

## **Programme to Identify Homes with High Radon Levels and to Encourage Radon Remediation in Homes in Flintshire**

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### **ABSTRACT**

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This report describes a pilot study in Flintshire where HPA worked with the Building Research Establishment and Flintshire Council to identify and remedy homes with high radon levels. The study is described in detail including the types of approach used in the different phases of the programme. The success of the programme was due in part to the involvement of Flintshire Council which acted as the public face for the programme. The programme resulted in a large increase in the uptake of the radon measurements offered with over 46% of those offered accepting compared with some 25% from previous campaigns. The initial contact letter, developed specifically for this programme with advice from WAG, has been used subsequently as a model to increase the uptake in other areas of the UK where similar campaigns are underway.

The introduction of face to face advice sessions for householders with levels of radon in excess of the Action Level increased the remediation rate during the three years that the programme was active. The number of householders requesting further tests to check the effectiveness of remediation increased by a factor of three over this period in comparison to the previous three years. However, the remediation undertaken by these householders was only successful in around 39% of homes; improvements to future programmes to address this are suggested.

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This report from HPA Radiation Protection Division reflects understanding and evaluation of the current scientific evidence as presented and referenced in this document.



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## 1 INTRODUCTION

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Advice on radon in homes was given by the National Radiological Protection Board (NRPB) to Government in 1990 (NRPB, 1990). An Action Level of  $200 \text{ Bq m}^{-3}$ , averaged over a year, was proposed and accepted. The concept of radon Affected Areas was also introduced at this time. Radon Affected Areas are areas where 1% or more homes are likely to have a level of radon that exceeds the Action Level. The probability is estimated from measurements in homes and mapped by 5-km squares of the National Grid. Advice about Affected Areas in Wales and radon probability maps were first provided in 1996 (NRPB, 1996) and updated in 1998 (NRPB, 1998). The 1998 advice contained a map of the whole of Wales. This map, showing radon Affected Areas in Wales, was republished in 2002 with an additional division in the probability banding (Green et al, 2002). At the end of last year, a radon map was published of England and Wales (Miles et al, 2007) which grouped measurements by geological formation rather than grid square.

Measurement programmes to identify homes with elevated levels were started after a UK wide survey of natural radiation in homes (Wrixon et al, 1988). To date these measurement programmes have had a national focus (Lomas et al, 1992; 1996; 1998). The aims of the current pilot programme were to trial the effects of introducing a local focus as well as to continue the two main objectives of the previous programmes:-

1. To identify the majority of estimated 10,000 dwellings in Wales with radon concentrations at or above the Action Level of  $200 \text{ Bq m}^{-3}$ .
2. To encourage owner-occupiers or landlords as appropriate to reduce the radon levels in these homes.

It has been shown (Insight Research and Consultancy, 2000) that householders are more likely to take up offers of testing and carry out remediation if they can discuss these issues with someone locally. Consequently, the focus for this programme changed from a national to a local level with Local Authorities acting as the front line organisation for contact. The Welsh Assembly Government (WAG) supported and co-ordinated the programme; the Building Research Establishment (BRE) and the Health Protection Agency (formerly the NRPB) provided support. Flintshire Council was chosen as the area where the programme would be piloted.

The first part of the programme was to continue to identify homes with elevated radon levels. The concept was to target homes not yet measured for radon and located within the 5 km x 5 km grid squares that are estimated to have a probability of 10% or more homes at or above the Action Level. In Wales forty-five 5-km x 5-km grid squares fulfil this criteria, with eleven Local Authorities eligible for the scheme. Part or all of four of the grid squares were located within Flintshire (a map of the area is shown in Annex A). Each unmeasured household in this pilot study area in Flintshire was offered a radon test. The measurements were offered free of charge on the undertaking that the householder agreed to share the results with the Local Authority.

The second part of the programme targeted homes identified as having a radon level at or above the Action Level; these included homes identified in the first part of the

programme as well as those identified in the previous national programmes. The majority of these houses were located within the 10% or greater probability squares noted above, but some were outside of these areas. Householders were offered information, advice and encouragement to carry out radon remedial works. On completion of appropriate works a free test was offered to confirm the effectiveness.

The project started in 2004 and ran for approximately three years.

## 2 PILOT PROGRAMME IN FLINTSHIRE

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### 2.1 Measurements in homes

Up to the commencement of the pilot programme measurements had been completed in some 2,100 homes throughout Flintshire and around 330 of these homes were found to have annual average radon concentrations that are at or above the Action Level of 200 Bq m<sup>-3</sup>. The overall data are given in Table 1.

**Table 1 Data for Flintshire prior to the commencement of the Pilot programme**

	Number of homes
Total housing stock	61,900
Measured	2,140
At or above the Action Level	334

The Flintshire Council area covers thirty-three 5 km x 5 km grid squares, four of which were estimated to have a radon potential (probability of radon levels in homes being at or above the Action Level) of 10% or greater (Green et al, 2002). Table 2 gives details of these four grid squares.

**Table 2 Data for the four grid squares within Flintshire with a radon potential of 10% or greater**

Grid square*	Location	Total number of		Measured (%)	At or above the Action Level	
		Dwellings	Results		Number	%
315 360	Cilcain	370	128	35	53	41
320 360	Mold	5,300	973	18	184	19
320 365	Soughton	1,700	419	25	35	8
	Northop					
	Rhosesmor					
330 355	Hope	1,900	310	16	37	12
	Caergwrie					
Totals		9,200	1,830	20	309	17

\* Co-ordinates of the bottom left-hand corner of the square

As can be seen from the information given above a small number, some 25 homes with levels of radon in excess of the Action Level were also identified in areas outside the four target squares.

## **2.2 Measurement and remediation programme**

The object of the measurement and remediation programme in Flintshire was to assess the effectiveness of a programme where the Local Authority was the initial point of contact for householders. This approach had not been previously tested in Wales; however, indications from similar programmes undertaken in England suggested that both uptake of testing and remediation rates were increased by this type of programme.

The programme included the following phases:

1. Initial planning;
2. Preparation of material and data;
3. Training;
4. Awareness raising;
5. Targeting of householders requiring initial measurements (First Time Testers);
6. Targeting of householders who have homes with radon levels at or above the Action Level (High Testers);
7. Provision of remediation advice;
8. Remediation and retesting to check the effectiveness of remedial works;
9. Exit strategy.

### **2.2.1 Initial planning**

The programme was initially planned to be completed within 12 to 18 months, with an exit programme to include further remediation and retesting to take an additional six months. An Action Plan was prepared that included a Gantt chart identifying the expected timescales for the different phases of the programme. This chart is given in Figure 1. The initial planning phase was completed in June 2004.

### **2.2.2 Preparation of materials and data**

The numbers of letters and leaflets required was estimated prior to the commencement of the programme using the following assumptions:

1. The response rate to an initial offer of a free test would be between 15% and 20%.
2. The response rate to a reminder offer would be 10% to 15%
3. Based on an overall response rate of 25% and the percentage of homes already identified in the four target grid squares (Radon survey programme in Wales, 2002) it was estimated that a further 300 or so homes at or above the Action Level would be identified.

The total response anticipated prior to commencement of the programme was expected to be of the order of 25% or 1,850 householders requesting tests.

The preparation of the leaflet to accompany the free test offer was undertaken by HPA in consultation with Flintshire Council. In total 8,000 leaflets were produced.

A database of all homes within the 10% and greater probability areas within Flintshire was prepared by HPA. Homes with valid measurements from previous programmes were excluded. The final database contained details of some 7,600 dwellings.

Letters of invitation to the occupiers of the homes identified above (First Time Testers), reminder letters to non-responders and letters to householders with identified radon levels in their homes that were at or above the Action Level (High Testers) inviting them to remediation information sessions, were agreed and produced. The invitation letter wording was based on a letter provided by WAG that was used successfully in a previous campaign in Wales where householder involvement was required. The reminder letter was based on the invitation letter and the High Tester letter was based on letters used in previous campaigns.

Table 3 gives details of the numbers of letters and leaflets produced

**Table 3 Numbers of letters and leaflets produced (rounded)**

Group	Number of dwellings
First Time Testers	7,600
Pre-paid envelopes	7,600
Leaflets	8,000
Total high tester invites (including repeats)	12,000
Reminder letters	5,200

All letters and leaflets were produced in both English and Welsh; translation services were provided by Flintshire Council.

Further detail on the letter content and enclosures for each of these groups is given below. Examples of the letters and leaflets used are given in the Appendix.

### **2.2.3 Training**

It was important that a consistent message regarding the importance of the radon programme was passed on to all stakeholders. Training was organised for all groups that were likely to be involved. The training was undertaken by staff from the BRE and HPA including the medically qualified Deputy Director from HPA who carried out the advice session for the health professionals' seminar. Training was delivered to four main groups: -

- 1) Council frontline staff, officers and elected members and parish councillors
- 2) Housing professionals such as estate agents, surveyors, architects and solicitors and representatives from Housing Associations from the Flintshire area.
- 3) Builders, representatives and Building Control staff.
- 4) Health professionals (GPs)

Each group was given information on radon including what it is, how it is measured, the health risks, how and why radon enters buildings and how existing homes can be remedied. Information packs were also provided to each attendee. Training was organised in conjunction with the Council who organised the venues and invited the attendees. The elected member from Flintshire Council with lead responsibilities on Environmental matters was also present and gave a short introduction on the programme to all attendees with the exception of the GPs seminar that was held separately.



The training was delivered to the first three groups at a hotel in Mold in June 2004 and to the GPs at their regular update meeting in April 2005. An additional training day for builders was organised by Flintshire Council in September 2005. The training session followed a similar format to that delivered previously but was extended to include more detail on the remedial methods that could be used and their implementation. Sixteen builders attended including several who were already used by Flintshire to undertake work on premises owned by the Council. Information packs including detailed information on remedial methods were provided to the attendees.

#### **2.2.4 Awareness raising**

Flintshire Council prepared press releases to coincide with the main phases of the programme. These were provided to the local media including the local newspapers namely the Liverpool Daily Post, the Chester Chronicle and the Flintshire Evening Leader. Photos were included together with quotes from the elected council member with the lead on environmental matters. An example of a press article is reproduced in the appendix.

#### **2.2.5 Targeting of First Time Testers (FTTs)**

First Time Testers are householders living in dwellings that are within the four 5-km grid squares with a 10% or higher radon potential and where the result of a validated radon measurement is not available. This includes householders who have failed to complete a radon test in the past. Also included are homes that are in adjacent grid squares and are an integral part of a settlement that falls within one of the 10% squares. Around 7,600 dwellings fall into this category in Flintshire. Occupiers of these dwellings were offered a free radon test. The package sent to each householder included: -

- An address specific letter from NRPB (now HPA) encouraging the householder to take up the offer of a free test. The letter included a tear-off slip to be completed and signed by the householder to confirm acceptance for their result to be passed to the Council.
- A circular letter to 'the Householder' from Flintshire Council offering a free test paid for by WAG.
- A pre-paid envelope for the return of the request slip to HPA.
- A leaflet giving general information on radon and an Affected Area map of the Council area.

All information was provided in Welsh and English.

Information on the numbers of offer letter packs sent and positive responses is given in Table 4.

**Table 4. First time tester initial offers made in November 2004**

Grid square	Location	Invites sent	Test requests received	
			Number	%
315 360	Cilcain	247	109	44
(315 365)+		(0)	(17)	-
320 360	Mold	4,398	1,352	31
320 365	Soughton	1,321	470	36
(325 365)+	Northop	(0)	(7)	
	Rhosesmor			
330 355	Hope	1,588	434	27
	Caergwrie			
Totals		7,554	2,389	31

+ Householders in Cilcain outside the 10% and greater areas allowed tests following requests to Flintshire CC.

To encourage take up of the free test offer a reminder letter was planned to be sent four weeks after the initial send out to those householders who have not replied by that time. In practice this letter was not sent until September 2004, some 10 months after the original invite. The letter included a copy of the Council's letter and a pre-paid envelope for return of the completed request slip. Some 5,200 reminder letters were sent. Details of the response to the reminder letter are given in Table 5.

**Table 5. First time tester reminder offers made in September 2005**

Grid square	Location	Invites sent	Test requests received	
			Number	%
315 360	Cilcain	135	28	21
320 360	Mold	3,019	631	21
320 365	Soughton	841	204	24
	Northop			
	Rhosesmor			
330 355	Hope	1,144	219	19
	Caergwrie			
Totals		5,139	1,082	21

The total number of householders taking up the offer of a free test was 3,471, some 46% of those invited. Householders responding positively to the offer by returning the signed reply slip were sent a pack of radon detectors together with full instructions for placement and return. The measurement pack comprised two radon detectors for placement in the main living area and a bedroom, placement instructions, a return reply paid envelope. A short questionnaire to obtain details of the property and dates that the detectors were placed and removed was also included.

Information on the individual homes sent measurement packs was supplied to the Council when the packs are dispatched. Summary information was also supplied to WAG.

The detectors remained in place for three months and were returned to HPA for processing by the householder in the pre-paid packaging supplied. On receipt the detectors were sent for processing by the supplying validated laboratory. Results were returned within four to six weeks.

Results were supplied to Flintshire Council in electronic format, together with a summary of the advice to be supplied to the householder. Results were supplied by letter to each individual householder by HPA. The letter contained information on whether action was required to reduce radon levels. Homes with annual average radon concentrations that were at or above the Action Level of 200 Bq m<sup>-3</sup> were offered advice from the Council following a similar process to those householders' whose homes were already known to require remediation (see below).

Details of the results of the measurement programme are given in Table 6.

**Table 6 Results of measurements**

Grid square	Location	Results available		
		Number	At or above the Action Level Number	%
315 360	Cilcain	125	39	31
(315 365)*		(17)	(9)	(53)
320 360	Mold	1730	293	17
320 365	Soughton	588	72	12
(325 365)*	Northop	(7)	(0)	(0)
	Rhosesmor			
330 355	Hope	568	90	16
	Caergwrie			
Totals		3011	494	16
		(3035)	(503)	(17)

\*Householders living in homes adjacent to the original 10% probability areas allowed free tests following requests to Flintshire Council.

### 2.2.6 Targeting of High Testers

High Testers are householders who have tested their home and the result is at or above the Action Level of 200 Bq m<sup>-3</sup>. High Testing homes throughout Flintshire were included, although homes where the householder has carried out successful works to reduce their radon level i.e. those householders who are known to have remedied, re-tested and their results are below 200 Bq m<sup>-3</sup> were excluded. Initially around 330 dwellings in Flintshire were identified in this category.

Following on from the measurement phase of the programme a further 503 homes were identified as being in the High Tester category. Both existing and new High Testers were invited to attend advice sessions as detailed below.

Letters were sent by HPA (initially as NRPB) to the named householders whose homes have annual average radon concentrations that are at or above the Action Level. The letter invited them to attend events where advice was available on ways to reduce the radon concentration in their homes. Encouragement to attend the sessions was made by the offer of a retest voucher that could be collected at the event. The retest was funded by WAG and hence was free of charge to the householder. To maintain confidentiality all letters were dispatched to the named householders in 'Private and Confidential' envelopes. The pack included: -

- An address specific letter from NRPB, and later HPA, encouraging the householder to take up the offer of advice on remediation at one of the planned events. The letter included a bar code so that householders attending the events could be noted. The annual average radon concentration was also included in the letter and householders were asked to bring the letter along to their chosen event.
- A circular letter to 'the Householder' from Flintshire Council offering free advice from the experts on ways to reduce radon levels and a free retest paid for by WAG.
- A schedule of the venues and the times that the events would be open.
- A booklet 'Radon – a guide to reducing levels in your home'.
- A questionnaire to complete with details of their home to aid staff from the BRE when giving individual advice.

To take account of the fact that some of the existing High Testing householders would have moved home during the period between testing and the invitation letter, the 'Private and Confidential' envelopes used for the send out included a return address for NRPB. This enabled the Royal Mail to return letters sent to householders who were no longer residing at the original address. Where this occurred the addresses were added to the First-time tester programme and letters sent addressed to 'The Occupier'. Some new occupiers, despite the 'Private and Confidential' envelope did open the letter. These householders were offered a free test to reflect their occupancy of the particular dwelling. In addition some new occupiers of 'High Tester' homes attended the advice sessions. These householders were also offered a free test to reflect their occupancy of the building.

### **2.2.7 Provision of remediation advice**

In addition to general remediation advice given to each individual householder by letter with the results of their radon measurement, more specific advice was offered by inviting householders to local advice sessions. Invitations were made to all householders with radon levels that were at or above the Action Level of 200 Bq m<sup>-3</sup> as described above.

The advice sessions were manned by staff from HPA, BRE and the Council. On arrival at the session each householder was provided with a printed voucher to claim a free retest if acceptable works were undertaken. The voucher gave information about the most recent measurement in their home, including the results for the individual detectors placed by the householder. Also included was general advice, based on the radon level

and the floor type of the property, on methods that should work to reduce radon levels in their home.

Householders were then given face-to face advice from staff from the BRE on how radon enters building and the different methods for reducing radon. Householders were advised to return the completed retest voucher to the Council on completion of the remedial works. Staff from HPA were also available to discuss any queries householders had regarding their measurement or the risks from radon. Displays of the radon Affected Area maps for the Flintshire area and Wales were available. In addition displays of the different types of radon remedy and the equipment used were available. Householders were also given a pack of information on the different remedies and a list of the builders that attended the training days to take away with them.

The first round of exhibitions was held in June 2005. Invitations were sent to householders who tested at or above the Action Level prior to the current Pilot programme (old High Testers) and also those that tested at or above the Action Level in this programme (new High Testers) before the beginning of June 2005; this included the vast majority of the householders who accepted the initial free test offer. The total numbers of invitations sent are detailed in Table 7 below.

**Table 7. Invitations to advice sessions in June 2005**

Group	Number of invitations sent
Old High Testers	330
New High Testers	260
All High Testers (to 4 June 2005)	590

The timetable for the exhibitions and attendee numbers are given in Table 8.

**Table 8. Venues and attendees for advice sessions in June 2005.**

Date	Venue	Number of households who attended	Percentage of the 590 households invited
Tuesday 7 June 2005	British Legion Club, Castle Street, Caergwrle	33	6
Wednesday 8 June 2005	Mold Town Hall, Earl Road, Mold	97	16
Thursday 9 June 2005	Chapel School Room, Chapel School, Cilcain	26	4
All		156	26

All advice sessions were open from 10:00 to 20:00.

Further advice sessions were undertaken in February and March 2006 in Mold for householders who received results that were at or above the Action Level in the period from June 2005. The same format as used in June 2005 was adopted. Invitations to attend included those householders who responded positively to the reminder letter sent in September and had an annual average radon level in their home that was at or above the Action Level. Repeat invitations were also sent to householders who did not attend

the exhibitions held in June, some 430 householders were in this category. The total number of invitations sent in February 2006 are detailed, by category, in Table 9.

**Table 9. Invitations to advice sessions in February / March 2006**

Group	Number of invitations sent
Old High Testers invited previously	224
New High Testers invited previously	192
New high testers since June 2005	200
Failed remediators since June 2005	9
All High Testers invited	625

The venue in Mold was chosen as this location was most popular in the first invitation phase. Unfortunately, the Town Hall was not available at this time therefore an alternative town centre location was chosen. Details are given in Table 10.

**Table 10. Venue and attendance at advice sessions in February / March 2006**

Date	Venue	Number of households who attended	Percentage of the 625 households invited
Tuesday 28 February 2006 18:30 to 21:00	The Mold and District Ex-Servicemen's Club Wrexham Road, Mold	16	3
Wednesday 1 March 2006 10:00 to 20:00	The Mold and District Ex-Servicemen's Club Wrexham Road, Mold	63	10
All		79	13

House visits were also made by Flintshire Council staff to a limited number of householders who were unable to attend the advice sessions. Information was supplied to these householders together with the offer of a free retest if the advised works were carried out.

### **2.2.8 Remediation and retesting**

Householders who were given advice on remediation either at the remediation advice events or during home visits were encouraged to complete the advised remediation as soon as possible. Further support was given by the Council and the BRE if householders required additional information prior to undertaking the works.

To enable the effectiveness of the remedial measures to be assessed householders were encouraged to contact Flintshire Council once they had undertaken works using their free retest voucher. The vouchers were time limited with a final date of 31 August 2006 for householders to apply to encourage prompt action, although in practice the final request was received in January 2007, this was allowed as the householder requested a repeat retest following further work to reduce radon; their initial request was received within the stipulated time period. Information on the numbers of householders who requested a retest following remediation is given in Table 11.

**Table 11 Retest requests**

Group	Number of requests		
	First retest	Follow up	Total
After June 2005 events	23	1	24
After February/March 2006 advice sessions	11	6	17
Whole programme	34	7	41

The effectiveness of the remedial works undertaken by the householders is detailed in Table 12.

**Table 12**

Group	Number of requests		
	Total	Below Action Level	Still above Action Level
First retest	34	13	21
Follow up retest	7	3	4
All retests	41	16	25

### 2.2.9 Exit strategy

The exit strategy was planned to conclude the programme within a six-month period following the completion of the main work programme. The exit strategy included planning for delayed testing by householders, both starting and returning their radon detectors, and the need for an extended remediation period for more complex buildings where repeat testing would extend beyond the original timescales set out in Figure 1. The main commitment during this period was from Flintshire Council staff, with support from the BRE and HPA in offering further remediation advice and retesting of remediated homes.

At the start of the programme it was anticipated that the majority of the work would be completed within 12 to 18 months of commencement of the programme. In practice, due to the delay in sending out the reminder letters of some 10 months the overall programme was extended by a similar time period. Final results were obtained in June 2007.

## 3 RESULTS AND DISCUSSION

Free test offers were made to some 7,560 householders with around 31% taking up the offer following the initial invitation. Initial estimates, based on previous surveys in Wales, suggested that the uptake would be around 15% to 20%, thus the unexpected increase in the number of householders who responded positively to the initial free test offer resulted in funding issues being encountered during this phase. The increased uptake was likely to have been the result of the improved wording of the invitation letter that was based on a letter used successfully by the Welsh Assembly Government in a previous campaign that enlisted the help of householders together with the involvement of the local Council. The requirement for additional funding as a result of the better than

expected response rate resulted in a 10 month delay between the initial test offer and the reminder offer. This offer was part of the original Action Plan. The uptake of positive responses from the reminder letter was at the top end of the original estimate at 15%. This gave an overall uptake of the free test offer of some 46% compared to the 25% estimated at the outset of the programme.

The objective to identify further homes with levels of radon that were at or above the Action Level in Flintshire was met; the proportion of homes tested in the 10% and above probability areas increased from 20% to almost 50% with a further 494 homes identified as requiring action. In addition a further nine homes were identified outside these areas taking the total number of homes identified as requiring action to 503.

The numbers of homes tested for radon in the target areas before and after the programme are detailed in Table 13. An additional 24 tests were included in the programme that were outside of the four target squares.

**Table 13 Overall measurement statistics**

Grid square	Location	Dwellings	Before the programme				On completion of the programme			
			Homes measured		At or above the Action Level		Homes measured		At or above the Action Level	
			Number	%	Number	% of total	Number	%	Number	% of total
315 360	Cilcain	370	128	35	53	41	253	68	92	36
320 360	Mold	5,300	973	18	184	19	2,703	51	477	18
	Soughton									
320 365	Northop	1,700	419	25	35	8	1007	59	107	11
	Rhosesmor									
330 355	Hope Caergwrie	1,900	310	16	37	12	878	46	127	14
Totals		9,200	1,830	20	309	17	4,841	52	803	17

To fulfil the second objective householders who tested at or above the Action Level as part of this and previous programmes were offered advice on ways to reduce radon levels. Advice was sent with the result letters and, later, all such householders were invited to attend at face to face information and advice sessions at local venues and staffed by the Council, HPA and BRE. Five all day information sessions were held; three in June 2005 and a further two in February / March 2006. In total some 790 householders were invited to these sessions with 235 attending at least one session.

To date 36 householders have requested a test following remediation, 34 of these requests were following initial remedial works with a further seven requesting a retest following additional works. Thus some 5% of those householders who attended a face to face information session have tested again to assess the effectiveness of the works. Although this may not reflect the total number that have undertaken remediation, this number is still disappointing. Also the proportion of these householders who have successfully reduced their radon level to below the Action Level is only 39%. This may be because householders did not follow the advice given at the events or were following a staged approach where the easiest / cheapest method was tried in the first instance. The rates observed are not untypical for remediation rates seen in other areas of the



UK. However, improvements to the advice delivery, including the results of further research into the effectiveness of remedial methods have been seen to increase the numbers of householders using effective methods.

## **4 CONCLUSIONS**

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The pilot programme was successful in encouraging householders to undertake radon testing with almost half of the householders, some 46%, offered a test taking up the offer. The success of the programme was due in part to the involvement of Flintshire Council which acted as the public face for the programme. The initial contact letter, developed specifically for this programme with advice from WAG, has been used subsequently as a model to increase the uptake in other areas of the UK where similar campaigns have been undertaken.

The introduction of face to face advice sessions for householders with levels of radon in excess of the Action Level increased the remediation rate during the three years that the programme was active. The number of householders requesting further tests to check the effectiveness of remediation increased by a factor of three over this period in comparison to the previous three years. However, the remediation undertaken by these householders was only successful on the first attempt in around 39% of homes. HPA recognises that the rate of remediation undertaken by the householders was poor even when face to face sessions were offered, although the numbers of householders who attended the sessions was encouraging. HPA are currently working with BRE to identify ways to increase the rates of remediation and to simplify the advice on remediation.

## **5 FUTURE WORK**

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The conclusions drawn from the Pilot programme to identify and remedy homes that was carried out in Flintshire suggests that the programme design was very effective at increasing the number of householders who took up the offer of a free radon measurement in their home and hence identifying homes with high radon levels. Our recommendation is that future programmes follow the programme design as detailed above. Important considerations were the involvement of the local council; the involvement of local stakeholders; the wording of the invitation letter; and the reminder letter.

The second objective to increase the number of householders with high radon levels in their homes that undertook remediation was also effective in part. However, improvements could be made to the format used in the Flintshire Pilot programme. For future programmes the following improvements, which have been tested in other radon programmes in the UK, are suggested:

- The timing of advice sessions for householders to be within a month or so of the results being received

- The simplification of the advice given at the advice events to limit the types of remedy to the most effective methods, with perhaps two or three choices tailored to each property
- The involvement of experienced local and national builders at the advice sessions where advice, equipment and costs of installation are provided

In addition the improved radon Affected Areas maps that were published in November 2007 (Miles et al, 2007) should aid in the targeting of any future programme.

## 6 GLOSSARY

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*Becquerel*. Symbol Bq. The unit of the amount or activity of a radionuclide. Describes the rate which transformations occur. 1 Bq = 1 transformation per second.

*Becquerel per cubic metre of air*. Symbol Bq m<sup>-3</sup>. The amount of a radionuclide in each cubic metre of air. Often referred to as the activity concentration.

*Radon Action Level*. The recommended upper limit for the activity concentration of radon in UK homes. Its value, expressed as the annual average radon gas concentration in the home, is 200 Bq m<sup>-3</sup>.

*Radon Affected Areas*. Parts of the country with a 1% probability or more of present or future homes being above the Action Level.

## 7 REFERENCES

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## **APPENDIX A**

### **Invitation to new testers**

Initial invitation, reminder letter and accompanying leaflets.





INVESTOR IN PEOPLE

NRPB is a public authority established by the Radiological Protection Act of 1970 to advance knowledge and to provide information and advice in the UK on radiation protection. NRPB is working in partnership with the Health Protection Agency.



The Occupier

«A1»  
«A2»  
«A3»  
«A4»

«ID»/STPNJ1T

30 November 2004

Dear Householder

**RADON IN HOMES IN FLINTSHIRE**

I am writing to let you know that your home has been selected as part of the Flintshire County Council's official survey of radon in homes. The Council has asked the National Radiological Protection Board (NRPB) to measure homes in areas within Flintshire where we know that radon levels are likely to be higher. Your home is in one of the areas chosen for the survey.

The radon test is simple, completely free and done by post: **so no one will call**. The enclosed leaflets give details and information about radon. To start the test add your name and telephone number to the form below, sign it and return it to NRPB within six weeks - **it really is that easy!** The return envelope is prepaid, so it won't cost you anything to reply.

**Although the test is entirely voluntary, by taking part you will be helping us to assess the health risk from radon in your neighborhood, helping to ensure any money spent on radon reduction is used most wisely and you will discover if you are at risk from radon.**

We will inform you of the result of the test in your home, explain the result, provide further information and offer advice. The result will also be given to Flintshire County Council. Data for individual homes will be treated in confidence by both the Council and NRPB.

I look forward to receiving your reply. Please contact me at the address below if you have any queries or comments on this survey.

Yours faithfully

Jane Bradley  
Radon Survey

PS This is a free offer, but please note the offer is open only for a limited period.

-----✂-----

«A1»  
«A2»  
«A3»  
«A4»

«ID»/STPNJ1T

30 November 2004

«Unique\_no»

I wish to accept a free radon measurement as described in the letter from NRPB.

Title: (Mr/Mrs/Ms etc)..... Initial(s)..... Surname.....  
(BLOCK CAPITALS PLEASE)

Signed:..... Telephone:.....





Corff cyhoeddus yw NRPB a sefydlwyd gan Ddeddf Diogelwch Radiolegol 1970 i hybu a darparu gwybodaeth a chyngor am ddiogelwch radiolegol yn y DG. Mae NRPB yn gweithio mewn partneriaeth â'r Asiantaeth Diogelu Iechyd.



Y Preswylydd

«A1»

«A2»

«A3»

«A4»

«ID»/STPNJ1T

30 Tachwedd 2004

Annwyl Gyfaill

## RADON MEWN CARTREFI YN SIR Y FFLINT

Ysgrifennaf atoch i roi gwybod ichi fod eich cartref wedi ei ddewis fel rhan o arolwg o radon mewn cartrefi Cyngor Sir y Fflint. Mae'r Cyngor wedi gofyn i National Radiological Protection Board (NRPB) fesur lefelau radon mewn cartrefi yn yr ardaloedd lle mae radon yn debygol o fod yn uchel. Mae'ch cartref chi yn un o'r ardaloedd a ddewiswyd ar gyfer yr arolwg.

Mae'r prawf radon yn syml, yn gwbl ddi-dâl a chaiff ei wneud drwy'r post: **felly ni fydd neb yn galw heibio i'ch cartef.** Yn y daflen sydd ynghlwm mae manylion a gwybodaeth am radon. I gael y prawf, rhwch eich enw a'r rhif ffôn ar y ffurflen isod, llofnodwch hi a'i hanfon i NRPB cyn pen chwe wythnos - **mae'r cyfan mor syml â hynny!** Mae amlen bwrpasol ar gael ac ni fydd angen ichi dalu am ei phostio.

**Er bod y prawf yn gwbl wirfoddol, drwy gymryd rhan, byddwch yn ein helpu ni i asesu'r peryglon sydd ynghlwm wrth radon yn eich ardal, gan helpu i sicrhau bod unrhyw arian sy'n cael ei wario i leihau radon yn cael ei ddefnyddio yn y ffordd orau bosibl, a chewch wybod a yw'ch iechyd chi mewn unrhyw berygl.**

Byddwn yn anfon canlyniadau'r prawf atoch, yn egluro'r canlyniadau, ac yn rhoi rhagor o wybodaeth a chyngor ichi. Hefyd, byddwn yn anfon y canlyniadau i Cyngor Sir y Fflint. Bydd gwybodaeth am gartrefi unigol yn cael ei thrin yn gwbl gyfrinachol gan y Cyngor a'r NRPB.

Edrychaf ymlaen at gael eich ateb. Cysylltwch â mi yn y cyfeiriad isod os oes gennych unrhyw ymholiadau neu sylw ynghylch yr arolwg.

Yn gywir

Jane Bradley  
Arolwg Radon

ON Mae'r cynnig hwn yn rhad ac am ddim, ond sylwch ei fod ar gael am gyfnod cyfyngedig yn unig.

-----X-----  
«A1» «ID»/STPNJ1T

«A2»

«A3»

«A4»

30 Tachwedd 2004

«bcode»

Rwy'n dymuno cael prawf radon am ddim fel a ddisgrifir yn y llythyr gan NRPB.

Teitl: (Mr/Mrs/Ms etc)..... Llythrennau Cyntaf..... Cyfenw.....

(PRIFLYTHRENAU)

Llofnod: .....

Rhif ffôn: .....







Health Protection Agency

Centre for Radiation,  
Chemical and  
Environmental Hazards

Radiation Protection  
Division

Chilton, Didcot  
Oxfordshire OX11 0RQ

Tel +44 (0) 1235 822622  
Fax +44 (0) 1235 833891  
www.hpa.org.uk/radiation  
radon@hpa-rp.org.uk

The Occupier

«A1»

«A2»

«A3»

«A4»

«ID»/STRPNJ1TR

1 September 2005

Dear Householder

### **RADON IN HOMES IN FLINTSHIRE - REMINDER**

I am writing to remind you that your home has been selected as part of the Flintshire County Council's official survey of radon in homes. The Council asked the Health Protection Agency, Radiation Protection Division (HPA-RPD - formerly the National Radiological Protection Board) to measure homes in areas within Flintshire where we know that radon levels are likely to be higher. Your home is in one of the areas chosen for the survey but we have no record of you requesting a test in your home.

You will recall that as explained in the information sent with my previous letter the radon test is simple, completely free and done by post: **so no one will call**. To start the test add your name and telephone number to the form below, sign it and return it to HPA-RPD as soon as possible - **it really is that easy!** The return envelope is prepaid, so it won't cost you anything to reply.

Although the test is entirely voluntary, by taking part you will be helping us to assess the health risk from radon in your neighborhood, helping to ensure any money spent on radon reduction is used most wisely and you will discover if you are at risk from radon.

We will inform you of the result of the test in your home, explain the result, provide further information and offer advice. The result will also be given to Flintshire County Council. Data for individual homes will be treated in confidence by both the Council and HPA-RPD.

I look forward to receiving your reply. Please contact me at the address below if you have any queries or comments on this survey.

Yours faithfully

Jane Bradley  
Radon Studies

PS This is a free offer, but please note this is your final chance to apply.

-----✂-----

«A1»

«ID»/STPNJ1TR

«A2»

«A3»

1 September 2005

«A4»

«ID»

I wish to accept a free radon measurement as described in the letter from HPA-RPD.

Title: (Mr/Mrs/Ms etc)..... Initial(s)..... Surname.....  
(BLOCK CAPITALS PLEASE)



INVESTOR IN PEOPLE

Signed:..... Telephone:.....



HPA Radiation Protection Division, formerly  
the National Radiological Protection Board



Y Preswlydd

«A1»

«A2»

«A3»

«A4»

«ID»/STPNJ1T

1 Medi 2005

Annwyl Gyfaill

Health Protection Agency

Centre for Radiation,  
Chemical and  
Environmental Hazards

Radiation Protection  
Division

Chilton, Didcot  
Oxfordshire OX11 0RQ

Tel +44 (0) 1235 822622  
Fax +44 (0) 1235 833891  
www.hpa.org.uk/radiation  
radon@hpa-rp.org.uk

## RADON MEWN CARTREFI YN SIR Y FFLINT - ATGOF

Ysgrifennaf atoch i'ch atgoffa chi fod eich cartref wedi ei ddewis fel rhan o arolwg o radon mewn cartrefi Cyngor Sir y Fflint. Mae'r Cyngor wedi gofyn i Health Protection Agency, Radiation Protection Division (HPA-RPD, yn gynt y National Radiological Protection Board) fesur lefelau radon mewn cartrefi yn yr ardaloedd lle mae radon yn debygol o fod yn uchel. Mae'ch cartref chi yn un o'r ardaloedd a ddewiswyd ar gyfer yr arolwg.

Mae'r prawf radon yn syml, yn gwbl ddi-dâl a chaiff ei wneud drwy'r post: **felly ni fydd neb yn galw heibio i'ch cartef**. Yn y daflen sydd ynghlwm mae manylion a gwybodaeth am radon. I gael y prawf, rhowch eich enw a'r rhif ffôn ar y ffurflen isod, llofnodwch hi a'i hanfon i HPA-RPD mor gynnar a phosib - **mae'r cyfan mor syml â hynny!** Mae amlen bwrpasol ar gael ac ni fydd angen ichi dalu am ei phostio.

**Er bod y prawf yn gwbl wirfoddol, drwy gymryd rhan, byddwch yn ein helpu ni i asesu'r peryglon sydd ynghlwm wrth radon yn eich ardal, gan helpu i sicrhau bod unrhyw arian sy'n cael ei wario i leihau radon yn cael ei ddefnyddio yn y ffordd orau bosibl, a chewch wybod a yw'ch iechyd chi mewn unrhyw berygl.**

Byddwn yn anfon canlyniadau'r prawf atoch, yn egluro'r canlyniadau, ac yn rhoi rhagor o wybodaeth a chyngor ichi. Hefyd, byddwn yn anfon y canlyniadau i Cyngor Sir y Fflint. Bydd gwybodaeth am gartrefi unigol yn cael ei thrin yn gwbl gyfrinachol gan y Cyngor a'r HPA-RPD.

Edrychaf ymlaen at gael eich ateb. Cysylltwch â mi yn y cyfeiriad isod os oes gennych unrhyw ymholiadau neu sylw ynghylch yr arolwg.

Yn gywir

Jane Bradley  
Arolwg Radon

ON Mae'r cynnig hwn yn rhad ac am ddim, ond sylwch dyma'ch cyfle olaf i ymgeisio.

-----✂-----  
«A1» «ID»/STPNJ1T

«A2»

«A3»

«A4»

1 Medi 2005

«ID»

Rwy'n dymuno cael prawf radon am ddim fel a ddisgrifir yn y llythyr gan HPA-RPD.

Teitl: (Mr/Mrs/Ms etc)..... Llythrennau Cyntaf..... Cyfenw.....  
(PRIFLYTHRENNAU)

Llofnod:..... Rhif fôn:.....



INVESTOR IN PEOPLE



HPA Radiation Protection Division, formerly  
the National Radiological Protection Board

Your Ref/Eich Cyf

Our Ref/Ein Cyf

Date/Dyddiad

Ask for/Gofynnwr am

Mr A Fuller

Direct Dial/Rhif Union

01352 703330

e-mail/e-bost: aaron.shotton@flintshire.gov.uk

Dear Sir/Madam

### **Radon Awareness Campaign Protecting your Health**

As you may already be aware, Flintshire County Council is running a campaign to raise awareness about the potential health effects from high levels of Radon gas in the home and how to reduce any risks.

The Welsh Assembly is sufficiently concerned about this issue to have promoted and financed this campaign, the first of its kind in Wales.

I am writing to ask you to read the information provided with this letter and to ask and recommend that you take up the offer of a free Radon test as soon as possible.

If you wish to discuss any of the matters raised in this correspondence, please do not hesitate to contact the department.

Yours faithfully / Yn gywir



Councillor Aaron Shotton / Y Cynghorydd Aaron Shotton  
Executive Member for the Directorate of Transportation, Planning & the Environment./  
Aelod Gweithredol y Gyfarwyddiaeth Cludiant, Cynllunio a'r Amgylchedd

County Hall  
Mold  
CH7 6NF  
Tel: 01352 704500  
Mobile: 07979 923069

Neuadd y Sir  
Yr Wyddgrug  
CH7 6NF  
Ffôn: 01352 704500  
Symudol: 07979 923069





### WHAT IS RADON?

Radon is a natural radioactive gas that enters homes from the ground. Indoor radon is the largest source of radiation exposure to the majority of people. There are areas within Flintshire where homes potentially have high levels of radon and these are shown on the enclosed map. The darker the colour, the higher the risk.

### WHY SHOULD I TAKE NOTICE OF RADON IN MY HOME?

Living in a home with a high radon level increases the risk of lung cancer. It is estimated that around 2000 people contract lung cancer each year in the UK because of their exposure to indoor radon.

Radon does not enter all homes in the same way. Two houses next to each other can have very different levels - that is why we strongly recommend that all homes in the higher risk areas in Flintshire are tested.

You have been contacted because you live in a higher risk area.

### WHO IS RUNNING THE CAMPAIGN?

The campaign is being funded by the Welsh Assembly Government (WAG). Flintshire County Council is then working with the National Radiological Protection Board (NRPB) and Building Research Establishment (BRE). All contact details for further information are listed on the reverse of the enclosed map.

### HOW CAN I TAKE PART IN THE CURRENT CAMPAIGN?

As part of the current campaign, you are being offered a free test in your home. The test is easy – NRPB will send you 2 small detectors and full instructions on where to place them in your home. After 3 months, you return them in the pre-paid envelope to NRPB.

After the detectors have been analysed, a letter giving the result will be sent to you with a full explanation of what it means along with appropriate advice.

Information on testing second or holiday homes and workplaces is available from the Council.

### WHAT WILL HAPPEN IF THE RESULTS SHOW A HIGH LEVEL OF RADON IN MY HOME?

Radon is measured in units called becquerels per cubic metre of air ( $\text{Bq m}^{-3}$ ). The average level in homes in the UK is  $20 \text{ Bq m}^{-3}$ . If your result is at or above  $200 \text{ Bq m}^{-3}$  (the Action Level for homes) you should take action to reduce risks to health.

You will be offered advice on works that could be completed within your home to reduce the level of radon and therefore reduce any risk to health. These are called remedial measures.

Most remedial measures are generally simple and effective. The responsibility for undertaking any remedial works lies with the homeowner.

Upon completion of any remediation works, a second free test will be offered to ensure the works have been effective and that the risks to health have subsequently been reduced.

### WHERE CAN I FIND OUT MORE?

See the contact details on the reverse of the enclosed map.

## RADON YN Y CARTREF

### BETH YW RADON?

Nwy ymbelydrol naturiol yw radon sy'n dod i mewn i'r tŷ o'r ddaear. Radon yn y cartef yw prif ffynhonnell ymbelydredd i'r rhan fwyaf o bobl. Mae rhai ardaloedd yn Sir y Fflint lle mae'n bosibl bod lefelau radon yn uchel ac mae'r rhain wedi'u dangos ar y map sydd ynghlwm. Mae'r lliwiau tywyllaf yn dynodi lle mae lefel radon ar ei uchaf.

### PAM DDYLWN I GYMRYD SYLW O RADON YN FY NGHARTREF?

Os ydych yn byw mewn cartref lle mae lefel radon yn uchel, mae'r siawns i chi gael canser yr ysgyfaint yn cynyddu. Amcangyfrifir bod tua 2000 o bobl yn cael canser yr ysgyfaint bob blwyddyn yn y DG oherwydd bod radon yn eu cartrefi.

Nid yw radon yn ymdreiddio i bob cartref yn yr un modd. Gall y lefelau mewn dau dy drws nesaf i'w gilydd fod yn wahanol iawn - dyna pam rydym yn argymhell yn gryf bod pob cartref yn yr ardaloedd hynny yn Sir y Fflint lle mae'r lefelau uchaf, yn cael eu profi.

Rydym yn cysylltu â chi gan eich bod yn byw yn un o'r ardaloedd lle mae lefel radon yn uchel.

### PWY SY'N RHEDEG YR YMGYRCH?

Llywodraeth Cynulliad Cymru sy'n ariannu'r ymgyrch. Mae Cyngor Sir y Fflint yn cydweithio â'r National Radiological Protection Board (NRPB) a Building Research Establishment (BRE). Mae manylion cysylltu ar gefn y map sydd ynghlwm os hoffech ragor o wybodaeth.

### SUT FEDRA' I GYMRYD RHAN YN YR YMGYRCH BRESENNOL?

Fel rhan o'r ymgyrch bresennol, rydym yn cynnig prawf am ddim i chi yn ein cartref. Mae'r prawf yn hawdd - bydd NRPB yn anfon 2 synhwyrdd atoch ynghyd â chyfarwyddiadau llawn ar ble i'w gosod yn eich cartref. Ar ôl 3 mis, byddwch yn eu dychwelyd mewn amlen bwrpasol i NRPB.

Ar ôl dadansoddi'r synhwyrddion, cewch lythyr yn rhoi'r canlyniad, ac yn egluro'r canlyniad, ac yn rhoi cyngor i chi.

Mae gwybodaeth am brofi ail gartrefi neu dai gwyliau a llefydd gwaith ar gael gan y Cyngor.

### BETH FYDD YN DIGWYDD OS YW'R CANLYNIADAU'N DANGOS BOD LEFEL RADON YN FY NGHARTREF YN UCHEL?

Mae radon yn cael ei fesur mewn unedau sy'n cael eu galw'n becquerels, fesul pob metr ciwbig o aer ( $Bq\ m^{-3}$ ).  $20\ Bq\ m^{-3}$  yw'r lefelau arferol mewn cartrefi yn y DG. Os yw'ch canlyniad yn dangos bod  $200\ Bq\ m^{-3}$  o radon neu ragor (y trothwy gweithredu mewn cartrefi) yna dylech gymryd camau i leihau'r perygl i'ch iechyd.

Cewch gyngor ar y math o waith y gellir ei wneud yn eich cartref i leihau lefel y radon a, thrwy hynny, leihau unrhyw berygl i'ch iechyd. Camau adferol yw'r rhain.

Mae'r rhan fwyaf o'r camau adferol yn syml ac yn effeithiol. Perchennog y cartref sy'n gyfrifol am drefnu unrhyw gamau adferol.

Ar ôl cwblhau unrhyw waith adferol, cewch brawf arall am ddim i sicrhau bod y gwaith yn effeithiol a bod y peryglon i'ch iechyd wedi lleihau.

### O BLE GA'I RAGOR O WYBODAETH?

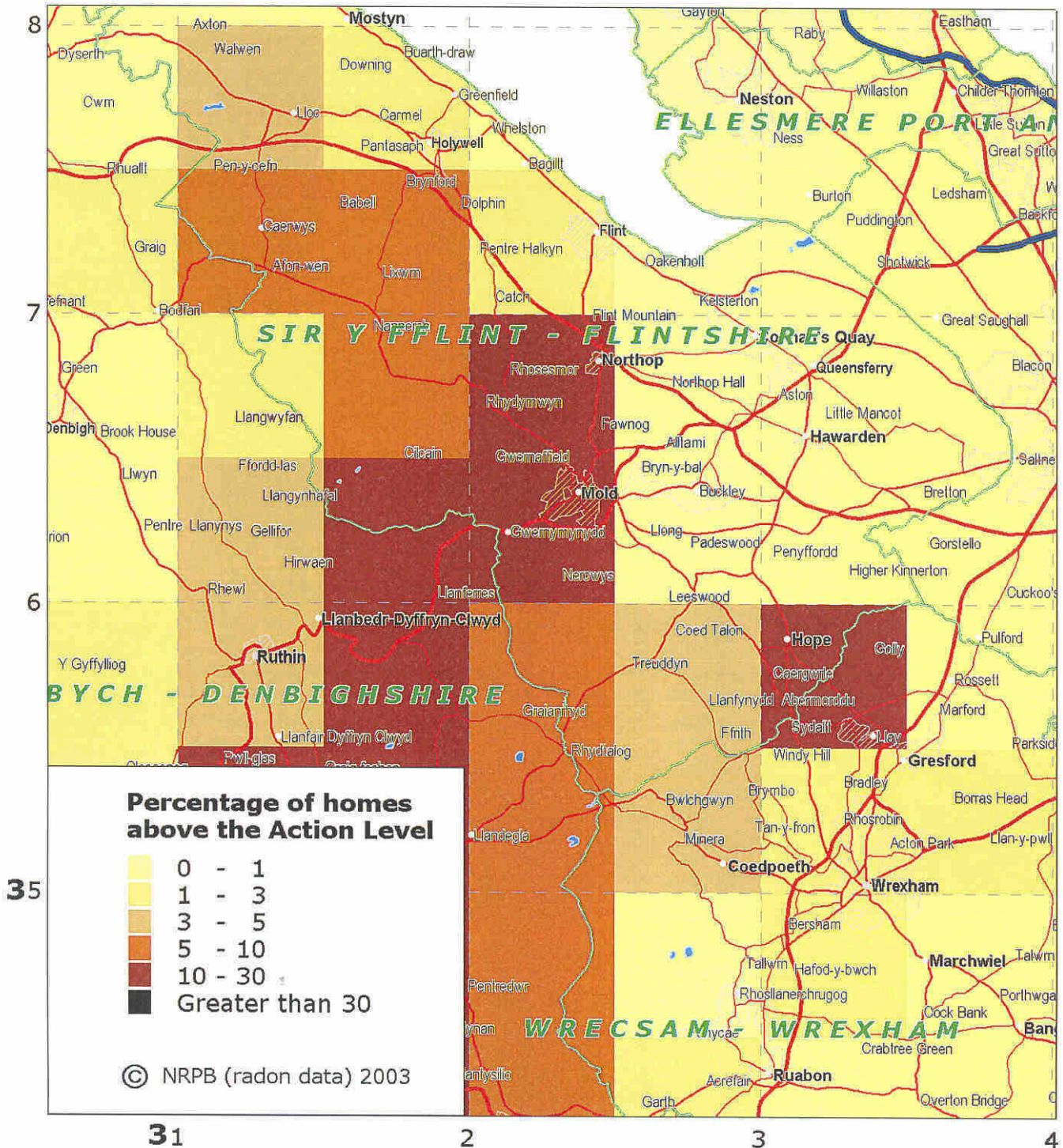
Gweler y manylion cysylltu ar gefn y map sydd ynghlwm.





### Radon Affected Areas by grid square in Flintshire

(Radon Affected Areas are parts of the country with a 1% probability or more of present or future homes being above the Action Level of 200 becquerels per cubic metre of air. District boundaries in green, major roads in red, urban areas in grey hatch.)



## WHERE CAN I FOUND OUT MORE ABOUT RADON ?

<p><b>Flintshire County Council</b></p> <p>By telephone: 01352 703330</p> <p>By email: radon@flintshire.gov.uk</p> <p>In writing:</p> <p>Environmental Health Department Flintshire County Council County Hall Mold Flintshire CH7 6NH</p> <p>Website: <a href="http://www.flintshire.gov.uk">www.flintshire.gov.uk</a></p>	<p><b>National Radiological Protection Board</b></p> <p>By telephone: 01235 822622</p> <p>By email: radon@nrpb.org</p> <p>In writing:</p> <p>Radon Survey NRPB Chilton Didcot Oxon OX11 ORQ</p> <p>Website: <a href="http://www.nrpb.org">www.nrpb.org</a></p>	<p><b>Building Research Establishment</b></p> <p>By telephone: 01923 664707</p> <p>By email: radon@bre.co.uk</p> <p>In writing:</p> <p>Environment Division BRE Garston Watford WD25 9XX</p> <p>Website: <a href="http://www.bre.co.uk/radon">www.bre.co.uk/radon</a></p>
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## **APPENDIX B**

### **Invitation to high testers to attend advice sessions**



## Centre for Radiation, Chemical and Environmental Hazards



Health Protection Agency

Centre for Radiation,  
Chemical and  
Environmental Hazards

Radiation Protection  
Division

Chilton, Didcot  
Oxfordshire OX11 0RQ

Tel +44 (0) 1235 822622  
Fax +44 (0) 1235 833891  
[www.hpa.org.uk/radiation](http://www.hpa.org.uk/radiation)  
[radon@hpa-rp.org.uk](mailto:radon@hpa-rp.org.uk)

«Name»  
«A1»  
«A2»  
«A3»  
«Postcode»

25 May 2005

Our ref: «Meas\_id»/STPNJHT

000«Meas\_id»

Dear «Sal»

### Invitation to an exhibition on reducing radon in homes

The Health Protection Agency (HPA) is working with Flintshire County Council to reduce levels of radon in dwellings. You will recall that we measured the radon in your home previously and we advised you that you should take action to reduce your radon level.

HPA have been asked by Flintshire County Council to write to all homes in the county where a measurement has shown radon levels at or above the Action Level of 200 Bq m<sup>-3</sup> to invite you to attend an exhibition where you can get advice on reducing radon in your home. Please note that if you tested your home before the current Welsh Assembly Government initiative then we have not passed your details to the Council.

The Council has arranged the exhibitions to provide information on radon and the most appropriate methods for reducing levels. There are many methods to reduce the level of radon in your home, most are simple and relatively inexpensive. Representatives from the Council, the HPA and the Building Research Establishment will be present to offer advice on methods of carrying out the work yourself and can also provide details of local builders who have received training in radon remediation. If you rent your property you should inform your landlord of the result.

The timetable on the reverse of this letter gives information on the dates, venues and times to allow you to select the one most convenient to you. **Please bring this letter with you when you attend.**

I do hope you will be able to come to one of these exhibitions where you will be able to obtain information and advice given by experts. They will be able to offer help on reducing radon and give you a voucher for a free retest to use once the remedial work is complete.

Even if you have already carried out radon remediation works in your home, the Council would still be pleased to talk to you to arrange a free retest to confirm that the radon level in your home has been reduced.

Yours sincerely

Jane Bradley

**P.S. Please come and take this opportunity to talk to the experts.**

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

# Radon Roadshows

## Timetable for June 2005

All roadshows open at 10.00am and close at 8.00pm

Date	Venue
<b>Tuesday</b> 7 <sup>th</sup> June	<b>British Legion club</b> Castle Street Caergwrle
<b>Wednesday</b> 8 <sup>th</sup> June	<b>Mold Town Hall</b> Earl Road Mold
<b>Thursday</b> 9 <sup>th</sup> June	<b>Chapel School Room</b> Chapel School Cilcain

For further information on the locations of the venues please see the enclosed maps.

## Centre for Radiation, Chemical and Environmental Hazards



Health Protection Agency

Centre for Radiation,  
Chemical and  
Environmental Hazards

Radiation Protection  
Division

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«Name»  
«A1»  
«A2»  
«A3»  
«Postcode»

22 February 2006

Our ref: «Meas\_id»/STPNJHT2B

0«Meas\_id»

Dear «Sal»

### Further invitation to an exhibition on reducing radon in homes

The Health Protection Agency (HPA) is working with Flintshire County Council to reduce levels of radon in dwellings. You will recall that we measured the radon in your home previously and we advised you that you should take action to reduce your radon level.

HPA have been asked by Flintshire County Council to write to homes in the county where a measurement has shown radon levels at or above the Action Level of 200 Bq m<sup>-3</sup>. The Council would like to offer you a further invitation to attend an exhibition where you can get advice on reducing radon in your home. Please note that if you tested your home before the current Welsh Assembly Government initiative then we have not passed your details to the Council.

The Council has arranged the exhibitions to provide information on radon and the most appropriate methods for reducing levels. There are many methods to reduce the level of radon in your home, most are simple and relatively inexpensive. Representatives from the Council, the HPA and the Building Research Establishment will be present to offer advice on methods of carrying out the work yourself and can also provide details of local builders who have received training in radon remediation. If you rent your property you should inform your landlord of the result.

The timetable on the reverse of this letter gives information on the dates, venues and times to allow you to select the one most convenient to you. **Please bring this letter with you when you attend.**

I do hope you will be able to come to one of these exhibitions where you will be able to obtain information and advice given by experts. They will be able to offer help on reducing radon and give you a voucher for a free retest to use once the remedial work is complete.

Even if you have already carried out radon remediation works in your home, the Council would still be pleased to talk to you to arrange a free retest to confirm that the radon level in your home has been reduced.

Yours sincerely

Jane Bradley

**P.S. Please come and take this opportunity to talk to the experts.**

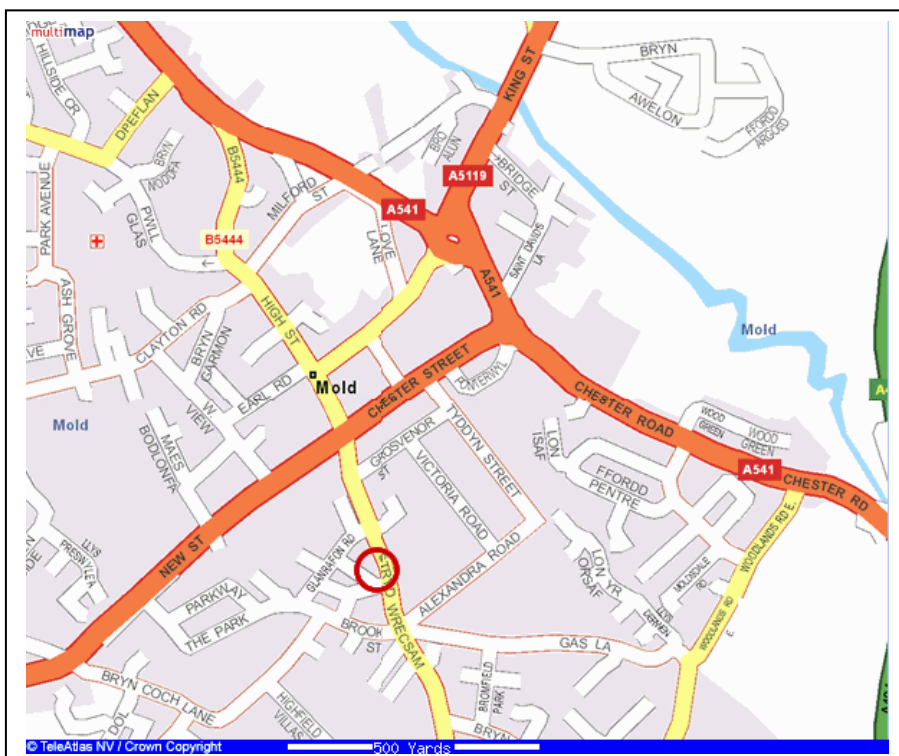
**radon**  
Don't live with the risk

# Radon Exhibitions

## Timetable for February/March 2006

Date	Venue	Open
<p><b>Tuesday</b> 28 February</p>	<p><b>The Mold and District Ex-Servicemen's Club</b> Wrexham Road Mold CH7 1HQ (circled on map below) Large car park at rear of Somerfield</p>	<p><b>EVENING ONLY</b></p> <p>6:30 pm to 9:00 pm</p>
<p><b>Wednesday</b> 1 March</p>	<p><b>The Mold and District Ex-Servicemen's Club</b> Wrexham Road Mold CH7 1HQ (circled on map below) Large car park at rear of Somerfield</p>	<p>10:00 am to 8:00 pm</p>

Please note there may be a short wait before an advisor is available to speak with you regarding your home especially between 1:00 pm and 2:00 pm on Wednesday



### Voucher for a free radon test after remedial work

This voucher entitles the named householder to a free radon retest following completion of radon remedial works at the address below.

Name	Mr J Smith	Postcode	AB12 3CD
Address	1 Any Street, Anytown, Anycounty		
Reference	12345678	Date Attended	12/05/05

The results of the radon measurement\* carried out in 2004 and further information about the building are given below.

Annual Average Bq m <sup>-3</sup>	280	Is your home double glazed	Yes
Living Area Detector Bq m <sup>-3</sup>	340	Is your home draught proofed	Yes
Bedroom Detector Bq m <sup>-3</sup>	220	The living area is	Solid Floor
Date Sent	01/03/04	The bedroom is	Suspended Floor
Your home is	Two Storey	The living area is on/in the	Ground Floor
The ground floor is	All Solid	The bedroom is on/in the	First Floor
When was it built	1977 – 1992		

On the basis of these results and the information provided on the floor-type, it is suggested that the following methods of remediation are considered:

**Very likely to work**      **A sump system or a positive ventilation unit.**

**Should work**              **Permanent room ventilation with trickle vents.**

I have now completed the remedial works in my home and wish to claim my free test. (Please give a brief description below of the work carried out in your home).

*I have installed a positive ventilation unit*

Signature..... J Smith

Date..... 02/06/06

To claim your free measurement, please complete this voucher and return to Andrew Fuller, Pollution Control Manager, Flintshire County Council.

NB. This voucher is valid until December 2005.

\*Where a property has been measured more than once, the most recent valid set of measurements has been used.

## APPENDIX C

### Press article: training of stakeholders

Wales

**Have your say on the News Messageboard**

#### **Free training for radon-gas alert**

Jun 24 2004

Rhodri Clark, The Western Mail

**BUILDERS**, surveyors and other people involved in the housing sector are to be alerted to the dangers of radon gas in one area of Wales.

Flintshire has the biggest population of all the Welsh hotspots for radon build-up in homes.

Long-term exposure to the gas - which seeps from the rocks beneath buildings - can leave residents suffering illnesses such as lung cancer.

Now Flintshire County Council is inviting tradesmen and professionals to attend training sessions where experts from the National Radiological Protection Board will explain how radon can be combated with simple measures.

Officers from the Building Research Establishment will also be on hand to give guidance.

The free sessions are aimed at solicitors, surveyors and other professionals involved in buying and selling property, and at builders and suppliers of building materials.

Radon is a colourless gas which can build up in houses. Remedies for high levels of radon are relatively cheap but are often not implemented because of ignorance or apathy.

Other Welsh radon hotspots are in North Pembrokeshire, the Vale of Glamorgan and Ceredigion.