INVESTIGATION of INTEGRATED SUBSURFACE PROCESSING of LANDFILL GAS and CARBON SEQUESTRATION, JOHNSON COUNTY, KANSAS

FINAL SCIENTIFIC/TECHNICAL REPORT
For UNITED STATES DEPARTMENT of ENERGY

Report period start/stop dates (10/1/04-3/31/07)

by
K. David Newell (P.I.)
Timothy R. Carr

August 2007
(DOE Award DE-FC26-O4NT42209)

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

KGS Open-file Report 2010-17

ABSTRACT

The Johnson County Landfill in Shawnee, KS, is operated by Deffenbaugh Industries and serves much of metropolitan Kansas City. Refuse, which is dumped in large plastic-underlined trash cells covering several acres, is covered over with shale shortly after burial. The landfill waste, once it fills the cell, is then drilled by Kansas City LFG, so that the gas generated by anaerobic decomposition of the refuse can be harvested.

Production of raw landfill gas from the Johnson County landfill comes from 150 wells. Daily production is approximately 2.2 to 2.5 mmcf, of which approximately 50% is methane and 50% is carbon dioxide and NMVOCs (non-methane volatile organic compounds). Heating value is approximately 550 BTU/scf. An upgrading plant, utilizing an amine process, rejects the carbon dioxide and NMVOCs, and upgrades the gas to pipeline quality (i.e., nominally a heating value >950 BTU/scf). The gas is sold to a pipeline adjacent to the landfill.

With coal-bearing strata underlying the landfill, and carbon dioxide a major effluent gas derived from the upgrading process, the Johnson County Landfill is potentially an ideal setting to study the feasibility of injecting the effluent gas in the coals for both enhanced coalbed methane recovery and carbon sequestration. To these ends, coals below the landfill were cored and then were analyzed for their thickness and sorbed gas content, which ranged up to 79 scf/ton. Assuming 1 1/2 square miles of land (960 acres) at the Johnson County Landfill can be utilized for coalbed and shale gas recovery, the total amount of in-place gas calculates to 946,200 mcf, or 946.2 mmcf, or 0.95 bcf (i.e., 985.6 mcf/acre X 960 acres). Assuming that carbon dioxide can be imbibed by the coals and shales on a 2:1 ratio compared to the gas that was originally present, then 1682 to 1720 days (4.6 to 4.7 years) of landfill carbon dioxide production can be sequestered by the coals and shales immediately under the landfill.

Three coal – the Bevier, Fleming, and Mulberry coals – are the major coals of sufficient thickness (nominally >1') that can imbibe carbon dioxide gas with an enhanced coalbed injection. Comparison of the adsorption gas content of coals to the gas desorbed from the coals shows that the degree of saturation decreases with depth for the coals.

TABLE of CONTENTS

EXECUTIVE SUMMARY

Three-inch diameter core samples from the Pennsylvanian Pleasanton, Marmaton, and Cherokee Groups were collected from the Kansas Geological Survey #1B Deffenbaugh Quarry core hole and the Kansas Geological Survey #2 Deffenbaugh Quarry core hole, sec. 1-T.12S.-R.23E., Johnson County, Kansas. The following gas contents were measured (not including residual gas), based on dry weight of the samples:

Deffenbaugh Quarry #1B

- 385.3' to 386.3' (black shale) (50.5 scf/ton)
- 420.5' to 421.9' (Anna Shale Member) (22.2 scf/ton)
- 455.5' to 456.5' (Little Osage Shale Member) (16.9 scf/ton)
- 458.7' to 459.1' (Summit coal) (63.5 scf/ton)
- 571.3' to 572.7' (Bevier coal) (70.3 scf/ton)
- 604.6' to 605.4' (black shale above Fleming coal) (6.0 scf/ton)
- 605.4' to 606.6' (Fleming coal) (76.1 scf/ton)
- 639.0' to 640.8' (Mineral coal) (57.6 scf/ton)
- 710.7' to 711.5' (? coal) (45.3 scf/ton)
- 742.9' to 743.9' (? coal) (42.0 scf/ton)

Deffenbaugh Quarry #2

- 388.0' to 389.0' (black shale) (46.4 scf/ton)
- 424.0' to 426.0' (Anna Shale Member) (19.3 scf/ton)
- 455.3' to 456.1' (Little Osage Shale Member) (14.2 scf/ton)
- 457.8' to 458.3' (Summit coal) (69.0 scf/ton)
- 469.6' to 471.0' (Excello Shale) (1.9 scf/ton)
- 569.7' to 571.3' (Bevier coal) (78.7 scf/ton)
- 605.0' to 606.0' (black shale above Fleming coal) (4.1 scf/ton)
- 606.0' to 607.3' (Fleming coal) (75.8 scf/ton)
- 637.6' to 638.9' (Mineral coal) (60.5 scf/ton)

The volume of in-place gas in the coals and shales underlying the Deffenbaugh Quarry can be calculated by using the average of the gas contents of the samples and the average thickness of the gas-bearing coal or shale at each well. A unit is discounted as a viable source of gas if it had less that 10 scf/ton or if it was not at least 1 foot thick at either of the two core holes.

? shale (385')	106.0 mcf/acre
Anna Shale Member (424')	95.1 mcf/acre
Little Osage Shale Member (455')	38.0 mcf/acre
Summit coal (456')	57.8 mcf/acre
Excello shale (470')	0.0 mcf/acre
Bevier coal (570')	220.3 mcf/acre
shale above Fleming coal (605')	0.0 mcf/acre
Fleming coal (606')	169.0 mcf/acre
Mineral coal (638')	232.3 mcf/acre

? coal (711')	0.0 mcf/acre;
? coal (743')	67.0 mcf/acre
TOTAL GAS IN PLACE	**985.6 mcf/acre**

Proximate analysis of the coals indicates that they straddle the boundary between high-volatile B and high-volatile A bituminous rank coals. Comparison of adsorption isotherms to gas contents of coals indicates that the coals and associated gas shales are undersaturated with respect to their gas content. The degree of saturation decreases with depth.

Isotopic analysis and hydrocarbon wetness of three desorption gases from the Deffenbaugh Quarry #2 well indicates the gas is mixed biogenic/thermogenic in origin. Heating values are 950 BTU/scf, 935 BTU/scf, and 750 BTU/scf respectively for the Bevier coal (570'), Fleming coal (606'), and the Mineral coal (638'). The decrease in saturation with depth is consistent with a biogenic influence in the origin of these gases.

Assuming 1 1/2 square miles of land (960 acres) at the Deffenbaugh Quarry/Johnson County Landfill can be utilized for coalbed and shale gas recovery, the total amount of in-place gas calculates to 946,200 mcf, or 946.2 mmcf, or 0.95 bcf (i.e., 985.6 mcf/acre X 960 acres).

Production of raw landfill gas from the Johnson County landfill comes from 150 wells. Daily production is approximately 2.2 to 2.5 mmcf, of which approximately 50% is methane and 50% is carbon dioxide and NMVOCs (non-methane volatile organic compounds). Assuming that carbon dioxide can be imbibed by the coals and shales on a 2:1 ratio compared to the gas that was originally present, then 1682 to 1720 days (4.6 to 4.7 years) of landfill carbon dioxide production can be sequestered by the coals and shales immediately under the landfill.

Three coals – the Bevier, Fleming, and Mulberry coals – are the major coals of sufficient thickness (nominally >1') that can imbibe carbon dioxide gas with an enhanced coalbed injection. These coals are the likely candidates for subsequent injection experiments and modeling.

Adsorption isotherms indicate that the coals have an adsorption capacity of carbon dioxide that is approximately three times that of methane. Rigging of the gas plant to inject the carbon dioxide into the coals for enhanced coalbed gas recovery would cost approximately $1.2 million, with a monthly operating cost estimated to be $25,000. Financial modeling is now necessary to determine if the added income from enhanced coalbed gas recovery would justify the expense of injecting the effluent of the gas plant into the coals underlying the landfill.

BACKGROUND

The Kansas Geological Survey Deffenbaugh Quarry #1B core hole and the Kansas Geological Survey Deffenbaugh Quarry #2 core hole were selected for desorption tests in association with a Department of Energy research project to study the feasibility of injecting landfill gas into coals for carbon sequestration and enhanced coalbed gas recovery. The location of the core holes is in the Western Interior Coal Basin in eastern Kansas, notably on the southern and eastern flanks of the Forest City basin (Figure 1). The core holes were drilled in the Deffenbaugh Quarry, which is also the location of the Johnson County Landfill (Figure 2).

The samples (2-inch-diameter core) for the Deffenbaugh Quarry #2 core hole were gathered November 19th through November 21st, 2004, by K. David Newell and W. Matt Brown of the Kansas Geological Survey. Coordinates for this well are 870.6' KB elevation; lat. 39° 2' 08.697", long. 94° 48' 33.663".

The second core hole drilled, the Kansas Geological Survey Deffenbaugh Quarry #1B, was spudded 1536' south-southeast of the Deffenbaugh Quarry #2 well (Figure 2). Coordinates for this well are 877.6' KB elevation; lat. 39° 1' 59.280", long. 94° 48' 18.452". The samples (2-inch-diameter core) for the #1B Deffenbaugh Quarry core hole were gathered May 3rd through May 6th, 2005, by K. David Newell, W. Matt Brown, and Kenneth Stalder of the Kansas Geological Survey.

Desorption samples were obtained for both wells during wireline coring. The wells were drilled by Kansas Geological Survey employees Joe Anderson and Matt Wedel, using an Acker wireline rig owned and operated by the Kansas Geological Survey.

Lithologies encountered for both wells were essentially identical, with minor changes in coal thickness at each well. A lithologic summary from the KGS Deffenbaugh Quarry #2 well is shown in Figure 3. A detailed summary of the lithologies encountered in this core hole are in Brown (2006). In general, the southeastern well (Deffenbaugh Quarry #1B) registered stratigraphic horizons 6 to 8 feet higher than in the Deffenbaugh Quarry #2 well.

For desorption measurements, bottom-hole times (i.e., the time the core sample was lifted from the bottom of the hole) and canistering times (i.e., the time the sample was placed in the desorption canister) were noted in order to determine lost gas and start of desorption. Approximate wet weight of the sample was determined by subtraction of the weight of the empty canister from the weight of the canister with the sample in it, with compensation for formation water added to the canister. After the sample was removed from the canister, it was weighed again before air- or oven-drying, then weighed after drying. The weight loss due to drying is noted in the desorption table (Tables 1, 2).

Temperature baths for the desorption canisters were on site, with temperatures at 65 degrees F for all samples. The canistered samples were later transported to the laboratory at the Kansas Geological Survey in Lawrence, KS, and desorption measurements were

continued. Desorption measurements were periodically made until the canisters produced no more gas upon testing for at least two successive measurements.

DESORPTION MEASUREMENTS

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

The desorption canisters were both home-made (i.e., Brady canisters) and commercially obtained (i.e., all others). The former were made with 3"-diameter (7.5-cm) PVC pipe and plumbing materials available at hardware stores. These canisters were 15 inches (38 cm) in length and enclosed a volume of 108 cubic inches (1740 cm^3). The commercial canisters were obtained from SSD, Inc. in Grand Junction, CO. The commercial canisters were approximately 12.5 inches in length (32 cm), 3 1/2 inches (9 cm) in diameter, and enclosed 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. The atmospheric pressure was displayed in millibars on this instrument, and later correlated to atmospheric pressure (in psi) read from a pressure transducer in the Petrophysics Laboratory in the Kansas Geological Survey in Lawrence, Kansas.

A spreadsheet program written by K.D. Newell (Kansas Geological Survey) was used to convert all gas volumes to 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 (STP) 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 instant the core sample is lifted from the bottom of the hole. Characteristically, the cumulative gas evolved from the sample, when plotted against the square root of time, is linear for a short time period after the sample reaches ambient pressure conditions; therefore, lost gas is determined by a line projected back to time zero. The period of linearity generally is about two hours for core samples.

LITHOLOGIC ANALYSIS

Upon removal from the canisters, the cores were washed of drilling mud and air-dried for 2 to 6 weeks. After drying, the cores were weighed again to obtain a dry-weight based gas content. Selected samples were sent for proximate analysis at Luman's Laboratories in Chetopa, KS, and for adsorption studies at TerraTek in Salt Lake City, UT. Density measurements were also made on each sample at the Kansas Geological Survey.

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) desorption graph for all samples at a common scale.

Data Tables of the Desorption Analyses (Table 1, 2)
These are the basic data used for lost-gas analysis and determination of total gas desorbed from the core 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 (or) 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 4-22)
Gas lost prior to the canistering of the sample was estimated by extrapolation of the first few data points after the sample was canistered. The linear characteristic of the initial desorption measurements was usually lost within the first two hours after canistering, thus data are presented in the lost-gas graphs for only up to 9 hours after canistering. Lost-gas volumes derived from this analysis are incorporated in the data tables described above.

Desorption Graph (Figure 23)
This is the desorption graph (gas content per weight vs. square root of time) for all the samples.

RESULTS and DISCUSSION

Sorbed Gas Contents
The following gas contents (not including residual gas) were calculated for three-inch core samples collected from the Kansas Geological Survey Deffenbaugh Quarry core holes. Samples were collected if the coal or shale were least 10 inches thick. Summit coal samples were from a seam less that 10 inches thick, but they were underlying the black Little Osage Shale Member, and thus the combination of this shale and the Summit coal constitute a substantial reservoir unit.

Deffenbaugh Quarry #1B
- 385.3' to 386.3' (black shale) (50.5 scf/ton)
- 420.5' to 421.9' (Anna Shale Member) (22.2 scf/ton)
- 455.5' to 456.5' (Little Osage Shale Member) (16.9 scf/ton)
- 458.7' to 459.1' (Summit coal) (63.5 scf/ton)
- 571.3' to 572.7' (Bevier coal) (70.3 scf/ton)
- 604.6' to 605.4' (black shale above Fleming coal) (6.0 scf/ton)
- 605.4' to 606.6' (Fleming coal) (76.1 scf/ton)
- 639.0' to 640.8' (Mineral coal) (57.6 scf/ton)
- 710.7' to 711.5' (? coal) (45.3 scf/ton)
- 742.9' to 743.9' (? coal) (42.0 scf/ton)

Deffenbaugh Quarry #2
- 388.0' to 389.0' (black shale) (46.4 scf/ton)

- 424.0' to 426.0' (Anna Shale Member) (19.3 scf/ton)
- 455.3' to 456.1' (Little Osage Shale Member) (14.2 scf/ton)
- 457.8' to 458.3' (Summit coal) (69.0 scf/ton)
- 469.6' to 471.0' (Excello shale) (1.9 scf/ton)
- 569.7' to 571.3' (Bevier coal) (78.7 scf/ton)
- 605.0' to 606.0' (black shale above Fleming coal) (4.1 scf/ton)
- 606.0' to 607.3' (Fleming coal) (75.8 scf/ton)
- 637.6' to 638.9' (Mineral coal) (60.5 scf/ton)

Volume of Gas in Place per Acre

Thickness data, density data, and gas content data can be utilized for calculating the volume of gas in place per acre. Thickness measurements for gas-in-place calculations represent the average thickness of the coal or shale derived from the thickness measurements made at each well. Gas content data (see above) were also averaged from the two wells. Density measurements were made on each sample. These measurements are based on the dry weight of the sample. The volumetric measurement was made by weighing the water displaced out of a beaker by immersing the sample in the beaker.

SAMPLE	DEPTH (feet *and* meters)	ESTIMATED GAS CONTENT (scf/ton *and* cm^3/gram)	DENSITY (gram/cm^3)	THICKNESS (inches *and* cm)	VOLUME OF GAS PER SURFACE AREA (thousand cubic feet per acre and $meter^3$ per hectare)
? shale	385'; 117.4 m	48.4 scf/ton; 1.51 cm^3/gram	1.61	12"; 30.5 cm	106.0 mcf/acre; 7415 m^3/hectare
Anna Shale Member	424'; 129.2 m	20.7 scf/ton; 0.65 cm^3/gram	2.08	19.5"; 49.5 cm	95.1 mcf/acre; 6658 m^3/hectare
Little Osage Shale Member	455'; 138.7 m	15.5 scf/ton; 0.48 cm^3/gram	2.06	10.5"; 26.7 cm	38.0 mcf/acre; 2658 m^3/hectare
Summit coal	456'; 140.0 m	66.3 scf/ton; 2.07 cm^3/gram	1.40	5.5"; 14.0 cm	57.8 mcf/acre; 4048 m^3/hectare
Excello Shale	470'; 143.1 m	1.9 scf/ton; 0.06 cm^3/gram	NA	18"; 45.7 cm	0 mcf/acre; 0 m^3/hectare (GAS

					CONTENT TOO LOW)
Bevier coal	570'; 173.7 m	74.5 scf/ton; 2.33 cm^3/gram	1.45	18"; 45.7 cm	220.3 mcf/acre; 15,419 m^3/hectare
Shale above Fleming coal	605'; 184.4 m	6.0 scf/ton; 0.19 cm^3/gram	NA	14"; 35.6 cm	0 mcf/acre; 0 m^3/hectare (GAS CONTENT TOO LOW)
Fleming coal	606'; 184.7 m	75.9 scf/ton; 2.37 cm^3/gram	1.31	15"; 38.1 cm	169.0 mcf/acre; 11,826 m^3/hectare
Mineral coal	638'; 194.5 m	59.0 scf/ton; 1,84 cm^3/gram	1.39	25"; 63.5 cm	232.3 mcf/acre; 16,257 m^3/hectare
? coal	711'; 216.7 m	45.3 scf/ton; 1.41 cm^3/gram	NA	10"; 25.4 cm	0 mcf/acre; 0 m^3/hectare (<1'; TOO THIN)
? coal	743'; 226.5 m	42.0 scf/ton; 1.31 cm^3/gram	1.28	11"; 27.9 cm	67.0 mcf/acre; 4689 m^3/hectare
TOTAL					**985.6 mcf/acre; 68,970 m^3/hectare**

Sorption Times

Relative permeability of each of the gas-bearing units underlying the Deffenbaugh Quarry can be determined by their sorption time, which is the time necessary to evolve 63.2% of the total gas evolved from the sample (McLennan and others, 1995, p. 2.9). Sorption times for the Deffenbaugh samples are as follows:

GAS-BEARING UNIT	***Avg. Gas Content (scf/ton) (days)***	***Gas-in-Place***	***Sorption Time (scf/acre)***	
			DQ1B	***DQ2***
? black shale @ 388'	48.4	106,000	6.24	8.84
Anna Shale Member @ 424'	20.7	95,100	74.45	101.12
Little Osage Shale Member @ 455'	15.5	38,000	26.03	50.26

Summit coal @ 458'	66.3	57,800	19.88	15.23
Bevier coal @ 570'	74.5	220,300	19.27	31.20
Fleming coal @ 606'	75.9	169,000	12.65	28.59
Mineral coal @ 638'	59.0	232,300	18.50	31.90
? coal @ 711'	45.3	----------	18.61	
? coal @ 742'	42.0	67,000	8.71	

In general, sorption times are shorter at Deffenbaugh Quarry #1B than at Deffenbaugh Quarry #2. The reason for this is not clear, but better cleats and more fractures may be present in the former well.

A synoptic comparison of the gas content and the sorption time is best accomplished with a crossplot of sorption time vs. the calculated gas per acre (Figure 24). From this diagram, the Mineral and Bevier coals will likely have almost identical reservoir characteristics, and are the best units with respect to their gas-in-place. The Fleming coal has less gas in place, but better sorption time than the Mineral and Bevier coals. All units except the shales have nearly identical sorption times, although there is a tendency for the minor coals deeper than 700' to have shorter sorption times. By its sorption time, the unidentified shale at 388'. is, for all means and purposes, a coal. Its moisture-free ash content (32.48% to 37.26%) is slightly greater than coals encountered in the core holes (12.71% to 27.59%), but it is considerably less than that of other black shales (76.32% to 78.47%).

Proximate Analyses

Proximate analyses were made for selected samples. The core was cut down its vertical axis and half was preserved for future analyses. The proximate analyses were performed on the following samples by Luman's Laboratory, Chetopa, KS:

? shale at 385.3' (DQ1B)	**As Received**	**Moisture Free**	**Moisture, Ash Free**
Moisture	4.44%		
Ash	31.04%	32.48%	
Volatile Matter	27.28%	28.55%	
Fixed Carbon	37.24%	38.97%	
BTU/lb	8,602	9,002	13,332
Sulfur	5.14%	5.38%	

? shale at 388.0' (DQ2)	**As Received**	**Moisture Free**	**Moisture, Ash Free**
Moisture	4.51%		
Ash	35.58%	37.26%	
Volatile Matter	24.40%	25.55%	
Fixed Carbon	35.51%	37.19%	
BTU/lb	7,909	8,283	13,203
Sulfur	3.73%	3.90%	

Anna Shale Member (DQ1B)	**As Received**	**Moisture Free**	**Moisture, Ash Free**

Moisture	2.69%		
Ash	73.14%	75.16%	
Volatile Matter	15.96%	16.40%	
Fixed Carbon	8.21%	8.44%	
BTU/lb	2,986	3,069	12,354
Sulfur	1.70%	1.74%	

Anna Shale Member (DQ2)	**As Received**	**Moisture Free**	**Moisture, Ash Free**
Moisture	2.11%		
Ash	74.72%	76.32%	
Volatile Matter	16.98%	17.34%	
Fixed Carbon	6.19%	6.34%	
BTU/lb	2,811	2,872	12,128
Sulfur	1.82%	1.86%	

Little Osage Shale Member (DQ1B)	**As Received**	**Moisture Free**	**Moisture, Ash Free**
Moisture	2.80%		
Ash	75.58%	77.76%	
Volatile Matter	14.43%	14.84%	
Fixed Carbon	7.19%	7.40%	
BTU/lb	2,441	2,511	11,294
Sulfur	1.16%	1.19%	

Little Osage Shale Member (DQ2)	**As Received**	**Moisture Free**	**Moisture, Ash Free**
Moisture	1.58%		
Ash	77.23%	78.47%	
Volatile Matter	15.26%	15.50%	
Fixed Carbon	5.93%	6.03%	
BTU/lb	2,250	2,286	10,620
Sulfur	1.25%	1.27%	

Summit coal (DQ1B)	**As Received**	**Moisture Free**	**Moisture, Ash Free**
Moisture	4.78%		
Ash	26.27%	27.59%	
Volatile Matter	32.73%	34.37%	
Fixed Carbon	36.22%	38.04%	
BTU/lb	9.874	10.370	14,322
Sulfur	2.36%	2.48%	

Summit coal (DQ2)	**As Received**	**Moisture Free**	**Moisture, Ash Free**
Moisture	5.04%		
Ash	21.97%	23.14%	
Volatile Matter	33.48%	35.64%	

Fixed Carbon	39.15%	41.22%	
BTU/lb	10,298	10,845	14,109
Sulfur	1.92%	2.03%	

Excello shale (DQ2)	**As Received**	**Moisture Free**	**Moisture, Ash Free**
Moisture	2.60%		
Ash	91.00%	93.42%	
Volatile Matter	5.84%	6.00%	
Fixed Carbon	0.56%	0.58%	
BTU/LB.	301	309	4,706
Sulfur	0.17%	0.17%	

Bevier coal (DQ1B)	**As Received**	**Moisture Free**	**Moisture, Ash Free**
Moisture	4.70%		
Ash	17.36%	18.21%	
Volatile Matter	34.96%	36.68%	
Fixed Carbon	42.98%	45.11%	
BTU/lb	10,825	11,358	13,888
Sulfur	9.56%	10.03%	

Bevier coal (DQ2)	**As Received**	**Moisture Free**	**Moisture, Ash Free**
Moisture	3.86%		
Ash	16.44%	17.10%	
Volatile Matter	37.25%	38.75%	
Fixed Carbon	42.45%	44.15%	
BTU/lb	11,418	11,876	14,326
Sulfur	6.84%	7.11%	

sh above Fleming (DQ1B)	**As Received**	**Moisture Free**	**Moisture, Ash Free**
Moisture	3.02%		
Ash	83.38%	85.98%	
Volatile Matter	7.96%	8.21%	
Fixed Carbon	5.64%	5.81%	
BTU/lb	1,150	1,186	8,460
Sulfur	2.26%	2.33%	

sh above Fleming (DQ2)	**As Received**	**Moisture Free**	**Moisture, Ash Free**
Moisture	2.15%		
Ash	85.41%	87.28%	
Volatile Matter	9.92%	10.14%	
Fixed Carbon	2.52%	2.58%	
BTU/lb	842	860	6.765
Sulfur	4.76%	4.87%	

Fleming coal (DQ1B)	**As Received**	**Moisture Free**	**Moisture, Ash Free**
Moisture	3.95%		

Ash	12.21%	12.71%	
Volatile Matter	37.86%	39.42%	
Fixed Carbon	45.98%	47.87%	
BTU/lb	12,103	12,601	14,435
Sulfur	4.65%	4.85%	

Fleming coal (DQ2)	**As Received**	**Moisture Free**	**Moisture, Ash Free**
Moisture	5.61%		
Ash	13.44%	14.24%	
Volatile Matter	38.97%	41.29%	
Fixed Carbon	41.98%	44.47%	
BTU/lb	11,830	12,533	14,614
Sulfur	3.52%	3.74%	

Mineral coal (DQ1B)	**As Received**	**Moisture Free**	**Moisture, Ash Free**
Moisture	5.38%		
Ash	22.98%	24.29%	
Volatile Matter	33.02%	34.90%	
Fixed Carbon	38.62%	40.81%	
BTU/lb	10,025	10,595	13,995
Sulfur	4.57%	4.83%	

Mineral coal (DQ2)	**As Received**	**Moisture Free**	**Moisture, Ash Free**
Moisture	5.06%		
Ash	14.90%	15.70%	
Volatile Matter	36.22%	38.16%	
Fixed Carbon	43.82%	46.14%	
BTU/lb	11,562	12,178	14,445
Sulfur	4.47%	4.71%	

coal at 710.0' (DQ1B)	**As Received**	**Moisture Free**	**Moisture, Ash Free**
Moisture	4.72%		
Ash	22.76%	23.89%	
Volatile Matter	32.01%	33.59%	
Fixed Carbon	40.51%	42.52%	
BTU/lb	9,969	10,464	13,748
Sulfur	10.26%	10.76%	

coal at 742.9' (DQ1B)	**As Received**	**Moisture Free**	**Moisture, Ash Free**
Moisture	2.98%		
Ash	14.32%	14.77%	
Volatile Matter	36.53%	37.65%	
Fixed Carbon	46.17%	47.58%	
BTU/lb	11,614	11,971	14,045
Sulfur	6.68%	6.89%	

According to the BTU/lb. (dry, ash-free) determinations, all the samples can be classified as high-volatile B and A bituminous coal. Most samples plot along the boundary of these two coal rankings (Figure 25).

Using the equation from McLennan and others (1995)

$G_c = G_{pc} (1-a_d)$,

where
G_c = gas content, scf/ton, dry basis
G_{pc} = "pure coal," gas content, scf/ton
a_d = dry ash content, weight fraction.

The gas content of the samples converts to

Deffenbaugh Quarry #1B

unit	*depth*	*moisture-free ash*	G_c	G_{pc}
? black shale	385.3'	32.48%	50.5 scf/tn	80.1 scf/tn
Anna Shale Member	420.5'	75.16	22.2 scf/tn	100.0 scf/tn
Little Osage Shale Member	455.5'	77.76%	16.9 scf/tn	86.9 scf/tn
Summit coal	458.7'	27.59%	63.5 scf/tn	93.8 scf/tn
Bevier coal	571.3'	18.21%	70.3 scf/tn	91.2 scf/tn
shale over Fleming	604.6'	85.98%	6.0 scf/tn	54.1 scf/tn
Fleming coal	605.4'	12.71%	76.1 scf/tn	91.3 scf/tn
Mineral coal	639.0'	24.29%	57.6 scf/tn	81.8 scf/tn
? coal	710.7'	23.89	45.3 scf/tn	63.5 scf/tn
? coal	742.9'	14.77%	42.0 scf/tn	51.0 scf/tn

Deffenbaugh Quarry #2

unit	*depth*	*moisture-free ash*	G_c	G_{pc}
? black shale	388.0'	37.26%	46.4 scf/tn	79.6 scf/tn
Anna Shale Member	424.0'	76.32%	19.3 scf/tn	89.5 scf/tn
Little Osage Shale Member	455.3'	78.47%	14.2 scf/tn	71.2 scf/tn
Summit coal	457.8'	23.14%	69.0 scf/tn	96.1 scf/tn
Excello shale	469.6'	93.42%	1.9 scf/tn	46.5 scf/tn
Bevier coal	569.7'	17.10%	78.7 scf/tn	99.6 scf/tn
shale over Fleming	605.0'	87.28%	4.1 scf/tn	39.0 scf/tn
Fleming coal	606.0'	14.24%	75.8 scf/tn	94.6 scf/tn
Mineral coal	637.6'	15.70%	60.5 scf/ton	76.4 scf/tn

Isotherms

A methane adsorption isotherm was determined for Mineral coal at the Deffenbaugh #2 well by TerraTek, Salt Lake City, UT. This isotherm, as well as two other isotherms from Mineral coal samples from elsewhere in eastern Kansas (e.g., Layne-Christensen #13-38 Beurskens well in Montgomery County, Colt Energy #2-6 Spencer well in Franklin County; see Fig. 1 for locations), are presented in Figure 26. The Mineral coal in the Spencer #2-6 well and Beurskens #13-38 well is high-volatile A bituminous coal, which is slightly higher rank than at the Deffenbaugh Quarry (see Figure 25). The ash content at the Spencer #2-6 well and Beurskens #13-38 well is lower than at Deffenbaugh Quarry, and the isotherms were determined at slightly higher reservoir temperatures at these two wellsites (see Figure 26).

Water would overnight rise to within a foot of the surface in both of the wellbores. Assuming that the hydrostatic gradient is 0.476 psi/ft (i.e., the gradient for saltwater), the Mineral coal at 638 ft depth in the Deffenbaugh Quarry #2 well would be under 304 psi pressure. According to the isotherm in Figure 26, methane in the Mineral coal at that pressure would be at saturation at a gas content of 109 scf/ton. As-received gas content for the Mineral at that locality is 60.5 scf/ton, so the Mineral coal is roughly 56% saturated.

Assuming that the PVT behaviors of other coals and shales at the Deffenbaugh Quarry are similar to that of the Mineral coal, the moisture, ash free (MAF) gas content of all the samples (see above) can be compared to the MAF isotherm determined for the Mineral coal (Figure 27). This comparison indicates that all samples from the two Deffenbaugh Quarry core holes are undersaturated.

The degree of undersaturation can be semi-quantitatively compared by determining the ratio of the MAF gas content to saturated gas content from the MAF isotherm (see Figure 28 and table below). The degree of saturation decreases with depth and is somewhat lower for shale than for coals.

Deffenbaugh Quarry #1B

unit	*depth (ft.)*	*pressure (psi)*	G_{pc} *(scf/tn)*	$G_{pc(saturated)}$ *(scf/tn)*	$G_{pc}/G_{pc(saturated)}$ *(%)*
? black shale	385.3'	183	80.1	117.6	68.5
Anna Shale Member	420.5'	200	NA	125.0	NA
Little Osage Shale Member	455.5'	217	86.9	132.7	65.5
Summit coal	458.7'	218	93.8	133.4	70.4
Bevier coal	571.3'	272	91.2	156.0	58.5
shale over Fleming	604.6'	288	54.1	162.2	33.4
Fleming coal	605.4'	288	91.3	162.3	56.2
Mineral coal	639.0'	304	81.8	168.4	48.6
? coal	710.7'	338	NA	180.5	NA
? coal	742.9'	354	51.0	185.7	27.5

Deffenbaugh Quarry #2

unit	*depth (ft.)*	*pressure (psi)*	G_{pc} *(scf/tn)*	$G_{pc(saturated)}$ *(scf/tn)*	$G_{pc}/G_{pc(saturated)}$ *(%)*
? black shale	388.0'	185	79.6	117.6	67.7
Anna Shale Member	424.0'	202	89.5	125.8	71.2
Little Osage Shale Member	455.3'	217	71.2	132.6	53.7
Summit coal	457.8'	218	96.1	133.2	72.2
Excello shale	469.6'	224	46.5	135.7	34.3
Bevier coal	569.7'	271	99.6	155.7	64.0
shale over Fleming	605.0'	288	39.0	162.3	24.0
Fleming coal	606.0'	288	94.6	162.5	58.2
Mineral coal	637.6'	303	76.4	168.1	45.4

Gas Chemistry

Compositional and isotopic chemistry were performed on three desorption gas samples from the Deffenbaugh Quarry #2 well. These analyses are in Appendix II and were performed by Isotech Laboratories in Champaign, IL.

Isotopic Analyses

Analysis	**Bevier (571.3')**	**Fleming (605.4')**	**Mineral (639.0')**
$\delta^{13}C_{methane}$	-61.61	-62.66	-64.93
$\delta^{13}C_{ethane}$	-38.78	-37.30	-36.51
$\delta^{13}C_{propane}$	-28.57	-28.67	-29.09
$\delta D_{methane}$	-216.1	-211.6	-201.1

Chemical Analyses (as reported; red = hydrocarbons; blue = non hydrocarbons, green = oxygen)

Component (%)	**Bevier**	**Fleming**	**Mineral**
Methane	84.11	74.60	51.57
Ethane	0.343	0.312	0.224
Propane	0.206	0.187	0.129
n-Butane	0.0383	0.0288	0.0191
iso-Butane	0.0332	0.0273	0.0172
n-Pentane	0.0054	0.0021	0
iso-Pentane	0.0091	0.0049	0.0023
Hexane+	0.0052	0.0030	0.0016
Nitrogen	13.79	21.27	41.16
Oxygen	1.11	3.00	6.27
Argon	0.164	0.234	0.435
Hydrogen	0	0	0
Carbon Dioxide	0.18	0.33	0.17
Helium	0.0032	0.0048	0.0059

Chemical Analyses (recalculated after removing atmospheric contamination; red = hydrocarbons; blue = non hydrocarbons)

Component (%)[1]	**Bevier**	**Fleming**	**Mineral**
Methane	88.81	87.05	73.56
Ethane	0.362	0.364	0.320
Propane	0.218	0.218	0.184
n-Butane	0.0404	0.0336	0.0272
iso-Butane	0.0351	0.0319	0.0245
n-Pentane	0.0057	0.0025	0
iso-Pentane	0.0096	0.0057	0.0033
Hexane+	0.0055	0.0035	0.0023
Nitrogen	10.20	11.79	25.41
Argon	0.121	0.118	0.223
Hydrogen	0	0	0
Carbon Dioxide	0.19	0.38	0.23
Helium	0.0034	0.0055	0.0082

[1]atmospheric component (based on oxygen content) subtracted from the analysis, with components recalculated to 100%

Other Gas Data

	Bevier	**Fleming**	**Mineral**
Specific Gravity	0.625	0.668	0.767
Calculated BTU	955	935	790
Total % non-HCs	10.51	12.29	25.88
HC Wetness (%)	0.76	0.75	0.76

Plotting of the isotopes and gas wetness (Figure 28) indicates that the gas is of mixed biogenic and thermogenic origin. Although isotopically the gases are mostly biogenic, the hydrocarbon wetness indicates minor thermogenic influence. Coals are farther from their outcrop the deeper they are, hence the deeper the coal, the more remote they are to freshwater that largely encourages biogenesis. The decreasing gas saturation with the deeper coals could be caused by waning influence of biogenesis with depth. Lighter (more negative) $\delta C^{13}_{methane}$ isotopes (thereby possibly indicating more biogenic than thermogenic origin), with depth, however, contradict this conclusion based on the gas saturations.

With present data, a rough mass balance can be made for sequestration of carbon dioxide from the gas operations at the Deffenbaugh Quarry/Johnson County Landfill. Assuming 1 1/2 square miles of land (960 acres) at the Deffenbaugh Quarry/Johnson County Landfill can be utilized for coalbed and shale gas recovery, the total amount of in-place gas calculates to 946,200 mcf, or 946.2 mmcf, or 0.95 bcf (i.e., 985.6 mcf/acre X 960 acres).

Production of raw landfill gas from the Johnson County Landfill comes from 150 wells. Daily production is approximately 2.2 to 2.5 mmcf ((Luke Morrow, SouthTex Treaters, personal communication to KDN, 2005), of which approximately 50% is methane and

50% is carbon dioxide and NMVOCs (non-methane volatile organic compounds). Daily carbon dioxide available to be sequesters therefore ranges from 1.1 to 1.25 mmcf. Assuming that carbon dioxide can be imbibed by the coals and shales on a 2:1 ratio compared to the gas that was originally present, then there is 1,892,000 mcf (1892.4 mmcf) capacity (i.e., 2 X 946.2 mmcf GIP). If 1.1 to 1.25 mmcf of carbon dioxide is injected per day, then 1682 to 1720 days (4.6 to 4.7 years) of landfill carbon dioxide production can be sequestered by the coals and shales immediately under the landfill.

Modeling Parameters

Three wells in the quarry provide correlation depths for the major coals and shales underlying the quarry. The following table lists these well and subsea depths.

DEPTH TO COMMON HORIZONS -- DEFFENBAUGH QUARRY WELLS

	KGS DQ #2		**KGS DQ #1B**		**#2 SWD**	
	datum= (ft.)	**870.6**	**datum= (ft.)**	**876.9**	**datum= (ft.)**	**852.5**
UNIT	**well depth**	**depth, S.L. datum**	**well depth**	**depth, S.L. datum**	**well depth**	**depth, S.L. datum**
Stark Shale Member	158.0	712.6	160.1	716.8	135.0	717.5
Hushpuckney Shale Member	184.2	686.4	187.1	689.8	161.5	691.0
shale (canistered)	388.0	482.6	384.5	492.4	346.8	505.7
Anna Shale Member (canistered)	424.0	446.6	420.5	456.4	397.5	455.0
Little Osage Shale Member (canistered)	455.5	415.1	455.5	421.4	433.0	419.5
Summit coal (canistered)	457.8	412.8	458.7	418.2	436.0	416.5
top of sand	481.0	389.6	490.0	386.9	456.8	395.7
top of sand's oil zone	481.0	389.6	504.0	372.9	not present	not present
base of sand	506.0	364.6	519.7	357.2	454.5	398.0
thin coal (3 1/2")	529.1	341.5	533.1	343.8	507.1	345.4
Bevier coal (canistered)	569.8	300.8	571.3	305.6	544.6	307.9
black shale	579.1	291.5	580.0	296.9	553.1	299.4
shale above Fleming coal (canistered)	604.6	266.0	604.6	272.3	577.6	274.9
Fleming coal (canistered)	606.0	264.6	605.1	271.8	579.0	273.5
Mineral coal (canistered)	638.3	232.3	638.9	238.0	612.0	240.5
thin coal under thin black shale	687.1	183.5	not present	not present	662.0	190.5
coal (canistered at DQ #1B)	709.4	161.2	710.7	166.2	not present	not present
coal (canistered at DQ #1B)	743.1	127.5	742.9	134.0	716.8	135.7
black shale	759.4	111.2	759.2	117.7	not present	not present
thin coal	826.3	44.3	826.4	50.5	not present	not present
thin coal	842.9	27.7	843.2	33.7	827.0	25.5
top Mississippian	866.0	4.6	870.3	6.6	867.9	-15.4

From this table, a series of structure maps (Figures 35-41) on the major coals and dark shales was constructed. Dips generally are to the north and west at 25 to 50 ft per mile. The structures derived are simple planes, for only three wells in the vicinity of the Deffenbaugh Quarry (i.e., KGS Deffenbaugh Quarry #1B, KGS Deffenbaugh Quarry #2, and Deffenbaugh Industries Waste Water Disposal #2) have geological information useful for structural and isopach mapping. The structure and isopach maps are therefore solutions in planar form, since three points define a plane XYZ space. Superimposed on these maps are thicknesses of the coals, and an isopach is the thicknesses amenable to constructing a logical solution to the three-point problem.

Adsorption isotherms provide basic data for modeling purposes. All coals have similar adsorption properties. Carbon dioxide adsorbs on an approximate 2 to 3:1 basis compared to methane. Comparison of the adsorption gas content to the gas desorbed from the coals shows that the degree of saturation decreases with depth for the coals. Injected carbon dioxide gas will more readily be injected into these deeper coals.

The cost for utilizing effluent carbon dioxide gas from the gas processing plant on site at the Johnson County Landfill also needs to be factored into economic considerations for an enhanced coalbed methane recovery operation. Cost estimates (Luke Morrow, personal communication, South-Tex Treaters, Inc.) are as follows:

Piping (on site)	$95,000
Screw Compressor	$900,000
Installation	$200,000

Monthly operating cost (electricity, oil, parts) $25,000/mo.

A simple economic justification to inject effluent gas from the gas plant into the ground will therefore cost $1,195,000. Incremental amounts of gas necessary to offset these extra costs are dependent on the price of natural gas, with lesser production needed with higher prices. The amount of production needed can then be compared to the amount of gas in-place to figure an incremental amount of recovery necessary to justify the expense. Assuming 1 1/2 square miles of land (960 acres) at the Johnson County Landfill can be utilized for coalbed and shale gas recovery, the total amount of in-place gas calculates to 946,200 mcf. The table below indicates that an ECBM project would have to bring in 15% to 28% extra recovery, depending on the price of gas (which is modeled to be between $4.50 to $8.50/mcf).

Price of Gas	*Production needed = $1,195,000 (mcf)*	*% extra recovery needed (prod. needed/in-place gas)*
$4.50/mcf	265,556 mcf	28%
$5.00/mcf	239,000 mcf	25%
$5.50/mcf	217,273 mcf	23%
$6.00/mcf	199,167 mcf	21%
$6.50/mcf	183,846 mcf	19%
$7.50/mcf	159,333 mcf	17%
$8.00/mcf	149,375 mcf	16%
$8.50/mcf	140,488 mcf	15%

Estimated operating costs of $25,000 per month need to be offset with production ranging from 5556 mcf/month (185.2 mcf/day) for gas priced at $4.50, to 2941 mcf/month (98 mcf/day) for gas priced at $8.50/mcf. Assuming a five-spot production configuration (four producing wells surrounding one injector), additional production per well would have to average 1389 mcf/month/well (46.3 mcf/day/well) to 735 mcf/month/well (24.5 mcf/day/well) just to account for operating costs.

CONCLUSIONS

The Johnson County Landfill, a major urban landfill serving the Kansas City metropolitan area, has several coals of sufficient thickness and gas content beneath it that can be utilized for possibly profitable coalbed gas recovery. This coalbed gas operation can supplement landfill gas that is currently upgraded to pipeline specifications at an upgrading plant located on site. Effluent carbon dioxide and other gases from the upgrading plant can possibly be injected into the coals with the dual goal of carbon sequestration and enhanced coalbed gas recovery. Costs of re-rigging the gas plant for injection of its effluent gases, which are currently vented to the atmosphere, would require additional ultimate coalbed gas recoveries of 15% to 28% before profitability of the operation is realized, depending on the price of natural gas. About 4½ to 5 years of current landfill carbon dioxide production can be sequestered by the coals and shales immediately under the landfill.

FIGURES and TABLES

FIGURE 38. Structure map of Bevier coal, with isopach of Bevier coal (in red).

FIGURE 39. Structure map of Fleming coal, with isopach of Fleming coal (in red) and thicknesses of overlying shale (in green).

FIGURE 40. Structure map of Mineral coal, with isopach of Summit coal (in red).

FIGURE 41. Structure map of unidentified coal, with isopach of unidentified coal (in red).

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LIST OF ACRONYMS AND ABBREVIATIONS

°	degrees, when used in context of location coordinates
'	minutes, when used in context of location coordinates; foot, when used in context of length measurement
"	seconds, when used in context of location coordinates; inch, when used in context of length measurement
>	greater than
%	percent, percentage
@	at
a_d	dry ash content, weight fraction
bcf	billion cubic feet
BTU/scf	BTU (British Thermal Units) per standard cubic foot of gas
C	Centigrade temperature
CBM	coalbed methane
cm	centimeter
DQ1B	shorthanded designation for Deffenbaugh Quarry #1B core hole
DQ2	shorthanded designation for Deffenbaugh Quarry #2 core hole
E	east, used in conjunction with township
ECBM	enhanced coalbed methane (recovery)
F	Fahrenheit temperature
ft	foot
G_c	gas content, scf/ton, dry basis
G_{pc}	"pure coal," gas content, scf/ton
GIP	gas in place
GR	gamma ray, as in gamma ray log
HCs	hydrocarbons
IL	Illinois
KGS	Kansas Geological Survey
KS	Kansas
lb.	pound weight
LFG	landfill gas
m	meters
MAF	moisture, ash-free (in context of coal analysis)
mcf	thousand cubic feet
mmcf	million cubic feet
n	moles
NMVOCs	non-methane volatile organic compounds
psi	pounds per square inch pressure
PVC	polyvinyl chloride
PVT	pressure-volume-temperature
R	range, when used in context of location; universal gas constant, when used in context of gas law equations
S	south, used in conjunction with township

scf/ton	standard cubic feet (i.e., one cubic foot of gas at 60 degrees F and sea level) per ton
sec.	section
stp	standard temperature and pressure (60 degrees F and sea level) for oil and gas industry
T.	township, when used in context of location, degrees Kelvin (K) when used in context of temperature
UT	Utah
V	volume, usually in liters or scf

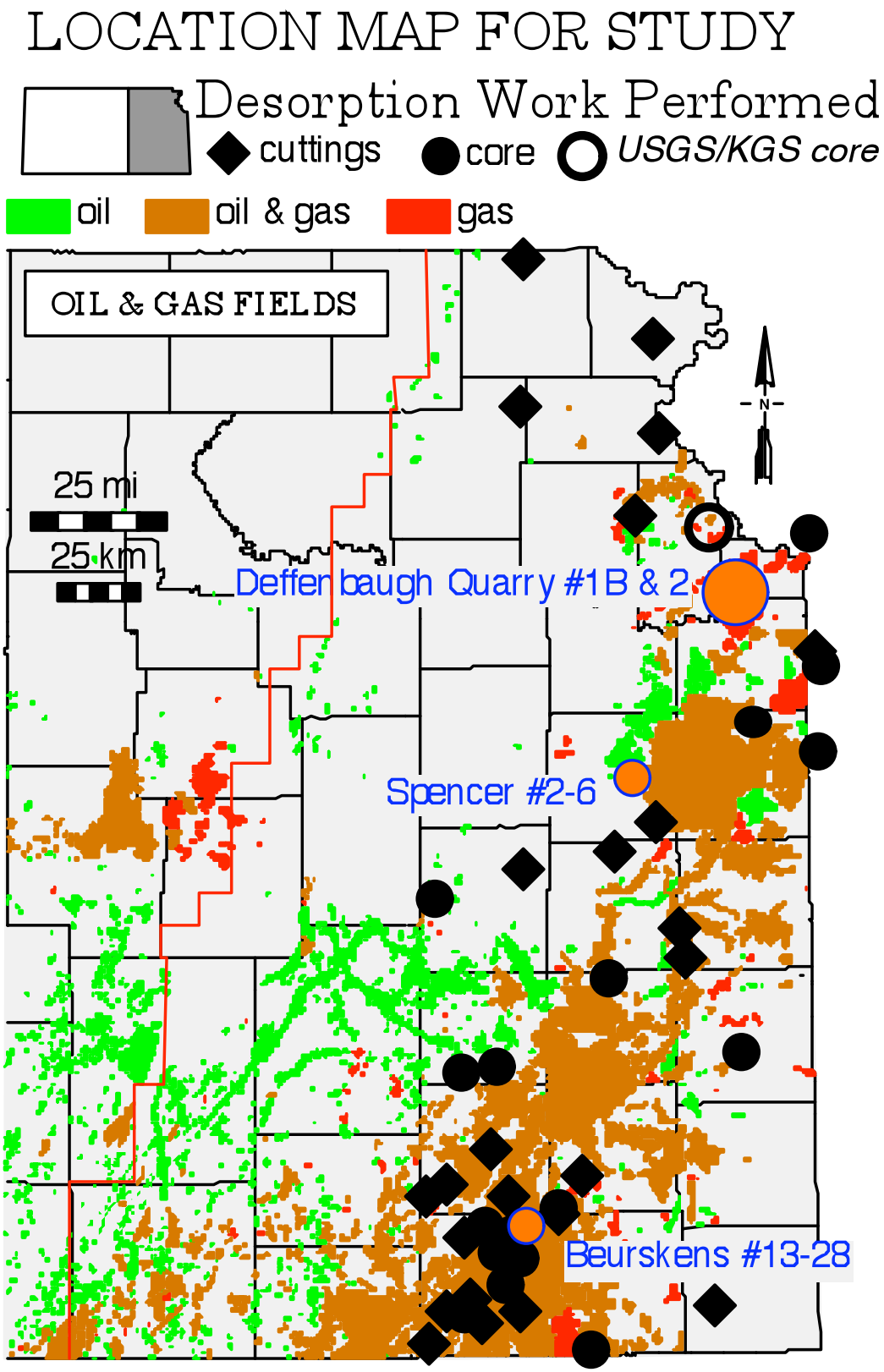

LOCATION MAP FOR STUDY
Desorption Work Performed
cuttings
core
USGS/KGS core
oil
oil & gas
gas
OIL & GAS FIELDS
25 mi
25 km
N
Deffenbaugh Quarry #1B & 2
Spencer #2-6
Beurskens #13-28

Figure 1.

TABLE 1 -- Desorption measurements for KGS Deffenbaugh Quarry #1B, sec. 1-T.12S.-T.23E., Johnson Co., KS

SAMPLE: 385.3' to 386.3' (black shale) in canister M2

	lbs.	grams		lbs.	grams	moisture %		TIME OF:
dry sample weight:	1.847	837.88	wet sample weight:	2.074	940.73	10.93%	est. lost gas (cc) = 67	off bottom 5/3/05 10:09

RIG/LAB MEASUREMENTS			CONVERSION OF RIG/LAB MEASUREMENTS TO STP (@60 deg F; 14.7 psi)					CUMULATIVE VOLUMES (@STP)		SCF/TON	SCF/TON		TIME SINCE
measured cc	measured T (F)	measured P	cubic ft	absolute T (F)	psia	cubic ft (@STP)	cc (@STP)	cubic ft	cc	without lost gas	with lost gas	TIME OF MEASURE	off bottom
9	67	1093	0.00032	527	14.187	0.00030266	8.57	0.00030266	8.57	0.33	2.89	5/3/05 10:32	0:23:30
22	67	1093	0.00078	527	14.187	0.000739836	20.95	0.001042496	29.52	1.13	3.69	5/3/05 10:47	0:38:00
26	67	1094	0.00092	527	14.200	0.000875152	24.78	0.001917648	54.30	2.08	4.64	5/3/05 11:09	1:00:30
33	67	1094	0.00117	527	14.200	0.001110769	31.45	0.003028417	85.75	3.28	5.84	5/3/05 11:46	1:37:00
13	67	1094	0.00046	527	14.200	0.000437576	12.39	0.003465993	98.15	3.75	6.31	5/3/05 12:01	1:52:00
19	67	1093	0.00067	527	14.187	0.000638949	18.09	0.004104942	116.24	4.44	7.01	5/3/05 12:32	2:23:00
8	67	1093	0.00028	527	14.187	0.000269031	7.62	0.004373973	123.86	4.74	7.30	5/3/05 12:43	2:34:00
43	67	1093	0.00152	527	14.187	0.001446043	40.95	0.005820016	164.80	6.30	8.86	5/3/05 14:13	4:04:00
18	67	1092	0.00064	527	14.174	0.000604767	17.13	0.006424783	181.93	6.96	9.52	5/3/05 14:55	4:46:00
20	67	1092	0.00071	527	14.174	0.000671963	19.03	0.007096745	200.96	7.68	10.25	5/3/05 15:43	5:34:00
2	67	1092	7.1E-05	527	14.174	6.71963E-05	1.90	0.007163942	202.86	7.76	10.32	5/3/05 16:05	5:56:00
7	67	1092	0.00025	527	14.174	0.000235187	6.66	0.007399129	209.52	8.01	10.57	5/3/05 16:25	6:16:00
11	67	1092	0.00039	527	14.174	0.00036958	10.47	0.007768708	219.98	8.41	10.97	5/3/05 16:55	6:46:00
8	67	1092	0.00028	527	14.174	0.000268785	7.61	0.008037493	227.60	8.70	11.26	5/3/05 17:17	7:08:00
7	67	1092	0.00025	527	14.174	0.000235187	6.66	0.00827268	234.26	8.96	11.52	5/3/05 17:43	7:34:00
23	70	1088	0.00081	530	14.122	0.000765569	21.68	0.009038249	255.93	9.79	12.35	5/3/05 18:45	8:36:00
49	66	1089	0.00173	526	14.135	0.001644907	46.58	0.010683156	302.51	11.57	14.13	5/3/05 23:22	13:13:00
79	72	1091	0.00279	532	14.161	0.002626899	74.39	0.013310055	376.90	14.41	16.97	5/4/05 7:56	21:47:00
124	69	1093	0.00438	529	14.187	0.004154219	117.63	0.017464274	494.53	18.91	21.47	5/5/05 7:01	44:52:00
63	69	1091	0.00222	529	14.161	0.002106749	59.66	0.019571024	554.19	21.19	23.75	5/5/05 18:46	56:37:00
53	70	1087	0.00187	530	14.109	0.001762515	49.91	0.021333538	604.10	23.10	25.66	5/6/05 7:53	69:44:00
37	67	1081	0.00131	527	14.031	0.001230609	34.85	0.022564147	638.94	24.43	26.99	5/6/05 18:47	80:38:00
33	68	1082	0.00117	528	14.044	0.001096505	31.05	0.023660652	669.99	25.62	28.18	5/7/05 8:00	93:51:00
23	68	1078	0.00081	528	13.992	0.000761405	21.56	0.024422057	691.55	26.44	29.00	5/7/05 16:26	102:17:00
45	67	1074	0.00159	527	13.940	0.001486995	42.11	0.025909052	733.66	28.05	30.61	5/8/05 18:17	128:08:00
36	68	1077	0.00127	528	13.979	0.001190659	33.72	0.027099711	767.38	29.34	31.90	5/9/05 15:04	148:55:00
43	69	1075	0.00152	529	13.953	0.001416852	40.12	0.028516563	807.50	30.88	33.44	5/10/05 20:19	178:10:00
30	72	1078	0.00106	532	13.992	0.00098567	27.91	0.029502233	835.41	31.94	34.50	5/11/05 17:22	199:13:00
30	71	1081	0.00106	531	14.031	0.000990275	28.04	0.030492507	863.45	33.01	35.58	5/12/05 20:57	226:48:00
34	68	1085	0.0012	528	14.083	0.001132864	32.08	0.031625372	895.53	34.24	36.80	5/14/05 13:15	267:06:00
15	66	1090	0.00053	526	14.148	0.000504005	14.27	0.032129377	909.80	34.79	37.35	5/15/05 11:05	288:56:00
19	66	1080	0.00067	526	14.018	0.00063255	17.91	0.032761927	927.71	35.47	38.03	5/16/05 16:10	318:01:00
30	68	1072	0.00106	528	13.914	0.00098761	27.97	0.033749537	955.68	36.54	39.10	5/18/05 18:35	368:26:00
14	71	1081	0.00049	531	14.031	0.000462128	13.09	0.034211665	968.76	37.04	39.60	5/20/05 20:11	418:02:00
50	71	1085	0.00177	531	14.083	0.001656565	46.91	0.03586823	1015.67	38.84	41.40	5/26/05 16:11	558:02:00
46	70	1077	0.00162	530	13.979	0.001515657	42.92	0.037383887	1058.59	40.48	43.04	6/2/05 14:47	724:38:00
46	76	1076	0.00162	536	13.966	0.001497299	42.40	0.038881186	1100.99	42.10	44.66	6/10/05 21:44	923:35:00
26	73	1081	0.00092	533	14.031	0.000855018	24.21	0.039736203	1125.20	43.02	45.58	6/16/05 10:06	1055:57:00
22	70	1084	0.00078	530	14.070	0.000729591	20.66	0.040465794	1145.86	43.81	46.37	6/23/05 10:54	1224:45:00
22	71	1081	0.00078	531	14.031	0.000726201	20.56	0.041191995	1166.42	44.60	47.16	7/1/05 15:36	1421:27:00
14	74	1085	0.00049	534	14.083	0.000461232	13.06	0.041653228	1179.48	45.10	47.66	7/7/05 11:47	1561:38:00
16	74	1081	0.00057	534	14.031	0.000525179	14.87	0.042178407	1194.35	45.67	48.23	7/14/05 14:15	1732:06:00
11	73	1084	0.00039	533	14.070	0.000362742	10.27	0.042541149	1204.63	46.06	48.62	7/22/05 10:27	1920:18:00
8	73	1087	0.00028	533	14.109	0.000264543	7.49	0.042805691	1212.12	46.35	48.91	7/28/05 14:39	2068:30:00
8	73	1085	0.00028	533	14.083	0.000264056	7.48	0.043069747	1219.59	46.63	49.19	8/4/05 16:12	2238:03:00
9	73	1079	0.00032	533	14.005	0.00029542	8.37	0.043365167	1227.96	46.95	49.51	8/11/05 15:39	2405:30:00
8	73	1074	0.00028	533	13.940	0.000261379	7.40	0.043626546	1235.36	47.24	49.80	8/18/05 16:33	2574:24:00
5	73	1079	0.00018	533	14.005	0.000164122	4.65	0.043790668	1240.01	47.41	49.97	8/26/05 14:20	2764:11:00
3	74	1085	0.00011	534	14.083	9.88355E-05	2.80	0.043889504	1242.81	47.52	50.08	9/1/05 16:18	2910:09:00
5	73	1084	0.00018	533	14.070	0.000164883	4.67	0.044054387	1247.48	47.70	50.26	9/8/05 15:54	3077:45:00
3	74	1083	0.00011	534	14.057	9.86533E-05	2.79	0.04415304	1250.27	47.81	50.37	9/15/05 14:58	3244:49:00
5	73	1079	0.00018	533	14.005	0.000164122	4.65	0.044317162	1254.92	47.98	50.54	9/22/05 16:19	3414:10:00

-2	71	1090	-7.1E-05	531	14.148	-6.65679E-05	-1.88	0.044250594	1253.03	47.91	50.47	9/29/05 14:28	3580:19:00
0	69	1088	0	529	14.122	0	0.00	0.044250594	1253.03	47.91	50.47	10/7/05 15:01	3772:52:00
1	71	1087	3.5E-05	531	14.109	3.31924E-05	0.94	0.044283787	1253.97	47.95	50.51	10/13/05 11:41	3913:32:00

DECANISTERED 10/13/2005; sample dried 59 days in air

SAMPLE: 420.5' to 421.9' (Anna Shale Mbr) in canister DG1B

	lbs.	grams		lbs.	grams	moisture %		TIME OF:
dry sample weight:	3.859	1750.54	wet sample weight:	4.049	1836.69	4.69%	est. lost gas (cc) = 12	off bottom 5/3/05 12:50

RIG/LAB MEASUREMENTS			CONVERSION OF RIG/LAB MEASUREMENTS TO STP (@60 deg F; 14.7 psi)					CUMULATIVE VOLUMES (@STP)		SCF/TON	SCF/TON		TIME SINCE
measured cc	measured T (F)	measured P	cubic ft	absolute T (F)	psia	cubic ft (@STP)	cc (@STP)	cubic ft	cc	without lost gas	with lost gas	TIME OF MEASURE	off bottom
4	67	1093	0.00014	527	14.187	0.000134516	3.81	0.000134516	3.81	0.07	0.29	5/3/05 13:22	0:32:30
2	67	1093	7.1E-05	527	14.187	6.72578E-05	1.90	0.000201773	5.71	0.10	0.32	5/3/05 13:38	0:48:00
6	67	1093	0.00021	527	14.187	0.000201773	5.71	0.000403547	11.43	0.21	0.43	5/3/05 14:05	1:15:00
1	67	1093	3.5E-05	527	14.187	3.36289E-05	0.95	0.000437176	12.38	0.23	0.45	5/3/05 14:11	1:21:30
4	67	1092	0.00014	527	14.174	0.000134393	3.81	0.000571568	16.18	0.30	0.52	5/3/05 14:53	2:03:00
5	67	1092	0.00018	527	14.174	0.000167991	4.76	0.000739559	20.94	0.38	0.60	5/3/05 15:41	2:51:00
14	67	1092	0.00049	527	14.174	0.000470374	13.32	0.001209933	34.26	0.63	0.85	5/3/05 17:44	4:54:00
14	70	1088	0.00049	530	14.122	0.000465998	13.20	0.001675931	47.46	0.87	1.09	5/3/05 18:45	5:55:00
14	66	1089	0.00049	526	14.135	0.000469974	13.31	0.002145905	60.77	1.11	1.33	5/3/05 23:24	10:34:00
40	72	1091	0.00141	532	14.161	0.001330076	37.66	0.00347598	98.43	1.80	2.02	5/4/05 7:57	19:07:00
56	69	1093	0.00198	529	14.187	0.001876099	53.13	0.005352079	151.55	2.77	2.99	5/5/05 7:03	42:13:00
30	69	1091	0.00106	529	14.161	0.001003214	28.41	0.006355293	179.96	3.29	3.51	5/5/05 18:47	53:57:00
27	70	1087	0.00095	530	14.109	0.000897885	25.43	0.007253178	205.39	3.76	3.98	5/6/05 7:55	67:05:00
19	67	1081	0.00067	527	14.031	0.000631934	17.89	0.007885112	223.28	4.09	4.31	5/6/05 18:49	77:59:00
27	68	1078	0.00095	528	13.992	0.000893824	25.31	0.008778936	248.59	4.55	4.77	5/7/05 16:27	99:37:00
32	67	1074	0.00113	527	13.940	0.001057418	29.94	0.009836354	278.53	5.10	5.32	5/8/05 18:18	125:28:00
19	68	1077	0.00067	528	13.979	0.000628403	17.79	0.010464758	296.33	5.42	5.64	5/9/05 15:04	146:14:00
31	69	1075	0.00109	529	13.953	0.001021451	28.92	0.011486209	325.25	5.95	6.17	5/10/05 20:20	175:30:00
17	72	1078	0.0006	532	13.992	0.000558546	15.82	0.012044755	341.07	6.24	6.46	5/11/05 17:23	196:33:00
21	71	1081	0.00074	531	14.031	0.000693192	19.63	0.012737948	360.70	6.60	6.82	5/12/05 20:58	224:08:00
23	68	1085	0.00081	528	14.083	0.000766349	21.70	0.013504297	382.40	7.00	7.22	5/14/05 13:18	264:28:00
5	66	1090	0.00018	526	14.148	0.000168002	4.76	0.013672299	387.15	7.09	7.31	5/15/05 11:07	286:17:00
21	66	1080	0.00074	526	14.018	0.000699134	19.80	0.014371433	406.95	7.45	7.67	5/16/05 16:10	315:20:00
33	68	1072	0.00117	528	13.914	0.001086371	30.76	0.015457804	437.71	8.01	8.23	5/18/05 18:35	365:45:00
19	71	1081	0.00067	531	14.031	0.000627174	17.76	0.016084978	455.47	8.34	8.56	5/20/05 20:12	415:22:00
60	71	1085	0.00212	531	14.083	0.001987878	56.29	0.018072855	511.76	9.37	9.59	5/26/05 16:12	555:22:00
61	70	1077	0.00215	530	13.979	0.002009893	56.91	0.020082748	568.68	10.41	10.63	6/2/05 14:48	721:58:00
66	73	1081	0.00233	533	14.031	0.002170429	61.46	0.022253177	630.14	11.53	11.75	6/10/05 21:45	920:55:00
10	71	1084	0.00035	531	14.070	0.000331008	9.37	0.022584185	639.51	11.70	11.92	6/23/05 10:37	1221:47:00
47	71	1081	0.00166	531	14.031	0.00155143	43.93	0.024135615	683.44	12.51	12.73	7/1/05 15:47	1418:57:00
27	74	1085	0.00095	534	14.083	0.000889519	25.19	0.025025134	708.63	12.97	13.19	7/7/05 11:47	1558:57:00
39	74	1081	0.00138	534	14.031	0.001280125	36.25	0.026305259	744.88	13.63	13.85	7/14/05 14:16	1729:26:00
29	73	1084	0.00102	533	14.070	0.00095632	27.08	0.027261579	771.96	14.13	14.35	7/22/05 10:28	1917:38:00
23	73	1087	0.00081	533	14.109	0.00076056	21.54	0.028022139	793.50	14.52	14.74	7/28/05 14:40	2065:50:00
27	73	1085	0.00095	533	14.083	0.000891188	25.24	0.028913327	818.73	14.98	15.20	8/4/05 16:13	2235:23:00
27	73	1079	0.00095	533	14.005	0.00088626	25.10	0.029799587	843.83	15.44	15.66	8/11/05 15:39	2402:49:00
26	73	1074	0.00092	533	13.940	0.000849481	24.05	0.030649068	867.88	15.88	16.10	8/18/05 16:34	2571:44:00
18	73	1079	0.00064	533	14.005	0.00059084	16.73	0.031239908	884.61	16.19	16.41	8/26/05 14:20	2761:30:00
12	74	1085	0.00042	534	14.083	0.000395342	11.19	0.03163525	895.81	16.39	16.61	9/1/05 16:18	2907:28:00
17	73	1084	0.0006	533	14.070	0.000560601	15.87	0.032195852	911.68	16.68	16.90	9/8/05 15:55	3075:05:00
15	74	1083	0.00053	534	14.057	0.000493267	13.97	0.032689118	925.65	16.94	17.16	9/15/05 14:59	3242:09:00
18	73	1079	0.00064	533	14.005	0.00059084	16.73	0.033279958	942.38	17.25	17.47	9/22/05 16:18	3411:28:00
3	71	1090	0.00011	531	14.148	9.98519E-05	2.83	0.03337981	945.21	17.30	17.52	9/29/05 14:28	3577:38:00
10	69	1089	0.00035	529	14.135	0.000333792	9.45	0.033713602	954.66	17.47	17.69	10/7/05 15:02	3770:12:00
10	71	1087	0.00035	531	14.109	0.000331924	9.40	0.034045526	964.06	17.64	17.86	10/13/05 23:42	3922:52:00
18	69	1077	0.00064	529	13.979	0.000594204	16.83	0.03463973	980.88	17.95	18.17	10/20/05 14:55	4082:05:00
18	69	1084	0.00064	529	14.070	0.000598066	16.94	0.035237796	997.82	18.26	18.48	11/6/05 23:40	4498:50:00
4	69	1087	0.00014	529	14.109	0.000133271	3.77	0.035371068	1001.59	18.33	18.55	11/10/05 17:46	4588:56:00
13	68	1084	0.00046	528	14.070	0.000432755	12.25	0.035803822	1013.85	18.55	18.77	11/21/05 14:09	4849:19:00

8	68	1086	0.00028	528	14.096	0.000266802	7.55	0.036070624	1021.40	18.69	18.91	12/5/05 15:44	5186:54:00
7	68	1086	0.00025	528	14.096	0.000233452	6.61	0.036304076	1028.01	18.81	19.03	12/12/05 16:38	5355:48:00
3	69	1093	0.00011	529	14.187	0.000100505	2.85	0.036404582	1030.86	18.87	19.09	12/20/05 17:20	5548:30:00
16	69	1094	0.00057	529	14.200	0.000536519	15.19	0.0369411	1046.05	19.14	19.36	1/9/06 14:57	6026:07:00
19	68	1077	0.00067	528	13.979	0.000628403	17.79	0.037569504	1063.85	19.47	19.69	1/17/06 16:09	6219:19:00
-4	65	1089	-0.00014	525	14.135	-0.000134534	-3.81	0.03743497	1060.04	19.40	19.62	1/24/06 15:22	6386:32:00
12	67	1081	0.00042	527	14.031	0.000399116	11.30	0.037834086	1071.34	19.61	19.83	1/30/06 15:51	6531:01:00
-3	67	1091	-0.00011	527	14.161	-0.000100702	-2.85	0.037733384	1068.49	19.55	19.77	2/7/06 16:29	6723:39:00
16	66	1074	0.00057	526	13.940	0.000529714	15.00	0.038263098	1083.49	19.83	20.05	2/14/06 15:20	6890:30:00
-13	68	1095	-0.00046	528	14.213	-0.000437146	-12.38	0.037825952	1071.11	19.60	19.82	2/19/06 14:21	7009:31:00
14	67	1083	0.00049	527	14.057	0.000466497	13.21	0.038292449	1084.32	19.84	20.06	2/24/06 14:53	7130:03:00
15	67	1074	0.00053	527	13.940	0.000495665	14.04	0.038788114	1098.35	20.10	20.32	3/7/06 16:38	7395:48:00
-7	66	1089	-0.00025	526	14.135	-0.000234987	-6.65	0.038553127	1091.70	19.98	20.20	3/14/06 15:53	7563:03:00
19	66	1068	0.00067	526	13.862	0.000625522	17.71	0.039178649	1109.41	20.30	20.52	3/30/06 16:10	7947:20:00
5	66	1071	0.00018	526	13.901	0.000165073	4.67	0.039343722	1114.09	20.39	20.61	4/14/06 17:28	8308:38:00
-3	65	1079	-0.00011	525	14.005	-9.99739E-05	-2.83	0.039243749	1111.26	20.34	20.56	4/28/06 16:12	8643:22:00
10	65	1074	0.00035	525	13.940	0.000331702	9.39	0.039575451	1120.65	20.51	20.73	5/8/06 16:11	8883:21:00
6	69	1082	0.00021	529	14.044	0.000198988	5.63	0.039774438	1126.28	20.61	20.83	5/22/06 16:48	9219:58:00
8	71	1086	0.00028	531	14.096	0.000265295	7.51	0.040039733	1133.79	20.75	20.97	6/2/06 15:07	9482:17:00
19	73	1078	0.00067	533	13.992	0.000623087	17.64	0.040662819	1151.44	21.07	21.29	6/9/06 15:50	9651:00:00
6	73	1078	0.00021	533	13.992	0.000196764	5.57	0.040859584	1157.01	21.17	21.39	6/15/06 17:14	9796:24:00
4	73	1086	0.00014	533	14.096	0.00013215	3.74	0.040991733	1160.75	21.24	21.46	6/22/06 16:50	9964:00:00
3	73	1091	0.00011	533	14.161	9.95685E-05	2.82	0.041091302	1163.57	21.29	21.51	7/6/06 16:52	10300:02:00
12	73	1078	0.00042	533	13.992	0.000393528	11.14	0.04148483	1174.72	21.50	21.72	7/13/06 17:07	10468:17:00
10	73	1086	0.00035	533	14.096	0.000330374	9.36	0.041815204	1184.07	21.67	21.89	8/7/06 15:38	11066:48:00
4	75	1085	0.00014	535	14.083	0.000131534	3.72	0.041946738	1187.79	21.74	21.96	8/14/06 11:46	11230:56:00
1	73	1087	3.5E-05	533	14.109	3.30678E-05	0.94	0.041979806	1188.73	21.76	21.97	8/21/06 15:24	11402:34:00
8	75	1081	0.00028	535	14.031	0.000262099	7.42	0.042241905	1196.15	21.89	22.11	8/28/06 12:00	11567:10:00
0	73	1087	0	533	14.109	0	0.00	0.042241905	1196.15	21.89	22.11	9/12/06 14:28	11929:38:00
3	74	1085	0.00011	534	14.083	9.88355E-05	2.80	0.04234074	1198.95	21.94	22.16	9/19/06 16:48	12099:58:00
-3	67	1087	-0.00011	527	14.109	-0.000100333	-2.84	0.042240408	1196.11	21.89	22.11	9/28/06 14:45	12313:55:00

DECANISTERED 9/28/2006; sample dried ?? days in air

SAMPLE: 455.5' to 456.5' (Little Osage Shale Mbr) in canister M3

	lbs.	grams		lbs.	grams	moisture %		est. lost gas (cc) =	TIME OF:
dry sample weight:	3.006	1363.43	wet sample weight:	3.195	1449.35	5.93%		21	off bottom
									5/3/05 15:20

RIG/LAB MEASUREMENTS			CONVERSION OF RIG/LAB MEASUREMENTS TO STP (@60 deg F; 14.7 psi)					CUMULATIVE VOLUMES (@STP)		SCF/TON	SCF/TON		TIME SINCE
measured cc	measured T (F)	measured P	cubic ft	absolute T (F)	psia	cubic ft (@STP)	cc (@STP)	cubic ft	cc	without lost gas	with lost gas	TIME OF MEASURE	off bottom
5	67	1092	0.00018	527	14.174	0.000167991	4.76	0.000167991	4.76	0.11	0.61	5/3/05 15:59	0:39:30
4	67	1092	0.00014	527	14.174	0.000134393	3.81	0.000302383	8.56	0.20	0.69	5/3/05 16:12	0:52:00
3	67	1091	0.00011	527	14.161	0.000100702	2.85	0.000403085	11.41	0.27	0.76	5/3/05 16:27	1:07:45
8	67	1091	0.00028	527	14.161	0.000268539	7.60	0.000671624	19.02	0.45	0.94	5/3/05 17:25	2:05:00
2	67	1091	7.1E-05	527	14.161	6.71347E-05	1.90	0.000738759	20.92	0.49	0.98	5/3/05 17:42	2:22:45
10	70	1088	0.00035	530	14.122	0.000332856	9.43	0.001071615	30.34	0.71	1.21	5/3/05 18:47	3:27:00
13	66	1089	0.00046	526	14.135	0.000436404	12.36	0.001508019	42.70	1.00	1.50	5/3/05 23:28	8:08:00
26	72	1092	0.00092	532	14.174	0.000865342	24.50	0.002373361	67.21	1.58	2.07	5/4/05 7:58	16:38:00
46	69	1093	0.00162	529	14.187	0.001541081	43.64	0.003914442	110.84	2.60	3.10	5/5/05 7:03	39:43:00
27	69	1091	0.00095	529	14.161	0.000902893	25.57	0.004817334	136.41	3.21	3.70	5/5/05 18:45	51:25:00
24	70	1087	0.00085	530	14.109	0.00079812	22.60	0.005615454	159.01	3.74	4.23	5/6/05 7:57	64:37:00
17	67	1081	0.0006	527	14.031	0.000565415	16.01	0.006180869	175.02	4.11	4.61	5/6/05 18:50	75:30:00
24	68	1078	0.00085	528	13.992	0.00079451	22.50	0.006975379	197.52	4.64	5.13	5/7/05 16:29	97:09:00
27	67	1074	0.00095	527	13.940	0.000892197	25.26	0.007867576	222.78	5.23	5.73	5/8/05 18:20	123:00:00
21	68	1077	0.00074	528	13.979	0.000694551	19.67	0.008562127	242.45	5.70	6.19	5/9/05 15:05	143:45:00
24	69	1075	0.00085	529	13.953	0.000790801	22.39	0.009352928	264.84	6.22	6.72	5/10/05 20:21	173:01:00
18	72	1078	0.00064	532	13.992	0.000591402	16.75	0.00994433	281.59	6.62	7.11	5/11/05 17:25	194:05:00
19	71	1081	0.00067	531	14.031	0.000627174	17.76	0.010571504	299.35	7.03	7.53	5/12/05 21:00	221:40:00
23	68	1085	0.00081	528	14.083	0.000766349	21.70	0.011337853	321.05	7.54	8.04	5/14/05 13:20	262:00:00
23	66	1080	0.00081	526	14.018	0.000765718	21.68	0.012103572	342.73	8.05	8.55	5/16/05 16:11	312:51:00
23	68	1072	0.00081	528	13.914	0.000757167	21.44	0.012860739	364.17	8.56	9.05	5/18/05 18:36	363:16:00

18	71	1081	0.00064	531	14.031	0.000594165	16.82	0.013454904	381.00	8.95	9.45	5/20/05 20:14	412:54:00
39	71	1085	0.00138	531	14.083	0.001292121	36.59	0.014747024	417.59	9.81	10.31	5/26/05 16:13	552:53:00
38	70	1077	0.00134	530	13.979	0.001252064	35.45	0.015999089	453.04	10.65	11.14	6/2/05 14:49	719:29:00
39	73	1075	0.00138	533	13.953	0.001275408	36.12	0.017274496	489.16	11.49	11.99	6/10/05 21:46	918:26:00
35	73	1081	0.00124	533	14.031	0.001150985	32.59	0.018425482	521.75	12.26	12.75	6/16/05 10:06	1050:46:00
11	71	1084	0.00039	531	14.070	0.000364108	10.31	0.01878959	532.06	12.50	13.00	6/23/05 10:55	1219:35:00
23	71	1081	0.00081	531	14.031	0.000759211	21.50	0.0195488	553.56	13.01	13.50	7/1/05 15:38	1416:18:00
15	74	1085	0.00053	534	14.083	0.000494177	13.99	0.020042978	567.55	13.34	13.83	7/7/05 11:48	1556:28:00
16	74	1081	0.00057	534	14.031	0.000525179	14.87	0.020568157	582.42	13.69	14.18	7/14/05 14:16	1726:56:00
13	73	1084	0.00046	533	14.070	0.000428695	12.14	0.020996853	594.56	13.97	14.46	7/22/05 10:28	1915:08:00
10	73	1087	0.00035	533	14.109	0.000330678	9.36	0.021327531	603.93	14.19	14.68	7/28/05 14:41	2063:21:00
9	73	1085	0.00032	533	14.083	0.000297063	8.41	0.021624593	612.34	14.39	14.88	8/4/05 16:17	2232:57:00
10	73	1079	0.00035	533	14.005	0.000328244	9.29	0.021952838	621.63	14.61	15.10	8/11/05 15:40	2400:20:00
9	73	1074	0.00032	533	13.940	0.000294051	8.33	0.022246889	629.96	14.80	15.30	8/18/05 16:36	2569:16:00
8	73	1079	0.00028	533	14.005	0.000262596	7.44	0.022509485	637.40	14.98	15.47	8/26/05 14:21	2759:01:00
6	74	1085	0.00021	534	14.083	0.000197671	5.60	0.022707156	642.99	15.11	15.60	9/1/05 16:19	2904:59:00
6	73	1084	0.00021	533	14.070	0.000197859	5.60	0.022905015	648.60	15.24	15.73	9/8/05 15:55	3072:35:00
5	74	1082	0.00018	534	14.044	0.00016427	4.65	0.023069285	653.25	15.35	15.84	9/15/05 14:59	3239:39:00
4	73	1079	0.00014	533	14.005	0.000131298	3.72	0.023200583	656.96	15.44	15.93	9/22/05 16:18	3408:58:00
2	71	1090	7.1E-05	531	14.148	6.65679E-05	1.88	0.023267151	658.85	15.48	15.97	9/29/05 14:29	3575:09:00
3	69	1089	0.00011	529	14.135	0.000100137	2.84	0.023367289	661.69	15.55	16.04	10/7/05 15:03	3767:43:00
3	71	1087	0.00011	531	14.109	9.95771E-05	2.82	0.023466866	664.51	15.61	16.11	10/13/05 23:42	3920:22:00
5	69	1077	0.00018	529	13.979	0.000165057	4.67	0.023631922	669.18	15.72	16.22	10/20/05 14:57	4079:37:00
6	69	1084	0.00021	529	14.070	0.000199355	5.65	0.023831278	674.82	15.86	16.35	11/6/05 23:41	4496:21:00
2	69	1087	7.1E-05	529	14.109	6.66357E-05	1.89	0.023897914	676.71	15.90	16.39	11/10/05 17:46	4586:26:00
4	68	1084	0.00014	528	14.070	0.000133155	3.77	0.024031069	680.48	15.99	16.48	11/21/05 14:10	4846:50:00
2	68	1086	7.1E-05	528	14.096	6.67005E-05	1.89	0.024097769	682.37	16.03	16.53	12/5/05 15:45	5184:25:00
3	68	1086	0.00011	528	14.096	0.000100051	2.83	0.02419782	685.20	16.10	16.59	12/12/05 16:38	5353:18:00
1	69	1093	3.5E-05	529	14.187	3.35018E-05	0.95	0.024231322	686.15	16.12	16.62	12/20/05 17:21	5546:01:00
4	69	1094	0.00014	529	14.200	0.00013413	3.80	0.024365452	689.95	16.21	16.71	1/10/06 14:58	6047:38:00
5	68	1077	0.00018	528	13.979	0.000165369	4.68	0.024530821	694.63	16.32	16.82	1/17/06 16:10	6216:50:00
0	65	1089	0	525	14.135	0	0.00	0.024530821	694.63	16.32	16.82	1/24/06 15:23	6384:03:00
1	67	1081	3.5E-05	527	14.031	3.32597E-05	0.94	0.024564081	695.57	16.34	16.84	1/30/06 15:52	6528:32:00
-1	67	1091	-3.5E-05	527	14.161	-3.35674E-05	-0.95	0.024530513	694.62	16.32	16.82	2/7/06 16:29	6721:09:00
2	66	1074	7.1E-05	526	13.940	6.62143E-05	1.87	0.024596728	696.50	16.37	16.86	2/14/06 15:20	6888:00:00
0	68	1095	0	528	14.213	0	0.00	0.024596728	696.50	16.37	16.86	2/19/06 14:22	7007:02:00
0	67	1082	0	527	14.044	0	0.00	0.024596728	696.50	16.37	16.86	2/24/06 14:54	7127:34:00
2	67	1074	7.1E-05	527	13.940	6.60886E-05	1.87	0.024662816	698.37	16.41	16.90	3/7/06 16:39	7393:19:00

DECANISTERED 3/07/2006; sample dried 90 days in air

SAMPLE: 458.7' to 459.1' (Summit coal) in canister Brady 31

	lbs.	grams		lbs.	grams	moisture %		est. lost gas (cc) =	TIME OF:
dry sample weight:	0.739	334.99	wet sample weight:	0.780	353.84	5.33%		23	off bottom
									5/3/05 15:20

RIG/LAB MEASUREMENTS			CONVERSION OF RIG/LAB MEASUREMENTS TO STP (@60 deg F; 14.7 psi)					CUMULATIVE VOLUMES (@STP)		SCF/TON	SCF/TON		TIME SINCE
measured cc	measured T (F)	measured P	cubic ft	absolute T (F)	psia	cubic ft (@STP)	cc (@STP)	cubic ft	cc	without lost gas	with lost gas	TIME OF MEASURE	off bottom
4	67	1092	0.00014	527	14.174	0.000134393	3.81	0.000134393	3.81	0.36	2.56	5/3/05 15:53	0:33:00
2	67	1092	7.1E-05	527	14.174	6.71963E-05	1.90	0.000201589	5.71	0.55	2.75	5/3/05 15:58	0:38:30
1	67	1092	3.5E-05	527	14.174	3.35981E-05	0.95	0.000235187	6.66	0.64	2.84	5/3/05 16:03	0:43:45
2	67	1092	7.1E-05	527	14.174	6.71963E-05	1.90	0.000302383	8.56	0.82	3.02	5/3/05 16:08	0:48:30
2	67	1092	7.1E-05	527	14.174	6.71963E-05	1.90	0.00036958	10.47	1.00	3.20	5/3/05 16:11	0:51:30
3	67	1092	0.00011	527	14.174	0.000100794	2.85	0.000470374	13.32	1.27	3.47	5/3/05 16:24	1:04:00
8	67	1092	0.00028	527	14.174	0.000268785	7.61	0.000739159	20.93	2.00	4.20	5/3/05 16:58	1:38:00
4	67	1092	0.00014	527	14.174	0.000134393	3.81	0.000873552	24.74	2.37	4.57	5/3/05 17:16	1:56:45
16	70	1088	0.00057	530	14.122	0.000532569	15.08	0.001406121	39.82	3.81	6.01	5/3/05 18:48	3:28:00
21	66	1089	0.00074	526	14.135	0.00070496	19.96	0.002111081	59.78	5.72	7.92	5/3/05 23:25	8:05:00
30	72	1092	0.00106	532	14.174	0.000998471	28.27	0.003109552	88.05	8.42	10.62	5/4/05 7:57	16:37:00
48	69	1093	0.0017	529	14.187	0.001608085	45.54	0.004717637	133.59	12.78	14.98	5/5/05 7:07	39:47:00
29	69	1091	0.00102	529	14.161	0.000969773	27.46	0.005687411	161.05	15.40	17.60	5/5/05 18:46	51:26:00
24	70	1087	0.00085	530	14.109	0.00079812	22.60	0.00648553	183.65	17.56	19.76	5/6/05 7:56	64:36:00

17	67	1081	0.0006	527	14.031	0.000565415	16.01	0.007050945	199.66	19.09	21.29	5/6/05 18:49	75:29:00
23	68	1078	0.00081	528	13.992	0.000761405	21.56	0.007812351	221.22	21.16	23.36	5/7/05 16:28	97:08:00
23	67	1074	0.00081	527	13.940	0.000760019	21.52	0.00857237	242.74	23.21	25.41	5/8/05 18:19	122:59:00
18	68	1077	0.00064	528	13.979	0.00059533	16.86	0.0091677	259.60	24.83	27.03	5/9/05 15:05	143:45:00
21	69	1075	0.00074	529	13.953	0.000691951	19.59	0.009859651	279.19	26.70	28.90	5/10/05 20:20	173:00:00
16	72	1078	0.00057	532	13.992	0.000525691	14.89	0.010385341	294.08	28.12	30.32	5/11/05 17:24	194:04:00
17	71	1081	0.0006	531	14.031	0.000561156	15.89	0.010946497	309.97	29.64	31.84	5/12/05 20:59	221:39:00
19	68	1085	0.00067	528	14.083	0.000633071	17.93	0.011579568	327.90	31.36	33.56	5/14/05 13:19	261:59:00
19	66	1080	0.00067	526	14.018	0.00063255	17.91	0.012212118	345.81	33.07	35.27	5/16/05 16:11	312:51:00
21	68	1072	0.00074	528	13.914	0.000691327	19.58	0.012903445	365.38	34.94	37.14	5/18/05 18:37	363:17:00
17	71	1081	0.0006	531	14.031	0.000561156	15.89	0.0134646	381.27	36.46	38.66	5/20/05 20:14	412:54:00
34	71	1085	0.0012	531	14.083	0.001126464	31.90	0.014591064	413.17	39.51	41.71	5/26/05 16:14	552:54:00
35	70	1077	0.00124	530	13.979	0.001153217	32.66	0.015744282	445.83	42.64	44.84	6/2/05 14:49	719:29:00
37	73	1075	0.00131	533	13.953	0.001210002	34.26	0.016954284	480.09	45.91	48.11	6/10/05 21:47	918:27:00
24	73	1081	0.00085	533	14.031	0.000789247	22.35	0.017743531	502.44	48.05	50.25	6/16/05 10:06	1050:46:00
10	71	1084	0.00035	531	14.070	0.000331008	9.37	0.018074538	511.81	48.95	51.15	6/23/05 11:00	1219:40:00
21	71	1081	0.00074	531	14.031	0.000693192	19.63	0.018767731	531.44	50.82	53.02	7/1/05 15:38	1416:18:00
14	75	1085	0.00049	535	14.083	0.00046037	13.04	0.019228101	544.48	52.07	54.27	7/7/05 11:48	1556:28:00
15	74	1081	0.00053	534	14.031	0.000492356	13.94	0.019720457	558.42	53.40	55.60	7/14/05 14:17	1726:57:00
12	73	1084	0.00042	533	14.070	0.000395719	11.21	0.020116175	569.62	54.48	56.68	7/22/05 10:29	1915:09:00
9	73	1087	0.00032	533	14.109	0.00029761	8.43	0.020413786	578.05	55.28	57.48	7/28/05 14:42	2063:22:00
8	73	1085	0.00028	533	14.083	0.000264056	7.48	0.020677841	585.53	56.00	58.20	8/4/05 16:18	2232:58:00
9	73	1079	0.00032	533	14.005	0.00029542	8.37	0.020973261	593.89	56.80	59.00	8/11/05 15:40	2400:20:00
7	73	1074	0.00025	533	13.940	0.000228706	6.48	0.021201968	600.37	57.42	59.62	8/18/05 16:36	2569:16:00
6	73	1079	0.00021	533	14.005	0.000196947	5.58	0.021398914	605.95	57.95	60.15	8/26/05 14:22	2759:02:00
4	74	1085	0.00014	534	14.083	0.000131781	3.73	0.021530695	609.68	58.31	60.51	9/1/05 16:19	2904:59:00
5	73	1084	0.00018	533	14.070	0.000164883	4.67	0.021695578	614.35	58.75	60.95	9/8/05 15:55	3072:35:00
4	74	1083	0.00014	534	14.057	0.000131538	3.72	0.021827116	618.07	59.11	61.31	9/15/05 15:00	3239:40:00
5	73	1079	0.00018	533	14.005	0.000164122	4.65	0.021991238	622.72	59.55	61.75	9/22/05 16:21	3409:01:00
1	71	1090	3.5E-05	531	14.148	3.3284E-05	0.94	0.022024522	623.66	59.64	61.84	9/29/05 14:30	3575:10:00
1	69	1089	3.5E-05	529	14.135	3.33792E-05	0.95	0.022057901	624.61	59.73	61.93	10/7/05 15:04	3767:44:00
2	71	1087	7.1E-05	531	14.109	6.63847E-05	1.88	0.022124286	626.49	59.91	62.11	10/13/05 23:43	3920:23:00
4	69	1077	0.00014	529	13.979	0.000132045	3.74	0.022256331	630.23	60.27	62.47	10/20/05 14:57	4079:37:00
2	69	1084	7.1E-05	529	14.070	6.64518E-05	1.88	0.022322783	632.11	60.45	62.65	11/6/05 23:42	4496:22:00
1	69	1087	3.5E-05	529	14.109	3.33179E-05	0.94	0.022356101	633.05	60.54	62.74	11/10/05 17:47	4586:27:00
2	68	1084	7.1E-05	528	14.070	6.65777E-05	1.89	0.022422678	634.94	60.72	62.92	11/21/05 14:11	4846:51:00
1	68	1086	3.5E-05	528	14.096	3.33503E-05	0.94	0.022456029	635.88	60.81	63.01	12/5/05 15:46	5184:26:00
1	68	1086	3.5E-05	528	14.096	3.33503E-05	0.94	0.022489379	636.83	60.90	63.10	12/12/05 16:39	5353:19:00
0	69	1093	0	529	14.187	0	0.00	0.022489379	636.83	60.90	63.10	12/20/05 17:22	5546:02:00
2	69	1094	7.1E-05	529	14.200	6.70648E-05	1.90	0.022556444	638.72	61.08	63.28	1/10/06 14:59	6047:39:00
-2	65	1077	-7.1E-05	525	13.979	-6.65257E-05	-1.88	0.022489918	636.84	60.90	63.10	1/17/06 16:11	6216:51:00
3	67	1089	0.00011	527	14.135	0.000100518	2.85	0.022590436	639.69	61.18	63.38	1/30/06 15:23	6528:03:00
-2	67	1081	-7.1E-05	527	14.031	-6.65194E-05	-1.88	0.022523916	637.80	61.00	63.20	2/7/06 16:30	6721:10:00
3	66	1091	0.00011	526	14.161	0.000100894	2.86	0.02262481	640.66	61.27	63.47	2/14/06 15:21	6888:01:00
-4	68	1074	-0.00014	528	13.940	-0.000131927	-3.74	0.022492883	636.93	60.91	63.11	2/19/06 14:23	7007:03:00

DECANISTERED 5/08/2006; sample dried 90 days in air

SAMPLE: 571.3' to 572.7' (Bevier coal) in canister D

	lbs.	grams		lbs.	grams	moisture %		TIME OF:
dry sample weight:	2.518	1142.10	wet sample weight:	2.637	1196.25	4.53%	est. lost gas (cc) = 87	off bottom
								5/4/05 14:33

RIG/LAB MEASUREMENTS			CONVERSION OF RIG/LAB MEASUREMENTS TO STP (@60 deg F; 14.7 psi)					CUMULATIVE VOLUMES (@STP)		SCF/TON	SCF/TON		TIME SINCE
measured cc	measured T (F)	measured P	cubic ft	absolute T (F)	psia	cubic ft (@STP)	cc (@STP)	cubic ft	cc	without lost gas	with lost gas	TIME OF MEASURE	off bottom
13	66	1093	0.00046	526	14.187	0.000438007		12.40	0.000438007	12.40	0.35	2.79	5/4/05 14:50	0:17:00
7	66	1093	0.00025	526	14.187	0.00023585		6.68	0.000673857	19.08	0.54	2.98	5/4/05 14:52	0:19:00
9	66	1093	0.00032	526	14.187	0.000303236		8.59	0.000977092	27.67	0.78	3.22	5/4/05 14:55	0:22:15
6	66	1093	0.00021	526	14.187	0.000202157		5.72	0.001179249	33.39	0.94	3.38	5/4/05 14:57	0:24:30
25	66	1093	0.00088	526	14.187	0.000842321		23.85	0.00202157	57.24	1.61	4.05	5/4/05 15:10	0:37:15
41	66	1093	0.00145	526	14.187	0.001381406		39.12	0.003402977	96.36	2.70	5.14	5/4/05 15:38	1:05:30
14	66	1092	0.00049	526	14.174	0.000471268		13.34	0.003874245	109.71	3.08	5.52	5/4/05 15:49	1:16:00

36	66	1092	0.00127	526	14.174	0.001211833	34.32	0.005086078	144.02	4.04	6.48	5/4/05 16:21	1:48:00
275	66	1093	0.00971	526	14.187	0.009265531	262.37	0.014351609	406.39	11.40	13.84	5/5/05 7:00	16:27:00
182	66	1087	0.00643	526	14.109	0.006098435	172.69	0.020450044	579.08	16.24	18.68	5/5/05 21:14	30:41:00
99	68	1087	0.0035	528	14.109	0.003304715	93.58	0.023754759	672.66	18.87	21.31	5/6/05 7:58	41:25:00
61	65	1081	0.00215	525	14.031	0.00203657	57.67	0.025791329	730.33	20.49	22.93	5/6/05 18:51	52:18:00
60	66	1082	0.00212	526	14.044	0.002001225	56.67	0.027792554	786.99	22.08	24.52	5/7/05 7:59	65:26:00
41	68	1078	0.00145	528	13.992	0.001357288	38.43	0.029149842	825.43	23.15	25.59	5/7/05 16:30	73:57:00
97	67	1074	0.00343	527	13.940	0.003205299	90.76	0.032355141	916.19	25.70	28.14	5/8/05 18:21	99:48:00
67	68	1077	0.00237	528	13.979	0.002215949	62.75	0.034571091	978.94	27.46	29.90	5/9/05 15:05	120:32:00
83	69	1075	0.00293	529	13.953	0.002734854	77.44	0.037305944	1056.38	29.63	32.07	5/10/05 20:22	149:49:00
54	72	1078	0.00191	532	13.992	0.001774206	50.24	0.039080151	1106.62	31.04	33.48	5/11/05 17:25	170:52:00
61	71	1081	0.00215	531	14.031	0.002013558	57.02	0.041093709	1163.64	32.64	35.08	5/12/05 21:00	198:27:00
73	68	1085	0.00258	528	14.083	0.002432327	68.88	0.043526035	1232.52	34.57	37.01	5/14/05 13:21	238:48:00
29	66	1090	0.00102	526	14.148	0.000974411	27.59	0.044500446	1260.11	35.35	37.79	5/15/05 11:08	260:35:00
48	66	1080	0.0017	526	14.018	0.001598021	45.25	0.046098467	1305.36	36.62	39.06	5/16/05 16:13	289:40:00
70	68	1072	0.00247	528	13.914	0.002304423	65.25	0.048402889	1370.61	38.45	40.89	5/18/05 18:38	340:05:00
37	68	1075	0.00131	528	13.953	0.001221461	34.59	0.04962435	1405.20	39.42	41.86	5/19/05 20:09	365:36:00
19	71	1081	0.00067	531	14.031	0.000627174	17.76	0.050251524	1422.96	39.92	42.36	5/20/05 12:15	381:42:00
140	71	1085	0.00494	531	14.083	0.004638381	131.34	0.054889905	1554.30	43.60	46.04	5/26/05 16:15	529:42:00
130	70	1077	0.00459	530	13.979	0.004283378	121.29	0.059173283	1675.59	47.00	49.44	6/2/05 14:50	696:17:00
139	73	1075	0.00491	533	13.953	0.004545684	128.72	0.063718967	1804.31	50.61	53.05	6/10/05 21:48	895:15:00
81	73	1081	0.00286	533	14.031	0.002663709	75.43	0.066382676	1879.74	52.73	55.17	6/16/05 10:08	1027:35:00
30	72	1084	0.00106	532	14.070	0.000991156	28.07	0.067373832	1907.81	53.52	55.96	6/23/05 11:01	1196:28:00
81	71	1081	0.00286	531	14.031	0.002673741	75.71	0.070047574	1983.52	55.64	58.08	7/1/05 15:39	1393:06:00
50	74	1085	0.00177	534	14.083	0.001647258	46.64	0.071694832	2030.16	56.95	59.39	7/7/05 11:49	1533:16:00
58	74	1081	0.00205	534	14.031	0.001903775	53.91	0.073598607	2084.07	58.46	60.90	7/14/05 14:17	1703:44:00
48	73	1084	0.0017	533	14.070	0.001582875	44.82	0.075181482	2128.89	59.72	62.16	7/22/05 10:30	1891:57:00
31	73	1087	0.00109	533	14.109	0.001025102	29.03	0.076206584	2157.92	60.53	62.97	7/28/05 14:42	2040:09:00
37	73	1085	0.00131	533	14.083	0.001221258	34.58	0.077427842	2192.50	61.50	63.94	8/4/05 16:19	2209:46:00
37	73	1079	0.00131	533	14.005	0.001214505	34.39	0.078642347	2226.89	62.47	64.91	8/11/05 15:41	2377:08:00
34	73	1074	0.0012	533	13.940	0.00111086	31.46	0.079753206	2258.35	63.35	65.79	8/18/05 16:37	2546:04:00
26	73	1079	0.00092	533	14.005	0.000853436	24.17	0.080606642	2282.52	64.03	66.47	8/26/05 14:22	2735:49:00
18	74	1085	0.00064	534	14.083	0.000593013	16.79	0.081199655	2299.31	64.50	66.94	9/1/05 16:20	2881:47:00
22	73	1084	0.00078	533	14.070	0.000725484	20.54	0.081925139	2319.85	65.07	67.51	9/8/05 15:56	3049:23:00
20	74	1083	0.00071	534	14.057	0.000657689	18.62	0.082582828	2338.48	65.60	68.04	9/15/05 15:01	3216:28:00
11	73	1082	0.00039	533	14.044	0.000362073	10.25	0.082944901	2348.73	65.88	68.32	9/19/05 15:37	3313:04:00
13	73	1079	0.00046	533	14.005	0.000426718	12.08	0.083371619	2360.81	66.22	68.66	9/22/05 16:21	3385:48:00
-2	71	1090	-7.1E-05	531	14.148	-6.65679E-05	-1.88	0.083305051	2358.93	66.17	68.61	9/29/05 14:30	3551:57:00
4	69	1089	0.00014	529	14.135	0.000133517	3.78	0.083438567	2362.71	66.28	68.72	10/7/05 15:04	3744:31:00
9	71	1087	0.00032	531	14.109	0.000298731	8.46	0.083737299	2371.17	66.51	68.95	10/13/05 23:45	3897:12:00
18	69	1077	0.00064	529	13.979	0.000594204	16.83	0.084331503	2387.99	66.99	69.43	10/20/05 14:58	4056:25:00
1	69	1084	3.5E-05	529	14.070	3.32259E-05	0.94	0.084364729	2388.93	67.01	69.45	11/6/05 23:43	4473:10:00
1	69	1087	3.5E-05	529	14.109	3.33179E-05	0.94	0.084398047	2389.88	67.04	69.48	11/10/05 17:48	4563:15:00
6	68	1084	0.00021	528	14.070	0.000199733	5.66	0.08459778	2395.53	67.20	69.64	11/21/05 14:12	4823:39:00
0	68	1086	0	528	14.096	0	0.00	0.08459778	2395.53	67.20	69.64	12/5/05 15:47	5161:14:00
3	68	1086	0.00011	528	14.096	0.000100051	2.83	0.08469783	2398.37	67.28	69.72	12/12/05 16:39	5330:06:00
-2	69	1093	-7.1E-05	529	14.187	-6.70035E-05	-1.90	0.084630827	2396.47	67.22	69.66	12/20/05 17:22	5522:49:00
6	69	1094	0.00021	529	14.200	0.000201195	5.70	0.084832021	2402.17	67.38	69.82	1/10/06 14:59	6024:26:00
19	68	1077	0.00067	528	13.979	0.000628403	17.79	0.085460425	2419.96	67.88	70.32	1/17/06 16:11	6193:38:00
-11	65	1089	-0.00039	525	14.135	-0.000369968	-10.48	0.085090456	2409.48	67.59	70.03	1/24/06 15:25	6360:52:00
10	67	1081	0.00035	527	14.031	0.000332597	9.42	0.085423053	2418.90	67.85	70.29	1/30/06 15:54	6505:21:00

DECANISTERED 1/30/2006; sample dried 90 days in air

SAMPLE: 604.6' to 605.4' (shale above Fleming) in canister M4

	lbs.	grams		lbs.	grams	moisture %		est. lost gas (cc) =	TIME OF:
dry sample weight:	2.246	1018.99	wet sample weight:	2.416	1096.01	7.03%		24	off bottom
									5/5/05 9:04

RIG/LAB MEASUREMENTS			CONVERSION OF RIG/LAB MEASUREMENTS TO STP (@60 deg F; 14.7 psi)					CUMULATIVE VOLUMES (@STP)		SCF/TON	SCF/TON		TIME SINCE
measured cc	measured T (F)	measured P	cubic ft	absolute T (F)	psia	cubic ft (@STP)	cc (@STP)	cubic ft	cc	without lost gas	with lost gas	TIME OF MEASURE	off bottom
15	66	1093	0.00053	526	14.187	0.000505393	14.31	0.000505393	14.31	0.45	1.20	5/5/05 10:52	1:48:45
21	66	1093	0.00074	526	14.187	0.00070755	20.04	0.001212942	34.35	1.08	1.83	5/5/05 11:41	2:37:45
1	66	1093	3.5E-05	526	14.187	3.36928E-05	0.95	0.001246635	35.30	1.11	1.86	5/5/05 12:00	2:56:00
7	66	1092	0.00025	526	14.174	0.000235634	6.67	0.001482269	41.97	1.32	2.07	5/5/05 13:25	4:21:00
8	67	1091	0.00028	527	14.161	0.000268539	7.60	0.001750808	49.58	1.56	2.31	5/5/05 14:54	5:50:00
3	67	1091	0.00011	527	14.161	0.000100702	2.85	0.00185151	52.43	1.65	2.40	5/5/05 15:20	6:16:00

8	67	1090	0.00028	527	14.148	0.000268293	7.60	0.002119803	60.03	1.89	2.64	5/5/05 17:20	8:16:00
13	67	1091	0.00046	527	14.161	0.000436376	12.36	0.002556179	72.38	2.28	3.03	5/5/05 18:44	9:40:00
2	67	1087	7.1E-05	527	14.109	6.68886E-05	1.89	0.002623068	74.28	2.34	3.09	5/5/05 20:53	11:49:00
18	68	1087	0.00064	528	14.109	0.000600857	17.01	0.003223925	91.29	2.87	3.62	5/6/05 7:59	22:55:00
13	67	1081	0.00046	527	14.031	0.000432376	12.24	0.003656301	103.53	3.26	4.01	5/6/05 18:52	33:48:00
10	68	1082	0.00035	528	14.044	0.000332274	9.41	0.003988575	112.94	3.55	4.31	5/7/05 7:58	46:54:00
6	68	1078	0.00021	528	13.992	0.000198627	5.62	0.004187203	118.57	3.73	4.48	5/7/05 16:31	55:27:00
13	67	1074	0.00046	527	13.940	0.000429576	12.16	0.004616779	130.73	4.11	4.86	5/8/05 18:22	81:18:00
6	68	1077	0.00021	528	13.979	0.000198443	5.62	0.004815222	136.35	4.29	5.04	5/9/05 15:06	102:02:00
8	69	1075	0.00028	529	13.953	0.0002636	7.46	0.005078822	143.82	4.52	5.28	5/10/05 20:23	131:19:00
3	72	1078	0.00011	532	13.992	9.8567E-05	2.79	0.005177389	146.61	4.61	5.36	5/11/05 17:26	152:22:00
3	71	1081	0.00011	531	14.031	9.90275E-05	2.80	0.005276417	149.41	4.70	5.45	5/12/05 21:02	179:58:00
1	66	1080	3.5E-05	526	14.018	3.32921E-05	0.94	0.005309709	150.35	4.73	5.48	5/16/05 16:14	271:10:00
4	71	1081	0.00014	531	14.031	0.000132037	3.74	0.005441745	154.09	4.84	5.60	5/20/05 12:15	363:11:00
-1	71	1085	-3.5E-05	531	14.083	-3.31313E-05	-0.94	0.005408614	153.15	4.82	5.57	5/26/05 16:08	511:04:00
2	70	1077	7.1E-05	530	13.979	6.58981E-05	1.87	0.005474512	155.02	4.87	5.63	6/2/05 14:52	677:48:00
1	73	1075	3.5E-05	533	13.953	3.27028E-05	0.93	0.005507215	155.95	4.90	5.66	6/10/05 21:50	876:46:00
-3	73	1081	-0.00011	533	14.031	-9.86559E-05	-2.79	0.005408559	153.15	4.82	5.57	6/16/05 10:09	1009:05:00
9	72	1084	0.00032	532	14.070	0.000297347	8.42	0.005705906	161.57	5.08	5.83	6/23/05 11:02	1177:58:00
1	71	1081	3.5E-05	531	14.031	3.30092E-05	0.93	0.005738915	162.51	5.11	5.86	7/1/05 15:39	1374:35:00
-2	74	1085	-7.1E-05	534	14.083	-6.58903E-05	-1.87	0.005673025	160.64	5.05	5.81	7/7/05 11:49	1514:45:00
3	74	1081	0.00011	534	14.031	9.84711E-05	2.79	0.005771496	163.43	5.14	5.89	7/14/05 14:18	1685:14:00
0	73	1084	0	533	14.070	0	0.00	0.005771496	163.43	5.14	5.89	7/22/05 10:30	1873:26:00
-2	73	1087	-7.1E-05	533	14.109	-6.61356E-05	-1.87	0.00570536	161.56	5.08	5.83	7/28/05 14:43	2021:39:00
0	73	1085	0	533	14.083	0	0.00	0.00570536	161.56	5.08	5.83	8/4/05 16:21	2191:17:00
2	73	1079	7.1E-05	533	14.005	6.56489E-05	1.86	0.005771009	163.42	5.14	5.89	8/11/05 15:42	2358:38:00
2	73	1074	7.1E-05	533	13.940	6.53447E-05	1.85	0.005836354	165.27	5.20	5.95	8/18/05 16:39	2527:35:00
-3	73	1079	-0.00011	533	14.005	-9.84733E-05	-2.79	0.005737881	162.48	5.11	5.86	8/26/05 14:23	2717:19:00
-2	74	1085	-7.1E-05	534	14.083	-6.58903E-05	-1.87	0.00567199	160.61	5.05	5.80	9/1/05 16:20	2863:16:00
0	73	1084	0	533	14.070	0	0.00	0.00567199	160.61	5.05	5.80	9/8/05 15:56	3030:52:00

DECANISTERED 9/8/2005; sample dried 23 days in air

SAMPLE: 605.4' to 606.6' (Fleming coal) in canister 4

	lbs.	grams		lbs.	grams	moisture %		est. lost gas (cc) =	TIME OF:
dry sample weight:	1.918	870.15	wet sample weight:	2.047	928.60	6.29%		132	off bottom
									5/5/05 9:04

RIG/LAB MEASUREMENTS			CONVERSION OF RIG/LAB MEASUREMENTS TO STP (@60 deg F; 14.7 psi)					CUMULATIVE VOLUMES (@STP)		SCF/TON	SCF/TON		TIME SINCE
measured cc	measured T (F)	measured P	cubic ft	absolute T (F)	psia	cubic ft (@STP)	cc (@STP)	cubic ft	cc	without lost gas	with lost gas	TIME OF MEASURE	off bottom
62	66	1093	0.00219	526	14.187	0.002088956	59.15	0.002088956	59.15	2.18	7.04	5/5/05 10:08	1:04:00
8	66	1093	0.00028	526	14.187	0.000269543	7.63	0.002358499	66.78	2.46	7.32	5/5/05 10:13	1:09:15
51	66	1093	0.0018	526	14.187	0.001718335	48.66	0.004076834	115.44	4.25	9.11	5/5/05 10:51	1:47:30
48	66	1093	0.0017	526	14.187	0.001617256	45.80	0.00569409	161.24	5.94	10.80	5/5/05 11:43	2:39:00
15	66	1093	0.00053	526	14.187	0.000505393	14.31	0.006199483	175.55	6.46	11.32	5/5/05 11:59	2:55:00
7	66	1092	0.00025	526	14.174	0.000235634	6.67	0.006435117	182.22	6.71	11.57	5/5/05 13:24	4:20:00
50	67	1091	0.00177	527	14.161	0.001678369	47.53	0.008113485	229.75	8.46	13.32	5/5/05 14:53	5:49:00
15	67	1091	0.00053	527	14.161	0.000503511	14.26	0.008616996	244.01	8.98	13.84	5/5/05 15:21	6:17:00
49	67	1090	0.00173	527	14.148	0.001643294	46.53	0.01026029	290.54	10.70	15.56	5/5/05 17:22	8:18:00
46	67	1091	0.00162	527	14.161	0.001544099	43.72	0.011804389	334.26	12.31	17.17	5/5/05 18:45	9:41:00
27	67	1087	0.00095	527	14.109	0.000902996	25.57	0.012707385	359.83	13.25	18.11	5/5/05 20:52	11:48:00
134	68	1087	0.00473	528	14.109	0.004473049	126.66	0.017180434	486.49	17.91	22.77	5/6/05 8:00	22:56:00
85	65	1081	0.003	525	14.031	0.002837844	80.36	0.020018278	566.85	20.87	25.73	5/6/05 18:53	33:49:00
75	66	1082	0.00265	526	14.044	0.002501532	70.84	0.022519809	637.69	23.48	28.34	5/7/05 7:57	46:53:00
48	68	1078	0.0017	528	13.992	0.00158902	45.00	0.024108829	682.68	25.13	29.99	5/7/05 16:31	55:27:00
103	67	1074	0.00364	527	13.940	0.003403565	96.38	0.027512394	779.06	28.68	33.54	5/8/05 18:24	81:20:00
69	68	1077	0.00244	528	13.979	0.002282097	64.62	0.029794491	843.68	31.06	35.92	5/9/05 15:07	102:03:00
82	69	1075	0.0029	529	13.953	0.002701904	76.51	0.032496395	920.19	33.88	38.74	5/10/05 20:23	131:19:00
51	72	1078	0.0018	532	13.992	0.001675639	47.45	0.034172034	967.64	35.63	40.49	5/11/05 17:26	152:22:00
56	71	1081	0.00198	531	14.031	0.001848513	52.34	0.036020546	1019.98	37.55	42.41	5/12/05 21:02	179:58:00
62	68	1085	0.00219	528	14.083	0.002065812	58.50	0.038086358	1078.48	39.71	44.57	5/14/05 13:23	220:19:00
23	66	1090	0.00081	526	14.148	0.000772808	21.88	0.038859166	1100.36	40.51	45.37	5/15/05 11:08	242:04:00

40	66	1080	0.00141	526	14.018	0.001331684	37.71	0.04019085	1138.07	41.90	46.76	5/16/05 16:14	271:10:00
59	68	1072	0.00208	528	13.914	0.001942299	55.00	0.042133149	1193.07	43.93	48.79	5/18/05 18:40	321:36:00
31	68	1075	0.00109	528	13.953	0.001023386	28.98	0.043156535	1222.05	44.99	49.85	5/19/05 20:10	347:06:00
14	71	1081	0.00049	531	14.031	0.000462128	13.09	0.043618664	1235.14	45.48	50.34	5/20/05 12:16	363:12:00
106	71	1085	0.00374	531	14.083	0.003511917	99.45	0.047130581	1334.58	49.14	54.00	5/26/05 16:17	511:13:00
99	70	1077	0.0035	530	13.979	0.003261957	92.37	0.050392538	1426.95	52.54	57.40	6/2/05 14:53	677:49:00
101	73	1075	0.00357	533	13.953	0.003302979	93.53	0.053695517	1520.48	55.98	60.84	6/10/05 21:51	876:47:00
53	73	1081	0.00187	533	14.031	0.00174292	49.35	0.055438438	1569.84	57.80	62.66	6/16/05 10:10	1009:06:00
51	72	1084	0.0018	532	14.070	0.001684966	47.71	0.057123403	1617.55	59.55	64.41	6/23/05 11:03	1177:59:00
56	71	1081	0.00198	531	14.031	0.001848513	52.34	0.058971916	1669.89	61.48	66.34	7/1/05 15:40	1374:36:00
32	74	1085	0.00113	534	14.083	0.001054245	29.85	0.060026161	1699.75	62.58	67.44	7/7/05 11:50	1514:46:00
42	74	1081	0.00148	534	14.031	0.001378596	39.04	0.061404757	1738.78	64.02	68.88	7/14/05 14:18	1685:14:00
33	73	1084	0.00117	533	14.070	0.001088226	30.82	0.062492983	1769.60	65.15	70.01	7/22/05 10:31	1873:27:00
18	73	1087	0.00064	533	14.109	0.000595221	16.85	0.063088204	1786.45	65.77	70.63	7/28/05 14:44	2021:40:00
25	73	1085	0.00088	533	14.083	0.000825174	23.37	0.063913378	1809.82	66.63	71.49	8/4/05 16:22	2191:18:00
25	73	1079	0.00088	533	14.005	0.000820611	23.24	0.064733989	1833.06	67.49	72.35	8/11/05 15:42	2358:38:00
23	73	1074	0.00081	533	13.940	0.000751464	21.28	0.065485453	1854.33	68.27	73.13	8/18/05 16:39	2527:35:00
14	73	1079	0.00049	533	14.005	0.000459542	13.01	0.065944995	1867.35	68.75	73.61	8/26/05 14:24	2717:20:00
9	74	1086	0.00032	534	14.096	0.00029678	8.40	0.066241775	1875.75	69.06	73.92	9/1/05 16:21	2863:17:00
12	73	1084	0.00042	533	14.070	0.000395719	11.21	0.066637494	1886.96	69.47	74.33	9/8/05 15:57	3030:53:00
11	74	1083	0.00039	534	14.057	0.000361729	10.24	0.066999223	1897.20	69.85	74.71	9/15/05 15:01	3197:57:00
11	73	1082	0.00039	533	14.044	0.000362073	10.25	0.067361296	1907.45	70.23	75.09	9/21/05 12:17	3339:13:00
14	73	1079	0.00049	533	14.005	0.000459542	13.01	0.067820838	1920.47	70.71	75.57	9/22/05 16:22	3367:18:00
2	71	1089	7.1E-05	531	14.135	6.65069E-05	1.88	0.067887345	1922.35	70.78	75.64	9/29/05 14:31	3533:27:00
1	69	1088	3.5E-05	529	14.122	3.33485E-05	0.94	0.067920693	1923.29	70.81	75.67	10/7/05 15:05	3726:01:00
3	71	1087	0.00011	531	14.109	9.95771E-05	2.82	0.06802027	1926.11	70.92	75.78	10/13/05 11:44	3866:40:00
9	69	1077	0.00032	529	13.979	0.000297102	8.41	0.068317372	1934.53	71.23	76.09	10/20/05 14:58	4037:54:00
-3	69	1084	-0.00011	529	14.070	-9.96777E-05	-2.82	0.068217695	1931.70	71.12	75.98	11/6/05 23:43	4454:39:00
-1	69	1087	-3.5E-05	529	14.109	-3.33179E-05	-0.94	0.068184377	1930.76	71.09	75.95	11/10/05 17:48	4544:44:00
2	68	1084	7.1E-05	528	14.070	6.65777E-05	1.89	0.068250955	1932.64	71.16	76.02	11/21/05 14:13	4805:09:00

DECANISTERED 11/21/2005; sample dried 48 days in air

SAMPLE: 639.0' to 640.8' (Mineral coal) in canister L

	lbs.	grams		lbs.	grams	moisture %		TIME OF:
dry sample weight:	3.220	1460.70	wet sample weight:	3.374	1530.24	4.54%	est. lost gas (cc) = 80	off bottom
								5/5/05 11:57

RIG/LAB MEASUREMENTS			CONVERSION OF RIG/LAB MEASUREMENTS TO STP (@60 deg F; 14.7 psi)					CUMULATIVE VOLUMES (@STP)		SCF/TON	SCF/TON		TIME SINCE
measured cc	measured T (F)	measured P	cubic ft	absolute T (F)	psia	cubic ft (@STP)	cc (@STP)	cubic ft	cc	without lost gas	with lost gas	TIME OF MEASURE	off bottom
15	66	1093	0.00053	526	14.187	0.000505393	14.31	0.000505393	14.31	0.31	2.07	5/5/05 12:18	0:20:30
7	66	1093	0.00025	526	14.187	0.00023585	6.68	0.000741242	20.99	0.46	2.21	5/5/05 12:20	0:23:15
6	66	1093	0.00021	526	14.187	0.000202157	5.72	0.0009434	26.71	0.59	2.34	5/5/05 12:23	0:25:30
31	66	1093	0.00109	526	14.187	0.001044478	29.58	0.001987878	56.29	1.23	2.99	5/5/05 12:41	0:44:15
6	66	1092	0.00021	526	14.174	0.000201972	5.72	0.00218985	62.01	1.36	3.11	5/5/05 12:45	0:47:45
15	66	1092	0.00053	526	14.174	0.00050493	14.30	0.00269478	76.31	1.67	3.43	5/5/05 12:56	0:58:30
34	66	1092	0.0012	526	14.174	0.001144508	32.41	0.003839288	108.72	2.38	4.14	5/5/05 13:23	1:25:30
19	66	1092	0.00067	526	14.174	0.000639578	18.11	0.004478867	126.83	2.78	4.54	5/5/05 13:43	1:45:30
32	67	1092	0.00113	527	14.174	0.00107514	30.44	0.005554007	157.27	3.45	5.20	5/5/05 14:17	2:19:30
10	67	1092	0.00035	527	14.174	0.000335981	9.51	0.005889989	166.79	3.66	5.41	5/5/05 14:30	2:32:30
11	67	1091	0.00039	527	14.161	0.000369241	10.46	0.00625923	177.24	3.89	5.64	5/5/05 14:52	2:54:30
22	67	1091	0.00078	527	14.161	0.000738482	20.91	0.006997712	198.15	4.35	6.10	5/5/05 15:22	3:24:30
44	67	1090	0.00155	527	14.148	0.001475611	41.78	0.008473322	239.94	5.26	7.02	5/5/05 16:35	4:37:30
12	67	1090	0.00042	527	14.148	0.000402439	11.40	0.008875762	251.33	5.51	7.27	5/5/05 16:57	4:59:30
15	67	1090	0.00053	527	14.148	0.000503049	14.24	0.009378811	265.58	5.82	7.58	5/5/05 17:23	5:25:30
49	67	1091	0.00173	527	14.161	0.001644801	46.58	0.011023612	312.15	6.85	8.60	5/5/05 18:43	6:45:30
41	67	1089	0.00145	527	14.135	0.001373739	38.90	0.012397351	351.05	7.70	9.45	5/5/05 20:51	8:53:30
175	68	1087	0.00618	528	14.109	0.005841668	165.42	0.018239019	516.47	11.33	13.08	5/6/05 8:02	20:04:30
105	65	1081	0.00371	525	14.031	0.003505572	99.27	0.021744591	615.74	13.50	15.26	5/6/05 18:54	30:56:30
92	66	1082	0.00325	526	14.044	0.003068545	86.89	0.024813137	702.63	15.41	17.17	5/7/05 7:56	43:58:30
59	68	1078	0.00208	528	13.992	0.00195317	55.31	0.026766307	757.93	16.62	18.38	5/7/05 16:32	52:34:30
137	67	1074	0.00484	527	13.940	0.004527072	128.19	0.031293379	886.13	19.44	21.19	5/8/05 18:25	78:27:30

87	68	1077	0.00307	528	13.979	0.002877427	81.48	0.034170806	967.61	21.22	22.98	5/9/05 15:07	99:09:30
102	69	1075	0.0036	529	13.953	0.003360904	95.17	0.03753171	1062.78	23.31	25.06	5/10/05 20:24	128:26:30
66	72	1078	0.00233	532	13.992	0.002168474	61.40	0.039700184	1124.18	24.66	26.41	5/11/05 17:27	149:29:30
74	71	1081	0.00261	531	14.031	0.002442677	69.17	0.042142862	1193.35	26.17	27.93	5/12/05 21:03	177:05:30
84	68	1085	0.00297	528	14.083	0.002798842	79.25	0.044941703	1272.60	27.91	29.67	5/14/05 13:24	217:26:30
35	66	1090	0.00124	526	14.148	0.001176013	33.30	0.046117716	1305.90	28.64	30.40	5/15/05 11:09	239:11:30
51	66	1080	0.0018	526	14.018	0.001697897	48.08	0.047815613	1353.98	29.70	31.45	5/16/05 16:15	268:17:30
77	68	1072	0.00272	528	13.914	0.002534865	71.78	0.050350478	1425.76	31.27	33.03	5/18/05 18:41	318:43:30
43	68	1075	0.00152	528	13.953	0.001419535	40.20	0.051770013	1465.96	32.15	33.91	5/19/05 20:10	344:12:30
23	71	1081	0.00081	531	14.031	0.000759211	21.50	0.052529224	1487.46	32.62	34.38	5/20/05 12:16	360:18:30
58	72	1081	0.00205	532	14.031	0.001910932	54.11	0.054440156	1541.57	33.81	35.57	5/22/05 10:11	406:13:30
103	71	1085	0.00364	531	14.083	0.003412523	96.63	0.057852679	1638.20	35.93	37.68	5/26/05 16:18	508:20:30
132	70	1077	0.00466	530	13.979	0.004349276	123.16	0.062201955	1761.36	38.63	40.39	6/2/05 14:53	674:55:30
139	73	1075	0.00491	533	13.953	0.004545684	128.72	0.06674764	1890.08	41.45	43.21	6/10/05 21:52	873:54:30
83	73	1081	0.00293	533	14.031	0.002729479	77.29	0.069477119	1967.37	43.15	44.90	6/16/05 10:10	1006:12:30
31	72	1084	0.00109	532	14.070	0.001024195	29.00	0.070501314	1996.37	43.79	45.54	6/23/05 11:03	1175:05:30
85	71	1081	0.003	531	14.031	0.002805778	79.45	0.073307092	2075.82	45.53	47.28	7/1/05 15:41	1371:43:30
53	74	1085	0.00187	534	14.083	0.001746094	49.44	0.075053185	2125.26	46.61	48.37	7/7/05 11:50	1511:52:30
61	74	1081	0.00215	534	14.031	0.002002246	56.70	0.077055432	2181.96	47.86	49.61	7/14/05 14:19	1682:21:30
49	73	1084	0.00173	533	14.070	0.001615851	45.76	0.078671283	2227.71	48.86	50.61	7/22/05 10:32	1870:34:30
36	73	1087	0.00127	533	14.109	0.001190441	33.71	0.079861724	2261.42	49.60	51.35	7/28/05 14:45	2018:47:30
39	73	1085	0.00138	533	14.083	0.001287272	36.45	0.081148996	2297.88	50.40	52.15	8/4/05 16:24	2188:26:30
38	73	1079	0.00134	533	14.005	0.001247329	35.32	0.082396325	2333.20	51.17	52.93	8/11/05 15:43	2355:45:30
35	73	1079	0.00124	533	14.005	0.001148856	32.53	0.083545181	2365.73	51.89	53.64	8/18/05 16:40	2524:42:30
29	73	1079	0.00102	533	14.005	0.000951909	26.95	0.08449709	2392.68	52.48	54.23	8/26/05 14:25	2714:27:30
19	74	1085	0.00067	534	14.083	0.000625958	17.73	0.085123048	2410.41	52.87	54.62	9/1/05 16:22	2860:24:30
23	73	1084	0.00081	533	14.070	0.000758461	21.48	0.085881509	2431.88	53.34	55.09	9/8/05 15:58	3028:00:30
20	74	1083	0.00071	534	14.057	0.000657689	18.62	0.086539198	2450.51	53.75	55.50	9/15/05 15:02	3195:04:30
21	73	1079	0.00074	533	14.005	0.000689313	19.52	0.087228511	2470.03	54.17	55.93	9/22/05 16:22	3364:24:30
9	71	1090	0.00032	531	14.148	0.000299556	8.48	0.087528067	2478.51	54.36	56.11	9/29/05 14:31	3530:33:30
6	69	1088	0.00021	529	14.122	0.000200091	5.67	0.087728158	2484.18	54.48	56.24	10/7/05 15:06	3723:08:30
12	69	1083	0.00042	529	14.057	0.000398343	11.28	0.088126501	2495.46	54.73	56.49	10/13/05 23:47	3875:49:30
5	69	1077	0.00018	529	13.979	0.000165057	4.67	0.088291558	2500.13	54.83	56.59	10/20/05 14:59	4035:01:30
0	69	1084	0	529	14.070	0	0.00	0.088291558	2500.13	54.83	56.59	11/6/05 23:44	4451:46:30
5	69	1087	0.00018	529	14.109	0.000166589	4.72	0.088458147	2504.85	54.94	56.69	11/10/05 17:48	4541:50:30
23	68	1084	0.00081	528	14.070	0.000765643	21.68	0.08922379	2526.53	55.41	57.17	11/21/05 14:14	4802:16:30
9	68	1086	0.00032	528	14.096	0.000300152	8.50	0.089523942	2535.03	55.60	57.35	12/5/05 15:47	5139:49:30
10	68	1086	0.00035	528	14.096	0.000333503	9.44	0.089857445	2544.47	55.81	57.56	12/12/05 16:40	5308:42:30
0	69	1093	0	529	14.187	0	0.00	0.089857445	2544.47	55.81	57.56	12/20/05 17:23	5501:25:30
0	69	1094	0	529	14.200	0	0.00	0.089857445	2544.47	55.81	57.56	1/10/06 15:00	6003:02:30

DECANISTERED 1/10/2006; sample dried 90 days in air

SAMPLE: 710.7' to 711.5' (? coal) in canister Brady 24

	lbs.	grams		lbs.	grams	moisture %	est. lost gas (cc) =	TIME OF:
dry sample weight:	1.445	655.34	wet sample weight:	1.615	732.61	10.55%	39	off bottom
								5/5/05 17:20

RIG/LAB MEASUREMENTS			CONVERSION OF RIG/LAB MEASUREMENTS TO STP (@60 deg F; 14.7 psi)					CUMULATIVE VOLUMES (@STP)		SCF/TON	SCF/TON		TIME SINCE
measured cc	measured T (F)	measured P	cubic ft	absolute T (F)	psia	cubic ft (@STP)	cc (@STP)	cubic ft	cc	without lost gas	with lost gas	TIME OF MEASURE	off bottom
5	67	1090	0.00018	527	14.148	0.000167683		4.75	0.000167683	4.75	0.23	2.14	5/5/05 17:34	0:14:00
2	67	1090	7.1E-05	527	14.148	6.70732E-05		1.90	0.000234756	6.65	0.32	2.23	5/5/05 17:36	0:16:00
5	67	1090	0.00018	527	14.148	0.000167683		4.75	0.000402439	11.40	0.56	2.46	5/5/05 17:39	0:19:00
3	67	1090	0.00011	527	14.148	0.00010061		2.85	0.000503049	14.24	0.70	2.60	5/5/05 17:42	0:22:00
2	67	1090	7.1E-05	527	14.148	6.70732E-05		1.90	0.000570122	16.14	0.79	2.70	5/5/05 17:44	0:24:30
3	67	1090	0.00011	527	14.148	0.00010061		2.85	0.000670732	18.99	0.93	2.84	5/5/05 17:47	0:27:00
1	67	1090	3.5E-05	527	14.148	3.35366E-05		0.95	0.000704269	19.94	0.97	2.88	5/5/05 17:49	0:29:00
3	67	1090	0.00011	527	14.148	0.00010061		2.85	0.000804879	22.79	1.11	3.02	5/5/05 17:51	0:31:00
1	67	1090	3.5E-05	527	14.148	3.35366E-05		0.95	0.000838415	23.74	1.16	3.07	5/5/05 17:52	0:32:30
34	67	1091	0.0012	527	14.161	0.001141291		32.32	0.001979706	56.06	2.74	4.65	5/5/05 18:42	1:22:00
39	69	1087	0.00138	529	14.109	0.001299396		36.79	0.003279102	92.85	4.54	6.45	5/5/05 20:49	3:29:00
84	70	1087	0.00297	530	14.109	0.00279342		79.10	0.006072522	171.95	8.41	10.31	5/6/05 8:03	14:43:00

53	67	1081	0.00187	527	14.031	0.001762764	49.92	0.007835286	221.87	10.85	12.75	5/6/05 18:56	25:36:00
41	68	1082	0.00145	528	14.044	0.001362324	38.58	0.00919761	260.45	12.73	14.64	5/7/05 7:55	38:35:00
26	68	1078	0.00092	528	13.992	0.000860719	24.37	0.010058329	284.82	13.92	15.83	5/7/05 16:34	47:14:00
45	67	1074	0.00159	527	13.940	0.001486995	42.11	0.011545323	326.93	15.98	17.89	5/8/05 18:27	73:07:00
32	68	1077	0.00113	528	13.979	0.001058364	29.97	0.012603687	356.90	17.45	19.35	5/9/05 15:08	93:48:00
35	69	1075	0.00124	529	13.953	0.001153252	32.66	0.013756939	389.55	19.04	20.95	5/10/05 20:25	123:05:00
23	72	1078	0.00081	532	13.992	0.00075568	21.40	0.014512619	410.95	20.09	22.00	5/11/05 17:28	144:08:00
15	71	1081	0.00053	531	14.031	0.000495137	14.02	0.015007756	424.97	20.78	22.68	5/12/05 21:04	171:44:00
27	68	1085	0.00095	528	14.083	0.000899628	25.47	0.015907384	450.45	22.02	23.93	5/14/05 13:25	212:05:00
24	66	1080	0.00085	526	14.018	0.00079901	22.63	0.016706394	473.07	23.13	25.03	5/16/05 16:16	262:56:00
27	68	1072	0.00095	528	13.914	0.000888849	25.17	0.017595243	498.24	24.36	26.26	5/18/05 18:42	313:22:00
20	71	1081	0.00071	531	14.031	0.000660183	18.69	0.018255426	516.93	25.27	27.18	5/20/05 12:17	354:57:00
19	72	1081	0.00067	532	14.031	0.000625995	17.73	0.018881421	534.66	26.14	28.04	5/22/05 10:13	400:53:00
28	71	1085	0.00099	531	14.083	0.000927676	26.27	0.019809097	560.93	27.42	29.33	5/26/05 16:21	503:01:00
35	70	1077	0.00124	530	13.979	0.001153217	32.66	0.020962315	593.58	29.02	30.92	6/2/05 14:55	669:35:00
39	73	1075	0.00138	533	13.953	0.001275408	36.12	0.022237722	629.70	30.78	32.69	6/10/05 21:54	868:34:00
24	73	1081	0.00085	533	14.031	0.000789247	22.35	0.023026969	652.05	31.88	33.78	6/16/05 10:11	1000:51:00
30	72	1084	0.00106	532	14.070	0.000991156	28.07	0.024018126	680.12	33.25	35.15	6/23/05 11:04	1169:44:00
24	71	1081	0.00085	531	14.031	0.00079222	22.43	0.024810345	702.55	34.34	36.25	7/1/05 15:43	1366:23:00
15	74	1085	0.00053	534	14.083	0.000494177	13.99	0.025304523	716.54	35.03	36.94	7/7/05 11:51	1506:31:00
18	74	1081	0.00064	534	14.031	0.000590827	16.73	0.025895349	733.27	35.85	37.75	7/14/05 14:19	1676:59:00
13	73	1084	0.00046	533	14.070	0.000428695	12.14	0.026324045	745.41	36.44	38.35	7/22/05 10:32	1865:12:00
9	73	1087	0.00032	533	14.109	0.00029761	8.43	0.026621655	753.84	36.85	38.76	7/28/05 14:46	2013:26:00
10	73	1085	0.00035	533	14.083	0.00033007	9.35	0.026951725	763.18	37.31	39.22	8/4/05 16:25	2183:05:00
11	73	1079	0.00039	533	14.005	0.000361069	10.22	0.027312794	773.41	37.81	39.72	8/11/05 15:43	2350:23:00
11	73	1074	0.00039	533	13.940	0.000359396	10.18	0.02767219	783.59	38.31	40.21	8/18/05 16:42	2519:22:00
7	73	1079	0.00025	533	14.005	0.000229771	6.51	0.027901961	790.09	38.62	40.53	8/26/05 14:25	2709:05:00
5	74	1085	0.00018	534	14.083	0.000164726	4.66	0.028066686	794.76	38.85	40.76	9/1/05 16:22	2855:02:00
7	73	1084	0.00025	533	14.070	0.000230836	6.54	0.028297522	801.29	39.17	41.08	9/8/05 15:58	3022:38:00
5	74	1083	0.00018	534	14.057	0.000164422	4.66	0.028461945	805.95	39.40	41.31	9/15/05 15:02	3189:42:00
7	73	1079	0.00025	533	14.005	0.000229771	6.51	0.028691716	812.46	39.72	41.62	9/22/05 16:23	3359:03:00
0	71	1090	0	531	14.148	0	0.00	0.028691716	812.46	39.72	41.62	9/29/05 14:32	3525:12:00
1	69	1089	3.5E-05	529	14.135	3.33792E-05	0.95	0.028725095	813.40	39.76	41.67	10/7/05 15:06	3717:46:00
3	71	1087	0.00011	531	14.109	9.95771E-05	2.82	0.028824672	816.22	39.90	41.81	10/13/05 23:44	3870:24:00
6	69	1077	0.00021	529	13.979	0.000198068	5.61	0.02902274	821.83	40.18	42.08	10/20/05 14:59	4029:39:00
5	69	1084	0.00018	529	14.070	0.00016613	4.70	0.02918887	826.53	40.41	42.31	11/6/05 23:45	4446:25:00
3	69	1087	0.00011	529	14.109	9.99536E-05	2.83	0.029288823	829.36	40.54	42.45	11/10/05 17:50	4536:30:00
3	68	1084	0.00011	528	14.070	9.98665E-05	2.83	0.02938869	832.19	40.68	42.59	11/21/05 14:15	4796:55:00
2	68	1086	7.1E-05	528	14.096	6.67005E-05	1.89	0.02945539	834.08	40.77	42.68	12/5/05 15:48	5134:28:00
3	68	1086	0.00011	528	14.096	0.000100051	2.83	0.029555441	836.91	40.91	42.82	12/12/05 16:41	5303:21:00
-1	69	1093	-3.5E-05	529	14.187	-3.35018E-05	-0.95	0.029521939	835.97	40.87	42.77	12/20/05 17:24	5496:04:00
3	69	1094	0.00011	529	14.200	0.000100597	2.85	0.029622536	838.81	41.01	42.91	1/9/06 15:01	5973:41:00
7	68	1077	0.00025	528	13.979	0.000231517	6.56	0.029854053	845.37	41.33	43.23	1/17/06 16:12	6166:52:00
-4	65	1089	-0.00014	525	14.135	-0.000134534	-3.81	0.02971952	841.56	41.14	43.05	1/24/06 15:25	6334:05:00
4	67	1081	0.00014	527	14.031	0.000133039	3.77	0.029852558	845.33	41.32	43.23	1/31/06 15:55	6502:35:00
-3	37	1091	-0.00011	497	14.161	-0.000106781	-3.02	0.029745778	842.30	41.18	43.08	2/7/06 16:30	6671:10:00
5	66	1074	0.00018	526	13.940	0.000165536	4.69	0.029911313	846.99	41.41	43.31	2/14/06 15:22	6838:02:00
-6	68	1095	-0.00021	528	14.213	-0.00020176	-5.71	0.029709554	841.28	41.13	43.03	2/19/06 14:24	6957:04:00
4	67	1083	0.00014	527	14.057	0.000133285	3.77	0.029842838	845.05	41.31	43.22	2/24/06 14:55	7077:35:00
5	67	1074	0.00018	527	13.940	0.000165222	4.68	0.03000806	849.73	41.54	43.45	3/7/06 16:40	7343:20:00
-4	66	1089	-0.00014	526	14.135	-0.000134278	-3.80	0.029873782	845.93	41.35	43.26	3/14/06 15:54	7510:34:00
6	66	1068	0.00021	526	13.862	0.000197533	5.59	0.030071315	851.52	41.63	43.53	3/30/06 16:11	7894:51:00
1	66	1071	3.5E-05	526	13.901	3.30147E-05	0.93	0.03010433	852.46	41.67	43.58	4/14/06 17:29	8256:09:00
-3	65	1079	-0.00011	525	14.005	-9.99739E-05	-2.83	0.030004356	849.63	41.53	43.44	4/28/06 16:14	8590:54:00
2	65	1074	7.1E-05	525	13.940	6.63404E-05	1.88	0.030070696	851.50	41.63	43.53	5/8/06 16:13	8830:53:00
2	69	1082	7.1E-05	529	14.044	6.63292E-05	1.88	0.030137025	853.38	41.72	43.63	5/22/06 16:51	9167:31:00
3	71	1085	0.00011	531	14.083	9.93939E-05	2.81	0.030236419	856.20	41.86	43.76	6/2/06 15:05	9429:45:00
10	73	1078	0.00035	533	13.992	0.00032794	9.29	0.03056436	865.48	42.31	44.22	6/9/06 15:51	9598:31:00
5	73	1078	0.00018	533	13.992	0.00016397	4.64	0.03072833	870.13	42.54	44.44	6/15/06 17:15	9743:55:00
2	73	1086	7.1E-05	533	14.096	6.60748E-05	1.87	0.030794405	872.00	42.63	44.54	6/22/06 16:51	9911:31:00

2	73	1091	7.1E-05	533	14.161	6.6379E-05	1.88	0.030860784	873.88	42.72	44.63	7/6/06 16:53	10247:33:00
6	73	1078	0.00021	533	13.992	0.000196764	5.57	0.031057548	879.45	42.99	44.90	7/13/06 17:07	10415:47:00
4	73	1086	0.00014	533	14.096	0.00013215	3.74	0.031189697	883.19	43.18	45.08	8/7/06 15:38	11014:18:00
2	75	1085	7.1E-05	535	14.083	6.57672E-05	1.86	0.031255464	885.05	43.27	45.17	8/14/06 11:50	11178:30:00
0	73	1087	0	533	14.109	0	0.00	0.031255464	885.05	43.27	45.17	8/21/06 15:25	11350:05:00
3	75	1081	0.00011	535	14.031	9.82871E-05	2.78	0.031353752	887.84	43.40	45.31	8/28/06 12:01	11514:41:00
-1	73	1087	-3.5E-05	533	14.109	-3.30678E-05	-0.94	0.031320684	886.90	43.36	45.26	9/12/06 14:29	11877:09:00
1	74	1085	3.5E-05	534	14.083	3.29452E-05	0.93	0.031353629	887.83	43.40	45.31	9/19/06 16:49	12047:29:00

DECANISTERED 9/19/2006; sample dried 31 days in air

SAMPLE: 742.9' to 743.9' (? coal) in canister Brady 25

	lbs.	grams		lbs.	grams	moisture %		TIME OF:
dry sample weight:	1.569	711.46	wet sample weight:	1.886	855.27	16.81%	est. lost gas (cc) = 44	off bottom
								5/6/05 10:42

RIG/LAB MEASUREMENTS			CONVERSION OF RIG/LAB MEASUREMENTS TO STP (@60 deg F; 14.7 psi)					CUMULATIVE VOLUMES (@STP)		SCF/TON	SCF/TON		TIME SINCE
measured cc	measured T (F)	measured P	cubic ft	absolute T (F)	psia	cubic ft (@STP)	cc (@STP)	cubic ft	cc	without lost gas	with lost gas	TIME OF MEASURE	off bottom
10	67	1089	0.00035	527	14.135	0.000335058		9.49	0.000335058	0.43	2.41	5/6/05 11:00	0:18:15
22	67	1089	0.00078	527	14.135	0.000737128		20.87	0.001072187	30.36	1.37	3.35	5/6/05 11:19	0:37:00
14	67	1088	0.00049	527	14.122	0.000468651		13.27	0.001540838	43.63	1.96	3.95	5/6/05 11:33	0:51:00
14	67	1088	0.00049	527	14.122	0.000468651		13.27	0.002009489	56.90	2.56	4.54	5/6/05 11:50	1:08:00
15	67	1088	0.00053	527	14.122	0.000502126		14.22	0.002511615	71.12	3.20	5.18	5/6/05 12:11	1:29:00
9	67	1088	0.00032	527	14.122	0.000301276		8.53	0.00281289	79.65	3.59	5.57	5/6/05 12:27	1:45:00
10	68	1087	0.00035	528	14.109	0.00033381		9.45	0.0031467	89.10	4.01	5.99	5/6/05 12:45	2:03:00
29	68	1086	0.00102	528	14.096	0.000967157		27.39	0.004113857	116.49	5.25	7.23	5/6/05 13:51	3:09:00
21	68	1085	0.00074	528	14.083	0.00069971		19.81	0.004813568	136.30	6.14	8.12	5/6/05 15:16	4:34:00
9	68	1085	0.00032	528	14.083	0.000299876		8.49	0.005113444	144.80	6.52	8.50	5/6/05 15:53	5:11:00
13	68	1084	0.00046	528	14.070	0.000432755		12.25	0.005546198	157.05	7.07	9.05	5/6/05 17:04	6:22:00
34	67	1081	0.0012	527	14.031	0.00113083		32.02	0.006677028	189.07	8.51	10.50	5/6/05 18:57	8:15:00
68	68	1082	0.0024	528	14.044	0.002259464		63.98	0.008936492	253.05	11.39	13.38	5/7/05 7:54	21:12:00
42	68	1078	0.00148	528	13.992	0.001390392		39.37	0.010326884	292.42	13.17	15.15	5/7/05 16:34	29:52:00
71	67	1074	0.00251	527	13.940	0.002346147		66.44	0.012673031	358.86	16.16	18.14	5/8/05 18:28	55:46:00
44	68	1077	0.00155	528	13.979	0.00145525		41.21	0.014128282	400.07	18.02	20.00	5/9/05 15:09	76:27:00
48	69	1075	0.0017	529	13.953	0.001581602		44.79	0.015709884	444.85	20.03	22.01	5/10/05 20:26	105:44:00
29	72	1078	0.00102	532	13.992	0.000952814		26.98	0.016662698	471.83	21.25	23.23	5/11/05 17:29	126:47:00
31	71	1081	0.00109	531	14.031	0.001023284		28.98	0.017685982	500.81	22.55	24.53	5/12/05 21:05	154:23:00
32	68	1085	0.00113	528	14.083	0.001066225		30.19	0.018752207	531.00	23.91	25.89	5/14/05 13:26	194:44:00
28	66	1080	0.00099	526	14.018	0.000932179		26.40	0.019684386	557.40	25.10	27.08	5/15/05 16:17	221:35:00
34	68	1072	0.0012	528	13.914	0.001119291		31.69	0.020803677	589.09	26.53	28.51	5/18/05 18:42	296:00:00
21	71	1081	0.00074	531	14.031	0.000693192		19.63	0.021496869	608.72	27.41	29.39	5/20/05 12:17	337:35:00
23	72	1081	0.00081	532	14.031	0.000757783		21.46	0.022254653	630.18	28.38	30.36	5/22/05 10:13	383:31:00
33	71	1085	0.00117	531	14.083	0.001093333		30.96	0.023347986	661.14	29.77	31.75	5/26/05 16:22	485:40:00
44	70	1077	0.00155	530	13.979	0.001449759		41.05	0.024797744	702.19	31.62	33.60	6/2/05 14:55	652:13:00
45	73	1075	0.00159	533	13.953	0.001471624		41.67	0.026269369	743.86	33.50	35.48	6/10/05 21:55	851:13:00
21	73	1081	0.00074	533	14.031	0.000690591		19.56	0.02695996	763.42	34.38	36.36	6/16/05 10:11	983:29:00
13	72	1084	0.00046	532	14.070	0.000429501		12.16	0.027389461	775.58	34.92	36.91	6/23/05 11:05	1152:23:00
20	71	1081	0.00071	531	14.031	0.000660183		18.69	0.028049644	794.27	35.77	37.75	7/1/05 15:43	1349:01:00
10	74	1085	0.00035	534	14.083	0.000329452		9.33	0.028379095	803.60	36.19	38.17	7/7/05 11:51	1489:09:00
17	74	1081	0.0006	534	14.031	0.000558003		15.80	0.028937098	819.40	36.90	38.88	7/14/05 14:20	1659:38:00
11	73	1084	0.00039	533	14.070	0.000362742		10.27	0.029299841	829.68	37.36	39.34	7/22/05 10:33	1847:51:00
6	73	1087	0.00021	533	14.109	0.000198407		5.62	0.029498247	835.29	37.61	39.59	7/28/05 14:47	1996:05:00
10	73	1085	0.00035	533	14.083	0.00033007		9.35	0.029828317	844.64	38.03	40.02	8/4/05 16:26	2165:44:00
11	73	1079	0.00039	533	14.005	0.000361069		10.22	0.030189386	854.86	38.49	40.48	8/11/05 15:44	2333:02:00
11	73	1074	0.00039	533	13.940	0.000359396		10.18	0.030548782	865.04	38.95	40.93	8/18/05 16:42	2502:00:00
5	73	1079	0.00018	533	14.005	0.000164122		4.65	0.030712904	869.69	39.16	41.14	8/26/05 14:26	2691:44:00
2	74	1085	7.1E-05	534	14.083	6.58903E-05		1.87	0.030778795	871.56	39.25	41.23	9/1/05 16:23	2837:41:00
5	73	1084	0.00018	533	14.070	0.000164883		4.67	0.030943677	876.22	39.46	41.44	9/8/05 15:59	3005:17:00
5	74	1083	0.00018	534	14.057	0.000164422		4.66	0.031108099	880.88	39.67	41.65	9/15/05 15:03	3172:21:00
8	73	1079	0.00028	533	14.005	0.000262596		7.44	0.031370695	888.32	40.00	41.98	9/22/05 16:23	3341:41:00
-4	71	1089	-0.00014	531	14.135	-0.000133014		-3.77	0.031237681	884.55	39.83	41.81	9/29/05 14:32	3507:50:00
-2	69	1088	-7.1E-05	529	14.122	-6.6697E-05		-1.89	0.031170984	882.66	39.75	41.73	10/7/05 15:07	3700:25:00

3	71	1087	0.00011	531	14.109	9.95771E-05	2.82	0.031270561	885.48	39.87	41.85	10/13/05 11:45	3841:03:00

DECANISTERED 10/13/2005; sample dried 59 days in air

		elapsed time (off bottom to canistering)	
at surface	in canister	19.0	minutes
5/3/05 10:14	5/3/05 10:28	0.317	hours
		0.562731434	SQRT (hrs)
at surface	in canister	SQRT hrs. (since off bottom)	
0:18:30	0:04:30	0.625832778	
0:33:00	0:19:00	0.795822426	
0:55:30	0:41:30	1.004158022	
1:32:00	1:18:00	1.271482075	
1:47:00	1:33:00	1.366260102	
2:18:00	2:04:00	1.543804824	
2:29:00	2:15:00	1.602081979	
3:59:00	3:45:00	2.016597795	
4:41:00	4:27:00	2.183269719	
5:29:00	5:15:00	2.359378449	
5:51:00	5:37:00	2.435843454	
6:11:00	5:57:00	2.503331114	
6:41:00	6:27:00	2.601281735	
7:03:00	6:49:00	2.670830083	
7:29:00	7:15:00	2.750757471	
8:31:00	8:17:00	2.93257566	
13:08:00	12:54:00	3.635473376	
21:42:00	21:28:00	4.667261867	
44:47:00	44:33:00	6.69825848	
56:32:00	56:18:00	7.524404738	
69:39:00	69:25:00	8.350648677	
80:33:00	80:19:00	8.979606524	
93:46:00	93:32:00	9.687620967	
102:12:00	101:58:00	10.1135223	
128:03:00	127:49:00	11.31959952	
148:50:00	148:36:00	12.20314167	
178:05:00	177:51:00	13.3479087	
199:08:00	198:54:00	14.11441344	
226:43:00	226:29:00	15.05988048	
267:01:00	266:47:00	16.3431943	
288:51:00	288:37:00	16.9980391	
317:56:00	317:42:00	17.8330218	
368:21:00	368:07:00	19.1946173	
417:57:00	417:43:00	20.44586348	
557:57:00	557:43:00	23.62272917	
724:33:00	724:19:00	26.91901435	
923:30:00	923:16:00	30.39051387	
1055:52:00	1055:38:00	32.49538429	
1224:40:00	1224:26:00	34.99642839	
1421:22:00	1421:08:00	37.70212196	
1561:33:00	1561:19:00	39.51750667	
1732:01:00	1731:47:00	41.6185055	
1920:13:00	1919:59:00	43.82122773	
2068:25:00	2068:11:00	45.48076517	
2237:58:00	2237:44:00	47.30803314	
2405:25:00	2405:11:00	49.04589687	
2574:19:00	2574:05:00	50.73854551	
2764:06:00	2763:52:00	52.57550127	
2910:04:00	2909:50:00	53.94580614	
3077:40:00	3077:26:00	55.47747291	
3244:44:00	3244:30:00	56.96329227	
3414:05:00	3413:51:00	58.43087084	

3580:14:00	3580:00:00	59.8357474
3772:47:00	3772:33:00	61.42366536
3913:27:00	3913:13:00	62.55823953

		elapsed time (off bottom to canistering)	
at surface	in canister	23.0	minutes
5/3/05 12:55	5/3/05 13:13	0.383	hours
		0.619139187	SQRT (hrs)
at surface	in canister	SQRT hrs. (since off bottom)	
0:27:30	0:09:30	0.735980072	
0:43:00	0:25:00	0.894427191	
1:10:00	0:52:00	1.118033989	
1:16:30	0:58:30	1.165475582	
1:58:00	1:40:00	1.431782106	
2:46:00	2:28:00	1.688194302	estimate
4:49:00	4:31:00	2.213594362	
5:50:00	5:32:00	2.43241992	
10:29:00	10:11:00	3.250640962	
19:02:00	18:44:00	4.372261047	
42:08:00	41:50:00	6.497435391	
53:52:00	53:34:00	7.345066371	
67:00:00	66:42:00	8.190441584	
77:54:00	77:36:00	8.830817252	
99:32:00	99:14:00	9.98081493	
125:23:00	125:05:00	11.20119041	
146:09:00	145:51:00	12.09269752	
175:25:00	175:07:00	13.2476413	
196:28:00	196:10:00	14.0196291	
224:03:00	223:45:00	14.97108324	
264:23:00	264:05:00	16.26243114	
286:12:00	285:54:00	16.91990938	
315:15:00	314:57:00	17.75762747	
365:40:00	365:22:00	19.1245915	
415:17:00	414:59:00	20.38054628	
555:17:00	554:59:00	23.56621876	
721:53:00	721:35:00	26.86943741	
920:50:00	920:32:00	30.34660882	
1221:42:00	1221:24:00	34.95401741	
1418:52:00	1418:34:00	37.66895273	
1558:52:00	1558:34:00	39.48354087	
1729:21:00	1729:03:00	41.58645613	
1917:33:00	1917:15:00	43.79079051	
2065:45:00	2065:27:00	45.45143929	
2235:18:00	2235:00:00	47.27984067	
2402:44:00	2402:26:00	49.01853391	
2571:39:00	2571:21:00	50.71226019	
2761:25:00	2761:07:00	52.54997621	
2907:23:00	2907:05:00	53.92092976	
3075:00:00	3074:42:00	55.45343392	
3242:04:00	3241:46:00	56.93988058	
3411:23:00	3411:05:00	58.40776204	
3577:33:00	3577:15:00	59.8133207	
3770:07:00	3769:49:00	61.40195437	
3922:47:00	3922:29:00	62.63279226	
4082:00:00	4081:42:00	63.89118353	
4498:45:00	4498:27:00	67.07334294	
4588:51:00	4588:33:00	67.74166615	
4849:14:00	4848:56:00	69.63703517	

5186:49:00	5186:31:00	72.02013607
5355:43:00	5355:25:00	73.18333144
5548:25:00	5548:07:00	74.48825411
6026:02:00	6025:44:00	77.62806623
6219:14:00	6218:56:00	78.8626443
6386:27:00	6386:09:00	79.91578901
6530:56:00	6530:38:00	80.81470576
6723:34:00	6723:16:00	81.99786583
6890:25:00	6890:07:00	83.00903565
7009:26:00	7009:08:00	83.7228563
7129:58:00	7129:40:00	84.4396234
7395:43:00	7395:25:00	85.9988372
7562:58:00	7562:40:00	86.96579787
7947:15:00	7946:57:00	89.14781732
8308:33:00	8308:15:00	91.15170505
8643:17:00	8642:59:00	92.96970833
8883:16:00	8882:58:00	94.25152519
9219:53:00	9219:35:00	96.0206575
9482:12:00	9481:54:00	97.37701645
9650:55:00	9650:37:00	98.23950326
9796:19:00	9796:01:00	98.97676495
9963:55:00	9963:37:00	99.81983771
10299:57:00	10299:39:00	101.4890799
10468:12:00	10467:54:00	102.3146291
11066:43:00	11066:25:00	105.1988593
11230:51:00	11230:33:00	105.9760979
11402:29:00	11402:11:00	106.7828014
11567:05:00	11566:47:00	107.5507632
11929:33:00	11929:15:00	109.2228609
12099:53:00	12099:35:00	109.9998485
12313:50:00	12313:32:00	110.9680885

		elapsed time (off bottom to canistering)	
at surface	in canister	32.0	minutes
5/3/05 15:28	5/3/05 15:52	0.533	hours
		0.730296743	SQRT (hrs)
at surface	in canister	SQRT hrs. (since off bottom)	
0:31:30	0:07:30	0.81137743	
0:44:00	0:20:00	0.930949336	
0:59:45	0:35:45	1.062622542	
1:57:00	1:33:00	1.443375673	
2:14:45	1:50:45	1.542454754	
3:19:00	2:55:00	1.857417562	
8:00:00	7:36:00	2.851899951	
16:30:00	16:06:00	4.078398378	
39:35:00	39:11:00	6.302116047	
51:17:00	50:53:00	7.170541588	
64:29:00	64:05:00	8.03844927	
75:22:00	74:58:00	8.689073598	
97:01:00	96:37:00	9.856469956	
122:52:00	122:28:00	11.09053651	
143:37:00	143:13:00	11.98957881	
172:53:00	172:29:00	13.15357999	
193:57:00	193:33:00	13.93137945	
221:32:00	221:08:00	14.88847429	
261:52:00	261:28:00	16.18641406	
312:43:00	312:19:00	17.68756625	
363:08:00	362:44:00	19.05955578	

412:46:00	412:22:00	20.31994094
552:45:00	552:21:00	23.51347132
719:21:00	718:57:00	26.82318649
918:18:00	917:54:00	30.30566504
1050:38:00	1050:14:00	32.41553126
1219:27:00	1219:03:00	34.92253332
1416:10:00	1415:46:00	37.63376144
1556:20:00	1555:56:00	39.45208064
1726:48:00	1726:24:00	41.5563874
1915:00:00	1914:36:00	43.76223638
2063:13:00	2062:49:00	45.42411254
2232:49:00	2232:25:00	47.25410035
2400:12:00	2399:48:00	48.99319681
2569:08:00	2568:44:00	50.68793413
2758:53:00	2758:29:00	52.5263426
2904:51:00	2904:27:00	53.8978973
3072:27:00	3072:03:00	55.4308879
3239:31:00	3239:07:00	56.91792336
3408:50:00	3408:26:00	58.38635685
3575:01:00	3574:37:00	59.79255807
3767:35:00	3767:11:00	61.38172909
3920:14:00	3919:50:00	62.61283149
4079:29:00	4079:05:00	63.87187696
4496:13:00	4495:49:00	67.05482831
4586:18:00	4585:54:00	67.72321119
4846:42:00	4846:18:00	69.61920233
5184:17:00	5183:53:00	72.00289346
5353:10:00	5352:46:00	73.16624905
5545:53:00	5545:29:00	74.47158295
6047:30:00	6047:06:00	77.76653093
6216:42:00	6216:18:00	78.84689806
6383:55:00	6383:31:00	79.90025031
6528:24:00	6528:00:00	80.79933993
6721:01:00	6720:37:00	81.98262011
6887:52:00	6887:28:00	82.99397568
7006:54:00	7006:30:00	83.70802431
7127:26:00	7127:02:00	84.42491733
7393:11:00	7392:47:00	85.98439781

		elapsed time (off bottom to canistering)
at surface	in canister	26.0 minutes
5/3/05 15:28	5/3/05 15:46	0.433 hours
		0.658280589 SQRT (hrs)
at surface	in canister	SQRT hrs. (since off bottom)
0:25:00	0:07:00	0.741619849
0:30:30	0:12:30	0.801040989
0:35:45	0:17:45	0.853912564
0:40:30	0:22:30	0.899073597
0:43:30	0:25:30	0.926462807
0:56:00	0:38:00	1.032795559
1:30:00	1:12:00	1.278019301
1:48:45	1:30:45	1.394931301
3:20:00	3:02:00	1.861898672
7:57:00	7:39:00	2.843120352
16:29:00	16:11:00	4.076354581
39:39:00	39:21:00	6.307403058
51:18:00	51:00:00	7.171703656
64:28:00	64:10:00	8.037412519

75:21:00	75:03:00	8.688114487
97:00:00	96:42:00	9.855624452
122:51:00	122:33:00	11.08978509
143:37:00	143:19:00	11.98957881
172:52:00	172:34:00	13.15294644
193:56:00	193:38:00	13.93078127
221:31:00	221:13:00	14.88791456
261:51:00	261:33:00	16.18589921
312:43:00	312:25:00	17.68756625
363:09:00	362:51:00	19.059993
412:46:00	412:28:00	20.31994094
552:46:00	552:28:00	23.51382572
719:21:00	719:03:00	26.82318649
918:19:00	918:01:00	30.30594001
1050:38:00	1050:20:00	32.41553126
1219:32:00	1219:14:00	34.92372641
1416:10:00	1415:52:00	37.63376144
1556:20:00	1556:02:00	39.45208064
1726:49:00	1726:31:00	41.55658793
1915:01:00	1914:43:00	43.76242681
2063:14:00	2062:56:00	45.424296
2232:50:00	2232:32:00	47.2542767
2400:12:00	2399:54:00	48.99319681
2569:08:00	2568:50:00	50.68793413
2758:54:00	2758:36:00	52.52650125
2904:51:00	2904:33:00	53.8978973
3072:27:00	3072:09:00	55.4308879
3239:32:00	3239:14:00	56.91806977
3408:53:00	3408:35:00	58.38678503
3575:02:00	3574:44:00	59.79269744
3767:36:00	3767:18:00	61.38186486
3920:15:00	3919:57:00	62.61296458
4079:29:00	4079:11:00	63.87187696
4496:14:00	4495:56:00	67.05495259
4586:19:00	4586:01:00	67.72333424
4846:43:00	4846:25:00	69.61932203
5184:18:00	5184:00:00	72.0030092
5353:11:00	5352:53:00	73.16636295
5545:54:00	5545:36:00	74.47169485
6047:31:00	6047:13:00	77.76663809
6216:43:00	6216:25:00	78.84700375
6527:55:00	6527:37:00	80.79634893
6721:02:00	6720:44:00	81.98272176
6887:53:00	6887:35:00	82.99407609
7006:55:00	7006:37:00	83.70812386

		elapsed time (off bottom to canistering)	
at surface	in canister	13.5	minutes
5/4/05 14:38	5/4/05 14:46	0.225	hours
		0.474341649	SQRT (hrs)

at surface	in canister	SQRT hrs. (since off bottom)
0:12:00	0:03:30	0.532290647
0:14:00	0:05:30	0.562731434
0:17:15	0:08:45	0.608960864
0:19:30	0:11:00	0.639009651
0:32:15	0:23:45	0.787929777
1:00:30	0:52:00	1.044828535
1:11:00	1:02:30	1.125462868

1:43:00	1:34:30	1.341640787	
16:22:00	16:13:30	4.055859958	
30:36:00	30:27:30	5.539253861	
41:20:00	41:11:30	6.435578192	
52:13:00	52:04:30	7.231873893	
65:21:00	65:12:30	8.089087299	
73:52:00	73:43:30	8.599418585	
99:43:00	99:34:30	9.989994995	
120:27:00	120:18:30	10.97876739	
149:44:00	149:35:30	12.23996187	
170:47:00	170:38:30	13.07159771	
198:22:00	198:13:30	14.08722826	
238:43:00	238:34:30	15.45315502	
260:30:00	260:21:30	16.14259376	
289:35:00	289:26:30	17.01959655	
340:00:00	339:51:30	18.44134847	
365:31:00	365:22:30	19.12066944	
381:37:00	381:28:30	19.53714411	
529:37:00	529:28:30	23.01521236	
696:12:00	696:03:30	26.38718123	
895:10:00	895:01:30	29.9207286	
1027:30:00	1027:21:30	32.05594069	estimate
1196:23:00	1196:14:30	34.58997928	
1393:01:00	1392:52:30	37.32425485	
1533:11:00	1533:02:30	39.15694915	
1703:39:00	1703:30:30	41.27630474	
1891:52:00	1891:43:30	43.49655159	
2040:04:00	2039:55:30	45.16801966	
2209:41:00	2209:32:30	47.00815532	
2377:03:00	2376:54:30	48.75585435	
2545:59:00	2545:50:30	50.45856386	
2735:44:00	2735:35:30	52.30503481	
2881:42:00	2881:33:30	53.68224412	
3049:18:00	3049:09:30	55.22122177	
3216:23:00	3216:14:30	56.71390188	
3312:59:00	3312:50:30	57.55924484	
3385:43:00	3385:34:30	58.18762755	
3551:52:00	3551:43:30	59.59823823	
3744:26:00	3744:17:30	61.19245596	
3897:07:00	3896:58:30	62.42755802	
4056:20:00	4056:11:30	63.69000445	
4473:05:00	4472:56:30	66.88173642	
4563:10:00	4563:01:30	67.55183195	
4823:34:00	4823:25:30	69.45250175	
5161:09:00	5161:00:30	71.84172418	
5330:01:00	5329:52:30	73.00753386	
5522:44:00	5522:35:30	74.3156556	
6024:21:00	6024:12:30	77.61722317	
6193:33:00	6193:24:30	78.69963998	
6360:47:00	6360:38:30	79.75504164	
6505:16:00	6505:07:30	80.65574995	

		elapsed time (off bottom to canistering)	
at surface	in canister	34.0	minutes
5/5/05 9:13	5/5/05 9:38	0.567	hours
		0.752772653	SQRT (hrs)
at surface	in canister	SQRT hrs. (since off bottom)	
1:39:45	1:14:45	1.346291202	
2:28:45	2:03:45	1.621470526	
2:47:00	2:22:00	1.712697677	
4:12:00	3:47:00	2.085665361	
5:41:00	5:16:00	2.415229458	estimate
6:07:00	5:42:00	2.503331114	

8:07:00	7:42:00	2.875181154
9:31:00	9:06:00	3.109126351
11:40:00	11:15:00	3.437537879
22:46:00	22:21:00	4.787135539
33:39:00	33:14:00	5.813776741
46:45:00	46:20:00	6.848357467
55:18:00	54:53:00	7.446475676
81:09:00	80:44:00	9.016651263
101:53:00	101:28:00	10.10115505
131:10:00	130:45:00	11.45934844
152:13:00	151:48:00	12.34368935
179:49:00	179:24:00	13.41516555
271:01:00	270:36:00	16.46713899
363:02:00	362:37:00	19.05736953
510:55:00	510:30:00	22.60678364
677:39:00	677:14:00	26.03459237
876:37:00	876:12:00	29.61024597
1008:56:00	1008:31:00	31.76607205
1177:49:00	1177:24:00	34.321519
1374:26:00	1374:01:00	37.07537368
1514:36:00	1514:11:00	38.91978931
1685:05:00	1684:40:00	41.05159355
1873:17:00	1872:52:00	43.2831761
2021:30:00	2021:05:00	44.96276237
2191:08:00	2190:43:00	46.8111454
2358:29:00	2358:04:00	48.56576297
2527:26:00	2527:01:00	50.27507666
2717:10:00	2716:45:00	52.12788761
2863:07:00	2862:42:00	53.50950071
3030:43:00	3030:18:00	55.0533075

		elapsed time (off bottom to canistering)
at surface	in canister	31.5 minutes
5/5/05 9:13	5/5/05 9:35	0.525 hours
		0.724568837 SQRT (hrs)
at surface	in canister	SQRT hrs. (since off bottom)
0:55:00	0:32:30	1.032795559
1:00:15	0:37:45	1.074321491
1:38:30	1:16:00	1.338531534
2:30:00	2:07:30	1.62788206
2:46:00	2:23:30	1.707825128
4:11:00	3:48:30	2.081665999
5:40:00	5:17:30	2.411776662
6:08:00	5:45:30	2.506657801
8:09:00	7:46:30	2.880972058
9:32:00	9:09:30	3.111805478
11:39:00	11:16:30	3.435112807
22:47:00	22:24:30	4.788875999
33:40:00	33:17:30	5.815209942
46:44:00	46:21:30	6.847140522
55:18:00	54:55:30	7.446475676
81:11:00	80:48:30	9.018499506
101:54:00	101:31:30	10.10198
131:10:00	130:47:30	11.45934844
152:13:00	151:50:30	12.34368935
179:49:00	179:26:30	13.41516555
220:10:00	219:47:30	14.84306797
241:55:00	241:32:30	15.55849179

271:01:00	270:38:30	16.46713899
321:27:00	321:04:30	17.93320942
346:57:00	346:34:30	18.63061996
363:03:00	362:40:30	19.0578068
511:04:00	510:41:30	22.61010099
677:40:00	677:17:30	26.03491246
876:38:00	876:15:30	29.61052741
1008:57:00	1008:34:30	31.76633438
1177:50:00	1177:27:30	34.3217618
1374:27:00	1374:04:30	37.07559844
1514:37:00	1514:14:30	38.92000343
1685:05:00	1684:42:30	41.05159355
1873:18:00	1872:55:30	43.28336863
2021:31:00	2021:08:30	44.96294771
2191:09:00	2190:46:30	46.81132342
2358:29:00	2358:06:30	48.56576297
2527:26:00	2527:03:30	50.27507666
2717:11:00	2716:48:30	52.12804747
2863:08:00	2862:45:30	53.50965645
3030:44:00	3030:21:30	55.05345887
3197:48:00	3197:25:30	56.55041998
3339:04:00	3338:41:30	57.78595562
3367:09:00	3366:46:30	58.0284413
3533:18:00	3532:55:30	59.44282968
3725:52:00	3725:29:30	61.04110637
3866:31:00	3866:08:30	62.18252702
4037:45:00	4037:22:30	63.54447262
4454:30:00	4454:07:30	66.74316444
4544:35:00	4544:12:30	67.41463738
4805:00:00	4804:37:30	69.31918926

		elapsed time (off bottom to canistering)
at surface	in canister	15.5 minutes
5/5/05 12:05	5/5/05 12:13	0.258 hours
		0.508265023 SQRT (hrs)
at surface	in canister	SQRT hrs. (since off bottom)
0:13:00	0:05:00	0.584522597
0:15:45	0:07:45	0.62249498
0:18:00	0:10:00	0.651920241
0:36:45	0:28:45	0.858778202
0:40:15	0:32:15	0.892094913
0:51:00	0:43:00	0.987420883
1:18:00	1:10:00	1.193733639
1:38:00	1:30:00	1.326021619
2:12:00	2:04:00	1.524795068
2:25:00	2:17:00	1.594260539
2:47:00	2:39:00	1.705383632
3:17:00	3:09:00	1.846167201
4:30:00	4:22:00	2.150581317
4:52:00	4:44:00	2.23420381
5:18:00	5:10:00	2.32916294
6:38:00	6:30:00	2.599679467
8:46:00	8:38:00	2.981889781
19:57:00	19:49:00	4.480513363
30:49:00	30:41:00	5.562523408
43:51:00	43:43:00	6.631364867
52:27:00	52:19:00	7.250862018
78:20:00	78:12:00	8.857670875

99:02:00	98:54:00	9.957827742
128:19:00	128:11:00	11.33321078
149:22:00	149:14:00	12.22667848
176:58:00	176:50:00	13.30757929
217:19:00	217:11:00	14.74590339
239:04:00	238:56:00	15.46582253
268:10:00	268:02:00	16.37961131
318:36:00	318:28:00	17.85287092
344:05:00	343:57:00	18.55285243
360:11:00	360:03:00	18.98178952
406:06:00	405:58:00	20.15502419
508:13:00	508:05:00	22.54643357
674:48:00	674:40:00	25.9793187
873:47:00	873:39:00	29.56194062
1006:05:00	1005:57:00	31.72078709
1174:58:00	1174:50:00	34.27961007
1371:36:00	1371:28:00	37.03680602
1511:45:00	1511:37:00	38.88283683
1682:14:00	1682:06:00	41.0165617
1870:27:00	1870:19:00	43.25014451
2018:40:00	2018:32:00	44.93096557
2188:19:00	2188:11:00	46.78078309
2355:38:00	2355:30:00	48.53615491
2524:35:00	2524:27:00	50.24647583
2714:20:00	2714:12:00	52.10046385
2860:17:00	2860:09:00	53.48278539
3027:53:00	3027:45:00	55.02734169
3194:57:00	3194:49:00	56.52499447
3364:17:00	3364:09:00	58.00352001
3530:26:00	3530:18:00	59.41850161
3723:01:00	3722:53:00	61.01755212
3875:42:00	3875:34:00	62.2561242
4034:54:00	4034:46:00	63.52184664
4451:39:00	4451:31:00	66.72162318
4541:43:00	4541:35:00	67.39318709
4802:09:00	4802:01:00	69.29844876
5139:42:00	5139:34:00	71.69257284
5308:35:00	5308:27:00	72.86088342
5501:18:00	5501:10:00	74.1715916
6002:55:00	6002:47:00	77.47929831

		elapsed time (off bottom to canistering)
at surface	in canister	12.3 minutes
5/5/05 17:26	5/5/05 17:32	0.204 hours
		0.451848057 SQRT (hrs)
at surface	in canister	SQRT hrs. (since off bottom)
0:08:00	0:01:45	0.483045892
0:10:00	0:03:45	0.516397779
0:13:00	0:06:45	0.562731434
0:16:00	0:09:45	0.605530071
0:18:30	0:12:15	0.639009651
0:21:00	0:14:45	0.670820393
0:23:00	0:16:45	0.695221787
0:25:00	0:18:45	0.718795289
0:26:30	0:20:15	0.735980072
1:16:00	1:09:45	1.169045194
3:23:00	3:16:45	1.866369024
14:37:00	14:30:45	3.836230789

25:30:00	25:23:45	5.059644256
38:29:00	38:22:45	6.211548385
47:08:00	47:01:45	6.872651114
73:01:00	72:54:45	8.55082842
93:42:00	93:35:45	9.68504001
122:59:00	122:52:45	11.09429283
144:02:00	143:55:45	12.00555427
171:38:00	171:31:45	13.10470653
211:59:00	211:52:45	14.56308118
262:50:00	262:43:45	16.21521919
313:16:00	313:09:45	17.70216559
354:51:00	354:44:45	18.84011677
400:47:00	400:40:45	20.02207115
502:55:00	502:48:45	22.42803305
669:29:00	669:22:45	25.87630834
868:28:00	868:21:45	29.47145512
1000:45:00	1000:38:45	31.63621343
1169:38:00	1169:31:45	34.2013645
1366:17:00	1366:10:45	36.96462273
1506:25:00	1506:18:45	38.81387209
1676:53:00	1676:46:45	40.95098696
1865:06:00	1864:59:45	43.18796129
2013:20:00	2013:13:45	44.87129743
2182:59:00	2182:52:45	46.72347732
2350:17:00	2350:10:45	48.48075219
2519:16:00	2519:09:45	50.19329304
2708:59:00	2708:52:45	52.04885525
2854:56:00	2854:49:45	53.43251195
3022:32:00	3022:25:45	54.97848064
3189:36:00	3189:29:45	56.47742912
3358:57:00	3358:50:45	57.95731188
3525:06:00	3524:59:45	59.37339472
3717:40:00	3717:33:45	60.97349151
3870:18:00	3870:11:45	62.21253893
4029:33:00	4029:26:45	63.47952426
4446:19:00	4446:12:45	66.68145669
4536:24:00	4536:17:45	67.35354482
4796:49:00	4796:42:45	69.25977669
5134:22:00	5134:15:45	71.65519288
5303:15:00	5303:08:45	72.82410315
5495:58:00	5495:51:45	74.1354616
5973:35:00	5973:28:45	77.28960689
6166:46:00	6166:39:45	78.52940001
6333:59:00	6333:52:45	79.58695454
6502:29:00	6502:22:45	80.63859704
6671:04:00	6670:57:45	81.6772102
6837:56:00	6837:49:45	82.69240191
6956:58:00	6956:51:45	83.40903228
7077:29:00	7077:22:45	84.12837413
7343:14:00	7343:07:45	85.69325139
7510:28:00	7510:21:45	86.66352558
7894:45:00	7894:38:45	88.85296844
8256:03:00	8255:56:45	90.86335895
8590:48:00	8590:41:45	92.68710806
8830:47:00	8830:40:45	93.97277975
9167:25:00	9167:18:45	95.74714965
9429:39:00	9429:32:45	97.10689986
9598:25:00	9598:18:45	97.97201982
9743:49:00	9743:42:45	98.71127933
9911:25:00	9911:18:45	99.55660032

10247:27:00	10247:20:45	101.2301832
10415:41:00	10415:34:45	102.0577451
11014:12:00	11014:05:45	104.9490353
11178:24:00	11178:17:45	105.7284257
11349:59:00	11349:52:45	106.5367699
11514:35:00	11514:28:45	107.3064925
11877:03:00	11876:56:45	108.982338
12047:23:00	12047:16:45	109.7610283

		elapsed time (off bottom to canistering)	
at surface	in canister	12.8	minutes
5/6/05 10:49	5/6/05 10:54	0.213	hours
		0.460977223	SQRT (hrs)

at surface	in canister	SQRT hrs. (since off bottom)
0:11:15	0:05:30	0.55151307
0:30:00	0:24:15	0.785281266
0:44:00	0:38:15	0.921954446
1:01:00	0:55:15	1.064581295
1:22:00	1:16:15	1.217921727
1:38:00	1:32:15	1.322875656
1:56:00	1:50:15	1.431782106
3:02:00	2:56:15	1.774823935
4:27:00	4:21:15	2.136976057
5:04:00	4:58:15	2.276693509
6:15:00	6:09:15	2.523225449
8:08:00	8:02:15	2.872281323
21:05:00	20:59:15	4.604345773
29:45:00	29:39:15	5.465040409
55:39:00	55:33:15	7.467708261
76:20:00	76:14:15	8.743569065
105:37:00	105:31:15	10.28267151
126:40:00	126:34:15	11.25981054
154:16:00	154:10:15	12.42510899
194:37:00	194:31:15	13.95468858
221:28:00	221:22:15	14.88567544
295:53:00	295:47:15	17.20465053
337:28:00	337:22:15	18.37344098
383:24:00	383:18:15	19.58358156
485:33:00	485:27:15	22.03784623
652:06:00	652:00:15	25.53853298
851:06:00	851:00:15	29.17561767
983:22:00	983:16:15	31.36053784
1152:16:00	1152:10:15	33.94677206
1348:54:00	1348:48:15	36.72896223
1489:02:00	1488:56:15	38.58950635
1659:31:00	1659:25:15	40.73859759
1847:44:00	1847:38:15	42.98662583
1995:58:00	1995:52:15	44.67754843
2165:37:00	2165:31:15	46.53744012
2332:55:00	2332:49:15	48.30148376
2501:53:00	2501:47:15	50.019996
2691:37:00	2691:31:15	51.88191721
2837:34:00	2837:28:15	53.26991021
3005:10:00	3005:04:15	54.82046455
3172:14:00	3172:08:15	56.32361849
3341:34:00	3341:28:15	57.80729481
3507:43:00	3507:37:15	59.22696458
3700:18:00	3700:12:15	60.83105019

3840:56:00	3840:50:15	61.97620511

TABLE 2 -- Desorption measurements for KGS Deffenbaugh Quarry #2, sec. 1-T.12S.-T.23E., Johnson Co., KS

SAMPLE: 388.0' to 389.0' (black shale) in canister DQ1

	lbs.	grams		lbs.	grams	moisture %		TIME OF:
dry sample weight:	1.857	842.48	wet sample weight:	2.025	918.72	8.30%	est. lost gas (cc) = 47	off bottom 11/19/04 11:44

RIG/LAB MEASUREMENTS			CONVERSION OF RIG/LAB MEASUREMENTS TO STP (@60 deg F; 14.7 psi)					CUMULATIVE VOLUMES (@STP)		SCF/TON	SCF/TON		TIME SINCE
measured cc	measured T (F)	measured P	cubic ft	absolute T (F)	psia	cubic ft (@STP)	cc (@STP)	cubic ft	cc	without lost gas	with lost gas	TIME OF MEASURE	off bottom
18	67	1084	0.00064	527	14.070	0.000600336	17.00	0.000600336	17.00	0.65	2.43	11/19/04 12:12	0:28:30
8	67	1084	0.00028	527	14.070	0.000266816	7.56	0.000867152	24.55	0.93	2.72	11/19/04 12:17	0:33:15
11	67	1084	0.00039	527	14.070	0.000366872	10.39	0.001234024	34.94	1.33	3.12	11/19/04 12:29	0:44:45
5	67	1084	0.00018	527	14.070	0.00016676	4.72	0.001400784	39.67	1.51	3.30	11/19/04 12:36	0:51:45
20	67	1084	0.00071	527	14.070	0.00066704	18.89	0.002067824	58.55	2.23	4.01	11/19/04 12:59	1:15:30
3	67	1083	0.00011	527	14.057	9.99637E-05	2.83	0.002167788	61.38	2.33	4.12	11/19/04 13:05	1:21:30
10	68	1083	0.00035	528	14.057	0.000332581	9.42	0.002500369	70.80	2.69	4.48	11/19/04 13:19	1:34:45
20	68	1083	0.00071	528	14.057	0.000665162	18.84	0.003165531	89.64	3.41	5.20	11/19/04 14:01	2:16:45
13	68	1083	0.00046	528	14.057	0.000432356	12.24	0.003597887	101.88	3.87	5.66	11/19/04 14:32	2:47:45
17	68	1083	0.0006	528	14.057	0.000565388	16.01	0.004163275	117.89	4.48	6.27	11/19/04 15:59	4:15:15
22	68	1083	0.00078	528	14.057	0.000731679	20.72	0.004894954	138.61	5.27	7.06	11/19/04 17:06	5:21:45
83	68	1086	0.00293	528	14.096	0.002768071	78.38	0.007663025	216.99	8.25	10.04	11/19/04 22:00	10:15:45
156	67	1093	0.00551	527	14.187	0.00524611	148.55	0.012909134	365.54	13.90	15.69	11/20/04 18:26	30:41:45
63	69	1098	0.00222	529	14.252	0.002120266	60.04	0.0150294	425.58	16.18	17.97	11/21/04 7:32	43:47:45
45	66	1096	0.00159	526	14.226	0.001520339	43.05	0.01654974	468.63	17.82	19.61	11/21/04 18:45	55:00:45
43	65	1090	0.00152	525	14.148	0.001447568	40.99	0.017997307	509.63	19.38	21.17	11/22/04 7:07	67:22:45
46	67	1081	0.00162	527	14.031	0.001529946	43.32	0.019527253	552.95	21.03	22.81	11/22/04 20:10	80:25:45
30	67	1083	0.00106	527	14.057	0.000999637	28.31	0.02052689	581.25	22.10	23.89	11/23/04 7:15	91:30:45
37	66	1080	0.00131	526	14.018	0.001231808	34.88	0.021758698	616.14	23.43	25.22	11/24/04 10:38	118:53:45
18	67	1082	0.00064	527	14.044	0.000599228	16.97	0.022357927	633.10	24.08	25.86	11/24/04 20:55	129:10:45
58	69	1073	0.00205	529	13.927	0.001907547	54.02	0.024265474	687.12	26.13	27.92	11/26/04 9:06	165:21:45
40	68	1085	0.00141	528	14.083	0.001332782	37.74	0.025598255	724.86	27.56	29.35	11/28/04 10:00	214:15:45
73	68	1081	0.00258	528	14.031	0.002423359	68.62	0.028021615	793.48	30.17	31.96	12/3/04 16:21	340:36:45
78	68	1089	0.00275	528	14.135	0.002608506	73.86	0.03063012	867.35	32.98	34.77	12/15/04 17:24	629:39:45
32	67	1100	0.00113	527	14.278	0.001083017	30.67	0.031713137	898.01	34.15	35.94	12/23/04 12:30	816:45:45
42	68	1085	0.00148	528	14.083	0.001399421	39.63	0.033112558	937.64	35.66	37.44	12/31/04 18:20	1014:35:45
30	67	1080	0.00106	527	14.018	0.000996868	28.23	0.034109426	965.87	36.73	38.52	1/10/05 14:23	1250:38:45
24	67	1078	0.00085	527	13.992	0.000796017	22.54	0.034905443	988.41	37.59	39.37	1/20/05 15:25	1491:40:45
4	68	1094	0.00014	528	14.200	0.000134384	3.81	0.035039827	992.21	37.73	39.52	1/27/05 16:36	1660:51:45
14	69	1093	0.00049	529	14.187	0.000469025	13.28	0.035508852	1005.49	38.24	40.02	2/3/05 15:52	1828:07:45
9	68	1093	0.00032	528	14.187	0.000302087	8.55	0.035810939	1014.05	38.56	40.35	2/10/05 15:16	1995:31:45
18	70	1089	0.00064	530	14.135	0.000599691	16.98	0.03641063	1031.03	39.21	40.99	2/17/05 14:18	2162:33:45
12	68	1087	0.00042	528	14.109	0.000400572	11.34	0.036811201	1042.37	39.64	41.43	2/24/05 15:38	2331:53:45
11	68	1080	0.00039	528	14.018	0.000364826	10.33	0.037176027	1052.70	40.03	41.82	3/3/05 14:31	2498:46:45
14	69	1075	0.00049	529	13.953	0.000461301	13.06	0.037637328	1065.77	40.53	42.32	3/10/05 14:22	2666:37:45
12	69	1071	0.00042	529	13.901	0.000393929	11.15	0.038031257	1076.92	40.95	42.74	3/18/05 10:54	2855:09:45
-3	68	1081	-0.00011	528	14.031	-9.95901E-05	-2.82	0.037931667	1074.10	40.84	42.63	3/23/05 12:38	2976:53:45
9	69	1084	0.00032	529	14.070	0.000299033	8.47	0.0382307	1082.57	41.17	42.95	4/2/05 15:33	3219:48:45
9	70	1080	0.00032	530	14.018	0.000297368	8.42	0.038528068	1090.99	41.49	43.27	4/8/05 14:56	3363:11:45
-1	69	1091	-3.5E-05	529	14.161	-3.34405E-05	-0.95	0.038494627	1090.04	41.45	43.24	4/15/05 10:52	3527:07:45
17	71	1072	0.0006	531	13.914	0.000556484	15.76	0.039051111	1105.80	42.05	43.84	4/21/05 17:34	3677:49:45
-8	68	1080	-0.00028	528	14.018	-0.000265328	-7.51	0.038785783	1098.29	41.76	43.55	4/28/05 14:56	3843:11:45
-4	67	1087	-0.00014	527	14.109	-0.000133777	-3.79	0.038652006	1094.50	41.62	43.41	5/5/05 21:48	4018:03:45
12	67	1080	0.00042	527	14.018	0.000398747	11.29	0.039050753	1105.79	42.05	43.84	5/12/05 11:51	4176:06:45
4	71	1081	0.00014	531	14.031	0.000132037	3.74	0.03918279	1109.53	42.19	43.98	5/20/05 12:01	4368:16:45
3	71	1085	0.00011	531	14.083	9.93939E-05	2.81	0.039282184	1112.34	42.30	44.09	5/26/05 15:56	4516:11:45
8	70	1077	0.00028	530	13.979	0.000263592	7.46	0.039545776	1119.81	42.58	44.37	6/2/05 14:37	4682:52:45
12	73	1076	0.00042	533	13.966	0.000392798	11.12	0.039938574	1130.93	43.01	44.79	6/10/05 21:36	4881:51:45
1	73	1081	3.5E-05	533	14.031	3.28853E-05	0.93	0.03997146	1131.86	43.04	44.83	6/16/05 9:59	5014:14:45
1	69	1084	3.5E-05	529	14.070	3.32259E-05	0.94	0.040004685	1132.80	43.08	44.86	6/23/05 10:43	5182:58:45
9	71	1081	0.00032	531	14.031	0.000297082	8.41	0.040301768	1141.21	43.40	45.18	7/1/05 15:29	5379:44:45
2	74	1085	7.1E-05	534	14.083	6.58903E-05	1.87	0.040367658	1143.08	43.47	45.26	7/7/05 11:42	5519:57:45

8	74	1081	0.00028	534	14.031	0.00026259	7.44	0.040630248	1150.52	43.75	45.54	7/14/05 14:07	5690:22:45
1	73	1084	3.5E-05	533	14.070	3.29766E-05	0.93	0.040663224	1151.45	43.79	45.57	7/22/05 10:22	5878:37:45
-1	73	1087	-3.5E-05	533	14.109	-3.30678E-05	-0.94	0.040630157	1150.51	43.75	45.54	7/28/05 14:32	6026:47:45
10	73	1085	0.00035	533	14.083	0.00033007	9.35	0.040960226	1159.86	44.11	45.89	8/4/05 16:00	6196:15:45
6	73	1079	0.00021	533	14.005	0.000196947	5.58	0.041157173	1165.44	44.32	46.11	8/11/05 15:34	6363:49:45
7	73	1074	0.00025	533	13.940	0.000228706	6.48	0.041385879	1171.91	44.56	46.35	8/18/05 16:24	6532:39:45
-1	73	1079	-3.5E-05	533	14.005	-3.28244E-05	-0.93	0.041353055	1170.98	44.53	46.32	8/26/05 14:15	6722:30:45
-3	73	1086	-0.00011	533	14.096	-9.91122E-05	-2.81	0.041253943	1168.18	44.42	46.21	9/1/05 16:06	6868:21:45
2	73	1084	7.1E-05	533	14.070	6.59531E-05	1.87	0.041319896	1170.04	44.49	46.28	9/8/05 15:48	7036:03:45

DECANISTERED 9/8/2005; sample dried 23 days in air

SAMPLE: 424.0' to 426.0' (Anna Shale Mbr) in canister DQ2

	lbs.	grams		lbs.	grams	moisture %	est. lost gas (cc) =	TIME OF:
dry sample weight:	4.704	2133.52	wet sample weight:	4.871	2209.58	3.44%	15	off bottom 11/19/04 13:51

RIG/LAB MEASUREMENTS			CONVERSION OF RIG/LAB MEASUREMENTS TO STP (@60 deg F; 14.7 psi)					CUMULATIVE VOLUMES (@STP)		SCF/TON	SCF/TON		TIME SINCE
measured cc	measured T (F)	measured P	cubic ft	absolute T (F)	psia	cubic ft (@STP)	cc (@STP)	cubic ft	cc	without lost gas	with lost gas	TIME OF MEASURE	off bottom
7	68	1083	0.00025	528	14.057	0.000232807		6.59	0.000232807	6.59	0.10	0.32	11/19/04 14:30	0:39:00
7	68	1083	0.00025	528	14.057	0.000232807		6.59	0.000465614	13.18	0.20	0.42	11/19/04 14:50	0:59:00
4	68	1083	0.00014	528	14.057	0.000133032		3.77	0.000598646	16.95	0.25	0.48	11/19/04 15:14	1:23:30
3	68	1083	0.00011	528	14.057	9.97744E-05		2.83	0.000698421	19.78	0.30	0.52	11/19/04 15:25	1:34:30
2	68	1083	7.1E-05	528	14.057	6.65162E-05		1.88	0.000764937	21.66	0.33	0.55	11/19/04 15:46	1:55:00
3	68	1083	0.00011	528	14.057	9.97744E-05		2.83	0.000864711	24.49	0.37	0.59	11/19/04 15:59	2:08:00
8	68	1083	0.00028	528	14.057	0.000266065		7.53	0.001130776	32.02	0.48	0.71	11/19/04 17:05	3:14:00
54	68	1086	0.00191	528	14.096	0.001800914		51.00	0.00293169	83.02	1.25	1.47	11/19/04 22:02	8:11:00
86	67	1093	0.00304	527	14.187	0.002892086		81.89	0.005823776	164.91	2.48	2.70	11/20/04 18:31	28:40:00
34	69	1098	0.0012	529	14.252	0.001144271		32.40	0.006968047	197.31	2.96	3.19	11/21/04 7:31	41:40:00
25	66	1096	0.00088	526	14.226	0.000844633		23.92	0.007812679	221.23	3.32	3.55	11/21/04 18:46	52:55:00
25	65	1090	0.00088	525	14.148	0.000841609		23.83	0.008654289	245.06	3.68	3.91	11/22/04 7:08	65:17:00
25	67	1081	0.00088	527	14.031	0.000831492		23.55	0.009485781	268.61	4.03	4.26	11/22/04 20:11	78:20:00
16	67	1083	0.00057	527	14.057	0.00053314		15.10	0.010018921	283.70	4.26	4.49	11/23/04 7:16	89:25:00
20	66	1080	0.00071	526	14.018	0.000665842		18.85	0.010684763	302.56	4.54	4.77	11/24/04 10:39	116:48:00
11	67	1082	0.00039	527	14.044	0.000366195		10.37	0.011050958	312.93	4.70	4.92	11/24/04 20:56	127:05:00
37	69	1073	0.00131	529	13.927	0.001216883		34.46	0.012267841	347.39	5.22	5.44	11/26/04 9:09	163:18:00
27	70	1085	0.00095	530	14.083	0.000896233		25.38	0.013164074	372.76	5.60	5.82	11/28/04 10:02	212:11:00
61	68	1081	0.00215	528	14.031	0.002024999		57.34	0.015189073	430.11	6.46	6.68	12/3/04 16:21	338:30:00
83	68	1089	0.00293	528	14.135	0.002775717		78.60	0.017964791	508.70	7.64	7.86	12/15/04 17:25	627:34:00
43	67	1100	0.00152	527	14.278	0.001455304		41.21	0.019420095	549.91	8.26	8.48	12/23/04 12:31	814:40:00
51	68	1085	0.0018	528	14.083	0.001699297		48.12	0.021119391	598.03	8.98	9.21	12/31/04 18:21	1012:30:00
45	67	1080	0.00159	527	14.018	0.001495302		42.34	0.022614693	640.37	9.62	9.84	1/10/05 14:24	1248:33:00
41	67	1078	0.00145	527	13.992	0.001359863		38.51	0.023974556	678.88	10.19	10.42	1/20/05 15:26	1489:35:00
19	68	1094	0.00067	528	14.200	0.000638323		18.08	0.024612879	696.96	10.47	10.69	1/27/05 16:36	1658:45:00
26	69	1093	0.00092	529	14.187	0.000871046		24.67	0.025483925	721.62	10.84	11.06	2/3/05 15:52	1826:01:00
21	68	1093	0.00074	528	14.187	0.00070487		19.96	0.026188794	741.58	11.14	11.36	2/10/05 15:16	1993:25:00
26	70	1089	0.00092	530	14.135	0.000866221		24.53	0.027055015	766.11	11.50	11.73	2/17/05 14:19	2160:28:00
22	68	1087	0.00078	528	14.109	0.000734381		20.80	0.027789396	786.91	11.82	12.04	2/24/05 15:39	2329:48:00
20	68	1080	0.00071	528	14.018	0.00066332		18.78	0.028452716	805.69	12.10	12.32	3/3/05 14:33	2496:42:00
22	69	1075	0.00078	529	13.953	0.000724901		20.53	0.029177617	826.21	12.41	12.63	3/10/05 14:23	2664:32:00
20	69	1071	0.00071	529	13.901	0.000656549		18.59	0.029834166	844.81	12.69	12.91	3/18/05 10:54	2853:03:00
6	68	1081	0.00021	528	14.031	0.00019918		5.64	0.030033346	850.45	12.77	13.00	3/23/05 12:38	2974:47:00
19	69	1084	0.00067	529	14.070	0.000631292		17.88	0.030664638	868.32	13.04	13.26	4/2/05 15:33	3217:42:00
16	70	1080	0.00057	530	14.018	0.000528653		14.97	0.031193292	883.29	13.26	13.49	4/8/05 14:57	3361:06:00
8	69	1091	0.00028	529	14.161	0.000267524		7.58	0.031460815	890.87	13.38	13.60	4/15/05 10:52	3525:01:00
21	71	1072	0.00074	531	13.914	0.000687421		19.47	0.032148236	910.33	13.67	13.89	4/21/05 17:35	3675:44:00
5	68	1080	0.00018	528	14.018	0.00016583		4.70	0.032314066	915.03	13.74	13.97	4/28/05 14:56	3841:05:00
8	67	1087	0.00028	527	14.109	0.000267554		7.58	0.032581621	922.61	13.85	14.08	5/5/05 21:48	4015:57:00
15	67	1080	0.00053	527	14.018	0.000498434		14.11	0.033080055	936.72	14.07	14.29	5/12/05 11:51	4174:00:00
11	71	1081	0.00039	531	14.031	0.000363101		10.28	0.033443155	947.00	14.22	14.45	5/20/05 12:01	4366:10:00
9	71	1085	0.00032	531	14.083	0.000298182		8.44	0.033741337	955.44	14.35	14.57	5/26/05 16:00	4514:09:00
13	70	1077	0.00046	530	13.979	0.000428338		12.13	0.034169675	967.57	14.53	14.75	6/2/05 14:38	4680:47:00

19	73	1076	0.00067	533	13.966	0.000621931	17.61	0.034791605	985.18	14.79	15.02	6/10/05 21:37	4879:46:00
7	73	1081	0.00025	533	14.031	0.000230197	6.52	0.035021802	991.70	14.89	15.12	6/16/05 10:00	5012:09:00
8	69	1084	0.00028	529	14.070	0.000265807	7.53	0.03528761	999.23	15.00	15.23	6/23/05 10:44	5180:53:00
15	71	1081	0.00053	531	14.031	0.000495137	14.02	0.035782747	1013.25	15.22	15.44	7/1/05 15:29	5377:38:00
8	74	1085	0.00028	534	14.083	0.000263561	7.46	0.036046308	1020.71	15.33	15.55	7/7/05 11:42	5517:51:00
14	74	1081	0.00049	534	14.031	0.000459532	13.01	0.03650584	1033.73	15.52	15.75	7/14/05 14:08	5688:17:00
10	73	1084	0.00035	533	14.070	0.000329766	9.34	0.036835606	1043.06	15.66	15.89	7/22/05 10:21	5876:30:00
6	73	1087	0.00021	533	14.109	0.000198407	5.62	0.037034012	1048.68	15.75	15.97	7/28/05 14:33	6024:42:00
12	73	1085	0.00042	533	14.083	0.000396084	11.22	0.037430096	1059.90	15.92	16.14	8/4/05 16:02	6194:11:00
12	73	1079	0.00042	533	14.005	0.000393893	11.15	0.03782399	1071.05	16.08	16.31	8/11/05 15:34	6361:43:00
11	73	1074	0.00039	533	13.940	0.000359396	10.18	0.038183385	1081.23	16.24	16.46	8/18/05 16:24	6530:33:00
7	73	1079	0.00025	533	14.005	0.000229771	6.51	0.038413157	1087.74	16.33	16.56	8/26/05 14:15	6720:24:00
4	74	1085	0.00014	534	14.083	0.000131781	3.73	0.038544937	1091.47	16.39	16.61	9/1/05 16:06	6866:15:00
7	73	1084	0.00025	533	14.070	0.000230836	6.54	0.038775773	1098.00	16.49	16.71	9/8/05 15:48	7033:57:00
8	74	1082	0.00028	534	14.044	0.000262833	7.44	0.039038606	1105.45	16.60	16.82	9/15/05 14:52	7201:01:00
10	73	1079	0.00035	533	14.005	0.000328244	9.29	0.03936685	1114.74	16.74	16.96	9/22/05 16:13	7370:22:00
-2	71	1090	-7.1E-05	531	14.148	-6.65679E-05	-1.88	0.039300282	1112.86	16.71	16.94	9/29/05 14:22	7536:31:00
4	69	1089	0.00014	529	14.135	0.000133517	3.78	0.039433799	1116.64	16.77	16.99	10/7/05 14:57	7729:06:00
5	71	1087	0.00018	531	14.109	0.000165962	4.70	0.039599761	1121.34	16.84	17.06	10/13/05 23:37	7881:46:00
10	69	1077	0.00035	529	13.979	0.000330113	9.35	0.039929874	1130.68	16.98	17.20	10/20/05 14:50	8040:59:00
9	69	1084	0.00032	529	14.070	0.000299033	8.47	0.040228907	1139.15	17.11	17.33	11/6/05 23:33	8457:42:00
1	69	1087	3.5E-05	529	14.109	3.33179E-05	0.94	0.040262225	1140.09	17.12	17.34	11/10/05 17:42	8547:51:00
7	68	1084	0.00025	528	14.070	0.000233022	6.60	0.040495247	1146.69	17.22	17.44	11/21/05 14:05	8808:14:00
4	68	1086	0.00014	528	14.096	0.000133401	3.78	0.040628648	1150.47	17.28	17.50	12/5/05 15:40	9145:49:00
4	68	1086	0.00014	528	14.096	0.000133401	3.78	0.040762049	1154.25	17.33	17.56	12/12/05 16:35	9314:44:00
0	69	1093	0	529	14.187	0	0.00	0.040762049	1154.25	17.33	17.56	12/20/05 17:18	9507:27:00
9	69	1094	0.00032	529	14.200	0.000301792	8.55	0.041063841	1162.79	17.46	17.69	1/10/06 14:53	10009:02:00
14	68	1077	0.00049	528	13.979	0.000463034	13.11	0.041526875	1175.91	17.66	17.88	1/16/06 16:06	10154:15:00
-5	68	1089	-0.00018	528	14.135	-0.000167212	-4.73	0.041359663	1171.17	17.59	17.81	1/24/06 15:19	10345:28:00
7	68	1081	0.00025	528	14.031	0.000232377	6.58	0.04159204	1177.75	17.69	17.91	1/30/06 15:49	10489:58:00
-3	69	1091	-0.00011	529	14.161	-0.000100321	-2.84	0.041491719	1174.91	17.64	17.87	2/7/06 16:26	10682:35:00
10	69	1074	0.00035	529	13.940	0.000329194	9.32	0.041820912	1184.23	17.78	18.01	2/14/06 16:26	10850:35:00
-9	68	1095	-0.00032	528	14.213	-0.00030264	-8.57	0.041518273	1175.66	17.65	17.88	2/19/06 14:16	10968:25:00
5	66	1082	0.00018	526	14.044	0.000166769	4.72	0.041685041	1180.38	17.72	17.95	2/24/06 14:49	11088:58:00
11	67	1074	0.00039	527	13.940	0.000363488	10.29	0.042048529	1190.68	17.88	18.10	3/7/06 16:35	11354:44:00
-4	66	1089	-0.00014	526	14.135	-0.000134278	-3.80	0.041914251	1186.87	17.82	18.05	3/14/06 15:50	11521:59:00
19	66	1068	0.00067	526	13.862	0.000625522	17.71	0.042539773	1204.59	18.09	18.31	3/30/06 16:07	11906:16:00
3	66	1071	0.00011	526	13.901	9.9044E-05	2.80	0.042638817	1207.39	18.13	18.36	4/14/06 17:17	12267:26:00
-2	65	1079	-7.1E-05	525	14.005	-6.66493E-05	-1.89	0.042572167	1205.50	18.10	18.33	4/28/06 16:10	12602:19:00
7	65	1074	0.00025	525	13.940	0.000232191	6.57	0.042804359	1212.08	18.20	18.43	5/8/06 16:08	12842:17:00
5	69	1082	0.00018	529	14.044	0.000165823	4.70	0.042970182	1216.78	18.27	18.50	5/22/06 16:48	13178:57:00
7	71	1086	0.00025	531	14.096	0.000232133	6.57	0.043202315	1223.35	18.37	18.60	6/2/06 15:05	13441:14:00
15	73	1078	0.00053	533	13.992	0.00049191	13.93	0.043694225	1237.28	18.58	18.80	6/9/06 15:00	13609:09:00
8	73	1078	0.00028	533	13.992	0.000262352	7.43	0.043956577	1244.71	18.69	18.92	6/15/06 17:11	13755:20:00
2	73	1086	7.1E-05	533	14.096	6.60748E-05	1.87	0.044022652	1246.58	18.72	18.94	6/22/06 16:48	13922:57:00
4	73	1091	0.00014	533	14.161	0.000132758	3.76	0.04415541	1250.34	18.78	19.00	7/6/06 16:49	14258:58:00
11	73	1078	0.00039	533	13.992	0.000360734	10.21	0.044516144	1260.55	18.93	19.15	7/13/06 17:03	14427:12:00
11	73	1086	0.00039	533	14.096	0.000363411	10.29	0.044879556	1270.84	19.08	19.31	8/7/06 15:31	15025:40:00

DECANISTERED 08/10/2006; sample dried 11 days in air

SAMPLE: 455.3' to 456.1' (Little Osage Shale Mbr) in canister DQ3

	lbs.	grams		lbs.	grams	moisture %		est. lost gas (cc) =	TIME OF:
dry sample weight:	4.298	1949.45	wet sample weight:	4.654	2110.98	7.65%		5	off bottom
									11/19/04 16:05

RIG/LAB MEASUREMENTS			CONVERSION OF RIG/LAB MEASUREMENTS TO STP (@60 deg F; 14.7 psi)					CUMULATIVE VOLUMES (@STP)		SCF/TON	SCF/TON		TIME SINCE
measured cc	measured T (F)	measured P	cubic ft	absolute T (F)	psia	cubic ft (@STP)	cc (@STP)	cubic ft	cc	without lost gas	with lost gas	TIME OF MEASURE	off bottom
3.5	68	1083	0.00012	528	14.057	0.000116403		3.30	0.000116403	3.30	0.05	0.14	11/19/04 16:32	0:27:15
0.5	68	1083	1.8E-05	528	14.057	1.66291E-05		0.47	0.000133032	3.77	0.06	0.14	11/19/04 16:38	0:32:45
3	68	1083	0.00011	528	14.057	9.97744E-05		2.83	0.000232807	6.59	0.11	0.19	11/19/04 17:04	0:59:00
40	68	1086	0.00141	528	14.096	0.00133401		37.77	0.001566817	44.37	0.73	0.81	11/19/04 22:04	5:58:30

56	67	1093	0.00198	527	14.187	0.001883219	53.33	0.003450036	97.69	1.61	1.69	11/20/04 18:32	26:26:30
23	69	1098	0.00081	529	14.252	0.000774065	21.92	0.004224101	119.61	1.97	2.05	11/21/04 7:30	39:24:30
20	66	1096	0.00071	526	14.226	0.000675706	19.13	0.004899808	138.75	2.28	2.36	11/21/04 18:47	50:41:30
22	65	1090	0.00078	525	14.148	0.000740616	20.97	0.005640424	159.72	2.62	2.71	11/22/04 7:09	63:03:30
23	67	1080	0.00081	527	14.018	0.000764265	21.64	0.006404689	181.36	2.98	3.06	11/22/04 20:12	76:06:30
15	67	1083	0.00053	527	14.057	0.000499818	14.15	0.006904507	195.51	3.21	3.30	11/23/04 7:17	87:11:30
19	66	1080	0.00067	526	14.018	0.00063255	17.91	0.007537057	213.42	3.51	3.59	11/24/04 10:39	114:33:30
10	67	1082	0.00035	527	14.044	0.000332905	9.43	0.007869962	222.85	3.66	3.74	11/24/04 21:02	124:56:30
36	69	1073	0.00127	529	13.927	0.001183995	33.53	0.009053957	256.38	4.21	4.30	11/26/04 9:11	161:05:30
24	68	1085	0.00085	528	14.083	0.000799669	22.64	0.009853626	279.02	4.59	4.67	11/28/04 10:04	209:58:30
59	68	1081	0.00208	528	14.031	0.001958606	55.46	0.011812231	334.48	5.50	5.58	12/3/04 16:22	336:16:30
87	68	1089	0.00307	528	14.135	0.002909487	82.39	0.014721718	416.87	6.85	6.93	12/15/04 17:27	625:21:30
44	67	1100	0.00155	527	14.278	0.001489148	42.17	0.016210867	459.04	7.54	7.63	12/23/04 12:32	812:26:30
52	68	1085	0.00184	528	14.083	0.001732616	49.06	0.017943483	508.10	8.35	8.43	12/31/04 18:22	1010:16:30
42	67	1080	0.00148	527	14.018	0.001395615	39.52	0.019339098	547.62	9.00	9.08	1/10/05 14:25	1246:19:30
36	67	1078	0.00127	527	13.992	0.001194026	33.81	0.020533124	581.43	9.56	9.64	1/20/05 15:27	1487:21:30
12	68	1094	0.00042	528	14.200	0.000403151	11.42	0.020936275	592.85	9.74	9.82	1/27/05 16:37	1656:31:30
20	69	1093	0.00071	529	14.187	0.000670035	18.97	0.02160631	611.82	10.05	10.14	2/3/05 15:53	1823:47:30
15	68	1093	0.00053	528	14.187	0.000503478	14.26	0.022109789	626.08	10.29	10.37	2/10/05 15:16	1991:10:30
21	70	1089	0.00074	530	14.135	0.00069964	19.81	0.022809428	645.89	10.61	10.70	2/17/05 14:21	2158:15:30
17	68	1087	0.0006	528	14.109	0.000567476	16.07	0.023376905	661.96	10.88	10.96	2/24/05 15:40	2327:34:30
16	68	1080	0.00057	528	14.018	0.000530656	15.03	0.023907561	676.98	11.13	11.21	3/3/05 14:33	2494:27:30
17	69	1075	0.0006	529	13.953	0.000560151	15.86	0.024467711	692.85	11.39	11.47	3/10/05 14:24	2662:18:30
15	69	1071	0.00053	529	13.901	0.000492412	13.94	0.024960123	706.79	11.62	11.70	3/18/05 10:55	2850:49:30
2	68	1081	7.1E-05	528	14.031	6.63934E-05	1.88	0.025026516	708.67	11.65	11.73	3/23/05 12:39	2972:33:30
13	69	1084	0.00046	529	14.070	0.000431937	12.23	0.025458453	720.90	11.85	11.93	4/2/05 15:34	3215:28:30
12	70	1080	0.00042	530	14.018	0.00039649	11.23	0.025854943	732.13	12.03	12.11	4/8/05 14:58	3358:52:30
1	69	1091	3.5E-05	529	14.161	3.34405E-05	0.95	0.025888384	733.07	12.05	12.13	4/15/05 10:53	3522:47:30
18	71	1072	0.00064	531	13.914	0.000589218	16.68	0.026477602	749.76	12.32	12.40	4/21/05 17:35	3673:29:30
0	68	1080	0	528	14.018	0	0.00	0.026477602	749.76	12.32	12.40	4/28/05 14:57	3838:51:30
1	67	1087	3.5E-05	527	14.109	3.34443E-05	0.95	0.026511046	750.71	12.34	12.42	5/5/05 21:50	4013:44:30
13	67	1080	0.00046	527	14.018	0.000431976	12.23	0.026943022	762.94	12.54	12.62	5/12/05 11:51	4171:45:30
7	71	1081	0.00025	531	14.031	0.000231064	6.54	0.027174086	769.48	12.65	12.73	5/20/05 12:02	4363:56:30
5	71	1085	0.00018	531	14.083	0.000165656	4.69	0.027339743	774.17	12.72	12.80	5/26/05 16:01	4511:55:30
10	70	1077	0.00035	530	13.979	0.000329491	9.33	0.027669233	783.50	12.88	12.96	6/2/05 14:39	4678:33:30
13	73	1076	0.00046	533	13.966	0.000425531	12.05	0.028094765	795.55	13.07	13.16	6/10/05 21:37	4877:31:30
2	73	1081	7.1E-05	533	14.031	6.57706E-05	1.86	0.028160535	797.41	13.10	13.19	6/16/05 10:00	5009:54:30
4	69	1084	0.00014	529	14.070	0.000132904	3.76	0.028293439	801.18	13.17	13.25	6/23/05 10:45	5178:39:30
10	71	1081	0.00035	531	14.031	0.000330092	9.35	0.02862353	810.53	13.32	13.40	7/1/05 15:30	5375:24:30
3	74	1085	0.00011	534	14.083	9.88355E-05	2.80	0.028722366	813.32	13.37	13.45	7/7/05 11:43	5515:37:30
10	74	1081	0.00035	534	14.031	0.000328237	9.29	0.029050603	822.62	13.52	13.60	7/14/05 14:09	5686:03:30
4	73	1084	0.00014	533	14.070	0.000131906	3.74	0.029182509	826.35	13.58	13.66	7/22/05 10:22	5874:16:30
1	73	1087	3.5E-05	533	14.109	3.30678E-05	0.94	0.029215577	827.29	13.60	13.68	7/28/05 14:34	6022:28:30
6	73	1085	0.00021	533	14.083	0.000198042	5.61	0.029413619	832.90	13.69	13.77	8/4/05 16:03	6191:57:30
8	73	1079	0.00028	533	14.005	0.000262596	7.44	0.029676214	840.33	13.81	13.89	8/11/05 15:35	6359:29:30
6	73	1074	0.00021	533	13.940	0.000196034	5.55	0.029872249	845.88	13.90	13.98	8/18/05 16:25	6528:19:30
1	73	1079	3.5E-05	533	14.005	3.28244E-05	0.93	0.029905073	846.81	13.92	14.00	8/26/05 14:16	6718:10:30
0	74	1086	0	534	14.096	0	0.00	0.029905073	846.81	13.92	14.00	9/1/05 16:06	6864:00:30
4	73	1084	0.00014	533	14.070	0.000131906	3.74	0.030036979	850.55	13.98	14.06	9/8/05 15:50	7031:44:30
3	74	1082	0.00011	534	14.044	9.85622E-05	2.79	0.030135541	853.34	14.02	14.11	9/15/05 14:53	7198:47:30
6	73	1079	0.00021	533	14.005	0.000196947	5.58	0.030332488	858.92	14.12	14.20	9/22/05 16:13	7368:07:30
-6	71	1090	-0.00021	531	14.148	-0.000199704	-5.65	0.030132784	853.26	14.02	14.10	9/29/05 14:22	7534:16:30
-1	69	1088	-3.5E-05	529	14.122	-3.33485E-05	-0.94	0.030099436	852.32	14.01	14.09	10/7/05 14:57	7726:51:30
3	71	1087	0.00011	531	14.109	9.95771E-05	2.82	0.030199013	855.14	14.05	14.14	10/13/05 11:36	7867:30:30

DECANISTERED 10/13/2005; sample dried 21 days in air

SAMPLE: 457.8' to 458.3' (Summit coal) in canister M1

	lbs.	grams		lbs.	grams	moisture %	est. lost gas (cc) =	TIME OF:
dry sample weight:	0.787	357.02	wet sample weight:	0.826	374.53	4.68%	10	off bottom
								11/19/04 16:05

RIG/LAB MEASUREMENTS			CONVERSION OF RIG/LAB MEASUREMENTS TO STP (@60 deg F; 14.7 psi)					CUMULATIVE VOLUMES (@STP)		SCF/TON	SCF/TON		TIME SINCE
measured cc	measured T (F)	measured P	cubic ft	absolute T (F)	psia	cubic ft (@STP)	cc (@STP)	cubic ft	cc	without lost gas	with lost gas	TIME OF MEASURE	off bottom
5	68	1083	0.00018	528	14.057	0.000166291		4.71	0.000166291	4.71	0.42	1.32	11/19/04 16:40	0:35:15
2.5	68	1083	8.8E-05	528	14.057	8.31453E-05		2.35	0.000249436	7.06	0.63	1.53	11/19/04 16:48	0:42:45
2.5	68	1083	8.8E-05	528	14.057	8.31453E-05		2.35	0.000332581	9.42	0.85	1.74	11/19/04 16:56	0:51:15
2	68	1083	7.1E-05	528	14.057	6.65162E-05		1.88	0.000399097	11.30	1.01	1.91	11/19/04 17:02	0:56:45
83	68	1086	0.00293	528	14.096	0.002768071		78.38	0.003167168	89.68	8.05	8.95	11/19/04 22:05	5:59:30
105	67	1093	0.00371	527	14.187	0.003531035		99.99	0.006698204	189.67	17.02	17.92	11/20/04 18:27	26:21:30
38	69	1098	0.00134	529	14.252	0.001278891		36.21	0.007977094	225.89	20.27	21.17	11/21/04 7:29	39:23:30
29	66	1096	0.00102	526	14.226	0.000979774		27.74	0.008956869	253.63	22.76	23.66	11/21/04 18:48	50:42:30
29	65	1090	0.00102	525	14.148	0.000976267		27.64	0.009933135	281.27	25.24	26.14	11/22/04 7:10	63:04:30
29	67	1080	0.00102	527	14.018	0.000963639		27.29	0.010896774	308.56	27.69	28.59	11/22/04 20:13	76:07:30
20	67	1083	0.00071	527	14.057	0.000666425		18.87	0.011563199	327.43	29.38	30.28	11/23/04 7:17	87:11:30
22	66	1080	0.00078	526	14.018	0.000732426		20.74	0.012295625	348.17	31.24	32.14	11/24/04 10:40	114:34:30
13	67	1082	0.00046	527	14.044	0.000432776		12.25	0.012728401	360.43	32.34	33.24	11/24/04 20:57	124:51:30
40	69	1073	0.00141	529	13.927	0.00131555		37.25	0.014043951	397.68	35.69	36.58	11/26/04 9:14	161:08:30
23	68	1085	0.00081	528	14.083	0.000766349		21.70	0.0148103	419.38	37.63	38.53	11/28/04 10:06	210:00:30
53	68	1081	0.00187	528	14.031	0.001759425		49.82	0.016569726	469.20	42.10	43.00	12/3/04 16:24	336:18:30
63	68	1089	0.00222	528	14.135	0.00210687		59.66	0.018676595	528.86	47.46	48.35	12/15/04 17:27	625:21:30
25	67	1100	0.00088	527	14.278	0.000846107		23.96	0.019522702	552.82	49.61	50.50	12/23/04 12:33	812:27:30
33	68	1085	0.00117	528	14.083	0.001099545		31.14	0.020622247	583.95	52.40	53.30	12/31/04 18:22	1010:16:30
23	67	1080	0.00081	527	14.018	0.000764265		21.64	0.021386513	605.60	54.34	55.24	1/10/05 14:25	1246:19:30
19	67	1078	0.00067	527	13.992	0.00063018		17.84	0.022016693	623.44	55.94	56.84	1/20/05 15:27	1487:21:30
2	68	1094	7.1E-05	528	14.200	6.71919E-05		1.90	0.022083885	625.34	56.11	57.01	1/27/05 16:37	1656:31:30
11	69	1093	0.00039	529	14.187	0.000368519		10.44	0.022452404	635.78	57.05	57.95	2/3/05 15:53	1823:47:30
8	68	1093	0.00028	528	14.187	0.000268522		7.60	0.022720926	643.38	57.73	58.63	2/10/05 15:17	1991:11:30
13	70	1089	0.00046	530	14.135	0.00043311		12.26	0.023154036	655.65	58.83	59.73	2/17/05 14:22	2158:16:30
9	68	1087	0.00032	528	14.109	0.000300429		8.51	0.023454465	664.15	59.60	60.49	2/24/05 15:41	2327:35:30
9	68	1080	0.00032	528	14.018	0.000298494		8.45	0.023752959	672.61	60.36	61.25	3/3/05 14:34	2494:28:30
11	69	1075	0.00039	529	13.953	0.00036245		10.26	0.02411541	682.87	61.28	62.17	3/10/05 14:25	2662:19:30
7	69	1071	0.00025	529	13.901	0.000229792		6.51	0.024345202	689.38	61.86	62.76	3/18/05 10:55	2850:49:30
-2	68	1081	-7.1E-05	528	14.031	-6.63934E-05		-1.88	0.024278808	687.50	61.69	62.59	3/23/05 12:40	2972:34:30
5	69	1084	0.00018	529	14.070	0.00016613		4.70	0.024444938	692.20	62.11	63.01	4/2/05 15:35	3215:29:30
9	70	1080	0.00032	530	14.018	0.000297368		8.42	0.024742305	700.62	62.87	63.77	4/8/05 14:58	3358:52:30
-1	69	1091	-3.5E-05	529	14.161	-3.34405E-05		-0.95	0.024708865	699.67	62.79	63.68	4/15/05 10:54	3522:48:30
13	71	1072	0.00046	531	13.914	0.000425546		12.05	0.025134411	711.72	63.87	64.76	4/21/05 17:36	3673:30:30
-4	68	1080	-0.00014	528	14.018	-0.000132664		-3.76	0.025001747	707.97	63.53	64.43	4/28/05 14:58	3838:52:30
-1	67	1087	-3.5E-05	527	14.109	-3.34443E-05		-0.95	0.024968303	707.02	63.44	64.34	5/5/05 21:51	4013:45:30
9	67	1080	0.00032	527	14.018	0.00029906		8.47	0.025267363	715.49	64.20	65.10	5/12/05 11:52	4171:46:30
3	71	1081	0.00011	531	14.031	9.90275E-05		2.80	0.025366391	718.29	64.46	65.35	5/20/05 12:03	4363:57:30
2	71	1085	7.1E-05	531	14.083	6.62626E-05		1.88	0.025432653	720.17	64.62	65.52	5/26/05 16:01	4511:55:30
6	70	1077	0.00021	530	13.979	0.000197694		5.60	0.025630348	725.77	65.13	66.02	6/2/05 14:40	4678:34:30
9	73	1076	0.00032	533	13.966	0.000294599		8.34	0.025924946	734.11	65.88	66.77	6/10/05 21:38	4877:32:30
0	73	1081	0	533	14.031	0		0.00	0.025924946	734.11	65.88	66.77	6/16/05 10:01	5009:55:30
1	69	1084	3.5E-05	529	14.070	3.32259E-05		0.94	0.025958172	735.05	65.96	66.86	6/23/05 10:46	5178:40:30
6	71	1081	0.00021	531	14.031	0.000198055		5.61	0.026156227	740.66	66.46	67.36	7/1/05 15:30	5375:24:30
2	74	1085	7.1E-05	534	14.083	6.58903E-05		1.87	0.026222117	742.52	66.63	67.53	7/7/05 11:43	5515:37:30
6	74	1081	0.00021	534	14.031	0.000196942		5.58	0.02641906	748.10	67.13	68.03	7/14/05 14:09	5686:03:30
1	73	1084	3.5E-05	533	14.070	3.29766E-05		0.93	0.026452036	749.04	67.21	68.11	7/22/05 10:23	5874:17:30
-1	73	1087	-3.5E-05	533	14.109	-3.30678E-05		-0.94	0.026418968	748.10	67.13	68.03	7/28/05 14:35	6022:29:30
3	73	1085	0.00011	533	14.083	9.90209E-05		2.80	0.026517989	750.90	67.38	68.28	8/4/05 16:04	6191:58:30
4	73	1079	0.00014	533	14.005	0.000131298		3.72	0.026649287	754.62	67.72	68.61	8/11/05 15:35	6359:29:30
5	73	1074	0.00018	533	13.940	0.000163362		4.63	0.026812649	759.25	68.13	69.03	8/18/05 16:26	6528:20:30
-1	73	1079	-3.5E-05	533	14.005	-3.28244E-05		-0.93	0.026779824	758.32	68.05	68.94	8/26/05 14:16	6718:10:30
-2	74	1086	-7.1E-05	534	14.096	-6.59511E-05		-1.87	0.026713873	756.45	67.88	68.78	9/1/05 16:07	6864:01:30
2	73	1084	7.1E-05	533	14.070	6.59531E-05		1.87	0.026779827	758.32	68.05	68.94	9/8/05 15:51	7031:45:30

DECANISTERED 9/8/2005; sample dried 23 days in air

SAMPLE: 469.6' to 471.0' (Excello shale) in canister M2

	lbs.	grams		lbs.	grams	moisture %	est. lost gas (cc) =	TIME OF:

dry sample weight:	3.176	1440.40	wet sample weight:	3.436	1558.63	7.59%	8	off bottom
								11/20/04 8:39

RIG/LAB MEASUREMENTS			CONVERSION OF RIG/LAB MEASUREMENTS TO STP (@60 deg F; 14.7 psi)					CUMULATIVE VOLUMES (@STP)		SCF/TON	SCF/TON		TIME SINCE
measured cc	measured T (F)	measured P	cubic ft	absolute T (F)	psia	cubic ft (@STP)	cc (@STP)	cubic ft	cc	without lost gas	with lost gas	TIME OF MEASURE	off bottom
13	69	1092	0.00046	529	14.174	0.000435124		12.32	0.000435124	12.32	0.27	0.45	11/20/04 10:08	1:29:15
6	69	1092	0.00021	529	14.174	0.000200827		5.69	0.000635951	18.01	0.40	0.58	11/20/04 11:10	2:31:00
7	70	1091	0.00025	530	14.161	0.000233642		6.62	0.000869593	24.62	0.55	0.73	11/20/04 12:15	3:36:15
4	70	1091	0.00014	530	14.161	0.000133509		3.78	0.001003102	28.40	0.63	0.81	11/20/04 13:16	4:37:00
4	68	1090	0.00014	528	14.148	0.000133892		3.79	0.001136995	32.20	0.72	0.89	11/20/04 14:26	5:46:30
8	67	1093	0.00028	527	14.187	0.000269031		7.62	0.001406026	39.81	0.89	1.06	11/20/04 18:33	9:53:30
12	69	1098	0.00042	529	14.252	0.00040386		11.44	0.001809886	51.25	1.14	1.32	11/21/04 7:29	22:49:30
8	66	1096	0.00028	526	14.226	0.000270283		7.65	0.002080169	58.90	1.31	1.49	11/21/04 6:49	22:09:30
6	65	1090	0.00021	525	14.148	0.000201986		5.72	0.002282155	64.62	1.44	1.62	11/22/04 7:11	46:31:30
5	67	1080	0.00018	527	14.018	0.000166145		4.70	0.002448299	69.33	1.54	1.72	11/22/04 20:14	59:34:30
3	67	1083	0.00011	527	14.057	9.99637E-05		2.83	0.002548263	72.16	1.60	1.78	11/23/04 7:18	70:38:30
0	66	1080	0	526	14.018	0		0.00	0.002548263	72.16	1.60	1.78	11/24/04 10:47	98:07:30
3	69	1073	0.00011	529	13.927	9.86662E-05		2.79	0.002646929	74.95	1.67	1.85	11/26/04 9:16	144:36:30
-1	68	1085	-3.5E-05	528	14.083	-3.33195E-05		-0.94	0.00261361	74.01	1.65	1.82	11/28/04 10:07	193:27:30
-1	68	1081	-3.5E-05	528	14.031	-3.31967E-05		-0.94	0.002580413	73.07	1.63	1.80	12/3/04 16:24	319:44:30
-3	68	1089	-0.00011	528	14.135	-0.000100327		-2.84	0.002480086	70.23	1.56	1.74	12/15/04 17:28	608:48:30
-2	67	1100	-7.1E-05	527	14.278	-6.76886E-05		-1.92	0.002412397	68.31	1.52	1.70	12/23/04 12:34	795:54:30

DECANISTERED 12/23/2004; sample dried 11 days in air

SAMPLE: 569.7' to 571.3' (Bevier coal) in canister DQBv

	lbs.	grams		lbs.	grams	moisture %	est. lost gas (cc) =	TIME OF:
dry sample weight:	2.719	1233.50	wet sample weight:	2.800	1270.03	2.88%	72	off bottom
								11/20/04 16:02

RIG/LAB MEASUREMENTS			CONVERSION OF RIG/LAB MEASUREMENTS TO STP (@60 deg F; 14.7 psi)					CUMULATIVE VOLUMES (@STP)		SCF/TON	SCF/TON		TIME SINCE
measured cc	measured T (F)	measured P	cubic ft	absolute T (F)	psia	cubic ft (@STP)	cc (@STP)	cubic ft	cc	without lost gas	with lost gas	TIME OF MEASURE	off bottom
21	69	1092	0.00074	529	14.174	0.000702893		19.90	0.000702893	19.90	0.52	2.39	11/20/04 16:22	0:20:45
7	69	1092	0.00025	529	14.174	0.000234298		6.63	0.000937191	26.54	0.69	2.56	11/20/04 16:25	0:23:30
20	69	1092	0.00071	529	14.174	0.000669422		18.96	0.001606613	45.49	1.18	3.05	11/20/04 16:32	0:30:45
12	69	1092	0.00042	529	14.174	0.000401653		11.37	0.002008267	56.87	1.48	3.35	11/20/04 16:39	0:37:45
19	69	1093	0.00067	529	14.187	0.000636534		18.02	0.0026448	74.89	1.95	3.82	11/20/04 16:54	0:52:45
31	69	1093	0.00109	529	14.187	0.001038555		29.41	0.003683355	104.30	2.71	4.58	11/20/04 17:15	1:13:45
86	67	1093	0.00304	527	14.187	0.002892086		81.89	0.006575441	186.20	4.84	6.71	11/20/04 18:34	2:32:00
110	66	1093	0.00388	526	14.187	0.003706212		104.95	0.010281654	291.14	7.56	9.43	11/20/04 19:49	3:47:00
410	69	1098	0.01448	529	14.252	0.013798559		390.73	0.024080212	681.87	17.71	19.58	11/21/04 7:28	15:26:00
123	66	1096	0.00434	526	14.226	0.004155594		117.67	0.028235807	799.55	20.77	22.64	11/21/04 18:50	26:48:00
107	65	1090	0.00378	525	14.148	0.003602087		102.00	0.031837894	901.55	23.42	25.29	11/22/04 7:12	39:10:00
96	67	1080	0.00339	527	14.018	0.003189977		90.33	0.035027871	991.88	25.76	27.63	11/22/04 20:15	52:13:00
68	67	1083	0.0024	527	14.057	0.002265844		64.16	0.037293714	1056.04	27.43	29.30	11/23/04 7:19	63:17:00
96	66	1080	0.00339	526	14.018	0.003196042		90.50	0.040489756	1146.54	29.78	31.65	11/24/04 10:41	90:39:00
44	67	1082	0.00155	527	14.044	0.00146478		41.48	0.041954537	1188.02	30.86	32.73	11/24/04 20:58	100:56:00
115	69	1073	0.00406	529	13.927	0.003782205		107.10	0.045736742	1295.12	33.64	35.51	11/26/04 9:19	137:17:00
100	68	1085	0.00353	528	14.083	0.003331954		94.35	0.049068696	1389.47	36.09	37.96	11/28/04 10:09	186:07:00
158	68	1081	0.00558	528	14.031	0.005245079		148.52	0.054313776	1537.99	39.95	41.82	12/3/04 16:39	312:37:00
202	68	1106	0.00713	528	14.355	0.006860816		194.28	0.061174592	1732.26	44.99	46.86	12/14/04 12:24	572:22:00
141	67	1100	0.00498	527	14.278	0.004772043		135.13	0.065946635	1867.39	48.50	50.37	12/23/04 12:35	788:33:00
116	68	1085	0.0041	528	14.083	0.003865067		109.45	0.069811702	1976.84	51.34	53.21	12/31/04 18:23	986:21:00
99	67	1080	0.0035	527	14.018	0.003289664		93.15	0.073101366	2069.99	53.76	55.63	1/10/05 14:26	1222:24:00
82	67	1078	0.0029	527	13.992	0.002719726		77.01	0.075821092	2147.01	55.76	57.63	1/20/05 15:28	1463:26:00
40	68	1094	0.00141	528	14.200	0.001343837		38.05	0.077164929	2185.06	56.75	58.62	1/27/05 16:40	1632:38:00
46	69	1093	0.00162	529	14.187	0.001541081		43.64	0.078706011	2228.70	57.88	59.75	2/3/05 15:54	1799:52:00
37	68	1093	0.00131	528	14.187	0.001241913		35.17	0.079947924	2263.86	58.80	60.67	2/10/05 15:17	1967:15:00
43	70	1089	0.00152	530	14.135	0.001432596		40.57	0.081380519	2304.43	59.85	61.72	2/17/05 14:22	2134:20:00
38	68	1087	0.00134	528	14.109	0.001268476		35.92	0.082648996	2340.35	60.78	62.65	2/24/05 15:42	2303:40:00
32	68	1080	0.00113	528	14.018	0.001061312		30.05	0.083710308	2370.40	61.57	63.44	3/3/05 14:34	2470:32:00
35	69	1075	0.00124	529	13.953	0.001153252		32.66	0.084863559	2403.06	62.41	64.28	3/10/05 14:26	2638:24:00
32	69	1071	0.00113	529	13.901	0.001050478		29.75	0.085914037	2432.81	63.19	65.06	3/18/05 10:55	2826:53:00
11	68	1081	0.00039	528	14.031	0.000365164		10.34	0.086279201	2443.15	63.45	65.32	3/23/05 12:41	2948:39:00

29	69	1084	0.00102	529	14.070	0.000963551	27.28	0.087242752	2470.43	64.16	66.03	4/2/05 15:36	3191:34:00
27	70	1080	0.00095	530	14.018	0.000892103	25.26	0.088134855	2495.69	64.82	66.69	4/8/05 14:59	3334:57:00
14	69	1091	0.00049	529	14.161	0.000468166	13.26	0.088603021	2508.95	65.16	67.03	4/15/05 10:55	3498:53:00
28	71	1072	0.00099	531	13.914	0.000916561	25.95	0.089519583	2534.90	65.84	67.71	4/21/05 17:37	3649:35:00
6	68	1080	0.00021	528	14.018	0.000198996	5.63	0.089718579	2540.54	65.98	67.85	4/28/05 14:59	3814:57:00
11	67	1087	0.00039	527	14.109	0.000367887	10.42	0.090086466	2550.96	66.25	68.12	5/5/05 21:52	3989:50:00
22	67	1080	0.00078	527	14.018	0.000731036	20.70	0.090817502	2571.66	66.79	68.66	5/12/05 11:53	4147:51:00
17	71	1081	0.0006	531	14.031	0.000561156	15.89	0.091378658	2587.55	67.20	69.07	5/20/05 12:04	4340:02:00
15	71	1085	0.00053	531	14.083	0.000496969	14.07	0.091875628	2601.62	67.57	69.44	5/26/05 16:02	4488:00:00
17	70	1077	0.0006	530	13.979	0.000560134	15.86	0.092435762	2617.48	67.98	69.85	6/2/05 14:41	4654:39:00
26	73	1076	0.00092	533	13.966	0.000851063	24.10	0.093286824	2641.58	68.61	70.48	6/10/05 21:39	4853:37:00
11	73	1081	0.00039	533	14.031	0.000361738	10.24	0.093648563	2651.82	68.87	70.74	6/16/05 10:02	4986:00:00
11	69	1084	0.00039	529	14.070	0.000365485	10.35	0.094014048	2662.17	69.14	71.01	6/23/05 10:47	5154:45:00
21	71	1081	0.00074	531	14.031	0.000693192	19.63	0.09470724	2681.80	69.65	71.52	7/1/05 15:31	5351:29:00
11	74	1085	0.00039	534	14.083	0.000362397	10.26	0.095069637	2692.06	69.92	71.79	7/7/05 11:44	5491:42:00
19	74	1081	0.00067	534	14.031	0.00062365	17.66	0.095693287	2709.72	70.38	72.25	7/14/05 14:10	5662:08:00
13	73	1084	0.00046	533	14.070	0.000428695	12.14	0.096121982	2721.86	70.69	72.56	7/22/05 10:24	5850:22:00
8	73	1087	0.00028	533	14.109	0.000264543	7.49	0.096386525	2729.35	70.89	72.76	7/28/05 14:36	5998:34:00
13	73	1085	0.00046	533	14.083	0.000429091	12.15	0.096815615	2741.50	71.20	73.07	8/4/05 16:05	6168:03:00
15	73	1079	0.00053	533	14.005	0.000492367	13.94	0.097307982	2755.44	71.57	73.44	8/11/05 15:36	6335:34:00
15	73	1074	0.00053	533	13.940	0.000490085	13.88	0.097798067	2769.32	71.93	73.80	8/18/05 16:27	6504:25:00
8	73	1079	0.00028	533	14.005	0.000262596	7.44	0.098060663	2776.76	72.12	73.99	8/26/05 14:17	6694:15:00
6	74	1085	0.00021	534	14.083	0.000197671	5.60	0.098258334	2782.36	72.26	74.13	9/1/05 16:14	6840:12:00
10	73	1084	0.00035	533	14.070	0.000329766	9.34	0.098588099	2791.69	72.51	74.38	9/8/05 15:51	7007:49:00
9	74	1082	0.00032	534	14.044	0.000295687	8.37	0.098883786	2800.07	72.72	74.59	9/15/05 14:54	7174:52:00
10	73	1079	0.00035	533	14.005	0.000328244	9.29	0.099212031	2809.36	72.97	74.84	9/22/05 16:14	7344:12:00
-2	71	1090	-7.1E-05	531	14.148	-6.65679E-05	-1.88	0.099145463	2807.48	72.92	74.79	9/29/05 14:24	7510:22:00
3	69	1089	0.00011	529	14.135	0.000100137	2.84	0.0992456	2810.31	72.99	74.86	10/7/05 14:59	7702:57:00
5	71	1087	0.00018	531	14.109	0.000165962	4.70	0.099411562	2815.01	73.11	74.98	10/13/05 23:38	7855:36:00
11	69	1077	0.00039	529	13.979	0.000363125	10.28	0.099774687	2825.29	73.38	75.25	10/20/05 14:52	8014:50:00
10	69	1084	0.00035	529	14.070	0.000332259	9.41	0.100106946	2834.70	73.62	75.49	11/6/05 23:35	8431:33:00
1	69	1087	3.5E-05	529	14.109	3.33179E-05	0.94	0.100140264	2835.65	73.65	75.52	11/10/05 17:43	8521:41:00
5	68	1084	0.00018	528	14.070	0.000166444	4.71	0.100306708	2840.36	73.77	75.64	11/21/05 14:05	8782:03:00
2	68	1086	7.1E-05	528	14.096	6.67005E-05	1.89	0.100373408	2842.25	73.82	75.69	12/5/05 15:41	9119:39:00
4	68	1086	0.00014	528	14.096	0.000133401	3.78	0.100506809	2846.03	73.92	75.79	12/12/05 16:36	9288:34:00
0	69	1093	0	529	14.187	0	0.00	0.100506809	2846.03	73.92	75.79	12/20/05 17:18	9481:16:00
9	69	1094	0.00032	529	14.200	0.000301792	8.55	0.100808601	2854.57	74.14	76.01	1/10/06 14:54	9982:52:00
17	68	1077	0.0006	528	13.979	0.000562256	15.92	0.101370857	2870.49	74.55	76.42	1/16/06 16:07	10128:05:00
-6	68	1089	-0.00021	528	14.135	-0.000200654	-5.68	0.101170203	2864.81	74.41	76.28	1/24/06 15:20	10319:18:00
9	68	1081	0.00032	528	14.031	0.00029877	8.46	0.101468973	2873.27	74.63	76.50	1/30/06 15:49	10463:47:00
-4	69	1091	-0.00014	529	14.161	-0.000133762	-3.79	0.101335211	2869.48	74.53	76.40	2/7/06 16:27	10656:25:00
13	69	1074	0.00046	529	13.940	0.000427952	12.12	0.101763163	2881.60	74.84	76.71	2/14/06 15:17	10823:15:00
-11	68	1095	-0.00039	528	14.213	-0.000369893	-10.47	0.10139327	2871.13	74.57	76.44	2/19/06 14:17	10942:15:00
10	66	1082	0.00035	526	14.044	0.000333538	9.44	0.101726808	2880.57	74.82	76.69	2/24/06 14:50	11062:48:00
10	67	1074	0.00035	527	13.940	0.000330443	9.36	0.102057251	2889.93	75.06	76.93	3/7/06 16:36	11328:34:00
-5	66	1089	-0.00018	526	14.135	-0.000167848	-4.75	0.101889403	2885.18	74.94	76.81	3/14/06 15:50	11495:48:00
15	66	1068	0.00053	526	13.862	0.000493833	13.98	0.102383236	2899.16	75.30	77.17	3/30/06 16:06	11880:04:00
1	66	1071	3.5E-05	526	13.901	3.30147E-05	0.93	0.102416251	2900.09	75.32	77.19	4/14/06 17:18	12241:16:00
-3	65	1079	-0.00011	525	14.005	-9.99739E-05	-2.83	0.102316277	2897.26	75.25	77.12	4/28/06 16:10	12576:08:00
8	65	1074	0.00028	525	13.940	0.000265362	7.51	0.102581639	2904.78	75.44	77.31	5/8/06 16:10	12816:08:00
5	69	1082	0.00018	529	14.044	0.000165823	4.70	0.102747462	2909.47	75.57	77.44	5/22/06 16:49	13152:47:00
8	71	1086	0.00028	531	14.096	0.000265295	7.51	0.103012756	2916.99	75.76	77.63	6/2/06 15:05	13415:03:00
19	73	1078	0.00067	533	13.992	0.000623087	17.64	0.103635843	2934.63	76.22	78.09	6/9/06 15:49	13583:47:00
10	73	1078	0.00035	533	13.992	0.00032794	9.29	0.103963783	2943.92	76.46	78.33	6/15/06 17:11	13729:09:00
2	73	1086	7.1E-05	533	14.096	6.60748E-05	1.87	0.104029858	2945.79	76.51	78.38	6/22/06 16:48	13896:46:00
4	73	1091	0.00014	533	14.161	0.000132758	3.76	0.104162616	2949.55	76.61	78.48	7/6/06 16:49	14232:47:00
11	73	1078	0.00039	533	13.992	0.000360734	10.21	0.10452335	2959.76	76.87	78.74	7/13/06 17:03	14401:01:00
-10	73	1086	-0.00035	533	14.096	-0.000330374	-9.36	0.104192976	2950.41	76.63	78.50	8/7/06 15:31	14999:29:00

DECANISTERED 8/10/2006; sample dried 11 days in air

SAMPLE: 606.0' to 607.3' (Fleming coal) in canister 6

	lbs.	grams		lbs.	grams	moisture %		est. lost gas (cc) =	TIME OF:
dry sample weight:	2.122	962.47	wet sample weight:	2.219	1006.68	4.39%		60	off bottom
									11/21/04 10:31

RIG/LAB MEASUREMENTS			CONVERSION OF RIG/LAB MEASUREMENTS TO STP (@60 deg F; 14.7 psi)					CUMULATIVE VOLUMES (@STP)		SCF/TON	SCF/TON		TIME SINCE
measured cc	measured T (F)	measured P	cubic ft	absolute T (F)	psia	cubic ft (@STP)	cc (@STP)	cubic ft	cc	without lost gas	with lost gas	TIME OF MEASURE	off bottom
23	67	1100	0.00081	527	14.278	0.000778418	22.04	0.000778418	22.04	0.73	2.73	11/21/04 11:04	0:33:15
6	67	1100	0.00021	527	14.278	0.000203066	5.75	0.000981484	27.79	0.93	2.92	11/21/04 11:23	0:52:00
1	67	1100	3.5E-05	527	14.278	3.38443E-05	0.96	0.001015328	28.75	0.96	2.95	11/21/04 11:25	0:53:30
25	68	1099	0.00088	528	14.265	0.000843737	23.89	0.001859065	52.64	1.75	3.75	11/21/04 11:50	1:19:15
3	68	1099	0.00011	528	14.265	0.000101248	2.87	0.001960314	55.51	1.85	3.84	11/21/04 11:53	1:22:15
9	68	1099	0.00032	528	14.265	0.000303745	8.60	0.002264059	64.11	2.13	4.13	11/21/04 12:02	1:30:45
16	68	1098	0.00057	528	14.252	0.0005395	15.28	0.002803559	79.39	2.64	4.64	11/21/04 12:17	1:45:45
15	68	1097	0.00053	528	14.239	0.000505321	14.31	0.00330888	93.70	3.12	5.12	11/21/04 12:40	2:08:45
33	68	1097	0.00117	528	14.239	0.001111706	31.48	0.004420586	125.18	4.17	6.16	11/21/04 13:29	2:58:15
79	70	1096	0.00279	530	14.226	0.002648896	75.01	0.007069482	200.18	6.66	8.66	11/21/04 16:21	5:50:15
20	70	1096	0.00071	530	14.226	0.000670607	18.99	0.007740089	219.17	7.30	9.29	11/21/04 17:22	6:50:30
77	67	1096	0.00272	527	14.226	0.002596533	73.53	0.010336622	292.70	9.74	11.74	11/21/04 21:11	10:39:30
129	65	1090	0.00456	525	14.148	0.004342703	122.97	0.014679325	415.67	13.84	15.83	11/22/04 7:13	20:41:30
126	67	1080	0.00445	527	14.018	0.004186845	118.56	0.01886617	534.23	17.78	19.78	11/22/04 20:16	33:44:30
81	67	1083	0.00286	527	14.057	0.00269902	76.43	0.02156519	610.66	20.33	22.32	11/23/04 7:19	44:47:30
116	66	1080	0.0041	526	14.018	0.003861884	109.36	0.025427073	720.01	23.97	25.96	11/24/04 10:42	72:10:30
50	67	1082	0.00177	527	14.044	0.001664523	47.13	0.027091597	767.15	25.54	27.53	11/24/04 20:59	82:27:30
110	69	1073	0.00388	529	13.927	0.003617762	102.44	0.030709358	869.59	28.95	30.94	11/26/04 9:23	118:51:30
94	68	1085	0.00332	528	14.083	0.003132037	88.69	0.033841395	958.28	31.90	33.89	11/28/04 10:12	167:40:30
169	68	1081	0.00597	528	14.031	0.005610243	158.86	0.039451638	1117.14	37.19	39.18	12/3/04 16:45	294:13:30
185	68	1106	0.00653	528	14.355	0.006283421	177.93	0.045735059	1295.07	43.11	45.11	12/14/04 12:30	553:58:30
139	67	1100	0.00491	527	14.278	0.004704355	133.21	0.050439414	1428.28	47.54	49.54	12/23/04 12:36	770:04:30
105	68	1085	0.00371	528	14.083	0.003498552	99.07	0.053937966	1527.35	50.84	52.84	12/31/04 18:25	967:53:30
87	67	1080	0.00307	527	14.018	0.002890917	81.86	0.056828883	1609.21	53.56	55.56	1/10/05 14:27	1203:55:30
70	67	1078	0.00247	527	13.992	0.002321718	65.74	0.0591506	1674.95	55.75	57.75	1/20/05 15:29	1444:57:30
32	68	1094	0.00113	528	14.200	0.00107507	30.44	0.06022567	1705.39	56.77	58.76	1/27/05 16:40	1614:08:30
38	69	1093	0.00134	529	14.187	0.001273067	36.05	0.061498737	1741.44	57.97	59.96	2/3/05 15:55	1781:23:30
30	68	1093	0.00106	528	14.187	0.001006956	28.51	0.062505693	1769.96	58.92	60.91	2/10/05 15:19	1948:47:30
37	70	1089	0.00131	530	14.135	0.001232699	34.91	0.063738392	1804.86	60.08	62.07	2/17/05 14:22	2115:50:30
30	68	1087	0.00106	528	14.109	0.001001429	28.36	0.064739821	1833.22	61.02	63.02	2/24/05 15:43	2285:11:30
26	68	1080	0.00092	528	14.018	0.000862316	24.42	0.065602137	1857.64	61.83	63.83	3/3/05 14:36	2452:04:30
29	69	1075	0.00102	529	13.953	0.000955551	27.06	0.066557688	1884.70	62.73	64.73	3/10/05 14:27	2619:55:30
25	69	1071	0.00088	529	13.901	0.000820686	23.24	0.067378374	1907.94	63.51	65.51	3/18/05 10:56	2808:24:30
6	68	1081	0.00021	528	14.031	0.00019918	5.64	0.067577554	1913.58	63.70	65.69	3/23/05 12:42	2930:10:30
22	69	1084	0.00078	529	14.070	0.00073097	20.70	0.068308524	1934.27	64.38	66.38	4/2/05 15:37	3173:05:30
21	70	1080	0.00074	530	14.018	0.000693858	19.65	0.069002382	1953.92	65.04	67.04	4/8/05 15:01	3316:29:30
10	69	1091	0.00035	529	14.161	0.000334405	9.47	0.069336787	1963.39	65.35	67.35	4/15/05 10:55	3480:23:30
25	71	1072	0.00088	531	13.914	0.000818358	23.17	0.070155145	1986.56	66.13	68.12	4/21/05 17:37	3631:05:30
2	68	1080	7.1E-05	528	14.018	6.6332E-05	1.88	0.070221477	1988.44	66.19	68.19	4/28/05 15:00	3796:28:30
4	67	1087	0.00014	527	14.109	0.000133777	3.79	0.070355254	1992.23	66.31	68.31	5/5/05 21:52	3971:20:30
20	67	1080	0.00071	527	14.018	0.000664579	18.82	0.071019833	2011.05	66.94	68.94	5/12/05 11:54	4129:22:30
12	71	1081	0.00042	531	14.031	0.00039611	11.22	0.071415942	2022.27	67.31	69.31	5/20/05 12:05	4321:33:30
10	71	1085	0.00035	531	14.083	0.000331313	9.38	0.071747255	2031.65	67.63	69.62	5/26/05 16:03	4469:31:30
15	70	1077	0.00053	530	13.979	0.000494236	14.00	0.072241491	2045.64	68.09	70.09	6/2/05 14:42	4636:10:30
22	73	1076	0.00078	533	13.966	0.00072013	20.39	0.072961621	2066.04	68.77	70.77	6/10/05 21:40	4835:08:30
7	73	1081	0.00025	533	14.031	0.000230197	6.52	0.073191818	2072.55	68.99	70.98	6/16/05 10:02	4967:30:30
12	69	1084	0.00042	529	14.070	0.000398711	11.29	0.073590529	2083.84	69.36	71.36	6/23/05 10:48	5136:16:30
17	71	1081	0.0006	531	14.031	0.000561156	15.89	0.074151685	2099.73	69.89	71.89	7/1/05 15:31	5332:59:30
8	74	1085	0.00028	534	14.083	0.000263561	7.46	0.074415246	2107.20	70.14	72.14	7/7/05 11:44	5473:12:30
15	74	1081	0.00053	534	14.031	0.000492356	13.94	0.074907602	2121.14	70.60	72.60	7/14/05 14:11	5643:39:30
9	73	1084	0.00032	533	14.070	0.000296789	8.40	0.075204391	2129.54	70.88	72.88	7/22/05 10:24	5831:52:30
5	73	1087	0.00018	533	14.109	0.000165339	4.68	0.07536973	2134.23	71.04	73.04	7/28/05 14:36	5980:04:30
10	73	1085	0.00035	533	14.083	0.00033007	9.35	0.0756998	2143.57	71.35	73.35	8/4/05 16:06	6149:34:30
12	73	1079	0.00042	533	14.005	0.000393893	11.15	0.076093693	2154.73	71.72	73.72	8/11/05 15:36	6317:04:30

12	73	1074	0.00042	533	13.940	0.000392068	11.10	0.076485761	2165.83	72.09	74.09	8/18/05 16:28	6485:56:30
5	73	1079	0.00018	533	14.005	0.000164122	4.65	0.076649883	2170.47	72.25	74.24	8/26/05 14:17	6675:45:30
2	74	1086	7.1E-05	534	14.096	6.59511E-05	1.87	0.076715834	2172.34	72.31	74.31	9/1/05 16:15	6821:43:30
6	73	1084	0.00021	533	14.070	0.000197859	5.60	0.076913694	2177.95	72.50	74.49	9/8/05 15:52	6989:20:30
6	74	1082	0.00021	534	14.044	0.000197124	5.58	0.077110818	2183.53	72.68	74.68	9/15/05 14:54	7156:22:30
23	73	1079	0.00081	533	14.005	0.000754962	21.38	0.077865781	2204.91	73.39	75.39	9/22/05 12:15	7321:43:30
4	71	1090	0.00014	531	14.148	0.000133136	3.77	0.077998916	2208.68	73.52	75.52	9/29/05 14:24	7491:52:30
2	69	1088	7.1E-05	529	14.122	6.6697E-05	1.89	0.078065613	2210.56	73.58	75.58	10/7/05 14:59	7684:27:30
1	71	1087	3.5E-05	531	14.109	3.31924E-05	0.94	0.078098806	2211.50	73.61	75.61	10/13/05 23:39	7837:07:30
6	69	1077	0.00021	529	13.979	0.000198068	5.61	0.078296874	2217.11	73.80	75.80	10/20/05 14:52	7996:20:30
-9	69	1084	-0.00032	529	14.070	-0.000299033	-8.47	0.077997841	2208.64	73.52	75.51	11/6/05 23:35	8413:03:30
-3	69	1087	-0.00011	529	14.109	-9.99536E-05	-2.83	0.077897887	2205.81	73.42	75.42	11/10/05 17:44	8503:12:30
-2	69	1084	-7.1E-05	529	14.070	-6.64518E-05	-1.88	0.077831435	2203.93	73.36	75.36	11/21/05 14:06	8763:34:30

DECANISTERED 08/11/2006; sample dried 10 days in air

SAMPLE: 605.0' to 606.0' (black shale above the Fleming coal) in canister M4

	lbs.	grams		lbs.	grams	moisture %	est. lost gas (cc) =	TIME OF:
dry sample weight:	3.176	1440.79	wet sample weight:	3.409	1546.29	6.82%	13	off bottom
								11/21/04 10:31

RIG/LAB MEASUREMENTS			CONVERSION OF RIG/LAB MEASUREMENTS TO STP (@60 deg F; 14.7 psi)					CUMULATIVE VOLUMES (@STP)		SCF/TON	SCF/TON		TIME SINCE
measured cc	measured T (F)	measured P	cubic ft	absolute T (F)	psia	cubic ft (@STP)	cc (@STP)	cubic ft	cc	without lost gas	with lost gas	TIME OF MEASURE	off bottom
5	67	1100	0.00018	527	14.278	0.000169221	4.79	0.000169221	4.79	0.11	0.40	11/21/04 11:27	0:56:15
3	67	1100	0.00011	527	14.278	0.000101533	2.88	0.000270754	7.67	0.17	0.46	11/21/04 11:48	1:17:15
14	68	1097	0.00049	528	14.239	0.000471633	13.36	0.000742387	21.02	0.47	0.76	11/21/04 13:31	3:00:00
18	70	1096	0.00064	530	14.226	0.000603546	17.09	0.001345933	38.11	0.85	1.14	11/21/04 16:20	5:48:45
6	70	1096	0.00021	530	14.226	0.000201182	5.70	0.001547115	43.81	0.97	1.26	11/21/04 17:21	6:49:30
23	67	1096	0.00081	527	14.226	0.000775588	21.96	0.002322703	65.77	1.46	1.75	11/21/04 21:12	10:40:30
31	65	1090	0.00109	525	14.148	0.001043595	29.55	0.003366298	95.32	2.12	2.41	11/22/04 7:14	20:42:30
23	67	1080	0.00081	527	14.018	0.000764265	21.64	0.004130563	116.96	2.60	2.89	11/22/04 20:17	33:45:30
16	67	1083	0.00057	527	14.057	0.00053314	15.10	0.004663703	132.06	2.94	3.23	11/23/04 7:20	44:48:30
18	66	1080	0.00064	526	14.018	0.000599258	16.97	0.005262961	149.03	3.31	3.60	11/24/04 10:44	72:12:30
6	67	1082	0.00021	527	14.044	0.000199743	5.66	0.005462704	154.69	3.44	3.73	11/24/04 21:00	82:28:30
10	69	1073	0.00035	529	13.927	0.000328887	9.31	0.005791591	164.00	3.65	3.94	11/26/04 9:24	118:52:30
1	68	1085	3.5E-05	528	14.083	3.33195E-05	0.94	0.005824911	164.94	3.67	3.96	11/28/04 10:14	167:42:30
2	68	1081	7.1E-05	528	14.031	6.63934E-05	1.88	0.005891304	166.82	3.71	4.00	12/3/04 16:26	293:54:30
0	68	1089	0	528	14.135	0	0.00	0.005891304	166.82	3.71	4.00	12/15/04 17:30	582:58:30
-1	67	1100	-3.5E-05	527	14.278	-3.38443E-05	-0.96	0.00585746	165.86	3.69	3.98	12/23/04 12:38	770:06:30
3	68	1085	0.00011	528	14.083	9.99586E-05	2.83	0.005957419	168.69	3.75	4.04	12/31/04 18:26	967:54:30
2	67	1080	7.1E-05	527	14.018	6.64579E-05	1.88	0.006023876	170.58	3.79	4.08	1/10/05 14:29	1203:57:30
2	67	1078	7.1E-05	527	13.992	6.63348E-05	1.88	0.006090211	172.45	3.83	4.12	1/20/05 15:30	1444:58:30
-2	68	1094	-7.1E-05	528	14.200	-6.71919E-05	-1.90	0.006023019	170.55	3.79	4.08	1/27/05 16:41	1614:09:30
0	69	1093	0	529	14.187	0	0.00	0.006023019	170.55	3.79	4.08	2/3/05 15:56	1781:24:30
-1	68	1093	-3.5E-05	528	14.187	-3.35652E-05	-0.95	0.005989454	169.60	3.77	4.06	2/10/05 15:21	1948:49:30

DECANISTERED 2/10/2005; sample dried 30 days in air

SAMPLE: 637.6' to 638.0' and 638.3' to 638.9' (Mineral coal) in canister DQM

	lbs.	grams		lbs.	grams	moisture %	est. lost gas (cc) =	TIME OF:
dry sample weight:	1.924	872.77	wet sample weight:	1.997	905.60	3.63%	69	off bottom
								11/21/04 13:16

RIG/LAB MEASUREMENTS			CONVERSION OF RIG/LAB MEASUREMENTS TO STP (@60 deg F; 14.7 psi)					CUMULATIVE VOLUMES (@STP)		SCF/TON	SCF/TON		TIME SINCE
measured cc	measured T (F)	measured P	cubic ft	absolute T (F)	psia	cubic ft (@STP)	cc (@STP)	cubic ft	cc	without lost gas	with lost gas	TIME OF MEASURE	off bottom
28	68	1097	0.00099	528	14.239	0.000943265	26.71	0.000943265	26.71	0.98	3.51	11/21/04 14:02	0:46:45
10	69	1097	0.00035	529	14.239	0.000336244	9.52	0.001279509	36.23	1.33	3.86	11/21/04 14:15	0:59:30
22	70	1097	0.00078	530	14.239	0.00073834	20.91	0.00201785	57.14	2.10	4.63	11/21/04 14:46	1:30:15
25	70	1096	0.00088	530	14.226	0.000838258	23.74	0.002856108	80.88	2.97	5.50	11/21/04 15:23	2:07:45
10	70	1096	0.00035	530	14.226	0.000335303	9.49	0.003191411	90.37	3.32	5.85	11/21/04 15:51	2:35:00
10	70	1096	0.00035	530	14.226	0.000335303	9.49	0.003526715	99.87	3.67	6.20	11/21/04 16:18	3:02:30
15	70	1096	0.00053	530	14.226	0.000502955	14.24	0.00402967	114.11	4.19	6.72	11/21/04 17:20	4:04:00
50	67	1096	0.00177	527	14.226	0.00168606	47.74	0.00571573	161.85	5.94	8.47	11/21/04 21:13	7:57:00
117	65	1090	0.00413	525	14.148	0.00393873	111.53	0.009654461	273.38	10.04	12.57	11/22/04 7:16	18:00:00

88	67	1080	0.00311	527	14.018	0.002924146	82.80	0.012578606	356.19	13.07	15.61	11/22/04 20:18	31:02:00	
61	67	1083	0.00215	527	14.057	0.002032595	57.56	0.014611202	413.74	15.19	17.72	11/23/04 7:24	42:08:00	
82	66	1080	0.0029	526	14.018	0.002729952	77.30	0.017341154	491.04	18.02	20.56	11/24/04 10:45	69:29:00	
41	67	1082	0.00145	527	14.044	0.001364909	38.65	0.018706063	529.69	19.44	21.98	11/24/04 21:00	79:44:00	
94	69	1073	0.00332	529	13.927	0.003091542	87.54	0.021797605	617.24	22.66	25.19	11/26/04 9:25	116:09:00	
59	68	1085	0.00208	528	14.083	0.001965853	55.67	0.023763458	672.90	24.70	27.23	11/28/04 10:15	164:59:00	
121	68	1081	0.00427	528	14.031	0.004016801	113.74	0.027780259	786.65	28.88	31.41	12/3/04 16:50	291:34:00	
105	68	1105	0.00371	528	14.342	0.003563041	100.89	0.0313433	887.54	32.58	35.11	12/14/04 12:35	551:19:00	
90	67	1100	0.00318	527	14.278	0.003045985	86.25	0.034389285	973.79	35.75	38.28	12/23/04 12:39	767:23:00	
78	68	1085	0.00275	528	14.083	0.002598924	73.59	0.03698821	1047.39	38.45	40.98	12/31/04 18:26	965:10:00	
47	67	1080	0.00166	527	14.018	0.00156176	44.22	0.038549969	1091.61	40.07	42.60	1/10/05 14:30	1201:14:00	
49	67	1078	0.00173	527	13.992	0.001625202	46.02	0.040175172	1137.63	41.76	44.29	1/20/05 15:31	1442:15:00	
16	68	1094	0.00057	528	14.200	0.000537535	15.22	0.040712707	1152.85	42.32	44.85	1/27/05 16:42	1611:26:00	
30	69	1093	0.00106	529	14.187	0.001005053	28.46	0.04171776	1181.31	43.36	45.90	2/3/05 15:56	1778:40:00	
23	68	1093	0.00081	528	14.187	0.000772	21.86	0.042489759	1203.17	44.17	46.70	2/10/05 15:22	1946:06:00	
32	70	1089	0.00113	530	14.135	0.001066118	30.19	0.043555877	1233.36	45.27	47.81	2/17/05 14:23	2113:07:00	
25	68	1087	0.00088	528	14.109	0.000834524	23.63	0.044390401	1256.99	46.14	48.67	2/24/05 15:43	2282:27:00	
23	68	1080	0.00081	528	14.018	0.000762818	21.60	0.045153219	1278.59	46.93	49.47	3/3/05 14:36	2449:20:00	
26	69	1075	0.00092	529	13.953	0.000856701	24.26	0.04600992	1302.85	47.82	50.36	3/10/05 14:28	2617:12:00	
23	69	1071	0.00081	529	13.901	0.000755031	21.38	0.046764951	1324.23	48.61	51.14	3/18/05 10:56	2805:40:00	
1	68	1081	3.5E-05	528	14.031	3.31967E-05	0.94	0.046798148	1325.17	48.64	51.18	3/23/05 12:42	2927:26:00	
19	69	1084	0.00067	529	14.070	0.000631292	17.88	0.04742944	1343.05	49.30	51.83	4/2/05 15:38	3170:22:00	
19	70	1080	0.00067	530	14.018	0.000627776	17.78	0.048057216	1360.82	49.95	52.48	4/8/05 15:02	3313:46:00	
4	69	1091	0.00014	529	14.161	0.000133762	3.79	0.048190978	1364.61	50.09	52.62	4/15/05 10:56	3477:40:00	
27	71	1072	0.00095	531	13.914	0.000883827	25.03	0.049074805	1389.64	51.01	53.54	4/21/05 17:38	3628:22:00	
-4	68	1080	-0.00014	528	14.018	-0.000132664	-3.76	0.048942141	1385.88	50.87	53.40	4/28/05 15:00	3793:44:00	
2	67	1087	7.1E-05	527	14.109	6.68886E-05	1.89	0.04900903	1387.78	50.94	53.47	5/5/05 21:53	3968:37:00	
21	67	1080	0.00074	527	14.018	0.000697808	19.76	0.049706837	1407.54	51.67	54.20	5/12/05 11:54	4126:38:00	
10	71	1081	0.00035	531	14.031	0.000330092	9.35	0.050036929	1416.88	52.01	54.54	5/20/05 12:05	4318:49:00	
8	71	1085	0.00028	531	14.083	0.00026505	7.51	0.050301979	1424.39	52.29	54.82	5/26/05 16:04	4466:48:00	
15	70	1077	0.00053	530	13.979	0.000494236	14.00	0.050796215	1438.38	52.80	55.33	6/2/05 14:43	4633:27:00	
21	73	1076	0.00074	533	13.966	0.000687397	19.46	0.051483612	1457.85	53.51	56.05	6/10/05 21:41	4832:25:00	
5	73	1081	0.00018	533	14.031	0.000164426	4.66	0.051648038	1462.50	53.68	56.22	6/16/05 10:03	4964:47:00	
16	69	1084	0.00057	529	14.070	0.000531614	15.05	0.052179653	1477.56	54.24	56.77	6/23/05 10:49	5133:33:00	
17	71	1081	0.0006	531	14.031	0.000561156	15.89	0.052740808	1493.45	54.82	57.35	7/1/05 15:32	5330:16:00	
6	74	1085	0.00021	534	14.083	0.000197671	5.60	0.052938479	1499.05	55.03	57.56	7/7/05 11:45	5470:29:00	
16	74	1081	0.00057	534	14.031	0.000525179	14.87	0.053463659	1513.92	55.57	58.10	7/14/05 14:11	5640:55:00	
7	73	1084	0.00025	533	14.070	0.000230836	6.54	0.053694495	1520.45	55.81	58.34	7/22/05 10:25	5829:09:00	
3	73	1087	0.00011	533	14.109	9.92035E-05	2.81	0.053793698	1523.26	55.91	58.45	7/28/05 14:36	5977:20:00	
11	73	1085	0.00039	533	14.083	0.000363077	10.28	0.054156775	1533.54	56.29	58.83	8/4/05 16:07	6146:51:00	
13	73	1079	0.00046	533	14.005	0.000426718	12.08	0.054583493	1545.63	56.74	59.27	8/11/05 15:37	6314:21:00	
12	73	1074	0.00042	533	13.940	0.000392068	11.10	0.054975561	1556.73	57.14	59.68	8/18/05 16:28	6483:12:00	
4	73	1079	0.00014	533	14.005	0.000131298	3.72	0.055106859	1560.45	57.28	59.81	8/26/05 14:18	6673:02:00	
0	74	1086	0	534	14.096	0	0.00	0.055106859	1560.45	57.28	59.81	9/1/05 16:16	6819:00:00	
6	73	1084	0.00021	533	14.070	0.000197859	5.60	0.055304718	1566.05	57.49	60.02	9/8/05 15:52	6986:36:00	
6	74	1082	0.00021	534	14.044	0.000197124	5.58	0.055501842	1571.63	57.69	60.22	9/15/05 14:55	7153:39:00	
9	73	1079	0.00032	533	14.005	0.00029542	8.37	0.055797262	1580.00	58.00	60.53	9/22/05 16:15	7322:59:00	
-7	71	1090	-0.00025	531	14.148	-0.000232988	-6.60	0.055564275	1573.40	57.76	60.29	9/29/05 14:25	7489:09:00	
0	69	1088	0	529	14.122	0	0.00	0.055564275	1573.40	57.76	60.29	10/7/05 15:00	7681:44:00	
5	71	1087	0.00018	531	14.109	0.000165962	4.70	0.055730236	1578.10	57.93	60.46	10/13/05 11:40	7822:24:00	

DECANISTERED 10/13/2005; sample dried 90 days in air

		elapsed time (off bottom to canistering)	
at surface	in canister	14.2	minutes
11/19/04 11:45	11/19/04 11:58	0.237	hours
		0.487339717	SQRT (hrs)
at surface	in canister	SQRT hrs. (since off bottom)	
0:27:45	0:14:15	0.689202438	
0:32:30	0:19:00	0.744423715	
0:44:00	0:30:30	0.863616427	
0:51:00	0:37:30	0.928708781	
1:14:45	1:01:15	1.121754578	
1:20:45	1:07:15	1.165475582	
1:34:00	1:20:30	1.256648983	
2:16:00	2:02:30	1.509690918	
2:47:00	2:33:30	1.67207456	estimate
4:14:30	4:01:00	2.06256313	
5:21:00	5:07:30	2.315707235	
10:15:00	10:01:30	3.203513696	
30:41:00	30:27:30	5.540382057	
43:47:00	43:33:30	6.617842045	
55:00:00	54:46:30	7.417041189	
67:22:00	67:08:30	8.208481386	
80:25:00	80:11:30	8.968230966	
91:30:00	91:16:30	9.566216598	
118:53:00	118:39:30	10.9039366	
129:10:00	128:56:30	11.36570133	
165:21:00	165:07:30	12.85933513	
214:15:00	214:01:30	14.63770815	
340:36:00	340:22:30	18.45569018	
629:39:00	629:25:30	25.09307673	
816:45:00	816:31:30	28.57905702	
1014:35:00	1014:21:30	31.85272097	
1250:38:00	1250:24:30	35.36447134	
1491:40:00	1491:26:30	38.62226258	
1660:51:00	1660:37:30	40.75368082	
1828:07:00	1827:53:30	42.75662717	
1995:31:00	1995:17:30	44.67134615	
2162:33:00	2162:19:30	46.50336009	
2331:53:00	2331:39:30	48.28970732	
2498:46:00	2498:32:30	49.98779018	
2666:37:00	2666:23:30	51.63941486	
2855:09:00	2854:55:30	53.43372063	
2976:53:00	2976:39:30	54.56093688	
3219:48:00	3219:34:30	56.74339169	
3363:11:00	3362:57:30	57.99306711	
3527:07:00	3526:53:30	59.38963855	
3677:49:00	3677:35:30	60.64510835	
3843:11:00	3842:57:30	61.99351445	
4018:03:00	4017:49:30	63.38818896	
4176:06:00	4175:52:30	64.62284813	
4368:16:00	4368:02:30	66.09295853	
4516:11:00	4515:57:30	67.20264752	
4682:52:00	4682:38:30	68.43156557	
4881:51:00	4881:37:30	69.87032632	
5014:14:00	5014:00:30	70.81133972	
5182:58:00	5182:44:30	71.99291053	
5379:44:00	5379:30:30	73.34675067	
5519:57:00	5519:43:30	74.29645012	

5690:22:00	5690:08:30	75.43460192
5878:37:00	5878:23:30	76.672219
6026:47:00	6026:33:30	77.6324406
6196:15:00	6196:01:30	78.71634201
6363:49:00	6363:35:30	79.77361197
6532:39:00	6532:25:30	80.82488787
6722:30:00	6722:16:30	81.99092938
6868:21:00	6868:07:30	82.87558446
7036:03:00	7035:49:30	83.88124045

		elapsed time (off bottom to canistering)
at surface	in canister	18.8 minutes
11/19/04 13:52	11/19/04 14:09	0.313 hours
		0.559016994 SQRT (hrs)
at surface	in canister	SQRT hrs. (since off bottom)
0:38:00	0:20:15	0.806225775
0:58:00	0:40:15	0.991631652
1:22:30	1:04:45	1.179689225
1:33:30	1:15:45	1.25499004
1:54:00	1:36:15	1.384437311
2:07:00	1:49:15	1.460593487
3:13:00	2:55:15	1.798147195
8:10:00	7:52:15	2.860652606
28:39:00	28:21:15	5.354126135
41:39:00	41:21:15	6.454972244
52:54:00	52:36:15	7.274384281
65:16:00	64:58:15	8.079810229
78:19:00	78:01:15	8.850612032
89:24:00	89:06:15	9.456038635
116:47:00	116:29:15	10.80740487
127:04:00	126:46:15	11.27312438
163:17:00	162:59:15	12.77888884
212:10:00	211:52:15	14.56651411
338:29:00	338:11:15	18.39836949
627:33:00	627:15:15	25.05128074
814:39:00	814:21:15	28.54236617
1012:29:00	1012:11:15	31.81980515
1248:32:00	1248:14:15	35.33482701
1489:34:00	1489:16:15	38.59512059
1658:44:00	1658:26:15	40.72775466
1826:00:00	1825:42:15	42.73191625
1993:24:00	1993:06:15	44.64769498
2160:27:00	2160:09:15	46.48082042
2329:47:00	2329:29:15	48.26800182
2496:41:00	2496:23:15	49.9669891
2664:31:00	2664:13:15	51.61911791
2853:02:00	2852:44:15	53.41394949
2974:46:00	2974:28:15	54.54157436
3217:41:00	3217:23:15	56.72477413
3361:05:00	3360:47:15	57.97499461
3525:00:00	3524:42:15	59.37185079
3675:43:00	3675:25:15	60.62782639
3841:04:00	3840:46:15	61.97647403
4015:56:00	4015:38:15	63.37152357
4173:59:00	4173:41:15	64.60650122
4366:09:00	4365:51:15	66.07697531
4514:08:00	4513:50:15	67.18742442
4680:46:00	4680:28:15	68.41625051

4879:45:00	4879:27:15	69.85532669
5012:08:00	5011:50:15	70.79653946
5180:52:00	5180:34:15	71.97835323
5377:37:00	5377:19:15	73.33234848
5517:50:00	5517:32:15	74.28223206
5688:16:00	5687:58:15	75.42070892
5876:29:00	5876:11:15	76.65833288
6024:41:00	6024:23:15	77.61894099
6194:10:00	6193:52:15	78.7031342
6361:42:00	6361:24:15	79.76037028
6530:32:00	6530:14:15	80.81181844
6720:23:00	6720:05:15	81.97804584
6866:14:00	6865:56:15	82.86283847
7033:56:00	7033:38:15	83.8686473
7201:00:00	7200:42:15	84.8588043
7370:21:00	7370:03:15	85.85083964
7536:30:00	7536:12:15	86.81311345
7729:05:00	7728:47:15	87.91530015
7881:45:00	7881:27:15	88.77931441
8040:58:00	8040:40:15	89.67153023
8457:41:00	8457:23:15	91.9657545
8547:50:00	8547:32:15	92.45458345
8808:13:00	8807:55:15	93.85218875
9145:48:00	9145:30:15	95.63376322
9314:43:00	9314:25:15	96.51286615
9507:26:00	9507:08:15	97.50615365
10009:01:00	10008:43:15	100.0451565
10154:14:00	10153:56:15	100.7682986
10345:27:00	10345:09:15	101.7126672
10489:57:00	10489:39:15	102.4205383
10682:34:00	10682:16:15	103.3565834
10850:34:00	10850:16:15	104.1661333
10968:24:00	10968:06:15	104.7302089
11088:57:00	11088:39:15	105.3041626
11354:43:00	11354:25:15	106.5585911
11521:58:00	11521:40:15	107.3405018
11906:15:00	11905:57:15	109.1158406
12267:25:00	12267:07:15	110.7584459
12602:18:00	12602:00:15	112.2600404
12842:16:00	12841:58:15	113.3237986
13178:56:00	13178:38:15	114.799608
13441:13:00	13440:55:15	115.9363331
13609:08:00	13608:50:15	116.6582616
13755:19:00	13755:01:15	117.2831332
13922:56:00	13922:38:15	117.9955508
14258:57:00	14258:39:15	119.4109152
14427:11:00	14426:53:15	120.1132799
15025:39:00	15025:21:15	122.5792261

		elapsed time (off bottom to canistering)	
at surface	in canister	9.7	minutes
11/19/04 16:06	11/19/04 16:15	0.162	hours
		0.403112887	SQRT (hrs)

at surface	in canister	SQRT hrs. (since off bottom)
0:26:15	0:17:30	0.673918887
0:31:45	0:23:00	0.738805342
0:58:00	0:49:15	0.991631652
5:57:30	5:48:45	2.444381312

26:25:30	26:16:45	5.142146115
39:23:30	39:14:45	6.277605701
50:40:30	50:31:45	7.11980805
63:02:30	62:53:45	7.940927738
76:05:30	75:56:45	8.724009017
87:10:30	87:01:45	9.337647812
114:32:30	114:23:45	10.70319267
124:55:30	124:46:45	11.17773084
161:04:30	160:55:45	12.6921892
209:57:30	209:48:45	14.49051414
336:15:30	336:06:45	18.33780249
625:20:30	625:11:45	25.00716564
812:25:30	812:16:45	28.50336237
1010:15:30	1010:06:45	31.78482342
1246:18:30	1246:09:45	35.30332845
1487:20:30	1487:11:45	38.56628493
1656:30:30	1656:21:45	40.70042997
1823:46:30	1823:37:45	42.70587391
1991:09:30	1991:00:45	44.62258397
2158:14:30	2158:05:45	46.45705903
2327:33:30	2327:24:45	48.24494792
2494:26:30	2494:17:45	49.94455259
2662:17:30	2662:08:45	51.59756131
2850:48:30	2850:39:45	53.39311753
2972:32:30	2972:23:45	54.52117326
3215:27:30	3215:18:45	56.7051585
3358:51:30	3358:42:45	57.95580213
3522:46:30	3522:37:45	59.35311
3673:28:30	3673:19:45	60.60933646
3838:50:30	3838:41:45	61.95852107
4013:43:30	4013:34:45	63.35409747
4171:44:30	4171:35:45	64.58915028
4363:55:30	4363:46:45	66.06013674
4511:54:30	4511:45:45	67.17086422
4678:32:30	4678:23:45	68.39998782
4877:30:30	4877:21:45	69.83927978
5009:53:30	5009:44:45	70.78070594
5178:38:30	5178:29:45	71.96289553
5375:23:30	5375:14:45	73.31717625
5515:36:30	5515:27:45	74.26725389
5686:02:30	5685:53:45	75.40595688
5874:15:30	5874:06:45	76.64381906
6022:27:30	6022:18:45	77.60460682
6191:56:30	6191:47:45	78.68899754
6359:28:30	6359:19:45	79.74642103
6528:18:30	6528:09:45	80.79805072
6718:09:30	6718:00:45	81.96447401
6863:59:30	6863:50:45	82.849311
7031:43:30	7031:34:45	83.85548084
7198:46:30	7198:37:45	84.84569327
7368:06:30	7367:57:45	85.83778306
7534:15:30	7534:06:45	86.80020161
7726:50:30	7726:41:45	87.90255021
7867:29:30	7867:20:45	88.69897594

		elapsed time (off bottom to canistering)
at surface	in canister	13.5 minutes
11/19/04 16:06	11/19/04 16:19	0.225 hours

0.474341649 SQRT (hrs)

at surface	in canister	SQRT hrs. (since off bottom)
0:34:15	0:21:45	0.766485486
0:41:45	0:29:15	0.844097151
0:50:15	0:37:45	0.924211375
0:55:45	0:43:15	0.972539631
5:58:30	5:46:00	2.447788117
26:20:30	26:08:00	5.134036748
39:22:30	39:10:00	6.27627809
50:41:30	50:29:00	7.120978397
63:03:30	62:51:00	7.941977084
76:06:30	75:54:00	8.724964183
87:10:30	86:58:00	9.337647812
114:33:30	114:21:00	10.70397123
124:50:30	124:38:00	11.17400257
161:07:30	160:55:00	12.69415876
209:59:30	209:47:00	14.49166427
336:17:30	336:05:00	18.33871133
625:20:30	625:08:00	25.00716564
812:26:30	812:14:00	28.50365474
1010:15:30	1010:03:00	31.78482342
1246:18:30	1246:06:00	35.30332845
1487:20:30	1487:08:00	38.56628493
1656:30:30	1656:18:00	40.70042997
1823:46:30	1823:34:00	42.70587391
1991:10:30	1990:58:00	44.62277072
2158:15:30	2158:03:00	46.4572384
2327:34:30	2327:22:00	48.24512065
2494:27:30	2494:15:00	49.94471944
2662:18:30	2662:06:00	51.59772282
2850:48:30	2850:36:00	53.39311753
2972:33:30	2972:21:00	54.5213261
3215:28:30	3215:16:00	56.70530545
3358:51:30	3358:39:00	57.95580213
3522:47:30	3522:35:00	59.3532504
3673:29:30	3673:17:00	60.60947396
3838:51:30	3838:39:00	61.95865557
4013:44:30	4013:32:00	63.35422901
4171:45:30	4171:33:00	64.5892793
4363:56:30	4363:44:00	66.06026289
4511:54:30	4511:42:00	67.17086422
4678:33:30	4678:21:00	68.40010965
4877:31:30	4877:19:00	69.8393991
5009:54:30	5009:42:00	70.78082367
5178:39:30	5178:27:00	71.96301133
5375:23:30	5375:11:00	73.31717625
5515:36:30	5515:24:00	74.26725389
5686:02:30	5685:50:00	75.40595688
5874:16:30	5874:04:00	76.64392779
6022:28:30	6022:16:00	77.6047142
6191:57:30	6191:45:00	78.68910344
6359:28:30	6359:16:00	79.74642103
6528:19:30	6528:07:00	80.79815386
6718:09:30	6717:57:00	81.96447401
6864:00:30	6863:48:00	82.84941159
7031:44:30	7031:32:00	83.85558022

elapsed time (off bottom to canistering)

at surface	in canister		
		12.5	minutes
11/20/04 8:38	11/20/04 8:52	0.208	hours
		0.456435465	SQRT (hrs)

at surface	in canister	SQRT hrs. (since off bottom)
1:30:00	1:16:45	1.219631092
2:31:45	2:18:30	1.586400538
3:37:00	3:23:45	1.898464292
4:37:45	4:24:30	2.148642983
5:47:15	5:34:00	2.403122968
9:54:15	9:41:00	3.145102012
22:50:15	22:37:00	4.777551674
22:10:15	21:57:00	4.70726389
46:32:15	46:19:00	6.820923691
59:35:15	59:22:00	7.718484307
70:39:15	70:26:00	8.404859705
98:08:15	97:55:00	9.905806378
144:37:15	144:24:00	12.02532051
193:28:15	193:15:00	13.90892999
319:45:15	319:32:00	17.88132173
608:49:15	608:36:00	24.67404169
795:55:15	795:42:00	28.21184739

elapsed time (off bottom to canistering)

at surface	in canister		
		12.7	minutes
11/20/04 16:04	11/20/04 16:14	0.212	hours
		0.460977223	SQRT (hrs)

at surface	in canister	SQRT hrs. (since off bottom)	
0:18:45	0:08:00	0.588075959	
0:21:30	0:10:45	0.625832778	
0:28:45	0:18:00	0.715891053	
0:35:45	0:25:00	0.793200269	
0:50:45	0:40:00	0.937638879	
1:11:45	1:01:00	1.108677891	
2:30:00	2:19:15	1.591644851	
3:45:00	3:34:15	1.945079261	
15:24:00	15:13:15	3.928528138	estimate
26:46:00	26:35:15	5.176871642	
39:08:00	38:57:15	6.258327785	
52:11:00	52:00:15	7.226110065	
63:15:00	63:04:15	7.955082233	
90:37:00	90:26:15	9.521029356	
100:54:00	100:43:15	10.04655828	
137:15:00	137:04:15	11.71679706	
186:05:00	185:54:15	13.64245823	
312:35:00	312:24:15	17.68096905	
572:20:00	572:09:15	23.92418581	
788:31:00	788:20:15	28.08113246	
986:19:00	986:08:15	31.40620958	
1222:22:00	1222:11:15	34.96283741	
1463:24:00	1463:13:15	38.25484719	
1632:36:00	1632:25:15	40.40585766	
1799:50:00	1799:39:15	42.42483549	
1967:13:00	1967:02:15	44.35369207	
2134:18:00	2134:07:15	46.19884558	
2303:38:00	2303:27:15	47.99652765	
2470:30:00	2470:19:15	49.70445989	
2638:22:00	2638:11:15	51.36535798	
2826:51:00	2826:40:15	53.16844302	
2948:37:00	2948:26:15	54.30147328	

3191:32:00	3191:21:15	56.49395248
3334:55:00	3334:44:15	57.74902597
3498:51:00	3498:40:15	59.15135952
3649:33:00	3649:22:15	60.41178141
3814:55:00	3814:44:15	61.76528151
3989:48:00	3989:37:15	63.16512751
4147:49:00	4147:38:15	64.40380424
4340:00:00	4339:49:15	65.87892936
4487:58:00	4487:47:15	66.9925369
4654:37:00	4654:26:15	68.22499542
4853:35:00	4853:24:15	69.6679027
4985:58:00	4985:47:15	70.61161378
5154:43:00	5154:32:15	71.79658766
5351:27:00	5351:16:15	73.15383335
5491:40:00	5491:29:15	74.10600515
5662:06:00	5661:55:15	75.24714834
5850:20:00	5850:09:15	76.48768964
5998:32:00	5998:21:15	77.45041424
6168:01:00	6167:50:15	78.53693399
6335:32:00	6335:21:15	79.59627294
6504:23:00	6504:12:15	80.64996384
6694:13:00	6694:02:15	81.81839646
6840:10:00	6839:59:15	82.70550163
7007:47:00	7007:36:15	83.71270314
7174:50:00	7174:39:15	84.70458469
7344:10:00	7343:59:15	85.69830803
7510:20:00	7510:09:15	86.66237169
7702:55:00	7702:44:15	87.76645145
7855:34:00	7855:23:15	88.63182273
8014:48:00	8014:37:15	89.52560155
8431:31:00	8431:20:15	91.82347194
8521:39:00	8521:28:15	92.31296406
8782:01:00	8781:50:15	93.71259254
9119:37:00	9119:26:15	95.49685859
9288:32:00	9288:21:15	96.37721031
9481:14:00	9481:03:15	97.37179605
9982:50:00	9982:39:15	99.91429661
10128:03:00	10127:52:15	100.638379
10319:16:00	10319:05:15	101.5839554
10463:45:00	10463:34:15	102.2926358
10656:23:00	10656:12:15	103.2299214
10823:13:00	10823:02:15	104.0348499
10942:13:00	10942:02:15	104.6052102
11062:46:00	11062:35:15	105.179846
11328:32:00	11328:21:15	106.4357396
11495:46:00	11495:35:15	107.2184686
11880:02:00	11879:51:15	108.9957186
12241:14:00	12241:03:15	110.6402579
12576:06:00	12575:55:15	112.1433606
12816:06:00	12815:55:15	113.2083625
13152:45:00	13152:34:15	114.6855847
13415:01:00	13414:50:15	115.8233569
13583:45:00	13583:34:15	116.5494888
13729:07:00	13728:56:15	117.1714556
13896:44:00	13896:33:15	117.884548
14232:45:00	14232:34:15	119.3012294
14400:59:00	14400:48:15	120.004236
14999:27:00	14999:16:15	122.4723778

		elapsed time (off bottom to canistering)	
at surface	in canister	18.5	minutes
11/21/04 10:33	11/21/04 10:50	0.308	hours
		0.555277708	SQRT (hrs)
at surface	in canister	SQRT hrs. (since off bottom)	
0:31:00	0:14:45	0.744423714	
0:49:45	0:33:30	0.930949336	
0:51:15	0:35:00	0.944281032	
1:17:00	1:00:45	1.149275134	
1:20:00	1:03:45	1.170825919	
1:28:30	1:12:15	1.229837388	
1:43:30	1:27:15	1.327591805	
2:06:30	1:50:15	1.464866319	
2:56:00	2:39:45	1.723610552	
5:48:00	5:31:45	2.416091886	
6:48:15	6:32:00	2.61565798	
10:37:15	10:21:00	3.264710299	
20:39:15	20:23:00	4.548809368	
33:42:15	33:26:00	5.808757756	
44:45:15	44:29:00	6.692657668	
72:08:15	71:52:00	8.49558709	
82:25:15	82:09:00	9.080657098	
118:49:15	118:33:00	10.9022169	
167:38:15	167:22:00	12.94893818	
294:11:15	293:55:00	17.15298808	
553:56:15	553:40:00	23.53667351	
770:02:15	769:46:00	27.75022522	
967:51:15	967:35:00	31.11095734	
1203:53:15	1203:37:00	34.6976224	
1444:55:15	1444:39:00	38.01260756	
1614:06:15	1613:50:00	40.17638195	
1781:21:15	1781:05:00	42.20653583	
1948:45:15	1948:29:00	44.14512053	
2115:48:15	2115:32:00	45.99827895	
2285:09:15	2284:53:00	47.80367838	
2452:02:15	2451:46:00	49.51843091	
2619:53:15	2619:37:00	51.18520294	
2808:22:15	2808:06:00	52.99441795	
2930:08:15	2929:52:00	54.13109088	
3173:03:15	3172:47:00	56.33020208	
3316:27:15	3316:11:00	57.58898911	
3480:21:15	3480:05:00	58.99484441	
3631:03:15	3630:47:00	60.2585402	
3796:26:15	3796:10:00	61.61554187	
3971:18:15	3971:02:00	63.01858192	
4129:20:15	4129:04:00	64.2602132	
4321:31:15	4321:15:00	65.73856048	
4469:29:15	4469:13:00	66.85450621	
4636:08:15	4635:52:00	68.08946321	
4835:06:15	4834:50:00	69.53518294	
4967:28:15	4967:12:00	70.48055287	
5136:14:15	5135:58:00	71.66781007	estimate
5332:57:15	5332:41:00	73.02733506	
5473:10:15	5472:54:00	73.98113498	
5643:37:15	5643:21:00	75.12428591	
5831:50:15	5831:34:00	76.36671395	
5980:02:15	5979:46:00	77.33094465	
6149:32:15	6149:16:00	78.41922596	
6317:02:15	6316:46:00	79.48002894	

6485:54:15	6485:38:00	80.53534421
6675:43:15	6675:27:00	81.70531398
6821:41:15	6821:25:00	82.59373463
6989:18:15	6989:02:00	83.60228266
7156:20:15	7156:04:00	84.59536039
7321:41:15	7321:25:00	85.56707895
7491:50:15	7491:34:00	86.55561796
7684:25:15	7684:09:00	87.66104228
7837:05:15	7836:49:00	88.52753809
7996:18:15	7996:02:00	89.42226606
8413:01:15	8412:45:00	91.72272528
8503:10:15	8502:54:00	92.21284256
8763:32:15	8763:16:00	93.61396797

elapsed time (off bottom to canistering)

at surface	in canister		
11/21/04 10:33	11/21/04 10:54	23.2	minutes
		0.387	hours
		0.622494980	SQRT (hrs)

at surface	in canister	SQRT hrs. (since off bottom)
0:54:00	0:33:00	0.968245837
1:15:00	0:54:00	1.134680572
2:57:45	2:36:45	1.732050808
5:46:30	5:25:30	2.41091269
6:47:15	6:26:15	2.612470096
10:38:15	10:17:15	3.267261851
20:40:15	20:19:15	4.55064098
33:43:15	33:22:15	5.810192194
44:46:15	44:25:15	6.693902698
72:10:15	71:49:15	8.497548666
82:26:15	82:05:15	9.081574753
118:50:15	118:29:15	10.90298124
167:40:15	167:19:15	12.95022522
293:52:15	293:31:15	17.14375494
582:56:15	582:35:15	24.14487523
770:04:15	769:43:15	27.75082581
967:52:15	967:31:15	31.1112252
1203:55:15	1203:34:15	34.69810273
1444:56:15	1444:35:15	38.01282678
1614:07:15	1613:46:15	40.17658937
1781:22:15	1781:01:15	42.20673327
1948:47:15	1948:26:15	44.14549807

elapsed time (off bottom to canistering)

at surface	in canister		
11/21/04 13:18	11/21/04 13:40	24.5	minutes
		0.408	hours
		0.639009651	SQRT (hrs)

at surface	in canister	SQRT hrs. (since off bottom)	
0:44:45	0:22:15	0.882704178	
0:57:30	0:35:00	0.995824616	
1:28:15	1:05:45	1.226444726	
2:05:45	1:43:15	1.459166429	
2:33:00	2:10:30	1.607275127	
3:00:30	2:38:00	1.744037461	
4:02:00	3:39:30	2.016597795	
7:55:00	7:32:30	2.819574436	estimate
17:58:00	17:35:30	4.242640687	

31:00:00	30:37:30	5.57075698
42:06:00	41:43:30	6.491019437
69:27:00	69:04:30	8.33566634
79:42:00	79:19:30	8.929352347
116:07:00	115:44:30	10.77729094
164:57:00	164:34:30	12.84458381
291:32:00	291:09:30	17.07532333
551:17:00	550:54:30	23.48013345
767:21:00	766:58:30	27.70168467
965:08:00	964:45:30	31.06713161
1201:12:00	1200:49:30	34.65881321
1442:13:00	1441:50:30	37.9769667
1611:24:00	1611:01:30	40.14266226
1778:38:00	1778:15:30	42.17424174
1946:04:00	1945:41:30	44.11462343
2113:05:00	2112:42:30	45.96864874
2282:25:00	2282:02:30	47.77499346
2449:18:00	2448:55:30	49.49073987
2617:10:00	2616:47:30	51.15857699
2805:38:00	2805:15:30	52.96854412
2927:24:00	2927:01:30	54.10576063
3170:20:00	3169:57:30	56.30600915
3313:44:00	3313:21:30	57.56532521
3477:38:00	3477:15:30	58.97174465
3628:20:00	3627:57:30	60.23592505
3793:42:00	3793:19:30	61.59328968
3968:35:00	3968:12:30	62.9969576
4126:36:00	4126:13:30	64.23887712
4318:47:00	4318:24:30	65.71770436
4466:46:00	4466:23:30	66.83412302
4633:25:00	4633:02:30	68.06944983
4832:23:00	4832:00:30	69.51558578
4964:45:00	4964:22:30	70.46121865
5133:31:00	5133:08:30	71.64879622
5330:14:00	5329:51:30	73.00867528
5470:27:00	5470:04:30	73.96271583
5640:53:00	5640:30:30	75.10603615
5829:07:00	5828:44:30	76.34887033
5977:18:00	5976:55:30	77.31321577
6146:49:00	6146:26:30	78.40184947
6314:19:00	6313:56:30	79.46288442
6483:10:00	6482:47:30	80.5183209
6673:00:00	6672:37:30	81.6886365
6818:58:00	6818:35:30	82.57723657
6986:34:00	6986:11:30	83.58588398
7153:37:00	7153:14:30	84.57925278
7322:57:00	7322:34:30	85.57443154
7489:07:00	7488:44:30	86.5398752
7681:42:00	7681:19:30	87.64549808
7822:22:00	7821:59:30	88.44433277

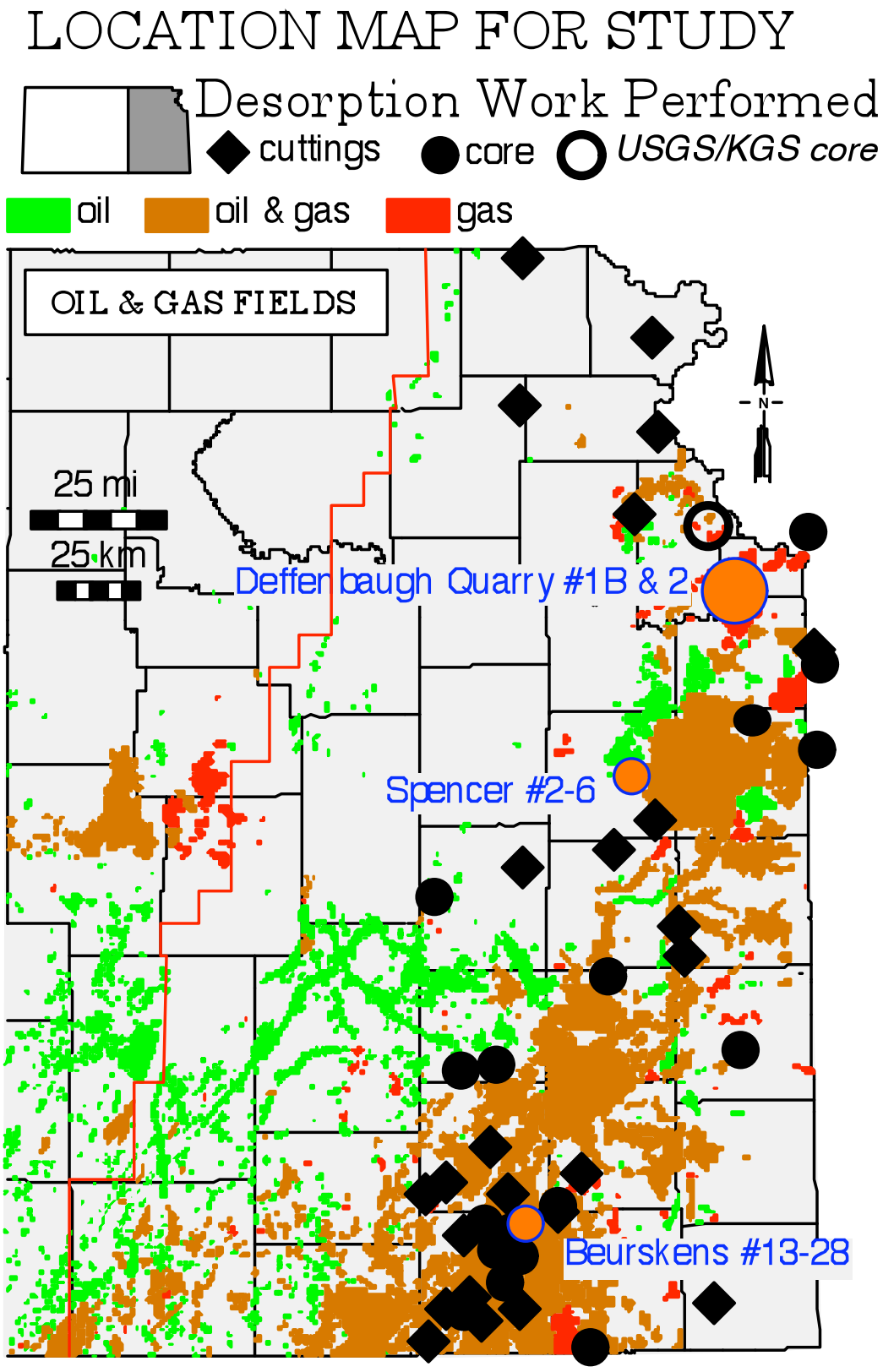

LOCATION MAP FOR STUDY
Desorption Work Performed
cuttings
core
USGS/KGS core
oil
oil & gas
gas
OIL & GAS FIELDS
25 mi
25 km
N
Deffenbaugh Quarry #1B & 2
Spencer #2-6
Beurskens #13-28

Figure 1.

DEFFENBAUGH QUARRY AND LOCATION OF CORE HOLES

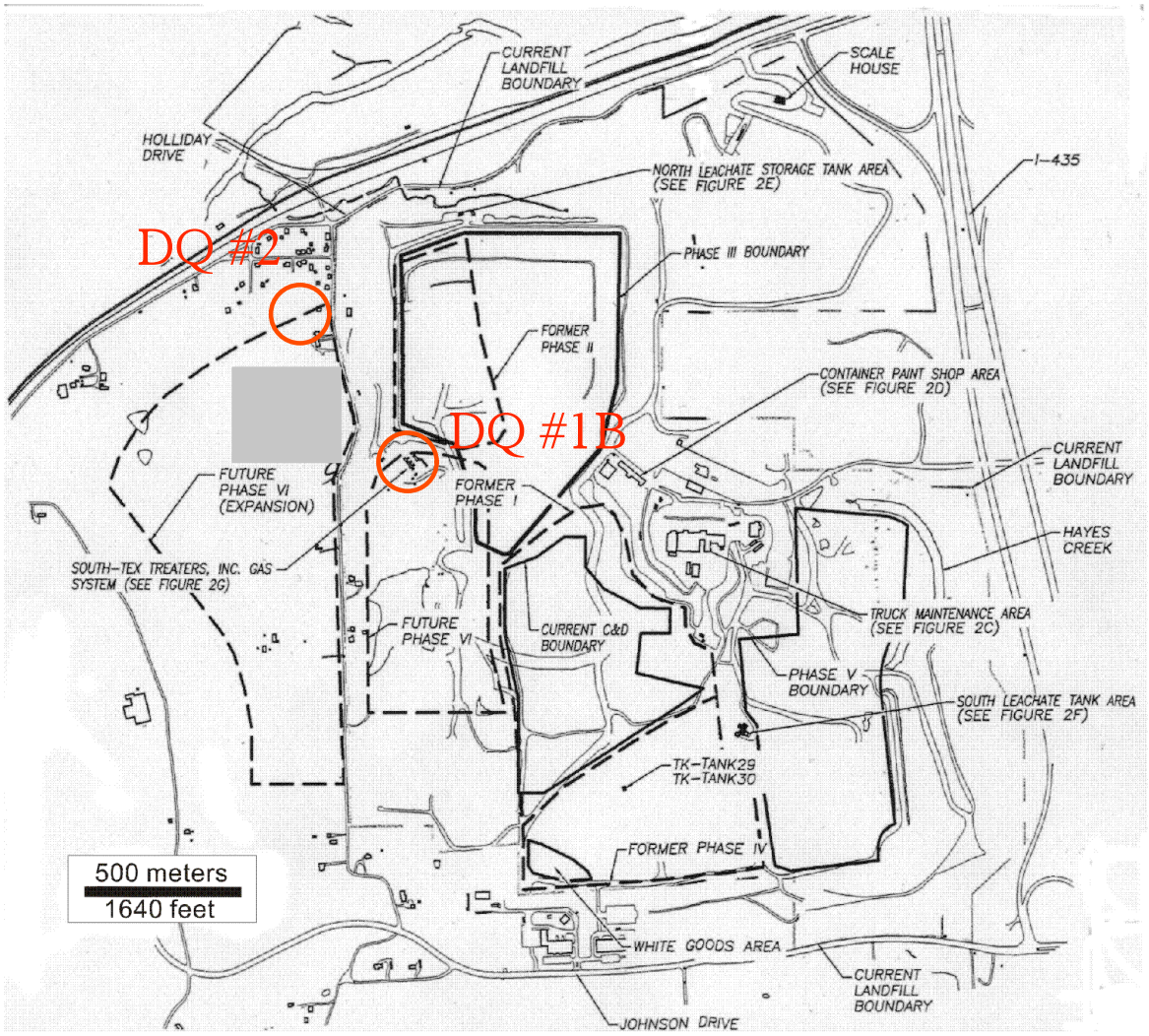


Figure 2.

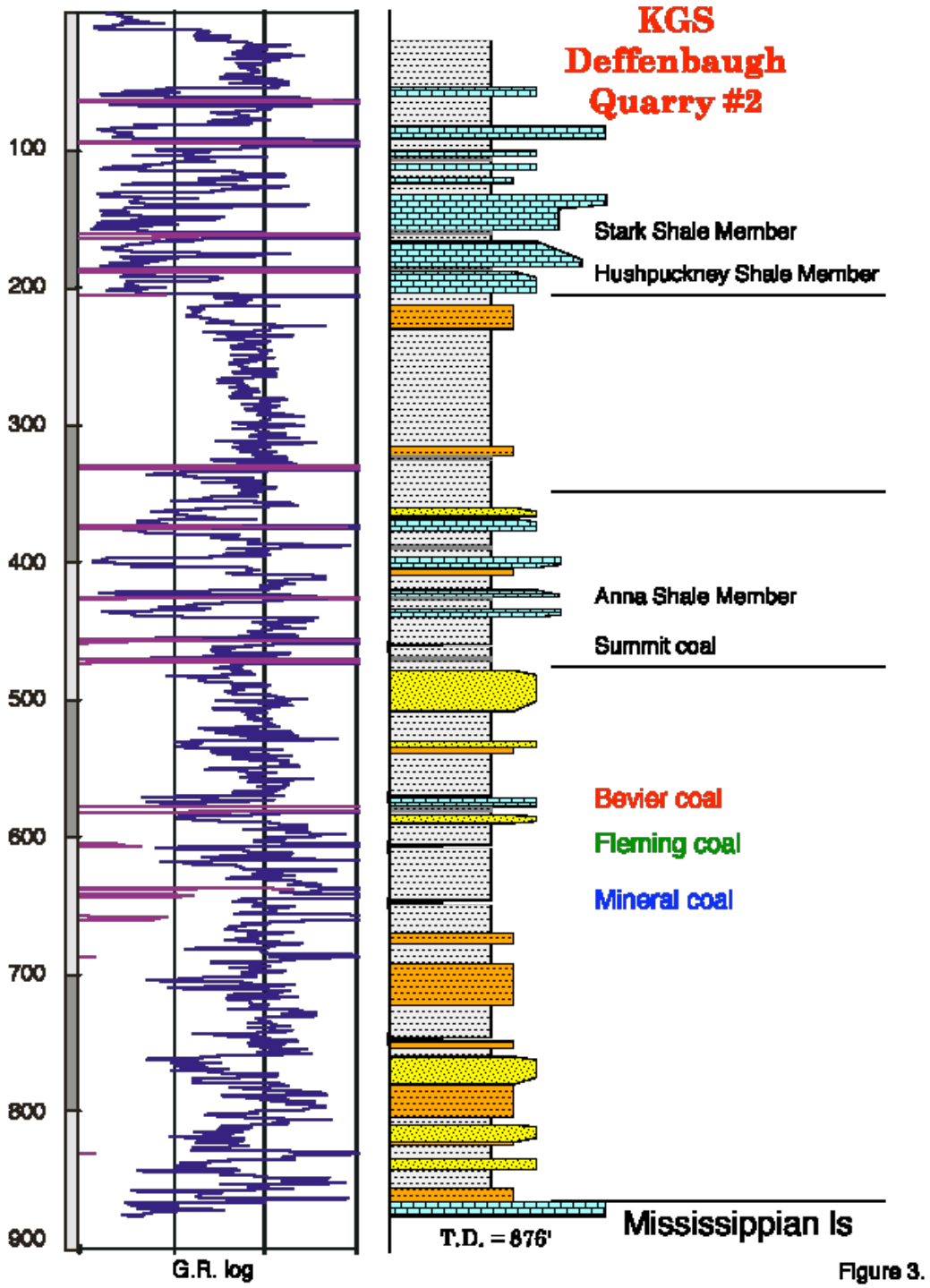

KGS
Deffenbaugh
Quarry #2
100
200
300
400
500
600
700
800
900
Stark Shale Member
Hushpuckney Shale Member
Anna Shale Member
Summit coal
Bevier coal
Fleming coal
Mineral coal
Mississippian ls
T.D. = 876'
G.R. log

Figure 3.

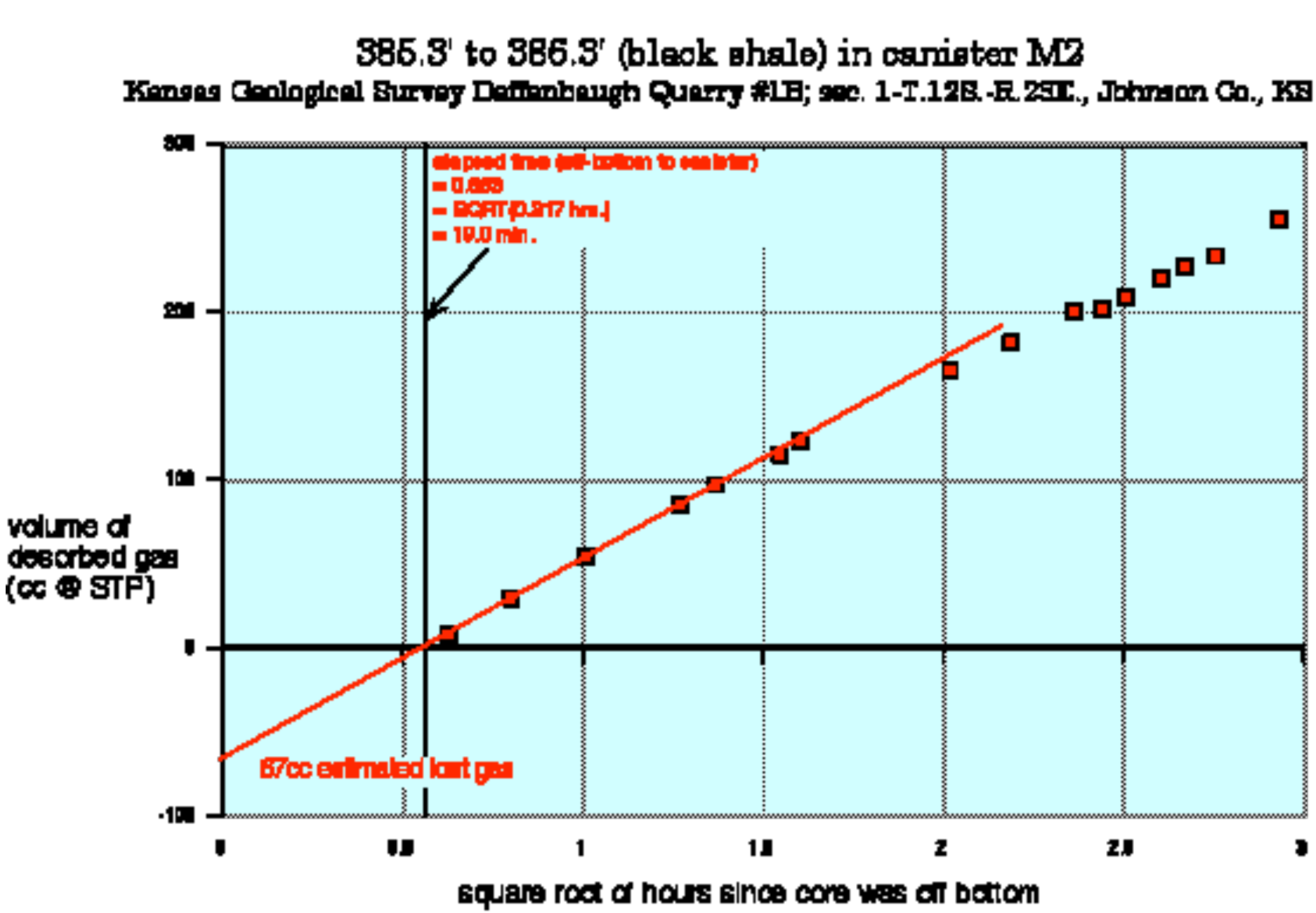

385.3' to 386.3' (black shale) in canister M2
Kansas Geological Survey Deffenbaugh Quarry #1B; sec. 1-T.12S.-R.25E., Johnson Co., KS
elapsed time (off-bottom to canister)
= 0.659
= SQRT(0.317 hrs.)
= 19.0 min.
67cc estimated lost gas
volume of
desorbed gas
(cc @ STP)
square root of hours since core was off bottom

Figure 4.

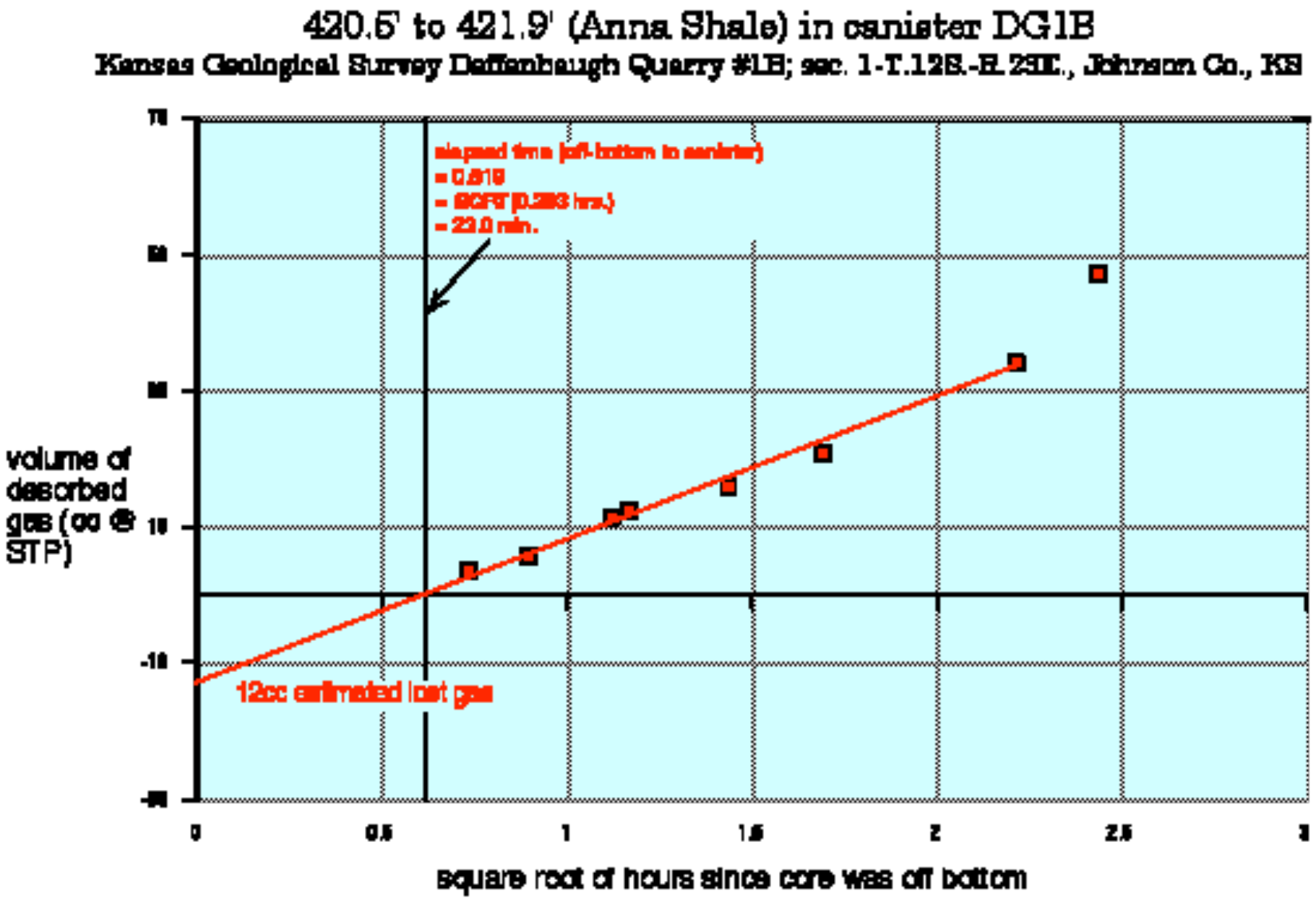

420.5' to 421.9' (Anna Shale) in canister DG1B
Kansas Geological Survey Deffenbaugh Quarry #1B; sec. 1-T.12S.-R.23E., Johnson Co., KS
elapsed time (off-bottom to canister)
= 0.819
= 0.905 hrs.)
= 23.0 min.
12cc estimated lost gas
volume of desorbed gas (cc @ STP)
square root of hours since core was off bottom

Figure 5.

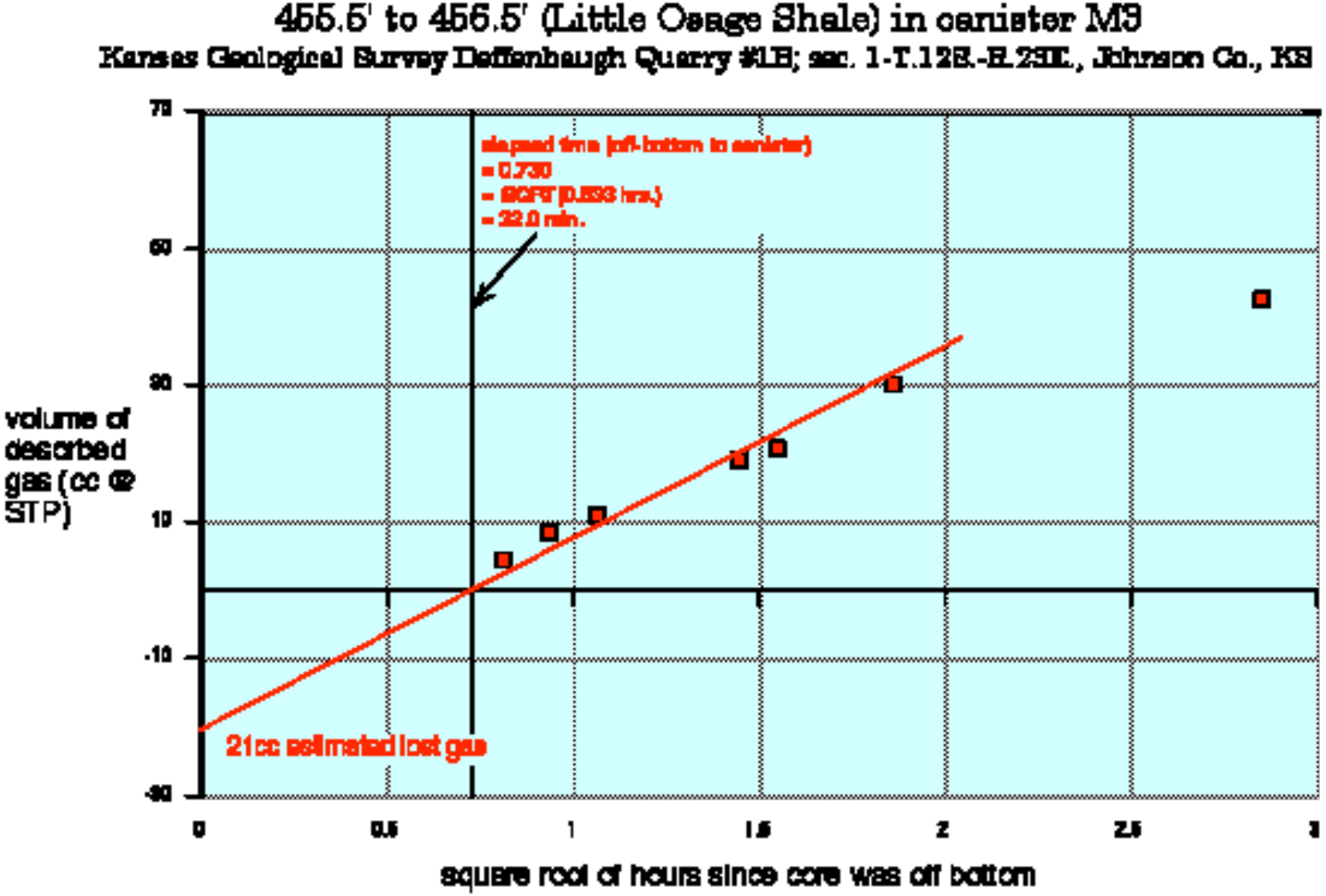

455.5' to 456.5' (Little Osage Shale) in canister M3
Kansas Geological Survey Deffenbaugh Quarry #1E; sec. 1-T.12S.-R.23E., Johnson Co., KS
elapsed time (off-bottom to canister)
= 0.730
= SQRT (0.533 hrs.)
= 32.0 min.
volume of desorbed gas (cc @ STP)
70
50
30
10
-10
-30
21cc estimated lost gas
0
0.5
1
1.5
2
2.5
3
square root of hours since core was off bottom

Figure 6.

458.7' to 459.1' (Summit coal) in canister Brady 31

Kansas Geological Survey Deffenbaugh Quarry #1B; sec. 1-T.12S.-R.23E., Johnson Co., KS

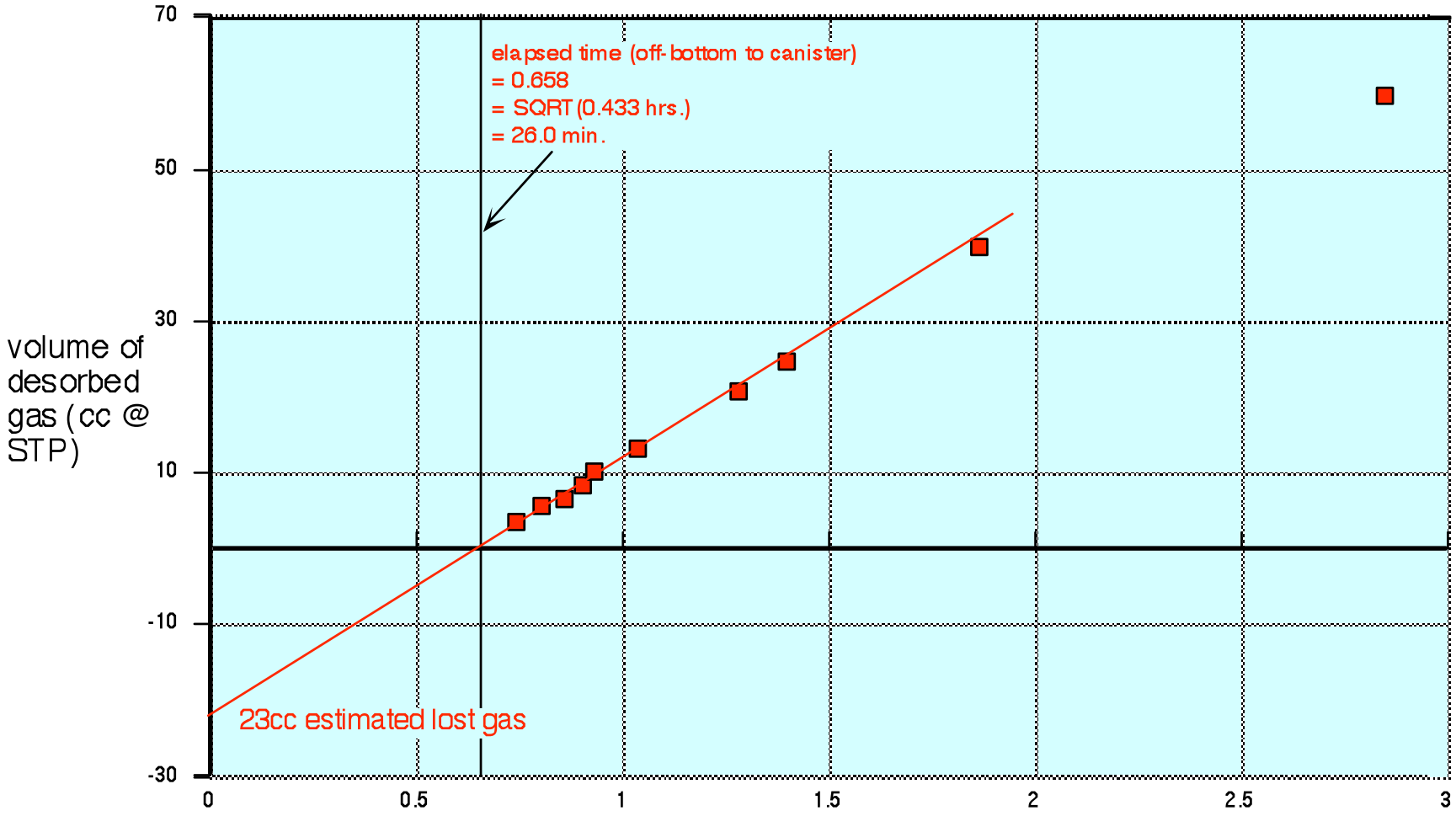


Figure 7.

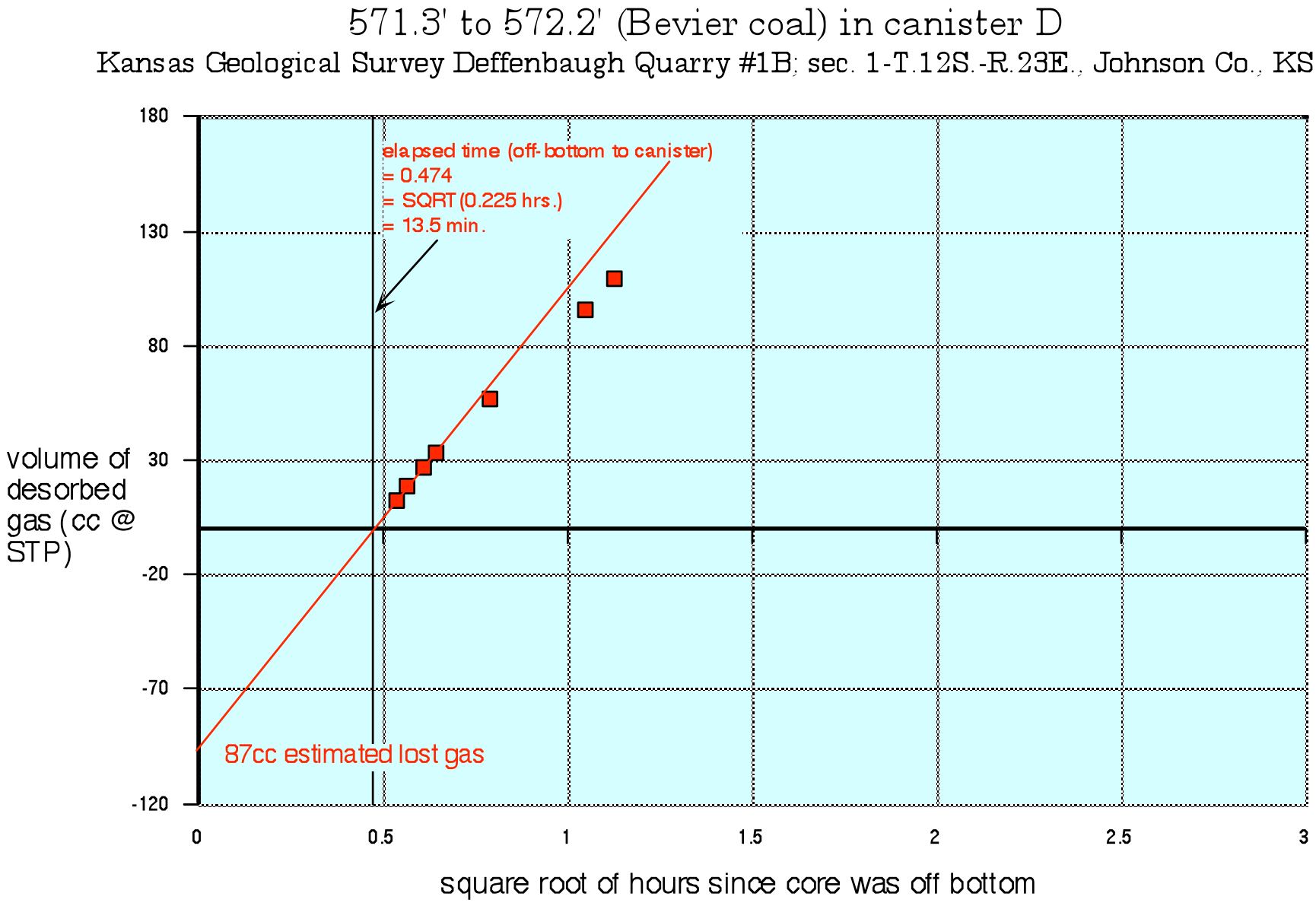

571.3' to 572.2' (Bevier coal) in canister D
Kansas Geological Survey Deffenbaugh Quarry #1B; sec. 1-T.12S.-R.23E., Johnson Co., KS
elapsed time (off-bottom to canister)
= 0.474
= SQRT(0.225 hrs.)
= 13.5 min.
87cc estimated lost gas
volume of desorbed gas (cc @ STP)
180
130
80
30
-20
-70
-120
0
0.5
1
1.5
2
2.5
3
square root of hours since core was off bottom

Figure 8.

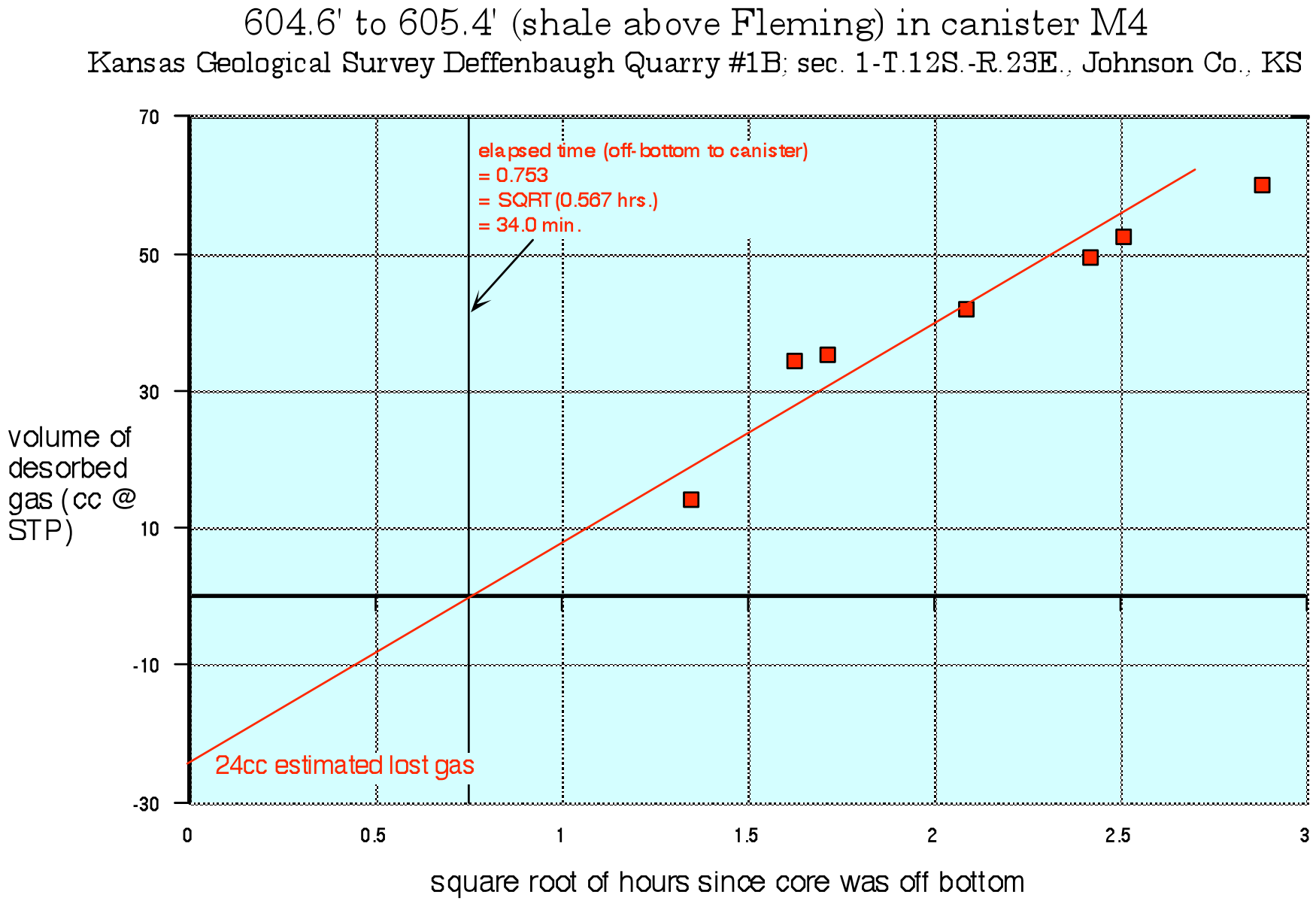

604.6' to 605.4' (shale above Fleming) in canister M4
Kansas Geological Survey Deffenbaugh Quarry #1B; sec. 1-T.12S.-R.23E., Johnson Co., KS
elapsed time (off-bottom to canister)
= 0.753
= SQRT(0.567 hrs.)
= 34.0 min.
24cc estimated lost gas
volume of desorbed gas (cc @ STP)
70
50
30
10
-10
-30
0
0.5
1
1.5
2
2.5
3
square root of hours since core was off bottom

Figure 9.

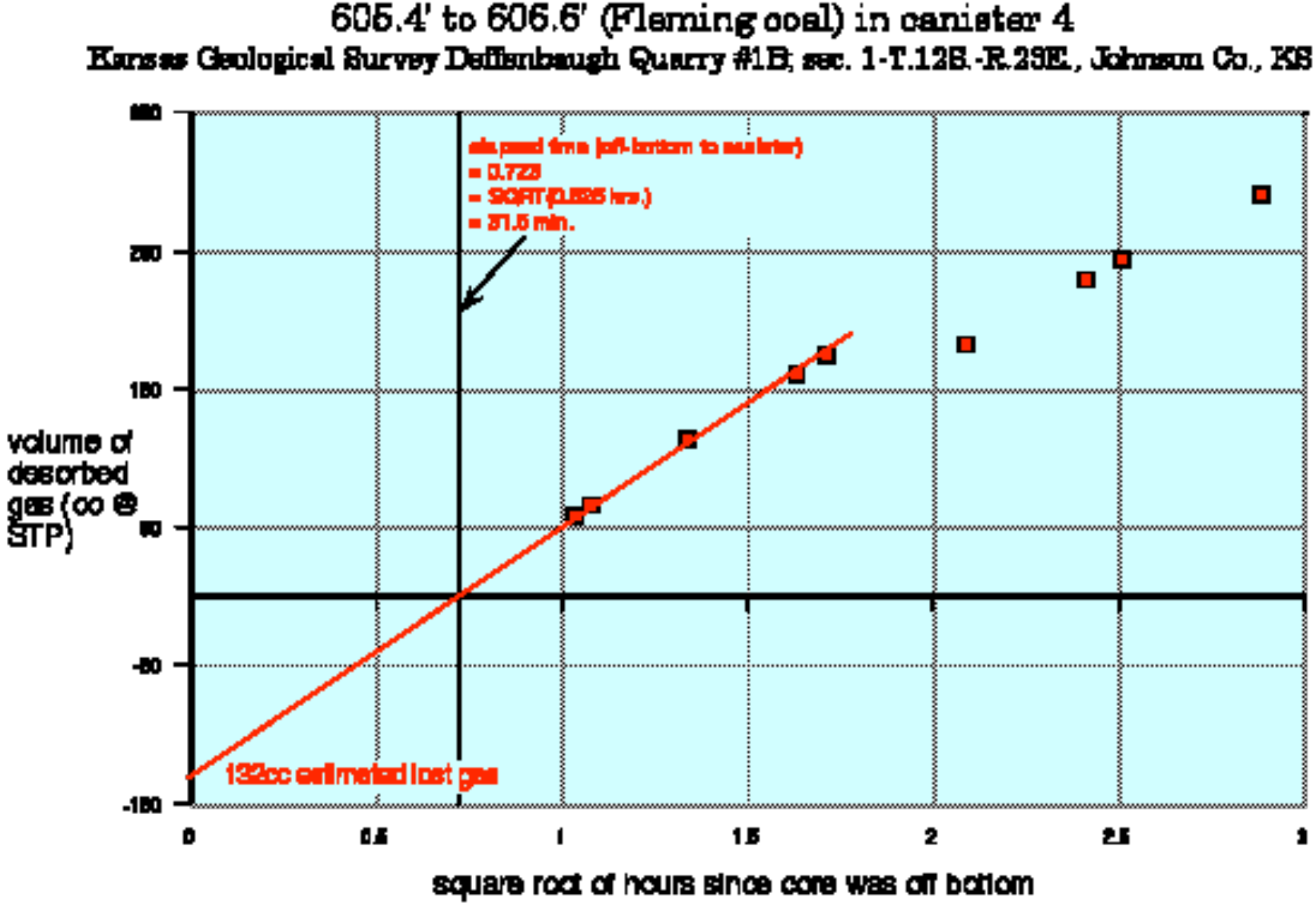

605.4' to 606.6' (Fleming coal) in canister 4
Kansas Geological Survey Deffenbaugh Quarry #1B; sec. 1-T.12S.-R.23E., Johnson Co., KS
elapsed time (off-bottom to canister)
= 0.725
= SQRT(0.525 hrs.)
= 31.5 min.
132cc estimated lost gas
volume of desorbed gas (cc @ STP)
square root of hours since core was off bottom

Figure 10.

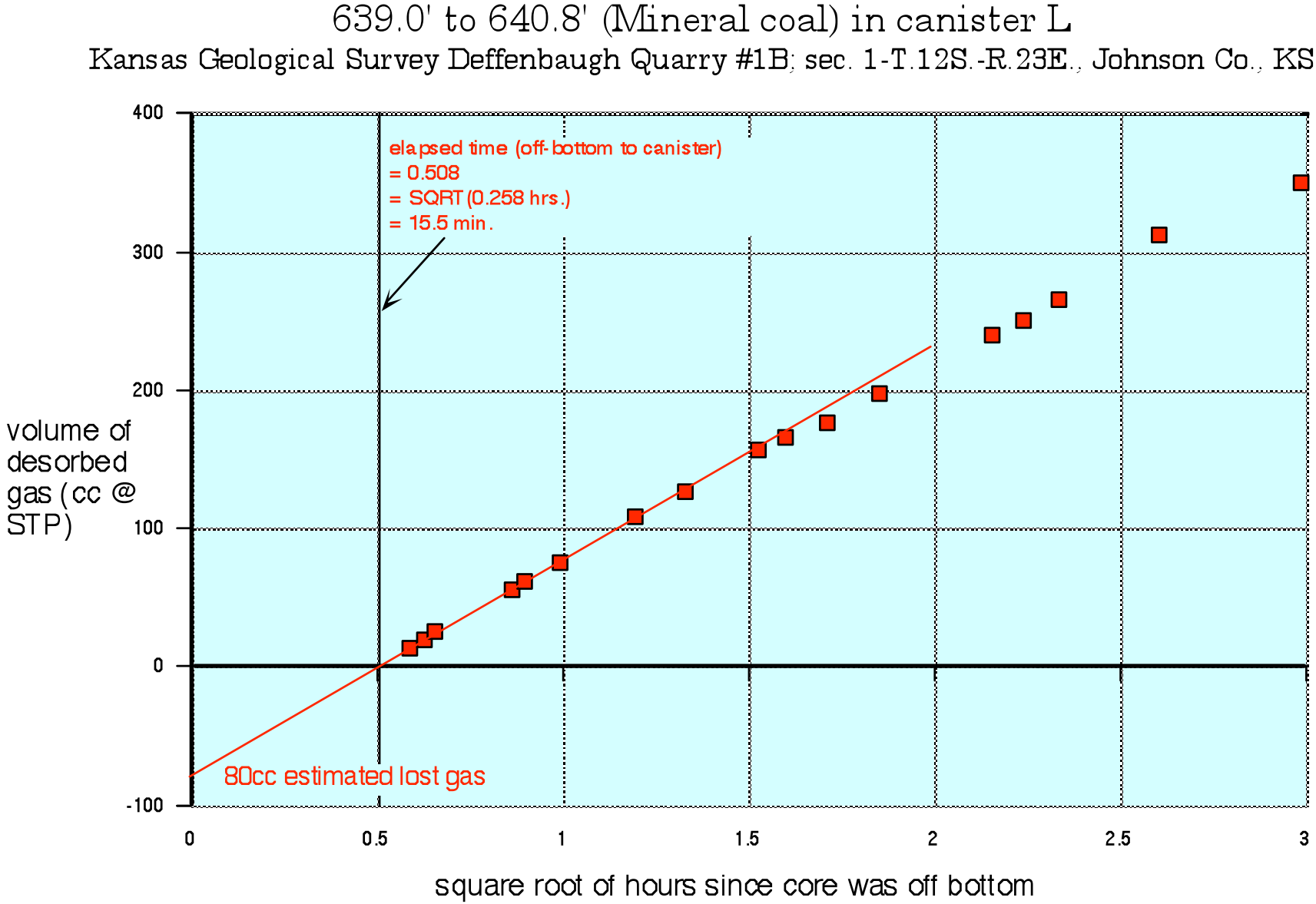

639.0' to 640.8' (Mineral coal) in canister L
Kansas Geological Survey Deffenbaugh Quarry #1B; sec. 1-T.12S.-R.23E., Johnson Co., KS
elapsed time (off-bottom to canister)
= 0.508
= SQRT(0.258 hrs.)
= 15.5 min.
80cc estimated lost gas
volume of desorbed gas (cc @ STP)
400
300
200
100
0
-100
0
0.5
1
1.5
2
2.5
3
square root of hours since core was off bottom

Figure 11.

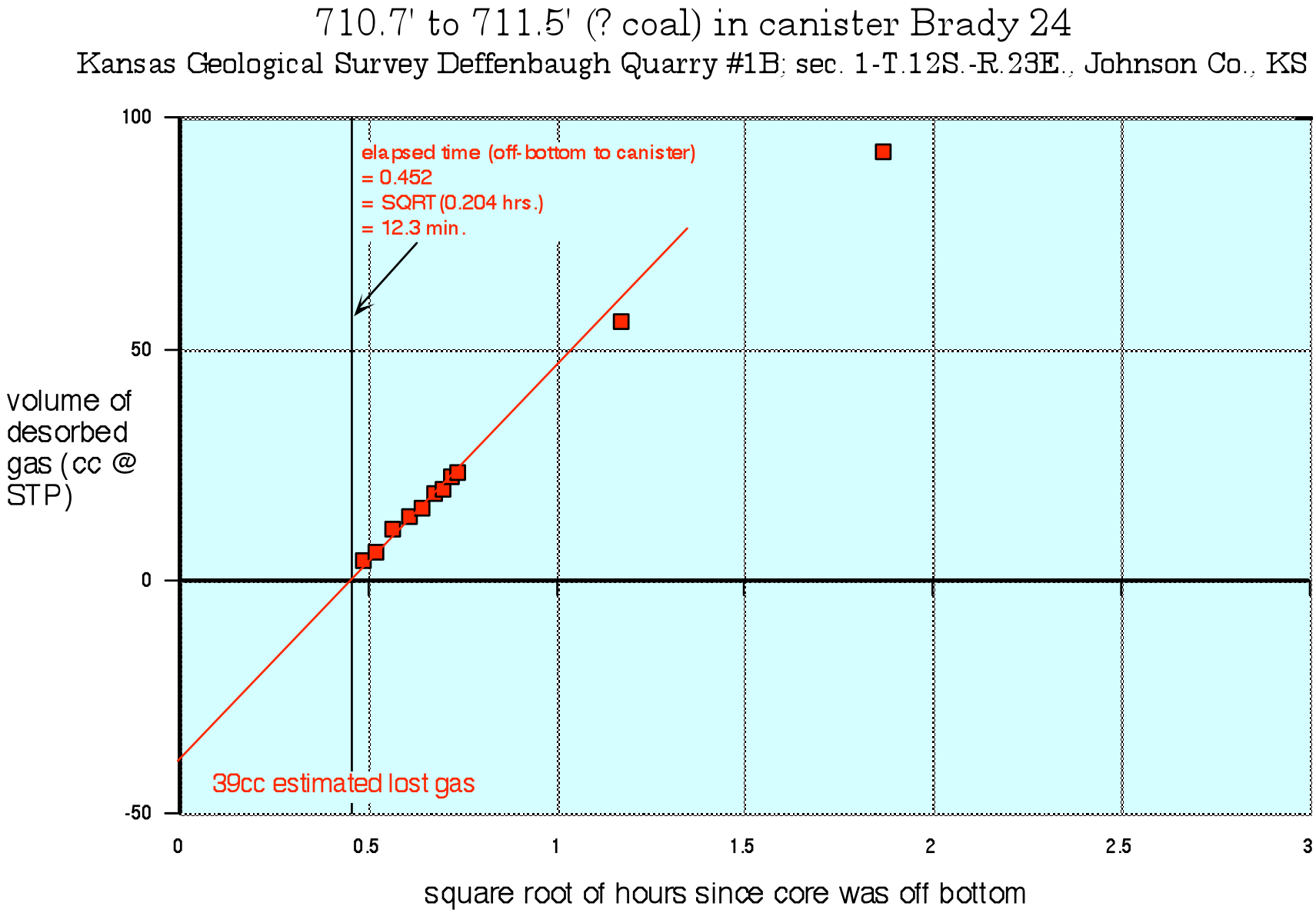

710.7' to 711.5' (? coal) in canister Brady 24
Kansas Geological Survey Deffenbaugh Quarry #1B; sec. 1-T.12S.-R.23E., Johnson Co., KS
elapsed time (off-bottom to canister)
= 0.452
= SQRT(0.204 hrs.)
= 12.3 min.
39cc estimated lost gas
volume of desorbed gas (cc @ STP)
100
50
0
-50
0
0.5
1
1.5
2
2.5
3
square root of hours since core was off bottom

Figure 12.

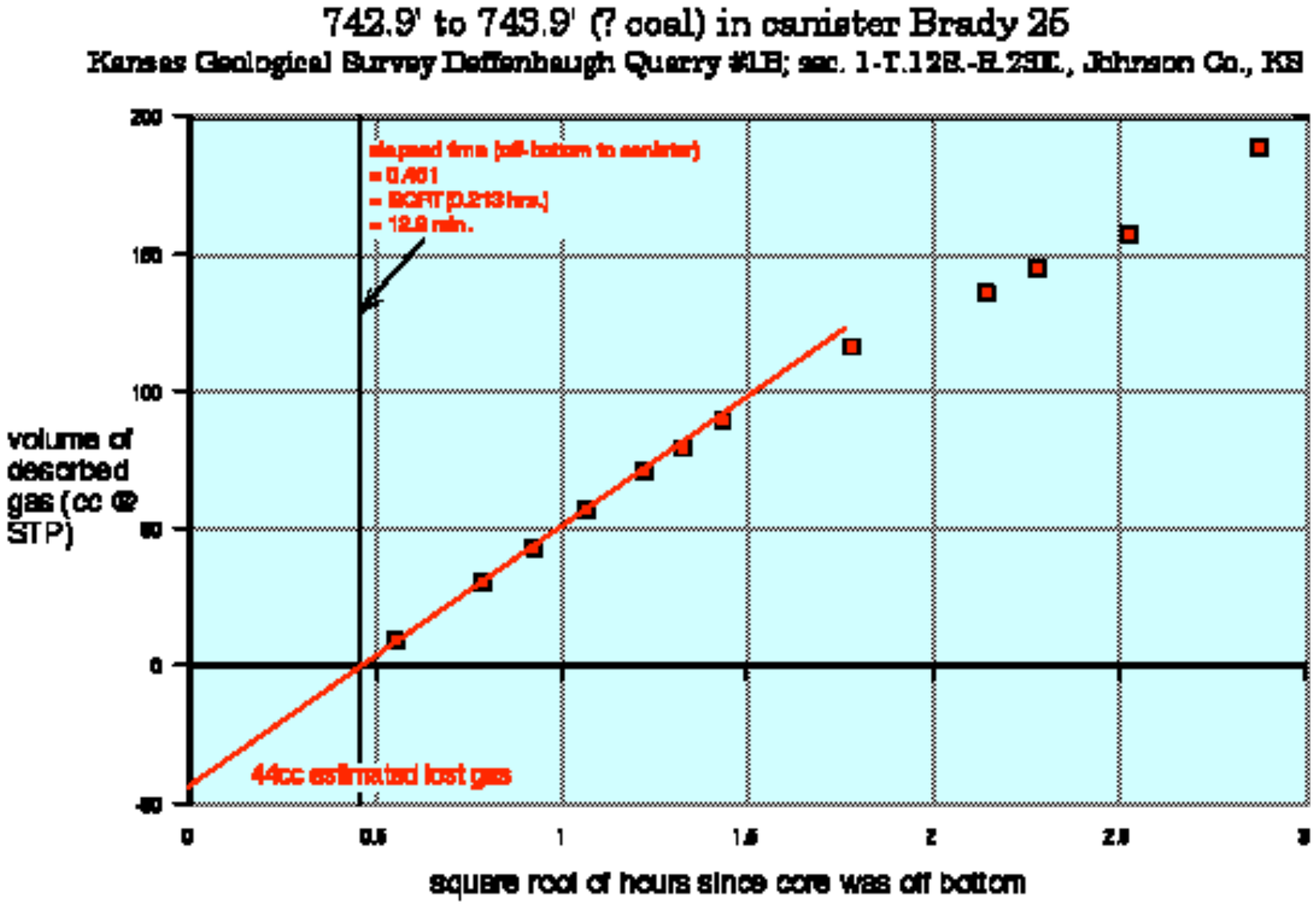

742.9' to 743.9' (? coal) in canister Brady 25
Kansas Geological Survey Deffenbaugh Quarry #1B; sec. 1-T.12S.-R.23E., Johnson Co., KS
elapsed time (off-bottom to canister)
= 0.461
= SQRT (0.213 hrs.)
= 12.8 min.
44cc estimated lost gas
volume of desorbed gas (cc @ STP)
200
150
100
50
0
-50
0
0.5
1
1.5
2
2.5
3
square root of hours since core was off bottom

Figure 13.

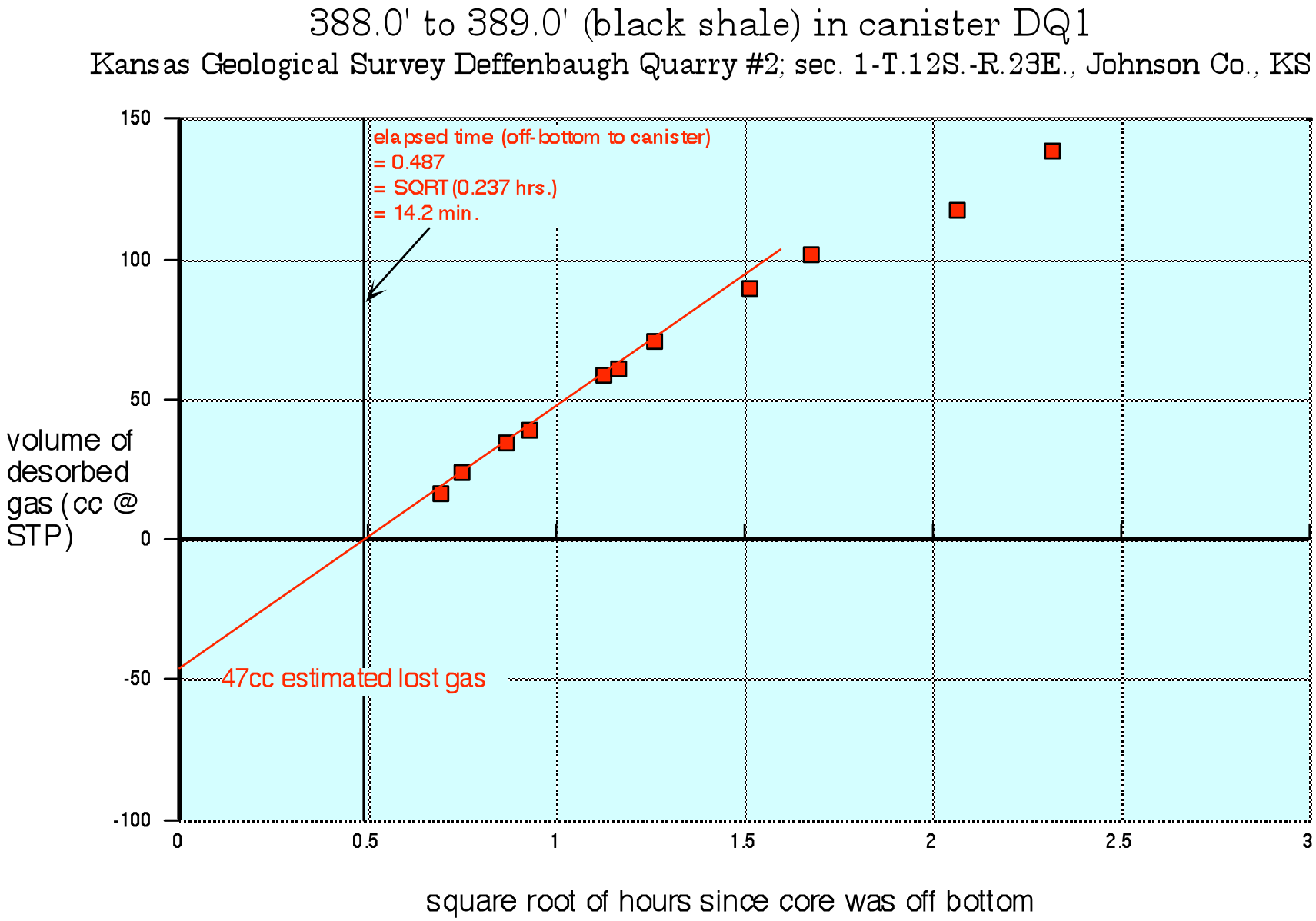

388.0' to 389.0' (black shale) in canister DQ1
Kansas Geological Survey Deffenbaugh Quarry #2; sec. 1-T.12S.-R.23E., Johnson Co., KS
elapsed time (off-bottom to canister)
= 0.487
= SQRT(0.237 hrs.)
= 14.2 min.
47cc estimated lost gas
volume of desorbed gas (cc @ STP)
150
100
50
0
-50
-100
0
0.5
1
1.5
2
2.5
3
square root of hours since core was off bottom

Figure 14.

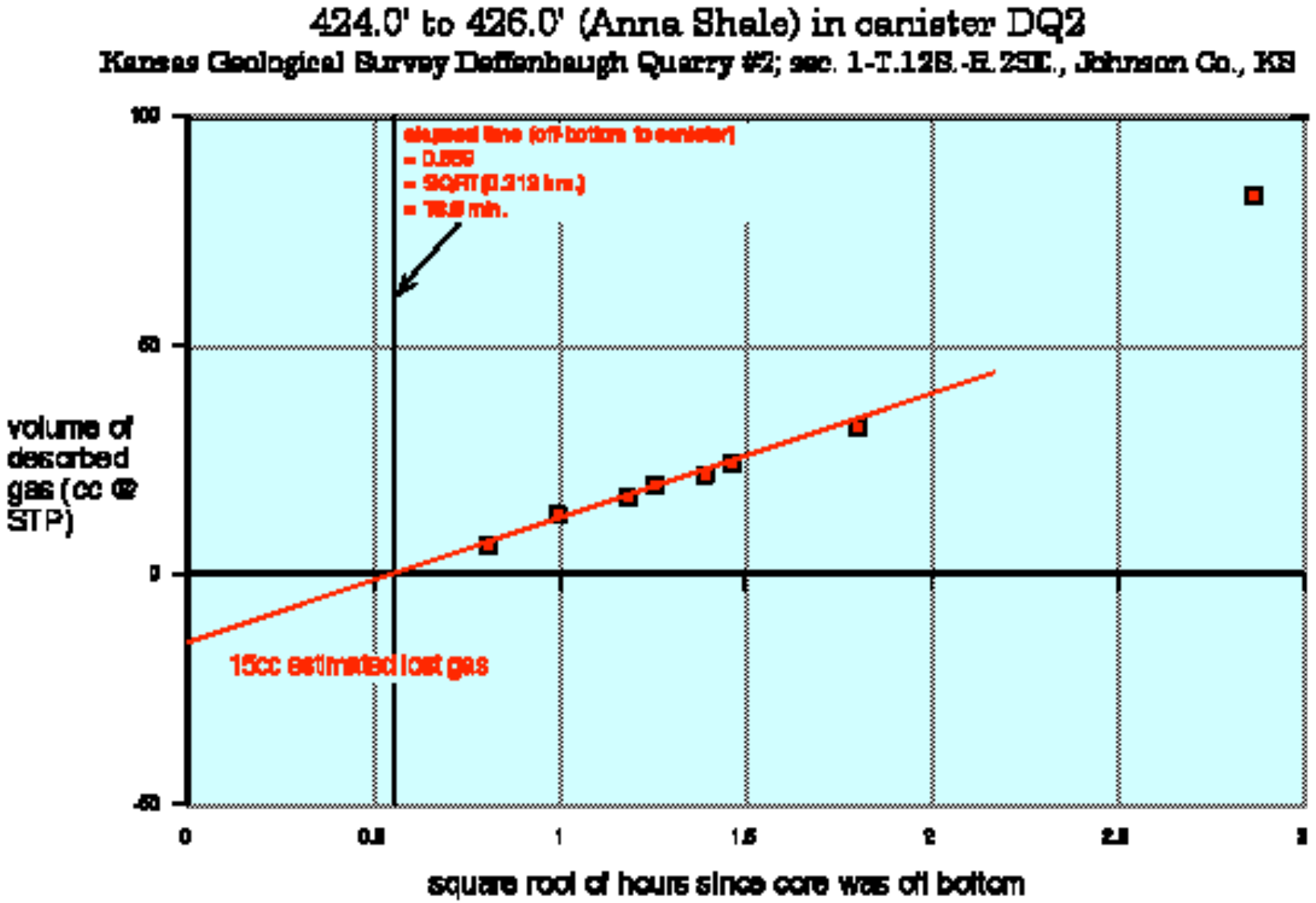

424.0' to 426.0' (Anna Shale) in canister DQ2
Kansas Geological Survey Deffenbaugh Quarry #2; sec. 1-T.12S.-R.25E., Johnson Co., KS
elapsed time (off-bottom to canister)
= 0.359
= SQRT(0.219 hrs.)
= 13.0 min.
volume of desorbed gas (cc @ STP)
15cc estimated lost gas
square root of hours since core was off bottom

Figure 15.

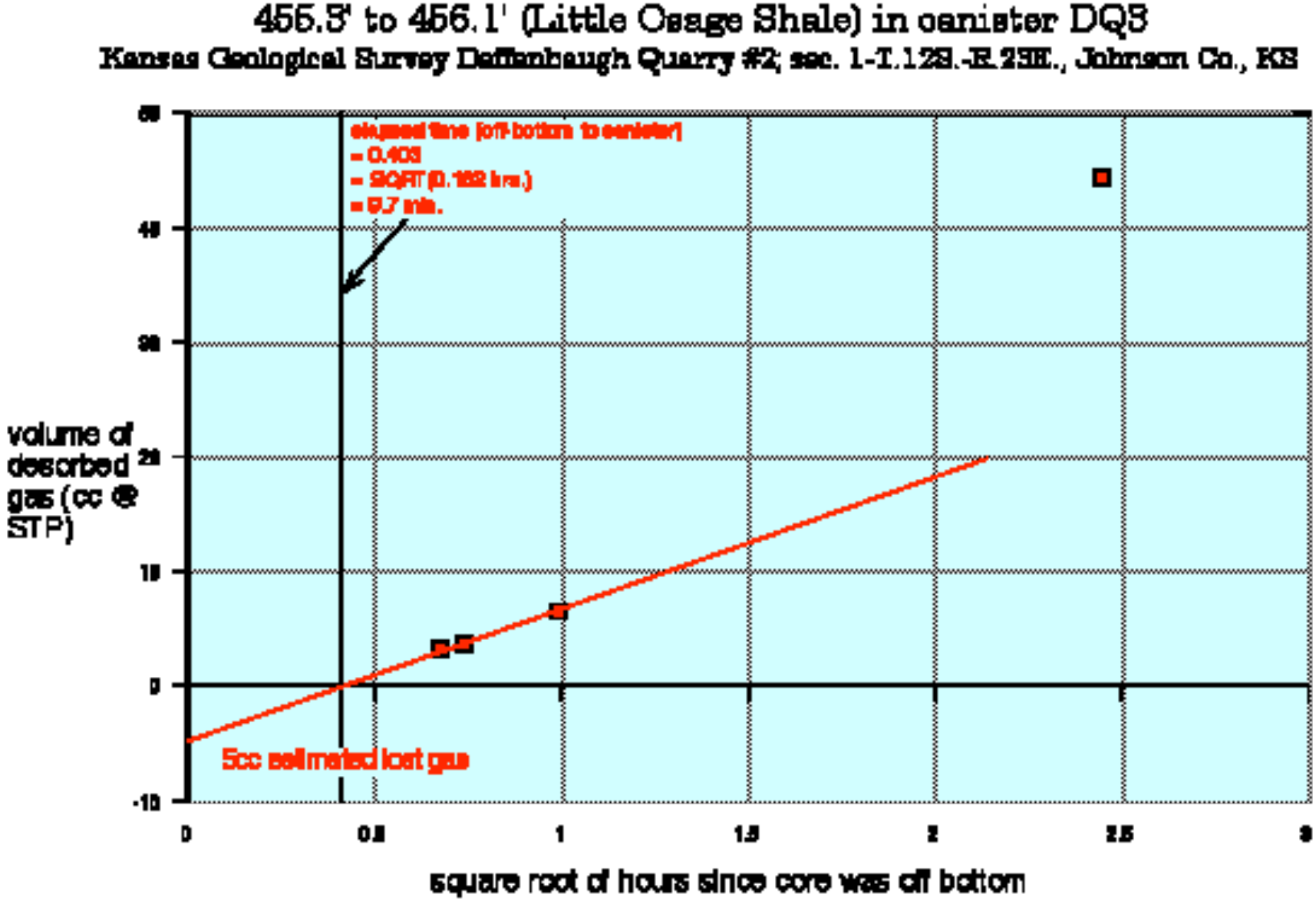

455.3' to 456.1' (Little Osage Shale) in canister DQ3
Kansas Geological Survey Deffenbaugh Quarry #2; sec. 1-T.12S.-R.23E., Johnson Co., KS
elapsed time (off-bottom to canister)
= 0.403
= SQRT (0.162 hrs.)
= 0.7 min.
volume of desorbed gas (cc @ STP)
5cc estimated lost gas
square root of hours since core was off bottom

Figure 16.

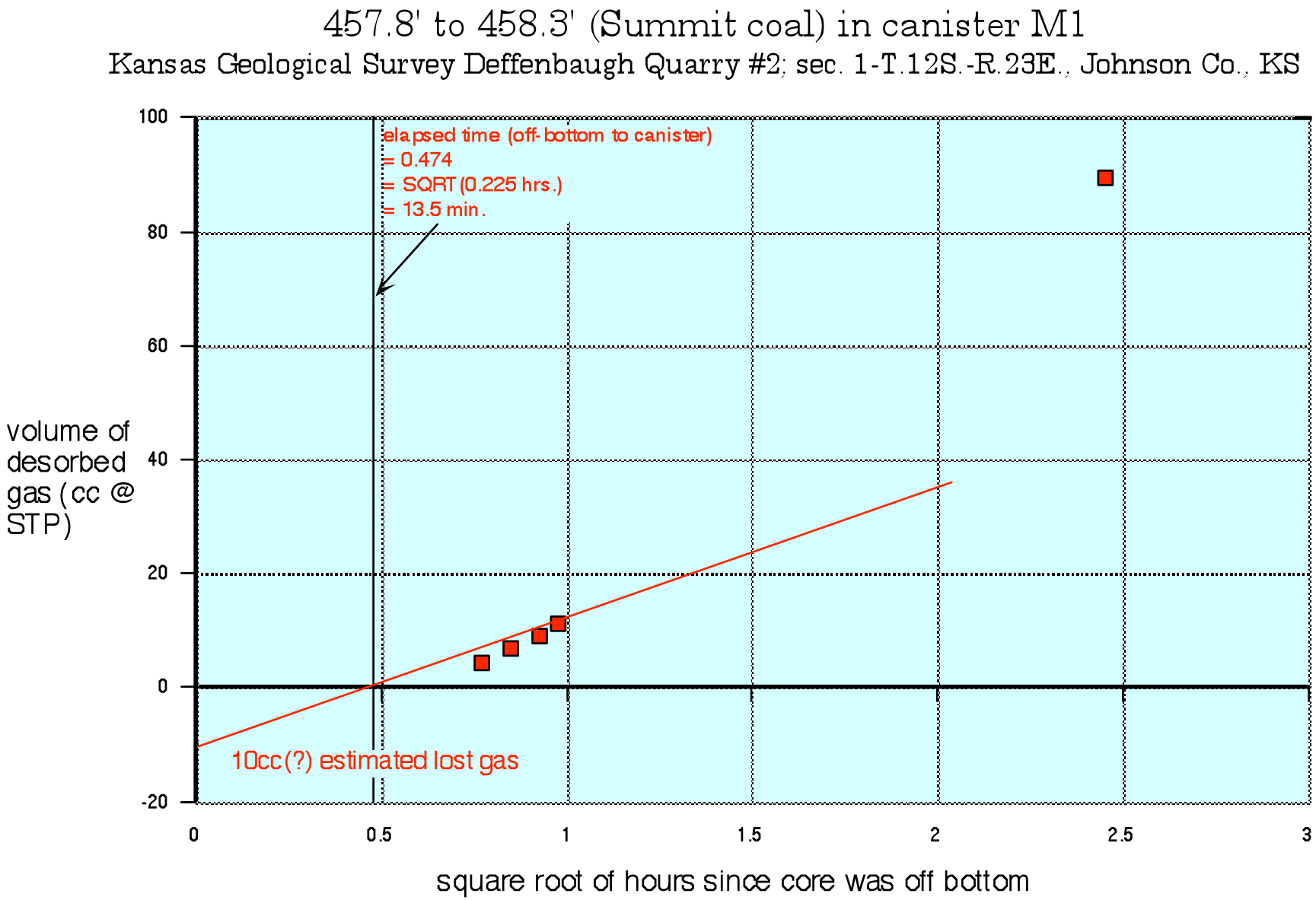

457.8' to 458.3' (Summit coal) in canister M1
Kansas Geological Survey Deffenbaugh Quarry #2; sec. 1-T.12S.-R.23E., Johnson Co., KS
elapsed time (off-bottom to canister)
= 0.474
= SQRT(0.225 hrs.)
= 13.5 min.
10cc(?) estimated lost gas
volume of desorbed gas (cc @ STP)
100
80
60
40
20
0
-20
0
0.5
1
1.5
2
2.5
3
square root of hours since core was off bottom

Figure 17.

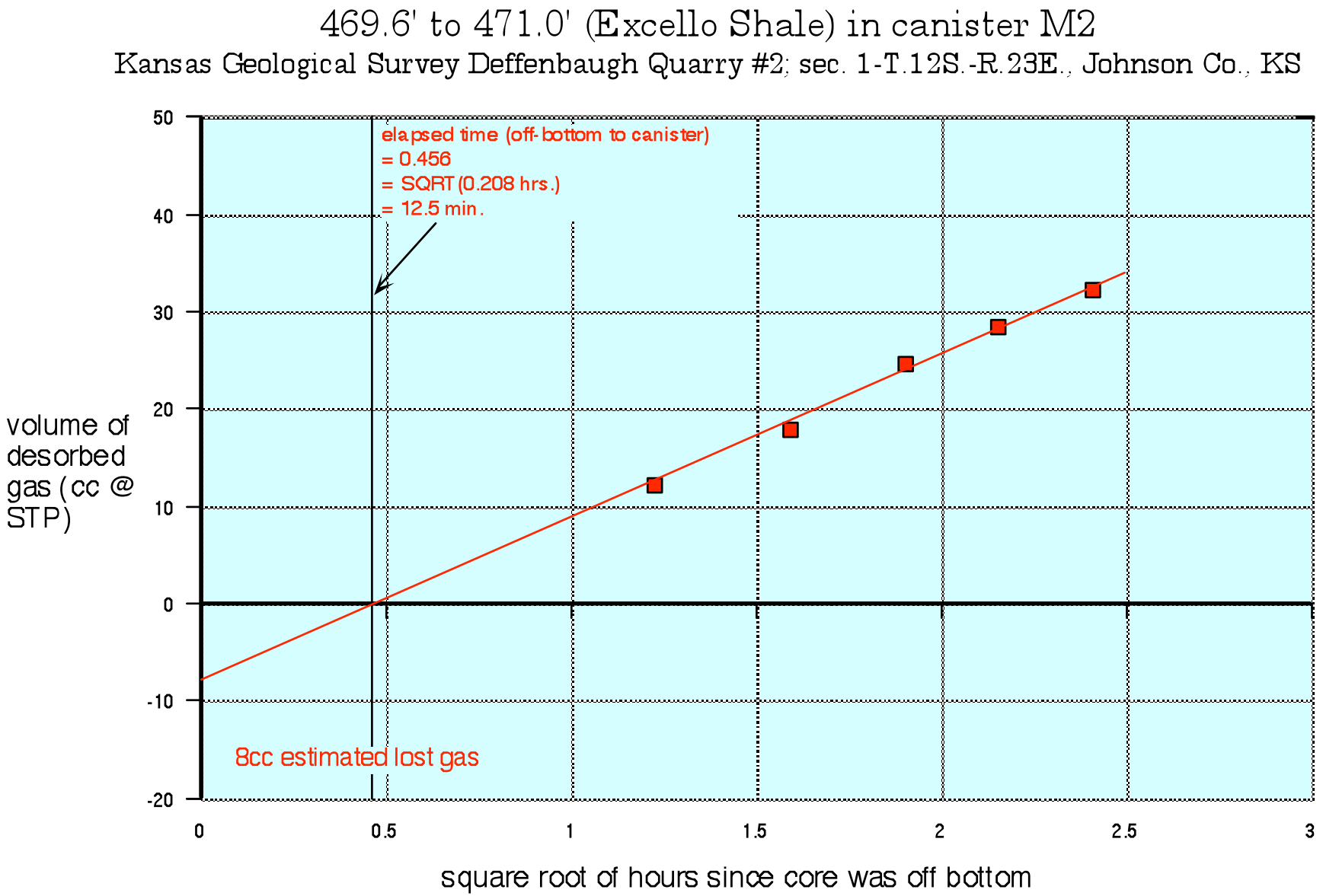

469.6' to 471.0' (Excello Shale) in canister M2
Kansas Geological Survey Deffenbaugh Quarry #2; sec. 1-T.12S.-R.23E., Johnson Co., KS
elapsed time (off-bottom to canister)
= 0.456
= SQRT(0.208 hrs.)
= 12.5 min.
8cc estimated lost gas
volume of desorbed gas (cc @ STP)
50
40
30
20
10
0
-10
-20
0
0.5
1
1.5
2
2.5
3
square root of hours since core was off bottom

Figure 18.

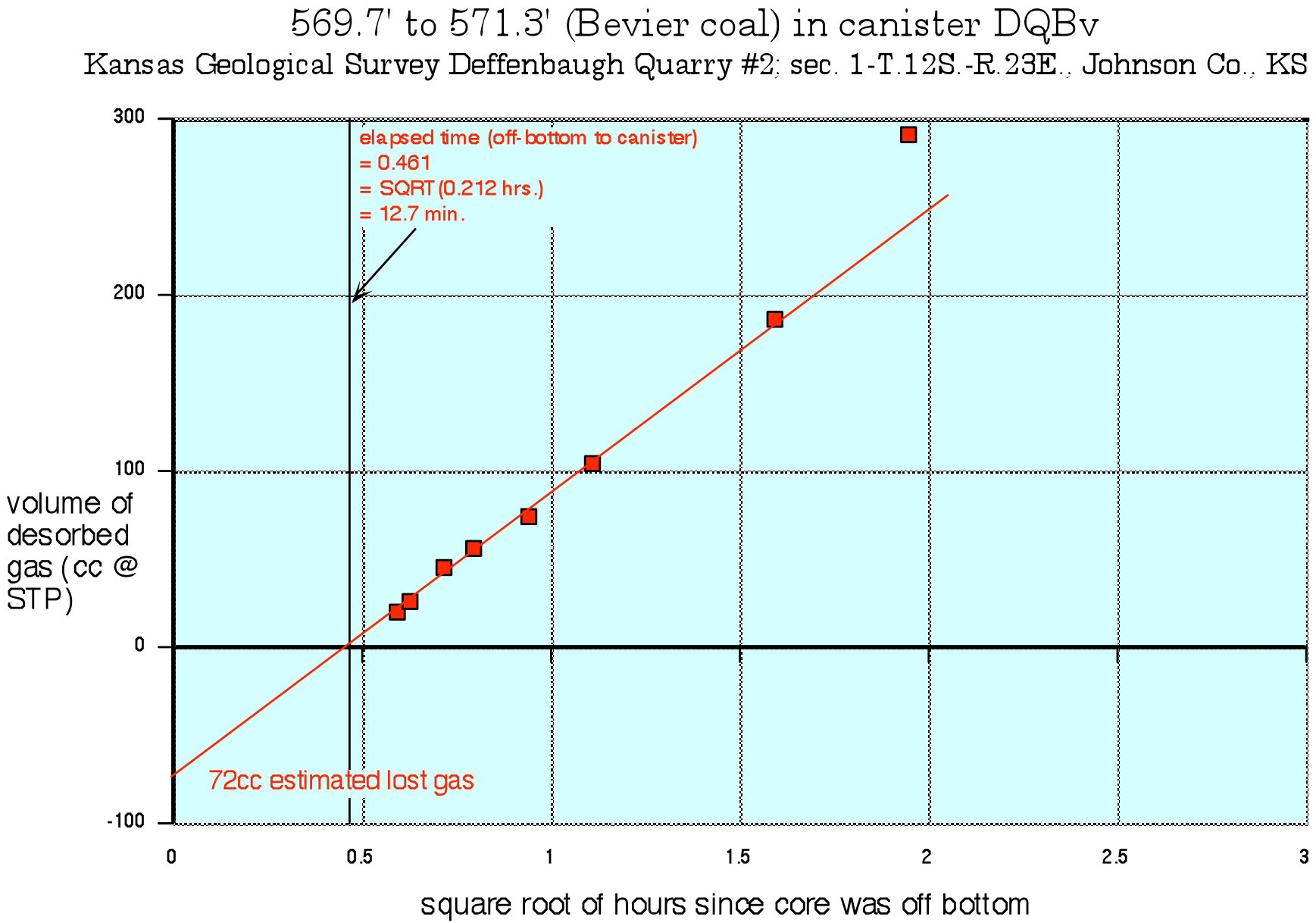

569.7' to 571.3' (Bevier coal) in canister DQBv
Kansas Geological Survey Deffenbaugh Quarry #2; sec. 1-T.12S.-R.23E., Johnson Co., KS
elapsed time (off-bottom to canister)
= 0.461
= SQRT(0.212 hrs.)
= 12.7 min.
72cc estimated lost gas
300
200
100
0
-100
volume of desorbed gas (cc @ STP)
0
0.5
1
1.5
2
2.5
3
square root of hours since core was off bottom

Figure 19.

605.0' to 606.0' (black shale above the Fleming coal) in canister M4

Kansas Geological Survey Deffenbaugh Quarry #2; sec. 1-T.12S.-R.23E., Johnson Co., KS

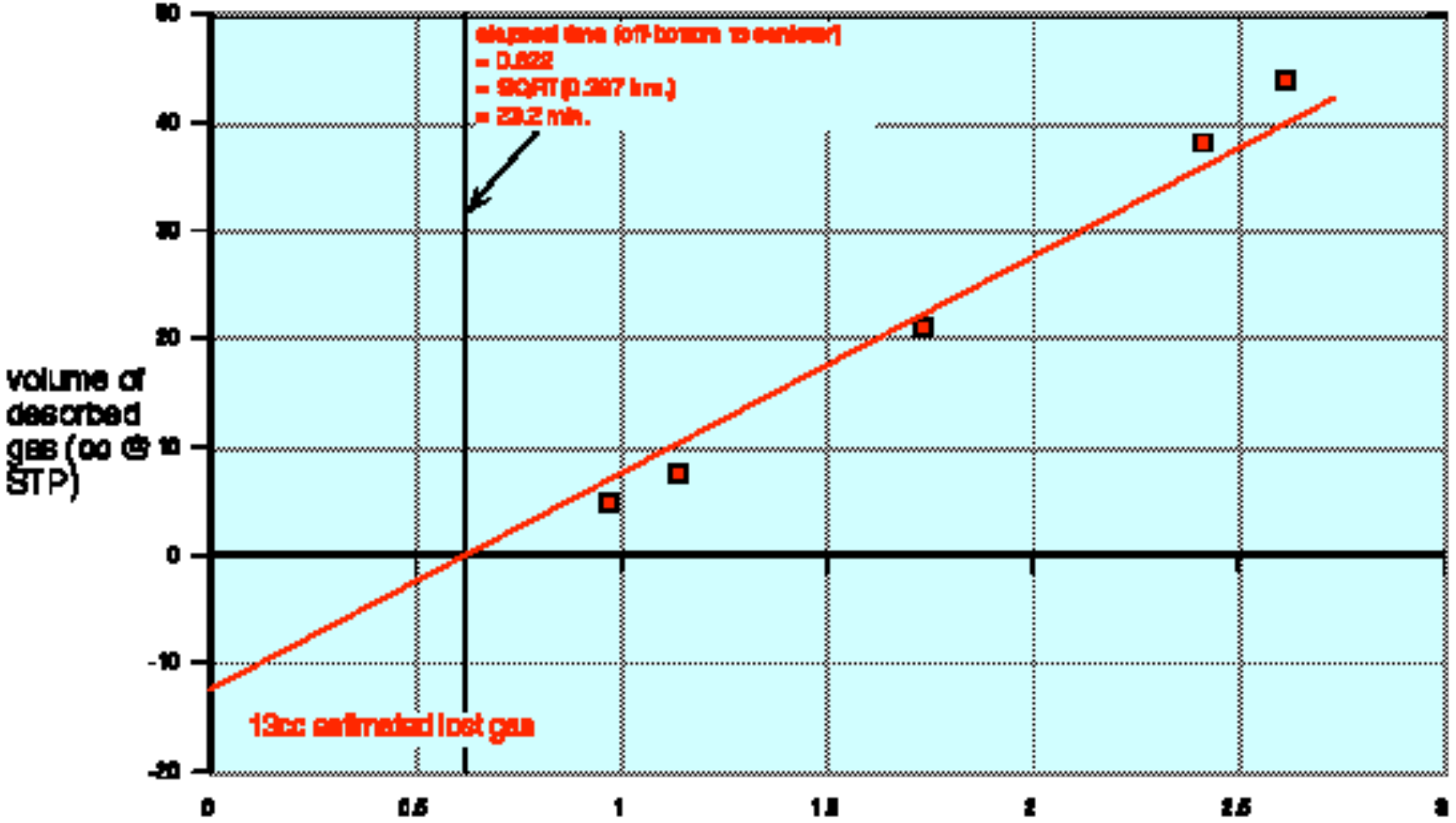


Figure 20.

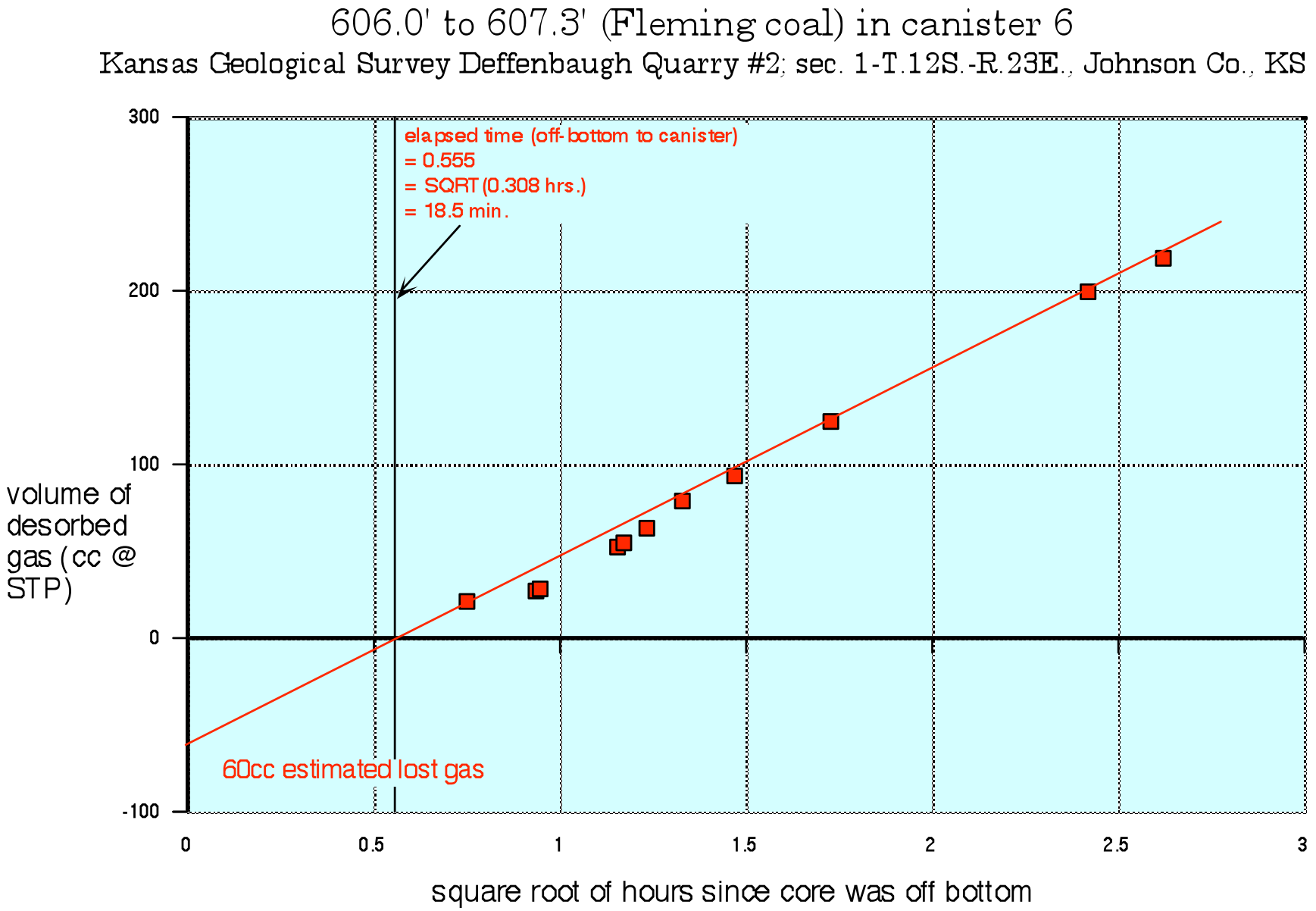

606.0' to 607.3' (Fleming coal) in canister 6
Kansas Geological Survey Deffenbaugh Quarry #2; sec. 1-T.12S.-R.23E., Johnson Co., KS
elapsed time (off-bottom to canister)
= 0.555
= SQRT(0.308 hrs.)
= 18.5 min.
60cc estimated lost gas
300
200
100
0
-100
volume of desorbed gas (cc @ STP)
0
0.5
1
1.5
2
2.5
3
square root of hours since core was off bottom

Figure 21.

637.6' to 638.0' and 638.3' to 638.9' (Mineral coal) in canister DQM

Kansas Geological Survey Deffenbaugh Quarry #2; sec. 1-T.12S.-R.23E., Johnson Co., KS

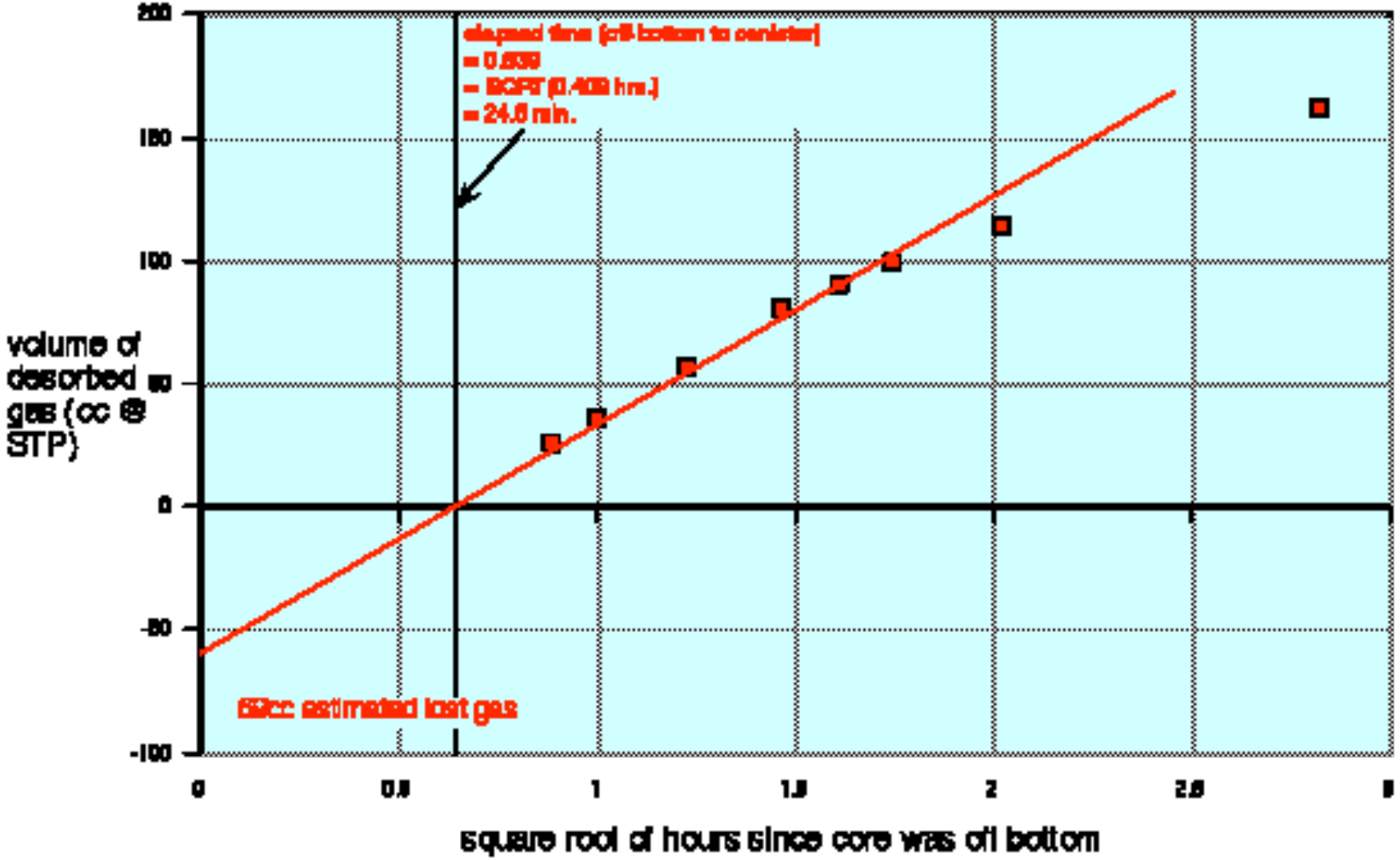


Figure 22.

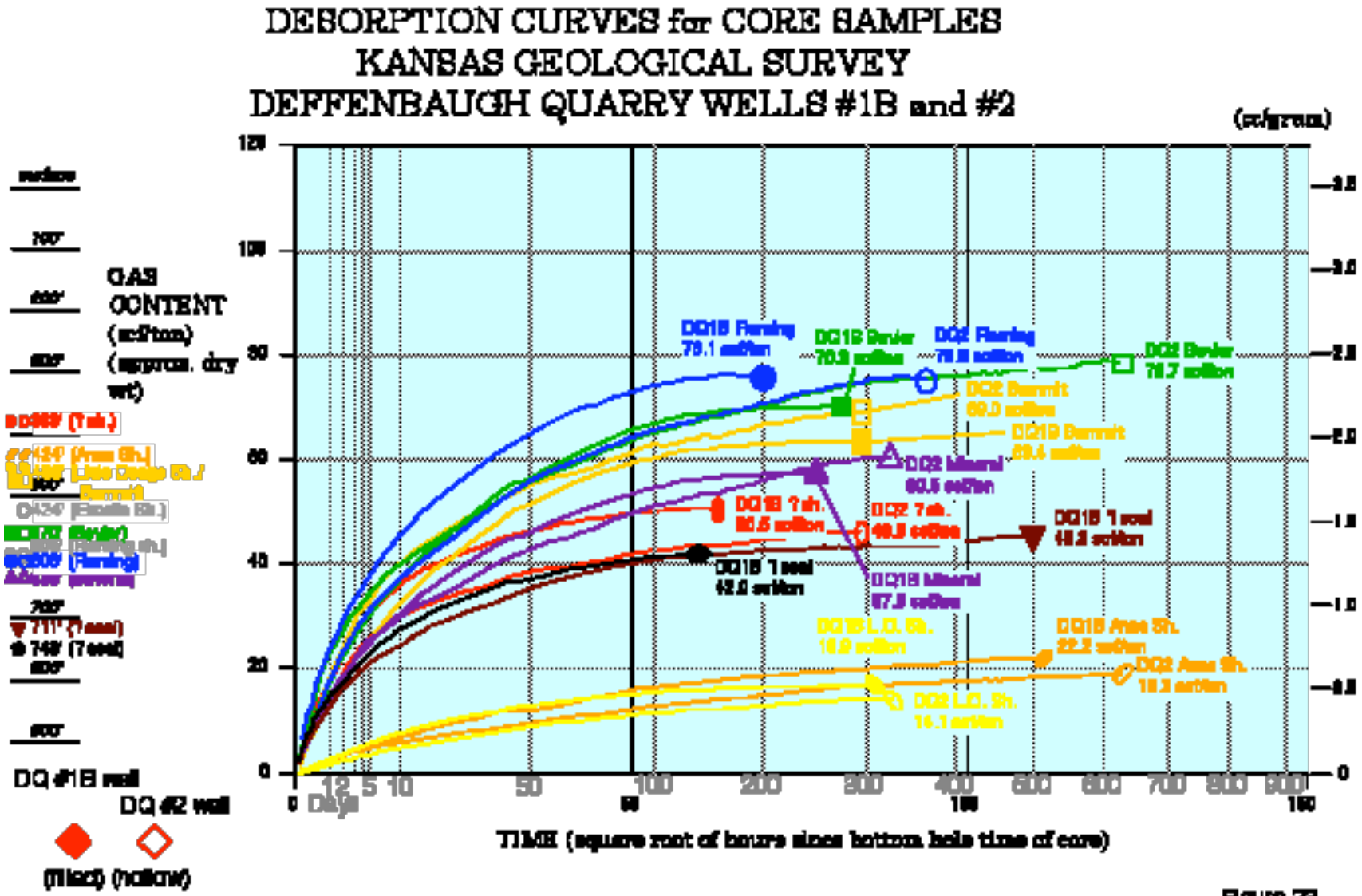

DESORPTION CURVES for CORE SAMPLES
KANSAS GEOLOGICAL SURVEY
DEFFENBAUGH QUARRY WELLS #1B and #2
(cc/gram)
GAS CONTENT (scf/ton) (approx. dry wt)
DQ #1B well
DQ #2 well
(filled) (hollow)
DQ1B Flaming 79.1 scf/ton
DQ1B Basler 70.9 scf/ton
DQ2 Flaming 78.8 scf/ton
DQ2 Basler 78.7 scf/ton
DQ2 Bennit 69.0 scf/ton
DQ1B Bennit 69.4 scf/ton
DQ2 Mineral 60.5 scf/ton
DQ1B 7 sh. 60.5 scf/ton
DQ2 7 sh. 49.8 scf/ton
DQ1B 7 seal 48.8 scf/ton
DQ1B 7 seal 42.0 scf/ton
DQ1B Mineral 47.8 scf/ton
DQ1B L.O. Sh. 16.9 scf/ton
DQ1B Area Sh. 22.2 scf/ton
DQ2 Area Sh. 18.3 scf/ton
DQ2 L.O. Sh. 14.1 scf/ton
0 Days
TIME (square root of hours since bottom hole time of core)

Figure 23.

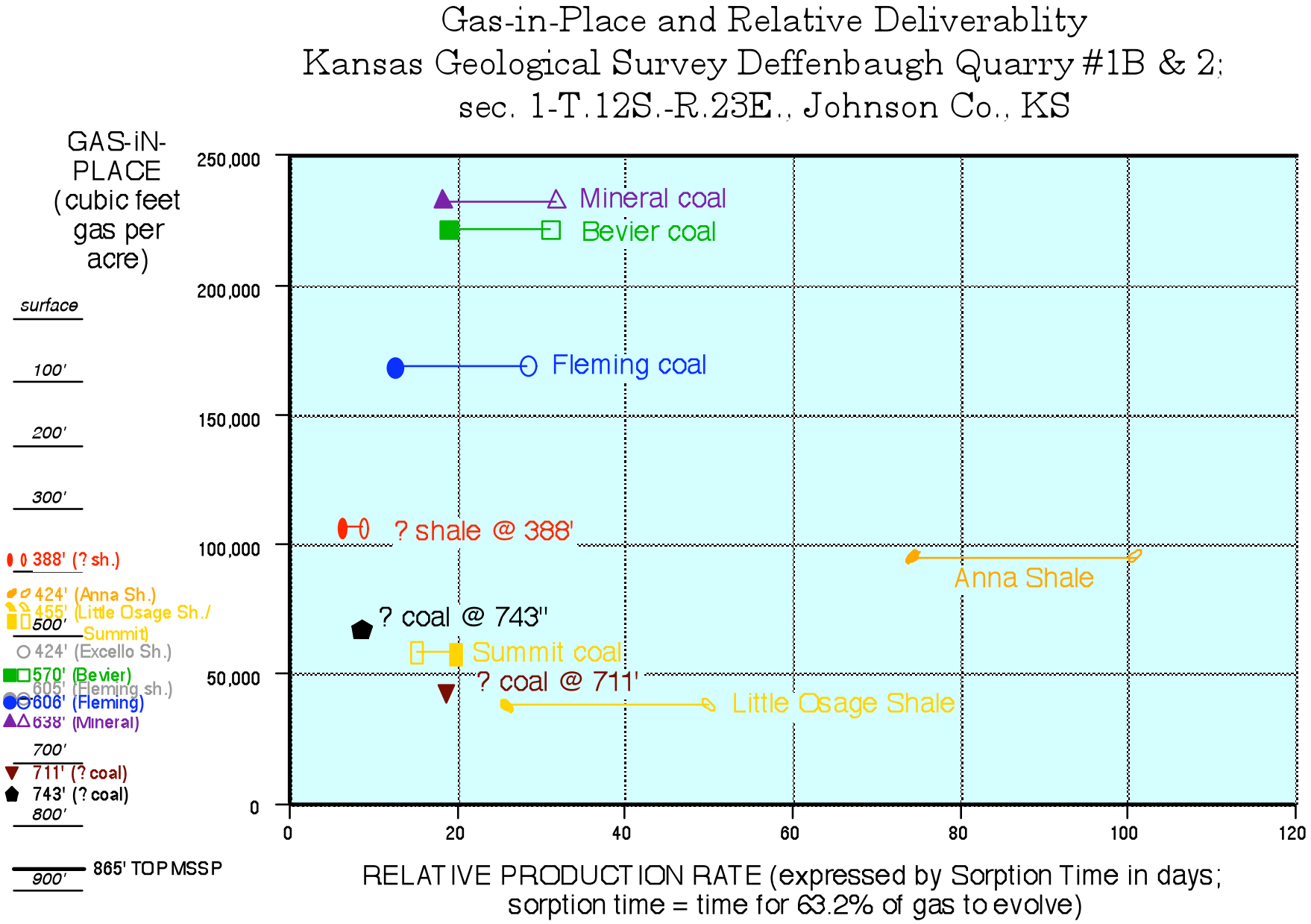
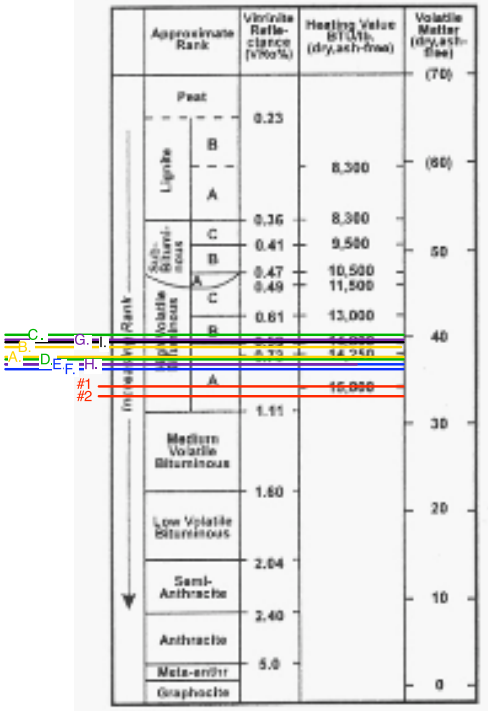

Gas-in-Place and Relative Deliverablity
Kansas Geological Survey Deffenbaugh Quarry #1B & 2;
sec. 1-T.12S.-R.23E., Johnson Co., KS
GAS-iN-PLACE (cubic feet gas per acre)
250,000
200,000
150,000
100,000
50,000
0
surface
100'
200'
300'
500'
700'
800'
900'
388' (? sh.)
424' (Anna Sh.)
455' (Little Osage Sh./ Summit)
424' (Excello Sh.)
570' (Bevier)
605' (Fleming sh.)
606' (Fleming)
638' (Mineral)
711' (? coal)
743' (? coal)
865' TOP MSSP
Mineral coal
Bevier coal
Fleming coal
? shale @ 388'
Anna Shale
? coal @ 743"
Summit coal
? coal @ 711'
Little Osage Shale
0
20
40
60
80
100
120
RELATIVE PRODUCTION RATE (expressed by Sorption Time in days; sorption time = time for 63.2% of gas to evolve)

FIGURE 24.

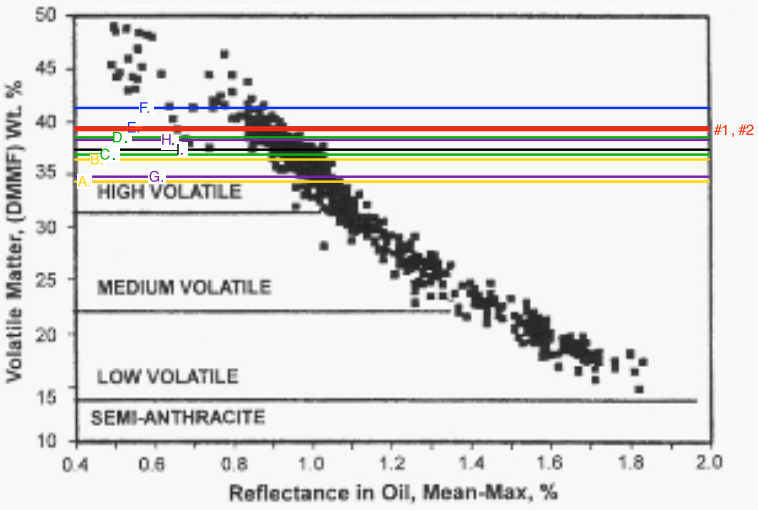
ASTM Classification of coals by rank

(from McLennan and others, 1995, p. 10.19)



A. Coal Rank Classification Chart.

1. Spencer #2-6 Mineral coal (14,942 BTU/lb. (MAF); 38.30% volatile matter)
2. Beurskens #13-28 Mineral coal (15,239 BTU/lb. (MAF); 39.46% volatile matter)



B. Relation Between the Rank of U.S. Coals and Vitrinite Reflectance.

CHARACTERISTICS of DEFFENBAUGH QUARRY SAMPLES (from proximate analysis)

BTU/lb. (MAF)

A. 14,322 BTU/lb. DQ1B Summit coal
B. 14,108 BTU/lb. DQ2 Summit coal
C. 13,888 BTU/lb. DQ1B Bevier coal
D. 14,326 BTU/lb. DQ2 Bevier coal
E. 14,435 BTU/lb. DQ1B Fleming coal
F. 14,614 BTU/lb. DQ2 Fleming coal
G. 13,995 BTU/lb. DQ1B Mineral coal
H. 14,445 BTU/lb. DQ2 Mineral coal
I. 14,045 BTU/lb. DQ1B coal at 711'

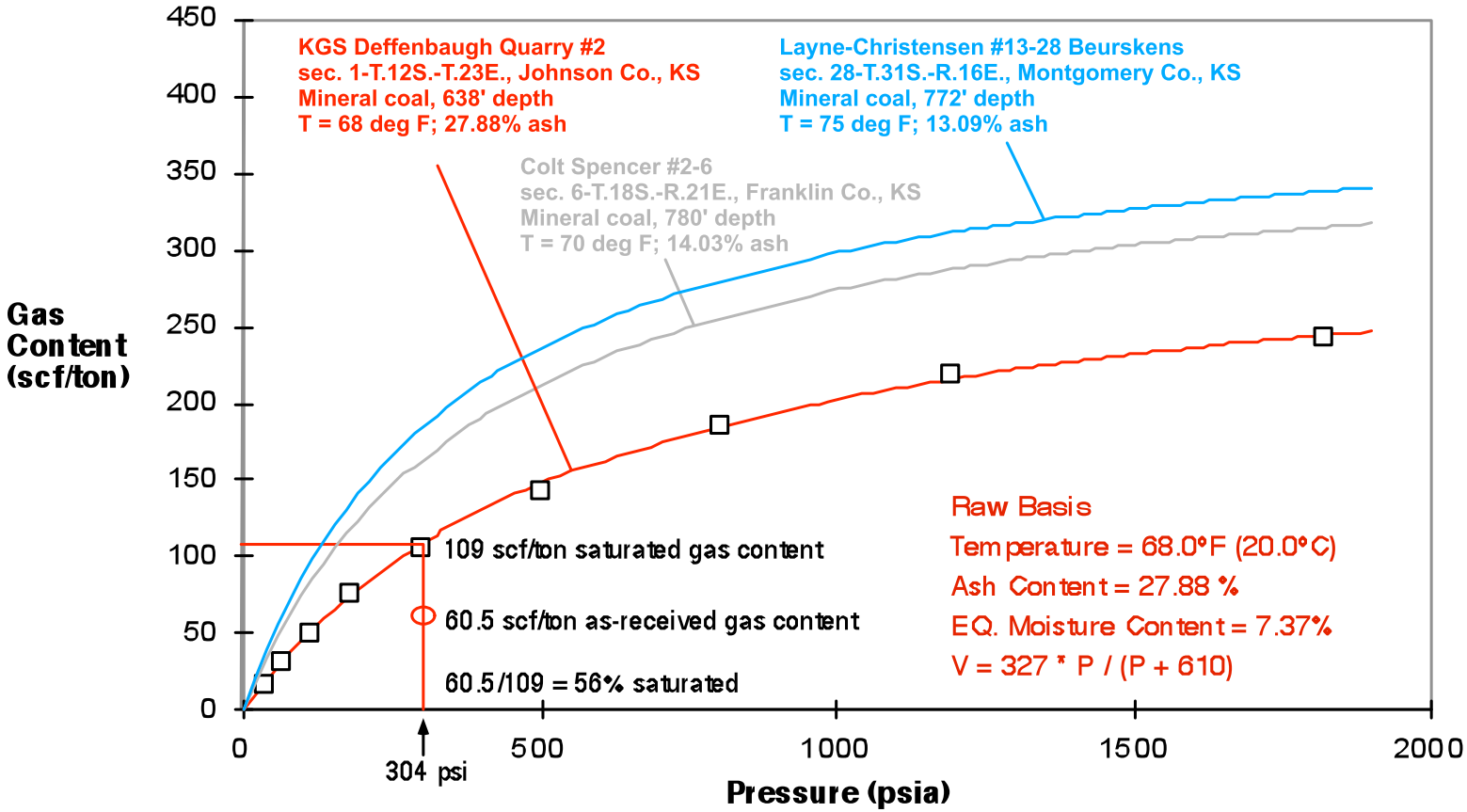
% VOLATILE MATTER (MAF)

A. 34.37% DQ1B Summit coal
B. 35.64% DQ2 Summit coal
C. 36.68% DQ1B Bevier coal
D. 38.75% DQ2 Bevier coal
E. 39.42% DQ1B Fleming coal
F. 41.29% DQ2 Fleming coal
G. 39.90% DQ1B Mineral coal
H. 38.16% DQ2 Mineral coal
I. 37.65% DQ1B coal at 711'

surface
100'
200'
300'
388' (? sh.)
424' (Anna Sh.)
455' (Little Osage Sh./ Summit)
500'
424' (Excello Sh.)
570' (Bevier)
605' (Fleming sh.)
606' (Fleming)
638' (Mineral)
700'
711' (? coal)
743' (? coal)
800'
865' TOP MSSP
900'

Methane Adsorption Isotherms for Mineral coal in Eastern Kansas

compared to Mineral coal gas content and pressure at Deffenbaugh Quarry #2



0.476 psi/ft X 638 ft depth = 304 psi reservoir pressure for Mineral coal

(0.476 psi/ft is hydrostatic gradient for salt water)

Figure 26.

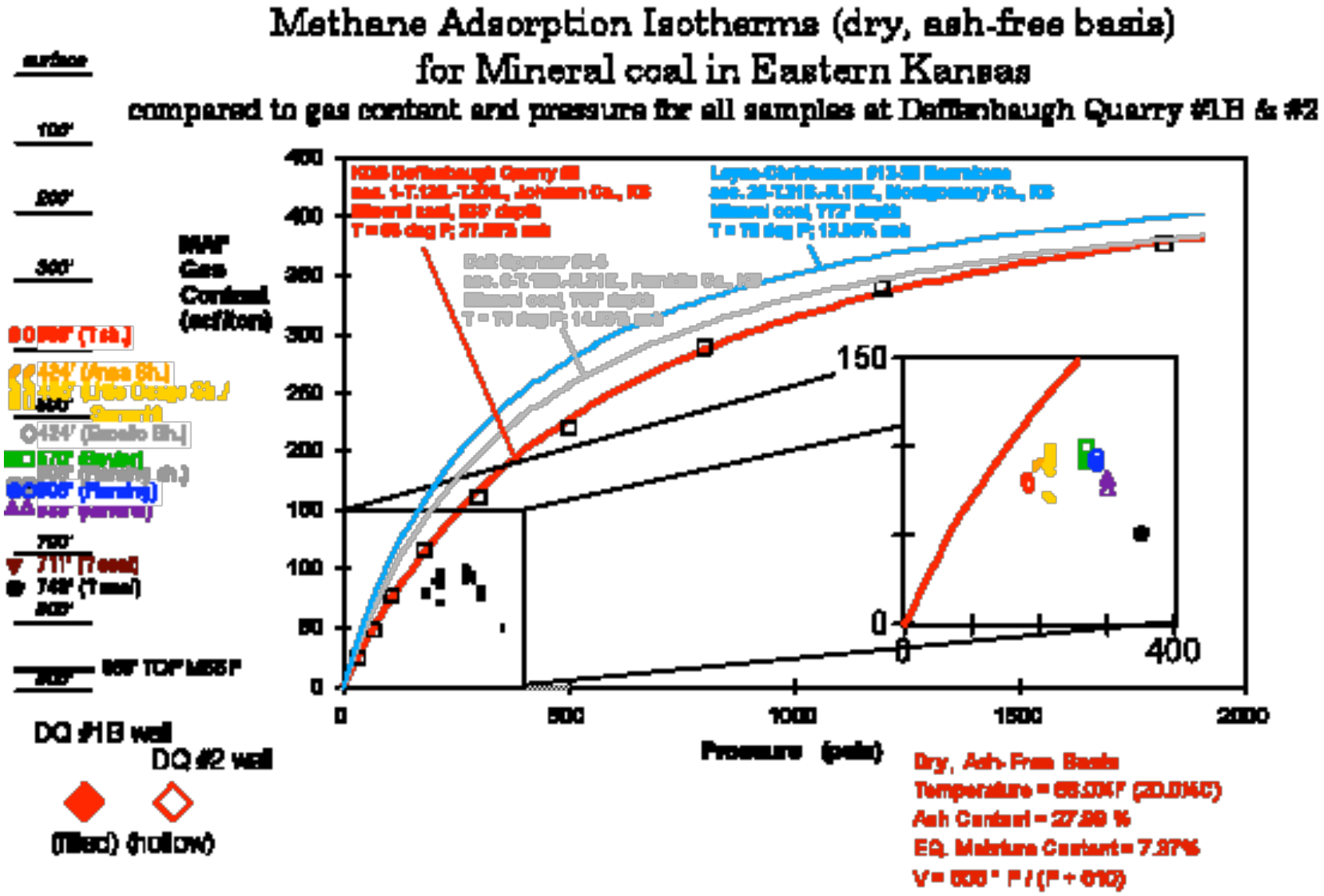

Methane Adsorption Isotherms (dry, ash-free basis)
for Mineral coal in Eastern Kansas
compared to gas content and pressure for all samples at Deffenbaugh Quarry #1B & #2
surface
100'
200'
300'
400'
500'
600'
700'
800'
900'
SCF/T
Gas
Content
(adsorbed)
DQ #1B well
DQ #2 well
(filled) (hollow)
0
100
200
300
400
500
0
500
1000
1500
2000
Pressure (psia)
150
0
0
400
Dry, Ash-Free Basis
Ash Content = 27.89 %
EQ. Moisture Content = 7.37%
V = 535 * P / (P + 610)

Figure 27.

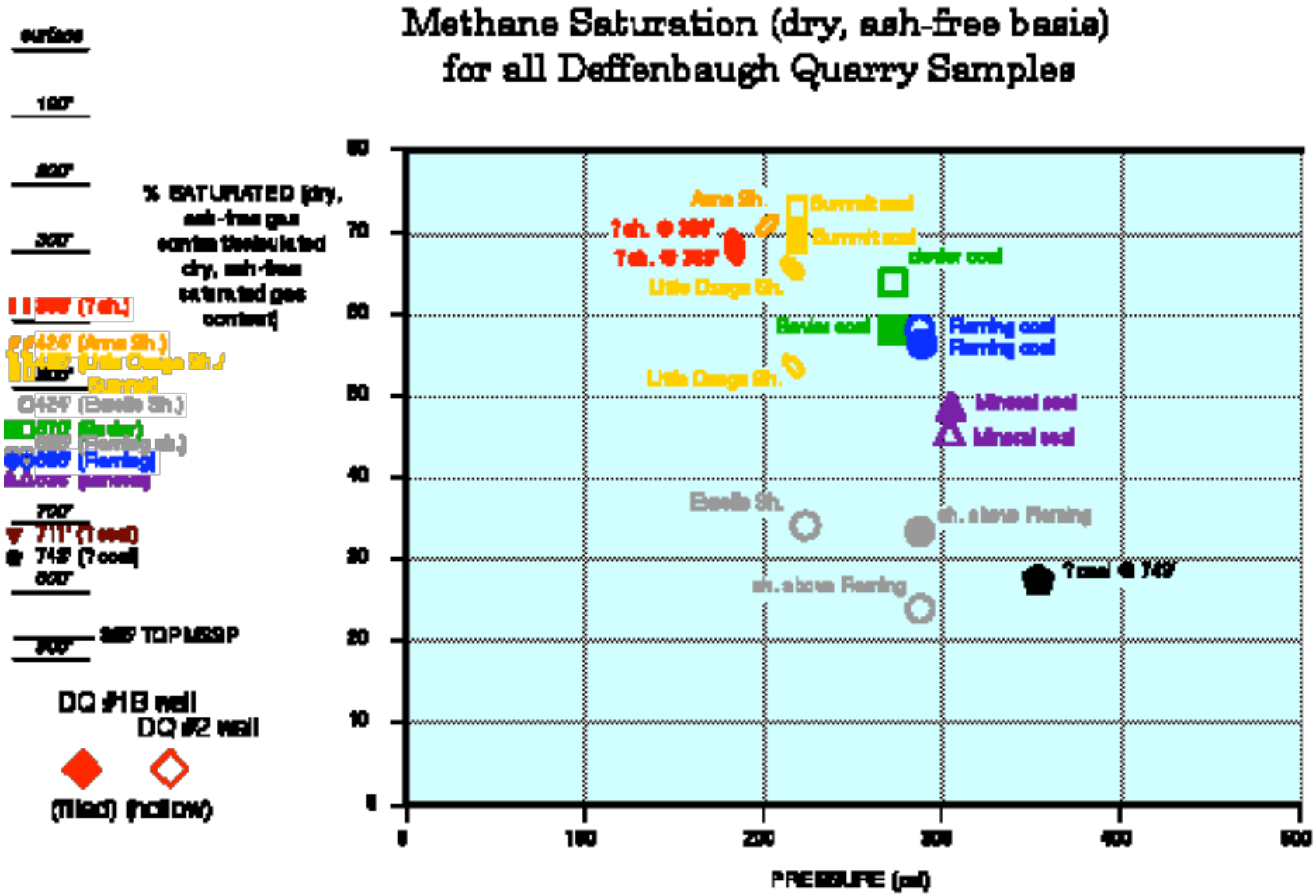
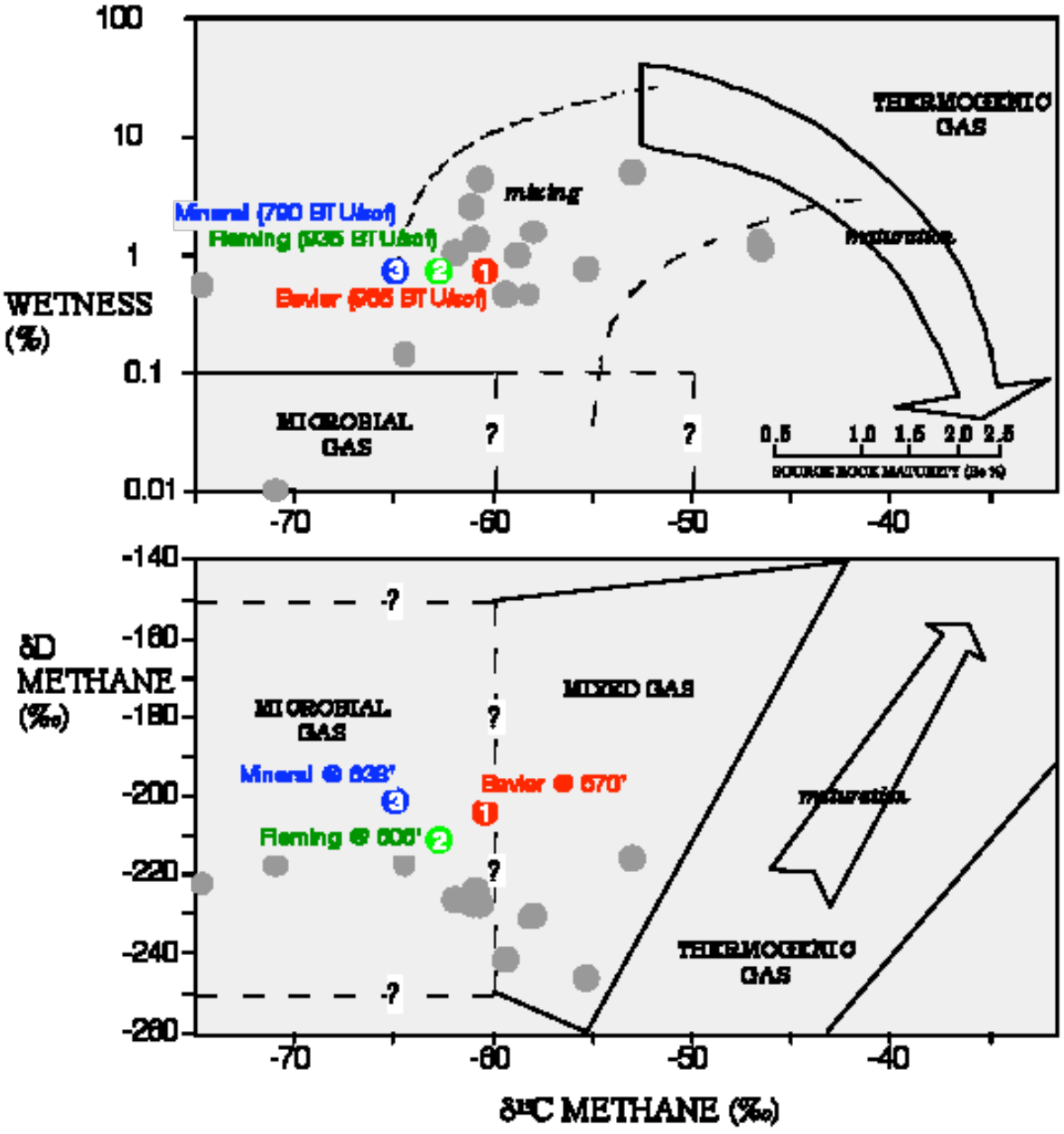

Methane Saturation (dry, ash-free basis)
for all Deffenbaugh Quarry Samples
surface
100'
200'
300'
700'
600'
900'
% SATURATED (dry, ash-free gas contents calculated dry, ash-free saturated gas content)
DQ #1B well
DQ #2 well
(filled) (hollow)
Anna Sh.
Summit coal
Summit coal
Little Osage Sh.
Skinner coal
Skinner coal
Fleming coal
Fleming coal
Little Osage Sh.
Mineral coal
Mineral coal
Beeler Sh.
sh. above Fleming
sh. above Fleming
Tcoal @ 749'
80
70
60
50
40
30
20
10
0
0
100
200
300
400
500
PRESSURE (psi)

Figure 29

Isotopic Characteristics and Hyrocarbon Wetness of Kansas Geological Survey Deffenbaugh Quarry #2 Coal Core Desorption Gas Samples

sec. 1-T.12S.-R.23E., Johnson Co., KS



● ● ● analysis of coalbed desorption gas from Deffenbaugh Quarry well

● analysis of other Forest City basin coalbed desorption gas

Figure 29.

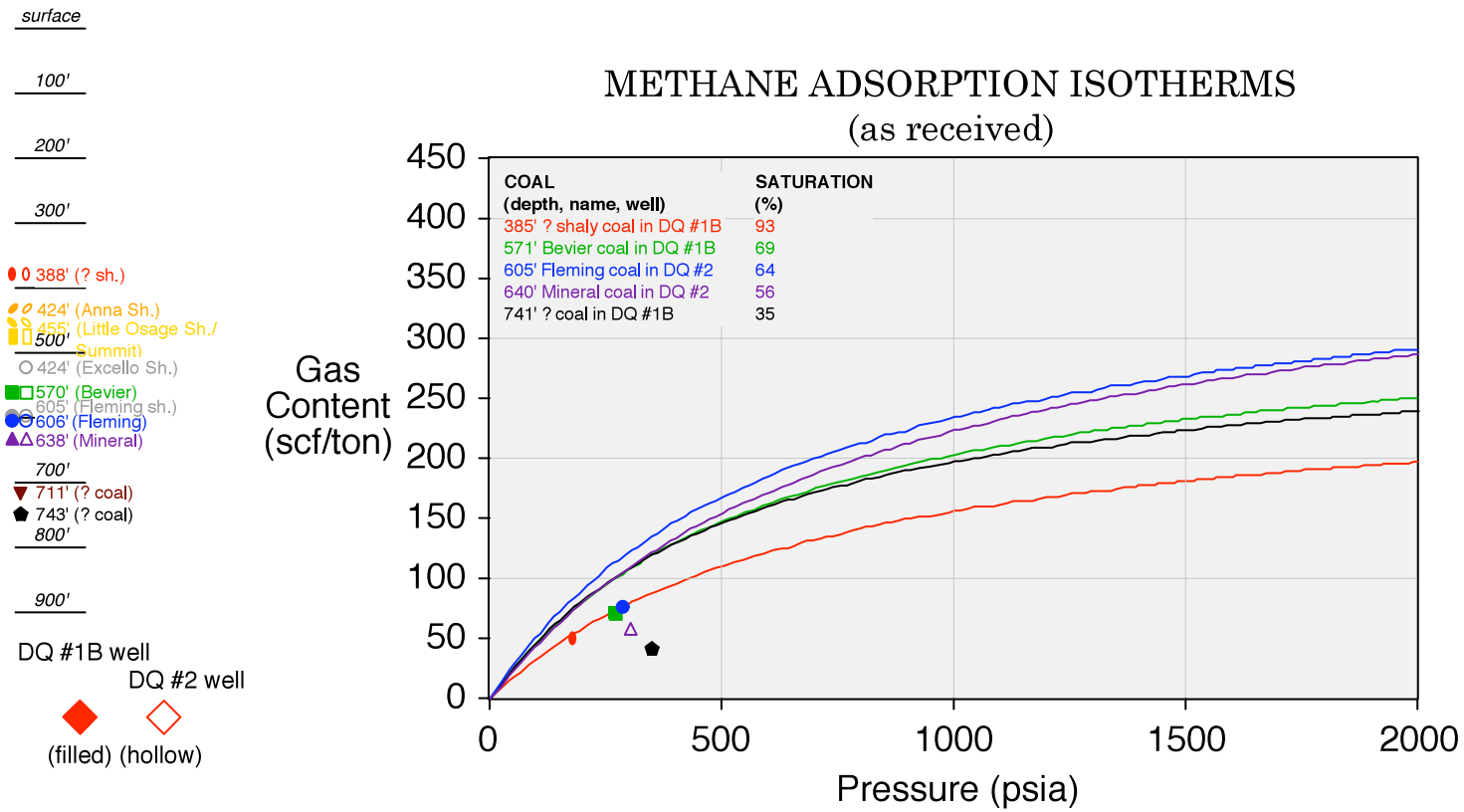

surface
100'
200'
300'
500'
700'
800'
900'
0 388' (? sh.)
424' (Anna Sh.)
455' (Little Osage Sh./ Summit)
424' (Excello Sh.)
570' (Bevier)
605' (Fleming sh.)
606' (Fleming)
638' (Mineral)
711' (? coal)
743' (? coal)
DQ #1B well
DQ #2 well
(filled) (hollow)
METHANE ADSORPTION ISOTHERMS
(as received)
Gas Content (scf/ton)
COAL (depth, name, well)
SATURATION (%)
385' ? shaly coal in DQ #1B 93
571' Bevier coal in DQ #1B 69
605' Fleming coal in DQ #2 64
640' Mineral coal in DQ #2 56
741' ? coal in DQ #1B 35
450
400
350
300
250
200
150
100
50
0
0
500
1000
1500
2000
Pressure (psia)

Figure 30.

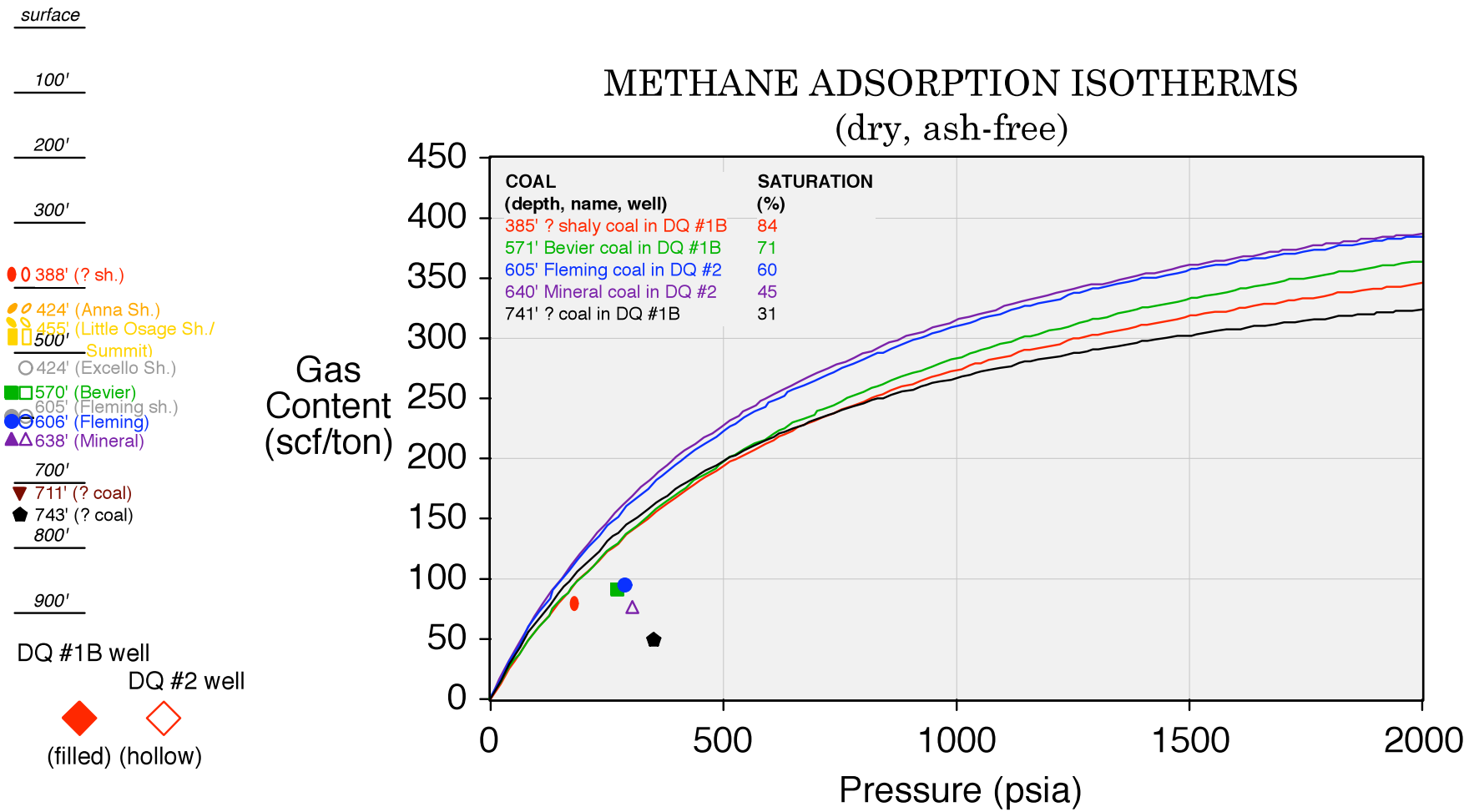

surface
100'
200'
300'
388' (? sh.)
424' (Anna Sh.)
455' (Little Osage Sh./ Summit)
500'
424' (Excello Sh.)
570' (Bevier)
605' (Fleming sh.)
606' (Fleming)
638' (Mineral)
700'
711' (? coal)
743' (? coal)
800'
900'
DQ #1B well
DQ #2 well
(filled) (hollow)
METHANE ADSORPTION ISOTHERMS
(dry, ash-free)
COAL (depth, name, well)
SATURATION (%)
385' ? shaly coal in DQ #1B 84
571' Bevier coal in DQ #1B 71
605' Fleming coal in DQ #2 60
640' Mineral coal in DQ #2 45
741' ? coal in DQ #1B 31
Gas Content (scf/ton)
450
400
350
300
250
200
150
100
50
0
0
500
1000
1500
2000
Pressure (psia)

Figure 31.

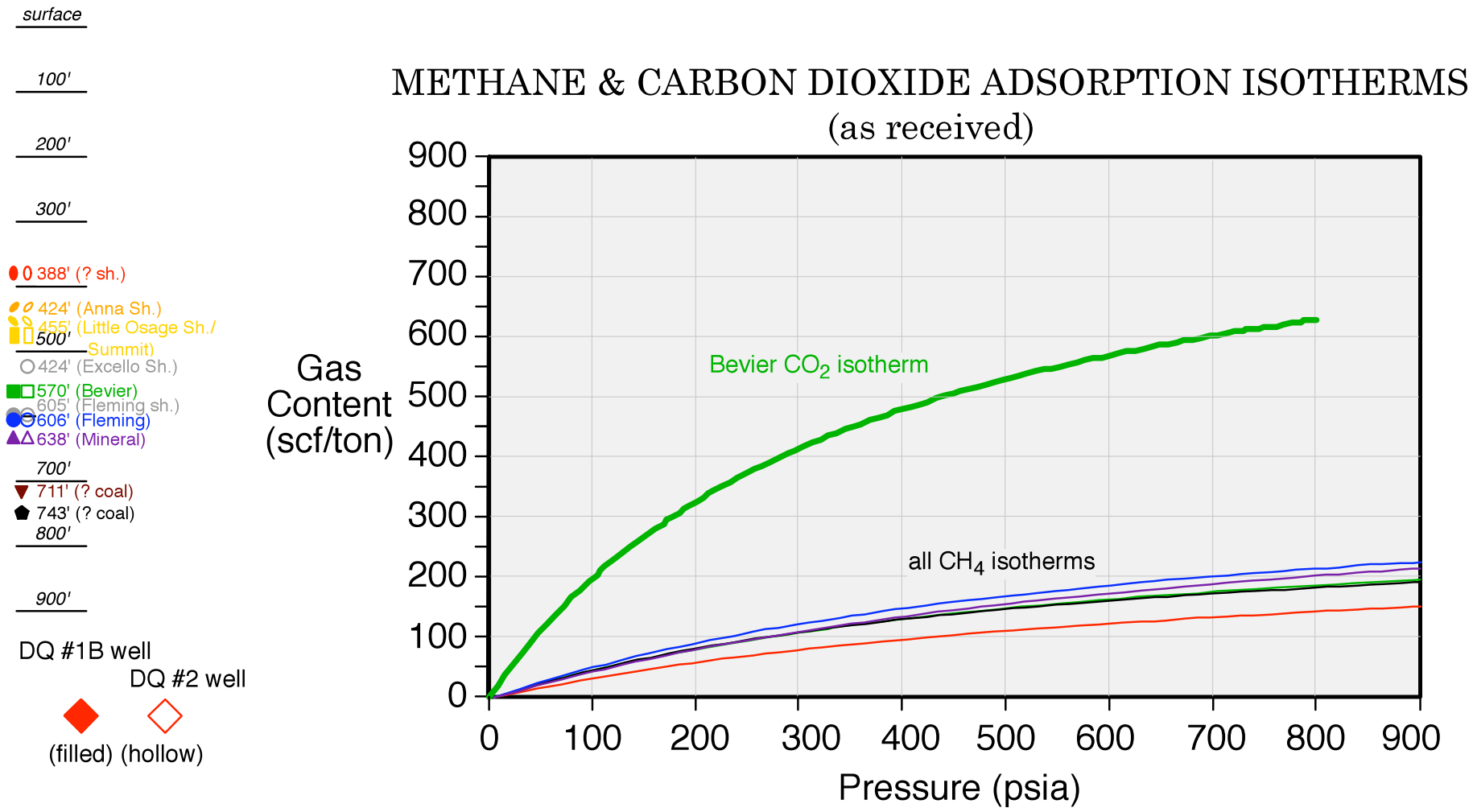

surface
100'
200'
300'
388' (? sh.)
424' (Anna Sh.)
455' (Little Osage Sh./ Summit)
500'
424' (Excello Sh.)
570' (Bevier)
605' (Fleming sh.)
606' (Fleming)
638' (Mineral)
700'
711' (? coal)
743' (? coal)
800'
900'
DQ #1B well
DQ #2 well
(filled) (hollow)
METHANE & CARBON DIOXIDE ADSORPTION ISOTHERMS
(as received)
Gas Content (scf/ton)
Bevier CO_2 isotherm
all CH_4 isotherms
0
100
200
300
400
500
600
700
800
900
Pressure (psia)

Figure 32.

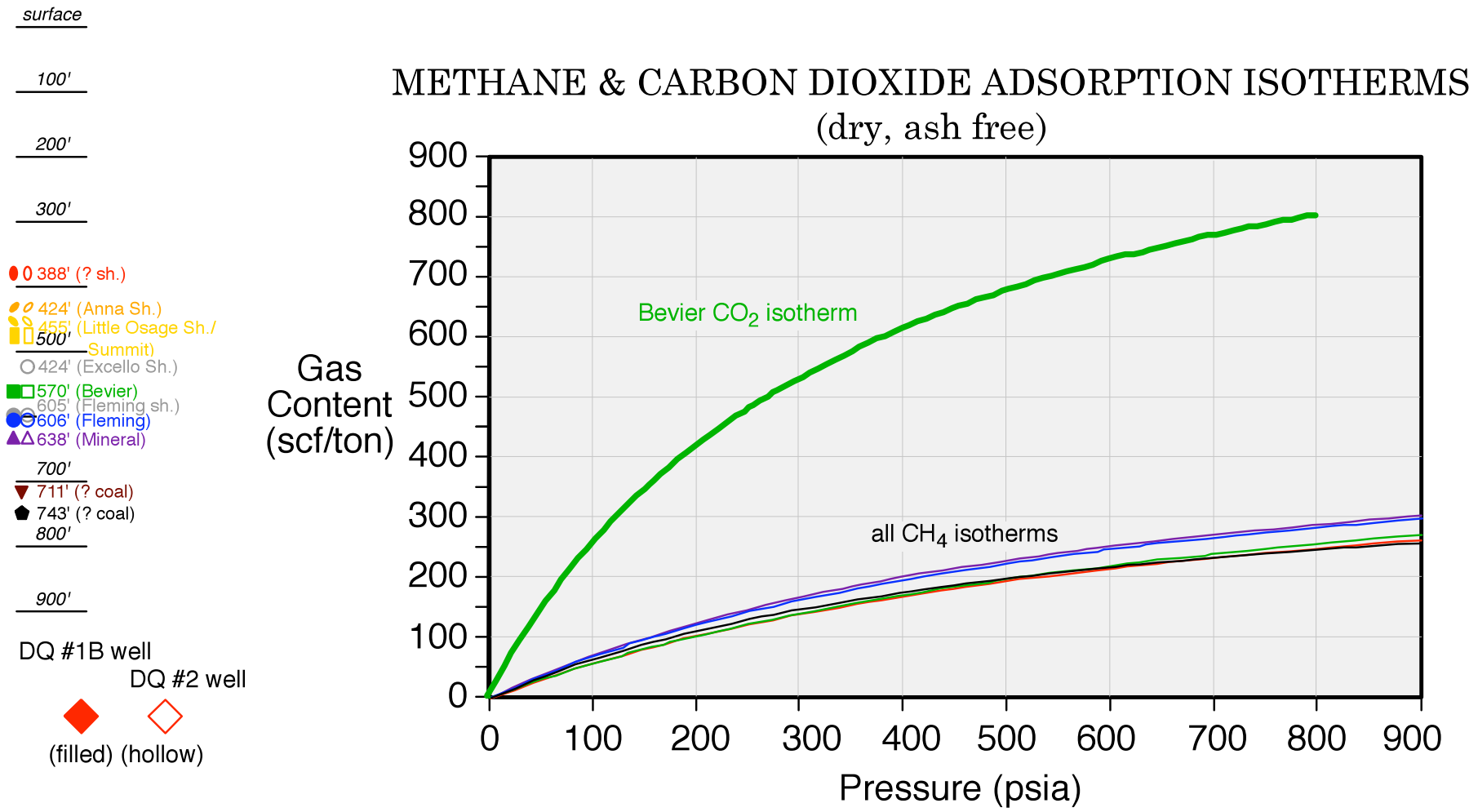

surface
100'
200'
300'
388' (? sh.)
424' (Anna Sh.)
455' (Little Osage Sh./
500'
Summit)
424' (Excello Sh.)
570' (Bevier)
605' (Fleming sh.)
606' (Fleming)
638' (Mineral)
700'
711' (? coal)
743' (? coal)
800'
900'
DQ #1B well
DQ #2 well
(filled) (hollow)
METHANE & CARBON DIOXIDE ADSORPTION ISOTHERMS
(dry, ash free)
Gas Content (scf/ton)
Bevier CO2 isotherm
all CH4 isotherms
0
100
200
300
400
500
600
700
800
900
Pressure (psia)

Figure 33.

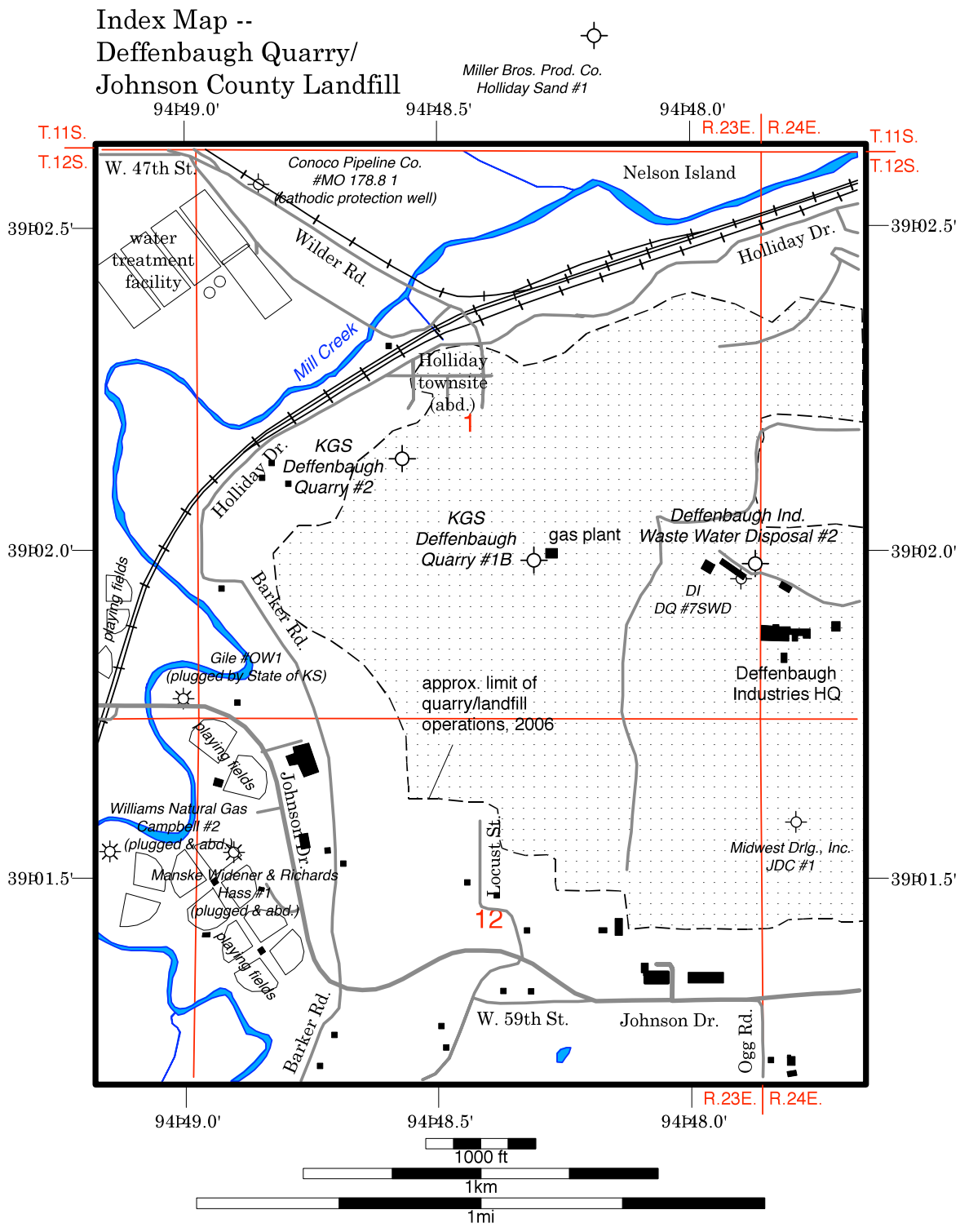

Index Map --
Deffenbaugh Quarry/
Johnson County Landfill
Miller Bros. Prod. Co.
Holliday Sand #1
94°49.0'
94°48.5'
94°48.0'
T.11S.
T.12S.
R.23E.
R.24E.
39°02.5'
39°02.0'
39°01.5'
W. 47th St.
Conoco Pipeline Co.
#MO 178.8 1
(cathodic protection well)
Nelson Island
water
treatment
facility
Wilder Rd.
Holliday Dr.
Mill Creek
Holliday
townsite
(abd.)
1
KGS
Deffenbaugh
Quarry #2
KGS
Deffenbaugh
Quarry #1B
gas plant
Deffenbaugh Ind.
Waste Water Disposal #2
DI
DQ #7SWD
playing fields
Barker Rd.
Gile #OW1
(plugged by State of KS)
approx. limit of
quarry/landfill
operations, 2006
Deffenbaugh
Industries HQ
Johnson Dr.
Williams Natural Gas
Campbell #2
(plugged & abd.)
Manske Widener & Richards
Hass #1
(plugged & abd.)
Locust St.
12
Midwest Drlg., Inc.
JDC #1
W. 59th St.
Ogg Rd.
1000 ft
1km
1mi

Figure 34.

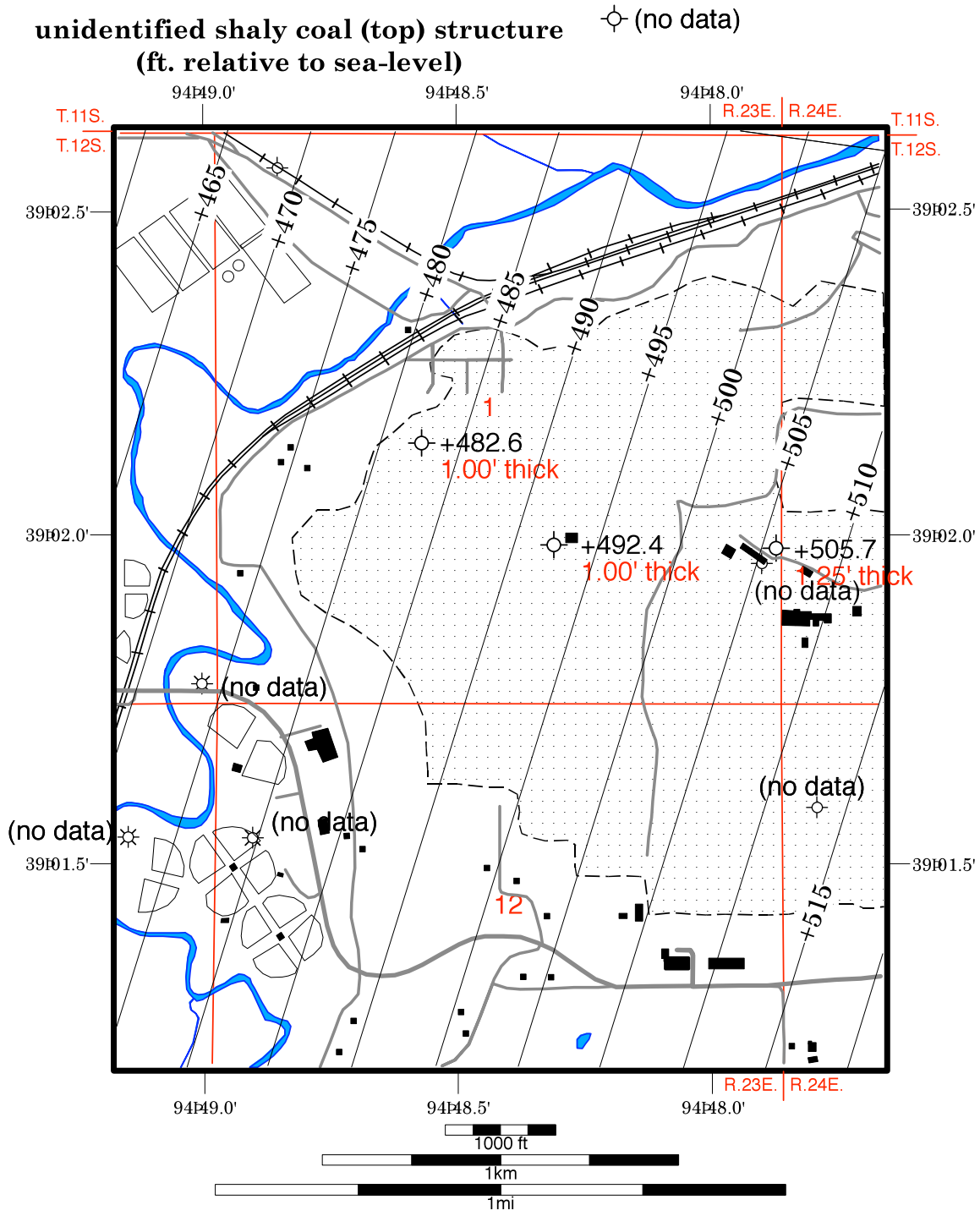

unidentified shaly coal (top) structure
(ft. relative to sea-level)
(no data)
94°49.0'
94°48.5'
94°48.0'
R.23E.
R.24E.
T.11S.
T.12S.
39°02.5'
39°02.0'
39°01.5'
+465
+470
+475
+480
+485
+490
+495
+500
+505
+510
+515
1
+482.6
1.00' thick
+492.4
1.00' thick
+505.7
1.25' thick
(no data)
(no data)
(no data)
(no data)
12
1000 ft
1km
1mi

Figure 35.

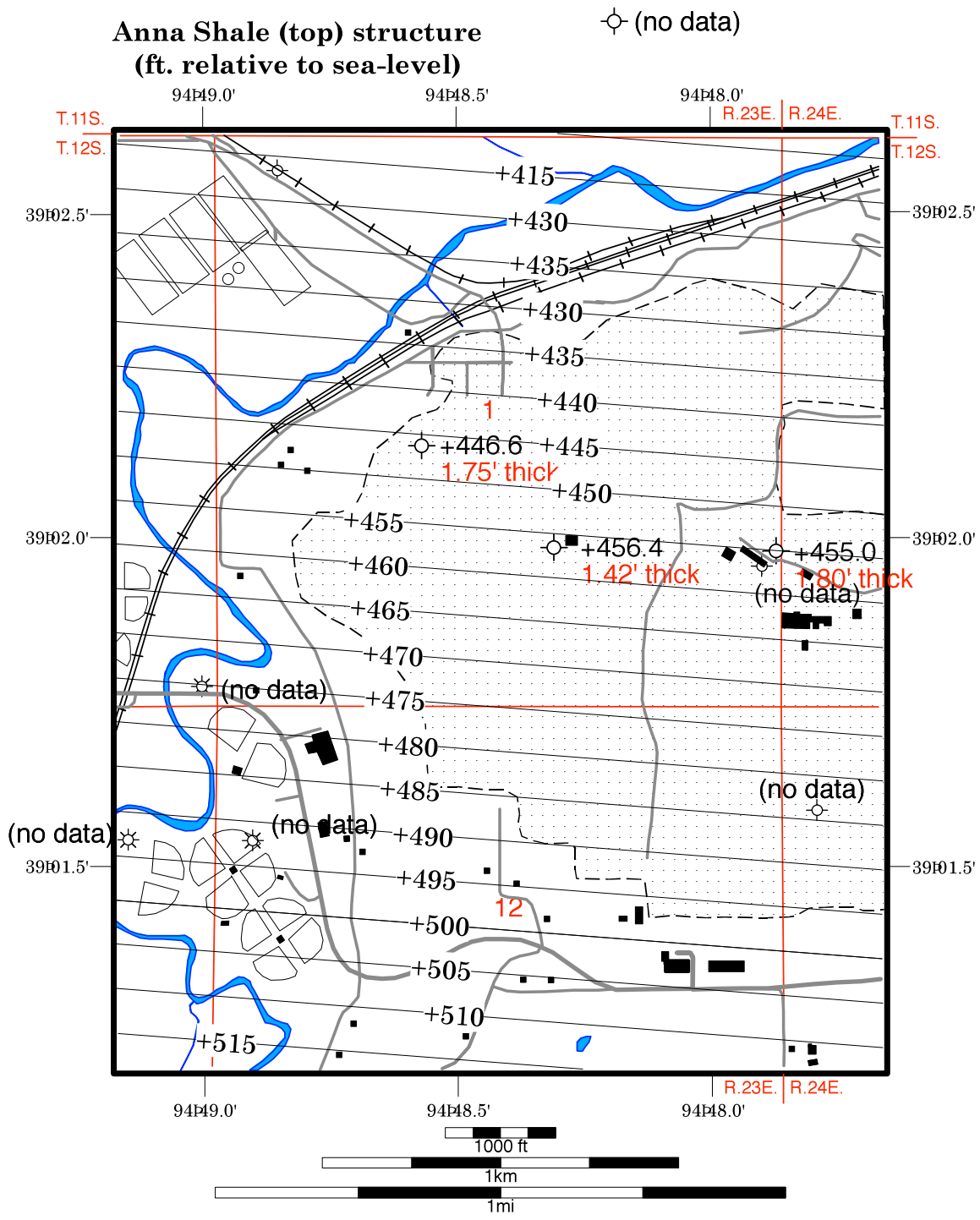

Anna Shale (top) structure
(ft. relative to sea-level)
(no data)
94°49.0'
94°48.5'
94°48.0'
R.23E.
R.24E.
T.11S.
T.12S.
39°02.5'
39°02.0'
39°01.5'
+415
+430
+435
+430
+435
+440
+445
+450
+455
+460
+465
+470
+475
+480
+485
+490
+495
+500
+505
+510
+515
1
+446.6
1.75' thick
+456.4
1.42' thick
+455.0
1.80' thick
12
(no data)
(no data)
(no data)
(no data)
1000 ft
1km
1mi

Figure 36.

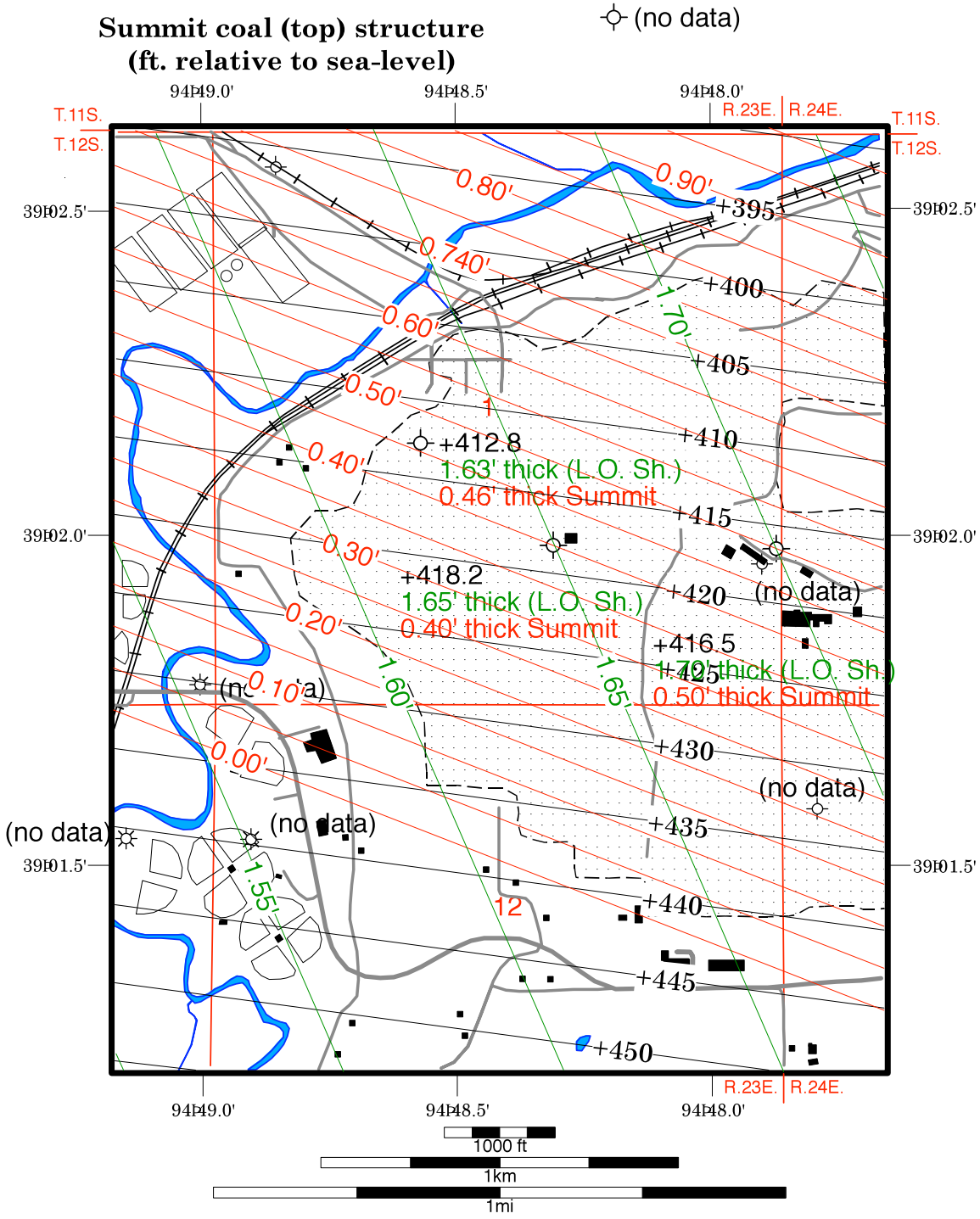

Summit coal (top) structure
(ft. relative to sea-level)
(no data)
94°49.0'
94°48.5'
94°48.0'
R.23E.
R.24E.
T.11S.
T.12S.
39°02.5'
39°02.0'
39°01.5'
0.80'
0.90'
+395
0.740'
+400
0.60'
1.70'
+405
0.50'
+412.8
1.63' thick (L.O. Sh.)
0.46' thick Summit
+410
0.40'
+415
0.30'
+418.2
1.65' thick (L.O. Sh.)
0.40' thick Summit
+420
(no data)
0.20'
+416.5
1.70' thick (L.O. Sh.)
0.50' thick Summit
1.60'
1.65'
0.10'
+425
+430
0.00'
(no data)
(no data)
(no data)
+435
1.55'
+440
12
+445
+450
1000 ft
1km
1mi

Figure 37.

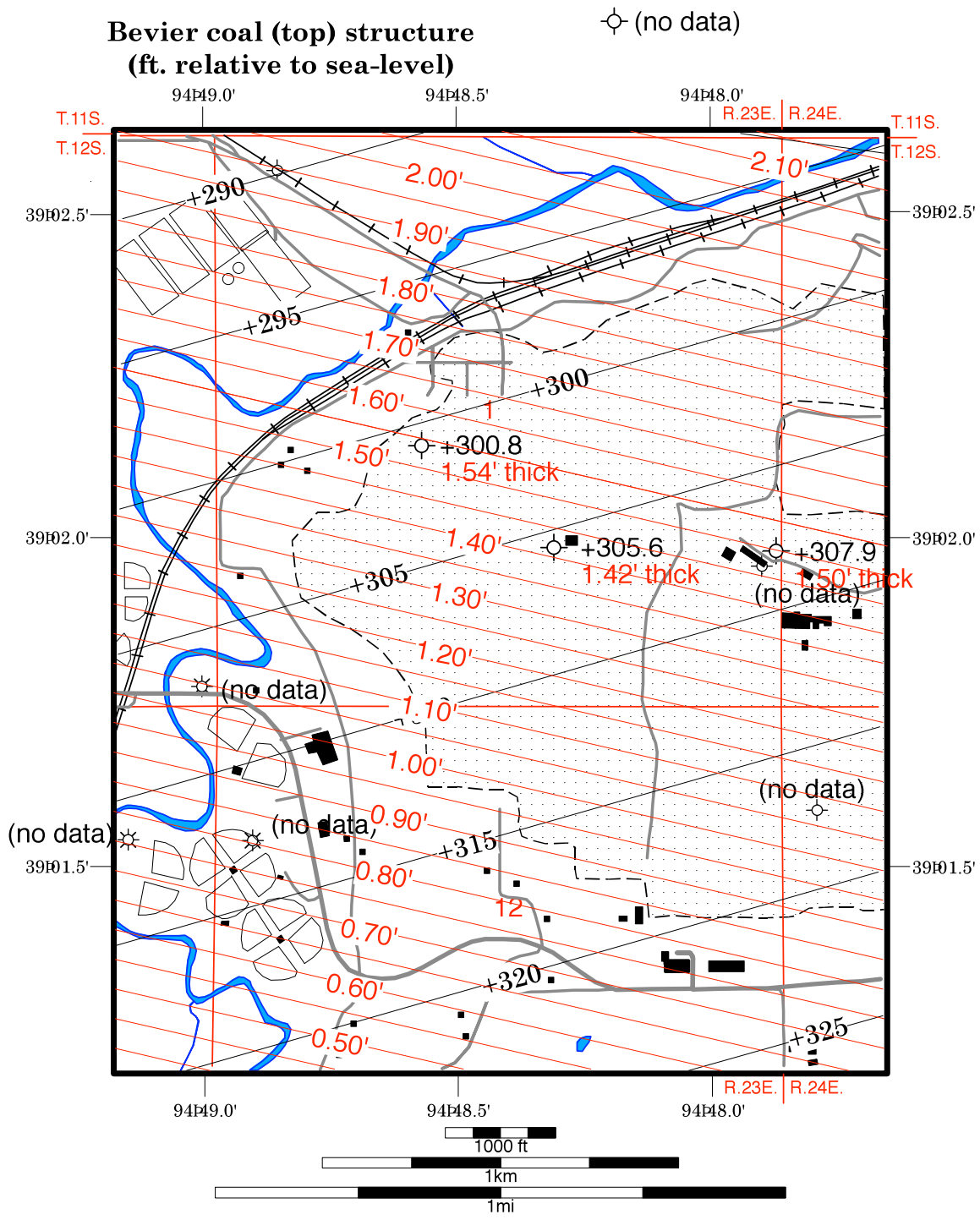

Bevier coal (top) structure
(ft. relative to sea-level)
(no data)
94°49.0'
94°48.5'
94°48.0'
R.23E.
R.24E.
T.11S.
T.12S.
39°02.5'
39°02.0'
39°01.5'
2.00'
2.10'
1.90'
1.80'
1.70'
1.60'
1.50'
1.40'
1.30'
1.20'
1.10'
1.00'
0.90'
0.80'
0.70'
0.60'
0.50'
+290
+295
+300
+305
+315
+320
+325
+300.8
1.54' thick
+305.6
1.42' thick
+307.9
1.50' thick
(no data)
(no data)
(no data)
(no data)
1
12
1000 ft
1km
1mi

Figure 38.

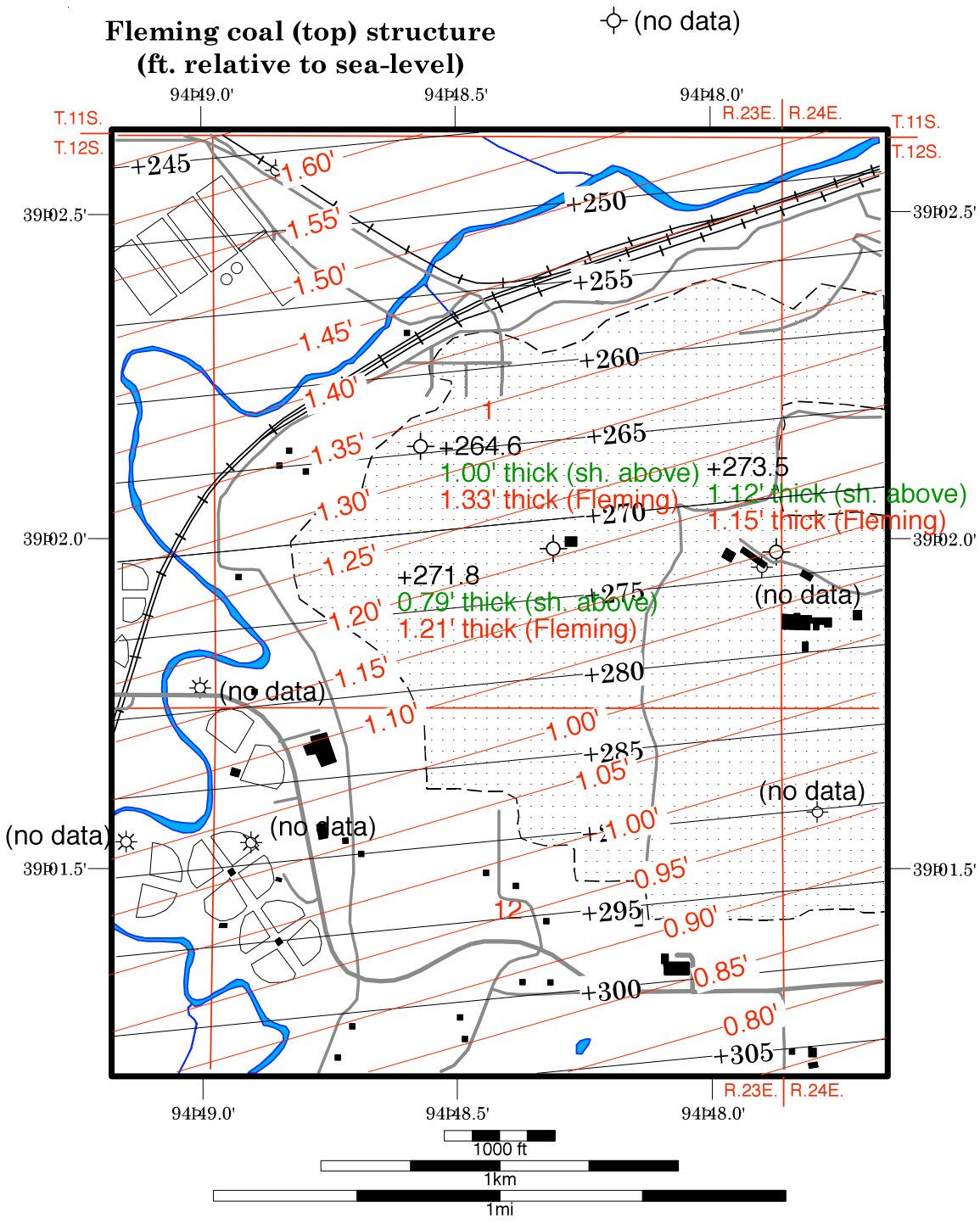

Fleming coal (top) structure
(ft. relative to sea-level)
(no data)
94°49.0'
94°48.5'
94°48.0'
T.11S.
T.12S.
R.23E.
R.24E.
39°02.5'
39°02.0'
39°01.5'
+245
+250
+255
+260
+265
+270
+275
+280
+285
+295
+300
+305
1.60'
1.55'
1.50'
1.45'
1.40'
1.35'
1.30'
1.25'
1.20'
1.15'
1.10'
1.00'
1.05'
0.95'
0.90'
0.85'
0.80'
+264.6
1.00' thick (sh. above)
1.33' thick (Fleming)
+273.5
1.12' thick (sh. above)
1.15' thick (Fleming)
+271.8
0.79' thick (sh. above)
1.21' thick (Fleming)
(no data)
(no data)
(no data)
(no data)
1000 ft
1km
1mi

Figure 39.

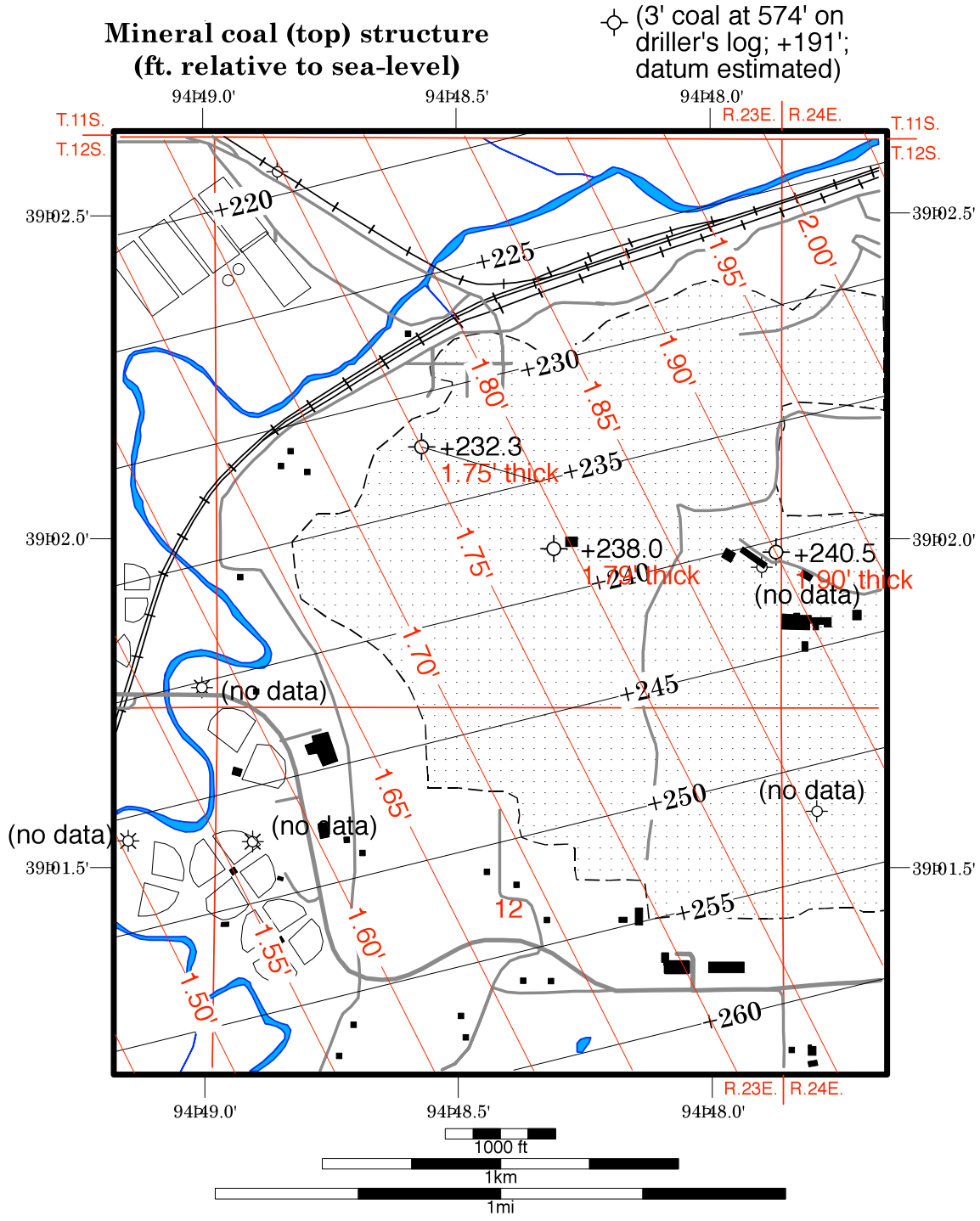

Mineral coal (top) structure
(ft. relative to sea-level)
(3' coal at 574' on driller's log; +191'; datum estimated)
94°49.0'
94°48.5'
94°48.0'
T.11S.
T.12S.
R.23E.
R.24E.
39°02.5'
39°02.0'
39°01.5'
+220
+225
+230
+232.3
1.75' thick
+235
+238.0
1.70' thick
+240.5
1.90' thick
+245
+250
+255
+260
1.95'
2.00'
1.80'
1.85'
1.90'
1.75'
1.70'
1.65'
1.60'
1.55'
1.50'
(no data)
12
1000 ft
1km
1mi

Figure 40.

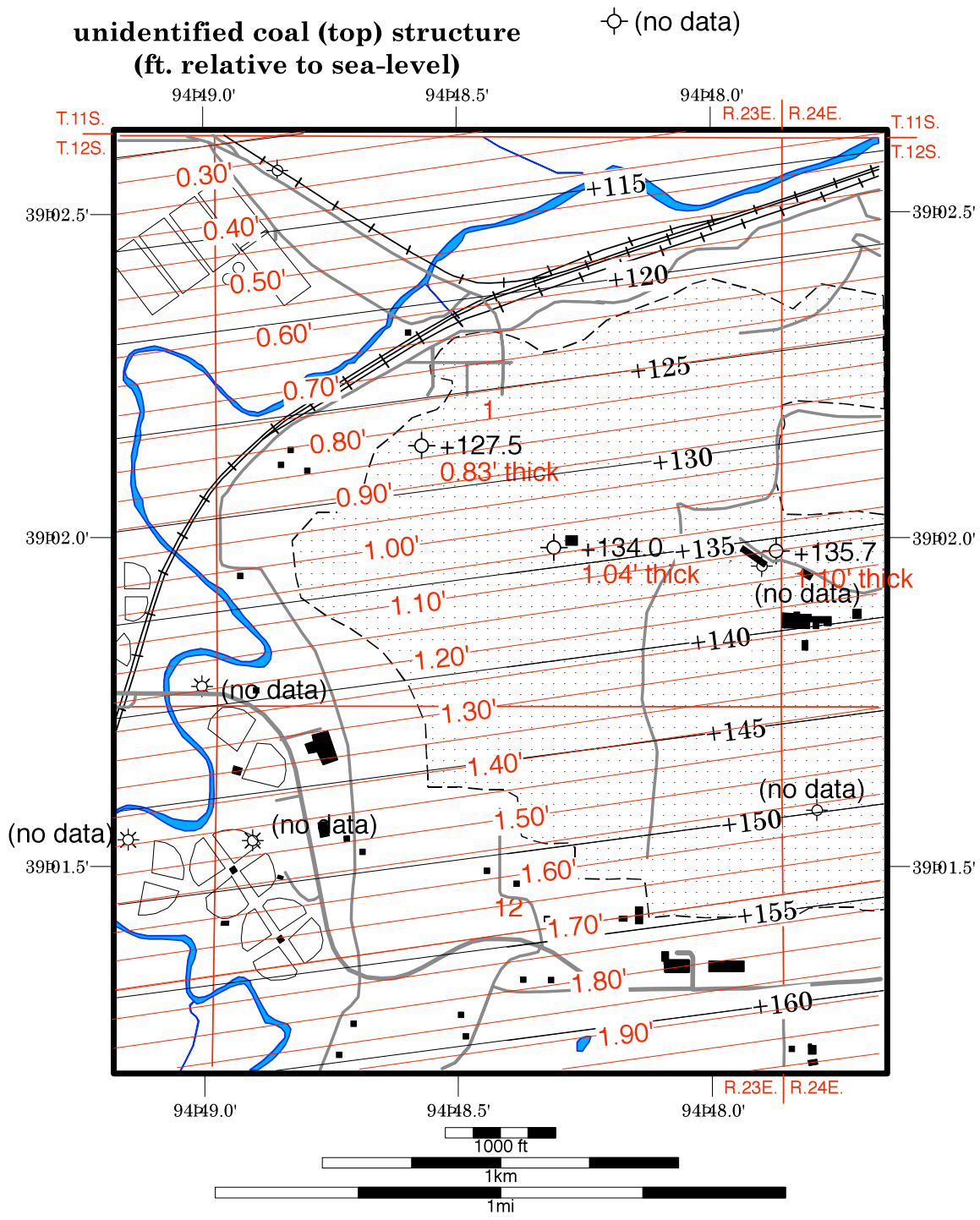

unidentified coal (top) structure
(ft. relative to sea-level)
(no data)
94°49.0'
94°48.5'
94°48.0'
T.11S.
T.12S.
R.23E.
R.24E.
39°02.5'
39°02.0'
39°01.5'
0.30'
0.40'
0.50'
0.60'
0.70'
0.80'
0.90'
1.00'
1.10'
1.20'
1.30'
1.40'
1.50'
1.60'
1.70'
1.80'
1.90'
+115
+120
+125
+127.5
0.83' thick
+130
+134.0
+135
+135.7
1.04' thick
1.10' thick
+140
+145
+150
+155
+160
1
12
(no data)
(no data)
(no data)
(no data)
1000 ft
1km
1mi

Figure 41.