



August 29, 2019

Transmitted by e-filing

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

Re: FERC Project No. P-2916-000 California
Lower Mokelumne River Project
2019 Update of Environmental Inspection Follow-Up Response and Exhibit A Revision

Dear Secretary Bose:

This letter updates the response for one item from East Bay Municipal Utility District's (District) July 10, 2019 letter to you. That letter provided a plan and schedule for implementing follow-up items from the 2019 environmental inspection, as identified in FERC's June 10, 2019 letter to the District.

Item 7. FERC's June 10, 2019 letter requested the District to file a revised Exhibit A with the Commission Secretary indicating the correct installed capacity for Pardee Units 1 and 2.

Attached is a revised Exhibit A – Project Description for the Lower Mokelumne River Project, FERC Project No. 2916. This Exhibit A replaces the last Commission approved Exhibit A in the January 17, 1996 Order Approving Revised Exhibit A and Revising Annual Charges¹ to indicate the correct installed capacity of Pardee Units 1 and 2. This submission includes: (1) a strike-through format, and (2) a final, clean copy incorporating the changes.

The District notes that the description of the current conditions for Pardee Units 1 and 2 set forth in FERC's June 10, 2019 letter contained several inaccuracies, specifically on page 3. Using the language from that letter, the District would like to address these inaccuracies by providing the following revisions to the stated observations:

[O]n the day of the inspection, we noted ~~a revised supplemental nameplates of 11,500 kVA each for the 2013 generator stator rewinding for Pardee units 1 and 2 of 11,500 kVA each, which equates to 11,500 kW, given that no reducing power factor is indicated on the unit. The increased in generator installed capacity appears to be the result of a stator rewind in 2013, as indicated on the updated nameplates. Accordingly, t~~he new limiting factor for Pardee units 1 and 2 appears to will be the lesser of the rated turbine capacity of 10.2 MW each or the generator unit rating as a standalone component. ~~, which is consistent with the production of the units on the day of the inspection of 10.3 MW each.~~

The existing generator nameplates have not been revised and remain in place. New nameplates have been added to supplement the existing plates, addressing only the rewound stators, which can operate at a higher temperature as reflected in an increased stator temperature rating and ampacity of 11,500kVA. However, the rewind did not increase the conductivity of the stator winding, nor were changes made to

¹ 74 FERC ¶ 62,010

the generators' rotor winding or magnetic circuit. **Consequently, the rated excitation current and voltage remain unchanged. The kVAr output capacity of both generators thus remains unchanged.**

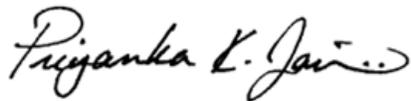
In addition, on May 16, 2019, during the FERC inspection, Pardee Reservoir was full, at 568.4 feet, and spilling. The surcharge head above the normal maximum surface elevation resulted in higher capacity operation at normal overload conditions of the Pardee Dam powerhouse turbine/generator units, accounting for the difference observed on the date of inspection between rated capacity and maximum capacity.

To determine the correct authorized installed capacity for Pardee units 1 and 2 for the purpose of filing an appropriate Exhibit A, the District retained an electrical engineering consultant that specializes in hydropower generation. Based on FERC's regulations², the consultant performed an evaluation that used the lesser of the generator or the turbine capacity, expressed in kilowatts.

The consultant calculated the power factor of the generator subsequent to the rewind to identify the true limiting factor for Pardee units 1 and 2 between the rated turbine capacity and generator unit rating. Based on the analysis with an 11,500kVA stator rewind rating and unchanged kVAr output capacity, the unit power factor is calculated to be 0.87, which corresponds to a generator power output rating of 10,005kW. As calculated under FERC's definition of "authorized installed capacity," using a rounding factor of 0.75 for converting horsepower to kilowatts, the Pardee Units 1 and 2's 13,600HP turbine output is 10,200 kW each. Applying FERC's definition, comparing the lesser of the generator or the turbine capacity expressed in kilowatts, the installed capacity would be the smaller 10,005kW rating of the generator at the calculated 0.87 power factor.

Please contact Mr. Joe Tam, P.E. Associate Civil Engineer, of my staff at 510-287-1389 or joe.tam@ebmud.com if you have any questions or additional information needs.

Sincerely,



Priyanka K. Jain, P.E.
Senior Civil Engineer
Water Resources Planning Division

PKJ:JGT:sjc

² 18 CFR Subpart A Section 11.1

EXHIBIT A

DESCRIPTION OF THE PROJECT

The Lower Mokelumne River Project - FERC Project No. 2916 comprises two existing major dams, two existing reservoirs, one existing powerhouse at an upstream location (Pardee Dam) having two hydrogenerating units and in which a third unit is to be added, a completely new powerhouse at a downstream location (Camanche Dam) to contain three new turbine-driven generating units, and various associated facilities at each of the two sites. National Dam Inspection Program reports on both Pardee and Camanche Dams have been prepared by the California Department of Water Resources, Division of Safety of Dams for the Department of the Army, the Corps of Engineers, Sacramento District evidencing approval of both structures; these reports are included with this Application as an appendix. The physical description of these features is:

	Pardee	Camanche
Location:	NW 1/4 of SW 1/4 Sec. 26 T5N R10E Mount Diablo Base and Meridian	SE 1/4 of SE 1/4 Sec. 6 T4N R9E Mount Diablo Base and Meridian
Physical Composition:	Curved-in-plan concrete gravity dam with upstream face battered 100V on 1.3H and downstream face sloped 1.6V on 1.0H; four gated sluiceways and two penstocks with 20 feet wide roadway on the crest.	Zoned earthen structure with impervious core; upstream slope of 2.25 to 1.00 and downstream slope of 2.50 to 1.00; a 24 feet to 32 feet wide paved roadway on the crest.
Dimensions:		
Crest above streambed	345 feet approximately	171 feet approximately
Crest above sea level	575 feet (roadway) 598 feet (gatehouse roof)	263 feet (roadway) 124 feet (valve house roof)
Crest length	1337 feet	2640 feet
Width at crest	16 feet	34.5 feet
Width at base	239 feet	750 feet
Volume	617,000 cubic yards	11,100,000 cubic yards (includes dikes)
Dikes	--	Approximately 4 miles in overall length.
Spillway Type:	<u>Main or South</u> : Uncontrolled concrete trough or chute type, with ogee crest, 20 openings at 40 feet for a total length of 800 feet, converging sidewalls, and a 4: 1 sloped concrete apron. <u>Jackson Creek</u> : Originally constructed as earthen dike 37 feet above streambed, crest length of 1360 feet and width of 20 feet, upstream face sloped 1.0V on 1.5H and covered by a reinforced concrete slab, downstream face 1.0V on 2.0H with sixteen 5' x 12' siphon barrels in a concrete spillway. Not considered necessary for flood control, and the siphons are closed off with concrete bulkheads. A 24-inch outlet provides discharge for irrigation releases downstream.	Trough or chute type, with low ungated ogee crest, 400 feet wide converging vertical sidewalls, on gentle varying slopes, and concrete lining for almost all of its length.

Pardee

Camanche

Crest Elevation
(above mean sea level):

567.65 feet

235.50 feet

General Configuration and Condition:

Plan, Elevation, Profiles and Details of Pardee Dam and Spillways are shown on Drawings Nos. F-1, F-2, F-3, F-4, and F-5 in Exhibit F. Overall condition is described fully in the recent COE Dam Inspection Report in the Appendix.

General Arrangement, Profile, Elevations and Details of Camanche Dam, Spillway and Outlet Works structures are shown on Drawings No. F-6 through F-11 in Exhibit F. General condition is covered in detail by current COE Dam Inspection report in the Appendix.

Penstock and Outlet Works:

Two 72-inch diameter flanged penstocks through base of dam, each with a 72-inch diameter butterfly valve for shutoff control.

Two 72-inch diameter flanged sluiceways and two 42-inch diameter flanged sluiceways through the base of dam and located outside the powerhouse, each fitted with a butterfly shutoff valve and a needle discharge valve for flow control.

The north 72-inch diameter sluiceway conduit will be bifurcated downstream of the existing butterfly valve. A straight 72-inch diameter extension will run through the new powerhouse and will be terminated at the downstream face with the needle valve removed from the existing north sluiceway. The branch will be a 66-inch diameter pipe downward and to the right to supply the new generating unit. The bifurcation will be anchored in the existing powerhouse, and flexible couplings will be provided in each of the two branches. See drawings No. F-13 and F-14 included in Exhibit F.

Two 96-inch diameter low-level conduits and one 48-inch diameter high-level conduit. The 48-inch diameter high-level conduit is gated at its intake by a 66" x 66" slide gate, and fitted with a 30-inch diameter fixed-cone dispersion valve at the outlet structure. The two 96-inch diameter conduits are screened at the intake by trashracks, and each is controlled by a 108-inch diameter butterfly valve in a common valve chamber near the center of the dam. Each 96-inch diameter conduit bifurcates into 2 branches in the outlet works structure, and the discharge is regulated by four 66-inch diameter fixed-cone dispersion valves - one on each branch.

The fixed cone valves on the two north 66-inch diameter low-level outlet conduits and on the 30-inch high-level conduit will be removed, and all three conduits will be extended downstream of the present outlet structure and connected into a common 120-inch diameter header, which will serve as a power conduit for the new power plant. Taps will be taken off the power header to each of three generating units and to two 66-inch diameter flood discharge outlets terminating with the fixed cone valves moved from their original location. A new 24-inch diameter valved connection will be provided from the 48-inch diameter high level conduit to the fish hatchery facilities for tempering the fish water supply. See Drawings No. F-15 and F-16 included in Exhibit F.

Pardee

Camanche

Powerhouses:
Existing

The powerhouse structure at Pardee Dam is of reinforced concrete, several floors high, approximately 30' wide x 100' long at the generator floor. Transformer bank is accessible from the powerhouse, but situated above and behind the structure abutting the downstream face of the dam. Oil circuit breakers, lightning arresters and outgoing transmission line facilities are located on the roof of the powerhouse. See Drawing No. F-2.

None.

The power plant at the base of the dam was installed in 1928, and consisted of two 10,000 HP Francis type vertical shaft turbines, each driving a 7,500 kW generator. In 1963, the generators were rewound to a tested rating of 9,375 kVA each, and turbines modified to develop 13,600 HP each operating at 450 rpm. In 2013, the stators were rewound, resulting in an increased stator temperature rating and ampacity of 11,500 kVA each. The generator power output rating is 10,005 kW each with a calculated unit power factor of 0.87.

Condition

The plant has been operated since 1963 with regular and routine maintenance. The plant is operating now and complies with current industry standards and all safety regulations; it is in very good condition.

Not applicable.

Proposed

A new separate powerhouse of reinforced concrete of the outdoor type about 40' x 50' will be constructed downstream of the existing structure near the right abutment of the dam. Deck of this new structure will be level with the generator floor of the existing powerhouse. See Drawing No. F-13.

The new powerhouse will contain one 14,500 HP vertical shaft, Francis type, turbine-driven generating unit of 9,050 kVA rating with a 0.95 power factor. This is equal to 8,598 kW.

The Camanche powerhouse will be a reinforced concrete structure approximately 63' wide x 140' long, located on the right abutment about 270 feet downstream of the existing outlet structure. The new structure will be of the semi-outdoor type with generators located under the finished deck. Transformer pad, disconnect switches and outgoing transmission line structure will be located across the road and behind the powerhouse. See Drawing No. F-15.

The new powerhouse will contain three new, adjustable blade, vertical shaft, Kaplan type turbines of 4,200 HP each, driving generators rated at 3,750 kVA each with 0.95 power factors. This is equal to 3,563 kW each.

Tailrace

Natural river channel in narrow rock- walled gorge. Present sluiceways discharge free in open air, and flow is regulated by the needle valves. The two 13,600 HP turbines continuously discharge through submerged draft tubes. Channel capacity downstream is adequate at all normal flows.

Natural river channel in open terrain, riprapped on the north bank for erosion control and protected on the south by existing fish facilities containment wall.

Additionally, discharges from the new power plant will negate the effectiveness of the existing attraction flows to the fish ladder. Hence a new fish ladder will be constructed downstream from the existing structure with the entry even further downstream of the discharge from the power plant discharges. To accomplish this effectively, a new fish training fence will be constructed to assist in directing the fish to the entrance of the fish ladder. For details of the existing fish facilities, see Drawing No. F-12 in Exhibit F.

Pardee

Camanche

Intakes: Three, semi-circular vertical tower wells integral with upstream face of the dam equipped with trashracks and slide gates. Center well serves as intake for the two 72-inch diameter powerhouse penstocks, and each outer well serves one 42-inch diameter and one 72-inch diameter sluice-way. Details and dimensions are shown on Drawing No. F-2 included as part of Exhibit F.

Outlet Works: There are four slightly sloped sluiceways through the concrete masonry of the dam with a MSL centerline intake elevation of 260.00 and elevation of 257.55 at centerline of the discharge valves, located on either side of the two 72-inch diameter penstocks. The two outboard sluiceways are 72-inch diameter; the two inboard sluiceways are 42-inch in diameter. All can be shut off by butterfly valves of equal diameter, and rate of discharge is controlled by Lerner-Johnson needle valves of corresponding diameter. See Drawing No. F-2 in Exhibit F.

Miscellaneous Structures: A high level domestic water supply intake is provided by a special structure adjacent to the left dam abutment. Details are shown on Drawing No. F-5 included in Exhibit F.

A service water supply for the Pardee power plant and appurtenant facilities is provided from the existing domestic water tower intake with standby electric and Pelton water wheel driven pumps in the power plant.

Sanitary wastes from the power plant are collected and routed by gravity to a septic tank, later pumped to a leach field about 1/4 mile away.

The Control Center for the Mokelumne River watershed hydro net that automatically gathers and transmits data on precipitation, temperature, and snow water content on the ground and upstream water surface elevations is located at Pardee Powerhouse.

A communications net with microwave facilities to Camanche and additional connections by two-way radio and commercial telephone lines to the District's operations center and service area offices are provided at Pardee.

Recreation Areas: Launching ramp, overnight camping, trailer parking, picnicking, boat and motor rentals, children's play area, restaurant, bait and tackle shop, and separate swimming pools. No bodily contact water sports.

Intake for the two 96-inch diameter conduits is located at the toe of upstream slope near the right abutment, having sloped trashracks and horizontal gates for debris control. The intake for the 48-inch diameter high level conduit is also located near the right abutment and is equipped with a trashrack. For details and dimensions, see Drawing No. F-10 included with Exhibit F.

Both 96-inch diameter sluiceways can be shut off by 108-inch diameter butterfly valves located in a valve chamber near the dam midsection. At the downstream end of the conduits, in a valve house located at the toe of the dam and on the right abutment, both 96-inch diameter conduits bifurcate into two 66-inch diameter branches and terminate in fixed-cone dispersion valves. The 48-inch diameter conduit terminates in a 30-inch diameter fixed-cone dispersion valve for control of discharge rate. For details, see Drawing No. F-9 in Exhibit F.

The valve house at the toe of the dam contains also, one 18-inch diameter take-off for supply of reservoir water to State of California operated fish facilities on the left bank, downstream of the dam. This take-off is equipped with an 18-inch diameter bypass for discharge of water below the dam, and the rate of discharge is regulated by an 18-inch diameter fixed-cone dispersion valve.

One 12-inch diameter and one 18-inch diameter fixed cone dispersion valve are installed on the two interior 66-inch diameter conduits primarily for fine-tuning of releases for downstream uses.

Multi-purpose day and overnight facilities are located on the north and south shores. Bodily contact water sports are allowed. Day camp facilities downstream from the dam also are available.

The data for Pardee Reservoir and Camanche Reservoir are shown fully in the COE Dam Inspection reports, Appendices A and B in Volume 2.

	Pardee	Camanche
Normal Maximum Surface Area:	2,257.0 acres	7,474 acres
Normal Maximum Surface Elevation (MSL):	567.65 feet	235.50 feet
Gross Storage Capacity:	209,950 acre-feet	417,120 acre-feet
Usable Storage Capacity:	194,076 acre-feet	415,120 acre-feet

The powerhouse data for the existing and proposed facilities are:

	Pardee	Camanche
Turbines:		
Existing	2	--
Number		
Type	Francis	--
Capacity, HP	13,600	--
RPM	450	--
Flow @	420*	--
Net Head of	317	--
Condition	Very good	--
 <i>Proposed</i>		
Number	1	3
Type	Francis	Kaplan
Capacity, HP	14,500	4,200
RPM	450	450
Flow @	440*	400
Net Head of	320	105
Condition	New	New
	*calculated from head and capacity	
 Generators:		
Existing	2	--
Number		
Size, kW	7,500	--
Proposed	1	3
Number		
Size, kW	8,598**	3,563**
	**calculated from KVA rating and power factor	

Power from the Pardee Power Plant currently is transmitted to the Northern California market through an existing 60 kV Pacific Gas and Electric line originating at the Pardee Power Plant. Under the proposed project, all power from Pardee will continue to be transmitted through this line. All power from the Camanche Power Plant will be transmitted by either one of two existing 12 kV PG&E transmission lines in the vicinity of the dam or by a new transmission line to an existing PG&E substation.

Other relevant electrical data are:

	Pardee	Camanche
Transformers:	<p>Three 2500 kVA, single phase units per generator installed in 1928, and still in service. One new 10,400 kVA, three phase 6.9 to 66/114.3 kV will be installed on deck of new powerhouse.</p>	<p>No power plant or electrical facilities exist at present - only power required for operating outlet structure valves, flow metering equipment and communications system.</p> <p>One, three phase, 8000/8960/11200 kVA transformer for connecting output of all three generators to outgoing line, voltage stepped up from 6.9 kV to 67 kV located outdoors north of powerhouse.</p>
Switchyard:	<p>Existing high voltage system operating at 60 kV located on powerhouse roof. Proposed addition located on cantilever extension from roof will be designed for 115 kV clearances, but will operate at 60 kV. See Drawing F-1.</p>	<p>Located outside powerhouse adjacent to the transformer pad, connected by fused 72 kV disconnect switch to outgoing transmission line.</p>
Circuit Breakers:	<p>Existing high voltage units, one per phase, are located on the roof of powerhouse. New breakers will be installed at right angles to present units on powerhouse roof.</p>	<p>Will be sized when transmission line is determined. See Drawing G-6 (Exhibit G).</p>
Switchgear:	<p>Switchgear presently consists of 7.2 kV type by Westinghouse and General Electric. New units of 7.2 kV metal clad type located on powerhouse floor at elevation 260.0 and include generator switchgear, excitation units, and voltage regulator.</p>	<p>Each generator will be connected to a common 6.9 kV bus through a breaker of indoor metal clad type with surge protection and will be located on the turbine floor next to the associated unit.</p>
Panels:	<p>Present relay and control panels for both units are located in control room of existing powerhouse. New control panel will be located in north end of present control room, and a new master supervisory control console will be provided for remote control of Camanche Power Plant and the outlet structure. A microwave system of telemetering and communications is installed at Pardee for service to and from Camanche.</p>	<p>New supervisory control and data system for Camanche Power Plant will be installed at Pardee for remote control; it will provide start-stop and load control for the generators as well as open-close operation of outlet works valves. Operational data will be telemetered to Pardee over existing microwave system.</p>

Miscellaneous facilities appurtenance to this project are:

	Pardee	Camanche
Facilities:	<p>A special reinforced concrete outlet tower, cylindrical in shape, founded below elevation 392, having an operating floor at elevation 585, more than 17 feet above maximum water surface in the reservoir, provides a means of withdrawing water for domestic uses. Inlets are provided at various elevations around the tower periphery. Outflow is through tunnels into the District's aqueduct system and is regulated by valves located inside the tower and controlled from the operating floor. See Drawing No. F-5 in Exhibit F.</p>	<p>The existing fish hatchery facility now does not permit effective mixing of high- level warm water and low-level cooler water for use within the Mokelumne River Fish Hatchery, which is almost directly across the river from the site of the proposed Camanche Power Plant. As part of the proposed project, the existing outlet pipes will be modified to permit this mixing. The result will be efficient temperature control for the hatchery water supply. Such control will minimize cold water disease of smoltsize salmon, thereby providing the opportunity for earlier release at a time when conditions in the lower river and Delta would be more suitable for survival of the hatchery fish.</p>

There are no lands of the United States within the project boundary.

EXHIBIT A

DESCRIPTION OF THE PROJECT

The Lower Mokelumne River Project - FERC Project No. 2916 comprises two existing major dams, two existing reservoirs, one existing powerhouse at an upstream location (Pardee Dam) having two hydrogenerating units and in which a third unit is to be added, a completely new powerhouse at a downstream location (Camanche Dam) to contain three new turbine-driven generating units, and various associated facilities at each of the two sites. National Dam Inspection Program reports on both Pardee and Camanche Dams have been prepared by the California Department of Water Resources, Division of Safety of Dams for the Department of the Army, the Corps of Engineers, Sacramento District evidencing approval of both structures; these reports are included with this Application as an appendix. The physical description of these features is:

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Dikes	--	Approximately 4 miles in overall length.
Spillway Type:	<u>Main or South</u> : Uncontrolled concrete trough or chute type, with ogee crest, 20 openings at 40 feet for a total length of 800 feet, converging sidewalls, and a 4: 1 sloped concrete apron. <u>Jackson Creek</u> : Originally constructed as earthen dike 37 feet above streambed, crest length of 1360 feet and width of 20 feet, upstream face sloped 1.0V on 1.5H and covered by a reinforced concrete slab, downstream face 1.0V on 2.0H with sixteen 5' x 12' siphon barrels in a concrete spillway. Not considered necessary for flood control, and the siphons are closed off with concrete bulkheads. A 24-inch outlet provides discharge for irrigation releases downstream.	Trough or chute type, with low ungated ogee crest, 400 feet wide converging vertical sidewalls, on gentle varying slopes, and concrete lining for almost all of its length.

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Two 72-inch diameter flanged sluiceways and two 42-inch diameter flanged sluiceways through the base of dam and located outside the powerhouse, each fitted with a butterfly shutoff valve and a needle discharge valve for flow control.

The north 72-inch diameter sluiceway conduit will be bifurcated downstream of the existing butterfly valve. A straight 72-inch diameter extension will run through the new powerhouse and will be terminated at the downstream face with the needle valve removed from the existing north sluiceway. The branch will be a 66-inch diameter pipe downward and to the right to supply the new generating unit. The bifurcation will be anchored in the existing powerhouse, and flexible couplings will be provided in each of the two branches. See drawings No. F-13 and F-14 included in Exhibit F.

Two 96-inch diameter low-level conduits and one 48-inch diameter high-level conduit. The 48-inch diameter high-level conduit is gated at its intake by a 66" x 66" slide gate, and fitted with a 30-inch diameter fixed-cone dispersion valve at the outlet structure. The two 96-inch diameter conduits are screened at the intake by trashracks, and each is controlled by a 108-inch diameter butterfly valve in a common valve chamber near the center of the dam. Each 96-inch diameter conduit bifurcates into 2 branches in the outlet works structure, and the discharge is regulated by four 66-inch diameter fixed-cone dispersion valves - one on each branch.

The fixed cone valves on the two north 66-inch diameter low-level outlet conduits and on the 30-inch high-level conduit will be removed, and all three conduits will be extended downstream of the present outlet structure and connected into a common 120-inch diameter header, which will serve as a power conduit for the new power plant. Taps will be taken off the power header to each of three generating units and to two 66-inch diameter flood discharge outlets terminating with the fixed cone valves moved from their original location. A new 24-inch diameter valved connection will be provided from the 48-inch diameter high level conduit to the fish hatchery facilities for tempering the fish water supply. See Drawings No. F-15 and F-16 included in Exhibit F.

	Pardee	Camanche
Powerhouses: Existing	<p>The powerhouse structure at Pardee Dam is of reinforced concrete, several floors high, approximately 30' wide x 100' long at the generator floor. Transformer bank is accessible from the powerhouse, but situated above and behind the structure abutting the downstream face of the dam. Oil circuit breakers, lightning arresters and outgoing transmission line facilities are located on the roof of the powerhouse. See Drawing No. F-2.</p> <p>The power plant at the base of the dam was installed in 1928, and consisted of two 10,000 HP Francis type vertical shaft turbines, each driving a 7,500 kW generator. In 1963, the generators were rewound to a tested rating of 9,375 kVA each, and turbines modified to develop 13,600 HP each operating at 450 rpm. In 2013, the stators were rewound, resulting in an increased stator temperature rating and ampacity of 11,500 kVA each. The generator power output rating is 10,005 kW each with a calculated unit power factor of 0.87.</p>	None.
Condition	The plant has been operated since 1963 with regular and routine maintenance. The plant is operating now and complies with current industry standards and all safety regulations; it is in very good condition.	Not applicable.
Proposed	<p>A new separate powerhouse of reinforced concrete of the outdoor type about 40' x 50' will be constructed downstream of the existing structure near the right abutment of the dam. Deck of this new structure will be level with the generator floor of the existing powerhouse. See Drawing No. F-13.</p> <p>The new powerhouse will contain one 14,500 HP vertical shaft, Francis type, turbine-driven generating unit of 9,050 kVA rating with a 0.95 power factor. This is equal to 8,598 kW.</p>	<p>The Camanche powerhouse will be a reinforced concrete structure approximately 63' wide x 140' long, located on the right abutment about 270 feet downstream of the existing outlet structure. The new structure will be of the semi-outdoor type with generators located under the finished deck. Transformer pad, disconnect switches and outgoing transmission line structure will be located across the road and behind the powerhouse. See Drawing No. F-15.</p> <p>The new powerhouse will contain three new, adjustable blade, vertical shaft, Kaplan type turbines of 4,200 HP each, driving generators rated at 3,750 kVA each with 0.95 power factors. This is equal to 3,563 kW each.</p>
Tailrace	Natural river channel in narrow rock- walled gorge. Present sluiceways discharge free in open air, and flow is regulated by the needle valves. The two 13,600 HP turbines continuously discharge through submerged draft tubes. Channel capacity downstream is adequate at all normal flows.	<p>Natural river channel in open terrain, riprapped on the north bank for erosion control and protected on the south by existing fish facilities containment wall.</p> <p>Additionally, discharges from the new power plant will negate the effectiveness of the existing attraction flows to the fish ladder. Hence a new fish ladder will be constructed downstream from the existing structure with the entry even further downstream of the discharge from the power plant discharges. To accomplish this effectively, a new fish training fence will be constructed to assist in directing the fish to the entrance of the fish ladder. For details of the existing fish facilities, see Drawing No. F-12 in Exhibit F.</p>

Pardee

Camanche

Intakes: Three, semi-circular vertical tower wells integral with upstream face of the dam equipped with trashracks and slide gates. Center well serves as intake for the two 72-inch diameter powerhouse penstocks, and each outer well serves one 42-inch diameter and one 72-inch diameter sluice-way. Details and dimensions are shown on Drawing No. F-2 included as part of Exhibit F.

Outlet Works: There are four slightly sloped sluiceways through the concrete masonry of the dam with a MSL centerline intake elevation of 260.00 and elevation of 257.55 at centerline of the discharge valves, located on either side of the two 72-inch diameter penstocks. The two outboard sluiceways are 72-inch diameter; the two inboard sluiceways are 42-inch in diameter. All can be shut off by butterfly valves of equal diameter, and rate of discharge is controlled by Lerner-Johnson needle valves of corresponding diameter. See Drawing No. F-2 in Exhibit F.

Miscellaneous Structures: A high level domestic water supply intake is provided by a special structure adjacent to the left dam abutment. Details are shown on Drawing No. F-5 included in Exhibit F.

A service water supply for the Pardee power plant and appurtenant facilities is provided from the existing domestic water tower intake with standby electric and Pelton water wheel driven pumps in the power plant.

Sanitary wastes from the power plant are collected and routed by gravity to a septic tank, later pumped to a leach field about 1/4 mile away.

The Control Center for the Mokelumne River watershed hydro net that automatically gathers and transmits data on precipitation, temperature, and snow water content on the ground and upstream water surface elevations is located at Pardee Powerhouse.

A communications net with microwave facilities to Camanche and additional connections by two-way radio and commercial telephone lines to the District's operations center and service area offices are provided at Pardee.

Recreation Areas: Launching ramp, overnight camping, trailer parking, picnicking, boat and motor rentals, children's play area, restaurant, bait and tackle shop, and separate swimming pools. No bodily contact water sports.

Intake for the two 96-inch diameter conduits is located at the toe of upstream slope near the right abutment, having sloped trashracks and horizontal gates for debris control. The intake for the 48-inch diameter high level conduit is also located near the right abutment and is equipped with a trashrack. For details and dimensions, see Drawing No. F-10 included with Exhibit F.

Both 96-inch diameter sluiceways can be shut off by 108-inch diameter butterfly valves located in a valve chamber near the dam midsection. At the downstream end of the conduits, in a valve house located at the toe of the dam and on the right abutment, both 96-inch diameter conduits bifurcate into two 66-inch diameter branches and terminate in fixed-cone dispersion valves. The 48-inch diameter conduit terminates in a 30-inch diameter fixed-cone dispersion valve for control of discharge rate. For details, see Drawing No. F-9 in Exhibit F.

The valve house at the toe of the dam contains also, one 18-inch diameter take-off for supply of reservoir water to State of California operated fish facilities on the left bank, downstream of the dam. This take-off is equipped with an 18-inch diameter bypass for discharge of water below the dam, and the rate of discharge is regulated by an 18-inch diameter fixed-cone dispersion valve.

One 12-inch diameter and one 18-inch diameter fixed cone dispersion valve are installed on the two interior 66-inch diameter conduits primarily for fine-tuning of releases for downstream uses.

Multi-purpose day and overnight facilities are located on the north and south shores. Bodily contact water sports are allowed. Day camp facilities downstream from the dam also are available.

The data for Pardee Reservoir and Camanche Reservoir are shown fully in the COE Dam Inspection reports, Appendices A and B in Volume 2.

	Pardee	Camanche
Normal Maximum Surface Area:	2,257.0 acres	7,474 acres
Normal Maximum Surface Elevation (MSL):	567.65 feet	235.50 feet
Gross Storage Capacity:	209,950 acre-feet	417,120 acre-feet
Usable Storage Capacity:	194,076 acre-feet	415,120 acre-feet

The powerhouse data for the existing and proposed facilities are:

	Pardee	Camanche
Turbines:		
Existing	2	--
Number		
Type	Francis	--
Capacity, HP	13,600	--
RPM	450	--
Flow @	420*	--
Net Head of	317	--
Condition	Very good	--
 <i>Proposed</i>		
Number	1	3
Type	Francis	Kaplan
Capacity, HP	14,500	4,200
RPM	450	450
Flow @	440*	400
Net Head of	320	105
Condition	New	New
	*calculated from head and capacity	
 Generators:		
Existing	2	--
Number		
Size, kW	7,500	--
Proposed	1	3
Number		
Size, kW	8,598**	3,563**
	**calculated from KVA rating and power factor	

Power from the Pardee Power Plant currently is transmitted to the Northern California market through an existing 60 kV Pacific Gas and Electric line originating at the Pardee Power Plant. Under the proposed project, all power from Pardee will continue to be transmitted through this line. All power from the Camanche Power Plant will be transmitted by either one of two existing 12 kV PG&E transmission lines in the vicinity of the dam or by a new transmission line to an existing PG&E substation.

Other relevant electrical data are:

	Pardee	Camanche
Transformers:	<p>Three 2500 kVA, single phase units per generator installed in 1928, and still in service. One new 10,400 kVA, three phase 6.9 to 66/114.3 kV will be installed on deck of new powerhouse.</p>	<p>No power plant or electrical facilities exist at present - only power required for operating outlet structure valves, flow metering equipment and communications system.</p> <p>One, three phase, 8000/8960/11200 kVA transformer for connecting output of all three generators to outgoing line, voltage stepped up from 6.9 kV to 67 kV located outdoors north of powerhouse.</p>
Switchyard:	<p>Existing high voltage system operating at 60 kV located on powerhouse roof. Proposed addition located on cantilever extension from roof will be designed for 115 kV clearances, but will operate at 60 kV. See Drawing F-1.</p>	<p>Located outside powerhouse adjacent to the transformer pad, connected by fused 72 kV disconnect switch to outgoing transmission line.</p>
Circuit Breakers:	<p>Existing high voltage units, one per phase, are located on the roof of powerhouse. New breakers will be installed at right angles to present units on powerhouse roof.</p>	<p>Will be sized when transmission line is determined. See Drawing G-6 (Exhibit G).</p>
Switchgear:	<p>Switchgear presently consists of 7.2 kV type by Westinghouse and General Electric. New units of 7.2 kV metal clad type located on powerhouse floor at elevation 260.0 and include generator switchgear, excitation units, and voltage regulator.</p>	<p>Each generator will be connected to a common 6.9 kV bus through a breaker of indoor metal clad type with surge protection and will be located on the turbine floor next to the associated unit.</p>
Panels:	<p>Present relay and control panels for both units are located in control room of existing powerhouse. New control panel will be located in north end of present control room, and a new master supervisory control console will be provided for remote control of Camanche Power Plant and the outlet structure. A microwave system of telemetering and communications is installed at Pardee for service to and from Camanche.</p>	<p>New supervisory control and data system for Camanche Power Plant will be installed at Pardee for remote control; it will provide start-stop and load control for the generators as well as open-close operation of outlet works valves. Operational data will be telemetered to Pardee over existing microwave system.</p>

Miscellaneous facilities appurtenance to this project are:

	Pardee	Camanche
Facilities:	<p>A special reinforced concrete outlet tower, cylindrical in shape, founded below elevation 392, having an operating floor at elevation 585, more than 17 feet above maximum water surface in the reservoir, provides a means of withdrawing water for domestic uses. Inlets are provided at various elevations around the tower periphery. Outflow is through tunnels into the District's aqueduct system and is regulated by valves located inside the tower and controlled from the operating floor. See Drawing No. F-5 in Exhibit F.</p>	<p>The existing fish hatchery facility now does not permit effective mixing of high-level warm water and low-level cooler water for use within the Mokelumne River Fish Hatchery, which is almost directly across the river from the site of the proposed Camanche Power Plant. As part of the proposed project, the existing outlet pipes will be modified to permit this mixing. The result will be efficient temperature control for the hatchery water supply. Such control will minimize cold water disease of smoltsize salmon, thereby providing the opportunity for earlier release at a time when conditions in the lower river and Delta would be more suitable for survival of the hatchery fish.</p>

There are no lands of the United States within the project boundary