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ОЦЕНКА ГЕОХИМИЧЕСКИХ СВОЙСТВ НЕФТЕЗАГРЯЗНЕННЫХ ПОЧВ

ASSESSMENT OF GEOCHEMICAL PROPERTIES OF OIL-CONTAMINATED SOILS

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Аннотация. При слабом загрязнении проводится только технический этап рекультивации при самоочищении почвы. С учетом наличия в почве глины мероприятия по размягчению проводят на глубину до 20 см. Эти участки остаются в покое на технической стадии рекультивации. Вспашку на глубину 8–10 см проводят на участках, где размягчение может вызвать эрозию, на участках, загрязненных нефтепродуктами. При этом вспаханную полосу шириной 2–3 м укладывают поперечно по направлению господствующих ветров.

Ключевые слова: почва, загрязнение, стадия, способ, очистка.

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Annotation. In the case of mild pollution, only the technical stage of reclamation is carried out in the self-cleaning of the soil. Taking into account the presence of clay in the soil, softening measures are carried out to a depth of 20 cm. These areas are left to rest during the technical phase of reclamation. Plowing to a depth of 8–10 cm is carried out in areas where softening can cause erosion, in areas contaminated with oil products. In this case, a plowed strip 2–3 m wide is laid transversely in the direction of the prevailing winds.

Keywords: soil, pollution, stage, method, cleaning.

Introduction. In general, the areas most affected by oil pollution in the Absheron Peninsula, where the landscape-ecological-geochemical conditions are not in good condition, are Balakhani, Zabrat, Sabunchu and Ramana.

In these areas, which are more exposed to pollution in the lands of Absheron IR, microelements such as chlorine (Cl), palladium (Pd), stibium (Sb), terbium (Tb), indium (In) predominate in landscapes and are characterized by high concentration clarks.

The following sequence of reduction of microelement concentration clarks was determined for the studied area:

Such a high level of concentration clarks suggests that the landscape in Absheron is polluted with these trace elements.

As can be seen from the decreasing order, the concentration of trace elements Pd (palladium), Cl (chlorine), Ag (silver), Cd (cadmium), In (indium), B (boron), Sb (antimony) and Mo (molybdenum) is higher. is distinguished from others. Concentrations of trace elements such as Cu (copper), Zn (zinc), Sn (tin), Pb (lead) are also high, ranging from 2,3 to 8,3. (Alizade E.K. et al.6 2015).

In the soils of the Absheron region, pollutants are filtered almost to the level of groundwater. In some cases, because the level of pollution is higher than the buffering properties of the soil, hydrocarbon compounds penetrate into groundwater. Soil buffering prevents contaminants from entering the soil and plants. This condition is violated when the soil layer is exposed to oil and oil products, agricultural and other industrial wastes for a long time.

On the other hand, according to the relief of the area, the mixing of hydrocarbon-contaminated groundwater with wastewater in the Caspian coastal strip poses a threat of coastal water pollution. In order to assess the ecological situation in the area, the following 4 cases of landscape disturbance are observed in the Absheron Peninsula:

- satisfactory landscapes without disturbance of soil and vegetation;
- medium-level landscapes with some (weak) soil cover;
- landscapes in a critical situation where the land cover has been destroyed and the relief has changed;
- landscapes in a catastrophic state where all elements of the landscape have changed and all intra-landscape connections have been broken.

This division allows us to assess the environmental situation in the area.

In the conditions of the Absheron Peninsula, it is expedient to rehabilitate the natural landscapes of the areas contaminated with oil and oil products in the following stages:

- purification of oil and oil products from the soil;
- land reclamation (technical and biological stage).



Cleaning of oil and oil products from soils, creation of collecting rocks after elimination of factors causing pollution (accidents, etc.), transportation of oil collected in the room by tank trucks, spraying of sorbent on the surface of oil.

Land reclamation within oil-contaminated landscapes is carried out in several stages. The duration and stages of reclamation are determined by the degree of pollution, climatic conditions and the state of the biogenocenosis.

There are 2 levels of oil pollution of soils:

– Mild pollution (when the oil content in the humus layer of the soil is less than 6%); Such pollution can be eliminated by activating self-cleaning processes using agro-technical methods (application of fertilizers, tillage and deep softening).

– Severe pollution (when the oil content in the humus layer of the soil is more than 6%); Such pollution can be eliminated by special measures that can create aerobic conditions and activate hydrocarbon processes.

Biological preparations are used to accelerate the biodegradation of oil products in areas heavily contaminated with oil and oil products.

At the technical stage, air treatment, evaporation and destruction of light fractions of oil, photooxidation of oil components on the soil surface, restoration of microbiological compounds, development of oil-oxidizing microorganisms are carried out by partial restoration of soil organisms. Some of the components are converted into a solid product. This improves the water-air regime of the soil. Aeration and irrigation of the soil intensify these processes and reduce the oil content.

The biological stage consists of 2 parts:

- phytomeliorative planting using mineral fertilizers;
- pollution-resistant perennial crops.

In the case of mild pollution, only the technical stage of reclamation is carried out in the self-cleaning of the soil. Taking into account the presence of clay in the soil, softening measures are carried out to a depth of 20 cm. These areas are left to rest during the technical phase of reclamation. Plowing is carried out to a depth of 8–10 cm in areas where softening can cause erosion, in areas contaminated with oil products. In this case, a plowed strip 2–3 m wide is laid transversely in the direction of the prevailing winds.

During the technical stage, the contaminated areas are periodically irrigated, and the fertile layer formed during the winter is protected.

At the biological stage of reclamation, test grasses are first planted. The purpose of the biological phase of reclamation is to assess the residual toxicity of the soil, to intensify the process of biodegradation of oil and to improve the agro-physical properties of the soil, to specify the time of transition to the final stage of reclamation.

In the second stage, 1,5–2,5 years after pollution, perennial grasses are planted. This work can be carried out after the restoration of vegetation in 75 % of the experimental grassland. Mowing, application of mineral fertilizers, planting of perennial grasses are carried out after cultivating the soil.

During the reclamation of man-made disturbed lands in Absheron, it is expedient to select the following main fruits and ornamental shrubs and trees for planting. fire grass, steppe cattail, finger meadow, as well as vegetable crops such as tomatoes, eggplant, carrots, onions, etc.

Although the industrial complex of the study area is multidisciplinary, oil and gas production, oil refining, petrochemical and machine-building industries dominate. Oil and gas fields such as Binagadi, Pirshagi, Gara-Heybat, Bibi-Heybat, Masazir, Zira, Buzovna, Mashtaga, Gala, Sulutepe, Sianshor, Lokbatan, Guzdek, Kurdakhani, Garadagh, Sabunchu, Ramana, Surakhani and Garachukhur located in the territory of Absheron region the territory of many of them is oily and swampy. In the fields, boreholes of different origins are used to maintain reservoir pressure, but in a number of fields, such as Lokbatan, Puta, Gushkhana, Xianshor, etc., mineral, rain and sewage water is accumulated in layers. Concentrating on oil rigs, «stagnant» reserve tanks, and mining lakes, they turn large areas into useless, dirty lands.

The content of pollutants in oil production is determined on the basis of geochemical characteristics of fields and production technologies. Therefore, even within the same oil field, the basic geochemical parameters of the flow of pollutants are very variable over time and area.

Operational and pressure wells are among the most common sources of contaminants entering the natural environment. Due to the fact that the pipes are in an emergency condition, it is even possible for sewage to leak from collection points, various settling tanks or primary oil refineries.

Sewage flows consist of complex multi-component mixtures. They consist mainly of water-soluble salts, mainly chlorides, small amounts of sulfates and carbonates. These salts are contained in liquids of various origins, sewage and petroleum waters, detergents, as well as a number of reagents used in oil refining. The scale and intensity of the impact of these chemical compounds on the surrounding landscape is often greater than the impact of oil and its bituminous components.



During the operation of obvious and complex unusual anomalous deposits, there are cases of continuous inflow of pollutants into natural landscapes, in which case the geochemical composition of the flows changes. All this creates a variety of forms of real transformation of the salt content of the ball, even at very short distances.

Forms of soil salinization, which is one of the main landscape factors, are determined in each case, mainly by the composition of man-made flows into the soil.

In the case of chlorinated water pollution, the soil acts as a strong chromatographic column, where the process of separation and purification of pollutants is underway. Concentrations of man-made bituminous components in the upper layer are typical for this type of pollution areas.

The salinity of the soil and its characteristics are determined not only by the specific composition of the washing solutions and contaminants in the landscape, its components, which enter the soil in different ways, and even by the composition of the soil itself.

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