Section.

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Rept.Bk.No. 75/118

WELL DISCHARGE TEST
PADTHAWAY SUBDIVISION.

Pt. Sec. 108, Hd. Parsons, Co. MacDonnell

for

South Australian Housing Trust

J.A. REED

Department of Mines
South Australia

DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOLOGICAL SURVEY
ENGINEERING DIVISION

WELL DISCHARGE TEST
PADTHAWAY SUBDIVISION

<u>Pt. Sec. 108, Hd. Parsons, Co. MacDonnell</u>

for

- South Australian Housing Trust -

by

J.A. REED
GEOLOGIST
HYDROGEOLOGY SECTION

Rept.Bk.No. 75/118
G.S. No. 5651
Hyd. No. 2700
D.M. No. 208/75

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DEPARTMENT OF MINES

SOUTH AUSTRALIA

Rept.Bk.No. 75/118
G.S. No. 5651
Hyd. No. 2700
D.M. No. 208/75

WELL DISCHARGE TEST
PADTHAWAY SUBDIVISION
Pt. Sec. 108, Hd. Parsons, Co. MacDonnell

ABSTRACT

An approximate transmissivity of 224 metres^3/day/metre has been calculated for the Bridgewater Formation in the vicinity of the South Australian Housing Trust bore, Padthaway.

The maximum safe discharge for the bore is 6 litres/second. Pumping should not exceed a total of 8 hours per day. The safe daily yield is 170,000 litres.

Monitoring is required to establish peak, daily and long term demands prior to further planning for water supply.

INTRODUCTION

The South Australian Housing Trust is establishing a subdivision in Pt. Section 108, Hd. of Parsons, 1 kilometre northeast of Padthaway township. Thirty three units have been completed, and a further 134 units are planned.

Water is produced from a single bore near the north-eastern corner of the subdivision. Following complaints from residents that water supplies were inadequate, the Housing Trust requested the Department of Mines to pump test the bore and determine the quantity of water available.

A three stage drawdown test, each stage comprising 100 minutes pumping followed by 100 minutes recovery, was conducted on the 29th April, 1975. The main test which commenced on the 30th April, 1975, consisted of 72 hours pumping at constant discharge, followed by 24 hours recovery. The Housing Trust pump installed in the bore was used for the investigation.

Water was discharged into the town storage tanks throughout the three stage test, but only as required for town supply during the main test.

BOREHOLE DETAILS

The bore, drilled in 1968 by private contractor, is 39 metres deep and lined with 150 mm (O.D.) casing from the surface to 34 metres. Water was cut at 33 metres and rose to a standing level of 31.7 metres. The hole was not logged.

A S.U.M.O. 12 N.A.T. pump, installed by Southern Cross Machinery Pty. Ltd., delivers approximately 6 litres/second to two 13 kilolitre overhead storage tanks. The pump inlet is set at 36.6 metres.

Between April 1970 and October 1971 the bore, numbered PAR 11, was used by the Department of Mines for observation purposes. Recorded water levels fluctuated between 32.106 metres and 32.60 metres below the bore collar. Standing water level was 32.36 metres prior to commencement of the three stage test.

HYDROGEOLOGY

Pt. Section 108 is located near the western edge of the Naracoorte Range, a series of northwesterly trending stranded coastal dunes of the Middle Pleistocene Bridgewater Formation (see plan no. 75-822).

Previous investigations (Harris, 1972) indicate that the subdivision is underlain by 40 to 50 metres of Bridgewater Formation, comprising medium to coarse grained calcarenitic sand and sandstone, above approximately 20 metres of Oligocene to Lower Miocene Gambier Limestone. The geological sequence is illustrated on plan number 75-824 (adapted from Harris op. cit.).

The Housing Trust bore is inferred to have been completed within the unconfined Bridgewater Formation, the main aquifer in the Naracoorte Range. Groundwater moves through the aquifer in a southwesterly direction towards the flats (see plan no. 75-822).

WATER SAMPLING

Water samples were taken regularly throughout the main 72 hours pump test. Approximate total dissolved salts were determined by the Department of Mines. Samples taken at the conclusion of testing were submitted to AMDEL for full analysis.

The results, summarised in Appendix B, show that during the test period salinities varied between 910 and 1020 mg/litre and pH between 7.2 and 7.4 .

PUMPING TEST RESULTS

Drawdown in a pumped facility is a function of three components, one non-linear flow term and two laminar flow terms, one of which is time dependent (Hazel, 1975). This relationship can be expressed in the following form,

$$s = (a + b \log t)Q + CQ^2$$

where a, b and C are constants, Q is the pumping rate, t is the time since pumping commenced and s is the drawdown.

By testing the bore at three different pumping rates, the constants a, b and C can be evaluated. The equation can then be used for long term drawdown predictions at various discharge rates.

The calculations for a, b and C are detailed in Appendix A, and the test results analysed below.

1. <u>ANALYSIS OF THE THREE STAGE DRAWDOWN TEST</u>

Measured drawdowns for the three constant discharge tests were plotted against the logarithm of time, as shown on plan no. 75-876.

The increased rates of drawdown after 10 minutes of pumping indicate reduced aquifer permeability at some indeterminate distance from the bore. This inhomogeneity is compatible with the known geology of the Bridgewater Formation.

As the equation for the bore is required for long term prediction, the constants a, b and C were evaluated from the late stage of each test. The calculated values are: $a = 0.235$, $b = 0.025$, and $C = 0.026$.

Equation for the bore is therefore:

$$s = (0.235 + 0.025 \log t)Q + 0.026\, Q^2$$

Residual drawdowns, measured during the recovery stage of each test, were plotted against the logarithm of $t1/t2$, where t1 = time since pumping commenced and t2= time since pumping stopped (see plan no. 75-875).

Using Jacob's Method, which relates transmissivity T to the slope Δs of the straight line relationship between s and log t, viz. $T = \frac{0.183 \times Q}{\Delta s}$, values of T were obtained for the pumping and recovery stages as tabulated below.

TABLE 2

TRANSMISSIVITY (m^3/day/m)

STAGE	PUMP TEST late	RECOVERY TEST early
1	535	752
2	586	665
3	789	725
Average	637	714

2. ANALYSIS OF THE MAIN TEST

The graph of measured drawdown against logarithm of time is shown on plan no. 75-874, together with a graph showing the residual drawdown plotted against logarithm of $^{t1}/t2$ and "Theoretical Drawdown" predicted from the equation for the bore.

The theoretical graph was derived using the value Q = 5.09 litres/second, the average discharge rate for the main test (see plan no. 75-873). This test rate is of the same order of magnitude as the pumping rate used by the Housing Trust (approx. 6 litres/sec.). Apart from intervals when the discharge was diverted to fill the town storage tanks, fluctuations from the mean pumping rate were less than 3%.

Good straight line relationships were obtained for both the drawdown and residual drawdown graphs. The changes in gradient were caused by the cone of depression encountering less permeable aquifer material, resulting in larger drawdowns within the bore.

Transmissivities were calculated for the three straight line drawdown relationships and the two residual drawdown stages. Results are tabulated below.

TABLE 3

TRANSMISSIVITY - MAIN TEST (m^3/day/m)

PUMP TEST			RECOVERY TEST	
Early	Middle	Late	Early	Late
619	424	224	671	358

DISCUSSION OF RESULTS

The theoretical and measured drawdown graphs agree well for the first 100 minutes of pumping. At the end of 2 000 minutes (1.4 days), the difference is 0.28 metres (10%) and after 10^4 minutes (6.9 days) the difference between predicted and extrapolated drawdown is 0.46 metres (16%).

For smaller pumping times (up to approximately 2 days) the equation for the bore can therefore be used to predict drawdowns for different discharge rates (plan no. 75-823).

Prior to the main test, standing water level was 32.335 metres. The maximum recorded seasonal fluctuation was 0.5 metres. Allowing 1 metre of water above the pump inlet (36.6 metres) to prevent intake of air, working drawdown for the bore is therefore 2.8 metres. The total available drawdown in 4.3 metres.

For pumping times up to 1 600 minutes, the maximum safe discharge rate is 6 litres/second (see plan no. 75-823). Recovery times from the 3-stage tests indicate that after 100 minutes of pumping at 6 litres/second, the bore would require approximately 200 minutes for complete recovery. The maximum safe daily yield is therefore 170 000 litres.

During the main test, approximately 66,000 litres of water per day were consumed by the 33 units of the subdivision (see plan no. 75-873), indicating that present demand is well within the safe capacity of the bore. Should future requirements exceed the safe capacity, yields could be increased by deepening the well to enlarge the working drawdown. However, higher discharge rates would necessitate longer recovery times, thereby limiting the safe daily yield. This limit cannot be estimated from the available data.

Alternatively, demand could be met by constructing a second bore sufficiently far from the existing bore to prevent mutual interference.

Using the calculated transmissivity T = 224 m^3/day/m, and storage coefficient of 0.24 (Harris, 1972), the limit of the cone of depression after 200 minutes of pumping at 6 litres/second is estimated as 30 metres (Thies, 1963). The recommended minimum distance between two similar bores is therefore 60 metres.

New bores should be located hydraulically up gradient from the subdivision, viz. to the north or northeast, to prevent contamination by septic tank effluent.

CONCLUSIONS & RECOMMENDATIONS

The Housing Trust bore in Pt. Section 108, Hd of Parsons has been developed within Bridgewater Formation aeolianite underlying the Naracoorte Range.

An equation for the bore was derived from the three stage pump test and used to predict drawdowns for various pumping rates.

The equation agrees well with drawdowns measured during the early part of the main test. However the cone of depression encountered less permeable aquifer material during the later stages of pumping, resulting in drawdowns greater than predicted. Transmissivity correspondingly decreased from 619 metres^3/day/metre to 224 metres^3/day/metre.

Maximum safe daily yield for the bore is 170 000 litres, sufficient for approximately 80 units. This estimated yield is based on 480 minutes pumping at 6 litres/second, with 960 minutes recovery.

Any inadequacy of supply to the present subdivision is possibly caused by deficiencies in the mains or by insufficient storage prior to peak demand.

If future requirements exceed the safe capacity of the bore, additional supplies would best be obtained from a second well. This should be sited to the north or north-east of the subdivision and depending upon pumping requirements, a minimum distance of 60 metres from the existing bore.

Deepening the present bore to enlarge the working drawdown is not recommended.

Before any proposals are considered to increase the existing water supply, a monitoring programme should be implemented to determine peak, daily and long term requirements of the subdivision. Bore water levels should also be measured once a week, prior to pumping on a particular day, to record any long term depletion of the aquifer.

Regular checks of water salinity and nitrate content are recommended.

Groundwater is used intensively in the Padthaway Irrigation Area and withdrawal from the aquifers is considered to have reached a critical level. Under present groundwater management policy, permits must be approved for drilling new wells or for increasing production from an existing well within the critical area.

As the irrigation area is recharged by groundwater moving southwesterly through the Naracoorte Range, any increased withdrawal by the subdivision will have an effect on recharge to the basin. Consultation with the Underground Waters Advisory Committee is therefore recommended prior to further planning.

J.A. Reed.

J.A REED

GEOLOGIST

26th September, 1975
JAR:JG

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SHEPHERD, R.G., 1972. "A Summary of the Hydrogeology of the South East Province". S. Aust. Dept. Mines unpublished report RB. 72/206.

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APPENDIX A

CALCULATION OF CONSTANTS FROM THE THREE STAGE TEST.

APPENDIX A

CALCULATION OF CONSTANTS FROM THE THREE STAGE TEST

Investigations have found that the drawdown in a discharging bore is comprised of three terms, one non-linear flow term and two laminar flow terms, one of which is time dependent. The non-linear term is constant for a particular value of discharge.

The drawdown can be expressed by the function:-

$$s\ (t) = (a + b \log t)Q + CQ^2$$

where $s\ (t)$ = drawdown at time "t" after discharge commenced.

a, b, C are constants, independent of t.

Q = discharge rate in litres/second.

t = time (in minutes) since pumping commenced at discharge rate Q.

CQ^2 = non-linear head loss.

A plot of drawdown versus log t will give a straight line of slope per log cycle, s = bQ and intercept (for log t = 0) of $aQ + CQ^2$. From the graphs for the three stages (plan no. 75-876), a, b and C are calculated as follows.

<u>Evaluation of "b"</u>

Stage I. $b = \frac{0.077}{2.56} = 0.030$

Stage II. $b = \frac{0.091}{3.45} = 0.026$

Stage III. $b = \frac{0.080}{4} = 0.020$

Average B = 0.025

<u>Evaluation of "a" and "C" from log t = 0 intercepts</u>

Stage I. $aQ1 + CQ_1^2 = 0.80$

for Q_1 = 2.56 l/sec a+ 2.56C = 0.3125 ......(1)

Stage II. $aQ2 + CQ_2^2 = 1.11$

for Q_2=3.45 l/sec. a+3.45C = 0.3217 ......(2)

Stage III. $aQ3 + CQ_3^2 = 1.385$

for $Q_3 = 4.0$ 1/sec $a + 4C =$ 0.3463 ......(3)

Subtracting (1) from (3), $1.44\ C = 0.0338$ $C = 0.023$

(2) from (3), $0.55\ C = 0.0246$ $C = 0.045$

(1) from (2), $0.89\ C = 0.0092$ $C = 0.010$

AVERAGE $C = 0.026$

Solving for "a"

(1) and (2) $3.45a + 3.45 \times 2.56C = 1.0781$

$2.56a + 2.56 \times 3.45C = 0.8236$

$0.89a = 0.2545$ $a = 0.286$

(1) and (3) $4a + 4 \times 2.56C = 1.25$

$2.56a + 2.56 \times 4C = 0.8865$

$1.44a = 0.3635$ $a = 0.252$

(2) and (3) $4a + 4 \times 3.45C = 1.2868$

$3.45a + 3.45 \times 4C = 1.1947$

$0.55a = 0.0921$ $a = 0.167$

AVERAGE $a = 0.235$

APPENDIX B

WATER ANALYSIS RESULTS

APPENDIX B

TABLE OF WATER ANSLYSIS RESULTS
MAIN TEST.

Time Sample taken	Salinity (mg/l)	pH	Analysis No.
Start of Test	990	7.4	W 3223/75
100 minutes	910	7.4	3224
300 minutes	910	7.3	3225
600 minutes	960	7.2	3226
900 minutes	990	7.2	3227
1 200 minutes	990	7.2	3228
1 500 minutes	1 020	7.2	3229
1 800 minutes	935	7.2	3230
2 100 minutes	1 020	7.2	3231
2 400 minutes	935	7.4	3232
2 700 minutes	1 020	7.4	3233
3 000 minutes	960	7.2	3234
3 300 minutes	910	7.3	3235
3 600 minutes	990	7.3	3236
3 900 minutes	990	7.2	3237
4287 minutes (final sealed sample)	1020	7.2	3238

WATER ANALYSIS REPORT

SAMPLE NO. W3239/75 JOB NO. 3991-75

CHEMICAL COMPOSITION

		MILLIGRAMS PER LITRE MG/L	MILLEQUIVS. PER LITRE ME/L
CATIONS			
CALCIUM	(CA)	137.	6.8
MAGNESIUM	(MG)	40.	3.3
SODIUM	(NA)	250.	10.9
POTASSIUM	(K)	4.	.1
ANIONS			
HYDROXIDE	(OH)	.	.0
CARBONATE	(CO3)	.	.0
BICARBONATE	(HCO3)	434.	7.1
SULPHATE	(SO4)	56.	1.2
CHLORIDE	(CL)	454.	12.8
NITRATE	(NO3)	4.	.1

TOTALS AND BALANCE

CATIONS (ME/L) 21.1 DIFF = .0
ANIONS (ME/L) 21.1 SUM = 42.2

$\frac{DIFF*100}{SUM}$ = .1%

DERIVED AND OTHER DATA

CONDUCTIVITY (E.C.) MICRO-S/CM AT 25 DEG. C. 2089.

TOTAL DISSOLVED SOLIDS	MILLIGRAMS PER LITRE MG/L
A. BASED ON E.C.	
B. CALCULATED (HCO3=CO3)	1158.
C. RESIDUE ON EVAP. AT 180 DEG. C.	
TOTAL HARDNESS AS CACO3	507.
CARBONATE HARDNESS AS CACO3	356.
NON-CARBONATE HARDNESS AS CACO3	151.
TOTAL ALKALINITY AS CACO3	356.
FREE CARBON DIOXIDE (CO2)	
SUSPENDED SOLIDS	
SILICA (SIO2)	
BORON (B)	

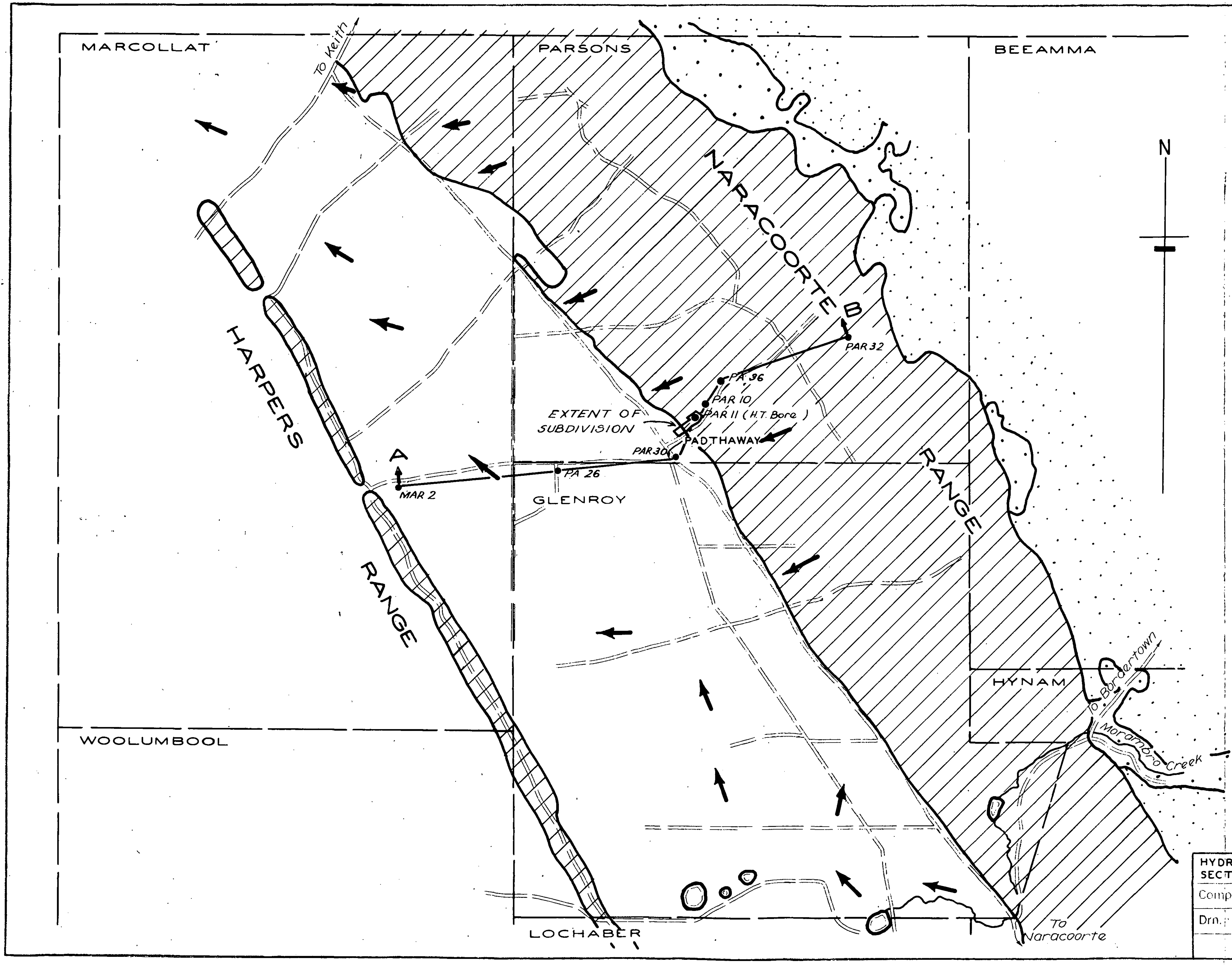
	UNITS
REACTION - PH	8.1
TURBIDITY (JACKSON)	
COLOUR (HAZEN)	

SODIUM TO TOTAL CATION RATIO (ME/L) 51.5%

NAME - PADTHAWAY
ADDRESS - HOUSING TRUST
DATE COLLECTED 3/5/75

HUNDRED - PARSONS
SECTION - 108
SUPPLY - 305 L/M
SAMPLE COLLECTED BY L.H.

WATER CUT -
WATER LEVEL-35.0m
DEPTH HOLE - 39.0m



LEGEND

- MOLINEAUX SAND:- Pale yellow unconsolidated quartz sand sheet.
- LIMESTONE:- Non fossiliferous covered by thin surface soils.
- BRIDGEWATER FORMATION:- Stranded coastal dunes & beach deposits. Mostly medium to coarse-grained calcarenitic quartz sands.
- PARILLA SANDS:- Red brown, medium grained, clayey quartz sand.
- Arrows indicate direction of groundwater flow.
- PAR 11 Borehole and number
- A B Geological Section (see Drg. No. 75-824)

SCALE IN KILOMETRES
5 0 5 10
2 0 2 4 6
SCALE IN MILES

Adapted from Drg. No. 71-827, compiled by B.M. Harris

HYDROGEOLOGY SECTION		DEPARTMENT OF MINES – SOUTH AUSTRALIA	Scale: AS SHOWN
Compiled:		SUBDIVISION — PADTHAWAY	Date: 29·8·75.
Drn.:	Ckd.	GEOLOGICAL PLAN	Drg. No. 75-822

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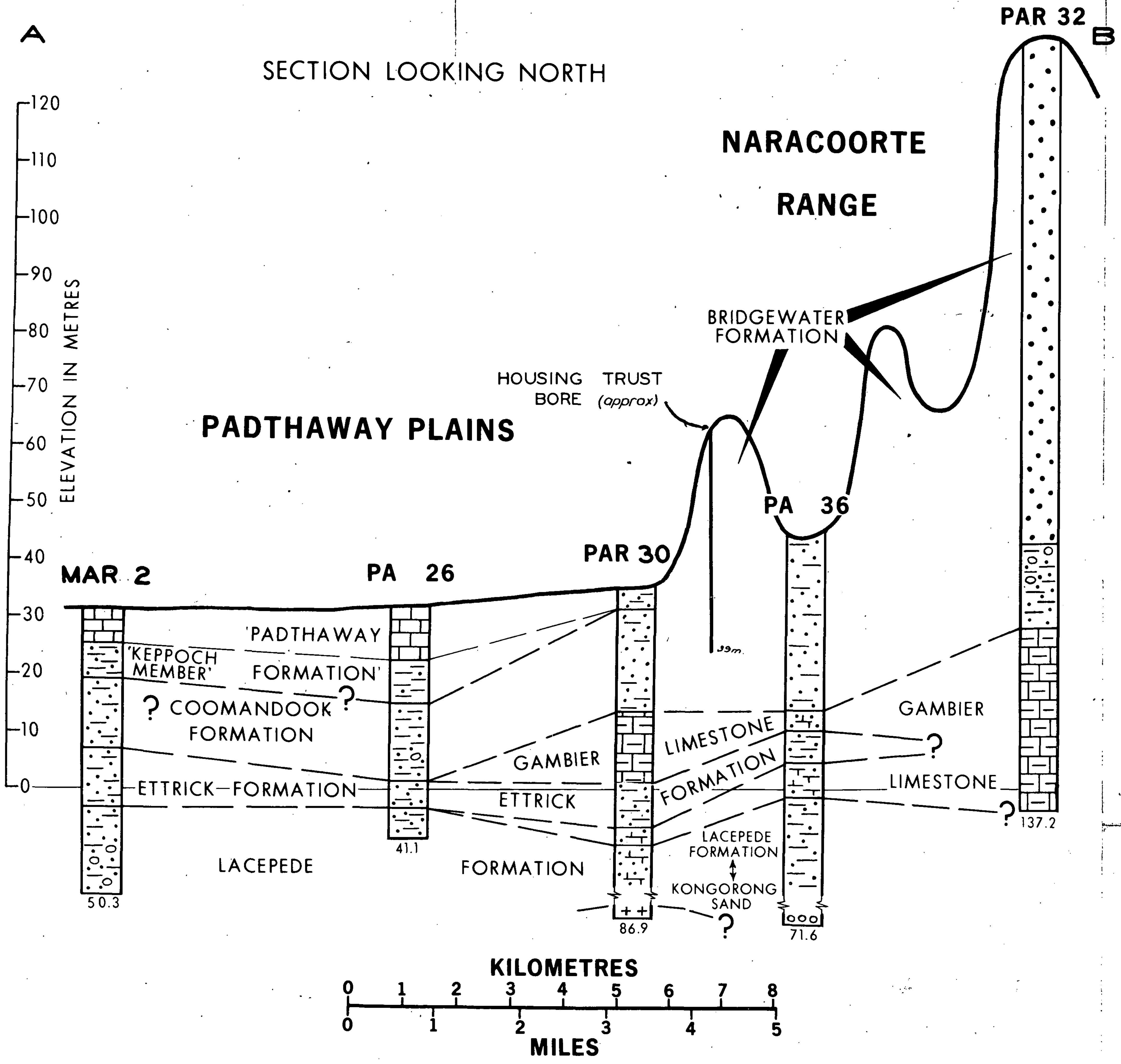


QUATERNARY

'PADTHAWAY FORMATION'—LIMESTONE, white, rubbly, with LIME SILT (calcisiltite) underlain by CLAY, green to brown ('Keppoch Member' of the Padthaway Formation)

BRIDGEWATER FORMATION—SANDS AND SANDSTONES, mainly medium to coarse grained, yellow brown calcarenitic, overlying ?Parilla Sand and Loxton Sands, more cemented and ferruginous

COOMANDOOK FORMATION — SAND AND SANDSTONE, fine—grained, pale brown to grey, calcarenitic

MIOCENE TO OLIGOCENE

GAMBIER LIMESTONE— CALCARENITES AND CALCISILTITES yellow brown to pale grey, bryozoal, shelly

EOCENE

ETTRICK FORMATION—SANDS, fine and SILTS, clayey glauconitic, calcarenitic, grey—green

LACEPEDE FORMATION— Brown green and grey glauconitic, and ferruginous, fossiliferous SAND, SILT, CLAY AND LIMESTONE

KONGORONG SAND— Dark brown ferruginous, gravelly, SILT AND SAND, fossiliferous, pyritic and glauconitic

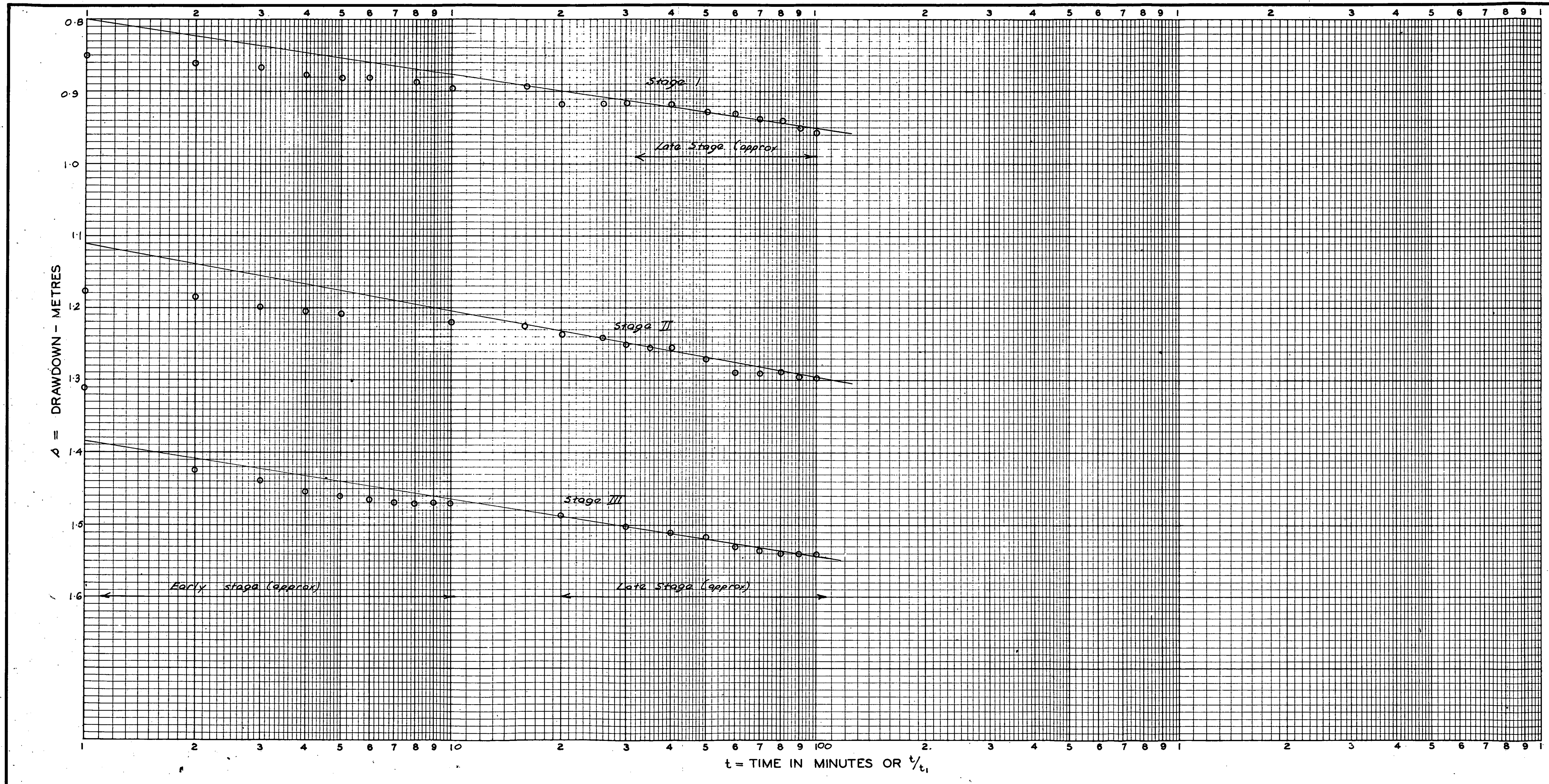
LOWER PALAEOZOIC

GRANITE

For location see plan 75-822. Adopted from drg. no. 71-826 compiled by B.M. Harris.

	DEPARTMENT OF MINES—SOUTH AUSTRALIA	Scale: As Shown
Compiled: B.M.H.	SUBDIVISION — PADTHAWAY	Date: 28-8-75
Drn. / Ckd.	DIAGRAMMATIC GEOLOGICAL SECTION A—B	Drg. No. 75-824

7024-IV & 6924-I



BOREHOLE STATE N°__________ TYPE OF PUMP__________
DEPTH TO WATER LEVEL DISCHARGE STARTED AT___ON___
AT TEST START (ℓ_2)_______(L) ** " STOPPED AT___ON___
PUMP INTAKE DEPTH (ℓ_1)______(L) AQUIFER FROM____TO_____(L)
*AVAILABLE DRAWDOWN_______(L) HOLE DEPTH_____(L)

EQUATIONS

$T = \frac{0.183 \times Q}{\Delta_\delta}$ $S = \frac{2.25 \times T t_0}{r^2}$

In which
T= Transmissivity ($L^3/t/L$)
Q= Pumping Rate (L^3/t)
Δ_δ= Drawdown per log cycle. (L)

S= Storage Coefficient
t_0= Zero drawdown time- (t)
r = Distance to Observation Bore- (L)
1day = 8.64×10^4 secs.

DATA

	Q	Δ_δ	t_0
Stage I	222 m³/day	0.076	
Stage II	298 m³/day	0.093	
Stage III	345 m³/day	0.08	

CALCULATIONS

Stage I $T = \frac{0.183 \times 222}{0.076} = 535$ m³/day/m

Stage II $T = \frac{0.183 \times 298}{0.093} = 586$ m³/day/m

Stage III $T = \frac{0.183 \times 345}{0.08} = 789$ m³/day/m

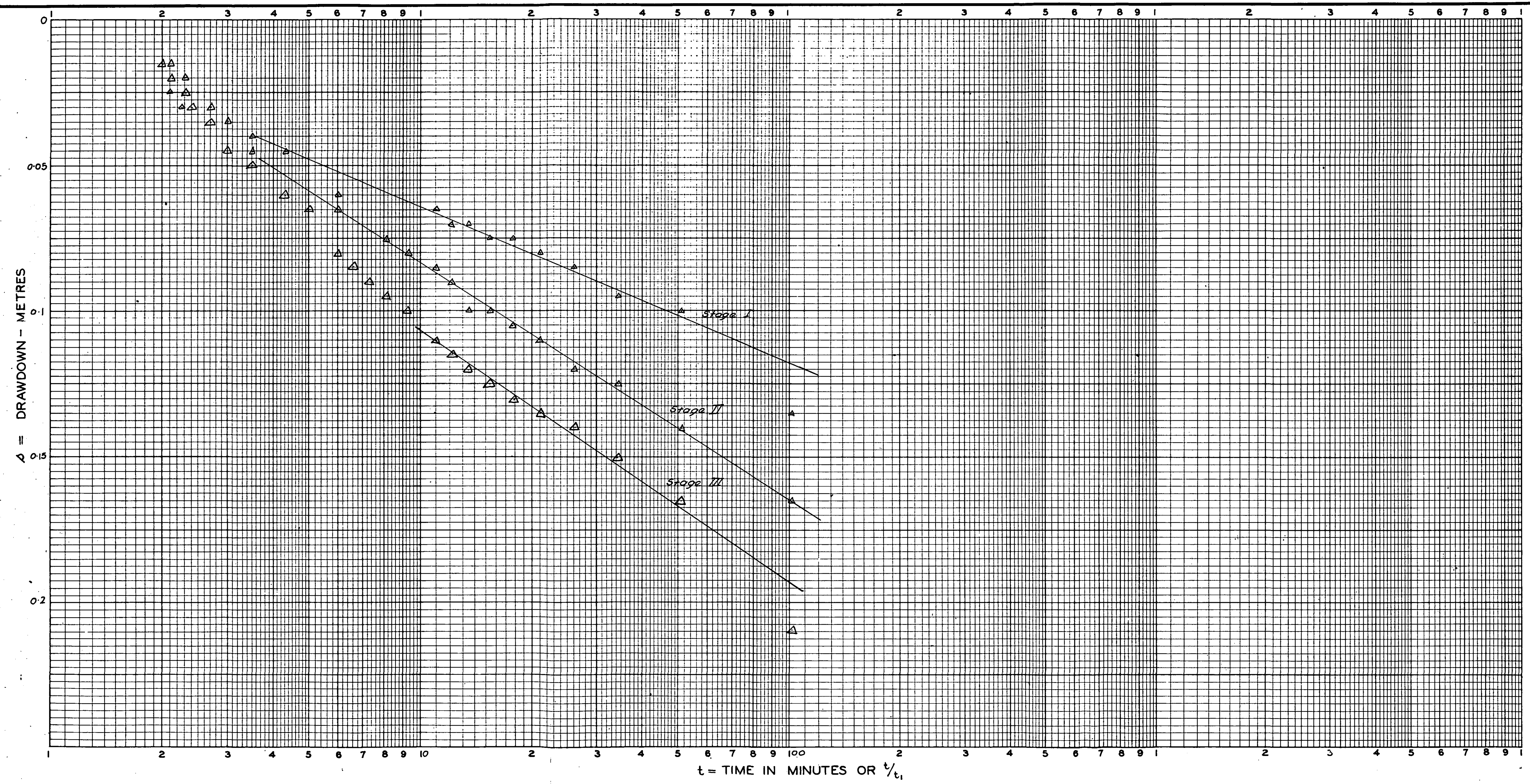
** L = unit of length.
t = time unit.

* Available drawdown = $\ell_1 - (\ell_2 + \_\_\_\_)$

HYDROGEOLOGY SECTION	DEPARTMENT OF MINES—SOUTH AUSTRALIA	D.M. /
COMPILED:	SUBDIVISION — PADTHAWAY Pt SEC 108 HD. PARSONS DRAWDOWN TEST. STAGES I, II + III	DATE:
DRN. CHD.		DRG. No. 75-876

P.F. No. 69—953 MH

7024-IV



BOREHOLE STATE Nº____________ TYPE OF PUMP________________
DEPTH TO WATER LEVEL DISCHARGE STARTED AT____ON____
AT TEST START (ℓ_2)________(L)** " STOPPED AT____ON____
PUMP INTAKE DEPTH (ℓ_1)________(L) AQUIFER FROM______TO______(L)
*AVAILABLE DRAWDOWN________(L) HOLE DEPTH______(L)

EQUATIONS

$T = \frac{0.183 \times Q}{\Delta_o}$ $S = \frac{2.25 \times T t_o}{r^2}$

In which

T = Transmissivity ($L^3/t/L$)
Q = Pumping Rate (L^3/t)
Δ_o = Drawdown per log cycle. (L)
S = Storage Coefficient
t_o = Zero drawdown time- (t)
r = Distance to Observation Bore- (L)
1 day = 8.64×10^4 secs.

DATA

	Q	Δ_o	t_o
Stage I	222 m³/day	0.054	
Stage II	298 m³/day	0.082	
Stage III	345 m³/day	0.087	

CALCULATIONS

Stage I $T = \frac{0.183 \times 222}{0.054}$ = 752 m²/day/m.

Stage II $T = \frac{0.183 \times 298}{0.082}$ = 665 m²/day/m

Stage III $T = \frac{0.183 \times 345}{0.087}$ = 725 m²/day/m.

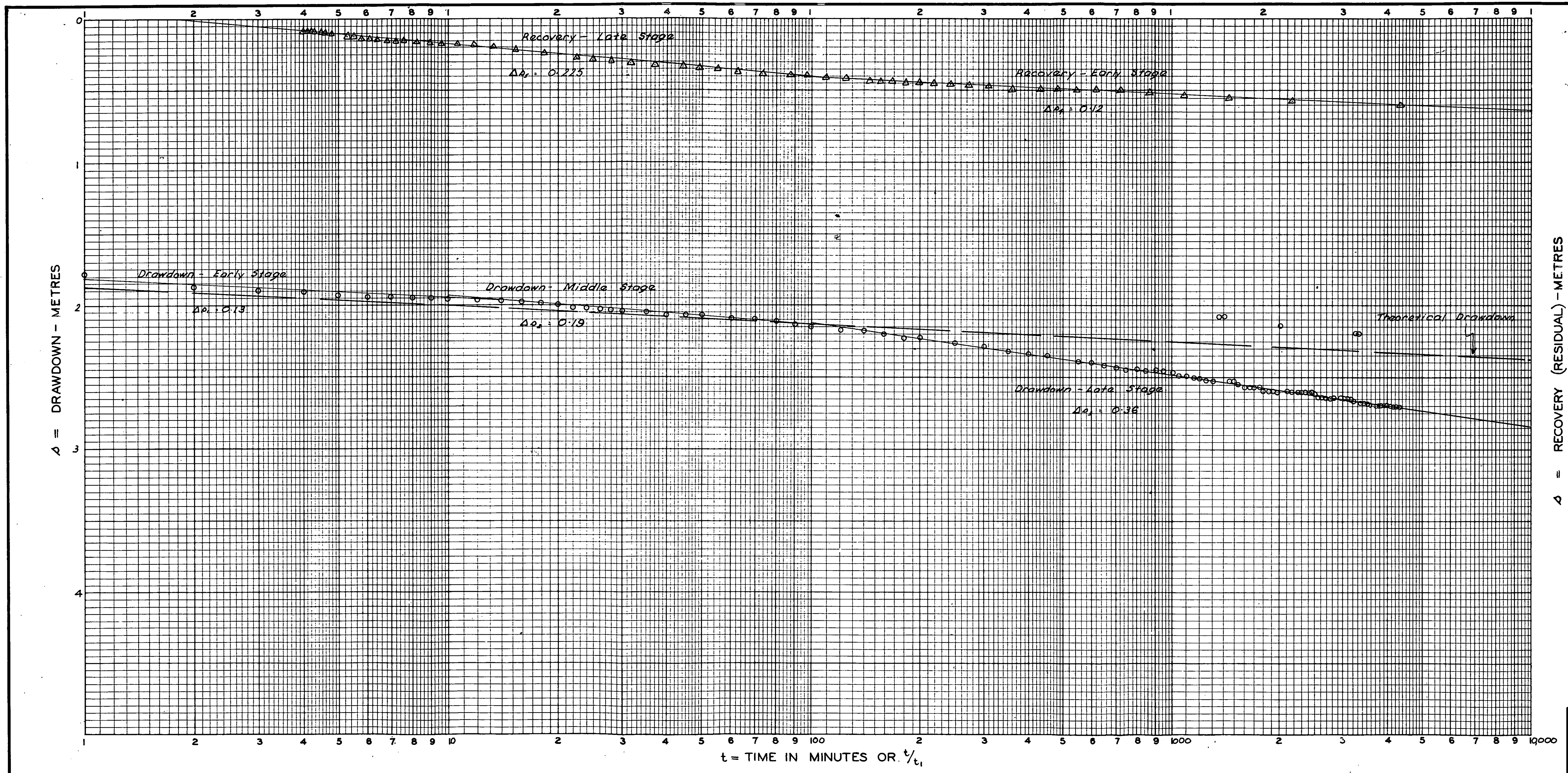
** L = unit of length.
t = time unit.

* Available drawdown = $\ell_1 - (\ell_2 + \_\_\_\_\_)$

HYDROGEOLOGY SECTION	DEPARTMENT OF MINES—SOUTH AUSTRALIA	D.M. /
COMPILED: J.A.R.	SUBDIVISION – PADTHAWAY Pt SEC 108 HD. PARSONS RECOVERY TEST. STAGES I, II + III	DATE:
DRN. / CHD.		DRG. No. 75-875

P.F. No. 69—953 MH

7024-IV



BOREHOLE STATE N°____________
DEPTH TO WATER LEVEL
AT TEST START (ℓ_2) _32·325m_ (L) **
PUMP INTAKE DEPTH (ℓ_1) _36·6m_ (L)
*AVAILABLE DRAWDOWN _2·77m_ (L)

TYPE OF PUMP________________
DISCHARGE STARTED AT _0800_ ON _30/4/75_
" STOPPED AT _0727_ ON _3/5/75_
AQUIFER FROM _____ TO _____ (L)
HOLE DEPTH _39m_ (L)

EQUATIONS

$$T = \frac{0{\cdot}183 \times Q}{\Delta_s}$$

$$S = \frac{2{\cdot}25 \times T t_0}{r^2}$$

In which
T = Transmissivity ($L^3/t/L$)
Q = Pumping Rate . (L^3/t)
Δ_s = Drawdown per log cycle. (L)

S = Storage Coefficient
t_0 = Zero drawdown time- (t)
r = Distance to Observation Bore- (L)
1 day = $8{\cdot}64 \times 10^4$ secs.

DATA

	Q	Δ_s	t_0
1. Drawdown - early	440m³/day	0·13m	
2. - middle		0·19m	
3. - late		0·36m	
4. Recovery - early		0·12m	
5. late		0·225m	

CALCULATIONS

1. $T = \frac{0{\cdot}183 \times 440}{0{\cdot}13}$ = 619 m³/day/m

2. $T = \frac{0{\cdot}183 \times 440}{0{\cdot}19}$ = 424 m³/day/m

3. $T = \frac{0{\cdot}183 \times 440}{0{\cdot}36}$ = 224 m³/day/m.

4. $T = \frac{0{\cdot}183 \times 440}{0{\cdot}12}$ = 671 m³/day/m

5. $T = \frac{0{\cdot}183 \times 440}{0{\cdot}225}$ = 358 m³/day/m.

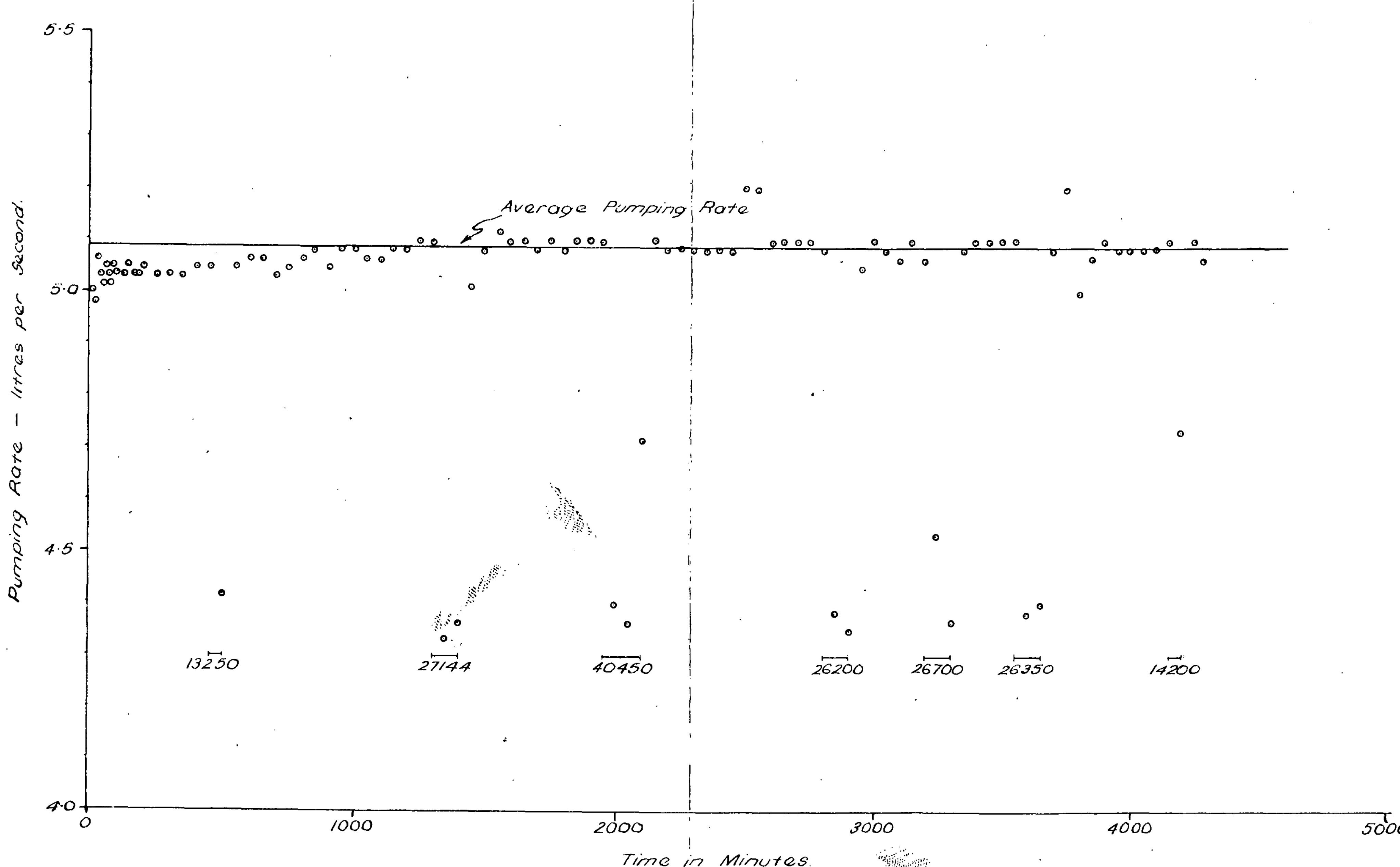
** L = unit of length.
t = time unit.

* Available drawdown = $\ell_1 - (\ell_2 + 1{\cdot}494)$ m.

HYDROGEOLOGY SECTION		DEPARTMENT OF MINES—SOUTH AUSTRALIA	DM. 208 / 75
COMPILED: J. A. R.		SUBDIVISION - PADTHAWAY P^T SEC 108 HD PARSONS MAIN TEST - DRAWDOWN & RECOVERY	DATE:
DRN.	CHD.		DRG. No. 75-874

P.F. No. 69-953 MH

7024-IV



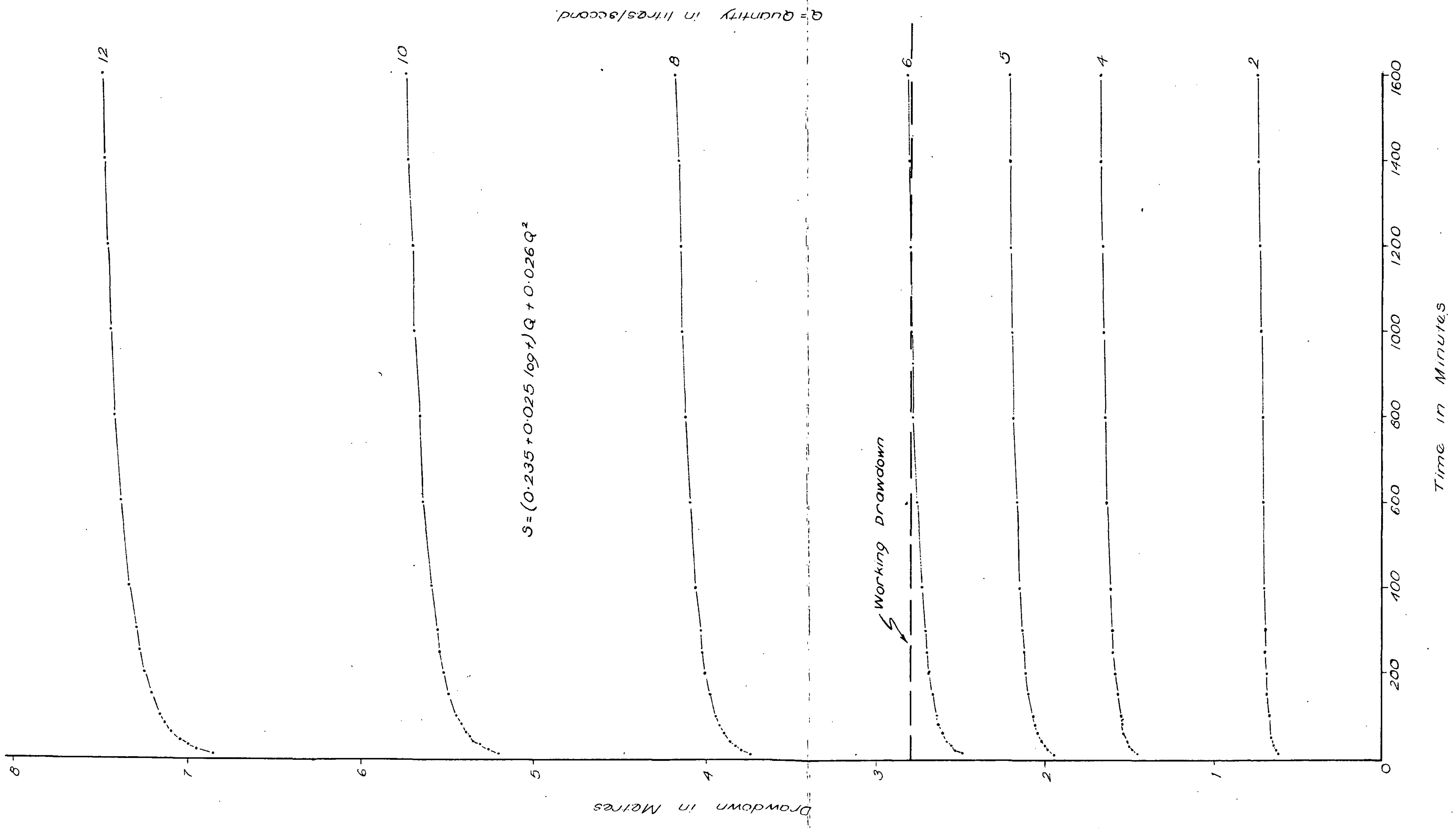
Time to refill storage tanks
26200 = No of litres required.

DEPARTMENT OF MINES — SOUTH AUSTRALIA

SUBDIVISION — PADTHAWAY
PLOT OF PUMPING RATE Vs. TIME
MAIN TEST

		Drn. J. R	**SCALE:** Graph
		Tcd. G.J.T.	75 — 873
		Ckd.	
Director of Mines		**Exd.**	**DATE:**

702.4.IK



	DEPARTMENT OF MINES – SOUTH AUSTRALIA	Scale:
Compiled:	SUBDIVISION — PADTHAWAY	Date: 29-8-75
Drn. G.J.T. | Ckd.	S. A. HOUSING TRUST BORE ANTICIPATED DRAWDOWN Vs TIME	Drg. No. 75-823

7024-IV + 6924-I