



# Office of Environmental Health and Pollution Regulation

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## Radon Survey 2012 - Guernsey

### Introduction

This report provides the results of the radon survey undertaken in 2012 and includes a discussion of the impact of radon on human health.

Over the last few years, concern has been raised by members of the States and several members of the public about radon risks. This report will address those concerns.

This work has been done in partnership with the UK Health Protection Agency (HPA). The contribution of the Radiation Protection Division of the HPA is acknowledged, with particular thanks to Jane Bradley, who has supported several of the recent surveys in Jersey.

The 2012 survey was carried out across the Channel Islands as a joint initiative.

Historically there were radon surveys in Jersey in 1987, 1992 and 1997, and in Guernsey there was a survey in 1985. In 2012 tests were also carried out in Herm, Alderney and Sark.

### Radon

Radon is a natural radioactive gas that is emitted in varying quantities from all rocks and soils. If it escapes from the ground into the open air, it is diluted to low concentrations and poses little risk to the public. However it can reach high concentrations if it gets trapped in enclosed spaces like caves, mines and buildings, including homes. Radon in the home delivers the largest dose to the public than any other natural source of ionising radiation. It was recognised over twenty years ago that exposure to high concentrations of radon in homes can increase the risk of developing lung cancer.

This is of potential concern in Guernsey because the geology of the island is made up of a number of different types of granite that contain natural uranium. Uranium is locked in the bedrock and radon gas is formed by the radioactive decay of the uranium. Being a gas, radon can travel out of the rock through fissures and faults and reach the surface where it becomes part of the atmosphere.

Radon gas itself is not harmful but shortly after being formed it undergoes radioactive decay forming "progeny" which are heavy particles roughly of the density of lead,

which themselves emit radiation, also through the process of radioactive decay. It is the radioactive products of decay that are harmful to human health.

For the purposes of this report the term 'radon' includes reference to all of the progeny and decay products of radon gas.

### **Health effects of radon**

A number of studies have been undertaken that have linked exposure to high levels of radon with an increased incidence of lung cancer.

It is well established scientifically that the major risk factor for lung cancer is smoking. There is also strong international scientific evidence demonstrating that people who smoke and who are **also** exposed to high levels of radon have an additional, increased risk of developing lung cancer than the risk they face from smoking alone.

Radon does not increase lung cancer risk in the short term, but the risk accumulates according to the level of radon and the length of time exposed. Exposure to smoking can take 20-30 years before it causes lung cancer; the same can be said of exposure to significant levels of radon.

The most important action anyone can take to reduce their risk of lung cancer is to stop smoking. However it is also sensible to reduce the risk from radon, alone or in combination with smoking, by sensible pragmatic precautionary measures to keep radon exposure as low as possible.

The building regulations recommend that, for all newly built homes in 'risk' areas, preventative measures fitted such as a membrane or a sump should be fitted. This means that radon does not build up in the home, even when built on radon-emitting bedrock. In most older homes, simple measures such as reasonable ventilation are all that is needed to keep the levels low.

It is estimated that 3.3% (one in every 30) lung cancer deaths in the UK are attributed to some extent to residential radon exposure.

Of the small proportion where radon has played a part in lung cancer causation, most are due to radon increasing the risk in smokers. Only a minority are due to radon acting alone – only about 1 in 100 of all lung cancer deaths are likely to be due to radon in non-smokers.

To help put the main risk factors for the commonest form of lung cancer into perspective, for every 100 cases of lung cancer around 95 will have been caused by smoking alone, about 4 will be due to the combined effects of smoking and radon exposure, and only 1 will be due to radon exposure alone.

## Radon in buildings

In 1984 the Royal Commission on Environmental Pollution (RCEP) and the International Commission on Radiological Protection (ICRP) first reported on the need for a reduction of radon exposures in homes. That report recommended the remediation of homes with high concentrations of radon and the installation of preventative measures in new homes in risk areas.

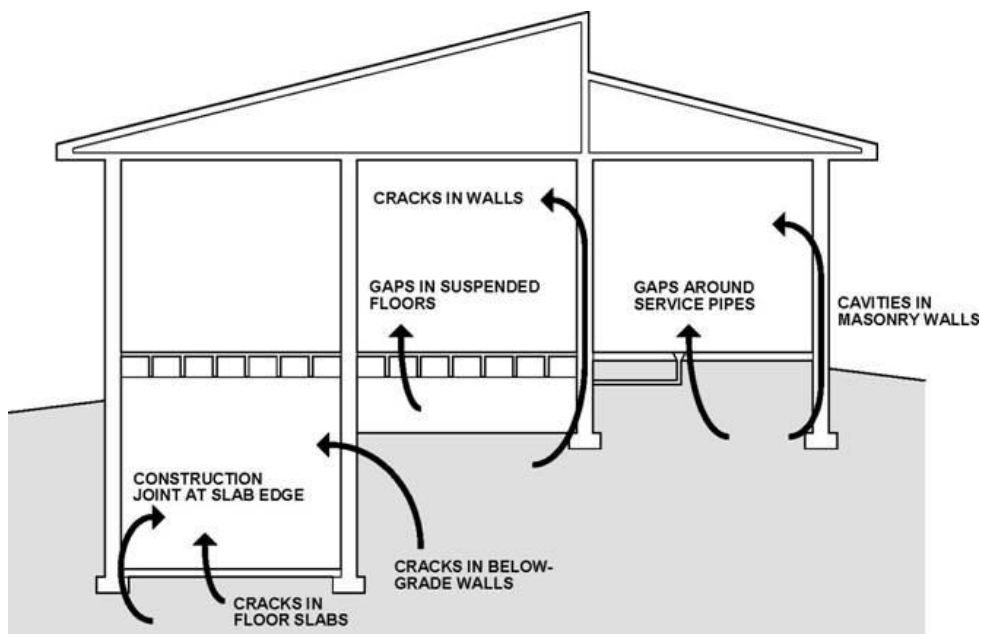
In 1990 the UK National Radiological Protection Board (NRPB), provided advice on the risks associated with radon in homes and recommended an 'action level' of 200 Becquerels per cubic metre (Bq/m<sup>3</sup>).

Measurements of radon levels in buildings are easily undertaken by placing two track etch detectors contained in small pots of about 5cm diameter, one on the ground floor and one on the first floor. These are then returned to a laboratory for analysis.

Radon enters buildings through the floor and at the sides of wall foundations. Concrete floors are not sufficiently gas proof to stop the gas passing through.

It is usual for levels to be higher in basements and cellars than ground floors and levels in first floors and above to be lower.

Concern has been raised about buildings constructed of granite but evidence from the work done in Cornwall has shown that construction granite (as against bedrock granite on which buildings are situated) makes only a small contribution to overall levels.



The situation in Guernsey is that most buildings are sited on potentially radon-emitting geology or bedrock. Occupiers of accommodation that includes ground floors may wish to consider having the radon levels in the building tested.

## **Mitigation**

Reducing radon levels in buildings can be done in a number of ways. Different methods are appropriate at different levels of radon. They include sealing the floor of a building, providing positive ventilation to pressurise the building to stop the gas entering and interrupting the flow of radon from the soil into the house by providing a ventilated sump under the floor or under floor space.

In new builds the usual approach is to install a gas proof membrane in the floor and walls and to build in a passive sump and pipe work that can be connected to a fan once the building is occupied and has been tested for radon.

## **Results of radon tests in Guernsey, 2012**

73 residents in Guernsey, Herm, Sark and Alderney returned their detectors for analysis.

None of these surveys were entirely random as premises were selected, at least in part, to cover different geological conditions or population areas.

The survey was funded by HSSD at a cost of about £3,000, and was undertaken in partnership with the UK Health Protection Agency (HPA). The survey was carried out across the other Channel Islands at the same time.

Houses were selected by staff of the Office of Environmental Health and Pollution Regulation (OEHPR). The island was divided into 1Km grid squares and a property was selected randomly in each square. Extra properties were selected in the more populated areas including St Peter Port, Vale and St Sampson's.

Properties selected for the survey were sent a pack from the HPA containing 2 radon detectors, an information leaflet and a prepaid return envelope. The detectors were placed in the bedroom and living room of each property for 3 months. At the end of the survey the detectors were returned to the HPA laboratory for analysis. The HPA then forwarded the results to the house holder and to the OEHPR.

## Guernsey test results

Number surveyed	Below target level (<100Bq/m <sup>3</sup> )	Target to action level (100-199Bq/m <sup>3</sup> )	Above action level (>200Bq/m <sup>3</sup> )
73	58	12	3

### Action taken

All occupiers of premises above the 200 Bq/m<sup>3</sup> action limit have received a letter from the HPS offering advice.

All occupiers of houses with results between the 'target level' and 'action level' (100-199Bq/m<sup>3</sup>) have received advice and an offer to smokers for free help to quit.

Businesses are recommended to include radon in their risk assessments for health and safety, the first step of which would be undertaking testing.

Occupiers of newer houses are encouraged to test their houses to check that the radon membrane is effective.

### Summary and conclusions

The 2012 Guernsey Radon Survey has shown that a minority of homes surveyed – 3 out of 73 - are above the action level for recommending remediation. These results are in keeping with previous surveys.

Radon plays a small, but significant role in the causation of lung cancer and it is worth keeping exposure to a minimum, especially in smokers. However stopping smoking is the most important means of reducing the significant risk of lung cancer that smokers face, by virtue of smoking alone.

Radon exposure at high levels (above the 'action' level) and over a prolonged period of 20-30 years does increase the risk of a non-smoker developing lung cancer, but this risk is low. However it is a risk that is relatively simple to mitigate, through adequate ventilation and measures to prevent radon build-up