DEPARTMENT OF MINES AND ENERGY

SOUTH AUSTRALIA

OPEN FILE ENVELOPE SERIES

This report was supplied by a private organisation as part of the requirement to hold a mineral exploration tenement in the State of South Australia or for work sponsored by the Department of Mines and Energy .

The Department accepts no responsibility for statements made , or conclusions drawn in the report or for the quality of the original text or drawings which in some cases are below an acceptable standard for microfilming .

CONTENTS ENVELOPE. 427. S.R. 11/5/177.

TENEMENT. NOT RELATED.

TENEMENT HOLDER. DELHI AUSTRALIAN PETROLEUM LTD.

LETTER.

EASLEY CHARLES T. 1964.
Application for grant of survey. (pgs. 3-5)

PLANS.

F.1. Location map. (pg 21)
EXIBIT 1. Regional geology map. (427-1)

ATTACHMENTS.

1. Objectives of the survey. (pgs. 9-10)
2. Particulars of survey. (pgs. 11-12)
3. Expenditure. (pgs. 13)
4. Techniques (pgs. 14-15)
5. Equipment. (pg. 16)
6. Regional geology & existing geophysics. (pgs. 17-19)
7. Contract personnel. (pg. 20)

LETTER.

EASLEY CHARLES T. 1964.
Captioned survey & related survey.
No plans. (pgs. 6-8)

November 27, 1964

The Secretary
Department of National Development
C/- Bureau of Mineral Resources
P.O. Box 378
CANBERRA CITY, A.C.T.

Dear Sir:

Delhi Australian Petroleum Ltd. and Santos Limited hereby apply for grant of subsidy under the provisions of the Petroleum Search Subsidy Act, 1959-1964, for a Gravity Survey in the Great Artesian Basin in the State of South Australia.

In accordance with the requirements set out in "Memorandum of Administrative Procedures" (revised September, 1964) we have prepared and present herewith for your consideration the following data:

1. The applicant's name as Operator for Santos Limited and Delhi Australian Petroleum Ltd. is:

   Delhi Australian Petroleum Ltd.

2. The applicant's registered address is:

   18 Leigh Street
   Adelaide, South Australia

3. All communications with respect to this application should be addressed to the Operator as follows:

   Charles T. Easley
   Resident Manager
   Delhi Australian Petroleum Ltd.
   G.P.O. Box 1837P
   Adelaide, South Australia

4. Evidence in the form of a Power of Attorney, which is still in effect, showing that Charles T. Easley has full authority to act on behalf of the Company in all matters relating to Commonwealth subsidy has previously been lodged with the Director, Bureau of Mineral Resources, Canberra.

5. A sum of not less than £100,000 is available for the proposed operation. Applicant has recently obtained Public Company status in the United States by virtue of the liquidation of its former parent Company, Delhi-Taylor Oil Corporation, and the issuance by Delhi Australian Petroleum Ltd. of 3,139,189 shares of common stock at a subscription price of $2.40 each, on the basis that holders of the common stock of Delhi-Taylor Oil Corporation had the right to subscribe to such stock on the basis of one of Delhi Australian for each two shares held in Delhi-Taylor. The issue was oversubscribed and resulted in the raising of $7,534,053 to be used in financing Delhi Australian Petroleum Ltd.'s share of certain oil exploration activities, including the cost of this survey.

6. Delhi Australian Petroleum Ltd. is a publicly owned corporation, incorporated in the State of Delaware, U.S.A.

7. A detailed summary of the provisions of Oil Exploration Licences 20 and 21, State of South Australia, within the bounds of which the proposed gravity survey is located, has been furnished with previous subsidy applications filed by Delhi Australian Petroleum Ltd.

8. One copy of the "Form of contract" proposed to be entered into by Wongela Geophysical Pty. Ltd. and Delhi Australian Petroleum Ltd. for performance of the proposed survey is included herewith as Attachment No. 8. A fully executed copy of this contract will be forwarded as soon as completed.

9. The following statements and discussions in support of our application are attached:

Attachment No.	1	The objective of the proposed survey and its contribution to oil search
"	" 2	Particulars of the survey and estimated time schedule
"	" 3	A detailed cost estimate
"	" 4	A detailed schedule of techniques to be employed
"	" 5	Descriptions and specifications of equipment

Attachment No. 6	Regional geology and the existing geophysical data
" " 7	A brief biography of the contract personnel who will actually conduct the survey
" " 8	The contract with Wongela Geophysical Pty. Ltd.

10. In addition to Attachments as listed above, the following exhibits are included as part of this application:

Exhibit No. 1	Small scale location map showing the proposed survey area - accompanied by original linen drawing
" " 2	Regional Gravity Map showing the existing gravity control and areas to be surveyed

Yours very truly,
DELHI AUSTRALIAN PETROLEUM LTD.

By Charles T. Easley
Resident Manager

CTE:tj

December 9, 1964

The Director
Bureau of Mineral Resources
Geology and Geophysics
Box 378
CANBERRA CITY

Dear Sir:

Petroleum Search Subsidy Act 1959-1964
Strzelecki Creek Gravity Survey
Ref. No. 64/4811

Thank you for your letter concerning the captioned survey, and its related survey, the Lake Gregory Gravity Survey, Ref. No. 64/4812.

Following your request, we have revised and submit herewith, in triplicate, separate cost estimates for the two surveys. The total cost remains as previously submitted.

Yours very truly,
DELHI AUSTRALIAN PETROLEUM LTD.

Charles T. Easley

By Charles T. Easley
Resident Manager

CTE:bb

BCC: Santos Limited
S.A. Department of Mines
N.C. Miller

Envelope 427

Delhi Australian Petroleum Ltd.
Attachment No. 3

COST ESTIMATE

STRZELECKI CREEK GRAVITY SURVEY

		£
A.	Contract Gravity Crew	
	330 readings @ $21.10.0d per New Reading	7,095
B.	Progress and Final Report	
	Drafting and reproduction costs and postages	50
C.	Audited Statement of Costs	50
D.	Aerial Photographs and Mosaics	150
E.	Permanent Station Markers	30
F.	Elevation Control	
	Spirit level surveys, in restricted areas, by subcontract, estimated maximum	750
G.	Company Supervision	
	Technical supervision	250
	1 air charter trip	125
	Company personnel expenses and transportation	25
H.	Contingencies	
	10% of total, excluding Item A	143
	TOTAL	£8,660

Delhi Australian Petroleum Ltd.
Attachment No. 3a

COST ESTIMATE

LAKE GREGORY GRAVITY SURVEY

	£
A. Contract Gravity Crew	
2,870 readings @ £18.0.0d per New Reading	51,660
Contingent additional readings, 150 @ £18.0.0d	2,700
B. Progress and Final Report	
Drafting and reproduction costs and postages	250
C. Audited Statement of Costs	400
D. Aerial Photographs and Mosaics	800
E. Permanent Station Markers	270
F. Elevation Control	
Spirit level surveys, in restricted areas, by subcontract, estimated maximum	2,250
G. Company Supervision	
Technical supervision	1,000
3 air charter trips	375
Company personnel expenses and transportation	125
H. Contingencies	
10% of total, excluding Item A	547
TOTAL	£60,377

Delhi Australian Petroleum Ltd.
Attachment No. 1

OBJECTIVES OF THE SURVEY

The objectives of the proposed gravity survey are twofold:

To provide structural leads in previously un-mapped areas for the purpose of enabling more precise and economical targeting of seismic surveys, which in turn define targets for exploratory wells, and

To complete the regional geological interpretations of the western Great Artesian Basin as revealed by reconnaissance gravity mapping in areas adjacent to the proposed survey.

The close coincidence of structural features involving Permian rocks, as mapped by seismograph and confirmed by drilling, and positive gravity anomalies is particularly striking in the Gidgealpa, Merrimelia, Innamincka and Nappacoongee areas. The gravity survey method is thus considered to be a very valuable means of detecting structural anomalies and trends in this region prior to conducting slower and more costly seismic surveys.

Reconnaissance aeromagnetic surveys have been effective in delineating general basin areas, but not local features. It is expected that the gravity survey will effectively bridge the gap between the two geophysical methods - (aeromagnetic and seismic) - mapping more precisely the depths and areal extent of the sedimentary basins and showing in reconnaissance fashion regional and local tectonic trends and the larger individual structures, many of which may eventually prove to be worthwhile targets for exploratory drilling.

An additional aspect of the information to be gained from the gravity survey is the possible interpretation of Pre-Permian structure, and depths to basement. Such data has taken on added importance with the discovery of excellent reservoir rocks of Cambrian age at Gidgealpa. In combination with existing aeromagnetic data, valid interpretations of Pre-Permian rocks may result in many areas, in contrast to only local success with the seismograph.

The regional developments of the proposed survey will, when interpreted in conjunction with adjoining gravity surveys, provide a broad and continuous picture of the geology of much of Central Australia, as well as fundamental data leading to a fuller understanding of the geological history and mineral economics of the area.

Delhi Australian Petroleum Ltd.
Attachment No. 2

PARTICULARS OF THE SURVEY AND TIME SCHEDULES

The proposed survey is to be conducted in two phases. The initial phase will be completed during December, 1964, and includes approximately 330 stations. The second portion of the survey, including approximately 2,870 stations, will commence in March, 1965, as early as weather conditions will permit effective operations, and will be completed within fifteen weeks.

The technical details of the operation are well defined in the terms of the contract between Delhi and Wongela and the specifications for helicopter gravity surveys as defined by the Bureau of Mineral Resources tender specifications (see T4/144/73 1963) for helicopter gravity surveys.

The operation has been divided into two portions in order to provide sufficient gravity control in previously unsurveyed areas for early, effective planning of the Company's 1965 seismic programme.

In order to avoid excessive placement costs, only one helicopter will be used for the initial phase of the programme, but two will be utilised during the second portion of the proposed survey. A 4-mile x 4-mile grid station pattern will be flown using the Cell method of flying, as outlined in Bureau of Mineral Resources Records 1962/130 and 1962/134. Existing levelling control (railway tracks, seismic lines, ground gravity traverses and State Government level traverses) will be used as elevation control points.

Ties will be made to existing gravity surveys and these surveys will be incorporated into the final interpretation of the proposed survey. The Bouguer anomaly values will be based on the observed gravity value at the Bureau of Mineral Resources pendulum station at Birdsville, and at least two B.M.R. stations will be occupied along each of the northern and eastern boundaries of the area being surveyed.

Progress reports and final reports will be submitted in the forms and at the times as set out in the Memorandum of Administrative Procedures (revised September, 1964) Appendix 5, Items (viii) and (ix). It is anticipated that the Final Report will be available for presentation to the Bureau on or before October 1, 1965.

Delhi Australian Petroleum Ltd.
Attachment No. 3

COST ESTIMATE

		£
A.	**Contract Gravity Crew**	
	Initial phase	
	330 readings @ £21.10.0d. per New Reading	7,095
	Final phase	
	2,870 readings @ £18.0.0d. per New Reading	51,660
	Contingent additional readings	
	150 @ £18.0.0d.	2,700
B.	**Progress and Final Report**	
	Drafting and reproduction costs and postages	300
C.	**Audited Statement of Costs**	450
D.	**Aerial Photographs and Mosaics**	950
E.	**Permanent Station Markers**	300
F.	**Elevation Control**	
	Spirit level surveys, in restricted areas, by subcontract, estimated maximum	3,000
G.	**Company Supervision**	
	Technical supervision	1,250
	4 air charter trips	500
	Company personnal expenses and transportation	150
H.	**Contingencies**	
	10% of total excluding Item A	690
	TOTAL	£69,045

Delhi Australian Petroleum Ltd.
Attachment No. 4

SCHEDULE OF TECHNIQUES TO BE EMPLOYED

1. Station interval

One station will be placed every 16 square miles in a 4-mile x 4-mile grid, except in those areas where there is an overlap with existing gravity coverage.

2. Time between repeat readings for drift control

Base stations will be re-visited every two hours and field barometers will be checked against the base barometer at intervals of less than four hours.

3. Network of base stations and size of closed loops

The density of base stations and tie stations will be sufficient to maintain the desired accuracy of control, and the actual size of any loop is left to the discretion of Wongela.

4. Probable error on loop closure

Actual deviation is not expected to exceed 0.1 milligal, and the standard deviation of the Bouguer anomaly value will be less than 1.5 milligals. The ability of Wongela to satisfy these requirements is known to the Bureau.

5. Station location

The accurate location of gravity stations will be marked precisely on air photographs with a needle prick. The pricked point will be marked on the front and back of the photograph by a small circle surrounding the point. Steel stakes will be used to mark permanent stations and these stations will be indicated on the air photographs and maps by double circles.

6. Base maps

Photo-centre compilation base maps prepared by the Department of National Mapping will be used for the proposed survey. When original maps are not on 1 : 250,000 scale they will be reduced photographically to this scale. Some maps of the area are currently being prepared by the Department and are expected to be completed in time for use as final report maps. Gravity stations will be transferred from the photos to these 1 : 250,000 base maps by use of proportional dividers. Latitude and longitude will be measured from the maps using a scaling graticule.

7. Elevation control

Existing elevation control in the region of the proposed survey is referred to a variety of datum levels, including:

Port Augusta Low Water Spring Tide equals Zero
Port Augusta Low Water Spring Tide equals Plus 100 feet
Port Augusta Mean Sea Level equals Zero
Brisbane Mean Sea Level equals Zero

The corrections to bring all prior surveys to a common datum are now known. For the proposed survey, elevations will be referred to Port Augusta Mean Sea Level equals Zero.

New elevation control will be acquired during progress of seismic surveys to be carried out during 1965 in some areas where control is presently sparse. If additional vertical control is deemed necessary at the conclusion of the helicopter survey, a team of qualified surveyors will be engaged as subcontractors by Wongela to carry out required spirit levelling. A provision for this work is included in the costing for the survey.

An elevation factor of 0.06982 milligals per foot will be used for the proposed survey. This is the same factor as used in previous gravity surveys in the region.

Delhi Australian Petroleum Ltd.
Attachment No. 5

SCHEDULE OF EQUIPMENT TO BE USED IN PROPOSED SURVEY

Wongela Geophysical Pty. Ltd. will furnish and operate the following equipment:

Technical Equipment

1. Two Worden gravity meters
   Scale constant approximately 0.10mg./div.
   (calibrated over a Bureau of Mineral Resources calibration range before and after the proposed survey)

2. Four Mechanisms Ltd. microbarometers
   Types 2016 and 2016A
   Calibrated in millimetres

3. Thermometers and wet and dry bulb thermometers as required.

Vehicles and Trailer

1. Two AWA 25 watt Model 60B teleceivers for communication with the Flying Doctor network

2. Four 4-wheel drive Toyotas, long wheel base, tray body

3. Two helicopters drawn from (1) Bell G3B-1
   (2) Bell G-2
   (3) Hughes 269A
   and supplied by Rotor-Work Pty. Ltd., a company with an established reputation in this work

Camp Facilities

1. One 16 foot office trailer and kitchen

2. Sufficient tents to accommodate contractor's personnel and one company visitor

Delhi Australian Petroleum Ltd.
Attachment No. 6

REGIONAL GEOLOGY
and
EXISTING GEOPHYSICS

Regional Geology

The area of the proposed gravity survey is in the western Great Artesian (Mesozoic) Basin, which includes sub-basins of Paleozoic age. It includes all of the areas in northeastern South Australia which have not previously been covered by gravity surveys. Previous gravity and seismic work has shown that, in this part of Australia, gravity anomalies are closely related to tectonic features, and, therefore, this survey will be of great value in the programming of other geophysical work and exploratory drilling.

Geological studies of outcrops around the perimeter of the Great Artesian Basin and the limited amount of subsurface information available permit highly interpretive stratigraphic projections of the parameters of Paleozoic rocks throughout the basin. These show that Permian and older rocks may be expected to be present, and in such lithologies, thicknesses and structural positions as to provide possibilities for the generation and accumulation of oil and gas. Rocks of all types are expected to be present, including shale and carbonate source beds and sandstone and carbonate reservoir beds. Both very gentle and very strong folding are common features of the Paleozoic rocks, providing numerous potential traps for oil and gas.

More detailed considerations of regional geology of the area of the proposed survey are included in recent subsidy applications submitted by the Company, in particular those for the Delhi-Santos Gidgealpa No. 1 and No. 2 wells and Delhi-Santos Merrimelia No. 1 well.

Existing Geophysics

The additional gravity control acquired in conjunction with the Coopers Creek Seismic Survey has shown that seismic structures and gravity anomalies are closely coincident along the Gidgealpa-Innamincka trend and are related along the Nappacoongee-Murta trend. Other such trends are likely to be indicated by the proposed survey and to be confirmed by future seismic programme.

Gravity metered reconnaissance seismic lines now extend well into some of the remaining unexplored areas (Ref: Progress Reports on Coopers Creek Seismic Survey) and will be used as control for the proposed survey. Other existing gravity surveys within and adjoining the proposed survey area will be tied to and incorporated into the final Bouguer Anomaly Maps. These surveys are listed in the contract between Wongela and Delhi and are shown on Exhibit No. 1.

The Innamincka-Betoota Aeromagnetic Survey (1961) covers the majority of the proposed survey area. The remainder of the proposed survey area (south of 29° 00') has been surveyed with an airborne magnetometer by the Bureau of Mineral Resources and the data is currently being reduced by the Department of Mines of South Australia.

Selected References

Further details of geology and geophysics pertinent to this application for subsidy are included in the following:

Final Reports on Subsidized Operations

GEOPHYSICS

1. Innamincka-Betoota Aeromagnetic Survey, 1961
2. Birdsville-Lake Frome Gravity Survey, 1963
3. Diamantina-McGregor Range Seismic Survey, 1963

WELLS

4. Delhi-Santos Gidgealpa No. 1 Well, 1963
5. Delhi-Santos Gidgealpa No. 2 Well, 1964
6. Delhi-Santos Gidgealpa No. 3 Well, 1964

Progress Reports on Subsidized Operations

GEOPHYSICS

1. Coopers Creek Seismic Survey, 1964

WELLS

2. Delhi-Santos Merrimelia No. 1 Well, 1964

Subsidy Applications

GEOPHYSICS

1. Coopers Creek Seismic Survey, 1964

WELLS

2. Delhi-Santos Gidgealpa No. 1 Well, 1963
3. Delhi-Santos Gidgealpa No. 2 Well, 1963
4. Delhi-Santos Gidgealpa No. 3 Well, 1964
5. Delhi-Santos Merrimelia No. 1 Well, 1964
6. Delhi-Santos Merrimelia No. 2 Well, 1964

Delhi Australian Petroleum Ltd.
Attachment No. 7

SCHEDULE OF CONTRACT PERSONNEL

Supervisor

Mr. L.N. Ingall, whose qualifications are well known to the Bureau of Mineral Resources will be responsible for the supervision of the field operations and the preparation of the final report.

Party Chief and Party Manager

Mr. G.F. Lonsdale and Mr. M. Brulhart will be responsible for the conduct of the field operations. Both men are experienced in helicopter gravity operations and their qualifications are on file with the Bureau.

Chief Observer

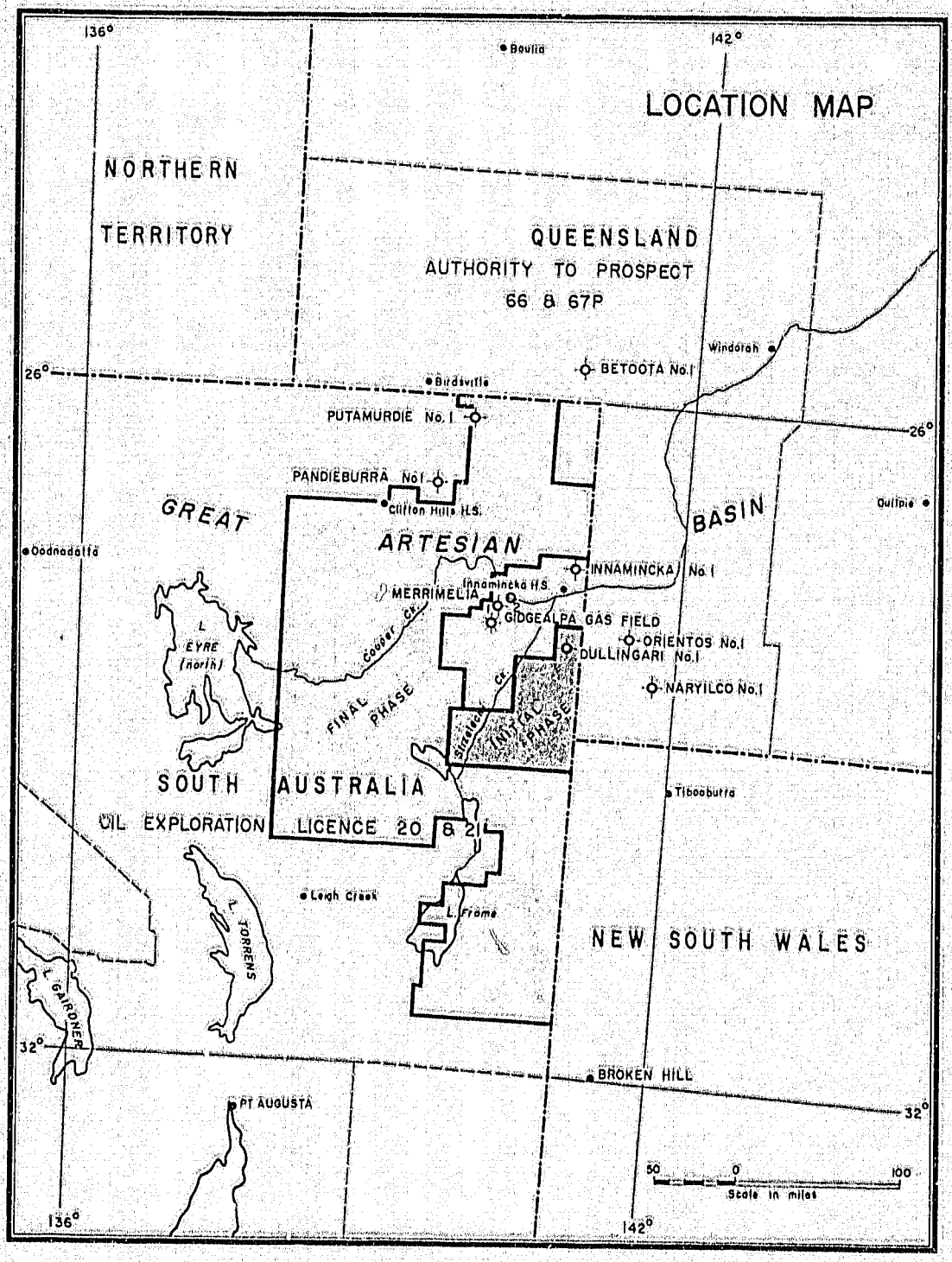
Frank C. Clements' qualifications as a gravity observer are also known to the Bureau.

In addition, Wongela will provide experienced men for the following positions:

2 Observers
1 Gravity Computer
2 Mechanic/Drivers
1 Cook

The helicopter crew will consist of the following personnel:

3 Pilots
1 Engineer



Envelope 427
F.1.

PASTORAL PLAN SHEET Nº 18.

NORTHERN TERRITORY

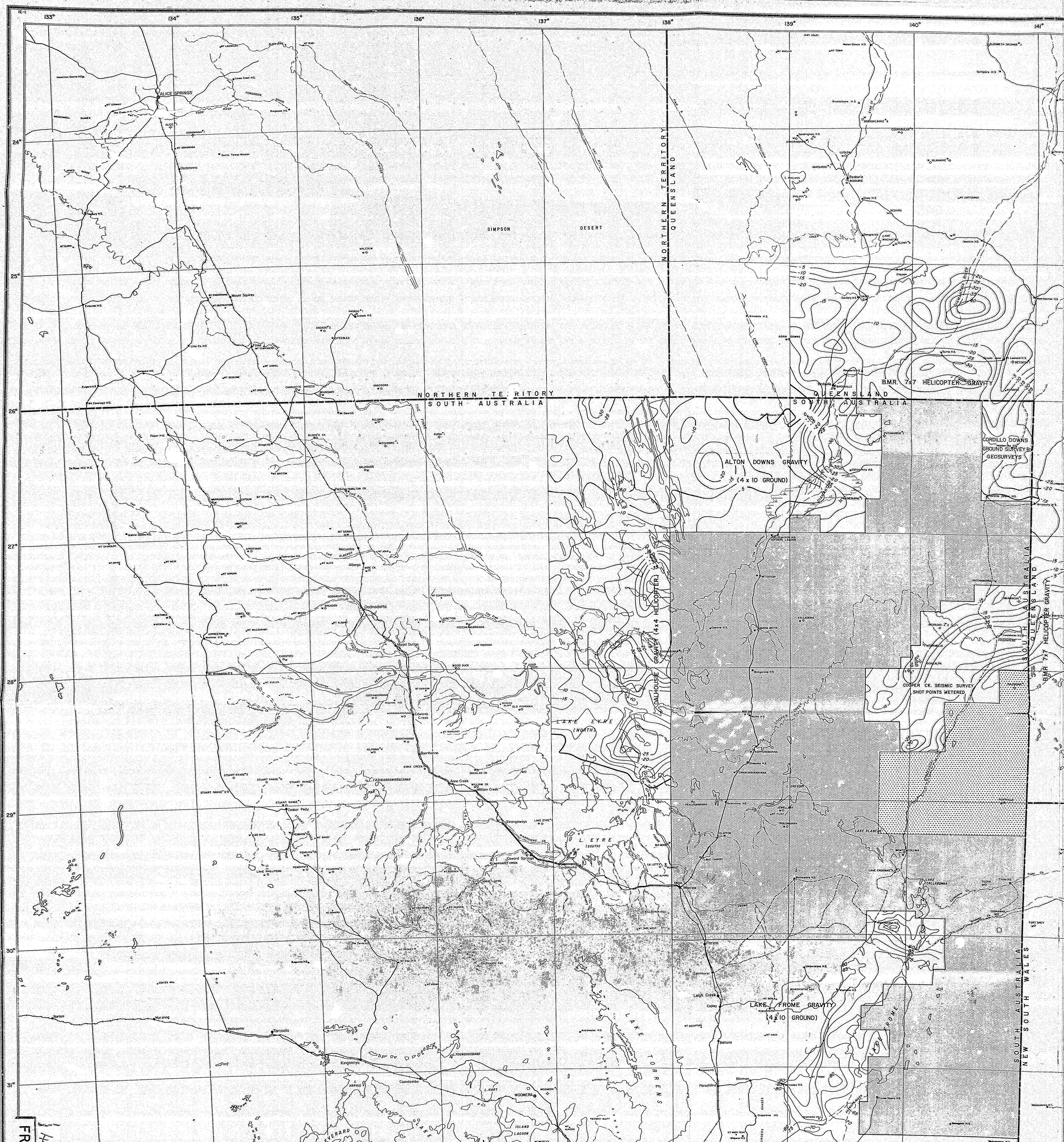
ASARCO PLAN Nº 510

SCALE IN MILES

SCALE IN KILOMETRES

ENV 1880 (2) – 12

1697



133°
134°
135°
136°
137°
138°
139°
140°
141°
24°
25°
26°
27°
28°
29°
30°
31°
ALICE SPRINGS
MACDONNELL RANGES
JAMES RANGE
FINKE R.
TODD RIVER
FERGUSSON RANGE
HALE RIVER
SIMPSON DESERT
NORTHERN TERRITORY
QUEENSLAND
SOUTH AUSTRALIA
NEW SOUTH WALES
Rodinga
Mount Squires
Finke
Abminga
Oodnadatta
Mount Dutton
Edwards Creek
Boorthanna
Anna Creek
William Creek
Strangeways
Coward Springs
Curdimurka
Marree
Farina
Lyndhurst
Leigh Creek
Copley
Beltana
Parachilna
Blinman
Hawker
Coober Pedy
Tarcoola
Kingoonya
Malbooma
Wynbring
Barton
Coondambo
WOOMERA
Woocalla
Bookaloo
Bedourie
Birdsville
EYRE CREEK
DIAMANTINA RIVER
COOPER CREEK
LAKE EYRE (NORTH)
L. EYRE (SOUTH)
LAKE TORRENS
LAKE GAIRDNER
L. EVERARD
L. HARRIS
L. HART
L. YOUNGHUSBAND
L. CADIBARRAWIRRACANNA
ISLAND LAGOON
PERNATTY LGN.
LAKE FROME
LAKE BLANCHE
LAKE CALLABONNA
L. GREGORY
FLINDERS RANGES
NORTH FLINDERS RANGES
STUART RANGE
B.M.R. 7x7 HELICOPTER GRAVITY
ALTON DOWNS GRAVITY (4 x 10 GROUND)
DALHOUSIE GRAVITY (4x4 HELICOPTER)
CORDILLO DOWNS GROUND SURVEY BY GEOSURVEYS
COOPER CK. SEISMIC SURVEY SHOT POINTS METERED
LAKE FROME GRAVITY (4 x 10 GROUND)
BROKEN HILL
Silverton
10 CENTIMETRES
FRAME 2
4274-1

EXHIBIT 1

DELHI AUSTRALIAN PETROLEUM LTD.
& SANTOS LTD.

HELICOPTER GRAVITY SURVEY

WESTERN GREAT ARTESIAN BASIN

CONTOUR INTERVAL: 5 MILLIGAL

DATE: NOVEMBER 1964

LEGEND

INITIAL PHASE

FINAL PHASE

SCALE 1:1,000,000

MILES 10 0 10 20 30 40 50 60 70 80 90 100 MILES

FRAME I

427-1

427-1

B.M.R. 7x7 HELICOPTER GRAVITY

ALTON DOWNS GRAVITY (4 x 10 GROUND)

CORDILLO DOWNS GROUND SURVEY BY GEOSURVEYS

DALHOUSIE GRAVITY (4x4 HELICOPTER)

COOPER CK. SEISMIC SURVEY SHOT POINTS METERED

LAKE FROME GRAVITY (4 x 10 GROUND)

B.M.R. 7x7 HELICOPTER GRAVITY

QUEENSLAND

SOUTH AUSTRALIA

NEW SOUTH WALES

NORTHERN TERRITORY

138° 139° 140° 141° 142° 143° 144° 145° 146°

24° 25° 26° 27° 28° 29° 30° 31°