Core Lab™

RESERVOIR OPTIMIZATION

Reservoir Fluid Study

for

Woodside Energy Limited

THA-01

AFL 20060043

CORE LABORATORIES AUSTRALIA PTY LTD

Reservoir Fluids Group

447-449 Belmont Avenue, Kewdale WA 6105

Tel: +61 8 9353 3944 Fax: +61 8 9353 1369 Web: http://www.corelab.com

CORE LABORATORIES AUSTRALIA PTY LTD
447-449 Belmont Avenue
Kewdale, WA 6105
P.O. Box 785
Cloverdale, WA 6985
Tel: (61-8) 9353 3944
Tel: (61-8) 9353 1369
e-mail: corelab.australia@corelab.com
Web: http://www.corelab.com

1st November 2007

Woodside Energy Limited
Woodside Plaza
240 St Georges Terrace
Perth
Western Australia, 6000

Attention: Sunil Paliwal, Yousof Hourani

Dear Gents,

Subject: Reservoir Fluid Study: Well: THA-01; Our file: AFL 20060043

Four separator gases and two separator condensate samples were forwarded to our Perth laboratory on 28th July 2006 for initial validation and compositional analysis. Presented in the following report are the results of the requested analyses.

Core Laboratories Australia Pty Ltd are very pleased to have been of service to Woodside Energy Limited in this work. Should any questions arise concerning the data presented in this report, or if we may be of assistance in any other matter, please do not hesitate to contact us.

Yours Faithfully,
For CORE LABORATORIES AUSTRALIA PTY LTD

Murray Macleod
Laboratory Supervisor

CLB Listed NYSE

Table of Contents

Section A - Summary of Analysis Methods

Summary of Analysis Methods

Separator Sample Validation

The separator gas samples were heated to a temperature 10°C above separator temperature, agitated, and allowed to stabilise. The opening pressure, air content and hydrocarbon composition through C12+ were determined for each sample.

As a preliminary quality check, the opening pressure of each separator condensate sample was determined and compared to field sampling and shipping data. The samples were then stabilised at a pressure of 2000 psig and heated to 100°C for twent-four hours. The samples were agitated thoroughly to ensure they were completely in single phase and homogenous. Additionally, each sample was checked for free water/filtrate and the bubble point pressure at ambient temperature was determined.

The results are summarised on page B.2.

Separator Gas Composition

Gas compositions were determined by a GPA 2286 method using a multi-column gas chromatograph system. A temperature programme was utilised to obtain optimum detection and separation of dodecanes plus components.

Separator Condensate Composition

Liquid compositions were determined using a combination of flash separation and gas chromatography techniques. Each fluid was flashed at a controlled temperature (50°C) and separated into oil and gas phases. The gas was analysed using extended gas chromatography as described in the gas composition procedure and the flashed oil by temperature programmed high resolution capillary gas chromatography. The two analyses were then mathematically recombined to the flash gas-oil ratio.

Wellstream Calculation

A shrinkage was predicted by inputting the separator condensate composition into a simulation program. This was performed in order to convert the stocktank rate to separator conditions. The measured compositions of the separator products were used, in conjunction with the corrected field gas-oil ratio, to calculate the reservoir fluid composition and the recombination ratio.

Compositional Analysis Databases

For all compositions reported in this study, the molecular weight and density of the individual components are tabulated in Section F of the Appendix.

Section B - Summary of Samples Received and Validation Data

Reported Well and Sampling Information

Reservoir and Well Information

Field	Thylacine
Well	THA-01
Reservoir Fluid	Gas Condensate
Formation	n/d
Reservoir Pressure	n/d
Reservoir Temperature	n/d
Installation	Maersk Guardian
Test	n/d
Perforations	2344-2631 m MDBRT

Sampling Information

Date sampled	19-Jul-06
Time sampled	various
Type of samples	Surface
Sampling company	Schlumberger
Sampling point	Separator
Choke	60/64"
Status of well	Flowing
Bottomhole pressure	n/d
Bottomhole temperature	n/d
Wellhead flowing pressure	2660 psia
Wellhead flowing temperature	66.0-68.0 °C
Separator pressure	775 psia
Separator temperature	32.0-34.0 °C
Pressure base	14.696 psia
Temperature base	60°F
Separator gas rate	49.05-49.08 MM scf/bbl
Stocktank oil rate	144-172 stb/d
Water flowrate	67-71 bbl/d
Gas gravity (Air = 1)	0.740
Supercompressibility factor	1.0640-1.0660
H2S	2 ppm
CO2	10.50%
BS&W	28-33%
Oil gravity, API at 60°F	50.52

Comments:

n/d - data not supplied

Summary of Separator Samples Received and Validation Data

	Separator Gases		Sampling :-		Laboratory opening :-		Free Liquid	Air
	Sample Number	Cylinder Number	Pressure (psia)	Temp. (°C)	Pressure (psig)	Temp. (°C)	Hydro-C. (cm^3)	Content (Mole%)
	1.09	A2633	775	32.0	828	43.0	0	0.04
	1.10	4348A	775	32.0	834	43.0	0	0.03
*	1.15	5072A	775	34.0	830	43.0	0	0.03
	1.16	4183A	775	34.0	820	43.0	2	0.05

	Separator Condensates		Sampling :-		Bubble point :-		Free Water	Sample
	Sample Number	Cylinder Number	Pressure (psia)	Temp. (°C)	Pressure (psig)	Temp. (°C)	Recovered (cm^3)	Volume (cm^3)
	1.08	7515-QA	775	32.0	648	15.3	0	580
*	1.14	7868-MA	775	34.0	642	15.6	0	570

Note:

***** Separator gas 5072A (sample no.: 1.15) and separator condensate 7868-MA (sample no.: 1.14) were selected for wellstream composition

Section C - Compositional Analysis Data - Separator Gas

Compositional Analysis of Separator Gas A2633 to C12+
(Sample No.: 1.09)

Component		Mole %	Weight %
H2	Hydrogen	0.00	0.00
H2S	Hydrogen Sulphide	0.00	0.00
CO2	Carbon Dioxide	9.97	20.53
N2	Nitrogen	1.43	1.87
C1	Methane	80.07	60.06
C2	Ethane	4.97	6.99
C3	Propane	1.70	3.51
iC4	i-Butane	0.28	0.75
nC4	n-Butane	0.35	0.95
C5	Neo-Pentane	0.00	0.00
iC5	i-Pentane	0.13	0.43
nC5	n-Pentane	0.08	0.27
C6	Hexanes	0.11	0.43
	M-C-Pentane	0.05	0.21
	Benzene	0.02	0.08
	Cyclohexane	0.14	0.55
C7	Heptanes	0.15	0.76
	M-C-Hexane	0.25	1.13
	Toluene	0.12	0.54
C8	Octanes	0.11	0.56
	E-Benzene	0.01	0.03
	M/P-Xylene	0.02	0.09
	O-Xylene	0.00	0.02
C9	Nonanes	0.04	0.22
C10	Decanes	0.00	0.02
C11	Undecanes	0.00	0.00
C12+	Dodecanes Plus	0.00	0.00
	Totals	100.00	100.00

Sample Information	
Sampling Date	19.07.06
Sampling Time	02:40-03:00
Sampling Location	Sep Gas Line
Sample Description	Separator Gas
Cylinder Number	A2633
Sampling Conditions	775.0 psia @ 32°C

Additional Sample Information		
Opening Pressure	828	psig
Opening Temperature	43	°C
Total Air Content	0.04	Mole%
Our Lab Identification	-	

Notes

0.00 means less than 0.005.

Calculated Residue Properties		Mole %	Weight %	Mole Weight ($g.mol^{-1}$)	Density at 60^oF ($g.cm^{-3}$)
C7+	Heptanes plus	0.91	4.21	97.5	0.7668
C8+	Octanes plus	0.55	2.61	102.4	0.7785
C10+	Decanes plus	0.00	0.02	134.0	0.7780
C12+	Dodecanes plus	0.00	0.00	-	-

Calculated Whole Gas Properties		
Real Relative Density	0.7405	(Air=1 @ 14.73 psia and 60°F)
Whole Sample Mole Weight	21.38	$g.mol^{-1}$
Gas Density	0.9045	$kg.m^{-3}$ @ 15°C
Calorific Value	38.12	$MJ.m^{-3}$ (Real Gross @ 15°C, metered @ 15°C)
Calorific Value	34.49	$MJ.m^{-3}$ (Real Net @ 15°C, metered @ 15°C)
Gas Compressibility Factor	0.9969	14.73psia @ 60°F

Compositional Analysis of Separator Gas 4348A to C12+
(Sample No.: 1.10)

Component		Mole %	Weight %
H2	Hydrogen	0.00	0.00
H2S	Hydrogen Sulphide	0.00	0.00
CO2	Carbon Dioxide	9.97	20.53
N2	Nitrogen	1.43	1.87
C1	Methane	80.23	60.06
C2	Ethane	4.96	6.99
C3	Propane	1.69	3.51
iC4	i-Butane	0.28	0.75
nC4	n-Butane	0.35	0.95
C5	Neo-Pentane	0.00	0.00
iC5	i-Pentane	0.13	0.43
nC5	n-Pentane	0.08	0.27
C6	Hexanes	0.09	0.43
	M-C-Pentane	0.04	0.21
	Benzene	0.02	0.08
	Cyclohexane	0.10	0.55
C7	Heptanes	0.11	0.76
	M-C-Hexane	0.19	1.13
	Toluene	0.11	0.54
C8	Octanes	0.10	0.56
	E-Benzene	0.01	0.03
	M/P-Xylene	0.03	0.09
	O-Xylene	0.01	0.02
C9	Nonanes	0.06	0.22
C10	Decanes	0.01	0.02
C11	Undecanes	0.00	0.00
C12+	Dodecanes Plus	0.00	0.00
	Totals	100.00	100.00

Sample Information	
Sampling Date	19.07.06
Sampling Time	02:40-03:00
Sampling Location	Sep Gas Line
Sample Description	Separator Gas
Cylinder Number	4348A
Sampling Conditions	775.0 psia @ 32°C

Additional Sample Information		
Opening Pressure	834	psig
Opening Temperature	43	°C
Total Air Content	0.03	Mole%
Our Lab Identification	-	

Notes

0.00 means less than 0.005.

Calculated Residue Properties		Mole %	Weight %	Mole Weight ($g.mol^{-1}$)	Density at 60°F ($g.cm^{-3}$)
C7+	Heptanes plus	0.79	4.21	99.8	0.7683
C8+	Octanes plus	0.52	2.61	104.8	0.7769
C10+	Decanes plus	0.01	0.02	134.0	0.7780
C12+	Dodecanes plus	0.00	0.00	-	-

Calculated Whole Gas Properties		
Real Relative Density	0.7379	(Air=1 @ 14.73 psia and 60°F)
Whole Sample Mole Weight	21.31	$g.mol^{-1}$
Gas Density	0.9015	$kg.m^{-3}$ @ 15°C
Calorific Value	37.99	$MJ.m^{-3}$ (Real Gross @ 15°C, metered @ 15°C)
Calorific Value	34.36	$MJ.m^{-3}$ (Real Net @ 15°C, metered @ 15°C)
Gas Compressibility Factor	0.9970	14.73psia @ 60°F

Compositional Analysis of Separator Gas 5072A to C12+
(Sample No.: 1.15)

Component		Mole %	Weight %
H2	Hydrogen	0.00	0.00
H2S	Hydrogen Sulphide	0.00	0.00
CO2	Carbon Dioxide	10.06	21.08
N2	Nitrogen	1.42	1.89
C1	Methane	80.27	61.30
C2	Ethane	5.06	7.25
C3	Propane	1.81	3.79
iC4	i-Butane	0.31	0.87
nC4	n-Butane	0.42	1.15
C5	Neo-Pentane	0.00	0.00
iC5	i-Pentane	0.17	0.58
nC5	n-Pentane	0.11	0.39
C6	Hexanes	0.12	0.50
	M-C-Pentane	0.04	0.16
	Benzene	0.02	0.06
	Cyclohexane	0.06	0.25
C7	Heptanes	0.03	0.20
	M-C-Hexane	0.05	0.24
	Toluene	0.03	0.11
C8	Octanes	0.01	0.09
	E-Benzene	0.00	0.00
	M/P-Xylene	0.00	0.02
	O-Xylene	0.00	0.01
C9	Nonanes	0.01	0.04
C10	Decanes	0.00	0.00
C11	Undecanes	0.00	0.00
C12+	Dodecanes Plus	0.00	0.02
	Totals	100.00	100.00

Sample Information	
Sampling Date	19.07.06
Sampling Time	03:20-0.3:40
Sampling Location	Sep Gas Line
Sample Description	Separator Gas
Cylinder Number	5072A
Sampling Conditions	775.0 psia @ 34°C

Additional Sample Information		
Opening Pressure	830	psig
Opening Temperature	43	°C
Total Air Content	0.03	Mole%
Our Lab Identification	-	

Notes

0.00 means less than 0.005.

Calculated Residue Properties		Mole %	Weight %	Mole Weight ($g.mol^{-1}$)	Density at 60°F ($g.cm^{-3}$)
C7+	Heptanes plus	0.25	1.20	94.2	0.7714
C8+	Octanes plus	0.10	0.53	103.7	0.7836
C10+	Decanes plus	0.00	0.02	175.4	0.8121
C12+	Dodecanes plus	0.00	0.02	181.7	0.8162

Calculated Whole Gas Properties		
Real Relative Density	0.7273	(Air=1 @ 14.73 psia and 60°F)
Whole Sample Mole Weight	21.00	$g.mol^{-1}$
Gas Density	0.8883	$kg.m^{-3}$ @ 15°C
Calorific Value	37.33	$MJ.m^{-3}$ (Real Gross @ 15°C, metered @ 15°C)
Calorific Value	33.74	$MJ.m^{-3}$ (Real Net @ 15°C, metered @ 15°C)
Gas Compressibility Factor	0.9971	14.73psia @ 60°F

Compositional Analysis of Separator Gas 4183A to C12+
(Sample No.: 1.16)

Component		Mole %	Weight %
H2	Hydrogen	0.00	0.00
H2S	Hydrogen Sulphide	0.00	0.00
CO2	Carbon Dioxide	10.04	20.94
N2	Nitrogen	1.43	1.90
C1	Methane	80.31	61.07
C2	Ethane	5.01	7.14
C3	Propane	1.75	3.67
iC4	i-Butane	0.29	0.81
nC4	n-Butane	0.38	1.04
C5	Neo-Pentane	0.00	0.00
iC5	i-Pentane	0.15	0.52
nC5	n-Pentane	0.10	0.33
C6	Hexanes	0.11	0.38
	M-C-Pentane	0.03	0.11
	Benzene	0.01	0.04
	Cyclohexane	0.04	0.18
C7	Heptanes	0.04	0.19
	M-C-Hexane	0.07	0.31
	Toluene	0.05	0.23
C8	Octanes	0.06	0.38
	E-Benzene	0.01	0.05
	M/P-Xylene	0.03	0.16
	O-Xylene	0.01	0.05
C9	Nonanes	0.06	0.37
C10	Decanes	0.02	0.13
C11	Undecanes	0.00	0.00
C12+	Dodecanes Plus	0.00	0.00
	Totals	100.00	100.00

Sample Information	
Sampling Date	19.07.06
Sampling Time	03:20-0.3:40
Sampling Location	Sep Gas Line
Sample Description	Separator Gas
Cylinder Number	4183A
Sampling Conditions	775.0 psia @ 34°C

Additional Sample Information		
Opening Pressure	820	psig
Opening Temperature	43	°C
Total Air Content	0.05	Mole%
Our Lab Identification	-	

Notes

0.00 means less than 0.005.

Calculated Residue Properties		Mole %	Weight %	Mole Weight ($g.mol^{-1}$)	Density at 60°F ($g.cm^{-3}$)
C7+	Heptanes plus	0.43	2.20	103.9	0.7681
C8+	Octanes plus	0.31	1.68	109.8	0.7719
C10+	Decanes plus	0.02	0.13	134.2	0.7782
C12+	Dodecanes plus	0.00	0.00	-	-

Calculated Whole Gas Properties		
Real Relative Density	0.7307	(Air=1 @ 14.73 psia and 60°F)
Whole Sample Mole Weight	21.10	$g.mol^{-1}$
Gas Density	0.8928	$kg.m^{-3}$ @ 15°C
Calorific Value	37.54	$MJ.m^{-3}$ (Real Gross @ 15°C, metered @ 15°C)
Calorific Value	33.94	$MJ.m^{-3}$ (Real Net @ 15°C, metered @ 15°C)
Gas Compressibility Factor	0.9970	14.73psia @ 60°F

Section D - Compositional Analysis Data - Separator Condensate

Compositional Analysis of Separator Condensate 7868-MA to C36+
(Sample No.: 1.14)

	Component	Mole %	Weight %
H_2	Hydrogen	0.00	0.00
H_2S	Hydrogen Sulphide	0.00	0.00
CO_2	Carbon Dioxide	3.96	1.84
N_2	Nitrogen	0.18	0.05
C_1	Methane	15.15	2.57
C_2	Ethane	4.23	1.34
C_3	Propane	4.12	1.92
iC_4	i-Butane	1.46	0.89
nC_4	n-Butane	2.58	1.58
C_5	Neo-Pentane	0.04	0.03
iC_5	i-Pentane	2.06	1.57
nC_5	n-Pentane	1.82	1.39
C_6	Hexanes	4.16	3.78
	M-C-Pentane	2.24	1.99
	Benzene	0.99	0.82
	Cyclohexane	3.89	3.45
C_7	Heptanes	4.75	5.02
	M-C-Hexane	7.09	7.34
	Toluene	3.94	3.83
C_8	Octanes	6.19	7.46
	E-Benzene	0.35	0.40
	M/P-Xylene	2.72	3.05
	O-Xylene	1.02	1.14
C_9	Nonanes	5.04	6.82
	1,2,4-TMB	0.64	0.81
C_{10}	Decanes	5.11	7.64
C_{11}	Undecanes	3.60	5.58
C_{12}	Dodecanes	2.59	4.40
C_{13}	Tridecanes	2.35	4.33
C_{14}	Tetradecanes	1.95	3.90
C_{15}	Pentadecanes	1.51	3.27
C_{16}	Hexadecanes	1.09	2.56
C_{17}	Heptdecanes	0.63	1.59
C_{18}	Octadecanes	0.80	2.12
C_{19}	Nonadecanes	0.48	1.34
C_{20}	Eicosanes	0.34	0.99
C_{21}	Heneicosanes	0.24	0.75
C_{22}	Docosanes	0.20	0.63
C_{23}	Tricosanes	0.14	0.46
C_{24}	Tetracosanes	0.11	0.37
C_{25}	Pentacosanes	0.07	0.25
C_{26}	Hexacosanes	0.05	0.17
C_{27}	Heptacosanes	0.03	0.13
C_{28}	Octacosanes	0.02	0.09
C_{29}	Nonacosanes	0.02	0.07
C_{30}	Triacontanes	0.01	0.05
C_{31}	Hentriacontanes	0.01	0.03
C_{32}	Dotriacontanes	0.01	0.02
C_{33}	Tritriacontanes	0.00	0.02
C_{34}	Tetratriacontanes	0.00	0.02
C_{35}	Pentatriacontanes	0.00	0.02
$C_{36}+$	Hexatriacontanes Plus	0.02	0.11
	Totals :	100.00	100.00

Note: 0.00 means < 0.005.

Compositional Analysis of Separator Condensate 7868-MA to C36+
(Sample No.: 1.14)

Calculated Residue Properties

C_7+	Mole%	60.24
	Molecular Weight (g mol-1)	131
	Density at 15.6°C (g cm-3)	0.7826
C_{11}+	Mole%	16.27
	Molecular Weight (g mol-1)	194
	Density at 15.6°C (g cm-3)	0.8247
C_{20}+	Mole%	1.27
	Molecular Weight (g mol-1)	314
	Density at 15.6°C (g cm-3)	0.8757
C_{36}+	Mole %	0.02
	Molecular Weight (g mol-1)	536
	Density at 15.6°C (g cm-3)	0.9250

Calculated Whole Sample Properties

	Average mole weight (g mol-1)	95

Section E - Wellstream Compositions

Gas-Oil Ratio Calculations, Products 5072A and 7868-MA
(Sample Nos.: 1.15 & 1.14)

Field Data

Standard Conditions	Pressure base	14.696	psia
	Temperature base	15.6	°C
Separator Conditions	Separator pressure	760	psig
	Separator temperature	34.0	°C
Gas Flow Data	Gas gravity factor, Fgf	1.1625	
	Supercompressibility factor, Fpvf	1.0640	
	Gas flow rate, Qf	49.1	MMscf / day
Liquid Flow Data	Shrinkage factor	1.182	
	B S & W	33.0	%
	Stocktank oil flow rate	144.0	bbl / day at 14.70 psia and 15.6°C

Laboratory Adjusted Data

Standard Conditions	Pressure base		14.696	psia
	Temperature base		15.6	°C
Gas Flow Data	Gas gravity factor, Fgl		1.1726	
	Supercompressibility factor, Fpvl		1.0628	
	Gas flow rate,	=	Qf x (Fgl/Fgf) x (Fpvl/Fpvf) x Fpb x Ftb	
		=	49.4	MMscf / day
Liquid Flow Data	Shrinkage factor	=	1.182	
	Separator Oil Flow Rate	=	114.0	bbl / day at 760 psig and 34.0°C
	Gas-Oil Ratio (Adjusted)	=	49.4 / 114.0	MMscf / bbl at 760 psig and 34.0°C
		=	0.43	MMscf / bbl at 760 psig and 34.0°C
			2.31	bbl / MMscf at 760 psig and 34.0°C

Fg is the gas gravity factor, the reciprocal of the square root of the gas gravity.
Fpv is the supercompressibility factor, the reciprocal of the square root of the deviation factor.
Q is the gas flow rate.
Fpb is (field pressure base) / (report pressure base).
Ftb is (report temperature base) / (field temperature base), temperatures in Rankine.

Compositional Analysis of Separator Products and Calculated Wellstream to C36+
(Sample Nos.: 1.15 & 1.14)

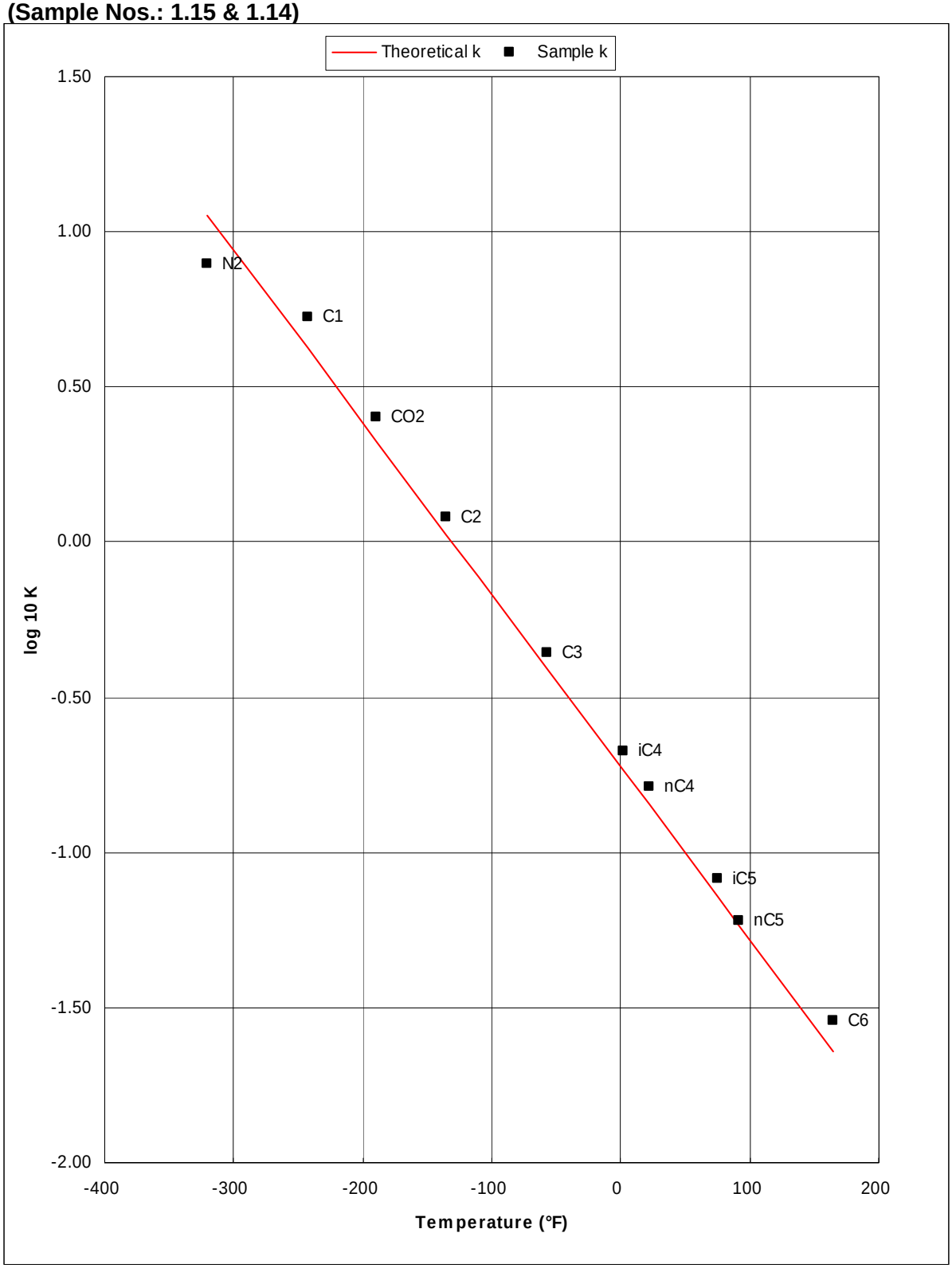
	Component	Separator Liquid		Separator Gas	Wellstream	
		Mole %	Weight %	Mole %	Mole %	Weight %
H_2	Hydrogen	0.00	0.00	0.00	0.00	0.00
H_2S	Hydrogen sulphide	0.00	0.00	0.00	0.00	0.00
CO_2	Carbon dioxide	3.96	1.84	10.06	10.05	20.88
N_2	Nitrogen	0.18	0.05	1.42	1.42	1.88
C_1	Methane	15.15	2.57	80.25	80.11	60.72
C_2	Ethane	4.23	1.34	5.06	5.06	7.18
C_3	Propane	4.12	1.92	1.81	1.82	3.78
iC_4	i-Butane	1.46	0.89	0.31	0.31	0.86
nC_4	n-Butane	2.58	1.58	0.42	0.42	1.17
C_5	neo-Pentane	0.04	0.03	0.00	0.00	0.00
iC_5	i-Pentane	2.06	1.57	0.17	0.17	0.59
nC_5	n-Pentane	1.82	1.39	0.11	0.11	0.39
C_6	Hexanes	4.16	3.78	0.12	0.13	0.53
	Me-Cyclo-pentane	2.24	1.99	0.04	0.05	0.18
	Benzene	0.99	0.82	0.02	0.02	0.08
	Cyclo-hexane	3.89	3.45	0.06	0.07	0.27
C_7	Heptanes	4.75	5.02	0.04	0.05	0.24
	Me-Cyclo-hexane	7.09	7.34	0.05	0.07	0.31
	Toluene	3.94	3.83	0.03	0.04	0.17
C_8	Octanes	6.19	7.46	0.02	0.03	0.18
	Ethyl-benzene	0.35	0.40	0.00	0.00	0.00
	Meta/Para-xylene	2.72	3.05	0.00	0.01	0.03
	Ortho-xylene	1.02	1.14	0.00	0.00	0.01
C_9	Nonanes	5.04	6.82	0.01	0.02	0.13
	Tri-Me-benzene	0.64	0.81	0.00	0.00	0.01
C_{10}	Decanes	5.11	7.64	0.00	0.01	0.08
C_{11}	Undecanes	3.60	5.58	0.00	0.01	0.06
C_{12}	Dodecanes	2.59	4.40	0.00	0.01	0.05
C_{13}	Tridecanes	2.35	4.33	0.00	0.01	0.04
C_{14}	Tetradecanes	1.95	3.90	0.00	0.00	0.04
C_{15}	Pentadecanes	1.51	3.27	0.00	0.00	0.03
C_{16}	Hexadecanes	1.09	2.56	0.00	0.00	0.03
C_{17}	Heptadecanes	0.63	1.59	0.00	0.00	0.02
C_{18}	Octadecanes	0.80	2.12	0.00	0.00	0.02
C_{19}	Nonadecanes	0.48	1.34	0.00	0.00	0.01
C_{20}	Eicosanes	0.34	0.99	0.00	0.00	0.01
C_{21}	Heneicosanes	0.24	0.75	0.00	0.00	0.01
C_{22}	Docosanes	0.20	0.63	0.00	0.00	0.01
C_{23}	Tricosanes	0.14	0.46	0.00	0.00	0.00
C_{24}	Tetracosanes	0.11	0.37	0.00	0.00	0.00
C_{25}	Pentacosanes	0.07	0.25	0.00	0.00	0.00
C_{26}	Hexacosanes	0.05	0.17	0.00	0.00	0.00
C_{27}	Heptacosanes	0.03	0.13	0.00	0.00	0.00
C_{28}	Octacosanes	0.02	0.09	0.00	0.00	0.00
C_{29}	Nonacosanes	0.02	0.07	0.00	0.00	0.00
C_{30}	Triacontanes	0.01	0.05	0.00	0.00	0.00
C_{31}	Hentriacontanes	0.01	0.03	0.00	0.00	0.00
C_{32}	Dotriacontanes	0.01	0.02	0.00	0.00	0.00
C_{33}	Tritriacontanes	0.00	0.02	0.00	0.00	0.00
C_{34}	Tetratriacontanes	0.00	0.02	0.00	0.00	0.00
C_{35}	Pentatriacontanes	0.00	0.02	0.00	0.00	0.00
$C_{36}+$	Hexatriacontanes plus	0.02	0.11	0.00	0.00	0.00
	Totals :	100.00	100.00	100.00	100.00	100.00

Note: 0.00 means less than 0.005.

Compositional Analysis of Separator Products and Calculated Wellstream to C36+
(Sample Nos.: 1.15 & 1.14)

Calculated Properties	Separator Liquid	Separator Gas	Wellstream
C_7+			
Mole%	60.24	0.27	0.40
Molecular Weight (g mol-1)	131	94	106
Density at 15.6°C (g cm-3)	0.7826	0.7650	0.7714
C_{11}+			
Mole%	16.27		0.03
Molecular Weight (g mol-1)	194	181	194
Density at 15.6°C (g cm-3)	0.8247	0.8158	0.8247
C_{20}+			
Mole%	1.27		0.00
Molecular Weight (g mol-1)	314		313
Density at 15.6°C (g cm-3)	0.8757		0.8756
C_{36}+			
Mole %	0.02		0.00
Molecular Weight (g mol-1)	536		536
Density at 15.6°C (g cm-3)	0.9250		0.9250
Calculated Whole Sample Properties			
Average mole weight (g mol-1)	94.8	21.0	21.2
Density at separator conditions (g cm-3 at 760 psig and 34.0°C)	0.7163		
Real relative density (Air = 1.000 at 14.696 psia 15.6°C)		0.727	

Graph of log(Equilibrium k) v Temperature
(Sample Nos.: 1.15 & 1.14)



Note: Theoretical k Values ref. GPSA Engineering Data Book, Vol I, Section 25, "Equilibrium Ratio (K) Data",1987.

Section F - Appendix

Data Used in Gas Compositional Calculations

Component		Mole Weight (g mol-1)	Density (g cm-3 at 60°F)	Component		Mole Weight (g mol-1)	Density (g cm-3 at 60°F)
Hydrogen	*	2.016	N/A	33DMC5	*	100.20	0.6954
Oxygen/(Argon)	**	31.999	1.1410	Cyclohexane	*	84.16	0.7827
Nitrogen (Corrected)	**	28.013	0.8086	2MC6/23DMC5	*	100.20	0.6917
Methane	**	16.043	0.2997	11DMCYC5/3MC6	*	99.20	0.7253
Carbon Dioxide	**	44.010	0.8172	t13DMCYC5	*	98.19	0.7528
Ethane	**	30.070	0.3558	c13DMCYC5/3EC5	*	99.20	0.7262
Hydrogen Sulphide	**	34.080	0.8006	t12DMCYC5	*	98.19	0.7554
Propane	**	44.097	0.5065	Heptanes (nC7)	*	100.20	0.6875
i-Butane	**	58.123	0.5623	22DMC6	*	114.23	0.6994
n-Butane	**	58.123	0.5834	MCYC6	*	98.19	0.7740
Neo-Pentane	*	72.15	0.5968	ECYC5	*	98.19	0.7704
i-Pentane	**	72.150	0.6238	223TMC5/24&25DMC6	*	114.23	0.7060
n-Pentane	**	72.150	0.6305	ctc124TMCYC5	*	112.21	0.7511
22DMC4	*	86.18	0.6529	ctc123TMCYC5	*	112.21	0.7574
23DMC4/CYC5	*	78.16	0.7129	Toluene	*	92.14	0.8734
2MC5	*	86.18	0.6572	Octanes (nC8)	*	114.23	0.7063
3MC5	*	86.18	0.6682	E-Benzene	*	106.17	0.8735
Hexanes (nC6)	*	86.18	0.6631	M/P-Xylene	*	106.17	0.8671
22DMC5	*	100.20	0.6814	O-Xylene	*	106.17	0.8840
M-C-Pentane	*	84.16	0.7533	Nonanes (nC9)	*	128.26	0.7212
24DMC5	*	100.20	0.6757	Decanes	***	134	0.778
223TMC4	*	100.20	0.6947	Undecanes	***	147	0.789
Benzene	*	78.11	0.8820	Dodecanes	***	161	0.800

Data Source Refs :

* ASTM Data Series Publication DS 4B (1991) - Physical Constants of Hydrocarbon and Non-Hydrocarbon Compounds.

** GPA Table of Physical Constants of Paraffin Hydrocarbons and Other Components of Natural Gas, GPA 2145-96.

*** Journal of Petroleum Technology, Nov 1978, Pages 1649-1655.
Predicting Phase Behaviour of Condensate/Crude Oil Systems Using Methane Interaction Coefficients - D.L. Katz & A. Firoozabadi.

Note :
The gas mole % compositions were calculated from the measured weight % compositions using the most detailed analysis results, involving as many of the above components as were identified. The reported component mole % compositions were then sub-grouped into the generic carbon number components.

Data Used in Liquid Compositional Calculations

Component		Mole Weight (g mol-1)	Density (g cm-3 at 60°F)	Component		Mole Weight (g mol-1)	Density (g cm-3 at 60°F)
Hydrogen	*	2.016	N/A	Undecanes	***	147	0.789
Hyd. sulphide	**	34.080	0.8006	Dodecanes	***	161	0.800
Carbon Dioxide	**	44.010	0.8172	Tridecanes	***	175	0.811
Nitrogen	**	28.013	0.8086	Tetradecanes	***	190	0.822
Methane	**	16.043	0.2997	Pentadecanes	***	206	0.832
Ethane	**	30.070	0.3558	Hexadecanes	***	222	0.839
Propane	**	44.097	0.5065	Heptadecanes	***	237	0.847
i-Butane	**	58.123	0.5623	Octadecanes	***	251	0.852
n-Butane	**	58.123	0.5834	Nonadecanes	***	263	0.857
i-Pentane	**	72.150	0.6238	Eicosanes	***	275	0.862
n-Pentane	**	72.150	0.6305	Heneicosanes	***	291	0.867
Hexanes	**	86.177	0.6634	Docosanes	***	305	0.872
Me-cyclo-pentane	*	84.16	0.7533	Tricosanes	***	318	0.877
Benzene	*	78.11	0.8820	Tetracosanes	***	331	0.881
Cyclo-hexane	*	84.16	0.7827	Pentacosanes	***	345	0.885
Heptanes	**	100.204	0.6874	Hexacosanes	***	359	0.889
Me-cyclo-hexane	*	98.19	0.7740	Heptacosanes	***	374	0.893
Toluene	*	92.14	0.8734	Octacosanes	***	388	0.896
Octanes	**	114.231	0.7061	Nonacosanes	***	402	0.899
Ethyl-benzene	*	106.17	0.8735	Triacontanes	***	416	0.902
Meta/Para-xylene	*	106.17	0.8671	Hentriacontanes	***	430	0.906
Ortho-xylene	*	106.17	0.8840	Dotriacontanes	***	444	0.909
Nonanes	**	128.258	0.7212	Tritriacontanes	***	458	0.912
1-2-4-T-M-benzene	*	120.19	0.8797	Tetratriacontanes	***	472	0.914
Decanes	**	142.285	0.7334	Pentatriacontanes	***	486	0.917

Data Source Refs :

* ASTM Data Series Publication DS 4B (1991) - Physical Constants of Hydrocarbon and Non-Hydrocarbon Compounds.

** GPA Table of Physical Constants of Paraffin Hydrocarbons and Other Components of Natural Gas GPA 2145-96.

*** Journal of Petroleum Technology, Nov 1978, Pages 1649-1655.
Predicting Phase Behaviour of Condensate/Crude Oil Systems Using Methane Interaction Coefficients - D.L. Katz & A. Firoozabadi.

Note :
The residue mole weight and density values (eg heptanes plus, undecanes plus, eicosanes plus) are calculated so that the calculated average mole weights and densities correspond with the measured values. This can lead to anomalous residue mole weights and densities where the Katz and Firoozabadi values may not be suitable for the isomer groups detected.

Report prepared by	**Report approved by**
Daryl Sequeira **Project Coordinator**	**Murray Macleod** **Laboratory Supervisor**