



Sacramento Municipal Utility District

**Iowa Hill Pumped Storage Development
Initial Information Package**

**Revision 1
July 17, 2003**



Introduction

The Sacramento Municipal Utility District (SMUD) has considered the construction of pumped storage capacity within its Upper American River Project (UARP), Federal Energy Regulatory Commission (FERC) Project No. 2101, on and off since 1972, when Bechtel Corporation performed preliminary engineering on the Iowa Hill site. As part of the beginning stage of the UARP relicensing process, SMUD evaluated the potential for modifications to the UARP and identified the potential addition of a pumped storage facility at Iowa Hill in its July 2001 Initial Information Package for the UARP relicensing. Based primarily on feasibility studies recently conducted, SMUD has decided to include the Iowa Hill Pumped Storage Development (“Iowa Hill” or “Development”) in its 2005 submittal to the FERC for a new license for the UARP.

This Initial Information Package (IIP) is intended to provide relicensing participants with enough information on the Iowa Hill Development to formulate issue questions to be addressed in the alternative licensing process that SMUD is using to develop its license application. This Revision 1 of the Iowa Hill IIP supersedes Revision 0, which was distributed to the Relicensing Plenary Group participants on May 23, 2003.

In order to include the Iowa Hill Development in its July 2005 license application, SMUD will be finalizing key design decisions, conducting studies to address the concerns identified by relicensing participants, and preparing the documents necessary to complete the filing. It is envisioned that this document will be updated periodically to reflect design considerations as they evolve in preparation for completion of the license application.

The purpose of this document is not to present a complete and fully designed development. Rather, the following sections describe the preliminary engineering, site selection, equipment description, and design and operation of the proposed Development at this conceptual stage. This document also describes the environmental resources of the affected area, preliminary issues, and SMUD’s proposed plan of study for assessing the effects the Development would have on the environment.

Again, the reader should understand that information contained in this package is preliminary, and, therefore, subject to change as the Development evolves.

General Development Description

The proposed Development is a nominal 400 MW pumped storage generating facility using the existing Slab Creek Reservoir as the lower reservoir and a new reservoir located on the top of Iowa Hill. The electrical power output would be carried by the existing 3 - 230 kV transmission lines that move power down from the UARP to SMUD’s load center. No new transmission lines would be required except for a new generation tie-line approximately two miles in length which would tie the Iowa Hill Development into the UARP system on the Camino/White Rock circuit.



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The new upper reservoir at Iowa Hill would hold approximately 6,400 acre-feet of water and be located, to the greatest extent possible on SMUD-owned land; however, some additional Federal land within the Eldorado National Forest would be required. The upper reservoir was laid out to avoid developed private land adjacent to the site. The location of additional land required for lower reservoir facilities will be finalized after rock core drilling is completed this fall to verify the suitability of sites. The expected land requirements for construction and operation of the Development include approximately 250 acres. The majority of this area includes the upper reservoir site. Other areas include the transmission line route and the intake structure. There will be no permanent spoil piles associated with the development.

SMUD's preliminary concept for the Development utilizes engineering for an *underground* powerhouse design, primarily to update prior engineering cost estimates on a fairly comparable basis. An underground powerhouse is a large underground cavern, which requires extensive additional tunneling and excavation for the power and construction tunnels, turbine and transformer chambers. However, the concept of a *shaft* powerhouse holds promise for significantly reducing costs to construct the Development. This type of powerhouse uses a large vertical shaft from the surface extending approximately 100 feet below the surface of the lower reservoir.

The Iowa Hill Development would enhance SMUD's ability to meet Sacramento's future energy needs, particularly during the critical times of peak demand. However, the value of the development goes beyond the exchange of on- and off-peak energy. In the larger context, the Iowa Hill Development will serve as an operational tool that will aid SMUD in delivering energy during the next 50 to 100 years. The adaptability and flexibility of pumped storage will provide the District with the necessary resources to transition from between potentially changing energy markets while maintaining quality of service. A list of benefits that the development will offer include:

- Improve the reliability of the District's electric system (and Northern California).
- Provide 400 MW of capacity as the District's load increases in the future.
- Improve the flexibility of dispatching of other types of units and of short and long-term purchases reducing the costs and improving the overall economics of the District's electric system.
- Improve the stability of the District's electric system.
- Can be used as quick-start reserve or spinning reserve for the District's own load and for sale to Northern California and the energy regulated or unregulated markets.
- Can be used for operating reserve.



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- Enable SMUD to utilize variable-speed pumped storage for regulation around the clock (1) saving conventional UARP critical dry-year energy and (2) increasing the efficiency of the gas units by running continuously at full load and minimizing peaking operations during the day. SMUD partially uses the existing conventional UARP to regulate with. Regulation occurs 24 hours per day 365 days per year.
- With a 400 MW capacity, will provide 700 MW of 24-hour load-swing capability for the District.
- Provide operational area-control regulation.
- Can be used for traditional peak shaving and load leveling to save costs of installed cogeneration capacity and purchased power.
- Improve reactive power support reducing the need for temporary measures sometimes used by the District.
- Can be used for minute-by-minute load following.
- Can be used for fast pick-up or shedding and or ramping.
- Improve the efficiency of cogeneration, fossil, nuclear and gas units and reduce the number of fossil or thermal units committed.
- Improve voltage and frequency control within the District's service area and Northern California.
- Reduce the number of start-ups of thermal and gas units.
- Can be used to provide capacity to the District's electric system to guard against future power interruptions from line faults, plant trips and market forces for reasons uncontrolled by the District.

Relicensing Schedule

SMUD is confident that (1) the Iowa Hill Development can be adequately analyzed and included in the UARP application for new license, due to the FERC by July 31, 2005, and (2) the inclusion of the Iowa Hill Development in the application is unlikely to cause significant delays to the UARP relicensing. This view is based on a number of factors that are unique to the Development, including:

- The proposed Iowa Hill Development incorporates existing facilities such as the Slab Creek Reservoir and the nearby UARP transmission line;



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- The Development does not involve the construction of new dams on existing streams or rivers;
- SMUD owns most of the land necessary for the upper reservoir site, as shown in Figure 2;
- The upper reservoir will be formed entirely from excavation atop Iowa Hill and berm embankment from the reservoir excavation and excavation from powerhouse and tunnels. The District will balance the excavation and fill requirements of the project eliminating any need for permanent spoil at the upper reservoir site.
- Many of the environmental studies presently underway for the UARP relicensing have direct application to the Development or could be easily expanded to incorporate the Iowa Hill affected environment, as proposed in the Environmental Resources section of this IIP; and
- Many of the environmental permits needed before construction can begin are not needed for the UARP license filing, but can be obtained after the filing or in the time interval between license issuance and the commencement of construction activities.

As demonstrated in the timeline (Appendix A), SMUD believes that all of the process steps required to include Iowa Hill in the license filing, due by July 31, 2005, can be accomplished. As shown in the timeline, necessary permits such as the U.S. Army Corp of Engineer's 404 Permit and the California Department of Fish and Game's 1600 Permit are required prior to construction, but are not required to be completed at the time of the submittal of the license application.

Through the licensing process for the Cosumnes Power Plant (CPP), SMUD has established an excellent working relationship with many of the resource agencies represented in this relicensing process. The CPP required the same permits and is currently in the process of completing or has already received all of the required permits. From our experience on the CPP, we have learned that the timeline for these permits is typically 12-18 months.