



Project Information Sheet Kajakai Hydro Power Plant

Kajakai – A critical component of the South East Transmission System

Implementing Partner	LBG
Project Start Date	May 2004
Anticipated Finish Date	June 2007

Overview

In the great Helmand River Valley of South Eastern Afghanistan, stands a rock fill dam, bearing testimony to the commitment that USAID has had over time to the development of Afghanistan, and the alleviation of acute regional poverty. This commitment evolved during the late 1940's with the construction of essential irrigation facilities and supportive infrastructure in the Helmand and Arghandab River Valleys. It soon translated into the construction of a regionally vital reservoir storage dam on the Helmand River in the early 1950's, the Kajakai Multipurpose Project, which integrates a number of extremely essential water storage and release functions, including:

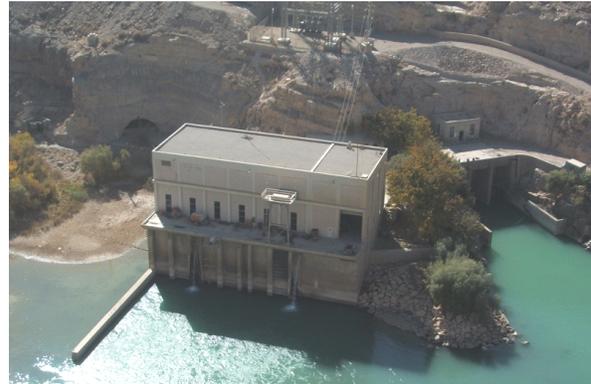
- § The provision of irrigation water to extensive agricultural lands in the Helmand River Valley downstream from the existing Kajakai Dam
- § The generation of additional hydroelectric energy at the Kajakai Hydro Power Plant facilities
- § Provision of water for both potable and industrial use to numerous communities situated in the Helmand River Valley downstream from the Kajakai Dam
- § The reduction of flooding on the Helmand River and mitigation of consequential damage to hydraulic structures constructed on downstream river reaches serving vital irrigation facilities

Standing 100 meters (320 feet) in height, spanning 270 meters (887 feet) in length and having a present storage capacity of 1.2 billion cubic meters of water, the Kajakai Dam creates the largest multi-purpose reservoir in the country. Irrigation water demands as initially envisioned were to serve 142,000 hectares, or some 285,000 acres, of existing downstream agricultural area.

Several years after the completion of the Kajakai Dam, the US Bureau of Reclamation coordinated the overall

implementation of Kajakai's downstream irrigation facilities. The Bureau's team of experts was in residence over a two and one-half year period. This intense support was undertaken in an effort to facilitate establishing agricultural productivity known to be inherent from the Helmand River reclaimed command areas. For decades after, water discharging from Kajakai has traversed some 300 miles of downstream irrigation canals feeding essential farmland.

In 1975, USAID commissioned the initial installation of two 16.5 MW generating units in a powerhouse constructed at the toe of the dam. This first stage powerhouse was actually constructed to house three equally sized units.



The Kajakai Powerhouse 2004

In October, 2002, USAID, along with international donors including the World Bank, the Japanese and Canadian Governments, the UN and European Union, agreed to undertake a national irrigation and power rehabilitation program. This National Priority Program was aimed at restoration of water supply for local communities, rehabilitating irrigation systems for farmlands and providing sufficient electrical power for residents, industries and commerce by harnessing water from various rivers for the power plant. Increased water and power supply will enable the country to expand irrigated farmlands and develop industrial parks, creating jobs for all Afghans.

Today, USAID is currently funding the procurement and installation of the missing third unit which will have slightly higher output than the other two existing units. USAID is also funding the rehabilitation of the existing two units which had deteriorated extensively in their service



capability during the intervening period of civil unrest which persisted from approximately 1979, the year the Soviet Union invaded Afghanistan, until 2002. Upon completion of both the rehabilitation of the existing units and the installation of the third, the power plant will have a combined output of approximately 51 MW. USAID is also completing the installation of the service spillway radial gates and the emergency spillway.

Project Activities

The current power plant refurbishments comprise the rehabilitation of the two existing units; know as Units 1 and 3, and the design and installation of a new 18.5 MW Unit 2. Prior to implementing the spillway gates, a three fold feasibility study has been done, comprising the social and environmental assessment of the reservoir area known as the Helmand Water Balance Study, and a technical analysis of the service and emergency spillways, including the installation of the eight service spillways.

USAID, in October 2003, funded a condition assessment of the two existing hydro-electric generating units. It was determined that the turbines at the plant were unreliable, making them virtually inoperable.



Cavitation Damage to Unit 1 Turbine Runner

In August, 2004 rehabilitation began on the Units 1 and 3, employing approximately 45 Kajakai HPP permanent powerhouse staff. At present, limited aspects of the work at Unit 2 are in progress, with the concrete structures for it in place and various other technical aspects underway.

Additionally, the original design concept for the project contemplated heightening of the reservoir an additional 11 meters. Reservoir heightening was to be achieved through the simple installation of radial gates in a currently un-gated spillway channel. This heightening would increase active reservoir storage volume from an estimated 1.7 billion cubic meters, to approximately 3.0 billion cubic meters. A radial gate construction program was begun in 1976 but was aborted in 1979, at the time of the Soviet invasion. A consignment of radial gate components was actually fabricated and shipped to the site pursuant to this construction program.



Rehabilitation of Unit 1 Turbine

Reservoir heightening would enhance project capabilities enormously. A primary enhancement would center around augmenting downstream irrigated command areas from what today is estimated to be 142,000 hectares to well over 350,000 hectares. This increase in agricultural productivity would have tremendous economic benefit for the overall economy of Afghanistan. Another enhancement involves augmenting power and energy capabilities.

Discharge conveyance capacity associated with the production of electrical energy was originally sized to eventually accommodate a grand total of 150 MW of installed generating capacity (Rated at 67 meters net head). Thus, reservoir heightening could facilitate the installation of an additional 100 MW of potential generating capacity.



During 2005, USAID initiated steps necessary for the installation of the radial gates at Kajakai. Through co-funding from CIDA, a socio-environmental assessment study program was implemented as the first step. These assessments are still in progress; however, a common malady affecting most reservoir development conditions in Afghanistan was also encountered at Kajakai. During the intervening period of civil strife, considerable numbers of inhabitants have materialized, and are currently living within the reservoir area that will be inundated by the proposed radial gate installation. People impacted by this heightened reservoir development will need to be relocated and provided an equivalent quality of life as they presently enjoy.

Project Accomplishments

At present, Unit 1 has been fully rehabilitated and currently produces 16.5 MW of reliable power. The Unit 3 rehabilitation will begin will disassembly in May 2006, with a scheduled return to service in early 2007. The new 18.5 MW Unit 2 turbine/generator has been contracted to China Machine Building International Corporation headquartered in Beijing. Engineering, design and procurement are ongoing. The work will be supervised by Montgomery Watson Harza and is planned to begin in September 2006 and be completed by June 2007.

Central to the long-term energy security and sustained economic growth of South Eastern Afghanistan is the rehabilitation and expansion of the Kajakai HPP. As a critical component of the South East Transmission System, the capacity of the Kajakai HPP will be expanded to 51 MW with a future potential for an additional 100 MW.