Denne rapport tilhører
STATOIL
LTEK DOK.SENTER
L.NR. 12483220034
KODE Well 1/9-6 nr20
Returneres etter bruk

FLOPETROL

P.V.T.STUDY REPORT

Client:STATOIL
Field :TOMMELITEN Well : 1/9-6 DST#4
Zone :Danian Samp. Date:26/11/82

Report #:83/L/031 Date: APRIL 1983

PVT

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P.V.T.STUDY REPORT

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MELUN LABORATORY

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Schlumberger

COMPANY : STATOIL

WELL : 1/9-6 DST#4

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SUMMARY AND MAIN RESULTS

The present report gives the experimental results of the P.V.T. study carried out on recombined surface samples from well 1/9-6 DST#4

The initial reservoir conditions are :

- Pi : 7063 psig
- T : 259 F

Dew point pressure determined on sample which was selected for complete P.V.T. study is :

- Pd : 6150 psig at 259 F
- Z at Pd : 1.170
- Specific volume at Pd : 0.0479 cu ft/pound

For an abandonment pressure of 205 psig, the cumulative liquid recovery will be :

- 49.82 % of propane plus in place
- 42.06 % of butanes plus in place
- 34.80 % of pentanes plus in place

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NOTICE

Curve Presentation

This report contains graphs of physical properties together with curves which are now drawn by computer program . These curves are empirical as the formulae used are not based on any theory , and are obtained using special Flopetrol computer programs . Except for saturation pressure determinations , equations are given on pages following each graph to enable easy and accurate interpolation using a calculator or a computer ; generally extrapolation is not advisable as the Flopetrol software is based only on the experimental range of measurements.
Although in most cases less significant figures can be used for parameters, we advise a validity check against experimental points when using less than the eleven significant figures given.
Clearly , properties can be calculated in this fashion to high precision , but cannot be more accurate than the original experimental measurements.

Parameters are given in E-format , where , for example :
b = -3.76908251347E-02 means b = -0.037690851347.

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TABLE 1

SAMPLING CONDITIONS

I. RESERVOIR AND WELL CHARACTERISTICS

Producing zone	:	Danian
Static pressure	:	7063 psig
Bottom hole temperature	:	259 F
Tubing diameter	:	3"-5" VAM
Casing size	:	7"
Casing shoe	:	N/A

II. SAMPLING CONDITIONS

A) SURFACE SAMPLE(S)

Date	:	26/11/82
Choke	:	26/64"
Flowing bottom hole pressure	:	N/A
Well head pressure	:	3865 psig
Separator pressure	:	930 psig
Well head temperature	:	135 F
Separator temperature	:	90 F
Gas rate (Separator)	:	10.2 MMscf/D
Stock tank temperature	:	N/A
Compressibility factor	:	0.859
Gas gravity	:	0.678 (Air=1)
Liquid rate (Separator)	:	1749 bbl/D (average)
G.L.R.	:	5832 scf/bbl
Sample(s) received	:	gas A13205, A13101
		liq.9214/318

B) BOTTOM HOLE SAMPLE(S)

Date	:	-
Choke	:	-
Sample(s) received	:	-
		-

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SAMPLE(S) VALIDITY

SEPARATOR LIQUID SAMPLE(S)

1) Sample bottle No 9214/318

Bubble point pressure determination at 90 F is 880 psig

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TABLE 2

BUBBLE POINT PRESSURE DETERMINATION AT 90 F

Separator liquid sample (cylinder 9214/318)

Pressure (psig)	Pump reading (cm3)
5000	306.73
4000	305.63
3000	304.40
2000	303.12
1000	301.73
Pb = 880	301.52
866	300.30
852	298.90
820	296.42
765	290.57
675	279.59

FLASH OF SEPARATOR LIQUID TO STOCK TANK CONDITIONS

GLR : 508 std cu ft/bbl std
Shrinkage factor : 0.775 Std bbl/bbl
Liberated gas gravity : 1.080 (Air = 1)
Stock tank liquid gravity: 0.785 60/60 F

This sample has been used for recombination

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BUBBLE POINT PRESSURE DETERMINATION AT 90 F

Separator liquid sample (cylinder 9214/318)

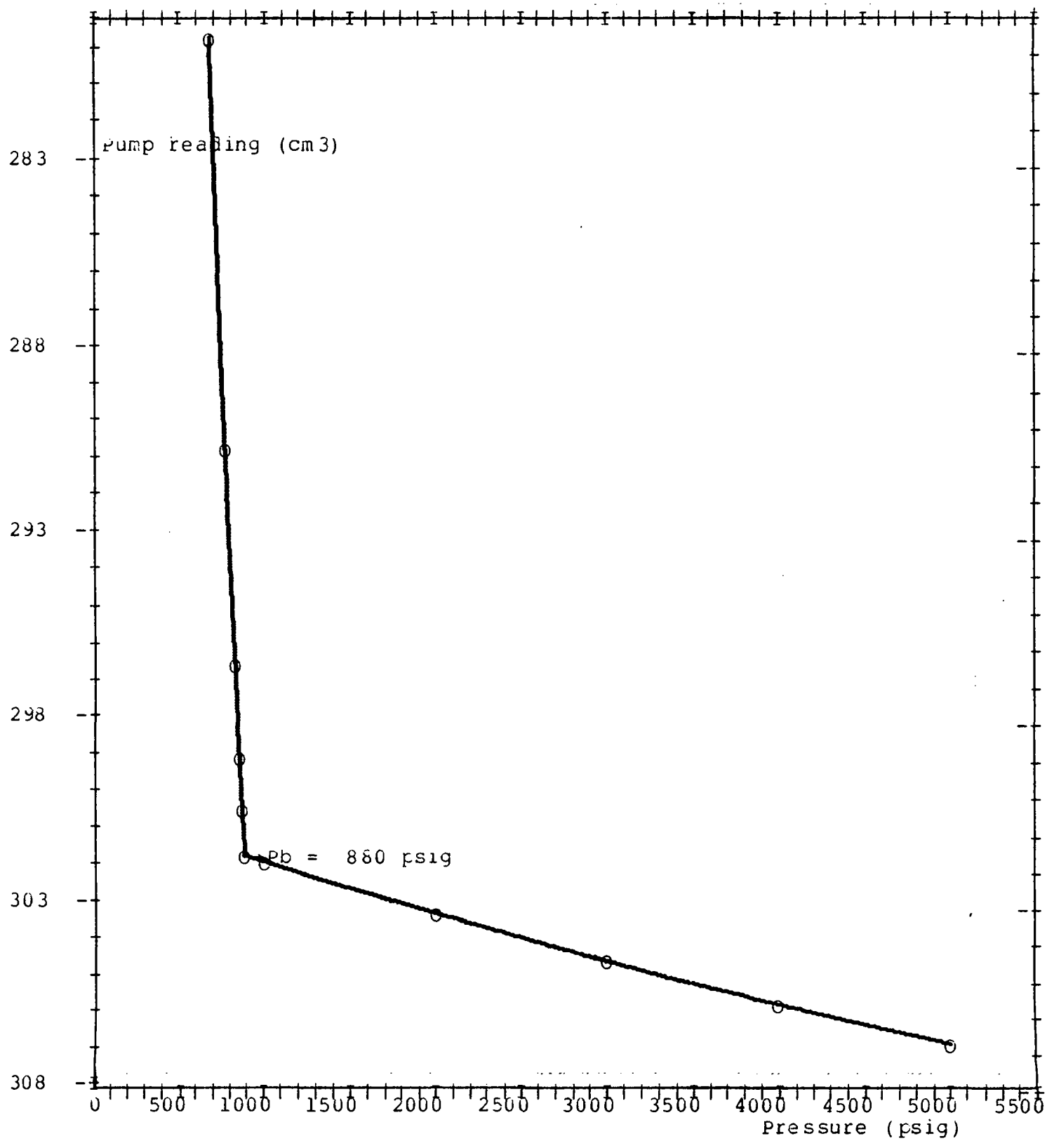

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TABLE 3

MOLECULAR COMPOSITION OF FIELD SEPARATOR GAS(ES)

I-Molecular composition (mole percent)

Components	Cylinder A13101	Cylinder A13205
Nitrogen	0.09	0.11
Carbon dioxide	2.93	2.94
Hydrocarbons:		
Methane	84.40	84.47
Ethane	7.75	7.72
Propane	2.78	2.74
I - Butane	0.47	0.46
N - Butane	0.85	0.84
I - Pentane	0.23	0.23
N - Pentane	0.24	0.24
Hexanes	0.17	0.16
Heptanes plus	0.09	0.09
TOTAL	100.00	100.00
Molecular weight	19.759	19.733
Gravity (Air=1)	0.682	0.681
Molecular weight of neptanes plus	104.9	104.9

II-Liquid content (g.p.M)

Propane plus	1.464	1.443
Butanes plus	0.703	0.692
Pentanes plus	0.283	0.279

The cylinder A13101 has been used for recombination

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COMPANY : STATOIL

WELL : 1/9-6 DST#4

TABLE 4

RECOMBINATION OF SEPARATOR SAMPLES

I. FLASH OF SEPARATOR LIQUID TO STOCK TANK CONDITIONS

G.L.R.	:	508	Std cu ft/bbl std
Shrinkage factor	:	0.775	Std bbl/bbl
Liberated gas gravity	:	1.080	(Air=1)
Stock tank liquid gravity	:	0.785	60/60 F

II. CORRECTION OF GAS LIQUID RATIO

Field G.L.R. : 5832 Std cu ft/bbl

Separator gas gravity (from chromatographic analysis)

G lab. : 0.682 (Air=1)

Compressibility factor Z at separator conditions

Z lab. : 0.857

$$\text{Corrected G.L.R.} : \text{Field G.L.R.} \times \sqrt{\frac{G_{field} \times Z_{field}}{G_{lab.} \times Z_{lab.}}}$$

$$\text{Corrected G.L.R.} : 5832 \sqrt{\frac{0.678 \times 0.859}{0.682 \times 0.857}} = 5822 \text{ Std cu ft /bbl}$$

III. PHYSICAL RECOMBINATION

Surface samples were physically recombined in the ratio of 5822 standard cubic feet of separator gas per barrel of separator liquid

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TABLE 5

FLASH OF SEPARATOR LIQUID TO STOCK TANK CONDITIONS
(Molecular composition)

Components	Stock tank liquid (mole percent)	Evolved gas (mole percent)	Recombined separator liquid (mole percent)
Nitrogen	0.00	0.00	0.00
Carbon dioxide	0.00	3.45	1.36
Hydrocarbons:			
Methane	0.00	50.13	19.84
Ethane	0.60	18.10	7.52
Propane	1.70	11.66	5.64
I - Butane	1.04	3.25	1.91
N - Butane	3.55	6.39	4.67
I - Pentane	3.02	2.25	2.72
N - Pentane	4.44	2.31	3.60
Hexanes	8.93	1.64	6.05
Heptanes	12.55	0.70	7.86
Octanes	15.06	0.12	9.15
Nonanes	11.46	0.00	6.93
Decanes	8.22	0.00	4.97
Undecanes	5.82	0.00	3.52
Dodecanes plus	23.61	0.00	14.26
TOTAL	100.00	100.00	100.00
Molecular weight	134.5	31.290	93.7
Gravity	0.785 60/60 F	1.080 (Air=1)	-----
Molar ratio	60.45	39.55	100.00
Mass ratio	86.79	13.21	100.00

Molecular weight of Dodecanes plus in STL: 223

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TABLE 6

MOLECULAR COMPOSITION OF RESERVOIR FLUID

Components	Recombined Separator liquid (mole percent)	Separator gas (mole percent)	Recombined Reservoir fluid (mole percent)
Nitrogen	0.00	0.09	0.08
Carbon dioxide	1.36	2.93	2.70
Hydrocarbons:			
Methane	19.84	84.40	74.97
Ethane	7.52	7.75	7.72
Propane	5.64	2.78	3.20
I - Butane	1.91	0.47	0.68
N - Butane	4.67	0.85	1.41
I - Pentane	2.72	0.23	0.59
N - Pentane	3.60	0.24	0.73
Hexanes	6.05	0.17	1.03
Heptanes	7.86	0.06	1.20
Octanes	9.15	0.03	1.36
Nonanes	6.93	0.00	1.01
Decanes	4.97	0.00	0.73
Undecanes	3.52	0.00	0.51
Dodecanes plus	14.26	0.00	2.08
TOTAL	100.00	100.00	100.00
Molecular weight	93.7	19.759	30.5
Gravity	-----	0.682 (Air=1)	1.054 (Air=1)
Molar ratio	14.59	85.41	100.00
Mass ratio	44.75	55.25	100.00

Molecular weight of Dodecanes plus in reservoir fluid : 223

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TABLE 7

CONSTANT MASS STUDY AND DEW POINT PRESSURE DETERMINATION AT 259 F

	Pressure (psig)	Relative volume (V/V Pd)	Compressibility factor (Z=PV/nRT)	Retrograde liquid deposit (% of hydrocarbon pore space)*
Pi =	7063	0.9486	1.274	
	6840	0.9596	1.248	
	6595	0.9728	1.220	
	6280	0.9914	1.184	
Pd =	6150	1.0000	1.170	0.00
	6100	1.0039		0.40
	5950	1.0145		3.03
	5852	1.0224		4.55
	5660	1.0403		8.37
	5370	1.0697		11.88
	4727	1.1479		16.75
	4158	1.2500		19.03
	3442	1.4401		20.69
	3120	1.5627		21.25
	2473	1.9305		21.90
	2186	2.1757		22.17
	1898	2.5127		22.33
	1576	3.0405		22.20

-Specific volume at dew point pressure = 0.04790 cu ft/pound

* Percent of retrograde liquid per volume of reservoir fluid at Pd

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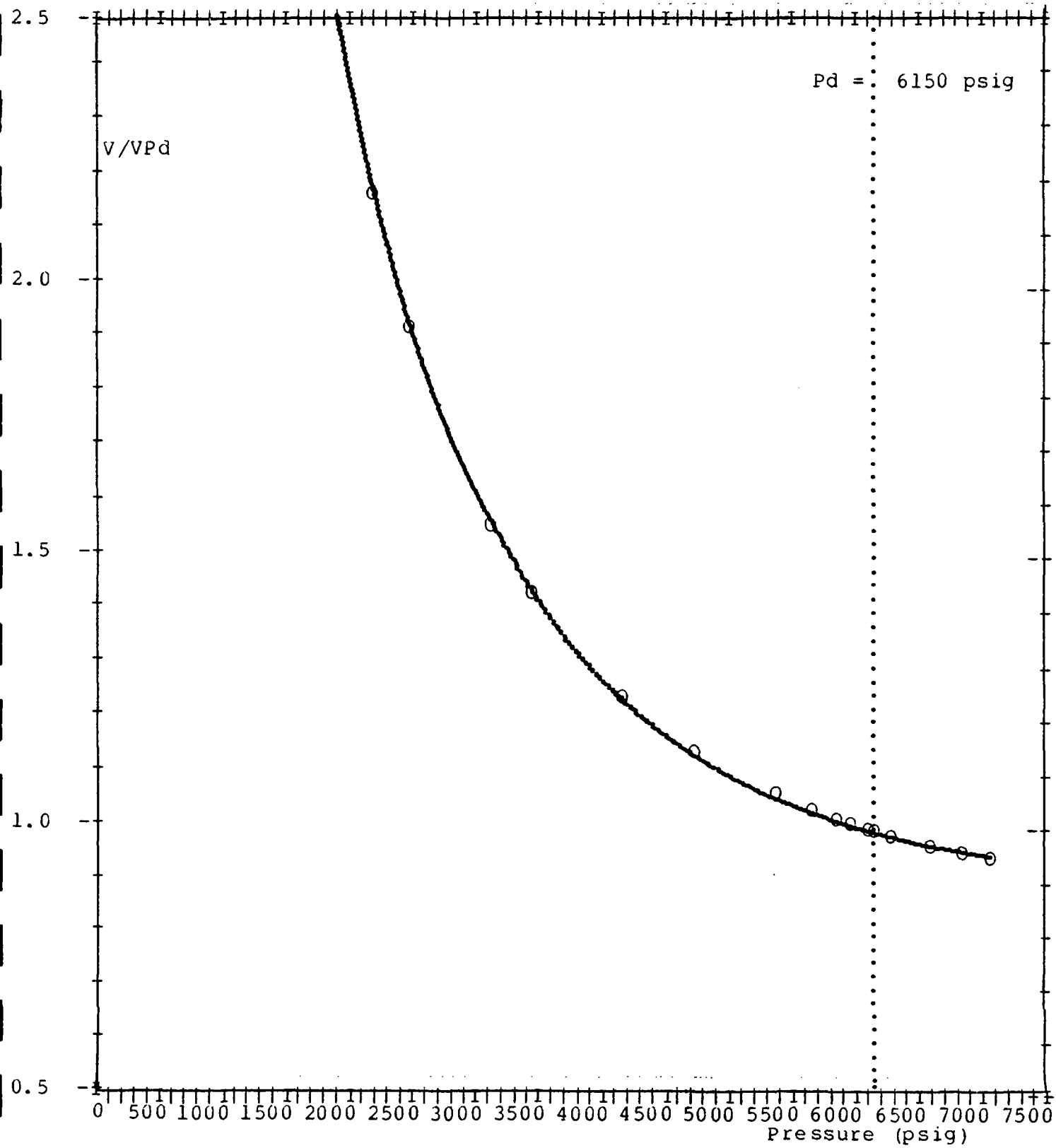
DEW POINT PRESSURE DETERMINATION AND CONSTANT MASS STUDY AT 259 F

Relative volume



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DEW POINT PRESSURE DETERMINATION AND CONSTANT MASS STUDY AT 259 F

Relative Volume

For 1576 <= P <= 7063

$$Vr = (a*x^2+b*x+c)/(d*x+1)$$

where:

Pd	=	6150 psig	x = P/Pd
a	=	-2.75384142010E 01	
b	=	1.06719077844E 01	
c	=	-5.53978857271E 01	
d	=	-7.38133818418E 01	

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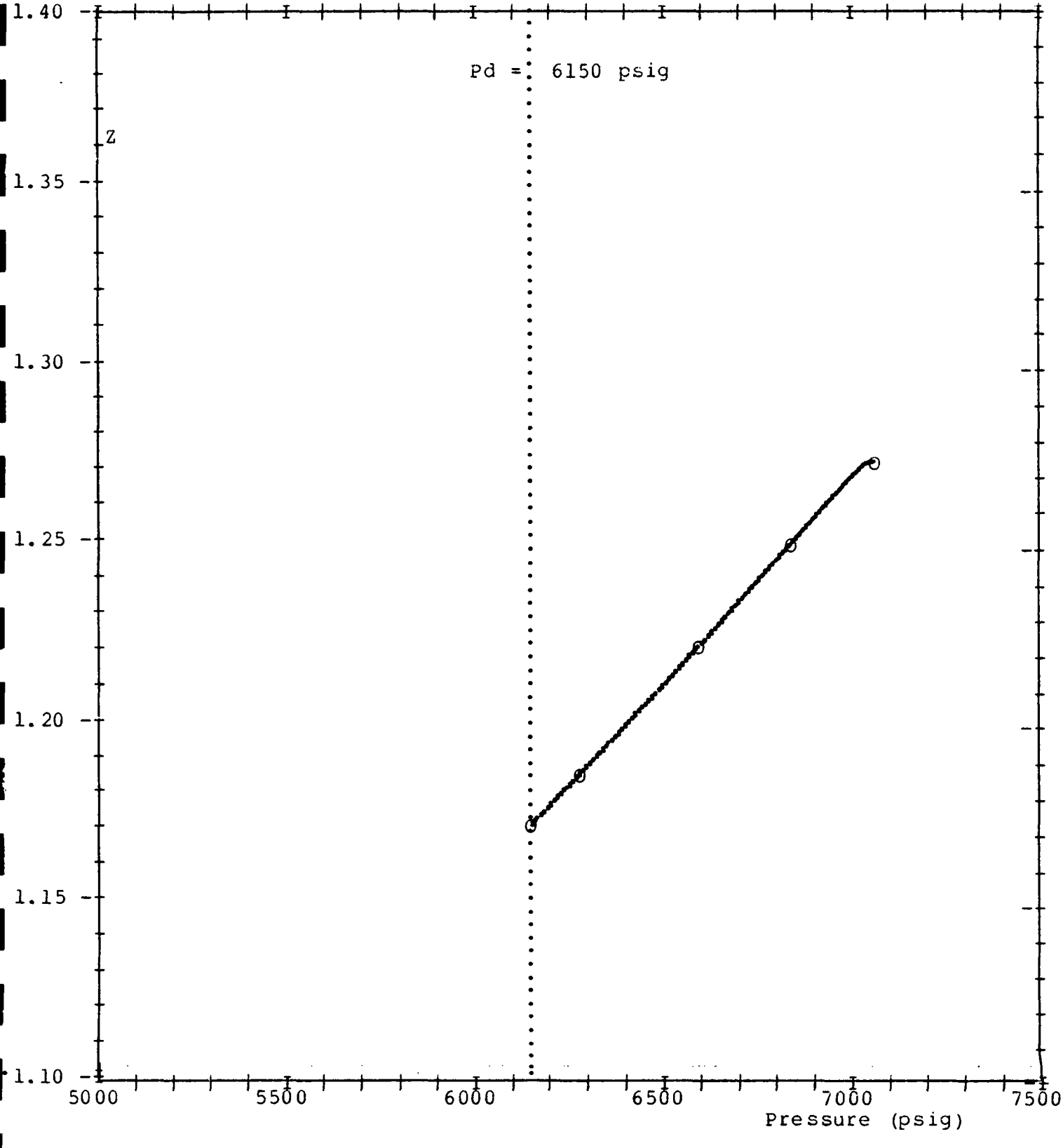
DEW POINT PRESSURE DETERMINATION AND CONSTANT MASS STUDY AT 259 F

compressibility factor



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DEW POINT PRESSURE DETERMINATION AND CONSTANT MASS STUDY AT 259 F

Compressibility factor Z

For Pd <= P <= 7063

$$Z = (a*x^2+b*x+c)/(d*x+1)$$

where:

Pd	=	6150 psig	x = P/Pd
a	=	-7.71601731583E-01	
b	=	2.36627038248E-01	
c	=	4.47984759488E-01	
d	=	-1.07435037081E 00	

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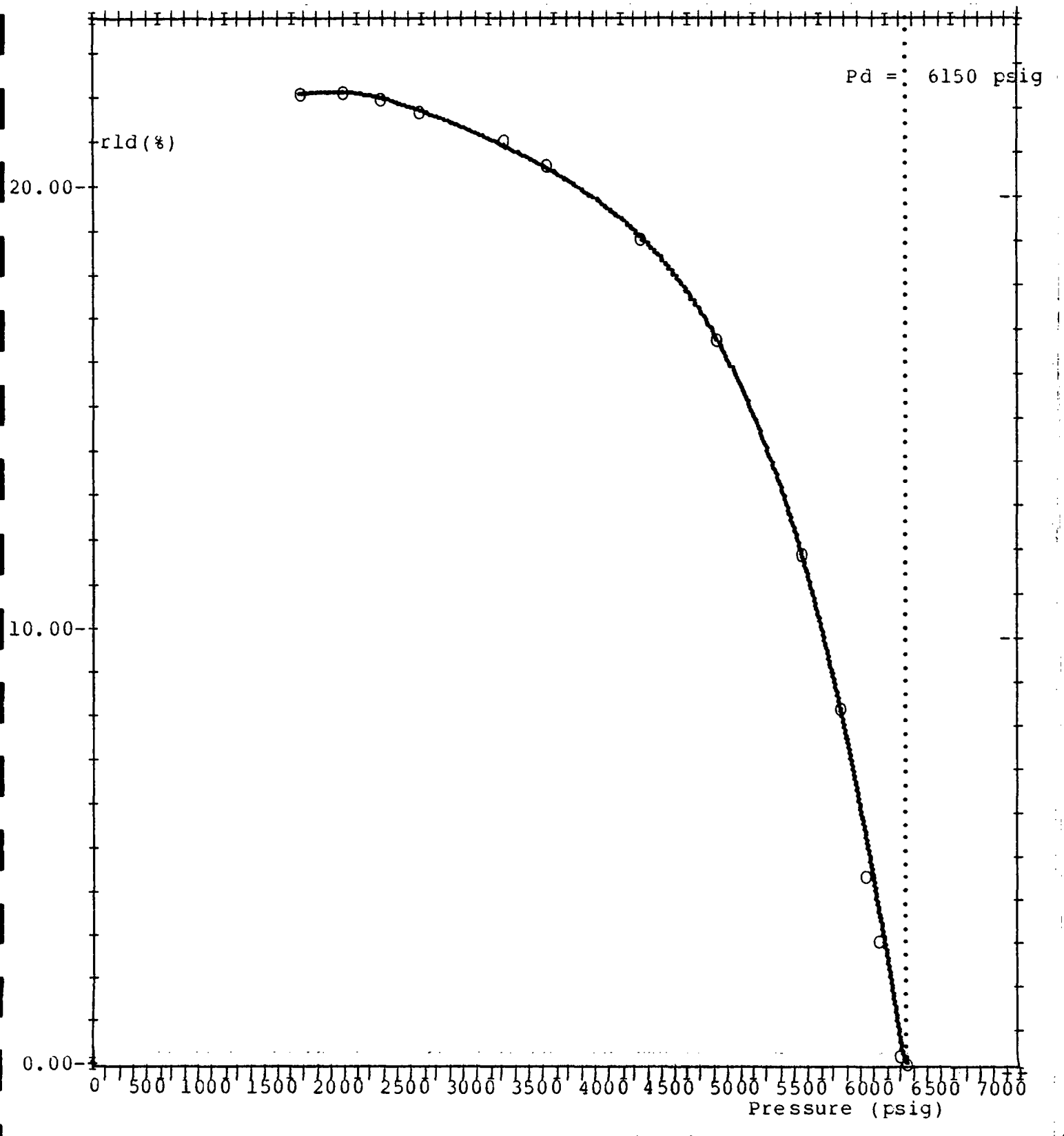
DEW POINT PRESSURE DETERMINATION AND CONSTANT MASS STUDY AT 259 F

Retrograde liquid deposit



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DEW POINT PRESSURE DETERMINATION AND CONSTANT MASS STUDY AT 259 F

Retrograde liquid deposit

For 1576 <= P <= Pd

$$rld\ (\%) = a+b*x^{i}+c*x^{3i}+d*x^{6i}+e*x^{9i}$$

where:

Pd	=	6150 psig	x	=	P/Pd
a	=	-1.89354362240E 00	i	=	0.5
b	=	7.39916329153E 01			
c	=	-1.18654086350E 02			
d	=	1.31501897784E 02			
e	=	-8.49459007277E 01			

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TABLE 8

DEPLETION STUDY OF RESERVOIR FLUID AT 259 F

Pressure (psig)	retrograde liquid deposit (percent of hydro-carbon pore space)*	Cumulative produced fluid (mole percent of initial fluid)	Compressibility factor of well stream (Z=PV/nRT)
Pd = 6150	0.00	0.00	1.170
5745	6.38	3.48	1.130
5200	11.57	8.77	1.073
4600	15.00	15.61	1.014
3820	18.02	26.29	0.958
3105	19.24	37.82	0.931
2260	19.21	53.11	0.926
1050	17.21	76.73	0.953
575	16.00	85.76	0.969
205	14.97	92.72	0.983

*Percent of retrograde liquid per volume of reservoir fluid at Pd

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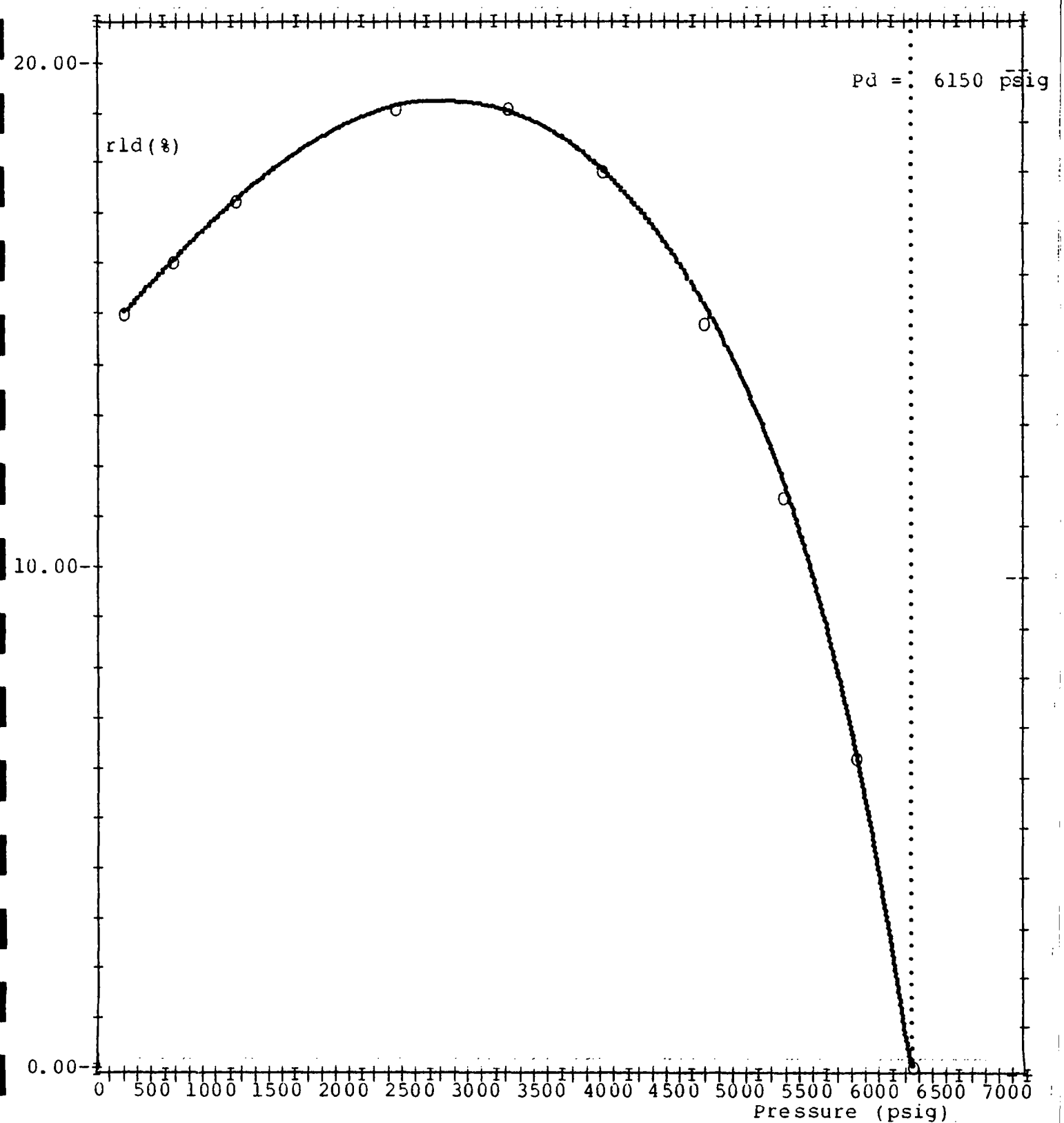
DEPLETION STUDY OF RESERVOIR FLUID AT 259 F

Retrograde liquid deposit



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DEPLETION STUDY OF RESERVOIR FLUID AT 259 F

Retrograde liquid deposit

For 205 <= P <= Pd

$$rld\ (\%) = a+b*x^{i}+c*x^{3i}+d*x^{6i}+e*x^{9i}$$

wnere:

Pd =	6150 psig	x	= P/Pd
a =	1.43927179183E 01	i	= 1.0
b =	1.74814106990E 01		
c =	-3.32435055921E 01		
d =	1.64116545796E 01		
d =	-1.50422776048E 01		

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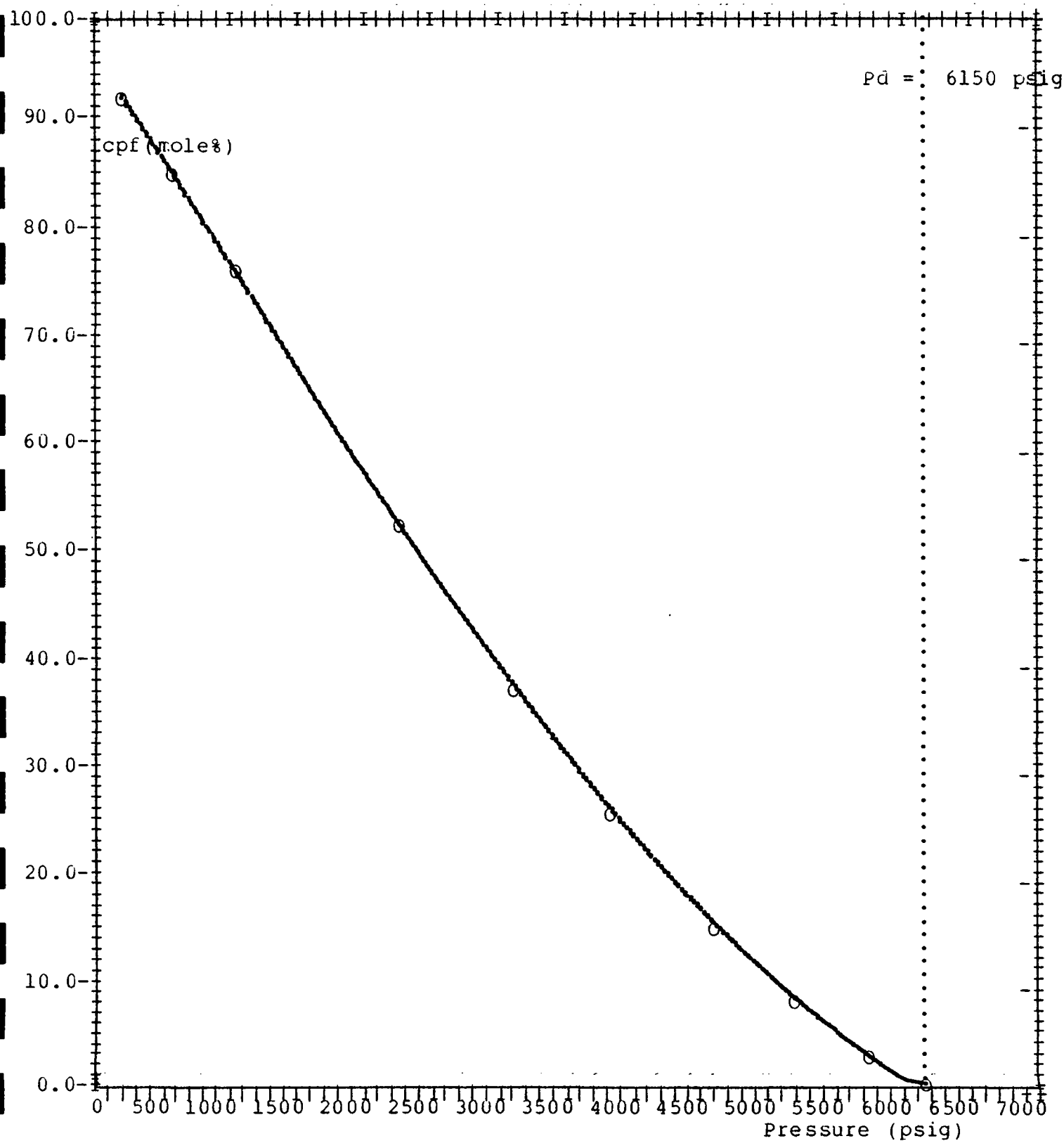
DEPLETION STUDY OF RESERVOIR FLUID AT 259 F

Cumulative produced fluid



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DEPLETION STUDY OF RESERVOIR FLUID AT 259 F

Cumulative produced fluid

For 205 <= P <= Pd

$$cpf\ (mole\ \%) = a+b*x^{i}+c*x^{j}+d*x^{k}$$

where:

Pd	=	6150 psig	x	=	P/Pd
a	=	9.60720345456E 01	i	=	1.1
b	=	-1.42105274352E 02	j	=	2.4
c	=	5.07266388228E 01	k	=	3
d	=	-4.69339901641E 00			

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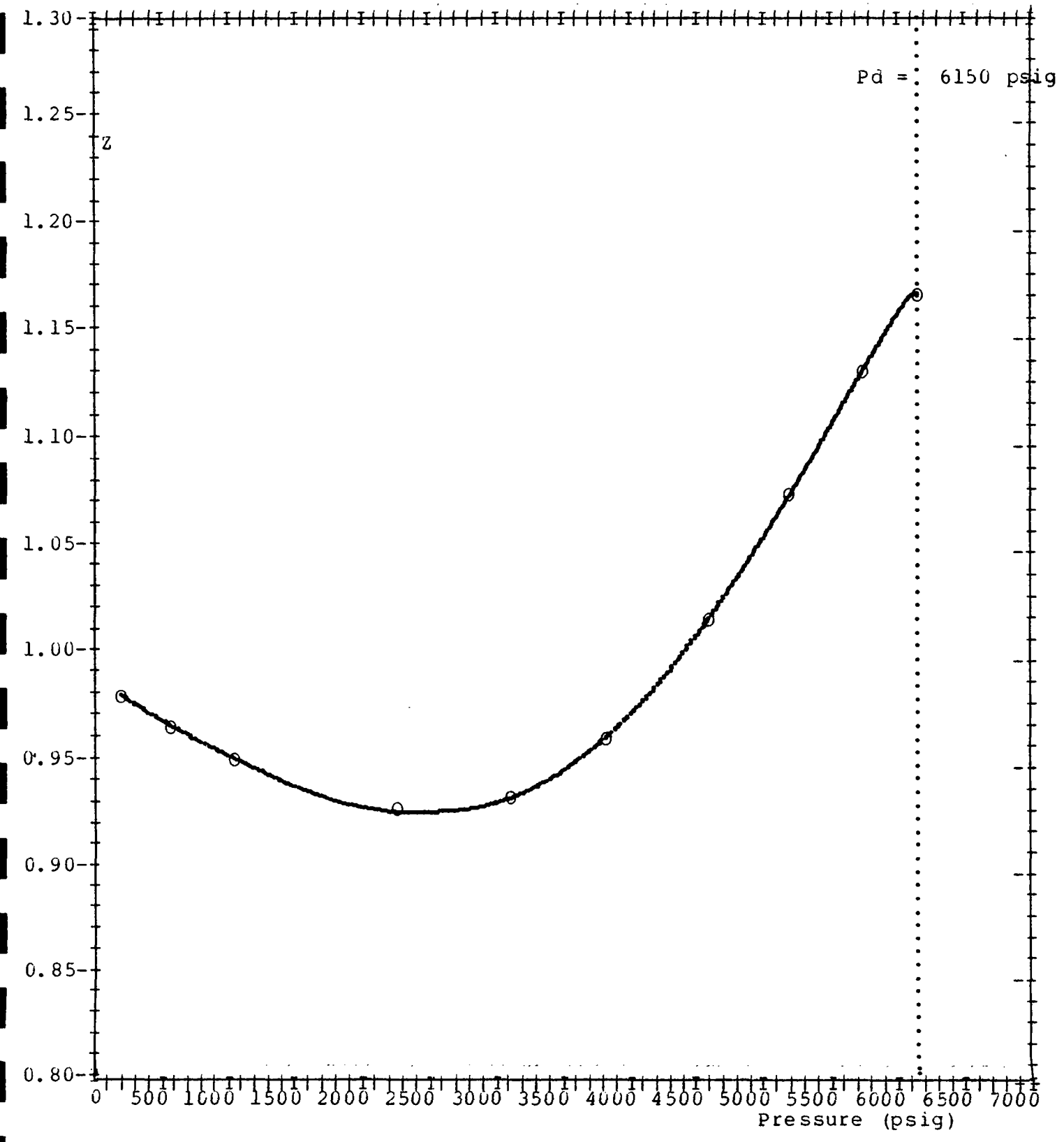
DEPLETION STUDY OF RESERVOIR FLUID AT 259 F

Produced well stream compressibility factor



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DEPLETION STUDY OF RESERVOIR FLUID AT 259 F

Produced well stream compressibility factor

For 205 <= P <= Pd

$$Z = a+b*x^{i}+c*x^{3i}+d*x^{6i}+e*x^{9i}$$

wnere:

Pd	=	6150 psig	x	=	P/Pd
a	=	9.96862813339E-01	i	=	0.6
b	=	-1.02830155525E-01			
c	=	-2.30694317023E-01			
d	=	9.43525539771E-01			
e	=	-4.36863880559E-01			

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TABLE 10

DEPLETION STUDY OF RESERVOIR FLUID AT 259 F

I-Molecular composition of produced well stream (mole percent)

Pressure (psig)	3105	2260	1050	575	205
Nitrogen	0.08	0.08	0.08	0.08	0.08
Carbon dioxide	2.84	2.88	2.99	3.05	3.02
Hydrocarbons:					
Methane	80.49	80.78	79.33	77.06	69.18
Ethane	7.94	8.05	8.64	9.26	10.89
Propane	3.19	3.23	3.57	4.05	5.70
I - Butane	0.65	0.65	0.73	0.87	1.45
N - Butane	1.29	1.29	1.45	1.75	2.95
I - Pentane	0.49	0.47	0.52	0.64	1.17
N - Pentane	0.58	0.55	0.60	0.74	1.33
Hexanes	0.70	0.58	0.71	0.85	1.31
Heptanes plus	1.75	1.44	1.38	1.65	2.92
TOTAL	100.00	100.00	100.00	100.00	100.00
Molecular weight	22.796	22.300	22.710	23.692	27.691
Gravity (Air=1)	0.787	0.769	0.784	0.818	0.956
Viscosity (cp)	0.0193	0.0171	0.0144	0.0132	0.0117
Molecular weight of Heptanes +	132.2	127.9	129.4	129.9	135.7

II-Liquid content of produced well stream (g.p.M)

Propane plus	3.172	2.914	3.147	3.726	6.119
Butanes plus	2.297	2.029	2.169	2.616	4.557
Pentanes plus	1.681	1.413	1.476	1.783	3.159

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WELL : 1/9-6 DST#4

TABLE 9

DEPLETION STUDY OF RESERVOIR FLUID AT 259 F

I-Molecular composition of produced well stream (mole percent)

Pressure (psig)	6150	5745	5200	4600	3820
Nitrogen	0.08	0.08	0.08	0.08	0.08
Carbon dioxide	2.70	2.76	2.75	2.83	2.84
Hydrocarbons:					
Methane	74.97	76.03	77.79	78.90	79.93
Ethane	7.72	7.84	7.76	7.83	7.86
Propane	3.20	3.23	3.20	3.20	3.21
I - Butane	0.68	0.68	0.67	0.67	0.66
N - Butane	1.41	1.40	1.39	1.38	1.32
I - Pentane	0.59	0.58	0.55	0.54	0.50
N - Pentane	0.73	0.70	0.67	0.65	0.61
Hexanes	1.03	0.97	0.89	0.83	0.73
Heptanes plus	6.89	5.73	4.25	3.09	2.26
TOTAL	100.00	100.00	100.00	100.00	100.00
Molecular weight	30.546	28.786	26.481	24.798	23.513
Gravity (Air=1)	1.054	0.993	0.914	0.856	0.811
Viscosity (cp)	0.0327	0.0301	0.0269	0.0242	0.0214
Molecular weignt of Heptanes +	152.7	150.1	145.4	140.5	135.3

II-Liquid content of produced well stream (g.p.M)

Propane plus	6.935	6.086	4.988	4.169	3.535
Butanes plus	6.058	5.201	4.112	3.292	2.656
Pentanes plus	5.394	4.540	3.457	2.641	2.026

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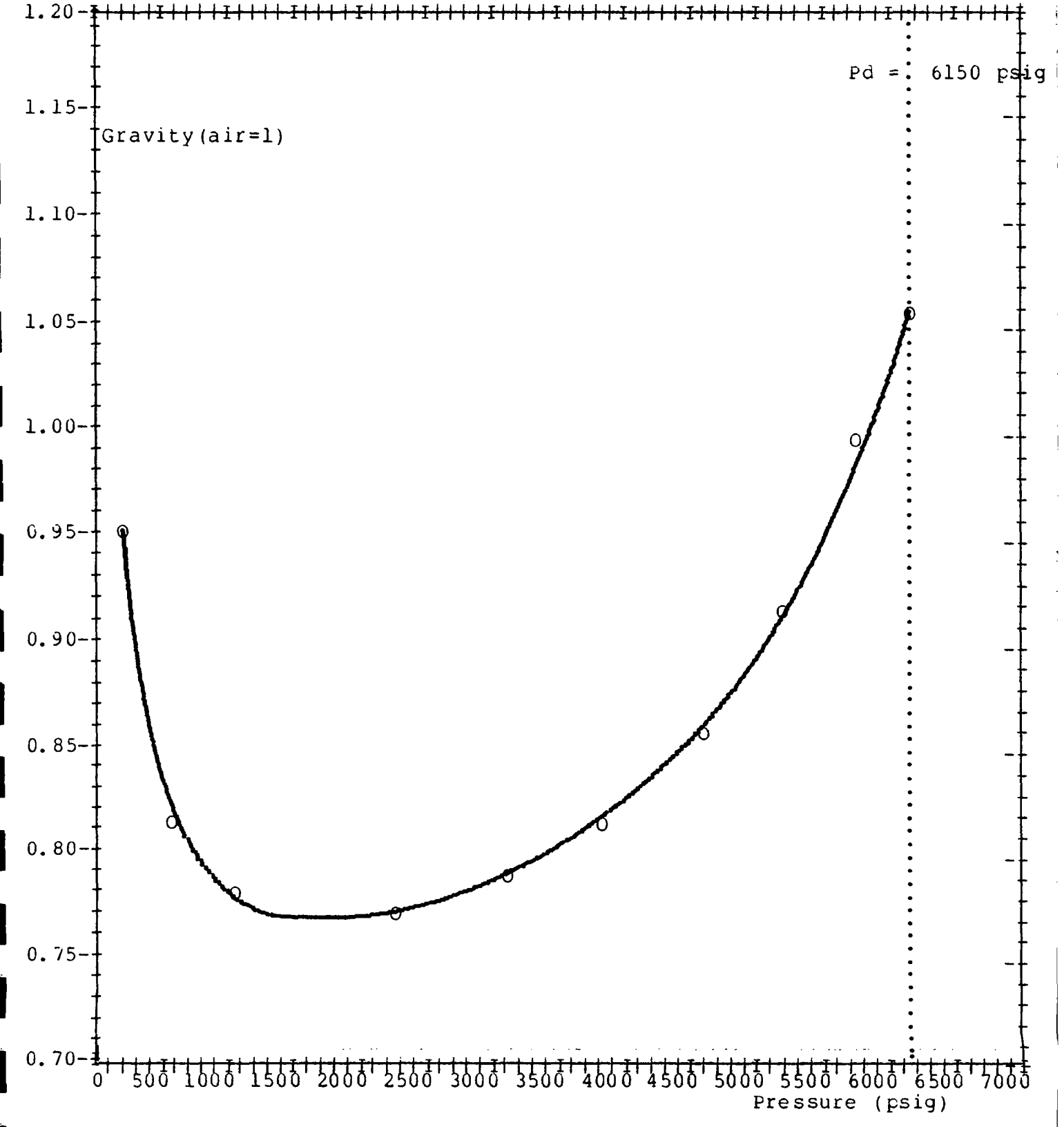
WELL : 1/9-6 DST#4

DEPLETION STUDY OF RESERVOIR FLUID AT 259 F

Produced well stream gravity



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COMPANY : STATOIL

WELL : 1/9-6 DST#4

DEPLETION STUDY OF RESERVOIR FLUID AT 259 F

Produced well stream gravity

For 205 <= P <= Pd

$$dg\ (air=1) = (a*x^2+b*x+c)/(d*x^2+e*x+1)$$

where:

Pd	=	6150 psig	x = P/Pd
a	=	-1.55920979303E 01	
b	=	2.53656476937E 01	
c	=	1.30099782544E 00	
d	=	-2.82859143839E 01	
e	=	3.77925408533E 01	

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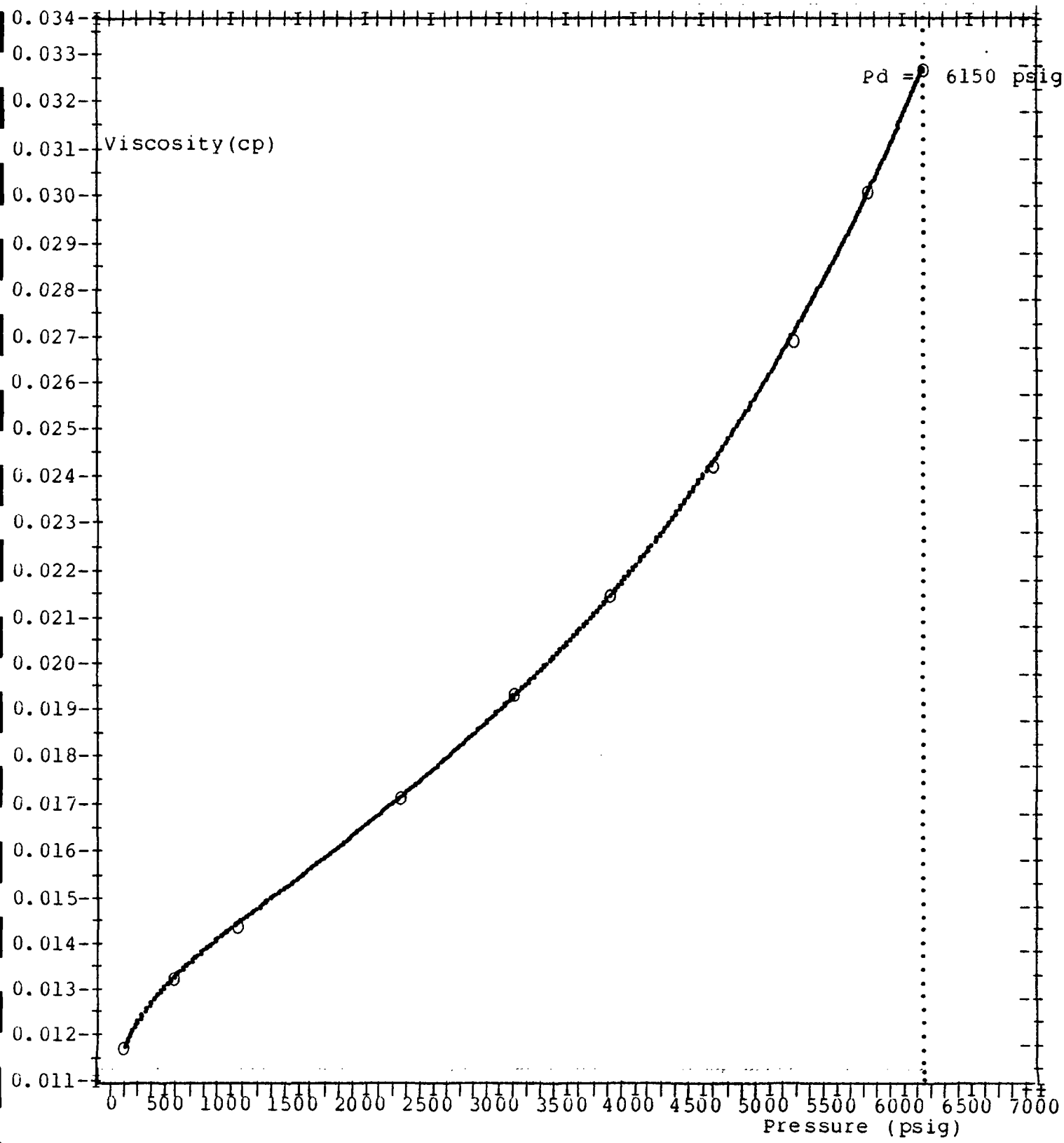
WELL : 1/9-6 DST#4

DEPLETION STUDY OF RESERVOIR FLUID AT 259 F

Produced well stream viscosity



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DEPLETION STUDY OF RESERVOIR FLUID AT 259 F

Produced well stream viscosity

For 205 <= P <= Pd

$$ng\ (cp) = a+b*x^{i}+c*x^{j}+d*x^{k}$$

where:

Pd	=	6150 psig	x	=	P/Pd
a	=	-4.95944842976E-04	i	=	0.1
b	=	1.70622433124E-02	j	=	1.6
c	=	1.02151121936E-02	k	=	4
d	=	5.89492777259E-03			

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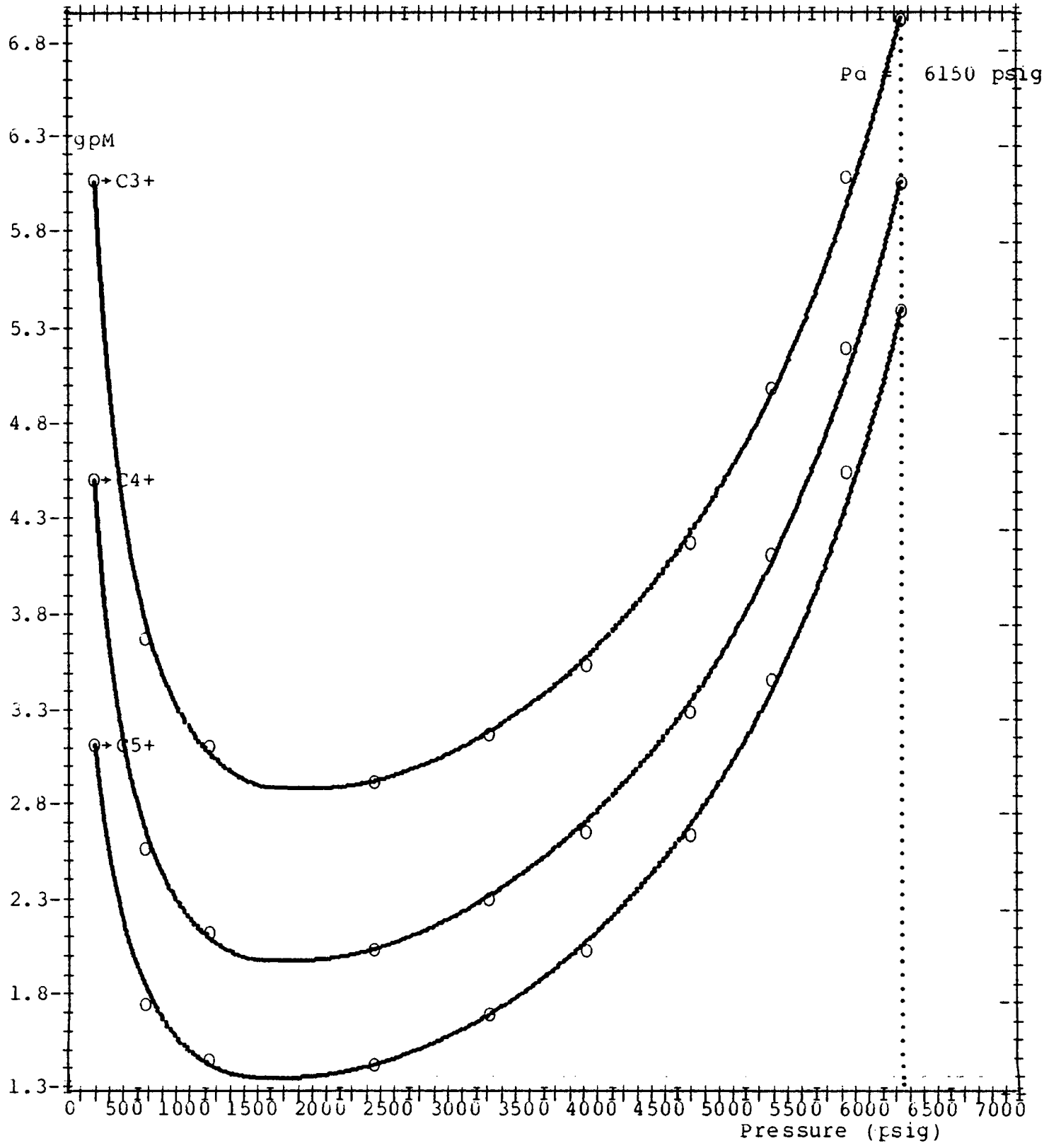
DEPLETION STUDY OF RESERVOIR FLUID AT 259 F

Liquid content of produced well stream



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DEPLETION STUDY OF RESERVOIR FLUID AT 259 F

Liquid content of produced well stream

gpM - propane plus

For 205 <= P <= Pd

$$gpM = (a*x^2+b*x+c)/(d*x^2+e*x+1)$$

where:

Pd	=	6150 psig	x = P/Pd
a	=	1.52260536733E 01	
b	=	7.45150633204E 01	
c	=	1.38744015735E 01	
d	=	-3.75963957960E 01	
e	=	5.15379822665E 01	

gpM - butanes plus

For 205 <= P <= Pd

$$gpM = (a*x^2+b*x+c)/(d*x^2+e*x+1)$$

where:

Pd	=	6150 psig	x = P/Pd
a	=	3.71209025657E 01	
b	=	3.23655928127E 01	
c	=	1.02972382197E 01	
d	=	-3.41321631159E 01	
e	=	4.63025677366E 01	

gpM - pentanes plus

For 205 <= P <= Pd

$$gpM = (a*x^2+b*x+c)/(d*x^2+e*x+1)$$

where:

Pd	=	6150 psig	x = P/Pd
a	=	3.49068451686E 01	
b	=	7.50988238580E 00	
c	=	6.23535635896E 00	
d	=	-2.47662031723E 01	
e	=	3.27860316832E 01	

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WELL : 1/9-6 DST#4

TABLE 11

DEPLETION STUDY OF RESERVOIR FLUID AT 259 F

Molar composition of produced well stream up to Dodecanes plus

Pressure (psig)	6150	5745	5200	4600	3820
Nitrogen	0.08	0.08	0.08	0.08	0.08
Carbon dioxide	2.70	2.76	2.75	2.83	2.84
Hydrocarbons:					
Methane	74.97	76.03	77.79	78.90	79.93
Ethane	7.72	7.84	7.76	7.83	7.86
Propane	3.20	3.23	3.20	3.20	3.21
I - Butane	0.68	0.68	0.67	0.67	0.66
N - Butane	1.41	1.40	1.39	1.38	1.32
I - Pentane	0.59	0.58	0.55	0.54	0.50
N - Pentane	0.73	0.70	0.67	0.65	0.61
Hexanes	1.03	0.97	0.89	0.83	0.73
Heptanes	1.20	1.06	0.86	0.75	0.63
Octanes	1.36	1.14	0.96	0.66	0.50
Nonanes	1.01	0.82	0.57	0.39	0.27
Decanes	0.73	0.62	0.42	0.33	0.23
Undecanes	0.51	0.44	0.34	0.26	0.21
Dodecanes plus	2.08	1.65	1.10	0.70	0.42
TOTAL	100.00	100.00	100.00	100.00	100.00
Molecular weignt	30.546	28.786	26.481	24.798	23.513
Molecular weignt of Dodecanes +	222.8	219.1	214.8	208.7	203.0

FLOPETROL JOHNSTON
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COMPANY : STATOIL

WELL : 1/9-6 DST#4

TABLE 12

DEPLETION STUDY OF RESERVOIR FLUID AT 259 F

Molar composition of produced well stream up to Dodecanes plus

Pressure (psig)	3105	2260	1050	575	205
Nitrogen	0.08	0.08	0.08	0.08	0.08
Carbon dioxide	2.84	2.88	2.99	3.05	3.02
Hydrocarbons:					
Methane	80.49	80.78	79.33	77.06	69.18
Ethane	7.94	8.05	8.64	9.26	10.89
Propane	3.19	3.23	3.57	4.05	5.70
I - Butane	0.65	0.65	0.73	0.87	1.45
N - Butane	1.29	1.29	1.45	1.75	2.95
I - Pentane	0.49	0.47	0.52	0.64	1.17
N - Pentane	0.58	0.55	0.60	0.74	1.33
Hexanes	0.70	0.58	0.71	0.85	1.31
Heptanes	0.54	0.49	0.50	0.55	0.76
Octanes	0.39	0.31	0.28	0.33	0.50
Nonanes	0.19	0.14	0.13	0.18	0.46
Decanes	0.17	0.14	0.13	0.17	0.40
Undecanes	0.16	0.14	0.14	0.17	0.27
Dodecanes plus	0.30	0.22	0.20	0.25	0.53
TOTAL	100.00	100.00	100.00	100.00	100.00
Molecular weight	22.796	22.300	22.710	23.692	27.691
Molecular weignt of Dodecanes +	197.2	190.5	190.7	191.0	197.1

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COMPANY : STATOIL

WELL : 1/9-6 DST#4

TABLE 13

DEPLETION STUDY OF RESERVOIR FLUID AT 259 F

Cumulative liquid recovery (g.p.M. of initial reservoir fluid)

Pressure (psig)	cumulative produced fluid (mole percent of initial fluid)	Cumulative liquid recovery (g.p.M.)		
		propane plus	butanes plus	pentanes plus
Pd = 6150	0.00	6.935 (1)	6.058 (1)	5.394 (1)
5745	3.48	0.212	0.181	0.158
5200	8.77	0.476	0.398	0.341
4600	15.61	0.761	0.624	0.521
3820	26.29	1.138	0.907	0.738
3105	37.82	1.504	1.172	0.932
2260	53.11	1.950	1.482	1.148
1050	76.73	2.693	1.995	1.496
575	85.76	3.029	2.231	1.657
205	92.72	3.455	2.548	1.877

(1) Total initial liquid in place (g.p.M.)

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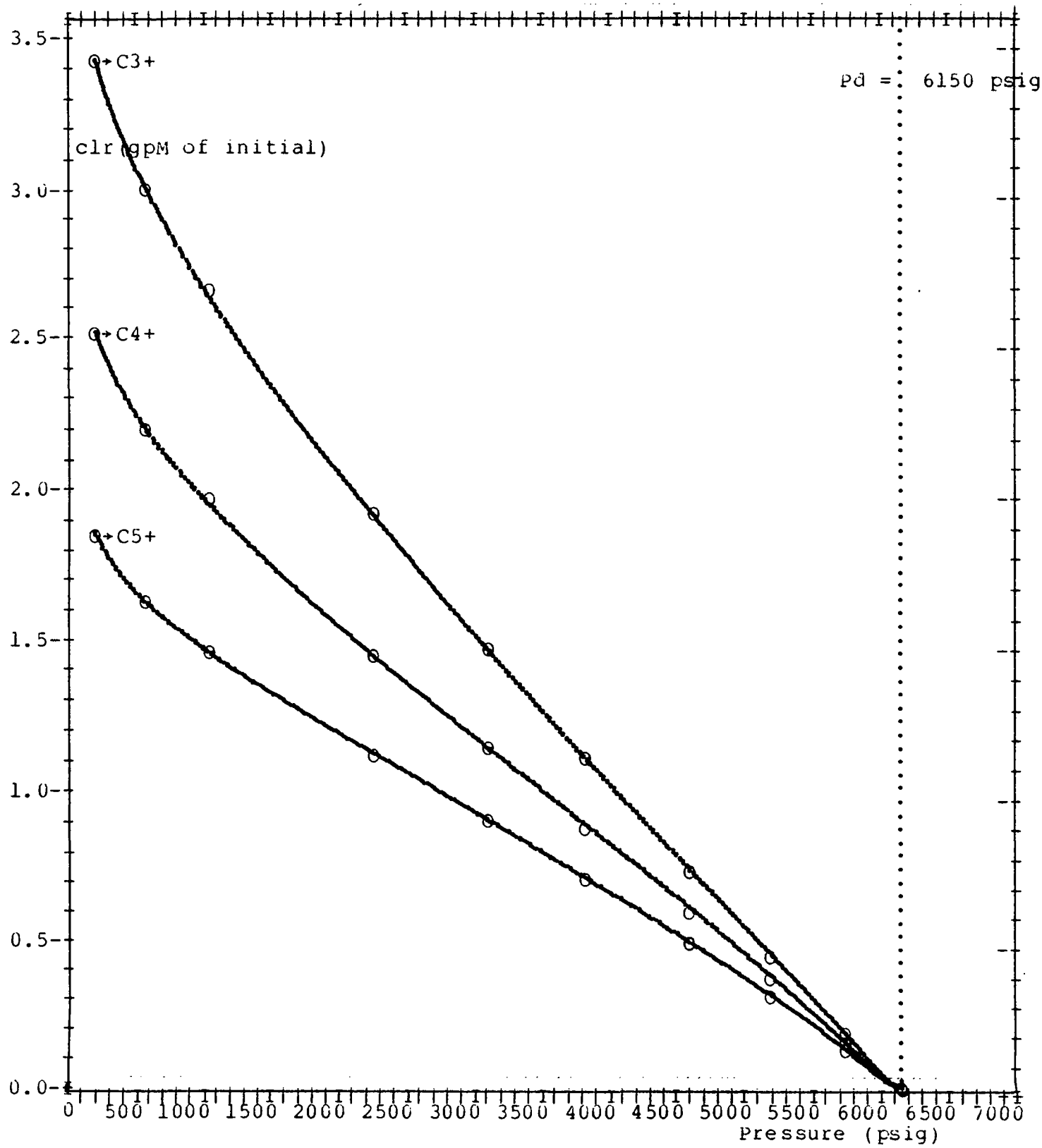
DEPLETION STUDY OF RESERVOIR FLUID AT 259 F

Cumulative liquid recovery



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WELL : 1/9-6 DST#4

DEPLETION STUDY OF RESERVOIR FLUID AT 259 F

Cumulative liquid recovery (g.p.M. of initial reservoir fluid)

Cumulative liquid recovery - propane plus

For 205 <= P <= Pd

clr (gpM of initial) = $a+b*x^i+c*x^j+d*x^k$

where:

Pd =	6150 psig	x	= P/Pd
a =	6.09673165958E 00	i	= 0.1
b =	-3.59688494514E 00	j	= 1.0
c =	-2.45416361328E 00	k	= 12
d =	-4.56831011354E-02		

Cumulative liquid recovery - butanes plus

For 205 <= P <= Pd

clr (gpM of initial) = $a+b*x^i+c*x^j+d*x^k$

where:

Pd =	6150 psig	x	= P/Pd
a =	4.80818568617E 00	i	= 0.1
b =	-3.12576552504E 00	j	= 1.1
c =	-1.50642978382E 00	k	= 5
d =	-1.75990377313E-01		

Cumulative liquid recovery - pentanes plus

For 205 <= P <= Pd

clr (gpM of initial) = $a+b*x^i+c*x^j+d*x^k$

where:

Pd =	6150 psig	x	= P/Pd
a =	3.68133393423E 00	i	= 0.1
b =	-2.52575673501E 00	j	= 1.5
c =	-1.08951823618E 00	k	= 11
d =	-6.60589630461E-02		

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WELL : 1/9-6 DST#4

TABLE 14

DEPLETION STUDY OF RESERVOIR FLUID AT 259 F

Flasn of remaining liquid from 205 psig to atmospheric conditions

(molecular composition of gas free liquid)

Components	Mole percent
Methane	0.00
Etnane	0.58
Propane	1.26
I - Butane	0.63
N - Butane	2.00
I - Pentane	1.62
N - Pentane	2.34
Hexanes	5.38
Heptanes	9.10
Octanes	13.32
Nonanes	11.91
Decanes	9.71
Undecanes	7.52
Dodecanes plus	34.63
TOTAL	100.00

Molecular weight of gas free liquid : 152

Molecular weight of Dodecanes plus in gas free liquid : 224

Specific gravity of gas free liquid : 0.808 (60/60 F)

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WELL : 1/9-6 DST 4

TABLE 15

COMPOSITION IN WEIGHT PERCENT

COMPONENTS	STOCK TANK LIQUID	EVOLVED GAS	SEPARATOR GAS
Nitrogen		0.00	0.13
Carbon Dioxide		4.85	6.53
HYDROCARBONS			
Methane		25.70	68.54
Ethane	0.13	17.39	11.79
Propane	0.56	16.43	6.20
I - Butane	0.45	6.04	1.38
N - Butane	1.53	11.87	2.50
I - Pentane	1.62	5.19	0.84
N - Pentane	2.38	5.33	0.88
Hexanes	5.72	4.52	0.74
Heptanes	9.35	2.24	0.30
Octanes	12.79	0.44	0.17
Nonanes	10.92		
Decanes	8.69		
Undecanes	6.76		
Dodecanes plus	39.10		
TOTAL	100.00	100.00	100.00
Molecular weight	134.5	31.290	19.759
Gravity	0.785 60/60 °F	1.080 (Air = 1)	0.682
Molecular weight of Dodecanes plus in STL	222.8		

TABLE 16

GRAVITY AND MOLECULAR WEIGHT DATA USED IN CALCULATIONS

	Molecular weight	Density
Hexanes	86.178	0.6649
Heptanes	100.205	0.6883
Octanes	114.232	0.7069
Nonanes	128.259	0.7220
Decanes	142.286	0.7343
Undecanes	156.313	0.7444
Dodecanes plus	223.000	0.9830

Note : As our condensate analyses are obtained directly by gas chromatography, all the above values are paraffin constants from literature up to C plus. The C plus molecular weight is calculated from chromatographic analysis and is consistent. But we point out that the C plus density is calculated by substracting all C minus components from total density. As the standard composition is given with all components assumed to be paraffins, which is obviously not the case (because of aromatic and naphthen contents), this value is not used for any calculation and is not given in our standard report.

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COMPANY : STATOIL

WELL : 1/9-6 DST 4

SUMMARY AND MAIN RESULTS (S.I. UNITS)

The initial reservoir conditions are :

- Pi : 487 bars
- T : 126 °C

Dew point pressure determined on sample which was selected for complete P.V.T. study is :

- Pd : 424 bars
- Z at Pd : 1.170
- Specific volume at Pd : 0.00299 m^3/kg

NOMENCLATURE

P	:	Pressure
V	:	Volume
T	:	Temperature
Pi	:	Initial static pressure
Pb	:	Bubble point pressure
Pd	:	Dew point pressure
Vr=V/V Pb	:	Relative volume (oil reservoir fluid)
Vr=V/V Pd	:	Relative volume (gas reservoir fluid)
$c = -\frac{1}{V}\times\frac{dV}{dP}$	:	Compressibility factor of reservoir fluid
$\alpha = \frac{1}{V}\times\frac{dV}{dT}$	:	Thermal expansion of reservoir fluid
$Y = \frac{Pb/P-1}{Vr-1}$	:	Dimensionless compressibility function
Bo	:	Oil formation volume factor
Rs	:	Solution gas oil ratio
Z	:	Gas compressibility factor or gas deviation factor
Bg	:	Gas formation volume factor
do	:	Reservoir oil density
Go	:	Residual oil gravity
G	:	Gas gravity (Air=1)
sto	:	Stock tank oil
GOR	:	Gas oil ratio
GLR	:	Gas liquid ratio
WOR	:	Water liquid ratio
Shrinkage factor	:	Oil volume at standard conditions / Oil volume at separator conditions
$Z = \frac{PV}{nRT}$	:	n=Total moles of a mixture in the gas state R=Universal gas constant (per mole)
gpM	:	Gallons per thousand standard cubic feet
Standard conditions	:	For gas volumes =60 F and 14.7 psia
	:	For oil measurements=60 F and atmospheric pressure

Gross heat content is calculated from API research project 44
Molecular weights,densities,critical values are from CRC Handbook of chemistry and physics
Gas viscosity is calculated with equations from Standing (Behavior of oil field hydrocarbon systems)