Theme 01: Mineral Exploration and Mining

Structures (folds and faults), petroleum and mineral resources of Rajanpur District (South Punjab, Pakistan)

M. Sadiq Malkani[1*], Nasir Somro[2]
[1] *Geological Survey of Pakistan, Muzaffarabad, Pakistan*
[2] *Geological Survey of Pakistan, Islamabad, Pakistan*
**Email: malkanims@yahoo.com*

Rajanpur District (west to east) represents Rakhni-Chacha-Baikar-Janthali synclinorium (core Kahan Group), Moranj anticline (exposed core Pab sandstone), Phailawagh syncline (core Shaheed Ghat shale), Kup anticline (core Dungan Limestone), Kalchas-Loop syncline and Sham anticline (core Shaheed Ghat shale), Dera Bugti syncline (core Kahan and Vihowa groups), Fort Munro-Maarri-Giandari anticline (core Mughalkot marl and mudstone) generally trending NE-SW and N-S with low to moderate dips. Kingri-Rakhni-Chacha and Dragal-Phailawagh are major left lateral faults. Water with possibly petroleum spring observed at Mat Khetran area along K-Pg boundary. First possible petroleum reservoir level is Cenozoic strata like Pirkoh, Habib Rahi, Drug and Dungan limestones and Rakhi Gaj sandstones being permeable due to primary and secondary porosity. Drazinda, Domanda, Baska, Shaheed Ghat and Rakhi Gaj shales can act as source and trap/cap rocks due to being impervious. Second petroleum reservoir level is Late Cretaceous Mughalkot, Fort Munro, Pab and Vitakri formations (Fort Munro Group). Mughalkot Formation shows porcellaneous marl/mudstone lithology except southern and western extremity where sandstone and shale appear and may act as both source and reservoir rocks. Third petroleum level is Early Cretaceous Parh Group consisting of Sembar (shale), Mekhtar (sandstone, commonly called lower Goru sandstone) Goru (shale and marl) and Parh (mainly limestones) formations. The Sembar and Goru shales act as source rock, while Mekhtar sandstone (Lower Goru), Goru marl and Parh limestone act as reservoir rocks. Cap rock for Mekhtar sandstone and Goru marl (lower unit) is Goru shale. The Cap rock for Goru marl (upper unit) and Parh limestone is Mughalkot shale. Fourth petroleum level is Triassic to Jurassic aged Sulaiman Group consisting of Wulgai (=Spingwar shale, marl and limestones), Loralai (thin to thick bedded limestones), Chiltan (mainly thick bedded to massive limestone) and Dilband (ferruginous brown and black weathered marl and siltstone and brown shale) formations. Wulgai shale act as source rock while Wulgai marl/limestone and Loralai and Chiltan limestones act as reservoir rocks. The Cap rock for this level is Sembar shales.

Rajanpur District host huge gypsum deposits, huge cement resource/raw rocks such as limestones, clays/shale and gypsum), coal and carbonaceous shale from Thol and Khaan areas. Decorstone and marble from Dungan limestone and Rakhi Gaj fossiliferous sandstone at Kaha Harrand section. Millstone and abrasives from Pab sandstone, ochre showings, celestite showings in Drug and Baska formations. Resistant (to erosion and weathering) and high density (heavy) minerals such as magnetite, gold, ilmenite, sheelite, garnet, sillimanite, rutile, zircon, REEs bearing monazite and xenotime, and others in placers. Gemstones and jewelry resources such as attractive detritial (pebbles and cobbles) and fragmentary chalcedonic silica

(jasper, flint, chert) and others hosted in placer deposits of Oligocene to Recent. Construction materials from Pab sandstones, Dungan limestones, Rakhi Gaj sandstone, Drug, Habib Rahi and Pirkoh limestones. Gravels from conglomerate of Sakhi Sarwar and Vihowa Groups and from alluvial terraces and fan deposits. Sand from Indus River and its east west flowing tributaries. Possible agrominerals like phosphatic nodules/shales, and different clays like fuller earth, bentonite and fireclays. Vast deposits of different clays are found in Koh Sulaiman Range of Rajanpur District. A footprint of Maastrichtian titanosaurian sauropod, Sauropaonia (*Dgkhansauroperus maarri*) dinosaur is found from Maarri peak area, however the western vicinity yielded famous titanosaurian sauropods, small and medium to large theropods, mesoeucrocodiles, pterosaur, bird and snake from latest Maastrichtian Vitakri Formation. The excavation and development of these geological resources, construction of water dams and installation of cement and gypsum industry share a lot for the development and economic growth of area and ultimately South Punjab and Pakistan. The eastern part of Rajanpur District producing diverse agricultural commodities, while the western part (along north south trending belt) host barren lands. While further westward the Koh Sulaiman Range hosts many mountain peaks and also host many rud/nalas. Most of its water is being wasted as flood. The vast western plain areas of Rajanpur District can be used for agriculture if necessary arrangements for water resources and small, medium and large sized dam's construction may apply. Most of the water resources of the area wasted as flood, if these water resources are stored and can be used properly to cultivate the vast barren land, Pakistan economy will be promoted significantly.

Keywords: Folds and faults; Petroleum and mineral potential; Rajanpur District; South Punjab; Economic growth, Pakistan.