

Fallout over radwaste

BY STUART HASZELDINE & DAVID SMYTHE

Stuart Haszeldine and David Smythe * respond to Bruce Yardley's criticisms published here in April and still available on *Geoscientist Online* under 'Previous Issues'



Bruce Yardley resorts to *ad hominem* criticism¹ of our scientific views on nuclear waste disposal, accusing us of 'campaigning' on science matters of public interest, in contrast to scientists (himself presumably included) who dispassionately and neutrally 'advise'. However, he has evidently not taken the trouble to look out and study the highly detailed online evidence^{2,3} underlying our summary views^{4,5} concerning West Cumbria.

NIREX

During the 1990s Nirex undertook a national site search with BGS help, but finally targeted an inland Sellafield site which had not even featured in the working list of 537 sites⁶. Nirex drilled, cored, and interpreted 29 boreholes, as well as undertaking various geophysical surveys, to produce geological and hydrogeological models of the West Cumbria district, at a cost of £400M. It proved to have exceptionally fractured geology, complex hydrogeology and geochemistry. The Nirex planning inquiry of 1995-96 rejected construction of an underground test laboratory there⁷, recommending that alternative UK sites should be investigated⁸.

Reports in 1999 by the Royal Society⁹ and the House of Lords Science and Technology Committee¹⁰ recommended a national site search, led by geological criteria. However the 2001 Defra white paper *Managing Radioactive Waste Safely*¹¹ ignored this advice, proposing 'voluntarism'. CoRWM, the committee set up to develop deep geological disposal for UK intermediate and high-level radwaste, which reported in 2006, contained not a single Earth scientist.

BIASED?

Are we partial and/or biased, according to Yardley, because our conclusions "overwhelmingly" support our case? It follows that the case for anthropogenic global warming is similarly campaign-induced, because the overwhelming

majority (97%) of climate scientists accept it¹². The Nirex planning inquiry inspector concluded⁷ that "The indications are, in my judgement, still *overwhelmingly* that this site is not suitable for the proposed repository, and that investigations should now be moved to one of the more promising sites elsewhere" [our emphasis]. Was he another biased 'campaigner'?

Yardley says that we "characterised the geology of west Cumbria as well-known, yet also so unpredictable that finding a safe repository site there was impossible" [our emphasis], implying that well-understood geology is necessarily predictable. But predictability does not necessarily arise from detailed measurement of a complex system. NASA calculated prior to the 1986 Challenger space shuttle disaster that the compound probability of failure from well-known components was one in 100,000. The real probability turned out to be more like one in 10.

Yardley makes the startling claim that the subsurface water geochemistry at west Cumbria is suitable for waste containment, based on cerium geochemistry from the PADAMOT project¹³. The full portfolio of evidence permits an outline reconstruction of both modern and palaeo-hydrogeology. Unsuitable oxic waters with Eh greater than +50 mV have clearly dominated to a depth of 1km, spanning all prospective repository depths. He has chosen his evidence to fit his prejudice. Yardley is an 'agnostologist'¹⁴; one who argues that we never know enough; 'we do not yet have enough data' – much like climate sceptics and in earlier times, apologists for big tobacco^{15,16}. Our full technical response to Yardley is available online^{2,3}.

▶ The references cited in this piece are listed in its online version. *Editor*

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Pictures should be of print quality – as a rule of thumb, anything over a few hundred kilobytes should do.

Precedence will always be given to more topical contributions. Any one contributor may not appear more often than once per volume (once every 12 months).

“CORWM, THE COMMITTEE SET UP TO DEVELOP DEEP GEOLOGICAL DISPOSAL FOR UK INTERMEDIATE AND HIGH-LEVEL RADWASTE, WHICH REPORTED IN 2006, CONTAINED NOT A SINGLE EARTH SCIENTIST”
Stuart Haszeldine & David Smythe