

GEOCHEMICAL CONTROL OF CRYOGENIC GAS HYDRATE ACCUMULATIONS - MESSOYAKHA GAS FIELD, WESTERN SIBERIA - CASE STUDY

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Cryogenic gas hydrate accumulations are the result of free gas to hydrate state transformation during the exogenic cooling of the sediments. The Messoyakha gas field in north-west Siberia is an example of such hydrate accumulation in the permafrost region of Russia. Since 1981, gas and geochemical investigations are conducted regularly at the gas field. Helium is used as the indicator of gas hydrate presence. Helium does not enter the structure of gas hydrates, being accumulated in residual gas. 3000 samples of gas were analyzed to detect helium. Average initial helium content in Cenomanian-hosted gases of the West Siberia is about 0.05%. Messoyakha gases were found to contain both anomalously low (0.001%) and high (up to 0.4%) helium concentrations. Anomalously high and medium concentrations of helium (0.05-0.4%) are confined to central zone of the field, varying in value from year to year which way could be explained by formation and decomposition of technogenic gas hydrates during exploitation. Permanently ultra low concentrations of helium (0.001%) are observed at peripheral part of the field, which could be explained by decomposition of natural gas hydrates. The following model of hydrate presence is suggested for the Messoyakha gas field: natural gas hydrates are distributed at the peripheral parts, whereas free gas and technogenic hydrates (in wells and in bottom-hole formation zone) are located in the central part of the gas field.