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AN EXPLANATION OF WATER LEVEL CHANGES
PRECEDING THE MECKERING EARTHQUAKE OF
14 OCTOBER 1968.

by

P.J. Gregson, K.F. McCue⁺ and R.S. Smith

⁺Imperial College, London

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On 14 October 1968 at 1059 WST (WST = UT + 8h) a magnitude 7 earthquake wrecked the small town of Meckering (about 130 km east of Perth, Western Australia), and caused light damage in Perth (Everingham, Gregson & Doyle, 1969). Water bore records from Gnangara, 19 km north of Perth, showed a sudden rise in water level beginning about 1.5h before the earthquake (Gordon 1970); this observation led Gordon (1971) to suggest that monitoring of water bores in the Perth region could provide a 'warning' of impending local earthquake activity.

We have examined many other recordings made between August 1968 and March 1971, at the times of sudden rises in bore water levels. The recordings were seismograms from the Bureau of Mineral Resources' seismological station at Mundaring, pluviograms from the Bureau of Meteorology at Perth, and water bore records from the Metropolitan Water Board.

No correlation was found between bore level rises and changes in atmospheric pressure, nor with local earthquakes, but excellent correlation was found with periods of heavy rainfall - whenever the water level rose in the bore at Gnangara it was raining in Perth.

Plates 1 and 2 show corresponding records of bore water-levels and the Perth pluviograms. Plate 1a covers the interval during which the Meckering earthquake occurred; the bore level rise reported by Gordon corresponds with rainfall at Perth and later a spike appears on the bore record at the time of the earthquake. It is well known that oscillations in well water-levels may occur during earthquakes (Richter, 1958) and this spike may have been produced by such oscillations; on the other hand, a spike on 15 October happened about 2.5h after a strong aftershock (ML5.7) on that day.

Plate 1b covers an interval during which a magnitude 6 earthquake occurred at Calingiri (1970 March 11 0115 WST), 110 km north east of Perth; there was no rise in water level nor any rainfall during this interval. Plate 2 shows pairs of recordings made at other intervals and are typical of all recordings examined.

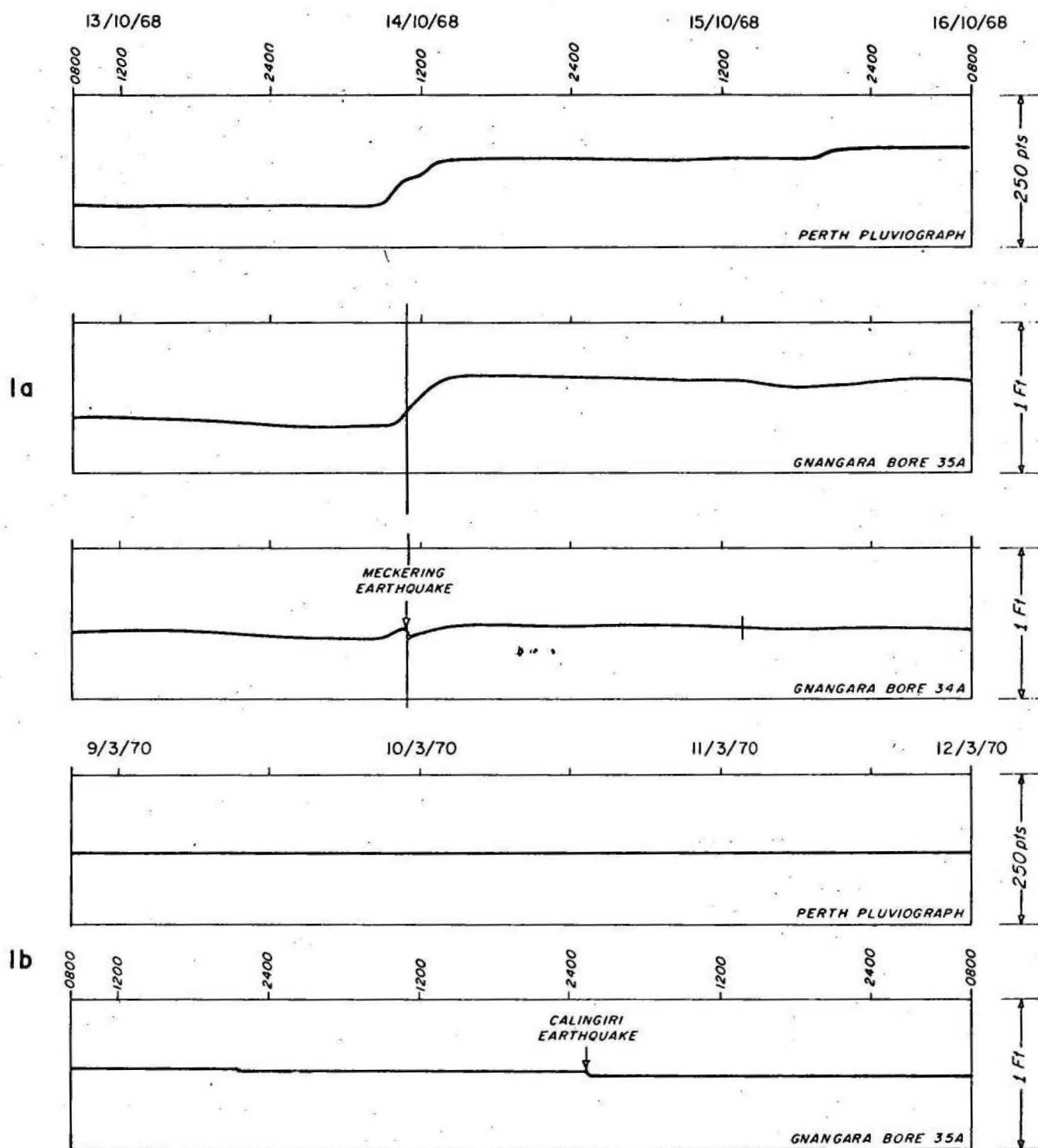
It seems clear that most sudden rises in Gnangara bore water-levels are the result of rainfall and are not related to earthquake activity; thus they could not be used as a warning of impending earthquakes.

ACKNOWLEDGEMENTS

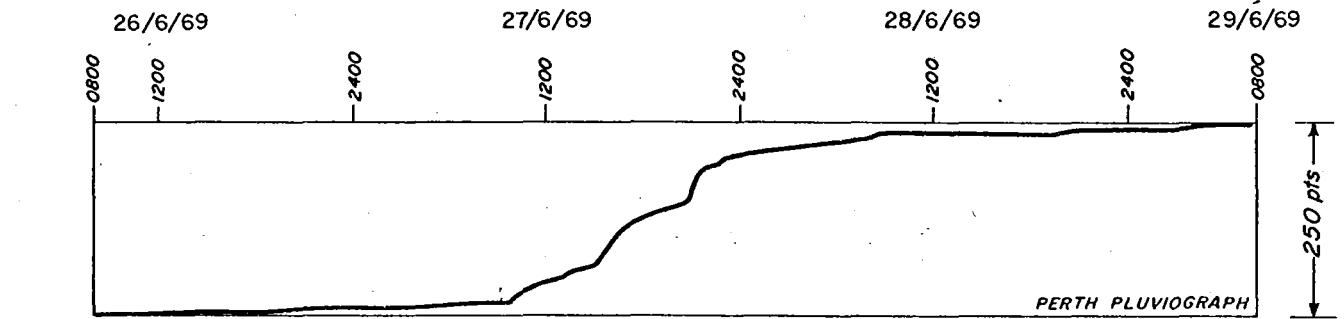
We thank the Regional Director of the Bureau of Meteorology (Perth) and the Water Resources Branch of the Metropolitan Water Board for permission to reproduce the pluviograms and water bore records respectively.

REFERENCES

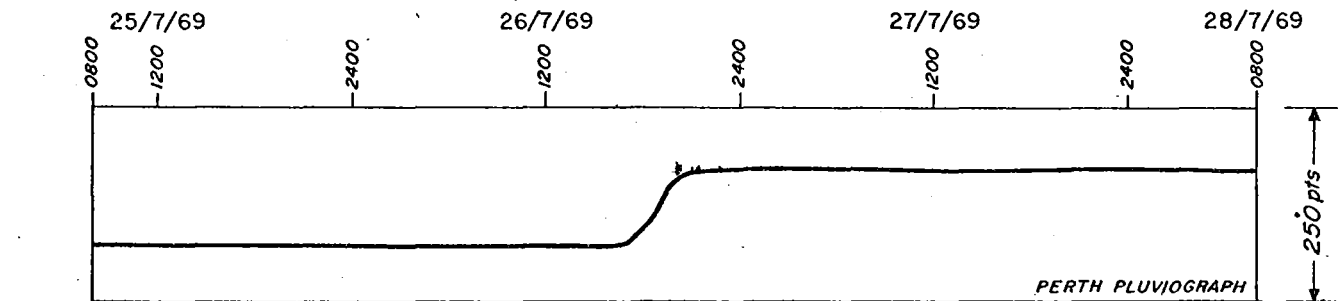
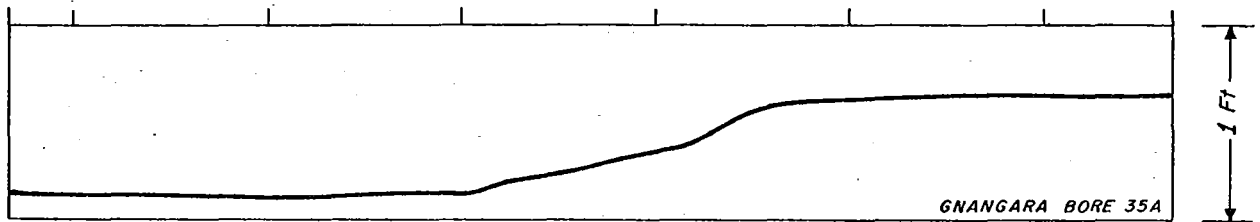
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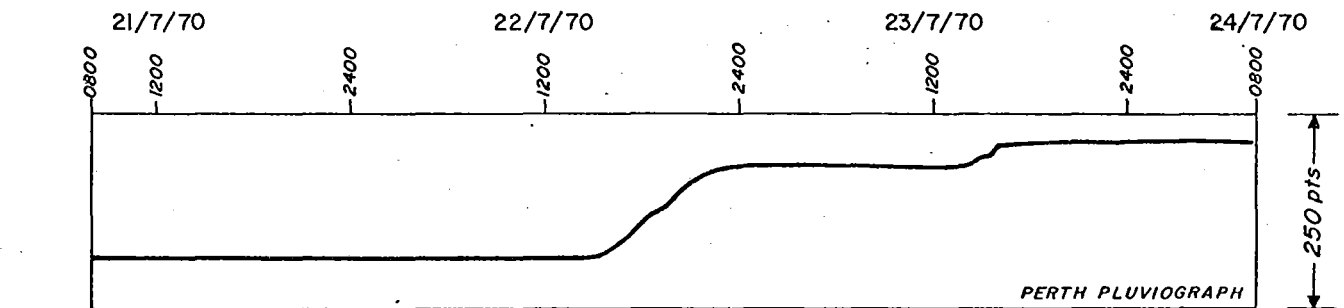
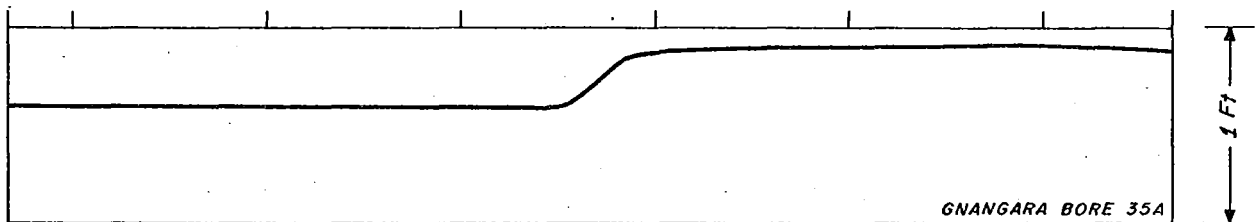
COMPARISON OF WATER BORE LEVELS AND RAINFALL



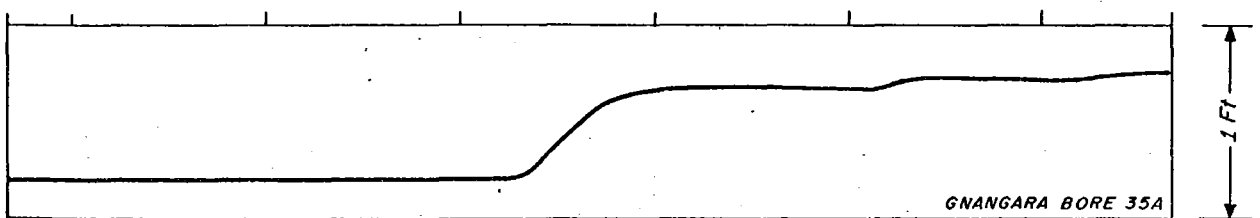
2a



2b



2c



COMPARISON OF WATER BORE LEVELS AND RAINFALL