TECHNICAL SCIENCES

PROTECTING THE ENVIRONMENT FROM OIL WASTE POLLUTION

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Abstract
The article describes biological, thermal, chemical, mechanical, biotechnological methods for cleaning the soil from oil waste. Various phytoremediation methods were chosen for cleaning the soil from crude oil. The purpose of the article is to obtain quality soil by cleaning the soil from oil and oily pollutants. It must be ensured that the process is carried out in the most efficient way and at the lowest cost.

Keywords: oil, polluted area, phytoremediation, ecological problems, reclamation, restoration

Introduction

Oil waste pollution is widespread in areas where the oil industry is developing. Oil spills cause great damage to these areas, in some cases causing deformation of ecosystems. In some cases, these wastes can change the properties of the earth's crust and even destroy habitats. Fungi, one of the most important components of ecosystems, play an important role in extracting organic matter from various types of soil. Therefore, the cleaning of areas contaminated with oil waste is one of the urgent problems.

Various measures are being taken in the direction of land cleaning and restoration.

As a result of the exploitation, transportation and processing of oil and gas, the lands contaminated with oil waste are disturbed, polluted and buried by oil and gas deposits. On the basis of oil waste, it is found in oil exploitation areas. Oil waste spilled on the ground slows down the flow of oil due to the unevenness of the soil profile. This leads to the surface of the soil being covered with a layer of oil [1].

Various measures are taken to restore the soil contaminated with oil waste. These include the following methods:

1. Phytoremediation. This method uses fat-oxidizing microorganisms.
2. Phytomelioration. Thanks to the planting of perennial grass plants, the ground cover becomes usable.
3. Reducing pollution with oil-resistant and resistant plants.

In addition, mechanical methods are also used to clean the oiled areas. Oil sludge is removed from oil-contaminated soil and wastewater from the area. At this time, deposits are formed and these deposits are softened and brought to a certain level. Then this area is covered with soil.

Many reclamation methods are used to rehabilitate soils contaminated with oil waste [2]. These methods are as follows:

1. Mechanical melioration
2. Biological reclamation
3. Thermal melioration
4. Chemical reclamation
5. Biotechnological reclamation

Due to the presence of oil production areas in different physical and geographical regions, there is currently no standard reclamation method for cleaning oil-contaminated lands. The choice of one or another method depends on the oiliness of the soil, the material composition of pollutants, the level and duration of pollution, the physical and chemical properties of the soil, climatic conditions, etc. oil products from lumps containing large amounts of oil before major breeding operations. This process is mainly carried out with 5-10% oil content. As a result of the experiments, it was found that it is possible to obtain 10-20% of oil from this area with a degree of pollution of 1-2 tons in this form.

Oil waste is removed from the soil by various biological methods. For example, collectors are placed in areas with a pollution level of 10-20%, and detergents are injected vertically into the soil between these channels.

Before being sent to processing stations, soil particles are degreased using detergents. Waste generated during this process is discharged into channels and collected in special containers. Only then it is sent to oil refineries. Improvement works are being carried out in those areas after cleaning of oil waste.

In modern times, biological, chemical, mechanical, biotechnological and thermal methods are used for the restoration of soils contaminated with oil waste. All over the world, these methods create various combinations, and 27 forms of melorization have been developed [3].

Mechanical reclamation. With this method, the soil layer contaminated with oil waste is removed from the area and sent to the washing area. Hydrocyclones, steam generators, pumps, hydraulic locks are used in the soil washing plant.

The process goes through different stages. Large particles separated from the soil during three-phase washing, as well as other parts of oil-contaminated soil that cannot pass through the vibrator, are transported to the collection area by vehicles.

At the last stage, the amount of oil products in the soil cleaned of waste is reduced to a minimum in accordance with the relevant regulations. After the soil is cleaned, it is sent from the workshop to the fields and fields and distributed. After the land is moved to the right area, it is recultivated by bulldozers to improve the landscape of the area.

Biological reclamation. In some cases, when the degree of oil contamination of the soil is more than 5-7%, it is considered appropriate to carry out biological restoration measures in the field after mechanical restoration measures. Also, this method can be used in the restoration of soils with a low degree of pollution, together with chemical, physical and mechanical cleaning methods. Biological reclamation is carried out in several stages rather than one. At the first stage, the most suitable plant species for agriculture and forestry are determined.

In the first stage, annual or perennial fodder crops are planted in the first year for testing. Then the germination of seeds planted under the same conditions is confirmed. If the seeds do not germinate enough, the oil waste decomposition period is extended by one year.

After the area is cleaned of oil waste, it is more appropriate to carry out measures to soften the plowed and cultivated fields. Planting of legumes, such as alfalfa or perennial forages, is recommended in bioremediation areas. After the completion of the first stage, other crops are planted depending on the development in the field.

Phytoremediation of areas polluted by oil waste. Phytomelioration is a system of actions carried out with the help of plants to completely change the natural state of a certain area . In order to make the soil, climate, hydrological and biological conditions of the area as good as possible, various studies have been conducted in this direction.

Annual and perennial grasses resistant to oil components are used as a phytomelioration measure in areas polluted with oil waste [4].

Phytoremediation of oil-contaminated soils is a sustainable technology, and although technical remediation measures are the most effective, they are generally more efficient than other methods used for the reclamation of contaminated soils, as well as traditional methods [5].

The use of phytomelioration creates conditions for the formation of root systems covering a large area of plants. At this time, microbial colonies accumulate in the root zone. In a short period of time, microbes in the root system directly affect the reality of the rheobacterial layer, forming exudates. The phytoremediation method removes many hazardous oil wastes, including diesel fuel, gasoline and other similar petroleum hydrocarbons, in a shorter time and more efficiently. Phytomeliorative measures lead to:

1. Decayed plant residues and rhizobacterial properties of the root system stimulate the sand layer, which affects the oxygen system in the soil.

2. Transport of pollutants to the root zone of plants is delayed due to increased absorption and evaporation.

3. Further metabolism, capture of a part of the evaporated water by the plants leads to a more efficient decomposition of pollutants as a result of the reaction [6].

At this time, phytomelioration depends on the interaction of plants with the environment. The good news is that no major engineering effort is required. Since the composition and concentration of different bacteria in the soil are changed by pollutants, only resistant bacteria live here.

remains and actively participates in the natural cleaning of the soil. Since hydrocarbons exist in soil form, these bacteria break down complex hydrocarbons into simpler forms. Different types of bacteria are used to break down different hydrocarbons [7,8].

Phytomelioration, biological recultivation and mechanical recultivation of areas polluted with oil wastes consists of using cleaning technologies and methods. It is shown in the article that the restoration of oil-contaminated areas, as well as industrial wastes by the method of phytoremediation, the effect on the current ecological condition of the areas, as well as natural and anthropogenic factors should be taken into account, and a directed action plan for the restoration of oil-contaminated areas should be prepared. The phytoremediation method is preferred because it is economically viable and does not harm the nature. In the latest technologies, bacteria and plants allow crude oil to be extracted from the soil more efficiently. Studies also show that phytoremediation methods are more effective than other methods.

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