ASSESSMENT OF THE GREATER CASPIAN REGION PETROLEUM RESERVES AND THEIR ROLE IN THE WORLD ENERGY

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Introduction

Since the break up of the Soviet Union, the Greater Caspian region has become available to foreign investors for developing existing hydrocarbon resources and for oil and gas prospecting. Having a large territory and a long history of oil production, the Greater Caspian has attracted many oil companies, large and small. However, a very significant uncertainty in the amount of proven and potential hydrocarbon reserves in the region exists, mainly due to differences between Soviet and Western methods of reserve estimation. More definite reserve estimates are important for decision making in many spheres including business and politics.

In our study, we focus on compiling information about each geological basin in the region and evaluating reserve estimates that came from different sources, such as state government, E&P companies, and independent consultants. We then compare the Greater Caspian hydrocarbon reserves with other oil producing countries to assess the market share of the Central Asian countries and to estimate their potential. Our results show that the Greater Caspian proven reserves account for only 3% of world oil reserves and 7% of gas.

Basin of the Greater Caspian

We evaluate five different geological basins within the Greater Caspian: South Caspian, North Caspian, North Ustyurt, Mangyshlak, and Amu-Darya (Fig. 1). The South Caspian basin is considered a Tertiary back-arc basin. An oceanic type crust underlies a 20 km thick sedimentary package. Most of the known hydrocarbon fields in the South Caspian are contained within structural traps. The primary reservoirs are fluvial deltaic Middle Pliocene sediments (“Productive Series”). The South Caspian is one of the oldest oil producing regions in the world. It has a number of proven fields that are in the early stage of production or await development. Many of the fields are located in the Caspian Sea offshore Azerbaijan. The largest fields are Azeri-Chirag-Guneshli (combined recoverable reserves 4.1 billion bbl of oil) and Neft Dashlary (1.2 billion bbl).

The North Caspian basin is a pericratonic basin of Late Proterozoic-Early Paleozoic age. The basin contains two super giant fields – Tengiz (3 billion barrelsof oil recoverable) and Karachaganak (46 tcf of gas). The reservoirs are shallow water carbonates and reefs of Devonian to lower Permian age. Permian (Kungurian) salt overlays the carbonates and formes a regional hydrocarbon seal. Several areas of the North Caspian basin, such as the Kazakhstan coastal transitional zone which lies just west of the giant Tengiz field, are underexplored and have high hydrocarbon potential.

The total proven reserves of the North Ustyurt basin are 2.2 billion bbl of oil and 1.4 tcf of gas. The North Ustyurt basin has a number of regional hydrocarbon plays. Middle-Upper Jurassic silts and sandstones contain over 60% of the basin’s oil and gas reserves. Triassic sandstones hold about 10%, and Lower Cretaceous (Neocomian) siltstones and sandstones contain about 21%. Eocene porous siltstones capped by clays hold about 8% of the region’s oil and gas reserves.

The Mangyshlak basin includes two early Paleozoic rift systems: Central Mangyshlak and Tuakyr-Karaaudan. The Mangyshlak and Ustyurt plates collided with the East European plate during the Early Cimmerian tectonic event. Exploration activity has been aimed at Triassic and Jurassic rocks targeting anticlinal structures identified on seismic sections. A single commercial discovery in Paleozoic reservoirs was found in the Oymash area. The northern part of the Buzachi Peninsula and the offshore extention of the basin on the Caspian shelf are considered promising areas. The total estimated Mangyshlak reserves are 3 billion bbl of oil and 3.2 tcf of gas.

The Amu-Darya basin lies within the Turanian plate and has a complex tectonic structure. The basin contains more than 130 gas, gas-condensate, and oil fields. There are three regional plays (Lower-Middle Jurassic

clastics, Upper Jurassic carbonates, and clastics), and two local plays (Upper Cretaceous carbonates and clastics and Paleogene carbonates). Lower Cretaceous red sandstones form the most prolific play and contain more than 50% of the discovered gas in the basin. Overall, the Amu-Darya basin is gas- prone and gas accounts for 96% of all hydrocarbon resources. According to some estimates, the Amu-Darya basin proven gas reserves are as high as 200 tcf.

Kazakhstan is the leader in oil reserves (10-22 billion barrels) among the Central Asia countries. Turkmenistan has large proven gas reserves (95 to 155 tcf) but small oil reserves. Azerbaijan has the second largest reserves among the Central Asia countries. It has a mature oil and gas industry and will remain and important producer for decades. The most prospective areas in Azerbaijan are offshore in the deep water Caspian. Uzbekistan does not have a significant amount of oil but contains large amounts of gas (70 to 105 tcf). It also has a large underexplored territory.

Table 1. Estimated proven worid reserves by region, end of 1996

Region	Crude reserves, mbbl		***Region***	***Natural gas***
				Reserves, bcf
Middle East	636,027.9		Eastern Europe	1,723,162.8
Eastern Europe**	156,708.8		Middle East	1,675,273.7
South America	90,426.7		***Greater Caspian***	229,510-360,370
North America	76,870.4		Far East	354,389.0
Africa	76,203.0		Africa	344,597.5
Far East	56,713.4		North America	299,133.0
Western Europe	34,356.0		Western Europe	240,054.8
Greater Caspian	15,310-31,150		South America	213,875.5
South Pasific	4,111.0		South Pasific	94,301.0
World Total*	1,160,102.6			5,177,178.9

*Totals may not add up due to the range of estimates in the Greater Caspian
**Includes Russia

Conclusions

Total proven oil reserves of the Greater Caspian countries are estimated in this study as ranging from 15 to 31 billion bbl and proven gas reserves estimates vary from 230 to 360 tcf of gas (Table 1). These numbers are significant but are much lower than the reserves of the Persian Gulf countries. The Greater Caspian reserves represent approximately 2.7% of the world total proven oil reserves and 7% of the world gas reserves. In contrast, Saudi Arabia has 255.5 billion barrels of proven oil reserves, which represents 22.5% of the world total. It is clear that while the reserves of the Greater Caspian region are significant, they will not drastically affect the leading role of the Persian Gulf oil producing countries. It is also important to note that the future of the Caspian region strongly depends on on-going exploration success and the establishment of infrastructure in the region. The full potential of the region will not be realized immediately and will most likely occur no sooner than the year 2015.

Acknowledgements

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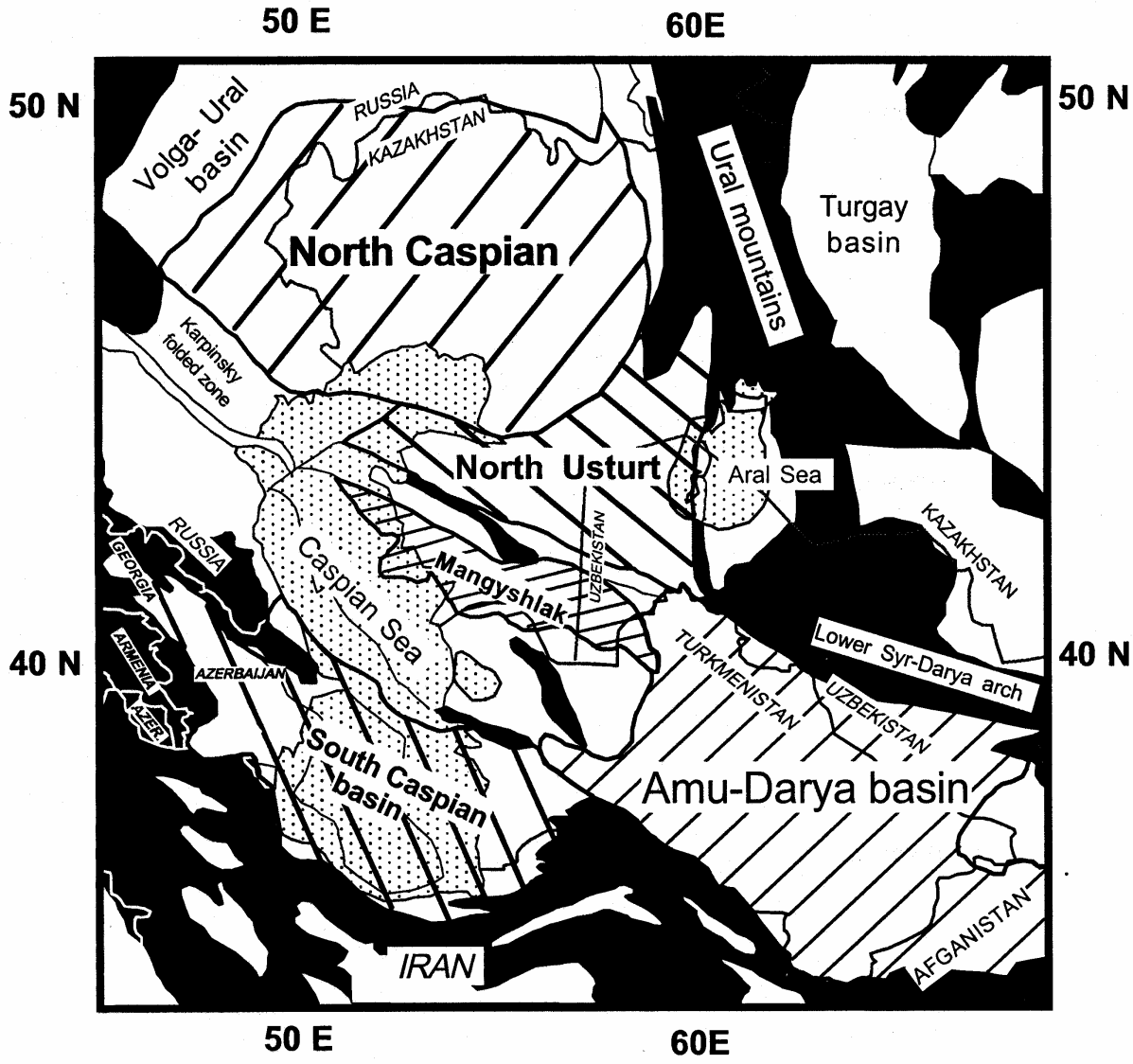

Figure 1. Index Map of the Greater Caspian Region.