

[REDACTED]  
Carillion Services  
17 Nant Alyn Road, Rhydymwyn  
Nr Mold, Flintshire  
CH7 5HQ

Your Ref: By credit card on 17/06/05

Our Ref: 1332900/RISP.ORG

20 December 2005

Dear [REDACTED]

### Report of Radon Measurements

Further to our telephone conversation, please find enclosed the Report of Radon Measurements that gives the results of the radon gas measurements taken with passive monitors.

The Ionising Radiations Regulations 1999 (IRR99) are normally applied when the average radon gas concentration in a building, when measured with a passive monitor over a three-month period in the winter, exceeds  $400 \text{ Bq m}^{-3}$  (becquerels per cubic metre of air). When measurements are taken at other times of the year, seasonal corrections can be used to determine whether the Regulations should be applied. For mines and other underground facilities, although the threshold of  $400 \text{ Bq m}^{-3}$  applies, the seasonal corrections are not used.

The results for the mine clearly exceed  $400 \text{ Bq m}^{-3}$  and the IRR99 apply. From our conversation, you stated that the mine is not occupied for more than a few hours per year. A risk assessment shows that annual doses in this case will not be significant. You need to inform the Health and Safety Inspector for this site of the results. You might be required to formalise the arrangements for access to ensure that doses from radon remain under control. These will, of course, need to be revised if the use or occupancy of the mine changes in the future.

The results for the building also exceed  $400 \text{ Bq m}^{-3}$  and the IRR99 apply. The radon level in the sump box, whilst high, indicates that it is not working adequately. You stated that it is a passive sump; I have enclosed information on active sump systems for your perusal. Once again, you need to inform the Health and Safety Inspector for this site. Ideally, continuous, regular measurements should be conducted in this building until the radon levels are lowered. Lastly, I have enclosed information sheets sent to most employers with high radon levels.

Please contact me if you would like further information.

Yours sincerely

[REDACTED]  
[REDACTED]

Enclosures: Report of Radon Measurements  
Notification to Health and Safety Inspector  
Official Notification for Employer  
Radon Interim Surveillance Package offer

Tel: [REDACTED]

e-mail: [REDACTED]

**radon**  
Don't live with the risk

## Report of Radon Measurements

Tel: 01235 822622  
e-mail: Radon@hpa-rp.org.uk

For:

[REDACTED]  
Carillion Services - Mine  
17 Nant Alyn Road, Rhydymwyn  
Nr Mold, Flintshire  
CH7 5HQ

Subject:

Measurement of radon-222 concentrations

Date of report:

20 December 2005

The concentrations of radon-222 at the locations given on the attached sheet were measured with NRPB radon gas passive monitors. The cumulative exposures recorded by the monitors were converted to concentrations averaged over the exposure time. Background corrections and calibration factors were obtained from control monitors kept at NRPB.

The table shows the average radon gas concentration at each location in units of becquerels per cubic metre of air ( $\text{Bq m}^{-3}$ ). The random uncertainties in the measurement are estimated to be 15%.

[REDACTED]  
Radon Studies Group



INVESTOR IN PEOPLE



HPA Radiation Protection Division, formerly  
the National Radiological Protection Board

## Notification of Protection Requirements Against Radon - 20 December 2005

**Carillion Services**  
17 Nant Alyn Road, Rhydymwyn  
Nr Mold, Flintshire  
CH7 5HQ

- 1 The enclosed measurement report shows that radon levels above  $400 \text{ Bq m}^{-3}$  are present in the workplace given below:

**Carillion Services**  
17 Nant Alyn Road, Rhydymwyn  
Nr Mold, Flintshire  
CH7 5HQ

Work in these premises, therefore, falls within the scope of the Ionising Radiations Regulations 1999 (IRR99) and is defined as

### *work with ionising radiation.*

- 2 The employer has a formal duty to comply with the IRR99 and should reduce the exposure of employees to radon without delay.
- 3 Until this reduction has been achieved, HPA advises continuing surveillance of radon levels with further measurements. This is described in the sheet offering the Radon Interim Surveillance Package.
- 4 There is a formal requirement to consult a suitable Radiation Protection Adviser (RPA), e.g. The Radon Studies Group at the HPA. However, as long as action to reduce radon levels is taken promptly, the steps listed below will provide an adequate level of interim protection.

### **Obligatory**

- Plan and implement work to reduce radon levels to below  $400 \text{ Bq m}^{-3}$ .\*
- Inform employees about the nature and level of risk.
- Inform local Health and Safety Inspector of results and subsequent plans.

\* If an area where the IRR99 apply is normally occupied less than **653** hours in a calendar year, you may opt to control access to the area rather than reduce the radon level. However, this would require a formal arrangement with an RPA, and incur additional costs.

### **Recommended**

- Nominate a person to arrange measurements and monitor progress of mitigation work.
- Arrange serial radon measurements (at two-monthly intervals) until radon levels are reduced to a satisfactory level.

### **Conclusions**

As the IRR99 apply, the employer is required to reduce the radon exposures of employees, and interim measurements should be started immediately. A Radon Interim Surveillance Package offered by the HPA provides a range of measures, which will assist an employer to meet their statutory obligations.

This package provides a way of assisting you to monitor the current radon exposure of your employees, keep them informed, and to implement effective radon mitigation without delay. It is expected that the process of planning and implementing the works should normally be completed within six months, during which three sets of two-month radon measurements will be supplied.

Exceptionally, the work might take longer, and in this case you will need to arrange a subsequent surveillance package. It is important that there is an uninterrupted series of measurements for the whole time that radon levels are above the IRR99 threshold. If radon levels are not reduced within twelve months, you will need to consult an RPA for additional controls. The package is as follows:

Action	Provided by Package
Information for employees	<ul style="list-style-type: none"> <li>An information sheet about radon sources and risks</li> <li>Respond to questions of concerns from management or employees</li> </ul>
Information for nominated company contact	<ul style="list-style-type: none"> <li>Ensure that the nominated contact is kept aware of the obligations</li> <li>Literature in plain English on radon sources and risks</li> </ul>
Serial radon measurements	<ul style="list-style-type: none"> <li>Arrange the radon monitor delivery and placement procedures with your nominated contact</li> <li>Send replacement radon monitors when they are due for exchange</li> <li>A priority results service</li> </ul>
Confirmation of acceptance	<ul style="list-style-type: none"> <li>A letter confirming the formal acceptance of the package, to provide evidence for management or Health and Safety Inspector</li> </ul>
Post mitigation arrangements	<ul style="list-style-type: none"> <li>Ensure that you have an adequate demonstration of reduced radon levels</li> <li>Advise you on ensuring that mitigation remains effective</li> <li>Send an annual reminder when re-check measurements due</li> <li>Maintain contact and send updated radon information when available</li> </ul>

#### Costs

The cost of this surveillance package for six months is £152.40 + VAT (£179.07), based on the supply of two radon monitors for each set of measurements. Additional monitors, if required, will be charged at £15.90 + VAT (£18.68) each.

-----detach or photocopy-----

-----detach or photocopy-----

Carillion Services  
17 Nant Alyn Road, Rhydymwyn  
Nr Mold, Flintshire  
CH7 5HQ

Ref: 1332900

Please provide me with a Radon Interim Surveillance Package as described above for our premises at **Carillion Services, 17 Nant Alyn Road, Rhydymwyn, Nr Mold, Flintshire, CH7 5HQ**; delivery arrangements to be as initial order. I enclose a cheque/official order made payable to HPA. Payment can also be made by credit card by calling [REDACTED] on [REDACTED].

Signed: ..... Date: .....



**Notification to Health and Safety Inspector**

You must send the following information to your usual Health and Safety Inspector (HSE or local council). This ensures that you are complying with Regulation 6(7) of the IRR99. The format below ensures that all the required information has been included. If any of the details are incorrect, please amend as appropriate.

**Introduction:** The following information is supplied in pursuance of Regulation 6(7) (in lieu of Regulations 6 (2) and 7) of the Ionising Radiations Regulations 1999.

**Name and address of employer:**

Carillion Services  
17 Nant Alyn Road, Rhydymwyn  
Nr Mold, Flintshire  
CH7 5HQ

**Contact name:** [REDACTED]

**Contact telephone or fax or e-mail:** .....

**Address of premises:**

Carillion Services  
17 Nant Alyn Road, Rhydymwyn  
Nr Mold, Flintshire  
CH7 5HQ

**Contact name:** [REDACTED]

**Contact telephone or fax or e-mail:** .....

**Nature of business:** .....

**Source of radiation:** An atmosphere containing the short-lived daughters of radon 222.

**Any other radiation sources:** .....

**Date of notification to Health and Safety Inspector:**.....

# Report of Radon Measurements

**Customer** Carillion Services  
**Measurement site** Carillion Services - Mine  
17 Nant Alyn Road, Rhydymwyn  
Nr Mold, Flintshire  
CH7 5HQ

Detno	Position	Date placed	Date removed	Radon gas
				concentration Bq m <sup>-3</sup>
03086782	F Waterfall	29/06/05	10/10/05	1280
03086759	Main B South	29/06/05	10/10/05	1270
03086796	Main D Centre	29/06/05	10/10/05	4260
03086780	Main D North	29/06/05	10/10/05	1200
03086754	Main Entrance Tunnel	29/06/05	10/10/05	1310
03086719	North Entrance Tunnel	29/06/05	10/10/05	1010
03086755	South Entrance Tunnel	29/06/05	10/10/05	800

# Report of Radon Measurements

**Customer** Carillion Services

**Measurement site** Carillion Services - Office  
17 Nant Alyn Road, Rhydymwyn  
Nr Mold, Flintshire  
CH7 5HQ

Detno	Position	Date placed	Date removed	Radon gas concentration, Bq m <sup>-3</sup>	
				Measured	Winter Corrected
03086791	Building 12	29/06/05	10/10/05	130	310
03086727	Building 128 Change Room	29/06/05	10/10/05	40	90
03086744	Main Office	29/06/05	10/10/05	320	760
03086749	Radon Sump Box	29/06/05	10/10/05	3400	8170
03086726	Under Tower Building 45	29/06/05	10/10/05	50	130

[REDACTED]  
Carillion Services Ltd  
17 Nant Alyn Road, Rhydymwyn  
Mold, Flintshire  
CH7 5HQ

Radon Studies Group  
Radiation Protection Division  
Health Protection Agency  
Chilton, Didcot, Oxfordshire  
OX11 0RQ

[REDACTED]  
[www.hpa.org.uk/radiation](http://www.hpa.org.uk/radiation)

Your ref:  
Our ref: 1339045/RISPRES\_CDIS

27 November 2006

Dear [REDACTED]

**Report of Radon Measurements**

**Carillion Services Ltd - Office, 17 Nant Alyn Road, Rhydymwyn, Nr Mold, Flintshire, CH7 5HQ**

Please find enclosed the Report of Radon Measurements, which gives the last set results of the radon gas measurements taken with passive monitors. I have also included all the radon results obtained from the surveillance monitoring, for reference.

As you know, the Ionising Radiations Regulations 1999 (IRR99) are normally applied when the average radon gas concentration in any area, when measured with a passive monitor over a three-month period in the winter, exceeds  $400 \text{ Bq m}^{-3}$ . When measurements are taken at other times of year, a correction factor is applied based upon typical seasonal variations.

The initial results corrected to winter exceeded  $400 \text{ Bq m}^{-3}$ . However, further measurements in the Main Office indicate that the radon levels in the building do not conform to the normal patterns. In the absence of a result greater than  $400 \text{ Bq m}^{-3}$ , therefore, the IRR99 are considered not to apply.

As the Radon Sump Box is not a normally occupied location, no additional precautions are required to control the exposure to radon. I suspect, however, that the last two monitors were both placed in the Main Office.

Please be aware that changes in usage, heating or ventilation could increase the radon levels and further radon measurements would be advisable at that time. You are, of course, free to take any radon mitigation action. You also need to ensure that your employees and local Health and Safety Inspector are informed of these results.

Please contact me if you would like to discuss any radon-related matter.

Yours sincerely

[REDACTED]  
[REDACTED]  
Enclosure

**radon**  
Don't live with the risk



## Report of Radon Measurements

For:

  
Carillion Services Ltd  
17 Nant Alyn Road, Rhydymwyn  
Mold, Flintshire  
CH7 5HQ

Subject:


Measurement of radon-222 concentrations

Date of report:

24 November 2006

The concentrations of radon-222 at the locations given on the attached sheet were measured with HPA radon gas passive monitors. The cumulative exposures recorded by the monitors were converted to concentrations averaged over the exposure time. Background corrections and calibration factors were obtained from control monitors kept at HPA.

The table shows the average radon gas concentration at each location in units of becquerels per cubic metre of air ( $\text{Bq m}^{-3}$ ). The random uncertainties in the measurement are estimated to be 15%.

  
Radon Studies Group

# Report of Radon Measurements

**Customer** Carillion Services Ltd  
**Measurement site** Carillion Services Ltd - Office  
17 Nant Alyn Road, Rhydymwyn  
Nr Mold, Flintshire

Detno	Position	Date placed	Date removed	Radon gas conc Bq m <sup>-3</sup>	
				As measured	Winter
03105521	Main Office	24/01/06	17/05/06	300	340
03105518	Radon Sump Box	24/01/06	17/05/06	4720	5430
03116253	Main Office	17/05/06	19/07/06	200	380
03116244	Radon Sump Box	17/05/06	19/07/06	1670	3130
03118994	Main Office	19/07/06	27/09/06	220	580
03118993	Radon Sump Box	19/07/06	27/09/06	210	570

[REDACTED]  
Carillion Services Ltd  
17 Nant Alyn Road, Rhydymwyn  
Mold, Flintshire  
CH7 5HQ

Radon Studies Group  
Radiation Protection Division  
Health Protection Agency  
Chilton, Didcot, Oxfordshire  
OX11 0RQ

[REDACTED]  
[www.hpa.org.uk/radiation](http://www.hpa.org.uk/radiation)

Your ref:  
Our ref: 1344564/RISPRES\_BL

14 September 2006

Dear [REDACTED]

**Report of Radon Measurements**

**Carillion Services Ltd - Office, 17 Nant Alyn Road, Rhydymwyn, Nr Mold, Flintshire, CH7 5HQ**

Please find enclosed the results from the second set of surveillance monitors.

As you know, the Ionising Radiations Regulations 1999 (IRR99) are applied when the radon level in any area exceeds  $400 \text{ Bq m}^{-3}$ . The enclosed results are similar to the last set in that the radon concentration in the main office is below  $400 \text{ Bq m}^{-3}$  (although close to this threshold when seasonally corrected) and the radon concentration in the sump box is lower than would be expected if it were functioning fully.

If the final set of monitors confirm these results, the IRR99 will most likely be disappplied in the main office.

If you would like to discuss these results, please do not hesitate to contact me.

Yours sincerely

[REDACTED]  
[REDACTED]  
Enclosure

## Report of Radon Measurements

For:

[REDACTED]  
Carillion Services Ltd  
17 Nant Alyn Road, Rhydymwyn  
Mold, Flintshire  
CH7 5HQ

Subject:

Measurement of radon-222 concentrations

Date of report:

14 September 2006

The concentrations of radon-222 at the locations given on the attached sheet were measured with HPA radon gas passive monitors. The cumulative exposures recorded by the monitors were converted to concentrations averaged over the exposure time. Background corrections and calibration factors were obtained from control monitors kept at HPA.

The table shows the average radon gas concentration at each location in units of becquerels per cubic metre of air ( $\text{Bq m}^{-3}$ ). The random uncertainties in the measurement are estimated to be 15%.

[REDACTED]  
Radon Studies Group



INVESTOR IN PEOPLE



HPA Radiation Protection Division, formerly  
the National Radiological Protection Board



**Customer** Carillion Services Ltd  
**Measurement site** Carillion Services Ltd - Office  
17 Nant Alyn Road, Rhydymwyn  
Nr Mold, Flintshire  
CH7 5HQ

Detno	Position	Date placed	Date removed	Radon gas concentration, Bq m <sup>-3</sup>	
				Measured	Winter corrected
03116253	Main Office	17/05/06	19/07/06	200	380
03116244	Radon Sump Box	17/05/06	19/07/06	1670	3130

Radon Studies Group  
Radiation Protection Division  
Health Protection Agency  
Chilton, Didcot, Oxfordshire  
OX11 0RQ

[REDACTED]  
Carillion Services Ltd  
17 Nant Alyn Road, Rhydymwyn  
Mold, Flintshire  
CH7 5HQ

[REDACTED]  
[www.hpa.org.uk/radiation](http://www.hpa.org.uk/radiation)

Your ref:  
Our ref: 1339045/RISPRES\_AL

3 August 2006

Dear [REDACTED]

**Report of Radon Measurements**

**Carillion Services Ltd - Office, 17 Nant Alyn Road, Rhydymwyn, Nr Mold, Flintshire, CH7 5HQ**

Please find enclosed the results from the first set of surveillance monitors. I apologize for the delay in sending these results.

As you know, the Ionising Radiations Regulations 1999 (IRR99) are applied when the radon level in any area exceeds  $400 \text{ Bq m}^{-3}$ . The enclosed result for the Office is now below  $400 \text{ Bq m}^{-3}$  and indicates that the IRR99 no longer apply in this area, although there is always some natural variation between measurements. The next set of monitors should confirm this result. The radon level in the Radon Sump Box remains high, although not as high as would be expected from a fully functional sump system.

If you would like to discuss these results, please do not hesitate to contact me.

Yours sincerely

[REDACTED]  
[REDACTED]  
Enclosure

## Report of Radon Measurements

For:

[REDACTED]  
Carillion Services Ltd  
17 Nant Alyn Road  
Rhydymwyn  
Mold, Flintshire  
CH7 5HQ

Subject:

Measurement of radon-222 concentrations

Date of report:

3 August 2006

The concentrations of radon-222 at the locations given on the attached sheet were measured with HPA radon gas passive monitors. The cumulative exposures recorded by the monitors were converted to concentrations averaged over the exposure time. Background corrections and calibration factors were obtained from control monitors kept at HPA.

The table shows the average radon gas concentration at each location in units of becquerels per cubic metre of air ( $\text{Bq m}^{-3}$ ). The random uncertainties in the measurement are estimated to be 15%.

[REDACTED]  
Radon Studies Group



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HPA Radiation Protection Division, formerly  
the National Radiological Protection Board

# Report of Radon Measurements

**Customer** Carillion Services Ltd

**Measurement site** Carillion Services Ltd  
17 Nant Alyn Road, Rhydymwyn  
Mold, Flintshire  
CH7 5HQ

Detno	Position	Date placed	Date removed	Radon gas conc Bq m <sup>-3</sup>	
				As measured	Winter
03105521	Main Office	24/01/06	17/05/06	300	340
03105518	Radon Sump Box	24/01/06	17/05/06	4720	5430



## Defra Rhydymwyn N Wales

This section details the control measures for the above location.

The site has responsibility for implementation and update of records.

Exposure records for ALL persons entering the caves will be kept at the site on a rolling ANNUAL BASIS – these records will be kept for 40 years.

The yearly exposure PER PERSON has been defined by CFS IMS as 140 Hours Maximum.

This is calculated as:

- Average cave exposure taken from samples in report 20 / 12/ 05 from the HPA is 890 Bqm3 – we double this to allow for error to 1767 Bq/m3
- We divide 254,000 by 1767 to give a nominal max working year of 140 man hours.

Additionally the site will put the measures below in place

- Caves to be vented for AT LEAST 20 Minutes before any entry (except emergency)
- No Children under 16, no pregnant or nursing mothers allowed in at any time.

Uncontrolled if saved or printed - check the intranet for the latest version

## Objective

To specify how legislative requirements in respect Radon Gas exposure at affected locations are to be delivered consistent with Target Zero and the plc OH&S Policy Statement.

## Scope

All Carillion Facilities Services locations where we are responsible for Radon Gas Management.

## Definitions

**"Radon"** the natural radioactive gas radon occurs in varying concentrations in all homes and workplaces. Inhaling radon, and especially the radioactive decay products of radon, which are themselves radioactive, causes the sensitive cells in the lungs to be irradiated.

**"IRR99"** requires employers to restrict exposure to radon if the concentration in the air exceeds specified levels. This may be the case for certain radon-prone areas of the country.

## Guidance and Requirements

Carillion Facilities Services employ a Radiation Protection Supervisor – Mr Ken Parkes – 07801 626057

Although exposure to radon is a complex problem, its restriction is often easily achieved. Simple remedial action by dutyholders can contribute to a significant reduction in UK occupational exposures to ionising radiation from this source.

Radioactive decay of naturally occurring uranium and thorium in rocks leads to the formation of the radioactive gas radon. This can escape from the rock via pores and cracks to reach the surface. It may then collect in buildings and under certain conditions can reach concentrations above which the risk to people in the workplace requires control under the Ionising Radiations Regulations 1999. Radon is odourless, tasteless and colourless and can only be detected using specialised equipment. Radon is now recognised to be the second largest cause of lung cancer in the UK after smoking. It is estimated that radon causes 2000 to 3000 lung cancer fatalities in the UK every year and in certain areas a significant proportion of an employee/s daily exposure may occur at work

IRR99 reg.3(1)(b) states that the Regulations apply to work 'carried out in an atmosphere containing radon 222 gas at a concentration in air exceeding 400 Bqm-3. [Radon gas air activity concentration is measured in Becquerels per cubic metre, Bqm-3.]

In a small number of cases, the Regulations can be disapplied if the employer can show that the second threshold in regulation 3(1)(b) has not been exceeded.

The best way in which employers can deal with radon in the workplace is to reduce levels to below that at which IRR99 apply. They can usually do this using the relatively simple

engineering methods. Such systems should be subject to appropriate planned preventative maintenance and testing under general requirements of health and safety legislation, as with other workplace equipment.

If such measures do not reduce the levels sufficiently (ie to below 400 Bqm-3), then IRR99 apply as for any other occupational exposure to ionising radiation. So:

- (1) work should be notified to HSE (reg.6);
- (2) a prior risk assessment should be undertaken (reg.7); and
- (3) exposures of persons must be restricted so far as is reasonably practicable (the ALARP principle) (reg.8) using, in order of preference:
  - (a) engineering controls;
  - (b) installed safety features;
  - (c) appropriate systems of work, provision of information, instruction and training to employees; and, where necessary;
  - (d) appropriate PPE.

Where levels above 400 Bqm-3 exist, it is good practice as part of personal exposure management to designate a supervised area (reg 16(3)). Part of the supervision will involve controls of occupancy times in the area and ensuring that installed safety features and engineering controls used to restrict exposures are subject to a suitable schedule of maintenance and testing (reg.10).

Areas where levels of radon (or radon daughters, which are the decay products of radon that are solid and radioactive) are sufficiently high to require special procedures to restrict exposures, or where people working might receive an effective dose greater than 6mSv per year, must be designated as controlled areas (reg.16). Consequently, local rules must be provided for entry into those areas and one or more radiation protection supervisors appointed (reg.17).

Employers must ensure that such areas are physically demarcated or delineated with appropriate signs and that access into the area is restricted (reg.18).

Very few employers are likely to have employees who will require to be designated as classified workers (reg.20) because, in most cases, it will be reasonably practicable to restrict access to areas where radon levels are significant (reg.8). However, a few employers, eg operators of deep mines, do have a number of classified employees and, in these cases, appropriate dosimetry from an approved dosimetry service and medical surveillance are required (regs.20-24).

### Consultation With Radiation Protection Advisers

The IRR99 require employers in certain circumstances to consult a radiation protection adviser (RPA) for advice on compliance with those Regulations. Employers who seek to establish whether IRR99 apply as a result of radon levels in their workplace do not need to consult an RPA until they have first established whether they apply. Usually this will be done by employers obtaining measurements of the levels of radon in their workplace. If the level is below 400 Bq m-3, then nothing further needs to be done other than to confirm this at appropriate intervals. Employers will need to ensure that further measurements are undertaken should any modifications to the building be carried out, or if there is a change in

the circumstances of the work. If the measured levels are above 400 Bq m<sup>-3</sup> the employer has two options, either to:

- (1) remove the radon from the workplace through remediation so that IRR99 do not apply (para 9). In this case, employers are not required to consult an RPA; or
- (2) manage the exposures that arise from working in the affected areas (paras 10 - 13). Full consultation with an RPA is thus required (reg.13 IRR99).

### Questions and Answers

Radon and its effects on health

#### What is radon?

Radon is a natural radioactive gas which seeps into buildings from minute amounts of uranium that are present in all rocks, soils, brick and concrete. The amount, or activity, of radon is measured in becquerel (Bq) [Read more](#)

#### Do radon levels vary with time?

Yes. Radon levels in homes vary during the day, from one day to the next, and from winter to summer, mainly because of temperature differences between indoors and outdoors. They are generally higher at night and during the winter [Read more](#)

#### Can radon levels build up indefinitely?

No. Although radon enters homes all the time, some is carried away by the natural ventilation. Even in a home with good draughtproofing and double glazing, the air changes several times a day.

#### What are the effects of radon?

Miners exposed to high radon levels have been found to run an increased risk of lung cancer. Radon in the home also presents a risk, but generally at a lower level [Read more](#)

#### Does radon cause leukaemia?

The main danger from high radon exposure is the increased risk of lung cancer. If there is any risk of leukaemia, it is, by comparison, extremely small.

#### Are children more at risk from radon than adults?

There is no indication from current evidence that the risk to children is any greater than that for adults.



## What is the Action Level for radon?

The Health Protection Agency recommends that radon levels should be reduced in homes where the average is more than 200 becquerels per cubic metre. This recommendation has been endorsed by the Government.

This Action Level refers to the annual average concentration in a home, so radon measurements are carried out with two detectors (in a bedroom and living room) over three months, to average out short-term fluctuations. To enable radon initiatives to be targeted effectively, the most radon-prone areas are designated as Affected Areas, defined as those with a greater than 1% chance of a house having radon above the Action Level [Read more](#)

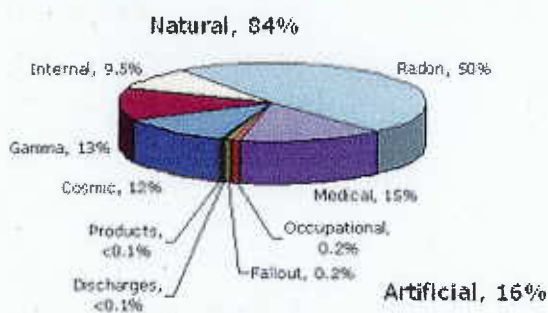
## What is the risk at the Action Level?

People living all their lives at the Action Level run the risk of a few percent of developing lung cancer. This may be compared with the average lung cancer incidence in the UK population of 6%. Put another way, about one in thirty people exposed for a lifetime at the Action Level would be expected to develop lung cancer [Read more](#)

## How do doses from radon in the home compare with other radiation sources?

Most people receive a larger radiation dose from radon indoors than from any other source, whether from the many industrial uses of radiation, nuclear power or medical exposures.

Average annual dose of ionising radiation to the UK population from all sources, 2.7mSv:



## Can radon get into water supplies?

Yes. Most water supplies have low levels of radon, but some smaller supplies may have high levels. None has been found in the UK with high enough levels to cause as much concern as radon from the ground. The Health Protection Agency endorses a proposed European guideline suggesting action if radon levels in private water supplies exceed 1000 becquerels per litre [Read more](#)

## Is there any risk from staying in a holiday home with high radon levels?

The risk from radon is calculated for a lifetime spent in the same home; the risk from holiday periods will be very small.

### Is there any danger from growing fruit and vegetables in areas affected by radon?

No. Exposure from the natural radioactivity in food is much less than from radon in the home.

### Controlled Locations incl. Measures

For details of controlled locations and measures see CFS R A – CONTROLLED LOCATIONS INCLUDING MEASURES

### Tools

- CFS R A – CONTROLLED LOCATIONS INCLUDING MEASURES
- CFS R B – INDIVIDUAL EXPOSURE RECORD
- CFS R C – GROUP EXPOSURE RECORD

### References

- Terms and Definitions
- Further advice is contained in HSE's leaflet Radon in the workplace obtained from <http://www.hse.gov.uk/>