

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

Petroleum Search Subsidy Acts

PUBLICATION No. 59

U-K-A. Wandoan No. 1, Queensland
OF
UNION OIL DEVELOPMENT CORPORATION
KERN COUNTY LAND COMPANY
AND
AUSTRALIAN OIL AND GAS CORPORATION LIMITED

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

1965⁹¹

COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

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

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FOREWORD

Under the Petroleum Search Subsidy 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 Bureau of Mineral Resources, Geology and Geophysics is required, on behalf of the Department of National Development, to examine the applications, maintain surveillance of the operations, and in due course publish the reports. 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 offices of the Bureau of Mineral Resources in Canberra and Melbourne (after the agreed period) and copies of the reports may be purchased.

Union - Kern - A.O.G. Wandoan No. 1 was drilled under the Petroleum Search Subsidy Act 1959-1961, in Authority to Prospect 57P, Queensland. The well was located at latitude 26° 10' 31" S., longitude 149° 54' 21" E., about 73 miles east-north-east of Roma, and was drilled for Union Oil Development Corporation, Kern County Land Company, and Australian Oil and Gas Corporation Limited by Oil Drilling and Exploration Limited of Sydney, using a National 80B drilling rig.

This Publication deals with the results of this drilling operation, and contains information furnished by Union Oil Development Corporation and edited in the Petroleum Exploration Branch of the Bureau of Mineral Resources. The final report was written by J.E. Mack, Jr, P.S. Roy, D.J. McGarry, and D.E. Pyle, of Union Oil Development Corporation. The methods employed in the drilling operation and the results obtained are presented in detail.

J.M. RAYNER
DIRECTOR

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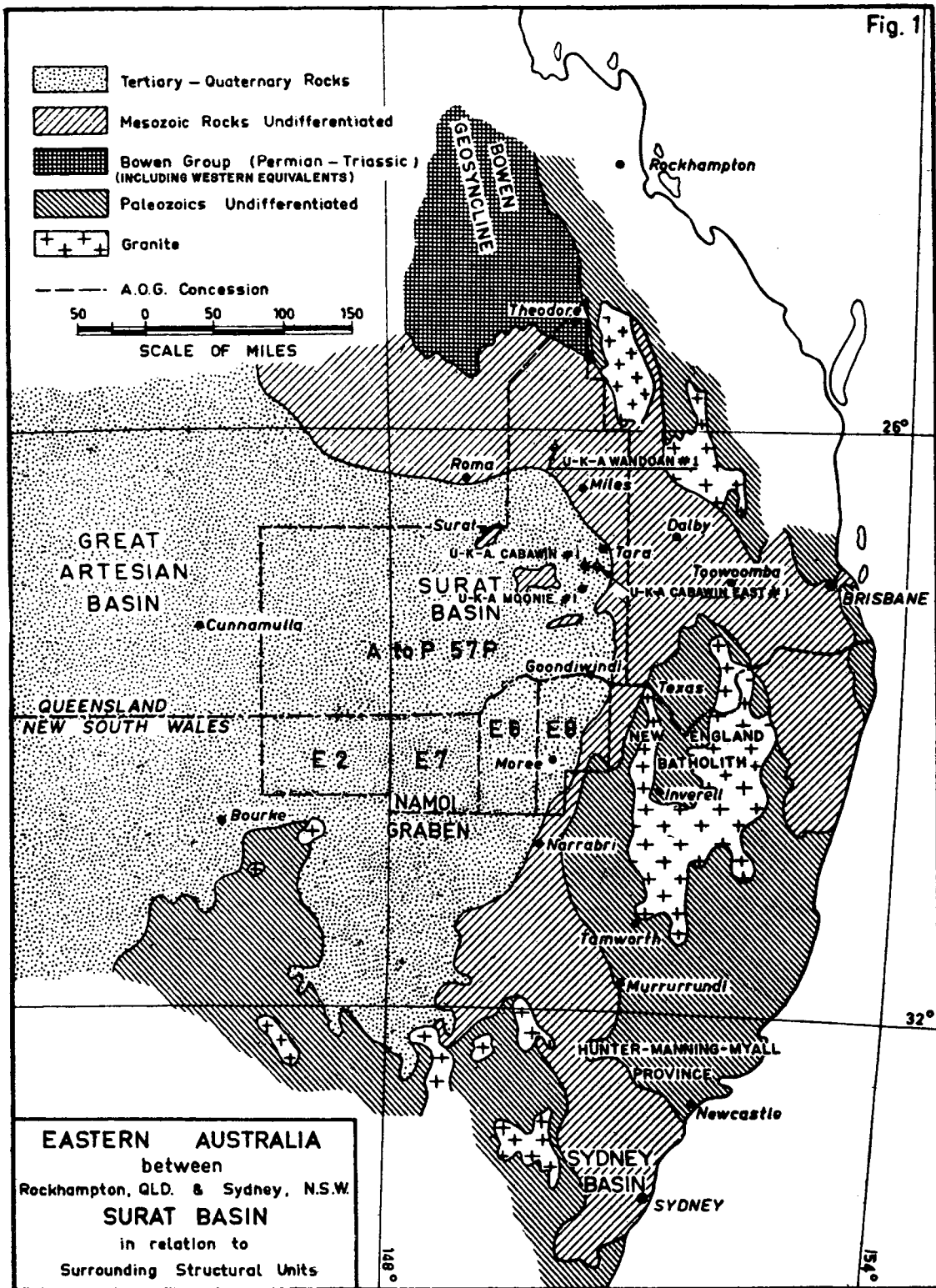
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Fig. 1



SUMMARY

Union - Kern - A.O.G. Wandoan No. 1 was the first wildcat drilled by Union Oil Development Corporation in the north-eastern part of the Surat Basin. Union - Kern - A.O.G. Moonie No. 1 had proven the potential of the Jurassic-Triassic Precipice Sandstone as an oil reservoir and it was necessary to evaluate this reservoir in other parts of the basin. In the Wandoan area seismic surveys defined a large north-plunging anticline in rocks of the Bowen Group, with a domal closure in the Great Artesian Group superimposed on the north plunge of the feature. This domal closure shows more than 200 feet of vertical closure encompassing an area of 30 square miles. The Wandoan well was programmed primarily to test the petroleum potential of the Precipice Sandstone on this closure.

Drilling commenced on 22nd April, 1962 and the well was completed on 18th June, 1962 as a dry hole at a total depth of 10,736 feet. A full programme of logging, testing, and coring was undertaken.

Wandoan No. 1 Well established the presence of 4798 feet of Mesozoic sediments of the Great Artesian Group resting disconformably on 5919 feet of Lower Mesozoic-Upper Palaeozoic strata of the Bowen Group. Testing over the interval 3260 to 3278 feet indicated that the Precipice Sandstone has excellent reservoir characteristics. Yellowish to bluish-white fluorescence in the samples, and traces of hydrocarbons in the formation water from this interval indicated that hydrocarbons have migrated through the sandstone. Fluorescence and minor gas shows in the upper part of the Bowen Group were noted but the reservoir characteristics of these rocks were unfavourable for an accumulation of oil and gas.

The well bottomed at 10,736 feet in coals and tuffs of the Kianga Formation. Cement plugs were set and the well was abandoned on 21st June, 1962.

INTRODUCTION

Union Oil Development Corporation, a wholly owned subsidiary of Union Oil Company of California, and the Kern County Land Company also of California, entered into an agreement in late 1959 with the Australian Oil and Gas Corporation Limited, holder of Authority to Prospect 57P, Queensland, whereby Union Oil Development Corporation as Operator for Union and Kern would conduct an exploration programme on lands of Authority to Prospect 57P in the Surat Basin.

Union Oil commenced exploratory operations in November, 1959 with an aeromagnetic survey and surface geological studies, followed by an intensive seismograph programme. The seismic work began in the area near Cabawin, Queensland, where a major north-south trending structure was first disclosed on a seismic reconnaissance line surveyed by the Geophysical Branch of the Bureau of Mineral Resources late in 1959. The primary objective of Union's continuing seismic programme has been to develop structurally closed drillable prospects suitable for testing the petroleum potential of the section in the Surat Basin.

Two exploratory tests were drilled by October, 1961: Union - Kern - A.O.G. Cabawin No. 1 and Cabawin East No. 1. The drilling of the first test resulted in a sub-commercial discovery of oil in the Permian Kianga Formation. The second test was dry. Union-Kern-A.O.G. Moonie No. 1 was the third wildcat drilled in the Basin and this resulted in a major discovery of oil in the Triassic Precipice Sandstone.

WELL HISTORY

General Data

Well name and number:	Union-Kern-A.O.G. Wandoan No. 1
Location:	Latitude 26° 10' 31" S. Longitude 149° 54' 21" E.
Name and address of Tenement Holder:	Australian Oil and Gas Corporation Limited, 261 George Street, Sydney, New South Wales
Details of Petroleum Tenement:	Authority to Prospect 57P, Queensland (approximately 47,000 square miles)
District:	Portion 105, Parish of Wandoan, County of Fortescue, State of Queensland
Total Depth:	10,736 feet
Date drilling commenced:	22nd April, 1962
Date drilling completed:	18th June, 1962
Date well abandoned:	21st June, 1962
Date rig released:	21st June, 1962

Drilling time in days to total depth:	56
Elevation (ground):	958 feet
Elevation (top K.B.):	977 feet (datum for all measurements)
Status:	Dry hole; plugged and abandoned
Cost:	£113,857

Drilling Data

Name and address of drilling contractor:	Oil Drilling and Exploration Limited, 93 York Street, Sydney, New South Wales
--	---

Drilling Plant:

Make:	National-Ideal
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Type:	80-B
-------	------

Rated capacity with 4 1/2" drill pipe:	12,000 feet
--	-------------

Rated capacity with 3 1/2" drill pipe:	14,000 feet
--	-------------

Motors:

Make:	3 x Caterpillar
-------	-----------------

Type:	D-375
-------	-------

H.P.:	3 x 335 H.P. Maximum
-------	----------------------

Derrick:

Make:	Muskogee
-------	----------

Type:	Standard 136' x 30'
-------	---------------------

Capacity:	800,000 lb.
-----------	-------------

Pumps:

Make:	2 Gardner-Denver
-------	------------------

Type:	GR-GXP
-------	--------

Size:	7 3/4" x 16"
-------	--------------

Make:	1 Gardner-Denver
-------	------------------

Type:	FG-FXG
-------	--------

Size:	4 1/2" x 16"
-------	--------------

Blowout preventer equipment:

Make: 2 Cameron QRC

Size: 12"

Series: S-900

Make: 1 G.K. Hydril

Size: 12"

Series: S-900

Powered by Hydril 80-gallon accumulator.

Hole sizes and depths: 30" to 29 feet
17 1/2" to 1045 feet
12 1/4" to 2025 feet
9 7/8" to 10736 feet

Casing and Liner details:

Depth (feet)	Size (in.)	Grade (Sch.)	Weight (lb./ft)	Seamless or Lap	Make
29	20	10	52	L	Australian
1036	13 3/8	H-40	48	S	Sumitomo

Casing and Liner cementing details:

Date	Casing (in.)	Depth Cemented (feet)	Cemented Through	Number of Sacks	Cement Rise
3.4.1962	20	29	Grout	50	Surface
26.4.1962	13 3/8	1036	Shoe	660	Surface

Drilling Fluid:

Fresh water gel base, low water loss, low pH mud was used to 3923 feet. At 3923 feet drilling fluid was converted to 5 percent oil emulsion, fresh water, gel base, low water loss, low pH mud using diesel fuel oil. Materials used included: Diesel, bentonite, barytes, caustic soda, Spersene and XP-20.

Drilling Fluid History:

Date	Depth (feet)	Weight (lb./cu. ft)	Visc. (sec.)	Fil- trate (cc)	pH	Salt (g/g)	Oil (%)	Sand (%)	Solids (%)	Remarks
23.4.62	Sur- face		35							Spud Mud - Gel and water
26.4.62	1537	71	35							
29.4.62	2873	78	40	10.0	10.5			5.0		Partly cement contamin- ated
30.4.62	3142	77	41	9.0	9.5			4.0		
1.5.62	3278	80	40	8.0	9.5			4.0		
5.5.62	4430	75	41	5.4	9.0			-		Water loss reduced with Spersene (XP-20)
9.5.62	5629	81	45	7.2	9.0		6.0	-	16.0	Mud changed to oil emul- sion after spotting diesel during fishing
13.5.62	6367	83	50	7.0	9.0		5.0	-	18.0	
17.5.62	7300	82	59	7.0	9.5		5.5	-	14.0	
19.5.62	7600	82	60	6.5	10.0		6.5	4.0	13.0	
20.5.62	7770	82.5	52	7.4	9.5		7.5	5.0	11.5	
23.5.62	8300	82	52	8.4	10.0		7.0	2.5	14.5	
25.5.62	8660	82	52	7.6	10.0	30		2.0		
27.5.62	8930	83	53	8.4	9.5			3.0		
29.5.62	9270	84	52	7.8	9.5			2.0		
31.5.62	9370	83	53	7.8	9.0			2.0		
3.6.62	9660	83	52	7.8	9.5		5.0	2.0	16.0	
7.6.62	10164	83	51	7.4	9.0			2.0		
11.6.62	10430	82.5	50	7.8	9.0	36	6.0	1.0	15.0	
13.6.62	10538	83	52	8.4	10.0			1.5		
15.6.62	10638	82.5	53	8.4	10.0			2.0		
17.6.62	10716	82	52	8.6	9.5		5.0	1.5	15.0	
18.6.62	10736	82	52	8.2	9.5	40		1.5		

Water Supply:

Fresh water for use during drilling operations was carted by motor transport from Wolleebec Creek, approximately six miles by road from the location.

Perforation and Shooting Record:

None

Plugging back and squeeze cement jobs:

Date	Depth Interval of Plug (feet)	No. of Sacks	Method	Remarks
20.6.1962	4835-4985	80	Open end drill pipe	-
20.6.1962	2840-2990	70	Open end drill pipe	-
20.6.1962	1570-1720	80	Open end drill pipe	-
20.6.1962	970-1056	60	Open end drill pipe	Tested with 10,000 lb. on top plug
20.6.1962	22- 40	15	Grouted	Surface plug

Fishing jobs:

Date	Depth (feet)	Remarks
2.5.1962	3923	Twisted off below pin leaving 17 - 6 1/2" drill collars, bit sub and 9 7/8" bit in hole. Fish 3423 - 3923 feet. Ran in with 7 7/8" Bowen Overshot with 6 3/8" grapple on McCullough Jars on 86' - 6 1/2" drill collars. Latched on to fish O.K. Unable to pull loose. Spotted oil. Unable to pull loose. Jars frozen. Spotted water. Pulled loose and recovered full fish.
11.5.1962	6099	Twisted off at pin leaving 11 - 6 1/2" drill collars, bit sub and 9 7/8" bit in hole. Fish 5776 - 6099 feet. Ran in with 7 7/8" Bowen Overshot with 6 3/8" grapple on McCullough Jars on Baash Ross Bumper Sub on 258' - 6 1/2" drill collars. Latched on and pulled out full fish.

Logging and Testing**Ditch Samples:**

Samples of cuttings were taken every ten feet from surface to 10,736 feet T.D. While coring cuttings were examined at approximately five-foot intervals.

Coring:

Twenty-five cores were cut using a Hughes "J" Type core barrel with both hard formation and soft formation cutter heads. In several instances soft formation coreheads were tipped with Servcoloy and utilized in an attempt to gain recovery in fractured formation. A total of 182 feet was cored and 95.5 feet (52%) recovered. (Descriptions of cores are given in Appendix 1).

Sidewall Cores:

Twenty-five sidewall samples were taken between 1920 and 10,567 feet using a Schlumberger Sidewall Coring Gun and hard formation sample takers. (See Appendix 1 for descriptions of sidewall cores).

Electric Logging:

Schlumberger carried out Electrical Log, Microlog and hole caliper, and Sonic Log. Details are given in Appendix 3.

In addition, a Velocity Survey was conducted and results are contained in Appendix 3.

Drilling Rate, Oil and Gas Log:

Continuous drilling rate and hydrocarbon plots were recorded during drilling and have been shown on the composite well log.

Formation Testing:

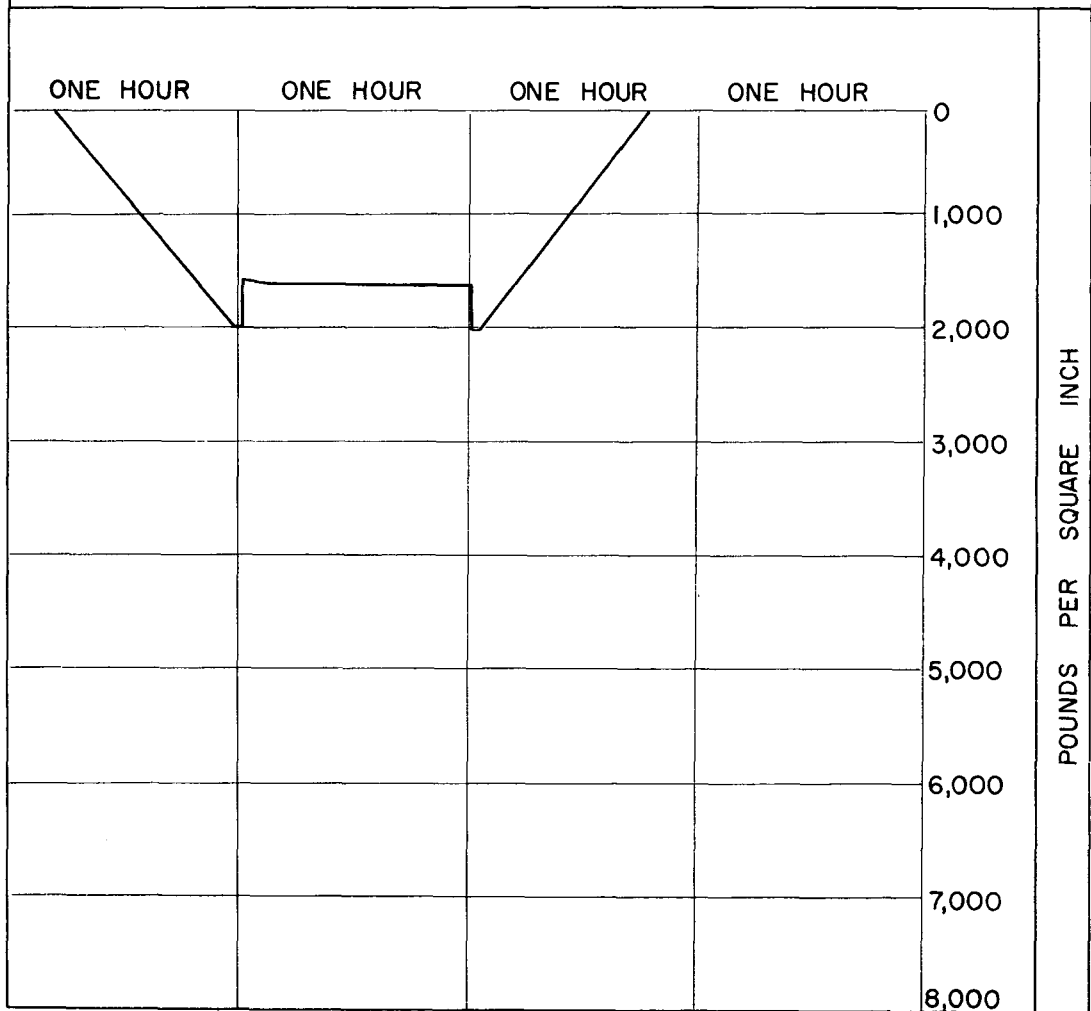
Two Halliburton formation tests, each of 60 minutes duration, using a Howco F.T. Tester with 8 1/2" packer were carried out during the drilling of the well. Details are tabulated below.

Date	Interval (feet)	Packer (feet)	Cushion	Results
1.5.1962	3260 to 3278	3260	280' water	Weak blow for 1 minute increasing medium to strong blow 22 minutes, dead remainder. Recovered net rise 2830 feet of water (10 g/g NaCl). Initial Hydrostatic 2000 p.s.i. Initial Flow 1575 p.s.i. Final Flow 1625 p.s.i. Final Hydrostatic 2025 p.s.i.
12.5.1962	6024 to 6095	6024	446' water	Weak blow throughout. Recovered net rise 105 feet of slightly gassy watery mud. Initial Hydrostatic 3450 p.s.i. Initial Flow 275 p.s.i. Final Flow 275 p.s.i. Final Hydrostatic 3435 p.s.i.

UNION-KERN-A.O.G. WANDOAN No.1
FORMATION TEST 1ST MAY, 1962

Details

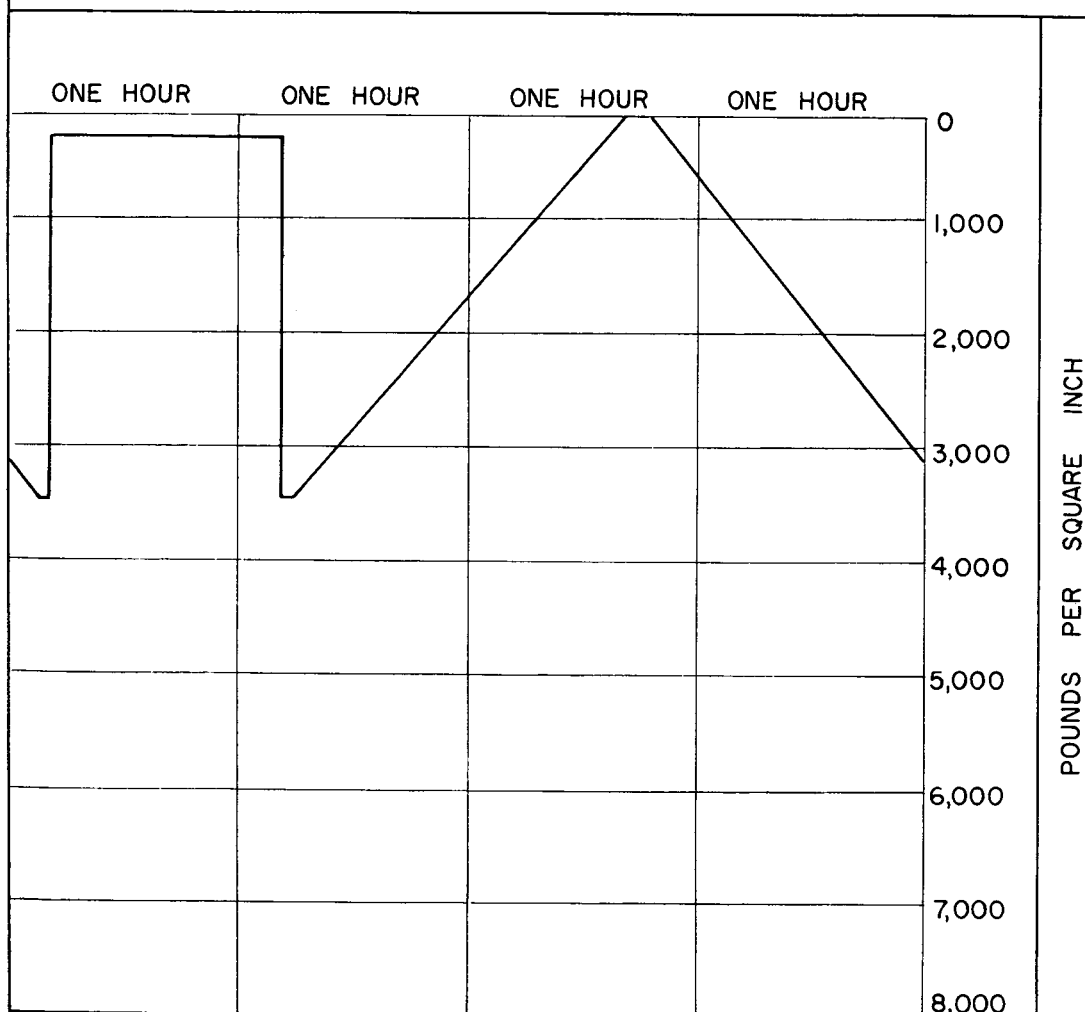
Casing size:	13 $\frac{3}{8}$ " C. 1,036 feet
Hole open to:	3,278 feet
Packer set at:	3,260 feet
Fluid cushion:	280 feet water
Flow period:	60 minutes
Fluid rise:	Net rise 2,830 feet water



**UNION-KERN-A.O.G. WANDOAN No.1
FORMATION TEST 12TH MAY, 1962**

Details

Casing size:	13 ³ / ₈ " C. 1,036 feet
Hole open to:	6,095 feet
Packer set at:	6,024 feet
Fluid cushion:	446 feet water
Flow period:	60 minutes
Fluid rise:	Net rise 105 feet slightly gassy watery mud



Deviation Surveys:

Twenty-two drift readings were recorded using a Totco 8⁰ Drift Indicator. Maximum deviation was 2⁰. Details have been plotted on the composite well log.

GEOLOGY

Regional Geology

Surface geological studies have been made by Union Oil Development Corporation over most of the Surat and Bowen Basins and adjoining areas. The structural and stratigraphic relationships have been mapped, described, and correlated with subsurface information from seismic and well studies. All work has been integrated into one regional report. For details of the nomenclature, stratigraphy, or structure, reference is made to "The Reconnaissance Geology of the Surat Basin, Queensland and New South Wales," by J.E. Mack, Jr, 1963. In the present report only a synopsis of this work is included as set out in the following paragraphs.

Authority to Prospect 57P lies within the Surat Basin, an eastern lobe of the Great Artesian Basin, a major Mesozoic downwarp that had its inception in Triassic time (Fig. 1). The northern edge of the Mesozoic Surat Basin overlaps the southern extension of the Bowen Basin, a major structure that warped downward in varying degrees from Permian into Triassic time.

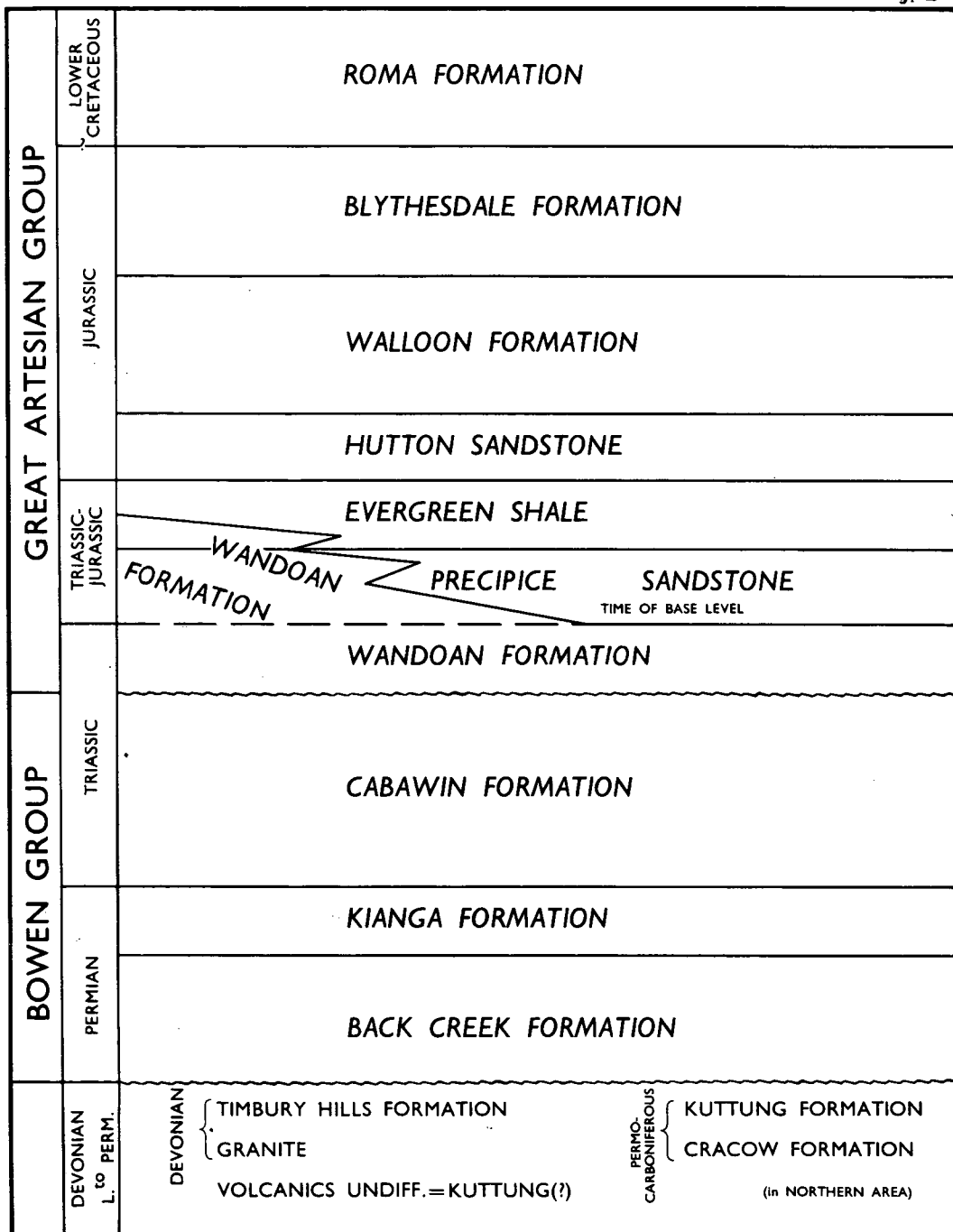
Two major phases of sedimentation have been recognized (Fig. 2), one related to the development of the Bowen Basin (Bowen Group) and the other related to the development of the Great Artesian Basin (Great Artesian Group). The Permian rocks of the Bowen Group grade upward from shallow marine tuffaceous clastics (Back Creek Formation) to non-marine tuffaceous clastics, tuff and coal (Kiangra Formation). The Triassic rocks of this group (Cabawin Formation) are tuffaceous, clastic, fill deposits and red-beds. A period of base levelling within Triassic time preceded the blanket deposition of the Great Artesian rocks. Transitional quartzose, tuffaceous clastics (Wandoan Formation), included at the base of the Great Artesian Group, reflect the final stages of fill in the Bowen Basin. These rocks are overlapped on the margins of the Surat Basin. The blanket deposits of the Great Artesian Group are predominantly continental clastics deposited in shallow inland seas and swamps (Precipice Sandstone, Evergreen Shale, Hutton Sandstone, Walloon Formation, and Blythesdale Formation). At the top of the Great Artesian Group a marine transgression is represented by rocks of the Roma Formation.

Structure of the Wandoan Anticline

The Wandoan Anticline is a major fold reflected in rocks of the Bowen Group on the eastern flank of the Bowen Basin (Plate 2). The structure trends north-south and plunges markedly to the north. A domal closure in rocks of the Great Artesian Group is superimposed on the north plunge of the anticline (Plate 3). Wandoan No. 1 Well was programmed to test the petroleum potential of this closure in the Great Artesian rocks and below that to evaluate the stratigraphic sequence on the plunge of the Wandoan Anticline.

Geophysical and surface geological studies in the north-eastern part of the Surat Basin indicate the interdependence of major folds and north-north-west trending

Fig. 2



COMPOSITE NOMENCLATURE CHART

basement faults. These faults are offset locally by a secondary fault system at right angles to the main trend and have produced a number of horsts and grabens along the eastern margin of the basin. The Wandoan Anticline occupies a position on the north side of a major west-dipping basement horst. From the marked north plunge of the anticline, it is inferred that this west-dipping basement horst acted as a relatively stable block during the compression that formed the fold. Depositional drape over the Wandoan feature provided the closure in the regionally south-west dipping rocks of the Great Artesian Group.

Plate 2 - Structure Map "L" Horizon - The "L" horizon is a continuous reflection from beds near the top of the Kiangra Formation, the youngest Permian unit in the Surat Basin. This horizon marks the approximate position of the Upper Permian oil zone encountered in the drilling of Union - Kern - A.O.G. Cabawin No. 1. The Wandoan Anticline is well defined by the "L" horizon map. As indicated on the map, dip on the north plunge of the anticline averages 750 feet per mile; however, vertical closure is limited because of a greatly reduced dip to the south-east. The flattening of the fold in this direction probably reflects the position of the west-dipping basement horst which controlled the north plunge of the anticline.

Plate 3 - Structure Map "G" Horizon - The "G" horizon represents the approximate top of the Precipice Sandstone, the primary target of the drilling test. As indicated by the "G" horizon map, the structure has more than 200 feet of vertical closure encompassing an area of more than 30 square miles.

Stratigraphy of Wandoan No. 1

As discussed earlier, two major phases of sedimentation have been recognized in the Surat Basin, one phase related to the development of the Bowen Basin and the other related to the development of the Great Artesian Basin. The Bowen Group includes rocks of both Permian and early Triassic age. The Permian rocks consist of shallow water marine clastics (Back Creek Formation) overlain by a freshwater sequence of coal, white tuff, and tuffaceous clastics (Kiangra Formation). The Triassic rocks are predominantly highly tuffaceous, clastic, fill deposits and red-beds (Cabawin Formation).

The overlying rocks of the Great Artesian Group, with the exception of the Wandoan Formation, were deposited as blanket units. These blanket deposits range in age from Triassic to Cretaceous and are sub-divided into the following formational units, from oldest to youngest, the Precipice Sandstone, Evergreen Shale, Hutton Sandstone, Walloon Formation, Blythesdale Formation, and the Roma Formation. The contacts between these formations are gradational and intertonguing. The Wandoan Formation, the oldest unit in the Great Artesian Group, is present in basinal positions and is overlapped on the basin margins. These rocks represent a transition from Bowen sedimentation to that of the Great Artesian Group.

Union - Kern - A.O.G. Wandoan No. 1 was spudded in the Walloon Formation of Jurassic age. The drill subsequently penetrated the Hutton Sandstone, Evergreen Shale, Precipice Sandstone, and Wandoan Formation to a disconformity at the base of the Great Artesian Group. Below the disconformity, the test entered the Triassic Cabawin Formation and then drilled into Permian coals and tuffs of the Kiangra Formation in which the well was bottomed. Tabled below is the stratigraphic sequence encountered in the well. Datum is the Kelly Bushing 19 feet above ground level (958 feet asl).

<u>Age</u>	<u>Formation</u>	<u>Depth Intervals</u> (feet)	<u>Thickness</u> (feet)
Jurassic	Walloon Formation	19- 1753	1734+
Jurassic	Hutton Sandstone	1753- 2618	865
Jurassic	Evergreen Shale	2618- 3159	541
Jurassic-Triassic	Precipice Sandstone	3159- 3530	371
Upper-Middle Triassic	Wandoan Formation	3530- 4817	1287
Middle (?) - Lower Triassic	Cabawin Formation	4817- 9285	4468
Lower Triassic - Upper Permian	Kianga Formation	9285-10736 (T.D.)	1451+

Great Artesian Group

Walloon Formation (Jurassic): 19 to 1753 feet (1734 feet +)

The Walloon Formation consists of 1734 feet of interbedded shale, siltstone, coal, and sandstone. Carbonaceous shale and siltstone are predominant between 19 - 470 feet and 840 - 1753 feet, whereas fine to medium-grained sandstone is more common in the intervening interval. Coals are best developed between 890 and 1475 feet and beds range up to 10 feet thick. The Walloon Formation grades downward into the Hutton Sandstone; the contact was picked on electric logs at the top of the first well developed, porous sandstone.

Detailed description, Walloon Formation

19 - 470 feet (451 feet)

SILTSTONE and SHALE, grey to brown, with disseminated carbonaceous matter and coal streaks; minor interbedded SANDSTONE, grey, fine to medium-grained, quartzose, slightly calcareous.

470 - 840 feet (370 feet)

SANDSTONE, grey, fine to medium-grained, quartzose; gummy, calcareous clay matrix. Interbeds of COAL and grey to brown, carbonaceous SILTSTONE and SHALE between 560 - 610 feet, and 710 - 750 feet.

840 - 1475 feet (635 feet)

COAL seams, up to 10 feet thick, interbedded with brown to dark grey, slightly calcareous SHALE and SILTSTONE with carbonaceous laminae and coal streaks. A SANDSTONE bed from 1015 - 1046 feet is grey, fine to medium-grained, subangular to round, quartzose, slightly micaceous and calcareous, with coaly laminae and shale streaks and blebs.

1475 - 1753 feet (278 feet)

SILTSTONE and SHALE, grey to brown, tan, carbonaceous, slightly calcareous; minor black to brown-black, shaly COAL seams. SANDSTONE, white to grey, speckled with macerated carbonaceous matter, medium to coarse-grained, quartzose, calcareous clay matrix, tight, develops toward the base of the interval.

Age, Walloon Formation

Spores found in the formation from 1025 feet and 1535 feet indicate a Jurassic age (P.R. Evans, Appendix 2).

Hutton Sandstone (Jurassic): 1753 to 2618 feet (865 feet)

The Hutton Sandstone consists of 865 feet of interbedded porous sandstone, shale, and siltstone, with sandstone predominant.

Detailed description, Hutton Sandstone

1753 - 2308 feet (555 feet)

SANDSTONE, brown to grey, fine to very coarse-grained, subangular to subround, quartzose, white slightly calcareous clay matrix, disseminated finely macerated carbonaceous matter; fair porosity. Interbeds of grey-brown, carbonaceous SHALE and SILTSTONE; rare thin COAL seams.

2308 - 2364 feet (56 feet)

SHALE, brown, slightly silty, carbonaceous and micaceous.

2364 - 2554 feet (190 feet)

SANDSTONE, grey, fine to coarse-grained, angular to subround, well sorted, quartzose, slightly micaceous, minor white tuffaceous clay matrix, porous.

2554 - 2618 feet (64 feet)

SANDSTONE, grey, silty, fine-grained, prominent white tuffaceous clay matrix, with lenses and laminae of shale and siltstone.

Age, Hutton Sandstone

Spores found in Wandoan No. 1 from 2025 feet and 2056 feet indicate a Jurassic age (P.R. Evans, Appendix 2).

Evergreen Shale (Jurassic): 2618 to 3159 feet (541 feet)

The Evergreen Shale is a thinly bedded sequence of shale, siltstone, minor coal seams and sandstone.

Detailed description, Evergreen Shale

2618 - 3159 feet (541 feet)

SILTSTONE and SHALE, grey, brown to black, carbonaceous, interbedded with minor black to brown shaly COAL seams. SANDSTONE, beds up to 15 feet thick, interrupt the sequence between 2828 and 2862 feet and at 3106 feet; grey, fine to coarse-grained, subangular, quartzose; white tuffaceous clay matrix. Trace spot yellow fluorescence and trace cut carbon tetrachloride in the sandstone at 3106 feet.

Age, Evergreen Shale

Spores found at 3137 feet in Wandoan No. 1 indicate a Jurassic age (P.R. Evans, Appendix 2).

Precipice Sandstone (Jurassic-Triassic): 3159 to 3530 feet (371 feet)

The Precipice Sandstone is a massive sandstone which was the primary target of the drilling test. The upper 94 feet is silty and tight whereas the lower 277 feet is highly porous and permeable. The base of the Precipice Sandstone is picked at the bottom of this porous zone.

Detailed description, Precipice Sandstone

3159 - 3253 feet (94 feet)

SANDSTONE, grey, silty, fine to medium-grained, subangular, quartzose, white clay matrix, with thin interbeds, lenses and blebs of grey-brown, carbonaceous SILTSTONE and SHALE; tight, spot bluish-white fluorescence, trace cut in carbon tetrachloride.

3253 - 3530 feet (277 feet)

SANDSTONE, white, fine-grained to granule size, subangular to rounded, streak sorted, quartzose, minor streaks carbonaceous matter, highly porous and permeable; blue-white fluorescence, cuts in carbon tetrachloride with pale whitish-yellow fluorescence.

Age, Precipice Sandstone

Although no spores were found in the Precipice Sandstone in this well, Triassic spores were identified from the section in U.K. A. Cabawin No. 1 correlative with the Precipice Sandstone in Wandoan No. 1.

Wandoan Formation (Upper - Middle Triassic): 3530 to 4817 feet (1287 feet)

The Wandoan Formation, as defined by Union Oil Development Corporation, includes 1287 feet of tuffaceous, quartzose sandstone, carbonaceous shale, and siltstone penetrated between 3530 and 4817 feet in Union-Kern-A.O.G. Wandoan No. 1. A thinner

sequence of the same unit was previously penetrated in Union-Kern-A.O.G. Cabawin No. 1 and Cabawin East No. 1, approximately 94 miles south of the Wandoan well. A feather edge of the unit has also been penetrated in Union-Kern-A.O.G. Burunga No. 1, 16 miles north-east of Wandoan. This sequence of rocks was previously assigned to the lower Bundamba in the Cabawin wells. The formation lies conformably below the Bundamba Formation and disconformably above the Cabawin Formation. The sandstones of the Wandoan Formation, in contrast to the porous sandstones of the lower member of the Bundamba Formation (Precipice Sandstone), are contaminated with an abundant tuffaceous clay matrix. The lower contact of the formation was picked at the top of mottled reddish-brown and green shales of the Cabawin Formation. On electric logs of both the Cabawin and Wandoan wells, rocks included within the Wandoan Formation are readily recognized as a separate unit (Plate 4). Since rocks of the Wandoan Formation have stronger lithologic affinity to rocks of the overlying Bundamba Formation than to the underlying Cabawin Formation, the formation is placed within the Great Artesian Group.

The Wandoan Formation is inferred to represent a transition from the fill and red-bed deposition which characterized the period of active downwarp in the Bowen geosyncline to the blanket deposition of the rocks of the Great Artesian Group subsequent to base-levelling of the Bowen Basin. The formation reflects the final stages of basinal fill and, consequently, is expected to be best developed in basinal positions and overlapped on the basin margins (Plate 4). The formation was not recognized below the Bundamba Formation in outcrop to the north.

Type section, Wandoan Formation

The type section of the Wandoan Formation consists of the following units as indexed to depths from K.B., in Union-Kern-A.O.G. Wandoan No. 1.

3530 - 3756 feet (226 feet)

SANDSTONE, grey to green-grey, white, fine to coarse-grained, subangular to rounded, quartzose (clear, translucent, pale orange, pale yellow, and pale green quartz grains); white tuffaceous clay matrix. Minor interbeds of brown to dark grey, carbonaceous SILTSTONE and SHALE.

3756 - 4298 feet (542 feet)

Interbedded SANDSTONE, SILTSTONE and SHALE, as above, with siltstone and shale becoming predominant toward the base of the interval; sandstone between 4190 and 4225 feet, is slightly calcareous.

4298 - 4338 feet (40 feet)

SANDSTONE, white to grey, fine to coarse-grained, quartzose, white clay matrix; grades to CONGLOMERATE, grey to green-grey, granules-pebbles of clear quartz, light green chert and tuff in a matrix of sandstone as above.

4338 - 4643 feet (305 feet)

SILTSTONE and SHALE, brown to grey, sandy, micaceous, carbonaceous. Interbeds of SANDSTONE, white to whitish-grey, silty, fine to medium-grained, few coarse streaks, quartzose; tuffaceous clay matrix; spot calcareous 4448 - 4497 feet.

4643 - 4817 feet (174 feet)

SANDSTONE, green-grey, fine-grained to granule size, few pebbles, angular to subround, poorly sorted, quartzose (clear, orange, pale green, pale rose quartz grains); tuffaceous clay matrix. Interbeds of SILTSTONE and SHALE, grey, green-grey, brown, with carbonaceous laminae.

Age, Wandoan Formation

Spores from 3923 feet within the Wandoan Formation indicate a Middle to Upper Triassic age. P.R. Evans of the Bureau of Mineral Resources (pers. comm.) states:

"In Core No. 7, 3923'5" - 3923'7",

Leiotriletes directus

Monoleti sp.

Granulatisporites sp.

Pteruchipollenites sp.

were identified, and characterize Upper-Middle Triassic "Zone 1" observed in Cabawin No. 1, Cores 22, 23 (7217 - 7414 feet). The relatively common Granulatisporites suggest comparison with Core No. 23 rather than Core No. 22."

Bowen Group

Cabawin Formation (Middle (?) - Lower Triassic): 4817 to 9285 feet (4468 feet)

The Cabawin Formation consists of a monotonous sequence, 4468 feet thick, of interbedded, varicoloured, tuffaceous shale, siltstone and sandstone. The colour and aspect of these rocks suggest a continental oxidizing environment. Sandstone in the formation is green-white to green, composed of quartz and reworked tuff and is impermeable due to an abundant tuffaceous clay matrix. Shale and siltstone are mottled green to red and brown with streaks and laminae of macerated carbonaceous matter locally. The formation at Wandoan No. 1 is not as coarsely clastic as the type section in U.K.A. Cabawin No. 1. The base of the Cabawin Formation is intertonguing with the Kianga Formation and was picked at the top of the first well-developed coal sequence.

Detailed description, Cabawin Formation

4817 - 4940 feet (123 feet)

SHALE and SILTSTONE, tuffaceous, mottled dark reddish-brown to chocolate-brown; mustard to khaki coloured in a few places.

4940 - 5364 feet (424 feet)

SANDSTONE, green-grey, fine to very coarse-grained, few pebble streaks, quartzose (multicoloured), abundant tuffaceous clay matrix; tight; spot bluish to yellowish-white fluorescence. Minor interbeds of SHALE and SILTSTONE as above.

5364 - 5792 feet (428 feet)

SHALE, green, grey-green, brown to reddish-brown, mottled, tuffaceous; SILTSTONE, grey, green-grey, tuffaceous with macerated carbonaceous matter.

5792 - 6990 feet (1198 feet)

SANDSTONE, green-white to grey-green, fine to coarse-grained, subangular to rounded, composed of clear, white, and green quartz and white and green tuff grains in a white tuffaceous clay matrix; tight; no fluorescence or cut. Interbeds of SILTSTONE and SHALE, varicoloured, tuffaceous, as above.

6990 - 7812 feet (822 feet)

SHALE, red, green, and brown, tuffaceous, and SILTSTONE, grey-brown to green-grey, sandy, slightly carbonaceous. Interbeds of SANDSTONE as above, tight, spot calcareous.

7812 - 9285 feet (1473 feet)

SANDSTONE, green to white-grey, fine to medium-grained, below 8890 feet coarse-grained bands composed of clear, milky, green, rare orange quartz, white and green tuff grains and trace mica in a tuffaceous clay matrix; tight; no fluorescence, or cut. Interbeds of varicoloured SHALE and SILTSTONE, as above.

Age, Cabawin Formation.

Spores from the Cabawin Formation between 5630 and 8309 feet suggest a Lower Triassic age (N.J. de Jersey, and P.R. Evans, Appendix 2).

Kianga Formation (Lower Triassic - Upper Permian): 9285 to 10,736 feet (1451 feet +)

The Kianga Formation is a freshwater sequence of coal measures, tuffaceous clastics and silicified white tuff of which 1451 feet were penetrated in the Wandoan well. From 9285 to 9778 feet the formation consists of interbedded coal, carbonaceous shale, calcareous, tuffaceous siltstone and minor sandstone. From 9778 to 10,150 feet the section is predominantly white silicified tuff with interbedded coal seams throughout and thin beds of tuffaceous siltstone and sandstone developed in the upper 200 feet of the interval. Below 10,150 feet tuff and coal are still predominant, but the tuff becomes silty to sandy and towards 10,736 feet (T.D.) gives way to a greater proportion of tuffaceous shale, siltstone, and sandstone.

Detailed description, Kianga Formation

9285 - 9778 feet (493 feet)

SHALE, light to dark grey, dark brown, carbonaceous; COAL, black to brown-black, slightly shaly; and SILTSTONE, grey to brown, calcareous, slightly micaceous. Thin interbeds of SANDSTONE from 9340 to 9378 feet and at 9434 feet and 9564 feet, light tan to brown, fine-grained, composed of clear and milky quartz and brown and white tuff grains in a tuffaceous clay matrix.

9778 - 9948 feet (170 feet)

TUFF, white, silicified, interbedded with COAL seams and carbonaceous, micaceous SHALE with plant fragments. Thin interbeds of SANDSTONE, tuffaceous as above.

9948 - 10,150 feet (202 feet)

TUFF, white to orange-brown, silicified, dense, spot calcareous, with laminae, streaks and thin interbeds of carbonaceous SHALE. Several interbedded COAL seams up to 10 feet thick.

10,150 - 10,500 feet (350 feet)

TUFF, as above, but with silty to sandy streaks and increased density as indicated on the Microlog. Interbedded COAL seams up to 15 feet thick.

10,500 - 10,736 feet (236 feet)

TUFF, white, and COAL as above, with interbedded SHALE, brown to dark grey, carbonaceous; SILTSTONE, green, brown, sandy, carbonaceous, tuffaceous; and SANDSTONE, white to light-green, fine to medium-grained, silty, quartzose, tuffaceous.

Age, Kianga Formation

Spores from the Kianga Formation at 9650 feet are basal Triassic whereas those at 10,434 feet are most probably Upper Permian (N.J. de Jersey, Appendix 2). As in the Cabawin wells, there is a gradational change from Triassic to Permian spores across the time line. In the Cabawin wells, the typical Kianga coal facies is restricted to Upper Permian time; however, at Wandoan this facies persists across the time line into the basal Lower Triassic.

Oil and Gas Indications and Potential

The Precipice Sandstone, the primary target in Wandoan No. 1 Well, showed a strong rise of fresh water (10 g/g) on open hole formation test. Although this sandstone was flushed at the position of the well, even bluish-yellowish-white fluorescence on samples from the main porous zone and traces of hydrocarbon noted in analysis of formation water from the zone indicate that hydrocarbons have migrated through it. Porosities in the zone tested range from 12.4% to 21.8% and permeabilities from 69 to 2330 md.

A trace of blue fluorescence was logged in the samples near the top of the Wandoan Formation and spotty white fluorescence occurred throughout Core No. 7 from 3923 to 3938 feet. Sandstone in the formation is generally impermeable due to an abundant clay matrix.

Electric and micrologs of the well indicate that both the Cabawin and Kianga Formations are impermeable. The sandstone in these formations has a tuffaceous clay matrix. Below the disconformity at the base of the Great Artesian Group, sandstone in the upper 500 feet of the Cabawin Formation displayed bluish to yellowish-white fluorescence. An open hole formation test, made over the interval 6024 - 6095 feet to evaluate a dry gas show, yielded a net rise of 105 feet of slightly gassy watery mud. Methane gas shows were coincident with coal seams throughout the Kianga Formation.

Contribution to Geological Concepts resulting from Drilling

The Wandoan well tested the Precipice Sandstone in domal closure in the north-eastern part of the Surat Basin. The artesian intake for the Precipice is in the area north of the well. The fact that this sandstone was flushed at Wandoan No. 1 suggests that in this part of the Surat Basin structural closures in the Great Artesian Group are insufficient to overcome the flushing effect of the artesian water drive and permit hydrocarbon accumulation in the Bundamba reservoir.

Below the Precipice Sandstone and above the disconformity at the base of the Great Artesian Group, a sequence of tuffaceous, quartzose clastics have been included in a new stratigraphic unit, the Wandoan Formation. Equivalent rocks, in Union-Kern-A.O.G. Cabawin No. 1, were previously included in the lower member of the Bundamba Formation. The Wandoan Formation reflects the final stages of fill in the Bowen Basin and is overlapped on the margins of the Surat Basin.

The lithologic character of that part of the Cabawin and Kianga Formations drilled at Wandoan No. 1 suggests unfavourable reservoir conditions in these formations.

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APPENDIX 1

CORE DESCRIPTIONS

UNION - KERN - A.O.G. WANDOAN NO. 1

Core No. 1

Depth Cored: 1015-1032 feet
Interval Cored: 17' 0"
Total Recovery: 14' 7"
Angle of Hole: 0° 15'
Apparent Dip of Core: Flat
Barrel Size and Type: Hughes 8 5/8" HTC - Draghead Bit

<u>From</u>	<u>To</u>	<u>Recovery</u>	<u>Description</u>
1015' 0"	1029' 7"	14' 7"	Graded sequence of SANDSTONE, grey, fine to medium-grained, subangular to rounded, quartzose (clear, white and pale green quartz grains), slightly micaceous, calcareous, with carbonaceous laminae, coal and shale streaks and blebs, and abundant disseminated carbonaceous matter, micro cross-bedded; SILTSTONE of similar composition as the sandstone and minor SHALE, dark grey, carbonaceous.

Core No. 2

Depth Cored: 1529-1537 feet
Interval Cored: 8' 0"
Total Recovery: 7' 0"
Angle of Hole: 0° 45'
Apparent Dip of Core: Flat
Barrel Size and Type: Hughes 8 5/8" HTC - Draghead Bit

<u>From</u>	<u>To</u>	<u>Recovery</u>	<u>Description</u>
1529' 0"	1529' 3"	0' 3"	SHALE, dark grey, hard, carbonaceous.
1529' 3"	1533' 7"	4' 4"	SANDSTONE, green-grey, fine to medium-grained, subangular to subround, quartzose, slightly calcareous clay matrix, carbonaceous laminae (some well preserved plant fragments), blebs of siltstone and abundant disseminated carbonaceous matter.

<u>From</u>	<u>To</u>	<u>Recovery</u>	<u>Description</u>
1533'7"	1534'6"	0' 11"	SANDSTONE, as described above, with bands and blebs of dark grey, carbonaceous shale and sub-spheroidal blebs of well-indurated, tan shale.
1534'6"	1535'4"	0' 10"	SHALE, grey, hard, banded and laminated with coal.
1535'4"	1536'0"	0' 8"	SANDSTONE, green, grey, fine to medium-grained, subangular to rounded, quartzose, disseminated carbonaceous matter, strong calcareous cement.

Core No. 3

Depth Cored: 2025-2031 feet
 Interval Cored: 6' 0"
 Total Recovery: 2' 6"
 Angle of Hole: 1° 00'
 Apparent Dip of Core: Flat to 2°
 Barrel Size and Type: Hughes 8 5/8" HTC - Draghead Bit

<u>From</u>	<u>To</u>	<u>Recovery</u>	<u>Description</u>
2025'0"	2025'2"	0' 2"	SANDSTONE, brown-grey, fine-grained, angular to subrounded, quartzose, micaceous, abundant disseminated carbonaceous matter. Tight.
2025'2"	2025'7"	0' 5"	SHALE, silty, dark brownish-grey, micaceous, carbonaceous.
2025'7"	2027'6"	1' 11"	SANDSTONE, light-grey, medium-grained, minor coarse-grained bands and lenses, subangular to round, fair sorting, white clay matrix, carbonaceous laminae in upper part of interval. Slight porosity especially in coarse-grained fraction; no odour, cut or fluorescence.

Core No. 4

Depth Cored: 2499-2507 feet
 Interval Cored: 8' 0"
 Total Recovery: 8' 0"
 Angle of Hole: 1° 45'
 Apparent Dip of Core: Flat
 Barrel Size and Type: Hughes 8 3/4" Conventional Type "J" Hard Formation Core Bit

<u>From</u>	<u>To</u>	<u>Recovery</u>	<u>Description</u>
2499'0"	2507'0"	8'0"	SANDSTONE, grey, fine-grained, angular to sub-round, well sorted, quartzose, slightly micaceous (muscovite), with blebs and discontinuous streaks of dark grey, micaceous, carbonaceous shale. Fair porosity.

Core No. 5

Depth Cored:	3137-3142 feet
Interval Cored:	5' 0"
Total Recovery:	1'11"
Angle of Hole:	0° 45'
Apparent Dip of Core:	Flat
Barrel Size and Type:	Hughes 8 3/4" Conventional Type "J" Hard Formation Core Bit

<u>From</u>	<u>To</u>	<u>Recovery</u>	<u>Description</u>
3137'0"	3138'4"	1'4"	SANDSTONE, grey, fine-grained, angular to sub-round, well sorted, quartzose, slightly calcareous finely disseminated carbonaceous matter, faint carbonaceous laminae, current bedding. Tight; trace faint pale yellow fluorescence.
3138'4"	3138'11"	0'7"	SHALE, silty, grey, with blebs and streaks of carbonaceous matter and coal.

Core No. 6

Depth Cored:	3263-3278 feet
Interval Cored:	15'0"
Total Recovery:	8'9"
Angle of Hole:	0° 45'
Apparent Dip of Core:	Flat (on basis of very thin carbonaceous streaks)
Barrel Size and Type:	Hughes 8 3/4" Conventional Type "J" Hard Formation Core Bit

<u>From</u>	<u>To</u>	<u>Recovery</u>	<u>Description</u>
3263'0"	3264'0"	1'0"	SANDSTONE, grey, fine-grained, angular to sub-round, well sorted, quartzose, with minor very thin micaceous, carbonaceous streaks. Fair porosity; abundant yellowish-white fluorescence; no cut or odour.

<u>From</u>	<u>To</u>	<u>Recovery</u>	<u>Description</u>
3264' 0"	3266' 5"	2' 5"	SANDSTONE, grey, grades from very coarse-grained to granule size at base of interval into fine-grained sandstone, described above, subangular to rounded, well sorted, quartzose, with trace white mica and finely disseminated carbonaceous matter. Very good porosity and permeability; abundant yellowish-white fluorescence; no cut or odour.
3266' 5"	3267' 1"	0' 8"	SANDSTONE, grey, fine-grained, angular to sub-rounded, well sorted, quartzose, with minor very thin discontinuous micaceous, carbonaceous streaks. Slight porosity; abundant yellowish-white fluorescence; no cut or odour.
3267' 1"	3271' 9"	4' 8"	SANDSTONE, grey, medium to very coarse-grained and granule size, subangular to rounded, quartzose. Good porosity to very good in coarser fraction; abundant yellowish-white fluorescence; no cut or odour.

Core No. 7

Depth Cored:	3923-3938 feet
Interval Cored:	15' 0"
Total Recovery:	14' 7"
Angle of Hole:	-
Apparent Dip of Core:	-
Barrel Size and Type:	Hughes 8 3/4" Conventional Type "J" Hard Formation Core Bit

<u>From</u>	<u>To</u>	<u>Recovery</u>	<u>Description</u>
3923' 0"	3923' 7"	0' 7"	SHALE, brownish, grey-black, hard, carbonaceous, with abundant plant material.
3923' 7"	3924' 1"	0' 6"	SANDSTONE, grey, firm, fine to medium-grained, angular to subrounded, poorly sorted, quartzose, whitish clay and silt matrix, with very thin micaceous, carbonaceous laminae. Tight; no fluorescence, cut or odour.
3924' 1"	3934' 2"	10' 1"	SANDSTONE, bluish-grey, friable, medium and some coarse-grained, angular to subrounded, mostly clear quartz grains with a few green chert and black coal grains, clay matrix, non-calcareous, massive, porous. Diesel oil odour from mud (57 barrels diesel oil used to free fish prior to coring); no fluorescence or cut.
3934' 2"	3934' 6"	0' 4"	SHALE, dark grey, as above.
3934' 6"	3934' 11"	0' 5"	SILTSTONE, light grey, hard, finely sandy, with a few thin carbonaceous laminae.

<u>From</u>	<u>To</u>	<u>Recovery</u>	<u>Description</u>
3934' 11"	3937' 7"	2' 8"	SANDSTONE, light bluish-grey, medium-grained, well sorted, subangular to rounded, quartzose, non-calcareous, white clay matrix, porous. Diesel oil odour; some spotty white fluorescence; no cut.

Core No. 8

Depth Cored:	4831-4841 feet
Interval Cored:	10' 0"
Total Recovery:	0' 1 1/2"
Remarks on Recovery:	All core recovery caught in catcher
Angle of Hole:	0° 08'
Apparent Dip of Core:	-
Barrel Size and Type:	Hughes 8 3/4" Conventional Type "J" Hard Formation Core Bit

<u>From</u>	<u>To</u>	<u>Recovery</u>	<u>Description</u>
4831' 0"	4831' 1 1/2"	0' 1 1/2"	SHALE, grey-brown with finely disseminated carbonaceous matter.

Core No. 9

Depth Cored:	4841-4846 feet
Interval Cored:	5' 0"
Total Recovery:	Nil
Angle of Hole:	0° 08'
Apparent Dip of Core:	-
Barrel Size and Type:	Hughes 8 3/4" Conventional Type "J" Hard Formation Core Bit

Core No. 10

Depth Cored:	5070-5076 feet
Interval Cored:	6' 0"
Total Recovery:	Nil
Angle of Hole:	-
Apparent Dip of Core:	-
Barrel Size and Type:	Hughes 8 3/4" Conventional Type "J" Hard Formation Core Bit

Core No. 11

Depth Cored: 5368-5378 feet
Interval Cored: 10' 0"
Total Recovery: Nil
Angle of Hole: 0° 15'
Apparent Dip of Core: -
Barrel Size and Type: Hughes 8 3/4" Conventional Type "J" Hard Formation Core Bit

Core No. 12

Depth Cored: 5623-5632 feet
Interval Cored: 9' 0"
Total Recovery: 8' 6"
Angle of Hole: -
Apparent Dip of Core: -
Barrel Size and Type: Hughes 8 3/4" Conventional Type "J" Hard Formation Core Bit

<u>From</u>	<u>To</u>	<u>Recovery</u>	<u>Description</u>
5623' 0"	5623' 2"	0' 2"	SILTSTONE, dark reddish-brown, micro-micaceous, tuffaceous.
5623' 2"	5631' 6"	8' 4"	SANDSTONE, green-grey with speckled mustard to reddish-brown tinge, fine to coarse-grained, predominantly medium-grained, angular to subround, hard, quartzose (multicoloured-clear, orange, green, yellow, amber), minor grains of reddish-brown siltstone and green to brown, tuffaceous shale, blebs and streaks of chocolate to dark reddish-brown shale, tuffaceous clay matrix, current bedding, tight.

Core No. 13

Depth Cored: 6099-6105 feet
Interval Cored: 6' 0"
Total Recovery: 5' 3"
Angle of Hole: 1°
Apparent Dip of Core: Flat
Barrel Size and Type: Hughes 8 3/4" Conventional Type "J" Hard Formation Core Bit

<u>From</u>	<u>To</u>	<u>Recovery</u>	<u>Description</u>
6099'0"	6102'8"	3'8"	SANDSTONE, green, fine-grained, subangular to sub-rounded, fairly well sorted, hard, quartzose, composed mainly of green quartz and green tuff, minor clear, milky and orange quartz, white tuff grains and brown mica flakes. Scattered grains of calcareous material or patches of calcareous cement; tight; no fluorescence; no cut.
6102'8"	6104'3"	1'7"	SHALE, green and red-brown, rare small patches of tuffaceous material, trace of mica flakes, red shale grades into the green variety, slickensides common.

Core No. 14

Depth Cored:	6552-6558 feet
Interval Cored:	6'0"
Total Recovery:	4'0"
Angle of Hole:	1° 45'
Apparent Dip of Core:	-
Barrel Size and Type:	Hughes 8 3/4" Conventional Type "J" Hard Formation Core Bit

<u>From</u>	<u>To</u>	<u>Recovery</u>	<u>Description</u>
6552'0"	6556'0"	4'0"	SANDSTONE, green-grey, fine-grained, minor medium-grained, subangular to subrounded, well sorted, quartzose, fairly hard, composed of white, clear and grey-green quartz, minor orange quartz and green and white tuff fragments, trace of clay matrix, prominent calcareous cement, trace of mica flakes. In some bands green-grey, rounded, tuff grains are prominent. Mainly tight; slight porosity in places; no fluorescence, cut or odour.

Core No. 15

Depth Cored:	7175-7182 feet
Interval Cored:	7'0"
Total Recovery:	Nil
Remarks on Recovery:	Catchers broken and slipping
Angle of Hole:	2°
Apparent Dip of Core:	-
Barrel Size and Type:	Hughes 8 3/4" Conventional Type "J" Hard Formation Core Bit

Core No. 16

Depth Cored: 7376-7380 feet
Interval Cored: 4'0"
Total Recovery: Nil
Angle of Hole: 2°
Apparent Dip of Core: -
Barrel Size and Type: Hughes 8 3/4" Conventional Type "J" Hard Formation Core Bit

Core No. 17

Depth Cored: 7596-7600 feet
Interval Cored: 4'0"
Total Recovery: Nil
Angle of Hole: 1°45'
Apparent Dip of Core: -
Barrel Size and Type: Hughes 8 3/4" Conventional Type "J" Hard Formation Core Bit

Core No. 18

Depth Cored: 7788-7792 feet
Interval Cored: 4'0"
Total Recovery: 4'0"
Angle of Hole: 1°45'
Apparent Dip of Core: Flat
Barrel Size and Type: Hughes 8 5/8" Conventional Type "J" Soft Formation Core Bit

<u>From</u>	<u>To</u>	<u>Recovery</u>	<u>Description</u>
7788'0"	7788'6"	0'6"	SANDSTONE, tuffaceous, green, fine-grained, sub-angular, well sorted, predominantly composed of tuff grains and quartz; tuff is green and white, quartz is clear and milky and rarely orange. Disseminated mica flakes. Prominent calcareous cement, or perhaps the tuff is a calcareous tuffaceous clay, hard, tight. No cut, odour or fluorescence.
7788'6"	7792'	3'6"	SHALE, greenish-grey, and red, prominent conchoidal fracture, strongly fractured, slickensided.

Core No. 19

Depth Cored: 8306-8310 feet
Interval Cored: 4'0"
Total Recovery: 3'1 1/2"
Angle of Hole: 2°
Apparent Dip of Core: Flat
Barrel Size and Type: Hughes 8 5/8" Conventional Type "J" Soft Formation Core Bit

<u>From</u>	<u>To</u>	<u>Recovery</u>	<u>Description</u>
8306'0"	8309'1 1/2"	3'1 1/2"	SHALE, slightly silty, grey, uniform texture, speckled with brown mica flakes and, in patches, macerated carbonaceous material. Large fragments of coal are also scattered throughout. Slickensides common.

Core No. 20

Depth Cored: 8848-8853 feet
Interval Cored: 5'0"
Total Recovery: Nil
Angle of Hole: 2°
Dip of Core: -
Barrel Size and Type: Hughes 8 5/8" Conventional Type "J" Soft Formation Core Bit

Core No. 21

Depth Cored: 8934-8939 feet
Interval Cored: 5'0"
Total Recovery: 0'6"
Angle of Hole: 2°
Apparent Dip of Core: 3°
Barrel Size and Type: Hughes 8 3/4" Conventional Type "J" Hard Formation Core Bit

<u>From</u>	<u>To</u>	<u>Recovery</u>	<u>Description</u>
8934'0"	8934'2"	0'2"	SANDSTONE, grey, fine-grained, subangular, well sorted, fairly hard quartzo-tuffaceous with the tuff fraction equal to or greater than the quartz proportion; clear, milky and minor green quartz; white, fawn, grey, and minor green tuff. Calcareous cement. Rare lithic fragments and common scattered grains and laminae of mascerated coaly material. The lower portion of sand is interlaminated with thin grey shales. Tight; no fluorescence, cut or odour.

<u>From</u>	<u>To</u>	<u>Recovery</u>	<u>Description</u>
8934'2"	8934'6"	0'4"	SHALE, grey, uniformly fine-grained, rare scattered tuff fragments.

Core No. 22

Depth Cored:	9378-9382 feet
Interval Cored:	4'0"
Total Recovery:	3'7"
Angle of Hole:	1° 30'
Apparent Dip of Core:	Flat
Barrel Size and Type:	Hughes 8 5/8" Conventional Type "J" Soft Formation Core Bit

<u>From</u>	<u>To</u>	<u>Recovery</u>	<u>Description</u>
9378'0"	9379'5"	1'5"	SHALE, coaly black to dark black-grey coal fragments and plant fossils (<u>Glossopteris</u> and <u>Thinfieldia</u> or <u>Lepidodendron</u>) very common; unit becomes slightly silty towards the base. Yellow fluorescence.
9379'5"	9381'7"	2'2"	SILTSTONE, carbonaceous, dark grey-brown, slightly speckled with white tuff and rare mica flakes. Minor thin, interlaminated, black carbonaceous shale bands. Plant fossils common as above. Yellow fluorescence; no cut or odour.

Core No. 23

Depth Cored:	9898-9908 feet
Interval Cored:	10'0"
Total Recovery:	5'9"
Angle of Hole:	1° 30"
Apparent Dip of Core:	Flat
Barrel Size and Type:	Hughes 8 3/4" Conventional Type "J" Hard Formation Core Bit

<u>From</u>	<u>To</u>	<u>Recovery</u>	<u>Description</u>
9898'0"	9903'0"	5'0"	SHALE and COAL, black, black-brown; dark grey, brown shale with occasional silty bands interlaminated with dull black coal and occasional lenses of bright coal. Plant fragments (coaly) and resin are very common and in the dark grey and black shale mica flakes occur commonly.

<u>From</u>	<u>To</u>	<u>Recovery</u>	<u>Description</u>
9903'0"	9903'9"	0'9"	SHALE, tuffaceous, brown, fairly soft; coal streaks common, semi-translucent on thin edges.

Core No. 24

Depth Cored:	10,433-10,438 feet
Interval Cored:	5'0"
Total Recovery:	2'0"
Angle of Hole:	-
Apparent Dip of Core:	-
Barrel Size and Type:	Hughes 8 3/4" Conventional Type "J" Hard Formation Core Bit

<u>From</u>	<u>To</u>	<u>Recovery</u>	<u>Description</u>
10,433'0"	10,435'0"	2'0"	SHALE, dark grey, massive (heavy, well compacted); small plant fragments disseminated throughout.

Core No. 25

Depth Cored:	10,712-10,716 feet
Interval Cored:	4'0"
Total Recovery:	1'2"
Angle of Hole:	1° 45'
Apparent Dip of Core:	Flat
Barrel Size and Type:	Hughes 8 3/4" Conventional Type "J" Hard Formation Core Bit

<u>From</u>	<u>To</u>	<u>Recovery</u>	<u>Description</u>
10,712'0"	10,713'2"	1'2"	TUFF, white, siliceous, very fine to fine-grained (shaly to silty texture); trace calcareous cement occurs in irregular patches; ferro-magnesian minerals occur as fine aggregates often concentrated into laminae, finely laminated, hard, brittle, tight, flat bedded, jointed and calcite veined.

SCHLUMBERGER SIDEWALL CORE DESCRIPTIONS

UNION-KERN-A.O.G. WANDOAN NO. 1

Date cores taken: 19th June, 1962

Coring Gun: 30-Shot Gun - Hard Formation Sample Takers

<u>Depth</u> (feet)	<u>Recovery</u> (in.)	<u>Description</u>
1920	2 1/2	SANDSTONE, white, fine-grained, subangular, poorly sorted, quartzose; clear grains loosely cemented with calcareous cement. Porous; no fluorescence, cut, or odour.
2013	1	SANDSTONE, white, fine-grained, subangular to subround, poorly sorted, quartzose; clear grains loosely cemented with calcareous cement; fairly porous; no fluorescence, cut, or odour.
2355	1 1/2	SHALE, silty, brown, fairly soft, slightly micaceous.
2358	1 1/2	SHALE, brown.
4840		LOST
5087	1 1/2	SHALE, grey, slickensided.
5300	1 1/2	SANDSTONE, light grey, fine to medium-grained, subangular, poorly sorted, quartzose; mainly clear, minor green, brown, red and orange quartz in a calcareous cement. Porous; no fluorescence, cut, or odour.
5853	1 1/2	SANDSTONE, light grey, medium-grained, subangular, moderately sorted, quartzose; composed of clear, milky, orange, brown, and green quartz in a white tuffaceous clay matrix; trace calcareous cement. Slightly porous; trace pale blue fluorescence; no cut or odour.
6048	1	SANDSTONE, light grey, fine to medium-grained, subrounded, quartzose; composed of clear, milky, brown, orange, and green quartz in a white tuffaceous clay matrix. Slight porosity; no fluorescence, cut, or odour.
6922		LOST
7130	3/4	SANDSTONE, green-grey, medium-grained, subrounded, moderately sorted, quartzose; composed of clear, milky, green, and grey, minor orange quartz, in a white calcareous, tuffaceous clay matrix. Slight porosity; no fluorescence, cut, or odour.

<u>Depth</u> (feet)	<u>Recovery</u> (in.)	<u>Description</u>
7379	1	SANDSTONE, green, fine-grained, subangular to subrounded, well sorted, quartzose; composed of green, grey, and minor orange quartz, trace calcareous cement. Trace porosity; no fluorescence, cut, or odour.
7459	1	SANDSTONE, grey, fine to medium-grained, subrounded, poorly sorted, quartzose; composed of clear, grey, green, and minor orange quartz in a light grey, tuffaceous clay matrix; strong calcareous cement. Trace porosity; no fluorescence, cut, or odour.
7590	1	SANDSTONE, dark green, fine-grained, moderately sorted, quartzose, tuffaceous; composed of clear quartz and green tuff grains, in calcareous cement and minor tuffaceous clay matrix. Slightly porous; no fluorescence, cut, or odour.
7630	1 1/2	SANDSTONE, green-grey, fine-grained, subrounded, well sorted, quartzose; composed mainly of clear, grey, white, and minor orange quartz; grey-green, tuffaceous clay matrix, calcareous cement. Porous; no fluorescence, cut, or odour.
7668	1	SANDSTONE, light green-grey, fine-grained, subrounded, fairly well sorted, quartzose; composed of clear, white, grey, and minor green quartz in a grey-green tuffaceous matrix; strong calcareous cement. Trace porosity; no fluorescence, cut, or odour.
7682	1 1/2	SANDSTONE, grey-green, fine-grained, subangular, well sorted, quartzose; composed of clear, milky, and grey quartz; minor green tuff and mica flakes in a green-grey, tuffaceous clay matrix; calcareous cement. Trace porosity; no fluorescence, cut, or odour.
7803	2	SHALE, grey-brown, hard.
8879	1 1/2	SANDSTONE, grey, fine-grained, subrounded, well sorted, quartzose; composed of clear, milky, and grey quartz; strong calcareous cement; minor grey tuff matrix. Fairly porous; no fluorescence, cut, or odour.
8972	1/2	SANDSTONE, grey, medium to coarse-grained, angular to subangular, poorly sorted, quartzose; composed of clear, milky, grey, and green quartz, minor green tuff set in a pale grey calcareous tuffaceous clay matrix. Tight; no fluorescence, cut, or odour.
9376	1	SANDSTONE, pale grey-white, fine-grained, subangular, poorly sorted, quartzose, tuffaceous; composed of clear, white, and minor grey quartz and prominent white tuff; tuffaceous clay matrix; calcareous cement. Slight porosity; no fluorescence, cut, or odour.

<u>Depth</u> (feet)	<u>Recovery</u> (in.)	<u>Description</u>
9528	Trace	TUFF, white, angular fragments, possibly a fine-grained tuff fragmented by the coring process.
9817		LOST
9823	1/2	TUFF, white-brown, fine-grained, slightly calcareous, tight; no fluorescence, cut, or odour.
10213	Trace	TUFF, white, fine-grained, hard.
10258	1/2	SHALE, dark grey, hard.
10305	1 1/2	COAL, dark brown, soft.
10567	1	SANDSTONE, white, fine-grained, subangular, moderately sorted, quartzose, tuffaceous; composed of clear and milky quartz, white tuff, minor calcareous cement; tight; no fluorescence, cut, or odour.
10570		LOST
10633		LOST

APPENDIX 2

PALYNOLOGICAL REPORTS

UNION-KERN-A.O.G. WANDOAN NO. 1

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PALYNOLOGICAL EXAMINATION OF SAMPLES FROM

UNION-KERN-A.O.G. WANDOAN NO. 1

by

P.R. Evans*

Summary

Core samples from the following depths were examined palynologically:

<u>Depth of Samples</u>	<u>Age or equivalent Formation</u>
C.1 1025 ft 3 in. - 6 in.	Jurassic)
C.2 1535 ft 0 in. - 4 in.	Jurassic) Relatively low yield
C.3 2025 ft 0 in. - 3 in.	Jurassic) No marker species identified
C.4 2506 ft 3 in. - 7 in.	Jurassic)
C.5 3137 ft 4 in. - 7 in.	Jurassic "Zone 2"
C.7 3923 ft 5 in. - 7 in.	M.-U. Triassic "Zone 1"
C.8 4831 ft 0 in. - 1 1/2 in.	Jurassic "Zone 3" or younger (out of place)
C.12 5630 ft 10 in.-5631 ft 2 in.	Lower Triassic (Cabawin Formation)
C.13 6103 feet	Lower Triassic (Cabawin Formation)
C.14 6556 feet	Lower Triassic (Cabawin Formation)

Observations and Comments

Core No. 1: 1025 ft 3 in. - 6 in.

High content of organic debris, few spores:

Lycopodiumsporites austroclavatidites

Callialasporites dampieri

Bisaccate spp.

Ginkocycadophytus nitidus

Classopollis cf. torosus

* Bureau of Mineral Resources, 8th June, 1962.

Core No. 2: 1535 ft 0 in. - 4 in.

A moderate spore yield:

Cyathidites australis

Sphagnumsporites australiensis

Baculatisporites comaumensis

Neoraistrickia sp.

Leptolepidites verrucatus

Ischyosporites sp.

Inaperturopollenites sp.

Classopollis cf. torosus

Bisaccate spp.

Core No. 3: 2025 ft 0 in. - 3 in.

Very low yield; but

Baculatisporites cf. comaumensis

Callialasporites dampieri

were identified.

Core No. 4: 2506 ft 3 in. - 7 in.

Sphagnumsporites australiensis

Baculatisporites comaumensis

Neoraistrickia sp.

Lycopodiumsporites austroclavatidites

Perinotriliti sp.

Bisaccate spp.

Inaperturopollenites turbatus

Ginkocycadophytus nitidus

Striatiti sp. (Permian remanie?)

The relatively low spore yield in these cores and the apparent absence of sufficient key species prevent a more accurate age determination than Jurassic. Because of the presence of Ischyosporites sp. in Core No. 2 it is tentatively suggested that the section is older than the Walloon Coal Measures at that point, and because of Perinotriliti sp. in Core No. 4, that the well was in an equivalent of the Bundamba Formation of Cabawin No. 1.

Core No. 5: 3137 ft 4 in. - 7 in.

The sandstone of this core gave a very low yield in which Classopollis cf. torosus is relatively abundant. Bisaccate spp. indet. (podocarpoid types) and cf. "Apiculati sp. nov." were also present. This is regarded as a Jurassic "Zone 2" assemblage, comparable with that in Cores 19 and 20 (6716 - 6767 feet) in Cabawin No. 1.

Core No. 7: 3923 ft 5 in. - 7 in.

Leiotriletes directus

Granulatisporites spp.

Monoleti sp.

Pteruchipollenites spp.

were identified and characterize Middle to Upper Triassic "Zone 1", observed in Cabawin No. 1 Cores 22, 23 (7217 - 7406 feet). The relatively common Granulatisporites suggests comparison with Core No. 23 rather than Core No. 22.

Core No. 8: 4831 ft 0 in. - 1 1/2 in.

Sphagnumsporites australiensis

Baculatisporites comaumensis

Neoraistrickia sp.

Leptolepidites verrucatus (fairly common)

Lycopodiumsporites austroclavatidites

Cingulatisporites cf. granulatus

Caytonipollenites pallidus (fairly common)

Bisaccate spp.

This well-preserved and abundant assemblage is Jurassic in age, probably no older than the Walloon Coal Measures. In view of the Triassic age of Core No. 7 above, and the apparently normal succession of strata, this core sample must have been derived from much higher in the hole. This appears to be the only piece recovered from Core No. 8, and must have been knocked from the wall of the hole prior to coring.

Core No. 12: 5630 ft 10 in. - 5631 ft 2 in.

Very low yield of fragments, among which a *Striatiti* sp. indet. was found.

Core No. 13: 6103 feet

Barren.

Core No. 14: 6556 feet

Very low yield:

Todisporites sp.

Apiculati sp.

Pteruchipollenites spp.

Striatiti spp.

Veryhachium sp.

The considerable change in abundance of species, the existence of a relatively high proportion of striate bisaccate pollens in Core No. 14, and the red-bed nature of the cores indicate that Cores 12-14 are probably Lower Triassic and from beds similar in age and lithology to the Cabawin Formation of Cabawin No. 1. The one specimen of hystrichospherid in Core No. 14 marks possible brackish water conditions of deposition.

PALYNOLOGY OF A SAMPLE FROM CORE NO. 19

UNION-KERN-A.O.G. WANDOAN NO. 1

by

N.J. de Jersey*

Observations and Comments

The sample examined from this core came from an approximate depth of 8309 feet. It yielded abundant spores and pollens, comprising the following:

<u>Acanthotriletes</u> sp.	0.5%	
<u>Alisporites</u> sp.	4.5%	
<u>Apiculatisporites</u> sp.	1.5%)	2.0%
<u>A. filiformis</u>	0.5%)	
<u>Calamospora</u> sp.	1.0%	
<u>Caytonipollenites</u> sp.	0.5%	
cf. <u>Cirratriradites</u> sp.	0.5%	
<u>Cyclogranisporites</u> sp.	1.5%	
<u>Distalanulisporites</u> sp.	5.0%)	13.0%
cf. <u>Distalanulisporites</u> sp.	8.0%)	
<u>Inaperturopollenites</u> sp.	24.5%	
<u>Leiotriletes</u> sp.	0.5%)	15.5%
<u>L. directus</u>	15.0%)	
<u>Lueckisporites</u> sp.	1.0%	
<u>Lunatisporites</u> sp.	0.5%	
cf. <u>Microreticulatisporites</u> sp.	0.5%	
<u>Nuskoisporites</u> sp. nov.	1.5%)	2.0%
<u>N. cf. triangularis</u>	0.5%)	

* Geological Survey of Queensland, 1st June, 1962.

<u>Pilasporites</u> sp.	10.5%	
<u>Platysaccus</u> sp.	1.0%	
<u>Punctatisporites</u> sp.	10.5%	) 12.5%
cf. <u>Punctatisporites</u> sp.	2.0%	
<u>Sphagnumsporites</u> sp.	3.0%	
<u>Striatites</u> sp.	0.5%	) 1.0%
S. cf. <u>cancellatus</u>	0.5%	
cf. <u>Tenuisaccites</u> sp. (de Jersey MS).	1.0%	
<u>Verrucosisporites</u> sp.	2.5%	
Striate bisaccate pollens	1.0%	

The presence of a mixture of striate and non-striate bisaccate pollens, and the absence of distinctive Permian species such as Dulhuntyispora parvitholus, indicate a Lower Triassic age for this assemblage. No close comparison can be made with any of the assemblages previously studied from the Lower Triassic Cabawin Formation. However this is not unexpected, as owing to the coarse lithology of these Lower Triassic sediments in the Cabawin No. 1 and Cabawin East No. 1 wells few of the cores examined gave a good yield of plant microfossils, and consequently it was not possible to obtain a detailed coverage of the microfloral sequence.

A characteristic feature of these Lower Triassic microfloras is the progressive disappearance of Permian species from the assemblages in ascending the sequence. On this basis comparison of this Wandoan assemblage with those from the Cabawin No. 1 samples suggests that it is intermediate between those from 9620 feet, (containing many Permian species), and from 8200 feet, (no Permian species, microflora dominated by Inaperturopollenites and "Pteruchipollenites") in the latter well.

Assemblages similar in many respects to this Wandoan microflora have recently been reported by P.R. Evans from the A.A.O. Meeleebee No. 1 Well (Well Completion Report, A.A.O. Meeleebee No. 1, Appendix 2, Unpubl.). Distinctive genera common to the assemblages from both wells include Distalanulisporites and Nuskoisporites, and several of the other forms listed by P.R. Evans are also present in the Wandoan assemblage. These Meeleebee assemblages came from samples over the interval 2960-3570 feet in that well. They were regarded as indicating a Lower Triassic age and as comparable with the microflora of the Pickanjinie Formation. The general similarity of the assemblages from the two wells thus supports the Lower Triassic age assigned above to the Wandoan assemblage and suggests that its horizon is fairly close to the interval 2960-3570 feet in A.A.O. Meeleebee No. 1.

PALYNOLOGY OF A SAMPLE FROM 9650 FEET

UNION-KERN-A.O.G. WANDOAN NO. 1

by

N.J. de Jersey*

Observations and Comments

The coal examined from this sample was separated from the accompanying shale by use of carbon tetrachloride. It yielded abundant spores and pollens, the following being identified:

<u>Acanthotriletes</u> sp.	0.5%)	
	)	2.5%
<u>A. ericianus</u>	1.5%)	
	)	
<u>A. tereteangulatus</u>	0.5%)	
<u>Apiculatisporites</u> sp.		0.5%
<u>Calamospora diversiformis</u>		0.5%
<u>Caytonipollenites</u> sp.		0.5%
<u>Conbaculatisporites</u> sp.		0.5%
<u>Cyclogranisporites</u> sp.	0.5%)	
	)	2.0%
cf. <u>Cyclogranisporites</u> sp.	1.5%)	
aff. <u>Distalanulisporites</u> sp.		0.5%
<u>Granulatisporites</u> sp.	3.0%)	
	)	
<u>G. micronodosus</u>	1.5%)	6.0%
	)	
<u>G. aff. micronodosus</u>	1.5%)	
<u>Inaperturopollenites</u> sp.		16.5%
<u>Leiotriletes directus</u>		35.5%
<u>Lunatisporites</u> sp.	1.0%)	
	)	5.5%
<u>L. amplius</u>	1.0%)	
	)	
<u>L. limpidus</u>	3.5%)	

* Geological Survey of Queensland, 14th June, 1962.

<u>Marsupipollenites</u> sp.	0.5%)	2.0%
cf. <u>Marsupipollenites</u> sp.	1.5%)	
cf. <u>Microreticulatisporites</u> sp.		1.5%
<u>Nuskoisporites</u> sp. nov.		1.0%
<u>Pilasporites</u> sp.		17.5%
<u>Punctatisporites</u> sp.		2.5%
<u>Striatopodocarpites fusus</u>		0.5%
<u>Verrucosisporites</u> sp.		0.5%
Indeterminate bisaccate pollens	1.5%)	
Striate bisaccate pollens	1.0%)	2.5%
Type 25A of de Jersey (1946)		1.5%

This assemblage is characterized by the presence of a mixture of Mesozoic forms, such as Caytonipollenites and Nuskoisporites sp. nov., with other species, such as Lunatisporites limpidus, which are survivals from the Permian, and lacking as it does the distinctive Permian species Dulhuntyispora parvitholus, is regarded as Lower Triassic in age. The presence of Lunatisporites limpidus, L. amplius, and Acanthotriletes tereteangulatus, which are not known to range far above the base of the Triassic, suggests that the horizon of the assemblage is fairly close to the Permian-Triassic boundary. It thus seems possible that a definite Permian assemblage may be found in Core No. 24 (10,434 feet), currently being processed.

PALYNOLOGY OF A SAMPLE FROM CORE NO. 24

UNION-KERN-A.O.G. WANDOAN NO. 1

by

N.J. de Jersey*

Observations and Comments

The sample examined from this core consisted of dark carbonaceous shale, from an approximate depth of 10,434 feet. On maceration it gave a low yield of spores and pollens, the specimens observed being dark, highly carbonized and poorly preserved. The dark, highly carbonized nature of the spore and pollen exines in this sample appears to be due to slight metamorphism. Because of the low yield and poor preservation of the microfossils, a detailed study of the percentage distribution of the species has not been attempted. Instead, in the following list the number of specimens of each species observed in a systematic study of five microslides is recorded:

* Geological Survey of Queensland, 18th June, 1962.

<u>Species</u>	<u>Number of specimens</u>
<u>Acanthotriletes tereteangulatus</u>	1
<u>Apiculatisporites filiformis</u>	2
<u>Calamospora</u> sp.	2
<u>Cyclogranisporites</u> sp.	3
<u>Granulatisporites</u> sp.	3
<u>G. micronodosus</u>	4
<u>Leiotriletes directus</u>	20
<u>Lunatisporites limpidus</u>	2
cf. <u>Marsupipollenites</u> sp.	1
<u>Pilasporites</u> sp.	4
<u>Protosacculina multistriatus</u>	1
Indeterminate bisaccate pollens	4
Indeterminate trilete spores	2
Striate bisaccate pollens	2

Although this assemblage comprises species ranging from Permian to Lower Triassic, and does not include any shorter ranged species, it is regarded as probably Permian in age on the basis of its stratigraphic horizon about 800 feet below a basal Triassic assemblage (report dated 14/6/62). Dulhuntyispora parvitholus, a species used by the writer as a key form in distinguishing Permian from basal Triassic in the Cabawin No. 1 and Cabawin East No. 1 wells, has not been observed. However this species is thick-walled and fairly dark in assemblages in a normal state of preservation; in this assemblage from Core No. 24, increased carbonization would tend to render its exine practically opaque, thus making diagnostic features of ornamentation difficult to detect. Some circular, almost opaque spores within the size range of D. parvitholus have actually been observed in the microslides from this sample, but their preservation is so poor that they cannot be definitely identified, or even compared with that species.

With regard to its horizon within the Permian, the assemblage includes the Upper Permian species Apiculatisporites filiformis and is lacking in Nuskoisporites triangularis, the abundance of which is a characteristic feature of the Lower Permian. Thus the available evidence, although not entirely conclusive because of the low yield and poor preservation of the spores and pollens, favours an Upper Permian age for the assemblage.

APPENDIX 3

WELL LOGGING

UNION - KERN - A.O.G. WANDOAN NO. 1

CONTENTS

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	Schlumberger Sonic Log	..	..	..	54

VELOCITY SURVEY

UNION - KERN - A.O.G. WANDOAN NO. 1

A survey was conducted on 18th June, 1962 to determine the subsurface velocities at Union - Kern - A.O.G. Wandoan No. 1 Well. The survey was conducted by United Geophysical Company, Party 119, which was based in Tara, Queensland. The well, at the time of the survey, had been drilled to a depth of 10,736 feet sub-kelly bushing.

Well depths were measured with a Schlumberger cable with reference to the kelly bushing; the elevation was 977 feet above sea level.

A total of twelve horizons were tested ranging from 1755 feet to 10,730 feet sub-kelly bushing. Horizons of geological significance were chosen wherever possible and at these horizons, shots were recorded from opposite sides of the well.

The velocity distribution $V_z = 8970 + 0.71Z$ feet per second was determined by using Miller's method (Seismic Prospecting for Oil by Dix) and checked by the formula

$$T = \frac{2}{k} \log_e \left(1 + \frac{kZ}{V_0} \right)$$

where $V_0 = 8970$ feet per second and $k = 0.71$.

The results of the survey are shown in Figures 4 and 5.

Fig. 4

Fig. 4

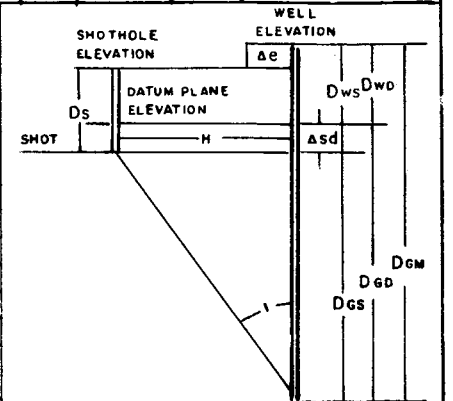
			COMPANY										WELL										LOCATION														
			UNION OIL DEVELOPMENT CORPORATION										U.K.A. WANDOAN No. 1										3460 feet NORTH and 110 feet WEST of SOUTHEAST CORNER of PORTION 10, PARISH of JUANDAH, COUNTY of FORTESCUE, STATE of QUEENSLAND AUSTRALIA.														
SHOT HOLE	ELEVATION	DISTANCE	SHOT HOLE	ELEVATION	DISTANCE	SHOT HOLE	ELEVATION	DISTANCE	SHOT HOLE	ELEVATION	DISTANCE	SHOT HOLE	ELEVATION	DISTANCE	SHOT HOLE	ELEVATION	DISTANCE	SHOT HOLE	ELEVATION	DISTANCE	SHOT HOLE	ELEVATION	DISTANCE	SHOT HOLE	ELEVATION	DISTANCE	SHOT HOLE	ELEVATION	DISTANCE	SHOT HOLE	ELEVATION	DISTANCE	SHOT HOLE	ELEVATION	DISTANCE	ELEVATION	
1	950'	600'	4	950'	600'																														KELLY BUSH	965	
2	950'	600'	5	949'	600'																														ROTARY TBL	964	
3	949'	600'	6	948'	600'																														DERRICK FL.	963	
																																				GROUND	948
REF. GEO.	RECORD NO.	SHOT HOLE NO.	DGM	Tus	Tc	Ds	Δe	Dws	Δsd	Dgs	H	Cot 1	Cos 1	T	GRADE	Tgs	ΔSD V	Tgd	Dgd	ΔDGD	ΔTGD	V _i INTERVAL VELOCITY	V _A AVERAGE VELOCITY	SMOTHOLE ELEVATION					WELL ELEVATION								
.090	A	3	1755	.037		146	+16	162	-3	1593	600	2.6550	.9358	.180	F	.1684	±000	.1684	.1590	1590	.1689	9414	9414														
.083	E	6	1755	.034		132	+17	149	-16	1606	600	2.6767	.9368	.183	F	.1714	-.002	.1694	.1590																		
.092	J	2	2618	.037		131	+15	146	-19	2472	600	4.1200	.9718	.263	F	.2556	-.003	.2526	2453	863	.0818	10550	9785														
.083	B	5	2618	.035		145	+16	161	-4	2457	600	4.0950	.9715	.257	F	.2497	-.001	.2487	2453																		
.091	I	2	3255	.036		132	+15	147	-18	3108	600	5.1800	.9819	.318	P	.3122	-.003	.3092	3090	637	.0585	10889	9994														
.084	D	6	3255	.034		141	+17	158	-7	3097	600	5.1617	.9817	.316	F	.3102	-.001	.3092	3090																		
.092	H	2	3530	.037		132	+15	147	-18	3383	600	5.6383	.9846	.342	F	.3367	-.003	.3337	3365	275	.0245	11224	10084														
.091	G	2	4815	.036		131	+15	146	-19	4669	600	7.7817	.9918	.442	F	.4384	-.003	.4354	4650	1285	.0997	12889	10729														
.083	A	5	4815	.034		139	+16	155	-10	4660	600	7.7667	.9918	.437	P	.4334	-.002	.4314	4650																		
.092	F	2	5800	.037		131	+15	146	-19	5654	600	9.4233	.9944	.521	G	.5181	-.003	.5151	5635	985	.0817	12056	10940														
.091	E	2	6800	.037		135	+15	150	-15	6650	600	11.0833	.9960	.602	F	.5996	-.002	.5976	6635	1000	.0825	12121	11103														
.089	D	2	7800	.036		136	+15	151	-14	7649	600	12.7483	.9969	.680	?	.6779	-.002	.6759	7635	1000	.0783	12771	11296														
.090	C	2	8500	.038		138	+15	153	-12	8347	600	13.9117	.9974	.740	F	.7381	-.002	.7361	8335	700	.0587	11925	11346														
.085	C	6	8500	.035		136	+17	153	-12	8347	600	13.9117	.9974	.737	P	.7351	-.002	.7331	8335																		
.087	A	1	9330	.035		138	+15	153	-12	9177	600	15.2950	.9979	.806	F	.8043	-.002	.8023	9165	830	.0680	12206	11419														
.089	B	2	9330	.035		134	+15	149	-16	9181	600	15.3017	.9979	.805	F	.8033	-.002	.8013	9165																		
.080	A	6	9330	.032		137	+17	154	-11	9176	600	15.2933	.9979	.808	P	.8063	-.002	.8043	9165																		
.088	C	1	10150	.036		134	+15	149	-16	10001	600	16.6683	.9982	.884	P	.8824	-.002	.8804	9985	820	.0778	10340	11341														
.088	B	1	10730	.034		132	+15	147	-18	10583	600	17.6383	.9984	.940	P	.9385	-.003	.9355	10565	580	.0571	10158	11269														
.083	B	6	10730	.035		146	+17	163	-2	10567	600	17.6117	.9984	.941	P	.9395	±000	.9395	10565																		
THE FOLLOWING SHOTS ARE NOT RELIABLE AND ARE NOT USED																																					
ON THE TIME DEPTH PLOT																																					
.090	B	3	1050	.036		135	+16	151	-14	899	600	1.4983	.551	.097	P	.0538	-.002	.0518	885	885	.0518	17085	17085														
.085	C	5	1050	.044?		144	+16	160	-5	890	600	1.4823	.5589	.119	P	.06651	-.001	.0655	885	885	.0655	13511	13511														
.089	A	2	9330	.036		146	+15	161	-4	9169	600	15.2817	.9979	.800	?	.7983	-.001	.7973	9165	830	.0627	13238	11495														

DWD = KELLY ELEVATION MINUS DATUM ELEVATION
DGM = SEISMOMETER DEPTH BELOW KELLY ELEVATION
TUS = UPHOLE TIME OF SHOT
TC = TIME CORRECTION (FROM REFLECTION, REFRACTION, OR UPHOLE TIME)
DS = DEPTH OF SHOT
ΔE = KELLY ELEVATION MINUS SHOTHOLE ELEVATION
DWS = DS + ΔE
ΔSD = DWS - DWD
DGS = DGM - DWS
H = HORIZONTAL DISTANCE WELL TO SHOTHOLE
COT 1 = DGS / H
T = WELL SEISMOMETER TIME FROM TIME BREAK
TGS = T COS 1
TGS = TGS + ΔSD / V_i = VERTICAL TRAVEL TIME, WELL SEISMOMETER TO DATUM PLANE
DGD = DGM - DWD = VERTICAL DISTANCE, WELL SEISMOMETER TO DATUM PLANE
V_i = INTERVAL VELOCITY = ΔDGD / ΔTGD
V_A = AVERAGE VELOCITY = DGD / TGD

SURVEYED FOR: UNION OIL DEVELOPMENT CORP.
SURVEYED BY: UNITED GEOPHYSICAL CO. S.A.
COMPUTED BY: H.D. GRAY and H.C. LEAVITT.
DATE SURVEYED: JUNE 18, 1962

CASING: 1036 feet below kelly bushing.

WEATHERING: No uphole survey conducted.



D_{wd} = KELLY ELEVATION MINUS DATUM ELEVATION
 D_{gm} = SEISMOMETER DEPTH BELOW KELLY ELEVATION
 T_{us} = UPHOLE TIME OF SHOT
 T_c = TIME CORRECTION (FROM REFLECTION, REFRACTION, OR UPHOLE TIME)
 D_s = DEPTH OF SHOT
 Δe = KELLY ELEVATION MINUS SHOTHOLE ELEVATION
 $D_{ws} = D_s + \Delta e$
 $\Delta sd = D_{ws} - D_{wd}$
 $D_{gs} = D_{gm} - D_{ws}$
 H = HORIZONTAL DISTANCE WELL TO SHOTHOLE
 $COT 1 = D_{gs} / H$
 T = WELL SEISMOMETER TIME FROM TIME BREAK
 $T_{gs} = T \cos 1$
 $T_{gs} = T_{gs} + \Delta sd / V_i$ = VERTICAL TRAVEL TIME, WELL SEISMOMETER TO DATUM PLANE
 $D_{gd} = D_{gm} - D_{wd}$ = VERTICAL DISTANCE, WELL SEISMOMETER TO DATUM PLANE
 V_i = INTERVAL VELOCITY = $\Delta D_{gd} / \Delta T_{gd}$
 V_A = AVERAGE VELOCITY = D_{gd} / T_{gd}

SURVEYED FOR: UNION OIL DEVELOPMENT CORP.
 SURVEYED BY: UNITED GEOPHYSICAL CO. S.A.
 COMPUTED BY: H.D. GRAY and H.C. LEAVITT.
 DATE SURVEYED: JUNE 18, 1962

CASING: 1036 feet below kelly bushing.

WEATHERING: No uphole survey conducted.

VELOCITY SURVEY
U.K.A WANDOAN No.1

BY
UNITED GEOPHYSICAL COMPANY, S.A.
(PARTY 1119)

Fig. 5

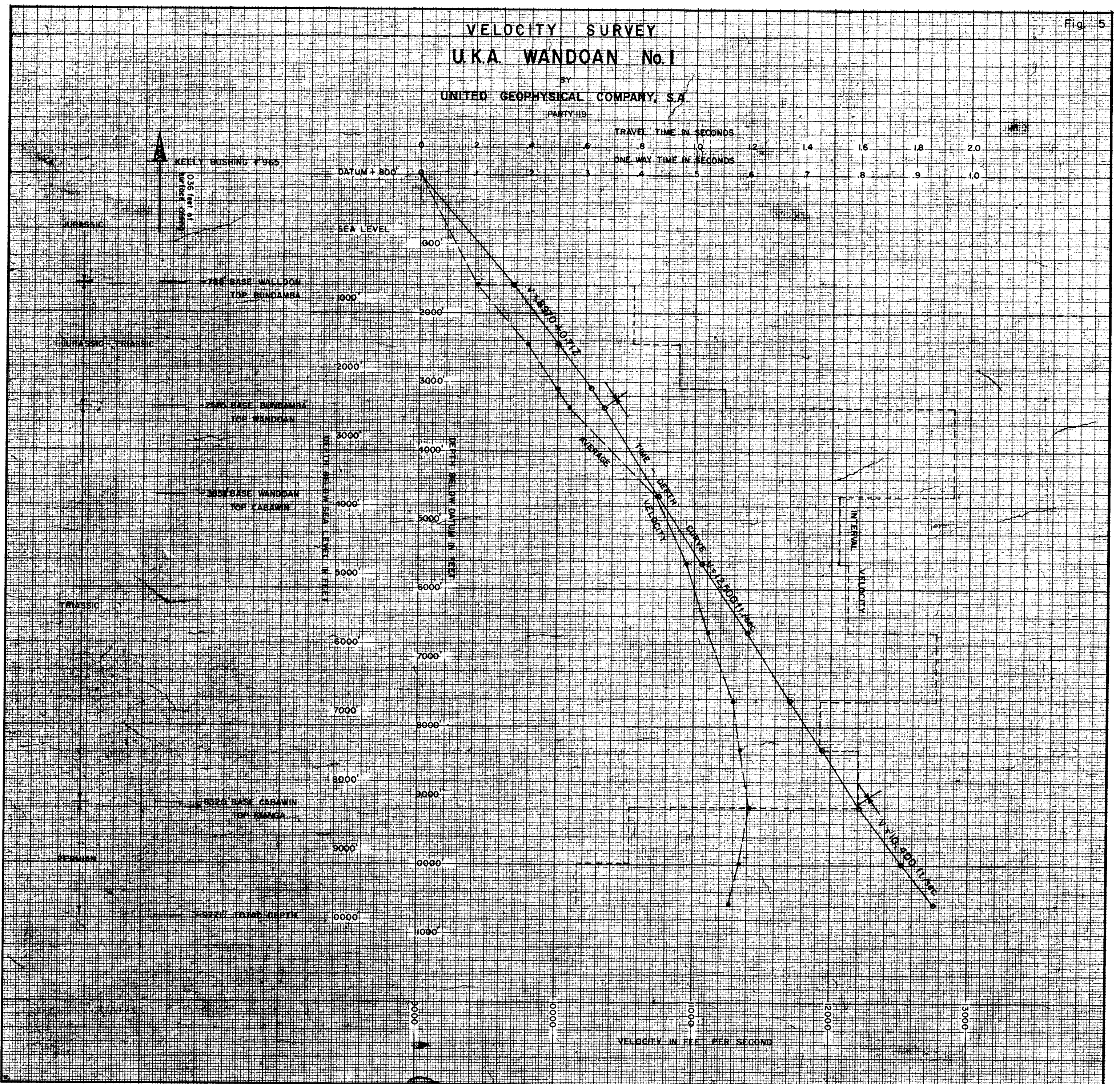
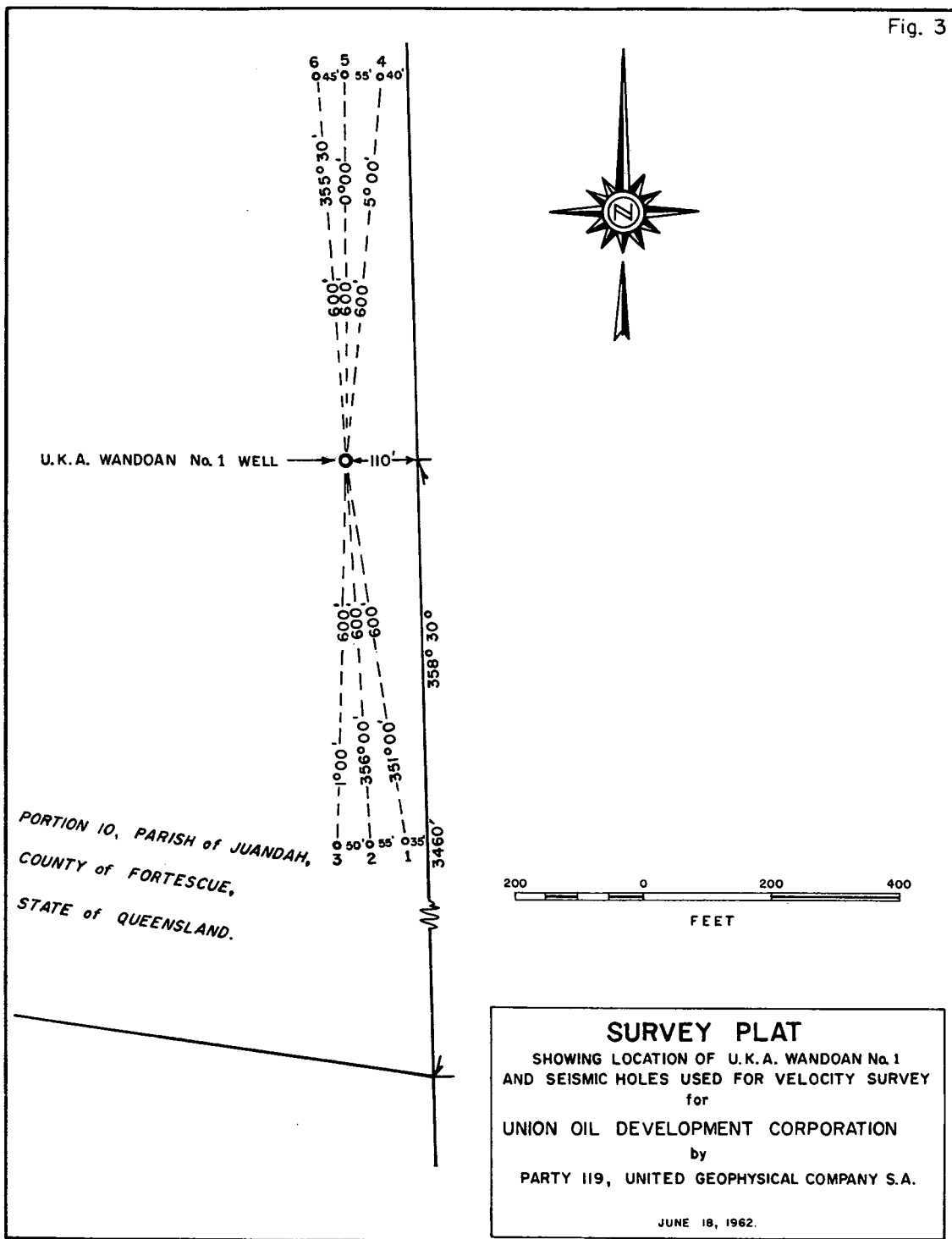


Fig. 3



WELL LOGGING

Schlumberger Electrical Log

Run No.	1	2	3	4	5	6
Date	2.5.1962	10.5.1962	11.5.1962	20.5.1962	31.5.1962	18.6.1962
First Reading	3643	5902	6107	7785	9381	10736
Last Reading	1035	3543	5802	6007	7685	9281
Feet Measured	2608	2359	305	1778	1696	1455
Casing Schlumberger	1035	1035	1035	1035	1035	1035
Casing Driller	1036	1036	1036	1036	1036	1036
Depth Reached	3644	5903	6108	7786	9383	10737
Bottom Driller	3640	5900	6105	7778	9382	10736
Depth Datum	K.B.	K.B.	K.B.	K.B.	K.B.	K.B.
Mud Nature	Gel	Gel	Oil Emulsion	Oil Emulsion	Oil Emulsion	Oil Emulsion
Mud Density	80	81	81.5	82.5	82	83
Mud Viscosity	42	45	47	52	52	52
Mud Resistivity	4.9 at 67 °F	6.4 at 75 °F	5.7 at 69 °F	4.4 at 81 °F	4.5 at 85 °F	4.8 at 74 °F
Mud Res. BHT	2.7 at 125 °F	3.2 at 147 °F	2.9 at 147 °F	2.2 at 162 °F	2.6 at 164 °F	2.1 at 174 °F
Mud pH	8.5	9.0	9.0	9.5	9.1	9.5
Mud Water Loss (cc/30 min.)	7.5	7.2	8.0	7.5	7.0	8.0
Max. Temp. (°F)	125	147	147	162	164	174
Bit Size (in.)	9 7/8	9 7/8	9 7/8	9 7/8	9 7/8	9 7/8

Schlumberger Electrical Log (Continued)

Run No.	1	2	3	4	5	6
Spacings - AM 1	16"	16"	16"	16"	16"	16"
Spacings - AM 2	64"	64"	64"	64"	64"	64"
Spacings - AO	18' 8"	18' 8"	18' 8"	18' 8"	18' 8"	18' 8"
Opr. Rig Time	1:30	2:00	2:00	2:00	2:00	2:30
Truck No.	2513	2513	2513	2513	2513	2513
Recorded by	A. Baudot	A. Baudot	A. Baudot	A. Baudot	G. Ollier & A. Baudot	G. Ollier
Witness	D. McGarry	D. McGarry	D. McGarry	D. McGarry	D. McGarry	D. Pyle & D. McGarry

Schlumberger Microlog

Run No.	1	2	3	4	5	6
Date	2.5.1962	10.5.1962	11.5.1962	20.5.1962	31.5.1962	18.6.1962
First Reading	3643	5902	6107	7784	9381	10736
Last Reading	1700	3543	5802	6007	7684	9281
Feet Measured	1943	2359	305	1777	1697	1455
Casing Schlumberger	1035	1035	1035	1035	1035	1035
Casing Driller	1036	1036	1036	1036	1036	1036
Depth Reached	3644	5903	6108	7785	9383	10737
Bottom Driller	3640	5900	6105	7778	9382	10736
Mud Nature	Gel	Gel-Oil Emuls.	Gel-Oil Emuls.	Oil Emuls.	Oil Emuls.	Oil Emuls.
Density/Vis- cosity	80/42	81/45	81.5/47	82.5/52	82/52	83/52
Mud Resistivity	4.9 at 67°F	6.4 at 75°F	5.7 at 69°F	4.4 at 81°F	4.5 at 85°F	4.8 at 74°F
Mud Res. BHT	2.7 at 125°F	3.2 at 147°F	2.9 at 147°F	2.2 at 162°F	2.6 at 164°F	2.1 at 174°F
Mud pH	8.5	9.0	9.0	9.5	9.1	9.5
Mud Water Loss (cc/30 min.)	7.5	6.5	8.0	7.5	7.0	8.0
Mud Rmf	5.3 at 67°F	5.0 at 75°F	4.5 at 68°F	4.0 at 81°F	5.2 at 85°F	4.1 at 77°F
Mud Rmc						4.3 at 77°F
Mud Log Rm	2.7	3.0	2.9	1.8	2.05	1.8
Mud Log Depth	3600	5800	6000	7700	9150	10200
Bit Size (in.)	9 7/8	9 7/8	9 7/8	9 7/8	9 7/8	9 7/8

Schlumberger Microlog (Continued)

Run No.	1	2	3	4	5	6
Sonde Type	PMS-B	PMS-B	PMS-B	PMS-B	PMS-B	PMS-B
Pad Type	H Pad Type I	H Pad Type I	H Pad Type I	H Pad Type I	H Pad Type I	H Pad Type I
Opr. Rig Time	2:00	2:30	2:30	3:00	3:00	4:00
Truck No.	2513	2513	2513	2513	2513	2513
Recorded by	A. Baudot	A. Baudot	A. Baudot	A. Baudot	G. Ollier & A. Baudot	G. Ollier
Witness	D. McGarry	D. Pyle	D. McGarry	D. McGarry	D. McGarry	D. McGarry

Schlumberger Sonic Log

Run No.	1	2	3	4	5
Date	2.5.1962	10.5.1962	20.5.1962	1.6.1962	15.6.1962
First Reading	3623	5890	7771	9230	10730
Last Reading	1036	3523	5802	7671	9130
Interval Measured	2587	2367	1969	1559	1600
Casing Schlumberger	1035	1035	1035	1035	1035
Casing Driller	1036	1036	1036	1036	1036
Depth Reached	3633	5900	7781	-	-
Bottom Driller	3640	5900	7778	9382	10736
Mud Nature	Gel	Oil Emuls.	Oil Emuls.	Oil Emuls.	Oil Emuls.
Density/Viscosity	80/42	81/45	82.5/52	82/52	83/52
Mud Resistivity	4.9 at 67 [°] F	6.4 at 75 [°] F	4.4 at 81 [°] F	4.5 at 84 [°] F	4.8 at 74 [°] F
Mud Res. BHT	2.7 at 125 [°] F	3.2 at 147 [°] F	2.2 at 162 [°] F	2.6 at 164 [°] F	2.1 at 174 [°] F
pH/Fluid Loss (cc/30 min.)	8.5/7.5	9.0/6.5	9.5/7.5	9.1/7.0	9.5/8.0
Origin of Sample	Flow Line	Flow Line	Flow Line	PMS	PMS
Mud Rmf	5.3 at 67 [°] F	5.0 at 75 [°] F	4.0 at 81 [°] F	5.2 at 85 [°] F	4.1 at 77 [°] F
Mud Rmc					4.3 at 77 [°] F
Bit Size (in.)	9 7/8	9 7/8	9 7/8	9 7/8	9 7/8
Casing Size (in.)	13 3/8	13 3/8	13 3/8	13 3/8	13 3/8
Opr. Rig Time	3:00	3:00	3:00	6:30	5:30
Truck No.	2513	2513	2513	2513	2513
Recorded by	A. Baudot	A. Baudot	A. Baudot	G. Ollier	G. Ollier
Witness	D. McGarry	E. Mack	D. McGarry	D. McGarry	D. McGarry

APPENDIX 4

CORE ANALYSIS

UNION - KERN - A.O.G. WANDOAN NO. 1

by

Bureau of Mineral Resources

Equipment

Tests of porosity and permeability were carried out using Ruska Field Porometer and Permeameter, and dry air and nitrogen as the saturating and flowing media.

Extractions were made by the Dean and Stark method using toluene as solvent.

All samples were received in unsealed condition.

Results

Results are summarized in the Table below. Note that the Bulk Density is the density of the whole rock, including pore space, measured after extraction and drying. The Grain Density equals the density of the solid matter itself.

A petroliferous odour was noted on breaking Core No. 23.

CORE RESULTS SUMMARY

Core No.	Depth	Effective Porosity Primary only		Permeability Primary only		Density gm/cc.		Saturation		Oil Character	Acid Solubility
		% by vol.		md.		Dry Bulk	Grain	Water %	Oil %		
		V	H	V	H	Avg.	Avg.	Pore Space	Pore Space	Extracted fluores. and colour	% by vol.
21	8934'0" to 8934'3"	8	10	Nil	Nil	2.41	2.65	65	Nil	No colour in solvent	2
22	9380'1" to 9380'5"	8	9	Nil	Nil	2.35	2.57	92	Nil	As above	Nil
23	9898'6"	8	10	Nil	Nil	2.32	2.55	97	Not measurable	Slight trace of colour in solvent	Nil
24	10434'0" to 10434'5"	5	4	Nil	Nil	2.42	2.54	67	Nil	No colour in solvent	Nil

WATER ANALYSIS

UNION - KERN - A.O.G. WANDOAN NO. 1

by

Queensland Government Chemical Laboratory

The results of the analysis of two samples of water recovered from formation tests on Wandoan No. 1. Well are tabulated below:

<u>Grains per gallon</u>	<u>GS 511/61</u> <u>3260' - 3278'</u>	<u>GS 512/62</u> <u>6024' - 6105'</u>
Total Solids	20.0	1463.0
Calcium Sulphate	0.4	4.2
Calcium Carbonate	0.9	12.5
Magnesium Carbonate	0.5	16.0
Sodium Carbonate	6.6	42.5
Sodium Chloride	1.2	7.5
Hardness	1.7	34.5
Suspended Solids	Present	Present
pH	7.8	7.8
	Traces of light hydrocarbons were detected	0.2% oil traces of light hydrocarbons were detected
Specific Resistance Ohms/cm	4595	1010

APPENDIX 5

ADDITIONAL DATA FILED IN THE

BUREAU OF MINERAL RESOURCES

The following additional data relating to Union-Kern-A.O.G. Wandoan No. 1, have been filed in the Bureau of Mineral Resources, Canberra, and are available for reference:

- (i) Descriptions of cuttings, by Union Oil Development Corporation
- (ii) Drilling Record, by Union Oil Development Corporation
- (iii) Daily drilling reports for period 13th April, 1962 to 21st June, 1962
- (iv) Well logs including the following:

- (a) Electrical Log

Run 1, 1035- 3643 feet (2" = 100 ft)

Run 2, 3543- 5902 feet (2" = 100 ft)

Run 3, 5802- 6107 feet (2" = 100 ft)

Run 4, 6007- 7785 feet (2" = 100 ft)

Run 5, 7685- 9381 feet (2" = 100 ft)

Run 6, 9281-10736 feet (2" = 100 ft)

Composite log, Runs 1 to 6 (2" = 100 ft)

Interpretive log, Runs 1 to 6 (2" = 100 ft)

- (b) Microlog

Composite log, Runs 1 to 6 (2" = 100 ft)

Run 1, 1700- 3643 feet

Run 2, 3543- 5902 feet

Run 3, 5802- 6107 feet

Run 4, 6007- 7784 feet

Run 5, 7684- 9381 feet

Run 6, 9281-10736 feet

(c) Sonic Log

Composite log, Runs 1 to 5 (2" = 100 ft)

Run 1, 1036- 3623 feet

Run 2, 3523- 5890 feet

Run 3, 5802- 7771 feet

Run 4, 7671- 9230 feet

Run 5, 9130-10730 feet

(d) Drilling rate, hydrocarbon analysis log (2" = 100 ft)

COMPANY: UNION OIL DEVELOPMENT CORPORATION

PETROLEUM TENEMENT: A. to P 57P
MILITARY 4-MILE SHEET: ROMA

WELL No.: UNION-KERN-A.O.G. WANDOAN No.1
BASIN: BOWEN-SURAT

STATE: QUEENSLAND
WELL STATUS: PLUGGED AND ABANDONED

ELECTRIC LOG DATA

DATUM: K.B.						
RUN NO	1	2	3	4	5	6
DATE	May 2, 1962	May 10, 1962	May 11, 1962	May 20, 1962	May 31, 1962	June 18, 1962
FIRST READING	3643'	5902'	6107'	7785'	9381'	10736'
LAST READING	1035'	3543'	5802'	6007'	7685'	9281'
INTERVAL MEASURED	2608'	2359'	305'	1778'	1696'	1455'
Csg., Schlumberger	1035'	1035'	1035'	1035'	1035'	1035'
Csg., DRILLER	1036'	1036'	1036'	1036'	1036'	1036'
DEPTH REACHED	3644'	5903'	6108'	7786'	9383'	10737'
BOTTOM, DRILLER	3640'	5900'	6105'	7778'	9382'	10736'
MUD NATURE	Gel	Gel	Oil emulsion	Oil emulsion	Oil emulsion	Oil emulsion
DENSITY - VISCOSITY	80 - 42	81 - 45	82 - 47	83 - 52	82 - 52	83 - 62
MUD RESISTIVITY	4.9 @ 67°F	6.4 @ 75°F	5.7 @ 69°F	4.4 @ 81°F	4.5 @ 85°F	4.8 @ 74°F
MUD RESIST. B.H.T.	2.7 @ 125°F	3.2 @ 147°F	2.9 @ 147°F	2.2 @ 162°F	2.6 @ 164°F	2.1 @ 174°F
pH FLUID LOSS	9.5/7.5 cc/30 min.	9.7/7.2 cc/30 min.	9.9 cc/30 min.	9.5/7.5 cc/30 min.	9.1/7 cc/30 min.	9.5/8 cc/30 min.
ORIGIN OF SAMPLE	Shaker	Shaker	Shaker	Shaker	Shaker	Shaker
R.M.F.	—	—	—	—	—	—
R.M.C.	—	—	—	—	—	—
BIT SIZE	1	12 1/4" to 2025'	12 1/4" to 2025'	12 1/4" to 2025'	12 1/4" to 2025'	12 1/4" to 2025'
2	9 5/8" to 3640'	9 5/8" to 5900'	9 5/8" to 6108'	9 5/8" to 7778'	9 5/8" to 9382'	9 5/8" to 10736'
Csg. SIZE	13 3/8" C. 1036'	13 3/8" C. 1036'	13 3/8" C. 1036'	13 3/8" C. 1036'	13 3/8" C. 1036'	13 3/8" C. 1036'
OPR. RIG TIME	1:30	2:00	2:00	2:00	2:00	2:30
TRUCK NO	2513	2513	2513	2513	2513	2513
RECORDED BY	A. Boudot	A. Boudot	A. Boudot	A. Boudot	Ollier - Boudot	Ollier
WITNESS	D. McGarry	D. McGarry	D. McGarry	D. McGarry	D. McGarry	D. Pyle

NAME OF WELL: Union-Kern-A.O.G. Wandoan No.1
STATE: Queensland
COUNTRY: Australia
COUNTY: Fortescue
PARISH: Wandoan
PORTION: 105
LATITUDE: 26° 10' 31" S
LONGITUDE: 143° 54' 21" E
ELEVATION: K.B. 977' (datum)
G.L. 358'
10736'
T.D.
DATE SPUDDED: April 22, 1962
DATE T.D.: June 18, 1962
DATE RIG RELEASED: June 21, 1962
STATUS OF WELL: Plugged and abandoned
DRILLED BY: Oil Drilling and Exploration Limited
DRILLING METHOD: Rotary National 80 B
LOGGING: Schlumberger
CEMENTING: Halliburton
MUD LOGGING: Union Oil Development Corporation

OTHER ELECTRICAL LOGS

SONIC LOG: 1036' - 10730'
VELOCITY SURVEY: 1755' - 10730'
MICROLOG: 1700' - 10736'

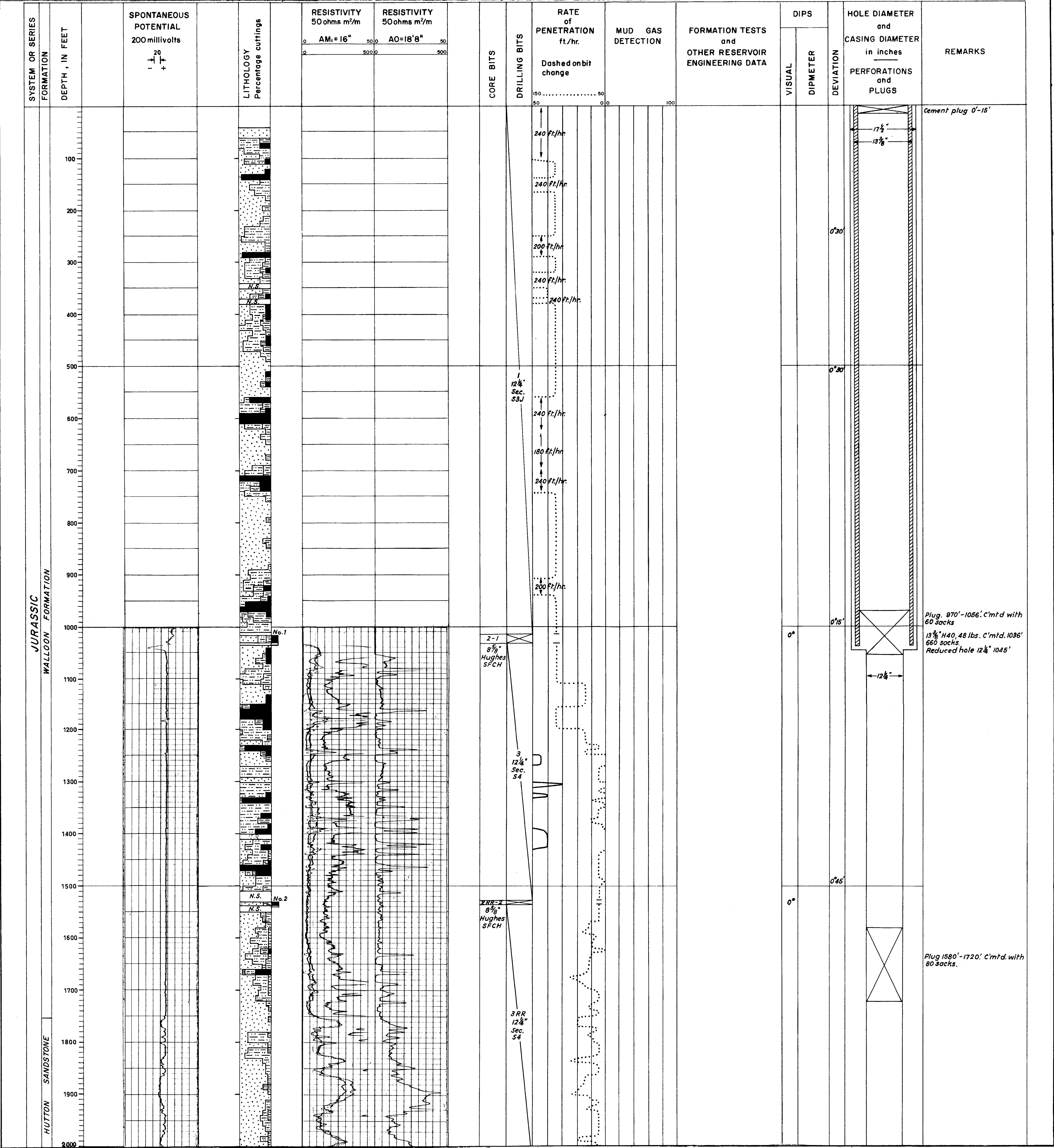
LITHOLOGIC REFERENCE

	Conglomerate		Shale or mudstone
	Sandstone		Limy shale
	Limy sandstone		Siltstone
	Tuffaceous sandstone		Coal and carbonaceous matter
	Tuff		Volcanic flows

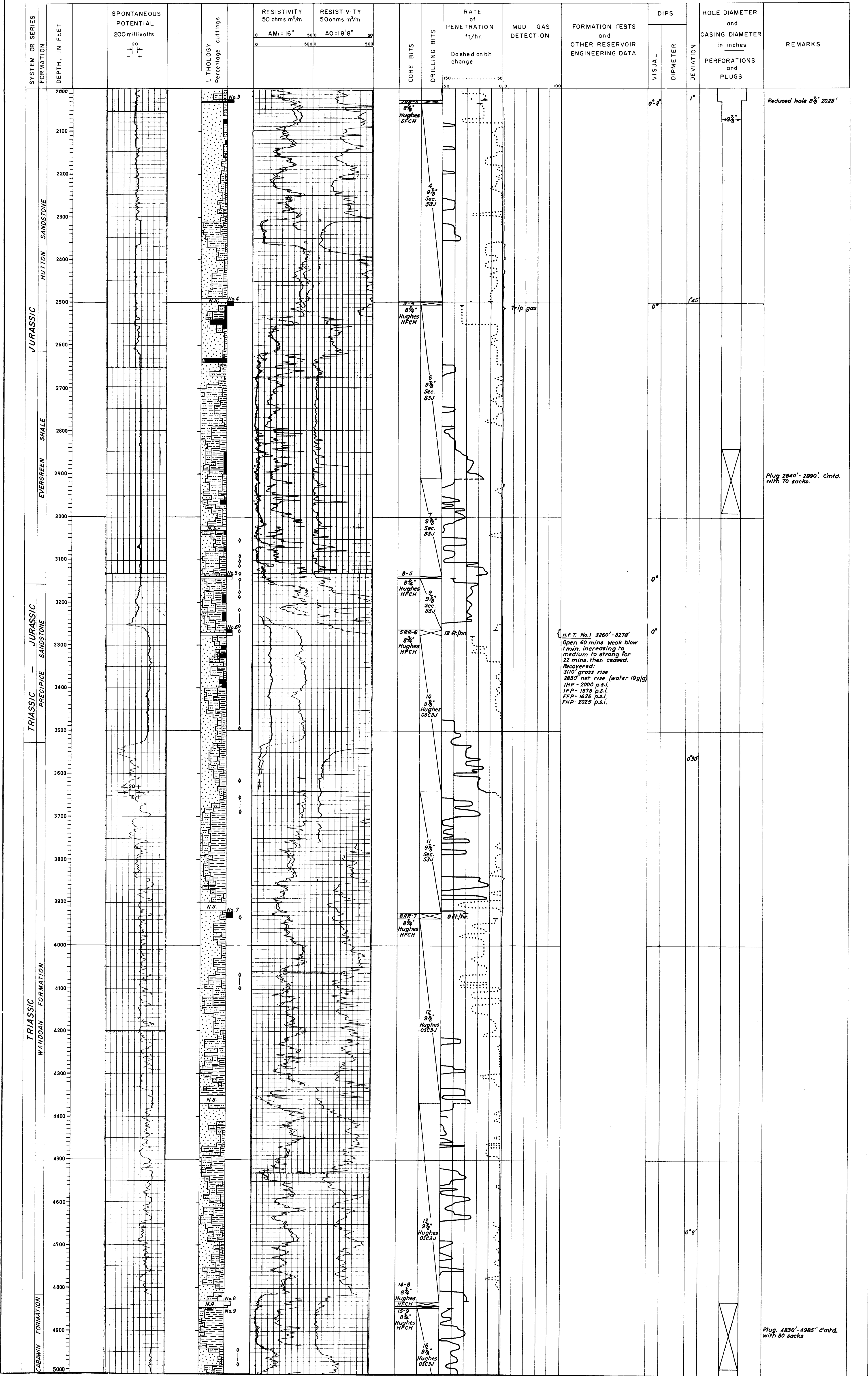
Lithology by
J.E. Mack, Jr. & Peter Roy

WELL SYMBOLS

	Gas show slight		Core interval, No. and recovery
	Gas show strong		Sidewall core
	Oil show slight		Perforated interval
	Oil show strong		Formation test or production test
	Oil and gas show		A.H. and in casing
	Fluorescence		
	Blowout		
	Macrofossil		Plugged interval
	Spore, pollen		

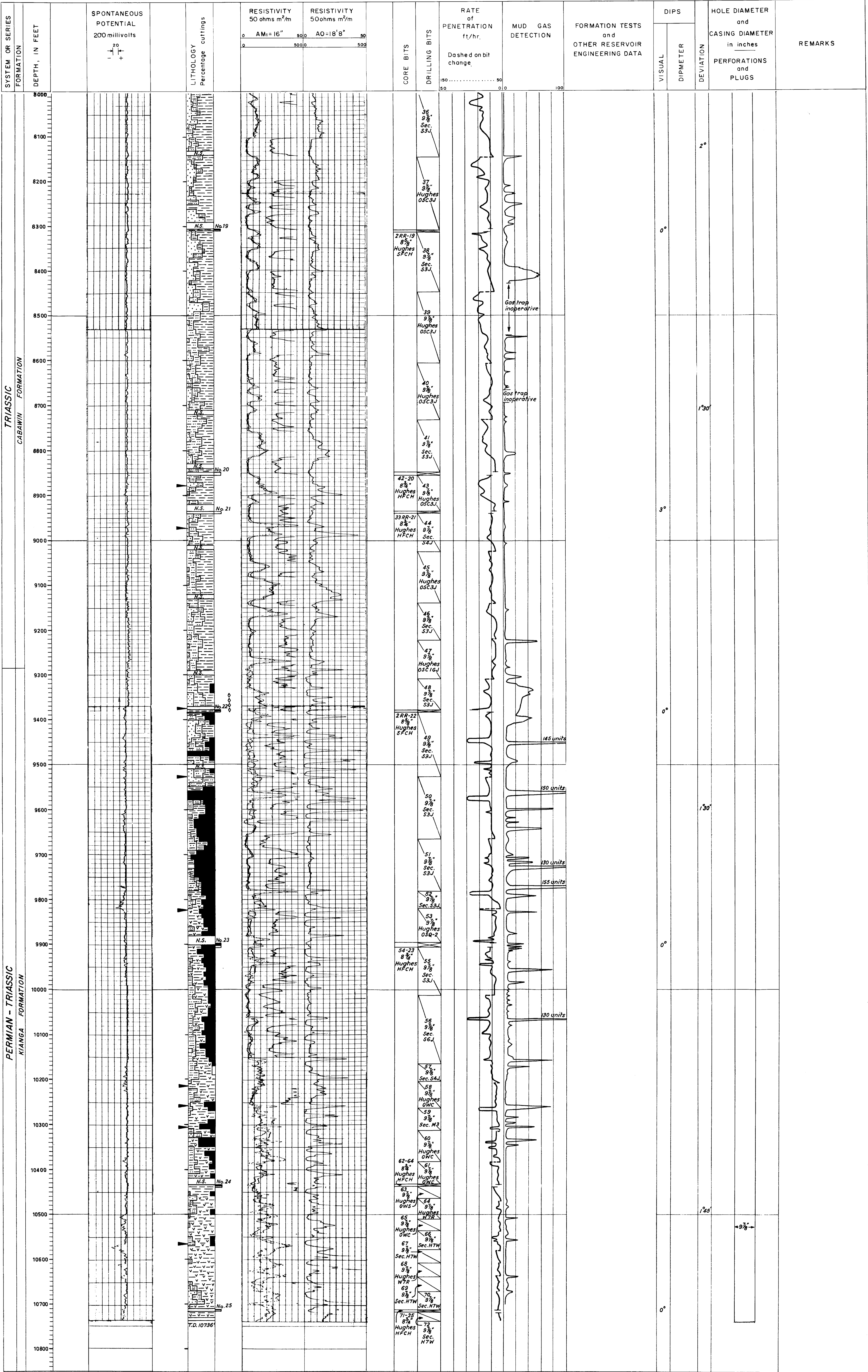


UNION - KERN - A.O.G. WANDOAN No. 1



[illegible]

UNION - KERN - A.O.G. WANDOAN No.1



Compiled by: J. E. Mack, Jr. & Peter Roy.....
Drafted by: M. Bradshaw. JULY 1962

