

Boost to UK geothermal energy prospects

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(PhysOrg.com) -- Geothermal energy in the UK is a step closer to reality after exploratory drilling by experts at Newcastle University revealed record levels of permeability in granite.

Research led by Professor Paul Younger, from the Sir Joseph Swan Institute for Energy Research at Newcastle University, has revealed the highest permeability ever recorded for a granite anywhere in the world - in the centre of Weardale, County Durham.

The team were investigating potential sources of [geothermal energy](#), which is becoming increasingly popular in the search for low-carbon energy resources.

Granite can be particularly useful as it is often rich in radioactive elements that generate heat as they decay but permeability is also important and until now granite was believed to be one of the most impermeable rocks.

“Hydrogeologists have traditionally viewed granite as poorly permeable, and this has led to a bit of a “counsel of despair” over the chances of finding decent permeability in granite,” explains Professor Younger, whose research is published today in the Quarterly Journal of Engineering Geology and Hydrogeology.

“We decided to challenge that pessimistic assumption, to see if we could find permeability at depth. And, eureka! we found it. As far as we can tell, the highest permeability ever recorded for a granite anywhere in the

world.

The results were obtained by pumping naturally-occurring saline groundwater from an exploratory [borehole](#) and monitoring the change in water levels. A permeability of almost 200 darcies - a unit of permeability - was recorded.

This is far higher than most prolific oil and gas reservoirs, and on a par with water wells in the Chalk that supplies London. The Newcastle team believe the find is not unique to the Weardale granite, as there are similar granites worldwide which may display equally high levels of permeability.

“This is great news for geothermal energy because high natural permeability means that time and money won’t need to be sunk into artificially developing permeability by means of hydraulic stimulation - a costly and uncertain business,” says Professor Younger.

However, the research also suggests that caution needs to be taken when selecting sites for nuclear waste disposal.

Granite is a popular rock in which to site repositories, and the higher than expected [permeability](#) of the rock suggests that safety estimates previously made may have to be reconsidered.

Although repositories will obviously be located in areas where there is no large-scale faulting, more care will have to be taken to ensure that excavations will not enter ground that is more permeable than expected.

"The discovery that granite can in places be as permeable as the Chalk Aquifer is a little disquieting for repository construction in granite," says Professor Younger.

"If these structures are avoided, it ought to be possible to construct successful repositories in granite. However, it will require more detailed geological mapping than might otherwise have been undertaken - which is not entirely bad news for us geologists of course!"

Provided by Newcastle University

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