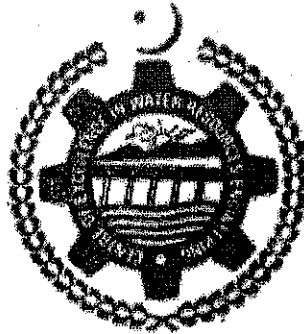


THESIS

**RESERVIOR OPTIMIZATION AND OPERATION OF SIMLY  
DAM THROUGH INTRODUCING AUXILIARY SPILLWAY**



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## ABSTRACT

The reservoir optimization and operation studies are very much important in planning of flood disaster prevention and evacuation strategies. Simly dam is the third highest dam in Pakistan constructed on one the most complex geological sites. The designers have done a commendable job in paying attention to all geological features and their incorporation in the design. However, such dams have to be very carefully monitored and operated. After the 1992 disoperation of Mangla dam the need of reservoir optimization and developed operation strategy for dams have become more sensitive issue in Pakistan. As Simly dam was designed and constructed on the basis of very little information, therefore the need of proper operation has been aggravated.

This study is done mainly to explore the flood mitigation capability of Simly Reservoir, its optimization by introducing auxiliary spillway and development of Standard Operation Procedure for all conditions of reservoir at the arrival of any flood. All possible scenarios of reservoir level before the arrival of flood have been studied. This study is confined to review of ratings of main spillway, design and ratings of auxiliary spillway, auxiliary spillway optimization by iteration and confirming certain constraints. The flood routing of Probable Maximum Flood and development of Standard Operating Procedure have also been included in this study.

In revision of ratings of main spillway, various parameters have been refined using excel spreadsheet which had not been so precisely calculated at the stage of initial designing. Similarly various iterations in design of auxiliary spillway have been executed for induction of auxiliary spillway and reservoir optimization. PMF hydrograph finally developed by Central Design Office (water) WAPDA has been used for development and routing of model. PMF data has a

time step interval of 0.75 hours and peak computed as 90,700 cusecs. Developed spreadsheet model could not be calibrated due to non-availability of same time interval flow data of any flood in dam life. The only measurement of discharges through spillway and reservoir levels has been available which are insufficient for calibration. For flood routing through reservoir, Step by Step method has been used to build spreadsheet model. Adjustments of releases have been checked for final reservoir levels attained after each interval and also after the completely routing of flood. Final levels for each time in all the possible scenarios have remained within the limit of maximum flood level of reservoir.

The design PMF of Simly dam (peak 77,100 cusecs on which the construction was based) was exceeded during construction. This was later on studied after construction and computed a PMF of 90,700 cusecs peak. As the dam was constructed with less peaked PMF and therefore it has been established by various studies that the Simly dam as it stands today is unsafe against PMF. Various studies also desired an immediate suitable flood handling study.

Results of this study revealed that PMF (peak of 90,700 cusecs) could be safely routed through the dam components without overtopping. These results provided a strong footing for development of operation procedure of reservoirs.

In order to evaluate the yield of reservoir by increasing Maximum Conservation Level (MCL), simulation study using Design Reservoir for Window (DRW) has been done. It has been found that 42 MGD release can be made safely for Islamabad at M.C.L 2317 ft SPD. Instead of 23 MGD supply at 2305 ft SPD. This study will be very helpful for flood handling of Simly dam and operation procedure can best be employed in dam operation. This will not only save the precious water but also be good spreadsheet software for reservoir evacuation development plan.