

Petroleum Resource Potential of Northern Afghanistan

Klett, T.R.¹, G.F. Ulmishek¹, C.J. Wandrey¹, A. Amirzada², A. Selab² (1) U.S. Geological Survey, Denver, CO (2) Afghanistan Ministry of Mines and Industry, Kabul, Afghanistan

As part of the U.S. Government's effort to aid in reconstructing Afghanistan's economy and infrastructure, the U.S. Geological Survey is cooperating with the Afghanistan Ministry of Mines and Industry to assess the undiscovered petroleum resources of Afghanistan. In spite of the limited success of Soviet-era exploration, both the Amu Darya and Afghan-Tajik Basins of northern Afghanistan have significant potential for new oil and gas discoveries.

Two total petroleum systems are identified and subdivided for resource assessment purposes. One petroleum system is located mainly in the Amu Darya Basin and extends into the Afghan-Tajik Basin. The system is composed of Lower to Middle Jurassic carbonaceous mudstone and Upper Jurassic basinal marine mudstone source rocks, Upper Jurassic carbonate and Lower Cretaceous clastic reservoirs, Upper Jurassic evaporites and Lower Cretaceous mudstones seals, and Mesozoic and Cenozoic structures and reef-related features as traps.

The source rocks for crude oil in the Afghan-Tajik Basin have not been identified by previous studies. Our data indicate that an unrecognized Paleogene oil-prone total petroleum system exists in this basin. This system is composed of lower Eocene basinal marine mudstone source rocks, Upper Cretaceous to Paleogene reservoirs, lower Eocene and upper Paleogene mudstone seals, and Neogene compressional structures associated with Himalayan orogenesis as traps. Upper Jurassic evaporites provide a décollement surface for allochthonous structures. Evaporite evacuation sites might allow mixing of Jurassic-sourced petroleum with Paleogene-sourced petroleum. Anticlinal structures in the eastern part of the basin are eroded and some are breached, resulting in biodegradation of petroleum in accumulations.