DEPARTMENT OF MINES

SOUTH AUSTRALIA

GEOLOGICAL SURVEY
PETROLEUM SECTION

LIGHT NO. 1

WELL COMPLETION REPORT

by

B. E. Cornish,
Geologist.

P

11th November, 1964.

DEPARTMENT OF MINES
SOUTH AUSTRALIA

LIGHT NO. 1

WELL COMPLETION REPORT

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G.S. 3009
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11.11.64

DEPARTMENT OF MINES
SOUTH AUSTRALIA

LIGHT NO. 1

WELL COMPLETION REPORT

SUMMARY

Light No. 1 was drilled on shot point E 126 subsequent to the Middle Beach Seismograph Survey which was conducted by the South Australian Department of Mines No. 1 Seismic Party during the months of July and August, 1964.

The purpose of the well was primarily to determine the depth to basement in this locality to assist in the correlation of seismograph records, and secondly to further stratigraphic information within the Adelaide Plains Area.

The well was drilled with a Failing 1500C Rotary rig owned and operated by the South Australian Department of Mines. From seismic data basement was expected to be intersected at a depth of approximately 600 ft. subsurface.

Drilling commenced on the 6th August, and a normal Quaternary and Tertiary sequence was encountered down to a depth of 561' at which stage Precambrian Quartzite was intersected, however there was a noted absence above the unconformity of any of the expected North Maslin Sands.

Drilling was completed on August 14th, 1964, at a total depth of 563 feet.

A Gamma Ray log was run from the surface to total depth by the Exploration Geophysics Section of the South Australian Mines Department on completion of drilling.

Two distinct water bearing zones were encountered in the well. The producing intervals were from 194-225' (Dry Creek Sands) and 535'-545', a sand sequence within the Blanche Point Marls.

Water from these zones rose to static levels of 11 feet and 15 feet respectively from the surface and both water samples had a total solid content of approximately 8000 p.p.m. - 9000 p.p.m.

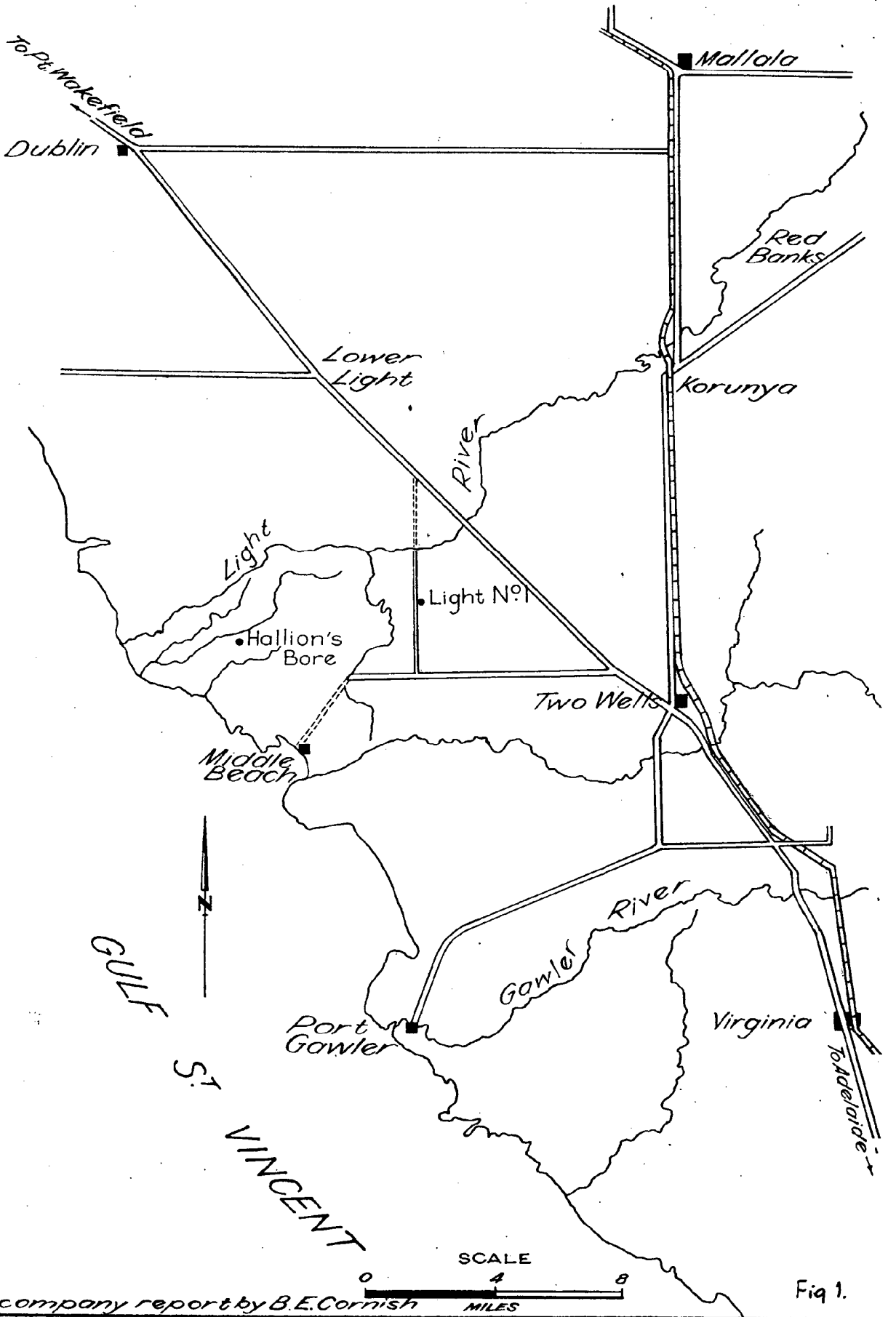


Fig 1.

accompany report by B.E. Cornish

S.A. DEPARTMENT OF MINES

Approved	Passed	Drn.	LIGHT Nº 1 BORE LOCALITY MAP	D.M.	Scale 4m. to 1 in.
		Tcd.G.M.		Req.	S3909
		Ckd.			GJ8
Director		Exd.			Date 14·10·64

300—6.60 6640

No significant amount of hydrocarbons was detected. The well was plugged and abandoned on August 21, 1964.

GENERAL WELL DATA

Well name and number:

South Australian Government Light No. 1

Location: General - 4 miles WNW Two Wells township

Latitude 34°34.5' S

Longitude 138°25.5' E

Elevation: Ground - 30' AMSL

Kelly Bushing - 33' AMSL

Map Reference:

4-mile Military Sheet - Adelaide

1-mile Military Sheet - Vincent

Hundred - Port Gawler

Shire Council road area of Mallala.

Oil Exploration Licence Area:

O.E.L. : 24

Licence : Beach Petroleum N.L.

Total Depth: 563'

Date Drilling Commenced: 6.8.1964

Date Drilling Completed: 14.8.1964

Date Well Completed: 21.8.1964

Status: Plugged and abandoned. (Cemented at surface).

INTRODUCTION

The aim of the stratigraphic test was to determine the depth to basement and provide stratigraphic information on the overlying sediments. It was interpreted from seismic results at that time that basement was at approximately 600 feet subsurface at Shot point E 126.

In conjunction with the seismic survey of the Adelaide Plains Area carried out by the No. 1 Seismic party, it was decided to use one of the shot hole drills currently with the seismic party

to drill the stratigraphic test at shot point E 126 which is approximately 4 miles NW of Two Wells township.

The drilling operation was conducted by the Mechanical and Boring Branch of the S.A. Department of Mines under the supervision of Messrs. D. P. E. Limb and R. B. Strempel.

Well site geology was carried out by Mr. B. E. Cornish (Petroleum Section). The assistance of Mr. J. M. Lindsay in palaeontological matters and Mr. C. Bleys in Hydrological investigations is gratefully acknowledged.

The Gamma Ray log was run by Mr. R. Turner (Geophysics) and witnessed by Mr. B. E. Cornish.

PHYSIOGRAPHY AND ACCESS

The site of Light No. 1 is approximately 30 miles due north of Adelaide and 4 miles NW of Two Wells township on the flat featureless coastal plain between the Main North Road and the swampy coastal margin of the Gulf of St. Vincent.

The site can be reached by vehicle on a built up graded gravel road by turning west off the main highway approximately 1 mile north of Two Wells township, onto the Middle Beach road and travelling approximately 3 miles west and then turning north for 1 mile towards the Light River. (See Fig. 1).

The better soil areas are under cereal crop and pasture while the more saline low lying swampy areas are as yet undeveloped and are generally restricted to the coastal regions.

WELL HISTORY

Operator: The South Australian Department of Mines, Mechanical and Boring Branch, Dalgleish Street, West Thebarton, South Australia.

Drilling Rig: Failing 1500C Rotary Rig.

Hole size and casing: A $6\frac{3}{4}$" Hawthorn Finger Bit was used to drill to a depth of 16 feet, after which 8 feet of 6" conductor pipe was set in place with the flow head attached.

The remainder of the hole from 16 feet to the total depth of 563 feet was drilled with various $4\frac{3}{4}$" rock bits except for the two cores cut over the intervals 458'-470' and 561'-563' using a 3.907" Mindrill Diamond Core Bit and Barrel.

TABLE 1 BIT RECORD

Bit No.	No. of Bits Used	Size	Bit Type	Interval
1	1	6¾"	Hawthorn Finder	0 - 16'
2	1	4¾"	Hawthorn	16'-180'
3	1	4¾"	Varel V3	180'-409'
4	1	4¾"	Williams OOH	409'-458'
4(a)	1	3,907"	Mindrill Diamond Bit	458'-470'
4	used again	4¾"	Williams OOH	470'-540'
5	1	4¾"	Varel V1	540'-561'
4(a)	used again	3.907"	Mindrill Diamond Bit	561'-563'

The above table of the Bit Record shows that five rotary rock bits were used and one Mindrill 3.907" Diamond Core Bit in the drilling of Light No. 1.

Drilling Fluids

A bentonite and water based mud was used with caustic and tannin additives as dispersing agents. No serious mud losses were encountered, however some thinning and lowering of viscosity was observed after penetrating the water bearing Dry Creek Sands.

Water Supply

Water was carted 2 miles from a bore on the seismic party location near Two Wells, the supply was from the Dry Creek Sands at a depth of approximately 200 feet.

Fishing Operations

No fishing operations were conducted.

Perforations

No perforation operations were conducted.

Plugs

A cement plug was spotted at the surface to seal off the well as it was located on the council roadway, and another at 190' to separate the main water bearing zones.

Sampling, Coring, Testing and Logging

Ditch Cuttings

Over the interval 0-563' samples were collected at 10 foot intervals, with 5 foot representative samples being taken during coring.

Coring

Two cores were cut in Light No. 1 as summarised in Table II below.

TABLE II

Core No.	Interval ft.	Recovery		Coring Equipment	Formation
		Ft.	%		
1	458' - 472'	12	100%	Mindrill	Blanche Pt. Marls
2	561' - 563'	2	100%	double barrel bottom discharge	Precambrian

The total footage cored was - 14 feet

Recovery was - 14 feet or 100%

Distribution and Storage of Ditch Samples and Cores

The samples were collected and marked by the geologist on site and a cut was made for reference. The remainder was bagged and dried for palaeontological examination and storage at the Core Laboratory of the South Australian Department of Mines, Thebarton, S.A.

Gamma Ray Logging

A radiometric log was run from the surface to total depth of 563' by the Exploration Geophysics Section of the S.A. Department of Mines using a full scale deflection of 2 units per second for maximum sensitivity on the Gamma Ray Logger.

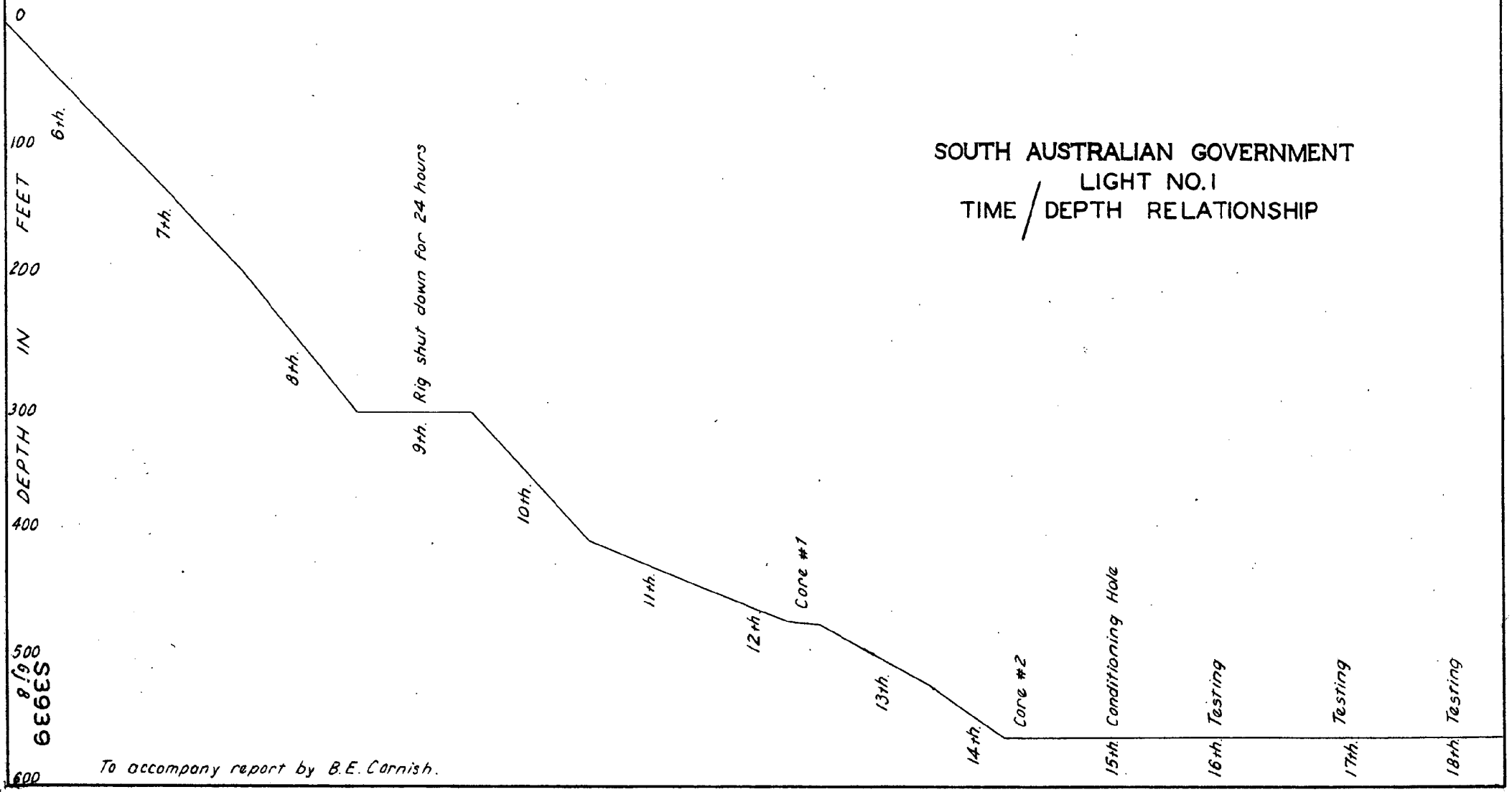
The Gamma-Ray Log was the only wire line survey conducted in Light No. 1.

Drilling Time

The time taken to drill each 10 feet was recorded by the driller and entered in the geological log sheet. Drilling times

Fig 2.

SOUTH AUSTRALIAN GOVERNMENT
LIGHT NO. 1
TIME / DEPTH RELATIONSHIP



To accompany report by B.E. Cornish.

Fig 8
S3939

at 1 foot intervals were recorded during coring operations and when critical sections were being drilled.

The drilling rate or rate of penetration is graphically recorded in mins./10 ft. on the composite log and the progress rate which includes time to make connections was recorded in the form of drilling rate expressed in feet per hour.

The time depth relationship expressed in hours since spud date is shown in fig. 2.

Hydrocarbon Detection

No mud gas analysis unit was considered necessary for the monitoring of the mud however each sample before being dried was checked under a portable Ultra Violet Unit to detect the presence of any hydrocarbons in the cuttings.

Formation Testing

No drill stem tests were conducted, however testing of particular water bearing zones was conducted with a bailer.

The zones tested are as follows:

530' - 563' in the Blanche Point Marls

235' - 382' in the Port Willunga Beds

194' - 225' in the Dry Creek Sands

The results of the testing are described in the following chapter dealing with the Well Completion.

Deviation Surveys

No deviation surveys were conducted at Light No. 1

Temperature Surveys

No temperature surveys were conducted at Light No. 1

WELL COMPLETION

Light No. 1 reached a total depth of 563' on the 14th August, 1964, the hole was conditioned and the gamma-ray log was run on August 17th.

On the 18th August a testing programme was designed to evaluate the various water bearing zones of the well.

TABLE III

The zones that required testing were		thickness
(1)	- 530 feet - 563 feet	33'
(2)	- 235 feet - 382 feet, that is a total of 197' which had to be done in stages of 20'.	197'
(3)	- 194 feet - 225 feet	31'

It was considered that the testing could be accomplished by back filling the bore with mud after each zone was tested, this mud would then control the lower zone waters. A packer to suit NX casing was made up by the Works Depot Machine Shop, and used with a line of NX casing above a bottom slotted 10 foot length of NX casing.

This method proved successful with the testing being carried out using an AX Casing Slush Pump.

Testing operations commenced on the 19th August and samples were collected at various intervals from total depth to the surface.

The two main water bearing zones were 535' - 545' and 194'-225', the lower zone after bailing produced moderate quality water of between 8000 and 9000 ppm total solids on the Salinity Bridge, while the upper zone produced much the same quality water with a total solid content of approximately 7000-8000 ppm.

The lower zone on being allowed to attain equilibrium reached a static level of 15 feet below surface level, while the upper zone reached a static level of 11 feet sub-surface.

During the bailing of the upper zone the well flowed water for two periods of approximately 5 minutes each, however this was actually due to the unequal pressure head developed between the clean water within the casing and the drilling mud outside the casing, such that as the water and mud was bailed from inside the NX casing the heavier drilling mud due to its greater weight per unit volume forced water to the surface from inside the casing, replenishing the supply from the water bearing zones.

Water samples were collected at various depths over the interval 382' - 235', however owing to the similarity of their total solid content values (measured with a salinity bridge) it was assumed that their source was actually the lower water bearing zone.

Analyses of water samples collected from Hallion's No. 2 Bore are given in detail in Appendix VI.

Table IV below illustrates the water sampling depths and the related physical data.

TABLE IV

Interval Tested 10' NX Casing Slotted	Total Solids using Salinity Bridge	Temp. °C.
200 - 225'	7800 ppm	16°C
260 - 270	5500 ppm	18°C
260 - 270	5700 ppm	18°C
320 - 330	5600 ppm	15°C
320 - 330	8800 ppm	20°C
520 - 530	8800 ppm	16°C
520 - 530 (flowing)	7800 ppm	16°C
Camp water for use in mud	280 ppm	16°C

Cement plugs were spotted at 190 feet, and just below the surface on the 21st August, to complete the well.

A complete water analysis is set out in Appendix IV.

GEOLOGY

Surface Geology

In the vicinity of the Light No. 1 Well, the surface is composed of essentially flat lying Quaternary alluvial plain deposits, consisting of clays, silts and sands.

Tertiary laterites outcrop west of Two Wells in the Freeling and Gawler-Willaston districts. The Tertiary section is relatively thin in these areas but thickens to the west and the south towards the Adelaide city area beneath the widespread Pleistocene - Recent plain deposits.

The nearest outcrop of basement to the Light No. 1 Well is found in a creek bed $4\frac{1}{2}$ miles N.E. of the township of Mallala.

The basement rock is part of the Torrensian series of the Proterozoic Adelaide System consisting of blue ribbon slates, minor sandy slates, and quartzites. The latter can most probably be related to the moderately dipping quartzites intersected at the base of the Light No. 1 Well. The outcrop is illustrated on the Kapunda 1-mile sheet and this map shows the structural relationship between the folded Adelaide System Rocks and the flat lying Quaternary plain deposits.

Lithology of the Light No. 1 Well

The principal reasons for drilling Light No. 1 Well were

1. To establish depth to basement.
2. To detect, log and evaluate any porous sand sections in the Tertiary sequence and to determine whether these sections contained good quality or saline waters.
3. To determine the stratigraphic sequence and to assist in the correlation of Light No. 1 with other wells in the St. Vincent Basin.

Below is a table illustrating the broad, lithological boundaries and the zones of porosity and permeability determined by lithology, drilling rates, and gamma-ray log characteristics.

TABLE V

Lithology	Depth KB +33'	Top MSL	Approx. Porosity	Water Bearing Total solids	Thickness
Silts and clays	Surface	+30	-	-	194'
Pale grey-yellow shelly sands	194'	-164'	20-30%	7000 ppm	31'
Bryozoal limestone	225'	-195'	10-20%	7000-8000 ppm	153'
Glauconitic marls, mudstones, siltstones.	378'	-348'	-	-	157'
Coarse quartz sand bed	535	-505'	15-20%	8000 ppm	10'
Glauconitic silty mudstones	545	-515'	-	-	16'
Grey Quartzite	561	-531'	-	-	2'+
TOTAL DEPTH	563	-533'			

The stratigraphy of the well is at present being studied in detail and the results will appear as an appendix on completion of the investigation. Meanwhile a brief description of the broad lithological units will suffice to provide the necessary information for which the well was originally designed.

Silts and clays — Surface to 194 feet

thickness - 194 feet.

Red-brown and grey mottled silty clays, sandy clays and clayey silts. With minor calcareous fragments scattered throughout, becoming more silty nearer the base to almost gritty in part.

Grey Shelly Sands — 194' - 225' approx.

thickness 31 feet.

Richly fossiliferous pale grey shelly sands, coarse poorly consolidated lamellibranch fragments, clear to opaque well sorted well rounded quartz sands. Porosity approximately 20-30%. Aquifer containing waters of approximately 7000-8000 ppm total solid

Bryozoal and saccharoidal sandy limestones

225' - 378'

thickness 153 feet.

Light grey-brown slightly glauconitic, bryozoal, sandy, recrystallised limestone. Much echinoid debris, mollusc and brachiopod fragments.

Pyritic and lignitic in part over interval 323' - 327'.

Becoming sandy, silty, recrystallised limestone and calcareous siltstone with brown clay pockets in part. Approximate porosity 10-20%.

Glauconitic Mudstones, Siltstones and bars of Siliceous Limestones and Marls.

378' - 535'

thickness 157 feet.

Dark brown-grey glauconitic pyritic mudstones and siltstones with numerous thin hard bands of siliceous grey limestones and marls.

Toward the base becoming black, lignitic, glauconitic pyritic soft mudstones and marls.

Quartz sands

535' - 545'

thickness 10'.

Coarse-medium grained highly polished well worted well rounded clear-opaque quartz sands, traces of pyrite and calcareous fragments. Approximate porosity 20-30%.

Water bearing zone of saline ground waters of approximate total solid content of 8000 ppm-9000 ppm.

Upper and lower boundaries being defined by the gamma-ray log.

Glauconitic Mudstone

545' - 561'

thickness 16 feet.

Black glauconitic pyritic lignitic mudstones.

Grey banded moderately dipping Quartzite

561' - 563'

thickness 2'+

Very hard light grey banded quartzite, with a moderate dip of approximately 30°.

Severely fractured at surface of unconformity with the fractures infilled with black glauconitic mudstones and shelly fragments.

Considered to be part of the Torrensian Series of the Proterozoic Adelaide System.

Porous and Permeable Sediments Penetrated

As mentioned above the two zones of interest are

(1) 194' - 225'

(2) 535' - 545'

These two zones show fair to good porosity and both contain saline waters, although having approximately the same total solid content as indicated by the Salinity Bridge these sections are considered to be separate aquifers. Both exhibit approximate porosity values of around 20-30%, these values are only visual estimates as quantitative values cannot be obtained from the gamma ray log.

The upper porous section contains very coarse shell fragments and is very loosely consolidated providing excellent conditions for an aquifer. The permeability is fair to good as the water level in the well remained reasonably static as the well was being bailed.

The lower porous section contains practically no shell fragments but consists almost entirely of highly polished quartz sand fragments well sorted and clear-blue to opaque in colour.

This section is porous and exhibits fair permeability as the static level of this aquifer was 15 feet below the surface, and remained reasonably constant during bailing.

Relevance to the occurrence of Petroleum

No evidence of hydrocarbons was detected at any stage during the drilling of Light No. 1 Well.

Hallions No. 1 well 7¼ miles west of Two Wells township was drilled to 603 feet in 1923 without reaching basement and it was reported that traces of oil occurred at 504 feet.

Subsequently Geosurveys Aust. Ltd. drilled Hallions Bore No. 2 in 1963 with negative results with regard to occurrence of Petroleum.

CONCLUSIONS

The drilling of Light No. 1 proved successful in that it achieved the objectives set out, namely to confirm the depth to basement to be of the order of 600 feet below surface and thus substantiate the seismic data calculations on the basement profile, and secondly to verify and ascertain the presence and the thickness of porous sections within the Tertiary Sequence of the Adelaide Plains Area of the St. Vincent Basin.

The porous sections are both aquifers containing saline ground water unfit for stock and irrigation purposes so that contamination of waters by further testing procedures to determine the extent and suitability of these aquifers for possible gas storage should not prove a serious obstacle.

The intersection of basement quartzite at a depth of 561' has proven conclusively the accuracy of the Two Wells - Middle Beach seismic survey sectional interpretations.

Brian R. Cornish

B. R. CORNISH,
GEOLOGIST,
PETROLEUM.

BRC:RMD
11.11.64.

REFERENCES

LINDSAY, J. M. - A Subsurface Section of the Adelaide Plains Basin from Grange to Port Wakefield. (Unpublished).

WEBB, B.P. & COONEY, A. M. - Report on Investigations of Hallions Bore. Geosurveys Aust. Ltd. for Beach Petroleum Ltd.

APPENDIX I

WELL STRATIGRAPHY

To be appended at later date.

APPENDIX II

SUMMARY OF GEOPHYSICAL WORK

by

K. R. SEEDSMAN

SUMMARY OF A REFLECTION SEISMIC SURVEY IN THE VICINITY OF LIGHT NO. 1 WELL - ADELAIDE PLAINS AREA

As the first stage of a reconnaissance reflection seismic survey in the Adelaide Plains, a continuous profile was shot along an irregular traverse northward from Port Gawler through Lower Light (see plan L64-171).

Record quality was generally fair, considering the thin sedimentary section (Tertiary) in the area. Observation Bore F, at Port Gawler, entered "basement" (Precambrian or Cambrian dolomit at 1148 feet. A time section along the traverse concerned (Line E is shown on the accompanying plan (L64-172). Adjacent to the Port Gawler Bore, primary reflections are recorded to a time of approximately 0.4 seconds. Northward, the section becomes thinner and beyond Lower Light the deepest, genuine, primary reflections are at less than 0.2 seconds.

Insufficient detailed velocity information is available to convert reflection times accurately to depths. For the purpose of identifying reflections, a constant average velocity of 5800 ft./sec. has been used to convert depths in Observation Bore F and Light No. 1 to the time scale on the section, and these depths are shown on the section. Stratigraphic boundaries from preliminary investigations were supplied by J. M. Lindsay (Port Gawler) and B. Cornish (Light No. 1). This velocity distribution is certainly not exact but may be a reasonable overall approximation.

The reflection of .200 secs. at ₱126 probably originates at the basement surface (530 feet below sea level). This reflection can be followed with good continuity northward to ₱165 (.168 secs. ≡ 485 feet below sea level) and southward to ₱60 (.331 secs. ≡ 960 feet below sea level). At ₱40, adjacent to Observation Bore F the reflection at .406 secs. probably originates from basement. This can be followed northward to ₱55 (.281 secs. ≡ 815 feet below sea level). Between ₱55 and ₱60 apparent structural disturbance results in poor records and the basement reflection can not be identified.

This basement reflection has been labelled "B" on the time section. Reflections plotted deeper than "B" are believed to be later legs of the reflection, ghosts or multiples and consequently do not indicate features within the basement.

Reflections from within the Tertiary sediments are less continuous than "B" and more difficult to identify geologically. One labelled "B-B" appears to originate within the Balcombian or Batesfordian beds of the Port Gawler Bore. It is almost flat-lying from Port Gawler to ₱73, beyond which, for unknown reasons, it is not recorded.

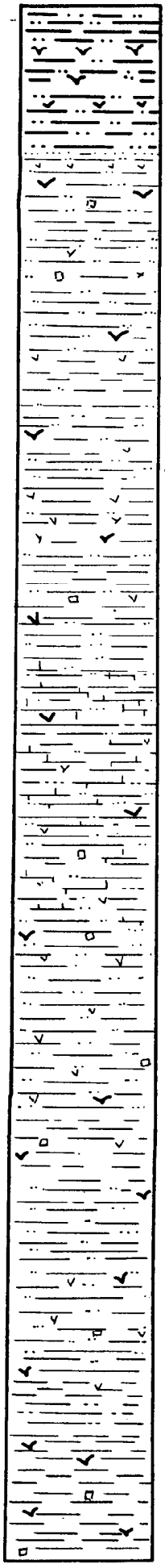
Another reflection ("BPM") at .277 seconds at shot point ₱40, apparently originates within the Blanche Point Marls. It can be traced to .251 secs. at ₱55. In this distance (9000 feet), the interval between this reflection and basement has thinned from approximately 375 feet to approximately 90 feet. Correlation of this reflection across the structural disturbance between ₱55 and ₱60 is very doubtful, but it may continue with very gentle southward dip to .227 seconds at ₱96. Here again it is only 90 feet above basement, and between this point and ₱126 (Light No. 1), this interval either wedges or is faulted out altogether.

The section generally shows gradual southward dip with minor faulting. No significant reversal of dip has been revealed by this line.

K. R. SEEDSMAN,
SENIOR GEOPHYSICIST.

APPENDIX III

CORE DESCRIPTIONS



Drilling Rate
mins/ft.

458

4 — Dark grey brown glauconitic slightly micaceous clayey mudstone

459

Gradationally becoming more shelly and silty dark grey-green brown glauconitic micaceous.

3½ — Clayey siltstone with worm burrows, slightly shelley.

466

3½

Grey-green glauconitic pyritic clayey siltstone.

461

2½

462

Dense dark grey-green glauconitic pyritic micaceous clay siltstone.

2

463

5 — Grey-green glauconitic calcareous pyritic micaceous siltstone.

464

7 — Friable grey-green glauconitic siltstone.

465

2

466

Dark green-brown glauconitic turritella clayey siltstone

2

467

3½ — Dark dense grey-green brown glauconitic clayey siltstone not as fossiliferous.

468

3

469

3½ — Dark grey-brown very fine grained pyritic glauconitic clay.

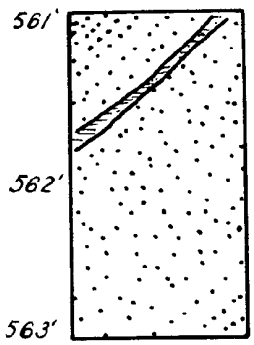
470

LIGHT NO.1

RECOVERY 12'-100% CORE NO.1 INTERVAL 458'-470'

S3938
Gj 8

accompany report by B.E. Cornish.



Fine grained sharply dipping quartzite sandstone
Very hard, fractured with fractures infilled with
black-brown glauconitic fossiliferous clays.
White-grey in colour with some dark banding.
Adelaide System Quartzites.

LIGHT NO.1 CORE 2
INTERVAL 561'-563'
RECOVERY 2'0" 100%

To accompany report by B.E. Cornish

S3937
Gj 8

APPENDIX IV

WATER ANALYSES

by

AUSTRALIAN MINERAL DEVELOPMENT LABORATORIES

GEOLOGICAL SURVEY OF SOUTH AUSTRALIA D.M.—C7

WATER ANALYSIS

Sample No. W258/64

Name and Address COUNCIL OF MALLALA

Location of Sample: Hundred TWO WELLS Section Adj. 344

Sample collected by B. E. Cornish Date 10.9.64

Analysis made by ..... and dated / /19

	P.P.M.
Chlorine, Cl	3695
Sulphuric acid (radicle), SO_4	1351
Carbonic acid (radicle), CO_3	289
Nitric acid (radicle), NO_3	-
Sodium, Na	2494
Potassium, K	-
Calcium, Ca	180
Magnesium, Mg	298
Silica, SiO_2	-
Total saline matter, Parts per million	8307
Total saline matter, Grains per gallon	
Total saline matter, Ounces per gallon	
Suspended matter	
Organic matter	

ASSUMED COMPOSITION OF SALTS	P.P.M.
Calcium carbonate	449
Calcium sulphate	-
Calcium chloride	-
Magnesium carbonate	28
Magnesium sulphate	1436
Magnesium chloride	-
Sodium carbonate	-
Sodium sulphate	303
Sodium chloride	6091
Sodium nitrate	-
Potassium chloride	-

HARDNESS

	P.P.M.
Total	1675
Temporary	482
Permanent	1193
Due to calcium	449
Due to magnesium	1226

Bore No. Lower Light Strat.No.1 Bore

Depth 563'

Water Level 11'

Water Cut 190-225' (No.1 sample)

Supply G.P.H. Not flowing

REMARKS

T. A. Barnes,
Government Geologist

10M—11.63 2329

GEOLOGICAL SURVEY OF SOUTH AUSTRALIA D.M.—C7

WATER ANALYSIS

Sample No. W259/64

Name and Address COUNCIL OF MALLALA

Location of Sample: Hundred TWO WELLS Section Adj. 344 (on Road)

Sample collected by B. E. Cornish Date 10.9.64

Analysis made by ..... and dated / /19

	P.P.M.
Chlorine, Cl	4690
Sulphuric acid (radicle), SO_4	1267
Carbonic acid (radicle), CO_3	251
Nitric acid (radicle), NO_3	-
Sodium, Na	2645
Potassium, K	-
Calcium, Ca	410
Magnesium, Mg	384
Silica, SiO_2	-
Total saline matter, Parts per million	9647
Total saline matter, Grains per gallon	
Total saline matter, Ounces per gallon	
Suspended matter	
Organic matter	

ASSUMED COMPOSITION OF SALTS	P.P.M.
Calcium carbonate	419
Calcium sulphate	822
Calcium chloride	-
Magnesium carbonate	-
Magnesium sulphate	861
Magnesium chloride	822
Sodium carbonate	-
Sodium sulphate	-
Sodium chloride	6723
Sodium nitrate	-
Potassium chloride	-

HARDNESS

	P.P.M.
Total	2603
Temporary	419
Permanent	2184
Due to calcium	1023
Due to magnesium	1580

REMARKS

Bore No. Lower Light No.1 Strat. Bore

Depth 563'

Water Level 11'

Water Cut 320-330' (2nd sample)

Supply G.P.H. Not flowing

T. A. Barnes,
Government Geologist

10M—11.63 2329

GEOLOGICAL SURVEY OF SOUTH AUSTRALIA D.M.—C7

WATER ANALYSIS

Sample No. W260/64

Name and Address COUNCIL OF MALLALA

Location of Sample : Hundred TWO WELLS Section Adj. 344

Sample collected by B. E. Cornish Date 10.9.64

Analysis made by ..... and dated / /19

	P.P.M.
Chlorine, Cl	4580
Sulphuric acid (radicle), SO_4	1240
Carbonic acid (radicle), CO_3	246
Nitric acid (radicle), NO_3	-
Sodium, Na	2583
Potassium, K	-
Calcium, Ca	406
Magnesium, Mg	372
Silica, SiO_2	-
Total saline matter, Parts per million	9427
Total saline matter, Grains per gallon	
Total saline matter, Ounces per gallon	
Suspended matter	
Organic matter	

ASSUMED COMPOSITION OF SALTS	P.P.M.
Calcium carbonate	410
Calcium sulphate	822
Calcium chloride	-
Magnesium carbonate	-
Magnesium sulphate	827
Magnesium chloride	803
Sodium carbonate	-
Sodium sulphate	-
Sodium chloride	6565
Sodium nitrate	-
Potassium chloride	-

HARDNESS

	P.P.M.
Total	2545
Temporary	410
Permanent	2135
Due to calcium	1014
Due to magnesium	1531

Bore No. Lower Light Strat. Bore No. 1

Depth 563'

Water Level 11'

Water Cut 530-540' (3rd Sample)

Supply G.P.H. Not flowing

REMARKS

T. A. Barnes,
Government Geologist

10M—11.63 2329

APPENDIX V.

LITHOLOGICAL DESCRIPTION

HALLIONS NO. 2 BORE

LOG OF CUTTINGS

Depth(ft.)	Description
0 - 6'	LIME-SAND, yellow white, weathers light grey, composed mainly of gastropod shells averaging 4-5mm with occasional gastropod and lamellibranch shells up to 3-4cms.
6 - 14'	CLAY, grey blue, becomes dark brown over lower 5 ft.
14 - 18	LIME-SAND, light brown white to light yellow, composed of fossils including gastropods varying in size from 0.5-10mm, lamellibranchs, scaphopods and foraminifera. The sand consists principally of gastropods and foraminifera.
18 - 20	CLAY, light yellow brown.
20 - 30	CLAY, light red brown mottled with grey, occasional dark brown clay pellets up to 1cm, few rounded clear quartz grains 1-2mm, few cream calcareous siltstone fragments.
30 - 40	CLAY, mottled light grey, red and light red brown, silty, few cream calcareous siltstone fragments and sub-angular quartz grains.
40 - 50	CLAY, mottled light grey, dark red, and light red brown, silty, few fragments of cream calcareous siltstone.
50 - 60	CLAY, as for 40-50'.
60 - 70	CLAY, as for 40-50'.
70 - 80	CLAY, as for 40-50'.
80 - 93	CLAY, generally light red brown with light grey and red mottling; silty.
93 - 94	KUNKAR-buff and brown, fine to medium grained calcarenite, hard. Numerous gastropod shells and ?lamellibranch fragments, few black quartz grains 1-2mm.
94 - 100	CLAY, mottled red and grey, some red brown, silty in parts, contains fragments of white calcareous siltstones.
100 - 110	CLAY as for 94-100'.
110 - 120	CLAY, red, some grey mottling, some cream siltstone fragments, few gastropod fragments.
120 - 130	CLAY, red, some grey mottling, red brown and silty in parts.
130 - 140	CLAY, generally red brown and yellow brown, some red and grey mottling, numerous 0.5mm clear quartz grains, occasional quartz grains up to 1cm.

140 - 150	CLAY, yellow brown to red brown, some red and grey mottling, silty, contains a few small (1mm) brownish quartz grains.
150 - 160	CLAY, yellow brown to red brown, some grey mottling, sandy contains numerous quartz grains 0.5-1mm.
160 - 163	SAND, red, fine grained (approximately 0.3mm), well sorted, forms poorly consolidated sandstone.
163 - 170	CLAY, mottled red, yellow brown and grey; sandy, few 5mm opaque quartz grains.
170 - 180	CLAY, red mottled with grey, some yellow brown, silty, occasional 5mm opaque quartz grains.
180 - 187	CLAY, red, mottled with grey and some yellow brown, silty, occasional 1mm quartz grains.
187 - 195	CLAY, green grey, mottled with yellow brown and red, very sandy, contains numerous opaque quartz grains 2-3mm, few lamellibranch fragments.
195 - 200	SHELL BED, composed of large (2cm) fragments of lammellibranch, gastropods up to 5mm, very sandy red brown and yellow brown clay and opaque quartz grains up to 5mm. Shells possibly reworked.
200 - 208	SHELL BED, as for 195-200'.
208 - 211	CLAY, grey blue, contains gastropods, lamellibranchs and ?bryozoans.
211 - 217	CALCARENITE, light grey to white, fine to medium grained, fair sorting, friable, contains bryozoans and fragments of porcelaneous calcium carbonate.
217 - 220	CALCARENITE, light grey to white, fine medium grained fair sorting, friable, contains fragments of porcelaneous calcium carbonate, and fragments of ?echinoid shells.
220 - 230	CALCARENITE, white, fine grained, well sorted, friable, large porcelaneous calcium carbonate fragments.
230 - 240	CALCARENITE, light grey to white, fine to medium grained, fair sorting, friable, contains bryozoans and foraminifera.
240 - 250	CALCARENITE, light grey, fine grained, well sorted, contains foraminifera, and ?echinoid fragments.
250 - 260	CALCARENITE, light grey to white, fine grained, well sorted contains foraminifera and ?echinoid fragments.
260 - 270	CALCARENITE, as for 250-260'.
270 - 280	CALCARENITE, light grey to white, well sorted, contains calcite veins, contains lamellibranch fragments, echinoid fragments, and small oval echinoids 2mm long.
290 - 300	CALCARENITE, light grey, fine to medium grained, fair sorting, minor glauconite in parts, contains oval echinoids up to 4mm, lamellibranchs and foraminifer

300 - 310 CALCARENITE, light grey fine to medium grained, fair sorting, minor glauconite in parts, few hard calcite veins, frequent echinoid fragments - mainly spines, contains a small brachiopod.

310 - 320 CALCARENITE, grey, fine to medium grained, fair sorting, glauconitic in parts, contains more impurities than calcarenite above, contains bryozoans, foraminifera and fragments (5mm) of large echinoids.

320 - 330 CALCARENITE, in part grey and green grey, medium grained, glauconitic, fair sorting, and in part light brown grey, fine grained, well sorted, hard, minor glauconite, contains bryozoans, small (4mm) circular echinoids and fragments and spines of larger echinoids.

330 - 340 CALCARENITE, in part light grey and grey, glauconitic in parts, medium grained fair sorting and in part light brown grey, fine grained, well sorted, hard, contains small (up to 5mm) circular and oval echinoids, a small brachiopod, and bryozoans.

340 - 350 CALCARENITE, in part light grey, grey and yellow some green, medium grained, fair sorting some glauconite and in part light brown grey and brown, fine grained, some glauconite. Contains small circular and oval echinoids and fragments of larger echinoids and echinoid spines, and ?bryozoans.

350 - 360 CALCARENITE, in part light grey, generally fine grained, fairly to well sorted, contains glauconite, forms hard angular fragments, and in part, light grey, medium grained, fair sorting, contains glauconite. Contains few small circular echinoids, fragments of large echinoids and lamellibranchs.

360 - 370 CALCARENITE, green grey, fine grained, fair sorting, very glauconitic and CLAY green grey, sandy, glauconitic, secondary calcite, contains small oval echinoids, echinoid spines and gastropods.

370 - 380 CALCARENITE, green grey, fine grained, very glauconitic, and CLAY green grey glauconitic, contains echinoids and lamellibranches.

380 - 390 CALCARENITE grey and green grey, very fine grained, glauconitic, contains calcite veins, and CLAY, green grey, glauconitic, contains bryozoans and lamellibranch fragments.

390 - 400 CALCARENITE, light grey, fine to medium grained, fair sorting, very glauconitic.

400 - 410 CALCARENITE, grey, fine grained glauconitic interbedded with LIMESTONE dark grey to black silicified, dense, glauconitic, contains gastropod and lamellibranch fragments.

410 - 420 CALCARENITE grey, fine grained, glauconitic and LIMESTONE, dark grey to black, silicified, dense, glauconitic. Contain lamellibranchs and gastropods.

420 - 430 CLAY, green grey, brownish in parts, glauconitic, silty, contains occasional fragments of dark brown clay.

430 - 440	CLAY, green grey, glauconitic, dark brown and lignitic in parts.
440 - 450	CLAY, brown, lignitic, some minor green grey glauconitic clay, few weathered gastropod shells.
450 - 460	CLAY, dark brown to black, lignitic, few small very silty lignite fragments, few lignitic gastropod fragments.
460 - 470	CLAY, dark brown to black, lignitic, glauconitic.
470 - 480	CLAY, dark brown to black, lignitic, contains few small very silty lignite fragments, minor glauconite, few gastropod fragments.
480 - 490	CLAY, dark brown to black, lignitic, some very silty lignite fragments, minor glauconite and pyrite, contains gastropod and lamellibranch fragments.
490 - 500	CLAY, dark brown to black, lignitic, also bands of black very silty lignite, contains gastropod and lamellibranch fragments.
500 - 510	CLAY, grey blue, and dark brown lignitic clay.
510 - 520	CLAY, grey blue, and some dark brown lignitic clay.
520 - 530	CLAY, dark brown to black, few very silty lignite fragments contains rounded quartz grains and lamellibranchs, gastropods and bryozoans - possible from above.
530 - 540	CLAY, dark brown to black, few very silty lignite fragments.
540 - 550	CLAY, as for 530-540'.
550 - 560	CLAY, dark brown to black, lignitic, few very silty lignitic fragments and SILTSTONE, grey, clayey, calcareous, poorly consolidated.
560 - 570	SILTSTONE, grey, glauconitic, clayey, poorly consolidated, contains minor gastropod and lamellibranch fragments and lignitic clay.
570 - 580	CLAY, dark brown to black, lignitic; some SILTSTONE grey glauconitic, clayey poorly consolidated. Contains fragments of gastropods and lamellibranch
580 - 590	SILTSTONE grey, glauconitic, poorly consolidated, clayey minor lignitic clay, contains gastropod and lamellibranch fragments.
590 - 603	SILTSTONE, grey brown, very poorly consolidated, clayey, some lignitic clay.

A. M. COONEY,
GEOLOGIST,
GEOSURVEYS AUST. LTD.

29.10.63

APPENDIX VI.

WATER ANALYSES FROM HALLIONS NO. 2 BORE.

Sample	Approximate Total Salts
A. HALLIONS BORE NO. 2	
1. Sample of artesian water flowing out of casing at surface. Sample taken on 7th October, 1963. Water probably from 180 ft. depth.	9,150 p.p.m.
2. (a) Sample of artesian water flowing out of casing at surface. Sample taken on 21st October, 1963. Water probably from 180 ft. depth.	9,256 p.p.m.
(b) Detailed analysis of this water:-	
Cl' SO_4 CO_3'' NO_3' Na^+ Ca^{++} Mg^{++}	
4960 788 200 Nil 2550 316 442	
Assumed composition of salts:-	
$CaCO_3$ $CaSO_4$ $MgSO_4$ $MgCl_2$ NaCl $NaNO_3$	Total
334 618 441 1382 6481 Nil	
Temporary hardness 334 p.p.m.	
Permanent Hardness 2273 p.p.m.	
B. HALLIONS BORE NO. 1	
Report of "a small flow of strong brine" (Mining Review No. 38-1923)	13 oz. Assuming this means 13 oz/gal. it is equivalent to approx. 5690 g.p.g. i.e. 81,300 p.p.m.
Sample of water in casing. The water was at ground level. The casing had been previously pumped clear of water from the top 15 feet. Over a period of at least one week the water rose in the casing to ground level. Sample taken on 17th October, 1963.	1,625 g.p.g. equivalent to 23,200 ppm.
Sample of water bailed from 4 feet depth in the casing. The casing had been reamed down to approximately 200 feet. Eight bailers of water were extracted prior to sampling.	30,300 p.p.m.
Sample from water tanker of water prior to its use in reaming process.	26,750 p.p.m.
Sample from mud pit at end of reaming project	36,600 p.p.m.
C. MISCELLANEOUS	
1. Sample of water in nearby creek	1,400 g.p.g.equivalent to 20,000 ppm.
2. (a) Sample of water in bore approximately 4¼ miles NE of Hallions Bore No.2 (Bore on land owned by Mr. Rowe, leased to Mr. Hein).	414 g.p.g.equivalent to 5,920 p.p.m. approximately.

Appendix VI Contd.

(b) Detailed analyses of this water:-

$CaCO_3$	$CaSO_4$	$MgSO_4$	$MgCl_2$	NaCl	Nitrates	Total
27.5	21.1	50.5	34.5	280.8	Nil	414.4 g.p.g.

Equivalent to:-

$CaCO_3$	$CaSO_4$	$MgSO_4$	$MgCl_2$	NaCl	Nitrates	Total
392.8	301.4	721.4	492.8	4011.4	Nil	5,920 p.p.m.

Temporary hardness 27.5 g.p.g.
Permanent hardness 93.7 g.p.g.

The bore was sunk to a depth of 230 feet into "coral limestone" (Bryozoan calcarenite?) in 1959.
Supply is 7,000 g.p.h.

REMARKS

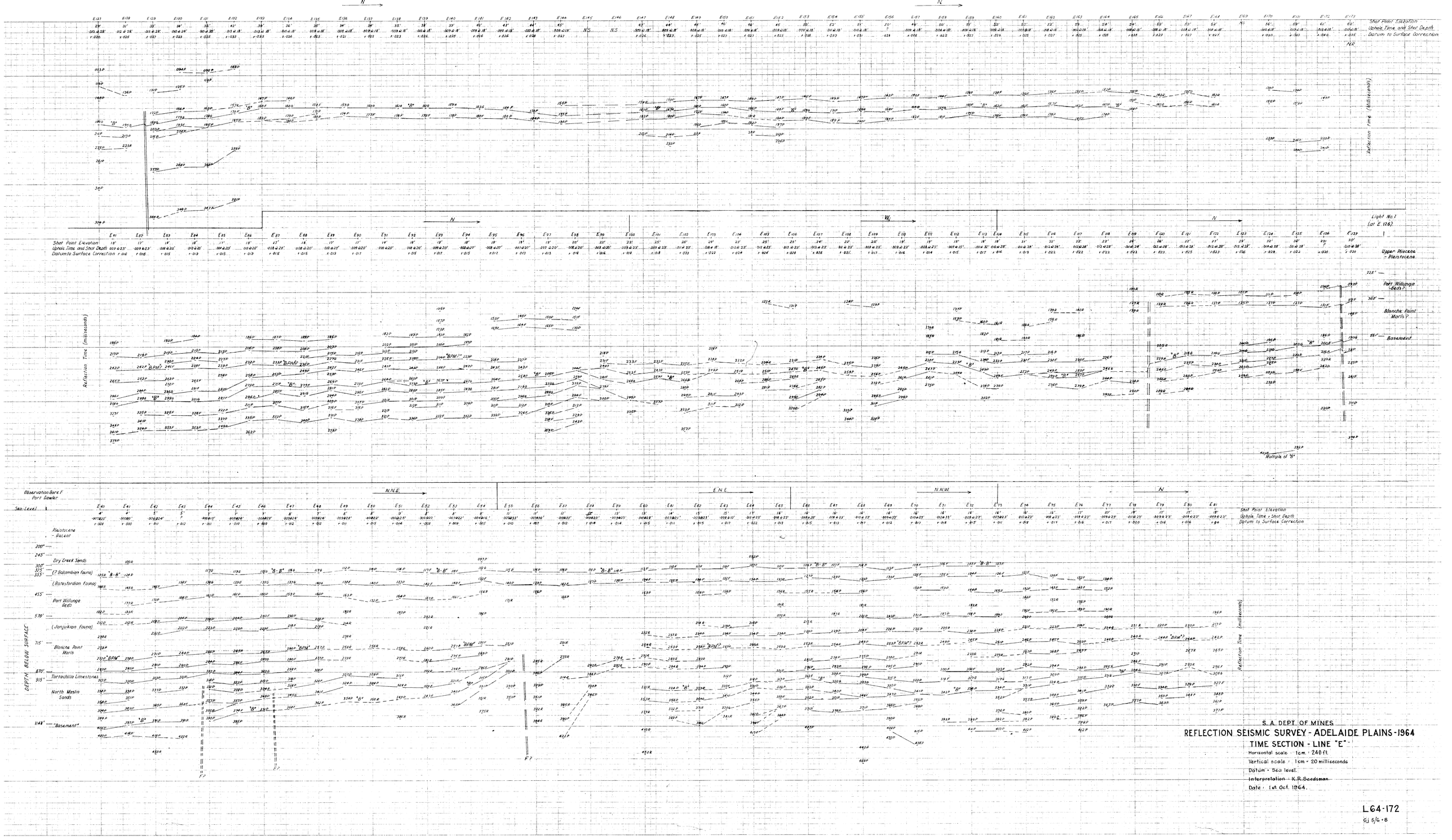
White crystals were in the water returns during the reaming of Hallions Bore No. 1. These were from the casing wall and probably had been precipitated from the salt water in the casing over many years.

Note

p.p.m. denotes parts per million
g.p.g. " grains per gallon

A. M. COONEY.
GEOSURVEYS AUST. LTD.

11th November, 1963.



S. A. DEPT. OF MINES

REFLECTION SEISMIC SURVEY - ADELAIDE PLAINS - 1964

TIME SECTION - LINE "E"

Horizontal scale : 1cm. = 240 ft.

Vertical scale : 1cm = 20 milliseconds

Datum - Sea level.

Interpretation - K.R. Seedsman.

Date : 1st Oct. 1964.

L64-172

Gj 5/6 - 8