Pressing Problems of Increasing Effectiveness of Geological Exploration for Oil and Gas

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Accelerated development of the Soviet oil industry depends on the ratio of production to reserves. This ratio must be maintained by discovery of new fields. This is particularly important at the present time when oil production is so intensive. The additional reserves are to be found in both old producing regions and in new regions including offshore shelf areas.

Among the difficulties that characterize present exploration are:

1. The ever increasing degree of exploration of most of the regions of the Volga-Ural, Caucasus, Central Asia, and Ukraine with an ever lessening probability of discovery of large oil fields.
2. Entry into regions that are more complicated geologically and climatically forbidding, as well as offshore areas.
3. Drilling targets at lower structural levels at great depth where drilling is complicated.
4. Targeting on stratigraphic traps.

Analysis of the present state of geology indicates the necessity for concentrating scientific efforts on increasing efficiency of geological exploration. Particular emphasis should be given to studies of the processes of formation and regularities in the distribution of oil and gas fields. Theoretical investigations must concentrate on the tectonic, litho-stratigraphic, geochemical, and hydrogeological regularities in the distribution of oil hydrocarbon accumulations. The problems of oil-gas productivity of deep zones in the Earth must be addressed.

In order to continue successful exploration for oil and gas at great depths in the Cis-Caucasus, Peri-Caspian depression, Central Asia, and the north of West Siberia, etc., there must be improvement in existing methods and development of new methods of study of the deep subsurface. Variations of reservoir and sealing properties with depth must be investigated.

Such oil-producing regions as the Volga-Ural should retain their importance as a principal producer of the country during the Eleventh Five Year Plan. This will require discovery of new reserves here. One way to accomplish this is to go after the potential reserves in the carbonates of the Upper Devonian and Lower Carboniferous in Tataria, Bashkiria, Udmurtia, West Urals, etc. Some of the border regions of the Volga-Ural province have not yet been adequately studied such as Udmurtia, the Perm Region, and the Timan-Pechora province.

On the young platforms, particularly the Central Asian and Cis-Caucasus plates, the main questions are; the geology and general make up of the pre-Jurassic sediments of the West Siberian, Middle Asian, and Cis-Caucasus platforms; the organic matter and its state of maturation in the pre-Jurassic sediments of the young platforms; the physical properties of the Paleozoic (pre-Jurassic) rocks and their systematic spatial variations; and conditions of formation of the zones of oil-gas accumulation.

A separate but important problem for the West Siberian platform is the study of the commercial oil productivity of the fractured bituminous shales of the Bazhenov formation. Problems to be addressed here are the mineral composition of the rock, genesis of the porosity and permeability, origin of the fissility, the formation of the pools, the complete absence of water, and the overpressure. The resources of the Bazhenov must be evaluated objectively.

It is now very pressing that geological and geochemical criteria be developed for quantitative and qualitative prediction of oil-gas productivity at depths at various stages of the exploration process.