



FIELD GAS ANALYSIS FINAL REPORT
of
EAST PILCHARD-1
for
ESSO AUSTRALIA PTY LTD
by
ACS LABORATORIES PTY LTD



23 August 2001

Esso Australia Pty Ltd
GPO Box 400C
MELBOURNE VIC 3001

Attention: Andrew Hodgson

FIELD GAS ANALYSIS - FINAL REPORT 0338-06

EAST PILCHARD-1

Please find enclosed the final results of the field gas analysis and fluid transfers performed at the East Pilchard-1 well site, Bass Strait.

If ACS can assist you in any way or if you require any further information, please do not hesitate to contact the undersigned.

NICK COX
PVT Laboratory Manager

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Head Office: 8 Cox Road, Windsor Qld 4030, Australia
☎: 61 7 3357 1133 Facsimile: 61 7 3357 1100
E-mail: acs.bris@acslabs.com.au

ACS Laboratories Pty Ltd
ABN: 81 008 273 005

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CHAPTER 1

SAMPLE DETAILS & VALIDATION CHECKS

SAMPLE DETAILS

Client: Esso Australia Pty Ltd

Well: East Pilchard-1

Well Number	East Pilchard-1
Sampling Depth	2593.5 - 3122.0 m RT
Sampling Date	26th July - 4th August 2001
Sample Type	Bottomhole
Reservoir Pressure	3892 - 4861 psia
Reservoir Temperature	88 - 122 °C

Standard conditions of temperature and pressure for this study are 15.6°C and 14.7 psia.

SUMMARY OF BOTTOMHOLE SAMPLE VALIDATION CHECKS

Client: Esso Australia Pty Ltd
Well: East Pilchard-1

Sampling & Transfer Details				Sampling Conditions		Field Opening Conditions		
Sample Number	Sampling Depth (m RT)	Down Hole Tool Number	ACS Cylinder Number	Pressure (psia)	Temperature (°C)	Pressure (psia)	Temperature (°C)	Free Water Volume (cc's)
1	2925.5	MRSC-BB-090	817398	4329.0	112.4	3415	20	310
2	2593.5	MRSC-BB-119	817397	3891.6	88.4	3855	14	0
-	2593.5	MPSR-0157	N/A	3891.6	88.4	3990	14	N/A
-	2596.0	MPSR-0193	N/A	3892.2	94.2	4015	14	N/A
3	2627.5	MPSR-0501	817395	3907.1	95.5	3965	14	5
-	2627.5	MPSR-0123	N/A	3907.1	95.5		Tool Empty	
5	2667.5	MPSR-0503	817393	3950.8	101.9	3315	13	50
6	2728.5	MPSR-0487	TS-39-18	3999.9	104.5	2615	13	Water Sample
7	2728.5	MRSC-BB-105	817394	3999.9	104.5	3415	13	N/A
8	2756.0	MPSR-0478	TS-33-09	4031.7	105.3	3315	13	0
9	2792.0	MPSR-0477	817396	4074.6	107.2	3415	13	15
-	2627.5	MPSR-0122	N/A	3902.6	95.5	3215	13	N/A
-	2641.0	MPSR-0156	N/A	3906.8	99.9	3265	13	N/A
-	2792.0	MPSR-0187	N/A	4069.9	107.2	3425	13	N/A
-	2965.5	MPSR-0123	TS-24711	4436.5	114.3	2265	13	0
-	2965.5	MPSR-0477	TS-24713	4436.5	114.3	3015	13	0
-	3095.0	MPSR-0186	TS-23-05	4803.1	120.8	2925	13	80
-	3095.0	MPSR-0497	N/A	4803.1	120.8		Tool Empty	
-	3103.8	MPSR-0192	TS-24409	4808.4	120.3	2965	13	0
-	3103.8	MPSR-0479	TS-23804	4804.4	120.3	3015	13	0
-	3122.0	MPSR-0494	TS-27-07	4860.8	121.8	2865	13	0
-	3122.0	MPSR-0485	TS-24410	4860.8	121.8	2815	13	0

CHAPTER 2

ANALYSIS RESULTS

COMPOSITION OF BOTTOMHOLE FLASH-GAS
(by Chromatographic Techniques)

Client: Esso Australia Pty Ltd
Well: East Pilchard-1
Down Hole Tool No: MRSC-BB-090
Sampling Depth: 2925.5 m RT
Sampling Time and Date: 26/07/2001 at 11:58 hrs
Sampling Conditions: 4329 psia at 112°C
Field Opening Pressure: 3415 psia at 20°C

Component	Flash Gas (Mole %)	Flash Gas (Weight %)	Molecular Weight	Liquid Density (g/cm ³)
Hydrogen Sulphide	0.00	0.00	34.08	0.801
Carbon Dioxide	49.61	70.41	44.01	0.817
Nitrogen	0.49	0.44	28.01	0.809
Methane	45.73	23.65	16.04	0.300
Ethane	2.29	2.22	30.07	0.356
Propane	1.11	1.58	44.10	0.507
iso-Butane	0.19	0.36	58.12	0.563
n-Butane	0.26	0.48	58.12	0.584
iso-Pentane	0.10	0.23	72.15	0.624
n-Pentane	0.10	0.23	72.15	0.631
Hexanes	0.06	0.15	84.00	0.685
Heptanes	0.05	0.15	96.00	0.722
Octanes plus	0.03	0.10	107.00	0.745
TOTALS:	100.00	100.00		

Sample Properties

Critical Pressure (psia): 866.1
Critical Temperature (°R): 455.9
Calculated Gas Gravity (Air = 1.000): 1.071
Average Molecular Weight: 31.0

CO₂ content by Draeger Tubes (mol %): 52
H₂S content by Draeger Tubes (ppm): <0.5

COMPOSITION OF BOTTOMHOLE FLASH-GAS

(by Chromatographic Techniques)

Client: Esso Australia Pty Ltd
Well: East Pilchard-1
Down Hole Tool No: MRSC-BB-119
Sampling Depth: 2593.5 m RT
Sampling Time and Date: 27/07/2001 at 15:10 - 15:24 hrs

Sampling Conditions: 3892 psia at 88°C
Field Opening Pressure: 3855 psia at 14°C

Component	Flash Gas (Mole %)	Flash Gas (Weight %)	Molecular Weight	Liquid Density (g/cm ³)
Hydrogen Sulphide	0.00	0.00	34.08	0.801
Carbon Dioxide	9.49	19.14	44.01	0.817
Nitrogen	2.35	3.01	28.01	0.809
Methane	76.84	56.54	16.04	0.300
Ethane	6.01	8.29	30.07	0.356
Propane	3.03	6.13	44.10	0.507
iso-Butane	0.52	1.39	58.12	0.563
n-Butane	0.89	2.36	58.12	0.584
iso-Pentane	0.30	0.99	72.15	0.624
n-Pentane	0.31	1.02	72.15	0.631
Hexanes	0.14	0.53	84.00	0.685
Heptanes	0.10	0.42	96.00	0.722
Octanes plus	0.04	0.18	107.00	0.745
TOTALS:	100.00	100.00		

Sample Properties

Critical Pressure (psia): 699.3
 Critical Temperature (°R): 392.4
 Calculated Gas Gravity (Air = 1.000): 0.753
 Average Molecular Weight: 21.8

 CO₂ content by Draeger Tubes (mol %): 7
 H₂S content by Draeger Tubes (ppm): <0.5

COMPOSITION OF BOTTOMHOLE FLASH-GAS
(by Chromatographic Techniques)

Client: Esso Australia Pty Ltd
Well: East Pilchard-1
Down Hole Tool No: MPSR-0501
Sampling Depth: 2627.5 m RT
Sampling Time and Date: 27/07/2001 at 17:50 - 18:02 hrs
Sampling Conditions: 3907 psia at 95°C
Field Opening Pressure: 3965 psia at 14°C

Component	Flash Gas (Mole %)	Flash Gas (Weight %)	Molecular Weight	Liquid Density (g/cm ³)
Hydrogen Sulphide	0.00	0.00	34.08	0.801
Carbon Dioxide	12.57	24.76	44.01	0.817
Nitrogen	2.29	2.87	28.01	0.809
Methane	74.99	53.86	16.04	0.300
Ethane	5.55	7.47	30.07	0.356
Propane	2.65	5.24	44.10	0.507
iso-Butane	0.45	1.16	58.12	0.563
n-Butane	0.73	1.91	58.12	0.584
iso-Pentane	0.25	0.80	72.15	0.624
n-Pentane	0.26	0.83	72.15	0.631
Hexanes	0.12	0.45	84.00	0.685
Heptanes	0.10	0.41	96.00	0.722
Octanes plus	0.05	0.24	107.00	0.745
TOTALS:	100.00	100.00		

Sample Properties

Critical Pressure (psia): 712.3
Critical Temperature (°R): 395.1
Calculated Gas Gravity (Air = 1.000): 0.772
Average Molecular Weight: 22.3

CO₂ content by Draeger Tubes (mol %): 10
H₂S content by Draeger Tubes (ppm): <0.5

COMPOSITION OF BOTTOMHOLE FLASH-GAS
(by Chromatographic Techniques)

Client: Esso Australia Pty Ltd
Well: East Pilchard-1
Down Hole Tool No: MPSR-0503
Sampling Depth: 2667.5 m RT
Sampling Time and Date: 28/07/2001 at 11:00 - 11:03 hrs
Sampling Conditions: 3951 psia at 102°C
Field Opening Pressure: 3315 psia at 13°C

Component	Flash Gas (Mole %)	Flash Gas (Weight %)	Molecular Weight	Liquid Density (g/cm ³)
Hydrogen Sulphide	0.00	0.00	34.08	0.801
Carbon Dioxide	16.00	30.34	44.01	0.817
Nitrogen	2.10	2.53	28.01	0.809
Methane	71.93	49.73	16.04	0.300
Ethane	5.52	7.15	30.07	0.356
Propane	2.65	5.03	44.10	0.507
iso-Butane	0.41	1.02	58.12	0.563
n-Butane	0.68	1.71	58.12	0.584
iso-Pentane	0.23	0.70	72.15	0.624
n-Pentane	0.24	0.73	72.15	0.631
Hexanes	0.11	0.40	84.00	0.685
Heptanes	0.09	0.39	96.00	0.722
Octanes plus	0.06	0.27	107.00	0.745
TOTALS:	100.00	100.00		

Sample Properties

Critical Pressure (psia): 726.6
Critical Temperature (°R): 401.7
Calculated Gas Gravity (Air = 1.000): 0.802
Average Molecular Weight: 23.2

CO₂ content by Draeger Tubes (mol %): 14
H₂S content by Draeger Tubes (ppm): <0.5

COMPOSITION OF BOTTOMHOLE FLASH-GAS
(by Chromatographic Techniques)

Client: Esso Australia Pty Ltd
Well: East Pilchard-1
Down Hole Tool No: MRSC-BB-105
Sampling Depth: 2728.5 m RT
Sampling Time and Date: 28/07/2001 at 12:44 - 12:56 hrs
Sampling Conditions: 4000 psia at 105°C
Field Opening Pressure: 3415 psia at 13°C

Component	Flash Gas (Mole %)	Flash Gas (Weight %)	Molecular Weight	Liquid Density (g/cm ³)
Hydrogen Sulphide	0.00	0.00	34.08	0.801
Carbon Dioxide	15.82	30.24	44.01	0.817
Nitrogen	2.31	2.81	28.01	0.809
Methane	72.24	50.32	16.04	0.300
Ethane	5.48	7.16	30.07	0.356
Propane	2.53	4.85	44.10	0.507
iso-Butane	0.38	0.96	58.12	0.563
n-Butane	0.64	1.63	58.12	0.584
iso-Pentane	0.20	0.64	72.15	0.624
n-Pentane	0.21	0.65	72.15	0.631
Hexanes	0.09	0.31	84.00	0.685
Heptanes	0.06	0.25	96.00	0.722
Octanes plus	0.04	0.18	107.00	0.745
TOTALS:	100.00	100.00		

Sample Properties

Critical Pressure (psia): 726.0
Critical Temperature (°R): 399.6
Calculated Gas Gravity (Air = 1.000): 0.795
Average Molecular Weight: 23.0

CO₂ content by Draeger Tubes (mol %): 16
H₂S content by Draeger Tubes (ppm): <0.5

COMPOSITION OF BOTTOMHOLE FLASH-GAS
(by Chromatographic Techniques)

Client: Esso Australia Pty Ltd
Well: East Pilchard-1
Down Hole Tool No: MPSR-0477
Sampling Depth: 2792.0 m RT
Sampling Time and Date: 28/07/2001 at 16:35 - 16:38 hrs
Sampling Conditions: 4075 psia at 107°C
Field Opening Pressure: 3415 psia at 13°C

Component	Flash Gas (Mole %)	Flash Gas (Weight %)	Molecular Weight	Liquid Density (g/cm ³)
Hydrogen Sulphide	0.00	0.00	34.08	0.801
Carbon Dioxide	16.40	31.25	44.01	0.817
Nitrogen	2.20	2.67	28.01	0.809
Methane	72.22	50.13	16.04	0.300
Ethane	5.20	6.77	30.07	0.356
Propane	2.37	4.53	44.10	0.507
iso-Butane	0.38	0.95	58.12	0.563
n-Butane	0.60	1.51	58.12	0.584
iso-Pentane	0.20	0.61	72.15	0.624
n-Pentane	0.20	0.63	72.15	0.631
Hexanes	0.10	0.35	84.00	0.685
Heptanes	0.08	0.34	96.00	0.722
Octanes plus	0.06	0.26	107.00	0.745
TOTALS:	100.00	100.00		

Sample Properties

Critical Pressure (psia): 728.4
Critical Temperature (°R): 399.9
Calculated Gas Gravity (Air = 1.000): 0.798
Average Molecular Weight: 23.1

CO₂ content by Draeger Tubes (mol %): 14
H₂S content by Draeger Tubes (ppm): <0.5

COMPOSITION OF BOTTOMHOLE FLASH-GAS
(by Chromatographic Techniques)

Client: Esso Australia Pty Ltd
Well: East Pilchard-1
Down Hole Tool No: MPSR-0123
Sampling Depth: 2965.5 m RT
Sampling Time and Date: 4/08/2001 at 11:00 - 11:04 hrs
Sampling Conditions: 4437 psia at 114°C
Field Opening Pressure: 2265 psia at 13°C

Component	Flash Gas (Mole %)	Flash Gas (Weight %)	Molecular Weight	Liquid Density (g/cm ³)
Hydrogen Sulphide	0.00	0.00	34.08	0.801
Carbon Dioxide	15.17	28.89	44.01	0.817
Nitrogen	2.84	3.45	28.01	0.809
Methane	71.98	49.98	16.04	0.300
Ethane	5.26	6.85	30.07	0.356
Propane	2.74	5.22	44.10	0.507
iso-Butane	0.65	1.64	58.12	0.563
n-Butane	0.74	1.85	58.12	0.584
iso-Pentane	0.27	0.86	72.15	0.624
n-Pentane	0.19	0.60	72.15	0.631
Hexanes	0.08	0.28	84.00	0.685
Heptanes	0.06	0.25	96.00	0.722
Octanes plus	0.03	0.13	107.00	0.745
TOTALS:	100.00	100.00		

Sample Properties

Critical Pressure (psia): 721.7
Critical Temperature (°R): 399.4
Calculated Gas Gravity (Air = 1.000): 0.798
Average Molecular Weight: 23.1

CO₂ content by Draeger Tubes (mol %): 13
H₂S content by Draeger Tubes (ppm): <0.5

COMPOSITION OF BOTTOMHOLE FLASH-GAS
(by Chromatographic Techniques)

Client: Esso Australia Pty Ltd
Well: East Pilchard-1
Down Hole Tool No: MPSR-0186
Sampling Depth: 3095.0 m RT
Sampling Time and Date: 4/08/2001 at 17:05 hrs
Sampling Conditions: 4803 psia at 121°C
Field Opening Pressure: 2925 psia at 13°C

Component	Flash Gas (Mole %)	Flash Gas (Weight %)	Molecular Weight	Liquid Density (g/cm ³)
Hydrogen Sulphide	0.00	0.00	34.08	0.801
Carbon Dioxide	14.79	29.02	44.01	0.817
Nitrogen	3.02	3.77	28.01	0.809
Methane	73.97	52.87	16.04	0.300
Ethane	4.92	6.59	30.07	0.356
Propane	2.02	3.98	44.10	0.507
iso-Butane	0.31	0.79	58.12	0.563
n-Butane	0.51	1.32	58.12	0.584
iso-Pentane	0.16	0.50	72.15	0.624
n-Pentane	0.16	0.52	72.15	0.631
Hexanes	0.07	0.26	84.00	0.685
Heptanes	0.06	0.24	96.00	0.722
Octanes plus	0.03	0.14	107.00	0.745
TOTALS:	100.00	100.00		

Sample Properties

Critical Pressure (psia): 721.1
Critical Temperature (°R): 392.3
Calculated Gas Gravity (Air = 1.000): 0.775
Average Molecular Weight: 22.4

CO₂ content by Draeger Tubes (mol %): 12
H₂S content by Draeger Tubes (ppm): <0.5

COMPOSITION OF BOTTOMHOLE FLASH-GAS
(by Chromatographic Techniques)

Client: Esso Australia Pty Ltd
Well: East Pilchard-1
Down Hole Tool No: MPSR-0192
Sampling Depth: 3103.8 m RT
Sampling Time and Date: 4/08/2001 at 18:18 hrs
Sampling Conditions: 4808 psia at 120°C
Field Opening Pressure: 2965 psia at 13°C

Component	Flash Gas (Mole %)	Flash Gas (Weight %)	Molecular Weight	Liquid Density (g/cm ³)
Hydrogen Sulphide	0.00	0.00	34.08	0.801
Carbon Dioxide	15.77	30.49	44.01	0.817
Nitrogen	2.59	3.19	28.01	0.809
Methane	73.11	51.53	16.04	0.300
Ethane	4.99	6.59	30.07	0.356
Propane	2.14	4.14	44.10	0.507
iso-Butane	0.32	0.82	58.12	0.563
n-Butane	0.56	1.42	58.12	0.584
iso-Pentane	0.18	0.56	72.15	0.624
n-Pentane	0.18	0.58	72.15	0.631
Hexanes	0.08	0.29	84.00	0.685
Heptanes	0.06	0.26	96.00	0.722
Octanes plus	0.03	0.13	107.00	0.745
TOTALS:	100.00	100.00		

Sample Properties

Critical Pressure (psia): 725.6
Critical Temperature (°R): 395.9
Calculated Gas Gravity (Air = 1.000): 0.786
Average Molecular Weight: 22.8

CO₂ content by Draeger Tubes (mol %): 13
H₂S content by Draeger Tubes (ppm): <0.5

COMPOSITION OF BOTTOMHOLE FLASH-GAS
(by Chromatographic Techniques)

Client: Esso Australia Pty Ltd
Well: East Pilchard-1
Down Hole Tool No: MPSR-0494
Sampling Depth: 3122.0 m RT
Sampling Time and Date: 4/08/2001 at 20:58 hrs
Sampling Conditions: 4861 psia at 122°C
Field Opening Pressure: 2865 psia at 13°C

Component	Flash Gas (Mole %)	Flash Gas (Weight %)	Molecular Weight	Liquid Density (g/cm ³)
Hydrogen Sulphide	0.00	0.00	34.08	0.801
Carbon Dioxide	13.50	26.78	44.01	0.817
Nitrogen	2.57	3.25	28.01	0.809
Methane	75.07	54.29	16.04	0.300
Ethane	5.20	7.05	30.07	0.356
Propane	2.23	4.42	44.10	0.507
iso-Butane	0.33	0.86	58.12	0.563
n-Butane	0.58	1.51	58.12	0.584
iso-Pentane	0.18	0.57	72.15	0.624
n-Pentane	0.18	0.59	72.15	0.631
Hexanes	0.08	0.28	84.00	0.685
Heptanes	0.06	0.26	96.00	0.722
Octanes plus	0.03	0.14	107.00	0.745
TOTALS:	100.00	100.00		

Sample Properties

Critical Pressure (psia): 716.5
Critical Temperature (°R): 392.1
Calculated Gas Gravity (Air = 1.000): 0.766
Average Molecular Weight: 22.2

CO₂ content by Draeger Tubes (mol %): 11
H₂S content by Draeger Tubes (ppm): <0.5