

**COMPOSITION OF THE OIL SYSTEMS OF YAMAL OIL-GAS-BEARING BASIN**

Elena V. SOBOLEVA, Tamara A. KIRJUHINA and Tatiana N. KORNEVA

*Lomonosov Moscow State University*

The whole stratigraphic sequence of Yamal oil-gas-bearing region from Paleozoic up to Cenomanian rocks is gas-saturated. Big quantity of gas and gas-condensate deposits is revealed nowadays, oil lists are fixed on Novoportovsk, Arktichesk, Neitin, Bovanenkovsk, Malyginsk and Western-Tambejsk fields, although oil shows are marked out on the other fields. Quantity of oil deposits is decreasing from South-Yamal megabank to the north.

Distinct phase fluid zoning is marked out within Yamal oil-gas-bearing region; it becomes apparent on Bovanenkovsk and Novoportovsk oil-gas-condensate fields: lower (Paleozoic – Lower Jurassic) and upper (Hauterivian – Lower Aptian) parts contain deposits with low stable condensate concentrations ( $<50 \text{ g/m}^3$ ), middle part contains condensate ( $90\text{--}100 \text{ g/cm}^3$ ) and high-condensate deposits ( $200\text{--}300 \text{ g/m}^3$ ). The uppermost part is represented by gas deposits in Cenomanian, Albian and partially Aptian rocks. Layers Ju<sub>2</sub>-Ju<sub>10</sub> of Bovanenkovsk and in Middle-Lower Jurassic sediments of Harasavejsk fields contain “conservational” deposits. It is possible to mark out 3 types of oil fluids by chemical parameters, group HC composition of benzene fractions, composition of C<sub>12</sub>-C<sub>32</sub> fractions.

**First type** is represented by “residual oils” containing small amount of benzene fractions, high concentration of hard waxes (up to 25%), relatively high amount of waxes and asphaltenes, n-alkanes up to C<sub>32</sub>, quantity of alkanes and naphtenes in benzene fractions is similar to heightened quantity of arenes. **Second type** includes light oils with high concentrations of hard paraffins, small amounts of waxes and asphaltenes, alkanes up to C<sub>32</sub>, heightened content of arenes; group HC composition of benzene fractions is similar to that of I type of oils. These oils contain less waxes, asphaltenes and more light fractions. **Third type** combines light condensate-like oils and condensates that do not contain waxes, asphaltenes and hard paraffins. By molecular composition fluids with alkane basis of benzene fractions with prevailing of n-alkanes under iso-alkanes within medium fractions are remaining aloof (in the lower part of the sequence), naphthene basis of benzene fractions and comparatively low content of arenes with prevailing of iso-alkanes in medium fractions (TP and PK strata).

There is a definite tendency in changing of fluid composition vertically and laterally. Oils of I type in Ju and BJa layers present in Bovanenkov field remained mainly on the southern dome. So-called “sealed” deposits are present on Harasavejsk field – oil composition is not yet analyzed, supposingly they are of I type.

Yamal light oils and condensates are younger by generation time. Inflow of "young fluids" changed alkane ratios in Eastern-Bovanenkovsk oils. Generation and migration of light HC's continues nowadays, that is proved by high gas content of the whole sequence and anomalously high layer pressures of the lowermost part of the sequence. BJa layer of Upper-Teutejsk field contains residual oils with close characteristics to J oils of Bovanenkovsk field.

High content of hard paraffins is observed for oils from lower layers of Yamal region. Its content increasing could happen due to inflow of high-molecular alkanes from accommodating rocks ("extraction" by light HC's) at high layer T°C and high gas content. Hard paraffins are present in condensates of underlying deposits, although in small amounts – they could come in due to migration of the fluids from the lower layers. To the north their quantity is decreasing yet remaining high – Upper-Teutejsk and Eastern-Bovanenkovsk fields.

North Yamal megabank fields contain mainly gas-condensate deposits; oils and condensates do not contain high content of hard paraffins that is connected to decreasing of humic components in OM of the source rocks or to absence of paraffin oils in the lowermost horizons as it is observed in the southern regions. Situation differs on Middle-Yamal vault: TP layers of Western-Tambejsk field contain oil deposits and lists, South-Tambejsk field situated to the south contain only gas condensate deposits. It could be supposed that oils of early generation formed deposits of Western-Tambejsk field, and HC fluids of later oil generation stage filled the traps to the end and formed deposits on South-Tambejsk structure.

Tendency of group HC composition of benzene fractions in oils and condensates is observed in all studied regions - increasing of arenes and alkanes towards the bottom, although hypsometrical level of this changing is lowering with the sedimentary sequence warming. Depths on Bovanenkovsk field reach 1700m, South-Tambejsk field – about 2300m.

Migration processes influence composition of all types of fluids – they are wiping off peculiarities of the chemical parameters, group and group HC composition. Unevenness of collector qualities in area extent (mostly in J sediments) is defining disconnection of separate parts of deposits that is explaining variations of oil composition and content in one layer.

As it is stated by most of the researches there are considerable differences in condensate composition in the upper part of the sequence (TP<sub>1-9</sub>, PK) and in the lower layers. This difference is mostly genetic and depends on composition and maturation level of OM of the source rocks. Source rocks for oils and condensates of Ju, BJa layers and lower part of TP layers were clayey sediments of Jurassic and Neokomian age, and for upper gas condensates with naphthenic basis and increased content of iso-alkanes – clayey sediments of the accommodating deposits enriched in coal material.