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**100-04-11-010-28-W100**

**ENERPLUS CORPORATION  
FINAL REPORT**

*Daly Unit #3  
Lic # 281*

- SECTION 1: SAMPLE VALIDATION RESULTS
- SECTION 2: RECOMBINED SAMPLE (RESERVOIR FLUID PROPERTIES)
- SECTION 3: DIFFERENTIAL LIBERATION RESULTS
- SECTION 4: SEPARATOR TEST RESULTS

Prepared for

**enerPLUS**  
CORPORATION

By

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June 14, 2011

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PROJECT FILE : CL-49659



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**ENERPLUS CORPORATION  
SECTION 1  
SAMPLE VALIDATION RESULTS**

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PROJECT FILE : CL-49954

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## SECTION 1 - SAMPLE VALIDATION RESULTS

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**TABLE 1-1**  
**ENERPLUS CORPORATION - DALY UNIT 3**  
**WELL 02-11-10-28W1M - SAMPLE CYL3598**  
**SAMPLE VALIDATION**  
**GAS SAMPLE COLLECTION DATA**

Project File:	CL-49659	
Company:	ENERPLUS CORPORATION	
Pool:	DALY UNIT 3	
Field:	LODGEPOLE	
Well Location:	02-11-10-28W1M	
Fluid Sample:	CYL3598	
Sample Description:	SEPARATOR GAS	
Sampling Company:	HYCAL ENERGY	
Name of Sampler:	DM	
Sampling Date:	11-Nov-10	
Sampling Point:	SEPARATOR	
Sampling Temperature:	68.0 F	20.0 C
Sampling Pressure:	14 psia	0.10 MPa
Reservoir Temperature:	82.4 F	28.0 C
Reservoir Pressure:	N/A psia	N/A MPa
Initial Reservoir Pressure (Pi)	955.0 psia	6.59 MPa
Depth of Reported Pi	N/A mMD	N/A mss



## SECTION 1 - SAMPLE VALIDATION RESULTS

**TABLE 1-2**  
**ENERPLUS CORPORATION - DALY UNIT 3**  
**WELL 02-11-10-28W1M - SAMPLE CYL3598**  
**SAMPLE VALIDATION**  
**COMPOSITIONAL ANALYSIS OF FLASHED GAS**

Component Name	Chemical Symbol	Mole Fraction		Liquid Volume	
		As Analyzed	Acid Gas Free	STB/MMscf	mL/m3
Nitrogen	N <sub>2</sub>	0.2120	0.2187		
Carbon Dioxide	CO <sub>2</sub>	0.0308	0.0000		
Hydrogen Sulphide	H <sub>2</sub> S	0.0000	0.0000		
Methane	C <sub>1</sub>	0.0665	0.0686		
Ethane	C <sub>2</sub>	0.2542	0.2623		
Propane	C <sub>3</sub>	0.2572	0.2653	167.935	942.871
i-Butane	i-C <sub>4</sub>	0.0356	0.0367	27.598	154.948
n-Butane	n-C <sub>4</sub>	0.0750	0.0773	56.084	314.882
i-Pentane	i-C <sub>5</sub>	0.0159	0.0164	13.855	77.786
n-Pentane	n-C <sub>5</sub>	0.0138	0.0142	11.840	66.476
Hexanes	C <sub>6</sub>	0.0089	0.0092	8.685	48.761
Heptanes	C <sub>7</sub>	0.0290	0.0300	31.800	178.540
Octanes	C <sub>8</sub>	0.0012	0.0013	1.486	8.344
Nonanes	C <sub>9</sub>	0.0000	0.0000	0.026	0.147
Decanes	C <sub>10</sub>	0.0000	0.0000	0.011	0.061
Undecane	C <sub>11</sub>	0.0000	0.0000	0.000	0.000
Dodecanes Plus	C <sub>12+</sub>	0.0000	0.0000	0.000	0.000
Total		1.0000	1.0000	319.319	1792.817
Propanes Plus	C <sub>3+</sub>	0.4366	0.4505	319.319	1792.817
Butanes Plus	C <sub>4+</sub>	0.1794	0.1851	151.384	849.946
Pentanes Plus	C <sub>5+</sub>	0.0689	0.0711	67.702	380.116

Calculated Gas Properties @ Standard Conditions			Calculated Pseudocritical Properties		
Molecular Weight	39.60 kg/kmol	39.60 lb/lb-mol	Ppc	610.7 psia	4.21 MPa
Specific Gravity	1.3672 (Air = 1)	1.3672 (Air = 1)	Tpc	577 F	302.7 C
MW of C7+	96.47 kg/kmol	96.47 lb/lbmol	Ppc*	605.4 psia	4.17 MPa
Density of C7+	0.7230 g/cc	723.0 kg/m3	Tpc*	572 F	300.1 C

Calculated Gross Heating Value @ Standard Conditions			Calculated Net Heating Value @ Standard Conditions		
Dry	1,853.4 Btu/scf	69.18 MJ/m3	Dry	1,704.3 Btu/scf	63.62 MJ/m3
Wet	1,821.1 Btu/scf	67.98 MJ/m3	Wet	1,674.7 Btu/scf	62.51 MJ/m3

\* - Corrected for Acid Gas Content

Standard Conditions: 60 F (15.5 C) @ 14.696 psia (0.101325 MPa)

GC ID: 4092

ID: 10874

# SECTION 1 - SAMPLE VALIDATION RESULTS

**TABLE 1-3**  
**ENERPLUS CORPORATION - DALY UNIT 3**  
**WELL 02-11-10-28W1M - SAMPLE AM4**  
**SAMPLE VALIDATION**  
**COMPOSITIONAL ANALYSIS OF FLASHED GAS**

Component Name	Chemical Symbol	Mole Fraction		Liquid Volume	
		As Analyzed	Acid Gas Free	STB/MMscf	mL/m3
Nitrogen	N <sub>2</sub>	0.1116	0.1153		
Carbon Dioxide	CO <sub>2</sub>	0.0319	0.0000		
Hydrogen Sulphide	H <sub>2</sub> S	0.0000	0.0000		
Methane	C <sub>1</sub>	0.0679	0.0701		
Ethane	C <sub>2</sub>	0.2827	0.2920		
Propane	C <sub>3</sub>	0.2953	0.3050	192.836	1082.681
i-Butane	i-C <sub>4</sub>	0.0418	0.0432	32.431	182.085
n-Butane	n-C <sub>4</sub>	0.0888	0.0917	66.440	373.027
i-Pentane	i-C <sub>5</sub>	0.0194	0.0200	16.870	94.714
n-Pentane	n-C <sub>5</sub>	0.0166	0.0171	14.229	79.891
Hexanes	C <sub>6</sub>	0.0103	0.0107	10.076	56.572
Heptanes	C <sub>7</sub>	0.0325	0.0336	35.611	199.937
Octanes	C <sub>8</sub>	0.0012	0.0012	1.415	7.947
Nonanes	C <sub>9</sub>	0.0000	0.0000	0.018	0.103
Decanes	C <sub>10</sub>	0.0000	0.0000	0.045	0.254
Undecane	C <sub>11</sub>	0.0000	0.0000	0.000	0.000
Dodecanes Plus	C <sub>12+</sub>	0.0000	0.0000	0.000	0.000
Total		1.0000	1.0000	369.972	2077.210
Propanes Plus	C <sub>3+</sub>	0.5059	0.5226	369.972	2077.210
Butanes Plus	C <sub>4+</sub>	0.2106	0.2175	177.136	994.529
Pentanes Plus	C <sub>5+</sub>	0.0800	0.0827	78.265	439.417

Calculated Gas Properties @ Standard Conditions			Calculated Pseudocritical Properties		
Molecular Weight	41.47 kg/kmol	41.47 lb/lb-mol	Ppc	623.0 psia	4.30 MPa
Specific Gravity	1.4317 (Air = 1)	1.4317 (Air = 1)	Tpc	161 F	71.6 C
MW of C7+	96.42 kg/kmol	96.42 lb/lbmol	Ppc*	617.8 psia	4.26 MPa
Density of C7+	0.7229 g/cc	722.9 kg/m3	Tpc*	124.7 F	51.5 C

Calculated Gross Heating Value @ Standard Conditions			Calculated Net Heating Value @ Standard Conditions		
Dry	2,117.4 Btu/scf	79.04 MJ/m3	Dry	1,947.4 Btu/scf	72.69 MJ/m3
Wet	2,080.6 Btu/scf	77.66 MJ/m3	Wet	1,913.5 Btu/scf	71.43 MJ/m3

\* - Corrected for Acid Gas Content

Standard Conditions: 60 F (15.5 C) @ 14.696 psia (0.101325 MPa)

GC ID: 4090

ID: 10872

## SECTION 1 - SAMPLE VALIDATION RESULTS

**TABLE 1-4**  
**ENERPLUS CORPORATION - DALY UNIT 3**  
**WELL 02-11-10-28W1M - SAMPLE BZ2**  
**SAMPLE VALIDATION**  
**COMPOSITIONAL ANALYSIS OF FLASHED GAS**

Component Name	Chemical Symbol	Mole Fraction		Liquid Volume	
		As Analyzed	Acid Gas Free	STB/MMscf	mL/m3
Nitrogen	N <sub>2</sub>	0.2251	0.2319		
Carbon Dioxide	CO <sub>2</sub>	0.0282	0.0000		
Hydrogen Sulphide	H <sub>2</sub> S	0.0007	0.0000		
Methane	C <sub>1</sub>	0.0576	0.0593		
Ethane	C <sub>2</sub>	0.2357	0.2427		
Propane	C <sub>3</sub>	0.2660	0.2739	173.714	975.320
i-Butane	i-C <sub>4</sub>	0.0367	0.0378	28.505	160.039
n-Butane	n-C <sub>4</sub>	0.0821	0.0846	61.430	344.901
i-Pentane	i-C <sub>5</sub>	0.0169	0.0174	14.727	82.683
n-Pentane	n-C <sub>5</sub>	0.0154	0.0159	13.276	74.539
Hexanes	C <sub>6</sub>	0.0087	0.0090	8.534	47.914
Heptanes	C <sub>7</sub>	0.0258	0.0265	28.211	158.394
Octanes	C <sub>8</sub>	0.0008	0.0008	0.974	5.466
Nonanes	C <sub>9</sub>	0.0000	0.0000	0.015	0.086
Decanes	C <sub>10</sub>	0.0000	0.0000	0.021	0.118
Undecane	C <sub>11</sub>	0.0000	0.0000	0.000	0.000
Dodecanes Plus	C <sub>12+</sub>	0.0000	0.0000	0.000	0.000
Total		1.0000	1.0000	329.407	1849.460
Propanes Plus	C <sub>3+</sub>	0.4526	0.4661	329.407	1849.460
Butanes Plus	C <sub>4+</sub>	0.1866	0.1921	155.693	874.140
Pentanes Plus	C <sub>5+</sub>	0.0677	0.0697	65.758	369.200

Calculated Gas Properties @ Standard Conditions			Calculated Pseudocritical Properties		
Molecular Weight	39.88 kg/kmol	39.88 lb/lb-mol	Ppc	606.3 psia	4.18 MPa
Specific Gravity	1.3767 (Air = 1)	1.3767 (Air = 1)	Tpc	84.3 F	29 C
MW of C7+	96.36 kg/kmol	96.36 lb/lbmol	Ppc*	600.8 psia	4.14 MPa
Density of C7+	0.7227 g/cc	722.7 kg/m3	Tpc*	79.8 F	26.5 C

Calculated Gross Heating Value @ Standard Conditions			Calculated Net Heating Value @ Standard Conditions		
Dry	1,850.9 Btu/scf	69.09 MJ/m3	Dry	1,702.4 Btu/scf	63.55 MJ/m3
Wet	1,818.7 Btu/scf	67.89 MJ/m3	Wet	1,672.8 Btu/scf	62.44 MJ/m3

\* - Corrected for Acid Gas Content

Standard Conditions: 60 F (288.7 K) @ 14.696 psia (0.101325 MPa)

GC ID: 4091

ID: 10873



# SECTION 1 - SAMPLE VALIDATION RESULTS

**TABLE 1-5**  
**ENERPLUS CORPORATION - DALY UNIT 3**  
**WELL 02-11-10-28W1M - SAMPLE CYL4049**  
**SAMPLE VALIDATION**  
**COMPOSITIONAL ANALYSIS OF FLASHED GAS**

Component Name	Chemical Symbol	Mole Fraction		Liquid Volume	
		As Analyzed	Acid Gas Free	STB/MMscf	mL/m3
Nitrogen	N <sub>2</sub>	0.1973	0.2025		
Carbon Dioxide	CO <sub>2</sub>	0.0257	0.0000		
Hydrogen Sulphide	H <sub>2</sub> S	0.0000	0.0000		
Methane	C <sub>1</sub>	0.0465	0.0477		
Ethane	C <sub>2</sub>	0.2389	0.2451		
Propane	C <sub>3</sub>	0.2903	0.2979	189.560	1064.284
i-Butane	i-C <sub>4</sub>	0.0407	0.0417	31.554	177.163
n-Butane	n-C <sub>4</sub>	0.0911	0.0935	68.194	382.875
i-Pentane	i-C <sub>5</sub>	0.0185	0.0190	16.074	90.250
n-Pentane	n-C <sub>5</sub>	0.0168	0.0172	14.425	80.992
Hexanes	C <sub>6</sub>	0.0088	0.0091	8.628	48.443
Heptanes	C <sub>7</sub>	0.0248	0.0255	27.170	152.546
Octanes	C <sub>8</sub>	0.0007	0.0007	0.797	4.474
Nonanes	C <sub>9</sub>	0.0000	0.0000	0.009	0.050
Decanes	C <sub>10</sub>	0.0000	0.0000	0.039	0.218
Undecane	C <sub>11</sub>	0.0000	0.0000	0.000	0.000
Dodecanes Plus	C <sub>12+</sub>	0.0000	0.0000	0.000	0.000
Total		1.0000	1.0000	356.451	2001.295
Propanes Plus	C <sub>3+</sub>	0.4917	0.5047	356.451	2001.295
Butanes Plus	C <sub>4+</sub>	0.2014	0.2067	166.891	937.010
Pentanes Plus	C <sub>5+</sub>	0.0696	0.0715	67.143	376.972

Calculated Gas Properties @ Standard Conditions			Calculated Pseudocritical Properties		
Molecular Weight	40.81 kg/kmol	40.81 lb/lb-mol	Ppc	606.7 psia	4.18 MPa
Specific Gravity	1.4090 (Air = 1)	1.4090 (Air = 1)	Tpc	101.9 F	38.8 C
MW of C7+	96.33 kg/kmol	96.33 lb/lbmol	Ppc*	602.2 psia	4.15 MPa
Density of C7+	0.7227 g/cc	722.7 kg/m3	Tpc*	97.8 F	36.5 C

Calculated Gross Heating Value @ Standard Conditions			Calculated Net Heating Value @ Standard Conditions		
Dry	1,954.1 Btu/scf	72.94 MJ/m3	Dry	1,797.6 Btu/scf	67.10 MJ/m3
Wet	1,920.1 Btu/scf	71.67 MJ/m3	Wet	1,766.3 Btu/scf	65.93 MJ/m3

\* - Corrected for Acid Gas Content

Standard Conditions: 60 F (288.7 K) @ 14.696 psia (0.101325 MPa)

GC ID: 4096

ID: 10875

**TABLE 1-6**  
**ENERPLUS CORPORATION - DALY UNIT 3**  
**WELL 00/04-11-10-28W1M - - SAMPLE AM5197**  
**SAMPLE VALIDATION**  
**SAMPLE COLLECTION DATA**

Project File:	CL-49659	
Company:	ENERPLUS CORPORATION	
Pool:	DALY UNIT 3	
Field:	LODGEPOLE	
Well Location:	00/04-11-10-28W1M	
Fluid Sample:	AM5197	
Sample Description:	LIVE OIL	
Sampling Company:	HYCAL ENERGY	
Name of Sampler:	DM	
Sampling Date:	11-Nov-10	
Sampling Point:	WELLHEAD	
Sampling Temperature:	39.2 F	4.0 C
Sampling Pressure:	40 psia	0.28 MPa
Reservoir Temperature:	82.4 F	28.0 C
Reservoir Pressure:	N/A psia	N/A MPa
Initial Reservoir Pressure (Pi)	955.0 psia	6.59 MPa
Depth of Reported Pi	N/A mMD	N/A mss

**TABLE 1-7**  
**ENERPLUS CORPORATION - DALY UNIT 3**  
**WELL 00/04-11-10-28W1M - . - SAMPLE AM5197**  
**SAMPLE VALIDATION**  
**MAIN PVT RESULTS**

**INITIAL RESERVOIR CONDITIONS**

Reservoir Pressure	N/A psia	N/A MPa
Reservoir Temperature:	82.4 F	28.00 C

**SINGLE-STAGE SEPARATOR TEST @ 1,676 psia (11.56 MPa) AND 66.2 F (19 C)**

At Separator Test Conditions		
Oil Formation Volume Factor	1.0449 res.bbl/STB	1.0449 res.m <sup>3</sup> /m <sup>3</sup>
Solution Gas-Oil Ratio	81.42 scf/STB	14.50 m <sup>3</sup> /m <sup>3</sup>
Oil Density	0.8431 g/cm <sup>3</sup>	843.1 kg/m <sup>3</sup>
At Tank Conditions		
Residual Oil Density	0.8520 g/cm <sup>3</sup>	852.0 kg/m <sup>3</sup>
API Gravity	34.58	34.58

**SINGLE-STAGE SEPARATOR TEST - MATERIAL BALANCE CHECK**

Oil FVF @ 1676 psia (11.56 MPa) (Measured)	1.0449	res.bbl/STB (res.m <sup>3</sup> /m <sup>3</sup> )
Oil FVF @ 1676 psia (11.56 MPa) (Calculated)	1.0414	res.bbl/STB (res.m <sup>3</sup> /m <sup>3</sup> )
Absolute Relative Error	0.3305	(%)



**TABLE 1-8**  
**ENERPLUS CORPORATION - DALY UNIT 3**  
**WELL 00/04-11-10-28W1M - - SAMPLE AM5197**  
**SAMPLE VALIDATION**  
**COMPOSITIONAL ANALYSIS OF WELLHEAD FLUID**

Boiling Point (F)	Component Name	Chemical Symbol	Mole Fraction	Mass Fraction	Calculated Properties
-320.4	Nitrogen	N <sub>2</sub>	0.0018	0.0003	<b>Total Sample</b>
-109.3	Carbon Dioxide	CO <sub>2</sub>	0.0001	0.0000	
-76.6	Hydrogen Sulphide	H <sub>2</sub> S	0.0000	0.0000	Molecular Weight 179.66
-259.1	Methane	C <sub>1</sub>	0.0049	0.0004	
-128.0	Ethane	C <sub>2</sub>	0.0417	0.0070	
-44.0	Propane	C <sub>3</sub>	0.0721	0.0177	<b>C<sub>6+</sub> Fraction</b>
10.9	i-Butane	i-C <sub>4</sub>	0.0174	0.0056	
30.9	n-Butane	n-C <sub>4</sub>	0.0547	0.0177	Molecular Weight 223.41
82.0	i-Pentane	i-C <sub>5</sub>	0.0273	0.0109	Mole Fraction 0.7402
97.0	n-Pentane	n-C <sub>5</sub>	0.0352	0.0141	Density (g/cc) 0.8611
97 - 156	Hexanes	C <sub>6</sub>	0.0535	0.0256	
156 - 208.9	Heptanes	C <sub>7</sub>	0.0498	0.0278	<b>C<sub>7+</sub> Fraction</b>
208.9 - 258.1	Octanes	C <sub>8</sub>	0.0514	0.0327	
258.1 - 303.1	Nonanes	C <sub>9</sub>	0.0436	0.0311	Molecular Weight 235.05
303.1 - 345	Decanes	C <sub>10</sub>	0.0406	0.0321	Mole Fraction 0.6562
345 - 385	Undecanes	C <sub>11</sub>	0.0457	0.0374	Density (g/cc) 0.8677
385 - 419	Dodecanes	C <sub>12</sub>	0.0429	0.0384	
419 - 455	Tridecanes	C <sub>13</sub>	0.0401	0.0390	<b>C<sub>12+</sub> Fraction</b>
455 - 486	Tetradecanes	C <sub>14</sub>	0.0316	0.0334	
486 - 519.1	Pentadecanes	C <sub>15</sub>	0.0248	0.0284	Molecular Weight 318.57
519.1 - 550	Hexadecanes	C <sub>16</sub>	0.0212	0.0262	Mole Fraction 0.3996
550 - 557	Heptadecanes	C <sub>17</sub>	0.0163	0.0215	Density (g/cc) 0.8999
557 - 603	Octadecanes	C <sub>18</sub>	0.0181	0.0253	
603 - 626	Nonadecanes	C <sub>19</sub>	0.0182	0.0266	<b>C<sub>30+</sub> Fraction</b>
626 - 651.9	Eicosanes	C <sub>20</sub>	0.0134	0.0206	
651.9 - 675	Heneicosanes	C <sub>21</sub>	0.0130	0.0210	Molecular Weight 600.36
675 - 696.9	Docosanes	C <sub>22</sub>	0.0121	0.0206	Mole Fraction 0.0842
696.9 - 716	Tricosanes	C <sub>23</sub>	0.0114	0.0202	Density (g/cc) 0.9861
716 - 736	Tetracosanes	C <sub>24</sub>	0.0108	0.0199	
736 - 755.1	Pentacosanes	C <sub>25</sub>	0.0092	0.0177	
755.1 - 774	Hexacosanes	C <sub>26</sub>	0.0081	0.0162	<b>Recombination Parameters</b>
774.1 - 792	Heptacosanes	C <sub>27</sub>	0.0085	0.0177	
792.1 - 809.1	Octacosanes	C <sub>28</sub>	0.0079	0.0172	Gas-Oil Ratio (cc/cc) 14.50
809.1 - 826	Nonacosanes	C <sub>29</sub>	0.0077	0.0173	Dead Oil Density (g/cc) 0.8520
Above 826	Tricontanes Plus	C <sub>30+</sub>	0.0842	0.2812	Dead Oil MW (g/mol) 199.32
<b>NAPHTHENES</b>					
120.0	Cyclopentane	C <sub>5</sub> H <sub>10</sub>	0.0046	0.0018	
162.0	Methylcyclopentane	C <sub>6</sub> H <sub>12</sub>	0.0151	0.0071	
178.0	Cyclohexane	C <sub>6</sub> H <sub>12</sub>	0.0148	0.0069	
214.0	Methylcyclohexane	C <sub>7</sub> H <sub>14</sub>	0.0134	0.0073	
<b>AROMATICS</b>					
176.0	Benzene	C <sub>6</sub> H <sub>6</sub>	0.0006	0.0003	
231.1	Toluene	C <sub>7</sub> H <sub>8</sub>	0.0004	0.0002	
277 - 282	Ethylbenzene & p,m-Xylene	C <sub>8</sub> H <sub>10</sub>	0.0044	0.0026	
291.9	o-Xylene	C <sub>8</sub> H <sub>10</sub>	0.0032	0.0019	
336.0	1, 2, 4-Trimethylbenzene	C <sub>9</sub> H <sub>12</sub>	0.0042	0.0028	
<b>Total</b>			<b>1.0000</b>	<b>1.0000</b>	

Note: Physical properties are calculated based on GPA 2145-00 physical constants

ID.: 4694-1601

## COMPOSITIONAL ANALYSIS OF FLASHED OIL

Number of Genera (G)	Number of Species (C)
2	0.00
3	0.00
4	0.00
5	0.00
6	0.027
7	0.059
8	0.066
9	0.067
10	0.066
11	0.090
12	0.075
13	0.060
14	0.053
15	0.048
16	0.045
17	0.040
18	0.035
19	0.030
20	0.025
21	0.022
22	0.020
23	0.018
24	0.017
25	0.016
26	0.015
27	0.014
28	0.013
29	0.012
30	0.011
31	0.010
32	0.009
33	0.008
34	0.007
35	0.006
36	0.005
37	0.004
38	0.003
39	0.002
40	0.001

GC ID: 9695



**TABLE 1-10**  
**ENERPLUS CORPORATION - DALY UNIT 3**  
**WELL 00/04-11-10-28W1M - - SAMPLE AM5197**  
**SAMPLE VALIDATION**  
**COMPOSITIONAL ANALYSIS OF FLASHED GAS**

Component Name	Chemical Symbol	Mole Fraction		Liquid Volume	
		As Analyzed	Acid Gas Free	STB/MMscf	mL/m3
Nitrogen	N <sub>2</sub>	0.0146	0.0147		
Carbon Dioxide	CO <sub>2</sub>	0.0011	0.0000		
Hydrogen Sulphide	H <sub>2</sub> S	0.0000	0.0000		
Methane	C <sub>1</sub>	0.0391	0.0391		
Ethane	C <sub>2</sub>	0.3326	0.3330		
Propane	C <sub>3</sub>	0.3890	0.3894	254.036	1426.287
i-Butane	i-C <sub>4</sub>	0.0522	0.0522	40.487	227.315
n-Butane	n-C <sub>4</sub>	0.1145	0.1146	85.641	480.831
i-Pentane	i-C <sub>5</sub>	0.0188	0.0188	16.309	91.565
n-Pentane	n-C <sub>5</sub>	0.0158	0.0158	13.569	76.184
Hexanes	C <sub>6</sub>	0.0069	0.0069	6.721	37.734
Heptanes	C <sub>7</sub>	0.0152	0.0152	16.600	93.200
Octanes	C <sub>8</sub>	0.0003	0.0003	0.331	1.857
Nonanes	C <sub>9</sub>	0.0000	0.0000	0.003	0.020
Decanes	C <sub>10</sub>	0.0000	0.0000	0.063	0.355
Undecane	C <sub>11</sub>	0.0000	0.0000	0.000	0.000
Dodecanes Plus	C <sub>12+</sub>	0.0000	0.0000	0.000	0.000
Total		1.0000	1.0000	433.760	2435.347
Propanes Plus	C <sub>3+</sub>	0.6126	0.6132	433.760	2435.347
Butanes Plus	C <sub>4+</sub>	0.2236	0.2238	179.724	1009.060
Pentanes Plus	C <sub>5+</sub>	0.0569	0.0570	53.596	300.914

Calculated Gas Properties @ Standard Conditions			Calculated Pseudocritical Properties		
Molecular Weight	42.50 kg/kmol	42.50 lb/lb-mol	Ppc	626.4 psia	4.32 MPa
Specific Gravity	1.4675 (Air = 1)	1.4675 (Air = 1)	Tpc	175.7 F	79.8 C
MW of C7+	96.30 kg/kmol	96.30 lb/lbmol	Ppc*	626.1 psia	4.32 MPa
Density of C7+	0.7226 g/cc	722.6 kg/m3	Tpc*	175.3 F	79.6 C

Calculated Gross Heating Value @ Standard Conditions			Calculated Net Heating Value @ Standard Conditions		
Dry	2,406.9 Btu/scf	89.84 MJ/m3	Dry	2,213.4 Btu/scf	82.62 MJ/m3
Wet	2,365.0 Btu/scf	88.28 MJ/m3	Wet	2,174.9 Btu/scf	81.18 MJ/m3

\* - Corrected for Acid Gas Content

Standard Conditions: 60 F (15.5 C) @ 14.696 psia (0.101325 MPa)

GC ID: 4088



# SECTION 1 - SAMPLE VALIDATION RESULTS

**TABLE 1-11**  
**ENERPLUS CORPORATION - DALY UNIT 3**  
**WELL 00/04-11-10-28W1M - - SAMPLE T39017**  
**SAMPLE VALIDATION**  
**SAMPLE COLLECTION DATA**

Project File:	CL-49659		
Company:	ENERPLUS CORPORATION		
Pool:	DALY UNIT 3		
Field:	LODGEPOLE		
Well Location:	00/04-11-10-28W1M		
Fluid Sample:	T39017		
Sample Description:	LIVE OIL		
Sampling Company:	HYCAL ENERGY		
Name of Sampler:	DM		
Sampling Date:	11-Nov-10		
Sampling Point:	WELLHEAD		
Sampling Temperature:	39.2 F	2.0 C	
Sampling Pressure:	40 psia	0.28 MPa	
Reservoir Temperature:	82.4 F	28.0 C	
Reservoir Pressure:	N/A psia	N/A MPa	
Initial Reservoir Pressure (Pi)	955.0 psia	6.59 MPa	
Depth of Reported Pi	N/A mMD	N/A mss	

**TABLE 1-12**  
**ENERPLUS CORPORATION - DALY UNIT 3**  
**WELL 00/04-11-10-28W1M - - SAMPLE T39017**  
**SAMPLE VALIDATION**  
**MAIN PVT RESULTS**

**INITIAL RESERVOIR CONDITIONS**

Reservoir Pressure	N/A psia	N/A MPa
Reservoir Temperature:	82.4 F	28.0 C

**SINGLE-STAGE SEPARATOR TEST @ 1,564 psia (10.78 MPa) AND 69.1 F (20.6 C)**

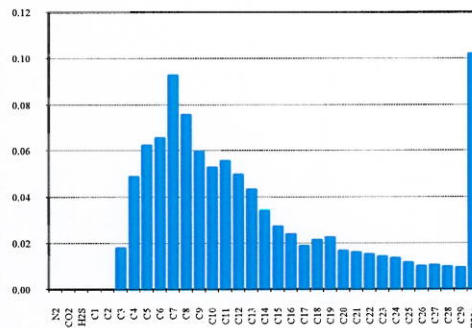
At Separator Test Conditions		
Oil Formation Volume Factor	1.0420 res.bbl/STB	1.0420 res.m <sup>3</sup> /m <sup>3</sup>
Solution Gas-Oil Ratio	77.08 scf/STB	13.73 m <sup>3</sup> /m <sup>3</sup>
Oil Density	0.8442 g/cm <sup>3</sup>	844.2 kg/m <sup>3</sup>
At Tank Conditions		
Residual Oil Density	0.8519 g/cm <sup>3</sup>	851.9 kg/m <sup>3</sup>
API Gravity	34.59	34.59

**SINGLE-STAGE SEPARATOR TEST - MATERIAL BALANCE CHECK**

Oil FVF @ 1564 psia (10.78 MPa) (Measured)	1.0420	res.bbl/STB (res.m <sup>3</sup> /m <sup>3</sup> )
Oil FVF @ 1564 psia (10.78 MPa) (Calculated)	1.0377	res.bbl/STB (res.m <sup>3</sup> /m <sup>3</sup> )
Absolute Relative Error	0.4154	(%)

**TABLE 1-13**  
**ENERPLUS CORPORATION - DALY UNIT 3**  
**WELL 00/04-11-10-28W1M - - SAMPLE T39017**  
**SAMPLE VALIDATION**  
**COMPOSITIONAL ANALYSIS OF WELLHEAD FLUID**

Boiling Point (F)	Component Name	Chemical Symbol	Mole Fraction	Mass Fraction	Calculated Properties
-320.4	Nitrogen	N <sub>2</sub>	0.0045	0.0007	<b>Total Sample</b>
-109.3	Carbon Dioxide	CO <sub>2</sub>	0.0000	0.0000	
-76.6	Hydrogen Sulphide	H <sub>2</sub> S	0.0000	0.0000	Molecular Weight 185.31
-259.1	Methane	C <sub>1</sub>	0.0062	0.0005	
-128.0	Ethane	C <sub>2</sub>	0.0409	0.0066	
-44.0	Propane	C <sub>3</sub>	0.0612	0.0146	<b>C<sub>6+</sub> Fraction</b>
10.9	i-Butane	i-C <sub>4</sub>	0.0146	0.0046	
30.9	n-Butane	n-C <sub>4</sub>	0.0470	0.0147	Molecular Weight 226.01
82.0	i-Pentane	i-C <sub>5</sub>	0.0254	0.0099	Mole Fraction 0.7626
97.0	n-Pentane	n-C <sub>5</sub>	0.0331	0.0129	Density (g/cc) 0.8627
97 - 156	Hexanes	C <sub>6</sub>	0.0537	0.0250	
156 - 208.9	Heptanes	C <sub>7</sub>	0.0515	0.0278	<b>C<sub>7+</sub> Fraction</b>
208.9 - 258.1	Octanes	C <sub>8</sub>	0.0522	0.0322	
258.1 - 303.1	Nonanes	C <sub>9</sub>	0.0441	0.0305	Molecular Weight 237.52
303.1 - 345	Decanes	C <sub>10</sub>	0.0418	0.0321	Mole Fraction 0.6772
345 - 385	Undecanes	C <sub>11</sub>	0.0487	0.0387	Density (g/cc) 0.8692
385 - 419	Dodecanes	C <sub>12</sub>	0.0436	0.0378	
419 - 455	Tridecanes	C <sub>13</sub>	0.0379	0.0358	<b>C<sub>12+</sub> Fraction</b>
455 - 486	Tetradecanes	C <sub>14</sub>	0.0300	0.0308	
486 - 519.1	Pentadecanes	C <sub>15</sub>	0.0241	0.0267	Molecular Weight 322.87
519.1 - 550	Hexadecanes	C <sub>16</sub>	0.0210	0.0252	Mole Fraction 0.4122
550 - 557	Heptadecanes	C <sub>17</sub>	0.0165	0.0211	Density (g/cc) 0.9014
557 - 603	Octadecanes	C <sub>18</sub>	0.0188	0.0254	
603 - 626	Nonadecanes	C <sub>19</sub>	0.0198	0.0281	<b>C<sub>30+</sub> Fraction</b>
626 - 651.9	Eicosanes	C <sub>20</sub>	0.0146	0.0216	
651.9 - 675	Heneicosanes	C <sub>21</sub>	0.0141	0.0221	Molecular Weight 598.10
675 - 696.9	Docosanes	C <sub>22</sub>	0.0133	0.0218	Mole Fraction 0.0896
696.9 - 716	Tricosanes	C <sub>23</sub>	0.0125	0.0214	Density (g/cc) 0.9858
716 - 736	Tetracosanes	C <sub>24</sub>	0.0118	0.0212	
736 - 755.1	Pentacosanes	C <sub>25</sub>	0.0101	0.0188	
755.1 - 774	Hexacosanes	C <sub>26</sub>	0.0088	0.0171	<b>Recombination Parameters</b>
774.1 - 792	Heptacosanes	C <sub>27</sub>	0.0091	0.0185	
792.1 - 809.1	Octacosanes	C <sub>28</sub>	0.0085	0.0178	Gas-Oil Ratio (cc/cc) 13.73
809.1 - 826	Nonacosanes	C <sub>29</sub>	0.0082	0.0179	Dead Oil Density (g/cc) 0.8519
Above 826	Tricontanes Plus	C <sub>30+</sub>	0.0896	0.2891	Dead Oil MW (g/mol) 205.43
120.0	NAPHTHENES				
120.0	Cyclopentane	C <sub>5</sub> H <sub>10</sub>	0.0044	0.0017	
162.0	Methylcyclopentane	C <sub>6</sub> H <sub>12</sub>	0.0154	0.0070	
178.0	Cyclohexane	C <sub>6</sub> H <sub>12</sub>	0.0154	0.0070	
214.0	Methylcyclohexane	C <sub>7</sub> H <sub>14</sub>	0.0139	0.0073	
176.0	AROMATICS				
176.0	Benzene	C <sub>6</sub> H <sub>6</sub>	0.0009	0.0004	
231.1	Toluene	C <sub>7</sub> H <sub>8</sub>	0.0003	0.0001	
277 - 282	Ethylbenzene & p,m-Xylene	C <sub>8</sub> H <sub>10</sub>	0.0047	0.0027	
291.9	o-Xylene	C <sub>8</sub> H <sub>10</sub>	0.0034	0.0019	
336.0	1, 2, 4-Trimethylbenzene	C <sub>9</sub> H <sub>12</sub>	0.0045	0.0029	
<b>Total</b>			<b>1.0000</b>	<b>1.0000</b>	

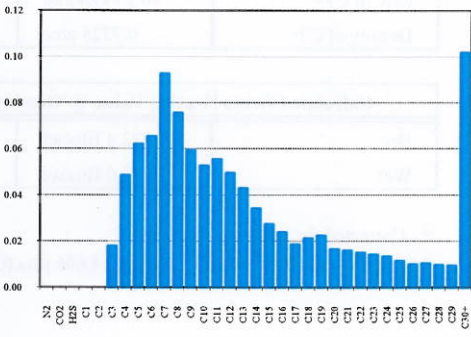


Note: Physical properties are calculated based on GPA 2145-00 physical constants

ID.: 4695-1603



**TABLE 1-14**  
**ENERPLUS CORPORATION - DALY UNIT 3**  
**WELL 00/04-11-10-28W1M - - SAMPLE T39017**  
**SAMPLE VALIDATION**  
**COMPOSITIONAL ANALYSIS OF FLASHED OIL**

Boiling Point (F)	Component Name	Chemical Symbol	Mole Fraction	Mass Fraction	Calculated Properties	
-320.4	Nitrogen	N <sub>2</sub>	0.0000	0.0000	Total Sample	
-109.3	Carbon Dioxide	CO <sub>2</sub>	0.0000	0.0000		
-76.6	Hydrogen Sulphide	H <sub>2</sub> S	0.0000	0.0000	Molecular Weight	205.43
-259.1	Methane	C <sub>1</sub>	0.0000	0.0000	Density (g/cc)	0.8476
-128.0	Ethane	C <sub>2</sub>	0.0000	0.0000		
-44.0	Propane	C <sub>3</sub>	0.0180	0.0039	C <sub>6+</sub> Fraction	
10.9	i-Butane	i-C <sub>4</sub>	0.0099	0.0028		
30.9	n-Butane	n-C <sub>4</sub>	0.0388	0.0110	Molecular Weight	226.50
82.0	i-Pentane	i-C <sub>5</sub>	0.0265	0.0093	Mole Fraction	0.8711
97.0	n-Pentane	n-C <sub>5</sub>	0.0357	0.0125	Density (g/cc)	0.8629
97 - 156	Hexanes	C <sub>6</sub>	0.0603	0.0253		
156 - 208.9	Heptanes	C <sub>7</sub>	0.0585	0.0285	C <sub>7+</sub> Fraction	
208.9 - 258.1	Octanes	C <sub>8</sub>	0.0595	0.0331		
258.1 - 303.1	Nonanes	C <sub>9</sub>	0.0503	0.0314	Molecular Weight	237.99
303.1 - 345	Decanes	C <sub>10</sub>	0.0476	0.0330	Mole Fraction	0.8058
345 - 385	Undecanes	C <sub>11</sub>	0.0555	0.0397	Density (g/cc)	0.8693
385 - 419	Dodecanes	C <sub>12</sub>	0.0496	0.0389		
419 - 455	Tridecanes	C <sub>13</sub>	0.0432	0.0368	C <sub>12+</sub> Fraction	
455 - 486	Tetradecanes	C <sub>14</sub>	0.0342	0.0316		
486 - 519.1	Pentadecanes	C <sub>15</sub>	0.0274	0.0275	Molecular Weight	322.87
519.1 - 550	Hexadecanes	C <sub>16</sub>	0.0240	0.0259	Mole Fraction	0.4698
550 - 557	Heptadecanes	C <sub>17</sub>	0.0188	0.0217	Density (g/cc)	0.9014
557 - 603	Octadecanes	C <sub>18</sub>	0.0214	0.0261		
603 - 626	Nonadecanes	C <sub>19</sub>	0.0226	0.0289	C <sub>30+</sub> Fraction	
626 - 651.9	Eicosanes	C <sub>20</sub>	0.0166	0.0223		
651.9 - 675	Heneicosanes	C <sub>21</sub>	0.0161	0.0227	Molecular Weight	598.10
675 - 696.9	Docosanes	C <sub>22</sub>	0.0151	0.0224	Mole Fraction	0.1021
696.9 - 716	Tricosanes	C <sub>23</sub>	0.0142	0.0220	Density (g/cc)	0.9858
716 - 736	Tetracosanes	C <sub>24</sub>	0.0135	0.0218		
736 - 755.1	Pentacosanes	C <sub>25</sub>	0.0115	0.0193		
755.1 - 774	Hexacosanes	C <sub>26</sub>	0.0100	0.0176		
774.1 - 792	Heptacosanes	C <sub>27</sub>	0.0104	0.0190		
792.1 - 809.1	Octacosanes	C <sub>28</sub>	0.0097	0.0184		
809.1 - 826	Nonacosanes	C <sub>29</sub>	0.0094	0.0184		
Above 826	Tricontanes Plus	C <sub>30+</sub>	0.1021	0.2972		
NAPHTHENES						
120.0	Cyclopentane	C <sub>5</sub> H <sub>10</sub>	0.0051	0.0017		
162.0	Methylcyclopentane	C <sub>6</sub> H <sub>12</sub>	0.0157	0.0064		
178.0	Cyclohexane	C <sub>6</sub> H <sub>12</sub>	0.0174	0.0071		
214.0	Methylcyclohexane	C <sub>7</sub> H <sub>14</sub>	0.0158	0.0075		
AROMATICS						
176.0	Benzene	C <sub>6</sub> H <sub>6</sub>	0.0010	0.0004		
231.1	Toluene	C <sub>7</sub> H <sub>8</sub>	0.0003	0.0002		
277 - 282	Ethylbenzene & p,m-Xylene	C <sub>8</sub> H <sub>10</sub>	0.0054	0.0028		
291.9	o-Xylene	C <sub>8</sub> H <sub>10</sub>	0.0038	0.0020		
336.0	1, 2, 4-Trimethylbenzene	C <sub>9</sub> H <sub>12</sub>	0.0051	0.0030		
Total			1.0000	1.0000		

Note: Physical properties are calculated based on GPA 2145-00 physical constants

GC ID: 9696

**TABLE 1-15**  
**ENERPLUS CORPORATION - DALY UNIT 3**  
**WELL 00/04-11-10-28W1M - - SAMPLE T39017**  
**SAMPLE VALIDATION**  
**COMPOSITIONAL ANALYSIS OF FLASHED GAS**

Component Name	Chemical Symbol	Mole Fraction		Liquid Volume	
		As Analyzed	Acid Gas Free	STB/MMscf	mL/m3
Nitrogen	N <sub>2</sub>	0.0364	0.0364		
Carbon Dioxide	CO <sub>2</sub>	0.0004	0.0000		
Hydrogen Sulphide	H <sub>2</sub> S	0.0000	0.0000		
Methane	C <sub>1</sub>	0.0506	0.0506		
Ethane	C <sub>2</sub>	0.3338	0.3340		
Propane	C <sub>3</sub>	0.3701	0.3702	241.688	1356.959
i-Butane	i-C <sub>4</sub>	0.0487	0.0487	37.790	212.169
n-Butane	n-C <sub>4</sub>	0.1056	0.1056	78.999	443.543
i-Pentane	i-C <sub>5</sub>	0.0176	0.0176	15.280	85.789
n-Pentane	n-C <sub>5</sub>	0.0147	0.0147	12.610	70.799
Hexanes	C <sub>6</sub>	0.0066	0.0066	6.458	36.259
Heptanes	C <sub>7</sub>	0.0152	0.0152	16.650	93.479
Octanes	C <sub>8</sub>	0.0003	0.0003	0.326	1.832
Nonanes	C <sub>9</sub>	0.0000	0.0000	0.000	0.000
Decanes	C <sub>10</sub>	0.0000	0.0000	0.025	0.141
Undecane	C <sub>11</sub>	0.0000	0.0000	0.000	0.000
Dodecanes Plus	C <sub>12+</sub>	0.0000	0.0000	0.000	0.000
Total		1.0000	1.0000	409.826	2300.970
Propanes Plus	C <sub>3+</sub>	0.5787	0.5790	409.826	2300.970
Butanes Plus	C <sub>4+</sub>	0.2086	0.2087	168.138	944.010
Pentanes Plus	C <sub>5+</sub>	0.0544	0.0544	51.349	288.298

Calculated Gas Properties @ Standard Conditions			Calculated Pseudocritical Properties		
Molecular Weight	41.56 kg/kmol	41.56 lb/lb-mol	Ppc	625.3 psia	4.31 MPa
Specific Gravity	1.4350 (Air = 1)	1.4350 (Air = 1)	Tpc	160.8 F	71.5 C
MW of C7+	96.23 kg/kmol	96.23 lb/lbmol	Ppc*	625.2 psia	4.31 MPa
Density of C7+	0.7225 g/cc	722.5 kg/m3	Tpc*	160.7 F	71.5 C

Calculated Gross Heating Value @ Standard Conditions			Calculated Net Heating Value @ Standard Conditions		
Dry	2,322.4 Btu/scf	86.69 MJ/m3	Dry	2,135.2 Btu/scf	79.70 MJ/m3
Wet	2,282.0 Btu/scf	85.18 MJ/m3	Wet	2,098.0 Btu/scf	78.31 MJ/m3

\* - Corrected for Acid Gas Content

Standard Conditions: 60 F (15.5 C) @ 14.696 psia (0.101325 MPa)

GC ID: 4089

**TABLE 1-16**  
**ENERPLUS CORPORATION - DALY UNIT 3**  
**WELL 00/04-11-10-28W1M - - SAMPLE Z39012**  
**SAMPLE VALIDATION**  
**SAMPLE COLLECTION DATA**

Project File:	CL-49659	
Company:	ENERPLUS CORPORATION	
Pool:	DALY UNIT 3	
Field:	LODGEPOLE	
Well Location:	00/04-11-10-28W1M	
Fluid Sample:	Z39012	
Sample Description:	LIVE OIL	
Sampling Company:	HYCAL ENERGY	
Name of Sampler:	DM	
Sampling Date:	11-Nov-10	
Sampling Point:	WELLHEAD	
Sampling Temperature:	39.2 F	4.0 C
Sampling Pressure:	40 psia	0.28 MPa
Reservoir Temperature:	82.4 F	28.0 C
Reservoir Pressure:	N/A psia	N/A MPa
Initial Reservoir Pressure (Pi)	955.0 psia	6.59 MPa
Depth of Reported Pi	N/A mD	N/A mss



**TABLE 1-17**  
**ENERPLUS CORPORATION - DALY UNIT 3**  
**WELL 00/04-11-10-28W1M - - SAMPLE Z39012**  
**SAMPLE VALIDATION**  
**MAIN PVT RESULTS**

**INITIAL RESERVOIR CONDITIONS**

Reservoir Pressure	N/A psia	N/A MPa
Reservoir Temperature:	82.4 F	28.0 C

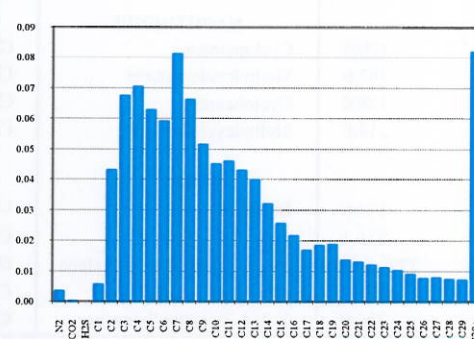
**SINGLE-STAGE SEPARATOR TEST @ 1,637 psia (11.29 MPa) AND 66.2 F (19 C)**

At Separator Test Conditions		
Oil Formation Volume Factor	1.0412 res.bbl/STB	1.0412 res.m <sup>3</sup> /m <sup>3</sup>
Solution Gas-Oil Ratio	73.78 scf/STB	13.14 m <sup>3</sup> /m <sup>3</sup>
Oil Density	0.8434 g/cm <sup>3</sup>	843.4 kg/m <sup>3</sup>
At Tank Conditions		
Residual Oil Density	0.8531 g/cm <sup>3</sup>	853.1 kg/m <sup>3</sup>
API Gravity	34.36	34.36

**SINGLE-STAGE SEPARATOR TEST - MATERIAL BALANCE CHECK**

Oil FVF @ 1637 psia (11.29 MPa) (Measured)	1.0412	res.bbl/STB (res.m <sup>3</sup> /m <sup>3</sup> )
Oil FVF @ 1637 psia (11.29 MPa) (Calculated)	1.0378	res.bbl/STB (res.m <sup>3</sup> /m <sup>3</sup> )
Absolute Relative Error	0.3304	(%)

**TABLE 1-18**  
**ENERPLUS CORPORATION- DALY UNIT 3**  
**WELL 00/04-11-10-28W1M - - SAMPLE Z39012**  
**SAMPLE VALIDATION**  
**COMPOSITIONAL ANALYSIS OF WELLHEAD FLUID**

Boiling Point (F)	Component Name	Chemical Symbol	Mole Fraction	Mass Fraction	Calculated Properties
-320.4	Nitrogen	N <sub>2</sub>	0.0034	0.0005	<b>Total Sample</b>
-109.3	Carbon Dioxide	CO <sub>2</sub>	0.0001	0.0000	
-76.6	Hydrogen Sulphide	H <sub>2</sub> S	0.0000	0.0000	
-259.1	Methane	C <sub>1</sub>	0.0056	0.0005	Molecular Weight
-128.0	Ethane	C <sub>2</sub>	0.0431	0.0073	
-44.0	Propane	C <sub>3</sub>	0.0675	0.0167	<b>C<sub>6+</sub> Fraction</b>
10.9	i-Butane	i-C <sub>4</sub>	0.0163	0.0053	
30.9	n-Butane	n-C <sub>4</sub>	0.0542	0.0177	
82.0	i-Pentane	i-C <sub>5</sub>	0.0274	0.0111	Molecular Weight
97.0	n-Pentane	n-C <sub>5</sub>	0.0354	0.0143	Mole Fraction
97 - 156	Hexanes	C <sub>6</sub>	0.0545	0.0263	Density (g/cc)
156 - 208.9	Heptanes	C <sub>7</sub>	0.0505	0.0284	<b>C<sub>7+</sub> Fraction</b>
208.9 - 258.1	Octanes	C <sub>8</sub>	0.0524	0.0336	
258.1 - 303.1	Nonanes	C <sub>9</sub>	0.0434	0.0313	
303.1 - 345	Decanes	C <sub>10</sub>	0.0407	0.0325	Molecular Weight
345 - 385	Undecanes	C <sub>11</sub>	0.0460	0.0379	Mole Fraction
385 - 419	Dodecanes	C <sub>12</sub>	0.0430	0.0388	Density (g/cc)
419 - 455	Tridecanes	C <sub>13</sub>	0.0399	0.0392	<b>C<sub>12+</sub> Fraction</b>
455 - 486	Tetradecanes	C <sub>14</sub>	0.0320	0.0342	
486 - 519.1	Pentadecanes	C <sub>15</sub>	0.0256	0.0296	
519.1 - 550	Hexadecanes	C <sub>16</sub>	0.0216	0.0269	Molecular Weight
550 - 557	Heptadecanes	C <sub>17</sub>	0.0169	0.0224	Mole Fraction
557 - 603	Octadecanes	C <sub>18</sub>	0.0185	0.0260	Density (g/cc)
603 - 626	Nonadecanes	C <sub>19</sub>	0.0187	0.0276	<b>C<sub>30+</sub> Fraction</b>
626 - 651.9	Eicosanes	C <sub>20</sub>	0.0136	0.0211	
651.9 - 675	Heneicosanes	C <sub>21</sub>	0.0131	0.0213	
675 - 696.9	Docosanes	C <sub>22</sub>	0.0122	0.0208	Molecular Weight
696.9 - 716	Tricosanes	C <sub>23</sub>	0.0112	0.0201	Mole Fraction
716 - 736	Tetracosanes	C <sub>24</sub>	0.0104	0.0193	Density (g/cc)
736 - 755.1	Pentacosanes	C <sub>25</sub>	0.0091	0.0176	<b>Recombination Parameters</b>
755.1 - 774	Hexacosanes	C <sub>26</sub>	0.0077	0.0155	
774.1 - 792	Heptacosanes	C <sub>27</sub>	0.0080	0.0167	
792.1 - 809.1	Octacosanes	C <sub>28</sub>	0.0074	0.0161	Gas-Oil Ratio (cc/cc)
809.1 - 826	Nonacosanes	C <sub>29</sub>	0.0072	0.0163	Dead Oil Density (g/cc)
Above 826	Tricontanes Plus	C <sub>30+</sub>	0.0819	0.2755	Dead Oil MW (g/mol)
<b>NAPHTHENES</b>					
120.0	Cyclopentane	C <sub>5</sub> H <sub>10</sub>	0.0047	0.0019	
162.0	Methylcyclopentane	C <sub>6</sub> H <sub>12</sub>	0.0146	0.0069	
178.0	Cyclohexane	C <sub>6</sub> H <sub>12</sub>	0.0152	0.0072	
214.0	Methylcyclohexane	C <sub>7</sub> H <sub>14</sub>	0.0135	0.0074	<b>AROMATICS</b>
176.0	Benzene	C <sub>6</sub> H <sub>6</sub>	0.0008	0.0004	
231.1	Toluene	C <sub>7</sub> H <sub>8</sub>	0.0003	0.0002	
277 - 282	Ethylbenzene & p,m-Xylene	C <sub>8</sub> H <sub>10</sub>	0.0047	0.0028	
291.9	o-Xylene	C <sub>8</sub> H <sub>10</sub>	0.0035	0.0021	
336.0	1, 2, 4-Trimethylbenzene	C <sub>9</sub> H <sub>12</sub>	0.0044	0.0030	
<b>Total</b>			<b>1.0000</b>	<b>1.0000</b>	

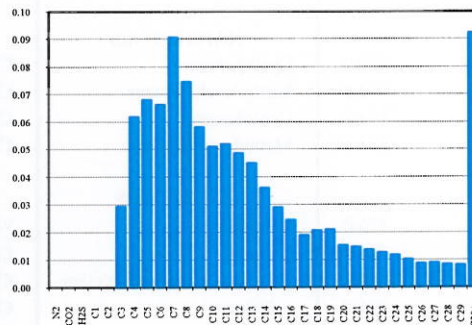
Note: Physical properties are calculated based on GPA 2145-00 physical constants

ID.: 4699-1604



**TABLE 1-19**  
**ENERPLUS CORPORATION- VIRDEN**  
**WELL 00/04-11-10-28W1M - - SAMPLE Z39012**  
**SAMPLE VALIDATION**  
**COMPOSITIONAL ANALYSIS OF FLASHED OIL**

Boiling Point (F)	Component Name	Chemical Symbol	Mole Fraction	Mass Fraction	Calculated Properties
-320.4	Nitrogen	N <sub>2</sub>	0.0000	0.0000	<b>Total Sample</b>
-109.3	Carbon Dioxide	CO <sub>2</sub>	0.0000	0.0000	
-76.6	Hydrogen Sulphide	H <sub>2</sub> S	0.0000	0.0000	Molecular Weight 195.87
-259.1	Methane	C <sub>1</sub>	0.0000	0.0000	Density (g/cc) 0.8401
-128.0	Ethane	C <sub>2</sub>	0.0000	0.0000	
-44.0	Propane	C <sub>3</sub>	0.0293	0.0066	<b>C<sub>6+</sub> Fraction</b>
10.9	i-Butane	i-C <sub>4</sub>	0.0127	0.0038	
30.9	n-Butane	n-C <sub>4</sub>	0.0492	0.0146	Molecular Weight 221.29
82.0	i-Pentane	i-C <sub>5</sub>	0.0293	0.0108	Mole Fraction 0.8408
97.0	n-Pentane	n-C <sub>5</sub>	0.0386	0.0142	Density (g/cc) 0.8597
97 - 156	Hexanes	C <sub>6</sub>	0.0609	0.0268	
156 - 208.9	Heptanes	C <sub>7</sub>	0.0569	0.0291	<b>C<sub>7+</sub> Fraction</b>
208.9 - 258.1	Octanes	C <sub>8</sub>	0.0591	0.0345	
258.1 - 303.1	Nonanes	C <sub>9</sub>	0.0490	0.0321	Molecular Weight 232.96
303.1 - 345	Decanes	C <sub>10</sub>	0.0459	0.0333	Mole Fraction 0.7746
345 - 385	Undecanes	C <sub>11</sub>	0.0519	0.0389	Density (g/cc) 0.8664
385 - 419	Dodecanes	C <sub>12</sub>	0.0484	0.0398	
419 - 455	Tridecanes	C <sub>13</sub>	0.0450	0.0402	<b>C<sub>12+</sub> Fraction</b>
455 - 486	Tetradecanes	C <sub>14</sub>	0.0361	0.0350	
486 - 519.1	Pentadecanes	C <sub>15</sub>	0.0289	0.0304	Molecular Weight 315.77
519.1 - 550	Hexadecanes	C <sub>16</sub>	0.0243	0.0276	Mole Fraction 0.4486
550 - 557	Heptadecanes	C <sub>17</sub>	0.0190	0.0230	Density (g/cc) 0.8987
557 - 603	Octadecanes	C <sub>18</sub>	0.0208	0.0267	
603 - 626	Nonadecanes	C <sub>19</sub>	0.0211	0.0283	<b>C<sub>30+</sub> Fraction</b>
626 - 651.9	Eicosanes	C <sub>20</sub>	0.0154	0.0216	
651.9 - 675	Heneicosanes	C <sub>21</sub>	0.0147	0.0219	Molecular Weight 599.75
675 - 696.9	Docosanes	C <sub>22</sub>	0.0137	0.0213	Mole Fraction 0.0923
696.9 - 716	Tricosanes	C <sub>23</sub>	0.0127	0.0206	Density (g/cc) 0.9860
716 - 736	Tetracosanes	C <sub>24</sub>	0.0117	0.0198	
736 - 755.1	Pentacosanes	C <sub>25</sub>	0.0102	0.0180	
755.1 - 774	Hexacosanes	C <sub>26</sub>	0.0087	0.0159	
774.1 - 792	Heptacosanes	C <sub>27</sub>	0.0090	0.0172	
792.1 - 809.1	Octacosanes	C <sub>28</sub>	0.0084	0.0166	
809.1 - 826	Nonacosanes	C <sub>29</sub>	0.0081	0.0167	
Above 826	Tricontanes Plus	C <sub>30+</sub>	0.0923	0.2826	
<b>NAPHTHENES</b>					
120.0	Cyclopentane	C <sub>5</sub> H <sub>10</sub>	0.0053	0.0019	
162.0	Methylcyclopentane	C <sub>6</sub> H <sub>12</sub>	0.0156	0.0067	
178.0	Cyclohexane	C <sub>6</sub> H <sub>12</sub>	0.0170	0.0073	
214.0	Methylcyclohexane	C <sub>7</sub> H <sub>14</sub>	0.0152	0.0076	
<b>AROMATICS</b>					
176.0	Benzene	C <sub>6</sub> H <sub>6</sub>	0.0009	0.0004	
231.1	Toluene	C <sub>7</sub> H <sub>8</sub>	0.0004	0.0002	
277 - 282	Ethylbenzene & p,m-Xylene	C <sub>8</sub> H <sub>10</sub>	0.0053	0.0029	
291.9	o-Xylene	C <sub>8</sub> H <sub>10</sub>	0.0039	0.0021	
336.0	1, 2, 4-Trimethylbenzene	C <sub>9</sub> H <sub>12</sub>	0.0050	0.0030	
<b>Total</b>			<b>1.0000</b>	<b>1.0000</b>	



Note: Physical properties are calculated based on GPA 2145-00 physical constants

GC ID: 9701



**TABLE 1-20**  
**ENERPLUS CORPORATION- VIRDEN**  
**WELL 00/04-11-10-28W1M - . - SAMPLE Z39012**  
**SAMPLE VALIDATION**  
**COMPOSITIONAL ANALYSIS OF FLASHED GAS**

Component Name	Chemical Symbol	Mole Fraction		Liquid Volume	
		As Analyzed	Acid Gas Free	STB/MMscf	mL/m3
Nitrogen	N <sub>2</sub>	0.0302	0.0302		
Carbon Dioxide	CO <sub>2</sub>	0.0005	0.0000		
Hydrogen Sulphide	H <sub>2</sub> S	0.0000	0.0000		
Methane	C <sub>1</sub>	0.0497	0.0498		
Ethane	C <sub>2</sub>	0.3817	0.3819		
Propane	C <sub>3</sub>	0.3671	0.3673	239.756	1346.114
i-Butane	i-C <sub>4</sub>	0.0445	0.0445	34.498	193.688
n-Butane	n-C <sub>4</sub>	0.0929	0.0930	69.514	390.286
i-Pentane	i-C <sub>5</sub>	0.0122	0.0122	10.624	59.646
n-Pentane	n-C <sub>5</sub>	0.0097	0.0097	8.326	46.744
Hexanes	C <sub>6</sub>	0.0038	0.0038	3.692	20.727
Heptanes	C <sub>7</sub>	0.0076	0.0076	8.300	46.603
Octanes	C <sub>8</sub>	0.0001	0.0001	0.157	0.883
Nonanes	C <sub>9</sub>	0.0000	0.0000	0.000	0.000
Decanes	C <sub>10</sub>	0.0000	0.0000	0.021	0.118
Undecane	C <sub>11</sub>	0.0000	0.0000	0.000	0.000
Dodecanes Plus	C <sub>12+</sub>	0.0000	0.0000	0.000	0.000
Total		1.0000	1.0000	374.888	2104.810
Propanes Plus	C <sub>3+</sub>	0.5379	0.5382	374.888	2104.810
Butanes Plus	C <sub>4+</sub>	0.1708	0.1709	135.131	758.695
Pentanes Plus	C <sub>5+</sub>	0.0334	0.0334	31.120	174.721

Calculated Gas Properties @ Standard Conditions			Calculated Pseudocritical Properties		
Molecular Weight	39.97 kg/kmol	39.97 lb/lb-mol	Ppc	635.2 psia	4.38 MPa
Specific Gravity	1.3799 (Air = 1)	1.3799 (Air = 1)	Tpc	151.8 F	66.5 C
MW of C7+	96.26 kg/kmol	96.26 lb/lbmol	Ppc*	635.0 psia	4.38 MPa
Density of C7+	0.7225 g/cc	722.5 kg/m3	Tpc*	151.3 F	66.2 C

Calculated Gross Heating Value @ Standard Conditions			Calculated Net Heating Value @ Standard Conditions		
Dry	2,245.8 Btu/scf	83.83 MJ/m3	Dry	2,063.5 Btu/scf	77.03 MJ/m3
Wet	2,206.7 Btu/scf	82.37 MJ/m3	Wet	2,027.6 Btu/scf	75.69 MJ/m3

\* - Corrected for Acid Gas Content

Standard Conditions: 60 F (15.5 C) @ 14.696 psia (0.101325 MPa)

GC ID: 4095

**TABLE 1-21**  
**ENERPLUS CORPORATION- VIRDEN**  
**WELL 00/04-11-10-28W1M - - SAMPLE Z39024**  
**SAMPLE VALIDATION**  
**SAMPLE COLLECTION DATA**

Project File:	CL-49659		
Company:	ENERPLUS CORPORATION		
Pool:	DALY UNIT 3		
Field:	LODGEPOLE		
Well Location:	04-11-10-28W1M		
Fluid Sample:	Z39024		
Sample Description:	LIVE OIL		
Sampling Company:	HYCAL ENERGY		
Name of Sampler:	DM		
Sampling Date:	11-Nov-10		
Sampling Point:	WELLHEAD		
Sampling Temperature:	39.2 F	2.0 C	
Sampling Pressure:	40 psia	0.28 MPa	
Reservoir Temperature:	82.4 F	28.0 C	
Reservoir Pressure:	N/A psia	N/A MPa	
Initial Reservoir Pressure (Pi)	955.0 psia	6.59 MPa	
Depth of Reported Pi	N/A mMD	N/A mss	

**TABLE 1-22**  
**ENERPLUS CORPORATION - DALY UNIT 3**  
**WELL 00/04-11-10-28W1M - - SAMPLE Z39024**  
**SAMPLE VALIDATION**  
**MAIN PVT RESULTS**

**INITIAL RESERVOIR CONDITIONS**

Reservoir Pressure	N/A psia	N/A MPa
Reservoir Temperature:	82.4 F	28.0 C

**SINGLE-STAGE SEPARATOR TEST @ 1,594 psia (10.99 MPa) AND 66.2 F (292.2 K)**

At Separator Test Conditions		
Oil Formation Volume Factor	1.0355 res.bbl/STB	1.0355 res.m <sup>3</sup> /m <sup>3</sup>
Solution Gas-Oil Ratio	70.57 scf/STB	12.57 m <sup>3</sup> /m <sup>3</sup>
Oil Density	0.8437 g/cm <sup>3</sup>	843.7 kg/m <sup>3</sup>
At Tank Conditions		
Residual Oil Density	0.8502 g/cm <sup>3</sup>	850.2 kg/m <sup>3</sup>
API Gravity	34.93	34.93

**SINGLE-STAGE SEPARATOR TEST - MATERIAL BALANCE CHECK**

Oil FVF @ 1594 psia (10.99 MPa) (Measured)	1.0355	res.bbl/STB (res.m <sup>3</sup> /m <sup>3</sup> )
Oil FVF @ 1594 psia (10.99 MPa) (Calculated)	1.0327	res.bbl/STB (res.m <sup>3</sup> /m <sup>3</sup> )
Absolute Relative Error	0.2706	(%)



**TABLE 1-23**  
**ENERPLUS CORPORATION- VIRDEN**  
**WELL 00/04-11-10-28W1M - - SAMPLE Z39024**  
**SAMPLE VALIDATION**  
**COMPOSITIONAL ANALYSIS OF WELLHEAD FLUID**

<b>Boiling Point (F)</b>	<b>Component Name</b>	<b>Chemical Symbol</b>	<b>Mole Fraction</b>	<b>Mass Fraction</b>	<b>Calculated Properties</b>
-320.4	Nitrogen	N <sub>2</sub>	0.0040	0.0006	Total Sample
-109.3	Carbon Dioxide	CO <sub>2</sub>	0.0000	0.0000	
-76.6	Hydrogen Sulphide	H <sub>2</sub> S	0.0000	0.0000	Molecular Weight
-259.1	Methane	C <sub>1</sub>	0.0068	0.0006	180.82
-128.0	Ethane	C <sub>2</sub>	0.0412	0.0069	
-44.0	Propane	C <sub>3</sub>	0.0671	0.0164	C <sub>6+</sub> Fraction
10.9	i-Butane	i-C <sub>4</sub>	0.0165	0.0053	
30.9	n-Butane	n-C <sub>4</sub>	0.0544	0.0175	Molecular Weight
82.0	i-Pentane	i-C <sub>5</sub>	0.0275	0.0110	224.52
97.0	n-Pentane	n-C <sub>5</sub>	0.0352	0.0141	Mole Fraction
97 - 156	Hexanes	C <sub>6</sub>	0.0541	0.0258	Density (g/cc) 0.7425
156 - 208.9	Heptanes	C <sub>7</sub>	0.0503	0.0279	0.8618
208.9 - 258.1	Octanes	C <sub>8</sub>	0.0521	0.0329	C <sub>7+</sub> Fraction
258.1 - 303.1	Nonanes	C <sub>9</sub>	0.0433	0.0307	
303.1 - 345	Decanes	C <sub>10</sub>	0.0409	0.0321	Molecular Weight
345 - 385	Undecanes	C <sub>11</sub>	0.0469	0.0381	236.36
385 - 419	Dodecanes	C <sub>12</sub>	0.0427	0.0380	Mole Fraction 0.6578
419 - 455	Tridecanes	C <sub>13</sub>	0.0374	0.0362	Density (g/cc) 0.8685
455 - 486	Tetradecanes	C <sub>14</sub>	0.0296	0.0311	C <sub>12+</sub> Fraction
486 - 519.1	Pentadecanes	C <sub>15</sub>	0.0236	0.0269	
519.1 - 550	Hexadecanes	C <sub>16</sub>	0.0204	0.0251	Molecular Weight
550 - 557	Heptadecanes	C <sub>17</sub>	0.0156	0.0205	322.09
557 - 603	Octadecanes	C <sub>18</sub>	0.0179	0.0248	Mole Fraction 0.3980
603 - 626	Nonadecanes	C <sub>19</sub>	0.0187	0.0273	Density (g/cc) 0.9010
626 - 651.9	Eicosanes	C <sub>20</sub>	0.0139	0.0211	C <sub>30+</sub> Fraction
651.9 - 675	Heneicosanes	C <sub>21</sub>	0.0135	0.0217	
675 - 696.9	Docosanes	C <sub>22</sub>	0.0128	0.0215	Molecular Weight
696.9 - 716	tricosanes	C <sub>23</sub>	0.0120	0.0211	603.51
716 - 736	Tetracosanes	C <sub>24</sub>	0.0113	0.0207	Mole Fraction 0.0846
736 - 755.1	Pentacosanes	C <sub>25</sub>	0.0100	0.0190	Density (g/cc) 0.9864
755.1 - 774	Hexacosanes	C <sub>26</sub>	0.0086	0.0170	
774.1 - 792	Heptacosanes	C <sub>27</sub>	0.0089	0.0185	Recombination Parameters
792.1 - 809.1	Octacosanes	C <sub>28</sub>	0.0084	0.0179	
809.1 - 826	Nonacosanes	C <sub>29</sub>	0.0081	0.0181	Gas-Oil Ratio (cc/cc) 12.57
Above 826	Tricontanes Plus	C <sub>30+</sub>	0.0846	0.2823	Dead Oil Density (g/cc) 0.8502
					Dead Oil MW (g/mol) 198.29
	<b>NAPHTHENES</b>				
120.0	Cyclopentane	C <sub>5</sub> H <sub>10</sub>	0.0046	0.0018	
162.0	Methylcyclopentane	C <sub>6</sub> H <sub>12</sub>	0.0147	0.0068	
178.0	Cyclohexane	C <sub>6</sub> H <sub>12</sub>	0.0151	0.0070	
214.0	Methylcyclohexane	C <sub>7</sub> H <sub>14</sub>	0.0135	0.0073	
	<b>AROMATICS</b>				
176.0	Benzene	C <sub>6</sub> H <sub>6</sub>	0.0008	0.0004	
231.1	Toluene	C <sub>7</sub> H <sub>8</sub>	0.0004	0.0002	
277 - 282	Ethylbenzene & p,m-Xylene	C <sub>8</sub> H <sub>10</sub>	0.0047	0.0028	
291.9	o-Xylene	C <sub>8</sub> H <sub>10</sub>	0.0034	0.0020	
336.0	1, 2, 4-Trimethylbenzene	C <sub>9</sub> H <sub>12</sub>	0.0044	0.0029	

The bar chart displays values for components from C<sub>2</sub> to C<sub>30+</sub>. The y-axis ranges from 0.00 to 0.09. Notable peaks occur at C<sub>8</sub>, C<sub>10</sub>, and C<sub>30+</sub>.

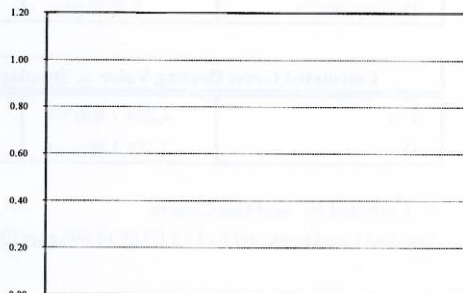
Component	Value
C <sub>2</sub>	~0.005
C <sub>3</sub>	~0.008
C <sub>4</sub>	~0.042
C <sub>5</sub>	~0.068
C <sub>6</sub>	~0.072
C <sub>7</sub>	~0.062
C <sub>8</sub>	~0.082
C <sub>9</sub>	~0.068
C <sub>10</sub>	~0.052
C <sub>11</sub>	~0.045
C <sub>12</sub>	~0.042
C <sub>13</sub>	~0.038
C <sub>14</sub>	~0.032
C <sub>15</sub>	~0.025
C <sub>16</sub>	~0.022
C <sub>17</sub>	~0.018
C <sub>18</sub>	~0.015
C <sub>19</sub>	~0.012
C <sub>20</sub>	~0.010
C <sub>21</sub>	~0.0

Note: Physical properties are calculated based on GPA 2145-00 physical constants

ID.: 4697-1605

**TABLE 1-24**  
**ENERPLUS CORPORATION- VIRDEN**  
**WELL 00/04-11-10-28W1M - . - SAMPLE Z39024**  
**SAMPLE VALIDATION**  
**COMPOSITIONAL ANALYSIS OF FLASHED OIL**

Boiling Point (F)	Component Name	Chemical Symbol	Mole Fraction	Mass Fraction	Calculated Properties
-320.4	Nitrogen	N <sub>2</sub>	0.0000	0.0000	<b>Total Sample</b>
-109.3	Carbon Dioxide	CO <sub>2</sub>	0.0000	0.0000	
-76.6	Hydrogen Sulphide	H <sub>2</sub> S	0.0000	0.0000	Molecular Weight 198.29
-259.1	Methane	C <sub>1</sub>	0.0000	0.0000	Density (g/cc) 0.8419
-128.0	Ethane	C <sub>2</sub>	0.0000	0.0000	
-44.0	Propane	C <sub>3</sub>	0.0312	0.0069	<b>C<sub>6+</sub> Fraction</b>
10.9	i-Butane	i-C <sub>4</sub>	0.0133	0.0039	
30.9	n-Butane	n-C <sub>4</sub>	0.0501	0.0147	Molecular Weight 224.80
82.0	i-Pentane	i-C <sub>5</sub>	0.0293	0.0107	Mole Fraction 0.8379
97.0	n-Pentane	n-C <sub>5</sub>	0.0383	0.0139	Density (g/cc) 0.8619
97 - 156	Hexanes	C <sub>6</sub>	0.0602	0.0262	
156 - 208.9	Heptanes	C <sub>7</sub>	0.0564	0.0285	<b>C<sub>7+</sub> Fraction</b>
208.9 - 258.1	Octanes	C <sub>8</sub>	0.0585	0.0337	
258.1 - 303.1	Nonanes	C <sub>9</sub>	0.0487	0.0315	Molecular Weight 236.65
303.1 - 345	Decanes	C <sub>10</sub>	0.0459	0.0329	Mole Fraction 0.7724
345 - 385	Undecanes	C <sub>11</sub>	0.0527	0.0391	Density (g/cc) 0.8685
385 - 419	Dodecanes	C <sub>12</sub>	0.0480	0.0389	
419 - 455	Tridecanes	C <sub>13</sub>	0.0421	0.0371	<b>C<sub>12+</sub> Fraction</b>
455 - 486	Tetradecanes	C <sub>14</sub>	0.0332	0.0318	
486 - 519.1	Pentadecanes	C <sub>15</sub>	0.0265	0.0275	Molecular Weight 322.09
519.1 - 550	Hexadecanes	C <sub>16</sub>	0.0230	0.0257	Mole Fraction 0.4472
550 - 557	Heptadecanes	C <sub>17</sub>	0.0176	0.0210	Density (g/cc) 0.9010
557 - 603	Octadecanes	C <sub>18</sub>	0.0201	0.0254	
603 - 626	Nonadecanes	C <sub>19</sub>	0.0211	0.0279	<b>C<sub>30+</sub> Fraction</b>
626 - 651.9	Eicosanes	C <sub>20</sub>	0.0156	0.0216	
651.9 - 675	Heneicosanes	C <sub>21</sub>	0.0152	0.0222	Molecular Weight 603.51
675 - 696.9	Docosanes	C <sub>22</sub>	0.0144	0.0221	Mole Fraction 0.0951
696.9 - 716	Tricosanes	C <sub>23</sub>	0.0135	0.0217	Density (g/cc) 0.9864
716 - 736	Tetracosanes	C <sub>24</sub>	0.0127	0.0212	
736 - 755.1	Pentacosanes	C <sub>25</sub>	0.0112	0.0195	
755.1 - 774	Hexacosanes	C <sub>26</sub>	0.0096	0.0175	
774.1 - 792	Heptacosanes	C <sub>27</sub>	0.0101	0.0190	
792.1 - 809.1	Octacosanes	C <sub>28</sub>	0.0094	0.0184	
809.1 - 826	Nonacosanes	C <sub>29</sub>	0.0092	0.0186	
Above 826	Tricontanes Plus	C <sub>30+</sub>	0.0951	0.2893	
<b>NAPHTHENES</b>					
120.0	Cyclopentane	C <sub>5</sub> H <sub>10</sub>	0.0052	0.0018	
162.0	Methylcyclopentane	C <sub>6</sub> H <sub>12</sub>	0.0156	0.0066	
178.0	Cyclohexane	C <sub>6</sub> H <sub>12</sub>	0.0169	0.0072	
214.0	Methylcyclohexane	C <sub>7</sub> H <sub>14</sub>	0.0151	0.0075	
<b>AROMATICS</b>					
176.0	Benzene	C <sub>6</sub> H <sub>6</sub>	0.0009	0.0004	
231.1	Toluene	C <sub>7</sub> H <sub>8</sub>	0.0004	0.0002	
277 - 282	Ethylbenzene & p,m-Xylene	C <sub>8</sub> H <sub>10</sub>	0.0053	0.0028	
291.9	o-Xylene	C <sub>8</sub> H <sub>10</sub>	0.0038	0.0021	
336.0	1, 2, 4-Trimethylbenzene	C <sub>9</sub> H <sub>12</sub>	0.0050	0.0030	
<b>Total</b>			<b>1.0000</b>	<b>1.0000</b>	



Note: Physical properties are calculated based on GPA 2145-00 physical constants

GC ID: 9699



**TABLE 1-25**  
**ENERPLUS CORPORATION - DALY UNIT 3**  
**WELL 00/04-11-10-28W1M - - SAMPLE Z39024**  
**SAMPLE VALIDATION**  
**COMPOSITIONAL ANALYSIS OF FLASHED GAS**

Component Name	Chemical Symbol	Mole Fraction		Liquid Volume	
		As Analyzed	Acid Gas Free	STB/MMscf	mL/m3
Nitrogen	N <sub>2</sub>	0.0362	0.0362		
Carbon Dioxide	CO <sub>2</sub>	0.0003	0.0000		
Hydrogen Sulphide	H <sub>2</sub> S	0.0000	0.0000		
Methane	C <sub>1</sub>	0.0618	0.0618		
Ethane	C <sub>2</sub>	0.3745	0.3746		
Propane	C <sub>3</sub>	0.3575	0.3576	233.445	1310.678
i-Butane	i-C <sub>4</sub>	0.0430	0.0430	33.361	187.308
n-Butane	n-C <sub>4</sub>	0.0894	0.0895	66.921	375.730
i-Pentane	i-C <sub>5</sub>	0.0131	0.0131	11.409	64.054
n-Pentane	n-C <sub>5</sub>	0.0104	0.0104	8.922	50.094
Hexanes	C <sub>6</sub>	0.0042	0.0042	4.077	22.890
Heptanes	C <sub>7</sub>	0.0094	0.0094	10.278	57.706
Octanes	C <sub>8</sub>	0.0002	0.0002	0.279	1.568
Nonanes	C <sub>9</sub>	0.0000	0.0000	0.000	0.000
Decanes	C <sub>10</sub>	0.0000	0.0000	0.029	0.160
Undecane	C <sub>11</sub>	0.0000	0.0000	0.000	0.000
Dodecanes Plus	C <sub>12+</sub>	0.0000	0.0000	0.000	0.000
<b>Total</b>		<b>1.0000</b>	<b>1.0000</b>	<b>368.721</b>	<b>2070.188</b>
Propanes Plus	C <sub>3+</sub>	0.5272	0.5274	368.721	2070.188
Butanes Plus	C <sub>4+</sub>	0.1698	0.1698	135.276	759.510
Pentanes Plus	C <sub>5+</sub>	0.0373	0.0373	34.994	196.471

Calculated Gas Properties @ Standard Conditions			Calculated Pseudocritical Properties		
Molecular Weight	39.72 kg/kmol	39.72 lb/lb-mol	Ppc	633.9 psia	4.37 MPa
Specific Gravity	1.3715 (Air = 1)	1.3715 (Air = 1)	Tpc	146.3 F	63.5 C
MW of C7+	96.34 kg/kmol	96.34 lb/lbmol	Ppc*	633.9 psia	4.37 MPa
Density of C7+	0.7227 g/cc	722.7 kg/m3	Tpc*	146.3 F	63.5 C

Calculated Gross Heating Value @ Standard Conditions			Calculated Net Heating Value @ Standard Conditions		
Dry	2,223.7 Btu/scf	83.01 MJ/m3	Dry	2,043.2 Btu/scf	76.27 MJ/m3
Wet	2,185.1 Btu/scf	81.56 MJ/m3	Wet	2,007.6 Btu/scf	74.94 MJ/m3

\* - Corrected for Acid Gas Content

Standard Conditions: 60 F (15.5 C) @ 14.696 psia (0.101325 MPa)

GC ID: 4093





**Weatherford®**  
LABORATORIES

**ENERPLUS CORPORATION  
SECTION 2  
RECOMBINED SAMPLE (RESERVOIR FLUID PROPERTIES)**

**FINAL REPORT**

Prepared for



By

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PROJECT FILE : CL-49954

## SECTION 2: SAMPLE VALIDATION

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### RESULTS AND DISCUSSION

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## RESULTS AND DISCUSSION

The Sample Validation study was conducted on the RECOMBINED sample Z39012 collected from the well 00/04-11-10-28W1M of the LODGEPOLE reservoir.

A small portion of the sample was flashed at atmospheric pressure to measure the oil formation volume factor and the solution gas-oil ratio from test conditions to stock tank conditions.

Compositional analyses were subsequently performed on the flashed phases using gas chromatography methods. The molecular weight of the flashed liquid phase was measured using the freezing point technique.

Based on these results, the selected sample was mathematically recombined to the measured solution gas-oil ratio.

[Table 1](#) summarizes the sample collection and transfer data.

The main PVT parameters measured along with the material balance check performed are given in [Table 2](#). The calculated formation volume factor compared to the measured one indicates very good agreement and is an indicator of overall data quality.

[Table 3](#) through [5](#) provide the composition analyses of recombined fluid, flashed oil at stock tank conditions and flashed gas at standard conditions.

**TABLE 2-1**  
**ENERPLUS CORPORATION - DALY UNIT 3**  
**WELL 00/04-11-10-28W1M - SAMPLE Z39012**  
**SAMPLE VALIDATION**  
**SAMPLE COLLECTION DATA**

Project File:	CL-49659	
Company:	ENERPLUS COPORATION	
Pool:	DALY UNIT 3	
Field:	LODGEPOLE	
Well Location:	00/04-11-10-28W1M	
Fluid Sample:	Z39012	
Sample Description:	LIVE OIL	
Sampling Company:	HYCAL ENERGY	
Name of Sampler:	DM	
Sampling Date:	11-Nov-10	
Sampling Point:	WELLHEAD	
Sampling Temperature:	39.2 F	4.0 C
Sampling Pressure:	40 psia	0.28 MPa
Reservoir Temperature:	82.4 F	28.0 C
Reservoir Pressure:	968.0 psia	6.67 MPa
Initial Reservoir Pressure (Pi)	955.0 psia	6.59 MPa
Depth of Reported Pi	N/A mMD	N/A mss

**TABLE 2-2**  
**ENERPLUS CORPORATION - DALY UNIT 3**  
**WELL 00/04-11-10-28W1M - SAMPLE Z39012**  
**SAMPLE VALIDATION**  
**MAIN PVT RESULTS**

**INITIAL RESERVOIR CONDITIONS**

Reservoir Pressure	968 psia	6.67 MPa
Reservoir Temperature:	82.4 F	28.0 C

**SINGLE-STAGE SEPARATOR TEST @ 1,513 psia (10.43 MPa) AND 82.4 F (28 C)**

At Separator Test Conditions		
Oil Formation Volume Factor	1.0780 res.bbl/STB	1.0780 res.m <sup>3</sup> /m <sup>3</sup>
Solution Gas-Oil Ratio	109.92 scf/STB	19.58 m <sup>3</sup> /m <sup>3</sup>
Oil Density	0.8247 g/cm <sup>3</sup>	824.7 kg/m <sup>3</sup>
At Tank Conditions		
Residual Oil Density	0.8513 g/cm <sup>3</sup>	851.3 kg/m <sup>3</sup>
API Gravity	34.71	34.71

**SINGLE-STAGE SEPARATOR TEST - MATERIAL BALANCE CHECK**

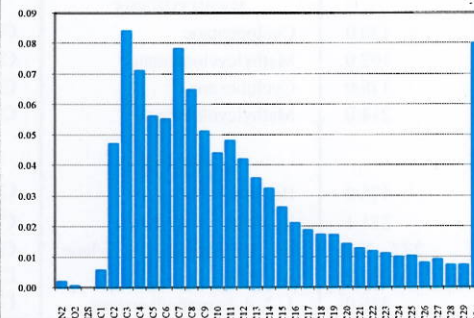
Oil FVF @ 1513 psia (10.43 MPa) (Measured)	1.0780	res.bbl/STB (res.m <sup>3</sup> /m <sup>3</sup> )
Oil FVF @ 1513 psia (10.43 MPa) (Calculated)	1.0755	res.bbl/STB (res.m <sup>3</sup> /m <sup>3</sup> )
Absolute Relative Error	0.2345	(%)

**PRESSURE VOLUME RELATIONSHIP @ 82.4 F (28 C)**

Bubble Point	186 psia	1.28 MPa
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**TABLE 2-3**  
**ENERPLUS CORPORATION - DALY UNIT 3**  
**WELL 00/04-11-10-28W1M - SAMPLE Z39012**  
**SAMPLE VALIDATION**  
**COMPOSITIONAL ANALYSIS OF RESERVOIR FLUID**

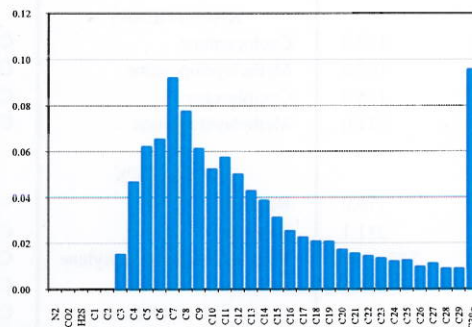
Boiling Point (F)	Component Name	Chemical Symbol	Mole Fraction	Mass Fraction	Calculated Properties	
-320.4	Nitrogen	N <sub>2</sub>	0.0019	0.0003	<b>Total Sample</b>	
-109.3	Carbon Dioxide	CO <sub>2</sub>	0.0004	0.0001		
-76.6	Hydrogen Sulphide	H <sub>2</sub> S	0.0000	0.0000	Molecular Weight	176.62
-259.1	Methane	C <sub>1</sub>	0.0056	0.0005		
-128.0	Ethane	C <sub>2</sub>	0.0469	0.0080		
-44.0	Propane	C <sub>3</sub>	0.0839	0.0209	<b>C<sub>6+</sub> Fraction</b>	
10.9	i-Butane	i-C <sub>4</sub>	0.0176	0.0058		
30.9	n-Butane	n-C <sub>4</sub>	0.0533	0.0176	Molecular Weight	222.25
82.0	i-Pentane	i-C <sub>5</sub>	0.0246	0.0100	Mole Fraction	0.7299
97.0	n-Pentane	n-C <sub>5</sub>	0.0316	0.0129	Density (g/cc)	0.8599
97 - 156	Hexanes	C <sub>6</sub>	0.0509	0.0248		
156 - 208.9	Heptanes	C <sub>7</sub>	0.0486	0.0276	<b>C<sub>7+</sub> Fraction</b>	
208.9 - 258.1	Octanes	C <sub>8</sub>	0.0536	0.0347		
258.1 - 303.1	Nonanes	C <sub>9</sub>	0.0431	0.0313	Molecular Weight	233.33
303.1 - 345	Decanes	C <sub>10</sub>	0.0395	0.0318	Mole Fraction	0.6494
345 - 385	Undecanes	C <sub>11</sub>	0.0479	0.0399	Density (g/cc)	0.8662
385 - 419	Dodecanes	C <sub>12</sub>	0.0419	0.0382		
419 - 455	Tridecanes	C <sub>13</sub>	0.0358	0.0355	<b>C<sub>12+</sub> Fraction</b>	
455 - 486	Tetradecanes	C <sub>14</sub>	0.0324	0.0349		
486 - 519.1	Pentadecanes	C <sub>15</sub>	0.0262	0.0306	Molecular Weight	316.28
519.1 - 550	Hexadecanes	C <sub>16</sub>	0.0212	0.0266	Mole Fraction	0.3932
550 - 557	Heptadecanes	C <sub>17</sub>	0.0188	0.0253	Density (g/cc)	0.8985
557 - 603	Octadecanes	C <sub>18</sub>	0.0174	0.0247		
603 - 626	Nonadecanes	C <sub>19</sub>	0.0173	0.0257	<b>C<sub>30+</sub> Fraction</b>	
626 - 651.9	Eicosanes	C <sub>20</sub>	0.0143	0.0222		
651.9 - 675	Heneicosanes	C <sub>21</sub>	0.0128	0.0211	Molecular Weight	599.75
675 - 696.9	Docosanes	C <sub>22</sub>	0.0119	0.0206	Mole Fraction	0.0799
696.9 - 716	Tricosanes	C <sub>23</sub>	0.0112	0.0202	Density (g/cc)	0.9860
716 - 736	Tetracosanes	C <sub>24</sub>	0.0100	0.0188		
736 - 755.1	Pentacosanes	C <sub>25</sub>	0.0103	0.0202		
755.1 - 774	Hexacosanes	C <sub>26</sub>	0.0080	0.0163	<b>Recombination Parameters</b>	
774.1 - 792	Heptacosanes	C <sub>27</sub>	0.0092	0.0194		
792.1 - 809.1	Octacosanes	C <sub>28</sub>	0.0073	0.0161	Gas-Oil Ratio (cc/cc)	19.58
809.1 - 826	Nonacosanes	C <sub>29</sub>	0.0073	0.0166	Dead Oil Density (g/cc)	0.8513
Above 826	Tricontanes Plus	C <sub>30+</sub>	0.0799	0.2713	Dead Oil MW (g/mol)	202.95
NAPHTHENES						
120.0	Cyclopentane	C <sub>5</sub> H <sub>10</sub>	0.0043	0.0017		
162.0	Methylcyclopentane	C <sub>6</sub> H <sub>12</sub>	0.0143	0.0068		
178.0	Cyclohexane	C <sub>6</sub> H <sub>12</sub>	0.0145	0.0069		
214.0	Methylcyclohexane	C <sub>7</sub> H <sub>14</sub>	0.0107	0.0060		
AROMATICS						
176.0	Benzene	C <sub>6</sub> H <sub>6</sub>	0.0007	0.0003		
231.1	Toluene	C <sub>7</sub> H <sub>8</sub>	0.0004	0.0002		
277 - 282	Ethylbenzene & p,m-Xylene	C <sub>8</sub> H <sub>10</sub>	0.0046	0.0028		
291.9	o-Xylene	C <sub>8</sub> H <sub>10</sub>	0.0034	0.0021		
336.0	1, 2, 4-Trimethylbenzene	C <sub>9</sub> H <sub>12</sub>	0.0043	0.0029		
Total			1.0000	1.0000		

Note: Physical properties are calculated based on GPA 2145-00 physical constants

ID.: 4725-1604

**TABLE 2-4**  
**ENERPLUS CORPORATION - DALY UNIT 3**  
**WELL 00/04-11-10-28W1M - SAMPLE Z39012**  
**SAMPLE VALIDATION**  
**COMPOSITIONAL ANALYSIS OF FLASHED OIL**

Boiling Point (F)	Component Name	Chemical Symbol	Mole Fraction	Mass Fraction	Calculated Properties
-320.4	Nitrogen	N <sub>2</sub>	0.0000	0.0000	<b>Total Sample</b>
-109.3	Carbon Dioxide	CO <sub>2</sub>	0.0000	0.0000	
-76.6	Hydrogen Sulphide	H <sub>2</sub> S	0.0000	0.0000	Molecular Weight 202.95
-259.1	Methane	C <sub>1</sub>	0.0000	0.0000	Density (g/cc) 0.8454
-128.0	Ethane	C <sub>2</sub>	0.0000	0.0000	
-44.0	Propane	C <sub>3</sub>	0.0150	0.0033	<b>C<sub>6+</sub> Fraction</b>
10.9	i-Butane	i-C <sub>4</sub>	0.0090	0.0026	
30.9	n-Butane	n-C <sub>4</sub>	0.0378	0.0108	Molecular Weight 222.66
82.0	i-Pentane	i-C <sub>5</sub>	0.0265	0.0094	Mole Fraction 0.8762
97.0	n-Pentane	n-C <sub>5</sub>	0.0355	0.0126	Density (g/cc) 0.8600
97 - 156	Hexanes	C <sub>6</sub>	0.0601	0.0255	
156 - 208.9	Heptanes	C <sub>7</sub>	0.0581	0.0287	<b>C<sub>7+</sub> Fraction</b>
208.9 - 258.1	Octanes	C <sub>8</sub>	0.0642	0.0361	
258.1 - 303.1	Nonanes	C <sub>9</sub>	0.0516	0.0326	Molecular Weight 233.72
303.1 - 345	Decanes	C <sub>10</sub>	0.0472	0.0331	Mole Fraction 0.8111
345 - 385	Undecanes	C <sub>11</sub>	0.0574	0.0416	Density (g/cc) 0.8663
385 - 419	Dodecanes	C <sub>12</sub>	0.0501	0.0398	
419 - 455	Tridecanes	C <sub>13</sub>	0.0428	0.0369	<b>C<sub>12+</sub> Fraction</b>
455 - 486	Tetradecanes	C <sub>14</sub>	0.0388	0.0363	
486 - 519.1	Pentadecanes	C <sub>15</sub>	0.0314	0.0319	Molecular Weight 316.28
519.1 - 550	Hexadecanes	C <sub>16</sub>	0.0253	0.0277	Mole Fraction 0.4706
550 - 557	Heptadecanes	C <sub>17</sub>	0.0226	0.0264	Density (g/cc) 0.8985
557 - 603	Octadecanes	C <sub>18</sub>	0.0208	0.0258	
603 - 626	Nonadecanes	C <sub>19</sub>	0.0207	0.0268	<b>C<sub>30+</sub> Fraction</b>
626 - 651.9	Eicosanes	C <sub>20</sub>	0.0171	0.0231	
651.9 - 675	Heneicosanes	C <sub>21</sub>	0.0154	0.0220	Molecular Weight 599.75
675 - 696.9	Docosanes	C <sub>22</sub>	0.0142	0.0214	Mole Fraction 0.0956
696.9 - 716	Tricosanes	C <sub>23</sub>	0.0134	0.0210	Density (g/cc) 0.9860
716 - 736	Tetracosanes	C <sub>24</sub>	0.0120	0.0195	
736 - 755.1	Pentacosanes	C <sub>25</sub>	0.0124	0.0210	
755.1 - 774	Hexacosanes	C <sub>26</sub>	0.0096	0.0170	
774.1 - 792	Heptacosanes	C <sub>27</sub>	0.0110	0.0202	
792.1 - 809.1	Octacosanes	C <sub>28</sub>	0.0087	0.0167	
809.1 - 826	Nonacosanes	C <sub>29</sub>	0.0088	0.0173	
Above 826	Tricontanes Plus	C <sub>30+</sub>	0.0956	0.2826	
120.0	NAPHTHENES				
120.0	Cyclopentane	C <sub>5</sub> H <sub>10</sub>	0.0051	0.0018	
162.0	Methylcyclopentane	C <sub>6</sub> H <sub>12</sub>	0.0157	0.0065	
178.0	Cyclohexane	C <sub>6</sub> H <sub>12</sub>	0.0173	0.0072	
214.0	Methylcyclohexane	C <sub>7</sub> H <sub>14</sub>	0.0128	0.0062	
176.0	AROMATICS				
176.0	Benzene	C <sub>6</sub> H <sub>6</sub>	0.0009	0.0003	
231.1	Toluene	C <sub>7</sub> H <sub>8</sub>	0.0005	0.0002	
277 - 282	Ethylbenzene & p,m-Xylene	C <sub>8</sub> H <sub>10</sub>	0.0055	0.0029	
291.9	o-Xylene	C <sub>8</sub> H <sub>10</sub>	0.0041	0.0021	
336.0	1, 2, 4-Trimethylbenzene	C <sub>9</sub> H <sub>12</sub>	0.0052	0.0031	
<b>Total</b>			<b>1.0000</b>	<b>1.0000</b>	



Note: Physical properties are calculated based on GPA 2145-00 physical constants

GC ID: 9752



**TABLE 2-5**  
**ENERPLUS CORPORATION - DALY UNIT 3**  
**WELL 00/04-11-10-28W1M - SAMPLE Z39012**  
**SAMPLE VALIDATION**  
**COMPOSITIONAL ANALYSIS OF FLASHED GAS**

Component Name	Chemical Symbol	Mole Fraction		Liquid Volume	
		As Analyzed	Acid Gas Free	STB/MMscf	mL/m3
Nitrogen	N <sub>2</sub>	0.0114	0.0114		
Carbon Dioxide	CO <sub>2</sub>	0.0025	0.0000		
Hydrogen Sulphide	H <sub>2</sub> S	0.0000	0.0000		
Methane	C <sub>1</sub>	0.0341	0.0342		
Ethane	C <sub>2</sub>	0.2852	0.2859		
Propane	C <sub>3</sub>	0.4333	0.4344	282.984	1588.816
i-Butane	i-C <sub>4</sub>	0.0613	0.0615	47.581	267.143
n-Butane	n-C <sub>4</sub>	0.1323	0.1326	98.967	555.649
i-Pentane	i-C <sub>5</sub>	0.0149	0.0150	12.974	72.840
n-Pentane	n-C <sub>5</sub>	0.0118	0.0118	10.103	56.726
Hexanes	C <sub>6</sub>	0.0046	0.0046	4.464	25.064
Heptanes	C <sub>7</sub>	0.0083	0.0083	9.066	50.900
Octanes	C <sub>8</sub>	0.0003	0.0003	0.407	2.285
Nonanes	C <sub>9</sub>	0.0000	0.0000	0.000	0.000
Decanes	C <sub>10</sub>	0.0000	0.0000	0.000	0.000
Undecane	C <sub>11</sub>	0.0000	0.0000	0.000	0.000
Dodecanes Plus	C <sub>12+</sub>	0.0000	0.0000	0.000	0.000
Total		1.0000	1.0000	466.545	2619.423
Propanes Plus	C <sub>3+</sub>	0.6668	0.6685	466.545	2619.423
Butanes Plus	C <sub>4+</sub>	0.2335	0.2340	183.562	1030.608
Pentanes Plus	C <sub>5+</sub>	0.0399	0.0400	37.014	207.815

Calculated Gas Properties @ Standard Conditions			Calculated Pseudocritical Properties		
Molecular Weight	43.06 kg/kmol	43.06 lb/lb-mol	Ppc	623.8 psia	4.30 MPa
Specific Gravity	1.4868 (Air = 1)	1.4868 (Air = 1)	Tpc	182.4 F	83.55 C
MW of C7+	96.43 kg/kmol	96.43 lb/lbmol	Ppc*	623.2 psia	4.30 MPa
Density of C7+	0.7229 g/cc	722.9 kg/m3	Tpc*	181.9 F	83.3 C

Calculated Gross Heating Value @ Standard Conditions			Calculated Net Heating Value @ Standard Conditions		
Dry	2,437.1 Btu/scf	90.97 MJ/m3	Dry	2,241.5 Btu/scf	83.67 MJ/m3
Wet	2,394.7 Btu/scf	89.39 MJ/m3	Wet	2,202.5 Btu/scf	82.21 MJ/m3

\* - Corrected for Acid Gas Content

Standard Conditions: 60 F (15.5 C) @ 14.696 psia (0.101325 MPa)

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LABORATORIES

**ENERPLUS CORPORATION**  
**SECTION 3 - DIFFERENTIAL LIBERATION RESULTS**

**FINAL REPORT**

Prepared for

**enerPLUS**

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PROJECT FILE : CL-49954

## **SECTION 3 - DIFFERENTIAL LIBERATION RESULTS**

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## **RESULTS AND DISCUSSION**

The reservoir fluid study was conducted on a RECOMBINED sample prepared from wellhead oil and wellhead gas collected from Well 00/04-11-10-28W1M of LODGEPOLE reservoir.

The sample collection data is provided in Table 1 and the sample validation data is given in Appendix A.

The PVT cell was charged with a portion of the live oil sample and a constant composition expansion experiment (CCE) was performed on the oil. Table 3 provides the CCE results of the average compressibility of the reservoir fluid at pressures above the bubblepoint. Table 4 contains the complete CCE results with the exception of the data already presented in Table 3. Figure 1 is the relative total volume ( $V/V_{sat}$ ) data and Y-function.

Table 5 contains various property measurements made on the differentially liberated oil below the bubblepoint including live oil density, oil formation volume factor and gas-oil ratios, which are shown in Figures 2 through 4, respectively.

Table 6 contains a summary of the properties of the differentially liberated gas including gas gravities, deviation factors, gas formation volume factors and gas expansion factors. The gas deviation factor ( $Z$ ), gas formation volume factor and gas expansion factor, and gas gravity are shown in Figures 5 through 7, respectively.

Table 7 provides the results of the reservoir fluid viscosity measurements. This data is represented by Figures 8 and 9. Gas phase viscosity was calculated using the compositional data and the Lee, Gonzalez, Eakin correlation.

Table 8 summarizes the effluent gas compositions from each pressure stage during the differential liberation experiment. Figure 10 shows this data plotted on semi-log co-ordinates. Table 9 presents the compositional analysis of the residual oil at completion of the experiment.

Table 10 provides the correlations of the measured PVT Data.

Appendix B contains the material balance check performed for this experiment. It is displayed as formation volume factors so that the balance can be checked on a point by point basis. Appendix C contains the compositional analyses of the liberated gases from the differential liberation test.

## SUMMARY

**ENERPLUS CORPORATION - LODGEPOLE**  
**WELL 00/04-11-10-28W1M - DALY UNIT 3 - RECOMBINED SAMPLE**  
**RESERVOIR FLUID STUDY**  
**MAIN PVT RESULTS**

### INITIAL RESERVOIR CONDITIONS

Reservoir Pressure	968 psia	6.67 MPa
Reservoir Temperature:	82.4 F	28 C

### CONSTANT COMPOSITION EXPANSION @ 82.4 F (28.0 C)

Saturation Pressure	186 psia	1.28 MPa
Compressibility @ Reservoir Pressure	6.43476E-06 psia <sup>-1</sup>	9.332847E-04 MPa <sup>-1</sup>
Compressibility @ Saturation Pressure	7.17175E-06 psia <sup>-1</sup>	1.040177E-03 MPa <sup>-1</sup>

### DIFFERENTIAL LIBERATION @ 82.4 F (28.0 C)

At Saturation Pressure		
Oil Formation Volume Factor	1.0759 res.bbl/STB	1.0759 res.m <sup>3</sup> /m <sup>3</sup>
Solution Gas-Oil Ratio	117.30 scf/STB	20.89 m <sup>3</sup> /m <sup>3</sup>
Oil Density	0.8319 g/cm <sup>3</sup>	831.9 kg/m <sup>3</sup>
Oil Viscosity	3.237 cp	3.237 mPa.s
At Ambient Pressure		
Residual Oil Density	0.8461 g/cm <sup>3</sup>	846.1 kg/m <sup>3</sup>
Residual Oil Viscosity	5.340 cp	5.340 mPa.s
At Tank Conditions		
Residual Oil Density	0.8580 g/cm <sup>3</sup>	858.0 kg/m <sup>3</sup>
API Gravity	33.42	33.42

### SINGLE-STAGE SEPARATOR TEST

At Saturation Pressure		
Oil Formation Volume Factor	1.0687 res.bbl/STB	1.0687 res.m <sup>3</sup> /m <sup>3</sup>
Solution Gas-Oil Ratio	109.92 scf/STB	19.58 m <sup>3</sup> /m <sup>3</sup>
At Tank Conditions		
Residual Oil Density	0.8513 g/cm <sup>3</sup>	851.3 kg/m <sup>3</sup>
API Gravity	34.71	34.71



**TABLE 3-5**  
**ENERPLUS CORPORATION - LODGEPOLE**  
**WELL 00/04-11-10-28W1M - DALY UNIT 3 - RECOMBINED SAMPLE**  
**RESERVOIR FLUID STUDY**  
**DIFFERENTIAL LIBERATION OIL PROPERTIES @ 82.4 F (28.0 C)**

Pressure		Oil	Oil Formation	Total Formation	Gas-Oil Ratio		Gas-Oil Ratio	
(psia)	(MPa)	Density (g/cm <sup>3</sup> )	Volume Factor [1]	Volume Factor [2]	Solution (scf/STB)	Liberated (scf/STB)	Solution (m <sup>3</sup> /m <sup>3</sup> )	Liberated (m <sup>3</sup> /m <sup>3</sup> )
2013	13.88	0.8416	1.0635	1.0635	117.30	0.00	20.89	0.00
1513	10.43	0.8391	1.0665	1.0665	117.30	0.00	20.89	0.00
1113	7.67	0.8371	1.0691	1.0691	117.30	0.00	20.89	0.00
913	6.29	0.8360	1.0705	1.0705	117.30	0.00	20.89	0.00
713	4.91	0.8349	1.0719	1.0719	117.30	0.00	20.89	0.00
513	3.54	0.8338	1.0734	1.0734	117.30	0.00	20.89	0.00
313	2.16	0.8326	1.0749	1.0749	117.30	0.00	20.89	0.00
186 Psat	1.28	0.8319	1.0759	1.0759	117.30	0.00	20.89	0.00
133	0.92	0.8337	1.0664	1.4251	96.42	20.87	17.17	3.72
103	0.71	0.8374	1.0600	1.8058	83.32	33.98	14.84	6.05
63	0.43	0.8403	1.0489	3.0287	59.33	57.97	10.57	10.32
13	0.09	0.8461	1.0183	13.2440	0.00	117.30	0.00	20.89
Density of Residual Oil = 0.8580 g/cm <sup>3</sup> (858.0 kg/m <sup>3</sup> ) @ 60 F (288.7K)								
<p>[1] Barrels (Cubic meters) of oil at indicated pressure and temperature per barrel (cubic meter) of residual oil @ 60 F (288.7 K).</p> <p>[2] Total barrels (cubic meters) of oil and liberated gas at the indicated pressure and temperature per barrel (cubic meter) of residual oil @ 60 F (288.7 K).</p> <p>Psat - Saturation Pressure</p> <p>- Tank conditions: 60 F (15.5 C) @ 13 psia (0.0896 MPa); Standard conditions: 60 F (15.5 C) @ 14.696 psia (0.101325 MPa).</p>								

**SECTION 3**  
**RESERVOIR FLUID STUDY**

**TABLE 3-6**  
**ENERPLUS CORPORATION - LODGEPOLE**  
**WELL 00/04-11-10-28W1M - DALY UNIT 3 - RECOMBINED SAMPLE**  
**RESERVOIR FLUID STUDY**  
**DIFFERENTIAL LIBERATION GAS PROPERTIES @ 82.4 F (28.0 C)**

Pressure		Gas Gravity		Gas Density (g/cm <sup>3</sup> )	Gas Deviation Factor (-)	Gas Formation Volume Factor [1]	Gas Expansion Factor [2]
(psia)	(MPa)	Incremental (Air = 1)	Cumulative (Air = 1)				
2013	13.88						
1513	10.43						
1113	7.67						
913	6.29						
713	4.91						
513	3.54						
313	2.16						
186 Psat	1.28						
133	0.92	1.1797	1.1797	0.0137	0.9159	0.0965	10.363
103	0.71	1.2272	1.1980	0.0108	0.9293	0.1233	8.114
63	0.43	1.3369	1.2555	0.0071	0.9478	0.1918	5.215
13	0.09	1.5907	1.4251	0.0017	0.9851	0.5852	1.709

[1] Cubic feet (meters) of gas at indicated pressure and temperature per cubic feet (meter) @ standard conditions

Psat - Saturation pressure

- Standard conditions: 60 F (15.5 C) @ 14.696 psia (0.101325 MPa)

# SECTION 3 RESERVOIR FLUID STUDY

**TABLE 3-7**  
**ENERPLUS CORPORATION - LODGEPOLE**  
**WELL 00/04-11-10-28W1M - DALY UNIT 3 - RECOMBINED SAMPLE**  
**RESERVOIR FLUID STUDY**  
**DIFFERENTIAL LIBERATION FLUID VISCOSITY @ 82.4 F (28.0 C)**

	Pressure		Oil Viscosity (cp=mPa.s)	Gas Viscosity (cp=mPa.s)	Oil - Gas Viscosity Ratio
	(psia)	(MPa)			
713		4.92	3.450		
413		2.85	3.328		
313		2.16	3.287		
186 Psat		1.28	3.237		
133		0.92	3.442	0.00932	369.34
103		0.71	3.767	0.00912	413.07
63		0.43	4.300	0.00874	491.98
13		0.09	5.340	0.00803	664.92
Psat - Saturation Pressure					



**SECTION 3**  
**RESERVOIR FLUID STUDY**

**TABLE 3-8**  
**ENERPLUS CORPORATION - LODGEPOLE**  
**WELL 00/04-11-10-28W1M - DALY UNIT 3 - RECOMBINED SAMPLE**  
**RESERVOIR FLUID STUDY**  
**COMPOSITIONAL ANALYSIS OF LIBERATED GAS @ 82.4 F (28.0 C)**

Component	Differential Liberation Stage Pressure (psia/MPa)			
	133	103	63	13
	0.92	0.71	0.43	0.09
N2	0.0390	0.0302	0.0120	0.0027
CO2	0.0038	0.0035	0.0033	0.0017
H2S	0.0000	0.0000	0.0000	0.0000
C1	0.0811	0.0615	0.0226	0.0109
C2	0.5453	0.5186	0.4234	0.1777
C3	0.2987	0.3353	0.4643	0.5827
i-C4	0.0087	0.0136	0.0203	0.0481
n-C4	0.0162	0.0282	0.0395	0.1047
i-C5	0.0023	0.0026	0.0044	0.0211
n-C5	0.0018	0.0023	0.0035	0.0183
C6	0.0008	0.0013	0.0018	0.0095
C7+	0.0024	0.0030	0.0048	0.0225
<b>Total</b>	<b>1.0000</b>	<b>1.0000</b>	<b>1.0000</b>	<b>1.0000</b>
<b>Calculated Properties of Total Sample @ Standard Conditions</b>				
MW (g/mol)	34.17	35.54	38.72	46.07
Gravity (Air=1.0)	1.1797	1.2272	1.3369	1.5907
<b>Calculated Properties of C7+ @ Standard Conditions</b>				
MW (g/mol)	96.74	96.97	96.58	96.24
Density (g/cc)	0.7236	0.7240	0.7232	0.7225

# SECTION 3 RESERVOIR FLUID STUDY

**TABLE 3-9**  
**ENERPLUS CORPORATION - LODGEPOLE**  
**WELL 00/04-11-10-28W1M - DALY UNIT 3 - RECOMBINED SAMPLE**  
**RESERVOIR FLUID STUDY**  
**COMPOSITIONAL ANALYSIS OF RESIDUAL OIL**

Boiling Point (F)			Mole Fraction	Mass Fraction	Calculated Properties
-320.4	Nitrogen	N2	0.0000	0.0000	<b>Total Sample</b>
-109.3	Carbon Dioxide	CO2	0.0000	0.0000	
-76.6	Hydrogen Sulphide	H2S	0.0000	0.0000	Molecular Weight 207.78
-259.1	Methane	C1	0.0000	0.0000	
-128.0	Ethane	C2	0.0000	0.0000	
-44.0	Propane	C3	0.0180	0.0038	<b>C6+ Fraction</b>
10.9	i-Butane	i-C4	0.0095	0.0027	
30.9	n-Butane	n-C4	0.0385	0.0108	Molecular Weight 228.49
82.0	i-Pentane	i-C5	0.0254	0.0088	Mole Fraction 0.8751
97.0	n-Pentane	n-C5	0.0335	0.0116	Density (g/cc) 0.8631
97 - 156	Hexanes	C6	0.0577	0.0239	
156 - 208.9	Heptanes	C7	0.0544	0.0262	
208.9 - 258.1	Octanes	C8	0.0558	0.0307	<b>C7+ Fraction</b>
258.1 - 303.1	Nonanes	C9	0.0501	0.0309	
303.1 - 345	Decanes	C10	0.0459	0.0314	Molecular Weight 239.56
345 - 385	Undecanes	C11	0.0539	0.0381	Mole Fraction 0.8124
385 - 419	Dodecanes	C12	0.0480	0.0372	Density (g/cc) 0.8691
419 - 455	Tridecanes	C13	0.0450	0.0379	
455 - 486	Tetradecanes	C14	0.0368	0.0336	
486 - 519.1	Pentadecanes	C15	0.0304	0.0301	<b>C12+ Fraction</b>
519.1 - 550	Hexadecanes	C16	0.0249	0.0266	
	Heptadecanes	C17	0.0218	0.0249	Molecular Weight 318.70
557 - 603	Octadecanes	C18	0.0222	0.0268	Mole Fraction 0.4896
603 - 626	Nonadecanes	C19	0.0224	0.0284	Density (g/cc) 0.8987
626 - 651.9	Eicosanes	C20	0.0199	0.0263	
651.9 - 675	Heneicosanes	C21	0.0174	0.0244	
675 - 696.9	Docosanes	C22	0.0160	0.0235	
696.9 - 716	Tricosanes	C23	0.0154	0.0236	
716 - 736	Tetracosanes	C24	0.0143	0.0227	
736 - 755.1	Pentacosanes	C25	0.0129	0.0215	
755.1 - 774	Hexacosanes	C26	0.0119	0.0205	
774.1 - 792	Heptacosanes	C27	0.0112	0.0201	
792.1 - 809.1	Octacosanes	C28	0.0108	0.0202	
809.1 - 826	Nonacosanes	C29	0.0103	0.0199	
Above 826	Tricontanes Plus	C30+	0.0979	0.2826	
120.0	Cyclopentane	C5H10	0.0049	0.0017	
162.0	Methylcyclopentane	C6H12	0.0148	0.0060	
178.0	Cyclohexane	C6H12	0.0162	0.0065	
214.0	Methylcyclohexane	C7H14	0.0148	0.0070	
176.0	Benzene	C6H6	0.0008	0.0003	
231.1	Toluene	C7H8	0.0022	0.0010	
277 - 282	Ethylbenzene & p,m-Xylene	C8H10	0.0050	0.0025	
291.9	o-Xylene	C8H10	0.0037	0.0019	
336.0	1, 2, 4-Trimethylbenzene	C9H12	0.0053	0.0031	
<b>Total</b>			<b>1.0000</b>	<b>1.0000</b>	

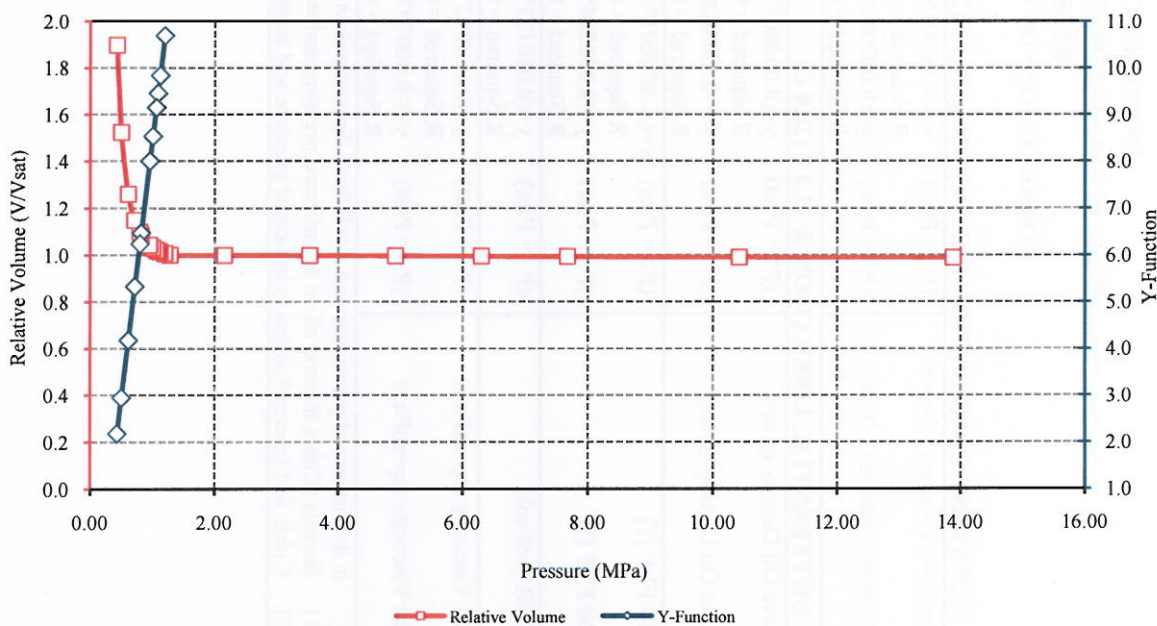
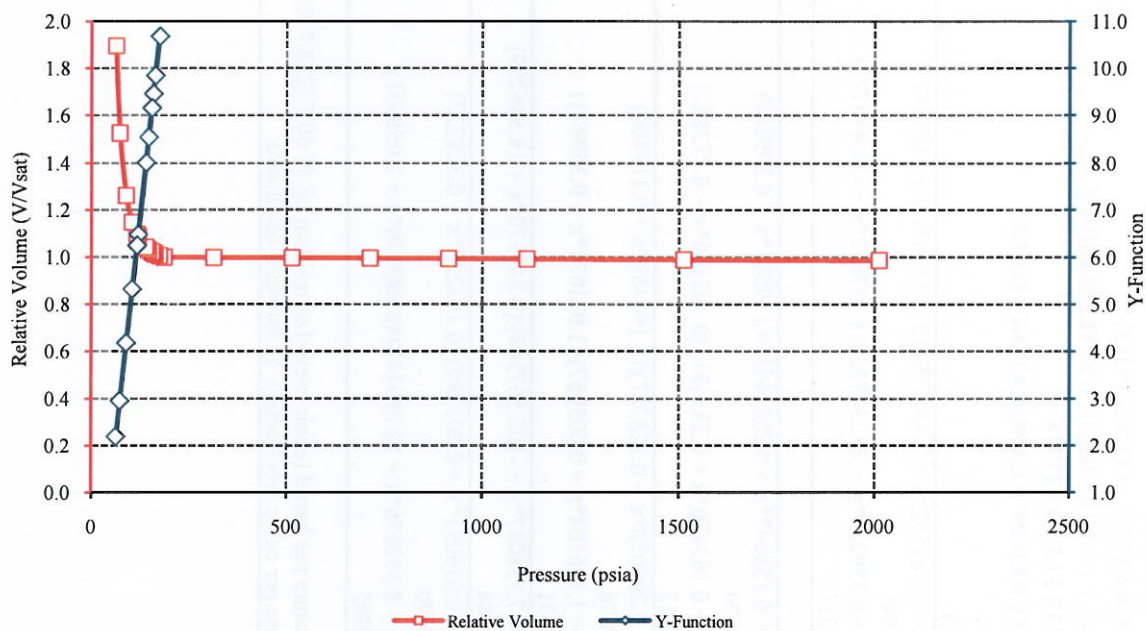
**SECTION 3**  
**RESERVOIR FLUID STUDY**

**TABLE 3--10**  
**ENERPLUS CORPORATION - LODGEPOLE**  
**WELL 00/04-11-10-28W1M - DAILY UNIT 3 - RECOMBINED SAMPLE**  
**RESERVOIR FLUID STUDY**  
**CORRELATIONS OF MEASURED PVT LABORATORY DATA**

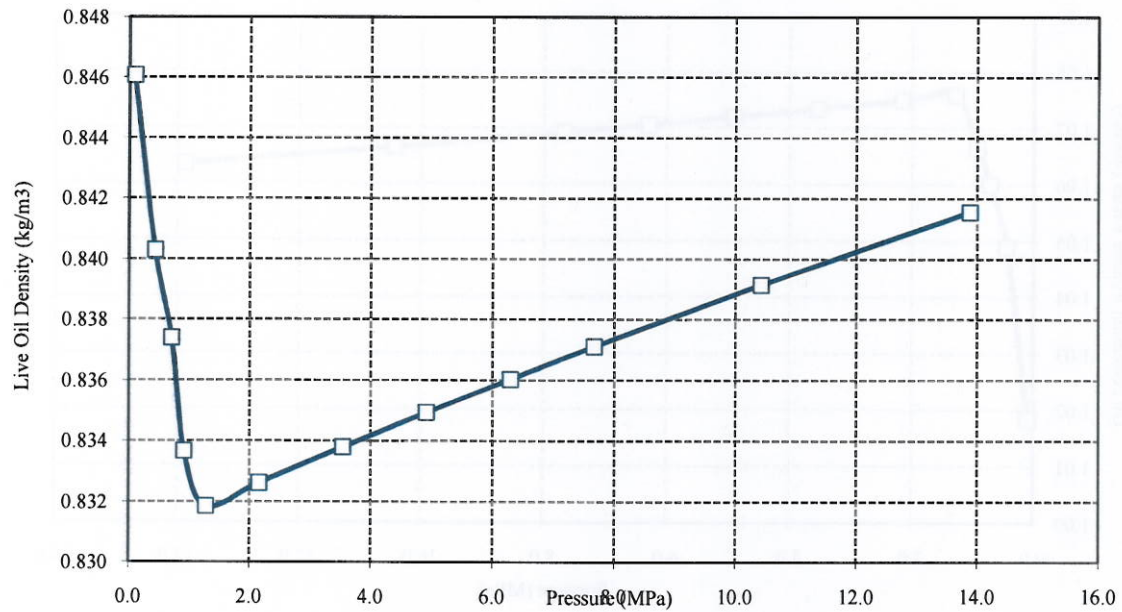
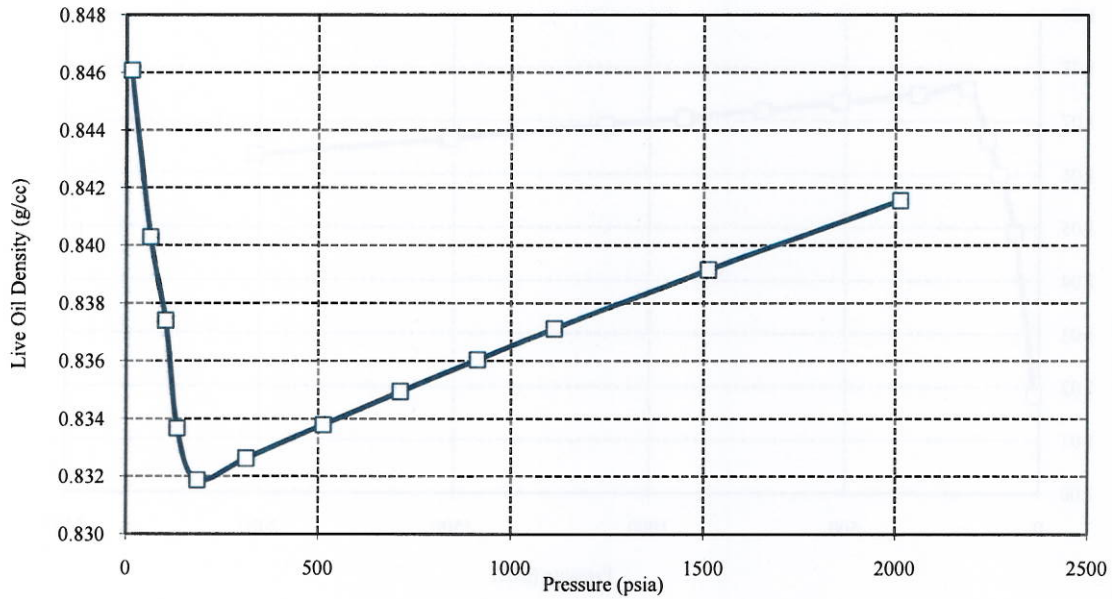
<b>CONSTANT COMPOSITION EXPANSION @ 82.4 F (28.0 C)</b>		
Relative Volume (V/V <sub>sat</sub> )	(P >= Psat)	$y = (-0.000016 * x^2 + 2.107552 * x + 0.464679) / (2.101370 * x + 1.569268)$ R Squared = 0.997995
Relative Volume (V/V <sub>sat</sub> )	(P <= Psat)	$y = (0.002081 * x^2 + 0.359223 * x + 20.237782) / (1.037622 * x + -38.412772)$ R Squared = 0.694311
<b>DIFFERENTIAL LIBERATION @ 82.4 F (28.0 C)</b>		
Live Oil Density (g/cc)	(P >= Psat)	$y = (0.000001 * x^2 + 0.158447 * x + 0.200144) / (0.190384 * x + 0.299884)$ R Squared = 0.837574
Live Oil Density (g/cc)	(P <= Psat)	$y = (-0.000018 * x^2 + 0.163470 * x + 0.233481) / (0.193156 * x + 0.272863)$ R Squared = 0.964413
Oil FVF [1]	(P >= Psat)	$y = (-0.000001 * x^2 + 0.209052 * x + 0.228227) / (0.194489 * x + 0.119406)$ R Squared = 0.759876
Oil FVF [1]	(P <= Psat)	$y = (0.000224 * x^2 + 1.116104 * x + 0.005967) / (1.071674 * x + 0.359471)$ R Squared = 0.995531
GOR (vol/vol)	(P <= Psat)	$y = (0.010103 * x^2 + 7.758067 * x - 102.567308) / (0.345370 * x + 18.586299)$ R Squared = 0.931684
Oil Viscosity (cp=mPa.s)	(P >= Psat)	$y = (0.000072 * x^2 + 0.616031 * x + 0.203399) / (0.193255 * x + 0.328227)$ R Squared = 0.946490
Oil Viscosity (cp=mPa.s)	(P <= Psat)	$y = (-0.000797 * x^2 + 0.352676 * x + 12.289147) / (0.083320 * x + 2.056031)$ R Squared = 0.919345
y is the measured parameter and x = P/P <sub>sat</sub> , dimensionless		
[1] Barrels (Cubic meters) of oil at indicated pressure and temperature per barrel (cubic meter) of residual oil @ 60 F (288.7 K).		
[2] Cubic feet (meters) of gas at indicated pressure and temperature per cubic feet (meter) @ standard conditions		



**FIGURE 3-1**  
**ENERPLUS CORPORATION - LODGEPOLE**  
**WELL 00/04-11-10-28W1M - DALY UNIT 3 - RECOMBINED SAMPLE**  
**RESERVOIR FLUID STUDY**  
**CONSTANT COMPOSITION EXPANSION @ 82.4 F (28.0 C)**



**FIGURE 3-2**  
**ENERPLUS CORPORATION - LODGEPOLE**  
**WELL 00/04-11-10-28W1M - DALY UNIT 3 - RECOMBINED SAMPLE**  
**RESERVOIR FLUID STUDY**  
**DIFFERENTIAL LIBERATION OIL DENSITY @ 82.4 F (28.0 C)**



**FIGURE 3-3  
ENERPLUS CORPORATION - LODGEPOLE  
WELL 00/04-11-10-28W1M - DALY UNIT 3 - RECOMBINED SAMPLE  
RESERVOIR FLUID STUDY  
DIFFERENTIAL LIBERATION OIL FORMATION VOLUME FACTOR @ 82.4 F (28.0 C)**

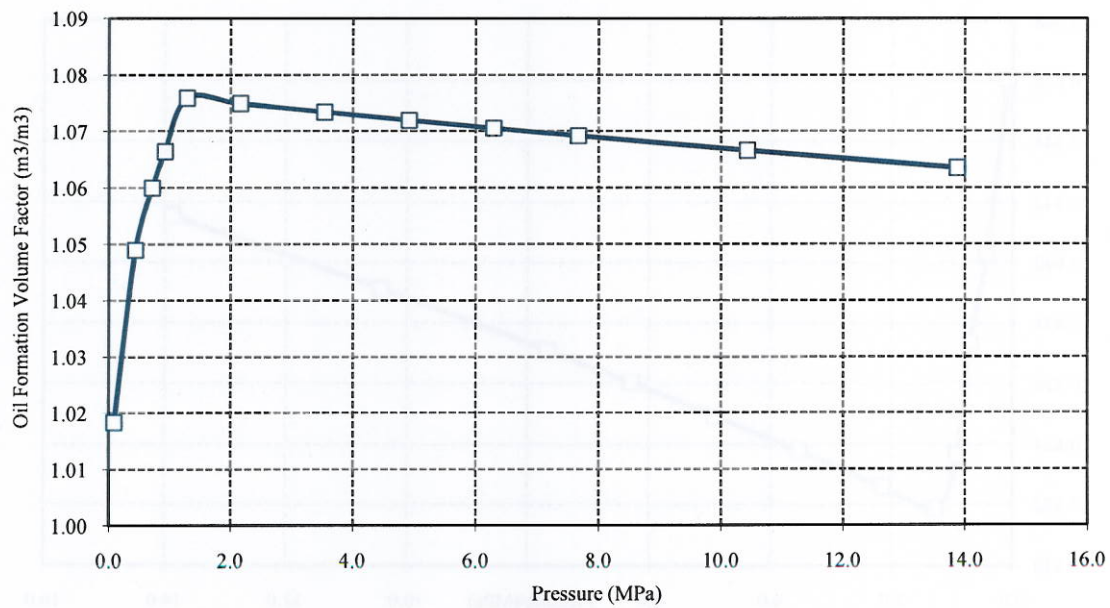
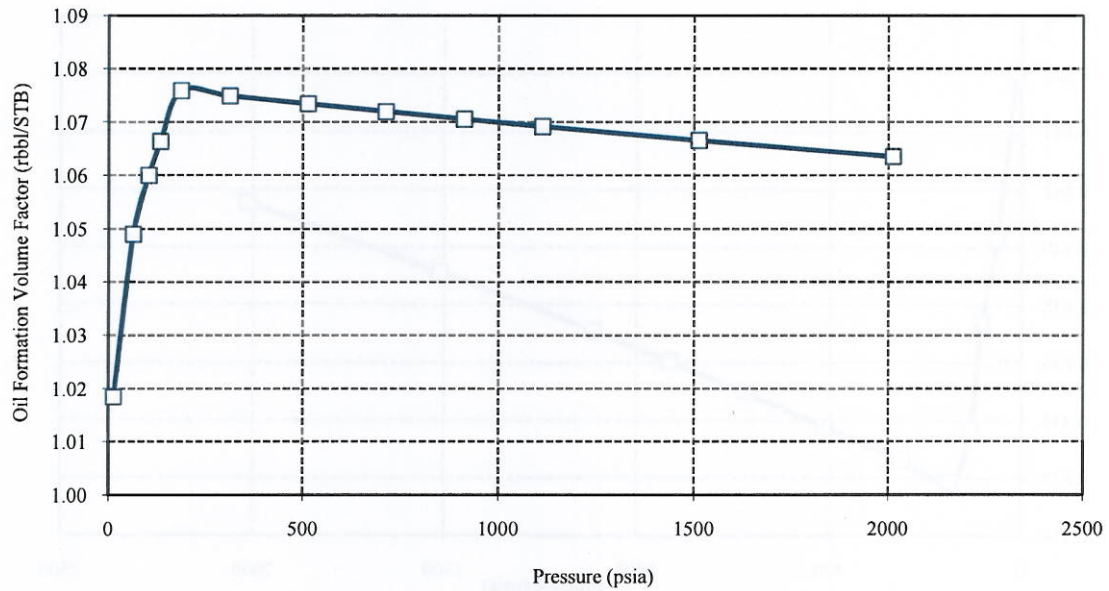
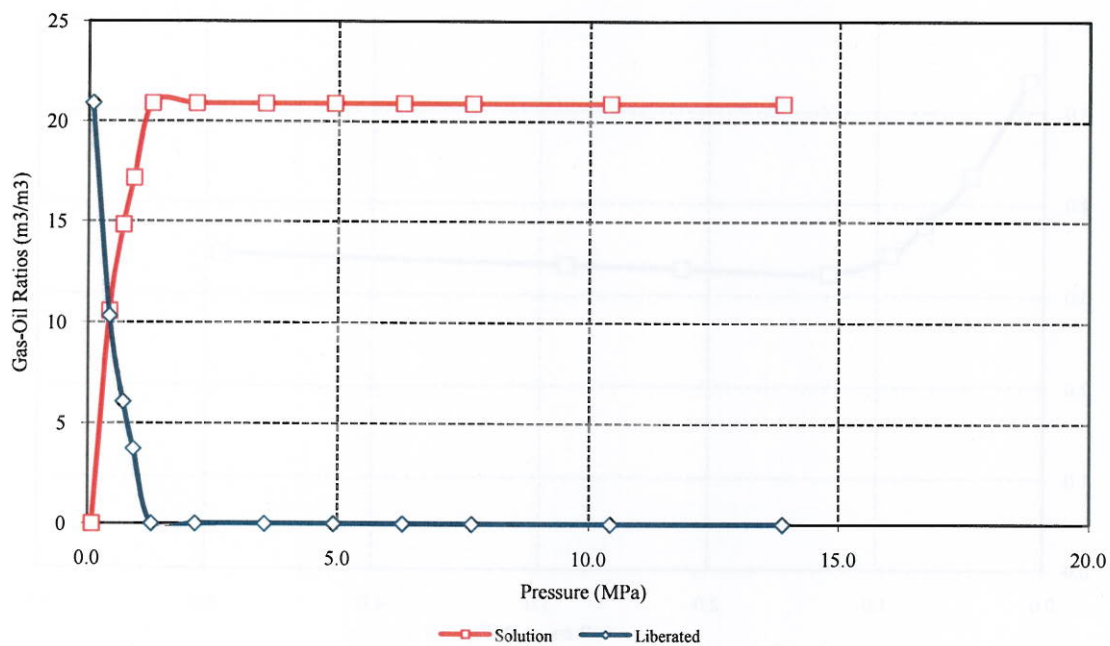
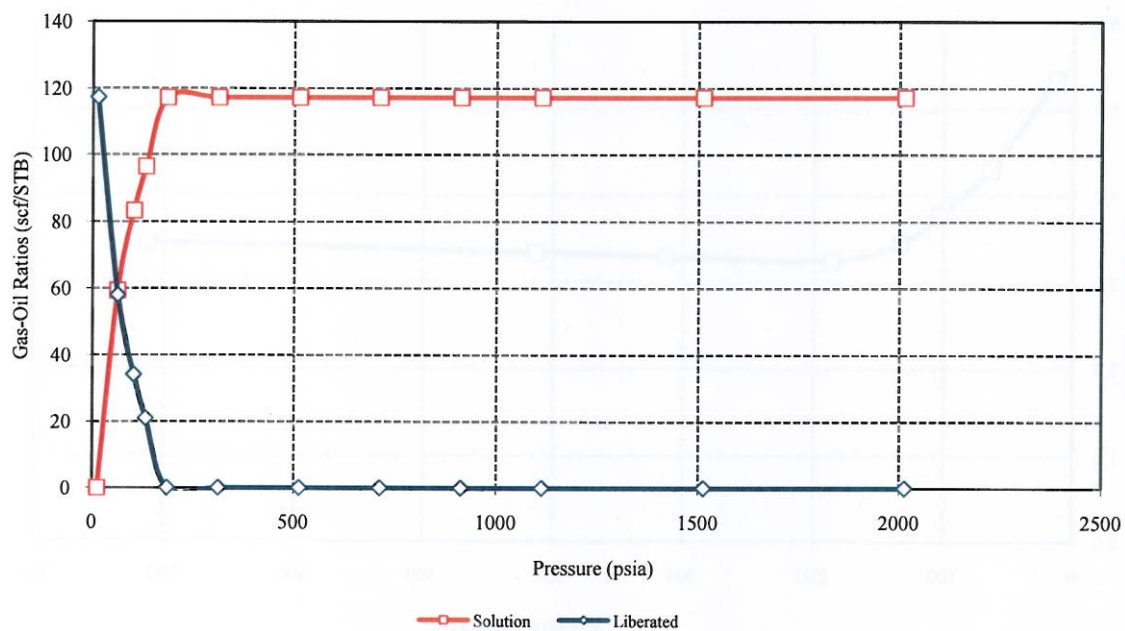
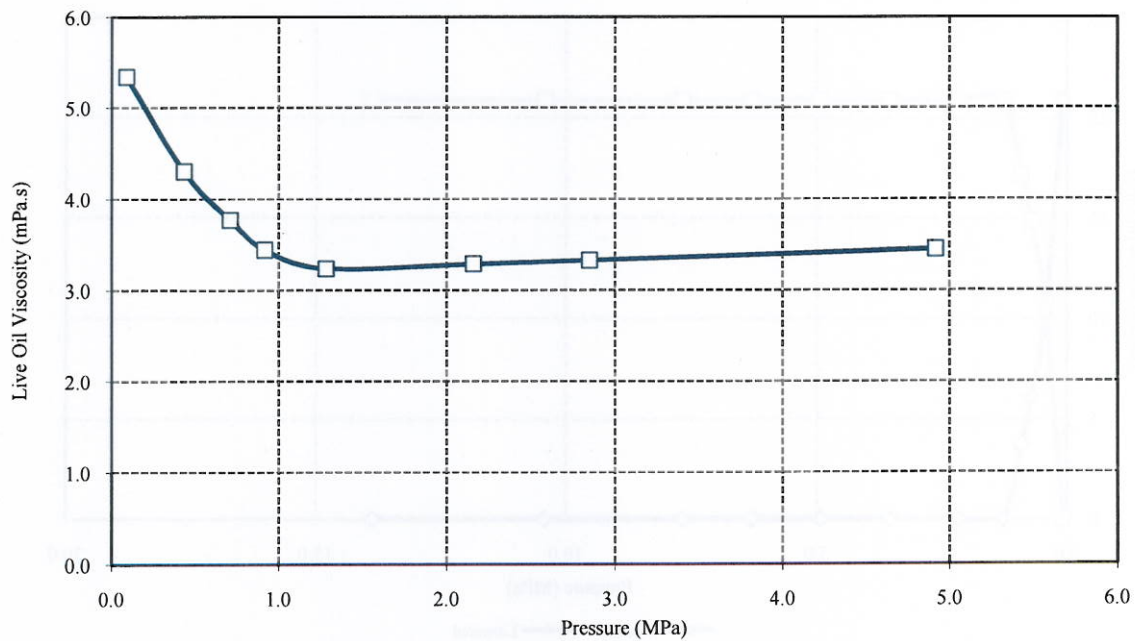
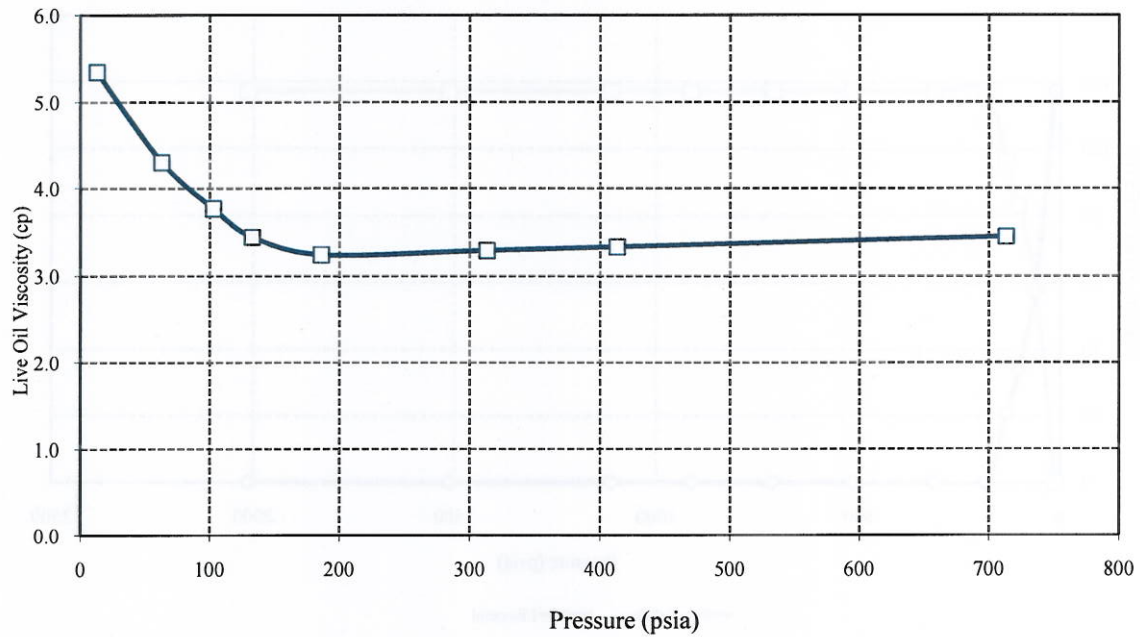




FIGURE 3-4  
ENERPLUS CORPORATION - LODGEPOLE  
WELL 00/04-11-10-28W1M - DALY UNIT 3 - RECOMBINED SAMPLE  
RESERVOIR FLUID STUDY  
DIFFERENTIAL LIBERATION GAS-OIL RATIOS @ 82.4 F (28.0 C)



**FIGURE 3-5**  
**ENERPLUS CORPORATION - LODGEPOLE**  
**WELL 00/04-11-10-28W1M - DALY UNIT 3 - RECOMBINED SAMPLE**  
**RESERVOIR FLUID STUDY**  
**DIFFERENTIAL LIBERATION OIL VISCOSITY @ 82.4 F (28.0 C)**



**FIGURE 3-6  
 ENERPLUS CORPORATION - LODGEPOLE  
 WELL 00/04-11-10-28W1M - DALY UNIT 3 - RECOMBINED SAMPLE  
 RESERVOIR FLUID STUDY  
 DIFFERENTIAL LIBERATION GAS DEVIATION FACTOR @ 82.4 F (28.0 C)**

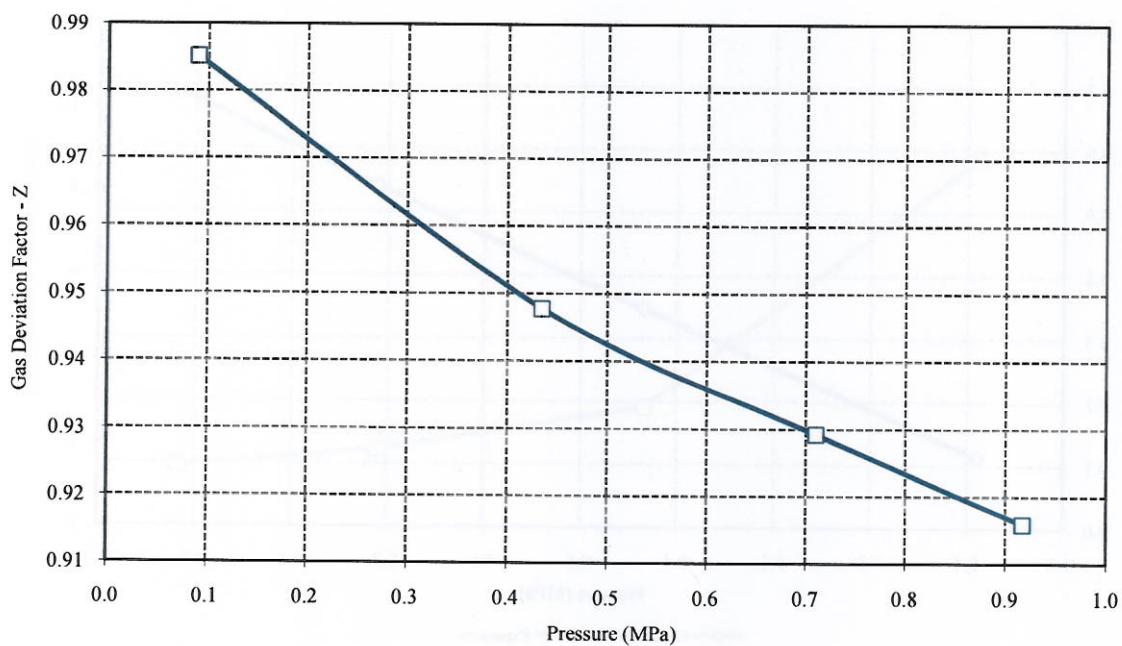
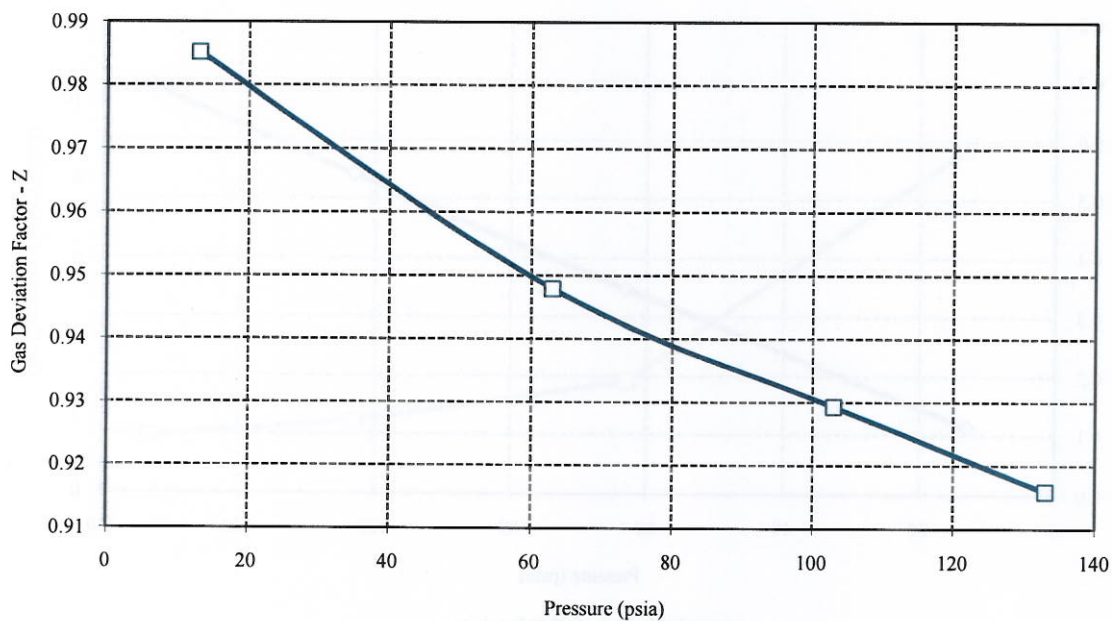
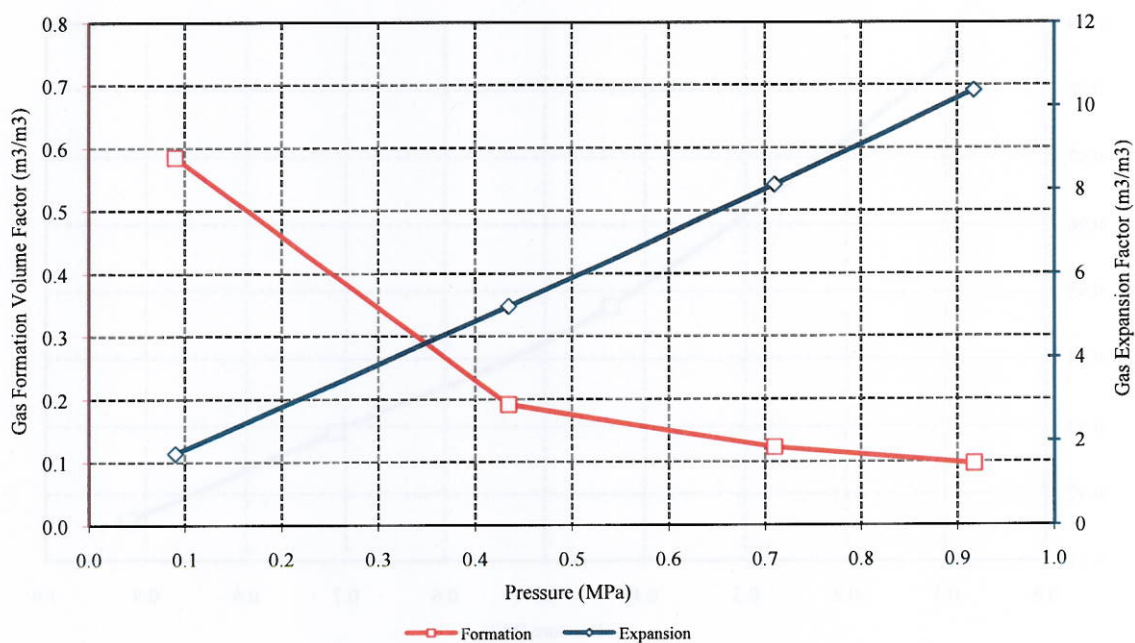
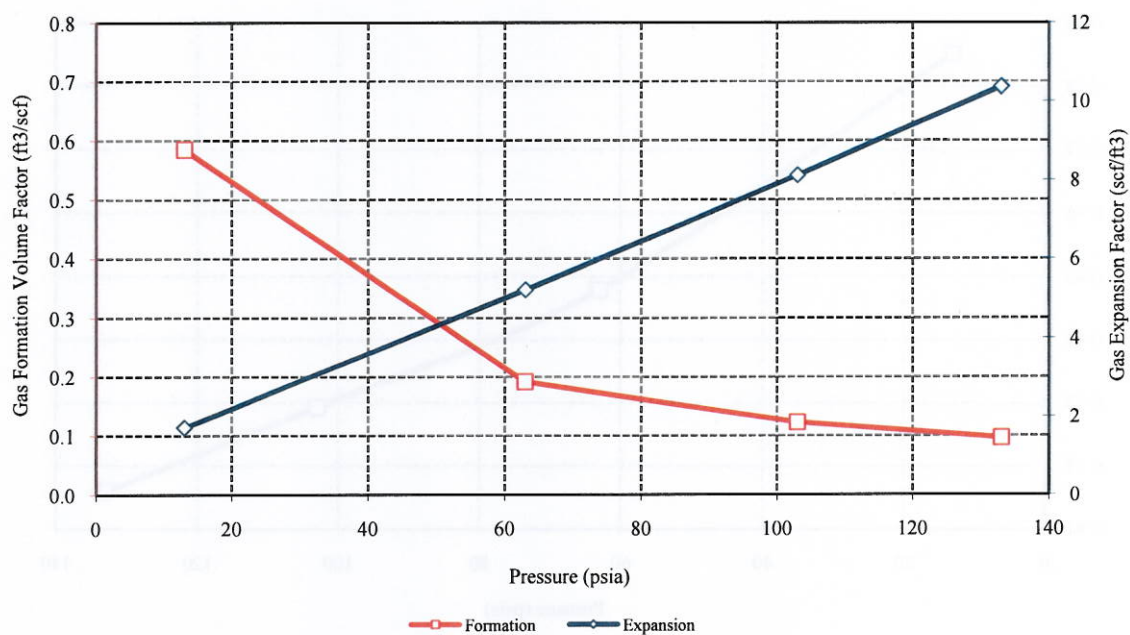
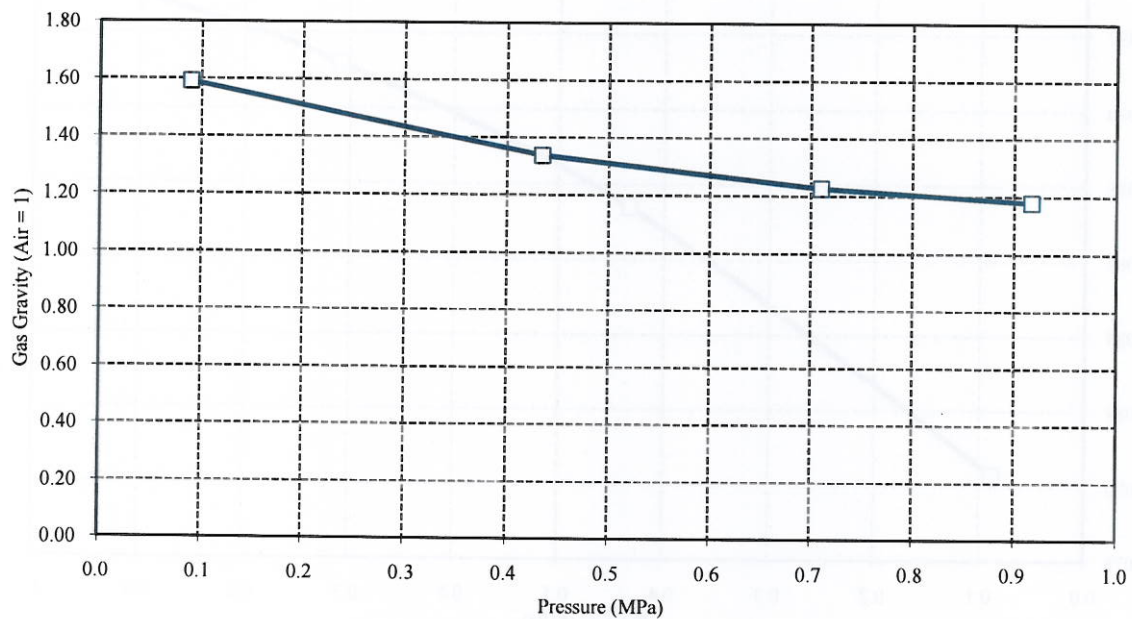
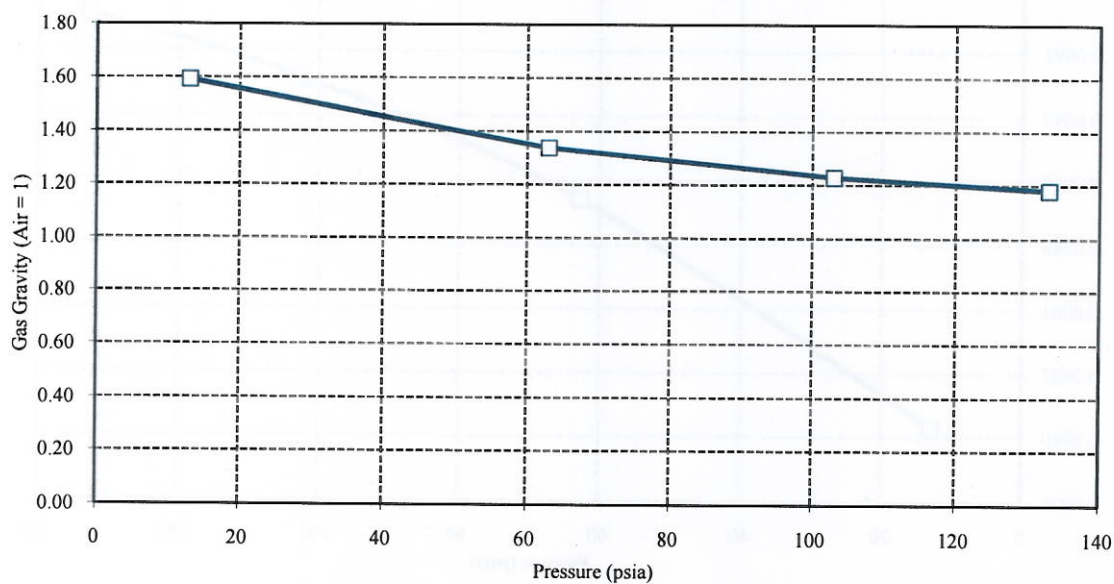




FIGURE 3-7  
ENERPLUS CORPORATION - LODGEPOLE  
WELL 00/04-11-10-28W1M - DALY UNIT 3 - RECOMBINED SAMPLE  
RESERVOIR FLUID STUDY  
DIFFERENTIAL LIBERATION GAS VOLUME FACTORS @ 82.4 F (28.0 C)

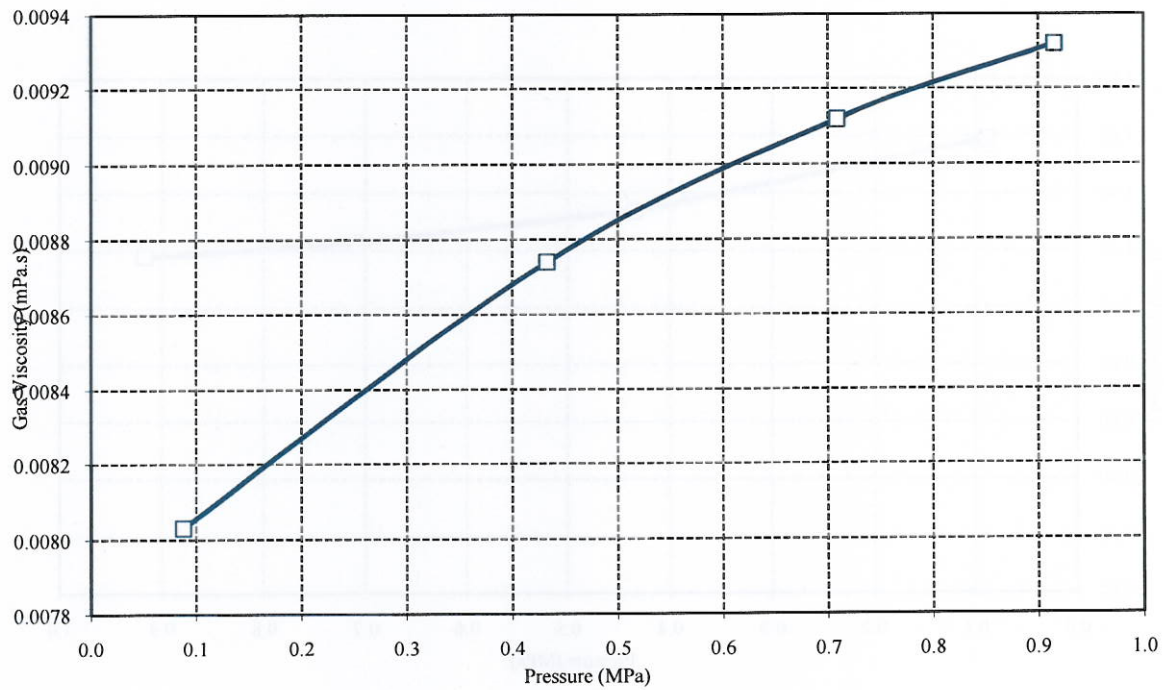
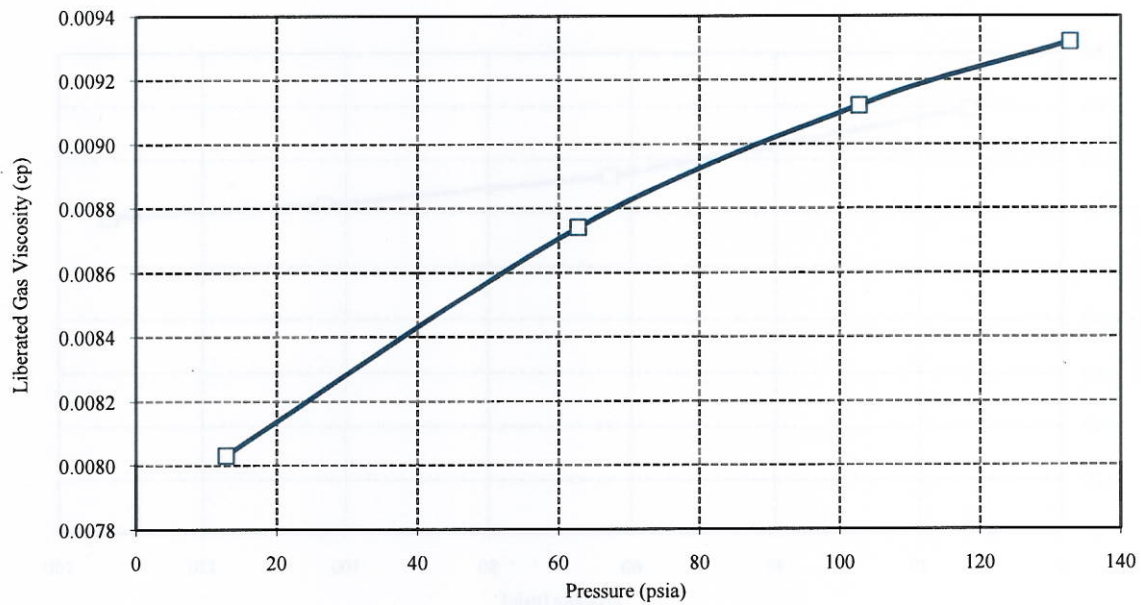


**FIGURE 3-8  
ENERPLUS CORPORATION - LODGEPOLE  
WELL 00/04-11-10-28W1M - DALY UNIT 3 - RECOMBINED SAMPLE  
RESERVOIR FLUID STUDY  
DIFFERENTIAL LIBERATION GAS GRAVITY @ 82.4 F (28.0 C)**



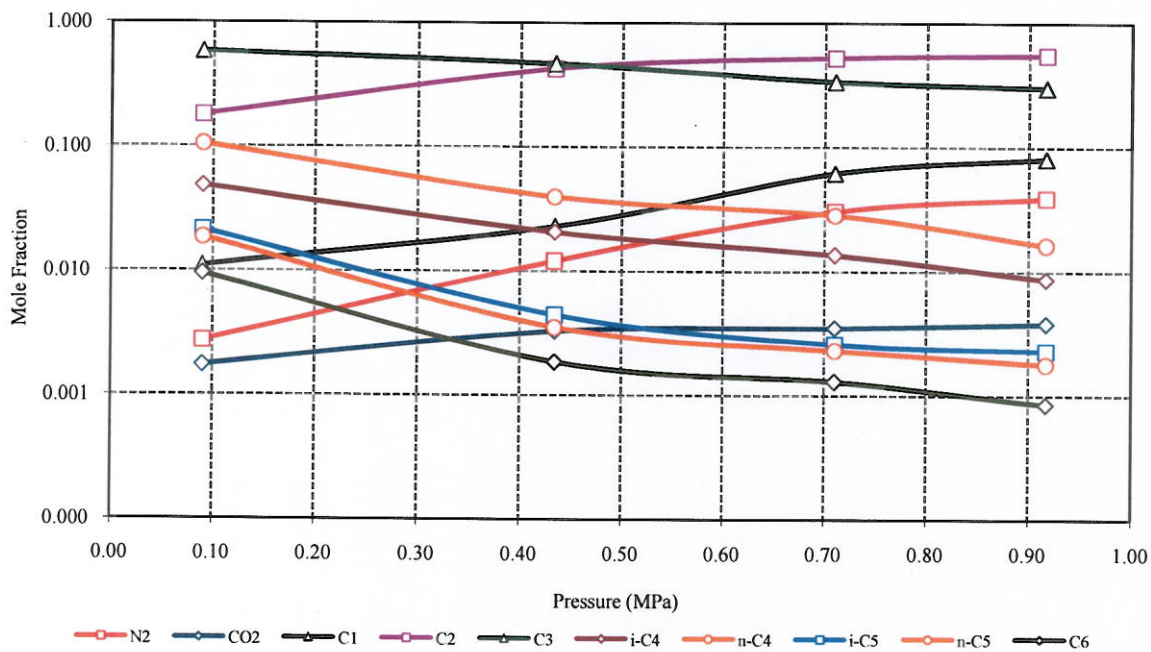
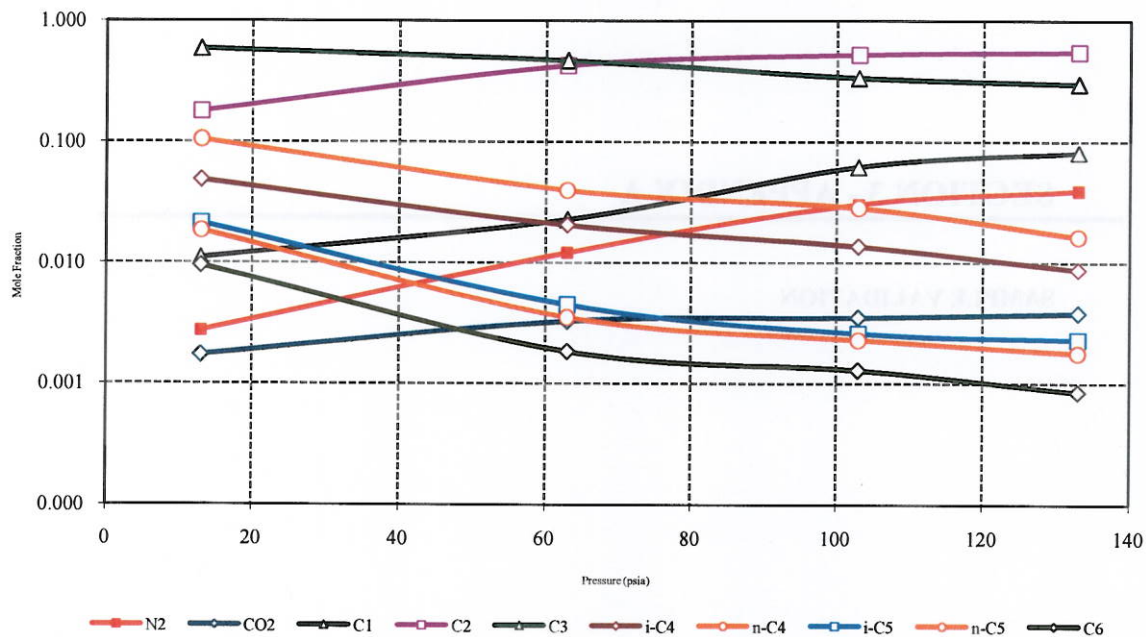
### SECTION 3 RESERVOIR FLUID STUDY

**FIGURE 3-9**  
**ENERPLUS CORPORATION - LODGEPOLE**  
**WELL 00/04-11-10-28W1M - DALY UNIT 3 - RECOMBINED SAMPLE**  
**RESERVOIR FLUID STUDY**  
**DIFFERENTIAL LIBERATION GAS VISCOSITY @ 82.4 F (28.0 C)**



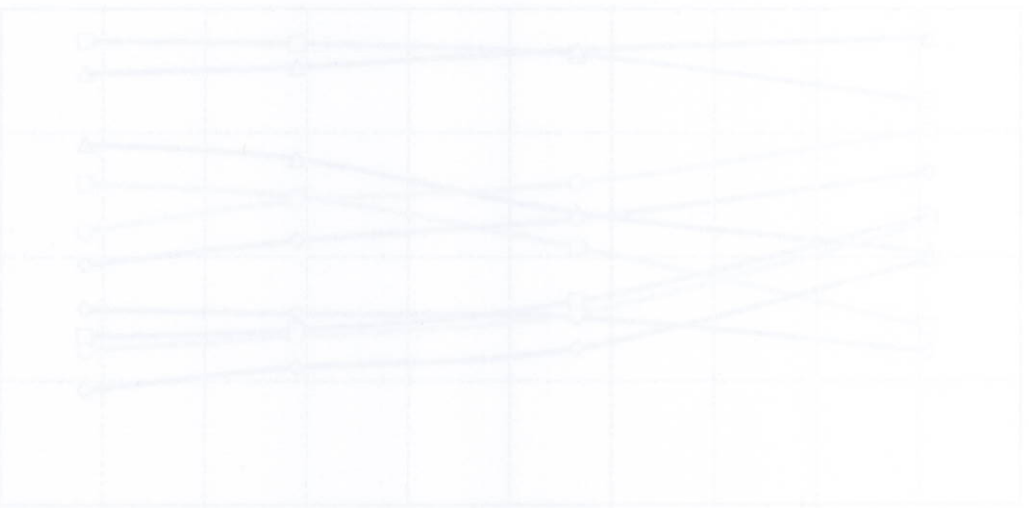
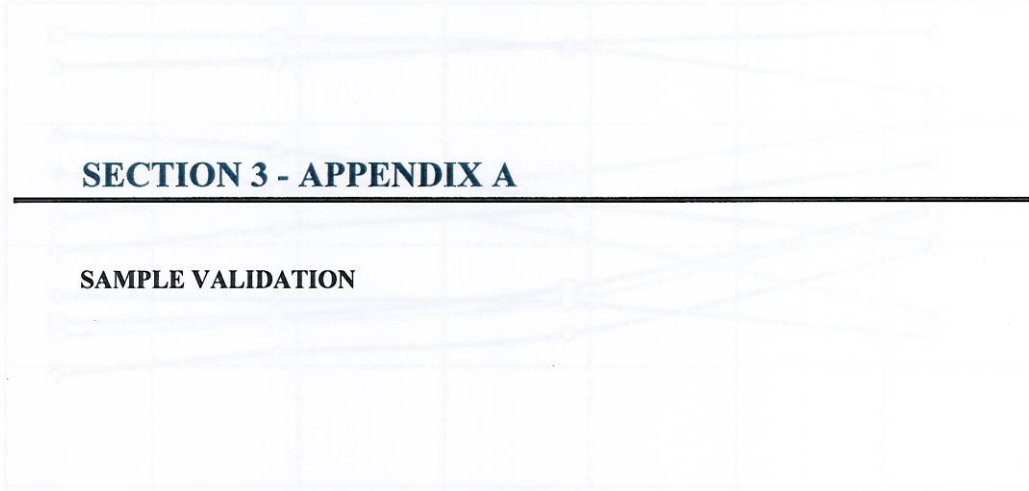


**FIGURE 3-10  
ENERPLUS CORPORATION - LODGEPOLE  
WELL 00/04-11-10-28W1M - DALY UNIT 3 - RECOMBINED SAMPLE  
RESERVOIR FLUID STUDY  
LIBERATED GAS COMPOSITION PROFILE @ 82.4 F (28.0 C)**



## SECTION 3 - APPENDIX A

### SAMPLE VALIDATION



# SECTION 3 RESERVOIR FLUID STUDY

**TABLE 3-A1**  
**ENERPLUS CORPORATION - LODGEPOLE**  
**WELL 00/04-11-10-28W1M - DALY UNIT 3 - RECOMBINED SAMPLE**  
**RESERVOIR FLUID STUDY**  
**COMPOSITIONAL ANALYSIS OF RESERVOIR FLUID**

Boiling Point (F)	Component Name	Chemical Symbol	Mole Fraction	Mass Fraction	Calculated Properties
-320.4	Nitrogen	N <sub>2</sub>	0.0019	0.0003	<b>Total Sample</b>
-109.3	Carbon Dioxide	CO <sub>2</sub>	0.0004	0.0001	
-76.6	Hydrogen Sulphide	H <sub>2</sub> S	0.0000	0.0000	Molecular Weight 176.65
-259.1	Methane	C <sub>1</sub>	0.0056	0.0005	Density (g/cc) 0.8209
-128.0	Ethane	C <sub>2</sub>	0.0466	0.0079	
-44.0	Propane	C <sub>3</sub>	0.0834	0.0208	<b>C<sub>6+</sub> Fraction</b>
10.9	i-Butane	i-C <sub>4</sub>	0.0176	0.0058	
30.9	n-Butane	n-C <sub>4</sub>	0.0532	0.0175	Molecular Weight 222.01
82.0	i-Pentane	i-C <sub>5</sub>	0.0246	0.0100	Mole Fraction 0.7353
97.0	n-Pentane	n-C <sub>5</sub>	0.0316	0.0129	Density (g/cc) 0.8598
97 - 156	Hexanes	C <sub>6</sub>	0.0509	0.0248	
156 - 208.9	Heptanes	C <sub>7</sub>	0.0486	0.0276	<b>C<sub>7+</sub> Fraction</b>
208.9 - 258.1	Octanes	C <sub>8</sub>	0.0536	0.0347	
258.1 - 303.1	Nonanes	C <sub>9</sub>	0.0431	0.0313	Molecular Weight 233.41
303.1 - 345	Decanes	C <sub>10</sub>	0.0395	0.0318	Mole Fraction 0.6790
345 - 385	Undecanes	C <sub>11</sub>	0.0479	0.0399	Density (g/cc) 0.8662
385 - 419	Dodecanes	C <sub>12</sub>	0.0419	0.0382	
419 - 455	Tridecanes	C <sub>13</sub>	0.0358	0.0355	<b>C<sub>12+</sub> Fraction</b>
455 - 486	Tetradecanes	C <sub>14</sub>	0.0324	0.0349	
486 - 519.1	Pentadecanes	C <sub>15</sub>	0.0262	0.0306	Molecular Weight 316.28
519.1 - 550	Hexadecanes	C <sub>16</sub>	0.0212	0.0266	Mole Fraction 0.3932
	Heptadecanes	C <sub>17</sub>	0.0188	0.0253	Density (g/cc) 0.8985
557 - 603	Octadecanes	C <sub>18</sub>	0.0174	0.0247	
603 - 626	Nonadecanes	C <sub>19</sub>	0.0173	0.0257	<b>C<sub>30+</sub> Fraction</b>
626 - 651.9	Eicosanes	C <sub>20</sub>	0.0143	0.0222	
651.9 - 675	Heneicosanes	C <sub>21</sub>	0.0128	0.0211	Molecular Weight 599.75
675 - 696.9	Docosanes	C <sub>22</sub>	0.0119	0.0206	Mole Fraction 0.0799
696.9 - 716	Tricosanes	C <sub>23</sub>	0.0112	0.0201	Density (g/cc) 0.9860
716 - 736	Tetracosanes	C <sub>24</sub>	0.0100	0.0188	
736 - 755.1	Pentacosanes	C <sub>25</sub>	0.0103	0.0202	
755.1 - 774	Hexacosanes	C <sub>26</sub>	0.0080	0.0163	<b>Recombination Parameters</b>
774.1 - 792	Heptacosanes	C <sub>27</sub>	0.0092	0.0194	
792.1 - 809.1	Octacosanes	C <sub>28</sub>	0.0073	0.0160	Gas-Oil Ratio (cc/cc) 19.58
809.1 - 826	Nonacosanes	C <sub>29</sub>	0.0073	0.0166	Dead Oil Density (g/cc) 0.8513
Above 826	Tricontanes Plus	C <sub>30+</sub>	0.0799	0.2712	Dead Oil MW (g/mol) 202.95
					<b>NAPHTHENES</b>
120.0	Cyclopentane	C <sub>5</sub> H <sub>10</sub>	0.0054	0.0022	
162.0	Methylcyclopentane	C <sub>6</sub> H <sub>12</sub>	0.0143	0.0068	
178.0	Cyclohexane	C <sub>6</sub> H <sub>12</sub>	0.0145	0.0069	
214.0	Methylcyclohexane	C <sub>7</sub> H <sub>14</sub>	0.0107	0.0060	
					<b>AROMATICS</b>
176.0	Benzene	C <sub>6</sub> H <sub>6</sub>	0.0007	0.0003	
231.1	Toluene	C <sub>7</sub> H <sub>8</sub>	0.0004	0.0002	
277 - 282	Ethylbenzene & p,m-Xylene	C <sub>8</sub> H <sub>10</sub>	0.0046	0.0028	
291.9	o-Xylene	C <sub>8</sub> H <sub>10</sub>	0.0034	0.0021	
336.0	1, 2, 4-Trimethylbenzene	C <sub>9</sub> H <sub>12</sub>	0.0043	0.0029	
<b>Total</b>			<b>1.0000</b>	<b>1.0000</b>	

Note: Physical Properties calculated based GPA 2145-00 physical constants



## SECTION 3

### RESERVOIR FLUID STUDY

**TABLE 3-A2**  
**ENERPLUS CORPORATION - LODGEPOLE**  
**WELL 00/04-11-10-28W1M - DALY UNIT 3 - RECOMBINED SAMPLE**  
**RESERVOIR FLUID STUDY**  
**COMPOSITIONAL ANALYSIS OF FLASHED OIL**

Boiling Point (F)	Component Name	Chemical Symbol	Mole Fraction	Mass Fraction	Calculated Properties
-320.4	Nitrogen	N <sub>2</sub>	0.0000	0.0000	<b>Total Sample</b>
-109.3	Carbon Dioxide	CO <sub>2</sub>	0.0000	0.0000	
-76.6	Hydrogen Sulphide	H <sub>2</sub> S	0.0000	0.0000	Molecular Weight 202.95
-259.1	Methane	C <sub>1</sub>	0.0000	0.0000	Density (g/cc) 0.8454
-128.0	Ethane	C <sub>2</sub>	0.0000	0.0000	
-44.0	Propane	C <sub>3</sub>	0.0150	0.0033	<b>C<sub>6+</sub> Fraction</b>
10.9	i-Butane	i-C <sub>4</sub>	0.0090	0.0026	
30.9	n-Butane	n-C <sub>4</sub>	0.0378	0.0108	Molecular Weight 222.66
82.0	i-Pentane	i-C <sub>5</sub>	0.0265	0.0094	Mole Fraction 0.8762
97.0	n-Pentane	n-C <sub>5</sub>	0.0355	0.0126	Density (g/cc) 0.8600
97 - 156	Hexanes	C <sub>6</sub>	0.0601	0.0255	
156 - 208.9	Heptanes	C <sub>7</sub>	0.0581	0.0287	<b>C<sub>7+</sub> Fraction</b>
208.9 - 258.1	Octanes	C <sub>8</sub>	0.0642	0.0361	
258.1 - 303.1	Nonanes	C <sub>9</sub>	0.0516	0.0326	Molecular Weight 233.72
303.1 - 345	Decanes	C <sub>10</sub>	0.0472	0.0331	Mole Fraction 0.8111
345 - 385	Undecanes	C <sub>11</sub>	0.0574	0.0416	Density (g/cc) 0.8663
385 - 419	Dodecanes	C <sub>12</sub>	0.0501	0.0398	
419 - 455	Tridecanes	C <sub>13</sub>	0.0428	0.0369	<b>C<sub>12+</sub> Fraction</b>
455 - 486	Tetradecanes	C <sub>14</sub>	0.0388	0.0363	
486 - 519.1	Pentadecanes	C <sub>15</sub>	0.0314	0.0319	Molecular Weight 316.28
519.1 - 550	Hexadecanes	C <sub>16</sub>	0.0253	0.0277	Mole Fraction 0.4706
	Heptadecanes	C <sub>17</sub>	0.0226	0.0264	Density (g/cc) 0.8985
557 - 603	Octadecanes	C <sub>18</sub>	0.0208	0.0258	
603 - 626	Nonadecanes	C <sub>19</sub>	0.0207	0.0268	<b>C<sub>30+</sub> Fraction</b>
626 - 651.9	Eicosanes	C <sub>20</sub>	0.0171	0.0231	
651.9 - 675	Heneicosanes	C <sub>21</sub>	0.0154	0.0220	Molecular Weight 599.75
675 - 696.9	Docosanes	C <sub>22</sub>	0.0142	0.0214	Mole Fraction 0.0956
696.9 - 716	Tricosanes	C <sub>23</sub>	0.0134	0.0210	Density (g/cc) 0.9860
716 - 736	Tetracosanes	C <sub>24</sub>	0.0120	0.0195	
736 - 755.1	Pentacosanes	C <sub>25</sub>	0.0124	0.0210	
755.1 - 774	Hexacosanes	C <sub>26</sub>	0.0096	0.0170	
774.1 - 792	Heptacosanes	C <sub>27</sub>	0.0110	0.0202	
792.1 - 809.1	Octacosanes	C <sub>28</sub>	0.0087	0.0167	
809.1 - 826	Nonacosanes	C <sub>29</sub>	0.0088	0.0173	
Above 826	Tricontanes Plus	C <sub>30+</sub>	0.0956	0.2826	
<b>NAPHTHENES</b>					
120.0	Cyclopentane	C <sub>5</sub> H <sub>10</sub>	0.0051	0.0018	
162.0	Methylcyclopentane	C <sub>6</sub> H <sub>12</sub>	0.0157	0.0065	
178.0	Cyclohexane	C <sub>6</sub> H <sub>12</sub>	0.0173	0.0072	
214.0	Methylcyclohexane	C <sub>7</sub> H <sub>14</sub>	0.0128	0.0062	
<b>AROMATICS</b>					
176.0	Benzene	C <sub>6</sub> H <sub>6</sub>	0.0009	0.0003	
231.1	Toluene	C <sub>7</sub> H <sub>8</sub>	0.0005	0.0002	
277 - 282	Ethylbenzene & p,m-Xylene	C <sub>8</sub> H <sub>10</sub>	0.0055	0.0029	
291.9	o-Xylene	C <sub>8</sub> H <sub>10</sub>	0.0041	0.0021	
336.0	1, 2, 4-Trimethylbenzene	C <sub>9</sub> H <sub>12</sub>	0.0052	0.0031	
<b>Total</b>			<b>1.0000</b>	<b>1.0000</b>	

Note: Physical Properties calculated based GPA 2145-00 physical constants

**SECTION 3**  
**RESERVOIR FLUID STUDY**

**TABLE 3-A3**  
**ENERPLUS CORPORATION - LODGEPOLE**  
**WELL 00/04-11-10-28W1M - DALY UNIT 3 - RECOMBINED SAMPLE**  
**RESERVOIR FLUID STUDY**  
**COMPOSITIONAL ANALYSIS OF FLASHED GAS**

Component Name	Chemical Symbol	Mole Fraction		Liquid Volume	
		As Analyzed	Acid Gas Free	STB/MMscf	mL/m3
Nitrogen	N <sub>2</sub>	0.0113	0.0113		
Carbon Dioxide	CO <sub>2</sub>	0.0025	0.0000		
Hydrogen Sulphide	H <sub>2</sub> S	0.0000	0.0000		
Methane	C <sub>1</sub>	0.0339	0.0340		
Ethane	C <sub>2</sub>	0.2832	0.2839		
Propane	C <sub>3</sub>	0.4303	0.4313	280.972	1577.519
i-Butane	i-C <sub>4</sub>	0.0609	0.0610	47.243	265.244
n-Butane	n-C <sub>4</sub>	0.1313	0.1317	98.263	551.699
i-Pentane	i-C <sub>5</sub>	0.0148	0.0149	12.881	72.322
n-Pentane	n-C <sub>5</sub>	0.0117	0.0117	10.032	56.323
Hexanes	C <sub>6</sub>	0.0045	0.0046	4.432	24.886
Heptanes	C <sub>7</sub>	0.0082	0.0082	9.001	50.538
Octanes	C <sub>8</sub>	0.0003	0.0003	0.404	2.269
Nonanes	C <sub>9</sub>	0.0000	0.0000	0.000	0.000
Decanes	C <sub>10</sub>	0.0000	0.0000	0.000	0.000
Undecane	C <sub>11</sub>	0.0000	0.0000	0.000	0.000
Dodecanes Plus	C <sub>12+</sub>	0.0000	0.0000	0.000	0.000
Total		<b>0.9929</b>	<b>0.9929</b>	<b>463.228</b>	<b>2600.799</b>
Propanes Plus	C <sub>3+</sub>	0.6621	0.6637	463.228	2600.799
Butanes Plus	C <sub>4+</sub>	0.2318	0.2324	182.256	1023.280
	C <sub>5+</sub>	0.0396	0.0397	36.751	206.338

Calculated Gas Properties @ Standard Conditions			Calculated Pseudocritical Properties		
Molecular Weight	42.76 kg/kmol	42.76 lb/lb-mol	Ppc	619.3 psia	4.27 MPa
Specific Gravity	1.4762 (Air = 1)	1.4762 (Air = 1)	Tpc	181.1 F	82.8 C
MW of C7+	0.82 kg/kmol	0.82 lb/lbmol	Ppc*	618.8 psia	4.27 MPa
Density of C7+	0.7229 g/cc	722.9 kg/m3	Tpc*	180.6 F	82.5 C

Calculated Gross Heating Value @ Standard Conditions			Calculated Net Heating Value @ Standard Conditions		
Dry	2,419.8 Btu/scf	90.33 MJ/m3	Dry	2,225.6 Btu/scf	83.07 MJ/m3
Wet	2,377.7 Btu/scf	88.75 MJ/m3	Wet	2,186.8 Btu/scf	81.63 MJ/m3

Standard Conditions: 60 F (15.5 C) @ 14.696 psia (0.101325 MPa)

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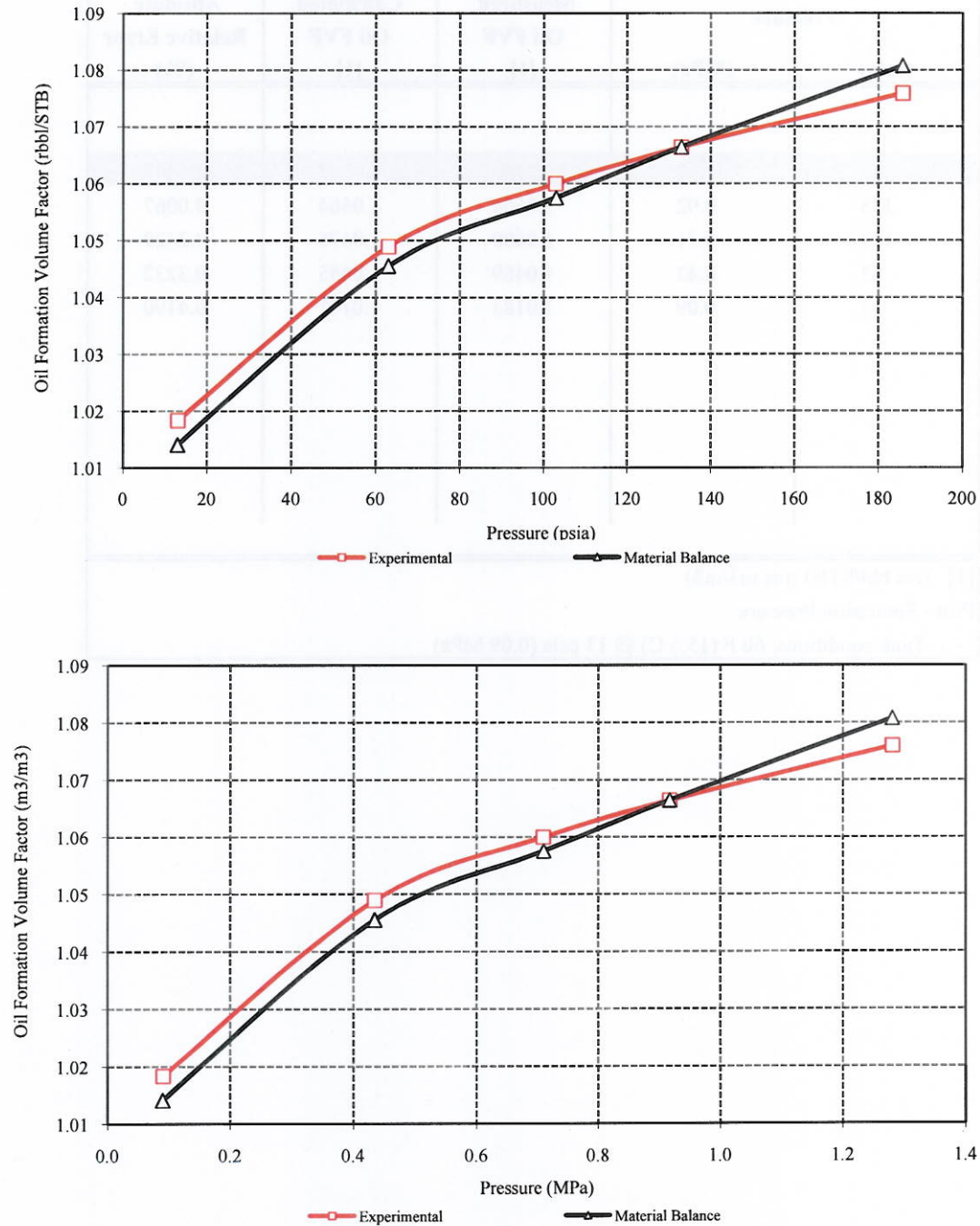
# SECTION 3 RESERVOIR FLUID STUDY

**TABLE 3-B1**  
**ENERPLUS CORPORATION - LODGEPOLE**  
**WELL 00/04-11-10-28W1M - DALY UNIT 3 - RECOMBINED SAMPLE**  
**RESERVOIR FLUID STUDY**  
**DIFFERENTIAL LIBERATION @ 82.4 F (28.0 C) - MATERIAL BALANCE**

Pressure		Measured	Calculated	Absolute
(psia)	(MPa)	Oil FVF	Oil FVF	Relative Error
		[1]	[1]	(%)
186 Psat	1.28	1.0759	1.0807	0.4497
133	0.92	1.0664	1.0664	0.0067
103	0.71	1.0600	1.0575	0.2329
63	0.43	1.0489	1.0455	0.3232
13	0.09	1.0183	1.0141	0.4190

[1] (res bbl/STB) (res m3/m3)  
Psat - Saturation Pressure  
- Tank conditions: 60 F (15.5 C) @ 13 psia (0.09 MPa)

FIGURE 3-B1  
ENERPLUS CORPORATION - LODGEPOLE  
WELL 00/04-11-10-28W1M - DALY UNIT 3 - RECOMBINED SAMPLE  
RESERVOIR FLUID STUDY  
DIFFERENTIAL LIBERATION @ 82.4 F (28.0 C) - MATERIAL BALANCE







# SECTION 3 RESERVOIR FLUID STUDY

**TABLE 3-C1**  
**ENERPLUS CORPORATION - LODGEPOLE**  
**WELL 00/04-11-10-28W1M - DALY UNIT 3 - RECOMBINED SAMPLE**  
**RESERVOIR FLUID STUDY**  
**DIFFERENTIAL LIBERATION GAS COMPOSITION @ 133 psia (0.92 MPa)**

Component Name	Chemical Symbol	Mole Fraction		Liquid Volume	
		As Analyzed	Acid Gas Free	STB/MMscf	mL/m3
Nitrogen	N <sub>2</sub>	0.0390	0.0391		
Carbon Dioxide	CO <sub>2</sub>	0.0038	0.0000		
Hydrogen Sulphide	H <sub>2</sub> S	0.0000	0.0000		
Methane	C <sub>1</sub>	0.0811	0.0814		
Ethane	C <sub>2</sub>	0.5453	0.5474		
Propane	C <sub>3</sub>	0.2987	0.2999	195.081	1095.283
i-Butane	i-C <sub>4</sub>	0.0087	0.0087	6.725	37.758
n-Butane	n-C <sub>4</sub>	0.0162	0.0163	12.138	68.150
i-Pentane	i-C <sub>5</sub>	0.0023	0.0023	1.972	11.072
n-Pentane	n-C <sub>5</sub>	0.0018	0.0018	1.516	8.509
Hexanes	C <sub>6</sub>	0.0008	0.0009	0.827	4.643
Heptanes	C <sub>7</sub>	0.0022	0.0022	2.438	13.688
Octanes	C <sub>8</sub>	0.0002	0.0002	0.196	1.100
Nonanes	C <sub>9</sub>	0.0000	0.0000	0.000	0.000
Decanes	C <sub>10</sub>	0.0000	0.0000	0.000	0.000
Undecane	C <sub>11</sub>	0.0000	0.0000	0.000	0.000
Dodecanes Plus	C <sub>12+</sub>	0.0000	0.0000	0.000	0.000
Total		1.0000	1.0000	220.893	1240.203
Propanes Plus	C <sub>3+</sub>	0.3309	0.3321	220.893	1240.203
Butanes Plus	C <sub>4+</sub>	0.0322	0.0323	25.812	144.921
	C <sub>5+</sub>	0.0073	0.0073	6.949	39.013

Calculated Gas Properties @ Standard Conditions			Calculated Pseudocritical Properties		
Molecular Weight	34.17 kg/kmol	34.17 lb/lb-mol	Ppc	664.3 psia	4.58 MPa
Specific Gravity	1.1797 (Air = 1)	1.1797 (Air = 1)	Tpc	102.9 F	39.4 C
MW of C7+	96.74 kg/kmol	96.74 lb/lbmol	Ppc*	663.4 psia	4.57 MPa
Density of C7+	0.7236 g/cc	723.6 kg/m3	Tpc*	102.2 F	39 C

Calculated Gross Heating Value @ Standard Conditions			Calculated Net Heating Value @ Standard Conditions		
Dry	1,913.1 Btu/scf	71.41 MJ/m3	Dry	1,753.7 Btu/scf	65.46 MJ/m3
Wet	1,879.8 Btu/scf	70.17 MJ/m3	Wet	1,723.2 Btu/scf	64.32 MJ/m3

Standard Conditions: 60 F (15.5 C) @ 14.696 psia (0.101325 MPa)

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# SECTION 3 RESERVOIR FLUID STUDY

**TABLE 3-C2**  
**ENERPLUS CORPORATION - LODGEPOLE**  
**WELL 00/04-11-10-28W1M - DALY UNIT 3 - RECOMBINED SAMPLE**  
**RESERVOIR FLUID STUDY**  
**DIFFERENTIAL LIBERATION GAS COMPOSITION @ 103 psia (0.71 MPa )**

Component Name	Chemical Symbol	Mole Fraction		Liquid Volume	
		As Analyzed	Acid Gas Free	STB/MMscf	mL/m3
Nitrogen	N <sub>2</sub>	0.0302	0.0303		
Carbon Dioxide	CO <sub>2</sub>	0.0035	0.0000		
Hydrogen Sulphide	H <sub>2</sub> S	0.0000	0.0000		
Methane	C <sub>1</sub>	0.0615	0.0617		
Ethane	C <sub>2</sub>	0.5186	0.5204		
Propane	C <sub>3</sub>	0.3353	0.3365	218.993	1229.538
i-Butane	i-C <sub>4</sub>	0.0136	0.0136	10.531	59.125
n-Butane	n-C <sub>4</sub>	0.0282	0.0283	21.092	118.421
i-Pentane	i-C <sub>5</sub>	0.0026	0.0026	2.232	12.533
n-Pentane	n-C <sub>5</sub>	0.0023	0.0023	1.958	10.992
Hexanes	C <sub>6</sub>	0.0013	0.0013	1.258	7.065
Heptanes	C <sub>7</sub>	0.0027	0.0027	2.975	16.703
Octanes	C <sub>8</sub>	0.0002	0.0002	0.297	1.670
Nonanes	C <sub>9</sub>	0.0000	0.0000	0.010	0.058
Decanes	C <sub>10</sub>	0.0000	0.0000	0.000	0.000
Undecane	C <sub>11</sub>	0.0000	0.0000	0.000	0.000
Dodecanes Plus	C <sub>12+</sub>	0.0000	0.0000	0.000	0.000
Total		1.0000	1.0000	259.347	1456.105
Propanes Plus	C <sub>3+</sub>	0.3862	0.3876	259.347	1456.105
Butanes Plus	C <sub>4+</sub>	0.0509	0.0510	40.354	226.567
	C <sub>5+</sub>	0.0091	0.0091	8.731	49.020

Calculated Gas Properties @ Standard Conditions			Calculated Pseudocritical Properties		
Molecular Weight	35.54 kg/kmol	35.54 lb/lb-mol	Ppc	660.2 psia	4.55 MPa
Specific Gravity	1.2272 (Air = 1)	1.2272 (Air = 1)	Tpc	118.2 F	47.9 C
MW of C7+	96.97 kg/kmol	96.97 lb/lbmol	Ppc*	659.4 psia	4.55 MPa
Density of C7+	0.7240 g/cc	724.0 kg/m3	Tpc*	117.5 F	47.5 C

Calculated Gross Heating Value @ Standard Conditions			Calculated Net Heating Value @ Standard Conditions		
Dry	2,001.9 Btu/scf	74.73 MJ/m3	Dry	1,836.3 Btu/scf	68.54 MJ/m3
Wet	1,967.1 Btu/scf	73.43 MJ/m3	Wet	1,804.3 Btu/scf	67.35 MJ/m3

Standard Conditions: 60 F (15.5 C) @ 14.696 psia (0.101325 MPa)

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**SECTION 3**  
**RESERVOIR FLUID STUDY**

**TABLE 3-C3**  
**ENERPLUS CORPORATION - LODGEPOLE**  
**WELL 00/04-11-10-28W1M - DALY UNIT 3 - RECOMBINED SAMPLE**  
**RESERVOIR FLUID STUDY**  
**DIFFERENTIAL LIBERATION GAS COMPOSITION @ 63 psia (0.43 MPa )**

Component Name	Chemical Symbol	Mole Fraction		Liquid Volume	
		As Analyzed	Acid Gas Free	STB/MMscf	mL/m3
Nitrogen	N <sub>2</sub>	0.0120	0.0121		
Carbon Dioxide	CO <sub>2</sub>	0.0033	0.0000		
Hydrogen Sulphide	H <sub>2</sub> S	0.0000	0.0000		
Methane	C <sub>1</sub>	0.0226	0.0227		
Ethane	C <sub>2</sub>	0.4234	0.4248		
Propane	C <sub>3</sub>	0.4643	0.4658	303.189	1702.257
i-Butane	i-C <sub>4</sub>	0.0203	0.0204	15.780	88.598
n-Butane	n-C <sub>4</sub>	0.0395	0.0396	29.517	165.722
i-Pentane	i-C <sub>5</sub>	0.0044	0.0044	3.842	21.570
n-Pentane	n-C <sub>5</sub>	0.0035	0.0035	3.013	16.917
Hexanes	C <sub>6</sub>	0.0018	0.0018	1.784	10.018
Heptanes	C <sub>7</sub>	0.0046	0.0046	5.041	28.305
Octanes	C <sub>8</sub>	0.0002	0.0002	0.281	1.578
Nonanes	C <sub>9</sub>	0.0000	0.0000	0.015	0.082
Decanes	C <sub>10</sub>	0.0000	0.0000	0.000	0.000
Undecane	C <sub>11</sub>	0.0000	0.0000	0.000	0.000
Dodecanes Plus	C <sub>12+</sub>	0.0000	0.0000	0.000	0.000
Total		1.0000	1.0000	362.462	2035.047
Propanes Plus	C <sub>3+</sub>	0.5387	0.5404	362.462	2035.047
Butanes Plus	C <sub>4+</sub>	0.0744	0.0746	59.273	332.790
	C <sub>5+</sub>	0.0146	0.0146	13.976	78.470

Calculated Gas Properties @ Standard Conditions			Calculated Pseudocritical Properties		
Molecular Weight	38.72 kg/kmol	38.72 lb/lb-mol	Ppc	649.4 psia	4.48 MPa
Specific Gravity	1.3369 (Air = 1)	1.3369 (Air = 1)	Tpc	152.6 F	67 C
MW of C7+	96.58 kg/kmol	96.58 lb/lbmol	Ppc*	648.7 psia	4.47 MPa
Density of C7+	0.7232 g/cc	723.2 kg/m3	Tpc*	151.9 F	66.6 C

Calculated Gross Heating Value @ Standard Conditions			Calculated Net Heating Value @ Standard Conditions		
Dry	2,202.8 Btu/scf	82.23 MJ/m3	Dry	2,023.1 Btu/scf	75.52 MJ/m3
Wet	2,164.5 Btu/scf	80.80 MJ/m3	Wet	1,987.9 Btu/scf	74.20 MJ/m3

Standard Conditions: 60 F (15.5C) @ 14.696 psia (0.101325 MPa)

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# SECTION 3

## RESERVOIR FLUID STUDY

**TABLE 3-C4**  
**ENERPLUS CORPORATION - LODGEPOLE**  
**WELL 00/04-11-10-28W1M - DALY UNIT 3 - RECOMBINED SAMPLE**  
**RESERVOIR FLUID STUDY**  
**DIFFERENTIAL LIBERATION GAS COMPOSITION @ 13 psia (0.09 MPa )**

Component Name	Chemical Symbol	Mole Fraction		Liquid Volume	
		As Analyzed	Acid Gas Free	STB/MMscf	ml/m3
Nitrogen	N <sub>2</sub>	0.0027	0.0027		
Carbon Dioxide	CO <sub>2</sub>	0.0017	0.0000		
Hydrogen Sulphide	H <sub>2</sub> S	0.0000	0.0000		
Methane	C <sub>1</sub>	0.0109	0.0109		
Ethane	C <sub>2</sub>	0.1777	0.1780		
Propane	C <sub>3</sub>	0.5827	0.5837	380.535	2136.515
i-Butane	i-C <sub>4</sub>	0.0481	0.0482	37.330	209.590
n-Butane	n-C <sub>4</sub>	0.1047	0.1049	78.348	439.888
i-Pentane	i-C <sub>5</sub>	0.0211	0.0211	18.351	103.034
n-Pentane	n-C <sub>5</sub>	0.0183	0.0183	15.737	88.353
Hexanes	C <sub>6</sub>	0.0095	0.0095	9.233	51.836
Heptanes	C <sub>7</sub>	0.0220	0.0220	24.096	135.288
Octanes	C <sub>8</sub>	0.0005	0.0005	0.559	3.138
Nonanes	C <sub>9</sub>	0.0000	0.0000	0.014	0.080
Decanes	C <sub>10</sub>	0.0000	0.0000	0.000	0.000
Undecane	C <sub>11</sub>	0.0000	0.0000	0.000	0.000
Dodecanes Plus	C <sub>12+</sub>	0.0000	0.0000	0.000	0.000
Total		1.0000	1.0000	564.203	3167.723
Propanes Plus	C <sub>3+</sub>	0.8069	0.8083	564.203	3167.723
Butanes Plus	C <sub>4+</sub>	0.2242	0.2246	183.668	1031.208
	C <sub>5+</sub>	0.0714	0.0715	67.990	381.729

Calculated Gas Properties @ Standard Conditions			Calculated Pseudocritical Properties		
Molecular Weight	46.07 kg/kmol	46.07 lb/lb-mol	Ppc	610.8 psia	4.21 MPa
Specific Gravity	1.5907 (Air = 1)	1.5907 (Air = 1)	Tpc	210.3 F	99 C
MW of C7+	96.24 kg/kmol	96.24 lb/lbmol	Ppc*	610.5 psia	4.21 MPa
Density of C7+	0.7225 g/cc	722.5 kg/m3	Tpc*	209.9 F	98.8 C

Calculated Gross Heating Value @ Standard Conditions			Calculated Net Heating Value @ Standard Conditions		
Dry	2,617.5 Btu/scf	97.70 MJ/m3	Dry	2,409.4 Btu/scf	89.94 MJ/m3
Wet	2,571.9 Btu/scf	96.00 MJ/m3	Wet	2,367.5 Btu/scf	88.37 MJ/m3

Standard Conditions: 60 F (15.5 C) @ 14.696 psia (0.101325 MPa)

GC No.: 4336



# **Weatherford®**

## **LABORATORIES**

### **ENERPLUS CORPORATION - LODGEPOLE SECTION 4 MULTI-STAGE SEPARATOR TEST**

### **FINAL REPORT**

Prepared for

**enerPLUS**  
CORPORATION

By

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June 16, 2011

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## **MULTI-STAGE SEPARATOR TEST**

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## RESULTS AND DISCUSSION

The multi-stage separator test was conducted on a RECOMBINED sample prepared from separator oil and separator gas collected from Well 00/04-11-10-28W1M of LODGEPOLE reservoir.

The sample collection data is provided in Table 1 and the sample validation data is given in Appendix A.

Table 2 provides the compositional analysis of the RECOMBINED sample.

Table 3 contains various oil property measurements performed on the multi-stage separator test including live oil density, oil formation volume factor and gas-oil ratios.

Table 4 contains a summary of the gas properties including gas gravities, deviation factors, gas formation volume factors and gas expansion factors.

Table 5 presents the compositional analysis of the residual oil at completion of the experiment.

Appendix B contains the material balance check performed for this experiment. It is displayed as formation volume factors so that the balance can be checked on a point by point basis. Appendix C contains the compositional analyses of the liberated gases from the multi-stage separator test.

**SECTION 4**  
**MULTI-STAGE SEPARATOR TEST**

**SUMMARY**

**ENERPLUS CORPORATION - LODGEPOLE**  
**WELL 00/04-11-10-28W1M - DALY UNIT 3 - RECOMBINED SAMPLE**  
**MULTI-STAGE SEPARATOR TEST**  
**MAIN PVT RESULTS**

**INITIAL RESERVOIR CONDITIONS**

Reservoir Pressure	968 psia	6.67 MPa
Reservoir Temperature:	82.4 F	28.0 C

**MULTI-STAGE SEPARATOR TEST**

Saturation Pressure	186 psia	1.28 MPa
At Saturation Pressure		
Oil Formation Volume Factor	1.0736 res.bbl/STB	1.0736 res.m <sup>3</sup> /m <sup>3</sup>
Solution Gas-Oil Ratio	113.16 scf/STB	20.15 m <sup>3</sup> /m <sup>3</sup>
Oil Density	0.8319 g/cm <sup>3</sup>	831.9 kg/m <sup>3</sup>
At Ambient Pressure		
Residual Oil Density	0.8469 g/cm <sup>3</sup>	846.9 kg/m <sup>3</sup>
At Tank Conditions		
Residual Oil Density	0.8544 g/cm <sup>3</sup>	854.4 kg/m <sup>3</sup>
API Gravity	34.11	34.11

**SINGLE-STAGE SEPARATOR TEST**

At Saturation Pressure		
Oil Formation Volume Factor	1.0784 res.bbl/STB	1.0784 res.m <sup>3</sup> /m <sup>3</sup>
Solution Gas-Oil Ratio	109.92 scf/STB	19.58 m <sup>3</sup> /m <sup>3</sup>
At Tank Conditions		
Residual Oil Density	0.8513 g/cm <sup>3</sup>	851.3 kg/m <sup>3</sup>
API Gravity	34.71	34.71



**SECTION 4**  
**MULTI-STAGE SEPARATOR TEST**

**TABLE 4-1**  
**ENERPLUS CORPORATION - LODGEPOLE**  
**WELL 00/04-11-10-28W1M - DALY UNIT 3 - RECOMBINED SAMPLE**  
**MULTI-STAGE SEPARATOR TEST**  
**SAMPLE COLLECTION DATA**

Project File:	CL-49659		
Operator Name:	ENERPLUS CORPORATION		
Pool or Zone:	DALY UNIT 3		
Field or Area:	LODGEPOLE		
Well Location:	00/04-11-10-28W1M		
Fluid Sample:	RECOMBINED		
Sampling Company:	WFT		
Name of Sampler:	DM		
Sampling Date:	11-Nov-10		
Sampling Point:	WELLHEAD		
Sampling Temperature:	39.2 F	4.0 C	
Sampling Pressure:	40 psia	0.28 MPa	
Reservoir Temperature:	82.4 F	28.0 C	
Reservoir Pressure:	968.0 psia	6.67 MPa	
Initial Reservoir Pressure (Pi)	N/A psia	N/A MPa	
Depth of Reported Pi	N/A mMD	N/A mss	

**SECTION 4**  
**MULTI-STAGE SEPARATOR TEST**

**TABLE 4-2**  
**ENERPLUS CORPORATION - LODGEPOLE**  
**WELL 00/04-11-10-28W1M - DALY UNIT 3 - RECOMBINED SAMPLE**  
**MULTI-STAGE SEPARATOR TEST**  
**COMPOSITIONAL ANALYSIS OF RESERVOIR FLUID**

Boiling Point (F)			Mole Fraction	Mass Fraction	Calculated Properties
-320.4	Nitrogen	N2	0.0019	0.0003	<b>Total Sample</b>
-109.3	Carbon Dioxide	CO2	0.0004	0.0001	
-76.6	Hydrogen Sulphide	H2S	0.0000	0.0000	Molecular Weight 176.62
-259.1	Methane	C1	0.0056	0.0005	
-128.0	Ethane	C2	0.0469	0.0080	
-44.0	Propane	C3	0.0839	0.0209	<b>C6+ Fraction</b>
10.9	i-Butane	i-C4	0.0176	0.0058	
30.9	n-Butane	n-C4	0.0533	0.0176	Molecular Weight 222.25
82.0	i-Pentane	i-C5	0.0246	0.0100	Mole Fraction 0.7342
97.0	n-Pentane	n-C5	0.0316	0.0129	Density (g/cc) 0.8599
97 - 156	Hexanes	C6	0.0509	0.0248	
156 - 208.9	Heptanes	C7	0.0486	0.0276	
208.9 - 258.1	Octanes	C8	0.0536	0.0347	<b>C7+ Fraction</b>
258.1 - 303.1	Nonanes	C9	0.0431	0.0313	
303.1 - 345	Decanes	C10	0.0395	0.0318	Molecular Weight 233.33
345 - 385	Undecanes	C11	0.0479	0.0399	Mole Fraction 0.6790
385 - 419	Dodecanes	C12	0.0419	0.0382	Density (g/cc) 0.8662
419 - 455	Tridecanes	C13	0.0358	0.0355	
455 - 486	Tetradecanes	C14	0.0324	0.0349	
486 - 519.1	Pentadecanes	C15	0.0262	0.0306	<b>C12+ Fraction</b>
519.1 - 550	Hexadecanes	C16	0.0212	0.0266	
550 - 557	Heptadecanes	C17	0.0188	0.0253	Molecular Weight 316.28
557 - 603	Octadecanes	C18	0.0174	0.0247	Mole Fraction 0.3932
603 - 626	Nonadecanes	C19	0.0173	0.0257	Density (g/cc) 0.8985
626 - 651.9	Eicosanes	C20	0.0143	0.0222	
651.9 - 675	Heneicosanes	C21	0.0128	0.0211	
675 - 696.9	Docosanes	C22	0.0119	0.0206	
696.9 - 716	Tricosanes	C23	0.0112	0.0202	
716 - 736	Tetracosanes	C24	0.0100	0.0188	
736 - 755.1	Pentacosanes	C25	0.0103	0.0202	
755.1 - 774	Hexacosanes	C26	0.0080	0.0163	
774.1 - 792	Heptacosanes	C27	0.0092	0.0194	
792.1 - 809.1	Octacosanes	C28	0.0073	0.0161	
809.1 - 826	Nonacosanes	C29	0.0073	0.0166	
Above 826	Tricontanes Plus	C30+	0.0799	0.2713	
120.0	Cyclopentane	C5H10	0.0043	0.0017	
162.0	Methylcyclopentane	C6H12	0.0143	0.0068	
178.0	Cyclohexane	C6H12	0.0145	0.0069	
214.0	Methylcyclohexane	C7H14	0.0107	0.0060	
176.0	Benzene	C6H6	0.0007	0.0003	
231.1	Toluene	C7H8	0.0004	0.0002	
277 - 282	Ethylbenzene & p,m-Xylene	C8H10	0.0046	0.0028	
291.9	o-Xylene	C8H10	0.0034	0.0021	
336.0	1, 2, 4-Trimethylbenzene	C9H12	0.0043	0.0029	
<b>Total</b>			<b>1.0000</b>	<b>1.0000</b>	

TABLE 4-3

Pressure		Temperature		Oil Density (g/cm <sup>3</sup> )	Oil Formation Volume Factor [1]	Total Formation Volume Factor [2]	Gas-Oil Ratio		Gas-Oil Ratio	
(psia)	(MPa)	(F)	(C)				Solution (scf/STB)	Liberated (scf/STB)	Solution (m <sup>3</sup> /m <sup>3</sup> )	Liberated (m <sup>3</sup> /m <sup>3</sup> )
186 Psat	1.28	82	28.0	0.8319	1.0736	1.0736	0.00	20.15	0.00	
28	0.19	60	15.5	0.8422	1.0208	7.248	97.41	2.81	17.35	
13	0.09	115	46.0	0.8469	1.0106	13.63	113.16	0.00	20.15	
13	0.09	60	15.6	0.8544	1.0000	13.65	113.16	0.00	20.15	

Density of Residual Oil = 0.8544 g/cm<sup>3</sup> (854.4 kg/m<sup>3</sup>) @ 60 F (288.7K)  
API Gravity of Residual Oil = 34.1

[1] Barrels (Cubic meters) of oil at indicated pressure and temperature per barrel (cubic meter) of residual oil @ 60 F (288.7 K).  
[2] Total barrels (cubic meters) of oil and liberated gas at the indicated pressure and temperature per barrel (cubic meter) of residual oil @ 60 F (288.7 K).

Psat - Saturation Pressure  
- Tank conditions: 60 F (288.7 K) @ 13 psia (0.0896 MPa); Standard conditions: 60 F (288.7 K) @ 14.696 psia (0.101325 MPa).



SECTION 4  
MULTI-STAGE SEPARATOR TEST

TABLE 4-4  
ENERPLUS CORPORATION - LODGEPOLE  
WELL 00/04-11-10-28W1M - DALY UNIT 3 - RECOMBINED SAMPLE  
MULTI-STAGE SEPARATOR TEST  
MULTI-STAGE SEPARATOR GAS PROPERTIES

Pressure		Temperature		Gas Gravity		Gas Density (g/cm <sup>3</sup> )	Gas Deviation Factor (-)	Gas Formation Volume Factor [1]	Gas Expansion Factor [2]
(psia)	(MPa)	(F)	(C)	Incremental (Air = 1)	Cumulative (Air = 1)				
186 Psat	1.28	82	28.0						
28	0.19	60	15.5	1.2281	1.2281	0.00288	0.9830	0.3589	2.786
13	0.09	115	46.0	1.4810	1.2633	0.00146	0.9897	0.6261	1.597

[1] Cubic feet (meters) of gas at indicated pressure and temperature per cubic feet (meter) @ standard conditions  
 [2] Cubic feet (meters) of gas @ standard conditions per cubic feet (meter) @ indicated pressure and temperature.  
 Psat - Saturation pressure  
 - Standard conditions: 60 F (288.7 K) @ 14.696 psia (0.101325 MPa)

**SECTION 4**  
**MULTI-STAGE SEPARATOR TEST**

**TABLE 4-5**  
**ENERPLUS CORPORATION - LODGEPOLE**  
**WELL 00/04-11-10-28W1M - DALY UNIT 3 - RECOMBINED SAMPLE**  
**MULTI-STAGE SEPARATOR TEST**  
**COMPOSITIONAL ANALYSIS OF RESIDUAL OIL**

Boiling Point (F)			Mole Fraction	Mass Fraction	Calculated Properties
-320.4	Nitrogen	N2	0.0000	0.0000	<b>Total Sample</b>
-109.3	Carbon Dioxide	CO2	0.0000	0.0000	
-76.6	Hydrogen Sulphide	H2S	0.0000	0.0000	Molecular Weight 201.61
-259.1	Methane	C1	0.0000	0.0000	
-128.0	Ethane	C2	0.0000	0.0000	
-44.0	Propane	C3	0.0292	0.0064	<b>C6+ Fraction</b>
10.9	i-Butane	i-C4	0.0133	0.0038	
30.9	n-Butane	n-C4	0.0484	0.0140	Molecular Weight 227.58
82.0	i-Pentane	i-C5	0.0289	0.0103	Mole Fraction 0.8437
97.0	n-Pentane	n-C5	0.0365	0.0130	Density (g/cc) 0.8202
97 - 156	Hexanes	C6	0.0582	0.0249	
156 - 208.9	Heptanes	C7	0.0541	0.0269	
208.9 - 258.1	Octanes	C8	0.0546	0.0310	<b>C7+ Fraction</b>
258.1 - 303.1	Nonanes	C9	0.0467	0.0297	
303.1 - 345	Decanes	C10	0.0444	0.0313	Molecular Weight 239.11
345 - 385	Undecanes	C11	0.0516	0.0376	Mole Fraction 0.7806
385 - 419	Dodecanes	C12	0.0453	0.0362	Density (g/cc) 0.8307
419 - 455	Tridecanes	C13	0.0413	0.0359	
455 - 486	Tetradecanes	C14	0.0354	0.0333	
486 - 519.1	Pentadecanes	C15	0.0280	0.0286	<b>C12+ Fraction</b>
519.1 - 550	Hexadecanes	C16	0.0246	0.0270	
550 - 557	Heptadecanes	C17	0.0221	0.0260	Molecular Weight 320.02
557 - 603	Octadecanes	C18	0.0216	0.0269	Mole Fraction 0.4662
603 - 626	Nonadecanes	C19	0.0209	0.0273	Density (g/cc) 0.8742
626 - 651.9	Eicosanes	C20	0.0187	0.0255	
651.9 - 675	Heneicosanes	C21	0.0166	0.0239	
675 - 696.9	Docosanes	C22	0.0151	0.0229	
696.9 - 716	Tricosanes	C23	0.0144	0.0228	
716 - 736	Tetracosanes	C24	0.0133	0.0219	
736 - 755.1	Pentacosanes	C25	0.0119	0.0203	
755.1 - 774	Hexacosanes	C26	0.0118	0.0210	
774.1 - 792	Heptacosanes	C27	0.0104	0.0193	
792.1 - 809.1	Octacosanes	C28	0.0102	0.0197	
809.1 - 826	Nonacosanes	C29	0.0094	0.0188	
Above 826	Tricontanes Plus	C30+	0.0950	0.2826	
120.0	Cyclopentane	C5H10	0.0050	0.0017	
162.0	Methylcyclopentane	C6H12	0.0149	0.0062	
178.0	Cyclohexane	C6H12	0.0163	0.0068	
214.0	Methylcyclohexane	C7H14	0.0147	0.0071	
176.0	Benzene	C6H6	0.0006	0.0002	
231.1	Toluene	C7H8	0.0023	0.0010	
277 - 282	Ethylbenzene & p,m-Xylene	C8H10	0.0054	0.0029	
291.9	o-Xylene	C8H10	0.0037	0.0020	
336.0	1, 2, 4-Trimethylbenzene	C9H12	0.0051	0.0031	
<b>Total</b>			<b>1.0000</b>	<b>1.0000</b>	

TABLE 4-6

ENERPLUS CORPORATION - LODGEPOLE

WELL 00/04-11-10-28W1M - DALY UNIT 3 - RECOMBINED SAMPLE

MULTI-STAGE SEPARATOR TEST

FLASH ADJUSTED DIFFERENTIAL LIBERATION DATA

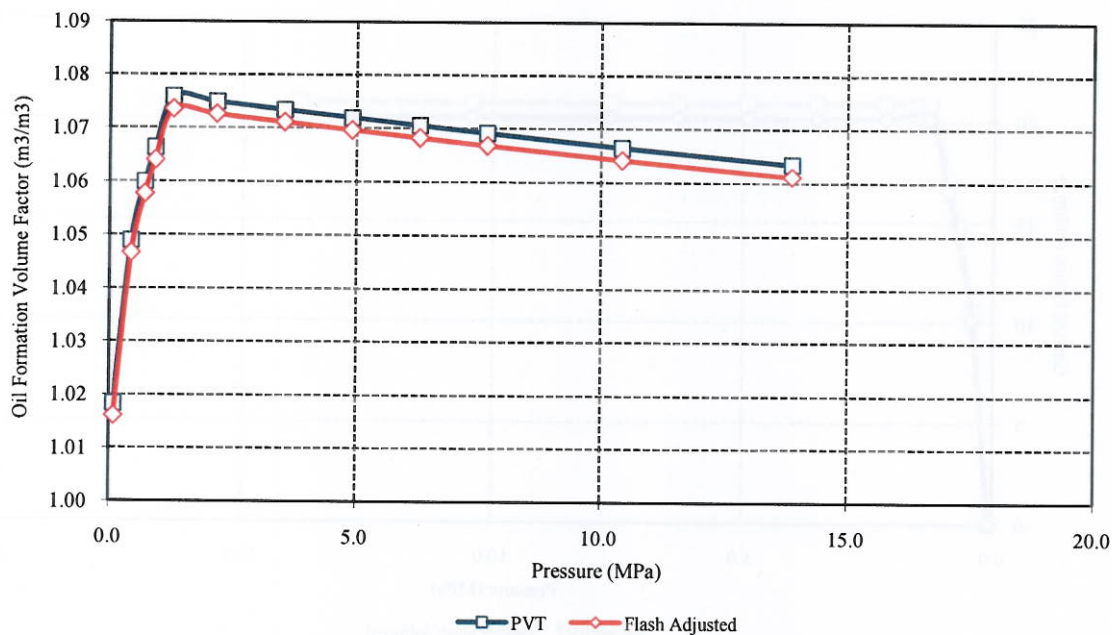
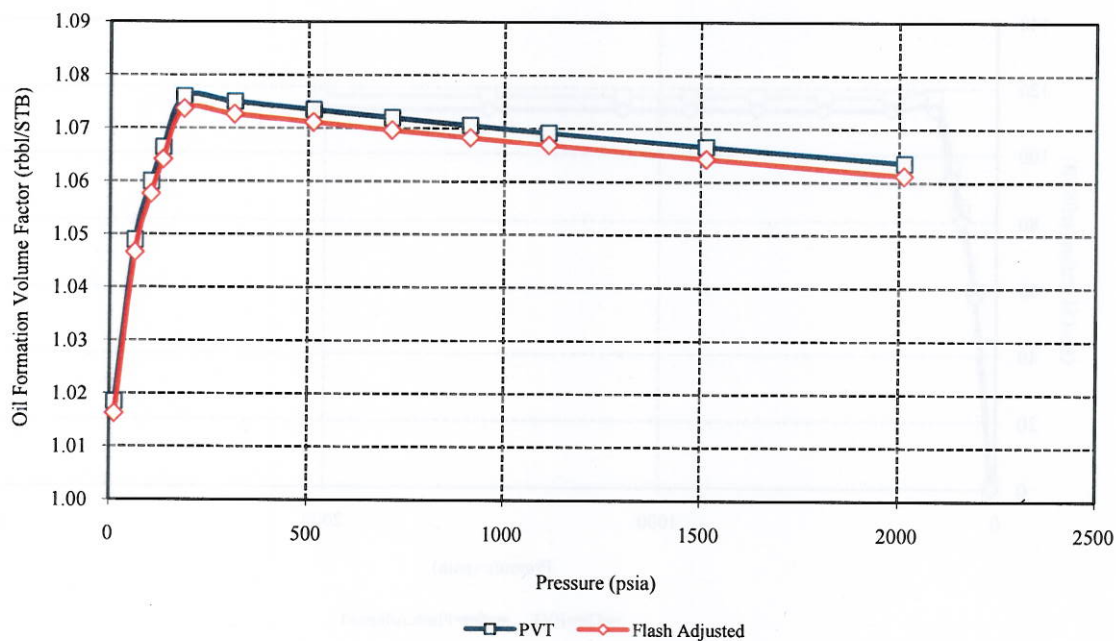
Pressure		Oil Formation Volume Factor		Solution Gas-Oil Ratio			
(psia)	(MPa)	PVT	Flash Adjusted	PVT (scf/STB)	Flash Adjusted (scf/STB)	PVT (m <sup>3</sup> /m <sup>3</sup> )	Flash Adjusted (m <sup>3</sup> /m <sup>3</sup> )
2013	13.88	1.0635	1.0612	117.30	113.16	20.89	20.15
1513	10.43	1.0665	1.0642	117.30	113.16	20.89	20.15
1113	7.67	1.0691	1.0668	117.30	113.16	20.89	20.15
913	6.29	1.0705	1.0682	117.30	113.16	20.89	20.15
713	4.91	1.0719	1.0696	117.30	113.16	20.89	20.15
513	3.54	1.0734	1.0711	117.30	113.16	20.89	20.15
313	2.16	1.0749	1.0726	117.30	113.16	20.89	20.15
186 Psat	1.28	1.0759	1.0736	117.30	113.16	20.89	20.15
133	0.92	1.0664	1.0641	96.42	93.02	17.17	16.57
103	0.71	1.0600	1.0577	83.32	80.38	14.84	14.32
63	0.43	1.0489	1.0467	59.33	57.24	10.57	10.19
13	0.09	1.0183	1.0162	0.00	0.00	0.00	0.00

Psat - Saturation Pressure



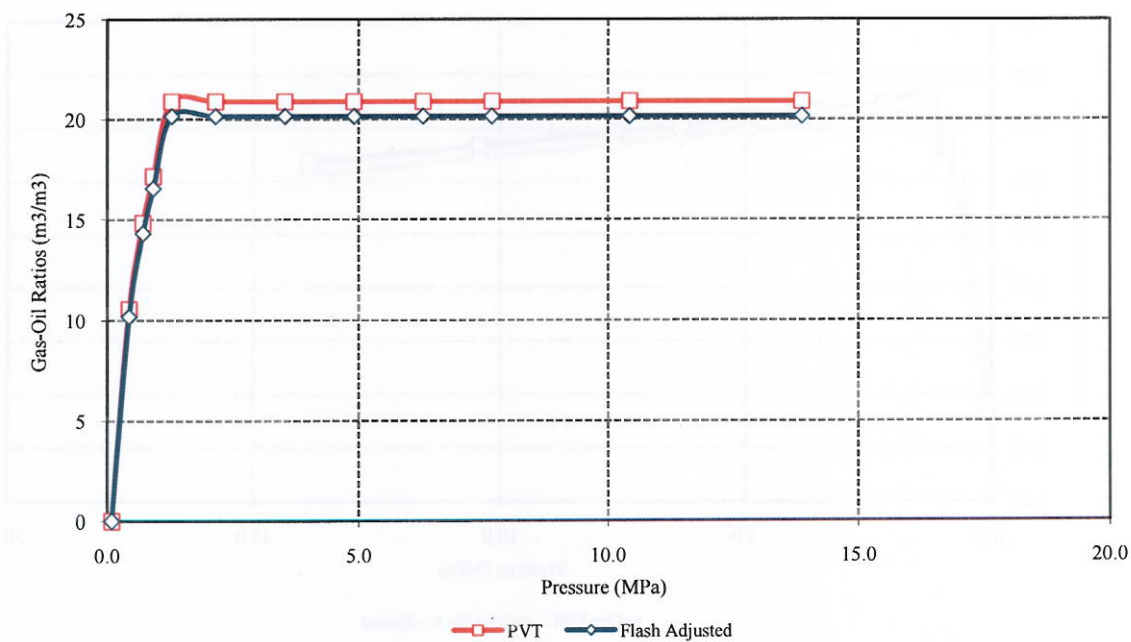
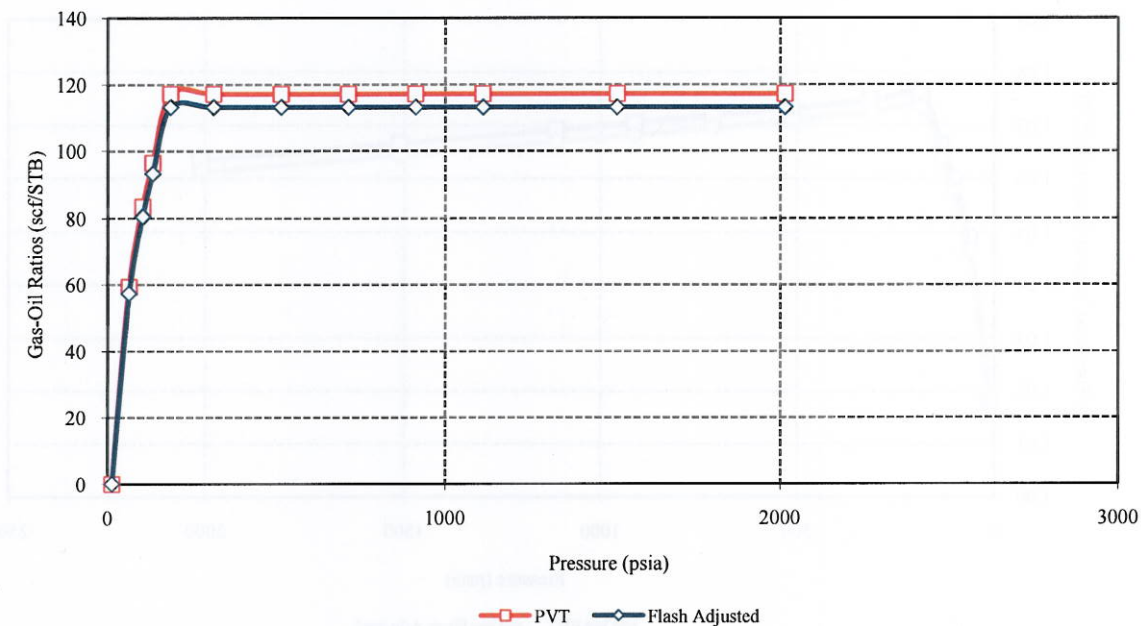
**SECTION 4**  
**MULTI-STAGE SEPARATOR TEST**

**FIGURE 4-1**  
**ENERPLUS CORPORATION - LODGEPOLE**  
**WELL 00/04-11-10-28W1M - DALY UNIT 3 - RECOMBINED SAMPLE**  
**MULTI-STAGE SEPARATOR TEST**  
**DIFFERENTIAL LIBERATION OIL FORMATION VOLUME FACTOR @ 82.4 F (28.0 C)**



**SECTION 4**  
**MULTI-STAGE SEPARATOR TEST**

**FIGURE 4-2**  
**ENERPLUS CORPORATION - LODGEPOLE**  
**WELL 00/04-11-10-28W1M - DALY UNIT 3 - RECOMBINED SAMPLE**  
**MULTI-STAGE SEPARATOR TEST**  
**DIFFERENTIAL LIBERATION GAS-OIL RATIOS @ 82.4 F (28.0 C)**



## SECTION 4 MULTI-STAGE SEPARATOR TEST

### SECTION 4 - APPENDIX A

#### SAMPLE VALIDATION

SECTION 4 - APPENDIX A	
SAMPLE VALIDATION	



# SECTION 4 MULTI-STAGE SEPARATOR TEST

**TABLE 4-B1**  
**ENERPLUS CORPORATION - LODGEPOLE**  
**WELL 00/04-11-10-28W1M - DALY UNIT 3 - RECOMBINED SAMPLE**  
**MULTI-STAGE SEPARATOR TEST**  
**MULTI-STAGE SEPARATOR - MATERIAL BALANCE**

Pressure		Measured Oil FVF [1]	Calculated Oil FVF [1]	Absolute Relative Error (%)
(psia)	(MPa)			
186 Psat	1.28	1.0736	1.0644	0.8592
28	0.19	1.0208	1.0205	0.0370
13	0.09	1.0106	1.0089	0.1664
13	0.09	1.0000	1.0000	0.0000
[1] (res bbl/STB) (res m3/m3) Psat - Saturation Pressure - Tank conditions: 60 F (288.7 K) @ 13 psia (0.09 MPa)				

## SECTION 4 MULTI-STAGE SEPARATOR TEST

### SECTION 4 - APPENDIX C

#### MULTI-STAGE SEPARATOR TEST - LIBERATED GAS ANALYSES

Component	Weight %	Volume %	Weight %	Volume %	Component
Hydrogen	0.000	0.000	0.000	0.000	Hydrogen
Hydrogen Sulfide	0.000	0.000	0.000	0.000	Hydrogen Sulfide
Helium	0.000	0.000	0.000	0.000	Helium
Neon	0.000	0.000	0.000	0.000	Neon
Argon	0.000	0.000	0.000	0.000	Argon
Krypton	0.000	0.000	0.000	0.000	Krypton
Xenon	0.000	0.000	0.000	0.000	Xenon
Nitrogen	0.000	0.000	0.000	0.000	Nitrogen
Oxygen	0.000	0.000	0.000	0.000	Oxygen
Carbon Dioxide	0.000	0.000	0.000	0.000	Carbon Dioxide
Water Vapor	0.000	0.000	0.000	0.000	Water Vapor
Acetylene	0.000	0.000	0.000	0.000	Acetylene
Ethylene	0.000	0.000	0.000	0.000	Ethylene
Ethane	0.000	0.000	0.000	0.000	Ethane
Propane	0.000	0.000	0.000	0.000	Propane
Isobutane	0.000	0.000	0.000	0.000	Isobutane
Normal Butane	0.000	0.000	0.000	0.000	Normal Butane
Pentane	0.000	0.000	0.000	0.000	Pentane
Hexane	0.000	0.000	0.000	0.000	Hexane
Heptane	0.000	0.000	0.000	0.000	Heptane
Octane	0.000	0.000	0.000	0.000	Octane
Nonane	0.000	0.000	0.000	0.000	Nonane
Tenane	0.000	0.000	0.000	0.000	Tenane
Undecane	0.000	0.000	0.000	0.000	Undecane
Dodecane	0.000	0.000	0.000	0.000	Dodecane
Tridecane	0.000	0.000	0.000	0.000	Tridecane
Tetradecane	0.000	0.000	0.000	0.000	Tetradecane
Pentadecane	0.000	0.000	0.000	0.000	Pentadecane
Hexadecane	0.000	0.000	0.000	0.000	Hexadecane
Heptadecane	0.000	0.000	0.000	0.000	Heptadecane
Octadecane	0.000	0.000	0.000	0.000	Octadecane
Nonadecane	0.000	0.000	0.000	0.000	Nonadecane
Eicosane	0.000	0.000	0.000	0.000	Eicosane
Sum	100.000	100.000	100.000	100.000	Sum

Component	Weight %	Volume %	Weight %	Volume %	Component
Hydrogen	0.000	0.000	0.000	0.000	Hydrogen
Hydrogen Sulfide	0.000	0.000	0.000	0.000	Hydrogen Sulfide
Helium	0.000	0.000	0.000	0.000	Helium
Neon	0.000	0.000	0.000	0.000	Neon
Argon	0.000	0.000	0.000	0.000	Argon
Krypton	0.000	0.000	0.000	0.000	Krypton
Xenon	0.000	0.000	0.000	0.000	Xenon
Nitrogen	0.000	0.000	0.000	0.000	Nitrogen
Oxygen	0.000	0.000	0.000	0.000	Oxygen
Carbon Dioxide	0.000	0.000	0.000	0.000	Carbon Dioxide
Water Vapor	0.000	0.000	0.000	0.000	Water Vapor
Acetylene	0.000	0.000	0.000	0.000	Acetylene
Ethylene	0.000	0.000	0.000	0.000	Ethylene
Ethane	0.000	0.000	0.000	0.000	Ethane
Propane	0.000	0.000	0.000	0.000	Propane
Isobutane	0.000	0.000	0.000	0.000	Isobutane
Normal Butane	0.000	0.000	0.000	0.000	Normal Butane
Pentane	0.000	0.000	0.000	0.000	Pentane
Hexane	0.000	0.000	0.000	0.000	Hexane
Heptane	0.000	0.000	0.000	0.000	Heptane
Octane	0.000	0.000	0.000	0.000	Octane
Nonane	0.000	0.000	0.000	0.000	Nonane
Tenane	0.000	0.000	0.000	0.000	Tenane
Undecane	0.000	0.000	0.000	0.000	Undecane
Dodecane	0.000	0.000	0.000	0.000	Dodecane
Tridecane	0.000	0.000	0.000	0.000	Tridecane
Tetradecane	0.000	0.000	0.000	0.000	Tetradecane
Pentadecane	0.000	0.000	0.000	0.000	Pentadecane
Hexadecane	0.000	0.000	0.000	0.000	Hexadecane
Heptadecane	0.000	0.000	0.000	0.000	Heptadecane
Octadecane	0.000	0.000	0.000	0.000	Octadecane
Nonadecane	0.000	0.000	0.000	0.000	Nonadecane
Eicosane	0.000	0.000	0.000	0.000	Eicosane
Sum	100.000	100.000	100.000	100.000	Sum

# SECTION 4 MULTI-STAGE SEPARATOR TEST

**TABLE 4-C1**  
**ENERPLUS CORPORATION - LODGEPOLE**  
**WELL 00/04-11-10-28W1M - DALY UNIT 3 - RECOMBINED SAMPLE**  
**MULTI-STAGE SEPARATOR TEST**  
**MULTI-STAGE SEPARATOR GAS COMPOSITION @ 28 psia (0.19 MPa) AND 59.9 F (15.5 C)**

Component Name	Chemical Symbol	Mole Fraction		Liquid Volume	
		As Analyzed	Acid Gas Free	STB/MMscf	mL/m3
Nitrogen	N <sub>2</sub>	0.1324	0.1333		
Carbon Dioxide	CO <sub>2</sub>	0.0064	0.0000		
Hydrogen Sulphide	H <sub>2</sub> S	0.0000	0.0000		
Methane	C <sub>1</sub>	0.1564	0.1574		
Ethane	C <sub>2</sub>	0.3616	0.3640		
Propane	C <sub>3</sub>	0.2229	0.2244	145.585	817.388
i-Butane	i-C <sub>4</sub>	0.0221	0.0222	17.141	96.240
n-Butane	n-C <sub>4</sub>	0.0453	0.0456	33.903	190.349
i-Pentane	i-C <sub>5</sub>	0.0102	0.0103	8.857	49.729
n-Pentane	n-C <sub>5</sub>	0.0127	0.0128	10.923	61.330
Hexanes	C <sub>6</sub>	0.0083	0.0084	8.130	45.646
Heptanes	C <sub>7</sub>	0.0211	0.0213	23.118	129.794
Octanes	C <sub>8</sub>	0.0005	0.0005	0.569	3.197
Nonanes	C <sub>9</sub>	0.0000	0.0000	0.014	0.080
Decanes	C <sub>10</sub>	0.0000	0.0000	0.000	0.000
Undecane	C <sub>11</sub>	0.0000	0.0000	0.000	0.000
Dodecanes Plus	C <sub>12+</sub>	0.0000	0.0000	0.000	0.000
Total		1.0000	1.0000	248.241	1393.754
Propanes Plus	C <sub>3+</sub>	0.3432	0.3454	248.241	1393.754
Butanes Plus	C <sub>4+</sub>	0.1202	0.1210	102.656	576.365
Pentanes Plus	C <sub>5+</sub>	0.0528	0.0532	51.612	289.776

Calculated Gas Properties @ Standard Conditions			Calculated Pseudocritical Properties		
Molecular Weight	35.57 kg/kmol	35.57 lb/lb-mol	Ppc	630.0 psia	4.34 MPa
Specific Gravity	1.2281 (Air = 1)	1.2281 (Air = 1)	Tpc	533.3 R	296.3 K
MW of C7+	96.25 kg/kmol	96.25 lb/lbmol	Ppc*	628.5 psia	4.33 MPa
Density of C7+	0.7225 g/cc	722.5 kg/m3	Tpc*	532.1 R	295.6 K

Calculated Gross Heating Value @ Standard Conditions			Calculated Net Heating Value @ Standard Conditions		
Dry	1,829.0 Btu/scf	68.27 MJ/m3	Dry	1,678.3 Btu/scf	62.65 MJ/m3
Wet	1,797.2 Btu/scf	67.09 MJ/m3	Wet	1,649.1 Btu/scf	61.56 MJ/m3

Standard Conditions: 60 F (288.7 K) @ 14.696 psia (0.101325 MPa)

GC No.: 4352



# SECTION 4 MULTI-STAGE SEPARATOR TEST

**TABLE 4-C2**  
**ENERPLUS CORPORATION - LODGEPOLE**  
**WELL 00/04-11-10-28W1M - DALY UNIT 3 - RECOMBINED SAMPLE**  
**MULTI-STAGE SEPARATOR TEST**  
**MULTI-STAGE SEPARATOR GAS COMPOSITION @ 13 psia (0.09 MPa) AND 114.8 F (46.0 C)**

Component Name	Chemical Symbol	Mole Fraction		Liquid Volume	
		As Analyzed	Acid Gas Free	STB/MMscf	mL/m3
Nitrogen	N <sub>2</sub>	0.0133	0.0133		
Carbon Dioxide	CO <sub>2</sub>	0.0039	0.0000		
Hydrogen Sulphide	H <sub>2</sub> S	0.0000	0.0000		
Methane	C <sub>1</sub>	0.0377	0.0379		
Ethane	C <sub>2</sub>	0.3303	0.3316		
Propane	C <sub>3</sub>	0.3977	0.3992	259.687	1458.017
i-Butane	i-C <sub>4</sub>	0.0488	0.0490	37.853	212.528
n-Butane	n-C <sub>4</sub>	0.1012	0.1016	75.722	425.143
i-Pentane	i-C <sub>5</sub>	0.0178	0.0179	15.474	86.877
n-Pentane	n-C <sub>5</sub>	0.0160	0.0160	13.715	77.003
Hexanes	C <sub>6</sub>	0.0091	0.0092	8.923	50.097
Heptanes	C <sub>7</sub>	0.0237	0.0238	25.940	145.641
Octanes	C <sub>8</sub>	0.0006	0.0006	0.734	4.122
Nonanes	C <sub>9</sub>	0.0000	0.0000	0.018	0.103
Decanes	C <sub>10</sub>	0.0000	0.0000	0.000	0.000
Undecane	C <sub>11</sub>	0.0000	0.0000	0.000	0.000
Dodecanes Plus	C <sub>12+</sub>	0.0000	0.0000	0.000	0.000
Total		1.0000	1.0000	438.067	2459.531
Propanes Plus	C <sub>3+</sub>	0.6149	0.6172	438.067	2459.531
Butanes Plus	C <sub>4+</sub>	0.2172	0.2180	178.380	1001.515
Pentanes Plus	C <sub>5+</sub>	0.0672	0.0675	64.804	363.843

Calculated Gas Properties @ Standard Conditions			Calculated Pseudocritical Properties		
Molecular Weight	42.90 kg/kmol	42.90 lb/lb-mol	Ppc	626.4 psia	4.32 MPa
Specific Gravity	1.4810 (Air = 1)	1.4810 (Air = 1)	Tpc	638.0 R	354.5 K
MW of C7+	96.29 kg/kmol	96.29 lb/lbmol	Ppc*	625.6 psia	4.31 MPa
Density of C7+	0.7226 g/cc	722.6 kg/m3	Tpc*	637.3 R	354.0 K

Calculated Gross Heating Value @ Standard Conditions			Calculated Net Heating Value @ Standard Conditions		
Dry	2,425.3 Btu/scf	90.53 MJ/m3	Dry	2,230.5 Btu/scf	83.26 MJ/m3
Wet	2,383.1 Btu/scf	88.95 MJ/m3	Wet	2,191.7 Btu/scf	81.81 MJ/m3

Standard Conditions: 60 F (288.7 K) @ 14.696 psia (0.101325 MPa)

GC No.: 4356

