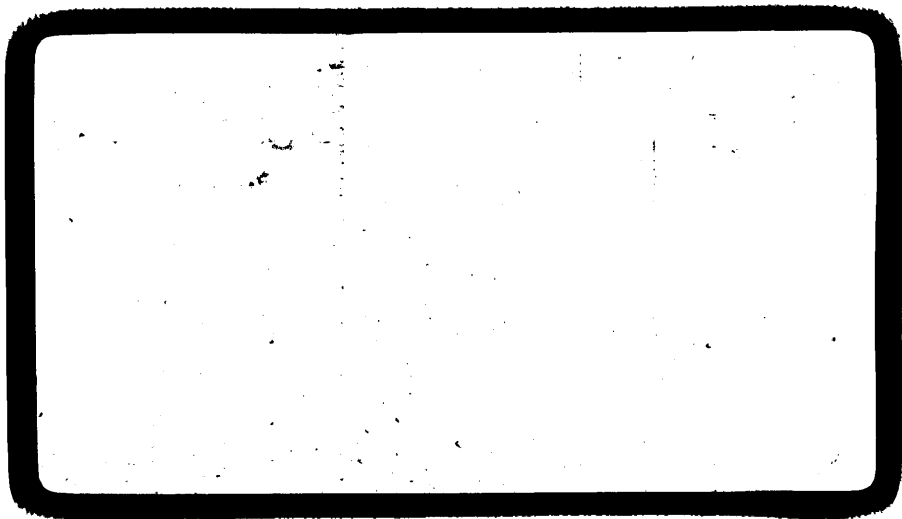


DEPT. NAT. RES & ENV



PE801099

GIPPSLAND BASIN
HYDROCARBON REPORT
CORELAB
LEATHERJACKET-1



RESERVOIR ANALYSIS



A/C 156

119
K.A.

ESSO AUSTRALIA LIMITED

LEATHERJACKET #1

RESERVOIR FLUID STUDY

@ 765m MDKB

PETROLEUM DIVISION

08 AUG 1986



Company : Esso Australia Limited Date Sampled : 1 March 1986
Well : Leatherjacket #1 State : Victoria
Field : Leatherjacket Country : Australia

FORMATION CHARACTERISTICS

Formation Name :
Date First Well Completed :
Original Reservoir Pressure :
Original Produced Gas-Oil Ratio :
 Production Ratio :
 Separator Pressure and Temperature :
 Oil Gravity @ 60°F :
Datum :
Original Gas Cap :

WELL CHARACTERISTICS

Elevation :
Total Depth :
Producing Interval :
Tubing Size and Depth :
Productivity Index :
Last Reservoir Pressure :
 Date :
 Reservoir Temperature :
 Status of Well :
 Pressure Gauge :
Normal Production Rate :
 Gas-Oil Ratio :
 Separator Pressure and Temperature :
 Base Pressure :
Well Making Water :

SAMPLING CONDITIONS

Depth sampled @ : 765 m MDKB
Sampling Pressure : 1110 psig
Sampling Temperature : 114°F
Estimated Reservoir Pressure : 1110 psig
Estimated Reservoir Temperature : 114°F

Sampled by :
Type Sampler : RFT Chamber No 443311

REMARKS :

CORE LABORATORIES
Petroleum Reservoir Engineering

Page : 2 of 16
File : AFL 86009
Well : Leatherjacket #1

QUALITY CHECK OF SAMPLES RECEIVED IN THE LABORATORY

Cylinder #: 1104/81 1025/80 1021/80

Sample #: 1 2 3

	<u>cm³ Mercury Injected</u>	<u>Pressure, psig</u>	<u>cm³ Mercury Injected</u>	<u>Pressure, psig</u>	<u>cm³ Mercury Injected</u>	<u>Pressure, psig</u>
1	410		0	380	0	430
2	415		1	390	1	430
3	420		2	400	2	431
4	425		3	410	3	431
5	430		4	420	4	432
6	435		5	430	5	432
7	505		6	542	6	433
8	885		7	865	7	545
9	1270		8	1200	8	875
10	1645		9	1530	9	1205
11	2040		10	1865	10	1535
			11	2235	11	1865
			12	2620		

Psat = 437 psig @ 68°F

Psat = 436 psig @ 68°F

Psat = 433 psig @ 66°F

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CORE LABORATORIES

Petroleum Reservoir Engineering



2nd June, 1986

Esso Australia Limited
Esso House
127 Kent Street,
Sydney NSW 2000

Attention: Mr. A. P. Whittle

Subject : Reservoir Fluid Study
Well : Leatherjacket
File : AFL 86009

Dear Sir,

A subsurface sample was collected from the subject well and submitted to our laboratory for use in a reservoir fluid study. Presented in the following report are the results of this study as requested by Esso Australia Limited.

The sample was transferred out of RFT chamber No. 443311 into high pressure PVT cylinders. As a quality check, the room temperature bubble point pressures were initially determined.

These were found to be 437 psig at 68°F for cylinder 1104/81, 436 psig at 68°F for cylinder 1025/81, and 433 psig at 66°F for cylinder 1021/80. Esso Australia Limited was informed of these and instructed us to use cylinder 1025/80 for the remainder of the analysis program. The results of the bubble point analysis can be found on page two and are depicted graphically on pages eleven and twelve.

The hydrocarbon composition of the subsurface fluid was measured through hexanes plus and further broken down through undecanes plus by high temperature distillation. These results can be found on pages three and four. The PNA content of the stock tank oil was also analysed and is reported on page five.

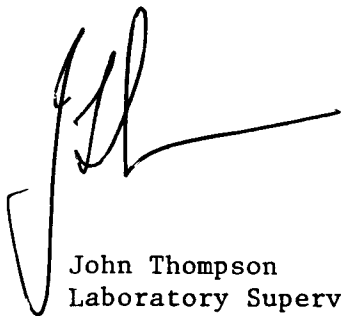
A portion of the fluid was charged to a high pressure visual cell and thermally expanded to the reported reservoir temperature of 114°F. This sample was then subjected to a constant compositional expansion during which a bubble point pressure of 520 psig was observed. The volumetric and pressure volume data are reported on pages six and seven respectively and depicted graphically on pages thirteen and fourteen.

The viscosity of the fluid was measured over a range of pressures in a rolling ball viscometer at the reservoir temperature of 114°F and also at 50°F. At 114°F the viscosity was found to vary from a minimum of 9.890 centipoise at saturation pressure to 16.488 centipoise at atmospheric pressure. At 50°F the viscosity was found to vary from a minimum of 58.05 centipoise at the estimated saturation pressure of 403 psig to 97.60 centipoise at atmospheric pressure. This data is tabulated on pages eight and nine and depicted graphically on pages fifteen and sixteen.

The wax content of the stock tank oil was determined using UOP method *A-46-40 and was found to be 0.95%. The pour point of the stock tank oil was determined using ASTM method D-97 and was found to be less than -30°C. These results are presented page ten.

It has been a pleasure to be of service to Esso Australia Limited. If you have any questions regarding this study, please do not hesitate to contact us.

Yours Sincerely,

A handwritten signature in black ink, appearing to read 'J. Thompson', with a long horizontal stroke extending to the right.

John Thompson
Laboratory Supervisor.

JT:KD:pn

HIGH TEMPERATURE DISTILLATION OF HEXANES PLUS
 FRACTION OF RESERVOIR FLUID SAMPLE TO UNDECANES PLUS

<u>Component</u>	<u>Cut Temp °C</u>	<u>Mol Percent</u>	<u>Weight Percent</u>	<u>Volume Percent</u>	<u>Density, gm/cc @ 60°F</u>	<u>°API @ 60°F</u>	<u>Mol Weight</u>
	IBP 49						
Hexanes	84	0.00	0.00	0.00			
Heptanes	112	0.00	0.00	0.00			
Octanes	138	0.00	0.00	0.00			
Nonanes	162	0.00	0.00	0.00			
Decanes	185	5.89	3.15	3.45	0.8348	37.8	156
Undecanes plus	FBP 185	94.11	96.85	96.55	0.9156	22.9	300
		<u>100.00</u>	<u>100.00</u>	<u>100.00</u>			

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PNA ANALYSIS

Paraffins	17% W/W
Napthenes	37% W/W
Aromatics	24% W/W
Polars	20% W/W
Asphaltenes	2% W/W

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VOLUMETRIC DATA OF RESERVOIR FLUID SAMPLE

Saturation pressure (bubble point pressure): 520 psig @ 114°F

Specific volume @ saturation pressure, $\frac{\text{ft}^3}{\text{lb}}$: 0.01871 @ 114°F

Thermal expansion of saturated oil @ 5000 psig @ $\frac{520^\circ\text{F}}{63^\circ\text{F}} = 1.01871$

Compressibility of saturated oil @ reservoir temperature: Vol/Vol/Psi:

From 5000 psig to 4000 psig = 4.17×10^{-6}

From 4000 psig to 3000 psig = 4.26×10^{-6}

From 3000 psig to 2000 psig = 4.44×10^{-6}

From 2000 psig to 1000 psig = 4.72×10^{-6}

From 1000 psig to 520 psig = 4.80×10^{-6}

Pressure, psig	PRESSURE - VOLUME RELATIONS @ 114°F		Y Function (3)
	Relative Volume (1)	Compressibility $\times 10^{-6}$ (2)	
5000	0.9803	4.13	
4500	0.9823	4.18	
4000	0.9844	4.24	
3500	0.9865	4.30	
3000	0.9886	4.36	
2500	0.9908	4.44	
2000	0.9930	4.53	
1500	0.9953	4.64	
1000	0.9977	4.79	
900	0.9981	4.83	
800	0.9986	4.87	
700	0.9991	4.92	
600	0.9996	4.98	
<u>520</u> *	1.0000	5.02	
512	1.0047		
498	1.0115		
483	1.0193		3.843
468	1.0318		3.391
445	1.0528		3.089
407	1.0884		3.031
368	1.1334		2.974
322	1.2019		2.910
275	1.2966		2.848
228	1.4321		2.781
179	1.6477		2.714
140	1.9220		2.659
102	2.3704		2.607
73	2.9788		2.567

* Saturation Pressure

(1) Relative volume: V/V_{sat} is barrels @ indicated pressure per barrel @ saturation pressure.

(2) Instantaneous Compressibility = $-\frac{dV}{VdP}$

(3) Y Function = $\frac{(P_{sat} - P)}{(P_{abs})(V/V_{sat}-1)}$

VISCOSITY DATA @ 114°F

<u>Pressure,</u> <u>psig</u>	<u>Oil Viscosity,</u> <u>Centipoise</u>
5000	18.488
4500	17.523
4000	16.559
3500	15.593
3000	14.627
2500	13.672
2000	12.738
1500	11.771
1000	10.825
900	10.618
800	10.444
700	10.248
600	10.052
<u>520*</u>	9.890
375	10.872
250	11.779
125	12.817
0	16.488

* Saturation Pressure.

VISCOSITY DATA @ 50°F

<u>Pressure,</u> <u>psig</u>	<u>Oil Viscosity,</u> <u>Centipoise</u>
5000	145.10
4500	135.60
4000	126.15
3500	116.80
3000	107.20
2500	97.80
2000	88.25
1500	78.82
1000	69.25
900	67.40
800	65.52
700	63.65
600	62.00
500	59.85
<u>403</u> *	58.05
320	59.52
210	63.09
110	68.99
0	97.60

* Estimated Saturation Pressure.

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BASIC CRUDE TESTS ON STOCK TANK OIL

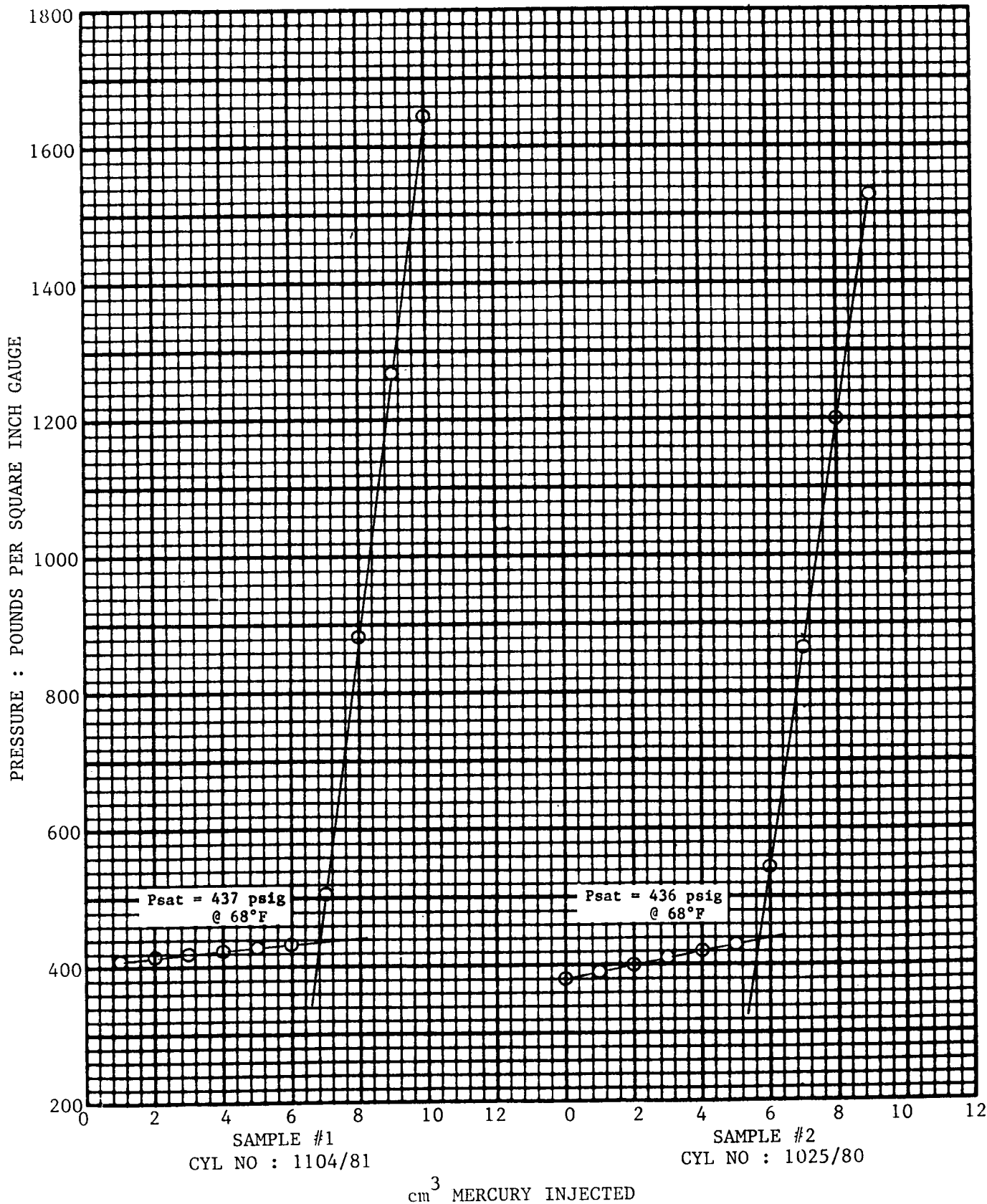
1. ASTM method D-97, pour point.

POUR POINT : less than -30°C

2. UOP method A-46-40, wax content.

WAX CONTENT : 0.95%

Company Esso Australia Limited Formation _____
Well Leatherjacket #1 State Victoria
Field Leatherjacket Country Australia



HYDROCARBON ANALYSIS OF RESERVOIR FLUID SAMPLE TO UNDECANES PLUS

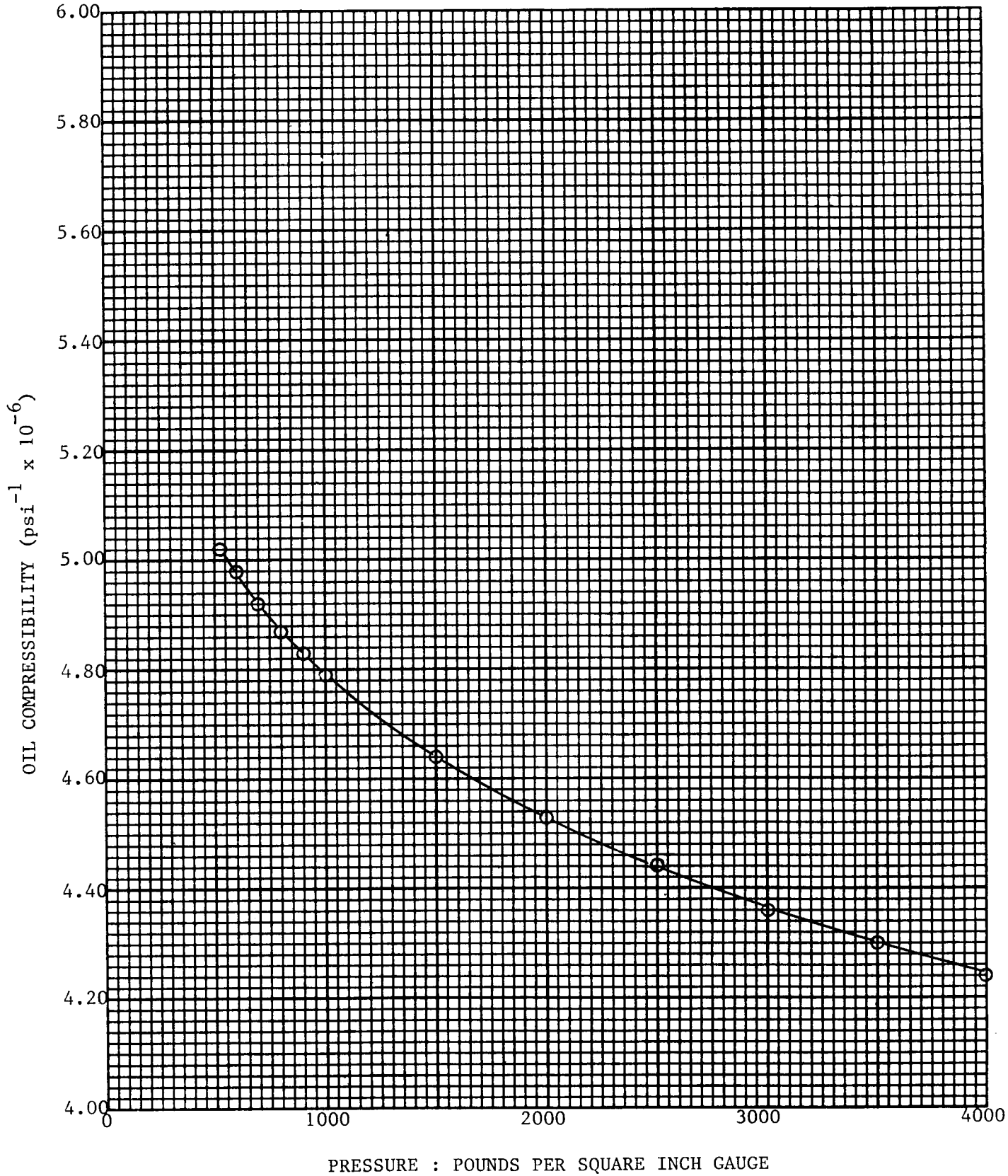
<u>Component</u>	<u>Mol Percent</u>	<u>Weight Percent</u>
Hydrogen Sulphide	0.00	0.00
Carbon Dioxide	0.37	0.07
Nitrogen	0.13	0.02
Methane	14.44	0.93
Ethane	0.23	0.03
Propane	0.07	0.01
iso-Butane	0.03	0.01
n-Butane	0.02	Trace
iso-Pentane	0.00	0.00
n-Pentane	0.00	0.00
Hexanes	0.00	0.00
Heptanes	0.00	0.00
Octanes	0.00	0.00
Nonanes	0.00	0.00
Decanes	4.99	3.12
Undecanes plus	79.72	95.81
	<u>100.00</u>	<u>100.00</u>

Properties of Hexanes plus

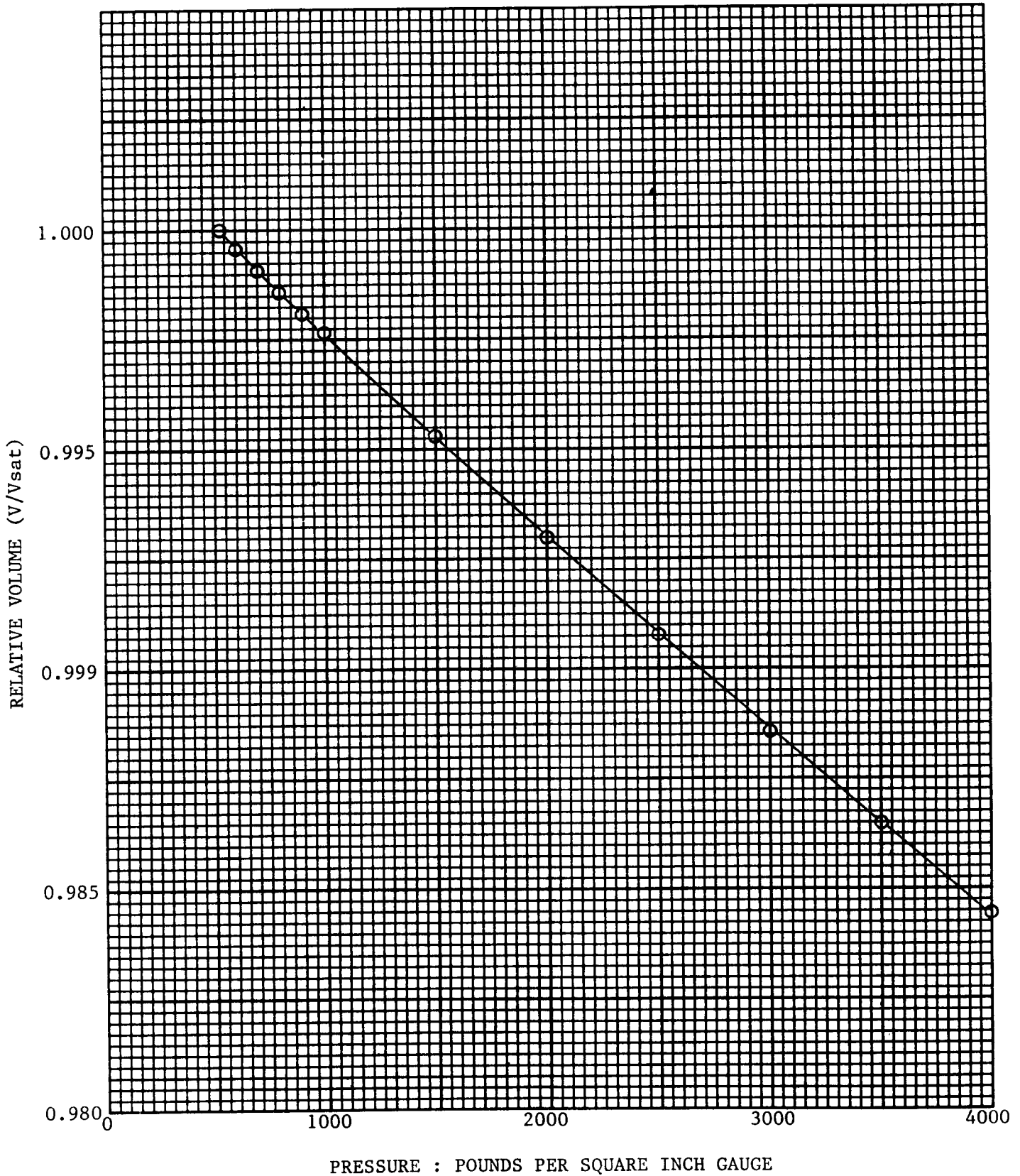
API gravity @ 60°F	23.4
Density, gm/cc @ 60°F	0.9128
Molecular weight	292

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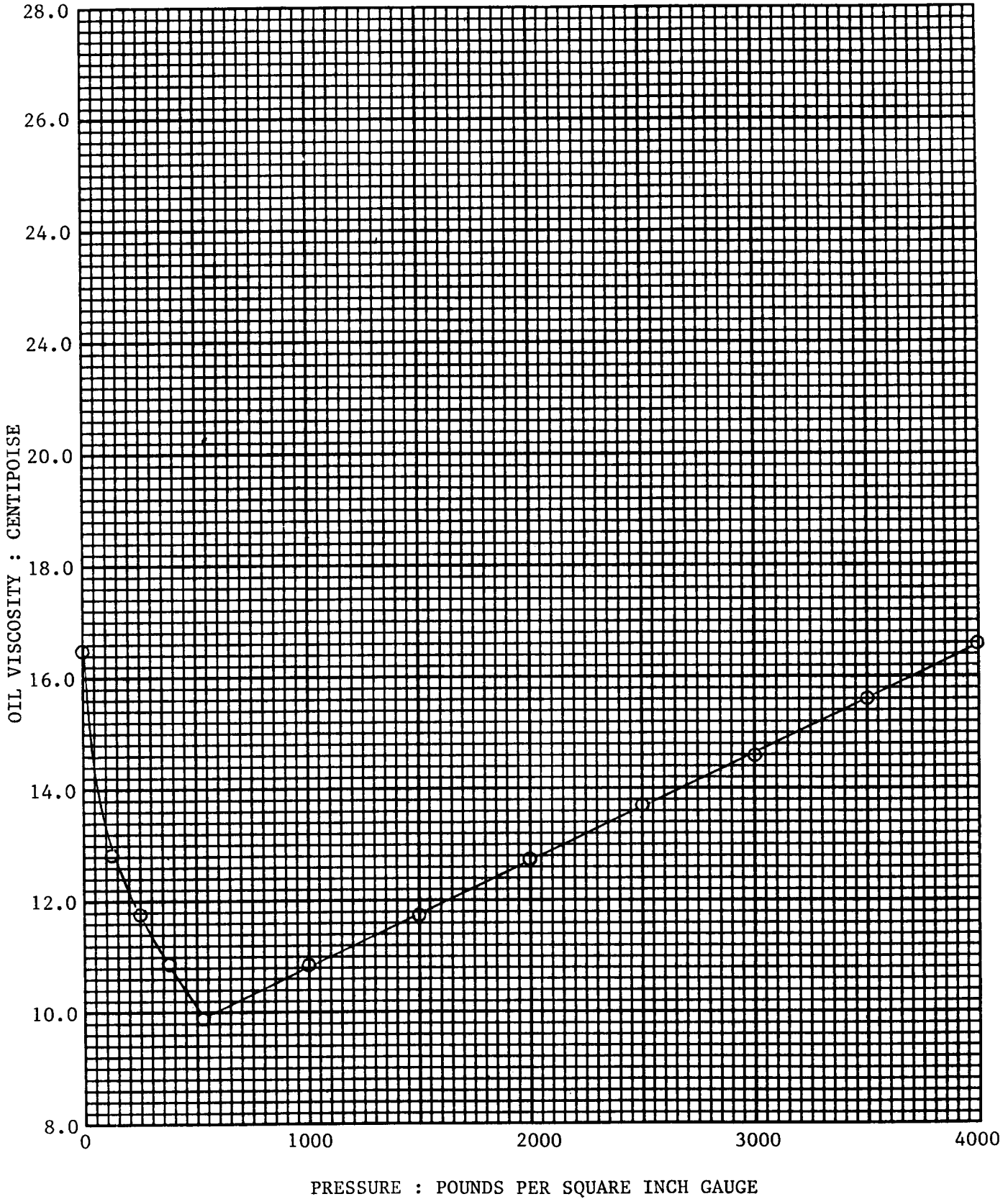
Company Esso Australia Limited Formation _____
Well Leatherjacket #1 State Victoria
Field Leatherjacket Country Australia



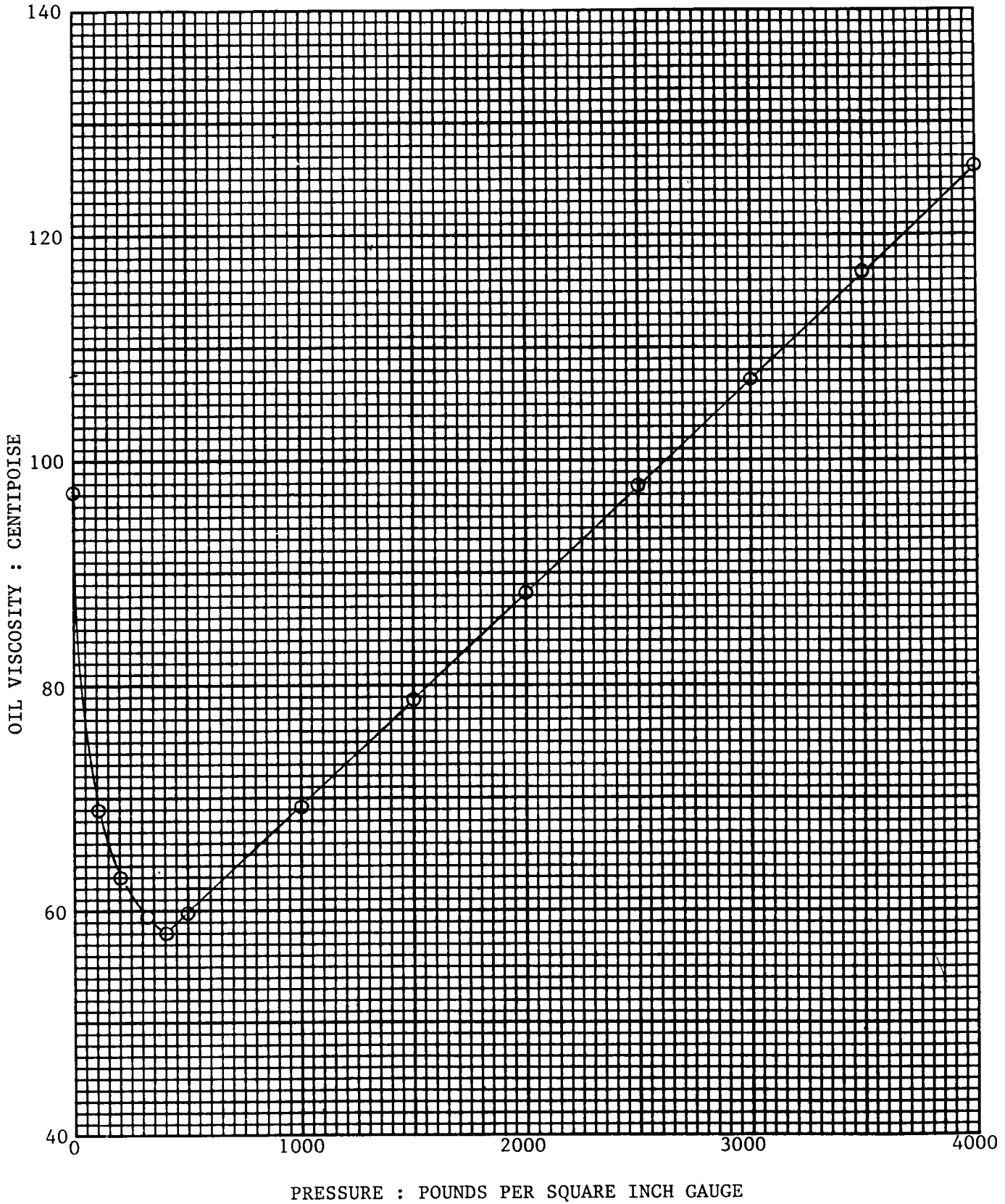
Company Esso Australia Limited Formation _____
Well Leatherjacket #1 State Victoria
Field Leatherjacket Country Australia



Company	Esso Australia Limited	Formation	
Well	Leatherjacket #1	State	Victoria
Field	Leatherjacket	Country	Australia



Company Esso Australia Limited Formation _____
Well Leatherjacket #1 State Victoria
Field Leatherjacket Country Australia



Company	Esso Australia Limited	Formation	
Well	Leatherjacket #1	State	Victoria
Field	Leatherjacket	Country	Australia

