11.1 Oil Shale Geology Assessments in Jordan

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Numerous geological studies have shown that over 60% of Jordan is underlain by oil shale deposits. One of the most extensive geological studies was carried out with cooperation of the BGR (German Federal Institute) to determine the oil shale reserves in central Jordan, where three main formations could be identified in areas where oil shale deposits were found. These are: Al Hisa Phosphorite, Muwaqqar Chalk Marl and Umm Rijam Chert Limestone Formations.

Jordan's Oil shale is part of the upper Cretaceous and lower Tertiary formations and has a broad distribution in Jordan. The most important oil shale occurs in the lower part of the Upper Cretaceous Muwaqqar Chalk Marl Formation which crops out across much of central northern and central southern Jordan. Although the oil shale is widespread, it varies in thickness and oil content.

These sediments form relatively elevated sections above graben erosional surfaces. They are composed of pebbles and cobbles of limestone, chert and phosphatic chert and limestone. The Alluvium and Wadi sediments of Holocene to Recent age consist of unsorted limy and siliceous gravels with sand matrix. The principal mineral components of the Jordanian oil shale are: calcite or more rarely quartz together with kaolinite and apatite and, in some samples feldspar, muscovite, illite, goethite and gypsum as secondary components.

The Jordanian oil shale consists of bituminous marlstone and is of varying shade of brown, grey or black with typical bluish light-grey weathered color. Another characteristic feature is the content of light fine-grained phosphatic xenocrysts, some of which are accumulated in bone beds. The oil shale contains few microfossils. The organic material of the oil shale largely consists of pre-bitumen bituminous groundmass. This was formed during the sedimentation or early in the diagenetic process mainly by microbial influence from initial plant and animal materials with a lipidic composition.