

**FOLD-THRUST EVALUATION AND HYDROCARBON PROSPECT OF THE  
WESTERN MARWAT-KHISOR RANGE AND SHEIKH BUDIN HILLS, NORTH  
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**Abstract**

The Marwat-Khisor Range of the Trans-Indus ranges is a south-vergent fold-thrust belt that defines an east-west to northeast trending structural geometries and protrudes south to southeastward into the northwestern Punjab Foreland deep. This structural province is characterized by east-west to northeast oriented parallel to en echelon, plunging anticlines and synclines pairs that are asymmetric to overturn in the form of fold train and dominantly southeast vergent. The frontal foothills of the Khisor Range and Sheikh Badin Hills comprise a latest partially emergent thrust fault named as Khisor and Sheikh Badin Frontal Thrust. Surface projection to depth of the emergent structural elements suggests a thin-skinned structural mechanism for evolution of the Marwat-Khisor Range where gliding horizon for the frontal thrust sheet being located within the Jhelum Group rocks of Cambrian age at a maximum depth of 4~5km. The structural growth of the study area is dominantly attributed to the south directed transfer deformation mechanism along the basal detachment horizon being observed at the foot of Cambrian Khewra Sandstone. Along this basal detachment surface the Khewra Sandstone is exposed at surface and juxtapose to the sediments southeastward on top of the northwestern frontier of the Punjab Foreland Basin. Thrusting generally commenced subsequent to deposition of the Siwalik Group rocks, for the reason that these rocks involved in the latest thrusting phase. The Khisor Range front is the latest and dynamic frontal fracture zone of the northwestern Himalaya where deformation proceeds in the course of southward progression. The Khisor Thrust demarcates the northwestern proximity of the Punjab Foreland and is predominantly underlain by the shallow marine rocks of Permian to Triassic age in the region of Dhupsari. The stratigraphic framework of the Marwat-Khisor Range is significantly associated and correlative with the Surghar and Salt ranges with some exceptions. Permian strata of the Khisor Range comprise on Nilawahan and Zaluch groups rocks, where the top of the Nilawahan Group consists of the Sardhai Formation and bottom of the Zaluch Group consists of the Amb Formation. The Sardhai Formation was observed >40m thick and consists of dark gray to blackish gray and black carbonaceous shale while the basal parts of the Amb Formation consists of dark gray carbonaceous and calcareous shale of more than 20m thick, which is conflicting to the stratigraphic setting of the Surghar and Salt ranges. The structural geometries and stratigraphic framework of the Khisor Range suggests that the northwestern Punjab Foredeep is pertinent for the hydrocarbon exploration as thick carbonaceous shale facies of both formations are feasible potential source rocks. The area is comprised of the other prerequisite parameters vital for the construction of hydrocarbon kitchen, as trapping mechanism along with reservoir, seal and overburden rocks.

**Keywords:** Marwat-Khisor Ranges; Structural Geometries; Foredeep; Hydrocarbon Exploration.