SACRAMENTO MUNICIPAL UTILITY DISTRICT
UPPER AMERICAN RIVER PROJECT
(FERC NO. 2101)

APPLICATION FOR NEW LICENSE

EXHIBIT H
GENERAL INFORMATION

Sacramento Municipal Utility District
Sacramento, California

June 2005

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EXHIBIT H
GENERAL INFORMATION

1.0 REGULATIONS DEFINING THE CONTENT OF EXHIBIT H

The Sacramento Municipal Utility District (SMUD) prepared Exhibit H as part of its application for a new license from the Federal Energy Regulatory Commission (FERC) for the Upper American River Project (UARP or project), FERC Project No. 2101. As a result of the Electric Consumers Protection Act (ECPA) passed by Congress in 1986, the Commission requires that all existing licensees applying for a new license provide the information included in this exhibit. This exhibit is prepared in conformance with Title 18 of the Code of Federal Regulations (CFR), Subchapter B (Regulations Under the Federal Power Act), Part 16 (Procedures Relating to Takeover and Relicensing of Licensed Projects), Subpart B (Applications for Projects Subject to Sections 14 and 15 of the Federal Power Act). In particular, this Exhibit H conforms to the regulations in § 16.10 and provides information to be provided by an applicant for a new license. As a reference, 18 CFR § 16.10 states:

(a) *Information to be supplied by all applicants*. All applicants for a new license under this part must file the following information with the Commission:

- (1) A discussion of the plans and ability of the applicant to operate and maintain the project in a manner most likely to provide efficient and reliable electric service, including efforts and plans to:
  - (i) Increase capacity or generation at the project:
  - (ii) Coordinate the operation of the project with any upstream or downstream water resource projects; and
  - (iii) Coordinate the operation of the project with the applicant's or other electrical systems to minimize the cost of production.
- (2) A discussion of the need of the applicant over the short and long-term for the electricity generated by the project, including:
  - (i) The reasonable costs and reasonable availability of alternative sources of power that would be needed by the applicant or its customers, including wholesale customers, if the applicant is not granted a license for the project;
  - (ii) A discussion of the increase in fuel, capital, and any other costs that would be incurred by the applicant or its customers to purchase or generate power necessary to replace the output of the licensed project, if the applicant is not granted a license for the project;
  - (iii) The effect of each alternative source of power on:
    - (A) The applicant's customers, including wholesale customers;
    - (B) The applicant's operating and load characteristics; and
    - (C) The communities served or to be served, including any reallocation of costs associated with the transfer of a license from the existing licensee.
- (3) The following data showing need and the reasonable cost and availability of alternative sources of power:
  - (i) The average annual cost of the power produced by the project, including the basis for that calculation;
  - (ii) The projected resources required by the applicant to meet the applicant's capacity and energy requirements over the short and long-term including:
    - (A) Energy and capacity resources, including the contributions from the applicant's generation, purchases, and load modification measures (such as conservation, if considered as a resource), as separate components of the total resources required;
    - (B) A resource analysis, including a statement of system reserve margins to be maintained for energy and capacity; and
    - (C) If load management measures are not viewed as resources, the effects of such measures on the projected capacity and energy requirements indicated separately;

- (iii) For alternative sources of power, including generation of additional power at existing facilities, restarting deactivated units, the purchase of power off-system, the construction or purchase and operation of a new Powerhouse, and load management measures such as conservation:
  - (A) The total annual cost of each alternative source of power to replace project power;
  - (B) The basis for the determination of projected annual cost; and
  - (C) A discussion of the relative merits of each alternative, including the issues of the period of availability and dependability of purchased power, average life of alternatives, relative equivalent availability of generating alternatives, and relative impacts on the applicant's power system reliability and other system operating characteristics; and
- (iv) The effect on the direct providers (and their immediate customers) of alternate sources of power.

(4) If an applicant uses power for its own industrial facility and related operations, the effect of obtaining or losing electricity from the project on the operation and efficiency of such facility or related operations, its workers, and the related community.

(5) If an applicant is an Native American tribe applying for a license for a project located on the tribal reservation, a statement of the need of such tribe for electricity generated by the project to foster the purposes of the reservation.

(6) A comparison of the impact on the operations and planning of the applicant's transmission system of receiving or not receiving the project license, including:
- (i) An analysis of the effects of any resulting redistribution of power flows on line loading (with respect to applicable thermal, voltage, or stability limits), line losses, and necessary new construction of transmission facilities or upgrading of existing facilities, together with the cost impact of these effects;
- (ii) An analysis of the advantages that the applicant's transmission system would provide in the distribution power; and
- (iii) Detailed single-line diagrams, including existing system facilities identified by name and circuit number, that show system transmission elements in relation to the project and other principal interconnected system elements. Power flow and loss data that represent system operating conditions may be appended if applicants believe such data would be useful to show that the operating impacts described would be beneficial.

(7) If the applicant has plans to modify existing project facilities or operations, a statement of the need for, or usefulness of, the modifications, including at least a reconnaissance-level study of the effect and projected costs of the proposed plans and any alternate plans, which in conjunction with other developments in the area would conform with a comprehensive plan for improving or developing the waterway and for other beneficial public uses as defined in section 10(a)(1) of the Federal Power Act.

(8) If the applicant has no plans to modify existing project facilities or operations, at least a reconnaissance-level study to show that the project facilities or operations in conjunction with other developments in the area would conform with a comprehensive plan for improving or developing the waterway and for other beneficial public uses as defined in section 10(a)(1) of the Federal Power Act.

(9) A statement describing the applicant's financial and personnel resources to meet its obligations under a new license, including specific information to demonstrate that the applicant's personnel are adequate in number and training to operate and maintain the project in accordance with the provisions of the license.

(10) If an applicant proposes to expand the project to encompass additional lands, a statement that the applicant has notified, by certified mail, property owners on the additional lands to be encompassed by the project and governmental agencies and subdivisions likely to be interested in or affected by the proposed expansion.

(11) The applicant's electricity consumption efficiency improvement program, as defined under section 10(a)(2)(C) of the Federal Power Act, including:
(i) A statement of the applicant's record of encouraging or assisting its customers to conserve electricity and a description of its plans and capabilities for promoting electricity conservation by its customers; and
(ii) A statement describing the compliance of the applicant's energy conservation programs with any applicable regulatory requirements.

(12) The names and mailing addresses of every Native American tribe with land on which any part of the proposed project would be located or which the applicant reasonably believes would otherwise be affected by the proposed project.

(b) *Information to be provided by an applicant who is an existing licensee.* An existing licensee that applies for a new license must provide:

(1) The information specified in paragraph (a).
(2) A statement of measures taken or planned by the licensee to ensure safe management, operation, and maintenance of the project, including:
  (i) A description of existing and planned operation of the project during flood conditions;
  (ii) A discussion of any warning devices used to ensure downstream public safety;
  (iii) A discussion of any proposed changes to the operation of the project or downstream development that might affect the existing Emergency Action Plan, as described in Subpart C of Part 12 of this chapter, on file with the Commission;
  (iv) A description of existing and planned monitoring devices to detect structural movement or stress, seepage, uplift, equipment failure, or water conduit failure, including a description of the maintenance and monitoring programs used or planned in conjunction with the devices; and
  (v) A discussion of the project's employee safety and public safety record, including the number of lost-time accidents involving employees and the record of injury or death to the public within the project boundary.
(3) A description of the current operation of the project, including any constraints that might affect the manner in which the project is operated.
(4) A discussion of the history of the project and record of programs to upgrade the operation and maintenance of the project.
(5) A summary of any generation lost at the project over the last five years because of unscheduled outages, including the cause, duration, and corrective action taken.
(6) A discussion of the licensee's record of compliance with the terms and conditions of the existing license, including a list of all incidents of noncompliance, their disposition, and any documentation relating to each incident.
(7) A discussion of any actions taken by the existing licensee related to the project which affect the public.
(8) A summary of the ownership and operating expenses that would be reduced if the project license were transferred from the existing licensee.
(9) A statement of annual fees paid under Part I of the Federal Power Act for the use of any Federal or Native American lands included within the project boundary.

Essential descriptions of the UARP are included below. Please refer to Exhibits A, B, and C of the License Application for detailed descriptions of project facilities and features, project operations, and a construction history and construction schedule for the proposed Iowa Hill Development, respectively. Detailed design drawings and project maps for all eight developments are addressed in Exhibits F and G, respectively.

All elevation data in this exhibit are in National Geodetic Vertical Datum of 1929 (NGVD 29) unless otherwise specified.

2.0 EFFICIENT AND RELIABLE ELECTRIC SERVICE *[18 CFR § 16.10 (A) 1]*

SMUD has owned and operated the UARP since the license was granted in 1957. Commercial operation began in 1963, giving SMUD lengthy experience in project operation. Prior to 1990, SMUD operated under an Integration Agreement with Pacific Gas and Electric Company (PG&E), under which all of SMUD's generating resources, including the UARP, were operated in an integrated fashion with PG&E's resources. Between 1990 and 2002, SMUD operated its system under an Interconnection Agreement with PG&E as a "sub-control area." Contractually, SMUD had responsibility for running its system like a control area, having an obligation to balance loads, generation, and interchange on an instantaneous basis under the same performance criteria as a control area. In June 2002, SMUD began operation as a control area within the Western Electricity Coordinating Council (WECC). Operational requirements include providing control area services (e.g., running the project as a primary source of operating reserves, providing regulation and spin, supporting other reliability needs of the system, including providing dependable capacity during peak load periods.) Within these constraints, SMUD operates its UARP as an integrated part of its resource portfolio, which includes SMUD-owned generation and purchased power. To maintain a safe, reliable, and economic supply of electricity to its customers, operation of the UARP is integrated into all aspects of SMUD's planning, including short-term and long-term energy procurement, and delivery and reliability planning.

Like virtually all large hydro systems, SMUD's UARP is energy limited – the hydrology of the drainage basins supplying the UARP are such that there is insufficient water to operate the project for continuous 24-hours-per-day/7-days-per-week electric production at full capacity.

SMUD maintains its own Energy Trading and Scheduling operation separate from its System Operations and Reliability group. The Energy Traders and Schedulers are fully knowledgeable of SMUD system capabilities, including UARP operating characteristics and water availability. The Trading and Scheduling group makes short-term operating decisions for all resources based upon the plan developed/updated in the short-term planning process.

Real-time transmission and generation operations and system dispatch is managed by SMUD's System Operations and Reliability group. Operating with day- and hour-ahead schedules developed by the Energy Trading and Scheduling group, the System Operations & Reliability group runs the system and manages the coordination of clearance and outage requests.

SMUD maintains a hydro operations staff of 83 employees located at its Fresh Pond Hydro Maintenance Facility near Pollock Pines, California. The complement of maintenance and operations (O&M) staff includes: hydro operators, electricians, mechanics, building maintenance mechanics; technicians; and civil maintenance staff. In addition, SMUD has engineering staff located at the Fresh Pond facility, as well as engineering staff located at its Sacramento headquarters, that support the engineering needs of the UARP system.

2.1 SMUD's Plans to Increase Project Capacity and Generation *[18 CFR § 16.10 (a) (1) (i)]*

By approximately 2015, SMUD plans to add the 400 MW Iowa Hill Pumped-storage Development to the existing UARP facilities. This development and its planned operations are described in detail in Exhibits A and B, respectively. Project economics are discussed in Exhibit D.

This development will provide SMUD with 400 MW of additional local peaking capacity to meet SMUD's summer peak load, which grows by about 60 MW per year. As discussed in

Exhibit D, this development will also play a significant role in assisting SMUD in achieving its overall long-term strategic, reliability and portfolio planning objectives by:

(a) Meeting State public policy objectives and energy challenges in the Northern California region;
(b) More comprehensively developing the waterway by expanding project capabilities without a significant impact on the environment;
(c) Producing significant local generation in the Sacramento region to maintain system reliability as well as alleviate anticipated voltage and transmission constraints during peak-demand periods;
(d) Aiding management of greatly increased minute-by-minute load balancing and control area challenges presented by wind and other non-dispatchable generation technologies that are needed to meet SMUD's renewable portfolio standards;
(e) Shifting energy from low-demand to significantly more valuable peak-demand periods when appropriate;
(f) Reducing emission burdens by displacing the need for additional thermal peaking power plants in the Sacramento region, which is a non-attainment area; and
(g) Providing generation diversity within SMUD's resource portfolio.

2.2 SMUD's Plans to Coordinate Project Operation with Upstream and Downstream Water Projects *[18 CFR § 16.10 a (1) (ii, iii)]*

Four other significant water projects exist in the American River basin, one upstream and three downstream of the UARP. At present, SMUD coordinates the operation of the UARP with these projects to varying degrees of informational exchange based upon formal agreements and informal coordination. A description of the level of existing coordination between SMUD and these four projects is described below along with any proposed changes to the existing relationships.

The El Dorado Irrigation District (EID) has operated the El Dorado Project (FERC Project No. 184), located in the headwaters of the South Fork of the American River, since the late 1990s. SMUD and EID coordinate emergency operations as detailed in their respective Emergency Action Plans (EAP). SMUD and EID participate in a desktop EAP exercise annually and in a more formal exercise once every five years. EID does not coordinate its routine operations at Silver Lake, Caples Lake, Lake Aloha, Echo Lake, or the Akin Powerhouse with SMUD. The storage capacity of these four reservoirs is small, and releases from Akin Powerhouse do not affect storage at SMUD's Slab Creek Reservoir (which lies directly downstream of the powerhouse) to a degree that warrants coordinated operations.

The Placer County Water Agency (PCWA) operates the Middle Fork Project (FERC Project No. 2079) on the Middle Fork of the American River. The upper portions of the UARP lie upstream of PCWA's facilities on the Rubicon River. The UARP diverts water from the Rubicon River watershed to the South Fork American River watershed through the combined operation of the Loon Lake and Robbs Peak developments. SMUD does not coordinate the operation of the UARP with PCWA. SMUD and PCWA have an agreement in place (May 21, 1962), which establishes that PCWA's water rights for the Middle Fork Project are subordinate to those of SMUD and the City of Sacramento.

PG&E operates the Chili Bar Project (FERC Project No. 2155) immediately downstream of the UARP White Rock Powerhouse. Chili Bar Reservoir serves as an afterbay to the White Rock Powerhouse. At present, SMUD provides discharge schedules on a daily basis (with hourly updates) to PG&E that allows PG&E to operate the Chili Bar Project to meet generation goals, comply with FERC license articles, and provide recreational releases. For the future, SMUD and PG&E intend to adopt a more formal coordination process for the two hydroelectric projects as part of their parallel and simultaneous relicensing processes. A full description of the future coordination process proposed by the licensees is presented in the Preliminary Draft Environmental Assessment (PDEA) of the License Application. With this more formal coordination process in place, SMUD and PG&E will produce energy more efficiently at the Chili Bar Project primarily by reducing the frequency and volume of spill at Chili Bar Dam. SMUD and PG&E also coordinate emergency operations, as detailed in their respective EAPs. SMUD, PG&E, and EID participate in a desktop EAP exercise annually, and in a more formal exercise once every five years.

The City of Sacramento has consumptive rights to water from Silver Creek, the South Fork American River, and the Rubicon River (State Water Resources Control Board Permits 11359 and 11360). SMUD has no obligation to make specific releases from the UARP to comply with these water rights, but does coordinate informally with the United States Bureau of Reclamation (USBR), which operates Folsom Lake, the point where the City of Sacramento takes its water.

The USBR Central Valley Project operates Folsom Lake at the confluence of the North and South Forks of the American River. Folsom Lake is managed and operated for the primary purposes of flood control, water supply, water transfer, and environmental protection. A portion of the management plan employed by the USBR is tied to an index of the seasonal storage volumes of four key reservoirs in the upper American River basin, which include SMUD's Union Valley and Ice House reservoirs. In general, this Four Reservoir Index is a continuous measure of the total upstream storage volume maintained by the USBR, and used by USBR in the winter and spring to set storage levels of Folsom Lake. Information on the storage volumes of the four reservoirs is posted by the California Data Exchange Center, a website operated by the California Department of Water Resources. SMUD also meets regularly with the USBR and other agencies and organizations throughout the year as part of the American River Operations Group, at which time general information on storage levels and snowpack in the reservoir watersheds is shared and discussed. In addition, SMUD is an active participant in the California Cooperative Snow Survey Program, which coordinates the efficient collection and sharing of snowpack information by utilities and water agencies in the state in order to accurately predict and plan for the spring snowmelt.

3.0 SMUD'S NEED FOR THE POWER
[18 CFR § 16.10 (A) (2)] AND [18 CFR § 16.10 (A) (3)]

Due to the interrelated nature of the information, sections 18 CFR § 16.10 (a) (2) and 18 CFR § 16.10 (a) (3) will be presented together in the following section.

SMUD was formed in 1923 and began providing electricity to customers on December 31, 1946. Since then, SMUD has grown to become the nation's sixth largest community-owned, not-for-profit, electric utility in terms of customers served. SMUD's purpose is to provide solutions for its customers' electrical energy needs. As described above, the UARP and proposed Iowa Hill Development are critical elements of the resource mix necessary for SMUD to fulfill its purpose.

SMUD generates, transmits, and distributes electric power to a 900-square-mile service area including Sacramento County and small portions of Placer and Yolo counties. General information concerning SMUD and its customer-owners as of March 2005 includes:

- Service area population: 1.5 million
- Service area (in square miles): 900
- Total number of customers: 567,176 (503,790 residential, 63,386 commercial)
- Full-time employees: 2,149
- Transmission bulk substations: 10
- Transmission lines (in circuit miles): 500
- Distribution lines (in circuit miles): 9,885
- Peak demand: 2,809 megawatts (July 22, 2003)

As of 2002, SMUD operates as its own control area separate from the California Independent System Operator (CISO) to better provide reliable, cost-effective electric service to its customer-owners. As the operator of its own control area, SMUD provides "balancing services", whereby SMUD must control how much power comes from each source to keep the system running smoothly and to ensure no electric lines are overloaded. SMUD also controls the flow of electricity on the Western Area Power Administration (WAPA) transmission lines inside California. Control area services include facilities that can generate additional power at a moment's notice to respond to increases in demand.

Hydroelectric facilities are essential to providing minute-by-minute load balancing services because these facilities provide instantaneous power: the operator opens the gates and the water flows through the turbines, which immediately generates power. In contrast, thermal powerplants, fired with natural gas, biomass, or geothermal fluids, can only increase the amount of generation in accordance with a specific curve that allows the equipment to warm up without damage. Therefore, a small combustion turbine may take up to a half-hour to come up to full power and a larger combined cycle machine can take 1 - 4 hours (depending upon how long the equipment has been shut down). In addition, balancing the load within a control area requires power generation sources to be placed at specific locations to keep the system in balance.

Preservation of the existing UARP's capacity and creation of the additional pumped-storage capacity provided by the proposed Iowa Hill Development are critical to SMUD given projected increases in demand for electricity. The population of the Sacramento region has been growing at an annual rate of approximately two percent and is expected to continue growing at this rate throughout the next decade and beyond. As a result, increasing long-term generation and control area needs are anticipated.

A detailed discussion related to the cost and the viability of Proposed Action and various alternative sources of power is included in Section 3.2 below.

3.1 SMUD Energy and Capacity Needs

Tables H3.1-1 presents SMUD's forecast of the annual system energy and peak load requirements for the period 2007-2016. The energy and peak load forecast includes sales to retail customers plus losses under normal load conditions (i.e., one in two weather conditions).

Table H3.1-1. Projected annual SMUD system energy and peak load requirements.

Year	***Energy* (GWh)**	**Peak Load (MW)**	**System Load Factor (%)**
2007	11,482	3,080	43%
2008	11,740	3,143	43%
2009	11,930	3,204	43%
2010	12,160	3,268	42%
2011	12,391	3,330	42%
2012	12,659	3,389	43%
2013	12,853	3,450	42%
2014	13,088	3,510	43%
2015	13,279	3,572	42%
2016	13,547	3,635	43%

3.1.1 SMUD Energy Resources

To meet SMUD's energy and capacity needs, SMUD relies upon a resource mix that includes SMUD/JPA owned generation, long-term contracts, and short-term market purchases. SMUD-owned generation resources include natural gas-fired generation, hydroelectric generation, and renewable energy from biomass, wind, and solar. Figure H3.1.1-1 shows the projected distribution of energy resources SMUD will utilize in 2007 to meet customer-owner energy needs.

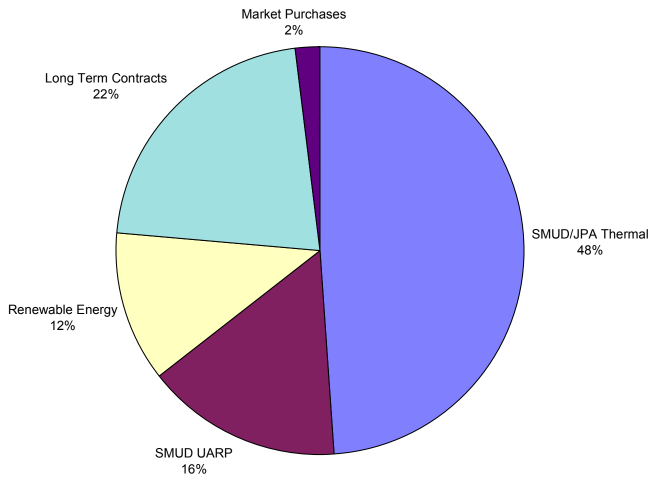


Figure H3.1.1-1. Projected distribution of generating resources in 2007.

In 2007, almost half of SMUD's annual energy needs are expected to be met by the natural gas-fired Cosumnes Power Plant and JPA cogeneration facilities. The second largest resource is long-term power contracts, which make up 22 percent of SMUD's portfolio. Assuming an average water year, hydroelectric generation from the UARP makes up 16 percent of the resource mix. Renewable resources represent an additional 12 percent of SMUD's energy needs and are expected to come from a variety of sources, including SMUD-owned photovoltaic and Solano Wind Farm facilities and long-term contractual purchases with renewable energy credits. The final category is short-term market purchases, which represent the last two percent.

Table H3.1.1-1 presents SMUD's energy balance table for selected years between 2007 and 2015. This table shows a significant increase in energy from renewable resources from 1,378 GWh in 2007 to 2,656 GWh by 2015, an increase from 12 to 20 percent of SMUD's resource portfolio to meet annual system energy requirements. This 2,656 GWh also meets SMUD's current Renewable Energy Portfolio goal of providing 20 percent of its annual system energy requirement from renewable generating resources by no later than 2011. In addition, this table shows a substantial decrease in energy from existing long-term energy contracts, from 2,470 GWh in 2007 to 835 GWh in 2015.

As discussed in Exhibit D of this License Application, the addition of the Iowa Hill Development in 2015 increases the annual UARP generation from 1,794 GWh on an average water year to 2,779 GWh. Generating these amounts of super-peak energy from the Iowa Hill Development will require an additional 1,246 GWh of energy for pumping purposes.

As shown in Table H3.1.1-1, new unspecified projects and market purchases range from 234 GWh to 1,362 GWh from 2007 to 2015, even with the addition of the proposed Iowa Hill Development and renewable resources developments. To ensure long-term reliability and economical energy supply, SMUD is currently evaluating various new projects and alternatives, including adding incremental generation resources at the Cosumnes Power Plant and/or at the JPA cogeneration facilities; the development of distributed generation projects; increased usage of energy efficiency; and long-term contractual and market purchases.

Table H3.1.1-1. Projected system energy (GWh) balance table, 2007-2015.

Resources	2007	2009	2011	2013	2015
SMUD/JPA Thermal	5,606	5,633	5,633	5,648	5,647
SMUD UARP[1]	1,794	1,794	1,794	1,794	2,779
Renewable Energy	1,378	1,909	2,478	2,571	2,656
Long-term Contracts	2,470	2,311	1,569	1,390	835
New Unspecified Projects and Market Purchases	234	283	917	1,450	1,362
Total Projected System Energy Requirement	11,482	11,930	12,391	12,853	13,279

[1] The 2015 projected SMUD UARP energy includes the expected annual generation from the Iowa Hill Development. The 1,246 GWh of pumping energy is a wholesale transaction, and is therefore not included in the 2015 projected total system energy requirement.

In Table H3.1.1-2, energy resources are presented as a percent of SMUD's total system energy requirement.

Table H3.1.1-2. Allocation of resources as a percentage of SMUD's total system energy requirement, 2007-2015.

Resources	2007	2009	2011	2013	2015
SMUD/JPA Thermal	49%	47%	45%	44%	43%
SMUD UARP [1]	16%	15%	14%	14%	12%
Renewable Energy	12%	16%	20%	20%	20%
Long-term Contracts	22%	19%	13%	11%	6%
New Unspecified Projects and Market Purchases	2%	2%	7%	11%	20%
Total	100%	100%	100%	100%	100%

Note: may not add up to 100% due to rounding.
[1] The 2015 projected SMUD UARP energy includes the expected annual generation from the Iowa Hill Development. The 1,246 GWh of pumping energy is a wholesale transaction, and is therefore not included in the 2015 projected total system energy requirement.

3.1.2 SMUD Capacity Resources

Table H3.1.2-1 shows SMUD annual system peak loads and system requirements, which are expected to increase from 3,080 MW in 2007 to 3,635 MW by 2016, an increase of about two percent per year. In addition to the resources utilized to meet customer loads, SMUD plans to procure sufficient reserves to meet applicable industry standards and/or regulatory requirements as they develop over time. At this time, SMUD is estimating it will need an additional ten percent to meet its long-term resource adequacy requirements.

Table H3.1.2-1. Projected annual system peak loads and requirements, in megawatts.		
Year	**System Peak**	**System Requirements**
2007	3,080	3,388
2008	3,143	3,457
2009	3,204	3,524
2010	3,268	3,595
2011	3,330	3,663
2012	3,389	3,728
2013	3,450	3,795
2014	3,510	3,861
2015	3,572	3,929
2016	3,635	3,999

SMUD calls upon a variety of resources to meet peak load, including generation capacity from the Cosumnes Power Plant, the McClellan CT, JPA cogeneration facilities, the UARP system, long-term contracts, short-term capacity contracts, and load reductions using SMUD's load management program.

Figure H3.1.2-1 shows the mix of peak resources in SMUD's portfolio in 2007.

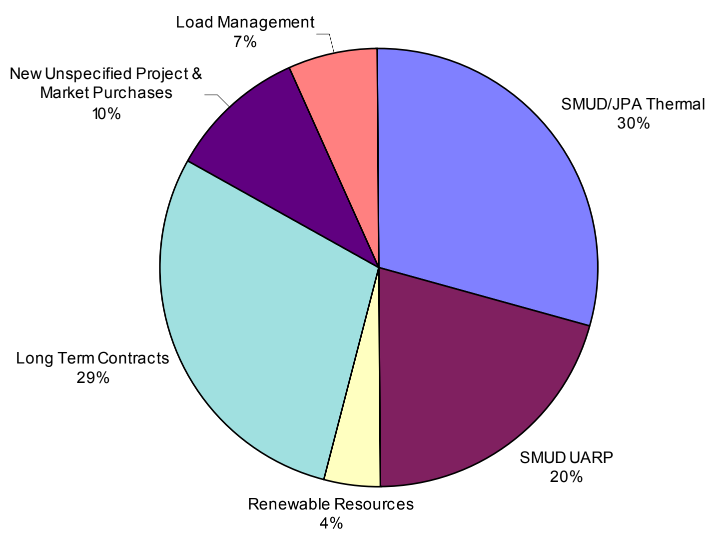


Figure H3.1.2-1. Distribution of 2007 capacity resources, by type.

Table H3.1.2-2 presents the SMUD capacity balance table for selected years between 2007 and 2015, in MW, as well as a percentage of total capacity requirements.

Table H3.1.2-2. Projected capacity balance table, in megawatts and (percent of total requirements).

Resources	2007	2009	2011	2013	2015
SMUD/JPA Thermal	1,001MW (30%)	1,001 (28%)	1,001 (27%)	1,001 (26%)	1,001 (25%)
SMUD UARP, including Iowa Hill Development in 2015	688 (20%)	688 (20%)	688 (19%)	688 (18%)	1,088 (28%)
Renewable Resources	138 (4%)	153 (4%)	241 (7%)	258 (7%)	274 (7%)
Long-term Contracts	986 (29%)	786 (22%)	642 (18%)	517 (14%)	336 (9%)
New Unspecified Projects and Market Purchases	350 (10%)	671 (19%)	865 (24%)	1,106 (29%)	1,004 (26%)
Load Management	226 (7%)	226 (6%)	226 (6%)	226 (6%)	226 (6%)
Total Requirements	**3,388 (100%)**	**3,525 (100%)**	**3,663 (100%)**	**3,795 (100)**	**3,929 (100)**

Note: Resources-specific percentages may not add to 100% due to rounding.

Under normal load conditions, SMUD's thermal and hydro resources, long-term contracts, and short-term energy and capacity contracts are called upon to meet its peak loads, plus reserves. Load reductions stemming from SMUD's load management program are called upon during emergency conditions but typically not for economic reasons.

As discussed in Section 2.1, providing generation diversity within SMUD's resource portfolio is an overall long-term strategic planning objective supported by the Proposed Action. In 2007, the UARP hydroelectric resource is expected to provide approximately 20 percent of SMUD's total system capacity requirements, with renewable resources accounting for an additional 4 percent of SMUD capacity resources. By 2015, with the addition of the Iowa Hill Development, the contribution of the hydroelectric resource to meeting SMUD's capacity requirement is expected to increase from 20 to about 28 percent. In contrast, during this same period, while energy production from renewable resources is expected to increase substantially from 12 to 20 percent, renewable capacity will only increased fractionally from 4 to 7 percent of SMUD's total system capacity requirement due to the intermittent nature of these technologies. Because of the uncertainty of siting natural gas plants in the Sacramento region due to existing limited availability of emission-offset credits, the gas-fired thermal resources are currently expected to decrease from 30 to 25 percent as the peak load grows during the period from 2007 to 2015.

Because SMUD is forecasting additional capacity will be required over time, as shown in Table H3.1.2-2, several options in addition to the Iowa Hill Development are currently being pursued. They include: 1) expansion of existing SMUD thermal generation capacity; 2) distributed generation; and 3) expansion of existing and new load management programs.

3.1.3 SMUD Energy Efficiency and Load Management Programs

Over the past two decades, SMUD has developed an array of energy efficiency and load management programs that provide energy and capacity to SMUD from its customers. Table H3.1.3-1 shows the projected cumulative energy efficiency benefits derived from these two programs for 2007 through 2016. SMUD's residential and commercial programs include: energy efficient appliances and lighting programs, shade tree and cool roofs installations, residential and commercial retrofit and new constructions programs, advisory, planning, and testing programs. These programs are described in greater detail in Section 10.0. Funding for these programs is established under SMUD Public Purpose Programs. In 2007, the projected energy efficiency budget is $16.5M. For subsequent years, the energy efficiency budget is increased by the rate of inflation.

SMUD's load management program benefits are listed according to their dispatchability. The dispatchable load benefits are from the SMUD air conditioning cycling program that includes over 100,000 participants or about 15 percent of SMUD's residential and commercial customer population. Program participation over recent years has remained stable. The non-dispatchable load benefits are from SMUD's industrial curtailment program, in which customers are paid an incentive to voluntarily curtail their loads. Both programs will be operated when the SMUD system is experiencing emergency conditions.

Table H3.1.3-1. Projected energy efficiency and load management benefits.

	Energy Efficiency		Load Management	
Year	**Energy (GWh)**	**Capacity (MW)**	**Dispatchable (MW)**	**Non-Dispatchable (MW)**
2007	51	8	169	57
2008	102	17	169	57
2009	151	25	169	57
2010	201	32	169	57
2011	250	40	169	57
2012	300	48	169	57
2013	350	56	169	57
2014	400	64	169	57
2015	450	72	169	57
2016	500	80	169	57

3.2 Alternative Sources of Power

Should FERC deny SMUD a new license for the UARP, SMUD would be required to build and/or secure (a) 688 MW immediately to replace the existing UARP facilities, and (b) an additional 400 MW by approximately 2015 to replace the proposed Iowa Hill Development. There is no immediate viable alternative to the 688 MW UARP of the Proposed Action that would meet SMUD's obligation to serve its customer-owners and provide reliable service. While other energy sources are available as alternatives to the Iowa Hill Development, none can fully replace the local system support the Proposed Action brings to the Sacramento region.

The following sections: 1) discuss the alternatives, if any, to the existing UARP and the Iowa Hill Development portions of the Proposed Action; 2) compare the estimated costs of the alternatives; and 3) summarize the impacts of these alternatives on SMUD's customers and system power operations.

3.2.1 Alternative to the Existing UARP Portion of the Proposed Action

For the near-term, there are no viable alternative sources of power to the existing UARP-portion of the Proposed Action. The existing transmission configuration in the Sacramento region limits physical power importation to the SMUD service territory. This import capability has been, and will continue to be, fully utilized to meet SMUD customer load reliably. The peaking capacity difference between imports and customer load plus reserves must be met by locally sited generation. As the 688 MW existing UARP capacity is a critical part of this remaining peaking capacity, losing this capability would result in insufficient capacity to fully meet SMUD's current system reliability standards for the summer peak load. As local generation from the UARP also provides voltage support to the existing transmission configuration, the loss of this project would further exacerbate import limitations. Under existing operating conditions, SMUD's import limitation is 2,100 MW, which supports a corresponding load-serving capability of approximately 3,200 MW. Without the UARP's 688 MW of local generation, SMUD's import limitation would be reduced by 688 MW to approximately 2,400 MW. Since SMUD's forecasted peak load, including reserves, for 2005 is projected to be over 3,000 MW, SMUD would be unable to meet all of its customer demand until a viable alternative had been secured.

For the longer term, SMUD would be required to build and/or secure 688 MW of capacity to replace this existing resource. Given the current state of technology, new natural gas-fired simple-cycle capacity and combined-cycle capacity have been, and will continue to be, the primary sources of new peaking and baseload generation, respectively, in California for the foreseeable future. Therefore, the likely long-term replacement alternative to existing UARP capacity would be a 400 MW gas-fired, simple-cycle peaking plant and a 300 MW gas-fired, combined-cycle power plant, along with transmission upgrades necessary to import this amount of power into the SMUD control area. The challenges SMUD would face in replacing this valuable resource would be very similar but larger in magnitude than those discussed in the next section.

3.2.2 Alternative to the Iowa Hill Development Portion of the Proposed Action

There are alternative sources of power to the Iowa Hill Development portion of the Proposed Action. For the purposes of this evaluation, a 400 MW simple-cycle peaking plant is used for comparison.

The ability to site a natural gas plant in the Sacramento region is highly uncertain due to existing limited availability of emission-offset credits. Therefore, SMUD developed two scenarios using this technology alternative to envelop the potential range of cost estimates. One scenario, the "Local Peaking Plant" scenario, assumes all 400 MW of this peaking plant can be built within the SMUD control area. The second scenario, the "Non-Local Peaking Plant" scenario, assumes that all 400 MW of this peaking plant would be built outside of the SMUD control area, with power delivered into the SMUD control area. Because of the existing import limitation discussed earlier, this "Non-local Peaking Plant" scenario would require the construction of a new 230 kV transmission interconnection, with an estimated $122 million capital cost. Given the limited availability of emission offsets for local generation, the "Non-Local" scenario is more likely.

Table H3.2.2-1 summarizes the comparison of the multitude of strategic, reliability, and portfolio planning attributes of the two alternatives as well as for the Iowa Hill Development.

Table H3.2.2-1. Comparison of strategic, reliability and portfolio planning attributes between the Iowa Hill Development and two peaking plant scenarios.

Attribute	Iowa Hill Development of the Proposed Action	"Local Peaking Plant" Scenario	"Non-Local Peaking Plant" Scenario
Meet Local Summer Peak Demand	YES	YES	YES
Alleviate local voltage and transmission constraints in the Sacramento area	YES	YES, but requires an additional $25 million of capital investment for new high-pressure gas pipeline	YES, but requires additional $122 million of capital investment for 230-kV transmission interconnection
Manage minute by minute load balancing required from emerging intermittent and non-dispatchable renewable resources	YES	YES, but more limited and costly	UNCERTAIN, may require direct physical interconnection and/or dynamic scheduling to SMUD. But if feasible, it would be at best more limited and costly
Impact of a non-attainment area	None	Limited offset credits within the non-attainment area	None

3.2.3 Cost Comparison of Alternatives to Iowa Hill Development

The primary source of peaking plant cost assumptions in this analysis is the California Public Utilities Commission (CPUC) Market Price Reference ruling, dated February 11, 2005. The ruling includes capital and operation and maintenance (O&M) assumptions used to estimate the long-term market price of electricity for a variety of power plant types, including peaking plants. For simple-cycle peaking plants, the capital cost of $556/kW has been amortized over its assumed useful life of 20 years, using a weighted return on capital of 8.2 percent. This results in $57.3/kW-yr annualized capital cost. In addition, fixed O&M cost is estimated to be $12.1/kW-yr.

The above cost assumptions are the same for both "Local" and "Non-Local" scenarios. In addition, capital costs for gas pipeline and/or electric transmission have been added accordingly. For the "Local Peaking Plant" scenario, a $25 million new high-pressure gas pipeline project, estimated to be $5.7/kW-yr, is assumed. For the "Non-Local Peaking Plant" scenario, a $122 million new 230-kV transmission interconnection project, estimated to be $27.6/kW-yr, has been added. As a result, the total annualized fixed cost for the "Local Peaking Plant" is estimated to be $75.1/kW-yr. Similarly, the total annualized fixed cost for the "Non-Local Peaking Plant" is estimated to be $97.0/kW-yr.

The average peaker heat rate of 9,959 Btu/kWh is also used. Variable O&M and other assumptions from the CPUC ruling are shown in Table H3.2.3-1. Fuel price is estimated using the 2004 average daily gas prices at PG&E Citygate, published in the Gas Daily. The fuel cost is determined by the product of the assumed heat rate multiplied by this 2004 average daily gas price at PG&E Citygate of $5.74/mmBtu. The resulting unit fuel cost for a peaker is estimated to be $ 57.2/MWh. An additional $9.7/MWh is estimated to account for variable O&M. Therefore, a total variable cost of $66.9/MWh is assumed for peaker energy production.

For the Iowa Hill Development, although the line item breakdowns are shown differently on this Table H3.2.3-1, the $474 million capital cost underlying assumptions, as well as the estimated total average annual costs assumptions are the same as those used in Table D3.3-1 and Table D3.5-1, both in Exhibit D of the License Application. The fuel cost assumed for the Iowa Hill Development is the same as the $52.3 million/yr pumping cost used in Table D4.2-1 of Exhibit D or the License Application.

Table H3.2.3-1. Cost comparison of peaking plant scenarios to Iowa Hill Development, 2004 Dollars.

	Iowa Hill Development	Local Peaking Plant Scenario	Non-Local Peaking Plant Scenario
Fixed Cost Assumptions[1]			
Capital Cost ($/kW)	1,184	556	556
Annualized Capital Cost ($/kW-yr)	66.3	57.3	57.3
Fixed O&M ($/kW-yr)	9.5	12.1	12.1
Capital Cost for Gas Pipeline and Transmission Upgrades ($)		25,000,000	122,000,000
Annualized Cost ($/kW-yr)		5.7	27.6
Total Annualized Fixed Cost ($/kW-yr)	**75.8**	**75.1**	**97.0**
Installed Capacity (MW)	**400**	**400**	**400**
CAPACITY COST ($/yr)	**$30,300,000**	**$30,000,000**	**$38,800,000**
Variable Cost Assumptions			
Heat Rate (Btu/kWh)		9,959	9,959
Average Daily Gas Price at PG&E Citygate ($/mmBtu)		5.74	5.74
Fuel Cost ($/MWh)[2]	42.0	57.2	57.2
Variable O&M ($/MWh)[3]	0	9.7	9.7
Total Variable Cost ($/MWh)	**42.0**	**66.9**	**66.9**
Estimated Annual Super-Peak Energy Generation (MWh)	**961,000**	**961,000**	**961,000**
Estimated Annual Pumping Load (MWh)	**1,246,000**	**0**	**0**
Estimated Annual Energy Cost ($/yr)	**$52,300,000**	**$64,300,000**	**$64,300,000**
TOTAL NET ANNUAL COSTS ($/yr)	**$82,600,000**	**$94,300,000**	**$103,100,000**

[1] The specific numbers for each line item of the Fixed Cost assumptions are derived from the same sources as those utilized in generating the Iowa Hill Development costs in Table D3.3-1and Table D3.5-1. Transmission costs are included in the Capital Cost line item.
[2] The pumping cost from Table D4.2-1 is used as a proxy for the fuel cost of the Iowa Hill Development.
[3] All O&M costs have been included in the Fixed O&M cost line item.

3.2.4 Conclusion

Based upon the economic analysis performed in Section 3.2.3, the Iowa Hill Development is the least-cost alternative. The total annual cost of the Iowa Hill Development is estimated to be about $83 million/yr, while the alternative of constructing 400 MW of simple-cycle peaking plants could potentially range from $94 million/yr to $103 million/yr, depending upon the location of the peaking plants. From a non-cost standpoint, the Iowa Hill Development offers many tangible but hard to quantify benefits; the range of multi-attribute benefits over and above the peaking plant alternative is summarized in Table H3.2.2-1.

While there is no viable alternative in the near term to replace the 688 MW existing UARP facilities portion of the Proposed Action, the long-term alternative would require SMUD to spend capital costs totaling up to $1 billion, in 2004 dollars, which includes: 1) the estimated $400-$500 million capital cost for permitting, building, and/or securing up to about 700 MW of gas-fired generating plants, of which 400 MW would be peaking plants and 300 MW would be combined-cycles plants; and 2) an estimated $400 to $500 million capital cost of new 230 kV and/or 500 kV transmission facilities necessary to deliver power generated from these gas-fired generation plants to the SMUD control area.

In sum, while other energy sources are available as a long-term alternative to the Proposed Action, they would cost significantly more financially, and none can fully replace the local system support the Proposed Action brings to the Sacramento region.

4.0 EFFECT ON INDUSTRIAL FACILITY
[18 CFR § 16.10 (A) (4)]

SMUD does not use project power for its own industrial facility. Therefore, this item is not applicable.

5.0 NATIVE AMERICAN TRIBE NEED FOR ELECTRICITY
[18 CFR § 16.10 (A) (5)]

SMUD is not a Native American tribe. Therefore, this item is not applicable.

6.0 EFFECT ON TRANSMISSION SYSTEM
[18 CFR § 16.10 (6) (I,II,III)]

There are three 230 kV overhead transmission lines connecting the UARP with SMUD's integrated transmission grid. One of these lines (Camino-Lake) originates at the Camino Switchyard. It runs 29.8 miles to Folsom Junction and then continues another 1.9 miles south to SMUD's Lake Substation. Two of the lines originate at the White Rock Switchyard. The first (White Rock-Orangevale) runs 21.8 miles to Folsom Junction and then continues another 9.3 miles northwest to SMUD's Orangevale Substation. The second (White Rock-Hedge) runs 21.8 miles to Folsom Junction and then continues another 17.8 miles southwest to SMUD's Hedge Substation. Thus, each of these three lines "turns the corner" at Folsom Junction before heading to their respective substations. (Folsom Junction is not an electrical facility but simply SMUD's name for the location at which the three lines come together before heading to their respective substations.) A transmission operating (single line) diagram illustrating this configuration is provided in Section 6.1, below.

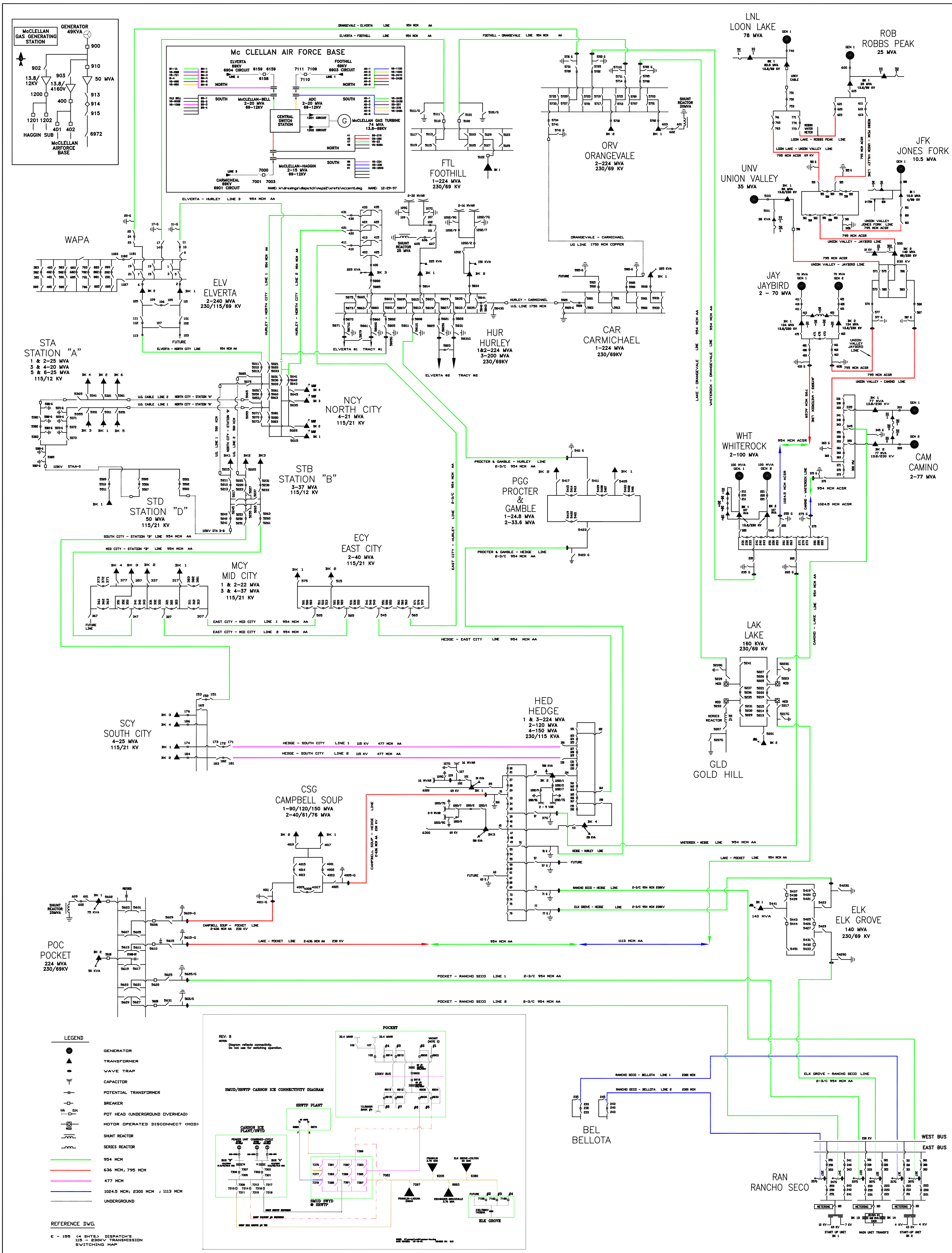
As discussed in Exhibit A of the License Application, SMUD is proposing to exclude from the project description and FERC Project Boundary certain portions of the transmission line sections describe above. The excluded sections are: 1) the 9.3-mile long section of 230 kV line from Folsom Junction to SMUD's Orangevale Substation; 2) the 17.8 mile long section of 230 kv line from Folsom Junction to SMUD's Hedge Substation; and 3) the 1.9-mile long section of kV line from Folsom Junction to SMUD's Lake Substation. These three sections are beyond the point of junction with SMUD's primary interconnected transmission system as defined in §3(11) of the Federal Power Act, and are thus not within FERC's licensing jurisdiction.

East of Folsom Junction, the three 230 kV transmission lines serve the sole purpose of transmitting power generated at the project to SMUD's load centers. These sections of the transmission lines are necessary to get all of the project power to market and do not serve any other power system function. Past Folsom Junction (north, west and south), the 230 kV lines are within SMUD's retail service territory and part of SMUD's interconnected system. If the UARP were not in existence, the sections of the 230 kV transmission line from the Lake, Orangevale, and Hedge substations to Folsom Junction would still be necessary to serve utility system purposes. The lines would have to be reconfigured slightly to reflect power was no longer coming from the UARP. The cost for this reconfiguration is nominal. These lines are looped lines and are not tapped to directly serve retail customers. However, were the UARP not to exist, the lines would be needed to transmit power from other SMUD sources of electric power, and thus to provide reliable electric service to SMUD's customers.

The Iowa Hill Pumped-storage Development will be tied into the existing UARP transmission system by looping the existing Camino-White Rock transmission line through the Iowa Hill Switchyard. This will require the construction of a new 2-mile-long, double-circuit 230 kV overhead transmission line interconnection at a cost of approximately $11 million. The conductors will be supported on conventional steel-pole-type structures. The new interconnection will extend from the switchyard up Iowa Hill to the north and east across Iowa Hill to its north on an easterly route and connect into the existing Camino-White Rock Transmission Line near Tower 141 or 142, approximately where Cable Road crosses under the existing transmission line corridor.

6.1 Detailed Single-Line Diagram
[18 CFR § 16.10 (a) (6) (iii)]

A detailed single-line diagram, including existing system facilities identified by name, showing SMUD system transmission elements in relation to the UARP and other principal interconnected system elements is provided in Figure H6.1-1.



OP-122-B

Figure H6.1-1
Transmission Line Switching Diagram 115-230 KV

115–230 KV TRANSMISSION LINE SWITCHING DIAGRAM
DSO MAPPING, ENERGY OPERATIONS

SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT

OP122B.DWG

REV 5

72–0013

NAME: k:\wmaps\xrefs\op122b.dwg DATE: June 09, 1999

7.0 MODIFICATIONS CONFORMING WITH COMPREHENSIVE PLANS *[18 CFR § 16.10 (A) (7,8)]*

Section 10(a)(2) of the FPA requires FERC to consider the extent to which a project is consistent with federal and state comprehensive plans filed with FERC for improving, developing, and conserving waterways affected by the project. A review of FERC's *Revised List of Comprehensive Plans* dated March 2005, which can be found at FERC's eLibrary, reveals federal and California agencies have filed 53 comprehensive plans specifically for California and 26 plans for the United States in general. Seventeen of these plans address resources relevant to the Rubicon River, Silver Creek, and SFAR waterways. These plans are:

1. California Department of Fish and Game. 1979. Rubicon River wild trout management plan. Sacramento, California. July 1979. 46 pp.

2. California Department of Parks and Recreation. 1998. Public opinions and attitudes on outdoor recreation in California. Sacramento, California. March 1998.

3. California Department of Parks and Recreation. 1980. Recreation outlook in Planning District 2. Sacramento, California. April 1980. 88 pp.

4. California Department of Parks and Recreation. 1994. California outdoor recreation plan-1993. Sacramento, California. April 1994. 154 pp. and appendices.

5. California Department of Water Resources. 1983. The California water plan: projected use and available water supplies to 2010. Bulletin 160-83. Sacramento, California. December 1983. 268 pp. and attachments.

6. California Department of Water Resources. 1994. California water plan update. Bulletin 160-93. Sacramento, California. October 1994. Two volumes and executive summary.

7. California Department of Water Resources. 2000. Final programmatic environmental impact statement/environmental impact report for the CALFED Bay-Delta Program. Sacramento, California. July 2000. CD Rom, including associated plans.

8. California State Water Resources Control Board. 1975. Water quality control plan report. Sacramento, California. Nine volumes.

9. California - The Resources Agency. Department of Parks and Recreation. 1983. Recreation needs in California. Sacramento, California. March 1983. 39 pp. and appendices.

10. California - The Resources Agency. 1989. Upper Sacramento River Fisheries and Riparian Habitat Management Plan. Sacramento, California. January 1989. 158 pp.

11. U.S. Fish and Wildlife Service. Canadian Wildlife Service. 1986. North American waterfowl management plan. Department of the Interior, Portland, Oregon. May 1986.

12. U.S. Fish and Wildlife Service. Undated. Fisheries USA: The recreational fisheries policy of the U.S. Fish and Wildlife Service. Washington, D.C.

13. National Parks Service. 1982. The nationwide rivers inventory. Department of Interior, Washington, D.C. January 1982.

14. Forest Service. Bureau of Land Management. 1994. Standards and guidelines for management of habitat for late-successional and old-growth forest related species within the range of the northern spotted owl. Department of Agriculture, Washington, D.C. April 13, 1994. 144 pp.

15. Forest Service. 1988. Eldorado National Forest land and resource management plan. Department of Agriculture, Placerville, California. December 1988. 752 pp.

16. U.S. Fish and Wildlife Service. California Department of Fish and Game. California Waterfowl Association. Ducks Unlimited. 1990. Central Valley habitat joint venture implementation plan: a component of the North American waterfowl management plan. Department of the Interior, Portland, Oregon. February 1990.

17. State Water Resources Control Board. 1999. Water Quality Control Plans and Policies Adopted as Part of the State Comprehensive Plan. April 1999. Three enclosures.

Through the course of consultation with the public, resource agencies, and non-governmental organizations, no inconsistencies with these plans have been identified.

8.0 FINANCIAL AND PERSONNEL RESOURCES
[18 CFR § 16.10 (A) (9)]

8.1 Financial Resources

SMUD's sources of financing and revenue are sufficient to meet the continuing O&M needs of the project. SMUD utilizes revenues from the sale of power to its customer/owners and third parties to meet the project O&M needs. As a political subdivision and special district under state law, SMUD has an elected Board of Directors with full power to establish rates and charges to insure cost recovery of investments, and is not subject to any review or regulation of its rates by any state or federal agency. SMUD is currently rated "A1" by Moody's and "A" by both Fitch and Standard and Poor's. The ratings provide SMUD with full access to the municipal bond market, due in large part to: 1) the Board of Directors' resolution to increase owner's equity from 8 to 20 percent by 2007; 2) a strong risk management program; 3) competitive rates; and 4) an overall improved financial condition.

8.2 Personnel Resources

SMUD has extensive experience operating and maintaining the UARP in an efficient and reliable manner. SMUD has a full time engineering and maintenance staff for purposes of operating and maintaining existing UARP facilities, in addition to other SMUD generating assets. Overall SMUD presently has 2,149 employees, of which 83 work in the hydro division, out of the Fresh Pond Hydro Maintenance Facility. SMUD uses contractors on a regular basis to supplement staff to accomplish engineering and maintenance activities, to provide for expertise that may not exist in-house, or to provide additional resources when the numbers of staff are insufficient to complete the workload. SMUD will hire additional staff as necessary to support the O&M of the Iowa Hill Development once it is constructed.

9.0 PROJECT EXPANSION NOTIFICATION *[18 CFR § 16.10 (A) (10)]*

SMUD notified by certified mail all of the property owners and government agencies and subdivisions affected by the project. All agencies and interested parties are listed in the Initial Statement.

10.0 ELECTRICITY CONSUMPTION EFFICIENCY IMPROVEMENT PROGRAM *[18 CFR § 16.10 (A) (11)]*

SMUD maintains energy services programs for both residential and commercial customers for the purposes of encouraging and assisting its customer-owners to more efficiently utilize electricity. These programs form an important part of the dividends our customers receive from a community-owned utility governed by an elected Board of Directors. Long before a legislative mandate required Public Good programs, SMUD built a national reputation as a leader in many of these areas, including energy efficiency, clean-energy projects, and research and development.

Over the past 25 years, SMUD has implemented energy efficiency and conservation programs that have produced a cumulative total of nearly 1,000 GWh of annual energy savings and close to 300 MW of average summer peak demand load reduction. [Source: U.S. Department of Energy, Energy Information Administration, 2003 Annual Electric Power Industry Report, Form EIA-861, Schedule 5. Demand-Side Management Information.]

Current California law requires utilities to preserve specific programs that contribute social and environmental benefits to the state. These Public Good programs may include:

- Cost-effective, demand-side management services to promote energy efficiency;
- New investment in renewable energy resources and technologies consistent with existing statutes and regulations that promote those resources and technologies;
- Research, development, and demonstration programs for the public interest, to advance science or technology that is not adequately provided by competitive and regulated markets; and/or

- Services provided for low-income electricity customers including, but not limited to, targeted energy-efficiency services and rate discounts.

In 2003, SMUD committed $29 million to Public Good programs, or about $9 million more than the minimum required by legislation. In 2004, SMUD committed $30.4 million to Public Good Programs.

10.1 Customer Energy Efficiency Programs

SMUD has also made "energy efficiency" a catchphrase in the Sacramento region. SMUD programs help customers get the most power for their energy dollar and reduce their demand for electricity. Through its energy efficiency programs, SMUD has shown customers how energy efficiency and comfort can go hand-in-hand. SMUD has an extensive record of encouraging and assisting its customers in the efficient use of electricity. In recognition of its efforts, SMUD won the 2004 American Council for an Energy Efficient Economy's Champion of Energy Efficiency Award, the National Energy Resources Organization Award for Energy Efficiency, and the Energy Star Partner Of The Year by the U.S. Department of Energy. Programs or activities initiated by SMUD are summarized in Table H10.1-1.

Table H10.1-1. Energy conservation and efficiency programs promoted by SMUD.

Program Name	Program Overview
Residential Energy Advisory Services Program	This program is designed to help residential customers improve the energy efficiency of their homes through a broad range of educational, advisory, and technical assistance services. In 2003, SMUD performed more than 1,600 on-site energy assessments and provided advisory services to more than 18,500 customers in the form of CD, on-line, or mail-in energy audits, as well as telephone assistance through its trained residential contact center staff.
Residential Equipment Efficiency Program	Provides rebates and energy-efficiency loans for home improvement projects designed to provide energy savings primarily from heating and cooling energy use reductions. In 2003, SMUD financed and/or provided rebates for approximately 4,000 high-efficiency central air conditioners and heat pumps. Approximately 1,700 homes were retrofitted with high-performance windows. In addition, more than 200 duct systems were sealed using the patented Aeroseal duct sealing process.
Residential New Construction Program	California's minimum cooling energy standards are among the most stringent in the nation, and SMUD Advantage Homes exceed the current Title 24 energy cooling requirements by providing incentives to home builders to install energy efficient HVAC systems that are designed to reduce cooling energy use by 25 to 50 percent. Of the more than 11,000 new single-family homes built in SMUD's service territory in 2003, nearly 6,000 of them were SMUD Advantage Homes.

Residential ENERGY STAR Retail Lighting Program

Through marketing partnerships with SMUD, retailers and lighting manufacturers are able to offer energy efficient light bulbs and fixtures at discounted cost to our customers. In 2003, these partnerships produced more than 275,000 energy-efficient, compact-fluorescent light bulbs and 2,300 energy efficient lighting fixtures. These partnerships were also accompanied by marketing campaigns designed to increase customer awareness of energy-efficient ENERGY STAR lighting products.

Residential Appliance Efficiency Program

Customers who purchase, or replace, clothes washers or room air conditioners are able to take advantage of SMUD rebates on ENERGY STAR-rated, high-efficiency models. Rebates for approximately 450 high-efficiency clothes washers and 450 room air conditioners were provided in 2003 through this program.

Residential Solar Water Heating Program

Rebates for new solar domestic hot water systems in single-family homes are provided by SMUD through this program. In addition, in 2003 nearly 200 inspections and repairs were conducted for systems installed in previous years.

Residential Pool/Spa Efficiency Program

SMUD added more than 2,200 new pool owners to the program in 2003. This brings the total number of customers who receive energy efficiency information regarding operation of their pool equipment to over 40,000. Customers are encouraged to operate pool pumps and sweeps during off-peak hours. In addition, customers are also encouraged to purchase and install energy efficient pool pumps and motors when installing new pools or replacing existing equipment.

Residential Shade Tree Program

One of SMUD's most popular and long-standing programs, the Shade Tree program, provides free shade trees to residential customers to plant in their yards to strategically shade homes from direct sunlight in the summer months. Properly placed shade trees can help reduce a home's cooling costs by up to 40% when trees reach maturity. In cooperation with the Sacramento Tree Foundation, SMUD provided more than 16,500 free shade trees to homes, schools, and public areas in 2003, bringing the total number of trees planted since 1990 to nearly 350,000.

Commercial & Industrial Energy Efficiency Retrofit Program

SMUD provides incentives and financing, as well as energy audits and equipment installation support for all its commercial, industrial, and agricultural customers. Programs are designed and targeted to the various customer segments within this group according to customer size and classification.

Large Commercial Customers:

$2.6 million was allocated to the key and major commercial customer in 2003. Project completion incentives were provided for nearly 80 projects for the installation of high-efficiency lighting and HVAC systems in large commercial facilities. Prescriptive incentives were also provided for more than 50 projects for the installation of high-efficiency air-conditioners and motors. Incentives were paid to contractors to encourage the installation and application of high efficiency lighting and air-conditioning systems as a component of their work at customer facilities. Funding was also provided for the re-commissioning of seven buildings to implement low-cost measures and operational improvements designed to improve the efficiency of these facilities. In addition, SMUD continued to work with all major school districts to implement projects and operation and maintenance measures designed to reduce the use of non-renewable resources and waste streams within these facilities.

Medium and Small Commercial Customers:

Small and medium-sized commercial customers were also provided with incentives to replace lighting, HVAC, and motor systems with high efficiency ones. Nearly 1,500 lighting retrofits were performed for customers of this size, while project completion and prescriptive incentives were paid for approximately 80 HVAC and motor replacement projects. In addition, air-conditioning system tune-up services were performed for more than 350 units at customer businesses and facilities in this class. In all, $3.4 million of the $6 million spent for the commercial retrofit program was allocated to this customer group in 2003.

Commercial & Industrial New Construction Program

Design assistance and rebates are provided by SMUD for new construction projects incorporating significant energy efficiency technologies or design improvements. In 2003, SMUD provided such services and rebates for 12 large new construction projects representing approximately 1.5 million square feet of new commercial building floor space.

Commercial & Industrial Agricultural Pump Testing Program

SMUD provided more than 360 pump tests to agricultural and water district customers, reporting operating efficiency and encouraging energy efficiency improvements in 2003.

Commercial & Industrial Cool Roof Program

Roofing contractors are able to sign-up for SMUD's innovative Cool Roof Program and earn a rebate for installing an ENERGY STAR sun-reflecting coating on a flat-roofed commercial building with a centrally air conditioned space under the roof. In 2003, over 1.7 million square feet of roof area were installed using these products.

Low-income Weatherization

Nearly 700 low-income households benefited from SMUD’s free weatherization programs in 2003. To help customers of modest means make their homes more energy efficient, comfortable and safe, SMUD provides free attic insulation, weather-stripping, shade screens, compact fluorescent bulbs, low-flow showerheads, faucet aerators, water heater wraps, pipe wrap and minor home repair services to low-income customers. In addition, customers with unsafe and energy-consuming halogen floor lamps can exchange them for energy-efficient fluorescent torchiere lamps. Some low-income homeowners may also qualify to have their old refrigerators replaced.

Community Partners Program

The Community Partners Program is an extension of SMUD’s Low-Income Program, allowing the utility to work with other agencies and community-based organizations to offer additional services. By partnering with SMUD, gas-heated customers can benefit from the same services as electric-heated customers, and receive combustion testing and repairs on their gas equipment. In 2003, SMUD was able to leverage funding and secure $265,000 in extended services for our customers. These services included major home repair, including roof and plumbing repair; home modifications for disabled and elderly customers; and appliance replacement such as clothes washers and microwaves. Portable evaporative coolers were loaned by SMUD to 58 customers whose health was being affected by excessive heat. The units were loaned to customers until their central systems could be repaired or until they no longer required them for the health and safety of a family member.

Residential Retrofit PV Program

Nearly a decade ago, SMUD initiated its PV Pioneer I program by designing and installing PV systems on residential structures in the Sacramento area. SMUD owned these systems, received the electrical output, and took full responsibility for operation and maintenance. This arrangement afforded great flexibility, promoted rapid technological advancement, and enabled SMUD to develop standardized, low-cost installation methods.

Since 2001, SMUD has introduced the PV Pioneer II program, through which the customers own the systems. As a result, homeowners are able to take advantage of "net metering," where SMUD pays retail prices for energy produced by the PV system.

Residential PV New Construction

In 2002, SMUD began working with homebuilders to offer PV systems as standard or optional equipment in several developments in the Sacramento area. New home designs combine PV systems with more traditional energy-efficiency measures. In 2003, the program focused on research and development of improved PV systems and added 18 PV-equipped homes (40 kW) completed by a leading local builder.

Building Integrated Commercial PV New Construction

PV systems for commercial customers have evolved from afterthoughts in building design to a "building integrated" design (BIPV). Today's PV modules look like structural or architectural exterior glass paneling, and newer products are surface conformable. With much of the exterior of new commercial buildings faced with glass panels, it is natural to begin to integrate these surfaces with electricity-producing PV panels. Several BIPV designs have emerged on commercial buildings in Europe and Japan, but until recently, Sacramento had no truly integrated examples.

In 2003, the second phase was completed in a major state government-building project, the East End Project, in Sacramento. Amorphous silicon type PV panels are used to ring the penthouse of several buildings using the PV panels as an electricity-producing exterior wall. The output from these exterior panels feeds electrical circuit inside the building's normal electrical supply cabinets.

11.0 NATIVE AMERICAN TRIBE NAMES AND MAILING ADDRESSES *[18 CFR § 16.10 (A) (12)]*

The project is not located on any land owned by Native American tribes. The tribes likely to be interested in the UARP licensing process have been consulted as non-federal 106 representatives and will be sent a copy of this license application. The tribes are:

Washoe Tribe of Nevada
Tribal Chairperson
919 US 395 South
Gardnerville, NV 89410

Shingle Springs Rancheria
Tribal Chairperson
PO Box 1340
Shingle Springs, CA 95682

12.0 SAFE MANAGEMENT, OPERATION AND MAINTENANCE *[18 CFR § 16.10 (B) (2)]*

All facilities are maintained to ensure safe and reliable operation. Frequent inspections by project personnel help identify potential problems, which are corrected as they are discovered.

Public safety is SMUD's primary goal. Operation and monitoring of different project facilities are automatically controlled by, and performed remotely from, the Energy Management Center (EMC) located in SMUD's Sacramento Headquarters. The EMC is staffed 24 hours a day with at least three operators per shift. Gates, stream gages, and power facilities are continuously monitored, and any parameters out of the normal operating range are brought to the operator's attention with an alarm. If a hazardous situation develops at one of the major dams, the EMC operator follows the EAP guidelines and notification flowcharts to provide maximum early warning of an emergency condition to emergency management agencies. Standard Operating Procedures include requirements for dam monitoring in the event of an emergency.

SMUD has implemented other public safety measures at project facilities. Potentially hazardous areas are secured, to the extent practicable, against public entry. Multiple warning devices (signs, fences, barriers) have been installed to warn the public. Both FERC and the California Department of Water Resources – Division of Safety of Dams (DSOD) inspect the UARP dams annually. Project facilities are visited daily by hydro personnel who are experienced and familiar with the project.

12.1 Operation During Flood Conditions *[18 CFR § 16.10 (b) (2) (i)]*

Operation during emergency conditions is detailed in SMUD's Emergency Action Plan (EAP). The UARP is not a designated flood control project and is not utilized directly in regional flood control procedures. However, SMUD voluntarily coordinates the operation of the project prior to and during flood conditions with the USBR as well as the State-Federal Flood Operation Center. In particular, information on SMUD's planned operation of Union Valley Reservoir is shared with the USBR and the United States Army Corps of Engineers (USACE), which uses this information to determine the allowable winter storage at Folsom Lake under the Sacramento Area Flood Control Association (SAFCA) Flood Control Diagram.

During anticipated peak storm events, such as the January 1997 storm, the UARP operates under special guidelines established to manage peak storm runoff in accordance with the FERC license. When conditions require releases from the various dams to be significantly greater than the specific powerhouse turbine capacity, appropriate notifications, pursuant to the UARP EAP, are made to respective county emergency management services, the California Office of Emergency Services, the National Weather Service, and the USACE at pre-determined discharge levels.

The DSOD issues Certificates of Approval as appropriate for each dam within the project specifying when spillway gates and flashboards may be put in place for the purposes of impounding water. These requirements are implemented to assure that the dams are ready and capable to safely pass potential winter flood flows without restriction or risk of overtopping the dams, thereby minimizing potential dam safety concerns.

12.2 Warning Devices for Downstream Public Safety
[18 CFR § 16.10 (b) (2) (ii)]

Public safety warning signs are provided at locations where changes in project operations have the potential to quickly alter water levels.

12.3 Emergency Action Plan
[18 CFR § 16.10 (b) (2) (iii)]

SMUD anticipates some changes to the EAP will be needed after the Iowa Hill Development is constructed. Exact changes are unknown at this time. SMUD performs tabletop tests of the EAP annually, and functional exercises once every five years. This is coordinated with other hydroelectric operators in the SFAR basin, as described in Section 2.2.

12.4 Monitoring Devices
[18 CFR § 16.10 (b) (2) (iv)]

The civil facilities and water conduits in the UARP are outfitted with a variety of monitoring devices to detect movement in civil structures, and to protect from water conduit failure. Devices installed and maintained in the UARP include: leakage weirs, piezometers, deformeters, slope inclinometers, load cells, tilt plates, and over-velocity trip devices. Instrumented monitoring data is converted into measurements of displacement, strain, stress, pressure, and flow for evaluation proposes.

SMUD monitors civil structures by conducting regular, periodic visual observations and by reviewing and analyzing data collected from various instruments throughout the UARP. This monitoring measures critical indicators of structural behavior. Data are collected, observations are made, and qualified personnel evaluate and make recommendations based on the collected data. Results are presented in easily understood reports and distributed to FERC and the DSOD.

Observations are made at all facilities twice weekly. Periodic scheduled inspections are made less frequently (monthly, quarterly, or annually) for collection of monitoring data. The results of these inspections are recorded and placed into databases used for tracking history of the measurements.

Twice annually, the Operations Superintendent and the Principal Civil Engineer of the generation operations staff inspect all facilities. Additionally, annual inspections are conducted with a Field Engineering Inspector from FERC or the DSOD.

Location, identification, and installation details for all monitoring devices are maintained on "as-built" drawings and are included with the annually published monitoring report. All record keeping is retained electronically in a centralized database to form a historical monitoring program.

An integral part of the maintenance and monitoring program includes the Part 12D Independent Consultant's inspection and reports completed every five years. This inspection and report provides an independent third party assessment of the instrumentation and performance-monitoring program. This report will also include recommendations for any additional instrumentation that would improve monitoring.

A comprehensive listing of devices used for monitoring civil structures and water conduits are shown below in Table H12.4.10-1 – H12.4.10-7 and described below.

12.4.1 Leakage Weirs

With one exception, SMUD uses small V-notch weirs installed to measure leakage discharge. The leakage weir installed in the Jaybird Tunnel Adit is a rectangular weir. The elevation is visually read off of the staff gage at the weir. The reading is logged on the appropriate data sheet and then manually entered into a database where the discharge flows are calculated. Charts of the historical data are plotted for evaluation and reporting.

12.4.2 Piezometer

The purpose of the piezometers is to monitor potential build-up of groundwater pore pressure in the vicinity of the dams to assess the possibility for reduced stability of the structures. SMUD uses both standpipe and hydraulic tube piezometers. The standpipe piezometers consist of a vertical pipe with a perforated section in the zone of interest. Changing water levels in the standpipe reflect changing pore pressure. The hydraulic tube piezometers are devices directly buried in the dam embankment. Small diameter plastic tubes extend from the piezometer to a centralized collection point. The plastic tubes are pressurized with water until the tube pressure balances the groundwater pore pressure. The standpipe piezometers are read by lowering a probe into the standpipe that can detect the water surface. The depth to the water surface is recorded in a database where the water surface elevation is calculated from a surveyed elevation of the top of the standpipe. Charts of the historical data are plotted for evaluation and reporting.

Data from the hydraulic tube piezometers is collected at a centralized collection point. After pressurizing the tubes that lead to the piezometer device, pore pressure is read directly from a pressure gauge and recorded on a data collection sheet. The pressure is manually entered in a database. Charts of the historical data are plotted for evaluation and reporting.

12.4.3 Deformeter

A deformeter is used to measure geologic displacement. For the UARP, SMUD uses deformeters that consist of a metal rod in a pipe. The base of the rod is anchored at the bottom and the pipe sleeve is anchored at the top. Differential movement between the top of the bar and the pipe sleeve indicates geologic movement between the bottom and the top of the deformeter.

Data from the deformeters is collected by measuring the distance between the end of the center bar and the upper end of the pipe sleeve and recorded on a data collection sheet. The distance is manually entered in a database. Charts of the historical data are plotted for evaluation and reporting.

12.4.4 Crack Inspection

Cracks in concrete dams occur as a result of settling and stress relief. Changes in cracking are monitored to evaluate changing conditions in the structure. Cracks on the surface of concrete dams are monitored by visual inspection. The observations are hand sketched on an elevation drawing of the dam and later transferred by a draft person to the appropriate drawing.

12.4.5 Relief Drains

Relief wells are installed in concrete gravity dams to provide pressure relief from foundation pore pressure. Without relief, this pore pressure could result in excessive uplift pressure and create stability issues for the dam. The relief wells are vertical holes in the gallery floor extending to the dam foundation contact. When the relief wells are flowing they are relieving pressure. When there is standing water in the well there is no excessive pressure. The wells are cleaned periodically to ensure functionality. Data for the relief wells is collected only for wells that are not flowing. The wells generally seep water out of the top. A few of the wells do not have enough pore pressure to flow, and in these instances, measurement is made from the top of the wall down to the water surface. This dimension is recorded on a field data sheet and is later transferred to a database.

12.4.6 Inclinometers

Slope inclinometers are used to measure horizontal ground and slope deformation in the subsurface. A casing with groves at four quadrants is grouted into a vertical hole. The alignment of the perpendicular grooves is recorded and provides information on the direction of movement.

There are two different models of slope inclinometer installations along the Camino penstock. Slope inclinometer casings B1 and W4 use an Applied Geomechanics Little Dipper slope indicator. The data is collected with an ADVisor handheld readout/logger. The handheld is then synchronized with a computer with the ADVisor software installed on it. The data is downloaded and inserted into TBASE II, an Applied Geomechanics program that is a database and graphing and analysis tool. All other inclinometer readings are collected with a SINCO Slope Indicator, Co. DIGITILT Inclinometer, Model 50309-E and Sensor, Model 50325-E. The readings are stored in the data collector and then downloaded to a computer using DMM for Windows software. The data is then graphed and evaluated using DigiPro software.

12.4.7 Tiltmeters

Tilt meters are used to monitor movement of the Camino penstock and foundations and anchor block foundations. Bronze Sinco 50373 tilt plate. A SINCO Slope Indicator Co. Tiltmeter (model no. 50344) and Digitilt Indicator (model no. 50309) are used to collect tilt meter readings. The readings are logged on a data sheet and then manually inputted into a database. Charts of the historical data are plotted for evaluation and reporting.

12.4.8 Load Cells

The load cell instrumentation is used to monitor movements and loads of deep tendon anchors. Load cell readings are taken with a RST Vibrating Wire Logger, model VW2104. The readings are stored in the data logger and then manually inputted into a Microsoft Excel database.

12.4.9 Trammel Point Measurements

Reference marks (trammel points) placed on penstock cans either side of selected couplings are measured to monitor displacement over time between the cans. Readings across these reference points are by hand measurement. The readings are logged on a form and then manually entered into a program developed in Microsoft Access.

12.4.10 Over-velocity Trip Devices

The water conveyances from each reservoir to the associated powerhouse are protected from the impacts of catastrophic failure of the conveyances by over-velocity trip devices. Conveyances are typically a tunnel from the reservoir connected to a penstock, which makes a short run from the tunnel outlet down to the powerhouse. The protective devices are located on either the inlet gate at the reservoir or on the penstock shutoff valve located where the penstock joins the tunnel at its outlet.

Over-velocity trip devices are typically triggered by the differential pressure measured across the valve or the gate. An excessive velocity across the valve or gate creates a high differential pressure. The trip devices are calibrated to close the valve or gate when a high differential pressure occurs, providing protection from the effects of free flowing water through a ruptured penstock.

The over velocity devices are checked annually by simulating a high differential pressure across pressure taps located in the penstock. When this condition is simulated, verification is made that the butterfly valve in the valve house will close within the allowed time.

In those water conveyance systems without valve houses, as in the case of Loon Lake and Union Valley, over-velocity trip devices are installed at the intake structure. Simulation of a high differential water level at the intake structure is performed to verify the intake gate will close within the allowed time.

Table H.12.4.10-1. Monitoring devices on civil structures and water conduits of the Loon Lake Development.

Civil Structure/ Equipment	Monitoring/Protection Device	Frequency of Monitoring/ Measurement
Loon Lake Main Dam	Leakage weir at dam toe.	Monthly
Loon Lake Main Dam	Terrestrial survey for vertical and horizontal movement	Annually
Loon Lake Auxiliary Dam	Leakage weir at dam toe.	Monthly
Loon Lake Auxiliary Dam	Terrestrial survey for vertical and horizontal movement	Annually
Loon Lake Dike	Terrestrial survey for vertical movement	Once every four years
Loon Lake Powerhouse Penstock/Tunnel	Over-velocity emergency shutoff of inlet gate	Annually
Loon Lake Penstock Exploratory Drift	Leakage weir.	Quarterly
Loon Lake Powerhouse	Powerhouse Ceiling Rock Movement Indicators (Deformeters)	Annually

Table H12.4.10-2. Monitoring devices on civil structures and water conduits of the Robbs Peak Development.

Civil Structure/ Equipment	Monitoring/Protection Device	Frequency of Monitoring/ Measurement
Gerle Creek Dam	Relief wells.	Monthly
Gerle Creek Dam	Crack inspection, gallery and exterior.	Monthly
Gerle Creek Canal	Leakage Weir	Monthly
Robbs Forebay	Crack inspection.	Monthly
Robbs Peak Penstock	Over-Velocity emergency shutoff of penstock valve	Annually

Table H12.4.10-3. Monitoring devices on civil structures and water conduits of the Jones Fork Development.

Civil Structure/ Equipment	Monitoring/Protection Device	Frequency of Monitoring/ Measurement
Ice House Main Dam	Leakage weir at dam toe.	Monthly
Ice House Main Dam	Terrestrial survey for vertical and horizontal movement	Annually
Ice House Dike 1	Leakage weir at dike toe.	Monthly
Ice House Dike 1	Terrestrial survey for vertical movement	Annually
Jones Fork Penstock	Over-velocity emergency shutoff of inlet gate–	Annually

Table H12.4.10-4. Monitoring devices on civil structures and water conduits of the Union Valley Development.		
Civil Structure/ Equipment	**Monitoring/Protection Device**	**Frequency of Monitoring/ Measurement**
Union Valley Dam	Piezometers	Monthly
Union Valley Dam	Leakage weirs at right toe, center toe, right embedded drain, left embedded drain.	Monthly
Union Valley Dam	Terrestrial survey for vertical and horizontal movement	Annually
Union Valley Penstock Tunnel	Leakage weir	Monthly
Union Valley Penstock	Over-velocity emergency shutoff of Inlet Gate	Annually

Table H12.4.10-5. Monitoring devices on civil structures and water conduits of the Jaybird Development.		
Civil Structure/ Equipment	**Monitoring/Protection Device**	**Frequency of Monitoring/ Measurement**
Junction Dam	Crack inspection	Monthly
Junction Dam	Terrestrial survey for vertical and horizontal movement	Biannually
Jaybird Tunnel	Leakage Weir on tunnel adit.	
Jaybird Penstock	Over-velocity emergency shutoff of penstock valve	Annually

Table H12.4.10-6. Monitoring devices on civil structures and water conduits of the Camino Development.		
Civil Structure/ Equipment	**Monitoring/Protection Device**	**Frequency of Monitoring/ Measurement**
Camino Dam	Terrestrial survey for horizontal movement	Biannually
Camino Dam	Crack Inspection	Monthly
Brush Creek Dam	Leakage weir, right abutment	Monthly
Brush Creek Dam	Deformeters for abutment	Yearly
Brush Creek Dam	Terrestrial survey for vertical and horizontal movement	Yearly
Brush Creek Dam	Crack Inspection	Monthly
Camino Penstock	Over-velocity emergency shutoff of penstock valve	Annually
Camino Penstock	Inclinometers on hillside.	Quarterly
Camino Penstock	Load cells - hillside tension anchors, caisson tension anchors	Quarterly
Camino Penstock	Trammel point measurements	Annually
Camino Penstock	Tilt plates – penstock foundation blocks, hillside tension anchor blocks	Semi annually
Camino Penstock	Penstock terrestrial survey for movement	Semi annually
Camino Penstock	Tension anchor block terrestrial survey for movement	Semi annually

Table H12.4.10-7. Monitoring devices on civil structures and water conduits of the Slab Creek/White Rock Development.

Civil Structure/ Equipment	Monitoring/Protection Device	Frequency of Monitoring/ Measurement
Slab Creek Dam	Leakage weirs – right gallery, left gallery, and left dam	Monthly
Slab Creek Dam	Crack inspection – gallery and exterior.	Monthly
Slab Creek Dam	Terrestrial survey for horizontal movement	Biannually
White Rock Penstock	Over-velocity emergency shutoff of penstock valve	Annually

12.5 Employee Safety and Public Safety Record *[18 CFR § 16.10 (b) (2) (v)]*

SMUD's records indicate there have been 13 lost-time incidents involving employees working at the UARP from 2000 to the present. There have been no accidents reported to SMUD involving the public relative to routine operations.

13.0 CURRENT OPERATIONS AND CONSTRAINTS *[18 CFR § 16.10 (B) (3)]*

In general SMUD currently operates the UARP in accordance with the existing FERC license and guided by the following:

- *Two Uppermost Reservoirs Divert Spring Runoff* – SMUD currently operates the two uppermost reservoirs, Rubicon and Buck Island, primarily to divert water to Loon Lake, where it is stored for future use. The majority of water diversion through these two uppermost reservoirs occurs during spring runoff.
- *Three Storage Reservoirs Capture Spring Runoff* – SMUD currently operates Loon Lake, Ice House, and Union Valley reservoirs as the primary storage reservoirs in the system. Consequently, these upper-watershed reservoirs normally reach their peak storage by the end of the spring runoff, and exhibit a classic annual fill and generation use cycle with gradual changes in elevation.
- *Five Smaller Reservoirs Re-Regulate Flows* – SMUD currently operates the five UARP lower elevation reservoirs (Gerle Creek, Robbs Peak, Junction, Camino and Slab Creek), which have little storage capability, primarily as re-regulating afterbays/forebays for daily or weekly peaking operation by the powerhouses to which each provides water. Consequently, these reservoirs do not exhibit the normal annual cycle described for the three storage reservoirs, as surface elevations fluctuate daily throughout the year.
- *Brush Creek Reservoir Operated for Spinning Reserves and Peaking* – SMUD currently operates Brush Creek Reservoir for reliability purposes, primarily in a spinning reserve capacity. It is also used to generate maximum peak power during emergencies or other limited situations.
- *Five Powerhouses Used for Peaking and One Powerhouse for Run-of-River* – Normally, SMUD would operate five of the powerhouses (Loon Lake, Jones Fork, Jaybird, Camino and White Rock) in a true peaking mode, and one (Robbs Peak) in a true run-of-river mode because of lack of storage in the Gerle Creek-Robbs Forebay system.

- *Water Released for Generation in High Demand Period, and Held in Storage in Low Demand Periods* – Typically, on a hot summer day when demand for electricity is high, SMUD releases water from storage to generate electricity at near project capacity, particularly during peak hours of the day such as the late afternoon and early evening. Alternatively, when demand for power is low or when western power supply has been abundant, SMUD holds water in the storage reservoirs and the Project would generate at reduced capacity for shorter periods of time.

Project operations under the Proposed Action discussed in Exhibit B of the License Application.

14.0 HISTORY OF THE PROJECT
[18 CFR § 16.10 (B) (4)]

Following are summaries of significant events during the history of the project and significant construction activities associated with the project.

On July 28, 1955, SMUD filed an application with the Federal Power Commission, predecessor to FERC, for a license under Section 4(e) of the Federal Power Act (FPA) for the UARP. On August 28, 1957, FERC issued an order effective August 1, 1957, to SMUD for the licensing of the project.

Article 25 of the license provided for the following three phases of construction of project facilities: 1) construction of Ice House and Junction Dams, the Jaybird Conduit, and one generating unit at the Jaybird Powerhouse, to begin within one year of the license issuance date and to be completed within 3.5 years of the license issuance date; 2) construction of Union Valley, Sawmill (never constructed), and Camino dams, Robbs Peak Tunnel, Camino Conduit, the second unit at Jaybird Powerhouse, and the Camino Powerhouse, to begin within 1.5 years of the license issuance and to conclude within 5.5 years of the license issuance date; 3) construction of the Rubicon Diversion, Buck Island, and Loon Lake dams, Buck-Loon and Ice House tunnels, and Union Valley Powerhouse, to begin within three years of the license issuance date and to be completed within seven years of the license issuance date.

On April 4, 1961, FERC issued an order granting SMUD an extension of time to complete construction of Stage 1 of the project facilities by July 1, 1961, and then on October 24, 1962,

FERC again provided SMUD with an extension of time to complete construction of Stage 2 of the Project facilities by July 1, 1963.

On October 31, 1962, FERC further modified Article 25 of the license to provide for construction of the White Rock Development, which included the Slab Creek Dam and Reservoir and White Rock Tunnel and Powerhouse, to begin within seven years of the effective date of the license and to be completed within 13 years of the effective date of the license.

On February 28, 1964, FERC again modified Article 25 of the license to provide for construction of the Robbs Peak Powerhouse, which includes the Robbs Peak Powerhouse and Penstock, to begin within seven years of the effective date of the license and to be completed within nine years of the effective date of the license.

On July 21, 1966, FERC modified Article 25 of the license to provide for construction for the installation of the Camino Generating Unit 2 in the Camino Powerhouse, to begin within 10 years of the effective date of the license and to be completed within 11 years of the effective date of the license.

On May 27, 1968, FERC again modified Article 25 of the license to delete reference to the Ice House Tunnel, thereby no longer requiring construction of the tunnel.

A list of construction activities associated with the UARP is provided, by development in Tables H14.0-1 through H14.0-7.

Table H14.0-1. Summary of significant construction activities and modifications to project facilities of the Loon Lake Development.

Year Completed	Description of Activity
1963	Construction of the Rubicon Dam and Reservoir
1963	Construction of the Rubicon Auxiliary Dam
1963	Construction of the Rockbound Tunnel
1963	Construction of the Buck Island Dam
1963	Construction of the Buck Island Auxiliary Dam
1963	Construction of the Buck-Loon Tunnel
1963	Construction of the Loon Lake Dam
1963	Construction of the Loon Lake Auxiliary Dam
1963	Construction of the Loon Lake Dike
1963	Construction of the Rubicon Dam and Reservoir
1971	Construction of the Loon Lake Tunnel and Penstock
1971	Construction of the Loon Lake Switchyard
1971	Construction of the Loon Lake Powerhouse (including the Turbine and Generator)
1971	Construction of the Transmission Line from Loon Lake to Robbs Peak
1971	Construction of the Loon Lake Powerhouse Tailrace Tunnel
1990	Rewedge of the Generator
1966	Construction of the Loon Lake Picnic Area
1966	Construction of the Loon Lake Boat Ramp
1967	Construction of the Loon Lake Campground
1967	Construction of the Loon Lake Day Use Area
1967	Construction of the Desolation Wilderness Trailhead

Table H14.0-1. Summary of significant construction activities and modifications to project facilities of the Loon Lake Development.

Year Completed	Description of Activity
1968	Construction of the Pleasant Boat-in Campground
1987	Construction of the Loon Lake Equestrian Group Campground
1989	Construction of the Loon Lake Chalet
1990	Construction of the Northshore Loon Lake RV Campground
1990	Construction of the Red Fir Group Campground
1991	Construction of the Loon Lake Equestrian Campground
1991	Enlargement and Reconstruction of the Loon Lake Campground
1991	Reconstruction of the Loon Lake Day Use Area into the Group Camps of the Loon Lake Campground
1992	Relocation of the Desolation Wilderness Trailhead
1992	Construction of the Loon Lake Sanitation Station
2000	Reconstruction of the Loon Lake Boat Ramp

Table H14.0-2. Summary of significant construction activities and modifications to project facilities of the Robbs Peak Development.

Year Completed	Description of Activity
1962	Construction of the Gerle Creek Dam and Reservoir
1962	Construction of the Gerle Canal
1962	Construction of the Robbs Peak Dam
1965	Construction of the Robbs Peak Tunnel
1965	Construction of the Robbs Peak Powerhouse Penstock
1965	Construction of the Robbs Peak Powerhouse (including the Turbine and Generator)
1965	Construction of the Robbs Peak Switchyard
1965	Construction of the Union Valley Transmission Facilities (from Robbs Peak to Union Valley)
1984	Rewind of the Generator
1988	Rewedge of the Generator
1993	Rewind of the Generator
1989	Replaced the Turbine Runner
1967	Construction of the Gerle Creek Family Campground
1988	Construction of the Summer Harvest Trail
1990	Construction of the Gerle Creek Day Use Area
1990	Construction of the Accessible Fishing Pier and Accessible Trail

Table H14.0-2. Summary of significant construction activities and modifications to project facilities of the Robbs Peak Development.

Year Completed	Description of Activity
1992	Construction of the Angel Creek Day Use Area
1996	Construction of the Airport Flat Campground

Table H14.0-3. Summary of significant construction activities and modifications to project facilities of the Jones Fork Development.

Year Completed	Description of Activity
1961	Construction of the Ice House Dam and Reservoir
1985	Construction of the Jones Fork Tunnel
1985	Construction of the Jones Fork Penstock
1985	Construction of the Jones Fork Powerhouse (including the Turbine and Generator)
1985	Construction of the Jones Fork Switchyard
1985	Construction of the Transmission Line from Jones Fork to Union Valley
1961	Construction of the Ice House Campground
1961	Construction of the Ice House Day Use Area
1962	Construction of the Ice House Boat Launch
1969	Construction of the Ice House Sanitation Station
1969	Construction of the Cleveland Corral Information Station
1980	Reconstruction of the Ice House Campground
1990	Construction of the Northwind Campground
1990	Construction of the Strawberry Point Campground
1992	Reconstruction of the Cleveland Corral Information Station
1999	Reconstruction of the Ice House Boat Launch
1999	Construction of the Ice House Bike Trail

Table H14.0-4.	Summary of significant construction activities and modifications to project facilities of the Union Valley Development.
Year Completed	**Description of Activity**
1963	Construction of the Union Valley Dam and Reservoir
1963	Construction of the Union Valley Tunnel and Penstock
1963	Construction of the Union Valley Powerhouse (including the Turbine and Generator)
1963	Construction of the Union Valley Switchyard
1963	Construction of the Transmission Lines from Union Valley to Jaybird and Union Valley to Camino
1987	Rewind of the Generator
1991	Replaced the Turbine Runner
1965	Construction of the Sunset Boat Launch
1965	Construction of the Sunset Sanitation Station
1966	Construction of the Sunset Campground
1966	Construction of the Fashoda Day Use Area
1969	Construction of the Wench Creek Campground
1969	Construction of the Wench Creek Group Campground
1969	Construction of the Crystal Basin Information Station
1970	Construction of the Yellowjacket Campground
1970	Construction of the Yellowjacket Boat Launch
1987	Construction of the West Point Boat Launch
1987	Reconstruction of the Sunset Boat Launch
1987	Reconstruction of the Sunset Sanitation Station
1991	Construction of the Jones Fork Campground
1991	Construction of the Fashoda Campground (in place of original Fashoda Day Use Area)
1995	Construction of the Wolf Creek Sanitation Station
1996	Construction of the Wolf Creek Campground
1999	Construction of the Azalea Cove Campground
1999	Construction of the Big Silver Group Campground
1999	Construction of the Camino Cove Campground
1999	Construction of the Jones Fork Bike Trailhead
1999/2000	Construction of the Union Valley Bike Trail
2000	Construction of the West Point Campground
2000	Construction of the Lone Rock Campground
2000	Reconstruction of the Crystal Basin Information Station

Table H14.0-5. Summary of significant construction activities and modifications to project facilities of the Jaybird Development.

Year Completed	Description of Activity
1961	Construction of the Junction Dam and Reservoir
1961	Construction of the Jaybird Tunnel
1961	Construction of the Jaybird Penstock
1961	Construction of the Jaybird Powerhouse (including the Unit 1 Turbine and Generator)
1961	Construction of the Jaybird Switchyard
1961	Construction of the Transmission Line from Jaybird to White Rock
1962	Construction of the Unit 2 Turbine and Generator
1983	Rewind of the Unit 2 Generator
1987	Rewedge of the Unit 2 Generator
1988	Rewind of the Unit 1 Generator
1990	Rewedge of the Unit 2 Generator
2003	Replace Unit 1 Turbine Runner
2003	Replace Unit 2 Turbine Runner
2004	Replace Unit 1 Generator Stator
2005	Replace Unit 2 Generator Stator

Table H14.0-6. Summary of significant construction activities and modifications to project facilities of the Camino Development.

Year Completed	Description of Activity
1963	Construction of the Camino Dam and Reservoir
1963	Construction of the Camino Tunnel
1963	Construction of the Camino Penstock
1963	Construction of the Camino Powerhouse (including the Unit 1 Turbine and Generator)
1963	Construction of the Camino Switchyard
1963	Construction of the Transmission Lines from Camino to White Rock and Camino to Lake Substation
1968	Construction of the Camino Unit 2 Turbine and Generator
1970	Construction of the Brush Creek Dam
1970	Construction of the Brush Creek Tunnel
1986	Rewedge of the Unit 2 Generator

Table H14.0-6. Summary of significant construction activities and modifications to project facilities of the Camino Development.	
Year Completed	**Description of Activity**
1989	Rewind of the Unit 2 Generator
1992	Rewind of the Unit 1 Generator
2000	Replaced the Unit 1 Turbine Runner

Table H14.0-7. Summary of significant construction activities and modifications to project facilities of the Slab Creek/White Rock Development.	
Year Completed	**Description of Activity**
1967	Construction of the Slab Creek Dam and Reservoir
1968	Construction of the Slab Creek Penstock
1968	Construction of the White Rock Tunnel
1968	Construction of the White Rock Penstock
1968	Construction of the White Rock Powerhouse (including the Turbines and Generators)
1968	Construction of the White Rock Switchyard
1968	Construction of the White Rock Transmission Facilities (White Rock to Orangevale and White Rock to Hedge)
1977	Construction of the Slab Creek Boat Ramp
1978	Rewedge of the White Rock Unit 1 Generator
1979	Rewedge of the White Rock Unit 2 Generator
1983	Construction of the Slab Creek Dam Powerhouse (including the Turbine and Generator)
1983	Construction of the Slab Creek Transmission Facilities
1999	Rewind White Rock Unit 2 Generator
2000	Rewind White Rock Unit 1 Generator
1999	Replaced the White Rock Unit 2 Turbine Runner
2000	Replaced the White Rock Unit 1 Turbine Runner

15.0 LOST POWER DUE TO UNSCHEDULED OUTAGES *[18 CFR § 16.10 (B)(5)]*

During the last five years, lost generation due to unscheduled outages has been minimal. Mechanical, electrical, or related outages are restored within minutes, or at most hours, except for major problems. When unanticipated circumstances beyond SMUD's control occur, the length of the outage can be significant. Table H15.0-1 identifies unscheduled outages for the UARP from 1995 through 2001 as well as the duration of the outage.

Table H15.0-1. History of unscheduled outages at the UARP.

Year	Generator	Cause of Outage	Outage Duration (hrs.)
1995	Jones Fork	Ice damage to pressure relief valve on penstock	379
1996	White Rock #1	Transformer failure; required transformer replacement	901
1997	Camino #1 and #2	Flood damage due to January 1997 flood on South Fork American River	585
1997	Slab Creek powerhouse	Flood damage due to January 1997 flood on South Fork American River	[1]
1998	Jaybird #1	Turbine runner bucket failure and deflector shield damage	875
1999	Jaybird #2	Oil cooler malfunction	340
2000	Jaybird #2	Turbine shutoff valve and bypass piping and thrust bearing insulation failures	727
2001	Jones Fork	Generation Availability Data System reporting failures	216

16.0 SMUD'S COMPLIANCE RECORD *[18 CFR § 16.10 (B) (6)]*

SMUD is in compliance with terms and conditions of the existing license. As a result of annual FERC project inspections and five-year environmental inspections, various remedial actions are recommended. SMUD initiates actions to correct any issues of safety, compliance, or other issues as recommended from the inspections and provides written confirmation of the actions taken. In the event of a noncompliance action, such as failure to comply with minimum flows, SMUD immediately notifies FERC, initiates an investigation, and provides a written report to FERC regarding the incident and corrective action. There has been one such event over the past five years.

SMUD contracts with the United States Geological Survey (USGS) to review and publish the daily stream flows required by Article 29 of the FERC license for the UARP. Furthermore, as required in the license and in the 1986 Fishwater Compliance Plan (FWCP) between SMUD and the State Water Resources Control Board (SWRCB), SMUD provides annual reports documenting compliance with the required minimum release flows. These are provided to FERC at the time of dam inspections and to the SWRCB after the end of each water year. Any inadvertent deviation is reported promptly to the SWRCB and FERC as required by the license and the FWCP. The only deviation in the last five water years occurred in July 2003, when the required increase from 8 cfs to 15 cfs at Ice House Reservoir was delayed for 36 hours due to a scheduling mix-up. Improved scheduling procedures were put in place to avoid recurrence of this problem. SMUD has met or exceeded the minimum requirement at all sites on all other days during these water years.

[1] The 1997 event resulted in the powerhouse being all but demolished. The unit was rebuilt and placed back in service in 2002.

17.0 PROJECT ACTIONS AFFECTING THE PUBLIC *[18 CFR § 16.10 (B) (7)]*

The most significant direct impact on the public of operation of UARP reservoirs is a positive one: creation of flat-water and whitewater recreation opportunities. The operation of the reservoirs for power generation and water supply generally result in declining reservoirs levels at the end of summer and into the fall, thus reducing the convenience and opportunity for recreation. These actions provide additional economic growth opportunity in a region largely owned by the federal government. This ownership has developed a robust recreation industry, as described in detail in the PDEA of the License Application. SMUD and specifically the UARP provide jobs and economic services for El Dorado County and the Sacramento region, which is also discussed in the PDEA.

18.0 REDUCED OWNERSHIP AND OPERATING EXPENSES IF THE LICENSE WAS TRANSFERRED *[18 CFR § 16.10 (B) (8)]*

Estimates of the project O&M, administration, capital improvements, and proposed mitigation costs are described in Section 3.1, 3.2 of this exhibit, as well as in Exhibit D. If the license were transferred, the costs for future operations estimated at $36.9 million per year would not be necessary (see Exhibit D). Other costs that would not be incurred include future capital improvements and the costs of mitigation measures. If the UARP were not owned by SMUD, the $24 million cost of relicensing (see Exhibit D) would not be incurred at the end of the next license term.

19.0 ANNUAL FEES FOR FEDERAL OR NATIVE AMERICAN LANDS *[18 CFR § 16.10 (B) (9)]*

The project occupies Federal Lands administered by the Department of Agriculture, El Dorado National Forest and the US Bureau of Land Management. No Native American lands are included within the FERC Project Boundary.

In 2003, SMUD paid $877,473 in Federal fees. These fees are broken down as follows:

- Use and enjoyment of federal lands $292,473
- Federal License Administration $585,000