Correlation of Field Barometer to KGS Petrophysics Lab Barometer

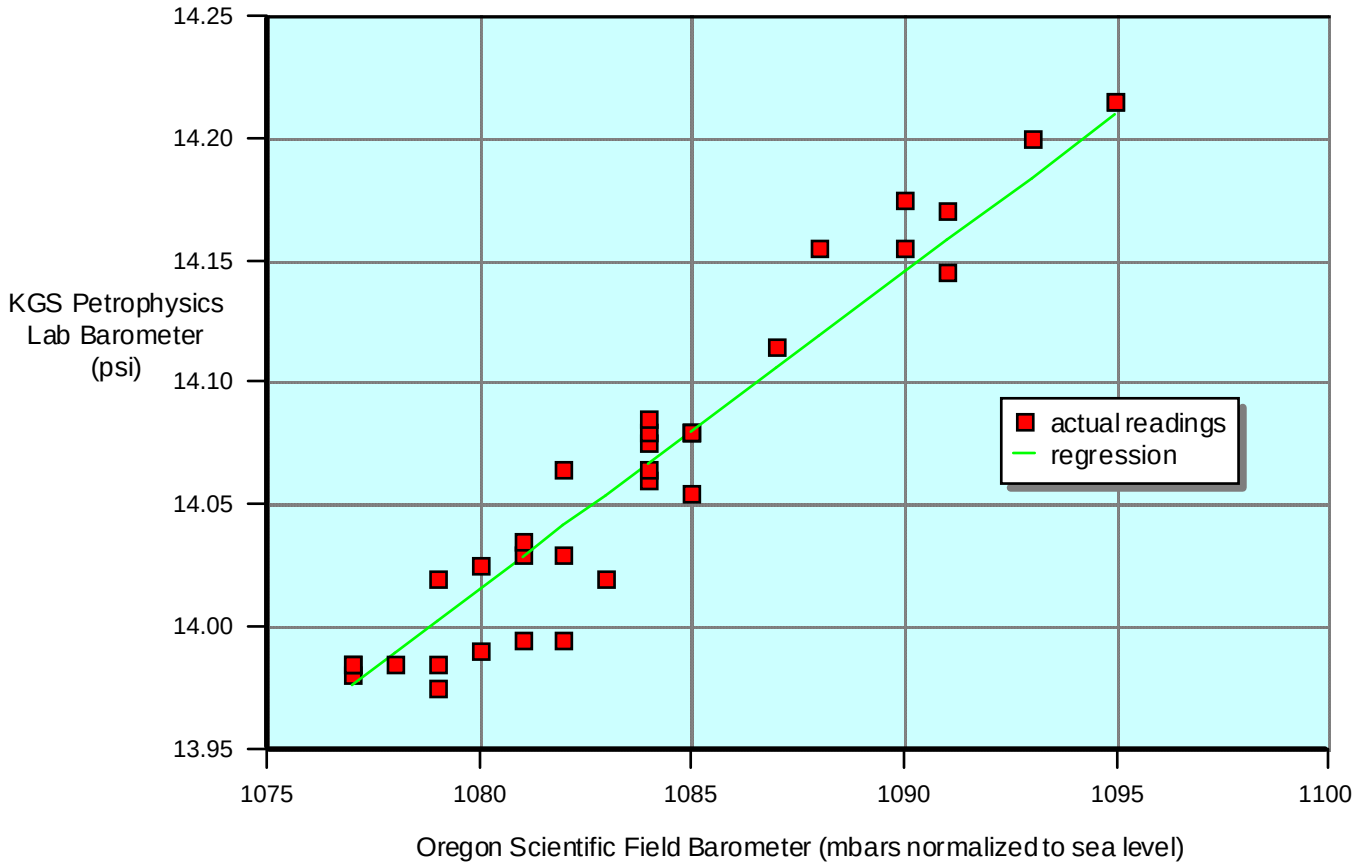


FIGURE 1.

Dart Cherokee Basin #A3-36 Fields, NW NE 36-T.34S.-R.14E., Montgomery County, KS

(based on lag times from Dart Cherokee Basin #CH-1 Holder; sec. 1-T.30S.-R.14E., Wilson County, KS

lag-time to surface for well cuttings

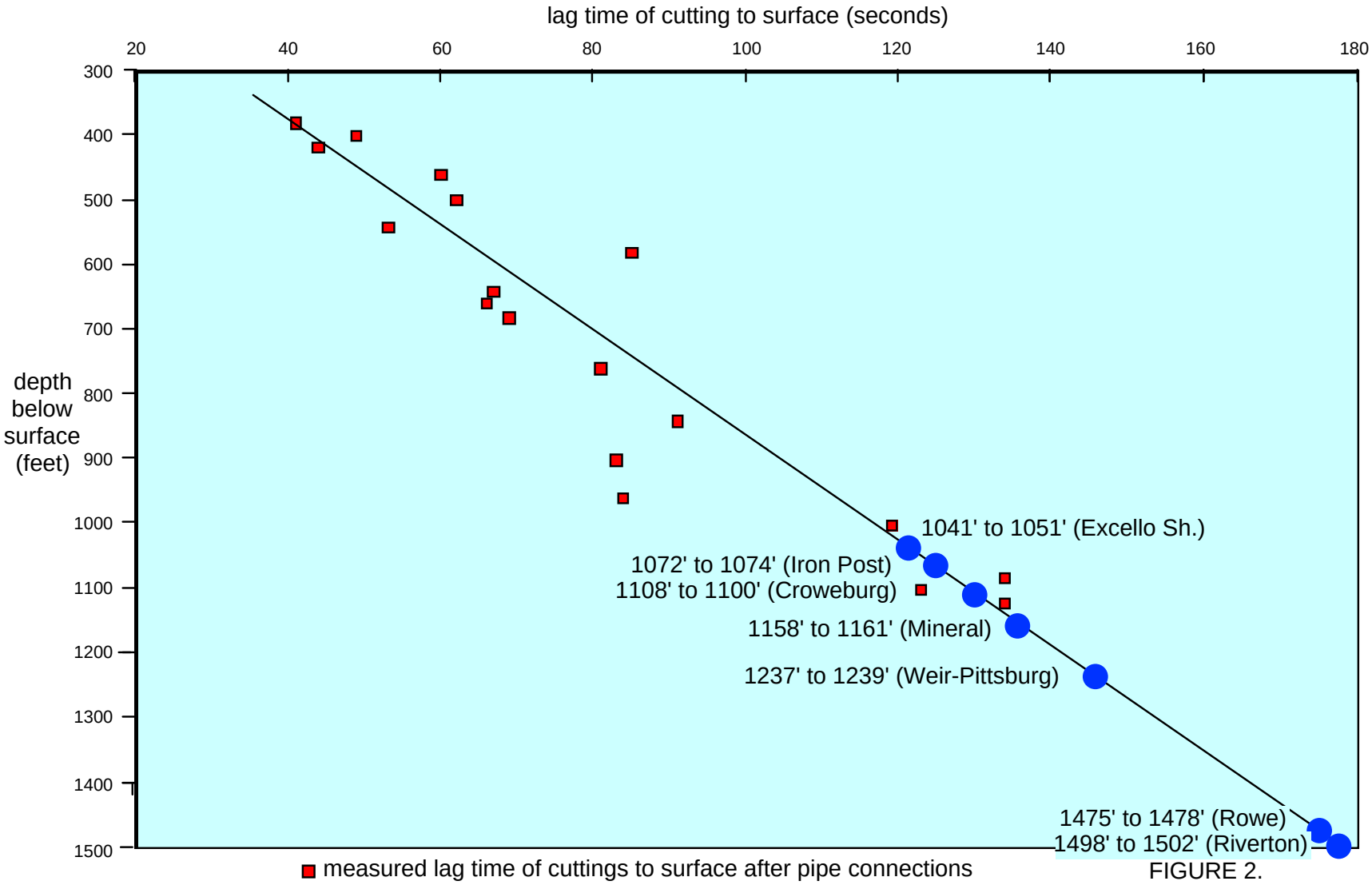
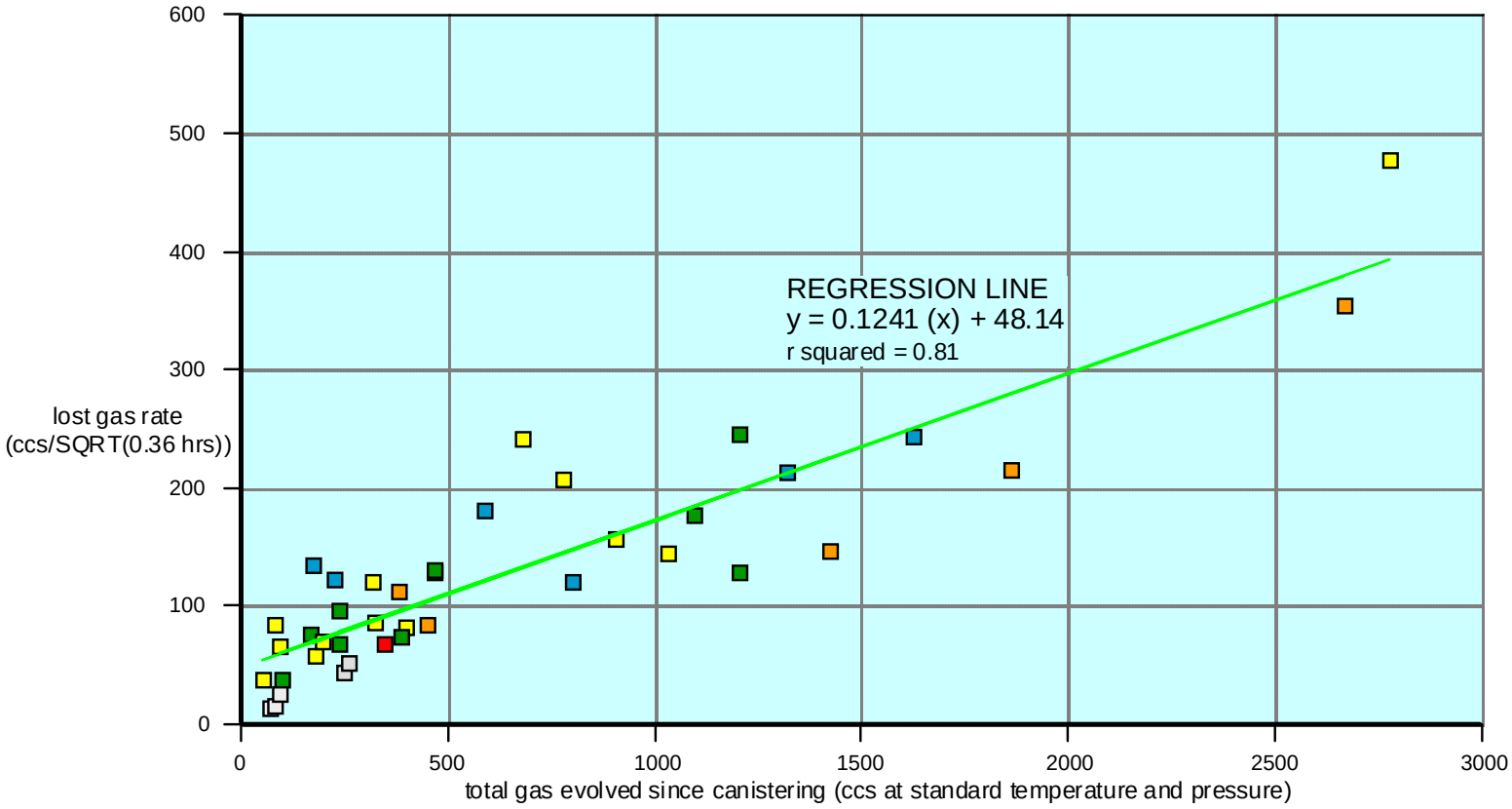
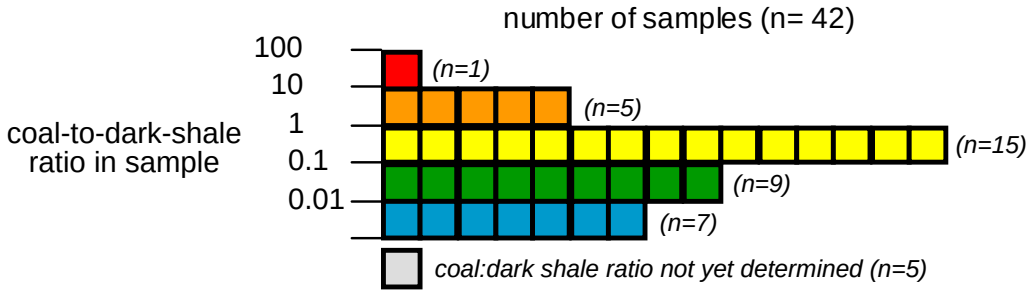


FIGURE 2.

RELATIONSHIP of TOTAL GAS EVOLVED FROM a CUTTINGS SAMPLE to RATE of LOST-GAS
(from 42 cuttings samples from air-drilled wells, Cherokee basin, southeastern Kansas)





LOST-GAS ALGORITHM

ccs lost gas = $\sqrt{X}$ (Y)

where X = bottom-hole to canister time (in hours)
where Y = ccs lost gas at 0.36 hours
(i.e., value Y from regression equation)

FIGURE 3.

Desorption Characteristics of Cuttings Samples

Dart Cherokee Basin #A3-36 Fields, 36-T.34S.-R.14E., Montgomery County, KS

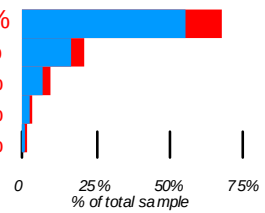
LITHOLOGIC COMPONENT SENSITIVITY ANALYSIS for calculation of Excello Shale from 1041' to 1051'

$$\text{GAS CONTENT}_{coal} = \frac{\text{total gas desorbed} - ((\text{gas content}_{dark\ shale}) * (\text{weight}_{dark\ shale}))}{\text{weight}_{coal}}$$

total gas desorbed
(including estimated lost gas) = 468.9 ccs

TOTAL DRY WEIGHT OF SAMPLE = 1684.41 grams
$\text{weight}_{light\text{-}colored\ lithologies}$ = 332.59 grams (19.7%)
$\text{weight}_{dark\ shale}$ = 1351.82 grams (80.3%)
weight_{coal} = 0.00 grams (0.0%)

sieve size	*grams*	*% coal / % dark shale / % light-colored liths*
>0.0930"	1120.19	0.00% / 82.20% / 17.71%
>0.0661"	341.24	0.00% / 79.01% / 9.30%
>0.0460"	159.73	0.00% / 73.33% / 7.72%
>0.0331"	46.48	0.00% / 69.64% / 30.46%
<0.0331"	16.77	0.00% / 65.00% / 35.00%
	1684.41 TOTAL	



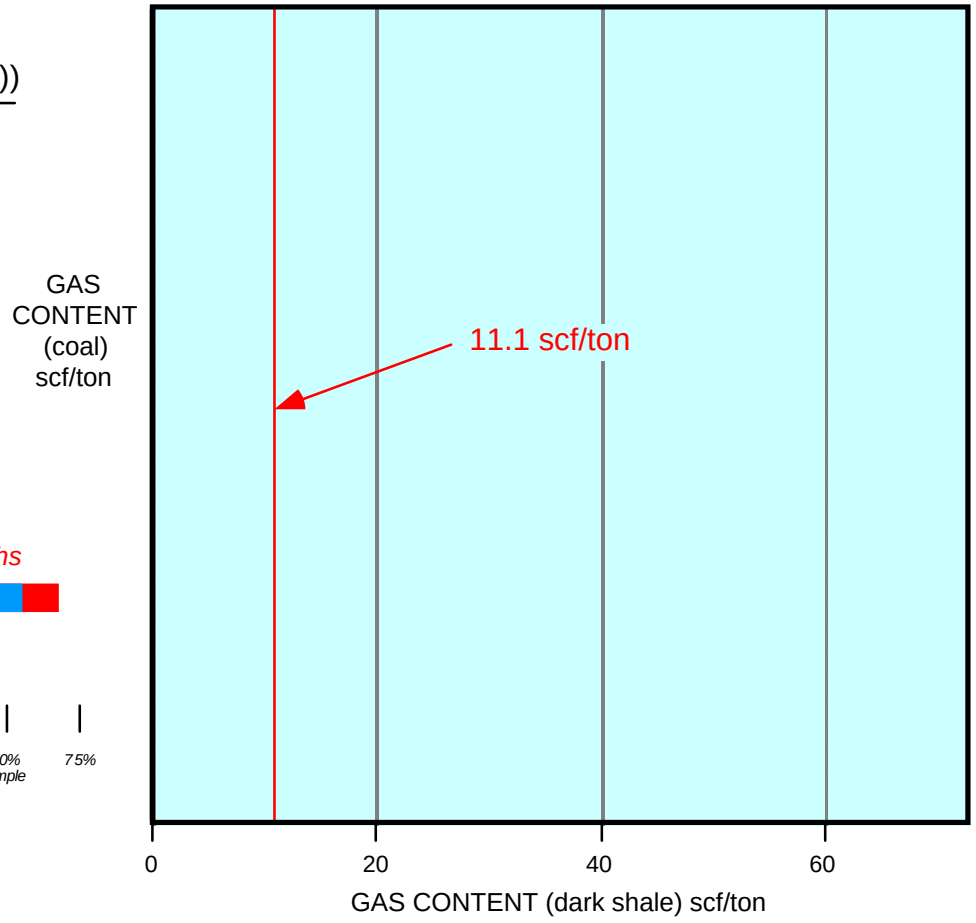


FIGURE 4.

Desorption Characteristics of Cuttings Samples

Dart Cherokee Basin #A3-36 Fields, 36-T.34S.-R.14E., Montgomery County, KS

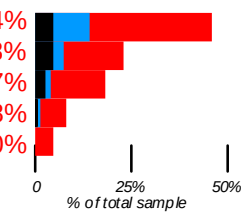
LITHOLOGIC COMPONENT SENSITIVITY ANALYSIS for calculation of gas content of Iron Post coal from 1072' to 1074'

$$\text{GAS CONTENT}_{coal} = \frac{\text{total gas desorbed} - ((\text{gas content}_{dark\ shale}) * (\text{weight}_{dark\ shale}))}{\text{weight}_{coal}}$$

total gas desorbed
(including estimated lost gas) = 126.9 ccs

TOTAL DRY WEIGHT OF SAMPLE = 390.71 grams
$\text{weight}_{light\text{-}colored\ lithologies}$ = 280.33 grams (71.8%)
$\text{weight}_{dark\ shale}$ = 57.89 grams (14.8%)
weight_{coal} = 52.49 grams (13.4%)

sieve size	*grams*	*% coal / % dark shale / % light-colored liths*
>0.0930"	178.78	10.57% / 20.98% / 68.44%
>0.0661"	89.28	22.11% / 11.30% / 66.58%
>0.0460"	71.72	15.19% / 8.83% / 75.97%
>0.0331"	32.18	7.41% / 11.11% / 81.48%
<0.0331"	18.76	3.00% / 2.00% / 95.00%
	390.71 TOTAL	



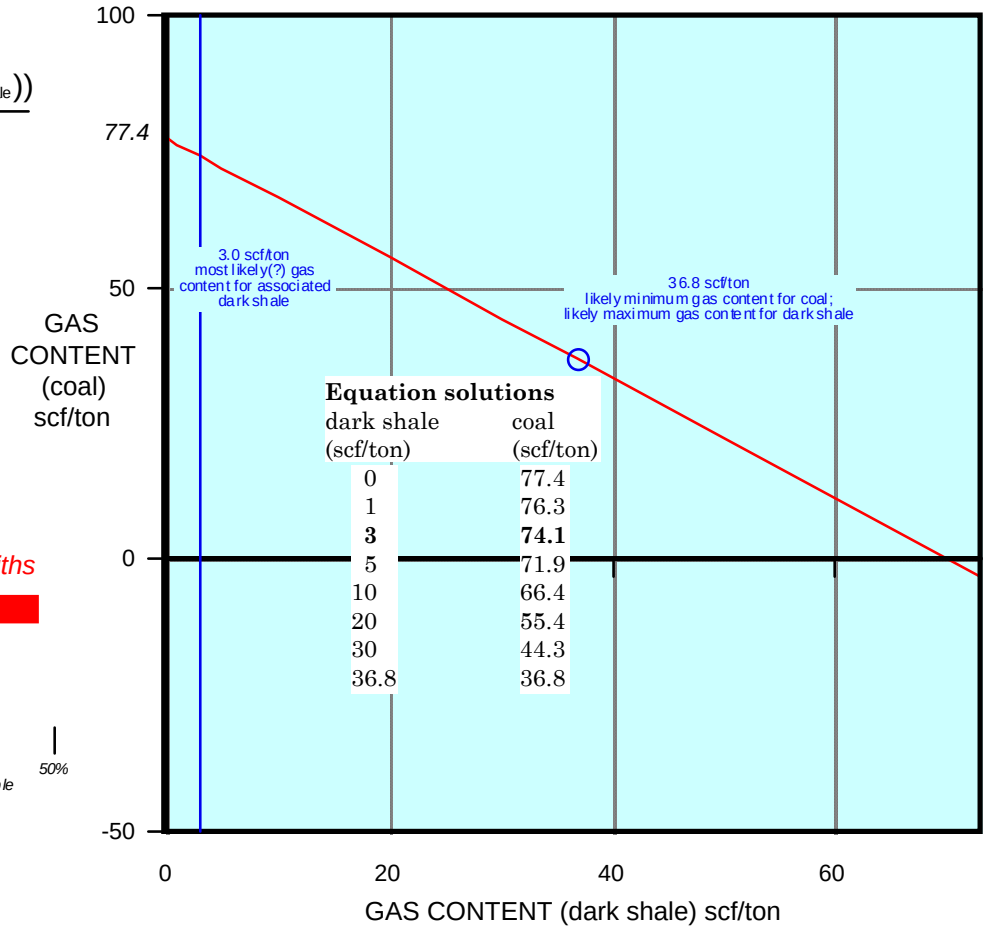


FIGURE 5.

Desorption Characteristics of Cuttings Samples

Dart Cherokee Basin #A3-36 Fields, 36-T.34S.-R.14E., Montgomery County, KS

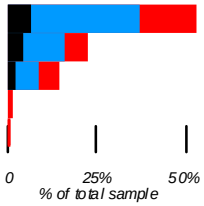
LITHOLOGIC COMPONENT SENSITIVITY ANALYSIS for calculation of gas content of Croweburg coal from 1108' to 1110'

$$\text{GAS CONTENT}_{coal} = \frac{\text{total gas desorbed} - ((\text{gas content}_{dark\ shale}) * (\text{weight}_{dark\ shale}))}{\text{weight}_{coal}}$$

total gas desorbed
(including estimated lost gas) = 204.4 ccs

TOTAL DRY WEIGHT OF SAMPLE = 322.04 grams
$\text{weight}_{light\text{-}colored\ lithologies}$ = 105.46 grams (32.8%)
$\text{weight}_{dark\ shale}$ = 169.18 grams (53.5%)
weight_{coal} = 47.40 grams (14.7%)

sieve size	*grams*	*% coal / % dark shale / % light-colored liths*
>0.0930"	192.65	12.61% / 56.67% / 30.73%
>0.0661"	72.77	20.89% / 49.53% / 29.58%
>0.0460"	47.34	15.30% / 47.01% / 37.69%
>0.0331"	6.28	8.24% / 17.65% / 74.12%
<0.0331"	3.00	5.00% / 20.00% / 75.00%
	322.04 TOTAL	



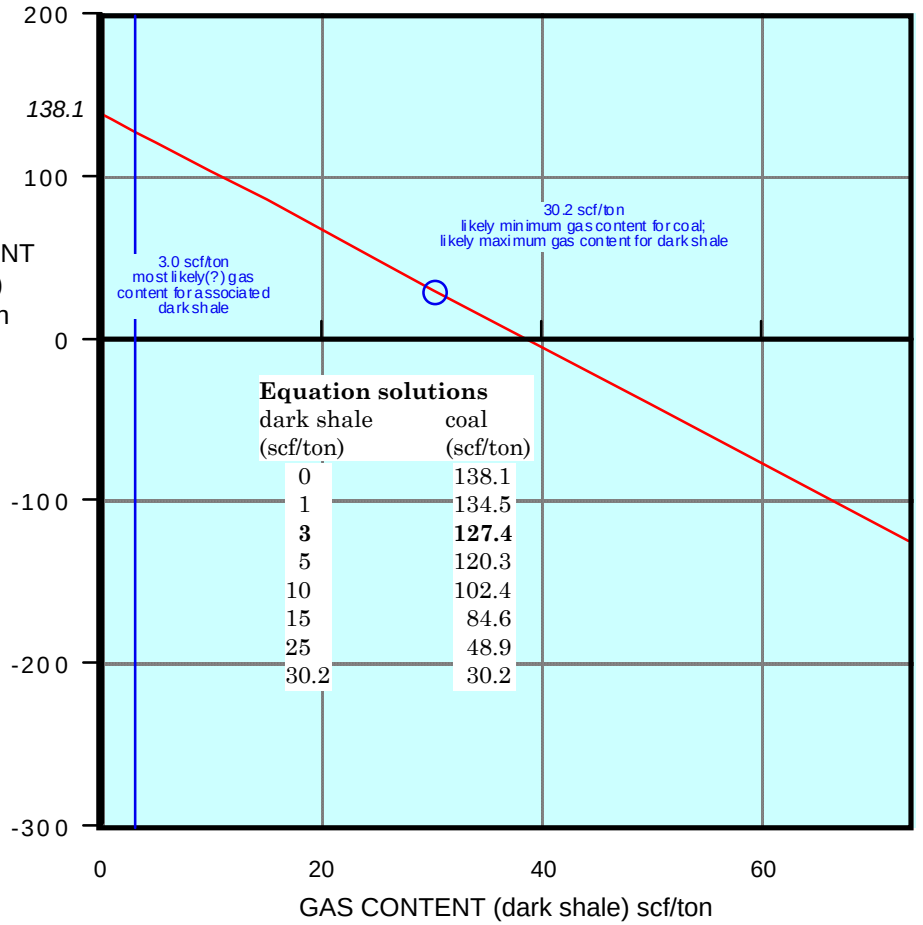


FIGURE 6.

Desorption Characteristics of Cuttings Samples

Dart Cherokee Basin #A3-36 Fields, 36-T.34S.-R.14E., Montgomery County, KS

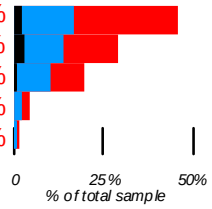
LITHOLOGIC COMPONENT SENSITIVITY ANALYSIS for calculation of gas content of Mineral coal from 1158' to 1161'

$$\text{GAS CONTENT}_{coal} = \frac{\text{total gas desorbed} - ((\text{gas content}_{\text{dark shale}}) * (\text{weight}_{\text{dark shale}}))}{\text{weight}_{coal}}$$

total gas desorbed
(including estimated lost gas) = 248.6 ccs

TOTAL DRY WEIGHT OF SAMPLE = 935.21 grams
$\text{weight}_{\text{light-colored lithologies}}$ = 520.74 grams (55.7%)
$\text{weight}_{\text{dark shale}}$ = 357.76 grams (38.3%)
weight_{coal} = 56.71 grams (6.1%)

sieve size	*grams*	*% coal / % dark shale / % light-colored liths*
>0.0930"	426.25	4.48% / 32.68% / 62.83%
>0.0661"	269.94	9.66% / 38.94% / 51.40%
>0.0460"	181.51	5.03% / 47.80% / 47.17%
>0.0331"	39.58	5.62% / 44.94% / 49.44%
<0.0331"	17.93	1.00% / 49.00% / 50.00%
	935.21 TOTAL	



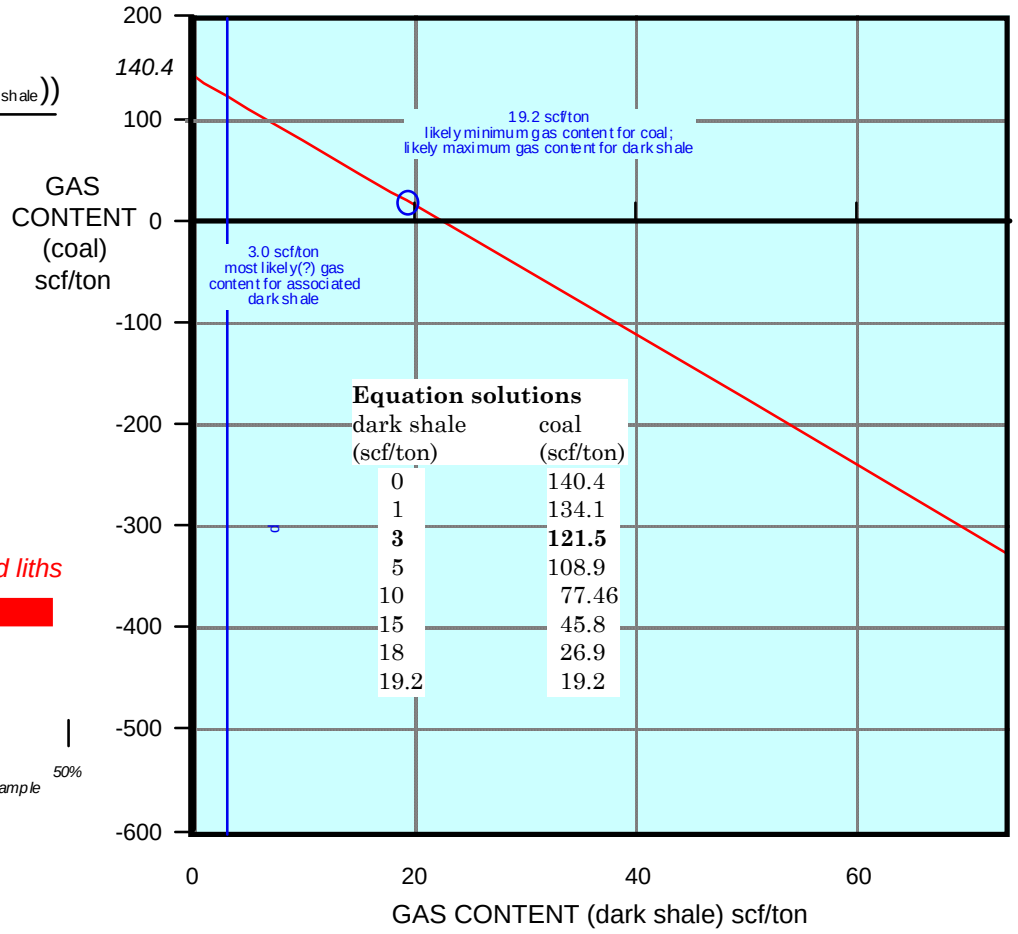


FIGURE 7.

Desorption Characteristics of Cuttings Samples

Dart Cherokee Basin #A3-36 Fields, 36-T.34S.-R.14E., Montgomery County, KS

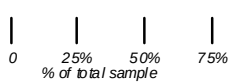
LITHOLOGIC COMPONENT SENSITIVITY ANALYSIS for calculation of gas content of Weir-Pittsburg coal from 1237' to 1239'

$$\text{GAS CONTENT}_{coal} = \frac{\text{total gas desorbed} - ((\text{gas content}_{dark\ shale}) * (\text{weight}_{dark\ shale}))}{\text{weight}_{coal}}$$

total gas desorbed
(including estimated lost gas) = 63.5 ccs

TOTAL DRY WEIGHT OF SAMPLE = 314.62 grams
$\text{weight}_{light\text{-}colored\ lithologies}$ = 284.51 grams (90.4%)
$\text{weight}_{dark\ shale}$ = 15.65 grams (5.0%)
weight_{coal} = 14.46 grams (4.6%)

sieve size	*grams*	*% coal / % dark shale / % light-colored liths*
>0.0930"	197.63	5.16% / 6.04% / 88.80%
>0.0661"	83.62	4.46% / 3.27% / 92.27%
>0.0460"	28.40	1.76% / 3.23% / 95.01%
>0.0331"	3.48	0.70% / 1.40% / 97.91%
<0.0331"	1.49	0.60% / 1.20% / 98.20%
	314.62 TOTAL	



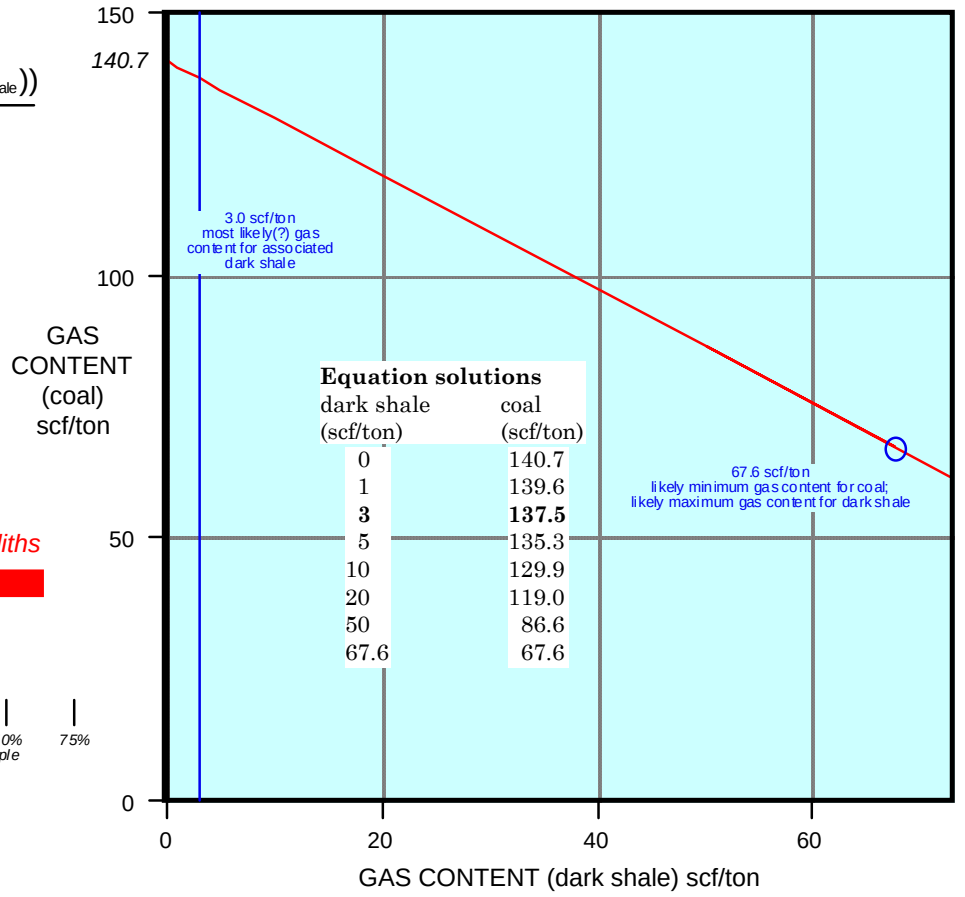


FIGURE 8.

Desorption Characteristics of Cuttings Samples

Dart Cherokee Basin #A3-36 Fields, NW NE 36-T.34S.-R.14E., Montgomery County, KS

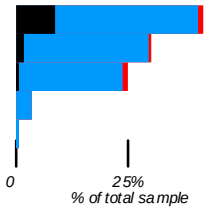
LITHOLOGIC COMPONENT SENSITIVITY ANALYSIS for calculation of gas content of Rowe coal from 1475' to 1478'

$$\text{GAS CONTENT}_{coal} = \frac{\text{total gas desorbed} - ((\text{gas content}_{dark\ shale}) * (\text{weight}_{dark\ shale}))}{\text{weight}_{coal}}$$

total gas desorbed
(including estimated lost gas) = 2056.5 ccs

TOTAL DRY WEIGHT OF SAMPLE = 2240.20 grams
$\text{weight}_{light\text{-}colored\ lithologies}$ = 64.54 grams (2.9%)
$\text{weight}_{dark\ shale}$ = 1930.28 grams (86.2%)
weight_{coal} = 245.38 grams (11.0%)

sieve size	*grams*	*% coal / % dark shale / % light-colored liths*
>0.0930"	927.26	20.99% / 76.31% / 2.70%
>0.0661"	666.71	5.23% / 93.11% / 1.66%
>0.0460"	552.77	2.68% / 93.39% / 3.93%
>0.0331"	81.30	1.19% / 91.70% / 7.11%
<0.0331"	12.16	1.00% / 91.00% / 8.00%
	2240.20 TOTAL	



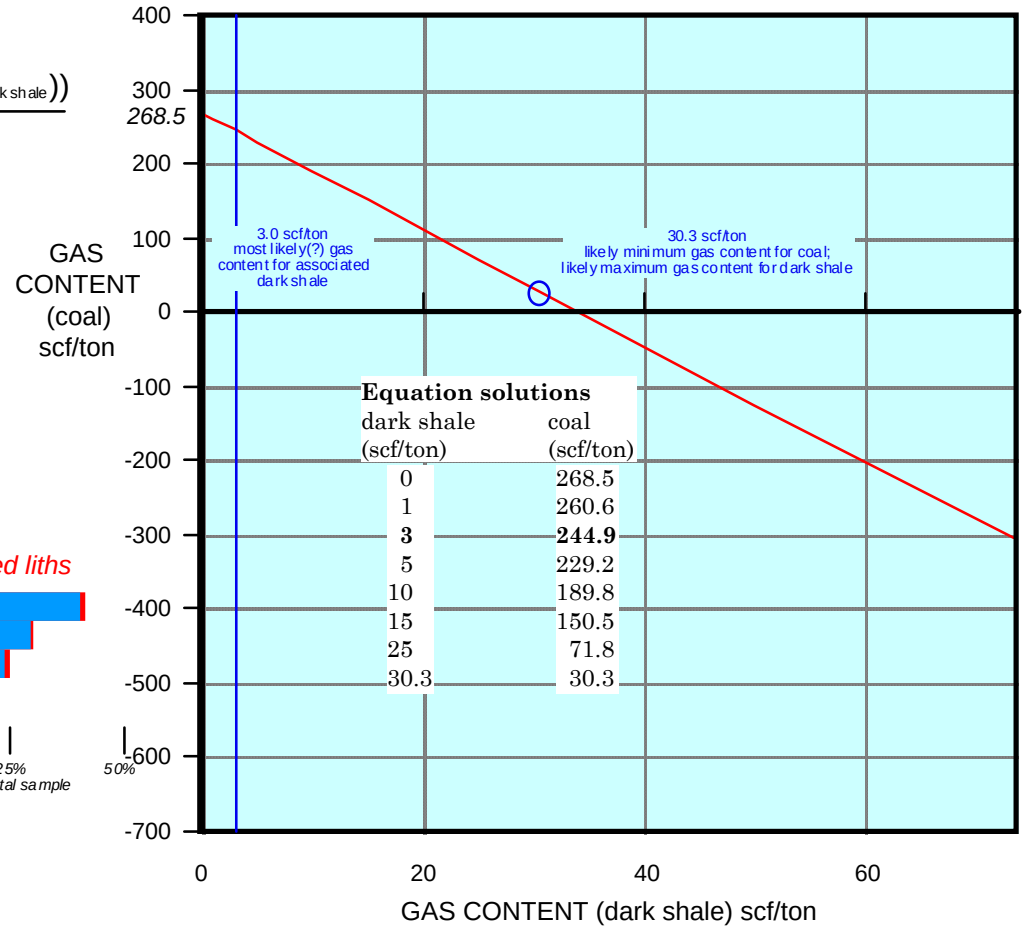


FIGURE 9.

Desorption Characteristics of Cuttings Samples

Dart Cherokee Basin #A3-36 Fields, 36-T.34S.-R.14E., Montgomery County, KS

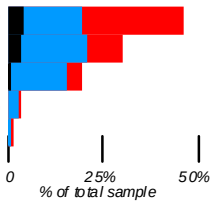
LITHOLOGIC COMPONENT SENSITIVITY ANALYSIS for calculation of gas content of Riverton coal from 1498' to 1502'

$$\text{GAS CONTENT}_{coal} = \frac{\text{total gas desorbed} - ((\text{gas content}_{dark\ shale}) * (\text{weight}_{dark\ shale}))}{\text{weight}_{coal}}$$

total gas desorbed
(including estimated lost gas) = 627.1 ccs

TOTAL DRY WEIGHT OF SAMPLE = 1190.47 grams
$\text{weight}_{light\text{-}colored\ lithologies}$ = 492.50 grams (41.4%)
$\text{weight}_{dark\ shale}$ = 590.26 grams (49.6%)
weight_{coal} = 107.71 grams (9.1%)

sieve size	*grams*	*% coal / % dark shale / % light-colored liths*
>0.0930"	544.29	9.38% / 32.54% / 58.08%
>0.0661"	353.54	11.76% / 57.65% / 30.59%
>0.0460"	231.76	5.47% / 73.18% / 21.35%
>0.0331"	44.43	4.26% / 70.92% / 24.82%
<0.0331"	16.47	3.60% / 50.00% / 47.00%
	1190.47 TOTAL	



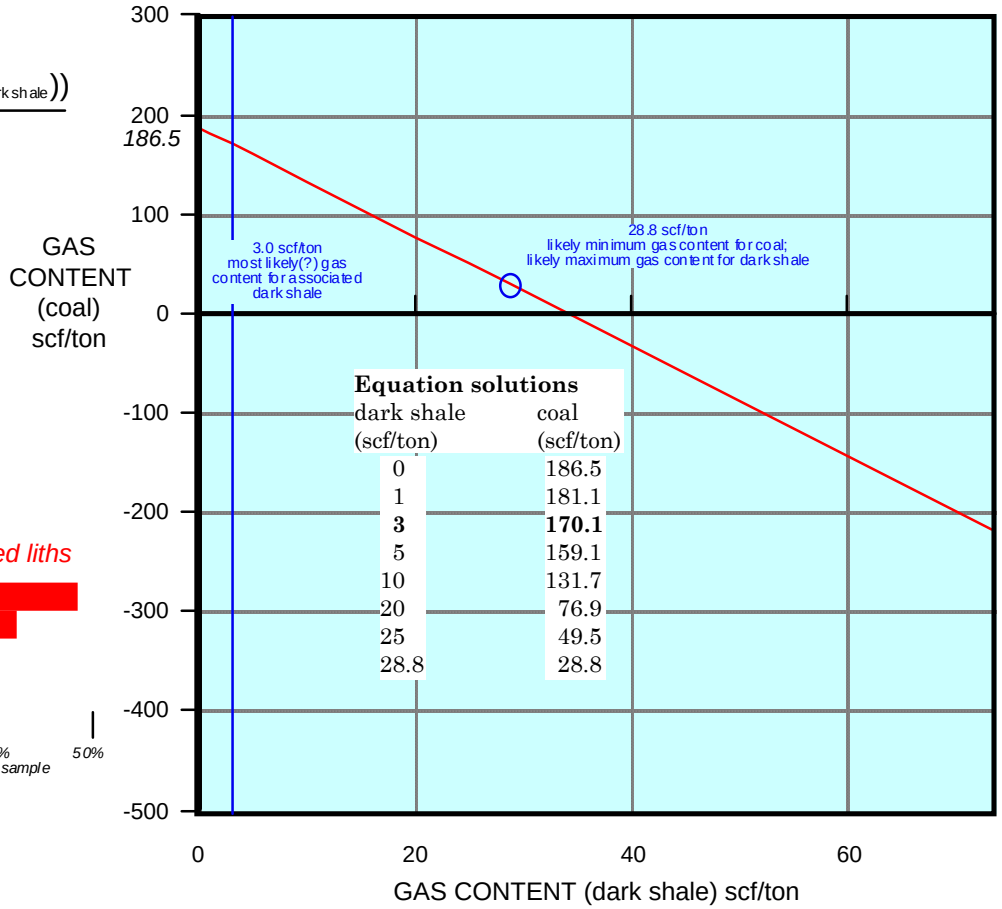


FIGURE 10.

Desorption Characteristics of Cuttings Samples

Dart Cherokee Basin #A3-36 Fields, NW NE 36-T.34S.-R.14E., Montgomery County, KS

LITHOLOGIC COMPONENT SENSITIVITY ANALYSIS for all samples

UNIT	coal in sample	scf/ton w/ shale @ 3 scf/ton	maximum scf/ton	minimum scf/ton
Excello Shale	----	----	----	11.1
Iron Post	13%	74.1	77.4	36.8
Croweburg	15%	127.4	138.1	30.2
Mineral	6%	121.5	140.4	19.2
Weir-Pittsburg	5%	137.5	140.7	67.6
Rowe	11%	244.9	268.5	30.3
Riverton	9%	170.1	186.5	28.8

surface
100'
200'
300'
400'
500'
600'
700'
800'
900'
1000'
1200'
1400'

1041'-1051' Excello Shale
1072'-1074' Iron Post
1108'-1110' Croweburg
1158'-1161' Mineral
1237'-1239' Weir-Pittsburg
1475'-1478' Rowe
1498'-1502' Riverton

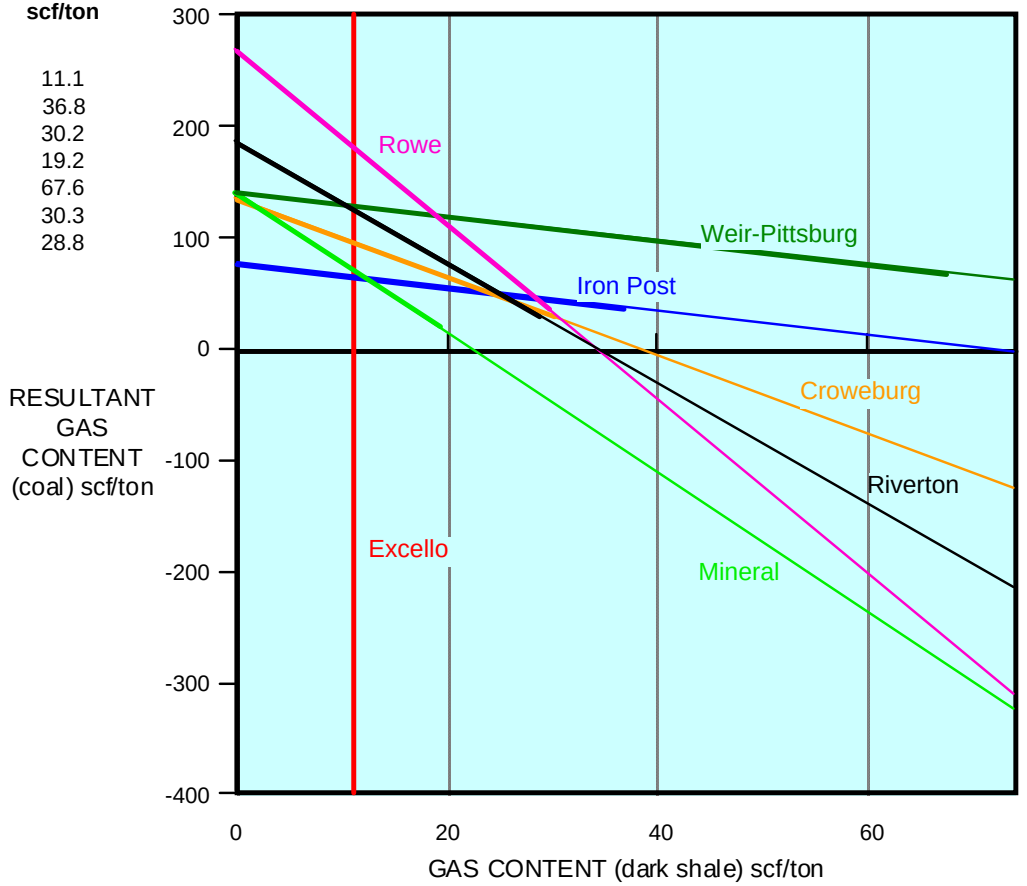


FIGURE 11.

Desorption Characteristics of Cuttings Samples

based on total weight of gas-generating lithologies (i.e., coal and dark shale) in sample

Dart Cherokee Basin #A3-36 Fields, NW NE 36-T.34S.-R.14E., Montgomery County, KS

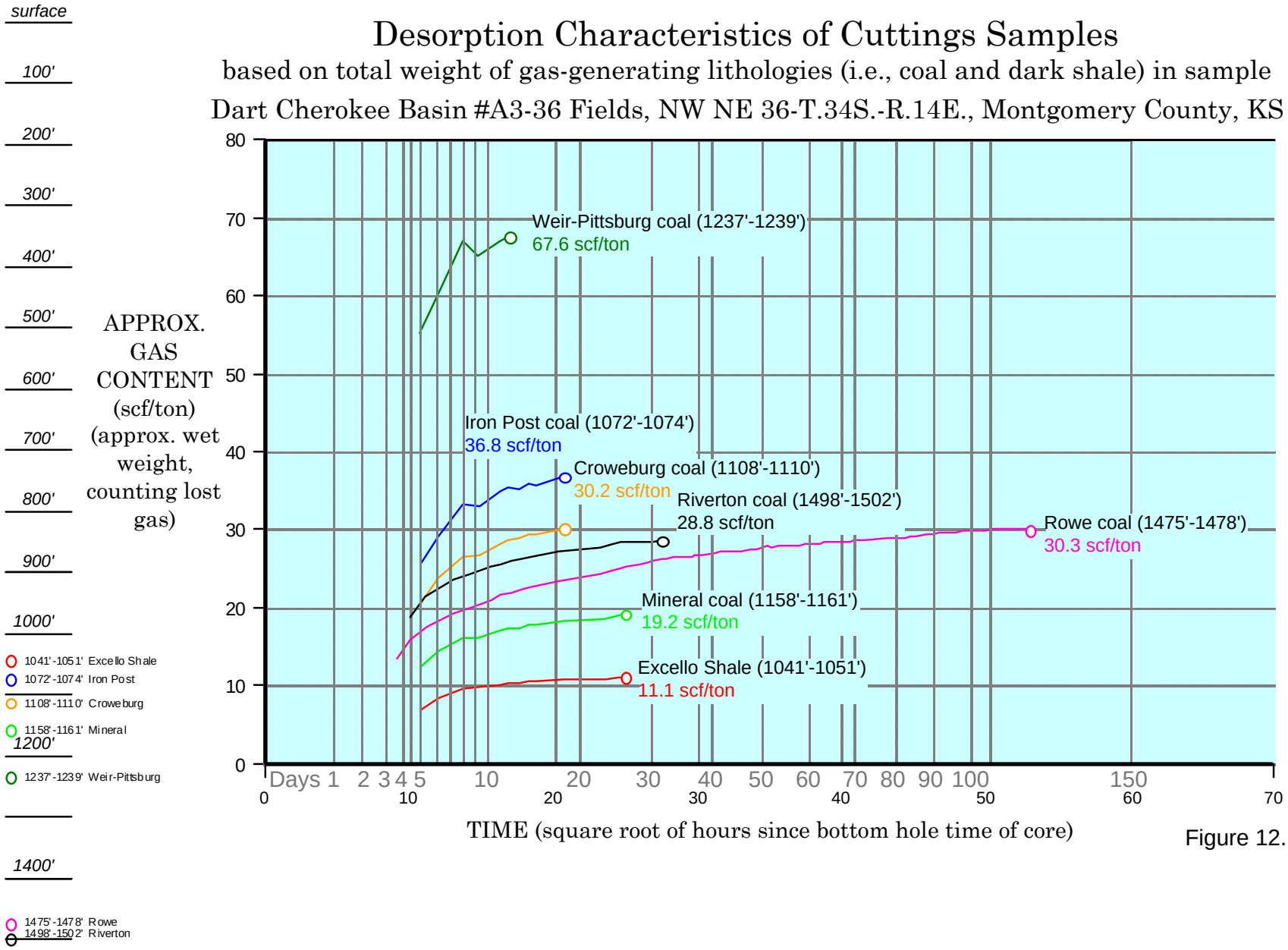


Figure 12.