

GEOCHEMICAL BARRIERS AND OIL POLLUTION

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Abstract

This article deals with the using of doctrine of geochemical barriers against the oil pollution problem. There are two ways of using: formation or destruction barriers. The example of formation the barrier is Surgut–Polotsk oil pipeline. In some cases, such as groundwater oil pollution on the Polaznenskoe oil deposit, environmental protection must be reached by destruction of geochemical barriers.

Oil pollution due to the widespread use of oil products may be in contrast to other pollutants occur almost anywhere on the globe. To search for new approaches to combat oil pollution can be used doctrine of geochemical barriers. Wide variation of redox condition, mineralization and chemistry of ground and surface water, physical and mechanical properties of matter, distribution of organic matter and its changeable activity lead to large geochemical barrier diversity. Naturally, geochemical barriers form chemistry of different soil horizons, sediments and ore deposits. In industrial centers there is a set of contamination sources. They result in local technogenic geochemical anomalies that negatively influence on the environment. The formation of such anomalies is frequently connected with technogenic migration of pollutants in water flows. The limitation methods of pollution expansion are worked out for decreasing of its negative effect. One of such methods is usage of artificial geochemical barriers. Geochemical barriers could be divided in different types: using natural barrier features of the environment and constructed specially (artificial). There are plenty of examples of their practical use for environmental protection in Russian territory.

The overflows of oil under oil pipelines accidents cause essential threat for the environment. For liquidation of that consequences method of applying of multicomponent sorbent was developed after Surgut–Polotsk oil pipeline rupture in the Perm Region. The laboratory research show that multicomponent sorbent on the basis of waste products of absorbite destructes water-emulsified crude oil and deletes oil, both in a volume, and from a surface of water. The part of sorbent forms sorbing layer at the bottom after a deposition. Under water filtration through ground this layer works as a precoat filter. The floating component of sorbent can be removed from a surface of water. Sorbent is not toxic and can be incinerated after usage.

In some cases environmental protection must be reached by destruction of geochemical barriers. Field researches have been tested by authors in the Polaznenskoe oil deposit and shown promising outlooks of this scientific direction. The hydrosphere at oil deposits in places with highly karstified surface is vulnerable to pollution. Contaminated groundwater is discharged to the water reservoir and causes a significant pollution of water reservoir and adjacent areas. The Polaznenskoe oil deposit is an example of such an area, where oil lenses were formed at the groundwater surface during its half a century development. These lenses contaminate water of the Kama water reservoir. Two methods of pollution control in the Kama water reservoir were used. These methods considered the following geological and environmental conditions at the deposit: pumping oil from the lens surface using special technique and biochemical destruction of oil by microbial activation in oil lenses using natural biodegradation.

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