

EDITORIAL

WHO SAYS, "EARTHQUAKES DON'T HAPPEN HERE" ?

"Earthquakes don't happen here" is a tale often heard at New Zealand extremities. The half of our population that lives north of Waikato, and the small percentage remaining in Otago, think in common that they live in parts of New Zealand that are earthquake free. 1974 has so far proved an upsetting year for these folk. Early on the morning of 1 March Auckland was rudely shaken by an earthquake. It was not felt by all - Aucklanders notoriously confuse the quakes they do have with traffic vibration - but by enough people to make the newspaper headlines, and to cause the Earthquake and War Damage Commission to receive numerous claims for damage to foundations.

Six weeks later, on 9 April, Dunedin received an early evening jolt that was felt by everyone, even the archproponents of the present earthquake zoning regulations who have claimed Dunedin's immunity from quakes. Dunedin's earthquake was a short jolt, lasting only a few seconds, but intense enough to affect about 2000 chimneys in the city, and to cause damage that is likely to total about \$250,000, making this the most costly earthquake anywhere in New Zealand since the major Inangahua earthquake of 1968. The damage at Auckland was less. The quake there was experienced as a longer, swaying motion, and many claims for damage originally thought to be due to the earthquake were later ascribed to cracking in the ground due to seasonal soil movement.

As might be expected from these descriptions, the earthquake effects in the two cities arose quite differently. Dunedin's earthquake, of magnitude 5.0, was barely large enough to be classified as moderate, but was centred just a few kilometres south of St. Kilda beach. It was a "direct hit" from a not particularly large earthquake. The Aucklanders, on the other hand, felt the effects of a larger earthquake, of magnitude 5.6, about 200 km to the east, in the Bay of Plenty. Despite Aucklanders' claim not to have many earthquakes, a larger shock, of magnitude 6.0, occurred at nearly the same spot in 1956, and like this year's shock was felt strongly in Auckland, with quite a few aftershocks.

The energy released in an earthquake goes up by a factor of about 30 for each unit step in magnitude. Thus, had the earthquake in the Bay of Plenty been 6.6, or even 7.6, Auckland would have experienced shaking about 30 or 1000 times as energetic, respectively, as it did on 1 March. Earthquakes in this part of the Bay of Plenty are relatively common, and the occurrence of earthquakes with these larger magnitudes must be considered a real possibility. There is also no reason why an earthquake of significant magnitude could not originate closer to Auckland - as close even as Dunedin's earth-

quake was to that city. In recent years the closest located earthquakes to Auckland have been near Te Aroha, and Whangarei, but there is good evidence that the large magnitude shock that damaged chimneys in Auckland in 1891 originated near the mouth of the Waikato River.

The Dunedin earthquake was not only the closest ever located to Dunedin, but the largest ever recorded in eastern Otago. There was no clue in the local geology, or in the pattern of past earthquakes, to suggest that this earthquake was about to happen, and there is also no reason why similar or larger earthquakes should not occur there again. If Dunedin's earthquake had been as large as Auckland's, it would have caused substantially more damage.

The history of earthquakes in New Zealand has not been studied long enough to establish any stability in occurrence. In other parts of the world, where the history is longer, and particularly in Korea, Japan and Turkey, there is evidence for changing regional patterns of seismicity. The existence of such changes makes long-term predictions of activity from a short period a risky business. Even in New Zealand, most people are unaware that over an 80-year period from 1860 to 1940, Christchurch experienced 10 damaging earthquakes to Wellington's 6. Memories are short, and because Christchurch has not had a serious shaking since 1929, most present-day New Zealanders would not consider Christchurch as bad an earthquake risk as Wellington, let alone a worse one.

This year's earthquakes have again shown the inappropriateness of the present New Zealand model by laws relating to earthquake zoning. In 1965 seismologists opposed the introduction of these provisions, which divide New Zealand into three categories of zone in which different degrees of earthquake resistant design are required. Auckland and Dunedin are both placed just inside the zone of least stringent requirements (zone C) which is officially described as being "conservatively drawn to include those regions which have suffered at the most trifling damage to the poorest class of non-earthquake resistant buildings and are free of epicentres of other than minor magnitude and of known reasonably recent ground disturbance". It would be surprising if Dunedin's inhabitants considered a quarter of a million dollars worth of damage as "trifling".

In recent years magnitude 5 earthquakes outside the areas of more frequent occurrence have occurred in Northland in 1963, at Te Aroha in 1972, in northern Taranaki in 1962, at Christchurch in 1968, and now at Dunedin in 1974. Christchurch, too, lies

just on the less stringent side of a zone boundary, in zone B. Besides its history of damage from large earthquakes to the north at the end of last century and early in this, and the magnitude 5 shock in 1968, many smaller earthquakes are now known to originate very close to the city. The most recent of these occurred on 19 April this year, only 10 days after Dunedin's earthquake, when a shock of magnitude 4.2 was close enough to be sharply felt throughout the city. No damage was reported, but this was a further reminder that Christchurch, too, is not immune from earthquakes.

Fortunately for seismologists, earthquakes are not yet predictable. So far this year we have had substantial damage at Dunedin, a widely felt shock in Auckland, and a smaller shock close to Christchurch. At the time of writing, Wellington has had no earthquake of note this year. By the time this article is published, Wellington may have had a substantial quake. Who knows? Wellingtonians at least have the comfort of knowing that their anti-earthquake building regulations are adequately severe. Surely people in Auckland, Christchurch and Dunedin deserve the same protection? Or do they still think, "Earthquakes don't happen here" ?

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