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

APPLICATION FOR NEW LICENSE

EXHIBIT C
CONSTRUCTION

Sacramento Municipal Utility District
Sacramento, California

JUNE 2005

TABLE OF CONTENTS

Section & Description **Page**

LIST OF TABLES

Table & Description **Page**

LIST OF APPENDICES

Appendix & Description

EXHIBIT C
CONSTRUCTION

1.0 REGULATIONS DEFINING THE CONTENT OF EXHIBIT C

The Sacramento Municipal Utility District (SMUD) has prepared this Exhibit C 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. 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 4 (Licenses, Permits, Exemptions, and Determination of Project Costs), Subpart E (Application for License for Major Unconstructed Project and Major Modified Project). In particular, Exhibit C conforms to the regulations in 18 CFR §4.41(d), and provides information regarding project construction and proposed new construction. As a reference, 18 CFR §4.41(b) states:

Exhibit C is a proposed construction schedule for the project. The information required may be supplemented with a bar chart. The construction schedule must contain:

(1) The proposed commencement and completion dates of any new construction, modification, or repair of major project works;

(2) The proposed commencement date of first commercial operation of each new major facility and generating unit; and

(3) If any portion of the proposed project consists of previously constructed, unlicensed water power structures or facilities, a chronology of original completion dates of those structures or facilities specifying dates (approximate dates must be identified as such) of:
(i) Commencement and completion of construction or installation;
(ii) Commencement of first commercial operation; and
(iii) Any additions or modifications other than routine maintenance.

Exhibit C includes: 1) the construction history of the seven existing UARP developments described in Exhibit A (Section 2.0); 2) proposed construction methods and schedule for the Iowa Hill Development (Section 3.0); and 3) proposed construction methods and schedule for new recreation facilities (Section 4.0).

As provided in 18 CFR §4.41(g)(2), the description of the Iowa Hill Development facilities and features and the accompanying design drawings in Exhibit F are conceptual in nature. SMUD intends to file final Exhibit F Design Drawings of the Iowa Hill Development for FERC approval prior to commencement of the construction of the Iowa Hill Development.

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

2.0 CONSTRUCTION HISTORY OF EXISTING UARP DEVELOPMENTS

On July 28, 1955, SMUD filed an application with FERC for an initial license under 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 UARP facilities: 1) construction of Ice House and Junction dams, the Jaybird Conduit, and one generating unit at the Jaybird Power Plant, 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 (not constructed) and Camino dams, Robbs Peak Tunnel, Camino Conduit, the second unit at Jaybird Power plant, and the Camino Power Plant, to begin within 1.5 years of the license issuance and to conclude within 5.5 years of the license issuance date; and 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 UARP facilities by July 1, 1961, and then on October 31, 1962, FERC again provided SMUD with an extension of time to complete construction of Stage 2 of the UARP facilities by July 1, 1963. On August 27, 1963, FERC extended the time to complete construction of stage 2 of the UARP facilities to January 1, 1964.

On October 31, 1962, FERC 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 modified Article 25 to provide for construction of the Robbs Peak Development, 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 to provide for construction and installation of the Camino Generating Unit 2 in the Camino Powerhouse, to begin within ten years of the effective date of the license and to be completed within 11 years.

On May 15, 1967, FERC added Article 60 to provide for construction of remaining UARP works comprising the Loon Lake Development.

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

On February 25, 1969, FERC added Article 61 (which subsequently was renumbered as Article 62 by FERC on June 16, 1970) to provide for the construction of Brush Creek Development

within one year of the date of issuance of the order and to be completed within three years of the date of issuance of the order. On September 8, 1969, FERC amended Article 60 to extend the construction period to December 31, 1971.

On September 10, 1980, FERC added Article 72 to provide for the construction of Slab Creek Powerhouse within two years from the effective date of this order and to be completed within four years from the effective date of this order.

On April 28, 1982, FERC added Article 76 to provide for the construction of a tunnel, a penstock and the Jones Fork Powerhouse within two years from the effective date of this order and to be completed within four years from the start of construction.

Major improvements in the UARP since original construction are summarized in Table C2.0-1 by development.

Table C2.0-1. Summary of significant construction activities and modifications to the Sacramento Municipal Utility District's Upper American River Project existing facilities.

Year of Completion	Description of Activity
	Loon Lake Development
1963	Construction of the Rubicon Dam and Reservoir
1963	Construction of the Rubicon Auxiliary Dam
1963	Construction of the Rubicon Rockbound Tunnel
1963	Construction of the Buck Island Dam
1963	Construction of the Buck Island Auxiliary Dam
1963	Construction of the Buck Island-Loon Lake Tunnel
1963	Construction of the Loon Lake Dam
1963	Construction of the Loon Lake Auxiliary Dam
1963	Construction of the Loon Lake Dike
1971	Construction of the Loon Lake Power 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
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

Table C2.0-1. Summary of significant construction activities and modifications to the Sacramento Municipal Utility District's Upper American River Project existing facilities.	
Year of Completion	**Description of Activity**
1992	Relocation of the Desolation Wilderness Trailhead
1992	Construction of the Loon Lake Sanitation Station
2000	Reconstruction of the Loon Lake Boat Ramp
Robbs Peak Development	
1962	Construction of the Gerle Creek Dam and Reservoir
1962	Construction of the Gerle Creek Canal
1962	Construction of the Robbs Peak Dam
1965	Construction of the Robbs Peak Powerhouse 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
1992	Construction of the Angel Creek Day Use Area
1996	Construction of the Airport Flat Campground
Jones Fork Development	
1961	Construction of the Ice House Dam and Reservoir
1985	Construction of the Jones Fork Power 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
Union Valley Development	
1963	Construction of the Union Valley Dam and Reservoir
1963	Construction of the Union Valley Power 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

Table C2.0-1. Summary of significant construction activities and modifications to the Sacramento Municipal Utility District's Upper American River Project existing facilities.	
Year of Completion	**Description of Activity**
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	Relocation of Fashoda Day Use Area
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
Jaybird Development	
1961	Construction of the Junction Dam and Reservoir
1961	Construction of the Jaybird Powerhouse 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
2005	Unit 1 Generator stator replacement and rotor refurbishment
Camino Development	
1963	Construction of the Camino Dam and Reservoir
1963	Construction of the Camino Power 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

Table C2.0-1. Summary of significant construction activities and modifications to the Sacramento Municipal Utility District's Upper American River Project existing facilities.	
Year of Completion	**Description of Activity**
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 Powerhouse Tunnel
1986	Rewedge of the Unit 2 Generator
1989	Rewind of the Unit 2 Generator
1992	Rewind of the Unit 1 Generator
2000	Replaced the Unit 1 Turbine Runner
Slab Creek/White Rock Development	
1967	Construction of the Slab Creek Dam and Reservoir
1968	Construction of the Slab Creek Penstock
1968	Construction of the White Rock Powerhouse 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 Unit 2 Generator
1999	White Rock Unit 2 Turbine Runner replacement
2000	Rewind Unit 1 Generator
2001	White Rock Unit 1 Turbine Runner replacement
2003	Slab Creek Powerhouse Rebuilt

3.0 CONSTRUCTION OF THE IOWA HILL DEVELOPMENT

3.1 Schedule, Duration and Critical Path

SMUD anticipates that from the time a new project license is issued by FERC and accepted by SMUD, approximately six to eight years would be required to complete the total engineering, procurement and construction for the Iowa Hill Development. Project engineering and equipment selection would begin within two years of license issuance.

The critical path for the schedule would be the excavation and completion of the underground works. The major factors affecting the overall construction sequencing are described below.

1. The process of design, preparation of bid documents and bidding by potential constructors and equipment suppliers would require an overall period of about two years. The design process will include the construction of an exploratory adit to investigate the *in situ* conditions in the planned underground works.

2. Unless it is decided to award the whole project to a single project delivery contractor under a turnkey arrangement, bidding and award of the equipment supply contract could take place in advance of the bidding and award of the main civil construction work. This would facilitate a reduction in overall construction duration, and would keep the equipment supply off the critical path.

3. The critical equipment supply issue is the pump/turbine and generator/motor. The following minimum times are expected:

    - First embedded parts (draft tube liner) delivered to jobsite: 21 months after award of equipment supply contract.
    - Installation of Unit 1 draft tube liner: 2 months.
    - Installation of Unit 1 pump/turbine stay ring: 3 months.
    - Installation of Unit 1 spiral case: 3 months.
    - Installation of Unit 1 pit liner: 1 month.
    - Installation of all other Unit 1 rotating equipment: 12 months.
    - Testing of Unit 1: 2 months.
    - Installation of Unit 2 draft tube liner: start upon completion of Unit 1 draft tube liner installation; pump/turbine stay ring, spiral case, pit liner and other rotating equipment to follow in accordance with the durations identified for Unit 1.
    - Installation of Unit 3 draft tube liner: start upon completion of Unit 2 draft tube liner installation; pump/turbine stay ring, spiral case, pit liner and other rotating equipment to follow in accordance with the durations identified for Unit 1.
    - Installation of other equipment should not be critical; however, the installation of the transformers, high-voltage cables to the surface, the switchyard and the transmission interconnection need to be complete in advance of Unit No. 1 testing.

4. At the stage of conceptual design, the critical path is through the removal of all underground spoils from the vertical access shaft over the underground powerhouse to the reservoir site. The shaft would be a double chamber shaft with one half dedicated for spoils removal via a vertical conveyor/bucket system and a separate shaft dedicated for transport of personnel and equipment. Spoils extracted to the top of the shaft would then be loaded into articulated dump trucks, large mining dump trucks, or equivalent and driven up a newly constructed switchback road past the microwave transmitter and along an existing road to the top of the hill near the reservoir site. Alternatively, the spoils could be placed on a series of switchback conveyors that would take the same route as the dump truck road.

5. Once all shaft and tunnel excavation is complete, concrete lining of the waterways would proceed. Lining would likely proceed from the bottom of the vertical shaft upwards, and in the high-pressure tunnel, from the intersection with the vertical shaft proceeding toward the powerhouse. A portion of the high-pressure tunnel would be lined with concrete only, and in a reach close to the powerhouse, the interior of the tunnel would be steel lined (embedded in concrete).

6. Tailrace tunnel lining would proceed after the concreting in the Iowa Hill Powerhouse and in the high-pressure segments of the tunnel have advanced so that construction access through the tailrace tunnel would no longer be required.

7. The Slab Creek Reservoir Intake/Outlet structure will likely proceed as a separate operation. The intake would be constructed inside a vertical circular shaped caisson or cofferdam. The details of this construction would need to be carefully evaluated during feasibility planning. Once the intake is complete and bulkheads are in place, the tailrace tunnel excavation could be advanced toward the intake/outlet and completed.

8. The Iowa Hill Reservoir construction operations would include clearing/disposal of vegetation, stripping and disposal of overburden (this could be stockpiled and used later for restoration work), and excavation of weathered rock removed from the foundation area under the dams. Some of the excavation in the basin portion of the reservoir would need to be started early to make the intake area available when necessary at the beginning of shaft construction. Final lining of the interior of the reservoir would be coordinated with the completion of the vertical shaft and the construction of the intake. The Iowa Hill Reservoir Intake/Outlet structure must be finished before the reservoir lining is complete.

3.2 Major Activities

3.2.1 Tunnel/Powerhouse Construction

Recent experience with nearby tunnel construction, points to using a conventional drilling, blasting, and mucking method rather than use of a Tunnel Boring Machine (TBM). Tunnel lengths (2,000 feet) and the shaft height (1,200 feet) are relatively short and are not amenable to using a TBM or raise bore machine.
The drill, blast, muck method of excavation in the metamorphic rock (phyllite, schist, quartzite) would produce platey/slabby material that would not be suitable as road base or rock armor. The metamorphics contain small amounts of pyrite (iron sulfide), calcite, and other minerals. The quartzites would be hard and durable, while the schist and phyllite would break down more readily upon removal and handling, particularly in the highly weathered portions near the ground surface.

The metamorphic rock consists of silica (quartzite), and calcium/potassium/aluminum silicates (schist and phyllite). These metamorphic rocks may be intruded locally with gabbro (calcium/potassium/aluminum silicates with trace amounts of chromite), felsic (quartz/feldspar), or mafic (hornblende/biotite) dikes. Blasting materials would introduce residual nitrites, nitrates, RDX, nitroglycerin, and other associated materials. Storage, handling, and use of petroleum hydrocarbons would be in accordance with applicable Storm Water Pollution Prevention Plans, Spill Prevention/Containment Plans and Waste Discharge Requirements prepared for the development.

The drill, blast, muck tunnel/shaft excavation method planned for the Iowa Hill Development is not expected to generate excessive amounts of fines like a TBM operation produces. If highly weathered zones or shear zones are encountered in the metamorphics, some fines would occur. These fines could be segregated from the coarser materials and disposed separately offsite. Best Management Practices (BMPs) such as silt fences, straw waddles, grading and berms, etc. would be employed to prevent migration of fines into surface waters.

The pressurized portions of the intake/outlet tunnel and shaft would be fully lined, thus preventing capture of groundwater. All other tunnels would be lined with concrete. Excessive groundwater inflow in the access or electrical conduit tunnels, or underground rooms is not expected in this hydrogeologic environment. However, if excessive groundwater inflow were encountered, well-established procedures for groundwater control using grout within tunnels, shafts, and underground cavities would be employed. Grout mixes could be modified in the field to control virtually every type of flow except low flows and seepage. For example, ratios of sand, cement, and water could be adjusted to meet specific field conditions. There are numerous thickeners, such as Kellco Crete, sawdust, paper and cellulose fibers, or cellophane chips (all of which are non-toxic) that can be used as mechanical bulking agents. Calcium chloride has been successfully used as a chemical accelerator to reduce grout-hardening time. Pre-grouting could be employed if there is indications of increasing groundwater inflow as the tunnel/shaft raise advances. There is no practical method for eliminating all groundwater seepage within tunnels, shafts, and underground caverns.

During construction, crews would have trailers for field offices, meetings and change rooms, as well as portable sanitary facilities. OSHA and MSHA require change rooms, showers, and sanitary facilities for miners involved in daily tunneling work. It would be difficult to locate a septic/leach field on the steep rocky slope next to Slab Creek Reservoir, so wastewater would have to be temporarily stored in tanks, pumped, and hauled offsite for disposal.

Preliminary calculations show that the expected cut and fill volumes for upper reservoir construction would be balanced. The dike would include material from excavation of the rock for the powerhouse, tunnels, and shafts. During construction, the Licensee would balance the excavation and fill requirements of the total Iowa Hill Development eliminating the need for permanent spoil and permanent spoil areas. Prior to the close of construction, all temporary spoil would be eliminated by incorporation into the Iowa Hill Reservoir dikes and the area landscaped. Overburden would be temporarily stockpiled for use during restoration. The temporary construction access and temporary spoil areas at the Iowa Hill Reservoir would be fully landscaped and planted prior to the close of construction. Any contaminated spoils would be disposed of in a location approved for storage of such material and would not be disposed of on National Forest System lands.

3.2.2 Upper Reservoir/Switchyard Access

The primary access to the upper reservoir site (Upper Site) off of US Highway 50 is via Carson Road, to Cable Road to Iowa Hill Road. The serviceability of 4 miles of existing Cable Road would be improved from the end of the paved portion of Cable Road to the Iowa Hill Reservoir

site. The Licensee would either provide an unimproved gravel road or pave the 4 miles of existing roadway to be improved. The existing road would not be widened. Wide places in the existing road would be improved along with the rest of the road and would function as passing turnouts. If a paved road is chosen, the existing dust would be eliminated. If the road were not paved, the Licensee would require the construction contractor to frequently apply water to the road while in use during construction to minimize dust. Once constructed, the Iowa Hill Reservoir would be fenced, locked and unavailable for public recreation.

After construction, during normal operation and maintenance of the Iowa Hill Development, vehicle trips to the Iowa Hill Reservoir area would be minimal, estimated at an average of no more than one vehicle round-trip per day.

3.2.3 Powerhouse/Intake Structure Access

The primary access to Slab Creek Reservoir (Lower Site) is off US Highway 50 via Carson Road, to Larsen Drive, to North Canyon Road, to the Slab Creek Reservoir access road. The intake structure and entrance to the Iowa Hill Powerhouse main access tunnel would be located at the end of the existing 2-mile-long Slab Creek Reservoir access road.

The first 1.1 miles of this existing road, starting from North Canyon Road going to a point near Slab Creek Dam, was constructed as a gravel road to provide access for dam construction and operation and maintenance access to the existing Slab Creek Reservoir.

The remaining 0.9 mile of the existing access road, starting from near Slab Creek Dam and heading east, was originally constructed as a 10-foot-wide road and currently provides access to Slab Creek Reservoir. The lower portion of the 0.9-mile-long road was partially constructed by SMUD and a portion of the road was constructed as part of the original Chute Camp lumber industry road that was abandoned prior to the construction of Slab Creek Reservoir. This segment of road would be widened by four feet in some areas. This 0.9-mile-long segment of access road has been used for many years without the need for tie-back reinforcement to increase the roadway stability and would probably not need stability improvements. However, as a precautionary move prior to construction, the Licensee would check for stability adequacy of the existing roadway cross-sectional cut-and-fill slopes, and if necessary, the Licensee, over a period of years, would install tie-back rock anchors at needed locations to improve the stability of the road.

The Licensee would pave the 2-mile-long Slab Creek Reservoir access road from North Canyon Road to the entrance of the Iowa Hill Powerhouse access tunnel. Paving would enhance serviceability and eliminate the existing dust. Similar to the Licensee's existing access roads to other UARP powerhouses, the Licensee would use a 14-foot-wide asphalt pavement with widened passing turnouts. The Licensee would widen and pave the existing turnaround area near the existing boat launch site to accommodate larger trucks. The widened turnaround area would also serve as a temporary access area during construction of the powerhouse access tunnel.

After construction, during normal operation and maintenance of the Iowa Hill Development, vehicle trips to the Iowa Hill Powerhouse are estimated to be less than an average of 4 round-trips per day.

3.2.4 Transporting Rock to the Upper Reservoir Site

During construction, the Licensee would transport the excavated rock and soil from the powerhouse, tunnel, and shaft to the Iowa Hill Reservoir site to be used for construction of the Iowa Hill Reservoir berm. The difference in elevation from the lower access area to the Iowa Hill Reservoir site is about 1,000 feet.

Underground spoils will be transported to the upper reservoir site using a vertical material handling system consisting of either a conveyor or bucket and cable system located in the cable shaft. Once the material is delivered at the upper reservoir site the material would be either trucked up a haul road within the FERC project boundary for the upper reservoir, or alternatively placed on a conveyor belt and transported to the upper reservoir site.

It is anticipated that the Slab Creek Reservoir access road would be closed to the public during construction. The contractor would establish a staging area along the road some distance from the construction operations. There would be daily construction traffic from the staging area to the tunnel portals. The Slab Creek Reservoir access road would be used during shotcreting, grouting, or other concrete work and when mechanical and electrical equipment is installed in the underground powerhouse.

The Licensee will finalize the preliminary draft Traffic and Transportation Plan prior to the commencement of construction that describes the level of planned road use and identifies measures to control impacts to social and environmental resources.

3.2.5 Temporary Construction Facilities and Laydown Areas

During construction several construction trailers would be located in a laydown area near the access tunnel entrance. In addition to the construction trailers, parking for approximately 50 construction workers would be included and temporary self contained type sanitation facilities would be available for the workers.

Construction facilities at the Iowa Hill Reservoir would include construction trailers, parking for about 100 workers and temporary sanitation facilities. The laydown area at the Iowa Hill Reservoir would be approximately 30 acres. The upper laydown area would be used for temporary storage of site spoils, organics and tunnel debris while the dike and reservoir are under construction.

3.2.6 Access Roads

In the project area, there are two connections from U.S. 50 to Carson Road: a non-signaled at-grade intersection between Placerville and Camino (designated the “old highway” intersection in

this document, and denoted as "Junction Old Highway" by Caltrans) and a grade-separated interchange near central Camino area (east Camino interchange).

The primary access to the upper reservoir site is off US Highway 50 via Carson Road, to Cable Road to Iowa Hill Road. SMUD will improve the serviceability of four miles of existing Cable Road from the end of the paved portion of Cable Road to the upper reservoir site. For the remaining four miles of existing road, SMUD plans to either chip seal or gravel it.

The primary access to the Slab Creek Reservoir is off US Highway 50 via Carson Road, to Larsen Drive, to North Canyon Road, to the Slab Creek Reservoir access road. At Slab Creek Reservoir, SMUD will construct the intake and an access tunnel to the underground powerhouse. The location of these facilities is at the end of the existing 2-mile-long Slab Creek Reservoir access road that begins at North Canyon Road and terminates at the reservoir. The first 1.1 miles of this access road, from North Canyon Road going to a point near the Slab Creek Reservoir Dam, was constructed by SMUD as a gravel road to provide access for dam construction and operations and maintenance access to the existing Slab Creek Reservoir. The remaining 0.9 miles of the existing access road, from near the dam to the proposed lower portal, was originally constructed as a 10-foot-wide road and currently provides access to Slab Creek Reservoir. The 2-mile-long Slab Creek Reservoir access road from North Canyon Road to the entrance of the Iowa Hill Powerhouse access tunnel would be paved to enhance serviceability and eliminate dust.

Appendix A shows the preliminary Iowa Hill Development labor plan for the Upper Site, Lower Site, total combined expected labor force for both sites including project support and total labor hours for the project. The maximum expected work force at the Upper Site is expected to occur in the third year with a peak work force of approximately 140 people. The Lower Site also peaks at this time with an expected work force of 60 people. The Draft Transportation Management Plan (contained in Appendix G of the applicant-prepared Preliminary Draft Environmental Assessment) assumes a worse-case condition assuming that the entire work force, including administrative support, would travel to one site or the other at the same time. The result of this analysis was that, using the techniques described in the report (i.e., shifting work hours, limiting equipment delivery times and days, longer duration shifts, use of car/van pooling and possibly busing), no reduction of service on the identified roadways leading to either site was identified. The final Transportation Management Plan will be developed during the design phase of the project and will include input from the local community with an emphasis on the local rural agricultural retail district, Apple Hill and local residences.

3.2.7 Transmission Line Construction

The Iowa Hill Development will be interconnected with the existing regional electrical transmission network by "looping" 230-kV Camino-White Rock transmission circuits through the Iowa Hill switchyard. The anticipated procedure and sequencing of events is described below.

The distance between the Iowa Hill switchyard and the interconnection point on the Camino-White Rock Transmission line is about two miles. A 100-foot-wide path will be cleared. A gravel-surface construction road will be developed from the upper reservoir/switchyard area for hauling required materials for tower and other transmission line construction activities.

Sites for the 11 poles will be cleared and grubbed, and foundations will be constructed. Single pole-style steel towers have been selected. Foundation construction will involve drilling for a caisson type foundation at each tower site, placement of reinforcing steel, and backfilling with concrete. Once foundations have been completed, the steel poles will be erected.

Upon completion of tower erection, the Camino-White Rock circuit that loops through the Iowa Hill Switchyard will be reconductored. The existing conductor will be removed and replaced, and insulators, conductors, and overhead protective ground wire will be installed on the 11 new towers between the Camino-White Rock route and the Iowa Hill site. The reconductoring operation and other transmission system improvements need to be completed prior to the planned Unit No 1 testing activities.

Upon completion of construction, the road would remain in place to facilitate future maintenance activities (inspections and vegetation control).

4.0 CONSTRUCTION OF RECREATION FACILITIES

Most of the recreation facilities in the area of the UARP storage reservoirs were constructed by SMUD under the original recreation plan for the UARP in the 1960s or under the amended recreation plan as a result of the addition of the Jones Fork Powerhouse (see Table C2.0-1). The amended recreation plan, which was phased in over a 15-year period from 1989-2003, resulted in the construction of a dozen group or small-sized campgrounds at the UARP reservoirs. Presently, the UARP-related recreation facilities (approximately 50) provide extensive recreational development at the primary UARP reservoirs.

For the new license term and as part of the Proposed Action, SMUD proposes a new Recreation Plan that includes development of a Recreation Facilities Reconstruction and New Construction Schedule (Reconstruction Schedule). The Reconstruction Schedule would include detailed plans for facility reconstruction or new construction within the FERC Project Boundary to be implemented in the third and fourth year of the new license. After initial implementation, the Reconstruction Schedule would be revised on a four-year cycle throughout the license term. This proposal is described in more detail in the PDEA. Thus, there are presently no plans or schedules for UARP-related recreation facility construction.

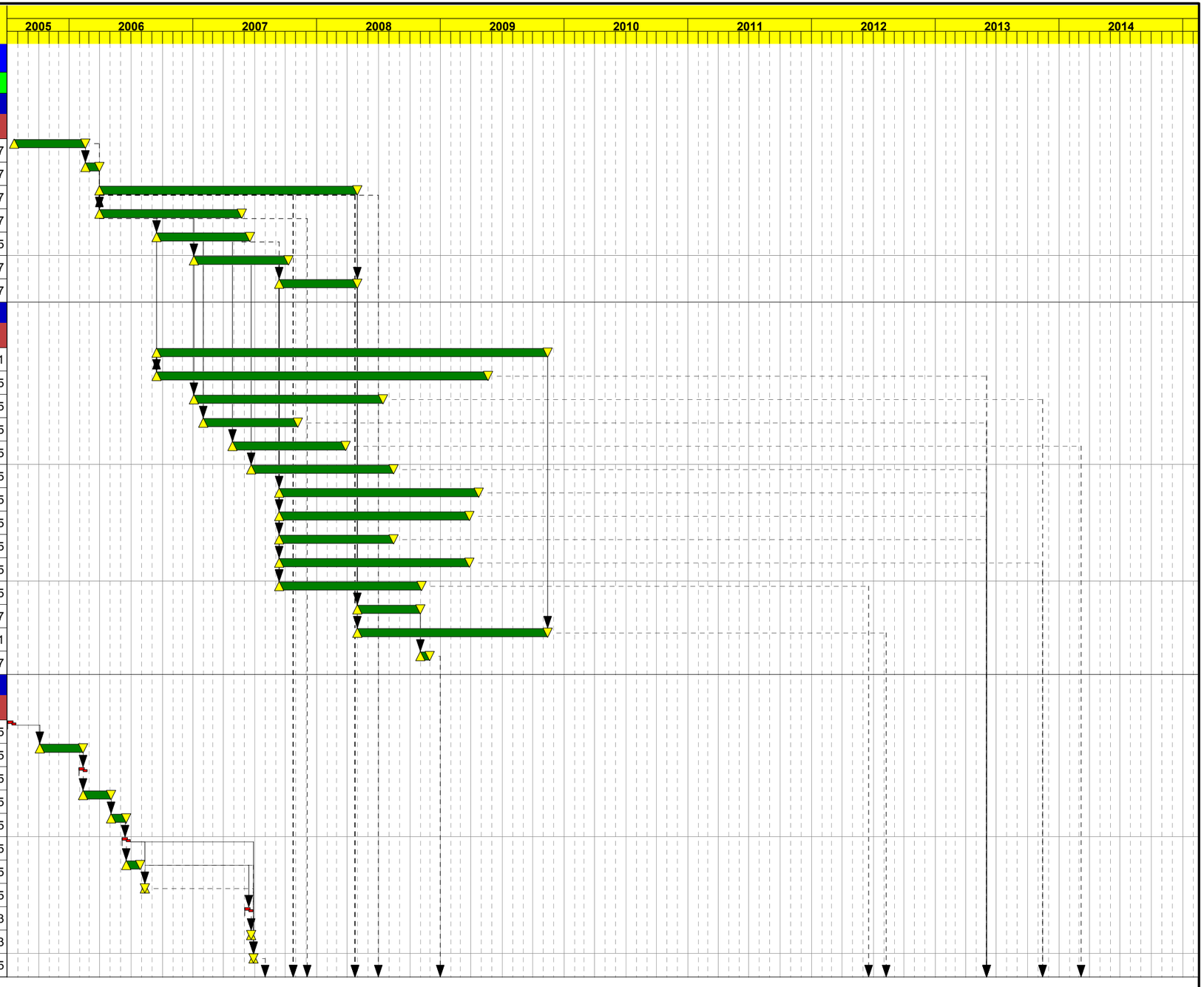
APPENDIX A

IOWA HILL DRAFT SCHEDULE

AND

IOWA HILL MANPOWER PLAN

Activity ID	Activity Description	Orig Dur	Early Start	Early Finish	Total Float
IOWA HILL PROJECT					
ENGINEERING PHASE					
IC200000	IOWA HILL CONCEPTUAL ENGINEERING	151	20JUL05*	15FEB06	37
IC200010	IOWA HILL CONSTRUCTABILITY STUDIES/ EPA MODELING	30	16FEB06	29MAR06	37
ICENG01	PROJECT ENGINEERING - DESIGN SUMMARY	545*	30MAR06	30APR08	37
ICENG11	CIVIL AND STRUCTURAL DESIGN	300	30MAR06*	23MAY07	37
ICENG21	MECHANICAL DESIGN	198	14SEP06	18JUN07	1,035
ICENG31	ELELCTRICAL BOP DESIGN	200	04JAN07	10OCT07	37
ICENG41	SWITCHYARD DESIGN	165	13SEP07	30APR08	37
PROCUREMENT PHASE					
IC300000	PROJECT PROCUREMENT SUMMARY	825*	14SEP06	11NOV09	891
ICPR001	PUMP TURBINE AND GOVERNOR	700	14SEP06	20MAY09	1,165
ICPR009	MECHANICAL - BOP	400	04JAN07	16JUL08	1,505
ICPR002	SPHERICAL VALVE	200	01FEB07	07NOV07	1,565
ICPR011	GATES AND HOISTS	240	26APR07	26MAR08	1,565
ICPR004	EXCITATION AND STATIC STARTING EQUIPMENT	300	21JUN07	13AUG08	1,365
ICPR003	GENERATOR / MOTOR	420	13SEP07	22APR09	1,185
ICPR006	MAIN POWER TRANSFORMERS	400	13SEP07	25MAR09	1,205
ICPR007	CABLES TO SURFACE	240	13SEP07	13AUG08	1,365
ICPR010	ELECTRICAL - BOP	400	13SEP07	25MAR09	1,325
ICPR012	UNIT AND PLANT CONTROL SYSTEM	300	13SEP07	05NOV08	955
IC300010	CONSTRCUTION CONTRACT - BIDDING PHASE	132	01MAY08	31OCT08	37
ICPR008	SWITCHYARD EQUIPMENT	400	01MAY08	11NOV09	891
IC300020	AWARD CONSTRUCTION CONTRACT	20	03NOV08	28NOV08	37
PERMITTING & COMPLIANCE					
ICIH0111	Application for license due to FERC	0		14JUL05*	35
ICIH0121	Address Infomation & Clarification Req from FERC	90	07OCT05	09FEB06	35
ICIH0131	FERC Accepts License Application	0		09FEB06	35
ICIH0161	Agencies - Terms & Conditions	60	10FEB06	04MAY06	35
ICIH0181	Applicant Response to Agency Terms & Conditons	30	05MAY06	15JUN06	35
ICIH0191	DEIS - Due from FERC	0		15JUN06	35
ICIH0201	SMUD - Issues Draft DEIR	30	16JUN06	27JUL06	275
ICIH0101	Request certification under sect. 401 - SWRCB	0	11AUG06	10AUG06	265
ICIH0231	SMUD - Accepts Final EIR	0		14JUN07	1,963
ICIH0171	SWRCB Issue 401 Permit	1	22JUN07	22JUN07	1,963
ICIH0211	FERC - Issue Final EIS	1	29JUN07	29JUN07	35



Start Date 01OCT01
Finish Date 12DEC14
Data Date 31MAY05
Run Date 03JUN05 16:51

Early Bar
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UARP

Sheet 1 of 4

SMUD
IOWA HILL PROJECT PLAN

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Date	Revision	Checked	Approved

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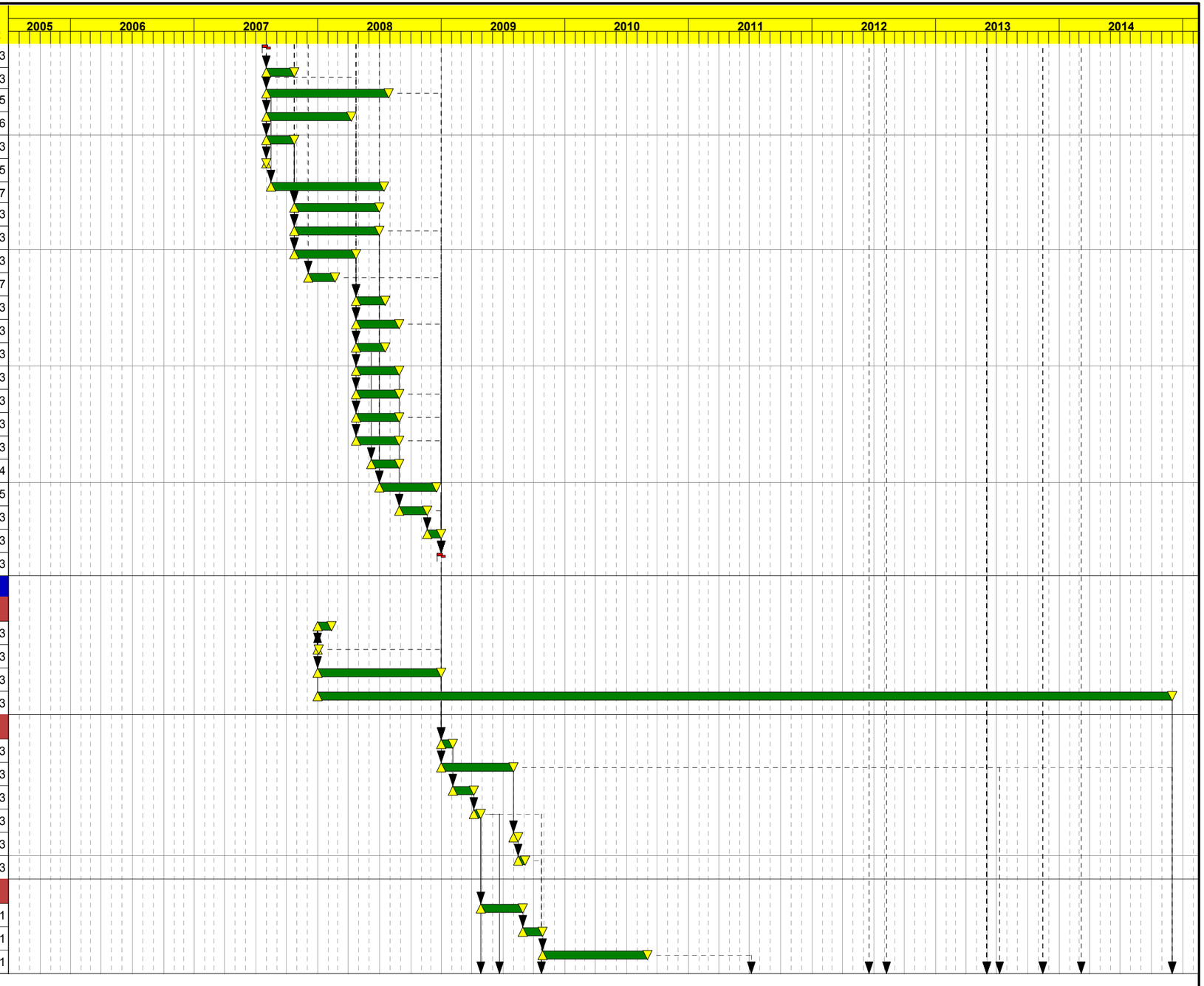
31MAY04	Draft Schedule For Review		RAMA K

Activity ID	Activity Description	Orig Dur	Early Start	Early Finish	Total Float
ICLIC01	FERC licensing decision (a probable estimate)	0		31JUL07*	13
ICIH0052	Consult with Fed and State on permits	60	01AUG07	23OCT07	13
ICIH0091	ROW AND LAND AQUISITION	260	01AUG07	29JUL08	125
ICIH0141	ROW and Permit Xmission line for Temp Power	180	01AUG07	08APR08	1,756
ICIH0151	EIR Report ready for 1601 & 401 Certificate	60	01AUG07	23OCT07	13
ICLIC11	IOWA HIll Water rights Application - SWRCB	1	01AUG07	01AUG07	1,935
ICIH0061	Conduct Environmental Studies	239	15AUG07*	14JUL08	1,687
ICIH0232	ACOE 404 Permit	180	24OCT07	01JUL08	13
ICIH0233	RWQCB - NPDES & WDR Permits	180	24OCT07	01JUL08	13
ICIH0235	CDFG 1601 Permit	132	24OCT07	24APR08	13
ICIH0221	Conduct pre-con survy for species of spl concern	60	03DEC07*	22FEB08	237
ICIH0241	Transportation Management Plan	60	25APR08	17JUL08	13
ICIH0251	Dust Abatement Plan	90	25APR08	28AUG08	13
ICIH0261	Storm Water Pollution Prevention Plans	60	25APR08	17JUL08	13
ICIH0271	Spill prevention/containment plans	90	25APR08	28AUG08	13
ICIH0281	Noise Attenuation Plan	90	25APR08	28AUG08	103
ICIH0291	Visual Resources Protection Plan	90	25APR08	28AUG08	103
ICIH0331	Fire Risk Reduction Plan	90	25APR08	28AUG08	103
ICIH0262	Spoils Disposal Plan	60	06JUN08	28AUG08	1,654
ICIH0234	FS Special Use Permit	120	02JUL08	16DEC08	25
ICIH0301	Site-specific Resources Mitigation Plan	60	29AUG08	20NOV08	13
ICIH0311	Site-specific spl. Concern Mitigation Plan	30	21NOV08	01JAN09	13
ICIH0321	ALL PERMITS APPROVED FOR CONSTRUCTION	0		01JAN09	13
CONSTRUCTION PHASE					
PROJECT MANAGEMENT					
ICCN0001	CONSTRUCTION METHOD STATEMENT	30	01JAN08	11FEB08	13
ICCN0011	Notify Sierra Pacific for Timber Harvesting	2	01JAN08	02JAN08	13
ICCN0021	Sierra Pacific Harvesting - 1year	263	01JAN08	01JAN09	13
ICPS001	PROJECT SUPPORT	1,805	01JAN08*	01DEC14	13
MOBILIZATION & OFF SITE FACILITIES					
ICM001	MOBILIZATION	22	02JAN09	02FEB09	13
ICSW004	INSTALL TRANSMISSION LINE	151	02JAN09	31JUL09	953
ICP001	PERMANENT ACCESS ROAD	45	03FEB09	06APR09	13
ICCR01	CONSTRUCTION ACCESS	15	07APR09	27APR09	13
ICSW024	INSTALL TRANFORMER FOR TEMP POWER	10	03AUG09	14AUG09	953
ICM021	TEMP POWER AVAILABLE AT JOB SITE	15	17AUG09	04SEP09	953
WATERWAYS AND INLET OUTLET STRUCTURE					
ICIO002	COFFER DAM SLAB CREEK	88	28APR09	27AUG09	1,101
ICIO003	EXCAVATION IO STRUCTURE	44	28AUG09	28OCT09	1,101
ICIO004	INTAKE/ OUTLET STRUCTURE CONCRETE	219	29OCT09	31AUG10	1,101



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Finish Date	12DEC14
Data Date	31MAY05
Run Date	03JUN05 16:51

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UARP

Sheet 2 of 4

SMUD
IOWA HILL PROJECT PLAN

MAIN LAY OUT

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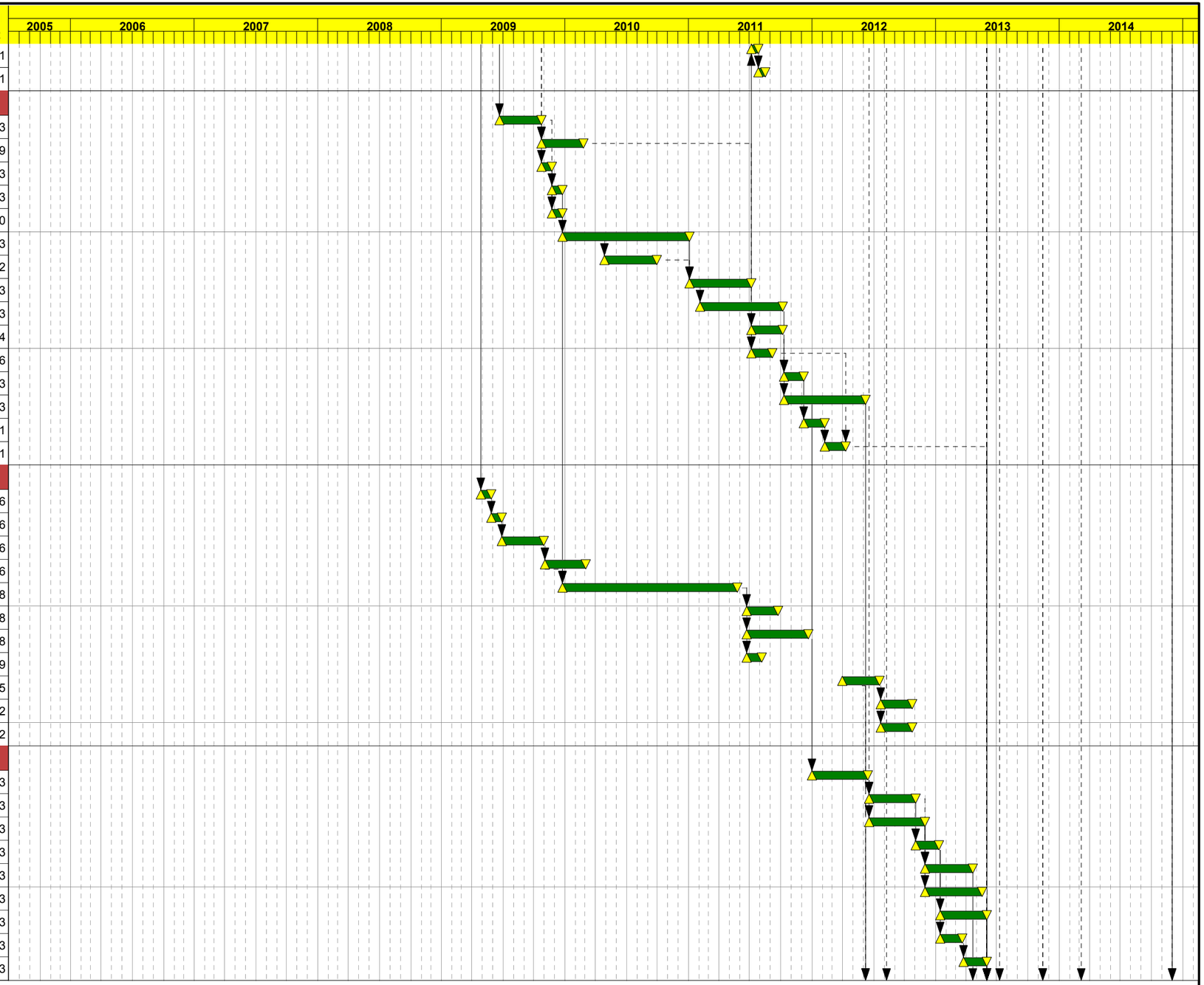
31MAY04	Draft Schedule For Review		RAMA K

Activity ID	Activity Description	Orig Dur	Early Start	Early Finish	Total Float
ICIO005	EXC TAILRACE TUNNEL PLUG	15	06JUL11	26JUL11	881
ICIO006	CONCRETE REMAINING TAILRACE TUNNEL	15	27JUL11	16AUG11	881
POWER HOUSE & TUNNEL EXCAVATION					
ICTP002	EXC POWER HOUSE SHAFT	88	23JUN09	22OCT09	13
ICTP001	EXC ACCESS TUNNEL	90	23OCT09	25FEB10	919
ICTP004	EXC POWER HOUSE TO BELOW CRANE RAIL	22	23OCT09	23NOV09	13
ICTP005	INSTALL BRIDGE CRANE RAIL	22	24NOV09	23DEC09	13
ICTP009	CONC LINE POWER HOUSE SHAFT	22	24NOV09	23DEC09	1,310
ICTP006	EXC REMAINING POWERHOUSE	269	24DEC09	04JAN11	13
ICTP008	EXC VERTICAL SHAFT AT RESERVOIR	110	29APR10	29SEP10	82
ICTP003	EXC TAILRACE TUNNEL	130	05JAN11	05JUL11	13
ICTP007	EXC PENSTOCK AND PRESSURE TUNNEL	176	04FEB11	07OCT11	13
ICTP014	TAILRACE TUNNEL CONCRETE	67	06JUL11	06OCT11	14
ICTP015	ACCESS TUNNEL CONCRETE	45	06JUL11	06SEP11	566
ICTP012	STEEL LINE CONC ENCASED PRESSURE TUNNEL	44	10OCT11	08DEC11	13
ICTP013	POWER HOUSE CONCRETE	174	10OCT11	07JUN12	13
ICTP011	CONCRETE LINE PRESSURE TUNNEL	44	09DEC11	08FEB12	411
ICTP010	CONC LINE VERTICAL SHAFT AT RESERVOIR	44	09FEB12	10APR12	411
UPPER RESERVOIR					
ICRV002	CLEARING RESERVOIR	23	28APR09	28MAY09	826
ICRV003	TOPSOIL REMOVAL	22	29MAY09	29JUN09	826
ICRV004	EXC TO STOCKPILE FOR PROCESSING	89	30JUN09	30OCT09	826
ICRV005	PROCESS EXCAVATION	88	02NOV09	03MAR10	826
ICRV007	RESERVOIR EXCAVATION TO EMBANKMENT	369	24DEC09	24MAY11	788
ICRV006	LHP TRANSITION ZONE EMBANKMENT	66	24JUN11	23SEP11	788
ICRV008	FILTER AND BEDDING ZONE	131	24JUN11	23DEC11	788
ICRV012	FENCING	30	24JUN11	04AUG11	889
ICRV009	UPPER RESERVOIR INTAKE/OUTLET STRUCTURE	80	02APR12*	20JUL12	185
ICRV010	GEOMEMBRANE LINER	66	23JUL12	22OCT12	572
ICRV011	INSTRUMENTATION	66	23JUL12	22OCT12	572
MECHANICAL & ELECTRICAL WORKS					
ICEM002	UNIT 1 DRAFT TUBE LINER	120	02JAN12	15JUN12	13
ICEM003	UNIT 1 STAY RING	100	18JUN12	02NOV12	13
ICEM007	UNIT 2 DRAFT TUBE LINER	120	18JUN12	30NOV12	343
ICEM004	UNIT 1 SPIRAL CASE	50	05NOV12	11JAN13	13
ICEM008	UNIT 2 STAY RING	100	03DEC12	19APR13	343
ICEM012	UNIT 3 DRAFT TUBE LINER	120	03DEC12	17MAY13	423
ICEM005	UNIT 1 PIT LINER	100	14JAN13	31MAY13	13
ICEM009	UNIT 2 SPIRAL CASE	50	14JAN13	22MAR13	413
ICEM014	UNIT 3 SPIRAL CASE	50	25MAR13	31MAY13	413



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Sheet 3 of 4

SMUD
IOWA HILL PROJECT PLAN

MAIN LAY OUT

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Date	Revision	Checked	Approved
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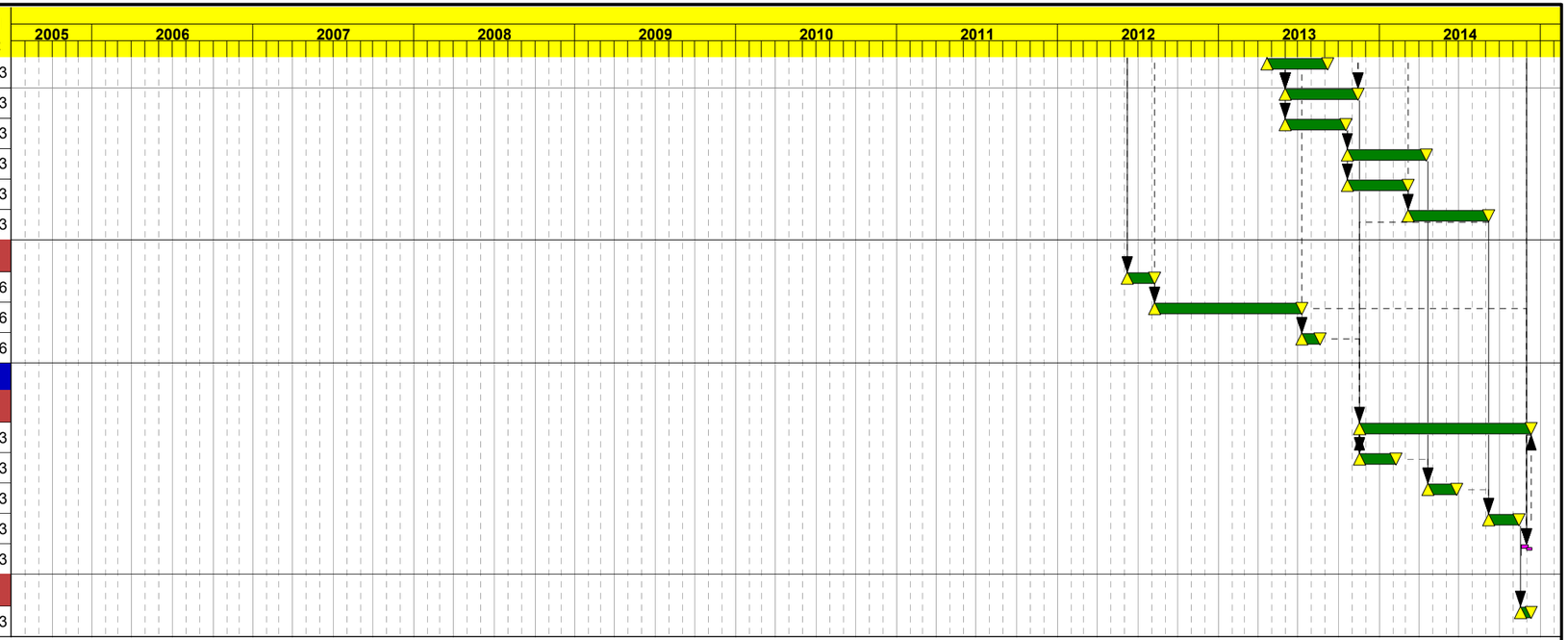
ICEM013	UNIT 3 STAY RING	100	22APR13	06SEP13	343
ICEM006	UNIT 1 ALL ROTATING EQUIPMENT	120	03JUN13	15NOV13	113
ICEM010	UNIT 2 PIT LINER	100	03JUN13	18OCT13	13
ICEM011	UNIT 2 ALL ROTATING EQUIPMENT	130	21OCT13	18APR14	63
ICEM015	UNIT 3 PIT LINER	100	21OCT13	07MAR14	13
ICEM016	UNIT 3 ALL ROTATING EQUIPMENT	130	10MAR14	05SEP14	13
SWITCHYARD					
ICSW002	BOX CULVERT FOR CABLE	44	08JUN12	08AUG12	176
ICSW003	INSTALL SWITCHYARD	239	09AUG12	09JUL13	176
ICSW014	BACKFEED & ENERGIZATION	30	10JUL13	20AUG13	176
STARTUP & COMMISSIONING PHASE					
MECHANICAL & ELECTRICAL WORKS					
ICEM017	TESTING AND STARTUP - SUMMARY	280*	18NOV13	12DEC14	13
ICEM027	UNIT 1 STARTUP & COMMISSIONING	60	18NOV13	07FEB14	113
ICEM037	UNIT 2 STARTUP & COMMISSIONING	50	21APR14	27JUN14	63
ICEM047	UNIT 3 STARTUP & COMMISSIONING	50	08SEP14	14NOV14	13
ICCOC01	COMMERCIAL OPERATION COMPLETE	0		01DEC14	13
DEMOBILIZATION					
ICCOC11	PROJECT CLEAN UP & DEMOBILIZATION	20	17NOV14	12DEC14	13



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Start Date	01OCT01
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Early Bar
Progress Bar

UARP

Sheet 4 of 4

SMUD
IOWA HILL PROJECT PLAN

MAIN LAY OUT

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IOWA HILL MAN POWER PLAN - *Draft*