Character of the Oil-Gas Occurrence in the Alay Sediments Within the South Tadzhik Depression

G. N. Gazaryan

Indications of oil have been known since pre-revolutionary times in Alay horizon 1 in the South Tadzhik depression in the Shakhrinans region at Sangmilya. Discharges of oil have been observed in the north part of the Gissar valley. See Fig. 1. The oil showings here occur in organo-clastic limestones with inclusions of fine-crystalline pyrite. Thick black oil with the odor of H₂S at present oozes out of the fractures of the limestones in considerable quantities.

In spite of the discharge of liquid oil from the Alay beds, however, up until 1947 no commercial flows of oil or gas had been obtained from these sediments in the Tadzhik depression.

In 1947 in the Lyal’-Mikar area, which is located within the Surkhan-Dar’ya synclinal zone, along with oil-gas productivity of the Bukhara sediments, commercial oil and gas was found in horizon 1, which occurs in the lower part of the Alay beds. See Fig. 2. In subsequent prospecting and production in the Lyal’-Mikar field it was established that horizon 1 is on the whole gas-bearing, and the pool here has an extremely narrow oil fringe on the periclinal parts of the fold. According to data of NPU Termezneft’, the gas reserves of this horizon are 141 million m³, and the extracted oil is 23 thousand tons.

In 1958-62 according to gas logging, hydrocarbons were noted in all three fields of the Vakhsh valley (well 41 Akbash-Adyr, well 31 Kichik-Bel, and well 18, 20, and others Kyzyl-Tumshuk). However, horizon 1 has not yet been tested in these three areas; therefore, its oil-gas productivity has not yet been established.

In 1962 during drilling of the first production well in the Kyzyl-Tumshuk field there were discharges of gas from horizon 1, thus indicating the prospects of this horizon.

In 1962 deep prospecting drilling disclosed commercial oil in horizon 1 on the Shaambary structure, which is located in the north part of the Gissar synclinal zone. A flow of oil at 3.5 tons per day was obtained in prospecting well 60 on the Shaamndary structure. After acid treatment the yield increased to 29 tons per day. The oil gave gas strongly.

Alay horizon 1, just as the productive carbonate unit of the Bukhara beds, appears to be regionally oil-gas-bearing in the South Tadzhik depression on a basis of both indirect and direct signs. This conclusion is confirmed by luminescence-bituminological analyses of rocks recovered from the Alay, Suzak, and other beds from exploration wells of the Kyzyl-Tumshuk and Kichik-Bel fields. See Table 1.

Horizon 1 is saturated largely by sodium sulfate waters with a low salinity (600-1000 mg-equiv per 1), in contrast to the lower occurring Bukhara and Upper Cretaceous sediments where the waters are the calcium chloride type with a high salinity (3500-5500 mg-equiv per 1). The presence of oil and gas pools in this horizon up to the time of erosion of the Paleogene sediments in the South Tadzhik depression is indicated by the following: 1) commercial oil and gas pools in the Lyal’-Mikar field, oil pools in the Shaambary area and discharges of oil at Sangmilya, and also gas showings observed during drilling in the Kyzyl-Tumshuk, Kichik-Bel, and Akbash-Adyr fields; 2) high content of H₂S in waters of the Alay horizon in all known fields and structures of the Vakhsh, Surkhan-Dar’ya, and Gissar synclinal zones, formed by bacterial oxidation of oil and gas pools. The H₂S content in the Alay horizon in the Lyal’-Mikar field is 180 mg per 1; Uch-Kizyl - 350 mg per 1.

In spite of the bacterial oxidation and destruction of the oil and gas pools of the Alay horizon in the Shaambary and Lyal’-Mikar areas, the oil of this horizon has better properties than that of the lower Bukhara sediments, although, as must be expected, it differs in quality from the Alay oil of the covered fields of Andizhan and Palvantash of the Fergana Valley due to the above mentioned processes. See Table 2.

The oils of the Alay and Bukhara horizons contrast sharply in-chemical composition. This difference appears to be due to the oil of the Alay horizon having formed in the clayey unit of the Suzak beds, which are rich in organic matter, and the oil of the Bukhara beds in dolomitized organic limestones of this same age.

A. N. Gavrilov, A. I. Mesropyan, and G. P. Tamrazyan determined that in the Apsheron Peninsula the oils of clayey formations are lighter whereas the oils of sandy formations are heavier.

The clayey deposits of the Suzak beds, which underlie Alay horizon 1, formed in a deep-water environment rich in organic matter,