



## Gas hydrates of the ocean floor - cause of ecological and technological disasters

Inna Balanyuk, Anatoly Dmitrievsky, Olga Chaikina, and Tatyana Akivis

P.P. Shirshov Institute of Oceanology, Russian academy of Sciences, Moscow, Russian Federation (iebalanyuk@yandex.ru)

In recent time, an intensive development of the shelf zone in relation with hydrocarbons production and underwater pipelining is in progress. Engineering works in non-consolidated sediment is placed on the agenda. Developers and engineers face completely new challenges due to necessity of reliable functioning of underwater constructions. Wide spread of gas hydrates in bed sediments of seas and oceans gives possible increase of hydrocarbons reserves but in the same time poses crucial industrial and ecological problem. The most complicated engineering problems are operation of underwater fields, oil platforms construction and pipelining under gas hydrate deposits instability condition. Gasmen faced this problem while construction of "Russia-Turkey" pipeline.

Gas hydrates production in nowadays rather problematic and relates to technologies of the future because of instability and specific character of their bedding. Nevertheless, due to scantiness of total world hydrocarbon reserves, gas hydrates attract more and more attention.

There exists an opinion that total amount of gas hydrates is enormous and one-two orders higher than assured oil and gas resources all over the world.

Thermodynamic conditions over a quarter of the land and nine tenth of the World ocean are favorable for accumulation and reservation of natural gas hydrates. There are sufficiently high pressure and low temperature on the sea bottom at depths exceeding 1000 m which is necessary for gas hydrate formation. Average water temperature on the bottom at a depth of 1 km does not exceed 5°, and at a depth of 2 km and more - 2°; and in the polar zones the temperature is permanently near 0°. In tropic regions gas hydrates can appear and accumulate from the depth of 300 m while in polar area – from the depth of only 100 m. When gas hydrate grows warm it "melts" and decomposes into free gas and water. A drilling of gas hydrate deposits is dangerous because gas hydrate can be melted by heat released by an auger, and as a result, huge amounts of gas and energy released can cause an explosion.

One of the possible reasons is global warming engendered by greenhouse effect intensification, because the specific absorption of the Earth thermal radiation by methane (radiation activity) is about 21 times higher than that by carbon dioxide.

Decomposition of the total gas hydrate reserves for the short time interval could have extremely catastrophic consequences. But even decomposition of relatively minor part of modern gas hydrate reserves could seriously affect the climate.

Recent paleoclimate research showed that about 55 millions years ago nearly 1200 g/t of gas hydrate (about 1/10 of modern reserves and probably the total reserves of the period) decomposed in the course of several thousands. As a result a temperature of the World Ocean water increased sharply by 8° in the surface and by 5° in the depths.