NATURAL RADIOACTIVITY SURVEY IN LATVIA

Petr Dobrodushin *(Urboekologija Ltd.)*
Ludmila Kartunova
Riga Technical University Spatial and Regional Development Research Centre
E-mail: urboekologija@gmail.com
E-mail: urbo17@gmail.com

Abstract

The article is devoted to technogenic radiation monitoring in Latvia as well as the dealing with the radon (natural radiation) problem. It analyses measurements of radon content in indoor air and soil air carried out in the country. It emphasises great social importance of the radon problem solving.

Keywords: *radiation, radon, Latvia*

Introduction

Radioactive gas radon (Rn222) was discovered by Ernest Rutherford in 1899. In 1908, physicists N.Ramzai and S.Grey set this element free and named it **Radon**.

In 1955, the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) estimated the effects of radon to organisms. In 1986, the International Commission on Radiological Protection has developed standards for radon, which were suggested to the international community. Over the period since 1986, many countries have adopted national standards for radon and laws mandating implementation of these standards.

Radiation monitoring in Latvia

In 1993, the Early Warning Environmental Radiation Monitoring System was established in Latvia. Stations of this system monitor the background gamma radiation in Latvia. The natural background gamma radiation in different regions of the country varies from 10 to 30 mR/h.

A year later, in 1994, the Law "On Radiation and Nuclear Safety" was passed in Latvia. The Commission for the control of radiation and nuclear safety was established in the same year.

Radon surveys in Latvia have begun in the mid-90s of the twentieth century. In 1995, with the assistance of experts from the Swedish Institute for Radiation and Nuclear Safety Control about 100 houses in different parts of the

country were first tested for radon in Latvia. The survey showed that Latvia faces the challenging radon problem.

On August 12, 1997, the government of Latvia passed the important piece of legislation "On Protection against the Ionizing Radiation", which refers to population protection measures against the technogenic and environmental radiation". The regulations proposed standards for radon. Thus, the indoor air content of radon for newly constructed buildings shall not exceed 300 Bq/m3, the standard of 370 Bq/kg was adopted for building materials, and up to 740 Bq/kg – for roads topping within residential areas.

There have been identified the indoor air contents of radon, which required varying degrees of complexity of radon protection, (300, 500, 1000 Bq/m3). [2]

In 1997, book of Swedish authors Bertil Clavensjo and Gustav Akerblom “Radon book" was translated into Latvian. [3] The book contains valuable information about radon and how to protect buildings from the excessive radon penetration in premises. However, the solutions offered by the regulations have not received the practical application, and the book about radon was not supplied to the bookstores.

From 1997 to the present day specialists of the company “SIA Urboekoloģija” continue taking measurements of indoor content of radioactive gas radon started by Swedish experts in 1995.

Results of radon measurements carried out in Latvia by Urboekoloģija for the period from 1997 to 2012

Measuring the content of radioactive radon gas in indoor air and soil air were launched in 1997 and maintained to the present. Measurements are taken by Radiometer Alpha GUARD of German make (Frankfurt-on-the-Main).

123 contracts were performed over the past 15 years. Measurements were taken in indoor air and soil air of land plots. Indoor radon content was measured 110 times. 464 times – in soil air. Most measurements were taken in Riga and Riga region, but measurements in other regions and towns of Latvia (11 regions) were taken too. Data resulting from indoor radon measurements are shown in Table 1.

Table 1. Results of indoor radon measurements in Latvia for the period from 1997 to 2012

Total measurements	Indoor radon content (Bq/m^3)		
	less than 40	40-200	more than 200
120	90	24	6
100%	75	20	5

As it is seen from Table 1, in 75% measurements, the indoor radon content is less 40 Bq/m3, and does not require radon-protective measures. However, the remainder 25% surveyed buildings are reported for high indoor radon content. Two very high figures were reported (in Ezerkalni populated area, Riga region - 614 Bq/m3 and Amata populated area, Cēsis region - 318 Bq/m3. Therefore, there is the radon problem in Latvia, and is needed to be addressed.

Measurements of radon content in soil air are shown in Table 2.

Table 2. Results of soil air radon measurements in Latvia for 15 years (from 1997 to 2012)

Total	Radon content in soil air (Bq/m^3)			
measurements	less than 5000	from 5000 to 10000	from 10000 to 40000	more than 40000
464	190	119	133	22
100%	41	26	29	4

Table 2 contains information about measurements of soil air radon content in different areas of Latvia. Table 2 shows that more than a half of the surveyed sites (55%) are radon-hazardous. The highest figures of radon content in soil air were obtained in Auri populated area, Dobele region (60 thousand Bq/m3), Kekava populated area, Riga region (62.8 thousand Bq/m3), in Latgale, Kalna Liči populated area, Daugavpils region and Skriveri populated area, Aizkraukle (90.68 thousand Bq/m3).

Conclusions

1. Radon surveys in Latvia conducted by Urboekoloģija from 1997 to the present day have shown a low level of population awareness about radon and risks associated with living in radon-hazardous areas.
2. Geological analysis of the territory of Latvia showed presence of a large percentage of the areas where radon could be a real threat to the population health (parts of the cortex with a relatively thin sedimentary cover from 500 m to 250 m, zones of tectonic faults and local uplifts, areas composed of uranium-containing rocks.
3. It is necessary to carry out further surveys for radon in existing stock of residential and public buildings, and in newly developed areas.

References

1. Publication 39 (UNSCEAR) “Principles of standardization of public exposure to natural sources of radiation", Moscow, Energoatomizdat, 1986.
2. Andris Salmiņš. „Radon and radiation”. Regulations and Guidelines. Thesis for Seminar on Radon, September 4 -5, 1997/ Ministry of Environmental Protection and Regional Development and Sweden Radiation Safety Institute, Riga, 1997.
3. Bertil Clavensjo, Gustav Aokerblom. Radon book /Anti-radon measures/Ministry of Environmental Protection and Regional Development of the Republic of Latvia, “Apgāds Jāņa sēta” Ltd., 1997, 120 pp.