

WAPDA micro seismic monitoring system in Northern Pakistan Seventy-five months of recording around Diamer-Bhasha Dam project

Syed Kazim Mehdi; Bilal Manzoor and Imran Hassan
Directorate of Seismic Studies, WAPDA, Tarbela Dam Project, Pakistan
sspkazim@hotmail.com

Abstract

Northern Pakistan is placed at the edge of Indian plate that continuously move under the Eurasian plate making the region highly susceptible to seismic activities. The mechanism has triggered a few great and several intermediate earthquake in a band of about 50-80 km width and an arc length of about 2500 km. Due to the availability of feasible water traps, Pakistan WAPDA is going to construct many large Dams and Hydropower structures like, Bunji (7100 MW), Diamer-Basha (4500 MW) and Dasu (4300 MW) in such an active tectonic environment. As per ICOLD recommendations. The Micro Seismic Monitoring System (MSMS) at least five years prior to the construction have been installed. The WAPDA MSMS consists of 29 six components seismic stations installed along the known active faults that are running close to the large Dams and Hydropower structures. All the stations are transmitting recorded seismic data through satellite link to its Central Recording Station (CRS) located at Tarbela Dam Project. At the CRS processing, analysis and cataloguing is carried out by the latest state of art Antelope Software.

Diamer Basha Dam with its 272-metres in height will be the highest RCC gravity dam in the world. It will be situated on the Indus River, about 315 km upstream from the Tarbela Dam site and about 40 km downstream from Chillas. It is designed to form a large reservoir on Indus River with an active storage of 6.39 MAF. The second purpose of the Project is to generate hydropower that will be accomplished through two power houses, one under each bank, with a total installed capacity of 4500 MW. Through three detailed Seismic Hazard Evaluations (SHE) and several seismotectonic studies it has been concluded that horizontal Peak Ground Acceleration (PGA) for Operating Basis Earthquake (OBE) = 0.22 'g', Maximum Design Earthquake (MDE) = 0.37 'g' and Maximum Credible Earthquake (MCE) = 0.46 'g'. Seismic Safety Monitoring of Dam site and surrounding areas started in September-2007 with the installation of ten WAPDA MSMS stations. By the end of December-2013 the MSMS has completed seventy-five months of microseismic monitoring. A developed map of 50 km radius confirms the existence of seismic sub-zones and fault near the Project, with seismicity mostly confined at shallow depths. However, the seismic events are micro in nature and the seismicity remained in the moderate level during the seventy-five months of monitoring period.