

Sellafield's Trojan horse

Britain's nuclear industry wants to build a depository under Sellafield for its waste. But this month, seven scientists will tell a public inquiry that the industry's case is far from rock solid



Grim tidings: environmental protesters greeted the opening of the public inquiry at Cleator Moor

John Giles/PA Photo Library

Rob Edwards

IN 1977, when David Smythe played bass for a punk rock band called the Rezillos, he took a principled stand in favour of nuclear power. He refused to join the band when they played an antinuclear benefit concert in Edinburgh. Now professor of geology at Glasgow University, he is leading Friends of the Earth's attack on the nuclear industry's plans to build an underground rock laboratory near Sellafield in Cumbria.

But Smythe's conversion from nuclear admirer to critic is symptomatic of the daunting problems now dogging the Nuclear Industry Radioactive Waste Executive (Nirex), the company that has the task of disposing of Britain's nuclear waste. Over the next few weeks, the company's plan to excavate a "rock characterisation facility" (RCF) at Longlands Farm in Gosforth will face its greatest challenge. Instinctively sympathetic scientists such

as Smythe are going to accuse Nirex of fundamental bungling.

"I'm certainly not an antinuclear greenie. In fact I am naturally predisposed in favour of what Nirex has to do," says Smythe. "But at present they are in a complete mess. Their surveys and interpretation are inconsistent, the data are mutually contradictory." Nirex's responses to his criticisms are, he maintains, "flaccid, flabby and weak".

Nirex wants to build a £195-million RCF to see if the site is suitable for the construction of a £1.8-billion repository for radioactive waste created by Britain's nuclear power programme. The RCF would consist of two 680-metre deep shafts down to an underground gallery designed to be used as a laboratory for testing the surrounding rock. Nirex eventually aims to dispose of up to 275 000 cubic metres of low and intermediate-level nuclear waste before 2060 in sealed tunnels drilled into the rock.

Nirex originally intended to submit a single planning application back in 1990 for both exploratory excavations and the final repository. But the company had to rethink its strategy after Cumbria County Council and independent experts expressed concern that radioactivity could leak out through the movement of groundwater.

In 1992, according to Nirex's director Michael Folger, the company decided to make a separate application for a RCF because an application for a repository "would be unlikely to be approved".

The county council and environmentalists accuse Nirex of "salami tactics"—slicing up an unpalatable proposal into more digestible chunks. If Nirex builds the RCF and it is a success, opponents will find it very difficult to argue against a repository at the site. "The RCF is a Trojan horse. We should not be fooled by it," says FoE's Patrick Green.

This month, in a drab civic hall in the

Cumbrian town of Cleator Moor, where the public inquiry is being held, Smythe and six other expert witnesses assembled by FoE will launch their attack on Nirex's plan. They will argue that the plan is premature and geologically destructive.

Naturally, Nirex does not agree. It says that it knows enough about the geology of the site to go ahead with the RCF which is, after all, only designed to find out more. The company's attitude, despite having one of the most unenviable tasks in Britain, remains bullish and confident. "We will pull them apart in cross-examination," promises one Nirex official.

The scale of the task facing Nirex is mind-boggling. It has to try to demonstrate that the nuclear waste will be safe for the next million years. It has to prove that the vast majority of the radionuclides will be contained underground and any that do reach to the surface in groundwater will be harmless. It has to take into account a highly complex, ill-understood and fault-

Smythe was a member of a geological review panel which advised British Nuclear Fuels in 1990-91. In the summer of 1994 he persuaded Nirex to commission Glasgow University to conduct an initial 3D seismic survey of part of the site Smythe and his team are still working on the survey's results.

So it is all the more surprising then, that Smythe should in the interim agree to give evidence against Nirex. "Some people think I am mad because I may not get any more money from Nirex, but I think their failings have to be brought to public notice," he says. His evidence turns on Nirex's unwillingness to commission comprehensive 3D seismic surveys, which Smythe believes are the best way of getting an accurate picture of underground geology.

Smythe does not want to talk about the detailed findings of his 3D survey for Nirex. But he is dismissive of the company's view that all his survey will do is to "refine" current understanding of the geology based on 2D seismic surveys. In his experience, 3D surveys, such as those commissioned by oil companies, have had a much more radical effect. "You have to throw your results from two-dimensional surveys in the rubbish bin and start again," he says.

Another of FoE's witnesses is Stephen Hencher, a senior lecturer in engineering geology at Leeds University. He says that the 450-million-year old volcanic rocks that Nirex wants to excavate are riddled with hairline fractures, some of them hundreds of metres long. He argues that the current modelling of fracture networks is not good enough to enable Nirex to predict the flow of fluids through these rocks.

Worse, he says that constructing an RCF before the fracture network is better understood could ruin once and for all the prospect of the site becoming Britain's waste repository. As soon as the first shaft is blasted, the whole structure of the rock will change. "They may cause irreparable damage through their ignorance. Potentially, they may make the site unusable as a repository by premature evacuation," claims Hencher.

"I'm certainly not antinuclear, I'm certainly not anti-Nirex, I'm certainly not anti-disposal. But it's got to be done safely," he says. "I think they will be in a far better position within ten years." He believes that an RCF would then be a "possibility".

Shaun Salmon, senior hydrogeologist with Shrewsbury-based consultants Aspinwall, also thinks the plan premature. He reckons that it will take five or six years to conduct the further investigations which he believes are necessary to understand the movement of groundwater.

The point is reinforced by George Reeves, an engineering geologist from

Newcastle University and a member of the government's Radioactive Waste Management Advisory Committee. He argues that Nirex has relied on too few boreholes drilled over too short a period. Investigations at British coalfields, he points out, take at least five years. Most of Nirex's hydrogeological records are less than two years old.

The government requires Nirex's plans to be based "on the best possible scientific information and analysis of risks". FoE maintains that Nirex's scientific information is "below an acceptable standard".

Green warns that excavating the laboratory before obtaining "the necessary scientific information runs the risk of wasting millions of pounds of public money".

Witnesses for Nirex counter that many of the alleged shortcomings will be rectified before the RCF is built or when it is in operation. "We do not need a comprehensive understanding and description of all features and processes," says John Holmes, Nirex's science director.

"Nirex is dealing with uncertainties by making conservative judgments until such time as these uncertainties can be better resolved," adds the company's science manager, Alan Hooper. "The concerns raised by objectors are considered to be ill-founded and to be addressed by work which Nirex already has in hand. The RCF is an essential component of this work."

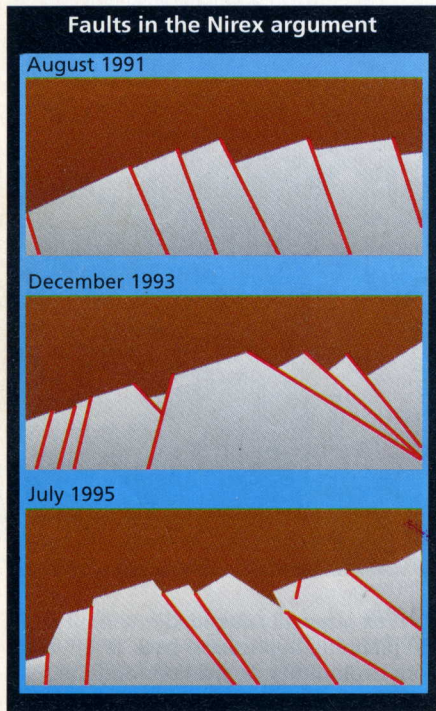
Another of Nirex's science managers, Robert Chaplow, accuses Smythe of selectively presenting information. Smythe's criticisms of Nirex's geological interpretations are "unjustified", Chaplow says, adding that Smythe fails to appreciate that Nirex is intending to carry out a 3D seismic survey before constructing an RCF.

Perhaps surprisingly, many of FoE's witnesses pay tribute to the high calibre of Nirex's individual scientists. Their objection is to the timetable the scientists are having to work to, says Smythe. "The trouble with Nirex, having seen it from the inside, is that their scientists are asked to do too much too soon," he says.

Green is more brutal: "The RCF is being driven by a bankrupt nuclear industry which is desperate to improve its economic performance by cutting costs and getting rid of its waste." Nirex disagrees, saying that government policy requires the company to construct a waste repository "as soon as reasonably practicable".

The public inquiry into the RCF is scheduled to finish at the end of January. The planning inspector, Chris Macdonald, says it will be October before he submits his recommendations to the government. Ministers will then work out the future of Longlands Farm. The outcome of the scientific tussle is going to be at least as unpredictable as Cumbria's geology. □

'If they can't even get the structure of the major fault right, then God help us'



Changing vision: Smythe shows how Nirex's view of the geology has shifted

ridden rock formation, as well as the impact of another ice age and whatever holes people may drill into the ground hundreds of thousands of years hence.

Smythe says that Nirex has tried to map the faults in the underground rock five times since 1990, and every time the pattern looks completely different (see Diagram). "Before you position the RCF you have to be aware of the major geological faults," he argues. "The biggest one is called F2. Nirex have got the structure of F2 completely wrong. If they can't even get the structure of the major fault in the region right, then God help us."