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DEPARTMENT OF MINES SOUTH AUSTRALIA



GEOLOGICAL SURVEY
HYDROLOGY SECTION

POLDA BASIN

QUARTERLY PROGRESS REPORT

PERIOD ENDING 31st MARCH, 1963

by

R.G. SHEPHERD

DM.1474/62

13/5/63

56/109

DEPARTMENT OF MINES

SOUTH AUSTRALIA

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INTRODUCTION

Drilling of observation bores has continued through the period; since 31st December, 1962 a total of 63 bores have been drilled in an area extending from approximately $1\frac{1}{2}$ miles east of Terre H.S. to 4-5 miles west of the trench. Levelling of the bores is in progress by an E.& W.S. surveyor and measurements of water levels are carried out periodically. For those bores within $1\frac{1}{2}$ miles of the trench, readings are taken weekly, while the remainder are read at monthly intervals, by E.& W.S. personnel.

A plan accompanying this report shows water level contours for 28th February, 1963 and for 4th December, 1962, before pumping commenced. A second plan shows location of all bores drilled to the end of March, showing salinities.

DRILLING RESULTS:

Test drilling has shown that the good quality water extends over a considerable area in the vicinity of Poldia, with salinity varying from 30 to 90 grains per gallon. However, there are certain areas where salinity of the groundwater is much higher. Beyond the limits of the basin, east and north of Terre H.S., bores yielded water of 476 and 736 grains per gallon respectively. In the vicinity of Poelpena Swamp, brackish and saline water also occur - varying from 120 to more than 1000 grains per gallon. To the north of Poelpena Swamp good quality water occurs; towards the south it merges into the brackish and saline groundwater occurring in the swamp. To the north of the swamp it extends for probably 4 miles, although analyses from the more northerly bores are not yet available.

Drilling has shown that the upper aquifer containing good quality water varies from 15 to approximately 35 feet in thickness and consists of aeolianite with a limestone crust. In some areas, particularly near the trench there is a second dense limestone horizon occurring at a depth of 12-15 feet. In all bores drilled to date a clay or sandy clay has been intersected at the base of the upper aquifer, separating the good quality water from brackish water occurring in lignitic sand at greater depth.

Beyond the limits of the aeolianite the groundwater is generally brackish, as shown by bore No. 47 which yielded water of 476 grains per gallon. In this bore limestone occurs directly above yellow sandy clay, which is equivalent to the clay bed occurring at the base of the upper aquifer in the main basin area. In this bore the brackish water occurs in sand beneath the clay, in sediments of Tertiary age. In the Poldu area generally water occurring in the Tertiary sediments is brackish or saline. The sediments occurring in Poelpena Swamp are of Tertiary age and a cover of Pleistocene aeolianite does not occur in this area. In view of the clay bed occurring at shallow depth it is considered that the saline water occurring in the swamp area is unlikely to move toward the trench under the influence of pumping. Although there has been a fall in water level for some of the brackish bores near Poelpena Swamp, this is thought to be caused by lowering of the water table to the east and north east.

EFFECTS OF PUMPING.

Reference to the plan will show that during pumping over a period of almost three months the water table has declined a little over 2 feet at bore No. 9 a short distance south of the trench. Other bores at a similar distance from the trench show a similar fall.

In the trench, where pumping commenced at the rate of approximately 700 gallons per minute, the water level fell to more than 4 feet below its original level. Later, with only one

pump operating, the drawdown remained relatively constant at approximately 3 feet.

With increasing distance east of the trench the effect of pumping becomes less noticeable. In bore 25 situated just over three miles east of the trench the actual fall in the water table during the period 4th December, 1962 to 28th February, 1963 was only .29 feet, or approximately 3½ inches. Part of this fall is probably caused by seasonal conditions; a general fall in water levels would be expected at this period of the year. For a bore in the vicinity of the present No. 25 a fall in water level of .12 feet was recorded during the period July 1936 - January 1937.

The area influenced by pumping appears to be more than 10 square miles in area, but the cone of depression of the water table is relatively flat. Normal gradient of the water table is five feet per mile in the vicinity of the trench. For pumping during the period 4th December, 1962 to 28th February, 1963 the gradient has increased to approximately 5.7 feet per mile. These figures indicate that the aquifer is relatively permeable and should be capable of yielding quite large supplies.

CONCLUSIONS.

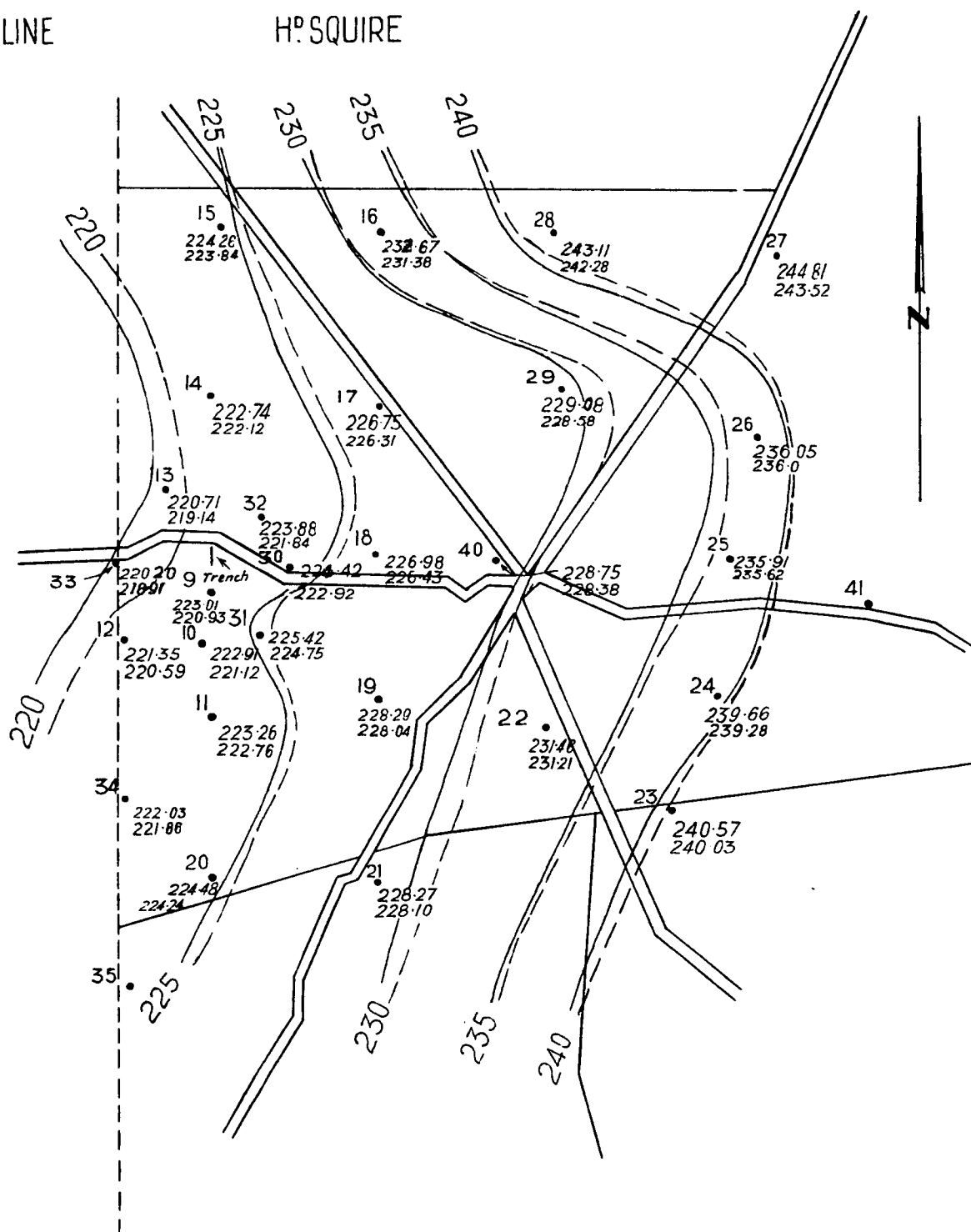
Up to the end of March, 1963 a total of 98 observation bores have been drilled and fitted with 2½" water pipe. Results of the drilling indicate that good quality water is obtainable over a wide area at shallow depth, the salinity generally varying between 30 and 90 grains per gallon. In some areas the salinity of the groundwater is much higher particularly in the vicinity of Poelpera Swamp, where aeolianite does not occur. In this area water of more than 1,200 grains per gallon was obtained in two bores and there are several others where salinity exceeds 250 grains.

Pumping has caused a very flat cone of depression to form indicating that the aquifer is relatively permeable. Larger supplies would probably be obtained by deepening the trench which, at present, intersects only the upper part of the aquifer.

However, it is considered that large diameter bores would be a better proposition. Recommendations have been made for drilling and pump testing a bore in the vicinity of the trench and also at another site several miles to the south west.

R.G. Shepherd
R.G. SHEPHERD
GEOLOGIST
HYDROLOGIST

RGS:MIP
13.5.63

H^o TINLINEH^o SQUIRE

Observation bores with number ²¹ 228.27 R.L. of Water table at 4-12-62 (before pumping)

228.10 " " " " 28-2-62

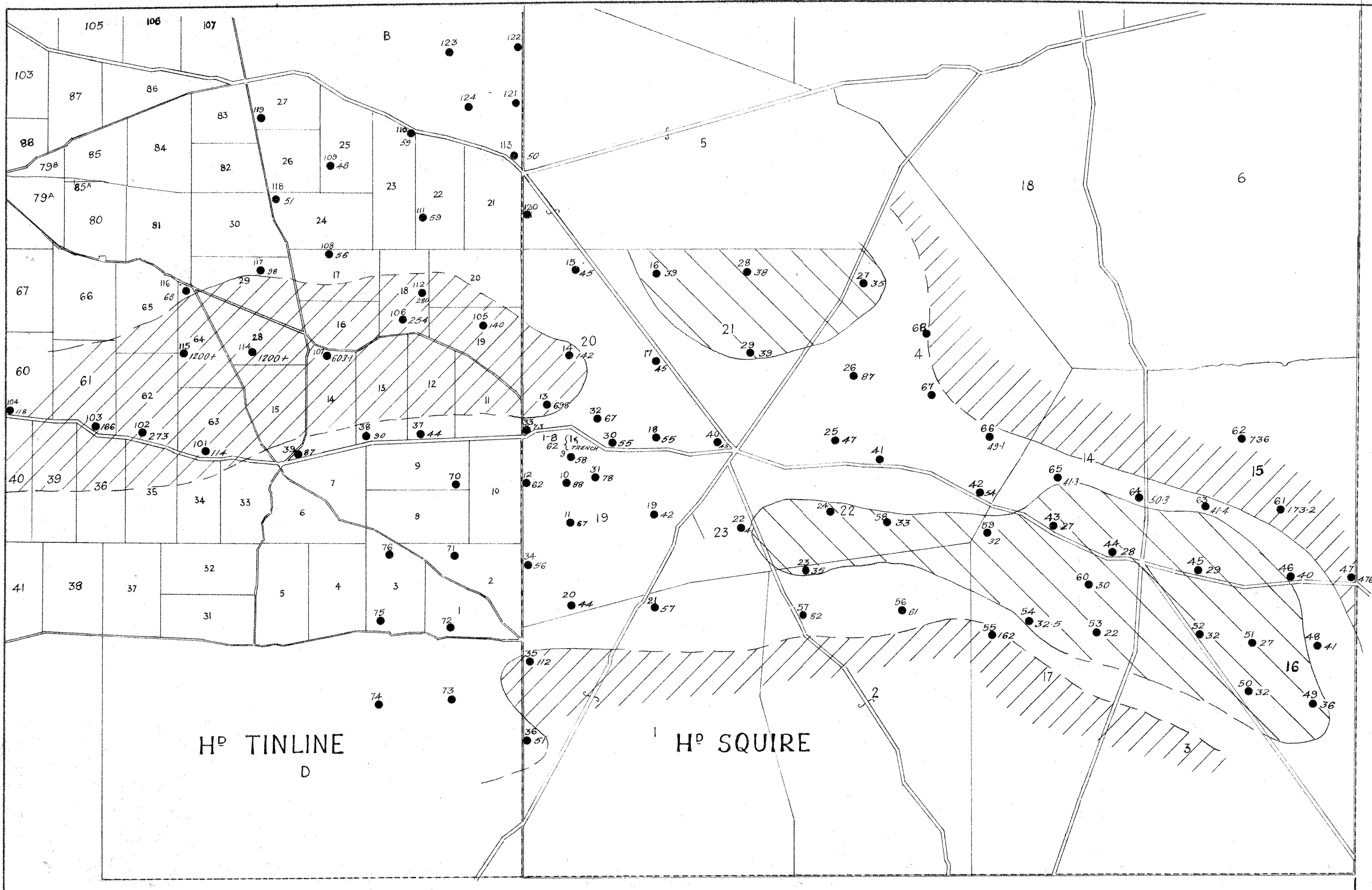
Water table contours at 4-12-62

" " " " 28-2-63

CH 80 40 0 1 2 3 MILES

S.A. DEPARTMENT OF MINES

Approved	Passed	Drn.	POLDA BASIN	D.M.	Scale 1 Mile to 1"
		Tcd. G.M.	WATER TABLE CONTOURS	Req.	S3393
		Ckd.	At 4-12-62 (Before pumping) &		DL 2/4
Director		Exd.	28-2-63		Date 3-5-63



H^d TINLINE
D

H^d SQUIRE

Salinity in grains per gallon.

- 0 - 40
- 40 - 100
- 100 & over

0 2 Miles

Observation bore 42 salinity in gr/gall.

Note: Bore positions approximate only.



To accompany report by R.G. SHEPHERD

S.A. DEPARTMENT OF MINES

POLDA BASIN

PT Hds SQUIRE & TINLINE

Showing observations, bores & isohalines
for period ending 31.3.63

No.	Amendment	Exd.	Date	Director	Approved	Passed	Drn.	Tcd. D.W.W.	Ckd.	Exd.	Date	7.5.63
Scale: 1" to 1 M.												