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Scientific Analysis of the Ecological Condition of the Soils Around the Angren Coal Mine

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ABSTRACT

In this research work, first of all, the elemental composition of the main raw material lignite mined from the Angren coal mine is presented. A study of the permissible limit shares of heavy metal soil composition is also presented when it is checked by mass spectroscopic analysis. In addition, in the research work, as a result of the spilling and accumulation of small particles of coal around the coal mine and the spread of chemical substances in the form of dust from the coal mine, scientific information about the plant life and ecological problems and their scientifically based solutions. data is provided.

KEYWORDS: soil, enzymatic activity, coal, environmental impact, quantity of microorganisms, anthropogenic ecosystem, mining industry, environmental problem.

Soil degradation is one of the main environmental problems throughout the world. Pollution, salinity, erosion and other problems are the main factors of degradation. Soils are being degraded on Earth through natural and anthropogenic means. This, in turn, causes processes such as the deterioration of soil properties, decrease in productivity, and the destruction of the natural ecosystem.

Globally, the state of soil pollution has been sharply deteriorating over the years. As the main sources and causes of soil pollution, we can include mining operations, industrial enterprises and urban, road construction works, and the use of thermal power plants.

In the world, a number of scientific researches are being carried out to determine the state of man-made degradation of soils and to create recultivation technology suitable for soil and climate conditions during the processes related to the chemical industry, thermal power industry, oil and gas, coal, and mineral deposits. For this purpose, it is necessary to reveal the mechanism of change of fertility by studying the physical, chemical and biological properties of soils, to create a technology of recultivation with low economic consumption and secondary damage.

The object of research is the dark gray soils scattered around the Angren coal mine in Angren, Tashkent region. Comparative geographic and laboratory research methods were used to study the soil composition.

In field conditions, soil samples were taken from the vicinity of the mine based on the Interstate Standard (GOST: 17.4.3.01–83). The distribution of plant cover was visually monitored, the distribution of plant cover was studied. The state of pollution in the research area was studied.

The element composition of the main raw material lignite mined from the Angren coal mine, when the surface of the coal is checked, the element composition is C-60.68%, O-30.78%, Mg-0.24%, Al-2.44%, Si-3.18%, K-0.38%, S-0.81%, Ca-0.92%, W-0.57% were found to be present. We can see that the amount of tungsten in the coal is 0.57%, which is more than the specified permissible limit and belongs to the group of elements of weak dangerous level of the international standard GOST 17.4.1.02-83.

The content of this heavy metal soil exceeded the permissible limit even when it was checked by mass spectroscopic analysis, even a small amount of heavy metal has a harmful effect on the soil, plants and natural ecosystem. during extraction, kaolin is separated along with coal, and kaolin contains silicon oxides (table).

Table 1. The composition of the soil around the coal mine

Element name	Soil samples		
	The percentage of permissible limit ppm	Example 1 mg/kg	Example 2 mg/kg
Ag	0.05<10	0.5	22.0
As	0.10-4000	50.0	8.4
Ce	0.04-4000	70	69
Ba	0.10-4000	1200-	800-
Ni	1.0-4000	36	33
Mo	0.1-400	26	5.70
Sn	0.01-10	3.6	3.7
Co	0.10-4000	10	11
Cr	1.0-4000	80	54
Cs	0.02-4000	12	8.9
Eu	0.01-4000	1.1	1.2
Zn	1.0-4000	350	260
Hf	0.05-4000	2.7	2.8-
La	0.5-4000	35	43
Lu	0.01-4000	0.29	0.36
Cu	1-4000	55	300
Pb	0.1-4000	99	140
Tb	0.01-4000	0.670	1.800
Th	0.01-4000	14	19
Sr	0.1-4000	370	140
Cs	0.02-4000	12	8.9
Sm	0.01-4000-	5.4	7.4
Au	0.05-4000-	<0.05	<0.05
W	0.08-4000	65	5.2
U	0.01-4000	5.00	4.80
Nd	0.01-4000	28.0	36.0
Rb	0.1-4000-	100	170
Sb	0.1-4000	3.3	5.6
Bi	0.01-4000	0.450	1.3

Zr	0.1-5000	95	94
Fe	0.06-30%	37000	31000
Ca	0.005-28%	50000	9300
Ti	0.006-9%	2600	2800
Al	0.002-20%	70000	56000
Mg	0.004-11%	9100	11000
B	1.0-4000	15.0	19.0
Na	0.004-11%	85000	16000

Thus, the group of main pollutants in a coal mine includes heavy metals (W.Zn.Ti.Fe,In), coal dust, hydrocarbons (methane), silicon(II) oxide, volatile organic compounds, coal waste These substances are accumulated in large quantities on the surface of the soil (0-5 cm), and as a result, the condition of the soil and the flora are seriously damaged.

From the above pictures, we can see that the coal dust and wastes falling on the surface of the soil make the soil look black, rich in organic matter, but in fact, due to these wastes, the microorganisms, flora and biological diversity of the soil are seriously affected. This situation was clearly demonstrated in the sample taken near the coal mine.

So, in the research work, the flora was damaged as a result of the spilling and accumulation of small particles of coal around the coal mine and the spread of chemical substances in the form of dust from the coal mine. When the elemental composition of the soil is checked by means of mass spectroscopic analysis, the elements in its composition that exceed the permissible limit share: B, Na, K, Mg, Al, Ca are heavy metals: Cr, In, Zr, Ti, Pt, W, Au, Fe did Fermentative activity is low due to pollution in the soils of the region, and the amount of total microorganisms is much lower than in healthy soils. In order to improve the ecological condition of the soil of the region, it is necessary to increase the number of 1-year and perennial plants common in that region. It has been scientifically explained that the use of organic fertilizers is an effective method to increase the amount of nutrients and increase productivity in the region, and it is appropriate to use this method. The use of phytoremediation plants and the simultaneous application of biological fertilizers for the removal of heavy metals from the soil gives a good result. For example, some types of acacia and coniferous plants, such as pine, linden, corn, and mustard, absorb some heavy metals from the soil.

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