

## China's Largest Granite-Type Gas Field was Discovered in Qinghai ——The Inorganic Theory has Aroused Attention again

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A growing number of oil and gas reservoirs have been discovered in granite and metamorphic crystallized rock areas. Statistics show that, about 157 oil and gas fields were found in crystallized bedrocks, with oil reserves of  $5048 \times 10^8$  t, and gas reserves of  $2681 \times 10^8$  m<sup>3</sup>. Among the discovered industrial oil and gas fields hosted in crystallized rocks, most occurred in granite rocks, occupying 40% in quantity and 75% in reserves, followed by those hosted in mafic and ultra-mafic rocks (about 3%), and then followed by those in volcanic rocks and metamorphic rocks. Examples of granite-type oil and gas fields are: (1) the Panhandle granite oil and gas field in the Amarillo uplift of the USA, with oil reserves of  $2.23 \times 10^8$  t and gas reserves of  $20000 \times 10^8$  m<sup>3</sup>; (2) the Nafora and Okira Precambrian granite fields in the Sirte basin of Libya, with oil reserves of  $10.1 \times 10^8$  t and  $2.3 \times 10^8$  t, respectively; (3) the Rapaz granite oil field in the Maracaibo basin of Venezuela, with oil reserves of  $2 \times 10^8$  t; and (4) the Bach Ho and Rong granite fields in Mekong delta of Vietnam, with oil reserves of  $5 \times 10^8$  t. Volcanic-type oil and gas reservoirs are also widely distributed, such as the Cretaceous volcanic reservoir in the western highs of 428 tectonic belt, Shijiutuo, Bohai Gulf, China, with volcanic rocks of olivine basalt, trachyte and tuff; the Carboniferous volcanic reservoir in the northwestern margin of the Junggar basin, Xinjiang; the Jatti Baron volcanic field in the west Java basin of Indonesian, with oil reserves of  $1.12 \times 10^8$  t. The well No. 2 in the Maloichskoe oil field hosted in the Pre-cambrian crystallized gneiss of the west Siberia, Russia can produce 400 m<sup>3</sup> oil per day, and is thus

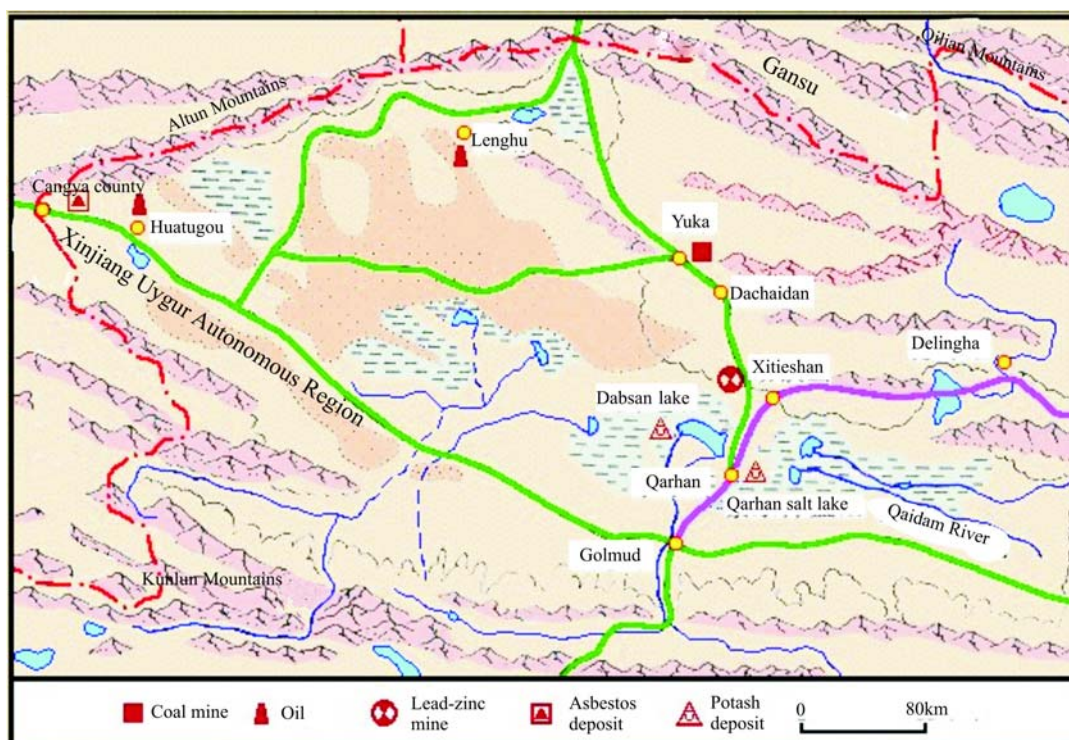


Fig. 1. Map showing oil and gas distribution in the Qaidam basin of Qinghai Province.

considered to be representative of inorganic origin.

In 2012, the Qinghai Oilfield Company of PetroChina discovered a deeply-buried gas reservoir hosted in dense granite and granitic gneiss in the Dongping area of eastern Altun Mountains, northwestern Qaidam basin, China. The gas was principally stored in matrix dissolution pores and fractures. This gas reservoir has a long gas-bearing well segment, with high formation temperature and pressure, and is thus difficult to be explored and developed. Till now, a total of  $7.2 \times 10^8 \text{ m}^3$  gas has been produced, and the daily gas production has reached up to  $3.26 \times 10^6 \text{ m}^3$  gas, ranking the largest granite gas field in China. The Qinghai oil field has the highest elevation in the world, with an average altitude of 3000 m, and is one of the earliest developed gas reservoir. It is suggested that, the region in which the Qinghai oilfield is situated has oil resources of up to  $4.0 \times 10^9 \text{ m}^3$  t, and gas resources of about  $10000 \times 10^8 \text{ m}^3$  (Fig. 1).

The Dongping gas reservoir is dominated by dense granites and granitic gneiss. In the eastern Altun Mountains of the northwestern Qaidam basin, granites are well distributed, predominantly type I granites, and have formed in two stages: 461~547 Ma and 239~244 Ma. The Mesozoic strata have a shallow burial depth. The Altun Mountains underwent strike-slip shearing due to the strong compression of the India-Eurasia Plate. The granites have thus experienced mylonitization, and have developed dissolution pores and fractures, providing favorable space for the storage of oil and gas.

Because this gas field is hosted in granites, and has complicated geological setting, the inorganic origin has attracted much attention again.

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