NATIONAL ACTION PLAN FOR CONTROL OF PUBLIC EXPOSURE TO RADON

STATE OFFICE FOR NUCLEAR SAFETY
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SÚJB
Státní úřad pro jadernou bezpečnost

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1. INTRODUCTION

The National Action Plan for Radon Exposure Control (hereinafter referred to as "RANAP") is a follow-up to the Radon Programmes of the Czech Republic, which were implemented on the basis of the Government Resolution between 2000 and 2009 and between 2010 and 2019.

Radon exposure often contributes significantly to the magnitude of public exposure. It is realistic and effective to reduce it, thereby reducing the potential health risks for the population.

The long-term health effects of radon and its daughter products are documented by significant epidemiological studies. According to the World Health Organization (WHO), the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) and other institutions, radon is the second risk factor after smoking, which can contribute to the development of severe lung disease. However, the combination of smoking and high radon exposure poses a significantly higher risk of lung cancer for individuals than each of these factors separately.

Due to its specific geological subsoil, the Czech Republic (hereinafter referred to as the "CR") is one of the countries with higher levels of exposure to this source in the world. A long-term stay in buildings with increased activity concentration of radon, which may be households, schools, workplaces, etc., and which are not sufficiently protected against the penetration of radon from the subsoil, is a risky situation. According to the latest estimates of the National Radiation Protection Institute, more than 4.5% of the housing stock in the Czech Republic is overburdened with radon.

In the Czech Republic, the legislation defines areas with increased risk from radon, namely individual municipalities, and explicitly stipulates obligations for the operators of workplaces on the underground or first floor of a building located in the areas of these municipalities. In these areas, the probability of exceeding the reference level set for radon is higher than 30%.

As a result of lifestyle changes in recent decades following the energy saving measures for buildings, the radon load needs to be examined and appropriate measures proposed in case of its potential increase.

RANAP is a binding document of the State Office for Nuclear Safety (hereinafter referred to as the "Office" or "SÚJB") for state authorities involved in the control of public exposure to radon.

RANAP is prepared in accordance with the requirements of COUNCIL DIRECTIVE 2013/59/EURATOM of 5 December 2013 laying down basic safety standards for protection against the dangers of exposure to ionising radiation, in accordance with the IAEA (International Atomic Energy Agency) document "Safety Standards General Safety Requirements Part 3.5 Existing exposure situation" and in accordance with Act No. 263/2016 Coll., Atomic Act (hereinafter referred to as the "Act").

Pursuant to § 208(s) of the Act, SÚJB, as the central administrative authority for the area of use of nuclear energy and ionising radiation seated in Prague, shall draw up and update the Action Plan for Control of Public Exposure to Radon in the Czech Republic.

The Office and the state authorities listed in the Action Plan in Chapter 2, are obliged to participate in the control of public exposure to radon within the Action Plan.

The National Action Plan for Radon Exposure Control comes into effect on 1 January 2020.

The Office shall assess the topicality of the Action Plan every five years and operatively reviews the Action Plan on the basis of new knowledge and practical experience or justified suggestions from cooperating ministries.

Once a year, the Office shall prepare, propose, assess and identify specific projects in order to meet the RANAP objectives, in cooperation with the authorities/entities involved in the fulfilment of the sub-objectives of the Action Plan.

The Office shall draw up an annual report on the performance of RANAP tasks in cooperation with the state authorities involved in the fulfilment of the set objectives and submit this report to the Chairperson of the Office by 30 June. The report on the fulfilment of RANAP will be published no later than by 15 July of each year on the SÚJB website and sent to individual cooperating state authorities. SÚJB shall also organize annual meetings of representatives of regional authorities and cooperating ministries in order to inform each other about the fulfilment of set objectives and tasks.

2. AUTHORITIES INVOLVED IN THE IMPLEMENTATION OF THE ACTION PLAN

2.1 State authorities

SÚJB as the central administrative authority for the area of use of nuclear energy and ionising radiation, shall draw up and update the National Action Plan for Control of Public Exposure to Radon and define the concept for the management of existing exposure situations.

SÚJB has a coordinating role in fulfilling the tasks of ministries, regional authorities and municipal authorities with extended powers set out in RANAP.

Under § 211 of the Act, in order to ensure protective measures within their fields of competence **ministries**, **regional authorities and municipal authorities with extended powers** shall participate in the control of public exposure to radon in the context of the National Action Plan for Control of Public Exposure to Radon.

Under § 212 of the Act, in the context of the National Action Plan for Control of Public Exposure to Radon, the **Ministry of Industry and Trade (hereinafter referred to as "MPO")** shall participate in informing and educating the public and professional groups in the area of protection against exposure to radon and in developing methods and technologies for reducing this exposure.

Under § 214 of the Act, in the context of the National Action Plan for Control of Public Exposure to Radon, the **Ministry of Health (hereinafter referred to as "MZ")** shall participate in informing and educating the public and professional groups in the area of protection against exposure to radon and in developing methods and technologies for reducing this exposure.

Under § 215 of the Act, the **Ministry of Finance (hereinafter referred to as "MF")** shall provide subsidies for the identification of the risks arising from the presence of radon and its conversion products in indoor air of buildings so that justified measures under § 103(1)(b) and measures reducing the natural radionuclide content of drinking water intended for public use can be adopted.

Under § 217 of the Act, in the context of the National Action Plan for Control of Public Exposure to Radon, the **Ministry of Agriculture (hereinafter referred to as "MZe")** shall participate in informing and educating the public and professional groups in the area of protection against exposure to radon and in developing methods and technologies for reducing this exposure.

Under § 218 of the Act, in the context of the National Action Plan for Control of Public Exposure to Radon, the **Ministry of the Environment (hereinafter referred to as "MŽP")** shall participate in informing and educating the public and professional groups in the area of protection against exposure to radon and in developing methods and technologies for reducing this exposure.

Under § 219 of the Act, in the context of the National Action Plan for Control of Public Exposure to Radon, the **Ministry for Regional Development (hereinafter referred to as "MMR")** shall participate in informing and educating the public and professional groups in the area of protection against exposure to radon and in developing methods and technologies for reducing this exposure.

Under § 224 of the Act, in the context of protecting the general public from exposure to natural sources of radiation, **regional authorities** shall:

1. participate in the detection of buildings with increased levels of exposure to natural sources of radiation in their indoor air and in informing the general public about the risks arising from increased concentrations of radon in homes,

2. in cooperation with the Office, control the efficiency of the measures taken to protect the health of the general public from exposure to natural radionuclide.

The objectives and strategies for controlling exposure to radon are set out in RANAP. The method and means of involvement of the various state authorities in their fulfilment are stipulated in the interdepartmental agreements between the designated ministries and the SÚJB.

3. LONG-TERM OBJECTIVES

RANAP is aimed at controlling the public exposure to radon in buildings with residential rooms or rooms intended to be occupied by persons, school facilities, buildings providing social or health services and in workplaces with increased radon exposure.

Long-term objectives of RANAP:

1. ***Informed and communicating state administration, involved public, educated professionals***
2. ***Effective prevention in the construction and reconstruction of buildings***
3. ***Effective control of existing exposure***

4. MEETING THE LONG-TERM OBJECTIVES

4.1 Informed and communicating state administration, involved public and educated professionals

The first objective is focused on the most important part of the Action Plan - creating a stimulating environment to ensure a sustained reduction in radon exposure. Its basic elements are individual state authorities, the public and professionals from individual fields. These elements create an interconnected network that is built on information, data, knowledge and communication. To meet the objective, the means mentioned in Subchapters 4.1 were chosen.

4.1.1 Communication strategy

A communication strategy will be prepared, implemented and updated for the target groups, namely the public, government employees and professional groups, based on:

A. Media image monitoring

Information about radon in the media environment and the reactions of the public will be monitored. The obtained information will be used to find and select the most effective information strategies.

B. Use of sociological knowledge and communication strategy

Using socio-scientific research methods, information on attitudes of different segments of the population towards the risk of radon exposure and their development will be gathered and tools will be sought to increase the public's motivation to reduce radon exposure. Based on the information identified, communication strategies on radon issues aimed at individual interest groups of the public will be prepared.

The tasks are performed by: SÚJB, MPO, MZ, MF, MZe, MMR,MŽP, regional authorities

4.1.2 Website

The website www.radonovyprogram.cz, operated by the Office, centralises and provides information and a comprehensive overview of radon issues. The website allows visitors to ask questions and request long-term radon measurements in the house. The website will be developed in accordance with the technological possibilities and behaviour of the population and the microsite will serve for information campaigns for individual target groups.

The tasks are performed by: SÚJB, MPO, MZ, MF, MZe, MMR, MŽP, regional authorities

4.1.3 Social networks

Social networks are the fastest and most effective information channel not yet used in the Radon Programme. Changes in population behaviour also require new approaches and technological means. Technical information, photographs and short videos focusing on radon issues will be communicated via social networks.

The tasks are performed by: SÚJB, MPO, MZ, MF, Mze, MMR,MŽP, regional authorities

4.1.4 Representative survey

A representative survey of the current distribution of radon activity concentration in buildings in the Czech Republic will be conducted through the TA CR research project according to the methodologies certified by the Office. A representative survey will evaluate changes in the distribution of radon activity concentration in buildings, contribute to finding the current average radon activity concentration in the Czech Republic and show the impact of the use of new technical/technological measures to reduce energy consumption on radon values in buildings. The data will serve as a basic pillar of information on the occurrence of radon in the Czech Republic.

The tasks are performed by: SÚJB

4.1.5 National radon database

A national radon database will be set up to provide, through the collected data, the possibility to monitor and evaluate the development of the exposure of individuals to radon in buildings.

SÚJB will be responsible for the operation of the database, records of results and data. The results and data collected in previous years will be imported into the new database. The database will be continuously updated with new data. The ministries listed above will contribute financially to the setting-up of the database and its technical operation and updating.

The tasks are performed by: SÚJB, MŽP, MMR and MPO

4.1.6 Monitoring and evaluation of foreign approaches to radon control

Radon issues in the Czech Republic are closely related to international activities and approaches in this area. The development and approach to the radon issues will be compared, evaluated and monitored in the countries of the European Union as well as in the world. The information and data identified will be used to update the means of dealing with the issue of radon exposure in the Czech Republic.

The tasks are performed by: SÚJB, MPO, MMR, MŽP, MZ, MZe, MF

4.1.7 Monitoring trends in construction

Development in the area of building construction and anti-radon prevention in the Czech Republic will be monitored

bot at national level and abroad. These trends will be evaluated in cooperation with specialists in the relevant fields. New knowledge that will affect the approach to radon exposure will be shared and communicated with the professional public.

The tasks are performed by: SÚJB, MPO, MMR

4.1.8 Preparation and updating of maps

There is an advanced system of "radon" maps in the Czech Republic, which has been developed and improved since the 1990s and further within the previous "phases" of the Radon Programme of the Czech Republic. This map system is used to monitor the risk of radon penetration from geological subsoil. The maps are available on the Internet through special applications open to the public. These maps and related data serve as a primary indicator of risks arising from the geological subsoil. Map applications will continue to be maintained, updated and shared with the public under RANAP.

The tasks are performed by: SÚJB, MŽP

4.1.9 Assessment of the health consequences of radon exposure

Current trends in assessment of the health effects of radon exposure will be monitored. Other possibilities and ways of cooperation with competent medical companies in this field will be sought.

The tasks are performed by: SÚJB, MZ

4.2 Effective prevention in the construction and reconstruction of buildings

Prevention in the field of public exposure to radon aims at ensuring, through the established steps, that exposure levels in newly built and renovated buildings are as low as reasonably achievable in economic and social terms, both from individual and public perspective. The upper limit of this optimized level is given by the legally set reference level of 300 Bq/m^3 of radon activity concentration.

At the same time, the individual exposure of 3,000 Bq/m^3 (annual average of radon activity concentration in air), which is stipulated by Decree No. 422/2016 Coll., is considered unacceptable.

In this case, the Atomic Act stipulates in § 99(4) the obligation of the owner of a building with residential rooms or rooms to be occupied by persons to take measures reducing the level of exposure.

4.2.1 Control in the area of prevention

The control of natural exposure in the area of prevention is implemented by a set of binding legal standards, technical standards and methodologies issued in the form of recommendations of the Office. Regulatory instruments are applied and controlled in accordance with applicable legislation and their effectiveness will be evaluated.

The tasks are performed by: SÚJB, MMR, MPO

4.2.2 Measurements within prevention

Measurements within prevention are used to assess the existing exposure situation and to decide whether there is a need to control the public exposure to radon. To that end, the determination of the radon index of the land, the measurement of radon in buildings and workplaces with possible increased exposure to radon are in place. Projects will be implemented that will contribute to the development of standards to improve measurement and its assessment.

The tasks are performed by: SÚJB

4.2.3 Civil engineering

Preparation, creation and updating of standards (ČSN) will be implemented. These standards define procedures for anti-radon prevention in the construction of new buildings and the rehabilitation of existing buildings. As a preventive measure, preparation and creation of a strategy for the energy savings programme will be launched.

The tasks are performed by: SÚJB, MŽP, MPO, MMR

4.3 Effective control of existing exposure

A major factor affecting the presence of radon in buildings is the fact that human activity and user habits can create or modify the supply paths for the entry of radon into the building, leading to an increase in the activity concentration of radon in the indoor air of buildings. The implementation of corrective measures in the reconstruction and modernization of buildings is, by its nature, well feasible, taking into account current knowledge and technical level.

Corrective measures are planned and implemented with the aim of reducing the radon activity concentration value to as low as reasonably achievable level, at least below the reference level of radon activity concentration of 300 Bq/m^3. Designing effective exposure control instruments for the reconstruction of existing buildings is a very important area of radiation protection.

Effective control of existing exposure (third objective of the Action Plan) is implemented through the means set out in Chapters 4.3.

4.3.1 Control of existing radon exposure

Control in the field of natural exposure in the reconstruction of buildings, in existing buildings and especially in buildings of public interest, in the production of building materials, in the workplace and in water supplied for public use is implemented through a set of binding legal standards, technical standards and methodologies issued in the form of recommendations of the Office. Regulatory instruments are part of the Act, they are continuously applied and controlled, including the evaluation of their effectiveness.

The tasks are performed by: SÚJB, MPO

4.3.2 Measurements of existing buildings, drinking water and building materials

Under RANAP, owners and users of buildings (intended for the long-term stay of persons) and owners of a building serving a school or school facility or a building providing social or health services for long-term stay of individuals will be offered and provided with measurements in order to:

1. obtain the results of radon activity concentration that serve as a basis for determining whether a reference level is exceeded in a building,
2. obtain the results of radon activity concentration in homes following anti-radon measures as a basis for determining their effectiveness,
3. determine the paths of radon supply to the building and other characteristics of the exposure situation,
4. analyse the building material from which the building was built,
5. obtain information on radon values in the water source intended for individual supply of a building.

In justified cases, the measurement will be provided under RANAP free of charge according to standardized SÚJB procedures.

The tasks are performed by: SÚJB

4.3.3 Providing subsidies in some existing exposure situations

The legislative framework of the Czech Republic and the Guideline of the Ministry of Finance stipulate the conditions for providing the subsidy from the state budget for the adoption of a justified measure to reduce the level of exposure to radon and its decay products in indoor air of buildings for habitation and occupancy of the public, and the adoption of measures to reduce the concentration of natural radionuclides in drinking water intended for public use.

The provision of the subsidy by the Ministry is implemented in two stages - before and after the implementation of the measure. In the first stage, before the implementation of the measure, the regional authority shall deliver a written application of the owner with all attachments, with its opinion and with the approval of the Office to the Ministry. In the second stage, after the implementation of the measures and after demonstrating the reasonably incurred costs and proving the effectiveness of the measure verified by the Office, the Ministry shall release the subsidy to the Region and, if the

beneficiary is not the Region, the Ministry shall release the subsidy to that beneficiary through the Region. The Ministry of Finance **may** provide a subsidy for anti-radon measures under specified conditions. The established system of subsidies will be maintained, evaluated and updated

with the aim of effectively drawing on funds to implement anti-radon measures. In cooperation with the Ministry of Finance, the funds drawn in each calendar year will be monitored. These facts will be presented in the annual report.

The tasks are performed by: SÚJB, MF, regional authorities

4.3.4 Building industry – anti-radon measures

All anti-radon measures are based on two principles, namely to reduce the supply of radon to the building and to ventilate the radon from the building. The specific measure is always selected with regard to other attributes affecting the radon values, such as the technical condition of the building, the location of the building in the field and others.

Successful implementation of the anti-radon measure depends on the correct assessment of the building-construction condition of the building, selection of the appropriate measure, implementation of the actual measure according to the project respecting the relevant ČSN.

The individual technologies, their efficiency, energy performance and the method of implementation will be compared. Furthermore, the development of technologies and procedures for reducing radon exposure in buildings will be monitored.

The tasks are performed by: SÚJB, MPO

5. ANNEXES

ANNEX

REGULATORY FRAMEWORK

Council Directive 2013/59 Euratom laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation

Council Directive 2013/51 Euratom laying down requirements for the protection of the health of the general public with regard to radioactive substances in water intended for human consumption

Act No. 263/2016 Coll., Atomic Act

Act No. 183/2006 Coll., on Town and Country Planning and Building Code (Building Act).

Decree No. 422/2016 Coll., on radiation protection and security of a radioactive source

Decree No. 362/2016 Coll ., on the conditions for the award of the grant from the state budget in some existing exposure situations

Decree No. 464/2016 Coll., on the process for awarding the grant from the state budget for the adoption of measures to reduce the level of exposure to the presence of radon and its decay products in indoor air in the constructions for habitation and occupancy of the public and for the adoption of measures to reduce natural radionuclides concentration in drinking water intended for public use.

Decree No. 503/2006 Coll., on more detailed town planning regulation, public contracts and planning measures

ČSN 73 0601 Protection of buildings against radon from the soil

ČSN 73 0602 Protection of buildings against radon and gamma radiation from building materials

SÚJB Recommendation Determination of the Radon Index of the Land

SÚJB Recommendation Measurement and Evaluation of Exposure to Natural Radiation Sources in Buildings with Residential Rooms or Rooms Intended To Be Occupied by Persons

SÚJB Recommendation Measurement and Evaluation of Natural Radionuclides Concentration in Drinking Water Intended for Public Needs and in Bottled Water

SÚJB Recommendation Measurement and Evaluation of Natural Radionuclides Concentration in Building Material

SÚJB Recommendation Determination of Individual Doses to Workers at a Workplace with the Possible Increase in Radon Exposure

Guideline Ref. No. MF-21588/2017/1203, as amended by ref. no. MF-6689/2018/1203 to implement Decree No. 464/2016 Coll., on the process for awarding the grant from the state budget for the adoption of measures to reduce the level of exposure to the presence of radon and its decay products in indoor air in the constructions for habitation and occupancy of the public and for the adoption of measures to reduce natural radionuclides concentration in drinking water intended for public use.

Annexes