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RADIOECOLOGICAL ASSESSMENT OF GARDABANI AREA

[*]Matiashvili S., [**]Chankseliani Z.

[*]Iv. Javakhishvili Tbilisi State University, M. Nodia Institute of Geophysics,1, Alexidze Str., 0160, Tbilisi, Georgia
sophiko79@mail.ru
[**]Soil Fertility Research Service of LEPL Agricultural Scientific Research Center, Tbilisi, Georgia

Summary: *The aim of our research is to study the radiologically relevant areas of Georgia in terms of ecological pollution. This time the study area was the area adjacent to the Gardabani district power plant. Determination of radionuclide content in soils. The study was conducted at several points in the district. The criteria were the content of specific contaminants in the soil and their assessment of whether the concentration exceeded the maximum allowable norms. The monitoring revealed that the content of heavy metals in the soils is different. In the mentioned points of the Gardabani district, the soils are severely affected, which is reflected in the increase of heavy metals in the soils. As for radionuclides, radionuclide K40 and its high content were found in the analysis of the samples taken. In addition Cs137 is found; It is noteworthy that their content decreases with increasing depth. Based on the obtained digital material, we can say that the peak reaches Pb, but its content also decreases with increasing depth.*

Keywords: *Radiological research, radioactive contamination, radionuclides*

Any country is valuable if the people of that country take care of the environment and its natural resources. If the environment is not taken care of and protected, then the value of this country will be drastically reduced, because such a country is unsuitable, first of all, for life and then for economic activity.

The rapid economic development of the country and the production and supply of competitive products and services should not be at the expense of environmental pollution. There are successful experiences in many countries around the world on how to produce a competitive product with minimal negative impact on the environment [1].

Industry and transport account for the largest share of environmental pollution. It is known that 2.4 billion tons of coal is consumed on the planet, as a result of which 280 thousand tons of arsenic and 224 thousand tons of uranium are scattered on the earth every day. At this time, the world produces 40 thousand tons of arsenic and 30 thousand tons of uranium. From this it is clear how much pollution of the environment with these substances prevails. Coal pollution and its recycling as well as its use are real and accountable.

This problem is really serious in Georgia. According to a study by the World Health Organization, Georgia ranks second in the world in terms of death rate due to air pollution per 100,000 inhabitants, and is only ahead of North Korea. Atmospheric precipitation, wind direction and others are known to be one of the main factors in the distribution of radionuclides. Waste management in parallel with polluted air is the most problematic issue in the country [2]. In most cases the waste is concentrated in the open air. During the wind, this waste is scattered over long distances in the hills and hills. Burial of waste damages and poisons the soil and, most importantly, pollutes one of our greatest treasures groundwater. For the second time, our target is soil research and its assessment in terms of radionuclide contamination. Also, with the content of heavy metals, since there is a thermal power plant in the territory of Gardabani.

The construction of a powerful thermal power plant "Tbilsres" in Gardabani started in the 60s of the 20th century. Today, Gardabani Municipality is one of the strongest agricultural, social and cultural regions for Georgia, Large enterprises are gathered here, including agricultural enterprises, educational and scientific institutions. Radiation background was measured a few years ago and samples were taken for analysis. The content of radionuclides and heavy metals was determined. The area around the Gardabani district thermal power plant was studied in terms of ecological pollution [3].

A similar study is conducted by our monitoring. Several soil samples were taken, including mixed-type, from agricultural areas. GPS coordinates were mapped and the sample taken from the corresponding detail was evaluated. Radionuclide contamination levels were determined. Cs137, Sr 90 and K40 were identified. The increase in pollution levels after the Chernobyl nuclear power plant accident is mainly due to the release of excess amounts of radioactive cesium. As it is known, one of the main factors in the distribution of radionuclides is atmospheric precipitation, wind direction and others. Influence.It is known that the content of radionuclides in the soil is directly related to the precipitated atmospheric precipitation [4].

A peculiar regularity of wind and precipitation distribution in the zone is manifested. A similar pattern was found in terms of radiation background Sampling took place in villages a few kilometers from the Gardabani thermal power plant as shown in the table, natural radionuclides of 40K were observed in the soils of the Gardabani district in all samples [5]. The presence of natural radionuclide 40K in soils is due to the composition of soil soils and also the use of phosphorus fertilizers. Sampling took place in villages a few kilometers from the Gardabani thermal power plant as shown in the table, natural radionuclides of 40K were observed in the soils of the Gardabani district in all samples. Measured doses of radionuclides as well as maximum allowable norms are given in the cells (Table 1-5).

Table 1. GPS coordinates 41.494063; 45.115063 (mixed)

	Radionuclide	Activity Bq/kg	St.err. %	Uncertainty Bq/kg	MPN Beck /kg
1	CS-137	2.12	92.1	2.03	50
2	SR-90	0.00	>100	21.0	20
3	K-40	403	4.7	108	370

Table 2. GPS coordinates 41.4963377; 45.109227

	Radionuclide	Activity Bq/kg	St.err. %	Uncertainty Bq/kg	MPN Beck/kg
1	CS-137	21.0	12.4	6.14	50
2	SR-90	0	>100	20.2	20
3	K-40	309	5.9	83.8	370

Table 3. GPS coordinates 41.471043; 45,102703

	Radionuclide	Activity Bq/kg	St.err. %	Uncertainty Bq/kg	MPN Beck/kg
1	CS-137	6.78	28.6	2.64	50
2	SR-90	18.4	>100	19.9	20
3	K-40	395	4.6	106	370

Table 4. GPS coordinates 41.477860; 45.074894

	Radionuclide	Activity Bq/kg	St.err. %	Uncertainty Bq/kg	MPN Beck /kg
1	CS-137	12.6	17.8	4.00	50
2	SR-90	10.1	>100	20.4	20
3	K-40	421	4.4	113	370

Table 5. GPS coordinates 41.516432; 45.065796

	Radionuclide	Activity Bq/kg	St.err. %	Uncertainty Bq/kg	MPN Beck / kg
1	CS-137	15.4	15.8	4.73	50
2	SR-90	0	>100	20.3	20
3	K-40	312	5.9	84.4	370

We also determined the content of heavy metals in the soil at 7 points [6]. The corresponding coordinates were taken and indicated in the table, we also have the maximum allowable norms of heavy metals, which we expressed graphically (Diagram 1,2).

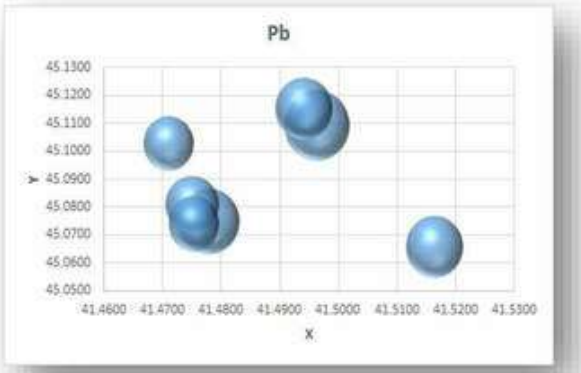

Diagram 1. Distribution of lead in the soil.

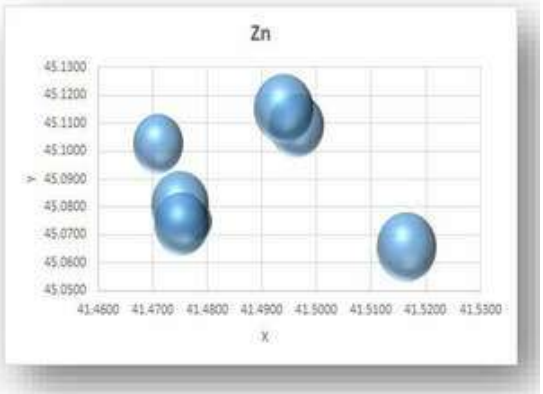

Diagram 2. Distribution of zinc in the soil.

Conclusion.

As a result of the research we can conclude: the soils of the area adjacent to the Gardabani district thermal power plant are exposed to it (heavy metals), which is reflected in the increase of the permissible level of heavy metals in the soils.

From the results obtained we focused on 137Cs, based on the obtained digital materials the radionuclide 137Cs, decreasing with respect to depth. We can say that there is no alarming situation regarding this radionuclide in the mentioned area of Gardabani. We have studied the content of heavy metals in the soils of the Gardabani district thermal power plant, namely Zn, Pb, and Fe.

As it turns out, the content of heavy metals in soils is different. As the depth of soil sampling increases, the content of heavy elements decreases. The following research can be concluded: Soils in the vicinity of the Gardabani district thermal power plant are exposed to it (heavy metals), which is reflected in the increase in the permissible level of heavy metals in the soils.

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