Status and Trend of Geological Exploration for Oil and Gas

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During the last ten years a number of large new oil and gas fields have been discovered in the Bashkir and Tatar ASSR’s, the Kuybyshev and Orenburg Regions, the Krasnodar and Stavropol districts, the Uzbek, Azerbaydzh an, and Ukraine SSR’s, and also in other areas of the Soviet Union. Accordingly, there has been an improvement in the geographic distribution of the oil and gas industry. It has shifted from the southern to the central part of the country - into the areas of largest oil and gas consumption.

Oil production in the Soviet Union in 1958 was 11.5 times greater than in 1913. It was 113 million tons, and gas production reached 14 billion m$^3$.

Commercial reserves of oil and gas have been sharply increased.

The oil men of the Soviet Union now have the task of increasing oil production in the next 15 years to 350-400 million tons and gas production to 270-320 billion m$^3$.

The commercial reserves of oil and gas should increase correspondingly.

Large expenditures are allotted each year to oil and gas exploration in the USSR. These expenditures amount to about 40% of the allotment for geologic exploration for all mineral resources. This figure will be 50% during the next seven years. About 30% of the expenditures put into oil exploration go for geological studies including regional work and also exploration and preparation of areas for prospecting drilling.

Very important to increasing the effectiveness of geological exploration in the next seven years are the regional investigations which include the revealing of prospective oil and gas regions and determination of the direction of further exploration.

Coordinated regional operations include scientific investigation of the stratigraphy, lithology, and facies of the sediments, paleogeography, tectonics, geochemistry, and hydrogeology of the region. Research and profile structural drilling as well as regional geologic and geophysical investigations play an important role in determining oil-gas prospects - particularly in covered regions.

In addition to the aerogeological and geological parties carrying out regional surveys on a scale of 1:200,000 and less, there are at present about 20 aeromagnetic parties covering about 3.5 million km$^2$ per year and 160 gravity teams carrying out surveys with 2- and 5-milligal accuracy on a scale of 1:200,000 over an area of about 600,000 km$^2$. In areas with thick covers of young, mildly deformed sediments, the coordinated investigations include electrical exploration, seismic survey, geomorphological observations, and water-gas surveys.

A method of deep seismic sounding (GSZ) has recently been worked out which is used in combination with areal regional investigations for geotectonic regionalization of an area under study.

As a result of work using GSZ in the Volga-Ural oil district on profiles of total length of 850 km yearly, a projection of the basement in the southeast of the Russian platform has been outlined, and the position of the northern border of the Pri-Caspian depression has been determined more accurately. Similar investigations were carried out in the Caspian and Okhotsk Seas and begun in Central Asia - in Turkmenia and Uzbekistan A general idea on the deep tectonics of Turkmenia has been obtained from gravity and seismic surveys and from profile drilling. A structural map has been compiled that shows the relief of the basement of the platform part of this area.

For estimating the thickness of the sedimentary cover, use has also been commonly made of calculations of the depth of occurrence of disturbing masses that cause an anomaly of the total vector of the magnetic field. These are related to basic and ultrabasic rocks of the basement of the platform and of intermontane depressions. In recent years in the Soviet Union, electrical exploration has begun to be carried out by the methods of dipole sounding (DZ) and telluric currents (TT). Further, new modifications of electrical prospecting are being worked out for determination of the depth of occurrence and the relief the deformed basement of large platform areas.

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