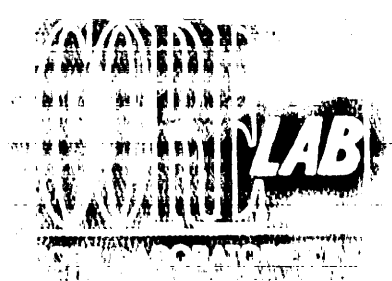
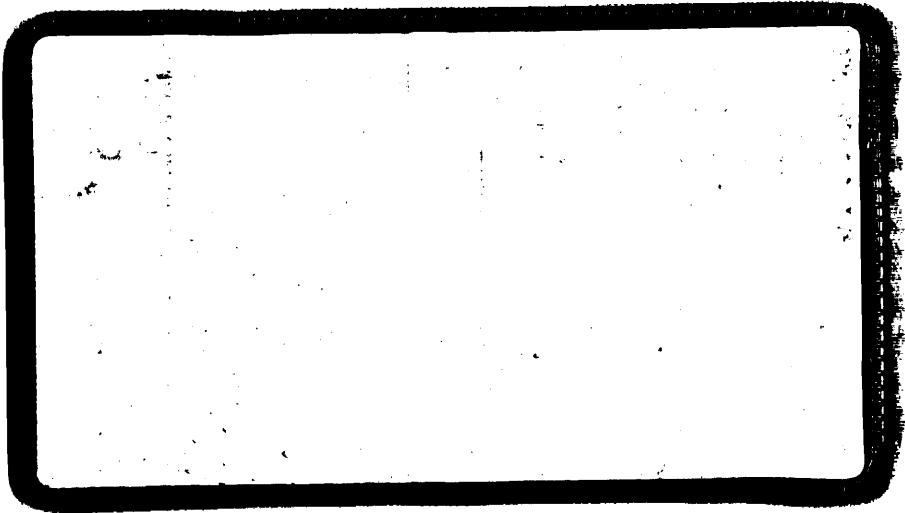




GIPPSLAND BASIN.
HYDROCARBON REPORT.

JOUELAB.
BREAN-4A.



HK DOX



OIL and GAS DIVISION

18 AUG 1982

PARTIAL RESERVOIR FLUID STUDY
FOR
ESSO AUSTRALIA LTD
AUSTRALIA

W752

BREAM-4A

SEE ESSO LETTER 14-9-1982 ON BREAM-4A
CORRESPONDENCE FILE

CORE LABORATORIES

Reservoir Fluid Division



M/S ESSO AUSTRALIA LTD
P O Box 372
Sale 3850
Victoria
AUSTRALIA

August 5, 1982

ATTENTION: MR A K KHURANA

SUBJECT: PARTIAL RESERVOIR FLUID
STUDY
Bream 4A
AUSTRALIA
SFL 82109

Gentlemen

Subsurface gas sample from the subject well was forwarded to our laboratory in Singapore to be used in the performance of a partial reservoir fluid study. Presented in the following report are the results of this study as requested by Esso Australia.

Upon arrival in the laboratory, the opening pressure of the sample cylinder 1057/81 was found to be 2770 psig at 70°F. The results of the preliminary quality checks are reported on page two of the report.

The subsurface gas sample in the cylinder was pressurised to 5000 psig so as to ensure that the sample was in single-phase. A small quantity of the gas sample was charged to a low temperature fractional distillation where along with chromatography, its composition was determined through hexanes. The heptanes plus fraction was collected at the end of this distillation and the composition of the gas sample was further analysed to undecanes plus utilizing liquid chromatography. The composition of the subsurface gas together with the physical properties of the heptanes plus fraction are presented on page three.

A known quantity of the subsurface sample was charged to a high pressure visual cell pre-heated to 77°F. During a constant composition expansion at this temperature, the fluid exhibited a retrograde dew point at 3814 psig. The results of the constant composition expansion at 77°F can be found on page four.

The reservoir fluid in the high pressure cell was then heated to 105°F. This fluid was repressured to 5000 psig and then subjected to a constant composition expansion at 105°F. During this test, the fluid was found to exist as a single-phase fluid at all pressures above 3790 psig where a retrograde dew point was observed. This data is reported on page five.

Likewise, the fluid in the cell was heated to 130°F, repressured to 5000 psig and subjected to a constant composition expansion. The fluid exhibited a retrograde dew point of 3730 psig at 130°F. This data is tabulated on page six.

cont..2/-

Page 2

M/S ESSO AUSTRALIA LTD

Subsequently, the subsurface sample contained in the cell was heated to 162°F. During a constant composition expansion at this temperature, the sample was found to have a retrograde dew point at 3715 psig. The results of this test can be found on page seven.

The subsurface fluid charged to the high pressure visual cell was heated to 180°F. The sample was observed while a constant composition expansion and pressure-volume measurements were performed concurrently. It was determined that the fluid exhibited a retrograde dew point at 3702 psig. Upon completion of the pressure-volume relation measurements, the sample in the cell was repressured and equilibrated at 5000 psig at which condition the deviation factor Z was measured. This measured Z factor was used in conjunction with the measured relative volume data to calculate the deviation factor Z of the reservoir fluid at all pressures measured during the relative volume measurements. It should be noted that although the deviation factor Z is not theoretically proper at pressures below the dew point pressure, these values should be good for practical engineering calculations due to the extremely small quantity of liquid existing within the system. These data are tabulated on page eight and shown in graphic form on page ten.

The remaining sample in the cell was then subjected to a constant volume depletion. This depletion consisted of several pressure expansions and constant pressure displacements, with each displacement terminating at the original size of the sample at the dew point pressure. This type of depletion simulates closely the production of this type of fluid from its reservoir. The maximum retrograde liquid accumulation was approximately 0.9 percent of the hydrocarbon pore space. The results of this depletion are reported on page nine and shown graphically on page eleven.

We wish to thank M/s Esso Australia for this opportunity to be of service. Please contact us should you require further information.

Very truly yours



JOHN SAVICKAS
Manager
Singapore Reservoir Fluid Laboratory

encl: 7 copies

JS/pv/mh

Company ESSO AUSTRALIA LTD Date Sampled _____
Well BREAM 4A State _____
Field _____ Country AUSTRALIA

FORMATION CHARACTERISTICS

Formation Name _____
Date First Well Completed _____ 19____
Original Reservoir Pressure _____ PSIG @ _____ FT
Original Produced Gas-Oil Ratio _____ SCF/Bbl
Production Ratio _____ Bbl/Day
Separator Pressure and Temperature _____ PSIG _____ °F
Oil Gravity at 60°F _____ °API
Datum _____ Ft Subsea
Original Gas Cap _____

WELL CHARACTERISTICS

Elevation _____ FT
Total Depth _____ FT
Producing Interval _____ FT
Tubing Size and Depth _____ In to _____ FT
Productivity Index _____ Bbl/D/PSI @ _____ Bbl/Day
Last Reservoir Pressure 2740.5 PSIG @ 6346.8 FT (1935m)
Date _____ 19____ Gas cap sample.
Reservoir Temperature 180 °F _____ FT
Status of Well _____
Pressure Gauge _____
Normal Production Rate _____ Bbl/Day
Gas-Oil Ratio _____ SCF/Bbl
Separator Pressure and Temperature _____ PSIG _____ °F
Base Pressure _____ PSIA
Well Making Water _____ % Cut

SAMPLING CONDITIONS

Sampled at _____ FT
Status of Well FLOWING
Gas-Oil Ratio _____ SCF/Bbl
Separator Pressure and Temperature _____ PSIG _____ °F
Tubing Pressure _____ PSIG
Casing Pressure _____ PSIG
Sampled by _____
Type Sample LEUTERT

REMARKS:

SUMMARY OF SAMPLE RECEIVED IN LABORATORY

Bottom hole gas sample contained in cylinder 1057/81

Opening pressure of gas cylinder : 2770 psig at 70°F

Water recovered : 0 cc

Approximate sample volume : 560 ccs

HYDROCARBON ANALYSIS OF RESERVOIR FLUID SAMPLE

<u>Component</u>	<u>Mol Percent</u>	<u>Weight Percent</u>
Hydrogen Sulfide	0.00	0.00
Carbon Dioxide	0.86	1.68
Nitrogen	0.70	0.87
Methane	81.17	57.91
Ethane	7.05	9.43
Propane	4.77	9.36
Iso-Butane	0.86	2.22
N-Butane	1.49	3.85
Iso-Pentane	0.57	1.82
N-Pentane	0.50	1.62
Hexanes	0.29	1.13
Heptanes	0.28	1.26
Octanes	0.60	2.97
Nonanes	0.34	1.88
Decanes	0.22	1.42
Undecanes plus	0.30	2.58
	100.00	100.00

Properties of heptanes plus

API gravity at 60°F	59.0
Density, Gm/Cc at 60°F	<u>0.7422</u>
Molecular weight	<u>129</u>

PRESSURE-VOLUME RELATIONS AT 77°F

<u>Pressure</u> <u>PSIG</u>	<u>Relative</u> <u>Volume (1)</u>
5000	0.9120
4200	0.9633
4100	0.9718
4000	0.9806
3900	0.9904
<u>3814</u> Dew Point Pressure	1.0000
3700	1.0122
3600	1.0238
3500	1.0358
3400	1.0491

- 1 Relative Volume : V/V_{sat} is barrels at indicated pressure per barrel at saturation pressure.

PRESSURE-VOLUME RELATIONS AT 105°F

<u>Pressure</u> <u>PSIG</u>	<u>Relative</u> <u>Volume (1)</u>
5000	0.9002
4100	0.9671
4000	0.9768
3900	0.9876
3800	0.9988
3790 Dew Point Pressure	1.0000
<u>3700</u>	1.0103
3600	1.0233
3500	1.0382
3400	1.0537

- 1 Relative Volume : V/V_{sat} is barrels at indicated pressure per barrel at saturation pressure.

PRESSURE-VOLUME RELATIONS AT 130°F

<u>Pressure</u> <u>PSIG</u>	<u>Relative</u> <u>Volume (1)</u>
5000	0.8806
4000	0.9665
3900	0.9771
3800	0.9908
<u>3730</u> Dew Point Pressure	1.0000
3600	1.0187
3500	1.0347
3400	1.0513
3300	1.0700

- 1 Relative Volume : V/V_{sat} is barrels at indicated pressure per barrel at saturation pressure.

PRESSURE-VOLUME RELATIONS AT 162°F

<u>Pressure</u> <u>PSIG</u>	<u>Relative</u> <u>Volume (1)</u>
5000	0.8614
4200	0.9298
4100	0.9430
4000	0.9566
3900	0.9710
3800	0.9864
<u>3715</u> Dew Point Pressure	1.0000
3600	1.0207
3500	1.0403
3400	1.0606
3300	1.0830
3200	1.1076

- 1 Relative Volume : V/V_{sat} is barrels at indicated pressure per barrel at saturation pressure.

PRESSURE-VOLUME RELATIONS OF RESERVOIR FLUID AT 180°F
(Constant Composition Expansion)

<u>Pressure</u> <u>PSIG</u>	<u>Relative</u> <u>Volume</u>	<u>Deviation Factor</u> <u>Z</u>
5000	0.8383	0.974
4500	0.8878	0.928
4000	0.9512	0.884
3900	0.9665	0.876
3800	0.9828	0.868
<u>3702</u> Dew Point Pressure	1.0000	0.861
3600	1.0191	0.853
3500	1.0392	0.846
3350	1.0730	0.836
3200	1.1116	0.828
3000	1.1737	0.819
2600	1.3335	0.807
2200	1.5764	0.809
1800	1.9568	0.822
1434	2.5084	0.842
1210	3.0176	0.856
1026	3.6040	0.869
898	4.1697	0.882
791	4.7751	0.891
710	5.3618	0.900
652	5.8649	0.906

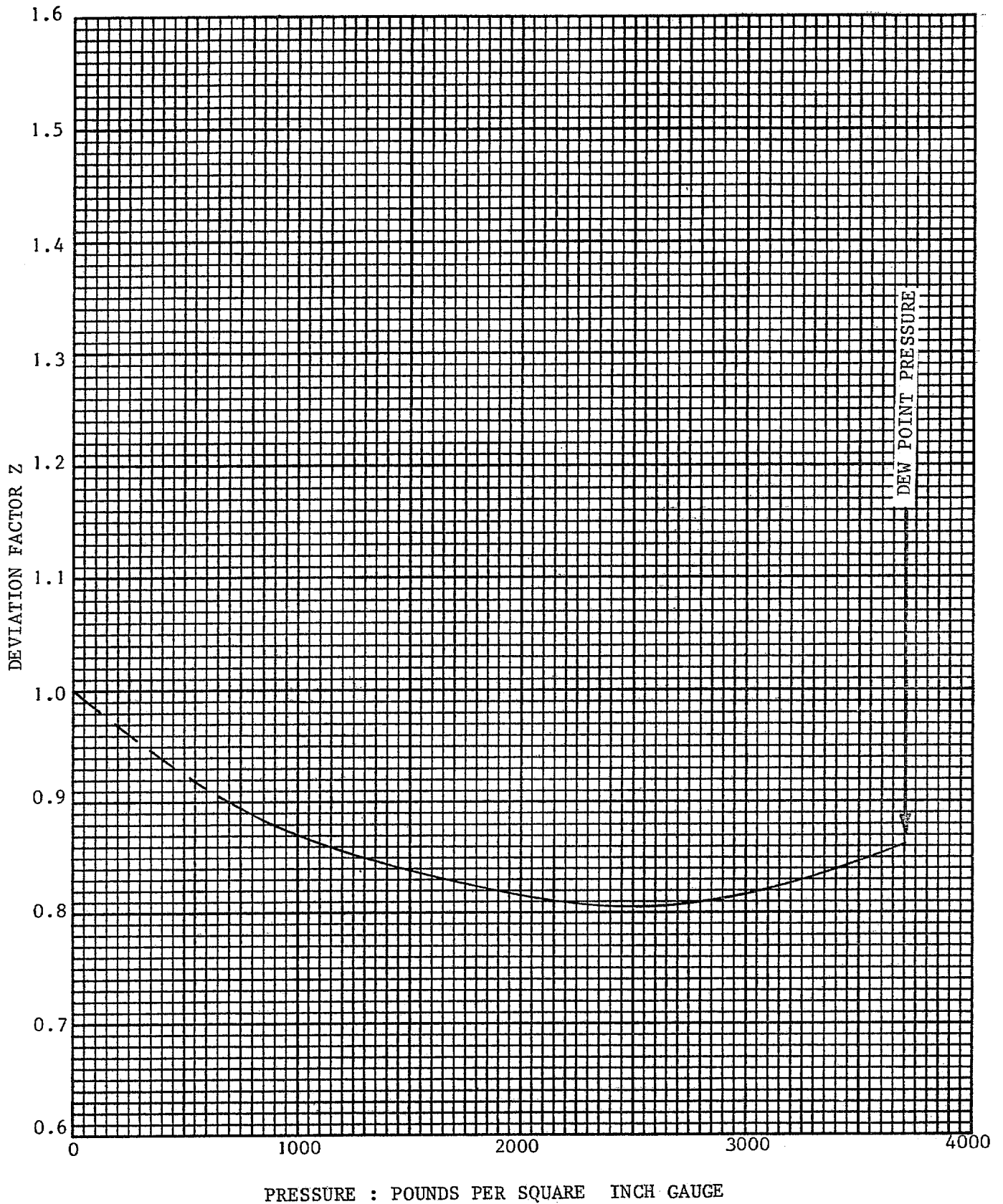
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RETROGRADE CONDENSATION DURING GAS DEPLETION AT 180° F

<u>Pressure</u> <u>PSIG</u>	<u>Retrograde Liquid Volume</u> <u>Percent of Hydrocarbon Pore Space</u>
3702 Dew Point Pressure	0.0
3350	0.2
3200	0.3
3100	0.4
3000	0.4
2500	0.7
2000	0.9
1500	0.9
1000	0.9
600	0.9
0	0.8

DEVIATION FACTOR Z OF GAS PHASE DURING DEPLETION AT 180°F

Company ESSO AUSTRALIA LTD Formation _____
Well BREAM 4A State _____
Field _____ Country AUSTRALIA



RETROGRADE CONDENSATION DURING DEPLETION AT 180°F

Company ESSO AUSTRALIA LTD Formation _____
Well BREAM 4A State _____
Field _____ Country AUSTRALIA

