

Concerns Arise Over Aquifer Near Nuclear Test Site

General
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Concerns Arise Over

By MARTIN FORSTENZER

When the federal government conducted 828 underground nuclear tests at the Nevada Test Site from 1956 to 1992, its scientists knew that ground water beneath the site would become contaminated. They believed that the underground water barely moved, and that radioactive particles would be sealed into cavities by the blasts or else absorbed by underground rock.

But studies in recent years have found that radioactive particles like long-lived plutonium 239 can travel with water, and that water is flowing more rapidly beneath the site than was once believed. Scientists now agree that contaminated plumes have the potential to flow beyond the borders of the 1,573 square-mile test site in south-central Nevada, toward populated areas.

The trouble is that no one knows how big the plumes are, where they

agement, said there was no evidence that the contamination had yet left the site and that it would not be likely to reach a populated area even 100 years from now.

The department has spent \$176 million to evaluate the ground water problem at the test site, but some experts say the agency has gone about it the wrong way. An early draft of a ground water model that tried to determine how far contaminants could travel at one section of the test site was heavily criticized last September by a review panel of ground water experts who said that the model lacked enough data to make it meaningful.

"It was severely data limited," said Dr. Lynn W. Gelhar, a ground water expert and professor of civil and environmental engineering at the Massachusetts Institute of Technology, who led the six-member peer review panel.

Another panel member, Dr. Dennis Weber, a physicist and ground water researcher at the University of Nevada at Las Vegas, said the agency relied on one of its own previous ground water models in place of gathering real data about the problem. "They tried to do this without taking data," Dr. Weber said. "Your models are only as good as your data."

The model, which the agency is now revising, predicted that ground water at the Frenchman Flat area of the site could travel only about three-fifths of a mile in 1,000 years, but the panel said that it did not take into account the "plausible" possibility that the water could drop into a lower aquifer, where it could travel much more rapidly.

"The testing was not actually done down in the primary aquifer, which is a limestone-type aquifer, but in a zone above that," Dr. Gelhar said. "The question is to what extent there is connection between the upper zone and this deeper, very permeable aquifer."

The Energy Department has already drilled dozens of monitoring wells both on and outside the test site and is installing eight wells northeast of Beatty. But agency critics say they are of limited value because they are not designed to find and define the contaminant plumes.

So many bomb tests, so little data on the mess they left.

have already traveled or what exactly they contain. Scientists from the United States Geological Survey and the University of Nevada say that a witch's brew of radionuclides could take as little as a decade to reach well water in Beatty, a town of 1,500 people in the Oasis Valley about 25 miles from the heavily contaminated northwest corner of the test site.

"Could it show up there in the next 10 years?" Randell Lacznik, a Geological Survey hydrologist and a co-author of a 1996 report on ground water at the test site, said in an interview. "There's that possibility. Will it show up at a dangerous level? I don't know."

Spokesmen for the Department of Energy, which administers the test site, were more conservative.

Bob Bangerter, manager of the Energy Department's program handling the ground water issue, said that because some underground tests occurred near the test site's western boundary at the heavily contaminated Pahute Mesa area and the water was moving toward the southwest, "there is a high potential that it will move off of the test site toward the Oasis Valley." But he would not estimate when this might happen.

Another Energy Department official in Nevada, Carl Gertz, assistant

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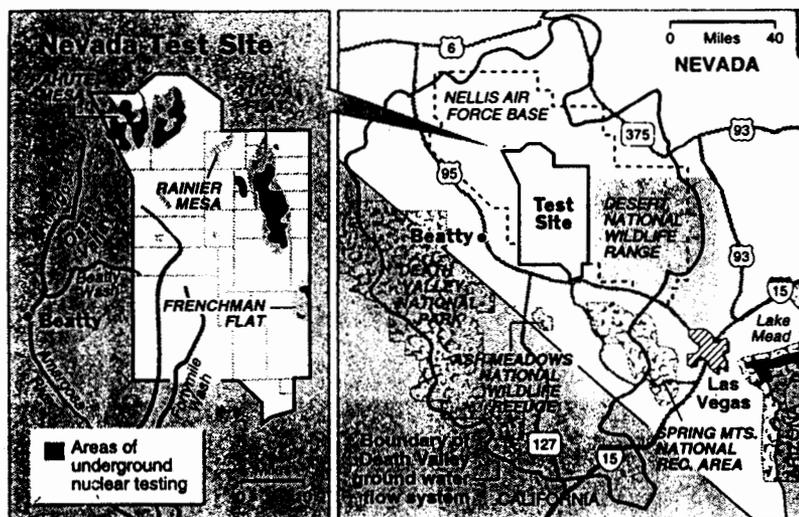
FOR RESIDENTS near the test site, the focus on contaminated ground water

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LANL: General (Groundwater)



Aquifer Near Nuclear Test Site



Source: U.S. Geological Survey, Department of Energy

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"They should design monitoring systems to intercept the contaminants from some of the critical larger detonations so that they learn more about the plumes, where they are going and how fast they are going," Dr. Weber said.

Mr. Gertz of the Energy Department, though, said new wells were not necessarily cost effective.

"Do you put a well every five miles?" Mr. Gertz asked. "Every six miles?" We have a site bigger than the state of Rhode Island. To go down to 6,000 feet, where we think you have to go in the northern part of our site, they're about \$2 million a well. What is the appropriate cost to taxpayers?"

Some scientists emphasize that even if ground water was to travel off the site, it does not mean that the radioactive contaminants would necessarily travel with it. It was once believed that plutonium 239 could not travel in ground water, but in 1997, scientists from the Los Alamos National Laboratory concluded that plutonium 239 had traveled nearly a mile from the location of an underground blast by attaching itself to colloids, insoluble particles suspended in water.

It is still not known whether the element, which has a half-life of 24,100 years, can move in ground water over distances of several miles in concentrations that would be harmful. But the finding increased

concern among scientists about the potential health threat from the ground water.

The one radionuclide at the site that is known to travel freely with water is tritium, a hydrogen isotope that becomes part of water molecules. Although it decays in only 12.3 years, tritium can remain dangerous to humans for hundreds of years when found in the kinds of large concentrations that the test site holds, Dr. Weber said. Other elements that contaminate the site include neptunium and americium, but little is known about their ability to travel in ground water.

Because Death Valley National Park is the end point of ground water flow for the region, scientists said that water from the test site would probably reach there eventually and could threaten the park, although most believe that it would take longer than a hundred years.

For residents near the test site, the focus on contaminated ground water

has compounded fears about the Yucca Mountain nuclear waste repository, which the federal government plans to build near the western border of the Nevada Test Site not far from Beatty and other populated areas.

By making the idea of contaminated ground water less abstract, it has sharpened public worries about what might happen if radioactive material leaked from the site, which would hold tons of high-level radioactive waste from around the country.

There is no feasible way to clean the ground water of contaminants or divert it from flowing toward a particular place. But to prepare for the possibility that contaminants might someday reach a populated area, the Energy Department has studied a variety of costly, experimental plans, including trying to mine out contaminants at the test site, which would cost trillions of dollars and present serious health risks to workers, diverting the ground water back onto the test site, and piping or trucking water to affected communities.

In Beatty, the issue has been a leading topic of discussion. "I'm concerned for a lot of reasons," said LaRene Younghans, who owns a ranch just north of Beatty. "We wanted to stay here until we died, and we'll probably have to move."

Such worries spiked in late February when Nye County officials reported that a very high level of radiation was found in one monitoring well south of the Oasis Valley. The report prompted calls to the Energy Department from county residents and spurred emergency meetings of town and county officials, but it turned out to be a false alarm: the initial well analysis was faulty.

Some scientists who have studied the issue believe that the Energy Department has never really tried to learn much about the contaminated ground water in order to keep public pressure off the agency.

"They haven't drilled wells with the intention of finding the plumes," Dr. Weber said. "They didn't want to know."

A spokeswoman for the department, Nancy Harkess, responded: "We are looking and we do want to find it if it's moving. Our No. 1 priority is to protect the public."

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