

COMMONWEALTH OF AUSTRALIA  
DEPARTMENT OF NATIONAL DEVELOPMENT  
BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

*Petroleum Search Subsidy Acts*

PUBLICATION No. 74

023574

**SUMMARY OF DATA AND RESULTS  
GREAT ARTESIAN BASIN, SOUTH AUSTRALIA**

**Delhi-Santos Gidgealpa No. 2 and No. 3 Wells**

**OF  
DELHI AUSTRALIAN PETROLEUM LTD  
AND  
SANTOS LIMITED**

*Issued under the Authority of the Hon. David Fairbairn  
Minister for National Development*

1966

COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

MINISTER: THE HON. DAVID FAIRBAIRN, D.F.C., M.P.

SECRETARY: R. W. BOSWELL

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

DIRECTOR: J. M. RAYNER

---

THIS REPORT WAS PREPARED FOR PUBLICATION IN THE PETROLEUM EXPLORATION BRANCH

ASSISTANT DIRECTOR: M. A. CONDON

*Published by the Bureau of Mineral Resources, Geology and Geophysics  
Canberra, A.C.T.*

## FOREWORD

Under the Petroleum SearchSubsidy Act 1959-1961, agreements relating to subsidized operations provide that the information obtained may be published by the Commonwealth Government six months after the completion of field work.

The growth of the exploration effort has greatly increased the number of subsidized projects and this increase has led to delays in publishing the results of operations.

The detailed results of subsidized operations may be examined at the office of the Bureau of Mineral Resources in Canberra (after the agreed period) and copies of the reports may be purchased.

In order to make the main results of operations available early, short summaries are being prepared for publication. These will be grouped by area and date of completion as far as practicable. Drilling projects and geophysical projects will be grouped separately. In due course, full reports will be published concerning those operations which have produced the more important new data.

This Publication contains summaries of data and results of two drilling operations undertaken in the Great Artesian Basin, South Australia : Gidgealpa No. 2, and Gidgealpa No. 3. The information has been abstracted by the Petroleum Exploration Branch of the Bureau of Mineral Resources from well completion reports furnished by Delhi Australian Petroleum Ltd.

J. M. RAYNER  
DIRECTOR

## CONTENTS

### Page

#### DELHI - SANTOS GIDGEALPA NO. 2

SUMMARY .. .. .	1
WELL HISTORY .. .. .	2
GEOLOGY .. .. .	4
REFERENCES .. .. .	9
ADDITIONAL DATA FILED IN THE BUREAU OF MINERAL RESOURCES .. .. .	10

#### DELHI - SANTOS GIDGEALPA NO. 3

SUMMARY .. .. .	15
WELL HISTORY .. .. .	16
GEOLOGY .. .. .	18
REFERENCES .. .. .	23
ADDITIONAL DATA FILED IN THE BUREAU OF MINERAL RESOURCES .. .. .	24

## ILLUSTRATIONS

Figure 1 : Locality Map, Delhi - Santos Gidgealpa No. 2 ..	Frontispiece
Figure 2 : Geology before and after drilling Gidgealpa No. 2 ..	Opp. p. 7
Figure 3 : Seismic Contour Map, Gidgealpa Structure ..	8
Figure 4 : Structural Interpretation, Gidgealpa Structure ..	Opp. p. 8
Figure 5 : Locality Map, Delhi - Santos Gidgealpa No. 3 ..	14
Figure 6 : Geology before and after drilling Gidgealpa No. 3 ..	Opp. p. 22
Plate 1 : Composite Well Log, Delhi - Santos Gidgealpa No. 2 (4 sheets) ..	At back of report
Plate 2 : Composite Well Log, Delhi - Santos Gidgealpa No. 3 (4 sheets) ..	At back of report

DELHI - SANTOS GIDGEALPA NO. 2

of

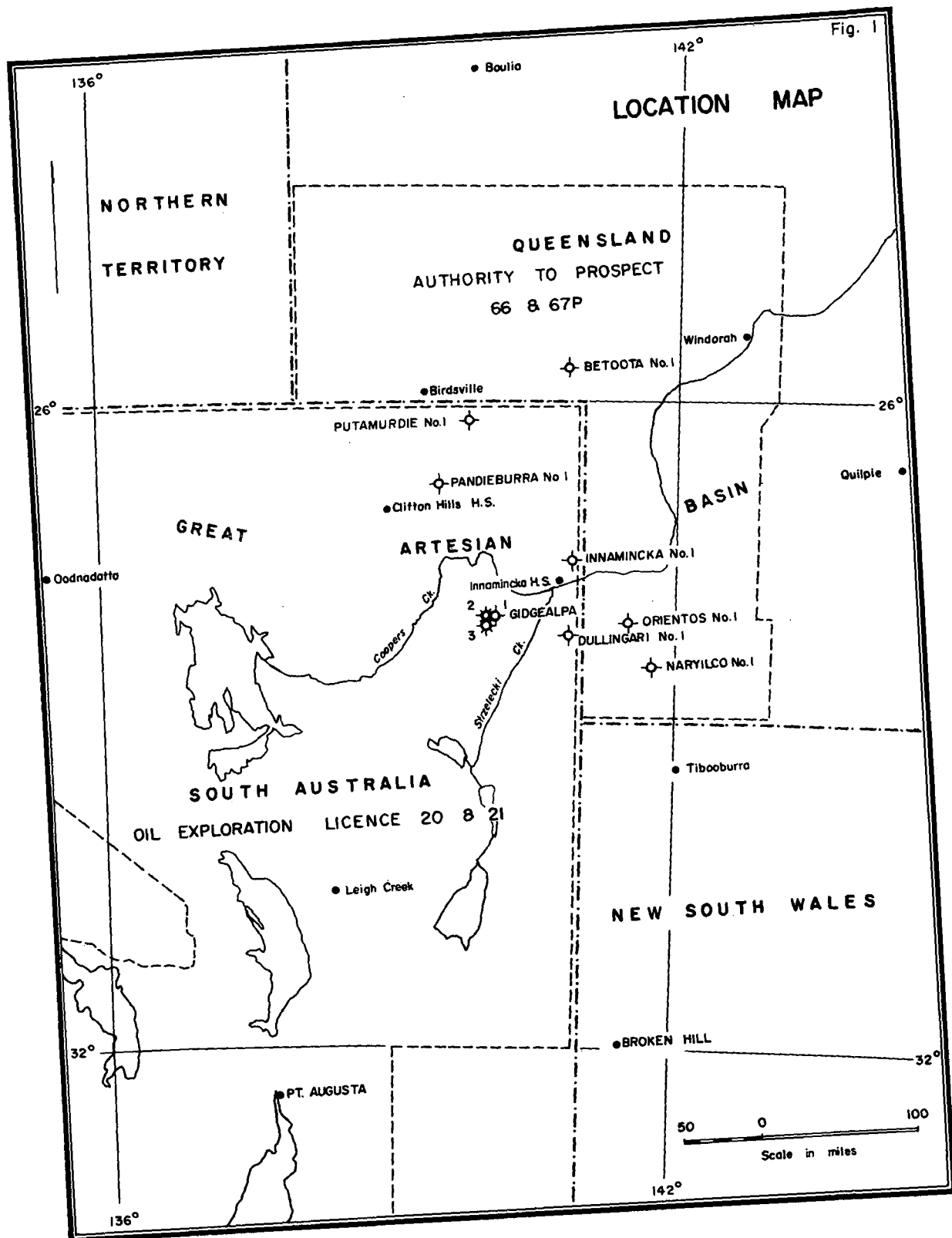
DELHI AUSTRALIAN PETROLEUM LTD

and

SANTOS LIMITED

SUMMARY OF DATA AND RESULTS

Fig. 1



## DELHI - SANTOS GIDGEALPA NO. 2

### SUMMARY OF DATA AND RESULTS\*

#### SUMMARY

Delhi-Santos Gidgealpa No. 2 Well was located in the Coopers Creek area in the far north-eastern corner of South Australia, two miles due west of Delhi-Santos Gidgealpa No. 1. The well was drilled by Drilling Contractors (Australia) Pty Ltd for Delhi Australian Petroleum Ltd and Santos Limited, to a total depth of 9020 feet. Drilling commenced on 12th December, 1963, and was completed on 10th February, 1964. A full programme of logging, testing, and coring was undertaken.

After passing through 618 feet of Recent and Tertiary sediments, the well penetrated 2277 feet of Upper Cretaceous, 1970 feet of Lower Cretaceous, 1681 feet of Jurassic, 124 feet of Triassic, and 182 feet of Permian. Below the regional angular unconformity at the base of the Permian at 6868 feet, a thick series of early Palaeozoic or Proterozoic tuffs and trachytic lavas was drilled to total depth. This series was in marked contrast to the Cambrian sediments found below the Permian in Gidgealpa No. 1.

Gidgealpa No. 2 was drilled primarily to test the Permian and Cambrian potential reservoir beds found in Gidgealpa No. 1, in a favourable structural position. The No. 2 well was drilled high on the Gidgealpa structure, immediately after the completion of the No. 1 well which was located on the flank of the anticline. The formations encountered in Gidgealpa No. 2 down to the base of the Permian section, were found to be lithologically the same as in Gidgealpa No. 1, but they are thinner, the Winton Formation, Lower Triassic, and Permian rocks markedly so.

Thirteen drillstem tests were run over intervals between 6465 and 7595 feet. Five of these tests were run in open hole and the remainder through perforations in the 7" casing. Four of the tests yielded substantial quantities of gas, and the well was completed as a shut-in gas well capable of yielding 11.6 million cubic feet of gas and 42 barrels of condensate daily, through a half-inch choke at a pressure of 2015 psi., from four Permian sandstones with a combined thickness of 61 feet. The calculated absolute open flow potential of Gidgealpa No. 2 was 29.5 million cubic feet of gas per day.

The test drilling operation at Delhi - Santos Gidgealpa No. 2 was subsidized under the Petroleum Search Subsidy Act 1959-1961, from surface to total depth.

---

\* Abstracted from : Well Completion Report, Delhi-Santos Gidgealpa No. 2, South Australia, by J. Harrison and G.T. Higginbotham, Delhi Australian Petroleum Ltd, June, 1964.

## WELL HISTORY

### General Data

Well name and number:	Delhi-Santos Gidgealpa No. 2
Location:	Latitude 27° 56' 44 " S. Longitude 140° 03' 01.5" E.
Name and address of Tenement Holders:	Delhi Australian Petroleum Ltd, 32 Grenfell Street, Adelaide, South Australia  Santos Limited, 44 Grenfell Street, Adelaide, South Australia
Details of Petroleum Tenement:	Oil Exploration Licences Nos 20 and 21, South Australia
Total Depth:	9020 feet
Date drilling commenced:	12th December, 1963
Date drilling completed:	10th February, 1964
Date well completed:	1st March, 1964
Date rig released:	24th February, 1964
Elevation (ground):	161.5 feet
Elevation (K.B.):	178 feet (datum for depths)
Status:	Completed as a shut-in gas well
Cost:	£170,178

### Drilling Data

#### Drilling Plant:

Make:	National-Ideal
Type:	80B

Hole sizes and depths:	17 1/2" to 527 feet
	12 1/4" to 5921 feet
	8 1/2" to 9020 feet (T.D.)

#### Casing details:

Size (in.):	13 3/8	9 5/8	7
Weight (lb./ft):	48	36	23
Grade:	H.40	J.55	J.55
Setting depth (ft):	527	5890	6932

## Logging and Testing

### Ditch Cuttings:

Interval: Thirty feet from surface to 4890 feet, and ten feet from 4890 feet to total depth.

Coring: Fourteen cores were cut using a Hycalog core barrel and Hycalog diamond coring heads. A total of 176 feet was cored and 117 feet (67%) recovered.

Sidewall Cores: Twenty-four sidewall samples were taken between 6500 and 6842 feet.

### Electric and other logging (Schlumberger):

Electrical Log: 528 - 9019 feet (4 runs)

Microlog-Caliper: 528 - 9016 feet (3 runs)

Sonic-Gamma Ray Log: 528 - 5889 feet (1 run )

Sonic Log: 5896 - 9010 feet (2 runs)

Laterolog: 5896 - 7530 feet (1 run )

Microlaterolog: 5896 - 7877 feet (1 run )

Gamma Ray - Neutron Log: 5850 - 9019 feet (2 runs)

Continuous Dipmeter: 5896 - 8656 feet (2 runs)

Temperature Log: 3500 - 6800 feet (2 runs)

Neutron-Casing Collar  
Correlation Log: 6400 - 6915 feet (1 run )

Cement Bond Log: 5500 - 6906 feet (1 run )

Drilling Time and Gas Log: Continuous drilling time was recorded on a Geolograph during drilling.

Formation Testing: Thirteen drillstem tests were carried out by Halliburton; details are tabulated below:

<u>Test No.</u>	<u>Interval Tested</u> (feet)	<u>Recovery</u>
1	6465 - 6475	Seven feet drilling mud.
2	6852 - 6865	96 feet gas-cut drilling mud. Gas to surface in five minutes; flow rate 2.8 MMcf/D.
3	6866 - 6880	Ten feet drilling mud.
4	6880 - 6915	Fifteen feet drilling mud.
5	7579 - 7595	Misrun - packer failed.

### Tests through 7" production casing

(perforations four per foot)

6	6773 - 6778	Thirty feet mud filtrate. During final flow period, gas flowed at rate 3.22 MMcf/D with slight amount of 49.1° A.P.I. gravity condensate.
7	6800 - 6808	600 feet water cushion. Gas flowed at rate 456 Mcf/D.
8	6793 - 6808	Thirty feet mud filtrate. During final flow period, well flowed at rate 3 MMcf/D on 3/8" choke, with some condensate.
9	6837 - 6842	Twenty feet water, ten feet condensate. During final flow period, well flowed at rate 2.86 MMcf/D on 1/4" choke and 5.92 MMcf/D on 1/2" choke, with some mud and condensate.
10	6858 - 6867	Thirty feet mud filtrate and condensate. During final flow period, well flowed at rate 2.6 MMcf/D on 1/4" choke and 5.315 MMcf/D on 1/2" choke, with 20 barrels of mud filtrate and condensate per million cubic feet of gas.
11	6500 - 6505	370 feet mud - cut water and 976 feet very slightly gas - cut water (1050 ppm. chloride).
12	6620 - 6624	180 feet mud and 135 feet muddy water (1050 ppm. chloride).
13	6637.5 - 6643.5) 6644.5 - 6652 )	152 feet mud and 158 feet muddy water and fine sand (13,500 ppm. chloride).

#### Deviation Survey:

The hole deviation was determined at regular intervals with a Totco instrument. Maximum hole deviation was 5° at 8350 and 8500 feet.

### GEOLOGY

#### Stratigraphy

##### General:

The stratigraphy of Delhi-Santos Gidgealpa No.2 follows very closely the succession found in Gidgealpa No. 1 down to the base of the Permian. The lithology of each unit is very similar in each case, the only real difference lying in thickness changes. Almost without exception the units in No. 2 well are thinner than in No. 1 well. In the case of the Winton Formation, Lower Triassic, and Permian, the thinning in No. 2 well is very marked. It is significant that these units are in some way associated with unconformities and that the erosion or non-deposition is connected with the rising Gidgealpa structure during periods of crustal movement. Below the Permian there is no similarity in the rocks encountered in each well other than that they are, in part at least, of volcanic origin.

The stratigraphic sequence encountered in Gidgealpa No. 2, is summarized in the Table below:

<u>Age</u>	<u>Formation</u>	<u>Depth Intervals</u> (feet)	<u>Thickness</u> (feet)
Recent and Tertiary		16 - 634	618
Upper Cretaceous	Winton Formation	634 - 2911	2277
Lower Cretaceous	Tambo Formation	2911 - 3897	986
Lower Cretaceous	Toolebuc Member, Tambo Formation	3897 - 4016	119
Lower Cretaceous	Roma Formation	4016 - 4657	641
Lower Cretaceous	"Transition Beds"	4657 - 4881	224
Upper Jurassic	Mooga Sandstone	4881 - 5788	907
Upper to Middle Jurassic	Walloon Formation	5788 - 6158	370
Middle to Lower Jurassic	Hutton Sandstone Equivalent	6158 - 6562	404
<hr/> Hiatus <hr/>			
Lower Triassic	Unnamed	6562 - 6686	124
Permian	Unnamed	6686 - 6868	182
<hr/> Angular Unconformity <hr/>			
Proterozoic (?)	Unnamed	6868 - 9020 (T.D.)	2152+

Detailed:

Recent and Tertiary : Surface to 634 feet

Loose quartz sand; soft, yellow clay with minor gypsum; grey-brown clay; grey-brown, soft, silty, carbonaceous mudstone; soft, amorphous to hard, micro-crystalline limestone between 500 and 550 feet.

Winton Formation (Upper Cretaceous, Cenomanian) : 634 to 2911 feet (2277 feet)

Predominantly grey, soft, silty, carbonaceous shale with numerous interbeds of "salt and pepper" sandstone and a few thin bands of microcrystalline limestone. Plant fragments common.

Tambo Formation (Lower Cretaceous, Albian) : 2911 to 3897 feet (986 feet)

Dark grey, soft, fissile, micromicaceous shale with minor interbeds of siltstone, sandstone, and limestone. Bivalve shells and Inoceramus prisms are common.

Toolebuc Member, Tambo Formation (Albian) : 3897 to 4016 feet (119 feet)

Grey and brown, calcareous and carbonaceous, fissile, silty shale containing Inoceramus prisms, shell fragments, and a few fish scales and spines.

Roma Formation (Lower Cretaceous, Aptian) : 4016 to 4657 feet (641 feet)

Dark grey, micaceous, silty shale with common interbeds of fine-grained, glauconitic sandstone. Bivalve shells common.

"Transition Beds" (Lower Cretaceous, Aptian-Neocomian) : 4657 to 4881 feet (224 feet)

White to cream, fine to medium-grained, subangular, poorly-sorted, quartz sandstone with kaolin cement, and minor interbeds of dark grey, carbonaceous, micaceous shale.

Mooga Sandstone (Upper Jurassic) : 4881 to 5788 feet (907 feet)

White, fine to coarse-grained and conglomeratic, angular to subrounded, poorly sorted and consolidated, quartz sandstone, with minor interbeds of dark grey, carbonaceous, micaceous shale. Good porosity below 5017 feet.

Walloon Formation (Upper to Middle Jurassic) : 5788 to 6158 feet (370 feet)

Dark grey, micaceous, carbonaceous, silty shale grading downwards into grey, medium to coarse-grained, angular to subangular, quartz sandstone, with kaolin cement and good porosity. Minor shale partings and traces of lignite.

Hutton Sandstone Equivalent (Middle to Lower Jurassic) : 6158 to 6562 feet (404 feet)

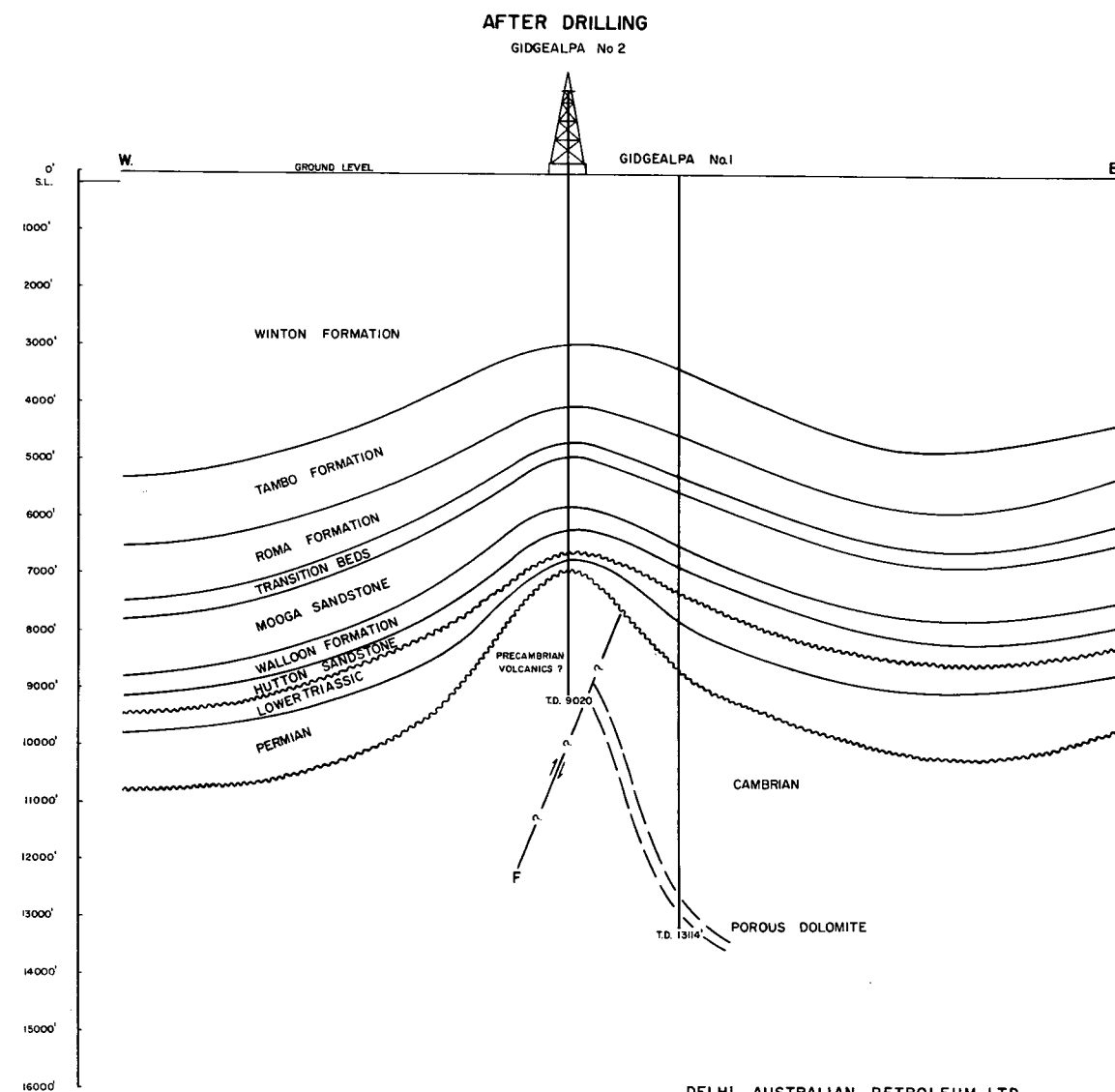
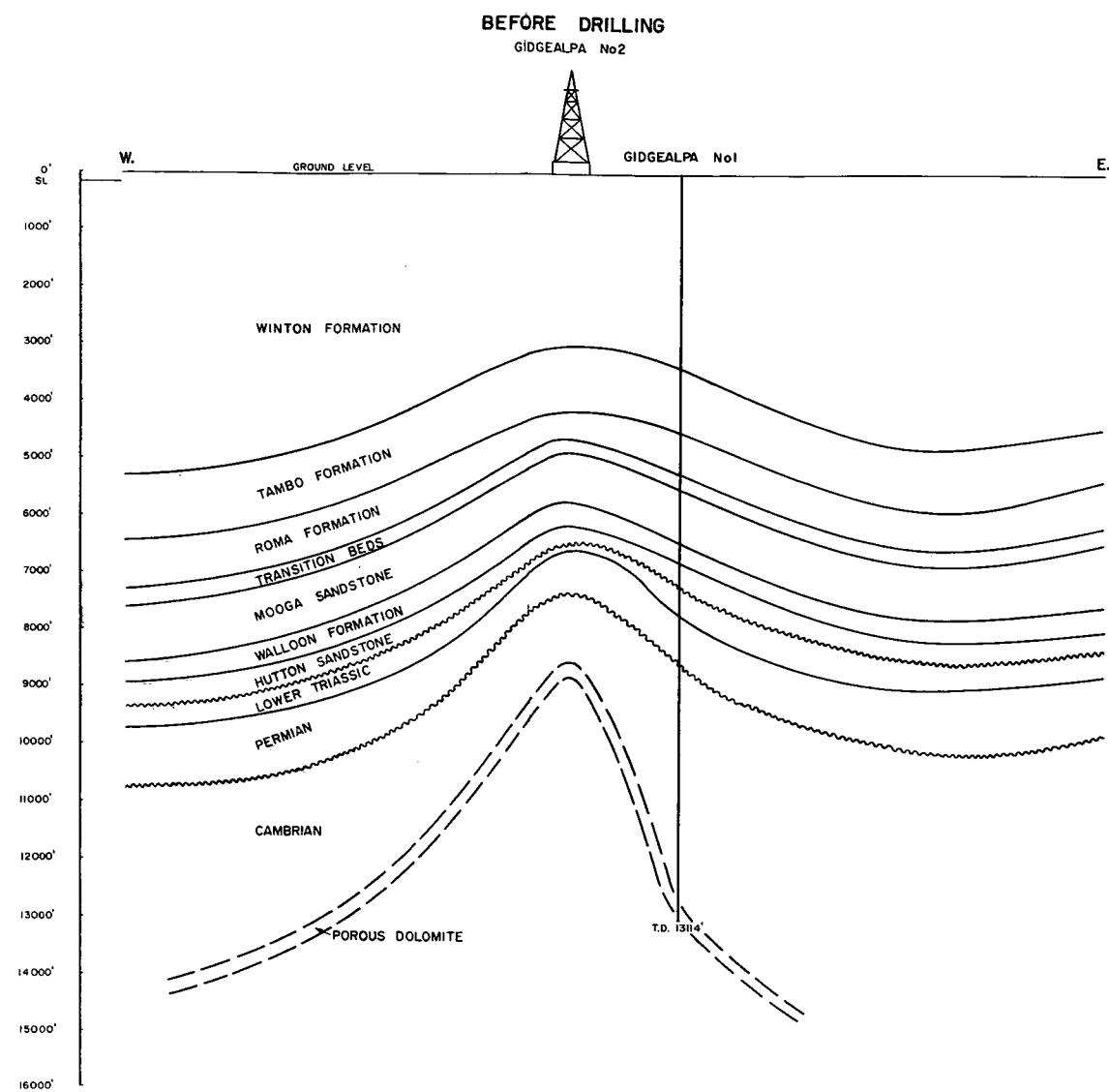
Light grey, fine to coarse-grained and conglomeratic, porous, quartz sandstone, grading downwards into interbedded sandstone, coal, and dark grey, micaceous, carbonaceous shale.

Unnamed formation (Lower Triassic) : 6562 to 6686 feet (124 feet)

Light grey, very fine-grained, micaceous, dolomitic sandstone to siltstone containing quartz and having kaolinitic and siliceous cement. Minor dark grey, silty shale bands occur.

Unnamed formation (Permian) : 6686 to 6868 feet (182 feet)

Interbedded, light grey, fine-grained to conglomeratic, quartz sandstone, and dark grey, carbonaceous, micaceous shale. Good porosity and evidence of hydrocarbons in several zones between 6756 and 6868 feet.



DELHI AUSTRALIAN PETROLEUM LTD.  
STRUCTURE AND STRATIGRAPHY  
OF THE  
**GIDGEALPA ANTICLINE**  
AS INTERPRETED  
BEFORE AND AFTER DRILLING  
GIDGEALPA No.2

HORIZONTAL SCALE  
MILES 1 0 1 2 3 4 5 6 7 MILES

Unnamed formation (early Palaeozoic or Proterozoic) : 6868 to 9020 feet (2152 feet+)

6868 to 7400 feet: Grey, green, and maroon, very fine to very coarse-grained, angular to subrounded, tuff, sandy and friable at top becoming harder downward, consisting of rock fragments, feldspar laths, chert pebbles, chlorite and calcite; thin interbeds of tan, microcrystalline, tight dolomite.

7400 to 8600 feet (approximately): Tuff at top grading to brown to tan, aphanitic, chloritic rhyolite, then to chocolate-brown, and orange, porphyritic trachyte containing large feldspar phenocrysts, ferromagnesian minerals, and trace of magnetite and sphalerite(?); calcite and quartz veins common.

8600 to 9020 feet: Chocolate-brown, and orange, very coarse-grained, tuffaceous trachyte containing angular blocks up to 4" across of trachyte in a groundmass of trachytic lava; large feldspar phenocrysts and ferromagnesian minerals common. Calcite, chlorite and epidote veins common.

### Structure

The general Gidgealpa structure is discussed in the report on Gidgealpa No. 1 Well.

The rocks below the Permian in Gidgealpa No. 2 are completely different from those encountered in the No. 1 well. In Gidgealpa No. 1, these rocks are Upper and Middle Cambrian marine, fossiliferous sediments containing some volcanic ash and tuff, whereas in No. 2 well, the sequence is tuff and trachytic lavas, the age of which is probably early Palaeozoic or Proterozoic.

This marked change in the pre-Permian section may be attributed to a high angle reverse fault, hading to the west or north-west and striking north-east, along the eastern flank of the Gidgealpa structure between the two wells.\* The No. 2 well was drilled on the upthrown and the No. 1 well on the downthrown block (see Fig. 4).

### Porosity and Permeability of Sediments Penetrated

The Mooga Sandstone, Walloon Formation, and Hutton Sandstone Equivalent showed the normal good porosity (15% to 25%) previously encountered in these formations; they were all water bearing. Several zones of rather streaky porosity averaging 12% to 14% occurred within the Lower Triassic rocks. Two of these zones were tested through perforations and yielded only water. The small amounts of water given up on these tests would indicate a very low permeability for these zones. Within the Permian sequence are four zones of very good porosity varying from 14% to 22% by log analysis. Core analysis on the only core taken within any of these porous zones, the lowermost one, gives comparable values for the porosity, 13% to 19.6%. The permeability on this core ranged up to 393 millidarcys. No effective porosity was found in the volcanic sequence below the Permian.

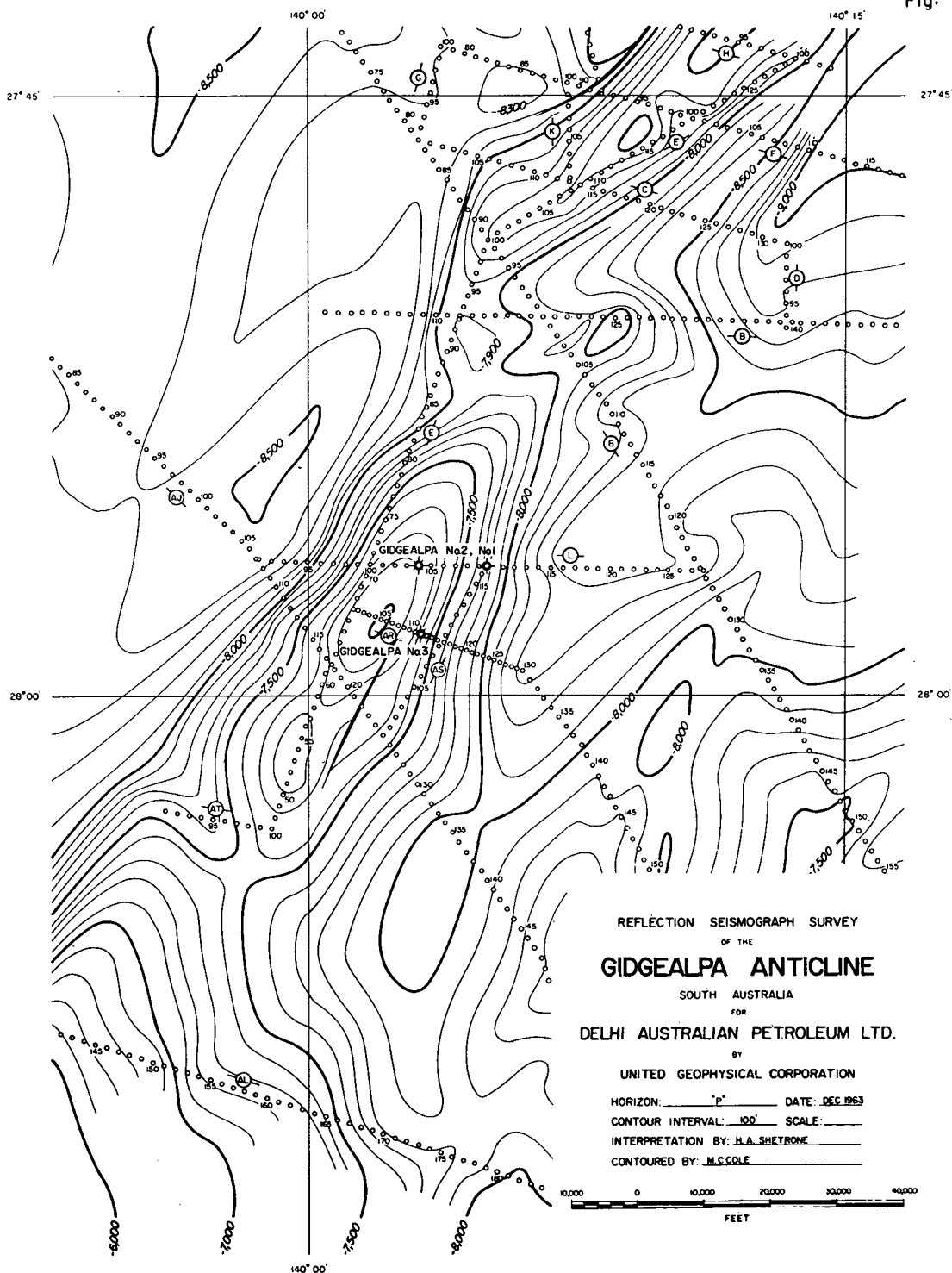
### Relevance to Occurrence of Petroleum

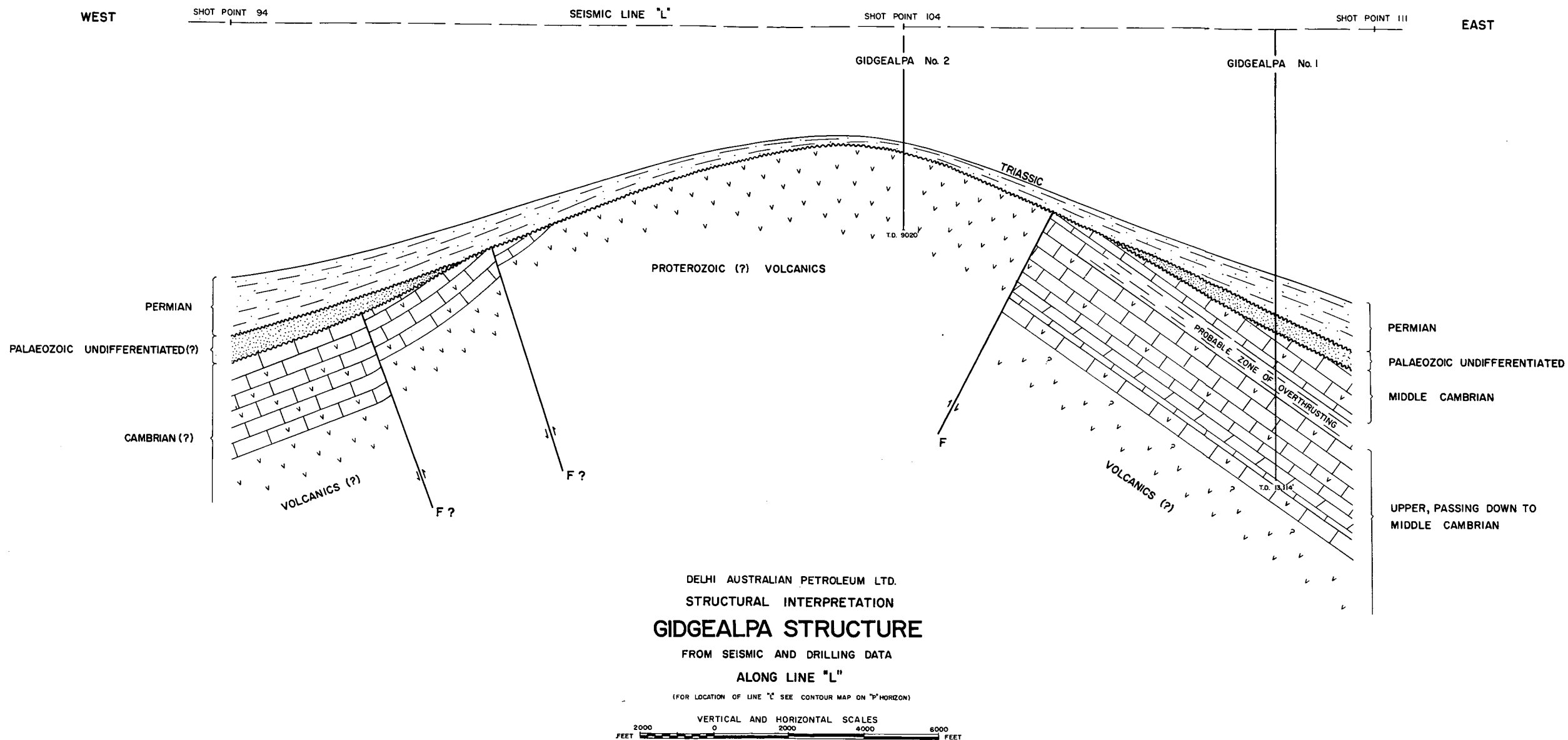
In Gidgealpa No. 2, the sandstone sections of the Walloon Formation and the Hutton Sandstone Equivalent were water bearing, and no oil or gas shows were encountered in the Lower Triassic.

---

\* Other explanations, e.g. recumbent folding, are possible.

Fig. 3





The four porous sandstones within the Permian section are all gas bearing, with some condensate, and with no sign of formation water. This most significant discovery opens up possibilities for future hydrocarbon finds within the Permian in the western part of the Great Artesian Basin, as rocks of this age and with similar lithology to those in Gidgealpa No. 2 are known to be widespread in this region. Furthermore, structures similar to the Gidgealpa feature have been detected by seismic work.

The porous Cambrian dolomite found in Gidgealpa No. 1, and which was a prime target in Gidgealpa No. 2, was not present, probably due to structural complexity.

#### Contribution to Geological Concepts resulting from Drilling

It is apparent that the Gidgealpa structure is an ancient feature, movement on which has been repeated at various periods throughout geological times. The structure was probably elevated originally during a post-Upper Cambrian orogeny. A fault developed along the eastern flank with the upthrown block being to the west and the downthrown block to the east. Probably during this period of faulting the Middle Cambrian was thrust over the Upper Cambrian in the vicinity of the No. 1 well. During the subsequent period of erosion before Permian deposition began, the Cambrian sediments on top of the western or upthrown block were stripped off. Thus when Permian deposition was initiated, the top of the Gidgealpa structure revealed Proterozoic (?) volcanics while Cambrian sediments were still retained on the flanks. The structure was either high throughout most of the Permian or was rising slowly as deposition progressed. At all events the low areas on either side were filled up and thus received a much greater thickness of sediments than did the top of the feature which was only inundated toward the close of the Permian period. An epeirogenic movement at the close of Lower Triassic times stripped much of the strata of this age from the crestal areas. It is possible also that the slow rise of the structure in Permian times continued into the Lower Triassic and that the thinning of the Triassic strata on the crest is due to a much slower rate of deposition in that area. With the start of sedimentation in Lower Jurassic times, a long period of more or less continuous deposition began which was only terminated at the close of the Upper Cretaceous. During this long interval vertical oscillations of the structure probably took place but no major movement of any consequence occurred. The last and final elevation of the Gidgealpa structure itself was probably effected in Miocene times.

Sedimentation and erosion over the Gidgealpa structure are directly related to its history of tectonic movement. Those formations which have been most affected are those which are adjacent to unconformities. These are Cambrian, Permian, Lower Triassic, Hutton Sandstone, and Winton Formation, all of which are much thinner (or absent in the case of the Cambrian) in Gidgealpa No. 2 than in Gidgealpa No. 1.

#### REFERENCES

- |  |       |   |
|--|-------|---|
| DELHI AUSTRALIAN PETROLEUM LTD,          | 1963: | Final report, Diamantina - McGregor seismic survey (Unpubl.).   |
| DELHI AUSTRALIAN PETROLEUM LTD,          | 1966: | Delhi - Santos Gidgealpa No. 1 Well, South Australia. <u>Bur. Min. Resour. Aust. Petrol. Search Subs. Acts Publ.</u> 73.        |
| HARRISON, J., and<br>HIGGINBOTHAM, G.T., | 1964: | Well Completion Report, Delhi - Santos Gidgealpa No. 2, South Australia. Unpublished report for Delhi Australian Petroleum Ltd. |

## ADDITIONAL DATA FILED IN THE BUREAU OF MINERAL RESOURCES

The following additional data relating to Delhi - Santos Gidgealpa No. 2, have been filed in the Bureau of Mineral Resources, Canberra, and are available for reference:

- (i) Well Completion Report, by J. Harrison and G.T. Higginbotham 24 pp.
  - Appendix 1 : Core descriptions 21 pp.
  - Appendix 2 : Petrology, by H.W. Fander 7 pp.
  - Appendix 3 : Palaeontology, by W.K. Harris 2 pp.
  - Appendix 4 : Core analyses, by BMR, and Core Laboratories, Inc. 4 pp.
  - Appendix 5 : Gas analysis, by H.W. Sears and D. McPharlin 7 pp.
  - Appendix 6 : Oil analysis, by H.W. Sears 11 pp.
  - Appendix 7 : Water analysis, by T. Frost 7 pp.
  - Appendix 8 : Halliburton Formation Test reports
- (ii) Daily drilling reports for period 7th December, 1963, to 25th February, 1964.
- (iii) Well logs including the following:
  - (a) Electrical Log
    - Run 1, 528 - 5898 feet (2", 5" = 100 ft)
    - Run 2, 5896 - 6919 feet (2", 5" = 100 ft)
    - Run 3, 6800 - 8753 feet (2", 5" = 100 ft)
    - Run 4, 8650 - 9019 feet (2", 5" = 100 ft)
  - (b) Microlog-Caliper
    - Run 1, 528 - 5892 feet (2", 5" = 100 ft)
    - Run 2, 5896 - 6915 feet (2", 5" = 100 ft)
    - Run 3, 6480 - 9016 feet (2", 5" = 100 ft)
  - (c) Sonic-Gamma Ray Log
    - Run 1, 528 - 5889 feet (2", 5" = 100 ft)

(d) Sonic Log

Run 1, 5896 - 7870 feet (2", 5" = 100 ft)

Run 2, 7750 - 9010 feet (2", 5" = 100 ft)

(e) Laterolog

Run 1, 5896 - 7530 feet (2", 5" = 100 ft)

(f) Microlaterolog

Run 1, 5896 - 7877 feet (2", 5" = 100 ft)

(g) Gamma Ray - Neutron Log

Run 1, 5850 - 7877 feet (2", 5" = 100 ft)

Run 2, 7870 - 9019 feet (2", 5" = 100 ft)

(h) Continuous Dipmeter

Runs 1 and 2, 5896 - 8656 feet (1.2" = 100 ft)

(i) Temperature Log

Run 1, 3500 - 5860 feet (2" = 100 ft)

Run 2, 5350 - 6800 feet (2" = 100 ft)

(j) Neutron - Casing Collar Correlation Log

Run 1, 6400 - 6915 feet (2", 5" = 100 ft)

(k) Cement Bond Log

Run 1, 5500 - 6906 feet (2", 5" = 100 ft)



DELHI - SANTOS GIDGEALPA NO. 3

of

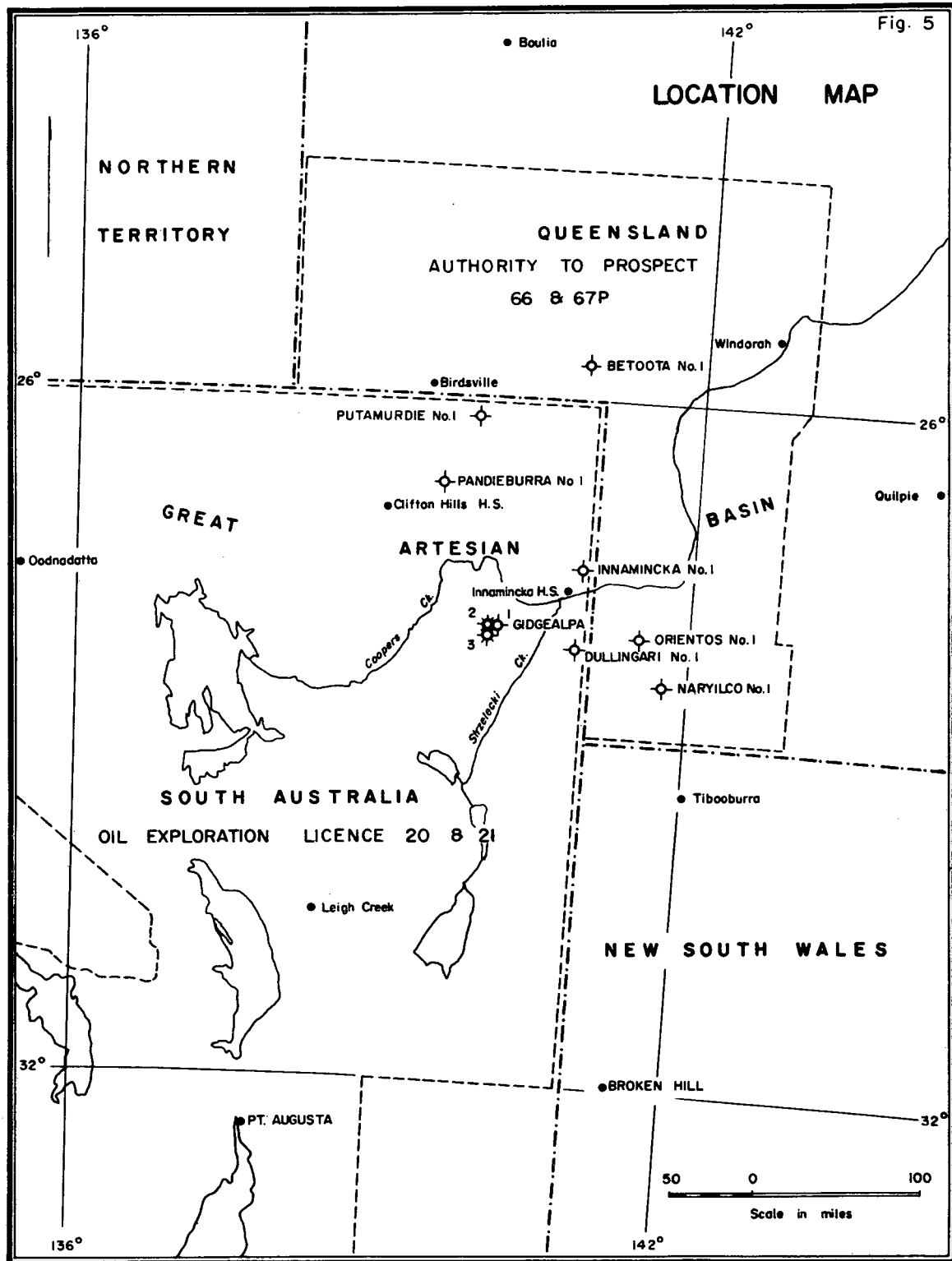
DELHI AUSTRALIAN PETROLEUM LTD

and

SANTOS LIMITED

SUMMARY OF DATA AND RESULTS

Fig. 5



## DELHI - SANTOS GIDGEALPA NO. 3

### SUMMARY OF DATA AND RESULTS\*

#### SUMMARY

Delhi - Santos Gidgealpa No. 3 Well was located two miles south of Gidgealpa No. 2 and 2 3/4 miles south-west of Gidgealpa No. 1, in the north-east of South Australia. The well was drilled by Drilling Contractors (Australia) Pty Ltd for Delhi Australian Petroleum Ltd and Santos Limited, to a total depth of 10,934 feet. Drilling commenced on 1st March, 1964, and was completed on 14th May, 1964. A full programme of logging, testing, and coring was undertaken.

The well passed through 623 feet of Recent and Tertiary sediments, and then penetrated 2425 feet of Upper Cretaceous, 2039 feet of Lower Cretaceous, 1687 feet of Jurassic, 247 feet of Lower Triassic, and 655 feet of Permian. Below the angular unconformity at the base of the Permian at 7692 feet, 93 feet of limestone of possible Cambrian age were encountered resting on a thick series of tuffs and trachytic lavas very similar to those found below the Permian in Gidgealpa No. 2. The well bottomed in this (?) Proterozoic volcanic sequence at 10,934 feet.

Gidgealpa No. 3 was drilled on the eastern flank of the Gidgealpa structure, southward from the previous two wells, to explore a thicker Permian sequence than in Gidgealpa No. 2, in a position structurally between the No. 1 and No. 2 wells. The Mesozoic stratigraphy encountered in Gidgealpa No. 3 was the same as in the two previous wells. Most of the Permian section resembled that found in the other wells but the bottom 130 feet consisted of a basal conglomerate of mainly tuffaceous material which was not present in the other Gidgealpa wells.

Fourteen drillstem tests were run over intervals between 6131 and 8668 feet; eight were conducted in open hole and six through perforations in the 7" production casing. Six of the tests over intervals in the Permian yielded substantial quantities of gas. The production testing that followed gave a flow rate of 2,599 million cubic feet of gas per day through a half-inch choke at a pressure of 498 psi, from five Permian sandstones having a combined thickness of 55 feet. The calculated absolute open flow potential was 2.73 million cubic feet of gas per day. The well was completed as a shut-in gas well.

The test drilling operation at Delhi - Santos Gidgealpa No. 3 was subsidized under the Petroleum Search Subsidy Act 1959-1961, from 7500 feet to total depth.

---

\* Abstracted from : Well Completion Report, Delhi-Santos Gidgealpa No. 3, South Australia, by J. Harrison and G.T. Higginbotham, Delhi Australian Petroleum Ltd, September, 1964.

## WELL HISTORY

### General Data

Well name and number:	Delhi-Santos Gidgealpa No. 3
Location:	Latitude 27° 58' 27.1"S. Longitude 140° 03' 05.1"E.
Name of address of Tenement Holders:	Delhi Australian Petroleum Ltd, 32 Grenfell Street, Adelaide, South Australia  Santos Limited, 44 Grenfell Street, Adelaide, South Australia
Details of Petroleum Tenement:	Oil Exploration Licences Nos 20 and 21, South Australia
Total Depth:	10,934 feet
Date drilling commenced:	1st March, 1964
Date drilling completed:	14th May, 1964
Date well completed:	28th May, 1964
Date rig released:	28th May, 1964
Elevation (ground):	160 feet
Elevation (K.B.):	176 feet (datum for depths)
Status:	Completed as a shut-in gas well
Cost (total):	£196,475

### Drilling Data

#### Drilling Plant:

Make:	National-Ideal
Type:	80B

Hole sizes and depths:	17 1/2" to 497 feet
	12 1/4" to 6115 feet
	8 1/2" to 10934 feet (T.D.)

#### Casing details:

Size (in.):	13 3/8	9 5/8	7
Weight (lb./ft):	48	36	23
Grade:	H.40	J.55	J.55
Setting depth (ft):	475	6115	7610

## Logging and Testing

### Ditch Cuttings:

Interval: Thirty feet from surface to 5103 feet, and ten feet from 5103 feet to total depth.

Coring: Fourteen cores were cut, the first eleven with a Hycalog core barrel and diamond coring head, and the last three with a Christensen barrel and diamond coring head. A total of 164 feet was cored and 147.9 feet (90%) recovered.

Sidewall Cores: Seventeen sidewall samples were taken between 7695 and 7784 feet.

### Electric and other logging (Schlumberger):

Electrical Log: 478 - 10936 feet (6 runs)

Microlog-Caliper : 478 - 8658 feet (4 runs)

Microcaliper Log: 6800 - 10936 feet (1 run )

Sonic Log: 478 - 10929 feet (4 runs)

Laterolog: 6117 - 8656 feet (1 run )

Microlaterolog: 6117 - 7582 feet (1 run )

Gamma Ray - Neutron Log: 60 - 10937 feet (5 runs)

Continuous Dipmeter: 6117 - 10932 feet (1 run )

Temperature Log: 3490 - 10937 feet (2 runs)

Gamma Ray - Casing 6555 - 7566 feet (1 run )

Collar Correlation Log:

Cement Bond Log: 6558 - 7538 feet (1 run )

Drilling Time and Gas Log: Continuous drilling time was recorded on a Geolograph during drilling.

Formation Testing: Fourteen drillstem tests were carried out by Halliburton; details are tabulated below:

<u>Test No.</u>	<u>Interval Tested</u> (feet)	<u>Recovery</u>
1	6131 - 6156	Twenty feet drilling mud.
2	6848 - 6868	Twenty feet drilling mud.
3	7096 - 7125	235 feet drilling mud, 275 feet heavily gas - cut muddy water, and 850 feet of heavily gas - cut brackish water (2800 ppm. chloride).
4	7164 - 7177	110 feet drilling mud, 20 feet muddy water, and 350 feet gas - cut water.
5	7313 - 7330	110 feet drilling mud, and ten feet condensate (45.4° A.P.I. gravity). Gas flowed at rate 0.965 MMcf/D on 1/4" choke; 1.1 MMcf/D on 3/8" choke.
6	7343 - 7380	135 feet drilling mud.
7	7528 - 7562	210 feet drilling mud. Gas flowed at rate 2.74 MMcf/D on 1/4" choke; 4.485 MMcf/D on 3/8" choke.
8	8598 - 8668	Thirty feet drilling mud.

Tests through 7" production casing

(perforations four per foot)

9	7208 - 7218	Tool failed to close.
10	7208 - 7218	190 feet drilling mud, and 750 feet gas - cut water.
11	7394 - 7396)	
	7413 - 7420)	882 feet mud filtrate.
	7449 - 7454)	Gas flowed at rate 0.468 MMcf/D.
	7473 - 7483)	
12	7394 - 7396)	475 feet mud filtrate.
	7413 - 7420)	Gas flowed at rate 0.510 MMcf/D.
	7449 - 7454)	Perforations - eight per foot.
	7473 - 7483)	
13	7523 - 7554	No recovery - reverse circulated.
		Gas flowed at rate 2.28 MMcf/D on 1/2" choke.
		Perforations - eight per foot.
14	7373 - 7483)	Gas flowed at rate 1.22 MMcf/D on 1/4" choke; 1.51 MMcf/D on 3/8" choke; 1.43 MMcf/D on 1/2" choke.
	7523 - 7554)	Perforations - eight per foot.

Deviation Survey: The hole deviation was determined at regular intervals with a Totco instrument. Maximum hole deviation was 8° at 10,275 feet.

GEOLOGY

General

Delhi - Santos Gidgealpa No. 3 Well was programmed as a direct result of the gas discovery in Gidgealpa No. 2. The well had two primary objectives:

- (i) It was to be a confirmation test of the gas-bearing zones in the Permian of Gidgealpa No. 2.

- (ii) It was designed as a further attempt to find, in a structurally favourable situation, the porous Middle Cambrian dolomite discovered in Gidgealpa No. 1 but which was absent in the No. 2 well.

## Stratigraphy

### General:

The stratigraphic succession found in Gidgealpa No. 3 shows similarities to those found in both No.1 and No. 2 wells. The formations down to the base of the Permian are common to all three wells. Only in the No. 1 well was the Palaeozoic sandstone unit immediately below the Permian found, but No. 3 well encountered a thin Cambrian (?) limestone section akin to the very thick Cambrian strata in Gidgealpa No. 1. No equivalent rocks were found in the No. 2 well. Below the limestone in No. 3, the Proterozoic (?) volcanic sequence, extending down to total depth, closely resembles the volcanics found below the Permian in No. 2.

A summary of the stratigraphic sequence encountered in Gidgealpa No. 3 is given in the following Table:

<u>Age</u>	<u>Formation</u>	<u>Depth Intervals</u> (feet)	<u>Thickness</u> (feet)
Recent and Tertiary		16 - 639	623
Upper Cretaceous	Winton Formation	639 - 3064	2425
Lower Cretaceous	Tambo Formation	3064 - 4050	986
Lower Cretaceous	Toolebuc Member, Tambo Formation	4050 - 4176	126
Lower Cretaceous	Roma Formation	4176 - 4864	688
Lower Cretaceous	"Transition Beds"	4864 - 5103	239
Upper Jurassic	Mooga Sandstone	5103 - 6010	907
Upper to Middle Jurassic	Walloon Formation	6010 - 6428	418
Middle to Lower Jurassic	Hutton Sandstone Equivalent	6428 - 6790	362
----- Hiatus -----			
Lower Triassic	Unnamed	6790 - 7037	247
Permian	Unnamed	7037 - 7692	655
----- Angular Unconformity -----			
Cambrian (?)	Unnamed	7692 - 7785	93
----- Unconformity -----			
Proterozoic (?)	Unnamed	7785 - 10934 (T.D.)	3149+

Detailed:

Recent and Tertiary : Surface to 639 feet

Unconsolidated, coarse quartz sand; brown and white, very soft iron stained clay; yellow-red, very soft, ferruginous clay. Between 535 and 552 feet, white, soft, amorphous, arenaceous limestone. Bottom of unit consists of light brown to white, fine to medium-grained, poorly consolidated sandstone with abundant plant fibre.

Winton Formation (Upper Cretaceous, Cenomanian) : 639 to 3064 feet (2425 feet)

Predominantly grey, soft, silty, carbonaceous shale with numerous interbeds of "salt and pepper", fine to coarse-grained, angular to subangular, poorly sorted, lignitic sandstone composed of quartz and chert in an argillaceous, occasionally calcareous cement. Few thin bands of grey-brown, microcrystalline, tight limestone. Occasional bands of lignite. Plant fossils common throughout.

Tambo Formation (Lower Cretaceous, Albian) : 3064 to 4050 feet (986 feet)

Almost entirely grey, soft, fissile, bentonitic, micromicaceous shale with occasional thin interbeds of grey, soft siltstone to very fine sandstone. Few bands of grey, microcrystalline, argillaceous, tight limestone. Bivalve shells and Inoceramus prisms common throughout.

Toolebuc Member, Tambo Formation (Albian) : 4050 to 4176 feet (126 feet)

Grey, very fine to fine-grained, glauconitic sandstone and grey-brown, fissile, slightly calcareous shale. Bivalve shells and Inoceramus prisms abundant; few fish scales and spines.

Roma Formation (Lower Cretaceous, Aptian) : 4176 to 4864 feet (688 feet)

Mainly dark grey, fissile, micaceous, silty shale with numerous interbeds of grey-green, very fine to fine-grained, poorly sorted, argillaceous, very glauconitic, tight sandstone. Bivalve shells and Inoceramus prisms common.

"Transition Beds" (Lower Cretaceous, Aptian-Neocomian) : 4864 to 5103 feet (239 feet)

Light grey, very fine to medium-grained, angular to subangular, poorly sorted, quartz sandstone with kaolin cement and dark grey, fissile, micaceous, silty shale.

Mooga Sandstone (Upper Jurassic) : 5103 to 6010 feet (907 feet)

Predominantly light grey to white, medium to very coarse-grained, in part conglomeratic, angular, well sorted, clear quartz sandstone poorly cemented with kaolin, generally good porosity throughout. Minor dark grey, fissile, micromicaceous, splintery, carbonaceous shale.

Walloon Formation (Upper to Middle Jurassic) : 6010 to 6428 feet (418 feet)

Dark brown to grey, micromicaceous, fissile, very carbonaceous, very silty shale with minor white, fine-grained, carbonaceous, tight sandstone grading downward to predominantly light grey to light brown, very fine-grained at top, becoming very coarse downward, angular, poorly sorted, quartz sandstone with kaolin cement, carbonaceous, generally good porosity. Minor interbeds of dark grey, fissile, carbonaceous shale. Few thin coal bands.

Hutton Sandstone Equivalent (Middle to Lower Jurassic) : 6428 to 6790 feet (362 feet)

Light grey, medium to very coarse-grained, angular, poorly sorted, carbonaceous, clear quartz sandstone with kaolin cement and fair porosity; interbedded with dark grey, fissile, carbonaceous shale; coal bands common in lower part.

Unnamed formation (Lower Triassic) : 6790 to 7037 feet (247 feet)

Light grey, very fine to fine-grained, argillaceous sandstone with pebbles of red siltstone; and dark grey, fissile, carbonaceous shale.

Note: The top of the Lower Triassic was picked at an abrupt increase of velocity on the Sonic Log. This also appears to correspond to a consistent seismic reflecting horizon. It is, therefore, a "log pick" and may not represent the true upper boundary of rocks of this age. However, as this change can be correlated clearly with the Sonic Logs of Gidgealpa No. 1 and No. 2, it will be adopted as the Lower Triassic marker, at least for the Gidgealpa area.

Unnamed formation (Permian) : 7037 to 7692 feet (655 feet)

7037 to 7560 feet: Light grey, fine to very coarse and conglomeratic, angular to subrounded, poorly sorted, quartz sandstone with kaolin cement; fair porosity with oil staining, fluorescence and "cut" in some beds; interbedded with dark grey to black, fissile, micaceous, very carbonaceous shale. Coal bands common throughout.

7560 to 7692 feet: Conglomerate composed of angular to subrounded cobbles, pebbles, and very coarse grains of red and reddish-brown tuff, green tuff, and rare reddish dolomite and chert in a dark grey-green carbonaceous, tuffaceous, argillaceous matrix; interbedded with dark grey to grey-brown, carbonaceous shale containing tiny fragments of dolomite and trachyte.

Unnamed formation (Cambrian (?)) : 7692 to 7785 feet (93 feet)

Erosion breccia of white, angular chert and quartz fragments in a slightly calcareous, clay matrix grading downward to light grey, microcrystalline, slightly dolomitic limestone with very minor green, very fine-grained tuff. Trace fracture porosity. Unfossiliferous.

Unnamed formation (Proterozoic (?)) : 7785 to 10,934 feet (3149 feet+)

7785 to 10,480 feet: Red to red-brown tuff composed of varicoloured, fine to very coarse-grained, occasionally conglomeratic, angular to subrounded rock fragments and quartz grains in an argillaceous, siliceous and slightly calcareous and dolomitic matrix. Calcite and chlorite common in veins. Few thin beds of maroon to red-brown tuffaceous shale.

10,480 to 10,934 feet: Red to brown trachyte consisting of orange and brown anhedral and euhedral phenocrysts of feldspar and mafic minerals in a brown, cryptocrystalline groundmass, dense, hard. Abundant fine and coarse calcite veins.

These volcanics are dissimilar to the tuffaceous material present in the Cambrian limestones of Gidgealpa No. 1.

## Structure

The well is located on the eastern flank of a north-east trending structure. The dipmeter survey confirmed this and confirmed the presence of the two established unconformities at the base of the Hutton Sandstone Equivalent and at the base of the Permian.

## Porosity and Permeability of Sediments Penetrated

Since the properties of the Mesozoic formations are constant and well known in this region, only the porosity and permeability of the Palaeozoic units are discussed here.

Near the top of the Permian in Gidgealpa No. 3 are five porous water-bearing sandstones which correlate closely with the four gas-bearing Permian sandstones in Gidgealpa No. 2, the two lowest sandstones in the No. 3 well having apparently coalesced before reaching No. 2 well. The porosity, from log analysis, in these sandstones is 14% to 15% which is comparable with that determined for these sandstones in Gidgealpa No. 2. By drillstem test, log analysis, or both, these sandstones were shown to be water bearing.

Below these upper sandstones are seven gas-bearing sandstones of varying thickness which have no equivalent in the No. 2 well since the Permian in that well is very much thinner than in No. 3. The porosities in these sandstones, by log and core analyses, vary considerably, from 9% to 23%. The Gamma Ray Log indicates a high degree of shaliness for much of these zones and, in consequence, a reduced permeability, a fact borne out by core analysis.

The Cambrian (?) limestone shows streaky porosity at the top and near the base. From log analysis the average porosity is 7%, but this analysis also indicates that the porous zones are 100% water saturated.

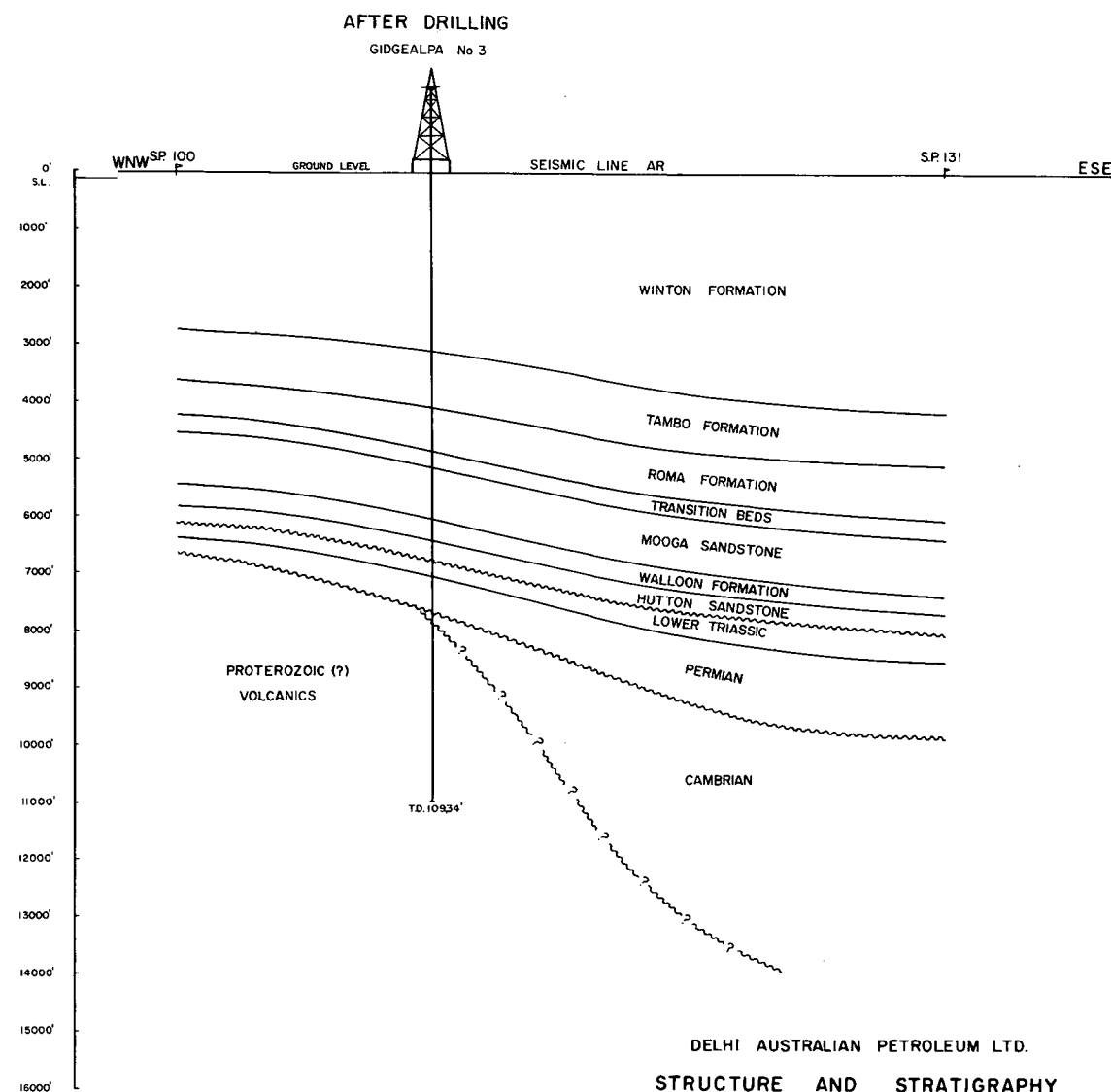
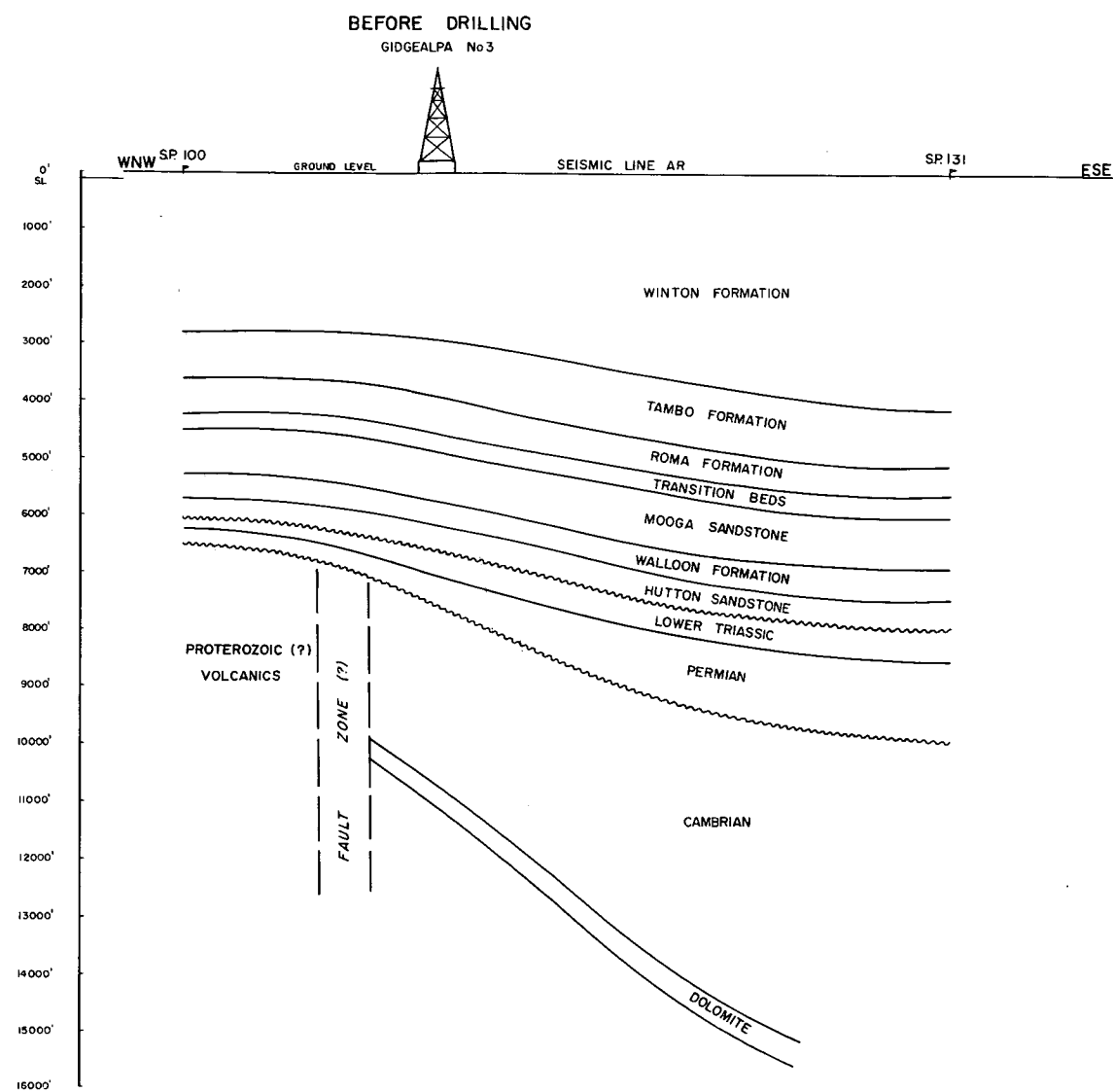
No effective porosity was found in the volcanic sequence below the Cambrian (?) limestone.

## Relevance to Occurrence of Petroleum

The Permian sandstones in Gidgealpa No. 3, considered to be stratigraphically equivalent to the gas-bearing sandstones of No. 2, were found to be water bearing. However, in the thickened Permian section of No. 3 well, deeper sandstone units were found to be gas-bearing.

Although the Cambrian dolomite was not found in No. 3 well, a much reduced (93 feet) section of possibly Cambrian limestone, very similar to tuffaceous limestones of the No. 1 well, was present. This limestone showed evidence of severe erosion with consequent development of porosity; it was water bearing.

All the porous sandstones throughout the Mesozoic were again water bearing, downgrading still further their hydrocarbon-bearing prospects, at least in the Gidgealpa area.



DELHI AUSTRALIAN PETROLEUM LTD.  
STRUCTURE AND STRATIGRAPHY  
OF THE EASTERN FLANK OF THE  
**GIDGEALPA ANTICLINE**  
AS INTERPRETED  
BEFORE AND AFTER DRILLING  
GIDGEALPA No.3

HORIZONTAL SCALE  
MILES 1 0 1 2 3 4 5 6 7 MILES

### Contribution to Geological Concepts resulting from Drilling

Of the three well so far drilled on the Gidgealpa structure only the third one is believed to have found the Cambrian limestone resting on the Proterozoic (?) volcanic sequence. In the No. 1 well, the Cambrian sediments were not fully penetrated and in the No. 2 well, the Cambrian rocks were absent, the Permian sequence resting directly on the Proterozoic (?) tuffs.\*

Volcanism, both effusive and explosive, was widespread in the Gidgealpa area in Proterozoic times. It is believed that a period of erosion took place before commencement of sedimentation in Cambrian times. This sedimentation was in the form of fossiliferous marine limestones and shales with admixtures of volcanic material. The Cambrian volcanism was either in a dying phase or the volcanic centres were at some distance from the Gidgealpa area. As far as is known, early Palaeozoic deposition was terminated with the laying down of the sandstone unit found in the No. 1 well immediately above the Cambrian limestone. Although some tectonic movement had occurred before this sandstone was deposited, the main orogeny took place at the conclusion of early Palaeozoic deposition. This movement elevated the Gidgealpa structure and resulted in faulting. There ensued a long period of erosion which stripped all of the early Palaeozoic sediments from the crestal area, leaving a structure which revealed Proterozoic (?) volcanics on the top with an ever thickening wedge of early Palaeozoic sediments passing down the flanks. On this outcrop pattern Permian sediments were laid down.

### REFERENCES

- |  |   |
|--|---|
| HARRISON, J., and<br>HIGGINBOTHAM, G.T., | 1964: Well Completion Report, Delhi-Santos<br>Gidgealpa No. 3, South Australia.<br>Unpublished report for Delhi Australian Petroleum Ltd. |
|--|---|

---

\* Recent work done at the Australian National University, Canberra, on radioactive dating of cores from Gidgealpa No. 2 gives a value of 400 million years for the upper part of the volcanic section and 700 million years for the section near total depth of that well.

The volcanic sequences found in Gidgealpa No. 2 and No. 3 wells bear a strong similarity, both petrologically and in their manner of accumulation, to volcanics in the Northern Flinders, Gawler, and Peake and Denison Ranges, which have been definitely established as Proterozoic by stratigraphic relationships.

## ADDITIONAL DATA FILED IN THE BUREAU OF MINERAL RESOURCES

The following additional data relating to Delhi - Santos Gidgealpa No. 3, have been filed in the Bureau of Mineral Resources, Canberra, and are available for reference:

- (i) Well Completion Report, by J. Harrison and G.T. Higginbotham 24 pp.
  - Appendix 1 : Core descriptions 19 pp.
  - Appendix 2 : Petrology, by H.W. Fander 7 pp.
  - Appendix 3 : Palaeontology, by W.K. Harris, and B. Daily 6 pp.
  - Appendix 4 : Core analyses, by BMR, and Core Laboratories, Inc. 3 pp.
  - Appendix 5 : Gas analysis, by H.W. Sears 4 pp.
  - Appendix 6 : Oil analysis, by H.W. Sears 3 pp.
  - Appendix 7 : Water analysis, by T. Frost 7 pp.
  - Appendix 8 : Halliburton Formation Test reports
- (ii) Daily drilling reports for period 26th February, 1964, to 30th May, 1964.
- (iii) Well logs including the following:
  - (a) Electrical Log
    - Run 1, 478 - 6112 feet (2", 5" = 100 ft)
    - Run 2, 6117 - 7116 feet (2", 5" = 100 ft)
    - Run 3, 7016 - 7563 feet (2", 5" = 100 ft)
    - Run 4, 7460 - 8659 feet (2", 5" = 100 ft)
    - Run 5, 8550 - 10062 feet (2", 5" = 100 ft)
    - Run 6, 9960 - 10936 feet (2", 5" = 100 ft)
  - (b) Microlog - Caliper
    - Run 1, 478 - 6100 feet (2", 5" = 100 ft)
    - Run 2, 6117 - 7112 feet (2", 5" = 100 ft)
    - Run 3, 7050 - 7554 feet (2", 5" = 100 ft)
    - Run 4, 7450 - 8658 feet (2", 5" = 100 ft)

(c) Microcaliper Log

Run 1, 6800 - 10936 feet (2", 5" = 100 ft)

(d) Sonic Log

Run 1, 478 - 6100 feet (2", 5" = 100 ft)

Run 2, 6117 - 7578 feet (2", 5" = 100 ft)

Run 3, 7450 - 8654 feet (2", 5" = 100 ft)

Run 4, 8550 - 10929 feet (2", 5" = 100 ft)

(e) Laterolog

Run 1, 6117 - 8656 feet (2", 5" = 100 ft)

(f) Microlaterolog

Run 1, 6117 - 7582 feet (2", 5" = 100 ft)

(g) Gamma Ray - Neutron Log

Run 1, 60 - 6112 feet (2", 5" = 100 ft)

Run 2, 5990 - 7583 feet (2", 5" = 100 ft)

Run 3, 7480 - 8659 feet (2", 5" = 100 ft)

Run 4, 8550 - 10062 feet (2", 5" = 100 ft)

Run 5, 9960 - 10937 feet (2", 5" = 100 ft)

(h) Continuous Dipmeter

Run 1, 6117 - 10932 feet (2" = 100 ft)

Final plotted log, Run 1

(i) Temperature Log

Run 1, 3490 - 6084 feet (2" = 100 ft)

Run 2, 6100 - 10937 feet (2" = 100 ft)

(j) Gamma Ray - Casing Collar Correlation Log

Run 1, 6555 - 7566 feet (2", 5" = 100 ft)

(k) Cement Bond Log

Run 1, 6558 - 7538 feet (2", 5" = 100 ft)

COMPOSITE WELL LOG

DELHI AUSTRALIAN PETROLEUM LTD. & SANTOS LIMITED

GIDGEALPA No.2

OIL EXPLORATION LICENCE: 20, SOUTH AUSTRALIA

4 MILE SHEET : INNAMINCKA

WELL STATUS: SHUT-IN GAS WELL

LOCATION  
Lat 27°56'44" S. Long 140°03'01.5" E  
ELEVATION  
GL 161.5' KB 178' A.S.L.

Date Spudded December 12, 1963  
Date Drilling Stopped February 10, 1964  
Date Rig Off March 1, 1964.  
Total Depth Driller 9020'

Well Head Fittings Production "Christmas Tree"  
Drilled by Drilling Contractors (Aust.) Pty. Ltd.  
Drilling Method Rotary  
Logged by Schlumberger  
Cemented by Halliburton

RESISTIVITY LOG DATA

TYPE OF LOG	ELECTRIC LOG	ELECTRIC LOG	ELECTRIC LOG	ELECTRIC LOG
RUN NUMBER	1	2	3	4
DATE	20-12-63	3-1-64	5-2-64	9-2-64
FOOTAGE LOGGED	5370	1023	1953	369
LOGGED FROM	5898	6919	8753	9019
LOGGED TO	528	5896	6800	8650
TOTAL DEPTH - ELECTRIC LOG	5900	6920	8754	9020
TOTAL DEPTH - DRILLER	5900	6915	8752	9020
CASING SHOE - ELECTRIC LOG	528	5896	5896	5896
CASING SHOE - DRILLER	527	5890	5890	5890
BIT SIZE	12 1/4	8 1/2	8 1/2	8 1/2
MUD	KIND Water base TREATMENT Red/Spersene WATER LOSS cc/30mins 5.9 WEIGHT lbs/gal 10.1 VISCOSITY 42 pH 10	Water base Spersene 4.4 10.5 51 10.5	Water base Gel - Spersene 6.8 10.7 42 9	Water base Spersene 6.6 10.6 42 9
RESISTIVITY	Rm 1.1 at 80° Rmf 0.32 at 172°	0.36 at 205° 0.20 at B.H.T	0.79 at 98° 0.20 at B.H.T	0.86 at 96° 0.20 at B.H.T
BHT / DEPTH	172° 5900'	221° 6920'	236° 8754'	243° 9020'
RECORDED BY	Collins - Maso	Collins	Collins	Collins

OTHER LOGS RUN

MICROLOG-CALIPER	528' - 9016'
SONIC - GAMMA RAY	528' - 5889'
SONIC - S.P	5896' - 9010'
LATEROLOG	5896' - 7530'
MICROLATEROLOG	5896' - 7877'
GAMMA RAY - NEUTRON	5850' - 9019'
CONTINUOUS DIPMETER	5896' - 8656'
TEMPERATURE	3500' - 5860' 5350' - 6800'
NEUTRON COLLAR	6400' - 6915'
LOCATOR	
CEMENT BOND LOG	5500' - 6906'

SYMBOLS

- Core number and recovery
- Sidewall core, recovery
- Sidewall core, no recovery
- Formation test and interval, open hole.
- Formation test and interval, in casing
- Perforated interval
- Casing Shoe
- Fluorescence
- Gas show
- Oil show

LITHOLOGIC REFERENCE

Sandstone	Coal	Limestone
Shale	Siltstone	Dolomite
Conglomerate	Tuff	Trachyte & Rhyolite
	Calcrete	

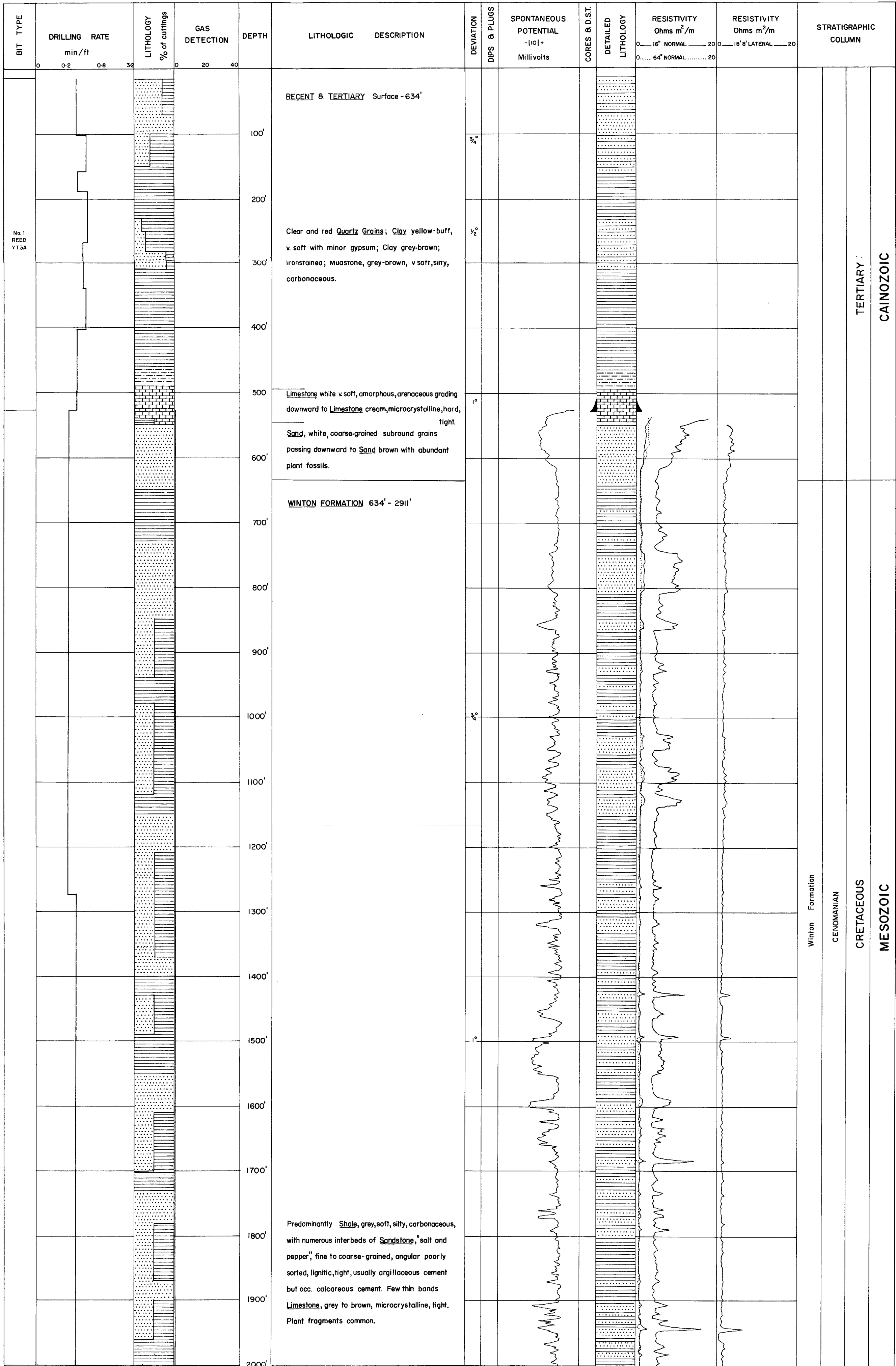
CASING

In.	Wt.	Gr.	Depth	Cmt	Cmt'd to
13 3/8	48	H40	527'	420 sks	Surface
9 5/8	36	J55	5483'	455 sks	4400'
9 5/8	40	N80	5890'		
7	23	J55	6364'	240 sks	5650'
7	29	N80	6932'		

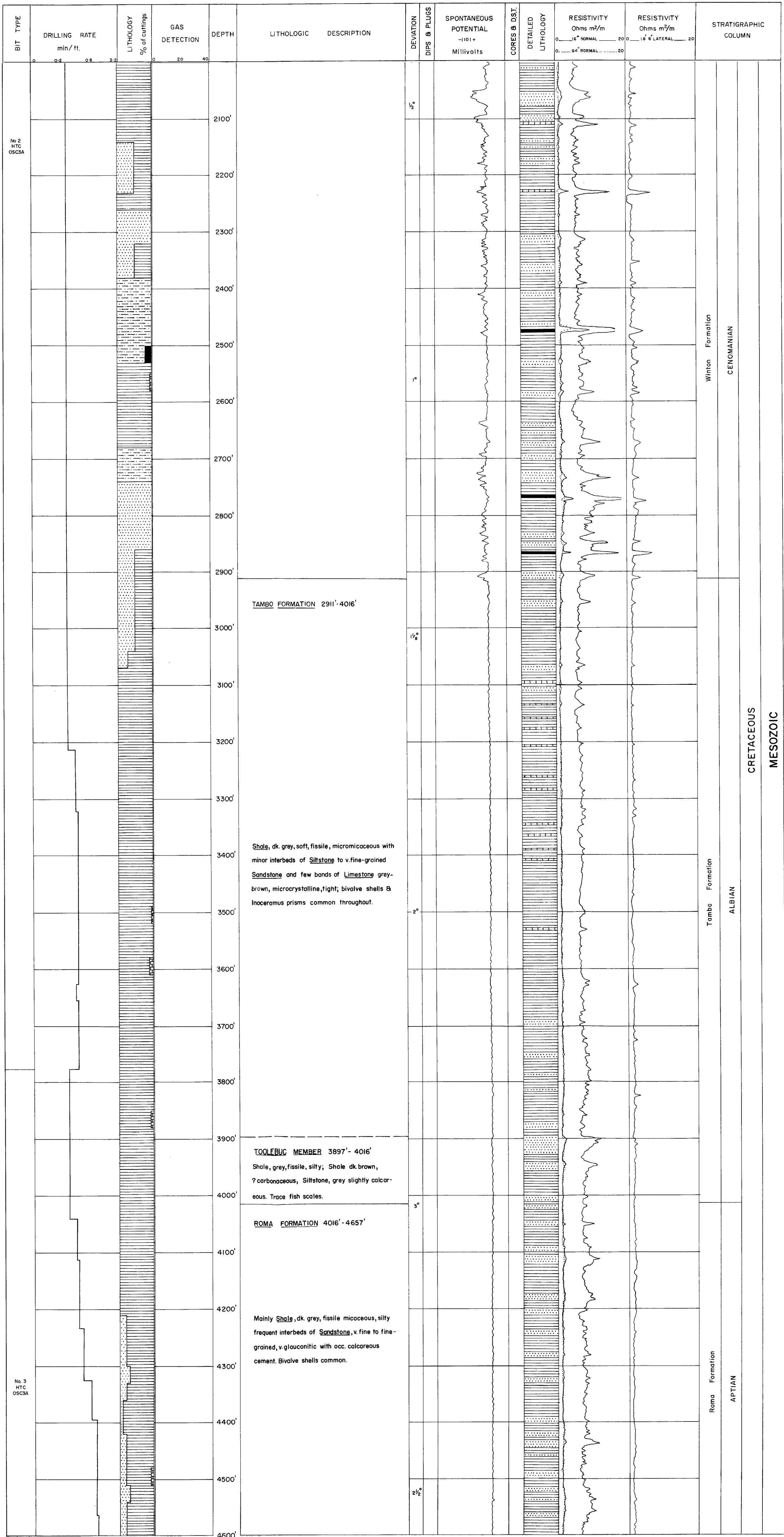
HOLE SIZE

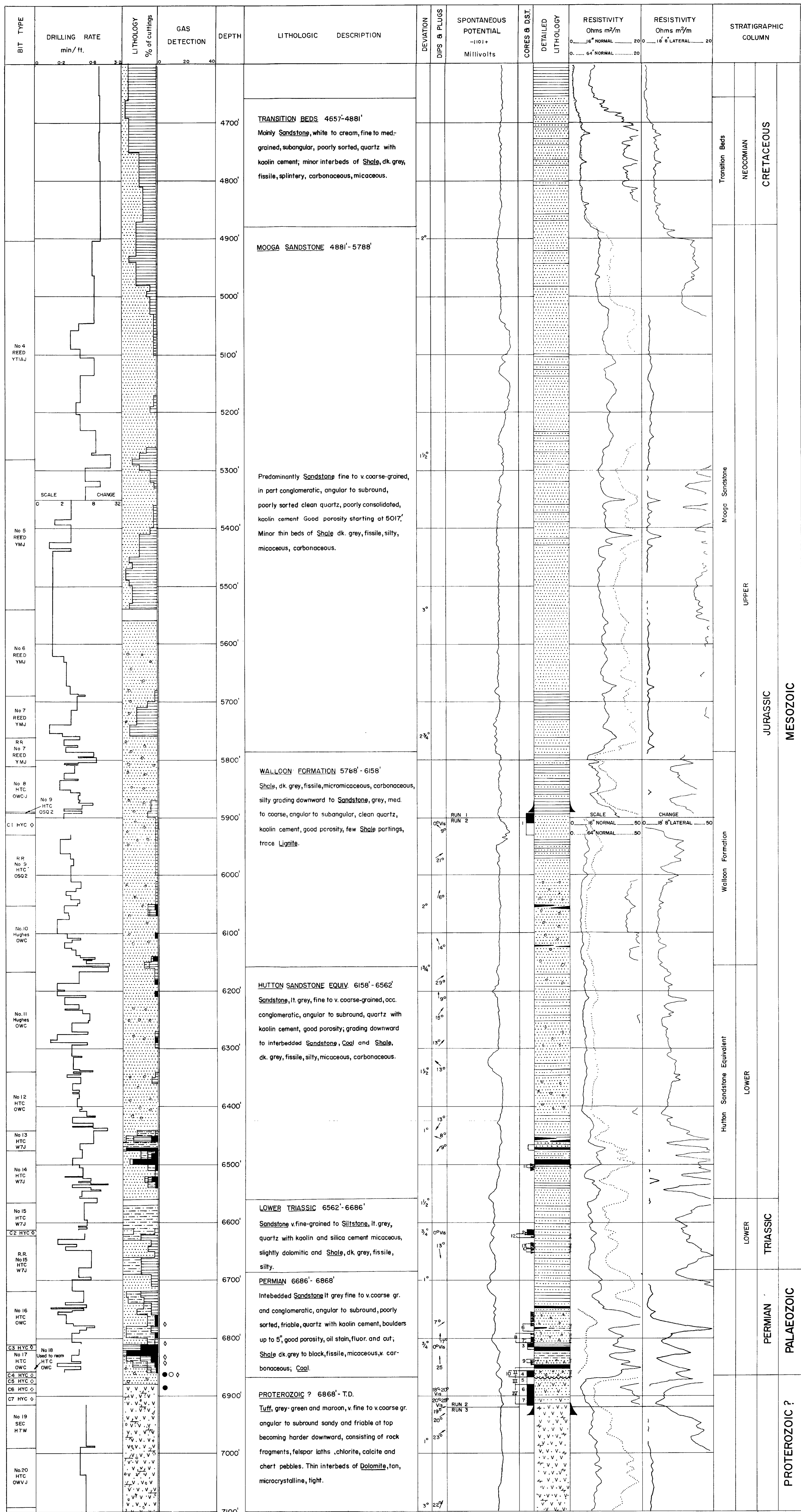
In.	From	To
17 1/2	0'	527'
12 1/4	527'	5921'
8 1/2	5921'	9020'

LITHOLOGY BY: J. HARRISON  
COMPILED BY: M.C. COLE

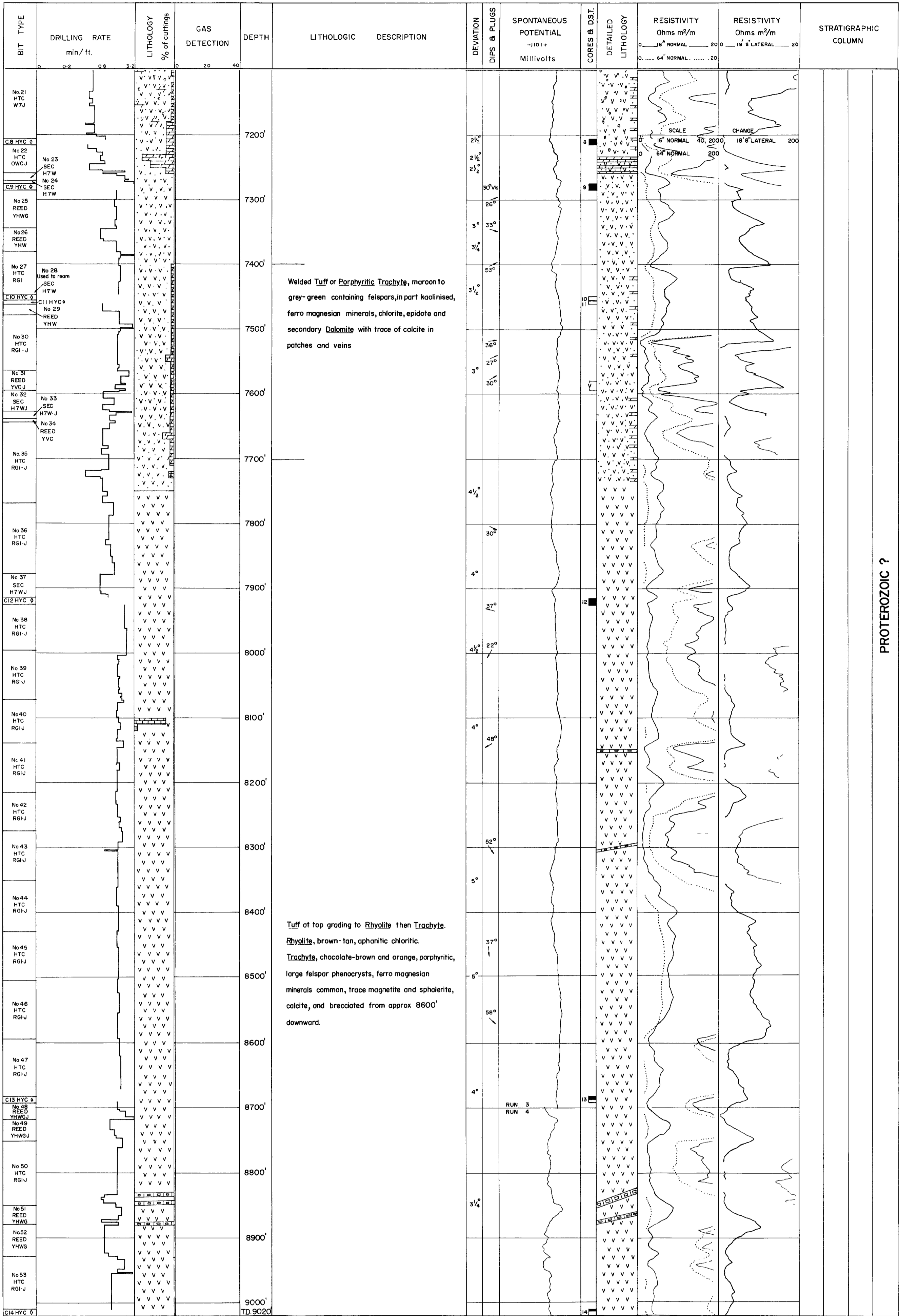


DELHI - SANTOS GIDGEALPA No.2





DELHI - SANTOS GIDGEALPA No.2



FORMATION TESTS

- I D.S.T. No.1 6465'-6475' Recovered 7' mud.

I.F.P.	16	I.S.I.P.	16	I.H.H.	3521	psi.
F.F.P.	16	F.S.I.P.	16	F.H.H.	3561	psi.
- II D.S.T. No.2 6852'-6865' Gas to surface in 5mins at 2-8 MMCF/D. Recovered 96' gas-cut mud.

I.F.P.	2190	I.S.I.P.	3094	I.H.H.	3784	psi.
F.F.P.	2667	F.S.I.P.	3085	F.H.H.	3749	psi.
- III D.S.T. No.3 6866'-6880' Recovered 10' mud.

I.F.P.	9	I.S.I.P.	9	I.H.H.	3780	psi.
F.F.P.	9	F.S.I.P.	9	F.H.H.	3780	psi.
- IV D.S.T. No.4 6880'-6915' Recovered 15' mud.

I.F.P.	66	I.S.I.P.	66	I.H.H.	3809	psi.
F.F.P.	66	F.S.I.P.	66	F.H.H.	3795	psi.
- V D.S.T. No.5 7579'-7595' Misrun, packer leaked.
- 6 D.S.T. No.6 6773'-6778' Water cushion to surface in 6mins gas in 8 mins at 3-22 MMCF/D with slight amount of 49-1° A.P.I. gravity distillate. Recovered 30' mud filtrate.

I.F.P.	1050	I.S.I.P.	3065	I.H.H.	3499	psi.
F.F.P.	2676	F.S.I.P.	2866	F.H.H.	3475	psi.
- 7 D.S.T. No.7 6800'-6808' Water cushion to surface after 5hrs Flowed gas at 0-456 MMCF/D Recovered 600' water cushion.

I.F.P.	1095	I.S.I.P.	3031	I.H.H.	3577	psi.
F.F.P.	421	F.S.I.P.	3097	F.H.H.	3520	psi.
- 8 D.S.T. No.8 6793'-6808 Gas to surface in 3mins at 3MMCF/D with some condensate Recovered 30' mud filtrate.

I.F.P.	1018	I.S.I.P.	3089	I.H.H.	3561	psi.
F.F.P.	2429	F.S.I.P.	3073	F.H.H.	3496	psi.
9. D.S.T. No.9 6837'-6842' Gas to surface in 3mins. at 2-86 MMCF/D on 1/4" choke, 4-835 on 3/8" choke, and 5-92 MMCF/D on 1/2" choke with some mud and condensate. Recovered 20' water and 10' condensate.

I.F.P.	933	I.S.I.P.	3081	I.H.H.	3603	psi.
F.F.P.	1421	F.S.I.P.	3013	F.H.H.	3603	psi.
10. D.S.T. No.10 6858'-6867' Gas to surface in 5mins at 2-6 MMCF/D on 1/4" choke 4-09 MMCF/D on 3/8" choke and 5315 MMCF/D on 1/2" choke with 20 barrels of mud filtrate and condensate per million cubic feet gas. Recovered 30' mud filtrate and condensate.

I.F.P.	764	I.S.I.P.	3097	I.H.H.	3661	psi.
F.F.P.	2142	F.S.I.P.	3076	F.H.H.	3641	psi.
11. D.S.T. No.11 6500'-6505' Recovered 370' mud-cut water and 976' of v. slightly gas-cut water (chlorides 1050 p.p.m)

I.F.P.	188	I.S.I.P.	2871	I.H.H.	3452	psi.
F.F.P.	922	F.S.I.P.	2868	F.H.H.	3436	psi.
12. D.S.T. No.12 6620'-6624' Recovered 180' mud and 135' muddy water (chlorides 1050 p.p.m)

I.F.P.	78	I.S.I.P.	2763	I.H.H.	3499	psi.
F.F.P.	131	F.S.I.P.	2666	F.H.H.	3473	psi.
13. D.S.T. No.13 6637 1/2'-6643 1/2' and 6644 1/2'-6652' Recovered 152' mud and 158' muddy water and finesand (chlorides 13500 p.p.m)

I.F.P.	56	I.S.I.P.	2745	I.H.H.	3512	psi.
F.F.P.	118	F.S.I.P.	2618	F.H.H.	3488	psi.

COMPOSITE WELL LOG

DELHI AUSTRALIAN PETROLEUM LTD & SANTOS LIMITED

GIDGEALPA No. 3

OIL EXPLORATION LICENCE 20, SOUTH AUSTRALIA

4 MILE SHEET : INNAMINCKA

WELL STATUS: SHUT-IN GAS WELL

LOCATION

Lat 27°58'27" S Long 140°03'05" E

ELEVATION

GL 160' K.B.176' A.S.L.

Date Spudded March 1, 1964

Date Drilling Stopped May 14, 1964

Date Rig Off May 28, 1964

Total Depth Driller 10934'

Well Head Fittings Production "Christmas Tree"

Drilled by Drilling Contractors (Aust) Pty Ltd.

Drilling Method Rotary

Logged by Schlumberger

Cemented by Halliburton

RESISTIVITY LOG DATA

TYPE OF LOG	ELECTRIC LOG	ELECTRIC LOG	ELECTRIC LOG	ELECTRIC LOG	ELECTRIC LOG	ELECTRIC LOG
RUN NUMBER	1	2	3	4	5	6
DATE	9-3-64	18-3-64	24-3-64	8-4-64	30-4-64	14-5-64
FOOTAGE LOGGED	5634	999	547	1199	1512	976
LOGGED FROM	6112'	7116'	7563'	8659'	10062'	10936'
LOGGED TO	478'	6117'	7016'	7460'	8550'	9960'
TOTAL DEPTH - ELECTRIC LOG	6113'	7117'	7564'	8660'	10063'	10938'
TOTAL DEPTH - DRILLER	6111'	7115'	7562'	8658'	10059'	10934'
CASING SHOE - ELECTRIC LOG	478'	6117'	6117'	6117'	6117'	6117'
CASING SHOE - DRILLER	475'	6115'	6115'	6115'	6115'	6115'
BIT SIZE	12 1/4"	8 1/2"	8 1/2"	8 1/2"	8 1/2"	8 1/2"
MUD KIND	Water base	Water base	Water base	Water base	Water base	Water base
TREATMENT	Queb- Gel- Caust	Gel- Queb- Caust	Gel- Queb	Vol- Tann- Caust	Gel- Tann- Caust	Gel- Cmc- Caust
WATER LOSS cc/30mins	5-0	5-5	4-2	4-4	8-0	8-6
WEIGHT lbs/gal	10-6	10-4	10-4	10-7	10-7	10-4
VISCOSITY	82	52	44	44	46	40
pH	8-0	9-5	9-5	9-0	9-0	9-5
Rm	173 at 77°	168 at 80°	181 at 63°	106 at 106°	177 at 80°	102 at 110°
RESISTIVITY Rmt	0.53 at BHT	1.38 at 79°	1.48 at 62°	1.13 at 85°	0.34 at BHT	1.34 at 70°
BHT / DEPTH	182° 6113'	215° 7117'	230° 7564'	256° 8660'	270° 10063'	286° 10938'
RECORDED BY	Collins	Collins	Collins	Collins	Collins	Collins

OTHER LOGS RUN

MICROLOG - CALIPER	478' - 8658'
SONIC	478' - 10929'
GAMMA RAY-NEUTRON	60' - 10937'
LATEROLOG	6117' - 8656'
MICROLATEROLOG	6117' - 7582'
CONTINUOUS DIPMETER	6117' - 10932'
CEMENT BOND LOG	6558' - 7538'
G.R. CASING COLLAR	
LOCATOR	6555' - 7566'
TEMPERATURE	3490' - 10937'

SYMBOLS

- Core number and recovery
- Formation test and interval, open hole
- Formation test and interval, in casing
- Perforated interval
- Casing Shoe
- Recovered Sidewall core

	Sandstone		Coal		Limestone
	Shale		Siltstone		Dolomite
	Conglomerate		Tuff		Trachyte

LITHOLOGIC REFERENCE

LITHOLOGY BY: J. HARRISON

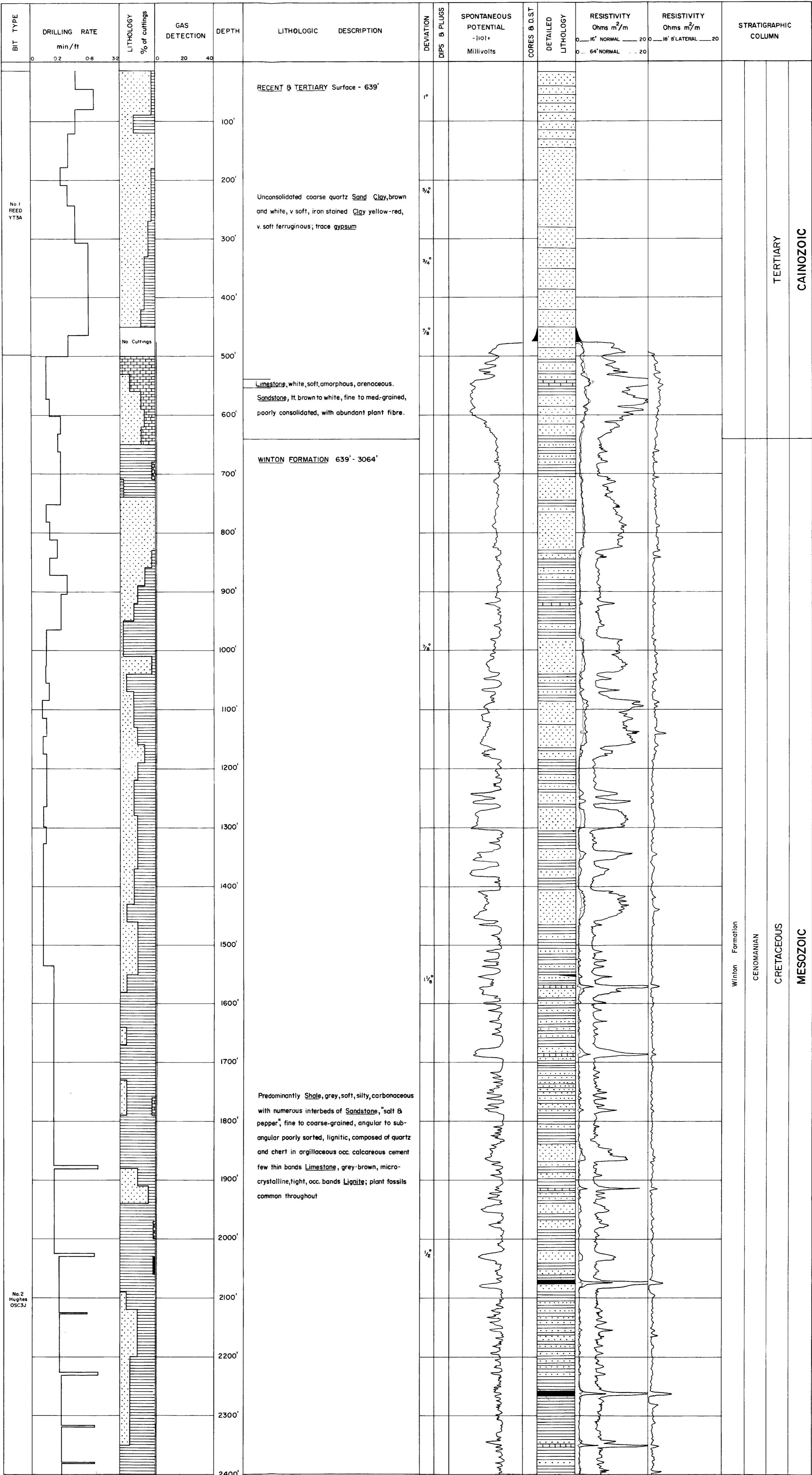
COMPILED BY: M.C. COLE

CASING

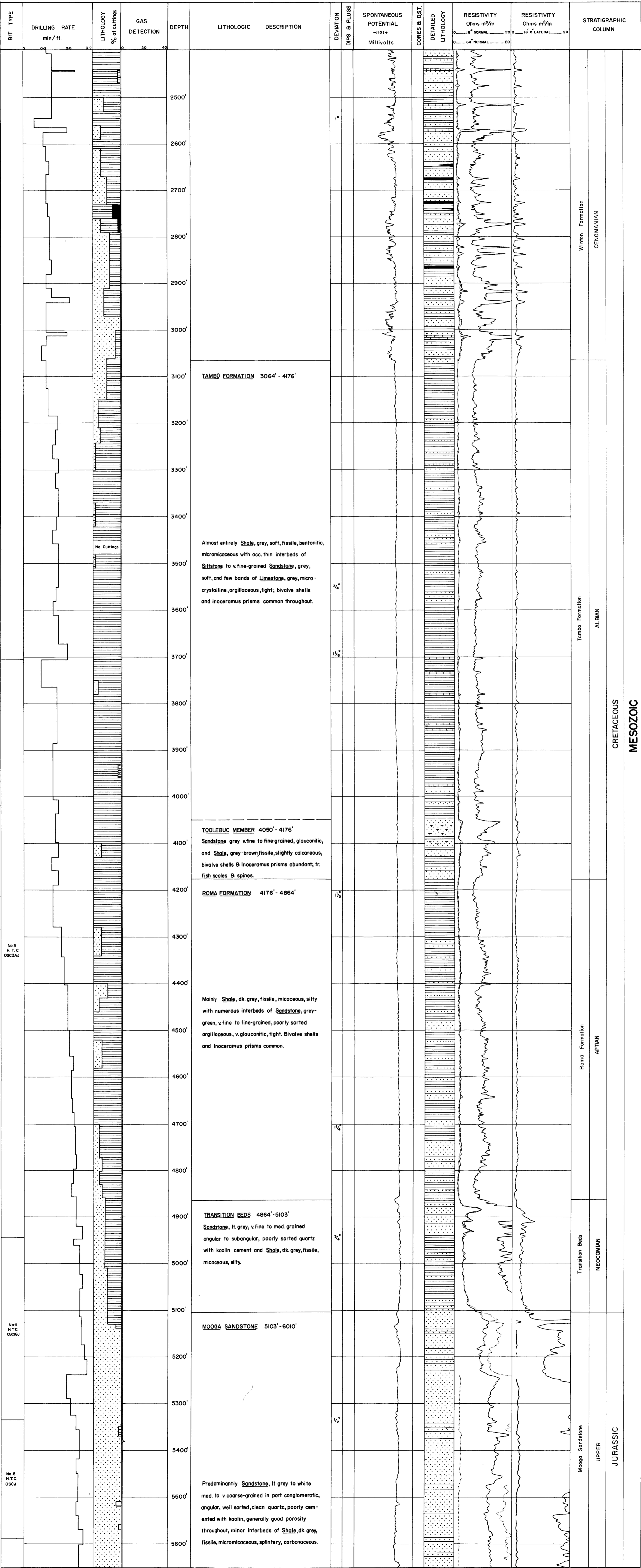
In.	Depth	Cmt	Cmt'd to
13 3/8	475'	410 sks	Surface
9 5/8	6115'	465 sks	4800'
7	7610'	287 sks	7000'

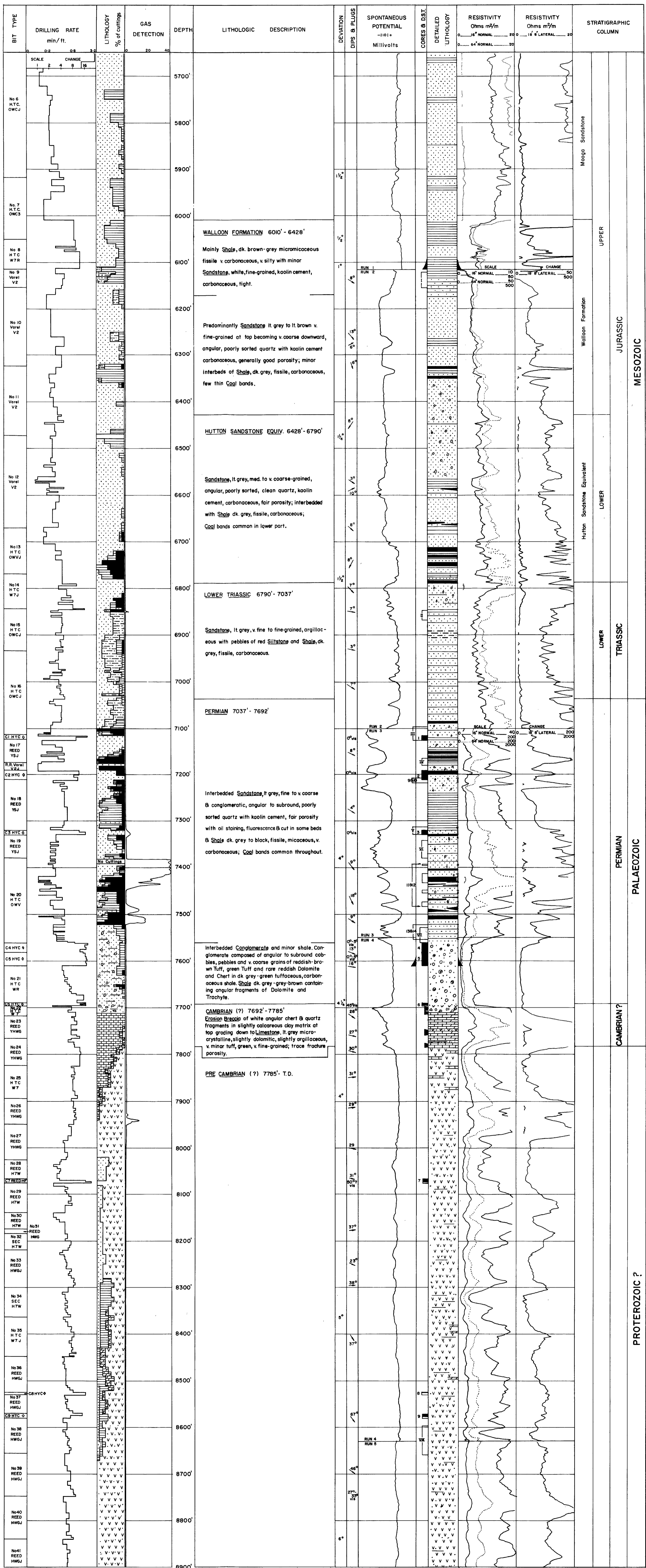
HOLE SIZE

In	From	To
17 1/2	0'	497'
12 1/4	497'	6115'
8 1/2	6115'	10934'

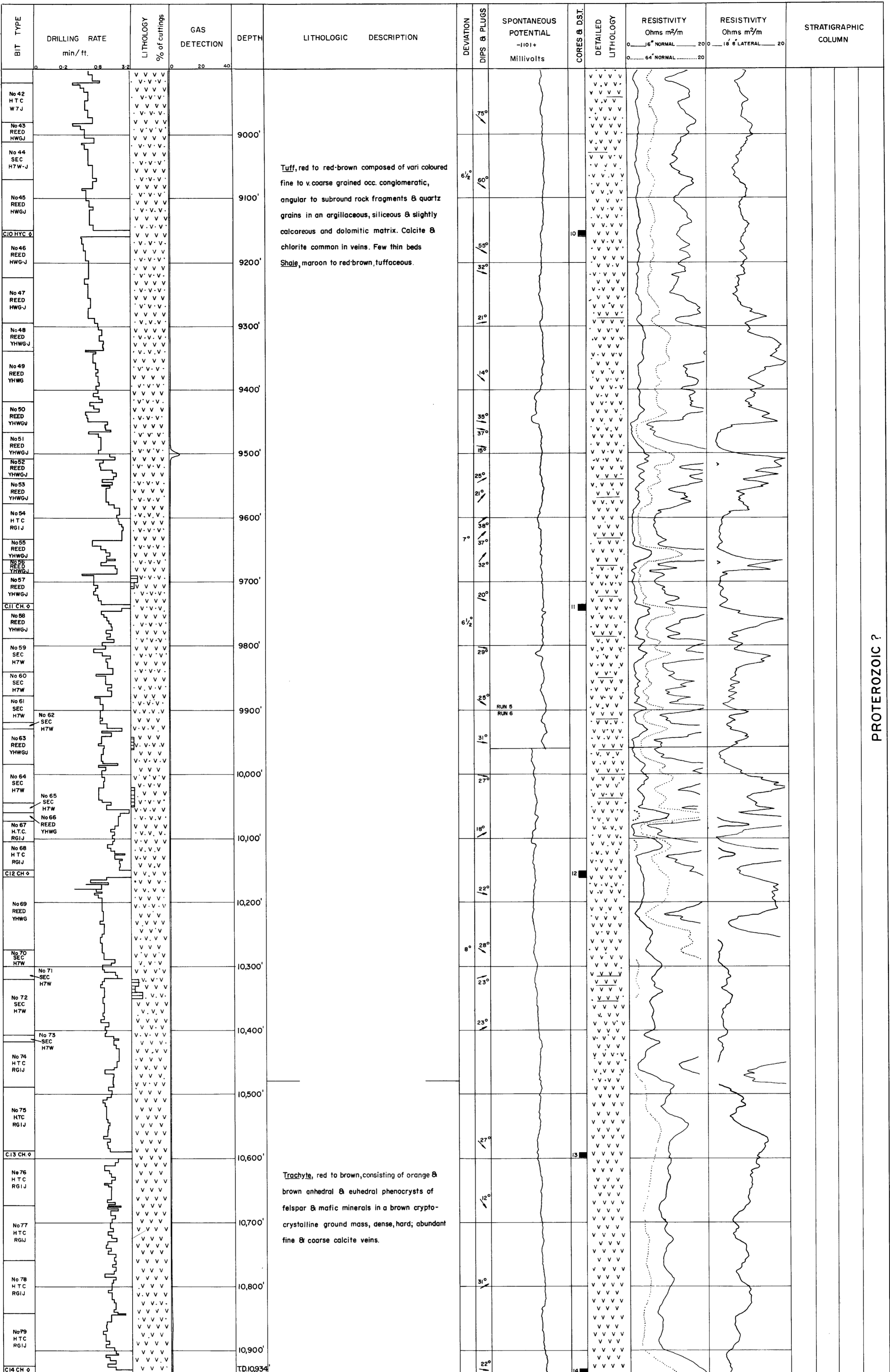


DELHI - SANTOS GIDGEALPA No.3





DELHI - SANTOS GIDGEALPA No.3



PROTEROZOIC ?

FORMATION TESTS

I	D.S.T. No 1 6131' - 6156'	Recovered 20' mud.	I.F.P.	16	ISIP	145	I.H.H.	3350	psi.	VIII	D.S.T. No 8 8596' - 8668'	Recovered 30' mud.	I.F.P.	42	ISIP	66	I.H.H.	4566	psi.
			F.F.P.	21	FSIP	94	F.H.H.	3253	psi.				F.F.P.	43	FSIP	54	F.H.H.	4566	psi.
II	D.S.T. No 2 6846' - 6868'	Recovered 20' mud.	I.F.P.	24	ISIP	1861	I.H.H.	3614	psi.	9	D.S.T. No 9 7208' - 7218'	Recovered 300' water-cut mud, 300' muddy water, 1600' gas-cut water. No shut in pressures avail.	I.F.P.	80	ISIP		I.H.H.	3624	psi.
			F.F.P.	24	FSIP	105	F.H.H.	3587	psi.				F.F.P.	1016	FSIP		F.H.H.	3590	psi.
III	D.S.T. No 3 7096' - 7125'	Recovered 235' mud, 275' gas-cut muddy water, 850' gas-cut brackish water.	I.F.P.	48	ISIP	3034	I.H.H.	3755	psi.	10	D.S.T. No 10 7208' - 7218'	Recovered 190' mud, 750' gas-cut water.	I.F.P.	94	ISIP	3070	I.H.H.	3637	psi.
			F.F.P.	619	FSIP	2861	F.H.H.	3710	psi.				F.F.P.	418	FSIP	3138	F.H.H.	3574	psi.
IV	D.S.T. No 4 7164' - 7177'	Recovered 110' mud, 20' muddy water, 350' gas-cut water	I.F.P.	24	ISIP	3061	I.H.H.	3796	psi.	11	D.S.T. No 11 7394' - 7396', 7413' - 7420', 7449' - 7454', 7473' - 7483'	Gas to surface in 15 mins at 468 MMCF/D on 3/4" choke. Recovered 882' mud filtrate.	I.F.P.	97	ISIP	3230	I.H.H.	3762	psi.
			F.F.P.	201	FSIP	3003	F.H.H.	3762	psi.				F.F.P.	488	FSIP	3274	F.H.H.	3606	psi.
V	D.S.T. No 5 7313' - 7330'	Gas to surface in 5 mins at 965 MMCF/D on 1/4" choke, 11 MMCF/D on 3/4" choke. Recovered 110' mud, 10' distillate (45.4° A.P.I.)	I.F.P.	625	ISIP	3157	I.H.H.	3909	psi.	12	D.S.T. No 12 7394' - 7396', 7413' - 7420', 7449' - 7454', 7473' - 7483'	Gas to surface at 51 MMCF/D Recovered 475' mud filtrate.	I.F.P.	233	ISIP	3261	I.H.H.	3687	psi.
			F.F.P.	405	FSIP	2253	F.H.H.	3877	psi.				F.F.P.	421	FSIP	3261	F.H.H.	3640	psi.
VI	D.S.T. No 6 7343' - 7380'	Gas to surface in 10 mins at rate too small to measure. Recovered 135' mud.	I.F.P.	64	ISIP	2916	I.H.H.	3948	psi.	13	D.S.T. No 13 7523' - 7554'	Gas to surface in 5 mins at 2.28 MMCF/D on 1/2" choke. No recovery - reverse circulated.	I.F.P.	259	ISIP	3339	I.H.H.	3726	psi.
			F.F.P.	70	FSIP	3018	F.H.H.	3932	psi.				F.F.P.	1050	FSIP	3222	F.H.H.	3726	psi.
VII	D.S.T. No 7 7526' - 7562'	Gas to surface in 3 mins at 2.74 MMCF/D on 1/4" choke, 4.485 MMCF/D on 3/4" choke. Recovered 210' mud	I.F.P.	719	ISIP	3337	I.H.H.	4029	psi.	14	D.S.T. No 14 7373' - 7483', 7523' - 7554'	Gas to surface in 4 mins at 1.22 MMCF/D on 1/4" choke, 1.51 MMCF/D on 3/4" choke, 1.43 MMCF/D on 1/2" choke. No recovery - reverse circulated	I.F.P.	678	ISIP	3258	I.H.H.	3736	psi.
			F.F.P.	1732	FSIP	3243	F.H.H.	4003	psi.				F.F.P.	1232	FSIP		F.H.H.		psi.

● Chart time expired