THESIS

OPTIMIZATION OF WATERWAY OF ALTIT HYDROPOWER SCHEME IN HUNZA VALLEY

By

MOHAMMAD ABDUL QAYYUM SIDDIQUI
(2004-PG-HPE-42)

For the Degree of

MASTER OF SCIENCE

IN

HYDROPOWER ENGINEERING

CENTRE OF EXCELLENCE IN WATER RESOURCES ENGINEERING
University of Engineering and Technology, Lahore, Pakistan

2007

ABSTRACT

Management of Lotic waters into lentic ecosystem has become a necessity to mankind's endeavour to have better quality of life. Since a few decades conversion of natural ecosystem into manmade or engineered ecosystem has increased tremendously as the agrarian and industrialized societies need water for their multifarious activities. It is estimated that about 4000 large reservoirs and about 80000 small reservoirs are serving mankind world wide. Most of the reservoirs are multipurpose and hydropower generation is the most common purpose. Keeping in view the economic situation and energy demand in the area, this study was carried out for the development of hydropower scheme at Altit Hydropower scheme in Hunza Valley.

Altit Hydropower scheme on main Hunza river was identified by HEPO-GTZ during the course of hydropower identification studies in Northern areas. First the scheme was identified on Survey of Pakistan General Topographic (GT) maps then a field visit was conducted to check the topographical and geological conditions in project area. These conditions were found favorable for developing about 40 MW scheme. The main components of Altit Hydel scheme are the followings:

- Diversion weir
- Sand trap
- Pressure tunnel
- Surge Tank
- Penstock
- Power house
- Tail race

Waterways of a hydropower scheme are important components as these have to carry out design discharge to the powerhouse. Waterways if designed under sized will not carry the required discharge to the powerhouse. On the other hand over-sized designed waterways any how will carry the design discharged but the cost of the project will be un-necessarily increased and sometimes the project cannot be economically justified.

Therefore, it is imperative to optimize/right size the waterways of this scheme which was done during the thesis work. The objectives of this study are to optimize/right size the following waterways of Altit Hydropower scheme. On the basis of optimization studies carried out to keep the same design discharge head and other parameters following results were obtained:

Headrace tunnel optimized dia	=	3.0 m
Surge tank	=	24 m and 45 m for 4.5 m
Penstock economic dia	=	2.6 m