

IAEA' s activities related to radon

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68th IAEA General Conference, 16 -20 September 2024

Side Event of Portugal – The implementation of Radon Action Plans

18 September 2024, Vienna



The Radiation Protection Unit and its activities

- ❑ Develops **safety standards** and guidance related to **the protection of the public in existing exposure situations** such as radon in buildings, radionuclides in building materials, food commodities
- ❑ Provides technical support for the application of safety standards through national and regional **technical cooperation projects** for e.g., **strengthening regulatory safety infrastructure** and for **capacity building**
- ❑ Develops educational material like webinars, e-training modules, leaflets
- ❑ Collaborates with international organizations and specialized agencies (e.g., ICRP, UNSCEAR, WHO, CRCPD) to promote international coherence and consistency of radiation safety practice
- ❑ And much more

IAEA Safety Standards

.....provide the requirements for the protection of people and the environment from harmful effects of ionizing radiation and for the safety of radiation sources.

Fundamentals

Requirements

Guides

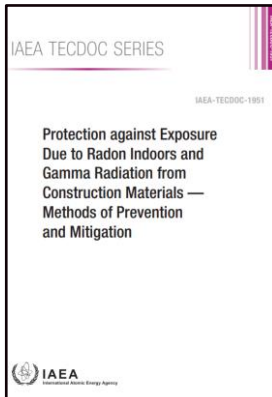
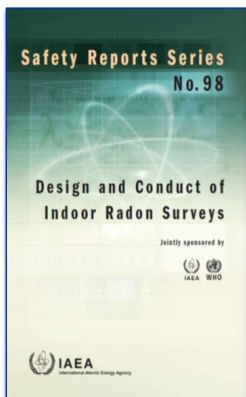
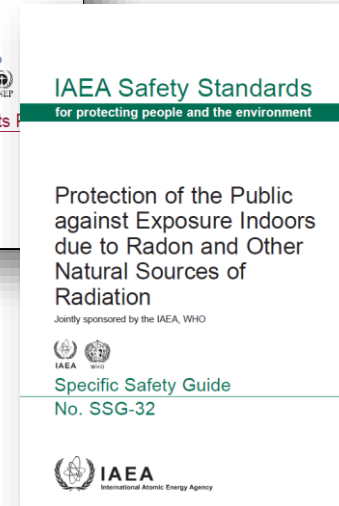
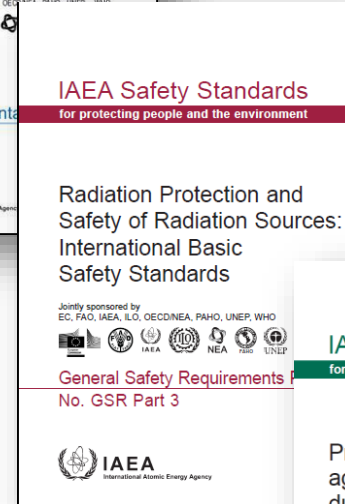


Strategic basis for all the other IAEA Safety Requirements (“**must**” statements)

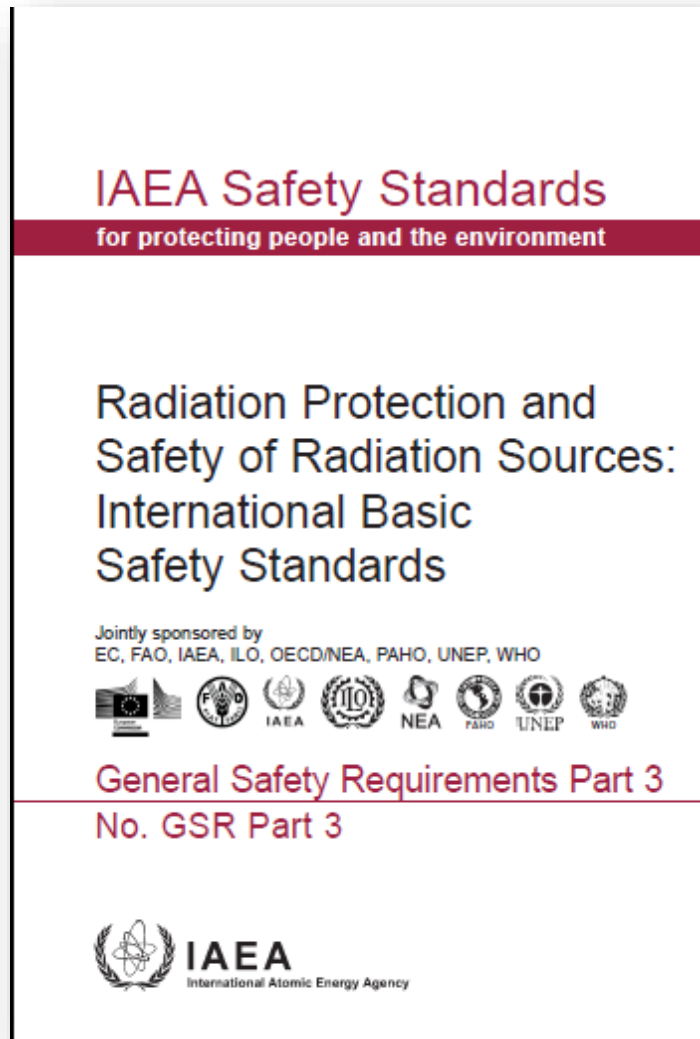
Governed by the objective and principles of SF, they are requirements that need to be met (“**shall**” statements)

Recommendations on how to comply with the safety requirement; good practices (“**should**” statements)

SR, TECDOC: **Informational documents**: provide further technical support (practical examples, detailed methods, ...)



IAEA General Safety Requirements (GSR Part 3)



- ❑ Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards (2014); Jointly sponsored by IAEA, ILO, FAO, UNEP, NEA/OECD, PAHO, WHO, EC.
- ❑ An integrated and consistent set of Safety Requirements **establishes the requirements that need to be met to ensure the protection of people and the environment, both now and in the future.** The requirements are governed by the objective and principles of the Safety Fundamentals.

**Exposure to
RADON**
**Existing Exposure
Situations = Section 5**

Structure of GSR Part 3: Exposure Situations

Planned Exposure Situations

situations involving the planned introduction and operation of sources (including commissioning, operation, decommissioning, disposal of radioactive waste).



Existing Exposure Situations

exposures due to situations that already exist when a decision on control is made, such as exposures due to natural radiation sources or residues from past practices.



Emergency Exposure Situations

unexpected situations such as those that might occur during a planned situation, or from a malicious act, requiring urgent attention.



Radon in GSR Part 3

Existing Exposure Situations – Section 5

Generic Requirements:

Requirement 47: Responsibilities of the government specific to existing exposure situations

Requirement 48: Justification for protective actions and optimization of protection and safety

Requirement 50: Public exposure due to radon indoors

Requirement 51: Exposure due to radionuclides in commodities

Requirement 52: Exposure in workplaces

IAEA Safety Standards
for protecting people and the environment

Radiation Protection and
Safety of Radiation Sources:
International Basic
Safety Standards



General Safety Requirements Part 3
No. GSR Part 3

SSG-32 -Protection of the Public against Exposure Indoors due to Radon and Other Natural Sources of Radiation

- ❑ Provides recommendations on fulfilling the requirements of GSR Part 3 for exposure of the public indoors due to natural sources of radiation. Published in 2015.
- ❑ **Objective:** To provide recommendations on meeting the requirements of GSR Part 3 for exposure of the public indoors due to natural sources of radiation (dwellings and buildings of high occupancy). It focuses on the identification and implementation of appropriate measures for protection of members of the public against exposure indoors due to natural sources of radiation.

IAEA Safety Standards
for protecting people and the environment

Protection of the Public
against Exposure Indoors
due to Radon and Other
Natural Sources of
Radiation

Jointly sponsored by the IAEA, WHO



Specific Safety Guide
No. SSG-32



The guide covers the following

Public exposure due to ^{222}Rn in dwellings and other buildings with high occupancy for the public (e.g., kindergartens, schools and hospitals).

Public exposure due to ^{220}Rn in dwellings.

Radon Action Plan (GSR Part 3 and SSG-32)

[Visio-FINAL-radon.vsd \(iaea.org\)](http://visio-FINAL-radon.vsd(iaea.org))

■ National radon strategy

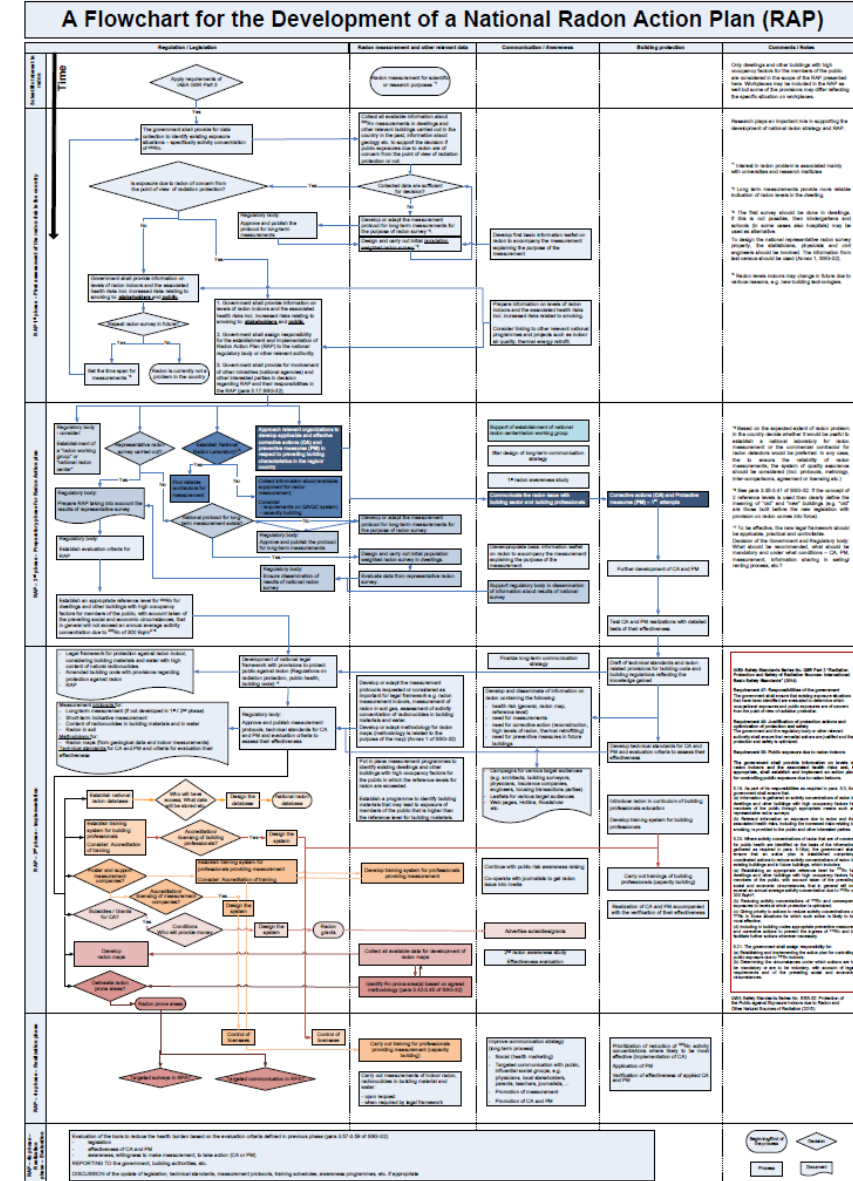
- ✓ Government to assign responsibility for establishing and implementing the action plan for controlling exposure due to radon indoors.
- ✓ Consultation with other national organizations – radiation measurements, public health, building standards.

■ Provision of information

- ✓ The requirement to provide public information applies irrespective of whether radon measurements are being carried out or are planned.
- ✓ For example, provide information on distribution of radon worldwide and its variability; scientific evidence on the health risks,...

■ National survey of radon in dwellings

- ✓ To identify areas where a greater proportion of homes are expected to have high concentrations of radon indoors (geographically based survey).
- ✓ To estimate the average exposure of the population due to radon, and the range of exposures occurring. The most appropriate basis for this is a national survey of concentrations of radon indoors in randomly selected dwellings, with account taken of population density.



Radon Action Plan (GSR Part 3 and SSG-32)

Measurement protocols

- ✓ Measurement period, type of detectors, seasonal correction factors
- ✓ Quality control programme
- ✓ Inter-comparison exercises

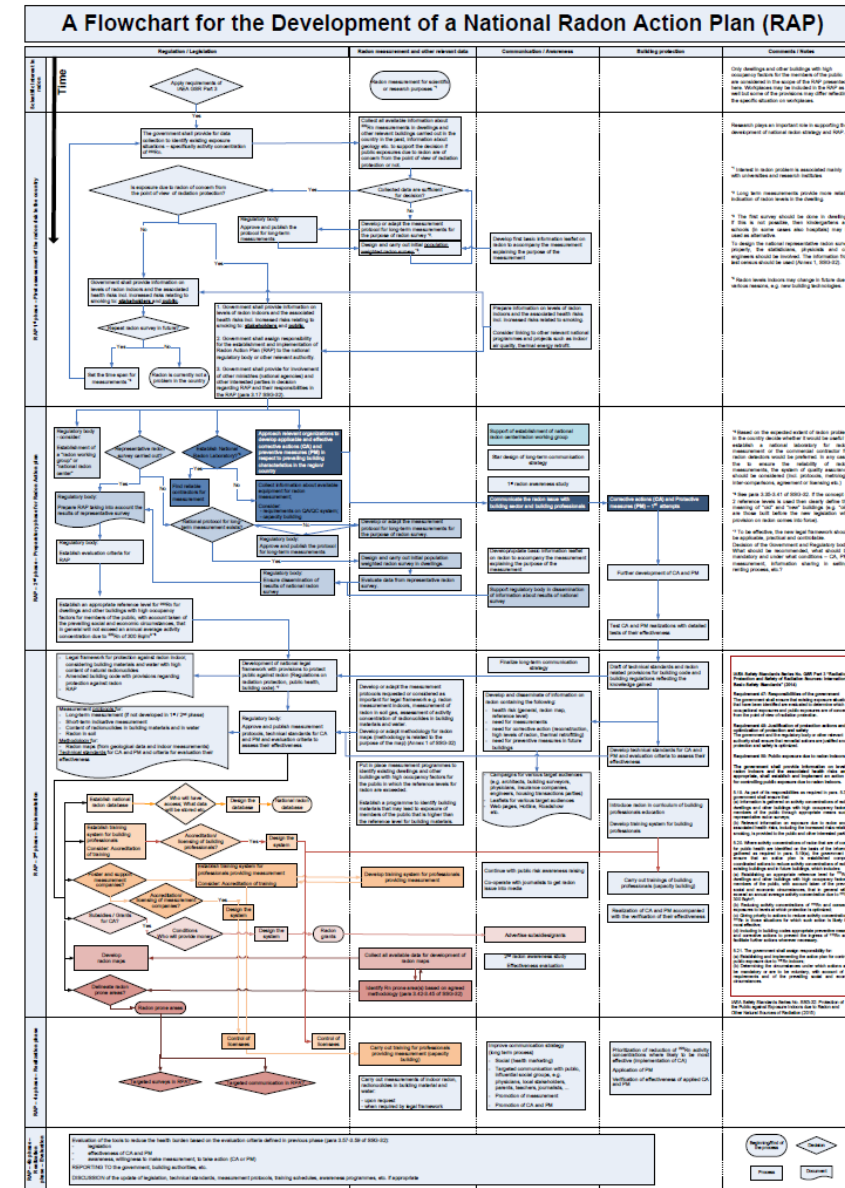
Setting a reference level for dwellings (and high occupancy buildings)

- ✓ Not to exceed an average annual concentration of 300 Bq/m³
- ✓ Take into account **prevailing social and economic circumstances**
- ✓ Chosen so that resulting activities are practicable and manageable

Radon prone areas

- ✓ Identify those regions where higher than average radon concentrations are likely to be found so that these can be specifically targeted
- ✓ Consider specific measures to be applied within these areas

[Visio-FINAL-radon.vsd \(iaea.org\)](#)



Radon Action Plan (GSR Part 3 and SSG-32)

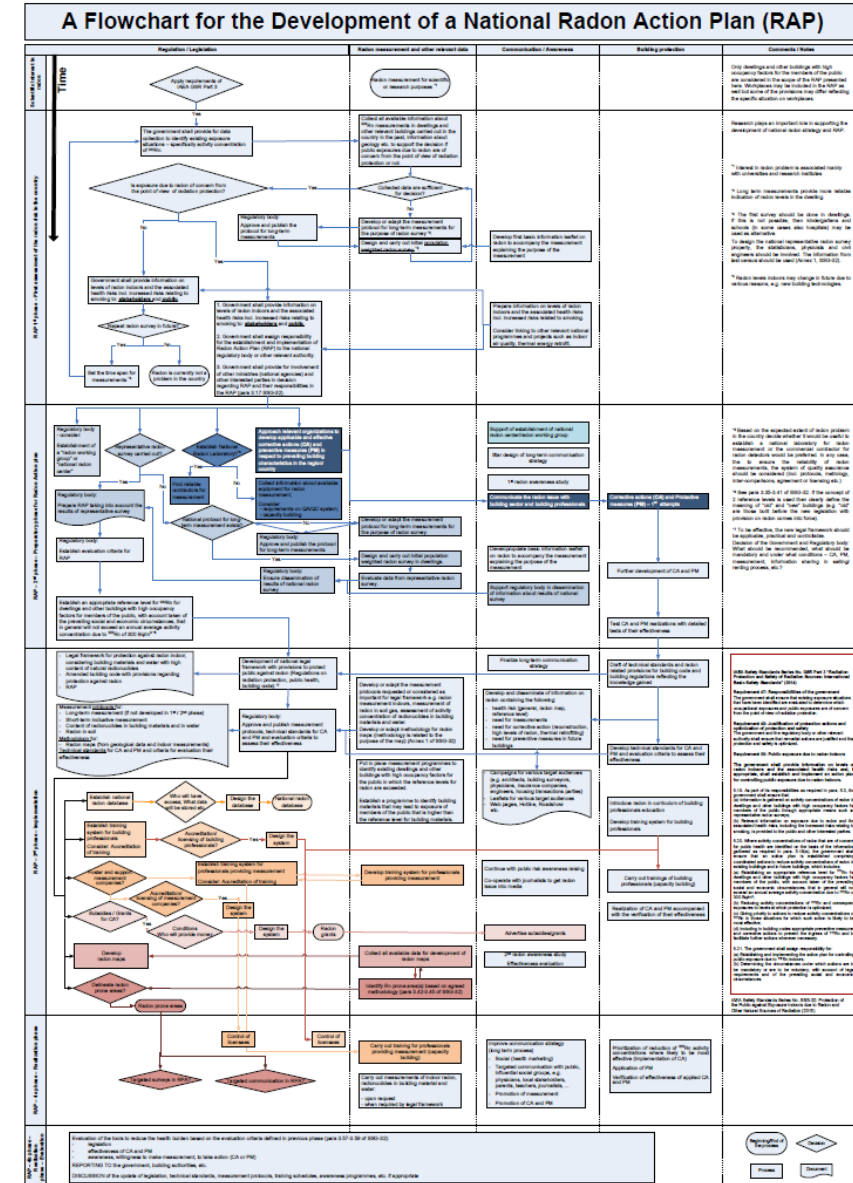
[Visio-FINAL-radon.vsd\(iaea.org\)](http://visio-FINAL-radon.vsd(iaea.org))

Control and reduction of exposure to radon

- ✓ Corrective measures for existing dwellings
- ✓ Priority for those dwellings that greatly exceed the reference level
- ✓ Availability and effectiveness of cost-effective radon mitigation techniques
- ✓ Decision on whether mitigation is carried out left to owners of dwellings
- ✓ Government to determine the circumstances under which corrective actions are to be mandatory or voluntary
- ✓ Building codes: preventive measures for new dwellings – radon prone areas

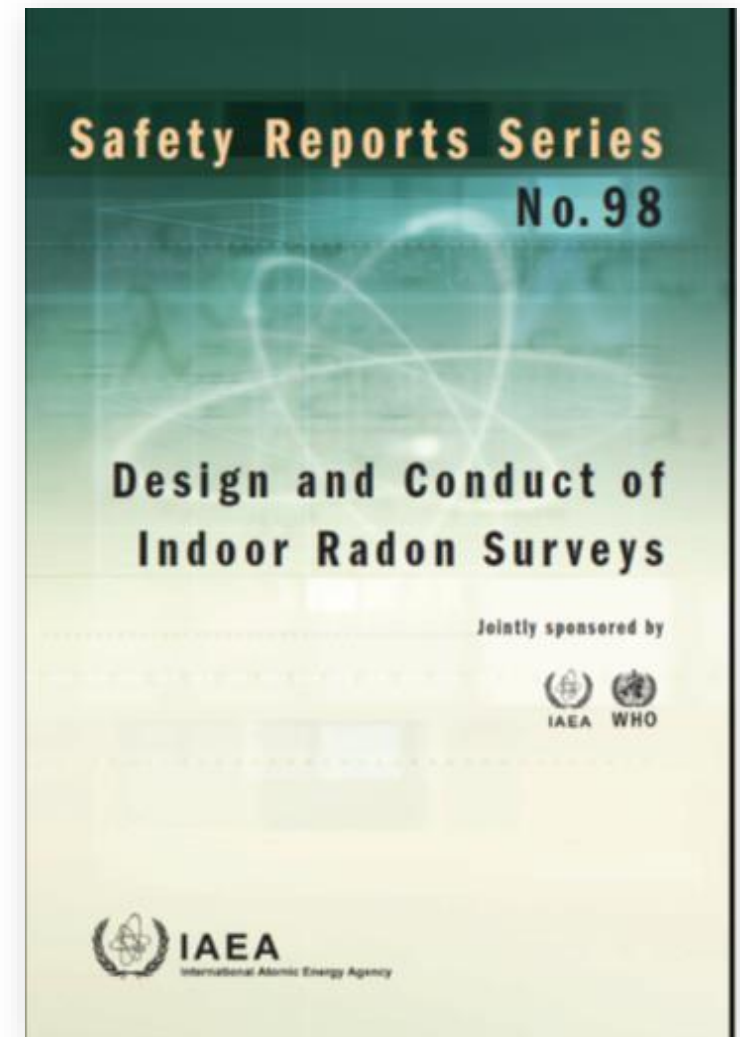
Evaluation of effectiveness

- ✓ Reduction in number or percentage of dwellings above reference level
- ✓ Reduction in average radon level
- ✓ Level of awareness of radon among the public, construction and medical professionals



Safety Report 98: Radon surveys in dwellings

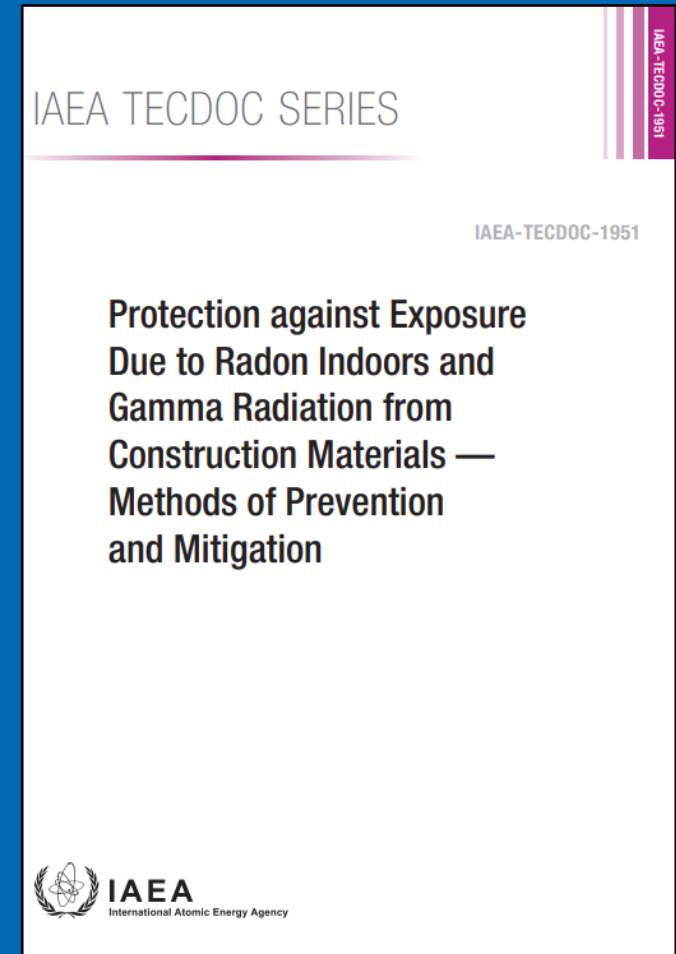
- Safety Report Series 98: Design and Conduct of Indoor Radon Surveys was published in 2019.
- It addresses the GSR Part 3 requirement: “Government shall ensure that information is gathered on activity concentrations of radon in dwellings and other buildings with high occupancy factors for members of the public through appropriate means such as representative radon surveys”.



SRS-98 discusses the need for, and the purpose of representative indoor radon surveys, as well as the factors to be considered in designing and carrying out such surveys. The Safety Report also considers how the data obtained from radon surveys can be used to develop **radon maps**.

Control and reduction of exposure to radon: TECDOC 1951

- *TECDOC 1951: Protection against Exposure Due to Radon Indoors and Gamma radiation from Construction Materials – Methods of Prevention and Mitigation* was **published in 2021**.
- **Objective:** to provide a **review of technical solutions for both corrective actions and preventive measures** to reduce the ingress of radon indoors - that could be considered by national authorities for including in national building codes.
- TECDOC 1951 **includes the description of methods, design and implementation of measures and actions, as well as equipment and materials used in the solutions**. It also provides methods for measuring and reducing exposure due to gamma.



Protection of Workers Against Exposure Due to Radon: SSG-91

- ❑ Exposure in workplaces (GSR Part 3, Requirement 52)
- ❑ It covers protection of workers against exposure due to radon, thoron and their progeny, in all types of workplaces (workplaces above ground, underground, and in industrial processes involving naturally occurring radioactive material) where occupational exposure to radon might occur.
- ❑ It covers exposure to radon in workplaces in **Existing Exposure Situations** and situations that require application of requirements for occupational exposure in **Planned Exposure Situations**.

SSG-91: Protection of Workers against Exposure to Radon
([2024 – in print](#))



IAEA SAFETY STANDARDS

No. SSG-91

for protecting people and the environment

Protection of Workers
Against Exposure Due
to Radon

GENERAL SAFETY GUIDE

Activities related to radon in the context of Technical Cooperation Projects – some examples

- Regional Training Course on prevention and mitigation methods for protection against radon exposure in buildings - EVT2305843. Coimbra, Portugal, 22-26 January 2024. (TCP RER9159)
- Regional Training Course on radon communication, prevention and mitigation in Cameroon. 9-12 December 2024 – Yaoundé, Cameroon. (TCP RAF9070)
- Webinars and e-learning material in collaboration with Portuguese Environment Agency (APA)



EVT2305843. Coimbra, Portugal, 22-26 January 2024

Future webinars on Strategies for indoor radon mapping

- ✓ The complementary webinars will cover survey planning, effective mapping strategies, and selecting appropriate detectors for accurate data collection.
- ✓ They will also discuss geogenic and anthropogenic factors in radon mapping, database management, and will introduce software tools like Geographic Information Systems for visualizing radon distribution.
- ✓ Additionally, the webinars will explore social and housing factors affecting radon levels, will provide experience from some countries and discuss possibility of extrapolating this experience to different regions of the world.

European
Radon Day
2024

SAVE THE DATE!

7 November 2024

Strategies of indoor radon mapping – Part 1

Speaker: Filipa Domingos, Laboratory of Natural Radioactivity at the University of Coimbra

14 November 2024

Strategies for indoor radon mapping – Part 2

Speakers: Zori Daraktchieva and David Rees Radon Group at UK Health Security Agency



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SSG-32 -Protection of the Public against Exposure Indoors due to Radon and Other Natural Sources of Radiation

Action plan on radon (3.23–3.59)

Setting a reference level for ^{222}Rn (3.35-3.41)

- ❑ Once public exposure due to ^{222}Rn has been assessed through appropriate surveys, it should be determined whether the activity concentrations of radon are of concern for public health.
- ❑ If so, the national authority is required to select and formally adopt a **reference level** for ^{222}Rn for dwellings and other buildings with high occupancy factors for members of the public.

GSR Part 3 requires that an appropriate reference level is established with account taken of the prevailing social and economic circumstances

Public exposure due to radon indoor
(GSR Part 3, Requirement 50)

not exceed an annual average activity concentration due to ^{222}Rn of **300 Bq/m³**

- ❑ **Reference levels should not be seen as a dividing line between safety and harm.** Rather, they should be used as guidance values which, once exceeded, should prompt the consideration of possible actions to lower exposure due to ^{222}Rn .
- ❑ The national authority could decide to compare risks associated with ^{222}Rn with other everyday risks.

SSG-32 -Protection of the Public against Exposure Indoors due to Radon and Other Natural Sources of Radiation

Action plan on radon (3.23–3.59)

Radon prone areas (3.42-3.45)

- ❑ When radon maps have been developed, it is possible to identify those areas where concentrations of ^{222}Rn are likely to be higher than average.
- ❑ These areas are often designated as being '**radon prone**'.
- ❑ The highest individual concentrations of ^{222}Rn will tend to be found in areas with the highest average concentrations of ^{222}Rn .
- ❑ There will also be dwellings with concentrations of ^{222}Rn above the reference level outside specified radon prone areas.
- ❑ The national authority should define radon prone areas within its territories and it should consider specific measures to be applied within these areas.

The ICRP suggested that radon prone areas could be defined as those where more than a certain percentage of dwellings have a concentration of ^{222}Rn exceeding ten times the national average value.

Once decided, the definition of a radon prone area should not be changed without serious consideration; however, the areas so designated should be amended as more information becomes available.

