

RADIATION BACKGROUND OF THE ATMOSPHERE, SOIL AND WATER IN BULGARIA AND ITS MONITORING IN THE CONTEMPORARY POLITICAL CONDITIONS

РАДИАЦИОНЕН ФОН НА АТМОСФЕРАТА, ПОЧВАТА И ВОДАТА В БЪЛГАРИЯ И НЕГОВОТО СЛЕДЕНЕ В СЪВРЕМЕННИТЕ ПОЛИТИЧЕСКИ УСЛОВИЯ

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Abstract: *After the Second World War sharply increased testing of nuclear weapons. In making nuclear blast separate radioactive particles and rays isotopes that have an impact on man and nature. Despite the ban still the world are carried out illegal nuclear tests. Observations on the state of the radiation background in Bulgaria are carried out in parallel in two ways. In view of the uncertain international situation it is necessary to strictly observe radiation protection measures and strengthen control.*

Keywords: *control monitoring, radiation control, radiological risk, radionuclides, radiometric measurements, gamma background*

1. Introduction

After detection of radioactivity in the early years of the century, scientists believed that the source of radioactive emissions into the atmosphere are only earth and rocks. Very soon, however, it is noted that with the increase in altitude (in experiments with balloons) the radioactive radiation has increased due to cosmic radiation. Later it was found that cosmic radiation contains two components: primary radiation - of galactic origin penetrating the atmosphere, and secondary cosmic radiation - derived from the reaction of cosmic rays with the nuclei of elements in the air, space dust, which is layered on the planet and others. This activity is mainly driven by the light radionuclides, such as: beryllium, sodium, aluminum, vanadium, etc. Cosmic rays that reach the Earth's surface can create radioisotopes decay but compared to other naturally occurring radionuclides is extremely low and not particularly important [2].

The discovery of radioactivity was one of the greatest discoveries of humankind. Just a few weeks after the discovery of X-rays (in 1896) French physicist Henri Becquerel, and studied phosphorescent properties of various substances experience began with potassium uranisulfat. The experience consisted in the fact that after exposure to daylight mineral, well wrapped in light-tight black paper was checked after a while if phosphorescent. The silhouette of the mineral are outlined under the influence of strong radiation of great penetrating power on photo emulsions. It is the existence of new called uranium by Becquerel rays, and the phenomenon is called by Marie Curie radioactivity.

This discovery quickly going into medicine and created the first X-ray machines that led to a revolution in medicine. Subsequently advanced and modernized X-ray machines of the latest generation repeatedly raising the precision of diagnostic activity and allow saving hundreds of lives [9].

At the same time found that radioactive rays are a major polluter of the environment with an extremely strong impact on the life and physiological activity of organisms ranging from incentives to killing.

It is known that everything on our planet it is subjected to constant exposure from the natural and anthropogenic, earth and space sources on ionizing radiation, ie find are in an conditions, created from the natural and technogenic radioactive background. Yonizirashite lacheniya accompany The living planet in negovite razlichni proyavleniya na all etapi from the evolutsiyata.

Prez godinite After switching Vtorata svetovna vojna poradi razvitiето na atomnata promishlenost and osobeno usilenoto izpitvane na yadrenoto orazhie iznikva with golyama ostrota vaposat charter radioaktivnoto zamarsyavane na planetata. Sled atomen blast in vazduha produktite na atomnoto delene zamarsyavat

atmosferata, sushata, vodite, rasteniyata, zhitovnite, hranitelnite produkti and others.

The importance of the issues arising from radioactive contamination have the appearance of mnogo nauki that CE interesuvat and izsledvat razlichnite strani na essence of zamarsyavaneto with radionuklidi arise and develop Novi nauchni disciplines and napravleniya.

Environmental pollution by radioactive substances begins with the creation of the atomic bomb and the emergence of the nuclear industry. Harmful effects of radiation on living organisms and man, at first was not known. At the dawn of the nuclear age, society did not have the information needed for this activity because of the secrecy of the nuclear production and it was not possible to assess accurately the impact and extent of this pollution.

They are currently being developed biotechnologies, in which by way of specific algae is extracted and concentrated uranium in the biomass and thus the water is purified.

The first serious pollution and soil caused by human activity is in Japan and dates from August 5 to 6, 1945. Over the Japanese cities of Hiroshima and Nagasaki without special military necessity Americans throw the first atomic bombs in history. Begins the era of the nuclear race, which includes the former Soviet Union, but the number of nuclear countries today is more than 20.

Of course, environmental pollution and soil pollution by radioactive substances is enhanced and the occurrence of the nuclear industry. At first it was not known even lacked reliable information about the negative effects of radiation on the environment and man, due to insufficient theoretical and field studies and secrecy of the proceedings was not possible to estimate accurately the amount of such pollution, ecological and social damage caused by it.

For a long time it was believed that a relatively limited locally not very dangerous. Later it was found that the various stages of production of uranium fuel (open or closed mines, hydro production and concentration of uranium purification, enrichment, etc.). Possible "enrichment" of environmental radionuclide uranium, especially radon (Rn-222). Waste hydrometallurgical plants are initially discharged without adequate treatment into the nearest rivers and irrigation are polluted agricultural fields and plants on them. Later it recommended in uranium contaminated water to grow special algae that can extract and concentrate uranium and purify water, and indirectly to protect and soil from contamination [10].

Of course in the largest scale and the highest intensity radioactive contamination of the environment and soil following the accident in Chernobyl, Ukraine 26.04.1986, Trimayl aylan - USA - 1976; Fukushima, Japan - March 2011 and other nuclear accidents and catastrophes.

Local pollution and soil has been described in Spain in 1966. As a result of the mid-air collision of aircraft carrying nuclear weapons by air - tank. Radioactive substances explode a nuclear device were scattered over an area of several thousand hectares. 990 tons of soil was excavated and put in tombs for radioactive substances in South Carolina, USA. This case shows that current armament, despite the high degree of security, the risk of nuclear contamination of vast areas actually exist, even in peacetime.

Under national legislation Ministry of Environment and Water is the competent authority which carries out specialized monitoring the radiation environment status.

The radiological monitoring system of the Ministry is carried out under a program approved by the Minister of Environment and Water. The program was developed at the Executive Environment Agency (EEA) and updated annually. It includes a network of observation points, respectively frequency and range of observed indicators of environmental components: soil, air and water. The program is part of the National Automated Environmental Monitoring System (NEMS).

Radiometric measurements in real conditions, sampling and analysis are performed by EEA and radiological control laboratories in the Regional Inspectorates of Environment (Regional Inspectorate) Burgas, Varna, Vratsa, Montana, Pleven, Plovdiv and Stara Zagora.

2. Monitoring of natural radioactivity

2.1. Gamma background

Observations on the state of the radiation background in Bulgaria are carried out in parallel in two ways:

Through the National Automated System for continuous monitoring of the radiation background by 26 local monitoring stations (LMS) covering the whole country, with greater density around NPP "Kozloduy". For operational action in the event of an accident can include mobile monitoring station. With the automated system establishes an occasional raising of the natural gamma background in the country and provides early information about neighboring countries in the event of a radiological emergency. Predictive data interpretation part of the LMS perform additional measurement of basic meteorological parameters.

A National Automated System provides real-time data the State Agency "Fire Protection and Civil Protection" at the Interior Ministry and the Committee for use of nuclear energy for peaceful purposes.

There are departmental systems for radiation monitoring to the Ministry, Ministry of Health, National Centre for Meteorology and Hydrology at the Bulgarian Academy of Sciences, including 42 laboratories for qualitative and quantitative spectrometric analysis.

By discrete measurements of gamma radiation background in the permanent observation points Burgas, Varna, Vratsa, Montana, Pleven, Plovdiv, Stara Zagora and Sofia, where he performed in triplicate daily measurements [8].

The results obtained in both ways show that the radiation background in 2015 is within the typical background values for the respective point and the particular weather conditions.

2.2. Atmospheric radioactivity

Studies of atmospheric radioactivity is carried out by stationary stations with automatic sampling system of the Ministry located in Sofia, Burgas, Vratsa, Varna and Montana.

In a signal of possible cross-border contamination conducted additional sampling point measurements with portable equipment in Plovdiv, Stara Zagora and Pleven.

Data from the monitoring of atmospheric radioactivity in the year characterized by background concentrations of technogenic Cs-137 (<3 mBq / m³) and cosmogeneous Be-7 (from 0.7 to 15.7 mBq / m³).

2.3. Radiation status of non-arable land

Radiation status of soils is estimated gamaspektrometrichen destructive analysis of samples from pre-selected checkpoints. In

2014 it was carried out periodic monitoring of the specific activity of natural and artificial radionuclides in over 840 samples of arable land across the country.

In assessing the resulting data are not recorded values for specific activities of natural radionuclides above background typical of soils in different areas.

To maintain readiness for accurate assessments of the content of radionuclides in soil and food every two years held national calibration available in their range of spectrometers and makes interlaboratory comparisons.

Tahnogennite radionuclides within the soil layer mainly global atmospheric deposition and are the result of aboveground nuclear explosions and accidents at the sites of nuclear power, as is the case of the 1986 Chernobyl nuclear power plant.

Most affected by the Chernobyl accident is in South Bulgaria. CA Data availability of technogenic Cs-137 show spot contamination of soils in this region. They are known and are subject to annual control monitoring system for radiological control of the Ministry [6].

Compared to previous years, found overall decrease in technogenic activity of cesium-137, due to its global redistribution of natural migration processes.

Radiological characteristics of surface water from rivers and reservoirs

The radiological monitoring of rivers, lakes and dams in the country is carried out through a network of stations and includes control of total beta activity and uranium and radium values are compared with the rates fixed in GVA for "Drinking water".

Held systematic control over radiation condition of the river. River (12 points) and about 75 points along the rivers: Iskar, Timok Maritza Tsibritsa, Yantra, Topolnitsa Stryama Vacha, Tundzha, Sazliyka, Bear, Barska, Kiselchovski, Lucky Chepelarska Vit, Osam, Struma, Erma, Nishava, Black, Arda, Kamchia, Ropotamo Rezovska Veleka lakes Mandra and Vaya and dams "Iskar" and "Kamchia".

Measured in 2015. radiological indicators in samples of these points is below MAC for drinking water and this leads to the conclusion that the main rivers and reservoirs in the country were in good condition radiation.

In pursuance of Art. 144 [1] item 1 and of the Law on Environmental Protection EEA performed radiological monitoring through a network of stations established and updated with the Order № 48 / 23.01.2014g. Minister of Environment and Water.

Exercised by the EEA monitoring includes research on radiological indicators of water and sediments from the Danube River and water from the Black Sea. Background radiation was monitored by periodically sampling the stations of the network. The specific activity of natural and technogenic radionuclides examined samples of water and sediments by radiochemical and spectrometric laboratory analysis.

The location of points of radiological network characteristics tested, and cycles of study are presented in the following tables 1 and 2:

Test parameters:

- P1 - Setsifichna activity of natural and artificial radionuclides
- P2 - Total alpha activity
- P3 - General beta activity
- P4 - cesium - 137
- P5 - Tritium

Radiological monitoring is carried out in accordance with Regulation No.H-4 / 14.09.2012g. to characterize the surface water. The maximum permissible concentration of total alpha activity is 0,2 Bq / l, while for total beta activity - 0,5 Bq / l. The results of the analyzes of samples showed typical background values of radiological indicators monitored for previous periods in the relevant points.

№	water	intervals	tested indicators
1	Danube River at Kozloduy port	monthly	P2 P3
		quarterly	P4
2	Danube River at Oriahovo port	monthly	P2 P3 P5
		quarterly	P4
3	Danube River at Lom	annual	P2 P3
4	Danube River at Novo Selo	annual	P2 P3
5	Danube River at Baikal	annual	P2 P3
6	Danube River at Nikopol	annual	P2 P3
7	Danube River at at Belene	annual	P2 P3
8	Danube River at Svishtov	annual	P2 P3
		quarterly	P4
9	Danube River at Ruse	annual	P2 P3
10	Danube River at Silistra	annual	P2 P3 P4
11	Black Sea in Nessebar	annual	P4
12	Black Sea coast in Chernomorets	annual	P4
13	Black Sea in Sinemorets	annual	P4
14	Black Sea bay "Vromos"	annual	P4
15	Black Sea - Mr. Shabla bridge to the lighthouse	annual	P4 P5
16	Black Sea - town. Kavarna	annual	P4
17	Black Sea - resort "St. Konstantin and Elena" bridge against hotel "Albatros"	annual	P4
18	Black Sea - town. Varna severen beach	annual	P4
19	Black Sea - mouth of the river. Kamchiya- beach	annual	P4

Table 1: The location of points of radiological network [4]

Regarding data for marine waters, it should be noted that these points except the Black Sea - the Gulf "Vromos" become part of the permanent radiological monitoring network in early 2014. with the above-mentioned order of the Minister of Environment and Water.

№	sediments	intervals	tested indicators
1	Danube River at Kozloduy	quarterly	P1
2	Danube River at Oriahovo	quarterly	P1
3	Danube River at Novo Selo	annual	P1
4	Danube River at Baikal	annual	P1
5	Danube River at Nikopol	annual	P1
6	Danube River at at Belene	annual	P1
7	Danube River at Svishtov	annual	P1
8	Danube River at Ruse	annual	P1
9	Danube River at Silistra	annual	P1

Table 2: Sediments in the River Danube [4]

Transport and storage of radioactive materials that pose a danger to people and the environment is carried out by specialized companies and under strict rules. This is controlled by the Nuclear Regulatory Agency (NRA) and subject to the Ordinance on the transportation of hazardous materials.

State border of the Republic of Bulgaria is guarded by the Border Police, which is the structure of the Ministry. The control of incoming and outgoing passengers and cargo it was proceeded by the General Directorate "Customs" to the Treasury at certain border crossing points (BCPs) on terrestrial, aquatic and aerial borders. There all vehicles, cargo and passengers are subjected to dose monitoring in order to detect the presence of radioactive materials. At the opening of such necessary measures are taken to isolate, study and correct their further storage and also promptly notify authorities had - the NRA and the Ministry. The processing of inspected sites using modern dosimetric equipment [1].

A serious problem are persons crossing the state border checkpoint not, in random unregulated places. These are the so-called migrants, most of whom are fleeing from war, but economic migrants or potential terrorists. Millions of our flow, moving from Africa and Asia to the heart of Europe, is a serious challenge for the leaders of the united Europe. They are representatives of other nationalities, cultures and religions that are not typical for Europeans and on this basis leads to serious contradictions of religious, cultural and other bases. Very often these conflicts escalate to unmanageable collisions and interference from relevant government authorities.

The main channel of migrants surrounded Bulgaria and passing through other countries - Greece, Macedonia, Serbia, Hungary and others. After the closure of the borders of some countries flow declined, but potential migrants are located in Bulgaria's neighboring countries - Turkey and Greece, and they can once again take to Germany and other other countries of central Europe. Although we are not attractive as a destination for these settlers are not insured by the pressure as a transit corridor.

Among people fleeing war there are those who are members of the "Islamic state" other terrorist or extremist organizations. Such trained agents fell already a number of specialized organizations in European countries. They used to carry weapons, ammunition and

other ekslozivi and women and children. There is no guarantee neither Bulgaria nor other European countries, they do not have or carry radioactive materials or nuclear fuel. Omission of our national security and the European one is that it does not check for the presence of both weapons and radioactive materials. This would reduce the likelihood of organizing and carrying out terrorist actions and operations and possible casualties.

3. Conclusions:

1. A well developed and organized system for control of Gamma - background atmospheric radioactivity, radiation capable of uncultivated soils and radiological characteristics of surface water from rivers and reservoirs in the Republic of Bulgaria and to inform the population in radiation accidents;
2. Gamma radiation, atmospheric radioactivity, radiation capable of uncultivated soils and radiological characteristics of surface water from rivers and reservoirs in Bulgaria is within the typical country background values;
3. Well-functioning system of transport and storage of radioactive materials and modern control checkpoints;
4. Insufficient control over the availability and transportation of radioactive materials illegally passing and migrants in Bulgaria.

4. Literature:

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