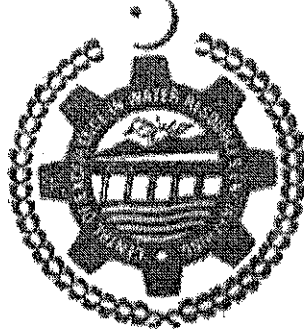


THESIS

**ANALYSIS OF HYDRAULIC REGIME OF PUNJNAD MAIN  
LINE UNDER NON PERENNIAL FLOW CONDITION**



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## ABSTRACT

Present research study was under taken to analyze operational problems of feeding high level channels, running of the canals with excessive discharge, maintenance of the canals and water theft. Punjnad Main Line Canal (PML) emanates from left bank of river Chenab (junction point of Chenab and Sutluj Rivers) at Punjnad Headworks. Punjnad Head Works was constructed below the confluence point of Chenab and Sutluj rivers during the years 1927-1932. It feeds Punjnad Main Line, Abbasia canal and Abbasia Link canal. This head work plays a vital role in providing assured and sustainable supplies to million of acres of fertile land of Bahawalpur and Rahim Yar Khan districts.

The authorized full supply discharge of Punjnad Main Line (PML) is 10484 ft<sup>3</sup>/sec which includes a perennial supply (Rabi Supply) of 2503 ft<sup>3</sup>/sec that is about 25% of the total discharge. Due to significant difference in summer and winter supplies, the operational behavior of the channel is against the philosophy of the regime channel. Furthermore the perennial channels off-take from the tail of the non-perennial channels resulting in a very lengthy distribution system.

In order to streamline irrigation of perennial and non-perennial areas on PML canal system and to utilize flood supplies of river Chenab in Cholistan area in district Rahim Yar Khan, WAPDA handed over Abbasia Link Canal to Irrigation and Power Department during the year 2004. This flood water carrying channel was so aligned and designed that the perennial channels of PML can be fed through this new source and accordingly alternate operational arrangements was envisaged.

In order to achieve the objectives of this study, hydraulic as well as condition surveys of Punjnad Main Line were carried out. The capacity of the PML on non-perennial discharge was reassessed by adopting Lacey's seepage losses formula for unlined channels. The channel was redesigned by using Lacey's formulae. The full supply level of PML at its head was increased keeping it at par with existing water level, so that the command of the channel should not be affected. The comparison of existing and proposed parameters of earthen sections were analysed and recommendations were made to achieve the proposed parameters. In order to feed high level channels, a Cross Regulator at RD 82+260 was designed. Twelve existing bridges were analyzed for surface flow condition and in order to achieve proposed water level, closing of bays and raising of floor levels were recommended. Three fall structures were also analyzed for both surface and sub-surface flow conditions for non-perennial discharge and accordingly fluming and raising of crest levels were recommended.