Environmental Radon Newsletter

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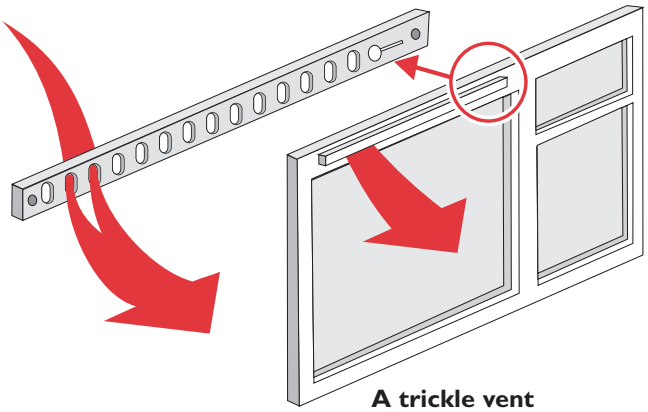
The truth about radon and opening windows

Chris Scivyer, Building Research Establishment

How many times have you heard people say "open your windows to reduce indoor radon levels"? Whilst it might work, it could actually make things worse. The problem is that most people do not understand how their houses work in terms of ventilation.



A trickle vent

Essentially a house acts as a chimney. Air moves up through the house due to warm air rising through the house (the stack effect) and due to suction effects on the roof caused by wind action. The warm air eventually finds its way out via gaps at the top of the house. This air is then replaced by more air entering lower down in the house. If it enters via doors and windows or gaps in walls above ground then it will be fresh air and should not pose a problem. But if the doors, windows and walls are relatively airtight then air will be drawn in via gaps in and around the floors, and in radon-prone areas this air will contain radon.

So, doesn't this mean that if we open more windows we can resolve the problem? Well, yes and no: ***if we open the wrong windows we can actually make the problem worse.*** For example it is quite common to shut downstairs doors and windows for security and then open bedroom windows upstairs for ventilation. This has the effect of increasing the stack effect which increases indoor radon. Instead, the aim should be to balance the ventilation by slightly increasing the amount of outdoor air entering downstairs and reducing unwanted leakage upstairs. As well as reducing the stack effect the additional ventilation will help to dilute the radon.

So with the right ventilation, radon levels can be reduced. Even so it is important to recognise that in most cases the reduction in radon level that can be achieved will be small. ***It is the least effective way of reducing radon levels*** in a house, and should therefore only be used if the radon level is very close to the action level (200-300 Bq m^{-3}) or if ventilation is combined with other methods.

To be successful, changes to ventilation must be permanent. Good ventilation practice is of course about more than just opening windows. The following measures will also help to reduce radon levels and improve the general indoor environment:

1. Cap-off and seal unused chimneys (allow some ventilation to the chimney to prevent condensation).
2. An open fire, gas, coal or oil fired heating discharging into a chimney must have adequate fresh air supplied to the room from outside to ensure proper combustion. If ventilation has been provided by cutting a hole through a timber floor, the hole should be sealed and an alternative source of ventilation provided.
3. Seal large gaps in and around floors.
4. Draught-proof loft hatches and seal around pipes or ducts which pass through the ceiling into the roof.
5. Seal cracks around upstairs windows.
6. Avoid prolonged use of extractor fans in kitchens, bathrooms and WCs. Fans should only need to be used intermittently to clear odours or reduce condensation.
7. Provide some ventilation downstairs, by installing trickle ventilators in downstairs windows or fitting through-the-wall vents.

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The risk of lung cancer from radon

Jon Miles, National Radiological Protection Board

The fact that radon in mines can cause lung cancer in miners has been known for more than 50 years. Once this was recognised, it was realised that certain mines in central Europe, notorious for centuries for their high death rates from lung disease, were also the ones with the highest radon levels. In 1556 Agricola had reported that some women in the area had had up to seven husbands who died of their lungs rotting away*.

Many epidemiological studies of miners have since been carried out, allowing the magnitude of the risk from radon to be quantified. This risk factor has been taken into account when setting the UK Action Level for radon in homes, as it has elsewhere around the world. But conditions in homes are not the same as in mines: it would be better to use evidence of the risk to people exposed to radon at home when setting Action Levels for radon in home. For this reason, many epidemiological studies of the risk of radon exposure at home were started.

It is not easy to do such studies. For one thing, the main cause of lung cancer is smoking, so it is essential to know whether, and how much, each individual in a study smoked, in order to separate out radon and smoking as causes of the disease. Assessing the exposure of each individual to radon over the past 30 years is also essential, but very difficult because people move house. Despite the difficulties, the past ten years have seen the publication of more than 20 epidemiological studies of the link between radon in homes and deaths due to lung cancer.

The results of these studies were consistent with the risks estimated from the studies of miners exposed to radon, but none of the studies of radon in homes included sufficient numbers of subjects to allow a precise estimate of the risk. To overcome that difficulty, the researchers are now pooling the data from different studies.

A summary of the results of pooling (separately) seven North American and two Chinese studies has recently been published**. The estimate of risk of exposure to radon, based on analysis of the subjects for whom full data on radon exposure was available, is roughly twice as large as the risk derived from the studies of miners. We cannot necessarily conclude from this that the risk of radon in homes has been underestimated in the past: the researchers point out that the pooled results are still consistent with the miner studies. By this they mean that uncertainties on the risk estimates are such that it is possible that the higher risk found in homes is due to chance variations.

The European Commission has been funding a similar pooling of European radon epidemiological studies***. The analysis of the data is not complete, and the results are not expected until later in 2004. It will be interesting to see whether this work indicates a higher risk than the miner studies. If it does, there could well be pressure to reduce radon reference levels, especially in those countries with higher values than the UK radon Action Level.

* *De Re Metallica.* Georgius Agricola, 1556. Translated by Herbert Clark Hoover and Lou Henry Hoover 1912, Dover Publications reprint, 1986.

** Studies of radon and lung cancer in North America and China. JH Lubin. *Radiation Protection Dosimetry,* 104, 315-319, 2003.

*** Health effects of residential radon: a European perspective at the end of 2002. SC Darby and DC Hill, *Radiation Protection Dosimetry,* 104, 321-329, 2003.

Radon programmes in the South West

Liam Davey, Department for Environment, Food and Rural Affairs

It only requires a glance at the radon map to see that the South West peninsula is the radon capital of England. Because of this, the closing decades of the twentieth century saw intensive government programmes of radon information and testing in the region:

- **1991-2** Leaflets were delivered to 650,000 homes offering a free radon measurement. Around 78,000 householders (about 12%) took up this offer.
- **1996** Letters offering a free test were sent to unmeasured households in the highest risk areas. About 40,000 South West householders responded.

The new millennium saw the rollout of a new Government radon programme in England. This offers support and resources to all local authorities with high risk radon areas. The programme is now in its fourth year, and attention is again focussed on the South West. Three authorities are participating: Kerrier District Council in Cornwall, South Hams District Council in Devon and the Unitary Authority of Torbay Council. These three contain 40% of the homes in Cornwall and Devon known to have high radon levels. By several measures, Kerrier is the jewel in the radon crown.

The radon programmes in these three areas are broadly similar. Information seminars for local council staff are followed by similar events for housing professionals such as solicitors, surveyors, estate agents and representatives of social housing schemes. Events concentrating on radon remedies are of interest to local builders and DIY store staff. Roadshows and/or local exhibitions are arranged for householders, who receive invitations by letter. The occupants of untested dwellings in high risk areas are offered a free measurement, again by individual letter. Free retests are offered to confirm the effectiveness of the completed works.


ATTENTION

FREE RADON TEST OFFER

FOR 25,000 PREMISES IN KNOWN HIGH RADON AREAS

REDUCED RATE RADON TEST FOR RESIDENTS WHO DO NOT LIVE IN KNOWN HIGH RADON AREAS

This offer won't be repeated

USE IT OR LOSE IT!

If you have any queries concerning Radon in the home, please contact Lee Wagland at Kerrier District Council on (01209) 614029 or by email: radon@kerrier.gov.uk

Co-ordinated by Kerrier District Council in partnership with DEFRA, the National Radiological Protection Board and the Buildings Research Establishment.

BRE defra nrpb

The councils are very much the public face of the campaign and provide a focal point for help and advice on remedial measures. The councils organise local media publicity and many of the leaflets and letters carry their logos. They have significant support from the Department for Environment, Food and Rural Affairs, the National Radiological Protection Board and the Building Research Establishment.

The programmes are in their early stages, though much of the initial work has been completed. In Kerrier, two successful series of roadshows have been completed: each day some 150 to 200 people visited the exhibition and talked with Council staff and experts from both BRE and NRPB. Individual letters have been sent to over 25,000 householders in Kerrier and some 30,000 to householders in South Devon. In short, the programme is on course. Watch this space for further reports.

Open house in the South West

Gerald Hudd, Secretary, Radon South West Committee

The Radon South West Committee is one of four regional committees in England set up by interested local authorities to provide a focus for radon matters. It meets on a regular basis and draws members from many councils in an area covering Gloucestershire, Wiltshire, Dorset, the former Avon authorities, Somerset, Devon and Cornwall.

Historically members of the committee tend to be drawn from the Environmental Health Departments. However radon is an issue relevant to a wide range of public sector professionals, including Building Control, Land Charges, Environmental Health (including Health and Safety), Primary Care Trusts and Public Health Protection. At the 2003 Annual General Meeting, the Committee agreed to a wider remit in order to address radon issues relevant to all of these groups and thereby widen membership.

As a consequence of this we organised an Open Meeting on Monday 22 September 2003 at the Thornbury offices of South Gloucestershire Council. This was open to all public sector personnel with an interest in radon issues. The content was designed to be of interest both to officers new to the subject as well as updating the more experienced. It was an opportunity to meet and discuss radon matters with like-minded public sector staff as well as national experts.

Jill Meara, Deputy director of the National Radiological Protection Board, opened proceedings with a talk on health effects and concerns from radon exposure. The nature and level of harm arising from population exposure to radon were covered with reference to different population characteristics, and the duration of exposure. Methods and models for evaluating radon risks were explained and the results placed in perspective with other everyday risks. The strength of associations of radon exposure with diseases other than lung cancer were covered and the future directions of research in this area noted.

Daryl Dixon then dealt with the identification and measurement of radon-prone premises. The nature, source and ingress mechanisms were covered and Action Level, Affected Areas and use of radon atlas were introduced. Measurement procedures and interpretation were addressed for varying circumstances.

Responsibility for promoting the health of local populations falls to a range of organisations from Environmental Health Department of the local Council to community health bodies such as hospital trusts. Councils are often the first point of contact for local people and manage a range of local initiatives on radon. Councils also administer programmes to improve the quality of local housing and can advise on the availability of grants. Peter Foley from Derbyshire Dales District Council informed the meeting how local networks for radon information and advice are particularly beneficial in this process, and the advantages to be gained from close and effective links with community health specialists.

Prevention of radon from entering a building is generally the most cost effective way of reducing radon exposure of the population, and formal arrangements are in place to ensure that buildings in the most radon-prone areas are built with protection. Malcolm Clinton of North East Derbyshire Council addressed this issue in his talk on planning for radon prevention in proposed new structures. These arrangements are administered by the Building Control Officers who advise on the need for protection in proposed new properties and substantial extensions. The role of other bodies such as the National House-Building Council and large builders in a comprehensive radon preventative strategy, and practical mechanisms to stimulate this were outlined.

Gareth Thomas, Health and Safety Executive, concluded the presentations with his talk on the enforcement approach for radon in the workplace. This included an overview of legislation, requirements of employers - risk assessment, measurement, actions, application of the Ionising Radiations Regulations 1999, enforcement action and HSE strategy.

The meeting generated considerable interest, with some 70 delegates and speakers. The aim of widening our target audience was successful in that there was a considerable level of interest from building control sections of local authorities. However the interest from the health sector remains particularly disappointing, with only 3 delegates despite a wide programme of advertising, and provides a pointer to an audience that requires future targeting.

This newsletter is prepared for the Chartered Institute of Environmental Health by the National Radiological Protection Board. It is published quarterly as an insert in Environmental Health and distributed by the Royal Environmental Health Institute for Scotland. Any suggestions for topics for future issues should be sent to Jon Miles at NRPB (see address on page 2). The views expressed in the contributions here are not necessarily those of the Chartered Institute of Environmental Health, the Royal Environmental Health Institute for Scotland or the National Radiological Protection Board.