

## Pumping Threatens to Sink High Desert's Future

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### Document Text

Residents of the Antelope Valley, reeling from the effects of the drought and the near-collapse of housing prices, may be starting to feel like the ground is literally opening up beneath their feet. And with good reason, it turns out.

In the last year, residents and city officials have become increasingly alarmed at the widening discoveries of sinking and cracking ground in at least three areas of the high desert. There is fear that the ground problems could sink the region's hopes for a bustling future.

At least 70 large cracks have been charted in a 10-square-mile area of undeveloped land in Lancaster that was intended for thousands of homes. And dozens more have surfaced on the dry lake bed at nearby Edwards Air Force Base, where the space shuttles land, forcing the closure of one runway.

Scientists believe that the cracks, called fissures, are the result of too much pumping of ground water for residents and crops in recent decades. With the removal of the water, some areas of the valley have fallen up to five feet in 20 years, in a process called subsidence.

Although a rare phenomenon in Los Angeles County, such ground failures have left a legacy of costly lawsuits, damaged homes and cracked roads and utility lines throughout the Southwest, including Riverside County, North Las Vegas and the Phoenix and Houston areas.

But it is especially bad news for the Antelope Valley because the region derives much of its economy from the housing and the aerospace industries. Now almost a year after the first cracks were found there, officials admit that they still don't know how widespread the problem is.

"When that consultant called me last May and said, 'Have you seen the cracks in your land?' I thought he was kidding me. I was in shock," recalled John Hamilton, a consultant to the Triple Five Corp., a Canadian developer that owns the vacant Lancaster property where the first cracks were discovered.

Triple Five is well-known in some circles for having built what is reputed to be the world's largest indoor mall, in Edmonton, Canada. But the developer's planned Sunset Ranch community in Lancaster, scheduled to include more than 1,300 homes on 460 acres, has been halted because of the fissures.

Likewise, officials in Lancaster have a long list of developers whose proposed home subdivisions are on hold until the city figures out how to cope with the problems. And officials at Edwards, the valley's largest employer, fear that the cracks could ruin the lake bed runways that are crucial to the base.

No buildings have been reported damaged in the Antelope Valley because the cracks have been found only in undeveloped areas. But local officials fear that the problems could make it impossible to build in those areas and, if not stopped, eventually spread to developed neighborhoods.

"The implications up there it appears to me are tremendous," said Roy Shlemon, a Newport Beach-based geologist who has studied land problems. "Just imagine if you had fissures racing through an urban area. . . . Can you imagine the litigation that would be going on?"

The largest fissure at Edwards, the one that forced the runway closure in late January, is half a mile long, up to 12 feet deep and 4 feet wide. And after rains in late February, another large fissure breached the end of a second runway, although it has remained open, base officials said.

In the northwest area of Lancaster, the cracks have been more numerous, but only up to 1 foot wide and 700 feet long, according to a report last month by a city consultant. That report only surveyed a 10-square-mile area, but said more cracks appear to have surfaced in nearby areas.

Of particular concern, the city's report found cracks on the site where Los Angeles County plans within several years to start building a \$188.5-million High Desert Hospital complex. Others are located near the site where the state already has begun building a 2,200-bed prison at a cost of \$250 million. The consultant's report called them "a significant constraint and potential hazard to land development."

County officials said they will consider the city's findings, even though the county's own analysis of the hospital site found no fissures. State officials said they are proceeding with the prison, saying that their consultant found nothing in a late 1988 review.

Part of the reason, according to the city's geotechnical consultant, Geolabs-Westlake Village, may be that the fissures at the two sites appear to have emerged relatively recently.

"I think this is just another negative that is hitting us at a time we don't need it. We certainly don't need news like this," said Lancaster Mayor William Pursley, citing the downturn in the valley's housing industry and problems with the drought.

Scientists say that one relatively sure way to stop the subsidence and fissuring is to reduce the pumping of ground water in the region. But local water agencies have been moving to increase their pumping, not to limit it, to make up for expected cutbacks in state water deliveries because of the drought.

When the water is pumped out of layers of earth hundreds of feet below ground, scientists believe, the soil begins to dry and grow more compact. Because those dry layers take up less space, gravity causes the soils above to settle, causing the subsidence and fissuring at the surface.

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Some officials in the building industry have argued that the cracks can be neutralized by digging up proposed development areas, filling in the cracks,

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packing down the earth and adding special reinforcing grids.

But many geologists say they are not sure that would be a permanent solution.

Scientists say that they still don't know for certain what causes the fissures. But the apparent relationship between the earth and ground water has already prompted a debate among Antelope Valley residents over whether future development in the region should be scaled back to conserve water and help stop the fissures.

Pursley, the mayor of Lancaster and a semi-retired real estate agent with strong pro-development ties, says that it's too early to make drastic decisions. He wants to wait until more scientific information is gathered. But others in the community have begun advocating slower growth.

Scientists say that the region needs to stop the subsidence as quickly as possible or face more serious and widespread damage. Both city officials and developers in Lancaster say that they expect the fissures to prove a long and costly problem to resolve. In one indication, the U.S. Geological Survey recently predicted a full-fledged study of the area could take five years and cost \$7 million, much of it in local money.

A wider analysis of subsidence problems shows that California had "the dubious honor" of having a larger area of ground water-related subsidence-about 6,200 square miles-than any other state, according to a 1984 report by the United Nations Educational, Scientific and Cultural Organization (UNESCO). Texas was second and Arizona was third.

Much of that was in the fertile San Joaquin Valley, where land sank up to 30 feet between the 1920s and 1970s until ground water pumping for agriculture was reduced. Because of the drought and limits on State Water Project deliveries, USGS officials fear that subsidence could resume there and elsewhere in the state.

The UNESCO report also said a 463-square-mile area around Lancaster had sunk up to 3 feet between 1955 and 1978. Last month, the city's consultant said some areas of Lancaster had sunk 5.5 feet between 1961 and 1981. And the consultant said the process appears to be continuing.

As with Lancaster, many areas that have subsidence also experience fissures. At least 14 areas in the Western United States-including eight in California-have suffered from fissures or similar faults due to subsidence and ground water withdrawals, according to a 1984 report by USGS geologist Thomas Holzer. Those eight areas are Edwards and Lancaster in the Antelope Valley, the Fremont Valley in Kern County, the Yucaipa Valley and Lucerne Lake areas in San Bernardino County, the San Jacinto Valley in Riverside County, the Pixley area in the San Joaquin Valley, and a part of the Santa Clara Valley.

Because they have tended to occur in remote agricultural areas or desert-type communities that have only begun urbanizing in recent years, fissures have caused less damage than might be expected elsewhere, scientists said. But that has not always been the case.

In the Nevada city of North Las Vegas, fissuring has damaged the streets and homes in the mostly minority Windsor Park area, a mid-1960s subdivision of about 240 homes. City officials, so far with no success, have been seeking at least \$14 million in federal funds to relocate residents' homes.

Subsidence can occur almost anywhere water or other substances such as oil are taken from the ground. The Long Beach and Wilmington areas had Los Angeles County's most costly and destructive subsidence problems until the 1950s, with some areas dropping nearly 30 feet because of oil drilling.

But scientists say that the fissures resulting from subsidence seem to occur mostly in desert areas with dry, brittle ground. The ground at Edwards Air Force Base is a hard clay material, while the problem areas in Lancaster have an almost concrete-like material near the surface called caliche.

One early theory is that the areas of fissuring in the Antelope Valley may have some relation to clay deposits from a lake, dubbed Lake Thompson, that covered much of the valley in ancient times. Clay type soils are considered more likely to both crack and subside.

The discovery of the problems with the Triple Five Corp.'s land led Lancaster officials last November to authorize the study of nearby areas. Its documentation of the widespread fissuring surfaced in early February, about the same time news broke of the huge crack at Edwards. And now, Lancaster officials are planning to survey a much larger area.

The problem, said Charles Swift, the geologist hired by Lancaster, is what to do with the fissures once they emerge. At least for now, there are no certain or cheap remedies. "Nobody has a real good handle on it," Swift said.

## CRACKS IN THE EARTH

Scientists believe that declining groundwater levels in the Antelope Valley are causing the ground in some areas to sink and crack, threatening future development there. As the water in underground aquifers is pumped out for agricultural irrigation and municipal use, layers of water-bearing soil hundreds of feet below ground begin to dry out and compress, leading to partial collapse of surface ground layers and causing the cracks.

## UNDER ANTELOPE VALLEY

Map shows the three areas, designated by shading, where cracks have been found recently. The cross-section of the valley, A-B, is depicted in the cutaway below. It shows how the U.S. Geological Survey envisions the subsurface of the Antelope Valley, similar to a large bowl, with water-bearing soils-the aquifer-and then layers of bedrock at the deepest levels. The clay-type soils, closest to the surface at the northern end of the valley, are considered the most likely to subside and suffer fissures when they are drained of water.

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[Illustration]

PHOTO: Cracks in lake bed at Edwards Air Force Base, blamed on pumping of ground water, closed a runway used by space shuttle.; PHOTO: (San Fernando Valley Edition, B1) Cracks in lake bed at Edwards Air Force Base closed runway used by space shuttle. / BORIS YARO / Los Angeles Times; DRAWING: CRACKS IN THE EARTH, MATT MOODY / Los Angeles Times; MAP: CRACKS IN THE EARTH, MATT MOODY / Los Angeles Times

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