



TARCOOLA - ALICE SPRINGS RAILWAY
(TARCOOLA - ROBIN RISE SECTION)
REPORT NO. 4

FABIO CAROSONE

Department of Mines
South Australia —

Jan 1973

71-8

73/10

DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOLOGICAL SURVEY
ENGINEERING DIVISION

TARCOOLA-ALICE SPRINGS RAILWAY
(TARCOOLA-ROBIN RISE SECTION)

REPORT NO.4

by

FABIO CAROSONE, Dr.Geol.Sc.
GEOLOGICAL ASSISTANT

Rept. Bk. No. 73/10
G.S. No. 5016
Hyd. No. 2465
DM. No. 525/71

11th January, 1973

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DEPARTMENT OF MINES
SOUTH AUSTRALIA

Rept. Bk. No. 73/10
G.S. No. 2465
Hyd. No. 2465
D.M. No. 525/71

TARCOOLA-ALICE SPRINGS RAILWAY WATER BORES
TARCOOLA-ROBIN RISE SECTION
ADDITIONAL WATER BORES

ABSTRACT AND CONCLUSIONS

Six bore holes have been drilled between previously existing productive holes to lessen water carting distances during railway construction. Drilling targets were the Cadna-owie Formation and/or the Algebuckina Sandstone. All holes were productive at various rates, One further hole remains to be drilled.

INTRODUCTION

Some additional drilling was required by the Commonwealth Railways along the proposed Tarcoola-Alice Springs Railway to lessen the haulage distance necessary during construction between bores drilled at the beginning of 1972 (see previous reports). Yields around $4.5 \text{ m}^3/\text{h}$ (1 000 gall/h) were sought. Seven new sites were suggested to be put down by a cable tool plant using six inch diameter casing.

The drilling crew left Adelaide on the 10th of October and returned on the 18th of November.

Six bores, with a total depth of 235.3 m, were successfully drilled; after a field reconnaissance it was decided that the site selected for the seventh and last bore (Bore 25), between Lake Wirrida and Robin Rise, at the 141 km mark, presented too many access hazards due to the thick scrub and very soft sands. This difficulty could be overcome in the future when earth moving equipment will be available in the area and a track to the drilling site could be cleared.

Sealed water samples have been taken from all the new and old productive bores and from the main shaft in the Tarcoola Mine. The static water level in the latter was 24 m, but, by now, a large capacity pump for dewatering the mine should be in operation lowering the water level.

All the water samples were forwarded to Amdel for full analyses and the results are shown in Appendix II.

There are at present on the line 14 productive bores (Fig. 1) nine of which have yields above $4.5 \text{ m}^3/\text{h}$ (1 000 gall/h). Assuming this as a minimum economical yield, the longest gap (42 km) is between km 37 (Bore 10) and km 79 (Bore 22). This is an area of extensive granite outcrops (Birthday Hill) and silcrete cover. The aquifer in the region is represented by the white, kaolinitic sand of the Cadnawowie Formation of early Cretaceous age, or its equivalent; big supplies are not common but water is often of reasonably good quality. The two bores drilled by the Department in this region are Luscombe Bore 2 at km 66.9 ($0.09 \text{ m}^3/\text{h}$ or 20 gall/h) and Bore 21 at km 60.2 ($0.27 \text{ m}^3/\text{h}$ or 60 gall/h).

Other major gaps are between km 10 (Bore 19) and km 37 (Bore 10) with Bore 20 ($2.3 \text{ m}^3/\text{h}$ or 500 gall/h) at km 21; between km 79 (Bore 22) and km 102 (Bore 12) with Bore 23 ($3.6 \text{ m}^3/\text{h}$ or 800 gall/h) at km 91, and between km 131 (Bore 13) and km 155 (Bore 6) where the projected Bore 25 was to be drilled at km 141.

The bores are generally within 150 m from the line and access is not difficult. Location of the bores is marked on the line by a peg with yellow and red marking tape as is the actual position of the bore. Bores 22, 23 and 13 are at a greater distance than 200 m from the line and present access difficulties because of the rather soft surrounding ground, particularly around Bore 22.

Yellow marking tapes on trees lead the way to Bores 22 and 23 and a sketch is given of their location (Fig. 2 and 3). No yellow marking tapes were left to indicate the position of Bore 13 at Lake Wirrida, but a sketch is given (Fig. 4). Details of the new bores follow, and a summary of all bores is given in Appendix 3.

BORE 19

Location: 80 m E. of km 10.0 peg of line

Depth: 37.3 m

Static water level: 2.40 m

Salinity: 78 000 mg/l

Yield: 15 m³/h (3 300 gall/h)

Casing: 6 inches

Suggested Pump Depth: 5 m

This bore was drilled not far from Bore 9, in another of the several salt pans adjacent to the line in that area. Material in the first 20 metres was quite similar to that of Bore 9, and a first shallow aquifer was cut at 5.5 m and persisted to 9 m. These sediments are thought to be of Tertiary age.

A second aquifer, separated from the first by a thick bed of clay, was cut at 21.4 m and persisted to the bottom of the bore which ended in what appeared to be weathered granite.

The bore was developed for two hours at the full capacity of a Diesel pump, the limit of which is 3 300 gall/h. The drawdown was very little and the recovery very fast. It is thought that, if needed, a much greater yield could be obtained from this bore.

BORE 20

Location: 100 m E of km 21.3 peg of line

Depth: 32 m

Static water level: 14.6 m

Salinity: 48 486 mg/l

Yield: 2.3 m³/h (500 gall/h)

Casing: 6 inches

Suggested pump depth: 20 m

Water was cut at 17.5 m in a very sandy clay alternating with very clayey sand, with bands of dark grey, carbonaceous clay. These sediments are of Tertiary age. At 25.6 m a hard grit or gravel was encountered that progressively passed to porphyry derived gravel, weathered porphyry and fresh porphyry. The bore was developed for 2.5 hours by air lift, but the yield remained low and salinity high.

BORE 21

Location: 200 m E of km 60.2 peg of line

Depth: drilled 56 m, backfilled to 18 m

Static water level: 10.3 m

Salinity: 2 230 mg/l

Yield: $0.27 \text{ m}^3/\text{h}$ (60 gall/h)

Casing: 6 inches

Suggested pump depth: 17 m

A thin band of hard silcrete followed by lightly silicified sand rests on top of about 10 m of gritty sand with off white, clayey matrix, believed to be of Tertiary age.

Fresh water, tasteless and odourless, was cut at 10.40 m (950 mg/l); salinity increased little up to around 15 m where it reached 2 500 mg/l. Advice was sought by radio from the Commonwealth Railways in Port Augusta whether the bore should be left as a fresh water bore for camping purposes or drilling should continue in an attempt to increase the supply. Instructions to go ahead were received. The aquifer ended at around 18 m. Drilling continued through a thick bed of varicoloured and unusual clays; at 45 m a gritty sand, including abundant siderite spherules, believed to be of Upper Eocene age was encountered which gave hope of a better supply. However, the thickness of these sediments was only around 3.5 m, and drilling was stopped at 56 m.

It was decided to backfill the bore to 18 m and develop with surger and air lift the eight metres of the upper aquifer, but only a very limited supply was obtained.

BORE 22 - Dead Roo Bore

Location: 350 m W of km 79.0 peg of line (see Fig. 2)

Depth: 44 m

Static water level: 9 m

Salinity: 32 105 mg/l

Yield: 36.3 m³/h (9 000 gall/h)

Casing: 6 inches

Suggested pump depth: 18 m

Gritty sand with off white kaolinitic matrix of the Cadna-owie Formation of early Cretaceous age was cut at 4 m and continued practically unaltered up to 44 m. Drilling was stopped at this depth because it was thought that an abundant supply was already obtained.

Water was cut at 13 m, with a salinity of 5 750 mg/l.

The bore was developed for 5 hours by air lift and a very good supply was obtained.

As this bore is situated some distance from the line, yellow marking tapes have been left hanging from trees and leading to the bore site. The terrain from the line and from the E-W road along the vermin proof fence, is very soft under a thin, apparently hard, crust. Driving the drilling and camping equipment to and from the bore site required a good deal of work and effort for more than half a day each time. Clearing and construction of a track from the line to the bore is considered necessary.

BORE 23 - Eagle Nest Bore

Location: 500 m W of km 91.4 peg of line (see Fig. 3)

Depth: 36 m

Static water level: 17.2 m

Salinity: 27 198 mg/l

Yield: $3.6 \text{ m}^3/\text{h}$ (800 gall/h)

Casing: 6 inches

Suggested pump depth: 25 m

This bore too is located some distance from the line and a series of yellow marking tapes on trees, departing from km 91.4 peg, lead the way to the site.

Drilling was very hard for the first 6 m as a series of hard bands of Tertiary silcrete was encountered. Penetration rates of 7 cm for two hours were recorded.

The same gritty sand with kaolinitic matrix of Bore 22 (Cadna-owie Formation, early Cretaceous age) was struck in this bore; the bore was developed for 4 hours by air lift, but the supply remained limited.

Soft ground around this site could also provide access difficulties.

BORE 24 - Two Rabbits Bore

Location: about 100 m E of km 119.1 peg of line, close to road to Webbs Dam.

Depth: 30 m

Static water level: 7 m

Salinity: 38 624 mg/l

Yield: 22.7 m³/h (5 000 gall/h)

Casing: 6 inches

Suggested pump depth: 15 m

This bore did not present any particular drilling or access problem. Only some fine, loose sand in the upper part required casing.

Drilling was stopped at 30 m in well consolidated sand or sandstone, belonging to the Cadna-owie Formation of early Cretaceous age, as a good supply was already obtained.

Fabio Carosone

FABIO CAROSONE, Dr. Geol. Sc.
GEOLOGICAL ASSISTANT

FC:FdeA
11.1.73

11th January, 1973

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APPENDIX I

BORE LOGS

BORE LOG · HYDROGEOLOGY

Lat. 30°40'00"

Long. 134°31'30"

State No. 065000178

Bore Serial No. 9/73

Purpose of Bore Construction Water

Hundred

Section 130

Owner Commonwealth Railways Address Port Augusta

Driller Eric Jamieson

Project No. 19

Docket No. 525/71

Commenced 13.10.72 Completed 17.10.72

R.L. Collar (M.S.L.)

Depth 37.34 m

Drill type Cable Tool Circulation

R.L. Surface

Co-ords E

Logged by F. Carosone Date 17.10.72

Casing 6"

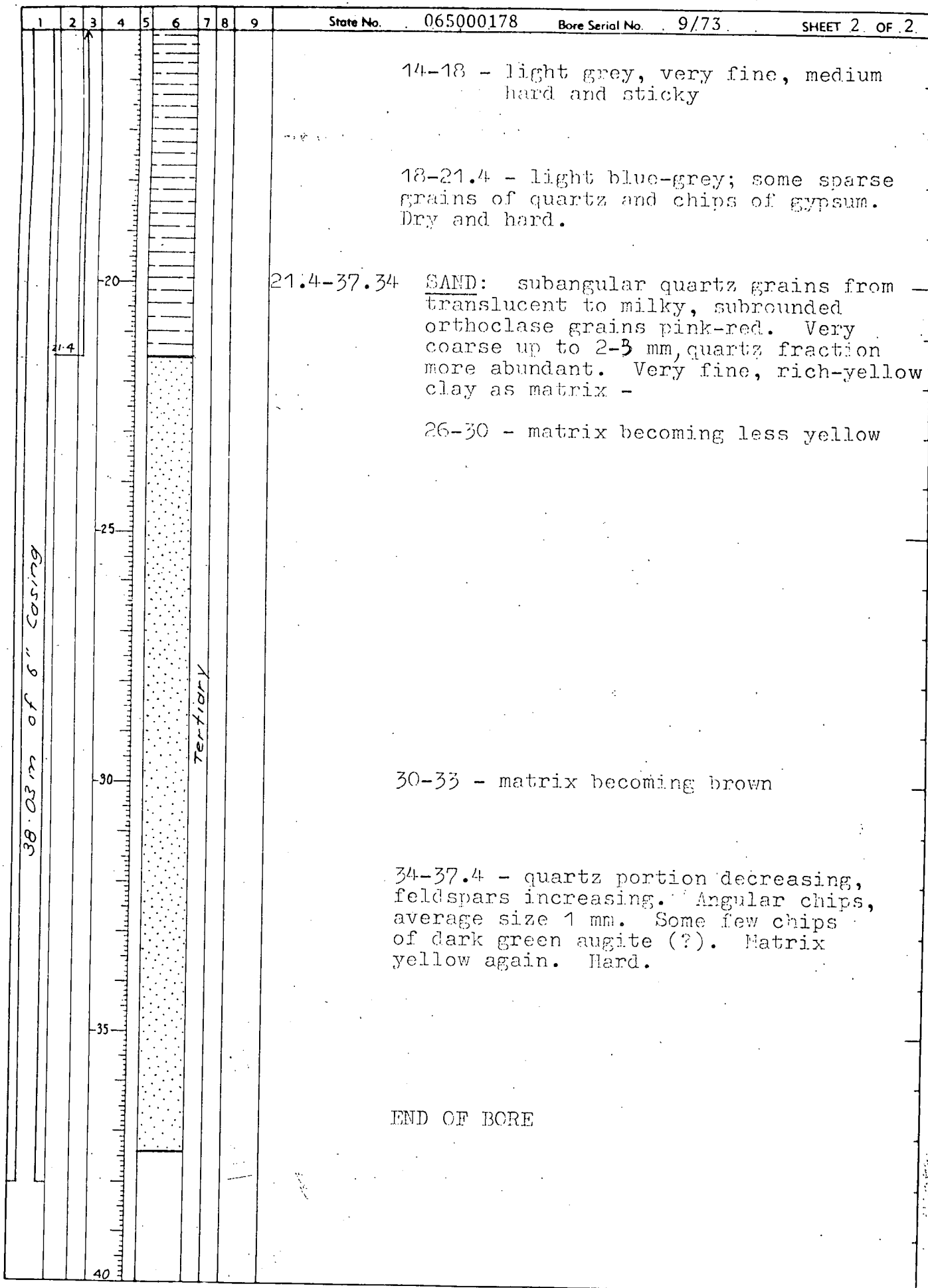
A.M.G. Zone

N

DEPTH (m)	WATER LEVEL (m)	SUPPLY-	HOW TESTED	TOTAL SALTS mg/l	ANALYSIS No.
5.50 21.4	2.40	15m ³ /h	Petter's Diesel Pump	78000	W 251/72

REMARKS 80 m E of km 10 peg of line

1 CASING	2 WATERS CUT	3 WATER LEVEL	4 DEPTH (m)	5 CORE	6 GRAPHIC LOG	7 AGE	8 UNIT	9 PENETRATION RATE	DESCRIPTION
38.03 m of 6" casing			21.4						0-9 <u>SAND</u> - Brown red, fine with some bigger rounded quartz grains - some minor silt 1.3-2.0 - more abundant, bigger subangular quartz grains - partially clayey. 2-5 - more clayey, some quartz grains up to 2 mm, subangular, red stained. Generally soft, yellower in colour. 5.0-6.0 - A band of very bright green, very plastic clay and some other sandier, dark brown and hard. 6.0-9.0 - Subangular to angular grains, from coarse (1-2 mm) to very fine, with abundant silt and clay, fawn in colour. Some lumps of black carbonaceous clay Abundant well formed, translucent gypsum Soft and unconsolidated. 9-21.4 <u>CLAY</u> grey-green, fine and hard with abundant quartz grains up to 1 mm. Very finely layered with red sand of the type as above. 10-14 - from red brown to black carbonaceous, very sandy with grains up to 1 mm - Plastic and medium hard - Abundant gypsum in white powdery form and well formed translucent crystals. Sand decreasing at bottom.



BORE LOG · HYDROGEOLOGYPurpose of Bore **CONSTRUCTION WATER**

Hundred

Section **B1k. 436, P.L.1733**Lat. **30°34'15"**Long. **134°31'20"**State No. **065000177**Owner. **Commonwealth Railway** Address **Port Augusta**Driller. **Eric Jamieson**Bore Serial No. **10/73**Project No. **20**Commenced. **18.10.72** Completed **23.10.72** R.L. Collar (M.S.L.)Docket No. **525/71**Drill type **Cable Tool** CirculationDepth **32 m**Logged by **Fabio Carosone** Date **23.10.72** Casing **6"**

A.M.G. Zone

Co-ords E

WATERS CUT	DEPTH (m)	WATER LEVEL (m)	SUPPLY-	HOW TESTED	TOTAL SALTS mg/l	ANALYSIS No.
	17.5	14.6	2.3	Air Lift	48406	W 252/72

REMARKS **100 m. E. of km 21.3 peg. of line**

1	2	3	4	5	6	7	8	9	DESCRIPTION
CASING	WATERS CUT	WATER LEVEL	DEPTH (m)	CORE	GRAPHIC LOG	AGE	UNIT	PENETRATION RATE	
									0.1 <u>SAND</u> , red fine to silty, unconsolidated
									1-6 <u>CLAY</u> , red brown, silty and sandy. Sand portion shows quartz grains up to 2-3 mm and more (well rounded). Traces of light calcretization. Medium hard.
									4-6 - Sandier. Angular to rounded quartz grains up to coarse (3 mm). Some translucent and milky quartz grains, rest red brown. Medium hard.
									6-8 <u>SAND</u> , very clayey, red brown, from fine to coarse (3 mm) - Angular to rounded translucent and milky quartz grains, but mainly red brown. Some chips of white calcrete at bottom. Medium hard
									8-16 <u>CLAY</u> - a thin band of white, sandy calcrete on top. pale green, very dry, medium hard; slightly sandy (fine to coarse quartz grains)
									11-12 - becoming yellow-green. sandy with red, white milky and translucent subrounded quartz grains, up to 3 mm. Slightly moist, Medium hard.
									14-16 - Turning grey and dark grey with carbonaceous veins.

32.43m of 6" Casing

14.5

15

Recent

Tertiary

40 =

Tertiary

END OF BORE

BORE LOG · HYDROGEOLOGY

Lat: 30°12'20"

Long: 134°32'30"

Purpose of Bore

CONSTRUCTION WATER

Hundred

Section BLK 632 P.L. 1479

State No.

065000176

Owner

COMMONWEALTH RLWYS. Address PORT AUGUSTA.

Bore Serial No.

11/73

Driller

ERIC JAMIESON

Project No. 21

Commenced 24.10.72

Completed 30.10.72

R.L. Collar (M.S.L.)

Docket No.

525/71

Drill type CABLE TOOL

Circulation

R.L. Surface

Depth

56 m

Logged by F. CAROSONE

Date 30.10.72

Casing 6"

A.M.G. Zone

N

DEPTH (m)	WATER LEVEL (m)	SUPPLY-	HOW TESTED	TOTAL SALTS mg/l	ANALYSIS No.
10.40	10.30	0.27	Air lift	947	
13				1084	
14				1000	
15				2500	
18				Total 2230	W 253/72

REMARKS

200 m E of km 60.2 peg of line

1	2	3	4	5	6	7	8	9	DESCRIPTION
CASING	WATERS CUT	WATER LEVEL	DEPTH (m)	CORE	GRAPHIC LOG	AGE	UNIT	PENETRATION RATE	
17.27 m of 6" Casing									
									0-2.5 SAND = red-brown, fine, becoming silty and clayey at bottom and less drk.
									2.5-3.0 SILCRETE: grey green cemented fine quartz grains. Very hard.
									3.0-6.0 SAND: light brown in colour, subangular; very fine quartz grains white milky and red; well consolidated with siliceous cement.
									4-6 - pink, homogeneous grains around 0.3-0.5mm. Cement grading to a hard clayey matrix.
									6-18 SAND: from fine to coarse, subangular, translucent, grey smoked, white milky, light green quartz grains in off-white clayey, stiff when dry, matrix. Medium hard.
									12-16 - sandier and coarser up to gravel
									16-18 - finer sand and more clayey.

[illegible]

Lat. $30^{\circ}2'40''$
Long. $134^{\circ}31'30''$

State No. 065000175

Section . B1k.733 P.L.2129

Bore Serial No. 13/73

Bore Serial No. 13/73

Project No. 22

Docket No. 525/71

R.L. Collar (M.S.L.)

Depth . 44 m

R.L. Surface

Co-ords E

Casing 6"

A.M.G. Zone

M

WATERS CUT	DEPTH (m)	WATER LEVEL (m)	SUPPLY-	HOW TESTED	TOTAL SALTS mg/l	ANALYSIS No.
	13	9.04	36.3	AIR LIFT	5750 final: 32105	W 254/72

REMARKS . Dead. Roo Bore. = 350. m.W. of km 79 peg. of line

	CASING	WATERS CUT WATER LEVEL	DEPTH (m)	CORE GRAPHIC LOG	AGE UNIT	PENETRATION RATE	DESCRIPTION
				RECENT			0-4 SAND, red-brown, fine to coarse. Unconsolidated. Angular to rounded quartz grains, red or translucent. Some gypsum chips.
40.31 m of 6" casing				CRETACEOUS FORMATION			4-24 SAND subangular grains from fine to coarse. Translucent, white milky, or smoked grey. Abundant white clayey matrix and gypsum, either weathered or fresh. Medium hard.

14-18 - Some fine lenses of fawn, hard clay. Some big pebbles of milky quartz.

18-24 - more clayey bands white and fawn in colour. Small chips of gypsum.

24-26

CLAY - light grey, very fine, sticky and hard. It seems like an enrichment in clay of the formation above. gypsum still present.

26-44.

SAND - the same as above - subangular grains from fine to coarse; translucent, opaline or smoked grey. Abundant white clayey matrix. Matrix percentage varies irregularly.

34-36 - Several big pebbles 2-3 cm in diameter, one up to 5 cm of rounded, grey smoked or opaline quartz.

36-38 Several quartz pebbles 1-3 cm in diameter - subangular to rounded, dark grey and opaline.
2 big pebbles (5 cm) of quartzite, one light grey, banded, the other dark grey. One nodule of blood red clayey sand. Matrix becomes light buff.

38-40 Some thin bands (1-2 mm) of blood red clayey sand. Little lenses of grey green hard clay

40-44 Matrix become cream in colour.

END OF BORE

CRAFTACIOUS

CADYNA-OWIE FORM.

BORE LOG · HYDROGEOLOGYLat: 29°56'00"
Long: 134°32'15"

Purpose of Bore CONSTRUCTION WATER

Hundred

Section BLK 730 P.L. 2159

State No.

Owner Commonwealth Railway

Address Port Augusta

Bore Serial No. 14/73

Driller Eric Jamieson

Project No. 23

Commenced 6.11.72

Completed 10.11.72

R.L. Collar (M.S.L.)

Docket No. 525/71

Drill type Cable Tool

Circulation

R.L. Surface

Depth 36 m

Logged by Fabio Carosone

Date

10.11.72

Casing 6"

A.M.G. Zone

N

DEPTH (m)	WATER LEVEL (m)	SUPPLY-	HOW TESTED	TOTAL SALTS mg/l	ANALYSIS No.
18	17.20	3.6	AIR LIFT	17600 final: 27108	W 254a/72

REMARKS Eagle Nest Bore . . 500 m.W of km 91.4 peg of line.

1	2	3	4	5	6	7	8	9	DESCRIPTION
CASING	WATERS CUT	WATER LEVEL	DEPTH (m)	CORE	GRAPHIC LOG	AGE	UNIT	PENETRATION RATE	
35.12 m of 6" Casing						Recent			0-1.5 <u>SAND</u> : red brown, from fine to coarse, silty at bottom.
									1.5 - 6.0 <u>SILCRETE</u> , light grey-green, very hard 2.0-2.5 - Interbedded with sandy clay - Clayey part dark fawn, sand part very fine and reddish.
						Tertiary			6.0-13 <u>SAND</u> - Subrounded quartz grains, from fine to coarse, light grey and translucent. Very hard. Some white grey clay as matrix.
									8.5-13 - grains size around 1 mm. Clayey matrix of white colour.
						Early Cretaceous			13-18 <u>CLAY</u> , light grey, very fine and sandy. Sand portion very fine, subangular semitranslucent grains. Fine chips of gypsum.
						Coolaroo Formation			

35.12 m of 6" casing

18

17-2

L-20

-25-

- 30 -

-35-

40

EARLY CRETACEOUS
CADNIA - OWIE FORMATION

18-36

SAND: subrounded, opaline, translucent and grey smoked grains, from fine to coarse, average 1 mm. Clayey matrix, very fine off white. Medium hard.

28-30 becoming finer, greyer and light brown.

END OF BORE

Lat: 29°40'20"
Long: 134°33'00"

Hundred

CONSTRUCTION WATER

Owner COMMONWEALTH RAILWAY

Section Block 731 P.L. 2153

Address PORT AUGUSTA

State No. 0640.00215

Bore Serial No. 15/73

Driller, ERIC JAMIESON

Commenced. 11.11.72 Completed 16.11.72

R.L. Collar (M.S.L.)

Project No. 24

Docket No. 525/71

Drill type CABLE TOOL Circulation

R.L. Surface

Co-ords E:

Logged by FABIO CAROSONE Date 23.11.72

Casing 6"

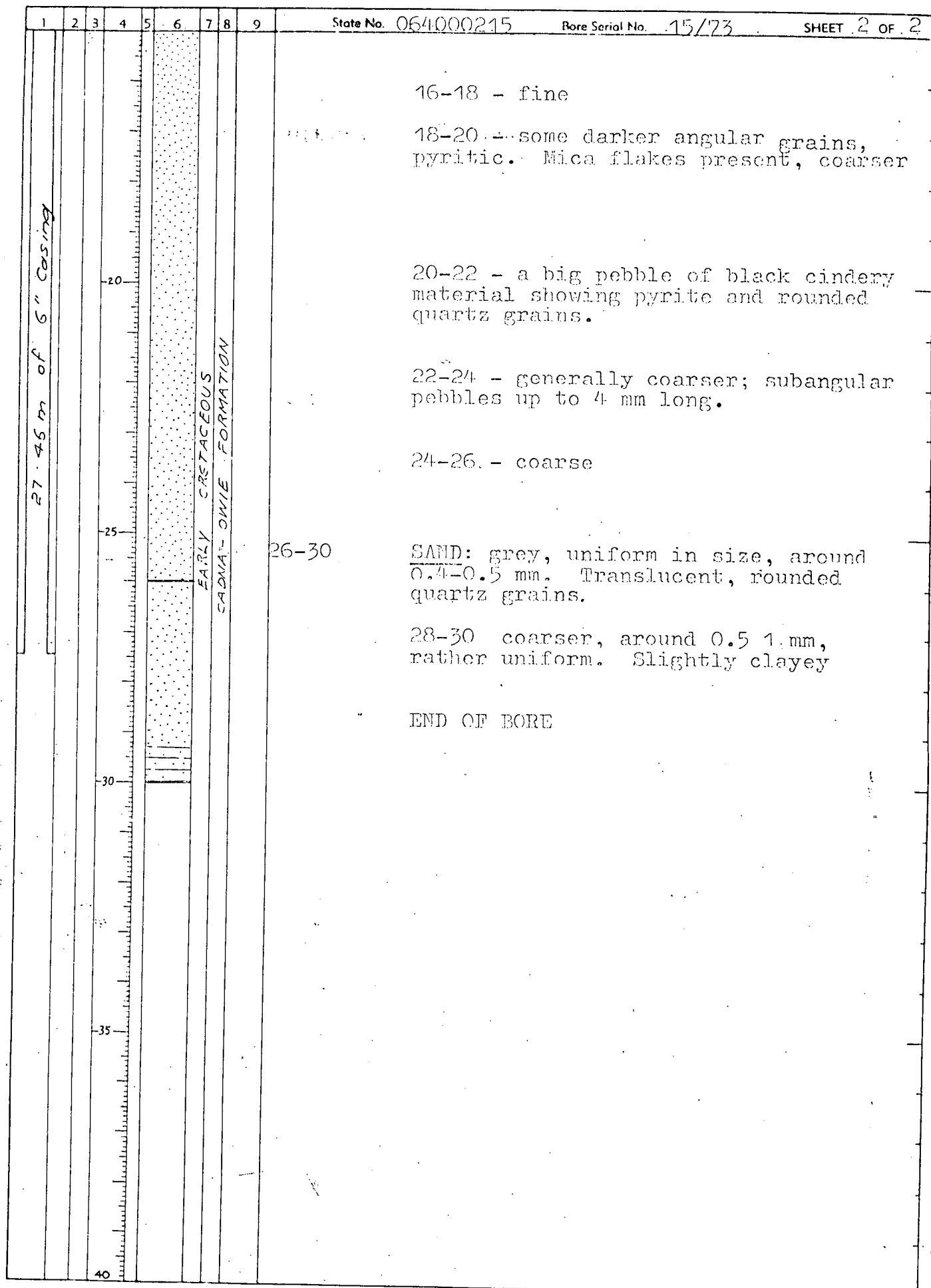
A.M.G. Zone

Co-ords E

WATERS CUT

REMARKS about 100 m. E. of km. 119.1 peg. of line, close to road to Webbs
Dam - Two Rabbits Bore

1	CASING	2	WATERS CUT	3	WATER LEVEL	4	DEPTH (m)	5	CORE	6	GRAPHIC LOG	7	AGE	8	UNIT	9	PENETRATION RATE		DESCRIPTION
27.46m of 6" casing																			



APPENDIX II

Water Analyses

WATER ANALYSIS REPORT

SAMPLE NO. W245/72

JOB NO. 2443/73

CHEMICAL COMPOSITION

		Milligrams per litre mg/l	Milliequivalents per litre me/l
Cations			
Calcium	(Ca)	<u>763</u>	<u>38.1</u>
Magnesium	(Mg)	<u>2100</u>	<u>172.6</u>
Sodium	(Na)	<u>19400</u>	<u>843.9</u>
Potassium	(K)	<u>475</u>	<u>12.2</u>
Iron	(Fe)	<u>1</u>	
Anions			
Carbonate	(CO ₃)		
Bicarbonate	(HCO ₃)	<u>45</u>	<u>0.7</u>
Sulphate	(SO ₄)	<u>5990</u>	<u>124.6</u>
Chloride	(Cl)	<u>31700</u>	<u>893.9</u>
Fluoride	(F)		
Nitrate	(NO ₃)	<u>32</u>	<u>0.5</u>
Phosphate	(PO ₄)		

TOTALS and BALANCE

Cations me/l	Anion me/l
<u>1066.8</u>	<u>1019.7</u>

diff Δ 47.1 sum Σ 2086.5 % ($\frac{\Delta \times 100}{\Sigma}$) 2.26

DERIVED AND OTHER DATA

Conductivity (E.C.) μS/cm at 25°C 77600

Milligrams
per litre
mg/l

Total Dissolved Solids:

a. Based on E.C.

b. Calculated (HCO₃=CO₃) 60483

c. Residue on evaporation at 180°C

Total Hardness as CaCO₃ 10545

Carbonate Hardness as CaCO₃ 35

Non-carbonate Hardness as CaCO₃ 10510

Total Alkalinity as CaCO₃ 35

Free Carbon Dioxide (CO₂)

Suspended Solids

Silica (SiO₂)

Boron (B)

Units

Reaction--pH 7.0

Turbidity (Jackson)

Colour (Hazen)

Sodium Absorption Ratio 79.1

Name <u>TARECOOLA</u>	Hundred	Supply
<u>ALICE SPRINGS RAILWAY</u>	Section	Depth Hole
Address	Hole No. <u>9</u>	Date Collected <u>14.10.72</u>
	Water Cut	Sample Collected by <u>F. CAROSONE</u>
	Water Level	Date Received

REMARKS:

for Director

WATER ANALYSIS REPORT

SAMPLE NO. W251/73

JOB NO. 2443/73

CHEMICAL COMPOSITION

DERIVED AND OTHER DATA

		Milligrams per litre mg/l	Milliequivalents per litre me/l
Cations			
Calcium	(Ca)	<u>1205</u>	<u>60.1</u>
Magnesium	(Mg)	<u>2530</u>	<u>208.0</u>
Sodium	(Na)	<u>24000</u>	<u>1044.0</u>
Potassium	(K)	<u>665</u>	<u>17.0</u>
Iron	(Fe)	<u>1</u>	
Anions			
Carbonate	(CO ₃)		
Bicarbonate	(HCO ₃)	<u>55</u>	<u>0.9</u>
Sulphate	(SO ₄)	<u>8105</u>	<u>168.6</u>
Chloride	(Cl)	<u>41450</u>	<u>1168.9</u>
Fluoride	(F)		
Nitrate	(NO ₃)	<u>17</u>	<u>0.3</u>
Phosphate	(PO ₄)		

TOTALS and BALANCE

	Cations me/l	Anion me/l
	<u>1329.1</u>	<u>1338.7</u>
diff Δ	<u>9.6</u>	sum Σ <u>2667.8</u> % ($\frac{\Delta \times 100}{\Sigma}$) <u>0.36</u>

Conductivity (E.C.) μS/cm at 25°C 98000

Milligrams
per litre
mg/l

Total Dissolved Solids:

a. Based on E.C.

b. Calculated (HCO₃=CO₃)

78000

c. Residue on evaporation at 180°C

Total Hardness as CaCO₃

13420

Carbonate Hardness as CaCO₃

45

Non-carbonate Hardness as CaCO₃

13375

Total Alkalinity as CaCO₃

45

Free Carbon Dioxide (CO₂)

Suspended Solids

Silica (SiO₂)

Boron (B)

Units

Reaction—pH

6.3

Turbidity (Jackson)

Colour (Hazen)

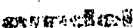
Sodium Absorption Ratio

78.5

Name TARCOOLA Hundred Supply 3000 G.P.H.
BLICE SPRINGS RAILWAY Section Depth Hole 37.3 m
 Address Hole No. 19 Date Collected 17.10.72
 Water Cut Sample Collected by F. PARSONE
 Water Level 2.40 Date Received

REMARKS:

for Director



WATER ANALYSIS REPORT

SAMPLE NO. *W 252/72*

JOB NO. 2443/73

CHEMICAL COMPOSITION

Milliequivalents
per litre
me/l

DERIVED AND OTHER DATA

Conductivity (E.C.) $\mu\text{S}/\text{cm}$ at 25°C 65500

Milligrams
per litre
mg/l

Cations

Calcium	(Ca)	1625	81.1
Magnesium	(Mg)	2100	172.6
Sodium	(Na)	13350	580.7
Potassium	(K)	395	10.1
Iron	(Fe)	< 1	

Total Dissolved Solids:

a. Based on E.C.

b. Calculated ($\text{HCO}_3 = \text{CO}_3$)

c. Residue on evaporation at 180°C

Total Hardness as CaCO_3 Carbonate Hardness as CaCO_3 Non-carbonate Hardness as CaCO_3 Total Alkalinity as CaCO_3

Free Carbon Dioxide (CO₂)

Suspended Solids

Silica (SiO_2)

Boron (B)

Anions

Carbonate	(CO ₃)		
Bicarbonate	(HCO ₃)	145	24
Sulphate	(SO ₄)	4630	96.3
Chloride	(Cl)	26310	741.9
Fluoride	(F)		
Nitrate	(NO ₃)	6	0.1
Phosphate	(PO ₄)		

TOTALS and BALANCE

Cations me/l	Anion me/l
844.5	840.7

diff Δ 3.8 sum Σ 1685.2 $\% \left(\frac{\Delta \times 100}{\Sigma} \right)$ 0.22

Units

6.7

Reaction-pH

Turbidity (Jackson)

Colour (Hazen)

Sodium Absorption Ratio

68-8

Name	TARCOOLA	Hundred	Supply
ALICE SPRINGS RAILWAY	Section	Depth Hole	
Address	IN WATER BORES	Hole No.	20
	Water Cut	Date Collected	23 10 72
	Water Level	Sample Collected by	F CAROLONE
		Date Received	

REMARKS:

for Director

WATER ANALYSIS REPORT

SAMPLE NO. W246/72

JOB NO. 2443/73

CHEMICAL COMPOSITION

		Milligrams per litre mg/l	Milliequivalents per litre me/l
Cations			
Calcium	(Ca)	<u>487</u>	<u>24.3</u>
Magnesium	(Mg)	<u>1470</u>	<u>120.8</u>
Sodium	(Na)	<u>13020</u>	<u>566.4</u>
Potassium	(K)	<u>290</u>	<u>7.4</u>
Iron	(Fe)	<u>1</u>	
Anions			
Carbonate	(CO ₃)		
Bicarbonate	(HCO ₃)	<u>100</u>	<u>1.6</u>
Sulphate	(SO ₄)	<u>5690</u>	<u>118.4</u>
Chloride	(Cl)	<u>21700</u>	<u>611.9</u>
Fluoride	(F)		
Nitrate	(NO ₃)	<u>40.5</u>	
Phosphate	(PO ₄)		

TOTALS and BALANCE

Cations me/l	Anion me/l
<u>718.9</u>	<u>731.9</u>

diff Δ 13 sum Σ 1450.8 % ($\frac{\Delta \times 100}{\Sigma}$) 0.90

DERIVED AND OTHER DATA

Conductivity (E.C.) μS/cm at 25°C	<u>96900</u>	Milligrams per litre mg/l
Total Dissolved Solids:		
a. Based on E.C.		
b. Calculated (HCO ₃ =CO ₃)	<u>42707</u>	
c. Residue on evaporation at 180°C		
Total Hardness as CaCO ₃	<u>7265</u>	
Carbonate Hardness as CaCO ₃	<u>80</u>	
Non-carbonate Hardness as CaCO ₃	<u>7185</u>	
Total Alkalinity as CaCO ₃	<u>80</u>	
Free Carbon Dioxide (CO ₂)		
Suspended Solids		
Silica (SiO ₂)		
Boron (B)		
Reaction—pH		Units
Turbidity (Jackson)		<u>6.5</u>
Colour (Hazen)		
Sodium Absorption Ratio		

Name TARCOOLA Hundred Supply

ALICE SPRINGS RAILWAY Section Depth Hole

Address Hole No. 10 Date Collected 25.10.72

Water Cut Sample Collected by F. CARSONE

Water Level Date Received

REMARKS:

for Director

WATER ANALYSIS REPORT

SAMPLE NO. W253/72

JOB NO. 2443/73

CHEMICAL COMPOSITION

		Milligrams per litre mg/l	Milliequivalents per litre me/l
Cations			
Calcium	(Ca)	<u>50</u>	<u>2.5</u>
Magnesium	(Mg)	<u>58</u>	<u>4.8</u>
Sodium	(Na)	<u>660</u>	<u>28.7</u>
Potassium	(K)	<u>43</u>	<u>1.1</u>
Iron	(Fe)	<u>41</u>	
Anions			
Carbonate	(CO ₃)		
Bicarbonate	(HCO ₃)	<u>225</u>	<u>3.7</u>
Sulphate	(SO ₄)	<u>264</u>	<u>5.5</u>
Chloride	(Cl)	<u>880</u>	<u>24.8</u>
Fluoride	(F)		
Nitrate	(NO ₃)	<u>165</u>	<u>2.7</u>
Phosphate	(PO ₄)		

TOTALS and BALANCE

Cations me/l	Anion me/l
<u>37.1</u>	<u>36.7</u>
diff Δ <u>0.4</u>	sum Σ <u>73.8</u>
	% ($\frac{\Delta \times 100}{\Sigma}$) <u>0.54</u>

DERIVED AND OTHER DATA

Conductivity (E.C.) μS/cm at 25°C	<u>4700</u>	Milligrams per litre mg/l
Total Dissolved Solids:		
a. Based on E.C.		
b. Calculated (HCO ₃ =CO ₃)	<u>2230</u>	
c. Residue on evaporation at 180°C		
Total Hardness as CaCO ₃	<u>365</u>	
Carbonate Hardness as CaCO ₃	<u>185</u>	
Non-carbonate Hardness as CaCO ₃	<u>180</u>	
Total Alkalinity as CaCO ₃	<u>185</u>	
Free Carbon Dioxide (CO ₂)		
Suspended Solids		
Silica (SiO ₂)		
Boron (B)		
Reaction-pH		Units
Turbidity (Jackson)		<u>6.8</u>
Colour (Hazen)		
Sodium Absorption Ratio		<u>77.4</u>

Name TARCOOLA Hundred Supply 50 GPH
ALICE SPRINGS RAILWAY Section Depth Hole 18m
 Address IN BORES Hole No. 21 Date Collected 30.10.72
 Water Cut Sample Collected by F CARSONE
 Water Level Date Received

REMARKS:

for Director



WATER ANALYSIS REPORT

SAMPLE NO. **W2517/72**

JOB NO. **AN6060/72**

CHEMICAL COMPOSITION

		Milligrams per litre mg/l	Milliequivalents per litre me/l
<i>Cations</i>			
Calcium	(Ca)	660	32.9
Magnesium	(Mg)	400	32.9
Sodium	(Na)	3750	163.1
Potassium	(K)	78	2.0
Iron	(Fe)		
<i>Anions</i>			
Carbonate	(CO ₃)		
Bicarbonate	(HCO ₃)	80	1.3
Sulphate	(SO ₄)	1870	38.9
Chloride	(Cl)	6740	190.1
Fluoride	(F)		
Nitrate	(NO ₃)	20	0.3
Phosphate	(PO ₄)		

TOTALS and BALANCE

Cations me/l	Anion me/l
230.9	230.6

diff Δ 0.3 sum Σ 460.5 % $(\frac{\Delta \times 100}{\Sigma})$ 0.07

DERIVED AND OTHER DATA

Conductivity (E.C.) μ S/cm at 25°C	20600	Milligrams per litre mg/l
Total Dissolved Solids:		
a. Based on E.C.		
b. Calculated (HCO ₃ =CO ₃)	13558	
c. Residue on evaporation at 180°C		
Total Hardness as CaCO ₃	3295	
Carbonate Hardness as CaCO ₃	65	
Non-carbonate Hardness as CaCO ₃	3230	
Total Alkalinity as CaCO ₃	65	
Free Carbon Dioxide (CO ₂)		
Suspended Solids		
Silica (SiO ₂)		
Boron (B)		
Reaction-pH		Units
Turbidity (Jackson)		
Colour (Hazen)		
Sodium Absorption Ratio	70.6	

Name **Commonwealth Railways** Hundred Supply
Section Depth Hole **24.00 m**
Address **Tarcoola Alice** Hole No. **1 Luscombe 2** Date Collected **19/5/72**
Springs Line Water Cut Sample Collected by **E. Jamieson**
Water Level **19.15 m** Date Received

REMARKS:

for Director

W.H.E.
15/7/72

WATER ANALYSIS REPORT

SAMPLE NO. W254/72

JOB NO. 2443/73

CHEMICAL COMPOSITION

		Milligrams per litre mg/l	Milliequivalents per litre me/l
<i>Cations</i>			
Calcium	(Ca)	<u>895</u>	<u>44.7</u>
Magnesium	(Mg)	<u>1215</u>	<u>99.9</u>
Sodium	(Na)	<u>9110</u>	<u>396.3</u>
Potassium	(K)	<u>215</u>	<u>5.5</u>
Iron	(Fe)	<u>41</u>	
<i>Anions</i>			
Carbonate	(CO ₃)		
Bicarbonate	(HCO ₃)	<u>10</u>	<u>0.2</u>
Sulphate	(SO ₄)	<u>4900</u>	<u>101.9</u>
Chloride	(Cl)	<u>15760</u>	<u>444.4</u>
Fluoride	(F)		
Nitrate	(NO ₃)	<u>5</u>	<u>0.1</u>
Phosphate	(PO ₄)		

TOTALS and BALANCE

Cations me/l	Anion me/l
<u>546.4</u>	<u>546.6</u>
diff Δ <u>0.2</u>	sum Σ <u>1093.0%</u> ($\frac{\Delta \times 100}{\Sigma}$) <u>0.02</u>

DERIVED AND OTHER DATA

Conductivity (E.C.) μS/cm at 25°C	<u>42000</u>	Milligrams per litre mg/l
Total Dissolved Solids:		
a. Based on E.C.		
b. Calculated (HCO ₃ =CO ₃)	<u>32105</u>	
c. Residue on evaporation at 180°C		
Total Hardness as CaCO ₃	<u>7235</u>	
Carbonate Hardness as CaCO ₃	<u>10</u>	
Non-carbonate Hardness as CaCO ₃	<u>7225</u>	
Total Alkalinity as CaCO ₃	<u>10</u>	
Free Carbon Dioxide (CO ₂)		
Suspended Solids		
Silica (SiO ₂)		
Boron (B)		
Reaction-pH	<u>4.2</u>	Units
Turbidity (Jackson)		
Colour (Hazen)		
Sodium Absorption Ratio	<u>72.5</u>	

Name TARCOOLA Hundred 8000 GPH
ALICE SPRINGS RAILWAY Section DEAD ROO BORE Depth Hole 44 m
 Address 22 Hole No. 4.11.72 Date Collected
 Water Cut 13m Sample Collected by F. CAROSONE
 Water Level 9.50 m Date Received

REMARKS:

for Director

WATER ANALYSIS REPORT

SAMPLE NO. W254/72

JOB NO. 2443/73

CHEMICAL COMPOSITION

		Milligrams per litre mg/l	Milliequivalents per litre me/l
<i>Cations</i>			
Calcium	(Ca)	<u>790</u>	<u>39.4</u>
Magnesium	(Mg)	<u>980</u>	<u>80.6</u>
Sodium	(Na)	<u>7780</u>	<u>338.4</u>
Potassium	(K)	<u>160</u>	<u>4.1</u>
Iron	(Fe)	<u>41</u>	
<i>Anions</i>			
Carbonate	(CO ₃)		
Bicarbonate	(HCO ₃)	<u>140</u>	<u>2.3</u>
Sulphate	(SO ₄)	<u>3565</u>	<u>74.2</u>
Chloride	(Cl)	<u>13800</u>	<u>384.2</u>
Fluoride	(F)		
Nitrate	(NO ₃)	<u>55</u>	<u>0.9</u>
Phosphate	(PO ₄)		

TOTALS and BALANCE

Cations me/l	Anion me/l
<u>462.5</u>	<u>466.6</u>
diff Δ <u>4.1</u>	sum Σ <u>929.1</u>
	% ($\frac{\Delta \times 100}{\Sigma}$) <u>0.44</u>

DERIVED AND OTHER DATA

Conductivity (E.C.) μS/cm at 25°C	<u>36500</u>	Milligrams per litre mg/l
Total Dissolved Solids:		
a. Based on E.C.		
b. Calculated (HCO ₃ =CO ₃)	<u>27198</u>	
c. Residue on evaporation at 180°C		
Total Hardness as CaCO ₃	<u>6005</u>	
Carbonate Hardness as CaCO ₃	<u>115</u>	
Non-carbonate Hardness as CaCO ₃	<u>5890</u>	
Total Alkalinity as CaCO ₃	<u>115</u>	
Free Carbon Dioxide (CO ₂)		
Suspended Solids		
Silica (SiO ₂)		
Boron (B)		
Reaction—pH	<u>7.4</u>	Units
Turbidity (Jackson)		
Colour (Hazen)		
Sodium Absorption Ratio	<u>73.2</u>	

Name TARCOOLA Hundred 800 GPH
ALICE SPRINGS RAILWAY Section EAGLE NEST BORE Depth Hole 36 m
 Address 23 Date Collected 10-11-72
 Water Cut 18 00 m Sample Collected by F CAROSONE
 Water Level 17 20 m Date Received

REMARKS:

WATER ANALYSIS REPORT

SAMPLE NO. W247/72

JOB NO. 2443/73

CHEMICAL COMPOSITION

		Milligrams per litre mg/l	Milliequivalents per litre me/l
Cations			
Calcium	(Ca)	<u>1010</u>	<u>50.4</u>
Magnesium	(Mg)	<u>1720</u>	<u>141.4</u>
Sodium	(Na)	<u>13800</u>	<u>600.3</u>
Potassium	(K)	<u>257</u>	<u>6.6</u>
Iron	(Fe)	<u>60</u>	
Anions			
Carbonate	(CO ₃)		
Bicarbonate	(HCO ₃)	<u>20</u>	<u>0.3</u>
Sulphate	(SO ₄)	<u>6350</u>	<u>132.1</u>
Chloride	(Cl)	<u>23400</u>	<u>659.9</u>
Fluoride	(F)		
Nitrate	(NO ₃)	<u>40.5</u>	
Phosphate	(PO ₄)		

TOTALS and BALANCE

Cations me/l	Anion me/l
<u>798.7</u>	<u>792.3</u>
diff Δ <u>6.4</u>	sum Σ <u>1591.0</u> % ($\frac{\Delta \times 100}{\Sigma}$) <u>0.40</u>

DERIVED AND OTHER DATA

Conductivity (E.C.) μS/cm at 25°C	<u>57900</u>	Milligrams per litre mg/l
Total Dissolved Solids:		
a. Based on E.C.		
b. Calculated (HCO ₃ =CO ₃)		<u>46597</u>
c. Residue on evaporation at 180°C		
Total Hardness as CaCO ₃		<u>9600</u>
Carbonate Hardness as CaCO ₃		<u>15</u>
Non-carbonate Hardness as CaCO ₃		<u>9585</u>
Total Alkalinity as CaCO ₃		<u>15</u>
Free Carbon Dioxide (CO ₂)		
Suspended Solids		
Silica (SiO ₂)		
Boron (B)		
Reaction—pH		<u>Units</u> <u>5.4</u>
Turbidity (Jackson)		
Colour (Hazen)		
Sodium Absorption Ratio		<u>75.2</u>

Name TARCOOLA Hundred Supply

ALICE SPRINGS RAILWAY Section Depth Hole

Address Hole No. 12 Date Collected 9.11.72

Water Cut RUDI BORE Sample Collected by F. CAROSONE

Water Level Date Received

REMARKS:

WATER ANALYSIS REPORT

SAMPLE NO. W255/73

JOB NO. 2443/73

CHEMICAL COMPOSITION

		Milligrams per litre mg/l	Milliequivalents per litre me/l
Cations			
Calcium	(Ca)	<u>986</u>	<u>49.2</u>
Magnesium	(Mg)	<u>1423</u>	<u>117.0</u>
Sodium	(Na)	<u>11250</u>	<u>489.4</u>
Potassium	(K)	<u>238</u>	<u>6.1</u>
Iron	(Fe)	<u><1</u>	

Anions

Carbonate	(CO ₃)		
Bicarbonate	(HCO ₃)	<u>55</u>	<u>0.9</u>
Sulphate	(SO ₄)	<u>5750</u>	<u>119.6</u>
Chloride	(Cl)	<u>18950</u>	<u>534.4</u>
Fluoride	(F)		
Nitrate	(NO ₃)	<u>1</u>	
Phosphate	(PO ₄)		

TOTALS and BALANCE

Cations me/l	Anion me/l
<u>661.7</u>	<u>654.9</u>
diff Δ <u>6.8</u>	sum Σ <u>1316.6</u>
	% ($\frac{\Delta \times 100}{\Sigma}$) <u>0.52</u>

DERIVED AND OTHER DATA

Conductivity (E.C.) μS/cm at 25°C	<u>48000</u>	Milligrams per litre mg/l
Total Dissolved Solids:		
a. Based on E.C.		
b. Calculated (HCO ₃ =CO ₃)	<u>38624</u>	
c. Residue on evaporation at 180°C		
Total Hardness as CaCO ₃	<u>8315</u>	
Carbonate Hardness as CaCO ₃	<u>45</u>	
Non-carbonate Hardness as CaCO ₃	<u>8270</u>	
Total Alkalinity as CaCO ₃	<u>45</u>	
Free Carbon Dioxide (CO ₂)		
Suspended Solids		
Silica (SiO ₂)		
Boron (B)		
Reaction-pH	<u>6.6</u>	Units
Turbidity (Jackson)		
Colour (Hazen)		
Sodium Absorption Ratio	<u>740</u>	

Name COMMONWEALTH Hundred 5000 Supply B.P.H
RAILWAYS Section TWO RABBITS BORE Depth Hole 30 m
Address TARCOOLA Hole No. 24 Date Collected 15.11.73
ALICE SPRINGS Water Cut 8.30m Sample Collected by E JAMESON
Water Level 7m Date Received

REMARKS:

WATER ANALYSIS REPORT

SAMPLE NO. W248/72

JOB NO. 2443/73.

CHEMICAL COMPOSITION

		Milligrams per litre mg/l	Milliequivalents per litre me/l
Cations			
Calcium	(Ca)	<u>775</u>	<u>38.7</u>
Magnesium	(Mg)	<u>2260</u>	<u>185.8</u>
Sodium	(Na)	<u>19650</u>	<u>854.8</u>
Potassium	(K)	<u>330</u>	<u>8.5</u>
Iron	(Fe)	<u>190</u>	
Anions			
Carbonate	(CO ₃)		
Bicarbonate	(HCO ₃)	<u>45</u>	
Sulphate	(SO ₄)	<u>9750</u>	<u>202.8</u>
Chloride	(Cl)	<u>32300</u>	<u>910.9</u>
Fluoride	(F)		
Nitrate	(NO ₃)	<u>40.5</u>	
Phosphate	(PO ₄)		

TOTALS and BALANCE

Cations me/l Anion me/l
1087.8 1113.7
 diff Δ 25.9 sum Σ 2201.5 % $(\frac{\Delta \times 100}{\Sigma})$ 1.18

DERIVED AND OTHER DATA

Conductivity (E.C.) μS/cm at 25°C 78400

Total Dissolved Solids:

a. Based on E.C. 65255

b. Calculated (HCO₃=CO₃) 11235

c. Residue on evaporation at 180°C 11235

Total Hardness as CaCO₃ 45

Carbonate Hardness as CaCO₃ 11235

Non-carbonate Hardness as CaCO₃ 45

Total Alkalinity as CaCO₃ 45

Free Carbon Dioxide (CO₂)

Suspended Solids

Silica (SiO₂)

Boron (B)

Units 3.5

Reaction-pH

Turbidity (Jackson)

Colour (Hazen)

Sodium Absorption Ratio 78.6

Name TARLOOLA Hundred Supply

ALICE SPRINGS RAILWAY Section Depth Hole

Address Hole No. 13 L. WIRRIDA Date Collected 9.11.72

Water Cut Sample Collected by F. PARSONS

Water Level Date Received

REMARKS:

for Director

WATER ANALYSIS REPORT

SAMPLE NO. W244/72

JOB NO. 2443/73

CHEMICAL COMPOSITION

		Milligrams per litre mg/l	Milliequivalents per litre me/l
Cations			
Calcium	(Ca)	<u>717</u>	<u>35.8</u>
Magnesium	(Mg)	<u>1650</u>	<u>135.6</u>
Sodium	(Na)	<u>14050</u>	<u>611.2</u>
Potassium	(K)	<u>430</u>	<u>11.0</u>
Iron	(Fe)		
Anions			
Carbonate	(CO ₃)		
Bicarbonate	(HCO ₃)	<u><5</u>	
Sulphate	(SO ₄)	<u>6360</u>	<u>132.3</u>
Chloride	(Cl)	<u>23100</u>	<u>651.4</u>
Fluoride	(F)		
Nitrate	(NO ₃)	<u><0.5</u>	
Phosphate	(PO ₄)		

TOTALS and BALANCE

Cations me/l	Anion me/l
<u>793.6</u>	<u>783.7</u>
diff Δ <u>9.9</u>	sum Σ <u>1577.3</u> % ($\frac{\Delta \times 100}{\Sigma}$) <u>0.63</u>

DERIVED AND OTHER DATA

Conductivity (E.C.) μS/cm at 25°C	<u>59,800</u>	Milligrams per litre mg/l
Total Dissolved Solids:		
a. Based on E.C.		
b. Calculated (HCO ₃ =CO ₃)		<u>46307</u>
c. Residue on evaporation at 180°C		
Total Hardness as CaCO ₃		<u>6580</u>
Carbonate Hardness as CaCO ₃		<u><5</u>
Non-carbonate Hardness as CaCO ₃		<u>6580</u>
Total Alkalinity as CaCO ₃		<u><5</u>
Free Carbon Dioxide (CO ₂)		
Suspended Solids		
Silica (SiO ₂)		
Boron (B)		
Reaction-pH		<u>Units</u>
Turbidity (Jackson)		<u>4.4</u>
Colour (Hazen)		
Sodium Absorption Ratio		<u>77.0</u>

Name TARCOOLA Hundred Supply

ALICE SPRINGS RAILWAY Section Depth Hole

Address Hole No. 6 Date Collected 9.11.72

Water Cut DEAD CAT SWAMP Sample Collected by F. CAROSONE

Water Level Date Received

REMARKS:

for Director

WATER ANALYSIS REPORT

SAMPLE NO. W250/72

JOB NO. 2443/73

CHEMICAL COMPOSITION

		Milligrams per litre mg/l	Milliequivalents per litre me/l
Cations			
Calcium	(Ca)	<u>874</u>	<u>43.6</u>
Magnesium	(Mg)	<u>2160</u>	<u>177.6</u>
Sodium	(Na)	<u>18700</u>	<u>813.5</u>
Potassium	(K)	<u>590</u>	<u>15.1</u>
Iron	(Fe)	<u>10</u>	
Anions			
Carbonate	(CO ₃)		
Bicarbonate	(HCO ₃)	<u>10</u>	<u>0.2</u>
Sulphate	(SO ₄)	<u>7620</u>	<u>158.5</u>
Chloride	(Cl)	<u>31200</u>	<u>879.8</u>
Fluoride	(F)		
Nitrate	(NO ₃)	<u>< 0.5</u>	
Phosphate	(PO ₄)		

TOTALS and BALANCE

Cations me/l	Anion me/l
<u>1049.8</u>	<u>1038.5</u>
diff Δ <u>11.3</u>	sum Σ <u>2088.3</u>
% ($\frac{\Delta \times 100}{\Sigma}$) = <u>0.54</u>	

DERIVED AND OTHER DATA

Conductivity (E.C.) μS/cm at 25°C	<u>82000</u>	Milligrams per litre mg/l
Total Dissolved Solids:		
a. Based on E.C.		
b. Calculated (HCO ₃ =CO ₃)	<u>61159</u>	
c. Residue on evaporation at 180°C		
Total Hardness as CaCO ₃	<u>11075</u>	
Carbonate Hardness as CaCO ₃	<u>10</u>	
Non-carbonate Hardness as CaCO ₃	<u>11065</u>	
Total Alkalinity as CaCO ₃	<u>10</u>	
Free Carbon Dioxide (CO ₂)		
Suspended Solids		
Silica (SiO ₂)		
Boron (B)		
		Units
Reaction—pH	<u>4.7</u>	
Turbidity (Jackson)		
Colour (Hazen)		
Sodium Absorption Ratio	<u>77.5</u>	

Name TIIRCOOLA Hundred Supply

ALICE SPRINGS RAILWAY Section Depth Hole

Address Hole No. 17 WICKY Date Collected 9.11.72

Water Cut Sample Collected by F. PARSONE

Water Level Date Received

REMARKS:

for Director

WATER ANALYSIS REPORT

SAMPLE NO. W249/72

JOB NO. 2443/13

CHEMICAL COMPOSITION

		Milligrams per litre mg/l	Milliequivalents per litre me/l
Cations			
Calcium	(Ca)	<u>528</u>	<u>26.3</u>
Magnesium	(Mg)	<u>881</u>	<u>72.4</u>
Sodium	(Na)	<u>8390</u>	<u>365.0</u>
Potassium	(K)	<u>270</u>	<u>6.9</u>
Iron	(Fe)	<u>45</u>	<u>1.6</u>
Anions			
Carbonate	(CO ₃)		
Bicarbonate	(HCO ₃)	<u>25</u>	
Sulphate	(SO ₄)	<u>3370</u>	<u>70.1</u>
Chloride	(Cl)	<u>13800</u>	<u>389.2</u>
Fluoride	(F)		
Nitrate	(NO ₃)	<u>1</u>	
Phosphate	(PO ₄)		

TOTALS and BALANCE

Cations me/l	Anion me/l
<u>472.2</u>	<u>459.3</u>
diff Δ <u>12.9</u>	sum Σ <u>931.5</u>
% ($\frac{\Delta \times 100}{\Sigma}$) <u>1.36</u>	

DERIVED AND OTHER DATA

Conductivity (E.C.) μS/cm at 25°C	<u>39200</u>	Milligrams per litre mg/l
Total Dissolved Solids:		
a. Based on E.C.		
b. Calculated (HCO ₃ =CO ₃)		<u>27285</u>
c. Residue on evaporation at 180°C		
Total Hardness as CaCO ₃		<u>4945</u>
Carbonate Hardness as CaCO ₃		<u>25</u>
Non-carbonate Hardness as CaCO ₃		<u>4945</u>
Total Alkalinity as CaCO ₃		<u>25</u>
Free Carbon Dioxide (CO ₂)		
Suspended Solids		
Silica (SiO ₂)		
Boron (B)		
		<u>Units</u>
Reaction—pH		<u>4.2</u>
Turbidity (Jackson)		
Colour (Hazen)		
Sodium Absorption Ratio		<u>77.3</u>

Name THRCOLN Hundred Supply

ALICE SPRINGS RAILWAY Section Depth Hole

Address Hole No. 15 LONG Date Collected 9.11.72

Water Cut CREEK BRIDGE Sample Collected by F CARDONE

Water Level Date Received

REMARKS:

for Director



WATER ANALYSIS REPORT

SAMPLE NO. W256/72.

JOB NO. 2443/73

CHEMICAL COMPOSITION

		Milligrams per litre mg/l	Milliequivalents per litre me/l
Cations			
Calcium	(Ca)	<u>693</u>	<u>34.6</u>
Magnesium	(Mg)	<u>663</u>	<u>54.5</u>
Sodium	(Na)	<u>4100</u>	<u>178.4</u>
Potassium	(K)	<u>91</u>	<u>2.3</u>
Iron	(Fe)	<u>20</u>	<u>0.7</u>
Anions			
Carbonate	(CO ₃)		
Bicarbonate	(HCO ₃)	<u>200</u>	<u>3.3</u>
Sulphate	(SO ₄)	<u>1700</u>	<u>35.4</u>
Chloride	(Cl)	<u>8070</u>	<u>227.6</u>
Fluoride	(F)		
Nitrate	(NO ₃)	<u>40.5</u>	
Phosphate	(PO ₄)		

TOTALS and BALANCE

Cations me/l	Anion me/l
<u>270.5</u>	<u>266.3</u>
diff Δ <u>4.2</u>	sum Σ <u>536.8</u>
	% ($\frac{\Delta \times 100}{\Sigma}$) <u>0.78</u>

DERIVED AND OTHER DATA

Conductivity (E.C.) μ S/cm at 25°C 24200

Milligrams
per litre
mg/l

Total Dissolved Solids:

a. Based on E.C.

b. Calculated (HCO₃=CO₃)

15435

c. Residue on evaporation at 180°C

Total Hardness as CaCO₃

4460

Carbonate Hardness as CaCO₃

165

Non-carbonate Hardness as CaCO₃

4295

Total Alkalinity as CaCO₃

165

Free Carbon Dioxide (CO₂)

Suspended Solids

Silica (SiO₂)

Boron (B)

Units

Reaction-pH

5.9

Turbidity (Jackson)

Colour (Hazen)

Sodium Absorption Ratio

66.0

Name TARCOOLA MINE Hundred Supply

MAIN SHAFT Section Depth Hole

Address Hole No. Date Collected 14.10.72

Water Cut Sample Collected by F. CAROSONE

Water Level 24 m Date Received

REMARKS:

for Director

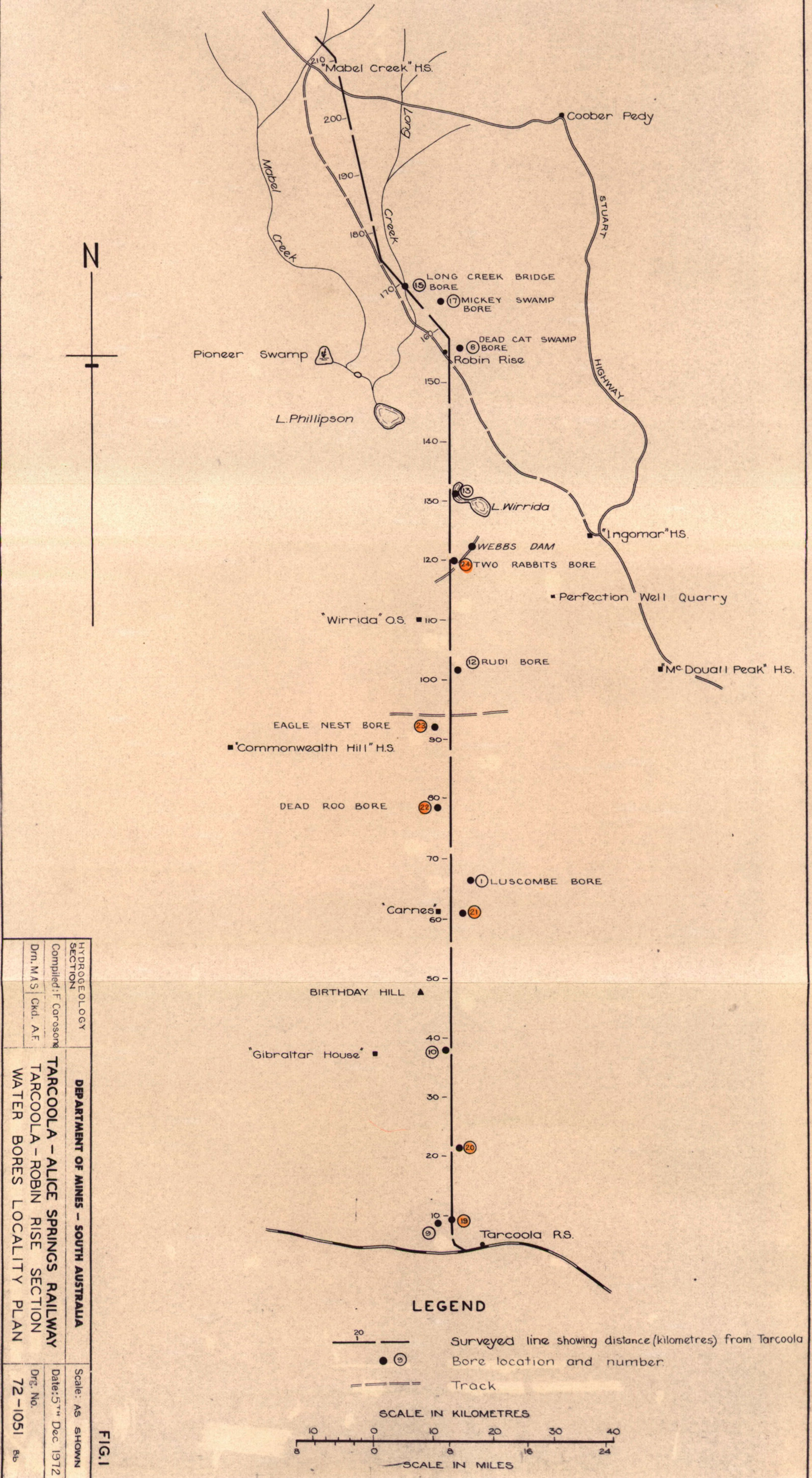
APPENDIX III

Summary of productive bores

LOCATION		BORE DETAILS												
km	Dist (m) & bearing from Line	No	Name	Depth (m)	CASING			S W L (m)	Salinity mg/l	Analysis No.	YIELD		Suggested pump depth (m)	Reference to previous reports
					Size (inches)	Total (m)	Slotted (m)				< 4.5 m ³ /h (1000 gall/h)	> 4.5 m ³ /h (1000 gall/h)		
9.15	600 W	9		21	5	18.5	12	5.1	60 483	W245 / 72	1.2 (270)		12	First Progress Report Completion Report
10.0	80 E	19		37.3	6	38	12.7	2.4	78 000	W251 / 72		15 (3300)	5	This Report
21.3	100 E	20		32	6	32.4	5.5	14.6	48 486	W252 / 72	2.3 (500)		20	This Report
36.7	150 W	10		93	5	93	18	4.8	42 707	W246 / 72		26.8 (5900)	20	First Progress Report Completion Report
60.2	200 E	21		18	6	17.3	5.5	10.3	2 230	W 253 / 72	0.27 (60)		17	This Report
66.9	650 E	1	Luscombe Bore 2	24	5	24	12	19.2	13 558	W2517/72	0.09 (20)		Not recommended	First Progress Report Completion Report
79.0	350 W	22	Dead Roo Bore	44	6	40.3	28.2	9	32 105	W254 / 72		36.3 (8000)	18	This Report
91.4	500 W	23	Eagle Nest Bore	36	6	35.1	17.1	17.2	27 198	W254a / 72	3.6 (800)		25	This Report
102.55	150 E	12	Rudi Bore	47	5	47	18	12.8	46 591	W247 / 72		5.5 (1200)	30	First Progress Report Completion Report
119.1	100 E	24	Two Rabbits Bore	30	6	27.5	15.7	7	38 624	W 255 / 72		22.7 (5000)	15	This Report
131.6	1000 E	13	Lake Wirrida Bore	29	5	24.5	12.2	9.2	65 255	W248 / 72		6.8 (1500)	20	Second Progress Report Completion Report
154.2	320 E	6	Dead Cat Swamp	62	5	55.6	18.5	22.6	46 507	W244 / 72		27.3 (6000)	40	Second Progress Report Completion Report
162.3	1100 E	17	Mickey Swamp	58.5	5	58.2	19.5	13.4	61 159	W 250 / 72		28.2 (6200)	30	Second Progress Report Completion Report
169	60m S of bridge site on right bank of creek	15	Long Ck Bridge	39	5	38.6	24.4	20	27 285	W 249 / 72		19.1 (4200)	30	Second Progress Report Completion Report
Tarcoola Mine Main shaft								24	15 435	W 256 / 72				This Report

Appendix III

DEPARTMENT OF MINES - SOUTH AUSTRALIA		50110
F. Carosone	TARCOOLA - ALICE SPRINGS RAILWAY	Date: 5 Jan 1973
A.F.	SUMMARY OF PRODUCTIVE BORES	73-9 Bb



HYDROGEOLOGY SECTION		DEPARTMENT OF MINES - SOUTH AUSTRALIA	
Compiled: F. Carosone		TARCOOLA - ALICE SPRINGS RAILWAY	
Dm. MAS		TARCOOLA - ROBIN RISE SECTION	
Ckd. A.F.		WATER BORES LOCALITY PLAN	
		Date: 5 th Dec 1972	
		Drg. No. 72-1051	
		8b	

FIG.1

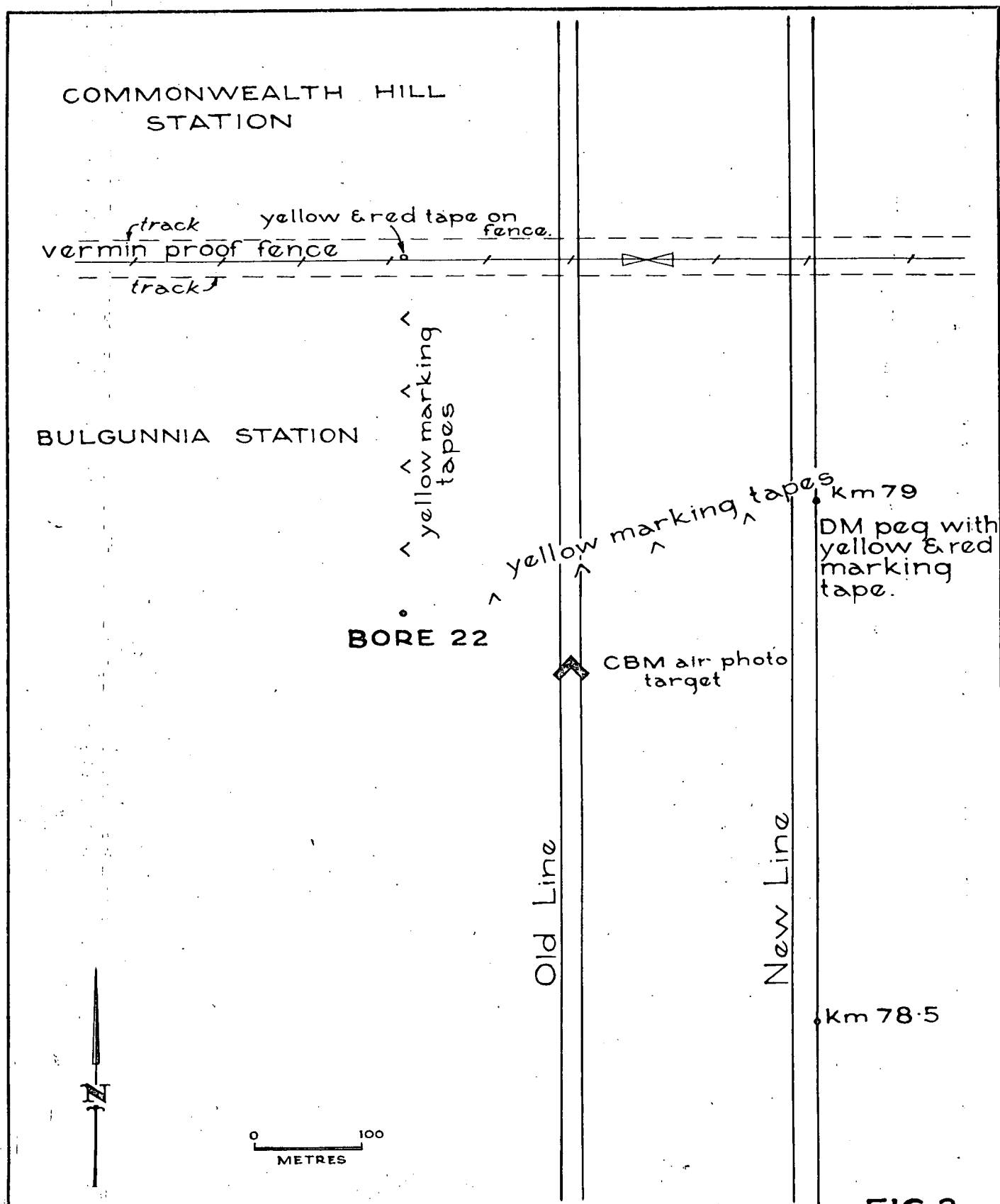


FIG.2

HYDROGEOLOGY SECTION	DEPARTMENT OF MINES – SOUTH AUSTRALIA	Scale: 1 : 5000
Compiled F. Carosone	TARCOOLA-Alice SPRINGS RAILWAY LOCATION SKETCH OF BORE 22	Date: 22 NOV. '72
Drn. G.M. Ckd. A.F.		Drg. No. S 10067 Bb

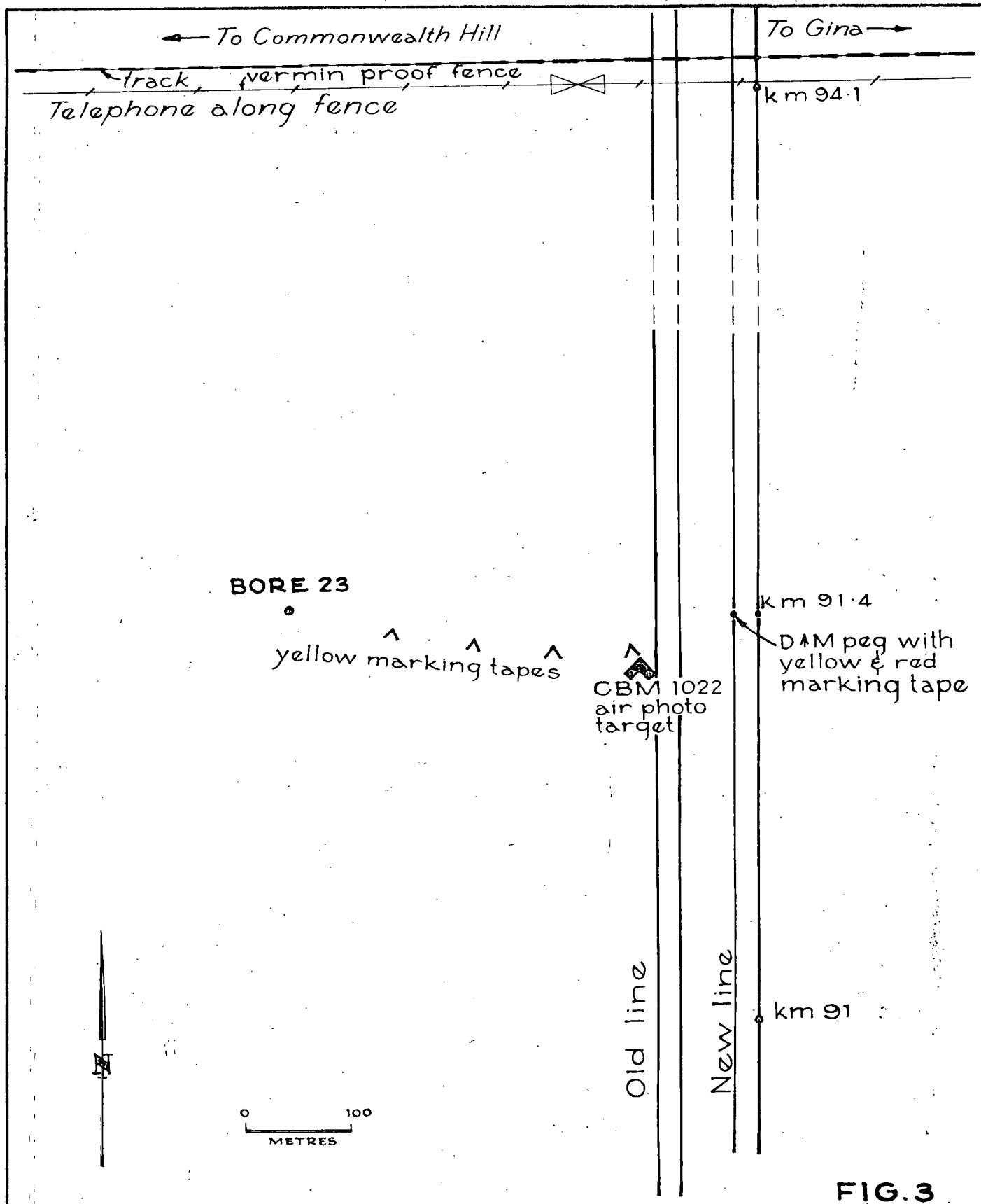


FIG.3

HYDROGEOLOGY SECTION	DEPARTMENT OF MINES - SOUTH AUSTRALIA	Scale: 1 : 5000
Compiled F. Carosone	TARCOOLA-ALICE SPRINGS RAILWAY LOCATION SKETCH OF BORE 23	Date: 22 Nov. 72
Drm. GM Ckd. A.F.		Org. No. S10068 Bb

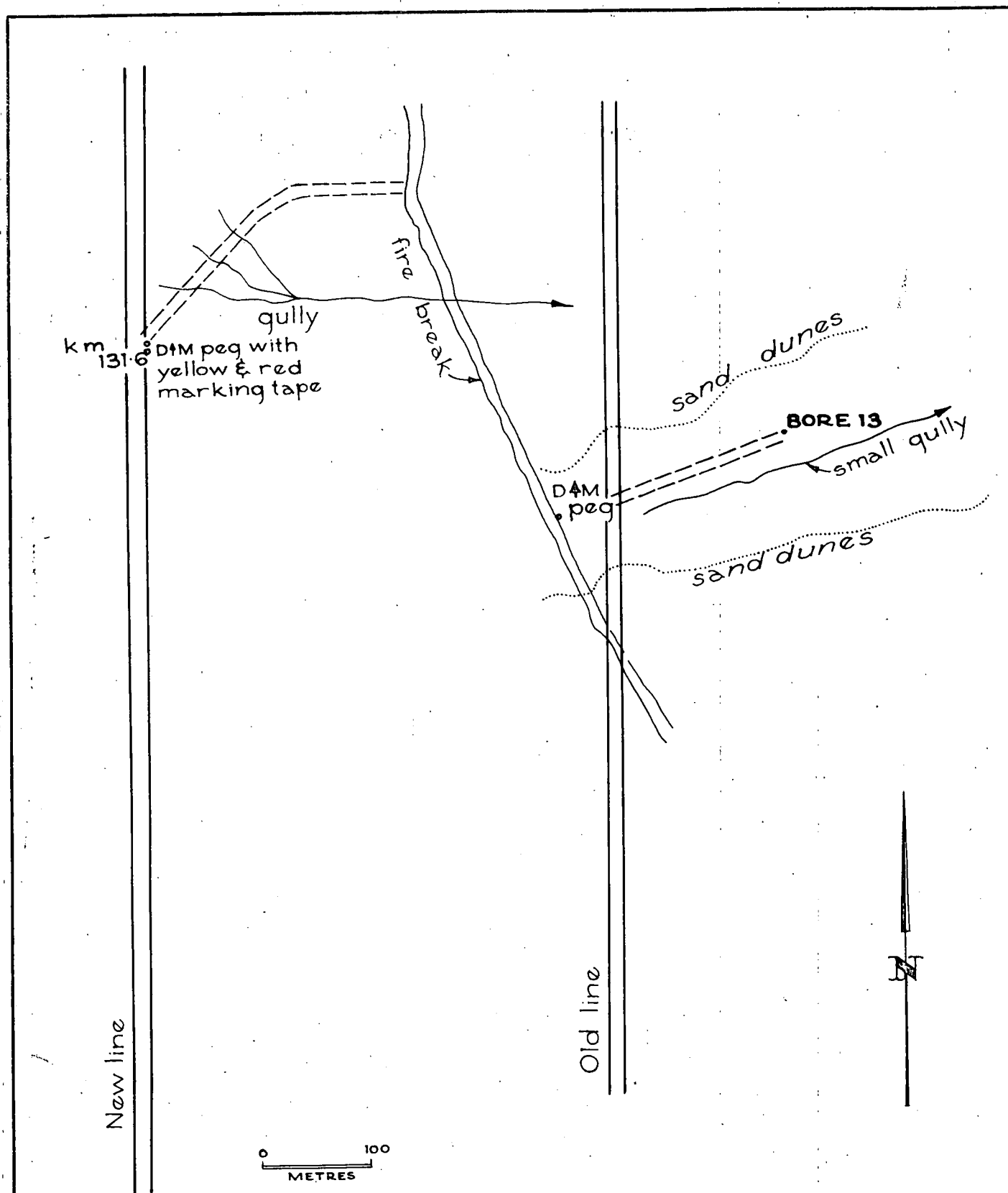


FIG. 4

HYDROGEOLOGY SECTION	DEPARTMENT OF MINES - SOUTH AUSTRALIA	Scale: 1 : 5000
Compiled. F. Carosone	TARCOOLA - ALICE SPRINGS RAILWAY	Date: 27 Nov. '72
Drn. G.M. Ckd. A.F.	LOCATION SKETCH OF BORE 13	Drg. No. 5 10069
		Bb