ANALYSIS OF CHEROKEE GROUP CUTTINGS SAMPLES FOR GAS CONTENT -- MERITAGE KCM #13-31 BROWN WELL (NW NE 13-T.22S.-R.21E.), LINN COUNTY, KANSAS

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SUMMARY

Seven cuttings samples from the Pennsylvanian Marmaton and Cherokee Group were collected from the Meritage KCM #13-31 Brown well in NW NE 13-T.22S.-R.21E. well in Linn County, KS:

- Mulberry coal at 323' to 325' depth
- Little Osage Shale at 422' to 428' depth
- Bevier coal at 510' to 512' depth
- Croweburg "coal" at 530' to 532' depth
- Tebo coal at 594' to 596'
- Weir-Pittsburg coal at 645' to 647' depth
- Riverton coal at 766' to 769' depth

Assuming the dark shale that is usually admixed with the coal cuttings has approximately 3 scf/ton gas content, the coals calculate as having the following gas contents:

- Mulberry coal at 323' to 325' depth (92.7 scf/ton)
- Little Osage Shale at 422' to 428' depth[1] (20.2 scf/ton)
- Bevier coal at 510' to 512' depth (38.5 scf/ton)
- Croweburg "coal" at 530' to 532' depth[1] (10.3 scf/ton)
- Tebo coal at 594' to 596' (32.2 scf/ton)
- Weir-Pittsburg coal at 645' to 647' depth (35.3 scf/ton)
- Riverton coal at 766' to 769' depth (62.3 scf/ton)

[1]no coal in sample

The amount of coal in the samples was sufficient for good confidence in analyses. The most reliable results, which is largely controlled by the amount of coal in the cuttings, is from the are from the Mulberry, Bevier, and Riverton coal samples. The least constrained results are from the Tebo sample, which had a reasonably good amount of coal (31% coal). The sample of the Little Osage Shale and the Croweburg "coal" sample had no coal in them, nevertheless, they respectively contained 94% dark shale, thus confidence in their results are high.

BACKGROUND

The Meritage KCM #13-31 Brown well in NW NE 13-T.22S.-R.21E. well (Linn County, KS) was selected for cuttings desorption tests in association with an on-going coalbed gas research project at the Kansas Geological Survey. The samples were gathered January 20, 2003 by K. David Newell and Jonathan P. Lange of the Kansas Geological Survey, with well site collection aided by Lawrence A. Weis (consultant for Meritage KCM). Samples were obtained during normal drilling of the well, with no cessation of drilling before zones of interest (i.e., coals in the Cherokee Group) were penetrated. The well was drilled using an air rotary rig owned by MOKAT Drilling. Lag times for samples to reach the surface (important for assessing lost gas) were determined by periodically

noting the time it took for cuttings to reach the surface following resumption of drilling after new pipe was added to the drill string.

Seven cuttings samples from the Pennsylvanian Marmaton and Cherokee Groups were collected:

- Mulberry coal at 323' to 325' depth (357 grams dry wt.)
- Little Osage Shale at 422' to 428' depth (1036 grams dry wt.)
- Bevier coal at 510' to 512' depth (208 grams dry wt.)
- Croweburg coal at 530' to 532' depth (1043 grams dry wt.)
- Tebo coal at 594' to 596' (363 grams dry wt.)
- Weir-Pittsburg coal at 645' to 647' depth (337 grams dry wt.)
- Riverton coal at 766' to 769' depth (990 grams dry wt.)

The cuttings samples were caught in a kitchen strainer at the air stream exit by the mud pit. The samples were washed in the kitchen strainer to rid them of drilling mud before they were placed in desorption canisters. A temperature bath for the desorption canisters was on site, with temperatures ranging between 68 and 70 degrees F. The canistered samples were later that day transported to the laboratory at the Kansas Geological Survey and desorption measurements were continued at 65 to 69 degrees F ambient temperature. Desorption measurements were periodically made until the canisters produced no more gas upon testing for at least two successive days.

DESORPTION MEASUREMENTS

The equipment and method for measuring desorption gas is that prescribed by McLennan and others (1995). The volumetric displacement apparatus is a set of connected dispensing burettes, one of which measures the gas evolved from the desorption canister. The other burette compensates for the compression that occurs when the desorbed gas displaces the water in the measuring burette. This compensation is performed by adjusting the cylinders so that their water levels are identical, then figuring the amount of gas that evolved by simply reading the difference in water level using the volumetric scale on the side of the burette.

The desorption canisters were obtained from PEL-I-CANS (by J.R. Levine) in Richardson, TX. On average, the canisters were approximately 11.2 inches high (28.5 cm), 3.8 inches (9.7 cm) in diameter, and enclosed a volume of approximately 127 cubic inches (2082 cm^3). In case of small sample size (generally sample weighing less than 300 grams dry wt.), a concrete plug was placed in the desorption canister to decrease the volume of free space within the canister. This volume of this plug was 77 cubic inches (1262 cm^3).

The desorbed gas that collected in the desorption canisters was periodically released into the volumetric displacement apparatus and measured as a function of time, temperature and atmospheric pressure.

The time and atmospheric pressure were measured in the field using a portable weather station (model BA928) marketed by Oregon Scientific (Tualatin, OR). The atmospheric pressure was displayed in millibars on this instrument, however, this measurement was not the actual barometric pressure, but rather an altitude-compensated barometric pressure automatically converted to a sea-level-equivalent pressure. In order to translate this measurement to actual atmospheric pressure, a regression correlation was determined over several weeks by comparing readings from the Oregon Scientific instrument to that from a pressure transducer in the Petrophysics Laboratory in the Kansas Geological Survey in Lawrence, Kansas (Figure 1). The regression equation shown graphically in Figure 1 was entered into a spreadsheet and was used to automatically convert the millibar measurement to barometric pressure in psi.

A spreadsheet program written by K.D. Newell (Kansas Geological Survey) was used to convert all gas volumes at standard temperature and pressure. Conversion of gas volumes to standard temperature and pressure was by application of the perfect-gas equation, obtainable from basic college chemistry texts:

$$n = PV/RT$$

where n is moles of gas, T is degrees Kelvin (i.e., absolute temperature), V is in liters, and R is the universal gas constant, which has a numerical value depending on the units in which it is measured (for example, in the metric system R = 0.0820 liter atmosphere per degree mole). The number of moles of gas (i.e., the value n) is constant in a volumetric conversion, therefore the conversion equation, derived from the ideal gas equation, is:

$$(P_{stp}V_{stp})/(RT_{stp}) = (P_{rig}V_{rig})/(RT_{rig})$$

Customarily, standard temperature and pressure for gas volumetric measurements in the oil industry are 60 °F and 14.7 psi (see Dake, 1978, p. 13), therefore P_{stp}, V_{stp}, and T_{stp}, respectively, are pressure, volume and temperature at standard temperature and pressure, where standard temperature is degrees Rankine (°R = 460 + °F). P_{rig}, V_{rig}, and T_{rig}, respectively, are ambient pressure, volume and temperature measurements taken at the rig site or in the desorption laboratory.

The universal gas constant R drops out as this equation is simplified and the determination of V_{stp} becomes:

$$V_{stp} = (T_{stp}/T_{rig})\ (P_{rig}/P_{stp})\ V_{rig}$$

The conversion calculations in the spreadsheet were carried out in the English metric system, as this is the customary measure system used in American coal and oil industry. V is therefore converted to cubic feet; P is psia; T is °R.

The desorbed gas was summed over the time period for which the coal samples evolved all of their gas. In the case of well cuttings from Meritage KCM #13-31 Brown well, the maximum time of desorption was 44 days.

Lost gas (i.e., the gas lost from the sample from the time it was drilled, brought to the surface, to the time it was canistered) was determined using the direct method (Kissel and others, 1975; also see McLennan and others, 1995, p. 6.1-6.14) in which the cumulative gas evolved is plotted against the square root of elapsed time. Time zero is assumed to be instant the cuttings sample is lifted from the bottom of the hole, or in the case of cuttings, when the drilled rock is cut and circulated off bottom. Characteristically, the cumulative gas evolved from the sample, when plotted against the square root of time, is linear for a short time period after the sample reaches ambient pressure conditions, therefore lost gas is determined by a line projected back to time zero. The period of linearity generally is about an hour for cuttings samples.

LITHOLOGIC ANALYSIS

Upon removal from the canisters, the cuttings were washed of drilling mud, and dried in an oven at 150 °F for 1 to 3 days. After drying, the cuttings were weighed and then dry sieved into 5 size fractions: >0.0930", >0.0661", >0.0460", >0.0331", and <0.0331". For large sample sizes, the cuttings were ran through a sample splitter and a lesser portion (approximately 75 grams) were sieved and weighed, and the derived size-fraction ratios were applied to the entire sample.

The size fractions were then inspected and sorted by hand under a dissecting microscope. Three major lithologic categories were differentiated: coal, dark shales (generally Munsell rock colors N3 (dark gray), N2 (grayish black), and N1 (black) on dry surface), and lighter-colored lithologies and/or dark and light-colored carbonates. After sorting, and for every size class, each of these three lithologic categories was weighed and the proportion of coal dark shale and light-colored lithologies were determined for the entire cuttings sample based on the weight percentages.

DATA PRESENTATION

Data and analyses accompanying this report are presented in the following order: 1) lag time to surface for the well cuttings, 2) data tables for the desorption analyses, 3) lost-gas graphs, 4) "lithologic component sensitivity analyses" showing the interdependence of gas evolved from dark shale versus coal in each sample, 5) a summary component analysis for all samples showing relative reliability of the data from all the samples, and 6) a desorption graph for all the samples.

Graph of Lag-time to Surface for Well Cuttings (Figure 2)
Lag time to surface varied, but there is a general trend of longer lag times for greater depth. The lag times accepted for cuttings were taken to be a visual average of the trend

(defined by the scatter of data points on this graph) at the depth at which the samples were taken.

Data Tables of the Desorption Analyses (Table 1)
These are the basic data used for lost-gas analysis and determination of total gas desorbed from the cuttings samples. Basic temperature, volume, and barometric measurements are listed at left. Farther to the right, these are converted to standard temperature, pressure and volumes. The volumes are cumulatively summed, and converted to scf/ton based on the total weight of coal and dark shale in the sample. At the right of the table, the time of the measurements are listed and converted to hours (and square root of hours) since the sample was drilled.

Lost-Gas Graphs (Figures 3-9)
Gas lost prior to the canistering of the sample was estimated by extrapolation of the first few data points after the sample was canistered. The linear characteristic of the initial desorption measurements was usually lost within the first hour after canistering, thus data are presented in the lost-gas graphs for only up to one hour after canistering. Lost-gas volumes derived from this analysis are incorporated in the data tables described above.

"Lithologic Component Sensitivity Analyses" (Figures 10-16)
The rapidity of penetration of an air-drilled well makes collection of pure lithologies from relatively thin-bedded strata rather difficult. Mixed lithologies are more the norm rather than the exception. Some of this mixing is due to cavings from strata farther up hole. The mixing may also be due to collection of two or more successively drilled lithologies in the kitchen sieve at the exit line, or differential lifting of relatively less-dense coal compared to other lithologies, all of which are more dense than coal.

The total gas evolved from the sample is due to gas being desorbed from both the coal and dark shale. Both lithologies are capable of generating gas, albeit the coal will be richer in gas than the dark-colored shale. Even though dark-colored shale is less rich in sorbed gas than coal, if a sample has a large proportion of dark, organic-rich shale and only a minor amount of coal, the total volume of gas evolved from the dark-shale component may be considerable.

The total amount of gas evolved from a cuttings sample can be expressed by the following equation:

$$\text{Total gas } (cm^3) = [\text{weight}_{coal} \text{ (grams) X gas content}_{coal} \ (cm^3/\text{gram})] + [\text{weight}_{\text{dark shale}} \text{ (grams) X gas content}_{\text{dark shale}} \ (cm^3/\text{gram})]$$

A unique solution for *gas content*$_{coal}$ in this equation is not possible because *gas content*$_{dark\ shale}$ is not known exactly. An answer can only be expressed as a linear solution to the above equation. The richer in gas the dark shales are, the poorer in gas the admixed coal has to be, and visa versa. If there is little dark shale in a sample, a relatively well constrained answer for *gas content*$_{coal}$ can be obtained. Conversely, if

considerable dark shale is in a sample, the gas content of a coal will be hard to precisely determine.

The lithologic-component-sensitivity-analysis diagram therefore expresses the bivariant nature inherent in the determination of gas content in mixed cuttings. The gas content of dark shales in Kansas can vary greatly. Proprietary desorption analyses of dark shales in cores from southeastern Kansas have registered as much as 50 scf/ton, but can be as low as 2-4 scf/ton. For a general understanding of the lithologic-component-sensitivity-analyses diagrams, the calculated *gas content*$_{coal}$ is given for assumed *gas content*$_{dark\ shale}$ at 30 scf/ton and 50 scf/ton. For most samples gathered in east-central and northeastern Kansas, the resultant *gas content*$_{coal}$ is a negative number for 30 scf/ton and 50 scf/ton *gas content*$_{dark\ shale}$. The only conclusion is that the *gas content*$_{dark\ shale}$ or most samples taken from this region has to be lower than 30-50 scf/ton. Conversely though, to assume that all the gas evolved from a cuttings sample is derived solely from the coal would result in an erroneously high gas content for the coal.

In all the lithologic-component-sensitivity-analysis diagrams, a "break-even" point is noted where the gas content of the coal is equal to that of the dark shale. This "break-even" point corresponds to the minimum gas content assignable to the coal and maximum gas content assignable to the dark shale. It can also be thought of the scf/ton gas content of the cuttings sample minus the weight of any of the lighter-colored lithologies, which are assumed to have no inherent gas content.

Summary Component Analysis for all Samples (Figure 17)
This diagram is a summary of the individual "lithologic component sensitivity analyses" for each sample, all set at a common scale. The steeper the angle of the line for a sample, the more uncertainty is attached to the results (i.e., *gas content*$_{coal}$) for that sample. If the coal content is miniscule (i.e., < approximately 5%), the results are a better reflection of the *gas content*$_{dark\ shale}$.

Desorption Graph (Figure 18)
This is a desorption graph (gas content per weight vs. square root of time) for all the samples. The rate at which gas is evolved from the samples is thus comparable at a common scale.

RESULTS and DISCUSSION

The Mulberry sample had the greatest gas content at 92.7 scf/ton (assuming the admixed dark shales produce 3 scf/ton), followed by the Riverton coal at 62.3 scf/ton. The Bevier, Tebo and Weir-Pittsburg coals all had similar gas-content assays at 38.5, 32.2, and 35,3 scf/ton. The high gas content of the Mulberry sample is unexpected, considering it's shallow depth. No bona fide coal was in the Little Osage Shale taken and the Croweburg "coal", which respectively assayed at 20.2 and 10.3 scf/ton.

Maximum gas content (gas content calculated assuming no gas contribution by admixed dark shale), minimum gas content (gas content calculated assuming equal gas content for coal and admixed dark shale) and "most likely" gas content (gas content calculated with admixed dark shales desorbing 3 scf/ton) for all the coal samples are presented on Figure 17. According to this diagram, the Mulberry and Bevier samples have the most tightly constrained results, which corresponds to the high percentages of coal (approximately 75%) captured in these samples. The Riverton sample also has good control and reasonably constrained results with coal making 65% of the sample. The least constrained results are for the Tebo coal sample, which contained 31% coal. This amount of coal, nevertheless, is sufficient for a reasonable gas estimate from cuttings.

The value of 3 scf/ton for the dark shales is based on the assay of the gas content of the dark shale in nearby wells. Core desorption analyses of shale in the stratigraphic vicinity of Riverton coal elsewhere in Kansas also yield comparable gas contents.

REFERENCES

Dake, L.P., 1978, Fundamentals of Reservoir Engineering, Elsevier Scientific Publishing, New York, NY, 443 p.

Kissel, F.N., McCulloch, C.M., and Elder, C.H., 1975, The direct method of determining methane content of coals for ventilation design: U.S. Bureau of Mines, Report of Investigations, RI7767.

McLennan, J.D., Schafer, P.S., and Pratt, T.J., 1995, A guide to determining coalbed gas content: Gas Research Institute, Chicago, IL, Reference No. GRI-94/0396, 180 p.

FIGURES and TABLES

Correlation of Field Barometer to KGS Petrophysics Lab Barometer

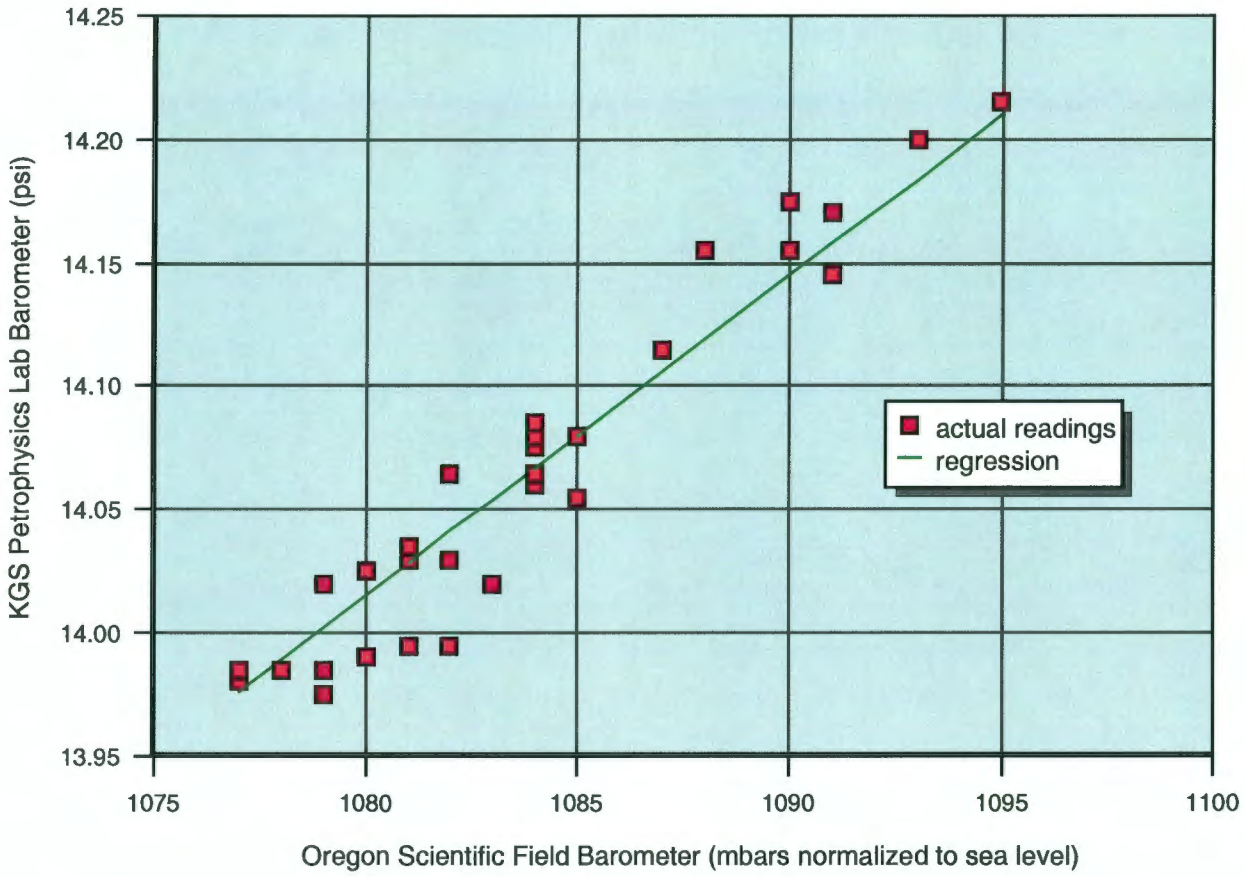

FIGURE 1.

Meritage KCM #13-31 Brown; NW NE sec. 13-T.22S.-R.21E., Linn County, KS
lag-time to surface for well cuttings

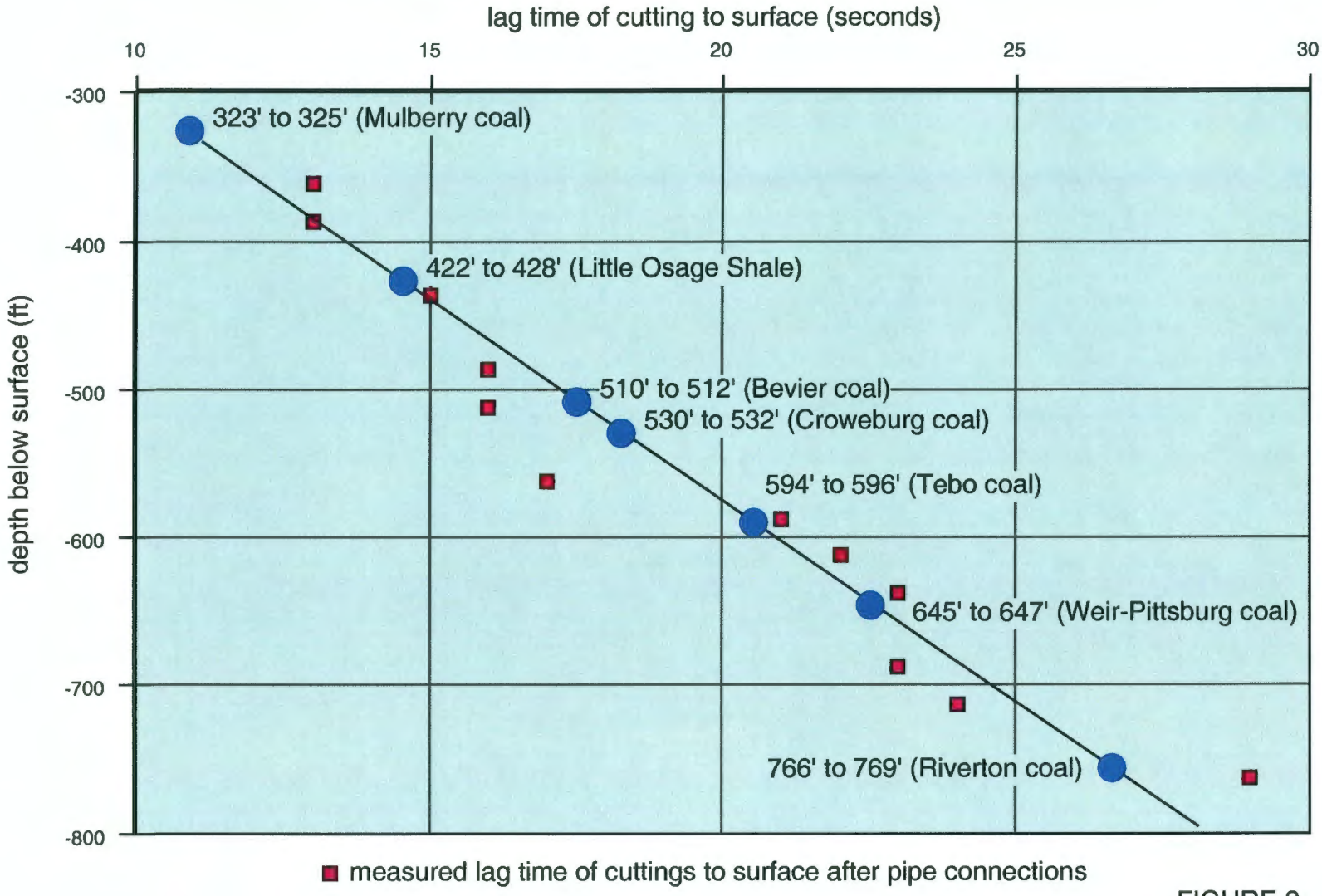

FIGURE 2.

Meritage KCM Brown #13-31, NW NE 13-T.22S.-R.21E.

SAMPLE: 323' to 325' (Mulberry coal) in canister Mer A

DENSITIES:

DRY WEIGHT	lbs.	grams
sample weight:	0.7793	353.477

est. lost gas (cc) = 8

TIME OF: at surface 1/20/03 9:32 elapsed time (off bottom to canistering)
off bottom 1/20/03 9:32 in canister 1/20/03 9:33 1.7 minutes 0.028 hours 0.167497927 SQRT (hrs)

CONVERSION OF VOLUMES TO STP

RIG MEASUREMENTS			CONVERSION OF RIG MEASUREMENTS TO STP (cubic ft; @60 degrees; @14.7 psi)						CUMULATIVE VOLUMES		SCF/TON	SCF/TON			TIME SINCE		
measured cc	measured T (F)	measured P	cubic ft (@rig)	ABSOLUTE T (F) (@rig)	psia (@rig)	cubic ft (@STP)	cc (@STP)	cubic ft (@STP)	cc (@STP)	without lost gas	with lost gas	TIME OF MEASURE		off bottom	in canister	SQRT hrs. (since off bottom)
2	70	1081	7.063E-05	530	14.031	6.61429E-05	1.87295	6.61429E-05	1.87295	0.169753088	0.894825405	1/20/03	9:34	0:02:41	0:01:00	0.211476292
3	70	1081	0.00010594	530	14.031	9.92143E-05	2.80943	0.000185357	4.68238	0.424382664	1.149455004	1/20/03	9:38	0:04:41	0:03:00	0.279384243
2	70	1081	7.063E-05	530	14.031	6.61429E-05	1.87295	0.0002315	6.55533	0.59413573	1.31920607	1/20/03	9:38	0:05:58	0:04:15	0.314466038
2	70	1081	7.063E-05	530	14.031	6.61429E-05	1.87295	0.000297643	8.42628	0.763888798	1.488981138	1/20/03	9:39	0:07:28	0:05:45	0.351978535
2	70	1081	7.063E-05	530	14.031	6.61429E-05	1.87295	0.000363788	10.3012	0.933641862	1.858714202	1/20/03	9:43	0:10:56	0:09:15	0.428874949
4	70	1081	0.00014128	530	14.031	0.000132286	3.7459	0.000498072	14.0471	1.273147993	1.998220333	1/20/03	9:48	0:15:56	0:14:15	0.515320828
5	69	1081	0.00017657	529	14.031	0.00016587	4.69123	0.000681741	18.7384	1.698332894	2.423405233	1/20/03	9:56	0:23:58	0:22:15	0.631576511
3	69	1081	0.00010594	529	14.031	9.94019E-05	2.81474	0.000781143	21.5531	1.953443834	2.678516173	1/20/03	10:01	0:29:41	0:28:00	0.703384928
9	69	1081	0.00031783	529	14.031	0.000298206	8.44421	0.001059349	29.9973	2.718778854	3.443848994	1/20/03	10:11	0:39:28	0:37:45	0.810892434
39	69	1081	0.00137728	529	14.031	0.001292224	36.5916	0.002351573	66.5689	6.035218675	6.760291215	1/20/03	10:29	0:57:11	0:55:30	0.976245643
23	69	1080	0.00081224	529	14.018	0.000761378	21.5597	0.003112949	88.1486	7.989260118	8.714332458	1/20/03	10:48	1:16:28	1:14:45	1.128866864
18	69	1080	0.00058504	529	14.018	0.000529653	14.998	0.003642601	103.147	9.348593157	10.0738855	1/20/03	11:01	1:28:58	1:27:15	1.217485491
11	69	1080	0.00038646	529	14.018	0.000364138	10.3112	0.004006738	113.458	10.28313482	11.00820896	1/20/03	11:18	1:45:58	1:44:15	1.328742095
19	68	1080	0.00067098	528	14.018	0.000630154	17.8439	0.004636892	131.302	11.90039982	12.62547218	1/20/03	11:40	2:07:56	2:06:15	1.480213074
13	68	1079	0.00045909	528	14.005	0.000430759	12.1977	0.00508765	143.499	13.0059251	13.73099744	1/20/03	11:58	2:25:56	2:24:15	1.559558342
21	68	1078	0.00074161	528	13.992	0.000695198	19.6857	0.005782847	163.185	14.79011855	15.51519089	1/20/03	12:30	2:57:56	2:56:15	1.722078847
18	67	1078	0.00063567	527	13.992	0.000597013	16.9055	0.00635988	180.09	16.32232913	17.04740147	1/20/03	12:54	3:21:56	3:20:15	1.834545054
7	67	1078	0.0002472	527	13.992	0.000232172	6.57435	0.006592031	186.665	16.9181888	17.64326114	1/20/03	13:03	3:30:58	3:29:15	1.874981481
8	67	1078	0.00026252	527	13.992	0.000265339	7.51354	0.006857371	194.178	17.59917128	18.32424362	1/20/03	13:18	3:45:56	3:44:15	1.940503944
103	66	1082	0.00363742	526	14.044	0.003435437	97.2804	0.010292807	291.459	26.41608413	27.14115847	1/20/03	19:54	10:21:58	10:20:15	3.219558286
98	67	1092	0.00346085	527	14.174	0.003292818	93.2382	0.013585425	384.695	34.86645764	35.59152998	1/21/03	10:03	24:30:56	24:29:15	4.951318567
89	66	1100	0.00314302	526	14.278	0.003017887	85.4562	0.016603292	470.151	42.6116954	43.33676774	1/22/03	15:08	53:35:56	53:34:15	7.321126204
83	68	1094	0.00293113	528	14.200	0.002768482	78.9601	0.019391754	549.111	49.7881727	50.49324504	1/24/03	15:56	102:23:56	102:22:15	10.11923361
69	69	1084	0.00243872	529	14.070	0.002292587	64.9188	0.021684342	614.03	55.652008	56.37708034	1/27/03	15:08	173:33:56	173:32:15	13.17442809
22	68	1095	0.00077893	528	14.213	0.000739786	20.9483	0.022424128	634.978	57.55083951	58.27571185	1/29/03	13:58	220:23:56	220:22:15	14.84583743
29	68	1085	0.00102413	528	14.083	0.000968287	27.3615	0.023390394	662.34	60.03052498	60.7555973	1/31/03	15:15	269:42:56	269:41:15	16.42301908
34	68	1075	0.0012007	526	13.953	0.001126891	31.9042	0.024517085	694.244	62.92213313	63.64720547	2/3/03	15:44	342:11:56	342:10:15	18.49661657
9	67	1088	0.00031783	527	14.096	0.000300722	8.51548	0.024817807	702.759	63.8939236	64.41899814	2/5/03	15:39	390:06:56	390:05:15	19.75134313
3	68	1090	0.00010594	526	14.146	0.000100801	2.65436	0.024918608	705.814	63.95262582	64.67769816	2/7/03	16:32	440:59:56	440:58:15	20.99997354
19	67	1083	0.00067098	527	14.057	0.000633103	17.9274	0.025551712	723.541	65.57746078	66.3025331	2/10/03	14:00	506:27:56	506:26:15	22.54918082
7	68	1090	0.0002472	528	14.148	0.000234312	6.63494	0.025786023	730.176	66.17881229	66.90388483	2/12/03	13:49	556:16:56	556:15:15	23.58563593
23	68	1068	0.00081224	528	13.862	0.000754342	21.3805	0.026540385	751.537	68.11480166	68.83987402	2/14/03	18:24	608:51:56	608:50:15	24.67520123
-6	68	1064	-0.0002119	528	14.070	-0.00020049	-5.6773	0.026339873	745.859	67.60024574	68.32531808	2/17/03	13:55	678:22:56	678:21:15	26.00734939
1	68	1090	3.5315E-05	528	14.148	3.34731E-05	0.94765	0.026373346	748.807	67.6881531	68.41122544	2/19/03	13:39	724:08:56	724:05:15	26.9093953
19	69	1073	0.00067098	529	13.927	0.000624886	17.6947	0.026998232	764.502	69.28989883	70.01497097	2/21/03	18:42	775:09:56	775:08:15	27.84179512
-11	65	1090	-0.0003885	525	14.148	-0.00037031	-10.486	0.026827924	754.016	68.33951776	69.0845901	2/23/03	22:23	828:50:56	828:49:15	28.78973583
-11	64	1100	-0.0003885	524	14.278	-0.00037442	-10.602	0.026253508	743.414	67.37658745	68.10365979	2/24/03	14:08	844:35:56	844:34:15	29.08198357
12	69	1084	0.00042376	529	14.070	0.000398711	11.2902	0.026652216	754.704	68.40186316	69.1269355	2/26/03	15:40	894:07:56	894:06:15	29.90204378
8	67	1083	0.00021189	527	14.057	0.000199927	5.66129	0.026852144	760.365	68.91498893	69.64004127	2/27/03	16:44	921:11:56	921:10:15	30.35125844
3	68	1083	0.00010594	528	14.057	9.97744E-05	2.82528	0.026951918	763.19	69.17103592	69.89810828	2/28/03	15:08	941:35:56	941:34:15	30.68548336
26	69	1078	0.00091818	529	13.986	0.000857498	24.2815	0.027809418	787.472	71.37177093	72.09684327	3/3/03	15:52	1014:19:56	1014:18:15	31.84658273
1	67	1075	3.5315E-05	527	13.953	3.30751E-05	0.93658	0.027642491	788.409	71.45865885	72.18172919	3/4/03	19:37	1042:04:56	1042:03:15	32.28129834
-10	69	1081	-0.0003531	529	14.031	-0.00033134	-9.3825	0.027511152	779.026	70.80828705	71.33135939	3/5/03	14:47	1061:14:56	1061:13:15	32.5788152

DECANISTERED 3/05/03

SAMPLE: 422' to 428' (Little Osage Shale) in canister Mer B

DRY WEIGHT	lbs.	grams
sample weight:	2.1370	969.323

est. lost gas (cc) = 38

TIME OF: at surface 1/20/03 10:08 elapsed time (off bottom to canistering)
off bottom 1/20/03 10:07 in canister 1/20/03 10:13 6.0 minutes 0.100 hours 0.315788255 SQRT (hrs)

CONVERSION OF VOLUMES TO STP

RIG MEASUREMENTS			CONVERSION OF RIG MEASUREMENTS TO STP (cubic ft; @60 degrees; @14.7 psi)						CUMULATIVE VOLUMES		SCF/TON	SCF/TON			TIME SINCE		
measured cc	measured T (F)	measured P	cubic ft (@rig)	ABSOLUTE T (F) (@rig)	psia (@rig)	cubic ft (@STP)	cc (@STP)	cubic ft (@STP)	cc (@STP)	without lost gas	with lost gas	TIME OF MEASURE		off bottom	in canister	SQRT hrs. (since off bottom)
5	69	1081	0.00017657	529	14.031	0.00016587	4.69123	0.00016587	4.69123	0.155049536	1.410985772	1/20/03	10:14	0:06:44	0:00:45	0.334995654
5	69	1081	0.00017657	529	14.031	0.00016587	4.69123	0.00033134	9.38245	0.310099075	1.566035309	1/20/03	10:18	0:06:44	0:02:45	0.381517438
8	69	1081	0.00028252	529	14.031	0.000265072	7.50596	0.000598411	16.8864	0.558178335	1.814114569	1/20/03	10:20	0:12:29	0:08:30	0.458131073
13	69	1081	0.00045909	529	14.031	0.000430741	12.1972	0.001027152	29.0858	0.961307133	2.217243367	1/20/03	10:24	0:18:44	0:10:45	0.528099317
2	69	1081	7.063E-05	529	14.031	6.62679E-05	1.87649	0.00109342	30.9821	1.023328948	2.279263182	1/20/03	10:27	0:19:44	0:13:45	0.573488351
7	69	1081	0.0002472	529	14.031	0.000231938	6.56772	0.001325356	37.5298	1.240398301	2.498332535	1/20/03	10:32	0:24:14	0:18:15	0.635522532

3	69	1081	0.00010594	529	14.031	9.94019E-05	2.81474	0.00142476	40.3446	1.333428023	2.589362258	1/20/03	10:33	0:25:59	0:20:00	0.658089567
5	69	1081	0.00017857	529	14.031	0.00016587	4.69123	0.00159043	45.0356	1.488475581	2.744411795	1/20/03	10:39	0:31:44	0:25:45	0.727247474
10	69	1080	0.00035315	529	14.016	0.000331033	9.37376	0.001921463	54.4096	1.798287773	3.054224007	1/20/03	10:47	0:39:29	0:33:30	0.811208235
18	69	1080	0.00063567	529	14.016	0.000595659	16.8726	0.002517322	71.2824	2.355949755	3.811885989	1/20/03	10:59	0:51:59	0:46:00	0.930800134
20	69	1080	0.0007063	529	14.016	0.000662066	18.7476	0.003179368	90.0299	2.975574179	4.231510413	1/20/03	11:16	1:08:59	1:03:00	1.072251007
16	66	1060	0.00063567	528	14.016	0.000598988	16.9046	0.003776376	106.935	3.534292339	4.790228573	1/20/03	11:28	1:20:44	1:14:45	1.159960843
15	66	1060	0.00052972	528	14.016	0.00049749	14.0873	0.004273866	121.022	3.999890805	5.255827039	1/20/03	11:39	1:31:29	1:25:30	1.234796429
10	66	1060	0.00035315	526	14.016	0.00033166	9.39153	0.004605528	130.413	4.310289783	5.566226017	1/20/03	11:48	1:40:59	1:35:00	1.29732631
20	68	1079	0.0007063	528	14.005	0.000662706	18.7657	0.005266232	149.179	4.930512925	6.186449159	1/20/03	12:07	1:59:59	1:54:00	1.41411535
25	68	1078	0.00088287	526	13.992	0.000827614	23.4353	0.006095846	172.614	5.705073337	6.961009571	1/20/03	12:28	2:20:44	2:14:45	1.531520668
24	67	1078	0.00084758	527	13.992	0.000796017	22.5406	0.006691863	195.155	6.450062296	7.70599853	1/20/03	12:52	2:44:14	2:38:15	1.654455285
11	67	1078	0.00036646	527	13.992	0.000364841	10.3311	0.007256705	205.486	6.791515569	8.047451803	1/20/03	13:03	2:55:44	2:49:45	1.711399687
10	67	1078	0.00035315	527	13.992	0.000331674	9.39192	0.007588379	214.878	7.101927635	8.357863869	1/20/03	13:19	3:11:44	3:05:45	1.78761189
113	66	1082	0.00399057	526	14.044	0.003768974	106.725	0.011357353	321.603	10.6292927	11.88522893	1/20/03	19:54	9:46:14	9:40:15	3.125788789
84	67	1092	0.00296644	527	14.174	0.002822244	79.9167	0.014179597	401.52	13.27061719	14.52655343	1/21/03	10:02	23:54:14	23:48:15	4.889160346
64	68	1100	0.00226015	526	14.276	0.002170152	61.4516	0.016349749	462.972	15.30165199	16.55758822	1/22/03	15:10	53:02:14	52:56:15	7.282665873
59	68	1099	0.00208357	528	14.285	0.001991219	56.3646	0.018340967	519.356	17.16522422	18.42116046	1/24/03	15:59	101:51:14	101:45:15	10.09226877
42	69	1084	0.00146322	529	14.070	0.001395488	39.5157	0.019736455	556.872	16.47125481	19.72719105	1/27/03	15:09	173:01:14	172:55:15	13.15372782
-5	68	1095	-0.0001768	528	14.213	-0.00016813	-4.761	0.019568322	554.111	16.31389978	19.56983601	1/29/03	13:57	219:49:14	219:43:15	14.82634687
11	68	1085	0.00036646	526	14.083	0.000366515	10.3785	0.019934637	564.49	16.65691939	19.91285582	1/31/03	15:16	269:08:14	269:02:15	16.40540223
8	66	1075	0.00026252	526	13.953	0.000265104	7.50687	0.020199941	571.998	16.90502875	20.16098499	2/3/03	15:45	341:37:14	341:31:15	18.48298016
-14	67	1086	-0.0004944	527	14.096	-0.00046779	-13.246	0.019732151	556.75	16.4672268	19.72316303	2/5/03	15:40	389:32:14	389:26:15	19.73669735

DECANISTERED 2/07/03

SAMPLE: 510' to 512' (Bevier coal) in canister Mer C

DRY WEIGHT	lbs.	grams								est. lost gas (cc) =						at surface	
sample weight:	0.4579	207.71								4				TIME 0F: off bottom	1/20/03 10:37 in canister	1/20/03 10:38	elapsed time (off bottom to canistering) 2.0 minutes
CONVERSION OF VOLUMES TO STP																1/20/03 10:39	0.034 hours
RIG MEASUREMENTS			CONVERSION OF RIG MEASUREMENTS TO STP (cubic ft; @60 degrees; @14.7 psi)					CUMULATIVE VOLUMES		SCF/TON	SCF/TON			TIME SINCE			0.184089350 SQRT (hrs)
measured cc	measured T (F)	measured P	cubic ft (@rig)	ABSOLUTE T (F) (@rig)	psia (@rig)	cubic ft (@STP)	cc (@STP)	cubic ft (@STP)	cc (@STP)	without lost gas	with lost gas	TIME OF MEASURE		off bottom	in canister		SQRT hrs. (since off bottom)
2	69	1080	7.063E-05	529	14.016	6.62066E-05	1.87476	6.62066E-05	1.87476	0.289160948	0.908118233	1/20/03	10:42	0:05:02	0:03:00		0.289835786
2	69	1080	7.063E-05	529	14.016	6.62066E-05	1.87476	0.000132413	3.74951	0.578321897	1.195279182	1/20/03	10:44	0:07:02	0:05:00		0.34237731
1	69	1080	3.5315E-05	529	14.018	3.31033E-05	0.93738	0.000165517	4.68669	0.722902371	1.339859858	1/20/03	10:46	0:09:17	0:07:15		0.393347457
4	69	1080	0.00014128	529	14.018	0.000132413	3.74951	0.00029793	8.4364	1.301224267	1.918161552	1/20/03	10:59	0:22:02	0:20:00		0.605968632
9	69	1080	0.00031783	529	14.018	0.00029793	8.4364	0.000595859	16.8726	2.602448535	3.21940582	1/20/03	11:16	0:39:02	0:37:00		0.806570242
7	68	1080	0.0002472	528	14.018	0.000232162	6.57407	0.000828021	23.4469	3.61642864	4.233385925	1/20/03	11:27	0:50:02	0:48:00		0.913175189
5	68	1080	0.00017657	528	14.018	0.00016563	4.69576	0.000993851	28.1426	4.340700144	4.957657429	1/20/03	11:38	1:01:17	0:59:15		1.010637862
4	68	1080	0.00014126	528	14.018	0.000132664	3.75681	0.001126515	31.8992	4.920117347	5.537074632	1/20/03	11:47	1:10:47	1:08:45		1.088150184
8	68	1079	0.00026252	528	14.005	0.000265062	7.50627	0.001391598	39.4055	6.077876759	6.694836044	1/20/03	12:05	1:26:47	1:26:45		1.216438335
9	68	1078	0.00031783	528	13.992	0.000297941	8.43872	0.001689539	47.8422	7.379153228	7.998110513	1/20/03	12:26	1:49:17	1:47:15		1.349588415
6	67	1078	0.00026252	527	13.992	0.000265339	7.51354	0.001954878	55.3558	8.538036499	9.154993784	1/20/03	12:51	2:14:02	2:12:00		1.494619981
5	67	1078	0.00017657	527	13.992	0.000165637	4.69596	0.002120715	60.0517	9.262336544	9.879295829	1/20/03	13:04	2:27:02	2:25:00		1.58542504
5	67	1078	0.00017657	527	13.992	0.000165637	4.69596	0.002286552	64.7477	9.986640586	10.80359787	1/20/03	13:20	2:43:02	2:41:00		1.648399898
44	66	1082	0.00155365	528	14.044	0.001467565	41.5567	0.003754117	106.304	16.39631182	17.01326911	1/20/03	19:59	9:22:02	9:20:00		3.060591809
25	67	1092	0.00066287	527	14.174	0.000639953	23.7647	0.004594071	130.089	20.06485465	20.68161193	1/21/03	10:01	23:24:02	23:22:00		4.837412072
17	66	1100	0.00060035	526	14.276	0.000576447	18.3231	0.005170517	146.412	22.58251884	23.19947392	1/22/03	15:13	52:36:02	52:34:00		7.252624046
24	68	1099	0.00084758	528	14.265	0.000809987	22.9362	0.005980504	169.346	26.12018056	26.73713785	1/24/03	16:00	101:23:02	101:21:00		10.06895869
16	69	1084	0.00056504	529	14.070	0.000531614	15.0536	0.006512119	184.402	28.44203588	29.05699317	1/27/03	15:13	172:36:02	172:34:00		13.13775306
-8	68	1095	-0.0002825	528	14.213	-0.00026901	-7.6176	0.006243106	176.784	27.26710655	27.88406384	1/27/03	15:14	172:37:02	172:35:00		13.13838735
-2	68	1085	-7.063E-05	528	14.083	-6.6639E-05	-1.867	0.006176487	174.697	26.97605671	27.59301399	1/29/03	13:58	219:21:02	219:19:00		14.81048803

DECANISTERED 1/31/03

SAMPLE: 530' to 532' (Croweburg coal) in canister Mer D

DRY WEIGHT	lbs.	grams								est. lost gas (cc) =						at surface	
sample weight:	2.1506	975.499								43				TIME 0F: off bottom	1/20/03 10:44 in canister	1/20/03 10:43	elapsed time (off bottom to canistering) 1.6 minutes
CONVERSION OF VOLUMES TO STP																1/20/03 10:45	0.027 hours
RIG MEASUREMENTS			CONVERSION OF RIG MEASUREMENTS TO STP (cubic ft; @60 degrees; @14.7 psi)					CUMULATIVE VOLUMES		SCF/TON	SCF/TON			TIME SINCE			0.164991583 SQRT (hrs)
measured cc	measured T (F)	measured P	cubic ft (@rig)	ABSOLUTE T (F) (@rig)	psia (@rig)	cubic ft (@STP)	cc (@STP)	cubic ft (@STP)	cc (@STP)	without lost gas	with lost gas	TIME OF MEASURE		off bottom	in canister		SQRT hrs. (since off bottom)
52	69	1080	0.00163837	529	14.016	0.001721372	48.7436	0.001721372	48.7436	1.800823922	3.013017194	1/20/03	10:51	0:07:18	0:05:40		0.348807492
5	69	1080	0.00017657	529	14.016	0.000165517	4.68669	0.001886886	53.4305	1.754749299	3.186942571	1/20/03	10:51	0:08:03	0:06:25		0.366287683
10	69	1080	0.00035315	529	14.016	0.000331033	9.37376	0.002217921	62.8043	2.062800053	3.474793326	1/20/03	10:54	0:10:18	0:08:40		0.414326783
6	69	1080	0.00021189	529	14.018	0.00019862	5.62427	0.002416541	68.4266	2.247310505	3.659503778	1/20/03	10:55	0:11:48	0:10:10		0.443471157
5	69	1080	0.00017657	529	14.018	0.000165517	4.68669	0.002582057	73.1154	2.401235882	3.813429155	1/20/03	10:57	0:13:18	0:11:40		0.470814897
2	69	1080	7.063E-05	529	14.018	6.62066E-05	1.87476	0.002646284	74.9902	2.462806033	3.874999306	1/20/03	10:58	0:14:18	0:12:40		0.488193951
15	69	1080	0.00052972	529	14.018	0.00049855	14.0607	0.003144614	89.0509	2.924582165	4.336775437	1/20/03	11:03	0:19:48	0:18:10		0.574456265

6	69	1080	0.00028252	529	14.018	0.000264626	7.49902	0.00340964	96.5499	3.170862766	4.583056041	1/20/03	11:07	0:24:03	0:22:25	0.633113997
15	69	1080	0.00052972	529	14.018	0.00049655	14.0607	0.003906189	110.611	3.832636899	5.044832172	1/20/03	11:15	0:31:18	0:29:40	0.722284956
16	68	1080	0.00056504	528	14.018	0.000530656	15.0264	0.004436845	125.637	4.126132987	5.53632626	1/20/03	11:26	0:42:33	0:40:55	0.84212034
11	66	1080	0.00038846	528	14.018	0.000364626	10.3307	0.004601671	135.968	4.465410172	5.677603445	1/20/03	11:37	0:53:33	0:51:55	0.944722181
9	68	1080	0.00031783	526	14.018	0.000298494	8.45238	0.005100165	144.42	4.743000597	6.155193869	1/20/03	11:47	1:03:18	1:01:40	1.027131929
17	68	1079	0.00060035	528	14.005	0.0005633	15.9508	0.005663465	180.371	5.266652567	6.67904584	1/20/03	12:04	1:20:48	1:19:10	1.160459679
15	66	1079	0.00052972	528	14.005	0.000497029	14.0742	0.006160494	174.445	5.729074894	7.141266167	1/20/03	12:23	1:39:18	1:37:40	1.288488033
16	67	1078	0.00056504	527	13.992	0.000530676	15.0271	0.006691173	189.472	6.222589791	7.634763064	1/20/03	12:49	2:05:48	2:04:10	1.447987109
9	67	1078	0.00031783	527	13.992	0.000298507	8.45273	0.006989679	197.925	6.500191921	7.912385194	1/20/03	13:05	2:21:18	2:19:40	1.534600925
13	67	1078	0.00045909	527	13.992	0.000431176	12.2095	0.007420655	210.134	6.901172775	8.313386047	1/20/03	20:01	9:17:18	9:15:40	3.047678711
25	66	1082	0.00088267	526	14.044	0.000833644	23.6117	0.008254899	233.748	7.676822531	9.088815803	1/21/03	10:00	23:16:18	23:14:40	4.824071586
10	67	1092	0.00035315	527	14.174	0.000335981	9.5139	0.008590681	243.26	7.969075144	9.401266417	1/22/03	15:13	52:29:18	52:27:40	7.244883252
-6	66	1100	-0.0002119	526	14.278	-0.00020345	-5.7611	0.008387229	237.499	7.799871137	9.21206441	1/24/03	16:01	101:17:18	101:15:40	10.08421052
3	66	1099	0.00010594	528	14.265	0.000101248	2.86703	0.008488477	240.366	7.894029124	9.306222396	1/27/03	15:14	172:30:18	172:28:40	13.13411588
12	69	1084	0.00042376	529	14.070	0.000398711	11.2902	0.008887188	251.656	8.264818254	9.677011527	1/27/03	15:14	172:30:18	172:28:40	13.13411588
-16	66	1095	-0.000565	526	14.213	-0.00053803	-15.235	0.008349182	236.421	7.764470062	9.176663355	1/29/03	13:59	219:15:18	219:13:40	14.80726173
15	66	1084	0.00052972	526	14.070	0.000499332	14.1395	0.008648495	250.561	8.22883431	9.641027563	1/31/03	15:20	268:36:18	268:34:40	18.38917328
23	66	1075	0.00081224	526	13.953	0.000762173	21.5823	0.009610668	272.143	8.937632655	10.34962593	2/3/03	15:49	341:05:18	341:03:40	18.46857692
-11	67	1065	-0.0003685	527	14.083	-0.00036721	-10.398	0.009243457	261.745	8.596137972	10.00833124	2/5/03	15:42	388:58:18	388:56:40	19.72238463

DECANISTERED 2/07/03

SAMPLE: 594' to 596' (Tabo coal) in canister Mer E

DRY WEIGHT	lbs.	grams															
sample weight:	0.7847	355.936															
CONVERSION OF VOLUMES TO STP																	
RIG MEASUREMENTS			CONVERSION OF RIG MEASUREMENTS TO STP (cubic ft; @60 degrees; @14.7 psi)						CUMULATIVE VOLUMES		SCF/TON	SCF/TON					
measured cc	measured T (F)	measured P	cubic ft (@rig)	ABSOLUTE T (F) (@rig)	psia (@rig)	cubic ft (@STP)	cc (@STP)	cubic ft (@STP)	cc (@STP)	without lost gas	with lost gas	TIME OF MEASURE		off bottom	in canister	SQRT hrs. (since off bottom)	
3	69	1080	0.00010594	529	14.018	9.93099E-05	2.81213	9.93099E-05	2.81213	0.253112707	0.973171806	1/20/03	11:09	0:04:21	0:02:50	0.28925824	
7	69	1080	0.0002472	529	14.018	0.000231723	6.56164	0.000331033	9.37376	0.843709025	1.563768123	1/20/03	11:12	0:07:36	0:06:05	0.355902608	
1	69	1080	3.5315E-05	529	14.018	3.31033E-05	0.93736	0.000364136	10.3112	0.928079827	1.648139026	1/20/03	11:14	0:08:51	0:07:20	0.384057287	
6	69	1080	0.00021189	529	14.018	0.00019862	5.62427	0.000562758	15.9354	1.434305342	2.154364441	1/20/03	11:20	0:14:51	0:13:20	0.497493718	
8	68	1080	0.00021189	528	14.018	0.000198998	5.63492	0.000761752	21.5703	1.941489517	2.661548616	1/20/03	11:25	0:20:08	0:18:35	0.578791845	
7	66	1080	0.0002472	528	14.018	0.000232162	6.57407	0.000993914	28.1444	2.533204388	3.253263487	1/20/03	11:36	0:31:06	0:29:35	0.719953702	
5	66	1080	0.00017657	528	14.018	0.00016583	4.69576	0.001159744	32.8402	2.955857867	3.675916986	1/20/03	11:45	0:39:51	0:38:20	0.814984212	
3	66	1080	0.00010594	528	14.018	9.9498E-05	2.81746	0.001259242	35.6576	3.209449955	3.929509053	1/20/03	11:51	0:45:51	0:44:20	0.874188269	
3	68	1080	0.00010594	528	14.018	9.9498E-05	2.81746	0.00135874	38.4751	3.463042042	4.183101141	1/20/03	11:54	0:49:08	0:47:35	0.904617783	
2	68	1080	7.063E-05	526	14.018	6.6332E-05	1.87831	0.001425072	40.3534	3.632103434	4.352162533	1/20/03	11:58	0:51:36	0:50:05	0.92736185	
3	66	1079	0.00010594	528	14.005	9.94059E-05	2.81485	0.001524478	43.1682	3.865460714	4.605519813	1/20/03	12:02	0:57:36	0:56:05	0.979795897	
3	66	1079	0.00010594	528	14.005	9.94059E-05	2.81485	0.001623664	45.9631	4.138617994	4.858677093	1/20/03	12:09	1:03:51	1:02:20	1.031584542	
5	68	1079	0.00017657	528	14.005	0.000165676	4.69142	0.00178956	50.6745	4.561060126	5.281139226	1/20/03	12:21	1:16:36	1:15:05	1.12989675	
10	67	1078	0.00035315	527	13.992	0.000331674	9.39192	0.002121234	60.0664	5.40642273	6.126461829	1/20/03	12:46	1:43:06	1:41:35	1.31085214	
6	67	1078	0.00021189	527	13.992	0.000199004	5.63515	0.002320236	65.7018	5.913628292	6.633687391	1/20/03	13:08	2:00:51	1:59:20	1.419213397	
5	67	1078	0.00017657	527	13.992	0.000165837	4.69596	0.002486075	70.3976	6.336299594	7.056358692	1/20/03	13:23	2:17:51	2:16:20	1.515750639	
32	66	1082	0.00113007	526	14.044	0.00106732	30.223	0.003553396	100.621	9.056595237	9.776854336	1/20/03	20:03	8:57:51	8:56:20	2.994021821	
16	67	1092	0.00056504	527	14.174	0.00053757	15.2222	0.004090966	115.843	10.42670696	11.14676606	1/21/03	9:59	22:53:51	22:52:20	4.785133227	
9	66	1100	0.00031783	526	14.276	0.000305178	8.64163	0.004396143	124.484	11.20451993	11.92457903	1/22/03	15:14	52:08:51	52:07:20	7.221322594	
5	66	1094	0.00017657	526	14.200	0.00016796	4.75684	0.004564123	129.241	11.63265225	12.35271135	1/24/03	16:02	100:56:51	100:55:20	10.04726331	
-2	69	1084	-7.063E-05	529	14.070	-6.6452E-05	-1.8617	0.004497671	127.359	11.46326547	12.18334457	1/27/03	15:16	172:10:51	172:09:20	13.12176944	
-14	66	1095	-0.0004944	526	14.213	-0.00047077	-13.331	0.004026696	114.029	10.26341921	10.96347831	1/29/03	14:07	219:01:51	219:00:20	14.79969031	

DECANISTERED 1/29/03

SAMPLE: 645' to 647' (Weir-Pittsburg coal) in canister Mer F

DRY WEIGHT	lbs.	grams															
sample weight:	0.7061	320.27															
CONVERSION OF VOLUMES TO STP																	
RIG MEASUREMENTS			CONVERSION OF RIG MEASUREMENTS TO STP (cubic ft; @60 degrees; @14.7 psi)						CUMULATIVE VOLUMES		SCF/TON	SCF/TON					
measured cc	measured T (F)	measured P	cubic ft (@rig)	ABSOLUTE T (F) (@rig)	psia (@rig)	cubic ft (@STP)	cc (@STP)	cubic ft (@STP)	cc (@STP)	without lost gas	with lost gas	TIME OF MEASURE		off bottom	in canister	SQRT hrs. (since off bottom)	
10	66	1080	0.00035315	526	14.018	0.00033166	9.39153	0.00033166	9.39153	0.939447554	1.839729956	1/20/03	11:29	0:08:18	0:08:30	0.371931893	
2	66	1080	7.063E-05	526	14.018	6.6332E-05	1.87831	0.000397992	11.2696	1.127337065	2.027619467	1/20/03	11:30	0:09:18	0:07:30	0.393700394	
3	68	1080	0.00010594	528	14.018	9.9498E-05	2.81746	0.00049749	14.0873	1.409171331	2.309453733	1/20/03	11:33	0:11:48	0:10:00	0.443471158	
2	68	1080	7.063E-05	528	14.018	6.6332E-05	1.87831	0.000563622	15.9656	1.597060842	2.497343244	1/20/03	11:35	0:14:03	0:12:15	0.493907705	
5	68	1080	0.00017657	526	14.018	0.00016583	4.69576	0.000729652	20.6614	2.066784819	2.967067021	1/20/03	11:41	0:20:33	0:18:45	0.585234995	
7	68	1080	0.0002472	526	14.018	0.000232162	6.57407	0.000961614	27.2354	2.724397907	3.624660309	1/20/03	11:50	0:29:03	0:27:15	0.695820858	
5	66	1079	0.00017657	526	14.005	0.000165676	4.69142	0.00112749	31.9286	3.193666755	4.093969157	1/20/03	12:02	0:40:48	0:39:00	0.824621125	
3	66	1079	0.00010594	526	14.005	9.94059E-05	2.81485	0.001226896	34.7417	3.475260063	4.375542485	1/20/03	12:09	0:48:33	0:46:45	0.899536918	
8	66	1079	0.00021189	526	14.005	0.000198612	5.6297	0.001425708	40.3714	4.038406861	4.938689063	1/20/03	12:20	0:59:33	0:57:45	0.996242942	

est. lost gas (cc) = 8

TIME OF: at surface 1/20/03 11:05 elapsed time (off bottom to canistering)
off bottom 1/20/03 11:05 in canister 1/20/03 11:06 1.5 minutes 0.025 hours
TIME SINCE 0.158989867 SQRT (hrs)

est. lost gas (cc) = 9

TIME OF: at surface 1/20/03 11:21 elapsed time (off bottom to canistering)
off bottom 1/20/03 11:21 in canister 1/20/03 11:23 1.8 minutes 0.030 hours
TIME SINCE 0.173205081 SQRT (hrs)

10	67	1078	0.00035315	527	13.992	0.000331674	9.39192	0.001757382	49.7633	4.977893849	5.878178251	1/20/03	12:47	1:25:48	1:24:00	1.195826074
8	67	1078	0.00026252	527	13.992	0.000265339	7.51354	0.002022721	57.2789	5.729483584	6.829785985	1/20/03	13:06	1:45:18	1:43:30	1.32476413
6	67	1078	0.00021189	527	13.992	0.000199004	5.63515	0.002221725	62.912	6.293175885	7.193458286	1/20/03	13:22	2:00:48	1:59:00	1.418919777
28	66	1082	0.00098861	528	14.044	0.000933905	26.4451	0.00315583	89.3572	8.938520491	9.838802892	1/20/03	20:04	8:42:48	8:41:00	2.951835587
19	67	1092	0.00067098	527	14.174	0.000638365	18.0764	0.003793995	107.434	10.74672826	11.64701066	1/21/03	9:57	22:35:48	22:34:00	4.753595131
17	66	1100	0.00060035	526	14.278	0.000576447	16.3231	0.004370442	123.757	12.37954923	13.27983163	1/22/03	15:15	51:53:48	51:52:00	7.20393411
14	68	1094	0.00049441	528	14.200	0.000470343	13.3186	0.004840785	137.075	13.71182504	14.81210744	1/24/03	18:03	100:41:48	100:40:00	10.03477288
8	69	1084	0.00026252	529	14.070	0.000265807	7.52879	0.005106592	144.802	14.48474086	15.36502306	1/27/03	15:18	171:56:48	171:55:00	13.11284358
-14	68	1095	-0.0004944	528	14.213	-0.00047077	-13.331	0.004835819	131.271	13.13124704	14.03152945	1/29/03	14:08	218:46:48	218:45:00	14.79121361
8	68	1084	0.00026252	528	14.070	0.000266311	7.54105	0.00490213	136.812	13.68558864	14.78587104	1/31/03	15:21	287:59:48	287:58:00	16.37060374
20	66	1075	0.0007063	526	13.953	0.000662759	18.7672	0.005564869	157.58	15.76289817	16.86317857	2/3/03	15:49	340:27:48	340:26:00	18.45164853
-4	67	1086	-0.0001413	527	14.098	-0.00013385	-3.7846	0.005431235	153.795	15.38431247	16.28459487	2/5/03	15:46	388:24:48	388:23:00	19.70820472

DECANISTERED 2/05/03

SAMPLE: 766' to 769' (Riverton coal) in canister Mer G

DRY WEIGHT	lbs.	grams									est. lost gas (cc) =			TIME OF:	at surface 1/20/03	12:04 elapsed time (off bottom to canistering)
sample weight:	2.0853	945.662									35			off bottom	in canister	1.7 minutes
CONVERSION OF VOLUMES TO STP														1/20/03 12:04	1/20/03 12:05	0.028 hours
RIG MEASUREMENTS			CONVERSION OF RIG MEASUREMENTS TO STP (cubic ft; @60 degrees; @14.7 psi)					CUMULATIVE VOLUMES		SCF/TON	SCF/TON			TIME SINCE		0.188325082 SQRT (hrs)
measured cc	measured T (F)	measured P	cubic ft (@rig)	ABSOLUTE T (F) (@rig)	psia (@rig)	cubic ft (@STP)	cc (@STP)	cubic ft (@STP)	cc (@STP)	without lost gas	with lost gas	TIME OF MEASURE		off bottom	in canister	SQRT hrs. (since off bottom)
32	68	1079	0.00113007	528	14.005	0.001060329	30.0251	0.001060329	30.0251	1.018949779	2.202400745	1/20/03	12:11	0:07:27	0:05:45	0.352372908
6	68	1079	0.00021189	528	14.005	0.000198812	5.6297	0.001259141	35.6548	1.207627863	2.393078628	1/20/03	12:12	0:08:27	0:06:45	0.375277675
9	68	1079	0.00031783	528	14.005	0.000298218	8.44455	0.001557358	44.0993	1.493644988	2.879095954	1/20/03	12:14	0:10:12	0:08:30	0.412310562
6	68	1079	0.00021189	528	14.005	0.000198812	5.6297	0.00175817	49.729	1.684323072	2.869774037	1/20/03	12:15	0:11:42	0:10:00	0.441588043
7	68	1079	0.0002472	528	14.005	0.000231947	6.56798	0.001988117	56.297	1.908780836	3.092231802	1/20/03	12:17	0:13:12	0:11:30	0.469041576
10	68	1079	0.00035315	528	14.005	0.000331353	9.38283	0.00231947	65.6798	2.224577642	3.410028608	1/20/03	12:19	0:15:12	0:13:30	0.503322296
20	68	1079	0.0007063	528	14.005	0.000662706	18.7657	0.002982176	84.4455	2.860171254	4.04562222	1/20/03	12:24	0:20:12	0:18:30	0.580229839
26	68	1076	0.00091818	528	13.992	0.000860719	24.3728	0.003842895	108.818	3.885877175	4.87112814	1/20/03	12:32	0:28:27	0:28:45	0.688597609
14	68	1078	0.00049441	528	13.992	0.000463464	13.1238	0.004308359	121.942	4.130180362	5.315631328	1/20/03	12:38	0:33:57	0:32:15	0.75221894
15	66	1078	0.00052972	528	13.992	0.000496569	14.0612	0.004802928	136.003	4.806433778	5.791884743	1/20/03	12:44	0:40:27	0:38:45	0.821076529
28	67	1078	0.00098861	527	13.992	0.000926887	26.2974	0.005731815	162.301	5.497127073	6.682578038	1/20/03	12:56	0:51:57	0:50:15	0.930501657
11	67	1078	0.00038846	527	13.992	0.000364841	10.3311	0.006098456	172.632	5.847042296	7.032493261	1/20/03	13:01	0:56:57	0:55:15	0.97425185
14	67	1078	0.00049441	527	13.992	0.000464344	13.1487	0.006560799	185.78	6.292388943	7.477839908	1/20/03	13:08	1:04:42	1:03:00	1.0384283
31	67	1078	0.00109478	527	13.992	0.001028189	29.115	0.007588989	214.895	7.278513662	8.463984628	1/20/03	13:23	1:19:27	1:17:45	1.150724409
185	67	1092	0.00653324	527	14.174	0.006215656	176.007	0.013804644	390.903	13.23987927	14.42533023	1/21/03	9:55	21:50:57	21:49:15	4.874309218
192	68	1100	0.00678044	526	14.278	0.006510456	184.355	0.0203151	575.257	19.46398395	20.68943492	1/22/03	15:17	51:12:57	51:11:15	7.15852383
176	68	1094	0.0062154	526	14.200	0.005912883	167.434	0.026227983	742.691	25.1549634	26.34041436	1/24/03	18:05	100:00:57	99:59:15	10.00079164
126	69	1084	0.00452029	529	14.070	0.004252916	120.429	0.030480899	863.12	29.23388714	30.4193381	1/27/03	15:20	171:15:57	171:14:15	13.08685727
67	68	1095	0.00238609	528	14.213	0.002252985	63.7972	0.032733883	926.917	31.39469925	32.58015022	1/29/03	14:08	218:03:57	218:02:15	14.76705229
87	68	1084	0.00238609	528	14.070	0.002230352	63.1583	0.034984235	990.073	33.53380457	34.71925554	1/31/03	15:23	267:18:57	267:17:15	16.34979613
66	66	1075	0.00240141	526	13.953	0.002253382	63.8084	0.037217817	1053.88	35.694998	36.88044897	2/3/03	15:50	339:45:57	339:44:15	18.43273809
15	67	1086	0.00052972	527	14.098	0.000501203	14.1924	0.03771882	1068.07	38.17569818	37.36114715	2/5/03	15:46	387:41:57	387:40:15	19.69007787
9	66	1090	0.00031783	526	14.148	0.000302403	8.58307	0.038021223	1076.64	38.46572775	37.65117871	2/7/03	16:34	438:29:57	438:28:15	20.94037169
42	67	1083	0.00148322	527	14.057	0.001399492	39.629	0.039420715	1116.27	37.80796453	38.9934155	2/10/03	14:01	505:58:57	505:55:15	22.49331382
13	68	1091	0.00045909	528	14.161	0.000435549	12.3333	0.039858264	1128.6	38.22569504	39.411146	2/12/03	13:48	553:41:57	553:40:15	23.53081313
55	66	1088	0.00194231	528	13.882	0.001803882	51.0795	0.041880126	1179.88	39.95575846	41.14120943	2/14/03	18:25	606:20:57	606:19:15	24.62415819
-11	66	1084	-0.0003885	526	14.070	-0.00036757	-10.408	0.041292557	1169.27	39.60322872	40.78667788	2/17/03	13:58	673:53:57	673:52:15	25.95958792
4	68	1090	0.00014128	528	14.148	0.000133892	3.79139	0.041428449	1173.08	39.73184137	40.91709233	2/19/03	13:41	721:36:57	721:35:15	26.86290813
42	69	1073	0.00148322	529	13.927	0.001381327	39.1147	0.042807778	1212.18	41.0584587	42.24190787	2/21/03	14:44	770:39:57	770:38:15	27.76086874
-23	67	1090	-0.0008122	527	14.148	-0.00077134	-21.842	0.042036434	1190.33	40.31687138	41.50212232	2/23/03	22:24	826:19:57	826:18:15	28.74599972
-12	66	1100	-0.0004238	526	14.278	-0.0004069	-11.522	0.041629531	1178.81	39.92641481	41.11186578	2/24/03	14:10	842:05:57	842:04:15	29.01894496
38	69	1084	0.00134196	529	14.070	0.001262584	35.7523	0.042892115	1214.56	41.1373453	42.32279626	2/26/03	15:41	891:36:57	891:35:15	29.85993693
7	67	1083	0.0002472	527	14.057	0.000233249	6.60484	0.043125364	1221.17	41.36105143	42.5465024	2/27/03	18:48	918:41:57	918:40:15	30.31005059
4	68	1083	0.00014128	528	14.057	0.000133032	3.76705	0.043258396	1224.94	41.4886414	42.67409237	2/28/03	15:09	939:04:57	939:03:15	30.64445301
24	69	1078	0.00084756	529	13.988	0.000791537	22.4137	0.044049933	1247.35	42.24779533	43.4332463	3/3/03	13:54	1009:49:57	1009:48:15	31.77786179
-1	67	1075	-3.531E-05	527	13.953	-3.3075E-05	-0.9366	0.044016858	1246.41	42.21607339	43.40152435	3/4/03	19:38	1039:33:57	1039:32:15	32.24229882

DECANISTERED 3/05/03

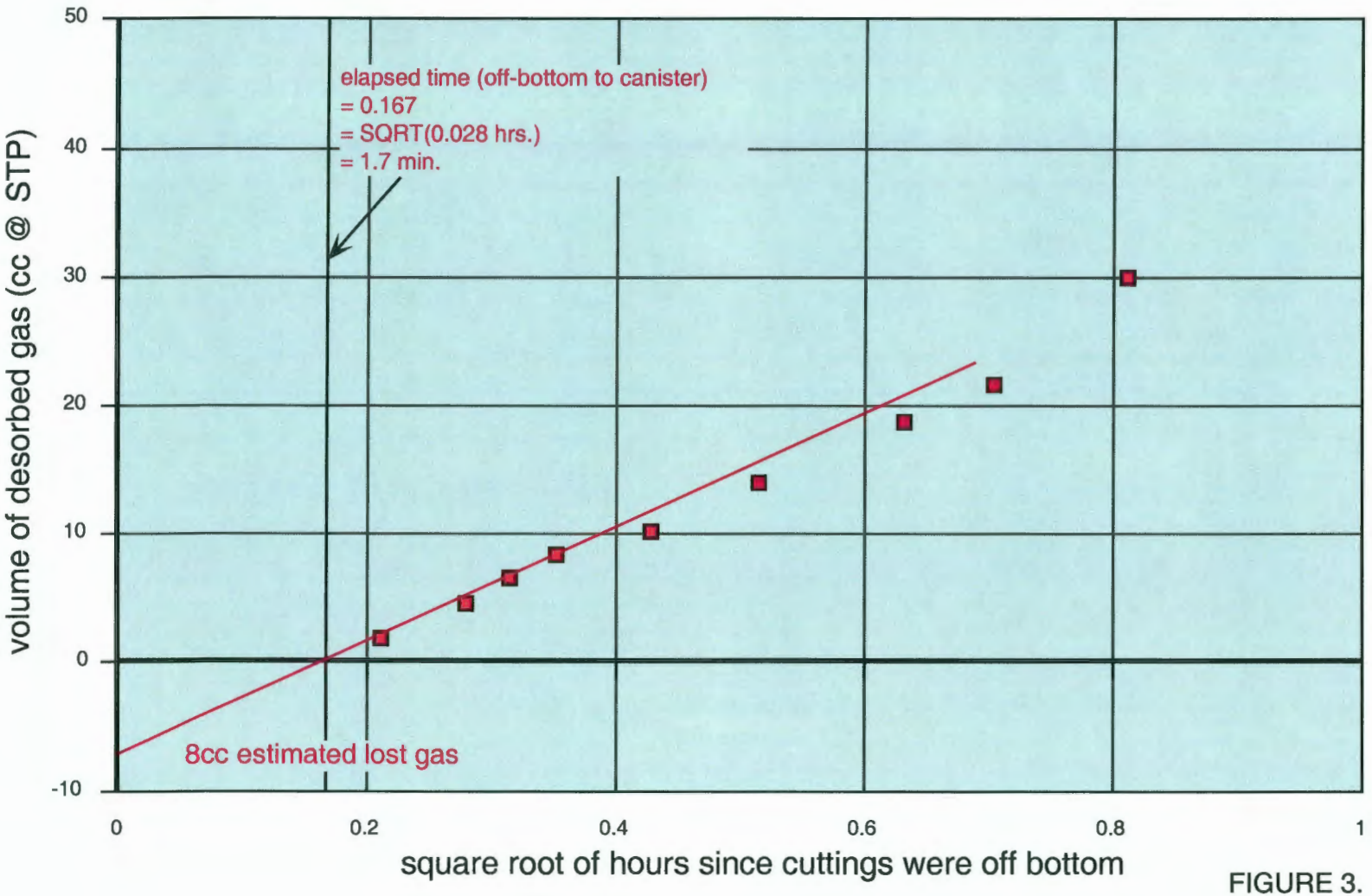
323' to 325' (Mulberry coal) in canister Mer A
Meritage KCM Brown #13-31; NW NE sec. 13-T.22S.-R.21E., Linn County, KS
elapsed time (off-bottom to canister)
= 0.167
= SQRT(0.028 hrs.)
= 1.7 min.
8cc estimated lost gas
volume of desorbed gas (cc @ STP)
square root of hours since cuttings were off bottom
50
40
30
20
10
0
-10
0
0.2
0.4
0.6
0.8
1

FIGURE 3.

422' to 428' (Little Osage Shale) in canister Mer B

Meritage KCM Brown #13-31; NW NE sec. 13-T.22S.-R.21E., Linn County, KS

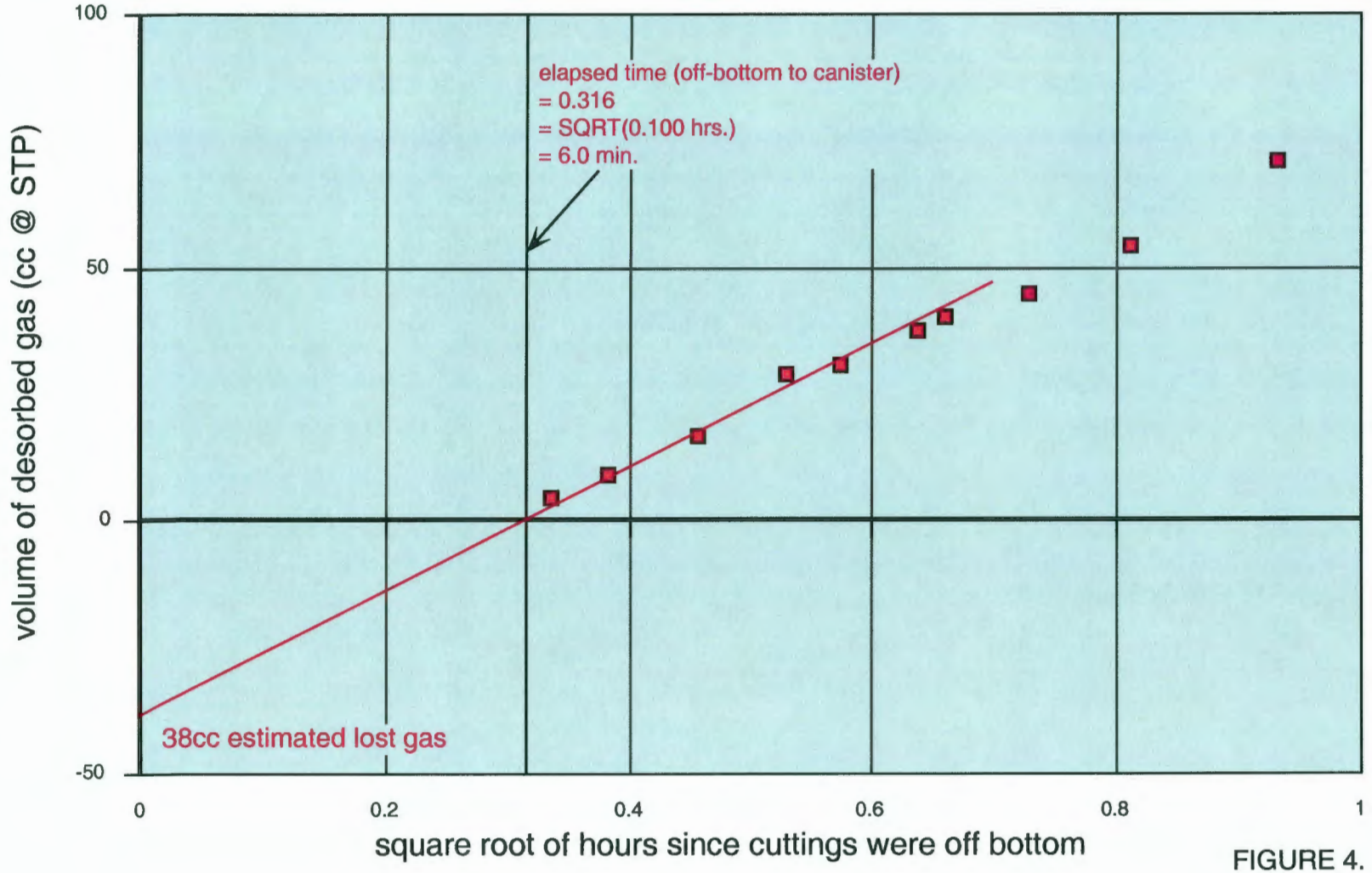

FIGURE 4.

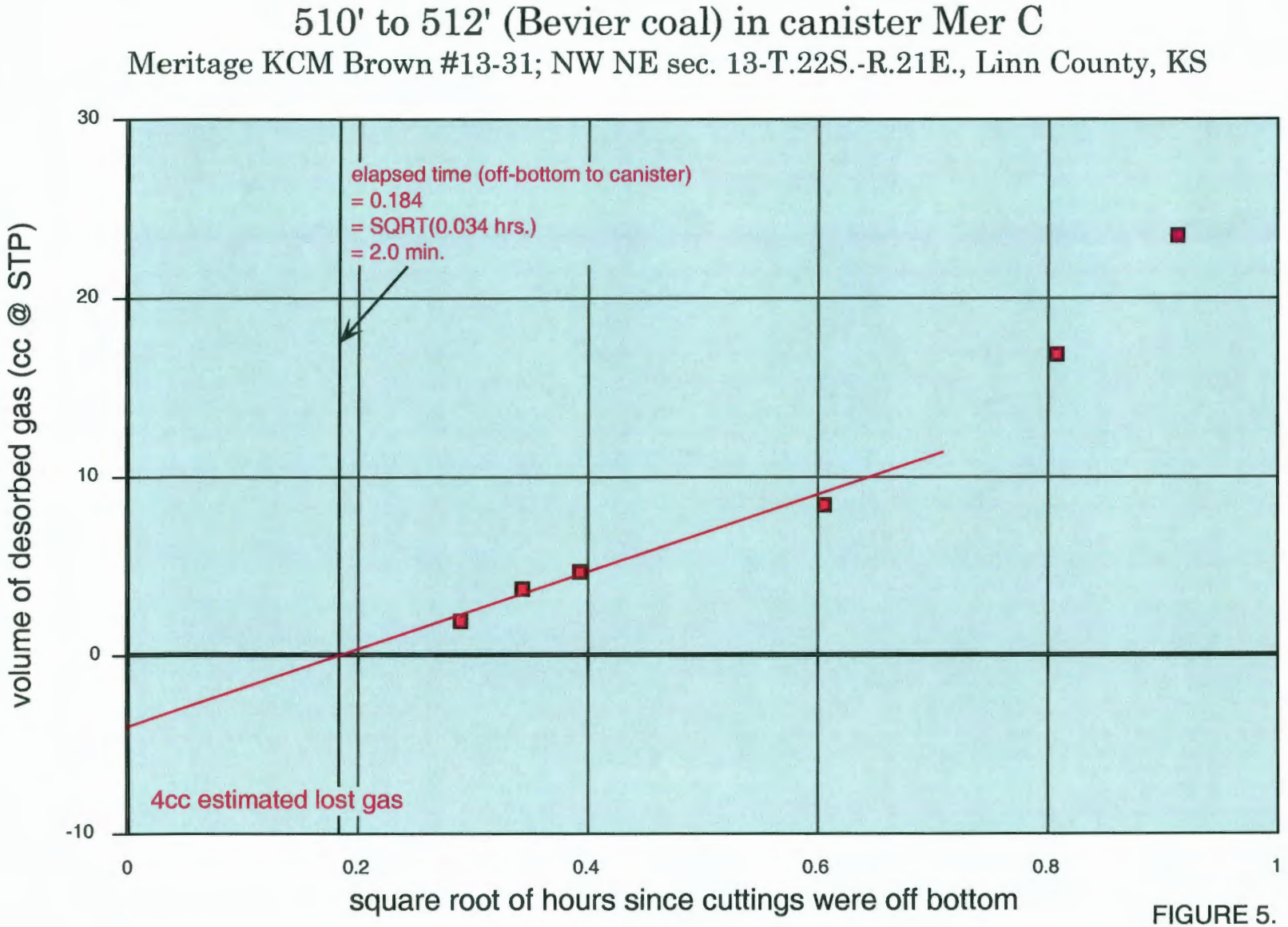
510' to 512' (Bevier coal) in canister Mer C
Meritage KCM Brown #13-31; NW NE sec. 13-T.22S.-R.21E., Linn County, KS
volume of desorbed gas (cc @ STP)
30
20
10
0
-10
elapsed time (off-bottom to canister)
= 0.184
= SQRT(0.034 hrs.)
= 2.0 min.
4cc estimated lost gas
0
0.2
0.4
0.6
0.8
1
square root of hours since cuttings were off bottom

FIGURE 5.

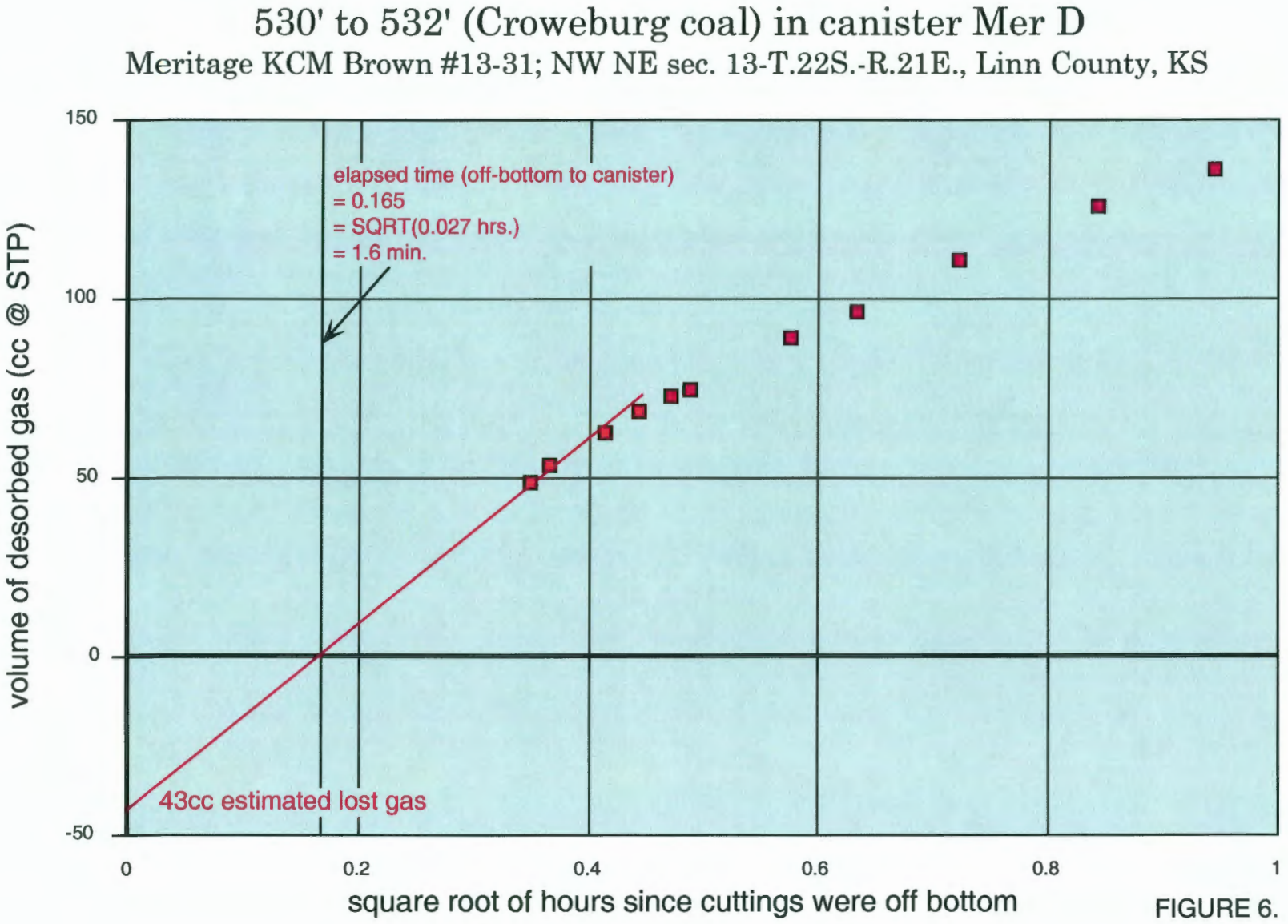
530' to 532' (Croweburg coal) in canister Mer D
Meritage KCM Brown #13-31; NW NE sec. 13-T.22S.-R.21E., Linn County, KS
150
100
50
0
-50
volume of desorbed gas (cc @ STP)
elapsed time (off-bottom to canister)
= 0.165
= SQRT(0.027 hrs.)
= 1.6 min.
43cc estimated lost gas
0
0.2
0.4
0.6
0.8
1
square root of hours since cuttings were off bottom

FIGURE 6.

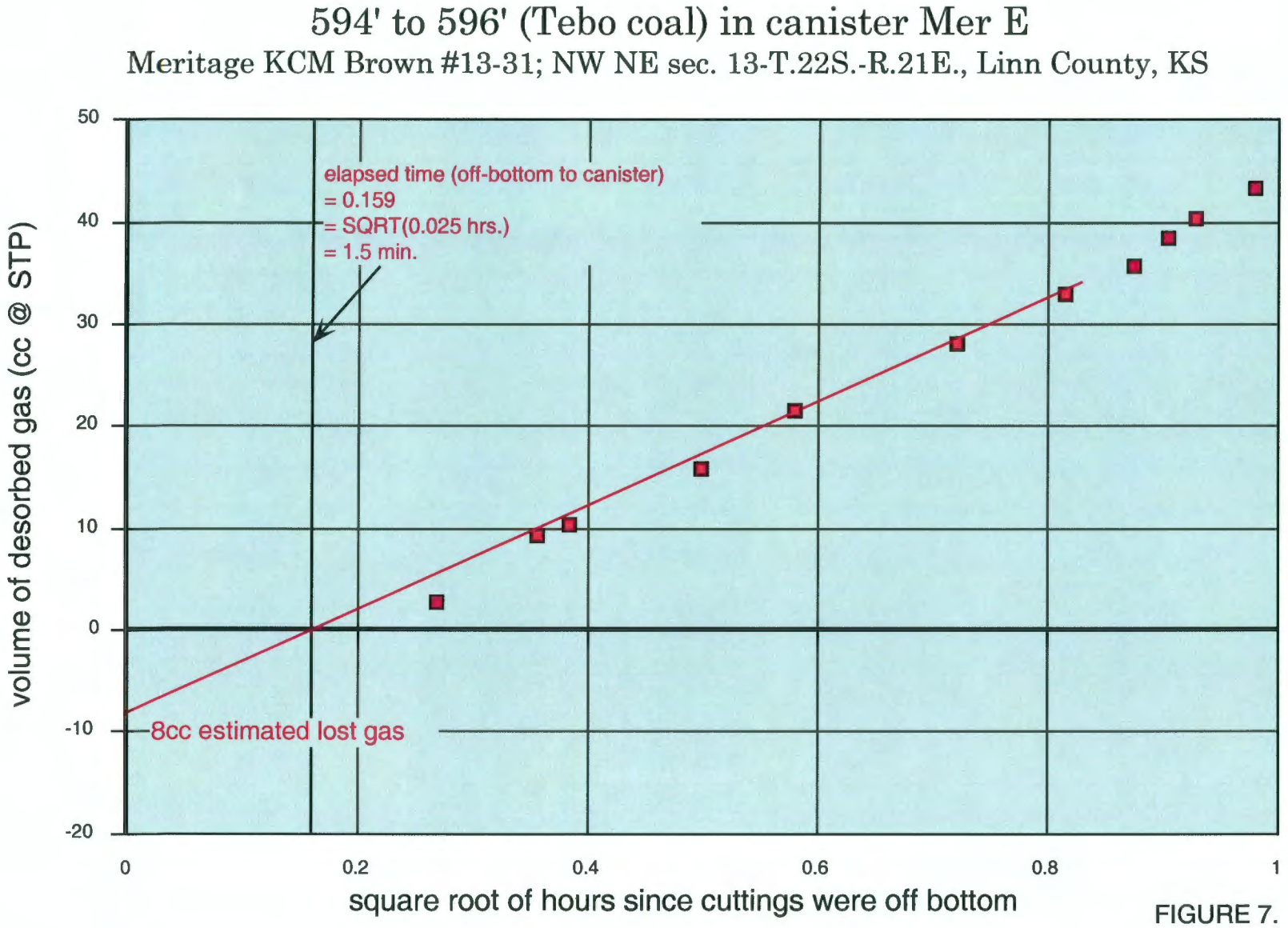
594' to 596' (Tebo coal) in canister Mer E
Meritage KCM Brown #13-31; NW NE sec. 13-T.22S.-R.21E., Linn County, KS
elapsed time (off-bottom to canister)
= 0.159
= SQRT(0.025 hrs.)
= 1.5 min.
8cc estimated lost gas
volume of desorbed gas (cc @ STP)
square root of hours since cuttings were off bottom
50
40
30
20
10
0
-10
-20
0
0.2
0.4
0.6
0.8
1

FIGURE 7.

645' to 647' (Weir-Pittsburg coal) in canister Mer F

Meritage KCM Brown #13-31; NW NE sec. 13-T.22S.-R.21E., Linn County, KS

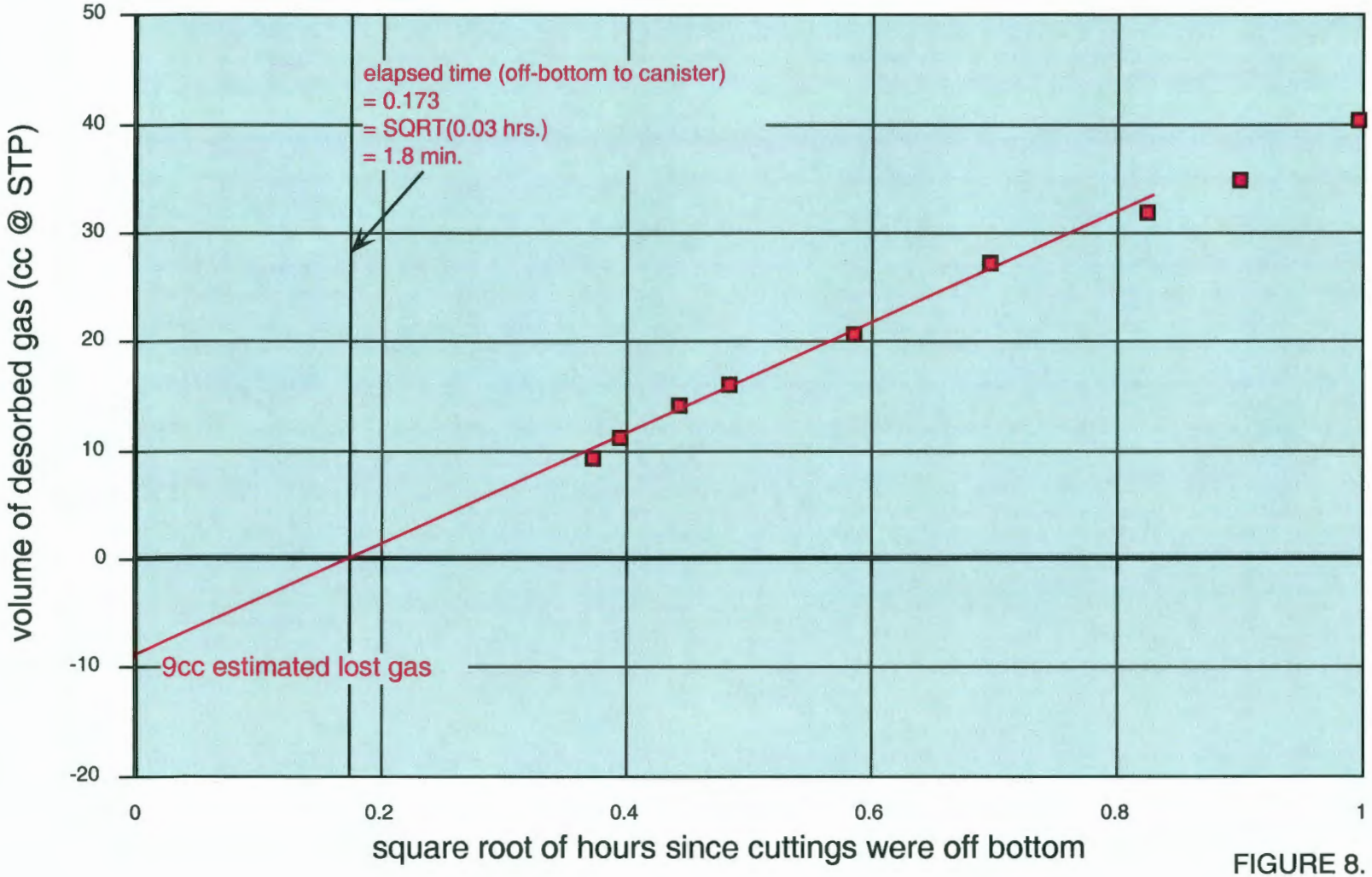

FIGURE 8.

766' to 769' (Riverton coal) in canister Mer G

Meritage KCM Brown #13-31; NW NE sec. 13-T.22S.-R.21E., Linn County, KS

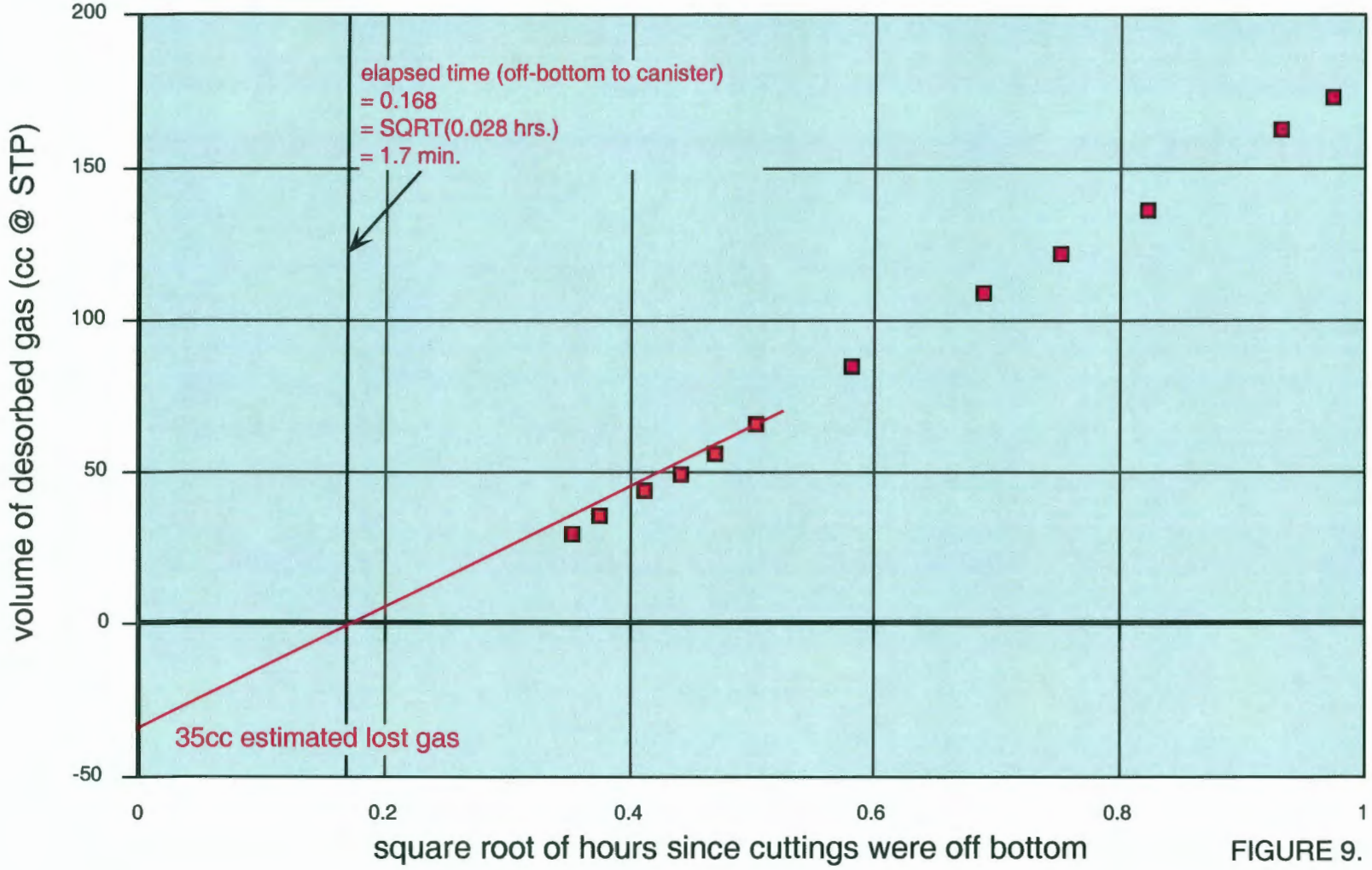

FIGURE 9.

Desorption Characteristics of Cuttings Samples

Meritage KCM #13-31 Brown; NW NE sec. 13-T.22S.-R.21E., Linn County, KS

LITHOLOGIC COMPONENT SENSITIVITY ANALYSIS for calculation of gas content of Mulberry coal at 323-325'

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

total gas desorbed = 796 ccs

TOTAL DRY WEIGHT OF SAMPLE = 357.47 grams
$\text{weight}_{\text{light-colored lithologies}}$ = 3.99 grams (1.1%)
$\text{weight}_{\text{dark shale}}$ = 80.99 grams (22.7%)
weight_{coal} = 272.49 grams (76.2%)

sieve size	*grams*	*% coal / % dark shale / % light-colored liths*
>0.0930"	153.34	70.64% / 27.99% / 1.37%
>0.0661"	105.28	79.97% / 19.15% / 0.88%
>0.0460"	72.04	80.24% / 18.54% / 1.22%
>0.0331"	17.95	84.62% / 15.38% / 0.00%
<0.0331"	8.86	78.87% / 20.26% / 0.87%
	357.47 TOTAL	

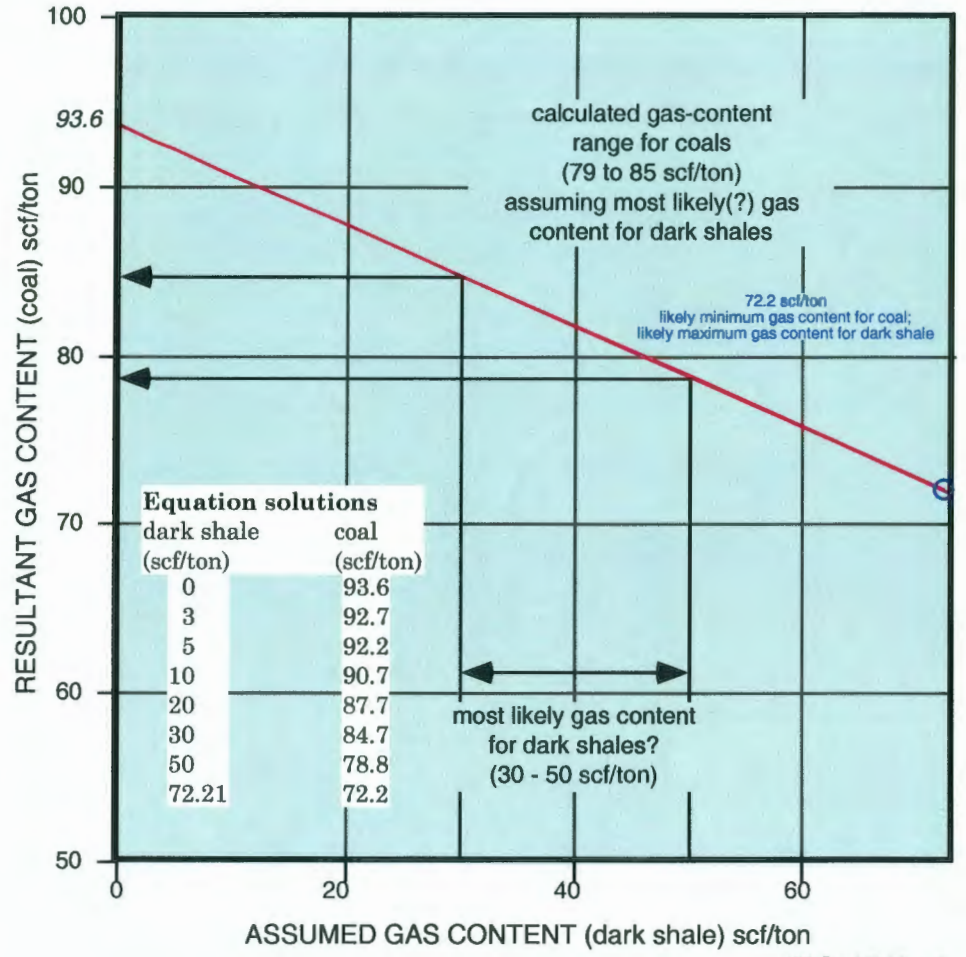

FIGURE 10.

Desorption Characteristics of Cuttings Samples

Meritage KCM #13-31 Brown; NW NE sec. 13-T.22S.-R.21E., Linn County, KS

LITHOLOGIC COMPONENT SENSITIVITY ANALYSIS for calculation of gas content of Little Osage Shale at 422-428'

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

total gas desorbed = 610 ccs

TOTAL DRY WEIGHT OF SAMPLE = 1036.42 grams
$\text{weight}_{light\text{-}colored\ lithologies}$ = 67.10 grams (6.5%)
$\text{weight}_{dark\ shale}$ = 969.32 grams (93.5%)
weight_{coal} = 0.00 grams (0.0%)

sieve size	*grams*	*% coal / % dark shale / % light-colored liths*
>0.0930"	623.96	0.00% / 93.12% / 6.88%
>0.0661"	192.05	0.00% / 91.46% / 8.54%
>0.0460"	136.50	0.00% / 96.74% / 3.26%
>0.0331"	54.95	0.00% / 96.84% / 3.16%
<0.0331"	28.96	0.00% / 94.54% / 5.46%
	1036.42 TOTAL	

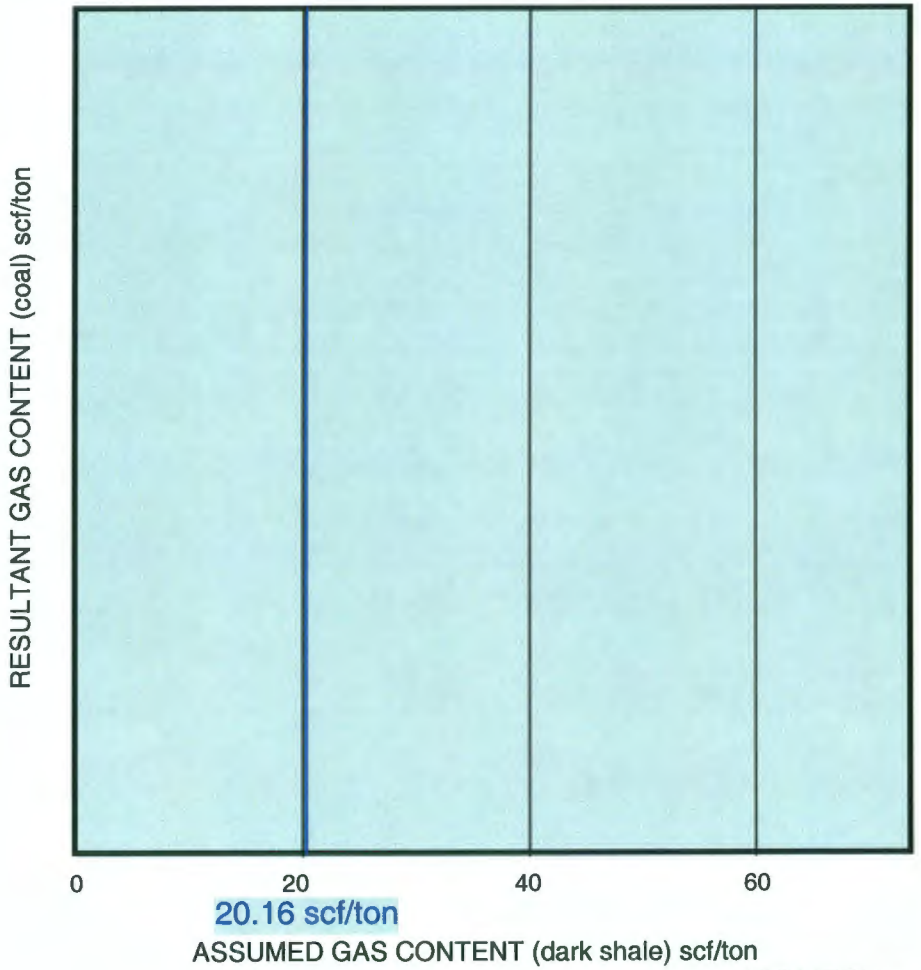

FIGURE 11.

Desorption Characteristics of Cuttings Samples

Meritage KCM #13-31 Brown; NW NE sec. 13-T.22S.-R.21E., Linn County, KS

LITHOLOGIC COMPONENT SENSITIVITY ANALYSIS for calculation of gas content of Bevier coal at 510-512'

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

total gas desorbed = 188 ccs

TOTAL DRY WEIGHT OF SAMPLE = 208.33 grams

$\text{weight}_{\text{light-colored lithologies}}$ = 0.62 grams (0.3%)

$\text{weight}_{\text{dark shale}}$ = 55.36 grams (26.6%)

weight_{coal} = 152.35 grams (73.1%)

sieve size	*grams*	*% coal / % dark shale / % light-colored liths*
>0.0930"	94.58	75.95% / 23.93% / 0.12%
>0.0661"	67.86	75.38% / 24.50% / 0.12%
>0.0460"	36.19	63.76% / 35.09% / 1.15%
>0.0331"	7.60	63.56% / 36.44% / 0.00%
<0.0331"	2.10	69.66% / 29.99% / 0.35%
	208.33 TOTAL	

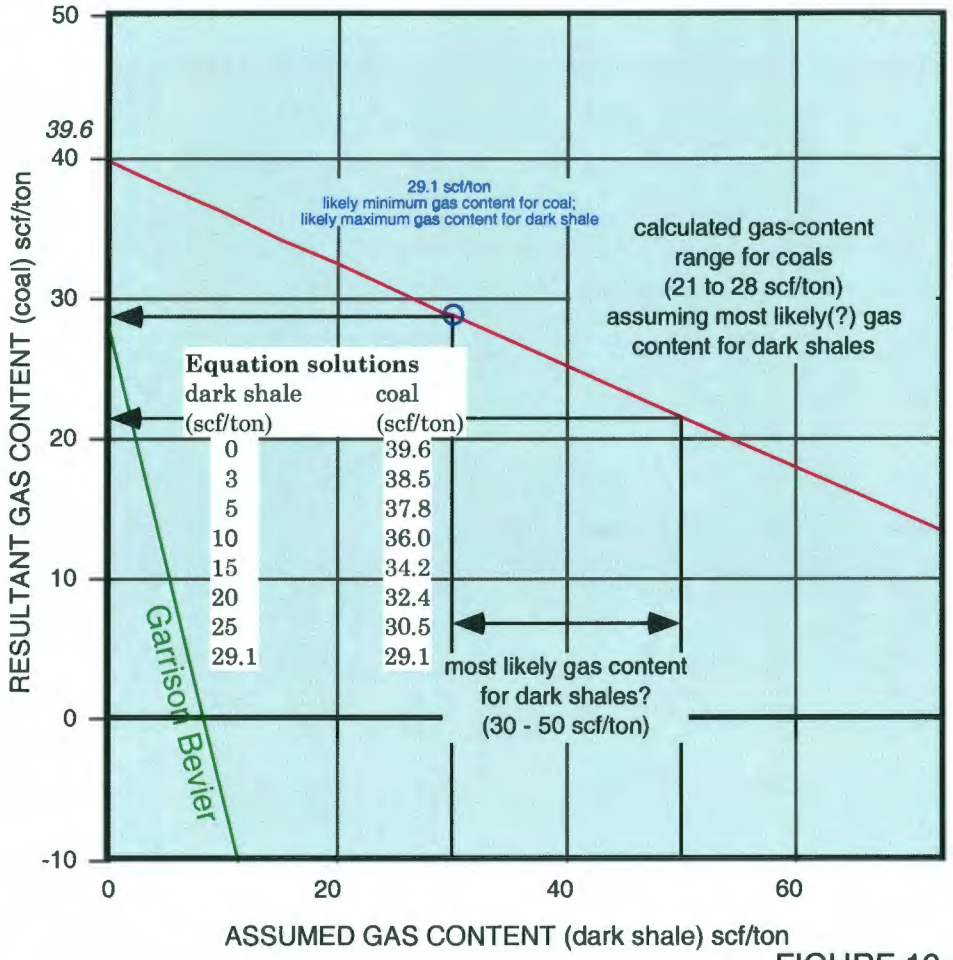

FIGURE 12.

Desorption Characteristics of Cuttings Samples

Meritage KCM #13-31 Brown; NW NE sec. 13-T.22S.-R.21E., Linn County, KS

LITHOLOGIC COMPONENT SENSITIVITY ANALYSIS for calculation of gas content of Croweburg "coal" at 530-532'

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

total gas desorbed = 315 ccs

TOTAL DRY WEIGHT OF SAMPLE = 1043.43 grams
$\text{weight}_{\text{light-colored lithologies}}$ = 67.93 grams (6.5%)
$\text{weight}_{\text{dark shale}}$ = 975.50 grams (93.5%)
weight_{coal} = 0.00 grams (0.0%)

sieve size	*grams*	*% coal / % dark shale / % light-colored liths*
>0.0930"	596.04	0.00% / 93.62% / 6.38%
>0.0661"	176.86	0.00% / 92.65% / 7.35%
>0.0460"	153.16	0.00% / 94.05% / 5.95%
>0.0331"	72.55	0.00% / 93.37% / 6.63%
<0.0331"	44.82	0.00% / 93.42% / 6.58%
	1043.43 TOTAL	

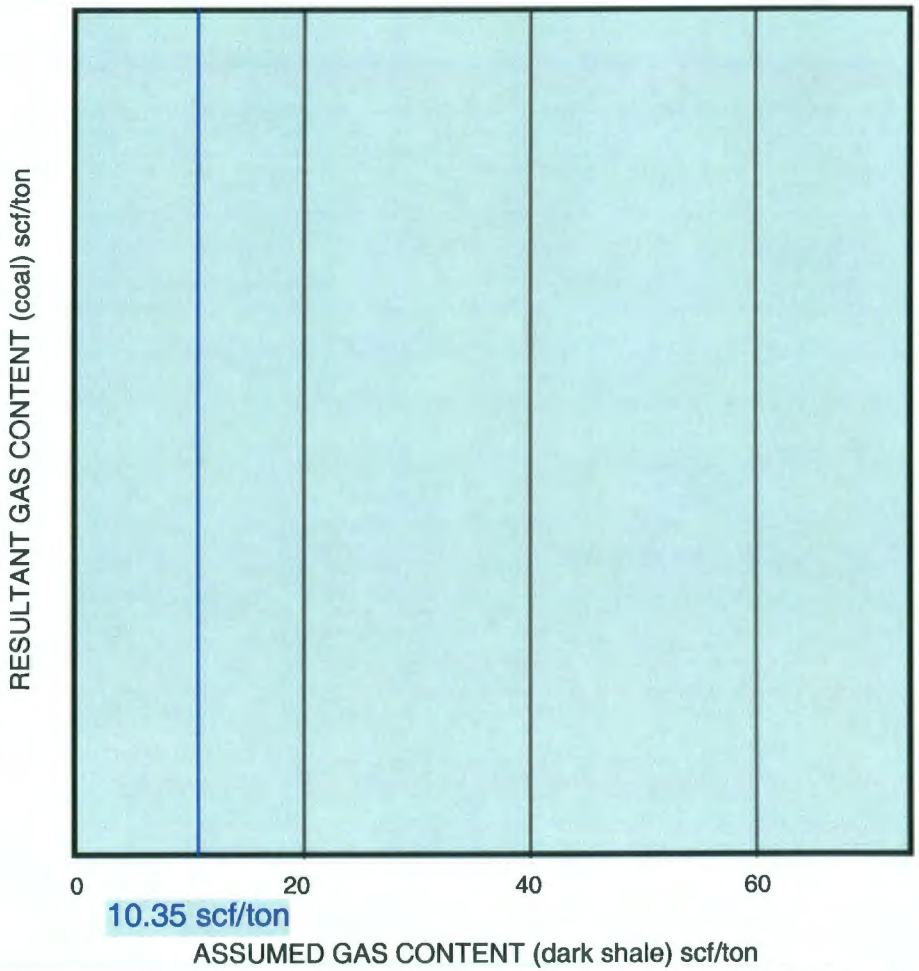

FIGURE 13.

Desorption Characteristics of Cuttings Samples

Meritage KCM Brown #13-31; NW NE sec. 13-T.22S.-R.21E., Linn County, KS

LITHOLOGIC COMPONENT SENSITIVITY ANALYSIS for calculation of gas content of Tebo coal from 594-596'

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

total gas desorbed = 137 ccs

TOTAL DRY WEIGHT OF SAMPLE = 362.71 grams
$\text{weight}_{light\text{-}colored\ lithologies}$ = 6.77 grams (1.9%)
$\text{weight}_{dark\ shale}$ = 242.00 grams (66.7%)
weight_{coal} = 113.94 grams (31.4%)

sieve size	*grams*	*% coal / % dark shale / % light-colored liths*
>0.0930"	238.71	23.14% / 75.57% / 1.29%
>0.0661"	76.39	45.75% / 53.20% / 1.05%
>0.0460"	39.79	49.84% / 44.41% / 5.75%
>0.0331"	5.64	52.94% / 37.91% / 9.15%
<0.0331"	2.18	42.92% / 52.77% / 4.31%
	362.71 TOTAL	

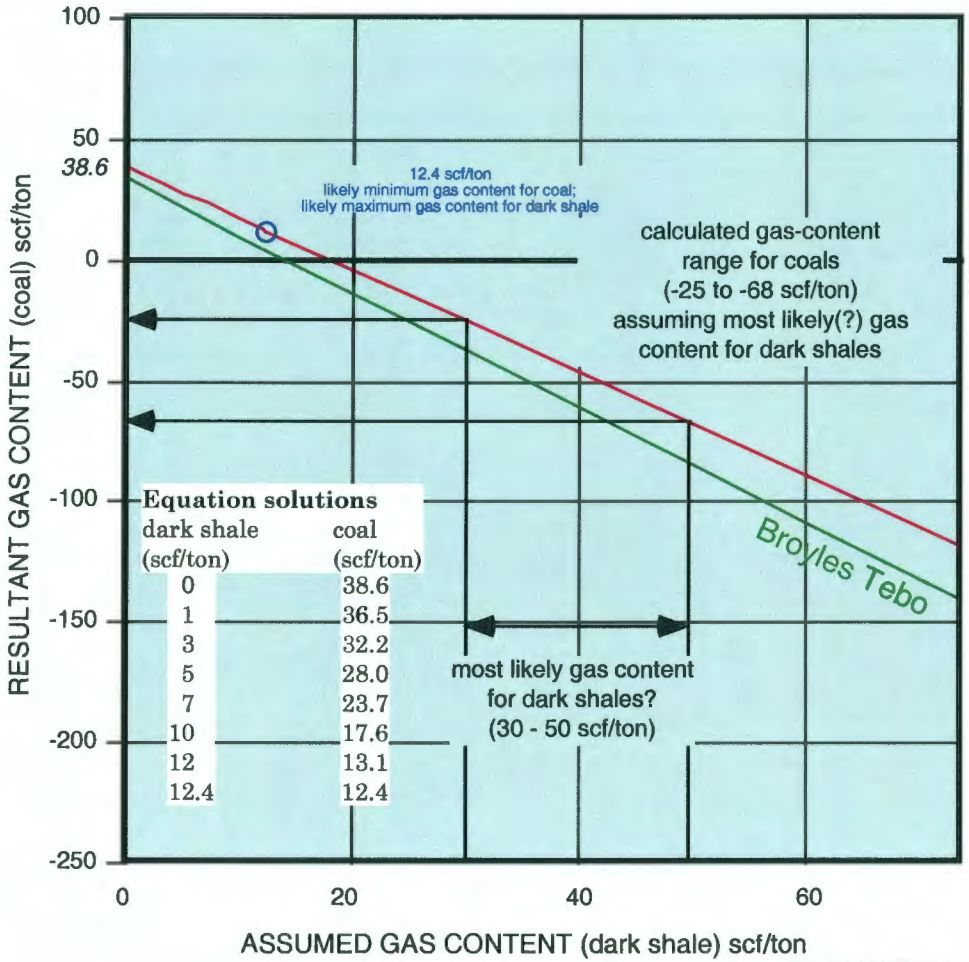

FIGURE 14.

Desorption Characteristics of Cuttings Samples

Meritage KCM Brown #13-31; NW NE sec. 13-T.22S.-R.21E., Linn County, KS

LITHOLOGIC COMPONENT SENSITIVITY ANALYSIS for calculation of gas content of Weir-Pittsburg coal from 645-647'

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

total gas desorbed = 167 ccs

TOTAL DRY WEIGHT OF SAMPLE = 336.93 grams
$\text{weight}_{\text{light-colored lithologies}}$ = 16.66 grams (4.9%)
$\text{weight}_{\text{dark shale}}$ = 184.57 grams (54.8%)
weight_{coal} = 135.27 grams (40.3%)

sieve size	*grams*	*% coal / % dark shale / % light-colored liths*
>0.0930"	228.62	28.71% / 65.26% / 6.03%
>0.0661"	73.42	64.64% / 32.96% / 2.40%
>0.0460"	31.02	65.10% / 32.26% / 2.64%
>0.0331"	2.56	65.15% / 25.76% / 9.09%
<0.0331"	1.32	55.90% / 39.06% / 5.04%
	336.93 TOTAL	

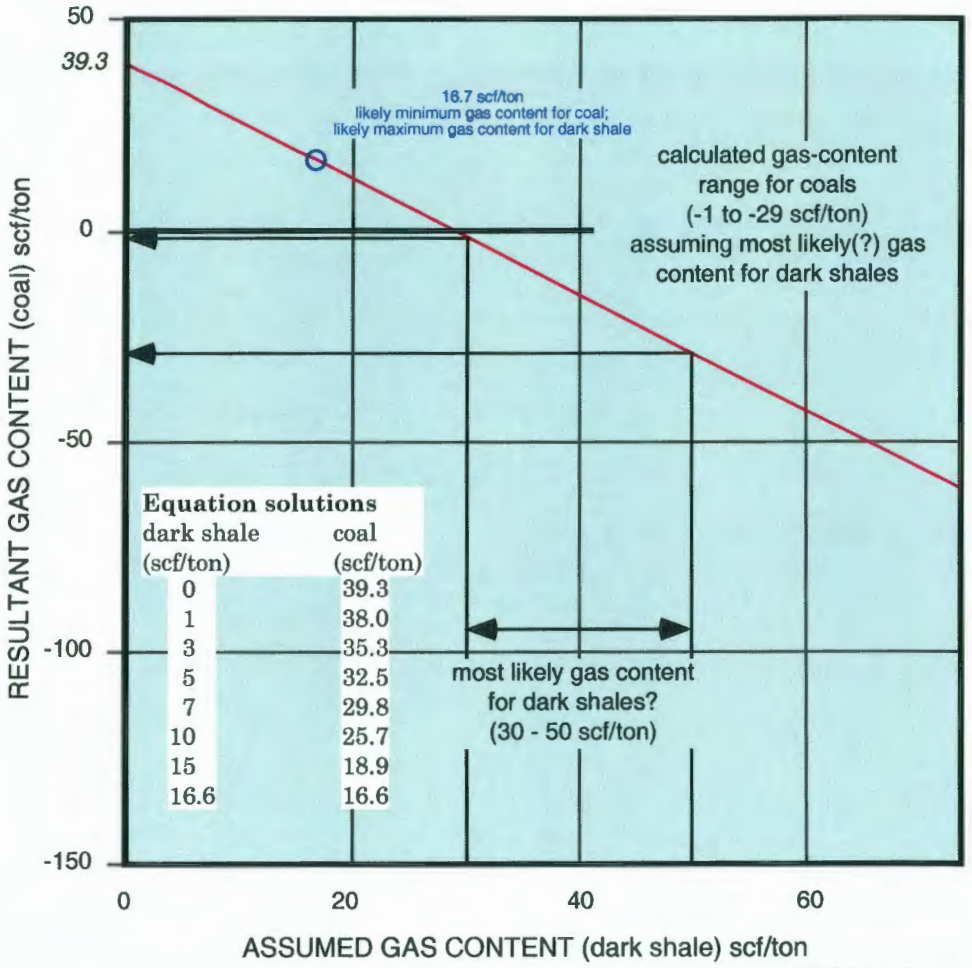

FIGURE 15.

Desorption Characteristics of Cuttings Samples

Meritage KCM Brown #13-31; NW NE sec. 13-T.22S.-R.21E., Linn County, KS

LITHOLOGIC COMPONENT SENSITIVITY ANALYSIS for calculation of gas content of Riverton coal from 766-769'

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

total gas desorbed = 1282 ccs

TOTAL DRY WEIGHT OF SAMPLE = 989.79 grams
$\text{weight}_{light\text{-}colored\ lithologies}$ = 43.91 grams (4.4%)
$\text{weight}_{dark\ shale}$ = 300.99 grams (30.4%)
weight_{coal} = 644.89 grams (65.2%)

sieve size	*grams*	*% coal / % dark shale / % light-colored liths*
>0.0930"	490.62	57.80% / 36.45% / 5.76%
>0.0661"	230.94	71.30% / 25.53% / 3.17%
>0.0460"	178.71	76.20% / 20.32% / 3.48%
>0.0331"	60.28	67.27% / 30.91% / 1.82%
<0.0331"	29.24	68.14% / 28.30% / 3.55%
	989.79 TOTAL	

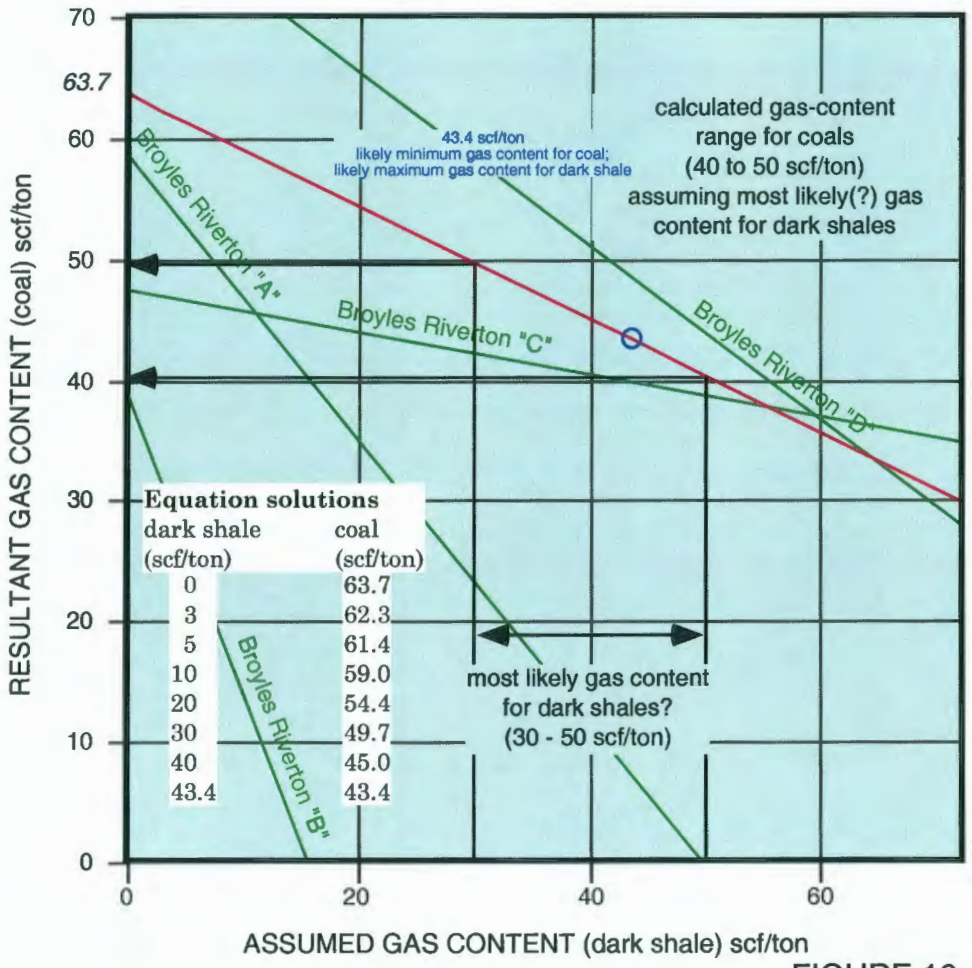

FIGURE 16.

Desorption Characteristics of Cuttings Samples

Meritage KCM Brown #13-31; NW NE sec. 13-T.22S.-R.21E., Linn 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
Mulberry	76%	92.7	93.6	72.2
Little Osage Sh.	0%	------	20.2	20.2
Bevier	73%	38.5	39.6	29.1
Croweburg	0%	------	10.3	10.3
Tebo	31%	32.2	38.6	12.4
Weir-Pittsburg	40%	35.3	39.3	16.7
Riverton	65%	62.3	63.7	43.4

surface
100'
200'
300'
323'-325' Mulberry
400'
422'-428' Little Osage Shale
500'
510'-512' Bevier
530'-532' Croweburg
594'-596' Tebo
645'-647' Weir-Pittsburg
700'
766'-769' Riverton
800'

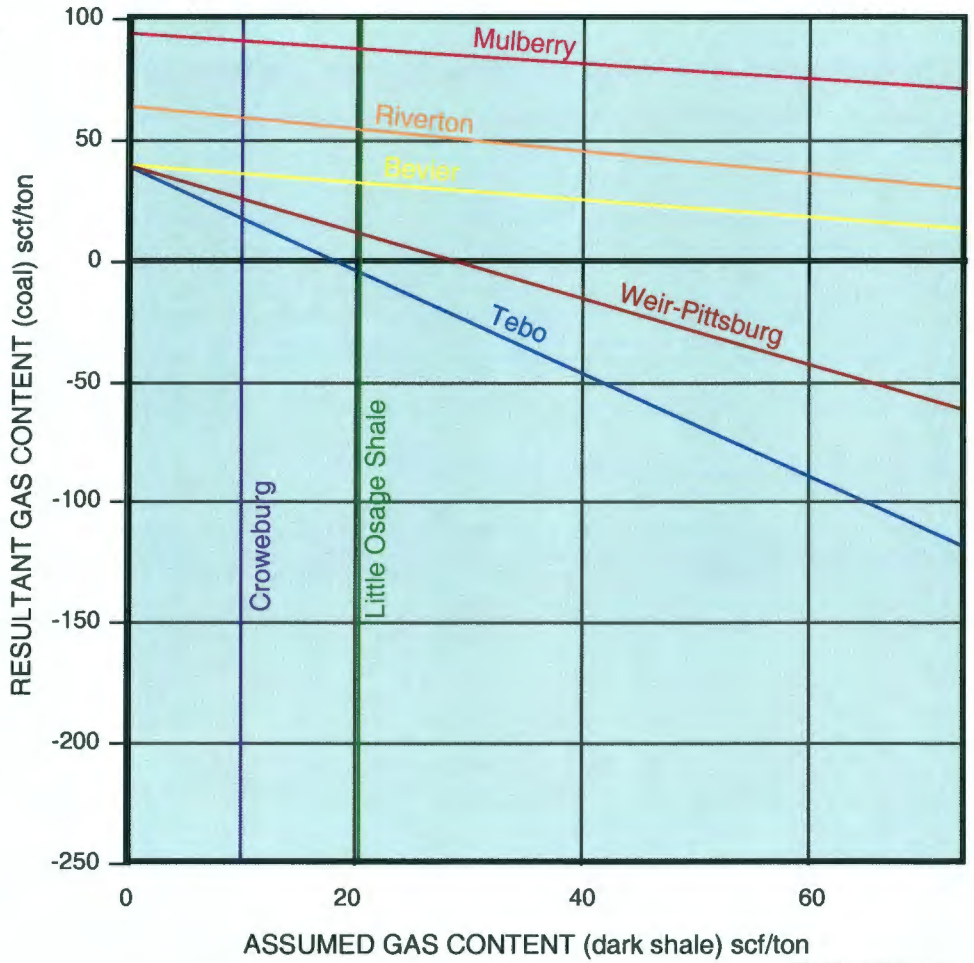

FIGURE 17.

Desorption Characteristics of Cuttings Samples (ie., coal & dark shale)

Meritage KCM Brown #13-31, NW NE 13-T.22S.-R.21E. Linn County, KS

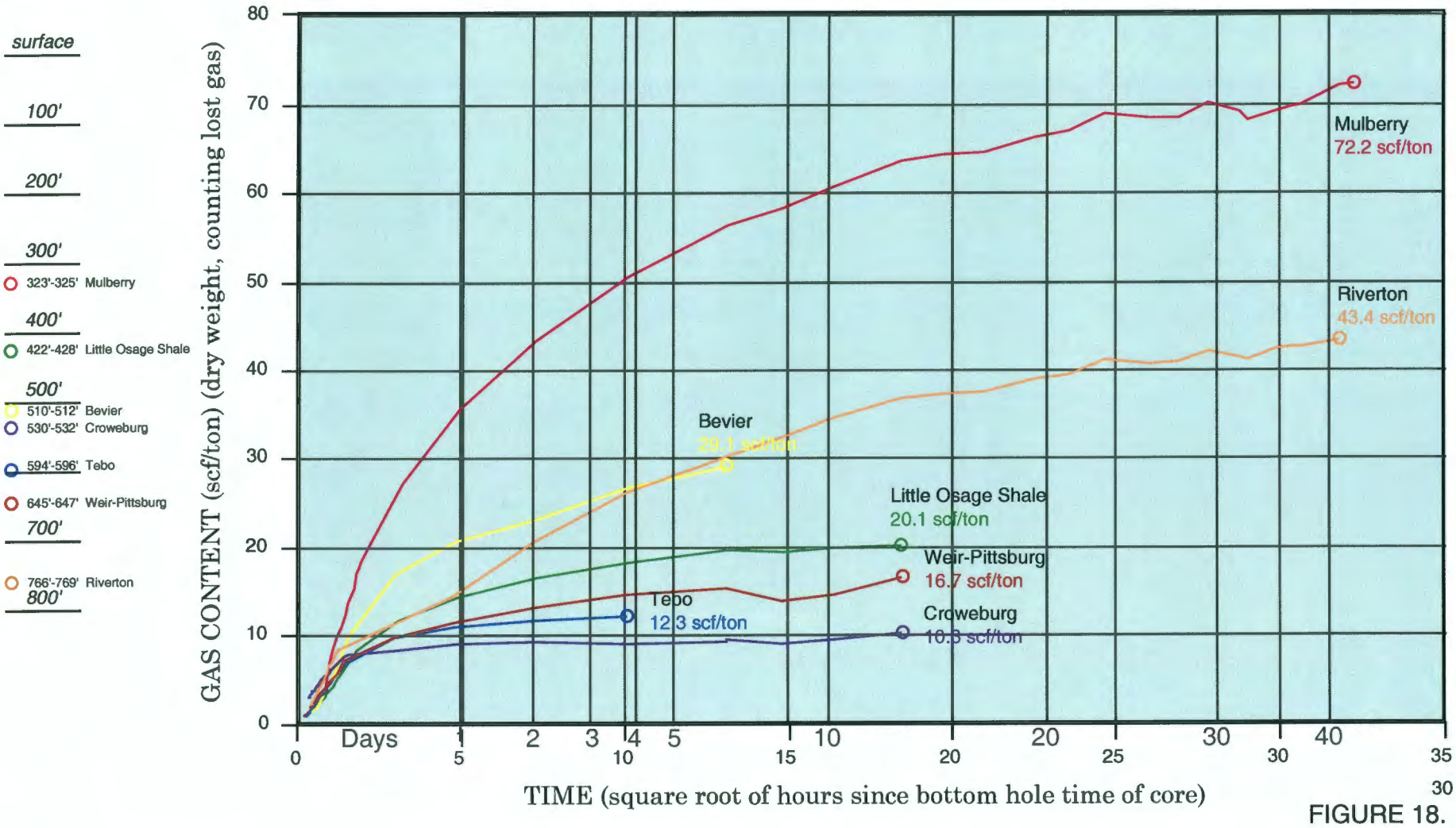

FIGURE 18.