Environmental Radon Newsletter

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Remediation Case Study Series
3. Older properties

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Householders owning older properties often have numerous constraints to consider when fitting radon remedial measures. A satisfactory remediation solution can usually be found at little extra cost.

When radon results are higher than desired, householders may worry about the costs of fitting radon reduction measures and the impact these measures may have on their property. This can be especially true for householders with older properties: they may worry that an older property will be more difficult or costly to remediate than a newer one built using modern construction methods. This article aims to dispel some of those myths and worries. Visit www.radoncornwall.co.uk for detailed examples.

High-level outlet mini-sump system on the front of a Cornish granite cottage

Myth	Reality
Granite building materials 'You cannot reduce radon levels in buildings made of granite because the radon comes from the building materials'	Radon is a decay product of uranium present in granite and other rocks, such as some types of limestone. The walls of granite buildings do emit some radon but the amounts are insignificant compared to the amount of radon from the ground. Good reductions can be achieved in such buildings
Thick stone walls 'Labour, construction time and disruption will be much greater for buildings with thick stone walls'	This can be true if large holes need to be made in the walls for vents and pipes. However, fitting a mini-sump system or positive pressure system can normally minimise these costs. Total fitment costs should not increase by more than 15 or 20% due to wall thickness issues
Solid floors 'Radon measures will need old solid floors (for example, flagstone or slate floors) to be disturbed'	Old solid floors rarely need to be dug up as a mini-sump system can be excavated from outside the property *See also suspended floors*
Suspended floors 'Radon cannot be reduced because of gaps in the floors. Use of under-floor fans will worsen drafts through gaps in the floors'	Just clearing out air vents, or fitting an under-floor mechanical extraction system, can reduce radon levels well. If a house has carpet with underlay across much of the ground floor, then usually an under-floor mechanical ventilation system can achieve an even greater reduction
Aesthetic features 'Fans and pipe work associated with radon remediation will detract from the beauty of a building'	To reduce the visual impact of pipe work from a radon sump system, consider fitting a low-level outlet sump system, as these do not necessarily have any pipe work or fans visible. Positive pressure systems can also be visually unobtrusive when fitted in a loft space or cupboard. Under-floor mechanical extraction systems can be fitted inside existing vents with very little detrimental visual impact
Conservation 'Fitment of measures will be refused by conservation regulatory bodies'	Older houses are often bought and sold because of their aesthetic features. If a building is listed or is in a conservation area, the relevant regulatory body should always be contacted before commencing remediation. Generally, local authorities do not object to radon remedial measures being fitted sympathetically
Environmental constraints 'Older properties may have established wildlife habitats/species, such as bats in the roof, which will affect what radon remediation measures can be fitted'	As always, regulatory bodies should be informed beforehand. If measures are fitted with consideration of the wildlife identified, there should be no difficulties. For example, if a bat's summer roost is present in a loft, the fitting of a positive pressure fan should be undertaken during winter to avoid disturbing it

Jerry Board is a radon remediation consultant with over 20 years of experience, including successful remediation of homes with very high radon levels (over 10,000 Bq m^{-3}) and successful remediation of many building types including those mentioned above. The information in this article represents his experience and views.

POINTS OF CONTACT

www.UKradon.org provides general information on radon, and also an estimate of the probability that an individual property in Great Britain is above the Action Level for radon.

Radon Survey
Centre for Radiation, Chemical and Environmental Hazards
Health Protection Agency
Chilton, Didcot, Oxon OX11 0RQ
Tel: 01235 822622
email: radon@hpa.org.uk
www.hpa.org.uk/radon

BRE
Garston, Watford WD2 7JR
www.bre.co.uk/radon

Health and Safety Executive
Health Directorate B6
Rose Court, 2 Southwark Bridge
London SE1 9HF
Tel: 020 7717 6854
www.hse.gov.uk/radiation/ionising/radon.htm

Welsh Assembly Government
Department for the Environment, Sustainability and Housing
Cathays Park, Cardiff CF10 3NQ
Tel: 0300 060 3300

Industrial Pollution and Radiochemical Inspectorate
Northern Ireland Environment Agency
Gasworks Business Park, Belfast BT7 2JA
Tel: 028 9056 9299
email: IPRI@doeni.gov.uk
www.ni-environment.gov.uk/pollution-home/radiation/radon.htm

Scottish Executive Development Department
Housing Division 1
First Floor East, Victoria Quay
Edinburgh EH6 6QQ
Tel: 0131 244 5575

Radon South West Committee
Secretary: Gerald Hudd
Malabar, Hillfarrance, Taunton
Somerset TA4 1AW
Tel: 01823 461095
email: gerald.hudd@sky.com

Derbyshire Radon Steering Group
c/o Environmental Health Department
Derbyshire Dales District Council
Town Hall, Matlock, Derbyshire DE4 3NN

The Radon Council Limited
PO Box 39, Shepperton
Middlesex TW17 8AD
Tel: 01932 221212
email: info@radoncouncil.org
www.radoncouncil.org

Laboratories validated by the HPA for making measurements of radon concentrations in homes are listed at: www.hpa.org.uk/radonvalidation

For a risk report where there is no valid postcode, the building footprint is larger than 25 m or for plots of land, visit shop.bgs.ac.uk/Georeports

New Scotland radon map published

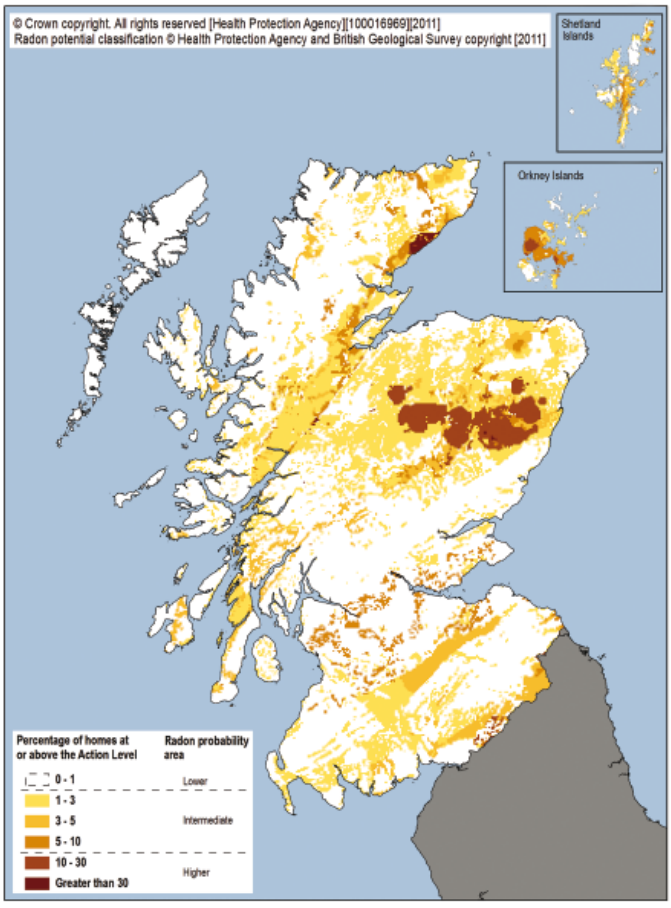
Digital mapping techniques have enabled the Health Protection Agency (HPA) and the British Geological Survey (BGS) to produce a new radon map of Scotland. Two years ago the HPA produced a radon map of Scotland based on measurements in homes (see *ERN* Issue 60). Since then HPA staff have worked closely with BGS colleagues to produce a more accurate map*.

The Scotland radon map shows that the main areas with elevated radon continue to be parts of Aberdeenshire, Highland and Orkney. The new map shows the increased potential for radon exposure in some wider rural areas than were seen in the 2009 map. It also identifies a number of pockets of elevated radon potential in the central belt of Scotland.

The new technique has led HPA scientists to estimate that between 2000 and 5000 Scottish homes could have radon concentrations above the radon Action Level where work would be recommended to protect occupants – a rise on the numbers predicted previously.

The report presents work carried out jointly by the HPA and BGS and is based on the results of measurements of radon in over 19,000 homes. The method allows variations in radon potential both between and within geological units to be mapped. The resulting digital map, which defines radon Affected Areas in Scotland, includes much more detail than could be shown in an atlas. The full detail is published as a dataset for Geographical Information Systems, which can be licensed from the BGS.

The estimated radon potential for an individual home can be obtained through the website, www.ukradon.org. The atlas presented in the report is a simplified version of the map, so is indicative rather than definitive: that is, each 1-km grid square is coloured according to the highest radon potential found within it.



Overall map of radon potential in Scotland

* Miles JC, Appleton JD, Rees DM, et al (2011). *Indicative Atlas of Radon in Scotland.* Chilton, HPA-CRCE-023. Available at www.hpa.org.uk

Radon in homes in England and Wales: 2010 data review

The Health Protection Agency (HPA) has published a review of radon in homes in a report that summarises the data from radon measurements in over 480,000 homes in England and Wales. The data are given by administrative unit, National Health Service (NHS) area, and divisions of the Royal Mail postcode system. The report predicts that the total number of homes at or above the Action Level in England and Wales is between 100,000 and 200,000.

The report, *Radon in Homes in England and Wales: 2010 Data Review,* HPA-CRCE-015, by Dave Rees and colleagues, is available for free download or to buy from www.hpa.org.uk. The HPA also offers large-scale (up to about A1 size) laminated radon maps for sale either as published map plates, or for bespoke areas (see *ERN* Issue 62).

Evaluation and equity audit of the England radon programme

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The Health Protection Agency (HPA) has undertaken a health equity audit of its England radon programme for homes (Chow et al, 2011; Zhang et al, 2010). The research identifies factors that influence the likelihood of individual homes being remediated to reduce radon levels.

The audit evaluates whether the radon programme meets the needs of those most at risk from the adverse health effects of radon (eg high levels of radon, long exposure and exposure to cigarette smoke). The programme was reviewed at the individual-home level using a questionnaire sent to all householders in the radon database for England with a measured radon level at or above the UK domestic Action Level (200 Bq m^{-3}) and where the measurement was made between 2001 and 2006.

Government radon control strategy to limit radon risk to health is a devolved responsibility, so strategies vary slightly across the UK. They involve the provision of statutory standards for radon protective measures in new buildings (building regulations) and programmes of encouraging radon measurement and remediation in existing dwellings in high radon areas. Strategies for assessing risk from radon in workplaces are included under legislation on the management of health and safety at work.

Questionnaires were sent to 8834 householders between July and September 2006, of which 49% were returned. No systematic differences were found between responders and non-responders based on the measured radon level.

For non-remediators, the reasons cited for not carrying out remedial work to lower their radon risk are given in the table. Those with the highest measured radon levels (at or above 800 Bq m^{-3}) were more worried about the cost of remediation than those with lower measured radon levels.

The great majority of respondents rated the information on radon and its risks provided in the radon programme to be clear or very clear (84%) and useful or very useful (65%). This influenced their willingness to carry out remediation, with a clear trend between those finding the information clear and useful with those who took action. Where people found the information, practical advice and support useful, they were nine times more likely to remediate than those who did not. Householders receiving a grant were also significantly more likely to remediate (16 times more likely) than those who did not.

Of the 4326 householders who responded to the survey, 30% have done some remediation work to reduce their indoor radon levels, with the majority of these (88%) doing so within 18 months of receiving the radon test result and the majority (79%) spending less than £1000 on the work.

The audit found that those householders most likely to remediate have higher incomes and higher socioeconomic status, eg householders who have job types of professional, managerial and technical are more likely to remediate than unskilled or partly skilled workers. This could be due to different levels of income, or simply due to better understanding and awareness of the health risk from radon exposure by those in the higher socioeconomic groups.

Householders are least likely to remediate if:

- the property has a higher radon concentration
- they have lived in the property a long time
- the household includes a current smoker
- the household includes an unskilled or unemployed worker
- they are elderly and living alone.

Householders with higher radon levels are more likely to worry about the cost of the work, while smokers and householders living in the same property for many years are less likely to believe that radon poses a real health risk. This research emphasises the importance of communication with householders, as well as with local stakeholders (mainly local authority staff in housing and environmental health departments) who can engage the general public, disseminate information and raise awareness of the health risks from radon. Public information about radon risk, measurements and remediation needs to be clear and understandable by the target population.

The HPA has already updated its programme strategy for measurement and remediation of homes in light of this and other ongoing reviews, providing more information on those remediation methods most likely to be effective in reducing radon levels, including guidance on their likely costs. It has also updated radon information for the public, and continues to do this, to make the information as accessible and as available as can be to all.

In addition, remediation specialists may find it useful to provide clear pricing structures and details of likely, possibly minimal, disruption to householders in their literature, websites and communications with prospective new clients.

Reason for not remediating	Number of responders choosing this reason	% of total responders
Worried about the cost of the work	1540	61.5
Deny it is a health risk	676	27.0
Inconvenience/disruption of having work done	608	24.3
Feel the work would be ineffective	598	23.9
Difficulty in finding someone to do the work	315	12.6
Other	215	8.6
Work planned within next six months	109	4.4
Landlord has refused to pay	39	1.5
Total responders	2503*	

* Not the sum of total responses, as some householders gave more than one reason.

References

Zhang W, Chow Y, Meara J and Green BMR (2010). Evaluation and equity audit of the domestic radon programme in England. *Health Policy*, doi:10.1016/j.healthpol.2010.09.016

Chow Y, Meara J, Green BMR and Zhang W (2011). *Evaluation and Equity Audit of the Domestic Radon Programme in England*. Chilton, HPA-CRCE-013. Available at www.hpa.org.uk

Readers' survey response

Thank you to the many readers who submitted a response to our reader survey, featured in our previous issue, Autumn 2010.

Your responses were very positive on both the content and frequency of issue. We intend to resume production of this newsletter with our usual quarterly publication dates.

Since the previous issue, we have been considering how we can deliver the newsletter in ways that ensure all our readers can access it in a way that suits them, whilst meeting the evolving and challenging constraints on communication and printing that were introduced by the new government in 2010. If you haven't already subscribed to receive this newsletter by email direct from the HPA, please visit the website www.ukradon.org/ern to be informed when the latest issue has been published and is available online.

It's great to be back and, as ever, there are lots of interesting and important radon stories to tell.

UK National Radon Forum 2010

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The Health Protection Agency (HPA) hosted the 2010 UK National Radon Forum at its Centre for Radiation, Chemical and Environmental Hazards (CRCE), Chilton, Oxfordshire, on 23 November 2010. There were sessions on the latest radon research, national programme updates, and radon remediation.

The forum was opened by Dr Jill Meara, CRCE Deputy Director and Public Health Consultant (HPA). Neil McColl (HPA) outlined the latest HPA advice on limiting exposure to radon (see also *ERN* Issue 64). The purpose of the HPA advice is to reduce the highest radon exposures to individuals and to reduce overall radon exposure across the UK. The advice emphasises that there is no 'safe' threshold limit for radon exposure below which the risk is zero, but rather that the risk from radon increases as radon exposure increases.

Jason Greatbanks (Dorset County Council, DCC) and Tracy Gooding (HPA) gave a 'lessons-learnt' review of phase 1 of the HPA schools radon programme in England. DCC decided to measure all its schools in radon Affected Areas as well as those within a 1-km boundary of an Affected Area. In total, 260 sites were identified as requiring radon measurements. Some of the lessons noted are to ensure written media statements are drafted early, to consider the timing of reporting results, and to ensure adequate council liaison staff-cover during summer holidays.

Wouter Poortinga (Welsh School of Architecture, Cardiff University) presented a population-based evaluation of the effectiveness of the HPA domestic radon programme. The work involved 100 face-to-face interviews in 15 English and Welsh local authorities, as well as an Ipsos MORI poll of 1578 people between October and December 2008. He found that awareness of radon in Affected Areas is sometimes only at a superficial level, so that many people have an unrealistic view that their home is not affected by radon. However, he also found that the HPA programme raises awareness of radon, provides relevant information about the health risks from radon and motivates people to test for radon.

Sue Hodgson (HPA) gave forum attendees a preview of her analysis of the effectiveness of various radon remedies. Her report, entitled *An Analysis of Radon Remediation Methods,* HPA-CRCE-019, has now been published. It is available for free download or to buy from the HPA website www.hpa.org.uk.

Chris Scivyer (BRE) gave a very useful presentation on why some radon solutions are not fit for the specific location or can be incorrectly installed, such as water getting into improperly fitted sump fans which subsequently become noisy as the entrapped water sloshes about.

Lee Wagland (Cornwall Council, CC) spoke about the additional care and advice given to householders with high radon levels (at or above 10,000 Bq m^{-3}) in Cornwall, including close liaison with the HPA, local NHS (primary care trust), directors of public health, BRE, and remediation contractors, with CC acting as the central point of contact for all.

Jerry Board (see his article in this issue), spoke on successful remediation of homes with very high radon levels. He gave examples where alternatives to the sump and fan (most often used for remediating very high levels) are needed.

Daryl Dixon (HPA) presented a radon remediation case of a Grade I listed stately home, with remedial works by Ralph Clayton from Clayton Associates and Fred Moughton from the National Trust. The building is a home, a workplace and a place visited by members of the public, some of whom volunteer on the estate.

Phil Hancock (Glencoe Radon Gas Centre Ltd) gave a valuable and practical talk on his experience of remediating a variety of large non-domestic properties.

As well as the formal presentations and discussions, forum attendees had the opportunity to view trade stands and exhibits from Airtech Environmental Systems, JR Board, Glencoe Radon Gas Centre Ltd, ProTen Services Ltd and NPS South West Ltd, and visit the HPA radon laboratory facilities.

The 10th UK National Radon Forum will be held on Wednesday 30 November 2011, at HPA CRCE Chilton. If you are interested in attending the next forum please email or telephone the Radon Survey at HPA CRCE (see Points of Contact, page 2).

New HPA radon training course

The Health Protection Agency is now offering a two-day radon course to meet the needs of the many professionals who require more than a superficial knowledge of radon. The course will be of interest to a wide range of professionals, such as environmental health and building control officers, housing association and commercial landlords, public health practitioners and radiation protection advisers.

The first course will be held on 24–25 October 2011 at the HPA Chilton Training Centre. Further details can be found at www.hpa-radiationservices.org.uk/rpts/.

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