State of California
The Resources Agency
Department of Water Resourcesp

EXHIBIT H
INFORMATION REQUIRED FOR NEW LICENSE

Oroville Facilities
FERC Project No. 2100

January 2005

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EXHIBIT H

INFORMATION REQUIRED FOR NEW LICENSE

The following information is provided in compliance with the requirements of CFR 18, Chapter 1, Subchapter B, §16.10.

1.0 OPERATION FOR EFFICIENT AND RELIABLE ELECTRIC SERVICE

1.1 GENERAL PROJECT DESCRIPTION

1.1.1 Overview

The Oroville Facilities (FERC Project No. 2100) were developed as part of the State Water Project (SWP), a water storage and delivery system of reservoirs, aqueducts, power plants, and pumping plants. The main purpose of the SWP is to store and distribute water to supplement the needs of urban and agricultural water users in northern California, the San Francisco Bay area, the San Joaquin Valley, and southern California. The Oroville Facilities are also operated for flood management, power generation, improvement of water quality in the Delta, and recreation and fish and wildlife enhancement.

FERC Project No. 2100 encompasses 41,100 acres and includes Oroville Dam and Reservoir, three power plants (Hyatt Pumping-Generating Plant, Thermalito Diversion Dam Powerplant, and Thermalito Pumping-Generating Plant), Thermalito Diversion Dam, the Feather River Fish Hatchery and Fish Barrier Dam, Thermalito Power Canal, Oroville Wildlife Area (OWA), Thermalito Forebay and Forebay Dam, Thermalito Afterbay and Afterbay Dam, and transmission lines, as well as a number of recreational facilities. An overview of these facilities is provided on Figure H.1.1-1. The Oroville Dam, along with two small saddle dams, impounds Lake Oroville, a 3.5 million acre-feet (maf) capacity storage reservoir with a surface area of 15,810 acres at its normal maximum operating level.

1.1.2 Existing Power Facilities

The hydroelectric facilities have a combined licensed generating capacity of approximately 762 megawatts (MW). The Hyatt Pumping-Generating Plant is the largest of the three power plants with a capacity of 645 MW. Water from the six-unit underground power plant (three conventional generating and three pumping-generating units) is discharged through two tunnels into the Feather River just downstream of Oroville Dam. The plant has a generating and pumping flow capacity of 16,950 cfs and 5,610 cfs, respectively. Other generation facilities include the 3-MW Thermalito Diversion Dam Powerplant and the 114-MW Thermalito Pumping-Generating Plant.

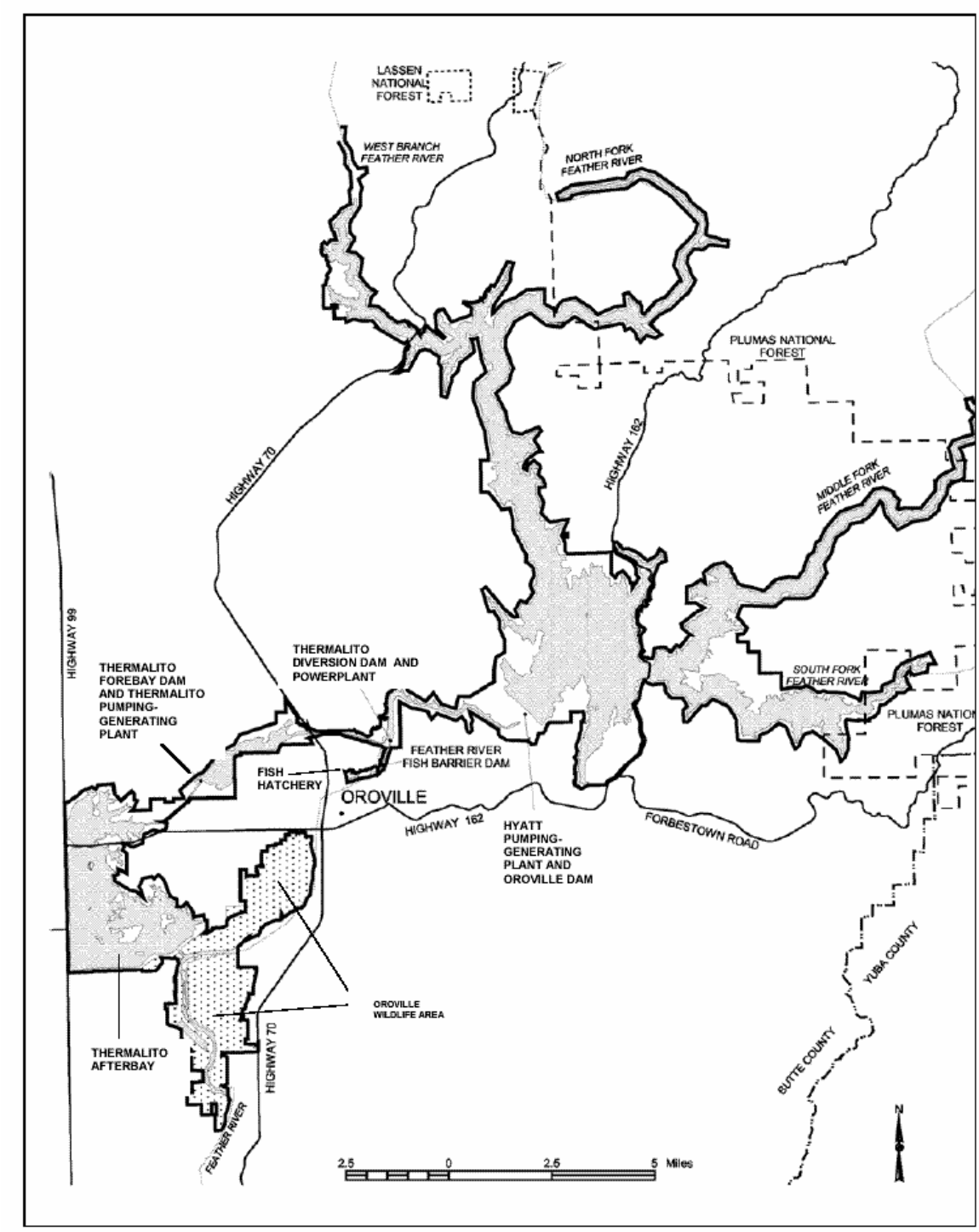

Figure H.1.1-1. Oroville Facilities features location map.

Thermalito Diversion Dam, four miles downstream of the Oroville Dam creates a tail water pool for the Hyatt Pumping-Generating Plant and is used to divert water to the Thermalito Power Canal. The Thermalito Diversion Dam Powerplant is a 3-MW power plant located on the left abutment of the Diversion Dam. The power plant releases a maximum of 615 cubic feet per second (cfs) of water into the river.

The Thermalito Power Canal is a 10,000-foot-long channel designed to convey generating flows up to 16,900 cfs to the Thermalito Forebay and pump-back flows to the Hyatt Pumping-Generating Plant. The Thermalito Forebay is an off-stream regulating reservoir for the Thermalito Pumping-Generating Plant. The Thermalito Pumping-Generating Plant is designed to operate in tandem with the Hyatt Pumping-Generating Plant and has generating and pump-back flow capacities of 17,400 cfs and 9,120 cfs, respectively. When in generating mode, the Thermalito Pumping-Generating Plant discharges into the Thermalito Afterbay, which is contained by a 42,000-foot-long earth-fill dam. The Afterbay is used to release water into the Feather River downstream of the Oroville Facilities, helps regulate the power system, provides storage for pump-back operations, and provides recreational opportunities. Several local irrigation districts receive water from the Afterbay.

1.1.3 Existing Environmental and Recreation Commitments

The Feather River Fish Barrier Dam is downstream of the Thermalito Diversion Dam and immediately upstream of the Feather River Fish Hatchery. The flow over the dam maintains fish habitat in the low-flow channel of the Feather River between the dam and the Afterbay outlet, and provides attraction flow for the hatchery. The hatchery was constructed to compensate for spawning grounds and rearing areas lost to returning salmon and steelhead trout and their offspring from the construction of Oroville Dam. The hatchery has recently accommodated over 20,000 adult fish and 15,000,000 young fish annually.

The Oroville Facilities support a wide variety of recreational opportunities. They include: boating (several types), fishing (several types), fully developed and primitive camping (including boat-in and floating sites), picnicking, swimming, horseback riding, hiking, off-road bicycle riding, wildlife watching, hunting, and visitor information sites with cultural and informational displays about the developed facilities and the natural environment. There are major recreation facilities at Loafer Creek, Bidwell Canyon, Spillway, Lime Saddle, North and South Thermalito Forebay, and Thermalito Afterbay. Lake Oroville has two full-service marinas, five car-top boat launch ramps, ten floating campsites, and seven dispersed floating toilets. There are also recreation facilities at the Visitors Center and the OWA.

The OWA comprises approximately 11,000-acres west of Oroville that is managed for wildlife habitat and recreational activities. It includes the Thermalito Afterbay and surrounding lands (approximately 6,000 acres) along with 5,000 acres adjoining the Feather River. The 5,000-acre area straddles 12 miles of the Feather River, which includes willow and cottonwood-bordered ponds, islands, and channels. Recreation areas include dispersed recreation (hunting, fishing, and bird watching), plus recreation

at developed sites, including Monument Hill Day Use Area, model airplane grounds, three boat launches on Thermalito Afterbay and two on the river, and two primitive camping areas. California Department of Fish and Game's (DFG) habitat enhancement program includes a wood duck nest-box program and dry land farming for nesting cover and improved wildlife forage. Limited gravel extraction also occurs in a number of locations.

1.2 PLANS TO INCREASE CAPACITY OR GENERATION

1.2.1 Proposed New Development

DWR does not propose any modifications to the Oroville Facilities that would either add new generation equipment or increase the generating capability of the existing three power plants. However, DWR does propose continuing to operate and maintain the Oroville Facilities for electric power generation with new environmental and recreational enhancements under the Proposed Action. These enhancements could be either structural and/or operational improvements that would affect future project costs and/or the amount of annual generation.

The report on Evaluation of Potential Generation Improvements resulted in Engineering and Operations Work Group participants' desire to explore the potential for developing additional generation capacity through hydropower improvements or construction additions to the Oroville Facilities. The report documents the studies conducted by DWR under SP-E3 to provide information on the issue of cost-efficient development of hydropower improvements or additions to the Oroville Facilities, in support of relicensing. SP-E3 explores the overall power potential of the Oroville Facilities in light of current technology, regulatory requirements, water delivery requirements, and expected future power market conditions. The overriding premise has been to evaluate potential environmentally acceptable improvements that would not adversely affect the primary purpose of the Oroville Facilities, which is water supply.

The report does not identify any preferred option, but rather presents possible design concepts for each potential new project, and provides a discussion of major issues, fatal flaws, benefits, and costs for each option.

The study results are summarized in the following Table H.1.2-1:

Table H.1.2-1. Summary of SP-E3 potential generation improvements study results.

Improvement Option	Installed MW / Avg. Energy (MWh)	Environmental Issues	Capital Costs	B/C Ratio
Hyatt Pumping-Generating Plant Modernization	645 MW (Existing)	None	Not estimated/ modernization program underway	N/A
Sutter Butte Canal Outlet small hydro plant-conventional turbine option	2.4 / 7,823	Minor	$8,953,000	0.69
Sutter Butte Canal Outlet-Hydromatrix™ option	1.2 / 4,411	Minor	$3,785,000	0.82
Palermo Canal Outlet Small Hydro Plant	0.5 / 1,604	Minor	$2,906,000	0.45
Hyatt Powerplant – Operations During Floods	N/A	None	Not estimated	N/A
Oroville-Thermalito Power Complex-Phase II	1,015 / 180,000	Significant	$1,719,263,000	0.54 **
Thermalito Pumping-Generating Pplant-Feasibility of Refurbishment of Unit 1	32 / 400	None	$7,064,000	0.05
Thermalito Pumping-Generating Plant-Evaluation of Potential to Convert Units 2, 3, & 4 to Variable Speed	85 / 13,397	None	Not estimated	N/A EIRR = 5.47%
Thermalito Afterbay River Outlet Small Hydro Plant	2.16 / 9,051	Minor	$6,534,000	1.10
Kinetic Energy of Water Flowing in Thermalito Power Canal	N/A	Minor	Not estimated	N/A
Additional Hydropower Generation at Thermalito Diversion Dam	5.0 / 7,554	Minor	$22,788,000	0.21
Fish Barrier Dam Small Hydro Plant	0.5 / 4,129	Minor	$7,404,000	0.45
Increased Spinning Reserves	N/A	None	Not estimated	N/A

1.2.2 Proposed Protection, Mitigation and Enhancement Measures

Operational changes or additional facilities to accommodate environmental, fishery, and recreation enhancement measures are being determined through a negotiated settlement agreement process. Costs for any facilities or programs currently under consideration can be found in Section 6.2 of the Preliminary Draft Environmental Assessment (PDEA) document.

1.3 PROJECT OPERATIONS

The licensed Oroville Facilities must operate within the constraints imposed by the much larger SWP, its complex operating rules, and existing Environmental Commitments. The SWP was authorized by the State Legislature in 1951 to "store runoff in Northern California and deliver to areas of need throughout the State." The SWP is a complex water storage and delivery system, involving 28 dams and reservoirs, 8 hydroelectric power plants (3 which are pumping-generating plants), 17 pumping plants, and more than 600 miles of pipelines and aqueducts. The SWP is a multipurpose water project, responsible for water supply, flood management, power generation, recreation, and habitat enhancement for fish and wildlife. Notwithstanding its multipurpose nature, the top priorities are water supply and flood control, and power generation is secondary. Water releases from various SWP reservoirs and diversion dams are dictated and controlled by essentially all authorized project purposes. The SWP has conveyed an average annual 2.4 maf of water to the 29 long-term SWP contractors.

Existing Operations

Lake Oroville stores and releases water that flows into the lake from upstream reservoir releases and runoff from the intervening area between Lake Oroville and the upper storage reservoirs. Water is released from Lake Oroville to the Feather River to meet water supply, flood protection, water quality improvement, fish and wildlife enhancement, and recreation requirements. Typically, power is generated when water is released from Lake Oroville through the Oroville Facilities for these purposes, or when pumped-storage operations at the Hyatt and Thermalito plants are in effect.

Planning and implementing SWP operations is highly dependent on constraints placed upon the Oroville Facilities. The Oroville Facilities' operational planning is performed by the Operations Control Office (OCO). The day-to-day operation of the Oroville Facilities is done through the Oroville Field Division (OFD). Decision-making for SWP operations begins with an overall long-range plan for the year. This long-range plan is used to establish general operational objectives and to assess the likelihood of achieving the operational objectives. Operations plans are developed on a weekly basis to meet the overall annual operational objectives. Daily schedules are subsequently developed to meet the weekly operational objectives and are adjusted in real-time as needed to respond to changes in conditions.

Reservoir Operations

DWR stores winter and spring runoff in Lake Oroville for release to the Feather River, as necessary to meet downstream demands. Annual operations planning is conducted for multiyear carryover, in which half the Lake Oroville storage above the minimum pool is assumed available for subsequent years. The operations plan is updated regularly to reflect changes in hydrology and downstream operations. Typically, Lake Oroville is filled to its maximum annual level of 900 ft mean sea level (msl) in June and then can be lowered as necessary to meet downstream requirements, to its minimum level in December or January. During and following dry years, the lake may be drawn down more and may not fill to desired levels the following spring. During 1991, 1992, and 1993 (1991 and 1992 were dry years), the minimum elevations were 651 ft, 702 ft, and 723 ft, respectively. During wetter hydrologic conditions, Lake Oroville is managed to control downstream flooding. The U.S. Army Corps of Engineers (USACE) requires Lake Oroville to be operated to maintain up to 750,000 acre-feet (af) of storage space to capture significant inflows for flood control. Historically, the maximum flood flows released from Lake Oroville were about 160,000 cfs in 1997.

1.3.1 Annual Water Operations Planning

Water operations planning requires coordination with other Federal, State, and local agencies and considers many factors. The OCO develops an annual water operations plan that considers forecasted water supply, projected operations of the Central Valley Project, and regulatory (flood management, instream requirements, and water quality) and contractual obligations. Details of the OCO operations are available to the public through the following web site:

http://wwwoco.water.ca.gov

The first official water operations plan is completed in early December of each year as part of the allocation process and is a significant component in determining the amount of forecasted deliveries to SWP contractors. This monthly time-step water operations plan includes projected releases to the Feather River, forecasts of Oroville inflow, Lake Oroville end-of-month storage, and local demands. The water operations plan is updated each month through April to reflect changes in hydrology and downstream operations. The Oroville Facilities power plants operate within the constraints established by the water operations plan.

1.3.2 Weekly Water Operations Planning

Each week, the OCO develops a general plan for reservoir releases. This plan considers how much water will be needed downstream for: (1) local water supply demands; (2) Delta water quality and quantity requirements; (3) instream flow and temperature requirements; (4) SWP pumping requirements in the Delta; and (5) minimum flood management space. The weekly plan is revised as needed to meet changing operational conditions both upstream and downstream of the Oroville Facilities.

1.3.3 Daily Water Operations Scheduling

Hourly water releases through the Oroville Facilities power plants are scheduled. The hourly operation of the power plants is planned to maximize the amount of energy that may be produced during periods when electrical demand is highest. Additionally, ancillary services required for participation in the electric utility market and bid into the California Independent Operator (CAISO) are scheduled on an hourly basis. These ancillary services include regulation up and down, spinning reserves, standby reserves, supplemental energy market, and voltage regulation. The hourly schedule is scheduled to maximize power benefits as long as Oroville Facilities operations fit within the constraints of the overall daily Feather River release objective downstream of Thermalito Afterbay.

Releases from Lake Oroville are scheduled on a weekly basis to accommodate (1) water supply, quality, and quantity requirements in the Sacramento-San Joaquin Delta, (2) instream flow requirements in the Feather River, and (3) minimum flood control space. Weekly operational plans are updated as needed to respond to changing conditions. The Thermalito Diversion Dam Pool and the Thermalito Forebay and Afterbay are too small for seasonal storage so they are used only in weekly and daily operations planning. Releases through Hyatt and Thermalito Pumping-Generating Plants are scheduled on an hourly basis to maximum the amount of energy produced when power values are highest. Because the downstream water supply is not dependent on hourly releases, and pumping of SWP water can be scheduled at off-peak times, hourly operational decisions are impacted by the following considerations:

- Electrical energy prices and ancillary service requirements such as spinning reserve;
- Supplemental energy market activities; and
- Voltage regulation requirements.

Storage in Thermalito Forebay and Afterbay is used to generate power and maintain uniform flows in the Feather River downstream of the Oroville Facilities. Thermalito Afterbay also provides storage for pump-back operations. The pump-back operations are designed to use water that is in excess of what is required for downstream flow requirements for pumping back into Thermalito Forebay and then into Lake Oroville during off-peak hours. This water is then released again during on-peak hours when power values increase. Generation provided by this pumpback activity contributes on average only about six or seven percent to the total annual Oroville Facilities generation. Because the two main power plants are operated to take advantage of weekday generation when power values are highest, there is usually higher storage in the Afterbay by the end of the week. During the weekend, water from the Afterbay continues to be released to the Feather River, generation at the Hyatt and Thermalito Pumping-Generating Plants is decreased, and pump-back operations into Lake Oroville may occur. By the end of the weekend, the elevation of the Afterbay is lowered to prepare for a similar operation the following week.

1.4 COORDINATION WITH AREA ELECTRICAL SYSTEMS

Overall, the SWP uses more energy than it produces. To balance SWP loads with available resources, DWR relies upon a suite of options that include purchases from the day-ahead, and hour-ahead markets; capacity exchanges; and energy contracts (both short and long-term). Two such contracts with Southern California Edison Company (SCE) allow DWR to exchange on-peak capacity and energy for off-peak energy that may be used elsewhere within the SWP system. Specifically, under the terms of the 1979 Power Contract and the 1981 Capacity Exchange Agreement, DWR provides SCE with up to 350 MW of capacity and approximately 40 percent of the energy from the Oroville Facilities. In return, DWR receives off-peak energy from SCE equal to the amount of energy provided to SCE from the Oroville Facilities, plus an additional amount of energy as payment for the on-peak capacity. The amount of additional energy is determined annually based on the Capacity-Energy Exchange Formula defined in the 1979 Power Contract.

Several power purchases and sales agreements, the largest of which are the SCE power and capacity exchange contracts, expired on December 31, 2004; a different portfolio of generation resources will be made available to meet SWP energy and capacity requirements starting January 1, 2005. DWR is involved in solicitation and confidential negotiation efforts with a variety of providers of generation capacity and energy. The results of solicitation and negotiations were not available at the time this document was prepared.

Load Management

The SWP controls the timing of its pumping load through an extensive computerized network. That control system allows DWR to minimize the cost of power it purchases by maximizing pumping during off-peak periods when power costs are lower—usually at night—and by selling power to other utilities during on-peak periods when power values are high. By taking advantage of this flexibility in scheduling SWP pumping load and generation, DWR reduces the net pumping cost for SWP water deliveries. During high water delivery periods/years there is a substantial amount of pumping during on-peak periods.

When generation from the Oroville Facilities exceeds SWP load requirements, DWR sells the excess power on the market. Currently, DWR contracts with utilities and marketers for short-term purchase, sale, or exchange of power. In addition to selling firm power, DWR may sell power on a day-to-day or hour-to-hour basis according to the terms of its interchange agreements and of the Western System Power Pool agreement. These agreements provide the basis for making energy transactions, short-term capacity and energy sales or exchanges, unit commitments, and transmission service purchases. Through these contracts, DWR sells excess capacity and energy at market rates.

Additionally, ancillary services required for participation in the electric utility market and bid into the California Independent System Operator (CAISO) are also scheduled on an

hourly basis. These services include spinning reserve, non-spinning reserve, supplemental energy market, and regulation.

2.0 NEED FOR POWER GENERATED BY THE PROJECT

2.1 USES OF OROVILLE FACILITIES GENERATION

The continued operation of the Oroville Facilities for electric power generation alleviates the need for new power resources that would otherwise be required to replace the 762 MW of capacity and roughly 2.4 million MWh per year of energy generated by the three power plants. This power capacity and generation is vital to the State of California, in that it provides a large portion of the electricity needed to pump water through the SWP at a lower cost than potential replacement power sources. Not only would replacement power sources be more expensive and lead to higher costs for SWP users, there is much uncertainty surrounding the future availability of such sources. For example, given current power supply and demand trends in California, the California Energy Commission (CEC) estimates that approximately 10,000 MW of additional generation (including reserves) or power demand reduction will be needed to meet the needs of the State's growing economy by 2013 (CEC 2003a). The CEC also predicts California only has adequate power supplies and planned transmission upgrades to meet projected demands through the year 2009, and this assumes that a number of adverse scenarios do not occur. If such adverse circumstances as earlier-than-expected retirement of older generation plants or more frequent dry water years do occur, California's power plant reserve margins could reach unacceptable levels as early as 2006 (CEC 2003b).

Thus, continued operation of the Oroville Facilities for electric power generation is critical to DWR achieving its mission of providing a reliable and affordable supply of water.

Power operations of the Oroville Facilities are heavily influenced by SWP-related agreements and other commitments. Continued operation and maintenance of the power features of the Oroville Facilities must be consistent with the operational criteria dictated by the operation of the entire SWP. The operation of the SWP is further described in Section 2.3 of the PDEA.

Oroville Facilities operations are planned and scheduled in concert with other SWP and U.S. Bureau of Reclamation (USBR) Central Valley Project (CVP) water storage, pumping, and conveyance facilities. The primary operating function of the Oroville Facilities power plants is to provide electricity to SWP pumps that move water through the SWP system. Overall, the SWP uses more energy than it produces. Thus, any decrease in power generation at the Oroville Facilities would need to be offset by increased purchases of energy from other resources and/or by construction of new power generating facilities. In 2000, the SWP required 9,190,000 MWh of generation to meet pumping requirements and station service usage. In the same year, the Oroville Facilities generated roughly 2,760,000 MWh of that total, which amounts to nearly one-third of the system's total requirements.

By generating hydroelectric power, the Oroville Facilities help reduce the amount of generation that is needed from fossil fuel power plants, thereby avoiding the emission of

such pollutants as hydrocarbons, nitrogen oxides, carbon monoxide, and particulate matter. Hydroelectric generation at the project's facilities possibly avoids the construction of new power plant facilities, thus avoiding other adverse environmental effects. Power from the Oroville Facilities contributes to a diversified generation mix and helps meet power needs within and beyond the region. Regional power benefits from the Oroville Facilities include those often referred to as ancillary system benefits, including spinning reserves, non-spinning reserves, peaking capacity, and grid stability. Additional information regarding power operations and benefits is included in Chapter 6.0 of the PDEA.

2.2 HISTORICAL ANNUAL GENERATION

Hydroelectric generation provides the largest share of SWP power resources. However, hydroelectric generation at the Oroville Facilities is greatly affected by the amount of annual runoff to the Feather River watershed. Over the past 20 years, the combined output of the Oroville Facilities has averaged 2,382,000 MWh. During that period, the range of generation has varied from below 1,000,000 MWh in 1991 and 1992 (critically dry years) to over 4,000,000 MWh in 1982-1983 (very wet years).

Monthly generation made available to the SWP in recent years (calendar years 1982 through 2003) from the Oroville Facilities operation is summarized in Table H.2.2-1. This generation data represents the combined generation output from Hyatt Pumping-Generating Plant, Thermalito Pumping-Generating Plant, and Thermalito Diversion Dam Powerplant.

Offsetting the above annual generation figures is the amount of pumping energy consumed each year by the Oroville Facilities as a result of the pump-back operation between Thermalito Afterbay and Lake Oroville. Pump-back operations provide peaking benefits for Oroville Facilities power generation. The Oroville Facilities' monthly pumping energy requirement in recent years (calendar years 1982 through 2003) is summarized in Table H.2.2-2. This pumping energy data represents the combined requirements of the Hyatt Pumping-Generating Plant and Thermalito Pumping-Generating Plant. The average for this 22-year period was approximately 162,000 MWh per year.

Table H.2.2-1. Energy generation at Oroville Facilities (in MWh).

(based on historic recorded data)													
Year	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
1982	429,640	395,540	454,680	571,280	436,870	280,310	267,590	327,870	255,520	155,500	162,840	343,190	4,080,830
1983	344,020	465,550	567,570	569,240	545,240	465,220	367,900	310,930	263,430	149,210	296,980	557,690	4,902,980
1984	424,271	212,858	243,067	152,246	210,121	240,974	355,041	245,820	169,706	97,762	86,117	171,631	2,609,613
1985	81,346	98,338	93,010	122,271	281,487	281,771	261,860	189,716	71,431	104,412	75,650	40,312	1,701,604
1986	44,328	303,708	536,715	148,440	169,867	167,344	313,108	223,153	201,884	154,054	99,610	88,309	2,450,519
1987	82,617	51,729	57,869	120,870	163,863	190,229	237,272	162,645	100,238	74,113	69,733	69,342	1,380,522
1988	55,793	60,745	135,001	162,764	132,289	189,829	241,443	160,824	129,878	102,966	101,286	78,985	1,551,802
1989	64,461	96,394	71,345	62,779	185,708	209,653	358,240	284,111	146,058	108,406	109,782	217,248	1,914,185
1990	117,732	84,179	107,931	260,023	176,892	134,446	189,071	174,741	54,550	46,763	44,906	123,939	1,515,173
1991	48,891	23,140	22,069	21,298	123,030	159,435	135,414	73,922	53,706	49,385	33,452	67,414	811,155
1992	32,071	19,512	55,578	21,099	143,544	119,619	138,679	112,213	90,795	51,847	35,663	47,004	867,625
1993	24,470	48,070	357,360	287,330	286,590	296,330	380,550	363,150	107,230	103,550	124,791	241,446	2,620,866
1994	77,973	51,685	76,006	125,148	168,379	185,184	215,556	172,927	137,847	120,330	80,103	89,486	1,500,625
1995	195,787	396,768	452,975	464,888	498,362	490,316	271,232	304,381	292,478	149,933	125,742	233,661	3,876,523
1996	233,353	506,606	347,132	361,981	384,562	275,606	382,597	301,526	113,114	122,279	131,504	432,231	3,592,492
1997	456,211	390,657	138,176	114,526	200,586	258,449	402,518	254,237	129,519	162,086	117,753	103,711	2,728,428
1998	250,092	470,162	420,671	324,009	383,016	423,400	343,632	325,401	263,785	155,809	97,969	411,109	3,869,053
1999	268,034	457,775	307,517	157,986	210,662	191,981	465,021	280,865	164,538	152,924	127,640	162,475	2,947,416
2000	108,827	259,837	369,124	175,572	245,297	281,055	384,404	308,198	166,922	162,972	150,533	133,188	2,745,929
2001	97,975	57,222	79,772	78,292	192,980	162,097	149,266	139,137	55,685	89,326	63,770	69,149	1,234,668
2002	54,056	27,758	43,077	78,699	155,011	218,519	307,655	222,950	121,503	102,656	71,772	81,966	1,485,621
2003	58,889	161,478	49,901	44,260	133,028	226,402	483,349	317,098	171,804	114,585	140,792	111,891	2,013,478
Average 1982-2003	161,402	210,896	226,661	201,136	246,699	247,644	302,336	238,901	148,255	115,040	106,745	176,153	2,381,869

Table H.2.2-2. Pumping energy requirements of the Oroville Facilities (in MWh).

(based on historic recorded data)													
Year	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
1984	142	11,257	9,542	44,885	357	5,159	13,829	28,863	32,165	19,566	7,427	4,623	177,815
1985	508	469	533	24,103	561	255	5,304	11,104	6,455	3,871	4,804	7,121	65,086
1986	617	1,168	34	31,628	45,197	12,084	21,177	27,832	15,455	4,874	6,757	6,880	173,703
1987	41,295	5,005	17,665	1,087	12,923	5,190	1,941	17,959	15,244	7,974	41,122	39,254	206,660
1988	41,592	30,947	10,297	536	3,481	7,489	905	15,280	37,522	50,013	68,451	54,478	320,991
1989	46,678	19,770	38,671	34,286	2,790	5,521	56	6,804	23,633	13,435	4,641	115	196,400
1990	30,118	54,541	37,412	26	34,728	53,897	26,938	110	148	186	204	106	238,412
1991	241	7,948	7,180	15,360	41,428	58,376	32,018	298	210	33	73	226	163,390
1992	357	4,152	57,228	11,829	9,863	33,860	16,210	137	284	21	37	275	134,254
1993	23,396	39,721	32,382	92	117	102	39	604	94	150	23,240	7	119,944
1994	14,025	7,440	26,322	31,549	15,103	34,380	12,934	24,625	31,977	25,597	32,157	54,006	310,117
1995	33,932	738	9,740	3,298	683	28	2,072	6,098	338	31	28,280	6,090	91,329
1996	43,209	0	32	2	4,512	23,432	7,417	5,221	32,299	142	7,068	3,037	126,369
1997	24	18	19,596	47,713	26,570	31,433	6,573	45,107	46,469	20,115	17,824	22,952	284,394
1998	16,025	1,521	394	25	3	19	11	1	38	64	3	1	18,104
1999	64	3	21	64	22	287	0	188	27,302	796	8,158	8,213	45,118
2000	5,566	15,988	55	6,447	136	71	330	8,983	42,951	49,877	54,654	39,767	224,825
2001	34,040	25,824	44,176	38,534	42,116	7,523	4,539	5,669	2,098	36	118	7,954	212,626
2002	17,843	15,285	17,728	21,077	14,694	1,578	0	2	3	0	11	139	88,360
2003	124	8,602	15,785	20,489	5,545	0	0	13	19	22	1	184	50,784
Average 1984-2003	17,490	12,520	17,240	16,651	13,041	14,034	7,615	10,245	15,735	9,840	15,251	12,771	162,434

3.0 COST AND AVAILABILITY OF ALTERNATIVE SOURCES OF POWER

3.1 ANNUAL AVERAGE COST OF PROJECT POWER

Table H.3.1-1 shows the current annual costs of the existing Oroville facilities. These annual costs do not include capital and annual expenditures for expected new PM&E measures.

Table H.3.1-1. Annual costs of Oroville Facilities.

Annual Cost Item	Amount
Levelized Bond Cost (1)	$10,046,000
Operations and Maintenance (2)	$14,890,000
Existing Environmental/Recreation Measures (3)	$9,090,000
Capital Improvements/Additions (4)	$5,926,000
Amortized FERC Relicensing Costs (5)	$4,722,000
FERC Annual Charges (6)	(included in O&M – see below)
Transmission Wheeling	N/A
Total	**$44,674,000**

(1) Levelized Bond Cost is based on a residual of $153,700,000 in outstanding revenue bond principal.
(3) O&M costs include operation, maintenance, & station power, but excludes pumpback energy costs
(4) Refer to Table D.4.7-1 below for the cost basis for existing environmental and recreation measures and programs; this annual figure does not include the additional capital costs associated with ongoing measures under the No-Action Alternative. They are included in the Capital Improvement line item.
(5) Estimated levelized annual value of major equipment renewals and replacements and infrastructure repairs/improvements
(6) Based on a total of $65 million in relicensing program expenditures through January 2005
(7) Annual administrative charges DWR has paid to FERC for the period beginning 1996 through 2002 are:

1996	$374,600	2000	$147400
1997	$307,300	2001	$38,300
1998	$383,200	2002	$53,200
1999	$274,700		

Based on an average annual historical generation of approximately 2,400,000 MWh, the above annual cost translates into a historical average annual power cost of $18.61 per MWh.

3.2 RESOURCES REQUIRED TO MEET CAPACITY AND ENERGY REQUIREMENTS

SWP power requirements are met by several contractual arrangements as well as the Oroville Facilities and other SWP facilities. The power purchase arrangements include capacity and energy purchases from other utilities in California, the Northwest, and the Southwest. The contractual arrangements include joint development projects, energy exchanges, purchases, and access to transmission service.

Several power purchase and sale agreements, the largest of which are the SCE power and capacity exchange contracts, expired on December 31, 2004; a different portfolio of generation resources will be made available to meet SWP energy and capacity requirements starting January 1, 2005. DWR is involved in solicitation and confidential negotiation efforts with a variety of providers of generation capacity and energy. The results of the solicitation and negotiations were not available at the time this document was prepared.

As noted above, the Oroville Facilities are a critical aspect of the SWP water storage and conveyance system. Overall, the SWP uses more energy than it produces. Thus, any decrease in power generation at the Oroville Facilities would need to be offset by increased purchases of energy from other resources and/or by construction of new power generating facilities. In 2000, the SWP required 9,190,000 MWh of generation to meet water pumping requirements and station service requirements. In the same year, the Oroville Facilities generated 2,760,000 MWh, roughly one-third of the system's total requirements.

The SWP controls the timing of its pumping load through an extensive computerized network. That control system allows DWR to minimize the cost of power it purchases by maximizing pumping during off-peak periods when power costs are lower—usually at night—and to sell power to other utilities during on-peak periods when power values are high. By taking advantage of this flexibility in scheduling SWP pumping load and generation, DWR reduces the net cost for SWP water deliveries.

On average over the five-year period beginning 1997 through 2000, the Oroville Facilities contributed approximately 50 percent of the total energy generated by SWP generation plants. The total energy generated by the Oroville Facilities and other SWP generation plants is supplemented by various power purchase agreements and arrangements to balance SWP generation resources and pumping load requirements. The contribution of the Oroville Facilities power generation toward total SWP generation can be viewed in Table 10-2 of Bulletin 132 and is available to the public through publications link at the following web site:

http://wwwswpao.water.ca.gov

Capacity and energy purchases supplementing Oroville Facilities generation is accomplished by continually pursuing economic options for power purchases under long-term or short-term arrangements. The capacity and energy purchases supplementing Oroville Facilities power generation can be viewed in Table 10-3 of Bulletin 132 and is available at the web site link above.

3.3 ANNUAL COSTS OF ALTERNATIVE SOURCES OF POWER

If the Oroville Facilities generation plants were not available, DWR would seek alternative economical generation resources to meet its pumping capacity and energy requirements. However, SWP contractors would become vulnerable to potentially higher water costs if the cost of alternative generation sources exceed the cost of

Oroville Facilities power generation. DWR's ability to protect the financial stability of SWP operations from the volatility of California's energy markets is an integral part of DWR's mission. Table H.3.3-1 shows the annual levelized cost of alternative energy over a 20 or 30 year period as published by the California Energy Commission. The levelized annual costs are based on a study by CEC entitled *Comparative Cost of California Central Station Energy Technologies*.

Table H.3.3-1. Alternative supply costs.

Technology	Energy Source	Operating Mode	Economic Life (Years)	Gross Capacity (MW)	Levelized Cost ($/MWh)
Simple Cycle	Natural Gas	Peaking	20	100	$157.10
Combined Cycle	Natural Gas	Baseload	20	500	$51.80
Wind	Wind; Resource Limited	Intermittent	30	100	$49.30
Solar Thermal	Sun; Resouce Limited	Load Following	30	110	$135.20 to $215.30
Photovoltaic	Sun; Resource Limited	Load Following	30	50	$427.20
Fuel Cell	Natural Gas	Base Load	20	25	$94.10 to $212.70

Source: Table 1 and 5, California Energy Commission, Comparative Cost of California Central Station Electricity Generation Technologies, Staff Report, Publication No. 100-03-001, August 2003, pgs. 3 and 11.

The least cost alternative energy supply would cost approximately $124 million per year on a levelized viable annual basis.

3.4 EFFECTS OF ALTERNATIVES ON CUSTOMERS

Oroville Facilities power generation plants were constructed to meet a portion of the SWP pumping capacity and energy requirements. The financial stability of SWP operations could be jeopardized if DWR was required to seek alternative power generation sources in California's volatile energy markets to replace the 762 MW capacity of the Oroville Facilities. Any power cost increases would likely have to be passed on to the SWP contractors. Under the least cost viable alternative energy supply scenario (i.e. combined cycle), the SWP contractors would incur a theoretical levelized annual cost increase of approximately $69 million per year.

4.0 INDUSTRIAL FACILITY USE

DWR does not operate any industrial facilities with power generated by the Oroville Facilities.

5.0 INDIAN TRIBE NEEDS

The California Department of Water Resources (DWR) has no claims as an Indian Tribe.

6.0 TRANSMISSION SYSTEM IMPACTS

Two sets of double circuit towers carrying three 230-kV circuits extend from the Hyatt Pumping-Generating Plant's 230-kV Switchyard to the Table Mountain Tap. One set of double circuit towers extends from the Thermalito Pumping-Generating Plant Switchyard to the Table Mountain Tap.

The distance from the Hyatt Pumping-Generating Plant 230-kV Switchyard to the Pacific Gas and Electric Company Table Mountain Substation is about nine miles. The distance from Thermalito Pumping-Generating Plant Switchyard to the Pacific Gas and Electric Company Table Mountain Substation is about 2.3 miles.

Also, two underground 15-kV power lines provide electric service to Thermalito Diversion Dam Powerplant and to the Feather River Fish Hatchery. One underground 15-kV power line, 3.9 miles long, connects Thermalito Diversion Dam Powerplant Switchyard with Hyatt Pumping-Generating Plant's Switchyard. The second underground 15-kV power line connects Thermalito Diversion Dam Powerplant with the downstream Feather River Fish Hatchery.

Power operations of the Oroville Facilities are heavily influenced by the SWP-related agreements and other commitments described in Section 3.2 above. Continued operation and maintenance of the power features of the Oroville Facilities must be consistent with the operational criteria dictated by the operation of the entire SWP. The operation of the SWP is further described in Section 2.3 of the PDEA.

7.0 PLANS TO MODIFY EXISTING PROJECT FACILITIES OR OPERATIONS

7.1 MODIFICATIONS TO PROJECT FACILITIES

DWR has no immediate plans to modify existing project facilities.

7.2 MODIFICATIONS TO PROJECT OPERATION

DWR does not propose any modifications to the Oroville Facilities that would either add new generation equipment or increase the generating capability of the existing three power plants. However, DWR does propose continuing to operate and maintain the Oroville Facilities for electric power generation with new environmental and recreational enhancements under the Proposed Action. These enhancements could be either structural and/or operational improvements that would affect future project costs and/or the amount of annual generation.

8.0 PLANS IF THERE ARE NO PROPOSED MODIFICATIONS

In order to identify issues, plan studies, and consider potential protection, mitigation, and enhancement (PM&E) measures, a Collaborative Team, including the licensee, State and federal agencies, Indian Tribes, local government officials, and interested members of the public actively participated in the relicensing process. This Collaborative Team worked together for over three years and adopted a Process Protocol that sets forth the structure and procedures for ALP. It is available for viewing at:

http://www.orovillerelicensing.water.ca.gov

During relicensing, the FPA requires FERC to consider "the plans and abilities of the applicant to operate and maintain the project in a manner most likely to provide efficient and reliable electric service." FERC licensing guidelines indicate that engineering studies for relicensing should include analyses of: 1) Project Operations; 2) Safety and Condition of Facilities and Equipment; and 3) Economics. The information to be gathered in these studies helps an applicant make a decision as to whether or not to propose project modifications, including generation improvements, in its license application.

As part of the collaborative process, Engineering and Operations Work Group participants' desired to explore the potential for developing additional generation capacity through hydropower improvements or construction additions to the Oroville Facilities. Subsequently, SP-E3 was prepared, a draft report documenting these studies conducted by DWR under SP-E3 to provide information on the issue of cost-efficient development of hydropower improvements or additions to the Oroville Facilities, in support of relicensing. SP-E3 explored the overall power potential of the Oroville Facilities in light of current technology, regulatory requirements, water delivery requirements, and expected future power market conditions. The overriding premise was to evaluate potential environmentally acceptable improvements that would not adversely affect the primary purpose of the Oroville Facilities, which is water supply.

The report does not identify any preferred option, but rather presents possible design concepts for each potential new project, and provides a discussion of major issues, fatal flaws, benefits, and costs for each option. As a result of this work, DWR has chosen not to conduct further studies at this time with the view that the full economic potential of the site has already been realized with the current development.

9.0 FINANCIAL AND PERSONNEL RESOURCES

Over the years, DWR has established automated business systems for its budgeting, accounting, and managing activities. Budgets are developed each fiscal year to the level of personnel resources needed to accomplish approved program objectives, consistent with available funds. As the year progresses, changes to work plans or activities are approved by Department management.

9.1 FINANCIAL RESOURCES

Funds from the sale of general obligation and revenue bonds have provided about 78 percent of financing for construction of the SWP, including the Oroville Facilities. Full repayment of these bond funds is being made by Project beneficiaries, rather than by the general taxpayer. Other funding sources have included tideland oil revenues, investment earnings, legislative appropriations for recreation, federal flood control payments, and SWP contractor advances. Currently, short-term financing is being obtained through commercial paper notes that are replaced periodically by long-term revenue bonds.

Annual costs of operation and maintenance include the salaries of a diversified team of engineers, biologists, and specialists trained in water development and power generation, hydroelectric plant technicians, and civil maintenance workers, as well as expenses (equipment, supplies, etc.) required to operate and maintain SWP facilities. Annual costs also include power purchases, exchanges and sales.

In calendar year 2000, annual payments by SWP contractors totaled about $670 million per year. Of that amount, operation and maintenance (O&M) costs for labor and equipment account for about 25 percent. The cost for power (power purchases minus power sales) amounts to about 32 percent. Bond debt service payments of principal and interest and repayments for other capital financing are about 37 percent. The remaining 6 percent includes deposits for replacement reserves, insurance and other miscellaneous costs.

The 29 SWP contractors repay all water supply related costs of the SWP. These repayments represent about 94 percent of the annual costs for operation and maintenance of SWP facilities. The remaining costs are funded by the federal government for joint operation of San Luis facilities (3 percent) and State general funds for recreation and fish and wildlife enhancement (3 percent).

SWP contractors also repaid principal and interest on about 89 percent of SWP capital expenditures made through 1995. Repayment of the remaining 11 percent comes from the federal government for flood control (2 percent), State general funds for recreation and fish and wildlife enhancement (5 percent), and from miscellaneous sources.

All SWP contractors pay the same rate per acre-foot for the cost of constructing and operating facilities that store and convey the SWP water supply. In addition, each SWP contractor pays a transportation charge that covers the cost of facilities required to deliver water to its service area. Thus, the SWP contractors more distant from the Harvey O. Banks Pumping Plant, which is the first SWP pumping plant on the main stem of the California Aqueduct, pay higher transportation charges than those near the Harvey O. Banks Pumping Plant.

Full payments are made each year for fixed SWP costs regardless of the variations in water deliveries that occur from year to year. Fixed costs include those for operation, maintenance and debt service. SWP contractors also pay costs that vary depending on the amount of water delivered during the year. These variable costs include the costs for energy used to pump water to their aqueduct turnout locations.

DWR performs financial analyses annually to ensure that the SWP financing program is sufficiently funded to meet construction obligations; project operation, maintenance, power, and replacement costs; and debt service payments for bonds expended for construction. In 2000, SWP costs were indirectly paid for by approximately 23 million water users served by the Project. Direct payments were received from the 29 long-term SWP contractors. DWR continues to pay bondholders as scheduled. In 2000, DWR received approximately $670 million in revenues for the SWP and spent approximately $670 million for SWP expenses.

A summary income statement is presented below. Additional information, including a detailed projection of expenses and income over the next 15 years, is available in Bulletin 132-02 from the publications link at the following web site address:

http://wwwswpao.water.ca.gov

The annual financial report for calendar year 2000 and all previous calendar years concluded that the SWP continues to be financially viable.

Table H.9.1-1. 2000 Income Statement for the State Water Project.

Revenues	Thousands of Dollars
SWP contractor payments	714,977
Revenue bond cover adjustments	(40,937)
Rate management adjustments	(33,000)
Other revenue	27,728
Total operating revenues	668,768
Expenses	**Thousands of Dollars**
Project operations, maintenance, and power	343,884
Deposits to reserves	57,959
Water bond principal	91,190
Water bond interest	175,735
Total operating expenses and debt service	668,768
Net system revenues	0

9.2 PERSONNEL RESOURCES

DWR's current workforce is comprised of approximately 2,500 positions. The job classifications are in the following general areas:

- Clerical and Office Support;
- Engineers and Scientists;
- Information Technology;
- Legal;
- Professional, Administration, and Financial Services;
- Crafts and Maintenance;
- Engineering and Scientific Technicians; and
- Printing Trades.

DWR's Oroville Field Division contains approximately 110 positions and is supported by approximately 175 positions in DWR's Division of Operations and Maintenance located at its headquarters building in Sacramento. DWR's Division of Operations and Maintenance is supported by a total of approximately 925 positions which are in its

headquarters location and in its field offices throughout Northern, Central, and Southern California. The Oroville Field Division is also supported by DWR's Northern District Office which provides assistance to local agencies and private citizens seeking information about the Oroville Facilities and the SWP in general.

DWR's current personnel resources in the Oroville Field Division, Division of Operations and Maintenance headquarters office, and other offices are more than sufficient to meet the obligations of a new license.

DWR's Training Office provides a high quality and extensive training program to meet the needs of DWR managers, supervisors and staff in all areas of professional, occupational and personal training and development. The Training Office also meets the changing needs of DWR by developing and providing instruction on new organizational, technical, business, and leadership practices and current DWR programs, policies and procedures.

10.0 ADDITIONAL LANDS NOTIFICATION

DWR is not proposing any significant purchases of new lands within the Oroville Facilities' Project Boundary.

11.0 ELECTRICITY CONSUMPTION EFFICIENCY IMPROVEMENT PROGRAM

11.1 PROMOTION AND ENCOURAGEMENT

California has an energy conservation program known as Flex Your Power which was implemented during calendar year 2001. Details of California's Flex Your Power program can be accessed at the following website:

http://www.fypower.com/

Highlights of the Flex Your Power program, as summarized on the web site, are noted below:

Flex Your Power is California's statewide energy efficiency marketing and outreach campaign. Initiated in 2001, Flex Your Power is a partnership of California's utilities, residents, businesses, institutions, government agencies and nonprofit organizations working to save energy. The campaign includes retail promotions, a comprehensive website, an electronic newsletter, educational materials and advertising. Flex Your Power has received national and international recognition, including an ENERGY STAR Award for excellence.

The campaign's primary funding comes from the Public Goods Charge as approved by the California Public Utilities Commission (CPUC), as well as contributing Municipalities and partner organizations and companies.

- During the energy crisis in 2001, 33 percent of California residents and nearly 30 percent of businesses reduced their energy consumption by 20 percent or more compared with the prior year. Ratepayers saved $600 million between January and June 2001 alone.

- For the third straight year, California leads the nation in sales of energy-efficient lighting, appliances and other products.

DWR's Office of Water Use Efficiency (OWUE) provides support for the stewardship of California's water resources and energy efficient use of water. This office is responsible for water use efficiency planning and coordination. Services include technical and financial assistance, information collection and dissemination, resources evaluation, and implementation. OWUE also provides expertise to local agencies and individuals regarding agricultural and urban water and energy conservation, reclamation and reuse of water, land and water use, and drainage management.

DWR manages the California Irrigation Management Information System (CIMIS) by collecting weather data from over 120 stations and disseminating calculated reference evapotranspiration to assist landscape and crop managers in irrigating their lands efficiently. To further its efforts in water use efficiency, OWUE assists in establishing mobile laboratories that conduct irrigation system evaluations through data analysis, demonstration projects, and research to achieve energy and water use efficiency.

OWUE also provides loans and grants to make more efficient use of water and energy resources. Additional information on DWR's water use efficiency programs can be accessed from the following web site provided below.

http://www.water.ca.gov/nav.cfm?topic=Local_Assistance&subtopic=Water_Use_Efficiency

11.2 COMPLIANCE WITH REGULATORY REQUIREMENTS FOR ENERGY CONSERVATION

DWR, as an agency of the State of California, supports the State of California's Flex Your Power program described in the previous section.

12.0 NATIVE AMERICAN TRIBES

No part of the existing Oroville Facilities is located on federally recognized tribal lands.

Several Indian tribes have expressed interest in the Oroville Facilities relicensing effort and may be affected by the project, as described below.

There are three federally-recognized Native American Tribes in Oroville who have been involved in the ALP process for the Oroville Facilities relicensing:

Berry Creek Rancheria of KonKow Maidu Indians

(Tribal Affiliation: KonKow, Tyme Maidu Indians)
Chairperson: Jim Edwards
5 Tyme Way
Oroville CA 95966-9115

Estom Yumeka (Enterprise Rancheria)

(Tribal Affiliation: Maidu)
Chairperson: Harvey Angle, Sr.
1940 Feather River Blvd., Suite B
Oroville CA 95965-4643

Mooretown Rancheria

(Tribal Affiliation: Concow Maidu)
Chairperson: Gary Archuleta
1 Alverda Drive
Oroville CA 95966-9379

In addition, another federally-recognized Native American Tribe (in Chico) has expressed interest in the ALP process for the Oroville Facilities relicensing.

Mechoopda Indian Tribe of Chico Rancheria

(Tribal Affiliation: Maidu)
Chairperson: Steve C. Santos
125 Mission Ranch Blvd.
Chico CA 95926

Also, an Oroville Tribe known as the Konkow Valley Band of Maidu is currently applying for federal recognition; they've expressed interest in the ALP and are participating actively.

Chairperson: Patsy Seek
1706 Sweem Street
Oroville, CA 95965

13.0 SAFETY OF PROJECT MANAGEMENT AND OPERATION

DWR, through its Division of Operations and Maintenance (O&M), monitors the Oroville Facilities to ensure safety and reliability. O&M staff conducts biennial and quinquennial inspections on the Oroville Facilities and prepares resultant reports to document any annual deficiencies. O&M staff collects and evaluates data on the performance of each generating and pumping unit in the Oroville Facilities plants. Engineers from the Division of Safety of Dams review instrumentation data and inspect Oroville dam annually to ensure that each dam is satisfactory for continued safe operation and evaluate any proposed modifications. Under FERC and California Water Code requirements, independent consulting engineers are retained to evaluate the safety of the Oroville Facilities' dams and power facilities every five years. These inspections allow the Oroville Facilities to be maintained at the highest level possible with available staff and resources. Finally, FERC inspects the Oroville Facilities annually. These annual inspections include a review of significant events, instrumentation data, and visual appearance of each dam, penstock, or power plant.

Operation of the Oroville Facilities are planned and scheduled in concert with other SWP facilities. Water deliveries from the Oroville Facilities complex to meet local and downstream requirements. Oroville Dam plays an important role in protecting lives and property downstream along the Feather and Sacramento rivers during periods of high flow. In addition, DWR operates the Oroville Facilities to offset some of the high energy costs associated with SWP pumping operations. Operation of the Oroville Facilities varies seasonally, weekly, and hourly depending on hydrology and the operational and regulatory objectives DWR plans to meet. Typically, releases to the Feather River are managed to conserve water while meeting instream, Sacramento-San Joaquin Delta, and other SWP requirements including flow, temperature, fisheries, recreation, water quality, and agricultural diversions.

Planning for and implementing the operations of the SWP is highly dependent on constraints placed upon the Oroville Facilities. The Oroville Facilities' operational planning is performed by the Operations Control Office (OCO). The day-to-day operation of the Oroville Facilities is done through the Oroville Field Division (OFD). Decision-making for SWP operations begins with an overall long range plan for the year. This long-range plan is used to establish general operational objectives and to assess the likelihood of achieving the operational objectives. Operations plans are developed on a weekly basis to meet the overall annual objectives. Daily schedules are subsequently developed to meet the weekly operational objectives and are adjusted in real-time as needed to respond to changes in conditions.

DWR operates the Oroville Facilities consistent with its commitment to public and employee safety. Existing measures will be expanded over time as appropriate to ensure the safe, continued operation of the Oroville Facilities.

13.1 EXISTING AND PLANNED OPERATION DURING FLOODS

The Oroville Facilities are an integral component of the flood management system for the areas along the Feather River and Sacramento Rivers downstream of Oroville Dam. During the wintertime, the Oroville Facilities are operated under flood control requirements specified by the U.S. Army Corps of Engineers (USACE). Under these requirements, Lake Oroville is operated to maintain up to 750,000 af of storage space to allow for the capture of significant inflows. Flood control releases are based on the release schedule in the flood control diagram or the emergency spillway release diagram prepared by the USACE, whichever requires the greater release. Decisions regarding such releases are made in consultation with the USACE.

The flood control requirements are designed for multiple use of reservoir space. During times when flood management space is not required to accomplish flood management objectives, the reservoir space can be used for storing water. From October through March, the maximum allowable storage limit (point at which specific flood release would have to be made) varies from about 2.8 to 3.2 maf to ensure adequate space in Lake Oroville to handle flood flows. The actual encroachment demarcation is based on a wetness index, computed from accumulated basin precipitation. This allows higher levels in the reservoir when the prevailing hydrology is dry while maintaining adequate flood protection. When the wetness index is high in the basin (i.e., wetness in the watershed above Lake Oroville), the flood management space required is at its greatest amount to provide the necessary flood protection. From April through June, the maximum allowable storage limit is increased as the flooding potential decreases, which allows capture of the higher spring flows for use later in the year. During September, the maximum allowable storage decreases again to prepare for the next flood season. During flood events, actual storage may encroach into the flood reservation zone to prevent or minimize downstream flooding along the Feather River.

Table H.13.1-1 lists the maximum flow targets at various locations along the Feather River.

Table H.13.1-1. Maximum Feather River flow rates.

Location	Max. Allowable Flow
Below Lake Oroville	150,000 cfs
Above Yuba River	180,000 cfs
Below Yuba River	300,000 cfs
Below Bear River	320,000 cfs

Source: Initial Information Package and Memo fro Maurice Roos to Lori Brown dated 7/18/03

Table H.13.1-2 presents the significant spills of record. The maximum release (excluding flows through the Hyatt Powerplant) of 150,000 cfs is considerably below the peak inflow of 266,000 cfs associated with that release. The largest total release of over 2 maf occurred between December 1996 and January 1997.

Table H.13.1-2. Significant spills of record.

Spill Begin	Period End	Peak Release (cfs)	Total Release (af)	Peak Inflow (cfs)
1-13-70	2-02-70	77,000	1,563,000	147,000
1-12-80	1-20-80	85,000	726,000	155,000
2-15-86	3-01-86	150,000	1,420,000	266,000
3-09-95	3-27-95	87,000	1,235,000	141,000
12-27-96	1-17-97	160,000	2,013,000	302,000

Source: Memo from Maurice Roos to Lori Brown dated 7/18/03

13.2 EMERGENCY NOTIFICATION AND WARNING DEVICES

The Oroville Facilities are operated by Oroville Field Division personnel comprised of highly trained and knowledgeable staff. The method of emergency notification is well regulated in accordance with comprehensive guidelines developed specifically in the Oroville Facilities' Emergency Action Plan (EAP).

The EAP defines responsibilities and provides procedures designed to identify unusual and unlikely conditions that may endanger Oroville Dam and its related facilities. The EAP also provides for orderly and timely notification procedures, mitigative action, and notification of the appropriate emergency management officials of a possible, impending, or actual failure of the dam. Response to an emergency will be based on the establishment of an Incident Command as defined in the Standardized Emergency Management System (SEMS). The EAP may also be used to provide notification when flood releases will create major flooding. The Oroville Facilities' EAP conforms to the revised guidelines which are consistent with the "Federal Guidelines for Dam Safety: Emergency Action Planning for Dam Owners," Mitigation Directorate FEMA 64, October 1998 (Section 6-3.3, page 6-12).

The Oroville Facilities' EAP contains notification charts to be used when flood releases may create major flooding downstream of the facilities. These charts contain the contact information for responsible agencies that need to mobilize in anticipation of flood releases. For changes to project releases not requiring notification of emergency personnel a warning siren was installed on the Thermalito Diversion Dam. The warning siren is used to warn recreational users on the Feather River downstream and upstream of Thermalito of imminent opening and release of water through the spillway gates.

Official operations manuals and an EAP are centrally located in the Thermalito Pumping-Generating Plant and the Area Control Center located adjacent to the Hyatt Pumping-Generating Plant entrance portal. Emergency contacts are listed at each phone location throughout the principal project features. Safety barriers consisting of floating buoys are in place upstream of the Feather River Fish Barrier Dam, the Thermalito Diversion Dam and canal headworks structure.

13.3 EFFECTS OF PROPOSED OPERATION ON THE EAP

The last complete reprint of the Emergency Action Plan (EAP) was submitted to FERC on March 10, 2000, and FERC by its letter dated April 4, 2000 acknowledged that the reformatted EAP had been prepared in accordance with the revised Chapter 6 of the FERC Engineering Guidelines. The last annual update was submitted on December 31, 2003 and FERC by its letter dated January 15, 2004 confirmed that they had updated the copies of the EAP on file in its office.

13.4 MONITORING DEVICES

The Oroville Facilities are inspected on a routine basis by trained operations and engineering staff. The Oroville Facilities are also subject to detailed inspections following the occurrence of high flow flooding events and immediately after the threshold seismic event adopted for the Oroville Facilities. Specific monitoring activities for each major project component are described below. This description is from the Sixth Part 12 Independent Consultant Report dated September 1999.

13.4.1 Oroville Dam Facilities

The internal and external drainage systems and instrumentation throughout the facility are routinely monitored according to the schedule in Table H.13.4-1.

Table H.13.4-1. Oroville Dam facilities instrumentation monitoring.

Instrument/Monitoring Type/Location	Number Originally Installed	Number Currently in Service	Minimum Monitoring Frequency
Seepage			
Foundation/Toe	1	1	Weekly
Grout Galleries	2	2	Weekly
Bypass/Access Galleries	2	2	Weekly
Terminal S (flow from broken piez. tubes)		3	Weekly
House T (flow from broken piez. tubes)		1	Weekly
Emergency Exit Tunnel	4	4	Weekly
River Outlet Chamber	1	1	Weekly
Grout Gallery Drain Holes	105	105	Quarterly
Core Block Drain Holes	26	26	Quarterly
Wet Area D.S. Face - Left	N.A.	N.A.	Annually
Hydraulic Piezometers	56	13	Weekly
Hydrodynamic Pore Pressure Cells	6	0	---
Grout Gallery Pore Pressure Cells	2	2	Quarterly
Broken Tube Bundle Monitoring			
Broken Tube Pressure Check (S & T)		5	Weekly
Core Block A/B Joint Pressure	2	2	Weekly
Sediment Transport Sample		4	Quarterly
Deformation			
Surface Settlement & Deflection	100	100	Annually
Fluid Level Settlement Devices	36	0	---
Crossarm Settlement Devices	2	0	---
Internal Horizontal Movement	14	14	Quarterly
Houses U & T	2	0	---
Core Block Extensometers	7	5	Quarterly
Core Block Joint Monitoring	38	38	Quarterly
Core Block Deformation Meters	8	0	---
Stress/Strain			
Core Block Stress Meters	20	13	Quarterly
Grout Gallery Stress Meters	21	11	Quarterly
Embankment Stress Meters - 30"	15	0	---
Embankment Stress Meters - 18"	27	10	Quarterly
Access Gallery Strain Meters	6	5	Quarterly
Grout Gallery Strain Meters	18	18	Quarterly
Thermometers			
Core Block Resistance Thermometer	62	51	Quarterly
Embankment Resistance Thermometer	13	13	Quarterly
Seismic			
Accelerometers-Force Balance	4	4	Annually
Accelerometers-Strong Motion	6	6	Annually

Table H.13.4-1. Oroville Dam facilities instrumentation monitoring.

Instrument/Monitoring Type/Location	Number Originally Installed	Number Currently in Service	Minimum Monitoring Frequency
Digital Data Acquisition System	1	1	Annually
Flood Control Outlet			
Foundation Pore Pressure Cells	10	6	Semi-annually
Bay Wall Piezometers	68	41	During flood releases
Concrete Strain Meters	61	45	Semi-annually
Bidwell Canyon Saddle Dam			
Surface Settlement & Deflection	8	8	Bi-annually
Parish Camp Saddle Dam			
Surface Settlement & Deflection	3	3	Bi-annually
Area Wide			
Crustal Movement Survey			5 Years
Hyatt Powerplant			
Stress/Strain Monitoring	210	177	Monthly
Extensometers	14	14	Quarterly
Seepage/Hyatt Sump	1	1	Weekly

Source: Sixth FERC Part 12 Safety Inspection Report

13.4.2 Thermalito Diversion Dam Facilities

In addition to routine inspections, the Diversion Dam and facilities are monitored remotely (24-hours per day) from the Oroville ACC. The Senior Operator at the ACC can dispatch personnel to the site within one-half hour should it be necessary. The drainage system in the spillway gallery is routinely monitored according to the schedule in Table H.13.4-2.

Table H.13.4-2. Thermalito Diversion Dam facilities instrumentation monitoring.

Instrument/Monitoring Type/Location	Number Originally Installed	Number Currently in Service	Minimum Monitoring Frequency
Foundation Drains			
Grout Gallery	64	64	Quarterly
Pressure Gages (Foundation Drains)			
Grout Gallery	8	6	Quarterly
Survey Monuments			
Spillway Crest Bridge	7	0	Discontinued 1979
Spillway Piers	6	6	Annually
Spillway Abutments	2	2	Annually
Powerhouse Structure	4	4	Annually
Retaining Walls (Powerhouse Area)	9	9	Annually
Penstock Area	1	1	Annually

Source: Sixth FERC Part 12 Safety Inspection Report

13.4.3 Thermalito Forebay Dam Facilities

The powerplant is manned at least one shift per day and is monitored remotely (24-hours per day) from the Oroville ACC. Similar to the Thermalito Diversion Dam, the Senior Operator can dispatch personnel to the site within one-half hour should the need arise. The toe drain and pressure relief systems are monitored daily as well. The instrumentation monitoring schedule is presented in Table H.13.4-3.

Table H.13.4-3. Thermalito Forebay Dam facilities instrumentation monitoring.

Instrument/Monitoring Type/Location	Number Originally Installed	Number Currently in Service	Minimum Monitoring Frequency
Open Standpipe Piezometers *Embankment*	154	1	Semi-monthly
Toe Drain Outlets *Embankment*	5	5	Semi-monthly (1)
Relief Well System - Pump Use *Downstream of Embankment*	1	1	Monthly
Tail Channel Seepage *Tail Channel*	3	2	Semi-monthly
Survey Monuments *Embankment*	23	23	Annually
Stress Meters *Headworks Structure*	15	0	Quarterly (2)
Strain Meters *Headworks Structure*	2	0	Quarterly (2)
Uplift Cells *Headworks Structure*	14	0	Quarterly (2)
Grout Gallery Drains *Headworks Structure*	25	25	Quarterly
Grout Gallery Drains *Approach Channel Dam*	4	4	Quarterly
Grout Gallery Piezometers *Headworks Structure*	10	10	Quarterly
Survey Monuments *Headworks Structure*	7	7	Annually
Survey Monuments *Approach Channel Dam*	5	5	Annually

(1) Flows have not been regulary measured or plotted since 1987. Drain outlets are inspected during routine semi-monthly reading of piezometers.

(2) Instruments are read quarterly by DWR. However, data is no longer analyzed.

Source: Sixth FERC Part 12 Safety Inspection Report

13.4.4 Thermalito Afterbay Dam Facilities

In addition to the routine inspections of the facilities, the toe drain and pressure relief systems are routinely monitored. The instrumentation monitoring schedule is presented in Table H.13.4-4 and Table H.13.4-5 contains the piezometer monitoring schedule.

Table H.13.4-4. Thermalito Afterbay Dam facilities instrumentation monitoring.

Instrument/Monitoring Type/Location	Number Originally Installed	Number Currently in Service	Minimum Monitoring Frequency
Pore Pressures			
Observation Wells	Unknown	0	
Open Standpipe Piezometers	146	81	See Table H.13.4-5
Settlement Monuments			
Embankment	49	49	5 Years
River Outlet	5	5	Annually
Sutter-Butte Outlet	8	8	Annually
Western-Richvale Canal Outlet	10	10	Annually
Fish Barrier Bridge	3	3	Annually
Horizontal Monuments			
River Outlet	3	3	Annually
Sutter-Butte Outlet	4	4	Annually
Western-Richvale Canal Outlet	4	4	Annually
Fish Barrier Bridge	3	3	Annually
Seepage			
Embankment Toe Drains	17	17	Weekly
Seismicity			
Accelerometers	4	4	Seismic Events

Source: Sixth FERC Part 12 Safety Inspection Report

Table H.13.4-5. Thermalito Afterbay piezometer monitoring.

Piezometers Read Weekly				
19+00	P-70	86A-283	45+00	P-73
75+00	126+00	P-71	84A-167	170+00
84A-170	84A-170A	85A-173	84A-176	176+00
220+00	84A-180	180+00	P-77	84A-187
P-91	239+00	P-90	243+00	P-15
84-291A	P-92	84A-273	277+00	84A-277
86A-287	84A-277B	84A-280	283+00	84A-283
86A-291	86A-273	84A-287	86A-277	84A-291
86A-280				
Piezometers Read Monthly (1)				
12+00	P-69	P-49	P-72	P-48
P-25	P-28	98+00	P-74	P-155
111+00	P-114	P-29	132+00	138+00
P-30	150+00	160+00	P-76	84A-C176
P-21	P-31	84A-183	198+00	P-32
P-159	203+00	214+00	216+00	P-78
P-79	P-89	84A-342	84A-C283	342+50
P-95	P-93	P-94	312+00	319+00

(1) Piezometers reading higher than 2 ft. below ground level are read weekly.

Source: Sixth FERC Part 12 Safety Inspection Report

13.4.5 Feather River Fish Barrier Dam Facilities

The Fish Barrier Dam facilities are visited daily by DWR personnel in conjunction with the Oroville-Thermalito Power Complex facilities. Field inspections are performed at least annually by trained DWR staff. DWR staff currently monitor 2 survey monuments for horizontal (JEC 25) and vertical (BM “N”) control and 13 sets of monitoring bolts installed in the dam to track horizontal and vertical movement.

13.5 EMPLOYEE SAFETY

DWR is committed to employee safety and accident prevention and has implemented a comprehensive Injury and Illness Prevention Plan (IIPP) in the Oroville Field Division. Table H13.5-1 highlights DWR’s safety programs under its IIPP. In the past five years (2000 through 2004), DWR experienced a total of 50 lost time injuries in the Oroville Field Division.

Table H.13.5.1. Safety Programs under the Injury and Illness Prevention Plan.

First Aid/Cardio Pulmonary Resuscitation	Self-Containing Breathing Apparatus
Automatic External Defibrillator	Mobile Crane
Defensive Driver Training	Overhead Bridge Crane Training and Safety
Workplace Safety	Personnel Lift Truck Training and Safety
Accident Investigation	Automotive Lift
Standardized Emergency Management System (SEMS)	Excavation/Trenching
Audiometric Testing	Boating Safety
Respirator Equipment Physical	Compressed Gas
Respirator Fitness Test	Hanta-Virus
Electrical Apparel	Hearing Conservation
Switchyard and Substation Safety	Prohibited Smoking
National Electrical Code (NEC)	Fire Prevention Plan
Grounding	Fire Protection Sprinkler System – Foam, CO_2, Halon, Fire Hydrant
Forklift Training and Safety	Fall Protection
Confined Space	Battery Handling
Lead Related Construction	Accident Prevention Signage
OP2 *(Lockout/Tagout Operating Procedures)*	Flaggers/Traffic Control
Hazardous Waste Operation and Emergency Response *(HAZWOPER)*	Emergency Action Plan/Drills
Hiliti Tool Powdered Actuated	Hazardous Communication/Right-To-Know/Material Safety Data Sheets
Chain Saw Safety	Portable Fire Extinguisher
Pesticide/Herbicide Safety	Safety Orientation *(New Hires and Transferring Employees)*
Van Pool Driver Safety	Ergonomics/Back/Repetitive Motion Injury
Asbestos Awareness	Security Awareness
Asbestos Notification	Bloodborne Pathogens
Commercial Truck Training	

Source: Oroville Field Division Safety Officer

13.6 PUBLIC SAFETY

DWR continues implementation and improvement of its Oroville Facilities' public safety efforts through its education, accident prevention, and signage programs. Recreation facilities within and near the Oroville Facilities project boundary experience an average daily visitation total of approximately 4,700 recreation days. For the 12-month period beginning May 2002 to May 2003, the total combined recreation visitation was approximately 1,730,000 recreation days.

In the past five years (2000 through 2004), there were a total of 44 reported incidents resulting in injury or death within the Oroville Facilities Project Boundary. Oroville Facilities' reporting records indicated a total of 13 deaths. And seven of the 13 deaths resulted from drowning incidents.

14.0 CURRENT MANNER OF PROJECT OPERATION

The licensed Oroville Facilities must operate within the constraints imposed by the much larger SWP, its complex operating rules, and existing environmental commitments. The SWP was authorized by the State Legislature in 1951 to "store runoff in Northern California and deliver to areas of need throughout the State." The SWP is a complex water storage and delivery system, involving 28 dams and reservoirs, 8 hydroelectric power plants (3 of which are pumping-generating plants), 17 pumping plants, and more than 600 miles of pipelines and aqueducts. The SWP is a multipurpose water project, responsible for water supply, flood management, power generation, recreation, and habitat enhancement for fish and wildlife. Notwithstanding its multipurpose nature, the top priorities are water supply and flood control, and power generation is secondary. Water releases from various SWP reservoirs and diversion dams are dictated and controlled by essentially all authorized project purposes. The SWP has conveyed an average annual 2.4 maf of water to the 29 long-term SWP contractors.

Lake Oroville stores and releases water that flows into the lake from upstream reservoir releases and runoff from the intervening area between Lake Oroville and the upper storage reservoirs. Water is released from Lake Oroville to the Feather River to meet water supply, flood protection, water quality improvement, fish and wildlife enhancement, and recreation requirements. Typically, power is generated when water is released from Lake Oroville through the Oroville Facilities for these purposes, or when the pumped-storage operations at the Hyatt and Thermalito plants are in effect.

Planning and implementing SWP operations is highly dependent on constraints placed upon the Oroville Facilities. The Oroville Facilities' operational planning is performed by the Operations Control Office (OCO). The day-to-day operation of the Oroville Facilities is done through the Oroville Field Division (OFD). Decision-making for SWP operations begins with an overall long range plan for the year. This long-range plan is used to establish general operational objectives and to assess the likelihood of achieving the operational objectives. Operations plans are developed on a weekly basis to meet the overall annual operational objectives. Daily schedules are subsequently developed to meet the weekly operational objectives and are adjusted in real-time as needed to respond to changes in conditions.

14.1 PROJECT OPERATION CURVES

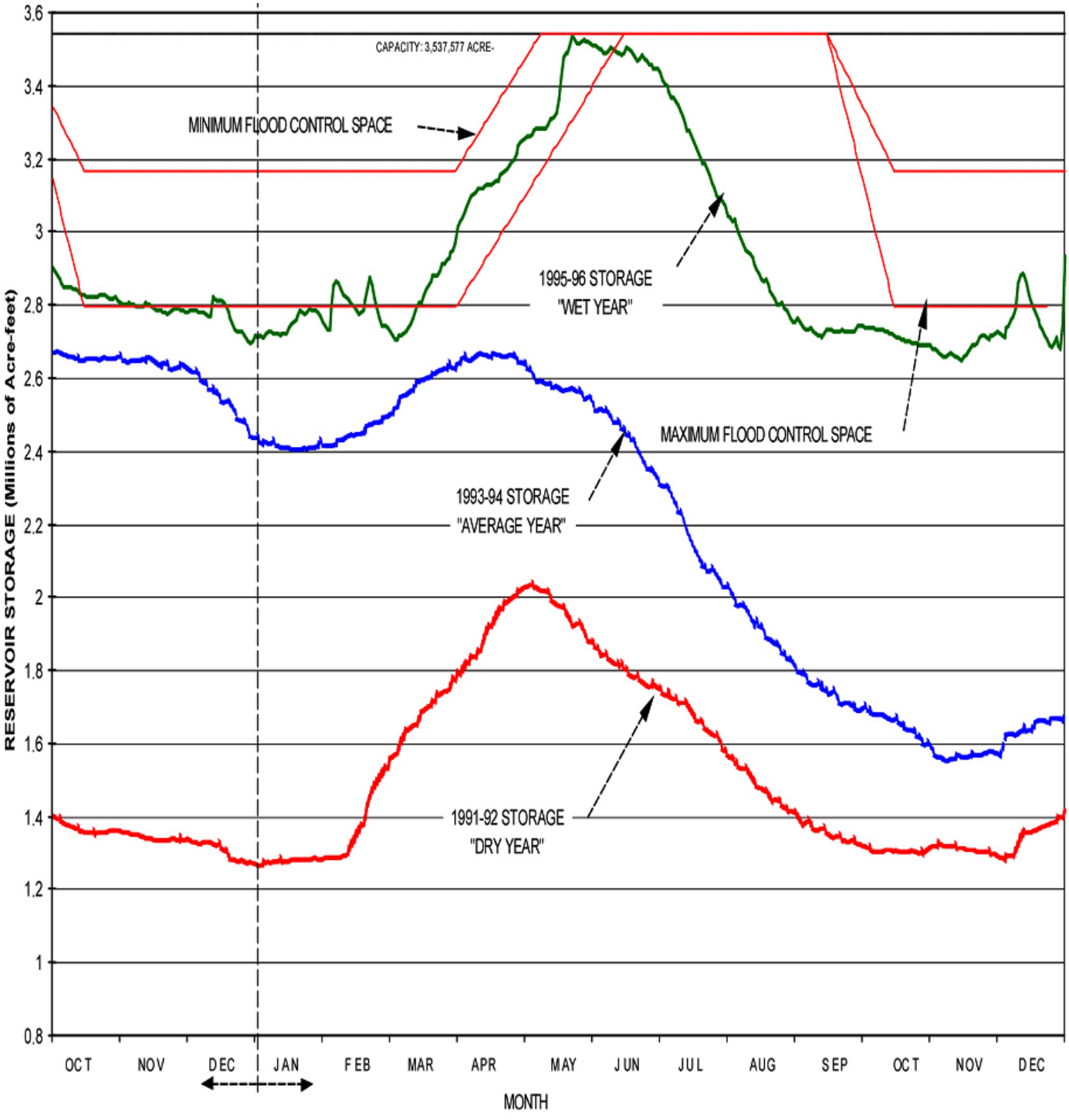

Figure H.14.1-1 Lake Oroville water levels for dry, average, and wet water years.

As seen in Figure H.14.1-1, the curve showing actual operations generally follows the shape of the flood control rule curve with:

- Lower levels in the late winter and early spring for flood control purposes;
- Higher levels in the late spring and early summer when higher flows may be captured without impacting flood protection; and
- Declining levels in the late summer and fall as the stored water is used.

Actual storage may encroach into the flood reservation during flood events to prevent or minimize downstream flooding along the Feather River.

14.2 FLOW AND TEMPERATURE REQUIREMENTS

Minimum flows in the Lower Feather River are established by a 1983 agreement between DWR and DFG, Concerning the Operation of the Oroville Division of the State Water Project for Management of Fish & Wildlife. The agreement establishes criteria for flow and temperature for the Low Flow Channel of the Feather River and the reach of the Feather River below the Thermalito Afterbay Outlet to the confluence with the Sacramento River (High Flow Channel) for preservation of salmon spawning and rearing habitat.

The agreement specifies that DWR release a minimum of 600 cfs into the Feather River from the Thermalito Diversion Dam for fisheries purposes. This is the total volume of flows from the Thermalito Diversion Dam outlet, Thermalito Diversion Dam Powerplant, and the Feather River Fish Hatchery pipeline.

Table H.14.2-1 lists the minimum instream flow requirements for the Feather River below the Thermalito Afterbay Outlet to the Feather River.

Table H.14.2-1. Feather River minimum flow requirements. (1)

Percent of Normal (2) Runoff (%)	Oct – Feb (cfs)	Mar (cfs)	Apr – Sep (cfs)
> 55	1,700	1,700	1,000
< 55	1,200	1,000	1,000

(1) If Oroville surface elevation is greater than 733 ft (msl).

(2) Normal is defined as the mean (1911 – 1960) April through July unimpaired runoff near Oroville of 1,942,000 af.

Source: Initial Information Package

The agreement includes a requirement that if during October 15 through November 30, the hourly flow is greater than 2,500 cfs then the flow minus 500 cfs must be maintained until the following March unless the high flow was due to flood management operations or mechanical problems. This requirement is to protect any spawning that could occur in overbank areas during the higher flow rate by maintaining flow levels high enough to

keep the overbank areas submerged. In practice, the flows are maintained below 2,500 cfs from October 15 to November 30 to prevent spawning in the overbank areas.

Numerical water temperature criteria specific to the Feather River have been established at two locations associated with the Oroville Facilities: at the Feather River Fish Hatchery, and at Robinson Riffle in the Low Flow Channel of the Feather River. The hatchery objectives were established in a 1983 agreement between DWR and DFG concerning the operation of the Oroville Division of the SWP for management of fish and game. The temperature objectives for the Feather River Fish Hatchery are listed in Table H.14.2-2. The temperature objective for Robinson Riffle is not to exceed 65 degrees Fahrenheit (°F) between June 1 and September 30. The temperature criterion for Robinson Riffle was included in the NOAA Fisheries 2002 and 2004 Operations Criteria and Plan (OCAP) Biological Opinions (NOAA 2002 and 2004).

Table H.14.2-2. Feather River Fish Hatchery temperature objectives (±4°F between April 1 and November 30).

Period	Temperature (°F)
April through May 15	51
May 16-31	55
June 1-15	56
June 16 - August 15	60
August 16-31	58
September	52
October - November	51
December - March	55

Source: Initial Information Package (DWR 2001)

In May 1969, DWR entered into an agreement with water districts that are now the Joint Water District Board to provide them with water based upon prior rights. The agreement discusses diversion season and amounts of diversion, but it does not set numerical criteria for water temperature of agricultural diversions. A similar agreement between DWR and the Western Canal Water District discusses the diversion season and amount of diversion without setting any specific temperature requirement. These agreements were executed in 1969 to resolve protests filed by holders of senior water rights. Issues related to these diversions are addressed under the terms of these agreements or concerns among the parties of these agreements are being addressed separately.

The 1983 agreement between DWR and DFG also established a narrative water temperature objective for the Feather River downstream of the Thermalito Diversion Dam and Thermalito Afterbay Outlet. This narrative objective requires water temperatures that are suitable for fall-run Chinook salmon during the fall (after September 15) and suitable downstream of the Thermalito Afterbay Outlet for shad, striped bass, and other warmwater species from May through August. This objective has no direct effect on operations because it is not well defined, but it has encouraged

operators to seek opportunities to provide colder water to the High Flow Channel during the fall months.

15.0 HISTORY OF PROJECT UPGRADES

15.1 EXISTING FACILITIES

The Oroville Division was first authorized by the Legislature in 1951 as part of the Feather River Project. The original application for a license from the Federal Power Commission (FPC), predecessor to the Federal Energy Regulatory Commission, to construct facilities at Oroville was dated January 31, 1952. This license application was revised August 31, 1953, and further amended October 31, 1955. In 1955 the Division of Water Resources, Department of Public Works, predecessor to Department of Water Resources, submitted a second report to the Legislature on the Feather River Project. This report found that the Feather River Project, including the Oroville Facilities, had engineering and financial feasibility and recommended that construction proceed. The Federal Power Commission issued an order to the Water Project Authority issuing a license (major) on December 14, 1956, for the Oroville Facilities (Feather River Project, Oroville division). This order covered the project for a concrete dam and power generating facilities. Subsequently the Legislature set up a new agency, the Department of Water Resources, and gave it the authority to implement the State Water Plan. On February 11, 1957, the Federal Power Commission issued a 50-year license, effective February 11, 1957, to the Department of Water Resources to construct and operate the Oroville Facilities (FERC Project No. 2100) in Butte County, California. Funds were appropriated for construction in 1957.

DWR submitted an amendment to the Federal Power Commission dated October 30, 1959, which reflected changes to include an embankment type dam as opposed to the concrete type dam previously approved and added the Thermalito power features. This amendment included an increase in the power output of the project due to the addition of the Thermalito Pumping-Generating Plant and an increase in the capacity of Hyatt Pumping-Generating Plant (formerly called Oroville Powerplant). This amendment, with subsequent modifications, was finally approved by the FPC on July 11, 1962. The approval covered the zoned earth and rockfill section for Oroville Dam and the design proposed for the Thermalito Diversion Dam.

Table H.15.1-1 gives a brief description and summary of completion dates for major features of the Oroville Facilities.

Table H.15.1-1. Oroville Facilities original construction.

Oroville Facilities	
Hyatt Pumping-Generating Plant Completed	1967
Oroville Dam Completed	1968
Thermalito Diversion Dam Facilities	
Dam Completed	1968
Powerplant Completed	1987
Thermalito Forebay Dam Facilities	
Forebay Dam Completed Pumping-Generating Plant Operations Begin	1968
Pumping-Generating Plant Construction Complete	1968 1969
Thermalito Afterbay Dam Facilities	
Afterbay Dam Completed	1968
Feather River Fish Barrier Dam Facilities	
Fish Barrier Dam Completed	1964
Fish Barrier Pool Completed	1964
Feather River Fish Hatchery Completed	1967

Table H.15.1-2 gives a brief description and summary of major O&M program upgrades since the original construction was completed.

Table H.15.1-2. Major capital additions/modifications to the Oroville Facilities.

Activity	Start of Construction	Construction Completed	Constructor
Dams, Reservoir & Power Facilities			
Motor/Generator Armature Windings (Spec. 78-51)	05-Jan-79	18-Jun-80	The Epoxylite Corporation
Furnishing 230KV Power Circuit Breaker (Spec. 82-29)	08-Oct-82	17-Oct-84	Brown Boveri Electric, Inc.
Thermalito Diversion Dam Powerplant (Spec. 84-44)	04-Dec-84	26-Aug-87	BRC-Resigned to Brown & Root, Inc.
Motor Generator Rewind Units 2, 3, and 4 (Emergency Contract), Thermalito Powerplant (Spec. 89-11)	24-Feb-89	09-Jul-90	Magnetek National Electric Const., Co.
Fiber Optic Cable (Spec. 89-18)	21-Jun-89	18-Apr-90	Clyde G. Steagal, Inc., Mid Valley Elec.
Boating Facilities Renovation – Lime Saddle Boat LA – Lake Oroville (Spec. 95-28)	19-Oct-95	17-Jul-96	Mark Guiton and Associates
Hatchery Expansion and ADA Modifications, Feather River Fish Hatchery and Oroville Area Control Center (Spec. 97-24)	06- May-98	17-Aug-99	Ginno
Turbine Refurbishment – Units 1, 3 and 5 (Spec. 98-22)	02-Feb-99	Estimated Apr 2005	Voest-Alpine MCE Corp.
Seal and Pave Roads (Spec. 99-13)	05-Aug-99	16-Aug-00	Franklin Construction
Furnishing Governor Replacement (Spec. 99-19)	24-Nov-99	08-Jan-04	Sulzer Compression, Inc
Fabrication/Rehabilitation, Thermalito Diversion Dam and Oroville Dam Spillway (Spec. 99-30)	03-Jan-00	26-Aug-02	Weston
Radial Gates Rehabilitation (Spec. 00-12)	18-Jul-00	26-Nov-01	ARB, Inc.
Radial Gate Rehabilitation (Spec. 00-11)	25-Jan-01	18-Mar-03	Dillingham Construction
Pump-Turbine Refurbishment Units 2, 4 and 6 (Spec. 01-11)	07-Nov-01	Work Continues	G.E. Hydro Power, Inc.
Fish Facilities			
Hatchery Expansion and ADA Modification, Feather River Fish Hatchery and Oroville Area Control Center (97-24)	06-May-98	17-Aug-99	Ginno & K9 Construction Inc.

Source: Final Construction Reports

Recently, there have also been several interim recreation projects that have been completed. Early in the ALP, DWR agreed to consider implementing some actions before receiving a new license provided no license amendment was needed, no environmental review was required, and there was agreement to include the actions in

the new license application when filed. These interim projects are listed below and discussed in further detail in Section 3.1.2.2 of the PDEA:

- Restroom Upgrades;
- Loafer Creek Equestrian Camp Improvements;
- Group Staging Area at Thompson Flat
- Bidwell Bar Bridge Exhibit;
- Saddle Dam Improvements;
- Lake Oroville Overlook Improvements;
- Reseed Oroville Dam;
- Model Aircraft Flying Facility Improvements;
- Promote Existing Recreation Facilities;
- Boating Safety Training;
- Maidu Sewim-Bo River Path; and
- FRH Landscaping Improvements.

15.2 PROPOSED NEW FACILITIES AND CONSTRUCTION SCHEDULE

At present, the Department of Water Resources is not proposing any changes to the Oroville Facilities.

16.0 SUMMARY OF HISTORICAL LOST GENERATION

For the five-year period beginning 1998 through 2002, there were no major unscheduled outages at the Oroville Facilities that extended beyond 14 days.

Table H.16.0-1 shows the total hours of unscheduled outages for each of the Oroville Facilities plants.

Table H.16.0-1. Total hours of unscheduled outages for the Oroville Facilities, 1998-2002.

Plant	1998	1999	2000	2001	2002
Hyatt Pumping-Generating Plant	11	56	84	396	135
Thermalito Pumping-Generating Plant	48	30	152	50	126
Thermalito Diversion Dam Powerplant	0	4	2	28	0
Total	59	90	238	474	261

Source: DWR Division of Operations and Maintenance, Water and Plant Office

17.0 FERC LICENSE COMPLIANCE RECORD

DWR has a relatively good record of compliance with the terms and conditions of its existing FERC License for the Oroville Facilities, as it has been amended over the past 47 years. Demonstrating its commitment to continued improvement in this area, in 1998, DWR commissioned an audit of its compliance activities for all of its licensed hydroelectric projects, including Project No. 2100. Results indicated that with only a few exceptions mainly occurring many years ago, DWR's record of compliance with the Standard License Articles has been quite satisfactory. A listing of non-compliance events generally included the following:

- Transfers of property;
- Construction and operation of recreational facilities;
- Ensuring safe public access to the Facilities; and
- Compliance with FERC-imposed deadlines for submission of Project information.

As of the date of the filing of this License Application, DWR addressed and resolved all non-compliance events.

18.0 HISTORICAL PROJECT ACTIONS AFFECTING PUBLIC

The continued operation of the Oroville Facilities for electric power generation alleviates the need for new power resources that would otherwise be required to replace the 762 MW of capacity and roughly 2.4 million MWh per year of energy generated by the three Oroville power plants. This power capacity and generation is vital to the State of California, in that it provides a large portion of the electricity needed to pump water throughout the SWP service area at a lower cost than potential replacement power sources.

Continued operation of the Oroville Facilities for electric power generation is critical to DWR achieving its central mission of providing a reliable and affordable supply of water to water customers in the State of California.

By generating hydroelectric power, the Oroville Facilities help reduce the amount of generation that is needed from fossil fuel power plants, thereby avoiding the emission of such pollutants as hydrocarbons, nitrogen oxides, carbon monoxide, and particulate matter. Hydroelectric generation at the Oroville Facilities possibly avoids the construction of new power plant facilities, thus avoiding other adverse environmental effects. Power from the Oroville Facilities contributes to a diversified generation mix and helps meet power needs within and beyond the immediate region. Regional power benefits from the Oroville Facilities include those often referred to as ancillary system benefits, including spinning reserves, nonspinning reserves, peaking capacity, regulation, and grid stability.

19.0 COST REDUCTIONS UPON LICENSE TRANSFER

If DWR does not receive a new license for the Oroville Facilities, its annual costs would be reduced by $30,930,000 because DWR would no longer be responsible for operating the Oroville Facilities or paying the associated administrative fees or land use fees. However, DWR would simultaneously incur a new annual cost far greater than the combined annual operating and ownership costs for the Oroville Facilities because it would be required to replace the power generated by the Project. The magnitude of the increased annual cost would depend upon the source of the replacement power, as described above.

20.0 ANNUAL FEES PAID UNDER PART I OF THE FPA

The Federal lands within the Oroville Facilities project boundary include a total of 6,200 acres. Both the U.S. Forest Service (USFS) and the U.S. Bureau of Land Management (BLM) manage federal lands within the project boundary. BLM property area totals 4,600 acres. USFS property area totals 1,600 acres. Most of the land within the project boundary is managed at the state level, with the state Department of Parks and Recreation (DPR) managing recreation use of project area lands, primarily under fee title ownership of the DWR.

Annual land charges DWR has paid to FERC for the past seven years are summarized in Table H.20.0-1:

Table H.20.0-1. Oroville Facilities annual land charges.

Calendar Year	Amount	Calendar Year	Amount
1996	$111,443	2000	$134,241
1997	$139,927	2001	$9,158
1998	$154,113	2002	$16,555
1999	$131,615		

Source: DWR State Water Project Analysis Office, Project Cost Branch

Total annual administrative charges, which include the land charges in the table above, DWR has paid to FERC for the past seven years are summarized in Table H.20.0-2:

Table H.20.0-2. Oroville Facilities annual FERC charges.

Calendar Year	Amount	Calendar Year	Amount
1996	$374,561	2000	$147,428
1997	$307,284	2001	$ 38,296
1998	$383,200	2002	$ 53,230
1999	$274,723		

Source: DWR State Water Project Analysis Office, Project Cost Branch.

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