



Radon in Ingleborough / Clapham Cave, North Yorkshire, UK.

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Abstract

Atmospheric radon concentration was measured at Ingleborough Cave, North Yorkshire during the summer of 2004, and the autumn / winter of 2004/5. Significantly, Ingleborough Cave forms part of a larger system which includes the world famous Gaping Gill pothole. This plunges 105 m (334 ft), contains the tallest unbroken waterfall in England and one of the largest known underground chambers in the UK. Measurements were taken to assess the effects of seasonal and spatial variation, elevation and ventilation on radon concentration in Ingleborough. In this study personal dose exposures for three groups of cave user were identified, and the performance of a variety of radon detection systems evaluated. Summer radon concentrations inside the cave peaked at around 7,000 Bq m⁻³, although average concentrations were less than 5,000 Bq m⁻³. During the winter measurement period, average concentrations were around 100 Bq m⁻³, and a winter / summer ratio therefore of 47,4. The average annual radon concentration exceeded the legislative limitations for the workplace of 400 Bq m⁻³ due in part to a failed fan in the ventilation system. When the fan was running we noted an 80% reduction in radon concentrations although reliability of the fan was problematic due to extensive but relatively rare flooding of the cave system.

The radon dose experienced by cave workers and guides in this study exceeded the Ionisation Radiation Regulations limit of 5 mSv/annum, and highlighted that for health and safety reasons the ventilation system should be fully operational during the high radon concentration summer months.

Keywords: Radon, Cave, Ingleborough, Detection methods