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1987/50. Pump testing a water bore in Triassic rocks at Cambridge.

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Abstract

A bore on A. R. McKay's property at Cambridge, should be capable of supplying water at the rate of 23 litres per minute for periods of at least a few hours, and with a drawdown of less than 30 metres. The water should be suitable for stock and for watering plants that have some salt tolerance in well-drained situations.

INTRODUCTION

Mr A. R. McKay of Richmond Road, Cambridge hired a pump from the Department of Mines to test the output of a bore [EN358589] which was installed by a private contractor. The test was undertaken to indicate the size of pump most suited to the bore. As the bore is quite close to Hobart and very few pump tests have been monitored in Triassic rocks in the region, the results have been recorded.

GEOLOGY AND DRILLING RESULTS

The hole has been drilled into sandstone and shale of Triassic age. These rocks form a small topographic high between two higher NW-trending ridges of Jurassic dolerite about two kilometres apart. To the north and south of the slightly elevated Triassic areas are lower-lying areas underlain by Tertiary sediments made up of clay, sand, and some gravel.

The bore was drilled about midway between the two dolerite ridges. Only sketchy information is available on the bore, as the driller has mislaid the drill results. The information below is only regarded as approximate.

Total depth	- 73 m
Depth water struck	- 48.8 m
Output	- 60 litres per minute (800 gallons per hour)

PUMP TESTS

Two tests at different rates were undertaken on 14 and 15 March 1987. The first test (rate 12 *l*/min) resulted in a drawdown to 9.19 m after over five hours of pumping from a standing water level of 2.13 m.

The second test (at 27-22 *l*/min) drew the water level down to 18.85 m from the standing water level after about 3.5 hours of pumping. In each test the motor driving the pump was left at a particular speed throughout the test, which resulted in a decrease in output with time. The first test began at 13 *l*/min and decreased to the above figure over the pumping period.

The results of the test are shown on Figure 1. In the later stages of each test the plot forms an approximate straight line. From these straight lines predictions estimating the drawdown after particular periods of continuous pumping can be made, e.g. after 1000 minutes (about 17 hours) the estimated drawdowns would be about 10 m at the low rate and 19.5 m for the high rate. At 100 000 minutes (about 69 days) projected drawdowns would be about 14 m and 21.5 m. These projections depend on the permeability of the rock, in the area around the bore that is being influenced, being uniform. This is

unlikely to be the case, as fracturing in the rock which supplies the travel paths for the water to the bore will be variable. However, it is almost certain that the bore is capable of supplying the larger quantity pumped (about 23 *l*/min) using the type of pump employed in the pump test (a venturi pump) or a windmill. The bore should yield this rate for a few hours at regular intervals.

WATER QUALITY

Samples of water were taken towards the end of each test and analysed at the Department of Mines laboratory in Launceston. These analyses are given below.

	First test	Second test
pH	7.2	7.2
Conductivity (µS/cm)	3030	3030
Item		
CO_3	nil	nil
HCO_3	740	730
Cl	710	710
SO_4	92	75
Ca	78	77
Mg	110	110
Fe	<0.1	<0.1
Al	<0.2	<0.2
K	10.5	11.0
Na	620	600
Total Dissolved Solids	1930	1920
Hardness - Permanent	43	47
Temporary	600	600
Alkalinity as $CaCO_3$	600	600

There is very little variation between the two analyses, although greater variation is possible with long-term use. The water should be suitable for stock and some domestic uses, e.g. septic tank. Plants that are salt sensitive are likely to be affected but many plants, including most grasses, are likely to survive in well-drained conditions.

CONCLUSIONS

The bore is capable of delivering at least 22 *l*/min of water for periods of at least a few hours and perhaps for extended periods, with a drawdown of less than 30 m. Higher rates could probably be pumped if a greater drawdown was acceptable.

The salinity of the water will restrict its use a little, but it should be useable for stock supplies, septic tanks, and for gardens, provided that salt-tolerant plants are watered in well-drained conditions.

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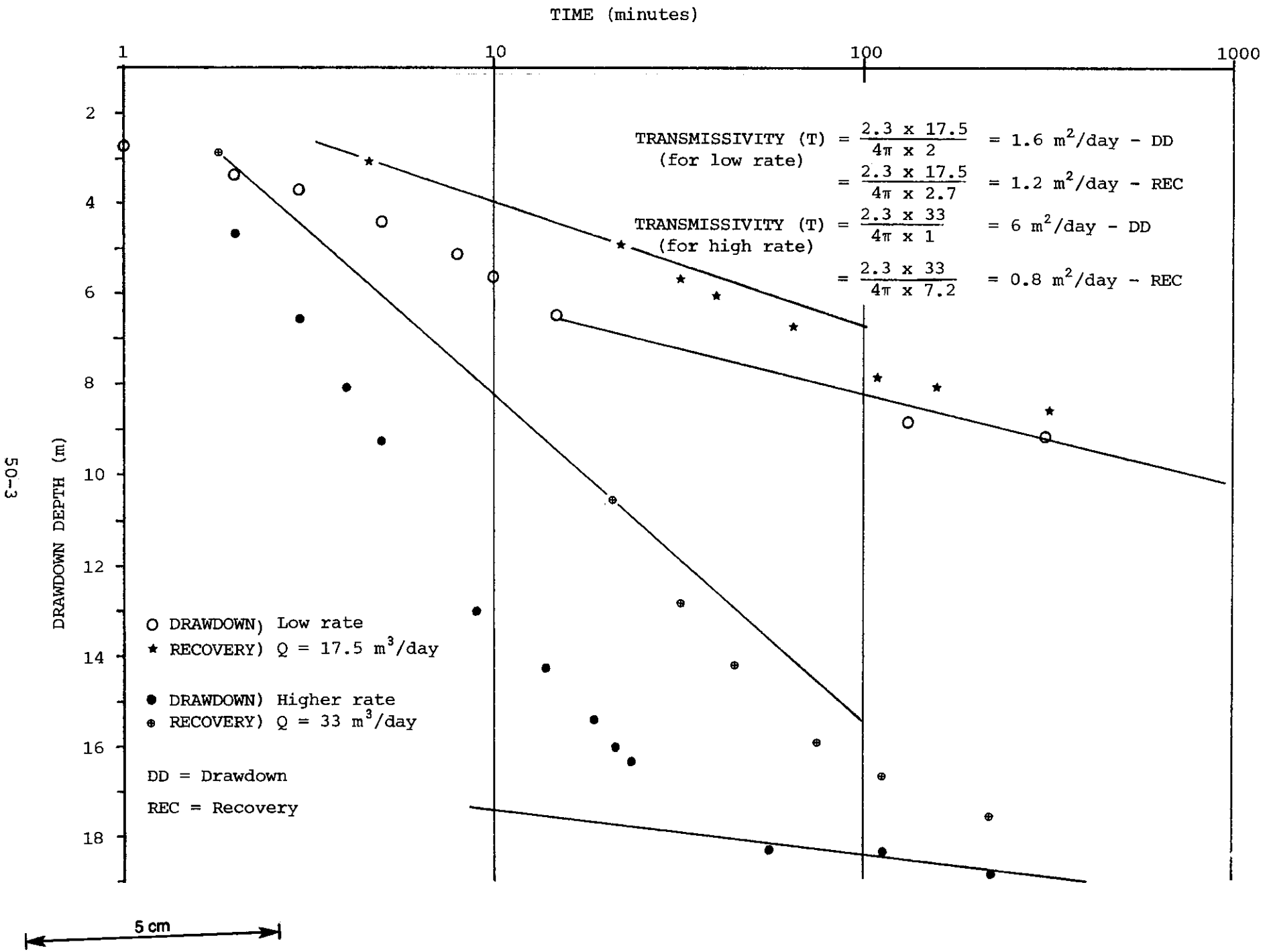
TIME (minutes)
1
10
100
1000
2
4
6
8
10
12
14
16
18
DRAWDOWN DEPTH (m)
TRANSMISSIVITY (T) = 2.3 x 17.5 / 4π x 2 = 1.6 m²/day - DD
(for low rate)
= 2.3 x 17.5 / 4π x 2.7 = 1.2 m²/day - REC
TRANSMISSIVITY (T) = 2.3 x 33 / 4π x 1 = 6 m²/day - DD
(for high rate)
= 2.3 x 33 / 4π x 7.2 = 0.8 m²/day - REC
O DRAWDOWN) Low rate
★ RECOVERY) Q = 17.5 m³/day
● DRAWDOWN) Higher rate
⊕ RECOVERY) Q = 33 m³/day
DD = Drawdown
REC = Recovery
5 cm

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