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Formation Conditions and Current Forms of Natural Gas Existence in Gas Hydrate/Free Gas Accumulations in Shallow Permafrost of Northwest Part of the Yamal Peninsula (West Siberia, Russia)

Considerable gas releases of microbial gas (measured flow rates up to 14 000 m3/day) are concentrated in the permafrost depth interval 60-80 m, also can be often encountered at depths upper or lower this interval. Gas hydrate presence in shallow permafrost of the studied area was confirmed by following observations and studies. 1. Association of gas-releasing zones and zones of reduced pore water salinity. Increasing of pore waters salinity often is documented for layers immediately below gas releasing zones that could be attributed to the cryo-hydrate squeezing of salts. 2. Association of gas releasing zones and zones of reduced organic matter content. This could be attributed to more complete microbial processing of organic matter and initially greater concentration of natural gas within these intervals. 3. Gas hydrate presence was detected by measurements of gas volume liberated during permafrost drill cores thawing in warm liquid. Total volume of liberated gas exceeded free pore volume 2-3 times (after core samples storage more than 2 weeks at subzero temperature and atmospheric pressure). 4. The possibility of gas hydrate formation in the studied cores has been confirmed by experimental formation of artificial methane hydrates in the sediment samples recovered from bore holes. On the base of the studies conducted the geological model of gas hydrate formation and preservation in shallow permafrost of the Yamal peninsula was developed.