Palmdale Bulge--It's Sinking in One Place
GEORGE ALEXANDER
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Relatively Sudden Change Stirs Concern Among Seismologists

BY GEORGE ALEXANDER
Times Science Writer

At least one part of the Palmdale Bulge has become the Palmdale Plunge—and the relatively sudden change in the elevation of the earth's crust is causing concern among seismologists and geologists.

The Bulge is a large swelling in the earth's crust along the western edge of the Mojave Desert and throughout the San Gabriel Mountains which has caused many to wonder whether an earthquake is in the making.

Now, a leveling survey recently completed by county surveyors has revealed that several points on the Bulge have dropped.

Specifically, one monument (a brass plaque, imbedded in concrete, upon which surveyors take their sightings) in the Palmdale area has dropped 17.4 centimeters (about 7 inches) between 1973 and last year, after having risen about 13 centimeters (a little more than 5 inches) in the five preceding years.

Overall, the land around that specific monument in the Palmdale area has flexed more than 30 centimeters (1 foot) during the last nine years and wound up 4.4 centimeters (1.75 inches) lower than it was at the start.

No one knows quite what to make of this up-and-down movement of the earth's crust.

Dr. Robert O. Castle, the U.S. Geological Survey scientist who discovered the Palmdale Bulge two years ago in a review of old surveying records, said: "Clearly, it is a reversal of the trend that has prevailed since 1955. I would have to say that I am puzzled and mystified by it."

Dr. Don L. Anderson, director of Caltech's Seismological Laboratory, said that there are at least three possible explanations for the rise and fall of the Palmdale land:

"It could be that the Bulge is migrating toward the southeast," he said, rather like a bubble of air beneath a blanket.

"Or," he continued, "it could be that the Bulge is concentrating itself in a very localized area."

"Or again," he added, "it could be that the Bulge is simply subsiding."

At the moment, Anderson, Castle and several other scientists insisted, it is impossible to tell just what is hap-

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pening on the Bulge because, as Anderson put it, "we only have this one line to go on."

That "line" is a series of sightings beginning at a tidal benchmark at San Pedro and extending up through Los Angeles to Saugus, through the Antelope Valley and on to Palmdale, Rosamond and Mojave. Other lines, also beginning at San Pedro, extend to Maricopa to the northwest and to San Bernardino to the east.

But if they are reluctant to comment publicly on the significance of this latest development in the Bulge—because, indeed, they really neither know nor understand the mechanism at work in the earth's crust there—they do admit privately to apprehension.

The scientists talk about a Czechoslovakian surveying team, back in the 1950s, that chased a leveling line around and around an area there and were never able to "close" it because the elevations at the various monuments kept changing. In other words, the land was rising and falling too quickly for them to complete their survey.

And as they were puzzling over this peculiar development, an earthquake struck. No earth scientist acquainted with the Czech story has any doubts that the elevation changes were precursory phenomena of the earthquake.

On the other hand, no scientist is completely certain that the Czech experience is applicable to what is happening presently in Southern California.

As Castle noted in his first report on the Bulge, there are indications in historical records that a similar uplift and collapse occurred in this area between 1897 and 1914 without any significant seismic activity—other than the "Tejon Pass" temblor of 1916, which seismologists regard as small.

But Castle also pointed out that there are significant differences between that turn-of-the-century Bulge and the more recent one, which appears to have developed between 1959 and 1974. The former seems to have been associated with the Transvere Ranges—the San Gabriel and San Bernardino mountains—while the present crustal deformation seems bound up with the San Andreas Fault.

Similar ups and downs were observed in the land around the Japanese city of Niigata prior to a damaging earthquake in 1964, but there the deformations took several years to run their course, unlike the several weeks in the case of the Czechoslovakian tremor.

"I'm not saying that I think this is a sure sign of an impending earthquake," said one scientist who asked not to be identified, "because I honestly don't know. But I've always felt that if the Bulge started to go down and go down fast—and I would consider this reported subsidence to be fast—that we ought to start looking at it as closely as we can."

The scientists say that it is important that new surveys be taken along the other branch lines radiating from the San Pedro tidal benchmark to give some picture of what is happening elsewhere in the uplifted area.

But such surveys are expensive and the county Engineering Department, already grappling with the drought and other problems, says it cannot undertake new surveys at the moment without funding support. Reportedly, the county is readying a proposal to the U.S. Geological Survey seeking that funding support, but this could not be confirmed.