ANALYSIS OF CHEROKEE GROUP CUTTINGS SAMPLES FOR GAS CONTENT -- EVERGREEN OPERATING CORP. RESCHKE #34-34; SW SE 34-T.1S.-R.16E., BROWN COUNTY, KANSAS

By
K. David Newell and W. Matthew Brown

Kansas Geological Survey
The University of Kansas
1930 Constant Avenue
Lawrence, KS 66047-3726

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SUMMARY

Ten cuttings samples from the Pennsylvanian Marmaton Group and Cherokee Group were collected from the Evergreen Operating Corp. Reschke #34-34; SW SE 34-T.1S.-R.16E., Brown County, KS. The samples calculate as having the following gas contents:

- Little Osage Shale at 1418' to 1422' depth[1] (3 scf/ton)
- Excello Shale at 1438' to 1440' depth[1] (7 scf/ton)
- Croweburg coal at 1545' to 1547' depth[2] (36 scf/ton)
- Mineral coal at 1585' to 1586' depth[2] (37 scf/ton)
- Weir "B"(?) coal at 1694' to 1695' depth[2] (41 scf/ton)
- Rowe "A" coal at 1933' to 1935' depth[2] (30 scf/ton)
- Rowe "B" or "C" coal at 1940' to 1942' depth[2] (32 scf/ton)
- ? coal at 2010' to 2012' depth[2] (34 scf/ton)
- ? coal at 2048' to 2050' depth[2] (51 scf/ton)
- ? coal at 2057' to 2059' depth[2] (15 scf/ton)

[1]no coal in sample
[2]assuming accompanying dark shale in sample desorbs 3 scf/ton

BACKGROUND

The Evergreen Operating Corp. Reschke #34-34; SW SE 34-T.1S.-R.16E., Brown 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 March 12, 13, 14, 2004 by K. David Newell and W. Matthew Brown of the Kansas Geological Survey, with assistance from Richard Robba (consultant to Evergreen). Samples were obtained during coring of the well, with no cessation of drilling before zones of interest (i.e., coals and dark shales in the Marmaton Group and Cherokee Group) were penetrated. The well was drilled using a mud system, with a rig owned by Layne-Christensen, Canada, Ltd.

Lag times for samples to reach the surface (important for assessing lost gas) were determined with a rule-of-thumb rate of circulation of 100 feet per minute. A mud-logging trailer with a gas detector trailer was on site.

Ten cuttings samples from the Pennsylvanian Marmaton Group and Cherokee Group were collected:

- Little Osage Shale at 1418' to 1422' depth (370 grams dry wt.)
- Excello Shale at 1438' to 1440' depth (416 grams dry wt.)
- Croweburg coal at 1545' to 1547' depth (320 grams dry wt.)
- Mineral coal at 1585' to 1586' depth (306 grams dry wt.)
- Weir "B"(?) coal at 1694' to 1695' depth (264 grams dry wt.)
- Rowe "A" coal at 1933' to 1935' depth (316 grams dry wt.)
- Rowe "B" or "C" coal at 1940' to 1942' depth (340 grams dry wt.)
- ? coal at 2010' to 2012' depth (340 grams dry wt.)

- ? coal at 2048' to 2050' depth (808 grams dry wt.)
- ? coal at 2057' to 2059' depth (465 grams dry wt.)

The cuttings were caught in kitchen strainers as they exited the shale shaker 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. Water with biocide was poured into the canisters before the canisters were sealed.

Temperature baths for the desorption canisters were on site, with temperature kept at approximately 70 °F. 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 the same temperature. 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.

Most desorption canisters were made in-house at the Kansas Geological Survey. The "ST" canisters enclosed a volume of 38 cubic inches (620 cm^3). The "DN" canisters enclosed a volume of 44 cubic inches (720 cm^3). Canisters "10 and "J" were obtained from SSD, Inc. in Grand Junction, CO. These canisters are 12.5 inches high (32 cm), 3 1/2 inches (9 cm) in diameter, and enclose a volume of approximately 150 cubic inches (2450 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 linear regression 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. The regression equation was entered into the desorption 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:

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

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. 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 either air-dried for several days, or 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) data tables for the desorption analyses, 2) lost-gas graphs, 3) "lithologic component sensitivity analyses" showing the interdependence of gas evolved from dark shale versus coal in each sample, 4) a summary component analysis for all samples showing relative reliability of the data from all the samples, and 5) a desorption graph for all the samples.

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 1-10)

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 10-20)
Collection of pure lithologies using drill cuttings 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 lighter-colored lithologies are considered to be incapable of generating significant amounts of gas.

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

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

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.

A value of 3 scf/ton for average dark shale is based on the assay of the gas content of cores of dark shales with normal gamma-ray readings in Kansas wells. However, high-gamma-ray shales (such as the Excello Shale), also colloquially known as "hot shales", typically have more organic matter and associated gas content than dark shales with no excessive gamma-ray level. Determination of gas content for a coal associated with a "hot" shale therefore carries more uncertainty than if the coal were associated with a shale without a high gamma-ray value. For example, the Mulky coal is a coal associated with a "hot shale" (Excello Shale).

In general, shale gas content does not have to be very much greater that 10 scf/ton before the associated coal starts to have a gas content less than that of the dark shale. In all the lithologic-component-sensitivity-analysis diagrams, a "break-even" point is therefore 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. 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.

Summary Component Analysis for all Samples (Figure 21)

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 22)

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 Little Osage Shale and Excello Shale samples did not contain significant coal. The gas from these samples is that produced from organic-rich shale. All of the other samples contain adequate coal for reasonable determination of gas content of the coal. No sample had less than 11% coal. According to the summary diagram for the sensitivity analyses (Figure 21), the best constrained results (in which the resultant coal gas content varies the least with shale gas content) is for the ? coal (2048' - 2050'). The least constrained results are for the Weir "B" coal (1694' - 1695').

REFERENCES

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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

TABLE 1 -- Desorption data for EVERGREEN RESCHKE #34-34; SW SE 34-T.1S.-R.16E., Brown County, KS

SAMPLE: 1418' to 1422' (Little Osage Shale) cuttings in canister ST1

dry sample weight: 0.3726 lbs. 169.03 grams

est. lost gas (cc) = 8

TIME OF: off bottom 3/12/04 16:03; at surface 3/12/04 16:16; in canister 3/12/04 16:30

elapsed time (off bottom to canistering): 26.3 minutes; 0.438 hours; 0.661437828 SQRT (hrs)

RIG/LAB MEASUREMENTS measured cc	measured T (F)	measured P	CONVERSION OF RIG/LAB MEASUREMENTS TO STP (@60 deg F; 14.7 psi) cubic ft	absolute T (R)	psia	cubic ft (@STP)	cc (@STP)	CUMULATIVE VOLUMES cubic ft (@STP)	cc (@STP)	SCF/TON without lost gas	SCF/TON with lost gas	TIME OF MEASURE	TIME SINCE off bottom	in canister	SQRT hrs. (since off bottom)
0	70	1066	0	530	14.096	0	0.00	0	0.00	0.00	1.52	3/12/04 16:32	0:26:45	0:02:30	0.692218655
0	70	1066	0	530	14.096	0	0.00	0	0.00	0.00	1.52	3/12/04 16:50	0:47:00	0:20:45	0.865061203
2	70	1086	7E-05	530	14.096	6.64488E-05	1.88	6.64466E-05	1.86	0.36	1.67	3/12/04 19:09	1:06:00	0:39:45	1.048808848
1	70	1086	4E-05	530	14.096	3.32244E-05	0.94	9.96732E-05	2.82	0.53	2.05	3/12/04 19:17	1:13:15	0:47:00	1.10491327
2	70	1085	7E-05	530	14.083	6.63876E-05	1.88	0.000166061	4.70	0.89	2.41	3/12/04 19:40	1:36:15	1:10:00	1.266557013
0	71	1086	0	531	14.096	0	0.00	0.000166061	4.70	0.89	2.41	3/12/04 22:24	4:20:15	3:54:00	2.08266656
3	71	1086	0.0001	531	14.096	9.94855E-05	2.82	0.000265546	7.52	1.43	2.94	3/12/04 23:06	5:04:15	4:36:00	2.25165109
1	71	1084	4E-05	531	14.070	3.31006E-05	0.94	0.000298647	8.46	1.60	3.12	3/13/04 1:12	7:08:15	6:42:00	2.671610002
0	71	1083	0	531	14.057	0	0.00	0.000298647	8.46	1.60	3.12	3/13/04 4:53	10:49:15	10:23:00	3.289503509
-2	71	1082	-7E-05	531	14.044	-6.6079E-05	-1.87	0.000232568	6.59	1.25	2.76	3/13/04 12:12	18:08:15	17:42:00	4.258614389
-1	71	1082	-4E-05	531	14.044	-3.304E-05	-0.94	0.000199528	5.65	1.07	2.59	3/13/04 16:24	24:20:15	23:54:00	4.93330518
0	71	1084	0	531	14.070	0	0.00	0.000199528	5.65	1.07	2.59	3/13/04 20:57	26:53:15	26:27:00	5.185315605
-3	71	1090	-1E-04	531	14.148	-9.9652E-05	-2.83	9.98761E-05	2.82	0.53	2.05	3/14/04 3:46	33:44:15	33:16:00	5.808399091
-2	70	1093	-7E-05	530	14.187	-6.6877E-05	-1.89	3.2799E-05	0.93	0.18	1.69	3/14/04 6:26	38:24:15	37:58:00	6.197109541
2	71	1087	7E-05	531	14.109	6.63847E-05	1.88	9.91637E-05	2.81	0.53	2.05	3/14/04 23:21	53:17:15	52:51:00	7.299826765
2	71	1082	7E-05	531	14.044	6.60794E-05	1.87	0.000165263	4.68	0.89	2.40	3/15/04 11:19	65:15:15	64:49:00	8.078005117
-1	70	1086	-4E-05	530	14.096	-3.3224E-05	-0.94	0.000132039	3.74	0.71	2.22	3/16/04 10:10	88:06:15	87:40:00	9.38636198
2	72	1078	7E-05	532	13.992	6.57113E-05	1.86	0.00019775	5.60	1.06	2.58	3/17/04 10:16	112:12:15	111:46:00	10.59264682
-2	72	1087	-7E-05	532	14.109	-6.626E-05	-1.88	0.00013149	3.72	0.71	2.22	3/18/04 15:17	141:13:15	140:47:00	11.88363721

DESORPTION TERMINATED 3/18/2004 DUE TO NO MORE GAS BEING EVOLVED; sampled air dried for 35 days

SAMPLE: 1438' to 1440' (Excello Shale) cuttings in canister ST4

dry sample weight: 0.6552 lbs. 297.17 grams

est. lost gas (cc) = 21

TIME OF: off bottom 3/12/04 19:18; at surface 3/12/04 19:33; in canister 3/12/04 19:40

elapsed time (off bottom to canistering): 21.5 minutes; 0.358 hours; 0.598609500 SQRT (hrs)

RIG/LAB MEASUREMENTS measured cc	measured T (F)	measured P	CONVERSION OF RIG/LAB MEASUREMENTS TO STP (@60 deg F; 14.7 psi) cubic ft	absolute T (R)	psia	cubic ft (@STP)	cc (@STP)	CUMULATIVE VOLUMES cubic ft (@STP)	cc (@STP)	SCF/TON without lost gas	SCF/TON with lost gas	TIME OF MEASURE	TIME SINCE off bottom	in canister	SQRT hrs. (since off bottom)
3	70	1085	0.0001	530	14.083	9.95814E-05	2.82	9.95814E-05	2.82	0.30	2.57	3/12/04 19:45	0:27:15	0:05:45	0.673918667
1	70	1085	4E-05	530	14.083	3.31938E-05	0.94	0.000132775	3.76	0.41	2.67	3/12/04 19:48	0:30:00	0:08:30	0.707106781
1	70	1085	4E-05	530	14.083	3.31938E-05	0.94	0.000165969	4.70	0.51	2.77	3/12/04 19:51	0:32:30	0:11:00	0.735980072
2	70	1085	7E-05	530	14.083	6.63676E-05	1.88	0.000232357	6.58	0.71	2.97	3/12/04 19:58	0:39:30	0:18:00	0.81137743
2	70	1085	7E-05	530	14.083	6.63676E-05	1.88	0.000298744	8.46	0.91	3.18	3/12/04 20:06	0:48:15	0:26:45	0.896753403
1	70	1085	4E-05	530	14.083	3.31938E-05	0.94	0.000331938	9.40	1.01	3.28	3/12/04 20:12	0:54:00	0:32:30	0.946863298
14	70	1085	0.0005	530	14.083	0.000464713	13.16	0.000796651	22.56	2.43	4.70	3/12/04 22:01	2:42:30	2:21:00	1.645701471
3	71	1086	0.0001	531	14.096	9.94855E-05	2.82	0.000896137	25.38	2.74	5.00	3/12/04 22:24	3:05:30	2:44:00	1.758313566
4	71	1086	0.0001	531	14.096	0.000132647	3.76	0.001028784	29.13	3.14	5.40	3/12/04 23:09	3:50:30	3:29:00	1.960017007
5	71	1084	0.0002	531	14.070	0.000165504	4.69	0.001194288	33.82	3.65	5.91	3/13/04 1:11	5:52:30	5:31:00	2.423839929
5	71	1083	0.0002	531	14.057	0.000165351	4.68	0.001359639	38.50	4.15	6.41	3/13/04 4:54	9:35:30	9:14:00	3.097041599
2	71	1082	7E-05	531	14.044	6.60794E-05	1.87	0.001425719	40.37	4.35	6.62	3/13/04 12:11	16:52:30	16:31:00	4.107919161
0	71	1062	0	531	14.044	0	0.00	0.001425719	40.37	4.35	6.62	3/13/04 16:23	23:04:30	22:43:00	4.80364445
0	71	1084	0	531	14.070	0	0.00	0.001425719	40.37	4.35	6.62	3/13/04 20:57	25:38:30	25:17:00	5.063760131
-2	71	1090	-7E-05	531	14.148	-6.6566E-05	-1.88	0.001359151	38.49	4.15	6.41	3/14/04 3:46	32:29:30	32:08:00	5.700146197
-2	70	1093	-7E-05	530	14.187	-6.6877E-05	-1.89	0.001292273	36.59	3.94	6.21	3/14/04 8:27	37:08:30	36:47:00	6.094396333
1	67	1088	4E-05	527	14.122	3.34751E-05	0.95	0.001325749	37.54	4.05	6.31	3/14/04 15:43	44:24:30	44:03:00	6.663957763
2	71	1087	7E-05	531	14.109	6.63847E-05	1.88	0.001392133	39.42	4.25	6.51	3/14/04 23:21	52:02:30	51:41:00	7.213991036
2	71	1082	7E-05	531	14.044	6.60794E-05	1.87	0.001458213	41.29	4.45	6.72	3/15/04 11:22	64:03:30	63:42:00	8.003645003
0	70	1086	0	530	14.096	0	0.00	0.001458213	41.29	4.45	6.72	3/16/04 10:11	86:52:30	86:31:00	9.320675941
2	72	1079	7E-05	532	14.005	6.57723E-05	1.86	0.001523985	43.15	4.65	6.92	3/17/04 10:17	110:56:30	110:37:00	10.53446724
-2	72	1087	-7E-05	532	14.109	-6.626E-05	-1.88	0.001457725	41.26	4.45	6.71	3/18/04 15:17	139:56:30	139:37:00	11.83110308
0	73	1087	0	533	14.109	0	0.00	0.001457725	41.26	4.45	6.71	3/19/04 10:04	158:45:30	158:24:00	12.59993386

DESORPTION TERMINATED 3/18/2004 DUE TO NO MORE GAS BEING EVOLVED; sampled air dried for 28 days

SAMPLE: 1545' to 1547' (V Shale & Croweburg coal) cuttings in canister ST7

dry sample weight: 0.4570 lbs. 207.26 grams

est. lost gas (cc) = 25

TIME OF: off bottom 3/13/04 4:22; at surface 3/13/04 4:36; in canister 3/13/04 4:50

elapsed time (off bottom to canistering): 27.5 minutes; 0.458 hours; 0.677003200 SQRT (hrs)

RIG/LAB MEASUREMENTS | CONVERSION OF RIG/LAB MEASUREMENTS TO STP (@60 deg F; 14.7 psi) | CUMULATIVE VOLUMES | SCF/TON | SCF/TON | TIME SINCE

measured cc	measured T (F)	measured P	cubic ft	absolute T (R)	psia	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	71	1083	0.0001	531	14.057	9.92107E-05	2.81	9.92107E-05	2.81	0.43	4.30	3/13/04 4:56	0:33:30	0:06:00	0.747217059
2	71	1083	7E-05	531	14.057	6.61404E-05	1.87	0.000165351	4.68	0.72	4.59	3/13/04 5:01	0:39:15	0:11:45	0.808805704
2	71	1083	7E-05	531	14.057	6.61404E-05	1.87	0.000231492	6.56	1.01	4.88	3/13/04 5:11	0:49:00	0:21:30	0.903696114
1	71	1083	4E-05	531	14.057	3.30702E-05	0.94	0.000264562	7.49	1.16	5.02	3/13/04 5:16	0:53:45	0:26:15	0.946484724
2	71	1083	7E-05	531	14.057	6.61404E-05	1.87	0.000330702	9.36	1.45	5.31	3/13/04 5:21	0:59:00	0:31:30	0.991631652
16	71	1083	0.0006	531	14.057	0.000529124	14.98	0.000859826	24.35	3.76	7.63	3/13/04 7:52	3:29:30	3:02:00	1.868600189
3	71	1083	0.0001	531	14.057	9.92107E-05	2.81	0.000959037	27.16	4.20	8.06	3/13/04 8:29	4:06:30	3:39:00	2.026902399
3	71	1083	0.0001	531	14.057	9.92107E-05	2.81	0.001058247	29.97	4.63	8.50	3/13/04 9:00	4:37:30	4:10:00	2.150581317
7	71	1082	0.0002	531	14.044	0.000231278	6.55	0.001289525	36.52	5.64	9.51	3/13/04 12:08	7:45:30	7:18:00	2.78537849
5	71	1081	0.0002	531	14.031	0.000165046	4.67	0.001454571	41.19	6.37	10.23	3/13/04 14:28	10:05:30	9:38:00	3.176738369
5	70	1082	0.0002	530	14.044	0.00016551	4.69	0.001620081	45.88	7.09	10.95	3/13/04 18:21	13:58:30	13:31:00	3.738315129
2	70	1084	7E-05	530	14.070	6.63264E-05	1.88	0.001686407	47.75	7.38	11.24	3/13/04 21:01	16:38:30	16:11:00	4.079419893
2	70	1090	7E-05	530	14.148	6.66935E-05	1.89	0.001753101	49.64	7.67	11.54	3/14/04 3:50	23:27:30	23:00:00	4.843380362
2	70	1093	7E-05	530	14.187	6.68771E-05	1.89	0.001819978	51.54	7.97	11.83	3/14/04 8:26	28:03:30	27:36:00	5.297011738
4	67	1088	0.0001	527	14.122	0.0001339	3.79	0.001953878	55.33	8.55	12.42	3/14/04 15:42	35:19:30	34:52:00	5.943483827
5	71	1087	0.0002	531	14.109	0.000165962	4.70	0.00211984	60.03	9.28	13.14	3/14/04 23:22	42:59:30	42:32:00	6.556803083
3	71	1082	0.0001	531	14.044	9.91191E-05	2.81	0.002218959	62.83	9.71	13.58	3/15/04 11:23	55:00:30	54:33:00	7.416760299
3	70	1088	0.0001	530	14.096	9.96732E-05	2.82	0.002318632	65.66	10.15	14.01	3/16/04 10:12	77:49:30	77:22:00	8.821847879
4	72	1076	0.0001	532	13.992	0.000131423	3.72	0.002450055	69.38	10.72	14.59	3/17/04 10:18	101:55:30	101:28:00	10.0957912
0	72	1087	0	532	14.109	0	0.00	0.002450055	69.38	10.72	14.59	3/18/04 15:18	130:55:30	130:28:00	11.44224828
2	73	1087	7E-05	533	14.109	6.61356E-05	1.87	0.002516191	71.25	11.01	14.88	3/19/04 10:09	149:46:30	149:19:00	12.23825968
0	75	1094	0	535	14.200	0	0.00	0.002516191	71.25	11.01	14.88	3/20/04 12:58	176:35:30	176:08:00	13.28877973
-1	73	1102	-4E-05	533	14.303	-3.3524E-05	-0.95	0.002482667	70.30	10.87	14.73	3/21/04 1:23	189:00:30	188:33:00	13.74803016
1	72	1097	4E-05	532	14.239	3.34348E-05	0.95	0.002516101	71.25	11.01	14.88	3/22/04 9:44	221:21:30	220:54:00	14.87811592
4	72	1084	0.0001	532	14.070	0.000132154	3.74	0.002648255	74.99	11.59	15.45	3/23/04 9:11	244:48:30	244:21:00	15.64635208
2	72	1081	7E-05	532	14.031	6.58942E-05	1.87	0.00271415	76.86	11.88	15.74	3/24/04 13:33	273:10:30	272:43:00	16.52800653
2	73	1082	7E-05	533	14.044	6.58314E-05	1.86	0.002779981	78.72	12.17	16.03	3/25/04 11:31	295:08:30	294:41:00	17.17968762
2	75	1084	7E-05	535	14.070	6.57066E-05	1.86	0.002845688	80.58	12.45	16.32	3/26/04 14:28	322:05:30	321:38:00	17.94691245
3	76	1076	0.0001	536	13.966	9.76499E-05	2.77	0.002943338	83.35	12.88	16.75	3/27/04 16:17	347:54:30	347:27:00	18.65230102
-1	74	1084	-4E-05	534	14.070	-3.2915E-05	-0.93	0.002910423	82.41	12.74	16.60	3/28/04 12:07	367:44:30	367:17:00	19.17659163
-4	70	1088	-1E-04	530	14.122	-0.00013314	-3.77	0.00277728	78.64	12.16	16.02	3/30/04 19:53	423:30:30	423:03:00	20.5793181

DESORPTION TERMINATED 3/30/2004 DUE TO NO MORE GAS BEING EVOLVED; sampled air dried for 28 days

SAMPLE: 1584.9' to 1585.7' (Mineral coal) cuttings in canister ST5

	lbs.	grams
dry sample weight:	0.5445	246.97

est. lost gas (cc) = 50

TIME OF:	off bottom	at surface	in canister
	3/13/04 7:54	3/13/04 8:50	3/13/04 9:00

elapsed time (off bottom to canistering)
66.7 minutes
1.112 hours
1.054751155 SQRT (hrs)

RIG/LAB MEASUREMENTS			CONVERSION OF RIG/LAB MEASUREMENTS TO STP (@60 deg F; 14.7 psi)					CUMULATIVE VOLUMES		SCF/TON	SCF/TON		TIME SINCE		
measured cc	measured T (F)	measured P	cubic ft	absolute T (R)	psia	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	71	1083	7E-05	531	14.057	6.61404E-05	1.87	6.61404E-05	1.87	0.24	6.73	3/13/04 9:06	1:12:00	0:05:15	1.095445115
2	71	1083	7E-05	531	14.057	6.61404E-05	1.87	0.000132281	3.75	0.49	6.97	3/13/04 9:10	1:16:30	0:09:45	1.129158979
1	71	1083	4E-05	531	14.057	3.30702E-05	0.94	0.000165351	4.68	0.61	7.09	3/13/04 9:15	1:21:15	0:14:30	1.16368667
2	71	1083	7E-05	531	14.057	6.61404E-05	1.87	0.000231492	6.56	0.85	7.34	3/13/04 9:21	1:27:15	0:20:30	1.205888331
1	71	1083	4E-05	531	14.057	3.30702E-05	0.94	0.000264562	7.49	0.97	7.46	3/13/04 9:29	1:35:00	0:28:15	1.258305739
2	71	1083	7E-05	531	14.057	6.61404E-05	1.87	0.000330702	9.36	1.21	7.70	3/13/04 9:38	1:44:45	0:38:00	1.321299865
3	71	1083	0.0001	531	14.057	9.92107E-05	2.81	0.000429913	12.17	1.58	8.07	3/13/04 9:57	2:03:00	0:56:15	1.431782106
4	71	1083	0.0001	531	14.057	0.000132281	3.75	0.000562194	15.92	2.07	8.55	3/13/04 10:21	2:27:30	1:20:45	1.56790731
1	71	1083	4E-05	531	14.057	3.30702E-05	0.94	0.000595264	16.86	2.19	8.67	3/13/04 10:32	2:38:30	1:31:45	1.625320481
10	71	1082	0.0004	531	14.044	0.000330397	9.36	0.000925661	26.21	3.40	9.89	3/13/04 12:03	4:09:00	3:02:15	2.037154879
11	71	1081	0.0004	531	14.031	0.000363101	10.28	0.001288762	36.49	4.73	11.22	3/13/04 14:13	6:19:00	5:12:15	2.513297966
14	71	1082	0.0005	531	14.044	0.000462556	13.10	0.001751317	49.59	6.43	12.92	3/13/04 18:19	10:25:00	9:18:15	3.227486122
6	71	1084	0.0002	531	14.070	0.000198605	5.62	0.001949922	55.22	7.16	13.65	3/13/04 21:02	13:08:00	12:01:15	3.623994113
10	71	1090	0.0004	531	14.148	0.00033284	9.42	0.002282762	64.64	8.39	14.87	3/14/04 3:51	19:57:00	18:50:15	4.466542287
6	70	1093	0.0002	530	14.187	0.000200631	5.68	0.002483393	70.32	9.12	15.61	3/14/04 8:22	24:28:00	23:21:15	4.946379147
8	67	1088	0.0003	527	14.122	0.000267801	7.58	0.002751193	77.90	10.11	16.59	3/14/04 15:41	31:47:00	30:40:15	5.637670914
11	71	1087	0.0004	531	14.109	0.000365116	10.34	0.003116309	88.24	11.45	17.93	3/14/04 23:24	39:30:00	38:23:15	6.284902545
11	71	1082	0.0004	531	14.044	0.000363437	10.29	0.003479746	98.54	12.78	19.27	3/15/04 11:23	51:29:00	50:22:15	7.175168732
14	70	1088	0.0005	530	14.096	0.000465142	13.17	0.003944888	111.71	14.49	20.98	3/16/04 10:12	74:18:00	73:11:15	8.619744776
14	72	1079	0.0005	532	14.005	0.000460406	13.04	0.004405294	124.74	16.18	22.67	3/17/04 10:18	98:24:00	97:17:15	9.919677414
9	72	1087	0.0003	532	14.109	0.00029817	8.44	0.004703464	133.19	17.28	23.78	3/18/04 15:19	127:25:00	126:18:15	11.28789913
7	73	1087	0.0002	533	14.109	0.000231475	6.55	0.004934938	139.74	18.13	24.61	3/19/04 10:05	146:11:00	145:04:15	12.09062998
5	75	1094	0.0002	535	14.200	0.000165782	4.69	0.00510072	144.44	18.74	25.22	3/20/04 12:58	173:04:00	171:57:15	13.15548048
1	73	1102	4E-05	533	14.303	3.35241E-05	0.95	0.005134244	145.39	18.86	25.35	3/21/04 1:24	185:30:00	184:23:15	13.61983847
4	72	1097	0.0001	532	14.239	0.000133739	3.79	0.005267983	149.17	19.35	25.84	3/22/04 9:45	217:51:00	216:44:15	14.75974255
6	72	1084	0.0002	532	14.070	0.000198231	5.61	0.005466214	154.79	20.08	26.58	3/23/04 9:12	241:18:00	240:11:15	15.53383404

5	72	1081	0.0002	532	14.031	0.000164736	4.66	0.00563095	159.45	20.66	27.17	3/24/04	13:33	269:39:00	268:32:15	16.42102311
5	73	1082	0.0002	533	14.044	0.000164579	4.66	0.005795529	164.11	21.29	27.77	3/25/04	11:32	291:38:00	290:31:15	17.07727535
5	75	1084	0.0002	535	14.070	0.000164266	4.65	0.005959795	168.76	21.69	28.38	3/26/04	14:28	316:34:00	317:27:15	17.84843597
5	76	1076	0.0002	536	13.966	0.00016275	4.61	0.006122545	173.37	22.49	28.98	3/27/04	16:18	344:24:00	343:17:15	18.55801714
0	74	1084	0	534	14.070	0	0.00	0.006122545	173.37	22.49	28.98	3/28/04	12:08	364:14:00	363:07:15	19.08489604
-2	70	1088	-7E-05	530	14.122	-6.6571E-05	-1.89	0.006055974	171.49	22.24	28.73	3/30/04	19:54	420:00:00	418:53:15	20.49390153
0	75	1086	0	535	14.122	0	0.00	0.006055974	171.49	22.24	28.73	3/31/04	14:00	436:06:00	436:59:15	20.93083649
2	71	1085	7E-05	531	14.083	6.62628E-05	1.88	0.006122236	173.36	22.49	28.97	4/1/04	9:44	457:50:00	456:43:15	21.39704029
6	76	1089	0.0002	536	14.135	0.000197659	5.60	0.006319896	178.96	23.21	29.70	4/2/04	11:08	463:14:00	482:07:15	21.98256665
4	77	1088	0.0001	537	14.122	0.000131407	3.72	0.006451302	182.68	23.70	30.18	4/3/04	16:57	513:03:00	511:56:15	22.65060706
2	78	1087	7E-05	536	14.109	6.57655E-05	1.86	0.006517068	184.54	23.94	30.42	4/4/04	15:15	535:21:00	534:14:15	23.13763169
2	77	1082	7E-05	537	14.044	6.53411E-05	1.85	0.006582409	186.39	24.18	30.66	4/5/04	21:03	565:09:00	564:02:15	23.77286371
0	72	1080	0	532	14.018	0	0.00	0.006582409	186.39	24.18	30.66	4/6/04	14:19	582:25:00	581:18:15	24.13331031
1	75	1076	4E-05	535	13.966	3.26108E-05	0.92	0.00661502	187.32	24.30	30.78	4/7/04	13:58	606:04:00	604:57:15	24.61842129
-0.5	74	1082	-2E-05	534	14.044	-1.6427E-05	-0.47	0.006598593	186.85	24.24	30.72	4/8/04	14:07	630:13:00	629:06:15	25.10411653
1	73	1081	4E-05	533	14.031	3.28853E-05	0.93	0.006631478	187.76	24.36	30.84	4/9/04	16:35	658:41:00	655:34:15	25.62563332
-1	75	1087	-4E-05	535	14.109	-3.2944E-05	-0.93	0.006598534	186.85	24.24	30.72	4/10/04	16:20	660:26:00	679:19:15	26.06511708
0	75	1084	0	535	14.070	0	0.00	0.006598534	186.85	24.24	30.72	4/11/04	22:36	710:44:00	709:37:15	26.65956239
-1	73	1086	-4E-05	533	14.096	-3.3037E-05	-0.94	0.006565496	185.91	24.12	30.60	4/12/04	14:32	726:38:00	725:31:15	26.95613721

DESORPTION TERMINATED 4/12/2004 DUE TO NO MORE GAS BEING EVOLVED; sampled air dried for 28 days

SAMPLE: 1694' to 1695' (Weir "B" (?) coal) cuttings in canister ST6

	lbs.	grams
dry sample weight:	0.3946	179.01

est. lost gas (cc) = 25

TIME OF: off bottom 3/13/04 16:25; at surface 3/13/04 16:42; in canister 3/13/04 16:56

elapsed time (off bottom to canistering): 31.0 minutes; 0.517 hours; 0.718795268 SQRT (hrs)

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

measured cc	measured T (F)	measured P	cubic ft	absolute T (R)	psia	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)
4	70	1082	0.0001	530	14.044	0.000132408	3.75	0.000132408	3.75	0.67	5.15	3/13/04	17:01	0:36:15	0:05:15	0.777261568
1	70	1082	4E-05	530	14.044	3.3102E-05	0.94	0.00016551	4.69	0.84	5.31	3/13/04	17:07	0:42:00	0:11:00	0.836660026
2	70	1082	7E-05	530	14.044	6.62041E-05	1.87	0.000231714	6.56	1.17	5.65	3/13/04	17:13	0:48:00	0:17:00	0.894427191
2	70	1082	7E-05	530	14.044	6.62041E-05	1.87	0.000297918	8.44	1.51	5.98	3/13/04	17:24	0:59:15	0:28:15	0.993730346
2	70	1082	7E-05	530	14.044	6.62041E-05	1.87	0.000364122	10.31	1.65	6.32	3/13/04	17:31	1:06:00	0:35:00	1.048808848
4	70	1082	0.0001	530	14.044	0.000132408	3.75	0.00049653	14.06	2.52	6.99	3/13/04	18:02	1:37:00	1:06:00	1.271482075
1	70	1082	4E-05	530	14.044	3.3102E-05	0.94	0.000529632	15.00	2.68	7.16	3/13/04	18:13	1:48:00	1:17:00	1.341640786
2	70	1082	7E-05	530	14.044	6.62041E-05	1.87	0.000595836	16.87	3.02	7.49	3/13/04	18:17	1:52:45	1:21:45	1.370827001
11	70	1084	0.0004	530	14.070	0.000364795	10.33	0.000960632	27.20	4.87	9.34	3/13/04	21:03	4:38:00	4:07:00	2.152517905
9	71	1090	0.0003	531	14.148	0.000299556	8.48	0.001260188	35.68	6.39	10.86	3/14/04	3:51	11:26:00	10:55:00	3.381321241
2	70	1093	7E-05	530	14.187	6.68771E-05	1.89	0.001327065	37.58	6.73	11.20	3/14/04	8:21	15:56:00	15:25:00	3.991657968
5	67	1089	0.0002	527	14.135	0.000167529	4.74	0.001494594	42.32	7.57	12.05	3/14/04	15:36	23:13:00	22:42:00	4.818367635
7	71	1087	0.0002	531	14.109	0.000232347	6.58	0.00172694	48.90	8.75	13.23	3/14/04	23:24	30:59:00	30:28:00	5.566267451
7	70	1082	0.0002	530	14.044	0.000231714	6.56	0.001958655	55.46	9.93	14.40	3/15/04	11:24	42:59:00	42:28:00	6.55616758
3	70	1086	0.0001	530	14.096	9.96732E-05	2.82	0.002058328	58.29	10.43	14.91	3/16/04	10:12	65:47:00	65:16:00	8.110692531
5	72	1076	0.0002	532	13.992	0.000164278	4.65	0.002222606	62.94	11.26	15.74	3/17/04	10:18	89:53:00	89:22:00	9.480682113
0	72	1067	0	532	14.109	0	0.00	0.002222606	62.94	11.26	15.74	3/18/04	15:19	118:54:00	116:23:00	10.90412766
1	72	1087	4E-05	532	14.109	3.313E-05	0.94	0.002255736	63.86	11.43	15.91	3/19/04	10:06	137:41:00	137:10:00	11.73385416
0	75	1094	0	535	14.200	0	0.00	0.002255736	63.86	11.43	15.91	3/20/04	12:59	164:34:00	164:03:00	12.82835401
-3	73	1102	-1E-04	533	14.303	-0.00010057	-2.85	0.002155164	61.03	10.92	15.40	3/21/04	1:24	176:59:00	176:28:00	13.30350631
2	72	1097	7E-05	532	14.239	6.68695E-05	1.89	0.002222033	62.92	11.26	15.74	3/22/04	9:45	209:20:00	208:49:00	14.46835626
4	71	1084	0.0001	531	14.070	0.000132403	3.75	0.002354436	66.67	11.93	16.41	3/23/04	9:13	232:46:00	232:17:00	15.2577649
2	71	1081	7E-05	531	14.031	6.60183E-05	1.87	0.002420455	68.54	12.27	16.74	3/24/04	13:34	261:09:00	260:38:00	16.16013614
1	73	1082	4E-05	533	14.044	3.29157E-05	0.93	0.00245337	69.47	12.43	16.91	3/25/04	11:33	263:08:00	282:37:00	16.8265663
0	75	1084	0	535	14.070	0	0.00	0.00245337	69.47	12.43	16.91	3/26/04	14:28	310:03:00	309:32:00	17.60623671
1	77	1076	4E-05	537	13.966	3.24894E-05	0.92	0.00248586	70.39	12.60	17.07	3/27/04	16:19	335:54:00	335:23:00	18.32757465
-1	72	1064	-4E-05	532	14.070	-3.3039E-05	-0.94	0.002452621	69.46	12.43	16.90	3/28/04	12:15	355:50:00	355:19:00	18.86354509
-4	70	1088	-1E-04	530	14.122	-0.00013314	-3.77	0.002319679	65.69	11.76	16.23	3/30/04	19:54	411:29:00	410:58:00	20.28505197

DESORPTION TERMINATED 3/30/2004 DUE TO NO MORE GAS BEING EVOLVED; sampled air dried for 21 days

SAMPLE: 1933' to 1935' (Rowe "A" coal) cuttings in canister DNNN

	lbs.	grams
dry sample weight:	0.6716	304.74

est. lost gas (cc) = 40

TIME OF: off bottom 3/14/04 11:17; at surface 3/14/04 11:37; in canister 3/14/04 11:52

elapsed time (off bottom to canistering): 34.2 minutes; 0.571 hours; 0.755535130 SQRT (hrs)

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

measured cc	measured T (F)	measured P	cubic ft	absolute T (R)	psia	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)
4	70	1091	0.0001	530	14.161	0.000133509	3.78	0.000133509	3.78	0.40	4.60	3/14/04	11:54	0:36:15	0:02:00	0.777281568
3	70	1091	0.0001	530	14.161	0.000100132	2.84	0.000233642	6.62	0.70	4.90	3/14/04	12:00	0:42:15	0:08:00	0.839146392

measured cc	measured T (F)	measured P	cubic ft	absolute T (R)	psia	cubic ft (@STP)	cc (@STP)	cumulative cubic ft (@STP)	cumulative cc (@STP)	SCF/TON without lost gas	SCF/TON with lost gas	TIME OF MEASURE		TIME SINCE off bottom	TIME SINCE in canister	SQRT hrs. (since off bottom)
6	70	1091	0.0002	530	14.161	0.000200264	5.67	0.000433908	12.29	1.29	5.50	3/14/04	12:14	0:56:30	0:22:15	0.970395108
8	70	1091	0.0003	530	14.161	0.000267019	7.56	0.000700925	19.85	2.09	6.29	3/14/04	12:35	1:18:00	0:43:45	1.140175425
6	70	1091	0.0002	530	14.161	0.000200264	5.67	0.000901189	25.52	2.66	6.89	3/14/04	12:53	1:35:45	1:01:30	1.263262971
4	70	1091	0.0001	530	14.161	0.000133509	3.78	0.001034698	29.30	3.08	7.29	3/14/04	13:06	1:48:15	1:14:00	1.343192714
8	70	1091	0.0003	530	14.161	0.000267019	7.56	0.001301717	36.86	3.88	8.08	3/14/04	13:37	2:19:45	1:45:30	1.52616076
22	67	1089	0.0008	527	14.135	0.000737128	20.87	0.002038646	57.73	6.07	10.27	3/14/04	15:37	4:19:15	3:45:00	2.078661428
44	71	1087	0.0016	531	14.109	0.001460464	41.36	0.00349931	99.09	10.42	14.62	3/14/04	23:26	12:08:15	11:34:00	3.483891502
7	70	1088	0.0002	530	14.122	0.000232999	6.60	0.003732309	105.69	11.11	15.32	3/15/04	2:45	15:27:15	14:53:00	3.931178788
24	71	1083	0.0008	531	14.057	0.000793685	22.47	0.004525994	128.16	13.47	17.68	3/15/04	10:44	23:26:15	22:52:00	4.841229183
28	70	1086	0.001	530	14.096	0.000930263	26.34	0.005456278	154.50	16.24	20.45	3/16/04	10:13	46:55:15	46:21:00	6.849678344
23	72	1078	0.0008	532	13.992	0.00075568	21.40	0.006211958	175.90	18.49	22.70	3/17/04	10:18	71:00:15	70:26:00	8.426397018
14	72	1087	0.0005	532	14.109	0.00046382	13.13	0.006675778	189.04	19.87	24.08	3/18/04	15:19	100:01:15	99:27:00	10.00104161
9	73	1087	0.0003	533	14.109	0.00029761	8.43	0.006973388	197.46	20.76	24.98	3/19/04	10:07	118:49:15	118:15:00	10.90049693
6	75	1094	0.0002	535	14.200	0.000198938	5.63	0.007172326	203.10	21.35	25.56	3/20/04	13:00	145:42:15	145:08:00	12.0707981
0	73	1102	0	533	14.303	0	0.00	0.007172326	203.10	21.35	25.56	3/21/04	1:25	158:07:15	157:33:00	12.57461088
3	72	1097	0.0001	532	14.239	0.000100304	2.84	0.007272631	205.94	21.65	25.86	3/22/04	9:46	190:28:15	189:54:00	13.8011171
5	72	1084	0.0002	532	14.070	0.000165193	4.68	0.007437823	210.61	22.14	26.35	3/23/04	9:14	213:56:15	213:22:00	14.62660248
5	72	1081	0.0002	532	14.031	0.000164736	4.66	0.007602559	215.28	22.63	26.84	3/24/04	13:34	242:16:15	241:42:00	15.56505166
6	73	1082	0.0002	533	14.044	0.000197494	5.59	0.007800053	220.87	23.22	27.43	3/25/04	11:34	264:16:15	263:42:00	16.25640899
5	75	1084	0.0002	535	14.070	0.000164266	4.65	0.007964319	225.52	23.71	27.91	3/26/04	14:29	291:11:15	290:37:00	17.06421695
5	76	1076	0.0002	536	13.966	0.00016275	4.61	0.008127069	230.13	24.19	28.40	3/27/04	16:19	317:01:15	316:27:00	17.80507686
-1	74	1084	-4E-05	534	14.070	-3.2915E-05	-0.93	0.008094154	229.20	24.10	28.30	3/28/04	12:15	336:57:15	336:23:00	18.35631136
-6	70	1088	-2E-04	530	14.122	-0.00019971	-5.66	0.007894441	223.54	23.50	27.71	3/30/04	19:56	392:38:15	392:04:00	19.81508264

SAMPLE DECANISTERED 3/30/2004 DUE TO NO MORE GAS BEING EVOLVED; sampled air dried for 35 days

SAMPLE: 1940' to 1942' (Rowe "B" or "C" coal) cuttings in canister DN1

dry sample weight: 0.6141 lbs. 278.53 grams

est. lost gas (cc) = 37

TIME OF: off bottom 3/14/04 12:02; at surface 3/14/04 12:22; in canister 3/14/04 12:34

elapsed time (off bottom to canistering): 31.5 minutes; 0.525 hours; 0.724568837 SQRT (hrs)

RIG/LAB MEASUREMENTS measured cc	measured T (F)	measured P	CONVERSION OF RIG/LAB MEASUREMENTS TO STP (@60 deg F; 14.7 psi) cubic ft	absolute T (R)	psia	cubic ft (@STP)	cc (@STP)	CUMULATIVE VOLUMES cubic ft (@STP)	cc (@STP)	SCF/TON without lost gas	SCF/TON with lost gas	TIME OF MEASURE		TIME SINCE off bottom	in canister	SQRT hrs. (since off bottom)
1	70	1091	4E-05	530	14.161	3.33774E-05	0.95	3.33774E-05	0.95	0.11	4.36	3/14/04	12:37	0:34:30	0:03:00	0.756287544
3	70	1091	0.0001	530	14.161	0.000100132	2.84	0.000133509	3.78	0.43	4.69	3/14/04	12:41	0:39:00	0:07:30	0.808225775
4	70	1091	0.0001	530	14.161	0.000133509	3.78	0.000267019	7.56	0.87	5.13	3/14/04	12:52	0:49:45	0:18:15	0.910585892
4	70	1091	0.0001	530	14.161	0.000133509	3.78	0.000400526	11.34	1.30	5.56	3/14/04	13:04	1:02:15	0:30:45	1.018577439
9	70	1090	0.0003	530	14.146	0.000300121	8.50	0.000700649	19.84	2.26	6.54	3/14/04	13:40	1:37:30	1:06:00	1.274754878
19	67	1089	0.0007	527	14.135	0.000636611	18.03	0.00133726	37.87	4.36	8.61	3/14/04	15:35	3:32:30	3:01:00	1.881931632
34	71	1087	0.0012	531	14.109	0.00112854	31.96	0.002465801	69.82	8.03	12.29	3/14/04	23:26	11:23:30	10:52:00	3.375154317
5	71	1088	0.0002	531	14.122	0.000166115	4.70	0.002631915	74.53	8.57	12.83	3/15/04	2:44	14:41:30	14:10:00	3.832970997
18	71	1083	0.0006	531	14.057	0.000595264	16.86	0.003227179	91.38	10.51	14.77	3/15/04	10:40	22:37:30	22:06:00	4.756574398
19	70	1086	0.0007	530	14.096	0.000631264	17.88	0.003858443	109.26	12.57	16.82	3/16/04	22:14	58:11:30	57:40:00	7.62834626
14	72	1078	0.0005	532	13.992	0.000459979	13.03	0.004318422	122.28	14.07	18.32	3/17/04	10:18	70:15:30	69:44:00	8.382024417
7	72	1087	0.0002	532	14.109	0.00023191	6.57	0.004550332	128.85	14.82	19.06	3/18/04	15:20	99:17:30	98:46:00	9.964520393
5	73	1087	0.0002	533	14.109	0.000165339	4.68	0.004715671	133.53	15.36	19.61	3/19/04	10:07	118:04:30	117:33:00	10.8662321
2	75	1094	7E-05	535	14.200	6.63127E-05	1.88	0.004781984	135.41	15.58	19.83	3/20/04	13:01	144:58:30	144:27:00	12.04055647
-1	73	1102	-4E-05	533	14.303	-3.3524E-05	-0.95	0.00474848	134.46	15.47	19.72	3/21/04	1:25	157:22:30	156:51:00	12.54491929
2	72	1097	7E-05	532	14.239	6.68695E-05	1.89	0.004815329	136.35	15.68	19.94	3/22/04	9:46	189:43:30	189:12:00	13.77408984
5	72	1084	0.0002	532	14.070	0.000165193	4.68	0.004980522	141.03	16.22	20.48	3/23/04	9:14	213:11:30	212:40:00	14.60108443
3	72	1081	0.0001	532	14.031	9.88413E-05	2.80	0.005079363	143.83	16.54	20.80	3/24/04	13:35	241:32:30	241:01:00	15.54161081
4	73	1082	0.0001	533	14.044	0.000131663	3.73	0.005211026	147.56	16.97	21.23	3/25/04	11:35	263:32:30	263:01:00	16.23396645
4	75	1084	0.0001	535	14.070	0.000131413	3.72	0.005342439	151.28	17.40	21.66	3/26/04	14:29	290:26:30	289:55:00	17.04234921
4	76	1076	0.0001	536	13.966	0.0001302	3.69	0.005472639	154.97	17.82	22.08	3/27/04	16:20	316:17:30	315:46:00	17.78459071
-2	74	1084	-7E-05	534	14.070	-6.583E-05	-1.86	0.00540681	153.10	17.61	21.87	3/28/04	12:16	336:13:30	335:42:00	18.33643913
-3	74	1086	-1E-04	534	14.096	-9.8927E-05	-2.80	0.005307883	150.30	17.29	21.54	3/29/04	16:44	364:41:30	364:10:00	19.09690202

SAMPLE DECANISTERED 3/30/2004 DUE TO NO MORE GAS BEING EVOLVED; sampled air dried for 35 days

SAMPLE: 2010' to 2012' (? coal) cuttings in canister DN2

dry sample weight: 0.5800 lbs. 263.10 grams

est. lost gas (cc) = 40

TIME OF: off bottom 3/14/04 17:27; at surface 3/14/04 17:47; in canister 3/14/04 18:09

elapsed time (off bottom to canistering): 42.7 minutes; 0.712 hours; 0.844097151 SQRT (hrs)

RIG/LAB MEASUREMENTS measured cc	measured T (F)	measured P	CONVERSION OF RIG/LAB MEASUREMENTS TO STP (@60 deg F; 14.7 psi) cubic ft	absolute T (R)	psia	cubic ft (@STP)	cc (@STP)	CUMULATIVE VOLUMES cubic ft (@STP)	cc (@STP)	SCF/TON without lost gas	SCF/TON with lost gas	TIME OF MEASURE		TIME SINCE off bottom	in canister	SQRT hrs. (since off bottom)
1	72	1088	4E-05	532	14.122	3.31605E-05	0.94	3.31605E-05	0.94	0.11	4.99	3/14/04	18:13	0:46:00	0:03:15	0.875595036
1	72	1088	4E-05	532	14.122	3.31605E-05	0.94	6.63209E-05	1.88	0.23	5.10	3/14/04	18:28	1:01:00	0:18:15	1.008298897
3	72	1088	0.0001	532	14.122	9.94814E-05	2.82	0.000165802	4.69	0.57	5.44	3/14/04	18:37	1:10:30	0:27:45	1.083974169

2	72	1086	7E-05	532	14.122	6.63209E-05	1.88	0.000232123	6.57	0.60	5.67	3/14/04	18:41	1:14:30	0:31:45	1.114300977
3	72	1088	0.0001	532	14.122	9.94814E-05	2.82	0.000331605	9.39	1.14	6.01	3/14/04	18:47	1:20:00	0:37:15	1.154700538
2	72	1088	7E-05	532	14.122	6.63209E-05	1.88	0.000397925	11.27	1.37	6.24	3/14/04	18:52	1:25:00	0:42:15	1.190238071
5	72	1088	0.0002	532	14.122	0.000165802	4.69	0.000563726	15.96	1.94	6.81	3/14/04	19:03	1:36:30	0:53:45	1.268200825
2	72	1086	7E-05	532	14.122	6.63209E-05	1.88	0.000630049	17.84	2.17	7.04	3/14/04	19:13	1:46:30	1:03:45	1.332291259
1	72	1088	4E-05	532	14.122	3.31605E-05	0.94	0.000663209	18.78	2.29	7.16	3/14/04	19:21	1:54:15	1:11:30	1.379915456
8	72	1088	0.0003	532	14.122	0.000265284	7.51	0.000928493	26.29	3.20	8.07	3/14/04	19:42	2:15:00	1:32:15	1.5
1	72	1088	4E-05	532	14.122	3.31605E-05	0.94	0.000961853	27.23	3.32	8.19	3/14/04	19:52	2:25:45	1:43:00	1.558578412
7	72	1088	0.0002	532	14.122	0.000232123	6.57	0.001193776	33.80	4.12	8.99	3/14/04	20:34	3:07:00	2:24:15	1.765408357
5	72	1088	0.0002	532	14.122	0.000165802	4.69	0.001359579	38.50	4.69	9.56	3/14/04	21:09	3:42:00	2:59:15	1.923538406
12	72	1086	0.0004	532	14.122	0.000397925	11.27	0.001757504	49.77	6.06	10.93	3/14/04	23:27	6:00:00	5:17:15	2.449489743
6	70	1068	0.0002	530	14.122	0.000199714	5.66	0.001957218	55.42	6.75	11.62	3/15/04	2:43	9:16:00	8:33:15	3.044120015
22	70	1063	0.0008	530	14.057	0.000728918	20.64	0.002686135	76.06	9.26	14.13	3/15/04	10:41	17:14:00	16:31:15	4.151305016
17	70	1066	0.0006	530	14.096	0.000564815	15.99	0.00325095	92.06	11.21	16.08	3/16/04	10:15	40:48:00	40:05:15	6.387487769
11	72	1078	0.0004	532	13.992	0.000361412	10.23	0.003612362	102.29	12.46	17.33	3/17/04	10:19	64:52:00	64:09:15	8.053984521
4	71	1087	0.0001	531	14.109	0.000132769	3.76	0.003745132	106.05	12.91	17.76	3/18/04	15:21	93:54:00	93:11:15	9.690201236
2	73	1087	7E-05	533	14.109	6.61356E-05	1.87	0.003611268	107.92	13.14	18.01	3/19/04	10:08	112:41:00	111:58:15	10.61524062
1	75	1094	4E-05	535	14.200	3.31564E-05	0.94	0.003644424	108.86	13.26	18.13	3/20/04	13:02	139:35:00	138:52:15	11.81453907
-3	73	1102	-1E-04	533	14.303	-0.00010057	-2.85	0.003743852	106.01	12.91	17.78	3/21/04	1:26	151:59:00	151:18:15	12.32815206
1	72	1097	4E-05	532	14.239	3.34348E-05	0.95	0.003777286	106.96	13.02	17.90	3/22/04	9:47	184:20:00	183:37:15	13.57694124
4	71	1084	0.0001	531	14.070	0.000132403	3.75	0.003909689	110.71	13.46	18.35	3/23/04	9:16	207:49:00	207:08:15	14.41584776
3	72	1081	0.0001	532	14.031	9.88413E-05	2.80	0.004006531	113.51	13.62	18.69	3/24/04	13:35	236:06:00	235:25:15	15.36663051
1	73	1082	4E-05	533	14.044	3.29157E-05	0.93	0.004041446	114.44	13.94	18.81	3/25/04	11:36	258:09:00	257:26:15	16.06704702
1	75	1084	4E-05	535	14.070	3.28533E-05	0.93	0.0040743	115.37	14.05	18.92	3/26/04	14:30	285:03:00	284:20:15	16.88342382
2	77	1076	7E-05	537	13.966	6.49787E-05	1.84	0.004139278	117.21	14.27	19.14	3/27/04	16:20	310:53:00	310:10:15	17.631884
-5	72	1084	-2E-04	532	14.070	-0.00016519	-4.68	0.003974066	112.53	13.70	18.57	3/28/04	12:17	330:50:00	330:07:15	18.18882441
-5	72	1086	-2E-04	532	14.096	-0.0001655	-4.69	0.003808566	107.85	13.13	18.00	3/29/04	16:44	359:17:00	358:34:15	18.95477073

SAMPLE DECANISTERED 3/30/2004 DUE TO NO MORE GAS BEING EVOLVED; sampled air dried for 21 days

SAMPLE: 2048' to 2050' (? coal) cuttings in canister 10

	lbs.	grams
dry sample weight:	1.7057	773.70

est. lost gas (cc) = 85

TIME OF:			elapsed time (off bottom to canistering)
off bottom	at surface	in canister	29.7 minutes
3/14/04 20:38	3/14/04 20:59	3/14/04 21:06	0.496 hours
			0.704154339 SQRT (hrs)

RIG/LAB MEASUREMENTS			CONVERSION OF RIG/LAB MEASUREMENTS TO STP (@60 deg F; 14.7 psi)					CUMULATIVE VOLUMES		SCF/TON	SCF/TON			TIME SINCE		
measured cc	measured T (F)	measured P	cubic ft	absolute T (R)	psia	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)
4	70	1087	0.0001	530	14.109	0.00013302	3.77	0.00013302	3.77	0.16	3.68	3/14/04	21:12	0:34:15	0:04:30	0.75553513
1	70	1067	4E-05	530	14.109	3.3255E-05	0.94	0.000166275	4.71	0.19	3.71	3/14/04	21:14	0:36:15	0:06:30	0.777281588
4	70	1087	0.0001	530	14.109	0.00013302	3.77	0.000299295	8.48	0.35	3.87	3/14/04	21:18	0:39:30	0:09:45	0.81137743
4	70	1087	0.0001	530	14.109	0.00013302	3.77	0.000432315	12.24	0.51	4.03	3/14/04	21:22	0:43:30	0:13:45	0.851469318
7	70	1087	0.0002	530	14.109	0.000232785	6.59	0.0006651	18.83	0.78	4.30	3/14/04	21:28	0:49:30	0:19:45	0.908295106
5	70	1087	0.0002	530	14.109	0.000166275	4.71	0.000831375	23.54	0.97	4.49	3/14/04	21:32	0:54:00	0:24:15	0.948683298
5	70	1087	0.0002	530	14.109	0.000166275	4.71	0.00099765	28.25	1.17	4.69	3/14/04	21:37	0:59:15	0:29:30	0.993730346
7	70	1087	0.0002	530	14.109	0.000232785	6.59	0.001230435	34.84	1.44	4.96	3/14/04	21:44	1:06:15	0:36:30	1.050793351
5	70	1087	0.0002	530	14.109	0.000186275	4.71	0.00139671	39.55	1.64	5.16	3/14/04	21:50	1:11:45	0:42:00	1.093541647
6	70	1087	0.0002	530	14.109	0.00019953	5.65	0.00159624	45.20	1.87	5.39	3/14/04	21:54	1:16:15	0:46:30	1.127312438
9	70	1087	0.0003	530	14.109	0.000299295	8.46	0.001895535	53.68	2.22	5.74	3/14/04	22:04	1:26:15	0:56:30	1.198957881
8	70	1087	0.0003	530	14.109	0.00026604	7.53	0.002161575	61.21	2.53	6.05	3/14/04	22:14	1:35:45	1:06:00	1.263262971
8	70	1087	0.0003	530	14.109	0.00026604	7.53	0.002427615	68.74	2.85	6.37	3/14/04	22:22	1:44:15	1:14:30	1.318142633
48	70	1087	0.0017	530	14.109	0.00159624	45.20	0.004023654	113.94	4.72	8.24	3/14/04	23:18	2:38:00	2:08:15	1.622754859
32	70	1087	0.0011	530	14.109	0.00106416	30.13	0.005088014	144.08	5.97	9.49	3/15/04	0:06	3:27:30	2:57:45	1.859659467
65	71	1088	0.0023	531	14.122	0.002159489	61.15	0.007247503	205.23	8.50	12.02	3/15/04	2:39	6:00:30	5:30:45	2.451190187
144	71	1083	0.0051	531	14.057	0.004762112	134.85	0.012009615	340.07	14.08	17.60	3/15/04	10:41	14:02:30	13:32:45	3.747221193
186	70	1086	0.0066	530	14.096	0.006179739	174.99	0.018189354	515.06	21.33	24.85	3/16/04	10:16	37:37:30	37:07:45	6.133922073
135	72	1078	0.0048	532	13.992	0.004435516	125.60	0.022624869	640.66	26.53	30.05	3/17/04	10:20	61:41:30	61:11:45	7.854404285
89	72	1087	0.0031	532	14.109	0.002948568	83.49	0.025573437	724.16	29.99	33.51	3/18/04	15:21	90:42:30	90:12:45	9.524092258
59	73	1087	0.0021	533	14.109	0.001951001	55.25	0.027524438	779.40	32.27	35.79	3/19/04	10:08	109:29:30	108:59:45	10.48362858
47	75	1094	0.0017	535	14.200	0.001558349	44.13	0.029082787	823.53	34.10	37.62	3/20/04	13:02	136:23:30	135:53:45	11.67868429
22	73	1102	0.0008	533	14.303	0.000737531	20.88	0.029820318	844.41	34.96	38.48	3/21/04	1:26	148:47:30	148:17:45	12.19801698
22	72	1097	0.0008	532	14.239	0.000735565	20.83	0.030555883	865.24	35.83	39.35	3/22/04	9:47	181:08:30	180:38:45	13.45886802
30	72	1084	0.0011	532	14.070	0.000991156	28.07	0.031547039	893.31	36.99	40.51	3/23/04	9:16	204:37:30	204:07:45	14.3047195
25	72	1081	0.0009	532	14.031	0.000823678	23.32	0.032370717	916.63	37.96	41.47	3/24/04	13:35	232:58:30	232:28:45	15.26242663
25	73	1082	0.0009	533	14.044	0.000822893	23.30	0.033193609	939.93	38.92	42.44	3/25/04	11:36	254:57:30	261:21:45	15.96741474
25	75	1084	0.0009	535	14.070	0.000821332	23.26	0.034014941	963.19	39.88	43.40	3/26/04	14:30	281:51:30	307:11:45	16.78883703
24	76	1076	0.0008	536	13.966	0.000781199	22.12	0.034796141	985.31	40.80	44.32	3/27/04	16:20	307:41:30	307:11:45	17.54114211
7	74	1084	0.0002	534	14.070	0.000230404	6.52	0.035026544	991.84	41.07	44.59	3/28/04	12:18	327:39:30	327:09:45	18.10133513
0	74	1086	0	534	14.096	0	0.00	0.035026544	991.84	41.07	44.59	3/29/04	14:45	354:08:30	353:38:45	18.81776643

1	70	1086	4E-05	530	14.122	3.32856E-05	0.94	0.03505983	992.78	41.11	44.63	3/30/04	19:56	383:17:30	382:47:45	19.57783611
0	75	1086	0	535	14.122	0	0.00	0.03505983	992.78	41.11	44.63	3/31/04	14:02	401:23:30	400:53:45	20.03476146
6	71	1084	0.0002	531	14.070	0.000198605	5.62	0.035258435	998.40	41.34	44.86	4/1/04	9:44	421:05:30	420:35:45	20.52051819
33	76	1089	0.0012	536	14.135	0.001087127	30.78	0.036345561	1029.19	42.62	46.14	4/2/04	11:08	446:29:30	445:59:45	21.13034942
19	77	1088	0.0007	537	14.122	0.000624182	17.67	0.036969744	1046.86	43.35	46.87	4/3/04	16:58	476:19:30	475:49:45	21.82467113
10	76	1087	0.0004	536	14.109	0.000328827	9.31	0.037298571	1056.17	43.73	47.25	4/4/04	15:18	498:39:30	498:09:45	22.33065904
11	77	1082	0.0004	537	14.044	0.000359376	10.18	0.037657947	1066.35	44.15	47.67	4/5/04	21:04	528:25:30	527:55:45	22.9874968
-3	72	1081	-1E-04	532	14.031	-9.8841E-05	-2.80	0.037559106	1063.55	44.04	47.56	4/6/04	14:19	545:40:30	545:10:45	23.3596875
2	75	1076	7E-05	535	13.966	6.52216E-05	1.85	0.037624327	1065.40	44.12	47.63	4/7/04	13:59	569:20:30	568:50:45	23.86066151
-1	74	1082	-4E-05	534	14.044	-3.2854E-05	-0.93	0.037591473	1064.47	44.08	47.60	4/8/04	14:07	593:28:30	592:58:45	24.36134233
3	73	1081	0.0001	533	14.031	9.86559E-05	2.79	0.037690129	1067.26	44.19	47.71	4/9/04	16:36	619:57:30	619:27:45	24.8989625
-1	75	1087	-4E-05	535	14.109	-3.2944E-05	-0.93	0.037657185	1066.33	44.15	47.67	4/10/04	16:21	643:42:30	643:12:45	25.37140779
0	75	1084	0	535	14.070	0	0.00	0.037657185	1066.33	44.15	47.67	4/11/04	22:38	673:59:30	673:29:45	25.96134946
5	73	1086	0.0002	533	14.096	0.000165167	4.68	0.037822372	1071.01	44.35	47.87	4/12/04	14:33	689:54:30	689:24:45	26.26610617
10	75	1088	0.0004	535	14.122	0.000329745	9.34	0.038152117	1080.34	44.73	48.25	4/13/04	14:08	713:27:30	712:57:45	26.71064063
7	75	1085	0.0002	535	14.083	0.000230185	6.52	0.038382302	1086.86	45.00	48.52	4/14/04	14:03	737:24:30	736:54:45	27.15526346
11	75	1076	0.0004	535	13.966	0.000358719	10.16	0.038741021	1097.02	45.42	48.94	4/15/04	14:24	761:45:30	761:15:45	27.59996981
6	75	1078	0.0002	535	13.992	0.000196029	5.55	0.03893705	1102.57	45.65	49.17	4/16/04	13:52	785:13:30	784:43:45	28.02166646
-1	75	1081	-4E-05	535	14.031	-3.2782E-05	-0.93	0.038904267	1101.64	45.62	49.14	4/17/04	19:28	814:49:30	814:19:45	28.54513969
-2	75	1079	-7E-05	535	14.005	-6.5403E-05	-1.85	0.038838864	1099.79	45.54	49.06	4/18/04	15:58	835:19:30	834:49:45	28.90196955
-3	75	1088	-1E-04	535	14.122	-9.8924E-05	-2.80	0.03873996	1096.99	45.42	48.94	4/19/04	14:00	857:21:30	856:51:45	29.28066191

SAMPLE DECANISTERED 4/22/2004 DUE TO NO MORE GAS BEING EVOLVED; sampled air dried for 14 days

SAMPLE: 2057.1' to 2058.6' (? coal) cuttings in canister J

	lbs.	grams
dry sample weight:	0.5866	266.06

est. lost gas (cc) = 20

TIME OF: off bottom 3/14/04 22:42; at surface 3/14/04 23:03; in canister 3/14/04 23:14

elapsed time (off bottom to canistering): 32.0 minutes; 0.533 hours; 0.730296743 SQRT (hrs)

RIG/LAB MEASUREMENTS			CONVERSION OF RIG/LAB MEASUREMENTS TO STP (@60 deg F; 14.7 psi)					CUMULATIVE VOLUMES		SCF/TON	SCF/TON			TIME SINCE		
measured cc	measured T (F)	measured P	cubic ft	absolute T (R)	psia	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)
6	71	1087	0.0002	531	14.109	0.000199154	5.64	0.000199154	5.64	0.66	3.09	3/14/04	23:29	0:46:30	0:14:30	0.880340843
1	71	1087	4E-05	531	14.109	3.31924E-05	0.94	0.000232347	6.58	0.79	3.20	3/14/04	23:35	0:52:30	0:20:30	0.935414347
1	71	1087	4E-05	531	14.109	3.31924E-05	0.94	0.000265539	7.52	0.91	3.31	3/14/04	23:47	1:04:30	0:32:30	1.036822068
2	71	1087	7E-05	531	14.109	6.63847E-05	1.88	0.000331924	9.40	1.13	3.54	3/14/04	23:57	1:15:00	0:43:00	1.118033989
1	71	1087	4E-05	531	14.109	3.31924E-05	0.94	0.000365116	10.34	1.24	3.65	3/15/04	0:02	1:19:30	0:47:30	1.151086443
3	71	1088	0.0001	531	14.122	9.96687E-05	2.82	0.000464785	13.16	1.58	3.99	3/15/04	2:41	3:58:30	3:26:30	1.993740204
12	71	1083	0.0004	531	14.057	0.000396843	11.24	0.000861627	24.40	2.94	5.35	3/15/04	10:43	12:00:30	11:28:30	3.465304219
-23	70	1086	-8E-04	530	14.096	-0.00076416	-21.64	9.74682E-05	2.76	0.33	2.74	3/16/04	10:17	35:34:30	35:02:30	5.964476183
-15	72	1076	-5E-04	532	13.992	-0.00049284	-13.96	-0.00039537	-11.20	-1.35	1.06	3/17/04	10:20	59:37:30	59:05:30	7.721722606
-9	72	1087	-3E-04	532	14.109	-0.00029817	-8.44	-0.00069354	-19.64	-2.36	0.04	3/18/04	15:22	88:39:30	88:07:30	9.415655422

SAMPLE DECANISTERED 3/18/2004 DUE TO NO MORE GAS BEING EVOLVED; sampled air dried for 28 days

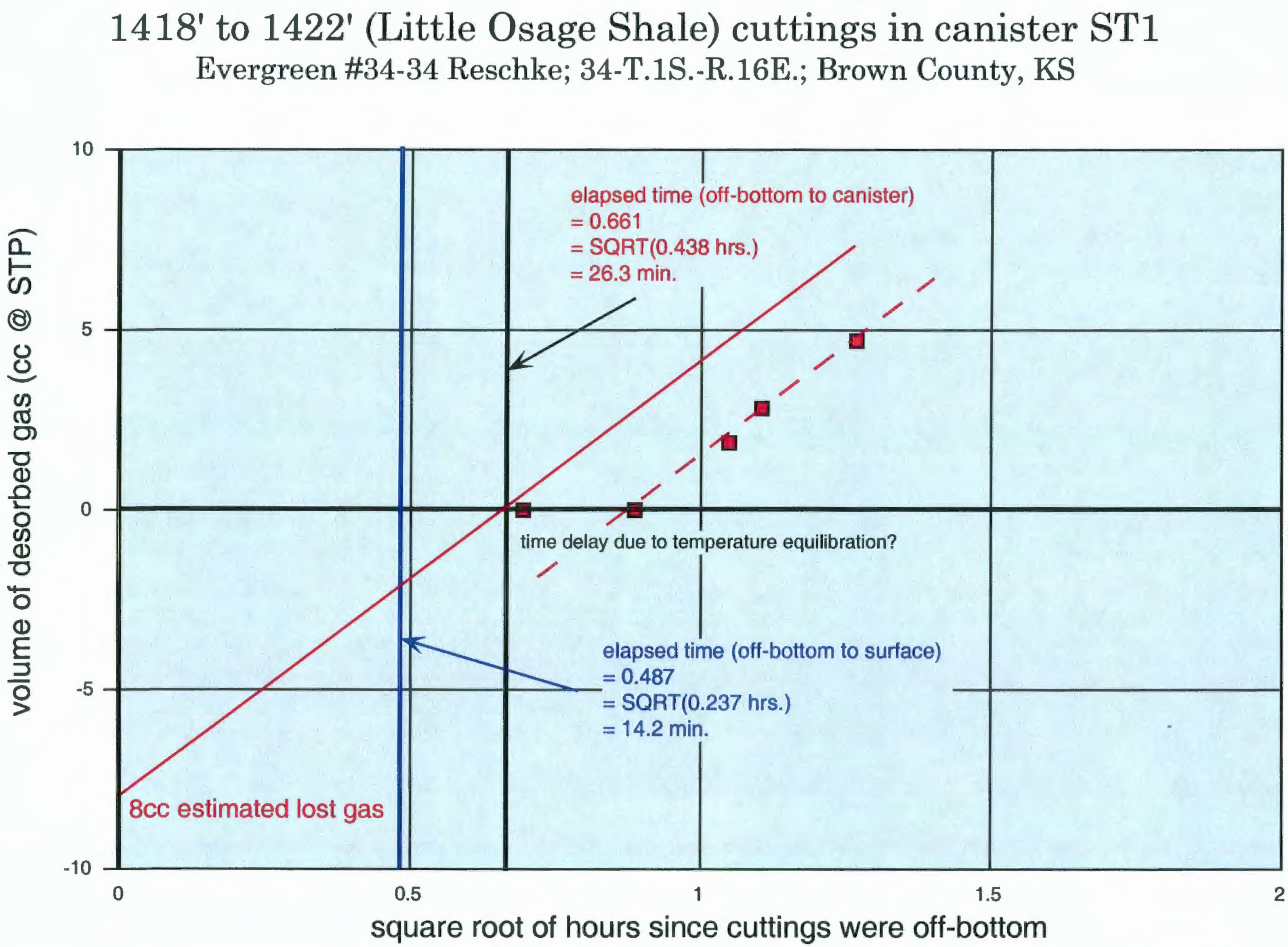

1418' to 1422' (Little Osage Shale) cuttings in canister ST1
Evergreen #34-34 Reschke; 34-T.1S.-R.16E.; Brown County, KS
elapsed time (off-bottom to canister)
= 0.661
= SQRT(0.438 hrs.)
= 26.3 min.
time delay due to temperature equilibration?
elapsed time (off-bottom to surface)
= 0.487
= SQRT(0.237 hrs.)
= 14.2 min.
8cc estimated lost gas
volume of desorbed gas (cc @ STP)
square root of hours since cuttings were off-bottom
10
5
0
-5
-10
0
0.5
1
1.5
2

FIGURE 1.

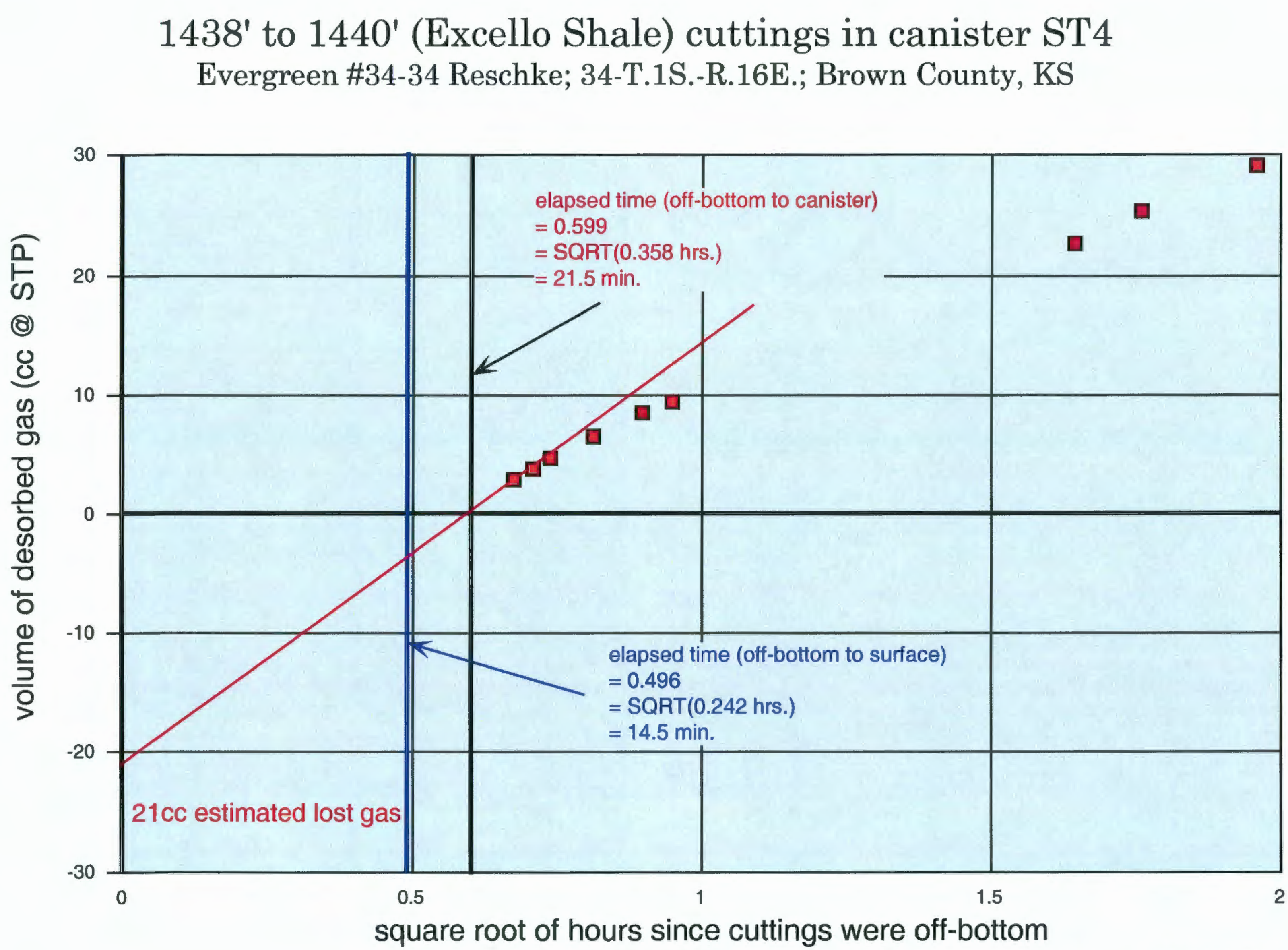

1438' to 1440' (Excello Shale) cuttings in canister ST4
Evergreen #34-34 Reschke; 34-T.1S.-R.16E.; Brown County, KS
elapsed time (off-bottom to canister)
= 0.599
= SQRT(0.358 hrs.)
= 21.5 min.
elapsed time (off-bottom to surface)
= 0.496
= SQRT(0.242 hrs.)
= 14.5 min.
21cc estimated lost gas
volume of desorbed gas (cc @ STP)
square root of hours since cuttings were off-bottom
30
20
10
0
-10
-20
-30
0
0.5
1
1.5
2

FIGURE 2.

1545' to 1547' (V Shale & Croweburg coal) cuttings in canister ST7

Evergreen #34-34 Reschke; 34-T.1S.-R.16E.; Brown County, KS

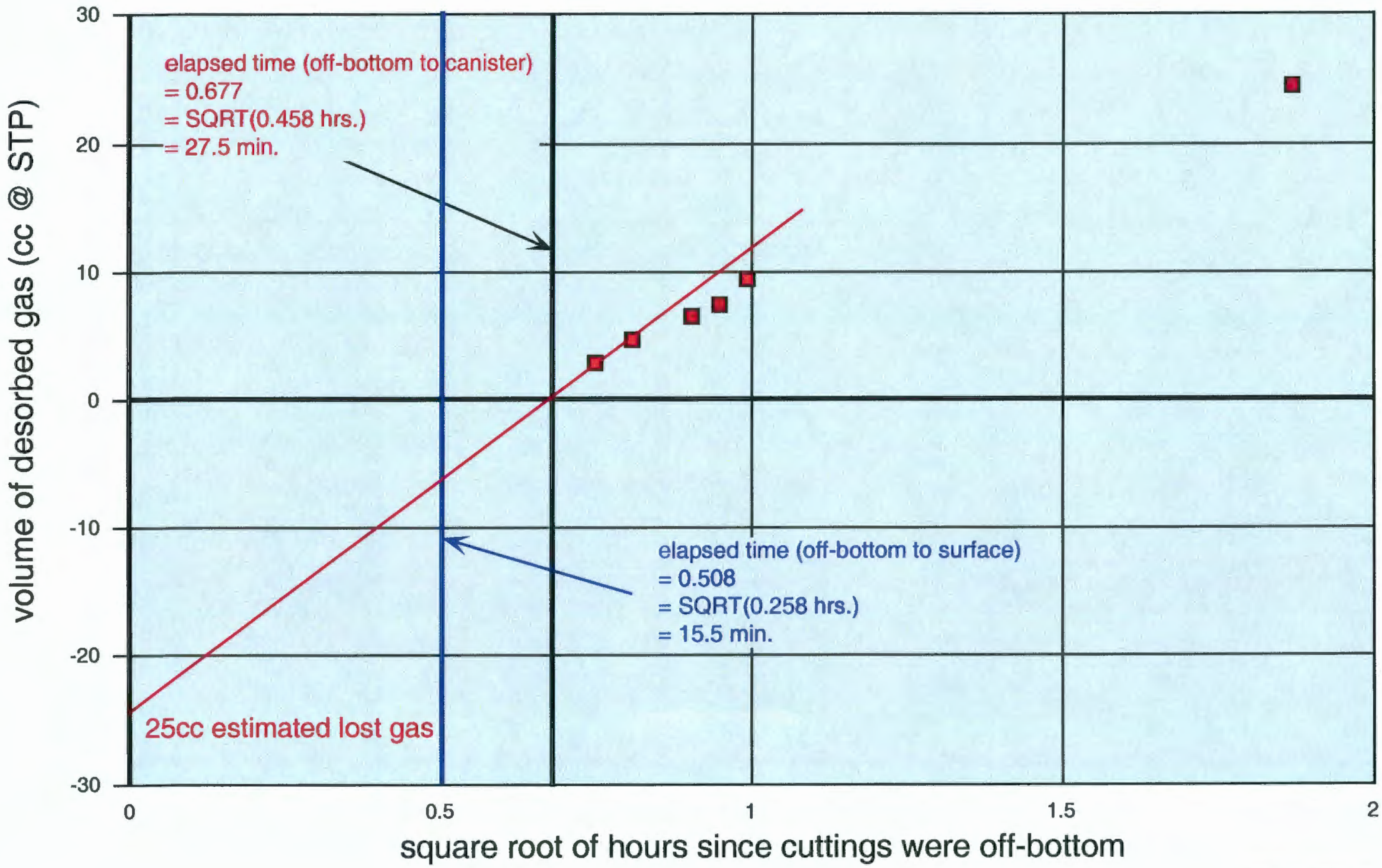


FIGURE 3.

1584.9' to 1585.7' (Mineral coal) cuttings in canister ST5

Evergreen #34-34 Reschke; 34-T.1S.-R.16E.; Brown County, KS

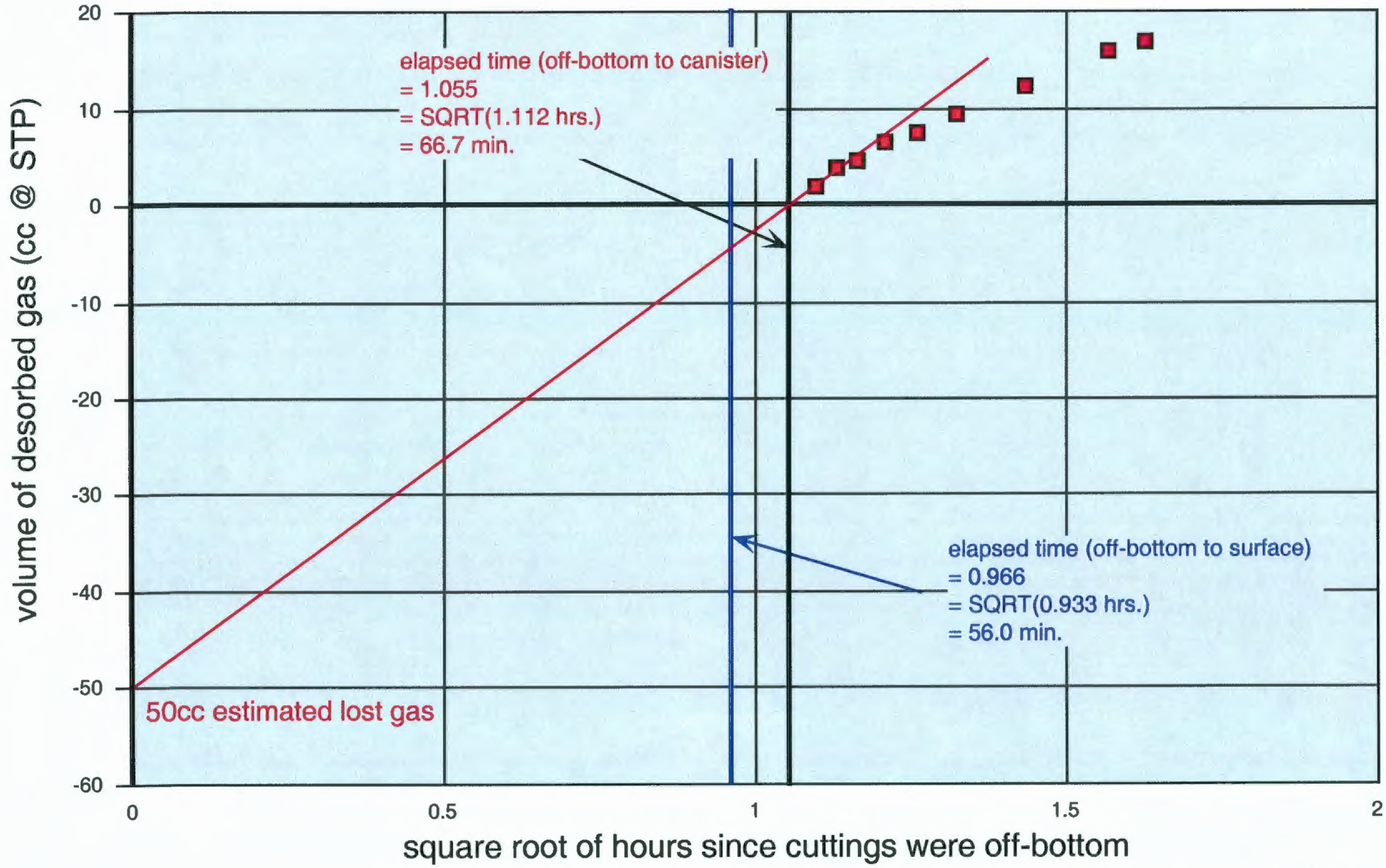


FIGURE 4.

1694' to 1695' (Weir "B" (?) coal) cuttings in canister ST6

Evergreen #34-34 Reschke; 34-T.1S.-R.16E.; Brown County, KS

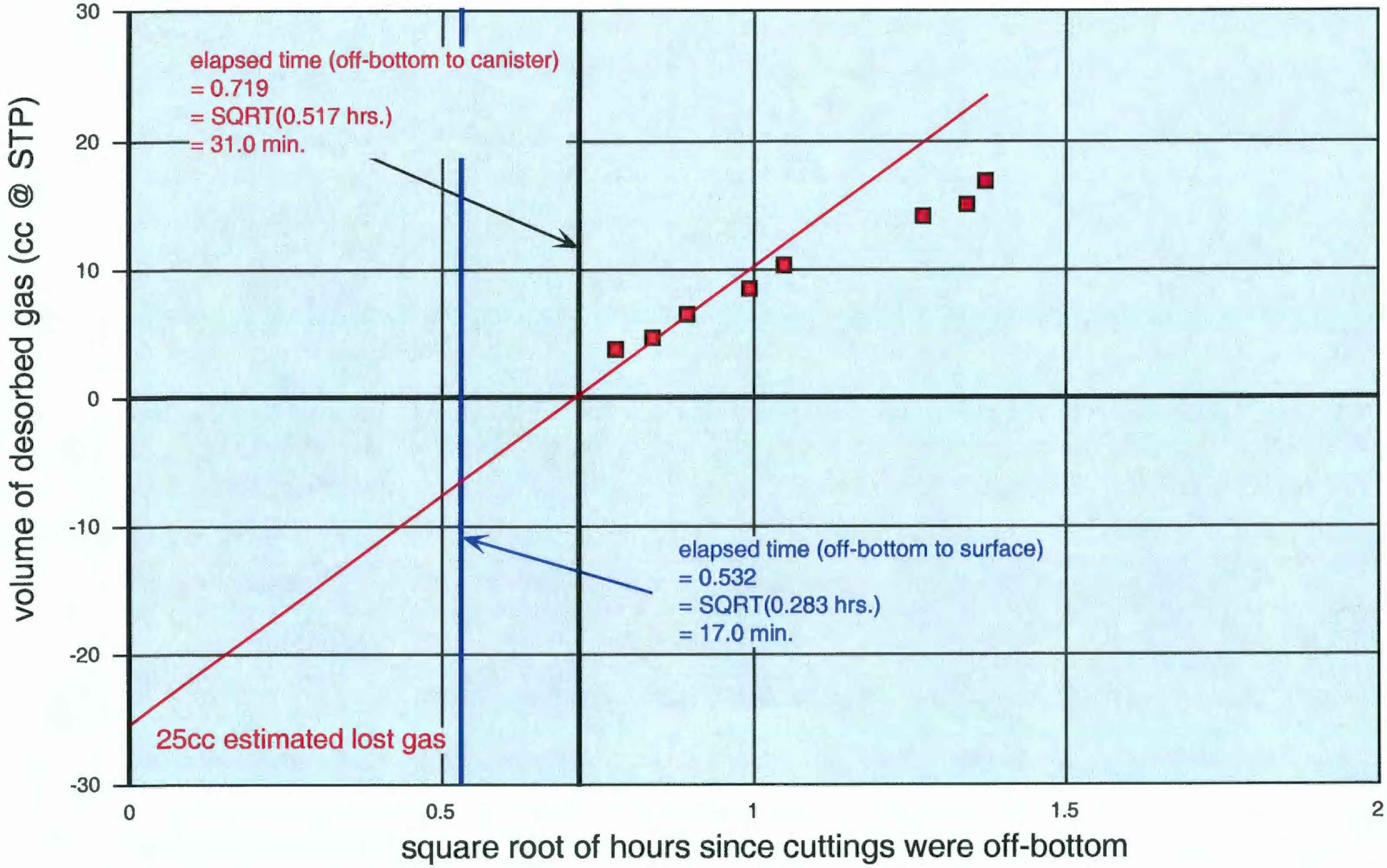


FIGURE 5.

1933' to 1935' (Rowe "A" coal) cuttings in canister DNNN

Evergreen #34-34 Reschke; 34-T.1S.-R.16E.; Brown County, KS

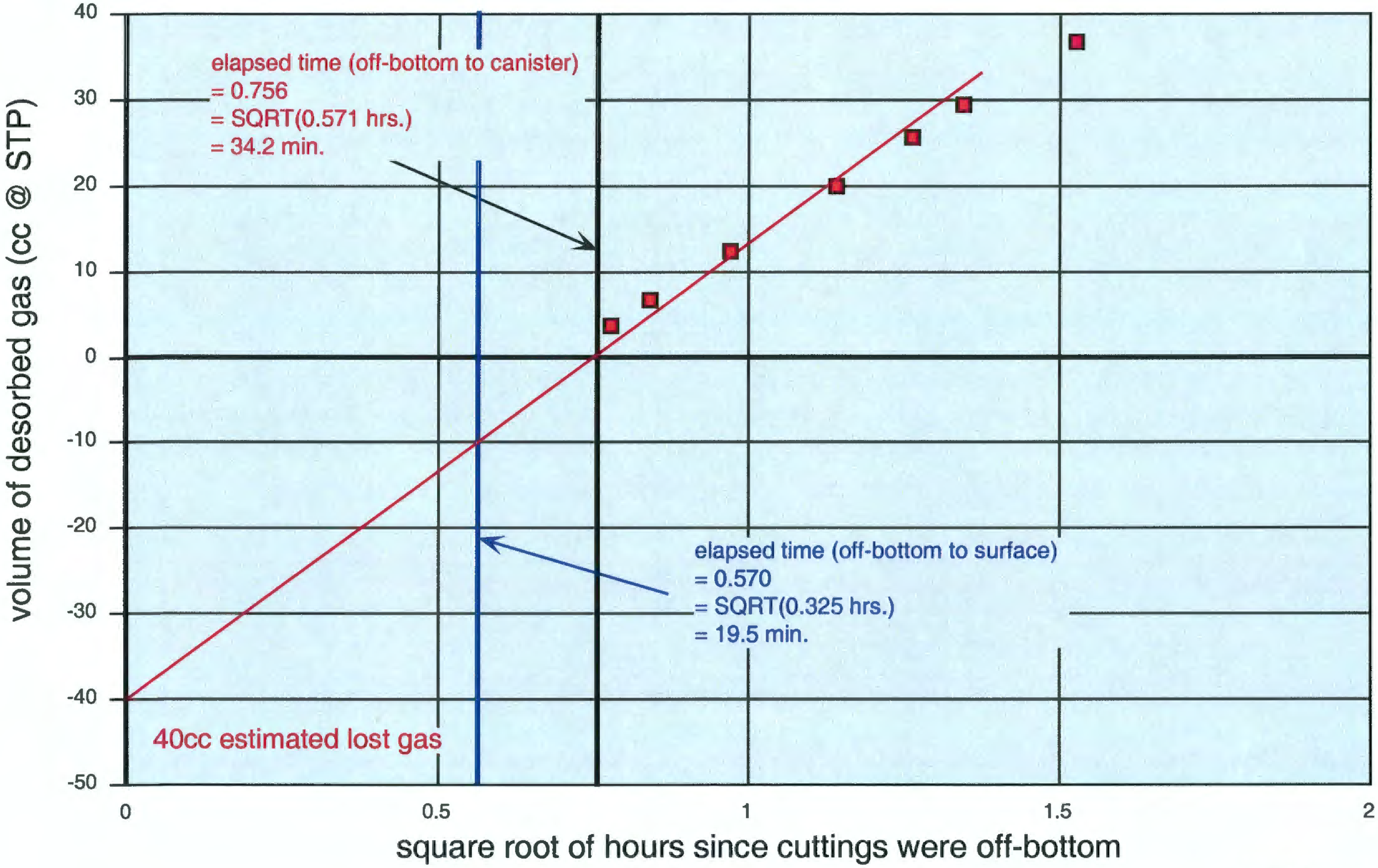


FIGURE 6.

1940' to 1942' (Rowe "B" or "C" coal) cuttings in canister DN1

Evergreen #34-34 Reschke; 34-T.1S.-R.16E.; Brown County, KS

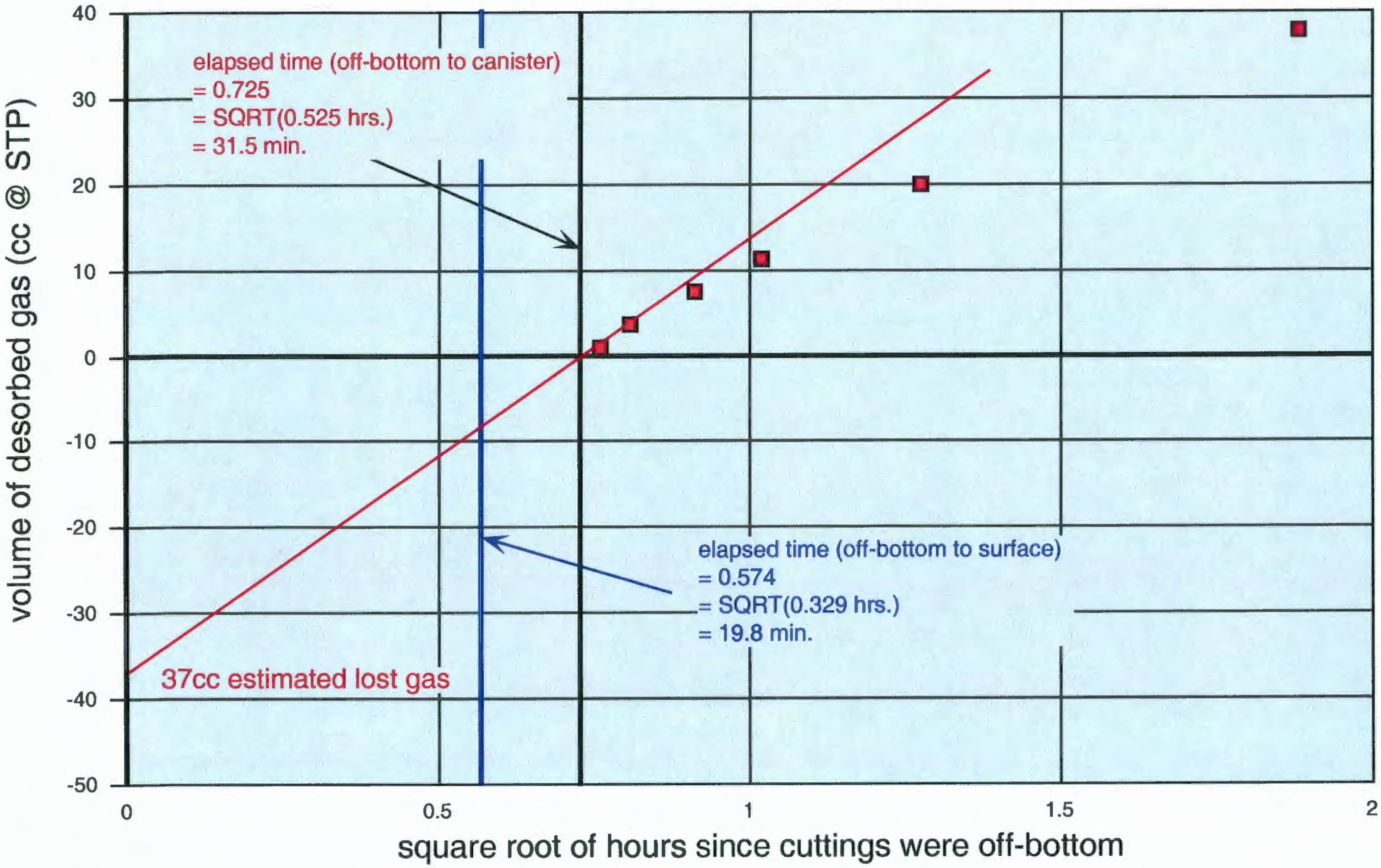


FIGURE 7.

2010' to 2012' (? coal) cuttings in canister DN2

Evergreen #34-34 Reschke; 34-T.1S.-R.16E.; Brown County, KS

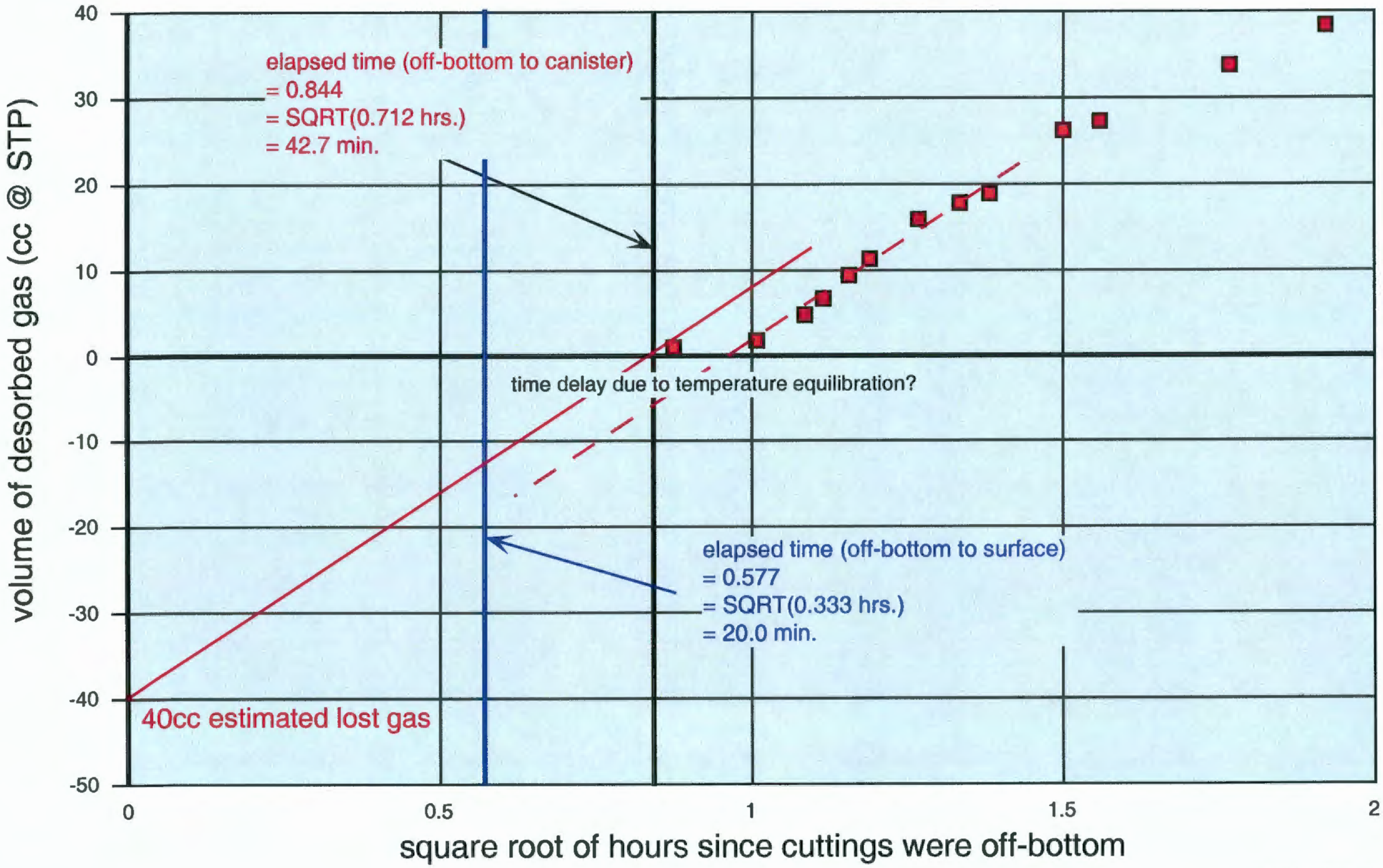


FIGURE 8.

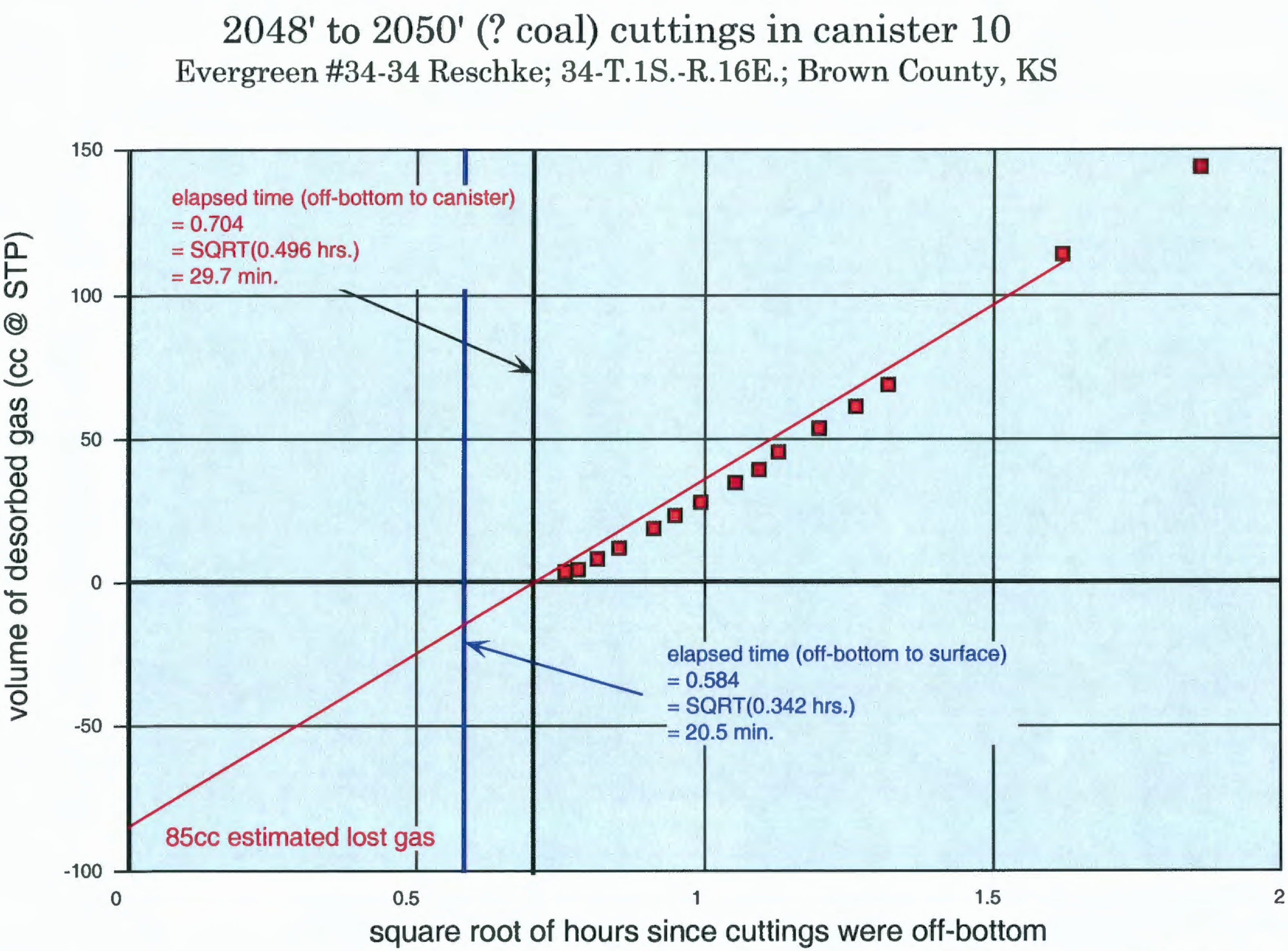

2048' to 2050' (? coal) cuttings in canister 10
Evergreen #34-34 Reschke; 34-T.1S.-R.16E.; Brown County, KS
elapsed time (off-bottom to canister)
= 0.704
= SQRT(0.496 hrs.)
= 29.7 min.
elapsed time (off-bottom to surface)
= 0.584
= SQRT(0.342 hrs.)
= 20.5 min.
85cc estimated lost gas
volume of desorbed gas (cc @ STP)
150
100
50
0
-50
-100
0
0.5
1
1.5
2
square root of hours since cuttings were off-bottom

FIGURE 9.

2057.1' to 2058.6' (? coal) cuttings in canister J

Evergreen #34-34 Reschke; 34-T.1S.-R.16E.; Brown County, KS

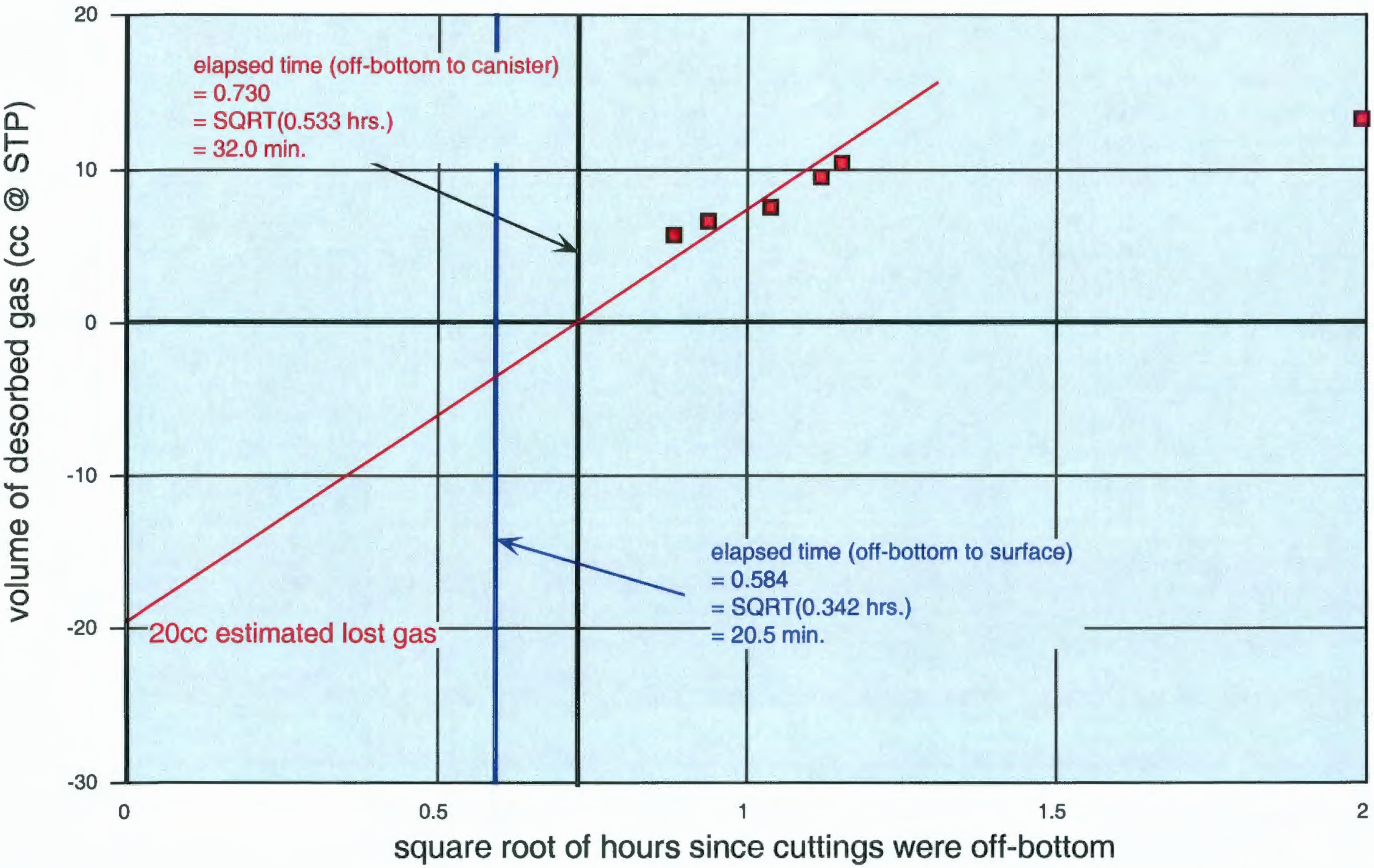


FIGURE 10.

Desorption Characteristics of Cuttings Samples

Evergreen Reschke #34-34; 34-T.1S.-R.16E., Brown County, KS

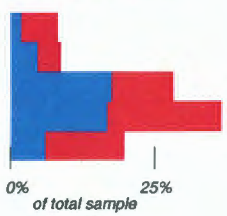
LITHOLOGIC COMPONENT SENSITIVITY ANALYSIS for calculation of gas content of Little Osage Shale from 1418-1422'

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

total gas desorbed = 16.5 ccs

TOTAL DRY WEIGHT OF SAMPLE = 369.96 grams
$\text{weight}_{light\text{-}colored\ lithologies}$ = 200.93 grams (54.3%)
$\text{weight}_{dark\ shale}$ = 169.03 grams (45.7%)
weight_{coal} = 0.00 grams (0.0%)

sieve size	*grams*	*% coal / % dark shale / % light-colored liths*
>0.0930"	29.33	00.00% / 21.17% / 78.83%
>0.0661"	31.28	00.00% / 52.52% / 47.48%
>0.0460"	103.20	00.00% / 61.99% / 38.01%
>0.0331"	134.24	00.00% / 45.33% / 54.67%
<0.0331"	71.92	00.00% / 30.00% / 70.00%
	369.96 TOTAL	



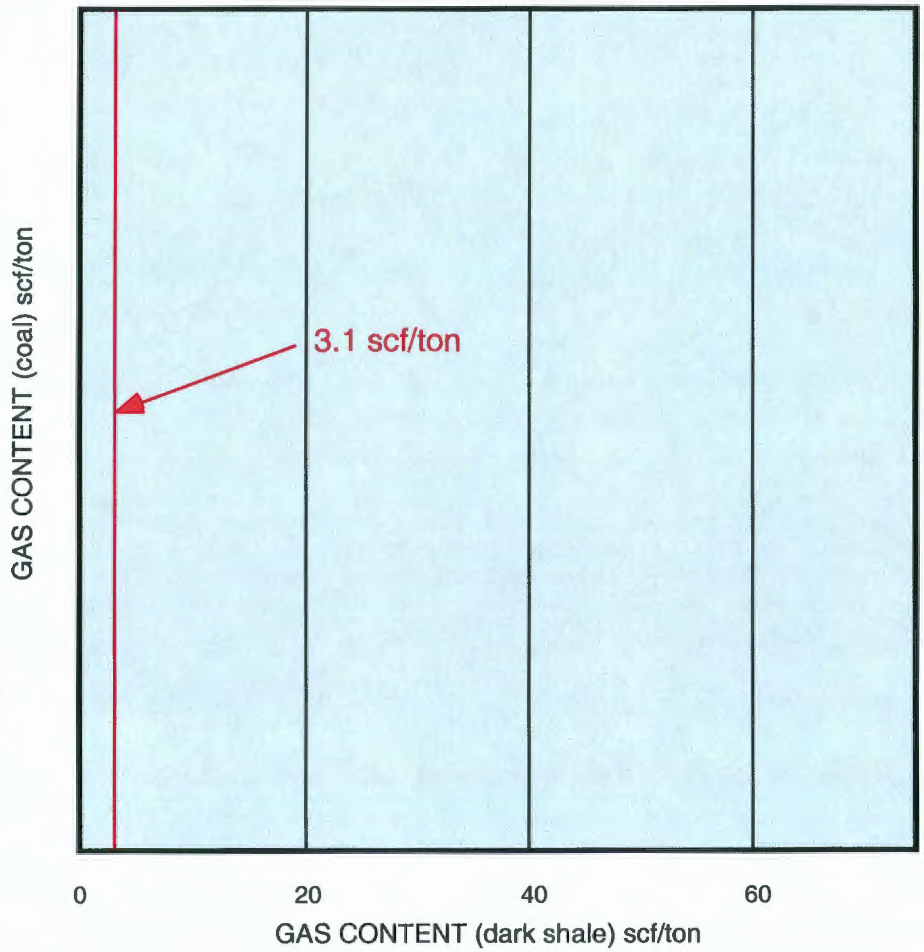


FIGURE 11.

Desorption Characteristics of Cuttings Samples

Evergreen Reschke #34-34; 34-T.1S.-R.16E., Brown County, KS

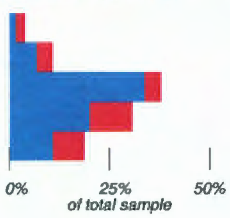
LITHOLOGIC COMPONENT SENSITIVITY ANALYSIS for calculation of gas content of Excello Shale from 1438-1440'

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

total gas desorbed = 64.2 ccs

TOTAL DRY WEIGHT OF SAMPLE = 415.50 grams
$\text{weight}_{light\text{-}colored\ lithologies}$ = 118.33 grams (28.5%)
$\text{weight}_{dark\ shale}$ = 297.17 grams (71.5%)
weight_{coal} = 0.00 grams (0.0%)

sieve size	grams	% coal / % dark shale / % light-colored liths
>0.0930"	15.10	00.00% / 37.82% / 62.18%
>0.0661"	43.63	00.00% / 62.32% / 37.68%
>0.0460"	154.98	00.00% / 89.45% / 10.55%
>0.0331"	125.49	00.00% / 65.22% / 34.78%
<0.0331"	76.39	00.00% / 57.41% / 42.59%
	415.50 TOTAL	



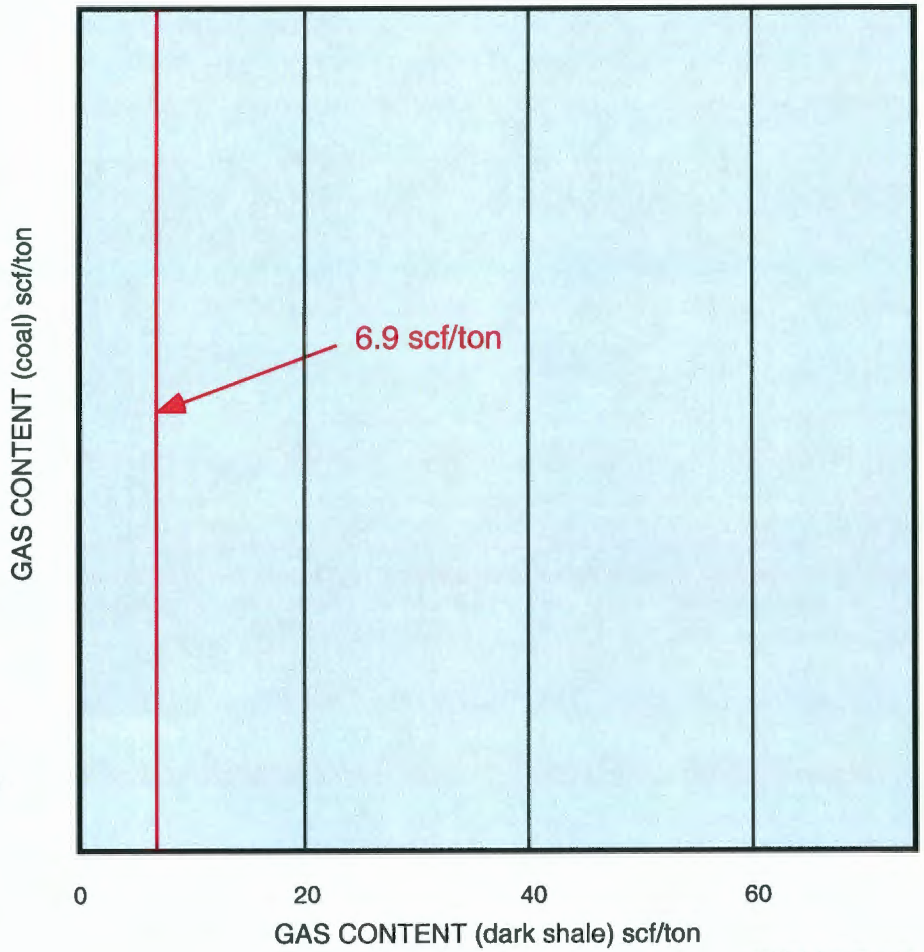


FIGURE 12.

Desorption Characteristics of Cuttings Samples

Evergreen Reschke #34-34; 34-T.1S.-R.16E., Brown County, KS

LITHOLOGIC COMPONENT SENSITIVITY ANALYSIS for calculation of gas content of Croweburg coal cuttings from 1545' to 1547'

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

total gas desorbed = 108.4 ccs

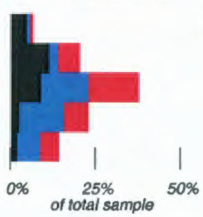
TOTAL DRY WEIGHT OF SAMPLE = 319.95 grams

$\text{weight}_{light\text{-}colored\ lithologies}$ = 58.90 grams (35.2%)

$\text{weight}_{dark\ shale}$ = 44.08 grams (37.5%)

weight_{coal} = 202.89 grams (27.3%)

sieve size	*grams*	*% coal / % dark shale / % light-colored liths*
>0.0930"	20.18	68.63% / 16.08% / 15.29%
>0.0661"	63.99	54.38% / 13.60% / 32.02%
>0.0460"	119.50	22.83% / 36.96% / 40.22%
>0.0331"	72.08	9.86% / 57.75% / 32.39%
<0.0331"	44.20	10.00% / 50.00% / 40.00%
	319.95 TOTAL	



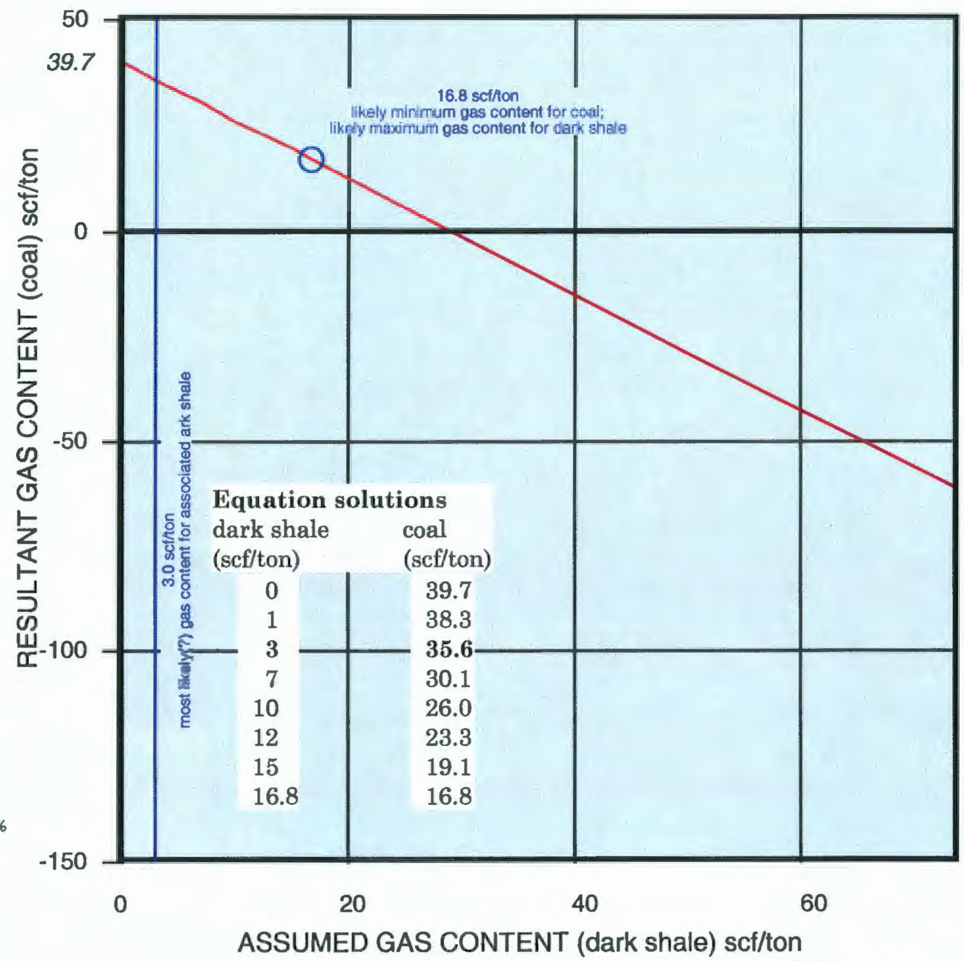


FIGURE 13.

Desorption Characteristics of Cuttings Samples

Evergreen Reschke #34-34; 34-T.1S.-R.16E., Brown County, KS

LITHOLOGIC COMPONENT SENSITIVITY ANALYSIS for calculation of gas content of Mineral coal cuttings from 1584.9' to 1585.7'

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

total gas desorbed = 237.8 ccs

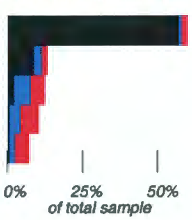
TOTAL DRY WEIGHT OF SAMPLE = 305.87 grams

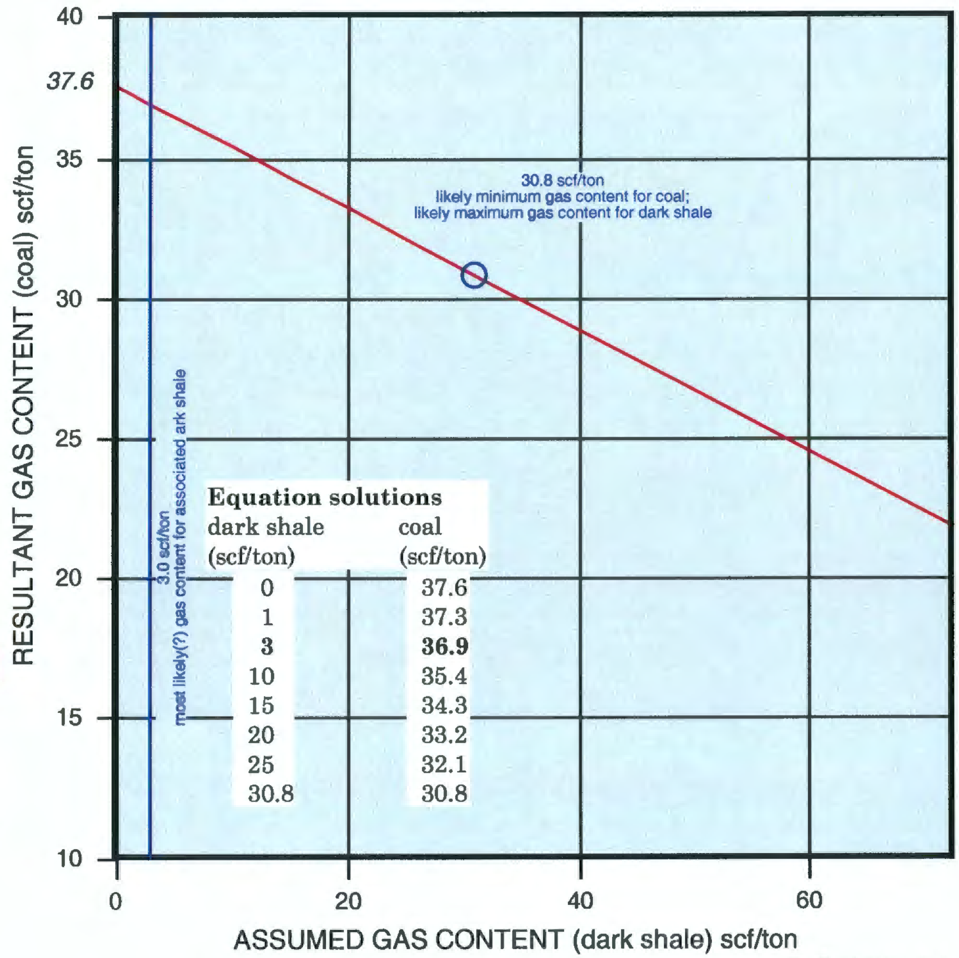
$\text{weight}_{light\text{-}colored\ lithologies}$ = 58.90 grams (19.3%)

$\text{weight}_{dark\ shale}$ = 44.08 grams (14.4%)

weight_{coal} = 202.89 grams (66.3%)

sieve size	*grams*	*% coal / % dark shale / % light-colored liths*
>0.0930"	181.03	95.12% / 1.55% / 3.32%
>0.0661"	38.74	63.97% / 20.65% / 15.38%
>0.0460"	36.32	14.13% / 45.00% / 40.87%
>0.0331"	29.51	1.25% / 38.13% / 60.63%
<0.0331"	20.27	2.00% / 28.00% / 70.00%
	305.87 TOTAL	





Equation solutions

dark shale (scf/ton)	coal (scf/ton)
0	37.6
1	37.3
3	**36.9**
10	35.4
15	34.3
20	33.2
25	32.1
30.8	30.8

FIGURE 14.

Desorption Characteristics of Cuttings Samples

Evergreen Reschke #34-34; 34-T.1S.-R.16E., Brown County, KS

LITHOLOGIC COMPONENT SENSITIVITY ANALYSIS for calculation of gas content of Weir "B" (?) coal cuttings 1694' to 1695'

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

total gas desorbed = 95.4 ccs

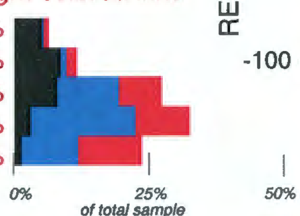
TOTAL DRY WEIGHT OF SAMPLE = 264.06 grams

$\text{weight}_{light\text{-}colored\ lithologies}$ = 85.05 grams (32.2%)

$\text{weight}_{dark\ shale}$ = 112.28 grams (42.5%)

weight_{coal} = 66.72 grams (25.3%)

sieve size	*grams*	*% coal / % dark shale / % light-colored liths*
>0.0930"	16.52	79.44% / 6.07% / 14.49%
>0.0661"	30.14	74.17% / 9.46% / 16.37%
>0.0460"	71.05	28.89% / 42.22% / 28.89%
>0.0331"	84.74	9.02% / 59.84% / 31.15%
<0.0331"	61.61	5.00% / 45.00% / 50.00%
	264.06 TOTAL	



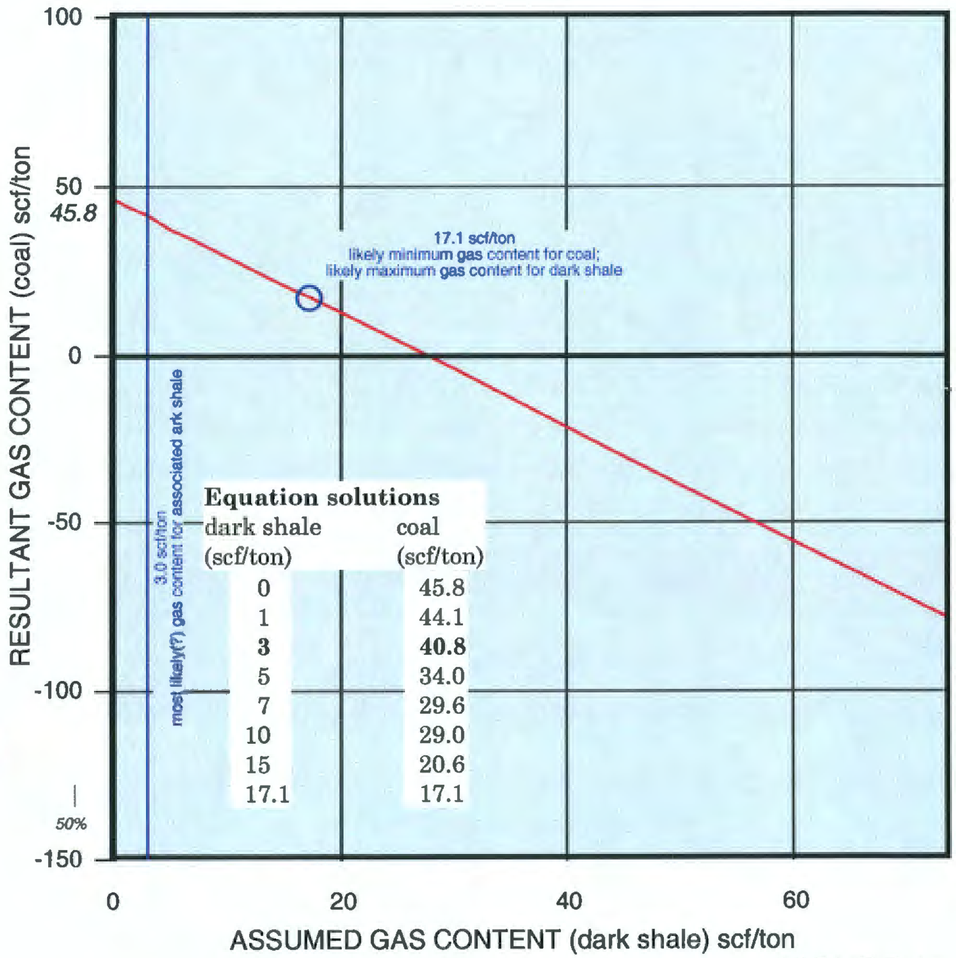


FIGURE 15.

Desorption Characteristics of Cuttings Samples

Evergreen Reschke #34-34; 34-T.1S.-R.16E., Brown County, KS

LITHOLOGIC COMPONENT SENSITIVITY ANALYSIS for calculation of gas content of Rowe "A" coal cuttings from 1933' to 1935'

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

total gas desorbed = 270.1 ccs

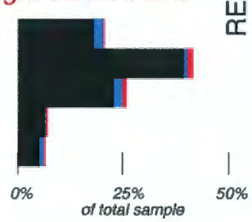
TOTAL DRY WEIGHT OF SAMPLE = 315.61 grams

$\text{weight}_{light\text{-}colored\ lithologies}$ = 10.87 grams (3.4%)

$\text{weight}_{dark\ shale}$ = 18.95 grams (6.0%)

weight_{coal} = 285.55 grams (90.6%)

sieve size	*grams*	*% coal / % dark shale / % light-colored liths*
>0.0930"	63.86	88.20% / 10.28% / 1.52%
>0.0661"	129.96	94.82% / 1.91% / 3.27%
>0.0460"	80.42	88.11% / 7.69% / 4.20%
>0.0331"	21.74	90.48% / 3.57% / 5.95%
<0.0331"	19.64	80.00% / 15.00% / 5.00%
	315.61 TOTAL	



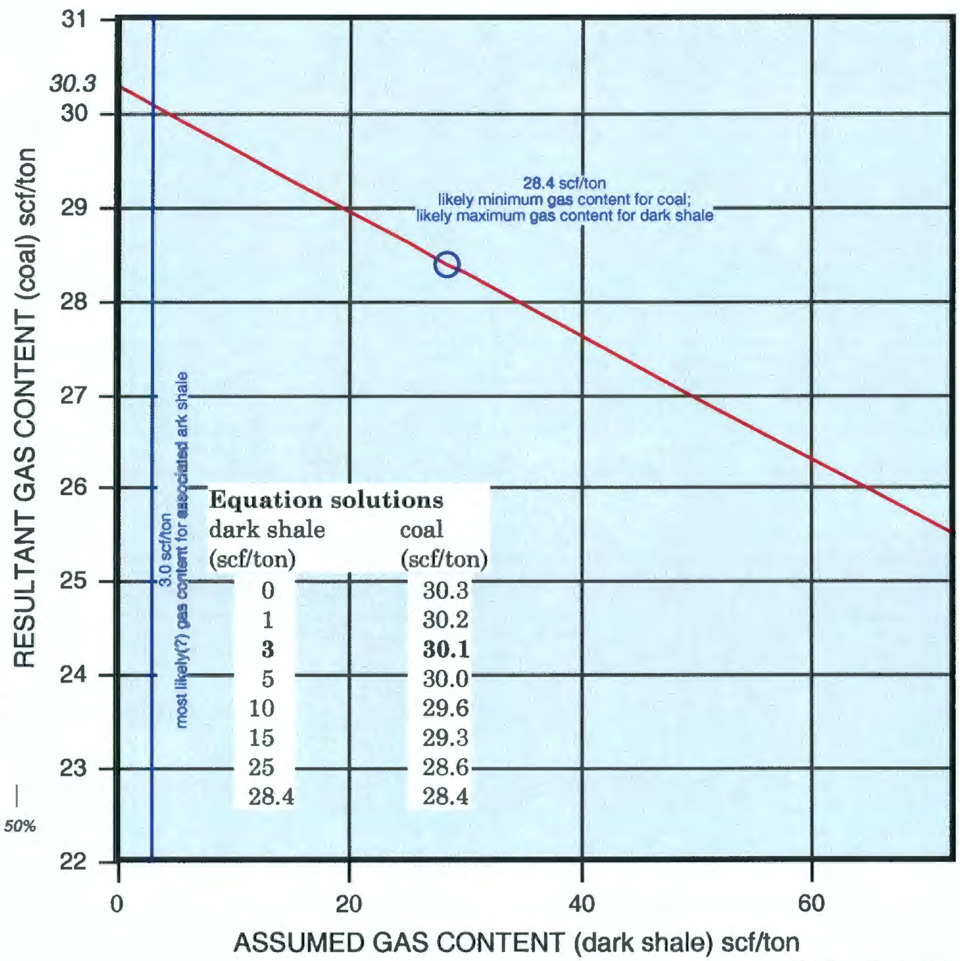


FIGURE 16.

Desorption Characteristics of Cuttings Samples

Evergreen Reschke #34-34; 34-T.1S.-R.16E., Brown County, KS

LITHOLOGIC COMPONENT SENSITIVITY ANALYSIS for calculation of gas content of Rowe "B" or "C" coal from 1940'-1942'

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

total gas desorbed = 192.0 ccs

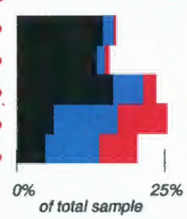
TOTAL DRY WEIGHT OF SAMPLE = 339.65 grams

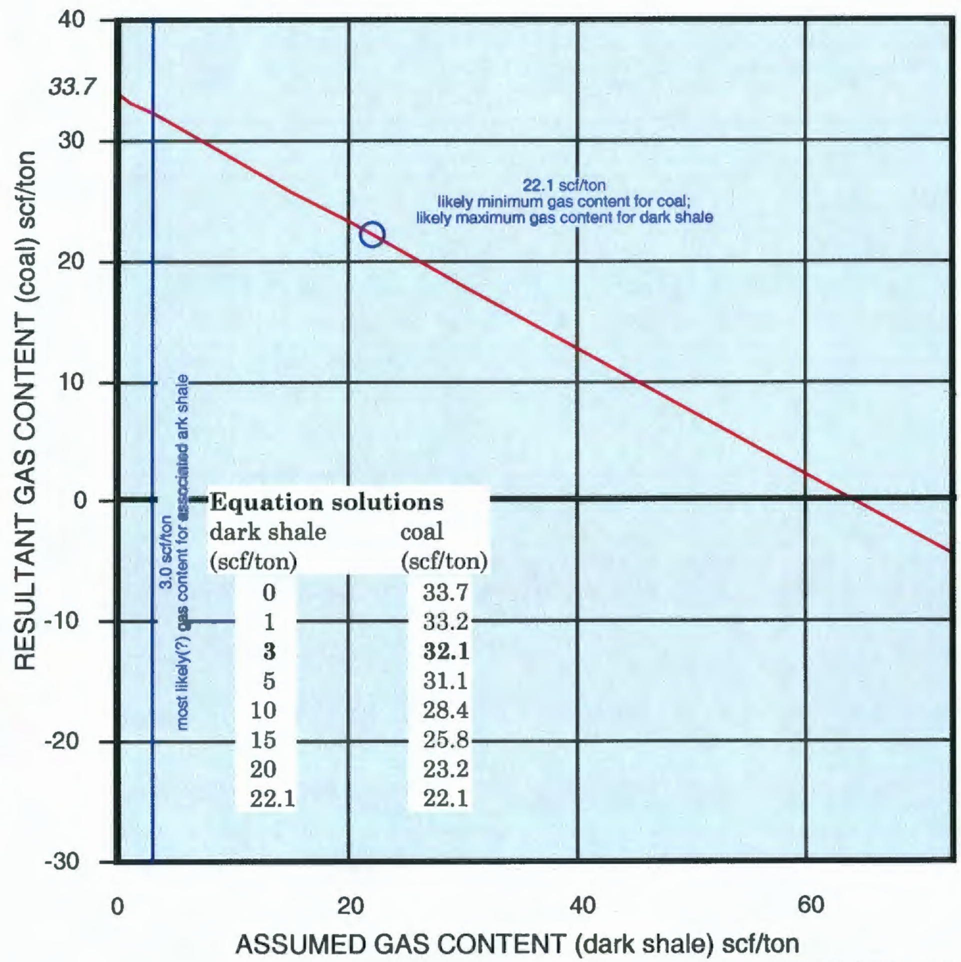
$\text{weight}_{light\text{-}colored\ lithologies}$ = 61.12 grams (18.0%)

$\text{weight}_{dark\ shale}$ = 95.89 grams (28.2%)

weight_{coal} = 182.64 grams (53.8%)

sieve size	*grams*	*% coal / % dark shale / % light-colored liths*
>0.0930"	55.86	86.17% / 11.82% / 2.02%
>0.0661"	51.99	86.25% / 8.75% / 5.00%
>0.0460"	78.72	68.78% / 21.84% / 9.39%
>0.0331"	84.83	23.71% / 43.30% / 32.99%
<0.0331"	68.25	22.58% / 45.16% / 32.26%
	339.65 TOTAL	





Equation solutions

dark shale (scf/ton)	coal (scf/ton)
0	33.7
1	33.2
3	**32.1**
5	31.1
10	28.4
15	25.8
20	23.2
22.1	22.1

FIGURE 17.

Desorption Characteristics of Cuttings Samples

Evergreen Reschke #34-34; 34-T.1S.-R.16E., Brown County, KS

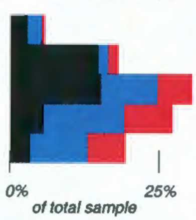
LITHOLOGIC COMPONENT SENSITIVITY ANALYSIS for calculation of gas content of ? coal from 2010-2012'

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

total gas desorbed = 157.2 ccs

TOTAL DRY WEIGHT OF SAMPLE = 339.40 grams
$\text{weight}_{light\text{-}colored\ lithologies}$ = 76.30 grams (22.5%)
$\text{weight}_{dark\ shale}$ = 124.01 grams (36.5%)
weight_{coal} = 139.08 grams (41.0%)

sieve size	*grams*	*% coal / % dark shale / % light-colored liths*
>0.0930"	19.06	48.18% / 42.73% / 9.09%
>0.0661"	60.77	81.49% / 9.13% / 9.37%
>0.0460"	102.71	49.82% / 31.05% / 19.13%
>0.0331"	91.97	20.00% / 50.00% / 30.00%
<0.0331"	64.89	16.67% / 50.00% / 33.33%
	339.40 TOTAL	



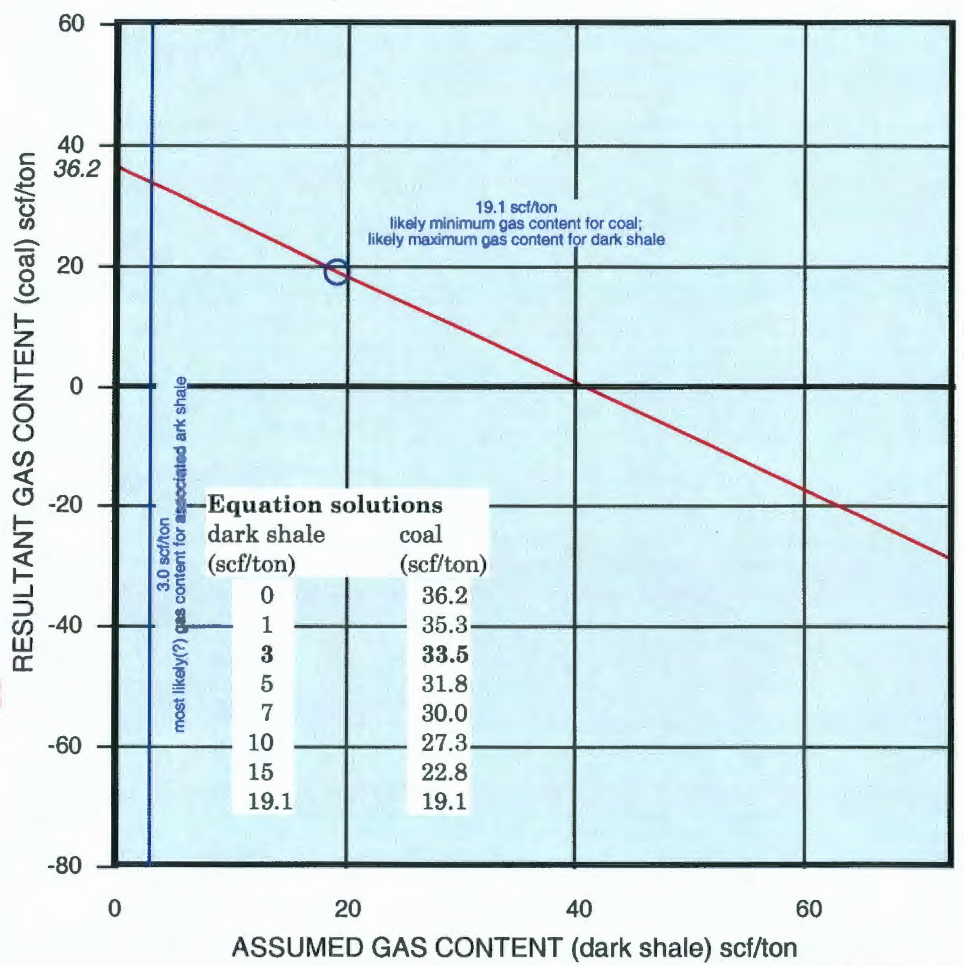


FIGURE 18.

Desorption Characteristics of Cuttings Samples

Evergreen Reschke #34-34; 34-T.1S.-R.16E., Brown County, KS

LITHOLOGIC COMPONENT SENSITIVITY ANALYSIS for calculation of gas content of ? coal from 2048'-2050'

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

total gas desorbed = 1187.6 ccs

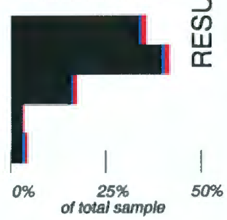
TOTAL DRY WEIGHT OF SAMPLE = 808.42 grams

$\text{weight}_{light\text{-}colored\ lithologies}$ = 34.72 grams (4.3%)

$\text{weight}_{dark\ shale}$ = 22.59 grams (2.8%)

weight_{coal} = 751.11 grams (92.9%)

sieve size	*grams*	*% coal / % dark shale / % light-colored liths*
>0.0930"	283.52	94.73% / 1.61% / 3.66%
>0.0661"	331.86	95.11% / 1.99% / 2.91%
>0.0460"	137.58	91.54% / 2.90% / 5.57%
>0.0331"	29.13	81.91% / 7.45% / 10.64%
<0.0331"	26.34	65.00% / 20.00% / 15.00%
	808.42 TOTAL	



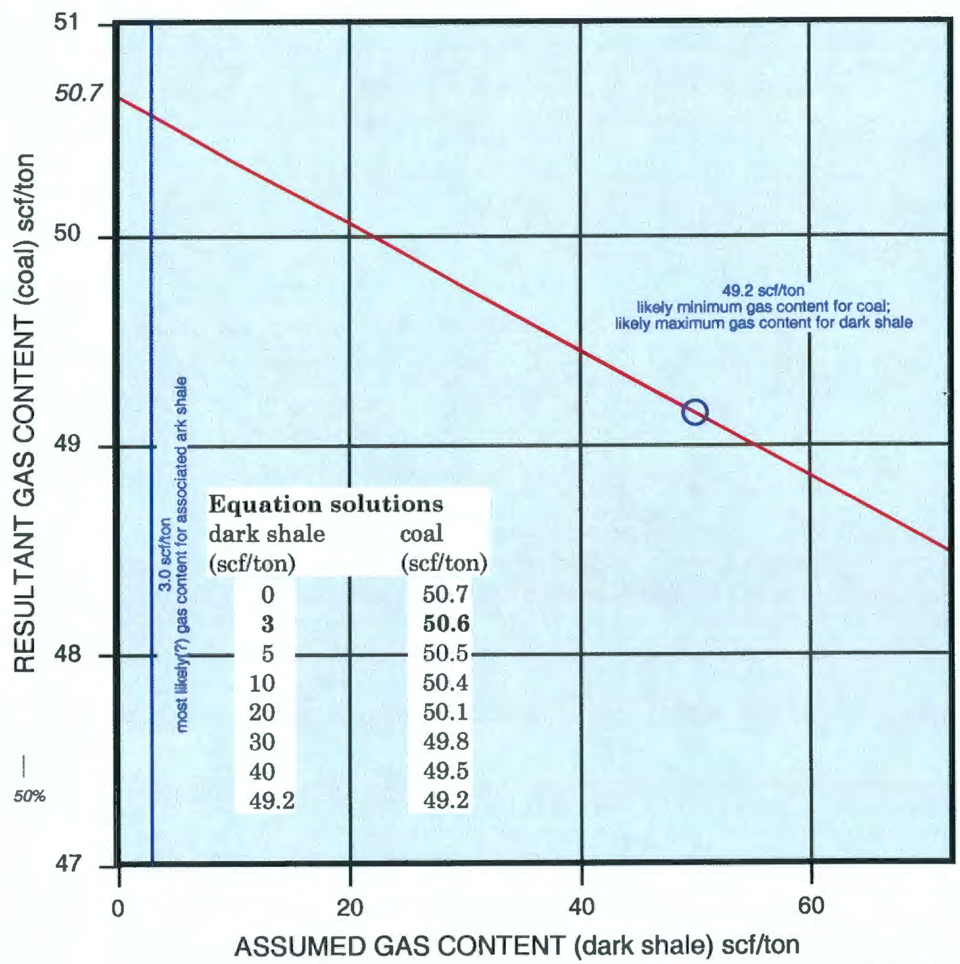


FIGURE 19.

Desorption Characteristics of Cuttings Samples

Evergreen Reschke #34-34; 34-T.1S.-R.16E., Brown County, KS

LITHOLOGIC COMPONENT SENSITIVITY ANALYSIS for calculation of gas content of ? coal from 2057.1-2058.6'

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

total gas desorbed = 44.4 ccs

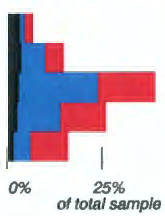
TOTAL DRY WEIGHT OF SAMPLE = 465.31 grams

$\text{weight}_{light\text{-}colored\ lithologies}$ = 199.25 grams (42.8%)

$\text{weight}_{dark\ shale}$ = 214.19 grams (46.0%)

weight_{coal} = 51.86 grams (11.2%)

sieve size	*grams*	*% coal / % dark shale / % light-colored liths*
>0.0930"	29.69	45.99% / 29.46% / 24.55%
>0.0661"	67.13	22.07% / 44.37% / 33.56%
>0.0460"	177.81	6.56% / 54.75% / 38.69%
>0.0331"	118.52	8.41% / 44.86% / 46.73%
<0.0331"	72.16	2.44% / 34.84% / 62.72%
	465.31 TOTAL	



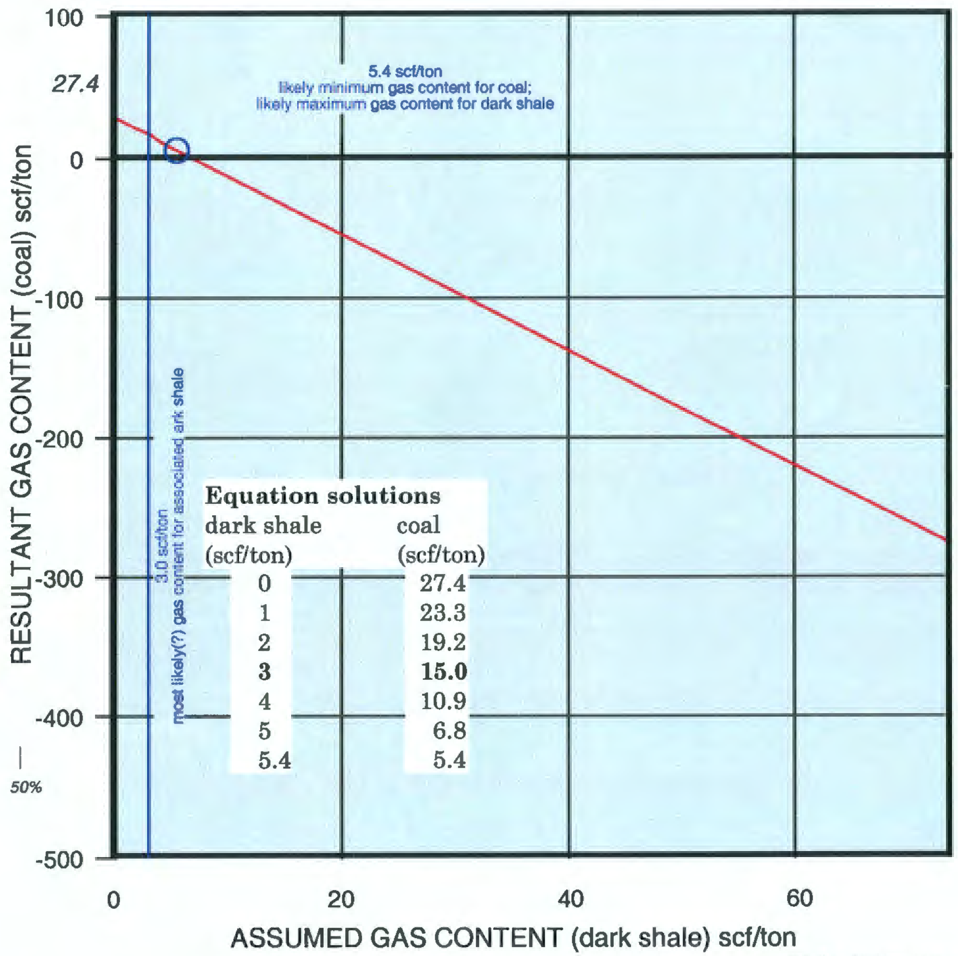


FIGURE 20.

Desorption Characteristics of Cuttings Samples

Evergreen #34-34 Reschke; 34-T.1S.-R.16E.; Brown 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
Little Osage Shale	0%	----	----	3.1
Excello Shale	0%	----	----	6.9
Croweburg	27%	35.6	39.7	16.8
Mineral	66%	36.9	37.6	30.8
Weir "B"(?)	25%	40.8	45.8	17.1
Rowe "A"	91%	30.1	30.3	28.4
Rowe "B" or "C"	54%	32.1	33.7	22.1
2010' (? coal)	41%	33.5	36.2	19.1
2048' (? coal)	93%	50.6	50.7	49.2
2057' (? coal)	11%	15.0	27.4	5.4

1000'
1100'
1200'
1300'
1400'
1418'-1422' Little Osage Sh.
1438'-1440' Excello Sh.
1500'
1545'-1547' Croweburg
1585'-1586' Mineral
1694'-1695' Weir "B"(?)
1800'
1900'
1933'-1935' Rowe "A"
1940'-1942' Rowe "B" or "C"
2000'
2010'-2012' ? coal
2048'-2050' ? coal
2057'-2059' ? coal
2100'

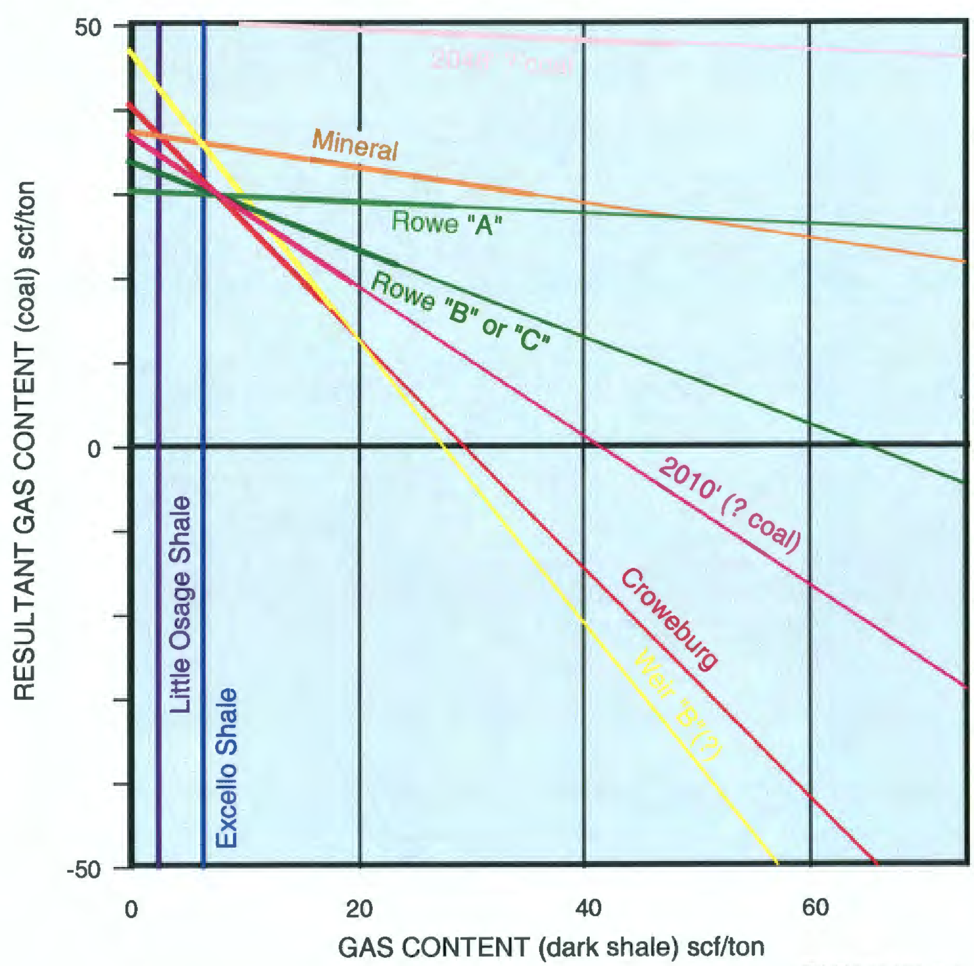


FIGURE 21.

Desorption Characteristics of Cuttings Samples

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

Evergreen #34-34 Reschke; 34-T.1S.-R.16E.; Brown County, KS

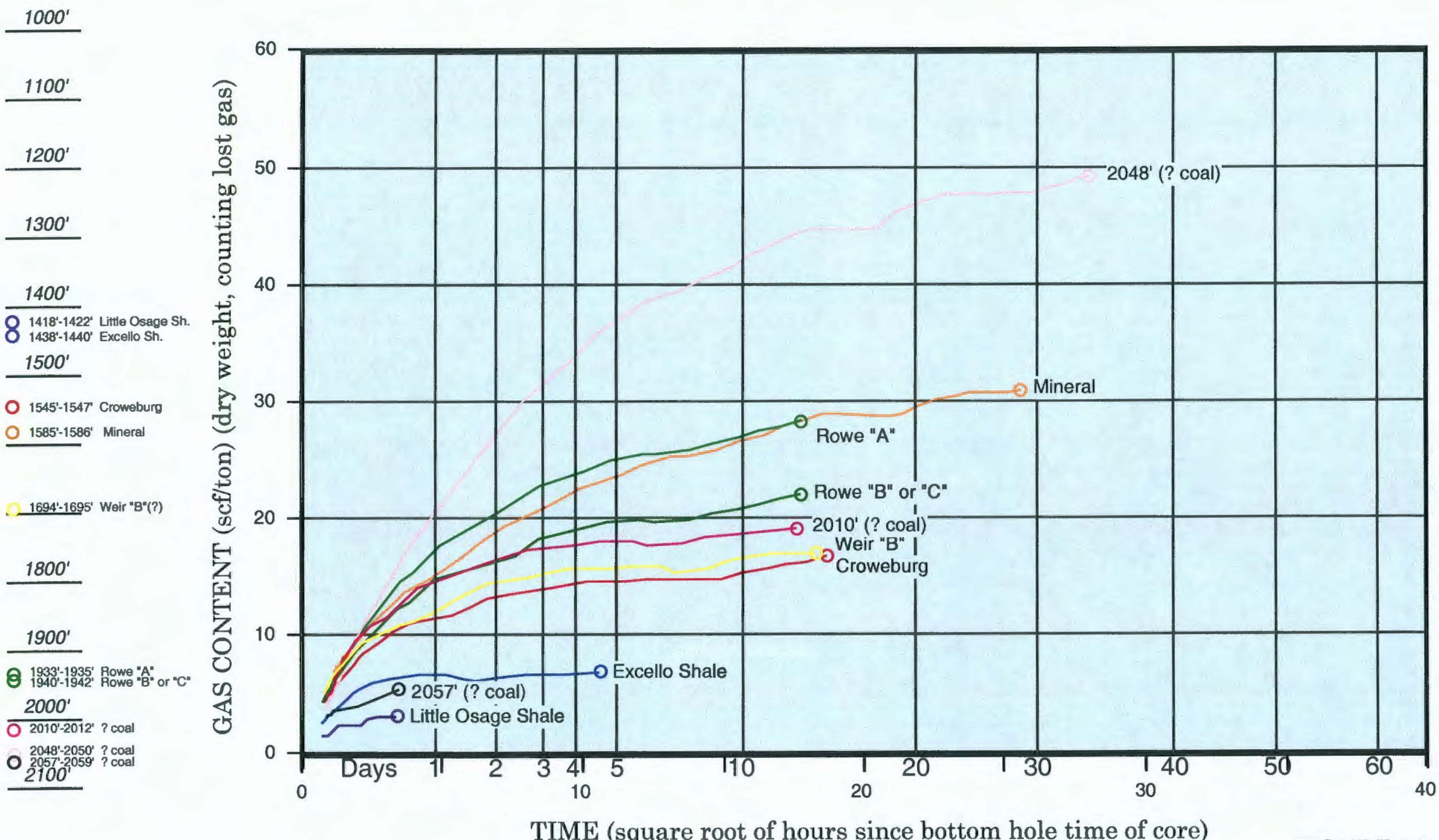


FIGURE 22.