FLOPETROL

P.V.T.STUDY REPORT

Client:STATOIL
Field :TOMMELITEN Well : 1/9-6 (DST 2B)
Zone :TOR Samp. date:24/09/82

Report #:83/L/027 Date: APRIL 1983

PVT

FLOPETROL JOHNSTON
Schlumberger

FLOPETROL JOHNSTON
Schlumberger

P.V.T.STUDY REPORT

Client:STATOIL
Field :TOMMELITEN Well : 1/9-6 (DST 2B)
Zone :TOR Samp. date:24/09/82

Report #:83/L/027 Date: APRIL 1983

MELUN LABORATORY

FLOPETROL JOHNSTON
Schlumberger

COMPANY : STATOIL

WELL : 1/9-6 (DST 2B)

INDEX

FLOPETROL JOHNSTON
Schlumberger

COMPANY : STATOIL

WELL : 1/9-6 (DST 2B)

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 2B)

The initial reservoir conditions are :

- Pi : 7150 psig
- T : 266 F

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

- Pd : 6700 psig at 266 F
- Z at Pd : 1.165
- Specific volume at Pd : 0.0384 cu ft/pound

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

- 39.47 % of propane plus in place
- 33.23 % of butanes plus in place
- 28.10 % of pentanes plus in place

FLOPETROL JOHNSTON
Schlumberger

COMPANY : STATOIL

WELL : 1/9-6 (DST 2B)

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.

FLOPETROL JOHNSTON
Schlumberger

COMPANY : STATOIL

WELL : 1/9-6 (DST 2B)

TABLE 1

SAMPLING CONDITIONS

I. RESERVOIR AND WELL CHARACTERISTICS

Producing zone	:	TOR
Static pressure	:	7150 psig
Bottom hole temperature	:	266 F
Tubing diameter	:	5"
Casing size	:	7"
Casing shoe	:	12700´

II. SAMPLING CONDITIONS

A) SURFACE SAMPLE(S)

Date	:	24/09/82
Choke	:	20/64"
Flowing bottom hole pressure	:	N/A
Well head pressure	:	4375 psig
Separator pressure	:	335 psig
Well head temperature	:	102 F
Separator temperature	:	56 F
Gas rate (Separator)	:	7.39 MMSCFD
Stock tank temperature	:	N/A
Compressibility factor	:	0.928
Gas gravity	:	0.690 (air=1)
Liquid rate (Separator)	:	1590 BOPD
G.L.R.	:	4648 SCF/BBL
Sample(s) received	:	gas A 13227,A 13278
		liq.1116/324

B) BOTTOM HOLE SAMPLE(S)

Date	:	N/A
Choke	:	N/A
Sample(s) received	:	N/A
		N/A

FLOPETROL JOHNSTON
Schlumberger

COMPANY : STATOIL

WELL : 1/9-6 (DST 2B)

SAMPLE(S) VALIDITY

SEPARATOR LIQUID SAMPLE(S)

1) Sample bottle No 1116/324

Bubble point pressure determination at 64 F is 340 psig

FLOPETROL JOHNSTON
Schlumberger

COMPANY : STATOIL

WELL : 1/9-6 (DST 2B)

TABLE 2

BUBBLE POINT PRESSURE DETERMINATION AT 64 F

Separator liquid sample (cylinder 1116/324)

Pressure (psig)	Pump reading (cm3)
5000	288.92
4000	288.17
3000	287.30
2000	286.48
1000	285.61
Pb = 340	285.00
326	284.09
308	282.36
292	278.78
276	273.50
260	267.10
240	260.83

FLASH OF SEPARATOR LIQUID TO STOCK TANK CONDITIONS

GLR : 176 std cu ft/bbl
Shrinkage factor : 0.913 Std bbl/bbl
Liberated gas gravity : 0.983 (Air = 1)
Stock tank liquid gravity: 0.796 60/60 F

This sample has been used for recombination

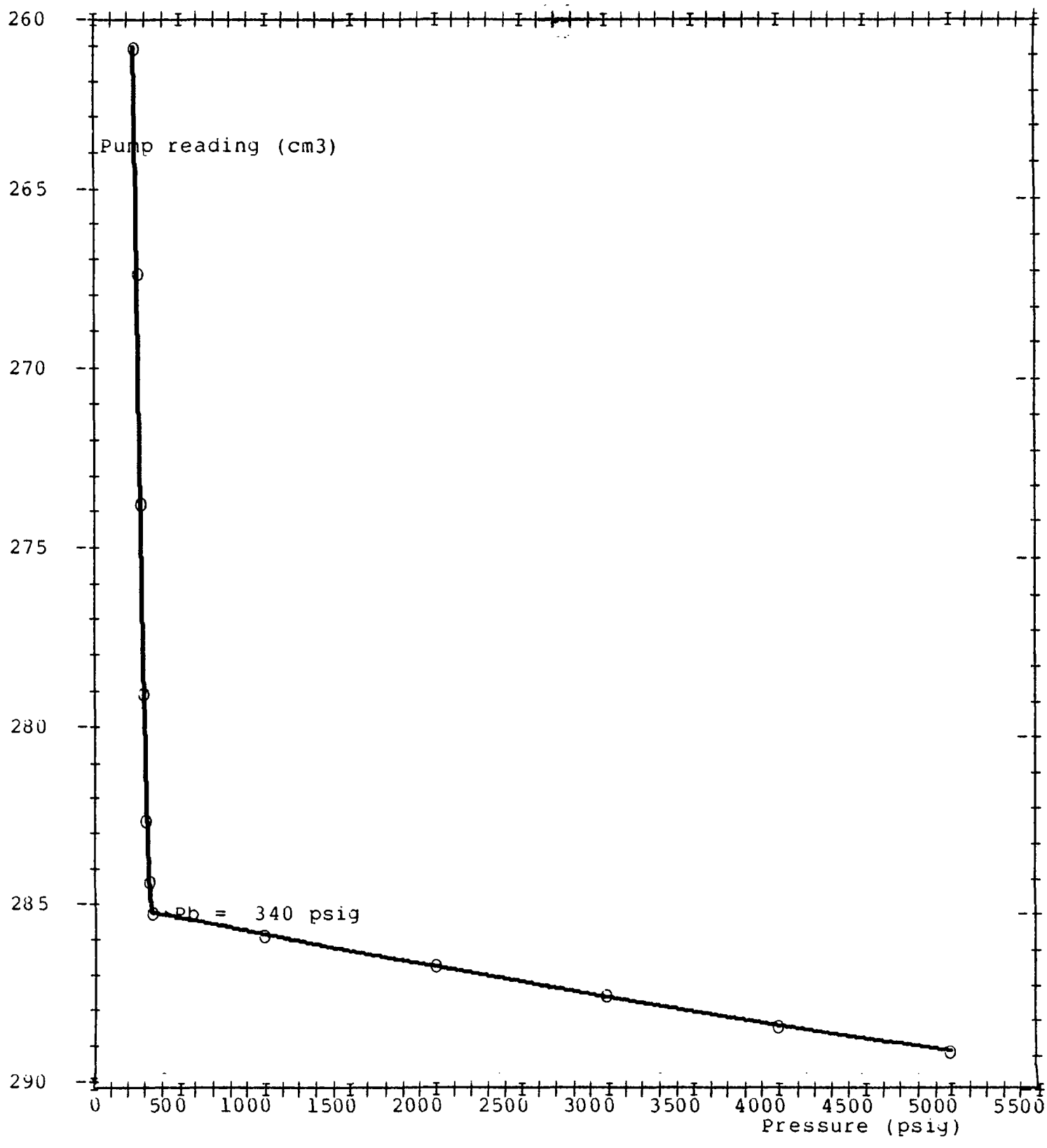
FLOPETROL JOHNSTON
Schlumberger

COMPANY : STATOIL

WELL : 1/9-6 (DST 2B)

BUBBLE POINT PRESSURE DETERMINATION AT 64 F

Separator liquid sample (cylinder 1116/324)



Gas P.V.T. software version 2.0,00

83/L/027

FLOPETROL JOHNSTON
Schlumberger

COMPANY : STATOIL

WELL : 1/9-6 (DST 2B)

TABLE 3

MOLECULAR COMPOSITION OF FIELD SEPARATOR GAS(ES)

I-Molecular composition (mole percent)

Components	Cylinder A 13278	Cylinder A 13227
Nitrogen	0.15	0.07
Carbon dioxide	3.28	3.31
Hydrocarbons:		
Methane	83.40	83.34
Ethane	8.04	8.11
Propane	3.01	3.05
I - Butane	0.52	0.52
N - Butane	0.93	0.93
I - Pentane	0.24	0.24
N - Pentane	0.24	0.24
Hexanes	0.14	0.14
Heptanes plus	0.05	0.05
TOTAL	100.00	100.00
Molecular weignt	19.972	19.991
Gravity (Air=1)	0.689	0.690
Molecular weight of heptanes plus	103.0	103.0

II-Liquid content (g.p.M)

Propane plus	1.541	1.552
Butanes plus	0.716	0.716
Pentanes plus	0.255	0.255

The cylinder A 13278 has been used for recombination

FLOPETROL JOHNSTON
Schlumberger

COMPANY : STATOIL

WELL : 1/9-6 (DST 2B)

TABLE 4

RECOMBINATION OF SEPARATOR SAMPLES

I. FLASH OF SEPARATOR LIQUID TO STOCK TANK CONDITIONS

G.L.R.	: 176	Std cu ft/bbl
Shrinkage factor	: 0.913	Std bbl/bbl
Liberated gas gravity	: 0.983	(Air=1)
Stock tank liquid gravity	: 0.796	60/60 F

II. CORRECTION OF GAS LIQUID RATIO

Field G.L.R. : 4648 Std cu ft/bbl

Separator gas gravity(from chromatographic analysis)

G lab. : 0.689 (Air=1)

Compressibility factor Z at separator conditions

Z lab. : 0.936

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

$$\text{Corrected G.L.R.} : 4648 \sqrt{\frac{0.690 \times 0.928}{0.689 \times 0.936}} = 4632 \text{ Std cu ft /bbl}$$

III. PHYSICAL RECOMBINATION

Surface samples were physically recombined in the ratio of 4632 standard cubic feet of separator gas per barrel of separator liquid

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	0.82	0.15
Carbon dioxide	0.00	0.99	0.18
Hydrocarbons:			
Methane	0.00	60.27	11.18
Ethane	0.55	12.51	2.77
Propane	2.03	11.12	3.72
I - Butane	1.25	3.43	1.65
N - Butane	4.10	5.14	4.29
I - Pentane	3.20	2.20	3.01
N - Pentane	4.56	1.57	4.01
Hexanes	8.65	1.31	7.29
Heptanes	11.55	0.55	9.51
Octanes	13.94	0.09	11.37
Nonanes	10.80	0.00	8.80
Decanes	7.91	0.00	6.44
Undecanes	5.74	0.00	4.68
Dodecanes plus	25.72	0.00	20.95
TOTAL	100.00	100.00	100.00
Molecular weight	136.6	28.484	116.6
Gravity	0.796 60/60 F	0.983 (Air=1)	-----
Molar ratio	81.45	18.55	100.00
Mass ratio	95.47	4.53	100.00

Molecular weight of Dodecanes plus in STL: 225

FLOPETROL JOHNSTON
Schlumberger

COMPANY : STATOIL

WELL : 1/9-6 (DST 2B)

TABLE 6

MOLECULAR COMPOSITION OF RESERVOIR FLUID

Components	Recombined Separator liquid (mole percent)	Separator gas (mole percent)	Recombined Reservoir fluid (mole percent)
Nitrogen	0.15	0.15	0.15
Carbon dioxide	0.18	3.28	2.79
Hydrocarbons:			
Methane	11.18	83.40	72.00
Ethane	2.77	8.04	7.21
Propane	3.72	3.01	3.12
I - Butane	1.65	0.52	0.70
N - Butane	4.29	0.93	1.46
I - Pentane	3.01	0.24	0.68
N - Pentane	4.01	0.24	0.83
Hexanes	7.29	0.14	1.27
Heptanes	9.51	0.04	1.54
Octanes	11.37	0.01	1.80
Nonanes	8.80	0.00	1.39
Decanes	6.44	0.00	1.02
Undecanes	4.68	0.00	0.74
Dodecanes plus	20.95	0.00	3.30
TOTAL	100.00	100.00	100.00
Molecular weight	116.6	19.972	35.2
Gravity	-----	0.689 (Air=1)	1.215 (Air=1)
Molar ratio	15.79	84.21	100.00
Mass ratio	52.25	47.75	100.00

Molecular weight of Dodecanes plus in reservoir fluid : 225

FLOPETROL JOHNSTON
Schlumberger

COMPANY : STATOIL

WELL : 1/9-6 (DST 2B)

TABLE 7

CONSTANT MASS STUDY AND DEW POINT PRESSURE DETERMINATION AT 266 F

	Pressure (psig)	Relative volume (V/V Pd)	Compressibility factor (Z=PV/nRT)	Retrograde liquid deposit (% of nydrocarbon pore space)*
Pi =	7150	0.9769	1.214	
	7000	0.9840	1.198	
	6850	0.9916	1.181	
	6720	0.9989	1.167	
Pd =	6700	1.0000	1.165	0.00
	6625	1.0037		1.94
	6415	1.0171		11.66
	6120	1.0390		20.49
	5690	1.0768		27.26
	4815	1.1820		33.53
	3886	1.3587		35.31
	3485	1.4786		35.39
	2765	1.7899		34.87
	2216	2.2060		33.92
	1963	2.4786		33.20
	1630	2.9781		32.40

-Specific volume at dew point pressure = 0.03838 cu ft/pound

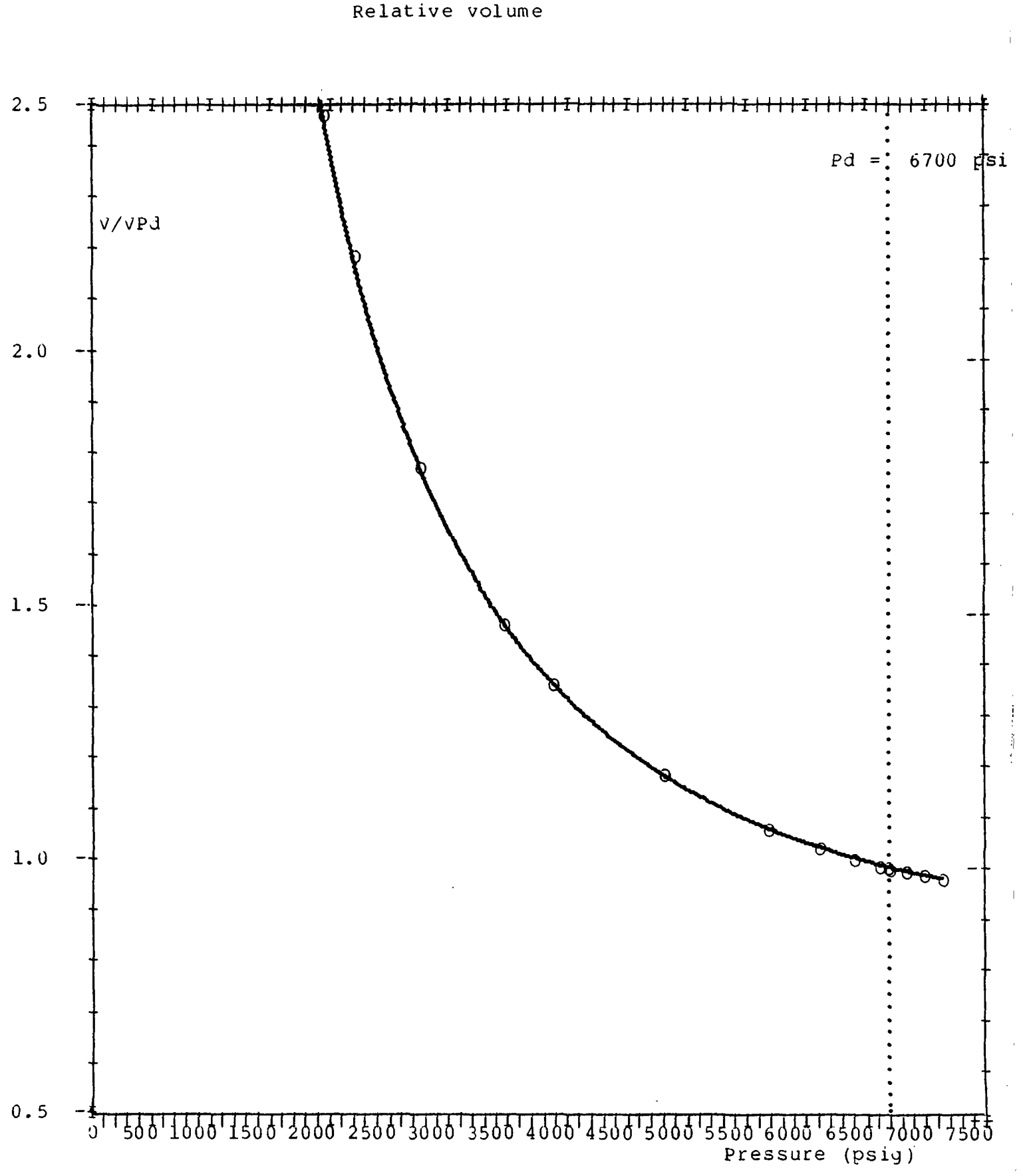
* Percent of retrograde liquid per volume of reservoir fluid at Pd

FLOPETROL JOHNSTON
Schlumberger

COMPANY : STATOIL

WELL : 1/9-6 (DST 2B)

DEW POINT PRESSURE DETERMINATION AND CONSTANT MASS STUDY AT 266 F



FLOPETROL JOHNSTON
Schlumberger

COMPANY : STATOIL

WELL : 1/9-6 (DST 2B)

DEW POINT PRESSURE DETERMINATION AND CONSTANT MASS STUDY AT 266 F

Relative Volume

For 1630 <= P <= 7150

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

where:

Pd	=	6700 psig	x = P/Pd
a	=	-6.02480787751E 00	
b	=	-4.92795787892E 00	
c	=	-1.49797672899E 01	
d	=	-2.69325330463E 01	

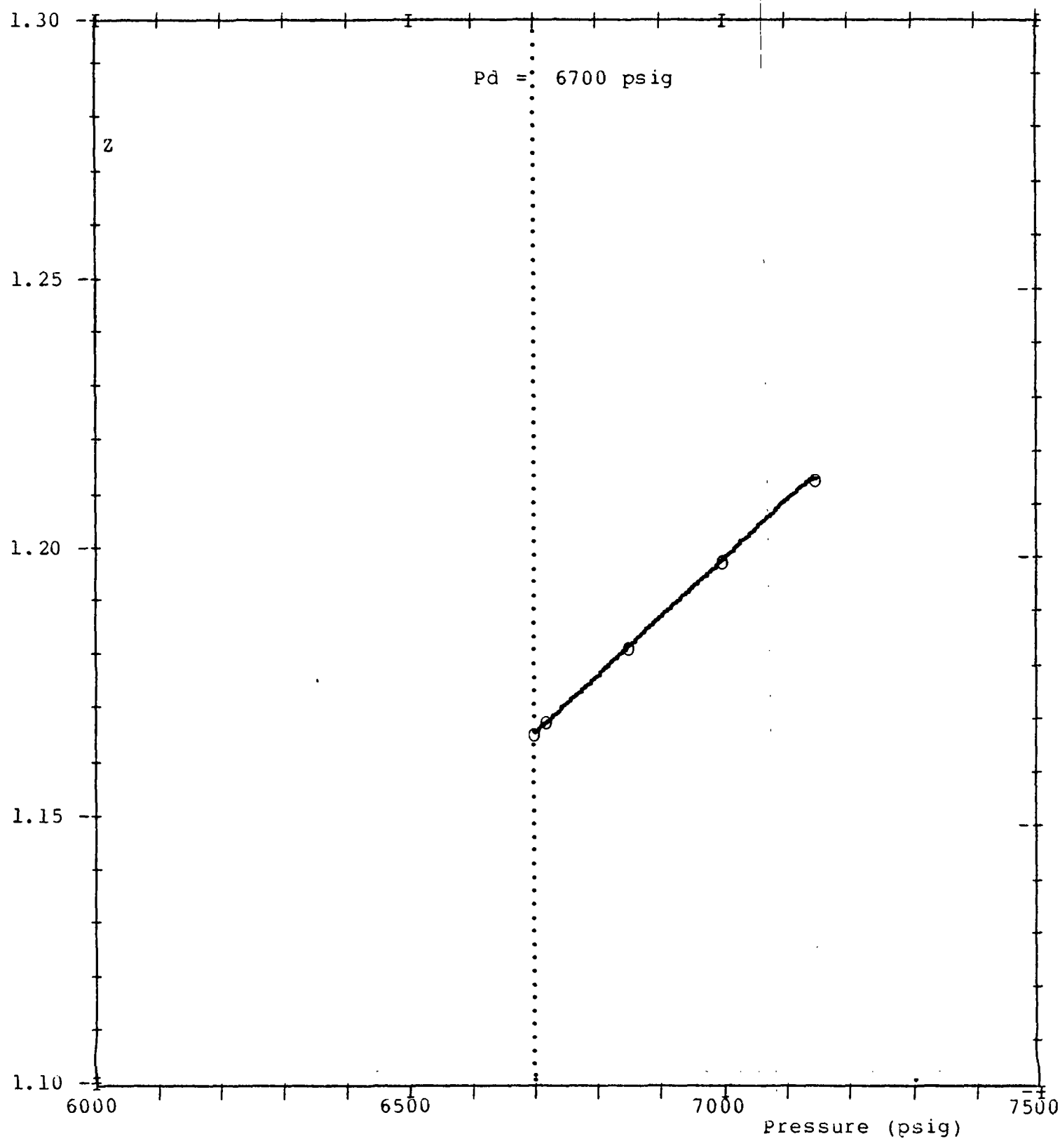
FLOPETROL JOHNSTON
Schlumberger

COMPANY : STATOIL

WELL : 1/9-6 (DST 2B)

DEW POINT PRESSURE DETERMINATION AND CONSTANT MASS STUDY AT 266 F

compressibility factor



FLOPETROL JOHNSTON
Schlumberger

COMPANY : STATOIL

WELL : 1/9-6 (DST 2B)

DEW POINT PRESSURE DETERMINATION AND CONSTANT MASS STUDY AT 266 F

Compressibility factor Z

For Pd <= P <= 7150

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

where:

Pd	=	6700 psig	x = P/Pd
a	=	-9.43758678444E-01	
b	=	4.01716120971E-01	
c	=	3.41868719216E-01	
d	=	-1.171823037l3E 00	

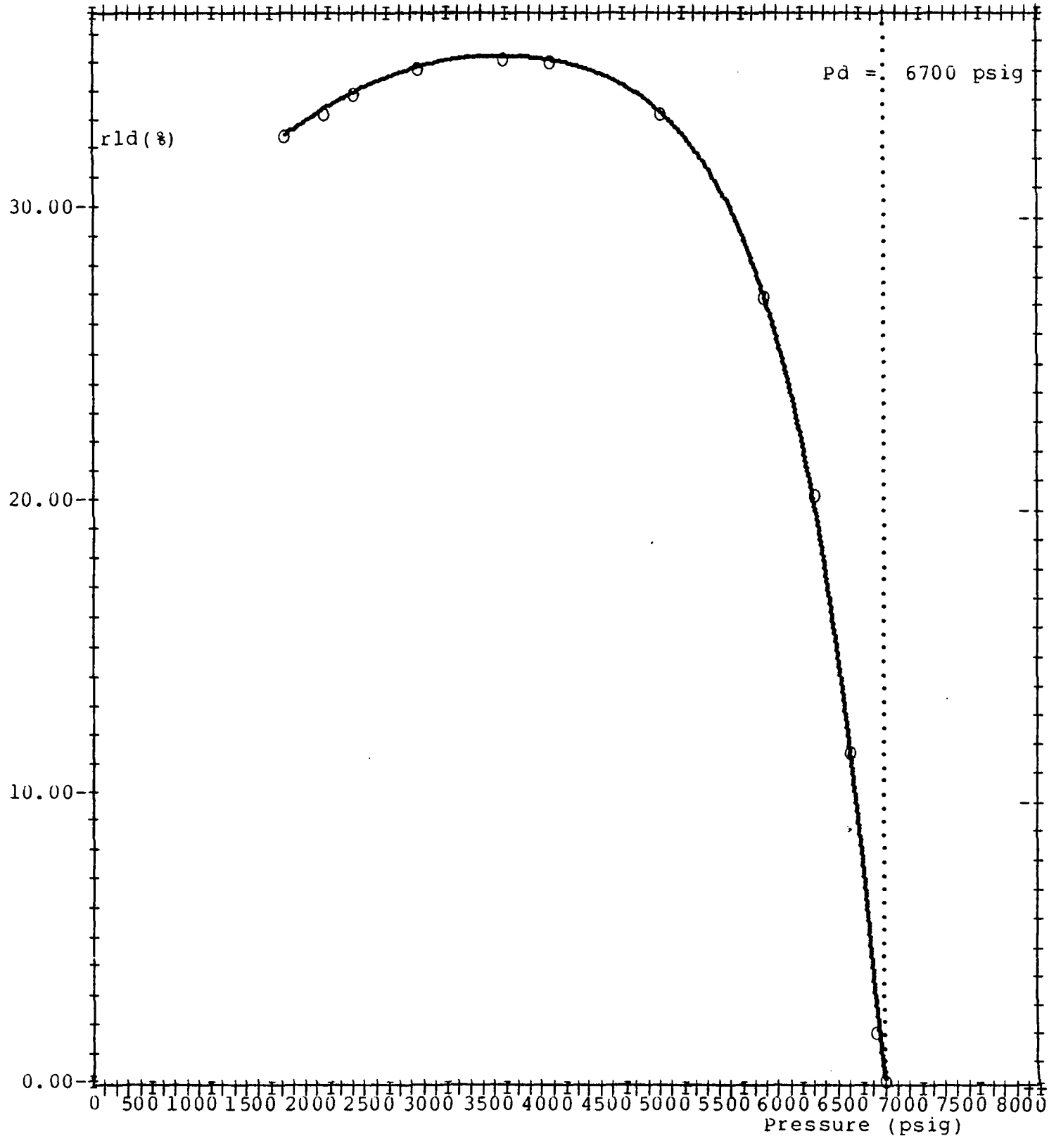
FLOPETROL JOHNSTON
Schlumberger

COMPANY : STATOIL

WELL : 1/9-6 (DST 2B)

DEW POINT PRESSURE DETERMINATION AND CONSTANT MASS STUDY AT 266 F

Retrograde liquid deposit



FLOPETROL JOHNSTON
Schlumberger

COMPANY : STATOIL

WELL : 1/9-6 (DST 2B)

DEW POINT PRESSURE DETERMINATION AND CONSTANT MASS STUDY AT 26o F

Retrograde liquid deposit

For 1630 <= P <= Pd

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

where:

Pd	=	6700 psig	x	=	P/Pd
a	=	2.64275457129E 01	i	=	1.0
b	=	2.68796037152E 01			
c	=	-4.00445574395E 01			
d	=	3.83983633008E 01			
e	=	-5.16609552895E 01			

FLOPETROL JOHNSTON
Schlumberger

COMPANY : STATOIL

WELL : 1/9-6 (DST 2B)

TABLE 8

DEPLETION STUDY OF RESERVOIR FLUID AT 266 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 = 6700	0.00	0.00	1.165
6500	8.39	3.72	1.150
5975	21.10	8.48	1.104
4990	28.95	14.76	1.014
4280	30.28	22.09	0.960
3420	30.43	33.44	0.918
2510	29.61	48.25	0.907
1620	27.74	64.03	0.928
830	25.96	77.82	0.960
240	24.62	88.10	0.988

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

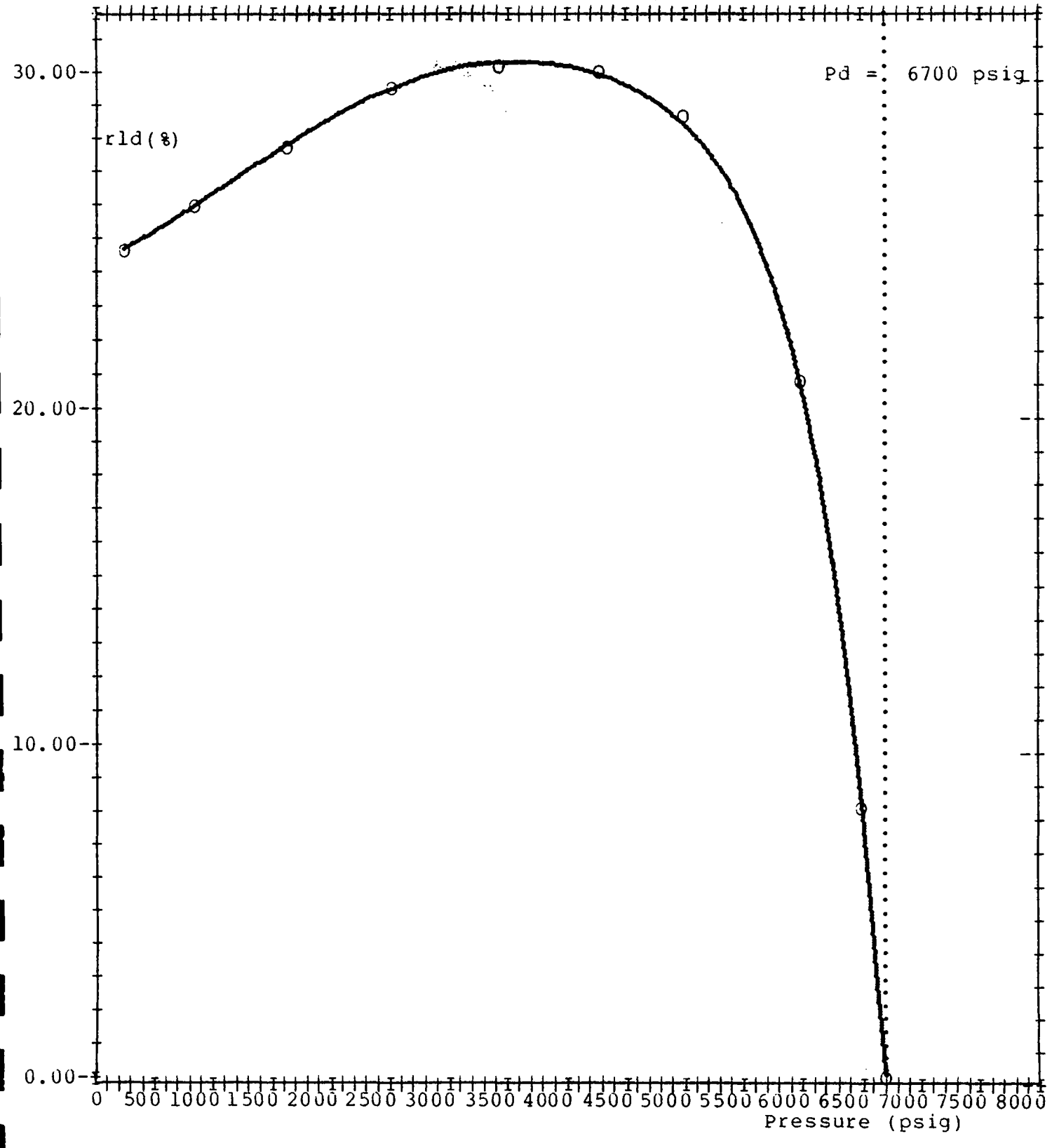
FLOPETROL JOHNSTON
Schlumberger

COMPANY : STATOIL

WELL : 1/9-6 (DST 2B)

DEPLETION STUDY OF RESERVOIR FLUID AT 266 F

Retrograde liquid deposit



Gas P.V.T. software version 2.0,00

83/L/027

FLOPETROL JOHNSTON
Schlumberger

COMPANY : STATOIL

WELL : 1/9-6 (DST 2B)

DEPLETION STUDY OF RESERVOIR FLUID AT 266 F

Retrograde liquid deposit

For 240 <= P <= Pd

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

where:

Pd	=	6700 psig	x	=	P/Pd
a	=	2.42448567489E 01	i	=	1.2
b	=	2.03692370479E 01			
c	=	-3.54535924013E 01			
d	=	3.53232308316E 01			
d	=	-4.44837322272E 01			

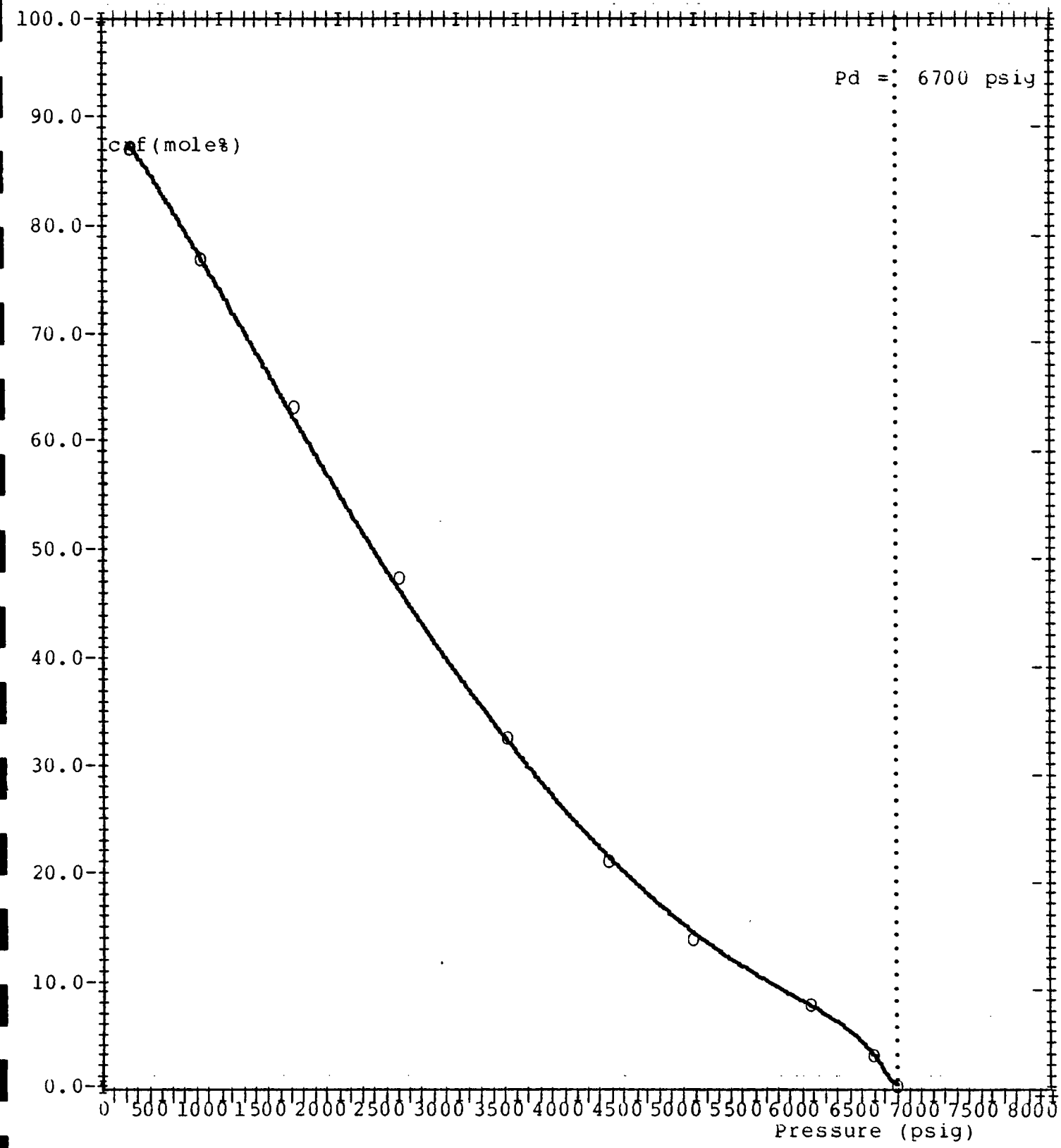
FLOPETROL JOHNSTON
Schlumberger

COMPANY : STATOIL

WELL : 1/9-6 (DST 2B)

DEPLETION STUDY OF RESERVOIR FLUID AT 266 F

Cumulative produced fluid



Gas P.V.T. software version 2.0,00

83/L/027

FLOPETROL JOHNSTON
Schlumberger

COMPANY : STATOIL

WELL : 1/9-6 (DST 2B)

DEPLETION STUDY OF RESERVOIR FLUID AT 266 F

Cumulative produced fluid

For 240 <= P <= Pd

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

where:

Pd	=	6700 psig	x	=	P/Pd
a	=	9.085500125 15E 01	i	=	1.6
b	=	1.13687514014E 03	j	=	1.5
c	=	-1.22144352457E 03	K	=	24
d	=	-6.28661682199E 00			

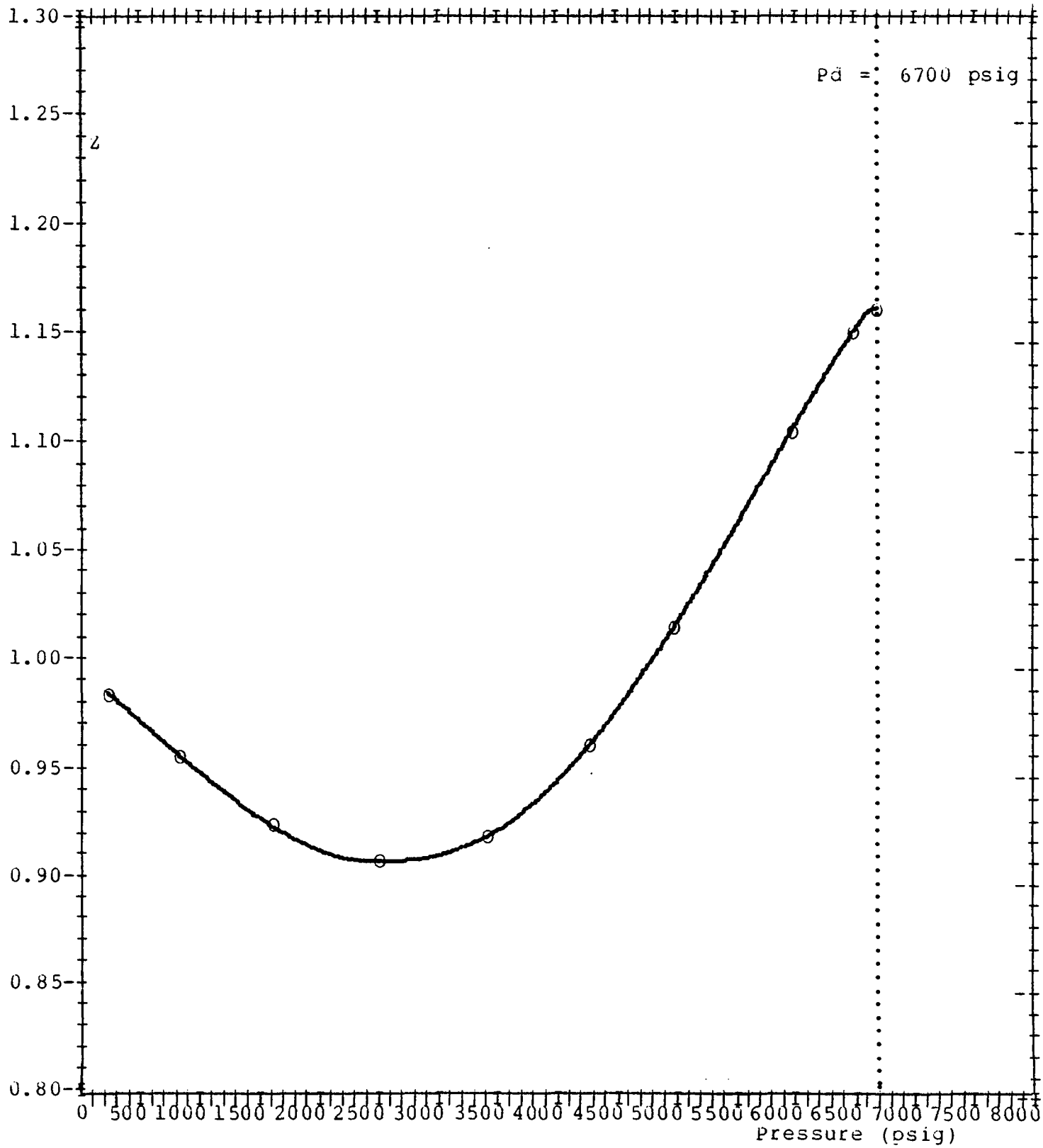
FLOPETROL JOHNSTON
Schlumberger

COMPANY : STATOIL

WELL : 1/9-6 (DST 2B)

DEPLETION STUDY OF RESERVOIR FLUID AT 266 F

Produced well stream compressibility factor



Gas P.V.T. software version 2.0,00

83/L/027

FLOPETROL JOHNSTON
Schlumberger

COMPANY : STATOIL

WELL : 1/9-6 (DST 2B)

DEPLETION STUDY OF RESERVOIR FLUID AT 266 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	=	6700 psig	x	=	P/Pd
a	=	1.00526013446E 00	i	=	0.5
b	=	-7.28799348856E-02			
c	=	-5.20785804324E-01			
d	=	1.39994331715E 00			
e	=	-6.46537712401E-01			

FLOPETROL JOHNSTON
Schlumberger

COMPANY : STATOIL

WELL : 1/9-6 (DST 2B)

TABLE 9

DEPLETION STUDY OF RESERVOIR FLUID AT 266 F

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

Pressure (psig)	6700	6500	5975	4990	4280
Nitrogen	0.15	0.14	0.12	0.11	0.10
Carbon dioxide	2.79	2.82	2.87	2.92	3.01
Hydrocarbons:					
Methane	72.00	73.15	75.69	78.44	79.48
Ethane	7.21	7.30	7.35	7.45	7.50
Propane	3.12	3.15	3.17	3.18	3.18
I - Butane	0.70	0.70	0.69	0.68	0.67
N - Butane	1.46	1.45	1.41	1.36	1.34
I - Pentane	0.68	0.64	0.60	0.53	0.51
N - Pentane	0.83	0.81	0.75	0.65	0.63
Hexanes	1.27	1.18	1.02	0.85	0.76
Heptanes plus	9.79	8.66	6.33	3.83	2.82
TOTAL	100.00	100.00	100.00	100.00	100.00
Molecular weight	35.223	33.425	29.851	25.935	24.437
Gravity (Air=1)	1.215	1.153	1.030	0.895	0.843
Viscosity (cp)	0.0377	0.0355	0.0311	0.0256	0.0228
Molecular weight of Heptanes +	157.5	156.0	153.7	146.8	142.9

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

Propane plus	9.171	8.315	6.596	4.705	3.965
Butanes plus	8.316	7.452	5.727	3.834	3.094
Pentanes plus	7.630	6.769	5.060	3.185	2.455

FLOPETROL JOHNSTON Schlumberger

COMPANY : STATOIL

WELL : 1/9-6 (DST 2B)

TABLE 10

DEPLETION STUDY OF RESERVOIR FLUID AT 266 F

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

Pressure (psig)	3420	2510	1620	830	240
Nitrogen	0.10	0.10	0.10	0.11	0.11
Carbon dioxide	3.03	3.16	3.18	3.30	3.50
Hydrocarbons:					
Methane	80.17	80.16	79.82	77.83	70.52
Ethane	7.66	7.92	8.21	8.95	11.28
Propane	3.18	3.20	3.29	3.75	5.39
I - Butane	0.64	0.64	0.66	0.77	1.22
N - Butane	1.27	1.27	1.29	1.51	2.40
I - Pentane	0.49	0.47	0.47	0.54	0.87
N - Pentane	0.59	0.57	0.57	0.65	0.97
Hexanes	0.73	0.71	0.71	0.80	1.30
Heptanes plus	2.14	1.80	1.70	1.79	2.44
TOTAL	100.00	100.00	100.00	100.00	100.00
Molecular weight	23.426	23.037	22.943	23.654	26.624
Gravity (Air=1)	0.808	0.795	0.792	0.816	0.919
Viscosity (cp)	0.0201	0.0178	0.0157	0.0139	0.0121
Molecular weight of Heptanes +	139.2	138.5	135.0	137.8	140.1

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

Propane plus	3.454	3.228	3.184	3.577	5.300
Butanes plus	2.582	2.351	2.282	2.549	3.823
Pentanes plus	1.975	1.744	1.663	1.825	2.672

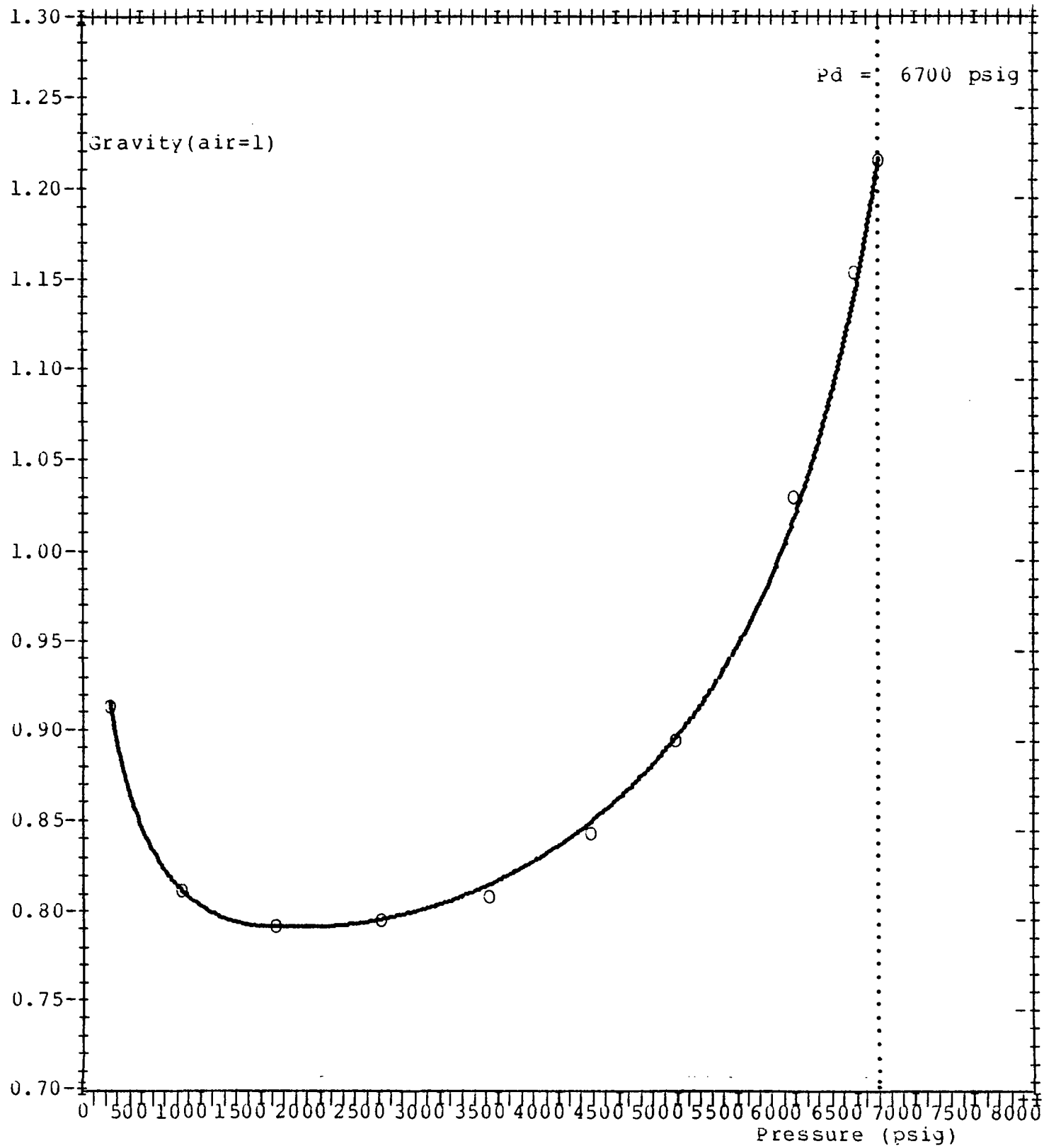
FLOPETROL JOHNSTON
Schlumberger

COMPANY : STATOIL

WELL : 1/9-6 (DST 2B)

DEPLETION STUDY OF RESERVOIR FLUID AT 266 F

Produced well stream gravity



FLOPETROL JOHNSTON
Schlumberger

COMPANY : STATOIL

WELL : 1/9-6 (DST 2B)

DEPLETION STUDY OF RESERVOIR FLUID AT 266 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	=	6700 psig	x = P/Pd
a	=	-1.42314954446E 01	
b	=	1.91062430162E 01	
c	=	1.11648313005E 00	
d	=	-2.31524626937E 01	
e	=	2.70817387092E 01	

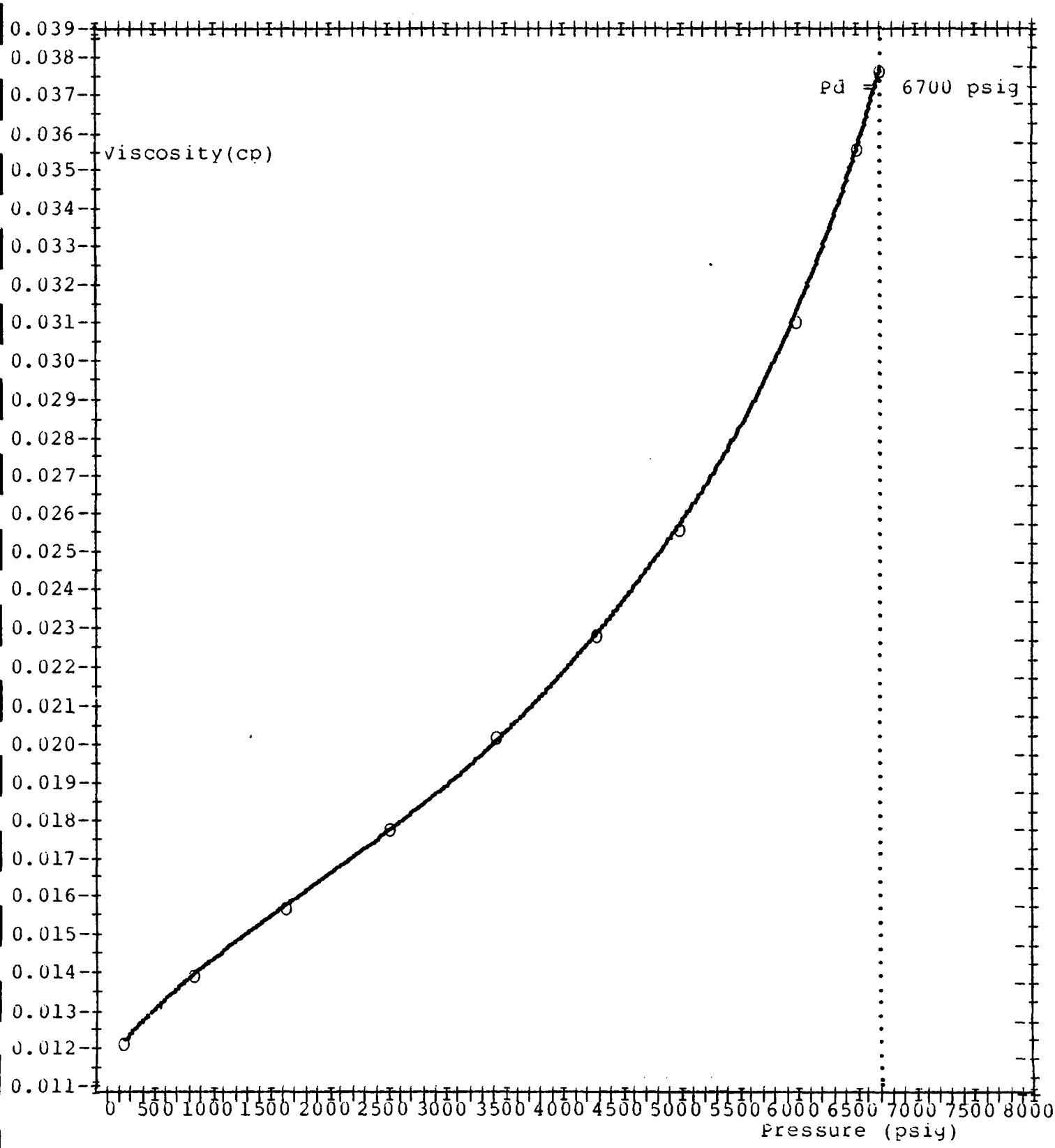
FLOPETROL JOHNSTON
Schlumberger

COMPANY : STATOIL

WELL : 1/9-6 (DST 2B)

DEPLETION STUDY OF RESERVOIR FLUID AT 266 F

Produced well stream viscosity



FLOPETROL JOHNSTON
Schlumberger

COMPANY : STATOIL

WELL : 1/9-6 (DST 2B)

DEPLETION STUDY OF RESERVOIR FLUID AT 266 F

Produced well stream viscosity

For 240 <= P <= Pd

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

where:

Pd	=	6700 psig	x	=	P/Pd
a	=	1.05354762165E-02	i	=	0.6
b	=	1.16388701914E-02	j	=	2.9
c	=	1.24328741879E-02	k	=	11
d	=	3.06540467637E-03			

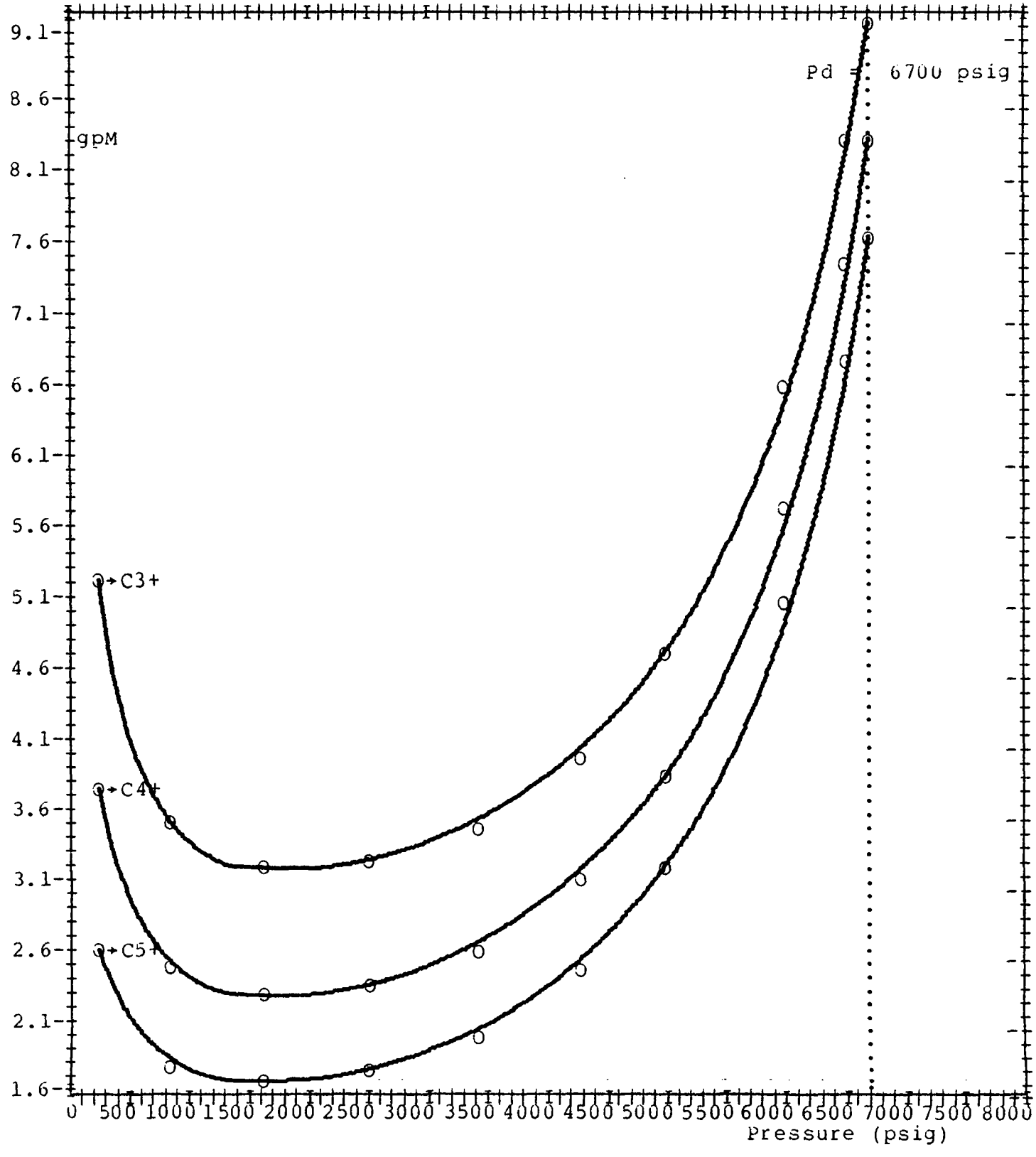
FLOPETROL JOHNSTON
Schlumberger

COMPANY : STATOIL

WELL : 1/9-6 (DST 2B)

DEPLETION STUDY OF RESERVOIR FLUID AT 266 F

Liquid content of produced well stream



FLOPETROL JOHNSTON
Schlumberger

COMPANY : STATOIL

WELL : 1/9-6 (DST 2B)

DEPLETION STUDY OF RESERVOIR FLUID AT 266 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	=	6700 psig	x = P/Pd
a	=	-1.22411662030E 01	
b	=	5.96064089752E 01	
c	=	9.04843656131E 00	
d	=	-2.67180637154E 01	
e	=	3.18694094450E 01	

gpM - butanes plus

For 240 <= P <= Pd

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

where:

Pd	=	6700 psig	x = P/Pd
a	=	6.45988758098E 00	
b	=	2.30460491024E 01	
c	=	5.88028235999E 00	
d	=	-1.85256336998E 01	
e	=	2.17808464260E 01	

gpM - pentanes plus

For 240 <= P <= Pd

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

where:

Pd	=	6700 psig	x = P/Pd
a	=	9.72197139449E 00	
b	=	6.63826133900E 00	
c	=	3.63504000660E 00	
d	=	-1.14641278671E 01	
e	=	1.30847864398E 01	

FLOPETROL JOHNSTON
Schlumberger

COMPANY : STATOIL

WELL : 1/9-6 (DST 2B)

TABLE 11

DEPLETION STUDY OF RESERVOIR FLUID AT 266 F

Molar composition of produced well stream up to Dodecanes plus

Pressure (psig)	6700	6500	5975	4990	4280
Nitrogen	0.15	0.14	0.12	0.11	0.10
Carbon dioxide	2.79	2.82	2.87	2.92	3.01
Hydrocarbons:					
Methane	72.00	73.15	75.69	78.44	79.48
Ethane	7.21	7.30	7.35	7.45	7.50
Propane	3.12	3.15	3.17	3.18	3.18
I - Butane	0.70	0.70	0.69	0.68	0.67
N - Butane	1.46	1.45	1.41	1.36	1.34
I - Pentane	0.68	0.64	0.60	0.53	0.51
N - Pentane	0.83	0.81	0.75	0.65	0.63
Hexanes	1.27	1.18	1.02	0.85	0.76
Heptanes	1.54	1.38	1.08	0.76	0.60
Octanes	1.80	1.65	1.22	0.76	0.58
Nonanes	1.39	1.24	0.93	0.56	0.42
Decanes	1.02	0.91	0.60	0.42	0.30
Undecanes	0.74	0.66	0.50	0.30	0.21
Dodecanes plus	3.30	2.82	2.00	1.03	0.71
TOTAL	100.00	100.00	100.00	100.00	100.00
Molecular weight	35.223	33.425	29.851	25.935	24.437
Molecular weight of Dodecanes +	225.1	224.4	221.3	214.4	207.3

FLOPETROL JOHNSTON
Schlumberger

COMPANY : STATOIL

WELL : 1/9-6 (DST 2B)

TABLE 12

DEPLETION STUDY OF RESERVOIR FLUID AT 266 F

Molar composition of produced well stream up to Dodecanes plus

Pressure (psig)	3420	2510	1620	830	240
Nitrogen	0.10	0.10	0.10	0.11	0.11
Carbon dioxide	3.03	3.16	3.18	3.30	3.50
Hydrocarbons:					
Methane	80.17	80.16	79.82	77.83	70.52
Ethane	7.66	7.92	8.21	8.95	11.28
Propane	3.18	3.20	3.29	3.75	5.39
I - Butane	0.64	0.64	0.66	0.77	1.22
N - Butane	1.27	1.27	1.29	1.51	2.40
I - Pentane	0.49	0.47	0.47	0.54	0.87
N - Pentane	0.59	0.57	0.57	0.65	0.97
Hexanes	0.73	0.71	0.71	0.80	1.30
Heptanes	0.48	0.42	0.40	0.42	0.65
Octanes	0.43	0.34	0.32	0.33	0.42
Nonanes	0.32	0.27	0.26	0.27	0.38
Decanes	0.23	0.20	0.19	0.20	0.24
Undecanes	0.16	0.14	0.13	0.13	0.15
Dodecanes plus	0.52	0.43	0.40	0.44	0.60
TOTAL	100.00	100.00	100.00	100.00	100.00
Molecular weight	23.426	23.037	22.943	23.654	26.624
Molecular weight of Dodecanes +	204.2	196.0	180.2	189.5	204.0

FLOPETROL JOHNSTON
Schlumberger

COMPANY : STATOIL

WELL : 1/9-6 (DST 2B)

TABLE 13

DEPLETION STUDY OF RESERVOIR FLUID AT 266 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 = 6700	0.00	9.171 (1)	8.316 (1)	7.630 (1)
6500	3.72	0.309	0.277	0.252
5975	8.48	0.623	0.550	0.493
4990	14.76	0.919	0.791	0.693
4280	22.09	1.210	1.017	0.873
3420	33.44	1.601	1.310	1.097
2510	48.25	2.080	1.659	1.355
1620	64.03	2.582	2.019	1.618
830	77.82	3.075	2.370	1.869
240	88.10	3.620	2.763	2.144

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

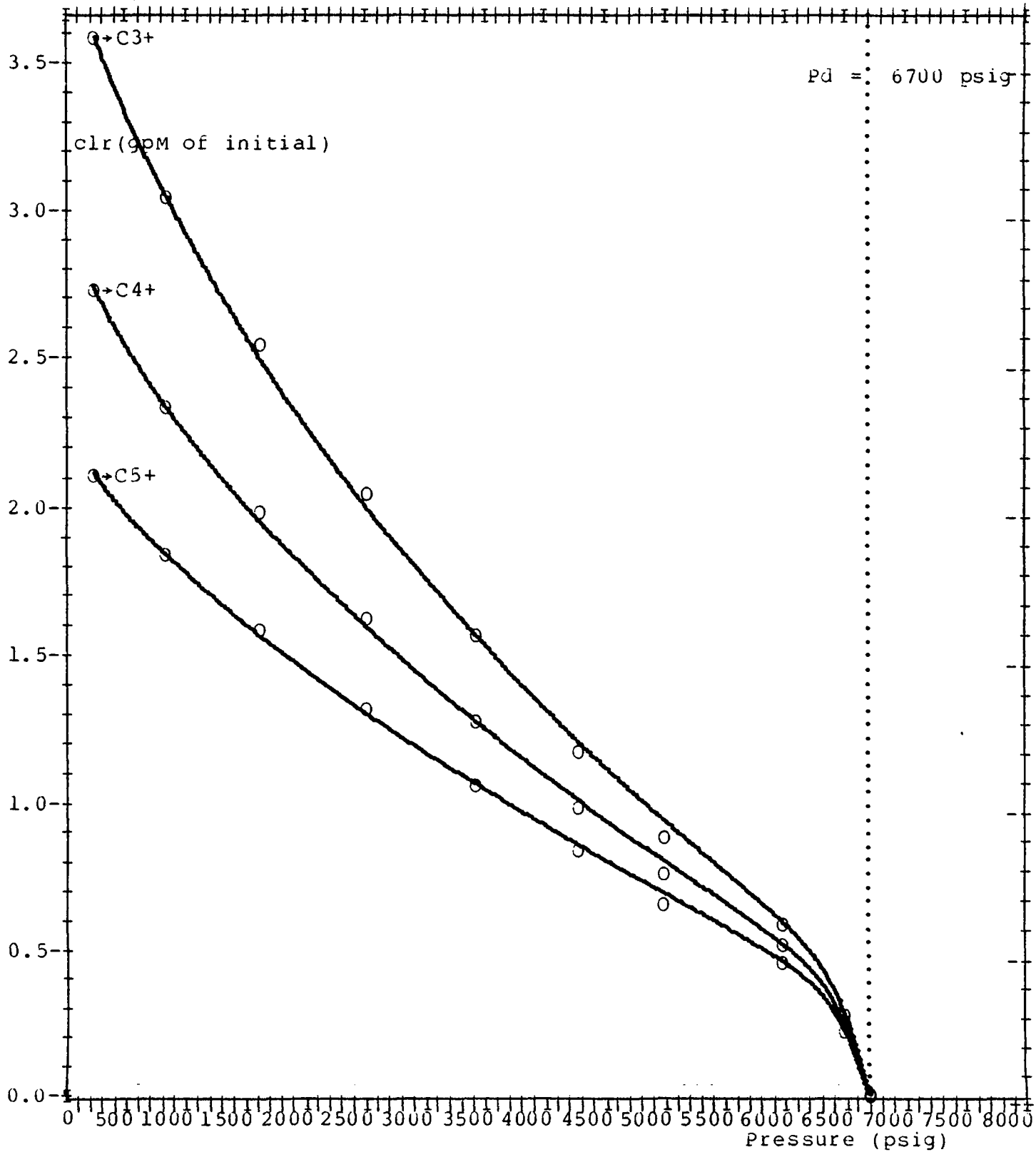
FLOPETROL JOHNSTON
Schlumberger

COMPANY : STATOIL

WELL : 1/9-6 (DST 2B)

DEPLETION STUDY OF RESERVOIR FLUID AT 266 F

Cumulative liquid recovery



Gas P.V.T. software version 2.0,00

83/L/027

DEPLETION STUDY OF RESERVOIR FLUID AT 266 F

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

Cumulative liquid recovery - propane plus

For 240 <= P <= Pd

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

wnere:

Pd	=	6700 psig	x	=	P/Pd
a	=	4.00136109790E 00	i	=	0.7
b	=	-4.48367274446E 00	j	=	1.5
c	=	9.01957025395E-01	k	=	30
d	=	-4.19645378844E-01			

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	=	6700 psig	x	=	P/Pd
a	=	3.05777262674E 00	i	=	0.7
b	=	-3.68797310402E 00	j	=	1.0
c	=	1.01086361037E 00	k	=	30
d	=	-3.80663133100E-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	=	6700 psig	x	=	P/Pd
a	=	2.37203192974E 00	i	=	0.6
b	=	-1.56099105946E 00	j	=	1.0
c	=	-4.59436164615E-01	k	=	30
d	=	-3.51604705666E-01			

FLOPETROL JOHNSTON
Schlumberger

COMPANY : STATOIL

WELL : 1/9-6 (DST 2B)

TABLE 14

DEPLETION STUDY OF RESERVOIR FLUID AT 266 F

Flash of remaining liquid from 240 psig to atmospheric conditions

(molecular composition of gas free liquid)

Components	Mole percent
Methane	0.00
Ethane	0.60
Propane	1.61
I - Butane	0.83
N - Butane	2.55
I - Pentane	1.91
N - Pentane	2.66
Hexanes	5.56
Heptanes	9.06
Octanes	12.65
Nonanes	11.11
Decanes	8.87
Undecanes	6.80
Dodecanes plus	35.79
TOTAL	100.00

Molecular weight of gas free liquid : 154

Molecular weight of Dodecanes plus in gas free liquid : 230

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

FLOPETROL JOHNSTON
Schlumberger

COMPANY : STATOIL

WELL : 1/9-6 DST 2 B

TABLE 15

COMPOSITION IN WEIGHT PERCENT

Components	Stock Tank Liquid	Evolved Gas	Separator Gas
Nitrogen		0.81	0.21
Carbon dioxide		1.53	7.23
Hydrocarbons:			
Methane		33.94	66.98
Ethane	0.12	13.21	12.11
Propane	0.65	17.22	6.65
I - Butane	0.53	7.00	1.51
N - Butane	1.74	10.49	2.71
I - Pentane	1.69	5.57	0.87
N - Pentane	2.41	3.98	0.87
Hexanes	5.45	3.96	0.60
Heptanes	8.47	1.93	0.20
Octanes	11.65	0.36	0.06
Nonanes	10.13		
Decanes	8.23		
Undecanes	6.56		
Dodecanes plus	42.37		
TOTAL	100.00	100.00	100.00
Molecular weight	136.6	28.484	19.972
Gravity	0.796 (60/60°F)	0.983 (Air=1)	0.689 (Air=1)
Molecular weight of Dodecanes plus in STL	225.0		

FLOPETROL JOHNSTON
Schlumberger

COMPANY : STATOIL

WELL : 1/9-6 DST 2 B

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	225.000	0.9990

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.

FLOPETROL JOHNSTON
Schlumberger

COMPANY : STATOIL

WELL : 1/9-6 DST 2 B

SUMMARY AND MAIN RESULTS (S.I. UNITS)

The initial reservoir conditions are :

- Pi : 493 bars
- T : 130°C

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

- Pd : 462 bars
- Z at Pd : 1.165
- Specific volume at Pd : 0.00240 m^3/kg

FLOPETROL JOHNSTON
Schlumberger

COMPANY : STATOIL

WELL : 1/9-6 (DST 2B)

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