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PIRIE TORRENS BASIN

1956 WILKATANA AREA REFRACTION SEISMIC SURVEY FINAL REPORT

Submitted by

Santos Ltd.
1956

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PRIMARY INDUSTRIES AND RESOURCES SA

CONTENTS ENVELOPE 32

TENEMENT: Not Related.

TENEMENT HOLDER: Santos Ltd.

REPORT: Seismic Refraction Surveys Wilkatana Area. Pgs. 3-58

PLANS: Nil.

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DEPARTMENT OF MINES

SOUTH AUSTRALIA

SEISMIC REFRACTION SURVEYS

WILKATANA AREA

by

J.L. Harris, Geophysicist

W.H. Parker, Asst. Geophysicist.

H.O. Report No. 41/118

Geophysical Report 15/55

G.S. 400

Accompanying Plans

S 1169-S 1170 - S 1171.

I 658/55.
151/56.

ABSTRACT.

Because a limestone layer entered by the percussion drill at 470 feet in Santos Bore No. 1, Wilkatana, was not refracted, it was necessary to assume a velocity for this bed in order to estimate an approximate minimum and maximum thickness. The velocity assumed was 12,000 feet/second and the depth to basement was calculated as a minimum of 540' and a maximum of 720'.

The interpretation of the second survey has been deferred pending completion of drilling in Bore No. 1 when a more accurate velocity determination for the limestone can possibly be made.

Even with this additional information however it will still only be possible to express depth to basement within certain limits.

Some difficulties experienced with the ABEM equipment have been discussed under the heading 'Seismic Equipment'.

INTRODUCTION.

During September and October two seismic refraction surveys were carried out in the Wilkatana area, 27 miles north of Port Augusta, by the Mines Department on behalf of Santos Limited (Oil Exploration License No. 7).

Following the finding of traces of a light honey coloured crude oil in Bore No. 1 it was suggested by Geosurveys of Australia Ltd., consultants to Santos Ltd. that an attempt should be made to locate a basement high in the immediate vicinity of the original hole. It is believed that tertiary sediments could possibly be draped in anticlinal form over this high and thus provide a structure favourable for the local accumulation of oil.

The purpose of the first survey centred on Bore No. 1 was to establish a direction and angle of dip of the basement.

The second survey was subsequently located approximately 4,500 feet away in an 'updip' direction.

PREVIOUS GEOPHYSICAL WORK.

During February 1955 gravity and magnetic observations were made in portions of the Pirie-Torrens Basin, extending 10 miles to the west of the Flinders Range escarpment and from Port Augusta in the south to the southern end of Lake Torrens in the north, by Geosurvey Ltd. Geophysicists .. Pegum and P. Mayman, (Santos Ltd. Report for Quarterly Period ended 30th April, 1955).

In the area in which the seismic surveys were conducted the magnetic survey shows a local anomaly passing through the Wilkatana Bore Site No. 1 with readings of the order of 1400 gammas; a small positive gravity anomaly of the order 1 milligal occurs slightly to the north of this magnetic anomaly.

GEOLOGY.

The geological formations of the Port Augusta area have been mapped in detail by Geosurveys Ltd. Details are included in the Port Augusta and Wilkatana geological map sheets (scale 1 mile to the inch).

The area covered in the survey is generally flat with a very fine loose sand cover to a depth of 20 - 25 feet. Occasional undulating sand dunes rise to a height of 20 - 30 feet, these being covered with pines and mulga trees whilst the flatter regions are thickly covered with spinnifex bush.

The following is an extract from a copy of a letter by L.C. Sprigg, Managing Director, Geosurveys of Australia Ltd., to Managing Director, Santos Ltd., relating to Bore No. 1.

> "Below approximately 200 feet of impervious part coloured clays the bore passed into lower tertiary white and grey and lesser sand with lignite beds and numerous showings of a light honey coloured oil. The sandy horizons harboured artesian waters with considerable hydraulic head".

At 470' the bore entered a limestone bed and is still penetrating this bed at 549' (Drilling has been temporarily suspended at this stage. The limestone has a specific gravity of 2.5 dry and 2.7 wet).

EQUIPMENT AND PERSONNEL.

Six personnel and three vehicles were engaged on each of the surveys. The personnel comprised a geophysicist, assistant geophysicist, senior electronic technician, explosives technician, driller, and a driver. A panel van was used to house and transport the equipment; a utility for carrying explosives, and a Land Rover for use by the explosives technician moving up and down the lines to set the charges.

Because of the amount of time required to drill the initial shot holes on the first survey it was necessary on the second survey to send a party of three in advance to prepare for the recording crew.

SEISMIC EQUIPMENT.

The seismic equipment (ABEM) was borrowed from the Bureau of Mineral Resources and was primarily designed for engineering problems such as finding depth to bedrock in dam sites.

The equipment was limited in range (a) as regards the time taken for the refracted ray to reach the geophone (b) with regard to the amplitude required to distinguish a 'first arrival break' from the straight recording line.

The equipment was fitted with an 'extension timing relay' which extended the length of the film passing through to almost any required length. There was, however, a point on the record, approximately 250-300 milliseconds from the 'shot instant' mark, where the release of the fixing relay caused a large back E.m.f. to be applied to the galvanometer recording the shot instant, and this in turn was applied to all the other galvanometers in the form of electrostatic cross talk. This cross talk often obliterated as many as three records when the first arrival occurred during this 'unbalanced period'. In the originally designed equipment cross talk did not present a problem since it would occur only on the last 10 - 20 milliseconds of the record.

The Amplifiers with the equipment were of relatively

simple design and had no bandwidth filters or automatic gain control. When shooting over relatively long distances such as at Wilkatana some amplifier gains had to be made very high with the result that very small noises due to wind and rain gave a fluctuating record which often made it difficult to interpret the first arrival. Tests were made with the geophones buried in the ground but the drop in the noise level was not found to be significant. Clearing of saltbush from an area around the geophones to overcome suspected noise from transmitted movements from the roots also failed to reduce noise background with gains set above 60.

With very short refractions the first arrival gave such a large amplitude on the galvanometer that cross talk occurred on other channels making it difficult to interpret first arrivals. It was not possible to determine accurately an amplifier setting to overcome this problem since the volume controls were not accurately calibrated and there was a risk of over correcting and thus not receiving any distinguishable signal.

Detonators used for firing the charges were No. 6 and No. 8 submarine electric detonators with resistances of 1.5 and 2.5 ohms respectively. With a cable loop resistance of approximately .475 ohms per 100 loop yards the resistance of a 1000 foot cable is approximately 1.55 ohms and only half the available heat is produced in a 1.5 ohm detonator.

The fuse of the detonator was fired via a bridge circuit from a large 132 μf condenser charged to approximately 70 volts.

METHODS USED.

Similar methods were used for each survey. Two lines each 3000 feet long and at right angles to one another were pegged at intervals of 100 feet. The bearing of each line and the elevation of the stations above sea level were determined by a departmental surveyor.

Originally it was intended to shoot the Wilkatana Southern traverses (Fig. 1) along one line only, up and down dip, this dip having been determined from the Wilkatana Bore traverses. Despite the comparatively short distance between the two surveys (4,500 feet), it was considered that the direction and angle of dip would not be the same for both since the Archaean basement is characterised by considerable variations in direction of strike and dip. A rather cursory analysis of the second survey results would appear to indicate that small changes in both direction and dip do occur. (Results of the Wilkatana Southern Survey will be interpreted upon completion of Bore No. 1).

Four shot points, located at intervals of 1000 feet and at the ends of the line, were used. The shot holes for the first four shots on each line were drilled with a specially made hand auger to depths varying from 3 feet to 15 feet depending upon the size of the charge. Where large charges were necessary the drilled holes were "bulled out". The remaining shots were fired in the craters, all loose earth having been removed and the charges subsequently covered with 4 - 5 feet of soil.

Sizes of charges varied depending upon the distance of the geophones (seismometers) from the shot points, smallest charges used were 1 lb. and the largest 50 lbs.

A reversed profile shooting technique was used for each line. The six geophones were spaced at intervals 5/100 feet and were retained in the same position whilst a shot was fired from each of the shot points. Five geophones were moved after each set of four shots, the sixth being retained in its original position so as to provide an overlap for tying in results. Twenty four shots were fired on each line and records were developed after every four shots before moving the geophones to new positions.

For the second survey special weathering shots were made with geophones spaced at intervals of 2 feet and 10 feet.

RESULTS.

First arrival times for each geophone on the records were plotted against geophone distances from the shot points.

From these graphs a velocity for each layer traversed was calculated. Corrections were made for variation in elevation and also to remove the effect of the top weathered layer. Since no special weathering shots were done for the first survey (Bore Site traverses), a weathered layer velocity and depth in this instance was determined from the first arrivals for the topmost layer. i.e. the layer immediately under the shallow weathered layer.

The surveys have been named. Bore Site Traverses and Wilkatana Southern Traverses.

Bore Site Traverses.

The following figures are based on the fact that all beds are homogeneous and that each successive layer has a higher velocity than the bed superimposed upon it. The average velocity of the weathered layer was found to be 1600 feet/sec. One refraction only was obtained other than this weathered layer refraction indicating that only two different velocity layers have been detected. The topmost layer has an average velocity of 6150 ft/second, and the bottom layer, the rather high velocity of 21,000 ft/sec. The bottom layer has an apparent dip of 3^{0} to the north on the N -S traverse and an apparent dip of 0.5^{0} to the east on the W - E traverse. The true dip is 3^{0} in a direction 036 M . Depths at either end have been calculated from intercept times and are:

Wilkatana Bore Site Traverses.

1.	North End (down dip)	573 feet
2.	Southern end (up dip)	489 feet
3.	Eastern end (down dip)	544 feet
4.	Western end (up dip)	525 feet

(A correction must be made for these values since a limestone layer was not refracted.)

011

INTERPRETATION.

The depths to basement are accurate only if each layer present beneath the surface provides a refraction. A study of the results alone would suggest a two layer formation sequence with the boundary between the beds having respective speeds of 6,150 ft/sec. and 21,000 ft/sec. dipping at an angle of 3° with the horizontal. Santos Limited sludge samples however show that a limestone bed was entered at 463 feet and is still being penetrated at 549 feet. This bed has apparently been completely masked by the higher speed basement layer. The possibility of the refracted layer being the limestone and the basement layer refraction not being recorded is extremely doubtful from consideration of layer velocity.

The 21,000 ft/second layer is interpreted as being basement rock.

(The velocities of longitudinal waves for various rock found in the earth's crust have a maximum value of the order 23,000 feet/sec. for metamorphic rocks, whilst for limestone bed the range is 7,000 - 20,000 feet/sec.)

Assuming a topmost layer velocity of 6,150 ft/second and a basement velocity of 21,000 feet/second it can be calculat that at a depth of 470 feet the following minimum thicknesses would be necessary before the limestone layer would be refracted

TABLE A

Limestone Velocity	Minimum Thickness for refraction (approx.)
18,000 ft./sec.	160 feet
17,000 ft./sec.	200 feet
15,000 ft./sec.	220 feet
12,000 ft./sec.	300 feet
10,000 ft./sec.	420 feet
8,000 ft./sec.	630 feet

Depths as calculated would need to be increased at the most by amounts equivalent to those shown in the table.

Approximate minimum thicknesses for various assumed velocities may be worked out as under.

TABLE B

Limestone Velocity	Approx. Minimum Thickness of Layer
18,000 ft./sec.	150 feet
17,000 ft./sec.	130 feet
15,000 ft./sec.	100 feet
12,000 ft./sec.	70 feet
10,000 ft./sec.	50 feet
8,000 ft./sec.	40 feet

The thicknesses in Table A are the minimum necessary to obtain a refraction. Since no refraction has been obtained these would in effect represent the maximum thickness the layers could have.

Minimum thicknesses in Table B are greatly influenced by intercept times, a variation of 1 millisecond may introduce an error up to 10%.

Whilst it is impossible to arrive at a velocity for the limestone without obtaining a refraction, from a study of the nature of the rock a velocity of the order of 12,000 feet/sec. seems feasible. Assuming such a figure the approximate depths to basement from Tables A and B are a minimum of 540 feet with a maximum of the order 770'.

CONCLUSIONS.

The time - distance refraction curve does not reveal the presence of a limestone bed penetrated by the drill at 470' and therefore the depth to basement calculated directly from the refraction curve is not a true depth. The correction to be applied for this limestone bed will depend upon the assumed velocity of the limestone material.

Seismic results have not revealed the presence of any fault as suggested possible from magnetic results.

The cross talk developed across the galvanometers by the firing signal does not appear on the records a constant time after the firing signal and time did not permit the tracing of this inconsistency. It is not believed, however, that this has materially affected the accuracy of the results.

Work was frequently delayed for long periods because the amplitude of the noise on the galvanometers caused by winds and rain was too large to permit detection of the first arrival. Delays could have been reduced by the presence of filters on the galvanometers.

Considerable time was also lost in drilling shot holes with the present hand auger equipment. It is suggested that consideration be given to the purchase of some mechanical drilling equipment if it is intended to carry out further seismic work.

Attempts to interpret the Bore Site traverses only have been made in this report and an interpretation of the Wilkatana Southern traverses will be made when drilling has ceased on bore No. 1.

ACKNOWLEDGEMENTS.

The writers wish to acknowledge the assistance given by Senior Technician A. Rousseau who was responsible for the modifications necessary to operate the equipment on work of this nature and also for the description of the seismic equipment.

J. L. Harris Geophysicist.
M.S.C. Parker. Asst Geophysicist

J.E. Webb.

D.M. 1485 55

TO THE HON. THE MINISTER OF MINES: 014

Seismic Survey at Perenilne for Santos Ltd.

An enquiry has been received from Geosurveys of Australia Ltd., acting for Santos Ltd., on the possibility of undertaking a Seismic survey for the company in the Perenilne Basin. Preliminary discussions have taken place with Mr. Spriggs and agreement has been reached on operating procedures which would apply if the project is finally approved by both parties. For our part we will provide the seismic and drilling equipment, staff and employees to operate them, vehicles, a mechanic, explosives and magazine containers. The company will provide a water tender and driver, camping and messing facilities, a surveyor and chainman and certain other equipment.

The terms and conditions under which the department undertook seismic work for Santos Ltd. at Kilkatonna in 1956 are set out in full detail in the former Director's letter of 5th September, 1956, D.M. 173/56 - copy enclosed herein. Briefly those conditions provide for full reimbursement of all departmental costs except salaries of officers and with one variation I recommend the same conditions be applied to the Perenilne survey.

The previous conditions provided for full reimbursement of fares and travelling expenses of salaries staff, but I would prefer to have this condition omitted and to leave these items as a departmental debit. Whilst we possess good equipment for this class of work our staff have had little experience and the Perenilne survey will be a good opportunity to further their training and experience with the company meeting all direct costs. If the present Santos negotiations are successful we may also have the opportunity of working in collaboration with United States experts and this could be of great advantage to the department. The company will provide free messing and accommodation for our staff and under the circumstances it would be equitable to forego reimbursement of fares and travelling expenses en route.

Your approval is sought to negotiate with the company and if they are agreeable to confirm agreement on the terms and conditions as above.

4-2-58. DIRECTOR OF MINES.

015

TO THE DIRECTOR OF MINES:

Proposed Seismic Survey at Parachilna

A conference was held in my office at 2.30 p.m. on 29/1/58 and was attended by Messrs. Sprigg, Fitzpatrick and Wopfner of GeoSurveys and Messrs. Webb, Milton and Betheras of the Department. The purpose of the conference was to reach a working agreement for a seismic survey at Parachilna and the following plan was adopted.

Santos agree to supply:-

1. A four wheel drive water tender with driver for the purpose of supplying drilling water. The tender to be used solely on the seismic survey and the driver to be employed overtime to fill the tanker at night.

2. Camping and messing facilities including a cook. There will be a minimum of nine Departmental officers plus tanker driver(s) and surveyors from GeoSurveys.

3. A surveyor and chainman to be provided to establish geophone stations and levels.

4. Explosives (20 cases) at present stored at Wilkatana and transport other explosives from the Government Magazine.

5. Transport for two ton weight and other equipment for testing weight dropping technique. Details of dropping mechanism will require further discussion after the proposed test at Gawler.

The Department of Mines will supply:-

1. Seismic equipment and all auxiliary equipment, including vehicles. Four Landrovers are required.

2. Two geophysicists, one technician, a powder monkey, and two cable layers. It is assumed that daily paid wages only will be chargeable.

3. Conrad drill with driller, offsider and all auxiliary equipment including possibly a pump for the water tender.

4. A mechanic to maintain the vehicles and drill.

5. Magazine boxes for the storage of explosives and all explosives apart from 20 cases stored at Wilkatana.

It will now be necessary to obtain written agreement to the above from Santos and to have the Minister approve the charges made for the survey.

SENIOR GEOPHYSICIST

JEW:AGK
30/1/58

REDUCED LEVELS = WILKATANA GRID EXTENSION

Datum - Mean Sea Level Pt. Augusta.

Co-ordinates	R.L.
52N00	100.31
56N00	101.22
60N00	104.32
64N00	111.44
68N00	109.54
72N00	103.98
76N00	100.41
80N00	98.80
84N00	99.16
88N00	100.31
96N00 92N00 105.00	101.50
100N00	109.17
104N00	106.97
108N00	104.64
112N00	104.87
116N00	105.29
120N00	104.16
124N00	109.42
128N00	113.13
132N00	120.73
136N00	108.79
140N00	109.99
144N00	114.15
148N00	130.74
152N00	115.00
156N00	114.39
160N00	116.43
176N00	109.44
192N00	115.14
108N00	118.72
224N00	115.24
240N00	120.16
256N00	124.07
36S00	86.21
40S00	111.38
44S00	104.28
48S00	99.75
52S00	98.58
56S00	95.99
60S00	98.63
64S00	96.98
68S00	97.09
72S00	99.93
76S00	94.68
80S00	87.82
84S00	90.38
88S00	94.98
92 S00	100.74
96S00	
100S00	97.78
104S000	112.15
108S00	110.80
112S00	106.87
116S00	111.70
120S00	108.83
124S00	108.38
128S00	105.01
132S00	103.34
136S00	101.62
140S00	101.96
144S00	104.52
148S00	105.44

Co-ordinates	R.L.
152S00	108.74
156S00	109.04
160S00	107.69
0024E	101.68
00 28E	100.92
00 32E	105.00
00 36E	103.46
00 40E	102.41
00 44E	109.35 111.40
00 52E	110.41
00 56E	110.47
00 60E	117.85
00 64E	116.82
00 68E	117.39
00 72E	119.40
00 76E	126.77
00 80E	137.91
00 84E	134.45
00 88E	139.94
00 92E	142.38
00 96E	146.53
00100E	149.84
00104E	152.83
00108E	158.50
00112E	163.31
00116E	170.34
00120E	175.29
00124E	181.31
00128E	185.30
00132E	187.51
00136E	192.01
00140E	198.33
00144E	202.86
00148E	209.55
00152E	215.25
00156E	222.50
00160E	228.14
00 24W	94.66
00 28W	94.19
00 32W	90.68
00 36W	90.62
00 40W	82.94
00 44W	86.92
00 48W	96.35
00 52W	90.22
00 56W	79.58
00 60W	78.90
00 64W	81.66
00 68W	99.62
00 72W	97.09
00 76W	98.37
00 80W	91.66
00 80W	92.02
00 88W	97.25
00 92W	89.51
00 96W	89.19
00100W	92.92
00104W	87.35
00108W	109.12
00112S	98.23
00116W	86.28
00120W	75.91

REDUCED LEVELS = WILKATANA GRID EXTENSION.

Datum - Mean Sea Level Pt. Augusta.

Co-ordinates	R.L.
00124W	74.86
00128W	82.79
00132W	91.86
00136W	90.15
00140W	81.39
00144W	82.87
00148W	94.18
00152W	91.72
00156W	94.37
00160W	88.99
Bore No. 6	
36.15S154.34W	70.18

REDUCED LEVELS - WILKATANA GRID EXTENSION

Datum - Mean Sea Level Pt. Augusta.

019

Co-ordinates	R.L.
52N00	100.31
56N00	101.22
60N00	104.32
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112N00	104.87
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128N00	113.13
132N00	120.73
136N00	108.79
140N00	109.99
144N00	114.15
148N00	130.74
152N00	115.00
156N00	114.39
160N00	116.43
176N00	109.44
192N00	115.14
108N00	118.72
224N00	115.24
240N00	120.16
256N00	124.07
36S00	86.21
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44S00	104.28
48S00	99.75
52S00	98.58
56S00	95.99
60S00	98.63
64S00	96.98
68S00	97.09
72S00	99.93
76S00	94.68
80S00	87.82
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96S00	
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00 80E	137.91
00 84E	134.45
00 88E	139.94
00 92E	142.38
00 96E	146.53
00100E	149.84
00104E	152.83
00108E	158.50
00112E	163.31
00116E	170.34
00120E	175.29
00124E	181.31
00128E	185.30
00132E	187.51
00136E	192.01
00140E	198.33
00144E	202.86
00148E	209.55
00152E	215.25
00156E	222.50
00160E	228.14
00 24W	94.66
00 28W	94.19
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00 56W	79.58
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00 68W	99.62
00 72W	97.09
00 76W	98.37
00 80W	91.66
00 80W	92.02
00 88W	97.25
00 92W	89.51
00 96W	89.19
00100W	92.92
00104W	87.35
00108W	109.12
00112S	98.23
00116W	85.28
00120W	75.91

REDUCED LEVELS - WILKATANA GRID EXTENSION.

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00144W	82.87
00148W	94.18
00152W	91.72
00156W	94.37
00160W	88.99
Bore No. 6	
35.15S154.34W	70.18

Mr Webb.

021

Memorandum to Mr. Sprigg,

Surveyor to Assist Seismic Party.

I should like to enquire the position regarding our having a Surveyor to assist the Seismic crew at Wilkatanna.

I understand that Mr. Webb has already discussed this with you.

The query has, however, again arisen, as the Seismic Party anticipate commencing operations at the latest by the end of August.

P.H.J.Hammett

PHJH:BVL.

P.H.J.HAMMETT.
Field Superintendant.

022

TO THE DEPUTY DIRECTOR:

through SENIOR GEOPHYSICIST

Submitted herewith is a final report on the Shallow Seismic Reflection Survey, Wilkatana, carried out for Santos Ltd., during the latter part of last year.

Outside advice tends to support the belief of departmental officers that the area is not a particularly favourable one for the conducting of a survey of this nature. The results although somewhat inconclusive generally, do reveal in places trends which could tie in with the known subsurface geology.

The delay in the presentation of the final report has been due mainly to the time required to put into effect, various reduction and interpretation techniques suggested by more experienced outside operators. Most of the information obtained from these sources was based on deeper reflection methods and it now seems apparent that many of the assumptions and approximations made for these deeper surveys are not tenable for shallow reflection work.

No suggestion made, either by outside organisations or originating from within the section, has been neglected in an attempt to obtain the maximum possible information from the records shot.

An analysis of the shortcomings of conventional reflection reduction methods as applied to shallow work is now in progress.

J.L. Harris

J.L. HARRIS
GEOPHYSICIST

JLH:AGK
11/6/57

office

DM 336 56

TO THE CHIEF GEOLOGIST: 023

PROPOSED DISCUSSIONS WITH G.S.I. ON SEISMIC REDUCTIONS AND FIELD TECHNIQUE.

It is anticipated that the reduction of the Wilkatana seismic results will be completed by the end of this week.

The results seem to indicate that multiple reflections from a rather shallow layer are being recorded. The detection and interpretation of multiple reflections, however, is a rather complex problem, and I am not prepared to state definitely that multiple echoes are being recorded.

It would be advisable, therefore, ~~if at all possible~~ to seek outside assistance from people who are far more experienced in this type of work. Not only is this necessary from the point of view of discussing reductions, but also they could possibly be of great assistance in discussions relating to field techniques, particularly with regard to such problems as geophone spacing and layout, correct filter settings, shot depths and sizes, encountered when commencing a survey in a new area.

Since discussions have already been held with personnel of the Bureau of Mineral Resources and suggestions made by them put into effect, it is recommended that the principals of Geophysical Services International, a Company operating on behalf of Wapet in Western Australia, be approached with a view to discussing both reduction and operational techniques on the following bases:

1. An officer or officers of Geophysical International, competent to discuss both reduction and instrument operating procedures, be invited to visit Adelaide. Whilst it is difficult to estimate a time limit for such a visit, a period of approximately one week be allowed for sighting and interpreting results, and a period of approximately two weeks operating in the field. This would necessitate organisation of a preliminary survey in a new area, presumably Yorke Peninsula.

2. In the event of no officers being available, or not being available for such a period, then one, and preferably two officers of this Department visit Geophysical Services International, providing that company is agreeable, for a similar period in Western Australia. Should it be evident in either case that little or no assistance can be given, then the visits would be curtailed in duration.

It is further suggested that any discussions with the company should be on the basis of Company to Mines Department in the elucidation of Mines Department problems, and not with the purpose of a solution to particular problems arising from the survey from a private company such a Santos Ltd..

In a minute to you dated 15.1.57 (DM 336/56) the Senior Geophysicist estimated the cost of sending two officers to

024

Perth as £120 for air fares, plus £38-10-0 per week for travelling allowances. Costs for one officer would naturally be halved and such costs would not include expenses involved, if necessary, to view field crews operating. It is not known in what areas Geophysical Services crews are operating, but it is believed the company has several crews operating in Western Australia. In arriving at any decision on this matter, it should be borne in mind that operating costs over a period of nine weeks at Wilkatana averaged £100 per day approximately, and it is estimated that costs to the Department acting on their own behalf on Yorke Peninsula will in all probability be somewhat higher, since Santos provided such items as free accommodation, water truck, some transport, and two personnel full time.

26.2.57

(J. Harris)
GEOPHYSICIST.

JEW:AGK

025

17th January, 57

Mr. Ben Kimler,
Geophysical Services International S.A.,
193 William St.,
PERTH. W.A.

Dear Ben,

I must apologise for not writing sooner but we have been tied up and the weeks just slip by.

The H.T.L. equipment has been behaving fairly well, the intermittent trouble was due to dry joints in one control panel and in one amplifier. Frank Rousseau resigned one week before we left for the field and we had to dump the job in Bob Turner's lap. He made such a good fist of maintaining the gear at short notice that we gave him the Senior technician job.

The area at Wilkatana is about the worst we could possibly have picked for a first job. We had to reduce our spread to 300 feet and shoot repeat shots with varying filter settings. The results are now proving a nightmare and we may be calling on Dick for a little fatherly advice in the near future.

John Harris has assumed full responsibility for the seismic team as I have now had another baby dumped in my lap. I have to convert a sub detector to a magnetometer and install it in a DC 3 aircraft. Also operate it for 2-3 months per year for 7 years. You can't say I get bored or, alternately have any chance of becoming an expert in any one geophysical method.

We have had a change of Director; Dickinson joined Rio Tinto and Tom Barnes, the former Deputy, is now the Director. This doesn't affect my pocket money in any way.

We are shortly shifting both our office and laboratory. If you are calling on us in Adelaide any time, we will be in the Foy & Gibsons Building in Rundle St. after the end of January.

Back to seismic. We carried out a well shoot at Wilkatana with fair success to 1700 ft. with readings at 100 ft. intervals. The average velocity was high, over 12000 ft. per second at 1700 ft. and the interval velocities up to 35,000 feet per second. The interval times for 100 feet separations were only 2 or 3 milliseconds so the values are very doubtful. Just another uncertainty of shallow reflection work.

Well, that seems enough of our troubles. I trust you are enjoying fine weather as we have been for the last couple of weeks.

Give my regards to Dick and Jim Howard.

Yours sincerely,

.....

John Webb.

027

TO THE DIRECTOR OF MINES:

Suggested Draft Press Statement

As an aid to the search for oil in South Australia, The Department of Mines has obtained a set of Seismic Equipment from America at a cost of £12,000. Additional equipment to be used in its operation includes 4 Landrovers and a truck mounted Conrad rotary drill.

The equipment will be used to measure the depth below the surface of various rock interfaces and by tracing these layers over long distances it is possible to determine the best location for drilling.

The principle used is similar to depth sounding used by shipping and the technique is identical with that used in the location of an earthquake. A charge of gelignite is exploded in a drill hole about 40 to 100 feet below the surface and the time taken for the shock to travel down to a rock face and back to the surface is measured to one thousandth part of a second. It is possible by this method to measure interfaces thousands of feet below the surface.

The equipment is being operated by Geophysicists and technicians of the Geophysics Section of the Department's Geological Survey and they will be leaving on 10th September to commence a survey at Wilkatana about 30 miles north of Port Augusta where evidence of oil was first obtained in December last year. This survey is expected to continue for six months and will be conducted on behalf of Santos Ltd.

SENIOR GEOPHYSICIST

JEW:AGK
3/9/56

DEPARTMENT OF MINES—SOUTH AUSTRALIA

DEPARTMENTAL MEMORANDUM

028

250blks200—3.58 930

Date 30-8-56

From:	*To:*
Senior Geophysicist	Employment Officer

Subject: Wage Hands for Wilkatana

Docket Reference D.M. | Security File No.

Refering to the enclosed minute of 10/4/56 please arrange to have the following three ~~men~~ positions filled to report for duty on Monday 10th September or if possible earlier. Should the rest of the Seismic Party leave before these men report for duty it will be necessary to send them to Pt Augusta by rail.

1 Man willing to train as powder monkey and able to ~~drill~~ drive.

2 Men to lay cables etc. These men should be fairly robust types as the cable & drum weigh about 60 lbs. Both must be able to drive.

The vehicles used will be Landrovers but they need not necessarily driven Rovers before.

DEPARTMENT OF MINES—SOUTH AUSTRALIA

DEPARTMENTAL MEMORANDUM 029

250blks200—3.53 930

Date.....

From:	*To*:
.....	.....
.....	.....

Subject:

Docket Reference D.M. Security File No.

Camping facilities (4 man huts) are being provided by Geosurveys & also messing of quite a high standard. At present cost of accomodation is 9/- per day and drillers are being reimbursed 8/- but we may be receiving full 9/- (not determined fully yet) All bedding is provided but men must supply their own towels.

John Blatch

TO SENIOR GEOPHYSICIST:

173/56

.030

5th September 56

John Bonython Esq.,
Chairman of Directors,
Santos Ltd.,
Mutual Life Chambers,
44 Grenfell Street,
ADELAIDE, S.A.

Dear Sir,

HIRE OF SEISMIC EQUIPMENT

Confirming our telephone conversation I wish to advise that we will be in a position to commence the seismic work at Wilkatana next week. Final adjustments are now being made to the equipment and provided we can rectify a slight fault which is giving trouble, the Geophysical party will leave for Wilkatana early next week.

Before the party leaves Adelaide I would appreciate confirmation of your acceptance of conditions under which the cost of the work will be computed and charged to your company. As stated previously salaries of salaried staff will not be charged but all other expenditure directly or indirectly incurred by the department on the survey will be a debit against your company. Items of expenditure to be reimbursed include the following -

1. Wages and overtime of weekly paid employees engaged on the survey. Planned requirements are for a foreman, three drivers, and two Drill Operators.

2. A percentage overhead on wages to reimburse for paid leave, workmen's insurance, payroll tax and supervision of drilling crew, etc. The present rate is 60 per cent and is subject to periodical review.

3. Materials - Consumable materials comprising explosives, photographic paper and sundry stores used in the survey will be charged at cost to the department including any oncharge normally added to cover handling costs. Freight will be added where applicable.

4. Equipment hire - Charges to reimburse interest, depreciation and maintenance costs will be raised on all equipment whilst in use on the survey. Charges for motor vehicles are computed on a mileage basis and apply to mileage to and from Adelaide as well as for mileage travelled in the area. Charges for scientific and drilling equipment are computed at hourly or weekly rates on a time occupied basis.

5. Freight - Material requirements will in general be transported in survey vehicles travelling to the field and no added cost will be involved. Any freight charges on stores or equipment incurred as an extra will be charged at cost to the department.

6. Fares, travelling expenses and camp allowances - Expenditure incurred under this category in providing for either staff or weekly paid employees will be charged at cost to the department, and will include travel to and from Adelaide as necessary during the course of the survey.

/3.

7. Incidental expenses - Any items of expenditure necessarily incurred in the conduct of the survey and which would not otherwise have been incurred will be charged at cost.

8. Accommodation and messing - The department has Public Service Board authority to reimburse salaried staff for the full cost of accommodation and messing. For practical purposes I suggest your company frank personal charges and debit the project direct.

Weekly paid employees receive free accommodation and 8/- per day camp allowance, which is a charge for reimbursement by your company under Clause 6 above. We will be pleased to continue the present practice of deducting meal charges from employees wages in accordance with lists supplied and crediting the proceeds to your company.

Charges as above will commence to accrue when the party leaves Adelaide en route for Wilkatana. They will continue whilst the survey is in progress until cessation of work for the Christmas close down or earlier provided at least one month's notice of termination is given by either party. Present indications are that your work, which you estimate as of 6 months' duration, can proceed without interruption, although the date of resumption after Christmas may depend upon climatic conditions at the time.

Approximately 50 holes have already been sunk in preparation for the survey. The cost of this work computed under the same terms as above, will be chargeable to your company as part of the operating cost of the survey. Apart from this item charges will commence when the party leaves Adelaide and conclude when the party and equipment are returned to Adelaide.

The control of survey personnel and equipment will vest in the Senior Geophysicist or his field representative. Our objective is to fulfil your requirements in the most practical manner and with this objective in view prompt advice of target areas would permit orderly and economical use of manpower and equipment. You will, I presume, nominate Mr Sprigg to select areas and you may wish him to have authority to deal direct with our Senior Geophysicist on this matter. Would you please confirm whether or not this is to be the case.

I would be grateful if you could give early consideration to the above proposals as I wish to have your acceptance of conditions on file before the party leaves Adelaide.

Yours faithfully,

DIRECTOR OF MINES

Mr. J. Webb.

28th August, 1956 032

Memo to Mr. P.H.J. Hammett and Mr. J. McCahon.

Re Secondary Base Line.

After considerable thought I am forced to consider altering the grid interval on the new base line. The complex maze of co-ordinate figures previously involved has been too much for many persons.

I now recommend, and require implemented unless you have some violent objection, the following: -

Secondary Baseline North-South.

Origin : N00 : E20,000
Station Interval : 500 foot with intermediate pegs at 100 foot intervals where required for geophones if D ! M geophysicists so require.
Line to be pegged for 40,000 feet north and 10,000 feet south.
Only the 500 foot stations need be leveled at this stage, intermediates can come later. Ends of lines should be tied in with Railway levels as checks.

Future drilling to be on 1000 feet stations. Next hole after No. 14 on 19,200 east to be 10,000 N 20,000 E.

Reg C. Sprigg
MANAGING DIRECTOR.

DM 176/56

JEW: AGK

033

23rd August, 56

Mr. M. Obst,
Drilling Overseer,
Department of Mines,
Wilkatana,
via PORT AUGUSTA. S.A.

Dear Merv,

We hope to commence testing the Seismic equipment at Wilkatana during the week commencing the 3rd September. For this we will require a set of test holes at 1200 ft. centres away from the main lines. I mentioned this to Rex McMahon recently and gave him a rough sketch of the layout, suggesting that he pick a place where drilling is reasonably easy.

If he has not already started on these holes would you put him on to them as soon as possible?

The Conrad drill arrived at the Depot on Monday and is now being checked.

Yours faithfully,

SENIOR GEOPHYSICIST

DM 176/56

JBW:ASK

034

23rd August, 56

Mr. R.C. Sprigg,
Managing Director,
GeoSurveys of Aust. Ltd.,
91 King William St.,
ADELAIDE. S.A.

Dear Reg,

Firstly with reference to your offer of free accommodation at Wilkatana for the Seismic Party, I would now like to accept your kind offer. The alternative of paying you direct and claiming recompense is proving difficult.

The installation of the equipment is proceeding satisfactorily and it is anticipated that we will commence tests at Wilkatana on 3rd September or soon after. Accommodation will be required for eight men at your camp, viz. two geophysicists, two technicians and four daily paid hands. The driller and offsider for the Conrad-Stork drill will be accommodated at the Mines Department Camp.

The tests will take several days and the team will then be ready to survey the main North-South and East-West lines. It will be necessary for you to have these lines pegged at one hundred feet intervals and levelled to the nearest foot for geophone stations.

John Webb will keep in touch with Peter Hammett on details and will be in charge of the survey initially.

Yours faithfully,

CHIEF GEOLOGIST

20th August, 1956

SENIOR GEOPHYSICIST

STATE MINING ENGINEER

035

Magazine at Wilkatana

A magazine has been constructed at Wilkatana for the storage of Geophex explosive for the seismic survey. This has been constructed in accordance with directions obtained from Mr. Putland of the Department of Chemistry. The internal dimensions are six feet by seven feet by seven feet high, and it is built into a sand hill with a sand hill between it and the nearest building which is approximately 650 feet distant.

Would you please arrange to have this building inspected at your convenience. It is being used in the meantime as discussed with you by 'phone.

JW

SENIOR GEOPHYSICIST

JEW:AGK.

1st August, 1956.

SENIOR GEOPHYSICIST

CHIEF MECHANICAL & BORING ENGINEER.

036

MODIFICATION TO STANDARD LANDROVER FOR SEISMIC WORK

176/56 (18/5/56)

The short wheelbase Landrover No. D.M. 103 was recently taken to Wilkatana and apart from mechanical defects which have been reported to the Transport Officer it was noted that the following modifications have still to be carried out:-

1. The two water tanks require screwed nosed taps and a twelve feet long hose complete with nut and tail.

2. Explosive and danger notices permanently fitted as required by law for a vehicle carrying explosives.

3. Explosives box which I understand will be fitted this week.

.....
J. E. WEBB
SENIOR GEOPHYSICIST

JEW:BRS
1/8/56.

C. H. McMeekan
Private Mail Bag
C/o Santos (Wilkatana)
Via P.T. Augusta. S.A.

16/7/56.

Dear John,

I received the time-sheets & new lay-out sheets, O.K. & thanks for having them sent on so soon.

Could you please send me a couple of envelopes that are addressed to you, & c/o at Heinz Ref. & Exhibition Buildings, as I only have the Departmental ones, for the Dept. from Jack. (the ones for overseas here). The shuttle staff seized up last Sunday morning, but we got it going O.K. sand, & grease was the main trouble, but our main troubles now is the rain, & boggy roads. Kind Regards to Allan, & tell him all about the plant P.T.O.

37A

F6274

I hope he can send some smokes, or a Cheque up soon, even a secretary's ~~Book~~ Cheque, will do until our pay turns up. Where do I have to address the time sheets to, + does Peter have to sign them, or just forward them on to you. ? If I can get some of these envelopes to send things to you it will be good oh.

Regards to you + Allan for now

Rex

DEPARTMENT OF MINES—SOUTH AUSTRALIA

DEPARTMENTAL MEMORANDUM 038

250blks200—3.53 930

Date 3-7-56

From: Senior Geophysicist

To: Field Superintendent Wilkatana

Subject:

Docket Reference D.M. Security File No.

Dear Peter,

At long last the Seismic Equipment is in Adelaide and should be released by customs today. You should plan to receive the party of up to eight men about the end of August in addition to the extra drilling staff who will be in the Mines Dept camp. Our party will comprise 2 geophysicists 2 staff technicians and 3 or 4 daily paid hands.

It looks as though Rex Mc Mahon & his driver will be transferred to Mines Dept. camp in a few days as he is to be under the control of Jock Brandon. I am leaving it to the Boring Branch to sort out.

I have arranged for a hut for storage and will ~~be~~ also use it for equipment repair & possibly also as an office if it is large enough & so relieve the strain on your office facilities. I have asked the boring branch to erect it as near as possible to your camp & if you approve

DEPARTMENT OF MINES—SOUTH AUSTRALIA

DEPARTMENTAL MEMORANDUM 039

250blks200—8.58 930

Date.....

From:	*To*:
.....	.....
.....	.....

Subject:

Docket Reference D.M. Security File No.

Connect it to your power supply so we can use our 240 Volt A.C. test equipment.

A complication has arisen with regard to the magazine as the capacity depends upon the distance from other buildings or workings, so could you keep an eye on any expansion in activities near the magazine? John Harris will measure the distances while he is on the job & I will arrange the licence. All being well you can expect a load of explosive within a week or two. We also need a detonator hut which is a small hut about 30 feet or more away from the magazine & mounted on legs. John H. will also have a word about this.

Had a quick yarn with Reg & he is agreeable to us paying you 3/- per meal if it works out. Carol for us with the Dept.

Regards

John

D [illegible] 151 66

IN THE MINISTRY FOR [illegible]:

SEISMIC [illegible] SURVEY - WILKATANA.

Forwarded herewith is a report of the above title by J.L. Harris and D.N. Hilton.

The Wilkatana area has proved a most difficult one for the seismic technique, and has involved the officers concerned in months of computation in an endeavour to obtain all possible information from the records. Besides our own resources, we have called upon officers of the Bureau of Mineral Resources and Geophysical Services International to assist in the task.

The results are possibly disappointing, but are in no way lacking because of either equipment or personnel, and I feel quite justified in stating that there is little to be gained by the use of the seismic method in this area.

14.6.57

.....
SENIOR GEOPHYSICIST.

DM 151 56

TO THE DEPUTY DIRECTOR

Through THE SENIOR GEOPHYSICIST

Forwarded herewith a report on Well Velocity Survey No. 1 Bore Wilkatana, carried out during November, 1956, by the Department on behalf of Santos Ltd. Casing breaks rather than formation breaks are suspected for the top portion of the hole.

12.6.57

J.L. Harris

(J.L. Harris)
GEOPHYSICIST.

TO THE CHIEF GEOLOGIST:

Installation of Seismic Equipment in Vehicle

An advance estimate of the cost of installing the seismic equipment in a long wheel base Landrover and modifying this and a standard Landrover has been obtained from the Chief Mechanical & Boring Engineer. The quotation is for £275 but cannot be given accurately as many details will be unknown until the equipment arrives.

In order to save time after the equipment arrives it is recommended that approval be obtained immediately for this expenditure.

All aspects of the installation have been discussed with Mr. Limb and Mr. Roberts and the amount of £275 contains allowance for contingencies.

SENIOR GEOPHYSICIST

JEW:AGK
11/6/56

043

TO THE CHIEF GEOLOGIST:

Provision of Magazine at Wilkatana

The problem of a magazine at Wilkatana has been discussed with the Chief Inspector of Explosives and he has stated the following requirements for a magazine let into the side of a sand dune:-

1. Any waterproof covering may be used on the outside
2. Inside to be covered on all walls, floor and ceiling with tongue and grooved boards. Nails to be punched and puttied.
3. Door of tongue and grooved boards covered with galvanised iron on the outside and provided with a strong lock.
4. 40% of the space to be air space, i.e. only 60% of magazine to be stacked with explosive.
5. A separate container of similar construction (e.g. box on legs) to be provided for detonators well away from the magazine.

Would you please pass on these requirements to Geosurveys and request that they construct a magazine approximately 8 ft. x 6 ft. x 7 ft. high.

SENIOR GEOPHYSICIST

JEW:AGK
5/6/56.

29th May, 1956

SENIOR GEOPHYSICIST

CHIEF MECHANICAL & BORING ENGINEER

Modifications to Standard Landrover & Landrover Utility

176/56

With reference to my minute D.M. 176/56 of 18/5/56 to Chief Geologist forwarded to you for estimate of cost, attached is a circular from the Chief Inspector of Explosives for your guidance.

The seismic equipment is now expected to arrive about June 20th and must be installed ready for final testing by the 11th July. In order to obtain approval for expenditure and priority for the work should it be needed, would you please let me have your estimate of the cost of the modifications and installations as soon as possible.

SENIOR GEOPHYSICIST

JEW:AGK
29/5/56

D.M. 176 56

TO THE CHIEF GEOLOGIST:

Vehicle Requirements for Seismic Survey

Apart from the Landrover mounted posthole digger four vehicles will be required for the seismic survey at Wilkatana as listed below:-

1. Long wheel base Landrover utility for the equipment van.
2. Normal Landrover for carrying explosives and water.
3. Normal Landrover for cable laying.
4. Holden panel van for carrying of supplies and personnel. This will also be used by the party leader for inspections etc.

Items one and two will require extensive modifications as outlined in a separate minute. Items three and four are standard vehicles.

It is anticipated that these vehicles will be required for initial tests in July.

SENIOR GEOPHYSICIST

JEW:AGK
18/5/56.

046

TO THE CHIEF GEOLOGIST:

Modification to Standard Landrover and Landrover Utility

Two of the vehicles required for the seismic work will require modifications as listed below. This request supersedes the earlier request for the modifications to the Holden Panel Van, D.M. 176/56, 20/4/56.

A. Short Wheelbase Landrover

1. Two only twenty or twenty five gallon water tanks to be fitted and provided with taps to rear of vehicle and supplied with a hose twelve feet long for filling shot holes.

2. Suitable means for carrying 4 cases 2¼" Geophex sliding gelignite (these cases are about 50% longer than AN 60 cases). The opening in any box provided should be towards the rear of the vehicle. Explosive notice as necessary to be fitted to vehicle.

3. Rack for carrying 6 loading poles. These poles are 1½" square by 10 feet long.

B. Long Wheel base Landrover Utility

1. Fit steel canopy with large sliding windows. This canopy should have means for locking the doors.

2. Connect earthing lead and stake to vehicle near rear on left side. The stake can be 5/16" steel rod about 12 inches long with looped top. Also provide a hook for holding coiled up lead and stake.

3. Install extra 6 or 12 volt generator and cutout for charging equipment batteries.

4. Provide rack or container for two 25 plate 6 volt accumulators. This could be either within the vehicle on one of the side platforms in an acid proof case or preferably under the vehicle. Leads will be required from the generator to the batteries and from the batteries to the equipment rack. A parallel series switch and a pair of terminals for charging at 6 volts from an external generator will also be necessary mounted on the left hand side of the vehicle. A sketch of the wiring requirements is attached.

B. Long Wheel base Landrover Utility (Contd.)

5. A black bakelite input panel 8" by 8" mounted on left hand side of canopy near the front and recessed behind a square hole 8" x 8" fitted with a hinged lid. Provide clip for holding lid open. A hook to be mounted below the opening to hold a geophone and 50 feet of plastiflex cable.

6. Fit dome light in centre of canopy roof with approximately 36 watt globe. Wire to equipment batteries. Also fit small rubber bladed fan near centre of ceiling and facing towards front of vehicle.

7. Provide racks for and install equipment including amplifiers along wall of canopy immediately behind the driving cab and camera and developing box along one side. Actual placement of items to be determined by Senior Geophysicist on arrival of equipment.

8. Fit low swivel stool (about 9" high) in front of equipment.

It will be possible for items Nos. 1-6 to be proceeded with immediately. Items 7 and 8 cannot be undertaken until the arrival of the equipment but authority is desired to allow the work to proceed without a detailed quote for this item after the equipment has arrived.

SENIOR GEOPHYSICIST.

JEW:AGK
18/5/56.

048

TO THE CHIEF GEOLOGIST:

Modifications to Holden Panel Van

Several modifications as listed below are required on the Holden Panel Van to make it suitable for use as a seismic recorder van.

Items one and two can be proceeded with immediately. Items 3 & 4 will have to be delayed until the arrival of the equipment, but to avoid delay later it is recommended that blanket approval be obtained to cover these items.

1. Fit extra 6 volt generator and cut out for charging equipment batteries. A switch board will be necessary to parallel batteries for charging and series them for use. Also racks for two 6 volt batteries.

2. Fit windows to sides of van. These windows should preferably be able to be opened.

3. Construct and fit racks for mounting equipment. Details to be supplied on arrival of equipment.

4. Fit swivel stool in front of equipment.

J. E. WEBB
SENIOR GEOPHYSICIST

JEW:AGK
20/4/56.

TO THE CHIEF GEOLOGIST:

Provision of Camping Facilities at Wilkatana

The first location for the seismic survey party will be Wilkatana and it will be necessary to provide accommodation for a minimum of eight persons. Office accommodation will also be required for the reduction of the results.

It is recommended that a cook be provided either for the seismic party alone or that a combined mess be set up with the drilling crews. At present there is a camp of twenty men at Wilkatana but the cook and facilities would not be able to cope with an additional eight persons.

SENIOR GEOPHYSICIST

JEW:AGK
10/4/56

050

TO THE CHIEF GEOLOGIST

INITIAL OPERATIONAL CHARGES OF SEISMIC EQUIPMENT

Permission has been given to recharge the operational costs of the seismic surveys to Santos Ltd., or other company, for whom the Department may be conducting surveys, however it is felt that the initial period of up to one month should not be borne entirely by Santos as during this period extensive testing will be necessary to determine the best operation of the equipment and also to determine the best method of conducting the survey.

The tests will involve working on the one equipment layout until the best filter settings, amplifier gains, shot depth etc. have been determined without obtaining information of any value to Santos Ltd.. Initial tests will be carried out near Adelaide but it is considered essential that later tests be carried out at Wilkatanna so that the equipment is tested on the particular problems associated with this area. This period will also be useful in training personnel.

It is suggested that the cost of initial testing be borne by the Department until it is considered that the results obtained are of some use to Santos Ltd, when a recharge of 50% should be made and after one month (or less if full efficiency is reached) at Wilkatanna the whole operational costs should be recharged.

JEW:JAH.
6. 4.56.

SENIOR GEOPHYSICIST.

TO THE MINE MANAGER: 051

No 1 (Information) Bore for Oil
Kilkatana Station, S. Jarcoolla.

Oil Exploration Licence No 7, held by
[redacted]

Following verbal instructions from the Director and Deputy Director, the site of No 1. Kilkatana Oil Bore was inspected on Tuesday 10.1.56 in company with Mr. H.O. Brunnschweiler. The site was again visited on Wednesday 11.1.56 in company with the following:

Mr. L.F. Bristowe, a Director of [redacted].
Mr. H.O. Brunnschweiler, Chief Petroleum Geologist of Geosurveys Ltd. Geological Consultants, [redacted].
Mr. [redacted] Chapman a reporter from the Sunday Mail.
Mr. [redacted] Shanebury, a photographer from the Sunday Mail.

Both company officials were quite open and helpful in their discussions with the press and myself, Mr. Brunnschweiler maintaining a cautious though hopeful attitude geologically while Mr. Bristowe was less cautious and much more optimistic.

The purpose of the second visit was to appraise the kind of information being made available to the press.

It is understood that an article on the oil boring is to appear in the Mail on Sunday 15.1.56.

A summarised log of the hole is as follows:-
0 - 464' Unconsolidated tertiary sands, silts, clays and mudstones with some limite bands.
464' - 569' Organic-reical limestone.
569' - 734' Yellow pink and grey dense limestone with vuggy porosity.
[redacted]' - 574' suspected interlayers of rock salt
[redacted]' - 734' "Oil" traces.

Mr. Brunnschweiler holds that the limestone from 464' to 734' + belongs to the Kent Hill Formation, is of Devonian age and is equivalent to the Coburne Group which Mr. Miles has referred to the Silurians.

From boring operations from 730' - to 734' (progress 1' per hour). Sludge recovered was sieved in a drum and the "oil" skimmed off, recovering possibly 50 - 75%. For each foot of drilling, approximately one teaspoon of thick black grease was recovered. This grease was rolled into a ball, and becomes soft with midday temperatures.

Cliff Walker, the mines opt. driller, considers that the amount of "oil" is increasing with depth. He has not seen any similar occurrence in 15 years of percussion boring.

Duplicate samples of all rock interpretations to date have been submitted to the West, and it is understood that Denton will continue to do so in future. Oil samples have been submitted to the west, and to Melbourne for identification.

I was impressed by the conscientious approach of the field personnel and the efforts made by Geosurvey to ensure that all alternate sources of oily material were investigated before reporting the discovery.

A report containing a more detailed drill log is to be prepared.

Graham Whitton

GRAHAM WHITTON
SENIOR GEOLOGIST.

KVR:GW.
13.1.56.

ENGINEERING GEOLOGY & MINERAL
EXPLORATION SECTION.

053

TO THE CHIEF GEOLOGIST

Seismic Refraction Surveys - Wilkatana Area

Attached is a report on the above subject by J.L. Harris and M.H. Parker. This survey was carried out using equipment on loan from the Bureau of Mineral Resources for Santos Limited.

It has not been possible to trace the limestone layer penetrated by the drill but limits of the thickness of this layer have been listed for a range of velocities. The examination of the results of the second traverse will be finalised at the cessation of drilling.

It has been assumed that the refraction recorded was from bedrock because the high velocity in this layer almost certainly rules out possibility of it being limestone.

JFW:ICS
14/12/55

ACTING SENIOR GEOPHYSICIST

15th November, 19

SENIOR GEOPHYSICIST

CHIEF GEOLOGIST

PURCHASE OF GELIGNITE FOR SEISMIC SURVEY
WILKATANA AREA

Whilst on a seismic refraction survey in the Wilkatana Area in September it was necessary to purchase 10 cases of AN-60 Gelignite from the Broken Hill Proprietary Company, Iron Knob, and 8 cases of AN-60 and Ligdyn gelignite from the Commonwealth Railways at Port Augusta.

On previous seismic surveys at Iron Knob charges of ½ - 5 lbs only were necessary but due to the long distances of the ~~shoots~~ and the depth to be penetrated charges up to 50 lbs were found necessary at Wilkatana. These charges were the minimum possible to obtain a successful result, the gains being set as high as possible.

Since a crew of six men was involved the gelignite was obtained from the nearest source, a local order being used for purchase from the Commonwealth Railways. An extra vehicle would have been necessary to transport the additional gelignite to Port Augusta in addition to the loss of working time by the crew.

Approval is therefore sought for these purchases which will amount to £77-10-0 and £61-0-0 approximately. Owing to an oversight this minute was not as had been intended, submitted immediately when advice was received from Geophysicist J.L. Harris that the additional gelignite would be necessary.

C. KERR GRANT
SENIOR GEOPHYSICIST

CKG:FCS

19th October, 1955

SENIOR GEOPHYSICIST

THE DIRECTOR

Purchase of Gelignite for Seismic Refraction Survey

In order to complete a seismic refraction survey in the Wilkatana area, twenty five cases of AN-60 gelignite 1⅛" diameter will be required. Estimated cost is £7/13/- per case, and Approval is sought for the expenditure of £191/5/- for twenty five cases.

C. KERR GRANT
SENIOR GEOPHYSICIST

JLH:AGK.

Dept. Sample No. P.260/55...
.....
.....

PETROLOGICAL REPORT.

Description of Sample(s) 1 sample dolomitic limestone W.No.1.

Marks or Nos. O.E.L. 7. WILKATANA BORE I, AT 470'

Locality etc. Newcastle (County), Yarrah (Hundred).

Submitted by C. Kerr Grant; Prince of Wales Building, MINES DEPT.

No. of Sample.	Specific Gravity.
P.260/55	2.61 Dry S.G.

a. J. Marlow.

Examined by : A. J. Marlow.

29/9/55.

A. W. Whittle,
CHIEF MINERALOGIST
& PETROLOGIST.

MINUTES forming ENCLOSURE to ..... *No.* 19

057

TO THE CHIEF GEOLOGIST:

Special Allowance for Salaried Staff at Wilkatana.

It is requested that consideration be given to the payment of the special field allowance to members of the salaried staff engaged in a seismic survey at Wilkatana, north of Port Augusta. It is expected that the salaried members of the party will comprise,

1 Geophysicist
1 Assistant Geophysicist
1 Senior Technician,

and that work in this area will commence on Monday, 19th September, 1955.

C. Kerr Grant
SENIOR GEOPHYSICIST

CKG:PCS
14/9/55

PM:BME 30th August, 1955.

RECONNAISSANCE GRAVITY SURVEY.

Oodnadatta Area.
Portion O.E.L. No. 7.

058

Interim Report by J.B.S. McCahon & P. Mayman.

Gravity observations were made during July, 1955 in that portion of the Great Artesian Basin west of the N-S railway near Oodnadatta. It was only possible to complete one 70 mile traverse and part of another as heavy rains disrupted the survey.

Method used.

100 stations were occupied using a Standard Worden Gravity Meter. The absolute value of gravity was determined by re-occupying an International gravity station at Oodnadatta aerodrome. The heights of stations were determined by barometric levelling from known railway benchmarks.

Results.

The results are presented in the form of a gravity profile, Free air, Bouger and latitude corrections having been applied to all observed gravity values.

INTERPRETATION.

The profile indicates an irregular but gradual overall deepening of the sediments to a point approximately 38 miles west of Oodnadatta, followed to the west by a steeper shallowing of the basin. Interpretation from these limited results should, however, be tentative.

P. Mayman

P. Mayman
GEOPHYSICIST.

J.B.S. McCahon

J.B.S. McCahon
CHIEF SURVEYOR.

GEOSURVEYS OF AUSTRALIA LIMITED.

Noted
B Keith Grant.
Govt Geologist.
13/9/55.