

Methane Adsorption Isotherm Summary

Well: Shenandoah No. 1 Australia
Reservoir: Lower Kyalla Shale
Sample Number: 44569-2M
Sample Type: shale
Drill Depth, feet: 5,217.67-5,217.80
Temperature, °F: 180.00

Pressure	Methane Storage Capacity, scf/ton	
psia	As-Received	
	Measured	Calculated
0.00	0.00	0.00
302.37	3.02	2.86
761.98	5.53	5.66
1,221.30	7.27	7.48
1,677.66	8.64	8.74
2,135.86	9.79	9.68
2,593.23	10.47	10.40

Parameters	Methane Langmuir Parameters (U.S. Units)
	As-Received
Slope:	0.0627
Intercept:	86.7619
Regression Coefficient (squared):	0.9947
Intercept Variation, psia*ton/scf:	13.1567
Slope Variation, ton/scf:	0.0080
G _{sL} Variation, scf/ton:	0.0022
P _L Variation, psia:	130.2568
Langmuir Volume, scf/ton:	15.94
Langmuir Pressure, psia:	1,383.39
Langmuir Equation:	$G_s = (G_{sL} * p) / (P_L + p)$
Pressure (Midpoint), psia:	2,884.45
Storage Capacity, scf/ton:	10.78

G_s Gas Storage Capacity

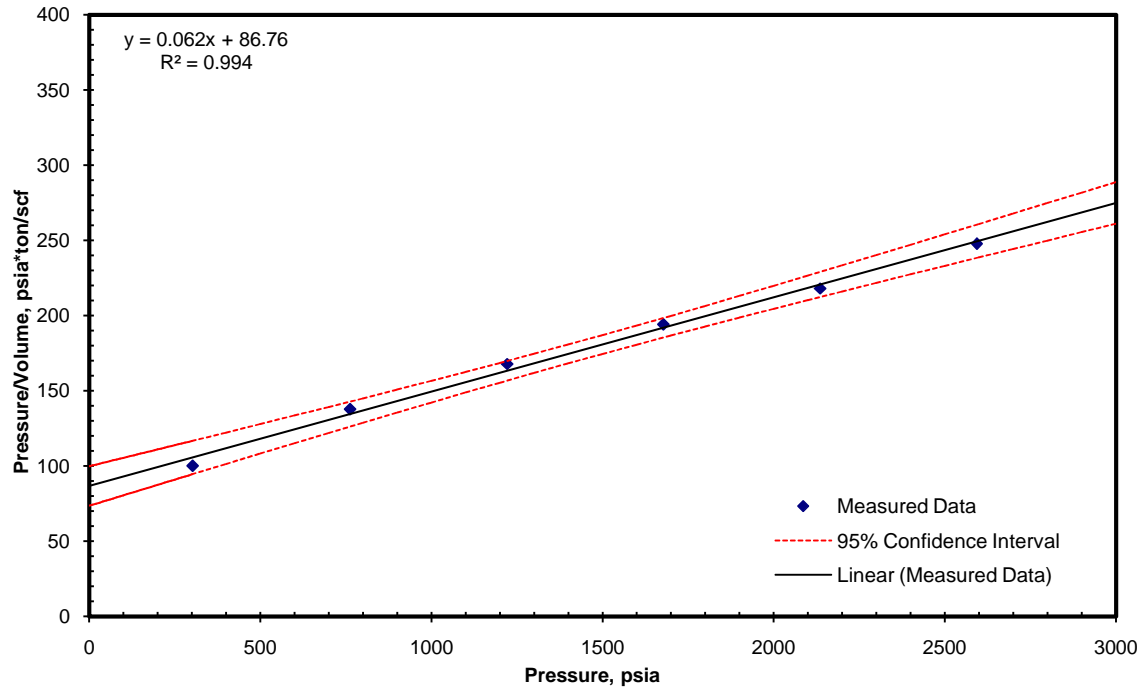
G_{sL} Langmuir Gas Storage Capacity

P_L Langmuir Pressure

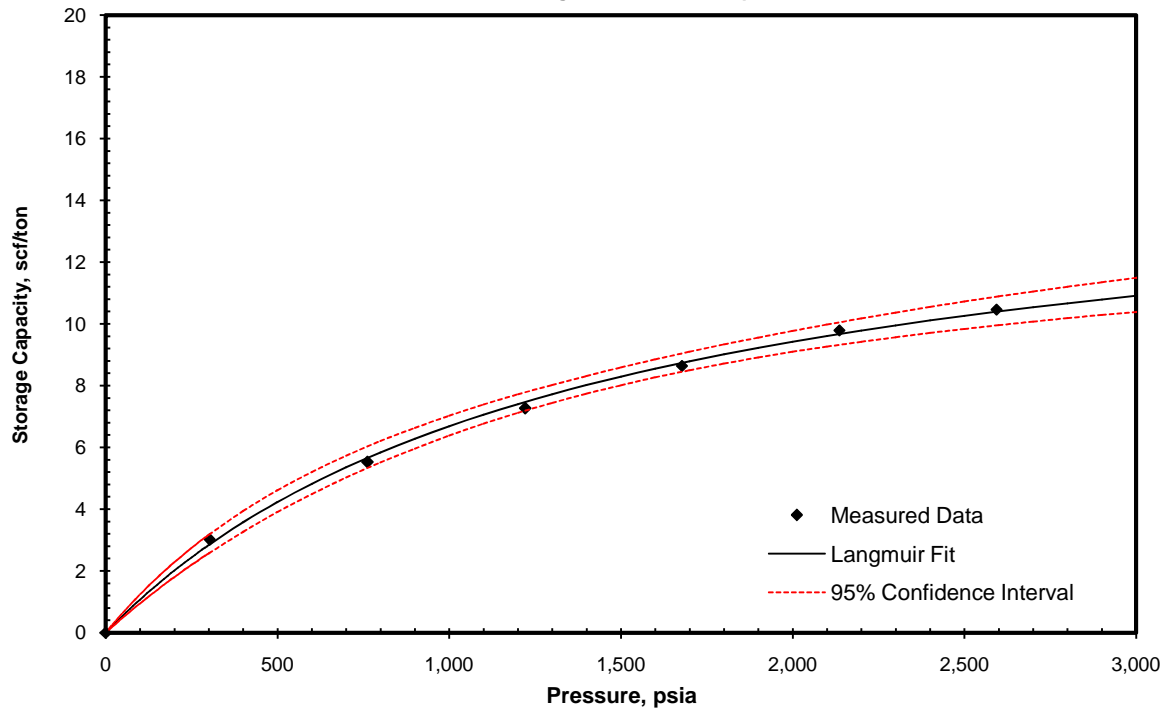
p Relevant Pressure (Reservoir Pressure)

Methane Adsorption Isotherm Summary Graphs

As-Received Langmuir Interpretation Graph



As-Received Langmuir Isotherm Graph



Methane Adsorption Isotherm Summary

Well: Shenandoah No. 1 Australia
Reservoir: Lower Kyalla Shale
Sample Number: 44569-2M
Sample Type: shale
Drill Depth, meters: 1590.35-1590.39
Temperature, °C: 82.22

Pressure	Methane Storage Capacity, scc/gram	
MPa	As-Received	
	Measured	Calculated
0.00	0.00	0.00
2.08	0.09	0.09
5.25	0.17	0.18
8.42	0.23	0.23
11.57	0.27	0.27
14.73	0.31	0.30
17.88	0.33	0.32

Parameters	Methane Langmuir Parameters (S.I. Units)
	As-Received
Slope:	2.0093
Intercept:	19.1645
Regression Coefficient (squared):	0.9947
Intercept Variation, Mpa*gram/scc:	2.9061
Slope Variation, gram/scc:	0.2560
G _{sL} Variation, scc/gram:	0.0001
P _L Variation, MPa:	0.8981
Langmuir Volume, scc/gram:	0.50
Langmuir Pressure, MPa:	9.54
Langmuir Equation:	$V=0.5*P/(P+9.5)$
Pressure (Midpoint), MPa:	19.89
Storage Capacity, scc/gram:	0.34

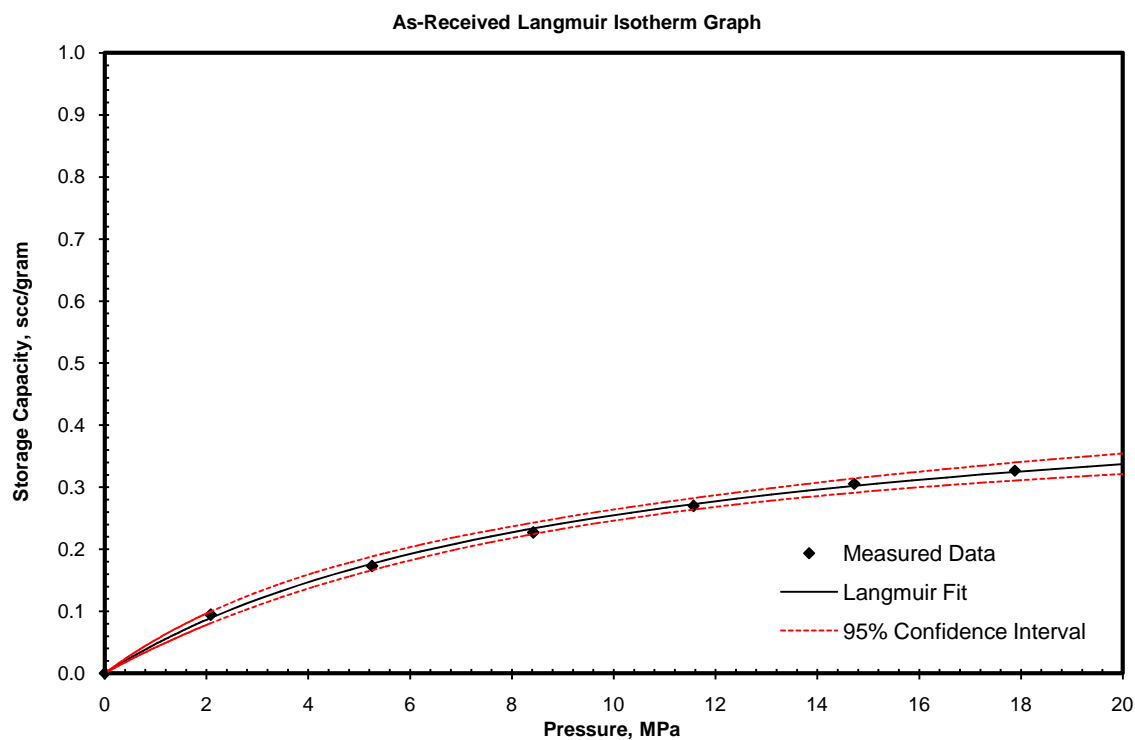
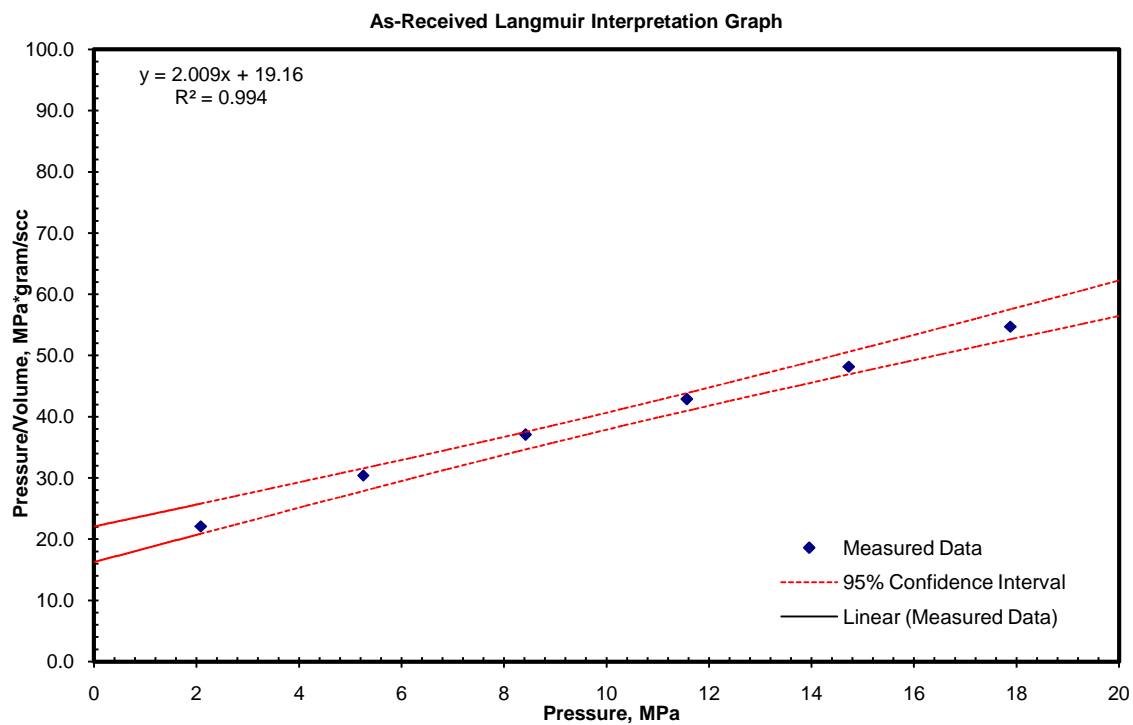
G_s Gas Storage Capacity

G_{sL} Langmuir Gas Storage Capacity

P_L Langmuir Pressure

p Relevant Pressure (Reservoir Pressure)

Methane Adsorption Isotherm Summary Graphs



Methane Adsorption Isotherm Summary

Well: Shenandoah No. 1 Australia
Reservoir: Lower Kyalla Shale
Sample Number: 44569-3M
Sample Type: shale
Drill Depth, feet: 5,226.63-5,226.70
Temperature, °F: 180.00

Pressure	Methane Storage Capacity, scf/ton	
psia	As-Received	
	Measured	Calculated
0.00	0.00	0.00
302.35	1.96	1.97
761.27	4.33	4.34
1,218.39	6.20	6.17
1,679.99	7.67	7.64
2,130.71	8.80	8.83
2,598.91	9.83	9.85

Parameters	Methane Langmuir Parameters (U.S. Units)
	As-Received
Slope:	0.0481
Intercept:	138.9965
Regression Coefficient (squared):	0.9996
Intercept Variation, psia*ton/scf:	2.7332
Slope Variation, ton/scf:	0.0017
G _{sL} Variation, scf/ton:	0.0008
P _L Variation, psia:	35.2493
Langmuir Volume, scf/ton:	20.80
Langmuir Pressure, psia:	2,891.29
Langmuir Equation:	$G_s = (G_{sL} * p) / (P_L + p)$
Pressure (Midpoint), psia:	2,889.36
Storage Capacity, scf/ton:	10.40

G_s Gas Storage Capacity

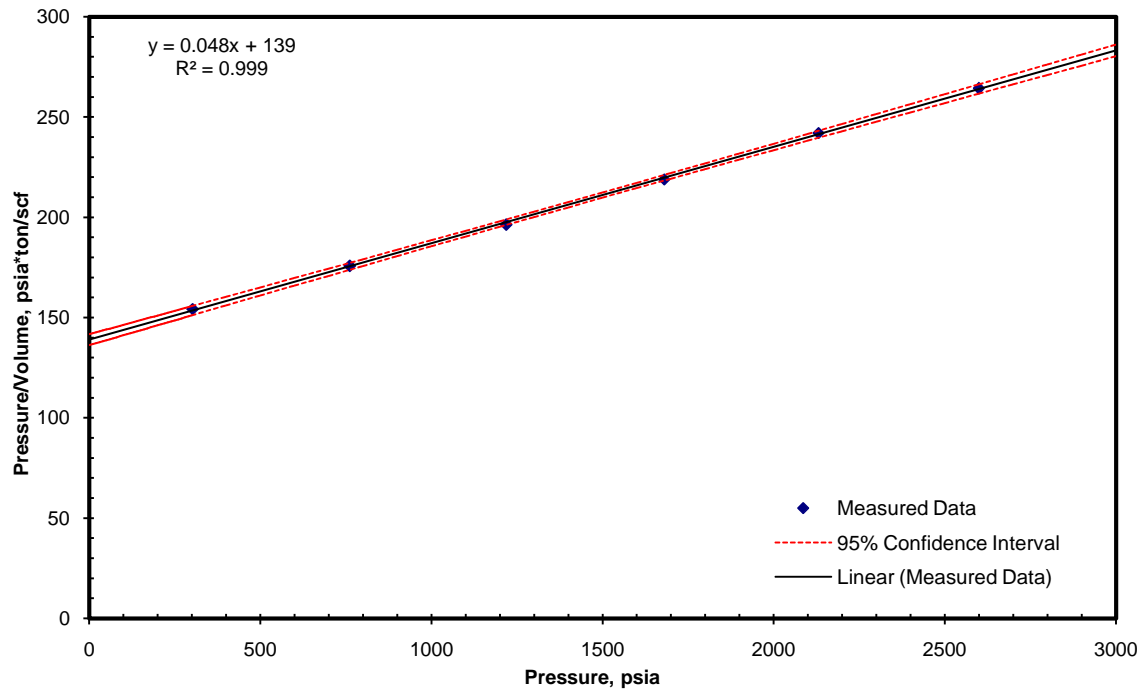
G_{sL} Langmuir Gas Storage Capacity

P_L Langmuir Pressure

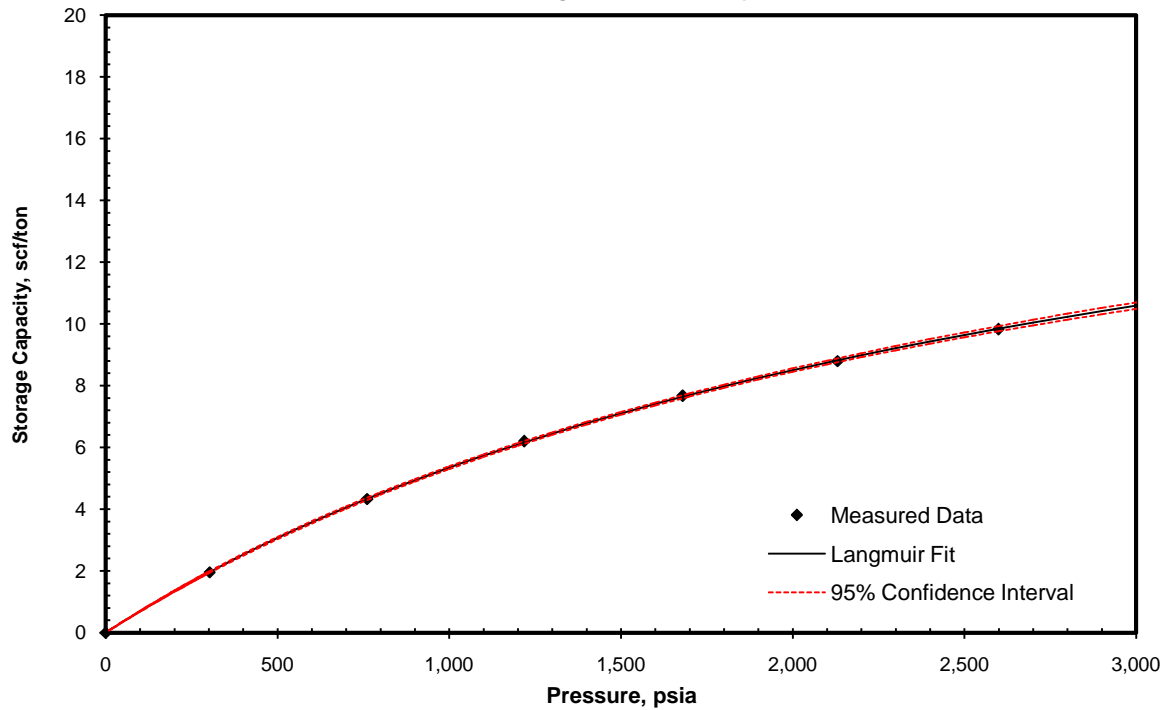
p Relevant Pressure (Reservoir Pressure)

Methane Adsorption Isotherm Summary Graphs

As-Received Langmuir Interpretation Graph



As-Received Langmuir Isotherm Graph



Methane Adsorption Isotherm Summary

Well: Shenandoah No. 1 Australia
Reservoir: Lower Kyalla Shale
 Sample Number: 44569-3M
 Sample Type: shale
 Drill Depth, meters: 1593.08-1593.10
 Temperature, °C: 82.22

Pressure	Methane Storage Capacity, scc/gram	
MPa	As-Received	
	Measured	Calculated
0.00	0.00	0.00
2.08	0.06	0.06
5.25	0.14	0.14
8.40	0.19	0.19
11.58	0.24	0.24
14.69	0.27	0.28
17.92	0.31	0.31

Parameters	Methane Langmuir Parameters (S.I. Units)
	As-Received
Slope:	1.5402
Intercept:	30.7024
Regression Coefficient (squared):	0.9996
Intercept Variation, Mpa*gram/scc:	0.6037
Slope Variation, gram/scc:	0.0532
G _{sL} Variation, scc/gram:	0.0000
P _L Variation, MPa:	0.2430
Langmuir Volume, scc/gram:	0.65
Langmuir Pressure, MPa:	19.93
Langmuir Equation:	$V=0.6*P/(P+19.9)$
Pressure (Midpoint), MPa:	19.92
Storage Capacity, scc/gram:	0.32

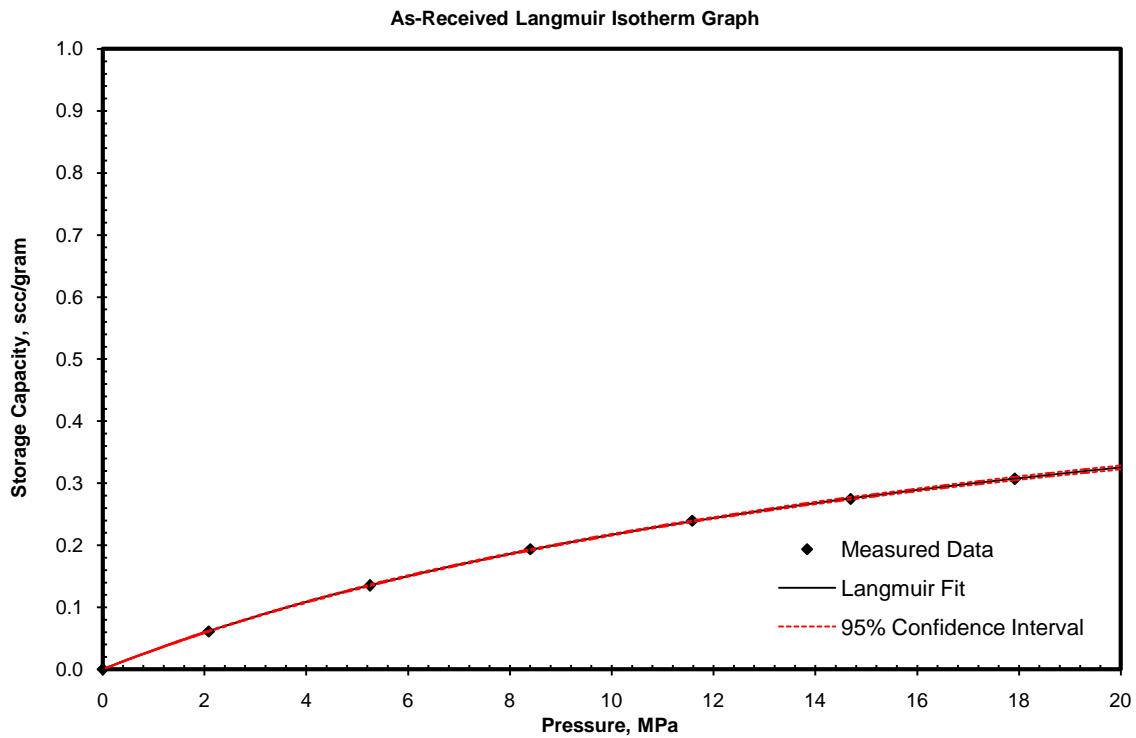
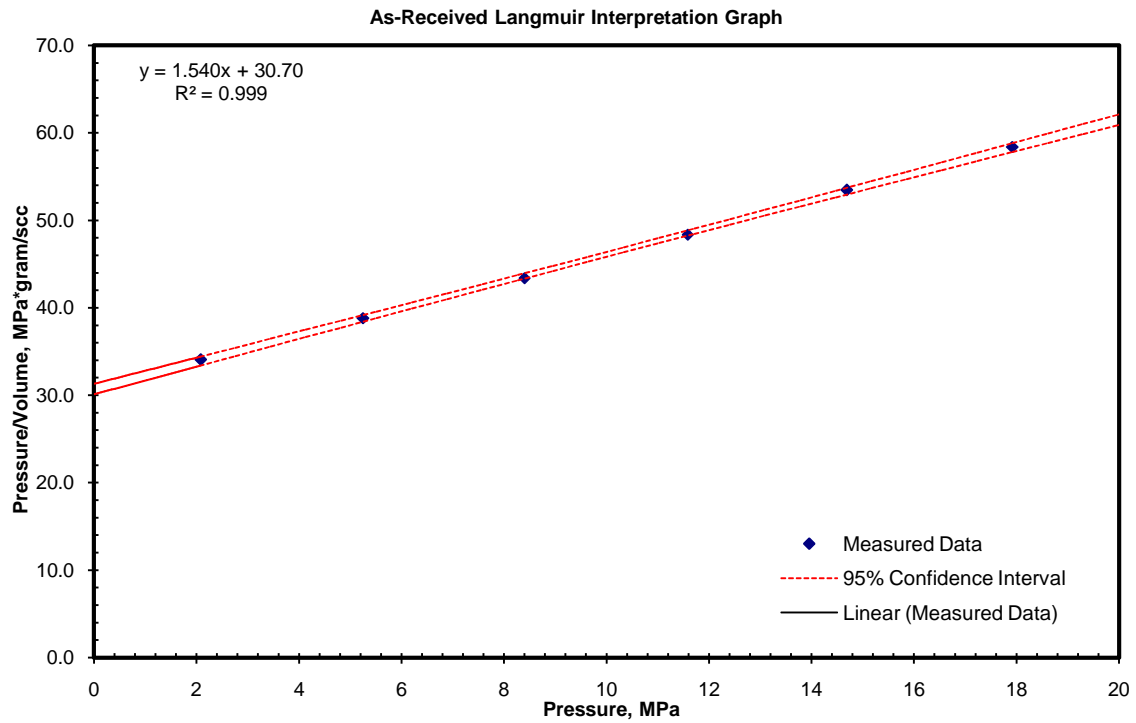
G_s Gas Storage Capacity

G_{sL} Langmuir Gas Storage Capacity

P_L Langmuir Pressure

p Relevant Pressure (Reservoir Pressure)

Methane Adsorption Isotherm Summary Graphs



Methane Adsorption Isotherm Summary

Well: Shenandoah No. 1 Australia

Reservoir: Velkerri B Shale

Sample Number: 44569-4M

Sample Type: shale

Drill Depth, feet: 8,240.90-8,241.00

Temperature, °F: 220.00

Pressure	Methane Storage Capacity, scf/ton	
psia	As-Received	
	Measured	Calculated
0.00	0.00	0.00
488.18	15.77	15.36
924.61	24.13	24.22
1352.38	29.97	30.43
1791.23	34.28	35.21
2221.26	38.89	38.85
2659.52	42.40	41.82
3087.73	44.94	44.19
3527.31	46.44	46.22
3961.15	47.33	47.92

Parameters	Methane Langmuir Parameters (U.S. Units)
	As-Received
Slope:	0.0147
Intercept:	24.6264
Regression Coefficient (squared):	0.9974
Intercept Variation, psia*ton/scf:	2.0037
Slope Variation, ton/scf:	0.0008
G_{sL} Variation, scf/ton:	0.0569
P_L Variation, psia:	78.9325
Langmuir Volume, scf/ton:	68.25
Langmuir Pressure, psia:	1,680.78
Langmuir Equation:	$V=68.3*P/(P+1,680.8)$
Pressure (Midpoint), psia:	4,547.22
Storage Capacity, scf/ton:	49.83

G_s Gas Storage Capacity

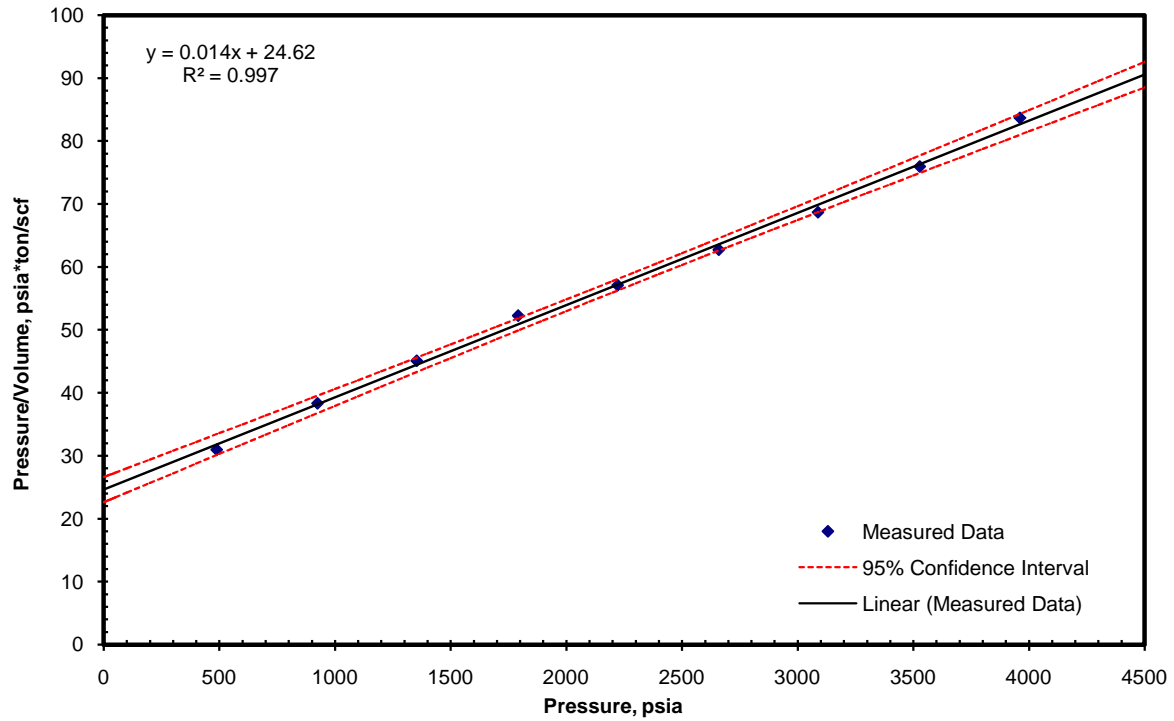
G_{sL} Langmuir Gas Storage Capacity

P_L Langmuir Pressure

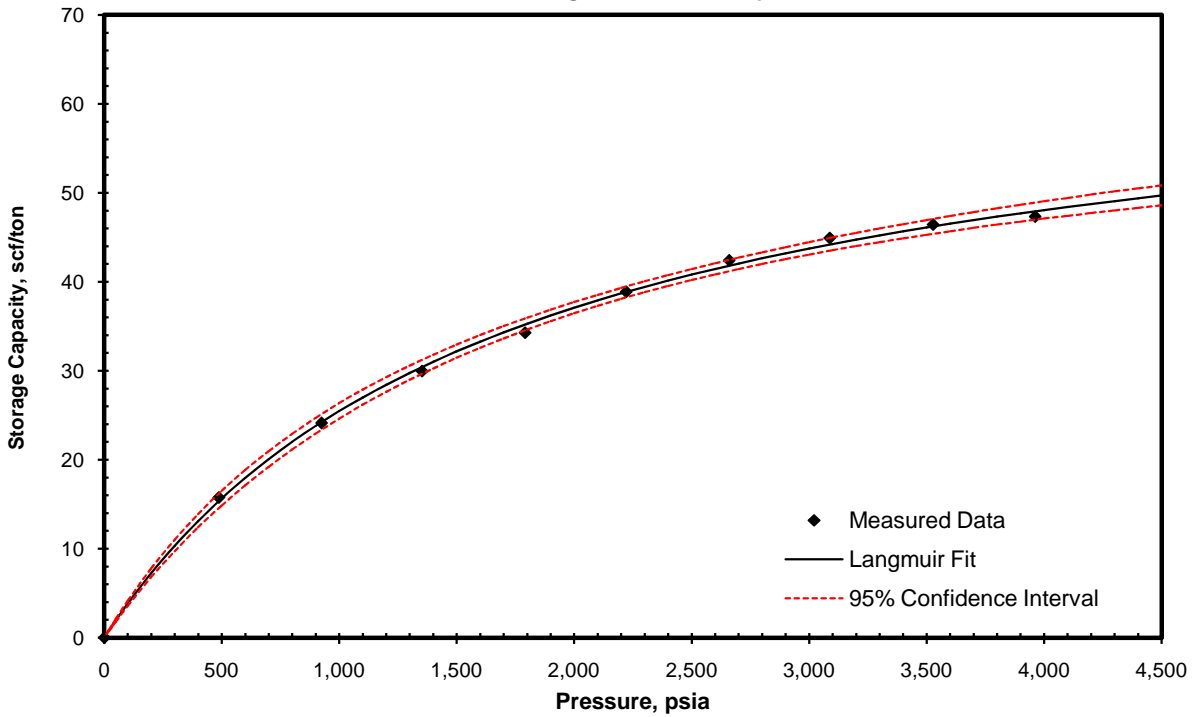
p Relevant Pressure (Reservoir Pressure)

Methane Adsorption Isotherm Summary Graphs

As-Received Langmuir Interpretation Graph



As-Received Langmuir Isotherm Graph



Methane Adsorption Isotherm Summary

Well: Shenandoah No. 1 Australia
Reservoir: Velkerri B Shale
 Sample Number: 44569-4M
 Sample Type: shale
 Drill Depth, meters: 2511.83-2511.86
 Temperature, °C: 104.44

Pressure	Methane Storage Capacity, scc/gram	
MPa	As-Received	
	Measured	Calculated
0.00	0.00	0.00
3.37	0.49	0.48
6.37	0.75	0.76
9.32	0.94	0.95
12.35	1.07	1.10
15.32	1.21	1.21
18.34	1.32	1.31
21.29	1.40	1.38
24.32	1.45	1.44
27.31	1.48	1.50

Parameters	Methane Langmuir Parameters (S.I. Units)
	As-Received
Slope:	0.4694
Intercept:	5.4396
Regression Coefficient (squared):	0.9974
Intercept Variation, Mpa*gram/scc:	0.4426
Slope Variation, gram/scc:	0.0258
G_{sL} Variation, scc/gram:	0.0018
P_L Variation, MPa:	0.5442
Langmuir Volume, scc/gram:	2.13
Langmuir Pressure, MPa:	11.59
Langmuir Equation:	$V=2.1*P/(P+11.6)$
Pressure (Midpoint), MPa:	31.35
Storage Capacity, scc/gram:	1.56

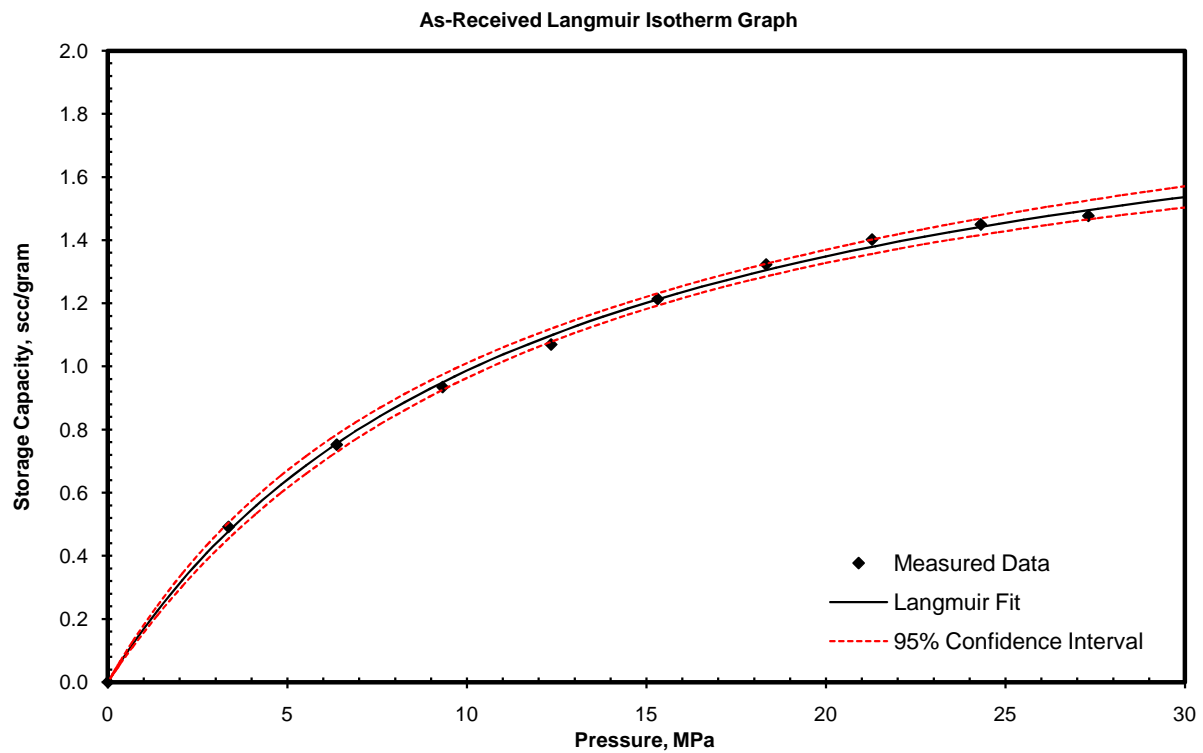
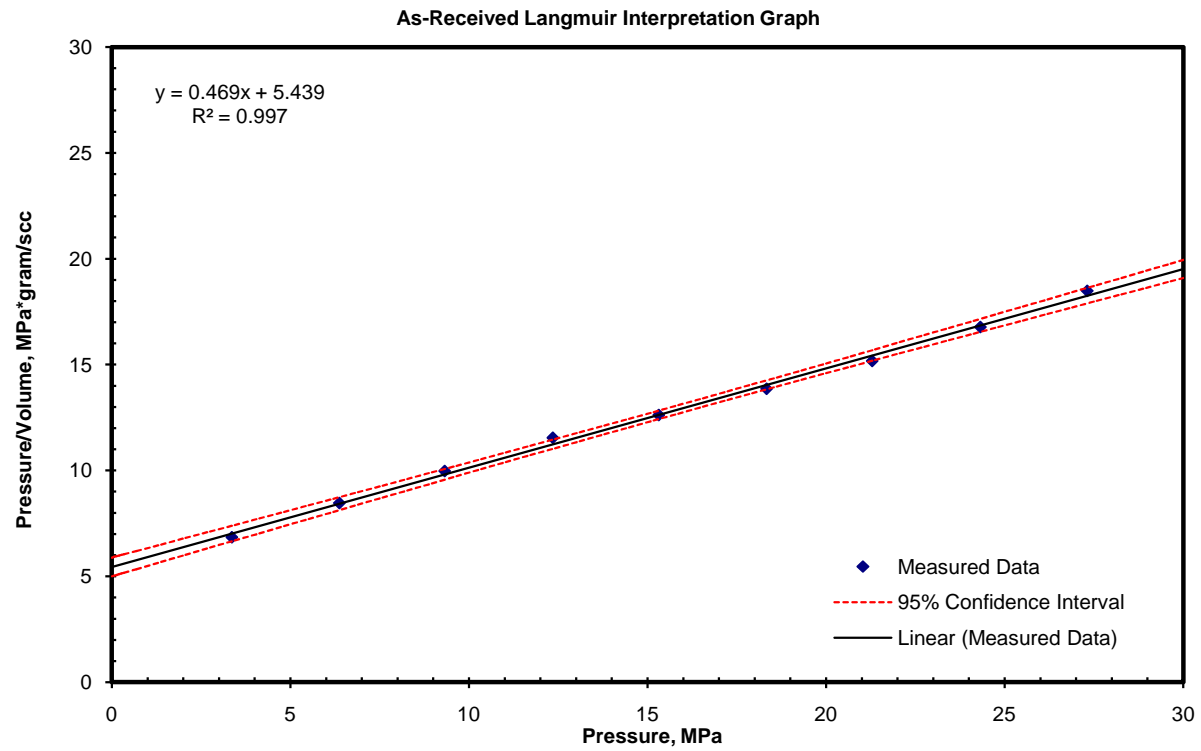
G_s Gas Storage Capacity

G_{sL} Langmuir Gas Storage Capacity

P_L Langmuir Pressure

p Relevant Pressure (Reservoir Pressure)

Methane Adsorption Isotherm Summary Graphs



Methane Adsorption Isotherm Summary

Well: Shenandoah No. 1 Australia
Reservoir: Velkerri B Shale
 Sample Number: 44569-5M
 Sample Type: shale
 Drill Depth, feet: 8,247.45-8,247.50
 Temperature, °F: 220.00

Pressure	Methane Storage Capacity, scf/ton	
psia	As-Received	
	Measured	Calculated
0.00	0.00	0.00
487.50	23.36	22.75
924.65	35.91	36.43
1,359.57	45.86	46.38
1,800.77	54.04	54.07
2,240.52	59.60	60.10
2,680.02	65.72	64.97

Parameters	Methane Langmuir Parameters (U.S. Units)
	As-Received
Slope:	0.0090
Intercept:	17.0237
Regression Coefficient (squared):	0.9968
Intercept Variation, psia*ton/scf:	1.5693
Slope Variation, ton/scf:	0.0009
G _{sL} Variation, scf/ton:	0.1732
P _L Variation, psia:	91.9552
Langmuir Volume, scf/ton:	110.62
Langmuir Pressure, psia:	1,883.22
Langmuir Equation:	$G_s = (G_{sL} * p) / (P_L + p)$
Pressure (Midpoint), psia:	4,536.11
Storage Capacity, scf/ton:	78.17

G_s Gas Storage Capacity

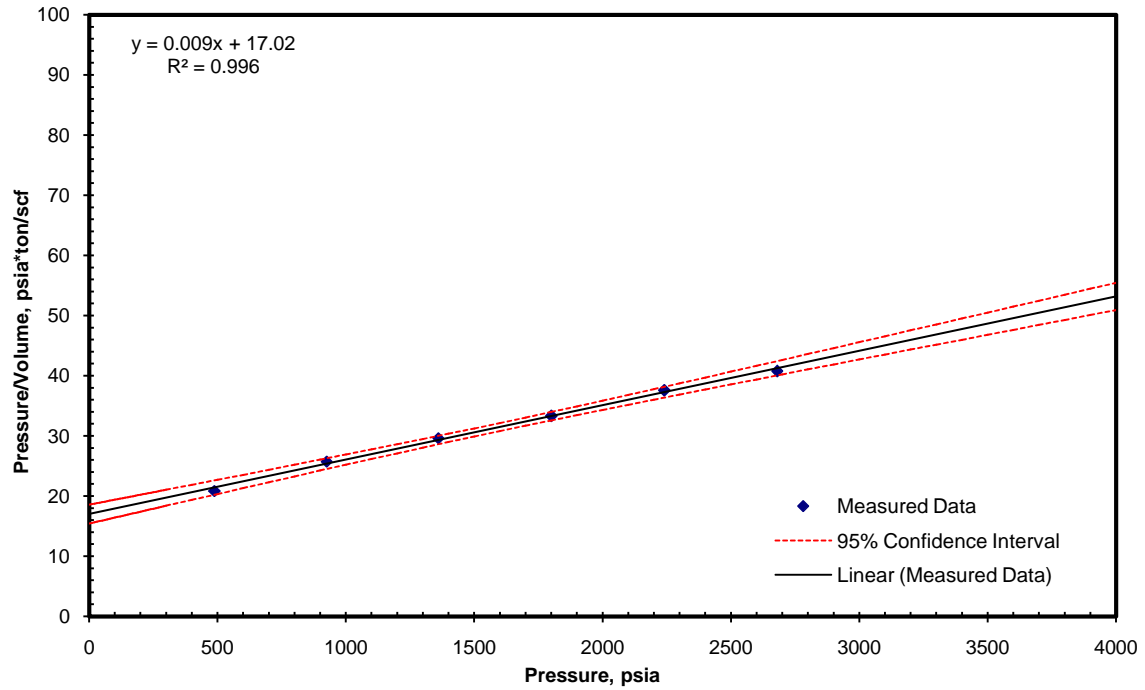
G_{sL} Langmuir Gas Storage Capacity

P_L Langmuir Pressure

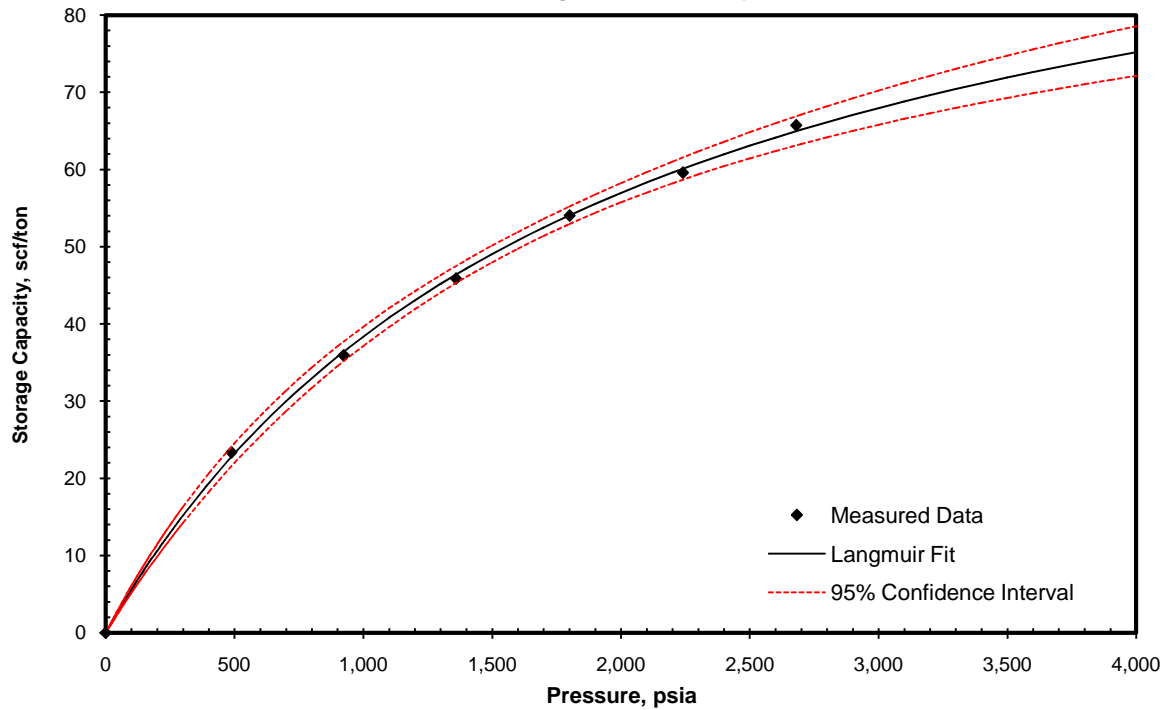
p Relevant Pressure (Reservoir Pressure)

Methane Adsorption Isotherm Summary Graphs

As-Received Langmuir Interpretation Graph



As-Received Langmuir Isotherm Graph



Methane Adsorption Isotherm Summary

Well: Shenandoah No. 1 Australia
Reservoir: Velkerri B Shale
 Sample Number: 44569-5M
 Sample Type: shale
 Drill Depth, meters: 2513.82-2513.84
 Temperature, °C: 104.44

Pressure	Methane Storage Capacity, scc/gram	
MPa	As-Received	
	Measured	Calculated
0.00	0.00	0.00
3.36	0.73	0.71
6.38	1.12	1.14
9.37	1.43	1.45
12.42	1.69	1.69
15.45	1.86	1.88
18.48	2.05	2.03

Parameters	Methane Langmuir Parameters (S.I. Units)
	As-Received
Slope:	0.2896
Intercept:	3.7603
Regression Coefficient (squared):	0.9968
Intercept Variation, Mpa*gram/scc:	0.3466
Slope Variation, gram/scc:	0.0287
G _{sL} Variation, scc/gram:	0.0054
P _L Variation, MPa:	0.6340
Langmuir Volume, scc/gram:	3.45
Langmuir Pressure, MPa:	12.98
Langmuir Equation:	$V=3.5*P/(P+13.0)$
Pressure (Midpoint), MPa:	31.28
Storage Capacity, scc/gram:	2.44

G_s Gas Storage Capacity

G_{sL} Langmuir Gas Storage Capacity

P_L Langmuir Pressure

p Relevant Pressure (Reservoir Pressure)

Methane Adsorption Isotherm Summary Graphs

