TESTING A HYPOTHESIS

A geophysicist makes an earthquake "prediction"

ON APRIL 21 it was widely reported in the press, and loudly broadcast on radio and television, that James Whitcomb, senior research fellow in geophysics at Caltech, had predicted that, sometime within the next year, southern California might have an earthquake with its epicenter somewhere near that of the 1971 San Fernando quake. Its magnitude would be somewhere between 5.5 and 6.5, which would be comparable with the San Fernando quake.

Though this news burst upon the general public, especially in southern California, like a small earthquake of its own, it was not at all a sudden announcement by Whitcomb. In fact, the data that led to the prediction had first been presented at a symposium held by the International Union of Geodesy and Geophysics in Grenoble, France, in September 1975, then offered in testimony before a congressional committee visiting southern California in October 1975. Interpretation of the data was presented in a paper before the annual meeting of the American Geophysical Union in Washington, D.C., in April 1976.

It was after that meeting that the press got wind of it, and began moving in on Whitcomb for confirmation and further information — to the point where he decided that the only way to get the information out accurately, and completely, was to make a general public statement.

It may not have been the first U.S. earthquake prediction, but it certainly was the first to get almost universal attention. By way of contrast, hardly anyone paid attention in January 1975 when Whitcomb predicted an earthquake near Riverside, California — even after one really did occur just a few weeks later in the town of Yucaipa. (The quake had a magnitude of 4, rather than the predicted 5 — which Whitcomb admits is further confirmation of the fact that his theory needs a lot more testing.)

Let it be noted that Whitcomb carefully tried to avoid

Checking the records in Caltech's seismological laboratory — Don Anderson, director of the lab; Roger Noll, professor of economics; James Whitcomb, senior research fellow in geophysics.

James Whitcomb appears before the California Earthquake Prediction Evaluation Council to describe the theory and data that led to his earthquake forecast.

describing his work as a "prediction." Again and again, he explains that he is simply testing a prediction hypothesis. Known as the velocity-bay theory, it was first proposed by the Russians in 1962. It is based on the observed slowing of seismic waves (naturally occurring ones, or those from quarry explosions). According to this theory, rocks along an active fault in the earth become strained as the land masses on either side of the fault slowly move in opposite directions. Eventually they develop countless hairline cracks. Seismic waves normally move faster through rocks than they do through air, but they slow down in rocks that have hairline cracks in them. Eventually — either because the cracks close again, or because they fill with water, or for other reasons still not known — the waves resume their former velocities. According to the velocity-bay theory, this is a signal that an earthquake is due. The theory also contends that the longer the period of slowed-down waves, the larger the quake.

Whitcomb's seismic studies showed a reduced velocity in seismic waves for most of 1974 and 1975 in an 80-mile-wide area with Los Angeles on the south, the Mojave Desert on the north, Fillmore on the west, and Mt. Baldy on the east. This area, which also contains the epicenter of the 1971 San Fernando quake, happens to be one where seismic instruments are in operation — and where, therefore, measurements can be made. There are, of course, countless other areas for which no such information is available.

The effects Whitcomb is now observing in this area were present before the 1971 quake, and similar effects have been observed before other quakes as well.

"Our experience in interpreting this kind of velocity anomaly is very limited," says Don Anderson, director of Caltech's seismological laboratory, "but there have been at least six examples where moderate earthquakes have been preceded by a similar effect. As Whitcomb has often pointed out, we have no information on the false alarm rate, or how often such an anomaly occurs without it being followed by an earthquake. And the magnitude assignment is based on limited previous experience. We are still in the learning process."

The California Earthquake Prediction Evaluation Council considered the Whitcomb forecast (the first it ever *had* considered) in a public meeting held on the Caltech campus on April 30. The council is made up of professional earth scientists from public and private California universities, state agencies, and the U.S. Geological Survey. After limited study, the eight-man council "did not conclude that the probability of an earthquake in the area in question is significantly higher than the average for similar geologic areas of California.

"Nevertheless, the data are sufficiently suggestive of such an increased probability as to warrant further intensive study and testing of the hypothesis presented by Dr. Whitcomb."

Further intensive study and testing is just what Whitcomb wants. In fact, his "prediction " is one more reminder of the fact that the development of an accurate and reliable earthquake prediction system is not just a local, or national, but an international concern.□