GEOTECHNICAL FACTORS IN THE EVOLUTION OF SEISMIC COEFFICIENT OF KADANA DAM ON MAHI RIVER, PANCHMAHALS DISTRICT, GUJARAT, INDIA.

BY

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SYNOPSIS

The foundations of Kadana dam across Mahi river on Aravalli Quartzites and Phyllites is traversed by 17 faults, besides, shears, fractures and joints. In the reservoir area comprising folded Aravallis, there occur a hot spring and a major WNW- ESE fault. The project is surrounded at a distance of 128 to 160km by regional fault of Aravalli, Cambay graben and Narmada-Sone lineament. A seismic coefficient of 0.1g for the masonry part of the dam has been recommended.

INTRODUCTION

A 66 metre high earth-cum-masonry dam across the Mahi river for hydro-irrigation benefits to Gujarat is under construction near village Kadana (23° 17'N : 73°50'E). The foundation rocks comprise intricately folded Aravalli Quartzites and Phyllites cut up by seventeen minor and major faults generally striking N-S. They are marked by breccia, gouge and clay. Of these, seven dip from 60° to 80°, five from 40° to 60° and the rest from 20° to 40°. In addition, mutually intersecting joints, shears, fractures etc. also traverse the foundation rocks.

The major part of the reservoir is covered by soil and alluvium except for a few exposures of Aravalli rocks. A major 50 metre-wide WNW - ESE fault having lateral throw of 300m and dipping at 65° upstream i.e. in northerly direction, runs across the Mahi river 6km upstream of the dam. A number of sympathetic faults also occur close to this fault. In the west of Mahi river, upstream of the dam, there are sharp folds with axes trending NNE- SSW. The area of the project is surrounded within a distance of 128 to 160km by regional faults of the Aravalli to the east, unstable (?) Cambay graben to the west and the active Narmada-Sone lineament to the south.

The occurrence of a hot spring in the reservoir area near Khedpada along the slip plane on the limb of northerly plunging anticline, not far from the major reservoir fault indicates that the spring water is perhaps from greater depths and has tectonic significance.

The downstream areas are suspected of dynamic rejuvenation on the basis of Quarternary tectonics and geomorphic features. However, healing of faults is exhibited by injection of quartz veins in breccia and its compaction in fault zone. The area also belongs to ancient Aravalli terrain which is regarded to be comparactively quiet as corroborated by the earthquake history. However, the possibility of triggering of earthquake due to reservoir induced seismicity which is now accepted (after Koyna earthquake) on western fringe of Peninsular Shield calls for caution.

In the light of the above seismotectonic framework, it has been recommended to incorporate a seismic coefficient of 0.1g for the masonry structures in the design of the dam. It has also hence been suggested to establish at least three seismological stations near Kadana to assess the seismic status of the dam and reservoir areas before and after impounding to support our views.

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DISCUSSION

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This paper does not contain any field study for determination of geotectonic movement along the major regional Aravali fault and the Narboda fault system, nor any based on photo-interpretation of the same. The faults at the dam site have also not been reported for this aspect. Such a study may lead to a evolution of a more precise seismic coefficient.

Author's Closure

Not received.