Environmental Radon Newsletter

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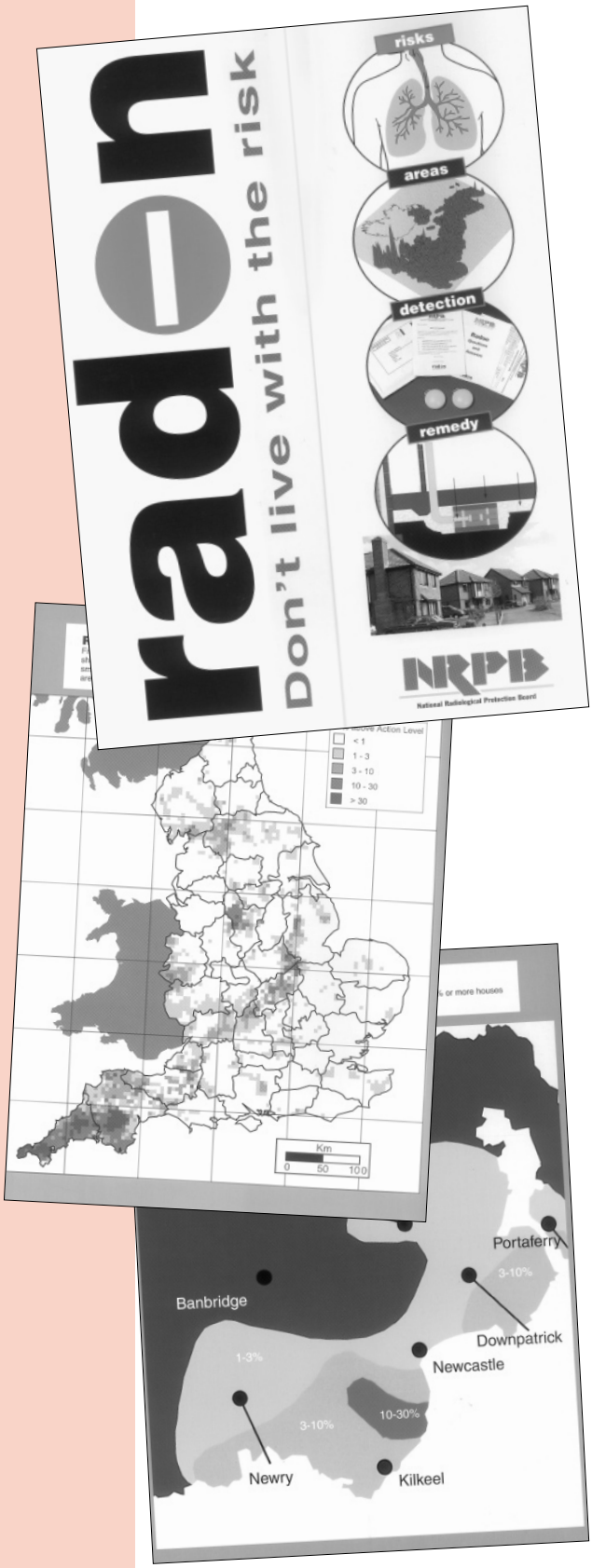

Housing Professionals

A campaign has recently been mounted by NRPB to provide essential information about radon in the home to professional groups, such as solicitors, estate agents and surveyors. The centre-piece is a new leaflet with a coloured, A4-size map of England which gives the probability of finding high radon levels in each 5 km square of the Ordnance Survey grid. Other information given in the leaflet includes a summary of the risks from exposure to radon, typical costs of remedial measures and where to go for further information.

Courtesy copies have been sent to over 5,000 companies, including solicitors, estate agents and surveyors as well as local authorities in the most radon-affected areas. A special version of the leaflet was prepared for the radon awareness week in the southeast of Northern Ireland (see page 4 of this newsletter), showing the probability of houses being above the radon Action Level in that area.

Intercomparison Results

In 1997 the seventh European intercomparison of passive radon detectors took place at NRPB, sponsored by the European Commission. The purpose of this series of intercomparisons is to ensure high standards of radon measurement throughout the European Union. Sixty two radon measurement laboratories submitted 74 sets of 40 passive detectors each. After exposure to radon the detectors were returned to their originating laboratories for assessment. Participants reported the estimated exposure for each detector before they were notified of the exposures given to the detectors. The intercomparison included three different laboratory exposures.

The results of the intercomparison are to be published by the European Commission. All of the eight laboratories validated for domestic radon measurements in the UK took part, and the results from all of them met the validation standard.

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Radioactive Minerals

Daryl Dixon, *National Radiological Protection Board*

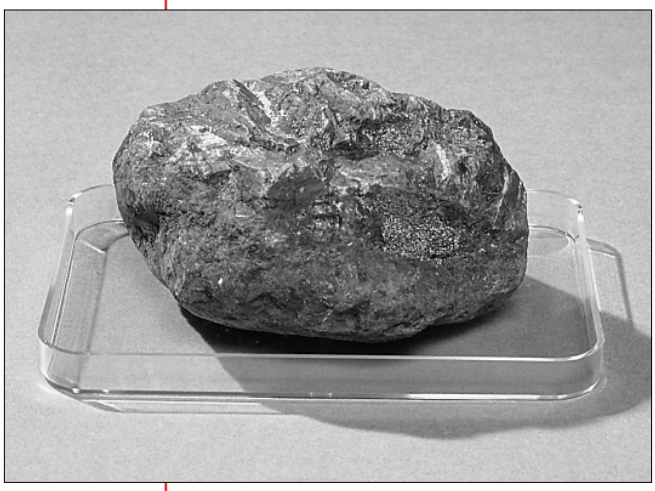
High quality specimens of various minerals are much sought after by collectors. Minerals formed from compounds of uranium are of particular interest since they occur in a wide range of interesting and attractive forms. The question then arises as to whether collections of such specimens are a radiation hazard to the collectors and their families. Three sources of hazard might be present: direct radiation (gamma rays and alpha particles), ingestion of minerals and emission of radon.

The ultimate source of radon indoors is the small amount of uranium that is present in all rocks and soils. Most of the radon in buildings comes from the ground underneath, with only a small contribution from the construction materials. The amount of uranium in most rocks and soils is relatively low, but granites may have twenty times the uranium concentration of other rocks. Householders are sometimes worried about the use of granite for construction or decorative purposes in houses, but it has been found that this is only a minor contributor to indoor radon levels.

Much higher levels of activity can occur in rocks in mineralised veins or deposits. In areas of the country with a history of mining activity such as Cornwall or Derbyshire specimens can sometimes be found in mine spoil heaps or old mine workings. An example of a mineral specimen found in surface debris is shown in the Figure.

Primary uranium minerals, of which the most common is uraninite, occur as dense, hard formations which are highly radioactive. Most specimens generally weigh 0.1 kg or less, but much larger samples are held in some museums. There can be a significant gamma ray hazard from larger specimens. In addition, dose rates to the skin can be very high if specimens are picked up. The amount of radon emanated by small specimens is not enough to cause concern, but keen collectors who store large quantities of material indoors may be exposing themselves and their families to significantly increased radon levels. This can be avoided by storing such collections in a garage or shed.

Various attractive minerals are produced by weathering of primary minerals and subsequent deposition in altered chemical forms. These secondary minerals usually occur as crystalline or powdery deposits, often yellow or green, on a substrate of ordinary rock. The amounts are usually quite small, but the minerals are often very friable, so activity can easily be removed by abrasion during handling. Frequent handling of specimens could lead to significant intake of radioactivity. Direct handling of specimens should therefore be minimised, and intake avoided by washing hands after contact or by wearing gloves.



Radioactive mineral found in spoil

Similar issues arise with professional collections, where specimens are likely to be of higher quality and more numerous. The requirements for protection of employees under the Ionising Radiations Regulations mean that museums holding such specimens need radiological protection to be a routine element of their health and safety programme. Practical measures to minimise exposures usually include the development of formal procedures for source management and sometimes ventilation or shielding of specimen stores.

Underfloor Ventilation Remedies

Paul Welsh, *Building Research Establishment*

High radon houses which have suspended timber floors over bare soil are amongst the most problematic to remedy. Because sumps are usually inappropriate, remedies are often centred on the adjustment of underfloor ventilation, either by mechanical or natural means.

Increased underfloor ventilation has in many cases been very successful. However, effectiveness has been found to vary widely from house to house, and some installations have been found to be unacceptable because of problems of noise or draughts. The uncertainty of success and possible problems of increased ventilation can put people off installing measures.

To help resolve this problem the Department of the Environment, Transport and the Regions (DETR) contracted BRE to investigate remedies suitable for timber floored dwellings. BRE therefore purchased a house in Devon which has a high indoor radon level, and developed it into a full-scale test facility. The aim of the project was to further the development of underfloor ventilation remedies and increase the confidence in and acceptability of the solutions. This article briefly discusses the results of trials in the house, focussing on the impact of different remedies on the average indoor radon level.

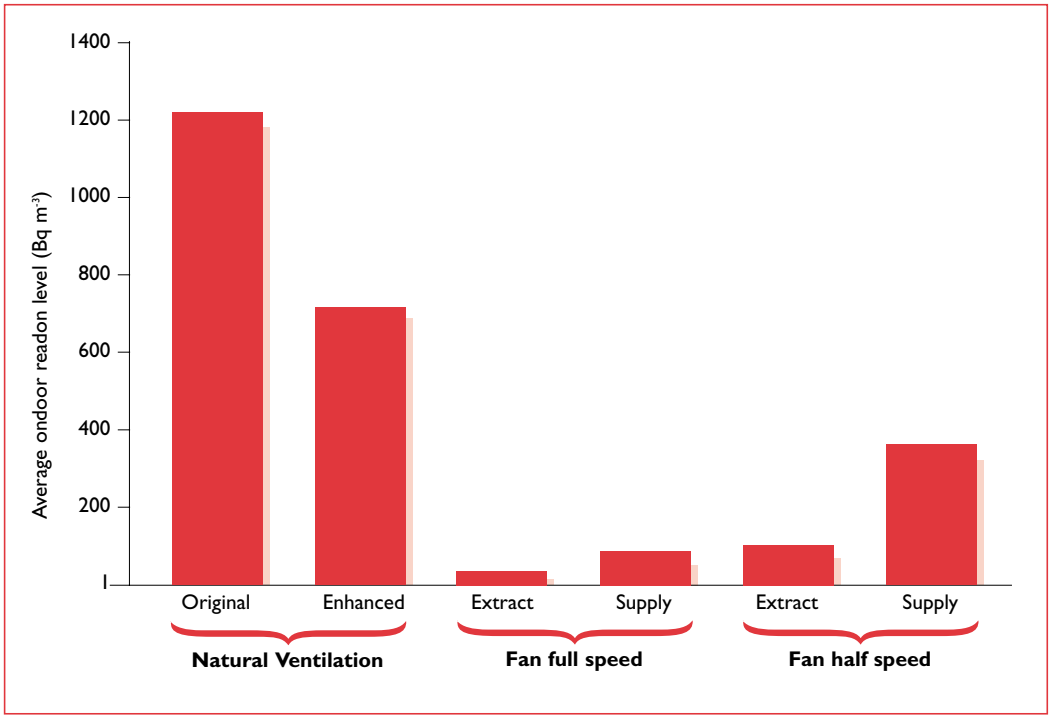
As can be seen in the figure, the average indoor radon concentration with the original level of natural underfloor ventilation was about 1200 Bq m^{-3} Enhanced natural underfloor ventilation reduced this to about 700 Bq m^{-3}. For mechanical underfloor ventilation using maximum fan flow, extraction of air reduced the radon level to around 35 Bq m^{-3} and supply of air reduced it to about 100 Bq m^{-3}.

The difference between extract and supply ventilation is much larger when using lower fan flows, extract giving about 90 Bq m^{-3} as opposed to almost 400 Bq m^{-3} for supply. This is a very important finding and has major implications. Not only does it mean that smaller, lower powered fans can be used, resulting in lower running costs, but also that systems can be made more acceptable: less flow causes less noise and draught. The latest BRE tests (results not given here) show that two fans positioned on opposite sides of the house can give large radon reductions at very low extract flows. This further increases the chances of occupant acceptance and system effectiveness.

The message from the BRE test house research is therefore that:

- Extract appears slightly more effective at large flow rates
- Extract is much more effective than supply at lower flow rates
- Using two fans on opposite sides of the building, both with very low extract flows, can prove very effective at reducing high radon levels, with the added benefit of low running costs and low noise levels.

For further information on this project please contact Chris Scivyer at BRE, on 01923 664718.



Effectiveness of different underfloor ventilation remedies

Northern Ireland Roadshow

Robert Larmour, *Northern Ireland Environment and Heritage Service*

The Radon Roadshow took place over the week of 15 to 19 September 1997 and covered 5 towns in the South Down area where high radon levels have been found in houses. The Environment and Heritage Service caravan was used, manned by staff from that Service and by Building Control staff from Newry and Mourne District Council. Various radon publications were available to hand out to the general public, including three new booklets and one new leaflet. Large scale maps of the radon affected area were on display to enable householders to identify their own locations.

A total of 411 people visited the caravan and sought advice on radon remedial measures and 121 (29%) requested a free test. The breakdown is shown in the table.

Town	Visitors per day	Free tests
Annalong (½ day)	12	7
Kilkeel	103	27
Newry	150	36
Warrenpoint	97	41
Rostrevor (½ day)	49	10
Total	**411**	**121**

The response from the public was generally favourable, but some were hesitant about coming into the caravan because they thought we were selling a new form of heating and cooking gas! Once it was explained what radon gas was, the public were quite willing to discuss matters. Other people were on holiday and did not come from the designated radon area, but still took an interest in the subject.

Of the 71% not applying for a free test, many already had their dwellings tested and were below the action level. A few were undertaking remedial work, and others were not prepared to spend their own money and enquired about grant availability. It was interesting to note the reaction of the different age groups. Many elderly people said they were too old to worry about radon but the younger generation, especially mothers with young children, were concerned about the increased risk resulting from living in a radon affected area.

To coincide with the Roadshow on Wednesday 17 September, a seminar on 'Radon Remedial Measures for Existing Dwellings' was held in the Arts Centre, Newry. This was open to the public, builders, architects and all other interested people and was well attended.

The seminar was chaired by Ken Ledgerwood, Chief Industrial Pollution and Radiochemical Inspector from the Environment and Heritage Service. Other speakers included Martyn Green, NRPB, Noel Adamson, Chief Building Control Officer, Newry and Mourne District Council, and David Bell, EHS. Representatives from the building supply industry gave papers on positive ventilation and sump extraction as possible remediation measures.

At the end of the week we were convinced that much more effort is required to educate the public on radon issues and especially the need to take remedial action. Perhaps the publicity material used to date has been too technical.

Overall, we were encouraged by the response to the Roadshow. It gave us a chance to meet the public in the radon affected area and it is our intention to repeat the exercise in other parts of Northern Ireland during 1998.

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.