. Pump tests at Currie, King Island.

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Abstract

Pump testing of closely spaced holes installed near Currie, King Island yielded pump rates of 135 *l*/min (northern area) and 75 *l*/min (southern area). Drawdowns measured in the pumped holes indicate that these withdrawal rates could be sustained over long term pumping periods.

Pump tests have been undertaken by the King Island Municipal Council on two sets of closely spaced bores installed during a recent investigation of groundwater around Currie (Matthews, 1978). These pump tests are the first stage of investigating whether either or both of the areas previously investigated are capable of supplying the required additions to the present water supply at Currie.

The northern set of bores was pumped for a little over 8 days, with recovery rate being measured for a further 26 hours. The southern set was pumped for about 4 days and recovery was measured for 2 days. In each case, one hole was used as an observation hole to record changes in water level as pumping proceeded. The pumping rate at the northern set was about 135 *l*/min (1800 gal/hour) while it was 75 *l*/min (1000 gal/hour) for the southern set. The depth of the water remaining in each of the pumped holes was measured prior to turning off the pump. These depths were:

Hole	*Northern set (m)*	*Southern set (m)*
1	2.18	0.61
2	1.92	1.52
3	2.18	1.52
4	1.78(?)	1.52
5		1.52
6		1.68

With the exception of Hole 1 in the southern set, which was known to have a fairly low output when installed, the other holes all have a sufficient depth of water remaining to suggest that they could withstand the above withdrawal rates over long term pumping periods. It may be possible to increase the output slightly and still retain a safe yield, as less than half the available drawdown was used in pumping the northern set, while for the southern set a little more than half the possible drawdown was used for the four best holes with slightly less than half for Hole 5. For unconfined aquifers such as these, an increase in the drawdown does not produce an increase in output of the same proportion.

The time taken to reach equilibrium conditions for pump tests in unconfined aquifers is usually large and neither of these pump tests were long enough for this state to be reached. However after one day of pumping in each case, a semi-log plot of time versus drawdown (figs 1, 2) approaches a straight line. This allows the calculation of an approximate value of transmissivity, the product of hydraulic conductivity and aquifer thickness. The transmissivity is lower for the southern set of holes than for the northern set. The bores in each area penetrate about the same depth of saturated sand (although in the southern area it extends below the bottom of the bores) so the difference in transmissivity values is caused largely by a difference in hydraulic conductivity. The main reason for the lower hydraulic

conductivity in the southern area is almost certainly the finer grain size of the sand forming the aquifer.

CONCLUSIONS

The pump tests have indicated that both areas can easily supply the quantity pumped over a period of several days. From the pumping data, the northern area could almost certainly sustain the same rate for long periods, while the southern set, which was pumped for only half the time of the northern set, would also probably sustain the yield.

The lower than expected output of the southern area suggests that some further investigation may be necessary. This would include examination of methods to extract more water per bore than in the present installation and may include experiments with the use of screens in the holes rather than slotted casing. It may be useful to install the slotted casing or screens to deeper levels into the saturated sand (8-9 m or more from the surface) and test the output. The use of slotted casing should not be discarded without good reason as the cost of installation per bore is much lower than when using screens. A suction pump would need to be installed below the surface to effectively draw from these depths. The material in the area selected to install the present set of bores may not have the best or a representative permeability for the whole area. The site was selected primarily because the water table was closest to the surface. The areas around Holes 20, 21 and 24 could be usefully investigated. Hole 20 is closest to Currie and would be the most favourable because of this.

Despite the lower output, the southern area is still regarded as the area with the potential to supply the most water. The northern area, from the pump test already performed could, without much doubt, supply about 200 000 *l*/day (about 45 000 gallons per day). The recharge to the area may be two to three times greater than this figure on a yearly basis, but if more water than 200 000 *l*/day is required, then pump tests at a greater rate using more bores should be undertaken. Additional holes could be put in south of the present bores towards investigation Hole 2, or in the low flats around Holes 5 and 6. A set of holes installed near Hole 12 would probably draw water from the north or outside the area considered in the investigation. The potential of this area has not been examined with drilling but may add considerably to the reserves already indicated.

REFERENCE

MATTHEWS, W.L. 1978. Drilling for water at Currie, King Island. *Unpubl. Rep.Dep.Mines Tasm.* 1978/10.

[20 April 1978]

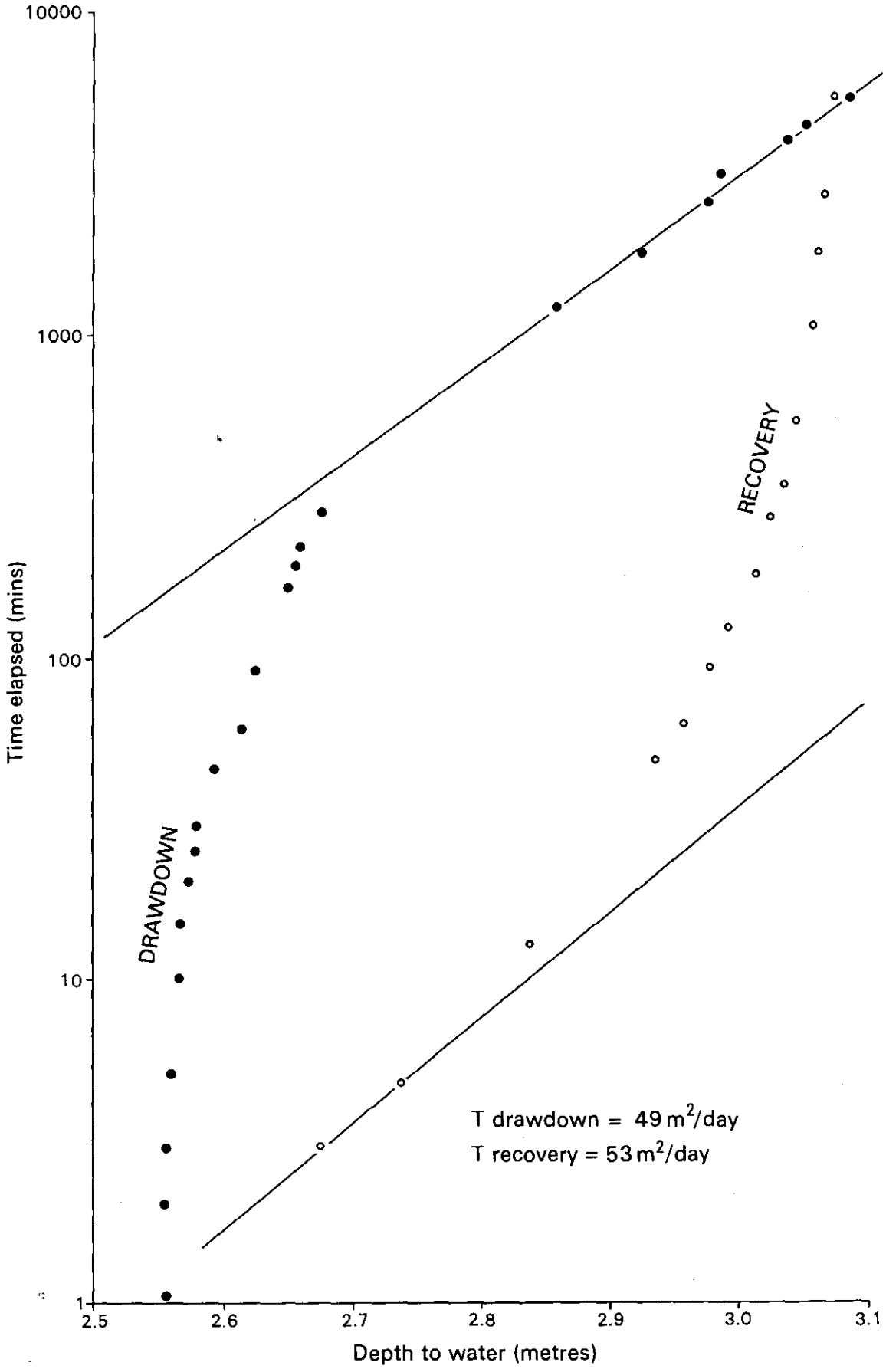

Figure 1. *Pump tests, southern area.*

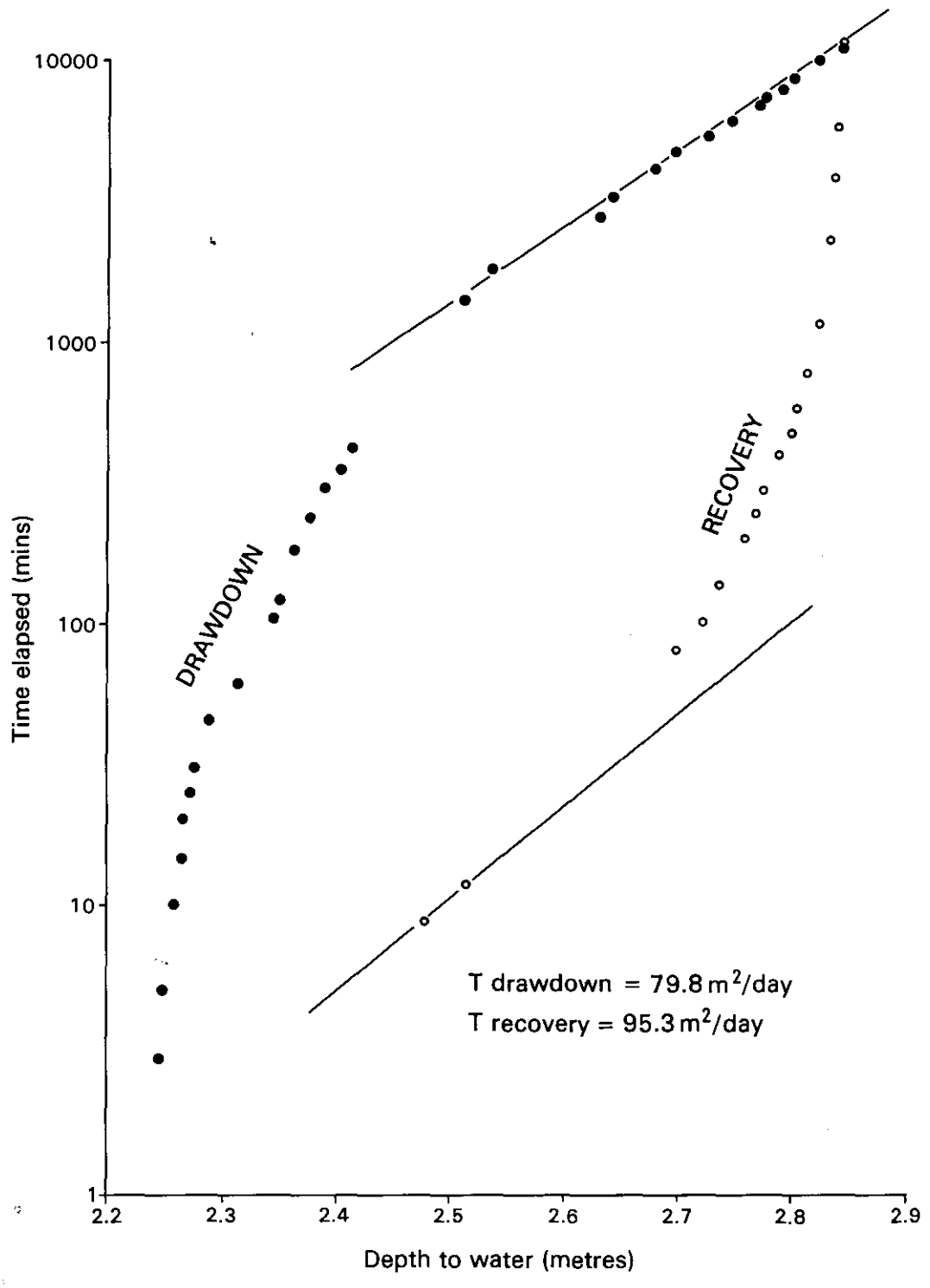

Figure 2. *Pump tests, northern area.*