

Nirex case didn't hold water

John Gummer has thrown out Nirex's appeal to build an RCF at Sellafield. Rachel Western can take a large chunk of the credit. Here she outlines the case assembled by FoE, which was presented at the planning inquiry

ON 17 March the environment secretary John Gummer dismissed the radioactive waste group Nirex's planning appeal against Cumbria County Council's refusal of planning permission for a Rock Characterisation Facility (RCF). It is the first time the nuclear industry in the UK has lost an application for planning permission. Justifying the refusal, Gummer remains "concerned about the scientific uncertainties and technical deficiencies in the proposals presented by Nirex [and] about the process of site selection and the broader issue of the scope and adequacy of the environmental statement."

Friends of the Earth (England, Wales and Northern Ireland) assembled a compelling technical case against the RCF. This decision has fully vindicated FoE's research programme, and delivered an historic victory for the environmental movement.

FoE's case

A safety case for a repository is largely dependent on the behaviour of local groundwater. Inevitably, groundwater will enter the repository and dissolve radionuclides, and water thus contaminated could subsequently find its way to the human environment. This is the most important risk posed by radioactive waste disposal, and its likelihood rests mostly on the nature and setting of the repository host rock. Careful site selection is therefore of critical importance to repository safety.

In 1985, Nirex, with the advice of the British Geological Survey (BGS), embarked upon a site selection procedure. An initial list of 500 potentially suitable sites was reduced by applying selection criteria based on geological and other criteria, such as planning considerations. The Borrowdale Volcanic Group (BVG) at Sellafield was later added to the list even though in 1980 the Institute of Geological Sciences (later the BGS) had previously concluded that Sellafield would be unsuitable for a nuclear waste repository.

Local characteristics at Sellafield suggest that contaminated water would tend to discharge on land above the repository rather than towards the sea. However, it may never be possible to make confident predictions of contaminated groundwater movements because of the variability of the host rock and because there is a likelihood of earthquakes along the fault zone at Sellafield. Nevertheless, in 1991 Nirex announced that it would concentrate further work on Sellafield and in 1992 publicly proposed to construct an underground RCF to investigate site suitability for construction of a repository.

Plans for the RCF progressed until, in December 1994, Nirex's application for planning permission

was refused by Cumbria County Council. Nirex appealed to the Secretary of State for the Environment and, in February 1995, John Gummer announced that a planning appeal would be heard at a Public Planning Inquiry in September 1995 ("Nirex's nuclear waste dilemma", SEJ 106).

A peer review of the RCF proposal, put forward in 1993 by Her Majesty's Inspectorate of Pollution (HMIP), was scuppered by Nirex's withdrawal from a cost recovery programme. In the absence of any regulator's review programme, and in preparation for the planning inquiry, Friends of the Earth decided to commission independent scientific and technical experts to assess implications of the RCF. Our witnesses were international experts in their field, including an advisor to the European Community, a member of the Radioactive Waste Management Advisory Committee (Rwamac) and a Nirex contractor. A summary of technical proofs is given below:

Dr Peter Kokelaar, Reader in Volcanology at Liverpool University, is an international expert and leading authority on the proposed site, the BVG. He concluded that due to the exceptional complexity of the BVG, it would prove to be extremely difficult to characterise to government standards required for a repository host rock.

Professor David Smythe, Chair of Geophysics at the University of Glasgow, was commissioned by Nirex to undertake geophysical rock characterisation. Professor Smythe reported major contradictions in Nirex's interpretations of rock structure, depending on the survey technique used, and surmised that the current geological interpretation would not provide a reliable foundation for hydrogeological modelling.

Mr George Reeves, a member of the Rwamac, is lecturer in engineering geology at Newcastle University. Mr Reeves was involved in the Canadian underground research laboratory programme, and his evidence considered the adequacy of the hydrogeological site investigation work carried out by Nirex. He concluded that their programme was inadequate and that the baseline flow regime had not been established.²

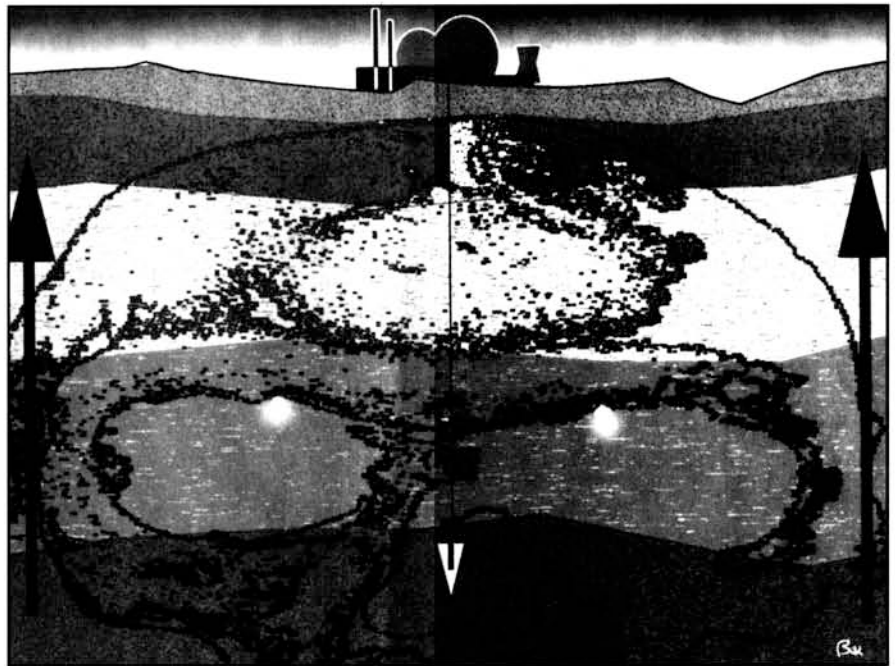
Dr Shaun Salmon is a Senior hydrogeologist at Aspinwall and Company. Dr Salmon has extensive experience of groundwater modelling issues and his evidence considered the reliability of the baseline computer model put forward by Nirex. He found the model to be a very poor representation of reality — it failed to replicate even observed groundwater responses and little attempt had been made to validate it for predictive purposes. Further work is required prior to RCF construction — work which would take at least nine years to complete.

Dr Stephen Hencher, Senior Lecturer in Engineering Geology at the University of Leeds, considered the issues related to fracture flow.³ In particular Dr Hencher's evidence considered Nirex's claim that the proposed RCF would provide information that would allow fracture flow within the BVG to be quantified. On reviewing the international research work carried out in this area, Dr Hencher concluded that the Nirex RCF proposal is highly unlikely to provide data adequate for predicting flow. He showed that the software tools used by Nirex to predict fracture flow have not been validated. Furthermore, he argued that far from providing useful data, the Nirex RCF may generate misleading data that would jeopardise the possibility of ever providing a reliable assessment of the risks posed by repository development at Sellafield.

Dr John Allison is a partner in the engineering firm Bullen Consultants. Since 1980 he has been responsible for a number of studies on repository engineering issues and has also been a member of an EC task group on repository sealing. Dr Allison considered the engineering aspects of Nirex's proposal and demonstrated that, given the particular problems associated with Sellafield, the need for the creation of engineered barriers assumes a special significance. He showed that Nirex's research proposals do not meet the required standards of good science and good engineering. Nirex clearly had not designed the RCF as an integral part of a final repository, and the proposal for the creation of an underground laboratory could therefore create a redundant excavation within the host rock which could act as a short circuit for the return of radionuclides to the surface. Dr Allison therefore concluded that the RCF would jeopardise the safety case for a final repository at the Sellafield site.

Dr Roy Wogelius of the University of Manchester looked at the geochemical issues of the RCF proposal. Dr Wogelius has been a researcher in the US nuclear waste programme and a regulator of hazardous waste disposal at the US Environmental Protection Agency. His analysis of the available documentation indicated unacceptable error levels and highlighted the possibility that dose limits may be exceeded. Because the chemical perturbations caused by rock excavation are not understood, further generic research is required before *in situ* geochemical data gathering would be of value. Given these circumstances, the proposed RCF would only serve to increase the present levels of uncertainty.

The Public Inquiry lasted from September 1995 to 1 February 1996, with a decision originally expected by November 1996. At the close of the inquiry, Nirex promised to carry out further work in the intervening months, addressing points made by objectors. It was clear that Nirex hadn't presented a credible case at the Inquiry — but it seemed to feel confident that a slight extension to its work programme would sort out the problems.



Rising dump

Not so. On 10 December, John Holmes, Director for Science at Nirex, realising that the company was struggling to make a case for the site, sent a memo to his staff:

"I have the feeling we may struggle to make a case for the site I was concerned that after £200 million the modellers are saying that we are short of datapoints by a factor of 10x or 100x. We need to get to the bottom of this — it seems more fundamental than just the number of hydrogeological units we are using. Options would seem to be more site characterisation, a different approach to modelling [or] we conclude that a BRUSC [Basement Rock Under Sedimentary Cover] type site is inherently not characterisable to the requisite level"

Leaked a month later, the memo prompted the Department of the Environment to request submission of any new evidence as a matter of urgency. Friends of the Earth immediately responded with two reports — one detailing how taxpayers stood to save millions if the project was delayed, and a second on the inadequacy of Nirex's new hydrogeological dataset.

Former chairman of Rwamac, Sir John Knill, also wrote to John Gummer on the matter: *"Dr Holmes's Proof of Evidence to the RCF Public Inquiry contains no inkling as to these profound reservations as to the adequacy of the safety assessment programme."* And arguing that further work was required which would take several years to carry out, Sir John then stated: *"If the RCF [were] to proceed without the matter being resolved, however that might be achieved, it would result in an unsafe situation which would require eventual resolution somehow"*.

On 5 February, following submission of all the new post-inquiry evidence, John Gummer formally invited supplementary comments, with a view to reopening the Inquiry. Friends of the Earth argued in its response that there was sufficient evidence for Nirex's application to be thrown out. □

Notes:

1. The proofs can also be found on the world wide web at: <http://www.foe.co.uk/nirexrcf/index.html>
2. It is essential to get a clear picture of groundwater flow before the RCF is built.
3. Hydrogeological conditions at Sellafield are predominantly controlled by flow through a network of interconnecting fractures such as joints and faults.

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