LETTER

A revised approach

DEAR EDITORS,

Jonathan Turner's article on nuclear waste disposal in the Autumn 2025 edition (*Geoscientist* 35 (3), 18-19) raises interesting questions. I have no doubt that we need nuclear power for the future, since it is reliable in a way that wind is not, and we need to deal with the waste that will arise, and with legacy waste too. The UK is making remarkably slow 'progress'. When I was working on the Nirex project (a body set up by the UK nuclear industry to examine geological disposal of radioactive waste) in the 1990s, the target operation date was 2015 – the year I would retire. I've now been retired 10 years, and we are less far forward.

I agree with Dr Turner that the Borrowdale Volcanics near Sellafield are not very promising as a repository host, but the site investigated had the advantage that it is close to Sellafield, where most of the waste for disposal is currently stored. Many criteria must be considered: suitable geology is clearly essential, but transport and other logistics cannot be ignored, and cooperation from the host community is also necessary. The Eocene clays beneath north London might be a possible repository host formation, but I can't imagine this proving acceptable for many reasons.

> **"Many criteria must be considered: suitable geology is clearly essential, but transport and other logistics cannot be ignored"**

The search for a location could be made easier by taking a different approach to what is a suitable geological environment. The emphasis so far has been on low-permeability formations: evaporites, clays and igneous/metamorphic rocks. But the real need is for extremely low rates of groundwater flow, both to protect the containment materials and to minimise the flux of waste radionuclides into the accessible environment, and confidence that this will continue for the long term.

Long-term persistence of saline water with no support →

Sizewell in Suffolk, UK, hosts the Sizewell A and B nuclear power stations (pictured here); A is being decommissioned and a third, Sizewell C, is planned. Saline groundwater, expected to be present at depth in the Chalk under Sizewell, may provide suitable conditions for nuclear waste disposal, suggests John Heathcote. *© Shutterstock*

from evaporites is a good indicator of very low groundwater flow, whatever the permeability of the rock. I'm aware of such in the St Bees Sandstone beneath Sellafield (Bath et al., 1996), and at depth in the Chalk of East Anglia, proven at Trunch in Norfolk but probably present under Sizewell in Suffolk (Heathcote, 2024). My own preferred location, on geological grounds, would be near Sizewell in the lower part of the Chalk, which is characterised by very old saline groundwater, an area of likely glacial deposition rather than erosion, and long-term tectonic subsidence. Excavating tunnels in the Chalk beneath the water table is very well understood (e.g. the Channel Tunnel) and it's not necessary to go very deep.

Local acceptance (not the same as volunteering) remains important, though. I appreciate the concept of 'acceptance', since where I live now in Scotland, a great deal of renewables electricity infrastructure is being foisted on us to meet needs in England, and it is meeting much opposition from host communities.

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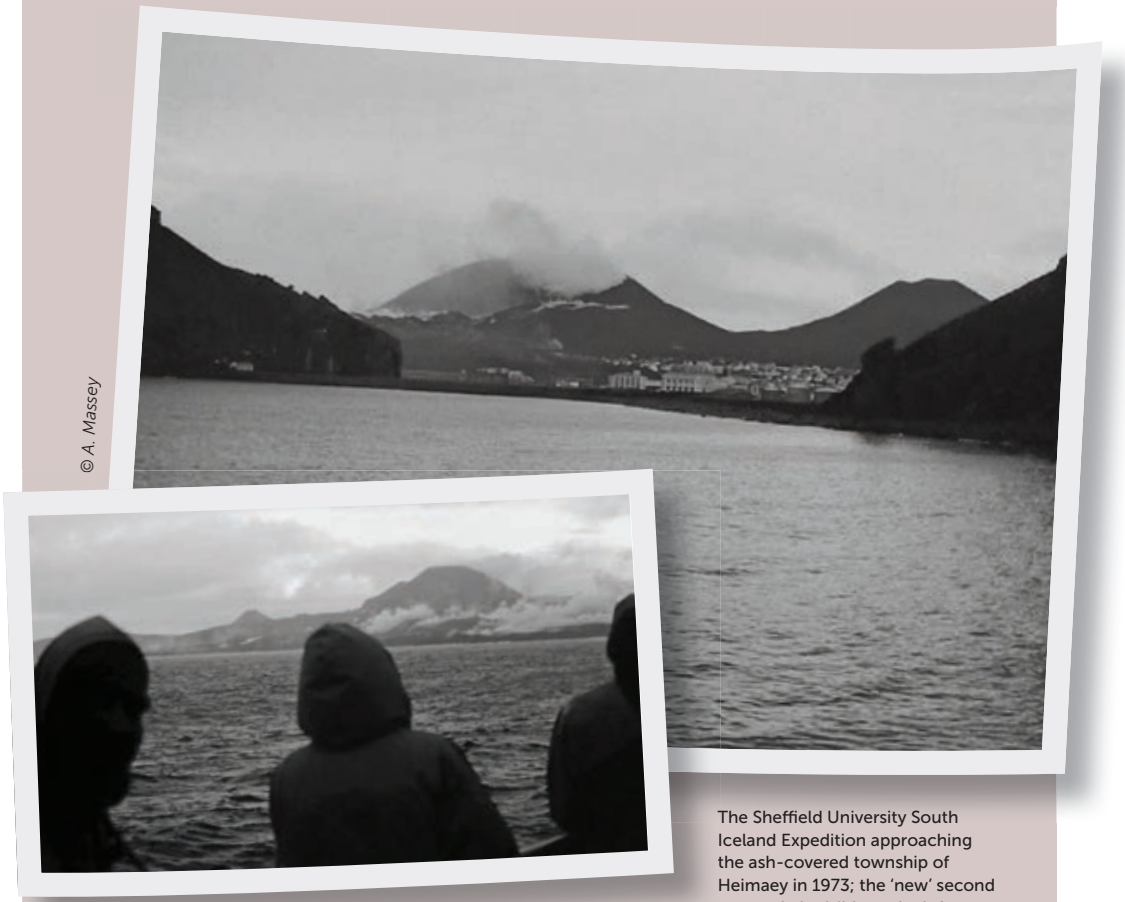
FURTHER READING

A full list of further reading is available at geoscientist.online.

- Bath,A.H. et al. (1996) QJEGH 29, S39 - S57
- Heathcote, J.A. (2024) QJEGH 58
- Turner, J. (2025) Geoscientist 35 (3), 18-19



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The Sheffield University South Iceland Expedition approaching the ash-covered township of Heimaey in 1973; the 'new' second mountain is visible to the left

LETTER

Icelandic reminiscence

DEAR EDITORS,

In the Autumn 2025 edition, Dr Rhian Meara presents a lovely example of how working within the Earth sciences can lead to a range of careers, sometimes unthought of when setting out (*Geoscientist* 35 (3), 40-44).

Rhian describes her deep connection with the Icelandic island of Heimaey and how the impact of the 1973 eruption on the local community was a driver in altering her career towards the social sciences.

Her beautiful photographs reminded me of a cold overcast June day in 1973, when, as a member of the Sheffield University South Iceland Expedition, I had the good fortune to see Heimaey within months of the eruption.

We were on the MS *Gullfoss* ferry from Leith to Reykjavik when it dropped off supplies and passengers at Heimaey. It was a remarkable sight, especially for many in our team who had only just graduated as geologists. We sailed past the still hot and steaming lava front which had reduced the once wide harbour mouth to a channel barely wide enough for the ship to navigate.

A fellow passenger returning home to Heimaey after two years away told us that when he left there was only one mountain, now there were two!

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