

THESIS

PERFORMANCE OF MAIN EMBANKMENT DAM AND ITS FOUNDATION  
BY EVALUATION AND ADOPTION OF SEEPAGE CONTROL MEASURES  
AT KHANPUR DAM

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(98-PG-WRE-23)

A thesis submitted in partial fulfillment of the  
requirements for the Degree of

MASTER OF PHILOSOPHY

IN

WATER RESOURCES ENGINEERING

CENTRE OF EXCELLENCE IN WATER RESOURCES ENGINEERING

UNIVERSITY OF ENGINEERING AND TECHNOLOGY,

LAHORE, PAKISTAN

2001

## ABSTRACT

### PERFORMANCE OF MAIN EMBANKMENT DAM AND ITS FOUNDATION BY EVALUATION AND ADOPTION OF SEEPAGE CONTROL MEASURES AT KHANPUR DAM

Khanpur Dam, 1560 ft long and 167 ft high, is founded on deep alluvium foundation with its abutments in limestone rock of varying characteristics. Khanpur dam is being faced by the problem of relatively large amounts of seepage flows and high piezometric pressures since its first impounding in 1983. The present study was aimed to analyze the seepage data as well as piezometric levels recorded since first impounding. The seepage is estimated through left abutment and downstream toe of MED using numerical model MODFLOW at different reservoir levels.

Initially a grout curtain was provided across the left abutment with partially cutting off the strata Lm-8 in upper limb of syncline of El±1720 ft. Whereas, the lower limb remained untreated. The problem of excessive seepage through the left abutment is mainly attributed to lower limb of the syncline which has not been grouted earlier, either during construction or through the remedial programme after impounding.

The results of the study reveal that seepage control measures adopted in the design and finally constructed are inadequate which is the real cause of excessive seepage occurring in the studied zone. Hence, the main source of seepage is limestone rock which will increase with passage of time, thus making the project non-functional to its beneficiaries.

In order to minimize the seepage losses, double line of grout curtain is recommended to tie the lower part of the existing grout curtain and further extend it down to elevation El 1630 ft., and the rock surface below rest house should be grouted so that the seepage could be controlled effectively. These remedial measures are required for safety as well as to prevent economic loss of the reservoir.

The study will help towards achieving an objective of safe method of design compatible with the design criteria prescribed by ICOLD so that post construction problems like uncontrolled seepage could be minimize to avoid erosion of foundation/material piping. Therefore, study will be useful for designers to adopt appropriate measures resulting in reduction to the excessive seepage. Study will also be very helpful to the concerned government departments responsible for dam construction and the project itself in adopting the remedial measures suggested for reducing the seepage and controlling of pore pressures at the downstream area of MED, which are generally developed with the rise of reservoir level.

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