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Waste Burial to the Pressure Deficit Areas in the Eastern Siberia

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Abstract : Important executive decisions on oil and gas production stimulation in Eastern Siberia have been recently taken. There are unique and large fields of oil, gas, and gas-condensate in Eastern Siberia. The Talakan, Koyumbinskoye, Yurubcheno-Tahomskoye, Kovykta, Chayadinskoye fields are supposed to be developed first. It will result in an abrupt increase in environmental load on the nature of Eastern Siberia. In Eastern Siberia, the introduction of ecological imperatives in hydrocarbon production is still realistic. Underground water movement is the one of the most important factors of the ecosystems condition management. Oil and gas production is associated with the forced displacement of huge water masses, mixing waters of different composition, and origin that determines the extent of anthropogenic impact on water drive systems and their protective reaction. An extensive hydrogeological system of the depression type is identified in the pre-salt deposits here. Pressure relieve here is steady up to the basement. The decrease of the hydrodynamic potential towards the basement with such a gradient resulted in reformation of the fields in process of historical (geological) development of the Nepsko-Botuobinskaya anteclise. The depression hydrodynamic systems are characterized by extremely high isolation and can only exist under such closed conditions. A steady nature of water movement due to a strictly negative gradient of reservoir pressure makes it quite possible to use environmentally-harmful liquid substances instead of water. Disposal of the most hazardous wastes is the most expedient in the deposits of the crystalline basement in certain structures distant from oil and gas fields. The time period for storage of environmentally-harmful liquid substances may be calculated by means of the geological time scales ensuring their complete prevention from releasing into environment or air even during strong earthquakes. Disposal of wastes of chemical and nuclear industries is a matter of special consideration. The existing methods of storage and disposal of wastes are very expensive. The methods applied at the moment for storage of nuclear wastes at the depth of several meters, even in the most durable containers, constitute a potential danger. The enormous size of the depression system of the Nepsko-Botuobinskaya anteclise makes it possible to easily identify such objects at the depth below 1500 m where nuclear wastes will be stored indefinitely without any environmental impact. Thus, the water drive system of the Nepsko-Botuobinskaya anteclise is the ideal object for large-volume injection of environmentally harmful liquid substances even if there are large oil and gas accumulations in the subsurface. Specific geological and hydrodynamic conditions of the system allow the production of hydrocarbons from the subsurface simultaneously with the disposal of industrial wastes of oil and gas, mining, chemical, and nuclear industries without any environmental impact.

Keywords : Eastern Siberia, formation pressure, underground water, waste burial
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