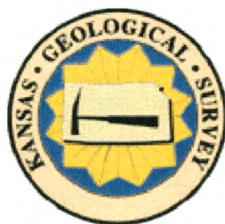


ANALYSIS OF CHEROKEE GROUP COAL SAMPLES FOR GAS CONTENT AND  
CORE DESCRIPTION – KANSAS GEOLOGICAL SURVEY COOPER #CW-1 WELL  
(SE SW SW 11-T35S-R18E), LABETTE COUNTY, KANSAS



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**KANSAS GEOLOGICAL SURVEY OPEN-FILE REPORT 2003-43**

## SUMMARY

During July of 2002 the Kansas Geological Survey drilled a continuous 2-inch diameter core from the surface to 860 feet total depth with a wireline-core drilling rig. Samples of core were boxed on site and later transported to the core repository at the Kansas Geological Survey in Lawrence, KS. Following the completion of drilling, the Fort Scott and Cherokee Group portions of the core were described in detail and photographed (Appendix A and B).

Six core samples from the Pennsylvanian Cherokee Group were collected from the Kansas Geological Survey Cooper #CW-1 well in SE SW SW11-T35S-R18E, Labette Co., KS. Desorbed gas from these samples were measured with the following results:

- Iron Post coal (382'-383') *[143.5 scf/ton]*
- Fleming coal (420'-421') *[49.0 scf/ton]\**
- Dry Wood coal (630.4'-631.4') *[87.4 scf/ton]*
- Rowe coal (695.9'-696.5') *[76.1 scf/ton]*
- Neutral coal (766.7'-767.7') *[69.3 scf/ton]*
- Riverton coal (840.2'-841.2') *[62.5 scf/ton]*

\* Measurement suspect to due leak discovered in desorption canister.

## BACKGROUND

The KGS Cooper #CW-1 well in SE SW SW 11-T35S-R18E, Labette Co., KS, was selected for core desorption tests in association with an on-going coalbed gas research project at the Kansas Geological Survey. The samples were gathered July 17-20, 2003 by Jonathan P. Lange and Troy Johnson of the Kansas Geological Survey. Samples were obtained in a wireline coring operation by the Kansas Geological Survey drilling rig. Time off bottom for every sample was noted, as well as time at surface and time in canister.

The samples were collected and inserted into desorption canisters at the well site. The canisters were then placed in temperature baths approximating formation temperature. The canistered samples were later transported to the Kansas Geological Survey and desorption measurements were continued. Desorption measurements were periodically made until the canisters produced no more gas.

## 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 homemade using PVC pipe and fixtures available at plumbing supply shops. On average, the canisters were approximately 12 inches high, 4 inches in diameter, and enclosed a volume of approximately 150 cubic inches (2450 cm<sup>3</sup>).

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 atmospheric pressure was estimated in the field. More precise measurements were made back at the laboratory using 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 at standard temperature and pressure. Conversion of gas volumes to standard temperature and pressure was by application of the perfect-gas equation, obtainable from basic college chemistry texts:

$$n = PV/RT$$

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

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

Customarily, standard temperature and pressure for gas volumetric measurements in the oil industry are 60 °F and 14.7 psi (see Dake, 1978, p. 13), therefore P<sub>stp</sub>, V<sub>stp</sub>, and T<sub>stp</sub>, respectively, are pressure, volume and temperature at standard temperature and pressure, where standard temperature is degrees Rankine (°R = 460 + °F). P<sub>rig</sub>, V<sub>rig</sub>, and T<sub>rig</sub>, 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<sub>stp</sub> becomes:

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

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

The desorbed gas was summed over the time period for which the coal samples evolved all of their gas. The Fleming sample from the Cooper CW-1 well desorbed for almost 2 months before the detection of a leak. All other samples evolved gas for over a period of four to eleven months.

Lost gas (i.e., the gas lost from the sample from the time it was drilled, brought to the surface, to the time it was canistered) was determined using the direct method (Kissel and others, 1975; also see McLennan and others, 1995, p. 6.1-6.14) in which the cumulative gas evolved is plotted against the square root of elapsed time. Time zero is assumed to be instant the core 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.

## LITHOLOGIC ANALYSIS

Upon removal from the canisters, the cores were washed of drilling mud and weighed. They were then dried in air for up to three weeks and weighed again. Weight loss, given in the spreadsheet desorption data tables, ranged between 1.7% to 5.1%.

## 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, and 3) a desorption graph for all the samples.

### *Data Tables of the Desorption Analyses (Table 1)*

These are the basic data used for lost-gas analysis and determination of total gas desorbed from the 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 dry weight of the sample. At the right of the table, the time of the measurements are listed and converted to hours (and square root of hours) since the sample was drilled.

### *Lost-Gas Graphs (Figures 1-6)*

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 couple of hours after canistering. Lost-gas volumes derived from this analysis are incorporated in the data tables described above.

*Desorption Graph (Figure 7)*

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

**PROXIMATE ANALYSIS and ASHING EXPERIMENTS**

Samples from the Iron Post, Dry Wood, Rowe and Riverton coals were sent out for proximate analysis at Luman's Labs in Chetopa, KS. The samples were obtained by sawing the coal-part of the core vertically in half and sending this half to the analytical laboratory. The analyses are as follows:

**Iron Post**

*As Received*

<i>moisture</i>	<i>ash</i>	<i>volatile matter</i>	<i>fixed carbon</i>	<i>BTU/lb</i>	<i>sulfur</i>
1.90%	11.18%	42.15%	44.77%	13,065	5.86%

*Moisture Free*

<i>ash</i>	<i>volatile matter</i>	<i>fixed carbon</i>	<i>BTU/lb</i>	<i>sulfur</i>
11.39%	42.96%	45.65%	13,317	5.97%

*Moisture/ash free*

*BTU/lb*  
15,030

**Dry Wood**

*As Received*

<i>moisture</i>	<i>ash</i>	<i>volatile matter</i>	<i>fixed carbon</i>	<i>BTU/lb</i>	<i>sulfur</i>
2.45%	31.77%	31.58%	34.20%	9,849	6.16%

*Moisture Free*

<i>ash</i>	<i>volatile matter</i>	<i>fixed carbon</i>	<i>BTU/lb</i>	<i>sulfur</i>
32.57%	32.37%	35.06%	10,097	6.31%

*Moisture/ash free*

*BTU/lb*  
14,973

**Rowe***As Received*

<i>moisture</i>	<i>ash</i>	<i>volatile matter</i>	<i>fixed carbon</i>	<i>BTU/lb</i>	<i>sulfur</i>
2.88%	44.19%	20.64%	32.29%	7,452	2.26%

*Moisture Free*

<i>ash</i>	<i>volatile matter</i>	<i>fixed carbon</i>	<i>BTU/lb</i>	<i>sulfur</i>
45.50%	21.25%	33.25%	7,673	2.33%

*Moisture/ash free*

*BTU/lb*  
14,079

**Riverton***As Received*

<i>moisture</i>	<i>ash</i>	<i>volatile matter</i>	<i>fixed carbon</i>	<i>BTU/lb</i>	<i>sulfur</i>
2.87%	33.44%	26.71%	36.98%	9,468	10.34%

*Moisture Free*

<i>ash</i>	<i>volatile matter</i>	<i>fixed carbon</i>	<i>BTU/lb</i>	<i>sulfur</i>
34.43%	27.50%	38.07%	9,748	10.65%

*Moisture/ash free*

*BTU/lb*  
14,866

According to the BTU and fixed carbon analyses, all of the coals sampled can be classified as high-volatile A bituminous coal.

Simple ashing of the Neutral sample at the Kansas Geological Survey was carried out in a muffle furnace in which the samples were first weighed and then subjected to 110 °C until their weight stabilized. This first firing approximates moisture content. A second firing at 750 °C for three to four days essentially ashed the sample. Two crucibles of sample were utilized for both the 110 °C and 750 °C firings. Each crucible was filled with approximately 1.5 grams of pulverized material (i.e., < 0.0460" sieve size). Results were accepted if the difference in weight loss for each sample was less than 2%.

<i>unit</i>	<i>depth</i>	<i>moisture</i>	<i>ash</i>	<i>moisture-free ash</i>
Neutral coal	766.7'	0.86%	26.69%	26.92%

Using the equation from McLennan and others (1995):

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

where:

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

the gas content of the samples converts to:

<i>unit</i>	<i>depth</i>	<i>moisture-free ash</i>	$G_c$	$G_{pc}$
Iron Post coal	382.0'	11.39%	143.5 scf/ton	161.9 scf/ton
Dry Wood coal	630.0'	32.57%	87.4 scf/ton	129.6 scf/ton
Rowe coal	695.1'	45.50%	76.1 scf/ton	139.6 scf/ton
Neutral coal	766.7'	26.92%	69.3 scf/ton	94.8 scf/ton
Riverton coal	840.2'	34.43%	62.5 scf/ton	95.3 scf/ton

## REFERENCES

- Dake, L.P., 1978, Fundamentals of Reservoir Engineering, Elsevier Scientific Publishing, New York, NY, 443 p.  
 Kissel, F.N., McCulloch, C.M., and Elder, C.H., 1975, The direct method of determining methane content of coals for ventilation design: U.S. Bureau of Mines, Report of Investigations, RI7767.  
 McLennan, J.D., Schafer, P.S., and Pratt, T.J., 1995, A guide to determining coalbed gas content: Gas Research Institute, Chicago, IL, Reference No. GRI-94/0396, 180 p.

## FIGURES, TABLES and APPENDICES

TABLE 1. Desorption measurements for samples.

FIGURE 1. Lost-gas graph for Iron Post coal 382'-383' depth

FIGURE 2. Lost-gas graph for Fleming coal 420'-421' depth.

FIGURE 3. Lost-gas graph for Dry Wood coal 630.4'-631.4' depth.

FIGURE 4. Lost-gas graph for Rowe coal 695.9'-696.5' depth

FIGURE 5. Lost-gas graph for Neutral coal 766.7'-767.7' depth

FIGURE 6. Lost-gas graph for Riverton coal and shale at 840.2'-841.2' depth.

FIGURE 7. Desorption graph for all samples.

APPENDIX A. Core description.

APPENDIX B. Summary of tops and core photos.



Table 1 - Desorption measurement of samples

SAMPLE: 382' to 382.11' (Iron Post Coal) Canister L#2

sample dried 7 days @ 150 deg. F (65 deg C)			APPROX. WEIGHT CALCULATION						0.21250		moisture weight		est. lost gas (cc) =		TIME OF:				elapsed time	
DRY WEIGHT	lbs.	grams	weight of container (full):			weight of container (empty)			wet sample weight:						off bottom	at surface	in canister	(off bottom to canistering)		
weight:	1.566	710.45							1.6		2.13%		140		7/16/02 11:52	7/16/02 11:54	7/16/02 12:03	11 min		
CONVERSION OF VOLUMES TO STP			CONVERSION OF RIG MEASUREMENTS TO STP (ft3; @60 degrees; @14.7 psi)						CUMULATIVE VOLUMES			SCF/TON	SCF/TON (approx)	TIME SINCE				0.18333333 hrs		
cc	T (F)	P	ft3 (@rig)	ABS. T (psia (@rig))	ft3 (@STP)	cc (@STP)	ft3 (@STP)	cc (@STP)	w/out lost gas	with lost gas	TIME	off bottom	at surface	in canister	SQRT hrs. (off bottom)					
0	79	1089	0.000000	539 14.13167422	0.000000	0	0.00000	0	0	6.314268199	7/16/02 12:03	0:11:00	0:09:00	0:00:00	0.428174419					
25	79	1089	0.000883	539 14.13167422	0.000819	23.18626895	0.00082	23.18626895	1.045745148	7.360013347	7/16/02 12:05	0:13:00	0:11:00	0:02:00	0.465474668					
17	79	1089	0.000600	539 14.13167422	0.000557	15.76666289	0.00138	38.95293184	1.756851849	8.071120048	7/16/02 12:07	0:15:00	0:13:00	0:04:00	0.5					
1	79	1089	0.000035	539 14.13167422	0.000033	0.927450758	0.00141	39.8803826	1.798681655	8.112949854	7/16/02 12:09	0:17:00	0:15:00	0:06:00	0.532290647					
30	79	1089	0.001059	539 14.13167422	0.000983	27.82352275	0.00239	67.70390535	3.053575832	9.367844031	7/16/02 12:15	0:23:00	0:21:00	0:12:00	0.619139187					
23	80	1089	0.000812	540 14.13167422	0.000752	21.29186491	0.00314	88.99577025	4.013879728	10.32814793	7/16/02 12:20	0:28:00	0:26:00	0:17:00	0.683130051					
1	80	1089	0.000035	540 14.13167422	0.000033	0.925733257	0.00318	89.92150351	4.055632072	10.36990027	7/16/02 12:25	0:33:00	0:31:00	0:22:00	0.741619849					
48	80	1089	0.001695	540 14.13167422	0.001569	44.43519633	0.00474	134.3566998	6.059744551	12.37401275	7/16/02 12:40	0:48:00	0:46:00	0:37:00	0.894427191					
34	79	1089	0.001201	539 14.13167422	0.001114	31.53332578	0.00586	165.8900256	7.481957952	13.79622615	7/16/02 12:50	0:58:00	0:56:00	0:47:00	0.98319208					
46	79	1089	0.001624	539 14.13167422	0.001507	42.66273488	0.00736	208.5527605	9.406129024	15.72039722	7/16/02 13:12	1:20:00	1:18:00	1:09:00	1.154700538					
43	80	1089	0.001519	540 14.13167422	0.001406	39.80653004	0.00877	248.3592905	11.20147979	17.51574799	7/16/02 13:34	1:42:00	1:40:00	1:31:00	1.303840481					
38	79	1089	0.001342	539 14.13167422	0.001245	35.24312881	0.01002	283.6024193	12.79101241	19.10528061	7/16/02 14:00	2:08:00	2:06:00	1:57:00	1.460593487					
50	79	1089	0.001766	539 14.13167422	0.001638	46.37253791	0.01165	329.9749573	14.88250271	21.19677091	7/16/02 14:36	2:44:00	2:42:00	2:33:00	1.653279569					
38	79	1087	0.001342	539 14.10572073	0.001242	35.17840314	0.01290	365.1533604	16.46911608	22.78338428	7/16/02 15:02	3:10:00	3:08:00	2:59:00	1.779513042					
34	79	1087	0.001201	539 14.10572073	0.001112	31.47541333	0.01401	396.6287737	17.88871752	24.20298572	7/16/02 15:30	3:38:00	3:36:00	3:27:00	1.906130461					
30	79	1087	0.001059	539 14.10572073	0.000981	27.77242353	0.01499	424.4011973	19.14130703	25.45557522	7/16/02 16:00	4:08:00	4:06:00	3:57:00	2.033060091					
28	79	1087	0.000989	539 14.10572073	0.000915	25.92092863	0.01590	450.3221259	20.31039056	26.62465876	7/16/02 16:30	4:38:00	4:36:00	4:27:00	2.152517905					
22	78	1086	0.000777	538 14.09274398	0.000720	20.38552856	0.01662	470.7076544	21.22981695	27.54408515	7/16/02 17:00	5:08:00	5:06:00	4:57:00	2.265686062					
76	78	1086	0.002684	538 14.09274398	0.002487	70.42273503	0.01911	541.1303895	24.40601721	30.72028541	7/16/02 18:00	6:08:00	6:06:00	5:57:00	2.476556749					
55	78	1086	0.001942	538 14.09274398	0.001800	50.9638214	0.02091	592.0942109	26.70458319	33.01885139	7/16/02 19:20	7:28:00	7:26:00	7:17:00	2.732520204					
50	78	1086	0.001766	538 14.09274398	0.001636	46.33074673	0.02255	638.4249576	28.79418862	35.10845682	7/16/02 21:00	9:08:00	9:06:00	8:57:00	3.022140522					
46	78	1086	0.001624	538 14.09274398	0.001505	42.62428699	0.02405	681.0492446	30.71662562	37.03089382	7/16/02 22:35	10:43:00	10:41:00	10:32:00	3.27363203					
89	78	1086	0.003143	538 14.09274398	0.002912	82.46872918	0.02696	763.5179738	34.4361233	40.75039149	7/17/02 5:45	17:53:00	17:51:00	17:42:00	4.228869037					
85	78	1086	0.003002	538 14.09274398	0.002781	78.76226944	0.02974	842.2802432	37.98845253	44.30272073	7/17/02 12:00	24:08:00	24:06:00	23:57:00	4.912568914					
91	78	1086	0.003214	538 14.09274398	0.002978	84.32195905	0.03272	926.6022023	41.79153442	48.10580262	7/17/02 23:10	35:18:00	35:16:00	35:07:00	5.941380311					
120	78	1086	0.004238	538 14.09274398	0.003927	111.1937922	0.03665	1037.795994	46.80658746	53.12085566	7/18/02 23:05	59:13:00	59:11:00	59:02:00	7.695236622					
110	80	1080	0.003885	540 14.01488352	0.003566	100.9890826	0.04022	1138.785077	51.36138855	57.67565675	7/19/02 18:15	78:23:00	78:21:00	78:12:00	8.853436244					
98	79	1079	0.003461	539 14.00190678	0.003180	90.05555379	0.04340	1228.840631	55.42306655	61.73733475	7/20/02 15:50	99:58:00	99:56:00	99:47:00	9.998333194					
100	82	1083	0.003531	542 14.05381375	0.003239	91.72356291	0.04664	1320.564194	59.55997495	65.87424315	7/21/02 15:06	123:14:00	123:12:00	123:03:00	11.101051					
72	77	1088	0.002543	537 14.11869747	0.002365	66.96360903	0.04900	1387.527803	62.580162	68.8944302	7/22/02 15:01	147:09:00	147:07:00	146:58:00	12.13053997					
98	90	1083	0.003461	550 14.05381375	0.003128	88.58161395	0.05213	1476.109417	66.57536249	72.88963069	7/23/02 15:18	171:26:00	171:24:00	171:15:00	13.09325526					
72	81	1079	0.002543	541 14.00190678	0.002328	65.91866784	0.05446	1542.028084	69.54842069	75.86268889	7/24/02 15:02	195:10:00	195:08:00	194:59:00	13.97020639					
67	81	1077	0.002366	541 13.97595329	0.002162	61.22728288	0.05662	1603.255367	72.30988844	78.62415664	7/25/02 15:41	219:49:00	219:47:00	219:38:00	14.82621552					
74	84	1074	0.002613	544 13.93702306	0.002368	67.06390646	0.05899	1670.319274	75.33459909	81.64886729	7/26/02 18:16	246:24:00	246:22:00	246:13:00	15.6971335					
96	85	1081	0.003390	545 14.02786026	0.003087	87.40819876	0.06207	1757.727473	79.27687631	85.59114451	7/28/02 14:40	290:48:00	290:46:00	290:37:00	17.052859					
50	78	1083	0.001766	538 14.05381375	0.001632	46.20276124	0.06371	1803.930234	81.36070935	87.67497755	7/29/02 15:52	316:00:00	315:58:00	315:49:00	17.77638883					
50	78	1079	0.001766	538 14.00190678	0.001626	46.03211392	0.06533	1849.962348	83.43684587	89.75111407	7/31/02 15:08	363:16:00	363:14:00	363:05:00	19.05955578					
57	78	1085	0.002013	538 14.07976724	0.001864	52.76841679	0.06719	1902.730765	85.81680256	92.13107076	8/2/02 13:41	409:49:00	409:47:00	409:38:00	20.24392913					
54	80	1087	0.001907	540 14.10572073	0.001762	49.89778761	0.06896	1952.628552	88.06728837	94.38155657	8/4/02 10:06	454:14:00	454:12:00	454:03:00	21.31275049					
45	80	1086	0.001589	540 14.09274398	0.001467	41.54323623	0.07042	1994.171788	89.94096791	96.25523611	8/5/02 15:40	483:48:00	483:46:00	483:37:00	21.99545408					
49	80	1088	0.001730	540 14.11869747	0.001600	45.31927584	0.07202	2039.491064	91.98495407	98.29922227	8/7/02 15:26	531:34:00	531:32:00	531:23:00	23.05572958					
25	80	1083	0.000883	540 14.05381375	0.000813	23.01581995	0.07284	2062.506884	93.02301164	99.33727984	8/9/02 15:59	580:07:00	580:05:00	579:56:00	24.0856112					



29	81	1080	0.001024	541	14.01488352	0.000938	26.57518119	0.07378	2089.082065	94.22160322	100.5358714	8/11/02 12:45	624:53:00	624:51:00	624:42:00	24.99766656
32	82	1081	0.001130	542	14.02786026	0.001035	29.29733599	0.07481	2118.379401	95.5429692	101.8572374	8/13/02 11:33	671:41:00	671:39:00	671:30:00	25.91685423
29	81	1084	0.001024	541	14.0667905	0.000942	26.67360779	0.07575	2145.053009	96.74600001	103.0602682	8/15/02 11:42	719:50:00	719:48:00	719:39:00	26.8297099
65	90	1082	0.002295	550	14.04083701	0.002073	58.69886096	0.07783	2203.75187	99.39343109	105.7076993	8/18/02 15:05	795:13:00	795:11:00	795:02:00	28.19958629
35	80	1082	0.001236	540	14.04083701	0.001137	32.19239526	0.07896	2235.944265	100.8453698	107.159638	8/22/02 9:25	885:33:00	885:31:00	885:22:00	29.75819215
34	82	1086	0.001201	542	14.09274398	0.001104	31.27239923	0.08007	2267.216665	102.2558149	108.5700831	8/25/02 10:38	958:46:00	958:44:00	958:35:00	30.96395754
35	80	1088	0.001236	540	14.11869747	0.001143	32.37091131	0.08121	2299.587576	103.715805	110.0300732	8/29/02 11:15	1055:23:00	1055:21:00	1055:12:00	32.48666393
33	80	1077	0.001165	540	13.97595329	0.001067	30.2125672	0.08228	2329.800143	105.0784497	111.3927179	9/1/02 14:58	1131:06:00	1131:04:00	1130:55:00	33.63183016
30	80	1084	0.001059	540	14.0667905	0.000976	27.64448624	0.08325	2357.444629	106.325269	112.6395372	9/5/02 10:55	1223:03:00	1223:01:00	1222:52:00	34.97213176
30	80	1084	0.001059	540	14.0667905	0.000976	27.64448624	0.08423	2385.089116	107.5720882	113.8863564	9/11/02 15:30	1371:38:00	1371:36:00	1371:27:00	37.03556849
45	80	1076	0.001589	540	13.96297654	0.001454	41.16070183	0.08568	2426.249817	109.4285148	115.742783	9/25/02 15:28	1707:36:00	1707:34:00	1707:25:00	41.32311702
41	80	1078	0.001448	540	13.98893003	0.001327	37.57167905	0.08701	2463.821496	111.1230695	117.4373377	10/1/02 15:20	1851:28:00	1851:26:00	1851:17:00	43.02867261
37	80	1084	0.001307	540	14.0667905	0.001204	34.09486636	0.08821	2497.916363	112.6608132	118.9750814	10/9/02 15:21	2043:29:00	2043:27:00	2043:18:00	45.20490386
29	79	1091	0.001024	539	14.1576277	0.000952	26.9454679	0.08916	2524.861831	113.8761055	120.1903737	10/13/02 9:54	2134:02:00	2134:00:00	2133:51:00	46.19559864
24	85	1089	0.000848	545	14.13167422	0.000777	22.01376699	0.08994	2546.875598	114.8689685	121.1832367	10/15/02 10:42	2182:50:00	2182:48:00	2182:39:00	46.72080193
35	85	1095	0.001236	545	14.20953468	0.001140	32.28028848	0.09108	2579.155886	116.3248714	122.6391396	10/22/02 9:10	2349:18:00	2349:16:00	2349:07:00	48.46957809
33	85	1087	0.001165	545	14.10572073	0.001067	30.21333929	0.09215	2609.369225	117.6875509	124.0018191	10/29/02 14:32	2522:40:00	2522:38:00	2522:29:00	50.2261552
32	85	1091	0.001130	545	14.1576277	0.001038	29.40559508	0.09319	2638.774821	119.0137995	125.3280677	11/11/02 14:02	2834:10:00	2834:08:00	2833:59:00	53.23689197
30	85	1085	0.001059	545	14.07976724	0.000968	27.41613542	0.09416	2666.190956	120.2503198	126.564588	11/19/02 10:47	3022:55:00	3022:53:00	3022:44:00	54.98105734
26	85	1096	0.000918	545	14.22251142	0.000848	24.00154209	0.09500	2690.192498	121.3328353	127.6471035	11/26/02 11:26	3191:34:00	3191:32:00	3191:23:00	56.49395248
27	85	1095	0.000953	545	14.20953468	0.000879	24.90193683	0.09588	2715.094435	122.4559603	128.7702285	12/3/02 8:40	3356:48:00	3356:46:00	3356:37:00	57.93789779
25	85	1082	0.000883	545	14.04083701	0.000805	22.7836087	0.09669	2737.878044	123.4835447	129.7978129	12/10/02 7:57	3524:05:00	3524:03:00	3523:54:00	59.36399021
26	85	1079	0.000918	545	14.00190678	0.000834	23.6292554	0.09752	2761.507299	124.5492694	130.8635376	12/19/02 8:15	3740:23:00	3740:21:00	3740:12:00	61.15867341
25	85	1077	0.000883	545	13.97595329	0.000801	22.678324	0.09832	2784.185623	125.5721053	131.8863735	12/29/02 15:38	3987:46:00	3987:44:00	3987:35:00	63.14876615
26	80	1093	0.000918	540	14.18358119	0.000853	24.15747263	0.09918	2808.343096	126.6616536	132.9759218	1/6/03 10:19	4174:27:00	4174:25:00	4174:16:00	64.60998375
15	81	1098	0.000530	541	14.24846491	0.000494	13.97487977	0.09967	2822.317975	127.2919474	133.6062156	1/15/03 16:28	4396:36:00	4396:34:00	4396:25:00	66.30686239
19	86	1109	0.000671	546	14.3912091	0.000626	17.7151262	0.10030	2840.033102	128.0909336	134.4052018	1/22/03 11:46	4559:54:00	4559:52:00	4559:43:00	67.52703162
22	85	1087	0.000777	545	14.10572073	0.000711	20.14222619	0.10101	2860.175328	128.9993865	135.3136547	1/29/03 11:05	4727:13:00	4727:11:00	4727:02:00	68.75475741
20	86	1093	0.000706	546	14.18358119	0.000649	18.37846607	0.10166	2878.553794	129.8282906	136.1425588	2/5/03 15:05	4899:13:00	4899:11:00	4899:02:00	69.99440454
21	86	1067	0.000742	546	13.84618585	0.000665	18.83834809	0.10232	2897.392142	130.6779362	136.9922044	2/13/03 15:10	5091:18:00	5091:16:00	5091:07:00	71.3533461
15	84	1100	0.000530	544	14.2744184	0.000492	13.92312719	0.10281	2911.315269	131.3058959	137.6201641	2/23/03 16:08	5332:16:00	5332:14:00	5332:05:00	73.022371
17	84	1072	0.000600	544	13.91106957	0.000543	15.37788303	0.10336	2926.693152	131.9994679	138.3137361	3/3/03 10:09	5518:17:00	5518:15:00	5518:06:00	74.28514881
15	85	1081	0.000530	545	14.02786026	0.000482	13.65753106	0.10384	2940.350683	132.6154487	138.9297169	3/10/03 11:54	5688:02:00	5688:00:00	5687:51:00	75.41905153
16	89	1068	0.000565	549	13.85916259	0.000505	14.28797353	0.10434	2954.638657	133.2598636	139.5741318	3/17/03 11:28	5855:36:00	5855:34:00	5855:25:00	76.52189229
12	85	1083	0.000424	545	14.05381375	0.000387	10.94623951	0.10473	2965.584896	133.75356	140.0678282	3/24/03 14:06	6026:14:00	6026:12:00	6026:03:00	77.62881767
10	85	1073	0.000353	545	13.92404631	0.000319	9.037638497	0.10505	2974.622535	134.1611748	140.475443	3/31/03 15:44	6195:52:00	6195:50:00	6195:41:00	78.71382767
14	84	1089	0.000494	544	14.13167422	0.000454	12.86496952	0.10550	2987.487504	134.7414096	141.0556778	4/9/03 9:15	6405:23:00	6405:21:00	6405:12:00	80.03363876
10	84	1078	0.000353	544	13.98893003	0.000321	9.096443098	0.10582	2996.583947	135.1516766	141.4659448	4/17/03 8:22	6596:30:00	6596:28:00	6596:19:00	81.21884018
10	84	1067	0.000353	544	13.84618585	0.000318	9.00362225	0.10614	3005.58757	135.5577572	141.8720254	4/23/03 14:40	6746:48:00	6746:46:00	6746:37:00	82.13890674
9	88	1079	0.000318	548	14.00190678	0.000287	8.134580132	0.10643	3013.72215	135.9246424	142.2389106	4/30/03 13:29	6913:37:00	6913:35:00	6913:26:00	83.14816093
8	85	1067	0.000283	545	13.84618585	0.000254	7.189681474	0.10668	3020.911831	136.2489108	142.563179	5/7/03 16:18	7084:26:00	7084:24:00	7084:15:00	84.16907587
5	85	1080	0.000177	545	14.01488352	0.000161	4.548298964	0.10684	3025.46013	136.4540478	142.768316	5/14/03 13:46	7249:54:00	7249:52:00	7249:43:00	85.14634461
3	85	1088	0.000106	545	14.11869747	0.000097	2.749194041	0.10694	3028.209324	136.5780417	142.8923099	5/22/03 15:52	7444:00:00	7443:58:00	7443:49:00	86.27861844
5	85	1088	0.000177	545	14.11869747	0.000162	4.581990068	0.10710	3032.791314	136.7846982	143.0989664	5/28/03 11:40	7583:48:00	7583:46:00	7583:37:00	87.08501593
5	84	1084	0.000177	544	14.0667905	0.000162	4.573536326	0.10726	3037.364851	136.9909735	143.3052417	6/4/03 11:23	7751:31:00	7751:29:00	7751:20:00	88.04269797
6	90	1077	0.000212	550	13.97595329	0.000190	5.393317781	0.10745	3042.758168	137.2342224	143.5484906	6/5/03 14:43	7778:51:00	7778:49:00	7778:40:00	88.19778909

DESORPTION TERMINATED 6/6/03 DUE TO NO GAS GENERATION



**SAMPLE: 420' to 421' (Fleming Coal) Canister L#3**

**APPROX. WEIGHT CALCULATION**

sample dried 40 days in air	weight of container (full):	5.038	0.21250
weight of container (empty):	2.800		
weight of sample:	2.238		

**CONVERSION OF VOLUMES TO STP**

RIG MEASUREMENTS			CONVERSION OF RIG MEASUREMENTS TO STP (cubic ft. @60 degrees; @14.7 psi)				CUMULATIVE VOLUMES			SCF/TON	SCF/TON (approx)	TIME OF: (off bottom to canistering)			
cc	T (F)	P	cubic ft (@rig)	ABS. T (psia @rig)	ft3 (@STP)	cc (@STP)	ft3 (@STP)	cc (@STP)	without lost gas	with lost gas	TIME	off bottom	at surface	in canister	8.2 minutes (off bottom to canistering)
0	79	1088	0.000000	539	14.119	0.000000	0	0.000000	0	1.893978101	7/16/02 14:06	2:14:00	2:12:00	2:03:00	1.494434118
7	79	1088	0.000247	539	14.119	0.000229	6.486193732	0.00023	6.486193732	2.098723249	7/16/02 14:08	2:16:00	2:14:00	2:05:00	1.505545305
7	79	1088	0.000247	539	14.119	0.000229	6.486193732	0.00046	12.97238746	0.409490296	7/16/02 14:10	2:18:00	2:16:00	2:07:00	1.516575089
4	79	1088	0.000141	539	14.119	0.000131	3.706396418	0.00059	16.67878388	0.526487524	7/16/02 14:12	2:25:00	2:23:00	2:14:00	1.554563176
7	79	1088	0.000247	539	14.119	0.000229	6.486193732	0.00082	23.16497761	0.731232672	7/16/02 14:17	2:43:00	2:41:00	2:32:00	1.648231375
36	79	1088	0.001271	539	14.119	0.001178	33.35756777	0.00200	56.52254538	1.784207719	7/16/02 14:35	2:58:00	2:56:00	2:47:00	1.722401424
25	79	1088	0.000883	539	14.119	0.000818	23.16497761	0.00281	79.687523	2.515440391	7/16/02 14:50	3:13:00	3:11:00	3:02:00	1.793506807
10	79	1087	0.000353	539	14.106	0.000327	9.25747451	0.00314	88.94499751	2.807664624	7/16/02 15:05	3:38:00	3:36:00	3:27:00	1.906130461
23	79	1087	0.000812	539	14.106	0.000752	21.29219137	0.00389	110.2371889	3.47978036	7/16/02 15:30	4:08:00	4:06:00	3:57:00	2.033060091
19	79	1087	0.000671	539	14.106	0.000621	17.58920157	0.00451	127.8263904	4.035006403	7/16/02 16:00	4:38:00	4:36:00	4:27:00	2.152517905
16	79	1087	0.000565	539	14.106	0.000523	14.81195922	0.00504	142.6383497	4.502565176	7/16/02 16:30	5:08:00	5:06:00	4:57:00	2.265686062
16	78	1086	0.000565	538	14.093	0.000524	14.82583895	0.00556	157.4641886	4.970562081	7/16/02 17:00	6:08:00	6:06:00	5:57:00	2.476556749
22	78	1086	0.000777	538	14.093	0.000720	20.38552856	0.00628	177.8497172	5.614057825	7/16/02 18:00	7:28:00	7:26:00	7:17:00	2.732520204
25	78	1086	0.000883	538	14.093	0.000818	23.16537336	0.00710	201.0150905	6.345302989	7/16/02 19:20	9:13:00	9:11:00	9:02:00	3.035896353
22	78	1086	0.000777	538	14.093	0.000720	20.38552856	0.00782	221.4006191	6.988798734	7/16/02 21:05	10:44:00	10:42:00	10:33:00	3.276176633
27	78	1086	0.000953	538	14.093	0.000884	25.01860323	0.00870	246.4192223	7.778543511	7/16/02 22:36	17:54:00	17:52:00	17:43:00	4.23083916
65	78	1086	0.002295	538	14.093	0.002127	60.22997075	0.01083	306.6491931	9.679780938	7/17/02 5:46	24:14:00	24:12:00	24:03:00	4.922736366
57	78	1085	0.002013	538	14.080	0.001864	52.76841679	0.01269	359.4176099	11.3454847	7/17/02 12:06	26:48:00	26:46:00	26:37:00	5.176871642
10	78	1085	0.000353	538	14.080	0.000327	9.25761698	0.01302	368.6752269	11.63771343	7/17/02 14:40	59:16:00	59:14:00	59:05:00	7.698484699
140	78	1085	0.004944	538	14.080	0.004577	129.6066377	0.01760	498.2818646	15.72891566	7/18/02 23:08	78:24:00	78:22:00	78:13:00	8.854377448
95	80	1080	0.003355	540	14.015	0.003080	87.21784403	0.02068	585.4997086	18.48206043	7/19/02 18:16	100:01:00	99:59:00	99:50:00	10.0008333
75	79	1079	0.002649	539	14.002	0.002434	68.92006667	0.02311	654.4197753	20.65761205	7/20/02 15:53	123:16:00	123:14:00	123:05:00	11.10255226
75	82	1083	0.002649	542	14.054	0.002429	68.79267218	0.02554	723.2124475	22.82914229	7/21/02 15:08	147:10:00	147:08:00	146:59:00	12.13122692
48	77	1088	0.001695	537	14.119	0.001577	44.64240602	0.02712	767.8548535	24.23833795	7/22/02 15:02	171:27:00	171:25:00	171:16:00	13.09389171
75	90	1086	0.002649	550	14.093	0.002401	67.97984111	0.02952	835.8346946	26.38421012	7/23/02 15:19	195:12:00	195:10:00	195:01:00	13.97139936
50	81	1079	0.001766	541	14.002	0.001617	45.77685266	0.03113	881.6115472	27.82921606	7/24/02 15:04	219:50:00	219:48:00	219:39:00	14.82677758
49	81	1077	0.001730	541	13.976	0.001581	44.77816211	0.03272	926.3897094	29.24269703	7/25/02 15:42	246:27:00	246:25:00	246:16:00	15.69872606
67	84	1079	0.002366	544	14.002	0.002154	61.00270509	0.03487	987.3924144	31.16832683	7/26/02 18:19	290:51:00	290:49:00	290:40:00	17.05432496
82	85	1081	0.002896	545	14.028	0.002637	74.66116978	0.03751	1062.053584	33.52510384	7/28/02 14:43	316:01:00	315:59:00	315:50:00	17.77685762
33	78	1083	0.001165	538	14.054	0.001077	30.49382242	0.03858	1092.547407	34.48768103	7/29/02 15:53	363:16:00	363:14:00	363:05:00	19.05955578
35	78	1079	0.001236	538	14.002	0.001138	32.22247975	0.03972	1124.769886	35.50482555	7/31/02 15:08	409:47:00	409:45:00	409:36:00	20.24310582
49	80	1085	0.001730	540	14.080	0.001596	45.1943146	0.04132	1169.964201	36.93144292	8/2/02 13:39	454:13:00	454:11:00	454:02:00	21.31235948
43	80	1087	0.001519	540	14.106	0.001403	39.73342347	0.04272	1209.697624	38.18568015	8/4/02 10:05	483:49:00	483:47:00	483:38:00	21.99583294
32	80	1086	0.001130	540	14.093	0.001043	29.54185688	0.04376	1239.239481	39.11820732	8/5/02 15:41	531:35:00	531:33:00	531:24:00	23.05609102
35	80	1088	0.001236	540	14.119	0.001143	32.37091131	0.04491	1271.610393	40.14003727	8/7/02 15:27	580:08:00	580:06:00	580:00:00	24.08595718
37	80	1083	0.001307	540	14.054	0.001203	34.06341353	0.04611	1305.673806	41.21529326	8/9/02 16:00	580:08:00	580:06:00	579:57:00	24.08595718
35	81	1080	0.001236	541	14.015	0.001133	32.07349454	0.04724	1337.747301	42.22773486	8/11/02 12:46	624:54:00	624:52:00	624:43:00	24.99799992
33	81	1081	0.001165	541	14.028	0.001069	30.2687241	0.04831	1368.016025	43.18320654	8/13/02 11:34	671:42:00	671:40:00	671:31:00	25.91717577
30	81	1084	0.001059	541	14.067	0.000974	27.59338737	0.04929	1395.609412	44.05422773	8/15/02 17:39	725:47:00	725:45:00	725:36:00	26.94036624
70	90	1082	0.002472	550	14.041	0.002232	63.21415796	0.05152	1458.82357	45.94820583	8/18/02 15:06	795:14:00	795:12:00	795:03:00	28.1998818
33	80	1082	0.001165	540	14.041	0.001072	30.35282981	0.05259	1489.1764	46.04966491	8/22/02 9:26	885:34:00	885:32:00	885:23:00	29.75847218
0	82	1086	0.000000	542	14.093	0.000000	0	0.05259	1489.1764	47.00779149	8/25/02 10:39	958:47:00	958:45:00	958:36:00	30.96422667
5	80	1077	0.000177	540	13.976	0.000162	4.577661697	0.05275	1493.754062	47.15229134	9/1/02 15:01	1131:09:00	1131:07:00	1130:58:00	33.6325735

DESORPTION TERMINATED 9/1/02 DUE TO LEAK IN CANISTER



**SAMPLE: 630.4' to 631.4' (Drywood Coal) Canister L#4**

**APPROX. WEIGHT CALCULATION**

sample dried 7 days @ 150 deg. F (65 deg C)

DRY WEIGHT lbs. grams

sample weight: 1.353 614.130000

weight of container (full):

weight of container (empty)

wet sample weight: 1.577

0.21250

moisture weight 14.2%

est. lost gas (cc) = 60

elapsed time

(off bottom to canistering)

0.208 hours 12.5 minutes

**CONVERSION OF VOLUMES TO STP**

**RIG MEASUREMENTS**

**CONVERSION OF RIG MEASUREMENTS TO STP (cubic ft. @60 degrees; @14.7 psi)**

**CUMULATIVE VOLUMES**

**SCF/TON**

**SCF/TON (approx)**

**TIME OF:**

off bottom at surface in canister

**TIME SINCE**

0.456435465 SQRT (hrs)

cc	T (F)	P	cubic ft (@rig)	ABS. T (psia (@rig))	f3 (@STP)	cc (@STP)	f3 (@STP)	cc (@STP)	without lost gas	with lost gas	TIME	off bottom	at surface	in canister	hrs. (since off bottom)
0	90	1083	0.000000	550	14.054	0.000000	0	0.00000	0	3.132133038	7/17/02 17:21	29:29:00	29:27:00	29:18:00	5.429855738
10	90	1083	0.000353	550	14.054	0.000319	9.038940199	0.00032	9.038940199	0.47185272	7/17/02 17:22	29:30:00	29:28:00	29:19:00	5.431390246
5	90	1083	0.000177	550	14.054	0.000160	4.5194701	0.00048	13.5584103	0.707779081	7/17/02 17:24	29:32:00	29:30:00	29:21:00	5.434457961
4	90	1083	0.000141	550	14.054	0.000128	3.61557608	0.00061	17.17398638	0.896520169	7/17/02 17:26	29:34:00	29:32:00	29:23:00	5.437523946
7	90	1083	0.000247	550	14.054	0.000223	6.327258139	0.00083	23.50124452	1.226817073	7/17/02 17:30	29:38:00	29:36:00	29:27:00	5.443650736
10	90	1083	0.000353	550	14.054	0.000319	9.038940199	0.00115	32.54018472	1.698669793	7/17/02 17:35	29:43:00	29:41:00	29:32:00	5.451299539
15	90	1083	0.000530	550	14.054	0.000479	13.5584103	0.00163	46.09859502	2.406448874	7/17/02 17:45	29:53:00	29:51:00	29:42:00	5.46656504
19	90	1083	0.000671	550	14.054	0.000606	17.17398638	0.00223	63.27258139	3.302969043	7/17/02 18:00	30:08:00	30:06:00	29:57:00	5.489383693
15	78	1083	0.000530	538	14.054	0.000489	13.86082837	0.00272	77.13340977	4.026535017	7/17/02 18:15	30:23:00	30:21:00	30:12:00	5.512107885
30	78	1083	0.001059	538	14.054	0.000979	27.72165674	0.00370	104.8550665	5.473666966	7/17/02 18:40	30:48:00	30:46:00	30:37:00	5.54977477
9	78	1083	0.000318	538	14.054	0.000294	8.316497023	0.00400	113.1715635	5.907806551	7/17/02 19:00	31:08:00	31:06:00	30:57:00	5.579725202
27	80	1083	0.000953	540	14.054	0.000878	24.85708555	0.00487	138.0286491	7.205401532	7/17/02 20:00	32:08:00	32:06:00	31:57:00	5.668627112
15	80	1083	0.000530	540	14.054	0.000488	13.80949197	0.00536	151.8381411	7.926287633	7/17/02 22:00	34:08:00	34:06:00	33:57:00	5.842373947
83	78	1084	0.002931	538	14.067	0.002711	76.7674023	0.00807	228.6055434	11.93371625	7/18/02 5:45	41:53:00	41:51:00	41:42:00	6.47173341
41	78	1084	0.001448	538	14.067	0.001339	37.92124692	0.00941	266.5267903	13.91328942	7/18/02 13:27	49:35:00	49:33:00	49:24:00	7.041543391
55	78	1084	0.001942	538	14.067	0.001796	50.86996538	0.01121	317.3967556	16.56881441	7/18/02 23:10	59:18:00	59:16:00	59:07:00	7.700649323
50	80	1080	0.001766	540	14.015	0.001621	45.90412844	0.01283	363.3008841	18.96511169	7/19/02 18:18	78:26:00	78:24:00	78:15:00	8.856259557
78	79	1079	0.002755	539	14.002	0.002531	71.67686934	0.01536	434.9777534	22.7068032	7/20/02 15:54	100:02:00	100:00:00	99:51:00	10.00166653
74	82	1083	0.002613	542	14.054	0.002397	67.87543655	0.01776	502.85319	26.25005149	7/21/02 15:10	123:18:00	123:16:00	123:07:00	11.10405331
52	77	1088	0.001836	537	14.119	0.001708	48.36260652	0.01947	551.2157965	28.77468679	7/22/02 15:03	147:11:00	147:09:00	147:00:00	12.13191384
68	90	1086	0.002401	550	14.093	0.002177	61.63505594	0.02164	612.8508524	31.99217337	7/23/02 15:20	171:28:00	171:26:00	171:17:00	13.094528212
46	81	1079	0.001624	541	14.002	0.001487	42.11470445	0.02313	654.9655569	34.19065432	7/24/02 15:05	195:13:00	195:11:00	195:02:00	13.9719958
43	81	1077	0.001519	541	13.976	0.001388	39.29512185	0.02452	694.2606787	36.24194681	7/25/02 15:43	219:51:00	219:49:00	219:40:00	14.82733961
48	84	1074	0.001695	544	13.937	0.001536	43.5009123	0.02605	737.761591	38.51279089	7/26/02 18:22	246:30:00	246:28:00	246:19:00	15.70031847
73	85	1081	0.002578	545	14.028	0.002347	66.46665114	0.02840	804.2282422	41.98249745	7/28/02 14:44	290:52:00	290:50:00	290:41:00	17.05481359
27	78	1083	0.000953	538	14.054	0.000881	24.94949107	0.02928	829.1777332	43.28491621	7/29/02 15:53	316:01:00	315:59:00	315:50:00	17.77685762
32	78	1079	0.001130	538	14.002	0.001040	29.46055291	0.03032	858.6382862	44.82282239	7/31/02 15:10	363:18:00	363:16:00	363:07:00	19.06043022
37	80	1085	0.001307	540	14.080	0.001205	34.12631919	0.03153	892.7646053	46.60429192	8/2/02 13:40	409:48:00	409:46:00	409:37:00	20.24351748
34	80	1087	0.001201	540	14.106	0.001109	31.41712553	0.03264	924.1817309	48.24433554	8/4/02 10:07	454:15:00	454:13:00	454:04:00	21.31314149
25	80	1086	0.000883	540	14.093	0.000815	23.07957569	0.03345	947.2613066	49.44914056	8/5/02 15:42	483:50:00	483:48:00	483:39:00	21.9962118
25	80	1088	0.000883	540	14.119	0.000817	23.12207951	0.03427	970.3833861	50.65616438	8/7/02 15:28	531:36:00	531:34:00	531:25:00	23.05645246
27	80	1083	0.000953	540	14.054	0.000878	24.85708555	0.03515	995.2404716	51.95375936	8/9/02 16:03	580:11:00	580:09:00	580:00:00	24.08699511
25	81	1080	0.000883	541	14.015	0.000809	22.90963896	0.03596	1018.150111	53.14969331	8/11/02 12:47	624:55:00	624:53:00	624:44:00	24.99833328
25	81	1081	0.000883	541	14.028	0.000810	22.93085159	0.03677	1041.080962	54.34673461	8/13/02 11:35	671:43:00	671:41:00	671:32:00	25.91749731
16	81	1084	0.000565	541	14.067	0.000520	14.71647326	0.03729	1055.797435	55.11496714	8/15/02 11:44	719:52:00	719:50:00	719:41:00	26.8303109
45	90	1082	0.001589	550	14.041	0.001435	40.63767297	0.03872	1096.435108	57.23634378	8/18/02 15:07	795:15:00	795:13:00	795:04:00	28.2001773
22	80	1082	0.000777	540	14.041	0.000715	20.23521988	0.03943	1116.670328	58.29266712	8/22/02 9:26	885:34:00	885:32:00	885:23:00	29.75847218
20	82	1086	0.000706	542	14.093	0.000650	18.39552896	0.04008	1135.065857	59.25295452	8/25/02 10:40	958:48:00	958:46:00	958:37:00	30.9644958
25	80	1088	0.000883	540	14.119	0.000817	23.12207951	0.04090	1158.187937	60.45997834	8/29/02 11:16	1055:24:00	1055:22:00	1055:13:00	32.48692045
21	80	1077	0.000742	540	13.976	0.000679	19.22617913	0.04158	1177.414116	61.46362752	9/1/02 15:03	1131:11:00	1131:09:00	1131:00:00	33.63306904
6	80	1084	0.000212	540	14.067	0.000195	5.528897247	0.04178	1182.943013	61.75224822	9/5/02 10:56	1223:04:00	1223:02:00	1222:53:00	34.97237005
25	80	1084	0.000883	540	14.067	0.000814	23.03707186	0.04259	1205.980085	62.95483445	9/11/02 15:31	1371:39:00	1371:37:00	1371:28:00	37.0357935
36	80	1076	0.001271	540	13.963	0.001163	32.92856146	0.04375	1238.908646	64.67377837	9/25/02 15:29	1707:37:00	1707:35:00	1707:26:00	41.32331868



25	80	1078	0.000883	540	13.989	0.000809	22.9095604	0.04456	1261.818207	65.86970822	69.00184126	10/1/02 15:21	1851:29:00	1851:27:00	1851:18:00	43.02886628
25	80	1084	0.000883	540	14.067	0.000814	23.03707186	0.04537	1284.855279	67.07229445	70.20442749	10/9/02 15:22	2043:30:00	2043:28:00	2043:19:00	45.20508821
15	79	1091	0.000530	539	14.158	0.000492	13.93731098	0.04587	1298.79259	67.79985299	70.93198603	10/13/02 9:55	2134:03:00	2134:01:00	2133:52:00	46.19577903
11	85	1089	0.000388	545	14.132	0.000356	10.0896432	0.04622	1308.882233	68.32655473	71.45868777	10/15/02 10:43	2182:51:00	2182:49:00	2182:40:00	46.7209803
17	85	1095	0.000600	545	14.210	0.000554	15.67899726	0.04678	1324.56123	69.14503316	72.27716619	10/22/02 9:11	2349:19:00	2349:17:00	2349:08:00	48.46975002
19	85	1087	0.000671	545	14.106	0.000614	17.39555898	0.04739	1341.956789	70.05311991	73.18525294	10/29/02 14:34	2522:42:00	2522:40:00	2522:31:00	50.22648704
20	85	1091	0.000706	545	14.158	0.000649	18.37849693	0.04804	1360.335286	71.0125182	74.14465123	11/11/02 14:03	2834:11:00	2834:09:00	2834:00:00	53.2370485
20	85	1085	0.000706	545	14.080	0.000645	18.27742362	0.04869	1378.61271	71.96664024	75.09877327	11/19/02 10:48	3022:56:00	3022:54:00	3022:45:00	54.98120891
18	85	1096	0.000636	545	14.223	0.000587	16.61645222	0.04927	1395.229162	72.83405589	75.96618892	11/26/02 11:27	3191:35:00	3191:33:00	3191:24:00	56.49409999
15	85	1095	0.000530	545	14.210	0.000489	13.83440935	0.04976	1409.063571	73.55624273	76.68837577	12/3/02 8:41	3356:49:00	3356:47:00	3356:38:00	57.93804162
15	85	1082	0.000530	545	14.041	0.000483	13.67016522	0.05024	1422.733736	74.26985566	77.4019887	12/10/02 7:58	3524:06:00	3524:04:00	3523:55:00	59.36413058
16	85	1079	0.000565	545	14.002	0.000514	14.54108024	0.05076	1437.274817	75.02893229	78.16106533	12/19/02 8:16	3740:24:00	3740:22:00	3740:13:00	61.15880967
15	85	1079	0.000530	545	14.002	0.000481	13.63226273	0.05124	1450.907079	75.74056664	78.87269967	12/29/02 15:39	3987:47:00	3987:45:00	3987:36:00	63.14889812
10	85	1093	0.000353	545	14.184	0.000325	9.206094015	0.05156	1460.113173	76.22114516	79.35327819	1/6/03 10:20	4174:28:00	4174:26:00	4174:17:00	64.61011273
10	81	1098	0.000353	541	14.248	0.000329	9.316586511	0.05189	1469.42976	76.70749163	79.83962467	1/15/03 16:29	4396:37:00	4396:35:00	4396:26:00	66.30698807
10	86	1109	0.000353	546	14.391	0.000329	9.323750629	0.05222	1478.753511	77.19421209	80.32634512	1/22/03 11:47	4559:55:00	4559:53:00	4559:44:00	67.52715503
15	85	1087	0.000530	545	14.106	0.000485	13.73333604	0.05271	1492.486847	77.91112268	81.04325572	1/29/03 11:06	4727:14:00	4727:12:00	4727:03:00	68.75487861
14	86	1093	0.000494	546	14.184	0.000454	12.86492625	0.05316	1505.351773	78.58270035	81.71483339	2/5/03 11:56	4896:04:00	4896:02:00	4895:53:00	69.97189912
14	86	1067	0.000494	546	13.846	0.000444	12.55889873	0.05360	1517.910672	79.23830271	82.37043575	2/13/03 15:11	5091:19:00	5091:17:00	5091:08:00	71.35346289
9	84	1100	0.000318	544	14.274	0.000295	8.353876315	0.05390	1526.264548	79.67439358	82.80652662	2/23/03 16:09	5332:17:00	5332:15:00	5332:06:00	73.02248512
11	84	1072	0.000388	544	13.911	0.000351	9.950394899	0.05425	1536.214943	80.19382626	83.32595929	3/3/03 10:10	5518:18:00	5518:16:00	5518:07:00	74.28526099
9	85	1081	0.000318	545	14.028	0.000289	8.194518634	0.05454	1544.409461	80.6215983	83.75373134	3/10/03 11:55	5688:03:00	5688:01:00	5687:52:00	75.41916202
10	89	1068	0.000353	549	13.859	0.000315	8.929983455	0.05486	1553.339445	81.08776324	84.21989627	3/17/03 11:29	5855:37:00	5855:35:00	5855:26:00	76.52200119
5	85	1083	0.000177	545	14.054	0.000161	4.560933128	0.05502	1557.900378	81.32585406	84.4579871	3/24/03 14:07	6026:15:00	6026:13:00	6026:04:00	77.62892502
7	85	1073	0.000247	545	13.924	0.000223	6.326346948	0.05524	1564.226725	81.6561034	84.78823643	3/31/03 15:45	6195:53:00	6195:51:00	6195:42:00	78.71393354
7	84	1089	0.000247	544	14.132	0.000227	6.432484762	0.05547	1570.65921	81.99189336	85.1240264	4/9/03 9:18	6405:26:00	6405:24:00	6405:15:00	80.0395113
5	84	1078	0.000177	544	13.989	0.000161	4.548221549	0.05563	1575.207431	82.22932061	85.36145365	4/17/03 8:23	6596:31:00	6596:29:00	6596:20:00	81.21894278
9	84	1067	0.000318	544	13.846	0.000286	8.103260025	0.05591	1583.310691	82.65232875	85.78446179	4/23/03 14:41	6746:49:00	6746:47:00	6746:38:00	82.13900819
6	88	1079	0.000212	548	14.002	0.000192	5.423053421	0.05611	1588.733745	82.93542417	86.0675572	4/30/03 13:30	6913:38:00	6913:36:00	6913:27:00	83.14826116
6	85	1067	0.000212	545	13.846	0.000190	5.392261105	0.05630	1594.126006	83.21691215	86.34904519	5/7/03 16:18	7084:26:00	7084:24:00	7084:15:00	84.16907587
4	85	1080	0.000141	545	14.015	0.000128	3.638639171	0.05642	1597.764645	83.40685719	86.53899022	5/14/03 13:47	7249:55:00	7249:53:00	7249:44:00	85.14644248
3	85	1088	0.000106	545	14.119	0.000097	2.749194041	0.05652	1600.513839	83.55037121	86.68250425	5/22/03 15:42	7443:50:00	7443:48:00	7443:39:00	86.27765257
5	85	1088	0.000177	545	14.119	0.000162	4.581990068	0.05668	1605.095829	83.78956125	86.92169429	5/28/03 11:58	7584:06:00	7584:04:00	7583:55:00	87.08673837
5	84	1084	0.000177	544	14.067	0.000162	4.573536326	0.05685	1609.669365	84.02830999	87.16044303	6/4/03 11:24	7751:32:00	7751:30:00	7751:21:00	88.04279263
6	90	1077	0.000212	550	13.976	0.000190	5.393317781	0.05704	1615.062683	84.30985314	87.44198617	6/5/03 14:44	7778:52:00	7778:50:00	7778:41:00	88.19788357

DESORPTION TERMINATED 6/6/03 DUE TO NO GAS GENERATION

**SAMPLE: 695.10' to 696.5' (Rowe Coal) Canister Brady #25**

APPROX. WEIGHT CALCULATION										0.21250		elapsed time			
sample dried 7 days @ 150 deg. F (65 deg C)				weight of container (full):		0.21250		moisture weight		est. lost gas (cc) =		TIME OF:			
DRY WEIGHT	lbs.	grams	weight of container (empty)		0.21250		moisture weight		est. lost gas (cc) =		TIME OF:				
sample weight:	1.043	473.340000	wet sample weight:		1.099	5.1%		50		TIME OF:					
CONVERSION OF VOLUMES TO STP										0.397911213		SQRT (hrs)			
RIG MEASUREMENTS			CONVERSION OF RIG MEASUREMENTS TO STP (cubic ft; @60 degrees; @14.7 psi)				CUMULATIVE VOLUMES			SCF/TON	SCF/TON (approx)	TIME SINCE			
cc	T (F)	P	cubic ft (@rig)	ABS. T (psia (@rig))	ft3 (@STP)	cc (@STP)	ft3 (@STP)	cc (@STP)	without lost gas	with lost gas	TIME	off bottom	at surface	in canister	Γ hrs. (since off bottom)
0	79	1084	0.000000	539	14.067	0.000000	0	0	0	3.385886865	7/18/02 11:45	47:53:00	47:51:00	47:42:00	6.919778417
5	79	1084	0.000177	539	14.067	0.000163	4.615962451	0.00016	4.615962451	3.698469397	7/18/02 11:47	47:55:00	47:53:00	47:44:00	6.922186552
8	79	1084	0.000283	539	14.067	0.000261	7.385539922	0.00042	12.00150237	4.19860145	7/18/02 11:51	47:59:00	47:57:00	47:48:00	6.927000313
13	79	1084	0.000459	539	14.067	0.000424	12.00150237	0.00085	24.00300475	1.62542917	7/18/02 11:58	48:06:00	48:04:00	47:55:00	6.935416354
17	79	1084	0.000600	539	14.067	0.000554	15.69427233	0.00140	39.69727708	6.074096646	7/18/02 12:10	48:18:00	48:16:00	48:07:00	6.949820142
12	79	1084	0.000424	539	14.067	0.000391	11.07830988	0.00179	50.77558696	6.824294724	7/18/02 12:20	48:28:00	48:26:00	48:17:00	6.961800533



24	79	1084	0.000848	539	14.067	0.000782	22.15661977	0.00258	72.93220673	4.938804016	8.324690881	7/18/02 12:55	49:03:00	49:01:00	48:52:00	7.003570518
18	79	1084	0.000636	539	14.067	0.000587	16.61746482	0.00316	89.54967155	6.064101133	9.449987998	7/18/02 13:25	49:33:00	49:31:00	49:22:00	7.039176088
5	79	1084	0.000177	539	14.067	0.000163	4.615962451	0.00333	94.165634	6.376683666	9.762570531	7/18/02 14:00	50:08:00	50:06:00	49:57:00	7.080489625
21	78	1083	0.000742	538	14.054	0.000685	19.40515972	0.00401	113.5707937	7.690757174	11.07664404	7/18/02 15:00	51:08:00	51:06:00	50:57:00	7.150757536
22	78	1083	0.000777	538	14.054	0.000718	20.32921495	0.00473	133.9000087	9.067405611	12.45329248	7/18/02 16:00	52:08:00	52:06:00	51:57:00	7.220341636
18	78	1083	0.000636	538	14.054	0.000587	16.63299405	0.00532	150.5330027	10.19375433	13.5796412	7/18/02 17:00	53:08:00	53:06:00	52:57:00	7.289261508
18	78	1083	0.000636	538	14.054	0.000587	16.63299405	0.00590	167.1659968	11.32010305	14.70598992	7/18/02 18:00	54:08:00	54:06:00	53:57:00	7.357535819
23	78	1083	0.000812	538	14.054	0.000751	21.25327017	0.00665	188.4192669	12.75932642	16.14521328	7/18/02 19:00	55:08:00	55:06:00	54:57:00	7.425182377
13	78	1083	0.000459	538	14.054	0.000424	12.01271792	0.00708	200.4319849	13.5728005	16.95868736	7/18/02 21:00	57:08:00	57:06:00	56:57:00	7.558659493
13	78	1083	0.000459	538	14.054	0.000424	12.01271792	0.00750	212.4447028	14.38627457	17.77216144	7/18/02 23:13	59:21:00	59:19:00	59:10:00	7.703895119
45	79	1085	0.001589	539	14.080	0.001468	41.58198647	0.00897	254.0266893	17.20211261	20.58799947	7/19/02 7:12	67:20:00	67:18:00	67:09:00	8.205689083
30	79	1085	0.001059	539	14.080	0.000979	27.72132431	0.00995	281.7480136	19.07933797	22.46522483	7/19/02 12:20	72:28:00	72:26:00	72:17:00	8.512735557
27	80	1080	0.000953	540	14.015	0.000875	24.78822936	0.01083	306.5362429	20.75794077	24.14382763	7/19/02 18:19	78:27:00	78:25:00	78:16:00	8.857200461
40	79	1079	0.001413	539	14.002	0.001298	36.75736889	0.01212	343.2936118	23.24706662	26.63295349	7/20/02 15:57	100:05:00	100:03:00	99:54:00	10.0041658
61	82	1083	0.002154	542	14.054	0.001976	55.95137337	0.01410	399.2449852	27.03596702	30.42185389	7/21/02 15:12	123:20:00	123:18:00	123:09:00	11.10555417
42	77	1088	0.001483	537	14.119	0.001379	39.06210527	0.01548	438.3070905	29.68116441	33.06705127	7/22/02 15:04	147:12:00	147:10:00	147:01:00	12.13260071
54	90	1086	0.001907	550	14.093	0.001729	48.9454856	0.01721	487.2525761	32.99564194	36.38152881	7/23/02 15:21	171:29:00	171:27:00	171:18:00	13.0951645
38	81	1079	0.001342	541	14.002	0.001229	34.79040802	0.01844	522.0429841	35.35156965	38.73745652	7/24/02 15:07	195:15:00	195:13:00	195:04:00	13.97318861
34	81	1077	0.001201	541	13.976	0.001097	31.07056146	0.01953	553.1135455	37.45559777	40.84148464	7/25/02 15:44	219:52:00	219:50:00	219:41:00	14.82790163
37	84	1079	0.001307	544	14.002	0.001190	33.68806102	0.02072	586.8016066	39.73687704	43.1227639	7/26/02 16:24	244:32:00	244:30:00	244:21:00	15.63756162
49	85	1081	0.001730	545	14.028	0.001576	44.61460145	0.02230	631.416208	42.7580769	46.14396376	7/28/02 14:46	290:54:00	290:52:00	290:43:00	17.05579081
21	78	1083	0.000742	538	14.054	0.000685	19.40515972	0.02298	650.8213677	44.07215041	47.45803727	7/29/02 15:54	316:02:00	316:00:00	315:51:00	17.77732638
22	78	1079	0.000777	538	14.002	0.000715	20.25413013	0.02370	671.0754979	45.44371427	48.82960114	7/31/02 3:11	351:19:00	351:17:00	351:08:00	18.7434433
27	80	1085	0.000953	540	14.080	0.000879	24.90298968	0.02458	695.9784875	47.13008838	50.51597525	8/2/02 13:43	409:51:00	409:49:00	409:40:00	20.24475241
23	80	1087	0.000812	540	14.106	0.000751	21.25276139	0.02533	717.2312489	48.5692773	51.95516416	8/4/02 10:10	454:18:00	454:16:00	454:07:00	21.31431444
18	80	1086	0.000636	540	14.093	0.000587	16.61729449	0.02592	733.8485434	49.69456288	53.08044974	8/5/02 15:43	483:51:00	483:49:00	483:40:00	21.99659064
17	80	1088	0.000600	540	14.119	0.000555	15.72301407	0.02647	749.5715575	50.75928981	54.14517668	8/7/02 15:29	531:37:00	531:35:00	531:26:00	23.05681389
19	80	1083	0.000671	540	14.054	0.000618	17.49202316	0.02709	767.0635807	51.94381004	55.32969691	8/9/02 16:05	580:13:00	580:11:00	580:02:00	24.08768703
15	81	1080	0.000530	541	14.015	0.000485	13.74578338	0.02757	780.809364	52.87464339	56.26053026	8/11/02 12:48	624:56:00	624:54:00	624:45:00	24.99866663
15	81	1081	0.000530	541	14.028	0.000486	13.75851095	0.02806	794.567875	53.80633862	57.1922549	8/13/02 11:38	671:46:00	671:44:00	671:35:00	25.91846189
12	81	1084	0.000424	541	14.067	0.000390	11.03735495	0.02845	805.6052299	54.55376332	57.93965019	8/15/02 11:46	719:54:00	719:52:00	719:43:00	26.83095228
30	90	1082	0.001059	550	14.041	0.000957	27.09178198	0.02941	832.6970119	56.3883575	59.77424436	8/18/02 15:08	795:16:00	795:14:00	795:05:00	28.20047281
13	80	1082	0.000459	540	14.041	0.000422	11.95717538	0.02983	844.6541873	57.19807036	60.58395723	8/22/02 9:27	885:35:00	885:33:00	885:24:00	29.75875221
13	82	1086	0.000459	542	14.093	0.000422	11.95709382	0.03025	856.6112811	58.0077777	61.39366456	8/25/02 10:40	958:48:00	958:46:00	958:37:00	30.9644958
15	80	1088	0.000530	540	14.119	0.000490	13.8732477	0.03074	870.4845288	58.94724264	62.33312951	8/29/02 11:17	1055:25:00	1055:23:00	1055:14:00	32.48717696
15	81	1085	0.000530	541	14.080	0.000488	13.80942126	0.03123	884.2939501	59.8823854	63.26827227	9/2/02 8:15	1148:23:00	1148:21:00	1148:12:00	33.88780508
10	80	1084	0.000353	540	14.067	0.000325	9.214828745	0.03155	893.5087788	60.50639276	63.89227962	9/5/02 10:57	1223:05:00	1223:03:00	1222:54:00	34.97260833
14	80	1084	0.000494	540	14.067	0.000456	12.90076024	0.03201	906.4095391	61.38000305	64.76588991	9/11/02 15:31	1371:39:00	1371:37:00	1371:28:00	37.0357935
20	80	1076	0.000706	540	13.963	0.000646	18.29364526	0.03266	924.7031843	62.61880731	66.00469418	9/25/02 15:30	1707:38:00	1707:36:00	1707:27:00	41.32352034
15	80	1078	0.000530	540	13.989	0.000485	13.74573624	0.03314	938.4489206	63.54963747	66.93552433	10/1/02 15:22	1851:30:00	1851:28:00	1851:19:00	43.02905995
15	80	1084	0.000530	540	14.067	0.000488	13.82224312	0.03363	952.2711637	64.4856485	67.87153536	10/9/02 15:22	2043:30:00	2043:28:00	2043:19:00	45.20508821
7	79	1091	0.000247	539	14.158	0.000230	6.504078458	0.03386	958.7752421	64.92608997	68.31197684	10/13/02 9:56	2134:04:00	2134:02:00	2133:53:00	46.19595942
15	85	1098	0.000530	545	14.248	0.000490	13.87231184	0.03435	972.647554	65.86549154	69.25137841	10/15/02 10:44	2182:52:00	2182:50:00	2182:41:00	46.72115866
15	85	1075	0.000530	545	13.950	0.000480	13.58172607	0.03483	986.2292801	66.7852153	70.17110217	10/22/02 9:12	2349:20:00	2349:18:00	2349:09:00	48.46992194
11	85	1087	0.000388	545	14.106	0.000356	10.0711131	0.03518	996.3003932	67.46720829	70.85309516	10/29/02 14:35	2522:43:00	2522:41:00	2522:32:00	50.22665295
10	85	1091	0.000353	545	14.158	0.000325	9.189248463	0.03551	1005.489642	68.0894834	71.47537027	11/11/02 14:04	2834:12:00	2834:10:00	2834:01:00	53.23720504
10	85	1085	0.000353	545	14.080	0.000323	9.138711808	0.03583	1014.628353	68.70833629	72.09422316	11/19/02 10:49	3022:57:00	3022:55:00	3022:46:00	54.98136048
9	85	1096	0.000318	545	14.223	0.000293	8.308226108	0.03612	1022.93658	69.27095056	72.65683743	11/26/02 11:28	3191:36:00	3191:34:00	3191:25:00	56.49424749
6	85	1085	0.000212	545	14.080	0.000194	5.483227085	0.03632	1028.419807	69.64226229	73.02814916	12/3/02 8:42	3356:50:00	3356:48:00	3356:39:00	57.93818545
6	85	1082	0.000212	545	14.041	0.000193	5.468066088	0.03651	1033.887873	70.01254736	73.39843422	12/10/02 7:59	3524:07:00	3524:05:00	3523:56:00	59.36427096
7	85	1079	0.000247	545	14.002	0.000225	6.361722607	0.03674	1040.249595	70.44334882	73.82923568	12/19/02 8:17	3740:25:00	3740:23:00	3740:14:00	61.15894593
6	85	1077	0.000212	545	13.976	0.000192	5.442797761	0.03693	1045.692393	70.81192277	74.19780963	12/29/02 15:40	3987:48:00	3987:46:00	3987:37:00	63.14903008



1	80	1093	0.000035	540	14.184	0.000033	0.929133563	0.03696	1046.621527	70.87484159	74.26072845	1/6/03 10:21	4174:29:00	4174:27:00	4174:18:00	64.61024171
1	81	1098	0.000035	541	14.248	0.000033	0.931658651	0.03699	1047.553185	70.9379314	74.32381827	1/15/03 16:30	4396:38:00	4396:36:00	4396:27:00	66.30711375
4	86	1109	0.000141	546	14.391	0.000132	3.729500252	0.03713	1051.282686	71.19048472	74.57637159	1/22/03 11:48	4559:56:00	4559:54:00	4559:45:00	67.52727844
7	85	1087	0.000247	545	14.106	0.000226	6.408890152	0.03735	1057.691576	71.62448026	75.01036713	1/29/03 11:07	4727:15:00	4727:13:00	4727:04:00	68.75499982
5	86	1093	0.000177	546	14.184	0.000162	4.594616518	0.03751	1062.286192	71.9356173	75.32150416	2/5/03 15:07	4899:15:00	4899:13:00	4899:04:00	69.99464265
5	86	1067	0.000177	546	13.846	0.000158	4.485320974	0.03767	1066.771513	72.23935308	75.62523995	2/13/03 15:12	5091:20:00	5091:18:00	5091:09:00	71.35357968
0	84	1100	0.000000	544	14.274	0.000000	0	0.03767	1066.771513	72.23935308	75.62523995	2/23/03 16:10	5332:18:00	5332:16:00	5332:07:00	73.02259924
5	84	1072	0.000177	544	13.911	0.000160	4.522906772	0.03783	1071.29442	72.5456341	75.93152096	3/3/03 10:11	5518:19:00	5518:17:00	5518:08:00	74.28537317
1	85	1081	0.000035	545	14.028	0.000032	0.91050207	0.03786	1072.204922	72.60729124	75.9931781	3/10/03 11:56	5688:04:00	5688:02:00	5687:53:00	75.41927251
1	89	1068	0.000035	549	13.859	0.000032	0.892998346	0.03790	1073.09792	72.66776306	76.05364993	3/17/03 11:31	5855:39:00	5855:37:00	5855:28:00	76.522219
1	85	1083	0.000035	545	14.054	0.000032	0.912186626	0.03793	1074.010107	72.72953428	76.11542114	3/24/03 14:08	6026:16:00	6026:14:00	6026:05:00	77.62903237
1	85	1073	0.000035	545	13.924	0.000032	0.90376385	0.03796	1074.913871	72.79073512	76.17662199	3/31/03 15:46	6195:54:00	6195:52:00	6195:43:00	78.71403941
0	84	1089	0.000000	544	14.132	0.000000	0	0.03796	1074.913871	72.79073512	76.17662199	4/9/03 9:18	6405:26:00	6405:24:00	6405:15:00	80.03395113
0	85	1081	0.000000	545	14.028	0.000000	0	0.03796	1074.913871	72.79073512	76.17662199	4/10/03 16:02	6436:10:00	6436:08:00	6435:59:00	80.22572322

DESORPTION TERMINATED 4/10/03 DUE TO NO GAS GENERATION

**SAMPLE: 766.7-767.7 ( Neutral Coal) Canister Brady # 31**

APPROX. WEIGHT CALCULATION

sample dried 7 days @ 150 deg. F (65 deg C)	weight of container (full):	0.21250	elapsed time
weight of container (empty)	moisture weight		(off bottom to canistering)
2.289	4.0%		9.3 minutes
sample weight: 2.208 1001.540000	wet sample weight: 2.300	90	0.156 hours

CONVERSION OF VOLUMES TO STP

RIG MEASUREMENTS			CONVERSION OF RIG MEASUREMENTS TO STP (cubic ft. @60 degrees; @14.7 psi)						CUMULATIVE VOLUMES			SCF/TON	SCF/TON (approx)	TIME OF:				SQRT (hrs)
cc	T (F)	P	ft3 (@rig)	ABS. T (psia (@rig))	ft3 (@STP)	cc (@STP)	ft3 (@STP)	cc (@STP)	without lost gas	with lost gas	TIME	off bottom	at surface	in canister	hrs. (since off bottom)			
0	79	1082	0.000000	539	14.041	0.000000	0	0.000000	0	2.878923913	7/18/02 18:37	54:45:00	54:43:00	54:34:00	7.399324293			
9	79	1082	0.000318	539	14.041	0.000293	8.293402648	0.00029	8.293402648	0.265289724	7/18/02 18:39	54:47:00	54:45:00	54:36:00	7.401576409			
8	79	1082	0.000283	539	14.041	0.000260	7.371913465	0.00055	15.66531611	0.501102813	7/18/02 18:41	54:49:00	54:47:00	54:38:00	7.403827839			
9	79	1082	0.000318	539	14.041	0.000293	8.293402648	0.00085	23.95871876	0.766392537	7/18/02 18:43	54:51:00	54:49:00	54:40:00	7.406078585			
7	79	1082	0.000247	539	14.041	0.000228	6.450424281	0.00107	30.40914304	0.97272899	7/18/02 18:45	54:53:00	54:51:00	54:42:00	7.408328646			
7	79	1082	0.000247	539	14.041	0.000228	6.450424281	0.00130	36.85956732	1.179065442	7/18/02 18:47	54:55:00	54:53:00	54:44:00	7.410578025			
13	79	1082	0.000459	539	14.041	0.000423	11.97935938	0.00172	48.8389267	1.562261711	7/18/02 18:52	55:00:00	54:58:00	54:49:00	7.416198487			
14	79	1082	0.000494	539	14.041	0.000456	12.90084856	0.00218	61.73977527	1.974934616	7/18/02 18:57	55:05:00	55:03:00	54:54:00	7.421814693			
13	79	1082	0.000459	539	14.041	0.000423	11.97935938	0.00260	73.71913465	2.358130884	7/18/02 19:02	55:10:00	55:08:00	54:59:00	7.427426652			
10	79	1082	0.000353	539	14.041	0.000325	9.214891831	0.00293	82.93402648	2.652897245	7/18/02 19:07	55:15:00	55:13:00	55:04:00	7.433034374			
22	79	1082	0.000777	539	14.041	0.000716	20.27276203	0.00364	103.2067885	3.301383238	7/18/02 19:17	55:25:00	55:23:00	55:14:00	7.444237145			
14	79	1082	0.000494	539	14.041	0.000456	12.90084856	0.00410	116.1076371	3.714056143	7/18/02 19:27	55:35:00	55:33:00	55:24:00	7.455423082			
15	79	1082	0.000530	539	14.041	0.000488	13.82233775	0.00459	129.9299748	4.156205683	7/18/02 19:40	55:48:00	55:46:00	55:37:00	7.469939759			
16	79	1082	0.000565	539	14.041	0.000521	14.74382693	0.00511	144.6738017	4.62783186	7/18/02 19:55	56:03:00	56:01:00	55:52:00	7.486654794			
21	79	1082	0.000742	539	14.041	0.000683	19.35127284	0.00579	164.0250746	5.246841217	7/18/02 20:30	56:38:00	56:36:00	56:27:00	7.525512164			
20	79	1082	0.000706	539	14.041	0.000651	18.42978366	0.00644	182.4548582	5.836373938	7/18/02 21:00	57:08:00	57:06:00	56:57:00	7.558659493			
31	79	1082	0.001095	539	14.041	0.001009	28.56616467	0.00745	211.0210229	6.750149656	7/18/02 23:13	59:21:00	59:19:00	59:10:00	7.703895119			
190	79	1085	0.006710	539	14.080	0.006200	175.5683873	0.01365	386.5894102	12.36623886	7/19/02 7:13	67:21:00	67:19:00	67:10:00	8.206704576			
104	79	1085	0.003673	539	14.080	0.003394	96.10059096	0.01705	482.6900012	15.44030875	7/19/02 12:22	72:30:00	72:28:00	72:19:00	8.514693183			
67	80	1080	0.002366	540	14.015	0.002172	61.5115321	0.01922	544.2015333	17.40794231	7/19/02 18:20	78:28:00	78:26:00	78:17:00	8.858141265			
146	79	1079	0.005156	539	14.002	0.004738	134.1643965	0.02396	678.3659298	21.69959886	7/20/02 15:58	100:06:00	100:04:00	99:55:00	10.00499875			
154	82	1083	0.005438	542	14.054	0.004988	141.2542869	0.02894	819.6202166	26.21804713	7/21/02 15:14	123:22:00	123:20:00	123:11:00	11.10705482			
73	77	1088	0.002578	537	14.119	0.002398	67.89365916	0.03134	887.5138758	28.38983245	7/22/02 15:05	147:13:00	147:11:00	147:02:00	12.13328755			
148	90	1086	0.005227	550	14.093	0.004737	134.1468865	0.03608	1021.660762	32.68092888	7/23/02 15:23	171:31:00	171:29:00	171:20:00	13.09643717			
85	81	1079	0.003002	541	14.002	0.002748	77.82064953	0.03883	1099.481412	35.1702592	7/24/02 15:09	195:17:00	195:15:00	195:06:00	13.97438132			
81	81	1077	0.002860	541	13.976	0.002614	74.02104348	0.04144	1173.502455	37.53804756	7/25/02 15:45	219:53:00	219:51:00	219:42:00	14.82846362			
107	84	1075	0.003779	544	13.950	0.003428	97.06107304	0.04487	1270.563528	40.64284139	7/26/02 18:35	246:43:00	246:41:00	246:32:00	15.70721702			



175	85	1081	0.006180	545	14.028	0.005627	159.3378623	0.05050	1429.901391	45.73974785	48.61867177	7/28/02 14:45	290:53:00	290:51:00	290:42:00	17.05530221
85	78	1083	0.003002	538	14.054	0.002774	78.54469411	0.05327	1508.446085	48.25223894	51.13116286	7/29/02 15:55	316:03:00	316:01:00	315:52:00	17.77779514
43	78	1079	0.001519	538	14.002	0.001398	39.58761797	0.05467	1548.033703	49.51856939	52.3974933	7/31/02 15:14	363:22:00	363:20:00	363:11:00	19.06217896
50	80	1085	0.001766	540	14.080	0.001629	46.11664755	0.05630	1594.15035	50.99375072	53.87267463	8/2/02 13:46	409:54:00	409:52:00	409:43:00	20.24598726
49	80	1087	0.001730	540	14.106	0.001599	45.27762209	0.05790	1639.427972	52.44209326	55.32101717	8/4/02 10:08	454:16:00	454:14:00	454:05:00	21.31353248
28	80	1086	0.000989	540	14.093	0.000913	25.84912477	0.05881	1665.277097	53.26895619	56.1478801	8/5/02 15:44	483:52:00	483:50:00	483:41:00	21.99696949
22	80	1088	0.000777	540	14.119	0.000719	20.34742997	0.05953	1685.624527	53.91983066	56.79875457	8/7/02 15:31	531:39:00	531:37:00	531:28:00	23.05753673
34	80	1083	0.001201	540	14.054	0.001105	31.30151513	0.06063	1716.926042	54.92110489	57.8000288	8/9/02 16:07	580:15:00	580:13:00	580:04:00	24.08837894
30	81	1080	0.001059	541	14.015	0.000971	27.49156675	0.06160	1744.417609	55.80050632	58.67943023	8/11/02 12:49	624:57:00	624:55:00	624:46:00	24.99899998
25	81	1081	0.000883	541	14.028	0.000810	22.93085159	0.06241	1767.348461	56.5340194	59.41294331	8/13/02 11:39	671:47:00	671:45:00	671:36:00	25.91878341
11	81	1084	0.000388	541	14.067	0.000357	10.11757537	0.06277	1777.466036	56.85766084	59.73658475	8/15/02 11:45	719:53:00	719:51:00	719:42:00	26.83064169
114	90	1082	0.004026	550	14.041	0.003636	102.9487715	0.06641	1880.414807	60.15079062	63.02971453	8/18/02 8:34	788:42:00	788:40:00	788:31:00	28.08380316
-10	80	1082	-0.000353	540	14.041	-0.000325	-9.197827216	0.06608	1871.21698	59.85657012	62.73549403	8/22/02 9:28	885:36:00	885:34:00	885:25:00	29.75903224
15	82	1086	0.000530	542	14.093	0.000487	13.79664672	0.06657	1885.013627	60.29789786	63.17682177	8/25/02 10:41	958:49:00	958:47:00	958:38:00	30.96476492
23	80	1088	0.000812	540	14.119	0.000751	21.27231315	0.06732	1906.28594	60.97835753	63.85728145	8/29/02 11:18	1055:26:00	1055:24:00	1055:15:00	32.48743347
33	81	1085	0.001165	541	14.080	0.001073	30.38072678	0.06839	1936.666667	61.95017754	64.82910146	9/2/02 11:17	1151:25:00	1151:23:00	1151:14:00	33.9325311
5	80	1084	0.000177	540	14.067	0.000163	4.607414373	0.06856	1941.274081	62.09755971	64.97648363	9/5/02 10:58	1223:06:00	1223:04:00	1222:55:00	34.97284661
20	80	1084	0.000706	540	14.067	0.000651	18.42965749	0.06921	1959.703739	62.6870884	65.56601231	9/11/02 15:32	1371:40:00	1371:38:00	1371:29:00	37.0360185
45	80	1076	0.001589	540	13.963	0.001454	41.16070183	0.07066	2000.864441	64.00373872	66.88266263	9/25/02 15:31	1707:39:00	1707:37:00	1707:28:00	41.323722
27	80	1078	0.000953	540	13.989	0.000874	24.74232523	0.07153	2025.606766	64.79519729	67.67412121	10/1/02 15:23	1851:31:00	1851:29:00	1851:20:00	43.02925362
3	80	1084	0.000106	540	14.067	0.000098	2.764448624	0.07163	2028.371214	64.8836266	67.76255051	10/9/02 15:24	2043:32:00	2043:30:00	2043:21:00	45.2054569
0.5	79	1091	0.000018	539	14.158	0.000016	0.464577033	0.07165	2028.835791	64.89848751	67.77741142	10/13/02 9:57	2134:05:00	2134:03:00	2133:54:00	46.19613981
14	81	1089	0.000494	541	14.132	0.000457	12.93630947	0.07210	2041.772101	65.31229474	68.19121865	10/15/02 10:45	2182:53:00	2182:51:00	2182:42:00	46.72133702
10	85	1095	0.000353	545	14.210	0.000326	9.222939566	0.07243	2050.995041	65.60731853	68.48624244	10/22/02 9:13	2349:21:00	2349:19:00	2349:10:00	48.47009387
16	85	1087	0.000565	545	14.106	0.000517	14.64889178	0.07295	2065.643932	66.07590792	68.95483183	10/29/02 14:36	2522:44:00	2522:42:00	2522:33:00	50.22681887
6	85	1091	0.000212	545	14.158	0.000195	5.513549078	0.07314	2071.157481	66.25227556	69.13119948	11/11/02 14:05	2834:13:00	2834:11:00	2834:02:00	53.23736157
6	85	1085	0.000212	545	14.080	0.000194	5.483227085	0.07334	2076.640708	66.42767327	69.30659718	11/19/02 10:50	3022:58:00	3022:56:00	3022:47:00	54.98151204
0	85	1096	0.000000	545	14.223	0.000000	0	0.07334	2076.640708	66.42767327	69.30659718	11/26/02 11:29	3191:37:00	3191:35:00	3191:26:00	56.494395

DESORPTION TERMINATED 11/30/03 DUE TO NO GAS GENERATION

**SAMPLE: 840.2' to 841.2' (Riverton Coal) Canister Brady #23**

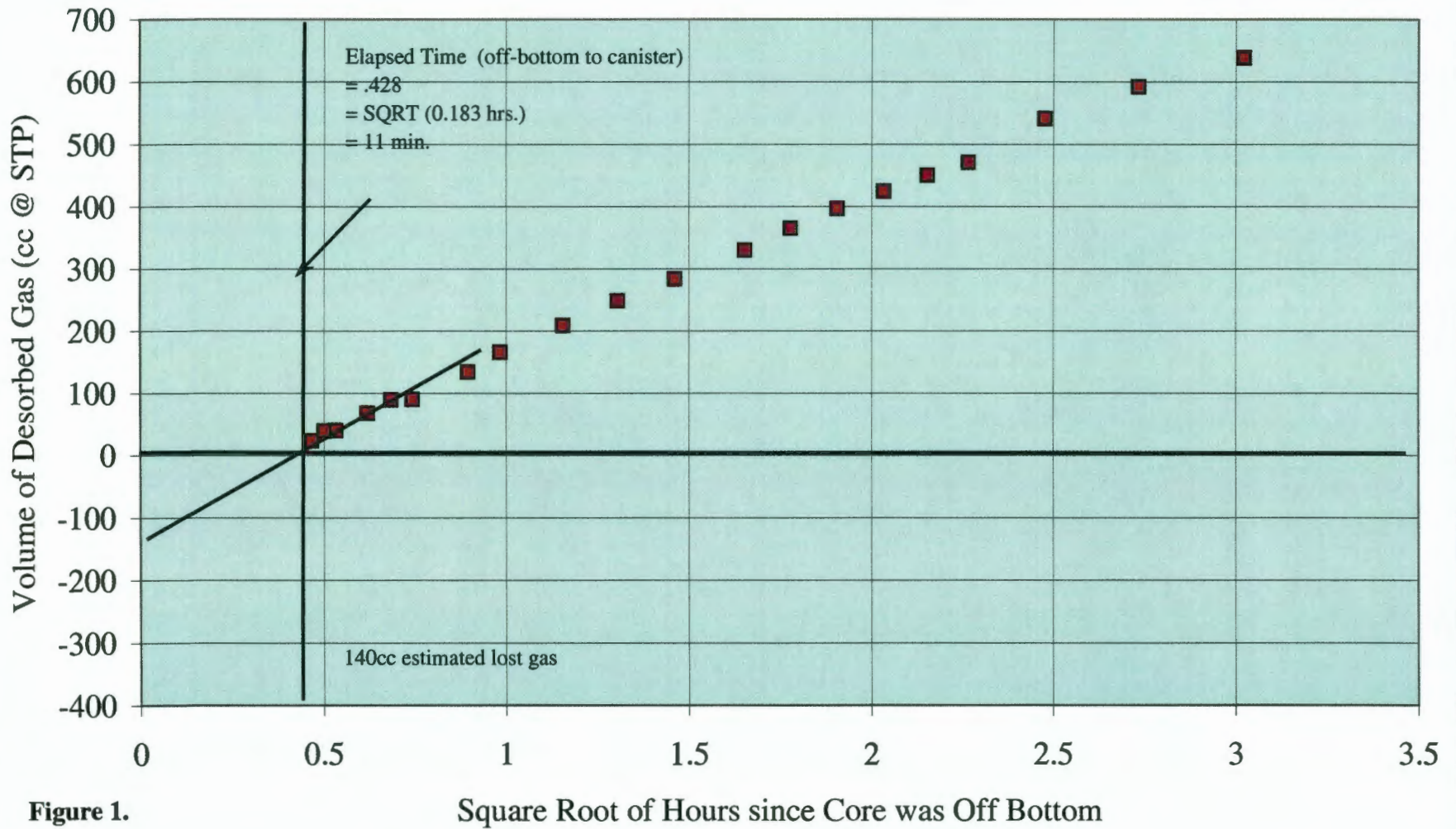
APPROX. WEIGHT CALCULATION										0.21250		elapsed time					
sample dried 7 days @ 150 deg. F (65 deg C)			weight of container (full):			weight of container (empty)			moisture weight			est. lost gas (cc) =		TIME OF: (off bottom to canistering)			
DRY WEIGHT	lbs.	grams	wet sample weight:			2.356			1.7%			80		7/19/02 11:14 7/19/02 11:17 7/19/02 11:23 0.150 hours			
CONVERSION OF VOLUMES TO STP										0.387298335		SQRT (hrs)					
RIG MEASUREMENTS			CONVERSION OF RIG MEASUREMENTS TO STP (cubic ft; @60 degrees; @14.7 psi)			CUMULATIVE VOLUMES			SCF/TON		SCF/TON (approx)		TIME SINCE				
cc	T (F)	P	cubic ft (@rig)	ABS. T (psia (@rig))	ft3 (@STP)	cc (@STP)	ft3 (@STP)	cc (@STP)	without lost gas	with lost gas	TIME	off bottom	at surface	in canister	SQRT hrs. (since off bottom)		
0	79	1085	0.000000	539	14.080	0.000000	0	0.00000	0	2.438656884	7/19/02 11:23	71:31:00	71:29:00	71:20:00	8.456752726		
6	79	1085	0.000212	539	14.080	0.000196	5.544264863	0.00020	5.544264863	2.607663888	7/19/02 11:25	71:33:00	71:31:00	71:22:00	8.458723308		
4	79	1085	0.000141	539	14.080	0.000131	3.696176575	0.00033	9.240441438	0.281678327	7/19/02 11:27	71:35:00	71:33:00	71:24:00	8.460693431		
8	79	1085	0.000283	539	14.080	0.000261	7.392353151	0.00059	16.63279459	0.507020988	7/19/02 11:29	71:37:00	71:35:00	71:26:00	8.462663095		
8	79	1085	0.000283	539	14.080	0.000261	7.392353151	0.00085	24.02514774	0.732363649	7/19/02 11:31	71:39:00	71:37:00	71:28:00	8.464632302		
9	79	1085	0.000318	539	14.080	0.000294	8.316397294	0.00114	32.34154503	0.985874143	7/19/02 11:33	71:41:00	71:39:00	71:30:00	8.46660105		
19	79	1085	0.000671	539	14.080	0.000620	17.55683873	0.00176	49.89838377	1.521062963	7/19/02 11:38	71:46:00	71:44:00	71:35:00	8.471520918		
23	79	1085	0.000812	539	14.080	0.000751	21.25301531	0.00251	71.15139907	2.168923114	7/19/02 11:44	71:52:00	71:50:00	71:41:00	8.477420991		
16	79	1085	0.000565	539	14.080	0.000522	14.7847063	0.00303	85.93610538	2.619608437	7/19/02 11:49	71:57:00	71:55:00	71:46:00	8.482334584		
14	79	1085	0.000494	539	14.080	0.000457	12.93661801	0.00349	98.87272339	3.013958094	7/19/02 11:54	72:02:00	72:00:00	71:51:00	8.487245332		
23	79	1085	0.000812	539	14.080	0.000751	21.25301531	0.00424	120.1257387	3.661818245	7/19/02 12:04	72:12:00	72:10:00	72:01:00	8.497058315		
28	79	1085	0.000989	539	14.080	0.000914	25.87323603	0.00516	145.9989747	4.450517559	7/19/02 12:20	72:28:00	72:26:00	72:17:00	8.512735557		
45	79	1085	0.001589	539	14.080	0.001468	41.58198647	0.00662	187.5809612	5.718070029	7/19/02 12:35	72:43:00	72:41:00	72:32:00	8.527406796		
45	79	1085	0.001589	539	14.080	0.001468	41.58198647	0.00809	229.1629477	6.985622498	7/19/02 13:20	73:28:00	73:26:00	73:17:00	8.57126984		



40	79	1085	0.001413	539	14.080	0.001305	36.96176575	0.00940	266.1247134	8.112335805	10.55099269	7/19/02 14:00	74:08:00	74:06:00	73:57:00	8.610071622
30	79	1085	0.001059	539	14.080	0.000979	27.72132431	0.01038	293.8460377	8.957370784	11.39602767	7/19/02 14:40	74:48:00	74:46:00	74:37:00	8.648699324
95	80	1080	0.003355	540	14.015	0.003080	87.21784403	0.01346	381.0638818	11.61605073	14.05470761	7/19/02 18:22	78:30:00	78:28:00	78:19:00	8.860022573
288	79	1079	0.010171	539	14.002	0.009346	264.653056	0.02280	645.7169378	19.68352569	22.12218258	7/20/02 16:00	100:08:00	100:06:00	99:57:00	10.00666445
193	82	1083	0.006816	542	14.054	0.006252	177.0264764	0.02906	822.7434142	25.07986113	27.51851802	7/21/02 15:15	123:23:00	123:21:00	123:12:00	11.10780506
93	77	1088	0.003284	537	14.119	0.003055	86.49466167	0.03211	909.2380759	27.71649616	30.15515304	7/22/02 15:06	147:14:00	147:12:00	147:03:00	12.13397434
165	90	1086	0.005827	550	14.093	0.005282	149.5556504	0.03739	1058.793726	32.27543262	34.7140895	7/23/02 15:24	171:32:00	171:30:00	171:21:00	13.09707346
75	81	1079	0.002649	541	14.002	0.002425	68.665279	0.03982	1127.459005	34.36857081	36.80722769	7/24/02 15:11	195:19:00	195:17:00	195:08:00	13.97557393
71	81	1077	0.002507	541	13.976	0.002291	64.88264305	0.04211	1192.341648	36.34640211	38.78505899	7/25/02 15:47	219:55:00	219:53:00	219:44:00	14.82958754
89	89	1074	0.003143	549	13.937	0.002822	79.92335192	0.04493	1272.265	38.78272251	41.2213794	7/26/02 18:27	246:35:00	246:33:00	246:24:00	15.70297212
162	85	1081	0.005721	545	14.028	0.005209	147.5013354	0.05014	1419.766336	43.27903685	45.71769373	7/28/02 14:47	290:55:00	290:53:00	290:44:00	17.05627939
24	85	1083	0.000848	545	14.054	0.000773	21.89247901	0.05091	1441.658815	43.94638991	46.38504679	7/29/02 15:55	316:03:00	316:01:00	315:52:00	17.77779514
30	78	1079	0.001059	538	14.002	0.000975	27.61926835	0.05189	1469.278083	44.7883139	47.22697078	7/31/02 15:13	363:21:00	363:19:00	363:10:00	19.06174179
46	80	1085	0.001624	540	14.080	0.001498	42.42731574	0.05339	1511.705399	46.08163472	48.5202916	8/2/02 15:46	411:54:00	411:52:00	411:43:00	20.29531966
40	80	1087	0.001413	540	14.106	0.001305	36.96132416	0.05469	1548.666723	47.20833456	49.64699144	8/4/02 10:08	454:16:00	454:14:00	454:05:00	21.31353248
28	80	1086	0.000989	540	14.093	0.000913	25.84912477	0.05560	1574.515848	47.99629889	50.43495577	8/5/02 15:45	483:53:00	483:51:00	483:42:00	21.99734833
23	80	1088	0.000812	540	14.119	0.000751	21.27231315	0.05635	1595.788161	48.6447473	51.08340418	8/7/02 15:30	531:38:00	531:36:00	531:27:00	23.05717531
31	80	1083	0.001095	540	14.054	0.001008	28.53961674	0.05736	1624.327778	49.51472646	51.95338334	8/9/02 16:09	580:17:00	580:15:00	580:06:00	24.08907083
31	81	1080	0.001095	541	14.015	0.001003	28.40795231	0.05837	1652.73573	50.38069206	52.81934895	8/11/02 12:50	624:58:00	624:56:00	624:47:00	24.99933332
27	81	1081	0.000953	541	14.028	0.000875	24.76531972	0.05924	1677.50105	51.13561853	53.57427541	8/13/02 11:37	671:45:00	671:43:00	671:34:00	25.91814037
10	81	1084	0.000353	541	14.067	0.000325	9.19779579	0.05957	1686.698845	51.41599688	53.85465376	8/15/02 11:47	719:55:00	719:53:00	719:44:00	26.83126286
108	90	1082	0.003814	550	14.041	0.003444	97.53041514	0.06301	1784.229261	54.38903711	56.82769399	8/18/02 15:10	795:18:00	795:16:00	795:07:00	28.20106381
-15	80	1082	-0.000530	540	14.041	-0.000487	-13.79674082	0.06252	1770.43252	53.96846815	56.40712503	8/22/02 9:29	885:37:00	885:35:00	885:26:00	29.75931227
10	82	1086	0.000353	542	14.093	0.000325	9.19776448	0.06285	1779.630284	54.24884554	56.68750243	8/25/02 10:41	958:49:00	958:47:00	958:38:00	30.96476492
20	80	1088	0.000706	540	14.119	0.000653	18.49766361	0.06350	1798.127948	54.81271373	57.25137061	8/29/02 11:16	1055:24:00	1055:22:00	1055:13:00	32.48692045
40	81	1085	0.001413	541	14.080	0.001300	36.82512337	0.06480	1834.953071	55.93526173	58.37391862	9/1/02 8:17	1124:25:00	1124:23:00	1124:14:00	33.53232272
5	80	1084	0.000177	540	14.067	0.000163	4.607414373	0.06496	1839.560486	56.07571052	58.5143674	9/5/02 10:59	1223:07:00	1223:05:00	1222:56:00	34.97308489
20	80	1084	0.000706	540	14.067	0.000651	18.42965749	0.06561	1857.990143	56.63750566	59.07616254	9/11/02 15:33	1371:41:00	1371:39:00	1371:30:00	37.03624351
41	80	1076	0.001448	540	13.963	0.001324	37.50197278	0.06694	1895.492116	57.78068621	60.21934309	9/25/02 15:32	1707:40:00	1707:38:00	1707:29:00	41.32392366
30	80	1078	0.001059	540	13.989	0.000971	27.49147247	0.06791	1922.983588	58.61871457	61.05737145	10/1/02 15:24	1851:32:00	1851:30:00	1851:21:00	43.02944728
5	80	1084	0.000177	540	14.067	0.000163	4.607414373	0.06807	1927.591003	58.75916335	61.19782023	10/9/02 15:25	2043:33:00	2043:31:00	2043:22:00	45.20564124
3	79	1091	0.000106	539	14.158	0.000098	2.787462196	0.06817	1930.378465	58.84413415	61.28279103	10/13/02 9:58	2134:06:00	2134:04:00	2133:55:00	46.1963202
0.5	85	1089	0.000018	545	14.132	0.000016	0.458620146	0.06819	1930.837085	58.85811436	61.29677125	10/15/02 10:46	2182:54:00	2182:52:00	2182:43:00	46.72151539
9	85	1095	0.000318	545	14.210	0.000293	8.30064561	0.06848	1939.137731	59.1111447	61.54980158	10/22/02 9:14	2349:22:00	2349:20:00	2349:11:00	48.4702658
13	85	1087	0.000459	545	14.106	0.000420	11.90222457	0.06890	1951.039955	59.47396272	61.9126196	10/29/02 14:37	2522:45:00	2522:43:00	2522:34:00	50.22698478
6	85	1091	0.000212	545	14.158	0.000195	5.513549078	0.06910	1956.553504	59.6420334	62.08069028	11/11/02 14:06	2834:14:00	2834:12:00	2834:03:00	53.2375181
11	85	1085	0.000388	545	14.080	0.000355	10.05258299	0.06945	1966.606087	59.94846841	62.38712529	11/19/02 10:51	3022:59:00	3022:57:00	3022:48:00	54.98166361
1	85	1096	0.000035	545	14.223	0.000033	0.923136234	0.06948	1967.529223	59.97660856	62.41526545	11/26/02 11:33	3191:41:00	3191:39:00	3191:30:00	56.49498503
4	85	1085	0.000141	545	14.080	0.000129	3.655484723	0.06961	1971.184708	60.08803948	62.52669636	12/3/02 8:43	3356:51:00	3356:49:00	3356:40:00	57.93832928
20	85	1082	0.000706	545	14.041	0.000644	18.22688696	0.07026	1989.411595	60.64365352	63.0823104	12/10/02 8:00	3524:08:00	3524:06:00	3523:57:00	59.36441134
15	85	1079	0.000530	545	14.002	0.000481	13.63226273	0.07074	2003.043858	61.05920866	63.49786554	12/19/02 8:18	3740:26:00	3740:24:00	3740:15:00	61.15908218
-20	80	1093	-0.000706	540	14.184	-0.000656	-18.58267125	0.07008	1984.461187	60.49274917	62.93140605	1/6/03 15:38	4179:46:00	4179:44:00	4179:35:00	64.65111497
-15	81	1098	-0.000530	541	14.248	-0.000494	-13.97487977	0.06959	1970.486307	60.06674996	62.50540685	1/15/03 16:31	4396:39:00	4396:37:00	4396:28:00	66.30723942

DESORPTION TERMINATED 1/1603 DUE TO NO GAS GENERATION

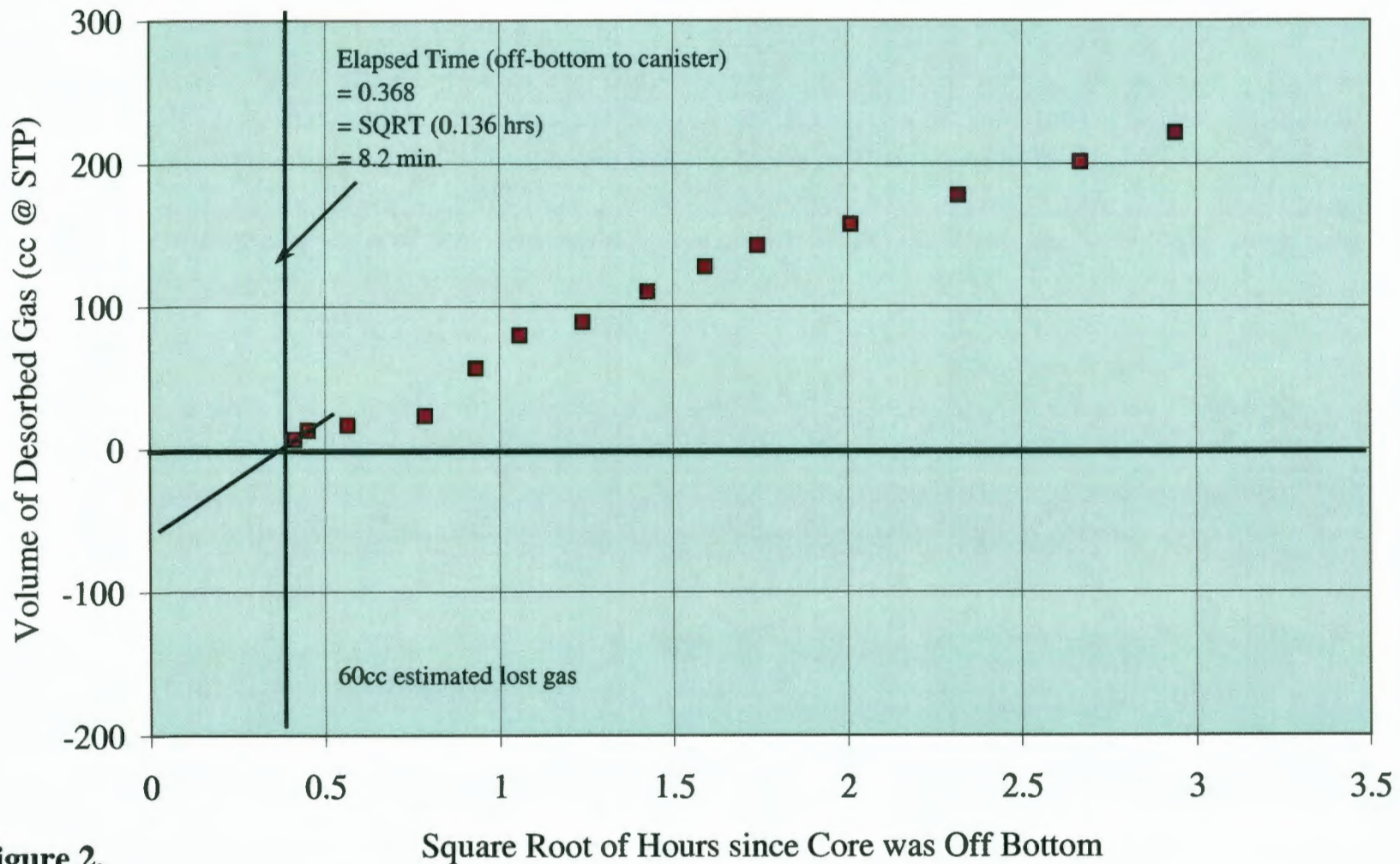
**382' to 382.11' (Iron Post Coal) Canister Lange #2**  
 Kansas Geological Survey, Cooper #CW-1; SE SW SW 11-T35S-R18E



**Figure 1.**



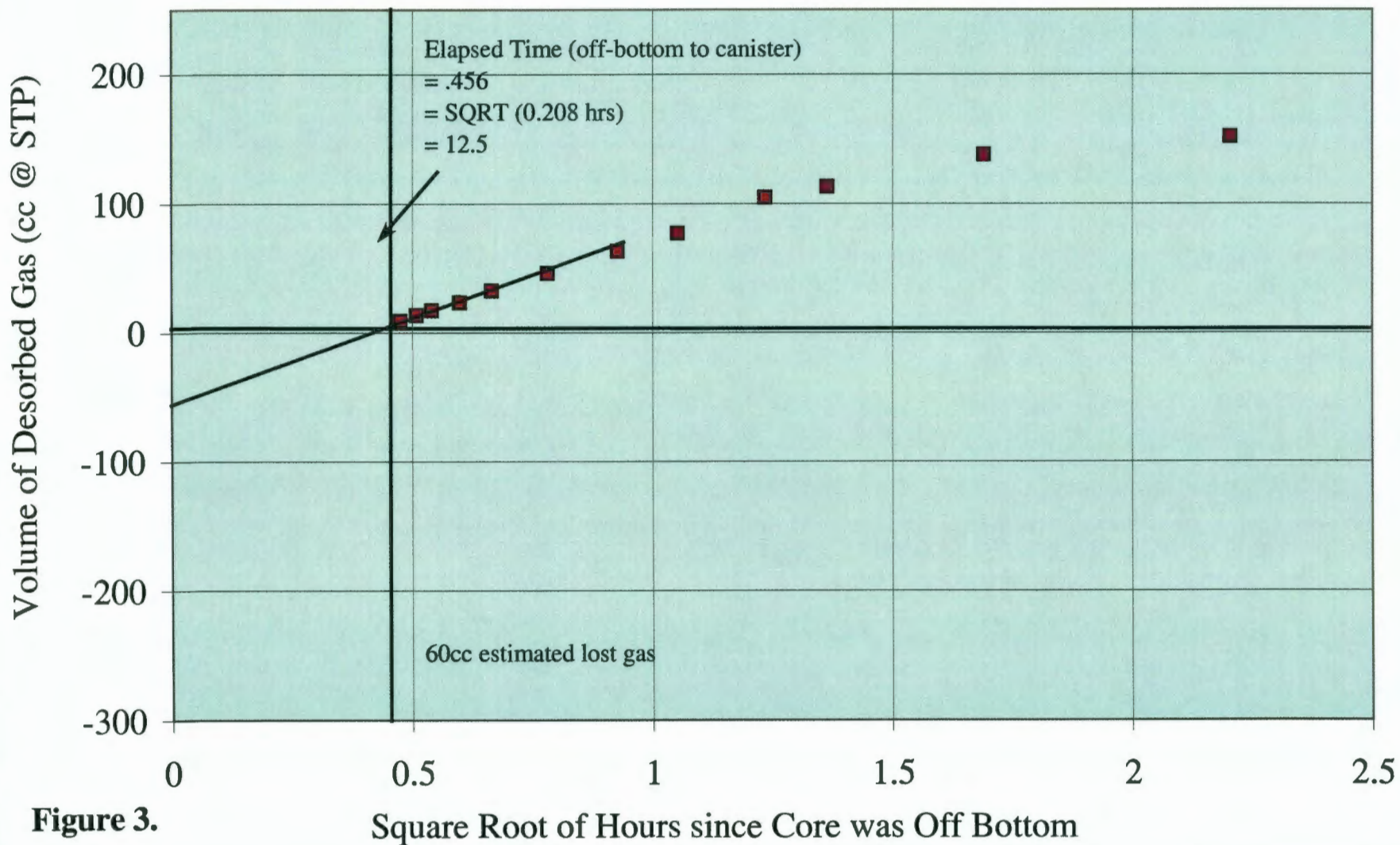
**420' to 421' (Fleming Coal) Canister Lange #3**  
Kansas Geological Survey, Cooper #CW-1; SE SW SW 11-T35S-R18E



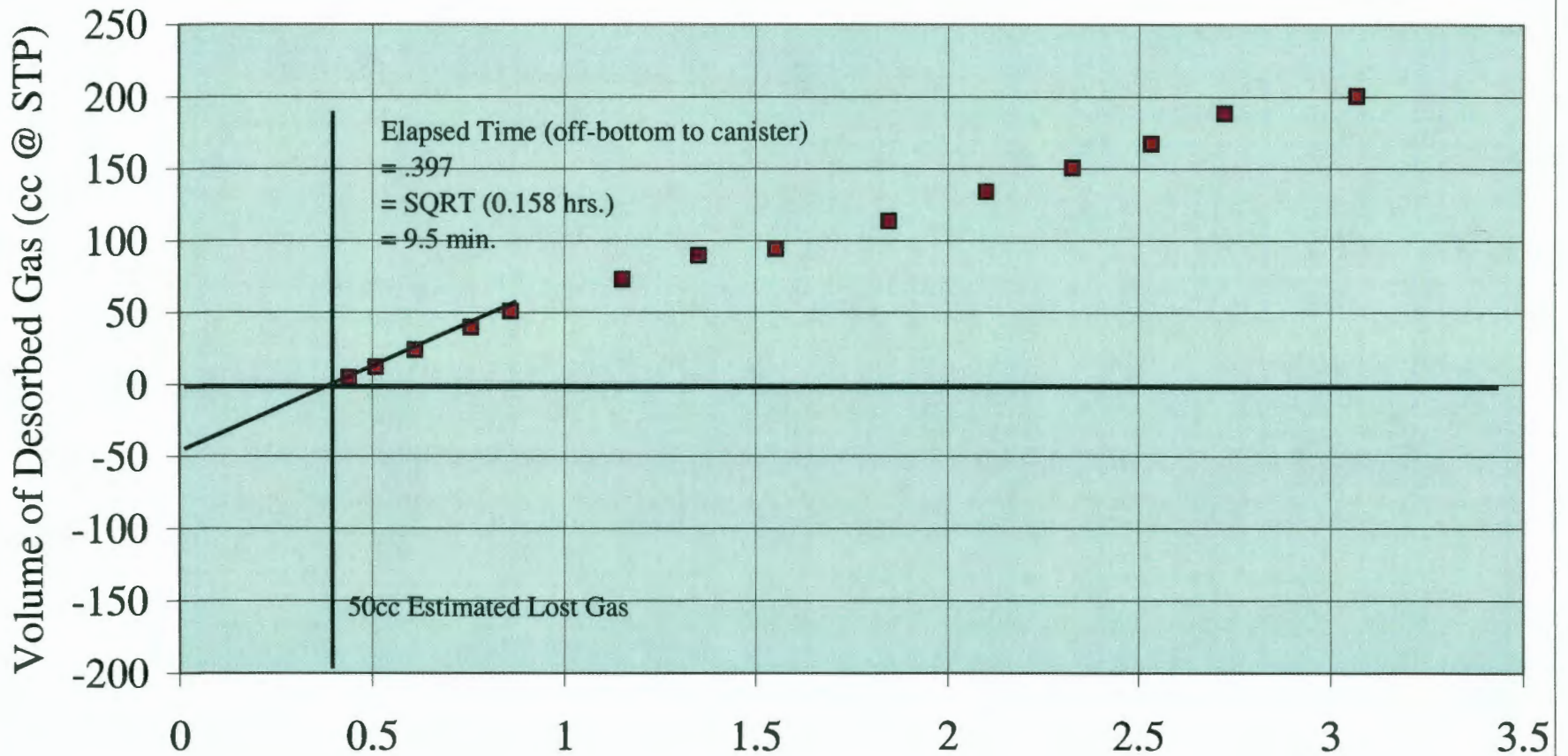
**Figure 2.**



**630.4' to 631.4' (Drywood Coal) Canister Lange #4**  
Kansas Geological Survey, Cooper #CW-1; SE SW SW 11-T35S-R18E



**895.9' to 695.5' (Rowe Coal) in canister Brady #25**  
Kansas Geological Survey, Cooper #CW-1; SE SW SW 11-T35S-R18E



**Figure 4.**

Square Root of Hours since Core was Off Bottom



### 766.7' to 767.7' (Neutral Coal) in canister Brady #31

Kansas Geological Survey, Cooper #CW-1; SE SW SW 11-T35S-R18E

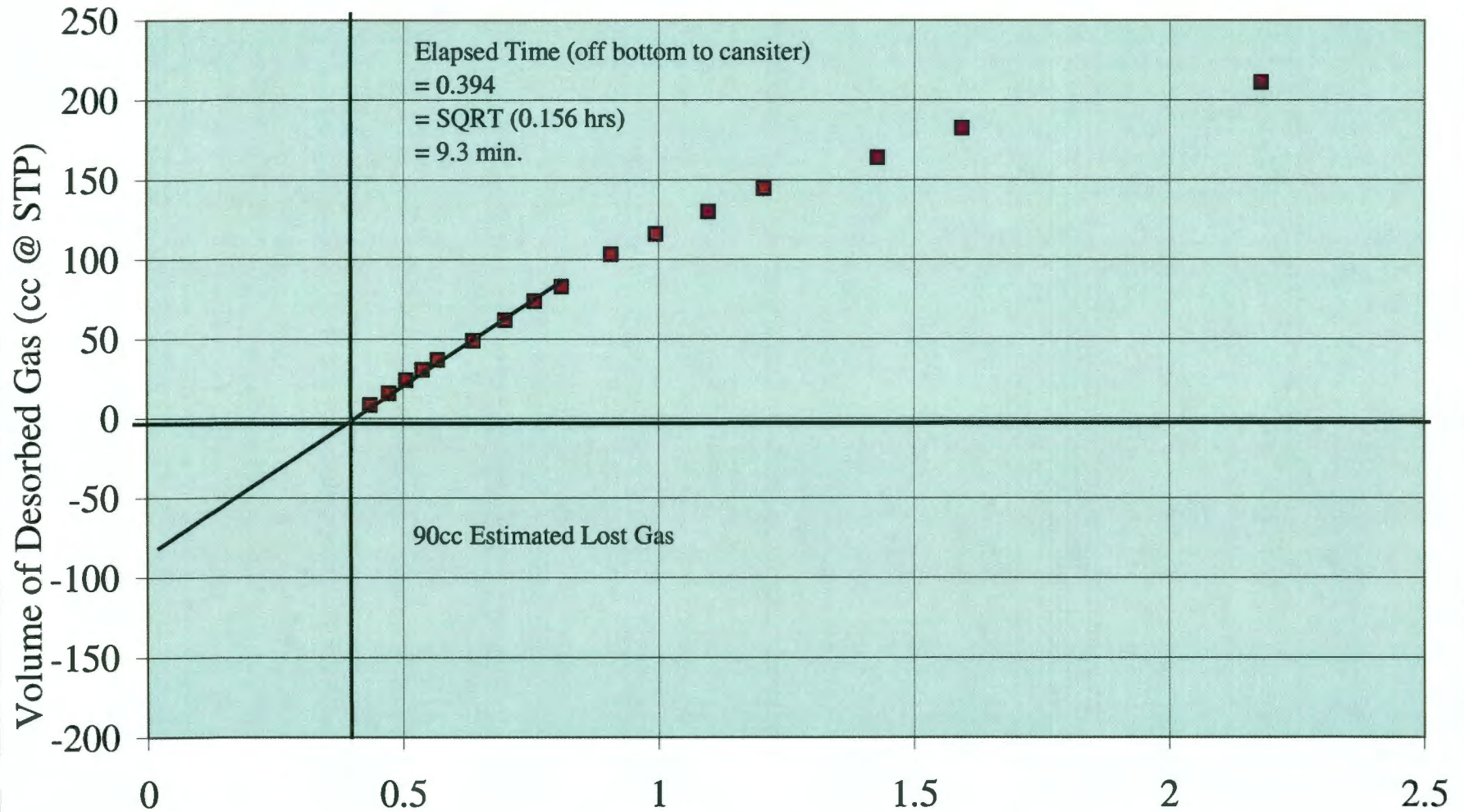
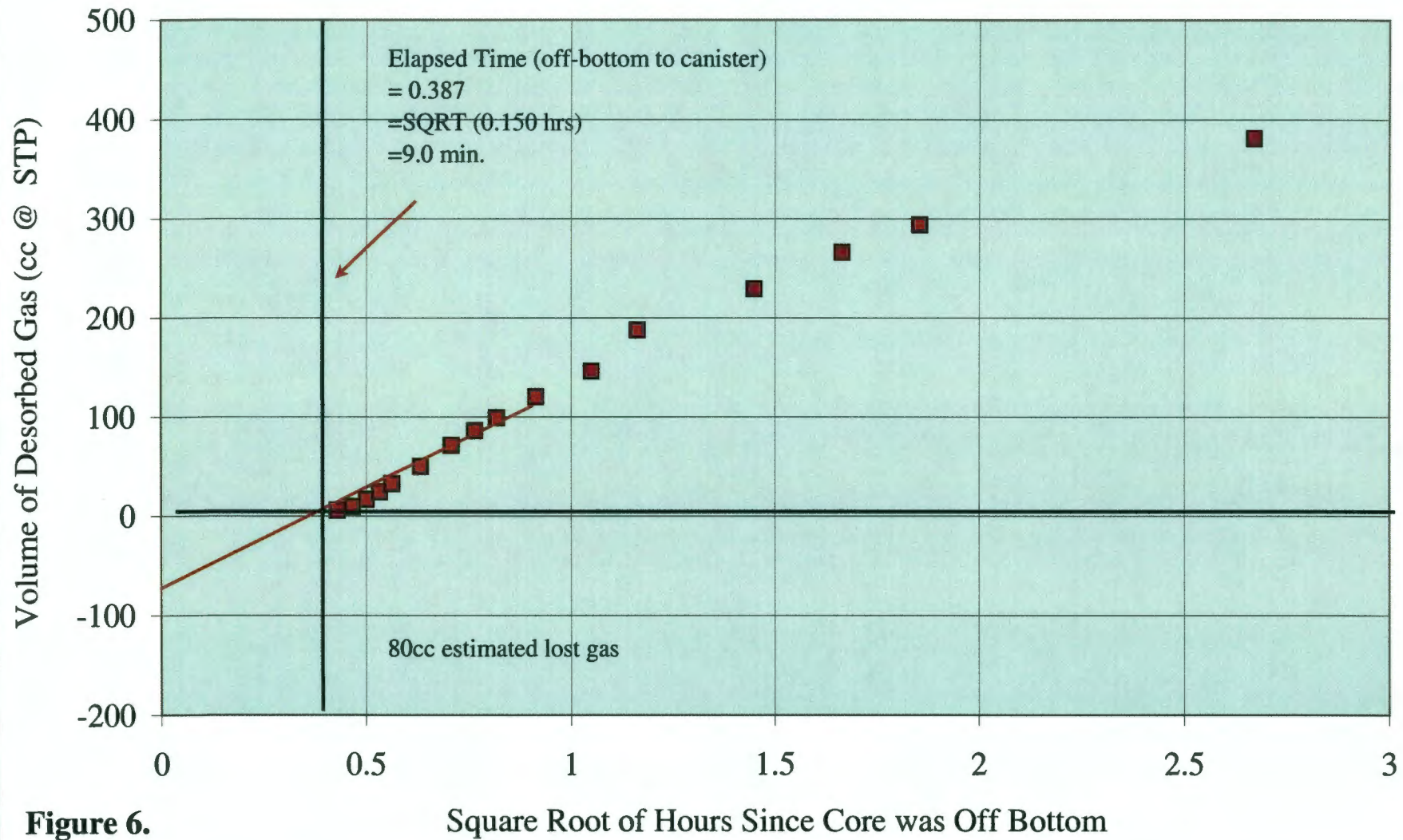


Figure 5.

Square Root of Hours since Core was Off Bottom

**840.2' to 841.2' (Riverton Coal) in canister Brady #23**  
 Kansas Geological Survey, Cooper #CW-1; SE SW SW 11-T35S-R18E



**Figure 6.**



**Desorption Characteristics of Cooper #Cw-1 Samples**  
 Kansas Geological Survey Cooper #CW-1 SE SW SW 11-T35S-R18E

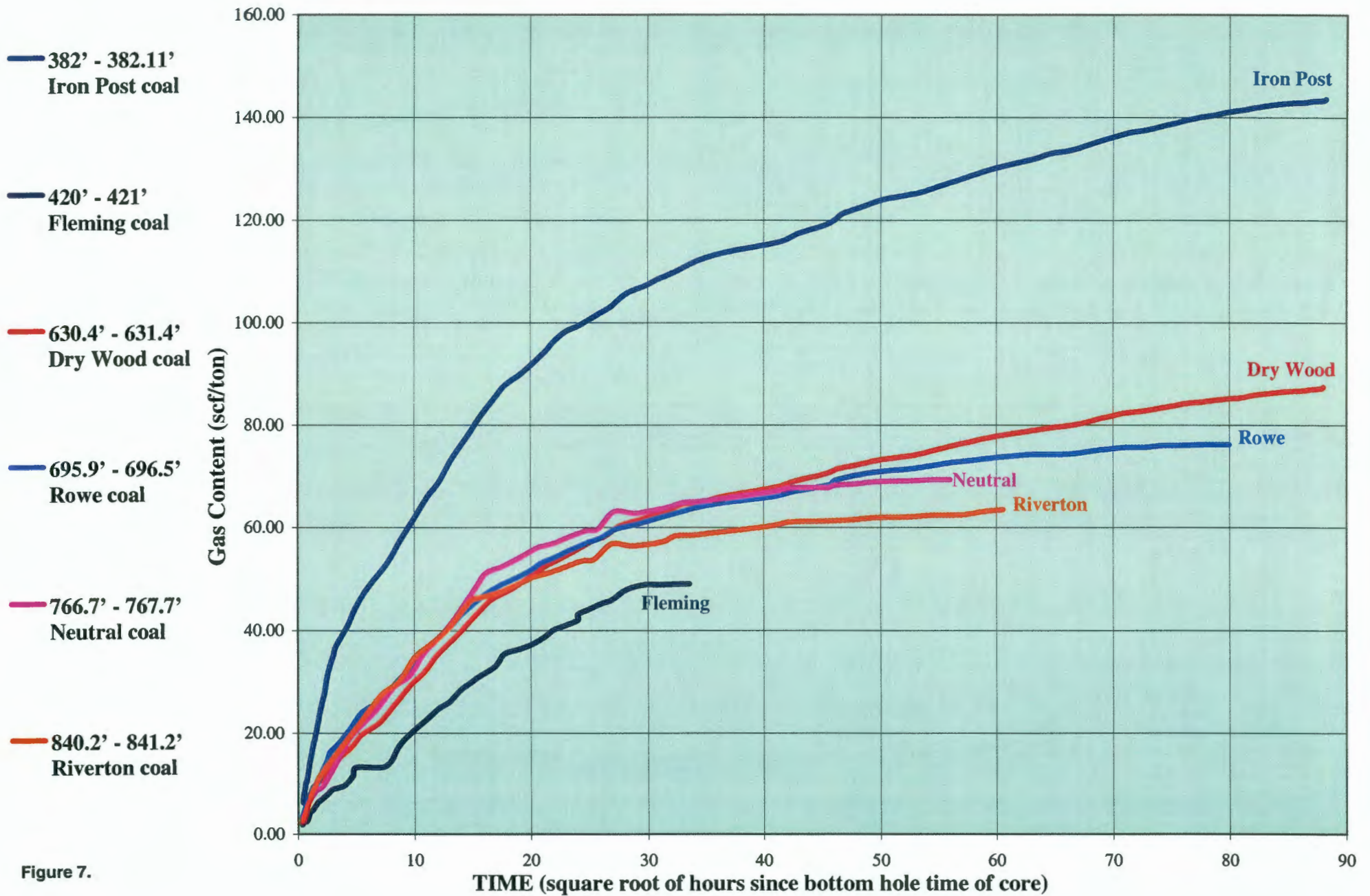


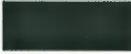









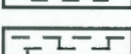

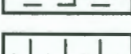

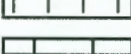

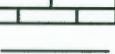



















Figure 7.



## **Appendix A**

Graphical and Verbal Descriptions of Core

## Legend

	Coal		Coal Bands
	Black Shale		Syneresis Cracks
	Sandstone		Soft Sediment Def.
	Shale		Stylolite
	Interbedded Sh and Ss		Bioclasts, Whole
	Calcareous Shale		Bioclastic Fragments
	Underclay		Algae
	Limestone		Brachiopods
	Planer Bedding		Bryozoa
	Flaser Bedding		Corals, Colonial
	Wavy Bedding		Crinoids
	Lenticular Bedding		Foraminifera
	Cross Ripple Laminae		Bioturbation
	Wave Ripples		Burrowing
	Siderite Nodules		Caliche
	Phosphatic Nodules		Slickensides
	Pyrite		Ped Structures
	Chert		Rhizoliths

NAME		COOPER CW-1		STRUCTURAL SETTING		CHEROKEE BASIN								
LOCATION		SE SW SW 11-T35S-R18E		DESCRIBED BY:		JONATHAN LANGE								
DEPTH (FT)	LITHOLOGY GRAIN SIZE AND STRUCTURES						LITHOLOGY	BOX #	DESCRIPTION	DATE	REMARKS, INTERPRETATION			
	CARBONATES											LITHOLOGY	- Lithology - Color - Comp., Cement, or Matrix - Shape and Sorting - Bedding - Sed. Structures - Upper Contact - Fossils	JANUARY 2003
	GN	PK	WKE	MUDST	EVAP									
CLASTICS						LITHOLOGY	- Fossils	PAGE 01 OF 30 PAGES						
Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay				LITHOLOGY	REMARKS, INTERPRETATION				
265												17	Limestone - Light gray to tan - Calcareous - Medium bedded - Stylolites, and horse tail stylolites - Calcite veins - Rooting - Gradational upper contact - Bioclasts of brachiopods, crinoids, fusulinids, and bryozoa - Bioturbated	Top of Fort Scott - <b>Higginsville Limestone</b>  Restricted marine - Above wave base - Shoaling upward sequence
270							17	Heavily fractured with calcite crystals						
275							18	Shale parting  Rip-up clasts and rooting  Peloidal and nonfossiliferous	<hr style="border-top: 1px dashed black;"/> Flooding surface Exposure surface Restricted marine - Tidal flat - Above wave base					

NAME <u>COOPER CW-1</u> STRUCTURAL SETTING <u>CHEROKEE BASIN</u>										
LOCATION <u>SE SW SW 11-T35S-R18E</u> DESCRIBED BY: <u>JONATHAN LANGE</u>										
DEPTH (FT)	LITHOLOGY GRAIN SIZE AND STRUCTURES						LITHOLOGY	BOX #	DESCRIPTION - Lithology - Color - Comp., Cement, or Matrix - Shape and Sorting - Bedding - Sed. Structures - Upper Contact - Fossils	DATE <u>JANUARY 2003</u> UNIT: Fort Scott PAGE 02 OF 30 PAGES REMARKS, INTERPRETATION
	CARBONATES									
	GN	PK	WKE	MUDST	EVAP					
CLASTICS										
Sand										
Gravel	Coarse	Medium	Fine	Silt	Clay					
285								18	Limestone - Same as above	Above wave base Shallowing upward sequence
290								19		
295									Whole bioclasts	Open Marine - Below Wave Base

NAME		STRUCTURAL SETTING		CHEROKEE BASIN								
LOCATION		DESCRIBED BY:		JONATHAN LANGE								
DEPTH (FT)	LITHOLOGY GRAIN SIZE AND STRUCTURES						BOX #	DESCRIPTION	DATE	REMARKS, INTERPRETATION		
	CARBONATES										LITHOLOGY	JANUARY 2003
	GN	PK	WKE	LMUDST	EVAP	Sand						
CLASTICS							PAGE 03 OF 30 PAGES					
Gravel	Coarse	Medium	Fine	Silt	Clay	<ul style="list-style-type: none"> <li>- Lithology</li> <li>- Color</li> <li>- Comp., Cement, or Matrix</li> <li>- Shape and Sorting</li> <li>- Bedding</li> <li>- Sed. Structures</li> <li>- Upper Contact</li> <li>- Fossils</li> </ul>		REMARKS, INTERPRETATION				
305									19	Black Shale - Black - Micaceous - Very thinly laminated - Planar bedding - Phosphatic nodules - Gradational Contact - Non-fossiliferous - Gas show	Little Osage Shale Transgressive marine core shale	
310							20		Limestone - Light gray to tan - Calcareous - Medium bedded - Stylolites - Caliche - Gradational upper contact - Bioclasts of brachiopods, crinoids, fusulinids, bryozoa - Burrowed	Flooding Surface Summit coal not present at this location Exposure Surface <b>Blackjack Creek Limestone</b> Restricted marine - tidal flat - Regressive limestone - Shaoling upward sequence - Top portion is an exposure surface - Above wave base		
315							21	Peloidal and non-fossiliferous				





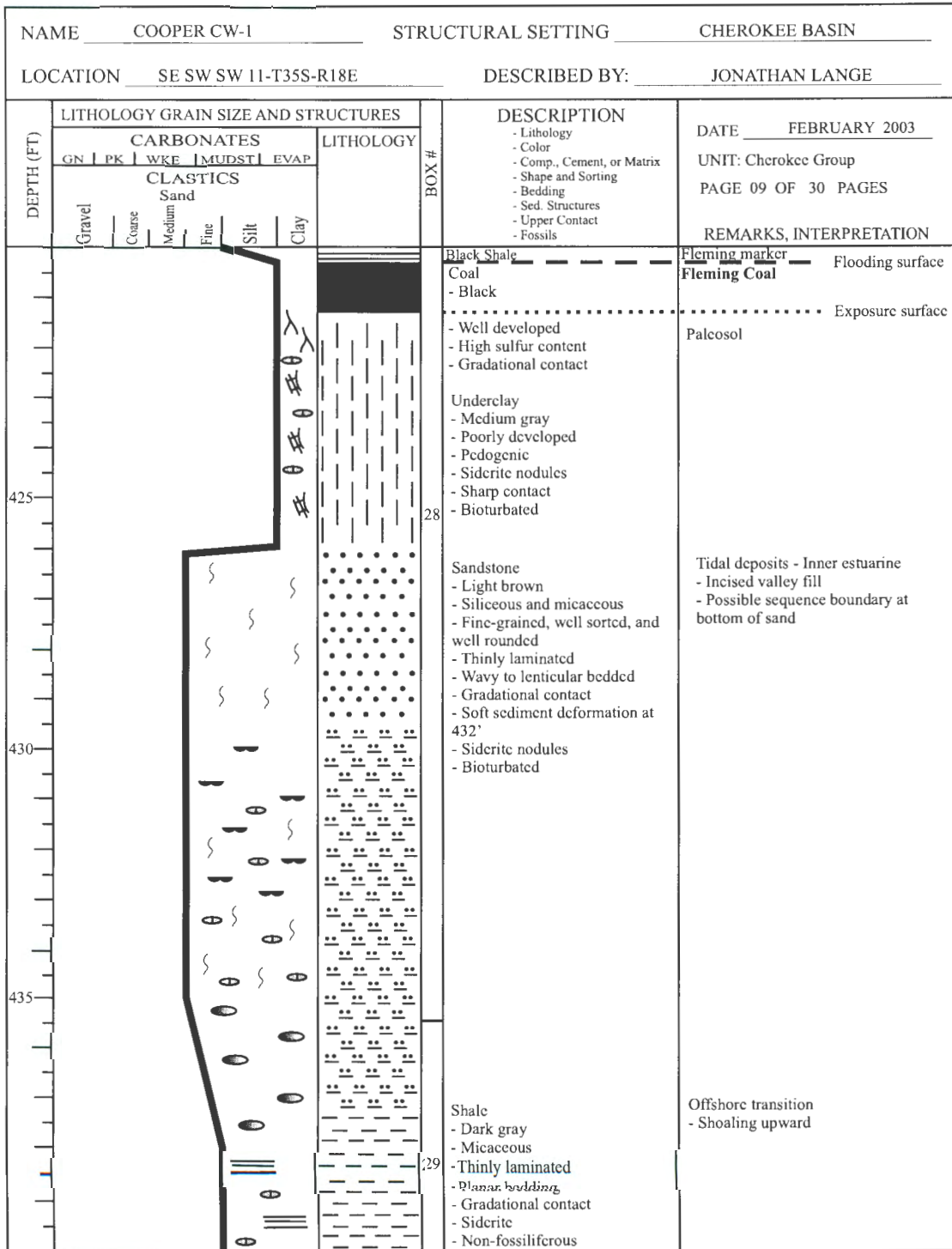
NAME <u>COOPER CW-1</u> STRUCTURAL SETTING <u>CHEROKEE BASIN</u>							
LOCATION <u>SE SW SW 11-T35S-R18E</u> DESCRIBED BY: <u>JONATHAN LANGE</u>							
DEPTH (FT)	LITHOLOGY GRAIN SIZE AND STRUCTURES		LITHOLOGY	BOX #	DESCRIPTION - Lithology - Color - Comp., Cement, or Matrix - Shape and Sorting - Bedding - Sed. Structures - Upper Contact - Fossils	DATE <u>JANUARY 2003</u>	
	CARBONATES GN   PK   WKE   MDST   EVAP					CLASTICS Sand	UNIT: Cherokee Group
	Gravel	Course					
REMARKS, INTERPRETATION							
345				22	<ul style="list-style-type: none"> <li>Black Shale</li> <li>- Black</li> <li>- Micaceous</li> <li>- Very thinly laminated</li> <li>- Planar bedding</li> <li>- Phosphatic nodules</li> <li>- Gradational Contact</li> <li>- Bioclastic fragments <i>conodonts?</i></li> <li>- Gas show</li> </ul>	<p><b>Top of Cherokee Group - Excello Shale</b> Transgressive marine core shale</p>	
350				23	<ul style="list-style-type: none"> <li>Limestone</li> <li>- Medium gray to dark gray</li> <li>- Calcareous</li> <li>- Medium bedded</li> <li>- Caliche</li> <li>- Gradational upper contact</li> <li>- Bioclasts of brachiopods, fusulinids, and bryozoa</li> <li>- Burrowed</li> </ul>	<p>Mulky coal not present at this location</p> <p>----- Flooding Surface ----- Exposure Surface</p> <p><b>Breezy Hill Limestone</b> Restricted marine - tidal flat</p> <ul style="list-style-type: none"> <li>- Regressive limestone</li> <li>- Exposure surface at top contact</li> <li>- Shallowing upward sequence</li> <li>- Above wave base</li> </ul>	
355					Whole bioclasts	<p>Open marine</p> <ul style="list-style-type: none"> <li>- Below wave base</li> </ul>	

NAME <u>COOPER CW-1</u> STRUCTURAL SETTING <u>CHEROKEE BASIN</u>						
LOCATION <u>SE SW SW 11-T35S-R18E</u> DESCRIBED BY: <u>JONATHAN LANGE</u>						
DEPTH (FT)	LITHOLOGY GRAIN SIZE AND STRUCTURES	LITHOLOGY	BOX #	DESCRIPTION - Lithology - Color - Comp., Cement, or Matrix - Shape and Sorting - Bedding - Sed. Structures - Upper Contact - Fossils	DATE <u>JANUARY 2003</u>	
	CARBONATES GN   PK   WKE   MUDST   EVAP				UNIT: Cherokee Group	
	CLASTICS Sand				PAGE 06 OF 30 PAGES	
	Gravel   Coarse   Medium   Fine   Silt   Clay				REMARKS, INTERPRETATION	
365			24	Limestone - Same as above		
370				Shale - Dark gray lighten upward - Micaceous with a slightly calcareous cement - Thinly laminated - Gradational contact - Planar bedding - Abundant pyrite - Bioclasts of brachiopods, crinoids, bryozoans and fusulinids	Offshore transition - Shoaling upward - Near anaerobic - disacrobic zone	
375			25	Graded bedding and concave down shells Black Shale - Dark Gray - Micaceous with a calcareous cement - Thinly laminated - Planar bedding - Gradational contact - Bioclastic fragments	Higher energy, storm deposits - Near mean storm wave base  Transgressive marine core shale	





NAME <u>COOPER CW-1</u> STRUCTURAL SETTING <u>CHEROKEE BASIN</u>							
LOCATION <u>SE SW SW 11-T35S-R18E</u> DESCRIBED BY: <u>JONATHAN LANGE</u>							
DEPTH (FT)	LITHOLOGY GRAIN SIZE AND STRUCTURES		LITHOLOGY	BOX #	DESCRIPTION	DATE <u>JANUARY 2003</u> UNIT: Cherokee Group PAGE 08 OF 30 PAGES REMARKS, INTERPRETATION	
	CARBONATES						CLASTICS
	GN	PK					
Gravel	Coarse	Medium	Fine	Silt	Clay		
405				26	Shale - Dark gray lightens upward - Micaceous with a slightly calcareous cement - Very thinly laminated - Planar bedding - Graded bedding - Gradational contact - Bioclastic fragments	Offshore transition	
410					Limestone - Medium to dark gray - Calcareous - Thinly bedded - Gradational contact - Bioclasts of crinoids, bryozoans, and brachiopods	<b>Verdigris Limestone</b> Open marine - Below wave base - Shallowing upward	
415				27	Black Shale - Black - Micaceous and calcareous - Thinly laminated - Planar bedding - Phosphatic nodules - Gradational contact - Bioclastic fragments <i>conodonts?</i>	<b>V-Shale</b> - Transgressive marine, core shale	
					Shale - Dark gray - Micaceous - Very thinly laminated - Planar bedding - Siderite nodules - Non-fossiliferous	Croweburg coal not present at this location Inner estuarine - Central basin --- Flooding Surface location	







NAME		STRUCTURAL SETTING		CHEROKEE BASIN							
LOCATION		DESCRIBED BY:		JONATHAN LANGE							
DEPTH (FT)	LITHOLOGY GRAIN SIZE AND STRUCTURES						DESCRIPTION	DATE	REMARKS, INTERPRETATION		
	CARBONATES									LITHOLOGY	BOX #
	GN	PK	WKE	MUDST	EVAP						
CLASTICS						LITHOLOGY	BOX #				
Sand								LITHOLOGY	BOX #		
Gravel	Coarse	Medium	Fine	Silt	Clay						
465							30	<ul style="list-style-type: none"> <li>Black Shale</li> <li>- Black</li> <li>- Micaceous</li> <li>- Thinly laminated</li> <li>- Planar bedding</li> <li>- Phosphatic, siderite nodules</li> <li>- Gradational contact</li> <li>- Bioclastic fragments <i>conodonts?</i></li> </ul>	Shelf shale - Transgressive marine core shale  Transgressive lag  - Flooding surface		
470							31	<ul style="list-style-type: none"> <li>Coal</li> <li>- Black</li> <li>- Poor cleating development</li> <li>- Calcite growth within cleats</li> <li>- Sharp contact</li> <li>- Good gas show</li> </ul>	Mineral Coal - Associated with estuarine environment  Paleosol  - Exposure surface		
475							32	<ul style="list-style-type: none"> <li>Underclay</li> <li>- Medium gray</li> <li>- Pedogenic</li> <li>- Slickensides,</li> <li>- Rooting, plant fragments</li> <li>- Siderite nodules</li> <li>- Sharp contact</li> <li>- Bioturbated</li> </ul>			
								<ul style="list-style-type: none"> <li>Shale</li> <li>- Medium gray</li> <li>- Micaceous</li> <li>- Pedogenical altered</li> <li>- Rooting and plant fragments</li> <li>- Siderite crystals</li> <li>- Some planar bedding</li> <li>- Gradational contact</li> <li>- Bioturbated</li> </ul>			







NAME		STRUCTURAL SETTING		CHEROKEE BASIN					
LOCATION		DESCRIBED BY:		JONATHAN LANGE					
DEPTH (FT)	LITHOLOGY GRAIN SIZE AND STRUCTURES					BOX #	DESCRIPTION	REMARKS, INTERPRETATION	
	CARBONATES								LITHOLOGY
	GN	PK	WKE	MUDST	EVAP				
CLASTICS					LITHOLOGY				
Gravel	C coarse	Medium	Fine	Silt		Clay			
525						34	Shale, same as above	DATE FEBRUARY 2003 UNIT: Cherokee Group PAGE 14 OF 30 PAGES REMARKS, INTERPRETATION	
							Black Shale - Micaceous - Thinly laminated - Planar bedding - Slightly phosphatic - Gradational - Brachiopod fragments		Tebo marker
							Coal - Well developed cleating - Low mineralization - Sharp contact - Good gas show		Tebo Coal - Flooding surface - Exposure surface
530						35	Underclay - Light gray - Pedogenic - Rooting - Siderite, and pyrite nodules - Sharp contact - Bioturbated	Paleosol	
							Shale - Medium gray, lightens upward - Micaceous - Thinly laminated - Wavy cross ripple lamina and planar in upper portion - Ripple cross-laminated - Rooting and plant fragments - Gradational contact - Bioturbated and non-fossiliferous	Shallow marine, probably a muddy tidal flat or coastal plain	
535						36			





NAME		STRUCTURAL SETTING		CHEROKEE BASIN					
LOCATION		DESCRIBED BY:		JONATHAN LANGE					
DEPTH (FT)	LITHOLOGY GRAIN SIZE AND STRUCTURES					BOX #	DESCRIPTION	REMARKS, INTERPRETATION	
	CARBONATES								LITHOLOGY
	GN	PK	WKE	MUDST	EVAP				
CLASTICS					LITHOLOGY	DATE	UNIT: Cherokee Group		
Gravel	Course Sand	Medium Sand	Fine Sand	Silt				Clay	PAGE 16 OF 30 PAGES
565						37	Sandstone, same as above		
								..... Sequence Boundary	
							Shale - Dark brown to gray - Micaceous with siliceous laminae - Thinly laminated - Lenticular bedded with planar bedding on top - Plant fragments - Gradational contact - Bioclastic fragments on top	Non-marine, outside shale	
570									
						38			
575							Black Shale - Black - Micaceous - Thinly laminated - Planar bedded - Phosphatic - Gradational contact - Non-fossiliferous	Transgressive marine, core shale	
								- Flooding surface	
							Sandstone, description on next page		

NAME		STRUCTURAL SETTING		CHEROKEE BASIN									
LOCATION		DESCRIBED BY:		JONATHAN LANGE									
DEPTH (FT)	LITHOLOGY GRAIN SIZE AND STRUCTURES						DESCRIPTION	DATE	UNIT: Cherokee Group	PAGE 17 OF 30 PAGES	REMARKS, INTERPRETATION		
	CARBONATES											LITHOLOGY	BOX #
	GN	PK	WKE	MUDST	EVAP								
CLASTICS						LITHOLOGY	BOX #						
Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay								
585							38	Sandstone - Light brown - Siliceous - Very fine-grained, well sorted and rounded - Thinly bedded to thickly laminated - Flaser bedded - Fractured on top - Gradational contact - Bioturbated on bottom			Crevasse Splay - Unidirectional flow - Some tidal influence - Coarsens upward - Sequence boundary		
								Shale - Dark gray to black - Thinly laminated and planar - Diagonal fracturing - Phosphatic - Gradational contact			Flooding surface Paleosol		
							39	Underclay - Gray - Pedogenic - Abundant plant fragments and rooting - Slickensides - Sharp contact - Bioturbated					
								Shale - Gray - Micaceous - Pedogenically altered - Thinly laminated - Planar bedded - Siderite nodules - Plant fragments - Gradational contact - Bioturbated					
595							40	Sandstone - Light brown to gray - Siliceous w/ mica laminae - Very fine-grained, well sorted and rounded - Thickly laminated - Flaser, lenticular and wavy bedded - Soft sediment deformation - Siderite, and rip-up clasts - Gradational contact - Bioturbated			<b>Bartlesville Sandstone</b> Bay head delta, upper estuarine - Incised valley fill - Bimodal flow - Tidal influenced		

NAME		COOPER CW-1		STRUCTURAL SETTING		CHEROKEE BASIN			
LOCATION		SE SW SW 11-T35S-R18E		DESCRIBED BY:		JONATHAN LANGE			
DEPTH (FT)	LITHOLOGY GRAIN SIZE AND STRUCTURES						BOX #	DESCRIPTION - Lithology - Color - Comp., Cement, or Matrix - Shape and Sorting - Bedding - Sed. Structures - Upper Contact - Fossils	DATE FEBRUARY 2003 UNIT: Cherokee Group PAGE 18 OF 30 PAGES REMARKS, INTERPRETATION
	CARBONATES								
	CLASTICS								
Sand						LITHOLOGY			
Gravel	Course	Medium	Fine	Silt	Clay				
605							40	Sandstone, same as above	
								Escape structures	
								Rip-up clasts	
								Passively filled vertical burrows	
610								Rip-up clasts	
615							41	Erosional contact	
									..... Exposure surface



NAME <u>COOPER CW-1</u> STRUCTURAL SETTING <u>CHEROKEE BASIN</u>				
LOCATION <u>SE SW SW 11-T35S-R18E</u> DESCRIBED BY: <u>JONATHAN LANGE</u>				
DEPTH (FT)	LITHOLOGY GRAIN SIZE AND STRUCTURES		DESCRIPTION	REMARKS, INTERPRETATION
	CARBONATES			
	CLASTICS			
	GN   PK   WKE   MUDST   EVAP	LITHOLOGY		
	Gravel   Coarse   Medium   Fine   Sand   Silt   Clay		<ul style="list-style-type: none"> <li>- Lithology</li> <li>- Color</li> <li>- Comp., Cement, or Matrix</li> <li>- Shape and Sorting</li> <li>- Bedding</li> <li>- Sed. Structures</li> <li>- Upper Contact</li> <li>- Fossils</li> </ul>	DATE <u>MARCH 2003</u> UNIT: Cherokee Group PAGE 19 OF 30 PAGES
625			Shale - Dark gray, lightens upward - Micaceous - Thinly laminated - Planar bedded - Rooting? - Siderite nodules - Gradational contact - Some bioturbation	Offshore transition - Shoaling upward
			Black shale - Micaceous - Thinly laminated - Planar bedded - Gradational contact - Non-fossiliferous	Shelf shale - Transgressive marine shale
			Coal - Sharp contact	<b>Drywood Coal</b> - Flooding surface
			Paleosol - Medium gray - Pedogenic - Rooting - Sharp contact - Bioturbated	Exposure surface
630			Shale - Dark gray to black - Micaceous - Thinly laminated - Planar bedded - Top is pedogenically altered - Rooting - Pyrite nodules - Gradational contact - Bioturbated	Nearshore shale   Transgressive marine shale
635				

NAME		STRUCTURAL SETTING		CHEROKEE BASIN								
LOCATION		DESCRIBED BY:		JONATHAN LANGE								
DEPTH (FT)	LITHOLOGY GRAIN SIZE AND STRUCTURES					BOX #	DESCRIPTION	DATE	REMARKS, INTERPRETATION			
	CARBONATES									LITHOLOGY	MARCH 2003	UNIT: Cherokee Group
	GN	PK	WKE	MUDST	EVAP							
CLASTICS					LITHOLOGY	- Lithology - Color - Comp., Cement, or Matrix - Shape and Sorting - Bedding - Sed. Structures - Upper Contact - Fossils	PAGE 20 OF 30 PAGES					
Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt				Clay	REMARKS, INTERPRETATION			
645											Shale, same as above	Swamp/marsh
							Limestone - Brown - Calcareous - Thinly bedded - Sharp contact - Bioclastic fragments	— Flooding surface				
650							Sandstone - Gray to light brown - Siliceous w/ micaceous laminae - Very fine-grained, well sorted, well rounded - Thickly laminated - Wavy bedding - Sharp contact - Non-fossiliferous	Tidal influenced				
							Shale - Dark gray - Micaceous - Thinly laminated - Planar bedded - Siderite nodules - Gradational contact - Non-fossiliferous					
655							Limestone - Dark brown - Calcareous - Medium bedded - Bioclasts of brachiopods and bryozoans - Bioturbated	— Flooding surface Open marine limestone				
							Shale - Dark gray - Very fossiliferous and carbonaceous shale, overlying a pedogenic bioturbated soil	..... Exposure surface				

NAME		STRUCTURAL SETTING		CHEROKEE BASIN						
LOCATION		DESCRIBED BY:		JONATHAN LANGE						
DEPTH (FT)	LITHOLOGY GRAIN SIZE AND STRUCTURES					DESCRIPTION	DATE	REMARKS, INTERPRETATION		
	CARBONATES								LITHOLOGY	BOX #
	GN	PK	WKE	MUDST	EVAP					
Sand					LITHOLOGY	BOX #				
Gravel	Coarse	Medium	Fine	Silt			Clay	DESCRIPTION	UNIT: Cherokee Group	
					DESCRIPTION		PAGE 21 OF 30 PAGES			
					DESCRIPTION		REMARKS, INTERPRETATION			
665						Shale	44	Nonmarine, outside shale		
						Carbonaceous shale		<ul style="list-style-type: none"> <li>- Dark gray</li> <li>- Micaceous, high carbon content</li> <li>- Thinly laminated</li> <li>- Planar bedded</li> <li>- Rooting and plant fragments</li> <li>- Siderite nodules</li> <li>- Gradational contact</li> <li>- Non-fossiliferous</li> </ul>	<ul style="list-style-type: none"> <li>- Coaly streaks</li> <li>- Gas show</li> </ul>	
670						Underclay	45	Paleosol		
						Shale		<ul style="list-style-type: none"> <li>- Gray</li> <li>- Pedogenic</li> <li>- Rooting and plant fragments</li> <li>- Siderite nodules</li> <li>- Sharp contact</li> <li>- Bioturbated</li> </ul>	<ul style="list-style-type: none"> <li>- Dark gray to black</li> <li>- Micaceous</li> <li>- Thinly laminated</li> <li>- Lenticular to planar bedded</li> <li>- Siderite nodules</li> <li>- Gradational contact</li> <li>- Non-fossiliferous</li> </ul>	
675						Underclay	45	Paleosol		
						Shale		<ul style="list-style-type: none"> <li>- Gray</li> <li>- Slickensides</li> <li>- Siderite crystals</li> <li>- Sharp contact</li> <li>- Heavily bioturbated</li> </ul>	<ul style="list-style-type: none"> <li>- Dark gray to black</li> <li>- Micaceous</li> <li>- Thinly laminated</li> <li>- Planar bedded</li> <li>- Siderite crystals</li> <li>- Gradational contact</li> <li>- Heavily bioturbated</li> </ul>	
								Lagoonal shale		





NAME		COOPER CW-1		STRUCTURAL SETTING		CHEROKEE BASIN						
LOCATION		SE SW SW 11-T35S-R18E		DESCRIBED BY:		JONATHAN LANGE						
DEPTH (FT)	LITHOLOGY GRAIN SIZE AND STRUCTURES						BOX #	DESCRIPTION	DATE	REMARKS, INTERPRETATION		
	CARBONATES										LITHOLOGY	MARCH 2003
	GN	PK	WKE	MUDST	EVAP							
CLASTICS						LITHOLOGY	PAGE 23 OF 30 PAGES					
Sand								LITHOLOGY	REMARKS, INTERPRETATION			
Gravel	Coarse	Medium	Fine	Silt	Clay					LITHOLOGY		
705							47				Shale - Dark gray to black - Micaceous - Thinly laminated - Planar to lenticular bedded - Siderite bands - Gradational contact - Non-fossiliferous	
710							47	Coal - Well developed cleating	Flooding surface Exposure surface			
715							48	Underclay - Gray - Pedogenic - Rooting and plant fragments - Siderite crystals - Slickensides - Sharp contact - Bioturbated	Paleosol			
							48	Shale - Medium gray - Micaceous - Thinly laminated - Planar bedding - Pedogenically altered at top 2' - Siderite nodules - Gradational contact - Heavily bioturbated	Lagoonal shale			

NAME <u>COOPER CW-1</u>		STRUCTURAL SETTING <u>CHEROKEE BASIN</u>								
LOCATION <u>SE SW SW 11-T35S-R18E</u>		DESCRIBED BY: <u>JONATHAN LANGE</u>								
DEPTH (FT)	LITHOLOGY GRAIN SIZE AND STRUCTURES						LITHOLOGY	BOX #	DESCRIPTION - Lithology - Color - Comp., Cement, or Matrix - Shape and Sorting - Bedding - Sed. Structures - Upper Contact - Fossils	DATE <u>MARCH 2003</u> UNIT: Cherokee Group PAGE 24 OF 30 PAGES REMARKS, INTERPRETATION
	CARBONATES									
	GN	PK	WKE	MUDST	EVAP					
CLASTICS										
Sand										
Gravel	Coarse	Medium	Fine	Silt	Clay					
725								48	Shale - Dark gray to black - Micaceous with a calcareous cement at 735' - Thinly laminated - Planar to lenticular bedded - Sparse siderite nodules - Sparse plant fragments - Gradational contact - Bioclastic fragments at 735'	Non-marine, outside shale
730										
735								49		



NAME <u>COOPER CW-1</u> STRUCTURAL SETTING <u>CHEROKEE BASIN</u>					
LOCATION <u>SE SW SW 11-T35S-R18E</u> DESCRIBED BY: <u>JONATHAN LANGE</u>					
DEPTH (FT)	LITHOLOGY GRAIN SIZE AND STRUCTURES	DESCRIPTION	DATE <u>MARCH 2003</u>		
	CARBONATES			LITHOLOGY	UNIT: Cherokee Group PAGE 25 OF 30 PAGES
	GN   PK   WKE   MUDST   EVAP				
CLASTICS	REMARKS, INTERPRETATION				
Gravel   Course   Medium   Fine   Silt   Clay					
745			Shale, same as above		
750		Underclay - Gray - Pedogenic - Plant fragments and rooting - Siderite nodules - Laminated on bottom - Sharp contact - Bioturbated	..... Exposure surface Paleosol		
755		Shale - Dark gray to black - Micaceous with a calcareous cement between 764.9'-766.7' - Planar bedding - Plant fragments - Siderite nodules - Gradational contact - Bioturbated on top - Bioclastic fragments	Lagoon shale		

NAME		STRUCTURAL SETTING						
COOPER CW-1		CHEROKEE BASIN						
LOCATION		DESCRIBED BY:						
SE SW SW 11-T35S-R18E		JONATHAN LANGE						
DEPTH (FT)	LITHOLOGY GRAIN SIZE AND STRUCTURES				DESCRIPTION	DATE		
	CARBONATES						LITHOLOGY	MARCH 2003
	GN	PK	WKE	MUDST				
CLASTICS				BOX #	PAGE 26 OF 30 PAGES			
Gravel	Coarse Sand	Medium Sand	Fine Sand			Silt	Clay	REMARKS, INTERPRETATION
765					Shale, same as above	Offshore transition - Shoaling upward		
					Abundant brachiopod fragments	Transgressive lag Shelf shale		
					Coal - Good gas show	Neutral coal - - - Flooding surface		
					51 Underclay - Gray - Pedogenic - Rooting and plant fragments - Carbonaceous - Siderite nodules - Sharp contact - Bioturbated	..... Exposure surface Paleosol		
770								
					Shale - Dark gray to black - Micaceous with a calcareous cement at 806' - Highly carbonaceous at 807' - Thinly laminated - Fissile	Outside nearshore shale, lagoonal shale		
775					52 Planar bedded - Plant fragments in top 2' - Siderite nodules - Gradational contact - Bioclastic fragments and bioturbated around 776'	Shelf shale		

NAME <u>COOPER CW-1</u>		STRUCTURAL SETTING <u>CHEROKEE BASIN</u>								
LOCATION <u>SE SW SW 11-T35S-R18E</u>		DESCRIBED BY: <u>JONATHAN LANGE</u>								
DEPTH (FT)	LITHOLOGY GRAIN SIZE AND STRUCTURES						LITHOLOGY	BOX #	DESCRIPTION - Lithology - Color - Comp., Cement, or Matrix - Shape and Sorting - Bedding - Sed. Structures - Upper Contact - Fossils	DATE <u>MARCH 2003</u> UNIT: Cherokee Group PAGE 27 OF 30 PAGES REMARKS, INTERPRETATION
	CARBONATES									
	GN	PK	WKE	MUDST	EVAP					
CLASTICS										
Sand										
Gravel	Coarse	Medium	Fine	Silt	Clay					
785							52	Underclay - Light gray - Pedogenic - Slickensides - Plant fragments - Siderite crystals and nodules - Sharp contact - Bioturbated	Paleosol	
								Shale - Dark gray lightens upward to a light gray - Micaceous - Thinly laminated - Planar bedded - Siderite bands and 1' of siderite at 800' - Gradational - Sparse microfossils - Abundant bioclasts at 806' - Heavily bioturbated at 798'	Offshore transition - Shoaling upward	
790										
795							53			











## **Appendix B**

Formation Tops and Core Photos

Company: Kansas Geological Survey  
 Well: Cooper CW-1  
 County: Labette State: Kansas  
 Location: 125' FSL & 1320' FWL SE-SW-SW 11-T35S-R18E

Formation Tops	Depth (md)	Box #1
Bandera Shale	22'	01-09
Pawnee Limestone	150'	09-11
Anna Shale	178'	11-12
Peru Sandstone	185'	12-17
Fort Scott	262'	17-22
Higginsville Limestone	262'	17-19
Little Osage Shale	300'	19-20
Black Jack Creek Limestone	305'	20-22
Excello Shale	340'	22-23
Cherokee Group	350'	23-57
Brezzy Hill Limestone	350'	23-24
IP coal	382'	25
Upper Squirrel Sandstone	387'	25
Bevier coal	393'	26
Lower Squirrel Sandstone	394'	26
Verdigris	406'	27
V-Shale	410'	27
Fleming coal	420'	28
Mineral coal	464'	31
Scammon coal	485'	32
Skinner Sandstone	489'	32-33
Tebo coal	525'	35
Bartlesville Sandstone	597'	40-41
Drywood coal	630'	42
Rowe coal	696'	46
Neutral coal	767'	51
Warner Sandstone	821'	55
Riverton coal	840'	56
Mississippian	853'	57



258

261

271

Cooper CW-1 SF, SW SW 11-T35S-R18E

In Cm





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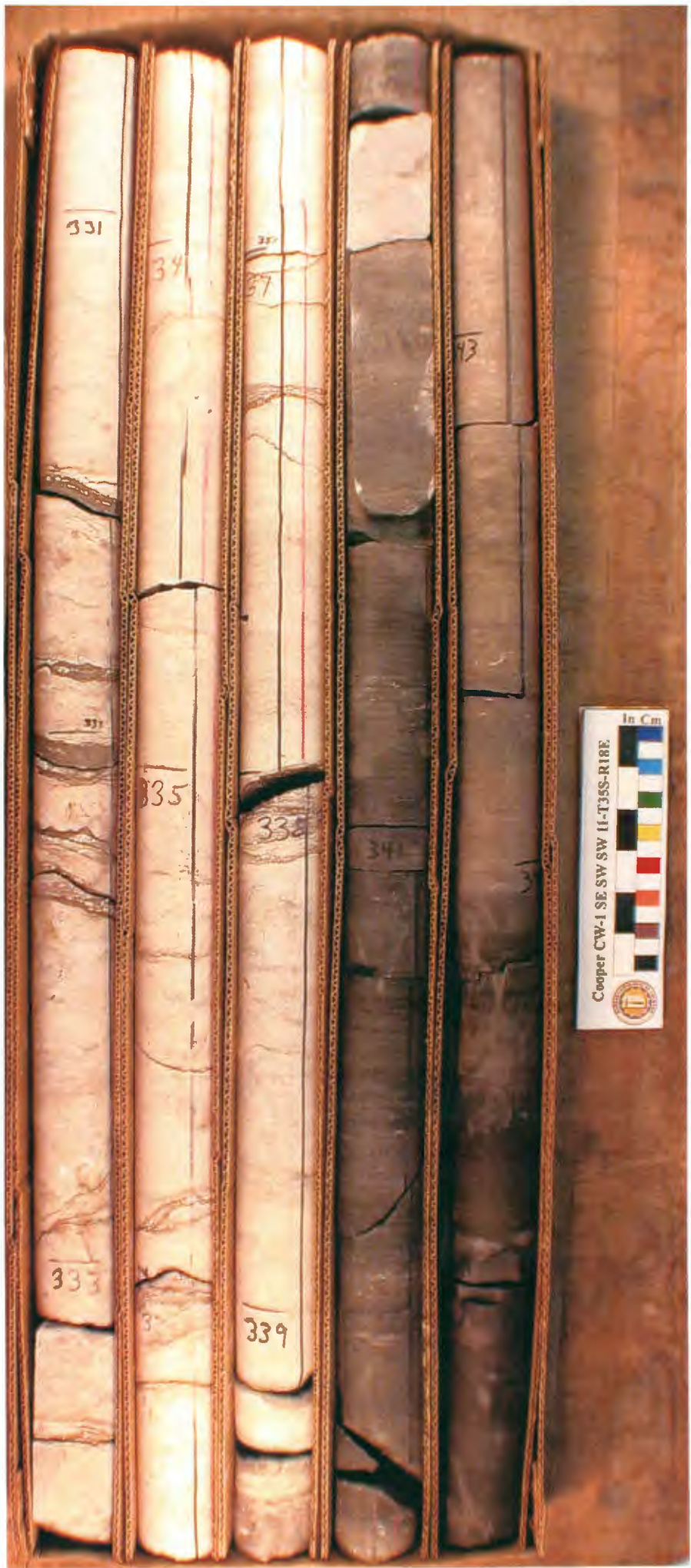
324

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Cooper CW-1 SE SW SW 11-TJSS-R18E





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In Cm

Cooper CW-1 SE SW SW II-T35S-R18E







In Cm  
Cooper CW-1 SE SW SW 11-TISS-R18E

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Iron Point Coal

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375





  
Cooper CW-I SE SW SW II-T3SS-R18E  
In Cm

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James Develin

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Cooper CW-1 SE SW SW 11-T35S-R18E

In Cm





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CROWEBURG COAL  
420. 15' -> 421 1''  
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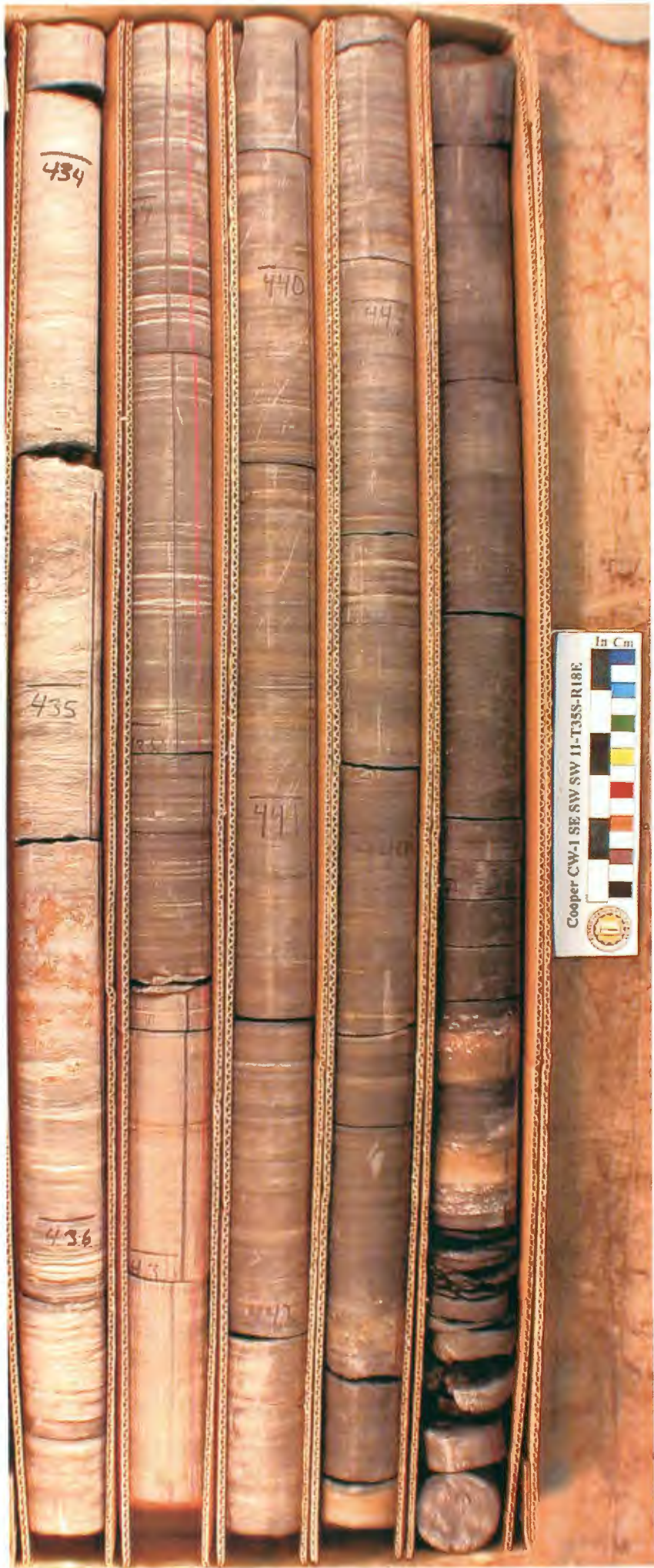
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In Cm

Cooper CW-1 SE SW SW 11-T35S-R18E





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In Cm

Cooper CW-1 SE SV SW II-T3SS-R18E

A color calibration chart with a ruler and a logo. The ruler shows measurements in centimeters. The chart includes a series of colored squares: black, white, red, yellow, green, cyan, blue, magenta, and brown. Below the chart is a circular logo with the text 'Cooper CW-1 SE SV SW II-T3SS-R18E' and a small emblem.





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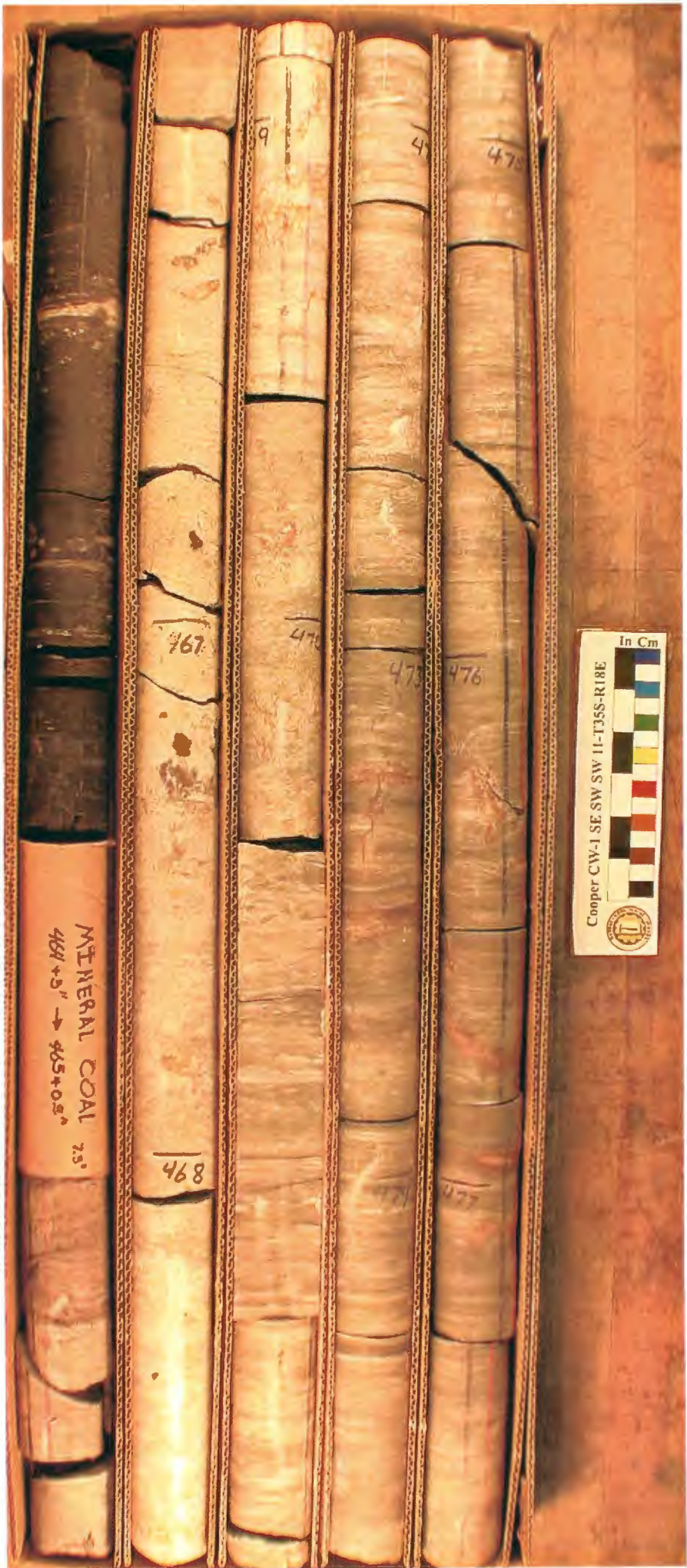
458

458

In Cm

Cooper CW-1 SE SW SW II-T35S-R18E





MINERAL COAL 25'  
464+5' → 465+0.5'

467

475

475

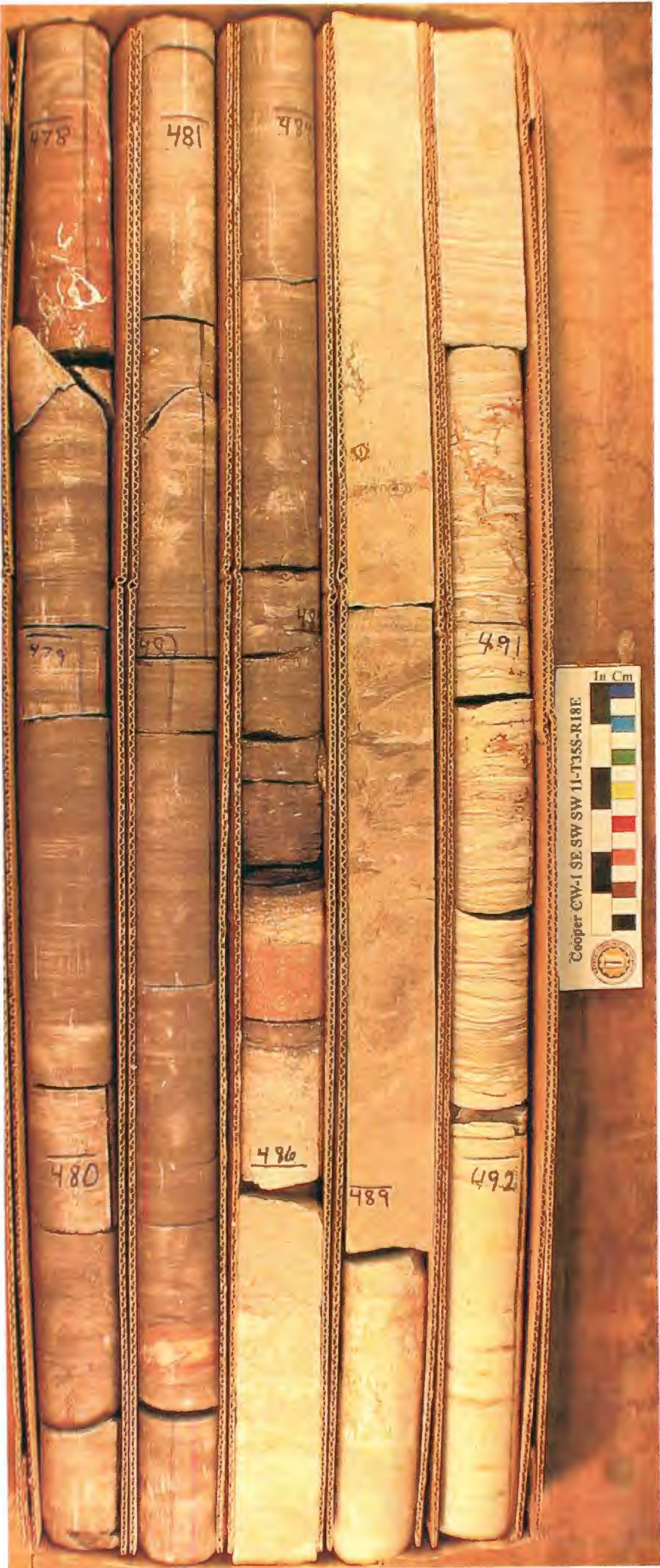
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In Cm

Cooper CW-1 SE SW SW 11-T355-R18E





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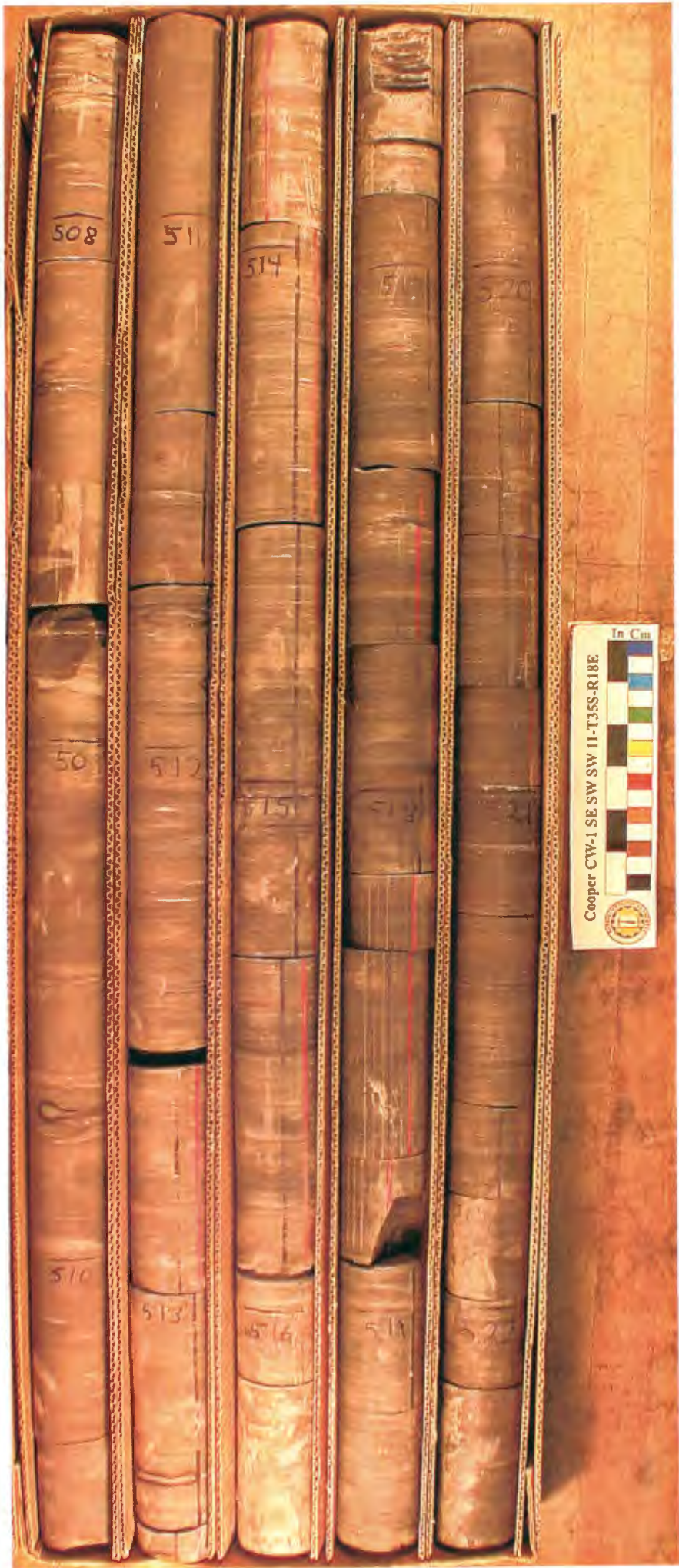
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In Cm  
Cooper CW-1 SE SW SW 11-T355-R18E  
  




*Handwritten label on top of roll 526:*  
The Court  
Significant  
Cases  
5/1/60

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Cooper CW-1 SE SW SW II-1355-R18E  
In Cm



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Cooper CW-I SE SW SW II-1355-R18E  
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Cooper CW-1 SE SW SW 11-T355-R18E  
In

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In. Cm  
Cooper CW-1 SE SW SW II-T35S-R18E  


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In Cm  
Cooper CW-1 SE SW SW 11-T35S-R18E  




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Cooper CW-J SE SW SW 11-1355-R18E  
In Cm



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Cooper CW-1 SE SW SW 11-T35S-R18E  
In Cm









In Cm  
Cooper CIW-1 SE SW SW II-1355-R18E



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In Cm  
Cooper CW-1 SE SW SW II-1355-R18E

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Cooper CW-1 SE SW SW 11-1355-R18E

In Cm



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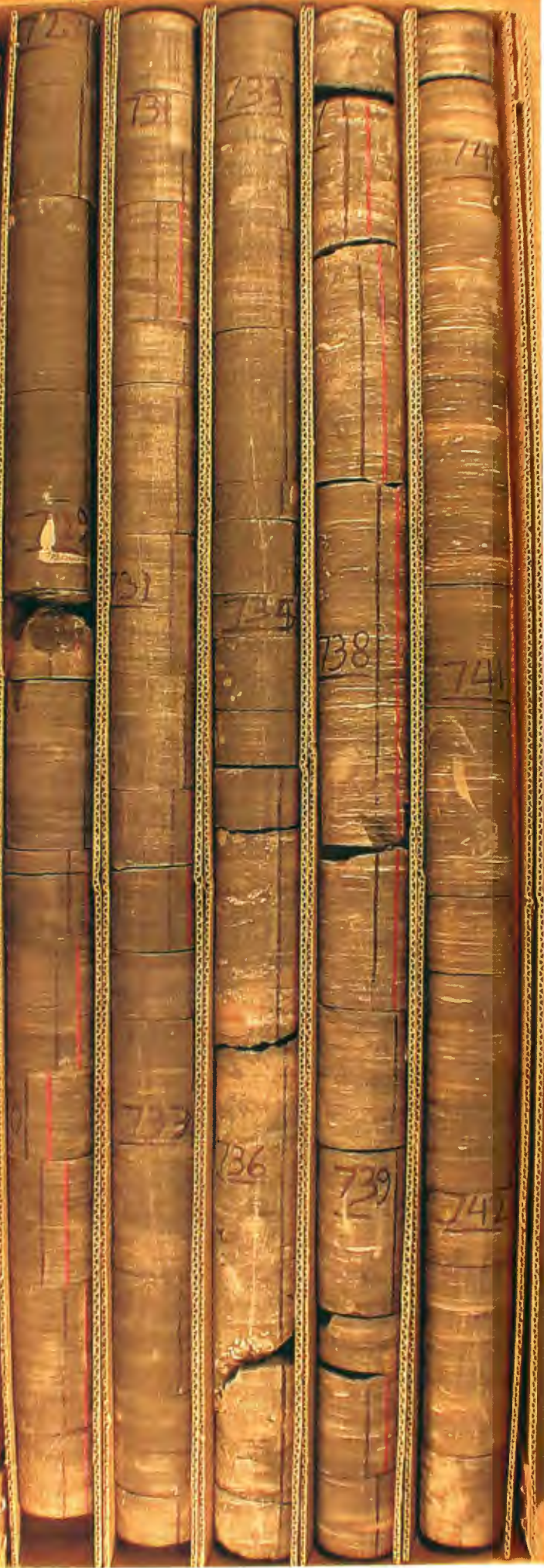
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In Cm  
Cooper CW-1 SE SW SW II-1355-R18E  






Cooper CW-1 SE SW SW 11-1355-R18E  
In Cu



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765

766.7  
769  
767.7  
768  
769

770  
771  
772



In Cm  
Cooper CIV-1 SE SW SW II-1355-R18E





In Cm  
Cooper CW-I SE SW SW 11-T355-R18E







803

809

Cass School

Fishermind

804

807

810

808


811

811

811





In Cm  
Cooper CW-1 SE SW SW 11-T355-R18E  


81

82

824

825

826

831





In Cm  
Cooper CW-1 SE SW SW 11-T35S-R18E

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In Cm  
Cooper CW-1 SE SW SW 11-T155-R18E

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857

850

**Desorption Characteristics of Cooper #Cw-1 Samples**  
 Kansas Geological Survey Cooper #CW-1 SE SW SW 11-T35S-R18E

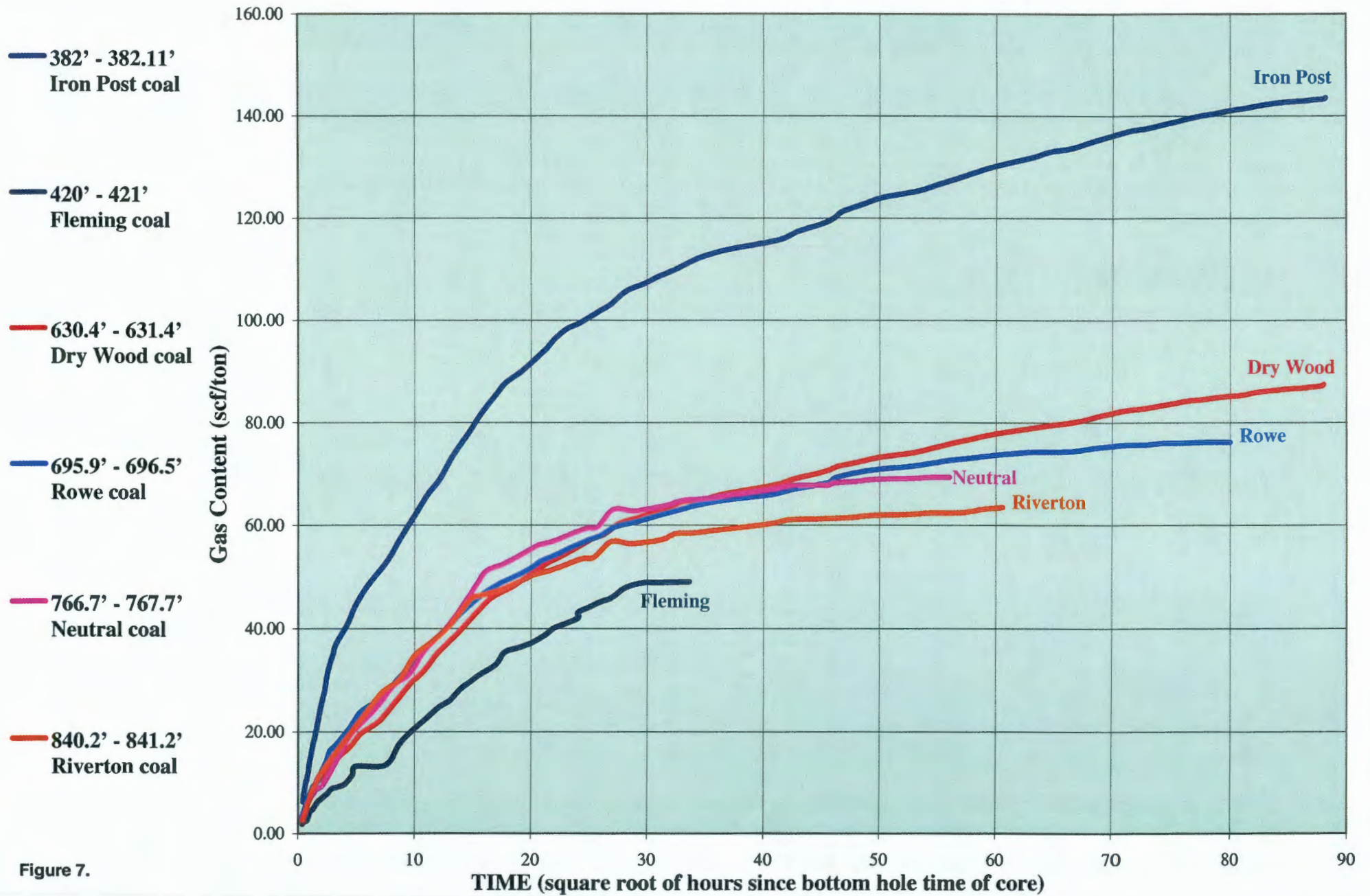


Figure 7.