EVALUATION OF EARTHQUAKE PARAMETERS FOR UKAI PROJECT, GUJARAT, INDIA.

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INTRODUCTION

The 69m. high and 4.9Km.long earth-cum-masonry-dam across Tapti river, completed in 1972 is located 110Km.east of Surat City on the west cosst. The dam has storage capacity of 8,51,000ha.m.of water. This multi-purpose dam is founded on Deccan basalts which are intruded by dolerite dyke swarms. The dam is situated in seismically active Narmada-Tapti rift.

GEOLOGICAL SET-UP & TECTONICS

At the dam site, the bed rock, consisting of Deccan traps, intruded by dolerite dykes is generally covered by 2m. to 20m. thick alluvial over-burden. The Tapti river in its course in the Deccan trap terrain flows along a series of faults which define the southern boundary of the Narmada-Son-Damodar graben. Three 15m. to 90m. wide shear zones, and other evidences of tectonic deformation indicate that during Tapti faulting system, the block comprising right bank of the river suffered deformation while the left bank (where masonry dam is located) stood as a rigid block. Occurrence of a number of springs in the Ukai reservoir area in linear pattern probably delineate deep seated fault planes. In addition to the Tapti river fault system, tectonic unit of significance is the 80km. wide intercratonic Cambay Graben, about 100km. N.W. of the project site.

SEISMICITY AND DESIGN SEISMIC CO-EFFICIENT

The past earthquakes of significance within 300km. of the dam site are of Magnitude 6.25 and 6 in the year 1938 and 1970 respectively. Broach Earthquake of 1970 with epicentre, 100km. North-West of the project site necessitated rethinking on the seismic co-efficient of 0.05g. adopted for Ukai dam during construction stage investigation. On re-appraisal of the earthquake parameters in April, 1970, the seismic co-efficient was suggested to be raised to 0.1g. But most of the reaches of dam had either been completed or in advance stage of construction. The revised computations revealed that original section of the dam did not need any changes. The width of left transition dam was however slightly increased. Uplift at the gallery was increased from 50% to 66% of the differential head. Recent instrumentation after Ukai reservoir impounding have shown mild seismicity. The Seismographs installed at the toe of Ukai dam have recorded 22 local events of Magnitude 2.6 to 3.45 during monitoring from 1972 to 1976.

CONCLUSION

It is hoped that detailed monitoring by minimum of 3 stations around Ukai reservoir would help in establishing the inter-relation between fault system and the epicentres. The earthquake activity investigation will also yield other useful information in evaluation of post-construction seismic problems at the Ukai project.

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