ESSO

ATTACHMENT TO

WCR VOL 2

REMORA-1 (W959)

W959

ESSO EXPLORATION AND PRODUCTION AUSTRALIA INC.

POST DRILL ASSESSMENT
REMORA-1

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Gippsland Group
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Doc. 2948L/1

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* Removed from this report and placed in WCR Vol 2 of Remora-1. Has barcode PE906274

Doc. 2948L/2

POST-DRILL ASSESSMENT

REMORA-1

SUMMARY

The accuracy of the current assessment is severely hampered by the paucity of water pressure data. Precise determination of column height is not possible with available pressure data for a large number of the hydrocarbon accumulations. In the Proved + Probable Case only two reservoirs have significant oil potential - one (L-4) in the L. balmei section and another T-14 in the T. longus interval.

Hydrocarbon columns are probably short for the whole Latrobe section. Two observations support this contention. Where water pressure data are available, Remora-1 is characterised by numerous, mostly thin, discrete reservoirs with short hydrocarbon columns. Also, fault seal analysis of the major E-W bounding fault immediately north of the Remora Discovery indicates that this fault probably cross leaks over almost the entire section penetrated by the well. Thus, in the present assessment, conservative estimates of column height are considered appropriate in the Proved + Probable Case for the two biggest reservoirs.

In the Proved Case 4.0 GSCFGIP and 1.6 MSTBOIP are assessed, whereas 20.6 GSCFGIP and 2.9 MSTBOIP are estimated for the Proved + Probable Case. In the Maximum Oil Case and the Maximum Gas Case the structure could contain 39.6 GSCFGIP or 42.6 MSTBOIP (these latter Cases are partially mutually exclusive).

INTRODUCTION

Remora-1 was drilled in May 1987 on the crest of a low-side rollover located immediately south of a major E-W bounding fault in north central Gippsland Basin. The well was drilled to test fault sealed closure 3.5km west of the Sunfish Discovery on the same trend.

The current assessment is based on Proved, Proved + Probable, and Maximum Oil/Gas Cases and supersedes the previous preliminary estimates. The present assessment also employs updated log analyses, pretest pressure data and hydrocarbon parameters.

HYDROCARBONS

Log analysis indicates Remora-1 penetrated 37 individual hydrocarbon sands totalling 79.5m net gas; 41.5m net oil and 2m net undifferentiated hydrocarbon sands. Pressure data suggest that the majority of these sands are discrete.

The hydrocarbons are distributed over the full Latrobe section (877m) with no obvious stratigraphic preference and no relationship of gas/oil distribution with depth.

Six gas sands, one oil sand and two undifferentiated gas/oil sands were intersected within the lower L. balmei interval (2185 to 2361m KB). The sands vary between 0.5 and 6.5 thick; porosities are between 13 and 19% and water saturations are from 31 to 81%.

The T. longus section contains the majority of the hydrocarbon sands. Sixteen gas sands and 10 oil sands were encountered between 2361 and 2818m KB. The sands vary between 0.75m and 9.75m thick (but only 7 are over 5m thick); porosities vary between 10.8 and 17.9% and water saturations range between 32% and 79%.

Two untested oil sands are interpreted from log data below an igneous section between 2949.5 and 2960.0m KB in poor porosity N. senectus sands.

ASSESSMENT

An assessment of hydrocarbon systems in the Remora structure is difficult due to the sparsity of water pressure data. However, available data suggest the hydrocarbon distribution in Remora-1 to be characterized by numerous, mostly thin, isolated accumulations. It is critical in the assessment of some reservoirs to make a geologically defensible estimate of column height. Reservoirs have been subdivided into four groups dependent on the degree of pressure data control for assessment purposes - See Enclosure 4.

Three Cases are included in the present assessment: Proved - from high proved oil or gas (HPO/G) to low proved oil or gas (LPO/G); Proved + Probable - the criteria for this case are variable dependent on the quality of available data, but generally it includes HPO/G to reliable inferred contacts from RFT data, Maximum Oil/Gas Cases - these cases are mutually exclusive and maximize oil/gas resources down to inferred OWC and GWC, or to structural spill point (SSP) where water gradients are unavailable. Oil is maximized by taking the GOC at LPG. Since Remora-1 was drilled in an essentially crestal location, there is no hydrocarbon potential above HPO/G.

Reservoirs in each of the four groups mentioned earlier are discussed below. However, although numerous hydrocarbon sands were penetrated, probably only a small number are significant.

2200 to 2400m KB Group Reservoirs:

Reservoirs (L-1 to L-7) within this group have no water pressure data and are thus difficult to assess accurately (Encl. 4). A water line was derived for this group of reservoirs by assuming the Gippsland gradient and a column height equal to independent closure (60m) for the reservoir (L-3) with the largest potential hydrocarbon column. This water line was checked by comparing the theoretical draw down at this level using the Production Department's Gippsland Basin aquifer model (60 psi) with the inferred draw down using independent closure (50 psi). The draw down in this upper section of the Latrobe, is presumably due to the Snapper Field production. The Maximum Gas and oil Cases are from HPG to SSP.

Detailed work currently being undertaken on fault seal analysis using Point Displaced Section Analysis (PDSA), indicates that the main bounding fault immediately north of the prospect is leaking at this depth (Enclosure 5). Where reliable water data are available in other parts of the well, the data suggest that Remora reservoirs are characterised by single systems with short hydrocarbon columns. These data indicate that for the Proved + Probable Case, the reservoirs in this group should likewise be considered discrete systems with short hydrocarbon columns, i.e. no major fault seal.

2400 to 2560m KB Group Reservoirs:

The water line for this group is taken from two water pressure data points (1/32 and 1/31) in the lower part of this interval.

Reservoirs in this group are assessed from HPG/O to LPG/O in the Proved Case and from HPG/O to inferred GWC/OWC in the Proved + Probable Case. In the Maximum Oil Case HPO is taken at LPG and the same water line as above is employed.

2560 to 2720m KB Group Reservoirs:

This group includes the potentially most voluminous reservoirs in Remora-1, however it is also the most difficult group to assess reliably.

Assessment of this group is also hampered by a sparsity of water pressure data. Two water pressure points (1/28, 1/27) in the uppermost part of the interval lie on the original Gippsland Basin water line. However, in view of the incipient overpressuring at this depth, it is doubtful whether these data are applicable to the whole group. The upper two water pressure points have therefore not been used in the assessment except in the Maximum Oil/Gas Cases.

It is apparent from the pressure data for the whole well that the water line is segmented and that it steps back from a drawn down position at the top of the Latrobe Group towards the original Gippsland gradient in the central part of the well, to being overpressured in the lower section of the well (below about 2700m KB). Depth of onset of overpressure is thus critical to the assessment of reservoirs in this group and although this depth can not be determined from density or resistivity log data, caliper or the drilling rate, it probably occurs in the region of these reservoirs (incipient overpressure probably occurs in the adjacent Sunfish-1 well at 2470mKB).

The same approach is used in assessing this group of reservoirs as that employed in the uppermost reservoir group. A water line is constructed assuming the Gippsland Basin gradient and a column height equivalent to independent closure (40m) for the reservoir with the highest hydrocarbon column potential in the group (T-14). This water line would indicate minor overpressure (25 psi) at this level and this is used for the Proved + Probable Case. A water line drawn through the uppermost water pressure points and which equates to the original Gippsland Basin water line, is used for the Maximum Oil/Gas Cases.

2720 to 2856m KB Group Reservoirs:

This group includes three fairly reliable water pressure points (1/3, 1/4, 1/5) which clearly indicate the overpressured nature of the reservoirs in this group. Reservoirs in this interval have very short hydrocarbon columns and all have low resource potential.

Reservoirs below the igneous interval:

Two oil sands (2949.5-2952 and 2955-2960mKB) have been identified at the base of the well from log analysis. No pressure data are available for the section (2947-2961mKB) below the igneous intersection at Remora-1. An approximate Maximum Case assessment of these reservoirs has been made by assuming the Gross Rock Volume to the mappable limit and using the following reservoir and hydrocarbon parameters.

Gross Rock Volume		$467km^2m$
Porosity		.12
NTG		.35
1-Sw	(Oil)	.55
	(Gas)	.60
1/FVF	(Oil)	.74
	(Gas)	1.10

MSTBOIP 50.2 OR GSCFGIP 81.4

RESULTS

Because, in the Proved Case the hydrocarbon contact is taken at low proved oil or gas, the hydrocarbon column is equivalent to the drilled intersection. Only T-14 has a reasonable intersection (18.25m net) and this reservoir comprises most of the total Proved Case oil resource. Total Proved gas and oil for Remora is 4.0 GSCFGIP and 1.6 MSTBOIP.

The total Proved + Probable gas and oil is 20.6 GSCFGIP and 2.9 MSTBOIP. Increases in reservoirs L-4 and T-14 account for all the Probable volume.

In the Maximum Case 39.6 GSCFGIP OR 42.6 MSTBOIP could be contained in the Remora-1 structure (these Cases are partially mutually exclusive). Reservoirs L-7, T-13, T-16 and also L-5, T-12 are the main contributions to this resource. The latter two accumulations are single sand reservoirs which have been extended to maximum structural spill (75m). In the Maximum Oil Case for reservoir T-14 the oil sands between 2646.5 and 2678.5mKB are regarded as a single system with a resource of 4.0 MSTBOIP.

TABLE 1 - REMORA-1 PRELIMINARY POST-DRILL ASSESSMENT - PROVED CASE

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RESERVOIR	INTERSECTION INTERVAL mKB	H.C. TYPE	CONTACT TYPE	CONTACT DEPTH	COLUMN (m)	INTERSECTION GROSS	INTERSECTION NET	GROSS VOLUME (Km^2m)	NTG	POROSITY	1-Sw	1/FVF	GSCFGIP	MSTBOIP
L-1	2204-2205.75	G	LPG	2205.75	1.75	1.75	1.5	NEG	-	-	-	-	-	-
L-3	2248-2278	G	LPG	2278	30.0	30.0	12	4.8	.40	.18	.62	1.09	1.5	-
L-4	2309-2323.5	O	LPO	2323.5	14.5	14.5	6	1.1	.43	.17	.44	.74	-	0.1
L-5	2328.5-2334	G	LPG	2334	5.5	5.5	4.75	NEG	-	-	-	-	-	-
L-7	2355.5-2361	G	LPG	2361	5.5	5.5	5.0	NEG	-	-	-	-	-	-
T-2	2397.5-2399.25	G	LPG	2399.25	1.75	1.75	1.5	NEG	-	-	-	-	-	-
T-3	2401.5-2442	G	LPG	2442	40.5	40.5	11.25	11.8	.28	.17	.65	1.09	2.5	-
T-4	2452.5-2459	G	LPG	2459	6.5	6.5	5.5	NEG	-	-	-	-	-	-
T-7	2491.5-2496.5	G	LPG	2496.5	5.0	5.0	4.25	NEG	-	-	-	-	-	-
T-10	2582.5-2589.5	O	LPO	2589.5	7.0	7.0	5.75	NEG	-	-	-	-	-	-
T-12	2618-2623.25	G	LPG	2623.25	5.25	5.25	4.0	NEG	-	-	-	-	-	-
T-13	2628.25-2639	G	LPG	2639	10.75	10.75	9.75	NEG	-	-	-	-	-	-
T-14	2646.5-2678.5	O	LPO	2678.5	32.0	32.0	18.25	7.8	.57	.14	.52	.74	-	1.5
T-16	2694-2705	G	LPG	2705	11.0	11.0	9.5	NEG	-	-	-	-	-	-
T-17	2731-2738.5	G	LPG	2738.5	7.5	7.5	5.5	NEG	-	-	-	-	-	-
T-18	2748.5-2751	O	LPO	2751	2.5	2.5	2.0	NEG	-	-	-	-	-	-
T-20	2765.5-2769	O	LPO	2769	3.5	3.5	2.5	NEG	-	-	-	-	-	-
T-21	2772.5-2774.5	O	LPO	2774.5	2.0	2.0	1.75	NEG	-	-	-	-	-	-
TOTAL													4.0	1.6

Notes : NEG = Negligible ($2km^2m$ or less, equivalent to approx. 1.0 MSTBOIP).
Reservoirs less than 1m net are not tabulated, i.e., L-2, -5, T-1, -5, -6, -8, -9, -11, -14, -15, -18

TABLE 2 - REMORA-1 PRELIMINARY POST-DRILL ASSESSMENT - PROVED + PROBABLE CASE

Doc. 2948L/11

RESERVOIR	INTERSECTION INTERVAL mkb	H.C. TYPE	CONTACT TYPE	CONTACT SOURCE	CONTACT DEPTH	COLUMN (m)	INTERSECTION GROSS	INTERSECTION NET	VOLUME (Km^2m)	GROSS NTG	POROSITY	1-Sw	1/FVF	GSCFGIP	MSTBOIP
L-1	2204-2205.75	G	(1)	-	2264	160.0	1.75	1.5	NEG	-	-	-	-	-	-
L-3	2248-2278	G	GWC	(2)	2308	60.0	30.0	12.0	20.1	.40	.18	.62	1.09	6.2	-
L-4	2309-2323.5	O	OWC	(2)	2323.5	40.0	14.5	6.0	5.7	.43	.17	.44	.74	-	0.8
L-5	2328.5-2334	G	GWC	(2)	2358.0	29.5	5.5	4.75	1.9	.86	.19	.67	1.09	1.4	-
L-7	2355.5-2361	G	GWC	(2)	2390	34.5	5.5	5.0	2.0	.91	.19	.58	1.09	1.4	-
T-2	2397.5-2399.25	G	GWC	(4)	2452	54.5	1.75	1.5	NEG	-	-	-	-	-	-
T-3	2401.5-2442	G	GWC	RFT	2456.5	55	40.5	11.25	18.8	.28	.17	.65	1.09	4.0	
T-4	2452.5-2459	G	GWC	RFT	2480	27.5	6.5	5.5	2.2	.79	.15	.51	1.09	1.0	-
T-7	2491.5-2496.5	G	GWC	RFT	2497	5.5	5.5	4.25	NEG	-	-	-	-	-	-
T-10	2582.5-2589.5	O	OWC	RFT	2590	7.5	7.0	5.75	NEG	-	-	-	-	-	-
T-12	2618-2623.25	G	GWC	(4)	2646	28.0	5.25	4	1.9	.76	.14	.59	1.09	0.8	-
T-13	2628.25-2639	G	GWC	(3)	2657	28.75	10.75	9.75	3.3	.90	.14	.63	1.09	1.7	-
T-14	2646.5-2678.5	O	OWC	(3)	2286.5	40.0	32.0	18.75	11.1	.57	.14	.52	.74	-	2.1
T-16	2694-2705	G	GWC	(3)	2753	59.0	11.0	9.5	7.7	.86	.13	.52	1.09	3.1	-
T-17	2731-2738.5	G	GWC	RFT	2750	19	7.5	5.5	2.0	.78	.13	.67	1.09	1.0	-
T-18	2748.5-2751	O	OWC	RFT	2758	9.5	2.5	2.0	NEG	-	-	-	-	-	-
T-20	2765.5-2769	O	OWC	RFT	2782	16.5	3.5	2.5	NEG	-	-	-	-	-	-
T-21	2772.5-2774.5	O	OWC	(4)	2889	16.5	3.5	2.5	NEG	-	-	-	-	-	-
TOTAL														20.6	2.9

Notes : (1) Contact taken at independent column height (60m)
(2) Using assumed water gradient line - see text.
(3) Contact taken at independent column height (40m)
(4) Same column height as T-20
NEG = Negligible ($2km^2m$ or less, equivalent to approx. 1.0 MSTBOIP).

TABLE 3 - REMORA-1 PRELIMINARY POST-DRILL ASSESSMENT - MAXIMUM OIL/GAS CASE*

Doc. 2948L/12

RESERVOIR	INTERSECTION INTERVAL mkb	H.C. TYPE	CONTACT TYPE	CONTACT DEPTH	COLUMN (m)	SAND INTERSECTION GROSS	SAND INTERSECTION NET	ROCK VOLUME (Km^2m)	NTG	POROSITY	1-Sw	1/FVF	GSCFGIP	MSTBOIP
L-1	2204-2205.75	G	GWC	2279	75	1.75	1.5	NEG	-	-	-	-	-	-
		O	GOC	2279	73.25	-	-	NEG	-	-	-	-	-	-
L-3	2248-2278	G	GWC	2323	75	30.0	12	33.9	.40	.18	.62	1.09	10.3	-
		O	GOC	2323	61	-	-	29.1	.40	.18	.62	0.74	-	6.0
L-4	2309-2323.5	O	OWC	2284	75	14.5	6.0	19.0	.43	.17	.44	.74	-	2.8
L-5	2328.5-2334	G	GWC	2403.5	75	5.5	4.75	7.0	.86	.19	.67	1.09	5.3	-
		O	OWC	2403.5	69	-	-	6.9	.86	.19	.67	.74	-	3.5
L-7	2355.5-2361	G	GWC	2430.5	75	5.5	5.0	8.5	.91	.19	.58	1.09	7.2	-
		O	OWC	2430.5	69.5	-	-	8.2	.91	.19	.58	.74	-	4.7
T-2	2397.5-2599.75	G	GWC	2592.5	195	2.25	1.5	10.3	.66	.13	.41	1.09	2.5	-
		O	OWC	2592.5	193.25	-	-	10.3	.66	.13	.41	.74	-	1.7
T-3	2401.5-2442	G	GOC	2456.5	55	40.5	11.25	18.8	.28	.17	.65	1.09	4.0	-
		O	OWC	2473	31.0	-	-	14.1	.28	.17	.65	.74	-	2.0
T-4	2452.5-2459	G	GOC	2480	27.5	6.5	5.5	2.2	.79	.15	.51	1.09	1.0	-
		O	OWC	2506	47.0	-	-	4.3	.79	.15	.51	.74	-	1.2
T-7	2491.5-2496.5	G	GWC	2497	5.5	5.5	4.25	NEG	-	-	-	-	-	-
T-10	2582.5-2589.5	O	GWC	2590	7.5	7.0	5.75	NEG	-	-	-	-	-	-
T-12	2618-2623.25	G	GWC	2665	47	5.25	4	3.1	.76	.14	.59	1.09	1.3	-
		O	OWC	2720	96.75	-	-	15.8	.76	.14	.59	.74	-	4.6
T-13	2628.25-2639	G	GOC	2673	44.75	10.75	9.75	5.4	.90	.14	.63	1.09	2.9	-
		O	OWC	2742	103	-	-	13.5	.90	.14	.63	.74	-	5.0
T-14	2646.5-2678.5	O	OWC	2738	91.5	32.0	18.25	32.0	.57	.14	.52	.74	-	4.0
T-16	2694-2705	G	GWC	2773	79	11.0	9.5	10.5	.86	.13	.52	1.09	4.2	-
		O	OWC	2846	141	-	-	31.9	.86	.13	.52	.74	-	8.5
T-17	2731-2738.5	G	GWC	2750	19	7.5	5.5	2.0	.78	.13	.67	1.09	0.9	-
		O	OWC	2755	16.5	-	-	1.8	.78	.13	.67	.74	-	0.6
TOTAL													39.6	42.6

Notes : NEG - Negligible (2Km^2 or less, equivalent to approx. 1.0 MSTBOIP).

* Maximum Oil and Gas Cases are partially mutually exclusive.

ENCLOSURES

PE902215

This is an enclosure indicator page.
The enclosure PE902215 is enclosed within the container PE902212 at this location in this document.

The enclosure PE902215 has the following characteristics:

ITEM_BARCODE	= PE902215
CONTAINER_BARCODE	= PE906275
NAME	= Geological Cross Section A-A1
BASIN	= GIPPSLAND
PERMIT	=
TYPE	= WELL
SUBTYPE	= CROSS_SECTION
DESCRIPTION	= Geological Cross Section A-A1
REMARKS	=
DATE_CREATED	= 1/08/97
DATE_RECEIVED	= 11/07/88
W_NO	= W956
WELL_NAME	= Remora-1
CONTRACTOR	= ESSO
CLIENT_OP_CO	= ESSO

(Inserted by DNRE - Vic Govt Mines Dept)

PE906276

This is an enclosure indicator page.
The enclosure PE906276 is enclosed within the container PE906275 at this location in this document.

The enclosure PE906276 has the following characteristics:

ITEM_BARCODE	= PE906276
CONTAINER_BARCODE	= PE906275
NAME	= Structure Map - T.longus
BASIN	= GIPPSLAND
PERMIT	= VIC/P1
TYPE	= SEISMIC
SUBTYPE	= HRZN_CNTR_MAP
DESCRIPTION	= Structure Map of T.longus Seismic Horizon (most likely case). Copy of PE902218.
REMARKS	=
DATE_CREATED	= 30/09/87
DATE_RECEIVED	= 11/07/88
W_NO	= W959
WELL_NAME	= REMORA-1
CONTRACTOR	=
CLIENT_OP_CO	= ESSO AUSTRALIA LIMITED

(Inserted by DNRE - Vic Govt Mines Dept)

PE906277

This is an enclosure indicator page.
The enclosure PE906277 is enclosed within the container PE906275 at this location in this document.

The enclosure PE906277 has the following characteristics:

ITEM_BARCODE	= PE906277
CONTAINER_BARCODE	= PE906275
NAME	= RFT Pretest Data
BASIN	= GIPPSLAND
PERMIT	= VIC/P1
TYPE	= WELL
SUBTYPE	= DIAGRAM
DESCRIPTION	= RFT Pretest Data for Remora-1
REMARKS	=
DATE_CREATED	= 30/09/87
DATE_RECEIVED	= 11/07/88
W_NO	= W959
WELL_NAME	= REMORA-1
CONTRACTOR	=
CLIENT_OP_CO	= ESSO AUSTRALIA LIMITED

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PE906278

This is an enclosure indicator page.
The enclosure PE906278 is enclosed within the container PE906275 at this location in this document.

The enclosure PE906278 has the following characteristics:

ITEM_BARCODE	= PE906278
CONTAINER_BARCODE	= PE906275
NAME	= Point Displaced Section
BASIN	= GIPPSLAND
PERMIT	= VIC/P1
TYPE	= WELL
SUBTYPE	= DIAGRAM
DESCRIPTION	= Point Displaced Sections Analysis for Remora-1
REMARKS	=
DATE_CREATED	= 30/09/87
DATE_RECEIVED	= 11/07/88
W_NO	= W959
WELL_NAME	= REMORA-1
CONTRACTOR	=
CLIENT_OP_CO	= ESSO AUSTRALIA LIMITED

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PE603618

This is an enclosure indicator page.
The enclosure PE603618 is enclosed within the container PE906275 at this location in this document.

The enclosure PE603618 has the following characteristics:

ITEM_BARCODE	= PE603618
CONTAINER_BARCODE	= PE906275
NAME	= Well Completion Log
BASIN	= GIPPSLAND
PERMIT	= VIC/P1
TYPE	= WELL
SUBTYPE	= COMPLETION_LOG
DESCRIPTION	= Well Completion Log for Remora-1. Copy of PE601092.
REMARKS	=
DATE_CREATED	=
DATE_RECEIVED	= 11/07/88
W_NO	= W959
WELL_NAME	= REMORA-1
CONTRACTOR	=
CLIENT_OP_CO	= ESSO AUSTRALIA LIMITED

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