DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

REPT BK NO. 89/80

ERNABELLA DRILLING, 1989

GEOLOGICAL SURVEY

by

R E READ

SEPTEMBER, 1989 DME 437/77

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DEPARTMENT OF MINES AND ENERGY
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A00090

ERNABELLA DRILLING, 1989

Three additional wells were drilled at Ernabella to augment the water supply and replace wells within the community area prone to pollution.

All wells intersected shallow aquifers in fractured and weathered adamellite. Salinities ranged from about 550 mg/L to 850 mg/L.

Because of the unusually wet season, the water table was high at the time of drilling and yields were greater than during a drought. The wells should not be test-pumped until the Ernabella Creek has stopped flowing.

INTRODUCTION

Ernabella is an Aboriginal community in the Musgrave Ranges in the Pitjantjatjara Lands (Fig. 1). The geology and history of Ernabella water supply are discussed in Read 1987.

DRILLING

Three wells were drilled by the Alice Springs based contractors Gorey and Cole.

Reasons for siting wells are shown in Table 1. Locations are shown in Figure 2 and results in Table 2. Depth/yield graphs are in Figure 3 and geological logs in Appendix A. Water analyses are in Table 3.

TABLE 1

Reasons for Siting Wells 1989

Pit Council	Unit No.	Reasons for Siting	Result
E 43	5345/86	Near intersection of two straight creeks	Marginal
E 44	5345/85	On extension of straight segment of Ernabella Creek	Success
E 45	5345/84	In valley of Ernabella Creek	Success

TABLE 2 - Wells Drilled, 1989

Unit No.	Pit Council No.	Permit No.	Depth (m)	Airlift Yield L/S	Conductivity micro siemens	SWL (m)	Casing (m)	Perforating	Comments
5345/86	E 43		30	2.2	1350	1	30	12-24	
5345/85	E 44		16.5	13	990	1.5	16.5	7.5-16.5	Drilling stopped because gauge buttons broken off bit
5345/84	E 45		30	5	1050	2.5	30	6-24	

TABLE 3 - Water Analyses

Well	TDS mg/L	Conductivity ECU	Na^{+}	K^{+}	Cu^{2+}	Mg^{2+}	Cl^{-}	SO_4^{2-}	NO_3^{-}	HCO_3^{-}	F^{-}
5345/84	640	1020	133	4	52	30	121	76	11	338	1.3
5345/85	590	920	109	1	58	34	78	60	6	407	1.1
5345/86	700	1130	168	4	50	36	126	91	6	401	1.4

Note: Concentrations are in mg/L.

DISCUSSION

The drilling programme was successful, but extreme caution is needed in interpreting the results. 1989 was an exceptionally wet year and the Ernabella Creek was still flowing as it had been for the previous six months. The water table was therefore at its highest.

The limited measurements available indicate that drought water levels could be as much as 6 to 7m lower. This would substantially reduce the available drawdowns and hence the yields of the aquifers intersected.

Well siting results suggest that while linear features may sometimes give high yields, siting wells near the creek in the area generally free of outcrops gives satisfactory results.

All aquifers intersected were in weathered adamellite.

The alluvium present is very thin and above even the unusually high water tables present at the time of drilling.

There is little point conducting pumping-tests on these wells until Ernabella Creek has ceased flowing. If pumped while the creek is flowing the wells are likely to draw water from the creek.

CONCLUSIONS AND RECOMMENDATIONS

1. The three wells drilled probably have useful supplies.
2. The wells should not be test-pumped until the Ernabella Creek has stopped flowing.
3. Even after the creek has stopped flowing the pump-test results will need to be corrected for the high water tables.

R E READ
SENIOR GEOLOGIST

REFERENCE

Read, R.E., 1987. Ernabella Water Supply. South Aust. Dept. Mines & Energy unpubl. report 87/74.

APPENDIX A

GEOLOGICAL LOGS

CONTENTS

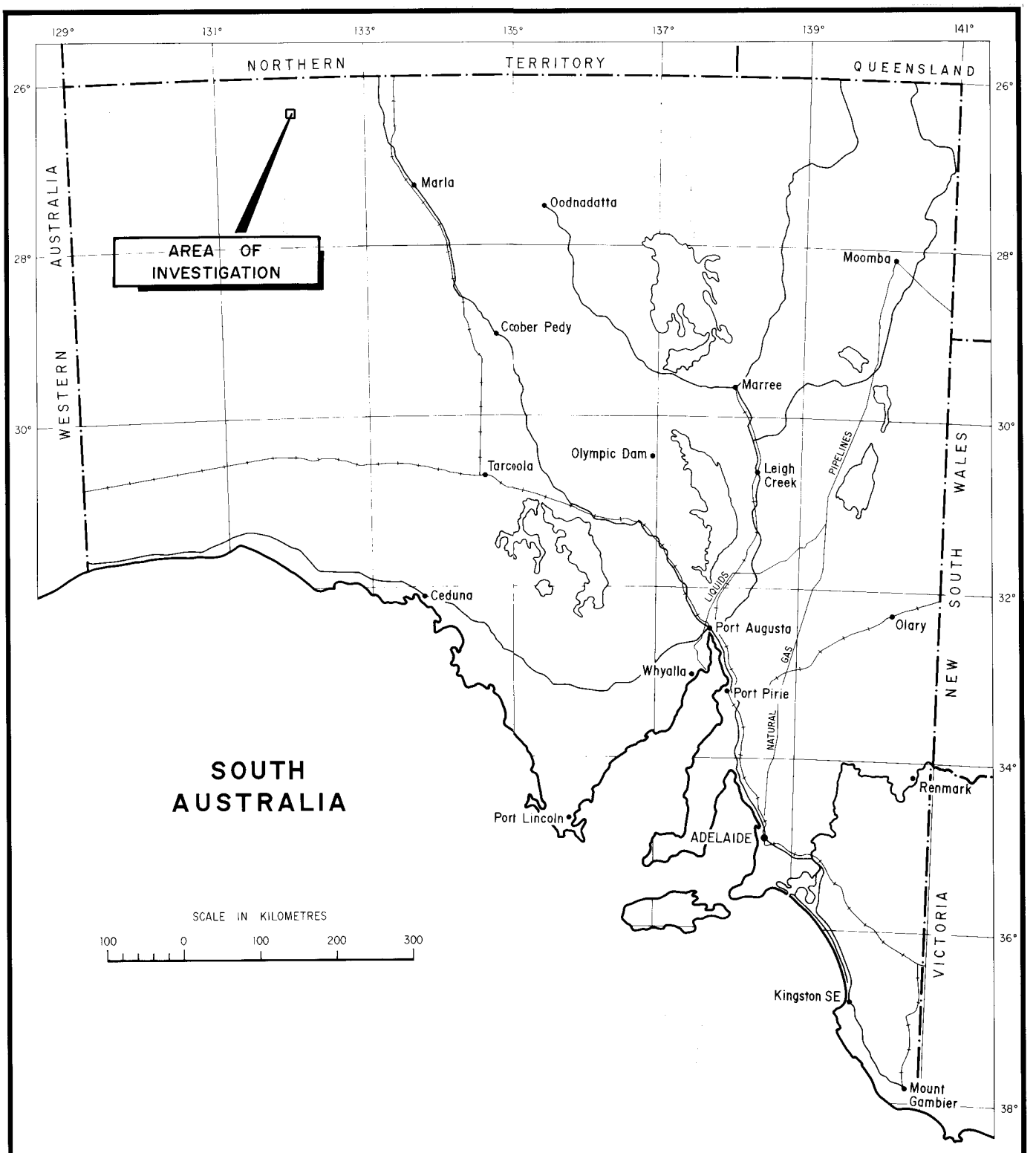


Figure.....1

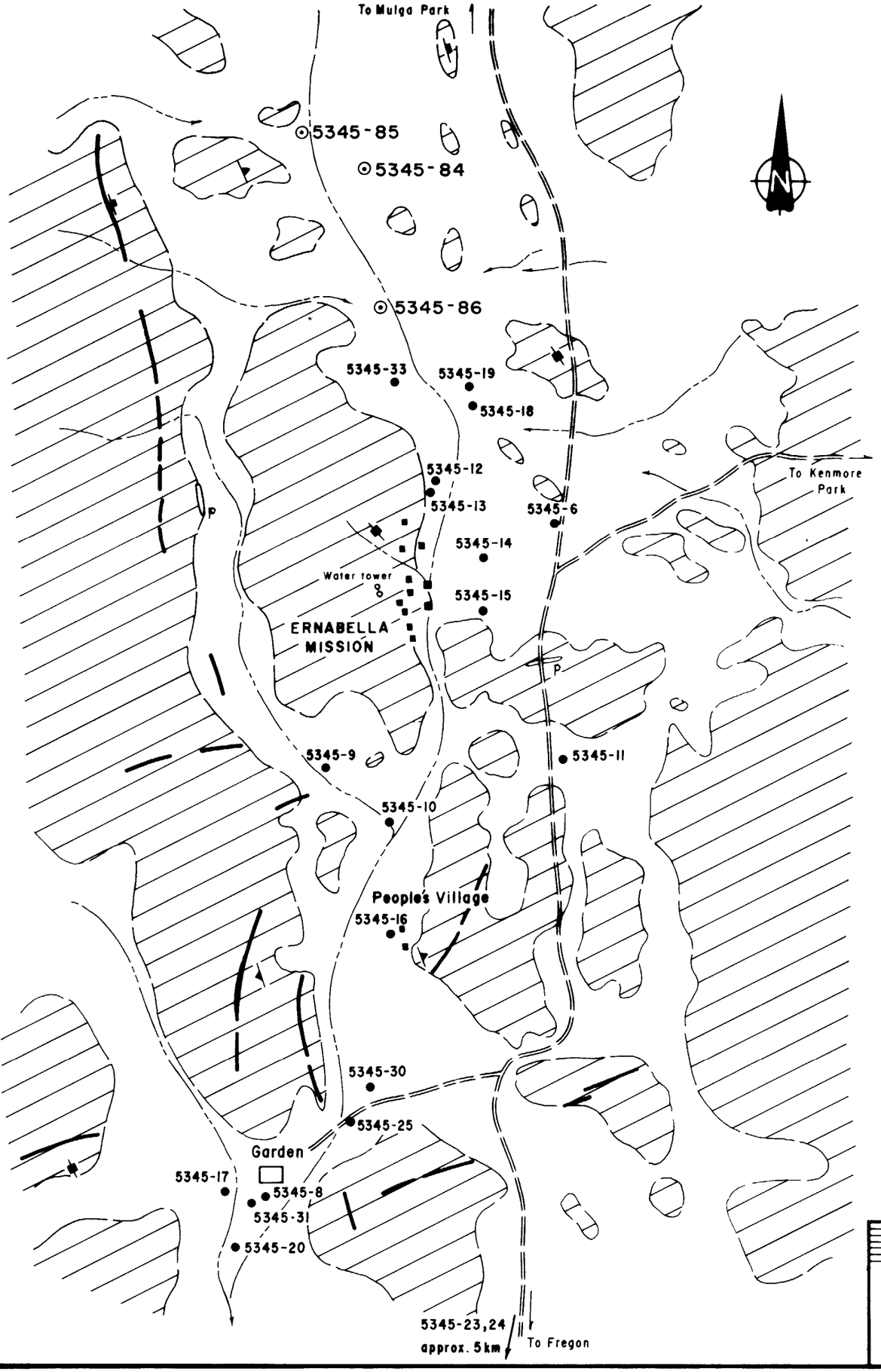
DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

ERNABELLA WATER SUPPLY 1989 DRILLING

LOCALITY PLAN

COMPILED R.E.R.	C.D.O. 1·3·90 DATE
DRAWN B.Donovan	SCALE As Shown
DATE Sep. 1989	PLAN NUMBER S 21065
CHECKED	

4892



REFERENCE

GRANITIC ROCK (Hypersthene adamellite)

ALLUVIUM (Silt soil and sand)

Dolerite dyke

p Pegmatite

Strike and dip of joint

Strike and dip of foliation

Strike of vertical joint

5345-16 ● Water Well with Unit number (abbrev.)

After Selby (1972)

5345-85 ⊙ Wells drilled 1989

SCALE IN METRES

1000 500 0 1000 2000

FIG..... 2

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

ERNABELLA WATER SUPPLY 1989 DRILLING

WELL LOCATION PLAN

COMPILED R.E.R.	CDO 1·3·90 DATE
DRAWN B. Donovan	SCALE 1:25000
DATE Sep. 1989	PLAN NUMBER 89-401
CHECKED	

4892

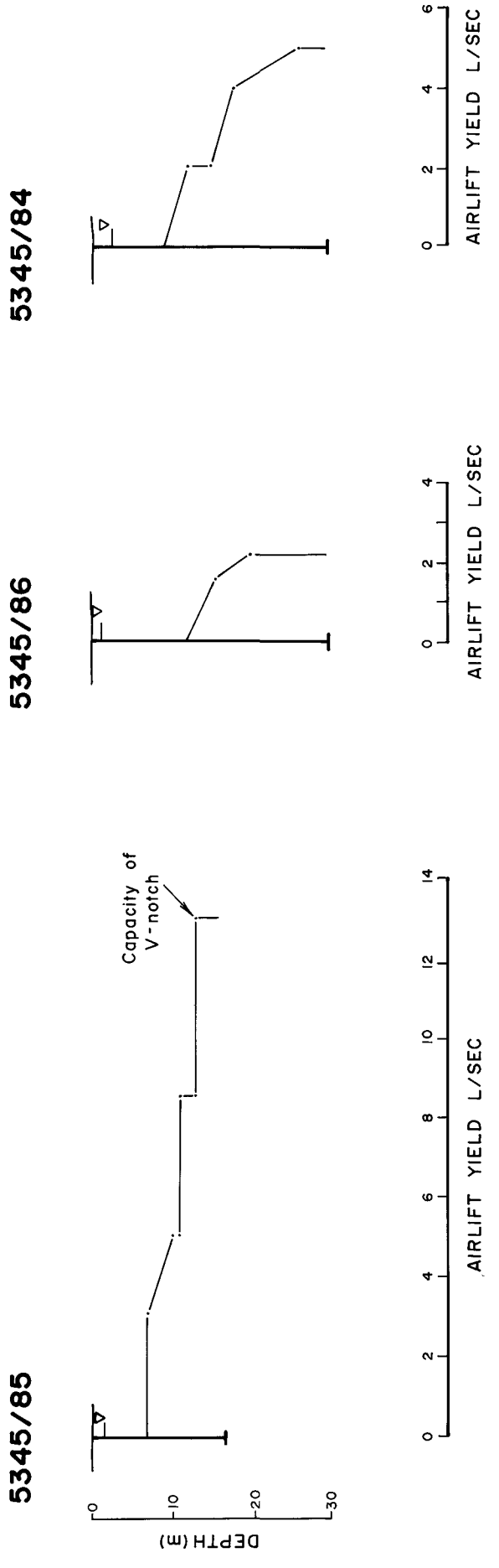


Figure.....3

DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA	COMPILED R.E.R	1·3·90 C.D.O DATE
ERNABELLA WATER SUPPLY 1989 DRILLING	DRAWN B. Donovan	SCALE As Shown
DEPTH YIELD GRAPHS	DATE Sep. 1989	PLAN NUMBER S 21066
	CHECKED	

4892