LOPETROL JC

P.V.T.STUDY REPORT

Client:STATOIL
Field :TOMMELITEN Well : 1/9-6 DST 3A
Zone :TOR Samp. date:19/10/82

Report #:84MEL012 Date: FEBRUARY 1984

PVT

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MELUN LABORATORY

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COMPANY : STATOIL

WELL : 1/9-6 DST 3A

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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 3A

The initial reservoir conditions are :

- Pi : 7020 psig
- T : 264 F

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

- Pd : 6845 psig at 264 F
- Z at Pd : 1.156
- Specific volume at Pd : 0.0415 cu ft/pound

For an abandonment pressure of 240 psig, the cumulative liquid recovery will be :

- 46.21 % of propane plus in place
- 37.90 % of butanes plus in place
- 30.65 % 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	:	TOR
Static pressure	:	7020 psig
Bottom hole temperature	:	264 F
Tubing diameter	:	5"/3 1/2"
Casing size	:	7"
Casing shoe	:	12865´

II. SAMPLING CONDITIONS

A) SURFACE SAMPLE(S)

Date	:	19/10/82
Choke	:	20/64"
Flowing bottom hole pressure	:	N/A
Well head pressure	:	4714 psig
Separator pressure	:	960 psig
Well head temperature	:	63 F
Separator temperature	:	111 F
Gas rate (Separator)	:	8.555 MMscf/D (average)
Stock tank temperature	:	N/A
Compressibility factor	:	0.870
Gas gravity	:	0.689 (air=1)
Liquid rate (Separator)	:	1463 bbl/D (average)
G.L.R.	:	5848 scf/bbl
Sample(s) received	:	gas A13191 , A13206
		liq.1116/359

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 1116/359

Bubble point pressure determination at 111 F is 895 psig

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TABLE 2

BUBBLE POINT PRESSURE DETERMINATION AT 111 F

Separator liquid sample (cylinder 1116/359)

Pressure (psig)	Pump reading (cm3)
3000	277.86
2500	277.39
2000	276.94
1500	276.45
1000	275.94
Pb = 895	275.85
877	274.87
840	272.77
779	268.73
700	261.90

FLASH OF SEPARATOR LIQUID TO STOCK TANK CONDITIONS

GLR	:	414 Std cu ft/Std bbl
Shrinkage factor	:	0.795 Std bbl/bbl
Liberated gas gravity	:	1.115 (Air = 1)
Stock tank liquid gravity	:	0.796 60/60 F

This sample has been used for recombination

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BUBBLE POINT PRESSURE DETERMINATION AT iii F

Separator liquid sample (cylinder 1116/359)

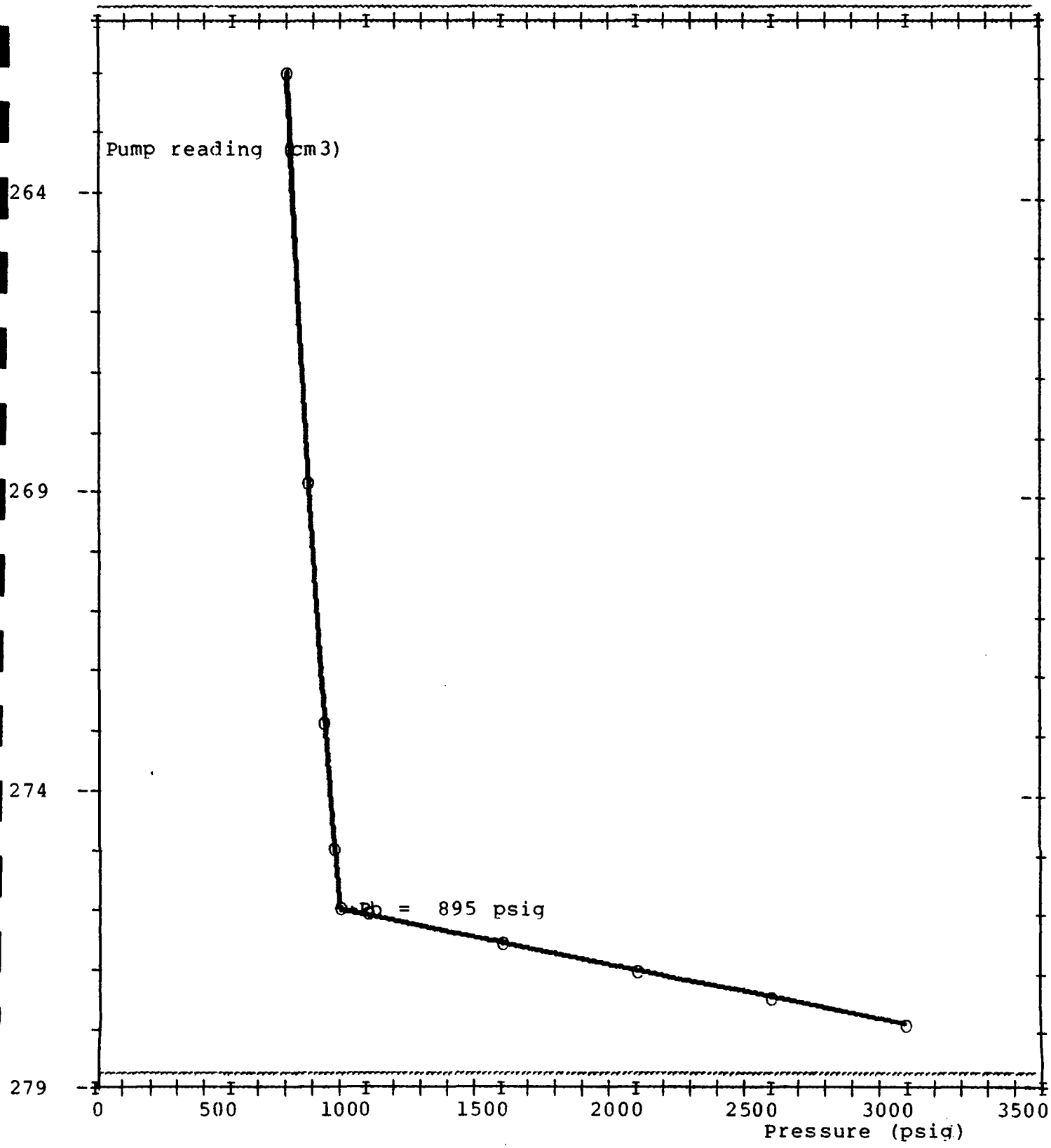

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TABLE 3

MOLECULAR COMPOSITION OF FIELD SEPARATOR GAS(ES)

I-Molecular composition (mole percent)

Components	Cylinder A13191	Cylinder A13206
Nitrogen	0.06	0.23
Carbon dioxide	3.35	3.71
Hydrocarbons:		
Methane	83.05	82.50
Ethane	7.81	7.77
Propane	3.16	3.16
I - Butane	0.53	0.53
N - Butane	0.98	0.99
I - Pentane	0.29	0.29
N - Pentane	0.30	0.31
Hexanes	0.24	0.25
Heptanes plus	0.23	0.26
TOTAL	100.00	100.00
Molecular weight	20.310	20.472
Gravity (Air=1)	0.701	0.706
Molecular weight of heptanes plus	105.7	106.7

II-Liquid content (g.p.M)

Propane plus	1.769	1.795
Butanes plus	0.903	0.929
Pentanes plus	0.422	0.445

The cylinder A13191 has been used for recombination

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TABLE 4

RECOMBINATION OF SEPARATOR SAMPLES

I. FLASH OF SEPARATOR LIQUID TO STOCK TANK CONDITIONS

G.L.R.	: 414	Std cu ft/Std bbl
Shrinkage factor	: 0.795	Std bbl/bbl
Liberated gas gravity	: 1.115	(Air=1)
Stock tank liquid gravity	: 0.796	60/60 F

II. CORRECTION OF GAS LIQUID RATIO

Field G.L.R. : 5848 Std cu ft/bbl

Separator gas gravity (from chromatographic analysis)

G lab. : 0.701 (Air=1)

Compressibility factor Z at separator conditions

Z lab. : 0.867

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

$$\text{Corrected G.L.R.} : 5848 \sqrt{\frac{0.689 \times 0.870}{0.701 \times 0.867}} = 5807 \text{ Std cu ft /bbl}$$

III. PHYSICAL RECOMBINATION

Surface samples were physically recombined in the ratio of 5807 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	3.46	1.22
Hydrocarbons:			
Methane	0.00	48.81	17.16
Ethane	0.00	16.10	5.66
Propane	1.70	13.72	5.93
I - Butane	0.86	3.21	1.69
N - Butane	2.94	7.00	4.37
I - Pentane	2.57	2.37	2.50
N - Pentane	3.83	2.51	3.37
Hexanes	8.29	1.79	6.00
Heptanes	12.38	0.81	8.31
Octanes	15.67	0.21	10.23
Nonanes	12.04	0.01	7.81
Decanes	8.82	0.00	5.72
Undecanes	5.93	0.00	3.84
Dodecanes plus	24.97	0.00	16.19
TOTAL	100.00	100.00	100.00
Molecular weight	138.8	32.307	101.3
Gravity	0.796 60/60 F	1.115 (Air=1)	-----
Molar ratio	64.84	35.16	100.00
Mass ratio	88.79	11.21	100.00

Molecular weight of Dodecanes plus in STL: 226

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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	0.06	0.05
Carbon dioxide	1.22	3.35	3.05
Hydrocarbons:			
Methane	17.16	83.05	73.92
Ethane	5.66	7.81	7.51
Propane	5.93	3.16	3.54
I - Butane	1.69	0.53	0.69
N - Butane	4.37	0.98	1.45
I - Pentane	2.50	0.29	0.60
N - Pentane	3.37	0.30	0.73
Hexanes	6.00	0.24	1.04
Heptanes	8.31	0.15	1.28
Octanes	10.23	0.07	1.48
Nonanes	7.81	0.01	1.09
Decanes	5.72	0.00	0.79
Undecanes	3.84	0.00	0.53
Dodecanes plus	16.19	0.00	2.25
TOTAL	100.00	100.00	100.00
Molecular weight	101.3	20.310	31.6
Gravity	-----	0.701 (Air=1)	1.089 (Air=1)
Molar ratio	13.89	86.11	100.00
Mass ratio	44.58	55.42	100.00

Molecular weight of Dodecanes plus in reservoir fluid : 226

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TABLE 7

CONSTANT MASS STUDY AND DEW POINT PRESSURE DETERMINATION AT 264 F

	Pressure (psig)	Relative volume (V/V Pd)	Compressibility factor (Z =PV/nRT)	Retrograde liquid deposit (% of hydrocarbon pore space)*
	7500	0.9668	1.224	
	7330	0.9741	1.206	
Pi =	7020	0.9910	1.174	
	6882	0.9979	1.160	
Pd =	6845	1.0000	1.156	0.00
	6780	1.0051		0.49
	6640	1.0138		2.80
	6535	1.0232		5.18
	6250	1.0387		7.90
	5984	1.0623		11.36
	5542	1.1059		15.47
	5050	1.1694		18.52
	3985	1.3689		22.37
	3538	1.5018		23.51
	2830	1.8180		24.66
	2435	2.1233		24.98
	2085	2.4736		25.02
	1858	2.7830		24.77
	1701	3.0449		24.53

-Specific volume at dew point pressure = 0.04150 cu ft/pound

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

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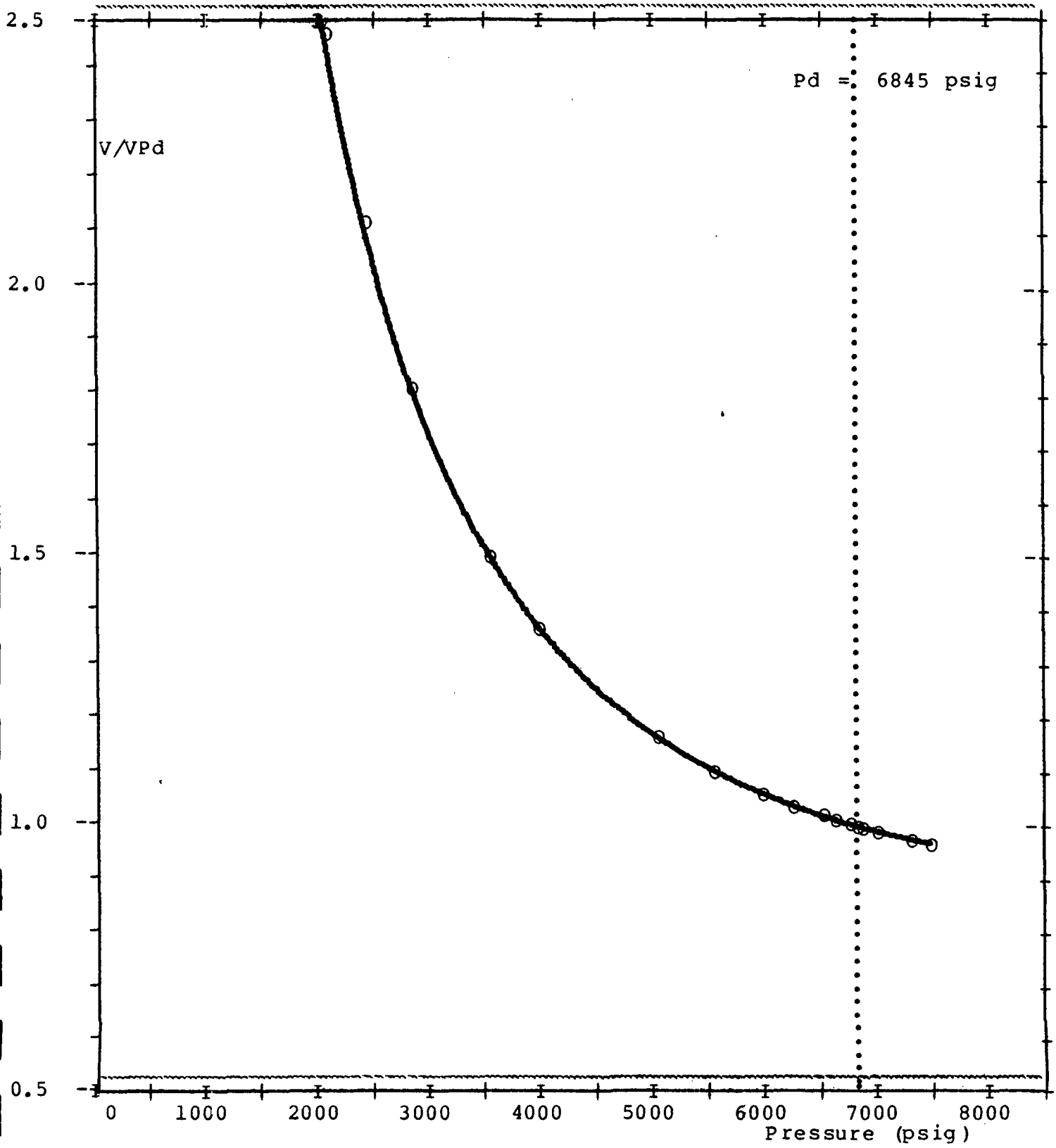
DEW-POINT-PRESSURE-DETERMINATION-AND-CONSTANT-MASS-STUDY-AT-264-F

Relative volume



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DEW POINT PRESSURE DETERMINATION AND CONSTANT MASS STUDY AT 264 F

Relative Volume

For 1701 <= P <= 7500

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

where:

Pd	=	6845 psig	x = P/Pd
a	=	-4.39067823331E 00	
b	=	-3.88739866813E 00	
c	=	-1.12564567265E 01	
d	=	-2.05357926545E 01	

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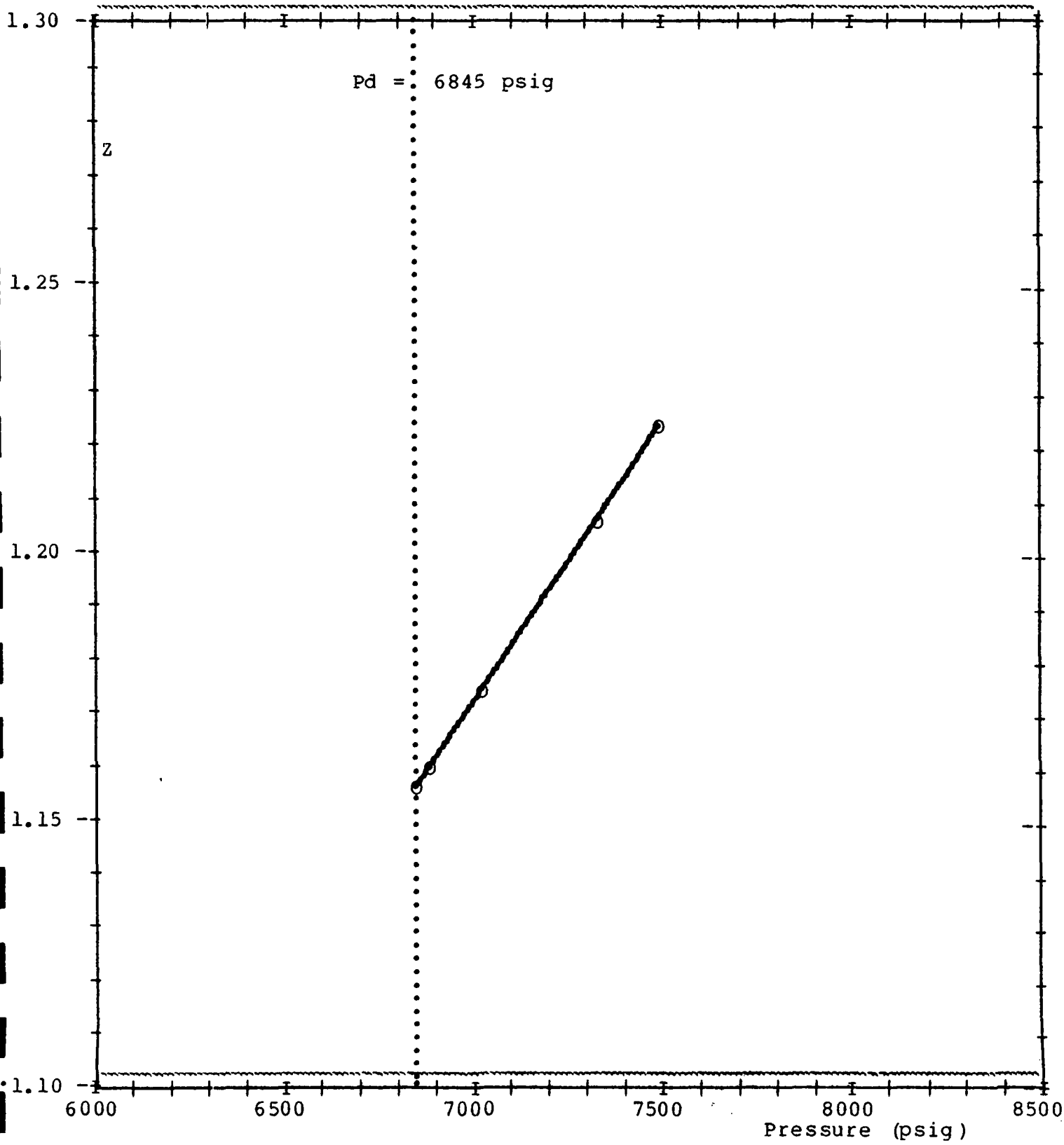
DEW POINT PRESSURE DETERMINATION AND CONSTANT MASS STUDY AT 264 F

compressibility factor



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DEW POINT PRESSURE DETERMINATION AND CONSTANT MASS STUDY AT 264 F

Compressibility factor Z

For Pd <= P <= 7500

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

where:

Pd	=	6845 psig	x = P/Pd
a	=	-6.418928455 61E-01	
b	=	2.91688469337E-01	
c	=	4.52069669249E-01	
d	=	-9.11881234401E-01	

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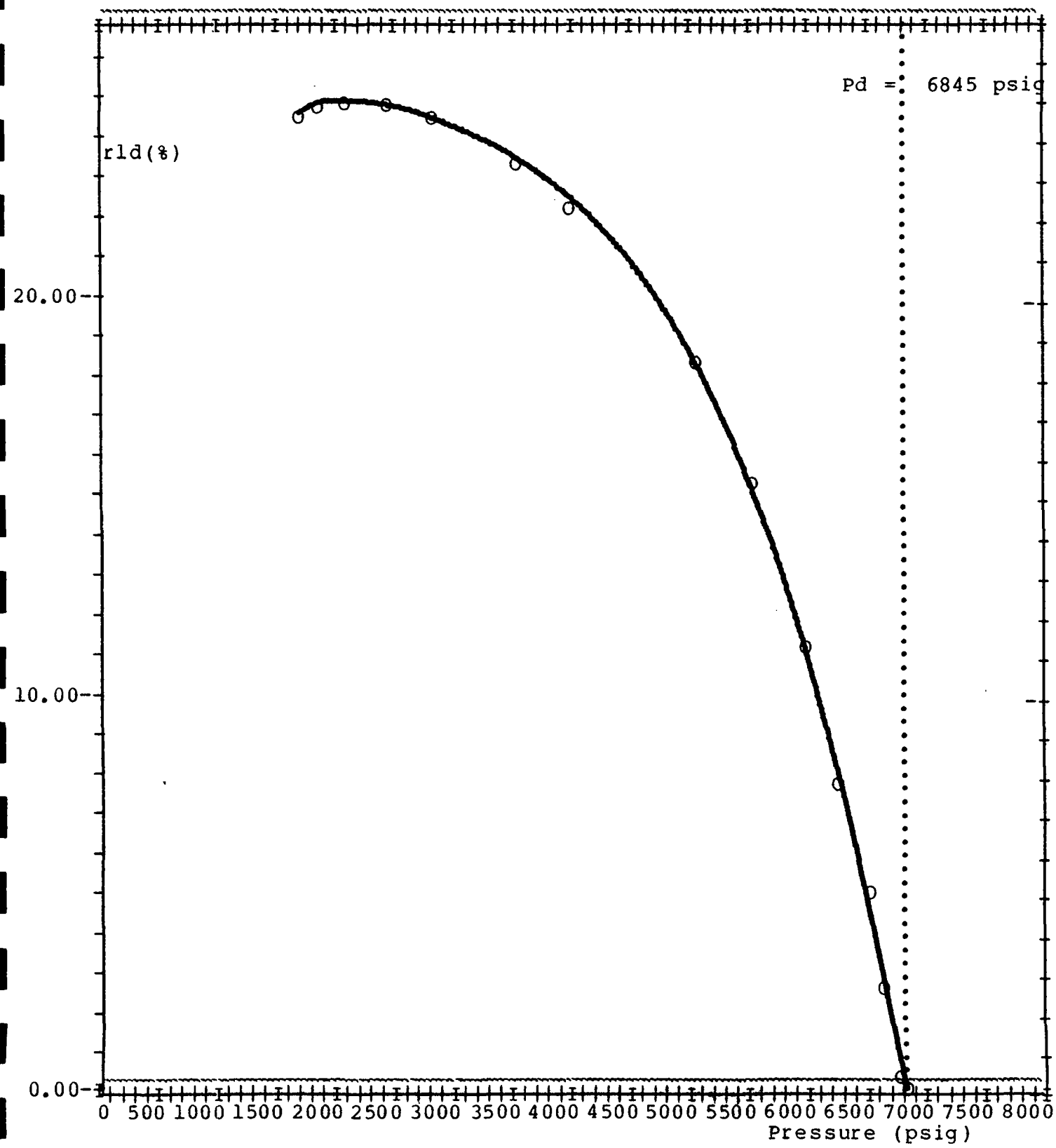
DEW POINT PRESSURE DETERMINATION AND CONSTANT MASS STUDY AT 264 F

Retrograde liquid deposit



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DEW POINT PRESSURE DETERMINATION AND CONSTANT MASS STUDY AT 264 F

Retrograde liquid deposit

For 1701 <= P <= Pd

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

where:

Pd	=	6845 psig	x	=	P/Pd
a	=	-1.77703159349E 02	i	=	0.3
b	=	5.17784903602E 02			
c	=	-6.08149016284E 02			
d	=	4.92274213716E 02			
e	=	-2.24206941684E 02			

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DEW POINT PRESSURE DETERMINATION AND CONSTANT MASS STUDY AT 264 F

Retrograde liquid deposit

For 1701 <= P <= Pd

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Pd	= 6845 psig	x	= P/Pd
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TABLE 8

DEPLETION STUDY OF RESERVOIR FLUID AT 264 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 = 6845	0.00	0.00	1.156
6250	7.43	4.29	1.110
5727	13.29	7.75	1.051
5250	16.39	11.65	1.011
4440	19.53	20.18	0.950
3745	20.83	29.20	0.922
3055	21.05	39.82	0.912
2172	20.10	55.17	0.921
1265	18.68	71.48	0.948
240	15.77	89.91	0.990

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

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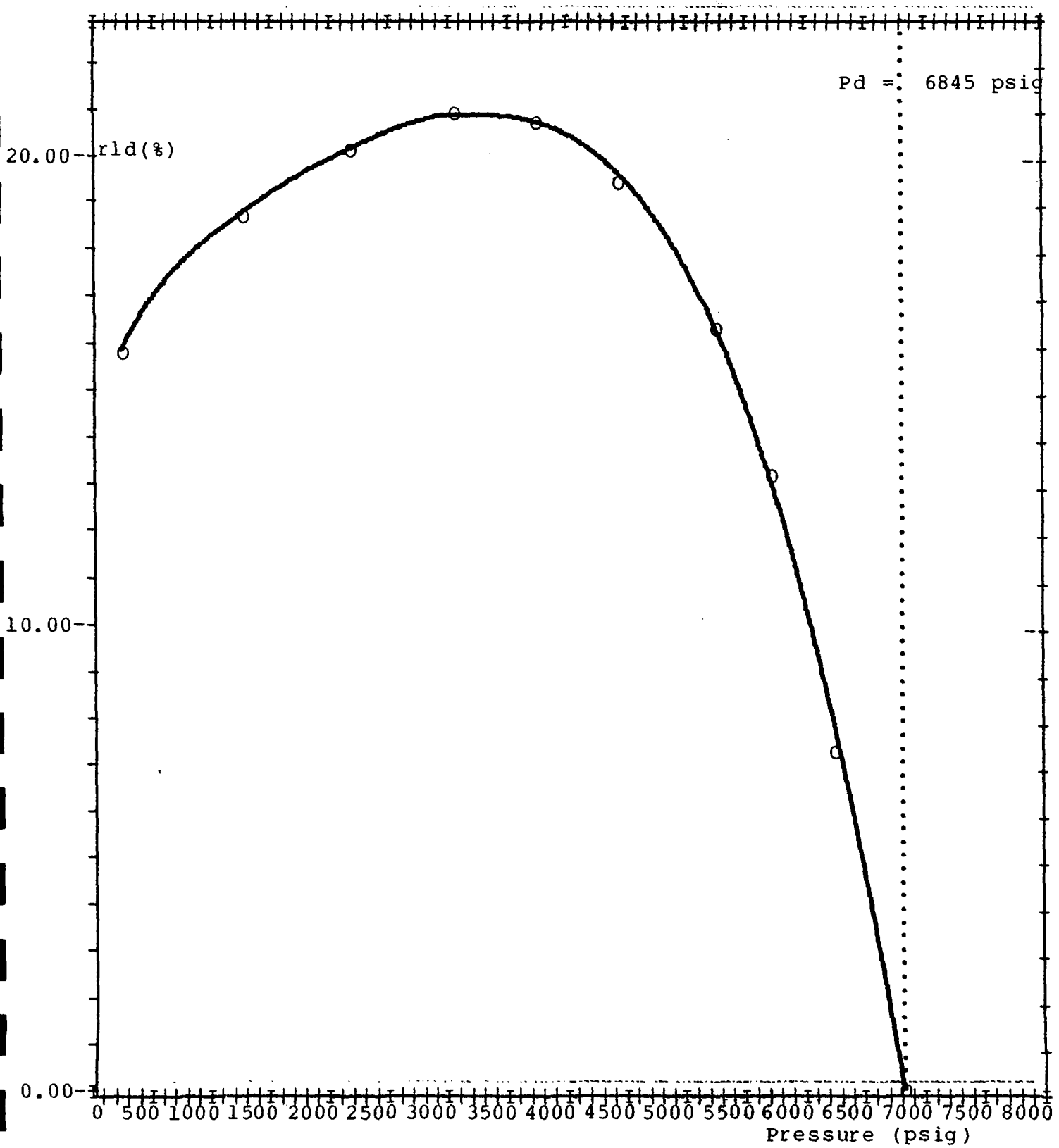
DEPLETION STUDY OF RESERVOIR FLUID AT 264 F

Retrograde liquid deposit



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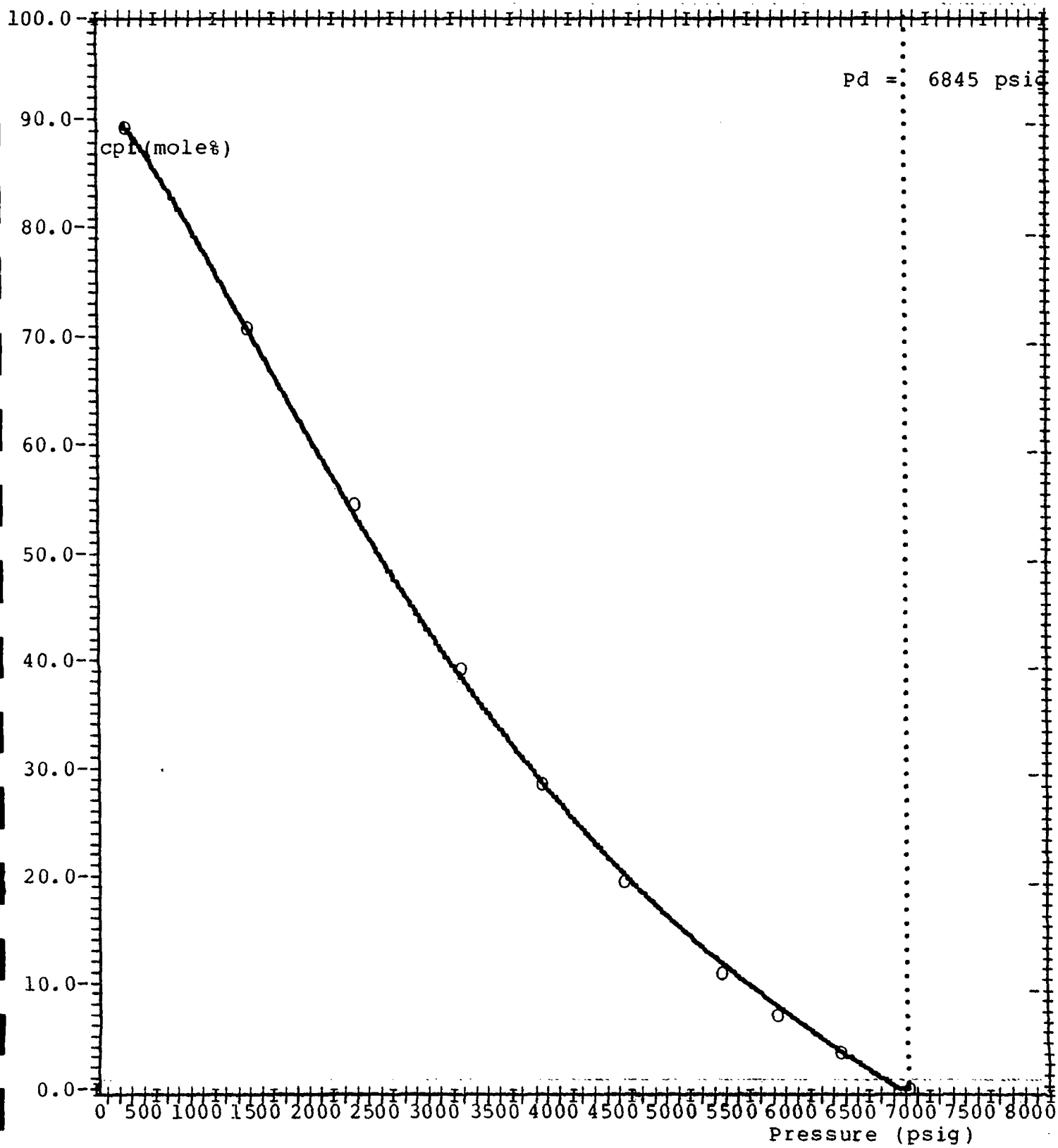
DEPLETION STUDY OF RESERVOIR FLUID AT 264 F

Cumulative produced fluid



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DEPLETION STUDY OF RESERVOIR FLUID AT 264 F

Cumulative produced fluid

For 240 <= P <= Pd

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

where:

Pd	=	6845 psig	x	=	P/Pd
a	=	9.21533118858E 01	i	=	1.6
b	=	-7.48465746340E 02	j	=	1.9
c	=	7.44727597789E 02	k	=	3
d	=	-8.84151633351E 01			

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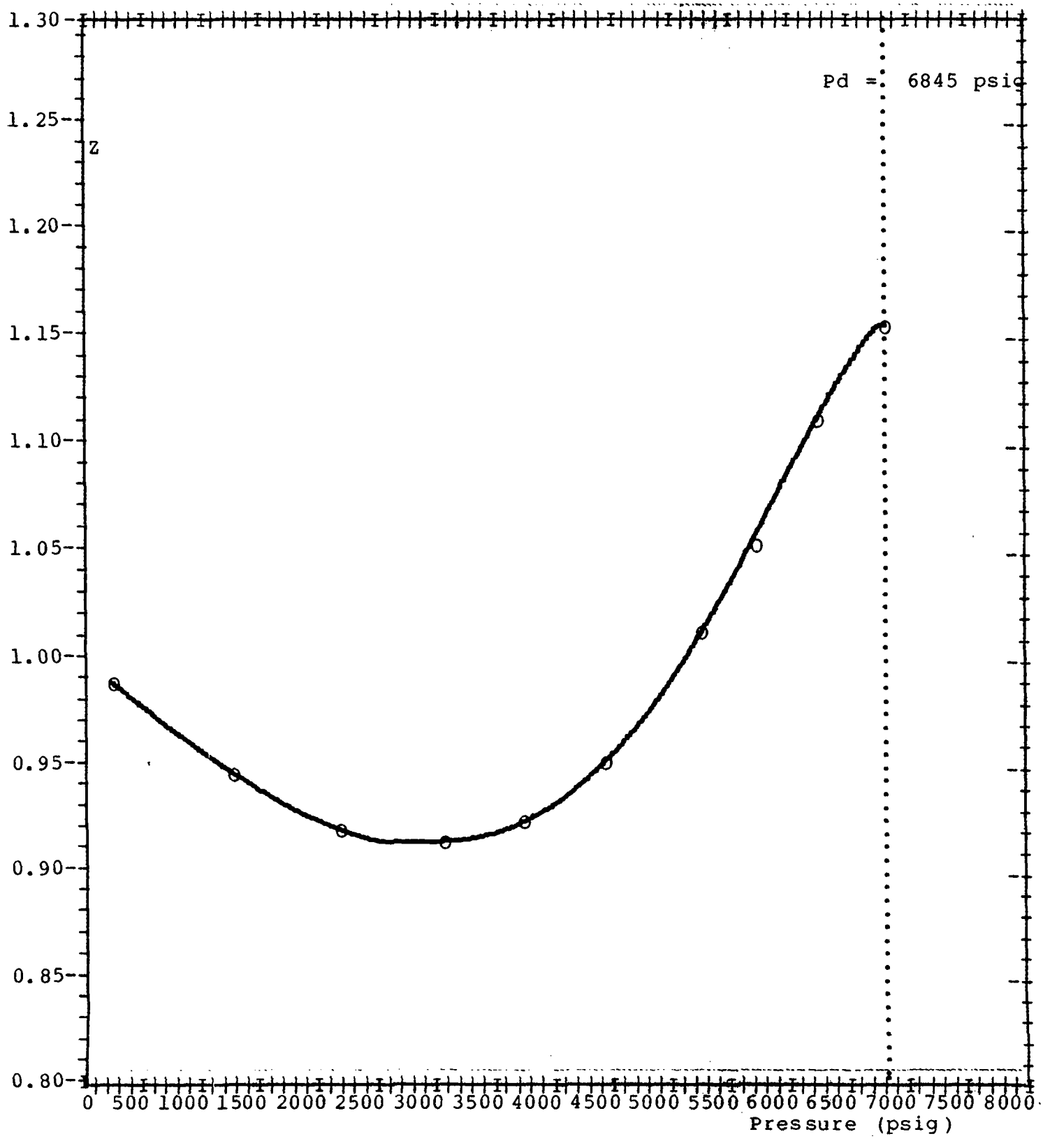
DEPLETION STUDY OF RESERVOIR FLUID AT 264 F

Produced well stream compressibility factor



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DEPLETION STUDY OF RESERVOIR FLUID AT 264 F

Produced well stream compressibility factor

For 240 <= P <= Pd

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

where:

Pd	=	6845 psig	x	=	P/Pd
a	=	1.00055322006E 00	i	=	1.0
b	=	-3.01605861947E-01			
c	=	5.03699768158E-01			
d	=	1.58035433953E-01			
e	=	-2.04427799601E-01			

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TABLE 9

DEPLETION STUDY OF RESERVOIR FLUID AT 264 F

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

Pressure (psig)	6845	6250	5727	5250	4400
Nitrogen	0.05	0.05	0.05	0.05	0.05
Carbon dioxide	3.05	3.04	3.08	3.11	3.11
Hydrocarbons:					
Methane	73.92	75.48	76.86	77.75	79.06
Ethane	7.51	7.60	7.65	7.72	7.74
Propane	3.54	3.50	3.49	3.47	3.43
I - Butane	0.69	0.70	0.67	0.67	0.65
N - Butane	1.45	1.49	1.36	1.35	1.30
I - Pentane	0.60	0.58	0.53	0.53	0.51
N - Pentane	0.73	0.68	0.64	0.61	0.59
Hexanes	1.04	0.94	0.83	0.76	0.67
Heptanes plus	7.42	5.94	4.84	3.98	2.89
TOTAL	100.00	100.00	100.00	100.00	100.00
Molecular weight	31.547	29.249	27.487	26.216	24.457
Gravity (Air=1)	1.089	1.009	0.948	0.905	0.844
Viscosity (cp)	0.0354	0.0318	0.0289	0.0266	0.0233
Molecular weight of Heptanes +	153.8	151.0	148.9	147.1	140.0

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

Propane plus	7.429	6.330	5.451	4.827	3.976
Butanes plus	6.459	5.371	4.494	3.876	3.036
Pentanes plus	5.779	4.675	3.849	3.234	2.417

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TABLE 10

DEPLETION STUDY OF RESERVOIR FLUID AT 264 F

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

Pressure (psig)	3745	3055	2172	1265	240
Nitrogen	0.05	0.05	0.04	0.04	0.04
Carbon dioxide	3.12	3.12	3.16	3.16	3.39
Hydrocarbons:					
Methane	79.92	80.48	80.82	79.64	71.65
Ethane	7.82	7.83	7.93	8.26	10.63
Propane	3.41	3.41	3.41	3.75	5.92
I - Butane	0.64	0.64	0.63	0.71	1.22
N - Butane	1.28	1.28	1.28	1.50	2.52
I - Pentane	0.47	0.46	0.44	0.54	0.90
N - Pentane	0.53	0.54	0.51	0.60	0.99
Hexanes	0.63	0.59	0.57	0.64	0.91
Heptanes plus	2.13	1.60	1.21	1.16	1.83
TOTAL	100.00	100.00	100.00	100.00	100.00
Molecular weight	23.321	22.549	22.016	22.341	25.411
Gravity (Air=1)	0.805	0.778	0.760	0.771	0.877
Viscosity (cp)	0.0210	0.0191	0.0169	0.0149	0.0122
Molecular weight of Heptanes +	135.0	127.9	121.8	117.8	124.8

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

Propane plus	3.412	3.044	2.769	3.011	4.872
Butanes plus	2.478	2.109	1.835	1.984	3.249
Pentanes plus	1.867	1.499	1.228	1.282	2.061

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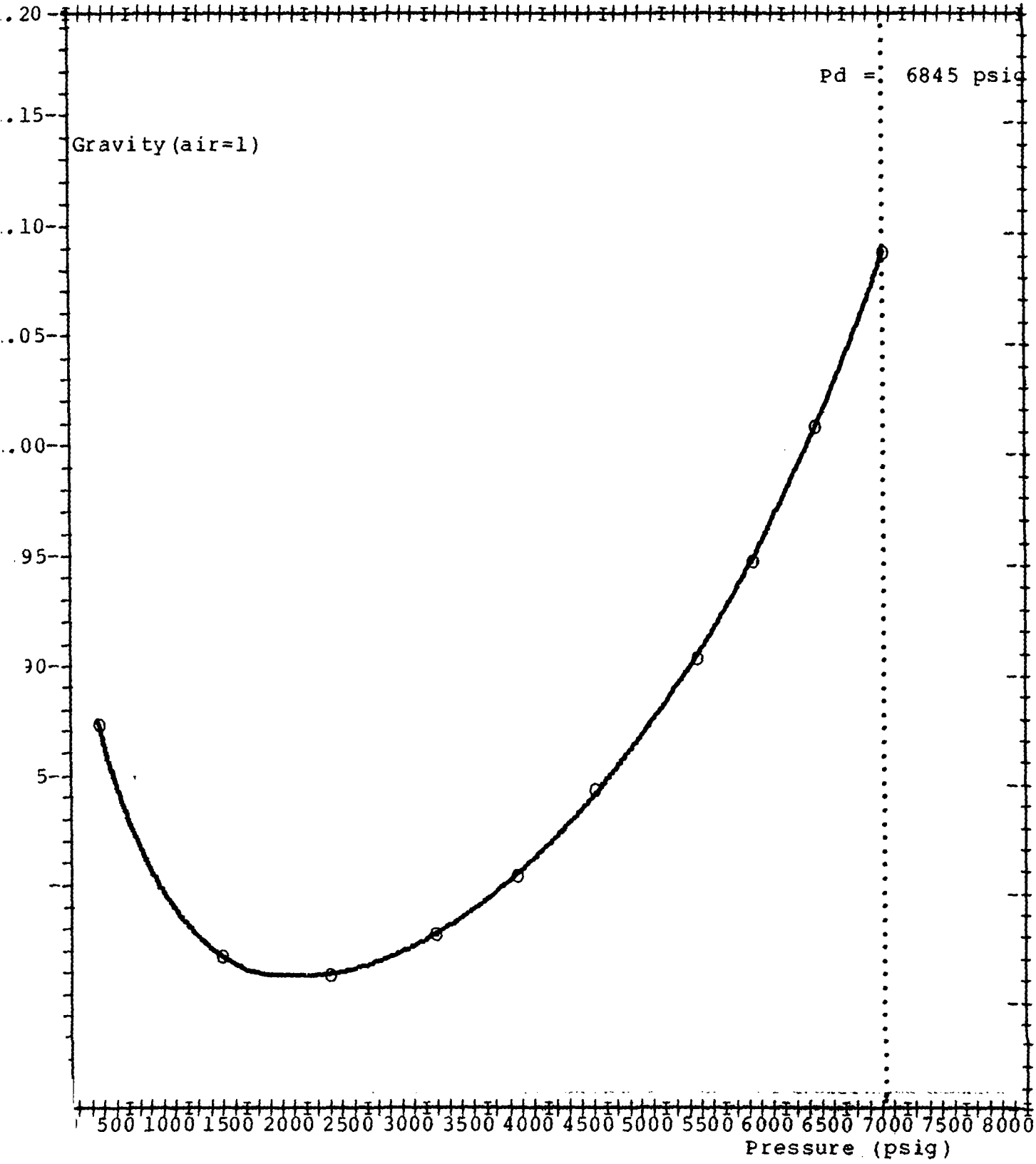
DEPLETION STUDY OF RESERVOIR FLUID AT 264 F

Produced well stream gravity



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WELL : 1/9-6 DST 3A

DEPLETION STUDY OF RESERVOIR FLUID AT 264 F

Produced well stream gravity

For 240 <= P <= Pd

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

where:

Pd	=	6845 psig	x = P/Pd
a	=	-5.11816429345E-01	
b	=	3.28021870688E 00	
c	=	9.43241804147E-01	
d	=	-3.59701541586E 00	
e	=	6.00669019277E 00	

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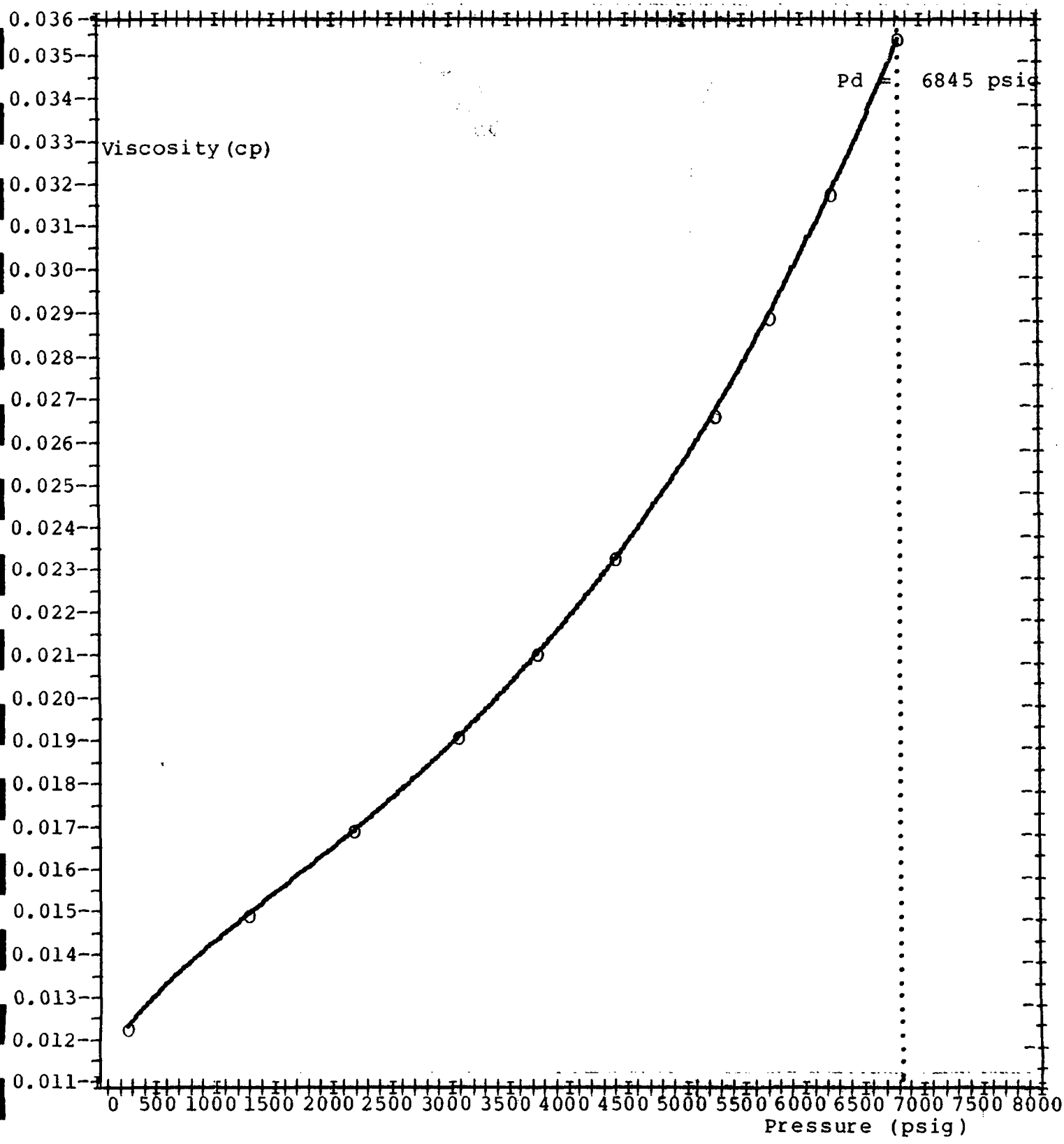
COMPANY : STATOIL

WELL : 1/9-6 DST 3A

DEPLETION STUDY OF RESERVOIR FLUID AT 264 F

Produced well stream viscosity



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WELL : 1/9-6 DST 3A

DEPLETION STUDY OF RE[illegible]R FLUID AT 264 F

Produced well stream viscosity

For 240 <= P <= Pd

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

where:

Pd	=	6845 psig	x	=	P/Pd
a	=	1.07622657673E-02	i	=	0.6
b	=	1.10067109764E-02	j	=	2.4
c	=	5.37629597539E-03	k	=	3
d	=	8.22911105529E-03			

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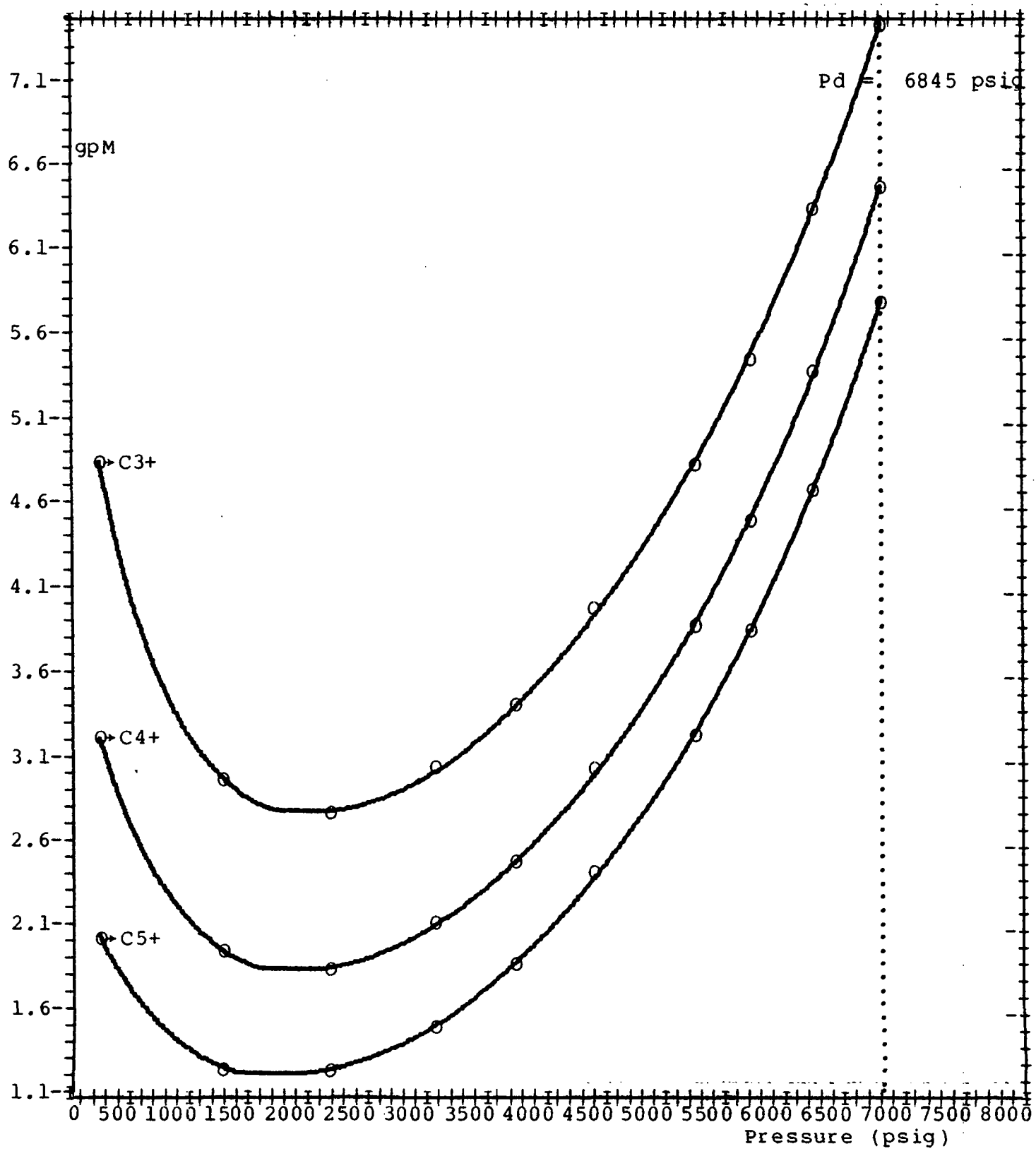
DEPLETION STUDY OF RESERVOIR FLUID AT 264 F

Liquid content of produced well stream



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DEPLETION STUDY OF RESERVOIR FLUID AT 264 F

Liquid content of produced well stream

gpM - propane plus

For 240 <= P <= Pd

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

where:

Pd	=	6845 psig	x = P/Pd
a	=	2.56782022157E 01	
b	=	-4.19191425115E 00	
c	=	6.03932556411E 00	
d	=	-3.58090799416E 00	
e	=	6.28608193213E 00	

gpM - butanes plus

For 240 <= P <= Pd

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

where:

Pd	=	6845 psig	x = P/Pd
a	=	2.06688105229E 01	
b	=	-6.59875028526E 00	
c	=	3.95340127396E 00	
d	=	-2.67509711238E 00	
e	=	4.46558463467E 00	

gpM - pentanes plus

For 240 <= P <= Pd

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

where:

Pd	=	6845 psig	x = P/Pd
a	=	1.52958513235E 01	
b	=	-5.76856878045E 00	
c	=	2.45933056955E 00	
d	=	-1.96374168110E 00	
e	=	3.03784293203E 00	

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WELL : 1/9-6 DST 3A

TABLE 11

DEPLETION STUDY OF RESERVOIR FLUID AT 264 F

Molar composition of produced well stream up to Dodecanes plus

Pressure (psig)	6845	6250	5727	5250	4400
Nitrogen	0.05	0.05	0.05	0.05	0.05
Carbon dioxide	3.05	3.04	3.08	3.11	3.11
Hydrocarbons:					
Methane	73.92	75.48	76.86	77.75	79.06
Ethane	7.51	7.60	7.65	7.72	7.74
Propane	3.54	3.50	3.49	3.47	3.43
I - Butane	0.69	0.70	0.67	0.67	0.65
N - Butane	1.45	1.49	1.36	1.35	1.30
I - Pentane	0.60	0.58	0.53	0.53	0.51
N - Pentane	0.73	0.68	0.64	0.61	0.59
Hexanes	1.04	0.94	0.83	0.76	0.67
Heptanes	1.28	1.06	0.92	0.77	0.66
Octanes	1.48	1.20	1.00	0.85	0.64
Nonanes	1.09	0.85	0.68	0.55	0.47
Decanes	0.79	0.65	0.54	0.45	0.30
Undecanes	0.53	0.43	0.35	0.28	0.18
Dodecanes plus	2.25	1.75	1.35	1.08	0.64
TOTAL	100.00	100.00	100.00	100.00	100.00
Molecular weight	31.547	29.249	27.487	26.216	24.457
Molecular weight of Dodecanes +	226.2	219.8	219.0	215.8	209.9

FLOPETROL JOHNSTON
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COMPANY : STATOIL

WELL : 1/9-6 DST 3A

TABLE 12

DEPLETION STUDY OF RESERVOIR FLUID AT 264 F

Molar composition of produced well stream up to Dodecanes plus

Pressure (psig)	3745	3055	2172	1265	240
Nitrogen	0.05	0.05	0.04	0.04	0.04
Carbon dioxide	3.12	3.12	3.16	3.16	3.39
Hydrocarbons:					
Methane	79.92	80.48	80.82	79.64	71.65
Ethane	7.82	7.83	7.93	8.26	10.63
Propane	3.41	3.41	3.41	3.75	5.92
I - Butane	0.64	0.64	0.63	0.71	1.22
N - Butane	1.28	1.28	1.28	1.50	2.52
I - Pentane	0.47	0.46	0.44	0.54	0.90
N - Pentane	0.53	0.54	0.51	0.60	0.99
Hexanes	0.63	0.59	0.57	0.64	0.91
Heptanes	0.58	0.52	0.48	0.50	0.65
Octanes	0.51	0.41	0.32	0.32	0.47
Nonanes	0.30	0.22	0.16	0.16	0.23
Decanes	0.22	0.14	0.08	0.06	0.16
Undecanes	0.13	0.09	0.06	0.05	0.12
Dodecanes plus	0.39	0.22	0.11	0.07	0.20
TOTAL	100.00	100.00	100.00	100.00	100.00
Molecular weight	23.321	22.549	22.016	22.341	25.411
Molecular weight of Dodecanes +	208.2	197.7	194.6	187.2	192.8

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COMPANY : STATOIL

WELL : 1/9-6 DST 3A

TABLE 13

DEPLETION STUDY OF RESERVOIR FLUID AT 264 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 = 6845	0.00	7.429 (1)	6.459 (1)	5.779 (1)
6250	4.29	0.271	0.230	0.200
5727	7.75	0.460	0.386	0.334
5250	11.65	0.648	0.537	0.460
4440	20.18	0.988	0.796	0.666
3745	29.20	1.295	1.020	0.835
3055	39.82	1.619	1.244	0.994
2172	55.17	2.044	1.525	1.182
1265	71.48	2.535	1.849	1.391
240	89.91	3.433	2.448	1.771

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

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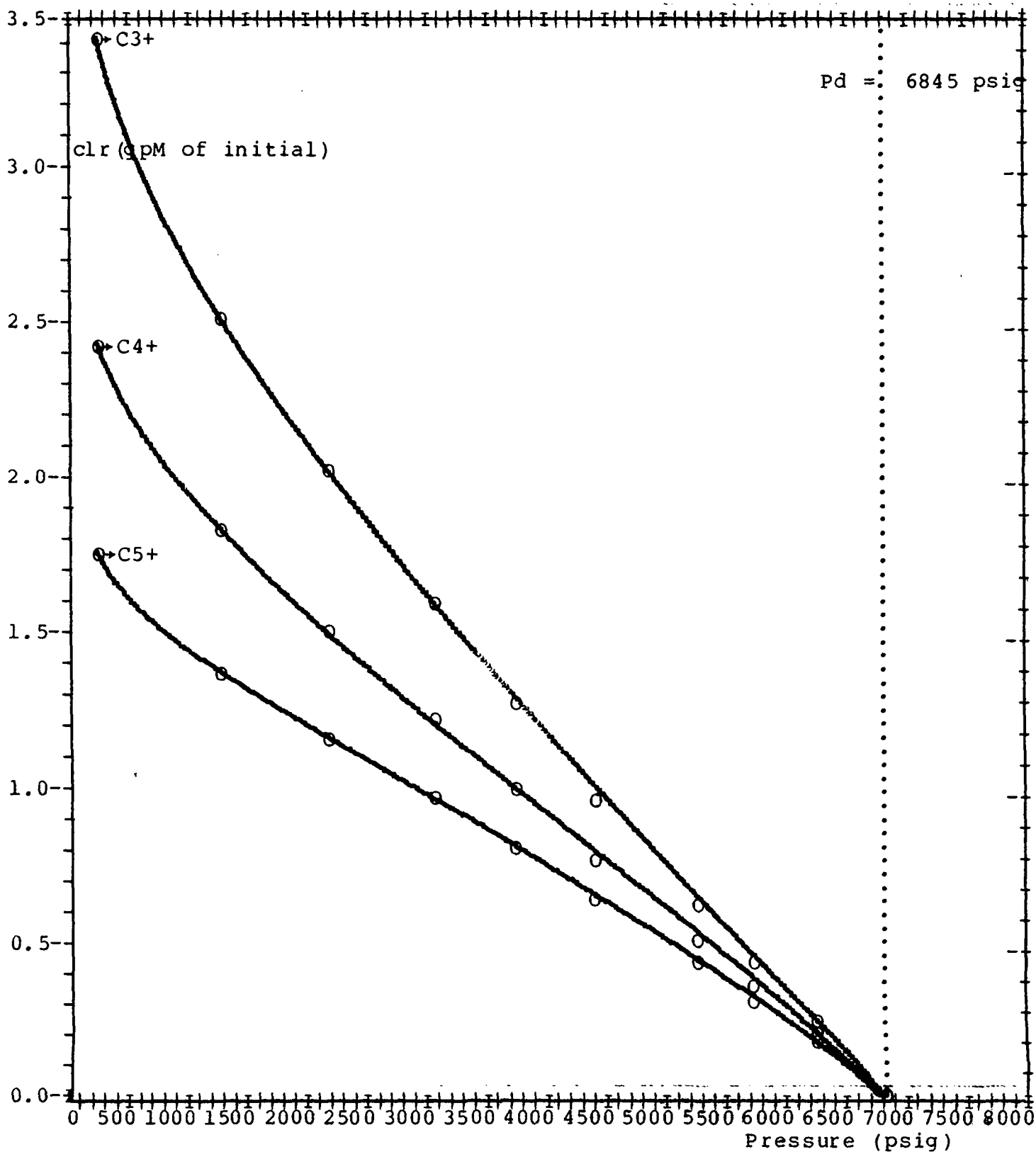
DEPLETION STUDY OF RESERVOIR FLUID AT 264 F

Cumulative liquid recovery



FLOPETROL JOHNSTON
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WELL : 1/9-6 DST 3A

DEPLETION STUDY OF RESERVOIR FLUID AT 264 F

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

Cumulative liquid recovery - propane plus

For 240 <= P <= Pd

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

where:

Pd	=	6845 psig	x	=	P/Pd
a	=	6.63125207382E 00	i	=	0.1
b	=	-4.36231218306E 00	j	=	1.0
c	=	-2.22798325934E 00	k	=	30
d	=	-4.09566314027E-02			

Cumulative liquid recovery - butanes plus

For 240 <= P <= Pd

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

where:

Pd	=	6845 psig	x	=	P/Pd
a	=	4.73078548891E 00	i	=	0.1
b	=	-3.14024971357E 00	j	=	1.1
c	=	-1.47082963390E 00	k	=	8
d	=	-1.19706141455E-01			

Cumulative liquid recovery - pentanes plus

For 240 <= P <= Pd

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

where:

Pd	=	6845 psig	x	=	P/Pd
a	=	3.52124478480E 00	i	=	0.1
b	=	-2.43982626140E 00	j	=	1.6
c	=	-1.03077591404E 00	k	=	16
d	=	-5.06426093599E-02			

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WELL : 1/9-6 DST 3A

TABLE 14

DEPLETION STUDY OF RESERVOIR FLUID AT 264 F

Flash of remaining liquid from 240 psig to atmospheric conditions

(molecular composition of gas free liquid)

Components	Mole percent
Methane	0.00
Ethane	0.54
Propane	1.38
I - Butane	0.72
N - Butane	2.33
I - Pentane	1.81
N - Pentane	2.60
Hexanes	5.67
Heptanes	9.31
Octanes	13.28
Nonanes	11.59
Decanes	9.32
Undecanes	6.93
Dodecanes plus	34.52
TOTAL	100.00

Molecular weight of gas free liquid : 152

Molecular weight of Dodecanes plus in gas free liquid : 226

Specific gravity of gas free liquid : 0.817 (60/60 F)

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WELL : 1/9-6 DST 3A

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)
$c = -\frac{1}{V}\frac{dV}{dP}$	:	Compressibility factor of reservoir fluid
$\alpha = \frac{1}{V}\frac{dV}{dT}$	:	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)