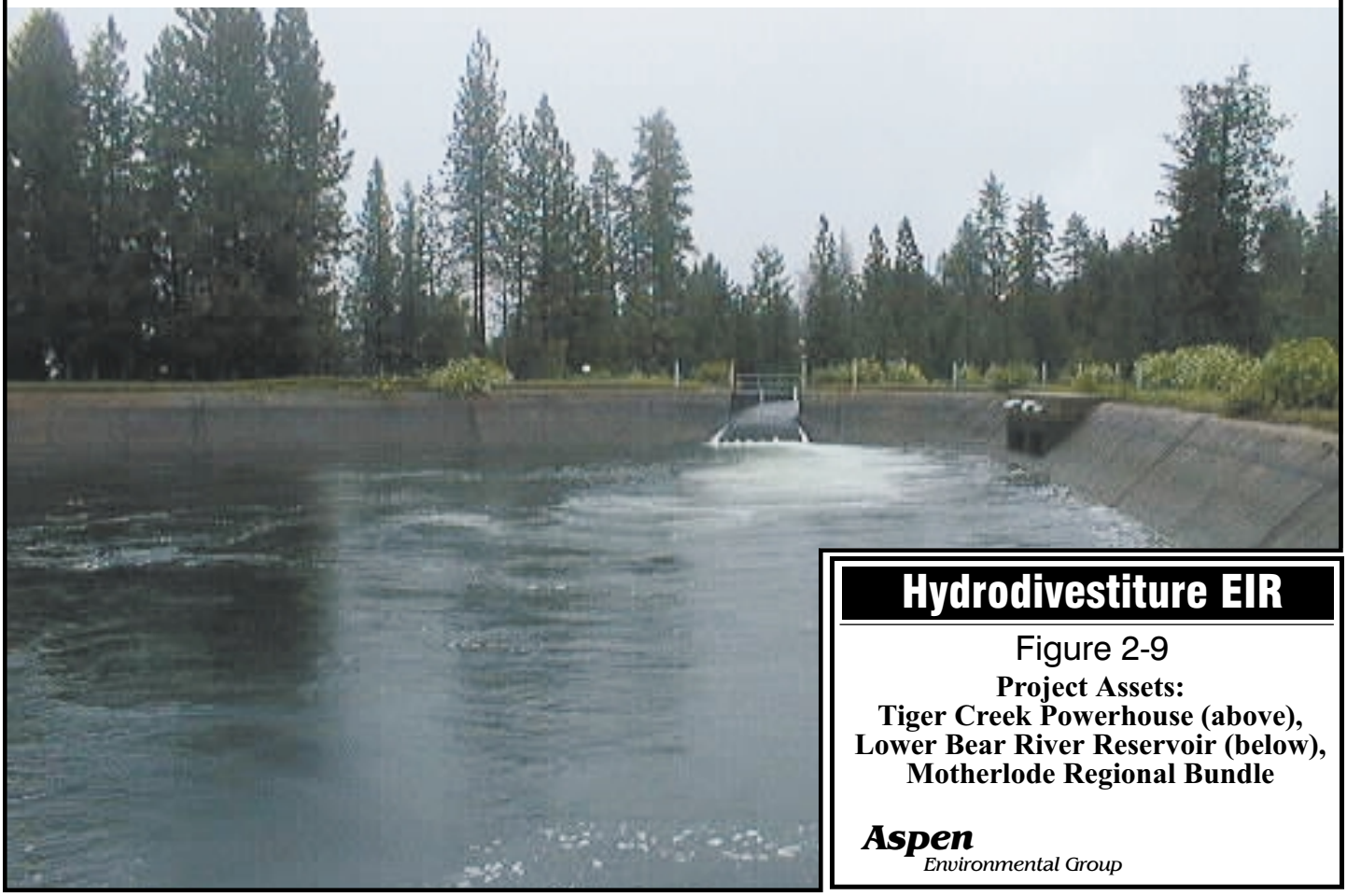

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Figure 2-9

Project Assets:
Tiger Creek Powerhouse (above),
Lower Bear River Reservoir (below),
Motherlode Regional Bundle

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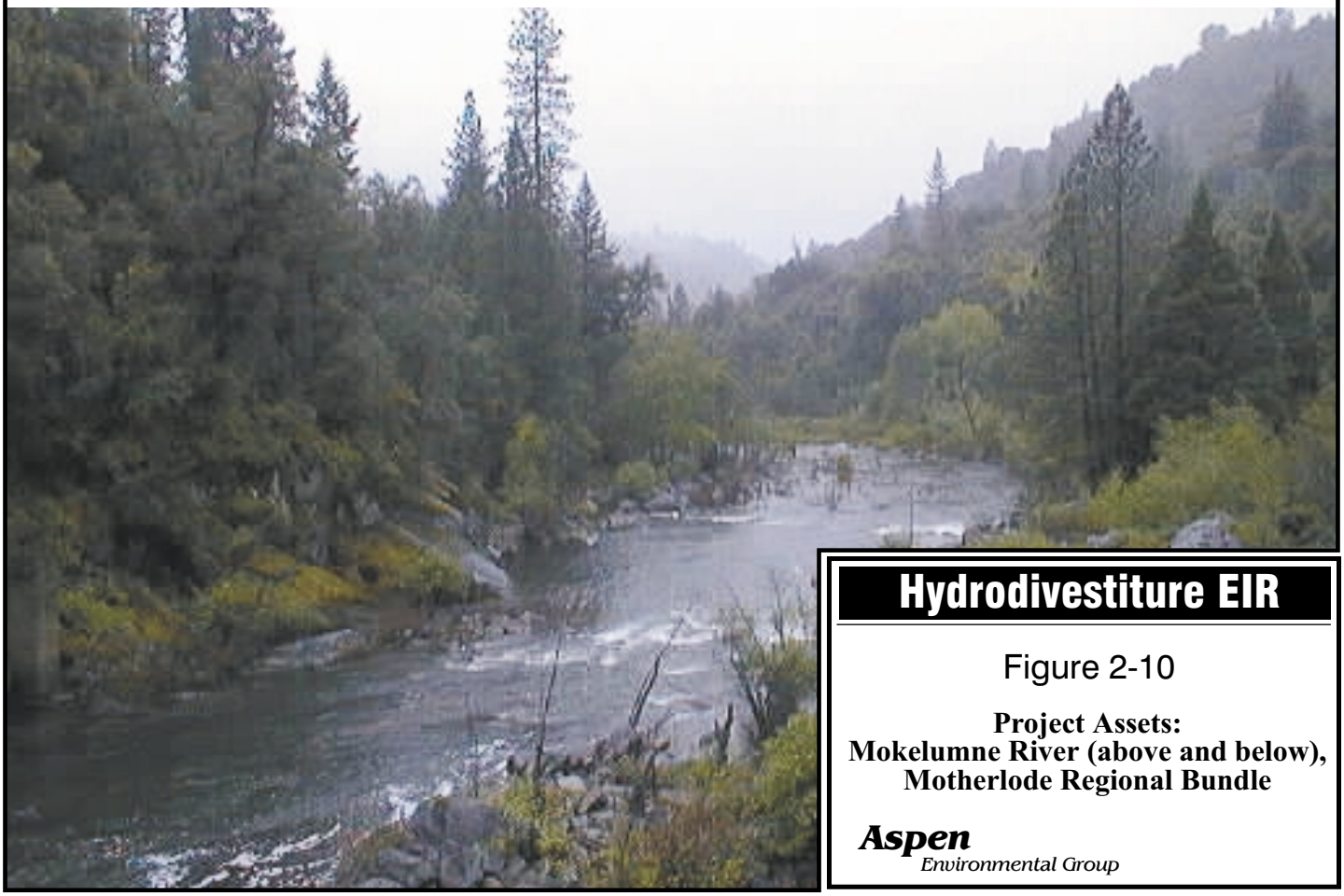

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Figure 2-10

Project Assets:
Mokelumne River (above and below),
Motherlode Regional Bundle

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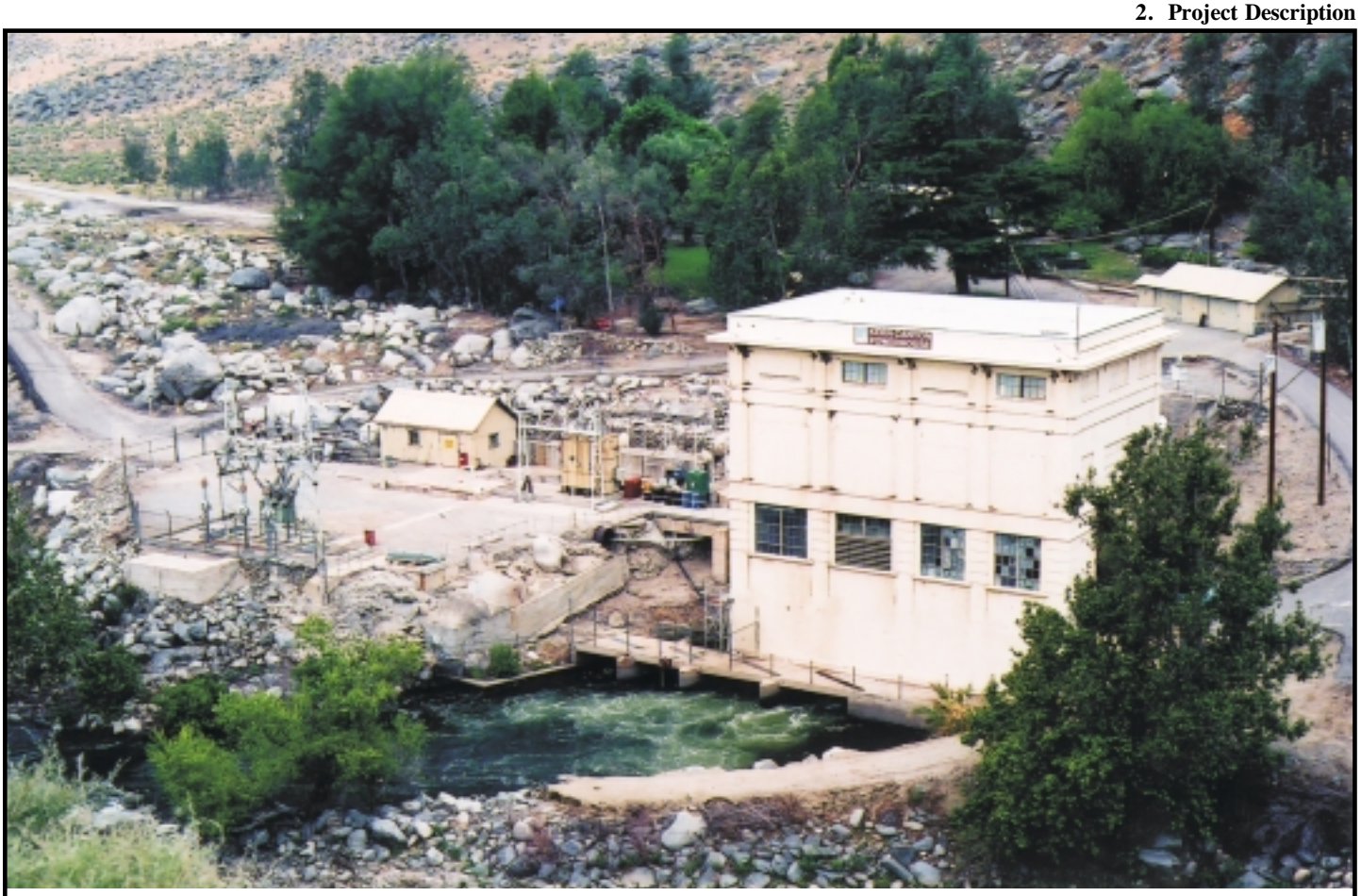

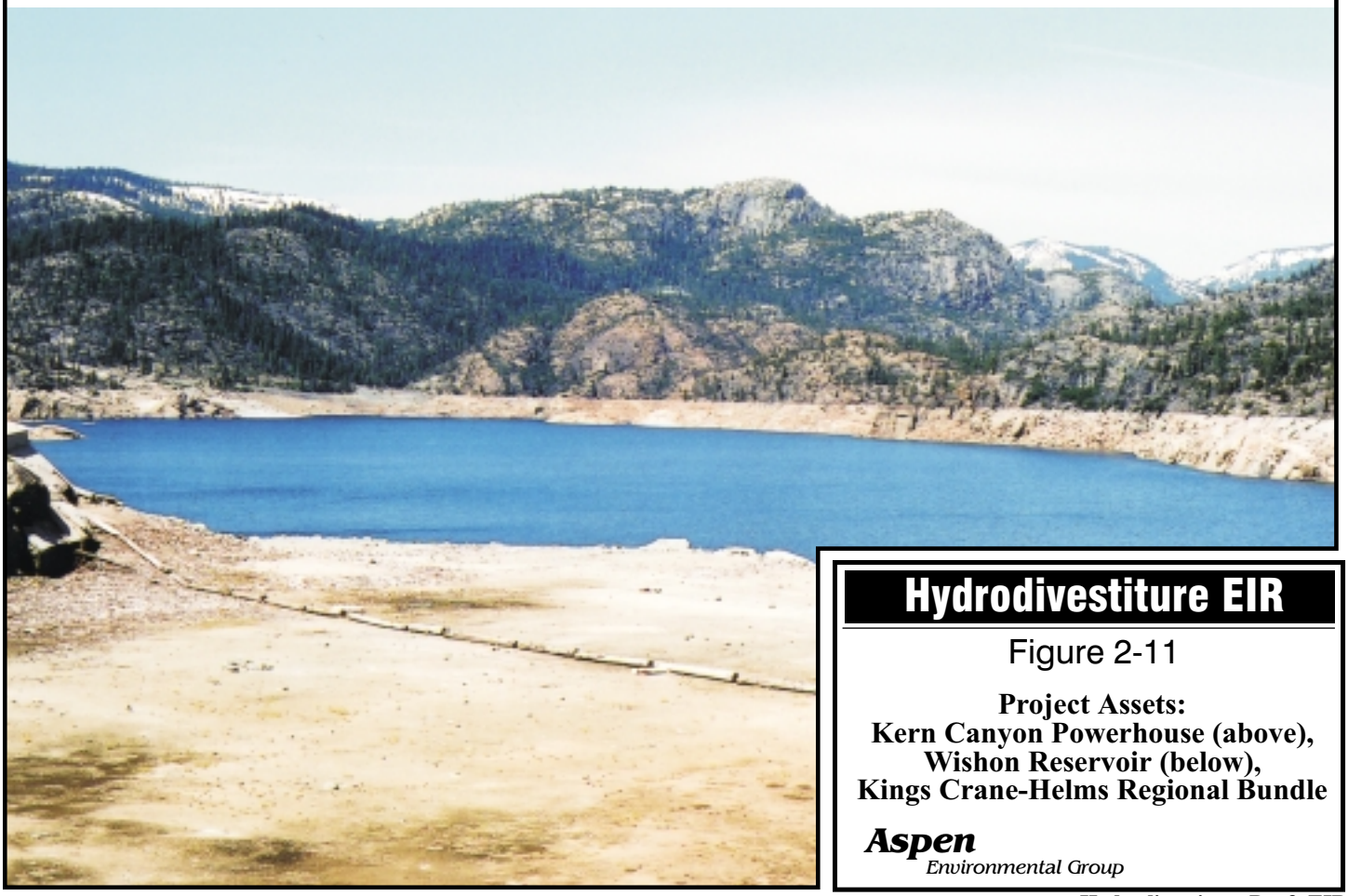

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Figure 2-11

Project Assets:
Kern Canyon Powerhouse (above),
Wishon Reservoir (below),
Kings Crane-Helms Regional Bundle

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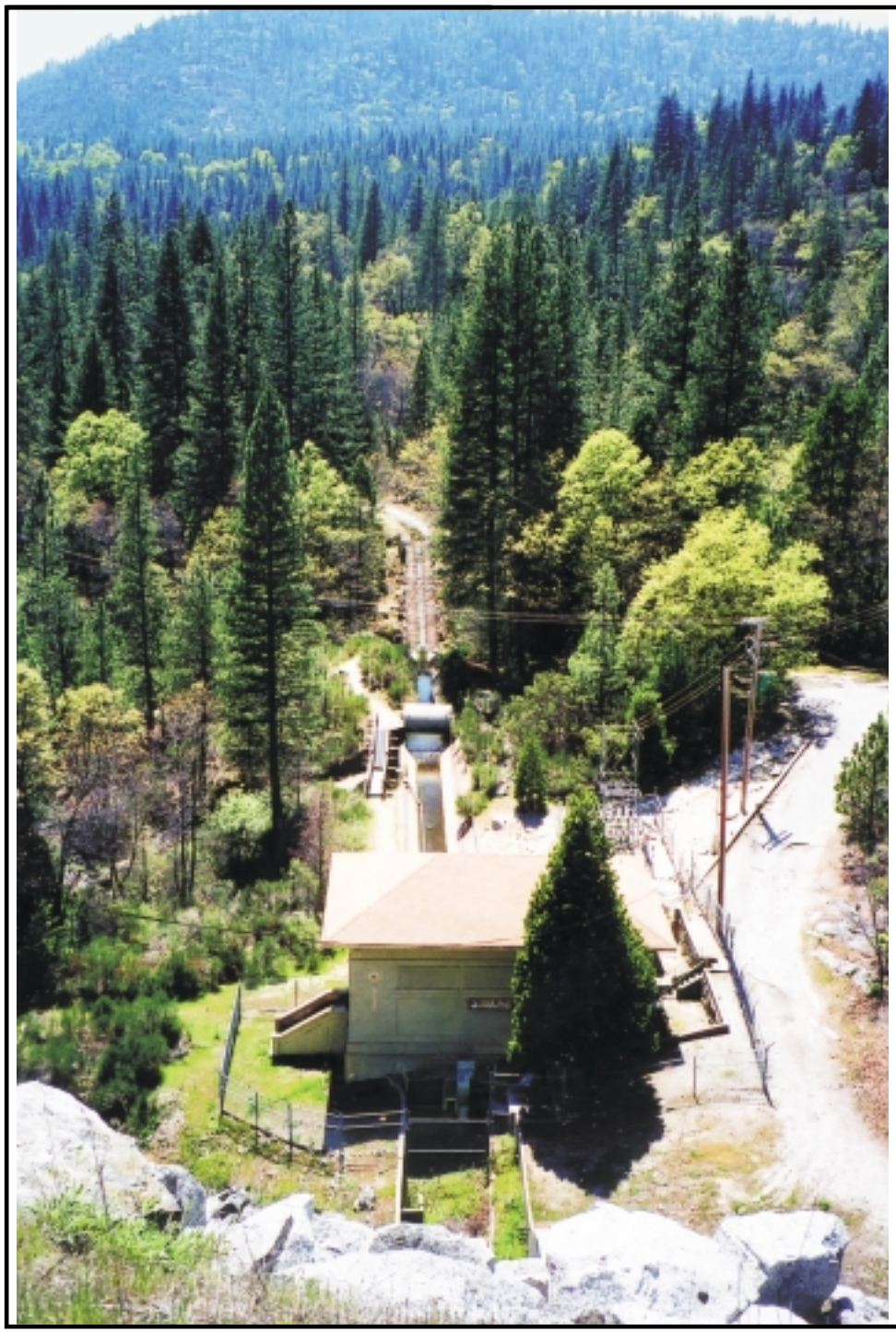

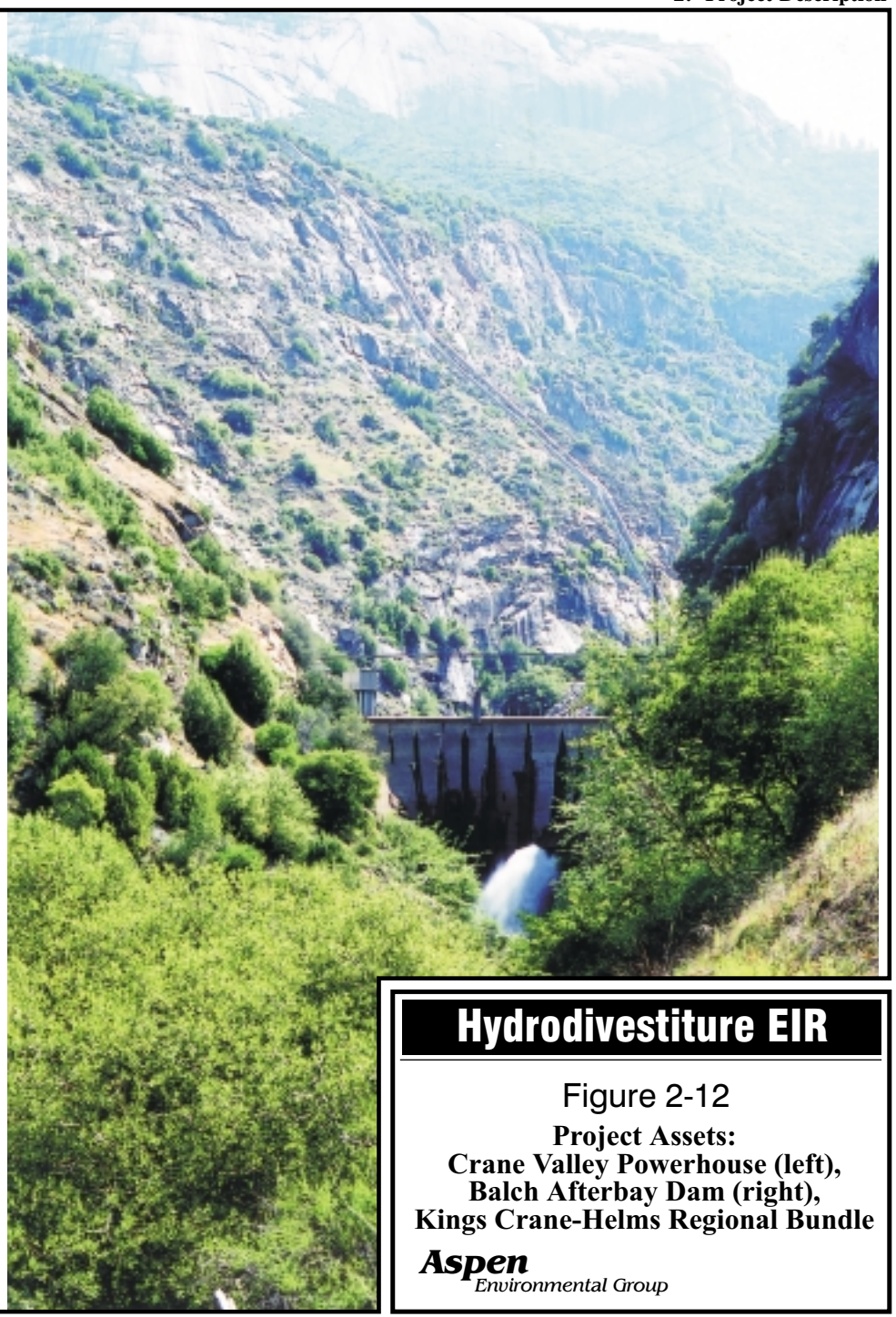

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Figure 2-12

Project Assets:
Crane Valley Powerhouse (left),
Balch Afterbay Dam (right),
Kings Crane-Helms Regional Bundle

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water flow from Mountain Meadows Reservoir produces electricity through a series of seven Pacific Gas and Electric Company powerhouses as the water flows to Lake Oroville. Water from the reservoir then produces electricity at two additional facilities, the Department of Water Resource's Edward Hyatt and Thermalito powerhouses, prior to diversions for the State Water Project.

Three of the Pacific Gas and Electric Company powerhouses (Helms, Haas, and Kerckhoff) are located in underground chambers excavated from solid granite. For these facilities, there are tailrace tunnels and access tunnels or shafts for equipment and personnel.

The Helms Creek Pumped Storage Plant (FERC 2735) is unlike the typical hydroelectric generation facility. Its operation can be reversed from the generating mode to the pumping mode to move water back into upstream storage in Courtright Lake for re-release (see Figure 2-13). In the generating mode, water is drafted from Courtright Lake, passed through the powerhouse turbines to generate up to 1,212 MW of power, and discharged to Lake Wishon. In the pumping mode, the turbines become pumps, the generators become motors, and the tailrace tunnel becomes an intake tunnel to draft water from Lake Wishon and return it through the penstocks and power tunnel to Courtright Lake, approximately 1,700 feet higher in elevation than Lake Wishon.

Due to efficiency losses of the cycle, Helms is a net user of energy. However, it is economically feasible to operate because the pumping takes place during off-peak hours when electric energy is inexpensive. Electricity is generated during on-peak hours when energy values are higher.

2.4.2 HYDROLOGICAL CYCLE

Hydropower is a renewable natural resource that depends on the natural annual hydrologic cycle to replenish streamflows and refill reservoirs. At the higher elevations, much of the precipitation occurs as snow that accumulates through the winter months. At lower elevations, much of the rainfall runs off rapidly, but a large portion also percolates into the ground to replenish groundwater resources and springs. Streams carrying direct runoff, spring water flows, and snowmelt coalesce into rivers that flow back to the ocean to repeat the hydrologic cycle. The snow pack melts slowly in the spring and early summer, often feeding streamflows into mid-summer. The snow pack is, in effect, a high-elevation storage reservoir that is of great value to hydroelectric power generation.

The porous volcanic rock formation of the Cascade Range provides another natural large reservoir that is recharged during the wet season and slowly releases the water to streamflow to benefit hydrogeneration and other water uses throughout the dry season. Pacific Gas and Electric Company's facilities on the McCloud and Pit rivers in the Shasta Regional Bundle and projects in the DeSabla Regional Bundle greatly benefit from the groundwater storage and discharge.

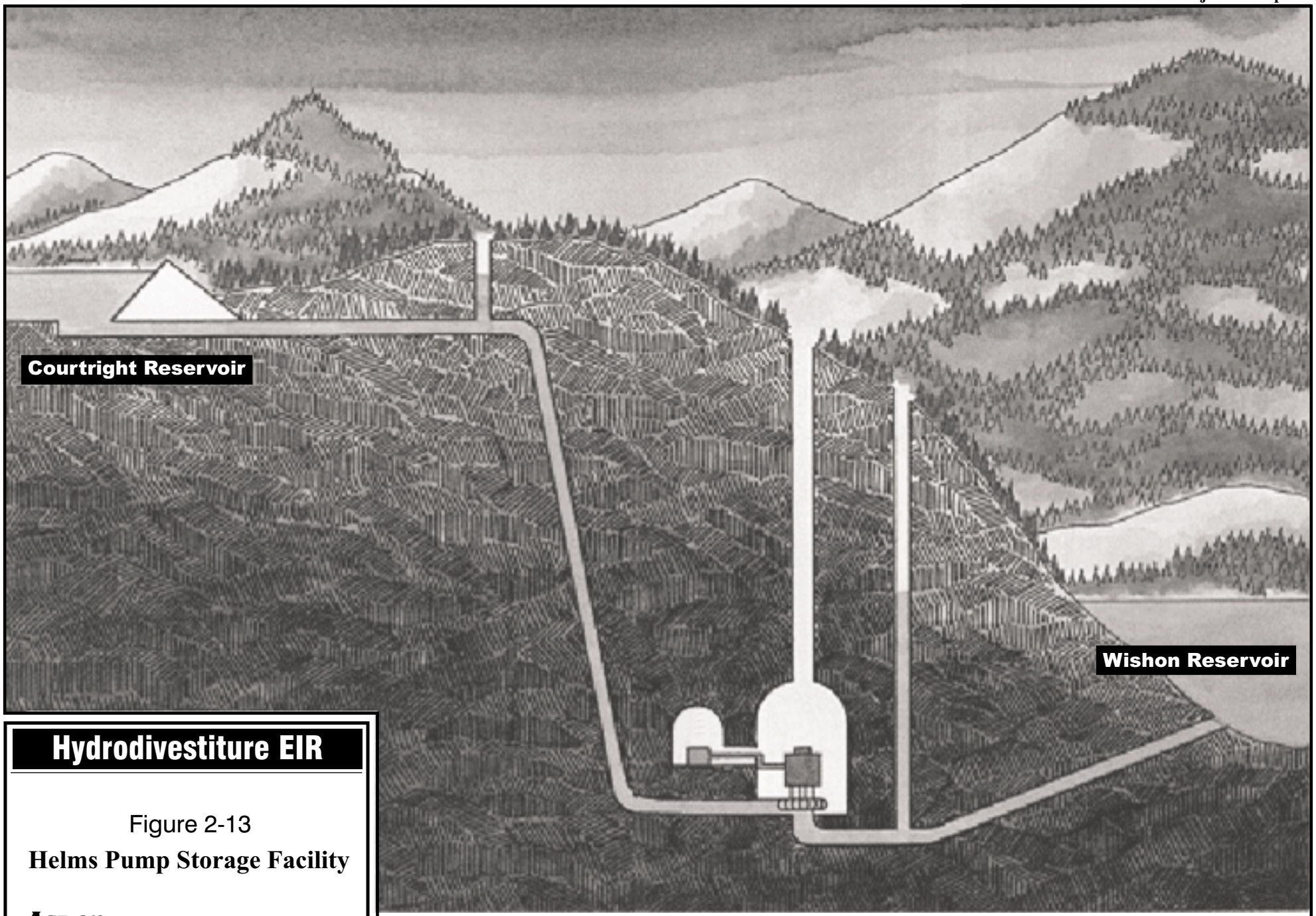

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Figure 2-13

Helms Pump Storage Facility

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2.4.3 SITING OF HYDROELECTRIC GENERATION FACILITIES

Except for the Potter Valley site in the Coastal Range, Pacific Gas and Electric Company's hydroelectric facilities are located on the western slopes of the Sierra Nevada and Cascade ranges, between the foothill zone along the eastern edge of the Central Valley and the crest of the ranges. Unlike combustion and nuclear power plants, which can be sited near load centers and transmission corridors, hydrogeneration facilities must be sited where the energy resources exist (i.e., where there are sufficient streamflows, elevation differences to provide head[4], and economically feasible opportunities to construct dams, reservoirs, and powerhouses to capture the hydroenergy). Due to the heavy precipitation and steep gradients of the western slopes of the Cascades and Sierra Nevada, many opportunities for hydropower generation existed that have been developed by Pacific Gas and Electric Company and its predecessors, other private and publicly owned electric utilities, water districts, and State and Federal agencies.

Many of the best hydropower sites are located in remote, rugged areas far from load centers and transmission corridors. These locations required the construction of access roads, long transmission lines, and operator housing in addition to the hydropower facilities themselves.

There are few sites in the mountains above 1,000 feet elevation suitable for large storage reservoirs due to the steep stream gradients and narrow steep-sided canyons. A major exception is Lake Almanor, which is situated in an inter-range basin, with 1.13 million acre-feet of useable storage capacity, representing more than half of Pacific Gas and Electric Company's total useable reservoir storage capacity of 2.2 million acre-feet. The best opportunities for major water storage facilities are located in the foothill zone between the floor of the Central Valley and the 1,000-foot elevation. This zone is where most of the major water supply projects constructed by State and Federal agencies and public water districts are located in California. Notable examples are the Bureau of Reclamation's Lake Shasta, with 4.55 million acre-feet of storage capacity at a water surface elevation of 1,065 feet, and the California Department of Water Resource's Lake Oroville, with a capacity of 3.54 million acre-feet at elevation 900 feet.

2.4.4 HYDROELECTRIC ENERGY PRODUCTION IN CALIFORNIA

When describing the hydroelectric system, capacity refers to a measure of the generating potential of various resources, whereas energy production shows how the energy demand has been met. Energy production is usually measured in kilowatt-hours (KWh), or, over longer time periods, in megawatt-hours (MWh) or gigawatt-hours (GWh)[5].

Electricity demand in California has grown an average of two to three percent per year for the last 20 years, and Californians now consume about 250,000 GWh of electricity during a year. The amount of energy generated from California's hydroelectric facilities, including Pacific Gas and

4 The difference in elevation, measured in feet, between the forebay and tailrace water levels.

5 A gigawatt is 1,000 megawatts; a megawatt is 1,000 kilowatts.

Electric Company's, has varied substantially over the last century due to large annual variations in the amount of rainfall and the depth and moisture content of mountain snow-packs. The California State Water Resources Control Board classifies years as wet, dry, or average, based on their level of precipitation relative to a long-term average. In a dry year, the amount of hydroelectric energy generated may be reduced by approximately 30 percent from an average year. In a wet year, the amount of hydroelectric energy generated may be increased by 75 percent over an average year (or double or more of a dry year).

The long-time average (1975-1999) for Pacific Gas and Electric Company-controlled hydroelectric generation is 11,832 GWh per year (not including Power Purchase Agreements [PPAs] that Pacific Gas and Electric Company dispatches). It has ranged from a low of 6,050 GWh in the drought year of 1977, to a high of 18,085 GWh in the very wet year of 1983. Thus, the variation between a very dry and a very wet year has been about 12,000 GWh. Pacific Gas and Electric Company's hydroelectric powerhouses currently produce approximately five percent of the electrical power marketed in California.

2.4.5 LOAD AND GENERATION PATTERNS

The swings in annual energy production demonstrate the paramount importance of precipitation in determining the level of hydroelectric generation. The importance of climate is also reflected in seasonal and daily variations in hydroelectric production. Daily, seasonal, and annual load curves typically follow patterns.

Fossil fuel and nuclear power plants use fuels that are available year-round. In contrast, the physical availability of "fuel" for hydroelectric facilities varies with the season of the year, the time of day, whether the facility has water storage capabilities, and whether it is a wet or dry year. In general, water for generation in Pacific Gas and Electric Company's system results from winter precipitation, most of which falls from November through March. Nearly 77 percent of the annual moisture for California's central Sierra Nevada is received in those months, with the five months from May through September receiving only about ten percent of the annual moisture. The winter precipitation typically accumulates as snow above 4,000 feet elevation, and remains frozen until about the first of April. For the central Sierra Nevada, snowmelt typically reaches maximum melt-runoff in late May, with a melt rate of about 1.5 inches of snow water per day.

During that melt period, the rate of inflow into headwater reservoirs varies according to the daily heating and cooling of the ground and air. While the exact timing depends on the distance and travel time from active melt areas to reservoirs or diversions, the peak of this inflow pulse typically

reaches most Pacific Gas and Electric Company headwater reservoirs about 11:00 p.m. to 1:00 a.m., with the lowest inflow occurring about 11:00 a.m. to 1:00 p.m[6].

The demand for energy, as depicted by seasonal load curves, tends to peak in August or September when warmer weather increases use of air conditioners and other cooling equipment. Generally, the daily demand for energy in Pacific Gas and Electric Company's service territory as depicted by daily load curves, goes through a bell-shaped cycle that peaks during the early afternoon or early evening hours, depending on the season of the year, and is at its lowest point during the night.

2.5 TERMS OF THE PROPOSED TRANSFER OF FACILITIES TO NEW OWNERS

In its PEA, Pacific Gas and Electric Company states that it has designed its divestiture proposal to meet regulatory and legal requirements, preserve the economic value of the assets, shield ratepayers and shareholders from future liabilities, and minimize actions that might otherwise adversely affect the environment. This section summarizes the key terms and conditions that Pacific Gas and Electric Company believes would accomplish those objectives.

Because the auction results in new ownership, the transactions with successful bidders would be structured so that the new owners assume Pacific Gas and Electric Company's contractual and legal obligations, and indemnify Pacific Gas and Electric Company against further liability for these obligations. In addition to its rights and assets, Pacific Gas and Electric Company has contractual obligations that relate to and affect its hydroelectric operations. These include, but are not limited to, the following, which are described in further detail in Section 2.8:

- Contractual and regulatory obligations to maintain recreational facilities and meet other conditions, such as instream flow requirements, imposed by FERC licenses;
- Contractual obligations to deliver water to certain agencies and parties for irrigation or domestic use;
- Road maintenance agreements with Federal, State, or local agencies and with private landowners;
- Leases or licenses that allow others to use lands associated with Pacific Gas and Electric Company's hydroelectric operations for grazing, agriculture, mining, timber, or recreation;
- Contractual or regulatory obligations to coordinate activities or share physical facilities with other hydroelectric owners;
- License conditions or special agreements with various environmental agencies to operate in a manner permitted but not required by the FERC license; and
- Certain responsibilities for soil or groundwater contamination on the property, and responsibility for any facilities decommissioning that may be required in the future.

Pacific Gas and Electric Company also has PPAs and Qualifying Facility (QF) contracts with certain irrigation districts and water agencies that currently affect, in some respects, the operations

6 Indicative of the difference this "pulsing" can make, during mid-June in the lower Sierra Nevada, the peak flow at midnight can be twice that of the noon flow.

of the hydroelectric facilities Pacific Gas and Electric Company proposes to sell. Pacific Gas and Electric Company would retain these PPAs, and would enter into contracts with the new owners of the facilities as necessary to address any operational coordination needed to ensure Pacific Gas and Electric Company can meet its obligations under the various agreements.

2.5.1 TRANSFER OF RIGHTS AND INTERESTS IN PACIFIC GAS AND ELECTRIC COMPANY-OWNED ASSETS

Generally, Pacific Gas and Electric Company proposes to transfer to new owners the FERC licenses and Pacific Gas and Electric Company's title or possessory interest in the lands, facilities, and equipment that support generation at the generating locations. The transferred assets would include generation-tie (gen-tie) spans that interconnect with the transmission grid at or within 0.10 miles of the switchyard. Assets would be transferred "as is." Pacific Gas and Electric Company would also transfer to the new owner(s) switching centers and some service centers, as well as various other equipment, vehicles, and supplies associated with operations at particular generating facilities. The new owner(s) would be granted the water rights that support the generation function, and would assume ownership of other lands not associated with generation. Along with other permits and entitlements, Pacific Gas and Electric Company would transfer its active timber harvest plans (THPs) to the new owner(s), as well as ongoing maintenance obligations required by the THPs under which timber harvesting has ceased. See Appendix D for a list of binding agreements that would be transferred as part of the proposed sale.

2.5.2 ASSUMPTION OF OBLIGATIONS AND LIABILITIES

The new owner(s) would be required to assume the terms and conditions of the existing FERC licenses. For projects that are in relicensing, the new owner(s) would "step into Pacific Gas and Electric Company's shoes" as of the closing, and would be required to honor commitments to accept agreements made prior to that time. Pacific Gas and Electric Company would also require the new owner(s) to assume formal, binding obligations and agreements with private parties or various agencies. Further, the new owner(s) would be required to assume various contractual and legal obligations, such as water-supply obligations, liabilities for existing soil and groundwater contamination, obligations under existing leases and licenses granted to others for grazing or other uses of transferred lands, and responsibility for any future decommissioning of the hydroelectric facilities (PG&E Co., 1999).

2.5.3 OPERATIONS AND MAINTENANCE SERVICES

As required by Public Utilities Code Section 363(a), if facilities are sold, Pacific Gas and Electric Company would continue to operate them for two years pursuant to operations and maintenance agreements approved by the CPUC as part of the divestiture. Under these agreements, the ownership risks pass to the buyer(s); Pacific Gas and Electric Company would merely provide personnel who would work under the direction of the buyer's management and supervisors. Pacific Gas and Electric Company has indicated that if PG&E NEG were to acquire the facilities,

PG&E NEG would offer Pacific Gas and Electric Company employees preferential employment to operate and maintain the facilities on terms at least as favorable as the employees' then-current collective bargaining agreement.

2.5.4 RETAINED ASSETS, RIGHTS AND OBLIGATIONS

Pacific Gas and Electric Company proposes to retain all facilities, easements and access rights necessary or incidental to operation and maintenance of the transmission and distribution (T&D) systems. Pacific Gas and Electric Company would take appropriate steps to physically separate the generation facilities from the T&D facilities when Pacific Gas and Electric Company determines that it is feasible and cost effective to do so. This may require minor construction or alterations, such as rewiring, metering, minor fencing, or signage removal. It is proposed that Pacific Gas and Electric Company would retain gen-tie lines that interconnect with the transmission system more than 0.10 miles from the switchyard, and would provide services to the new owner(s) under Special Facilities Agreements, which will also be approved by the CPUC as part of divestiture. Pacific Gas and Electric Company and the new owner(s) would indemnify each other against any harm caused by their respective operations on closely associated lands.

2.5.5 SHARED ACCESS AND SHARED FACILITIES AGREEMENTS

As currently operated by Pacific Gas and Electric Company, many of the powerhouses included in the asset bundles share support facilities, such as administrative buildings, switching centers, and service centers. Various powerhouses also share communications equipment, such as phone systems, microwave towers, repeaters, and computer links. This shared use would be expected to continue if the system were transferred intact, or if the high bids tend to aggregate bundles at the regional bundle level. To provide flexibility for smaller bundles to be sold separately, Pacific Gas and Electric Company has identified shared assets and services, and has established contractual service agreements such as Shared Service Center Lease Agreements, Switching Center Services Agreements, and Telecommunications Services Agreements. The agreements are designed to give new bundle owners long-term access to the facilities owned by others, or a reasonable amount of time to make alternate arrangements.

The new owner(s) would also be required to enter into certain service agreements with Pacific Gas and Electric Company to cover shared facilities that currently support Pacific Gas and Electric Company's transmission, distribution, and generation functions. The transaction would be structured so that Pacific Gas and Electric Company and the new owner(s) would give or retain easements or licenses necessary for each entity to access its own property, or to carry out various duties and responsibilities (such as Pacific Gas and Electric Company's continuing responsibility to maintain transmission and distribution lines, and the new owners' responsibilities to maintain roads).

2.5.6 NON-BINDING AGREEMENTS AND PRACTICES

In addition to its binding or legal obligations, Pacific Gas and Electric Company has, over the years, engaged in a number of practices that reflect informal, non-binding agreements and practices with various agencies, entities or individuals, or that, according to Pacific Gas and Electric Company, reflect its view of "Best Management Practices" for efficiently operating the system and meeting the environmental compliance obligations. See Appendix D for a list of non-binding agreements and practices. Non-binding agreements would not bind the new owner(s); however, to enable the new owner(s) to assess these practices and continue them as appropriate, Pacific Gas and Electric Company would make a good-faith effort to disclose such practices to the new owner(s).

2.5.7 INFORMATION DISCLOSURES

Pacific Gas and Electric Company proposes to provide the new owner(s) with manuals, engineering drawings, environmental and emergency plans, and non-privileged information about sensitive habitats, cultural resources, public and worker health and safety, and potential environmental contamination.

The terms and conditions summarized in Section 2.5 would be reflected in the Purchase and Sale Agreement and other related agreements that are described in the Application. Pro formas of these agreements have been submitted with the Application for CPUC review. The proposed terms and conditions for transferring the assets to a single buyer or to the purchasers of one of the five regional bundles are about the same. If, however, the assets were sold to multiple owners within the regional bundles, up to and including separate owners for each of the 20 smaller bundles, Pacific Gas and Electric Company has identified additional terms and conditions to govern relationships among the owners and Pacific Gas and Electric Company.

2.6 PACIFIC GAS AND ELECTRIC COMPANY'S USE OF HYDROELECTRIC RESOURCES

This section discusses the primary considerations that have governed Pacific Gas and Electric Company's approach to hydroelectric generation and water management, both before and since the advent of electric industry restructuring. Restructuring affects business decisions on hydroelectric operations regardless of the owner; the discussion sheds light on the context in which new owners would also have to operate.

2.6.1 MARKET STRUCTURE IMPLEMENTED BY ELECTRIC RESTRUCTURING[7]

In l995, the CPUC began a movement to competitive generation market models by issuing an order directing the CPUC-regulated utilities to separate out the components of their integrated systems: generation, transmission, and distribution[8]. In 1996, the State Legislature responded to and shaped the CPUC's restructuring efforts by passing AB 1890[9]. In summary, the CPUC direction, as shaped by AB 1890:

- Transferred some authority over pricing of California's electricity generation to a market by creating the California Power Exchange (PX), a nonprofit organization which would set prices for wholesale sales of electricity in California (subject to wholesale rate regulatory oversight by FERC);
- Created incentives for CPUC-regulated utilities to sell their generation facilities to unregulated private power companies;
- Transferred operational control of the transmission owned by CPUC-regulated utilities system to the Independent System Operator (ISO), a nonprofit organization which would manage the transmission system and its day-to-day operations under FERC oversight;
- Let the IOUs retain ownership and control of the distribution system;
- Set rates in a way that accelerated payoffs of the above market capital costs of CPUC-regulated utilities' power plants by permitting the CPUC-regulated utilities to "freeze" artificially high rates and use revenues exceeding costs to pay down capital investment. The amount used for this purpose is listed as a "CTC" (Competition Transition Charge) charge on every electric bill. AB 1890 provided that the rate freeze would end when the above market capital costs of CPUC-regulated utilities generation assets have been recovered or at the end of 2001, whichever occurs first. The rate freeze ended for SDG&E Co. in mid-1999,[10] but it remains in place for Pacific Gas and Electric Company and SCE.

The new system of buying and selling power and the rules that govern those sales and purchases is extraordinarily complex (see Appendix B for more detail). Simply stated, a day in advance, participating generators bid power into the wholesale market auction, conducted by the PX and their counterpart buyers. Scheduling Coordinators throughout California provide estimates of anticipated loads to the PX. On the basis of hourly supply and demand bids and orders, the PX sets the price to be paid to all power sellers at the highest price successfully bid for that hour, even if some sellers would have sold power at a lower price. The ISO then directs the flow of electricity throughout the State (see Figure 2-14). When supply purchased in the PX market is less than the

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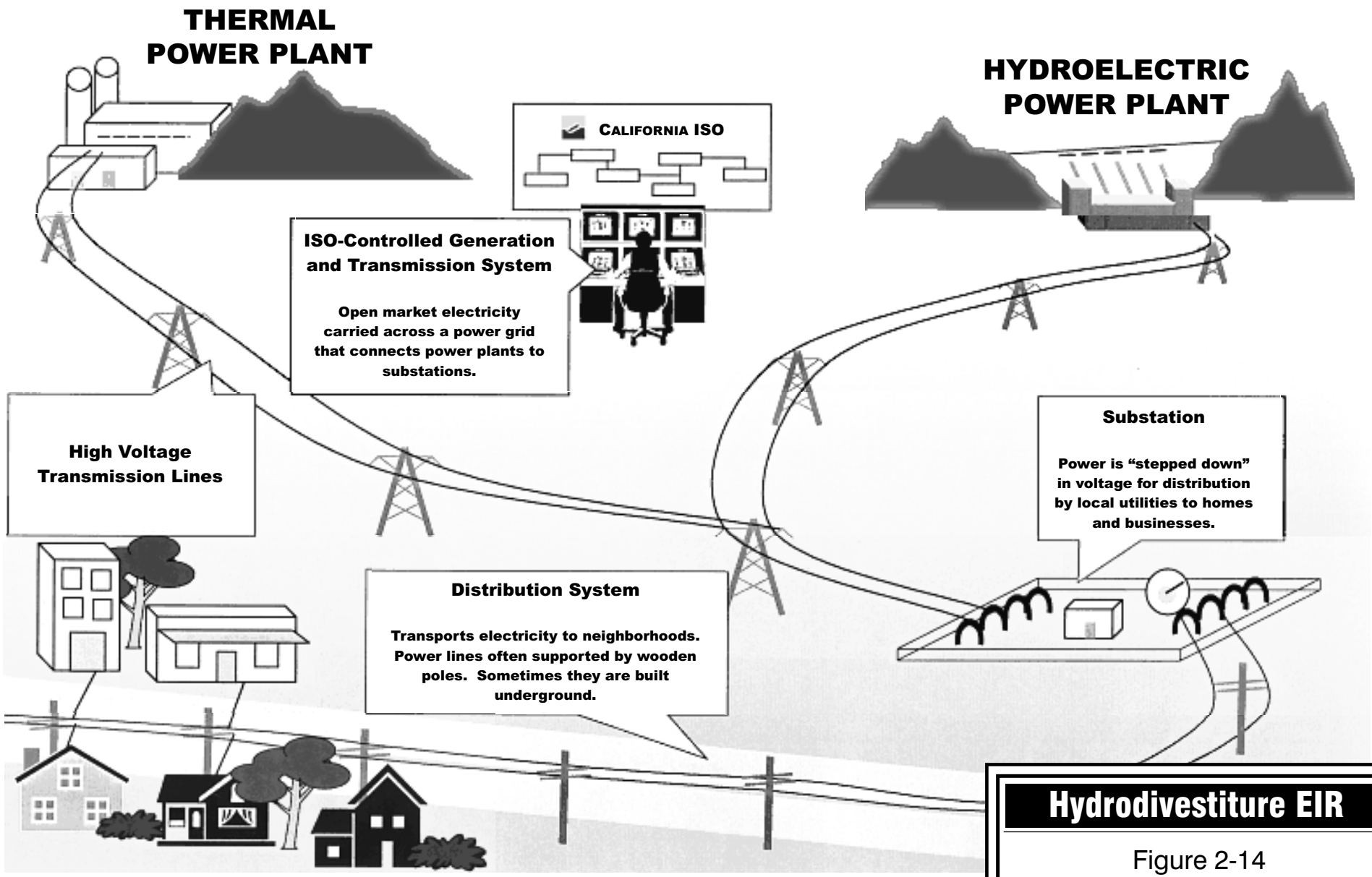
7 The future structure of both the market and regulatory oversight of the market are being debated in the wake of this summer's high wholesale electric prices, increases in retail prices for customers in San Diego Gas & Electric (SDG&E's) service area, reliability problems throughout the state, and unprecedented back-outs in the Bay Area. The CPUC, Legislature, and Federal Energy Regulatory Commission (FERC) have all recently either adopted policies, initiated investigations, and/or proposed institutional changes to address these problems. This discussion summarizes the institutional and regulatory situation through October 2000, while this Draft EIR was being completed.

8 CPUC Decision (D.) 95-12-059.

9 Statutes of 1996, Chapter 854, Brulte.

10 CPUC Decision (D.) 99-05-051. Note that the CPUC and the Legislature re-instituted a rate ceiling for some SDG&E customers in late August and early September 2000 in response to significant retail rate increases.



Hydrodivestiture EIR

Figure 2-14

Schematic Diagram of How the ISO Works

Aspen Environmental Group

Source: Original graphic supplied by Independent Systems Operator, 2000 and modified by Aspen Environmental Group.

State's demand for electricity, the ISO makes up the difference by purchasing enough electricity to balance the load and meet specified "reserve" levels.

The ISO administers a graduated system of increasing alerts to maintain operating reserves – the buffer capacity needed at all times to keep the electric system stable and functioning. When forecasted reserves for the next day fall below seven percent, the ISO issues an alert and generators are asked to increase their power bids into the market. When forecasted reserves for the current day fall below seven percent, the ISO issues a warning, and the ISO begins buying supplies directly. When actual reserves fall below seven percent, then five percent, then 1.5 percent, the ISO issues first a Stage 1 Emergency (public appeals and other measures to increase supply and decrease demand), then a Stage 2 Emergency, (interruptible customers are curtailed), and finally, a Stage 3 Emergency — the highest level — under which firm customers (including residential and commercial) are blacked out to keep the system from crashing.

The ISO purchases "ancillary services" — generation products needed to enable it to balance load instantaneously by ramping generators up and down — that include both the capacity to produce electricity and the actual production. There are a number of "auctions" for ancillary services into which generators can bid under current rules. In addition, scheduling coordinators (SCs) can adjust their schedules to enable the ISO to balance the system. Also, the ISO has signed long term Reliability Must Run (RMR) contracts with some generators whose power is used to keep the transmission system stabilized. These RMR contracts are intended to provide a degree of operational control comparable to the former integrated utility ownership.

The ISO limits the top price purchasers will be charged for electricity by implementing "price caps" approved by the FERC through the tariff process. Wholesale price caps are intended to limit sellers' ability to drive prices up during periods of short supply. The use of price caps recognizes the potential for sellers' market power (often coupled with customers' inelastic demand) to drive up prices.

2.6.2 GENERATION STRATEGIES

Prior to electric industry restructuring, Pacific Gas and Electric Company bore the responsibility for providing energy and maintaining electric system reliability for all the retail customers in its service territory. Pacific Gas and Electric Company accomplished this through resource planning (which ensured the availability of a mix of resources to meet projected needs), and through coordinated use of its energy generating resources. Until recently, resources included hydroelectric facilities, fossil-fueled facilities, geothermal facilities, the Diablo Canyon nuclear facility, contracts for power provided by third parties (PPAs and QF contracts), and other resources inside and outside of its service territory. Pacific Gas and Electric Company used these resources according to their relative costs, subject to regulatory and contractual constraints that sometimes dictated using units in something other than strict economic order. "Strict economic order" dictates that increased electrical demand is served by the least costly power facility not previously in operation.

Since March 31, 1998, Pacific Gas and Electric Company no longer has direct responsibility for deciding how generation resources will be used to meet system or local loads, or to meet reliability planning criteria. Such decisions have, to the extent possible, been replaced by auction markets for energy administered by the PX and the ISO. Generation planning, from Pacific Gas and Electric Company's viewpoint, is now based on forecasts of market prices (which, in turn, are based in part on forecast market supply and demand) rather than assessments of the future costs of supplying customer load.

Generally, the water used to produce hydroelectric power is free to the operator within existing water rights. Therefore, hydroelectric generation has virtually no variable costs and it is advantageous to operate the facilities to the maximum extent possible during a year, using all available water. This does not lead to a constant level of operation, as the availability of water varies by season and the total amount of water available during the year is limited. The ultimate goal of hydrogeneration planning and dispatch is to maximize, over time, the value realized from the water available by generating at the times when electricity is at its highest value. The primary tools for maximizing the value from hydroelectric resources are reservoirs, which allow the planner/dispatcher to increase flows or retain flows for later use.

Factors that influence the strategies Pacific Gas and Electric Company's uses to bid for its hydroelectric assets into the PX and ISO include:

- Forecast market prices (which determine opportunity costs of energy-limited generation, like hydroelectric);
- Predictions regarding available water;
- Constraints associated with water supply contracts and ISO RMR obligations[11];
- Revenue opportunities presented by the option to participate in both the primary energy markets and ancillary services markets; and
- Regulatory compliance obligations.

These same factors would influence decisions of any new owner(s) operating in the restructured market with the same license constraints and contractual obligations as Pacific Gas and Electric Company. Ultimately, competition and the ISO's view of reliability needs influence whether the hydroelectric generation bid into the market actually gets used, and the price.

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11 The existence of ISO RMR contracts may create risks associated with decisions to store or release water for market sales. If one or more units on a particular river system is deemed must-run, all hydrologically-linked units are also considered must-run. Pacific Gas and Electric Company seeks to ensure that water is available to generate when called and, if necessary, will try to reserve water for times that may or may not fully match Pacific Gas and Electric Company's forecasts for market operations. Thus, the must-run status of units on a river system theoretically constrains Pacific Gas and Electric Company's operational flexibility, and introduces an element of conservatism into water planning. In practice, the must-run system results in little operational difference for hydroelectric facilities. The ISO is likely to call upon must-run units in hours of high demand. This tends to correspond to times of highest market price, when the powerhouses have an incentive to run anyway. In this situation, the RMR contract may affect the price received, but does not result in units operating that would not otherwise have run.

2.6.3 BIDDING STRATEGIES AND THE ANCILLARY SERVICES MARKET

Hydroelectric resources have always provided a portion of Pacific Gas and Electric Company's reserve and load-following needs. The current market structure also provides opportunities for hydroelectric facilities to sell products and services other than just energy. In the restructured market, Pacific Gas and Electric Company has the opportunity to bid and schedule its generation into the PX energy markets, then to bid and schedule any unloaded capacity into the subsequent Ancillary Services Markets and the Imbalance Energy Market.

The Ancillary Services Markets have been established by the ISO to ensure that necessary capacity and operational flexibility are available to maintain reliability of the electric system. The PX and, for the most part, the ISO, procure energy or ancillary services through auctions. There are five Ancillary Services Markets (both day-ahead and hour-ahead) into which energy producers may bid their generation:

- Regulation "up" — generation that is already up and running (synchronized with the power grid) and can be moved via direct electronic commands by the ISO *above* the unit's scheduled output level, to keep system-wide energy supply and energy use in balance (Automatic Generation Control [AGC], or market).
- Regulation "down" — generation that is already up and running (synchronized with the power grid) and can be moved via direct electronic commands by the ISO *below* the unit's scheduled output level, to keep system-wide energy supply and energy use in balance (AGC, or market).
- Spinning reserves — unloaded online generation that can be dispatched within ten minutes.
- Non-spinning reserves — unloaded offline generation that can be dispatched within ten minutes.
- Replacement reserves — generation that can begin contributing to the grid within an hour.

Generators must submit bids for all the ancillary services auctions in which they wish to participate before any of the ancillary services bids are awarded contracts. Since the same generating capacity can frequently satisfy many of these ancillary-needed services, ancillary service awards are done sequentially so as to track the incremental commitment of generation available. The ISO recalculates the bids after each market is cleared.

A generator has an incentive to bid hydroelectric generation into the market in a way that results in the highest value. The characteristics of a particular facility and the amount of water available at a given time may dictate which, if any, ancillary services can be provided. The ability to provide AGC market services (regulation up/down) is subject to having the specific hardware and control systems that enable remote control of output by the ISO. Fifty of Pacific Gas and Electric Company's hydroelectric units offer ancillary services, for a total of 3,757.7 MW (about 96 percent of the hydroelectric system capacity). The hydroelectric facilities can offer up to 2,843 MW (about 73 percent of the hydroelectric system capacity) in the AGC (regulation up/down) market. The capabilities of the individual facilities to provide AGC are identified in the data sheets presented later in this chapter.

Hydrological linkage with other powerhouses may limit the flexibility of a particular powerhouse to provide ancillary services. For example, if a facility has a relatively small afterbay downstream of the powerhouse, a release of water used to provide ancillary services at that powerhouse may automatically affect downstream powerhouses. If this is not an optimal use of resources, Pacific Gas and Electric Company may decide not to provide ancillary services at the upstream unit even though it is technically feasible to do so.

In another example of linked market considerations, increased real-time spill[12] may be economic if reduced generation is being caused by AGC provided to the ISO. In such a case, Pacific Gas and Electric Company is paid for its scheduled energy and receives AGC reservation payments, but the revenues are expected to exceed the cost of replacing energy not generated[13]. In general, net-revenue maximization necessitates predicting performance and participating in various market segments to provide the most profitable combination of energy services a facility or group of facilities in a system can provide.

2.6.4 WATER MANAGEMENT STRATEGIES

Both before and since the advent of the new electricity market, Pacific Gas and Electric Company planned and managed its water to be available when generation would be most valuable. The steps involved in planning water utilization have changed in some respects. Further, market conditions have resulted in some differences in how water is used at certain hydroelectric generation facilities on an hourly and daily basis. Pacific Gas and Electric Company's seasonal approach to overall water management, however, has remained the same, and continues to be primarily governed by regulatory and physical constraints and the level of precipitation.

In an average year, Pacific Gas and Electric Company generally draws down the reservoirs by the winter months so that the reservoirs can accommodate the influx of water from the spring run-off. Pacific Gas and Electric Company has generally taken the reservoirs to a low level by the end of December to accommodate the sudden accumulations that often come with winter storms and "rain on snow" events.

When the year is expected to be dry, however (i.e., when spring run-off is expected to be low), it is often necessary or advantageous to "save" water from the summer and fall, rather than drain the reservoirs. Indeed, in drought conditions, it may be necessary or advantageous to continue to accumulate stored water throughout the winter and spring to ensure water is available for generation in periods of peak demand, usually encountered in mid-to-late summer. Not saving enough water for peak-price conditions could reduce the value of the stored water to Pacific Gas and Electric Company (or, prior to electric industry restructuring, increase risks of not having sufficient power to meet peak demands).

12 The release of stored water past a hydroelectric facility without using the water's potential to generate electric energy.

13 In practice, the amount of generation (lost MWh) affected by regulation services is small.

In years when water is more plentiful or snow melts earlier than anticipated, however, "saving" stored water may, in hindsight, prove to have been a poor strategy. In such circumstances, the saved water winds up being used to generate at low prices because demand for power tends to be low at about the same time the snowpack is melting and additional water is flowing into the reservoirs. Some water may be spilled. In such cases, "saving" water for anticipated higher price periods could result in realizing lower overall value from the stored water.

The exact level and timing of precipitation and snowmelt are inherently uncertain. A generator must nonetheless attempt to forecast water availability as accurately as possible. Both historically and in the new market, Pacific Gas and Electric Company has relied on long-term forecasts and trends, in addition to taking extensive measurements of snowpack throughout the winter and spring, and on reviewing such measurements taken by the California Department of Water Resources. Pacific Gas and Electric Company uses these measurements and statistical methods (regression analyses) of historical snowpack data to forecast seasonal run-off. These data are then utilized in a probabilistic scheduling model, which optimizes for generation value for the year, given future weather and value uncertainty. Based on measurements and data updated every seven to eight days, Pacific Gas and Electric Company then uses shorter-term forecasting and scheduling models to determine the optimal use of hydroelectric generation to meet peak, partial-peak and off-peak market opportunities (or, pre-restructuring, customer loads). Although the modeling exercise provides key input, experienced Pacific Gas and Electric Company personnel still use professional judgment in making decisions to store or release water to optimize generation.

Pacific Gas and Electric Company's water management strategy takes into account a variety of limitations on flow and reservoir storage levels. These constraints are imposed by license conditions, agreements with other agencies and contractual obligations, and are generally built into Pacific Gas and Electric Company's modeling exercise. The opportunity to participate in the ancillary services market, and the prevailing prices in this market start-up period, have at some facilities led to greater daily cycling (i.e., more changes in the level of generation over the course of the day) than was experienced in the regulated market. This increased cycling, however, must be consistent with minimum instream flow requirements and ramping rate restrictions in the FERC licenses.

2.7 LOCATION AND CHARACTERIZATION OF PACIFIC GAS AND ELECTRIC COMPANY'S HYDROELECTRIC AND LAND ASSETS

The hydroelectric generation facilities that Pacific Gas and Electric Company proposes to sell are located primarily in the Sierra Nevada mountain range. The waters of the Sierra naturally partition into 24 discernable river basins. Permanent and temporary water flows within these basins subdivide them to an even smaller scale. The hydroelectric generation facilities and land proposed for sale are located primarily in the northern and central portions of the Sierra Nevada, within watersheds from the Pit River in the north to the Kern River in the south (see Figure 2-1), a distance of 500 miles. With the exception of three facilities and some of the associated lands,

Pacific Gas and Electric Company has authority to operate the facilities it proposes to divest under licenses granted by FERC. The expiration dates of these licenses range from 1975 to 2033. Pacific Gas and Electric Company (or a new owner) must relicense facilities with expired licenses.

Pacific Gas and Electric Company proposes to transfer all powerhouses, reservoirs, water conveyances, equipment, support facilities, and land used to support the generation function of the hydroelectric powerhouses, as well as substantial acreage of watershed lands. In some cases, Pacific Gas and Electric Company proposes to retain certain lands and support facilities, and to grant access to the new owner(s) through appropriate easements, leases, or shared services agreements. Pacific Gas and Electric Company proposes to retain ownership of transmission and distribution assets and lines from each generating facility. Pacific Gas and Electric Company also proposes that the new owner(s) reach agreements with the Company that would cover shared access to facilities or services, and allocation of responsibility for maintenance and environmental issues.

Pacific Gas and Electric Company's hydroelectric system consists of 110 generating units at 68 powerhouses, with a total generating capacity of 3,896 MW. The main system components are identified in Section 2.1. The locations of the facilities are shown in Figure 2-1, and the typical features of a hydroelectric plant are illustrated in Figures 2-2 to 2-12. Section 2.8.1 provides a more detailed description of the water rights, land interests, and formal and informal agreements that provide constraints on the hydroelectric system. In addition, detailed maps are provided in Section 2.9 for each of the individual hydroelectric generation facilities in the bundles.

2.7.1 WATER RIGHTS

Pacific Gas and Electric Company claims numerous consumptive and non-consumptive water rights to support its hydroelectric operations, including pre-1914 appropriative rights, riparian rights, permitted and licensed rights governed by the State Water Resources Control Board (SWRCB), and rights to use water based on agreements with third parties. These rights are described, in part, in 161 current statements of water diversion and use, 84 licenses, nine permits, and two contracts. Pacific Gas and Electric Company also has three water rights applications pending before the SWRCB. Pacific Gas and Electric Company would deed its water rights and/or assign its water rights contracts associated with a particular facility to the new owner(s) of those assets.

Pacific Gas and Electric Company's operations also are subject to more than 45 separate contractual obligations to supply and/or deliver water to third parties for a variety of consumptive and non-consumptive uses. These contracts allow parties to divert water from Pacific Gas and Electric Company's facilities, use water based on Pacific Gas and Electric Company's consumptive water rights, or require Pacific Gas and Electric Company to release water to satisfy downstream rights. Pacific Gas and Electric Company's water-related obligations would be transferred along with the assets with which they are associated.

2.7.2 LAND INTERESTS

Pacific Gas and Electric Company owns approximately 139,874 acres of land that are associated with the hydroelectric generation facilities, and that are proposed to be sold. Pacific Gas and Electric Company's proposal is to auction the land bundled with the hydroelectric generating facilities. The PEA prepared by Pacific Gas and Electric Company indicates that approximately 95,208 of these acres contain major components of the hydroelectric generating facilities (e.g., powerhouses, lakes, reservoirs, dams, intake structures), and are either within FERC license boundaries or are otherwise necessary or appropriate for the operations and maintenance of the facilities. Pacific Gas and Electric Company has referred to these collectively as "FERC lands." Subsequent review of these FERC lands indicated that these lands are generally parcels with features necessary for hydroelectric generation operations; however, a large percentage of the 95,208 acres are outside FERC license boundaries (and FERC jurisdiction), and therefore are not under FERC regulation. This EIR will distinguish between the two types of land, referring to "FERC License Lands" if the land is within the actual FERC license boundaries, and "Watershed Lands" if the land is outside of the FERC license boundaries. This EIR also refers to "Project Lands" when referring to all lands to be sold, the combination of the FERC License Lands and the Watershed Lands. Table 2-1 shows the breakdown of these lands in each of the regional and local bundles. See Figure 2-15 for an illustration of the various types of land assets owned by Pacific Gas and Electric Company.

The remaining lands for sale by Pacific Gas and Electric Company, approximately 44,666 acres, are also referred to as "watershed lands," as these are outside of the FERC license boundaries, with some exceptions. These were added as an amendment to Pacific Gas and Electric Company's Application in March 2000. A portion of these additional lands (1,267 acres) contains linear features within FERC license boundaries, such as canals, flumes, or roads. In Table 2-1, the 1,267 acres have been aggregated with the FERC license lands.

The watershed lands are largely undeveloped, with the exception of linear features within the FERC license boundaries that transect some watershed lands, and some minor improvements such as roads and recreation home sites. Pacific Gas and Electric Company has granted licenses and permits to, and entered into leases and other agreements with, third parties for land uses such as grazing, agriculture, recreational activities, recreational home sites, and installation of culverts and bridges. In addition, Pacific Gas and Electric Company conducts timber management pursuant to THPs on some of the watershed lands. These THPs are approved and enforced by the California Department of Forestry and Fire Protection.

Table 2-1 Lands Proposed for Auction[a]

Bundle Name	Local Bundle No.	FERC License	FERC Licensed Areas (acres)			Watershed Lands (acres)			Total Land (acres)
			Land Area[b]	Water Area[c]	Total	Contiguous Watershed Land[d]	Associated Watershed Land[e]	Total	All Lands
Shasta Regional Bundle									
Hat Creek	1	*2661*	297	129	426	1,256	1,416	2,672	3,098
Pit River	2								
Pit 1		*2687*	1,238	1,562	2,800	6,832	1,831	8,663	11,463
Pit 3, 4 & 5		*0233*	2,023	1,135	3,158	1,770	10,210	11,980	15,138
McCloud, Pit 6 & 7		*2106*	722	855	1,577	213	6,343	6,556	8,133
Kilarc-Cow Creek	3	*0606*	113	4	117	272	2,218	2,490	2,607
Battle Creek	4	*1121*	804	129	933	2,238	3,840	6,078	7,011
		Total	**5,197**	**3,814**	**9,011**	**12,581**	**25,858**	**38,439**	**47,450**
DeSabla Regional Bundle									
Hamilton Branch	5	*(None)*	0		0	6799	0	6,799	6,799
Feather River	6								
Upper North Fork		*2105*	1,193	28,692	29,885	1,292	2,141	3,433	33,318
Rock Creek-Cresta		*1962*	31	65	96	3,029	27	3,056	3,152
Poe		*2107*	148	9	157	72	3,129	3,201	3,358
Bucks Creek	7	*0619*	418	1,282	1,700	565	239	804	2,504
Butte Creek	8								
Butte Creek		*0803*	185	175	360	691	1,499	2,190	2,550
Lime Saddle		*(None)*	0		0	131	0	131	131
Coal Canyon		*(None)*	0		0	10	1,088	1,098	1,098
		Total	**1,975**	**30,223**	**32,198**	**12,589**	**8,123**	**20,712**	**52,910**
Drum Regional Bundle									
North Yuba River	9	*1403*	23	0	23	0	41	41	64
Potter Valley	10	*0077*	725	1,560	2,285	1,674	3,423	5,097	7,382
South Yuba-Bear River	11	*2310*	1,374	2,141	3,515	11,258	3,764	15,022	18,537
Chili Bar	12	*2155*	126	67	193	8	24	32	225
		Total	**2,248**	**3,768**	**6,016**	**12,940**	**7,252**	**20,192**	**26,208**
Motherlode Regional Bundle									
Mokelumne River	13	*0137*	1,110	1,091	2,201	2,866	2,124	4,990	7,191
Stanislaus River	14								
Spring Gap & Stanislaus		*2130*	187	14	201	568	0	568	769

Table 2-1 Lands Proposed for Auction[a]

Bundle Name	Local Bundle No.	FERC License	FERC Licensed Areas (acres)			Watershed Lands (acres)			Total Land (acres)
			Land Area[b]	Water Area[c]	Total	Contiguous Watershed Land[d]	Associated Watershed Land[e]	Total	All Lands
Phoenix		*1061*	115	117	232	800	39	839	1,071
Merced River	15	*2467*	7	12	19	1	0	1	20
		Total	**1,419**	**1,234**	**2,653**	**4,235**	**2,163**	**6,398**	**9,051**
Kings Crane-Helms Regional Bundle									
Crane Valley	16	*1354*	263	856	1,119	740	0	740	1,859
Kerckhoff	17	*0096*	127	40	167	73	0	73	240
Kings River	18								
Helms		*2735*	237	64	301	139	0	139	440
Haas & Kings River		*1988*	37	512	549	458	0	458	1,007
Balch 1 and 2		*0175*	0	0	0	0	0	0	0
Tule River	19	*1333*	10	0	10	32	3	35	45
Kern Canyon	20	*0178*	52	0	52	612	0	612	664
		Total	**726**	**1,472**	**2,198**	**2,054**	**3**	**2,057**	**4,255**
		Project Total	**11,565**	**40,511**	**52,076**	**44,399**	**43,399**	**87,798**	**139,874**

a. This acreage data comes from the Proponent's Environmental Assessment (PEA), filed October 29,1999 and Supplemental PEA, filed March 27, 2000, by Pacific Gas and Electric Company. The lands have generally not been surveyed and thus the acres in this table are approximate in all cases. The CPUC consulting team used GIS data provided by Pacific Gas and Electric Company to determine the acres of water within the FERC-licensed areas.

b. Land areas that are within the boundaries of the FERC license. This includes primarily land areas from the PEA filed October 29, 1999, and also 1,267 acres from the March 27, 2000 Supplemental PEA. In addition to these lands inside the FERC boundary that are for sale, the FERC license grants Pacific Gas and Electric Company right of use to other federally-owned land inside the FERC license boundary that is not part of this sale.

c. Water areas (i.e., reservoirs and rivers) that are within the boundaries of the FERC license. These areas were all in the October 29, 1999 PEA.

d. Contiguous watershed lands are from the PEA (September 30, 1999). These lands are in parcels that have land inside FERC boundaries and outside FERC boundaries. Contiguous watershed lands are the portion of the parcel that is outside the FERC license area. This column also includes three hydroelectric facilities that do not have FERC licenses: the Hamilton Branch (Bundle 5 -- about 68 percent is water); and Lime Saddle and Coal Canyon hydroelectric powerhouses (part of Bundle 8). This column also includes some lands that Pacific Gas and Electric Company considers necessary for operation of the hydroelectric facilities even though the land is not inside the FERC license boundaries. The unlicensed hydroelectric powerhouses are necessary for hydroelectric generation. The Applicant also claims other portions of the contiguous lands are necessary for operation of the FERC licensed projects. Pacific Gas and Electric Company identifies such lands to include: construction or materials laydown areas; unstable lands that require routine inspection and preventative actions to protect downhill hydroelectric facilities; and Humbug Valley, which is committed to FERC Project relicensing efforts.

e. Associated Watershed Lands include all lands in the Supplemental PEA, except for 1,267 acres of linear features that are inside FERC boundaries.

Source: Pacific Gas & Electric Company, Aspen Environmental Group, EIP Associates, and Foothill Associates, 2000.

Pacific Gas and Electric Company also holds possessory interests in Federal public lands managed by the U.S. Forest Service and the U.S. Bureau of Land Management that derive primarily from the FERC licenses.

To the extent Pacific Gas and Electric Company has leased, subleased, or granted easements in land it owns or controls, the new owner(s) would succeed to Pacific Gas and Electric Company's underlying interest subject to the interests Pacific Gas and Electric Company has granted to others.

It should be noted that land uses in the vicinity of the hydroelectric generation facilities are generally governed by various general plans and zoning regulations which, due to Federal preemption doctrines, do not apply directly to the lands included within FERC license boundaries. FERC license provisions, however, frequently direct compliance with local plans or require consultation with State and local agencies regarding land uses otherwise within the purview of FERC and other Federal agencies.

It should also be noted that, during the public scoping process for this EIR, the CPUC received comments from representatives of the Native American community, including members of both the Maidu and Pit tribes concerning land ownership. It has been alleged that some of the lands covered by Pacific Gas and Electric Company's application do not truly belong to Pacific Gas and Electric Company, and instead belong to various Native American persons or tribes. Such allegations do not implicate physical changes to the environment that would result from the project, and are more appropriately explored and addressed in some other forum than this document. Therefore, this EIR — while not passing any judgment as to the validity of the disputed land title claims discussed above nor the validity of title for any lands proposed to be sold — assumes that all land included within Pacific Gas and Electric Company's application would be transferred to a new owner if the project were approved.

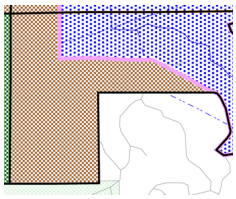
2.7.3 Informal Agreements, Contractual Obligations, and Other Encumbrances

Over many years of developing and operating its hydroelectric generation system, Pacific Gas and Electric Company has entered into many informal, non-binding agreements with regard to the hydroelectric generation facilities and lands. Non-binding agreements have been made with a number of public and private groups. Examples of such Non-binding agreements are management of reservoir levels to benefit recreation, and altering of instream flows to accommodate recreational boating. These Non-binding agreements would not automatically transfer as a result of the sale. This EIR identifies these agreements, and discusses the effect of possible termination of them through the transfer of ownership of the facilities and lands.

Pacific Gas and Electric Company proposes to transfer to the new owner(s) contractual obligations, land encumbrances (e.g., leases or easements granted to third parties or retained by Pacific Gas and Electric Company to support utility functions), and obligations to supply or deliver water or

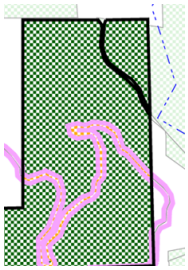
The following images are examples of GIS graphics presented in this EIR. They are intended to illustrate the relationships between various categories of property. In general, the EIR identifies the property as either FERC License Area (land or water that is inside FERC boundaries and owned by Pacific Gas & Electric Company) or Watershed Lands that are outside the FERC boundaries and owned by Pacific Gas & Electric Company. The Contiguous Watershed Lands are the lands from Pacific Gas & Electric Company's September 1999 application, which often are in the same legal parcels as major elements of FERC Licensed Water or Land.

A.



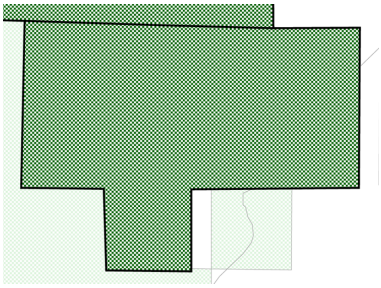
Example A shows Contiguous Watershed Lands in the same parcel as FERC Licensed Waters.

B.



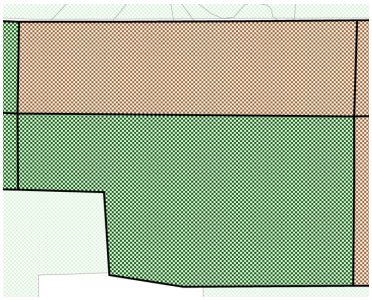
Example B shows an Associated Watershed Land parcel with minor linear FERC features, water conveyance facilities.

C.



Example C shows Associated Watershed Lands in a parcel with no FERC features.

D.



Example D shows that Associated Watershed Lands can be next to Contiguous Watershed Lands.

Hydrodivestiture EIR

Figure 2-15
Depiction of Land Assets

Aspen Environmental Group

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services. Also, Pacific Gas and Electric Company proposes to transfer (or the buyer[s] would seek reissuance of) all environmental permits.

The following informal or non-binding agreements or practices are common to all of the Pacific Gas and Electric Company bundles:

- Pacific Gas and Electric Company maintains a system-wide telecommunications system;
- Not all licenses require Pacific Gas and Electric Company to operate and/or maintain sanitary facilities, solid waste pickup and disposal, and water supply/treatment at public recreation sites;
- In cooperation with California Department of Water Resources, Pacific Gas and Electric Company participates in voluntary monitoring of approximately 50 snow courses system-wide;
- Pacific Gas and Electric Company voluntarily makes boats available for emergency response;
- Pacific Gas and Electric Company voluntarily conducts fish rescues on an as-needed basis when canals are de-watered during normal maintenance activities, usually in coordination with local California Department of Fish and Game staff, specifically at Pit 1 (FERC 2687), Battle Creek (FERC 1121), DeSabla Centerville (FERC 0803), Hamilton Branch, Lime Saddle and Coal Canyon Powerhouses, and Potter Valley (FERC 0077);
- Pacific Gas and Electric Company exercises discretionary water management affecting irrigation water;
- Pacific Gas and Electric Company often provides road maintenance on its properties which is not included in existing agreements or requirements;
- Pacific Gas and Electric Company allows public agencies to conduct safety and training classes on its lands and roads;
- Pacific Gas and Electric Company provides recreational facilities that are not specifically required under its FERC licenses, and may also maintain and manage such facilities at higher standards than other public and private providers, including flood protection;
- To ensure proper management and stewardship of biological and cultural resources, Pacific Gas and Electric Company has formulated a guidance document referred to as Best Management Practices. These specify a variety of practices that Pacific Gas and Electric Company considers in planning any hydroelectric construction and in operation and maintenance activities (including basic steps for preservation or mitigation of cultural resources discovered during operations or maintenance); and
- Within FERC license flexibility, stream flows and reservoir levels have been maintained through goodwill agreements, some historically beneficial to recreation.

See Appendix D for a complete list of non-binding agreements and practices.

2.8 DESCRIPTIONS OF THE ASSETS TO BE SOLD

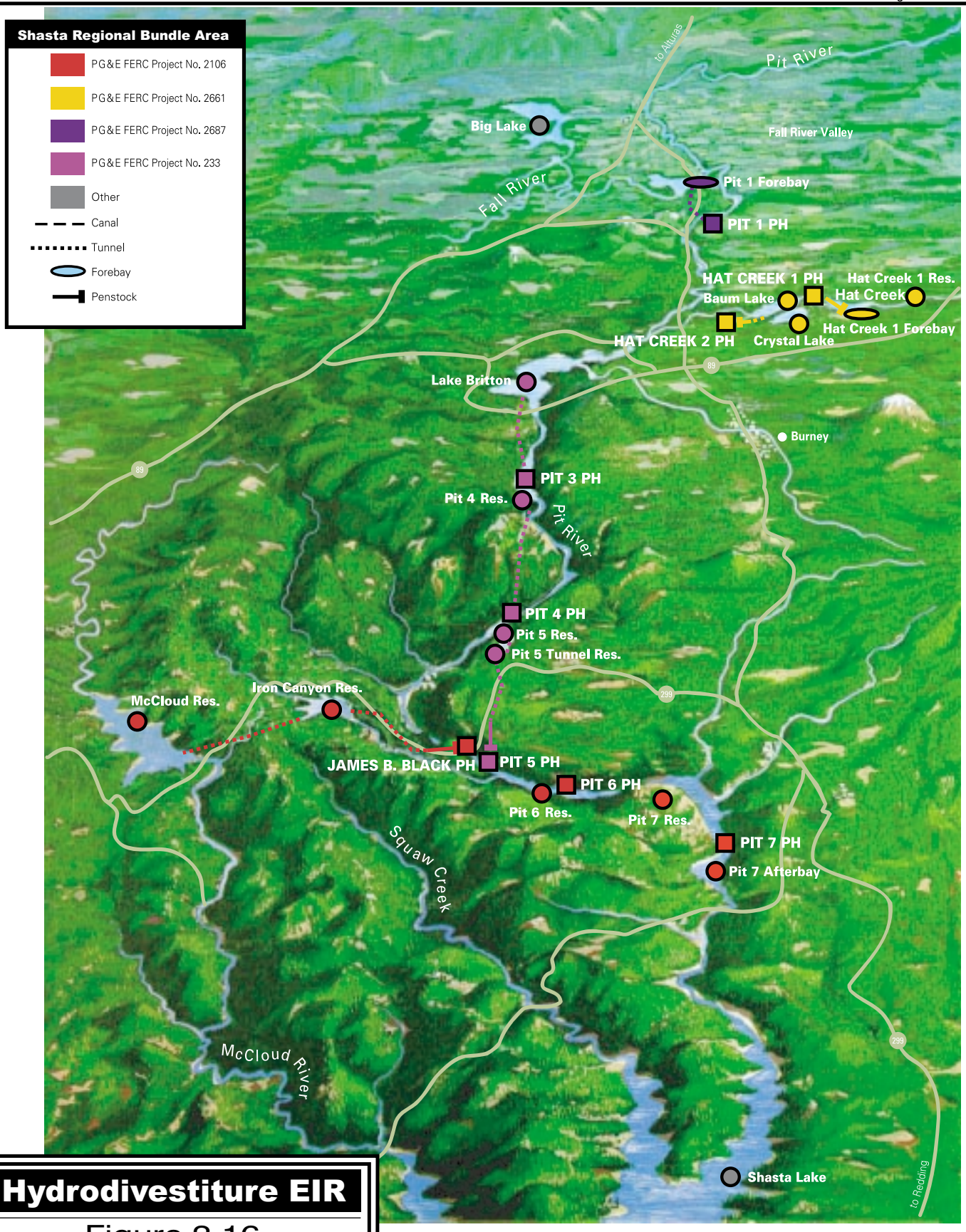
Pacific Gas and Electric Company currently divides the system into five regional bundles for operational purposes, and it proposes to sell the assets in those regional bundles in the auction. The following text, tables, and figures describe the hydroelectric generation facilities and related assets in each regional bundle. The smaller local bundles are also described within the description of each

regional bundle. (The acres of the lands in each bundle are shown in Table 2-1.) The five regional bundles are:

- Shasta Regional Bundle — six FERC licenses covering 16 powerhouses with a combined capacity of 809.9 MW
- DeSabla Regional Bundle — five FERC licenses covering 12 powerhouses, and three non-FERC-jurisdictional powerhouses, with a combined capacity of 763.4 MW
- Drum Regional Bundle — four FERC licenses covering 15 powerhouses, with a combined capacity of 218.2 MW
- Motherlode Regional Bundle — four FERC licenses covering eight powerhouses with a combined capacity of 318 MW, and
- Kings Crane-Helms Regional Bundle — seven FERC licenses covering 13 conventional powerhouses, and the Helms pumped storage facility, with a combined capacity of 1,786.6 MW.

2.8.1 SHASTA REGIONAL BUNDLE

Pacific Gas and Electric Company proposes to auction 47,450 acres in the Shasta Regional Bundle. In this section, each of the six FERC-licensed projects in this bundle is described, as well as the service center for the regional facilities. The capacities and characteristics of the specific projects and service centers in the Shasta Regional Bundle are summarized in Table 2-2, and are described in further detail on the data sheets that follow. The locations of the associated powerhouses and facilities are shown in Figures 2-16 to 2-18, which also show the types of real property interest that Pacific Gas and Electric Company holds in the lands proposed for sale.



Hydrodivestiture EIR

Figure 2-16
Hydroelectric Developments on the Pit and McCloud Rivers and Hat Creek

Aspen Environmental Group

Source: Pacific Gas & Electric Company, August 2000.

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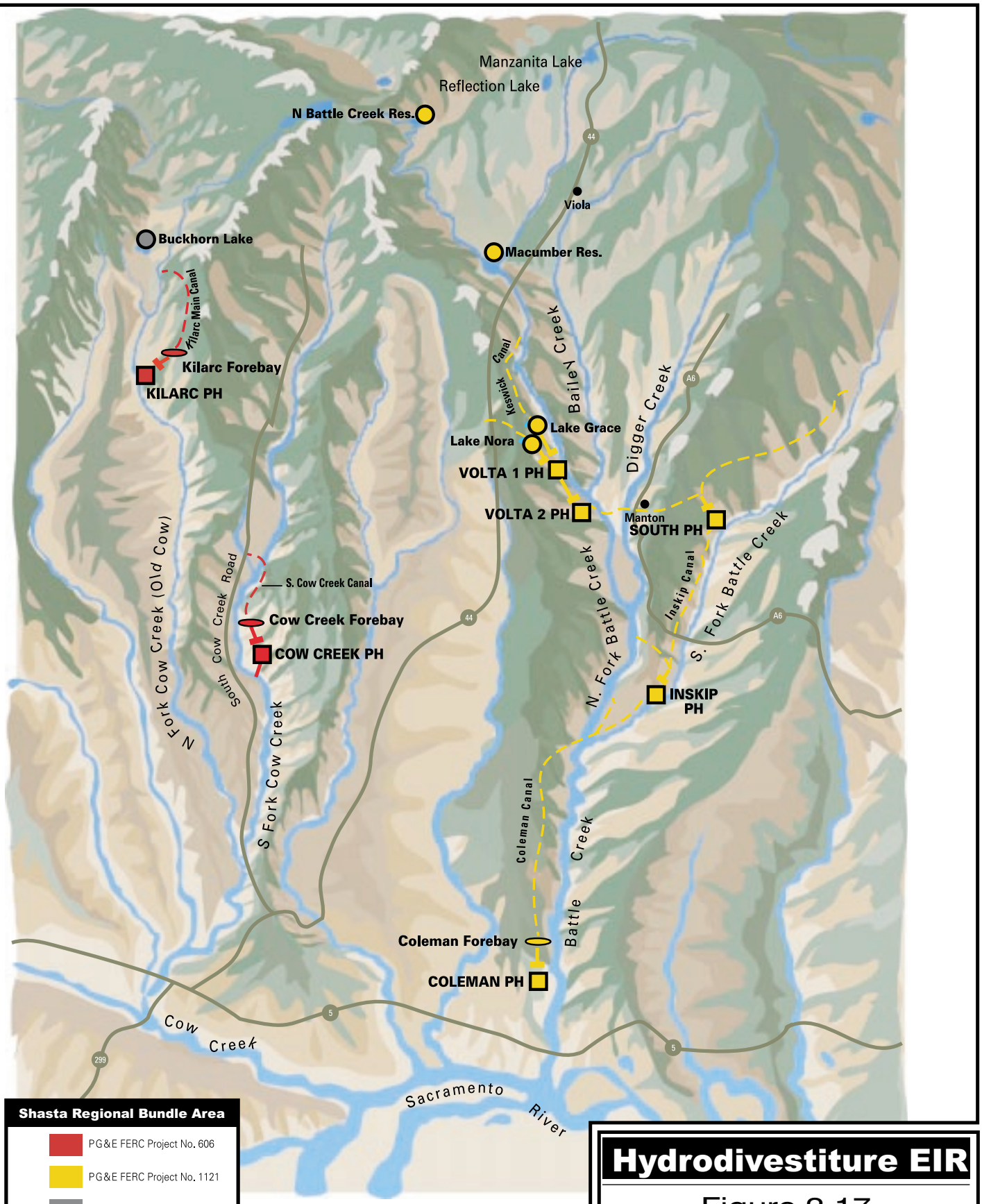

Source: Pacific Gas & Electric Company, August 2000.

Hydrodivestiture EIR

Figure 2-17

Hydroelectric Developments on Cow and Battle Creeks

Aspen Environmental Group

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Siskiyou

Shasta

Lassen

Tehama

Bundle 2 Pit River

Bundle 1 Hat Creek

Bundle 3 Kilarc-Cow Creek

Bundle 4 Battle Creek

MC ARTHUR SUB

PIT PH #3

PIT PH #4

PIT PH #5

JAMES B BLACK PH

PIT PH #6

PIT PH #7

PIT PH #1

HAT CREEK PH #2

RISING RIVER SUB

BURNEY SUB

ROUND MTN SUB

CEDAR CREEK SUB

KILARC PH

WHITMORE SUB

COW CREEK PH

VOLTA PH #1

VOLTA PH #2

COLEMAN PH

INSKIP PH

SOUTH PH

LAKE SHASTA

REDDING

5

299

44

89

36

DeSabla

DISCLAIMER

1. "This map is not a survey of legal boundaries or a depiction of actual FERC boundaries. It should not be relied upon for such purpose. It is intended solely to be a visual depiction of such boundaries. The data used to prepare this map were compiled from multiple sources and varying levels of accuracy. Arbitrary adjustments have been made to FERC boundaries and the property line boundaries in order to provide a spatial dataset that is consistent with existing spatial data. While the map is believed to be an accurate depiction of the underlying data, Pacific Gas and Electric Company assumes no liability for any person's reliance upon this map for any reason."

2. "The FERC project boundaries and boundaries for Company fee land used in this report may not be accurate legal boundaries. The actual locations of any feature identified in this report would need to be surveyed in order to definitively determine whether the feature lies within or outside of Company fee land."

Source: Pacific Gas and Electric Company GIS Data Files; Ferc Boundary, Hydrology, Parcels, Public Lands; and EIP Associates GIS Program August 2000. GIS Data Projection: UTM Zone 10, NAD 83, Units Meters.

FERC License Area
- Water
- Land

Watershed Lands
- Contiguous Land
- Associated Land

General Bundle Area
State Highway
Roads
County Line
Public Lands
Powerhouses & Substations (Pacific Gas & Electric Company unless other owner identified)

Map Location Reference

N

5 0 5

Miles

Hydrodivestiture EIR

Figure 2 - 18
Shasta Regional Bundle

Aspen Environmental Group

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Table 2-2 Shasta Regional Bundle Facilities

Bundle	FERC Licenses and Powerhouses	No. of Units	Capacity (MW)	Reservoirs	Switching Centers		Service Centers	
					Existing	Proposed	Existing	Proposed
	Shasta Watershed Region	28	809.9					
Hat Creek Bundle 1	FERC 2661 Hat Creek No. 1 Hat Creek No. 2	 1 1	 8.5 8.5	FERC 2661 Hat Creek 1 Reservoir (Cassel Pond) Crystal Lake Hat Creek 2 Reservoir (Baum Lake)	FERC 2661 Pit 3	FERC 2661 (None)	FERC 2661 Use of Burney[a]	FERC 2661 (None)[b]
Pit River Bundle 2	FERC 2687 Pit 1	 2	 61	FERC 2687 Pit 1 Forebay Pit 1 Diversion Reservoir	FERC 2687 Pit 3	FERC 2687 Pit 3	FERC 2687 Use of Burney	FERC 2687 Use of Burney
	FERC 0233 Pit 3 Pit 4 Pit 5	 3 2 4	 70 95 160	FERC 0233 Lake Britton (Pit 3) Pit 4 Forebay Pit 5 Diversion Pit 5 Open Conduit	FERC 0233 Pit 3, Pit 5	FERC 0233 Pit 3, Pit 5	FERC 0233 Use of Burney	FERC 0233 Use of Burney
	FERC 2106 James B. Black Pit 6 Pit 7	 2 2 2	 172 80 112	FERC 2106 McCloud Reservoir Iron Canyon Reservoir Pit 6 Forebay Pit 7 Forebay Pit 7 Afterbay	FERC 2106 Pit 5	FERC 2106 Pit 5	FERC 2106 Use of Burney	FERC 2106 Use of Burney
Kilarc-Cow Creek Bundle 3	FERC 0606 Kilarc Cow Creek	 2 2	 3.2 1.8	FERC 0606 Kilarc Forebay Cow Creek Forebay	FERC 0606 Pit 3	FERC 0606 (None)	FERC 0606 Manton	FERC 0606 (None)
Battle Creek Bundle 4	FERC 1121 Volta No. 1 Volta No. 2 South Inskip Coleman	 1 1 1 1 1	 9 0.9 7 8 13	FERC 1121 North Battle Creek Reservoir Macumber Reservoir Lake Grace Lake Nora Coleman Forebay	FERC 1121 Pit 3	FERC 1121 (None)	FERC 1121 Manton	FERC 1121 Manton

a "Use of" in the Existing Service Center column refers to the fact that this service center is used by other Pacific Gas and Electric Company business units as well as by the hydroelectric generation unit.

b "Use of" in the Proposed Service Center column means that this service center will be retained by Pacific Gas and Electric Company and made available to the new owner(s) of the bundle for an interim period.

Source: PG&E Co., 1999b.

HAT CREEK BUNDLE 1		SHASTA REGIONAL BUNDLE		
FERC License No.	**FERC Expiration Date**	**Relicense Filing Date**	**FERC Relicensing Status**	
2661 (Hat Creek 1 and 2)	9/30/2000	9/30/1998	Application filed 1998; New license expected 9/2001	
FERC License Area (acres)		**Watershed Lands (acres)**		**Total Acres**
Land Area	*Water Area*	*Contiguous Watershed Lands*	*Associated Watershed Land*	*All Lands*
297	129	1,256	1,416	3,098

Number of Generating Units	Two (Hat Creek No. 1: One; Hat Creek No. 2: One)
Normal Maximum Operating Capacity	17 MW (Hat Creek No. 1: 8.5 MW; Hat Creek No. 2: 8.5 MW)
Date Commissioned	1921

Elevation of Facilities	2,780 to 3,200 feet mean sea level (ft msl)	**Automatic Generation Control**	None
Reservoir Storage Capacity	677 acre-feet (af)	**Average Energy Production**	98 GWh/year
Consumptive Water Uses	Domestic, Incidental Irrigation, Fire Protection	**Project Type**	Storage w/ conveyance

Location

The Hat Creek Bundle is on the Hat Creek, a tributary to the Pit River, and within the Hat Creek Basin. The Hat Creek 1 and 2 Powerhouses are located on the Hat Creek near Burney in Shasta County. Hat Creek 1 Powerhouse is immediately south of Hat Creek, and Hat Creek 2 Powerhouse is immediately north of Hat Creek.

System Components/Facilities

Hat Creek flows are diverted from Cassel Pond through the Hat Creek 1 Powerhouse, and are then discharged to Baum Lake. The Hat Creek No. 1 Diversion consists of three water bodies at similar elevations such that they function as one reservoir. A primarily unlined 0.52-mile-long, 9.5-foot-deep, and 17- to 45.5-foot-wide canal connects the Cassel Pond diversion reservoir to the forebay. The forebay is approximately 0.5 miles southwest of the powerhouse; total usable storage capacity is about 48 acre-feet (af). The diversion reservoir is formed from a 231-foot-long, 12-foot-high concrete slab and buttress dam. Water flows to the powerhouse through a 1,601-foot penstock from Hat Creek No. 1 Diversion. The penstock is a riveted steel pipe with a diameter of 90 to 120 inches, with a flow capacity of 545 cubic feet per second (cfs). The Hat Creek 1 Powerhouse is a multilevel, reinforced concrete building.

Flows are diverted from Baum Lake to flow through the Hat Creek 2 Powerhouse and then discharged back to Hat Creek. Baum Lake, the forebay, has a usable storage capacity of approximately 629 af. Water flows from the forebay to the penstock intake building through a 4,520-foot, reinforced concrete flume. The penstock is a 413-foot, riveted steel pipe with a diameter of 90 to 120 inches; it has a flow capacity of 580 cfs. The Hat Creek 2 Powerhouse is a tri-level, reinforced concrete building.

Summary of Water Rights and Water Purchases

Hat Creek has been used for hydroelectric generation since the early 1900s. Water use associated with the project consists of non-consumptive power generation; however, Pacific Gas and Electric Company also operates the project for recreation, aquatic habitat, and wildlife habitat.

Pacific Gas and Electric Company relies upon a riparian water right for power generation to divert 600 cfs of water from Hat Creek at the Hat Creek 1 Powerhouse, and a riparian water right to divert 700 cfs of water from Hat Creek for use at the Hat Creek 2 Powerhouse. It also relies upon a riparian water right of 450 gallons per minute from Hat Creek for domestic supply, incidental irrigation, and fire protection purposes at the Hat Creek 1 Powerhouse and Camp. Pacific Gas and Electric Company relies upon a pre-1914, 10 cfs water right to divert water from Rock Creek to supply the Crystal Lake Fish Hatchery.

PIT RIVER BUNDLE 2		SHASTA REGIONAL BUNDLE		
FERC License No.	**FERC Expiration Date**	**Relicense Filing Date**	**FERC Relicensing Status**	
2687 (Pit 1)	12/31/1995	12/20/1993	On annual license; New license expected 7/2001	
FERC License Area (acres)		**Watershed Lands (acres)**		**Total Acres**
Land Area	*Water Area*	*Contiguous Watershed Lands*	Associated Watershed Land	All Lands
1,238	1,562	6,832	1,831	11,463

Number of Generating Units	Two (Pit 1)
Normal Maximum Operating Capacity	61.0 MW
Date Commissioned	1922

Elevation of Facilities	2,850 to 3,305 ft msl	**Automatic Generation Control**	None
Reservoir Storage Capacity	2,451 af	**Average Energy Production**	311 GWh/year
Consumptive Water Uses	Domestic, Incidental Irrigation, Fire Protection	**Project Type**	Storage w/ Conveyance

Location

The Pit 1 Powerhouse is on the Pit River, downstream of the confluence with Fall River. Pit 1 Powerhouse is located approximately 11 miles east of Burney in Shasta County, and can be accessed from State Highway 299. It is the uppermost of nine hydroelectric powerhouses owned by Pacific Gas and Electric Company in the McCloud-Pit River watershed.

System Components/Facilities

The Pit 1 Bundle diverts water from Fall River to the Pit 1 Powerhouse, and then discharges the water to the Pit River. Sections of the Tule River and the Little Tule River (approximately 2,252 acres), the Fall River (approximately 729 acres), the McArthur Canal, the Old Lee Springs Drainage Canal, and the North Drainage Canal are upstream of the diversion dam and are included in the FERC license. The Pit 1 diversion dam located on the Fall River is approximately 1.6 miles upstream from the forebay dam. A second dam on the Fall River is located approximately 0.9 miles upstream of the confluence of the Fall River and Pit River where the Pit 1 Forebay is formed. It encompasses approximately 411 acres, and has a usable storage capacity of 2,451 acre-feet (af). Intake No. 2 releases water from the forebay into the intake canal. Although water can be diverted directly to the intake canal through Intake No. 1, water is primarily directed into Pit 1 Forebay. Approximately 1,000 feet downstream of the diversion dam, both Intake No. 1 and Intake No. 2 canals converge into a single canal that extends to the tunnel intake. A 10,070-foot tunnel connects the canal to the two penstocks. The penstocks are approximately 1,272 feet long, 10.75 to 8.0 feet in diameter, and are constructed from riveted steel pipe in the upper sections and welded steel pipe in the lower sections. The Pit 1 Powerhouse is a multi-level, reinforced concrete building.

Summary of Water Rights and Water Purchases

The Fall River has been used for water supply and hydroelectric generation since the early 1900s. The Pit 1 bundle primarily uses water for non-consumptive storage and power generation. Pacific Gas and Electric Company also operates the bundle for recreation and aquatic habitat and wildlife habitat.

Pacific Gas and Electric Company relies upon two claims of riparian water rights for water diverted for use at Pit 1 Powerhouse: one of 2,400 cubic feet per second (cfs) of water diverted from the Tule River for power generation, and the other of 450 gallons per minute of water diverted from an unnamed spring tributary to the Pit River for domestic supply, fire protection, and incidental irrigation at the Pit 1 Powerhouse and Camp.

Pacific Gas and Electric Company also acquires water in accordance with an agreement dated April 19, 1982, between Pacific Gas and Electric Company and Kenneth McArthur, under the terms that Pacific Gas and Electric Company agrees to purchase water from the Fall River for use in the Pit 1 Powerhouse to generate power. Pacific Gas and Electric Company's water right includes 10 cfs of water from October 15 of each year to March 15 of the succeeding year, and varying amounts of water between 0 cfs and 33.5 cfs between March 15 and October 15 of each year (a minimum of 13,082 af per year). The agreement was extended through June 30, 2002, by an agreement dated August 15, 1997. Either party may terminate this agreement with 30 days notice.

PIT RIVER BUNDLE 2		SHASTA REGIONAL BUNDLE	
FERC License No.	**FERC Expiration Date**	**Relicense Filing Date**	**FERC Relicensing Status**
0233 (Pit 3, 4 and 5)	10/30/2003	9/30/1998	Notice of Intent filed 1998; New license expected 10/2005

FERC License Area (acres)		**Watershed Lands (acres)**		**Total Acres**
Land Area	*Water Area*	*Contiguous Watershed Lands*	*Associated Watershed Land*	All Lands
2,023	1,135	1,770	10,210	15,138

Number of Generating Units	Nine (Pit 3: Three; Pit 4: Two; Pit 5: Four)
Normal Maximum Operating Capacity	325 MW (Pit 3: 70 MW; Pit 4: 95 MW; Pit 5: 160 MW)
Date Commissioned	1925 – Pit 3, 1955 – Pit 4, 1944 – Pit 5

Elevation of Facilities	1,415 to 2,738 ft msl	**Automatic Generation Control**	Pit 3, Pit 4, Pit 5
Reservoir Storage Capacity	45,205 af	**Average Energy Production**	1,949 GWh/year
Consumptive Water Uses	Domestic, Incidental Irrigation, Fire Protection	**Project Type**	Storage w/ Conveyance

Location

Pit 3, 4, and 5 are situated on the Pit River, a major tributary to the Sacramento River. All three powerhouses are on the Pit River in Shasta County. The Pit 3 Powerhouse is ten miles northwest of Burney; the Pit 4 Powerhouse is 22 miles northwest of Burney; and the Pit 5 Powerhouse is 18 miles northwest of Burney. The project area is partially located within the Lassen National Forest and the Shasta-Trinity National Forest. McArthur-Burney Falls Memorial State Park and Lassen Volcanic National Park are located south of Lake Britton.

System Components/Facilities

The Pit 3, 4 and 5 Powerhouses are linked in hydraulic series, with the Pit 5 Powerhouse being the furthest upstream.

Pit 3 Powerhouse: Lake Britton, formed by the Pit 3 Dam in 1925, serves as a storage reservoir for the Pit 3 Powerhouse and other downstream powerhouses. It has a usable storage capacity of 41,877 acre-feet (af) and a surface area of 1,293 acres. The dam is a concrete structure with a concrete bridge deck; it has a 494-foot crest length and is 130 feet high from the foundation to the spillway. A concrete lined tunnel extends from Lake Britton to the valve house. The tunnel, approximately 2.5 miles northeast of the powerhouse, is exposed at its crossing with Rock Creek. The tunnel branches into four tunnels just before reaching the valve house. Three of the tunnels continue to the valve house where the water is branched into three penstocks. The fourth branch of the tunnel diverts water into a surge tank. Some of the water from the surge tank returns to the river, and some water is stored in a reservoir tank to be used as cooling water for the turbine bearings. All three penstocks are concrete tunnels with a combined flow capacity of 3,315 cubic feet per second (cfs). The Pit 3 Powerhouse is a multilevel, reinforced concrete building.

Pit 4 Powerhouse: The Pit 4 Reservoir serves as the afterbay for Pit 3 Powerhouse and forebay for the Pit 4 Powerhouse. It has a usable capacity of approximately 1,970 af. The dam is a concrete structure consisting of a gravity type overpour section and a slab and buttress type section. A pressure tunnel extends from the reservoir to the head of the penstocks. There are two steel penstocks that are 12 feet in diameter, and are 800 feet long with a flow capacity of 3,700 cfs. The Pit 4 Powerhouse is a four-level, concrete structure.

Pit 5 Powerhouse: The Pit 5 and Open Conduit Reservoirs provide storage for the Pit 5 Powerhouse. The Pit 5 Reservoir has a usable storage capacity of 314 af, a surface area of 32 acres, and is created by a 67-foot high concrete gravity dam with a 340-foot crest length. The Open Conduit Reservoir has a usable storage capacity of 1,044 af, a surface area of 48 acres and is created by a 71-foot high earth-filled dam with a 2,964-foot crest length. Water is diverted from the Pit 5 Reservoir to Tunnel No. 1. Tunnel No. 1 is a 19-foot diameter, horseshoe and circular tunnel that can discharge up to 3,400 cfs to the Open Conduit Reservoir. The Open Conduit Reservoir is formed by the Pit 5 Open Conduit Dam, and serves as a 3,124-foot conduit connecting Tunnel No. 1 to Tunnel No. 2. The outlet works for the Open Conduit Reservoir is the intake for Tunnel No. 2, which carries water through a 19-foot diameter, concrete lined tunnel to the valve house above the powerhouse. The tunnels have a combined length of approximately 28,200 feet. Four steel penstocks with a total flow capacity of 3,580 cfs connect Tunnel No. 2 to the Pit 5 Powerhouse. The powerhouse is a multi-level, concrete structure. There are permanent employee housing and other storage facilities located at Pit 5 Powerhouse. Camp Pit, an additional feature of the project, is a 20-acre recreational facility located near the Pit 5 Open Conduit converted from construction-era housing and now leased to the Pacific Gas and Electric Company Employee Association.

Summary of Water Rights and Water Purchases
The Pit River has been used for water supply and hydroelectric generation since the early 1900s. Water uses associated with the project consist of non-consumptive storage and power generation; however, Pacific Gas and Electric Company also operates the project to provide other beneficial uses such as recreation, aquatic habitat, and wildlife habitat. Pacific Gas and Electric Company relies upon a combination of licensed and riparian water rights for power generation purposes at the Pit 3, Pit 4, and Pit 5 Powerhouses. Pacific Gas and Electric Company relies upon riparian water rights for domestic purposes, incidental irrigation, and fire protection at Camp Shasta, Camp Britton, and the Pit 5 Powerhouse.

PIT RIVER BUNDLE 2		SHASTA REGIONAL BUNDLE	
FERC License No.	**FERC Expiration Date**	**Relicense Filing Date**	**FERC Relicensing Status**
2106 (J.B. Black, Pit 6 and Pit 7)	7/31/2011	7/31/2009	Mid-term

FERC License Area (acres)		**Watershed Lands (acres)**		**Total Acres**
Land Area	*Water Area*	*Contiguous Watershed Lands*	Associated Watershed Land	All Lands
722	855	213	6,343	8,133

Number of Generating Units	Six (James B. Black: Two; Pit No. 6: Two; Pit No. 7: Two)
Normal Maximum Operating Capacity	364 MW (James B. Black: 172 MW; Pit No. 6: 80 MW; Pit No. 7: 112 MW)
Date Commissioned	1965

Elevation of Facilities	1,080 to 2,680 ft msl	**Automatic Generation Control**	James B. Black, Pit 6, Pit 7
Reservoir Storage Capacity	109,333 af	**Average Energy Production**	1,553 GWh/year
Consumptive Water Uses	Incidental Domestic	**Project Type**	Storage w/ conveyance

Location

This license is called the McCloud-Pit Project. The primary facilities for this license are on the Pit River, and a storage reservoir facility on the McCloud River in the McCloud Basin diverts water into the Pit River. The bundle is in Shasta County near the communities of McCloud, Hillcrest, Big Bend, and Montgomery Creek. Many of the project facilities and the surrounding lands lie within Shasta-Trinity National Forest. The James B. Black Powerhouse is 18 miles northwest of Burney. The Pit 6 Powerhouse is approximately six miles northwest of Montgomery Creek. The Pit 7 Powerhouse is approximately three miles west of Montgomery Creek.

System Components/Facilities

J.B. Black Powerhouse: The McCloud Reservoir, created by the McCloud Reservoir Dam, is the uppermost reservoir that provides storage for the James B. Black Powerhouse. The Iron Canyon Reservoir provides additional storage to the powerhouse. The McCloud and James B. Black tunnels transfer water from the reservoirs to the penstock. The McCloud Tunnel is 7.08 miles long, and extends from the McCloud Reservoir to Iron Canyon Reservoir. The James B. Black Tunnel is 2.9 miles long, and extends from Iron Canyon Reservoir to a steel penstock. The penstock is a 5,467-foot-long, 11.5-foot to ten-foot diameter structure with a total flow capacity of 2,000 cubic feet per second (cfs), and bifurcates to two 7-foot diameter legs before entering the powerhouse. The James B. Black Powerhouse is a tri-level, reinforced-concrete structure located on the Pit River just upstream of the Pit 5 Powerhouse and the Pit 6 Reservoir.

Pit 6 Powerhouse: The Pit 6 Reservoir serves as the forebay for the Pit 6 Powerhouse. The reservoir has a usable storage capacity of 15,605 acre-feet (af) and a surface area of 268 acres. The dam is a 183-foot-high concrete gravity structure. Two 18-foot-diameter, steel penstocks extend 602 feet from the reservoir dam to the turbines in the powerhouse. They have a total flow capacity of 6,470 cfs. The powerhouse is a four-level (three levels below grade), concrete reinforced structure. The Powerhouse discharges into the Pit 7 Reservoir.

Pit 7 Powerhouse: The Pit 7 Reservoir serves as the forebay for the powerhouse. The reservoir has a usable storage capacity of approximately 34,302 af and a surface area of 471 acres at a normal water surface elevation of 1,271 feet. The dam is a 228-foot-high concrete gravity structure. Two 15-foot-diameter steel penstocks, with a total flow capacity of 7,440 cfs, extend 572 feet from the dam to the turbines in the powerhouse. The Pit 7 Powerhouse is a four-level (three levels below grade), concrete reinforced structure that contains two turbine generators. Water flows from the Pit 87 Reservoir through the powerhouse to the Pit 7 Afterbay. The afterbay serves to lessen the energy of the water discharged, resulting in a more uniform flow of water in the river below the afterbay than would otherwise occur due to normal powerhouse operations. The afterbay has a surface area of approximately 70 acres at a normal water surface elevation of 1,036 feet. The dam is a 30-foot-high, steel reinforced, open-graded porous rock-fill structure that allows water to flow through the dam to dissipate energy.

Summary of Water Rights and Water Purchases

The major project facilities are situated in the Pit River basin, although a storage reservoir on the McCloud River in the McCloud Basin diverts water into the Pit River. The Pit River and McCloud River have been used for hydroelectric generation and water supply since the early 1900s. Water uses associated with the project consist primarily of non-consumptive storage and power generation. Pacific Gas and Electric Company also operates the project to provide other beneficial uses including recreation, aquatic habitat, and wildlife habitat.

Pacific Gas and Electric Company's licensed storage water rights for FERC Project 2106 are for power generation and incidental domestic uses. Pacific Gas and Electric Company has licensed water rights for up to 35,300 af of water stored in the McCloud Reservoir, and 19,943 af of water stored in the Iron Canyon Reservoir. Pacific Gas and Electric Company also has a licensed right for the storage of 15,000 af of water impounded by the Pit 6 Dam, and a licensed right for storage of 15,500 af of water impounded by the Pit 7 Dam.

Pacific Gas and Electric Company relies upon a combination of licensed and riparian water rights for power generation and incidental domestic uses for FERC Project 2106. Pacific Gas and Electric Company has licensed water rights for the diversion of up to 1,870 cfs of water from the McCloud River at the McCloud Dam, and another 454 cfs of water from Iron Canyon Creek into the Iron Canyon Reservoir for power generation and incidental domestic uses at the James B. Black and Pit 6 and Pit 7 Powerhouses. Pacific Gas and Electric Company also holds licensed water rights for direct diversion of 4,500 cfs of water through the Pit 6 Powerhouse, and 4,850 af of water through the Pit 7 Powerhouse. Pacific Gas and Electric Company also relies on two riparian water rights for water diverted for power generation at the Pit 6 Dam and the Pit 7 Dam.

KILARC-COW CREEK BUNDLE 3		SHASTA REGIONAL BUNDLE		
FERC License No.	**FERC Expiration Date**	**Relicense Filing Date**	**FERC Relicensing Status**	
0606 (Kilarc and Cow Creek)	3/27/2007	3/27/2005	Notice of Intent will be filed 2002; New license expected 3/2007	
FERC License Area (acres)		**Watershed Lands (acres)**		**Total Acres**
Land Area	*Water Area*	*Contiguous Watershed Lands*	Associated Watershed Land	All Lands
113	4	272	2,218	2,607

Number of Generating Units	Four (Kilarc: Two; Cow Creek: Two)
Normal Maximum Operating Capacity	5 MW (Kilarc: 3.2 MW; Cow Creek: 1.8 MW)
Date Commissioned	Kilarc 1903/1904; Cow Creek 1907

Elevation of Facilities	822 to 3,780 ft msl	**Automatic Generation Control**	None
Reservoir Storage Capacity	36 af	**Average Energy Production**	32 GWh/year
Consumptive Water Uses	Domestic and Incidental Irrigation	**Project Type**	Run-of-the-River

Location

The Kilarc-Cow Creek Bundle lies on the Cow Creek Basin in Shasta County. Cow Creek is located in the Cascade Mountain Range, and is a direct tributary to the Sacramento River, entering downstream of Lake Shasta. The Kilarc Powerhouse is on North Fork Cow Creek (Old Cow Creek), and the Cow Creek Powerhouse is on a tributary to South Cow Creek near the rural communities of Whitmore and Millville. The project is located northwest of the Latour Demonstration State Forest and adjacent to the Lassen National Forest.

System Components/Facilities

The Kilarc Project diverts water from the North Canyon Creek to South Canyon Creek through North Canyon Creek Canal, a 0.35-mile canal. Water is then discharged to the Kilarc Main Canal, a 3.65-mile canal. The Kilarc Main Canal also receives water diverted from Old Cow Creek. The three canals are unlined, with some concrete lined segments and concrete dams. Water from the Kilarc Main Canal is discharged into the Kilarc Forebay southeast of the powerhouse. The forebay has a storage capacity of approximately 30.4 acre-feet (af). Water flows from the forebay to the Kilarc Powerhouse through an underground penstock. The penstock is an approximately 4,800-foot riveted steel pipe with a 36- to 48-inch diameter.

A three-foot-high diversion dam on Mill Creek diverts water into the 0.17-mile Mill Creek Canal, which empties into South Cow Creek. A timber crib and rock fill diversion dam on South Cow Creek diverts water into the 2.06-mile, unlined and concrete lined South Cow Creek Main Canal, which empties into the Cow Creek Forebay. Portions of the South Cow Creek Main Canal consist of concrete pier bridges and a tunnel. Cow Creek Forebay is a one-acre forebay with a storage capacity of 5.4 af and a three- to ten-foot depth. The forebay is about 4,500 feet northeast of the powerhouse. Water flows from the northern end of the forebay through the penstock to the Cow Creek Powerhouse. The 4,487-foot penstock consists of an approximately 3,721-foot-long, 30-inch-diameter riveted steel segment, and an approximately 766-foot-long, 36-inch-diameter welded steel segment. It has a total flow capacity of 50 cubic feet per second (cfs). The powerhouse is a single-level, steel frame structure.

Summary of Water Rights and Water Purchases

Cow Creek has been used for hydroelectric generation since the early 1900s. Water use associated with the project primarily consists of non-consumptive power generation; however, Pacific Gas and Electric Company operates the project to provide other uses including recreation, instream freshwater habitat, and wildlife habitat.

Pacific Gas and Electric Company relies upon pre-1914 water rights for its diversions of water at North Canyon Creek Canal (2.5 cfs), South Canyon Creek Canal (7.5 cfs), and Kilarc Main Canal (52 cfs) for power generation at the Kilarc Powerhouse, as well as pre-1914 rights for its diversions at Mill Creek Canal (20 cfs) and South Cow Creek Main Canal (50 cfs) for power generation at the Cow Creek Powerhouse. Pacific Gas and Electric Company also relies on a pre-1914 water right at the Kilarc Powerhouse for a diversion of 200 gallons per minute of water for domestic supply and incidental irrigation.

BATTLE CREEK BUNDLE 4		SHASTA REGIONAL BUNDLE	
FERC License No.	**FERC Expiration Date**	**Relicense Filing Date**	**FERC Relicensing Status**
1121 (Volta No. 1, Volta No. 2, South, Inskip and Coleman)	7/31/2026	7/31/2024	Mid-term

FERC License Area (acres)		**Watershed Lands (acres)**		**Total Acres**
Land Area	*Water Area*	*Contiguous Watershed Lands*	*Associated Watershed Land*	*All Lands*
804	129	2,238	3,840	7,011

Number of Generating Units	Five (Volta No. 1: One; Volta No. 2: One; South: One; Inskip: One; Coleman: One)		
Normal Maximum Operating Capacity	37.9 MW (Volta No. 1: 9 MW; Volta No. 2: 0.9 MW; South: 7 MW; Inskip: 8 MW; Coleman: 13 MW)		
Date Commissioned	Volta No. 1: 1980; Volta No. 2: 1981; South: 1979; Inskip: 1979; Coleman: 1979		
Elevation of Facilities	460 to 5,571 ft msl	**Automatic Generation Control**	None
Reservoir Storage Capacity	1,658 af	**Average Energy Production**	245 GWh/year
Consumptive Water Uses	None	**Project Type**	Primarily Run-of-the-River (small storage)

Location

Battle Creek drains the western slopes of Mount Lassen, which lies in the southernmost range of the Cascade Mountains, and is a direct tributary to the Sacramento River that enters downstream of Lake Shasta. The Battle Creek Bundle, located in Shasta and Tehama Counties, is composed of five hydroelectric generating facilities that lie within different subbasins of the Battle Creek basin. The Volta 1 and Volta 2 Powerhouses are situated on the North Fork Battle Creek (NFBC) subbasin. These facilities utilize water from NFBC subbasin, but also make use of water transferred from Ash Creek and Baldwin Creek. The Volta 1 and 2 powerhouses are approximately 35 miles east of Redding and three miles north of Manton in Shasta County. The South and Inskip facilities are situated on the South Fork Battle Creek (SFBC) subbasin, and utilize water from an 88.3-square-mile drainage within the subbasin, but also uses water transferred from the NFBC. The South Powerhouse is 25 miles northeast of Red Bluff, and the Inskip Powerhouse is 20 miles northeast of Red Bluff in Tehama County. The Coleman Powerhouse is situated at the base of the Battle Creek basin below the confluence of the North Fork and South Fork, utilizing water from a 332-square-mile drainage area including water from the SFBC below Inskip Powerhouse. The Coleman Powerhouse is 18 miles southeast of Redding in Shasta County. The Manton Hydro Service Center is centrally located to the Battle Creek facilities in Tehama County in the town of Manton, approximately 30 miles southeast of Redding.

System Components/Facilities

Volta 1 Powerhouse: The Macumber and North Battle Creek reservoirs provide storage for the Volta 1 Project. The Macumber Reservoir has a usable storage capacity of 430 acre-feet (af), an 85-acre surface area, and an earth-filled with masonry dam. The North Battle Creek Reservoir has a usable storage capacity of 1,090 af, an 80-acre surface area, and a rock-filled with concrete face dam. A series of canals and flumes convey water from the reservoirs to Lake Grace and Lake Nora, the powerhouse forebays. Loomis Ditch is an unlined, wood flume segment canal. It has a concrete and timber diversion dam, and conveys water from Bailey Creek to Deer Creek. Armstrong No. 1 and Armstrong No. 2 are a total of 1.55-mile, unlined canals with a total flow capacity of ten cubic feet per second (cfs). The canals convey water within Deer Creek. The Al Smith Flume is a 3.45-mile, partly unlined and partly gunite lined flume. The flume has a flow capacity of 45 cfs, and conveys water from NFBC to Millseat Creek. The Keswick Flume is an elevated metal flume, both unlined and concrete lined with a concrete and timber buttress diversion dam. The flume is 4.19 miles long, and has a flow capacity of 45 cfs. The flume conveys water from the North Fork Battle Creek to the Lake Nora Forebay. The Shingle Creek Flume is a wood and metal flume with both unlined and lined segments and an earth dam. The 0.54-mile flume has a flow capacity of three cfs, and conveys water from Shingle Creek to Baldwin Creek. The Baldwin-Lake Grace Canal is a 1.02-mile-long canal with both lined and unlined segments. The canal has a flow capacity of four cfs, and conveys water from Millseat Creek to Lake Grace Forebay. Lower Millseat Canal is a 0.78-mile canal with both lined and unlined segments, and a concrete and timber buttress diversion dam. The canal has a flow capacity of 70 cfs, and conveys water from Millseat Creek to Lake Grace Forebay. The Millseat Creek Bypass is a 0.02-mile-long wood flume with two metal slide gates. It has a flow capacity of 130 cfs, and conveys water from Millseat Creek to Volta Tailrace.

Lake Nora and Lake Grace forebays have usable storage capacities of 14.9 and 46.5 af, respectively. Lake Nora is north of the powerhouse and south of Lake Grace. Two steel penstocks serve the powerhouse. One penstock is approximately 6,983 feet long and extends from Lake Nora to the powerhouse. The second penstock is approximately 8,970 feet long and extends from Lake Grace to the powerhouse. They have a total flow capacity of 115 cfs. The Volta 1 Powerhouse is a multi-level, concrete reinforced building.

Volta 2 Powerhouse: The Upper Cross County Canal conveys water from the Volta 1 tailrace to the Volta 2 headwork. "Brush Creek Diversion" adds up to 10 cfs of flow to the canal. A 406-foot, welded steel penstock extends from the headworks to the powerhouse. The penstock has a total flow capacity of 115 cfs. The Volta 2 Powerhouse is a metal structure.

South Powerhouse: A series of diversion dams and canals convey the water to the South Powerhouse. Lower Cross County Canal is a 5.34-mile combination of lined canal, flume, and pipe. It has a total flow capacity of 130 cfs, and conveys water from Volta 2 Tailrace to Union Canal. North Battle Creek Feeder is a 0.13-mile metal flume. It has a total flow capacity of 40 cfs, and conveys water from NFBC to Lower Cross Country Canal. Digger Creek Feeder is a 0.30-mile combination of flume, canal, and pipe. It has a total flow capacity of 14 cfs, and conveys water from Digger Creek to Lower Cross Country Canal. Upper Ripley Creek Feeder has a total flow capacity between two cfs and six cfs, and conveys water from Ripley Creek to Lower Cross Country Canal. South Battle Creek Canal is a 5.74-mile lined flume and tunnel. It has a total flow capacity of 100 cfs, and conveys water from SFBC to Union Canal. Union Canal is a 0.61-mile concrete canal with a total flow capacity of 225 cfs. It conveys water from South Battle Creek and Lower Cross Country Canals to South Forebay. The South Penstock extends from the headworks to the powerhouse. It is a riveted and welded steel pipe with Dresser-type couplings, and is about 1,970 feet long with a diameter that varies from 72 to 48 inches. The penstock has a total flow capacity of 190 cfs. The South Powerhouse is a tri-level, reinforced-concrete building.

Inskip Powerhouse: The Inskip Diversion Dam diverts water from the SFBC into Inskip Canal. Two diversion dams and associated canals convey water to the Inskip Powerhouse. The Inskip Canal and Diversion dam conveys water from SFBC to Inskip Forebay. The 4.51-mile-long canal consists of lined flume and tunnel. It has a total flow capacity of 220 cfs. The Eagle Canyon Canal and Diversion Dam conveys water from NFBC to Inskip Forebay. The 2.61-mile-long canal consists of lined flume and tunnel. It has a total flow capacity of 115 cfs. Inskip Powerhouse, a tri-level, concrete-reinforced building, is near the north bank of SFBC. The penstock header box regulates the flow of water from Inskip and Eagle Canyon Canals into the penstock. The penstock, extending from the headworks to the powerhouse, is a welded steel pipe with Dresser-type couplings. The penstock is approximately 3,305 feet long, with a diameter that varies from 96 to 60 inches. It has a total flow capacity of 270 cfs. Inskip Powerhouse is a tri-level, concrete-reinforced building.

Coleman Powerhouse: The Coleman Diversion Dam and Canal diverts water from SFBC to Coleman Forebay. The 9.70-mile-long canal consists of flume lined tunnel, and pipe. It has a total flow capacity of 340 cfs. Wildcat Diversion Dam and Canal diverts water from NFBC to Coleman Canal. The 1.87-mile canal consists of concrete lined sections and pipes. It has a total flow capacity of 18 cfs. Ashbury Pipe conveys water from Ashbury Pump on Baldwin Creek to Coleman Canal. The 0.32-mile-long canal has a total flow capacity of 35 cfs. An earth-filled embankment having a maximum height of 20 feet and a crest length of approximately 2,604 feet creates the Coleman Forebay. It has a usable storage capacity of 76.4 af. The Coleman Forebay is about 3,500 feet northeast of Coleman Powerhouse, and regulates water delivered by Coleman Canal to the penstocks. Two partially buried penstocks, constructed of riveted and welded steel pipes with Dresser-type couplings, extend from the forebay to the powerhouse. They have a total flow capacity of 340 cfs. The Coleman Powerhouse is a tri-level, reinforced-concrete building.

Manton Hydro Service Center: Manton Hydro Service Center occupies six acres of a 15-acre parcel, and provides support for the construction and operation of the various powerhouses and associated facilities.

Summary of Water Rights and Water Purchases

Battle Creek drains the western slopes of Mount Lassen, which lies in the southernmost range of the Cascade Mountains, and is a direct tributary to the Sacramento River, entering downstream of Lake Shasta. The Battle Creek watershed has been used for water supply and hydroelectric generation since the late 1800s. Water uses associated with the project primarily consist of non-consumptive storage and power generation; however, Pacific Gas and Electric Company also operates the project for other beneficial uses including recreation, instream freshwater habitat, and wildlife habitat.

Pacific Gas and Electric Company relies upon pre-1914 water rights for storage of 1,012 af of water in North Battle Creek Reservoir, and 430 af of water in Macumber Reservoir. Pacific Gas and Electric Company also holds several pre-1914 direct diversion water rights for power generation purposes. The pre-1914 direct diversion rights are used for power generation purposes at the Volta 1, Volta 2, South, Inskip, and Coleman Powerhouses. Pacific Gas and Electric Company also has a license for direct diversions of 18 cfs of water from NFBC into Wildcat Canal, and for 25 cfs of water from Darrah Creek feeder into Coleman Canal for power and incidental domestic purposes. Pacific Gas and Electric Company maintains several pre-1914 water rights for irrigation, incidental irrigation and domestic uses at Volta 1, Inskip, and Coleman Powerhouses. Pacific Gas and Electric Company also purchases on an annual basis, 100 miner's inch of water from Erin Brainerd, pursuant to an agreement dated January 1, 1996, that is diverted at the Digger Creek Feeder for use at South, Coleman, and Inskip powerhouses.

2.8.2 DeSabla Regional Bundle

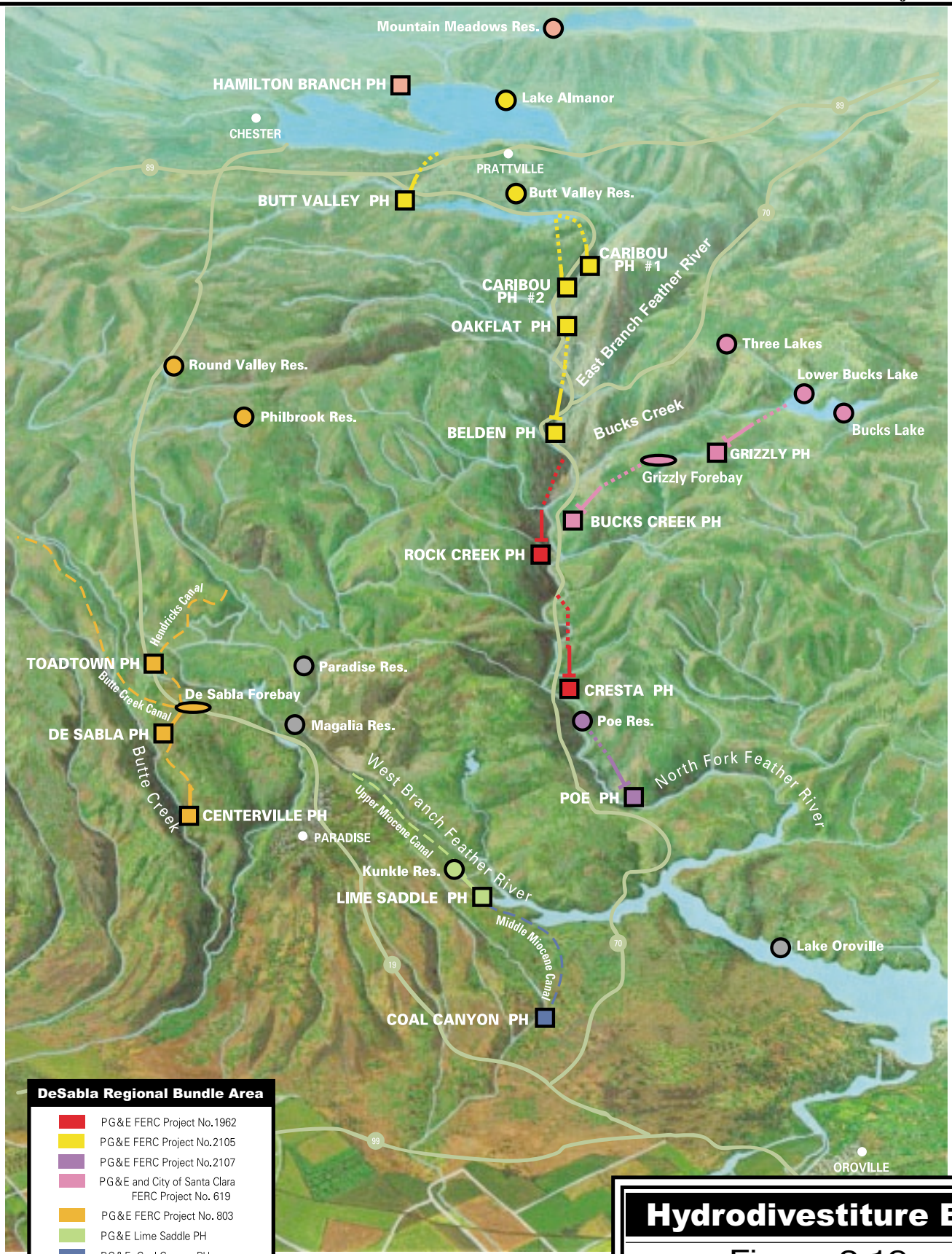
Pacific Gas and Electric Company proposes to auction 52,910 acres in the DeSabla Regional Bundle. In this section, each of the five FERC-licensed projects in this bundle are described, along with the three projects that are not licensed by FERC and two service centers. The capacities and characteristics of the specific projects and service centers in the DeSabla Regional Bundle are summarized in Table 2-3, and are described in further detail on the data sheets that follow. The locations of the associated powerhouses and facilities are shown in Figures 2-19 and 2-20, which also show the types of real property interest that Pacific Gas and Electric Company holds in the lands proposed for sale.

Table 2-3 DeSabla Regional Bundle Facilities

Bundle	FERC Licenses, Powerhouses and PPAs	No. of Units	Capacity (MW)	Reservoirs	Switching Centers		Service Centers	
					Existing	Proposed	Existing	Proposed
	DeSabla Watershed Region	25	763.4					
Hamilton Branch Bundle 5	No FERC License Hamilton Branch	2	4.8	No FERC License Mountain Meadows Reservoir	No FERC License Caribou	No FERC License (None)	No FERC License Rodgers Flat	No FERC License (None)
Feather River Bundle 6	FERC 2105 Butt Valley Caribou No. 1 Caribou No. 2 Oak Flat Belden	 1 3 2 1 1	 41 75 120 1.3 125	FERC 2105 Lake Almanor Butt Valley Reservoir Belden Forebay	FERC 2105 Caribou	FERC 2105 Caribou, Rock Creek	FERC 2105 Rodgers Flat Prattville	FERC 2105a Rodgers Flat Prattville
	FERC 1962 Rock Creek Cresta FERC 2107 Poe	 2 2 2	 112 70 120	FERC 1962 Rock Creek Reservoir Cresta Reservoir FERC 2107 Poe Reservoir	FERC 1962 Rock Creek FERC 2107 Rock Creek	FERC 1962 Caribou, Rock Creek FERC 2107 Caribou, Rock Creek	FERC 1962 Rodgers Flat FERC 2107 Rodgers Flat	FERC 1962 Rodgers Flat FERC 2107 Rodgers Flat
Bucks Creek Bundle 7	FERC 0619 Bucks Creek	2	65	FERC 0619 Bucks Storage (Bucks Lake) Three Lakes Bucks Diversion Reservoir (Lower Bucks Lake) Grizzly Forebay	FERC 0619 Rock Creek	FERC 0619 (None)	FERC 0619 Rodgers Flat	FERC 0619 (None)
Butte Creek Bundle 8	FERC 0803 Toadtown Centerville DeSabla No FERC License Lime Saddle No FERC License Coal Canyon	 1 2 1 2 1	 1.5 6.4 18.5 2 0.9	FERC 0803 Round Valley Reservoir Philbrook Reservoir DeSabla Forebay No FERC License Kunkle Reservoir No FERC License	FERC 0803 Rock Creek No FERC License Rock Creek No FERC License Rock Creek	FERC 0803 (None) No FERC License (None) No FERC License (None)	FERC 0803 Camp 1 No FERC License Camp 1 No FERC License Camp 1	FERC 0803 Camp 1 No FERC License Camp 1 No FERC License Camp 1

a. The Canyon Dam Service Center will be transferred to the new owner of the Feather River Bundle, subject to lease back to Pacific Gas and Electric Company for its exclusive use.

Source: PG&E Co., 1999b.



Source: Pacific Gas & Electric Company, August 2000.

Hydrodivestiture EIR

Figure 2-19
Hydroelectric Developments on the Butte Creek and North Fork Feather River

Aspen Environmental Group

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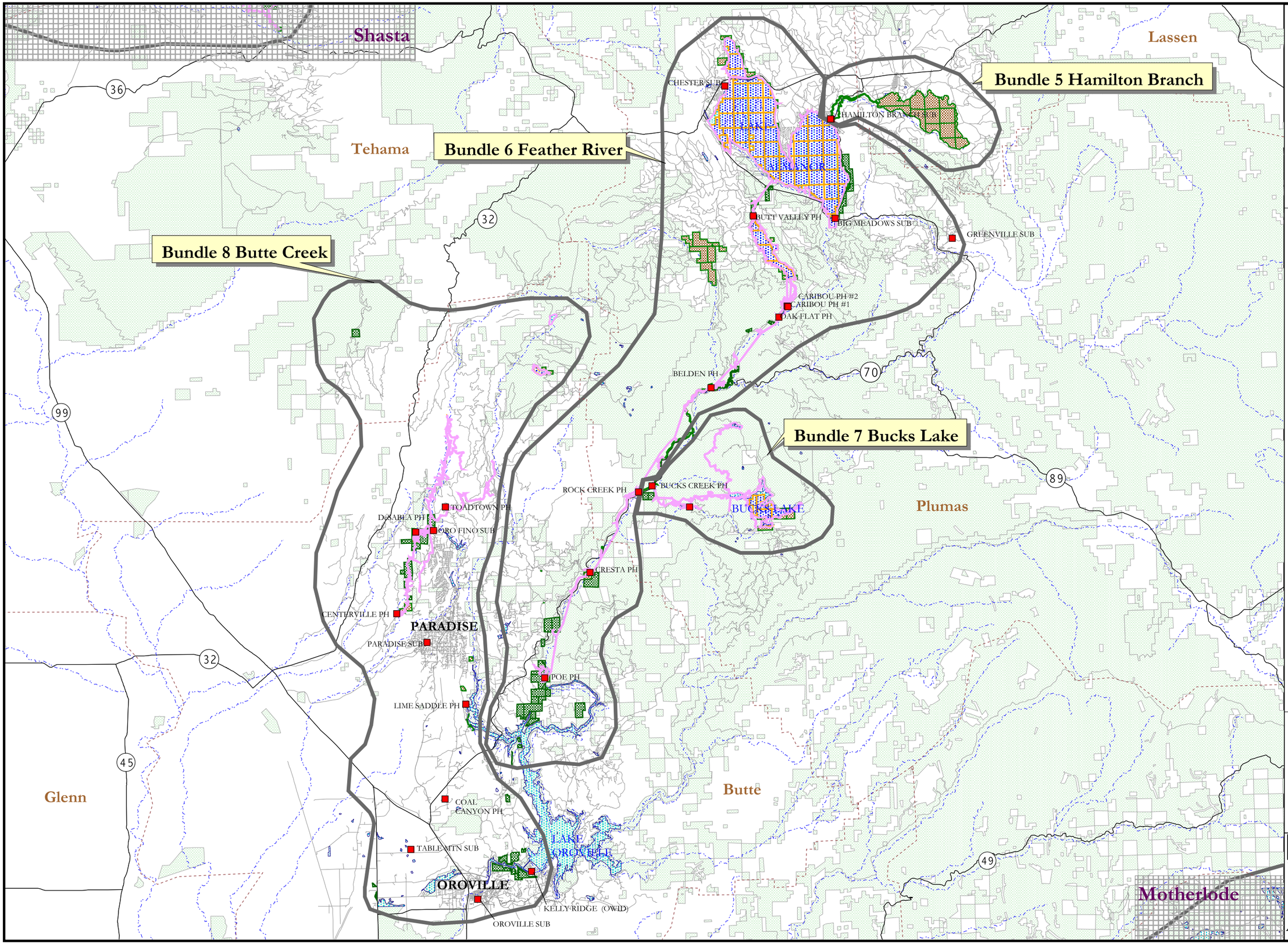

DISCLAIMER

1. "This map is not a survey of legal boundaries or a depiction of actual FERC boundaries. It should not be relied upon for such purpose. It is intended solely to be a visual depiction of such boundaries. The data used to prepare this map were compiled from multiple sources and varying levels of accuracy. Arbitrary adjustments have been made to FERC boundaries and the property line boundaries in order to provide a spatial dataset that is consistent with existing spatial data. While the map is believed to be an accurate depiction of the underlying data, Pacific Gas and Electric Company assumes no liability for any person's reliance upon this map for any reason."

2. "The FERC project boundaries and boundaries for Company fee land used in this report may not be accurate legal boundaries. The actual locations of any feature identified in this report would need to be surveyed in order to definitively determine whether the feature lies within or outside of Company fee land."

Source: Pacific Gas and Electric Company GIS Data Files; Ferc Boundary, Hydrology, Parcels, Public Lands; and EIP Associates GIS Program August 2000. GIS Data Projection: UTM Zone 10, NAD 83, Units Meters.

- FERC License Area
  - Water
  - Land
- Watershed Lands
  - Contiguous Land
  - Associated Land
- General Bundle Area
- State Highway
- Roads
- County Line
- Public Lands
- Powerhouses & Substations (Pacific Gas & Electric Company unless other owner identified)

Map Location Reference

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Miles

Hydrodivestiture EIR

Figure 2 - 20
DeSabla Regional Bundle

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HAMILTON BRANCH BUNDLE 5	DESABLA REGIONAL BUNDLE

FERC License No.	FERC Expiration Date	Relicense Filing Date	FERC Relicensing Status
Unlicensed (Hamilton Branch)	NA	NA	NA

FERC License Area (acres)		Watershed Lands (acres)		Total Acres
Land Area	Water Area	Contiguous Watershed Lands	Associated Watershed Land	All Lands
0	0	6,799	0	6,799

Number of Generating Units	Two (Hamilton Branch)
Normal Maximum Operating Capacity	4.8 MW
Date Commissioned	1921

Elevation of Facilities	4,498 to 5,046 ft msl	**Automatic Generation Control**	None
Reservoir Storage Capacity	23,942 af	**Average Energy Production**	23 GWh/year
Consumptive Water Uses	None	**Project Type**	Storage w/ conveyance

Location

The Hamilton Branch Powerhouse is located in Plumas and Lassen Counties; the forebay and portions of the canal are in Lassen County. The Hamilton Branch Powerhouse is situated in the lower region of the Hamilton Branch tributary of the North Fork Feather River (NFFR) near Lake Almanor and the small communities of Westwood and Clear Creek.

System Components/Facilities

Mountain Meadows Reservoir is the primary water storage facility. The reservoir has a flooded area of approximately 5,746 acres and a storage capacity of 23,942 acre-feet (af). Indian Ole Dam, also known as Mountain Meadows Dam, was rebuilt in 1965 and is constructed of a steel frame with a timber face. The Hamilton Branch Diversion Dam is downstream of Indian Ole Dam near the community of Clear Creek. The diversion dam is constructed of a steel frame with a timber face. Water can be released from the dam in three ways: the canal diversion gate, a fish ladder, and a sluice gate to Hamilton Branch. Pumps located at Clear Creek and Red Bridge supplement water to the Hamilton Branch Canal by pumping water from Clear Creek and Hamilton Branch. Water flows by gravity from a small concrete dam on Clear Creek, through a steel pipe to a concrete water-retention pit next to the Hamilton Branch Canal. Two pumps at Clear Creek move water approximately ten feet from the retention pit to the Hamilton Branch Canal. The Red Bridge pump pulls water from the Hamilton Branch downstream from the diversion dam, and delivers it to the Hamilton Branch Canal.

The Hamilton Branch Canal carries water from the diversion dam to the header box and penstock, approximately 3.2 miles. The canal, lined with gunite concrete, is nine to 15 feet wide, five feet deep, and has a carrying capacity of approximately 200 cubic feet per second (cfs). Ramps project out from the canal at several locations for deer escapes. The Hamilton Branch Penstock, constructed of 60- to 34-inch-diameter steel pipe, carries water approximately 0.42 miles from the header box to the powerhouse. It has a total flow capacity of 200 cfs. The Hamilton Branch Powerhouse is a single level, wood frame building.

Summary of Water Rights and Water Purchases

The Hamilton Branch Powerhouse, located in Plumas and Lassen Counties, is situated in the lower region of the Hamilton Branch tributary of the NFFR. The Hamilton Branch Powerhouse tailrace water flows directly into Lake Almanor. The primary water use associated with the powerhouse is power supply. In addition, water in the powerhouse area is used locally to support recreation and fish and wildlife habitat within the Hamilton Branch watershed.

Pacific Gas and Electric Company relies upon permitted and prescriptive water rights for 24,000 af of water storage in Mountain Meadows Reservoir. Pacific Gas and Electric Company claims riparian rights for a direct diversion of 200 cfs of water into Hamilton Branch Flume below Mountain Meadows Reservoir, and additional flows diverted at Spring Creek Feeder (15 cfs), Clear Creek Feeder (30 cfs), and Red Bridge Pump (35 cfs). Pacific Gas and Electric Company also holds irrigation rights at Mountain Meadows Reservoir and at Hamilton Branch Flume. Pacific Gas and Electric Company stores and releases water from Mountain Meadows Reservoir; the water is used for power generation at Hamilton Branch Powerhouse and is then released downstream into Lake Almanor and into Pacific Gas and Electric Company's other North Fork Feather River projects.

FEATHER RIVER BUNDLE 6	DESABLA REGIONAL BUNDLE

FERC License No.	FERC Expiration Date	Relicense Filing Date	FERC Relicensing Status
2105 (Upper North Fork Feather River)	10/31/2004	10/31/1999	Notice of Intent filed 1999; New license expected 11/2005

FERC License Area (acres)		Watershed Lands (acres)		Total Acres
Land Area	*Water Area*	*Contiguous Watershed Lands*	*Associated Watershed Land*	All Lands
1,193	28,692	1,292	2,141	33,318

Number of Generating Units	Eight (Butt Valley: One, Caribou No. 1: Three; Caribou No. 2: Two; Oak Flat: One; Belden: One)
Normal Maximum Operating Capacity	362.3 MW (Butt Valley: 41 MW; Caribou No. 1: 75 MW; Caribou No. 2: 120 MW; Oak Flat: 1.3 MW; Belden: 125 MW)
Date Commissioned	Butt Valley: 1958; Caribou No. 1: 1921; Caribou No. 2: 1958; Oak Flat: 1985; Belden: 1969

Elevation of Facilities	2,216 to 4,504 ft msl	**Automatic Generation Control**	Caribou 2, Belden
Reservoir Storage Capacity	1,181,334 af	**Average Energy Production**	1,172 GWh/year
Consumptive Water Uses	Municipal, Industrial, Irrigation, Stock Watering, Domestic, Fire Protection	**Project Type**	Storage w/ conveyance

Location

The Upper North Fork Feather River Project is located on the North Fork Feather River (NFFR), a tributary of the Feather River. The Upper North Fork Feather River Project lies entirely within the NFFR basin, which drains the southern end of the Cascades and the northern end of the Sierra Nevada into the Sacramento River. The Upper North Fork Feather River Project area is in Plumas County near the towns of Chester, Prattville, and Belden. The project lies within Plumas National Forest, and is adjacent to Lassen National Forest. The Bucks Lake Wilderness Area is adjacent to the Belden Powerhouse located at the town of Belden. The Rodgers Flat Hydro Service Center is 3.5 miles southwest of Belden along the NFFR in Plumas County. The Butt Valley Powerhouse is on Butte Creek, and is four miles west of Prattville. The Caribou 1 and Caribou 2 Powerhouses are approximately 7 miles northeast of Belden.

System Components/Facilities

Water in the Upper North Fork Feather River Project flows from Lake Almanor through the Butt Valley Powerhouse into Butt Valley Reservoir, and then though Caribou 1 and Caribou 2 powerhouses into the Belden Forebay. From the forebay, water is diverted to the Belden Powerhouse that discharges water into Rock Creek Reservoir. Oak Flat is a small energy recovery unit operating on minimum required stream flow release at Belden Dam. It has no effect on water storage or the operation of any other generating units.

Butt Valley Powerhouse: Lake Almanor, formed by Canyon Dam, is the main storage facility for the NFFR. Canyon Dam is a hydraulically filled, riprap-faced dam. Lake Almanor has a usable storage capacity of 1,129,016 acre-feet (af) and a surface area of 27,064 acres at a water surface elevation of 4,494 feet. Water is sent from Lake Almanor directly to the Butt Valley Powerhouse. Most releases from Lake Almanor are made from the Prattville intake, from which a concrete lined, 13-foot-diameter tunnel carries water 2.06 miles to the penstock. The 5,568-ft. long, riveted steel penstock, 12- ft. to 11-ft. diameter, conveys water from the tunnel to the powerhouse. The penstock has a total flow capacity of 2,118 cubic feet per second (cfs). The Butt Valley Powerhouse is a tri-level, reinforced concrete building.

Caribou 1 and 2 Powerhouses: Butt Valley Reservoir is south of Lake Almanor, and has a usable storage capacity of 49,897 af and a surface area of 1,600 acres at 4,142 feet above mean sea level (US Geological Survey [USGS] datum). Two intake towers, each with control gates and associated equipment, are at the southwestern end of the reservoir. Two concrete lined tunnels carry water from the intake towers to the penstocks. A ten-foot-diameter tunnel delivers water 1.85 miles from the Caribou 1 Intake Tower to the approximately 0.42-mile Caribou 1 Penstock. From the Caribou 2 Intake Structure, a 13-foot tunnel with horseshoe and circular sections carries water 1.65 miles to the approximately 0.44-mile-long Caribou 2 Penstock. The penstocks convey water to the powerhouses, and have a combined rated flow capacity of 2,350 cfs. The Caribou 1 Powerhouse is constructed of reinforced concrete and steel frame with glass windows. The Caribou 2 Powerhouse is constructed of reinforced concrete with a waterproof membrane and concrete wearing surface roof. The powerhouses are within approximately 100 yards of each other.

Oak Flat Powerhouse: The Belden Reservoir is the forebay for both the Oak Flat and Belden Powerhouses, and the afterbay for the Caribou 1 and Caribou 2 Powerhouses. The Belden Dam creates a maximum surface area of approximately 42 acres, with an approximate capacity of 2,421 af. The Oak Flat powerhouse intake gates are on the upstream side of Belden Dam. The gates, hydraulically operated at the dam, open to allow water from Belden Reservoir to flow through the penstock. The penstock goes through Belden Dam via a tunnel to the powerhouse. The penstock splits near the powerhouse; one leg continues to the powerhouse while the other goes to the Howell-Bunger Valve. The Howell-Bunger Valve, adjacent to the powerhouse, is a synchronous bypass that opens automatically when the unit trips off-line. When work is being done on the powerhouse that requires

shutting off water flow through the turbine, the valve can be activated by an electric motor, allowing Pacific Gas and Electric Company to continue to meet minimum FERC instream flow requirements. The Oak Flat Powerhouse is a two-level building constructed entirely of reinforced concrete.

Belden Powerhouse: The Belden Tunnel, including a 1,859-ft. long siphon crossing the NFFR, carries water approximately 6.6 miles from Belden Reservoir to the powerhouse's penstock. The tunnel is mostly 15 feet horseshoe and circular concrete lined with steel lined sections 13 feet diameter at the portals. The siphon carries the water down one side and up the other of the steep NFFR Valley. The hillside adjacent to the end of the siphon near Caribou Road was reinforced with rock anchors in 1996 to protect the siphon pipe from rockfalls and slope movement. The penstock is a steel surface pipe with a 12.25 foot to 10.75 foot diameter, and carries water approximately 1,105 feet from the tunnel to the powerhouse. It has a total flow capacity of 2,410 cfs. Belden Powerhouse is a tri-level building constructed entirely of reinforced concrete.

Canyon Dam Service Center: The Canyon Dam Service Center is located within the Upper North Fork Feather River Project. The center is used for non-hydroelectric related functions, primarily for maintenance and repair support for electric distribution and transmission.

Rodgers Flat Hydro Service Center: The Rodgers Flat Hydro Service Center provides maintenance and repair services to the hydroelectric generating facilities in the region. The service center occupies approximately 50 acres. The service center includes seven main buildings and numerous smaller structures.

Summary of Water Rights and Water Purchases

Water in the project area is used locally for power production, fish and wildlife habitat, and recreational purposes. Project waters also support municipal, industrial, irrigation, and stock watering uses in the Sierra Nevada foothills and Sacramento Valley.

Pacific Gas and Electric Company relies on pre-1914 water rights for storage of 1,142,964 af of water in Lake Almanor and 49,897 af of water in Butt Valley Reservoir. Pacific Gas and Electric Company has pending Water Rights Applications, 30257, 30258, and 30415, before the State Water Board. Application 30257 is for 500,000 af of storage in Lake Almanor, to be used for power generation at the Butt Valley Powerhouse. Applications 30258 and 30415 are for direct diversions from North Fork Feather River at Lake Almanor, to be used for power generation at the Butt Valley Powerhouse and Caribou Powerhouse. These pending applications are not for additional storage above the current 1,142,964 af of storage capacity of Lake Almanor (nor for additional diversions), but if approved will resolve a dispute over the adequacy of Pacific Gas and Electric Company's pre-1914 water rights.

Pacific Gas and Electric Company relies on a combination of riparian, pre-1914, licensed and permitted water rights for direct diversions of water for power generation at its Upper North Fork Feather River powerhouses (Butt Valley, Caribou 1, Caribou 2, Belden and Oak Flat). Pacific Gas and Electric Company also maintains miscellaneous water rights for irrigation, fire protection, and domestic uses.

FEATHER RIVER BUNDLE 6	DeSabla Regional Bundle

FERC License No.	FERC Expiration Date	Relicense Filing Date	FERC Relicensing Status
1962 (Rock Creek-Cresta)	9/30/1982	9/26/1979	On annual license; New license expected 7/2001

FERC License Area (acres)		Watershed Lands (acres)		Total Acres
Land Area	Water Area	Contiguous Watershed Lands	Associated Watershed Land	All Lands
31	65	3,029	27	3,152

Number of Generating Units	Four (Rock Creek: Two; Cresta: Two)
Normal Maximum Operating Capacity	182 MW (Rock Creek: 112 MW; Cresta: 70 MW)
Date Commissioned	Rock Creek: 1950; Cresta: 1949/1950

Elevation of Facilities	1,380 to 2,220 ft msl	**Automatic Generation Control**	Rock Creek, Cresta
Reservoir Storage Capacity	3,656 af	**Average Energy Production**	863 GWh/year
Consumptive Water Uses	Municipal, Industrial, Agricultural	**Project Type**	Storage w/ Conveyance

Location

The Rock Creek-Cresta Project is located in Butte and Plumas Counties, and is situated on the lower reaches of the North Fork Feather River (NFFR). The NFFR basin is a branch of the Feather River that drains the southern end of the Cascades and the northern end of the Sierra Nevada mountains into the Sacramento River. The two project reservoirs are located within the Quincy Ranger District in Plumas National Forest. The Bucks Lake Wilderness Area and the Chips Creek Roadless Area are adjacent to the Rock Creek Reservoir. The Rock Creek Powerhouse is on the west bank of the NFFR. The Cresta Powerhouse is on the NFFR, approximately 24 miles north of Oroville in Butte County.

System Components/Facilities

The Rock Creek-Cresta Bundle consists of the Rock Creek Powerhouse and Cresta Powerhouse. Water is diverted from Rock Creek Reservoir through Rock Creek Powerhouse, and is discharged into the Cresta Reservoir. From Cresta Reservoir, flow is diverted through the Cresta Powerhouse and then discharged to the Poe Reservoir. In addition to the discharge from Belden Powerhouse, Rock Creek Reservoir receives significant inflows from instream flow of the NFFR, East Branch NFFR, Yellow Creek, and several smaller tributaries.

Rock Creek Powerhouse: Rock Creek Reservoir regulates water to the Rock Creek Powerhouse. The reservoir currently has an estimated gross capacity of 1,500 acre-feet (af), approximately 44 percent of the original design capacity of 4,400 af due to sediment accumulation. The Rock Creek Dam is a concrete structure that has two large drum gates and a smaller radial gate on the spillway that regulates flow. The gate controls are within the dam structure. The concrete tunnel intake structure is adjacent to Highway 70, approximately 100 feet upstream from the right abutment of Rock Creek Dam. The tunnel carries water approximately 6.5 miles from Rock Creek Reservoir to the penstock valve house. The tunnel is a 21.7-foot horseshoe in the lined sections and a 25-foot horseshoe in the unlined sections. The tunnel's capacity is approximately 3,300 cubic feet per second (cfs). Two penstocks deliver water from the penstock valve house to the two powerhouse generating units. The pipes are of welded steel with riveted field joints, and are approximately 1,860 feet long, 12 feet in diameter, and have a total flow capacity of 3,300 cfs. Flow in the penstocks can be stopped from the penstock valve house that is located on the hillside above the powerhouse. The lower portions of the penstocks are concrete encased in tunnels beneath a railroad track, highway and the switchyard. The Rock Creek Powerhouse is a multi-level, reinforced concrete building.

Cresta Powerhouse: Cresta Reservoir regulates water to the Cresta Powerhouse. The reservoir had an original gross capacity of 4,140 af; sediment accumulation has reduced this to 2,156 af, 52 percent of the original capacity. The Cresta Dam is a concrete structure that has two large drum gates and a radial gate that regulates flow. The concrete tunnel intake structure is adjacent to Highway 70, and is approximately 30 feet upstream from the left abutment of Cresta Dam. The tunnel carries water approximately four miles (3.96 miles of tunnel and 0.03 miles of pipe) from Cresta Reservoir to the penstock valve house. Although most of the tunnel is unlined, some fractured rock was encountered where it was constructed with timber supports and concrete lining. Also, over 500 feet of steel liner was installed at the downstream end of the tunnel. The entire length of the tunnel is generally horseshoe shaped. A circular, reinforced concrete tube crosses Grizzly Creek where the tunnel daylights. The tunnel's capacity is approximately 3,800 cfs. Two penstocks, approximately 802 and 776 feet-long, deliver water from the valve house to the powerhouse. Both penstocks are 12 feet in diameter. They have a total flow capacity of 3,800 cfs. The Cresta Powerhouse is a multi-level, steel framed, reinforced concrete and glass window building.

Summary of Water Rights and Water Purchases

The primary use of water associated with the Rock Creek-Cresta Project is power supply. In addition, water in the project area is used locally to support recreation and fish and wildlife habitat within the NFFR. NFFR waters also support municipal, industrial, and agricultural uses in the Sierra Nevada foothills and Sacramento Valley.

Pacific Gas and Electric Company relies on a combination of riparian, licensed, and permitted water rights to divert water to generate power at the Rock Creek and Cresta Powerhouses. Pacific Gas and Electric Company has a pre-1914 water right to divert four cfs of water from Yellow Creek for irrigation and domestic purposes at Humbug Valley, and it maintains several licensed rights to use water for domestic and fire protection purposes at powerhouses, project headquarters, camps, and service centers.

FEATHER RIVER BUNDLE 6	DeSabla Regional Bundle

FERC License No.	FERC Expiration Date	Relicense Filing Date	FERC Relicensing Status
2107 (Poe)	9/30/2003	9/30/2001	Notice of Intent filed 1998; New license expected 10/2004

FERC License Area (acres)		*Watershed Lands (acres)*		*Total Acres*
Land Area	**Water Area**	**Contiguous Watershed Lands**	Associated Watershed Land	All Lands
148	**9**	**72**	3,129	3,358

Number of Generating Units	Two (Poe)
Normal Maximum Operating Capacity	120.0 MW
Date Commissioned	1958

Elevation of Facilities	892 to 1,380 ft msl	**Automatic Generation Control**	Poe
Reservoir Storage Capacity	1,203 af	***Average Energy Production***	584 GWh/year
Consumptive Water Uses	Municipal, Industrial, Agricultural, Incidental Domestic	**Type of Project**	Storage w/ conveyance

Location

The Poe Project is located in Butte County and is situated in the lower reaches of the North Fork Feather River (NFFR), directly upstream of Lake Oroville (owned by the State of California Department of Water Resources). The project is located in very rugged terrain in a relatively narrow channel with steep canyon walls.

System Components/Facilities

Poe Reservoir regulates water to the powerhouse. The reservoir has a usable capacity of 1,203 acre feet (af). Poe Dam has a concrete structure, five radial gates, and one skimmer gate that regulate the flow. The tunnel has a 19-foot-diameter circular section and a 25-foot unlined horseshoe section. The tunnel carries water approximately 6.2 miles from Poe Reservoir to the penstocks. The 14.25-foot-diameter underground penstock extends 780 feet downstream from the end of the tunnel and then bifurcates to two 10-foot-diameter legs extending 110 feet further to the powerhouse. The penstocks have a total flow capacity of 3,900 cubic feet per second (cfs). The Poe Powerhouse is a multi-level, reinforced concrete building constructed mostly underground, similar to other powerhouses without a superstructure building to house the generators. Water discharges from the powerhouse to Lake Oroville. When Lake Oroville is drawn down, the old Big Bend (Las Plumas) Project diversion dam about one mile downstream of Poe Powerhouse is exposed and acts as an afterbay to smooth-out surges in flow from the powerhouses. The low, overflow-type dam was breached with a V-notch weir so that it is not a fish barrier. The Big Bend Project, the first large power development on the NFFR, was decommissioned upon construction of the State's Oroville Project in the mid-1960's.

Summary of Water Rights and Water Purchases

The primary use of water associated with the Poe Project is for power generation. In addition, water in the project area is used locally to support recreation and fish and wildlife habitat in the NFFR. NFFR waters also support municipal, industrial, and agricultural uses in the Sierra Nevada foothills and the Sacramento Valley.

Pacific Gas and Electric Company relies on a combination of riparian, licensed, and permitted water rights for direct diversions to generate power at the Poe Powerhouse. Pacific Gas and Electric Company has licensed water rights from North Fork Feather River for diversions for incidental domestic uses at the Poe Powerhouse.

BUCKS CREEK BUNDLE 7			DESABLA REGIONAL BUNDLE	
FERC License No.	**FERC Expiration Date**	**Relicense Filing Date**	**FERC Relicensing Status**	
0619 (Bucks Creek)	12/31/2018	12/31/2016	Mid-term	
FERC License Area (acres)		**Watershed Lands (acres)**		**Total Acres**
Land Area	*Water Area*	*Contiguous Watershed Lands*	Associated Watershed Land	All Lands
418	1,282	565	239	2,504

Number of Generating Units	Two (Bucks Creek)
Normal Maximum Operating Capacity	65 MW
Date Commissioned	1928

Elevation of Facilities	1,760 to 6,080 ft msl	**Automatic Generation Control**	Bucks Creek
Reservoir Storage Capacity	112,861 af	**Average Energy Production**	241 GWh/year
Consumptive Water Uses	Municipal, Industrial, Agricultural	**Project Type**	Storage w/ Conveyance

Location

The Bucks Creek Project is situated on three tributaries of the North Fork Feather River (NFFR). The Bucks Creek Project includes Bucks, Grizzly and Milk Ranch Creeks, which flow in a westerly direction from the crest of the Sierra Nevada to the NFFR. The NFFR is a branch of the Feather River that drains the southern end of the Cascade and northern end of the Sierra into the Sacramento River. The headwaters of the NFFR lie on the southeastern slopes of Mount Lassen in Plumas County. The main river channel flows for approximately 63 miles before reaching Lake Oroville in Butte County. The project occupies Plumas National Forest lands on the western slope of the Sierra Nevada, and is adjacent to Lassen National Forest. The Bucks Lake Wilderness Area is adjacent to Bucks Lake. The Bucks Creek Powerhouse is approximately 0.5 miles southwest of Storrie in Plumas County.

System Components/Facilities

Water storage for the Bucks Creek Bundle is provided by four reservoirs: Bucks Lake, Lower Bucks Lake, Three Lakes, and Grizzly Forebay. Three Lakes, formed by Three Lakes Dam, is approximately seven miles northeast from the powerhouse. Three Lakes Dam is a rock-fill concrete face dam, with a 30-foot-high and 584-foot-long dam crest. The lake has a usable storage capacity of 606 acre-feet (af) and a surface area of 44 acres. Bucks Lake, created by Bucks Lake Dam, is approximately seven miles east of the powerhouse. Bucks Lake Dam is a rock-fill with concrete face dam, with a 123-foot-high and 1,320 foot-long dam crest. The lake has a usable storage capacity of 105,327 af and a surface area of 1,852 acres. Lower Bucks Lake is approximately six miles east of the powerhouse. The lake has a concrete arch dam, a usable storage capacity of 5,820 af, and a surface area of 136 acres. Grizzly Forebay is the forebay for the Bucks Creek Powerhouse and the afterbay for the Grizzly Powerhouse, which is approximately two miles upstream of Bucks Creek Powerhouse. The forebay has a usable storage capacity of 1,109 af and a surface area of 38 acres. It has a concrete arch dam with a 98-foot-high and 520-foot-long dam crest.

Bucks Lake is the primary storage reservoir of the system. Water is discharged from the valve house into a tunnel, through the dam, and into Lower Bucks Lake. Lower Bucks Lake also receives water from Three Lakes. A manual valve at the foot of the Three Lakes Dam controls the flow of water from the lakes into Milk Ranch Creek. Approximately 1,500 feet downstream of the dam, a diversion directs a portion of Milk Ranch Creek into Milk Ranch Conduit. The conduit (a buried pipe) carries water approximately eight miles from the diversion to Lower Bucks Lake. The conduit is up to 36-inches in diameter, and has a maximum capacity of 50 cubic feet per second (cfs). Several small surface streams are diverted to contribute to the total flow in the conduit. Two intake structures are in Lower Bucks Lake: the old Lower Bucks Lake Tunnel Intake and the new Grizzly Powerhouse Tunnel Intake. The Grizzly Powerhouse intake delivers water to Grizzly Powerhouse. The new intake, which was built in 1994 and is owned by the City of Santa Clara, is a concrete and brick building.

Grizzly Forebay Tunnel Intake contains equipment to monitor the water level of Grizzly Forebay. Grizzly Forebay Tunnel, a seven- to nine-foot-diameter unlined tunnel, carries water 2.26 miles from Grizzly Forebay to Bucks Creek Portal. Bucks Portal Valve House, at the top of the penstocks, is a split-level, reinforced concrete structure that contains two hydraulic shut-off valves, one for each penstock. The twin penstocks carry water approximately 4,786 feet from the portal to the powerhouse. The penstocks are constructed of riveted steel pipe and welded, steel-banded pipe. Their diameter varies from 54 to 36 inches. They have a total flow capacity of 384 cfs. The Bucks Creek Powerhouse is a tri-level building constructed entirely of reinforced concrete.

Under the Settlement Agreement, the FERC license for Pacific Gas and Electric Company's Bucks Creek Project (FERC 0619) was amended to designate Santa Clara as a joint licensee. Pacific Gas and Electric Company constructed Grizzly, a new 20 megawatt hydroelectric powerhouse. Santa Clara financed and paid for the construction of Grizzly. Santa Clara owns Grizzly and is responsible for its operation. Under the Settlement Agreement, Pacific Gas and Electric Company dispatches Grizzly in series with Pacific Gas and Electric Company's Buck Creek Powerhouse "as if it were the owner of Grizzly" and delivers the equivalent of Grizzly generation (17.66 MW of capacity plus energy equivalent to the kilowatt hours actually produced by Grizzly) to Santa Clara on the Santa Clara delivery schedule.

Summary of Water Rights and Water Purchases
The primary use of water associated with the Bucks Creek Project is power generation. The project also provides for recreation and fish and wildlife habitat beneficial uses. NFFR waters also support municipal, industrial, and agricultural uses in the Sierra Nevada foothills and Sacramento Valley. Pacific Gas and Electric Company relies on four licensed water storage rights for storage of 736 af of water in Three Lakes, and a combined storage of 118,000 af of water in Bucks Lake and Lower Bucks Lake, to be used for power generation. Pacific Gas and Electric Company has a separate licensed water storage right for the storage of 70,000 af of water in Bucks Lake to be used for irrigation. Pacific Gas and Electric Company relies on several licensed and permitted water rights for direct diversion of water for power generation. Pacific Gas and Electric Company also maintains rights for fire protection, industrial, and domestic uses.

BUTTE CREEK BUNDLE 8			DESABLA REGIONAL BUNDLE	
FERC License No.	**FERC Expiration Date**	**Relicense Filing Date**	**FERC Relicensing Status**	
0803 (Toadtown, Centerville, DeSabla)	10/11/2009	10/11/2007	Mid-term	
FERC License Area (acres)		**Watershed Lands (acres)**		**Total Acres**
Land Area	*Water Area*	*Contiguous Watershed Lands*	Associated Watershed Land	All Lands
185	175	691	1,499	2,550

Number of Generating Units	Four (Toadtown: One; DeSabla: One; Centerville: Two)		
Normal Maximum Operating Capacity	26.4 MW (Toadtown: 1.5 MW; DeSabla: 18.5 MW; Centerville: 6.4 MW)		
Date Commissioned	Toadtown: 1986; DeSabla: 1963; Centerville: 1900		
Elevation of Facilities	475 to 5,650 ft msl	**Automatic Generation Control**	None
Reservoir Storage Capacity	6,393 af	**Average Energy Production**	161 GWh/year
Consumptive Water Uses	None	**Project Type**	Storage w/ Conveyance

Location

The DeSabla-Centerville Project is situated within two separate north-to-south drainage basins of the southern Cascades and northern Sierra Nevada: the West Branch Feather River (WBFR) and Butte Creek. Both drainage basins have headwaters at an elevation of approximately 7,000 feet on the crest. The WBFR drains into Lake Oroville on the Feather River. The drainage area within the WBFR watershed utilized by the project is 46 square miles, as determined at Hendricks Head Dam, which is the downstream diversion facility. Butte Creek flows directly into the Sacramento River. The drainage area within Butte Creek utilized by the project is approximately 60 square miles. The DeSabla-Centerville Project is in Butte County, approximately seven miles northeast of Paradise. The Toadtown Powerhouse is adjacent to the Toadtown Canal, 18 miles northeast of Chico in Butte County. The DeSabla Powerhouse is on Butte Creek, approximately 15 miles northeast of Chico in Butte County. The Centerville Powerhouse is on Butte Creek, about nine miles northeast of Chico in Butte County. The Camp One Hydro Service Center is north of the town of Magalia, approximately 15 miles northeast of Chico in Butte County.

System Components/Facilities

Toadtown Powerhouse: Round Valley Reservoir and Philbrook Reservoir are the main storage facilities. Round Valley Reservoir, also called Snag Lake, is approximately 14 miles northeast of Toadtown Powerhouse. The reservoir has a usable storage capacity of 1,196 acre-feet (af), and a surface area of 98 acres. It has an earth-fill dam with a 29-foot-high and 850-foot-long dam crest. A spillway is located at the east abutment of the dam. An exposed gate valve on a pipe protruding from the dam controls water discharged from Round Valley Reservoir to the WBFR. Philbrook Reservoir is approximately 12 miles northeast of Toadtown Powerhouse. The reservoir has a usable storage capacity of 5,009 af, and a surface area of 173 acres. It has two earth-fill dams, one 24 feet high with a 470-foot long crest, and the other 87 feet high with a 850-foot long crest. Water discharged from Philbrook Reservoir to Philbrook Creek is conveyed to the WBFR.

The Hendricks Head Dam diverts water from the WBFR into Hendricks Canal. Water travels through a segment of lined canal into the Hendricks Tunnel. Water leaves the tunnel, merges with water from Long Ravine, travels down Long Ravine, and is diverted back into a lined canal by Long Ravine Diversion Dam. The water then travels through a flume segment and Lovelock Tunnel before reaching the penstock header box. The Hendricks Canal is approximately 8.7 miles long, of which 6.2 miles is ditch, 0.40 mile is flume, 1.1 miles is tunnel, 0.28 miles is pipe, and 0.68 miles is natural waterway in Long Ravine. The canal has a capacity rating of 125 cubic feet per second (cfs). Water not flowing into the header box spills over into a by-pass pipe (called Rapid Pipe), and eventually discharges into the Toadtown Canal. The penstock, which extends from the header box to the powerhouse, is a welded-steel pipe with Dresser-type couplings. The entire penstock is buried, and is 1,556 feet long with a diameter of 54" to 36". It has a total flow capacity of 134 cfs. The Toadtown Powerhouse is a single-level building constructed of reinforced-concrete block. Water discharged from the powerhouse flows into the Toadtown Canal, where it is conveyed to Butte Creek Canal.

DeSabla Powerhouse: The Toadtown and Butte Creek Canals combine to convey water to the DeSabla Forebay. The Toadtown Canal is a 2.4-mile-long ditch and flume canal with a total flow capacity of 125 cfs. It conveys water from the Hendricks Canal to the Butte Creek Canal. The Butte Creek Canal is an 11.44-mile-long combination of ditch, flume, tunnel, and pipe. It conveys water from Butte Creek to the DeSabla Forebay. The DeSabla Forebay, with a usable storage capacity of 188 af, is about one mile northeast of the powerhouse. An earth-filled embankment that has a maximum height of 52 feet and a crest length of approximately 1,080 feet creates the forebay. The forebay conveys water to the penstock and Upper Centerville Canal (part of the Centerville Hydroelectric Generating Facility). The steel penstock descends from the forebay to the powerhouse. It is 6,350 feet long with a diameter of 66 to 42 inches. It has a total flow capacity of 171 cfs. The DeSabla Powerhouse is a bi-level building constructed of reinforced concrete.

Centerville Powerhouse: The five-mile-long Upper Centerville Canal conveys water from DeSabla Forebay, through Helltown Ravine, to the Lower Centerville Canal. The Upper Centerville Canal is also used to provide irrigation water to public users adjacent to the canal, and generally has a flow no greater than three cfs. The Lower Centerville Diversion Dam diverts water from Butte Creek into the Lower Centerville Canal. The eight-mile-long Lower Centerville Canal, which conveys water to the powerhouse, has a rated flow capacity that varies from 180 to 192 cfs, based upon location. Several

flumes and one tunnel are between the Lower Centerville Diversion Dam and the powerhouse. The penstock, which extends from the headworks to the powerhouse, consists of two separate steel-riveted pipes. The pipes are 2,559 feet long; one has a diameter of 42 to 36 inches, the other a diameter of 30 inches. They have a combined flow capacity of 183 cfs. The Centerville Powerhouse is a reinforced concrete, single-level building, approximately 109 feet by 32 feet in size.

Camp One Service Center: The Camp One Hydro Service Center provides maintenance and repair services to the hydroelectric generating facilities in the region. The service center property occupies approximately 20 acres. The service center includes seven main buildings and numerous smaller structures. Some portions of the subject property are managed and operated by General Construction, a separate Pacific Gas and Electric Company operational group. These portions will be vacated upon transfer to a new owner.

Summary of Water Rights and Water Purchases

The primary use of water associated with the DeSabla-Centerville Project is power generation. In addition, water in the project area is used locally to support domestic use, irrigation, recreation and fish and wildlife habitat within the WBFR and Butte Creek.

Pacific Gas and Electric Company has a pre-1914 water right for the storage of 1,196 af of water in Round Valley Reservoir, and relies upon licensed water rights for 5,060 af of storage at Philbrook Reservoir. For power generation purposes, Pacific Gas and Electric Company relies upon pre-1914 water rights from Butte Creek, WBFR, and collective tributaries that divert water into Hendricks, Butte Creek, Toadtown, and Centerville Canals. Pacific Gas and Electric Company also maintains a permitted appropriative water right for a ten-cfs feeder to Toadtown Canal from Little Butte Creek. Pacific Gas and Electric Company's pre-1914 water rights also include rights for domestic and irrigation uses for water diverted from the Old Stirling Ditch (transferred to Hendricks Canal) and the Butte Creek Canal, its feeders, and a tributary to Butte Creek. These two water sources are currently used for domestic and incidental irrigation purposes at the DeSabla and Centerville Powerhouses (and Toadtown Powerhouse via Hendricks Canal), and for consumptive use at other locations where Pacific Gas and Electric Company has contracts to provide domestic and irrigation water.

BUTTE CREEK BUNDLE 8			DeSabla Regional Bundle	
FERC License No.	**FERC Expiration Date**	**Relicense Filing Date**	**FERC Relicensing Status**	
Unlicensed (Lime Saddle)	NA	NA	NA	
FERC License Area (acres)		**Watershed Lands (acres)**		**Total Acres**
Land Area	*Water Area*	*Contiguous Watershed Lands*	Associated Watershed Land	All Lands
0	0	131	0	131

Number of Generating Units	Two (Lime Saddle)		
Normal Maximum Operating Capacity	2.0 MW		
Date Commissioned	1906		
Elevation of Facilities	984 to 1,441 ft msl	**Automatic Generation Control**	None
Reservoir Storage Capacity	154 af	**Average Energy Production**	10 GWh/year
Consumptive Water Uses	Municipal, Domestic, Irrigation	**Project Type**	Storage w/ Conveyance

Location

The Lime Saddle Powerhouse is situated near the lower reaches of the West Branch Feather River (WBFR), downstream of the Upper Miocene Diversion Dam and adjacent to the West Branch Arm of Lake Oroville. The Lime Saddle Powerhouse is in Butte County near Paradise, and is adjacent to State and Bureau of Land Management lands. The Lime Saddle Powerhouse is approximately 15 miles southeast of Chico in Butte County.

System Components/Facilities

Kunkle Reservoir is located approximately one mile north of the powerhouse at 1,441 feet above mean sea level, and serves as the forebay for the Lime Saddle Powerhouse. It has a usable storage capacity of 154 acre-feet (af). The Upper Miocene Diversion Dam diverts water from the WBFR into the Upper Miocene Canal. The amount of diverted flow is regulated at the diversion dam by a manually operated valve. The Upper Miocene Canal conveys water to the Kunkle Reservoir. The penstock extends from Kunkle Reservoir to Lime Saddle Powerhouse, and consists of one 5,490-foot, of riveted steel pipe. The penstock's diameter varies from 42" to 30", and has a total flow capacity of 87 cubic feet per second (cfs). The Lime Saddle Powerhouse is a single level, reinforced concrete building, and is approximately 66 by 37 feet in size. Water discharged from the powerhouse flows into the Middle Miocene Canal.

Summary of Water Rights and Water Purchases

The powerhouse lies in the Sacramento River Basin, West Fork Feather River sub-basin, as defined by the Central Valley Regional Water Quality Control Board.

Pacific Gas and Electric Company relies upon pre-1914 water rights from the WBFR and Upper Miocene Canal feeder to supply water to the Lime Saddle Powerhouse, Coal Canyon Powerhouses, and the California Water Service Company. The pre-1914 water rights permits power, domestic, irrigation, and public service uses.

Water discharged from the Lime Saddle Powerhouse passes through the Middle Miocene Canal and Coal Canyon Powerhouse to provide municipal, irrigation, and domestic uses for California Water Service Co. and domestic and irrigation supply for 11 private parties. In addition, three private parties are served from taps to the Lime Saddle Penstock (PEA Errata C-2-26 to 28 Rev.1)

BUTTE CREEK BUNDLE 8		DESABLA REGIONAL BUNDLE	
FERC License No.	**FERC Expiration Date**	**Relicense Filing Date**	**FERC Relicensing Status**
Unlicensed (Coal Canyon)	NA	NA	NA

FERC License Area (acres)		**Watershed Lands (acres)**		**Total Acres**
Land Area	*Water Area*	*Contiguous Watershed Lands*	Associated Watershed Land	All Lands
0	0	10	1,088	1,098

Number of Generating Units	One (Coal Canyon)		
Normal Maximum Operating Capacity	0.9 MW		
Date Commissioned	1907		
Elevation of Facilities	474 to 984 ft msl	**Automatic Generation Control**	None
Reservoir Storage Capacity	None	**Average Energy Production**	6 GWh/year
Consumptive Water Uses	Municipal, Domestic, Irrigation	**Project Type**	Run of Canal

Location

The Coal Canyon Powerhouse is situated near the lower reaches of the West Branch Feather River (WBFR), downstream of the Lime Saddle Powerhouse and downstream of Hendricks Head Dam. The powerhouse is operated in conjunction with Pacific Gas and Electric Company's Lime Saddle powerhouse. The powerhouse is on private land adjacent to the lower Miocene Canal, east of the intersection of Highway 70 and Highway 191, and about seven miles northwest of Oroville in Butte County.

System Components/Facilities

The Middle Miocene Canal conveys water from the tailrace of the Lime Saddle Powerhouse to the Coal Canyon headworks. The headworks are at the top of the penstock, approximately 0.58 miles east of the powerhouse at approximately 824 feet above mean sea level. The header box transfers water from the Middle Miocene Canal to the penstock. The canal is regulated with a manually operated valve. Excess water diverted from the canal is directed to an unnamed creek adjacent to the Lime Saddle Powerhouse. The penstock consists of a 3,042-foot welded steel pipe, a portion of which is cement-lined. The penstock's diameter varies from 40 to 30 inches. The penstock splits just before entering the powerhouse. It has a total flow capacity of 45 cubic feet per second. The Coal Canyon Powerhouse is a single level, stone masonry building that is approximately 24 by 58 feet in size.

Summary of Water Rights and Water Purchases

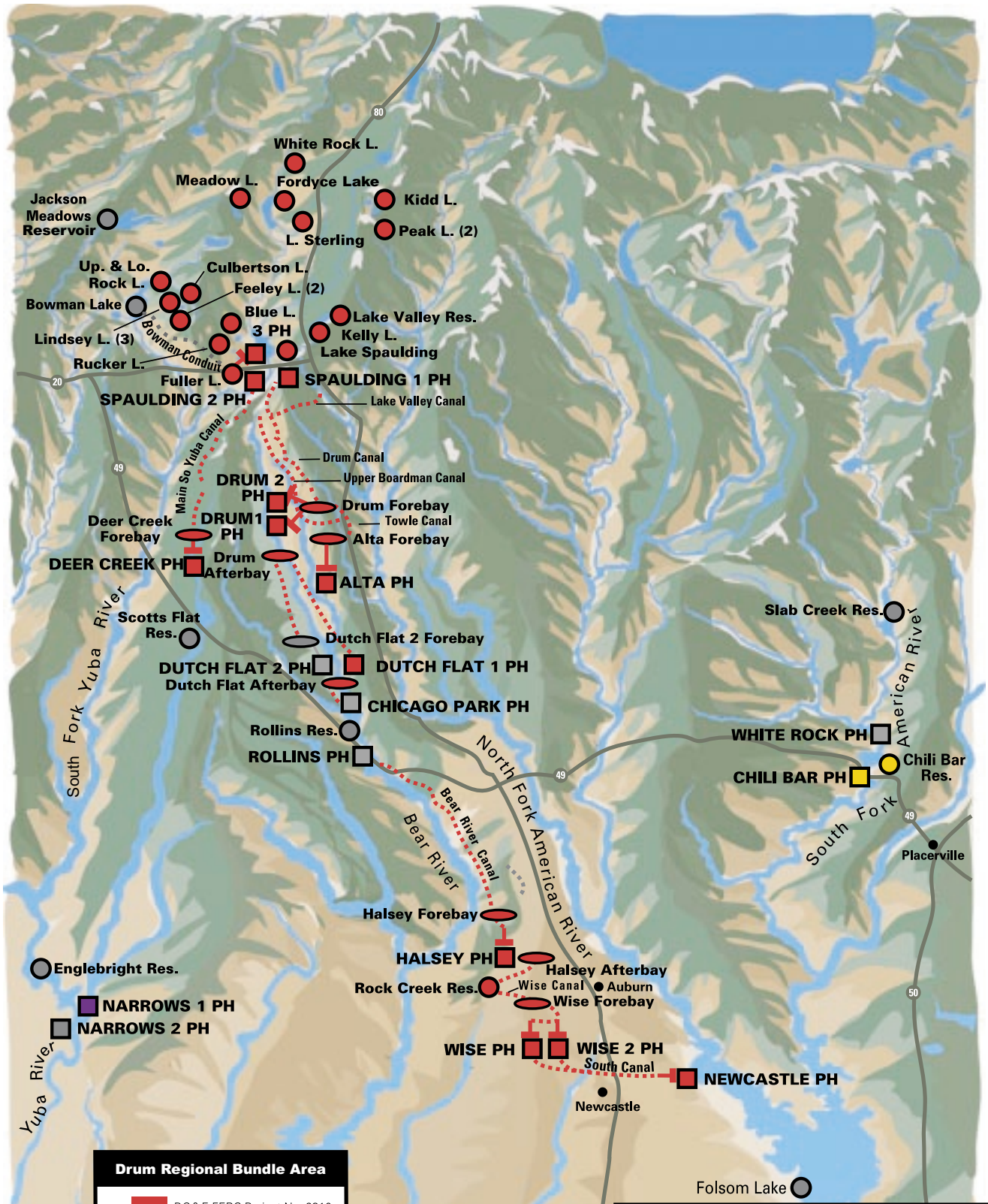
The Coal Canyon Powerhouse lies in the Sacramento River Basin, West Branch Feather River subbasin, as defined by the Central Valley Regional Water Quality Control Board.

Discharge from the powerhouse is delivered under contract to the California Water Service Co. via the Powers Canal (Lower Miocene) for municipal, domestic, and irrigation uses.

In addition, water is delivered from the Forebay and Lower Miocene Canal at various taps to 11 private parties for irrigation and domestic use under contracts with Pacific Gas and Electric Company. (PEA Errata, C-2-30 to C-2-32 Rev. 1).

2.8.3 DRUM REGIONAL BUNDLE

Pacific Gas and Electric Company proposes to auction 26,208 acres in the Drum Regional Bundle. The Drum Regional Bundle is made up of two geographically separated systems - the larger one located in the Sierra Nevada foothills, and a smaller system in the coastal range. The capacities and characteristics of the four FERC-licensed projects and the three service centers in the Drum Regional Bundle are summarized in Table 2-4, and are described in further detail on the data sheets that follow. The locations of the associated powerhouses and facilities are shown in Figures 2-21 to 2-24, which also show the types of real property interest that Pacific Gas and Electric Company holds in the lands proposed for ownership transfer.



Source: Pacific Gas & Electric Company, August 2000.

Hydrodivestiture EIR

Figure 2-21
Hydroelectric Developments on the Yuba, Bear, and American Rivers

Aspen Environmental Group

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Source: Pacific Gas & Electric Company, August 2000.

Hydrodivestiture EIR

Figure 2-22
Hydroelectric Developments on the Eel River and East Fork of Russian River

Aspen Environmental Group

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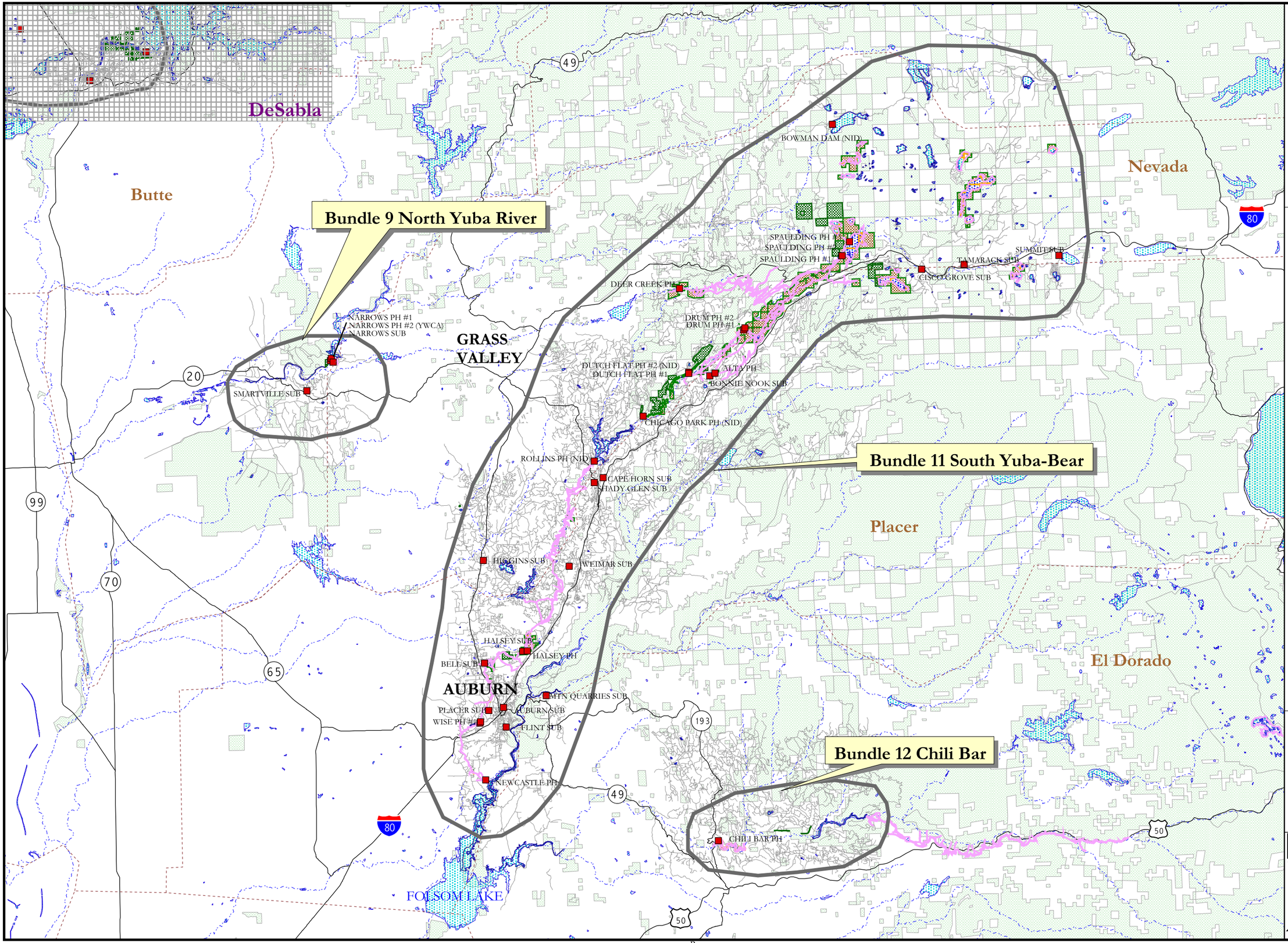

DISCLAIMER

1. "This map is not a survey of legal boundaries or a depiction of actual FERC boundaries. It should not be relied upon for such purpose. It is intended solely to be a visual depiction of such boundaries. The data used to prepare this map were compiled from multiple sources and varying levels of accuracy. Arbitrary adjustments have been made to FERC boundaries and the property line boundaries in order to provide a spatial dataset that is consistent with existing spatial data. While the map is believed to be an accurate depiction of the underlying data, Pacific Gas and Electric Company assumes no liability for any person's reliance upon this map for any reason."

2. "The FERC project boundaries and boundaries for Company fee land used in this report may not be accurate legal boundaries. The actual locations of any feature identified in this report would need to be surveyed in order to definitively determine whether the feature lies within or outside of Company fee land."

Source: Pacific Gas and Electric Company GIS Data Files; Ferc Boundary, Hydrology, Parcels, Public Lands; and EIP Associates GIS Program August 2000. GIS Data Projection: UTM Zone 10, NAD 83, Units Meters.

- FERC License Area
  - Water
  - Land
- Watershed Lands
  - Contiguous Land
  - Associated Land
- General Bundle Area
- State Highway
- Roads
- County Line
- Public Lands
- Powerhouses & Substations (Pacific Gas & Electric Company unless other owner identified)

Map Location Reference

N

5 0 5

Miles

Hydrodivestiture EIR

Figure 2 - 23

Drum Regional Bundle (Spaulding)

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Bundle 10 Potter Valley

Mendocino

Lake

WILLITS

UKIAH

POTTER VALLEY PH

PH

LSBURY

MENDOCINO LAKE

TULE LAKE

CLEAR LAKE

10 1

20

DISCLAIMER

1. "This map is not a survey of legal boundaries or a depiction of actual FERC boundaries. It should not be relied upon for such purpose. It is intended solely to be a visual depiction of such boundaries. The data used to prepare this map were compiled from multiple sources and varying levels of accuracy. Arbitrary adjustments have been made to FERC boundaries and the property line boundaries in order to provide a spatial dataset that is consistent with existing spatial data. While the map is believed to be an accurate depiction of the underlying data, Pacific Gas and Electric Company assumes no liability for any person's reliance upon this map for any reason."

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Source: Pacific Gas and Electric Company GIS Data Files; Ferc Boundary, Hydrology, Parcels, Public Lands; and EIP Associates GIS Program August 2000. GIS Data Projection: UTM Zone 10, NAD 83, Units Meters.

- FERC License Area
  - Water
  - Land
- Watershed Lands
  - Contiguous Land
  - Associated Land
- General Bundle Area
- State Highway
- Roads
- County Line
- Public Lands
- Powerhouses & Substations (Pacific Gas & Electric Company unless other owner identified)

Map Location Reference

N

1 0 1

Miles

Hydrodivestiture EIR

Figure 2 - 24

Drum Regional Bundle (Potter Valley)

Aspen Environmental Group

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Table 2-4 Drum Regional Bundle Facilities

Bundle	FERC Licenses and Powerhouses	No. of Units	Capacity (MW)	Reservoirs	Switching Centers		Service Centers	
					Existing	Proposed	Existing	Proposed
	DRUM WATERSHED REGION	21	218.2					
North Yuba River Bundle 9	**FERC 1403** Narrows No. 1	1	12	**FERC 1403** No reservoirs or dams owned by PG&E	**FERC 1403** Wise	**FERC 1403** (None)	**FERC 1403** Use of Auburn	**FERC 1403** (None)
Potter Valley Bundle 10	**FERC 0077** Potter Valley	3	9.2	**FERC 0077** Lake Pillsbury Van Arsdale Reservoir	**FERC 0077** Fulton [a]	**FERC 0077** (None)	**FERC 0077** (None)	**FERC 0077** (None)
South Yuba-Bear River Bundle 11	**FERC 2310** Spaulding No. 3 Spaulding No. 1 Spaulding No. 2 Deer Creek Drum No. 1 Drum No. 2 Dutch Flat No. 1 Alta Halsey Wise No. 1 Wise No. 2 Newcastle	1 1 1 1 4 1 1 2 1 1 1 1	5.8 7 4.4 5.7 54 49.5 22 2 11 14 3.1 11.5	**FERC 2310** Upper Rock Lake Lower Rock Lake Culbertson Lake Upper Lindsey Lake Middle Lindsey Lake Lower Lindsey Lake Upper and Lower Feeley Lake, Blue Lake, Rucker Lake / Fuller Meadow Lake, White Rock Lake, Fordyce Lake Lake Sterling, Kidd Lake, Upper Peak Lake, Lower Peak Lake, Lake Spaulding Kelley Lake Lake Valley Reservoir Drum Forebay Drum Afterbay Alta Forebay Deer Creek Forebay Halsey Forebay Halsey Afterbay Rock Creek Reservoir Wise Forebay	**FERC 2310** Drum, Wise	**FERC 2310** Drum, Wise	**FERC 2310** Alta, Use of Auburn, Bear Valley, Rock Creek Yard	**FERC 2310** Alta, Use of Auburn, Bear Valley, Rock Creek Yard[b]
Chili Bar Bundle 12	**FERC 2155** Chili Bar	1	7	**FERC 2155** Chili Bar Reservoir	**FERC 2155** Wise	**FERC 2155** (None)	**FERC 2155** Use of Auburn	**FERC 2155** (None)

Source: PG&E Co., 1999b

a Pacific Gas and Electric Company is planning to transfer the switching center functions for Potter Valley from the Fulton Switching Center to the Wise Switching Center.

b The Bear Valley and Rock Creek Yard Service Centers will be transferred to the new owner of the South Yuba-Bear River Bundle, subject to a Shared Service Center Lease Agreement with Pacific Gas and Electric Company.

NORTH YUBA RIVER BUNDLE 9		DRUM REGIONAL BUNDLE		
FERC License No.	**FERC Expiration Date**	**Relicense Filing Date**	**FERC Relicensing Status**	
1403 (Narrows No. 1)	01/31/2023	01/31/2021	Mid-term	
FERC License Area (acres)		**Watershed Lands (acres)**		**Total Acres**
Land Area	*Water Area*	*Contiguous Watershed Lands*	Associated Watershed Land	All Lands
23	0	0	41	64

Number of Generating Units	One (Narrows No. 1)		
Normal Maximum Operating Capacity	12.0 MW		
Date Commissioned	1942		
Elevation of Facilities	287 to 527 ft msl	**Automatic Generation Control**	None
Reservoir Storage Capacity	45,000 af *	**Average Energy Production**	44 GWh/year
Consumptive Water Uses	None	**Project Type**	Storage w/conveyance

Location

The Narrows No. 1 Powerhouse is on the southeast bank of the Yuba River, downstream of the convergence of the South and North Yuba Rivers, about 12 miles west of Grass Valley in Nevada County.

System Components/Facilities

Pacific Gas and Electric Company constructed a tunnel that taps into the U.S. Army Corps of Engineers (USACE) Englebright Reservoir diversion tunnel. Pacific Gas and Electric Company's 1,609-foot tunnel leads to the Narrows No. 1 penstock. The tunnel segments of 9-foot horseshoe, 11-feet x 12-feet rectangular and 8-foot diameter circular cross section and lining composed of segments of concrete and gunite. The tunnel is approximately 440 feet above mean sea level. The penstock conveys water from the pressure tunnel northeast of the powerhouse, and terminates at the butterfly turbine shut-off valve above the scroll case of the powerhouse turbine. The welded and riveted steel penstock is 271 feet long, and has a 96-inch diameter. It has a total flow capacity of 730 cubic feet per second (cfs). The Narrows No. 1 Powerhouse is a steel-framed, concrete, tri-level building.

Summary of Water Rights and Water Purchases

The Narrows Project utilizes water stored in the Englebright Reservoir for hydroelectric generation. Water storage and diversion facilities owned and operated by the Yuba County Water Agency (YCWA) and USACE regulate water flow from the North, Middle, and South Yuba Rivers that converges at the Englebright Reservoir. Narrows Project operation is coordinated with those of the YCWA, who operate the Colgate and Narrows 2 powerhouses within the Yuba River basin.

Pacific Gas and Electric Company relies upon a licensed water right to store up to 45,000 acre-feet of water in Englebright Reservoir, and to divert 700 cfs for power generation at Narrows No. 1 Powerhouse. Pacific Gas and Electric Company also claims a riparian water right for up to 740 cfs of water diverted into the Narrows No. 1 Tunnel for power generation at Narrows No. 1 Powerhouse. Also, pursuant to an Agreement dated January 22, 1990, with Yuba County Water Agency, Pacific Gas and Electric Company agrees to pay for water for generation that otherwise would have been diverted for consumptive purposes above Narrows No. 1 Powerhouse.

* Pacific Gas and Electric Company's share of storage in Englebright Reservoir.

POTTER VALLEY BUNDLE 10		DRUM REGIONAL BUNDLE		
FERC License No.	**FERC Expiration Date**	**Relicense Filing Date**	**FERC Relicensing Status**	
0077 (Potter Valley)	04/14/2022	04/14/2020	License condition under review	
FERC License Area (acres)		**Watershed Lands (acres)**		**Total Acres**
Land Area	*Water Area*	*Contiguous Watershed Lands*	Associated Watershed Land	All Lands
725	1,560	1,674	3,423	7,382

Number of Generating Units	Three (Potter Valley)
Normal Maximum Operating Capacity	9.2 MW
Date Commissioned	1908

Elevation of Facilities	1,828 to 1,015 ft msl	**Automatic Generation Control**	None
Reservoir Storage Capacity	80,946 af	**Average Energy Production**	52 GWh/year
Consumptive Water Uses	Irrigation and Domestic	**Type of Project**	Storage w/conveyance

Location

The Potter Valley Project is located primarily on the Eel River, a coastal river in northern California that lies in Lake, Mendocino, and Humboldt Counties. The Potter Valley Powerhouse is adjacent to Adobe Creek, with facilities in the Mendocino Mountain Range, approximately 90 miles north of Santa Rosa. The powerhouse discharges water to the Russian River drainage basin, making an interbasin transfer.

System Components/Facilities

Water storage for the project is provided by 80,556 af Lake Pillsbury- formed by Scott Dam, located across the Eel River Canyon at the lower end of the Gravelly Valley. Scott Dam is a concrete gravity overflow dam that consists of a Cyclopean concrete-ogee gravity section with a spill crest at 1,818.3 feet. Water released from Lake Pillsbury flows approximately 12 miles down the Eel River to Van Arsdale Reservoir. Van Arsdale Reservoir, formed on the Eel River by Cape Horn Dam, serves as a forebay to the Potter Valley Powerhouse. The reservoir has a usable storage capacity of 390 acre-feet (af) and a surface area of approximately 65 acres. It is operated as a diversion point; its storage capacity is typically not used for powerhouse operation. Cape Horn Dam is composed of a concrete gravity flow section across the Eel River, and an earth-fill with concrete core at the right abutment with crest elevation at 1,516.8 feet. The Potter Valley Tunnel intake structure is on the south bank of Van Arsdale Reservoir, approximately 400 feet upstream of Cape Horn Dam. It connects the reservoir to the Potter Valley Tunnel. The intake is equipped with a trash rake to remove debris, a fish screen, and a slide gate to stop water flow in the tunnel. In 1995, Pacific Gas and Electric Company completed the installation of a new state-of-the-art fish screen at the intake replacing an earlier screen that was disfunctional.

The Potter Valley Tunnel originates at the intake structure and consists of two tunnels in series. The two semi-buried penstocks convey water to the powerhouse. They have a total flow capacity of 331 cubic feet per second (cfs). The 5,826-foot-long Tunnel No. 1 and the 807-foot-long Tunnel No. 2 are interconnected by above ground sections of riveted steel pipe, and include a sand trap. Tunnel #1 is trapezoidal, 7'-2" high, 6 feet wide at the bottom and 5 feet wide at the top. Tunnel #2 is circular, with a diameter of 7' to 7'-4". The Potter Valley Powerhouse is a single-story, steel-framed structure. The tailrace channel conveys water from the powerhouse to Adobe Creek, a tributary of the East Fork of the Russian River. It is partially man-made, partially natural, and is approximately 6,420 feet long.

Summary of Water Rights and Water Purchases

Power generation is the primary water use of the Potter Valley Project; however, irrigation and domestic water, recreation, and fish habitat are also provided.

Pacific Gas and Electric Company relies upon licensed water rights for 102,366 af of water collected and stored in Lake Pillsbury for power generation and fish and wildlife uses, and on pre-1914 rights for 1,457 af of water stored in Van Arsdale Reservoir (the forebay to the Potter Valley Powerhouse) for power generation, irrigation, and domestic purposes. Pacific Gas and Electric Company has pre-1914 water rights for 340 cfs of water diverted into the Potter Valley Tunnel that feeds the Potter Valley Powerhouse for power generation and irrigation purposes. Pacific Gas and Electric Company relies on two licensed rights for the storage of 4,500 and 4,908 af of water in Lake Pillsbury and for the direct diversion of 40 cfs for water delivered to Potter Valley Irrigation District for irrigation uses.

SOUTH YUBA-BEAR RIVER BUNDLE 11	DRUM REGIONAL BUNDLE

FERC License No.	FERC Expiration Date	Relicense Filing Date	FERC Relicensing Status
2310 (Spaulding 1, 2 and 3, Deer Creek, Drum 1 and 2, Dutch Flat 1, Alta, Wise 1 and 2, Halsey, Newcastle)	05/01/2013	05/01/2011	Mid-term

FERC License Area (acres)		Watershed Lands (acres)		Total Acres
Land Area	*Water Area*	*Contiguous Watershed Lands*	Associated Watershed Land	All Lands
1,374	2,141	11,258	3,764	18,537

Number of Generating Units	Sixteen (Spaulding No.3: One; Spaulding No.2: One; Deer Creek: One; Alta: Two; Spaulding No. 1: One; Drum No.1: Four; Drum No. 2: One; Dutch Flat No. 1: One; Halsey: One; Wise No. 1: Two; Wise No. 2: One; Newcastle: One)
Normal Maximum Operating Capacity	190.0 MW
Date Commissioned	Spaulding No.3: 1929; Spaulding No. 2: 1920, rebuilt 1928, Deer Creek: 1908; Alta: 1955-56; Spaulding No.1: 1920, rebuilt 1928; Drum No. 1: 1913; Drum No.2: 1965; Dutch Flat No. 1: 1943; Halsey: 1916; Wise No. 1: 1917; Wise No. 2: 1986; Newcastle: 1986

Elevation of Facilities	435 to 7,820 ft msl	**Automatic Generation Control**	None
Reservoir Storage Capacity	151,264 af	**Average Energy Production**	786 GWh/year
Consumptive Water Uses	Irrigation, Municipal, Domestic, Public Service, Industrial	**Type of Project**	Storage w/conveyance

Location

The Drum-Spaulding Project extends from the crest of the central Sierra Nevada Mountains to Auburn, California, covering an elevational range from 400 to 8,000 feet. The hydraulically linked facilities are within the Yuba River, Bear River, Deer Creek, and American River basins. The uppermost powerhouse, Spaulding No. 3 Powerhouse is on the northwest shore of Lake Spaulding, and is approximately 39 miles northeast of Auburn in Placer County. The Spaulding No. 1 and Spaulding No. 2 Powerhouses, also at Lake Spaulding, are on the South Yuba River, about 38 miles northeast of Auburn in Placer County. The Deer Creek Powerhouse is on the South Fork of Deer Creek, about 14 miles east of Nevada City in Nevada County. The Drum 1 and Drum 2 Powerhouses are on the Bear River, and are about 29 miles northeast of Auburn in Placer County. The Alta Powerhouse is on a tributary to the Bear River, near Alta in Placer County. The Dutch Flat 1 Powerhouse is on the Bear River, and is most readily accessed via the town of Dutch Flat off Interstate 80, about 25 miles northeast of Auburn in Placer County. The Halsey Powerhouse is east of Interstate 80 in Placer County. The Wise 1 and Wise 2 Powerhouses are adjacent to South Canal off Interstate 80, in Auburn in Placer County. The Newcastle Powerhouse is on the shore of Folsom Lake near Auburn in Placer County.

System Components/Facilities

The Drum-Spaulding Project consists of 12 interconnected facilities.

Spaulding 3 Powerhouse (5.8 MW): Upstream of the Spaulding 3 headworks are 11 storage lakes: Upper and Lower Rock Lakes, Culbertson Lake, Upper, Middle, and Lower Lindsey Lakes, Upper and Lower Feeley Lakes, Blue Lake, Rucker Lake, and Fuller Lake. These lakes are remotely located in the Texas and Fall Creek drainages at 5,343 to 6,724 feet above mean sea level (msl). All are natural lakes that have had their usable storage capacity increased by earth and rock-filled dams. Only dirt roads lead to the lakes. Upper Rock Lake has a usable storage capacity of 207 acre-feet (af), a surface area of 21 acres, and an earth-fill with rock-wall dam with a 17-foot-high and 214-foot-long dam crest. Lower Rock Lake has a usable storage capacity of 48 af, surface area of nine acres, and an earth- or rock-filled dam with a 10-foot-high and 110-foot-long dam crest. Culbertson Lake has a usable storage capacity of 953 af, surface area of 70 acres, and a earth- or rock-filled with gunite face dam with a 20-foot-high and 255-foot-long dam crest. Upper Lindsey Lake has a usable storage capacity of 18 af, a surface area of six acres, and an earth-fill with rock wall dam with an eight-foot-high and 90-foot-long dam crest. Middle Lindsey Lake has a usable storage capacity of 110 af, a surface area of 24 acres, and an earth and rock-fill granite faced dam 8 feet high with a 335-foot crest length. Lower Lindsey Lake has a usable storage capacity of 293 af, a surface area of 29 acres, and an earth and rock wall with gunite face dam with a 16-foot-high and 487-foot-long dam crest. Upper Feeley has a usable storage capacity of 289 af, a surface area of 56 acres, and an earth- and rock-filled dam with a 23-foot-high and 210-foot-long dam crest. Lower Feeley Lake has a usable storage capacity of 150 af, a surface area of 17 acres, and an earth and rock-filled dam 19 feet high with a crest length of 185 feet. Blue Lake has a usable storage capacity of 1,163 af, a surface area of 69 acres, and an earth-fill rock wall dam with a 21-foot-high and 620-foot-long dam crest. Rucker Lake has a usable storage capacity of 648 af, a surface area of 63 acres, and an earth-fill rock wall dam with a 21-foot-high and 282-foot-long dam crest. Fuller Lake has a usable storage capacity of 1,127 af, a surface area of 69 acres, and an earth- and rock-fill with gunite face dam with a 39-foot-high and 410-foot-long dam crest.

The Bowman-Spaulding Canal (operated by the Nevada Irrigation District [NID] under a separate FERC license) conveys water to the Spaulding 3 headworks. A 1,615-foot-long, riveted steel penstock conveys water from the header box to the powerhouse. The penstock has a 66-inch diameter, and it terminates at the 60-inch-diameter butterfly valve above the scroll case of the powerhouse turbine. It has a flow capacity of 270 cubic feet per second

(cfs). The Spaulding 3 Powerhouse is a single-level (excluding the turbine level), steel-frame and concrete-wall structure, approximately 70 by 48 feet in size.

Spaulding 1 and 2 Powerhouses (7.0 MW and 4.0 MW, respectively): Seven storage lakes located in the upper reaches of the Yuba River and Fordyce Creek feed into Lake Spaulding. Lake Spaulding is the primary storage lake for the powerhouses and other downstream powerhouses in the watershed. These storage lakes include Lake Fordyce, Kidd Lake, Upper and Lower Peak (Cascade) Lakes, Lake Sterling, White Rock Lake, and Meadow Lake. These lakes are remotely located in the Fordyce Creek and South Yuba River drainages at 6,402 to 7,818 feet above msl. All except Lake Fordyce are natural lakes that have had their usable storage capacity increased by earth- and rock-fill dams. Lake Fordyce has a usable storage capacity of 49,903 af, a surface area of 772 acres, and a rock-fill with concrete face dam with a 145-foot-high and 1,220-foot-long dam crest. Kidd Lake has a usable storage capacity of 1,505 af, a surface area of 86 acres, and two earth- and rock-fill gunite faced dams with a 35- and 15-foot-high and 449- and 617-foot-long, respectively, dam crest. Upper Peak Lake has a usable storage capacity of 1,736 af, a surface area of 85 acres, and an earth- and rock-fill dam with a 39-foot-high and 316-foot-long dam crest. Lower Peak Lake has a usable storage capacity of 484 af, a surface area of 33 acres, and two earth- and rock-filled with gunite face dams with a 31- and nine-foot-high and 200- and 410-foot-long, respectively, dam crest. Lake Sterling has a usable storage capacity of 1,764 af, a surface area of 112 acres, and a rock with gunite face dam with a 32-foot-high and 228-foot-long dam crest. White Rock Lake has usable storage capacity of 570 af, a surface area of 90 acres, and an earth-fill with rock wall dam with a 13-foot-high and 374-foot-long dam crest. Meadow Lake has a usable storage capacity of 4,841 af, a surface area of 250 acres, and an earth-fill rock wall granite-face dam 38 feet high and 940 feet long at the crest.

Lake Spaulding encompasses about 698 acres and has a usable storage capacity of 74,773 af. Five dams impound water to form the lake. No. 1 Dam is the primary dam, and is located near the powerhouses. It is a concrete arch type having a crest length of 800 feet and a maximum height of 276 feet. A sluice pipe with a gate valve is located at the base of the No. 1 Dam. No. 2 Dam is a concrete gravity dam with a crest length of 309 feet and a height of 42 feet. Nos. 3, 4 and 5 Dams are contiguous, spanning a total crest length of 813 feet across three separate gaps, with a maximum height of 91 feet occurring at No. 4 Dam. These dams are concrete buttress-type dams. A 963-foot-long concrete-lined tunnel is the primary water conveyance structure from Lake Spaulding to the powerhouses. The tunnel has an 8.7-foot diameter, and a flow capacity of 750 cfs. Upper and lower intakes, upstream of the dam's south abutment, each have a 72-inch-diameter underground butterfly valve that is used for maintenance, emergency, and some operational purposes. A 4.5-foot-diameter concrete-lined tunnel branches from the larger tunnel and travels 188 feet to the Spaulding 2 Powerhouse penstock. The penstock for Spaulding 1 Powerhouse is the tunnel from Lake Spaulding, cemented into the tunnel at its portal on the northeast wall of the powerhouse cavern. Two large, bypass relief valves are located between the penstock and turbine for the Spaulding 1 Powerhouse. The penstock for Spaulding 2 Powerhouse is 233 feet long, 4.5 feet in diameter, and passes through a valve house just north of the Spaulding 1 Powerhouse. The total flow capacities for Penstocks 1 and 2 are 550 and 200 cfs, respectively. The Spaulding 1 and 2 Powerhouses are reinforced concrete structures. The Spaulding 1 Powerhouse is uphill and southeast of the Spaulding 2 Powerhouse. Because the powerhouses are adjacent to each other and share electrical transformers and circuit breakers, they essentially function as one powerhouse. The Spaulding 1 Powerhouse is partially built in a rock cavern cut into the side of a cliff. The Spaulding 2 Powerhouse is accessed by a covered tramway from the Spaulding 1 Powerhouse.

Deer Creek Powerhouse (5.7 MW): The Main South Yuba and Chalk Bluff Canals combine to convey water to the powerhouse. The Main South Yuba Canal is a 15.71-mile-long combination of open ditch, U-shaped steel flume, tunnel, and pipe canal. It conveys water from Spaulding 2 Tailrace and South Fork Yuba River. The Chalk Buff Canal is a 3.24-mile-long open ditch and flume/pipe canal. It conveys water from the main South Yuba Canal to the Deer Creek Forebay. The Deer Creek Forebay, about one mile east of the powerhouse, has a usable storage capacity of 15.7 af and a surface area of three acres at 4,473 feet above msl. A penstock intake building, at the western end of the forebay, controls the water flow into a 5,589-foot-long steel penstock that gradually, and then steeply, descends to the powerhouse. The penstock has a total flow capacity of 110 cfs. The Deer Creek Powerhouse is a concrete-reinforced, single-level building, situated immediately northeast of Little Deer Creek.

Drum 1 and 2 Powerhouses (54 MW and 49.5MW, respectively): Kelly Lake and Lake Valley Reservoir store water for the powerhouses in addition to Lake Spaulding and its upstream reservoirs. Kelly Lake has a usable storage capacity of 336 af, a surface area of 26 acres, and an earth-fill, gunite face dam with a 23-foot-high and 448-foot-long dam crest. Lake Valley Reservoir has a usable storage capacity of 7,964 af, a surface area of 298 acres, and an earth-fill dam with a 75-foot-high and 1,035-foot-long dam crest. The Lake Valley and Drum Canals combine to convey water to the powerhouses. Lake Valley Canal is a 2.4-mile-long combination of lined and unlined ditch, flume and pipe canal. It conveys water from the North Fork of the North Fork American River (NFNFAR) to the Drum Canal. The Drum Canal is a 9.1-mile-long combination of open ditch, flume, tunnel, and pipe canal. It conveys water from the Spaulding 1 Tailrace to the Drum Forebay.

The Drum Forebay is about one mile southeast of the powerhouses at 4,762 feet above msl. It regulates the water delivered by the Drum Canal to the penstocks. An earth-filled embankment with a maximum height of 65 feet and a crest length of about 4,107 feet creates the forebay, with a usable storage capacity of 621 af and a surface area of 23 acres. Water is released through a natural waterway on the forebay's southern shore to Canyon Creek, a source of water for the Alta Hydroelectric Generating Facility. Three penstocks combine to deliver water to the powerhouses. For Drum 1, two penstocks are 6,272 feet long with diameters of 72 to 53 inches. The two Drum 1 penstocks are made of riveted steel with a total flow capacity of 643 cfs. The Drum 2 penstock is a 5,798-foot-long penstock with a diameter 84 to 60 inches. It is a steel penstock with a Dresser type coupling, and has a flow capacity of 505 cfs. The Drum 1 and 2 Powerhouses are reinforced concrete structures. The Drum 1 Powerhouse is a tri-level building, and the Drum 2 Powerhouse is a multi-level building just east of the Drum 1 Powerhouse. The Drum 1 Powerhouse is the switching center for the upper Drum-Spaulding powerhouses, including the three Spaulding, Drum 2, Dutch Flat 1, Deer Creek, and Alta powerhouses.

Alta Powerhouse(2 MW): Water is released from the Drum Forebay into Canyon Creek, and is then diverted into Towle Canal. The Towle Canal conveys water to the Alta Powerhouse. The canal is 3.88 miles long, and consists of 3.28 miles of unlined and gunite-lined ditch and 0.6 miles of flume and pipe. The canal's maximum capacity is 42 cfs. Alta Forebay is approximately one mile east of the powerhouse. It has a usable storage capacity of 29 af, and a surface area of five acres at 4,240 feet above msl. A penstock intake building, at the western end of the forebay, controls the water flow into the penstock. The Placer County Water Agency (PCWA) maintains a water treatment building and two water storage tanks adjacent to the forebay. The 5,383-foot-long, steel penstock gradually descends to the powerhouse. It has a total flow capacity of 56 cfs. The penstock shutoff valves are hydraulically actuated by pressurized water from the penstock. The Alta Powerhouse is an unreinforced stone masonry, single-level building.

Dutch Flat 1 Powerhouse (22.0 MW): The Dutch Flat Afterbay, adjacent to the powerhouse, was built and is operated by the NID, and is not included in the FERC boundary. The forebay (also referred to as the Drum Afterbay) is on the Bear River below the Drum 1 and 2 Powerhouses. It has a usable storage capacity of 341 af, and a surface area of 10 acres at 3,383 feet above msl. The forebay is formed by a concrete arch dam that is 102 feet high, has a 356-foot crest length, and a base width of 18 feet. Water is conveyed to the powerhouse through a tunnel and then a penstock. The tunnel is approximately 4.1 miles long, and has a capacity rating of 475 cfs. Unlined segments of the tunnel are square-shaped, and measure 12 feet wide by 12 feet tall. Concrete-lined segments of the tunnel are either circular or horseshoe shaped, with a diameter of nine feet. A 3,640-foot-long, welded-steel penstock steeply descends along a straight alignment to the powerhouse. It has a total flow capacity of 490 cfs. The Dutch Flat 1 Powerhouse is a reinforced concrete tri-level building.

Halsey Powerhouse (110 MW): The Bear River Diversion Dam, which diverts water from the Bear River into the Bear River Canal, is downstream of the Rollins Reservoir Dam and Powerhouse operated by NID (part of FERC 2266). Water is retained at the diversion in a reinforced-concrete sand settler. At the lower end of the settler, water flows over a weir into either the Bear River or through the diversion gate into the Bear River Canal. The Bear River Canal conveys water from the diversion dam to the forebay. The canal is approximately 22.7 miles long, and consists of 20.7 miles of ditch, 0.7 mile of flume, and 1.3 miles of tunnel. The canal's maximum transport capacity is 490 cfs. The Halsey Forebay is created by two earth-filled dams, and regulates water from the Bear River Canal to the penstock. The forebay has a usable capacity of approximately 240 af and an approximate surface area of 18 acres. The penstock is approximately 5,472 feet long, and consists of an 8-foot diameter concrete-lined tunnel and a 96" to 72" diameter riveted steel pipe. It has a total flow capacity of 495 cfs. The Halsey Powerhouse is a concrete-reinforced, single-level building. The powerhouse empties into the afterbay. A rock-fill dam constructed between 1913 and 1916 created the Halsey Afterbay, also known as Christian Valley Reservoir. The afterbay has a usable storage capacity of 96 af and a surface area of approximately ten acres. Water is discharged from the afterbay to the Wise Canal through a steel pipe controlled by a slide gate.

Wise 1 and 2 Powerhouses (14.0 MW and 3.2 MW, respectively): The Wise Canal carries water from the Halsey Afterbay to the Wise Forebay. The canal is approximately six miles long and consists of approximately 4.9 miles of ditch, 0.1 miles of flume, 0.8 miles of tunnel, and 0.2 miles of natural, unlined cannel. The canal's capacity is 488 cfs. Water can be diverted from the canal, around Rock Creek Lake, into the Rock Creek Diversion, which empties into Middle Fiddler Green Canal (for use by the PCWA) and eventually into the Wise forebay. Middle Fiddler Green and Rock Creek Diversion are not part of the FERC project boundary. Rock Creek Lake was created by three dams (a multiple-arch, concrete dam and two auxiliary earth-fill dams) to regulate flow in the Wise Canal. The lake has a storage capacity of about 548 af and a surface area of 55 acres. The Wise Forebay, retained by an earth-fill dam, is used to regulate the flow entering the Wise 1 Penstock. It has a designed storage capacity of about 32 af, and floods an area of approximately eight acres. Water can also be directed to the PCWA for irrigation or domestic purposes. The Wise 1 and 2 Penstocks deliver water to the Wise 1 and 2 Powerhouses. The Wise 1 Penstock is a 1.6-mile-long riveted steel pipe (including 436 feet of 8' diameter tunnel) with a diameter 96" to 66". It has a total flow capacity of 393 cfs. The Wise 2 Penstock is a 1,362'-long welded steel penstock with Dresser-type couplings that taps into the Wise 1 penstock upstream of the powerhouses. The penstock has a diameter of 60 and 30 inches, and a total flow capacity of 80 cfs. The Wise 1 Powerhouse is a concrete-reinforced, single-level building. The main floor of the powerhouse is 97 by 44 feet, and houses the generation unit. The Wise 2 Powerhouse is a concrete, single-level facility. They both contain a single horizontal Francis-type turbine and generator. The tailraces from the Wise 1 and Wise 2 Powerhouses discharge directly into the South Canal. The Wise 1 Powerhouse is the switching center for the lower elevation powerhouses in the Drum Watershed, including Wise 2, Newcastle, Halsey, Narrows 1, and Chili Bar powerhouses. The facility is operated in close coordination with the NID and PCWA systems. Both the NID and PCWA receive water for domestic and irrigation use from numerous delivery points along the project's extensive canal and water conduit system.

Newcastle Powerhouse (11.5 MW): The South Canal conveys water from the Wise 1 and 2 Powerhouse tailraces to the penstock intake structure for the Newcastle Powerhouse. The canal is 6.7 miles long, and consists of 4.1 miles of ditch, 0.4 miles of flume, one mile of tunnel, and 1.1 miles of natural waterway. Water from the South Canal can be diverted three ways at the penstock headworks: to the penstock, to the PCWA for irrigation or domestic water use, and to the South Canal Spill Channel, where a constant minimum flow is required as part of the FERC license agreement for fish habitat maintenance (fish release). The penstock intake structure controls water intake from the South Canal into the penstock. The penstock carries water from the intake structure to the powerhouse turbine. The penstock is approximately 1.1 miles long, and has a diameter of 84" to 60". The upper 4,670 ft of the penstock is concrete pipe and the remainder is steel. It has a total flow capacity of 392 cfs. The Newcastle Powerhouse is a multi-level, reinforced concrete and steel building.

Service Centers: There are three additional service centers for the South Yuba-Bear River Bundle. The Alta Service Center, approximately one acre, is located in an unincorporated area of Placer County about 25 miles east of Auburn. It currently serves the Pacific Gas and Electric Company water crews that maintain the South Yuba-Bear River Bundle. The service center is on Bowman Lake Road, adjacent to the Sierra Discovery Trail near Highway 20 in Placer County. The facility serves as a seasonal camp for Pacific Gas and Electric Company's hydroelectric operations for construction activities in the

high country during the summer months between May and October, and seasonal support for electric transmission and distribution operations. The Rock Creek Yard Service Center is located on a 12-acre parcel on Canal Street in the City of Auburn, near State Highway 49 in Placer County. It is adjacent to the Wise Canal. The service center is currently used by Pacific Gas and Electric Company's hydroelectric personnel and distribution personnel.

Summary of Water Rights and Water Purchases

Water uses associated with the Drum-Spaulding Project are primarily non-consumptive storage and power generation; however, the water is also used to support recreation, aquatic habitat, and wildlife habitat. The available water supply is optimized to meet the demand for both domestic and irrigation purposes.

Pacific Gas and Electric Company relies upon pre-1914 and licensed water rights to store water in 20 lakes and reservoirs. Pacific Gas and Electric Company relies upon pre-1914, licensed, permitted and prescriptive water rights for water diverted for power generation at the Yuba/Bear River Powerhouses (Spaulding 1, 2, and 3, Deer Creek, Drum 1 and 2, Alta, Dutch Flat 1, Halsey, Wise 1 and 2, and Newcastle). Pacific Gas and Electric Company also maintains miscellaneous water rights for irrigation, municipal, domestic, public service, and industrial users, including rights used by PCWA. In addition, some of the water used by Pacific Gas and Electric Company to generate power at the powerhouses covered by FERC Project 2310 is delivered to Pacific Gas and Electric Company by the NID for delivery by PPA to the NID at diversion points downstream. Pacific Gas and Electric Company benefits from these deliveries and from water rights held by the NID to generate power at both Pacific Gas and Electric Company and NID facilities (which Pacific Gas and Electric Company operates pursuant to a PPA with the NID). Similarly, the NID benefits from water deliveries from Pacific Gas and Electric Company pursuant to water rights held by Pacific Gas and Electric Company. As a result, Pacific Gas and Electric Company and the NID have entered into several agreements coordinating water operations and the delivery of water to Pacific Gas and Electric Company and the NID, including the Consolidated Contract for Water Diversion and Power Purchase dated July 12, 1963, and subsequent amendments.

CHILI BAR BUNDLE 12		DRUM REGIONAL BUNDLE	
FERC License No.	**FERC Expiration Date**	**Relicense Filing Date**	**FERC Relicensing Status**
2155 (Chili Bar)	7/31/2007	7/31/2005	Notice of Intent will be filed 2002; New license expected 7/2007

FERC License Area (acres)		**Watershed Lands (acres)**		**Total Acres**
Land Area	*Water Area*	*Contiguous Watershed Lands*	Associated Watershed Land	All Lands
126	67	8	24	225

Number of Generating Units	One (Chili Bar)		
Normal Maximum Operating Capacity	7.0 MW		
Date Commissioned	1965		
Elevation of Facilities	936 to 996 ft msl	**Automatic Generation Control**	None
Reservoir Storage Capacity	3,139 af	**Average Energy Production**	34 GWh/year
Consumptive Water Uses	None	**Type of Project**	Run-of-the-River

Location

The Chili Bar Project is on the South Fork American River in El Dorado County. It is approximately three miles north of Placerville, and can be accessed from Highway 193.

System Components/Facilities

Chili Bar Reservoir has a usable storage capacity of 3,139 acre-feet. Chili Bar Dam is a concrete gravity dam, with a maximum height of approximately 120 feet, and a crest length of about 375 feet. A spillway is near the center of the dam. Water enters the powerhouse through a penstock at the north base of the Chili Bar Dam. The penstock has a total flow capacity of 1,500 cubic feet per second. The penstock and bypass pipe-intake gate controllers are on the dam. The Chili Bar Powerhouse, a concrete-reinforced, tri-level building, is at the base of the Chili Bar Dam. The size of the powerhouse is 70 by 65 feet.

Summary of Water Rights and Water Purchases

The primary use of water associated with the Chili Bar Project is power generation.

Pacific Gas and Electric Company relies upon a claim of riparian water rights to operate the Chili Bar Powerhouse. In addition, Pacific Gas and Electric Company also shares several licensed water rights with Sacramento Municipal Utility District (SMUD) for power generation at the Chili Bar Powerhouse and the SMUD powerhouses.

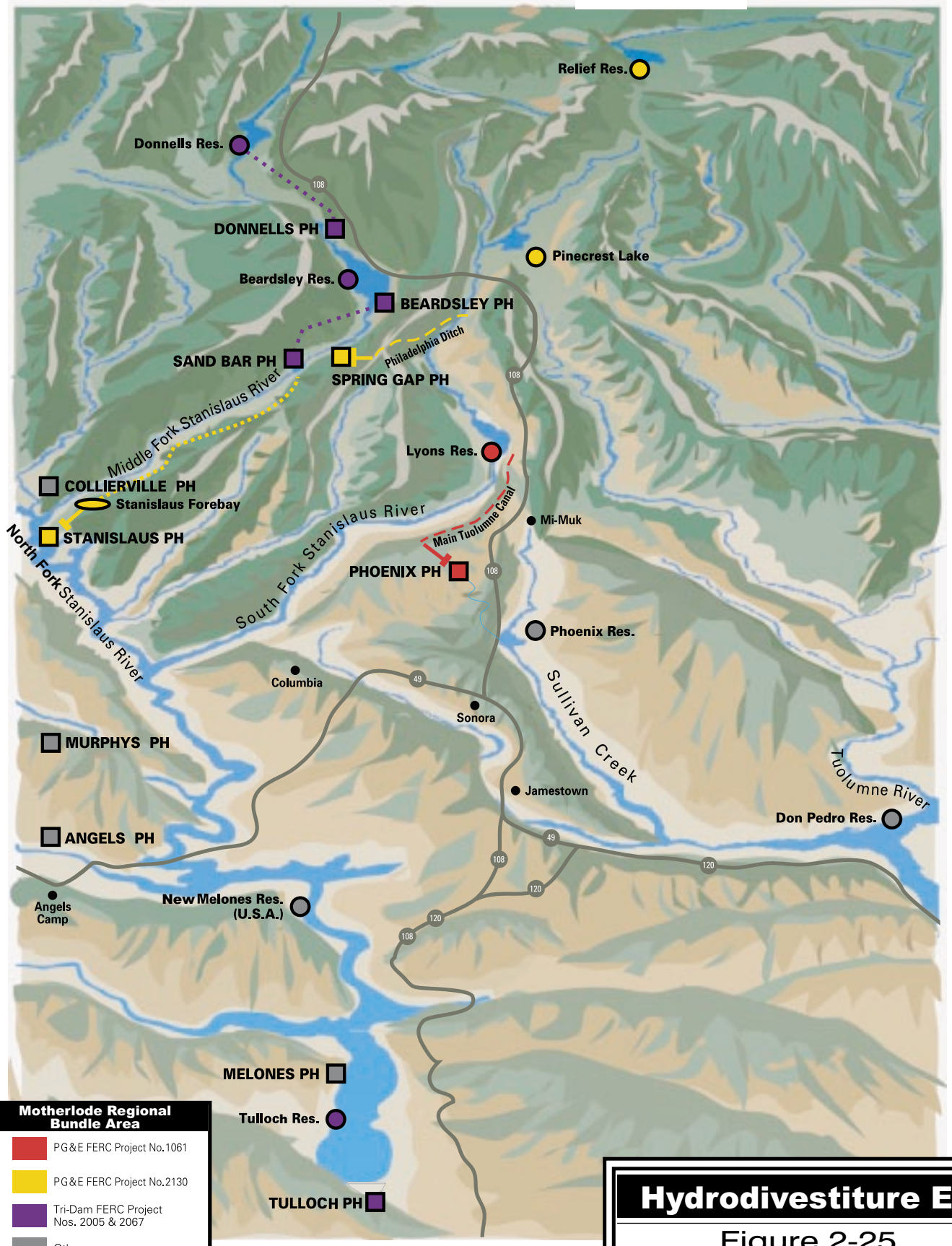
2.8.4 MOTHERLODE REGIONAL BUNDLE

Pacific Gas and Electric Company proposes to auction 9,051 acres in the Motherlode Regional Bundle. The capacities and characteristics of the four FERC-licensed projects and one service center in the Motherlode Regional Bundle are listed in Table 2-5, and are described in further detail on the data sheets that follow. The locations of the associated powerhouses and facilities are shown in Figures 2-25 to 2-27, which also show the types of real property interest that Pacific Gas and Electric Company holds in the lands proposed for sale.

Table 2-5 Motherlode Regional Bundle Facilities

Bundle	FERC Licenses and Powerhouses	No. of Units	Capacity (MW)	Reservoirs	Switching Centers		Service Centers	
					Existing	Proposed	Existing	Proposed
	Motherlode Watershed Region	12	318					
Mokelumne River Bundle 13	FERC 0137 Salt Springs Tiger Creek West Point Electra	 2 2 1 3	 44 58 14.5 98	FERC 0137 Upper Blue Lake Lower Blue Lake Twin Lakes Meadow Lake Upper Bear River Reservoir Lower Bear River Reservoir Salt Springs Reservoir Tiger Creek Regulator Tiger Creek Forebay Tiger Creek Afterbay Lake Tabeaud Electra Diversion Reservoir Electra Afterbay	FERC 0137 Tiger Creek	FERC 0137 Tiger Creek	FERC 0137 Tiger Creek	FERC 0137 Tiger Creek
Stanislaus River Bundle 14	FERC 2130 Spring Gap Stanislaus	 1 1	 7 91	FERC 2130 Relief Reservoir Strawberry Reservoir (Pinecrest) Stanislaus Forebay	FERC 2130 Tiger Creek	FERC 2130 (None)	FERC 2130 Use of Angels Camp, Sonora	FERC 2130 Use of Angels Camp
	FERC 1061 Phoenix	 1	 2	FERC 1061 Lyons Reservoir	FERC 1061 Tiger Creek	FERC 1061 (None)	FERC 1061 Use of Angels Camp, Sonora	FERC 1061 Use of Angels Camp
Merced River Bundle 15	FERC 2467 Merced Falls	 1	 3.5	FERC 2467 Merced Falls Reservoir	FERC 2467 Service Contract with Fresno Operating Center	FERC 2467 (None)	FERC 2467 (None)	FERC 2467 (None)

Source: PG&E Co., 1999b.



Source: Pacific Gas & Electric Company, August 2000.

Hydrodivestiture EIR

Figure 2-25
Hydroelectric Developments on the South, Middle and North Forks of Stanislaus

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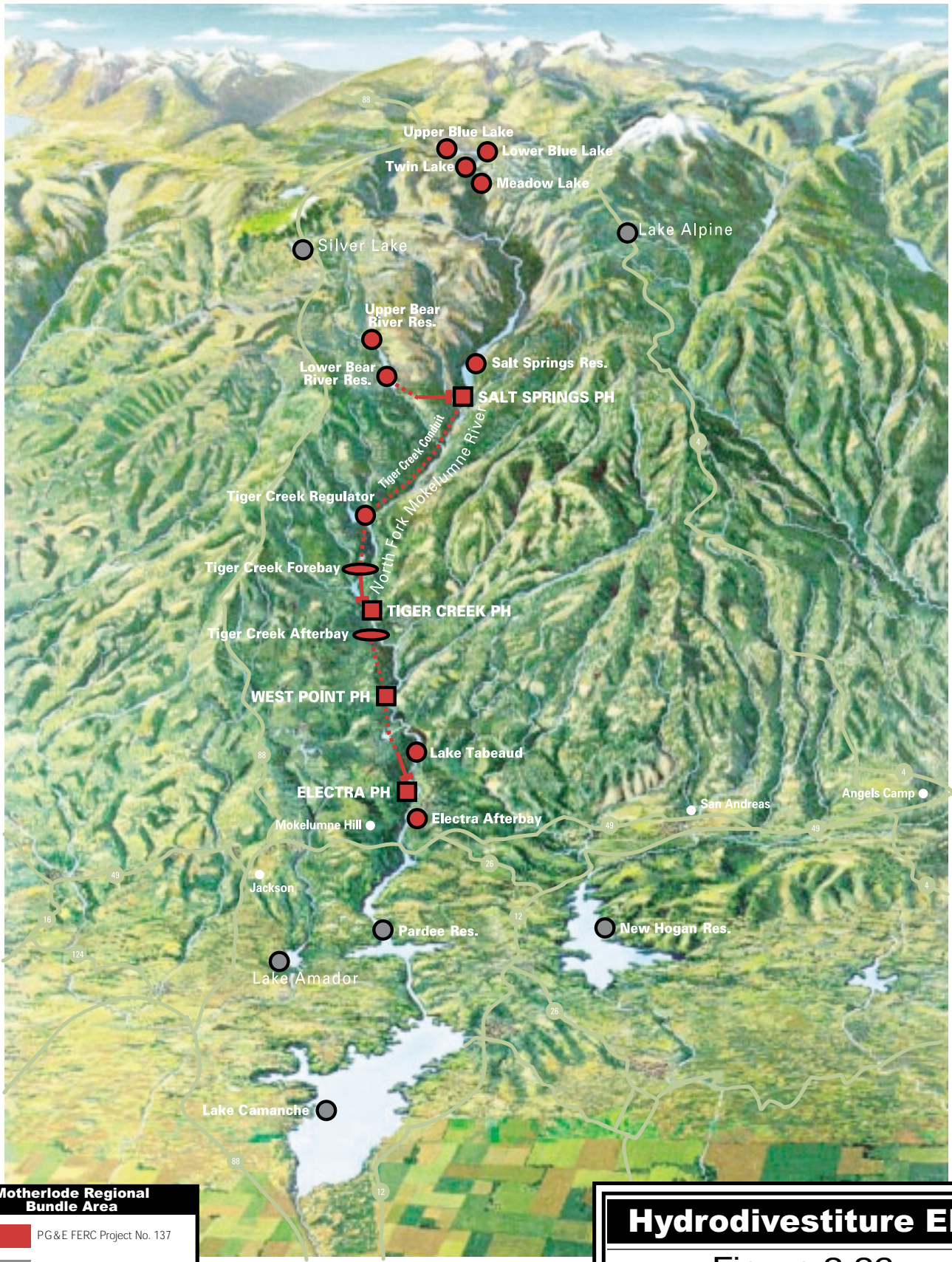

Motherlode Regional Bundle Area

- PG&E FERC Project No. 137
- Other
- Canal
- Tunnel
- Forebay
- Penstock

Source: Pacific Gas & Electric Company, August 2000.

Hydrodivestiture EIR

Figure 2-26
Hydroelectric Developments on the North Fork Mokelumne River

Aspen Environmental Group

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El Dorado
Amador
Alpine
Tuolumne
Calaveras
Stanislaus
Mariposa
Merced

SALT SPRINGS RESERVOIR
SALT SPRINGS PH #1 & #2
SALT SPRINGS SUB
TIGER CREEK PH
PINE GROVE SUB
WEST POINT PH
ELECTRA PH
MOKELUMNE HILL
PARDEE RESERVOIR
NEW HOGAN LAKE
ARNOLD
DONNELLS PH (Tri-Dam)
BEARDSLEY LAKE
BEARDSLEY PH (Tri-Dam)
SPRING GAP PH
SAND BAR PH (Tri-Dam)
STANISLAUS PH
MIWUK SUB
PHOENIX PH
NEW MELONES LAKE
CHERRY LAKE
LAKE ELEANOR
HETCH HETCHY RESERVOIR
LAKE MCCLURE (Exchequer Reservoir)
EXCHEQUER PH (MID)
MC SWAIN PH (MID)
MERCED FALLS PH

Bundle 13 Mokelumne River
Bundle 14 Stanislaus River
Bundle 15 Merced River

DISCLAIMER

1. "This map is not a survey of legal boundaries or a depiction of actual FERC boundaries. It should not be relied upon for such purpose. It is intended solely to be a visual depiction of such boundaries. The data used to prepare this map were compiled from multiple sources and varying levels of accuracy. Arbitrary adjustments have been made to FERC boundaries and the property line boundaries in order to provide a spatial dataset that is consistent with existing spatial data. While the map is believed to be an accurate depiction of the underlying data, Pacific Gas and Electric Company assumes no liability for any person's reliance upon this map for any reason."

2. "The FERC project boundaries and boundaries for Company fee land used in this report may not be accurate legal boundaries. The actual locations of any feature identified in this report would need to be surveyed in order to definitively determine whether the feature lies within or outside of Company fee land."

Source: Pacific Gas and Electric Company GIS Data Files; Ferc Boundary, Hydrology, Parcels, Public Lands; and EIP Associates GIS Program August 2000. GIS Data Projection: UTM Zone 10, NAD 83, Units Meters.

FERC License Area
Water
Land
Watershed Lands
Contiguous Land
Associated Land
General Bundle Area
State Highway
Roads
County Line
Public Lands
Powerhouses & Substations (Pacific Gas & Electric Company unless other owner identified)

Map Location Reference

N

5 0 5
Miles

Hydrodivestiture EIR

Figure 2 - 27
Motherlode Regional Bundle

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MOKELUMNE RIVER BUNDLE 13	MOTHERLODE REGIONAL BUNDLE

FERC License No.	FERC Expiration Date	Relicense Filing Date	FERC Relicensing Status
0137 (Salt Springs, Tiger Creek, West Point, Electra)	11/23/1975	12/19/1972	On annual license; New license expected 7/2001

FERC License Area (acres)		Watershed Lands (acres)		Total Acres
Land Area	*Water Area*	*Contiguous Watershed Lands*	Associated Watershed Land	All Lands
1,110	1,091	2,866	2,124	7,191

Number of Generating Units	Eight (Salt Springs: Two; Tiger Creek: Two; West Point: One; Electra: Three)
Normal Maximum Operating Capacity	214.5 MW (Salt Springs: 44.0 MW; Tiger Creek: 58.0 MW; West Point: 14.5 MW; Electra: 98.0 MW)
Date Commissioned	Salt Springs Unit 1 and Tiger Creek: 1931; Salt Springs Unit 2: 1953, West Point and Electra: 1948

Elevation of Facilities	694 to 8,137 ft msl	**Automatic Generation Control**	Electra
Reservoir Storage Capacity	216,118 af	**Average Energy Production**	1,036 GWh/year
Consumptive Water Uses	Municipal, Irrigation and Domestic	**Type of Project**	Storage w/ conveyance

Location

The Mokelumne River Project lies within the North Fork Mokelumne River (NFMR) drainage basin in Alpine, Amador, and Calavares Counties. Many of the storage and diversion reservoirs are located on the tributaries that flow south to the NFMR. All four powerhouses of the Mokelumne River Project are along the Mokelumne River in Amador County. Salt Springs Powerhouse is approximately 47 miles east of Jackson; Tiger Creek is 16 miles southeast of Jackson; and Electra is eight miles southeast of Jackson. West Point Powerhouse is northwest of West Point.

System Components/Facilities

Salt Springs Powerhouse : Four reservoirs, in addition to Salt Springs Reservoir, provide water storage for Salt Springs Unit 1 and downstream powerhouses: Meadow Lake (constructed in 1903), Twin Lake (1898), Lower Blue Lake (1885), and Upper Blue Lake (1881). Meadow Lake has a usable storage capacity of 5,656 acre-feet (af), a surface area of 140 acres, and a rock-fill gunite-faced dam with a 77-foot-high and 775-foot-long dam crest. Twin Lake has a usable storage capacity of 1,207 af, a surface area of 106 acres, and an earth- and rock-fill dam with a 22-foot-high and 1,520-foot-long dam crest. Lower Blue Lake has a usable storage capacity of 5,091 af, a surface area of 198 acres, and an earth- and rock-fill dam with a 40-foot-high and 1,063-foot-long dam crest. Upper Blue Lake has a usable storage capacity of 7,300 af, a surface area of 343 acres, and an earth- and rock-fill dam with a 31-foot-high and 837-foot-long dam crest.

The Salt Springs Powerhouse is a reinforced-concrete building containing two generating units drawing water from separate sources. Salt Springs Reservoir is the forebay for generating Unit 1. The reservoir has a usable storage capacity of 138,864 af, a surface area of 963 acres, and a rock-filled, concrete-face dam. The outlet works for Salt Springs Reservoir consist of a 19-foot-diameter concrete tunnel beneath the south abutment of the dam, which is plugged beneath the downstream toe. Two 129-inch-diameter steel pipes (a penstock 514 feet long, 129 to 90 inches in diameter-and a bypass-485 feet long,129 to 72 inches in diameter) extend from the concrete plug. Upper Bear River, and Lower Bear River Reservoirs serve Salt Springs Unit 2. Upper Bear River Reservoir empties directly into Lower Bear River Reservoir. The Upper Bear Reservoir has a usable storage capacity of 6,806 af, a surface area of 173 acres, and a rock-fill, gunite-face dam. Outlet works consist of three steel pipes through the dam. Lower Bear River Reservoir provides water to Unit 2 at Salt Springs Powerhouse. The Lower Bear Reservoir has a usable storage capacity of 48,725 af, a surface area of 746 acres, and a rock-fill, gunite-face dam. Outlet works for Lower Bear Reservoir consist of an approximately 2.5-mile-long, 8.5-foot-wide, 11-foot-high unlined tunnel, which passes beneath the left abutment of Lower Bear River Reservoir Dam 1. Cole Creek is a tributary to the NFMR. When significant flows are available in Cole Creek (primarily during the spring run-off period) water is diverted from Cole Creek into the Bear River Tunnel for Unit 2 at Salt Springs Powerhouse. This reduces the draw-down of Lower Bear River Reservoir. When Cole Creek flows exceed the capacity of Unit 2, excess water back-flows in the tunnel and is stored in Lower Bear River Reservoir. Bear River Tunnel intake works are approximately 3,800 feet east of the Lower Bear River Reservoir dams. The Unit 1 penstock is a 4,698-foot long welded and riveted steel pipeline 72 to 36 inches in diameter. The penstocks to Units 1 and 2 have flow capacities of 600 and 218 cfs, respectively.

Tiger Creek Powerhouse: The Tiger Creek Powerhouse is a reinforced-concrete, tri-level building on the NFMR downstream of the Salt Springs Powerhouse. The Tiger Creek conduit conveys water to the Tiger Creek Powerhouse from the Salt Springs Powerhouse and also picks-up several stream diversions. The first segment of the Tiger Creek conduit, approximately 17.8-miles long, conveys water from the headgate at Salt Springs Powerhouse to Tiger Creek Regulator Reservoir. The Conduit is a 14.3-foot-wide by seven-foot-high box-shaped concrete structure with a slight concave bottom. Concrete pier bridges and seven unlined tunnels occur at several points along the canal's alignment. The Tiger Creek Regulator Reservoir is on Tiger Creek, about three miles northeast of the powerhouse. It has a usable storage capacity of 522 af, and a surface area of 13 acres at 3,587.4 feet above mean sea level (msl). The dam is a 100-foot-high, reinforced-concrete, slab and buttress dam. Water stored here is conveyed by

a second segment of the Tiger Creek conduit 2.52 miles to Tiger Creek Forebay. The forebay, a concrete-lined pool with a 33-foot-high earth-filled dam, has a usable storage capacity of 39 af at about 3,559 feet above msl. The riveted and seamless steel penstock from the forebay to the powerhouse is 102 to 72 inches in diameter before branching near the powerhouse to four 36 inch pipes. The 4,976-foot long penstock has total flow capacity of 750 cfs. The Tiger Creek Afterbay is on the Mokelumne River adjacent to and downstream of the powerhouse. The afterbay has a usable storage capacity of 2,607 af. The afterbay dam is a concrete arch dam, about 0.75 miles southwest of the powerhouse. Tiger Creek is the Switching Center for the Salt Springs, Tiger Creek, West Point and Electra powerhouses, the Stanislaus River Project (Spring Gap and Stanislaus powerhouses), and the Phoenix Project.

West Point Powerhouse: Water is diverted from Tiger Creek Afterbay and transported through an approximately 2.7 mile long tunnel to the head of the penstock. The approximately 623-foot penstock, 120" to 84" diameter, conveys water from the tunnel to the powerhouse. The penstock has a total flow capacity of 675 cfs. The West Point Powerhouse is a reinforced-concrete, multi-level structure. Water flows from the tailrace directly into the Electra Powerhouse Tunnel Intake.

Electra Powerhouse: Water discharged from West Point Powerhouse is merged at the tailrace with water diverted from the NFMR by the Electra Diversion Dam, located immediately upstream from the powerhouse. These combined flows enter the Electra Tunnel to be conveyed 8.15 miles to Lake Tabeaud. Lake Tabeaud serves as the forebay for the powerhouse. It has a usable storage capacity of 1,246 af and a surface area of 44 acres at a maximum surface elevation of 1,966.6 feet. Water from Lake Tabeaud is transported to the powerhouse through a 2,890-foot-long tunnel and an approximately 4,030-foot-long penstock. The penstock has a total flow capacity of 1,130 cfs. The Electra Powerhouse is a steel and reinforced-concrete, multi-level structure. The tailrace discharges into the Electra Afterbay. The Electra Afterbay Dam serves to regulate flows in the Mokelumne River below the powerhouse. The dam is a concrete gravity structure with a 15-foot-deep overpour spillway extending across the center 250 feet of the 319-foot-long dam. The dam is 37 feet high, and has a base thickness of 24 feet.

Summary of Water Rights and Water Purchases

The NFMR has been used for water supply and hydroelectric generation since the late 1800s. Water use associated with the project is primarily for non-consumptive storage and power generation; however, it also operates under FERC license and contractual obligations for irrigation, consumptive domestic, recreation, and reservoir or instream fish and wildlife habitat.

Pacific Gas and Electric Company relies upon pre-1914 and licensed rights for water stored in Upper Blue Lake, Lower Blue Lake, Twin Lake, Meadow Lake, Salt Springs Reservoir, Upper Bear Reservoir, Lower Bear Reservoir, and Lake Tabeaud. Pacific Gas and Electric Company relies upon pre-1914 licensed and permitted water rights for the direct diversion of water to the Salt Springs 1, Salt Springs 2, Tiger Creek, West Point, and Electra Powerhouses. Pacific Gas and Electric Company relies upon riparian, pre-1914 and licensed rights for water used for irrigation and domestic purposes at the powerhouses and several cottages. Pacific Gas and Electric Company relies on licensed and permitted rights for direct diversion of water to various diversions to Tiger Creek Conduit, Salt Springs 2 Tunnel, and West Point Tunnel. Several of Pacific Gas and Electric Company's pre-1914 rights include the right to use the water for irrigation and domestic purposes.

STANISLAUS RIVER BUNDLE 14	MOTHERLODE REGIONAL BUNDLE

FERC License No.	FERC Expiration Date	Relicense Filing Date	FERC Relicensing Status
2130 (Spring Gap and Stanislaus)	12/31/2004	12/31/2002	Notice of Intent filed 1999; New license expected 12/2005

FERC License Area (acres)		Watershed Lands (acres)		Total Acres
Land Area	*Water Area*	*Contiguous Watershed Lands*	Associated Watershed Land	All Lands
187	14	568	0	769

Number of Generating Units	Two (Spring Gap: One; Stanislaus: One)
Normal Maximum Operating Capacity	98.0 MW, Stanislaus: 91 MW; Spring Gap: 7 MW
Date Commissioned	Spring Gap: 1921; Stanislaus: 1963

Elevation of Facilities	1,077 to 7,340 ft msl	**Automatic Generation Control**	Stanislaus
Reservoir Storage Capacity	34,140 af	**Average Energy Production**	424 GWh/year
Consumptive Water Uses	Municipal, Irrigation and Domestic	**Type of Project**	Storage w/Conveyance

Location

The Stanislaus River Bundle lies within the Middle Fork and South Fork Stanislaus Rivers, two branches of the Stanislaus River that drain the western slope of the Sierra Nevada mountains in Tuolumne County. Both powerhouses are in Tuolumne County. Spring Gap Powerhouse is on the Middle Fork Stanislaus River (MFSR), approximately 20 miles northeast of Sonora. The Stanislaus Powerhouse, located 5 miles east of the town of Murphys, is on the North Fork Stanislaus River at the head of New Melones Reservoir.

System Components/Facilities

Spring Gap Powerhouse: Pinecrest Reservoir, created by Strawberry Dam, is the primary storage facility. The reservoir has a usable capacity of 18,266 acre-feet (af) and a surface area of 299 acres. Strawberry Dam is an approximately 143-foot-high, rock-fill concrete-face structure across the South Fork of the Stanislaus River (SFSR). Water collected in the reservoir intake tower is transferred through a tunnel discharged to the SFSR. The Emergency Action Plan (EAP) building, which houses water-level measuring and remote communication systems, (monitored at Tiger Creek Switching Center), is adjacent to the spillway. The Philadelphia Diversion, on the SFSR, is approximately four miles downstream of Strawberry Dam. It is a rock and concrete dam that diverts water to the Philadelphia Ditch leading to the Spring Gap Powerhouse located at Sand Bar Reservoir on the MFSR. The Philadelphia Ditch ends at the Spring Gap penstock header box. The 4.7-mile long ditch runs along the north side of the SFSR Canyon until it crosses the divide to the MFSR drainage basin. It consists of four miles of ditch and 0.7 miles of flume. The penstock header box is 1.35 miles south-southeast of the powerhouse at approximately 4,876 feet above mean sea level. Water from the header box is diverted into a riveted steel penstock, with a slope length of 7,249 feet and a diameter ranging from 36.75 to 29.5 inches. It has a flow capacity of 59 cubic feet per second. The Spring Gap Powerhouse is a reinforced-concrete, single-level building.

Stanislaus Powerhouse: Sand Bar Diversion on the MFSR is the diversion point for the Stanislaus Tunnel, which conveys flows up to 525 cfs to the Stanislaus Forebay. The conduit is 11.2 miles long, and consists of 10.87 miles of tunnel, 0.27 miles of ditch, and 0.06 miles of flume. The 320 af capacity forebay is approximately 4,700 feet northeast of the powerhouse and has two earth- and rock-fill dams; one 60 feet high and 1000 feet long at the crest, and the other 55 feet high and 400 feet long. Water from the forebay is discharged via a header box into a welded steel penstock with a length of 4,707 feet, diameter ranging from 118 to 84 inches, and flow capacity of 830 cfs. The Stanislaus Powerhouse is a reinforced concrete structure that is equipped with a special "tailwater depression system" that allows the powerhouse to continue operation under high tailwater conditions from high water levels in the New Melones Reservoir and/or high flows from the upstream Collierville Powerhouse operated by the Northern California Power Agency.

Relief Reservoir, part of the Stanislaus project FERC licensed facilities, is the uppermost of four water storage facilities that supply water to Stanislaus Powerhouse in addition to Pinecrest Lake. Relief Dam is a 141-foot-high rock-fill, concrete-faced structure on Summit Creek (also identified as Relief Creek), which is a tributary of the MFSR. An EAP building is adjacent to the spillway, and houses water-level measuring and remote communication systems that communicate to the Tiger Creek Switching Center. The other storage reservoirs are the Tri-Dam's Donnells and Beardsley Reservoirs and Beardsley Afterbay. Water released from Relief Reservoir first passes through Tri-Dam's Donnells, Beardsley, and Sand Bar Project facilities before being diverted at Sand Bar Diversion. The Sand Bar Diversion, approximately 33 miles downstream of Relief Reservoir, is a rock-filled timber-crib dam.

Summary of Water Rights and Water Purchases
Operations of the Spring Gap-Stanislaus Project and Tri-Dam's Donnells-Beardsley and Sand Bar Projects are coordinated to maximize efficient power production at the separately owned facilities. Water in the Stanislaus River basin is used for a variety of purposes, including hydroelectric generation, domestic consumption, irrigation, instream fish habitat, and recreation. Pacific Gas and Electric Company relies on pre-1914 water rights for storage of 18,312 af of water in Pinecrest Lake (Strawberry Reservoir) for power generation, irrigation, and domestic uses, and pre-1914 water rights for 15,554 af of water stored in Relief Reservoir. Pacific Gas and Electric Company relies upon pre-1914 and licensed rights for direct diversions of water to the Spring Gap and Stanislaus Powerhouses, and for domestic use at the tender's cottage at Relief Reservoir Dam.

STANISLAUS RIVER BUNDLE 14		MOTHERLODE REGIONAL BUNDLE		
FERC License No.	**FERC Expiration Date**	**Relicense Filing Date**	**FERC Relicensing Status**	
1061 (Phoenix)	08/31/2022	08/31/2020	Mid-term	
FERC License Area (acres)		**Watershed Lands (acres)**		**Total Acres**
Land Area	*Water Area*	*Contiguous Watershed Lands*	Associated Watershed Land	All Lands
115	117	800	39	1,071

Number of Generating Units	One (Phoenix)
Normal Maximum Operating Capacity	2.0 MW
Date Commissioned	1898 and rebuilt in 1940

Elevation of Facilities	2,610 to 4,226 ft msl	**Automatic Generation Control**	None
Reservoir Storage Capacity	6,224 af	**Average Energy Production**	11 GWh/year
Consumptive Water Uses	Domestic, Irrigation, Municipal	**Type of Project**	Storage w/conveyance

Location

The Phoenix Project uses water within the South Fork Stanislaus River (SFSR) drainage, one of the three primary tributaries of the Stanislaus River that drain the west slope Sierra Nevada mountains, in Tuolumne County. The powerhouse is approximately 4.5 miles northeast of the town of Sonora.

System Components/Facilities

Lyons Reservoir, on the SFSR downstream from Pinecrest (Strawberry) Reservoir, is the primary water storage reservoir for the facility. It has a usable storage capacity of 6,224 acre-feet (af) and a surface area of 184 acres. The current Lyons Dam, a concrete arch structure 132 ft. high with a crest 532-feet-long that replaced an older dam in 1940, spans the SFSR. Water released from Lyons Reservoir is diverted to the Main Tuolumne Canal by the Main Tuolumne Diversion Dam approximately 80 feet downstream of Lyons Dam. It also is a concrete arch dam, and contains the headworks for the Main Tuolumne Canal. The Main Tuolumne Canal, located along the south side of the SFSR Canyon, conveys it to the Phoenix Header Box and penstock where part of the flow is diverted to the Phoenix Powerhouse and the remainder to the "Columbia Ditch" owned by the Tuolumne Utility District. The canal is 15.4 miles long, and consists of 13.3 miles of ditch, two miles of flume, and 0.1 miles of pipe. The canal's capacity is 52 cubic feet per second (cfs). The header box is a concrete gate control and bypass facility at the head of the penstock. Water from the header box is discharged into a riveted and welded-steel penstock with a slope length of 5,611 feet, and a diameter ranging from 30 to 16 inches. It has a flow capacity of 25 cfs. The Phoenix Powerhouse is a reinforced-concrete, single-level building.

Summary of Water Rights and Water Purchases

The Phoenix Project is an integral part of the Tuolumne Water System, a water distribution system owned by the Tuolumne Utility District that provides agricultural and domestic supply water through much of Tuolumne County. The hydroelectric project itself provides water for power generation, fish habitat, and recreation.

Pacific Gas and Electric Company relies on a combination of pre-1914 and licensed water rights for water storage. Pacific Gas and Electric Company has a pre-1914 water right for storage of 839 af of water in Lyons Reservoir for power generation, irrigation, and municipal uses, and a licensed water right for 3,919 af of storage in Lyons Reservoir for power generation. Pacific Gas and Electric Company has a licensed water right for storage of 5,360 af of water in Lyons Reservoir for irrigation and domestic uses. The Phoenix Project also relies upon water rights from Strawberry Reservoir for power generation, irrigation, and domestic uses. Pacific Gas and Electric Company has a pre-1914 water right for direct diversion of 52 cfs of water through the Tuolumne Canal for power generation, irrigation, and domestic uses, and a pre-1914 water right for direct diversion of 30 gallons per minute of water from an unnamed spring for domestic use at Lyons Cottage.

MERCED RIVER BUNDLE 15		MOTHERLODE REGIONAL BUNDLE			
FERC License No.	**FERC Expiration Date**	**Relicense Filing Date**		**FERC Relicensing Status**	
2467 (Merced Falls)	02/28/2014	02/28/2012		Mid-term	
FERC License Area (acres)		**Watershed Lands (acres)**			**Total Acres**
Land Area	Water Area	Contiguous Watershed Lands	Associated Watershed Land		All Lands
7	12	1	0		20
Number of Generating Units		One (Merced Falls)			
Normal Maximum Operating Capacity		3.5 MW			
Date Commissioned		First commissioned in 1897 and reconstruction completed in 1930			
Elevation of Facilities		318 to 344 ft msl	**Automatic Generation Control**	None	
Reservoir Storage Capacity		603 af	**Average Energy Production**	15 GWh/year	
Consumptive Water Uses		Agriculture	**Type of Project**	Run-of-the-River	

Location

The Merced Falls Project is on the Merced River along the border of Mariposa and Merced Counties. The Merced Falls Powerhouse is at the lower reaches of the Merced River as it flows into the San Joaquin Valley, approximately six miles east of Snelling.

System Components/Facilities

The Merced Falls Diversion Dam is a 1,679-foot-long, 38-foot-high concrete gravity dam. The dam creates Merced Falls Reservoir with a usable storage capacity of 603 acre-feet (af). The powerhouse has a total flow capacity of 1,750 cubic feet per second (cfs). There is no penstock; water flows directly from the intake structure in the reservoir to the turbine. The Merced Falls Powerhouse is a concrete, one-story, semi-outdoor facility. The powerhouse is operated using water from the reservoir available at the point of the diversion. The Merced Falls Powerhouse is operated as a baseload, run-of-the-river facility that uses flows released by Merced Irrigation District's Exchequer Reservoir.

Summary of Water Rights and Water Purchases

Operation of the Merced Project provides for power supply, agriculture, recreation, and fish and wildlife habitat.

Pacific Gas and Electric Company relies upon pre-1914 water rights for storage of 1,000 af of water impounded by Merced Falls Reservoir. Pacific Gas and Electric Company has pre-1914 water rights for direct diversion of 1,800 cfs and licensed rights for direct diversion of 1,750 cfs of water at the Merced Falls Dam for hydroelectric generation at Merced Falls Powerhouse.

2.8.5 KINGS CRANE-HELMS REGIONAL BUNDLE

Pacific Gas and Electric Company proposes to auction 4,255 acres in the Kings Crane-Helms Regional Bundle. The capacities and characteristics of the seven FERC-licensed projects and one service center in this bundle are summarized in Table 2-6, and are described in further detail on the data sheets that follow. The locations of the associated powerhouses and facilities are shown in Figures 2-28 to 2-31, which also show the types of real property interest that Pacific Gas and Electric Company holds in the lands proposed for sale.

Table 2-6 Kings Crane-Helms Regional Bundle Facilities

Bundle	FERC Licenses and Powerhouses	No. of Units	Capacity (MW)	Reservoirs	Switching Centers		Service Centers	
					Existing	Proposed	Existing	Proposed
E	Kings Crane-Helms Watershed Region	24	1786.6					
Crane Valley Bundle 16	FERC 1354 Crane Valley San Joaquin No. 3 San Joaquin No. 2 San Joaquin No. 1A A.G. Wishon	 1 1 1 1 4	 0.9 4.2 3.2 0.4 20	FERC 1354 Chilkoot Lake Bass Lake San Joaquin # 3 Forebay Manzanita Lake San Joaquin # 2 Forebay Corinne Lake	FERC 1354 Service Contract with FOC	FERC 1354 (None)	FERC 1354 Auberry	FERC 1354 (None)
Kerckhoff Bundle 17	FERC 0096 Kerckhoff No. 1 Kerckhoff No. 2	 3 1	 38 155	FERC 0096 Kerckhoff Reservoir	FERC 0096 Service Contract with FOC	FERC 0096 (None)	FERC 0096 Auberry	FERC 0096 Auberry[a]
Kings River Bundle 18	FERC 2735 Helms Pumped Storage	 3	 1212	FERC 2735 Courtright Reservoir Lake Wishon	FERC 2735 Service Contract with FOC	FERC 2735 Helms 24-hour Operators	FERC 2735 Helms	FERC 2735 Helms
	FERC 1988 Haas Kings River	 2 1	 144 52	FERC 1988 Courtright Reservoir Lake Wishon	FERC 1988 Service Contract with FOC	FERC 1988 Service Contract with FOC	FERC 1988 Balch	FERC 1988 Balch
	FERC 0175 Balch No. 1 Balch No. 2	 1 2	 34 105	FERC 0175 Black Rock Reservoir Balch Afterbay	FERC 0175 Service Contract with FOC	FERC 0175 Service Contract with FOC	FERC 0175 Balch	FERC 0175 Balch
Tule River Bundle 19	FERC 1333 Tule River	 2	 6.4	FERC 1333 (None)	FERC 1333 Service Contract with FOC	FERC 1333 (None)	FERC 1333 Auberry	FERC 1333 (None)
Kern Canyon Bundle 20	FERC 0178 Kern Canyon	 1	 11.5	FERC 0178 Kern Canyon Diversion Reservoir	FERC 0178 Service Contract with FOC	FERC 0178 (None)	FERC 0178 Auberry	FERC 0178 (None)

a. The Auberry Service Center will be transferred to the new owner subject to a Shared Service Center Lease Agreement with Pacific Gas and Electric Company.

Source: PG&E Co., 1999b.

Hydrodivestiture EIR

Figure 2-28
Hydroelectric Developments on the San Joaquin River

Aspen Environmental Group

Source: Pacific Gas & Electric Company, August 2000.

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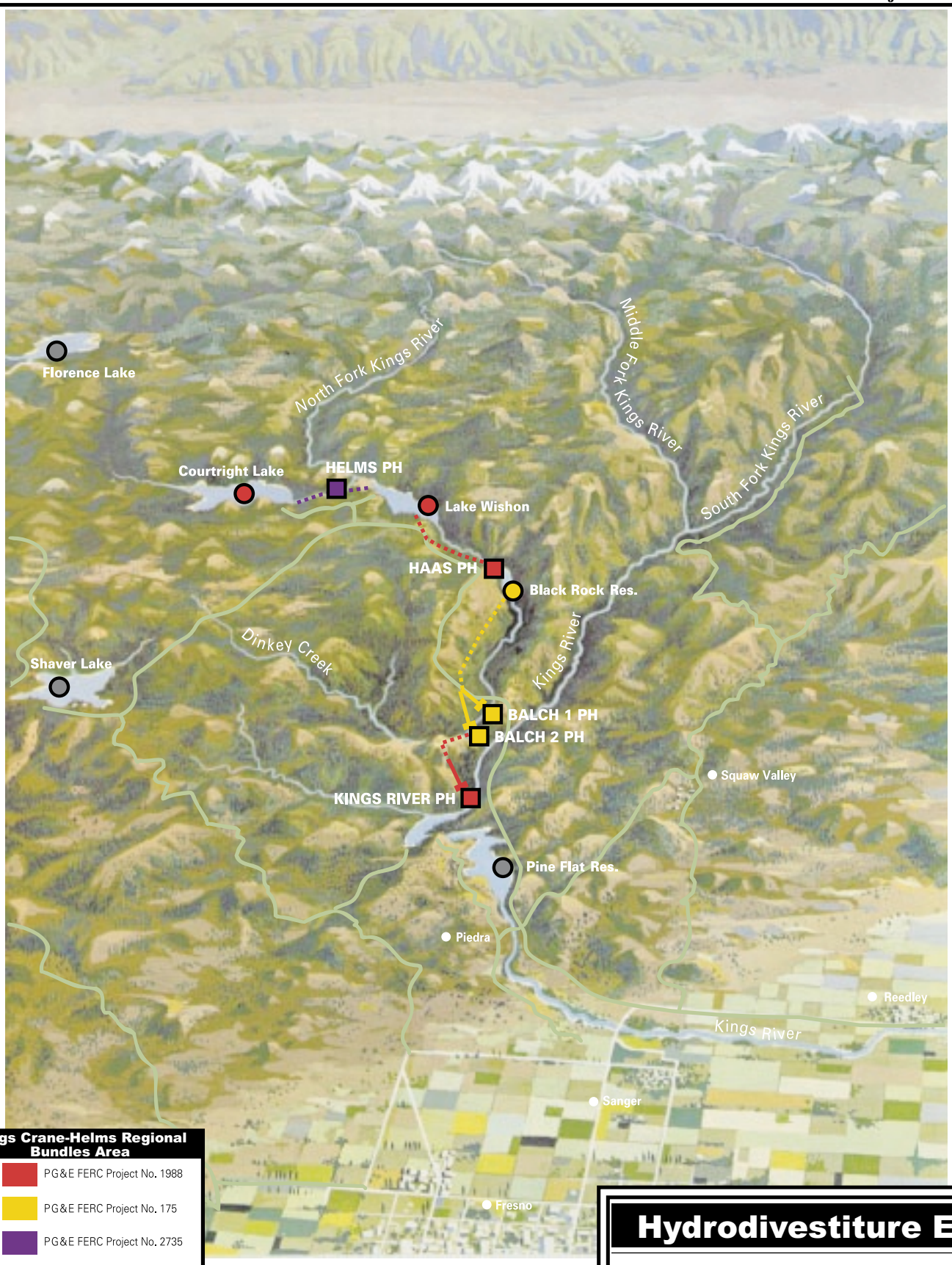

Source: Pacific Gas & Electric Company, August 2000.

Hydrodivestiture EIR

Figure 2-29

Hydroelectric Developments on the Kings River

Aspen Environmental Group

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Mariposa

Madera

Tulare

MADERA

FRESNO

Bundle 16 Crane Valley

Bundle 17 Kerckhoff

Bundle 18 Kings River

CRANE VALLEY PH

SAN JOAQUIN PH #3

SAN JOAQUIN PH #2

SAN JOAQUIN PH #1A

A.G. WISHON PH

KERCKHOFF PH #1

AUBERRY SUB

KERCKHOFF PH #2

HELMS PH

WOODCHUCK SUB

KINGS RIVER PH

Huntington Lake

Shaver Lake

Courtright Reservoir

Millerton Lake

Pine Flat Reservoir

99

41

114

168

180

DISCLAIMER

1. "This map is not a survey of legal boundaries or a depiction of actual FERC boundaries. It should not be relied upon for such purpose. It is intended solely to be a visual depiction of such boundaries. The data used to prepare this map were compiled from multiple sources and varying levels of accuracy. Arbitrary adjustments have been made to FERC boundaries and the property line boundaries in order to provide a spatial dataset that is consistent with existing spatial data. While the map is believed to be an accurate depiction of the underlying data, Pacific Gas and Electric Company assumes no liability for any person's reliance upon this map for any reason."

2. "The FERC project boundaries and boundaries for Company fee land used in this report may not be accurate legal boundaries. The actual locations of any feature identified in this report would need to be surveyed in order to definitively determine whether the feature lies within or outside of Company fee land."

Source: Pacific Gas and Electric Company GIS Data Files; Ferc Boundary, Hydrology, Parcels, Public Lands; and EIP Associates GIS Program August 2000. GIS Data Projection: UTM Zone 10, NAD 83, Units Meters.

FERC License Area
- Water
- Land

Watershed Lands
- Contiguous Land
- Associated Land

General Bundle Area
State Highway
Roads
County Line
Public Lands
Powerhouses & Substations (Pacific Gas & Electric Company unless other owner identified)

Map Location Reference

N

5 0 5

Miles

Hydrodivestiture EIR

Figure 2 - 30

Kings Crane-Helms Regional Bundle

Aspen Environmental Group

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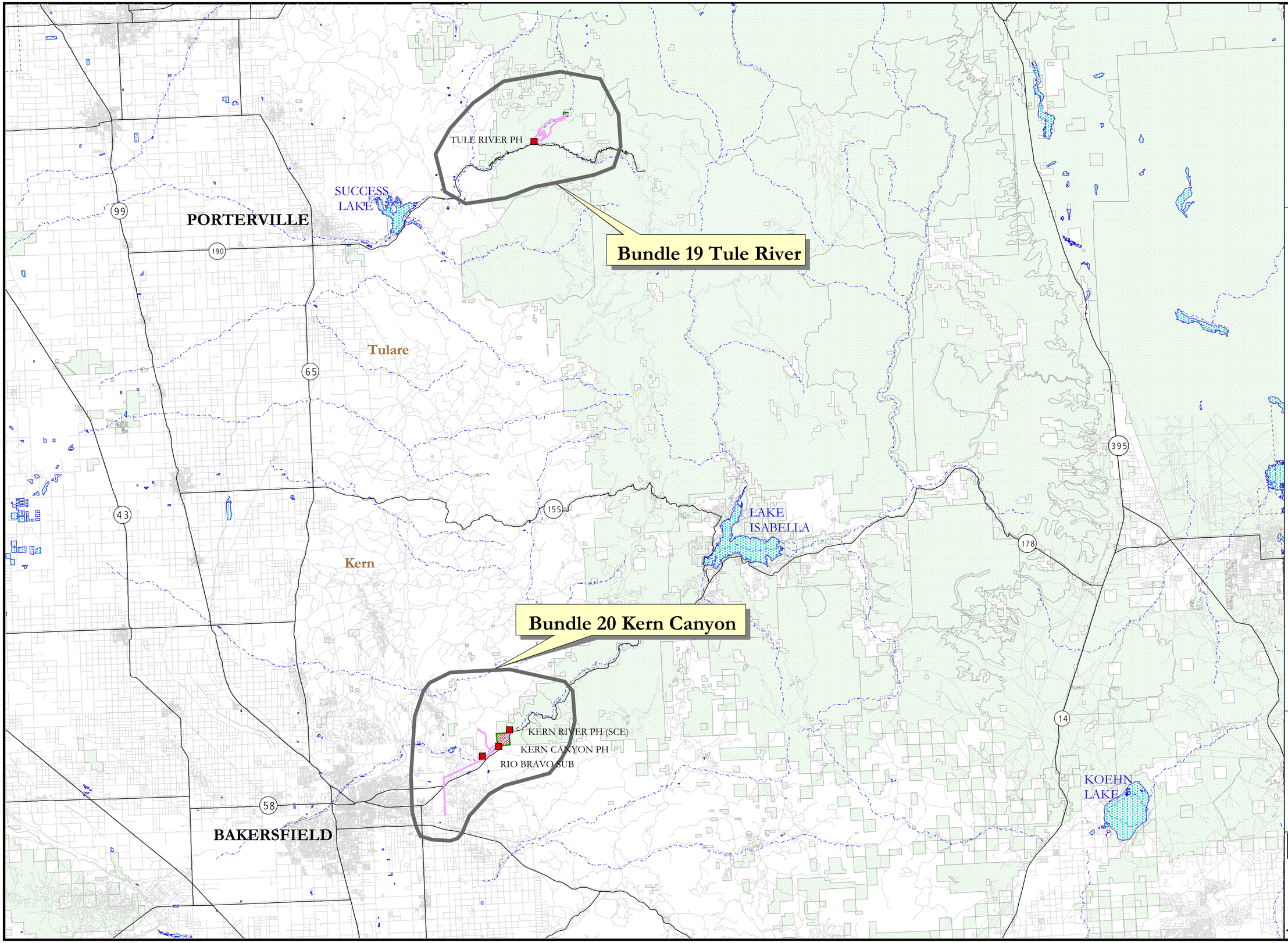

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Source: Pacific Gas and Electric Company GIS Data Files; Ferc Boundary, Hydrology, Parcels, Public Lands; and EIP Associates GIS Program August 2000. GIS Data Projection: UTM Zone 10, NAD 83, Units Meters.

- FERC License Area
  - Water
  - Land
- Watershed Lands
  - Contiguous Land
  - Associated Land
- General Bundle Area
- State Highway
- Roads
- County Line
- Public Lands
- Powerhouses & Substations (Pacific Gas & Electric Company unless other owner identified)

Map Location Reference

N

5 0 5

Miles

Hydrodivestiture EIR

Figure 2 - 31
Kings Crane-Helms Regional Bundle (Sheet 2)

Aspen Environmental Group

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CRANE VALLEY BUNDLE 16		KINGS CRANE-HELMS REGIONAL BUNDLE		
FERC License No.	**FERC Expiration Date**	**Relicense Filing Date**	**FERC Relicensing Status**	
1354 (Crane Valley)	04/30/1989	04/25/1986	On annual license; New license expected 12/2002	
FERC License Area (acres)		**Watershed Lands (acres)**		**Total Acres**
Land Area	*Water Area*	*Contiguous Watershed Lands*	Associated Watershed Land	All Lands
263	856	740	0	1,859

Number of Generating Units	Eight (Crane Valley: One; San Joaquin No. 3: One; San Joaquin No. 2: One; San Joaquin No. 1A: One; A.G. Wishon: Four)
Normal Maximum Operating Capacity	28.7 MW (Crane Valley: 0.9 MW; San Joaquin 3: 4.2 MW; San Joaquin 2: 3.2; San Joaquin 1A: 0.4 MW; A.G. Wishon: 20.0 MW)
Date Commissioned	Crane Valley: 1919; San Joaquin No. 3: 1906 reconstructed in 1923; San Joaquin No. 2: 1917; San Joaquin No. 1A: 1919; A.G. Wishon: 1910)

Elevation of Facilities	990 to 7,500 ft msl	**Automatic Generation Control**	None
Reservoir Storage Capacity	45,981 af	**Average Energy Production**	100 GWh/year
Consumptive Water Uses	Irrigation	**Type of Project**	Storage w/conveyance

Location

The Crane Valley Project lies within the North Fork Willow Creek (NFWC) basin, a tributary to the San Joaquin River, and it drains the western slope of the Sierra Nevada. All of the project storage and diversion facilities are located on the North Fork and South Fork of Willow Creek and their tributaries. The Crane Valley Powerhouse is at the base of the Crane Valley Dam on the south shore of Bass Lake, 42 miles northeast of Fresno, and just east of Oakhurst in Madera County. The San Joaquin 3 Powerhouse is upstream from the Manzanita Lake, approximately 40 miles north of Fresno in Madera County. The San Joaquin 2 Powerhouse is two miles south of the town of North Fork, and approximately 36 miles northeast of Fresno in Madera County. The San Joaquin 1A Powerhouse is adjacent to Lake Corrine, 35 miles northeast of Fresno in Madera County. The A.G. Wishon Powerhouse is on the shore of Kerckhoff Reservoir, approximately five miles south of North Fork in Madera County.

System Components/Facilities

The Crane Valley Bundle consists of five hydroelectric generating facilities.

Crane Valley Powerhouse: Chilkoot Lake, the uppermost facility of the project, is approximately eight miles northeast of Crane Valley Reservoir, and is primarily fed by Chilkoot Lake Pick-up Ditch, a rock channel that diverts runoff from Chiquito Creek. The lake has a designed usable capacity of 308 acre-feet (af) at an elevation of 7,497 feet above mean sea level (msl). The Chilkoot Dam is a rock-filled structure at the southwest end of Chilkoot Lake. The lake encompasses 57 acres. The dam includes a concrete-lined, steel outlet pipe that is located three feet below the toe of the dam, and discharges into Chilkoot Creek. In late spring of every year, water is released from Chilkoot Lake to Chilkoot Creek, where it flows into North Fork Willow Creek and eventually into Bass Lake. The Browns Creek diversion dams are two concrete-wall arch dams. The dams divert water from the South Fork of Willow Creek into the Browns Creek Conduit. The diversion continues throughout the year, except during periods of very low flow in mid- to late-summer, at which time no diversion occurs. The Browns Creek Conduit is 2.6 miles long, consisting of 1.9 miles of ditch, 0.59 miles of flume, and 0.06 miles of pipe. The water in the conduit is discharged into Bass Lake. Crane Valley Reservoir, more commonly known as Bass Lake, is the storage reservoir for the entire Crane Valley system as well as the forebay for the powerhouse. The reservoir, located immediately north of the powerhouse, has a designed usable storage capacity of 45,410 af at approximately 3,377 feet above msl. The Crane Valley Dam is a combination of hydraulic-fill and rock-fill, with a concrete core. The intake structure for the powerhouse consists of a vertical reinforced-concrete intake tower for the inlet tunnel. The tunnel has an unlined tunnel leading from the intake structure and a 550-foot-long concrete-lined section from the unlined tunnel to the underground penstock, a 198-foot-long riveted steel pipe 48 to 42 inches in diameter encased in concrete. The penstock has a flow capacity of 160 cfs. The Crane Valley Powerhouse is a single-level, reinforced-concrete building approximately 27 by 45 feet in size. The tailrace is located below the powerhouse, and discharges directly into the San Joaquin 3 Conduit.

San Joaquin 3 Powerhouse: Water discharged from the tailrace of the Crane Valley Powerhouse is diverted into the San Joaquin 3 Conduit, a canal, which consists of 2.6 miles of partially lined ditch, 0.75 miles of flume, and 0.23 miles of tunnel. The canal has a designed capacity of 160 cfs, and discharges into the San Joaquin 3 Forebay. The San Joaquin 3 Forebay is formed by an earth embankment that is 450 feet long, up to 40 feet high, and is 140 feet wide at its base. It encompasses approximately three acres, and has a usable storage capacity of 19 af. An intake structure at the eastern end of the forebay controls the water flow into the penstock. The penstock is on a slope west of the powerhouse. It is a mortar-lined and riveted-steel buried pipeline, with a slope length of 3,028 feet. The penstock's diameter varies from 60 to 52 inches. It has a total flow capacity of 164 cfs. The San Joaquin 3 Powerhouse is a reinforced- concrete, one-story building approximately

44 by 80 feet in size. The powerhouse discharges water to Manzanita Lake.

San Joaquin 2 Powerhouse: The conduit conveying water from Manzanita Lake to the San Joaquin 2 Forebay is 2.91 miles long, and consists of 1.24 miles of ditch, 0.53 miles of flume, 1.12 miles of tunnel, and 0.02 miles of pipe. The conduit's rated flow capacity is 160 cfs. The San Joaquin 2 Forebay has a usable storage capacity of 11 af, and a surface area of approximately one acre at approximately 2,783 feet above msl. The dam for the forebay is a masonry arch dam with a gunite face, measuring 26 feet high, 189 feet long, and six feet wide at the base. The penstock is a 3,415-foot mortar-lined, riveted-steel pipeline. It has a total flow capacity of 148 cfs. The San Joaquin 2 Powerhouse is a reinforced- concrete, one-story building, approximately 31 by 51.5 feet in size. Water flowing through the powerhouse is discharged into the San Joaquin 1A Conduit for use downstream at the San Joaquin 1A Powerhouse.

San Joaquin 1A Powerhouse: The South Fork Willow Creek Diversion Dam is a concrete, gravity dam that diverts water from the South Fork Willow Creek through a concrete flume to a metal flume just above the North Fork Willow Creek Diversion Dam. The North Fork Willow Creek Diversion Dam is a concrete gravity dam that diverts water into a conduit. The conduit conveys water from the diversions and from the tailrace of San Joaquin 2 Powerhouse into a concrete header box that serves as a forebay. The conduit consists of 2.74 miles of partially lined ditch, 0.14 miles of flume, and 1.94 miles of tunnel. Water can be diverted from the header box to Corrine Lake by a metal flume bypass. The penstock is a 980-foot-long, 60-inch-diameter pipeline. The penstock has a total flow capacity of 167 cfs. The San Joaquin 1A Powerhouse is a reinforced- concrete, one-story building approximately 27 by 57 feet in size. The tailrace is below the powerhouse, and discharges into Corrine Lake.

A.G. Wishon Powerhouse: Corrine Lake is located approximately 0.5 miles northeast of the powerhouse. It serves as the forebay for the facility, and has a usable storage capacity of approximately 69 af. The outlet for this lake includes the intakes for the penstocks and a spillway. Two penstocks, which are approximately 4,300 feet long, are located east of A.G. Wishon Powerhouse on a steep slope between Corrine Lake and the powerhouse. The diameter of the penstocks ranges from 44 inches to 34 inches. They have a total flow capacity of 235 cfs. The A.G. Wishon Powerhouse is a reinforced- concrete, bi-level building approximately 72 by 149 feet in size.

Summary of Water Rights and Water Purchases

Willow Creek has been used for water supply and hydroelectric generation power production since the late 1800s. Water use associated with the Crane Valley Project consists primarily of non-consumptive storage and power generation; however, it also supports irrigation, recreation, and reservoir and instream fish habitat.

Pacific Gas and Electric Company maintains a pre-1914 storage right for storage of 357 and 45,410 af of water in Chilkoot Lake and Bass Lake (Crane Valley Reservoir), respectively. Pacific Gas and Electric Company relies upon pre-1914 water rights to divert water for power production at the Willow Creek Powerhouse (Crane Valley, San Joaquin 3, San Joaquin 2, San Joaquin 1A, and Wishon Powerhouses).

KERCKHOFF BUNDLE 17		KINGS CRANE-HELMS REGIONAL BUNDLE		
FERC License No.	**FERC Expiration Date**	**Relicense Filing Date**		**FERC Relicensing Status**
0096 (Kerckhoff 1 and 2)	11/30/2022	11/30/2020		Mid-term
FERC License Area (acres)		**Watershed Lands (acres)**		**Total Acres**
Land Area	*Water Area*	*Contiguous Watershed Lands*	Associated Watershed Land	All Lands
127	40	73	0	240

Number of Generating Units	Four (Kerckhoff No. 1: Three; Kerckhoff No. 2: One)
Normal Maximum Operating Capacity	193.0 MW (Kerckhoff No. 1: 38.0 MW; Kerckhoff No. 2: 155.0 MW)
Date Commissioned	Kerckhoff No. 1: 1920; Kerckhoff No. 2: 1983

Elevation of Facilities	530 to 985 ft msl	**Automatic Generation Control**	Kerckhoff No. 2
Reservoir Storage Capacity	4,252 af	**Average Energy Production**	587 GWh/year
Consumptive Water Uses	Incidental Irrigation	**Type of Project**	Run-of-the-River

Location

The Kerckhoff Project lies within the San Joaquin River Basin, which drains the western slope of the Sierra Nevada. All of the project storage and diversion facilities are located on the San Joaquin River. The powerhouses of the Kerckhoff Project are on the San Joaquin River, four miles west of Auberry in Fresno County. The Kerckhoff No. 2 Powerhouse is downstream from Kerckhoff No. 1 Powerhouse.

System Components/Facilities

Kerckhoff No. 1 Powerhouse: Kerckhoff Reservoir serves as the forebay for both Kerckhoff No. 1 and No. 2 powerhouses, and has a usable storage capacity of approximately 4,252 acre-feet (af). A concrete arch dam, approximately 114 feet in height and 507 feet in crest length, forms Kerckhoff Reservoir. The tunnel intake is on the southern banks of the forebay. The unlined tunnel is approximately 16,943 feet long, and conveys water from the forebay to the penstock. The intake structure for the tunnel is made of concrete, and is approximately 74 feet high and 780 square feet in area. Three penstocks, ranging from 913 to 945 feet in length and 96 to 84 inches in diameter convey water from the tunnel to the powerhouse. The penstocks have a total flow capacity of 1,735 cubic feet per second (cfs). The Kerckhoff 1 Powerhouse is a reinforced-concrete, tri-level building approximately 46 by 99 feet in size.

Kerckhoff No. 2 Powerhouse: A tunnel approximately 21,632 feet long and 24.1 feet in diameter conveys water from Kerckhoff Lake to the penstock. The tunnel intake structure is on the southern bank of the Kerckhoff Lake. The intake structure is a concrete-lined box inlet that is embedded into the southeast shore of Kerckhoff Lake, and is located upstream of the Kerckhoff 1 tunnel inlet. A concrete and steel-lined penstock, bored through solid rock, is approximately 1,013 feet long, and conveys water from the tunnel to the powerhouse. The penstock consists of a 20-foot-diameter, 481-foot-long concrete-lined section, an 18-foot-diameter, 338-foot-long concrete-lined section, and a 15-foot-diameter, 194-foot-long steel-lined section that enters the powerhouse chamber. It has a total flow capacity of 5,100 cfs. The Kerckhoff 2 Powerhouse is approximately 200 feet underground in a circular, rock chamber measuring 85 feet in diameter and is 124 feet high. A 531-foot long, 25-foot horseshoe tunnel serves as the tailrace returning water to the San Joaquin River at the head of Millerton Lake (Friant Reservoir).

Summary of Water Rights and Water Purchases

The San Joaquin River has been used for water supply and hydroelectric generation since the late 1800s. Water use associated with the project consists primarily of non-consumptive storage and power generation. The Kerckhoff project also operates in support of irrigation, recreation, and reservoir and instream fish and wildlife habitat.

Pacific Gas and Electric Company relies upon pre-1914 water rights for water storage in Chilkoot Lake and Bass Lake, and for direct diversions at Chiquito Creek Canal (previously identified above for the Crane Valley Project). Pacific Gas and Electric Company also relies upon licensed water rights from the San Joaquin River for storage of 3,900 af of water at Kerckhoff Reservoir, and for direct diversion of up to 375 cfs for use at both Kerckhoff Nos. 1 and 2 powerhouses. Pacific Gas and Electric Company relies upon licensed water rights for power generation at the Kerckhoff 1 and 2 Powerhouses. Pacific Gas and Electric Company also maintains rights for incidental irrigation at the Kerckhoff 2 Powerhouse.

KINGS RIVER BUNDLE 18		KINGS CRANE-HELMS REGIONAL BUNDLE	
FERC License No.	**FERC Expiration Date**	**Relicense Filing Date**	**FERC Relicensing Status**
1988 (Haas and Kings River)	03/31/1985	02/19/1985	On annual license; New license expected 3/2001

FERC License Area (acres)		**Watershed Lands (acres)**		**Total Acres**
Land Area	*Water Area*	*Contiguous Watershed Lands*	Associated Watershed Land	All Lands
37	512	458	0	1,007

Number of Generating Units	Three (Haas: Two; Kings River: One)
Normal Maximum Operating Capacity	196.0 MW (Haas: 144.0 MW; Kings River: 52.0 MW)
Date Commissioned	1958 (Haas) and 1962 (Kings River)

Elevation of Facilities	905 to 8,184 ft msl	**Automatic Generation Control**	None
Reservoir Storage Capacity	208,300 af	**Average Energy Production**	57 GWh/year
Consumptive Water Uses	Irrigation, Domestic, Fire Protection	**Type of Project**	Storage w/conveyance

Location

The Kings River Bundle lies within the North Fork Kings River (NFKR) basin, which drains the western slope of the Sierra Nevada in Fresno County. All of the project storage and diversion facilities are on the NFKR and its tributaries. The Haas Powerhouse is on the NFKR, approximately 43 miles east of Fresno. The Kings River Powerhouse is on the Kings River, approximately 35 miles east of Fresno.

System Components/Facilities

Haas Powerhouse: Lake Wishon is the forebay for Haas Powerhouse. A 6.19-mile-long tunnel, located on the southwest end of Lake Wishon, conveys water from Lake Wishon to the powerhouse. The tunnel connects to the penstock at the valve house, which is approximately 2,000 feet north of the powerhouse. The penstock is approximately 4,563 feet long, and has a total flow capacity of 825 cubic feet per second (cfs). The Haas Powerhouse is a multi-level facility consisting of one chamber located approximately 475 feet below ground surface. The tailrace is a tunnel, and serves as a discharge for tail water from the powerhouse to Black Rock Reservoir.

The Haas-Kings River Project includes Lake Wishon and Courtright Lake in its FERC license, which are shared with the Helms Pumped Storage Project (FERC Lic. No. 2735).

Kings River Powerhouse: The intake structure is in Balch Afterbay near the dam. Inside the intake structure, a gate controls the flow of water into the tunnel and penstock. The Kings tunnel, connecting the Balch Afterbay with the Kings penstock, has two sections joined by the Dinkey Creek Siphon that combined are approximately 3.5 miles long. The Dinkey Creek Siphon, approximately 0.4 mile long, conveys water across Dinkey Creek Canyon. The welded and riveted steel penstock is approximately 1,810 feet long, 108 to 90 inches in diameter, and has a total flow capacity of 990 cfs. The Kings River Powerhouse is a multi-level facility. The tailrace is an open channel that conveys water discharged from the powerhouse to Kings River at the upper end of Pine Flat Reservoir.

Summary of Water Rights and Water Purchases

Kings River and North Fork Kings River have been used for water supply and hydroelectric generation since the 1920s. Water use is primarily non-consumptive storage and power generation; however, the projects also operate for irrigation support, recreation, and reservoir and instream fish and wildlife habitat.

This FERC project is integrated and hydraulically connected upstream with Pacific Gas and Electric Company's Helms Pumped Storage FERC Project (including Courtright and Wishon Reservoirs), and with Pacific Gas and Electric Company's Balch 1 and 2 Powerhouses, located between the Haas and Kings River Powerhouses. In addition to the 9,000-cfs direct diversion permitted right and additional storage rights within Wishon and Courtright Reservoirs (as discussed in FERC Project 2735), Pacific Gas and Electric Company has secured a total of five licensed water rights for storage of water in Courtright and Wishon Reservoirs for use within the Haas-Kings River Bundle. Pacific Gas and Electric Company has three licenses to collectively store up to 108,835 af of water per year in Courtright Reservoir, and Pacific Gas and Electric Company has two licenses to collectively store up to 134,788 af of water per year in Wishon Reservoir. Pacific Gas and Electric Company's licensed water rights permit diversions of up to 1,010 cfs of water for use at the Haas, Balch 1 and 2 and Kings River powerhouses. In addition to hydroelectric generation uses, Pacific Gas and Electric Company has licensed rights for incidental domestic uses at the Haas and Kings River Powerhouses, and at both reservoirs. Recreation and domestic uses are also authorized at Courtright Reservoir. Pacific Gas and Electric Company also has a licensed right to divert 0.33 cfs of water from Williams Creek for domestic and fire protection purposes at Haas Powerhouse.

KINGS RIVER BUNDLE 18		KINGS CRANE-HELMS REGIONAL BUNDLE		
FERC License No.	**FERC Expiration Date**	**Relicense Filing Date**	**FERC Relicensing Status**	
2735 (Helms)	04/30/2026	04/30/2024	Mid-term	
FERC License Area (acres)		**Watershed Lands (acres)**		**Total Acres**
Land Area	*Water Area*	*Contiguous Watershed Lands*	Associated Watershed Land	All Lands
237	64	139	0	440

Number of Generating Units	Three (Helms)		
Normal Maximum Operating Capacity	1,212 MW		
Date Commissioned	1984		
Elevation of Facilities	6,240 to 8,184 ft msl	**Automatic Generation Control**	Helms
Reservoir Storage Capacity	123,300 af	**Average Energy Production**	684 GWh/year peaking energy*
Consumptive Water Uses	Irrigation	**Type of Project**	Storage w/conveyance

Location

The underground Helms Pumped Storage Facility is located between Courtright Lake and Lake Wishon, 50 miles east of Fresno on the North Fork Kings River (NFKR). The unique project is one of the world's largest and highest -head pumped storage facilities with up to 1744 feet of head between the forebay and afterbay. At the time constructed the reversible pump-turbine units were the largest in the world. Peaking power is generated by releasing water from Courtright Lake through the powerhouse and discharging it to Lake Wishon. During off-peak periods, when there is surplus energy available, the process is reversed to pump water from Lake Wishon to the higher Courtright Lake for re-use during the next peaking cycle.

System Components/Facilities

Courtright Lake, at an elevation of 8,184 feet, is formed by Courtright Dam, a 315-foot high rock-fill concrete faced structure with a crest length 862 feet long and is located approximately 2.65 miles upstream of the Helms Powerhouse. It has a usable storage capacity of 123,300 acre-feet (af). The Courtright Lake intake-discharge structure, which feeds Tunnel One, is at the bottom of the reservoir; the structure is remotely controlled and actuated by gravity. Tunnel One has a circular concrete-lined, 27-foot-diameter, 3,312-foot-long section and a circular steel-lined, 22-foot-diameter, 931-foot-long section connecting to Lost Canyon Pipe. Tunnel One is connected to Tunnel Two via a 206-foot-long steel pipe across Lost Canyon. A 17-foot by 30 foot wheel gate that can be closed for maintenance or an emergency is provided in Tunnel 1 about 1,000 feet downstream of Courtright Lake. Tunnel Two, 8973 feet long, is connected to penstock, 27 feet in diameter and 2,244 feet long (including 1,745 feet of inclined shaft) which is connected to the penstock manifold located immediately upstream of the powerhouse. The water is distributed from the manifold, to three steel-lined penstocks 505 feet long, each 11.5 to 8.0 feet in diameter to the three units in the powerhouse. They have a total flow capacity of 9,000 cubic feet per second (cfs). Downstream of the pump-turbines, the three draft tubes are extended 270 feet to converge to a 27-foot diameter tailrace tunnel (Tunnel 3) 3,797 feet long that discharges water up an incline and through the intake/discharge structure to Lake Wishon. The structure is equipped with bulkhead gates that can be closed for maintenance or in an emergency to prevent flooding of the powerhouse. Surge chambers are located in Tunnel 2 near the incline shaft and in Tunnel 3 just downstream of the powerhouse. When operating in the pumping mode the direction of flow is reversed and the tailrace tunnel becomes an intake tunnel and the penstocks and Tunnels 1 and 2 convey pumped water to Courtright Lake. The Helms Powerhouse is a multi-level facility consisting of two chambers located approximately 1,000 feet below ground surface between Courtright Lake and Lake Wishon, and about 300 feet below the maximum water level in Lake Wishon. The main chamber of the powerhouse contains three pump-turbines and generator-motors; the other chamber contains transformer banks. The tailrace gates and their operating cylinders are below the chambers. A 20-foot diameter concrete lined vertical shaft from the powerhouse to the surface contains an elevator, stairs, and high voltage power cables to the switchyard at the surface. Drive-in access to the powerhouse is through a 3,760-foot long tunnel from the shore of Lake Wishon. Lake Wishon is formed by Lake Wishon Dam, a concrete faced rock-fill structure, which is 2.55 miles downstream of the powerhouse. It has a usable storage capacity of 89,100 af at 6,550 feet above mean sea level (msl). The two project reservoirs also provides storage for the Haas, Balch 1, Balch 2, and Kings River powerhouses are jointly licensed to the Haas-Kings River Project (FERC 1988)

The Helm support facilities include operator housing, warehouses, shops, and offices. Because of the high elevation and remote location, the project must be self-sufficient during the winter months when roads are frequently blocked by snow and helicopter access is blocked by clouds and fog.

Summary of Water Rights and Water Purchases

The NFKR has been used for water supply and hydroelectric generation since the 1920s, with the Helms Pumped Storage facility being the most recent facility constructed in 1984. Water use associated with the Helms Pumped Storage Facility consists primarily of non-consumptive storage and power generation. Pacific Gas and Electric Company also operates these reservoirs in support of other beneficial uses, such as irrigation, recreation, and fish and wildlife habitat.

For the Helms Pumped Storage Facility, Pacific Gas and Electric Company maintains two licensed water rights for a combined storage of 47,335 af within Courtright Reservoir. Pacific Gas and Electric Company also maintains a permitted water right for direct diversions of up to 9,000 cfs of water and collective storage of 57,000 af of water at Courtright and Wishon Reservoirs. Thus, for use just within Helms Pumped Storage Project, Pacific Gas and

Electric Company has authorization to store (for 30 days or more) up to 104,335 af of water per year collectively between Courtright and Wishon Reservoirs. In addition, Pacific Gas and Electric Company holds additional storage rights in the two reservoirs for uses at Pacific Gas and Electric Company's powerhouses located downstream of Wishon Reservoir along the NFKR. Pacific Gas and Electric Company is also licensed to use water for recreational purposes in Courtright Reservoir only, and for domestic and incidental domestic purposes at both reservoirs and the Helms Powerhouse facilities.

* Pumping energy to allow for peaking generation is about 30 percent greater

KINGS RIVER BUNDLE 18		KINGS CRANE-HELMS REGIONAL BUNDLE			
FERC License No.	**FERC Expiration Date**	**Relicense Filing Date**		**FERC Relicensing Status**	
0175 (Balch 1 and 2)	04/30/2026	04/30/2024		Mid-term	
FERC License Area (acres)		**Watershed Lands (acres)**			**Total Acres**
Land Area	*Water Area*	*Contiguous Watershed Lands*	Associated Watershed Land		All Lands
0	0	0	0		0
Number of Generating Units		Three (Balch No. 1: One; Balch No. 2: Two)			
Normal Maximum Operating Capacity		139.0 MW (Balch No.1: 34.0 MW; Balch No. 2: 105.0 MW)			
Date Commissioned		1927 (Balch No.1); 1958 (Balch No. 2)			
Elevation of Facilities		1,708 to 4,097 ft msl	**Automatic Generation Control**	None	
Reservoir Storage Capacity		1,577 af	**Average Energy Production**	620 GWh/year	
Consumptive Water Uses		Irrigation, Domestic, and Municipal	**Type of Project**	Storage w/conveyance	

Location

The Balch Project lies within the North Fork Kings River (NFKR) drainage basin, which drains the western slope of the Sierra Nevada mountains, in Fresno County. All of the Balch Project storage and diversion facilities are located on the NFKR and its tributaries. The powerhouses are approximately 40 miles east of Fresno. The Balch facilities lie between the Haas and Kings River components of the Haas-Kings River Project (FERC 1988)

System Components/Facilities

Black Rock Reservoir, which is the forebay for the two Balch powerhouses, is approximately 3.4 miles upstream of the powerhouses. It is formed by a 135-foot-high, 402-foot-long concrete arch dam, and receives water discharged from the Haas Powerhouse. In addition tributary inflows are received from Rancheria, Long Meadow, Teakettle, Williams, and Mule Creeks. The reservoir has a usable storage capacity of 1,260 acre-feet (af) and a surface area of 35 acres. An intake structure for the Balch Tunnel is off the north shore of the reservoir and consists of a concrete tower with a hoist house on top and a steel slide gate at the bottom. Water flows from the intake structure through the approximately 3.7-mile-long Balch Tunnel to the valve house where water is manifolded into two penstocks. The tunnel has both unlined and concrete-lined sections, and has approximate dimensions of 12 feet wide and 12.5 feet high. Two header pipes, located along the tunnel alignment, divert water from Black Rock Creek and Weir Creek into the tunnel. The two penstocks travel down the north face of the North Fork Kings River Canyon to the powerhouses. Penstock 1 is welded steel banded pipe 4,581 feet long with diameter tapering from 60 inches at the valve house to 48 inches at its bifurcation to two 34-inch diameter legs 301 feet above the Balch 1 Powerhouse to serve the two turbines driving the generator. Penstock 2, a welded steel pipe with riveted field joints, tapers from 96 inches to 68 inch diameter at its bifurcation just north of the Balch 2 Powerhouse to serve the two Balch 2 generating units. Balch Afterbay receives water discharged from the powerhouses. The concrete arch dam that forms the reservoir is 119 feet high and 238 feet long at the crest. The reservoir has a usable storage capacity of 317 af and a surface area of approximately seven acres. The Balch 1 and 2 Powerhouses are reinforced- concrete, multi-level buildings approximately 1,730 feet above mean sea level (msl). Balch Afterbay also serves as the forebay for the Kings River Powerhouse. Water is diverted into an intake structure located off the north shore of the reservoir, for use at the Kings River Powerhouse. Balch Camp is approximately 1.4 miles west of the powerhouses and provides an array of support facilities for the project.

Summary of Water Rights and Water Purchases

The NFKR has been used for water supply and hydroelectric generation since the 1920s. Water use associated with the Balch Project consists primarily of non-consumptive storage and power generation; however, Pacific Gas and Electric Company also operates the project for irrigation and other beneficial uses, such as recreation and reservoir and instream fish and wildlife habitat.

This FERC project is integrated and hydraulically connected: (1) upstream with Pacific Gas and Electric Company's Helms Pumped Storage Project and Haas Powerhouse facilities; and (2) downstream with Pacific Gas and Electric Company's Kings River Powerhouse. In addition to the 9,000 cubic feet per second (cfs) direct diversion permitted right and additional storage rights within Wishon and Courtright Reservoirs (as discussed in FERC Project 2735), Pacific Gas and Electric Company has secured a total of five licensed water rights for storage of water in Courtright and Wishon Reservoirs for use at Balch 1 and 2 Powerhouses. Pacific Gas and Electric Company has three licenses to collectively store up to 108,835 af of water per year in Courtright Reservoir for uses at the Balch 1 and 2 Powerhouses, as well as two licenses to collectively store up to 134,788 af of water per year in Wishon Reservoir for uses at the Balch 1 and 2 Powerhouses. In addition to hydroelectric generation uses, Pacific Gas and Electric Company is licensed for incidental domestic uses at the Balch 1 and 2 Powerhouses and both reservoirs. Recreation and domestic uses are also authorized at Courtright Reservoir. Pacific Gas and Electric Company's licensed water rights permit diversions of up to 1010 cfs of water for use at Haas, Balch 1 and 2, and Kings River powerhouses for power generation as well as domestic use at the powerhouses. The diversions for hydroelectric generation uses also include incidental domestic uses at each of the powerhouses. Pacific Gas and Electric Company also has a licensed right to divert six cfs of water from the East and West Forks of Black Rock Creek and Weir Creek into Balch Tunnel for power generation purposes at the Balch 1 and 2 Powerhouses.

TULE RIVER BUNDLE 19		KINGS CRANE-HELMS REGIONAL BUNDLE		
FERC License No.	**FERC Expiration Date**	**Relicense Filing Date**	**FERC Relicensing Status**	
1333 (Tule River)	07/31/2033	07/31/2031	Mid-term	
FERC License Area (acres)		**Watershed Lands (acres)**		**Total Acres**
Land Area	*Water Area*	*Contiguous Watershed Lands*	Associated Watershed Land	All Lands
10	0	32	3	45

Number of Generating Units	Two (Tule River)		
Normal Maximum Operating Capacity	6.4 MW		
Date Commissioned	1914		
Elevation of Facilities	2,458 to 4,000 ft msl	**Automatic Generation Control**	None
Reservoir Storage Capacity	0	**Average Energy Production**	26 GWh/year
Consumptive Water Uses	None	**Type of Project**	Run-of-the-River

Location

The Tule River Project lies within the North Fork of the Middle Fork Tule River (NFMFTR) drainage, which drains the western slope of the Sierra Nevada mountains in Tulare County. All diversion facilities are on the NFMFTR and its associated tributaries. The Tule River Powerhouse is on the NFMFTR, on the northwestern edge of the Sequoia National Forest, seven miles east of Springville.

System Components/Facilities

This facility is operated as a baseload, run-of-the-river facility using the flows available in the NFMFTR. There are no storage reservoirs, forebays, or afterbays associated with the facility. The Tule River, Hossack Creek, and Doyle Springs diversion dams combine to divert water the powerhouse. The Tule River Diversion Dam is on the NFMFTR, and diverts water into a diversion headworks. The dam is concrete with a 98-foot-long and six-foot-high crest. The diversion headworks consists of an intake conduit, screen house and debris rack, sedimentation pond, overflow weir, and headworks tunnel discharge pipe. The Hossack Creek Diversion Dam is on Hossack Creek, and diverts water from the creek into Tule River Tunnel. The dam is concrete lined with a 17-foot-long and 7.5-foot-high crest. The Doyle Springs Diversion Dam impounds accretion water from below the Tule River Diversion Dam and flow from Doyle Springs, which is pumped to the Tule River Tunnel via the Wishon Pump. The Tule River conduit is 3.22 miles long, and consists of ditch, tunnel and pipe sections. Redwood and lap-welded steel pipes connect two tunnels of the conveyance system. The tunnels are unlined, and are a total of approximately 2.7 miles long. The penstock is a buried steel pipe approximately 3,603 feet long. It has a total flow capacity of 66 cubic feet per second (cfs). Two turbine shut-off valves at the powerhouse control flow through the penstock. The Tule River Powerhouse is a reinforced- concrete, two-story building. The tailrace from the powerhouse is an open channel connecting the powerhouse to the South Fork of the Middle Fork Tule River, very near the confluence with the NFMFTR.

Summary of Water Rights and Water Purchases

The Middle Fork Tule River has been used for water supply and hydroelectric generation since the early 1900s. Water use is primarily power generation; however, as it is a run-of-the-river facility, it also provides recreation and instream fish and wildlife habitat.

Pacific Gas and Electric Company claims riparian rights of: (1) 75 cfs for direct diversions of water from NFMFTR, and (2) 15 cfs for direct diversions of water from Hossack Creek for power generation purposes at Pacific Gas and Electric Company's Tule River Powerhouse. Pacific Gas and Electric Company also holds an appropriative water license to divert three cfs of water from Doyle Springs Diversion Dam and Meadow Creek Springs for hydroelectric generation at the Tule River Powerhouse.

KERN CANYON BUNDLE 20		KINGS CRANE-HELMS REGIONAL BUNDLE	
FERC License No.	**FERC Expiration Date**	**Relicense Filing Date**	**FERC Relicensing Status**
0178 (Kern Canyon)	04/302005	04/30/2003	Notice of Intent filed 2000; New license expected 4/2005

FERC License Area (acres)		**Watershed Lands (acres)**		**Total Acres**
Land Area	*Water Area*	*Contiguous Watershed Lands*	Associated Watershed Land	All Lands
52	0	612	0	644

Number of Generating Units	One (Kern Canyon)		
Normal Maximum Operating Capacity	11.5 MW		
Date Commissioned	Reconstructed in 1921		
Elevation of Facilities	684 to 950 ft msl	**Automatic Generation Control**	None
Reservoir Storage Capacity	26 af	**Average Energy Production**	68 GWh/year
Consumptive Water Uses	None	**Type of Project**	Run-of-the-River

Location

The Kern Canyon Project lies within the Kern River Basin, which drains the western slope of the Sierra Nevada, in Kern County. All of the project diversion and storage facilities are located on the Kern River. The Kern Canyon Powerhouse is on the Kern River, on a private land within the Sequoia National Forest, ten miles east of Bakersfield. FERC licensed facilities include the diversion dam, headworks, tunnel, and penstock powerhouse.

System Components/Facilities

The flow in the Kern Canyon Project reach of the Kern River depends on the schedule of water releases from the US Army Corps of Engineers (USACE) Lake Isabella Project, located approximately 34 miles upstream. Therefore, the Kern Canyon Powerhouse is operated as a baseload, run-of-the-river facility that uses the flows released by the USACE. There are no storage reservoirs associated with the project. The magnitude of the flow to the powerhouse varies with the upstream releases. The headworks include the diversion dam and a small 26 af reservoir with 3 acres of surface area, which also is the afterbay of Southern California Edison's (SCE) Kern 1 Powerhouse (FERC 1930). The SCE Kern 1 facility also lacks any significant storage. The concrete overflow diversion dam across the Kern River diverts water from the Kern River into the Kern Canyon Tunnel. The tunnel is 8,363 feet long, and connects to the penstock. The penstock is a 520-foot-long riveted steel pipe 96 to 90 inches in diameter. It has a total flow capacity of 650 cubic feet per second (cfs). A valve house north of the powerhouse contains a valve that can be closed to empty the penstock. The Kern Canyon Powerhouse is a reinforced-concrete, two-story building approximately 59 by 48 feet in size. The tailrace from the powerhouse is an open channel connecting the powerhouse to the Kern River.

Summary of Water Rights and Water Purchases

The Kern River has been used for water supply and hydroelectric generation since the late 1800s. Primary water use associated with the project is power generation and fish habitat.

Pacific Gas and Electric Company maintains pre-1914 water rights for diversion of 720 cfs of water into Kern Canyon Tunnel and Powerhouse. Pacific Gas and Electric Company also holds two licensed water rights for direct diversion of a total of 550 cfs of water from Kern River for hydroelectric generation at the Kern Canyon Powerhouse.

2.9 INTENDED USES OF THE EIR

Because the CPUC must determine whether the transfer of ownership of these facilities would be in the public interest, implementation of the proposed divestiture application entails discretionary decision-making by the CPUC. The CPUC is the Lead Agency for this project, as defined in Section 15362 of the CEQA Guidelines, and is responsible for preparing this EIR. The primary intended use of this EIR is to inform the public and government agencies of the potential environmental impacts of the project, to solicit comments from such agencies and the general public, and to assist the CPUC in its decision making process.

Under CEQA, a public agency, other than the Lead Agency, that has responsibility for carrying out or approving a project is defined as a Responsible Agency. Divestiture of the hydroelectric generation facilities and associated lands would require the transfer or re-issuance of permits and other regulatory approvals or consents necessary for the sales to close. In some cases, transfers of existing permits would be ministerial. Other permit transfers or re-issuance of permits for individual power plants could trigger discretionary approval by responsible agencies, which may use this EIR in considering such actions.

Since the proposed auction has not been approved, the identities of the purchasers of the hydroelectric assets and associated lands are not currently known. However, it is possible that one or more public agencies may acquire hydroelectric facilities or land as a result of the project. Any public agency acquiring these assets would need to comply with CEQA in such purchase or acquisition. This EIR may be used by any such entity as the CEQA document for an acquisition, so that any such agencies could be responsible agencies. Although such agency purchasers have not been identified at this time, the potential impacts of public entity ownership are analyzed in this EIR.

CEQA defines Trustee Agencies as those having jurisdiction over certain resources held in trust for the people of California, and these agencies must be notified of CEQA documents relevant to their jurisdiction. The agencies that the CPUC has identified as Trustee Agencies are: the California Department of Fish and Game, the State Lands Commission, and the California Department of Parks and Recreation. Other interested agencies include the State Water Resources Control Board, the U.S. Fish and Wildlife Service, the U.S. Forest Service, the Bureau of Land Management, the National Marine Fisheries Service, water supply agencies that use water affected by the hydroelectric assets, and cities and counties throughout California that could be affected by the project.

2.10 REFERENCES

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State of California, Title 14. California Code of Regulation. Chapter 3. Guidelines for Implementation of the California Environmental Quality Act, as amended March 29, 1999.