

## **Joints/Fractures analyses of Shanawa area, District Karak, Khyber Pakhtunkhwa**

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### **Abstract**

Neo tectonic and shear zones study was carried out in Shanawa, and adjoining areas of Tehsil Takhti Nasrati ditrict Karak to understand kinematics, geometry, tectonics and model for development of different structures. The area is tectonically active with no older and younger gravel deposits. In the Shanwa nala, only recent gravel deposits are present indicating recent tectonic activity. Moreover, the channel avulsion of different nalas in Kurram River also indicates that area is structurally and seismologically active. To study the joint pattern two methods i.e. circle inventory and rectangular methods have been adopted. The circle inventory method is useful where maximum numbers of fracture sets are exposed. The circle inventory data is then used for frequency diagrams and statistical density calculations. The shear zones that generally cut across the strata are typical cataclastic strike slip in character showing distinct asymmetric kinematic indicators of reidel assemblages (Marwar, 1989). In most places, where shear zones cut across each other, form a complex geometry of conjugate joint patterns showing mesoscopic displacements. Tensional joints of orthogonal symmetry are well developed. These joints are systematic and may have formed due to the folding strata of Makarwal Anticline. The hybrid relationship of joints and conjugate fractures is nicely preserved in Shanawa Sandstone-1. The strike of the strata is north-south. It shows younger joint pattern dipping toward east and crosscutting all older joint pattern and the eastern limb of the Makarwal Anticline. The eastern limb of the Makarwal Anticline deeply eroded exposing older formations and splays of Surghar Thrust dipping towards west (Gee, 1945, 1989). Thus, we interpret that the origin of the shear zones in the studied area is dynamically related with the neo tectonic of the Makarwal Anticline, while tensional joints are episodically related with the formation and uplifting of the Makarwal Anticline. The synchronous relationship of tensional joints and shear zones further suggests that Makarwal Anticline may be developed as a result of inversion tectonic as positive flower structure under transtentional regime.