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PETROLEUM DIVISION

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VIC/P19
BASKER-MANTA BLOCK
RESOURCE AND RESERVES ESTIMATE

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September 1998

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VIC/P19 BASKER-MANTA BLOCK
RESOURCE ESTIMATE

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VIC/P19 BASKER-MANTA BLOCK
RESOURCE ESTIMATE

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Summary

Proven, proven and probable, and possible 3P GIP and reserves are listed on the following tables.

Significant gas resources are mapped in the Manta field in the Golden Beach Group (204 Bcf GIP) and lower Latrobe Group (109 Bcf GIP), but half of the 309 Bcf of 2P accessible gas is contained in the northwest part of the structure and will need confirmation by an appraisal well.

A small gas pool in the U3 sandstone in the Gummy fault block could be developed in conjunction with Manta.

Both Manta and Gummy gas are very rich in liquid hydrocarbons, containing a total of 17.1 MMBOE reserves, together with the 219 PJ of sales gas.

Both Basker and Manta fields contain small oil pools which are currently considered uneconomic.

BASKER MANTA GUMMY FIELDS

PROVEN RESERVES

Unit	Zone	OIP (MMSTB)	GIP (BCF)	Accessed Gas	Recovery Efficiency	Sales Gas (PJ)	LPG (kt)	Condensate (kbbl)
Basker-1								
B	1		3.4					
Zone 1	1 (Water)							
D	2	14.5						
E	3		6.9					
F	4	1.0						
Zone 4	4 (Water)							
G	5		4.0					
I	6	0.8						
J	7							
Sub Total		**16.3**	**14.3**					
Manta-1								
B	2	3.3						
C	3		3.9					
D	4	1.5						
E	5		26.6	26.6	0.735	16.8	42.5	448.8
G/H	6		13.7	13.7	0.735	8.6	21.9	231.2
I/J	7	8.3	14.3	14.3	0.735	9.0	22.9	241.3
M3			1.5				0.0	0.0
M2			1.5				0.0	0.0
M1	8		3.9	3.9	0.697	2.5	9.3	108.8
U3	8		98.0	98.0	0.697	61.8	234.6	2734.3
Sub Total		**13.1**	**163.4**	**156.5**		**98.7**	**331.3**	**3764.3**
Gummy-1								
G4	1		3.6					
G3	1		3.5					
G2	2		0.5					
G1	2		1.5					
Upper U3	3a		10.5	10.5	0.682	6.5	24.6	286.7
U3	3b		17.9	17.9	0.682	11.0	41.9	488.7
Sub Total			**37.5**	**28.4**		**17.5**	**66.5**	**775.3**
TOTAL			**215.2**			**116.2**	**397.8**	**4539.7**

liquids mmboe 9.2

total mmboe 28.5

BASKER MANTA GUMMY FIELDS

PROVEN and PROBABLE RESERVES

Unit	Zone	OIP (MMSTB)	GIP (BCF)	Accessed Gas	Recovery Efficiency	Sales Gas (PJ)	LPG (kt)	Condensate (kbbl)
Basker-1								
B	1		3.4					
Zone 1	1 (Water)							
D	2	17.4	6.4					
E	3		6.9					
F	4	2.0	2.5					
Zone 4	4 (Water)							
G	5		4.0					
I	6	1.2	1.0					
J	7	1.1	2.7					
Sub Total		**21.7**	**26.9**					
Manta-1								
B	2	4.2	0.6					
C	3		3.9					
D	4	2.0	0.7					
E	5		53.2	53.2	0.735	33.6	85.1	897.6
G/H	6		27.5	27.5	0.735	17.4	44.0	464.0
I/J	7	16.6	28.6	28.6	0.735	18.1	45.7	482.6
M3			1.5			0.0		
M2			1.5			0.0		
M1	8		7.8	3.9	0.697	2.5	9.3	108.8
U3	8		196.0	196.0	0.697	123.5	469.2	5467.0
Sub Total		**22.8**	**321.3**	**309.2**		**195.0**	**653.3**	**7420.0**
Gummy-1								
G4	1		3.6					
G3	1		7.0					
G2	2		1.0					
G1	2		3.0					
Upper U3	3a		21.0	21.0	0.682	13.0	49.2	573.4
U3	3b		17.9	17.9	0.682	11.0	41.9	488.7
Sub Total		**0.0**	**53.5**	**38.9**		**24.0**	**91.1**	**1062.1**
TOTAL		**44.5**	**401.7**	**348.1**		**219.0**	**744.4**	**8482.1**
							liquids mmboe	17.1
							total mmboe	53.6

BASKER MANTA GUMMY FIELDS

PROVEN, PROBABLE and POSSIBLE RESERVES

Unit	Zone	OIP (MMSTB)	GIP (BCF)	Accessed Gas	Recovery Efficiency	Sales Gas (PJ)	LPG (kt)	Condensate (kbbl)
Basker-1								
B	1		7.6					
Zone 1	1 (Water)	4.1	8.9					
D	2	23.7	6.4					
E	3		7.6					
F	4	3.6	2.5					
Zone 4	4 (Water)	2.8	6.5					
G	5		6.7					
I	6	2.0	1.0					
J	7	2.5	2.7					
Sub Total		**38.7**	**49.9**					
Manta-1								
B	2	4.5	0.6					
C	3		3.9					
D	4	3.7	0.7					
E	5		53.2	53.2	0.735	33.6	85.1	897.6
G/H	6		27.5	27.5	0.735	17.4	44.0	464.0
I/J	7	16.6	28.6	28.6	0.735	18.1	45.7	482.6
M3			3.0					
M2			3.0					
M1	8		27.0	13.5	0.697	8.5	32.3	376.6
U3	8		216.0	216.0	0.697	136.1	517.0	6024.9
Sub Total		**24.8**	**363.5**	**338.8**		**213.7**	**724.1**	**8245.7**
Gummy-1								
G4	1		3.6					
G3	1		8.0					
G2	2		2.8					
G1	2		8.5					
Upper U3	3a		52.0	52.0	0.682	32.1	121.8	1419.7
U3	3b		20.9	20.9	0.680	12.9	48.8	568.9
Sub Total		**0.0**	**95.8**	**72.9**		**44.9**	**170.7**	**1988.6**
TOTAL		**63.5**	**509.2**	**411.7**		**258.6**	**894.8**	**10234**
							liquids mmboe	20.6
							total mmboe	63.7

Several thin (1 – 2 m) gas bearing sandstones are present from 3200 m KB to the U3 pool. Pressure data shows they are in four separate pools (refer Figure 1), which are either isolated and overpressured or are connected to the regional water gradient and have substantial columns.

Assuming that they have large columns:

GWC G 1 = 3496 mss giving a 142 m column

GWC G 2 = 3437 mss giving a 116 m column

GWC G 3 = 3350 mss giving a 108 m column

GWC G 4 = 3213 mss (3237 mss) giving a 49 m column (73m)

3. Gas Composition

Pressure gradient = 0.455 psi/m (0.139 psi/ft)

This equates to a molecular wt of 29, very close to that of gas tested from the U3 sst in Manta-1 (27.7) 2.9% CO_2 was present in Manta.

4. Net Pay, Porosity and Water Saturation

All permeable sand above 0.5 md was considered net pay, as estimates of well deliverability show that sands of this calibre would produce of the order of 20% of their contained gas over the expected life of the field.

Permeable sand was estimated, using log indicators such as caliper, resistivity separation, SP and porosity. These indicators agreed with RFT data.

Note that porosity and hydrocarbon saturation cut-offs were not used (although the porosity of net pay was generally >= 9%).

Shell's original log analysis contained in the Gummy Well Completion Report was used for porosity and water saturation values. (Enclosure 6) Computed water saturations are reasonably consistent with the indicated rock quality and hydrocarbon columns. The permeabilities of a few tens of millidarcies (derived from RFT tests and porosity / permeability relationships from Manta-1 core in the U3 sandstone), when related to the appropriate capillary pressure data (Figure 6, Kipper-2 Golden Beach Group), result in water saturations of 40 - 60%. The Sw values derived from the capillary pressure curves are about 10% higher than the log derived values.

Note that Shell re-analysed the petrophysics in September 98 and computed slightly higher porosity and higher water saturations than the original interpretation. This interpretation was a better match to the saturations derived from capillary pressures but the ∅ Sg was the same as the original interpretation.

5. Gas In Place

Reservoir parameters for the 5 pools are summarised in the following Table 1. The U3 sandstone is a relatively high energy sandstone unit with interbedded shales and a N/G of

55%. Permeabilities computed from RFT pressure tests and implied from Manta core analysis indicate modest permeabilities. Two zones can be recognised; one with ~19.5m net sandstone at approximately 30 - 80 md and another with ~15.5 net sandstone at approximately 5 - 15 md. These two zones have ϕ and Sg of 12% and 62%, and 9.5% and 45% respectively.

The "Upper" U3 unit, which consists of thinly bedded sandstones 1-2m thick over a 75m interval immediately above the U3, is in the same pool as the U3. Total net sand is 8.5m, of which 6.5m is in the top 30m and 2m is at approximately 3447 mss (covering an area of 4km ^{2}). The other four pools comprise very thin fluvial sands. Net Rock Volume (NRV) for the thin sands was calculated by assuming ribbons of sand covering an area measured at the midpoint of the ribbon.

Table 1
Summary of Reservoir Parameters

Unit	Top (mss)	Gross Thickness (m)	Net (m)	N/G	ϕ	Sg	Expf	GWC (mss)	Area to GWC (km^2)	Area to Midpt (km^2)	GRV (10^6m^3)
G4	3164	22	4.0		0.11	0.5	240	3213		1.9	
G3	3242	1	3.7		0.11	0.5	245	3350		4.5	
G2	3331	-	1.5	-	0.11	0.5	245	3437		11.5	
G1	3354	-	1.5	-	0.11	0.5	245	3496		12.0	
"Upper" U3	3392	75	8.5	-	0.13	0.5	245	3522		11.5	
U3	3467	63	35	0.55	0.11	0.55	245	3522	2		62.3

Table 2
Summary of Gas in Place, Gummy Field.

Unit	Proven (BCF)	Probable (BCF)	Possible (BCF)
G4	3.6	-	-
G3	3.5	3.5	1.0
G2	0.5	0.5	1.8
G1	1.5	1.5	5.5
Upper U3	10.5	10.5	31
U3	17.9	-	3.0
Total	37.5	16	42.3

Refer to Section 6.3 for reserve definitions

6. Reserves

6.1 Drive mechanism

Aquifer pressure support is unknown, but pressure support in the U3 sandstone is likely to be weak while pressure support for the remainder of the sands will probably be very weak. It is therefore interpreted that the pool will be produced under pressure depletion.

Production from the U3 and Upper U3 pool has been modelled assuming that it is produced together with Manta gas and is illustrated in the following table. Production has been modelled to an abandonment pressure of 1,250 psi, and it is estimated that approximately 26.5 Bcf (68%) of the gas in place will be recovered.

6.2 Reservoir Connectivity

Only gas in the U3 and Upper U3 has been assessed to be recoverable. The U3 sand is a fairly widespread sand, of moderately high net / gross. It is therefore interpreted that all the gas present in the relatively small pool will be accessed by one crestal well.

6.3 Reserve Definitions

Proven GIP in thin sands is taken to be that gas within 2 km^2 (800m radius) of the wellbore.
Probable GIP in thin sands is that gas an additional 2 km^2 (ie from radius 800m to 1,130m) from the wellbore
Possible GIP estimations assume deepest GWC possible and the sand covers the whole structure to the GWC

6.4 Recovery Efficiency

Recovery efficiency of 68% has been calculated assuming volumetric depletion, with one well completed with 7" tubing, producing via the Kipper export pipeline. The well was assumed to have been completed over 25m, with an effective average permeability of 15 md. This is likely to be conservative, as noted above and in the discussion of the Manta U3 reservoir.

6.5 Product Yields

The composition of the Gummy accumulation was assumed to be identical to the Manta U3 production test data, and is summarised in Table 4.

Deliverability
Gas wells

Gummy U3 upper U3

Year	Reservoir Pressure psia	Yearly Demand PJ	Average Rate Raw Gas mmscfd	Peak Daily Rate mmscfd	BHP at Peak Rate psia	THP at Peak Rate psia	BHP at Avge Rate psia	THP at Avge Rate psia	Cum Raw Gas BCF	Plant Inlet Pressure psia	P/Line Press Drop psi	P/Line Velocity at exit Ft/sec
1.0	5095.0	2	6.1	8.5	4849.2	3579.5	4920.7	3636.6	2.2	3579.1	0.4	0.3
2.0	4774.9	2	6.1	8.5	4511.6	3329.1	4588.4	3390.4	4.4	3328.7	0.4	0.3
3.0	4454.7	2	6.1	8.5	4171.3	3076.6	4254.2	3142.8	6.6	3076.1	0.5	0.4
4.0	4134.6	2	6.1	8.5	3827.6	2821.3	3917.7	2893.4	8.8	2820.8	0.5	0.4
5.0	3814.5	2	6.1	8.5	3479.3	2562.6	3578.3	2641.7	11.1	2562.0	0.6	0.4
6.0	3494.3	2	6.1	8.5	3125.0	2299.1	3234.8	2387.0	13.3	2298.5	0.6	0.5
7.0	3174.2	2	6.1	8.5	2762.4	2029.1	2886.1	2128.2	15.5	2028.4	0.7	0.6
8.0	2854.1	2	6.1	8.5	2387.7	1749.5	2529.7	1863.5	17.7	1748.6	0.8	0.7
9.0	2533.9	2	6.1	8.5	1994.0	1454.8	2162.1	1590.1	19.9	1453.8	1.0	0.8
10.0	2213.8	2	6.1	8.5	1567.2	1133.2	1776.2	1302.4	22.1	1132.0	1.3	1.0
11.0	1893.6	2	6.1	8.5	1068.3	751.2	1356.4	988.1	24.3	749.3	1.9	1.5
12.0	1573.5	1.5	4.5	6.4	801.6	563.7	1080.0	788.1	26.0	562.3	1.4	1.5
13.0	1333.4	0.5	1.5	2.1	1080.2	796.9	1158.2	855.8	26.5	796.8	0.1	0.4
14.0	1253.4	0	0.0	0.0	1253.4	927.4	1253.4	927.4	26.5	927.4	0.0	0.0
15.0	1253.4	0	0.0	0.0	1253.4	927.4	1253.4	927.4	26.5	927.4	0.0	0.0
16.0	1253.4	0	0.0	0.0	1253.4	927.4	1253.4	927.4	26.5	927.4	0.0	0.0
17.0	1253.4	0	0.0	0.0	1253.4	927.4	1253.4	927.4	26.5	927.4	0.0	0.0
18.0	1253.4	0	0.0	0.0	1253.4	927.4	1253.4	927.4	26.5	927.4	0.0	0.0
19.0	1253.4	0	0.0	0.0	1253.4	927.4	1253.4	927.4	26.5	927.4	0.0	0.0
20.0	1253.4	0	0.0	0.0	1253.4	927.4	1253.4	927.4	26.5	927.4	0.0	0.0
21.0	1253.4	0	0.0	0.0	1253.4	927.4	1253.4	927.4	26.5	927.4	0.0	0.0
		24										

RE= 0.68

24

Gas shrinkage 0.904577 PJ/BCF
Tubing ID 5.5 inches
No Wells 1
OGIP= 38.9 BCF raw
Peak Factor= 1.4

Pipeline temp 12.0 deg C
Pipeline Diameter 14.0 inches
Pipeline Length 55.0 km
k= 5 md
h= 82 ft
Depth= 11482.94 ft
Temp= 239 degF
SG= 0.85
Zfactor= 0.95
s= 0.602

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Table 3

A. GUMMY

Intra Latrobe Group

Good shows were encountered in the basal part of the Latrobe group, in a section equivalent to the oil and gas reservoirs in Basker and Manta, but logs and RFT data indicate the thin fluvial sands are water bearing

Golden Beach Group

The upper part of the Golden Beach group (3035 – 3420 m KB) consists of interbedded basic volcanics and predominantly shaley coastal plain sediments. The section is very low net/gross (~4%), with minor thin sandstone beds, generally 1- 2 m thick.

The interval 3420 m to TD (3563 m) is sandy, including a braided stream unit (U3 sst) below 3495 m, which can be readily correlated to other wells. (Enclosure 1)

1. Structure

Two horizons within the Golden Beach Group were mapped. One, a strong continuous (negative) reflection corresponding to the base of (T. Lilliei) volcanics, at 3,318 mKB in Gummy, could be readily correlated across the block. (Enclosure 2)

The top of the U3 sandstone, corresponding to a weak to moderate negative reflection within the gas column was also mapped. (Enclosure 3) Subtle phase changes on the east and south side of the structure at the level of the GWC correlated well to the time structure. These changes could not be recognised on the western side of the structure due to the presence of volcanics.

A depth map was created by using a single average velocity defined at Gummy-1 for the Gummy fault block and a single velocity from Manta-1 for the Manta fault block. (Enclosure 4)

2. Fluid Contacts

All pressure data from Chimaera-1, Manta-1, Gummy-1 and Basker-1 have been plotted (refer Figure 1). The water gradient through the Latrobe Group is 1.42 psi/m (0.433 psi/ft) but the good data set indicates 1.44 psi/m (0.44 psi/ft) in the Golden Beach Formation.

Pressure data indicates that the U3 sst in Gummy-1 appears to be in the same fluid system as the sand under the U3 in Manta-1 and are very probably at original pressure (80 psi (56m) head at S.L.). Connection across the fault must occur within the water leg.

That system is approximately 25 psi higher than the system comprising the U3 sst in Manta and most of the sandstones in Chimaera, indicating some depletion in this latter system due to production elsewhere in the basin.

GWC contact in the U-3 sst in Gummy-1 is estimated at 3522 mss (3550 KB). This is in good agreement with the logs, which show a clear transition zone. (Enclosure 5) The contact could possibly be 5m deeper.

Manta Reservoir Fluid Composition V3

	GHV Btu/scf	MW	Liquid us gal/ lbmol	RVP psia	Raw Gas mol%	Split to sales gas
CO2	0	44.010			2.90	0.25
N2	0	28.013			0.50	1.00
C1	1009.7	16.043	6.4	5000	78.23	1.00
C2	1768.8	30.070	10.12	800	8.02	1.00
C3	2517.5	44.098	10.42	190	4.19	0.05
i-C4	3252.7	58.124	12.38	72.2	0.71	
n-C4	3262.1	58.124	11.93	51.6	1.22	
I-C5	4000.3	72.151	13.85	20.44	0.44	
n-C5	4009.3	72.151	13.71	15.57	0.38	
C6	4756.2	86.178	15.57	4.956	0.40	
C7	5502.8	100.205	17.46	1.62	0.71	
C8	6249.7	114.232	19.39	0.537	0.71	
C9	6996.5	128.259	21.32	0.179	0.41	
C10	7742.1	142.286	23.24	0.0597	0.25	
C11+	8000	156.000	23.24	0.02985	0.93	
					100.00	

	Residue Gas ex Plant before fuel			
	moles per100	mol%	GHV Btu/scf	MW
CO2	0.725	0.827%	0.00	0.36
N2	0.5	0.570%	0.00	0.16
C1	78.23	89.218%	900.83	14.31
C2	8.02	9.146%	161.78	2.75
C3	0.2095	0.239%	6.01	0.11
i-C4	0	0.000%	0.00	0.00
n-C4	0	0.000%	0.00	0.00
I-C5	0	0.000%	0.00	0.00
n-C5	0	0.000%	0.00	0.00
C6	0	0.000%	0.00	0.00
C7	0	0.000%	0.00	0.00
C8	0	0.000%	0.00	0.00
C9	0	0.000%	0.00	0.00
C10	0	0.000%	0.00	0.00
C11+	0	0.000%	0.00	0.00
	87.6845		**1069**	**17.69**

	LPG			
	Split to LPG	moles per 100	mol %	tonne
CO2		0.00	0.00	
N2		0.00	0.00	
C1		0.00	0.00	
C2		0.00	0.00	0.0000
C3	0.95	3.98	0.67	0.0796
i-C4	1.00	0.71	0.12	0.0187
n-C4	1.00	1.22	0.21	0.0322
I-C5		0.00	0.00	
n-C5		0.00	0.00	
C6		0.00	0.00	
C7		0.00	0.00	
C8		0.00	0.00	
C9		0.00	0.00	
C10		0.00	0.00	
C11+		0.00	0.00	
		5.91		**0.1305**

	Liquid ex Plant				
	moles per100	mol%	RVP psia	Volume bbls	MW
CO2	0.00	0.00%	0.0	0.00	0.0
N2	0.00	0.00%	0.0	0.00	0.0
C1	0.00	0.00%	0.0	0.00	0.0
C2	0.00	0.00%	0.0	0.00	0.0
C3	0.00	0.00%	0.0	0.00	0.0
i-C4	0.00	0.00%	0.0	0.00	0.0
n-C4	0.00	0.00%	0.0	0.00	0.0
I-C5	0.44	10.40%	2.1	6.09	7.5
n-C5	0.38	8.98%	1.4	5.21	6.5
C6	0.40	9.46%	0.5	6.23	8.1
C7	0.71	16.78%	0.3	12.40	16.8
C8	0.71	16.78%	0.1	13.77	19.2
C9	0.41	9.69%	0.0	8.74	12.4
C10	0.25	5.91%	0.0	5.81	8.4
C11+	0.93	21.99%	0.0	21.61	34.3
	4.23	100.00%	**4.4**	79.86	113.3

GHV 39.8 MJ/m3
1127 GJ/scf

Wobbe 1367.3 Btu/scf
Mol Wt 17.69

Fuel= 8.5%
Shrinkage 0.8023 scf sales/scf raw allowing for fuel
Yield= 0.904577 PJ/BCF raw incl fuel

LPG 3.92 t/mmscf sales before fuel

4.28 t/mmscf sales allowing for fuel
3.80 t/Pjsales

LGR 57.1 bbl/mmscf before fuel

RVP 4.4 psia
MW 113.3

62.4 bbl/mmscf allowing for fuel
55.3 bbl/PJ sales
44.25 after retrograde

TOTAL LPG+Condensate= 99.4 bbl/PJ
89.9 bbl/scf raw

Table 4

802209 015

B. MANTA

GOLDEN BEACH GROUP

As in Gummy, the upper part of the Golden Beach group consists of Volcanics and predominantly shaly lower coastal plain sediments.

Massive braided stream sandstones are present at depth, the uppermost unit of which is the U3 sandstone.

The U3 contains a significant gas column of 61.5m in Manta-1

1. Structure

The Manta structure is a downside fault closure which has two distinct culminations. The structural culminations are located where the direction of the major controlling fault changes from north-west to east-west. The structures are consistent with a regional right lateral shear couple causing extension on the north-westerly trending part of the fault.

The fault is normal, with about 130 m of throw at the U3 sandstone level, near the well, and decreasing upwards. The fault and structure is relatively subdued at the lower Latrobe Group level (~60m throw), where there are several oil and gas pools, and dies out completely before the Top Latrobe Group.

An event correlated to the top U3 sandstone was mapped and an amplitude map was created. Subtle but distinct amplitude and phase changes were noted at the level of the U3 GWC, as defined by log data, and the amplitude map of the U3 correlates quite well with the time structure and the known GWC in Manta-1.

This reasonable correlation in both the Manta-1 and Manta NW culminations strongly suggest that the GWC in both is common, extending beneath the intervening saddle. The lower amplitude in the saddle is most probably due to the gas column being too thin to be properly resolved.

Given the fair to moderately good correlation between amplitude and time, it appears that there is little variation in average velocity to the U3 sandstone across the field, and a single velocity defined at the well was used to convert to depth. (Enclosure 4)

2. Fluid Contacts

- U3 Good quality RFT pressure data (Figure 1) indicates a GWC of 3,295 mss, which is broadly in accord with the electric logs. Resistivity logs suggest gas possibly as deep as 3,301 mss. The U3 gas column in the well is 61.5 (to 67.5m) and may be as much as 102m in the culmination WNW of Manta.
- Several thin (1.0m) sandstones above the U3 are interpreted to contain gas (or oil). Pressure data indicates three separate pools, informally labelled M1 to M3. (Enclosure 7)
  - The M1, less than 20m above the U3, has a GWC at 3,274 mss and a column of 57.5m.

- The M2 has a GWC at 3,213 mss and a column of 24.5m
- The M3 most probably contains gas, with a GWC at 3,138 mss and a column of 18m

3. Gas Composition

The lower part of the U3 was tested, flowing at 18.6 MMCFD and 1,022 bcpd. Condensate ratio is 60-75 bbls/MMSCF

The Gas gradient from RFT pressure data is 0.358 psi/m (0.109 psi/ft),which is consistent with the measured molecular weight of 27.

4. Net Pay, Porosity and Water Saturation

Net permeable sand was estimated from logs (as per Gummy) with no $\phi + S_W$ cut offs.

Average $\phi + S_W$ were taken from Shell's log analysis contained in the Manta-1 Well Completion Report (enclosure 8). Shell later re-analysed the petrophysics for the U3 sand in September, 1998, with similar results (slightly higher Sw).

8.3m of core was recovered from the bottom part of the U3 sandstone and routine, but no special core analysis was carried out. Overburden corrected porosity and permeability ranged from 8.3 to 15.4% and 4 to 165 md and averaged 11.7% and 40 md respectively.

Overburden corrected porosity agrees quite well with the log analysis. Sw derived from Kipper 2 capillary pressure curves (Figure 6), using permeabilities estimated from Manta core Ø vs k relationship (Figure 7) and the height above Free water level, agree reasonably well with the log analysis.

5. Gas in Place

Reservoir parameters are summarised in Table 6 and hydrocarbons in place in Table 7.

The U3 is the most important unit and reservoir parameters are noted in more detail here.

Top in Manta	3,233.5 mss (2,208 msec, V = 2,929 m/s)
Base	3,303 mss
Gross	69.8m
Net	54.5m
N/G Manta-1	0.78
Av. N/G Manta U3 Pool(1)	Assume 0.65 due to lower N/G at top.
Av ϕ	0.13
Av Sg	0.55
Exp. Factor	237 (Res. Temp 123°C, Pressure 4,740 psi, z = 0.96)
Average permeability	50 - 100 md
Area at GWC	15.1 km^2
GRV entire Structure (2)	503.5 x 10^6 m^3

OGIP entire structure as mapped = 196 bcf

Estimated OGIP in Basker/Manta Block = 175 bcf

Note

1) Decrease in N/G towards Gummy (55%) occurs mainly at the top of the unit and will therefore adversely affect Net sandstone at the edge of the pool.
2) core data and log analysis results indicate permeabilities of 50 - 150 md, but ranging as high as several hundred md. This is in conflict with the Production Test data, which has been interpreted to give an average permeability of 3.5md over 45m (and a skin factor of -2). The test data should be viewed with caution, as the well was cleaning up through the flow period.
3) Structure extends into VIC P/19 and RL-2, which is calculated to hold 20 bcf gas in place (GRV Basker/Manta 450 x $10^6 m^3$)
4) Possible additional GIP due to 5m lower GWC ~ 20 bcf (assuming Sg 35%)

6. Reserves

6.1 Drive Mechanism

Pressures suggest that the U3 sand is slightly drawndown due to production elsewhere in the basin, indicating some connection to regional aquifers. Pressure support from the aquifer during production at Manta is likely to be weak to moderate and it is interpreted that the drive mechanism will be pressure depletion.

It is possible that the fault plane seal may break down during production at Manta, due to the large pressure differential which will develop across the fault as the Manta reservoir is drawndown. Water will then flow across at a structurally high level from the Chimaera block sandstones.

We believe that this should not cause major problems, as high gas production rates should allow gas to outrun the water.

6.2 Reservoir Connectivity

The U3 sandstone in Manta was deposited in a high energy braided stream environment and the few shale beds within the unit are unlikely to be laterally extensive. No faults likely to partition the reservoir have been recognised. Considering the high mobility of gas and the high-pressure drawdown at abandonment, the reserves calculation assumes that all the gas is accessed by development wells.

6.3 Reserve Definitions are stated at the foot of Table 7.

6.4 Recovery Efficiency

Recovery efficiency has been calculated at 70% assuming volumetric depletion, with two wells, completed using 5.5" tubing and producing via the Kipper export pipeline. Wells were assumed to have been completed over 25 m (82 feet), with an effective permeability of 15 md. This assumed permeability has been assigned largely on the basis of the production tests data, but as noted above, the average permeability may be considerably higher. The field is abandoned when the THP falls to 500 psia. The calculations are summarised in Table 5.

6.5 Product Yields

The yield of sales gas, LPG and condensate, is estimated assuming that the plant recovers 95% propane, 100% butane plus, and consumes 8.5% of residue gas as fuel (Table 4). Retrograde condensation in the reservoir reduces the condensate yield to 83% of theoretical.

Deliverability **Manta U3+M1**

Gas wells

Year	Reservoir Pressure psia	Yearly Demand PJ	Average Rate Raw Gas mmscfd	Peak Daily Rate mmscfd	BHP at Peak Rate psia	THP at Peak Rate psia	BHP at Avge Rate psia	THP at Avge Rate psia	Cum Raw Gas BCF	Plant Inlet Pressure psia	P/Line Press Drop psi	P/Line Velocity at exit Ft/sec
1.0	4700.0	10	30.3	42.4	4473.5	3338.2	4539.4	3415.2	11.1	3335.5	2.7	1.7
2.0	4412.7	10	30.3	42.4	4170.6	3104.4	4241.2	3187.2	22.1	3101.6	2.9	1.8
3.0	4125.3	10	30.3	42.4	3865.3	2868.2	3941.4	2957.6	33.2	2865.1	3.1	2.0
4.0	3838.0	10	30.3	42.4	3557.1	2628.8	3639.5	2726.0	44.2	2625.4	3.4	2.2
5.0	3550.6	10	30.3	42.4	3245.0	2385.3	3335.2	2492.0	55.3	2381.6	3.7	2.4
6.0	3263.3	10	30.3	42.4	2927.8	2136.3	3027.4	2254.8	66.3	2132.1	4.2	2.7
7.0	2976.0	10	30.3	42.4	2603.7	1879.6	2715.2	2013.3	77.4	1874.8	4.7	3.1
8.0	2688.6	10	30.3	42.4	2269.7	1611.4	2396.9	1765.6	88.4	1605.9	5.5	3.6
9.0	2401.3	10	30.3	42.4	1920.6	1325.0	2069.4	1508.7	99.5	1318.2	6.7	4.4
10.0	2114.0	10	30.3	42.4	1546.4	1004.7	1727.7	1236.9	110.5	995.8	8.9	5.8
11.0	1826.6	10	30.3	42.4	1122.1	598.5	1361.1	937.4	121.6	583.5	15.0	9.8
12.0	1539.3	7	21.2	29.7	956.7	589.1	1153.6	820.9	129.3	581.7	7.4	6.9
13.0	1338.1	5	15.1	21.2	867.1	583.9	1024.1	745.9	134.9	580.1	3.8	4.9
14.0	1194.5	4	12.1	17.0	771.9	533.0	912.8	670.3	139.3	530.3	2.7	4.3
15.0	1079.5	0	0.0	0.0	1079.5	818.7	1079.5	818.7	139.3	818.7	0.0	0.0
16.0	1079.5	0	0.0	0.0	1079.5	818.7	1079.5	818.7	139.3	818.7	0.0	0.0
17.0	1079.5	0	0.0	0.0	1079.5	818.7	1079.5	818.7	139.3	818.7	0.0	0.0
18.0	1079.5	0	0.0	0.0	1079.5	818.7	1079.5	818.7	139.3	818.7	0.0	0.0
19.0	1079.5	0	0.0	0.0	1079.5	818.7	1079.5	818.7	139.3	818.7	0.0	0.0
20.0	1079.5	0	0.0	0.0	1079.5	818.7	1079.5	818.7	139.3	818.7	0.0	0.0
21.0	1079.5	0	0.0	0.0	1079.5	818.7	1079.5	818.7	139.3	818.7	0.0	0.0
		126										

RE= 0.70

Gas shrinkage	0.904577	PJ/BCF
Tubing ID	5.5	inches
No Wells	2	
OGIP=	199.9	BCF raw
Peak Factor=	1.4	

Pipeline temp	12.0	deg C
Pipeline Diameter	14.0	inches
Pipeline Length	55.0	km
k=	15	md
h=	82	ft
Depth=	10662.73	ft
Temp=	253.4	degF
SG=	0.85	
Zfactor=	0.95	
s=	0.553	

Slant Well

Table 5

Table 6
Summary of Reservoir Parameters, Manta Field

Sand	Zone	Top (mss)	Gross Thickness (m)	Net (m)	N/G	Ø	Sh	Exp.f	GO/WC (mss)	OWC (mss)	Area to G/OWC (km^2)	Area to Midpt (km^2)	GRV (10^6m^4)	NRV (10^6m^3)
B	2	2590	20.5	10	0.49	0.215	0.55			2603	1.4		21	10.3
C	3	2621.5		3.0		0.19	0.62	222	2636		1.4	1.4		4.2
D	4	2636		2		0.196	0.65			2659	4.0	4.0		
E	5	2644	18	13.4	0.74	0.209	0.76	225	2667.5		3.1	-	57	42.2
G/H	6	2696	11	4.8		0.21	0.77	228	2728		5.1	4.4		21.1
I/J	7	2711.5	37.5	24		0.213	0.63	229	2726.7	2741	4.8	-		59.7
M3		3120		2.0		0.15	0.6	235	3138		1.0			
M2		3188.5		1.5		0.15	0.6	235	3213		1.2			
M1	8	3216.5		2.5		0.155	0.6	235	3274		14	14		
U3	8	3233.5		54.5	0.65	0.13	0.55	237	3295		15.1		450	292.5

Note: Bo 1.695 used for I/J sand
Bo 1.716 all other oil

MANTA
LATROBE GROUP

Oil and gas is present in 7 different pools in the lower Latrobe Group.(Enclosures 9 and 10) The reservoirs consist of stacked fluvial sandstones, generally 1-7 m thick. The J unit consists of more massively bedded sandstones, more than 14 m thick.

1. Structure

The structure map used to estimate hydrocarbon in place was Shell's Top Marginal Marine Marker Time map (Figure 3), as amplitude and time mapping of the deeper U3 sandstone suggests there are no significant lateral velocity gradients. The co-incidence of the structural spill point on the time structure map and the hydrocarbon water contacts of the individual pools suggest the time structure may represent the depth structure. Note however, Shell's Depth Structure Top Marginal Marine Market (Figure 4) which shows the structure continuing to the north west.

The Top Coally Sequence Time map (Figure 5) is probably more representative of the B and C units, which lie close that horizon and which have reduced columns.

2. Fluid Contacts

There is sufficient pressure data, combined with wireline log data to define hydrocarbon contacts, or a range of contact depths in all pools. The pressure data is plotted on Enclosure 9. Contacts are listed in Section 4.

- **K unit.** Unit was not evaluated due to estimated very low OIP
- **I/J Unit.** OWC and GWC evident on logs and supported by pressure data. The oil gradient is 0.88 psi/m (0.268 psi/ft), equivalent to a density of 0.62 g/cc and the gas gradient is reasonably well defined at 0.275 psi/m (0.084 psi/ft). The OWC lies at the structural spill to the NW, giving a 29.5m hydrocarbon column at Manta-1.
- **G/H Unit.** Gas column of 32 m in Manta-1 assuming little or no oil, which is likely given the structural picture.
- **E Unit.** Maximum gas column of 23.5 m or minimum 18 m and maximum 12 m oil column at Manta-1.
- **D Unit.** OWC estimated at 2664 mss, giving a 28 m column at Manta-1. Pressure data allows contact to be as much as 5 m higher.
- **C Unit.** Maximum gas colum 14.5 m in Manta-1 if no oil leg. Oil leg not defined and could be as much as 23 m.
- **B Unit.** OWC defined at 2603, 13 m below top of unit in Manta-1

3. Gas Composition

Fluid pressure gradients of 0.275psi/m (0.084) psi/ft which is very similar to the gas gradient in Kipper, indicate that the gas is likely to contain reasonable amounts of condensate; estimated at 26.7 bc/PJ, as in Kipper.

4. Net Pay, Porosity and Water Saturation

Net sandstone was estimated from logs (as per Gummy), with no porosity and Sw cut offs.

Estimated net effective sandstone agreed closely with that interpreted by Shell in their log analysis contained in the Manta-1 Well Completion report (see Enclosure 10 and Appendix for summary) and those average porosity and water saturation values for each zone were adopted for calculating hydrocarbon in place.

5. Hydrocarbon in Place

Reservoir parameters are summarised in Table 6 and Hydrocarbon in place in Table 7. Some working data is contained in the Appendix.

5.1 K UNIT

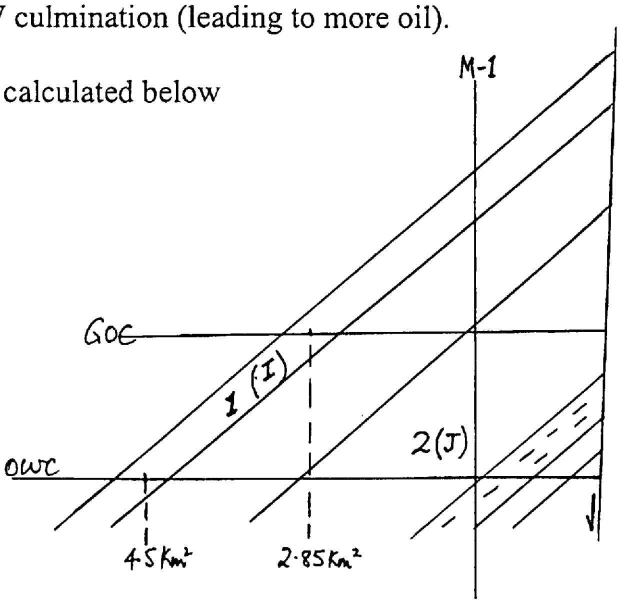
Three thin poor quality sands with 2 m net oil are present at ~2810 m KB. Pressure data is poor. The sands are either overpressured with a small column or the column could be of the order of 30 m. Expected OIP is small.

5.2 I/J UNIT

Top	2711.5 mss
Base	2749 mss
Gross Thickness	37.5 m
Net sst	24 m
N/G	0.64
ϕ	0.213
S_h	0.63
Bo	1.695 RB/STB
Exp factor	229 v/v (z = 0.858)
Reservoir Temp	108°C
Reservoir Pressure	3,970 psia
GOC	2726.7 mss
OWC	2741 mss
Gas Column in Manta - 1	15.2 m
Oil Column	14.3 m

Structure map suggest that both culminations will have the same OWC and GOC, although there is a small possibility that the saddle may be below the GOC and that the GOC could be higher in the NW culmination (leading to more oil).

OIP and GIP are calculated below



Note massive J sandstone will almost certainly cover the structure down to OWC, while the I sandstone with an estimated channel width of 800 m may not. Assume 70% coverage in oil leg and 90% in gas cap.

Oil Net RV = Vol (1) + (2)
= 25 x N/G + 0.7(4.5 - 2.85) km^2 x 5.5 m + 3
= 33.3 x 10^6 m^3
N/G = 0.95
OIP = 33.3 x 0.213 x 0.63 x $\frac{1}{1.695}$ x 6.2898 MMSTB
= 16.9 MMSTB
Note area within the oil leg in massive sst = 3.2 km^2 and 4.8 km^2 in total unit

Gas Net RV = 13 x 0.95 + 0.9 (2.85 km^2 x 5.5 m)
= 26.4 x 10^6 m^3
GIP = 27 x 0.95 x 0.213 x 0.63 x 229 x 35.3 MMCF
= 28.6 bcf

5.3 G/H UNIT

Top = 2696 mss
LPG = 2707 mss
GWC $^{(1)}$= 2728, if column all gas
Gas column at Manta-1 32m
Area = 5.1 km^2 (4.4 km^2 to mid point of unit)

Assume 4.8 m net ribbon sand, with mid point at 2702 mss at Manta-1, covers all of the potential area and that column is all gas, as maximum hydrocarbon columns in all other units are less than 32 m (an oil leg would increase the hydrocarbon column)

Proven and Possible GIP = 27.5 bcf

5.4 E UNIT

Top = 2644 mss
Base = 2662 mss
Gross thickness 18 m
LPG = 2662 mss
Minimum Gas Column at Manta-1 = 18 m
Maximum Oil Column = 12 m $\left(\frac{6.5\text{ psi}}{1.421 - 0.886\text{ psi/m}}\right)$
Maximum Gas Column at Manta-1 = minimum hydrocarbon column = 23.5 m

The E sand lies quite close to the Top Coally Sequence and the structural configuration of the sand may therefore be expected to follow that marker. The hydrocarbon column is, however, greater than the structural closure at this level. Given the thickness and likely extent of the sand, it is likely that structure, not stratigraphy determines the extent of the pool.

The structural options are 1) the saddle between the Manta and Manta NW culminations is at least 10 msec deeper than mapped or 2) the fault extends further to the NW i.e the structure is more like that of the Top Marginal Marine Marker.

Hydrocarbons in the Manta culmination can be taken as proven, while those in the NW culmination are probable.

Assuming a 23.5 m gas column (and no oil), the total pool covers 3.1 km^2 to GWC

Proven GIP= 26.5 Bcf (Manta culmination)

Probable GIP = 26.5 Bcf (Manta NW)

If a maximum 12 m oil leg is present,

Proven and Probable OIP = $26.4(RV) \times 0.74 \times 0.209 \times 0.76 \times \frac{1}{1.7} \times 6.29$
= 11.5 MMSTB
Proven and Probable GIP = 33.5 bcf (GRV 42.6×10^6 m^3)

5.5 D UNIT

Top = 2636 mss
OWC = 2659 mss (most likely OWC; could be 5 m deeper due to scatter in pressure data)
Oil column at Manta-1 = 23 m
Area = 4 km^2, assuming structural form of Top Marginal Marine Marker
Proven OIP = 1.5 MMSTB

5.6 C UNIT

Top = 2621.5 mss
Minimum Gas Column = 3.5 m
Maximum Oil Column = 23 m (OWC at 2648 mss)
Maximum Gas Column = 14.5 m if no oil leg
Assume gas column of 14.5 m over area 1.4 km^2 ie Manta-1 culmination only. Possible small upside in NW culmination
Maximum GIP = 3.9 bcf

5.7 B UNIT

Top = 2590 mss

Proven and Probable hydrocarbons are estimated at 4.2 MMSTBOIP and 0.6 BCF GIP, with a maximum of 4.5 MMSTBOIP.

Note Shell compute 6.6 MMSTBOIP by material balance, assuming no gas cap. A small gas cap is likely (< 20% volume) due to the reservoir pressure being just below bubble point and OIP calculated from material balance would therefore be less than 6.6 MMSTB, and is in good agreement with volumetric estimates.

Table 7
Summary of Hydrocarbon in Place, Manta Field

Unit	Zone	Proven		Probable		Possible	
		OIP (MMSTB)	GIP (BCF)	OIP (MMSTB)	GIP (BCF)	OIP (MMSTB)	GIP (BCF)
B	2	3.3		0.9	0.6	0.3	-
C	3		3.9				
D	4	1.5		0.5	0.7	1.7	
E	5		26.6		26.6	-	
G/H	6		13.7		13.8	-	
I/J	7	8.3	14.3	8.3	14.3		
M3			1.5				1.5
M2			1.5				1.5
M1	8		3.9	3.9			19.2
U3	8		87.5	87.5			20.0
Total		13.1	152.9	9.7	147.4	2.0	42.2

The areas and volumes of the two Manta culminations are almost the same. HIP in the Manta culmination is considered proven, while that in Manta NW is probable.

Proven	-	Manta culmination only
	-	Oil to High Proved Oil and down to most likely OWC from RFT data
	-	Areal extent 2 km^2 around well bore for thin sands
Probable	-	Manta NW culmination
	-	Oil updip to half updip column, gas in remainder
	-	Areal extent 2 km^2 additional to proven, for thin sands
Possible	-	Sand covers whole structure
	-	Oil fills updip column
	-	Hydrocarbon to lowest interpreted contact

6. Reserves

a) Oil

Only the I/J reservoir contains significant oil, with an estimated 16.6 MMSTBOIP. A 14.3 m oil leg, covering an area greater than 3km^2 underlies a significant gas cap, estimated at 28.6 Bcf OGIP.

The reservoir is a massive sandstone with an average permeability of about 1,000 md. Aquifer pressures are approximately 25 psi below original, indicating a weak connection, through the aquifer, to producing fields. Water drive is unknown, but is likely to be weak. The natural drive mechanism is therefore interpreted to be pressure depletion.

Primary recovery under gas cap expansion is estimated to be about 20% or 3.3 MMSTB using two horizontal wells.

Gas injection could increase the recovery to as much as 30 - 35% (5.8 MMSTBO).

The pool is considered to be non commercial at this point in time and no reserves have been assigned to it.

The B & D oil pools are too small to be commercially exploited at this time.

b). Gas

6.1 Drive mechanism

Significant gas is reservoired in the E, G/H and I/J reservoirs. Weak aquifer support is expected in each of these reservoirs and the drive mechanism is interpreted to be pressure depletion.

6.2 Reservoir Connectivity

The I/J and E units are reasonably thick with high net / gross and the sands within these units are interpreted to be well connected, where they are present.

6.3 Reserve Definition

Reserve classification is appended to Table 7.

6.4 Recovery Efficiency

Recovery efficiency has been calculated at 73% assuming volumetric depletion, with two wells completed with 5.5" tubing, producing via the Kipper pipeline. The wells are completed over 82 feet, with an average permeability of 500 md. The field is abandoned when the THP falls below 500 psia.

The calculations are summarised in Table 8.

6.5 Product Yields

No detailed gas analysis is available, but as the density of the gas (from RFT data) is the same as in Kipper, a similar composition has been assumed.

The yield of sales gas, LPG and condensate, is estimated assuming that the plant recovers 95% propane, 100% butane plus, and consumes 8.5% of residue gas as fuel (Table 9). Retrograde condensation in the reservoir reduces the condensate yield to 83% of theoretical.

Deliverability **Manta Latrobe**
Gas wells

Year	Reservoir Pressure psia	Yearly Demand PJ	Average Rate Raw Gas mmscfd	Peak Daily Rate mmscfd	BHP at Peak Rate psia	THP at Peak Rate psia	BHP at Avge Rate psia	THP at Avge Rate psia	Cum Raw Gas BCF	Plant Inlet Pressure psia	P/Line Press Drop psi	P/Line Velocity at exit Ft/sec
1.0	4700.0	7	22.3	31.3	4690.2	3443.2	4693.0	3501.5	8.1	3437.6	5.6	1.2
2.0	4292.0	7	22.3	31.3	4281.3	3121.8	4284.3	3186.0	16.3	3115.6	6.2	1.4
3.0	3884.0	7	22.3	31.3	3872.1	2797.7	3875.5	2869.1	24.4	2790.8	6.9	1.5
4.0	3475.9	7	22.3	31.3	3462.7	2469.8	3466.5	2550.5	32.6	2462.0	7.8	1.7
5.0	3067.9	7	22.3	31.3	3052.9	2136.5	3057.2	2229.2	40.7	2127.4	9.1	2.0
6.0	2659.9	7	22.3	31.3	2642.5	1794.6	2647.5	1904.0	48.9	1783.8	10.8	2.4
7.0	2251.9	7	22.3	31.3	2231.4	1438.0	2237.2	1572.5	57.0	1424.5	13.5	3.0
8.0	1843.8	7	22.3	31.3	1818.7	1052.1	1825.9	1229.5	65.2	1033.5	18.5	4.1
9.0	1435.8	7	22.3	31.3	1403.4	580.8	1412.8	861.4	73.3	546.5	34.3	7.7
10.0	1027.8	4	12.8	17.9	1001.9	563.5	1009.4	673.4	78.0	552.2	11.3	4.4
11.0	794.6	2	6.4	8.9	777.9	532.1	782.7	565.0	80.3	529.1	3.0	2.3
12.0	678.0	0	0.0	0.0	678.0	514.2	678.0	514.2	80.3	514.2	0.0	0.0
13.0	678.0	0	0.0	0.0	678.0	514.2	678.0	514.2	80.3	514.2	0.0	0.0
14.0	678.0	0	0.0	0.0	678.0	514.2	678.0	514.2	80.3	514.2	0.0	0.0
15.0	678.0	0	0.0	0.0	678.0	514.2	678.0	514.2	80.3	514.2	0.0	0.0
16.0	678.0	0	0.0	0.0	678.0	514.2	678.0	514.2	80.3	514.2	0.0	0.0
17.0	678.0	0	0.0	0.0	678.0	514.2	678.0	514.2	80.3	514.2	0.0	0.0
18.0	678.0	0	0.0	0.0	678.0	514.2	678.0	514.2	80.3	514.2	0.0	0.0
19.0	678.0	0	0.0	0.0	678.0	514.2	678.0	514.2	80.3	514.2	0.0	0.0
20.0	678.0	0	0.0	0.0	678.0	514.2	678.0	514.2	80.3	514.2	0.0	0.0
21.0	678.0	0	0.0	0.0	678.0	514.2	678.0	514.2	80.3	514.2	0.0	0.0
		69										

RE= 0.73

Gas shrinkage 0.858904 PJ/BCF
Tubing ID 5.5 inches
No Wells 1
OGIP= 109.3 BCF raw
Peak Factor= 1.4

Pipeline temp 12.0 deg C
Pipeline Diameter 14.0 inches
Pipeline Length 55.0 km
k= 500 md
h= 82 ft
Depth= 10662.73 ft
Temp= 253.4 degF
SG= 0.85
Zfactor= 0.95
s= 0.553

Slant Well

802209 030

Table 8

Kipper Reservoir Fluid Composition

	GHV		Liquid		Raw	Split to	Residue Gas ex Plant				LPG				Liquid ex Plant				
	Btu/scf	MW	us gal/ lbmol	RVP psia	Gas mol%	sales gas	moles per100	mol%	GHV Btu/scf	MW	Split to LPG	moles per 100	mol %	tonne	moles per100	mol%	RVP psia	Volume bbls	MW
CO2	0	44.010			10.18	0.25	2.545	2.954%	0.00	1.30		0.00	0.00		0.00	0.00%	0.0	0.00	0.0
N2	0	28.013			0.20	1.00	0.2	0.232%	0.00	0.07		0.00	0.00		0.00	0.00%	0.0	0.00	0.0
C1	1009.7	16.043	6.4	5000	77.29	1.00	77.29	89.707%	905.77	14.39		0.00	0.00		0.00	0.00%	0.0	0.00	0.0
C2	1768.8	30.070	10.12	800	5.99	1.00	5.99	6.952%	122.97	2.09		0.00	0.00	0.0000	0.00	0.00%	0.0	0.00	0.0
C3	2517.5	44.098	10.42	190	2.67	0.05	0.1335	0.155%	3.90	0.07	0.95	2.54	0.68	0.0508	0.00	0.00%	0.0	0.00	0.0
i-C4	3252.7	58.124	12.38	72.2	0.46		0	0.000%	0.00	0.00	1.00	0.46	0.12	0.0121	0.00	0.00%	0.0	0.00	0.0
n-C4	3262.1	58.124	11.93	51.6	0.75		0	0.000%	0.00	0.00	1.00	0.75	0.20	0.0198	0.00	0.00%	0.0	0.00	0.0
I-C5	4000.3	72.151	13.85	20.44	0.28		0	0.000%	0.00	0.00		0.00	0.00		0.28	11.38%	2.3	3.88	8.2
n-C5	4009.3	72.151	13.71	15.57	0.26		0	0.000%	0.00	0.00		0.00	0.00		0.26	10.57%	1.6	3.56	7.6
C6	4756.2	86.178	15.57	4.956	0.38		0	0.000%	0.00	0.00		0.00	0.00		0.38	15.45%	0.8	5.92	13.3
C7	5502.8	100.205	17.46	1.62	0.58		0	0.000%	0.00	0.00		0.00	0.00		0.58	23.58%	0.4	10.13	23.6
C8	6249.7	114.232	19.39	0.537	0.33		0	0.000%	0.00	0.00		0.00	0.00		0.33	13.41%	0.1	6.40	15.3
C9	6996.5	128.259	21.32	0.179	0.20		0	0.000%	0.00	0.00		0.00	0.00		0.20	8.13%	0.0	4.26	10.4
C10	7742.1	142.286	23.24	0.0597	0.14		0	0.000%	0.00	0.00		0.00	0.00		0.14	5.69%	0.0	3.25	8.1
C11+	8000	156.000	23.24	0.02985	0.29		0	0.000%	0.00	0.00		0.00	0.00		0.29	11.79%	0.0	6.74	18.4
					100.00		86.1585		**1033**	**17.92**		**3.75**		**0.0827**	2.46	100.00%	**5.2**	44.14	105.0

GHV 38.5 MJ/m3
1089 GJ/scf

Wobbe 1313.0 Btu/scf
Mol Wt 17.92

Yield= 0.858904 PJ/BCF raw incl fuel

Fuel= 8.5%
Shrinkage 0.78835 scf sales/scf raw allowing for fuel

LPG 2.52 t/mmscf sales before fuel

2.76 t/mmscf sales allowing for fuel
2.532624 t/Pjsales

LGR 32.1 bbl/mmscf before fuel

RVP 5.2 psia
MW 105.0

35.1 bbl/mmscf allowing for fuel
32.20131 bbl/PJ sales

26.72708 after retrograde

Table 9

C. BASKER

Location

16 km to Kipper, 26 km to Flounder and 35 km to Tuna

1. Geology

- 7 separate hydrocarbon pools in thin sands in T lilliei, Lower Latrobe Fmn (Enclosure 12)
- High sinuosity meandering channels, sand bodies 1-3m thick. Composite beds 8m Basker-1, 20m Manta-1
- Sand/shale ~ 18% in reservoir section in Basker-1, 30% in Manta-1
- Dipmeter studies show sediment transport direction to SE, although great care should be taken in extrapolating stream current directions from one well.
- Seismic attributes equivocal; showing high sinuosity channels, possibly ~ N/S (similar to sediment transport direction in Golden Beach GP)
- Syn-depositional faults, during thermal subsidence phase – reactivation of E Cret Strzlecki Gp extensional faulting. General thickening to south. No later reactivation.
- Tuna/Flounder studies indicate thickness/width ratios of meandering streams ~ 1:200, flowing in a south-easterly direction. Likely stream widths for the D sand at Basker are 1 to 1.5Kms

2. Structure

- Shell's Time Structure Map Top Marginal Marine Marker, which shows the pool being largely confined to the E-W portion of the Basker fault, (Figure3) was used for volumetric calculations. The map (and area) is very similar to the Depth Structure Map of 7/98 (Figure 4), excluding the small SE culmination. The structural trap as mapped is not full to spill, indicating that cross fault leakage (through juxtaposed permeable units) has probably determined the spill points of the various pools. The presence of water sands in between hydrocarbon bearing sands with variable but small columns suggests that clay smear along the fault plane is not the trapping mechanism and that juxtaposition of sealing shales across the fault is the likely mechanism.

3. Production Tests/Material Balance

- D sand. 7m net sst (8m gross)
  - 4967 BOPD 42° API, GOR 970 scf/bbl through ¾" choke
  - 3 barriers, at 90m, 340m and 470m
  - K 946 – 1038 md
  - PI 19.1 bbs/d/psi
  - Material Balance estimates of OOIP are not reliable due to uncertainties in pressure data. The original analysis of the test (SDA report 543) concluded that there was 10-17 MMSTBOIP. However, the pressure data at the end of the test is poor. A later 1989 report suggested ~ 100 MMSTBOIP, if the pressure decline was 1 psi and all the fluid was oil.

- F sand. 4m net

- F sand. 4m net
  - 3270 BOPD 45° API, GOR 3100-3800 scf/bbl through 3/4" choke 1.5 BW/MMCFD initial and 3.3 BW/MMCF during multiflow
  - Limited pool. Material balance = 0.3 MMSTBOIP
  - Barrier at 50 m
  - Volumetrics indicate a productive area of ~0.5 km^2 and an OOIP = 0.7 mmstb, consistent with material balance estimates.

4. Fluid Contacts

Hydrocarbon contacts have been estimated from RFT pressure data (Enclosure 11), as no contacts are evident on logs (Enclosure 12). The data indicates that the D and lower sands (zones 2 - 7) are at original pressure, defined by 0.433 psi/ft +84 psi (within limits of accuracy of the currently accepted 0.433 psi/ft + 80 psi). Sands above the D are increasingly drawndown upwards (but only by 14 psi at 2,901 mkb) indicating some weak communication with the regional aquifers which have been depleted by production elsewhere in the basin (See Fig. 1)

Unit	Fluid	Contact (MSS)	Column at Basker-1(m)
B (Zone 1)	Gas	3,007 (2)	14
D (Zone 2)	Oil	3,085 (1)	20
E (Zone 3)	Gas (3)	3,088	4
F (Zone 4)	Oil	3,109	5
G (Zone 5)	Gas (4)	3,190	19
I (Zone 6)	Oil	3,228	12.5
J (Zone 7)	Oil	3,252	2

Note:

1) D Sand OWC could be 5m lower at 3,090 mss if it, like the sands above, are more drawn down than the E and deeper sands.
2) Similarly, B sand GWC could be 9m lower at 3,016 mss if it is more drawndown than the water sand just beneath it. This is considered unlikely.
3) E sand is considered to contain gas on the basis of neutron/density logs and mudlog shows.
4) G sand is considered to contain gas on the basis of mudlog shows (and the fact that the oil column would be 39m, out of keeping with columns in other sands).

5. Net Pay, Porosity and Water Saturation

Net pay, porosity and water saturation estimates were, with very minor changes, those computed by Shell and listed in the Basker-1 Well Completion report and the 1993 RL application (refer Appendix for Shell's summary). Units are annotated on Enclosure 12 and reservoir parameters are summarised on Table 10.

6. Hydrocarbon in Place

At least 7 separate pools can be identified in the lower Latrobe Gp in the Basker-1 wellbore. Reservoir units are very thin fluvial sands, sealed by shales 3-10 m thick, eg. 3.5m section of shale

Table 10
Summary of Reservoir Parameters, Basker Field

Sand	Zone	Top mbdf	Top (mss)	Gross (m)	Net (m)	ϕ	Sg	GWC (MSS)	OWC (MSS)	Area to G/OWC (km^2)	Area to Midpt (Km^2)	Areal Coverage %	NRV (%sst) 10^6m^3	NRV (100%)	NRV updip
B	1	3018	2993	1.5	1.5	.186	.63	3007		3.9	3.8	60	3.4 (4.6)	5.7 (7.7)	
Water	1				11.0	0.2	0.6				1.6				17.6
D	2	3090	3065	8	7	0.234	0.74		3085	4.9 (5.6max)	14.3 (5.0 max)	100	30.1(35)	30.1 (35)	8.7
E	3	3108.8	3083.8	7.7	5	.2	0.5	3088		2.5	1.8	90	8.1	9	
F	4	3128.7	3103.7	3.5	3.5	0.218	0.54/.60		3109	2.6	2.3	80	6.4	8	5.6
Water	4				8.0	0.2	0.6				1.6				12.8
G	5	3195.8	3170.8	1.5	1.5	0.188	0.61	3190		4.7	4.6	60	4.1	6.9	
I	6	3240.5	3215.5	1.5	1.5	0.242	0.46/0.55		3228	3.7	3.7	70	3.9	5.6	2.6
J	7	3275	3250	5.5	3	0.233	0.51/0.6		3252	1.8	1.8	90	4.9	5.4	5.0

Note: area used excludes SE culmination which is not manifest on the time map. The saddle between this and the main structure is very close to the contact at the D and G unit levels and is below the contacts at other levels. The area of this culmination at the D sand most likely OWC is about 1 Km^2.

- An expansion factor of 240 has been used, a Bo of 1.61 for D sand and 1.75 for others.

- Using an estimated fluvial channel width to thickness ratio of 200, 2m and 8m thick sands will have channel widths of 0.4, and 1.6 km respectively.

  Assuming that stream transport direction is NW/SE, parallel to the fault, which is the most optimistic scenario, and knowing that Basker-1 lies 0.7 km from the Basker fault, an estimate of the areal coverage of each unit within closure was made.

and coal seals the G gas accumulation from an overlying water sand, and the seals between the F, E and D reservoirs are of the order of 10m thick.

Each hydrocarbon bearing unit has therefore been treated separately, and possible hydrocarbon, updip of the well, has been estimated for several water bearing sands in the well.

Estimates for Proven, Probable, and Possible oil and gas in place have been made, using the following assumptions.

- Proven
  - Oil to High Proved Oil and down to most likely OWC from RFT data
  - Proportion of areal sand coverage as noted above
- Probable
  - Oil updip to half of updip column, gas in remainder
  - Proportion of areal sand coverage as above
- Possible
  - Sand covers whole structure
  - Oil fills updip column
  - Oil downdip to lowest interpreted OWC from RFT
  - In water bearing sands at the well, oil fills half the column and gas half the column updip of the well.

Table 11 Summary of Hydrocarbons in Place, Basker Field

Unit		Proven		Probable		Possible	
		OIP (MMSTB)	GIP (BCF)	OIP (MMSTB)	GIP (BCF)	OIP (MMSTB)	GIP (BCF)
B	(Zone 1)	-	3.4	-	-		4.2
Zone 1	Water	-	-	-	-	4.1	8.9
D	(Zone 2)	14.5	-	2.9	6.4	6.3	-
E	(Zone 3)	-	6.9	-	-	-	0.7
F	(Zone 4)	1.0	-	1.0	2.5	1.6	-
Zone 4	Water	-	-	-	-	2.8	6.5
G		-	4.0	-	-	-	2.7
I		0.8	-	0.4	1.0	0.8	-
J		-	-	1.1	2.7	1.4	-
Total		16.3	14.3	5.4	12.6	17.0	23

Note:
For Proven and Probable and Possible oil, where there is an oil leg at the well, Probable gas must be excluded.

Zone 1 Water sands include A and comprise 5 sands 1.5 to 2.5 m thick.
Zone 4 Water sands comprise 3 sands 1 to 3.5m thick.
F sand estimated to contain 0.3 MMSTOIP by Material Balance calculations.

Total Proven and Probable OIP = 21.7 MMSTB
GIP = 26.9 Bcf

Total Proven and Probable and Possible

OIP = 38.7 MMSTB
GIP = 23 Bcf

Comparison of Shell P50 and AWE 2P

Unit		Shell		AWE	
(Sand)	(Zone)	OIP (MMSTB)	GIP (BCF)	OIP (MMSTB)	GIP (BCF)
B	1	-	51.4	-	3.4
D	2	27.8	-	17.4	6.4
E	3	11.7	-	-	6.9
F	4	18.1	-	2.0	2.5
G	5	8.4	-	-	4.0
I	6	6.0	-	1.2	1.0
J	7	6.2		1.1	2.7
		80.2	51.4	21.7	26.9

The major differences are

D sand	AWE has ~ 15% smaller area by excluding E culmination. Shell has overestimated GRV by their selection on zone tops. Shell have assumed the pool is entirely oil
B sand	Shell method of large zone, using N/G approach has introduced errors.
E and G	AWE interprets these to be gas bearing.

7. Oil Properties

D Sand

- 2 samples; bubble point 4325 and 4305 psi (ie slightly undersaturated with respect to Pres 4469 psia at 3,070 mss)
- Res Temp 111°C
- Pour point 36°C
- 43% wax

8. Reserves

OIL

Drive Mechanism

The D Sand is the only reservoir that contains significant volumes of oil. It consists of two stacked point bar sands, with individual channel sands 3 - 4 m thick. The meander belt width is likely to be one Km or less and the channel orientation is not known with certainty. Interpretation of Gummy (and Basker and Manta) dipmeter/FMS data suggests a southeasterly flow, while seismic semblance data suggests a north south direction. Either is possible on paleographic grounds. Aquifer support is expected to be insignificant and any gas cap will be small. Drive mechanism will therefore be by pressure depletion.

All other sands are thinner and most probably less areally extensive than the D sand. Drive would also be by pressure depletion.

Extent of Reservoir

The extent of the D Sand cannot be predicted with any surety at this time. If the channel flow was to the SE, it is possible the sand could cover much of the structural closure.

Reserve Definition

OIP/GIP categories are defined in Section 6

Recovery Efficiency

Primary recovery would be low and pressure maintenance would be required. Shell/RISC have modelled gas injection (July 1998), which they interpret to be slightly more effective than water injection and estimate 30 - 35% recovery (ie 5.2 to 6.1 MMSTBO Proven plus probable category). The pool is currently considered uneconomic.

GAS

Estimated GIP is small and is considered to be uneconomic.

9. Golden Beach Group

Seismic mapping indicates that Basker-1 penetrated the U3 sandstone. Seismic correlations across the Basker fault to the north show a very good character tie and are supported by geological correlations. The U3 was penetrated at approximately 3,878 mkb. The unit is much finer grained than in Gummy or Manta, and is composed of low energy lower coastal plain sediments, which include common coals.

Thin sandstones are probably of poor quality, as the caliper shows they have caved. There is little or no net sand. (Enclosure 13)

Low resistivities of less than 10 ohmm and low mudlog gas indicates the sands are most probably water bearing.

The quality of any deeper sands below the U3, beneath TD is questionable, given the facies change from Gummy to Basker.

Effective seals to hydrocarbons have not been encountered beneath the U3 in Manta (and Chimaera) and would be a high risk at Basker.

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and is enclosed within the document PE802209 at this page.

802209 040

GUMMY GOLDEN BEACH GAS RESOURCE

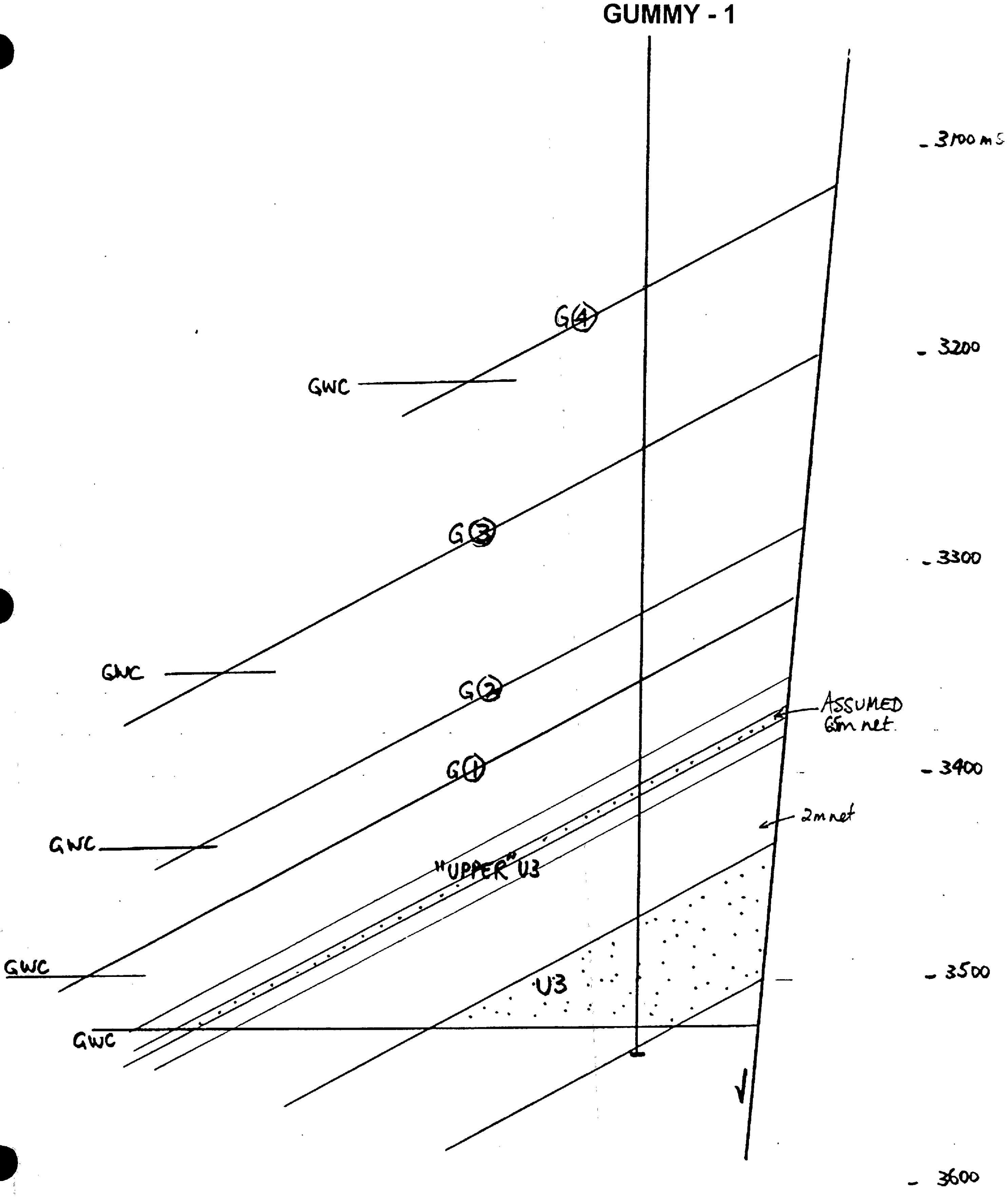

Figure 2

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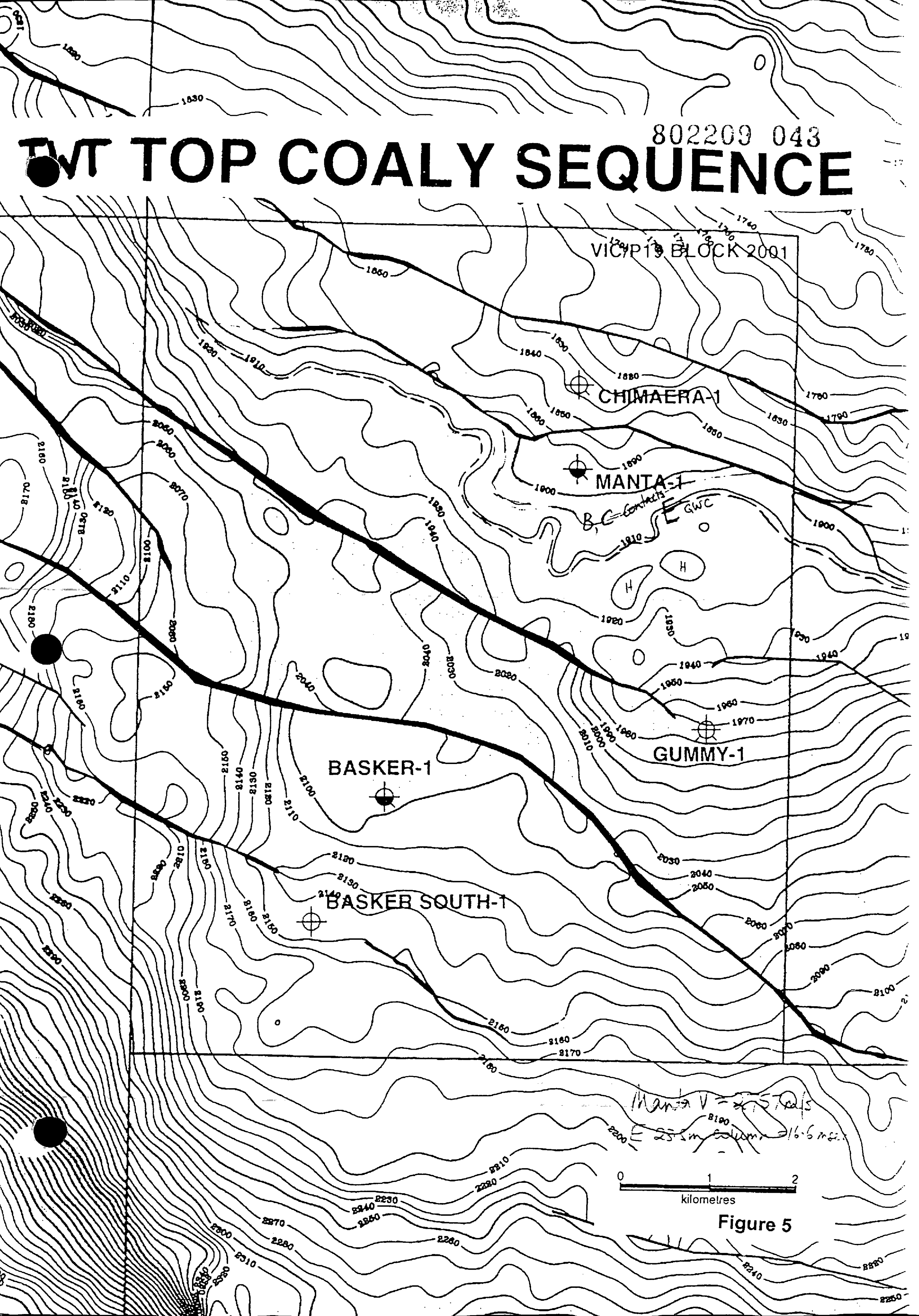
802209 043

TWT TOP COALY SEQUENCE



Manta V = 75 Tcfs
E 25.5m column = 16.6 msec

Figure 5

KIPPER-2 S1 RESERVOIR, DRAINAGE CAPILLARY PRESSURE DATA

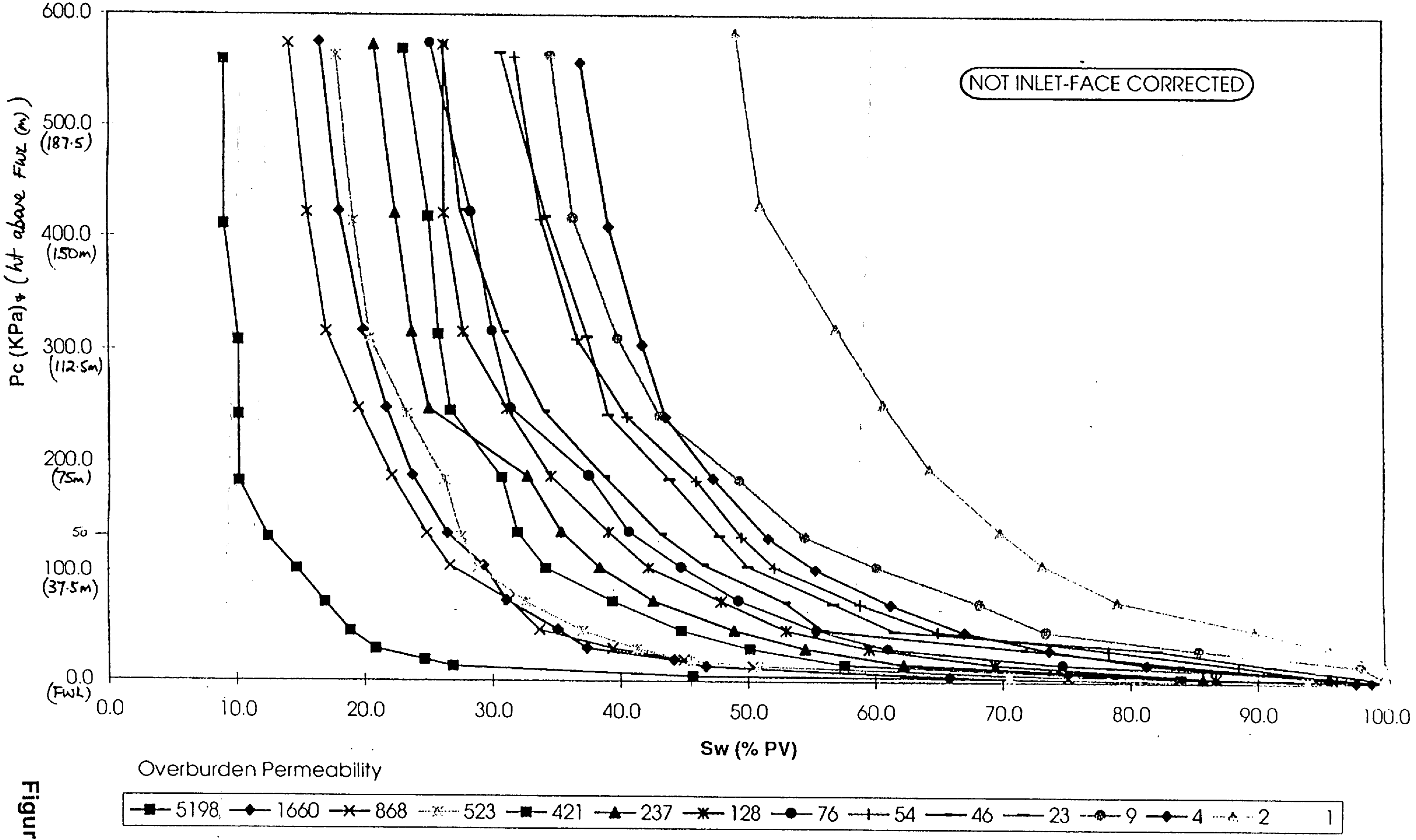
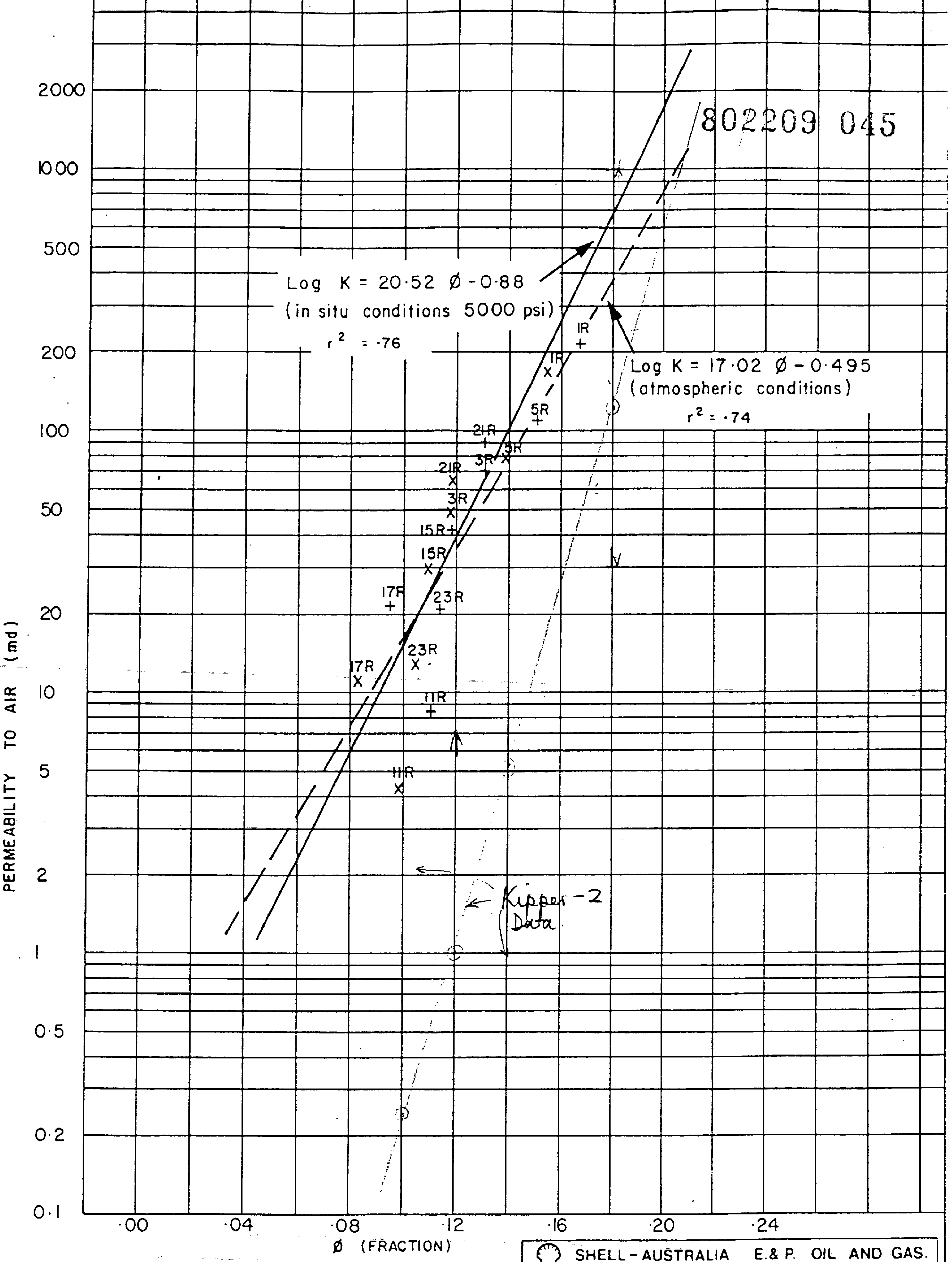


Figure 6

802209 045



\+ ATMOSPHERIC CONDITIONS (CORELAB - ADELAIDE)

X OVERBURDEN CONDITIONS (CORELAB - ADELAIDE)

K = PERMEABILITY TO AIR (md)

Ø = POROSITY FRACTION

SHELL - AUSTRALIA E.& P. OIL AND GAS.

MANTA - 1
POROSITY Vs PERMEABILITY
At Atmospheric And In Situ Conditions

Author	EPE / 2	Date	June 1984	Fig.7
Report No	SDA 596	Drawing No	18766	

802209 047

```
==================================================================
        GRV For U3 Sand (lower) Gummy Structure
==================================================================
Input grid file           TpU3_dep_1.gri
Accuracy factor           4
Input polygon file        TpU3_Gum_GRV.ply
Grid coordinate units     METRES
Grid vertical units       METRES
Output area units         SQ-KMS
Output volume units       CUBIC-METRES
End contour               ** NOT SPECIFIED **

===================================================================

VOLUMES FOR POLYGON       Gummy U3 pay vicinity_15
-------------------------------------------------------------------

          Slice         Base Area    Slice Volume  Total struct vol
above base
 3420.0 to 3254.0              0            0              0
 3425.0 to 3420.0              0            0              0
 3430.0 to 3425.0              0           20             20
 3435.0 to 3430.0              0        11306          11326
 3440.0 to 3435.0              0        44371          55697
 3445.0 to 3440.0              0       109183         164880
 3450.0 to 3445.0              0       246108         410988
 3455.0 to 3450.0              0       522814         933802
 3460.0 to 3455.0              0      1104031        2037833
 3465.0 to 3460.0              0      1559925        3597758
 3470.0 to 3465.0              0      1970721        5568479
 3475.0 to 3470.0              1      2404040        7972519
 3480.0 to 3475.0              1      2874537       10847056
 3485.0 to 3480.0              1      3386727       14233783
 3490.0 to 3485.0              1      4082278       18316061
 3495.0 to 3490.0              1      4737129       23053190
 3500.0 to 3495.0              1      5393486       28446677
 3505.0 to 3500.0              1      6108640       34555317
 3510.0 to 3505.0              1      6835620       41390937
 3515.0 to 3510.0              2      7970495       49361431
 3520.0 to 3515.0              2      9037296       58398727
 3522.0 to 3520.0              2      3860853       62259580
                          Total:     62259580

     ----- Reference level  3522.000 ---------
```

2 m

U3 Gummy-1

if GWC 5m deeper, 1.2 × GRV = 72.5 × $10^6 m^3$

```
===================================================================
        TOTAL VOLUME CALCULATION
===================================================================
Input grid file          TpU3_dep_1.gri
Accuracy factor          4
Input polygon file       TpU3_Gum2_GRV.ply
Grid coordinate units    METRES
Grid vertical units      METRES
Output area units        SQ-METRES
Output volume units      CUBIC-METRES
End contour              3510.000

====================================================================

VOLUMES FOR POLYGON      GUMMY BLOCK
--------------------------------------------------------------------

          Slice         Base Area    Slice Volume  Total struct vol above base
 3510.0 to -9999999.0       1454609            0       41448877
                         Total:            0

     ----- Reference level  3510.000 ---------

          Slice         Base Area    Slice Volume  Total struct vol above base
 3515.0 to 3510.0         1,737,070     8033356       49482233
 3516.0 to 3515.0         1785586      1763198       51245431
                         Total:        9796554

     ----- Reference level  3516.000 ---------
```

AWE
RDF

Table 3 Gummy Volumetric Fluid Properties (SHELL)

UNIT	Interval m.ss	Parameter	Parameter Value				
			Low	ML	High		
G4	1. 3160-3250	Eg scf/rcf	229	241	253	Used 245.	
	Datum 3200 m.ss	CGR bbl/mmscf	40	57	63		
	Pi 4650 psia						
	Temp 247 deg F						
G1,2,3	2. 3250-3400	Eg scf/rcf	246	248	260	Used 250	
	Datum 3375 m.ss	CGR bbl/mmscf	40	57	63		245
	Pi 5015 psia						
	Temp 257 deg F						
U3, upper U3	2. 3400-3520	Eg scf/rcf	246	248	260	Used 255	244
	Datum 3500 m.ss	CGR bbl/mmscf	40	57	63		
	Pi 5100 psia ✓						
	Temp 262 deg F ✓						

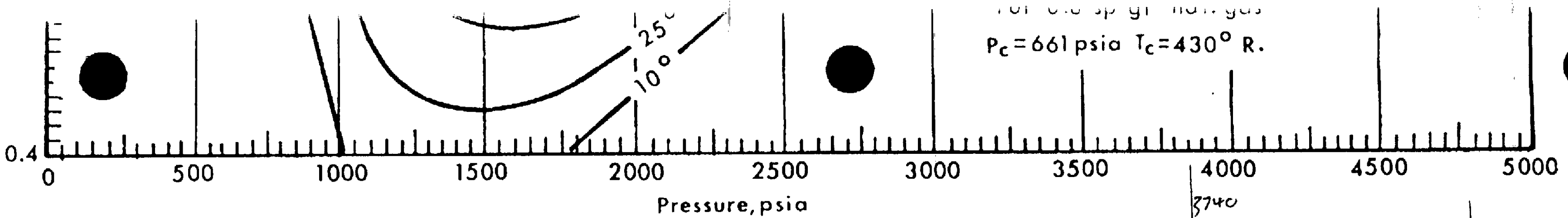
3500 m -> 130°C using Hanta GG
(= 266°F)

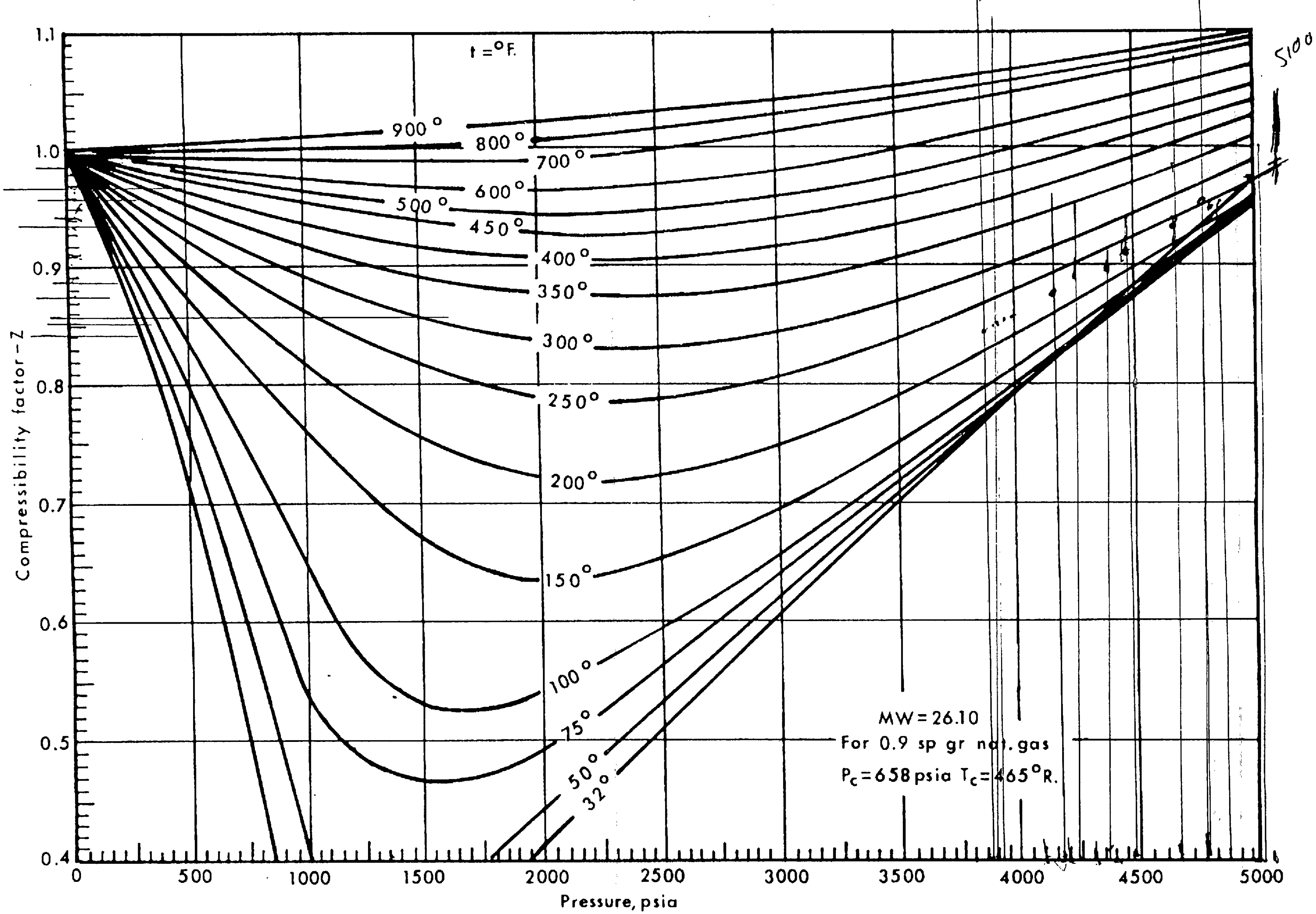
– 125°C using Basker

AWE Expansion Factors.

Zone	Pr psia	Tr degF	MW	z	Bgi rb/scf	Eg
Manta 1	3740	221	26	0.840	0.000802	222.2
2	3770	222	26	0.845	0.000801	222.3
3	3805	223	26	0.845	0.000795	224.1
4	3830	224	26	0.845	0.000791	225.2
5	3850	225	26	0.850	0.000792	224.7
6	3937	226	26	0.855	0.000781	228.2
7	3975 3955	227	26	0.858	0.000777	229.2
8	4760	253 ✓	26	0.960	0.000752	236.8
Gummy 1	4650	247	26	0.935	0.000744	239.4
2	5015	257	26	0.970	0.000725	245.5
3	5100	262	26	0.985	0.000729	244.3
Basker 1	4365	228	26	0.900	0.000743	239.6
2	4475	232	26	0.910	0.000737	241.6
3	4485	233	26	0.912	0.000738	241.3
4	4505	238	26	0.965	0.000783	227.5
5	4645	241	26	0.940	0.000743	239.8
6	4690	243	26	0.960	0.000753	236.5
7	4750	245	26	0.962	0.000747	238.3

RDF 8/98


For 0.8 sp gr nat. gas
Pc=661 psia Tc=430° R.
25°
10°
0.4
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
Pressure, psia
3740


5100
t = °F.
900°
800°
700°
600°
500°
450°
400°
350°
300°
250°
200°
150°
100°
75°
50°
32°
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
Compressibility factor - Z
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
Pressure, psia
MW = 26.10
For 0.9 sp gr nat. gas
Pc = 658 psia Tc = 465°R.

802209 051

MANTA-1
RESULTS OF PETROPHYSICAL EVALUATION

Sand Unit	Depth Interval (m bdf)	Net (m)	Porosity (%)	Av. Sh (%)	Fluid
A	2607.4 - 2608.2	0.8 ✓	22.2	45.0	Oil
B	2614.9 - 2617.9	3.0 2.8	19.9	57.6	Oil
B B water	2623.1 - 2626.3	3.2 ✓ 4.0	23.0	47.5	Oil
C	2646.3 - 2648.7	2.4 ✓	17.9	59.2	Gas ?
C	2649.3 - 2649.9	0.6	22.7	71.6	Gas ?
D	2662.1 - 2663.3	1.2 2.0	19.9	68.9	Oil
E	2668.8 - 2672.8	4.0 ✓	19.4	80.7	Gas top poor
E	2674.3 - 2680.7	6.4 ✓	21.4 20.9	76.3 76	Gas
E	2683.9 - 2686.9	3.0 ✓	19.2	72.2	Gas
G	2721.2 - 2722.0	0.8 1.0	21.7	71.8	Gas
H	2726.1 - 2729.4	3.3	20.9 21	82.3	Gas
H	2731.2 - 2731.9	0.7	16.6	49.4	Gas ?
I	2736.3 - 2741.2	4.9 4.5	20.4	65.0	Gas
I	2743.6 - 2744.5	0.9	18.4	41.3	Gas ?
J	2751.1 - 2751.7	0.6	23.5	59.8	Gas ?
J J water	2751.7 - ~~2765.6~~ 66	~~12.9~~ 13.8 4.0	21.7	63.4	Oil
K	2801.4 - 2802.4	1.0	19.9	41.5	Oil
K	2808.7 - 2809.5	0.8	21.8	55.0	Oil
K	2811.9 - 2813.1	1.2	18.7	41.8	Oil
L	2884.0 - 2885.4	1.4	24.8	48.3	Oil
M	2995.9 - 2996.6	0.7	15.2	40.5	Oil
N	3040.2 - 3040.8	0.6	20.2	42.8	Oil
N	3043.7 - 3044.9	1.2	19.5	61.1	Gas
O	3046.0 - 3047.5	1.5	18.1	77.4	Gas
P	3145.4 - 3146.4	1.0	20.6	47.5	Oil
Q	3154.5 - 3155.4	0.9	22.2	43.3	Oil
R	3216.9 - 3217.6	0.7	17.7	31.6	Gas
S	3241.8 - 3243.2	1.4	17.9	52.4	Gas
T	3258.3 - 3260.4	1.5	11.9	49.7	Gas
U	3261.0 - 3261.9	0.9	11.8	31.1	Gas
U	3273.5 - 3317.0	39.0	13.5	56.6	Gas

J sand	gas-oil contact from logs at 2751.7 m. ✓ oil-water contact from logs at 2765.6 m. 66
U sand	inferred gas-water contact from logs at 3317.0 m. inferred gas-water contact from pressure data at 3320.0 m.

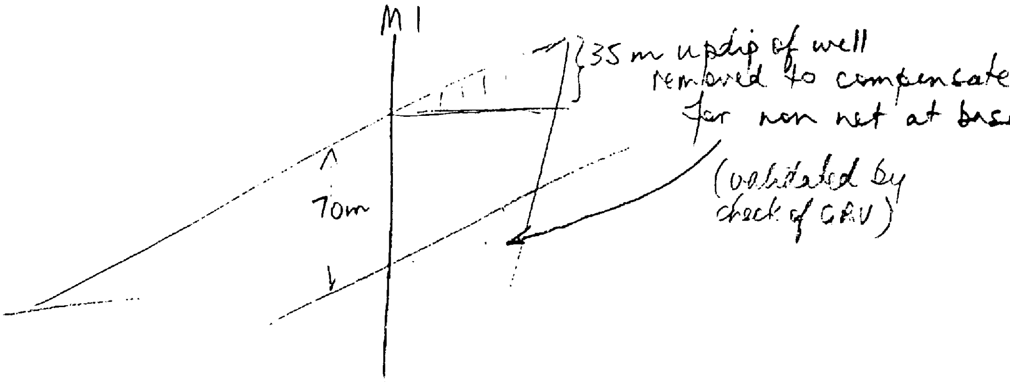
TOTAL NET OIL	28.3 m (cut-offs : porosity 13%, Sh 40%)
TOTAL NET GAS	73.8 m (cut-offs : porosity 10%, Sh 30%)

Source : SHELL WELL COMPLETION REPORT + 1993 RL APPLICATION

```
Top porosity grid          TpU3_dep_Manta.gri
Base porosity grid         BsU3_dep_Manta.gri
Accuracy factor            4
Input polygon file         BLOCK-BNDY.ply
Grid coordinate units      METRES
Grid vertical units        METRES
Output area units          SQ-METRES
Output volume units        CUBIC-METRES
End contour                ** NOT SPECIFIED **

===================================================================

VOLUMES FOR POLYGON        Block_Boundary   BMG BLOCK
-------------------------------------------------------------------

          Slice          Base Area    Slice Volume  Total struct vol above base
 3187.6 to -9999999.0         11328             0           49100
                           Total:             0

     ----- Reference level  3187.648 ---------

          Slice          Base Area    Slice Volume  Total struct vol above base
 3190.0 to 3187.6          14844         30795           79895
 3195.0 to 3190.0          33594        145327          225223
 3200.0 to 3195.0          75625        281403          506626
 3205.0 to 3200.0         134609        513355         1019981
 3210.0 to 3205.0         271875       1032980         2052961
 3215.0 to 3210.0         433125       1737744         3790706
 3220.0 to 3215.0         696914       2872355         6663060
 3225.0 to 3220.0        1038750       4299222        10962282
 3230.0 to 3225.0        1389297       6144557        17106839
 3235.0 to 3230.0        1742695       7841729        24948568
 3240.0 to 3235.0        2188789       9794928        34743496
 3245.0 to 3240.0        2698242      12243686        46987182
 3250.0 to 3245.0        3463711      15344916        62332099
 3255.0 to 3250.0        4726758      20143664        82475762
 3260.0 to 3255.0        6281719      27515853       109991615
 3265.0 to 3260.0        7594336      34759232       144750848
 3270.0 to 3265.0        8809570      40774416       185525264
 3275.0 to 3270.0        9960586      46582769       232108033
 3280.0 to 3275.0       10733086      50679659       282787692
 3285.0 to 3280.0       11429375      53859166       336646858
 3290.0 to 3285.0       12010078      55843645       392490503
 3295.0 to 3290.0       12569648      57147457       449637960
                         Total:      449588860

     ----- Reference level  3295.000 ---------
```

802209/054

```
============================================================
       GRV for Lower U3 sand in Greater Manta Struct
============================================================
Input grid file          TpU3_dep_Manta.gri
Accuracy factor          4
Input polygon file       TpU3_Manta_GRV.ply
Grid coordinate units    METRES
Grid vertical units      METRES
Output area units        SQ-METRES
Output volume units      CUBIC-METRES
End contour              ** NOT SPECIFIED **

============================================================

VOLUMES FOR POLYGON      MANTA_BLOCK
------------------------------------------------------------

         Slice        Base Area    Slice Volume  Total struct vol
above base
 3187.6 to -9999999.0       11328            0          49100
                     Total:               0

     ----- Reference level  3187.648 ---------

         Slice        Base Area    Slice Volume  Total struct vol
above base
 3190.0 to 3187.6       14844          30795           79895
 3195.0 to 3190.0       33594         145327          225223
 3200.0 to 3195.0       75625         281403          506626
 3205.0 to 3200.0      134609         513355         1019981
45m updip 3210.0 to 3205.0      271875        1032980         2052961
 3215.0 to 3210.0      433125        1737744         3790706
 3220.0 to 3215.0      701523        2890935         6681641
 3225.0 to 3220.0     1050781        4341846  -10974385  11023487
Manta 1 → 3230.0 to 3225.0     1416562        6246110        17269597
 3235.0 to 3230.0     1811094        8110664        25380261
 3240.0 to 3235.0     2303086       10269804        35650064
 3245.0 to 3240.0     2864961       12936688        48586752
 3250.0 to 3245.0     3724375       16482009        65068761
 3255.0 to 3250.0     5083398       21667930        86736690
 3260.0 to 3255.0  6.0 →   6759727       29631472       116368162
 3265.0 to 3260.0     8260156       37742617       154110779
 3270.0 to 3265.0     9703711       44953226       199064005
 3275.0 to 3270.0    11096289       52202475       251266480
 3280.0 to 3275.0    12149961       58155344       309421823
 3285.0 to 3280.0    13134414       63435052       372856875
 3290.0 to 3285.0    14163438       68180009       441036884
GWC 3295.0 to 3290.0    15189961       73469600       514506484
                     Total:       514457384

     ----- Reference level  3295.000 ~503,483,000
```



35m updip of well removed to compensate for non net at bas

(validated by check of GRV)

MANTA LATROBE

TOP MARGINAL MARINE TIME STR.

AREA VS HEIGHT

TWT	V=2825m/s m	Area (Km²)	Manta culm. only (Km²)
1954 Crest	0	0	
1960	8	0·16	
1970	22	0·36	0·1
1980	36	1·44	0·72
1990	50	3·5	1·36
2000	64	5·0	2·56

Manta 1978msec

$1cm^2 = 2.5 \times 10^6 m^2$

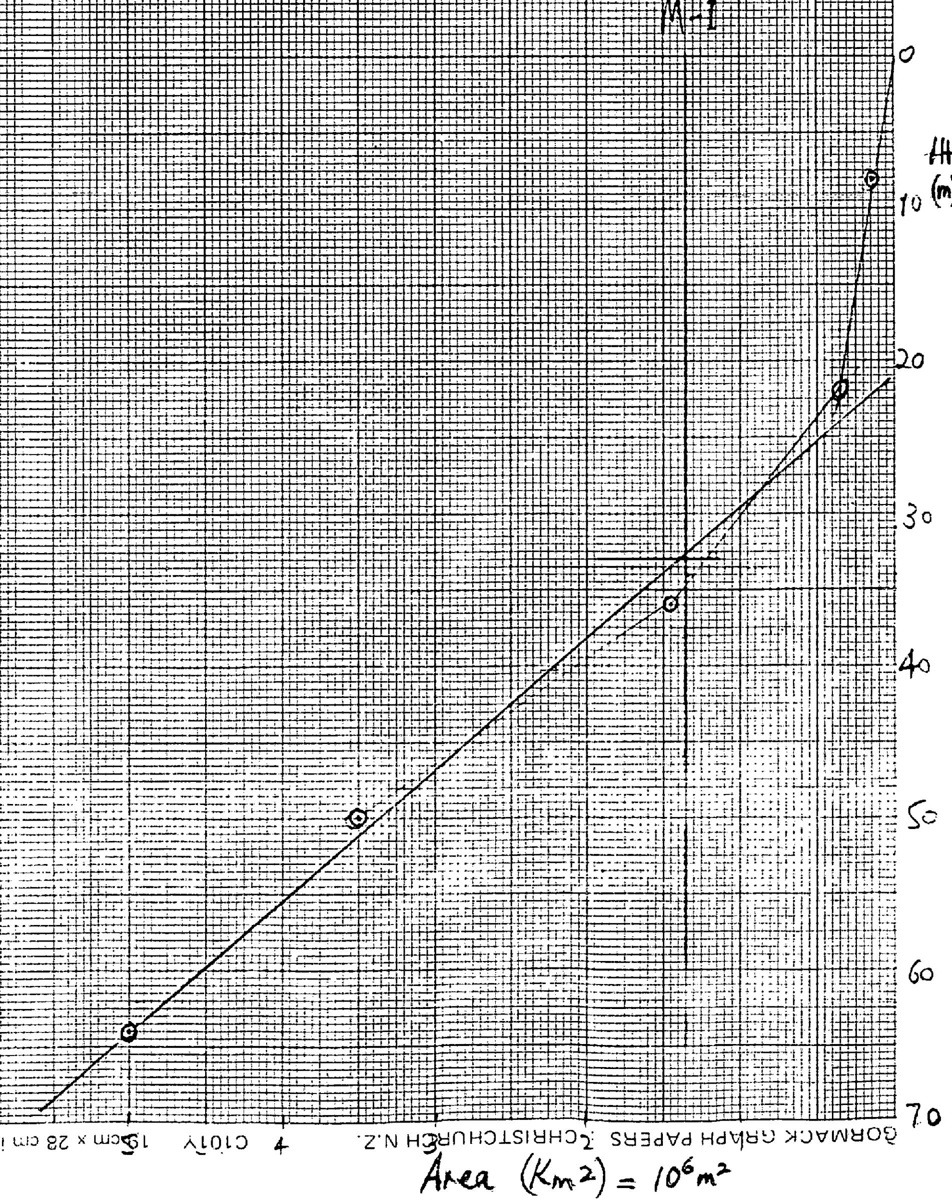


Table 2 Manta Volumetric Fluid Properties

UNIT	Interval m.ss	Parameter	Parameter Value			AWE RDF	RDF
			Low	ML	High		
	1. 2575-2590	Boi rb/stb	1.80	1.74	1.67		
	Datum 2580 m.ss	Rsi scf/stb	1310	1189	1070		
	Pi 3740 psia	Eg scf/rcf	-	-	-		
	Temp 221 deg F (105°c)	CGR bbl/mmscf	11	14	17		
	2. 2590 - Top Coaly (PT-3)	Boi rb/stb	1.80	1.74	1.67		
B	Datum 2600 m.ss	Rsi scf/stb	1310	1189	1070		
	Pi ~~3770~~ psia 3761	Eg scf/rcf	-	222	-	222	
	Temp 222 deg F	CGR bbl/mmscf	11	14	17		
C	3. Top Coaly-2635	Boi rb/stb	-	-	-		
	Datum 2625 m.ss	Rsi scf/stb	-	-	-		
	Pi 3805 psia ✓	Eg scf/rcf	206	217	228	224	
	Temp 223 deg F (106°c)	CGR bbl/mmscf	10	15	60		
D	4. 2635-2643	Boi rb/stb	1.80	1.74	1.65		
	Datum 2640 m.ss	Rsi scf/stb	1310	1189	890		
	Pi 3830 psia ✓	Eg scf/rcf	-	-	-		
	Temp 224 deg F	CGR bbl/mmscf	11	14	17		
E	5. 2643-2695	Boi rb/stb	-	-	-		
	Datum 2655 m.ss	Rsi scf/stb	-	-	-		
	Pi 3850 psia ✓	Eg scf/rcf	207	218	229	225	
	Temp 225 deg F 107°c	CGR bbl/mmscf	10	15	60		
G/H	6. 2695-2710	Boi rb/stb	-	-	-		
	Datum 2710 m.ss OK	Rsi scf/stb	-	-	-		
	Pi 3937 psia ✓	Eg scf/rcf	210	221	232	228	
	Temp 226 deg F 108°c	CGR bbl/mmscf	10	15	60		
I/J	7. 2710-2755 (PT-2)	Boi rb/stb	1.76	1.71	1.65		
	Datum 2735 m.ss ✓~midpt	Rsi scf/stb	1090	987	890		
	Pi ~~3975~~ psia 3955	Eg scf/rcf	210	222	233	229	~~229~~
	Temp 227 deg F (108°c)	CGR bbl/mmscf	10	13	16		
	8. Golden Beach (PT-1)	Boi rb/stb	-	-	-		
GWC 3293 3275	Datum ~~3300~~ m.ss (3265)	Rsi scf/stb	-	-	-		
✓	Pi 4760 psia 4755	Eg scf/rcf	227	239	251	237	
	Temp 253 deg F 123°c	CGR bbl/mmscf	51	57	63		

≈ GG = 123-15 = 33°c / km

[illegible]

802209 057

BASKER-1 RFT PRETESTS AND SAMPLES

retracted + resampled at 3091.7 after plugging

SAND	DEPTH (m)	(mSS)	RESERVOIR FLUID OR GAS	PRESSURE psig	TEMP °F	REMARKS
	2901	2876	water	4157	213	
	2953.5	(·2928.5	water ✓	4234	214	(1·433 psi/m
A	2986	2961	water	4280	215.5	
B	3019	2994	gas	4350	216	
	3033	3008	water	4355	217	
C	3059.4	3034.4	water	4394	218	Ran back to this lev after ~~mea~~ measuring 290
D	3091.7 3092.3	~~3044.7~~ 3067.3	oil	~~4444~~ ✓ 4446/47	211.5*	Sample 1 } – C+D pressures ~~pro~~ probably not consistent with pressure run. (pressure not reliable*)
D	3097	3072	oil	4455 ✓	218.5	– (seal failure jumps it to 4466 before tool retracted)
E	3109	3084	gas/water	4470	218.8	
	3116	3091	water	4477 or 78	219.5	
F	3131	3106	oil	4498	221	
	3131.5 ~~3135~~	3106.5	oil	4497		Separate Run for Sample 2 (buildup 15 mins)
G.	3196.5	3171.5	gas/oil	4611	221	
I	3241	3216	oil	4660	221.9	
	3362.5		water	-	226	Tight (volcanics)
	3380		water	-	226	Tight (volcanics)
	3487.2		water	5023	226.2	
	3810.4		water/hydrocarbon	-	239.1	Tight
	3855.5		oil	-	241.2	Seal failure
	3940.6		water	-	-	Tight
	3951		oil?	5992	240.2	
	3951.1		oil?	5984	256.8*	Sample 3 (pressure not reliable*)

3091.5 Sample 1: 46 scf gas, 9 ltr waxy crude and 10 ltr water (6 gallon chamber)
Sample 2: 2.2 scf gas, 0.5 ltr waxy crude and 2 ltr water (1 gallon chamber)
Sample 3: 1 ltr filtrate (no hydrocarbons)

* Pressure not reliable because of unstable temperature.

ex 1993 RL applicn.

BASKER-1
RESULTS OF PETROPHYSICAL EVALUATION

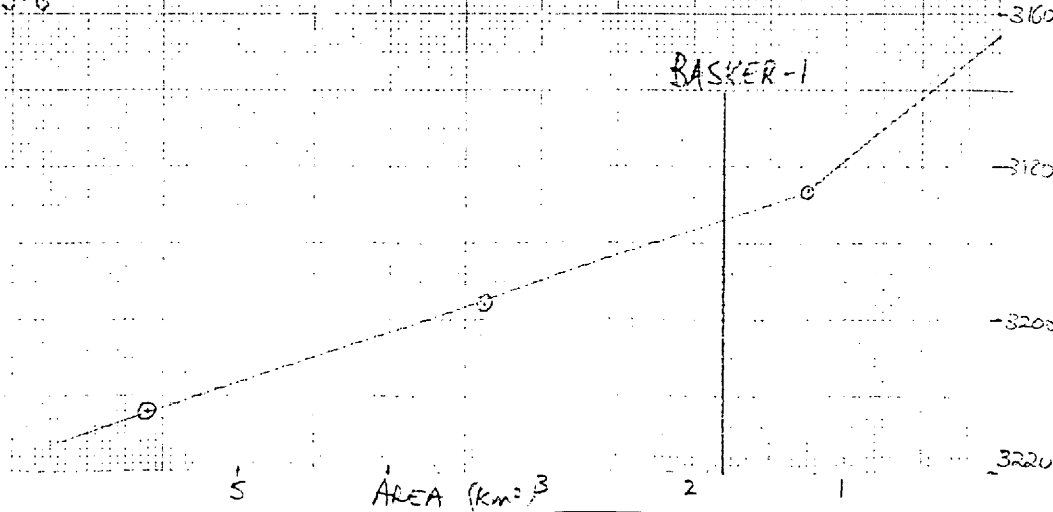
Sand Unit	Depth Interval (m bdf)	Net (m)	Porosity (%)	Av. Sh (%)	Fluid
A	2987.3 - 2988.4	1.1	21.9	35.0	~~Oil~~
B	3018.0 - 3019.8	1.5 1.8	18.6	63.0	Gas
C	3056.2 - 3057.0	0.8	16.7	40.0	~~Oil~~
D	3090.2 - 3098.0	✓6.9	23.4	74.0	Oil
F	3128.5 - 3132.1	3.5 3.7	21.8	54.0	Oil
G	3195.8 - 3197.3	1.5 ✓	18.8	61.0	Unspec.
H	3222.8 - 3223.8	1.0	20.7	44.0	Oil
I	3240.5 - 3241.5	1.0	24.2	46.0	Oil
J	3274.6 - 3276.9	2.0 2.3	23.3	51.0	Oi.
K	3474.1 - 3474.9	0.8	19.3	63.0	Oil
L	3757.4 - 3758.6	1.2	13.0	36.0	Oil

TOTAL NET OIL	18.8 m (cut-offs : porosity 13%, Sh 35%)
TOTAL NET GAS	1.8 m (cut-offs : porosity 13%, Sh 35%)
TOTAL NET UNSPECIFIED HYDROCARBONS	1.8 m (cut-offs : porosity 13%, Sh 35%)

Basker Time Marginal Area

T(msec)	D(m)	Area (km²)
2200	3169	
2210	3183	1.26
2220	3198	3.38
2230	3212	5.6

$V = 2881 m/s \left(\frac{3187}{2.212} \right)$



AWE
(RDF)

Table 1 Basker Volumetric Fluid Properties

UNIT	Interval m.ss	Parameter	Parameter Value			
			Low	ML	High	
	1. Top Coaly - 3050	Boi rb/stb	-	-	-	
B	Datum 3000 m.ss ✓	Rsi scf/stb	-	-	-	
	Pi 4365 psia ✓	Eg scf/rcf	235	247	259	240
	Temp 228 deg F	CGR bbl/mmscf	8	11	50	
D	**2. 3050-3075 (PT-1) (includes D sand)**	Boi rb/stb	1.66	1.61	1.56	
	Datum 3075 m.ss	Rsi scf/stb	1130	1027	925	
	Pi 4475 psia ✓	Eg scf/rcf	-	-	-	242
	Temp 232 deg F	CGR bbl/mmscf	8	11	14	
	3. 3075-3092 (includes E sand)	Boi rb/stb	1.82	1.64	1.56	
	Datum 3085 m.ss	Rsi scf/stb	1370	1080	925	
	Pi 4485 psia	Eg scf/rcf	-	-	-	241
	Temp 233 deg F	CGR bbl/mmscf	8	11	14	
F	4. **3092-3170 (PT-2) (includes F sand)**	Boi rb/stb	1.82	1.75	1.68	
	Datum 3100 m.ss ✓	Rsi scf/stb	1370	1243	1120	
	Pi 4505 psia	Eg scf/rcf				228
	Temp 238 deg F	CGR bbl/mmscf	8	11	14	
G	**5. 3170-3215**	Boi rb/stb	1.82	1.75	1.56	
	Datum 3175 m.ss ✓	Rsi scf/stb	1370	1243	925	
	Pi 4645 psia 4627	Eg scf/rcf				240
	Temp 241 deg F	CGR bbl/mmscf	8	11	14	
I	**6. 3215-3250**	Boi rb/stb	1.82	1.75	1.56	
	Datum 3215 m.ss	Rsi scf/stb	1370	1243	925	
	Pi 4690 psia	Eg scf/rcf				237
	Temp 243 deg F	CGR bbl/mmscf	8	11	14	
	7. 3250 - Top Golden Beach	Boi rb/stb	1.82	1.75	1.56	
	Datum 3250 m.ss	Rsi scf/stb	1370	1243	925	
	Pi 4750 psia	Eg scf/rcf				238
	Temp 245 deg F	CGR bbl/mmscf	8	11	14	

PE807199

This is an enclosure indicator page.
The enclosure PE807199 is enclosed within the container PE802209 at this location in this document.

The enclosure PE807199 has the following characteristics:
ITEM_BARCODE = PE807199
CONTAINER_BARCODE = PE802209
NAME = Encl 1 Stratigraphic Cross-section
BASIN = GIPPSLAND
ONSHORE? = N
DATA_TYPE = WELL
DATA_SUB_TYPE = WELL_CORRELATION
DESCRIPTION = Encl 1 Stratigraphic Cross-section Chimaera 1, Manta 1, Gummy 1 and Basker 1, enclosure to accompany report "Basker-Manta Reserves Estimate" (PE802209).
REMARKS =
DATE_WRITTEN = 30-SEP-1998
DATE_PROCESSED =
DATE_RECEIVED = 24-FEB-1999
RECEIVED_FROM = Australian Worldwide Exploration NL
WELL_NAME = Manta 1
CONTRACTOR =
AUTHOR =
ORIGINATOR =
TOP_DEPTH = 0
BOTTOM_DEPTH = 0
ROW_CREATED_BY = CC00_SW

(Inserted by DNRE - Vic Govt Mines Dept)

PE807200

This is an enclosure indicator page.
The enclosure PE807200 is enclosed within the container PE802209 at this location in this document.

The enclosure PE807200 has the following characteristics:

ITEM_BARCODE = PE807200
CONTAINER_BARCODE = PE802209
NAME = Encl 2 Time Structure Map
BASIN = GIPPSLAND
ONSHORE? = N
DATA_TYPE = SEISMIC
DATA_SUB_TYPE = ISOCHRON_MAP
DESCRIPTION = Encl 2 Time Structure Map Base T. Lilliei Volcanics, CI 10msec, by Australian Worldwide Exploration, enclosure to accompany report "Basker-Manta Reserves Estimate" (PE802209).
REMARKS =
DATE_WRITTEN = 23-JUL-1998
DATE_PROCESSED =
DATE_RECEIVED = 24-FEB-1999
RECEIVED_FROM = Australian Worldwide Exploration NL
WELL_NAME =
CONTRACTOR =
AUTHOR =
ORIGINATOR =
TOP_DEPTH =
BOTTOM_DEPTH =
ROW_CREATED_BY = CC00_SW

(Inserted by DNRE - Vic Govt Mines Dept)

PE807201

This is an enclosure indicator page.
The enclosure PE807201 is enclosed within the container PE802209 at this location in this document.

The enclosure PE807201 has the following characteristics:

ITEM_BARCODE = PE807201
CONTAINER_BARCODE = PE802209
NAME = Encl 3 Time Structure Map Top U3 Sand
BASIN = GIPPSLAND
ONSHORE? = N
DATA_TYPE = SEISMIC
DATA_SUB_TYPE = ISOCHRON_MAP
DESCRIPTION = Encl 3 Time Structure Map Top U3 Sand, CI 10msec, by Australian Worldwide Exploration, enclosure to accompany report "Basker-Manta Reserves Estimate" (PE802209).
REMARKS =
DATE_WRITTEN = 23-JUL-1998
DATE_PROCESSED =
DATE_RECEIVED = 24-FEB-1999
RECEIVED_FROM = Australian Worldwide Exploration NL
WELL_NAME =
CONTRACTOR =
AUTHOR =
ORIGINATOR =
TOP_DEPTH =
BOTTOM_DEPTH =
ROW_CREATED_BY = CC00_SW

(Inserted by DNRE - Vic Govt Mines Dept)

PE807202

This is an enclosure indicator page.
The enclosure PE807202 is enclosed within the container PE802209 at this location in this document.

The enclosure PE807202 has the following characteristics:

ITEM_BARCODE = PE807202
CONTAINER_BARCODE = PE802209
NAME = Encl 4 Depth Structure Map
BASIN = GIPPSLAND
ONSHORE? = N
DATA_TYPE = SEISMIC
DATA_SUB_TYPE = HRZN_CONTR_MAP
DESCRIPTION = Encl 4 Depth Structure Map Top U3 Sand (Lower), by Australian Worldwide Exploration, enclosure to accompany report "Basker-Manta Reserves Estimate" (PE802209).
REMARKS =
DATE_WRITTEN = 24-JUL-1998
DATE_PROCESSED =
DATE_RECEIVED = 24-FEB-1999
RECEIVED_FROM = Australian Worldwide Exploration NL
WELL_NAME =
CONTRACTOR =
AUTHOR =
ORIGINATOR =
TOP_DEPTH =
BOTTOM_DEPTH =
ROW_CREATED_BY = CC00_SW

(Inserted by DNRE - Vic Govt Mines Dept)

PE807203

This is an enclosure indicator page.
The enclosure PE807203 is enclosed within the container PE802209 at this location in this document.

The enclosure PE807203 has the following characteristics:

ITEM_BARCODE = PE807203
CONTAINER_BARCODE = PE802209
NAME = Encl 5 Composite Log Gummy-1
BASIN = GIPPSLAND
ONSHORE? = N
DATA_TYPE = WELL
DATA_SUB_TYPE = COMPOSITE_LOG
DESCRIPTION = Encl 5 Composite Log of Golden Beach section, Gummy-1, by Australian Worldwide Exploration, enclosure to accompany report "Basker-Manta Reserves Estimate" (PE802209).
REMARKS =
DATE_WRITTEN =
DATE_PROCESSED =
DATE_RECEIVED = 24-FEB-1999
RECEIVED_FROM = Australian Worldwide Exploration NL
WELL_NAME = Gummy-1
CONTRACTOR =
AUTHOR =
ORIGINATOR =
TOP_DEPTH = 0
BOTTOM_DEPTH = 0
ROW_CREATED_BY = CC00_SW

(Inserted by DNRE - Vic Govt Mines Dept)

PE807204

This is an enclosure indicator page.
The enclosure PE807204 is enclosed within the container PE802209 at this location in this document.

The enclosure PE807204 has the following characteristics:

ITEM_BARCODE = PE807204
CONTAINER_BARCODE = PE802209
NAME = Encl 6 Petrophysical Analysis Gummy-1
BASIN = GIPPSLAND
ONSHORE? = N
DATA_TYPE = WELL
DATA_SUB_TYPE = WELL_LOG
DESCRIPTION = Encl 6 Petrophysical Analysis Gummy-1, enclosure to accompany report "Basker-Manta Reserves Estimate" (PE802209).
REMARKS =
DATE_WRITTEN =
DATE_PROCESSED =
DATE_RECEIVED = 24-FEB-1999
RECEIVED_FROM = Australian Worldwide Exploration NL
WELL_NAME = Gummy-1
CONTRACTOR =
AUTHOR =
ORIGINATOR =
TOP_DEPTH = 0
BOTTOM_DEPTH = 0
ROW_CREATED_BY = CC00_SW

(Inserted by DNRE - Vic Govt Mines Dept)

PE807205

This is an enclosure indicator page.
The enclosure PE807205 is enclosed within the container PE802209 at this location in this document.

The enclosure PE807205 has the following characteristics:

ITEM_BARCODE = PE807205
CONTAINER_BARCODE = PE802209
NAME = Encl 7 Composite Log Golden Beach Goup
BASIN = GIPPSLAND
ONSHORE? = N
DATA_TYPE = WELL
DATA_SUB_TYPE = COMPOSITE_LOG
DESCRIPTION = Encl 7 Composite Log Golden Beach Group Manta-1, enclosure to accompany report "Basker-Manta Reserves Estimate" (PE802209).
REMARKS =
DATE_WRITTEN =
DATE_PROCESSED =
DATE_RECEIVED = 24-FEB-1999
RECEIVED_FROM = Australian Worldwide Exploration NL
WELL_NAME = Manta-1
CONTRACTOR =
AUTHOR =
ORIGINATOR =
TOP_DEPTH = 0
BOTTOM_DEPTH = 0
ROW_CREATED_BY = CC00_SW

(Inserted by DNRE - Vic Govt Mines Dept)

PE807206

This is an enclosure indicator page.
The enclosure PE807206 is enclosed within the container PE802209 at this location in this document.

The enclosure PE807206 has the following characteristics:

ITEM_BARCODE = PE807206
CONTAINER_BARCODE = PE802209
NAME = Encl 8 Shell Petrophysical Analysis
BASIN = GIPPSLAND
ONSHORE? = N
DATA_TYPE = WELL
DATA_SUB_TYPE = WELL_LOG
DESCRIPTION = Encl 8 Shell Petrophysical Analysis Golden Beach Group Manta - 1, enclosure to accompany report "Basker-Manta Reserves Estimate" (PE802209).
REMARKS =
DATE_WRITTEN =
DATE_PROCESSED =
DATE_RECEIVED = 24-FEB-1999
RECEIVED_FROM = Australian Worldwide Exploration NL
WELL_NAME = Manta-1
CONTRACTOR =
AUTHOR =
ORIGINATOR =
TOP_DEPTH = 0
BOTTOM_DEPTH = 0
ROW_CREATED_BY = CC00_SW

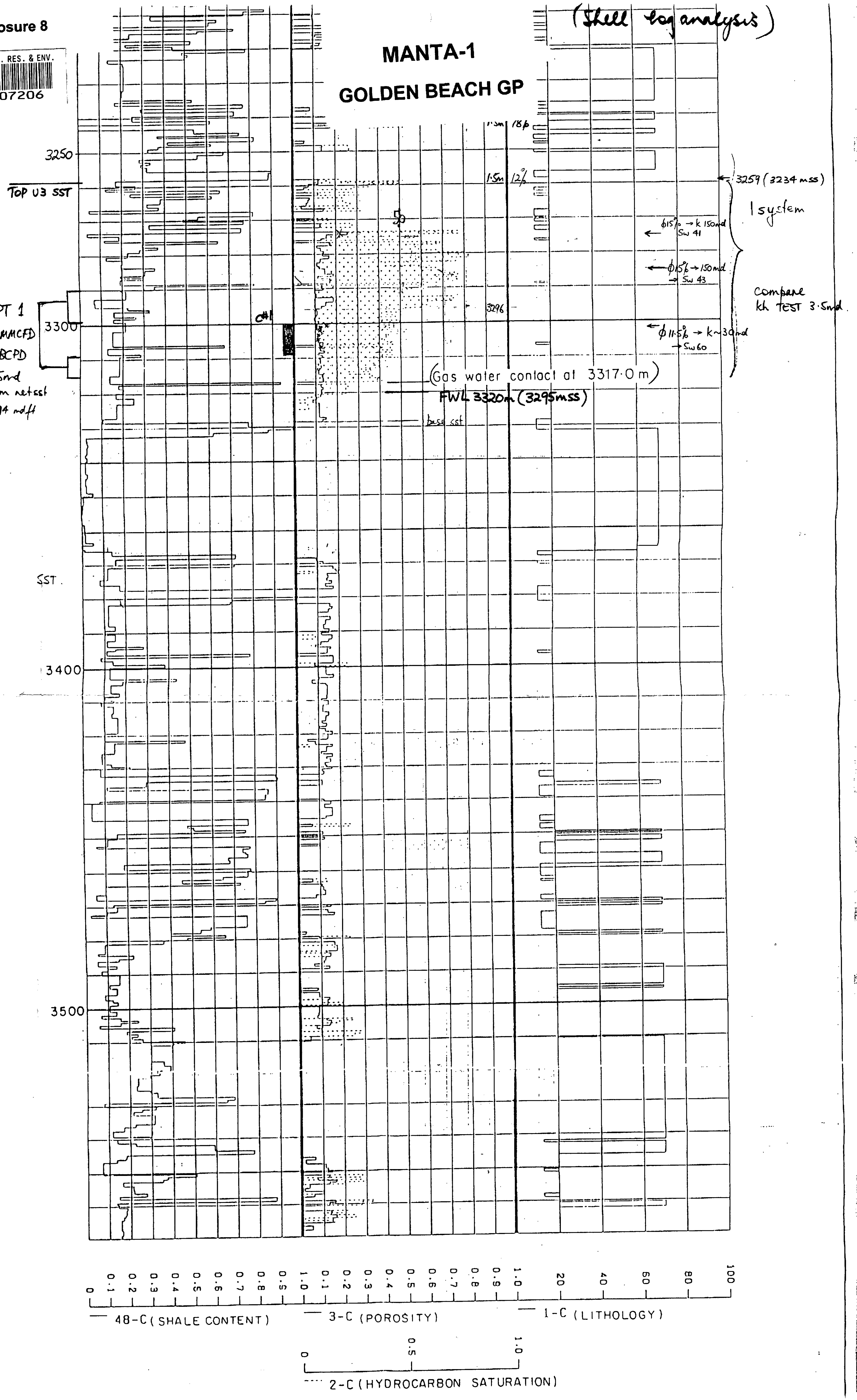
(Inserted by DNRE - Vic Govt Mines Dept)

Enclosure 8

(Shell log analysis)

MANTA-1

GOLDEN BEACH GP



PE807207

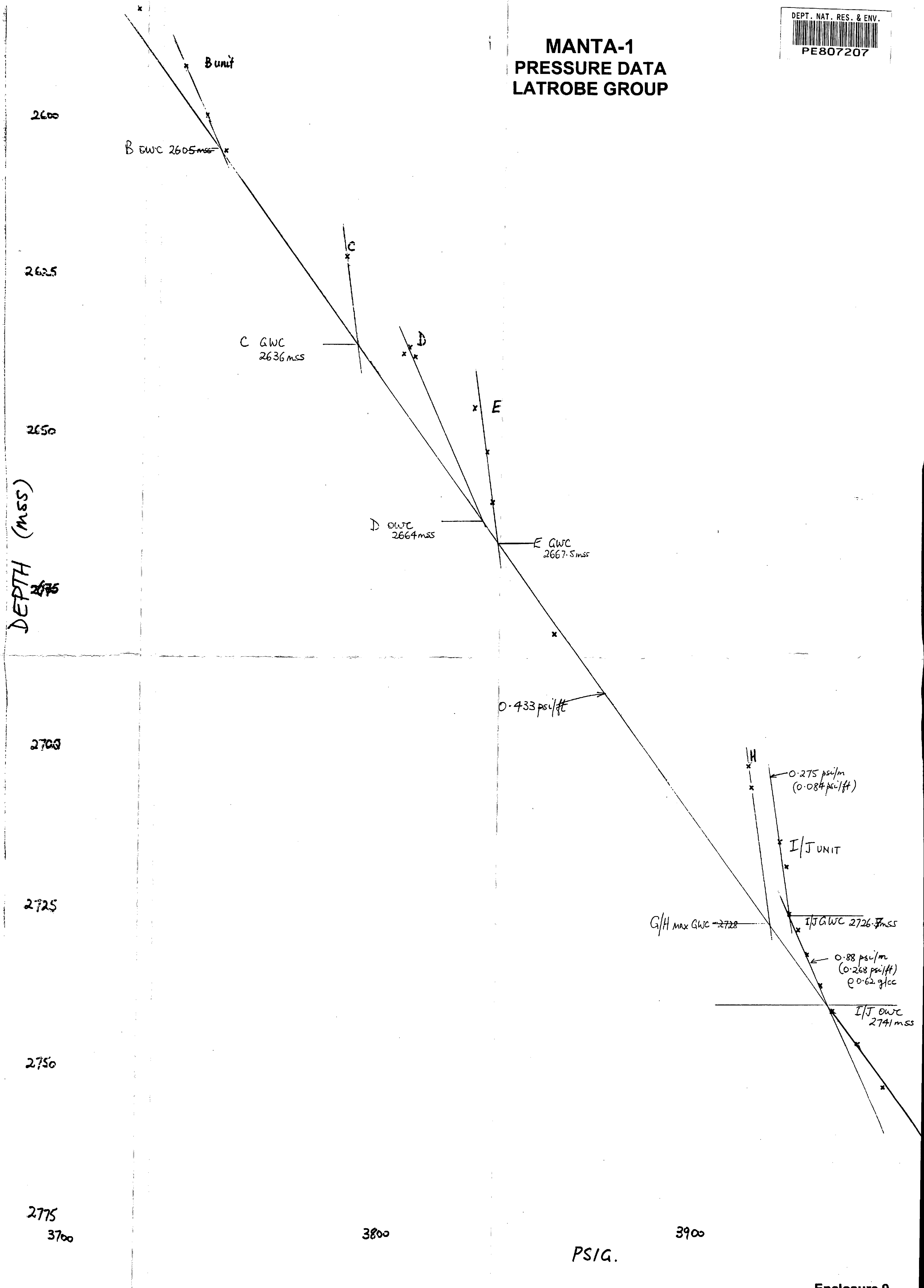
This is an enclosure indicator page.
The enclosure PE807207 is enclosed within the container PE802209 at this location in this document.

The enclosure PE807207 has the following characteristics:

ITEM_BARCODE = PE807207
CONTAINER_BARCODE = PE802209
NAME = Encl 9 RFT Pressure Data
BASIN = GIPPSLAND
ONSHORE? = N
DATA_TYPE = WELL
DATA_SUB_TYPE = RFT
DESCRIPTION = Encl 9 RFT Pressure Data Lower Latrobe Group Manta - 1, enclosure to accompany report "Basker-Manta Reserves Estimate" (PE802209).
REMARKS =
DATE_WRITTEN =
DATE_PROCESSED =
DATE_RECEIVED = 24-FEB-1999
RECEIVED_FROM = Australian Worldwide Exploration NL
WELL_NAME = Manta-1
CONTRACTOR =
AUTHOR =
ORIGINATOR =
TOP_DEPTH = 0
BOTTOM_DEPTH = 0
ROW_CREATED_BY = CC00_SW

(Inserted by DNRE - Vic Govt Mines Dept)

MANTA-1
PRESSURE DATA
LATROBE GROUP



Enclosure 9

PE807208

This is an enclosure indicator page.
The enclosure PE807208 is enclosed within the container PE802209 at this location in this document.

The enclosure PE807208 has the following characteristics:

ITEM_BARCODE = PE807208
CONTAINER_BARCODE = PE802209
NAME = Encl 10 Composite Log Lower Latrobe Grp
BASIN = GIPPSLAND
ONSHORE? = N
DATA_TYPE = WELL
DATA_SUB_TYPE = COMPOSITE_LOG
DESCRIPTION = Encl 10 Composite Log Lower Latrobe Grp Manta-1, enclosure to accompany report "Basker-Manta Reserves Estimate" (PE802209).
REMARKS =
DATE_WRITTEN =
DATE_PROCESSED =
DATE_RECEIVED = 24-FEB-1999
RECEIVED_FROM = Australian Worldwide Exploration NL
WELL_NAME = Manta-1
CONTRACTOR =
AUTHOR =
ORIGINATOR =
TOP_DEPTH = 0
BOTTOM_DEPTH = 0
ROW_CREATED_BY = CC00_SW

(Inserted by DNRE - Vic Govt Mines Dept)

PE807209

This is an enclosure indicator page.
The enclosure PE807209 is enclosed within the container PE802209 at this location in this document.

The enclosure PE807209 has the following characteristics:

ITEM_BARCODE = PE807209
CONTAINER_BARCODE = PE802209
NAME = Encl 11 RFT Pressure Data
BASIN = GIPPSLAND
ONSHORE? = N
DATA_TYPE = WELL
DATA_SUB_TYPE = RFT
DESCRIPTION = Encl 11 RFT Pressure Data Lower Latrobe Grp Basker-1, enclosure to accompany report "Basker-Manta Reserves Estimate" (PE802209).
REMARKS =
DATE_WRITTEN =
DATE_PROCESSED =
DATE_RECEIVED = 24-FEB-1999
RECEIVED_FROM = Australian Worldwide Exploration NL
WELL_NAME = Basker-1
CONTRACTOR =
AUTHOR =
ORIGINATOR =
TOP_DEPTH = 0
BOTTOM_DEPTH = 0
ROW_CREATED_BY = CC00_SW

(Inserted by DNRE - Vic Govt Mines Dept)

PE807210

This is an enclosure indicator page.
The enclosure PE807210 is enclosed within the container PE802209 at this location in this document.

The enclosure PE807210 has the following characteristics:

ITEM_BARCODE = PE807210
CONTAINER_BARCODE = PE802209
NAME = Encl 12 Composite Log Lower Latrobe Grp
BASIN = GIPPSLAND
ONSHORE? = N
DATA_TYPE = WELL
DATA_SUB_TYPE = COMPOSITE_LOG
DESCRIPTION = Encl 12 Composite Log Lower Latrobe Grp, enclosure to accompany report "Basker-Manta Reserves Estimate" (PE802209). Basker-1
REMARKS =
DATE_WRITTEN =
DATE_PROCESSED =
DATE_RECEIVED = 24-FEB-1999
RECEIVED_FROM = Australian Worldwide Exploration NL
WELL_NAME = Basker-1
CONTRACTOR =
AUTHOR =
ORIGINATOR =
TOP_DEPTH = 0
BOTTOM_DEPTH = 0
ROW_CREATED_BY = CC00_SW

(Inserted by DNRE - Vic Govt Mines Dept)

PE807211

This is an enclosure indicator page.
The enclosure PE807211 is enclosed within the
container PE802209 at this location in this
document.

The enclosure PE807211 has the following characteristics:
ITEM_BARCODE = PE807211
CONTAINER_BARCODE = PE802209
NAME = Encl 13 Composite Log Golden Beach Grp
BASIN = GIPPSLAND
ONSHORE? = N
DATA_TYPE = WELL
DATA_SUB_TYPE = COMPOSITE_LOG
DESCRIPTION = Encl 12 Composite Log Golden Beach Grp Basker-1, enclosure to accompany report "Basker-Manta Reserves Estimate" (PE802209).
REMARKS =
DATE_WRITTEN =
DATE_PROCESSED =
DATE_RECEIVED = 24-FEB-1999
RECEIVED_FROM = Australian Worldwide Exploration NL
WELL_NAME = Basker-1
CONTRACTOR =
AUTHOR =
ORIGINATOR =
TOP_DEPTH = 0
BOTTOM_DEPTH = 0
ROW_CREATED_BY = CC00_SW

(Inserted by DNRE - Vic Govt Mines Dept)

- (Incorrectly) Reinterpreted RFT at 3097m to give OWC at 3136 m KB

- Recalculated total EUR at 31 MMSTB, using RF of 30% for 3 "notional thin sands" and 40% for the D sand. D sand reserves estimated at 15.2 (±5) MMSTB (ie 37.5 MMSTBOIP) and "notional thin sands" at 15.9 MMSTB (ie 53 MMSTBOIP).

- Material balance reworked

  None of the modelled systems accurately predict the late time deviations observed in the main buildup in the Basker D sand test.

  Best fit models require no flow boundary at 210m.

  Boundary cannot be OWC, due to similar k/m of oil and water (u oil = u water = 0.3 cp)

  Modelled STOOIP range 24 – 53 MMSTB

4. Reservoir correlation study - Tuna and Flounder Fields (SDA 922) 5/90

5. ?/90 SDA 989 Dimpeter interpretation

6. 6/93 Basker & Manta Field Development Plan SDA 1079 (for incorporation into RL application)

   - FMS data from Gummy-1 confirmed NW-SE paleocurrent direction (SDA 989).
   - Reserves reappraised, still assuming lower OWC, at Basker.

     - 50% expectation, Basker

D sand	8.9	MMSTB	(RF 30%)
3 "nominal ssts"	12.6		(RF 30%)
Total	22.5		

     - 50% expectation, Manta

B	3.1	(RF 25%)
J	1.7	(RF 15%, due to gas cap)
Total	4.8	

     - (unfavourably) compared FPSO development to Cossack. Uneconomic.
     - Subsea satellite option with 5 wells connected to Kipper @ A$194 million.

HISTORY

VIC/P19 awarded 1981

(Volador	1/83)
Basker–1	4/83 (did not reach Kipper sst)
Bignose-1	9/83
Basker Sth-1	11/83
Manta-1	1/84
Chimaera-1	3/84

1985 Esso/BHP Farmin

Kipper-1	1986
Leatherjacket-1	1986
Kipper-2	1987
Infill 2D	1988
Gummy-1	Spud 5/90
3D Seismic	1/1996

SHELL BASKER/MANTA REPORTS

1. 6/87 Hydrocarbon prospectivity review post Kipper, concentrating on Golden Beach Gp. Nothing big identified.

   Prior to this review EUR Basker 6.5 MMB (15.3 OIP) (SDA 654)
   EUR Manta 1.5 + 35 BCF

   After reprocessing seismic

	OIP	EUR
Basker D	22	5.4
Manta Oil J	10	2.5
Manta Gas (U-3)	13 BCF	7 BCF

2. 8/89 Lateral prediction of Basker D sand. (SDA 914) Concluded it was beyond seismic resolution and the individual sand could not be confidently mapped.

3. 12/89 B/M Block review (SDA 923)

   - Depth maps based on VINT from stkg vels (2D 0.5km dip line) Form of depth maps using well based velocities and seismic based velocities very similar.

   - Manta ϕ 23% 2600m to 18% at 2830
     K 900 – 2000 md

     - U3 alluvial sst (Golden Beach)
       f –cse gr, mod std, lithic, dolomitic and siliceous cement
       15% (at ~ 3280m)
       k 3.5 – 200 mD
       sst/sh 85%

     - Re-evaluation of reserves. Reserves only attributed to the B & J sands, which are assumed to be continuous over the entire structure.

     - Area includes Manta northwest culmination

     - RF 40%

     - Estimated Reserves

B	5.3 (± 1.6) mmstb
J	4.6 (± 0.9) mmstb
E	29.6 bcf
I	9.7 bcf
J	15.8 bcf
U3	10.3 bcf
Total	**65.4 bcf**

   - Basker H_2O salinity ~ 10,000 ppm (Test of stratigraphically equivalent interval in Bignose-1 + very minor H_2O on test of D sand) (= 0.436 psi/ft)