Reese Mesa Isotherm Input Data and Calculations Spreadsheet

Average Properties for Reese Mesa 101

Initial Pressure =	1723 psia
$V_{L,DAF}$ =	676 scf/ton
P_L =	203 psia
b =	0.00493 psia-1
Bulk Density =	1.50 grams/cc
Cleat Porosity =	0.005 fraction

Ash =	0.293 fraction
Moisture =	0.006 fraction
Gc =	474 scf/ton
Pure Coal Density =	1.21 g/cc
Pure Ash Density =	2.2 g/cc

	Pure Coal	Reservoir	Recovery
Pressure	$G_{s,\ DAF}$	$G_{s,\ in\text{-}situ}$	Factor
(psia)	(scf/ton)	(scf/ton)	(%)
10	32	22	95
100	223	156	63
200	335	235	44
300	403	283	33
400	448	314	26
500	481	337	20
600	505	354	16
700	524	367	13
800	539	378	11
900	552	387	9
1000	562	394	7
1100	571	400	5
1200	578	405	4
1300	585	410	3
1400	590	414	2
1500	595	417	1
1600	600	421	1
1700	604	423	0
1723	605	424	0

*Actual sorption data from Reese Mesa 101 core analysis

Definitions

$G_{s,\ in\text{-}situ}$ = In-situ (reservoir) gas storage capacity at pressure, scf/ton

$G_{s,\ DAF}$ = Pure coal gas storage capacity at pressure, scf/ton

$V_{L,DAF}$ = Dry, ash-free Langmuir storage capacity, scf/ton

a = Ash content, weight fraction

w_c = Moisture content, weight fraction

$b = 1/P_L$ = Lanmuir constant, psi^{-1}

p = pressure, psia

Example Calculations at Initial Pressure

$b = 1/P_L = 1/203 = .00493\ psi^{-1}$

a = (Density(log) - Density (pure coal))/(Density (pure ash) - Density (pure coal))

a = (1.60-1.21)/(2.2-1.21) = 0.394

$Gs_{,\ in\text{-}situ} = V_{L,DAF}*(b*P/(1+b*P))*(1-(a+wc))$

$G_{s,\ in\text{-}situ}$ = 676*((0.00493*1723)/(1+0.00493*1723))*(1-0.394-0.006) = 363 scf/ton

$G_{s,\ DAF} = V_{L,DAF}*(b*P/(1+b*P))$

$G_{s,\ DAF}$ = 676*(0.00493*1723)/(1+0.00493*1723) = 605 scf/ton

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Reese Mesa 100 & 101
320-Acre Volumetric Gas In Place Calculation
ConocoPhillips

Definitions

Gi = Gas in Place at initial reservoir conditions (Bcf)
A = Drainage area, acres
h = Net Coal Thickness (ft)
Cgi = Initial sorbed gas concentration, dry ash-free coal, (scf/ton)
RHOC = Density of Pure Coal (grams/cc)
$V_{L,DAF}$ = Dry, ash-free Langmuir storage capacity, scf/ton
a = Ash content, weight fraction
w_c = Moisture content, weight fraction
$b = 1/P_L$ = Lanmuir constant, psi^{-1}
Pi = Initial Pressure (psia)

Equations

$Cgi = V_{L,DAF\ @\ Pi} * (b*Pi/(1+b*Pi))$
$**Gi = 1.359*Cgi*RHOC*h*A*(1-a-wc)/1000000$

**Assumes free gas in fractures and dissolved gas in water are negligible at initial conditions

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Initial Gas in Place: NM32NR8W East $^1/_2$ of Section 13

P_L = 203 psia
b = 0.00493 psia-1
$V_{L,\ DAF\ @\ Pi}$ = 676 scf/ton

Area	A	Pi	h	RHOC	a	Wc	Cgi	Gi (BCF)
CO Average	320	1723	36	1.21	0.293	0.006	605	8.036

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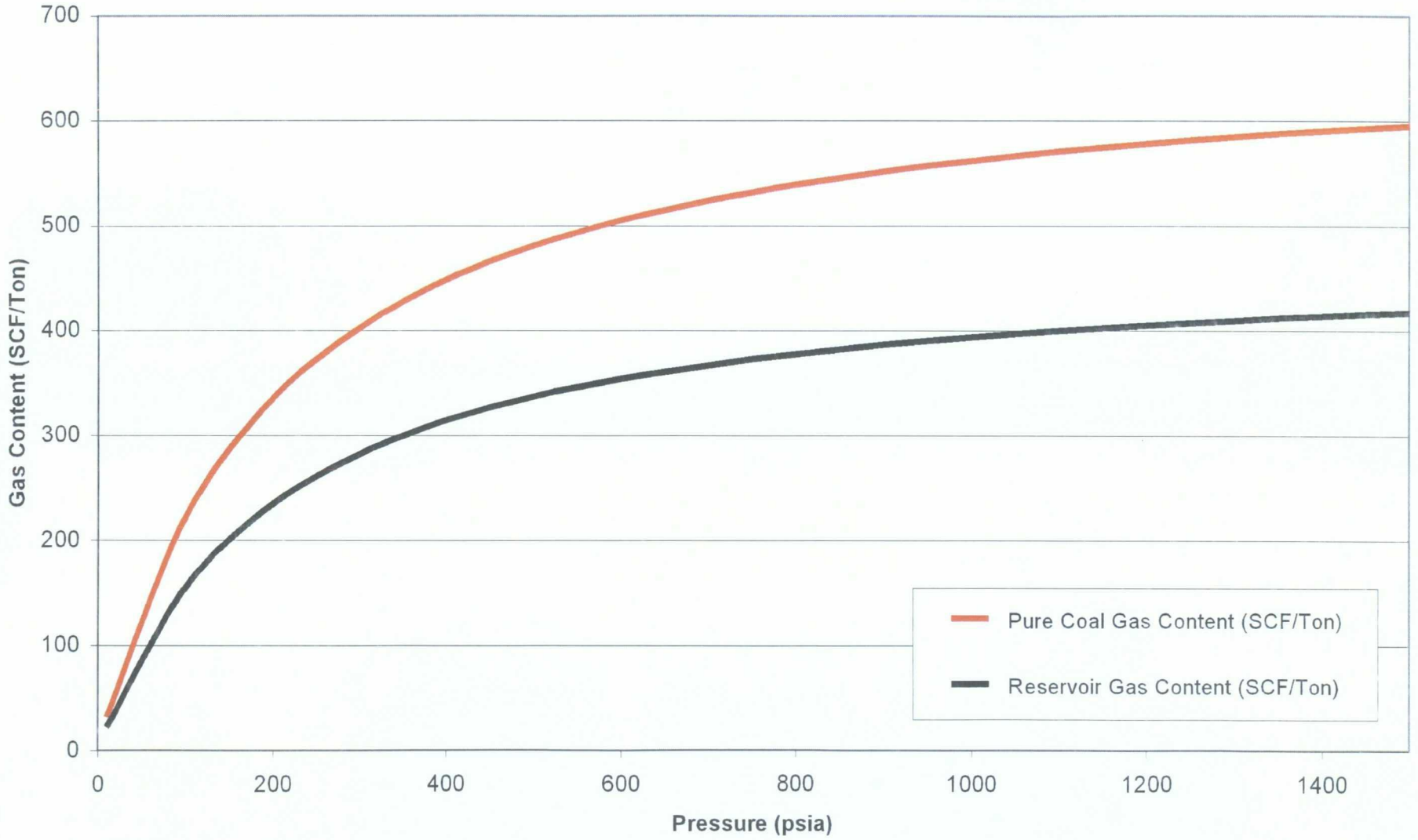
Reese Mesa 101 Methane Langmuir Isotherms



Reese Mesa Recovery Factor Versus Reservoir Pressure