AUSTRALIAN AQUITAINE PETROLEUM PTY. LTD

WEABER NO. 1

WELL COMPLETION REPORT

Report No. PG/181/82

I.E. Garside
8.4.83

OPEN FILE

ONSHORE

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Exploration Manager

[redacted]

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		Dwg. No.	Sect.
1.	COMPOSITE WELL COMPLETION LOG (By Australian Aquitaine Petroleum)	21471	36
2.	COMPOSITE MUD LOG (By Auslog Pty. Ltd)		35
3.	SET OF WIRELINE LOGS		

Run No. 1	Scale	Interval
ISF-BHC-MSFL-GR-CAL-SP	1:200	14m to 385m
Run No. 2		
ISF-BHC-MSFL-GR-CAL-SP	1:200	365m to 1,063m
FDC-CNL		
HDT		
Run No. 3		
ISF-BHC-GAL, GR-SP	1:200	1,005m to 1,267m
FDC-CNL		
DLL-MSFL-CAL-SP		
HDT		
HDT FIL		

4.	PROBABLE WELL CORRELATIONS		
	KEEP RIVER NO. 1 - WEABER NO.1	21828	30-31

ENCLOSURE 3

3. PAPER LOGS

LOG TYPE	RUN		Sect.
Cluster Log* (Four-Arm High Resolution ConTinuous Dipmeter)	Run 1	1:500	32
	Run 2	1:500	32
Induction Resitivity Sonic Log	Run 1	1:200	32
	Run 2	1:200	33
Fracture Identification Log	Run 1	1:100	34
Dual Laterolog	Run 1	1:200	33
Compensated Neutron Formation Density Log	Run 1	1:200	33
Fracture Porosity Log			
Compensated Neutron Formation Density Log	Run 1	1:500	
Dual Laterolog	Run 1	1:500	
Four-Arm High Resolution Continuous DIpmeter	Run 1	1:200	
Induciton Resistivity Sonic Log	Run 2	1:500	

Re : "Enclosure 3" : - this list was included by mistake in the list of enclosures. The logs relevant to the Well Completion Report, as specified above, are being forwarded to you.

THE FOLLOWING ENCLOSURES WERE NOT SUBMITTED WITH THIS REPORT.

- Fracture Porosity Log
- Compensated Neutron Formation Density Log, Run 1 1:500
- Dual Laterolog, Run 1 1:500
- Four-Arm High Resloution Continuous Dipmeter, Run 1 1:200
- Induciton Resistivity Sonic Log, Run 2 1:500

I. SUMMARY

Weaber No. 1, a wildcat, was spudded on the 14th September, 1982 at 1730 hours in the Northern Territory, licence OP186, Block No. 7846.

Located at shotpoint 245 on seismic line BNT80-207, the well was drilled to test a closed anomaly associated with a suspected Famennian carbonate bank, a lateral equivalent of the Ningbing Limestone encountered in Keep River No. 1.
The well reached a total depth of 1,950m (KB) at 2230 hours on 16th October, 1982. Atco Rig A1 was released at 700 hours on the 18th October, 1982.

The limestone top was intersected at 1,667m. No gas or oil shows were detected and consequently there were no tests.

The secondary objective, the Keep River Group, was intersected at 1,206m. Again no gas or oil shows were detected and this group was not tested.

Visual porosity and wireline logs indicated that the objectives in both the Keep River Group and the Ningbing Limestone were tight.

Weaber No. 1 was plugged and abandoned.

II. INTRODUCTION

Permit OP186 was granted on the 18th July, 1979, for a five year period, renewable for two additional five year terms, subject to a 50% reduction of the original area (4,910km) at each renewal.

Clastic and carbonate reservoirs were expected along the eastern platform margin (Burt Range Syncline). The Bonaparte/Milligans Beds were considered to be excellent source rocks.

Two wells, Keep River No. 1 and Spirit Hill No. 1, were drilled prior to the granting of OP186.

Spirit Hill No. 1, a continuously cored hole, was plugged and abandoned in November, 1960, at a total depth of 915m. Traces of oil were extracted from siltstones in the Milligans Beds at 182m. (after J.J. Veevers).

Keep River was plugged and abandoned in March 1969 at a total depth of 4,762m. No oil shows were detected whilst drilling. Gas shows were detected below 1,050m. DST No. 4, performed over the interval 2,583m to 3,353m produced dry gas at the rate of 84,950m^3/day reducing to 3,398m^3/day from sands within the Keep River Group.

Mineral exploration core holes, drilled along the contact of the Bonaparte Beds and the Ningbing Limestone, have encountered biodegraded oil in vugular porosity within the Late Devonian Ningbing Limestone Reef Complex. This sequence was encountered in Keep River No. 1, at a depth of 3,712m. Vugular porosity within the Ningbing Limestone may have originated during the dewatering of the overlying marine shales of the Bonaparte/Milligans beds.

Weaber No. 1 location was based on the detailed mapping of the BNT80 seismic survey.

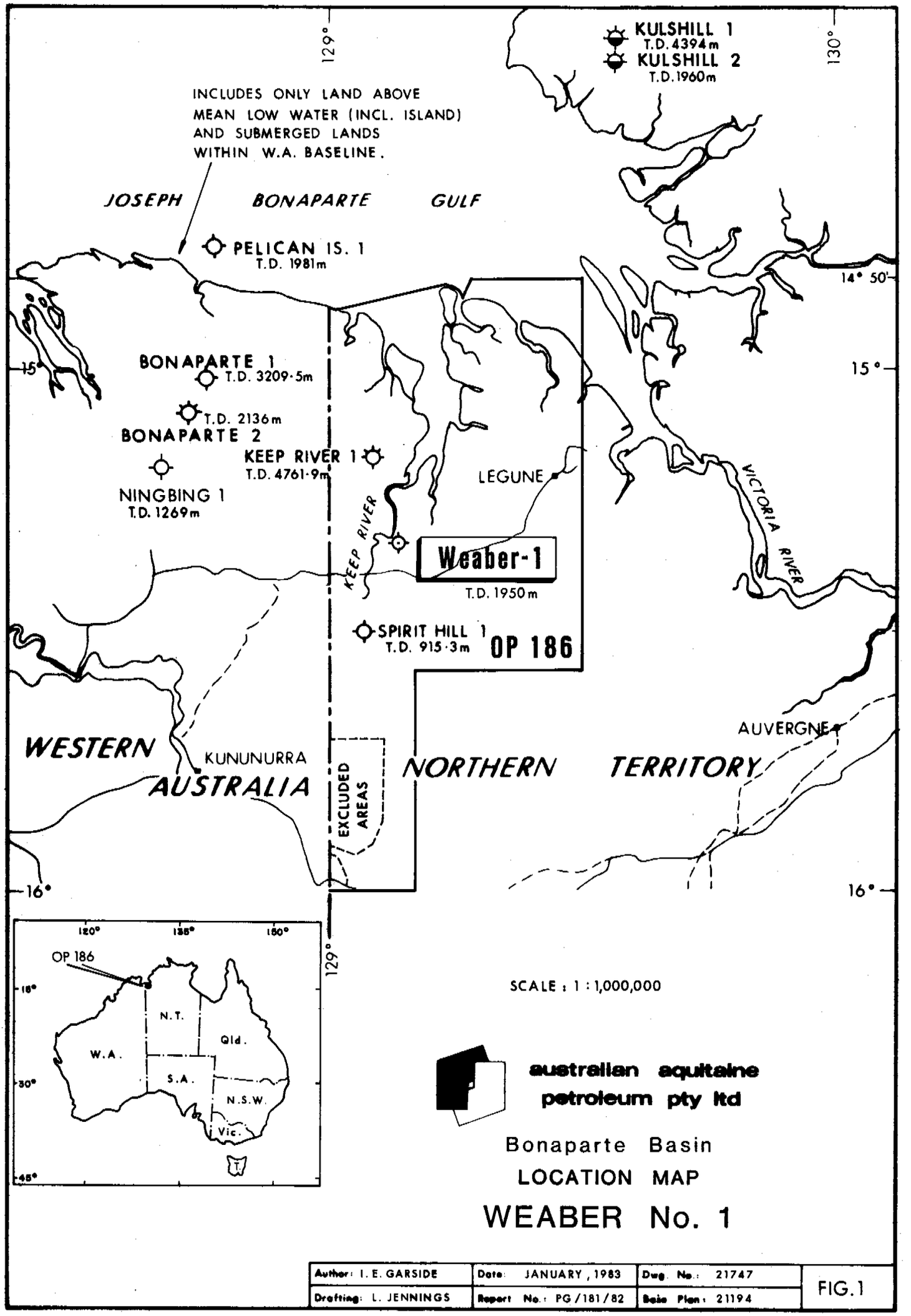
Atco A.P.M. rig A1 was contracted to drill Weaber No. 1 using Australian Aquitaine's Darwin base as the supply base.

III. WELL HISTORY

A. GENERAL DATA

Well Name:	Weaber No. 1
Operator:	Australian Aquitaine Petroleum Pty. Ltd 99 Mount Street, North Sydney, NSW 2060 for partners:
	Alliance Petroleum International Limited 25% Vamgas Limited 25% Australian Aquitiane Petroleum Pty. Ltd 50%)
Structure:	Ningbing carbonate bank anomaly
Location:	Latitude 15°21'10.4"S Longitude 129°07'48.9"E Graticular Block No. 7846
Permit:	OP186 (Northern Territory)
District:	Joseph Bonaparte Gulf 4 mile Map Sheet SD 52-15 Auvergne
Elevation:	Ground Level: 17.6m A.M.S.L. Kelly Bushing: 6.0m A.G.L

Total Depth:	Drillers: 1,950m (KB) Loggers: 1,949m (KB)
Date Drilling Commenced:	14th September, 1982
Date Total Depth Reached:	16th October, 1982
Date Well Plugged and Abandoned:	18th October, 1982
Date Rig Released:	18th October, 1982
Drilling Time in Total Days:	32 days
Status:	Plugged and Abandoned
Total Cost:	Estimated $1,500,000 (Aust.)



australian aquitaine petroleum pty ltd

Bonaparte Basin

LOCATION MAP

WEABER No. 1

Author: I. E. GARSIDE	Date: JANUARY, 1983	Dwg. No.: 21747	FIG.1
Drafting: L. JENNINGS	Report No.: PG/181/82	Base Plan: 21194	

B. DRILLING DATA

(i) Drilling Contractor

ATCO-APM Drilling Pty. Ltd.
35 Barfield Cresent,
Elizabeth, S.A. 5112

(ii) Drilling Plant

Rig Al - Diesel Electric NAT. 610

Draworks: NAT 610E, 75 HP.

Rotary Table: NAT C-205 20-1/2" x 53-1/4"

Mast: Dreco Cantilever 133 ft - 700,000 lbs. capacity.

Pumps: 2 x NAT 8P.80H - Triplex precharged, powered by one 750 HP. 575 volts DC GE electric motor each.

Tanks: two tank system - 740 bbls ($118m^3$) solid treatment. Shakers - Diesanders - Desilters.

(iii) Blowout Preventer Equipment

Hydraulic Accumulator : Wagner 25-130 3BN with remote control panel on drill floor.

Hydril $13^5/8$" 'GK' 5000 psi spherical BOP.

2 x Hydril $13^5/8$" single gate ram preventer 5000 psi WP.

1 SAFCO $13^5/8"$ x $13^5/8"$ 5000 psi spacer spool, 3000 psi mud cross.

Well Control manifold: 3" x 5000 psi ARMCO- 2 x Willis M3 multi orifice choke.

(iv) Hole sizes and Depths; RKB

Size	Interval
26"	6- 11m
17 1/2"	11- 250m
12 1/4"	250-1285m
8 1/2"	1285-1550m T.D.

(v) Casing + Cementing Details

Size	Weight	Grade	Shoe Depth	Cement	Cement to
20"	94 lb/ft	x 56	11m	It."A"	Surface
13 3/8"	54.5 lb/ft	J55	246m	42.4 T."A"	Surface
9 5/8"	43.5lb/ft	N80			
	40lb/ft	N80	1284m	21.1 T."A"	684m

(vi) Drilling Fluid

26" Hole

GEL BENEX
WT = 8.8lb/gal
pH = 9.5 - Hi.VIS PILL VIS : 120 sec

17 1/2" Hole

GEL BENEX
WT = 8.8lb/gal
VIS = 45/50 sec
pH = 9.5

12 1/4" Hole

GEL - CMC

WT = 8.9/10	WL = 8.5/5.8
VIS = 50/120	pH+1 = 9.5
GEL = 0^1 = 3-15	ClNa = 550/700
10^1 = 13-30	Solids % 4.5/11.2%

(vii) Water Supply:

Water well on site (5km)

(viii) Perforation & Shooting Record:

Nil

(xi) Plugging back & Squeeze Jobs:

Plug No. 1	1692 - 1617m
Plug No. 2	1334 - 1234m
Plug No.3	100 - 50m

(x) Fishing Operations:

Nil

(xi) Side-tracked hole:

Nil

(xii) Communication:

Radio Darwin; AAP offshore base; Kununurra Aquitaine base; N.T. Flying Doctor.

(xiii) Base of Operations:

Logistic : Darwin AAP shorebase
Technical: Aquitaine Sydney Office

(XIV) Transportation

Trucks and Fixed wing to Kneebone Station airstrip.

(XV) Location

Drilling site was cleaned and levelled after the rig moved off station. A marker stake was cemented at the wellhead.

C. FORMATION SAMPLING

1. Ditch Cuttings

Lagged samples were collected at three metre intervals from 20m to 1950m (TD). Carbide lag checks were run at approximately 60m intervals or more frequently, depending on rate of penetration.

Cuttings descriptions are presented in Appendix I.

Both washed and unwashed cuttings were dried, bagged, marked, boxed and subsequently distributed as follows:-

1 set to: The Secretary,
Department of Mines and Energy,
Mineral House,
Esplanade,
DARWIN NT 5794

1 set to: Australian Aquitaine Petroleum Pty Ltd.,
99 Mount Street,
NORTH SYDNEY NSW 2060

2. Conventional Diamond Cores

Two conventional, 100mm diameter cores were cut using a Christensen "C20 and C22" 8-15/32" core bit. Intervals cored and recoveries are listed in Table No. 1.

CORE NO.	DEPTH INTERVAL (m) (KB)	CORE CUT (m)	CORE RECOVERY	RECOVERY %
1	1515.75-1524.5	8.75	7.5m	86%
2	1676.5-1685.54	9.04	9.04m	100%

TABLE NO. 1

The cores were slabbed into halves and distributed as follows:-

1 half to: The Secretary,
Department of Mines and Energy,
Mineral House,
Esplanade, DARWIN NT 5794

1 half to: Australian Aquitaine Petroleum Pty. Ltd
99 Mount Street,
NORTH SYDNEY, NSW 2060

Core No. 2 was sent to Auscore Pty Ltd in Perth for analysis and photographing.

Wellsite core descriptions and core No. 2 analyses are presented in Appendix No. II.

Photographs of Core No. 2 are attached as Addendum No. 1.

3. Sidewall Cores

No sidewall cores were shot in Weaber No. 1

4. Calcimetry

Calcimetry measurements were taken at three metre intervals from surface to total depth. Results are presented on both the "Aquitaine Composite Well Log", Enclosure No. 1, and on the "Auslog Composite Mud Log", Enclosure No. 2.

5. Canned Cuttings

One-litre cans were used to collect cuttings every 30m. Cans were 2/3 filled with unwashed cuttings and covered with water to which an antibacterial agent was added. The cans were labelled and despatched to the Bureau of Mineral Resources. Head Space Analyses conducted by the B.M.R. are presented in Appendix VIII

D. LOGGING AND SURVEYS

1. Mud Logging

Mud logging services were provided by Auslog (Aust.) Pty Ltd of Perth.

Standard services included penetration rate, total gas and chromatograph analysis, pump stroke counter, cuttings, gas analysis, washing, drying and bagging of samples.

Extra services were requested covering calcimetry and pit-volume monitoring.

Auslog (Aust.) Pty Ltd's "Composite Mud Log" is presented as Enclosure No. 2, and their final report is attached as Appendix III.

2. Penetration Rate and Gas Logs

The hydrocarbon content of the drilling mud was logged continuously. Rate of penetration data was recorded at one metre intervals from surface to total depth. Both gas and rate of penetration logs are presented on Aquitaine's "Composite Well Log" (Enclosure No. 1) and on Auslog's "Composite Mud Log" (Enclosure No. 2).

3. Lithological Logs

Composite three-metre samples were microscopically analysed and described from 20m to 1950m (TD).

One metre samples were collected during coring, in the case of no core recovery . The percentage cuttings log by Auslog, is presented on both Enclosure No. 1 and Enclosure No. 2.

An interpreted lithological log derived from cuttings analysis, calcimetry data, rate of penetration log, core data and wireline logs, has been prepared by Aquitaine's geologists and is incorporated in the Aquitaine "Composite Well Log", Enclosure No. 1.

4. Wire Line Logs

Two suites of wireline logs were run in Weaber No.1 and are listed in Table 2. The D.L.L was added to the second run of logs to improve data response in the limestone. The H.D.T. run 2 was repeated in the fracture identification mode.

Maximum BHT was measured at 86.1°C

Depth Metres	Date	Logs	Additional Services
247m-1278m	1.10.82	SP-CAL-GR-ISF-BHC H.D.T	H.D.T.Cluster
1283m-1949m	16.10.82	SP-CAL-GR-ISF-BHC H.D.T. H.D.T. 1:40 FDC-CNL-CAL-GR DLL	H.D.T Cluster Fracture Identification Log

TABLE NO. 2

5. Deviation Surveys

Borehole deviation from vertical was measured using a Totco 0-8° single slot instrument. Survey results are presented in Table 3. Deviation data is also recorded on the Aquitaine "Composite Well Log", Enclosure No. 1

6. Velocity Survey

A twelve-level velocity survey was carried out by Seismograph Services Limited - their report is presented as Appendix IV.

7. Testing

No repeat formation tests, formation interval tests or drill-stem tests were conducted in Weaber No. 1.

Survey No.	Depth M(KB)	Deviation (Deg.)	Survey No.	Depth m(KB)	Deviation (Deg.)
1	32	1/4	25	1,091	1/4
2	272	1/4	26	1,130	1/4
3	89	1/4	27	1,163	1/8
4	126	1/2	28	1,231	1/8
5	172	1/4	29	1,294	3/4
6	218	1/2	30	1,342	1
7	250	3/4	31	1,390	1
8	322	1-1/2	32	1,438	2 1/8
9	356	1-1/4	33	1,468	1 3/4
10	399	3/4	34	1,497	1 3/4
11	447	1/2	35	1,536	1 1/2
12	495	3/4	36	1,584	3 1/2
13	546	1/2	37	1,603	3 3/4
14	595	1/4	38	1,622	4 1/8
15	643	1/2	39	1,639	4 1/2
16	690	1/2	40	1,658	4 1/2
17	748	miss run	41	1,686	4 1/2
18	757	1 3/4	42	1,715	4 1/2
19	805	1 3/4	43	1,753	5
20	843	3/4	44	1,791	4 1/2
21	891	3/4	45	1,826	4 1/2
22	938	3/4	46	1,868	4 1/2
23	996	1/4	47	1,906	4 1/2
24	1,044	1/2	48	1,945	4

TABLE 3

IV. GEOLOGY

A. Previous Exploration and Surveys

Prior to the current Licence No. OP186 being granted to the consortium the onshore area was partially covered by two licence numbers OP2 and OP162. (Fig. 2)

1. Geophysical:

Gravity

The major part of gravity reconnaissance work in the Bonaparte Gulf Basin was carried out betwen 1955 and 1958.

The first gravity survey was done in 1955 by Mines Administration Pty. Ltd., and covered the southern part of OP.2 (Keep River).

In 1956 A.A.O. conducted a gravity survey in the Port Keats area, while the Keep River reconnaissance was completed by the B.M.R.

Gravity work intensified in the northeast part of the basin in 1957. The B.M.R. completed the Port Keats area and extended lines to Daly River.

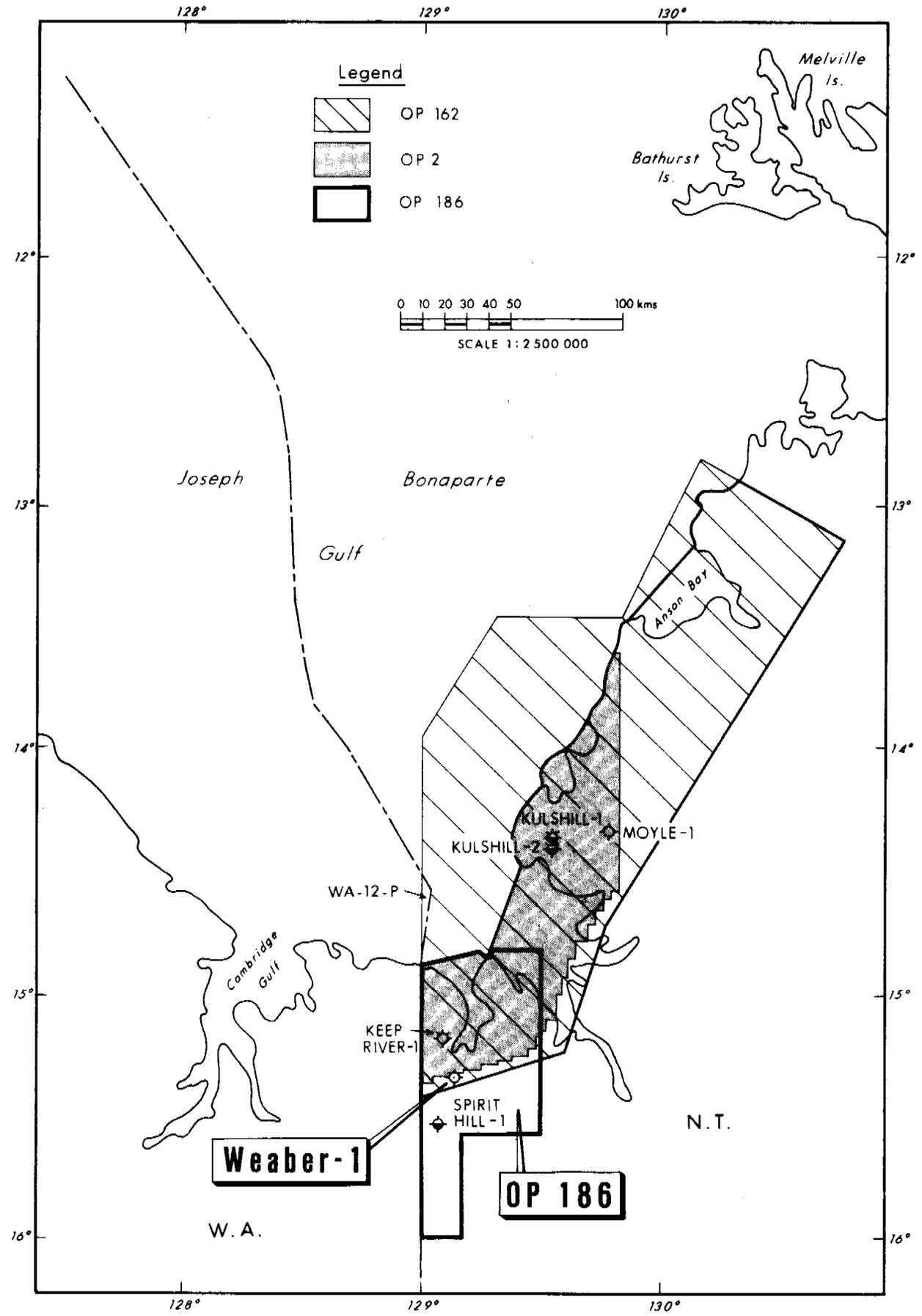
A.A.O. undertook a new survey from Daly River Inlet along the beach to Keep Inlet. At this point all gravity results available were synthesized by Minad who published the results "Regional Gravity Survey on the Bonaparte Gulf Basin" early in 1958. In this year complementary gravity reconnaissance work was conducted by the B.M.R.

Seismic

Table 4 lists all seismic surveys conducted in the onshore licence areas OP2, OP162 and OP186. Figure 2 shows the relative areas covered by the above licence areas.

Survey Area Name	Type	Licence No.	Kms	Month and Year
Port Keats	Reflection	OP2	100	10-11/1961
Keep River	Reflection/ Refraction	OP2	176	8-11/1963
Pearce Point	Reflection/ Refraction	OP2	145	7-9/1962
Kulshill	Reflection Refraction/Gravity	OP2	419	7-10/1964
Legune	Reflection/Gravity	OP2	91	7-10/1964
Skull Creek	Reflection Refraction	OP2	60	8-9/1965
Moyle River	Reflection Refraction/Gravity	OP2	293	7-10/1966
Oaks Creek	Refraction/Gravity	OP162	161	8-10/1967
Burt Range	600% Reflection	OP 162	236	10-11/1970
Lone Hill	Refraction/Gravity	OP162	111	8-10/1969
Border Creek	Reflection	OP162	107	8-9/1972
Quins	600% Reflection	OP162	116	8-9/1972
BNT 80	1200% Reflection/ Gravity	OP186	141	6-8/1980
BWA 81	2400% Reflection	OP186	129	8-9/1981

TABLE 4



australian aquitaine petroleum pty ltd

BONAPARTE BASIN N.T.

HISTORIC LICENCE AREAS ASSOCIATED WITH OP 186

Author: I.E. GARSIDE	*Date:* APRIL, 1983	*Dwg No:* 21748	FIG. 2
Drafted by: L.J.	*Report No:* PG/181/82	*Base Plan:* 18160	

2. Geological

Prior to 1963, a number of reconnaissance and semi-detailed geological surveys were conducted in the Carlton Embayment of the Bonaparte Basin; these included surveys by Dr Frank Reeves for Standard Vacuum Oil Company, by geologists of the Bureau of Mineral Resources, and by E.P. Utting for Westralian Oil Ltd, Gulf Oil Syndicate and Oil Development NL.

A photogeological study of the Carlton Embayment was carried out by W.F. Schneeberger for Gulf Oil Syndicate and photogeological studies of selected areas within the embayment were also made by E.P Utting.

In 1963, the geology of the Bonaparte Basin was reviewed by J.M. Drummond of the Bureau of Mineral Resources. An extensive bibliography of the geological and geophysical literature relating to the Bonaparte Basin is included in his report - "Compilation and Review of the Geology of the Bonaparte Gulf Basin 1962" (Bur. Min. Resources Rec. 1963/133).

The surface geology of the Bonaparte Basin, including that area covered by OP186, was examined by Veevers et al (1964) of the B.M.R during 1963 and by geologists of Australian Aquitaine Petroleum Pty. Ltd. and Aquitaine Australian Minerals Pty. Ltd.

In July 1963, Alliance Oil Development Australia NL spudded Bonaparte No. 1. The well was located on a closed structure determined by the Carlton Basin seismic survey in EP126. The well spudded in the Port Spring Sandstone and intersected the Tanmurra Formation at 194m. The Early Carboniferous Bonaparte Beds were drilled from 496m to the intersection of the Keep River Group

(Burt Range Formation equivalent) at 2,317m. The Cockatoo Formation equivalent was intersected at 2,893m and continued to total depth (3209m). Bonaparte No. 1 was a dry hole and subsequent seismic has shown that the well was drilled down flank of the main structural closure.

Bonaparte No. 2 was spudded in July 1964 and intersected a similar section to Bonaparte No. 1 down to 1,508m where the well intersected a fault down thrown to the east. The section beneath this fault is the Keep River Group (Burt Range Formation equivalent and Cockatoo Formation equivalent). Bonaparte No. 2 produced a small gas flow of 43,607 m /day from a 3.6m thick sand at 1,437.4m within the Bonaparte Beds. Sand development in both the Bonaparte Beds and the underlying section was greater than the section drilled in Bonaparte No. 1.

In OP186, Spirit Hill No. 1 was drilled in November 1960 by Westralian Oil Ltd. and Oil Development Ltd. The hole was continuously cored to a total depth of 915m. Traces of oil were extracted from cored siltstone at 182m in the Milligans Beds (after J.J. Veevers). In 1969 Keep River No. 1 was plugged and abandoned at a total depth of 4,762 metres. No oil shows were detected. Gas was produced from multiple sands over the interval 2,583m to 3,352.8 metres. Keep River No. 1 was drilled by Australian Aquitaine Petroleum.

Apart from numerous diamond core holes drilled by Australian Aquitaine Minerals Pty. Ltd, no further drilling in OP186 has occurred since 1969.

B. REGIONAL GEOLOGY (ONSHORE)

The Bonaparte Basin first developed on metamorphosed Proterozoic basement during a period of intracratonic rifting in the Early Palaeozoic. The northwards movement of the Darwin Block along the "Halls Creek Mobile Zone" (Figure 3) resulted in the formation of a northwest-southeast trending aulacogen. The basin onshore is the southeast apex of this rift.

Onshore development of the basin was aided by crustal sag associated with the extrusion of an estimated 100,000m^3 of the Early Cambrian Antrim Plateau Volcanics which outcrop around the present-day basin margin.

Sedimentation onshore commenced after this initial subsidence with the deposition of continental and shallow marine clastics of the Early Cambrian to Early Ordovician Carlton Group (Figure 4). The basinward extent of this group is unknown; it is only observed in outcrop around the current basin margins. Probable Cambrian sediments, on basement fault blocks, have been observed in offshore seismic sections in graben-flanking terraces.

Between the Early Ordovician and Frasnian the onshore and graben flanks in the offshore were uplifted. Mild erosion scoured the onshore and flank areas while salt was deposited in the stranded, restricted marine offshore graben.

Deposition onshore recommenced with a widespread marine transgression in the Frasnian. The main clastic source was in the east from the Sturt Block. The eastern basin margin was controlled by the Cockatoo fault system. The southern and western basin margins extended over a larger area than the present day basin limits.

The Cockatoo Formation was deposited consisting of shallow marine and possibly eolian sediments of moderate thickness. The formation grades from fault scarp conglomerates in the south and east, through coarse and fine sands in the west, culminating in reefal carbonates of the Westwood Member in the extreme northwest. The western platform margin edge lies basinward of the Ningbing Limestone outcrop. The eastern platform, Burt Range Syncline and Legune Faulted Terrace were the eastern sites for shallow water clastic deposition. The platform margin was coincident with the Pincombe High trend.

Within the area covered by the "Moogarooga Deep", sands probably lense and pinchout into silts and shales as the water depth increased away from the platform margins.

The northeasterly-trending Pincombe High, a Precambrian basement inlier, began to exert a greater influence on deposition towards the end of the Frasnian. Four sedimentary provinces are evident: Western Platform, Moogarooga Deep, Legune Faulted Terrace and the Burt Range Syncline (Figure 5).

Basin tectonics and clastic supply stabilised during the Famennian, allowing the development of a platform carbonate facies, the Ningbing Limestone and associated lagoonal facies of the Buttons Beds. Within the Moogarooga Deep, fine silts and shales were deposited.

The Ningbing Limestone (Famennian to earliest Tournaisian?), is an algal reef. Excellent forereef (marginal slope), reef (platform margin), back reef and interreef facies were formed on a bathymetric high which marked the shallow marine shelf edge in the Western Platform province.

This carbonate facies extends southeast towards the Pincombe High and then swings north-northeast along the Pincombe High trend, which marks the shallow marine shelf edge on the eastern side of the basin. In excess of 900 metres of Ningbing Limestone were drilled in Keep River No. 1, located on the western flank of the Pincombe High trend (Figure 6).

Sediment supply to the deeper basin was via a series of channels that cut through the reef. These channels can be observed in the northern outcrops. The largest channel, the Waggon Channel, is sited along a major structural lineation. Minor movements may have occurred along the lineation in the Famennian; however, major movements occurred in the Early to Middle Tournaisian as evidenced by a Middle Tournaisian shoreline breccia on the southern side of the Waggon Channel.

In the Early to Middle Tournaisian, carbonate deposition terminated on the western platform. In the east, subsidence continued within the Burt Range Syncline and on the Legune Faulted Terrace where the Keep River Group was disconformably deposited on the Ningbing Limestone.

The Keep River Group consists of an alternating sequence of calcareous shallow marine sands and limestones deposited in response to vertical movements of the source area (and continued subsidence of the eastern platform). There are no known outcrops of the Keep River Group on the western platform.

The middle Tournaisian "Shoreline Breccia" correlates with the earliest member of the Keep River Group, the Burt Range Formation.

Growth of the Ningbing Limestone north of the Waggon Channel ceased in the earliest Tournaisian?, probably due to uplift.

The Waggon Channel and Carlton Sub-basin were block faulted at this time and reef growth may have continued in this small, shallow graben.

Within the Moogarooga Deep deposition of silts, shales and minor sands continued throughout the Early Carboniferous.

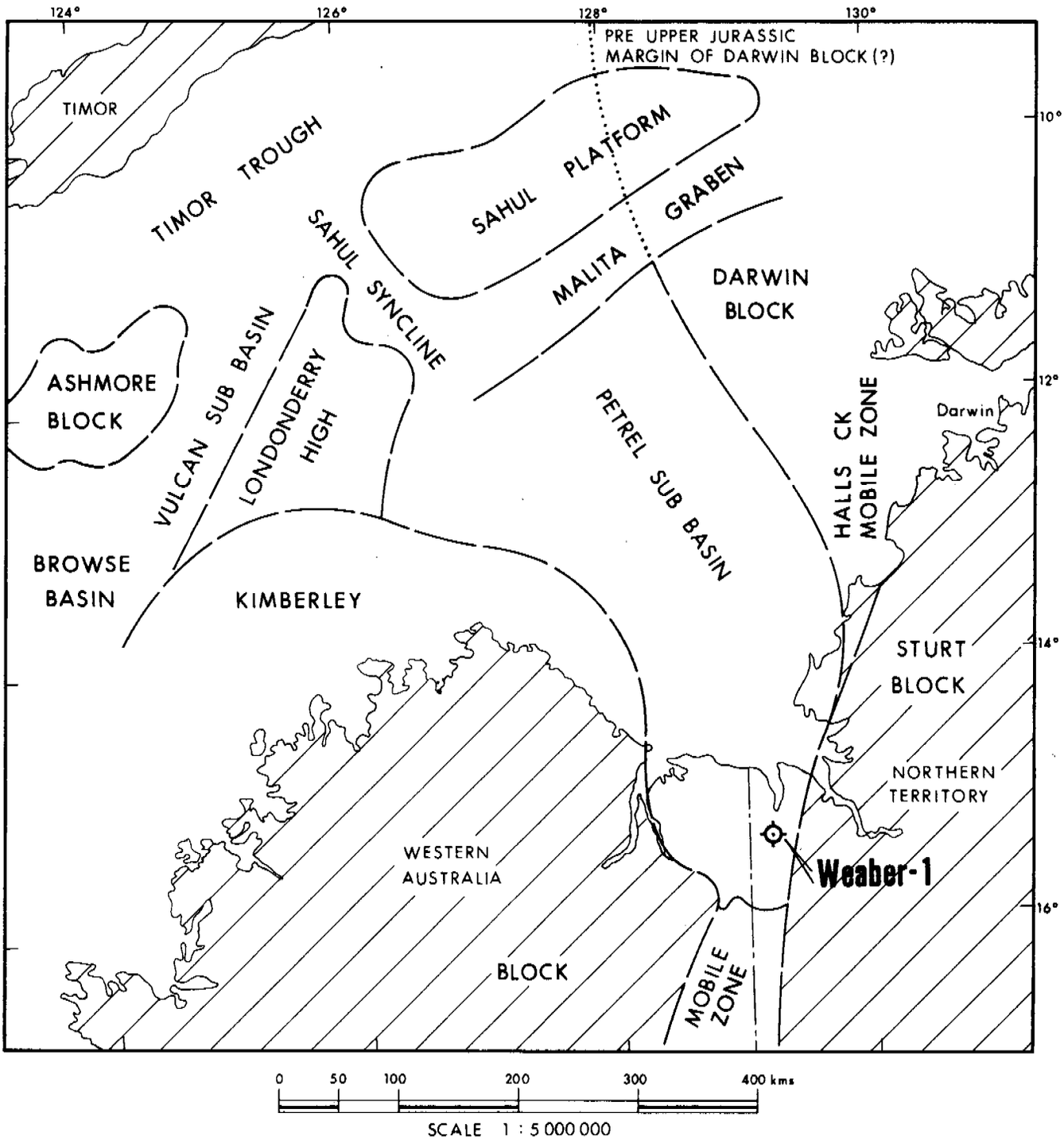
The Utting Calcarenite, which outcrops with abutment unconformity against the Ningbing Limestone, may have been deposited at the apex of the graben paralleling the Ningbing Lineation and passing through Bonaparte No. 2. The outcrop is complex due to transverse faulting.

In the Late Visean the basin either reached depositional maturity or was slightly uplifted. A regional unconformity marks the end of the Milligans Beds transgression. Deposition then returned to a shallow water regime.

Littoral sediments of the Burvill Beds and Point Springs Sandstone were deposited throughout the basin and are laterally equivalent to the shallow marine calcareous sandy sediments of the Tanmurra Formation deposited offshore and over the area of the Moogarooga Deep. Along the southern edge of the Waggon Channel another breccia, the Waggon Creek Breccia, supports the postulated basin uplift at this time.

Fluvial sediments of the Border Creek Formation unconformably overlie the Late Visean/Namurian sediments of the Point Springs Sandstone and Tanmurra Formation.

Early Permian (?) glacial sediments of the Port Keats Group outcrop near the mouth of the Keep River. They contain pebbles and boulders of granite, granodiorite, porphyry, schist and sub-graywackes all of which are common in the Precambrian successions of the Kimberley Block.



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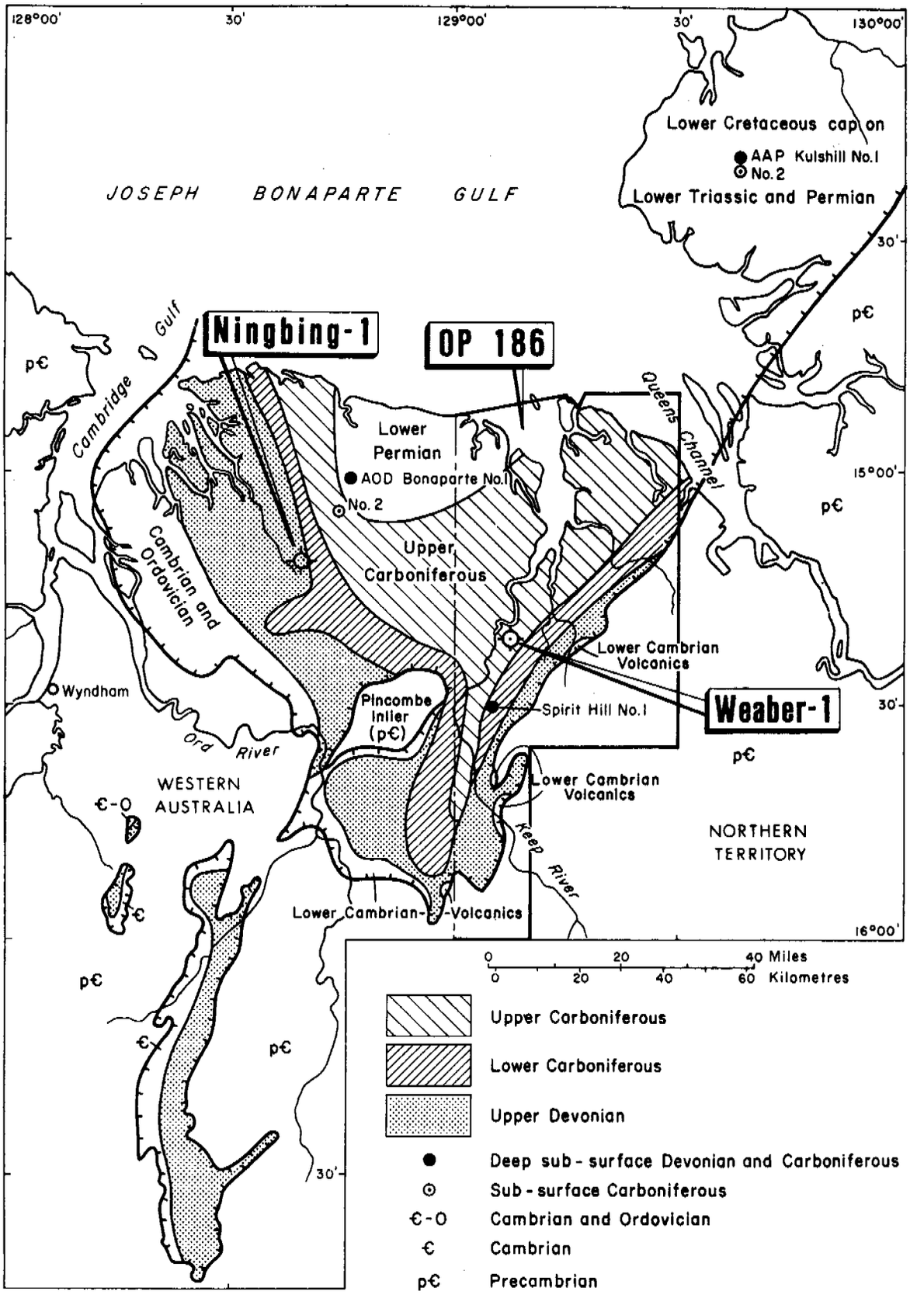
BONAPARTE BASIN / TIMOR SEA

REGIONAL STRUCTURAL PROVINCES

Author: I.GARSIDE	*Date:* JAN.,1983	*Dwg No:* 21749	FIG.3
Drafted by: L.J.	*Report No:* PG/181/82	*Base Plan:*	



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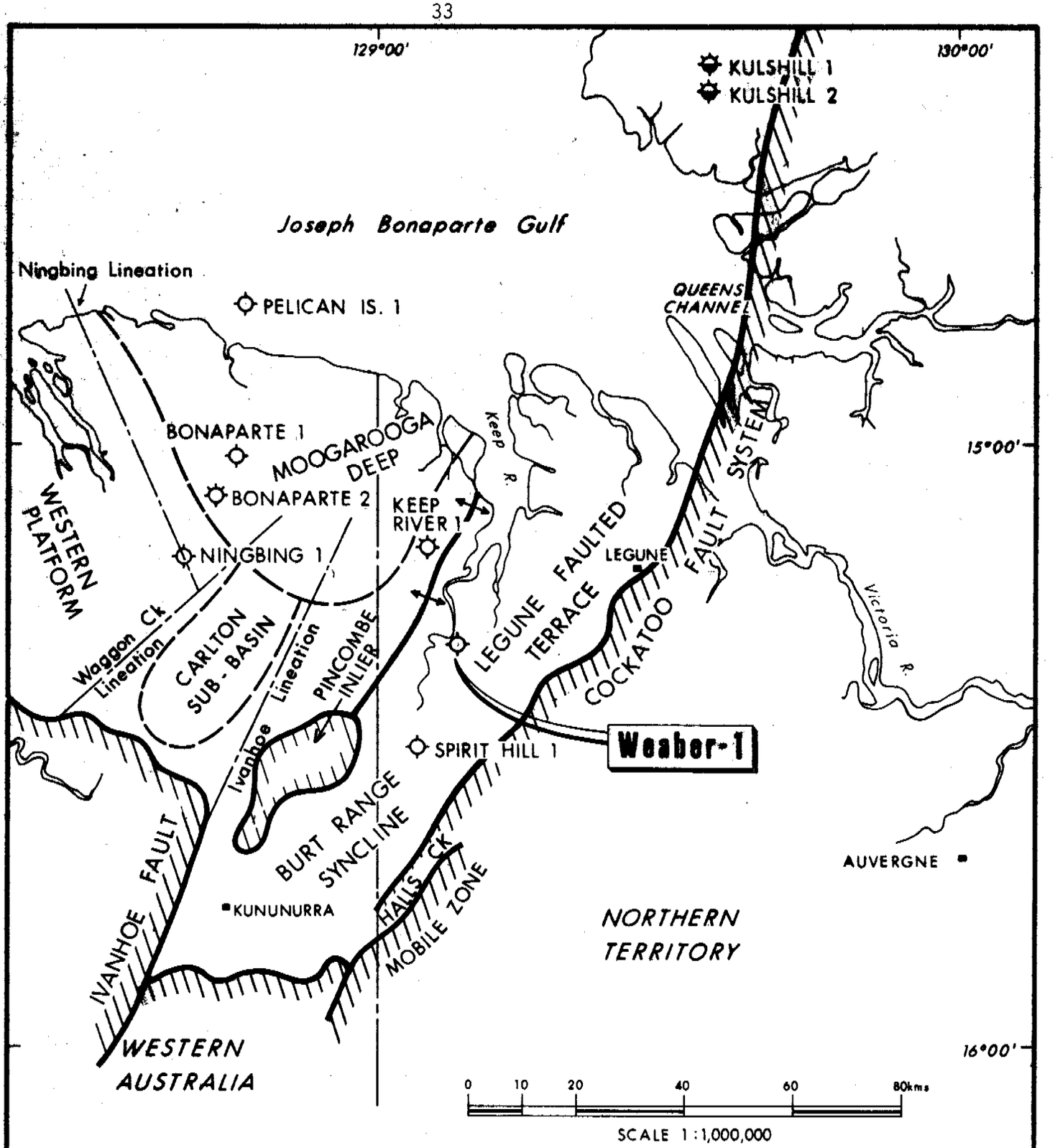
BASIC SOLID GEOLOGY OF ONSHORE BONAPARTE BASIN

(AFTER VEEVERS & ROBERTS BMR BULLETIN 97)

Author: I.GARSIDE	*Date*: JAN, 1983.	*Dwg No*: 21750	FIG.4
Drafted by: L. J.	*Report No*: PG/181/82	*Base Plan*:	



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SEDIMENTARY PROVINCES ONSHORE
BONAPARTE BASIN

Author: I.E. GARSIDE	Date: JAN., 1983	Dwg No: 21455	FIG.5
Drafted by: L.J.	Report No: PG/181/82	Base Plan:	

C. REGIONAL STRATIGRAPHY (ONSHORE)

The stratigraphy of the onshore Bonaparte Basin is summarised in Table 5 and on the Weaber No. 1 well data sheet, Figure 8.

Precambrian Basement

Two Precambrian basement blocks, the Kimberley Block and the Sturt Block, were the main source areas for sediments deposited in the onshore Bonaparte Basin.

Cambrian to Early Ordovician (Carlton Group)

a) Hart Spring Formation; reddish-brown, fine-grained sandstone with ripple marks, sun cracks, mud pellets, and minor interrelated impure limestone beds.

b) Skewthorpe Formation; reddish-yellow, medium to coarse grained, thinly bedded micaceous, shallow marine sandstone, interbedded with grey finely crystalline, oolitic limestone and minor grey to green shales.

c) Pretlove Sandstone; white, medium to coarse-grained, silty, feldspathic, fossiliferous, shallow marine sandstone.

d) Clarke Sandstone; dark greenish to reddish, glauconitic, friable, fossiliferous, shallow to restricted marine sandstone.

e) Pander Greensand; reddish to green, highly glauconitic, medium to coarse-grained, fossiliferous sandstone of shallow to restricted marine environment.

Total known thickness of the Carlton Group in outcrop is at least 1,000m. The subsurface distribution of this sequence is unknown.

Late Ordovician to Mid Devonian

No sediments of this age have been observed in outcrop or in drill holes in the Bonaparte Basin. The basin probably underwent erosion during this interval.

Late Devonian (Frasnian): Cockatoo Formation

The Western Platform sequence consists of four members unconformably overlying the Early Ordovician.

a) Kellys Knob Sandstone Member; generally a yellow to white, pebbly, coarse to fine-grained , weakly cemented, friable, medium cross-bedded, ripple-marked, shallow marine westward dipping sandstone.

b) Hargreaves Member (Western Platform only); varicoloured, fine-grained, well-sorted, flat-bedded sandstone, grading northwestward to dolomitic sandstone and marl where it is laterally equivalent to the carbonate Westwood Member.

c) Westwood Member; a thick sequence of richly fossiliferous sandy, stromatolitic limestone with pelecypod coquinite and oncolite beds interbedded with sandy limestone, interpreted to be of reef facies.

d) Cecil Sandstone Member; a tabular body of white to yellow strongly cross-bedded, jointed, fine, medium and coarse-grained sandstone dipping to the northeast. Environment of deposition is unclear and could be shallow marine, eolian, or a combination of both.

The Eastern Platform, Burt Range Syncline and Legune faulted terrace sequence consists of five members unconformably overlying the Early Ordovician.

a) Ragged Range Conglomerate Member; a fault scarp conglomerate of deeply-jointed, thick bedded, red-brown, cobble to boulder conglomerate, of marine environment that passes laterally into the Kellys Knob, Kununurra, Abney and Cecil members.

b) Kellys Knob Sandstone Member; as described for the western platform area.

c) Kununurra Member; varicoloured, fine-grained, dolomitic, micaceous, fossiliferous, shallow marine quartz sandstone.

d) Abney Sandstone Member; a tabular body of red-brown, medium to fine-grained, thinly bedded, fossiliferous quartz sandstone. Environment of deposition is shallow marine. Channelling of the top of the member indicates minor erosion and may relate to tectonics during deposition of the Westwood Member.

e) Cecil Sandstone Member; as described for the western platform area.

Maximum known thickness of the Cockatoo Formation is 1,542m (Burt Range Syncline).

Late Devonian (Famennian): Jeremiah Member, Ningbing Limestone and Buttons Beds

Western Platform: The Jeremiah Member is considered to be conformably overlain by the Ningbing Limestone. It is usually a brown, red and yellow-grey, fine to medium grained, thin to thick-bedded, dolomitic sandy limestone. The Jeremiah Member is considered to be a transition from the Cockatoo Formation to the Ningbing Limestone and probably crosses the Frasnian/Famennian boundary. No outcrops are known on the eastern platform.

Ningbing Limestone:

Platform margin facies (Reef Core): Massive algal stromatactis limestone.

Marginal slope facies (Fore Reef): a 20^{o} (approx), dipping stromatolitic algal breccia, filled with a calcarenite matrix.

Inner Reef: platy, grey and pink sandy pisolitic algal limestone.

Back Reef: uniform, medium-bedded fairly fine, grey to yellow algal limestone and dolomitic micrite calcarenite.

Maximum known thickness of the Ningbing Limestone is 900m in Keep River No. 1. In outcrop the maximum thickness is 305m.

Buttons Beds: Are considered to be a back reef lagoonal facies of the Ningbing Limestone consisting of silty micrite interbedded with pebbly limestone and sandy skeletal micrite-grain calcarenite.

Early Carboniferous (Tournaisian): Keep River Group

Eastern Platform: The Keep River Group consists of four members unconformably(?) overlying the Famennian Ningbing Limestone.

a) Burt Range Formation: Consists of alternating beds of thinly bedded olive-grey crinoidal calcarenite, stromatolitic limestone, skeletal crinoidal calcarenite and skeletal calcarenite grading upwards to yellow grey, fine to medium-grained, occasionally coarse-grained, dolomitic sandstone and sandy limestone.

b) Enga Sandstone is white, clean, fine to medium-grained, well-sorted, well-rounded and bedded quartz sandstone.

c) Septimus Limestone is represented by thick bedded yellow, brown and olive sandy calcarenite and fawn calcareous sandstone with minor polyzoan limestone, interbedded with crinoidal sandy calcarenite and medium-grained, cross-bedded dolomitic sandstone. An intraformational beccia towards the top of the sequence suggests contemporaneous erosion.

d) Zimmermann Sandstone is of limited areal extent. The Zimmermann Sandstone may represent a littoral facies of the Milligans Beds transgression and consists of medium-grained, well-rounded, well-sorted, medium-bedded calcareous quartz sandstone. A thin white siltstone occurs at the top of this member.

The maximum known thickness of the Keep River Group is 937m.

Western Platform: So far, the Keep River Group has not been positively identified west of the Pincombe High. The only definite Tournaisian outcrop known west of the Pincombe High is a mid-Tournaisain shoreline breccia on the south side of the Waggon Channel. The breccia consists of 30m of dolomitic breccia with marly dolomite in blocks of up to one metre long originating from the Cockatoo Formation and lying unconformably on the Cockatoo Formation.

<u>Early Carboniferous: Early Visean: Milligans Beds/Bonaparte Beds</u>

These are mainly grey to black silty shales, locally calcareous, gypsiferous and pyritic, frequently fissile and blocky with minor thin sandy stringers and beds, deposited in the Carlton Sub-basin, Burt Range Syncline, Legune Faulted Terrace and Moogarooga Deep.

Early Carboniferous: Middle Visean: Utting Calcarenite

This formation is a coarse to medium-grained, grey-yellow brown skeletal sandy calcarenite, usually thinly to medium-bedded, occasionally cross-bedded and highly fossiliferous. Thickness 122m? (maximum).

Early Carboniferous: Visean to Namurian

Waggon Creek Breccia, Burvill Beds, Point Spring Sandstone and Tanmurra Formation.

a) Waggon Creek Breccia; 56m. Comprises a basal, friable, pebbly sandstone overlain by a breccia containing tabular blocks of dolomite and sub-angular to rounded fragments of metaquartzite set in a dark sandy dolomitic matrix.

b) Burvill Beds: 85m. A coarse-grained, ferruginous quartz sandstone with minor interbeds of sandy limestone and an 11m thick bed of dark grey shale. The sandy limestone contains abundant sub-rounded coarse grains and granules of lustrous quartz and includes rugose corals, polyzoans and brachiopods.

c) Point Spring Sandstone; 271m. Yellow to white medium to coarse-grained, friable, cross-bedded sandstones interbedded with thinly bedded, fine-grained quartz sandstones.

d) Tanmurra Formation; 302m. A basal light brown, very fine to fine-grained sandy calcarenite, pelletoidal in part overlain by white to medium-grey, very fine to medium-grained, angular, calcareous and dolomitic quartz sandstone grading upwards into a buff to medium-grey, medium-grained to silty oolitic calcirudite and sandy calcarenite.

Late Carboniferous: Border Creek Formation

The Border Creek Formation unconformably overlies the Early Carboniferous sequence. Total thickness is 111m. It is a basal channel infilling consisting of pebbles to cobbles, vein quartz and quartzite conglomerate interbedded with coarse-grained, jointed, cross-bedded sandstones. In the Burt Range area, the sandstones are white to brown, medium to coarse-grained, moderately to poorly-sorted, thick-bedded, locally cross-bedded with a clay matrix cement. Environment of deposition is fluvial.

Early Permian: Port Keats Group

The Port Keats Group outcrops around Keep River inlet and consists of glacial sands, silts and shales. They are of fluviogacial and marine origin. These Early Permian sediments thicken offshore where over 1,000m has been drilled.

ONSHORE BONAPARTE BASIN

CAMBRIAN TO LOWER PERMIAN STRATIGRAPHIC TABLE

		Western Platform / Carlton Sub Basin.	Moogarooga Deep.	Burt Range Syncline / Pincombe High / Legune Faulted Terrace.
EARLY PERMIAN	Sakmarian		Port Keats Group	
LATE CARBONIFEROUS		Border Creek Formation	Border Ck Formation / Kulshill Formation	Border Creek Formation
EARLY CARBONIFEROUS	Namurian	Point Spring Sandstone	Tanmurra Formation	Point Spring Sandstone
	Visean	Utting Calcarenite; Milligans Beds	Waggon Ck Breccia Burvill Beds	Burvill Beds; Milligans Beds
	Tournaisian	Tournaision Breccia; Burt Range Formation ?		Keep River Group: Zimmermann Sandstone; Septimus Limestone; Enga Sandstone; Burt Range Formation
LATE DEVONIAN	Famennian	Ningbing Limestone; Jeremiah Member ?	Bonaparte Beds	Ningbing Limestone; Buttons Beds; Jeremiah Member ?
	Frasnian	Cecil Member; Westwood Member / Hargreaves Member; Kellys Knob Sandstone Member — COCKATOO FORMATION		Cecil Member; Abney Member; Kununurra Mbr; Kellys Knob Sandstone Mbr — RAGGED RANGE; COCKATOO FORMATION
EARLY TO MIDDLE DEVONIAN				
EARLY TO LATE SILURIAN				
LATE ORDOVICIAN				
EARLY ORDOVICIAN		Panda Greensand	?	Panda Greensand
EARLY TO LATE CAMBRIAN		Clarke Sandstone; Pretlove Sandstone; Skewthorpe FM; Hart Spring FM — CARLTON GROUP		Clarke Sandstone; Pretlove Sandstone; Skewthorpe FM; Hart Spring FM — CARLTON GROUP
		Antrim Plateau Volcanics		Antrim Plateau Volcanics
PRE-CAMBRIAN		Basement	Basement	Basement

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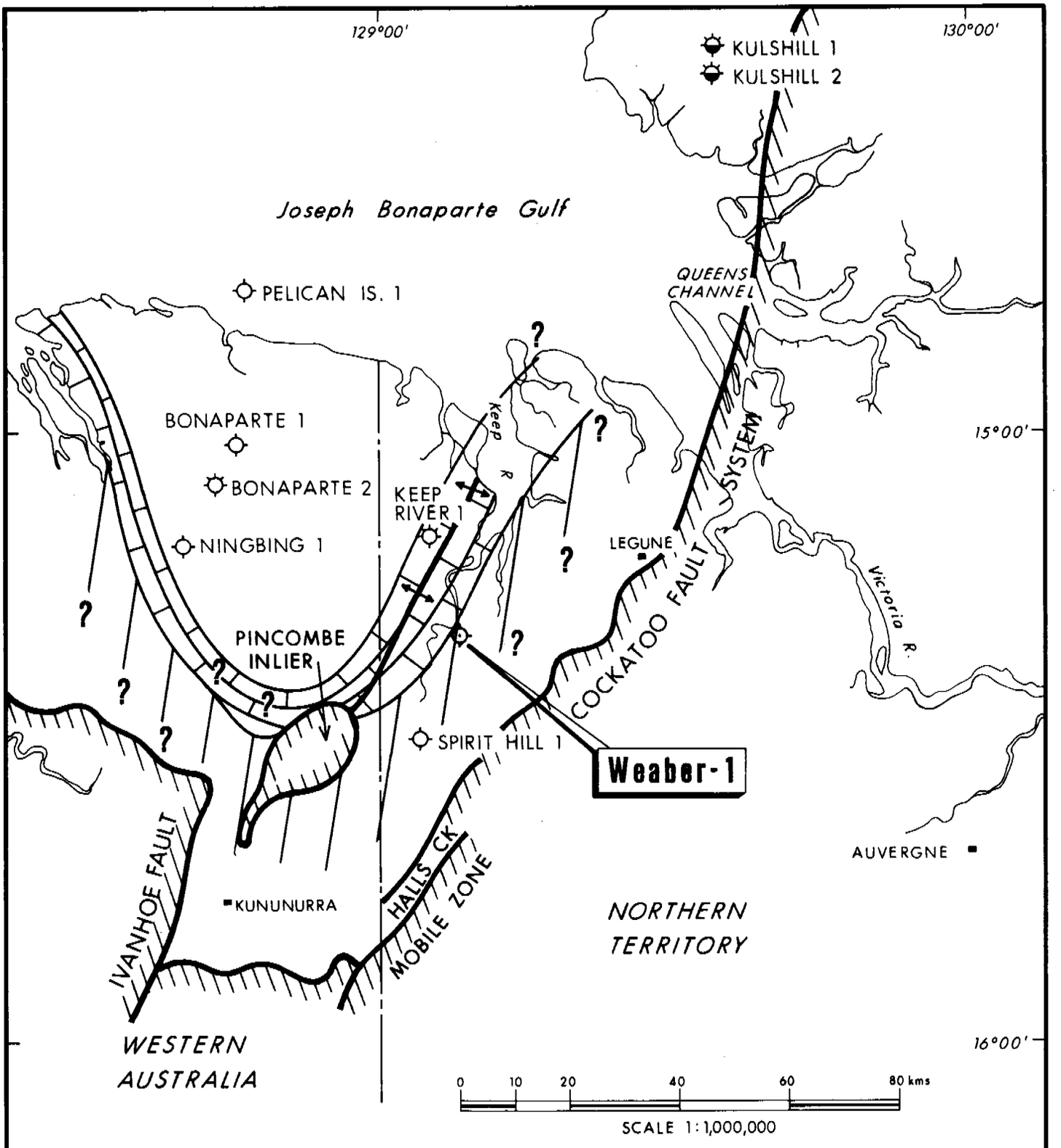
Author: I.GARSIDE	Date: JAN., 1983	Dwg No: 21459
Drafted by: L.J.	Report No: PG/181/82	Base Plan:



LEGEND

Button beds

Ningbing Limestone carbonate trend.

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NINGBING LIMESTONE CARBONATE PROVINCE

Author: I.E. GARSIDE	Date: JAN., 1983	Dwg No: 21973	FIG.6
Drafted by: L.J.	Report No: PG/181/82	Base Plan: 21456	

D. STRATIGRAPHY OF WEABER NO. 1

The stratigraphic subdivisions for Weaber No. 1 are shown in Table No. 6. Palynological studies by Dr. C. Keraus, Appendix V, Conodont Studies by B.M. Nicoll (B.M.R.) Appendix IV and electric log correlations, combined with Veevers J.J. and Roberts J. (BMR BULL 97) and the Well Completion Report Keep River No. 1 were used for correlation purposes.

All depths quoted are from the KB, 23.6m above mean sea level. First samples were collected at 20m after setting the conductor pipe.

Kulshill Formation: Early Permian: Ground level to 264m

It consists of interbedded sandstones and siltstones. Sandstones make up 80% of the section. They are clear to white and translucent, fine to coarse-grained with individual beds of fine, medium and occasionally coarse grained sands. Gravel beds were intersected over the intervals 32 to 41m and 71 to 77m. Generally poor to moderately sorted, and sub-angular, the sands are moderately cemented, non-calcareous, and contain quartz overgrowths and occasional intergranular pyrite.

The siltstones vary from dark brown to grey, they are hard to soft, fissile, thinly-laminated, non calcareous with thin beds of highly calcareous material and laminations of hard vitreous coal. No age dating material was recovered from the section. The base of the Kulshill Formation has been picked by log correlations with Keep River No. 1. It is the point where the sands change from a average gammaray reading of 30API units to 45API units (Enclosure 4).

Tanmurra Formation: Upper Visean to Early Namurian
264m to 430m

The formation consists of interbedded sandstones and siltstone. The sandstones are clear, white, opaque and occasionally green (chloritic), fine to medium-grained with occasional coarse-grained beds. The fine-grained faction is well-sorted, the remainder moderately sorted, sub-angular to sub-rounded with the coarse-grained faction angular and loose. The fine to medium-grained faction is well cemented (siliceous). The sands are non calcareous, slightly pyritic and have fair to good porosity.

The siltstones are medium to dark grey, firm to hard, non fissile, slightly calcareous in the lower beds and slightly pyritic.

The base of the Tanmurra Formation is placed at a sharp change in the gammaray reading from 60 API units to 150 API units (Enclosure 4). The same sharp change is noted in Keep River No. 1 and marks the top of the Bonaparte/ Milligans Beds.

Bonaparte/Milligans Beds: Late Tournaisian to Visean 430m to 1,206m?

Generally a siltstone/shale sequence with interbedded sandstones.

430m to 615m. Siltstone, light to medium grey becoming dark grey with depth, firm to hard, finely laminated, non to slightly calcareous, micro-micaceous with disseminated pyrite. Forams were observed but not identified at the well site. The siltstones frequently grade to sandstones, very fine-grained, off white to yellow brown, moderately to well-sorted, sub-angular, slightly calcareous with siliceous cement. Bed thickness is approximately 1 to 3 metres.

615 to 655m. Sandstone. This bed is the thickest sandstone in the Bonaparte/Milligans Beds. The sandstones are clear to white, fine to medium-grained, well-sorted, sub-angular, poorly-cemented and friable.

On the HDT log the sands exhibit a typical red pattern dipping SE indicative of an offshore bar. Beneath the sand a typical blue pattern, showing ESE dip, may represent an unconformity. A structural dip pattern at 520m indicates a westerly dip at 10°; a further structural dip pattern below the blue pattern indicates a northeast to southeast dip at 2 to 4° over the interval 680m to 780m. This possible unconformity may represent the Milligans Beds transgression.

From 655m to 775m the section is mainly siltstone and shale with minor interbeds of sandstone. The shales are light to medium blue grey, firm, massive, slightly fissile becoming fissile with depth, micro-micaceous and slightly dolomitic.

The siltstones are medium grey to grey green, mottled, massive to occasionally laminated, non-calcareous and non-pyritic. The sandstones in beds up to 1.5m thick, are clear, white, offwhite and brown, fine to medium-grained, moderately to well-sorted, calcareous and dolomitic. The dip of this interval is 2 to 4° northeast to southeast.

From 775m to 825m the section consists of interbedded sandstones and shales. The sandstones are white to translucent, fine to medium-grained, well-sorted, sub-rounded, dolomitic and siliceously cemented. Beds range from 1.5 to 2.5m thick and appear to dip to the northwest. Shales are medium grey brown, firm, massive, sub-fissile and slightly micaceous. Lenticular and slightly cupped cuttings may indicate some overpressure.

Interval 825 to 1206m is mainly shale with minor siltstone interbeds. The shales are medium to dark grey, firm, massive to laminated, fissile, and frequently carbonaceous. Below 1,190m the shales have an indurated appearance. From 950m to 1,206m large lenticular, cupped cuttings indicate definite overpressure which was controlled by increasing the mud weight. The siltstones are medium brown to light grey, firm to hard, massive to thinly laminated and calcareous.

The base of the Bonaparte/Milligans Beds has been placed at 1,206m based on five criteria.

1. The sequence immediately below 1206m becomes very sandy and thinly bedded.

2. Age dating by the B.M.R. indicates fauna of Bonaparte Beds/Septimus Limestone age between 950 to 980m. The dating is based, however, on one specimen only. However it indicates that the boundary can't be above 980m. Since the sequence is lithologically continuous and the dipmeter is consistent, the boundary is probably at 1,206m.

3. On the HDT the beds above 1,206m show a scattered dip angle between .5 and 10°, with azimuths varying from northeast to east and no apparent pattern. From 1,187m to 1,200m a strong and definite red pattern is developed with a consistent structural dip pattern immediately below dipping 4° to the northeast. The red pattern probably indicates faulting.

4. In both Keep River No. 1 and Weaber No. 1, immediately above the base of the Bonaparte/ Milligans Beds, two distinct, upwards coarsening patterns can be interpreted from the gammaray (Enclosure 4).

Although the two patterns may be coincidental, there is a strong likelihood that they reflect a legitimate correlation between the two wells.

5. The sonic log shows a consistent increase over the initial 1,206 to 1,396 metres. The Δt changes from an average of 95 μsec/m above 1206m to 75 μsec/m below 1206m.

Keep River Group: Visean to Tournaisian

The Keep River Group is provisionally assigned to the section from 1,206m to 1,667m. Three members are probably present:

Septimus Limestone	1,206 to 1,396m
Enga Sandstone	1,396 to 1,414m
Burt Range Formation	1,414 to 1,667m

The identification of these members is based on the following:

1. Palaeontological studies by the BMR positively identified one species, FELLERITES SPECIES A, interval 1640 - 1670m whose age is known on the eastern platform to be that of the mid-Burt Range Formation.

2. Aquitaine Australian Minerals Pty. Ltd have positively identified a basinwide, upper Burt Range Formation, angular unconformity. This unconformity can be seen on the HDT log between 1,530 to 1,540m (Fig. 9). Correlation between gamma ray curves of mineral bore holes and Weaber No. 1 supports the presense of this unconformity.

Septimus Limestone: Tournaisian 1,206m to 1,396m

This formation consists of interbedded siltstones, sandstones and shales. The siltstones are dark grey brown, firm to hard, slightly laminated, sub-fissile to blocky, indurated, moderately calcareous with disseminated and nodular pyrite. The sandstones are clear, white and cream in beds of fine, medium and occasionally coarse-grained. Bed thickness reaches 5 metres. The sands are generally well-sorted, sub-rounded to angular (coarse faction), well-cemented (siliceous and dolomitic) with tight to fair porosity (visual). The shales are dark grey, firm to brittle, silty, slightly micromicaceous with minor laminated zones. Below 1,316m minor calcilutite bands are generally firm, brittle, with rare development of a sucrosic texture. The base of the Septimus Limestone has been placed at 1,396m immediately above a 18m sand. No age dating is available to establish this boundary. The only evidence for a possible formation change exists on the HDT. The interval 1,355 to 1,396m shows two distinct blue to red patterns although within the sand the dips are variable with scattered azimuths.

Enga Sandstone: 1,396 to 1,414m

The sandstone is 18 metres thick and has an average gamma ray reading of 30API units. It is clear to white, very fine to fine-grained, well-sorted, sub-rounded, well-cemented (dolomitic) and firm to hard. The HDT pattern indicates cross bedding or massive bedding. In outcrop the Enga Sandstone has a very similar lithology with cross bedding near the Cockatoo Fault Complex grading to flat bedding away from the fault complex. In outcrop the Enga Sandstone conformably overlies the Burt Range Formation and is paraconformably overlain by the Septimus Limestone.

There is no other supportive evidence to identify this sand as the Enga Sandstone.

Burt Range Formation: Tournaisian 1,414m to 1,667m

This formation consists of interbedded sandstones, siltstones, shales and limestones (basal zone) deposited in three upward fining sequences.

Upper sequence: 1,414m to 1,465m: The upper 38m consists of interbedded siltstones and shales. The siltstones are dark brown, firm, non-calcareous, slightly dolomitic and grade to shale, medium grey to grey brown, subfissile and non-calcareous. The basal 13m is a silty sandstone fine to medium-grained, occasionally coarse-grained, poorly-sorted, sub-rounded, well-cemented (calcareous/dolomitic), hard with a silty matrix.

Middle sequence 1,465m to 1,538m. Upper 13m consists of interbedded siltstones and shales. The siltstones are dark grey brown, laminated, slightly carbonaceous, non-calcareous and slightly dolomitic. The shales are dark grey to black, fissile, carbonaceous and calcareous.

The lower 50m consists of interbedded sandstones, limestones and siltstones. The sands are white to clear, very fine-grained, well-sorted and well-cemented (siliceous). Thin stringers of mottled, white to black, soft, flaky, calcilutite are interbedded and interlaminated with the siltstone. The 8° angular unconformity occurs at 1,540m.

Lower Sequence: 1,538 to 1,667m. The upper 76m consists of interbedded siltstones and limestones. The siltstones are black to grey brown, carbonaceous, slightly pyritic, brittle, calcareous, and slightly laminated. The limestones are white cream and brown, occasionally mottled, calcilutites and calcisiltites and occur as thin stringers. The basal 53m consists of interbedded siltstones and limestones. The siltstones are grey to brown, laminated, calcareous, fossiliferous. The limestones are white, cream to tan, mottled calcisiltites and calcilutites grading to white and light grey, hard, partially crystalline calcilutites and calcisiltites

The HDT shows the Burt Range Formation to be well-bedded above and below the unconformity (Fig. 9) with the middle sequence showing strong red and blue patterns. Above the unconformity structural dips are 2 to 4° east northeast and below, the unconformity, 10-12° northeast.

Ningbing Limestone: Famennian 1,667m to 1,949m

The top of the limestone has been picked using drill rate, gamma ray, density, sonic and lithology data. The limestone is white to buff and light grey, hard, cryptocrystalline to microcrystalline. Presence of calcite rhombs below 1,793m may be indicative of vugular porosity, fractures or both. Below 1,829m quartz sand content increases to a maximum of 20%. Highly calcareous, dark grey, fissile shales and siltstones are interbedded with the limestone. Dr C. Kerans has described a section of core No. 2 over the interval 1,679.6m to 1,679.7m, as a "quartz" - peloidal - oncolite - Packstone (Dunham). The fauna suggests a "shallow subtidal depositional environment probably in water depths of 10m or less. Oncalites are indicative of moderate wave aggitation". Dr. C. Keraus's report is presented as Appendix No.V.

The interbedded shales and silts, combined with the increase in quartz percentage with depth, are interpreted to be indicative of a lagoonal environment of deposition similar to the Buttons Beds.

ONSHORE BONAPARTE BASIN

STRATIGRAPHIC TABLE
WEABER No.1

PERIOD	EPOCH	FORMATION		DEPTH (m) K.B. 23·6m AMSL	THICKNESS (m)
LATE CARBONIFEROUS - EARLY PERMIAN		KULSHILL FORMATION		K.B. (MSL)	264+
				264 (240·4)	
CARBONIFEROUS	NAMURIAN	TANMURRA FORMATION			166
				430 (406·4)	
	VISEAN	BONAPARTE / MILLIGANS BEDS			776
				1206 (1182·4)	?
	TOURNAISIAN	KEEP RIVER GROUP	SEPTIMUS LIMESTONE?		190
				1396 (1372·4)	
			ENGA SANDSTONE?		18
				1414 (1390·4)	
			BURT RANGE FORMATION		253
				1667 (1643·4)	
DEVONIAN	FAMENNIAN	NINGBING LIMESTONE		T.D. 1950 (1926·4)	283+

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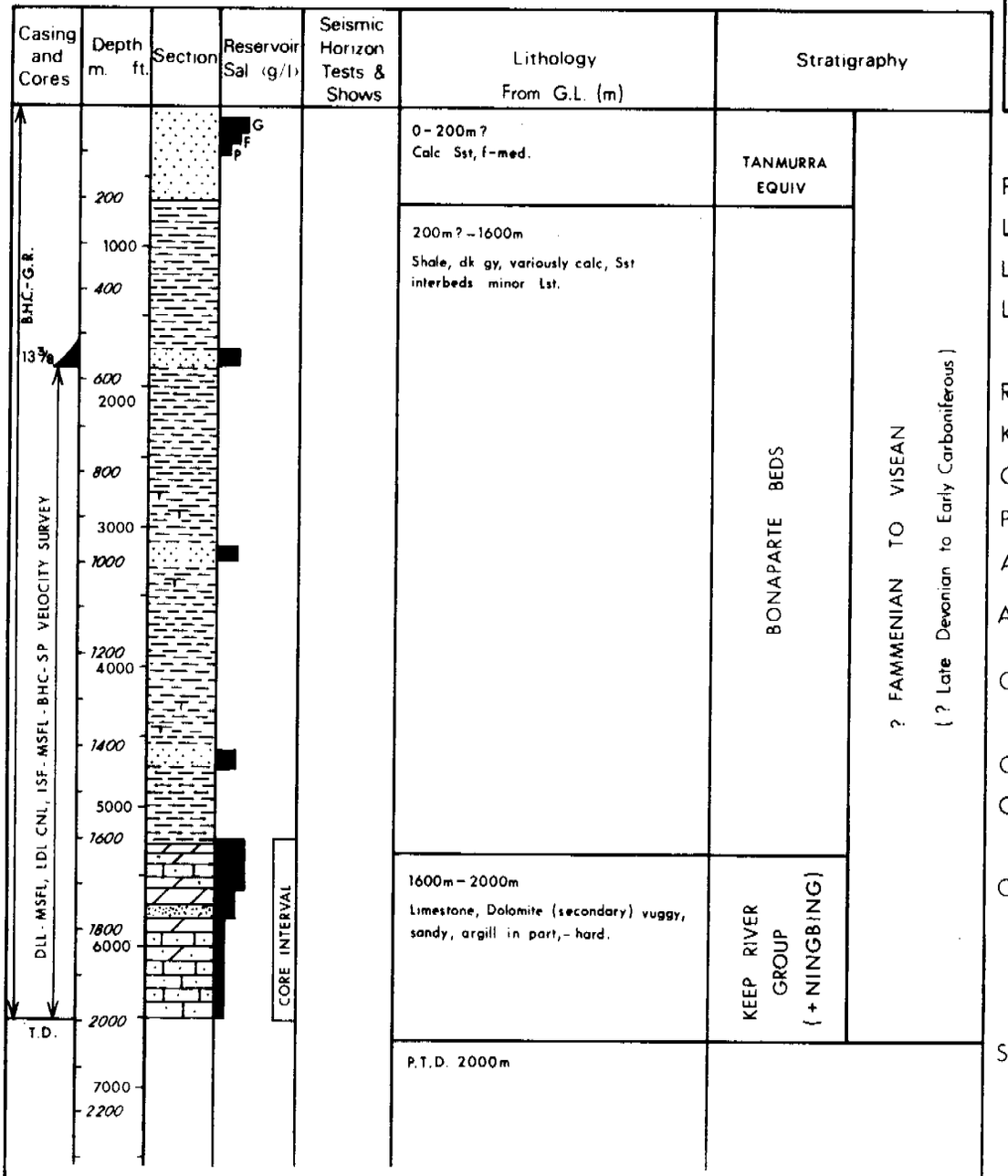
Author: I.E.GARSIDE	*Date:* APRIL, 1983	*Dwg No:* 21751
Drafted by: L.J.	*Report No:* PG/181/82	*Base Plan:*

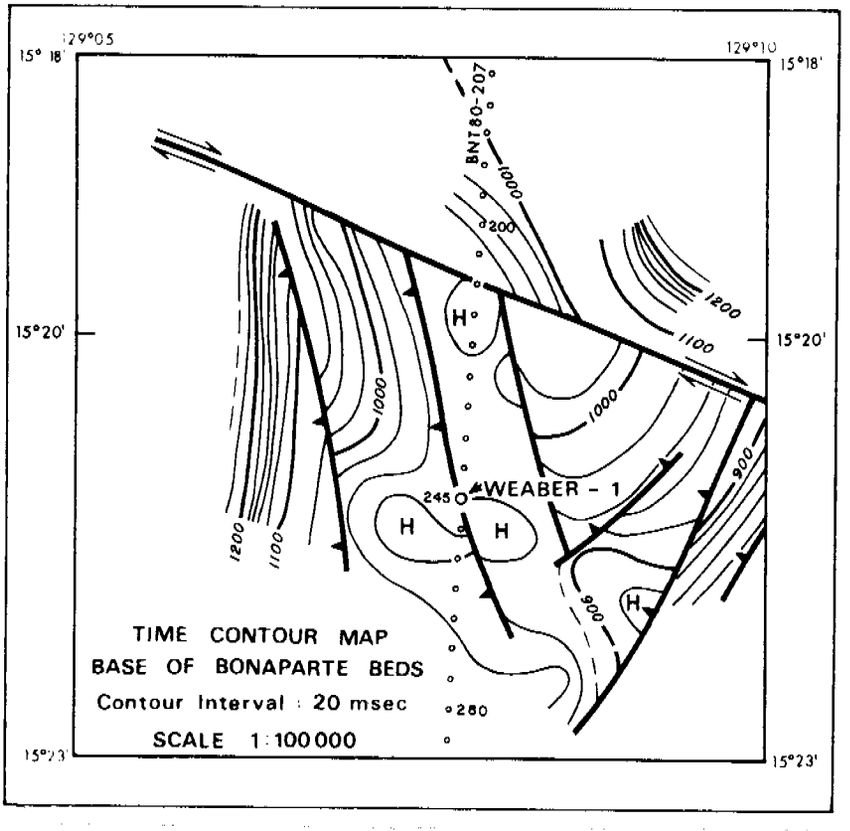
TABLE 6

AUSTRALIAN AQUITAINE PETROLEUM PTY. LIMITED

WEABER No.1

PREDICTED SECTION





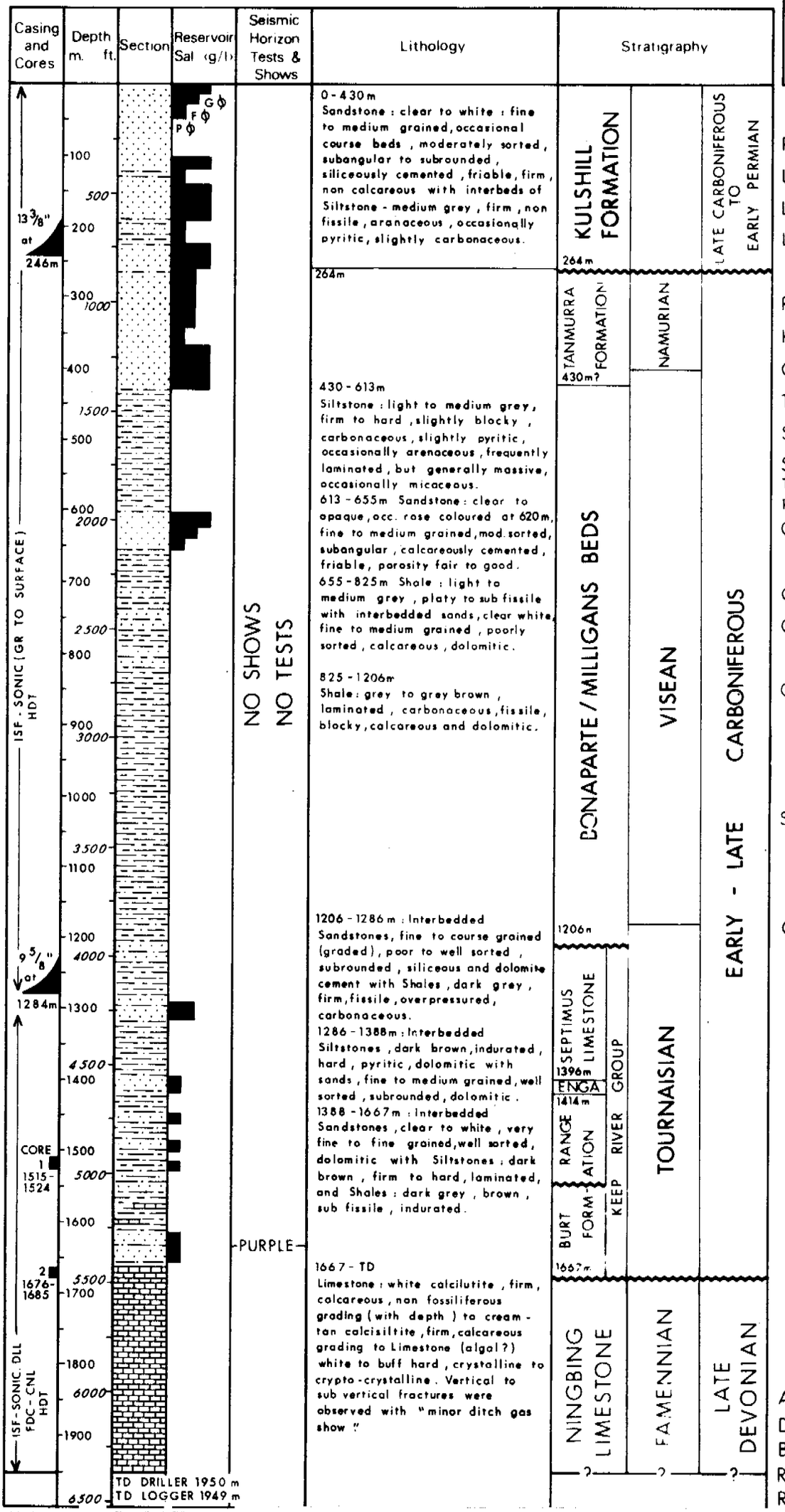
Permit	OP 186
Location	S.P.245 line BNT80-207
Latitude	15° 21' 14·22" S
Longitude	129° 07' 46·53"
Rig	ATCO A1 Nat 610
K.B.	6m approx.
G.L.	17·6m A.M.S.L.
P.T.D.	2000m
Approx Spud Date:	1/9/82
Approx Duration:	28 days
Operator	A.A.P
Cost	$ 1·1 million
Cost /ft.	
Objectives	Keep River Gp. plus Ningbing (?) carbonates
Structure	Carbonate bank margin ?
Comments	1. Coring on shows 2. Testing during drilling

FIG. 7

Author: V. DJOKIC
Date: JUNE 1982
Base Map No 9112
Reference No. 20859

AUSTRALIAN AQUITAINE PETROLEUM PTY. LIMITED

WEABER No.1
FINAL DRILLED SECTION



Permit OP 186

Location Onshore , North Western Australia. Bonaparte Basin.

Latitude 15° 21' 10·4 " S

Longitude 129° 07' 48·9" E

Rig ATCO : Rig 1 , Nat. 610

K.B. 6·2m AGL

G.L. 17·6m AMSL

T.D. 1950 m (K B)

Status Plugged & Abandoned

Spudded 14th Sept., 1982

TD reached . 16/ 10/82

Rig released : 18/ 10/82

Operator Australian Aquitaine Petroleum Pty Ltd.

Cost $1 500 000 (A)

Cost /m $769 (A)

Objectives Primary : To evaluate the Devonian Ningbing Limestone. Secondary : To evaluate Sandstone Reservoirs within the Bonaparte Beds.

Structure A closed anomaly on the Ningbing Carbonate Platform margin.

Comments

(1) Sands within the Bonaparte Beds were intersected . Minor gas was recorded, no hydrocarbons were observed.

(2) The Ningbing Limestone was encountered at 1667m (KB). No shows were observed , minor gas was recorded in the mud system.

(3) No DST were run.

(4) Two cores were cut — No 1 : 1515 to 1524m Recovered minor Limestone and black Shale. No 2 : 1676 to 1685m Recovered 100% Limestone. No shows were observed in either cores.

(5) BHT MEAS. 86·1° c EXTRAP.

FIG. 8

Author: I.E. GARSIDE

Date: 4 - 11 - 1982

Base Map No 9112

Reference No : 21227

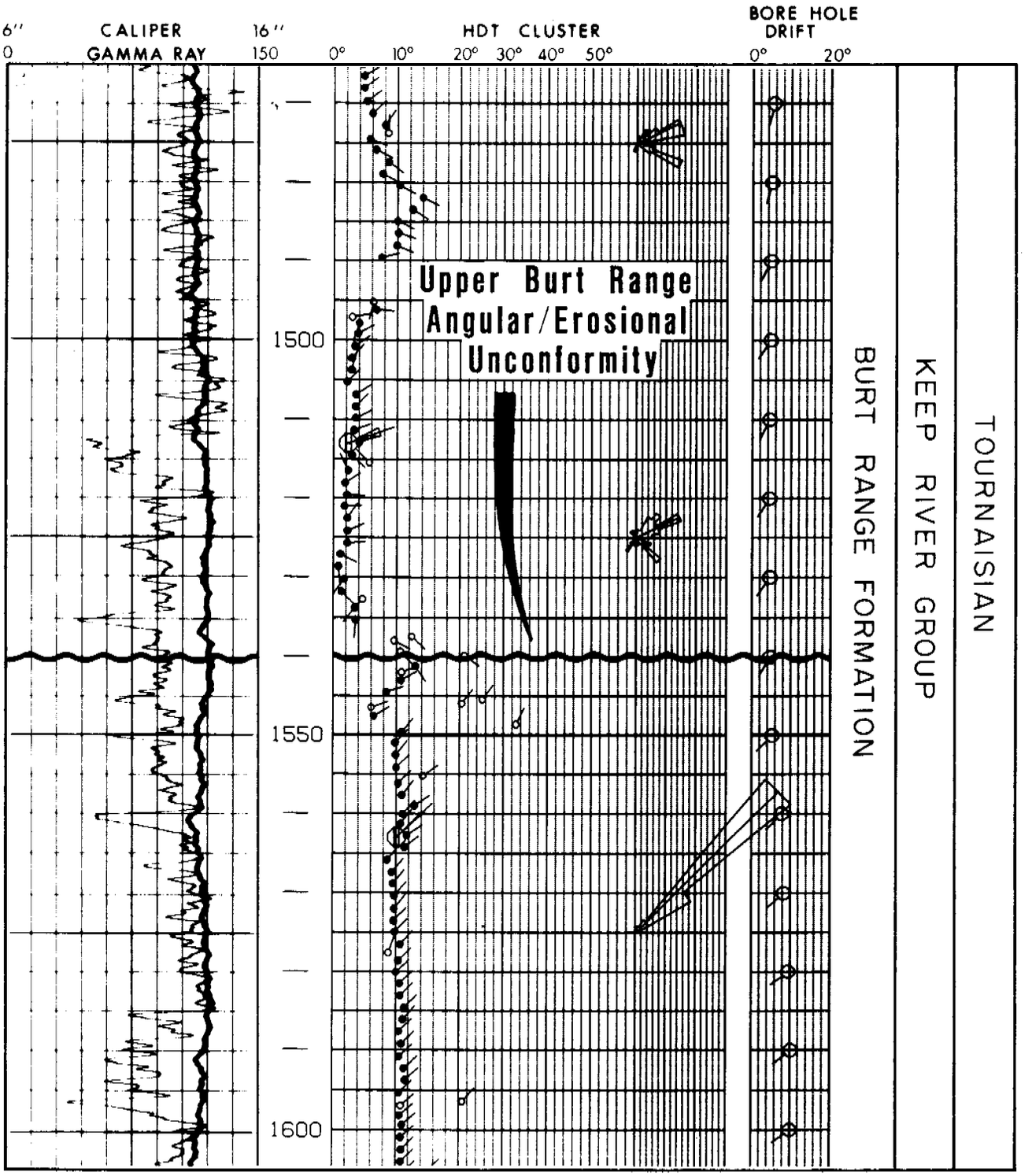
Report No: PG/196/83

BONAPARTE GULF

WEABER No.1 HDT/GAMMA RAY LOG

"Upper Burt Range Angular Unconformity"

Vertical Scale 1:500 Depth from KB 23.6m AMSL



australian aquitaine petroleum pty ltd

Author: I.E.GARSIDE	Date: APRIL, 1983	Dwg No: 21752	FIG.9
Drafted by: L.J.	Report No: PG/181/82	Base Plan:	

E. STRUCTURE

The Weaber carbonate bank anomaly was identified and mapped using the semi-detailed grid of the B.N.T. 81 seismic survey. Possible structural closure was mapped on the purple horizon (Fig. 10). This closure is thought to have formed along a north-northwest trending horst block. The closure is dependant on fault configuration, and seismic quality is rarely better than average in the area. Prior to drilling Weaber No. 1, the purple horizon, (Fig. 11 & 12), was interpreted as coinciding with the base of Carboniferous Milligans Beds (Fig 10). Analysis of the velocity survey shows the purple horizon to be equilavent to the Upper Burt Range angular unconformity intersected at 1,540m in Weaber No. 1, (Fig. 9).

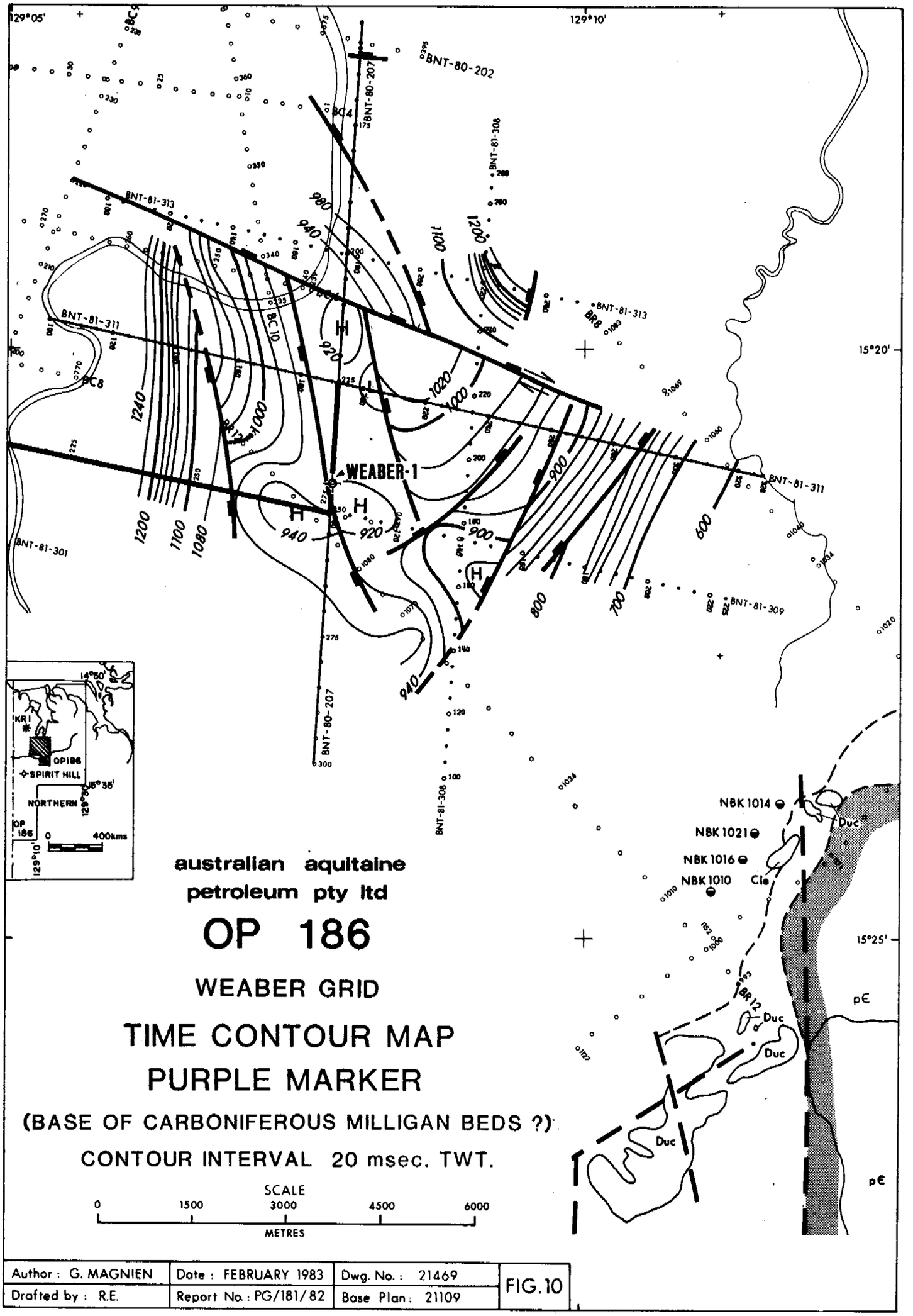
The base of the Bonaparte/Milligans Beds has been marked as the "green horizon", on Figs. 11 & 12. However, the seismic quality is very poor and any lateral continuity is difficult to map.

The top of the Ningbing limestone equivalent can not be observed on the seismic as it is masked by the highly calcareous basal Burt Range Formation. However, the carbonate bank is clearly seen on the seismic line BNT-81-311 (Fig. 11).

To the west of the Weaber No. 1 location, the Upper Burt Range unconformity dips steeply into the Burt Range Syncline. This steep dip defines the eastern edge of the unconformity and a NNW trending palaeo re-entrant was probably present during deposition of the Ningbing Limestone intersected in Weaber No. 1. The presence of a tidal-type channel would explain the northeast dips in the Ningbing limestone and Burt Range Formation. The carbonates would have been deposited in the shallow, tidal-controlled waters bordering the edge of the channel.

The yellow horizon was originally thought to represent the top of the Cambrian Carlton Group. It is probably nearer the top of the Cockatoo Formation of Frasnian age. Seismic sections elsewhere show the unconformity to be coincident with this yellow horizon.

The red horizon is shown in Fig. 11 & 12 as a possible basement horizon "Carlton Group" of Cambrian age. If the yellow and red horizons are correctly identified then the Burt Range Syncline section near the Cockatoo Fault complex is thicker than previously thought.



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OP 186

WEABER GRID

TIME CONTOUR MAP

PURPLE MARKER

(BASE OF CARBONIFEROUS MILLIGAN BEDS ?)

CONTOUR INTERVAL 20 msec. TWT.

SCALE

0 1500 3000 4500 6000

METRES

Author : G. MAGNIEN	Date : FEBRUARY 1983	Dwg. No. : 21469	FIG.10
Drafted by : R.E.	Report No. : PG/181/82	Base Plan : 21109	

RELEVANCE TO THE OCCURRENCE OF HYDROCARBONS

No indications of live oil were detected by the logging unit.

Traces of direct dull gold mineral fluorescence only were recorded over the intervals 665m to 752m, and 1,223m to 1,262m.

The maximum total gas recorded was 4.2% (C_1 3.1% C_2 + C 0.2%) at 1463m. This gas show originated from a 1.5m sand, the uppermost of a group of four thin sands in the upper Burt Range Formation.

The first signs of heavy hydrocarbons, to a maximum of trace C_4, were recorded at 755m. The maximum % C_3 + C_4 was 0.12% over the interval 1,262m to 1,277m.

Two sandstone beds at 615m to 655m, and 1,395m to 1,415m recorded a very high negative SP response.

The sand zone from 615m to 655m had a maximum total gas show of 0.35% at 638m: C_1 = .29%, C_2, C_3 C_4 Nil. No fluorescence was recorded or observed in this zone. A trace of dull gold fluorescence with no cut was recorded in the silts and shales below this zone.

The sand zone from 1,395 to 1,415m had a maximum total gas show of 3.12% at 1412m, C_1 = 1.9%, C_2 + C_3 = .2%.

A trace of pin point fluorescence, dull gold with an instant slow streaming cut, was recorded at 1,397m. The fluorescence observed was unusual in its colour and distribution within the sample. Contamination by additives was suspected at the time, and on checking, was found not to be the case.

The pipe dope was then checked and found to have identical characteristics to the fluorescence and dispersion within the samples. This dope had been used on the two previous connections and was a different brand from the standard dope used on Rig A1. The contaminating fluorescence disappeared when a new tin of the standard pipe dope was used.

The high (-85 mV) SP recorded in the sandstone 1396m-1414m is very significant. Normally, in a porous and permeable reservoir, this would be indicative of water salinities in the vicinity of 54,000 ppm (141°F and Rmf 0.7 ohm-m). Furthermore, with those salinities, a porosity of 10% and an Sw of 50%, the Rt should read 28 ohm-m. At Weaber No. 1 the resistivities were in the range 45-47 ohm-m. Conversely, with the measured resistivities and supposing 100% water saturation, Rw would be 0.42 ohm-m, equivalent to a salinity of 7000 ppm and an SP of only -28 mV.

There are a number of alternative explanations:

(a) The SP is reading correctly and the reservoir is hydrocarbon-bearing with high water salinity. The high resistivities still need to be explained.

(b) The SP is incorrect and the reservoir is saturated with fresh water.

(c) The SP is reading correctly but is influenced by important electrokinetic effects brought about by low permeabilities and absence of mudcake. In this case the abnormally high negative deflection cannot be used in calculating the Rw.

Thin section studies of cuttings show extensive destruction of permeability by silicification, and for this reason the third explanation is favoured. The interval was not tested at the time because there had been no manifestation of oil

in the mud (SG 1.09) and only minor gas shows during drilling. The salinity of the mud remained a constant 850-1000 ppm and neither gains nor losses were recorded during or after penetration of the sand interval.

Any hydrocarbon accumulation would almost certainly be gas, based on the source rock assessment at Weaber No. 1

CONTRIBUTIONS TO GEOLOGICAL CONCEPTS

1. Weaber No. 1 proved the existence of a carbonate bank of probable Ningbing age eqivalence east of the Pincombe High trend.

2. Carbonate reservoirs intersected were tight with no apparent primary or secondary porosity.

3. Entrapment of hydrocarbons was not apparent in the carbonates.

4. Shales and silts of the Bonaparte/Milligans Beds do not lie in direct contact with the Ningbing limestones at Weaber No. 1.

5. Sands within the Bonaparte/Milligins Beds, although having fair to good porosity, were found to be non-hydrocarbon bearing due to either lack of generation or lack of structural closure.

6. The purple horizon, originally interpreted to be the base of the Bonaparte/Milligans Beds, corresponds in fact, to the upper Burt Range angular unconformity.

7. The thickness of the Bonaparte/Milligans Beds in Weaber No. 1 is 776m and thickens to 2,142m at Keep River No. 1 demonstrating continuous active movement west of the Pincombe High Trend.

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