



## **EAN Working Group on the Application of ALARA for Radon At Work (A-RAW)**

### **Why a Survey on radon?**

National regulations for the protection against radon at the workplace have recently evolved in Europe. In general, the number of workplaces affected by the regulations has increased; including many workplaces not previously aware of the radiation protection system. Furthermore, the practical application of the regulation for radon, using a step-by-step approaches, with reference level/exposure values, might be challenging in practice. It can raise questions from employers and other affected parties and communication might be an issue

As a consequence, the European ALARA Network has set up, in 2021, a working group to investigate the practical implementation of the ALARA principle in relation to exposure from Radon At the Workplace (A-RAW).

### **The objective**

The objective of the working group is to collate a sample of practical experiences in Europe (1~2 case studies per country), detailing the controls and measures implemented to protect against radon exposure in the workplace.

A set of questions to assist the description of suitable case studies is proposed (cf. below). It focuses on the steps taken to identify and manage workplaces with regard to radon.

The Working Group aims to synthesize the experiences collected from the field

1. Commonalities and differences
2. Lessons-learned,
3. good practices and difficulties in application.

These information can be useful to discuss the application of ALARA principle in these situations, address potential gaps and identify if actions (ex. guidance) are needed in the future and by who.

The Working Group aims to share these results to the concerned radiation protection community and will work on identifying opportunities to do so.



**SET OF QUESTIONS.**

**1 survey = 1 case study of your choice** (workplace concerned with regulation on radon: touristic cave, underground workplace, bakery, robot factory ...)

The check box (; ) are used to have a quick view of the national regulation. The text inbox host experience from the practical case study.

<b>ALARA FOR RADON AT WORK TEMPLATE FOR CASE STUDY</b>
<p><b>Could you please provide a short description of the case study and the workplace?</b> Context, sitting, number of workers etc. ...</p>
<p><b># IDENTIFICATION OF WORKPLACES</b> Context: Radon measurements shall be carried out in identified workplaces</p>
<ul style="list-style-type: none"> <li>• <b>What are the criteria to select the workplaces?</b>  <input type="checkbox"/> Workplace in basement   <input type="checkbox"/> Workplace in ground floor   <input type="checkbox"/> Map or radon-prone area   <input type="checkbox"/> Specific workplace   <input type="checkbox"/> former radon measurement   <input type="checkbox"/> other: ...</li> <li>• <b>Using the criteria:</b>   <input type="checkbox"/> Mandatory   <input type="checkbox"/> Not mandatory</li> </ul>
<p><b>What are your views about the system for the identification of workplaces? And what happens to all the other workplaces?</b> ...</p>
<p><b># RADON CONCENTRATION MEASUREMENT</b> Context: Radon measurement protocol.</p>
<ul style="list-style-type: none"> <li>• <b>Normative protocol for radon concentration measurement</b>   <input type="checkbox"/> Mandatory   <input type="checkbox"/> Not mandatory</li> <li>• <b>Preference given to</b>   <input type="checkbox"/> passive or   <input type="checkbox"/> direct-reading measurement devices?</li> <li>• <b>Accredited/certified services for radon concentration measurements</b>   <input type="checkbox"/> Mandatory   <input type="checkbox"/> Not mandatory</li> <li>• <b>Are provisions for verification measurement provided in law?</b>   <input type="checkbox"/> Yes   <input type="checkbox"/> No</li> </ul>
<p><b>What are your views about the protocol for radon concentration measurement?</b> Issues in practicality, cost, information to the workers and/or Health and Safety ...</p>
<p><b>What if &lt; reference level?</b> Any (mandatory) requirements to reduce exposure ALARA? ...</p>
<p><b># DIAGNOSIS AND REMEDIATION</b> Context: If &gt; reference level, remedial action to reduce radon concentration shall be taken.</p>
<ul style="list-style-type: none"> <li>• <b>Who is responsible?</b>   <input type="checkbox"/> Employer   <input type="checkbox"/> Property Owner</li> <li>• <b>Are accredited/certified services for radon concentration measurements mandatory?</b>   <input type="checkbox"/> Mandatory   <input type="checkbox"/> Not mandatory</li> <li>• <b>Are guidance available to help establish a diagnosis of the building and inform the type of mitigation required?</b>   <input type="checkbox"/> Yes   <input type="checkbox"/> No Ex. Guidance on best practices, definition of standards for corrective measures (technical, organizational, cost) and their long-term follow-up.</li> <li>• <b>Is it needed?</b>   <input type="checkbox"/> Yes   <input type="checkbox"/> No</li> <li>• <b>Time frame for remediation actions?</b> ... (years)</li> <li>• <b>Time frame for remediation follow-up measurement?</b> ... (years)</li> </ul>

<ul style="list-style-type: none"> <li>• Same protocol as initial measurement? <input type="checkbox"/> Yes <input type="checkbox"/> No</li> </ul>
<p><b>Is the optimization principle considered in the implementation of the remedial action?</b> Cost-efficacy consideration, numerical target, involvement of workers, ... ...</p>
<p><b># GOING FURTHER</b> Context: Remedial action were not sufficient.</p>
<ul style="list-style-type: none"> <li>• Is it clear how to notify the situation to the competent authority? <input type="checkbox"/> Yes <input type="checkbox"/> No</li> <li>• Is then the exposure assessment always requested? <input type="checkbox"/> Yes <input type="checkbox"/> No</li> <li>• Who can perform the exposure assessment <input type="checkbox"/> Employer <input type="checkbox"/> Property Owner <input type="checkbox"/> In-house Radiation Protection Expert <input type="checkbox"/> External Radiation Protection Expert</li> <li>• Are data/guidance available for the determination of annual radon concentration and "theoretical" estimate of effective dose to workers? <input type="checkbox"/> Yes <input type="checkbox"/> No <i>Ex. calculation techniques for estimating the radon concentration average and effective dose: respiratory/breathing rate, time in contact with radon, which conversion factors do you use, equilibrium factor etc.</i></li> <li>• Is it needed? <input type="checkbox"/> Yes <input type="checkbox"/> No</li> </ul>
<p><b>What are your views about the exposure assessment process?</b> ...</p>
<p><b># CASE WHERE EFFECTIVE DOSE &lt; 6 mSv</b></p>
<ul style="list-style-type: none"> <li>• Is it clear how to notify the results of the exposure assessment to the competent authority? <input type="checkbox"/> Yes <input type="checkbox"/> No</li> <li>• Who is responsible of implementing the requirements? <input type="checkbox"/> Employer <input type="checkbox"/> Property Owner <input type="checkbox"/> In-house Radiation Protection Expert <input type="checkbox"/> External Radiation Protection Expert</li> <li>• Are there practical difficulties in? <ul style="list-style-type: none"> <li>- The identification of radon prone area (zoning) ..... <input type="checkbox"/> Yes <input type="checkbox"/> No</li> <li>- Signage or warning system ..... <input type="checkbox"/> Yes <input type="checkbox"/> No</li> <li>- Ventilation/airflow requirements? And checks on continued operation of radon countermeasures (fans/sumps)? ..... <input type="checkbox"/> Yes <input type="checkbox"/> No</li> <li>- Control of exposure of workers ..... <input type="checkbox"/> Yes <input type="checkbox"/> No</li> <li>- Provision to "promote the development of an appropriate radiation protection culture" by the workers ..... <input type="checkbox"/> Yes <input type="checkbox"/> No</li> <li>- Re-measurement/re-assessment ..... <input type="checkbox"/> Yes <input type="checkbox"/> No</li> <li>- Other: ...</li> </ul> </li> </ul>
<p><b>Any details you would like to report?</b> ...</p>
<p><b># CASE WHERE EFFECTIVE DOSE ≥ 6 mSv</b></p>
<ul style="list-style-type: none"> <li>• Who is responsible for the implementation of licencing requirements for the workers? <input type="checkbox"/> Employer <input type="checkbox"/> Property Owner</li> <li>• Are there practical difficulties in? <ul style="list-style-type: none"> <li>- Individual radiological surveillance: dosimetry system (calculation hypothesis, EAP, personal dosimeter (incl. market analysis) against ambient measurement, etc.) ..... <input type="checkbox"/> Yes <input type="checkbox"/> No</li> <li>- Categorization of workers? ..... <input type="checkbox"/> Yes <input type="checkbox"/> No</li> </ul> </li> </ul>



- Recording and reporting of result (dose register) and access to the results? .....	<input type="checkbox"/> Yes <input type="checkbox"/> No
- Protection of outside workers? .....	<input type="checkbox"/> Yes <input type="checkbox"/> No
- How do employers access/obtain advice from a radiation protection expert and training and education in radon .....	<input type="checkbox"/> Yes <input type="checkbox"/> No
- Other: ...	
<b>Any details you would like to report?</b>	
...	
<b>Are there practical difficulties for workplaces combining radon + other exposure from planned situation? (radiological surveillance, dose limit, ...)</b>	
...	

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