

ENVIRONMENTAL RADIOACTIVITY MONITORING IN LATVIA

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The first measurements of radioactivity in Latvia were performed in 1967. During the following 20 years the network of the radioactivity control were organized for all regions of Latvia. Until 1991 in Latvia the sample collection were solely performed, whereas the measurements were done in Obninsk (Russia). At present only a small research reactor with the thermal power of 5000 kW and the depository of radioactive waste are located in Latvia. The nearest nuclear power stations are situated in Ignalina (Lithuania), St.Petersbourg, Finnland and Sweden. A power of our reactor is small, therefore the increasing of radiation background can be caused only from the neighbour nuclear power stations or transport of radioactive materials.

After Chernobyl reactor accident a great attention from different organizations was paid to the control of radiation situation in Latvia. In this connection the determination of radionuclide concentration in environmental and food samples were organized in the Laboratory of nuclear spectroscopy at Nuclear Research Center of Academy of Sciences of Latvia till 1986 (1,2).

At present there are several organizations and paralel systems which ensure the control of the radioactivity in our republic. The first control system was organized in the Latvian Hidrometeorological agency. Now the system for the continuous measurements and processing of the data is developed.

At present the 46 stations for measurement of gamma radiation (approximately one in 1390 km²) are established in Latvia. The largest density of such stations is found inside of the 100 km zone around the Ignalina nuclear power station..

The control program consists of registration of gamma radiation dosis rate from 46 stations, measurement of total beta activity of aerosols from the surface layer of the atmosphere and the precipitations and determination of the radionuclide concentration in various samples.

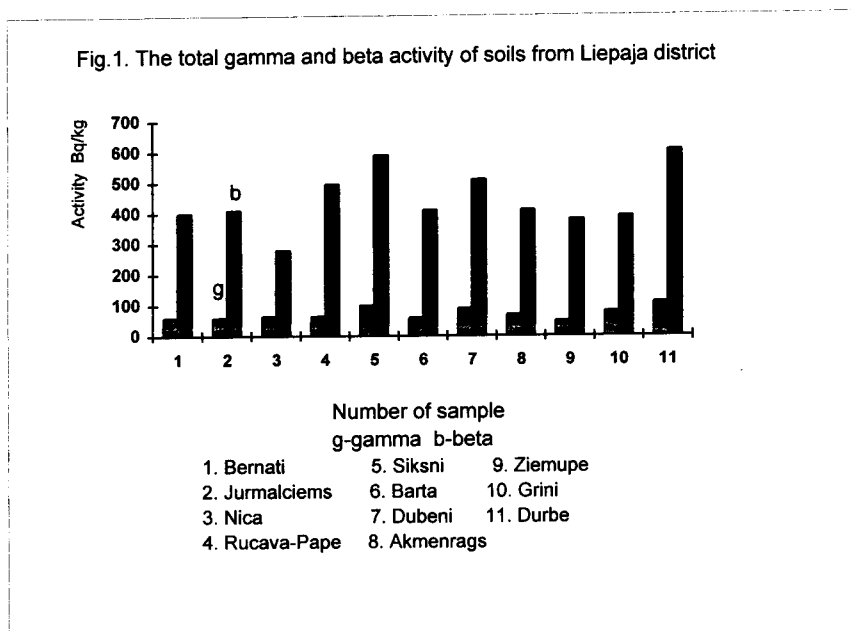
Since 1992 the concentration of natural and artificiel radionuclides in the aerosols, water, precipitation and sediments were measured in the Nuclear Research Centre of the Latvian Academy of Science using the methods of low background gamma spectroscopy and radiochemistry.

All data obtained from the network are transmitted to the several state institutions and are used for the international programs MORS and HELCOM. The information is obtained from the telecommunication network and forwarded by the direct telephon line BALTMET Riga-Norrkoping. Every day the infomation of gamma dosis rate is transmitted to Sweden.

The measurements of total beta activity of aerosols and precipitations from the reactor control zone were performed by the group of dosimetry of our nuclear reactor. These measurements were performed since 1967.

During the last years a new control system were organized in the Environmental Data Center at Ministry of Environment. In order to measure the gamma radiation the

automatic system was developed in the Environmental Data Center in cooperation with the Swedish Institute of Radiation Protection. Since December 1993 eight Rados radiation detector RD-02 were installed in Daugavpils, Salaspils, Salacgriva, Talsi, Liepaja, Madona, Rezekne and Ventspils. This system has two signal levels consisting of a warning level at $0.2 \mu\text{Sv/h}$ and an alarm level at $0.5 \mu\text{Sv/h}$. In order to evaluate the concentration of radionuclides the spectrometrical analysis of aerosol, soil and precipitation samples is foreseen in a case of the first signal level. Similar systems are installed inside of other Baltic states allowing to perform the data exchange. This year these data will be sent to IAEA, too. In order to collect the samples of plants and soils for spectrometrical analysis the control area are organized near the four control stations located at Daugavpils, Salaspils, Ventspils and Liepaja. The results of measurements show that the total gamma activity of the soil samples near Daugavpils corresponds to $82\text{--}120 \text{ Bq/kg}$. The 1.Fig. shows the total beta and gamma activity near Liepaja.



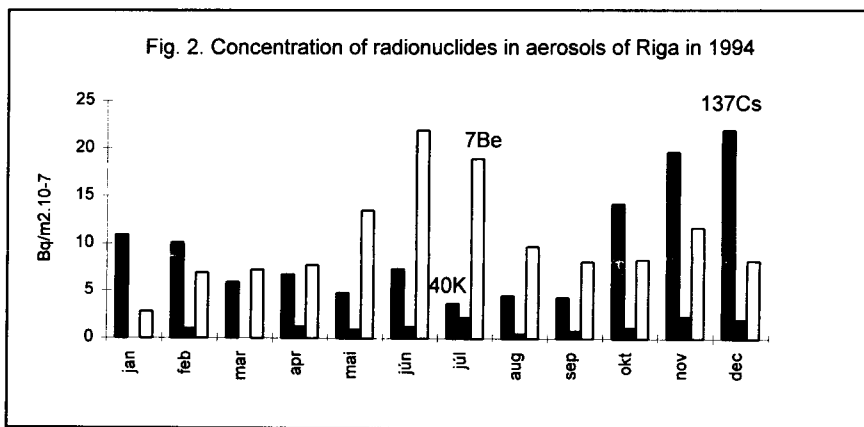
The following conclusions can be proposed from the measurements obtained during the last four years.

1. The mean values of exposure gamma radiation dosis rate per year were ranged from 9 to $13 \mu\text{R/h}$, the minimum was at $6 \mu\text{R/h}$ (Liepaja) and the maximum at $19 \mu\text{R/h}$ (Kuldiga, Madona, Kraslava). The mean value of $7 \mu\text{R/h}$ was obtained from the automatic gamma stations within the last 5 months in 1994.
2. The mean monthly values of the total beta activity during the last four years decrases slowly from $8.8 \cdot 10^{-5}$ to $6.3 \cdot 10^{-5} \text{ Bq/m}^3$. Newertheless, we can see an insignificant increase of the total beta activity in the summer months.
3. The mean monthly values of radioactive pollution in 1993 in the precipitation vary from 0.5 Bq/m^2 in Ventspils to 2.5 Bq/m^2 in Daugavpils.

4. The concentration of radionuclides in aerosols and precipitation were determined in the Laboratory of nuclear reactions of Nuclear Research Center with the methods of gamma spectroscopy. Only ^7Be , ^{40}K and ^{137}Cs were detected in the samples of aerosols and ^{40}K and ^{137}Cs in precipitations. The mean concentration of ^{137}Cs in aerosols was $0.07 \cdot 10^{-5} \text{ Bq/m}^3$ and 0.7 Bq/m^2 in precipitations in 1993. The highest ^{137}Cs concentration in aerosols (three times above the mean concentration) was observed in May and September of 1993. Such concentration would be connected with the air mass movement from Byelorussia during the forest fire and can be caused from Chernobyl accident.

5. The water samples were taken from the four biggest rivers of our republic, the Gulf of Riga and the Baltic Sea. The concentrations of ^{90}Sr and ^{137}Cs were determined. The mean concentration of ^{90}Sr observed for the rivers, the Gulf of Riga and sea water was 25, 46 and 21 Bq/m^3 , respectively. The concentration of ^{137}Cs was smaller than 0.03 Bq/l .

6. The concentration of ^{137}Cs is 2.7 Bq/kg in the river sediments, nevertheless, the value of 41 Bq/kg in the Gulf of Riga and 97 Bq/kg in the Baltic Sea were measured. These values are practically the same as in 1992.



References

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