

Planned US nuclear repository 'at risk' ...

[WASHINGTON] The US Department of Energy (DoE) is preparing to investigate claims that warm underground fluids may have entered its proposed nuclear waste repository at Yucca Mountain, Nevada, at some time in the past, possibly less than a million years ago.

Scientists from the US Geological Survey (USGS) and the University of Las Vegas at Nevada are to collect, analyse and date calcite samples from the site. Calcite is a signature of the historical presence of water.

The claims are made in a study published last week by the independent Institute for Energy and Environmental Research based near Washington DC. The study's author is Yuri Dublyansky, a geologist with the Russian Academy of Sciences, and former consultant to the state of Nevada.

Dublyansky has been studying the Yucca Mountain site for the past five years. The state is opposed to a repository on its soil and, if confirmed, Dublyansky's claims could raise further questions about the suitability of Yucca Mountain as a repository for 77,000 tonnes of civilian and military nuclear waste.

This is because one of the site's main attractions when it was chosen 12 years ago was the belief, backed up by a strong scientific consensus, that the site has been dry for at least 8 million years.

Water is among the proposed repository's worst enemies, as it will corrode the metal containers used to store the waste. This will lead to radionuclides leaking out and eventually contaminating the environment.

USGS scientists are sceptical of Dublyansky's claims, and say they do not expect their own analysis to provide confirmatory evidence. But leading geologists from other universities in the United States

and Europe are more supportive.

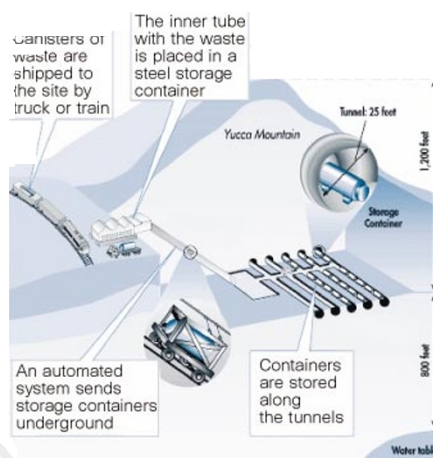
Robert Loux, executive director of the Nevada state Nuclear Waste Projects Office, says that if the age of the samples is found to be around 100,000 years old, the basis for choosing Yucca Mountain would be called into question.

This is also the view of Congress's scientific advisory board on nuclear waste, the Nuclear Waste Technical Review Board. In an assessment of some of Dublyansky's preliminary work, the board concluded: "If fluids at elevated temperatures were present less than 100,000 years ago, this could lend credence to the hypothesis of ongoing hydrothermal activity at Yucca Mountain."

This possible setback to the DoE's plans comes after criticisms made last month by the board. In its latest report to Congress, the board says there are still many uncertainties in the site's suitability as a repository for nuclear waste. The report also calls on the DoE to consider alternatives to its proposed designs for the repository (see below).

These developments could not have come at a worse time for the DoE, which is due to present its design ideas for the repository, and an estimate of costs, to Congress by the end of this month. The department has until 2001 to decide if it is to recommend the site to the president.

An application for a construction licence will need the approval of both the president and Congress. Dublyansky says his conclusion that warm fluids once ascended into the repository are based on an analysis of the gases and vapour found trapped in calcite samples taken from a five-mile tunnel that has been excavated at the site for research. The gases are known as 'fluid inclusions'.



The Yucca Mountain storage plan: its stability in the face of geological change is being questioned.

Dublyansky says that the temperature of the samples at the point of entrapment was between 35 and 75 °C. "Water at such a temperature could not have come from surface sources," he claims.

But Joe Whelan of the USGS says that Dublyansky's inference that the calcite must therefore have formed from warm, ascending underground fluids is pure speculation. USGS scientists believe the water probably percolated downwards from rain or snow.

Whelan and six colleagues accuse the Russian scientist of ignoring contrary conclusions from a 1992 study by the National Research Council, as well as the absence of any known physical mechanism by which the fluids might have risen.

"This is not a scholarly investigation," says Whelan of Dublyansky's work. "Strong but careless conclusions are drawn from off-hand observations, and possible interpretations of data are presented as established fact, with no effort to objectively consider plausible alternatives."

Arjun Makhijani, president of the Institute for Energy and Environmental Research, says he was taken aback by the nature and tone of the USGS response. But he says that this was the exception out of five reviews of Dublyansky's work.

Three of the other four reviewers, including Bruce Yardley, professor of earth sciences at the University of Leeds, UK, and Larry Diamond, professor of mineralogy and petrology at the University of Leoben, Austria, support Dublyansky's conclusion.

The fourth reviewer, Jean Cline of the University of Las Vegas at Nevada, is more cautious. She says the fluid-inclusion data by themselves suggest no more than that fluids at elevated temperatures once existed at Yucca Mountain. More research, she says, is needed to understand fully how they were formed.

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