

Radon in drinking-water

A hazard on tap?

by David Talbot, *Keyworth*

The BGS has many years of experience on natural radioactivity research and has undertaken a number of studies on radon in drinking-water both in the UK and overseas, for example in Jordan and Cyprus. The most recent BGS work in this field was a research project for the Department of the Environment, Transport and Regions (DETR) on natural radioactivity in private water supplies in West Devon. This found elevated levels of radon in some private water supplies derived from groundwater.

The findings of this work have been published by the DETR in a research report, number DETR/RAS/00.010, entitled *Natural Radioactivity in Private Water Supplies in Devon*, which may be obtained free of charge from the DETR website:

<http://www.environment.detr.gov.uk>

At approximately nine per cent of the water supplies sampled, dissolved radon, a naturally occurring radioactive gas, was found to be present at levels exceeding the draft European Union Commission Recommendation action level of 1000 becquerels per litre for private supplies.

Exposure to radon via drinking-water can occur by either of two ways, the first is through inhalation of degassed radon (a practice once commonly encouraged at many water spas). In terms of exposure via household drinking-water supplies, the main route is ingestion, although inhalation exposure during showering or bathing may also be important where extremely high levels are involved. Although the behaviour of ingested radon is not fully understood,

current thinking is that the majority of radon ingested enters the circulatory system, where it decays by emission of an alpha particle and deposits its radioactive progeny (isotopes of polonium, lead, and bismuth) amongst the body's tissues.

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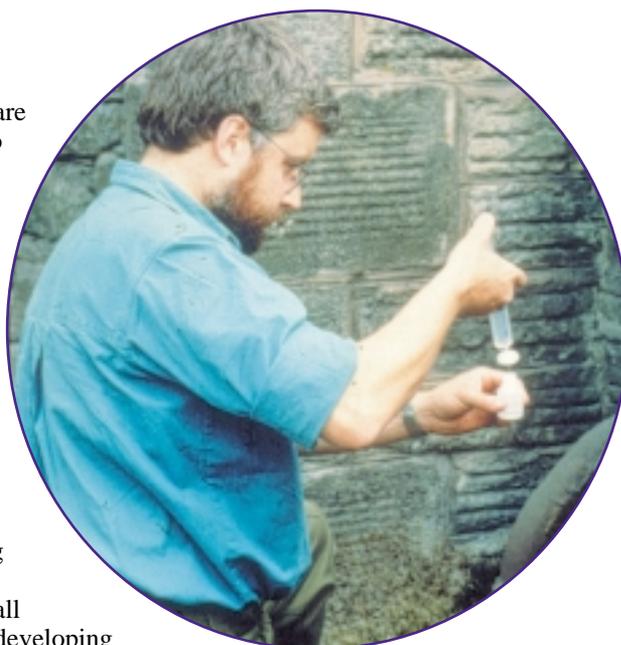
The primary adverse health effects of exposure to radon are caused by cell damage due to alpha particles produced by radon and its associated decay products (which themselves quickly undergo radioactive decay releasing further alpha particles). Likely effects will depend upon the level of exposure. High levels of exposure to radon and its progeny by inhalation are widely thought to lead to an increased risk of lung cancer. The risks arising from ingestion of radon are thought to include a very small increase in the likelihood of developing various cancers associated with exposure to radioactivity. Although this risk is less well understood than that arising from inhalation it is thought to

be much lower. Further information on the health effects of radon can be found on the National Radiological Protection Board website:

<http://www.nrpb.org.uk>

It is unlikely that the occurrence of radon in drinking-water is restricted to West Devon, though levels of radon are only likely to be elevated at properties in which drinking-water is derived from private groundwater sources (such as springs, wells, adits, and private boreholes). Major public supplies, even when they come from groundwater sources, are unlikely to carry elevated levels of radon due to losses in the treatment processes. The extent of the potential for elevated levels of radon in drinking-water outside of the West Devon area is presently uncertain, although previous data collected from natural springs suggest the problem is restricted to areas in which radon in indoor air is also a problem.

The BGS is engaged in further analysis of the radioactivity of drinking-water for a number of organisations. It is also engaged in a range of other radon and natural radioactivity research.



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A spring being sampled for radon and uranium analysis in Derbyshire.