

Biological method of oil and oil products spill clean-up on the ground

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Background. The oil industry is one of the most profitable sectors of our economy. However, the process of oil production is not only difficult, but also dangerous for the environment in cases of technological accidents. Oil and oil products spills pose a threat to human life. For this reason, various methods have been invented to eliminate oil and oil products spills on the ground.

Aim. The aim of the research is identifying advantages and disadvantages of biological purification methods of oil-contaminated lands on Tomsk region.

Methods. Biological methods of elimination can be divided into:

1. Phytoremediation;
2. Bioremediation.

Phytoremediation [2] is one of the new directions of biological elimination based on the use of plants of their ability to absorb and accumulate pollution in their parts, as well as to activate the activity of soil microorganisms in the fight against pollution, providing them with the necessary nutrients

The phytoremediation principle of plant action consists of several stages:

1. Absorption and accumulation of the pollutant in the rhizosphere of plants;
2. Transformation of the pollutant from the roots to the stem;
3. Release of recycled pollutant residues into the atmosphere using leaves.

Bioremediation methods [1] are based on the destruction of pollutants by various types of microorganisms. The effect is achieved by activating the native microflora or introducing certain cultures of microorganisms into the soil, as well as all kinds of complex preparations and methods.

Results. We considered two methods of land recultivation in oil-contaminated territories of Tomsk region:

- 1) Bioremediation, using the biological preparation “MD-dry, liquid”;
- 2) A complex method using cultures of microbial destructors and herb meliorants isolated from the native microflora.

As objects of research, we considered two contaminated sites, reclaimed by various methods of biological purification. The recultivation of site 1, located at the Zapadno-Ostaninskoye field, was carried out by a complex method. The recultivation of site 2, located at the Luginetsky deposit, was carried out by a bioremediation. You can see the results of our research in the fig. 1. The blue blocks show amount of oil before recultivation, they exceeded the permissible values by 4 times. The orange blocks show the amount of oil after recultivation.

The species composition and phytomass of the living ground cover after reclamation were also considered. You can see the results of our research in the table 1.

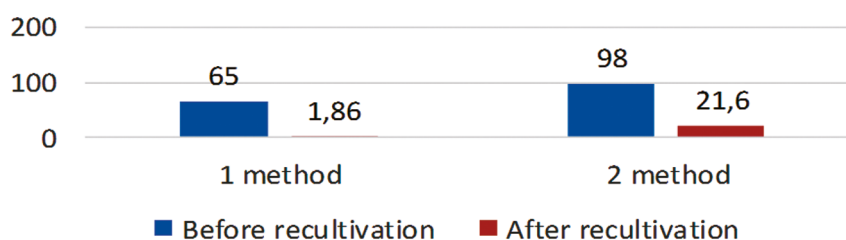


Fig. 1. The content of petroleum products in the soils of the experimental sites before and after recultivation

Table 1. The data of covering after remediation

№	Plant species	Number of experimental site	
		1	2
1	Marsh bagulnik	4,1/1,4	1,7/2,3
2	European weekday	0,4/0,1	–
3	Marsh cypress	4,7/1,6	5,5/9,1

Sample number 1 called Marsh bagulnik and 3 called Marsh cypress were able to adapt to the soils after using both methods, but sample 2 called European weekday was unable to adapt to the soil of site 2.

Conclusions. During the research, various advantages and disadvantages of the methods were found but the best method of elimination is a complex method.

Keywords: oil and gas, research, biological methods, bioremediation, phytoremediation.

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