

**NUMERICAL MODELING OF THE TAILRACE CHANNEL OF
CHASHMA HYDROPOWER PROJECT**



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2019

ABSTRACT

The fast growing energy demand in Pakistan needs to be met in order to allow the economic and social development of the country. The present short fall in electric power can only be overcome with the implementation of Power generation projects of relatively short completion time. Large dams are not being constructed in near future whereas water and power demand is increasing day by day. In current scenario, we need to focus on the existing projects to get their full power generation. Chashma hydropower is one of the major projects which is facing problem of low generation in flood season due to back water effect of the river. The Barrage was completed in 1971 as a part of the Indus Basin Project. It is located on the Indus River about 56 km downstream of Jinnah Barrage & supplies water to the Chashma Jhelum (CJ) Link & Chashma Right Bank Canal (CRBC). The installed capacity of the Chashma Hydrel Power Project is 184 MW comprising of 8 bulb type turbine units each of 23 MW capacities. The normal operating range of Net Head of Chashma Hydrel Power Station is 4 to 13 meters and maximum discharge through eight turbines is 84,755 cusecs. The storage capacity of Chashma barrage has been lost with the passage of time due to siltation of ponds and operation of power plant has been limited. The power output of Chashma barrage is badly affected when irrigation indent is increased beyond power house maximum discharge causing increase of Tailrace water level and resultant decrease in net head. Therefore, numerical modeling of the Tailrace channel of Chashma Hydro Power Project is done by using different scenarios to improve/enhance the power generation from Chashma Hydropower Power Station during high flows. To carry out the study/research work, specific data was needed for which a special survey was carried out at the downstream of Chashma Barrage. Field

survey data was collected from the ISRIP, WAPDA. Geometric data includes x-sections of 3km reach d/s from Chashma barrage, River L-Section for 3km reach & flow data of Power House and Chashma Barrage. HEC-RAS 1-D computer model was used in the present research for numerical modeling simulation to study the effect of water levels of Indus River on Tailrace channel of Chashma Hydropower Project. Different scenarios for the numerical modeling of Tailrace channel and Indus River were developed. Model was run for different discharges and results were compiled to compare with the field levels. It was concluded after analyzing the necessary simulations that a considerable gain is achieved in the net head values which ultimately resulted in an increase in total Power generation.