DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA

Rept. Bk. No. 80/35

STUART HIGHWAY - PIMBA TO BAKER WELL SECTION, DRILLING FOR CONSTRUCTION WATER

by

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MARCH, 1980.

D.M. No. 364/75

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ABSTRACT

Of 16 wells drilled along this section of the proposed highway realignment only 6 have provided an adequate supply of saline groundwater for construction use. On the western part of the section, 4 wells into the deeper fractured rock aquifer were dry. Subsequently another 8 randomly sited wells were drilled in this area into the Cadnaowie Formation Sandstone and of these, only one yielded a small supply of saline water.

All wells which are to be used should be production tested to determine likely behaviour under the expected 12 months continuous use.

Due to the very poor groundwater prospects in this region, alternative development of shallow supplies from salt lakes through the use of well points or trenches should be considered.

INTRODUCTION

In April and May 1979 eight holes were drilled on behalf of the Highways Department in an effort to locate supplies of construction water on the Pimba to Baker Well section of the Stuart Highway. In November 1979 a further eight wells were drilled in the western end of the section. (Fig. 1) Results of drilling are summorised in Table I.

TOPOGRAPHY

West from Pimba to Eucolo Bluff the proposed road crosses a stony tableland. After descending a steep scarp the remainder of the route is over fairly flat sandhill country and open plains with salt lakes.

DRILLING METHODS

Most holes were drilled with a Mayhew 1000 rig using down-hole hammer and air-circulation methods. In 6135WW89 it was necessary to resort to mud drilling to get through the Cadnaowie Formation.

TABLE 1

•				
Unit No.	Depth	S.W.L.	Yield Kl/day	Remarks
6035WW52	150		Ni1	0-35 Cadnaowie Fm. 35-150 Pandurra Fm.
6034WW53	60	13.	50	0-18 Cadnaowie Fm. 18-60 Pandurra Fm.
6035WW54	24	12	30	0-18 Cadnaowie Fm. 18-24 Pandurra Fm.
6035WW55	24	٠ , ع	Ni1	0-18 Cadnaowie Fm. 18-24 Pandurra Fm.
6035WW56	24	13	20	0-15 Cadnaowie Fm. 15-24 Pandurra Fm.
6034WW57	30		Ni1	0-24 Cadnaowie Fm. 24-30 Pandurra Fm.
6135WW84	150		ery small upply 37m	0-44 Cadnaowie Fm. 44-150 Pandurra Fm.
6134WW85	150		Ni1	0-15 Cadnaowie Fm. 15-150 Pandurra Fm.
6135WW86	150		Ni1	Pandurra Formation
6135WW87	84	6	230	Pandurra Formation
6135WW88	60	30 approx	5	0-42 Cadnaowie Fm. 42-60 Pandurra Fm.
6235WW89	60	27	130	0-39 Cadnaowie Fm. 39-60 Pandurra Fm.
6135WW90	4 2	28	130	Cadnaowie Formation
6235WW62	148	19	80	0-120 Woomera Shale 120-140 Tapley Hill Fm. Water cut at 104 M Well back filled and abandoned
6235WW63	127	35	60	0-127 Woomera Shale
6234WW64	145	43	200	0-68 Arcoona Quartzite Member 68-145 Woomera Shale

DRILLING

1. Deep drilling - first round

In view of the poor results from existing shallow wells and the known occurrence of fissure-type aquifers at considerable depth in Adelaidean sediments elsewhere in the Stuart Shelf the first round of drilling was designed to explore for these aquifers. Drilling was contined until water was struck or 150 metres.

This approach was moderately successful in the eastern part of the section as far as Lake Hart. Wells 6235WW64 and 6134WW87 yielded satisfactory supplies, and wells 6234WW62 and 6235WW63 yielded small supplies.

All four wells drilled in the western end of the section were dry.

The latter result is remarkable. It may be due in part to the more silty nature of the Pandurra Formation sandstone. However, it is likely that the difference is due to a difference in tectonic history which had led to poorer development of jointing than in the areas to the east.

2. <u>Cadnaowie Formation - Second Round</u>

Following the failure of the first round of drilling to locate even small supplies in the western part of the section, attention was directed at locating shallow supplies in the Cadnaowie Formation.

Well 6135WW88 was drilled to 60 metres at a site selected by a diviner and convenient to the Highways Department at their requests. The well was in sands and clays of the Cadnaowie Formation to 42 metres, at which depth it entered weathered Pandurra Formation. A supply of 5 K1/day was struck at 30m. 6135WW89 was drilled 200 metres from the old rail-siding well, 6135WW38. The well was in sandstones and shales of the Cadnaowie Formation for the first 39 metres, and then in Pandurra Formation to 60 metres. A supply of 130 K1/day of 12000 mg/L water was cut from 30 to 36m. The well was cased to 36m with slots from 30 to 36 metres. A second well, 6135WW90 was drilled 250 metres east to 42 metres with similar results.

The remainder of the drilling was directed at locating water supplies in the Baker Well area.

The first hole, 6035WW53 was drilled at a site selected by a diviner. A supply of 50 Kl/day was struck at 18 metres at the base of the Cadnaowie Formation.

The well was cased to 24m, with slots from 18m to 24m and drilled on to 60 metres in Pandurra Formation. No further supply was cut and the slots became clogged, cutting off the supply. The casing was withdrawn and successfully re-run. The second hole, 6035WW54 was drilled 800m away. 30 Kl/day was cut between and 13 and 18m. The hole entered Pandurra Formation at 19m and was abandoned at 24m.

A third hole 6035WW55 was drilled 180m from the first. This was dry to 24m, when it was abandoned.

A fourth hole 6035WW56 was then drilled 200m from 6035WW55. This obtained only $10 \ K1/day$.

A fifth well was then drilled 1 km east (6035WW56). This was dry.

CONCLUSIONS

- In the area from Pimba to west of Lake Hart fissure-type aquifers occur in the Adelaidean sediments. 150 metres is a reasonable maximum drilling depth in this area.
- 2. West of Lake Hart the Adelaidean Pandurra Formation lacks fissure-permeability and is not worth drilling.
- The Cadnaowie Formation contains low-yielding aquifers.

 The only wells drilled in this programme with a satisfactory yield from the Cadnaowie Formation were 6135WW89 and 6135WW90, which were sited close to the highest yielding known well in the area.

Of eight randomly located wells drilled through the Cadnaowie Formation only one yielded 50 Kl/day.

Since there is no definite relationship between saturated thickness and yield geophysical methods are unlikely to increase the chances of success.

The only alternative to the expensive process of exploring by drilling is to develop areas of low permeability by using either well-point systems or trenches in areas where the water table is shallow. Salt lakes may provide suitable locations for this type of installation since the water table is less than 1m from the surface.

RECOMMENDATIONS

- 1. All successful wells should be pump-tested to determine their likely behaviour under 12 months continuous use.
- 2. Up to 5 well-points should be jetted in around Lake

 Jessie as a trial prior to establishing a full-scale

well-point system. This will confirm the feasibility of such a system, and provide information for designing it.

R. READ

Geologist

REFERENCES

- Dennis, K.J. and Lawson, T., Gairdner & Childara 1:250 000

 Sheets, Water Well Survey. S. Aust. Dept.

 Mines report 77/100.
 - Read, R.E. 'Stuart Highway, Bookaloo, Mount Gunson Section Drilling for Construction Water', S. Aust. Dept.
 Mines report 79/86.

APPENDIX A

GEOLOGICAL LOGS

PROJECT: Stuart Highway-Pimba to Baker Well DEPARTMENT OF MINES AND ENERGY-SOUTH AUSTRALIA HOLE NO: PN6203.NO1 WATER WELL LOG UNIT / STATE NO. LOCATION OR COORDS: Dut of Hundreds SH 53-15,393149 60358853 El. Surface DM FL Ref. Point DISSOLVED SOLIDS TOTAL SUPPLY INTERVAL TESTED DEPTH- TO DEPTH TO Analysis No: WATER CUT (m) STANDING WATER (m) milliorammes/litre Test Length (hrs) Me thod kilolitres/day To: From: **AQUIFER** w ---While Air lift 13.4 50 SUMMARY: drilling DEPTH CASING ROCK / SEDIMENT GRAPHIC FORMATION / AGE CORE GEOLOGICAL DESCRIPTION SAMPLE Dia(mm) From(m) To(m) LOG NAME Tertiary Silcrete Hard brown white and yellow silcrete n 3 developed on medium grained sandstone White fine grained poorly sorted silty Cadna-Owie 3 Sandstone sandstone with grains up to very coarse Formation sand size lightly silica cemented Coarse white silty poorly sorted sandstone Sandstone Cretaceous Siltstone White firm siltstone with some very fine 15 sand. No bedding visible. 15 Very coarse poorly sorted white silty 18 Sandstone sandstone (aquifer) COMPLETED: 14.11.79 DRILL TYPE: Rotary * NOTE: 110 kl / day = 1000gals / hr. REMARKS: LOGGED BY: R. Read Problems experienced with cloqqing of slots, cutting off CIRCULATION: Air foam supply and Casing withdrawn and re-run. DATE: 14.11.79 ... of....3....

PROJECT	St	uart	Highway	-Pimba to	Baker Wel	DEPARTM	AENT OF	MINES AND ENERGY- ENGINEERING DIVISIO	SOUTH AUSTRALIA		•		HOLE N	o: PN	6203	, No1
LOCATIO	ON OR CO	DORDS:	Out of		SH53-15, 3	93149	W	ATER WELL	LOG			•		UNIT / ST 035W		
SEC.		HD.		El. Surface El. Ref. Point	•	m m Del	tum .		. •				DM			
	•			DEPTH TO .	DEPTH TO	INTERVAL	TESTED		SUPPLY				ISSOLVE		LIDS	
	٠,	QUIFE	 S D	WATER CUT (m)	STANDING WATER (m)	From:	To:	kilolitres/day*	Test Length (hrs)	Me th	od	milligrammes/litre	Analysi:	No:		
	^	CQUII L											w -			
	SL	JMMA	RY:				•]					• •			:	
•							• •									
					1	1 1				L		<u> </u>	DEPTH		CASING	
From	H (m)	GRAPHIC		SEDIMENT AME		GEO	LOGIC	AL DESCRIPTION	•		FORM	ATION / AGE	CORE	Dia(mm)	From(m)	To(m)
18	21				Coarse poo	rlv s	sorte	ed light b	rown sandst	one.	Pandı	urra Formati	on on			
,,,	41				Minor musc	ovite	2, 1	imonite fi	lled vughs.		Torre	ensian				•.
21	24				Coarse to	Verv	coa	rse poorly	sorted	J. 1. 1						
2.1	24		·		sandstone,	moti	ted 1	brown and u	white.					İ		
					Weathered	micad	ceou	s matrix.	•		· •		1			
24	30				Medium ora	ined	000	rly sorted	red-brown						Ì	
24	30				sandstone.							•				
30	33			·	White medi	ıım tı	ת הירח	arse grain	ed poorly		. •	•	-		·	
30	33				sorted sar	dsto	ne.	Some dree	n micaceous							
	,			•	sandstone.								١.		· ·	
33	42				Red brown	medi	um. t	o coarse q	rained poor	ly						
	- T				sorted wel	l in	dura	ted sandst	one, with				1			
					white mott	ling.	•	-	:							
						•	•	•	.•		•	. ''				
							· .				• •	•		<u> </u>	ļ	<u> </u>
REM	ARKS:	•	•	. *1	NOTE: 110 kl / day = 10	00gals / hr.				DRIL	L TYPE: R	otary Hammer	СОМ	PLETED:	4.11	•79
			•					••		CIRC	CULATION:	Air foam	roce	GED BY:	R. R	ead
						•		·	•	SHE	et 2	of3	DATE	. 14	.11.	79
										i						

						DEPARTME								
OCATIO	N OR CO	ORDS: (Dut of H	undreds S	H53 -1 5,			AIEK WELL						
			•	El. Surface	•	n Dote						DM	-	
EC.		HD.		El. Ref. Point	· · · · · · · · · · · · · · · · · · ·			<u>· </u>	CLIDDLY		TOTAL DI	SSOLVED	SOLIDS	
	CATION OR COORDS: Dut of Hundreds SH53-15, WATER WELL LOG El. Surface													
CATION OF COORDS. Dut of Hundreds SH53-15, WATER WELL LOG IN Section 1														
•	NOR COORDS. Out of Hundreds SH53-15, WATER WELL LOG NO. El Bel Folian Dobban Dobban													
	WATER WELL LOG WATER COULDS. Out of Hundreds SH53-15, BL Surfoce IN Debum D													
	MOUNT OR COOLDS. Dut of Hundreds SH53-15, WATER WELL LOG El Suffers Down				<u> </u>									
DEPTH	1 (m)	GRAPHIC	ROCK / S	EDIMENT	<u> </u>	CCO		AL DESCRIPTION		FORM	AATION / AGE	CORE		
From		- 1	NA	ME		GEOI	LOGIC	AL DESCRIPTION	·			SAMPLE	ia(mm) From(m)	10(*)
45	48 51		Sandsto	one	with micac weathered Brown with micaceous White medisorted. Moshale. As above p	eous shale whit matri um gr linor	mat e m x. ain bro	rix. Mino ottling. ed and mod wn sandsto se pebbly	r light gre Silty finel erately wel ne and gree	en y				
54	60		Sandst	one	White and	•	. •		ed and poor					
REM	ARKS:	NOR COOKE Out of Hundreds SH53-15, WATER WELL LOG Cooker Cook												
							•	•	· · · · · · · · · · · · · · · · · · ·	CIRCULATION	Air foam	LOGGI	D BY: R. F	Read
										SHEET3.	of3	DATE:	14.11.7	79

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PROJEC	ı Stı	uarț	Highway	-Pimba to	Baker Well	DEPAR	MENT O	F MINES AND ENERGY- ENGINEERING DIVISION	-SOUTH AUSTRALIA			HOLE I	io: PN	6203	No
	ION OR C		Out of N	El. Surface	6H53 - 15, 39	93159 m	, V	VATER WELL	LOG				35WW	STATE NO. 54	W., 6
SEC.		HD.		EL Ref. Point		m D	atum	·				DM			
				DEPTH TO	DEPTH TO	INTERVA	L TESTED	·	SUPPLY		TOTAL D	ISSOLVE	D SC	OLIDS	
	A	QUIFE	R	WATER CUT (m)	STANDING WATER (m)	From:	To:	kilolitres/day*	Test Length (hrs)	Me thod	milligrammes/litre	Analysi	s No:		
		JMMA		13				30		Air lift		w —			
DEP1	TO	GRAPHIC LOG	ROCK / S	EDIMENT ME		GE	OLOGIC	AL DESCRIPTION		FORA	MATION / AGE	DEPTH CORE	· · · · · · · · · · · · · · · · · · ·	CASING From(m)	72(-)
3 9 12 18	3 9 12 18 21		Silcred Sandsto Sandsto Sandsto	one one one	Sample chibrown colograined sa	Min wn p coa rse, efly ur. indst	or conflore.	y sorted c poorly sor ty and poo ings from ps of red-	layey sands ted and sil rly sorted	tone Cadn ty Form Cret Pand m Form	iary a-Owie ation aceous urra ation, ensian				
REM	ARKS:			*N	OTE: 110 kl / day = 1000	Ogals / hr.			* * * * * * * * * * * * * * * * * * * *	DRILL TYPE: R	otary Hammer	COMP	LETED.	14.11	1.79
		Hol	e abando	oned		-	-			CIRCULATION:	Air foam	LOGGI	ED BY: R	• Rea	a d
•					•					SHEET	. l. of1	DATE:	14	.11.7	79

PROJECT: Stuart Highway-Pimba to Baker Well DEPARTMENT OF MINES AND ENERGY-SOUTH AUSTRALIA HOLE NO: PN6203.No3 ENGINEERING DIVISION **WATER WELL LOG** LOCATION OR COORDS: Out of Hundreds SH53-15, 393159 UNIT / STATE NO. 6035WW55 El. Surface SEC. El. Ref. Point Datum DM INTERVAL TESTED SUPPLY DISSOLVED SOLIDS DEPTH TO DEPTH TO TOTAL STANDING WATER (m) WATER CUT (m) From: kilolitres/day Test Length (hrs) To: Me thod milligrammes/litre Analysis No: **AQUIFER** w --Dry SUMMARY: DEPTH (m) DEPTH CASING GRAPHIC ROCK / SEDIMENT GEOLOGICAL DESCRIPTION FORMATION / AGE CORE LOG NAME SAMPLE Dia(mm) From(m) ·To(m) Sandstone Brown soil plus brown medium grained poorly sorted calcreted sandstone Pleistocene? White medium grained and poorly sorted, Sandstone Cadna-Owie plus white siltstone Formation, 9 Siltstone White and sandy. No bedding visible Cretaceous 12 Sandstone White, medium grained silty and poorly sorted 12 15 Sandstone Coarse, similar to the above. 15 18 Sandstone Medium grained, similar to the above. 21 Sandstone 18 Coarse, similar to the above. 21 24 Sandstone Brown. medium grained and poorly sorted Pandurra Formation with limonite filled vuohs. Torrensian DRILL TYPE Rotary Hammer COMPLETED: 15.11.79 REMARKS: * NOTE: 110 kl / day = 1000gals / hr. Albandoned Surface about 3M below Well No. 2 CIRCULATION: Air foam LOGGED BY: R. Read SHEET ... 1 OF 1 . . . DATE: 15.11.79

			_	- Pimba t	o Baker Well SH53-15, 4			MINES AND ENERGY ENGINEERING DIVISION	ON			HOLE N		N6203	3 , No4
	on or c			El. Surfoce	3033-13, 4	:1 <u>3</u> /154	J ••				· 1	. 6		WW56	
SEC.		HD.		EL Ref. Point		m D	atum					DM	,	•	,
	. 7.7			- DEPTH TO	DEPTH TO	INTERVA	L TESTED		SUPPLY		TOTAL D	DISSOLVE	D SC	OLIDS	
		QUIFER		WATER CUT (m)	STANDING WATER (m)	From:	To:	kilolitres/day*	Test Length (hrs)	Method	milligrammes/litre	Analys1	No:		
	٠	UMMAR'		15				20				w-		,	
DEPTI	• •	GRAPHIC	ROCK / SE			GFC	DLOGIC	AL DESCRIPTION	. •	FORA	NATION / AGE	DEPTH		CASING	
From	To	roc	NAI	WE				AL DESCRIPTION		- FORM	——————————————————————————————————————	SAMPLE	Dia(mm)	From(m)	To(m)
0 3 6 9	3 6. 9 12		Oil Silcre Sandst Sandst	one one	lightly s Coarse, p silty. M Medium gr sorted.	sandained ilci oorl inor ained Soma	dstor d poor fied y sor sil d wh: e lir	ne orly sorted, minor sinted soft wastone ite and sintente standard	ltstone white and lty and poor ining.	Tert Cadn Form Cret	a-Owie ation, aceous				
12	18	(3)	Sandst	one	Sandstone	, soi	me da	ark staini	פר						. '
18	24		Sandst	one	indurated	san	dstor	well sorte ne with te brown with	rnished	Pandu Forma Torra	rra tion ensian		,		
REMA	DVC				IOTE					R	otary Hammer			16.11	1 70
KEMA	•	ollar	about 3	M below	OTE: 110 kl / doy = 1000 LIP	Ugols / hr.		•				COMPI	.E I ED:		
	,			,, 55250						CIRCULATION	Air foam	rocci	D BY:	R. Re	ad
			•			<u> </u>		· .		SHEET 1.	OF 1	DATE:	16.	.11.7	'9

A-6

MINES DEPARTMENT --- SOUTH AUSTRALIA HOLE NO: 5A Stuart Highway - Pimba to Baker Well PROJECT: ENGINEERING DIVISION WATER WELL LOG UNIT / STATE NO LOCATION OR COORDS: 6135WW84 EL Surface DM EL Ref. Point SEC. HD. SOLIDS TOTAL DISSOLVED SUPPLY INTERVAL TESTED DEPTH TO DEPTH TO WATER CUT (m) STANDING WATER (m) milligrammes/litre Analysis No: Test Length (hrs) Method kilolitres/day From: To: **AQUIFER** w ---NIL **SUMMARY:** DEPTH CASING DEPTH (m) **ROCK / SEDIMENT** GRAPHIC FORMATION / AGE CORE GEOLOGICAL DESCRIPTION SAMPLE Dia(mm) From(m) To(m) NAME ιog From Pale brown poorly sorted medium grained Sandstone 0 silty sandstone Cadna Owie White silty micaceous coarse poorly Sandstone 18 Formation sorted quartz sandstone, some pebbles Yellow grey coarse moderately sorted 18 30 Sandstone silty quartz sandstone White medium grained poorly sorted 30 48 Sandstone silty sandstone. Pebbles up to Uncomformity 15mm Moderate brown coarse silty sandstone 48 60 Sandstone (Pebbles and fragments of boulders Pandurra Formation from up hole) COMPLETED: 30.5.79 * NOTE: 110 kl / day = 1000gals / hr. Rotary/Hammer REMARKS: Mud, LOGGED BY: R. Road CIRCULATION Air form DATE: 10.7.79 SHEET 1 OF 2

											•						
PROJECT	:						MINES	DEPARTMENT — SOUTH	I AUSTRALIA N		•		HOL	E NO:	5/	4	
LOCATIO	ON OR CO	OORDS:	÷ .					ATER WELL						UN	_	ATE NO	
		,		EL Surface		n .		•							5WW	34	
SEC.		HD.		EL Ref. Point		m Dat	tum						DM				
				DEPTH TO	DEPTH TO	INTERVAL			SUPPLY	· · · · ·		TOTA	· · · · · · · · · · · · · · · · · · ·				
	. A	QUIFE	R	WATER CUT (m)	STANDING WATER (m)	From:	To:	kilolitres/day*	Test Length (hrs)	<u> </u>	Me thod	milligrammes/li	tre Anal	ysis N	to :	•	
		JMMAI											W -				
DEPT	H (m)	GRAPHIC	ROCK / S	FDIMENT		LL		4					DEP.	тн		CASING	
From	To	IOG		ME		GEO	OLOGICA	AL DESCRIPTION			FORM	ATION / AGE	SAM	RE OI	ia (mm)	From(m)	To(m)
60	150		Sandst	cone	Brown we sandst	ll in	ndura	ated medium	grained								
REM	ARKS:	,		·*N	IOTE: 110 kl / day = 100	Ogols / hr.				,	DRILL TYPE:			OMPLET			
											CIRCULATION:			ÖĞED	BYı		
					·				•		SHEET 2	of2.	D	ATE:		-	

OJECT:	Stuart	t Highway - Pi	imba	to Baker W	, err	ES DEPARTMENT — SOU ENGINEERING DIVISI	ON _			HOLE N	0:	4	
OCATION OF	R COORDS:					WATER WELL	LOG			6	135W	TATE NO	
ec.	HD.	EL Surface EL Ref. Poi		· ·	n Datum			•		DM	<u> </u>		
		DEPTH		DEPTH TO	INTERVAL TESTE	D	SUPPLY	W. W	TOTAL D	ISSOLVE	D SC	LIDS	
	AQUIFE	D WATER C	UT (m)	STANDING WATER (m)	From: To:	kilolitres/day*	Test Length (hrs)	Method	milligrammes/litre	Analysis	No:		
	SUMMAI	N	IL						·	w-	•		
DEPTH (m)	GRAPHIC	ROCK / SEDIMENT			GFOLOG	ICAL DESCRIPTION	<u> </u>	5OPM	ATION / AGE	DEPTH		CASING	
om To	rog	NAME			<u> </u>	ICAE DESCRIPTION		FORM	ATION / AGE	SAMPLE	Jia(mm)	From(m)	To(m)
) 3		Soil		Red brown	silty s	and (IOR5/4	+)	Rece	ņt .				ı
6		Sand		Pink (7.5 sand. Su		coarse poo	orly sorted		a Owie ation				•
5 9		Sand		Medium gra	ined, s	imilar to t	the above						
15		Sand		Coarse poo (7.5 YR 3	rly sor /2)	ted clayey	sand		, ·				
5 24		Weathered Sandstone		Red brown sandstone		e clayey sa	nds and	Pand For	urra mation			.:	
4 45		Sandstone		quartz sa	ndstone	2) coarse with sub ruscovite fl	poorly sort counded akes	ted					
REMARKS	 3:		*1	NOTE: 110 kl / day = 1000	Ogols / hr.			DRILL TYPE: R	otary/Hammer	СОМР	LETED:	30.4.	.79
		(IOR 5/4)) et	c refer to	Munsell	Colour Cha	rt	CIRCULATION	Air	1000	CO BY:	₹, हि€	ead
					•	÷		SHEET1	OF3	DATE:	3	.5.79)

PROJECT							MINES	DEPARTMENT - SOUTH	I AUSTRALIA N				HOLE N	10:		
LOCATIO	ON OR CO	OORDS:					W	ATER WELL						UNIT / S	TATE NO	
				EL Surface	,	n							6	135V	W85	
SEC.		HD.		EL Ref. Point		m Do	atum						DM			
				DEPTH TO	DEPTH TO	INTERVA	L TESTED		SUPPLY	r		TOTAL	DISSOLVE	D SC	DLIDS	
	A	QUIFE	R	WATER CUT (m)	STANDING WATER (m)	From:	To:	kilolitres/day**	Test Length (hrs)		Method	milligrammes/litre	Analysi	s No:		
	SU	JMMAI	RY:										w-	• •		
									•						• .	
DEPT	-1 (m)	GRAPHIC		EDIMENT	·-	C E C	21.0010	AL DESCRIPTION			EOB44	ATION / AGE	DEPTH	Ι .	CASING	
rom	То	ιog	N	AME		GEC		AL DESCRIPTION	<u> </u>		FORM	ATION / AGE	SAMPLE	Jia (mm)	From(m)	To(m)
31 36 39	819699114		Sandst Sandst Sandst	cone	red (IO) As above, (7.5 YR Similar to Medium grasandstor parts.	but 8/2 0 abo aineo ne.	mos) ove d d du Abur e pir	lty poorly andstone tly pinkish but coarse sky red poondant musconkish white	white grained rly sorted vite in sandstone						45.	
14	132		Sands	cone	Pinkish who sorted	nite silt:	med: stone	ium gr a ined e	poorly			•				
32	135		Sandst	cone	Dusky red coarse	• Ch silts	nip o stone	of grey (5Y e.	5/1)	,						
REM	NRKS:	<u> </u>	-1.2.	· *N	OTE: 110 kl / day = 100	Ogals /, hr.					DRILL TYPE:		COMF	LETED:	1,	I
							•	•			GIRCUILATION:		LOGG	ED AY:		
						•					SHEET 2	Of3	DATE			

PROJECT:						MINES	DEPARTMENT - SOUTH	I AUSTRALIA N			HOLE NO) :	Ì
LOCATIC	ON OR CO	ORDS:				W	ATER WELL	LOG				UNIT / STATE	
ioc, ic	,,, o. co	ONDO:		EL Surface		m ·	:			•		135WW8	35
SEC.		HD.		EL Ref. Point		m Datum			•		DM		
				DEPTH TO Water cut (m)	DEPTH TO STANDING WATER (m)	INTERVAL TESTED	*	SUPPLY	Method	TOTAL D	Analysis		os .
	A	QUIFE	R .	WATER COT (III)	STANDING WATER (III)	From: To:	kilolitres/day*	Test Length (hrs)	He Choo	miligrammes/litre	w —		-
	SU	IMMAF	RY:		·		*	,				•	
	 	 -			<u> </u>						DEPTH		SING
DEPT	H (m)	GRAPHIC LOG		SEDIMENT :		GEOLOGIC	CAL DESCRIPTION		FORM	ATION / AGE	L CORE L	Ola(mm) Fr	
1 <i>3</i> 5 141 144	144		Sands Sands Sands	stone	As for 11 As above tarnished As for 11	with min d pyrite	or films of						
REM	ARKS:			* N	OTE: 110 kl / day = 100	00gols / hr.		•	DRILL TYPE:		СОМР	LETED:	
				•					CIRCULATION:		rocc	ED BY:	
	•								SHEET3.	of3	DATE:		

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MINES DEPARTMENT - SOUTH AUSTRALIA Stuart Highway - Pimba to Baker Well PROJECT: HOLE NO: 44 ENGINEERING DIVISION **WATER WELL LOG** UNIT / STATE NO LOCATION OR COORDS: 6135WW86 **EL Surface** DM EL Ref. Point SEC. HD. DISSOLVED SOLIDS SUPPLY TOTAL INTERVAL TESTED DEPTH TO DEPTH TO WATER CUT (m) STANDING WATER (m) Analysis No: Test Length (hrs) He thod. milligrammes/litre To: kilolitres/day From: **AQUIFER** w --NIL. **SUMMARY:** DEPTH CASING DEPTH (m) GRAPHIC **ROCK / SEDIMENT** DESCRIPTION FORMATION / AGE CORE GEOLOGICAL SAMPLE Jia (mm) From(m) NAME . To(m) LOG From Τo Femuginous sandstone with calcrete Weathered 0 Sandstone coatings Medium brown, fine grained and poorly Sandstone 6 sorted Pandurra Sandstone' White silty and moderately well indurated 6 9 Pink brown medium grained silty and Formation Sandstone 9 15 poorly sorted Grey coarse poorly sorted and silty 15 Sandstone 27 Mottled brown and grey with micaceous 27 Sandstone 33 matrix 33 39 Sandstone Coarse and grey DRILL TYPE: Rotary/Hammer COMPLETED: 30.5.79 * NOTE: 110 kl / day = 1000gols / hr. **REMARKS:** Mud, LOGGED BY: R. Road CIRCULATION: A fire flowing SHEET 1 OF 2 DATE: 10.7.79

														
PROJECT	r:			•		MINES	DEPARTMENT — SOUT ENGINEERING DIVISION	H AUSTRALIA	: '			HOLE N	0 : 4A	
LOCATI	ON OR CO	OORDS:	•			V	VATER WELL	LOG				·	UNIT / STATE NO	,
		٠.	•	EL Surface		m							35WW86	
SEC.		HD.		EL Ref. Point	•	m Datum				·		DM	•	
				DEPTH TO	DEPTH TO STANDING WATER (m)	INTERVAL TESTED		SUPPLY				ISSOLVE		
	A	QUIFE	R ·	WATER CUT (m)	STANDING WATER (m)	From: To:	kilolitres/day*	Test Length (hrs)	ļ	Method	milligrammes/litre	Analysis	No:	
									\ ·			w-		
	SL	JMMA	RY:							, ,				
	٠,		• • •						,					
DEPT	H (m)	GRAPHIC		EDIMENT		CFOLOCIC	CAL DESCRIPTION		<u> </u>	FORM	ATION! / ACE	DEPTH CORE	CASINO	;
From	То	LOG	ŅĀ	ME		GEOLOGIC	LAL DESCRIPTION	·		. rukm.	ATION / AGE	SAMPLE	Ola(mm) From(m) To(m)
	114 117 150		Sands Sands	tone	micaceou oxide gr White cos sandstor	us siltstrains in arse poor ne fine br	rly sorted	dant iron silty						
· · · · · ·	<u>.</u>	<u> </u>		<u> </u>		· .			-	· .	· · · · · · · · · · · · · · · · · · ·			
REM	ARKS:		•	* N	OTE: 110 kl / day = 100	Ogals / hr.				DRILL TYPE:		СОМР	LETED:	
			•	·						CIRCULATION:		rogg	ED BY:	
										sheet 2	of2	DATE:		

MINES DEPARTMENT - SOUTH AUSTRALIA FROMER Stuart Highway - Pimba to Baker Well HOLE NO: ENGINEERING DIVISION WATER WELL LOG UNIT / STATE NO LOCATION OF COORDS: 6135WW87 EL Surface SEC. HD. EL Ref. Point DM DISSOLVED INTERVAL TESTED SUPPLY SOLIDS TOTAL DEPTH TO DEPTH TO WATER CUT (m) STANDING WATER (m) From: kilolitres/day* Test Length (hrs) To: Method milligrammes/litre Analysis No: : : 'AQUIFER w ---33 33 35 20 Airlift SUMMARY: 38 .38 85 55 240 DEPTH CASING DEPTH (m) GRAPHIC **ROCK / SEDIMENT** FORMATION / AGE CORE GEOLOGICAL DESCRIPTION NAME LOG Tο SAMPLE Dia(mm) From(m) From To(m) 6 Coarse poorly sorted red (IOR5/6); 0 Sand Recent Clayey sand Pandurra Light grey yellow and purple clayey 6 36 Weathered Formation Sandstone sand 36 57 Coarse to medium grained quartz sandstone Sandstone with micaeous silty matrix. Abundant fine sand size iron oxide grains. Some muscovite flakes. Weak red (7.5 R4/2) 63 Similar to the above, with fine pebbles 57 Sandstone 63 81 As for 36-57mSandstone 81 84 Coarse pebbly sandstone similar to the Sandstone above COMPLETED: 25.4.79 DRILL TYPE: Rotary/Hammer REMARKS: * NOTE: 110 kl / day = 1000gals / hr. LOGGED BY: CIRCULATION: R. Read Air IOR 5/6 etc refers to Munsell Colour Chart DATE: 3.5.79 SHEET...1.... OF.....1....

PROJECT	stı	Jart	Highway	- Pimba t	o Baker Well	DEPART	MENT O	MINES AND ENERGY-				HOLE N	o: PN	6202	, No
	ON OR (Out of H	El. Surface	н53-15,413	143 m	W	ATER WELL	LOG				35 LIN	TATE NO.	
SEC.		HD.		EL Ref. Point			otum	<u> </u>	<u> </u>			DM			
	•			DEPTH TO WATER CUT (m)	DEPTH TO STANDING WATER (m)		L TESTED		SUPPLY		TOTAL	DISSOLVE		LIDS	
		AQUIF	ER		The state of the s	From:	To:	· ,kilolitres/day**	Test Length (hrs)	Method	milligrammes/litre	Analysis W—	· No:		
	C		DV.	30		30	60	5	·	Air lift		• •			
	. "3	UMMA	KY:					· :·							
\						L									
DEPT From	H (m)	GRAPHIC LOG		EDIMENT	·:	GE	orogic	AL DESCRIPTION		FORM	ATION / AGE	DEPTH CORE		CASING	
								•			*;**	SAMPLE	D1a(mm)	From(m)	To(m)
0 3 6 9	3 6 9 15		Claye Claye Sandst Sandst	sand one	sand. Som Coarse poo with brown 30% sample 70% white softed qua sub-angula As above	e ca rly , ye as fria rtz r gr	lcre soft llow above ble sand ains	te. ed angular and white silty coars stone. Ang	se poorly gular to	Pleis Creta Cadna	stocene aceous, a-Owie ation?				
18	30		Sandst	one	;	te s	ilty	quartz sar							
						***					-		3		
REM/	ARKS:			* NO	OTE: 110 kl / day = 100	Ogals / hr.	•	43 4 1	•	DRILL TYPE:	Rotary	COMPL	ETED:	10.1	11.7
			Hole aba	ındoned		:	:			CIRCULATION:	Air foam	LOGGE	D BY: F	R. Re	ead .
										SHEET 1]	of2	DATE:	10.1	11.79	ᢖ

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Stuart Highway - Pimba to Baker PROJECT: DEPARTMENT OF MINES AND ENERGY-SOUTH AUSTRALIA HOLE NO: PN6202, No.1 Well **WATER WELL LOG** UNIT / STATE NO. LOCATION OR COORDS: Out of Hundreds SH53-15,413143 6135WW88 El. Surface SEC. EL Ref. Point DM . INTERVAL TESTED SUPPLY TOTAL DISSOLVED . SOLIDS DEPTH TO DEPTH TO WATER CUT (m) STANDING WATER (m) From: Test Length (hrs) Analysis No: kilolitres/day Method milligrammes/litre **AQUIFER** w-SUMMARY: DEPTH (m) GRAPHIC DEPTH CASING **ROCK / SEDIMENT** GEOLOGICAL DESCRIPTION FORMATION / AGE CORE LOG NAME From To SAMPLE Dia(mm) From(m) To(m) 30 39 Sandstone Very coarse silty white sandstone. 39 42 Sandstone Similar to above with pebbles of quartzite up to medium gravel size. Pink colour marks top of weathered Pandurra Formation. 42 60 Sandstone Samples consist mostly of sand caved from Torrensian, above. Pink colour and chips of friable Pandurra red-brown fine grained poorly sorted Formation sandstone show that the hole is in weathered bedrock. REMARKS: COMPLETED: 10.11.79 * NOTE: 110 kl / day = 1000gals / hr. DRILL TYPE: Rotary CIRCULATION: Air foam LOGGED BY: R. Read SHEET 2 OF 2 DATE: 10.11.79

HOLE NO: PN6202 NO2 DEPARTMENT OF MINES AND ENERGY-SOUTH AUSTRALIA MOJECT: Stuart Highway - Pimba to Baker ENGINEERING DIVISION Well **WATER WELL LOG** UNIT / STATE NO. LOCATION OR COORDS: Out of Hundreds SH53-15, 413145 6135WW89 El. Surface DM : SEC HD. EL Ref. Point DISSOLVED SOLIDS SUPPLY TOTAL INTERVAL TESTED DEPTH TO DEPTH TO WATER CUT (m) STANDING WATER (m) Test Length (hrs) Me thod milligrammes/litre Analysis No: From: kilolitres/day # **AQUIFER** w --- · 를 hour Air lift 18000 E2C2b. 30 30 60 130 SUMMARY: 12000 ma/1 DEPTH CASING DEPTH (m) GRAPHIC ROCK / SEDIMENT ... FORMATION / AGE CORE GEOLOGICAL DESCRIPTION SAMPLE Dia(mm) From(m) LOG · NAME To(m) Τo From 150l 36 6 Sandstone Brown coarse poorly sorted, lightly Cretaceous, 0 silicified. 36 White and brown very coarse silty poorly 510ts 30 9 Sandstone Cadna-Owie sorted. Formation? Medium grained, white silty and poorly 12. Sandstone sorted. 12 15 Sandstone Medium orained moderately well sorted white silty sandstone. Moderately well indurated. Sandstone Coarse white poorly sorted quartz sandstone 15 21 21 24 Sandstone As above, well cemented 27 24 Sandstone As above, less cemented COMPLETED: 12.11.79 DRILL TYPE: Rotary REMARKS: * NOTE: 110 kl / day = 1000gals / hr. CIRCULATION: Air foam LOGGED BY: R. Read

A-17

DATE: 12.11.79

SHEET ... 1 OF ... 2

		NOR COORDS: Dut of Hundreds SH 53-15,413145 WATER WELL LOG El. Surface m HD. El. Ref. Point m Datum									UNIT / STATE NO. 6135WW89				
	•			DEPTH TO	DEPTH TO INTERV		D	TOTAL	DISSOLVED . SOLIDS						
	A	QUIFE	R ·	WATER CUT (m)	STANDING WATER (m)	From: To:	kilolitres/day*	Test Length (hrs)	, Me thod	milligrammes/litre	Analysis No:				
SUMMARY:											w -				
PTH	i (m)	GRAPHIC	ROCK / SI	DIMENT						DEPTH CASING					
	To.	roc	NA	ME		GEOLOG	ICAL DESCRIPTION	•		FORMATION / AGE	CORE SAMPLE	Dia(mm)	From(m)	To(m)	
	30 33		Sandstone As above, fragment of large quartzite cobble. Sandstone As above with quartzite pebbles												
	36		Sandst		Sample as above, but brown colour indicates change. Torrensian,								•		
	60		Sandst	one	Cretaceous	s. Chi	chiefly of o ps of red bi micaceous n	cown weathe	red	Pandurra Formation					
MARKS:				* NOTE: 110 kl / day = 1000gals / hr.			.: · · ·			∈Rotary Hammer		COMPLETED: 12.11.79			
				•				CIRCULATION: Air			LOGGED BY . Read				
			•					•	CHEET			12	11.7	ď	

mouser Stuart Highway-Pimba to	Baker Well bepartment of white own energy south succession		HOLE NO! PN6	•	
	SH53-15, 413145 WATEN WELL LOG		6135WW		
EI. Surface EEC. HD: EURaf. Paint	m Datum		DM-	• :	
рертн то	DEPTH TO INTERVALTESTED SUPPLY		ISSOLVED SOLI	D\$	
AQUIFER	STANDING WATER (m) From: To: killel tres/day tast scoots (krs)	Nethod milligrammes/litro	Analysts No:		
SUMMARY: 33	33 42 130 g hour	13000 mg/i		· •	
DEPTH (m) GRAPHIC ROCK / SEDIMENT	GEOLOGICAL DESCRIPTION	FORMATION / AGE	CORE SAMPLE DIA (mm) F	rom(n) to(n)	
0 3 Sahd	Brown clayey sand.	.Pleistæne	150	0 42	
3 6 Sandstade	Brown silicified sandstone	Cretaceous	dots	36 42	
5. 12 Sand	Coarse to very coarse brown clayey sand	Cadna -Ourie		7	
12 18 Sandstone	Very coarse pebbly poorly sorted white and silty.	Formation			
18 21 Sandstone	Coarse, poorly sorted white and silty				
21 30 Sandstone	Medium grained, similar to the above				
30 36 Sandstone	Very coarse, similar to the above				
36 39 Sandstone	Similar to the above with large quartzite pebbles				
39 42 Sandstone	Firm silty medium grained white poorly sorted sandstone	Pandurra Formatio	n		
REMARKS:	DRILL TYPEROtary Hammer	COMPLETED: 13.11.79			
		circulation: Air foam	LOGGED BY: R	. Read	
		SHEET 1 OF 1	DATE: 13.	11.79	

Monca Stuart Highway - Pimba to Baker Well MINES DEPARTMENT - SOUTH AUSTRALIA HOLE NO: 2 ENGINEERING DIVISION WATER WELL LOG LOCATION OR COORDS: UNIT / STATE NO 6235WW62 EL Surface SEC. HD. DM INTERVAL TESTED SUPPLY DEPTH TO DEPTH TO TOTAL DISSOLVED SOLIDS WATER CUT (m) STANDING WATER (m) From: kilolitres/day* Test Length (hrs) Method milligrammes/litre Analysis No: **AQUIFER** w ---104 104 106 19.2 80 Airlift **SUMMARY:** DEPTH (m) ROCK / SEDIMENT GRAPHIC DEPTH CASING GEOLOGICAL DESCRIPTION FORMATION / AGE NAME . CORE LOG From To SAMPLE Dia(mm) From(m) To(m). Red brown silty poorly sorted sand 0 Sand Recent 6 Clayey Sand Brown light grey and yellow clayey sand 9 Weathered Shale Brown grey and yellow clay Woomera Shale 18 Shale Dark brown micaceous shale. Very soft due to weathering 18 120 Siltstone Light green grey micaceous shaly siltstone interbedded with micaceous dark brown siltstone 120 147 Siltstone Medium grey dolomitic siltstone, finely Tapley Hill laminated Minor pyrite Formation DRILL TYPE: Rotary/Hammer REMARKS: COMPLETED: 6.4.79 * NOTE: 110 kl / day = 1000gais / hr. CIRCULATION: LOGGED BY: Air R. Read SHEET 1 OF 1 DATE: 26.4.79

PROJECT: MINES DEPARTMENT - SOUTH AUSTRALIA Stuart Highway - Pimba to Baker Well HOLE NO: 2A ENGINEERING DIVISION WATER WELL LOG LOCATION OR COORDS: UNIT / STATE NO 6235WW63 EL Surface SEC. HD. EL Ref. Point DM INTERVAL TESTED SUPPLY DEPTH TO DEPTH TO TOTAL DISSOLVED SOLIDS WATER CUT (m) STANDING WATER (m) From: To: kilolitres/day* Test Length (hrs) Me thod milligrammes/litre Analysis No: **AQUIFER** w-44 44 48 20 Airlift SUMMARY: 78 44 79 65 11 DEPTH (m) **ROCK / SEDIMENT** GRAPHIC DEPTH CASING GEOLOGICAL DESCRIPTION FORMATION / AGE CORE LOG NAME From To SAMPLE | Jia (mm) From(m) 0 Soil/Weathered Siltstone Clayey sand Recent 9 Weathered Siltstone Brown Clay Woomera Shale 15 Weathered Silt-Very soft brown and yellow fragments of Stone siltstone 15 36 Siltstone Dark brown and light grey coarse laminated siltstone. Weathered. 36 126 Siltstone Interbedded dark brown and light green grey siltstones. Fine to coarse. DRILL TYPE: Rotary 10.4.79 REMARKS: * NOTE: 110 kl / day = 1000gals / hr. COMPLETED: Air CIRCULATION: LOGGED BY: R. RODA SHEET 1 OF 1 DATE: 26.4.79

PROJECT: Stuart Highway - Pimba to E					to Baker L	Baker Well MINES DEPARTMENT — SOUTH AUSTRALIA ENGINEERING DIVISION							HOLE NO: 2 1					
LOCATIO	ON OR (COORDS:				WATER WELL LOG									6235WW64			
EL Surface SEC. HD. EL Ref. Point			m															
	1 2	HD.		EL Ref. Point		m Datum		•					DM					
				DEPTH TO WATER CUT (m)	DEPTH TO STANDING WATER (m)	From:	L TESTED	* **	SUPPLY	·.			ISSOLVE		LIDS			
	. 🖊	AQUIFE	R			From:	To:	kilolitres/day*,	Test Length (hrs)		Me thod .	milligrammes/litre	Analysi W —	s No:				
	S	UMMAI	RY:	65 7 5	43 47	43 43 63	65 77 145	20 100 200		Α.	irlift irlift irlift	20 000	w —		Ì			
-	H (m)	GRAPHIC	ROCK / SE	I		GF	OLOGIC	AL DESCRIPTION					DEPTH CORE	CASING				
From	To	log	NA:	ME				AL DESCRIPTION			FORMATION / AGE			Ola(mm)	From(m)	To(m)		
0 3 6 15 27	3 6 15 27 30		Sandsto Sandsto Sandsto Sandsto	one one one	White Very pale sorted qua angular gr Similar to Medium bro sandstone White medi	Mi brow irtz ains abo	nor on me sand	dium grain stone, rou yellow bro hite claye	y claystone ed moderate nded to sub	ly -	Membei	na Quartzite of Tent ormation		150	0	2.		
					sandstone		•											
REM/	ARKS:		•	* N	OTE: 110 kl / day = 1000	Ogols / hr.	•			,	DRILL TYPEROT	ary Hammer	COMP	LETED:	30.3	.79		
							•				CIRCUI ATION:	۸ir	1000	TO RYI	R. RE	EAD		
											SHEET1.	Of2	DATE:		5.4.			

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PROJECT:			,		MINES DEPARTMENT — SOUTH AUSTRALIA ENGINEERING DIVISION						HOLE NO:					
LOCATION OR COORDS:						WATER WELL LOG						UNIT / STATE NO 6235WW64				
SEC.		HD.		EL Surface EL Ref. Point	m Datum							DM				
				DEPTH TO DEPTH TO WATER CUT (m) STANDING WATER (m		DEPTH TO INTERVAL TESTED		SUPPLY		TOTAL		DISSOLVED SOLIDS				
		QUIFE				From: To	: kilolitres/day*	Test Length (hrs)	Method	milligrammes/litre	Analysi	s No:				
	^	QUIL	.n								w					
	SU	JMMA!	RY:													
										·						
DEPTI	1 (m)	GRAPHIC	ROCK / SI			GEOLO	GICAL DESCRIPTION		FOR	FORMATION / AGE		DEPTH CASING				
From	To	roc	NA 	ME .		WATION / AGE	SAMPLE	Ola(mm) F	rom(m) To(m)							
									•							
36	48	i	Sandst	one	Medium ore	ev and	light brown	well		·						
			00				ous sandsto	ne								
4.0	6.0		0 - 4-1		00 - 12			•								
48	68		Sanost	tone Medium brown medium grained micaceous sandstone												
68	144		Siltst	one		rown with interbedded light grey micaceous siltstone.			Мооше	Woomera Sha le						
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RFM	TEKC.	<u>. </u>	<u> </u>		OTE: 110 kl / day = 100	Oggals / hr			DRILL TYPE:		СОМІ	PLETED:				
REMARKS:				*11	2. 110 M / GUY - 100	loogus / III.			CIRCULATION		LOGGED BY:					
					•				2	OF2	DATE					





