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Las Vegas Review-Journal (Las Vegas, NV)

September 11, 1997 Thursday, FINAL EDITION

SECTION: A; Pg. 1A

LENGTH: 1188 words

HEADLINE: Plutonium found in water

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BODY:

Nevada's U.S. senators say tainted ground water at the test site supports their fears about Yucca Mountain.

By Keith Rogers
Review-Journal

Plutonium from a below-ground nuclear test conducted more than 28 years ago has traveled nearly a mile through ground water layers at the Nevada Test Site, two government scientists said Wednesday.

The discovery raised concerns with U.S. Sens. Harry Reid and Richard Bryan, both D-Nev., about future contamination risks if nuclear waste is stored at Yucca Mountain.

The scientists said plutonium, a potentially deadly cancer-causing agent from the core of a nuclear bomb, was detected in a monitoring well eight-tenths of a mile south of the Benham test that was conducted Dec. 19, 1969, in the northwest part of the test site.

The levels were within safe drinking water standards and the contamination had not migrated off the test site, 65 miles northwest of Las Vegas, they said.

The levels were less than half the 4-millirem-per-year dose allowed for drinking water, the scientists said.

Plutonium
'This is the first time we've seen plutonium transported in ground water,' said Annie Kersting, a chemist from Lawrence Livermore National Laboratory in California.

Kersting and her colleague, Joe Thompson, a chemist from the Los Alamos, N.M., national laboratory, revealed their findings in a paper presented during a session of the American Chemical Society's national meeting in Las Vegas.

After their presentation, they said the fact that plutonium was carried through ground water attached to very small mineral particles _ clay and zeolites _ does not necessarily mean plans for Yucca Mountain should be halted. Yucca Mountain, which borders the test site, is 100 miles northwest of Las Vegas.



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'I don't know if it has any particular significance. The material was deposited as a result of nuclear tests without engineered barriers,' like those proposed for the Yucca Mountain repository, Thompson said.

But after the presentation, Reid and Bryan, in a joint statement, said the discovery is more evidence that confirms the nation's high-level nuclear waste should not be entombed in **Yucca Mountain**.

'This report adds significant credibility to our previously-stated concerns that proceeding with the storage of nuclear waste at the (planned) **Yucca Mountain** repository poses a grave risk of environmental contamination,' Reid said.

'Contaminated ground water at the Nevada Test Site is not something that should be taken lightly,' he said. 'If what we have seen before bears out, there is a lot of work which needs to be done on radiation and ground water before anybody starts storing any high-level nuclear waste here.'

Bryan said the report is 'another red flag that has been raised up the **Yucca Mountain** flagpole.'

'This new report on the speed with which plutonium has migrated through the water table should send shock waves through the scientific community,' Bryan said. He noted that even though the report focused on the test site, 'far greater quantities of radioactive materials would be stored at **Yucca Mountain**.'

The repository is being designed to contain 77,000 tons of high-level radioactive waste, primarily metal-encased pellets of spent fuel from commercial nuclear power reactors. Ten percent of the waste would come from military sources and would be solidified before it is stored as glass logs. Plutonium is one of the radioactive waste components. It has a half-life of some 24,000 years _ the time it takes for half of its atoms to decay to safe levels.

Rick Nielsen, executive director of Citizen Alert, a statewide environmental group, said the report signals an alarm about the future quality of ground water in the Southern Nevada region.

'With our limited water supply, we don't need any more contamination in the future,' he said. 'It shows how easily our ground water can become contaminated.'

Nielsen said scientists need to determine how long it will take for the contamination to migrate off the test site, a question Kersting and Thompson said they are trying to answer.

Said Kersting, 'How far does plutonium migrate? We don't know.'

'It's clear from this work that our understanding of the subsurface geology is inadequate,' she said.

The study was part of an ongoing monitoring program at the test site that began in 1973.



Scientists have theorized that the higher temperatures and pressures produced by a nuclear chain reaction below ground melts rock around the blast cavity, but also adds new fractures in the bedrock. The Benham test was conducted at 4,500 feet below the surface and some 2,000 feet below the water table. The test had an energetic yield equivalent to detonating 1.15 million tons of TNT.

Kersting and Thompson analyzed samples from two monitoring wells. The wells were sampled three times over a 16-month period ending in April.

By comparing the ratio of different plutonium isotopes attached to fine particles of minerals in the samples they were able to tell that the plutonium contamination came from the 1968 Benham test and not from the 1975 Tybo test, a smaller test that was detonated in the same area closer to the surface at a depth of 2,500 feet.

'Is it coming from the melt glass (in the test cavity)? I don't think so. I think it's a step in between that alters the chemistry. You could have had fractures (from the test) that inhibited ground water,' Kersting said.

'Indeed, minerals in the subsurface have the ability to transport plutonium,' she said. 'I think the Yucca Mountain Project should look at these results.'

Nielsen said the discovery raises the question about what scientific proof is needed to deem Yucca Mountain unsuitable for storing high-level radioactive waste.

'What is a disqualifying factor? We keep finding more and more evidence that Yucca Mountain should not be licensed as a repository. If this is not enough, what is enough to disqualify it?' he asked.

While this was the first time that scientists confirmed that plutonium had migrated from a test cavity, it was not the first time radioactive materials have escaped from a test cavity into ground water at the test site.

In 1990, Department of Energy scientists acknowledged they had found fission products in water from the 1977 Sandreef nuclear test at Yucca Flat in a hole that was dug eight years later for the Aleman test. They believed the materials — bits of radioactive cesium, antimony, and high levels of tritium, a radioactive form of hydrogen — had been injected through cracks in rock layers that widened at the time of the blast.

The materials had traveled one-fifth of a mile from the Aleman cavity, which means at that rate it would take 1,120 years for the materials to migrate beyond the southern boundary of the test site.

For about a year after contaminants were discovered in the Aleman hole, scientists were puzzled by small amounts of plutonium that had been detected. They later concluded their samples were tainted with plutonium that had been scattered across the test site from above-ground tests and consequently had been washed into the hole by surface runoff.

LANGUAGE: ENGLISH

LOAD-DATE: September 12, 1997



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