

Reducing exposure to RADON below harmful levels

What is radon and where can it be found?

Radon is a naturally occurring radioactive gas that can seep out of the ground and build up in houses and indoor workplaces, particularly in basements and ground floors. It is found quite widely in the UK from the south west of England, Wales, through North West England and northern Scotland. The [Health Protection Agency](#) (HPA) can provide advice on radon affected areas.

How does it affect health?

When breathed in is immediately exhaled and presents little hazard. However, the decay products of radon are more like solid materials than a gas. They attach to dust and water droplets in the air which can then be breathed in and become lodged in the lungs and airways. Some give off particularly hazardous radiation called alpha particles which cause significant damage to the sensitive cells in the lung. Radon is now recognised to be the second largest cause of lung cancer in the UK after smoking.

Legal requirements and testing for radon

Radon is covered by the Ionising Radiation Regulations 1999 (IRR). It comes into effect where radon is present above the defined level of 400 Bq/m³ and employers are required to take action to restrict resulting exposures. Radon surveys should be conducted in any building or basement where its location and characteristics suggest that elevated levels may be found and significant exposures to employees and/or other persons are possible. Inexpensive surveys can be carried out by leaving small plastic passive detectors in rooms of interest. The HPA website contains up-to-date details of [validated laboratories](#) capable of supplying such detectors for undertaking radon measurements.

Under these Regulations employers must [notify HSE](#) at least 28 days before they start any work. [Notifications](#) should be e-mailed to irrnnot@hse.gsi.gov.uk and copied to the appropriate ORR account holder for the railway premises involved.

Control of radon levels

Radon enters a building primarily by airflow from the underlying ground and protection measures for reducing levels inside workplaces vary depending upon the severity of the problem and the type of building construction. Further advice and sources of help can be found on [HSE's web site](#).

Railway premises and radon

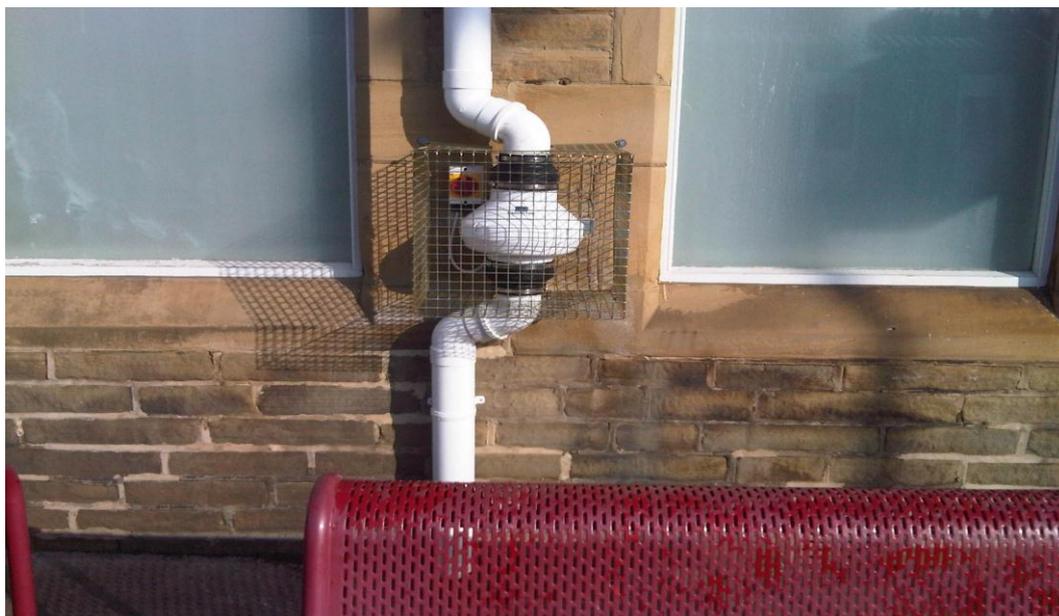
In 2009 Northern Rail raised the emerging issue of naturally occurring radon with HSE and the risk to staff it represents to staff working in ground floor and basement area where it could be present. They took the initiative to put a 2009 safety plan project in place to look at the levels of radon in all of their 170 manned locations. A post code check by the HPA confirmed that at 30 of these locations could be between 1% and 30% maximum risk of being above the threshold where action was needed and another 4 showed no clear levels. Therefore additional monitoring took place over a three month period and this identified one location, Shipley Station, West Yorkshire, where the levels of radon were above the IRR threshold of 400 Bq/m³.

There are currently six ticket office staff and two cleaners who work at this location. Overall the cost to Northern of monitoring for radon including supply of monitors is estimated to be just over £2,000. At first a simple solution was used, the aim being to reduce employee exposure below the IRR threshold level.

By turning the existing ventilation system on overnight to ensure a consistent flow of air out of the building. Initially, this appeared to be effective, however as a down side energy usage increased at this location by around 20%, but during the six monthly monitoring of this site it indicated that the problem had reoccurred and levels were again exceeding the threshold.

Further advice was sought from the HPA, who suggested a more effective solution of installing fixed sub-floor forced ventilation, four under floor sump pumps in different parts of the station building.

Northern Rail then approached Network Rail as the landlords for the building who provided the pumps (as a cost of around £20,000) in March 2011.



In June 2011 the results of monitoring the effectiveness of the radon pumps at Shipley showed a level of 110 Bq/m³, 290 Bq/m³ below the actionable limit.

Future Actions

A maintenance regime will be put in place to ensure the pumps are well looked after and remain fit for purpose.

The energy usage at Shipley Station will as a result increase as they run day and night and further checks will be needed through the monitors to ensure the pumps are maintaining the levels below the actionable level.

The HPA have recommended the same control measures as Northern Rail have put in place with the station management team ie a re-check every 12 months to ensure the pumps are doing what they should be.

Further radon monitoring will be needed 10 years after the initial tests were done at other locations that were initially identified as at risk.

This case study clearly shows the importance of a proactive approach to managing all potential significant health risks, in order to safeguard workers from ill health and ensure legal compliance.