

National Enforcement of Radon in the Workplace (UK)

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1. Abstract

In the UK, it is estimated that radon daughters cause 2,500 fatal lung cancers per year and exposure in the workplace is responsible for a proportion of this total exposure. This paper describes how the Health and Safety Executive (HSE) and Local Authorities regulate radon in the workplace under the Health and Safety at Work etc Act 1974. It describes the launch of a project aimed at significantly increasing the numbers of employers with premises located in government defined radon Affected Areas who undertake radon risk assessments and measurements for the gas.

Whilst it is recognised that the vast majority of employers have not undertaken suitable and sufficient risk assessment of radon exposure of their employees, the enforcing authorities do not have the resources to tackle the issue alone. The project contains a number of initiatives targeted at increasing the numbers of workplaces assessed on a year on year basis with the longer-term aim of reducing workplace exposures and possible resulting fatalities. It is also hoped that increased awareness in the workplace will result in increased awareness of employees themselves in relation to their domestic exposures. The initiatives described in the paper broadly fall into three coordinated categories, namely; working with stakeholders and intermediaries, direct enforcement, and provision of information and advice.

2. Introduction

Radon is now recognised to be the second largest cause of lung cancer in the UK after smoking. Lung cancer is the biggest killer in the UK and only around 5% of all lung cancers are curable. Radon contributes by far the largest component of background radiation to the average individual in the UK (see Figure 1) and, while the largest radiation doses arise in domestic dwellings due to the longer time spent there, significant exposures are possible in workplaces. The UK Health Protection Agency (HPA), formerly the National Radiological Protection Board (NRPB), is responsible for carrying out research and advising government on the risks of radon in the UK. They estimate that 5 to 7% of lung cancer deaths, approximately 2,500 people per year, are attributable to exposure to radon in the home and at work [1].

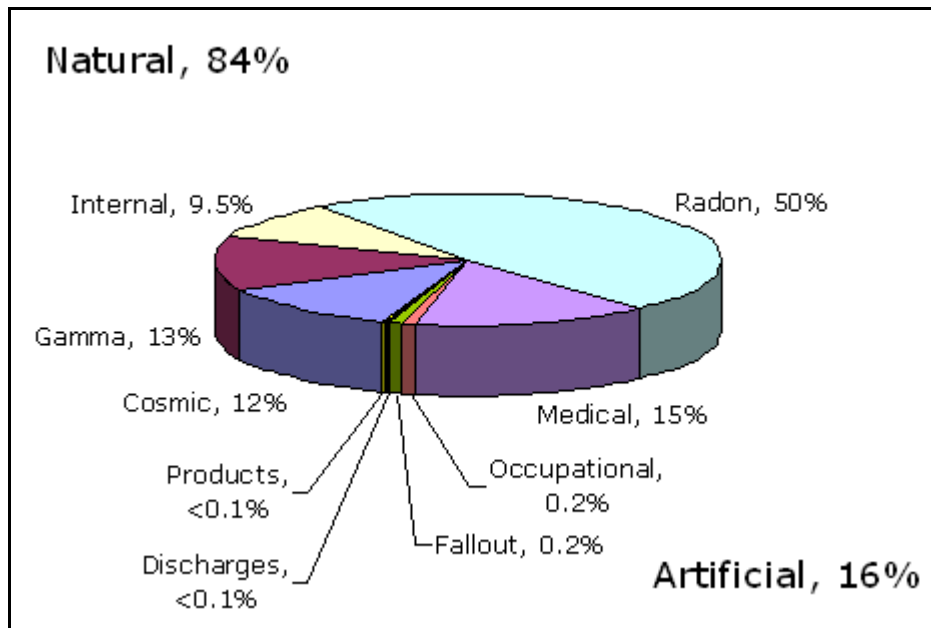


Figure 1. Contributions to the annual radiation dose to the average individual in the UK [2].

There are approximately 2 million workplaces in the UK, and the HPA estimates that approximately 90 to 280 of the 2,500 lung cancer deaths per year [3] result from radon exposure in the workplace.

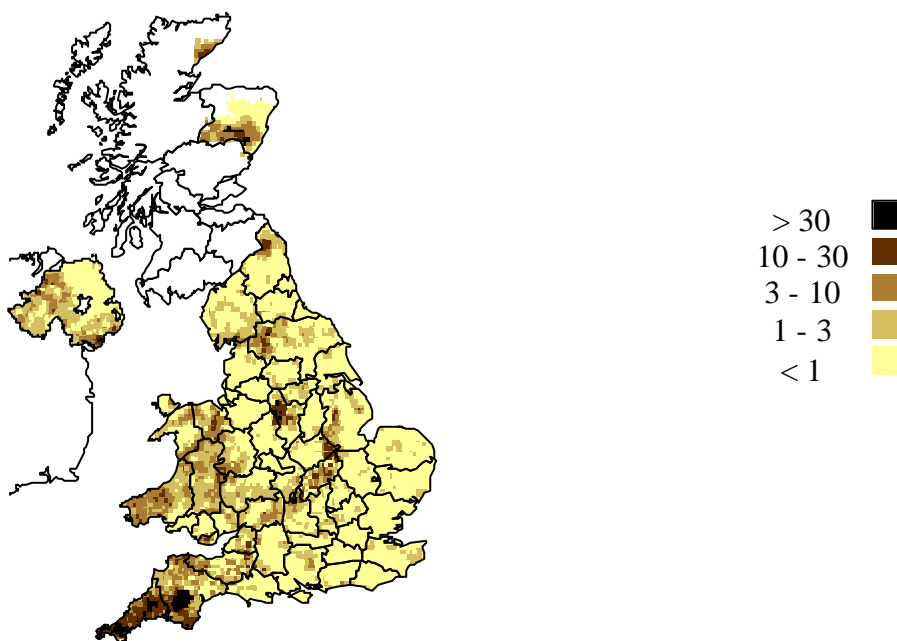


Figure 2. HPA map of radon probability in the United Kingdom [5]. Estimated percentage of houses above the Action Level (200 Bq m^{-3}).

Figure 2 shows the percentage of dwellings in parts of the UK that are likely to have elevated indoor radon levels. (Parts of Scotland have still to be mapped.) Although data is limited concerning radon levels in the workplace, evidence [4] indicates an almost identical map for workplaces.

3. EU and UK legislation for radon in the workplace

3.1 *European Basic Safety Standards Directive*

Radon gas can collect in domestic and workplace buildings and under certain conditions can reach concentrations above which the workplace risk to people requires control under the European Basic Safety Standards Directive [6]. In relation to radon, the Directive is adopted in the UK within the Ionising Radiations Regulations 1999 [7].

3.2 *Health and Safety at Work etc. Act 1974*

The Health and Safety at Work etc. Act 1974 requires all employers to ensure the overall health and safety of their employees and others who have access to the work environment. The Act also enables the creation of regulations to address more specific risks to health and safety.

3.3 *Management of Health and Safety at Work Regulations 1999*

The Management of Health and Safety at Work Regulations 1999 require that employers assess all relevant risks to employees. Employers with premises in Affected Areas should therefore carry out a risk assessment to determine whether or not the premises have radon levels above the action level. This assessment should consider factors such as construction and ventilation of all parts of the premises and the likelihood (as identified by HPA maps) of having high radon levels. In the vast majority of cases, the assessment will include a number of measurements around the premises.

3.4 *Ionising Radiations Regulations 1999 (IRR99) [7]*

The IRR99, reg.3(1)(b) states that the Regulations apply to work 'carried out in an atmosphere containing radon 222 gas at a concentration in air, averaged over 24 hour period, exceeding 400 Bqm⁻³. In rare circumstances, employers can disapply the regulations in certain circumstances.

HPA estimate that there are now approximately 160,000 workplaces located in radon Affected Areas. From the thousands of workplace measurements they have carried out, HPA estimate that 10% (16,000) workplaces located in Affected Areas are likely to have levels in excess of 400 Bq m⁻³.

Where levels are found to exceed the action level, remedial action should be taken to try to reduce them to below the action level. This can usually be done using relatively simple and inexpensive engineering methods and systems [8]. Such systems should be subject to appropriate planned preventative maintenance and testing under general requirements of health and safety legislation as with other workplace equipment. If such measures do not reduce the levels sufficiently (i.e. to below 400 Bqm⁻³), then IRR99 apply as for any other occupational exposure to ionising radiation. In this case a Radiation Protection Adviser must be consulted and additional measures such as occupancy controls may be implemented in order to restrict employee exposures so far as reasonably practicable.

3.5 *Building Regulations 1991*

The Building Regulations for England and Wales 1991 [9] require radon 'proofing' in new domestic and workplace buildings, modifications and extensions. Similar requirements exist in the Scottish building regulations.

4. **Responsibilities and enforcement of UK legislation**

Responsibility for enforcement of most health and safety legislation in the UK is divided between the Health and Safety Executive (HSE) and Local Authorities. The division of responsibilities for enforcement is governed by the Health and Safety (Enforcing Authority) Regulations 1998. Local Authorities are responsible for enforcement in approximately half of all workplaces and about 12 million employed people nationally. They are generally responsible for offices, shops, warehouses, call centres and similar premises. HSE is responsible for the remainder of activities and the workers involved.

The current **HSE** strategy [11] for radon is coordinated by the Radiation Specialist Inspectors in the Radiation Team and may be summarised as follows:

- Target employers in areas identified by UK government as radon Affected Areas
- Raise employers awareness of risk of lung cancer from radon in the workplace and remind them of their responsibilities for protecting employees
- Provide advice & direction to stakeholders
- Require appropriate risk assessment/ measurement
- Require any necessary remedial action
- Inform employees & encourage home measurements

In summary, this work has consisted of some inspection, a number of mail shots to selected employers in Affected Areas, the commissioning of a number of research projects, production of a guidance leaflet, and provision of assistance to Local Authorities.

Since the mid 1990s a number of **Local Authorities** have stated that they believe that radon in the workplace is a very significant health and safety issue and begun long-term programmes of work aimed at monitoring and remediation for all commercial premises (including their own) in the high-risk zones during routine health and safety inspections.

5. **Experience of compliance with UK legislation**

Experiences of HSE and Local Authority inspectors has shown that around 95% of employers with workplaces located in Affected Areas are unaware that radon could cause risks in the workplaces (despite being aware of the domestic risks), have received no information regarding radon in the workplace, and have not undertaken

any measurements. The vast majority of employers (almost without exception) are very willing to take action when the matter is brought to their attention. All employers who been found to have elevated levels at their premises have carried out successful remediation without the need for legal enforcement action. Experience has also shown that any remediation undertaken by employers reduces levels to significantly below the 400 Bq m⁻³ action level for workplaces.

6. Proposals for future enforcement in the workplace

In view of the levels of risk and the poor compliance with the regulations, the HSE Radiation Specialist Inspectors have proposed a series of 13 new initiatives aimed at reducing incidences of ill health caused by exposure to radon at work by ensuring that all employers in Affected Areas assess the risks and effectively remediate where appropriate. Although the initiatives summarised below currently form part of a HSE workplan, progress has been made to link with relevant Local Authorities and the HPA.

The current proposals recommend application of the these proposals only in radon Affected Areas of the UK where there is a defined probability of premises having radon levels in excess of 400 Bq m⁻³.

7. Summary of new HSE radon initiatives

7.1 Working with stakeholders and intermediaries

7.1.1 Joint action with other government departments and local authorities.

HSE works closely with many government departments, Local Authorities, non-departmental public bodies such as the HPA, and the devolved administrations in Wales and Scotland. Ways of coordinating efforts between various health programmes are being developed.

7.1.2 Encourage professional bodies and organisations to raise the profile

Many employers in the UK obtain their health and safety information through professional organisations such as the British Occupational Hygiene Society (BOHS), Institute of Occupational Safety & Health (IOSH), Institute of Occupational Medicine (IOM), local chambers of commerce, safety & environmental consultants, the medical profession, the insurance profession, radon measurement and remediation companies, and the Society for Radiological Protection (SRP).

7.1.3 Joint initiatives with trade unions

HSE and Local Authorities often work with trade unions and their employee safety representatives to influence health and safety in the workplace. A number of unions have called for increased action on radon.

7.1.4 Advice from building inspectors during their routine work and new permissioning regime for building change of use.

Increased liaison with the Building Research Establishment (BRE) to raise awareness amongst Local Authority Building Control Offices and Approved Inspectors to discuss HSE's workplace radon guidance directly with employers.

7.2 Direct enforcement

7.2.1 Routine inspection by HSE inspectors during their normal work

Include inspection of radon in HSE inspections of all employers premises located in radon Affected Areas.

7.2.2 Advice from HSE Health and Safety Awareness Officers (HSAOs) during their routine work

HSE has recently employed 50 HSAOs throughout the UK to further improve the provision of advice and information to small and medium sized enterprises.

7.2.3 Intensive inspections programmes in selected high radon areas

Used as a vehicle to launch overall radon initiatives by inspecting a large number of employers over short time periods and maximising the media coverage. The first of these took place in spring 2005 and involved over 100 workplaces and 2500 persons in them.

7.2.4 Targeting large employers through head offices

Draw up central list of national organisations to contact, including government and Local Authorities, with workplaces and significant numbers of employees in radon Affected Areas.

7.2.5 Targeted mail shots in very 'hot' local areas

Past experience of HSE and others is mail-shots are not effective unless done at very specific local areas.

7.2.6 Closer work with Local Authority Health & Safety inspectors.

HSE is to provide increased support for local initiatives including training provision and joint inspections of workplace premises.

7.3 Provision of information and advice

7.3.1 Publicity campaign (inc articles in professional journals)

Coordinated long term publicity regarding all initiatives and overall programme including public and technical media.

7.3.2 Update HSE guidance on radon and ensure web site availability

Revise and update HSE radon information leaflet.

7.3.3 Health and safety training programmes

Examine methods of including/ increasing radon awareness in health and safety training the training programmes of professional bodies and education establishments.

8. Conclusions

The higher end of the range 90 to 280 potential lung cancer deaths per year resulting from breathing in radon in the workplace is almost equivalent to the total annual number of fatal injuries to UK workers and, if assumed to be correct, presents an extremely serious workplace risk. The HSE Radiation Team therefore believes that employers cannot continue to ignore exposure to radon in workplaces. With a pragmatic mixture of risk assessment and remedial work, and by drawing on the expertise of enforcement agencies and radiation protection advisers, practical and effective solutions can usually be found without excessive cost. Radon is overwhelmingly the major source of ionising radiation exposure to the UK workforce. The risk posed to life from excessive radon exposure at home and at work is significant and fully justifies resource allocation. Whilst past government radon measurement programmes and the current HPA programme to encourage remediation are impressive, the rate of mitigation in homes and workplaces is still extremely low. It is hoped that the implementation of the initiatives described above by the various stakeholders working together will maximise their collective influence on radon health and safety and result in significant progress in radon remediation in UK workplaces. It is also hoped that the overall increased awareness and enforcement of the legislation in workplaces will encourage more employees to consider radon in their homes as well.

9. Acknowledgements

HPA for permission to include Figures 1 and 2 above.

10. References

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