OP 225 NORTHERN TERRITORY

QUEENSLAND PETROLEUM PTY LTD

BULLO RIVER NO 1

WELL COMPLETION REPORT

JOHN K WEBBY

OCTOBER 1984.

CONTENTS.

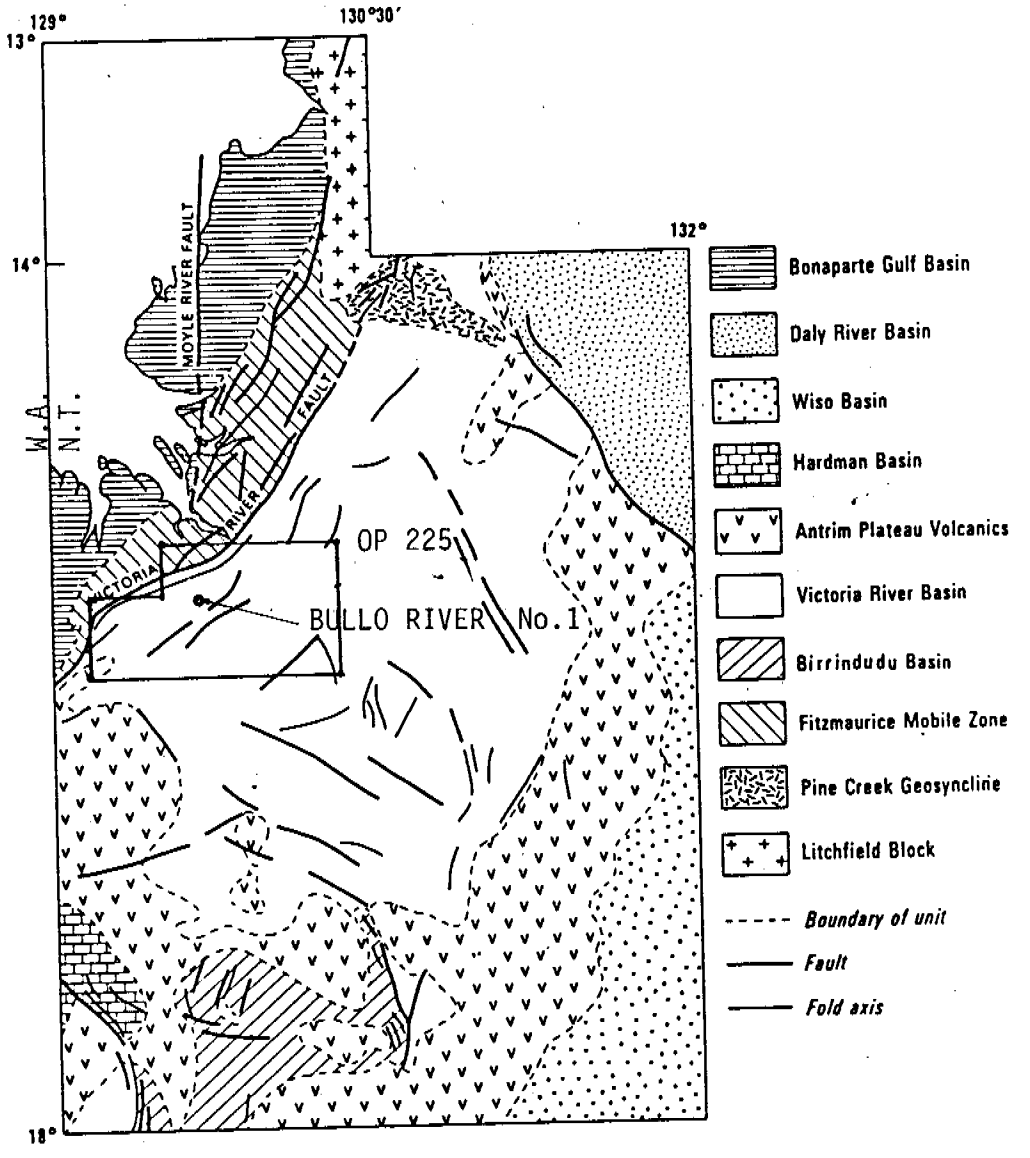


Figure. REGIONAL SETTING.

1. SUMMARY

Queensland Petroleums Bullo River No.1 is located on Bullo River Station within the Proterozoic Victoria River Basin.

The well was spudded on the 15th July 1984 to test a large surface mapped faulted structure and is the first well to penetrate the Proterozoic rocks of this basin in the subsurface. All previous information has come from variably weathered outcrops.

The hydrocarbon prospectivity of the area was relatively unknown, there have been several historic recordings of oil shows in the area and the Proterozoic rocks of the McCarther River Basin on the Western margin of the Gulf of Carpentaria are currently the target of oil exploration. Gas is produced from Proterozoic age rocks in the Amadeus Basin to the south and in other parts of the world. However with no other subsurface information in this area the well was a rank wildcat.

A 5 5/8" hole was rotary drilled to 250 metres cased and then continuously cored to a TD of 970 metres. Core recovery was better than 99 percent.

Surface to 50 metres comprised Saddle Creek Formation a predominantly fine to medium grained sandstone.

The Angalarri Formation from 50 to 803 metres is a red-brown and light grey green well indurated fissile shale and siltstone. Below a sandstone bed at 530 metres interbedded red-brown and grey shales grade down into ripple cross laminated very fine to medium grey sandstones and thin black shales.

Electric log response indicates that the Angalarri Formation has a separate basal unit from 530 metres with lower resistivity, higher sonic velocity and a more shaly gamma response. The top of this unit is marked by a single thin sandy bed and in general is more sandy with interbedded shales and siltstones.

Trace fossils in the form of 2-5mm wide sand filled burrows below 760 metres are evidence of primitive sea floor dwelling life forms existing prior to the evolution of any herbaceous land plants or any vertebrate marine organisms.

The base of the Angalarri formation at 803 metres is marked by a change from a grey silty/shale sequence to the Jasper Gorge sandstone, a predominantly white to cream fine to medium ripple cross laminated quartz sandstone with occasional silty shales.

Summary cont.....

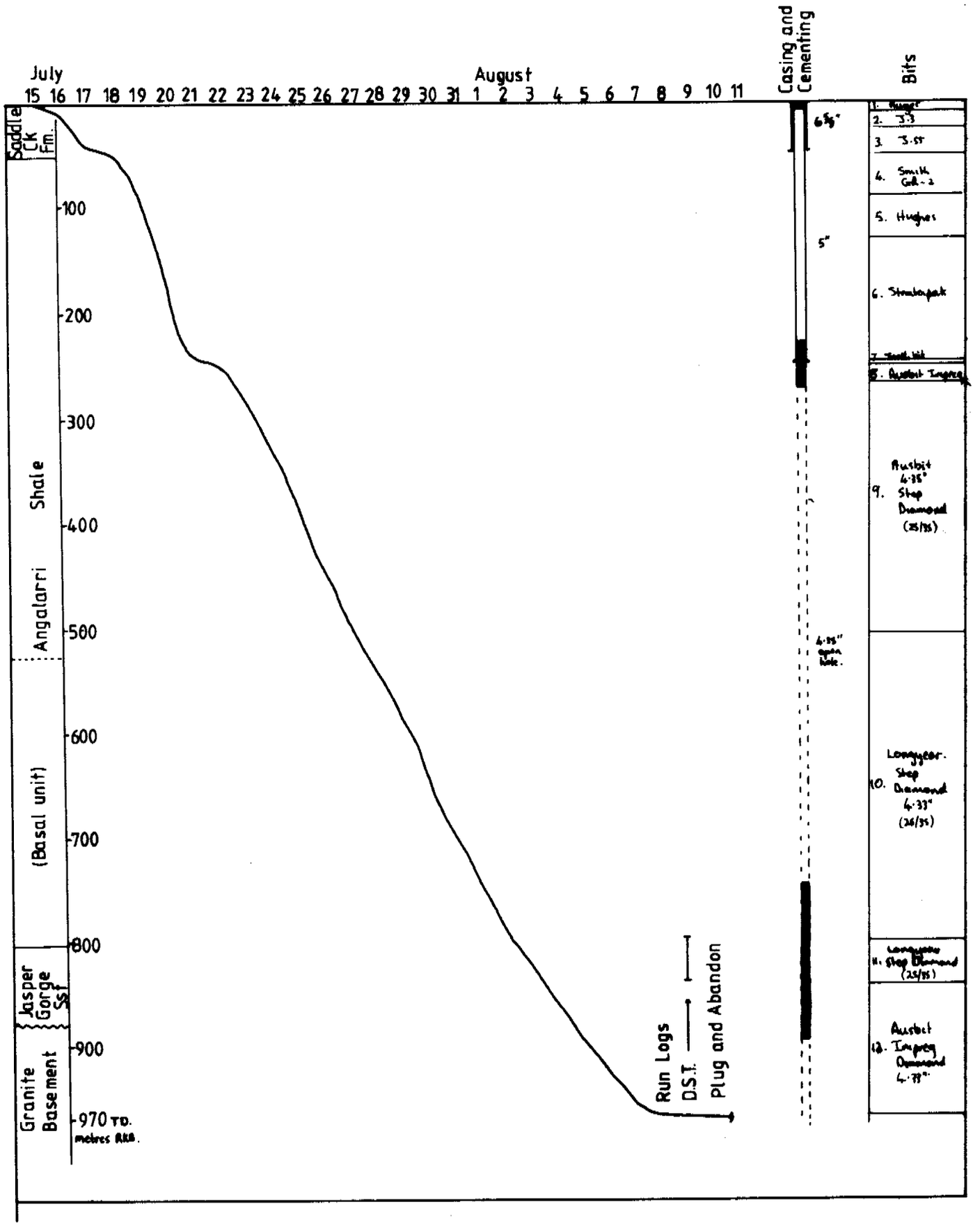
Neither the fine sandstones in the Angalarri sequence or the Jasper Gorge sandstones have any better than poor porosity, core analysis (see appendix) indicated 1.6 to 5% porosity and no permeability.

Throughout the lower part of the Angalarri Formation in the ripple cross laminated shales and sandstones gas analysis returned traces of C1 to C3 gas indicating that the thin shales were releasing traces of gas while drilling, however there was no appreciable trip or connection gas.

A fractured section of the Jasper Gorge Sandstone between 800 and 840 metres was drill stem tested with the view to recovering fluid for hydrocarbon analysis, no flow was recorded at the surface however resistivity of the recovered drilling mud indicates a degree of water dilution suggesting there was a slight inflow of fluid. (see appendices)

Basement at 880 metres comprised a weakly altered graphic granite, probaly of similar age to the metamorphic Fitzmaurice group to the north.

BULLO RIVER No.1. Well History.



2. WELL HISTORY.

2.1 ..... GENERAL DATA

Well Name ;	BULLO RIVER No.1
Location ;	15° 35' 48" Latitude 15deg 35min 48sec Longitude 129deg 37min 48sec
	Ground Elevation approx 24m AMSL RKB Elevation approx 27m AMSL
Tenement Holders ;	OP 225 Northern Territory
	Queensland Petroleum Pty Ltd 75% Newmetal Mines 25%
Operator	Queensland Petroleum Pty Ltd
Date Spudded	15th July 1984.
Date Drilling Stopped	7th August 1984
Date Well Abandoned	10th August 1984
Total Depth	970 metres RKB
Status	Plugged and Abandoned.

2.2..... DRILLING DATA

Drilling Contractor	Rockdrill Contractors Pty Ltd 1 Jijaws Street Sumner. Brisbane. Qld.
Drilling Rig	Longyear HD 6000
Rating	2180 metres with HD 101 Rods
Power Unit	Caterpillar 3306 T, 210 HP @ 2100rpm
Mud Pumps	5 x 6 Gardner Denver rated 150 gpm @ 310 psi, powered by Sundsrand #21 pump and motor. 2 x 535 Bean Pumps powered by Sundsrand#21 pump driving 2 Sundsrand #20 in series.
Derrick	Crown Block Rating 121,000lbs including 1.64 factor of saftey. Mast Length 17.78 metres.
Blow Out Preventor	Hydril 6" 3000 psi W.P. Type GK bottom flanged. 6" 3000 psi Bore size 7-1/16".
Well Head	Breda National Compact 5,000 psi to suit 6-5/8", 5", 4" casing.
Hole Size and Depth	7-7/8" hole surface to 50m RKB 5-5/8" hole 50 to 250metres RKB 4.33" hole 250 to 970metres RKB
Casing and Cementing	Surface Conductor to 10m, 2 joints 8-5/8" casing cemented with 20sx class A cement at 15.6 ppg. Surface to 50m, 5 joints 6-5/8" 24lb N-80 grade casing cemented with 28sx Class a cement at 15.3 ppg. Surface to 250m, 29 joints 5" 24lb N-80 grade casing cemented with 52sx Class A cement at 15.6 ppg.

Drilling Data cont....

Drilling Fluid

Type: KCl-Polymer + Water Base

Average Mud Properties:

Metres RKB	100	200	400	600	800	950
Weight (ppg)	8.7	8.8	8.8	8.7	8.8	8.9
Viscosity (sec/Qt)	41	38	36	38	34	37
Filter Cake	1/32	1/32	1/32	2/32	2/32	2/32
Gel Strength	15	10	7	5	n/r	n/r
Yeild Pt	8	7	4	5	n/r	n/r
Plastic Visc	15	11	8	10	n/r	n/r
Solids (%)	3.5	3.5	4.0	3.0	3.5	3.5
PH	10.5	9.5	9.0	8.5	9.0	9.3
Water Loss (cc)	10.2	12	11.5	11	13	12

Cement Plugs

Plug No.1	840-900m	27sx Class A cement at 15.5 ppg
Plug No.2	750-840m	31sx Class A cement at 15.5 ppg
Plug No.3	230-275m	21sx Class A cement at 15.5 ppg, across casing shoe.
Plug No.4	4.25-5.5m	10sx Class A cement at surface.

2.3.....LOGGING

Mud Logging by Core Laboratories (Aust) Ltd.

Cuttings — Samples were collected every five metres from surface to 250 metres. Each interval was described and tested for hydrocarbon shows.

Core. — A total of 719.25 metres of core was cut from 250.5 to 969.75 metres. Final recovery was better than 99%. All core was marked at 0.25m intervals tested for hydrocarbon shows and described in detail at 1:25 scale.
Selected intervals were sent to Core Laboratories for porosity, permeability and fluid saturation tests. Selected shale zones were sent to AMDEL in South Australia for source rock analysis.

Electric Logging. — The hole was logged by BPB Instruments Wireline Logging Service using their slimhole test tools.

RUN No.	TOOL TYPE.	LOG	DEPTH
1	DD1	Density	752 - 249m
		Gamma Ray	820 - 785m
			750 - surface
		Caliper	821 - 249m
2.	RO1	Resistivity	880- 249m
3.	MS1	Sonic	880 - 249m

2.4.....SURVEYS

The following surveys were carried out using an Eastman Whipstock survey camera.

DEPTH	DEVIATION
45m	1/4 deg
102m	1/4 deg
247m	1/2 deg
300m	1/2 deg
402m	1/4 deg
502m	1/2 deg
608m	1/2 deg
798m	2 deg
900m	2 deg

2.5..... TESTING

A single open hole drill stem test was run using Halliburtons slim hole test tools

The test objective was a fractured zone within the Jasper Gorge Sandstone from 805 - 840 metres.

The first attempt was abandoned due to the inability to obtain a packer seat.

The second attempt with the packer set higher gave a good seat and no annulus leakage.

Only a very weak blow of short duration was recorded at the surface, subsequent resistivity checks on the fluid recovered from the drill string indicated dilution of the drilling mud by water, indicating a slight inflow of fluid from the fractured zone. On pulling out of the hole fluid was recovered from 256ft obove the tool also indicating some fluid inflow.

A full report on the test is included in the appendices.

2.6.....HYDROCARBON SHOWS

No fluorescence other than mineral fluorescence was recorded, however from 260m - 460m traces of C1 were encountered and from 460m through to 900m traces of C1 to C3 were recorded.

The majority of this gas came from zones of thin interbedded ripple cross laminated fine to medium sandstones with thin grey shale laminae. The sandstones had a porosity of less than 5%, and it is likely the gas was released from the shale laminae while drilling.

The very small volumes of gas recorded while drilling, on connections and on trips together with the lack of porosity suggest the gas was released from the shales rather than the sandstones. Geochemical analysis indicates the shales have low TOC content that is gas prone and over mature.

2.7.....CORE ANALYSIS (Core Lab.(Aust) Ltd)

Three samples from the coarsest sandstone intervals were analysed, the results (see appendix) indicate very low porosity (1.5-5%) and virtually no permeability (0.1-0.3 millidarcys). No oil saturation was recorded.

The results confirm visual estimation that the sands were tight and too fine grained to be suitable reservoirs.

2.8..... PETROGRAPHY (see appendices)

Two samples (1) a sandstone/shale from 722.5m and (2) a sample of basement at 931.25m were sent to Geochempet Services in Brisbane for optical Petrography analysis.

The sandstone comprised quartz and altered feldspar with some calcite cement, fine to medium grained and showing indications of very low grade burial metamorphism. Alteration of the feldspars and the development of calcite cement has destroyed any original porosity.

Basement comprised a coarse grained graphic granite also weakly altered, the major components were quartz and microcline (plag. feldspar) and sericite from diagenetic decomposition of feldspar.

2.9..... GEOCHEMICAL ANALYSIS (Amdel S.A.see appendices)

Five core samples of various shales were analysed for TOC and by Rock Eval Pyrolysis. As a hydrocarbon source the shales were generally poor. TOC values were low (0.03 - 0.5%).

The highest TOC value came from a sequence of fine to medium sandstones and dark grey shales with ubundant trace fossils in the form of burrows in the shale horizons.

The conclusion that these sediments contain over-mature gas prone organic matter is confirmed by the petrographic conclusion that they have been subject to very low grade burial metamorphism.

3.0..... GEOLOGY

3.1..... REGIONAL GEOLOGY

Prior to this well being drilled the known stratigraphy has come from generally well exposed and variably weathered outcrop. In particular the sandstone units form well developed scarp faces with the shales and siltstones forming more recessive slopes.

The stratigraphy of the Victoria River area is shown in the following table, Bullo River No.1 was spudded within the Auvergne Group with the intention being to drill to a TD in the units underlying.

Table 1....Victoria River Stratigraphy.

Age	Unit
Adelaidean to Cambrian	Antrim Plateau Volcanics
	Kinevans Sandstone
---Unconf.---	
	Duerdin Group
	---Unconf-
	Bullo River Sandstone
	---Unconf---
Adelaidean	-Spencer Sst -Shoal Reach Fm Auvergne -Lloyd Creek Fm Group -Pinkerton Sst -Saddle Ck Fm. -Angalarri Sltst -Jasper Gge Sst
	---Unconf---
	Skull Creek Limestone / Timber Creek Fm. /
	Stubb Formation / Wondoan Hill Fm /
	Bullita Group / Wattie Group /
	Granite (Fitzmaurice Group Equivalent?)
Mid - Lower Proterozoic	

The basin is characterised by laterally very extensive units, sandstone beds can be followed along strike for tens of kilometres without any major facie variation.

It is assumed the original sedimentary basin was very large with a restricted low energy depositional environment, and was very stable with occasional periods of slow subsidence and uplift accounting for the stratigraphic breaks.

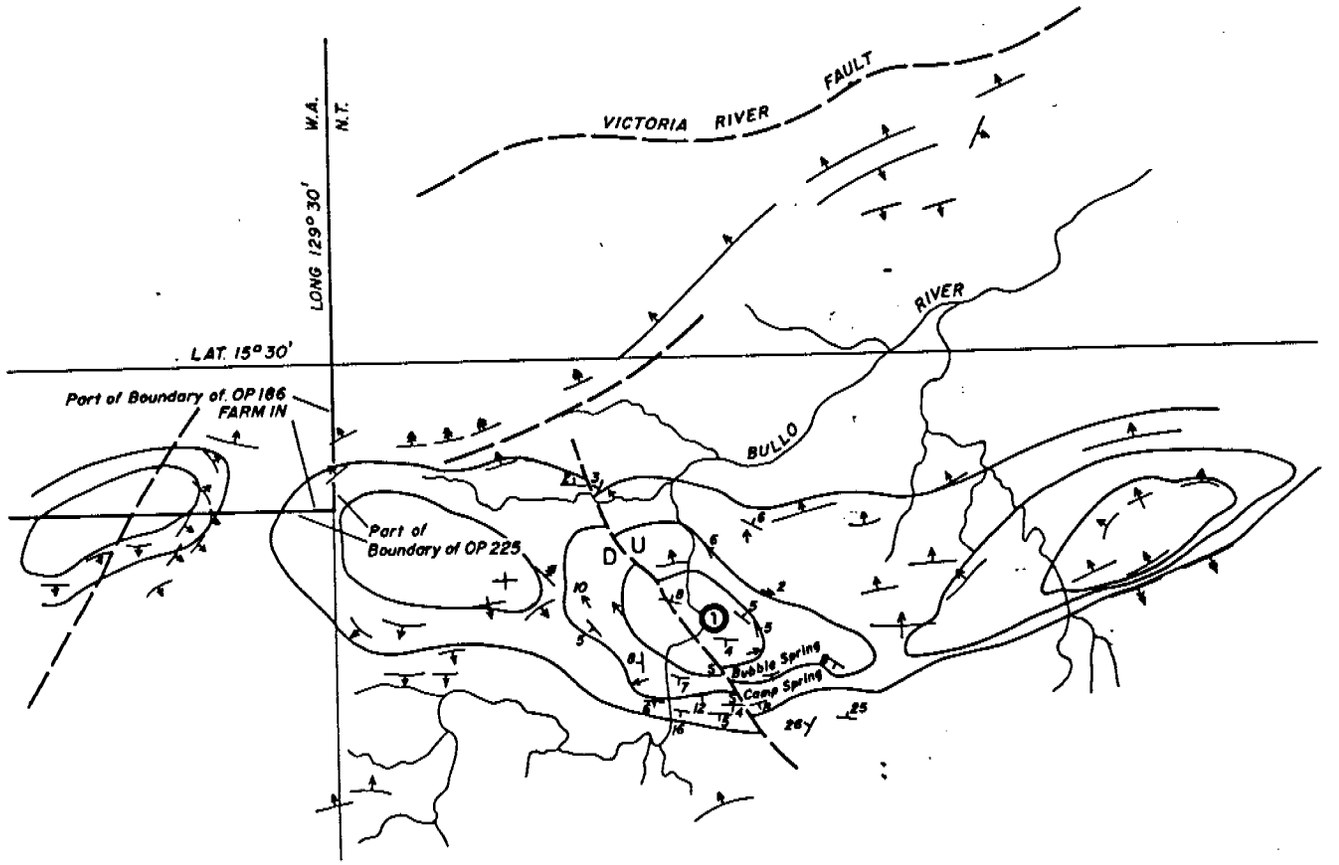
Individual units as well as formations as a whole show a transgressive nature of sedimentation. The Angalarri shale member for example has a generally sandy base grading up into thick shale units.

Underlying the basal Auvergne group Jasper Gorge Sandstone is a major unconformity. In Bullo River No.1 a granite is present below the unconformity however in other parts of the basin up to four different units underly the basal sandstone and these were additional targets not intersected in this well.

The entire sequence exposed showed a very low grade of burial metamorphism, the thin shale partings for example had moderately developed chlorite and the sands were cemented and silicified to a degree. Coarser sands may be expected to have the porosity better preserved although due to the age there will likely be some degree of alteration.

The fine sands and shales at the base of the Jasper Gorge Sandstone directly overlie basement granite. Thus all the units mapped in outcrop to the south as underlying the Auvergne group are here absent, and the straigraphic relationship between Bullo River and the area to the south is unknown.

The absence of a basal Jasper Gorge conglomerate overlying basement infers the sediment source was fairly distant.



PART OF OP 225 N.T.

SCALE

0 7 KM

LEGEND

Photogeological Dips

- Flat
- 0 - 2°
- 2° - 15°
- 15° - 30°
- 30° - 85°
- 85° - 90°

Formline Contours

Fault

① First Well Location

4.1.....WELL SITE AND STRUCTURE

The site chosen to drill was based on air photo interpretation and surface mapping which outlined a very large closed structure faulted through the middle, with the eastern side upthrown approximately 100-200 metres.

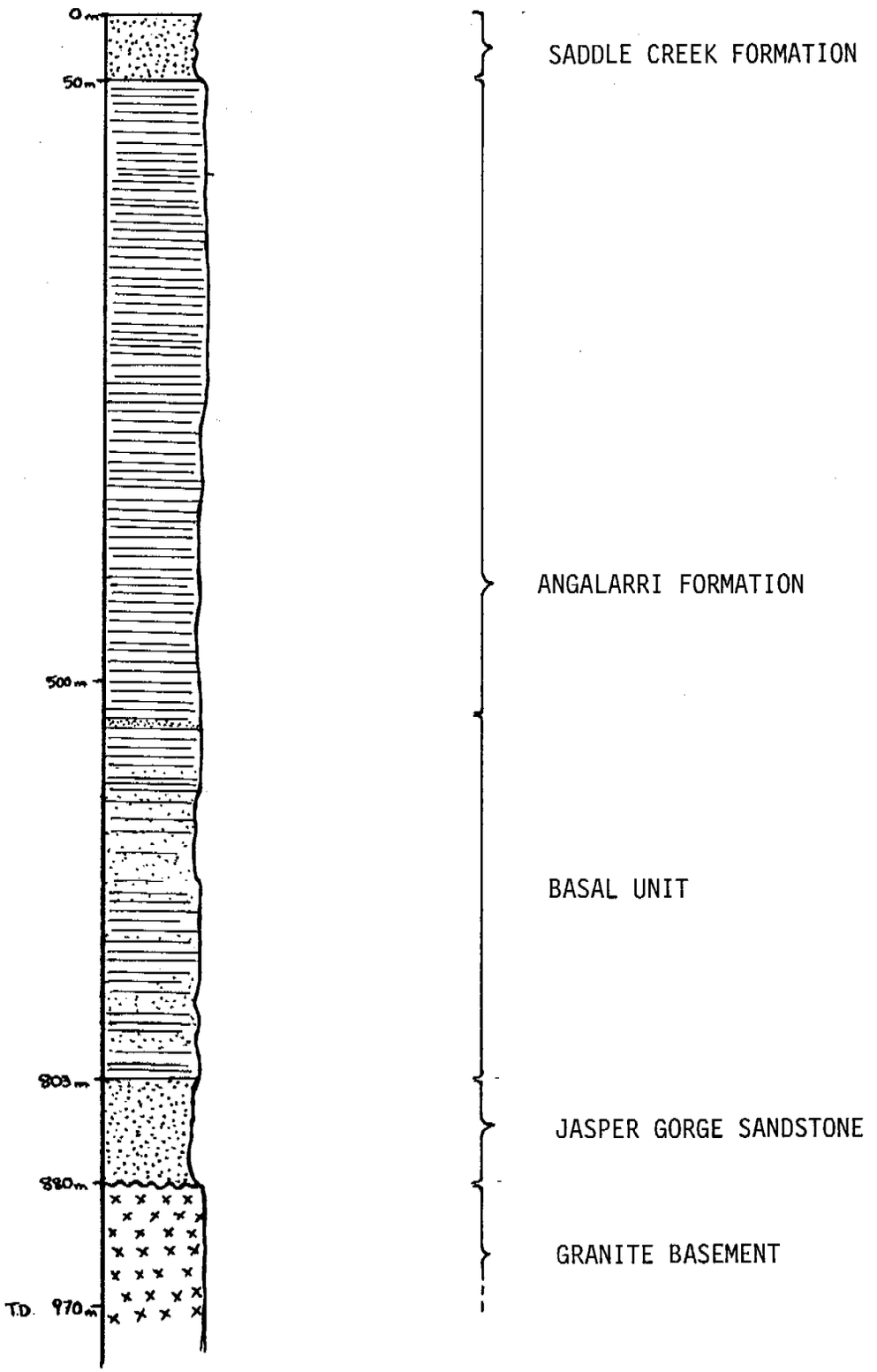
The closed structure is one of several along an ENE trend. This part of the basin is characterised by very broad open folding.

A series of closed structures are evident on air photographs. These are the result of deformation along the Halls Creek Mobile Zone to the west and along the Victoria River Fault a major high angle thrust fault to the north. The Victoria River fault formed as a response to deformation by crustal wrench tectonics along the Halls Creek Mobile Zone, a failed rift arm.

As a further response to the deformation induced by wrench faulting along the Halls Creek Zone there are a number of other high angle faults, these are both reverse and normal in nature and have created a series of folded and faulted blocks.

The drill site was located on the upthrown side of one of these blocks and on the crest of what is a large faulted dome.

SUMMARISED
STRATIGRAPHIC COLUMN.



3.3.....Description of Sedimentary Units

SADDLE CREEK FORMATION
Surface to 50 metres.

Sandstone.... Light grey fine to medium occ very fine to silty, sub round to sub angular, moderate to poorly sorted, well indurated quartz sandstone with white clay cement and siliceous matrix, no visible porosity.

ANGALARRI FORMATION.
50 to 803 metres.

Massively bedded red-brown, grey, grey-green shale and silty shale, well indurated, occasional calcite filled fractures with traces of pyrite and galena, some thin-medium interbedded red-brown and white shale and siltstone, from 460 metres trace of C1-C3 gas while drilling, very low trip and connection gas.

From 530 metres interbedded shale and ripple cross laminated/cross stratified very fine to fine light grey sandstone with thin grey shale laminae are commonly micaceous and chloritic, some contorted (slumped?) bedding planes, quartz filled fractures are pyritic.

The electric logs show a distinct break at 530m possibly indicating an unconformity that may in fact be the base of the Angalarri formation. Below this break the unit is sandier despite the baseline shift in the gamma log. Visually the core did not show as great a change as the logs indicate and the main lithology change at 803m is taken as the top of the Jasper Gorge Sandstone, and it may be that there is a seperate unit in between. For the purposes of this report it is termed the Angalarri Basal Unit.

From 680 metres increase in shale, commonly grey to grey-green, red-brown and chloritic with some thin interbedded fine light grey sandstones.

The base from 760 metres comprises ripple cross stratified fine sandstones and grey shales with ubundant trace fossils in the form of 2-5mm wide and up to 15mm deep sand filled burrows.

Formation Descriptions cont....

JASPER GORGE SANDSTONE.
803 - 880 metres

White to light grey and cream fine to medium sub-round to round moderately sorted very well indurated in part siliceous quartz-subfeldspathic sandstone, medium to thick bedded and ripple cross stratified , some siliceous bands, quartz filled fracture zones with traces of pyrite and galena, very low porosity and no permeability except in fracture zones. Rare interbedded chloritic shales and siltstones.

BASEMENT.
880 to TD 970 metres.

Light grey-cream mottled graphic granite altered and slightly deformed by metamorphic processes.

CONCLUSION....

Bullo River No.1 was the first well to expose the Victoria River Basin sediments in the sub-surface. The hydrocarbon potential was previously relatively undetermined and based on scattered reports of hydrocarbon seeps in the area.

Proterozoic rocks in the McCarther River Basin to the East are currently the target of hydrocarbon exploration and oil is produced from proterozoic age rocks (Adelaidean) in the Amadeus basin to the south and also in other parts of the world.

The section exposed was thin compared with outcropping areas to the south, where coarser sandstone units and carbonates are common below the Auvergne group.

No potential sandstone reservoirs were encountered however several fractured zones could be potential resevoirs.

The Angalarri shale units are a potential hydrocarbon source although they are now low in TOC and generally over mature with respect to hydrocar--bon generation due to burial and age. Traces of C1-C3 were recorded from 460m however.

Assuming hydrocarbons have been generated from the Angalarri shales relatively early then the sandy units in the upper Auvergne Group may be targets. Alternatively if generation was late then a fractured reservoir is a possible target for a gas reservoir. The potential for oil generation however appears to be low.

ROUTINE CORE ANALYSIS

QUEENSLAND PETROLEUM

BULLO RIVER #1

CORE LAB AUSTRALIA

HEAD OFFICE 1173 KINGSFORD SMITH DR, PINKENBA, BRISBANE, QLD 4007
TELEPHONE (07) 268 5732 260 1722 TELEX AA42513

CORE LABORATORIES AUSTRALIA (QLD.) LTD.

IAN RILEY
Regional Manager

Our Ref: QLD-CA-162

21st August, 1984

Queensland Petroleum
G.P.O. Box 1443
Brisbane Qld 4001

Attention: Mr Colin Laing

Dear Sir,

Presented here are the results of analyses performed on core from Bullo River #1. This report contains final data, an outline of analysis procedures and brief lithological descriptions.

Three samples of core were received on 8th August, 1984 from Steve Fish and analysis was to include fluid saturation, porosity and permeability and grain density determinations.

Three one inch diameter plugs were drilled with tap water and air dried prior to analysis. Fluid saturation data was telexed to Queensland Petroleum on 10th August, 1984 (tlx BO507/108) and the porosity permeability data on 21st August, 1984 (tlx BO530/122).

Should you have any queries concerning this report, please contact me in Brisbane on (07) 260-1722.

I thank you for the opportunity to provide our routine core analysis services and trust that we may be of service in the future.

Yours faithfully,
CORE LABORATORIES AUSTRALIA (QLD) LTD

Murray Helm
Laboratory Supervisor,
Brisbane, Australia
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CORE LABORATORIES
Petroleum Reservoir Engineering

COMPANY:	QLD PETROLEUM	FORMATION:		FILE:	QLD-CA-162
WELL:	BULLO RIVER #1	CORE TYPE:		DATE REPORT:	21/8/84
FIELD:		BASIN:		ANALYSTS:	MH
COUNTRY:	AUSTRALIA	STATE:	~~WA~~ N.T.	DRILLING FLUID:	

SAMPLE NO.	DEPTH METRES	KA-md	SUMMATION OF FLUIDS Ø %	SO	STW	HE INJ Ø %	GRAIN DENSITY
1	808.05	0.03	3.7	-	75.4	3.7	2.66
2	809.40	0.01	1.6	-	53.7	I.5	2.68
3	853.00	0.02	4.9	-	90.9	7.1	2.68

ROUTINE CORE ANALYSIS PROCEDURES

The data contained in the report has been derived by the following methods:

1. Helium Injection Porosity - measured by a Helium Porosimeter to determine grain volume and, consequently, pore volume. The Porosimeter is based on the Boyles Law equation of gas expansion and uses helium because of its small molecular composition and inert properties.

2. Permeability - measured by a gas permeameter to determine fluid "transmissibility". The permeameter is based on Darcy's equation for compressible fluids (gas) assuming laminar flow with air being the gas used (API RP.40).

3. Residual Fluid Content and Porosity by Summation of Fluids - measured by the conventional retort method. This involves distilling off liquids contained in samples at controlled temperatures. The gas volume of the sample is measured by mercury injection. Saturated Oil (So) and Saturated Water (Stw) are calculated as a percentage of pore space. Porosity is derived by summing the fluid volumes (oil, water and gas).

4. Grain Density - derived by measurements utilizing a mercury displacement pump to determine bulk volume, the helium porosimeter to determine grain volume and analytical balance to determine weight.

CORE LABORATORIES
Petroleum Reservoir Engineering

FILE: QLD-CA-162

LITHOLOGICAL DESCRIPTION

CORE NO: 1

SAMPLE NO.	
1	SST, wh, m text, sub ang, p srtg, hd, sl calc, carb bands.
2	SST, m gry, m text, sub rnd, p srtg, hd, non calc, sh streaks; silty mtx.
3	SST, lt gry, f text, sub rnd, m srtg, hd, sl calc.

LOG INTERPRETATION
A.C.M.LAING

Logs run by BPB Instruments include

Density/Caliper	821 - 249m
Gamma	820 - 785m and
	750 - surface
Resistivity	880 - 249m
Sonic	880 - 249m

The high bottom hole temperature of 72deg celcius was beyond the limit of 70deg celcius for BPB Instruments logging tools. Logging was therefore only carried out from 880m and even then the interval 785- 750m could not be logged with the gamma ray probe because of temperature failure.

In the log interpretation listed below, because of the partial failure of the density log the sonic log was used to calculate porosities using a matrix transit time of 19,500ft per second. The porosities thus calculated agree well with the core analysis.

The porosities were converted to formation factors using the formula $0.62/\phi^{2.15}$

Apparent water resistivity (Rwa) was obtained from the formula Rwa = Rt/F

Rt being read directly from the resistivity log.

Actual water resistivity was calculated from the ratio of the resistivity of the lowest water sample recovered from the drill stem test to the resistivity of the mud. This is assuming the 12cuft of mud and water recovered was a mixture of the 3cuft of mud below the packer and the formation water.

On this basis a Rw = 0.26 at BHT was used.

Water saturation (Sw) was calculated from the formula

$$Sw = \sqrt{Rw/Rwa}$$

Log interpretation cont.....

Depth	Sonic	Rt	Os	Fs	Rwa	Sw(%) Rw=0.26
876-880	68	40	12	70	0.57	68
853-876	62	50	8	160	0.31	92
825-853	53	180	1	10000	0.02	100
804-825	58	100	5	400	0.25	100
687-690	70	40	14	50	0.80	57
529-531	54	210	2	2400	0.09	100
522-529	60	90	6	280	0.32	90

Geochempet Services

PETROLOGICAL and GEOCHEMICAL CONSULTANTS

REGISTERED IN QUEENSLAND
Principal : A.S. Joyce B.Sc.(Hons), Ph.D.
200 Chapel Hill Road
Chapel Hill, Qld. 4069

Telephone: (07) 375 5258
A/H 378 6467

PETROLOGICAL REPORT ON TWO SAMPLES

prepared for

CHILLAGOE MINERALS

Ref: J. K. Webby

Stan Joyce

A. S. Joyce, B.Sc.(Hons), Ph.D.

21st September, 1984

SUMMARY COMMENTS

The sample 1256 shows no evidence in hand specimen or thin section to support the view that it is conglomeratic. The sample provided is graphic biotite granite which has been weakly altered and veined by sericite, then quartz and feldspar, then chlorite. Particularly the chlorite veins appear joint-controlled and overprinted by weak metamorphic foliation which is not parallel to the vein walls.

The sample 1255 is finely laminated slate and metasandstone which has experienced a very low grade form of burial metamorphism.

There is no indication that 1255 has experienced any thermal metamorphism or veining which could be attributed to a mesothermal granite such as 1256. Thus, it is concluded that if the two samples were collected close together, then they are likely to be separated by an unconformity or some other structural discontinuity.

Sample Number : 1255 722·5m RKB.

Identification : Very low grade laminated slate and metasandstone

Description :

The sample is a drill core specimen of unweathered, finely laminated medium light grey sandstone and dark grey slate. The slate layers range from a fraction of a millimetre to about 3 mm and the sandstone from less than 1 mm to 7 mm. There is low angle cross bedding in the thickest sandstone layers.

A cobaltinitrite staining test produced a diffuse reaction with sericitic slate layers but revealed no K-feldspar.

In thin section the slate layers are seen to consist of abundant sericite, aligned parallel to bedding, and minor silt-sized quartz and detrital muscovite and a few specks of probably secondary sphene. A typical mode is :

75-85%	sericite
15-20%	quartz silt
1-5%	detrital muscovite
0.1-0.2%	sphene

The sandstone layers contain well sorted, subrounded grains of unstrained to faintly strained quartz and feldspar (commonly altered to sericite, but with some plagioclase surviving) and a few detrital muscovite flakes and small opaque grains. There is a sericitic matrix and minor secondary sphene. Within one of the layers of coarsest grainsize (0.15 mm) there is a major cement of calcite and it replaces former feldspar clasts. A similar cement occurs patchily in some other layers. Modal variation overall is about :

50-70%	quartz
1-35%	sericite after feldspar
0-2%	residual plagioclase
1-3%	detrital muscovite
trace	opaque oxides
0.1-0.2%	sphene
0-10%	sericitie matrix or cement
0-40%	calcite cement and replacements

Comments and Interpretations :

The sample consists of finely laminated slate and meta-sandstone. There has been little modification of the sedimentary textures and metamorphism has been restricted to converting feldspar and clay-sized components to sericite and generating traces of fine sphene. There is no indication of hornfelsing and no indication of dynamothermal metamorphism. Thus the metamorphic adjustments are considered to be products of very low grade burial metamorphism.

Sample Number : 1256 931.25m RKB.

Identification : Graphic granite with weak alteration and veining

Description :

The sample is an unweathered drill core sample of light grey granitoid rock speckled with a few greenish yellow altered mineral grains and cut by a rhombic pattern of sheared greenish grey fractures.

A cobaltinitrite staining test revealed abundant K-feldspar with graphic granitoid textures.

In thin section this sample plainly displays the textures of a graphic granite with grainsizes commonly of 0.5 to 5 mm.

The major minerals are weakly strained quartz and microperthitic microcline, generally locked in complex graphic intergrowths. Plagioclase is present in low abundance and typically heavily replaced or totally pseudomorphed by sericite (greenish yellow in hand specimen). Former biotite grains have been pseudomorphed by chlorite and minor sphene. There are a few leucoxene aggregates after opaques.

There are a few contorted fine veinlets or sericite and rare patches of calcite. Straighter thin veinlets carry quartz and feldspar. Later veins varry chlorite; they are fissure veins and display metamorphic foliation not parallel to their walls.

An approximate mode is :

35-40%	quartz
50-60%	microcline
5-10%	sericite after plagioclase, along with minor residual plagioclase
1-2%	chlorite-sphene after biotite
0.1-0.3%	leucoxene after opaques
0.3-0.4%	sericite in veinlets
0.2-0.3%	quartz and feldspar in veinlets
0.3-0.4%	chlorite inpre-metamorphic veins

Comments and Interpretations :

This sample is a graphic granite of probable mesozonal type. It was quite leucocratic and consisted of quartz, microcline, minor plagioclase and small amounts of biotite and probably ilmenite. Plagioclase has been finely sericitized and veinlets of sericite, quartz and feldspar and chlorite have been generated, quite possibly by incipient metamorphic processes which were capable of creating minor crenulation of veins and alignment of chlorite, but without seriously shearing the bulk rock. The chlorite veins appear to reflect a jointing pattern.

The Australian Mineral Development Laboratories

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Please address all correspondence to
P.O. Box 114 Eastwood
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In reply quote:

4 October 1984

3/0/0 F1197/85

Queensland Petroleum Pty. Ltd.,
GPO Box 1443
BRISBANE QLD 4001

Attention: Mr A C Laing

REPORT: F1197/85

YOUR REFERENCE:	Letter from J. K. Webby 10 September 1984
TITLE:	Preliminary source rock analysis of five core samples from Bullo River-1, OP-225, Bonaparte Basin
MATERIAL:	Core
LOCALITY:	BULLO RIVER-1
SAMPLE IDENTIFICATION:	Proterozoic, 503.15-880.0 m depth.
DATE RECEIVED:	12 September 1984
WORK REQUIRED:	Total organic carbon. Rock-Eval pyrolysis. Interpretation

Investigation & Report by: Dr David M McKirdy

Chief, Fuels Section: Dr Brian G Steveson

Brian G Steveson

for Dr William G Spencer
Manager
Mineral & Material Sciences Division

sj

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PRELIMINARY SOURCE ROCK ANALYSIS OF FIVE CORE SAMPLES FROM BULLO RIVER-1, OP-225, BONAPARTE BASIN

Queensland Petroleum Pty. Ltd.

F3/0/0 - 1197 October 1984

1. INTRODUCTION

Five core samples from 503-880 metres depth in the Proterozoic section penetrated by Bullo River-1 were received for total organic carbon analysis and Rock-Eval pyrolysis. The results of this work were phoned to the client on 1 October 1984.

2. ANALYTICAL PROCEDURE

2.1 Total Organic Carbon (TOC)

Total organic carbon was determined by digestion of a known weight (0.2 - 0.5 g) of powdered rock in 50% HCl to remove carbonates, followed by combustion in oxygen in the induction furnace of a Leco IR-12 Carbon Determinator and measurement of the resultant CO_2 by infra-red detection.

2.2 Rock-Eval Analysis

A 100 mg portion of powdered rock was analysed by the Rock-Eval pyrolysis technique (Girdel IFP-Fina Mark 2 instrument; operating mode, Cycle 1).

3. RESULTS

TOC and Rock-Eval data for Bullo River-1 are listed in Table 1.

4. DISCUSSION

4.1 Maturity

Small, ill-defined S_2 peaks in the pyrograms of the two samples selected for Rock-Eval analysis preclude quantitative assessment of their maturity. However, both these samples appear to be over-mature with respect to hydrocarbon generation.

4.2 Source Richness

With one exception, the TOC values of these cores are less than the minimum values considered necessary for the genesis of producible hydrocarbons (viz. shale, 0.5%TOC; carbonate, 0.3%TOC).

The source richness of core from 880.0 metres depth is extremely low (S_1S_2<0.1 kg hydrocarbons/tonne rock) and indicative of a poor gas-prone source bed.

4.3 Source Quality

Hydrogen indices are very low (HI $\leq$ 25) consistent with the previously inferred over-mature, gas-prone character of the kerogen.

5. CONCLUSION

Proterozoic rocks from 503-880 metres depth in Bullo River-1 contain small concentrations (TOC $\leq$ 0.5%) of (?) over-mature, gas-prone organic matter.

TABLE 1: TOC AND ROCK-EVAL DATA ON PROTEROZOIC SEQUENCE IN BULLO RIVER-1

Depth m	Tmax	S_1	S_2	S_3	S_1+S_2	PI	S_2/S_3	PC	TOC	HI	OI
503.15									0.03		
575.50									0.06		
598.80									0.13		
603.00	*428	0.01	0.03	0.13	0.04	0.25	0.23	0.00	0.12	25	108
880.00	*366	0.02	0.93	0.08	0.05	0.50	0.37	0.00	0.50	6	16

* Unreliable; S_2 peak too small for accurate measurement

KEY TO ROCK-EVAL PYROLYSIS DATA SHEET

PARAMETER		SPECIFICITY
T max	position of S_2 peak in temperature program (^oC)	Maturity/Kerogen type
S_1	kg hydrocarbons (extractable)/tonne rock	Kerogen type/Maturity/Migrated oil
S_2	kg hydrocarbons (kerogen pyrolysate)/tonne rock	Kerogen type/Maturity
S_3	kg CO_2 (organic)/tonne rock	Kerogen type/Maturity *
$S_1 + S_2$	Potential Yield	Organic richness/Kerogen type
PI	Production Index ($S_1/S_1 + S_2$)	Maturity/Migrated Oil
PC	Pyrolysable Carbon (wt. percent)	Organic richness/Kerogen type/Maturity
TOC	Total Organic Carbon (wt. percent)	Organic richness
HI	Hydrogen Index (mg h'c (S_2)/g TOC)	Kerogen type/Maturity
OI	Oxygen Index (mg CO_2(S_3)/g TOC)	Kerogen type/Maturity *

*Also subject to interference by CO_2 from decomposition of carbonate minerals.

Australian Laboratory Services PTY. LTD.

Incorporated in Queensland

CONSULTING ANALYTICAL CHEMISTS

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Everton Park, Q. 4053
Phone: (07) 352 5577
Telex: ALSEV 42344

LABORATORY REPORT

RECEIVED
01 OCT 1984
Ans'd

t: CHILLAGOE MINERALS LIMITED
ddress: G.P.O. BOX 1433
BRISBANE Q. 4001

Batch Number: J042

ontact: MR. COLIN LAING

der No. S.F.F. 7/9/84 Sample Type: WATER + MUD

No. of Samples: 1
Date Received: 07/09/84
Date Completed: 28/09/84

METHOD CODE	ANALYSIS DESCRIPTION	SAMPLE NUMBER BULLO RIVER NO.1	
W628-A	T.D.S.-Elect.Conductivity	14850	mg/l
W606	CHLORIDE - Cl-	5150	mg/l
W603	BI-CARBONATE HCO3- mg/l CaCO3	520	mg/l
W611-A	METAL IONS - Ca	132	mg/l
W611-B	METAL IONS - Mg	5.04	mg/l
W611-D	METAL IONS - K	5290	mg/l
W611-C	METAL IONS - Na	510	mg/l

omments:

Signatory: G J Kilmister

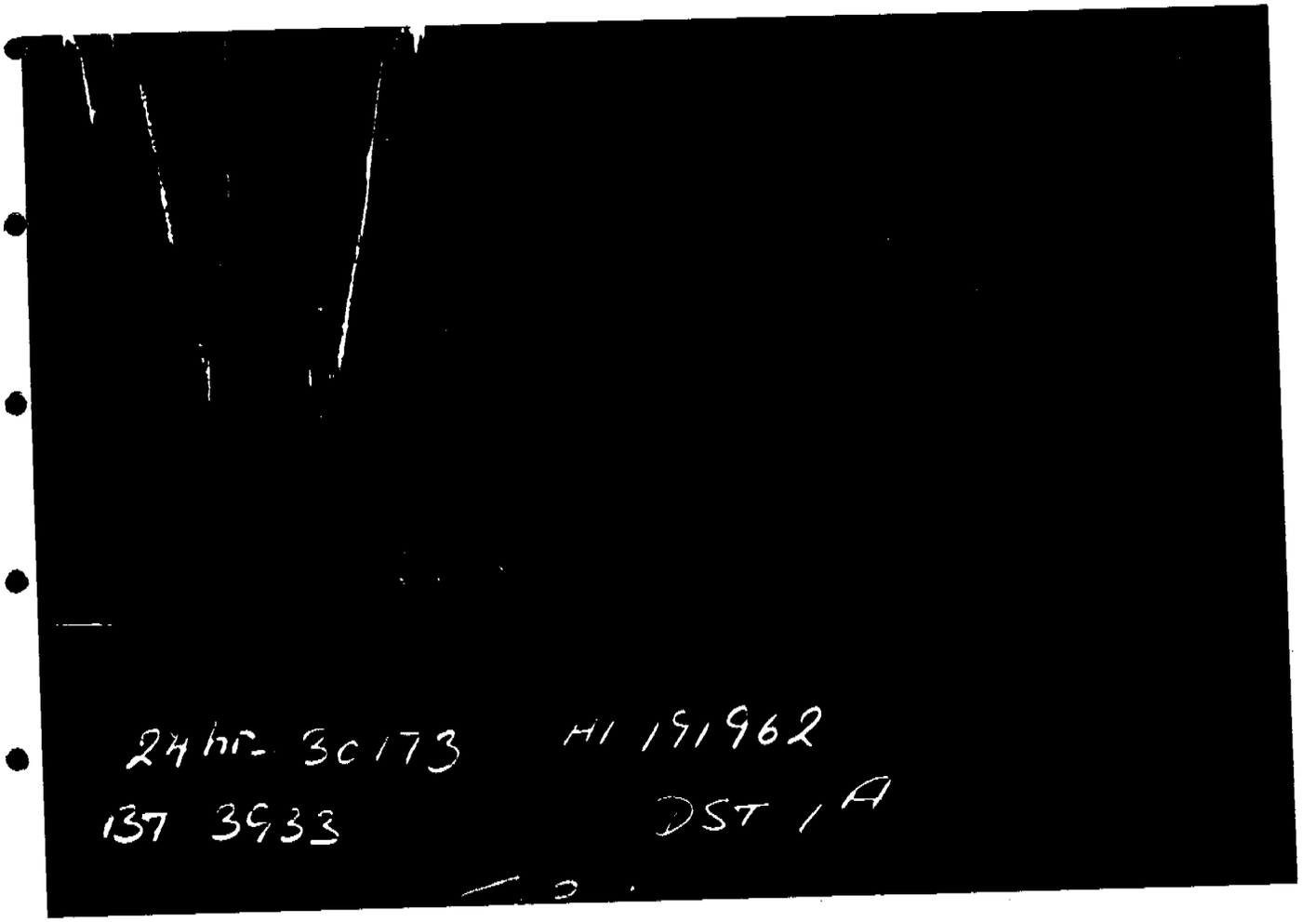
HALLIBURTON
SERVICES

TICKET NO. 19196200
28-AUG-84
PERTH

FORMATION TESTING SERVICE REPORT

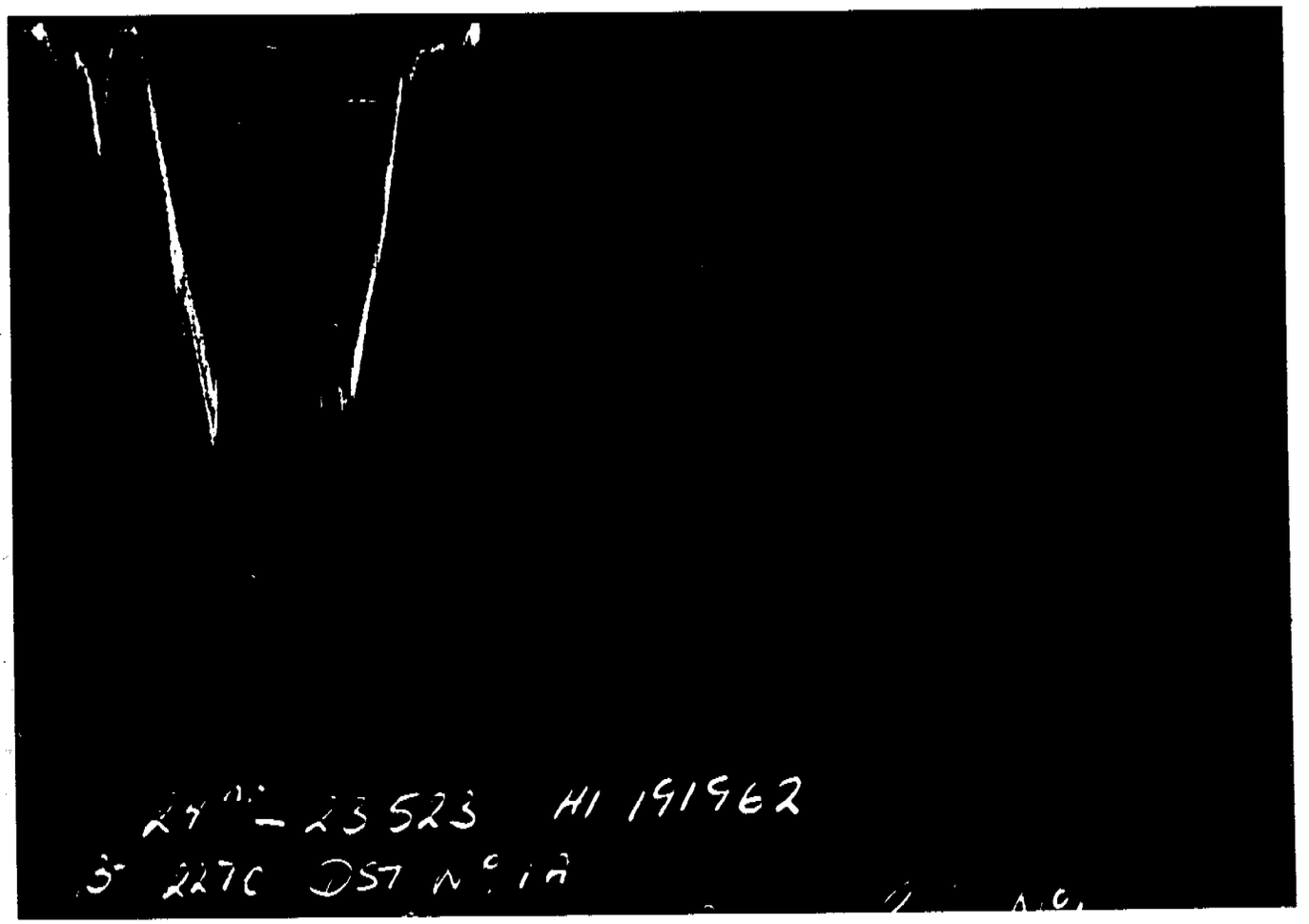
LEGAL LOCATION SEC. - TWP. - RNG.	WELL NO.	TEST NO.	TESTED INTERVAL	LEASE OWNER/COMPANY NAME
OP 225 P				
FIELD AREA	COUNTY		STATE	
DARWIN	NTHN. TERRITORY		AUSTRALIA SM	

LEASE NAME



GAUGE NO: 3933 DEPTH: 2616.6 BLANKED OFF: NO HOUR OF CLOCK: 24

ID	DESCRIPTION	PRESSURE		TIME		TYPE
		REPORTED	CALCULATED	REPORTED	CALCULATED	
A	INITIAL HYDROSTATIC	1180	1189.5			
B	INITIAL FIRST FLOW	32	35.9	37.0	34.9	F
C	FINAL FIRST FLOW	69	71.3			
C	INITIAL FIRST CLOSED-IN	69	71.3	60.0	62.1	C
D	FINAL FIRST CLOSED-IN	951	961.7			
E	FINAL HYDROSTATIC	1180	1185.9			



GAUGE NO: 2270 DEPTH: 2752.2 BLANKED OFF: YES HOUR OF CLOCK: 24

ID	DESCRIPTION	PRESSURE		TIME		TYPE
		REPORTED	CALCULATED	REPORTED	CALCULATED	
A	INITIAL HYDROSTATIC	1244	1249.6			
B	INITIAL FIRST FLOW	94	95.9	37.0	34.9	F
C	FINAL FIRST FLOW	128	128.9			
C	INITIAL FIRST CLOSED-IN	128	128.9	60.0	62.1	C
D	FINAL FIRST CLOSED-IN	1013	1016.9			
E	FINAL HYDROSTATIC	1240	1247.5			

EQUIPMENT & HOLE DATA

FORMATION TESTED: _____
NET PAY (ft): _____
GROSS TESTED FOOTAGE: 130.9
ALL DEPTHS MEASURED FROM: ROTARY TABLE
CASING PERFS. (ft): _____
HOLE OR CASING SIZE (in): 4.330
ELEVATION (ft): 0
TOTAL DEPTH (ft): 2755.9
PACKER DEPTH(S) (ft): 2625
FINAL SURFACE CHOKE (in): 0.375
BOTTOM HOLE CHOKE (in): _____
MUD WEIGHT (lb/gal): 8.80
MUD VISCOSITY (sec): _____
ESTIMATED HOLE TEMP. (°F): _____
ACTUAL HOLE TEMP. (°F): 155 @ 2755.9 ft

TICKET NUMBER: 19196200

DATE: 8-9-84 TEST NO: 1-A

TYPE DST: OPEN HOLE

HALLIBURTON CAMP: PERTH

TESTER: P. SMITH

WITNESS: H. HERRIOT

DRILLING CONTRACTOR: ROCKDRILL 20

FLUID PROPERTIES FOR RECOVERED MUD & WATER

SOURCE	RESISTIVITY	CHLORIDES
	@ °F	ppm
	@ °F	ppm
	@ °F	ppm
	@ °F	ppm
	@ °F	ppm
	@ °F	ppm

SAMPLER DATA

Psig AT SURFACE: _____
cu.ft. OF GAS: _____
cc OF OIL: _____
cc OF WATER: _____
cc OF MUD: _____
TOTAL LIQUID cc: _____

HYDROCARBON PROPERTIES

OIL GRAVITY (°API): _____ @ °F
GAS/OIL RATIO (cu.ft. per bbl): _____
GAS GRAVITY: _____

CUSHION DATA

TYPE	AMOUNT	WEIGHT

RECOVERED:

256 FEET OF WATER CONTAMINATED MUD

MEASURED FROM TESTER VALVE

REMARKS:

TEST DATE IS 9 AUGUST, 84.

TOOL STRING REPORTED AS SHOWN.

TICKET NO: 19196200	GAUGE NO: 3933
CLOCK NO: 30173 HOUR: 24	DEPTH: 2616.6

HALLIBURTON SERVICES

FIRST FLOW

REF		MINUTES	PRESSURE	ΔP	$\frac{t \times \Delta t}{t+\Delta t}$	$\log \frac{t+\Delta t}{\Delta t}$
B	1	0.0	35.9			
	2	6.0	40.4	4.5		
	3	12.0	47.3	6.9		
	4	18.0	53.7	6.4		
	5	24.0	60.3	6.6		
	6	30.0	65.9	5.6		
C	7	34.9	71.3	5.4		

FIRST CLOSED-IN

REF		MINUTES	PRESSURE	ΔP	$\frac{t \times \Delta t}{t+\Delta t}$	$\log \frac{t+\Delta t}{\Delta t}$
C	1	0.0	71.3			
	2	5.0	417.8	346.5	4.4	0.904
	3	10.0	634.0	562.7	7.8	0.653
	4	15.0	696.3	625.0	10.5	0.523
	5	20.0	749.8	678.4	12.7	0.438
	6	25.0	788.1	716.8	14.6	0.380
	7	30.0	825.5	754.2	16.1	0.335
	8	35.0	855.9	784.6	17.5	0.300
	9	40.0	884.9	813.5	18.6	0.272
	10	45.0	907.0	835.7	19.6	0.249
	11	50.0	925.4	854.1	20.5	0.230
	12	55.0	942.5	871.2	21.3	0.213
D	13	62.1	961.7	890.4	22.3	0.194

REF	MINUTES	PRESSURE	ΔP	$\frac{t \times \Delta t}{t+\Delta t}$	$\log \frac{t+\Delta t}{\Delta t}$

REMARKS:

TICKET NO: 19196200	GAUGE NO: 2270
CLOCK NO: 23522 HOUR: 24	DEPTH: 2752.2

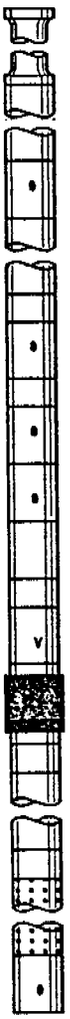
HALLIBURTON SERVICES

REF		MINUTES	PRESSURE	ΔP	$\frac{t \times \Delta t}{t+\Delta t}$	$\log \frac{t+\Delta t}{\Delta t}$
			FIRST FLOW			
B	1	0.0	95.9			
	2	6.0	99.3	3.4		
	3	12.0	105.3	6.0		
	4	18.0	111.3	6.0		
	5	24.0	116.9	5.6		
	6	30.0	122.5	5.5		
C	7	34.9	128.9	6.4		
			FIRST CLOSED-IN			
C	1	0.0	128.9			
	2	5.0	418.1	289.3	4.4	0.901
	3	10.0	659.5	530.6	7.8	0.653
	4	15.0	728.7	599.9	10.5	0.522
	5	20.0	781.5	652.6	12.7	0.439
	6	25.0	830.8	702.0	14.6	0.379
	7	30.0	866.6	737.7	16.1	0.335
	8	35.0	901.2	772.3	17.5	0.300
	9	40.0	929.2	800.4	18.6	0.272
	10	45.0	952.8	824.0	19.7	0.249
	11	50.0	976.3	847.4	20.5	0.230
	12	55.0	997.1	868.2	21.3	0.213
D	13	62.1	1016.9	888.1	22.3	0.194

REF	MINUTES	PRESSURE	ΔP	$\frac{t \times \Delta t}{t+\Delta t}$	$\log \frac{t+\Delta t}{\Delta t}$

REMARKS:

TICKET NO. 19196200



		O.D.	I.D.	LENGTH	DEPTH
1	DRILL PIPE.....			2347.0	
3	DRILL COLLARS.....			196.9	
50	IMPACT REVERSING SUB.....	3.625	1.750	1.0	2542.2
3	DRILL COLLARS.....			59.0	
5	CROSSOVER.....	3.625		0.9	
13	DUAL CIP SAMPLER.....	3.000		5.5	
5	CROSSOVER.....	3.000	1.625	0.7	
60	HYDROSPRING TESTER.....	3.000		4.4	2612.0
32	LOCKED OPEN BYPASS.....	3.000		2.2	
80	AP RUNNING CASE.....	3.000		4.7	2616.6
5	CROSSOVER.....	3.000	1.000	0.3	
16	VR SAFETY JOINT.....	3.000	0.500	2.7	
70	OPEN HOLE PACKER.....	3.625		2.7	2625.0
5	CROSSOVER.....	3.625	1.250	0.7	
3	DRILL COLLARS.....			98.4	
5	CROSSOVER.....	3.750	1.250	0.7	
20	FLUSH JOINT ANCHOR.....	3.000		25.0	
81	BLANKED-OFF RUNNING CASE.....	3.000		5.7	2752.2
	TOTAL DEPTH				2755.9

EQUIPMENT DATA

TYPE & SIZE MEASURING DEVICE: 6" CERAMIC CHOKE | TICKET NO: 19196200

TIME	CHOKE SIZE	SURFACE PRESSURE PSI	GAS RATE MCF	LIQUID RATE BPD	REMARKS
8-9-84					
1330					MADE UP TOOLS AND RAN IN HOLE.
1405					RAN IN HOLE
					TRIPPED OUT TO CHANGE PACKER
					DEPTH.
					RAN IN HOLE.
1700					RIGGED UP AND TAGGED BOTTOM
1720					OPENED TOOL
1720					INDICATION TOOL IS OPEN
1725					NO BUBBLES
1730					NO BUBBLES
1735					WEAK BLOW
1740					WEAK BLOW
1745					WEAK BLOW
1750					WEAK BLOW
1757					CLOSED TOOL
1857					UNSEATED PACKER AND PULLED
					PIPE WET.
2040					FLUID AT SURFACE, 256' TO
					HYDROSPRING.
2200					TOOLS OUT OF HOLE.