

2 GEOLOGICAL DATA

2.1 Geological Summary

Mason 1 was designed to test a structural closure approximately 7km north north-west of Jamison 1 which recovered very small amounts of oil and gas on drill stem test. The well's primary objective was the "Jamison Sandstone" (formerly termed Bukalorkmi Sandstone) from which minor amounts of oil and gas were recovered in Jamison 1. A secondary objective existed within the sands of the lower part of the "Hayfield Mudstone" (formerly termed Chambers River Formation) one of which flowed minor amounts of gas in Jamison 1.

The well spudded in unconsolidated to poorly consolidated clays, silts and minor sands, believed to be of Cretaceous and Tertiary age, which persisted to a depth of 63.2m. The well then intersected a sequence of interbedded siltstones, limestones and medium to coarse sandstones believed to be the Cambrian Jinduckin Formation. While drilling the Jinduckin Formation total circulation losses were encountered in a flaggy limestone interbed at 98m. From here the well was drilled without returns to the 9 5/8 inch casing point at 517 metres (Driller). Interpretation of the electric logs indicates the well intersected the Tindall Limestone at 121.5 metres, the Antrim Plateau Volcanics at 346m and the "Hayfield Mudstone" at 472.3 metres. A Cambrian sand, probably a correlative of the the Bukalara Sandstone, was prognosed below the Antrim Plateau Volcanics, but based upon gamma ray log interpretation is thought to be absent in Mason 1.

Upon drilling out the 9 5/8 inch casing shoe, Mason 1 intersected a predominantly green grey claystone and siltstone sequence with laminated very fine sandstones of the "Hayfield Mudstone". Minor amounts of dolostone were intersected between 601m (Driller) and 628.5m (Driller) and siderite at 700 metres (Driller). At 808.3 metres the well intersected the very fine to fine grained quartz sands of the 3 metre thick "Lower Hayfield Sand" which was found to exhibit moderate hydrocarbon fluorescence and elevated gas readings. A closed chamber DST over this sand failed to flow significant volumes of fluid, although a small flow of gas is indicated from the surface pressure data.

Drilling recommenced in the claystone dominant "Hayfield Mudstone" which exhibited an increasing fine grained sand content below 862m indicative of a gradual interfingering into the underlying "Jamison Sandstone" which was intersected at 876.5m. The "Jamison Sandstone" can be subdivided into an upper facies between 876.5m and 900m which is made up of interbedded

fine to very fine sandstones, a middle facies between 900m and 921.5m comprising fine to coarse quartz sandstone, and a lower facies between 921.5m and 973.7m which is dominated by very fine to fine grained sandstone. DST 2 was conducted in response to moderate hydrocarbon fluorescence between 900m (Driller) and 902.9m (Driller) but failed to flow significant volumes of fluid although a thin film of oil emulsion was observed on the test tool.

Below the "Jamison Sandstone" Mason 1 passed sharply into a claystone dominated sequence with very occasional siltstone interbeds below 973.7m. The claystone unit is thought to correlate with the Proterozoic Kyalla Member of the McMinn Formation of the upper Roper Group recorded in wells to the north of EP18.

The well reached a total depth of 1106m (1103m Driller) in claystones of the Kyalla Member.

2.2 Well Objectives and Performance

Mason 1 was designed to test a structural closure 7km north-north west of Jamison 1. The failure of the well to flow significant volumes of hydrocarbon on DST was an obvious disappointment casting doubt over the structural integrity of the prospect.

Overall the well came in within expectations down to the base of the Antrim Plateau Volcanics. Below the volcanics the "Cambrian Sandstone" seen in Jamison 1 is interpreted to be absent, although it should be noted that this section of the well was drilled without returns and the presence or absence of this sand can only be deduced by correlating the gamma ray log with near by wells. Below the Antrim Plateau Volcanics the well passed into the claystones and siltstones of the "Hayfield Mudstone" which was found to occur 90m low to prognosis and 2m to 3m low to Jamison 1. The section drilled from the top of the "Hayfield Mudstone" to total depth bore a striking resemblance to the section previously encountered in Jamison 1 with even quite subtle features such as the carbonate stringers and red mudstones of the "Hayfield Mudstone" being correlatable between two wells.

The observation that the well was approximately 90m low to prognosis at the top "Jamison Sandstone" level indicates a questionable seismic interpretation over the prospect. A post drilling review of the seismic has indicated a poor stack response as a result of unpredicted velocity variations within the Cambrian section. This poor stack response resulted in the wrong reflector being mapped over the prospect. The post drilling review has determined that it should be

possible to predict these near surface velocity variations using three layer refraction statics and hence improve the stack response of the section. This should result in a more reliable interpretation.

At this point in time the seismic at **Mason 1** is being reprocessed to incorporate three layer refraction statics. Until this work is complete the structural integrity of the feature drilled by **Mason 1** cannot be determined, and conclusions as to the relative absence of hydrocarbon cannot be drawn.

An unconformity is believed to exist at the base of the "Jamison Sandstone". The FMS image over this boundary does not indicate an unconformity surface, however there is approximately 0.5m of section missing from the top of the McMinn Formation in **Mason 1** when compared to **Jamison 1**.

2.3 Stratigraphy

Appendix 9 contains a full description of cuttings and core chips from **Mason 1**. The description also includes a record of mud gas readings and observed fluorescence. A comparison of the intersected formations against those prognosed is shown in Figure 7 (PetNTcw 4489-R) while Figure 8 (PetNTcw 4682) illustrates the section drilled in **Mason 1** compared to **Jamison 1**.

Undifferentiated (Tertiary/Cretaceous)

Surface to 63.2m (58.5m thick)

White, grey and orange pink and yellow orange claystone with common iron staining and occasional uncemented medium to coarse grained sand grains increasing towards the base of unit.

Jinduckin Formation (Cambrian)

63.2 to 121.5m (58.3m thick)

Thinly bedded moderate yellow brown and dark red siltstone and very pale orange to grey orange crystalline limestone.

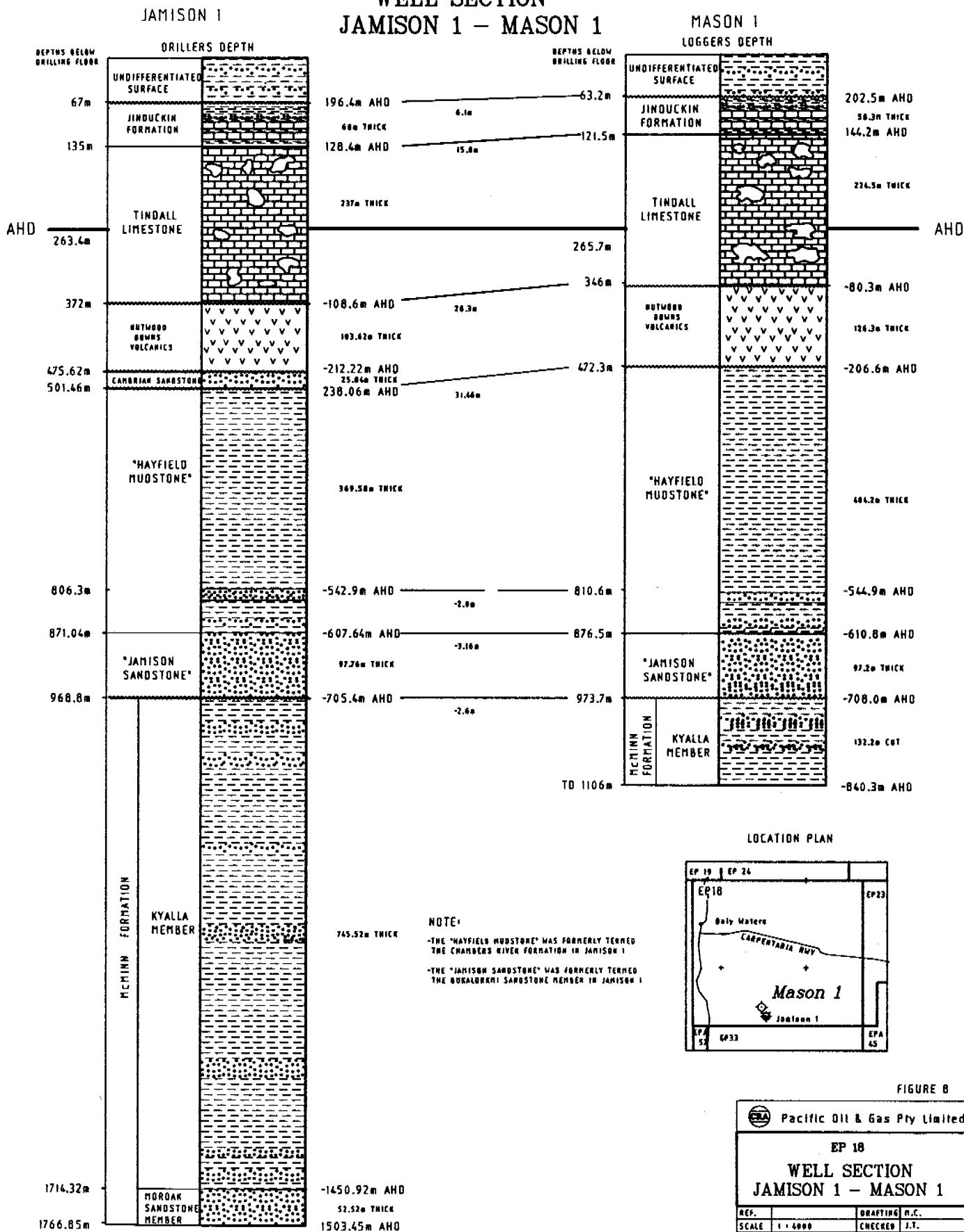
Tindall Limestone (Cambrian)

121.5 to 346m (224.5m thick)

This formation was drilled without returns. From nearby wells the Tindall Limestone comprise off-white to light grey and locally brown/orange fine to coarse crystalline limestone.

EP 18

WELL SECTION JAMISON 1 - MASON 1



NOTE:
 -THE "HAYFIELD MUDSTONE" WAS FORMERLY TERMED THE CHAMBERS RIVER FORMATION IN JAMISON 1
 -THE "JAMISON SANDSTONE" WAS FORMERLY TERMED THE BUKALUBRI SANDSTONE MEMBER IN JAMISON 1

LOCATION PLAN

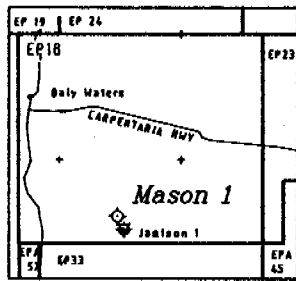


FIGURE B

Pacific Oil & Gas Pty Limited	
EP 18 WELL SECTION JAMISON 1 - MASON 1	
REF.	DRAFTING D.C.
SCALE 1:4000	CHECKED J.T.
AUTHOR J.T.	REPORT 304567
DATE JAN. '92	PLAN No. PAINTCw6082

Antrim Plateau Volcanics (Cambrian)

346 to 472.3m (126.3m thick)

This formation was drilled without returns. From nearby wells the Antrim Plateau Volcanics comprise dark greenish to brownish grey, fine to occasionally coarse-grained crystalline basalt. Locally altered and vuggy.

"Hayfield Mudstone" (Proterozoic)

472.3 to 876.5m (404.2m thick)

472.3 to 810.6m. Green grey to dark green grey and occasionally red brown and light grey to medium grey claystones with minor interbedded medium dark grey siltstone and light grey to green grey very fine sandstone increasing in abundance towards the base of the unit. Occasional dolostone beds between 600 and 629 metres and a siderite bed at 700 metres.

810.6 to 815.7m. Very fine to fine grained light grey sandstone. Moderately well sorted, sub-rounded with common clay matrix and quartz cement with increasing medium light grey siltstone and dark grey claystone interbeds and laminae towards the base of unit.

815.7 to 876.5m. Dark green grey to medium dark grey, occasionally dusky red claystone with minor interbeds of light grey very fine grained sandstone and light grey siltstone.

"Jamison Sandstone"

876.5 to 973.7m (97.2m thick)

876.5 to 900m. Interbedded medium light grey to very light grey, fine and very fine grained sandstone. Well sorted, sub-rounded with a common clay matrix and quartz cement.

900 to 921m. Very light grey to yellow grey, medium to occasionally coarse grained sandstone. Moderately well sorted sub-angular to sub-rounded with minor clay matrix and abundant quartz cement. Individual quartz grains are clear to translucent.

921.5 to 973.7m. Yellow grey occasionally very light grey, very fine to fine grained sandstone. Moderately well sorted, sub-rounded, with common clay matrix and quartz cement.

Kyalla Member of the McMinn Formation

973.7 to 1106m Total Depth (132.3m cut).

Interbedded light blue grey to medium dark grey claystone and medium dark grey to dark grey siltstone.

2.4 Mud Logging

Mud logging services were provided by Halliburton Geodata. Their personnel were responsible for the collection of cuttings samples every 3m, or more frequently as directed by the wellsite geologist. Each sample was lightly washed and dried, evaluated for hydrocarbons and described. Rate of penetration, total gas, gas chromatography, pump strokes, calcimetry, and H₂S concentration were monitored and plotted on a continuous mud log at a scale of 1:500. A copy of the mud log is included in this report as Enclosure 1 (PetNTcw4613). Geodata personnel also assisted Pacific staff in the recovery, handling and dispatch of core.

2.4.1 Cuttings Samples

Lightly washed and dried cuttings samples were collected over 3 metre intervals throughout those zones where circulation was maintained. Each sample was divided into two with one sample being sent to the Northern Territory Department of Mines and Energy and the other being stored at Pacific Oil & Gas Pty Limited's Box Hill office. A small portion of each cutting sample was placed in a samplex tray which was also retained by Pacific Oil & Gas.

2.4.2 Core Samples

Three cores were cut in Mason 1. Each of these cores was recovered in a fibreglass core tube, cut into one metre lengths, sealed and dispatched to the core laboratory. Chip samples were taken from each one metre cut in the fibreglass tube and are stored with the cuttings samplex trays. At the time of writing this report the core was in the sole possession of Pacific Oil & Gas.

2.5 Geophysical Logs

2.5.1 Wireline Logging

After drilling the 12½ inch hole to 517m (Driller) three attempts were made to obtain electric log data. On the first attempt the Dual Induction and Gamma Ray tools were combined and run in the hole until becoming held up at 112m. The logging tools were recovered and the hole reamed out to 517m. The Borehole Compensated Sonic and Gamma Ray tools were made up and run in the hole, again becoming stuck at 112m. The hole was again reamed to bottom this time using a stiffer

bottom hole assembly and a final attempt made to run the Dual Induction, Borehole Compensated Sonic and Gamma Ray logs. After trying several combinations of centralizer and stand off arrangements, finally removing them all, the tool was run becoming stuck at 112m, 123m, 150m and finally at 247m. The hole was then logged with the tool becoming jammed, probably on a ledge, in the limestone at 147m (Top of tool at 128m). The tool was finally freed after several hours, without recourse to fishing. At this point a decision was made to abandon the intermediate logging suite. The DIL-BHC-GR log from 247 metres to 147 metres is included in this report as Enclosure 2 (PetNTcw4614).

After reaching total depth the hole was circulated clean and the following suite of wireline logs run:-

DLL-MSFL-BHC-SP-GR-CAL	from 1104 to 514m (GR to Surface)
LDL-CNL-NGS	from 1104 to 514m
FMS-GR	from 1070 to 770m.

The DLL-MSFL-BHC-SP-GR-CAL log is included in this report as Enclosure 3 (PetNTcw4615). The LDL-CNL-NGS log is included in this report as Enclosure 4 (PetNTcw4616). A Mean Square Dip computation based on the FMS data is included in this report as Enclosure 5 (PetNTcw4617).

2.5.2 Bottom Hole Temperature

Bottom hole temperatures were recorded on the three total depth logging runs. Using the temperature data recorded from the BHC-DLL-MSFL-GR-SP and the LDL-CNL-NGS logs gives an extrapolated bottom hole temperature of 60.6°C at 1106m. Assuming a 25°C surface temperature this equates to a geothermal gradient of 32.2 degrees celcius per kilometre.

The maximum recorded temperature obtained while running the FMS-GR log is anomalously high at 60.56°C and may indicate a slightly higher bottom hole temperature and hence geothermal gradient than stated above.

TABLE 4

CORE ANALYSIS RESULTS

MASON 1

CRAE SAMPLE NO.	DEPTH (m)	PERMEABILITY (HORIZONTAL) Kair md	POROSITY (HELIUM) %	SATURATION		GRAIN DENSITY gm/cc
				(PORE VOLUME)		
				OIL %	WATER %	
C O R E 1						
3229478	809.50	0.01	6.1	27.2	30.4	2.89
3229479	810.10	0.21	16.2	17.1	51.1	2.69
3229480	810.75	2.25	9.1	14.1	74.3	2.70
3229481	811.60	0.12	11.6	13.6	55.8	2.70
3229482	811.90	0.07	10.8	18.6	46.1	2.68
3229484	812.35	0.05	12.9	31.5	50.3	2.62
3229485	812.75	0.02	6.4	37.9	49.4	2.82
3229483	815.20	0.71	10.9	0.0	94.6	2.75
C O R E 2						
3229486	876.20	0.04	16.0	0.0	79.5	2.66
3229487	876.90	0.01	12.8	0.0	88.4	2.65
3229488	879.60	<.01	8.0	0.0	88.7	2.66
3229489	880.27	<.01	4.5	0.0	63.6	2.66
3229490	881.46	0.04	13.3	0.0	89.3	2.66
3229491	883.80	0.20	16.1	5.6	91.9	2.63
C O R E 3						
3229492	894.90	<.01	7.7	0.0	87.5	2.65
3229493	896.20	0.26	11.9	0.0	87.4	2.64
3229494	897.30	0.01	10.4	0.0	84.6	2.65
3229495	898.10	0.29	5.1	34.8	46.5	2.67
3229496	898.40	11.3	8.6	4.2	63.5	2.65
3229497	898.76	0.33	12.1	0.0	85.7	2.65
3229498	899.60	0.01	9.2	0.0	72.2	2.65
3229499	901.10	0.34	8.6	3.2	84.8	2.65
2955259	902.10	0.09	12.9	0.0	82.7	2.65

2.5.3 Synthetic Seismogram

The sonic log recorded in **Mason 1** was drift corrected using check shot data and along with the density log used to generate several synthetic seismograms for **Mason 1**. The synthetic processing report (CRAE report number 304534) is not included with this report. A synthetic seismogram using a 30 Hertz zero phase Ricker wavelet was found to give the best match to the seismic data and has been included in this report as Enclosure 6 (PetNTcw4526).

2.6 Reservoir Analysis

A total of 23 core plugs were cut from the three cores recovered in **Mason 1**. Each plug was analyzed for routine core analysis, petrology and scanning electron microscopy. A summary of the reservoir analysis results is given in Table 4. The full core analysis reports are included in this report as Appendices 10, 11 & 12.

2.7 Contributions to Geological Knowledge

Mason 1 was significant in that it highlighted processing deficiencies in our seismic data. The identification of near surface velocity variations within the Cambrian section and the subsequent changes to the seismic processing stream to improve the stack response can be directly attributed to the drilling of **Mason 1**. Overall this should lead to improvements in seismic data quality and hopefully more reliable interpretations.

Until the seismic data is reprocessed and interpreted it is not possible to determine if **Mason 1** was a valid structural target and what implications the relative absence of hydrocarbons will have on the ongoing exploration programme.

KEYWORDS

Petroleum, Proterozoic, Rotary Drilling, Hydrocarbon Potential, McArthur Basin, Roper Group, Drill Stem Test, Well Logs, Petrology

LOCATION

Approximately 38km east-south east of Dunmarra.

AMG Zone 53
 E 365 445
 N 8 150 487

Latitude 16° 43' 28" South
Longitude 133° 44' 16" East

1:100,000 Sheet Warramban 5664
1:250,000 Sheet Tanumbirini SE53-2

LIST OF DPO'S

78129, 78130, 78131, 78132, 78133, 78134.