

ANALYSIS OF KANSAS CITY, MARMATON, AND CHEROKEE GROUP  
CUTTINGS SAMPLES FOR GAS CONTENT  
-- MERITAGE KCM  
#22-44 KIPPER; SE SE sec. 22-T.19S.-R.19E.; ANDERSON COUNTY, KANSAS

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DECEMBER, 2003  
(to be held proprietary to September 29, 2005)

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## SUMMARY

Eight cuttings samples from the Pennsylvanian Kansas City Group, Marmaton Group, and Cherokee Group were collected from the Meritage KCM #22-44 Kipper well, SE SE sec. 22-T.19S.-R.19E., in Anderson County, KS. The samples calculate as having the following gas contents:

- Hushpuckney Shale at 399' to 403' depth (15.8 scf/ton)<sup>1</sup>
- Mulberry coal at 656' to 660' depth (24.2 scf/ton)<sup>2</sup>
- Little Osage Shale at 739' to 744' depth (2.5 scf/ton)<sup>1</sup>
- Dry Wood coal at 1058' to 1060' depth (65.7 scf/ton)<sup>2</sup>
- Rowe coal at 1080' to 1082' depth (92.8 scf/ton)<sup>2</sup>
- Riverton "A" coal at 1114' to 1116' depth (----- scf/ton)<sup>3</sup>
- Riverton "B & C" coals at 1116' to 1118' depth (74.2 scf/ton)<sup>2</sup>
- Riverton "D" coal at 1123' to 1125' depth (76.8 scf/ton)<sup>2</sup>

<sup>1</sup>no coal in sample

<sup>2</sup>assumes that accompanying dark shales desorb 3 scf/ton

<sup>3</sup>no valid results due to leak in canister valve

## BACKGROUND

The Meritage KCM #22-44 Kipper well, SE SE sec. 22-T.19S.-R.19E., in Anderson 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 September 29, 2003 by K.D. Newell and T.A. Johnson 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., shales in the Kansas City Group; coals in the Marmaton Group and 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.

Eight cuttings samples from the Pennsylvanian Kansas City Group, Marmaton Group, and Cherokee Group were collected:

- Hushpuckney Shale at 399' to 403' depth (426 grams dry wt.)
- Mulberry coal at 656' to 660' depth (488 grams dry wt.)
- Little Osage Shale at 739' to 744' depth (351 grams dry wt.)
- Dry Wood coal at 1058' to 1060' depth (1414 grams dry wt.)
- Rowe coal at 1080' to 1082' depth (1711 grams dry wt.)
- Riverton "A" coal at 1114' to 1116' depth (1705 grams dry wt.)
- Riverton "B & C" coals at 1116' to 1118' depth (1259 grams dry wt.)
- Riverton "D" coal at 1123' to 1125' depth (932 grams dry wt.)

The cuttings were caught in kitchen strainers as they exited the air-stream pipe emptying to the mud pit. The samples were then washed in water while in the kitchen strainers to rid them of as much drilling mud as possible before the cuttings were placed in desorption canisters.

Temperature baths for the desorption canisters were on site, with temperature kept at 70 °F for the Hushpuckney sample, 72 °F for the Mulberry and Little Osage samples, and 74 °F for the deeper samples. The canistered samples at the end of the day were transported to the laboratory at the Kansas Geological Survey in Lawrence, KS and desorption measurements were continued at approximately the same temperatures. Desorption measurements were periodically made until the canisters produced negligible gas with daily 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 reading the difference in water level using the volumetric scale on the side of the burette.

The desorption canisters used were commercial and home made canisters. The commercial canisters were from SSD, Inc. in Grand Junction, CO and PEL-I-CANS (by J.R. Levine) in Richardson, TX. The SSD canisters were 12.5 inches high (32 cm), 3 1/2 inches (9 cm) in diameter, and enclosed a volume of approximately 150 cubic inches (2450 cm<sup>3</sup>). The PEL-I-CANS 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<sup>3</sup>). 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<sup>3</sup>). Formation water obtained from a nearby well was also placed in the canisters, with biocide (i.e., zephryn chloride) also added.

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 pounds per square inch (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:

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

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  $P_{\text{stp}}$ ,  $V_{\text{stp}}$ , and  $T_{\text{stp}}$ , respectively, are pressure, volume and temperature at standard temperature and pressure, where standard temperature is degrees Rankine ( $^{\circ}\text{R} = 460 + ^{\circ}\text{F}$ ).  $P_{\text{rig}}$ ,  $V_{\text{rig}}$ , and  $T_{\text{rig}}$ , 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  $V_{\text{stp}}$  becomes:

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

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 samples evolved all of their gas. In the case of well cuttings from Meritage KCM #22-44 Kipper well, the maximum time of desorption was 34 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 the moment that the rock is cut and its cuttings 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 surface 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. The lighter-colored lithologies are considered to be incapable of generating significant amounts of gas. 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, and 5) a desorption graph for all the samples.

After desorption was finished, a leaky valve was discovered on the canister that held the Riverton "A" sample, thus results for the gas content of this sample were very low (approximately 35 scf/ton), and not considered valid. No data are presented in graphs for this sample.

### *Graph of Lag-time to Surface for Well Cuttings (Figure 2)*

Lag time of cuttings 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 is usually lost within the first hour after the cuttings leave the bottom of the hole, thus data are presented in the lost-gas graphs for only up to one hour after cuttings are off bottom. Lost-gas volumes derived from this analysis are incorporated in the data tables described above.

### *"Lithologic Component Sensitivity Analyses" (Figures 10-17)*

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. In the "lithologic component sensitivity analysis" diagrams, each sample is described in terms of its admixed lithologies for both the entire sample and its sieved fractions.

### *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. The final value represents the standard cubic feet of gas per ton (scf/ton) calculated for the sample, using the combined weight of the coal and dark shale in the sample.

## RESULTS and DISCUSSION

The Hushpuckney Shale and Little Osage Shale are composed of dark gray and grayish black shales. Rarely, conodonts can be observed in the cuttings. Admixed non-gas-generating lithologies (light-colored shale and limestones) were not present in significant quantity due to these shales being relatively near the surface.

The Riverton "A" sample, as previously mentioned, had results not considered valid due to a leaky needle valve discovered after its desorption was finished. The Rowe sample had only 5% coal, and thus its results are the least certain of all the samples. The

Riverton "B&C" sample also had lesser constrained results due to an approximately equal amount of dark shale in the sample.

#### 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

FIGURE 1. Correlation of field barometer to Petrophysics Lab pressure transducer.

FIGURE 2. Lag-time to surface for well cuttings.

TABLE 1. Desorption measurements for samples.

FIGURE 3. Lost-gas graph for Hushpuckney Shale at 399' to 403' depth.

FIGURE 4. Lost-gas graph for Mulberry coal at 656' to 660' depth.

FIGURE 5. Lost-gas graph for Little Osage Shale at 739' to 744' depth.

FIGURE 6. Lost-gas graph for Dry Wood coal at 1058' to 1060' depth.

FIGURE 7. Lost-gas graph for Rowe coal at 1080' to 1082' depth.

FIGURE 8. Lost-gas graph for Riverton "B & C" coals at 1116' to 1118' depth.

FIGURE 9. Lost-gas graph for Riverton "D" coal at 1123' to 1125' depth.

FIGURE 10. Sensitivity analysis for Hushpuckney Shale at 399' to 403' depth.

FIGURE 11. Sensitivity analysis for Mulberry coal at 656' to 660' depth.

FIGURE 12. Sensitivity analysis for Little Osage Shale at 739' to 744' depth.

FIGURE 13. Sensitivity analysis for Dry Wood coal at 1058' to 1060' depth.

FIGURE 14. Sensitivity analysis for Rowe coal at 1080' to 1082' depth.

FIGURE 15. Sensitivity analysis for Riverton "B & C" coals at 1116' to 1118' depth.

FIGURE 16. Sensitivity analysis for Riverton "D" coal at 1123' to 1125' depth.

FIGURE 17. Sensitivity analyses for all samples.

FIGURE 18. Desorption graph for all samples.

## Correlation of Field Barometer to KGS Petrophysics Lab Barometer

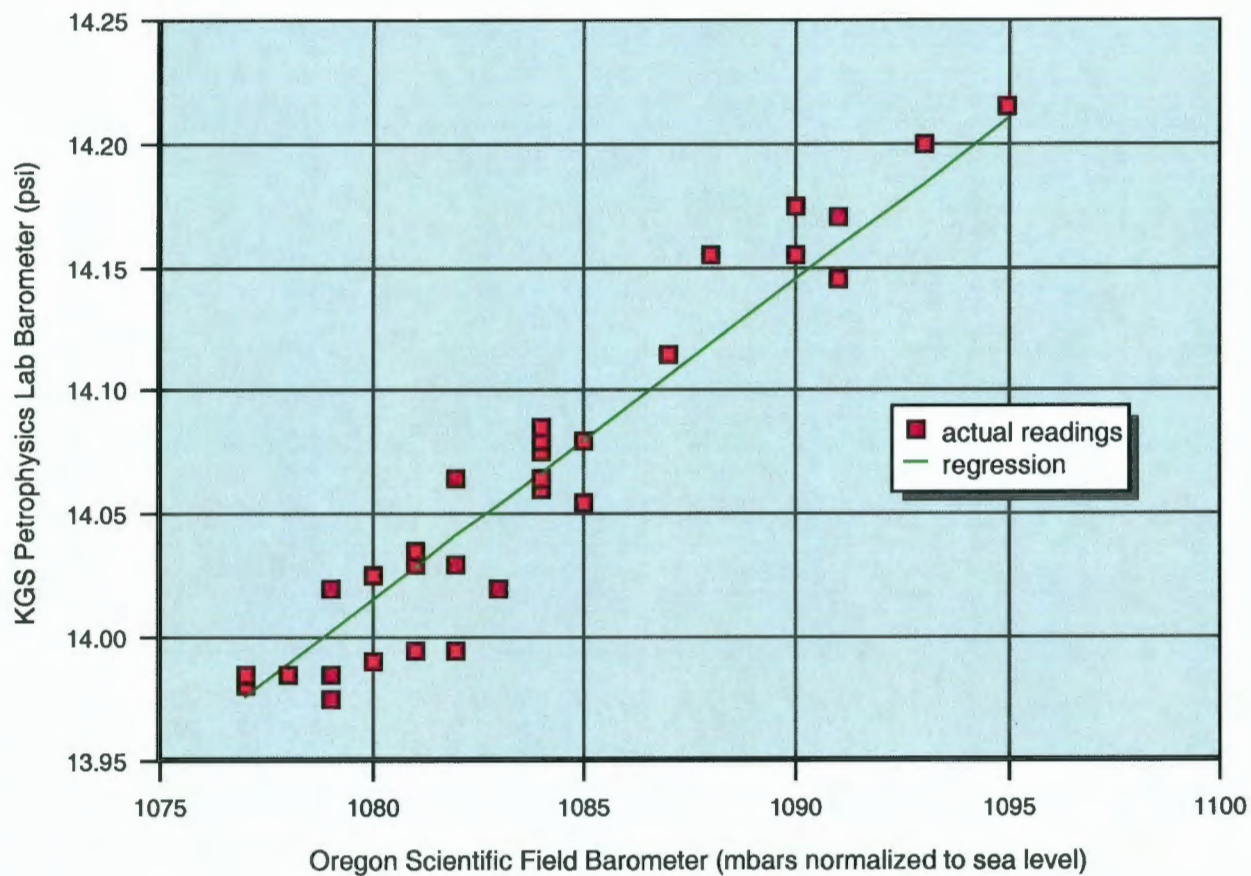


FIGURE 1.



Meritage KCM #22-44 Kipper; SE SE sec. 22-T.19S.-R.19E., Anderson County, KS  
lag-time to surface for well cuttings

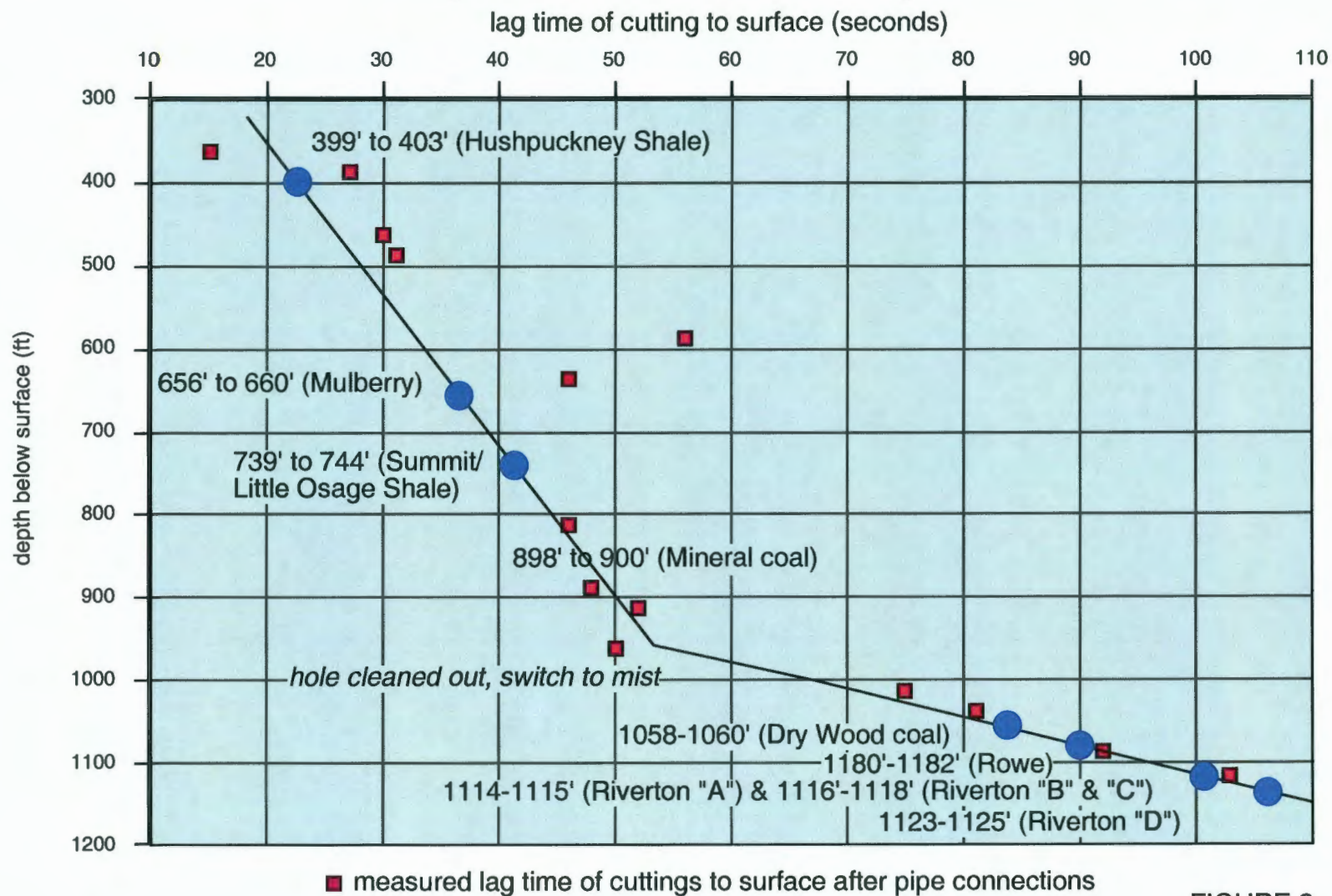


FIGURE 2.

TABLE 1 -- Description Measurements for Heritage KCM Kipper #22-44, SE SE 22-T.19S.-R.19E.

SAMPLE: 399' to 403' (Hushpuckney Shale) in canister M4

DRY WEIGHT		lbs.	grams	est. lost gas (cc) =				TIME OF:		at surface		elapsed time (off bottom to canistering)		
sample weight:		0.8053	365.274	9				off bottom	9/29/03	10:05	in canister	10:07	2.6 minutes	
RIGLAB MEASUREMENTS		CONVERSION OF RIGLAB MEASUREMENTS TO STP (@60 deg F, 14.7 psi)				CUMULATIVE VOLUMES		SCF/TON	SCF/TON	TIME OF MEASURE		TIME SINCE		0.208832735
measured cc	measured T (F)	measured	cubic ft	absolute T (F) psia	cubic ft (@STP)	cc (@STP)	cubic ft (@STP)	cc (@STP)	without lost gas	with lost gas	off bottom	in canister	SQRT hrs. (since off bottom)	0.044 hours
2	70	1092	7.1E-05	530 14.174	6.68159E-05	1.89	6.68159E-05	1.89	0.17	0.96	9/29/03 10:09	0:04:07	0:01:30	0.261937227
3	70	1092	0.00011	530 14.174	0.000100224	2.84	0.00016704	4.73	0.41	1.20	9/29/03 10:11	0:05:52	0:03:15	0.312694384
3	70	1092	0.00011	530 14.174	0.000100224	2.84	0.000267264	7.57	0.66	1.45	9/29/03 10:14	0:08:52	0:06:15	0.384418753
3	70	1092	0.00011	530 14.174	0.000100224	2.84	0.000367488	10.41	0.91	1.70	9/29/03 10:17	0:12:37	0:10:00	0.45856055
3	70	1092	0.00011	530 14.174	0.000100224	2.84	0.000467711	13.24	1.16	1.95	9/29/03 10:20	0:15:07	0:12:30	0.501940678
6	70	1092	0.00021	530 14.174	0.000200448	5.68	0.000668159	18.92	1.66	2.45	9/29/03 10:27	0:22:37	0:20:00	0.613958015
1	71	1092	3.5E-05	531 14.174	3.3345E-05	0.94	0.000701504	19.86	1.74	2.53	9/29/03 10:35	0:30:07	0:27:30	0.708480377
3	71	1092	0.00011	531 14.174	0.000100035	2.83	0.000801539	22.70	1.99	2.78	9/29/03 10:46	0:41:22	0:38:45	0.830327914
10	71	1092	0.00035	531 14.174	0.00033345	9.44	0.00113499	32.14	2.82	3.61	9/29/03 10:51	0:45:52	0:43:15	0.874325137
1	72	1092	3.5E-05	532 14.174	3.32824E-05	0.94	0.001168272	33.08	2.90	3.69	9/29/03 11:02	0:57:37	0:55:00	0.97993764
4	72	1092	0.00014	532 14.174	0.000133129	3.77	0.001301402	36.85	3.23	4.02	9/29/03 11:19	1:13:52	1:11:15	1.109554465
7	72	1092	0.00025	532 14.174	0.000232977	6.60	0.001534378	43.45	3.81	4.60	9/29/03 11:45	1:40:07	1:37:30	1.291747309
8	73	1092	0.00028	533 14.174	0.000265759	7.53	0.001800138	50.97	4.47	5.26	9/29/03 12:11	2:05:52	2:03:15	1.448370732
8	73	1092	0.00028	533 14.174	0.000265759	7.53	0.002065897	58.50	5.13	5.92	9/29/03 12:54	2:48:52	2:46:15	1.677630604
6	74	1090	0.00021	534 14.148	0.000198582	5.62	0.002284479	64.12	5.62	6.41	9/29/03 13:49	3:43:52	3:41:15	1.931608426
9	75	1089	0.00032	535 14.135	0.000297043	8.41	0.002561522	72.53	6.36	7.15	9/29/03 16:03	5:57:52	5:55:15	2.442221211
8	76	1091	0.00028	536 14.161	0.00026403	7.48	0.002825552	80.01	7.02	7.81	9/29/03 19:05	8:59:52	8:57:15	2.999629607
14	78	1093	0.00049	536 14.187	0.000462899	13.11	0.003288452	93.12	8.17	8.96	9/29/03 22:55	12:49:52	12:47:15	3.582054035
18	75	1096	0.00064	535 14.226	0.000597905	16.93	0.003886357	110.05	9.65	10.44	9/30/03 9:46	23:40:52	23:38:15	4.866324189
12	75	1096	0.00042	535 14.226	0.000398604	11.29	0.004284961	121.34	10.64	11.43	9/30/03 20:02	33:56:52	33:54:15	5.826472155
11	74	1094	0.00039	534 14.200	0.000365403	10.35	0.004650364	131.68	11.55	12.34	10/1/03 13:51	51:45:52	51:43:15	7.194751173
9	72	1090	0.00032	532 14.148	0.000298993	8.47	0.004949356	140.15	12.29	13.08	10/2/03 15:05	76:59:52	76:57:15	8.774837764
9	73	1081	0.00032	533 14.031	0.000295968	8.38	0.005245324	148.53	13.03	13.82	10/3/03 10:37	96:31:52	96:29:15	9.825024738
21	78	1085	0.00074	538 14.083	0.000666705	19.45	0.005932028	167.98	14.73	15.52	10/6/03 11:43	169:37:52	169:35:15	13.02425088
3	77	1082	0.00011	537 14.044	9.801116E-05	2.78	0.00603004	170.75	14.98	15.77	10/7/03 18:08	200:02:52	200:00:15	14.14382472
0	74	1082	0	534 14.044	0	0.00	0.00603004	170.75	14.98	15.77	10/8/03 20:14	228:08:52	228:06:15	15.03821059
0	72	1082	0	532 14.044	0	0.00	0.00603004	170.75	14.98	15.77	10/9/03 11:27	241:21:52	241:19:15	15.53590823

DECANISTERED 10/09/03

SAMPLE: 656' to 660' (Mulberry coal) in canister M1

DRY WEIGHT		lbs.	grams	est. lost gas (cc) =				TIME OF:		at surface		elapsed time (off bottom to canistering)		
sample weight:		0.7711	349.758	10				off bottom	9/29/03	11:15	in canister	11:20	4.1 minutes	
RIGLAB MEASUREMENTS		CONVERSION OF RIGLAB MEASUREMENTS TO STP (@60 deg F, 14.7 psi)				CUMULATIVE VOLUMES		SCF/TON	SCF/TON	TIME OF MEASURE		TIME SINCE		0.262466929
measured cc	measured T (F)	measured	cubic ft	absolute T (F) psia	cubic ft (@STP)	cc (@STP)	cubic ft (@STP)	cc (@STP)	without lost gas	with lost gas	off bottom	in canister	SQRT hrs. (since off bottom)	0.069 hours
4	72	1092	0.00014	532 14.174	0.000133129	3.77	0.000133129	3.77	0.35	1.28	9/29/03 11:24	0:08:08	0:04:00	0.3681787
2	72	1092	7.1E-05	532 14.174	6.65647E-05	1.88	0.000199694	5.65	0.52	1.43	9/29/03 11:26	0:10:23	0:06:15	0.415999466
1	72	1092	3.5E-05	532 14.174	3.32824E-05	0.94	0.000232977	6.60	0.60	1.52	9/29/03 11:27	0:11:38	0:07:30	0.44032816
7	72	1092	0.00025	532 14.174	0.000232977	6.60	0.000465953	13.19	1.21	2.12	9/29/03 11:37	0:21:08	0:17:00	0.593483127
3	72	1092	0.00011	532 14.174	9.98471E-05	2.83	0.0005658	16.02	1.47	2.38	9/29/03 11:42	0:26:53	0:22:45	0.669369521
7	72	1092	0.00025	532 14.174	0.000232977	6.60	0.000798777	22.62	2.07	2.99	9/29/03 11:56	0:40:23	0:36:15	0.820399632
6	73	1092	0.00021	533 14.174	0.00019932	5.64	0.000998096	28.26	2.59	3.50	9/29/03 12:09	0:53:08	0:49:00	0.941039614
6	73	1091	0.00021	533 14.161	0.000199137	5.64	0.001197233	33.90	3.11	4.02	9/29/03 12:27	1:11:38	1:07:30	1.092652227
5	74	1091	0.00018	534 14.161	0.000165637	4.69	0.00136287	38.59	3.53	4.45	9/29/03 12:53	1:37:08	1:33:00	1.272355646
10	74	1090	0.00035	534 14.148	0.00033097	9.37	0.00169384	47.96	4.39	5.31	9/29/03 13:50	2:34:08	2:30:00	1.602775371
10	75	1089	0.00035	535 14.135	0.000330048	9.35	0.002023888	57.31	5.25	6.17	9/29/03 16:05	4:49:08	4:45:00	2.195196777
10	76	1091	0.00035	536 14.161	0.000330037	9.35	0.002353926	66.66	6.11	7.02	9/29/03 19:05	7:49:08	7:45:00	2.796227617
13	78	1093	0.00046	536 14.187	0.000429835	12.17	0.002783761	78.83	7.22	8.14	9/29/03 22:57	11:41:08	11:37:00	3.418414187
16	75	1096	0.00057	535 14.226	0.000531471	15.05	0.003315232	93.88	8.60	9.51	9/30/03 9:48	22:32:08	22:28:00	4.747162895
11	75	1096	0.00039	535 14.226	0.000365387	10.35	0.003680619	104.22	9.55	10.48	9/30/03 20:03	32:47:08	32:43:00	5.725867232
10	74	1094	0.00035	534 14.200	0.000332184	9.41	0.004012803	113.63	10.41	11.32	10/1/03 13:52	50:36:08	50:32:00	7.113523896
7	72	1090	0.00025	532 14.148	0.00023255	6.59	0.004245353	120.21	11.01	11.93	10/2/03 15:06	75:50:08	75:46:00	8.708361244
7	73	1081	0.00025	533 14.031	0.000230197	6.52	0.00447555	126.73	11.81	12.52	10/3/03 10:38	95:22:08	95:18:00	9.765699611
15	78	1085	0.00053	538 14.083	0.000490503	13.89	0.004966053	140.62	12.88	13.80	10/6/03 11:44	168:28:08	168:24:00	12.97955658

2	77	1082	7.1E-05	537	14.044	6.53411E-05	1.85	0.005031395	142.47	13.05	13.97	10/7/03	18:12	198:56:08	198:52:00	14.10445162
1	74	1082	3.5E-05	534	14.044	3.28541E-05	0.93	0.005064249	143.40	13.14	14.05	10/8/03	20:15	224:59:08	224:55:00	14.99951851
0	72	1082	0	532	14.044	0	0.00	0.005084249	143.40	13.14	14.05	10/9/03	11:27	240:11:08	240:07:00	15.49792101
5	75	1082	0.00018	535	14.044	0.000163963	4.64	0.005228212	148.05	13.56	14.48	10/10/03	10:59	263:43:08	263:39:00	16.23942391
6	79	1079	0.00021	539	14.005	0.000194754	5.51	0.005422966	153.56	14.07	14.98	10/11/03	11:24	288:08:08	288:04:00	16.97455612
-1	78	1087	-4E-05	538	14.109	-3.27605E-05	-0.93	0.005390206	152.63	13.98	14.90	10/12/03	13:16	314:00:08	313:56:00	17.72010785
0	73	1085	0	533	14.083	0	0.00	0.005390206	152.63	13.98	14.90	10/14/03	22:38	371:22:08	371:18:00	19.27093378

DECANISTERED 10/17/2003

SAMPLE: 739' to 744' (Little Osage Shale) in canister M2

DRY WEIGHT lbs. grams  
sample weight: 0.7343 333.077

est. lost gas (cc) = 5

TIME OF: 9/29/03 11:40 elapsed time (off bottom to canistering)  
off bottom in canister 5.2 minutes  
9/29/03 11:41 9/29/03 11:46 0.087 hours

RIGLAB MEASUREMENTS		CONVERSION OF RIGLAB MEASUREMENTS TO STP (@60 deg F; 14.7 psi)				CUMULATIVE VOLUMES		SCF/TON	SCF/TON	TIME OF MEASURE	TIME SINCE	TIME SINCE	TIME SINCE	SQRT hrs. (since off bottom)
measured cc	measured T (F)	measured cubic ft	absolute T (F)	psia	cubic ft (@STP)	cc (@STP)	cubic ft (@STP)	cc (@STP)	without lost gas	with lost gas	off bottom	in canister	0.294392029	
2	72	1092	7.1E-05	532	14.174	6.65647E-05	1.88	6.65647E-05	1.88	0.18	0:09:12	0:04:00	0.391578004	
1	72	1092	3.5E-05	532	14.174	3.32824E-05	0.94	9.98471E-05	2.83	0.27	0:11:42	0:06:30	0.441588043	
1	72	1092	3.5E-05	532	14.174	3.32824E-05	0.94	0.000133129	3.77	0.36	0:16:27	0:11:15	0.523609269	
1	73	1092	3.5E-05	533	14.174	3.32199E-05	0.94	0.000166349	4.71	0.45	0:25:42	0:20:30	0.654471797	
0.5	73	1092	1.8E-05	533	14.174	1.861E-05	0.47	0.000182959	5.18	0.50	0:31:12	0:26:00	0.721110255	
0	73	1092	0	533	14.174	0	0.00	0.000182959	5.18	0.50	0:44:42	0:39:30	0.863133825	
1	74	1091	3.5E-05	534	14.161	3.31274E-05	0.94	0.000216087	6.12	0.59	1:10:42	1:05:30	1.085510633	
3	74	1090	0.00011	534	14.148	9.9291E-05	2.81	0.000315378	8.93	0.86	2:09:42	2:04:30	1.470260748	
-1	75	1089	-4E-05	535	14.135	-3.30048E-05	-0.93	0.000282373	8.00	0.77	4:24:42	4:19:30	2.100396788	
-1	76	1091	-4E-05	536	14.161	-3.30037E-05	-0.93	0.000249369	7.08	0.68	7:24:42	7:19:30	2.722437633	
2	76	1093	7.1E-05	538	14.187	6.61285E-05	1.87	0.000315498	8.93	0.86	11:16:42	11:11:30	3.583222994	
3	75	1096	0.00011	535	14.226	9.96509E-05	2.82	0.000415148	11.76	1.13	22:07:42	22:02:30	4.704076247	
3	75	1096	0.00011	535	14.226	9.96509E-05	2.82	0.000514799	14.58	1.40	32:22:42	32:17:30	5.690196247	
-1	74	1094	-4E-05	534	14.200	-3.32184E-05	-0.94	0.000481581	13.64	1.31	50:12:42	50:07:30	7.086019099	
0	72	1090	0	532	14.148	0	0.00	0.000481581	13.64	1.31	75:25:42	75:20:30	8.684948666	
5	73	1081	0.00018	533	14.031	0.000164426	4.66	0.000646007	18.29	1.76	94:56:42	94:51:30	9.743972496	
3	78	1065	0.00011	538	14.083	9.81007E-05	2.78	0.000744108	21.07	2.03	168:03:42	167:58:30	12.96386002	
-4	77	1082	-0.0001	537	14.044	-0.000130882	-3.70	0.000613426	17.37	1.87	198:31:42	198:26:30	14.09000828	
-2	74	1082	-7E-05	534	14.044	-6.57081E-05	-1.86	0.000547718	15.51	1.49	224:34:42	224:29:30	14.98593785	
-1	72	1082	-4E-05	532	14.044	-3.29776E-05	-0.93	0.00051474	14.58	1.40	239:47:42	239:42:30	15.48531562	

DECANISTERED 10/09/03

SAMPLE: 1058' to 1060' (Dry Wood coal) in canister M3

DRY WEIGHT lbs. grams  
sample weight: 1.3169 597.325

est. lost gas (cc) = 37

TIME OF: 9/29/03 13:58 elapsed time (off bottom to canistering)  
off bottom in canister 7.6 minutes  
9/29/03 13:56 9/29/03 14:04 0.127 hours

RIGLAB MEASUREMENTS		CONVERSION OF RIGLAB MEASUREMENTS TO STP (@60 deg F; 14.7 psi)				CUMULATIVE VOLUMES		SCF/TON	SCF/TON	TIME OF MEASURE	TIME SINCE	TIME SINCE	TIME SINCE	SQRT hrs. (since off bottom)
measured cc	measured T (F)	measured cubic ft	absolute T (F)	psia	cubic ft (@STP)	cc (@STP)	cubic ft (@STP)	cc (@STP)	without lost gas	with lost gas	off bottom	in canister	0.356682243	
8	74	1090	0.00028	534	14.148	0.000264776	7.50	0.000264776	7.50	0.40	0:11:23	0:03:45	0.435571145	
2	74	1090	7.1E-05	534	14.148	6.6194E-05	1.87	0.00033097	9.37	0.50	0:13:08	0:05:30	0.467855628	
5	74	1090	0.00018	534	14.148	0.000165485	4.69	0.000496455	14.06	0.75	0:15:23	0:07:45	0.506348584	
5	74	1090	0.00018	534	14.148	0.000165485	4.69	0.00066194	18.74	1.01	0:17:38	0:10:00	0.542115199	
4	74	1090	0.00014	534	14.148	0.000132388	3.75	0.000794328	22.49	1.21	0:20:23	0:12:45	0.582856948	
16	74	1090	0.00057	534	14.148	0.000529552	15.00	0.001323879	37.49	2.01	0:31:38	0:24:00	0.726100697	
6	74	1090	0.00021	534	14.148	0.000198582	5.62	0.001522461	43.11	2.31	0:38:38	0:31:00	0.802426874	
11	74	1090	0.00039	534	14.148	0.000364067	10.31	0.001886528	53.42	2.87	0:51:23	0:43:45	0.925412821	
32	75	1089	0.00113	535	14.135	0.001056154	29.91	0.002942682	83.33	4.47	2:09:23	2:01:45	1.468464807 estimate	
6	74	1090	0.00021	534	14.148	0.000198582	5.62	0.003141264	88.95	4.77	2:27:23	2:19:45	1.567287111	
31	76	1091	0.00109	536	14.161	0.001023116	28.97	0.00416438	117.92	6.32	5:09:23	5:01:45	2.270768348	
38	76	1093	0.00134	536	14.187	0.001256441	35.58	0.005420821	153.50	8.23	9:02:23	8:54:45	3.006613082	
50	75	1096	0.00177	535	14.226	0.001660888	47.03	0.00708167	200.53	10.78	19:52:23	19:44:45	4.457920542	
32	75	1096	0.00113	535	14.226	0.001062943	30.10	0.008144613	230.63	12.37	30:09:23	30:01:45	5.491483305 estimate	
36	74	1094	0.00127	534	14.200	0.001195864	33.86	0.009340477	264.49	14.19	47:58:23	47:50:45	6.92625841	
28	72	1090	0.00099	532	14.148	0.0009302	26.34	0.010270676	290.83	15.80	73:11:23	73:03:45	8.555099194	
23	73	1081	0.00081	533	14.031	0.000756362	21.42	0.011027038	312.25	16.75	92:42:23	92:34:45	9.6284157	
50	78	1085	0.00177	538	14.083	0.001635011	48.30	0.012662049	358.55	19.23	177:48:23	177:40:45	13.33440621	
19	77	1082	0.00067	537	14.044	0.00062074	17.58	0.013282789	378.13	20.17	196:17:23	196:09:45	14.0103434	

11	74	1082	0.00039	534	14.044	0.000361395	10.23	0.013644184	386.36	20.72	22.71	10/8/03	20:17	222:20:23	222:12:45	14.9110804
5	72	1082	0.00018	532	14.044	0.000164888	4.67	0.013809072	391.03	20.97	22.96	10/9/03	11:32	237:35:23	237:27:45	15.41394571
12	75	1082	0.00042	535	14.044	0.000393512	11.14	0.014202584	402.17	21.57	23.55	10/10/03	10:59	281:02:23	260:54:45	16.15672375
17	79	1079	0.0006	539	14.005	0.000551804	15.63	0.014754388	417.80	22.41	24.39	10/11/03	11:24	285:27:23	285:19:45	16.89545468
13	78	1087	0.00046	538	14.109	0.000425886	12.06	0.015180274	429.86	23.05	25.04	10/12/03	13:16	311:19:23	311:11:45	17.64434911
10	75	1084	0.00035	535	14.070	0.000328533	9.30	0.015508007	439.18	23.55	25.54	10/14/03	22:39	368:42:23	368:34:45	19.2017288
8	73	1083	0.00028	533	14.057	0.000263589	7.48	0.015772376	446.62	23.95	25.94	10/16/03	9:58	404:01:23	403:53:45	20.10032476
1	71	1091	3.5E-05	531	14.161	3.33145E-05	0.94	0.01580569	447.57	24.00	25.99	10/17/03	12:45	430:48:23	430:40:45	20.75587601
10	72	1085	0.00035	532	14.083	0.00033069	9.36	0.016136381	458.93	24.51	26.49	10/19/03	2:24	468:27:23	468:19:45	21.64385337
7	77	1084	0.00025	537	14.070	0.000229116	6.49	0.016385497	463.42	24.86	26.84	10/19/03	21:06	487:09:23	487:01:45	22.07181953
6	77	1081	0.00021	537	14.031	0.000195842	5.55	0.016561339	468.96	25.15	27.14	10/20/03	15:55	505:58:23	505:50:45	22.49384484
4	78	1085	0.00014	536	14.083	0.000131289	3.72	0.016692628	472.68	25.35	27.34	10/21/03	11:48	525:49:23	525:41:45	22.93083199
1	72	1081	3.5E-05	532	14.031	3.29471E-05	0.93	0.016725575	473.81	25.40	27.39	10/23/03	10:58	573:01:23	572:53:45	23.93789998
1	71	1077	3.5E-05	531	13.979	3.2887E-05	0.93	0.016758462	474.55	25.45	27.44	10/24/03	18:51	602:54:23	602:46:45	24.55415217
-1	73	1092	-4E-05	533	14.174	-3.32199E-05	-0.94	0.016725242	473.60	25.40	27.39	10/25/03	15:34	625:37:23	625:29:45	25.01245801
3	73	1093	0.00011	533	14.187	9.9751E-05	2.82	0.016824993	476.43	25.55	27.54	10/26/03	11:14	645:17:23	645:09:45	25.40255346
4	71	1075	0.00014	531	13.953	0.000131304	3.72	0.016956297	480.15	25.75	27.74	10/27/03	15:18	673:21:23	673:13:45	25.94911152
5	73	1075	0.00018	533	13.953	0.000163514	4.63	0.017119811	484.78	26.00	27.99	10/28/03	18:18	700:21:23	700:13:45	26.46424737
3	73	1087	0.00011	533	13.849	9.73782E-05	2.78	0.017217189	487.53	26.15	28.13	10/29/03	20:25	726:28:23	726:20:45	26.95316411
0	72	1071	0	532	13.901	0	0.00	0.017217189	487.53	26.15	28.13	10/30/03	14:18	744:21:23	744:13:45	27.28289554
-3	73	1091	-0.0001	533	14.161	-9.95685E-05	-2.82	0.01711762	484.72	26.00	27.98	10/31/03	18:04	772:07:23	771:59:45	27.78710232

DECANISTERED 11/01/03

SAMPLE: 1080' to 1082' (Rowe coal) in canister Brady 28

DRY WEIGHT lbs. grams  
sample weight: 0.5343 242.35

est. lost gas (cc) = 17

TIME OF: 9/29/03 14:22  
at surface 9/29/03 14:24 elapsed time (off bottom to canistering) 5.3 minutes  
in canister 9/29/03 14:27 0.088 hours

RIG/LAB MEASUREMENTS		CONVERSION OF RIG/LAB MEASUREMENTS TO STP (@60 deg F, 14.7 psi)				CUMULATIVE VOLUMES		SCF/TON	SCF/TON	TIME OF MEASURE	TIME SINCE	TIME SINCE	SQRT hrs. (since off bottom)	
measured cc	measured T (F)	measured cubic ft	absolute T (F)	psia	cubic ft (@STP)	cc (@STP)	cubic ft (@STP)	cc (@STP)	without lost gas	with lost gas	off bottom	in canister		
3	74	1090	0.00011	534	14.148	9.9291E-05	2.81	9.9291E-05	2.81	0.37	2.62	9/29/03 14:30	0:07:30	0.3535339
6	74	1090	0.00021	534	14.148	0.000198582	5.62	0.000297873	8.43	1.12	3.36	9/29/03 14:34	0:11:45	0.442530602
12	74	1090	0.00042	534	14.148	0.000397164	11.25	0.000695037	19.88	2.60	4.85	9/29/03 14:48	0:25:30	0.651920241
6	74	1090	0.00021	534	14.148	0.000198582	5.62	0.000893619	25.30	3.35	5.59	9/29/03 14:59	0:36:30	0.779957264
13	74	1090	0.00046	534	14.148	0.000430261	12.18	0.001323879	37.49	4.96	7.20	9/29/03 15:14	0:52:15	0.933184512
4	74	1090	0.00014	534	14.148	0.000132388	3.75	0.001456287	41.24	5.45	7.70	9/29/03 15:23	1:00:45	1.00623059
3	75	1089	0.00011	535	14.135	9.90144E-05	2.80	0.001555282	44.04	5.82	8.07	9/29/03 15:31	1:08:30	1.068488028
9	75	1089	0.00032	535	14.135	0.000297043	8.41	0.001852325	52.45	6.93	9.18	9/29/03 16:07	1:44:30	1.319722193
4	74	1090	0.00014	534	14.148	0.000132388	3.75	0.001984713	58.20	7.43	9.68	9/29/03 16:23	2:00:30	1.417156778
18	76	1091	0.00064	536	14.161	0.000594067	16.82	0.00257878	73.02	9.65	11.90	9/29/03 19:07	4:44:30	2.177536835
19	76	1093	0.00067	536	14.187	0.000628221	17.79	0.003207001	90.81	12.00	14.25	9/29/03 23:00	8:37:30	2.936835031
24	75	1096	0.00085	535	14.228	0.000797207	22.57	0.004004208	113.39	14.99	17.24	9/30/03 9:51	19:28:30	4.413048833
15	75	1096	0.00053	535	14.226	0.000498255	14.11	0.004502463	127.50	16.85	19.10	9/30/03 20:06	29:43:30	5.452063829
13	74	1094	0.00046	534	14.200	0.000431854	12.23	0.004934303	139.72	18.47	20.72	10/1/03 13:56	47:33:30	6.896255022
14	72	1090	0.00049	532	14.148	0.0004651	13.17	0.005399402	152.89	20.21	22.46	10/2/03 15:09	72:46:30	8.530826455
10	73	1081	0.00035	533	14.031	0.000328853	9.31	0.005728255	162.21	21.44	23.69	10/3/03 10:39	92:16:30	9.605987716
24	78	1085	0.00085	538	14.083	0.000784805	22.22	0.00651306	184.43	24.38	26.63	10/6/03 11:47	165:24:30	12.86111711
6	77	1082	0.00021	537	14.044	0.000196023	5.55	0.006709084	189.98	25.11	27.36	10/7/03 18:14	195:51:30	13.99493956
6	74	1082	0.00021	534	14.044	0.000197124	5.58	0.006906208	195.56	25.85	28.10	10/8/03 20:18	221:55:30	14.89714738
1	72	1082	3.5E-05	532	14.044	3.29776E-05	0.93	0.006939186	196.50	25.98	28.22	10/9/03 11:33	237:10:30	15.40048701
9	75	1082	0.00032	535	14.044	0.000295134	8.36	0.00723432	204.85	27.08	29.33	10/10/03 11:01	260:38:30	16.14440047
9	75	1079	0.00032	535	14.005	0.000294316	8.33	0.007528635	213.19	28.18	30.43	10/11/03 11:25	285:02:30	16.88317703
1	79	1087	3.5E-05	539	14.109	3.26997E-05	0.93	0.007561335	214.11	28.30	30.55	10/12/03 13:18	310:55:30	17.63306553
5	75	1084	0.00018	535	14.070	0.000164265	4.65	0.007725601	218.76	28.92	31.17	10/14/03 22:40	388:17:30	19.19092668
3	73	1083	0.00011	533	14.057	9.88384E-05	2.80	0.00782444	221.56	29.29	31.54	10/16/03 9:59	403:38:30	20.09000581
-2	71	1091	-7E-05	531	14.161	-6.8629E-05	-1.89	0.007757811	219.68	29.04	31.29	10/17/03 12:46	430:23:30	20.74588313
5	73	1085	0.00018	533	14.083	0.000165035	4.67	0.007922846	224.35	29.66	31.90	10/19/03 2:25	468:02:30	21.63427065
5	72	1084	0.00018	532	14.070	0.000165193	4.68	0.008088038	229.03	30.28	32.52	10/19/03 21:07	486:44:30	22.06222261
4	77	1081	0.00014	537	14.031	0.000130581	3.70	0.0082186	232.72	30.76	33.01	10/20/03 15:58	505:35:30	22.48536561
0	76	1085	0	536	14.083	0	0.00	0.0082186	232.72	30.76	33.01	10/21/03 11:46	525:23:30	22.92142375
-2	72	1081	-7E-05	532	14.031	-6.58942E-05	-1.87	0.008152706	230.86	30.52	32.77	10/23/03 11:01	572:38:30	23.92993244

DECANISTERED 10/23/03

SAMPLE: 1114' to 1116' (Riverton "A" coal) in canister Brady 27

DRY WEIGHT lbs. grams  
sample weight: 0.0000 0

est. lost gas (cc) = 35

TIME OF: 9/29/03 14:52 elapsed time (off bottom to canistering) 7.9 minutes  
at surface 9/29/03 14:52 elapsed time (off bottom to canistering) 7.9 minutes  
in canister 9/29/03 14:52 elapsed time (off bottom to canistering) 7.9 minutes

RIGLAB MEASUREMENTS		CONVERSION OF RIGLAB MEASUREMENTS TO STP (@60 deg F; 14.7 psi)				CUMULATIVE VOLUMES		SCF/TON	SCF/TON	TIME OF MEASURE	9/29/03 14:50	9/29/03 14:58	0.132 hours
measured cc	measured T (F)	measured	cubic ft	absolute T (F) psia	cubic ft (@STP)	cc (@STP)	cubic ft (@STP)	cc (@STP)	without lost gas	with lost gas	TIME SINCE	0.36323737 SQRT (hrs)	
											off bottom	in canister	SQRT hrs. (since off bottom)
6	74	1090	0.00021	534	14.148	0.000198582	5.82	0.000198582	5.82	#DIV/0!	9/29/03 15:00	0:10:26	0:416999867
17	74	1090	0.0006	534	14.148	0.000582649	15.93	0.000781231	21.56	#DIV/0!	9/29/03 15:12	0:21:56	0.604611905
12	74	1090	0.00042	534	14.148	0.000397164	11.25	0.001158395	32.80	#DIV/0!	9/29/03 15:19	0:29:11	0.697415865
7	74	1090	0.00025	534	14.148	0.000231679	6.56	0.001390073	39.36	#DIV/0!	9/29/03 15:26	0:35:56	0.773879118
7	75	1089	0.00025	535	14.135	0.000231034	6.54	0.001621107	45.90	#DIV/0!	9/29/03 15:33	0:43:26	0.850816601
5	75	1089	0.00018	535	14.135	0.000165024	4.87	0.001788131	50.58	#DIV/0!	9/29/03 15:39	0:48:41	0.900771274
10	75	1089	0.00035	535	14.135	0.000330048	9.35	0.002116179	59.92	#DIV/0!	9/29/03 15:59	1:09:11	1.073804244
4	75	1089	0.00014	535	14.135	0.000132019	3.74	0.002248199	83.66	#DIV/0!	9/29/03 16:08	1:17:41	1.137858613
7	74	1090	0.00025	534	14.148	0.000231679	6.56	0.002479878	70.22	#DIV/0!	9/29/03 16:21	1:31:26	1.234458946
39	76	1091	0.00138	536	14.161	0.001287146	36.45	0.003787023	106.67	#DIV/0!	9/29/03 19:07	4:16:41	2.068346092
42	76	1093	0.00148	536	14.187	0.001388698	39.32	0.005155722	145.99	#DIV/0!	9/29/03 23:01	8:10:41	2.859729979
53	75	1096	0.00187	535	14.226	0.001760499	49.85	0.006916221	195.84	#DIV/0!	9/30/03 9:52	19:01:41	4.362115949
35	75	1096	0.00124	535	14.226	0.001162594	32.92	0.008078815	228.77	#DIV/0!	9/30/03 20:08	29:17:41	5.412459905
35	74	1094	0.00124	534	14.200	0.001162646	32.92	0.00924146	261.69	#DIV/0!	10/1/03 13:57	47:06:41	6.863773662
30	72	1090	0.00106	532	14.148	0.000986642	28.22	0.010238103	289.91	#DIV/0!	10/2/03 15:10	72:19:41	8.504590264
22	73	1081	0.00078	533	14.031	0.000723476	20.49	0.010961579	310.40	#DIV/0!	10/3/03 10:40	91:49:41	9.582695631
92	78	1085	0.00325	538	14.083	0.00300842	85.19	0.013969999	395.58	#DIV/0!	10/6/03 10:47	163:56:41	12.804090006
57	77	1082	0.00201	537	14.044	0.00186222	52.73	0.015832219	448.32	#DIV/0!	10/7/03 18:15	195:24:41	13.97896237
19	74	1082	0.00067	534	14.044	0.000624227	17.68	0.016456447	465.99	#DIV/0!	10/8/03 20:20	221:29:41	14.88269875
9	72	1082	0.00032	532	14.044	0.000296798	8.40	0.016753245	474.40	#DIV/0!	10/9/03 11:33	236:42:41	15.38542781
3	75	1079	0.00011	535	14.005	9.81052E-05	2.78	0.01685135	477.18	#DIV/0!	10/10/03 11:01	260:10:41	16.13003582
3	79	1087	0.00011	539	14.109	9.80991E-05	2.78	0.016949449	479.95	#DIV/0!	10/11/03 11:26	284:35:41	16.86993545
4	78	1087	0.00014	538	14.109	0.000131042	3.71	0.017080491	483.66	#DIV/0!	10/12/03 13:19	310:28:41	17.6203875
6	75	1084	0.00021	535	14.070	0.00019712	5.58	0.017277611	489.25	#DIV/0!	10/14/03 22:49	367:58:41	19.18275412
3	73	1083	0.00011	533	14.057	9.88384E-05	2.80	0.017376449	492.04	#DIV/0!	10/16/03 9:59	403:08:41	20.07846414
0	71	1091	0	531	14.161	0	0.00	0.017376449	492.04	#DIV/0!	10/17/03 12:46	429:55:41	20.73470655
8	73	1085	0.00028	533	14.083	0.000264056	7.48	0.017640505	499.52	#DIV/0!	10/19/03 2:26	467:35:41	21.62393864
6	72	1084	0.00021	532	14.070	0.000198231	5.61	0.017838736	505.13	#DIV/0!	10/19/03 21:07	486:16:41	22.05171321
5	77	1081	0.00018	537	14.031	0.000163202	4.62	0.018001938	509.76	#DIV/0!	10/20/03 15:59	505:08:41	22.47542485
0	76	1085	0	536	14.083	0	0.00	0.018001938	509.76	#DIV/0!	10/21/03 11:49	524:58:41	22.9123996
0	72	1081	0	532	14.031	0	0.00	0.018001938	509.76	#DIV/0!	10/23/03 11:33	572:42:41	23.9313892

DECANISTERED 10/23/03

SAMPLE: 1118 to 1118 (Riverton "B" & "C" coal) in canister Mer H

DRY WEIGHT lbs. grams  
sample weight: 2.3348 1059.05

at surface  
est. lost gas (cc) = 36  
TIME OF: 9/29/03 15:06 elapsed time (off bottom to canistering)  
off bottom in canister 6.4 minutes  
9/29/03 15:04 9/29/03 15:11 0.107 hours

RIGLAB MEASUREMENTS		CONVERSION OF RIGLAB MEASUREMENTS TO STP (@60 deg F; 14.7 psi)				CUMULATIVE VOLUMES		SCF/TON	SCF/TON	TIME OF MEASURE	9/29/03 15:04	9/29/03 15:11	0.327448045 SQRT (hrs)
measured cc	measured T (F)	measured	cubic ft	absolute T (F) psia	cubic ft (@STP)	cc (@STP)	cubic ft (@STP)	cc (@STP)	without lost gas	with lost gas	TIME SINCE	0.327448045 SQRT (hrs)	
											off bottom	in canister	SQRT hrs. (since off bottom)
18	74	1090	0.00064	534	14.148	0.000595746	16.87	0.000595746	16.87	0.51	9/29/03 15:20	0:15:41	0.511262055
14	74	1090	0.00049	534	14.148	0.000463358	13.12	0.001059104	29.99	0.91	9/29/03 15:27	0:22:41	0.614862225
13	75	1089	0.00046	535	14.135	0.000429063	12.15	0.001488166	42.14	1.27	9/29/03 15:35	0:30:26	0.712195354
10	75	1089	0.00035	535	14.135	0.000330048	9.35	0.001818214	51.49	1.56	9/29/03 15:42	0:37:41	0.792499562
19	75	1089	0.00067	535	14.135	0.000627091	17.78	0.002445306	69.24	2.09	9/29/03 16:00	0:55:41	0.963356401
9	75	1089	0.00032	535	14.135	0.000297043	8.41	0.002742349	77.65	2.35	9/29/03 16:08	1:03:58	1.032257504
9	74	1090	0.00032	534	14.148	0.000297873	8.43	0.003040222	86.09	2.60	9/29/03 16:21	1:18:11	1.126819516
71	78	1091	0.00251	536	14.161	0.002343266	66.35	0.005383488	152.44	4.61	9/29/03 19:06	4:03:11	2.013220195
75	76	1093	0.00265	536	14.187	0.002479818	70.22	0.007863306	222.66	6.74	9/29/03 23:02	7:57:11	2.820116231
83	75	1096	0.00293	535	14.226	0.002757008	78.07	0.010620314	300.73	9.10	10/1/03 9:53	18:48:11	4.336249019
51	75	1096	0.0018	535	14.226	0.001694065	47.97	0.012314379	348.70	10.55	9/30/03 20:10	29:05:11	5.393179849
55	74	1094	0.00194	534	14.200	0.001827014	51.74	0.014141394	400.44	12.11	10/1/03 13:59	48:54:11	6.84858055
46	72	1090	0.00182	532	14.148	0.001528185	43.27	0.015669579	443.71	13.42	10/2/03 15:11	72:08:11	8.49135181
32	73	1081	0.00113	533	14.031	0.001052329	29.80	0.016721908	473.51	14.32	10/3/03 10:41	91:38:11	9.570946519
80	78	1085	0.00283	538	14.083	0.002816018	74.08	0.019337926	547.59	16.56	10/8/03 11:49	164:44:11	12.83496743
25	77	1082	0.00088	537	14.044	0.000816763	23.13	0.020154689	570.72	17.26	10/7/03 18:17	195:12:11	13.97150871
14	74	1082	0.00049	534	14.044	0.000459957	13.02	0.020614646	583.74	17.66	10/7/03 20:21	221:16:11	14.87513772
4	72	1082	0.00014	532	14.044	0.00013191	3.74	0.020748556	587.47	17.77	10/9/03 11:34	236:29:11	15.37811396
19	75	1082	0.00067	535	14.044	0.000623061	17.64	0.021389617	605.12	18.31	10/10/03 11:02	259:57:11	16.12305975
24	79	1079	0.00085	539	14.005	0.000779017	22.06	0.022148634	627.18	18.97	10/11/03 11:27	284:22:11	16.86326547
4	78	1087	0.00014	538	14.109	0.000131042	3.71	0.022279676	630.89	19.08	10/12/03 13:20	310:15:11	17.61400169

13	75	1084	0.00048	535	14.070	0.000427093	12.09	0.022708769	842.98	19.45	20.54	10/14/03	22:50	367:45:11	387:38:45	19.17688858
9	73	1083	0.00032	533	14.057	0.000296515	8.40	0.023003284	851.38	19.70	20.79	10/16/03	10:00	402:55:11	402:48:45	20.07286034
-4	75	1091	-0.0001	535	14.181	-0.000132262	-3.75	0.022871022	847.63	19.59	20.68	10/17/03	12:47	429:42:11	429:35:45	20.72928015
15	73	1085	0.00053	533	14.083	0.000495105	14.02	0.023388127	681.85	20.02	21.10	10/19/03	2:28	487:23:11	467:18:45	21.61912091
12	72	1084	0.00042	532	14.070	0.000396462	11.23	0.023762589	672.88	20.36	21.44	10/19/03	21:08	486:03:11	485:56:45	22.04661098
9	77	1081	0.00032	537	14.031	0.000293763	8.32	0.024056352	681.20	20.61	21.70	10/20/03	16:00	504:55:11	504:48:45	22.47041883
4	76	1085	0.00014	536	14.083	0.000131289	3.72	0.024187641	884.92	20.72	21.81	10/21/03	11:50	524:45:11	524:38:45	22.90748907
-1	72	1081	-4E-05	532	14.031	-3.29471E-05	-0.93	0.024154894	683.98	20.69	21.78	10/23/03	11:06	572:01:11	571:54:45	23.9169338
0	71	1077	0	531	13.979	0	0.00	0.024154694	683.98	20.69	21.78	10/24/03	16:52	601:47:11	601:40:45	24.53133484

DECANISTERED 10/24/03

SAMPLE: 1123' to 1125' (Riverton "D" coal) in canister Mer 1

DRY WEIGHT lbs. grams  
sample weight: 1.4188 642.64

est. lost gas (cc) =  
27

TIME OF: at surface  
9/29/03 15:11 elapsed time (off bottom to canistering)  
off bottom in canister 6.5 minutes  
9/29/03 15:09 9/29/03 15:16 0.108 hours

FIG/LAB MEASUREMENTS		CONVERSION OF RIG/LAB MEASUREMENTS TO STP (@60 deg F; 14.7 psi)				CUMULATIVE VOLUMES		SCF/TON		SCF/TON		TIME OF MEASURE		TIME SINCE		SQRT hrs. (since off bottom)	
measured cc	measured T (F)	measured cubic ft	absolute T (F) psia	cubic ft (@STP)	cc (@STP)	cubic ft (@STP)	cc (@STP)	without lost gas	with lost gas	TIME OF MEASURE	off bottom	in canister	9/29/03 15:09	9/29/03 15:16	0.328718049	0.108 hours	
11	74	1090	0.00039	534	14.148	0.000364087	10.31	0.000364067	10.31	0.51	1.86	9/29/03 15:21	0:11:59	0:05:30	0.446902923		
10	74	1090	0.00035	534	14.148	0.000330097	9.37	0.000695037	19.68	0.98	2.33	9/29/03 15:29	0:19:14	0:12:45	0.566176258		
8	75	1089	0.00028	535	14.135	0.000264039	7.48	0.000959075	27.16	1.35	2.70	9/29/03 15:36	0:26:29	0:20:00	0.664371048		
7	75	1089	0.00025	535	14.135	0.000231034	6.54	0.001190109	33.70	1.68	3.03	9/29/03 15:43	0:33:49	0:27:20	0.750740375		
13	75	1089	0.00046	535	14.135	0.000429063	12.15	0.001619172	45.85	2.29	3.63	9/29/03 16:01	0:51:14	0:44:45	0.924061085		
6	75	1089	0.00021	535	14.135	0.000198029	5.61	0.0018172	51.46	2.57	3.91	9/29/03 16:09	0:59:44	0:53:15	0.997775303		
6	74	1090	0.00021	534	14.148	0.000198582	5.62	0.002015782	57.08	2.85	4.19	9/29/03 16:19	1:09:59	1:03:30	1.079994856		
60	78	1091	0.00212	536	14.181	0.001980224	56.07	0.003996007	113.15	5.64	6.99	9/29/03 19:09	3:59:14	3:52:45	1.996803		
55	76	1093	0.00194	536	14.187	0.001818533	51.49	0.00581454	164.65	8.21	9.55	9/29/03 23:03	7:53:14	7:46:45	2.80841988		
62	75	1096	0.00219	535	14.226	0.002059452	58.32	0.007873992	222.97	11.12	12.48	9/30/03 9:54	18:44:14	18:37:45	4.328651317		
37	75	1096	0.00131	535	14.226	0.001229022	34.80	0.00910302	257.77	12.85	14.20	9/30/03 20:11	29:01:14	28:54:45	5.387073004		
50	74	1094	0.00177	534	14.200	0.001660922	47.03	0.010763942	304.80	15.19	16.54	10/1/03 14:00	46:50:14	46:43:45	6.843772514		
33	72	1092	0.00117	532	14.174	0.001098318	31.10	0.01186226	335.90	16.75	18.09	10/2/03 15:12	72:02:14	71:55:45	8.487474431		
26	73	1081	0.00092	533	14.031	0.000855018	24.21	0.012717278	360.11	17.95	19.30	10/3/03 10:42	91:32:14	91:25:45	9.567508674		
74	78	1085	0.00261	538	14.083	0.002419816	68.52	0.015137094	428.63	21.37	22.71	10/6/03 11:54	164:44:14	164:37:45	12.83499989		
18	77	1082	0.00064	537	14.044	0.000588807	16.65	0.015725164	445.29	22.20	23.54	10/7/03 18:18	195:08:14	195:01:45	13.96915252		
11	74	1082	0.00039	534	14.044	0.000361395	10.23	0.016086558	455.52	22.71	24.05	10/8/03 20:22	221:12:14	221:05:45	14.87292469		
4	72	1082	0.00014	532	14.044	0.00013191	3.74	0.016218469	459.25	22.89	24.24	10/9/03 11:35	236:25:14	236:18:45	15.37597332		
16	75	1082	0.00057	535	14.044	0.000524683	14.86	0.016743151	474.11	23.64	24.98	10/10/03 11:06	259:56:14	259:49:45	16.12256872		
19	79	1079	0.00067	539	14.005	0.000618722	17.46	0.017359873	491.58	24.51	25.85	10/11/03 11:28	284:18:14	284:11:45	16.86131338		
0	78	1087	0	538	14.109	0	0.00	0.017359873	491.58	24.51	25.85	10/12/03 13:21	310:11:14	310:04:45	17.61213281		
7	75	1084	0.00025	535	14.070	0.000229973	6.51	0.017589846	498.09	24.83	26.18	10/14/03 22:51	367:41:14	367:34:45	19.17517203		
6	73	1083	0.00021	533	14.057	0.000197677	5.60	0.017787523	503.68	25.11	26.46	10/16/03 10:01	402:51:14	402:44:45	20.07122041		
-4	71	1091	-0.0001	531	14.161	-0.000133258	-3.77	0.017654265	499.91	24.92	26.27	10/17/03 12:47	429:37:14	429:30:45	20.72729012		
14	73	1085	0.00049	533	14.083	0.000462098	13.09	0.018116363	513.00	25.57	26.92	10/19/03 2:28	467:18:14	467:11:45	21.61721279		
9	72	1084	0.00032	532	14.070	0.000297347	8.42	0.01841371	521.42	25.99	27.34	10/19/03 21:08	485:58:14	485:51:45	22.04473986		
8	77	1081	0.00028	537	14.031	0.000261123	7.39	0.018674832	528.81	26.36	27.71	10/20/03 16:00	504:50:14	504:43:45	22.468583		
4	78	1085	0.00014	536	14.083	0.000131289	3.72	0.018806121	532.53	26.55	27.89	10/21/03 11:50	524:40:14	524:33:45	22.90568828		
-1	72	1081	-4E-05	532	14.031	-3.29471E-05	-0.93	0.018773174	531.60	26.50	27.85	10/23/03 11:06	571:56:14	571:49:45	23.91520901		
2	71	1077	7.1E-05	531	13.979	6.5774E-05	1.86	0.018838948	533.46	26.59	27.94	10/24/03 16:53	601:43:14	601:36:45	24.52999298		
-3	73	1092	-0.0001	533	14.174	-9.96598E-05	-2.82	0.018739288	530.64	26.45	27.80	10/25/03 15:35	624:25:14	624:18:45	24.98840842		
2	73	1093	7.1E-05	533	14.187	6.65007E-05	1.88	0.018805789	532.52	26.55	27.89	10/26/03 11:16	644:08:14	643:59:45	25.3792019		
10	71	1075	0.00035	531	13.953	0.000328259	9.30	0.019134048	541.81	27.01	28.36	10/27/03 15:19	672:09:14	672:02:45	25.92593082		
11	73	1075	0.00039	533	13.953	0.00035973	10.19	0.019493779	552.00	27.52	28.86	10/28/03 18:19	699:09:14	699:02:45	26.44151828		
8	73	1087	0.00028	533	13.849	0.000259675	7.35	0.019753454	559.35	27.89	29.23	10/29/03 20:25	725:15:14	725:08:45	26.93053822		
-2	72	1071	-7E-05	532	13.901	-6.52846E-05	-1.85	0.019688169	557.50	27.79	29.14	10/30/03 14:18	743:08:14	743:01:45	27.26054332		
-9	73	1091	-0.0003	533	14.161	-0.000298706	-8.46	0.019389464	549.05	27.37	28.72	10/31/03 18:05	770:55:14	770:48:45	27.76545616		

DECANISTERED 11/01/03

### 399' to 403' (Hushpuckney Shale) in canister M4

Meritage KCM Kipper #22-44; SE SE sec. 22-T.19S.-R.19E., Anderson County, KS

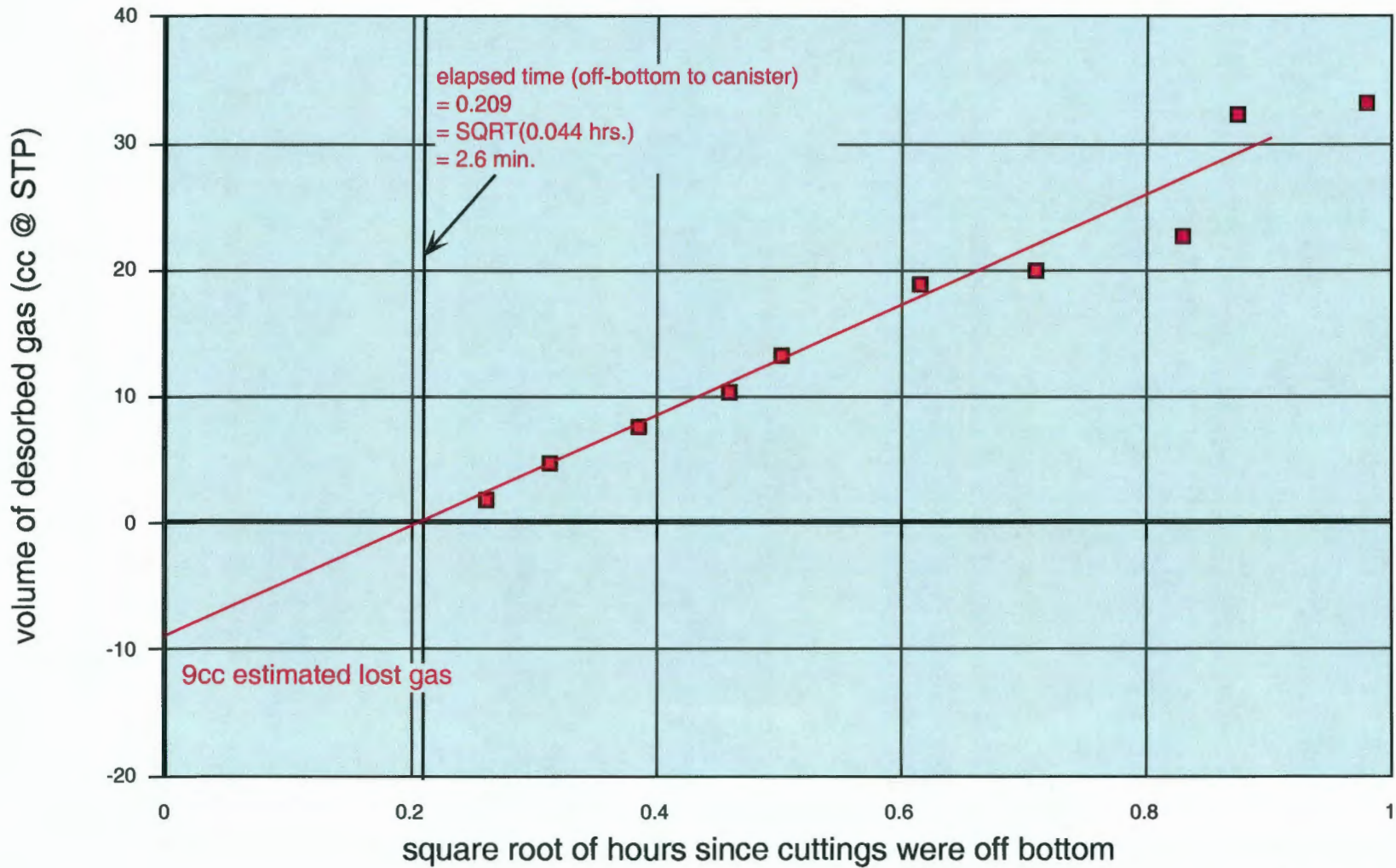


FIGURE 3.

### 656' to 660' (Mulberry coal) in canister M1

Meritage KCM Kipper #22-44; SE SE sec. 22-T.19S.-R.19E., Anderson County, KS

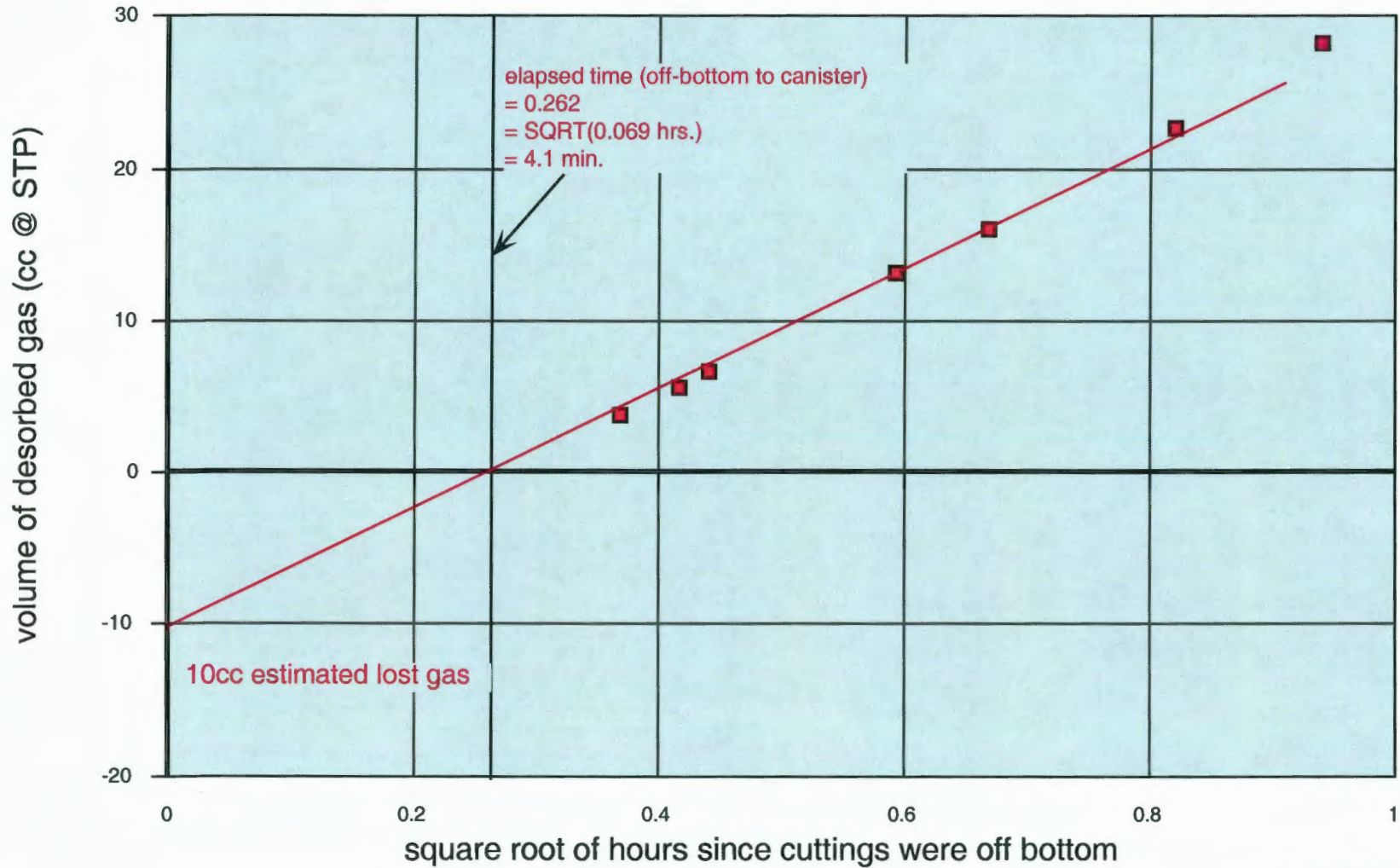


FIGURE 4.



# 739' to 744' (Little Osage Shale) in canister M2

Meritage KCM Kipper #22-44; SE SE sec. 22-T.19S.-R.19E., Anderson County, KS

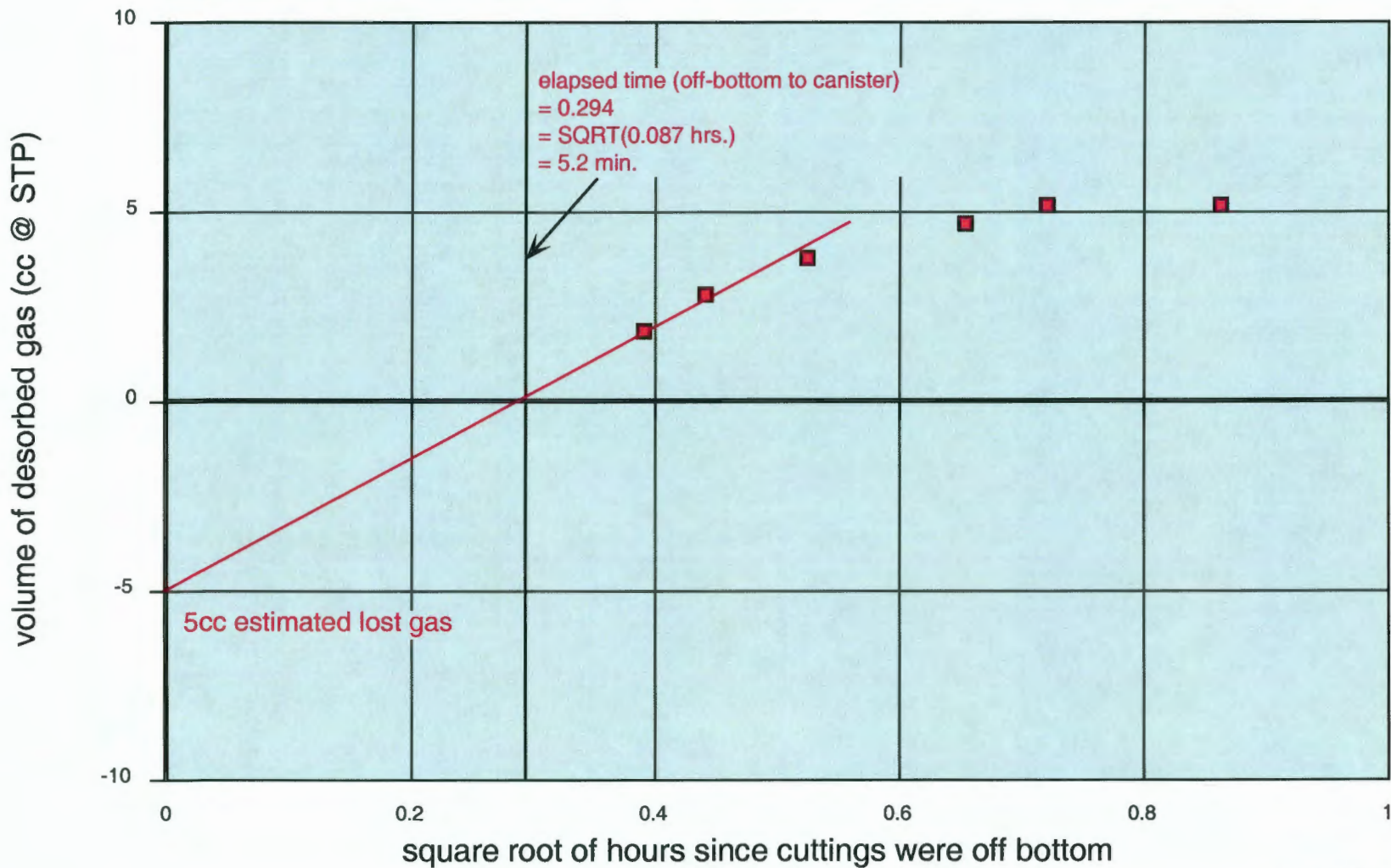


FIGURE 5.

# 1058' to 1060' (Dry Wood coal) in canister M3

Meritage KCM Kipper #22-44; SE SE sec. 22-T.19S.-R.19E., Anderson County, KS

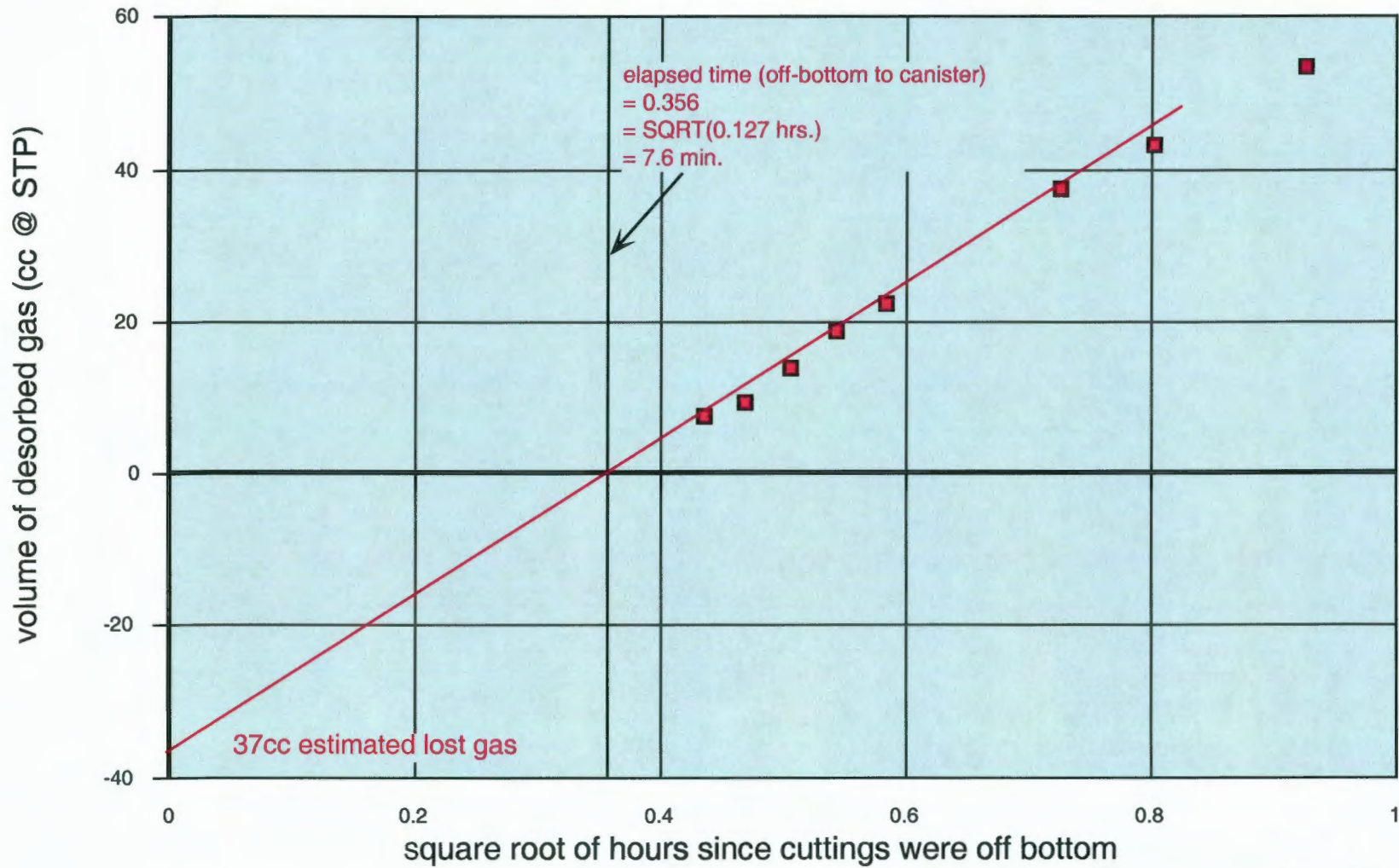


FIGURE 6.

# 1080' to 1082' (Rowe coal) in canister Brady 28

Meritage KCM Kipper #22-44; SE SE sec. 22-T.19S.-R.19E., Anderson County, KS

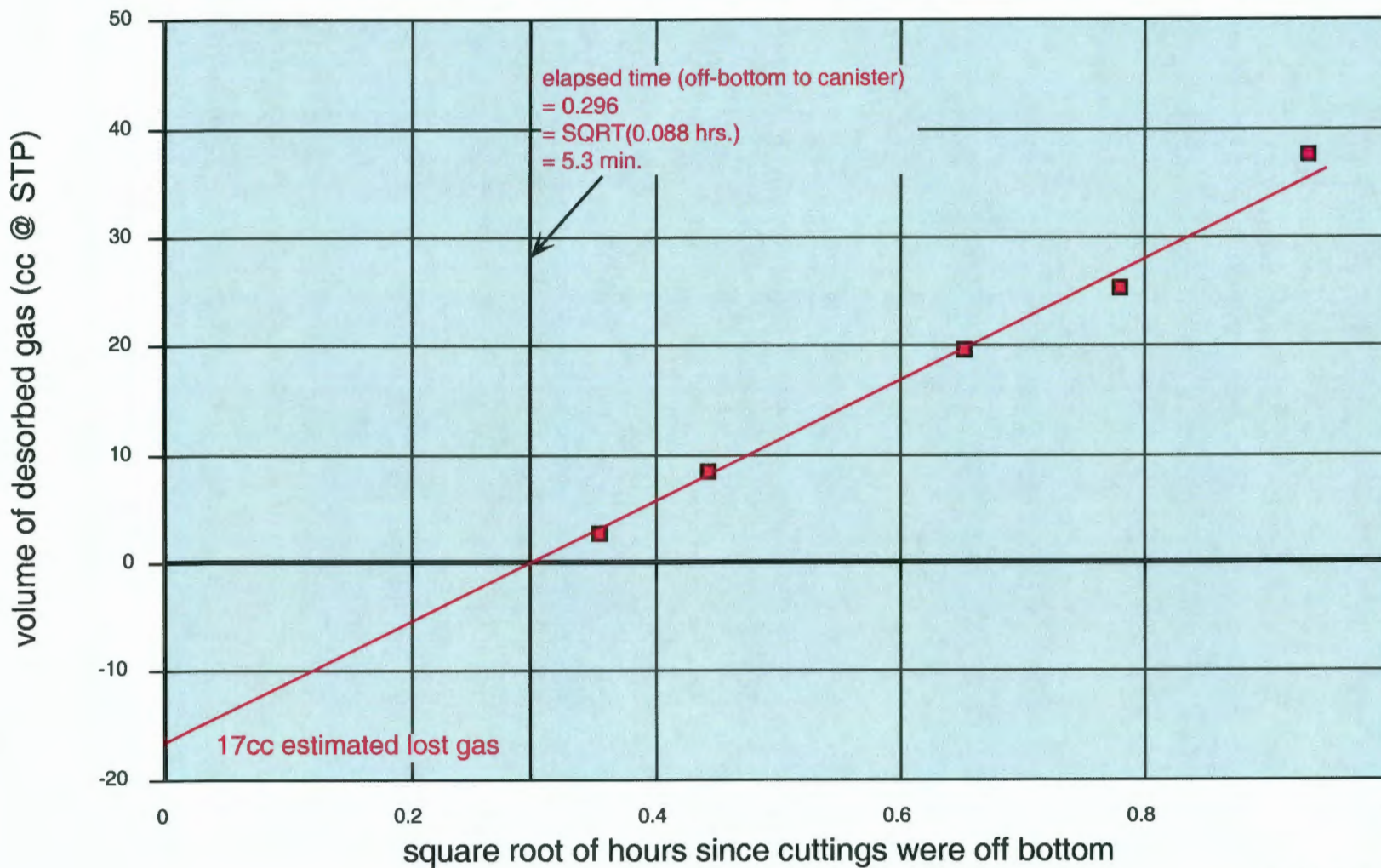


FIGURE 7.

1116' to 1118' (Riverton "B"&"C" coal) in canister Mer H  
Meritage KCM Kipper #22-44; SE SE sec. 22-T.19S.-R.19E., Anderson County, KS

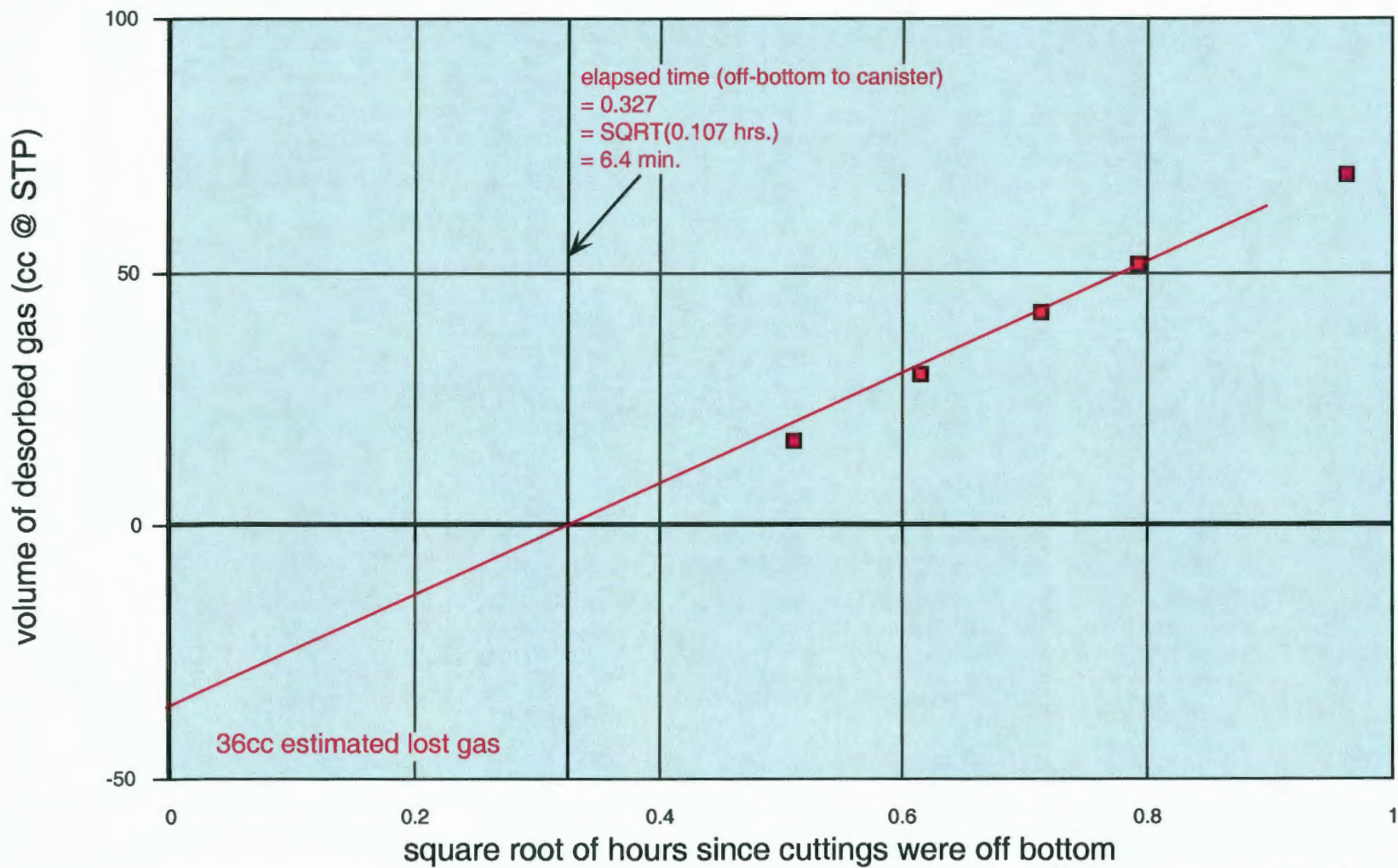


FIGURE 8.

1123' to 1125' (Riverton "D" coal) in canister Mer H  
Meritage KCM Kipper #22-44; SE SE sec. 22-T.19S.-R.19E., Anderson County, KS

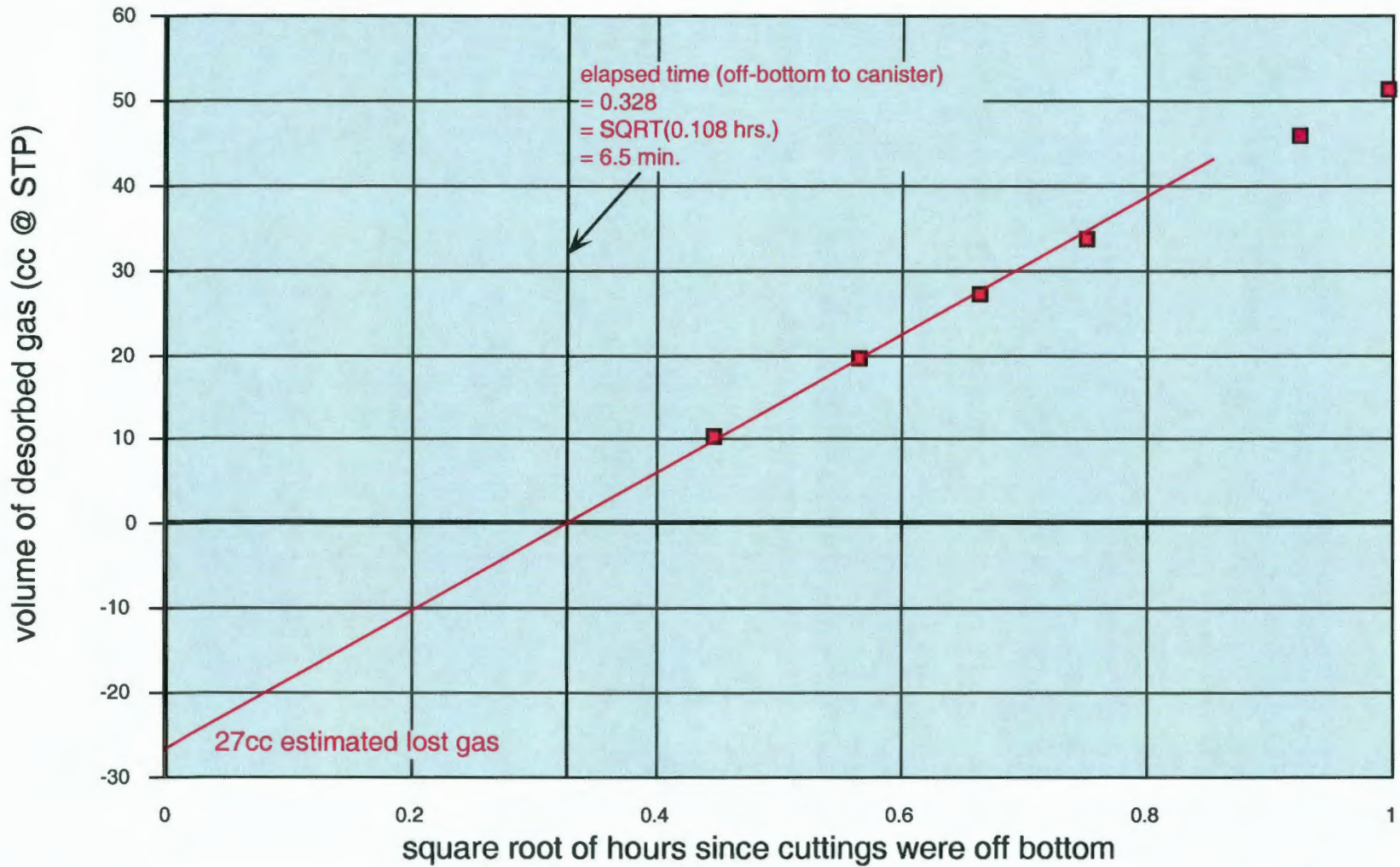


FIGURE 9.

# Desorption Characteristics of Cuttings Samples

Meritage KCM #22-44 Kipper; SE SE sec. 22-T.19S.-R.19E., Anderson County, KS

LITHOLOGIC COMPONENT SENSITIVITY ANALYSIS for calculation of gas content of Hushpuckney Shale from 399-403'

GAS CONTENT<sub>coal</sub> =

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

total gas desorbed = 180 ccs

TOTAL DRY WEIGHT OF SAMPLE = 425.90 grams

weight<sub>light-colored lithologies</sub> = 60.63 grams (14.2%)

weight<sub>dark shale</sub> = 365.27 grams (85.8%)

weight<sub>coal</sub> = 00.00 grams (0.0%)

sieve size	grams	% coal / % dark shale / % light-colored liths
>0.0930"	317.32	0.00% / 86.33% / 13.67%
>0.0661"	62.85	0.00% / 82.97% / 17.03%
>0.0460"	34.26	0.00% / 84.75% / 15.25%
>0.0331"	8.11	0.00% / 89.62% / 10.38%
<0.0331"	3.36	0.00% / 85.92% / 14.08%
<b>425.90 TOTAL</b>		

RESULTANT GAS CONTENT (coal) scf/ton

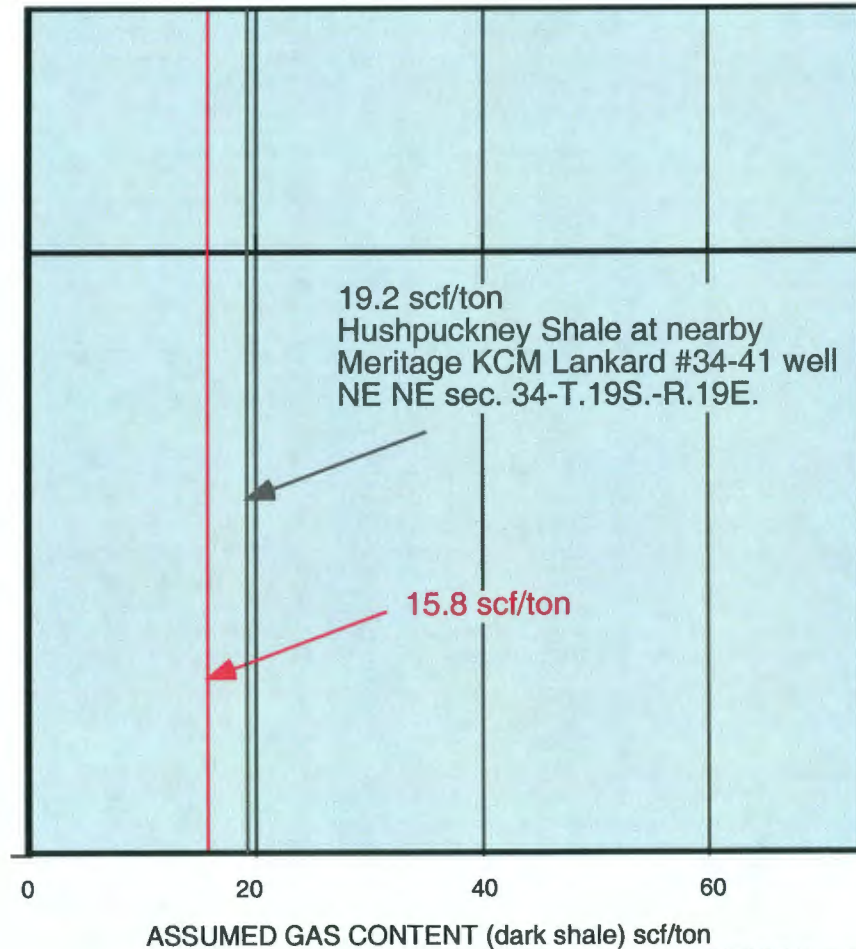


FIGURE 10.

# Desorption Characteristics of Cuttings Samples

Meritage KCM #22-44 Kipper; SE SE sec. 22-T.19S.-R.19E., Anderson County, KS

LITHOLOGIC COMPONENT SENSITIVITY ANALYSIS for calculation of gas content of Mulberry coal from 656-660'

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

total gas desorbed = 164 ccs

TOTAL DRY WEIGHT OF SAMPLE = 488.23 grams

weight<sub>light-colored lithologies</sub> = 198.15 grams (40.6%)

weight<sub>dark shale</sub> = 151.61 grams (31.1%)

weight<sub>coal</sub> = 138.47 grams (28.4%)

sieve size	grams	% coal / % dark shale / % light-colored liths
>0.0930"	251.72	29.20% / 32.72% / 38.08%
>0.0661"	142.69	61.05% / 23.06% / 15.89%
>0.0460"	77.87	40.05% / 38.19% / 21.76%
>0.0331"	10.63	38.64% / 44.70% / 16.67%
<0.0331"	5.31	42.23% / 34.67% / 23.10%

**488.23 TOTAL**

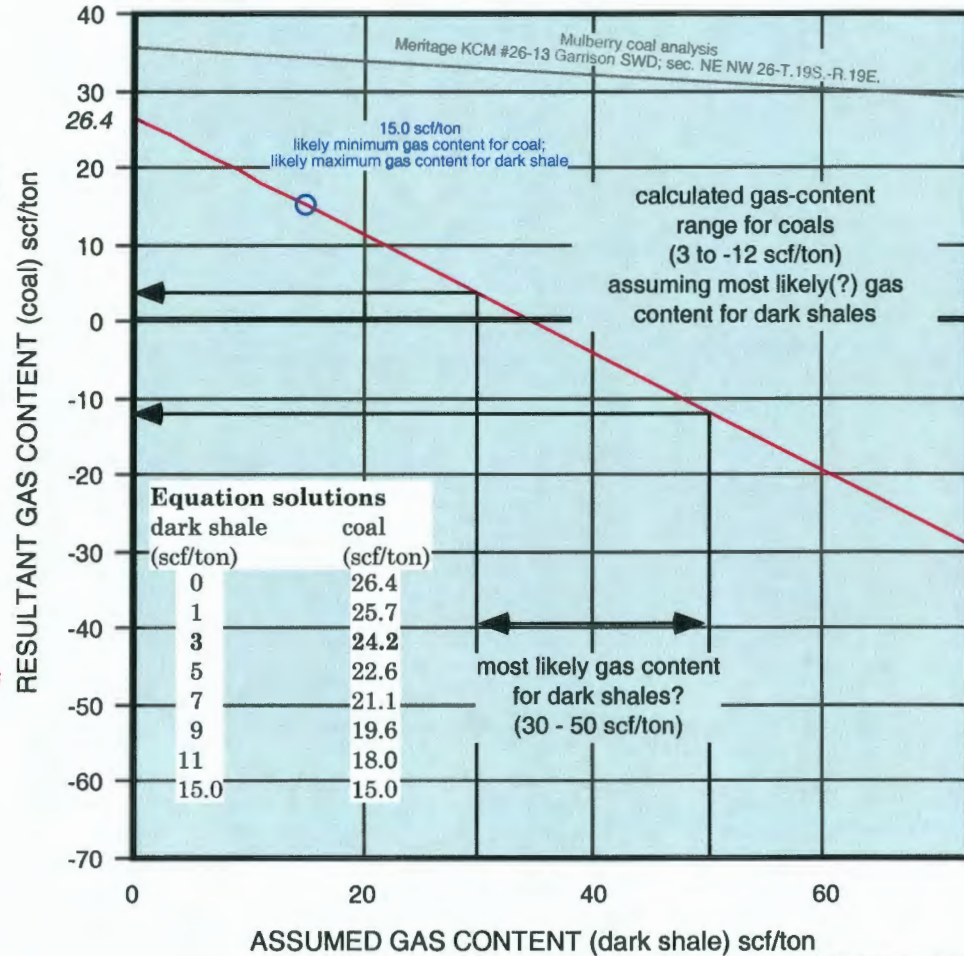


FIGURE 11.

# Desorption Characteristics of Cuttings Samples

Meritage KCM #22-44 Kipper; SE SE sec. 22-T.19S.-R.19E., Anderson County, KS

LITHOLOGIC COMPONENT SENSITIVITY ANALYSIS for calculation of gas content of Little Osage Shale from 739-744'

GAS CONTENT<sub>coal</sub> =

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

total gas desorbed = 26 ccs

TOTAL DRY WEIGHT OF SAMPLE = 351.45 grams

weight<sub>light-colored lithologies</sub> = 18.37 grams (5.2%)

weight<sub>dark shale</sub> = 333.08 grams (94.8%)

weight<sub>coal</sub> = 00.00 grams (0.0%)

sieve size	grams	% coal / % dark shale / % light-colored liths
>0.0930"	236.56	0.00% / 96.33% / 3.67%
>0.0661"	77.42	0.00% / 90.80% / 9.20%
>0.0460"	32.36	0.00% / 93.37% / 6.63%
>0.0331"	3.96	0.00% / 91.49% / 8.51%
<0.0331"	1.16	0.00% / 93.00% / 7.00%
<b>351.45 TOTAL</b>		

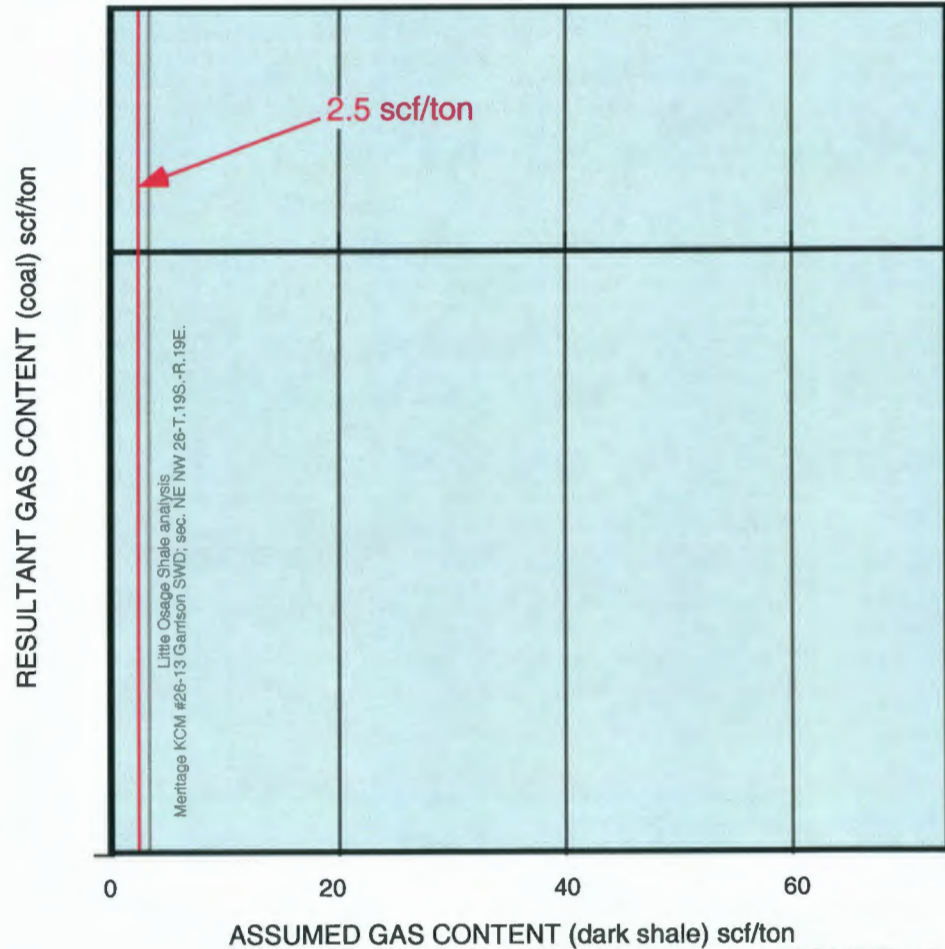


FIGURE 12.



# Desorption Characteristics of Cuttings Samples

Meritage KCM #22-44 Kipper; SE SE sec. 22-T.19S.-R.19E., Anderson County, KS

LITHOLOGIC COMPONENT SENSITIVITY ANALYSIS for calculation of gas content of Dry Wood coal from 1058-1060'

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

total gas desorbed = 525 ccs

TOTAL DRY WEIGHT OF SAMPLE = 1413.99 grams

weight<sub>light-colored lithologies</sub> = 816.67 grams (57.8%)

weight<sub>dark shale</sub> = 357.89 grams (25.3%)

weight<sub>coal</sub> = 239.44 grams (17.0%)

sieve size	grams	% coal / % dark shale / % light-colored liths
>0.0930"	1052.00	17.81% / 25.66% / 56.53%
>0.0661"	229.75	17.26% / 28.48% / 54.26%
>0.0460"	82.86	11.09% / 19.92% / 68.98%
>0.0331"	27.88	7.78% / 13.89% / 78.33%
<0.0331"	21.48	5.00% / 10.00% / 85.00%
<b>1413.99 TOTAL</b>		

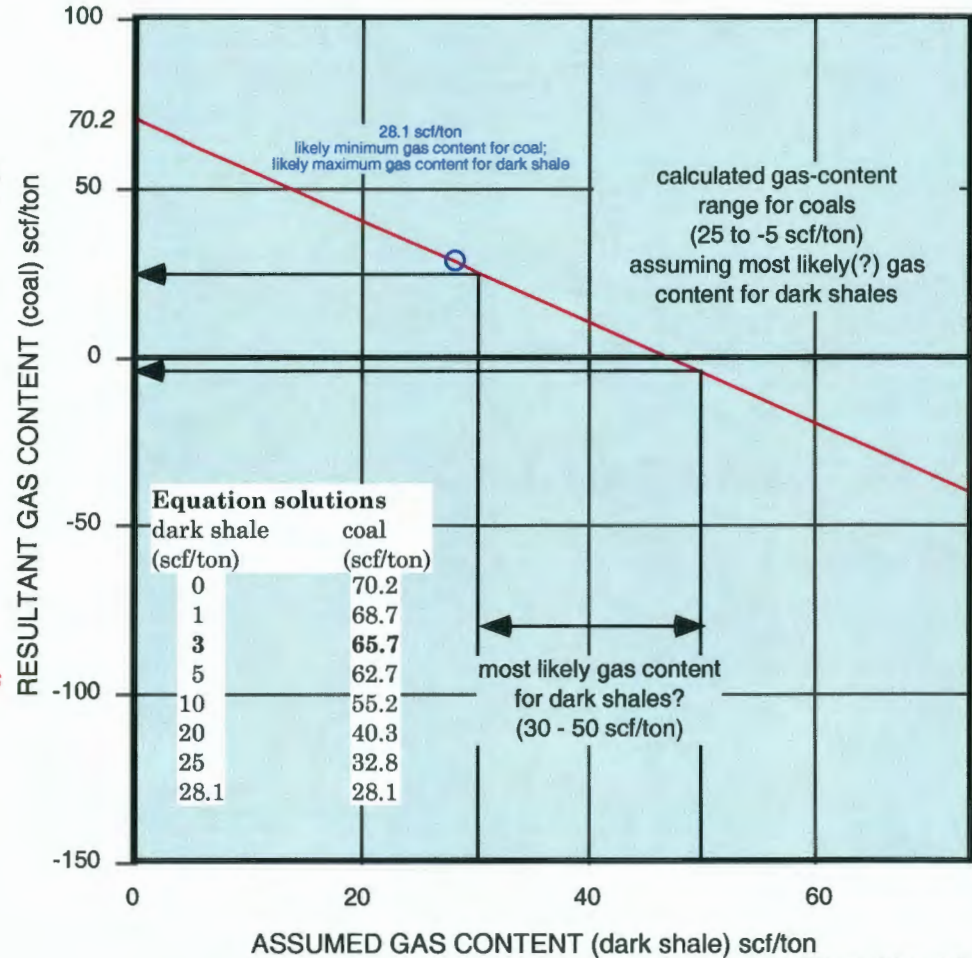


FIGURE 13.

# Desorption Characteristics of Cuttings Samples

Meritage KCM #22-44 Kipper; SE SE sec. 22-T.19S.-R.19E., Anderson County, KS

LITHOLOGIC COMPONENT SENSITIVITY ANALYSIS for calculation of gas content of Rowe coal from 1080-1082'

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

total gas desorbed = 250 ccs

TOTAL DRY WEIGHT OF SAMPLE = 1710.94 grams

weight<sub>light-colored lithologies</sub> = 1468.59 grams (85.8%)

weight<sub>dark shale</sub> = 161.37 grams (9.4%)

weight<sub>coal</sub> = 80.98 grams (4.7%)

sieve size	grams	% coal / % dark shale / % light-colored liths
>0.0930"	1128.24	6.38% / 7.79% / 85.83%
>0.0661"	343.60	1.85% / 14.78% / 83.38%
>0.0460"	172.41	0.51% / 10.85% / 88.64%
>0.0331"	46.81	2.61% / 4.56% / 92.83%
<0.0331"	19.89	2.84% / 9.49% / 87.67%
<b>1710.94 TOTAL</b>		

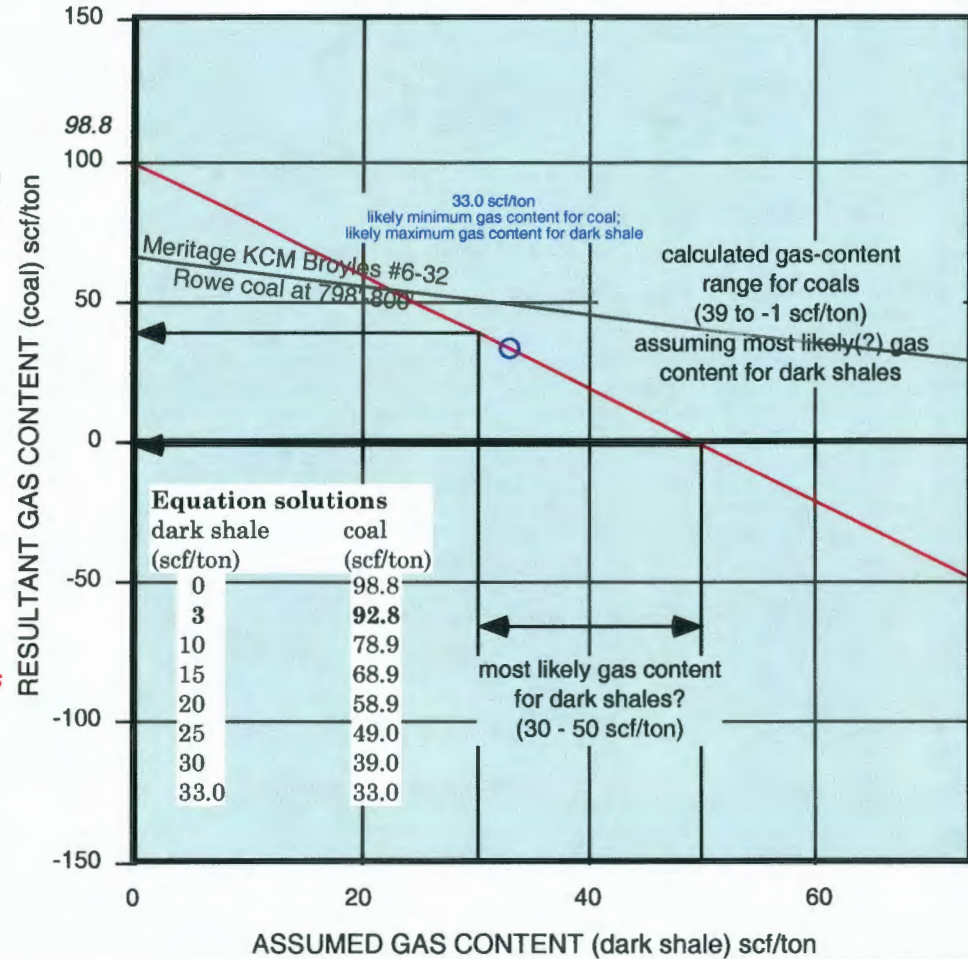


FIGURE 14.

# Desorption Characteristics of Cuttings Samples

Meritage KCM #22-44 Kipper; SE SE sec. 22-T.19S.-R.19E., Anderson County, KS

THOLOGIC COMPONENT SENSITIVITY ANALYSIS for calculation of gas content of Riverton "B" & "C" coals from 1116-1118'

$$\text{GAS CONTENT}_{\text{coal}} =$$

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

total gas desorbed = 721 ccs

TOTAL DRY WEIGHT OF SAMPLE = 1258.81 grams

weight<sub>light-colored lithologies</sub> = 199.76 grams (15.9%)

weight<sub>dark shale</sub> = 779.30 grams (61.9%)

weight<sub>coal</sub> = 279.79 grams (22.2%)

sieve size	grams	% coal / % dark shale / % light-colored liths
>0.0930"	964.32	20.91% / 64.16% / 14.92%
>0.0661"	206.97	30.19% / 53.62% / 16.19%
>0.0460"	69.81	17.82% / 56.60% / 25.58%
>0.0331"	10.89	16.00% / 56.00% / 28.00%
<0.0331"	6.82	21.23% / 57.60% / 21.17%

1258.81 TOTAL

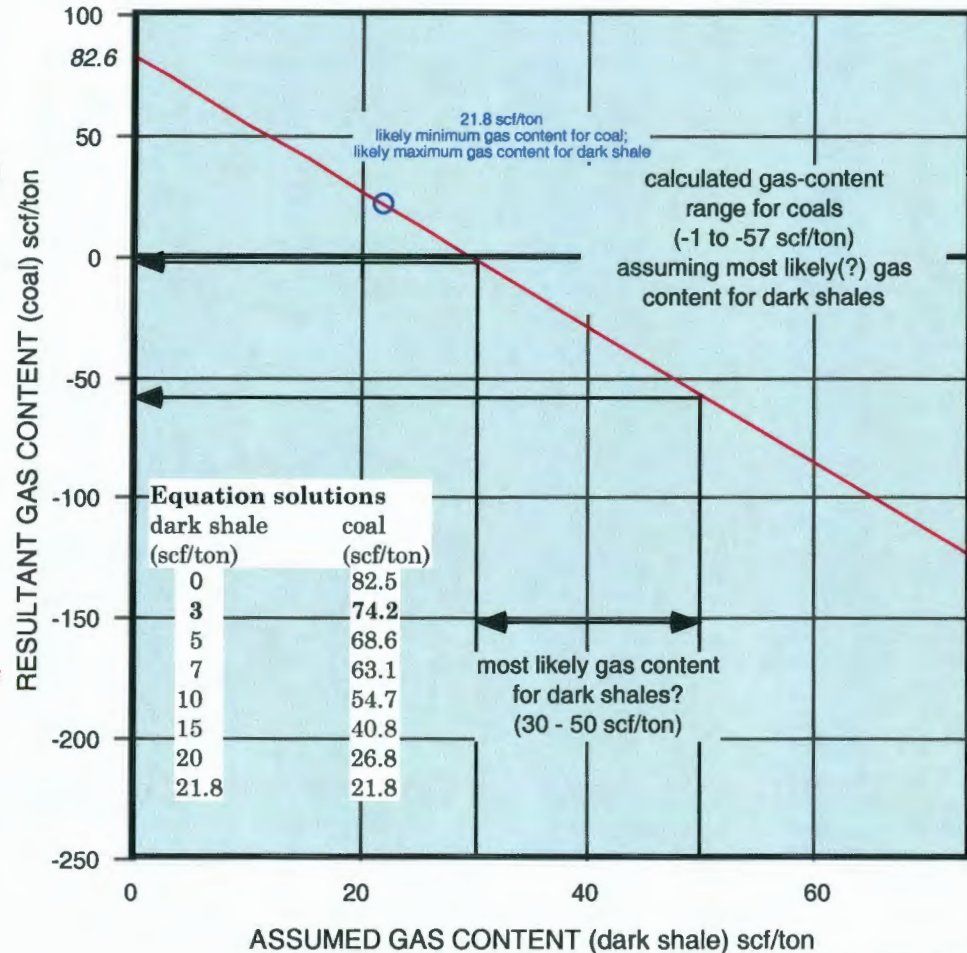


FIGURE 15.

# Desorption Characteristics of Cuttings Samples

Meritage KCM #22-44 Kipper; SE SE sec. 22-T.19S.-R.19E., Anderson County, KS

LITHOLOGIC COMPONENT SENSITIVITY ANALYSIS for calculation of gas content of Riverton "D" coal from 1123-1125'

$$\text{GAS CONTENT}_{\text{coal}} =$$

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

total gas desorbed = 586 ccs

TOTAL DRY WEIGHT OF SAMPLE = 931.86 grams

weight<sub>light-colored lithologies</sub> = 289.22 grams (31.0%)

weight<sub>dark shale</sub> = 414.10 grams (44.4%)

weight<sub>coal</sub> = 228.54 grams (24.5%)

sieve size	grams	% coal / % dark shale / % light-colored liths
>0.0930"	419.28	14.01% / 43.24% / 42.75%
>0.0661"	318.38	36.11% / 43.15% / 20.74%
>0.0460"	147.03	29.76% / 49.04% / 21.20%
>0.0331"	30.45	22.33% / 50.97% / 26.70%
<0.0331"	16.72	25.55% / 46.60% / 27.85%
<b>931.86 TOTAL</b>		

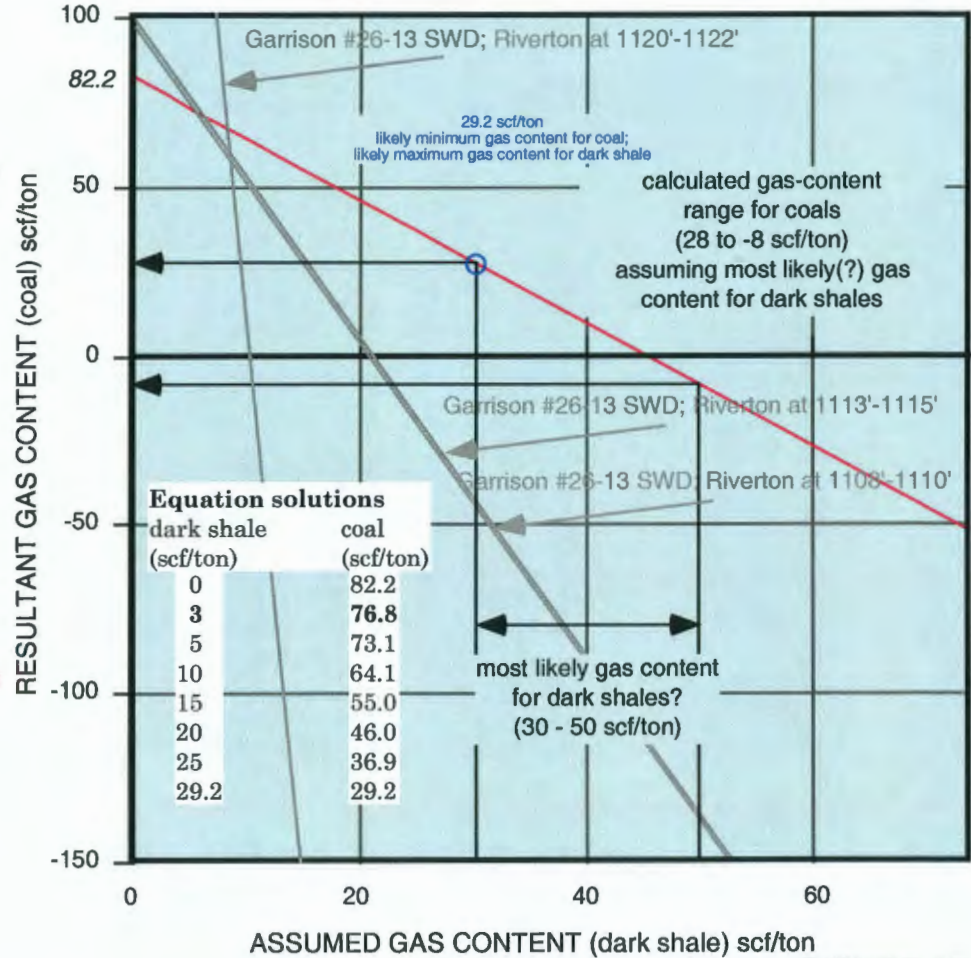


FIGURE 16.



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

Meritage KCM #22-44 Kipper; SE SE sec. 22-T.19S.-R.19E., Anderson County, KS

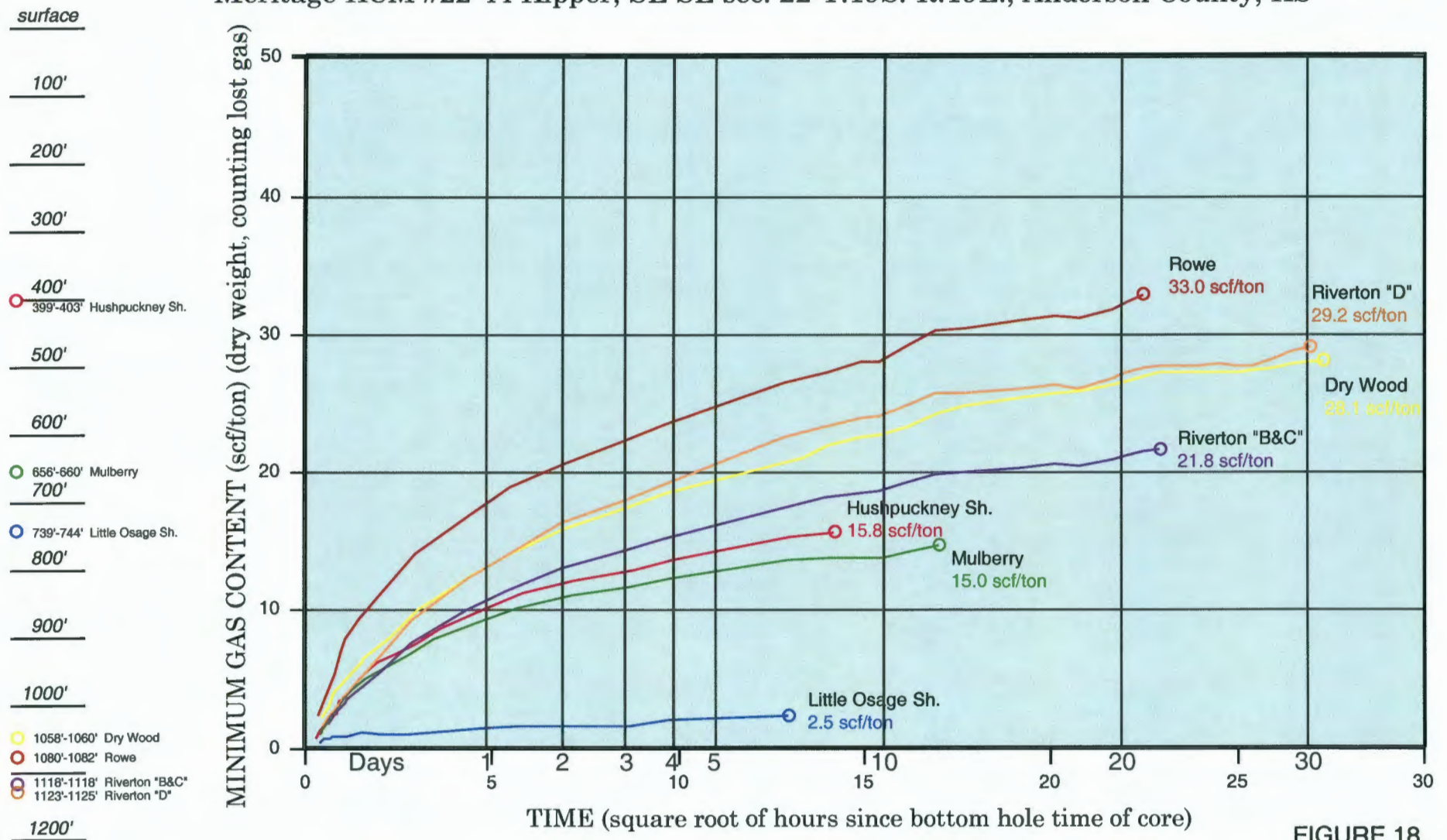


FIGURE 18.