

Post Construction Stage - Geotechnical Investigation on Adavinainarkoil Reservoir, Tirunelveli District, Tamil Nadu

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Abstract

Under the *Dam Safety Assurance and Rehabilitation Project* (DSARP) of Tamil Nadu State, many projects constructed about 3 - 5 decades ago and essentially few century old, have been referred to GSI for assessment of the present health status and longevity of the structures and for proper documentation of geological and geotechnical data. Geological and geotechnical data's are not available for many of the dams in Tamil Nadu, even if available, it is scattered and sketchy. The present paper deals with post construction stage geotechnical investigation on Adavinainarkoil Reservoir, Tirunelveli district, Tamil Nadu, and contain details on *Regional geological milieu, site characterization, structural details, seepage analyses and seismic status of the dam site*.

The Adavinainarkoil reservoir envisages the construction of 74.20 m high and 670 m long Masonry dam with uncontrolled central spillway of 100 m length, built across the River Hanuman Nadhi, a tributary of Chittar River in Tamiraparani basin, with storage capacity of 174 m c ft.

Charnockite and migmatite with linear strings of pyroxene granulite are the prominent rock types, traversed by granite, pegmatite and quartz veins. The pyroxene granulite exhibits spheroid weathering, at places. The area had under gone poly phase of deformation. The general trend of foliation is N 65°-70°W S 65°- 70° E with steep to moderate dip (50°-65°) due S20°-25°W, where as the dam axis is oriented along N62°W S62°E direction. There are four prominent joint sets observed, of which, foliation joints are prominent. The foliation joints are pronounced in the riverbed and are sympathetic to the shears guided by the river lineament. Achan koil lineament is located 2.5 km south of the dam site. Shearing affects in the pyroxene granulites and the biotite gneiss, in the downstream of the reservoir may be the causative

factures of this major geological structure. However, no distress was observed on either side of the abutment structures.

The dam has been provided with drainage galleries at three different levels. There are 26 blocks of different length and size, each block joint had been provided with “V” notch to measure the seepages. Transverse drainage galleries were provided with pressure gauge meter. In the lowest gallery at El 210.6m, at vertical drain shaft hole No 60, 61 & 63 heavy seepage with high pressure was observed requiring immediate attention. The drainage galleries are choked due to heavy calcination. At places, along with calcinations iron stains and red/yellow precipitation was also distinct. At the exit No 3 from the left end abnormal seepage with respect to the reservoir level 115.25m was also distinct. Particles like sand and gravel are also noticed in the drainage chute near the “V” notch (exit No 3) warranting immediate rectification.

No perceptible seismic risk is evident for the project. However, recent events of earthquakes of low to moderate magnitude in the peninsular part of India warrant installation of seismograms at the project site for information and mitigation of impending danger if any to the existing dams of this region for retrofitting as well as for the design of new ones.