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Changes in radon affected areas

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The first map of radon Affected Areas in the UK covered just Cornwall and Devon, and was published in 1990 by the National Radiological Protection Board (now part of the Health Protection Agency, HPA). Since then, as more radon measurements were made and mapping methods were refined, other areas of the country have been covered, and in greater detail. Each time one map supersedes another, there are changes, with some areas newly designated as being Affected Areas, and some losing that designation. This is inevitable as more data become available: the first map was based on the results of measurements in 8,200 homes, and we now have half a million results for the whole UK.

We at the HPA and the British Geological Survey (BGS) produce radon maps that provide the best advice on radon risk that is available at the time, based on the data available and the mapping methods developed. However, no map is perfect, and there is always room for refinement when new data is collected or better mapping methods are developed. But we also recognise that it is important to avoid frequent changes to the maps, and so we only alter them when we can significantly improve them.

The new radon maps of England and Wales (see Environmental Radon Newsletter 51) contain much more detail than previous HPA maps of radon Affected Areas, because of the division of each grid square according to the underlying geology. Most of England and Wales has previously been mapped by 5-km grid squares. One 5-km square may contain more than a dozen combinations of bedrock and superficial geology, each with a different estimated percentage of homes above the Action Level. A grid square that, taken as a whole, is below the threshold for Affected Areas may well have some parts of it above that threshold, when the full detail is revealed. When this occurs in urban areas, this can affect significant numbers of houses.

When a draft of the new radon map of England and Wales was completed, many detailed changes in radon Affected Areas were evident. HPA and BGS therefore compared the new map with the previous radon map, and noted areas where there were unexpected or significant differences. The reasons for the differences were then investigated to determine whether the changes were explicable and justifiable.

In one area, investigation showed that a student Environmental Health Officer had carried out a survey of radon in homes, and had arranged for those houses with higher radon results to be remeasured by HPA. Inclusion of only the high radon houses from his survey in the data for mapping had caused a bias in the map. These results were therefore deleted from

the database, and the area remapped, reducing the radon Affected Area locally.

In the vast majority of areas investigated, however, it was found that the radon potential shown on the map was explicable in terms of the underlying geological units, and the radon concentrations found in houses on those units. For instance, it was initially surprising to find some radon Affected Areas in the Greenwich area of London.

Investigation of the cause of this showed that there are occurrences in

Greenwich of geological combinations known to result in a greater than 1% probability of indoor radon concentrations above the Action Level. One of these is the White Chalk Group covered by Head, which are locally derived superficial deposits formed under periglacial conditions.

It should also be remembered that the definition of a radon Affected Area is a part of the country with a 1% probability or more of present or future homes being above the radon Action Level. Affected Area status is therefore a cautious marker of areas where further investigation is warranted. The great majority of homes in such areas will not have high radon concentrations.



Variation in radon potential within a 1-km grid square

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For many years, the Radioactive Substances Division (RAS), of the Department of Environment, Food and Rural Affairs (Defra) maintained a contact point on radon in homes. In April 2005, responsibility for radon in homes in England passed from RAS to the Radiation Protection Division of the Health Protection Agency (HPA). Despite this change, RAS continued to fulfil the role of providing radon information via a widely published telephone number.

However, at the end of July 2007 RAS, along with other parts of Defra, moved offices and the radon information number ceased to function. It is therefore important that the Defra number (0207082 8497/8498) is no longer promulgated as a radon information source and that literature containing it is no longer made available.

The Defra number should be replaced with those operated by HPA. These are:-

01235 822622 Manned during normal working hours but diverts to a voicemail during busy periods and outside working hours.

0800 614529 A free 24 hour answer-phone for people to leave their name, address and postcode to receive a free information pack.

A wealth of radon information is also available on various websites:

www.hpa.org.uk/radiation/radon

Information on radon risks, mapping, radon measurements, and many other radon topics including copies of this newsletter, from HPA

www.bre.co.uk/radon

Guidance on radon remedial measures for existing buildings and preventive measures for new buildings from the Building Research Establishment

www.ukradon.org.uk

Facility for finding the estimated probability of radon problems in individual houses, from HPA and the British Geological Survey (website not yet operating at the time of writing)

www.bgs.ac.uk/radon

Information on whether building sites require radon preventive measures from the British Geological Survey

www.hse.gov.uk/radiation/ionising/radon.htm

Guidance on legal requirements and control of radon in workplaces from the Health and Safety Executive

www.ehnsi.gov.uk/pollution/radiation/radon.htm

Information about radon in dwellings in Northern Ireland from the Environment and Heritage Service of the Northern Ireland Department of the Environment

Assessing the need to test workplaces for radon

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The treatment of radon in dwellings and in workplaces is similar in many ways. There is, however, one important difference with workplaces: regulatory control. Regulations cover workplaces from the initial radon hazard assessment to the long-term maintenance of any mitigation systems. Previous issues of the Environmental Radon Newsletter have discussed the best ways of monitoring a workplace, but strong support is also needed at the initial stage: arranging a test.

A great deal of progress has been made in raising radon awareness by the publication of information leaflets aimed at employers, and the targeted Health and Safety Executive/Local Authority campaigns in specific areas with higher radon concentrations. Employers are required to undertake a hazard assessment under the Management of Health and Safety at Work Regulations 1999, and act upon the results of that assessment, which in many cases means conducting radon measurements.

Falling at the first hurdle

Who needs to do a radon test in the first place? In an ideal world, employers would carry out radon screening measurements in all areas of the country, and a few larger employers have chosen to do this, which we call *reassurance monitoring*. Usually, however, attention is targeted on areas where measurements are most likely to reveal high radon levels. In short, this means the radon Affected Areas that have been declared for homes. Although alternative maps exist, such as those in the Building Research Establishment's guidance for new buildings, the Affected Area maps provide the best guide. When the new radon map of England and Wales is published, the confusion that arises from the disparate sources of information will be resolved.

One small problem that remains is that the geographical position information for workplaces is less complete than for homes, and is complicated by the sheer size of many premises. With this in mind, some employers might prefer to use the data presented in the new indicative map rather than the full detail provided on the ukradon.org website.

What's the storey?

The published advice for workplaces normally relates to ground floor rooms. From data collected in workplaces it is clear that basements have a higher radon potential than ground floors, and that high radon concentrations can be found in basements anywhere in the country, regardless of Affected Area

status. This is especially relevant for the banking and pub sectors where basements are common.

Conversely, first floor and higher storeys have a reduced radon potential. Our policy of concentrating on ground (and lower) floor radon measurements means that limited data exist for workplaces on upper storeys. We know from house measurements, however, that the average radon concentration on the first floor is 43% lower than on the ground floor. In round terms, this means that the radon gas potential is likely to shift down a band as you go up a storey. For example, if the ground floor radon potential is 3-5%, the first floor radon potential may be 1-3%. Business premises whose lowest storey is above ground level should not be ignored, particularly in the highest radon areas, but higher priority premises may exist downstairs. Exceptions to this pattern may exist where there are unusual ventilation conditions, such as extensive ducting and forced ventilation.

Future work

As more workplace data are gathered, opportunities for further analysis become available. Two main areas of interest are whether seasonal correction factors for workplaces are significantly different from those for houses, and whether there is a systematic difference in the radon potential between different workplace types within the same geographical area.

Lastly, the conclusions above may be overridden by local political priorities, such as providing radon protection for schoolchildren or for people who have very high occupancy in workplaces such as residential homes.



Testing holiday homes in radon affected areas

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There is some confusion over whether it is necessary to measure radon concentrations in holiday homes in radon Affected Areas. The standing advice from the Health Protection Agency (HPA) is that all homes in these areas should be tested. However, the risk to health from radon depends on the length of the exposure, as well as on the radon concentration. If the owners spend only a small percentage of their time in their holiday home, the radon there will generally make little contribution to their overall exposure, most of which will come from their permanent residence and their workplace. Nevertheless, many people want to have the radon concentration checked in their holiday home.

A three-month radon measurement is used to provide the householder with an estimate of the long-term average concentration of radon in a building. There is a common misconception that as long as the owner can place radon detectors and remove them after three months, they do not need to be in residence for the duration of the test. This is not the case, because both heating and ventilation affect radon concentrations. The heating in an unoccupied property is normally turned down to a low level or turned off, and the ventilation reduced by shutting all windows and doors. Reducing the heating level reduces radon concentrations, because warm air rising indoors draws radon into a building. On the other hand, reducing the ventilation rate in a property will allow the radon concentration to build up. It is impossible to predict which of these mechanisms will predominate for an individual property.

If a holiday home is occupied for a prolonged period, for example over the summer holidays, this provides a good opportunity for a valid, three-month test. Otherwise, if a measurement takes place when the home is unoccupied, the result will be less reliable as a guide to the radon concentration during occupation.

The degree of occupancy is therefore an important factor when it comes to deciding whether or not to recommend a test when asked. From a health protection standpoint, the greater the amount of time spent in the holiday home, the more the radon concentration in that home will add to the cumulative dose and the greater the need to test. Equally, sustained occupation during the measurement



period produces a more reliable result. This does not mean that low-occupancy holiday homes should never be tested. Providing the result from a low-occupancy home is treated with caution and used only as a general indication as to whether or not the concentrations are high, the test can still be useful.

Advising people who are buying holiday homes can be difficult. Because the results of radon measurements in holiday homes carry greater uncertainties than those in permanent homes, it may be difficult to decide whether any radon remedial works should be paid for out of money retained from the purchase price (often referred to as a radon bond - see Environmental Radon Newsletter 34).

To find out whether a property is within a radon Affected Area, the Radon Atlas of England and Wales (Report NRPB-W26) can be downloaded from the HPA website, www.hpa.org.uk/radiation. In addition to checking whether their holiday home is within a radon Affected Area, householders should check whether their permanent address might also be in such an area. They may also wish to make enquiries about monitoring at their place of work, if it is within a radon Affected Area.

For a copy of our free information pack about radon please leave your name and address on our freephone number 0800 614529. You can e-mail the Radon Studies Group at radon@hpa.org.uk, alternatively you can call on 01235 822622 Monday-Friday 8.30am – 4.30pm.

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