ANALYSIS OF CHEROKEE GROUP COAL SAMPLES FOR GAS CONTENT AND CORE DESCRIPTION -- COLT ENERGY HINTHORN #CW-1 WELL (SE SW 14-T.32S.-R.16E.), MONTGOMERY COUNTY, KANSAS

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SUMMARY

During June of 2002 the Kansas Geological Survey drilled a continuous 2-inch diameter core from the surface to 1086 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 Colt Energy Hinthorn #CW-1 well in SE SW 14-T.32S.-R.16E., Montgomery Co., KS. Desorbed gas from these samples were measured with the following results:

Excello Shale (687.1'-688.1')	*[10.2 scf/ton]*
Excello Shale (689.4'-690.2')	*[20.4 scf/ton]*
Shale from above Mineral shale (778.2'-779.2')	*[11.3 scf/ton]*
Upper Weir-Pittsburg coal (868.4'-868.6')	*[45.6 scf/ton]*
Shale from above Lower Weir-Pittsburg coal (895.1'-896.1')	*[46.3 scf/ton]*
Riverton coal and shale (1068.3'-1069.3')	*[114 scf/ton]*

Coal and shale in the Riverton sample were weighed separately. A linear solution results in which the amount of gas evolved from the coal depends on the amount of gas the associated shale evolved. Nearby cored wells in which gas contents have been measured for shale closely associated with the Riverton coal indicate that these shales evolve about 3 scf/ton. Given this gas content for shale, the Riverton coal in the Hinthorn well has a gas content of 270 scf/ton.

BACKGROUND

The Colt Energy Hinthorn #CW-1 well in SE SW 14-T.32S.-R.16E., Montgomery 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 June 2-5, 2003 by Jonathan P. Lange of the Kansas Geological Survey, with well site collection aided by Jim Stegeman of Colt Energy. 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. Tichora, Inc., was charged with the responsibility to collect most of the coals from this well, but results for shale and minor coals collected separately by the Kansas Geological Survey are reported in this document.

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^3).

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

The 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:

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

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

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

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

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

The desorbed gas was summed over the time period for which the coal samples evolved all of their gas. The Riverton sample from the Hinthorn CW-1 well desorbed for almost 6 months, but other samples evolved gas for less time.

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 0.73% to 2.55%.

DATA PRESENTATION

Data and analyses accompanying this report are presented in the following order: 1) data tables for the desorption analyses, 2) lost-gas graphs, 3) a desorption graph for all the samples, and 4) a "lithologic component sensitivity analyses" showing the interdependence of gas evolved from dark shale versus coal for the Riverton coal sample,.

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.

"Lithologic Component Sensitivity Analysis" for Riverton sample (Figure 8)

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

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

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

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

The lithologic-component-sensitivity-analysis diagram therefore expresses the bivariant nature inherent in the determination of gas content in a mixed-lithologic sample. In the case of the Riverton sample, the shale portion and the coal portion were weighed separately after decanistering. The gas content of dark shales in Kansas can vary greatly,. Proprietary desorption analyses of dark shales in cores from southeastern Kansas have registered as much as 50 scf/ton, but can be as low as 2-4 scf/ton. For a general understanding of the lithologic-component-sensitivity-analyses diagrams, the calculated *gas content*$_{coal}$ is given for assumed *gas content*$_{dark\ shale}$ at 30 scf/ton and 50 scf/ton. Conversely though, to assume that all the gas evolved from a mixed-lithologic sample is derived solely from the coal would result in an erroneously high gas content for the coal.

In the case of shale in the stratigraphic vicinity of the Riverton coal in and around Montgomery County, samples of this shale generally desorb around 3 scf/ton. Using this value, the linear equation of shale and coal gas content in the Riverton sample solves at 270 scf/ton for pure coal.

In the lithologic-component-sensitivity-analysis diagram, a "break-even" point is noted where the gas content of the coal is equal to that of the dark shale. This "break-even" point corresponds to the minimum gas content assignable to the coal and maximum gas content assignable to the dark shale. It can also be thought of the scf/ton gas content of the entire sample, as shown on the desorption graphs (Figure 7).

PROXIMATE ANALYSIS and ASHING EXPERIMENTS

A sample of coal from the Riverton coal was sent out for proximate analysis at Luman's Labs in Chetopa, KS. The sample was 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:

As Received

moisture	*ash*	*volatile matter*	*fixed carbon*	*BTU/lb*	*sulfur*
1.48%	11.75%	31.86%	54.91%	13386	2.73%

Moisture Free

ash	*volatile matter*	*fixed carbon*	*BTU/lb*	*sulfur*
11.93%	32.34%	55.73%	13587	2.77%

Moisture/ash free

BTU/lb
15427

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

Simple ashing of the samples at the Kansas Geological Survey were 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%.

unit	*depth*	*moisture*	*ash*	*moisture-free ash*
Excello Shale	687.1'	0.77%	83.43%	84.08%
Excello Shale	689.6'	0.98%	81.47%	82.28%

sh. above Mineral	779.0’	1.44%	56.33%	57.16%
U. Weir coal	868.4’	0.52%	7.47%	7.51%
L. Weir sh.	895.1’	0.23%	66.39%	66.54%
sh. above Riverton	1068.3’	0.80%	90.32%	91.05%
Riverton coal	1068.6’	0.43%	7.25%	7.28%

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:

unit	*depth*	*moisture-free ash*	G_c	G_{pc}
Excello Shale	687.1’	84.08%	10.2 scf/ton	64.3 scf/ton
Excello Shale	689.6’	82.28%	20.4 scf/ton	115.1 scf/ton
sh. above Mineral	779.0’	57.16%	11.3 scf/ton	26.3 scf/ton
U. Weir coal	868.4’	7.51%	45.6 scf/ton	49.3 scf/ton
L. Weir sh.	895.1’	66.54%	46.3 scf/ton	138.3 scf/ton
sh. above Riverton	1068.3’	91.05%	3.0 scf/ton	33.5 scf/ton
Riverton coal	1068.6’	7.28%	270.0 scf/ton	291.2 scf/ton
Riverton coal (Luman’s Labs analysis)	1068.6’	11.93%	270.0 scf/ton	306.6 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

SAMPLE: Riverton Coal (1068.3'-1069.3') in numberless Stegeman container in 90-degree bath

MEASURED DENSITY: 2.59 grams/cc average; 2.61 max, 2.58 min

sample air dried 10 days

	lbs.	grams		lbs.	grams	free moisture
DRY WEIGHT sample weight:	1.97	895.46	WET WEIGHT sample weight:	2.03	916.93	2.55%

est. lost gas (cc) = 195

TIME OF:	off botton	at surface	in canister
	6/5/02 10:37	6/5/02 10:47	6/5/02 10:51

elapsed time (off-bottom to canistering)

13.3 minutes

0.222 hours

0.471404521 SQRT (hrs)

CONVERSION OF VOLUMES TO STP

RIG MEASUREMENTS		CONVERSION OF RIG MEASUREMENTS TO STP (cubic ft; @60 degrees; @14.7 psi)					CUMULATIVE VOLUMES		SCF/TON (approx)	SCF/TON (approx)		TIME SINCE			
measured cc	measured T (F)	cubic ft (@rig)	ABSOLUTE T (F) (@rig)	psia (@rig)	cubic ft (@STP)	cc (@STP)	cubic ft (@STP)	cc (@STP)	without lost gas	with lost gas	TIME OF MEASURE	off bottom	at surface	in canister	SQRT hrs. (since off bottom)
57	82	0.002012944	542	14.013	0.001840982	52.1306	0.001840982	52.1306	1.665048459	8.641459036	6/5/02 10:59	0:21:20	0:12:00	0:08:00	0.596284794
8	82	0.000282516	542	14.013	0.000258363	7.316575	0.002099365	59.4472	2.126809647	9.103220224	6/5/02 11:01	0:23:20	0:14:00	0:10:00	0.623609564
4	82	0.000141259	542	14.013	0.000129192	3.658266	0.002228557	63.1055	2.25769024	9.234100817	6/5/02 11:02	0:24:20	0:15:00	0:11:00	0.636832439
4	82	0.000141259	542	14.013	0.000129192	3.658266	0.002357748	66.7637	2.388570834	9.364981411	6/5/02 11:04	0:26:20	0:17:00	0:13:00	0.662466897
3	82	0.000105944	542	14.013	9.68938E-05	2.743716	0.002454642	69.5075	2.486731279	9.463141856	6/5/02 11:05	0:27:20	0:18:00	0:14:00	0.674948558
2	82	7.06296E-05	542	14.013	6.45958E-05	1.829144	0.002519238	71.3366	2.552171576	9.528582153	6/5/02 11:06	0:28:20	0:19:00	0:15:00	0.687184271
3	82	0.000105944	542	14.013	9.68938E-05	2.743716	0.002616132	74.0803	2.650332021	9.626742598	6/5/02 11:07	0:29:20	0:20:00	0:16:00	0.699205699
2	82	7.06296E-05	542	14.013	6.45958E-05	1.829144	0.002680728	75.9095	2.715772318	9.692182895	6/5/02 11:08	0:30:20	0:21:00	0:17:00	0.7110243
4	82	0.000141259	542	14.013	0.000129192	3.658266	0.002809919	79.5678	2.846652912	9.823063489	6/5/02 11:10	0:32:20	0:23:00	0:19:00	0.734090518
3	82	0.000105944	542	14.013	9.68938E-05	2.743716	0.002906813	82.3115	2.944813357	9.921223934	6/5/02 11:11	0:33:20	0:24:00	0:20:00	0.745355992
1.5	82	5.29722E-05	542	14.013	4.84469E-05	1.371856	0.00295526	83.6833	2.993893579	9.970304156	6/5/02 11:12	0:34:20	0:25:00	0:21:00	0.756453715
1.5	82	5.29722E-05	542	14.013	4.84469E-05	1.371856	0.003003707	85.0552	3.042973802	10.01938438	6/5/02 11:13	0:35:20	0:26:00	0:22:00	0.767390962
6	82	0.000211889	542	14.013	0.000193788	5.487431	0.003197494	90.5426	3.239294693	10.21570527	6/5/02 11:16	0:38:20	0:29:00	0:25:00	0.799305254
7.5	82	0.000264861	542	14.013	0.000242234	6.859289	0.003439729	97.4019	3.484695806	10.46110638	6/5/02 11:20	0:42:20	0:33:00	0:29:00	0.839973545
7.5	82	0.000264861	542	14.013	0.000242234	6.859289	0.003681963	104.261	3.730096919	10.7065075	6/5/02 11:24	0:46:20	0:37:00	0:33:00	0.878761755
11	82	0.000388463	542	14.013	0.000355277	10.06029	0.00403724	114.321	4.090018551	11.06642913	6/5/02 11:31	0:53:20	0:44:00	0:40:00	0.942809042
30.5	82	0.001077101	542	14.013	0.000985087	27.89444	0.005022327	142.216	5.087983076	12.06439365	6/5/02 11:55	1:17:20	1:08:00	1:04:00	1.135292424
13.5	82	0.00047675	542	14.013	0.000436022	12.34672	0.005458349	154.563	5.529705081	12.50611566	6/5/02 12:07	1:29:20	1:20:00	1:18:00	1.220200348
132	82	0.004661554	542	14.013	0.004263326	120.7235	0.009721675	275.286	9.848764671	16.82517525	6/5/02 16:27	5:49:20	5:40:00	5:36:00	2.412928143
40.2	82	0.001419655	542	14.013	0.001298377	36.76579	0.011020051	312.052	11.16411464	18.14052521	6/5/02 18:10	7:32:20	7:23:00	7:19:00	2.745703715
132	82	0.004661554	542	14.013	0.004263326	120.7235	0.015283377	432.775	15.48317423	22.4595848	6/5/02 22:14	11:36:20	11:27:00	11:23:00	3.406692759
227.3	83	0.008027054	543	14.013	0.007327798	207.4993	0.022611175	640.275	22.90676729	29.88317787	6/6/02 8:20	21:42:20	21:33:00	21:29:00	4.658922145
15	83	0.000529722	543	14.013	0.000483577	13.69331	0.023094752	653.968	23.39666565	30.37307623	6/6/02 9:01	22:23:20	22:14:00	22:10:00	4.731669856
109	90	0.003849313	550	14.080	0.003485854	98.70803	0.026580606	752.676	26.92808966	33.90450048	6/6/02 16:59	30:21:20	30:12:00	30:08:00	5.509587603
175	89	0.00618009	549	14.050	0.005594803	158.4268	0.032175409	911.103	32.59603267	39.57244325	6/7/02 9:12	46:34:20	46:25:00	46:21:00	6.824384384
113	89	0.003990572	549	13.965	0.003595931	101.825	0.03577134	1012.93	36.23897251	43.21538308	6/7/02 21:25	58:47:20	58:38:00	58:34:00	7.66739127
140	89	0.004944072	549	13.970	0.004450357	126.0198	0.040221697	1138.95	40.74750835	47.72391893	6/8/02 17:50	79:12:20	79:03:00	78:59:00	8.899750309
160	90	0.005650388	550	13.990	0.005084143	143.9664	0.04530584	1282.91	45.89811583	52.8745264	6/9/02 22:30	107:52:20	107:43:00	107:39:00	10.38615531
142	90	0.005014702	550	13.960	0.004508952	127.6788	0.049814792	1410.59	50.46601213	57.44242271	6/10/02 17:50	127:12:20	127:03:00	126:59:00	11.27854404
113	95	0.003990572	555	13.965	0.003551969	100.5802	0.053366761	1511.17	54.06441536	61.04082596	6/11/02 11:37	144:59:20	144:50:00	144:46:00	12.04113321
43	90	0.001518536	550	13.970	0.00136441	38.63565	0.054731171	1549.81	55.4466622	62.42307276	6/11/02 21:52	155:14:20	155:05:00	155:01:00	12.45948991
51	90	0.001801055	550	14.020	0.001624048	45.98788	0.056355219	1595.8	57.09193884	64.06834941	6/12/02 11:33	168:55:20	168:46:00	168:42:00	12.9970082
68	90	0.002401406	550	14.035	0.002167711	61.38251	0.058522928	1657.18	59.28798805	66.26439863	6/13/02 9:20	190:42:20	190:33:00	190:29:00	13.80961823
84	90	0.002966443	550	14.085	0.0026873	76.09556	0.061210228	1733.27	62.01041903	68.98682961	6/14/02 13:48	219:10:20	219:01:00	218:57:00	14.80446629
76	90	0.002683925	550	14.000	0.002416694	68.4329	0.063626922	1801.71	64.45870626	71.43511684	6/15/02 18:58	248:20:20	248:11:00	248:07:00	15.75877161
96	90	0.003390221	550	14.030	0.003059208	86.62679	0.06668613	1888.33	67.55790655	74.53431713	6/17/02 11:42	289:04:20	288:55:00	288:51:00	17.00212405
66	90	0.002330777	550	13.960	0.00209571	59.34367	0.06878184	1947.68	69.88101336	76.85742396	6/18/02 16:30	319:52:20	319:43:00	319:39:00	17.88497197
72	90	0.002542666	550	14.155	0.002314848	65.54894	0.071096688	2013.23	72.02612279	79.00253337	6/20/02 16:06	365:28:20	365:19:00	365:15:00	19.1173278
59	90	0.002083573	550	14.175	0.001899569	53.78981	0.072996257	2067.02	73.95052488	80.92693546	6/22/02 0:47	398:09:20	398:00:00	397:56:00	19.95383561
60	90	0.002118888	550	14.080	0.001918819	54.33469	0.074915076	2121.35	75.89442613	82.8708367	6/23/02 19:52	441:14:20	441:05:00	441:01:00	21.00568706
54	90	0.001906999	550	14.060	0.001724484	48.83178	0.07663956	2170.18	77.64145595	84.61786652	6/25/02 14:20	483:42:20	483:33:00	483:29:00	21.99330706
85	90	0.003001758	550	13.985	0.002699985	76.45479	0.079339545	2246.64	80.37673613	87.3531467	6/27/02 19:21	536:43:20	536:34:00	536:30:00	23.16726618
75	90	0.00264861	550	14.055	0.002394265	67.79777	0.08173381	2314.44	82.80230277	89.77871335	6/30/02 20:18	609:40:20	609:31:00	609:27:00	24.69154151
44	90	0.001553851	550	14.060	0.001407134	39.84544	0.083140944	2354.28	84.22783182	91.20424239	7/2/02 17:22	654:44:20	654:35:00	654:31:00	25.58786605
56	90	0.001977629	550	14.110	0.001794713	50.82043	0.084935658	2405.1	86.04600723	93.02241781	7/5/02 15:09	724:31:20	724:22:00	724:18:00	26.91695048
44	90	0.001553851	550	14.115	0.001410632	39.94449	0.086346289	2445.05	87.47507985	94.45149043	7/7/02 21:38	779:00:20	778:51:00	778:47:00	27.910671
46	90	0.001624481	550	14.085	0.001469527	41.61222	0.087815816	2486.66	88.96381797	95.94022854	7/10/02 15:51	845:13:20	845:04:00	845:00:00	29.07270579
24	90	0.000847555	550	14.030	0.000764802	21.6567	0.088580618	2508.31	89.73861804	96.71502862	7/11/02 18:27	871:49:20	871:40:00	871:36:00	29.52663581
30	90	0.001059444	550	14.050	0.000957365	27.10948	0.089537984	2535.42	90.70849874	97.68490932	7/13/02 20:15	921:37:20	921:28:00	921:24:00	30.35823154
30	90	0.001059444	550	14.075	0.000959068	27.1577	0.090497052	2562.58	91.68010521	98.65651579	7/15/02 20:54	970:16:20	970:07:00	970:03:00	31.14919296
17	90	0.000600352	550	14.055	0.0005427	15.3675	0.091039752	2577.95	92.22989987	99.20631044	7/16/02 17:50	991:12:20	991:03:00	990:59:00	31.48341715
10	90	0.000353148	550	14.105	0.000320371	9.071861	0.091360123	2587.02	92.554459	99.53086957	7/17/02 10:56	1008:18:20	1008:09:00	1008:05:00	31.75362742
22	90	0.000776926	550	14.015	0.000700319	19.83075	0.092060442	2606.85	93.26393306	100.2403436	7/18/02 17:13	1038:35:20	1038:26:00	1038:22:00	32.22714522
16	90	0.000565037	550	14.025	0.000509686	14.43265	0.092570128	2621.28	93.78028236	100.7566929	7/19/02 17:30	1062:52:20	1062:43:00	1062:39:00	32.60172115
13	90	0.000459092	550	14.015	0.000413825	11.71817	0.092983953	2633	94.19951703	101.1759276	7/20/02 18:31	1087:53:20	1087:44:00	1087:40:00	32.98316069
17	90	0.000600352	550	14.055	0.0005427	15.3675	0.093526653	2648.37	94.74931168	101.7257223	7/22/02 16:10	1133:32:20	1133:23:00	1133:19:00	33.66806928
0	90	0	550	14.030	0	0	0.093526653	2648.37	94.74931168	101.7257223	7/29/02 15:07	1300:29:20	1300:20:00	1300:16:00	36.06229179
50	90	0.00176574	550	14.150	0.001606966	45.50402	0.095133619	2693.87	96.37728463	103.3536952	8/5/02 10:31	1463:53:20	1463:44:00	1463:40:00	38.26080094
15	90	0.000529722	550	14.015	0.00047749	13.52098	0.095611109	2707.39	96.86101695	103.8374275	8/12/02 13:34	1634:56:20	1634:47:00	1634:43:00	40.43437756
85	90	0.003001758	550	13.950	0.002693229	76.26345	0.098304337	2783.66	99.58945359	106.5658642	8/23/02 16:52	1902:14:20	1902:05:00	1902:01:00	43.61466369
20	90	0.000706296	550	14.090	0.000640061	18.12443	0.098944398	2801.78	100.2378615	107.2142921	8/26/02 10:43	1968:05:20	1967:56:00	1967:52:00	44.36314787
32	90	0.001130074	550	13.989	0.001016756	28.79121	0.099961154	2830.57	101.2679294	108.2443399	9/2/02 14:28	2139:50:20	2139:41:00	2139:37:00	46.25839263
18	90	0.000635666	550	14.080	0.000575646	16.30041	0.1005368	2846.87	101.8511003	108.8275109	9/7/02 12:50	2258:12:20	2258:03:00	2257:59:00	47.52058034
28	90	0.000988814	550	13.976	0.000888835	25.1689	0.101425634	2872.04	102.7515546	109.7279652	9/13/02 18:31	2407:53:20	2407:44:00	2407:40:00	49.07024443

30	90	0.001059444	550	13.940	0.00094987	26.89722	0.102375504	2898.94	103.7138419	110.8902525	9/20/02	10:33	2567:55:20	2567:46:00	2567:42:00	50.67467042
25	90	0.00088287	550	14.015	0.000795817	22.53494	0.103171321	2921.48	104.5200625	111.498473	9/27/02	14:03	2739:25:20	2739:16:00	2739:12:00	52.33949008
22	90	0.000776926	550	14.054	0.000702268	19.88593	0.103873589	2941.36	105.2315108	112.2079214	10/4/02	18:58	2912:20:20	2912:11:00	2912:07:00	53.96609018
20	90	0.000706296	550	14.028	0.000637244	18.04468	0.104510833	2959.41	105.8770855	112.8534961	10/11/02	17:46	3079:08:20	3078:59:00	3078:55:00	55.48998909
23	90	0.00081224	550	13.960	0.000729278	20.65079	0.105240111	2980.06	106.6158976	113.5923082	10/18/02	15:02	3244:24:20	3244:15:00	3244:11:00	56.9596836
15	90	0.000529722	550	14.140	0.000481749	13.64158	0.10572186	2993.7	107.1039443	114.0803549	10/26/02	15:03	3436:25:20	3436:16:00	3436:12:00	58.62100496
-2	85	-7.06296E-05	545	14.028	-6.4309E-05	-1.821022	0.105657551	2991.88	107.0387948	114.0152052	11/7/02	13:03	3722:25:20	3722:16:00	3722:12:00	61.01165645
8	85	0.000282518	545	14.093	0.000258428	7.317841	0.105915979	2999.2	107.300801	114.2770116	11/16/02	22:46	3948:08:20	3947:59:00	3947:55:00	62.8342175
4	85	0.000141259	545	14.230	0.00013047	3.694489	0.106046449	3002.89	107.4327768	114.4091874	11/22/02	17:26	4086:48:20	4086:39:00	4086:35:00	63.92812805

SAMPLE DECANISTERED 12/03/02 DUE TO NO MORE GAS BEING EVOLVED

SAMPLE: Lower Weir (895.1'-896.1') in Stegeman container #5 in 85-degree bath

est. lost gas (cc) =
200

sample dried 40 days in air

DRY WEIGHT	lbs.	grams	WET WEIGHT	lbs.	grams	free moisture
sample weight:	3.08	1396.15	wet sample weight:	3.11	1412.03	1.12%

TIME OF:

off botton	at surface	in canister
6/3/02 12:41	6/3/02 12:55	6/3/02 12:55

elapsed time (off-bottom to canistering)
13.9 minutes
0.23 hours
0.480740170 SQRT (hrs)

CONVERSION OF VOLUMES TO STP

RIG MEASUREMENTS		CONVERSION OF RIG MEASUREMENTS TO STP (cubic ft; @60 degrees; @14.7 psi)					CUMULATIVE VOLUMES		SCF/TON (approx)	SCF/TON (approx)			TIME SINCE			
measured cc	measured T (F)	cubic ft (@rig)	ABSOLUTE T (F) (@rig)	psia (@rig)	cubic ft (@STP)	cc (@STP)	cubic ft (@STP)	cc (@STP)	without lost gas	with lost gas	TIME OF MEASURE		off bottom	at surface	in canister	SQRT hrs. (since off bottom)
26	81	0.000918185	541	14.018	0.000841598	23.83132	0.000841598	23.8313	0.546850455	5.136192493	6/3/02	13:00	0:18:52	0:05:00	0:05:00	0.560753461
11	81	0.000388463	541	14.018	0.000356061	10.08248	0.001197659	33.9138	0.778210263	5.367552301	6/3/02	13:01	0:19:52	0:06:00	0:06:00	0.57542255
13	81	0.000459092	541	14.018	0.000420799	11.91586	0.001618458	45.8295	1.051635491	5.640977528	6/3/02	13:03	0:21:52	0:08:00	0:08:00	0.603692343
29	81	0.001024129	541	14.018	0.000938708	26.58109	0.002557164	72.4108	1.661584076	6.250926113	6/3/02	13:07	0:25:52	0:12:00	0:12:00	0.65659052
7	81	0.000247204	541	14.018	0.000226584	6.416125	0.002783749	78.8267	1.808813044	6.398155082	6/3/02	13:08	0:26:52	0:13:00	0:13:00	0.669161997
6	81	0.000211889	541	14.018	0.000194215	5.499536	0.002977964	84.3262	1.935009303	6.52435134	6/3/02	13:09	0:27:52	0:14:00	0:14:00	0.68150161
6	81	0.000211889	541	14.018	0.000194215	5.499536	0.003172179	89.8258	2.061205562	6.650547599	6/3/02	13:10	0:28:52	0:15:00	0:15:00	0.693621735
6	81	0.000211889	541	14.018	0.000194215	5.499536	0.003366394	95.3253	2.187401821	6.776743858	6/3/02	13:11	0:29:52	0:16:00	0:16:00	0.705533683
12	81	0.000423776	541	14.018	0.00038843	10.99907	0.003754824	106.324	2.439794339	7.029136376	6/3/02	13:12	0:30:52	0:17:00	0:17:00	0.717247826
6	81	0.000211889	541	14.018	0.000194215	5.499536	0.003949039	111.824	2.565990598	7.155332635	6/3/02	13:13	0:31:52	0:18:00	0:18:00	0.728773704
5	81	0.000176574	541	14.018	0.000161848	4.582947	0.004110884	116.407	2.671154147	7.260496184	6/3/02	13:14	0:32:52	0:19:00	0:19:00	0.74012011
6	81	0.000211889	541	14.018	0.000194215	5.499536	0.004305099	121.906	2.797350406	7.386692443	6/3/02	13:15	0:33:52	0:20:00	0:20:00	0.751295178
5	81	0.000176574	541	14.018	0.000161848	4.582947	0.004466945	126.489	2.902513955	7.491855992	6/3/02	13:16	0:34:52	0:21:00	0:21:00	0.762306442
6	81	0.000211889	541	14.018	0.000194215	5.499536	0.00466116	131.989	3.028710214	7.618052251	6/3/02	13:17	0:35:52	0:22:00	0:22:00	0.7731609
5	81	0.000176574	541	14.018	0.000161848	4.582947	0.004823006	136.572	3.133873763	7.7232158	6/3/02	13:18	0:36:52	0:23:00	0:23:00	0.783865068
5	81	0.000176574	541	14.018	0.000161848	4.582947	0.004984852	141.155	3.239037312	7.828379349	6/3/02	13:19	0:37:52	0:24:00	0:24:00	0.794425019
5	81	0.000176574	541	14.018	0.000161848	4.582947	0.005146698	145.738	3.344200861	7.933542898	6/3/02	13:20	0:38:52	0:25:00	0:25:00	0.804846431
5	81	0.000176574	541	14.018	0.000161848	4.582947	0.005308544	150.321	3.44936441	8.038706447	6/3/02	13:21	0:39:52	0:26:00	0:26:00	0.815134617
5	81	0.000176574	541	14.018	0.000161848	4.582947	0.00547039	154.904	3.554527959	8.143869996	6/3/02	13:22	0:40:52	0:27:00	0:27:00	0.82529456
5	81	0.000176574	541	14.018	0.000161848	4.582947	0.005632235	159.487	3.659691508	8.249033546	6/3/02	13:23	0:41:52	0:28:00	0:28:00	0.835330939
5	81	0.000176574	541	14.018	0.000161848	4.582947	0.005794081	164.069	3.764855057	8.354197095	6/3/02	13:24	0:42:52	0:29:00	0:29:00	0.845248156
4	81	0.000141259	541	14.018	0.000129477	3.666357	0.005923558	167.736	3.848985897	8.438327934	6/3/02	13:25	0:43:52	0:30:00	0:30:00	0.855050356
4.5	81	0.000158917	541	14.018	0.000145661	4.124652	0.006069219	171.861	3.943633091	8.532975128	6/3/02	13:26	0:44:52	0:31:00	0:31:00	0.864741451
4.5	81	0.000158917	541	14.018	0.000145661	4.124652	0.00621488	175.985	4.038280285	8.627622322	6/3/02	13:27	0:45:52	0:32:00	0:32:00	0.874325137
5	81	0.000176574	541	14.018	0.000161848	4.582947	0.006376726	180.568	4.143443834	8.732785871	6/3/02	13:28	0:46:52	0:33:00	0:33:00	0.883804906
4.5	81	0.000158917	541	14.018	0.000145661	4.124652	0.006522386	184.693	4.238091028	8.827433065	6/3/02	13:29	0:47:52	0:34:00	0:34:00	0.893184067
4.5	81	0.000158917	541	14.018	0.000145661	4.124652	0.006668049	188.817	4.332738222	8.92208026	6/3/02	13:30	0:48:52	0:35:00	0:35:00	0.902465758
4	81	0.000141259	541	14.018	0.000129477	3.666357	0.006797525	192.484	4.416869062	9.006211099	6/3/02	13:31	0:49:52	0:36:00	0:36:00	0.911652955
4.5	81	0.000158917	541	14.018	0.000145661	4.124652	0.006943187	196.608	4.511516256	9.100858293	6/3/02	13:32	0:50:52	0:37:00	0:37:00	0.920748488
4.5	81	0.000158917	541	14.018	0.000145661	4.124652	0.007088848	200.733	4.60616345	9.195505487	6/3/02	13:33	0:51:52	0:38:00	0:38:00	0.929755045
4	81	0.000141259	541	14.018	0.000129477	3.666357	0.007218325	204.399	4.690294289	9.279636327	6/3/02	13:34	0:52:52	0:39:00	0:39:00	0.938675189
4	81	0.000141259	541	14.018	0.000129477	3.666357	0.007347801	208.066	4.774425129	9.363767166	6/3/02	13:35	0:53:52	0:40:00	0:40:00	0.94751136
4.5	81	0.000158917	541	14.018	0.000145661	4.124652	0.007493463	212.19	4.869072323	9.45841436	6/3/02	13:36	0:54:52	0:41:00	0:41:00	0.956265886
4	81	0.000141259	541	14.018	0.000129477	3.666357	0.007622939	215.857	4.953203162	9.542545199	6/3/02	13:37	0:55:52	0:42:00	0:42:00	0.964940988
4	81	0.000141259	541	14.018	0.000129477	3.666357	0.007752416	219.523	5.037334001	9.626676039	6/3/02	13:38	0:56:52	0:43:00	0:43:00	0.973538791
4	81	0.000141259	541	14.018	0.000129477	3.666357	0.007881893	223.19	5.121464841	9.710806878	6/3/02	13:39	0:57:52	0:44:00	0:44:00	0.982061324
6	81	0.000211889	541	14.018	0.000194215	5.499536	0.008076108	228.689	5.247661099	9.837003137	6/3/02	13:40	0:58:52	0:45:00	0:45:00	0.990510531
4	81	0.000141259	541	14.018	0.000129477	3.666357	0.008205584	232.355	5.331791939	9.921133978	6/3/02	13:41	0:59:52	0:46:00	0:46:00	0.998888271
4	81	0.000141259	541	14.018	0.000129477	3.666357	0.008335061	236.022	5.415922778	10.00526482	6/3/02	13:42	1:00:52	0:47:00	0:47:00	1.007198329
4	81	0.000141259	541	14.018	0.000129477	3.666357	0.008464538	239.688	5.500053617	10.08939565	6/3/02	13:43	1:01:52	0:48:00	0:48:00	1.015436414
3	81	0.000105944	541	14.018	9.71075E-05	2.749768	0.008561645	242.438	5.563151747	10.15249378	6/3/02	13:44	1:02:52	0:49:00	0:49:00	1.023610169
3.5	81	0.000123602	541	14.018	0.000113292	3.208063	0.008674937	245.646	5.636766231	10.22610827	6/3/02	13:45	1:03:52	0:50:00	0:50:00	1.031719169
4	81	0.000141259	541	14.018	0.000129477	3.666357	0.008804414	249 312	5.72089707	10.31023911	6/3/02	13:46	1:04:52	0:51:00	0:51:00	1.039764931
3 5	81	0.000123602	541	14.018	0.000113292	3.208063	0.008917706	252.52	5.794511555	10.38385359	6/3/02	13:47	1:05:52	0:52:00	0:52:00	1.04774891
3	81	0.000105944	541	14.018	9.71075E-05	2.749768	0.009014814	255.27	5.857609684	10.44695172	6/3/02	13:48	1:06:52	0:53:00	0:53:00	1.055672508
4	81	0.000141259	541	14.018	0.000129477	3.666357	0.00914429	258.936	5.941740523	10.53108258	6/3/02	13:49	1:07:52	0:54:00	0:54:00	1.063537076
3.5	81	0.000123602	541	14.018	0.000113292	3.208063	0.009257582	262.145	6.015355008	10.60469705	6/3/02	13:50	1:08:52	0:55:00	0:55:00	1.071343912
3	81	0.000105944	541	14.018	9.71075E-05	2.749768	0.00935469	264.894	6.078453137	10.66779517	6/3/02	13:51	1:09:52	0:56:00	0:56:00	1.07909427
3.5	81	0.000123602	541	14.018	0.000113292	3.208063	0.009467982	268.102	6.152067622	10.74140966	6/3/02	13:52	1:10:52	0:57:00	0:57:00	1.086789359
3.5	81	0.000123602	541	14.018	0.000113292	3.208063	0.009581274	271.31	6.225682106	10.81502414	6/3/02	13:53	1:11:52	0:58:00	0:58:00	1.094430344
3	81	0.000105944	541	14.018	9.71075E-05	2.749768	0.009678382	274.06	6.288780235	10.87812227	6/3/02	13:54	1:12:52	0:59:00	0:59:00	1.10201835
3.5	81	0.000123602	541	14.018	0.000113292	3.208063	0.009791674	277.268	6.36239472	10.95173678	6/3/02	13:55	1:13:52	1:00:00	1:00:00	1.109554465
3.5	81	0.000123602	541	14.018	0 000113292	3.208063	0 009904966	280.476	6.436009204	11.02535124	6/3/02	13:56	1:14:52	1:01:00	1:01:00	1.117039739

4	81	0.000141259	541	14.018	0.000129477	3.666357	0.010034442	284.143	6.520140043	11.10948208	6/3/02 13:57	1:15:52	1:02:00	1:02:00	1.124475168	
3	81	0.000105944	541	14.018	9.71075E-05	2.749768	0.01013155	286.892	6.583238173	11.17258021	6/3/02 13:58	1:16:52	1:03:00	1:03:00	1.13186179	
3	81	0.000105944	541	14.018	9.71075E-05	2.749768	0.010228657	289.642	6.646338302	11.23567834	6/3/02 13:59	1:17:52	1:04:00	1:04:00	1.139200499	
3.5	81	0.000123602	541	14.018	0.000113292	3.208063	0.01034195	292.85	6.719950787	11.30929282	6/3/02 14:00	1:18:52	1:05:00	1:05:00	1.146492235	
3.5	81	0.000123602	541	14.018	0.000113292	3.208063	0.010455242	296.058	6.793565271	11.38290731	6/3/02 14:01	1:19:52	1:06:00	1:06:00	1.153737887	
3	81	0.000105944	541	14.018	9.71075E-05	2.749768	0.010552349	298.808	6.8566634	11.44600544	6/3/02 14:02	1:20:52	1:07:00	1:07:00	1.160936318	
11.5	81	0.00040612	541	14.018	0.000372245	10.54078	0.010924595	309.349	7.098539563	11.6878816	6/3/02 14:11	1:29:52	1:16:00	1:16:00	1.223837317	
3	81	0.000105944	541	14.018	9.71075E-05	2.749768	0.011021702	312.099	7.161637693	11.75097973	6/3/02 14:12	1:30:52	1:17:00	1:17:00	1.230627683	
2.5	81	0.000088287	541	14.018	8.09229E-05	2.291473	0.011102625	314.39	7.214219487	11.8035615	6/3/02 14:13	1:31:52	1:18:00	1:18:00	1.237380746	
3	81	0.000105944	541	14.018	9.71075E-05	2.749768	0.011199732	317.14	7.277317597	11.86665963	6/3/02 14:14	1:32:52	1:19:00	1:19:00	1.244097174	
22	81	0.000776926	541	14.018	0.000712122	20.16497	0.011911854	337.305	7.740037213	12.32937925	6/3/02 14:17	1:35:52	1:22:00	1:22:00	1.264032348	
3	81	0.000105944	541	14.018	9.71075E-05	2.749768	0.012008962	340.055	7.803135342	12.39247738	6/3/02 14:20	1:38:52	1:25:00	1:25:00	1.283657988	
5	81	0.000176574	541	14.018	0.000161848	4.582947	0.012170808	344.638	7.908298891	12.49764093	6/3/02 14:25	1:43:52	1:30:00	1:30:00	1.315718957	
24	81	0.000847555	541	14.018	0.00077686	21.99814	0.012947668	366.636	8.413063927	13.00240596	6/3/02 14:32	1:50:52	1:37:00	1:37:00	1.3593299	
13	81	0.000459092	541	14.018	0.000420799	11.91566	0.013368467	378.551	8.686509155	13.27585119	6/3/02 14:37	1:55:52	1:42:00	1:42:00	1.389644239	
17	81	0.000600352	541	14.018	0.000550276	15.58202	0.013918743	394.133	9.044065221	13.63340726	6/3/02 14:47	2:05:52	1:52:00	1:52:00	1.448370732	estimate
4	81	0.000141259	541	14.018	0.000129477	3.666357	0.014048219	397.8	9.128196061	13.7175381	6/3/02 14:56	2:14:52	2:01:00	2:01:00	1.499259078	
3	81	0.000105944	541	14.018	9.71075E-05	2.749768	0.014145327	400.55	9.19129419	13.78063623	6/3/02 14:58	2:16:52	2:03:00	2:03:00	1.510334768	
4	81	0.000141259	541	14.018	0.000129477	3.666357	0.014274804	404.216	9.275425029	13.86476707	6/3/02 15:00	2:18:52	2:05:00	2:05:00	1.521329828	
29	81	0.001024129	541	14.018	0.000938706	26.58109	0.015213509	430.797	9.885373814	14.47471585	6/3/02 15:15	2:33:52	2:20:00	2:20:00	1.601388287	
11	81	0.000388463	541	14.018	0.000356061	10.08248	0.01556957	440.879	10.11673342	14.70607546	6/3/02 15:20	2:38:52	2:25:00	2:25:00	1.627199366	
17	81	0.000600352	541	14.018	0.000550276	15.58202	0.016119846	456.461	10.47428949	15.06363153	6/3/02 15:29	2:47:52	2:34:00	2:34:00	1.672655905	
9	81	0.000317833	541	14.018	0.000291323	8.249304	0.016411169	464.711	10.66358388	15.25292591	6/3/02 15:35	2:53:52	2:40:00	2:40:00	1.702286045	
29	81	0.001024129	541	14.018	0.000938706	26.58109	0.017349875	491.292	11.27353246	15.8628745	6/3/02 15:49	3:07:52	2:54:00	2:54:00	1.769494592	
35	81	0.001236018	541	14.018	0.001132921	32.08063	0.018482796	523.373	12.00967731	16.59901934	6/3/02 16:10	3:28:52	3:15:00	3:15:00	1.865773596	
34	81	0.001200703	541	14.018	0.001100552	31.16404	0.019583347	554.537	12.72478944	17.31413148	6/3/02 16:30	3:48:52	3:35:00	3:35:00	1.953060277	
61	81	0.002154203	541	14.018	0.001974519	55.91195	0.021557867	610.448	14.00778474	18.59712678	6/3/02 17:15	4:33:52	4:20:00	4:20:00	2.136456046	
100	81	0.00353148	541	14.018	0.003236917	91.65893	0.024794783	702.107	16.11105572	20.70039776	6/3/02 18:05	5:23:22	5:09:30	5:09:30	2.321517703	
177	82	0.00625072	542	14.018	0.005718772	161.937	0.030513556	864.044	19.82697674	24.41631878	6/4/02 7:05	18:23:22	18:09:30	18:09:30	4.288291553	
140	82	0.004944072	542	14.018	0.004523323	128.0857	0.035036878	992.13	22.76612331	27.35546535	6/4/02 15:58	27:16:22	27:02:30	27:02:30	5.222334514	
106	82	0.003743389	542	14.018	0.003424801	96.97921	0.03846168	1089.11	24.99147715	29.58081918	6/5/02 7:25	42:43:22	42:29:30	42:29:30	6.536266348	
86.6	82	0.003058282	542	14.018	0.002797998	79.23019	0.041259678	1168.34	26.80954924	31.39889128	6/5/02 22:15	57:33:22	57:19:30	57:19:30	7.586574399	
95.1	82	0.003358437	542	14.018	0.003072628	87.00662	0.044332306	1255.35	28.80606952	33.39541155	6/6/02 8:15	67:33:22	67:19:30	67:19:30	8.219252467	
3.7	83	0.000130665	543	14.080	0.000119853	3.393834	0.044452159	1258.74	28.88394684	33.47328887	6/6/02 16:34	75:52:22	75:38:30	75:38:30	8.710498136	
83.2	84	0.002938191	544	13.985	0.002671958	75.66114	0.047124117	1334.4	30.62012119	35.20946323	6/7/02 22:13	105:31:22	105:17:30	105:17:30	10.27242804	
110	84	0.003884628	544	13.990	0.0035339	100.0685	0.050658017	1434.47	32.91636469	37.50570672	6/9/02 22:26	153:44:22	153:30:30	153:30:30	12.39917112	
82	82	0.002895814	542	13.985	0.002643138	74.84504	0.053301155	1509.31	34.63381221	39.22315425	6/11/02 22:05	201:23:22	201:09:30	201:09:30	14.19117488	
98	84	0.00346085	544	14.065	0.003165262	89.6299	0.056466417	1598.94	36.69052359	41.27986563	6/14/02 17:12	268:30:22	268:16:30	268:16:30	16.38615608	
43	82	0.001518536	542	14.000	0.001387522	39.29011	0.057853939	1638.23	37.5921023	42.18144433	6/15/02 19:03	294:21:22	294:07:30	294:07:30	17.15680947	
41	84	0.001447907	544	14.030	0.001320947	37.40491	0.059174886	1675.64	38.45042197	43.03976401	6/17/02 11:49	335:07:22	334:53:30	334:53:30	18.30635894	
5	85	0.000176574	545	13.980	0.000160222	4.536976	0.059335109	1680.18	38.55453089	43.14387273	6/18/02 18:33	365:51:22	365:37:30	365:37:30	19.1273855	
15	85	0.000529722	545	14.155	0.000486684	13.78131	0.059821793	1693.96	38.87076652	43.46010856	6/20/02 16:09	411:27:22	411:13:30	411:13:30	20.28438098	
17	85	0.000600352	545	14.175	0.000552355	15.64089	0.060374148	1709.6	39.22967352	43.81901556	6/22/02 0:49	444:07:22	443:53:30	443:53:30	21.07422069	
22	85	0.000776926	545	14.080	0.000710022	20.1055	0.06108417	1729.7	39.69102656	44.2803706	6/23/02 19:57	487:15:22	487:01:30	487:01:30	22.07387646	
21	85	0.000741611	545	14.060	0.000676785	19.16435	0.061760955	1748.87	40.13078738	44.72012941	6/25/02 14:28	529:46:22	529:32:30	529:32:30	23.01679339	
21	85	0.000741611	545	13.985	0.000673175	19.06212	0.06243413	1767.93	40.56820039	45.15754243	6/27/02 19:35	582:53:22	582:39:30	582:39:30	24.14310348	estimate
17	85	0.000600352	545	14.055	0.000547679	15.50848	0.062981809	1783.44	40.92406902	45.51341106	6/30/02 20:21	655:39:22	655:25:30	655:25:30	25.60578277	
3	85	0.000105944	545	14.080	9.68211E-05	2.741659	0.06307863	1786.18	40.98698108	45.57632311	7/2/02 17:35	700:53:22	700:39:30	700:39:30	26.47431869	
11	85	0.000388463	545	14.110	0.000355767	10.07417	0.063434397	1796.26	41.2181501	45.80749213	7/5/02 15:12	770:30:22	770:16:30	770:16:30	27.75799184	
11	85	0.000388463	545	14.115	0.000355893	10.07774	0.06379029	1806.33	41.44940104	46.03874307	7/7/02 21:42	825:00:22	824:46:30	824:46:30	28.72291961	
10	85	0.000353148	545	14.070	0.000322506	9.132372	0.064112798	1815.47	41.65895893	46.24830097	7/10/02 14:02	889:20:22	889:06:30	889:06:30	29.82179479	
1	85	3.53148E-05	545	14.050	3.22049E-05	0.911939	0.064145003	1816.38	41.67988494	46.26922697	7/13/02 20:42	968:00:22	967:46:30	967:46:30	31.11279858	

DESORPTION TERMINATED 7/15/02 DUE TO NO GAS GENERATION

SAMPLE: Upper Weir (868.4-868.6') in Stegeman container #6 in 85-degree bath

est. lost gas (cc) = 28

sample dried 10 days in oven @ 150 degrees F

DRY WEIGHT	lbs.	grams	WET WEIGHT	lbs.	grams	moisture weight
sample weight:	0.22	99.39	wet sample weight:	0.22	101.49	2.07%

TIME OF:		
off botton	at surface	in canister
6/3/02 9:07	6/3/02 9:31	6/3/02 9:31

elapsed time (off-bottom to canistering)
24.67 minutes
0.41 hours
0.641179469 SQRT (hrs)

CONVERSION OF VOLUMES TO STP

RIG MEASUREMENTS		CONVERSION OF RIG MEASUREMENTS TO STP (cubic ft; @60 degrees; @14.7 psi)					CUMULATIVE VOLUMES		SCF/TON (approx)	SCF/TON (approx)		TIME SINCE			
measured cc	measured T (F)	cubic ft (@rig)	ABSOLUTE T (F) (@rig)	psia (@rig)	cubic ft (@STP)	cc (@STP)	cubic ft (@STP)	cc (@STP)	without lost gas	with lost gas	TIME OF MEASURE	off bottom	at surface	in canister	SQRT hrs. (since off bottom)
1.7	81	6.00352E-05	541	13.992	5.49255E-05	1.555312	5.49255E-05	1.55531	0.501334142	9.526763096	6/3/02 9:33	0:26:40	0:02:00	0:02:00	0.666666667
1.4	81	4.94407E-05	541	13.992	4.52326E-05	1.280845	0.000100158	2.83616	0.914197554	9.93962651	6/3/02 9:36	0:29:40	0:05:00	0:05:00	0.703167437
0.8	81	2.82518E-05	541	13.992	2.58473E-05	0.731911	0.000126006	3.56807	1.150119503	10.17554846	6/3/02 9:38	0:31:40	0:07:00	0:07:00	0.726483157
0.9	81	3.17833E-05	541	13.992	2.90782E-05	0.8234	0.000155084	4.39147	1.415531698	10.44096065	6/3/02 9:40	0:33:40	0:09:00	0:09:00	0.749073502
1.3	81	4.59092E-05	541	13.992	4.20019E-05	1.189356	0.000197086	5.58082	1.798904883	10.82433382	6/3/02 9:42	0:35:40	0:11:00	0:11:00	0.771002234
1.3	81	4.59092E-05	541	13.992	4.20019E-05	1.189356	0.000239088	6.77018	2.182278031	11.20770699	6/3/02 9:44	0:37:40	0:13:00	0:13:00	0.792324288
1.2	81	4.23778E-05	541	13.992	3.8771E-05	1.097867	0.000277859	7.86805	2.536160955	11.56158991	6/3/02 9:46	0:39:40	0:15:00	0:15:00	0.813087395
0.5	81	1.76574E-05	541	13.992	1.61546E-05	0.457445	0.000294013	8.32549	2.683612173	11.70904113	6/3/02 9:48	0:41:40	0:17:00	0:17:00	0.833333333
0.6	81	2.11889E-05	541	13.992	1.93855E-05	0.548934	0.000313399	8.87443	2.860553635	11.88598259	6/3/02 9:50	0:43:40	0:19:00	0:19:00	0.853098926
0.8	81	2.82518E-05	541	13.992	2.58473E-05	0.731911	0.000339246	9.60634	3.096475585	12.12190454	6/3/02 9:52	0:45:40	0:21:00	0:21:00	0.872418822

0.7	81	2.47204E-05	541	13.992	2.26164E-05	0.640422	0.000361862	10.2468	3.30290729	12.32833625	6/3/02 9:54	0:47:40	0:23:00	0:23:00	0.89131813
1.9	81	6.70981E-05	541	13.992	6.13874E-05	1.73829	0.00042325	11.985	3.88322192	12.88865086	6/3/02 10:02	0:55:40	0:31:00	0:31:00	0.963212218
0.4	81	1.41259E-05	541	13.992	1.29237E-05	0.365958	0.000436173	12.351	3.981182894	13.00661185	6/3/02 10:04	0:57:40	0:33:00	0:33:00	0.980362745
0.7	81	2.47204E-05	541	13.992	2.26164E-05	0.640422	0.00045879	12.9914	4.1876148	13.21304356	6/3/02 10:06	0:59:40	0:35:00	0:35:00	0.997218353
0.6	81	2.11889E-05	541	13.992	1.93855E-05	0.548934	0.000478175	13.5404	4.364558062	13.38998502	6/3/02 10:08	1:01:40	0:37:00	0:37:00	1.013793755
0.3	81	1.05944E-05	541	13.992	9.69274E-06	0.274467	0.000487868	13.8148	4.453026793	13.47845575	6/3/02 10:10	1:03:40	0:39:00	0:39:00	1.030102476
5.1	81	0.000180105	541	13.992	0.000164777	4.665935	0.000652644	18.4808	5.95702922	14.98245818	6/3/02 10:46	1:39:40	1:15:00	1:15:00	1.288840995
3.8	81	0.000134196	541	13.992	0.000122775	3.476579	0.000775419	21.9573	7.077858479	16.10308744	6/3/02 11:06	1:59:40	1:35:00	1:35:00	1.412246011
1.5	81	5.29722E-05	541	13.992	4.84637E-05	1.372334	0.000823883	23.3297	7.520012134	16.54544109	6/3/02 11:58	2:51:40	2:27:00	2:27:00	1.691481928
0.6	81	2.11889E-05	541	13.992	1.93855E-05	0.548934	0.000843268	23.8786	7.696953596	16.72238255	6/3/02 12:31	3:24:40	3:00:00	3:00:00	1.846919357
1.8	81	6.35666E-05	541	13.992	5.81564E-05	1.646801	0.000901425	25.5254	8.227777982	17.25320694	6/3/02 14:50	5:43:40	5:19:00	5:19:00	2.393277622
0	79	0	539	13.992	0	0	0.000901425	25.5254	8.227777982	17.25320694	6/3/02 16:26	7:19:40	6:55:00	6:55:00	2.706966645
0.4	79	1.41259E-05	539	13.992	1.29718E-05	0.367314	0.000914396	25.8927	8.346178859	17.37180582	6/4/02 7:16	22:09:40	21:45:00	21:45:00	4.707556933
2.6	79	9.18185E-05	539	13.992	8.43154E-05	2.387539	0.000998712	28.2803	9.115768065	18.14119702	6/4/02 16:04	30:57:40	30:33:00	30:33:00	5.564270942
2.5	79	0.000088287	539	13.992	8.10725E-05	2.29571	0.001079784	30.578	9.8557598	18.88118876	6/5/02 7:30	46:23:00	45:58:20	45:58:20	6.810531061
2	79	7.06296E-05	539	13.992	6.4858E-05	1.836568	0.001144642	32.4125	10.44775319	19.47318214	6/5/02 22:23	61:16:00	60:51:20	60:51:20	7.827302643
3.3	79	0.000116539	539	13.992	0.000107018	3.030337	0.001251658	35.4429	11.42454228	20.44997124	6/6/02 8:18	71:11:00	70:46:20	70:46:20	8.437021591
6.7	85	0.000236609	545	14.080	0.000216234	6.123038	0.001467892	41.5659	13.39822248	22.42365144	6/6/02 16:38	79:31:00	79:06:20	79:06:20	8.917211821
3.6	84	0.000127133	544	13.985	0.000115614	3.2738	0.001583508	44.8397	14.45348837	23.47891733	6/7/02 22:30	109:23:00	108:58:20	108:58:20	10.45864673
5	84	0.000176574	544	13.990	0.000160632	4.548569	0.001744137	49.3883	15.91965945	24.94508841	6/9/02 22:23	157:16:00	156:51:20	156:51:20	12.54060073
8	82	0.000282518	542	13.985	0.000257887	7.301955	0.002002005	56.6902	18.27334804	27.29877699	6/11/02 22:09	205:02:00	204:37:20	204:37:20	14.31898507
8	84	0.000282518	544	14.065	0.000258389	7.316727	0.002260393	64.007	20.63179793	29.65722888	6/14/02 17:13	272:06:00	271:41:20	271:41:20	16.49545392
5	82	0.000176574	542	14.000	0.00016134	4.568617	0.002421733	68.5756	22.10443111	31.12986007	6/15/02 18:59	297:52:00	297:27:20	297:27:20	17.25881417
5	84	0.000176574	544	14.030	0.000161091	4.561575	0.002582824	73.1372	23.57479425	32.6002232	6/17/02 11:47	338:40:00	338:15:20	338:15:20	18.40289832
3	85	0.000105944	545	13.980	9.61335E-05	2.722187	0.002678958	75.8593	24.45225511	33.47788406	6/18/02 18:36	369:29:00	369:04:20	369:04:20	19.22194926
3	85	0.000105944	545	14.155	9.73369E-05	2.756263	0.002776295	78.6156	25.34089992	34.36612867	6/20/02 16:12	415:05:00	414:40:20	414:40:20	20.37359402
4	85	0.000141259	545	14.175	0.000129968	3.68021	0.00290626	82.2958	26.52896675	35.5523957	6/22/02 0:50	447:43:00	447:18:20	447:18:20	21.15931631
5	85	0.000176574	545	14.080	0.000161139	4.562941	0.0030674	86.8586	27.99777024	37.02319919	6/25/02 14:46	533:39:00	533:14:20	533:14:20	23.10088576
4	85	0.000141259	545	13.985	0.000128224	3.630881	0.003195624	90.4896	29.16813649	38.19358544	6/27/02 19:37	586:30:00	586:05:20	586:05:20	24.21776208
5	65	0.000176574	545	14.055	0.000161062	4.561318	0.003356706	95.051	30.63841893	39.66364589	6/30/02 20:22	659:15:00	658:50:20	658:50:20	25.67586415
4	85	0.000141259	545	14.080	0.000129095	3.655545	0.0034858	98.7065	31.81673347	40.84216243	7/2/02 17:35	704:28:00	704:03:20	704:03:20	26.54179095
4	85	0.000141259	545	14.110	0.00012937	3.663334	0.00361517	102.37	32.99756063	42.02298959	7/5/02 15:13	774:06:00	773:41:20	773:41:20	27.82265264
4	85	0.000141259	545	14.115	0.000129416	3.664632	0.003744586	106.034	34.17880622	43.20423518	7/7/02 21:43	828:36:00	828:11:20	828:11:20	28.78541297
4	85	0.000141259	545	14.070	0.000129003	3.652949	0.003873589	109.687	35.35628589	44.38171484	7/10/02 14:03	892:56:00	892:31:20	892:31:20	29.88199012
4	85	0.000141259	545	14.050	0.00012882	3.647756	0.004002409	113.335	36.53209181	45.55752077	7/13/02 20:44	971:37:00	971:12:20	971:12:20	31.17076622

DESORPTION TERMINATED 7/15/02 DUE TO NO GAS GENERATION

SAMPLE: Excello Shale (687.1'-688.1') Brady container #23 in 85-degree bath

est. lost gas (cc) =
28

sample dried 40 days in air

DRY WEIGHT	lbs.	grams	WET WEIGHT	lbs.	grams	free moisture
sample weight:	2.98	1351.91	wet sample weight:	3.01	1367.12	1.11%

	off botton	at surface	in canister
TIME OF:	6/2/02 7:45	6/2/02 7:47	6/2/02 7:58

elapsed time (off-bottom to canistering)
13.0 minutes
0.22 hours
0.465474668 SQRT (hrs)

CONVERSION OF VOLUMES TO STP

RIG MEASUREMENTS		CONVERSION OF RIG MEASUREMENTS TO STP (cubic ft; @60 degrees; @14.7 psi)					CUMULATIVE VOLUMES		SCF/TON (approx)	SCF/TON (approx)		TIME SINCE			
measured cc	measured T (F)	cubic ft (@rig)	ABSOLUTE T (F) (@rig)	psia (@rig)	cubic ft (@STP)	cc (@STP)	cubic ft (@STP)	cc (@STP)	without lost gas	with lost gas	TIME OF MEASURE	off bottom	at surface	in canister	SQRT hrs. (since off bottom)
7.9	81	0.000278987	541	14.018	0.000255716	7.241058	0.000255716	7.24108	0.171595787	0.835129147	6/2/02 8:08	0:23:00	0:20:18	0:10:00	0.619139167
2.3	81	8.1224E-05	541	14.018	7.44491E-05	2.108155	0.000330166	9.34921	0.221554054	0.885087414	6/2/02 8:12	0:27:00	0:24:18	0:14:00	0.670820393
1	81	3.53148E-05	541	14.018	3.23692E-05	0.916589	0.000362535	10.2658	0.24327504	0.9068084	6/2/02 8:14	0:29:00	0:26:18	0:16:00	0.695221787
0.7	81	2.47204E-05	541	14.018	2.26584E-05	0.641613	0.000385193	10.9074	0.25847973	0.92201309	6/2/02 8:16	0:31:00	0:28:18	0:18:00	0.718795289
0.3	81	1.05944E-05	541	14.018	9.71075E-06	0.274977	0.000394904	11.1824	0.264996026	0.928529385	6/2/02 8:18	0:33:00	0:30:18	0:20:00	0.741619849
0.8	81	2.82518E-05	541	14.018	2.58953E-05	0.733271	0.000420799	11.9157	0.282372814	0.945908174	6/2/02 8:20	0:35:00	0:32:18	0:22:00	0.763762616
0.5	81	1.76574E-05	541	14.018	1.61846E-05	0.458295	0.000436984	12.374	0.293233307	0.956788867	6/2/02 8:22	0:37:00	0:34:18	0:24:00	0.785281266
0.8	81	2.82518E-05	541	14.018	2.58953E-05	0.733271	0.000462879	13.1072	0.310610098	0.974143455	6/2/02 8:26	0:41:00	0:38:18	0:28:00	0.826639765
0.4	81	1.41259E-05	541	14.018	1.29477E-05	0.366636	0.000475827	13.4739	0.31929849	0.98283185	6/2/02 8:35	0:50:00	0:47:18	0:37:00	0.912870929
0.7	82.6	2.47204E-05	542.6	14.018	2.25916E-05	0.639721	0.000498418	14.1136	0.334458345	0.997991705	6/2/02 8:45	1:00:00	0:57:18	0:47:00	1
0.9	82.6	3.17833E-05	542.6	14.018	2.90463E-05	0.822498	0.000527465	14.9361	0.353949587	1.017482947	6/2/02 8:56	1:11:00	1:08:18	0:58:00	1.087811258
3.2	82.6	0.000113007	542.6	14.018	0.000103276	2.924437	0.000630741	17.8605	0.423251781	1.086785141	6/2/02 9:16	1:31:00	1:28:18	1:18:00	1.231530213
1.9	82.6	6.70981E-05	542.6	14.018	6.13201E-05	1.736384	0.000692061	19.5969	0.464399959	1.127933318	6/2/02 9:26	1:41:00	1:38:18	1:28:00	1.297433364
5.3	82.6	0.000187168	542.6	14.018	0.000171051	4.843599	0.000863111	24.4405	0.579181718	1.242715077	6/2/02 9:54	2:09:00	2:06:18	1:56:00	1.46628783
3.3	82.6	0.000116539	542.6	14.018	0.000106503	3.015826	0.000969615	27.4563	0.650649605	1.314182985	6/2/02 10:09	2:24:00	2:21:18	2:11:00	1.549193339
1.5	82.6	5.29722E-05	542.6	14.018	4.84108E-05	1.37083	0.001018025	28.8272	0.683135009	1.346668368	6/2/02 10:34	2:49:00	2:46:18	2:36:00	1.678292783
2.9	82.6	0.000102413	542.6	14.018	9.35938E-05	2.650271	0.001111619	31.4774	0.745940122	1.409473482	6/2/02 10:39	2:54:00	2:51:18	2:41:00	1.702938637
2.6	82.6	9.18185E-05	542.6	14.018	8.39117E-05	2.376105	0.001195531	33.8535	0.802248155	1.485781514	6/2/02 11:09	3:24:00	3:21:18	3:11:00	1.843908891
2.6	82.6	9.18185E-05	542.6	14.018	8.39117E-05	2.376105	0.001279442	36.2296	0.858556188	1.522089547	6/2/02 11:39	3:54:00	3:51:18	3:41:00	1.974841766
4.9	82.6	0.000173043	542.6	14.018	0.000158141	4.478044	0.001437584	40.7077	0.964675172	1.628208532	6/2/02 12:22	4:37:00	4:34:18	4:24:00	2.148642963
2.2	82.6	7.76926E-05	542.6	14.018	7.10022E-05	2.01055	0.001508586	42.7182	1.012320431	1.67585379	6/2/02 12:52	5:07:00	5:04:18	4:54:00	2.26200501
4.6	82.6	0.000162448	542.6	14.018	0.000148459	4.203878	0.001657045	46.9221	1.111942335	1.775475694	6/2/02 13:48	6:03:00	6:00:18	5:50:00	2.459674775
3.5	82.6	0.000123602	542.6	14.018	0.000112958	3.198603	0.001770003	50.1207	1.187741609	1.851274989	6/2/02 14:35	6:50:00	6:47:18	6:37:00	2.614064524
2.6	82.6	9.18185E-05	542.6	14.018	8.39117E-05	2.376105	0.001853915	52.4968	1.244049642	1.907583001	6/2/02 15:44	7:59:00	7:56:18	7:46:00	2.82547931
1.2	82.6	4.23778E-05	542.6	14.018	3.87285E-05	1.096664	0.001892643	53.5935	1.270037965	1.933571324	6/2/02 15:58	8:13:00	8:10:18	8:00:00	2.866472882
1.2	82.6	4.23778E-05	542.6	14.018	3.87285E-05	1.096664	0.001931372	54.6901	1.296028287	1.959559647	6/2/02 17:09	9:24:00	9:21:18	9:11:00	3.065941943
3.4	82.6	0.00012007	542.6	14.018	0.000109731	3.107214	0.002041102	57.7974	1.369659869	2.033193228	6/2/02 17:49	10:04:00	10:01:18	9:51:00	3.172801076

21	82.6	0.000741611	542.6	14.018	0.000677746	19.19162	0.00271885	76.989	1.824455517	2.487988876	6/3/02 7:04	23:19:00	23:16:18	23:06:00	4.828733443
4.1	82.6	0.000144791	542.6	14.018	0.000132322	3.746935	0.002851173	80.7359	1.913248953	2.576782313	6/3/02 8:04	24:19:00	24:16:18	24:06:00	4.931193229
1.4	82.6	4.94407E-05	542.6	14.018	4.51832E-05	1.279441	0.002896356	82.0154	1.943568663	2.607102022	6/3/02 9:14	25:29:00	25:26:18	25:16:00	5.048101954
7.7	82.6	0.000271924	542.6	14.018	0.000248508	7.036926	0.003144863	89.0523	2.110327067	2.773860427	6/3/02 11:53	28:08:00	28:05:18	27:55:00	5.304068475
8.4	82.6	0.000296644	542.6	14.018	0.000271099	7.676647	0.003415963	96.7289	2.292245327	2.955778686	6/3/02 14:42	30:57:00	30:54:18	30:44:00	5.563272418
1.7	82.6	6.00352E-05	542.6	14.018	5.48653E-05	1.553607	0.003470828	98.2825	2.329062117	2.992595477	6/3/02 16:22	32:37:00	32:34:18	32:24:00	5.711100303
1.9	82.6	6.70981E-05	542.6	14.018	6.13201E-05	1.736384	0.003532148	100.019	2.370210295	3.033743655	6/4/02 6:52	47:07:00	47:04:18	46:54:00	6.864158118
13.5	82.6	0.00047675	542.6	14.018	0.000435695	12.33747	0.003967843	112.356	2.662578926	3.326112286	6/4/02 16:24	56:39:00	56:36:18	56:26:00	7.526819427
9	82.6	0.000317833	542.6	14.018	0.000290463	8.224979	0.004258307	120.581	2.857491347	3.521024706	6/5/02 7:11	71:26:00	71:23:18	71:13:00	8.451824261
12	82.6	0.000423776	542.6	14.018	0.000387285	10.96664	0.004645591	131.548	3.117374575	3.780907934	6/5/02 22:30	86:45:00	86:42:18	86:32:00	9.313968005
9.8	82.6	0.000346085	542.6	14.018	0.000316282	8.956088	0.004961874	140.504	3.329612544	3.993145903	6/6/02 8:05	96:20:00	96:17:18	96:07:00	9.814954576
10.3	85	0.000363742	545	14.060	0.000332419	9.413029	0.005294293	149.917	3.552676923	4.216212262	6/6/02 16:49	98:29:00	98:29:00	98:16:24	9.923876931
17.8	85	0.000628603	545	13.985	0.000570596	16.15742	0.005864889	166.075	3.935571291	4.59910465	6/7/02 21:55	127:35:00	127:35:00	127:22:24	11.29527925
25	85	0.00088287	545	13.990	0.000801685	22.70112	0.006666575	188.778	4.473533738	5.137067096	6/9/02 22:25	176:05:00	176:05:00	175:52:24	13.26983953
29	85	0.001024129	545	13.965	0.000929623	26.32388	0.007596197	215.1	5.097347147	5.760880507	6/11/02 22:10	223:50:00	223:50:00	223:37:24	14.96106057
39	85	0.001377277	545	14.085	0.001257334	35.60359	0.008853531	250.703	5.941087608	6.604600967	6/14/02 17:05	290:45:00	290:45:00	290:32:24	17.0513929
34	85	0.001200703	545	13.980	0.001089513	30.85145	0.009943044	281.555	6.67217357	7.33570693	6/18/02 18:38	388:18:00	388:18:00	388:05:24	19.70532923
3	85	0.000105944	545	14.155	9.73369E-05	2.756263	0.010040381	284.311	6.73749044	7.4010238	6/20/02 16:12	433:52:00	433:52:00	433:39:24	20.82948631
10	85	0.000353148	545	14.175	0.000324915	9.200524	0.010365295	293.511	6.955520988	7.619054327	6/22/02 0:53	466:33:00	466:33:00	466:20:24	21.59976852
27	85	0.0009535	545	14.060	0.000870152	24.63988	0.011235448	318.151	7.539427464	8.202960644	6/25/02 14:52	552:32:00	552:32:00	552:19:24	23.5060276
20	85	0.000706296	545	13.965	0.000641119	18.1544	0.011876567	336.306	7.969643629	8.633176988	6/27/02 19:39	605:19:00	605:19:00	605:06:24	24.60318406
16	85	0.000565037	545	14.055	0.000515463	14.59622	0.012392029	350.902	8.315539254	8.979072614	6/30/02 20:24	678:04:00	678:04:00	677:51:24	26.03971326
0	85	0	545	14.060	0	0	0.012392029	350.902	8.315539254	8.979072614	7/2/02 17:37	723:17:00	723:17:00	723:04:24	26.89392744
15	85	0.000529722	545	14.110	0.000485137	13.7375	0.012877167	364.639	8.641085364	9.304618724	7/5/02 15:14	792:54:00	792:54:00	792:41:24	28.15848007
15	85	0.000529722	545	14.115	0.000485309	13.74237	0.013362476	378.382	8.966748834	9.630280194	7/7/02 21:44	847:24:00	847:24:00	847:11:24	29.11013569
15	85	0.000529722	545	14.070	0.000483762	13.69856	0.013846238	392.08	9.291370064	9.954903423	7/10/02 14:04	911:44:00	911:44:00	911:31:24	30.19492231
13	85	0.000459092	545	14.050	0.000418664	11.85521	0.014264902	403.936	9.572310281	10.23584364	7/13/02 20:47	990:27:00	990:27:00	990:14:24	31.4714156

DESORPTION TERMINATED 7/15/02 DUE TO NO GAS GENERATION

SAMPLE: Excello Shale (689.4'-690.2') in Brady container #31 in 85-degree bath

est. lost gas (cc) =
14

sample dried 40 days in air

DRY WEIGHT	lbs.	grams	WET WEIGHT	lbs.	grams	free moisture	TIME OF:			elapsed time (off-bottom to canistering)
sample weight:	2.23	1013.37	wet sample weight:	2.25	1020.82	0.73%	off botton	at surface	in canister	11.2 minutes
							6/2/02 8:21	6/2/02 8:24	6/2/02 8:33	0.187 hours
										0.432370726 SQRT (hrs)

CONVERSION OF VOLUMES TO STP

RIG MEASUREMENTS		CONVERSION OF RIG MEASUREMENTS TO STP (cubic ft; @60 degrees; @14.7 psi)					CUMULATIVE VOLUMES		SCF/TON (approx)	SCF/TON (approx)		TIME SINCE			
measured cc	measured T (F)	cubic ft (@rig)	ABSOLUTE T (F) (@rig)	psia (@rig)	cubic ft (@STP)	cc (@STP)	cubic ft (@STP)	cc (@STP)	without lost gas	with lost gas	TIME OF MEASURE	off bottom	at surface	in canister	SQRT hrs. (since off bottom)
4.4	82.6	0.000155385	542.6	14.018	0.000142004	4.021101	0.000142004	4.0211	0.127124547	0.569725662	6/2/02 8:38	0:16:13	0:13:50	0:05:00	0.519882485
0.9	82.6	3.17833E-05	542.6	14.018	2.90463E-05	0.822498	0.000171051	4.8436	0.153127296	0.595728411	6/2/02 8:41	0:19:13	0:16:50	0:08:00	0.565930895
0.3	82.6	1.05944E-05	542.6	14.018	9.68212E-06	0.274166	0.000180733	5.11778	0.161794876	0.604395994	6/2/02 8:45	0:23:43	0:21:20	0:12:30	0.628711204
0	82.6	0	542.6	14.018	0	0	0.000180733	5.11778	0.161794876	0.604395994	6/2/02 8:47	0:25:43	0:23:20	0:14:30	0.654683978
7.8	82.6	0.000275455	542.6	14.018	0.000251735	7.128315	0.000432468	12.2461	0.387152031	0.829753146	6/2/02 9:00	0:38:43	0:36:20	0:27:30	0.803291838
1.2	82.6	4.23776E-05	542.6	14.018	3.87285E-05	1.096664	0.000471196	13.3427	0.421822382	0.864423477	6/2/02 9:12	0:50:43	0:48:20	0:39:30	0.919389894
8.1	82.6	0.00028605	542.6	14.018	0.000261417	7.402481	0.000732613	20.7452	0.655847097	1.098448212	6/2/02 9:29	1:07:43	1:05:20	0:56:30	1.062361102
2.1	82.6	7.41611E-05	542.6	14.018	6.77746E-05	1.919162	0.000800388	22.6644	0.716520176	1.159121291	6/2/02 9:37	1:15:43	1:13:20	1:04:30	1.123363006
3.6	82.6	0.000127133	542.6	14.018	0.000116185	3.289991	0.000916574	25.9544	0.820531169	1.263132285	6/2/02 9:50	1:28:43	1:26:20	1:17:30	1.215981542
1.2	82.6	4.23776E-05	542.6	14.018	3.87285E-05	1.096664	0.000955302	27.051	0.855201501	1.297802616	6/2/02 10:10	1:48:43	1:46:20	1:37:30	1.346084658
9.7	82.6	0.000342554	542.6	14.018	0.000313055	8.864699	0.001268357	35.9157	1.135453344	1.578054459	6/2/02 10:28	2:04:43	2:02:20	1:53:30	1.441738919
5.8	82.6	0.000204828	542.6	14.018	0.000187188	5.300542	0.001455545	41.2163	1.303026611	1.745627726	6/2/02 10:53	2:31:43	2:29:20	2:20:30	1.590160719
3.3	82.6	0.000116539	542.6	14.018	0.000106503	3.015828	0.001562048	44.2321	1.398370021	1.840971136	6/2/02 11:08	2:46:43	2:44:20	2:35:30	1.666916646
6.3	82.6	0.000222483	542.6	14.018	0.000203324	5.757485	0.001765372	49.9896	1.580389259	2.022990375	6/2/02 11:43	3:21:43	3:19:20	3:10:30	1.833560592
3.6	82.6	0.000127133	542.6	14.018	0.000116185	3.289991	0.001881558	53.2798	1.684400253	2.127001368	6/2/02 12:13	3:51:43	3:49:20	3:40:30	1.965183056
4.8	82.6	0.000169511	542.6	14.018	0.000154914	4.386655	0.002036472	57.6662	1.823081577	2.265682692	6/2/02 12:54	4:32:43	4:30:20	4:21:30	2.131965707
4.9	82.6	0.000173043	542.6	14.018	0.000158141	4.478044	0.002194613	62.1443	1.964652096	2.407253211	6/2/02 13:44	5:22:43	5:20:20	5:11:30	2.319183285
3.1	82.6	0.000109476	542.6	14.018	0.000100049	2.833048	0.002294661	64.9773	2.054217116	2.496818233	6/2/02 14:58	6:36:43	6:34:20	6:25:30	2.571370149
1.1	82.6	3.88463E-05	542.6	14.018	3.55011E-05	1.005275	0.002330163	65.9826	2.085996255	2.52859937	6/2/02 15:14	6:52:43	6:50:20	6:41:30	2.622710642
5.6	82.6	0.000197763	542.6	14.018	0.000180733	5.117785	0.002510895	71.1004	2.247793133	2.690394248	6/2/02 16:05	7:43:43	7:41:20	7:32:30	2.780037969
4.4	82.6	0.000155385	542.6	14.018	0.000142004	4.021101	0.0026529	75.1215	2.374917681	2.817518796	6/2/02 17:06	8:44:33	8:42:10	8:33:20	2.956771866
3.5	82.6	0.000123602	542.6	14.018	0.000112958	3.198603	0.002765858	78.3201	2.47803948	2.918640595	6/2/02 17:46	9:24:13	9:21:50	9:13:00	3.066530794
31	82.6	0.001094759	542.6	14.018	0.001000485	28.33046	0.003766343	106.651	3.3716897	3.814290815	6/3/02 6:52	22:30:13	22:27:50	22:19:00	4.74379712
5	82.6	0.000176574	542.6	14.018	0.000161369	4.569433	0.003927712	111.22	3.516149413	3.958750528	6/3/02 8:06	23:44:43	23:42:20	23:33:30	4.872912659
4.4	82.6	0.000155385	542.6	14.018	0.000142004	4.021101	0.004069716	115.241	3.64327396	4.085875075	6/3/02 9:14	24:52:13	24:49:50	24:41:00	4.987010906
8	82.6	0.000282516	542.6	14.018	0.00025819	7.311092	0.004327906	122.552	3.874409501	4.317010616	6/3/02 11:20	26:58:13	26:55:50	26:47:00	5.193291613
2.3	82.6	8.1224E-05	542.6	14.018	7.42296E-05	2.101939	0.004402135	124.654	3.940860989	4.383462084	6/3/02 11:50	27:28:13	27:25:50	27:17:00	5.241209572
12.2	82.6	0.000430841	542.6	14.018	0.000393739	11.14942	0.004795875	135.804	4.293342888	4.735943763	6/3/02 14:43	30:21:13	30:18:50	30:10:00	5.50941114
5.7	82.6	0.000201294	542.6	14.018	0.00018396	5.209153	0.004979835	141.013	4.458028741	4.900627856	6/3/02 16:19	31:57:43	31:55:20	31:46:30	5.653469581
30	82.6	0.001059444	542.6	14.018	0.000968212	27.4166	0.005948047	168.429	5.324785019	5.767386134	6/4/02 7:00	46:38:13	46:35:50	46:27:00	6.82912472
1.4	82.6	4.94407E-05	542.6	14.018	4.51832E-05	1.279441	0.00599323	169.709	5.365233738	5.807834853	6/4/02 16:20	55:58:13	55:55:50	55:47:00	7.48132861
7.7	82.6	0.000271924	542.6	14.018	0.000248508	7.036926	0.006241737	176.746	5.587701696	6.030302811	6/5/02 7:14	70:52:13	70:49:50	70:41:00	8.418448656
8.4	82.6	0.000296644	542.6	14.018	0.000271099	7.676647	0.006512837	184.422	5.830394014	6.272995129	6/5/02 22:26	86:06:13	86:03:50	85:55:00	9.279203151
1.7	82.6	6.00352E-05	542.6	14.018	5.48653E-05	1.553607	0.006567702	185.976	5.879510316	6.322111431	6/6/02 8:06	95:46:13	95:43:50	95:35:00	9.786228987
16.1	85	0.000568568	545	14.060	0.000519607	14.71357	0.007087309	200.689	6.34467047	6.787271585	6/6/02 16:28	104:06:13	104:03:50	103:55:00	10.20311772

28.9	84	0.001020598	544	13.985	0.00092812	26.28134	0.008015429	226.971	7.175538198	7.618139313	6/7/02 22:03	133:41:13	133:38:50	133:30:00	11.56230706
48	84	0.001624481	544	13.990	0.001477813	41.84884	0.009493242	268.818	8.498499447	8.941100582	6/9/02 22:17	181:55:13	181:52:50	181:44:00	13.48776254
48	82	0.001624481	542	13.985	0.001482736	41.98624	0.010975977	310.804	9.825687903	10.26846902	6/11/02 22:15	229:53:13	229:50:50	229:42:00	15.1620231
66	84	0.002330777	544	14.085	0.002131707	60.363	0.013107685	371.167	11.73420589	12.1766068	6/14/02 17:06	298:46:13	298:43:50	298:35:00	17.22702173
61	84	0.002154203	544	13.980	0.001958307	55.45288	0.015065992	426.62	13.48731333	13.92991445	6/18/02 16:43	394:21:13	394:18:50	394:10:00	19.65833858
22	85	0.000776928	545	14.155	0.000713804	20.21259	0.015779796	446.832	14.12632166	14.58892279	6/20/02 16:15	439:53:13	439:50:50	439:42:00	20.97348193
9	85	0.000317833	545	14.175	0.000292423	8.280472	0.016072219	455.113	14.38810354	14.83070465	6/22/02 0:54	472:32:13	472:29:50	472:21:00	21.73791491
50	85	0.00176574	545	14.060	0.001611393	45.82941	0.017683612	500.742	15.83064831	16.27324942	6/25/02 14:54	556:32:13	556:29:50	556:21:00	23.63336622
23	85	0.00081224	545	13.985	0.000737287	20.87758	0.018420899	521.62	16.49067923	16.93328034	6/27/02 19:40	611:18:13	611:15:50	611:07:00	24.72455462
39	85	0.001377277	545	14.055	0.00125644	35.57826	0.019677339	557.198	17.61546401	18.05806512	6/30/02 20:25	684:03:13	684:00:50	683:52:00	26.15441858
14	85	0.000494407	545	14.060	0.000451632	12.79441	0.020129171	569.992	18.0199511	18.46255221	7/2/02 17:39	729:17:13	729:14:50	729:06:00	27.00531326
2	85	7.06298E-05	545	14.110	6.4685E-05	1.831667	0.020193856	571.824	18.07785809	18.5204592	7/5/02 15:16	798:54:13	798:51:50	798:43:00	28.264863
22	85	0.000776928	545	14.115	0.000711787	20.15548	0.020905643	591.98	18.71508089	19.1576618	7/7/02 21:47	853:25:13	853:22:50	853:14:00	29.21335787
27	85	0.0009535	545	14.070	0.000870771	24.6574	0.021776414	616.637	19.4945669	19.93719001	7/10/02 14:06	917:44:13	917:41:50	917:33:00	30.29417344
18	85	0.000585037	545	14.050	0.000515279	14.59103	0.022291693	631.226	19.9558749	20.39847602	7/13/02 20:49	998:27:13	996:24:50	998:16:00	31.58665347
0	85	0	545	14.075	0	0	0.022291693	631.226	19.9558749	20.39847602	7/15/02 20:42	1044:20:13	1044:17:50	1044:09:00	32.31820251

DESORPTION TERMINATED 7/15/02 DUE TO NO GAS GENERATION

SAMPLE: Mineral Shale, plus 0.2 ft coal (778.2'-779.2') in Brady #25 canister

est. lost gas (cc) =
35

sample dried 40 days in air
DRY WEIGHT lbs. grams
sample weight: 2.41 1093.82
WET WEIGHT lbs. grams free moisture
wet sample weight: 2.48 1115.89 2.00%
TIME OF:
off botton 6/2/02 14:20
at surface 6/2/02 14:20
in canister 6/2/02 14:32
elapsed time (off-bottom to canistering)
12.6 minutes
0.210 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 (approx)	SCF/TON (approx)		TIME SINCE			0.458257570 SQRT (hrs)
measured cc	measured T (F)	cubic ft (@rig)	ABSOLUTE T (F) (@rig)	psia (@rig)	cubic ft (@STP)	cc (@STP)	cubic ft (@STP)	cc (@STP)	without lost gas	with lost gas	TIME OF MEASURE	off bottom	at surface	in canister	SQRT hrs. (since off bottom)
5	82.6	0.000176574	542.6	14.018	0.000161369	4.569433	0.000161369	4.56943	0.133659237	1.159166684	6/2/02 14:37	0:17:30	0:17:30	0:04:54	0.540061725
4	82.8	0.000141259	542.8	14.018	0.000129095	3.655546	0.000290463	8.22498	0.240948827	1.266254074	6/2/02 14:38	0:18:30	0:18:30	0:05:54	0.555277708
4	82.8	0.000141259	542.8	14.018	0.000129095	3.655546	0.000419558	11.8805	0.346034017	1.373341464	6/2/02 14:41	0:21:30	0:21:30	0:08:54	0.5986095
4	82.8	0.000141259	542.6	14.018	0.000129095	3.655546	0.000548653	15.5381	0.455121407	1.480428854	6/2/02 14:44	0:24:30	0:24:30	0:11:54	0.839009851
0.6	82.8	2.82518E-05	542.8	14.018	2.5819E-05	0.731109	0.000574472	16.2672	0.476538665	1.501648332	6/2/02 14:47	0:27:30	0:27:30	0:14:54	0.8770032
0	82.6	0	542.8	14.018	0	0	0.000574472	16.2672	0.478538885	1.501646332	6/2/02 14:50	0:30:30	0:30:30	0:17:54	0.712974988
0.9	82.8	3.17633E-05	542.8	14.018	2.90463E-05	0.622498	0.000603519	17.0897	0.500833548	1.525940995	6/2/02 14:53	0:33:30	0:33:30	0:20:54	0.747217059
0	82.8	0	542.6	14.018	0	0	0.000603519	17.0697	0.500833548	1.525940995	6/2/02 14:58	0:38:30	0:36:30	0:23:54	0.779957264
1.1	82.8	3.88463E-05	542.8	14.018	3.55011E-05	1.005275	0.00063902	18.095	0.53008258	1.555390027	6/2/02 15:18	0:58:30	0:58:30	0:45:54	0.987420883
1	82.6	3.53146E-05	542.6	14.018	3.22737E-05	0.913887	0.000671293	19.0088	0.556854428	1.582181875	6/2/02 15:40	1:20:30	1:20:30	1:07:54	1.158303357
0.8	82.8	2.11889E-05	542.8	14.018	1.93642E-05	0.548332	0.000690658	19.5572	0.572917538	1.598224983	6/2/02 16:00	1:40:30	1:40:30	1:27:54	1.294217911
2.4	82.6	8.47555E-05	542.8	14.018	7.74589E-05	2.193328	0.000768115	21.7505	0.63718997	1.682477417	6/2/02 17:12	2:52:30	2:52:30	2:39:54	1.695582498
2	82.6	7.06298E-05	542.6	14.018	6.45474E-05	1.827773	0.000632862	23.5783	0.690713665	1.716021112	6/2/02 17:52	3:32:30	3:32:30	3:19:54	1.661931632
8.1	82.8	0.00021542	542.6	14.018	0.00019687	5.574708	0.001029532	29.153	0.854021935	1.879329382	6/3/02 6:49	16:29:00	16:29:00	16:16:24	4.059967159
1.8	82.6	6.35866E-05	542.6	14.016	5.80927E-05	1.644996	0.001087624	30.798	0.902211261	1.927516707	6/3/02 8:10	17:50:00	17:50:00	17:37:24	4.222953153
1.1	82.8	3.88463E-05	542.6	14.018	3.55011E-05	1.005275	0.001123125	31.8033	0.931660293	1.95698774	6/3/02 9:19	18:59:00	18:59:00	18:46:24	4.358988726
0.2	82.8	7.06298E-06	542.8	14.016	6.45474E-06	0.182777	0.00112958	31.986	0.937014662	1.962322109	6/3/02 11:00	20:40:00	20:40:00	20:27:24	4.546060566
0	82.8	0	542.8	14.018	0	0	0.00112956	31.988	0.937014862	1.962322109	6/3/02 16:15	25:55:00	25:55:00	25:42:24	5.09084145
48.7	82.8	0.001649201	542.8	14.018	0.001507183	42.6765	0.002636783	74.6845	2.16725994	3.212567387	6/4/02 16:11	49:51:00	49:51:00	49:38:24	7.060453243
19	82.8	0.000670981	542.8	14.018	0.000613201	17.36384	0.003249984	92.0284	2.695925043	3.72123249	6/5/02 7:21	65:01:00	65:01:00	64:48:24	8.063291305
17	82.8	0.000600352	542.6	14.018	0.000548653	15.53607	0.003798617	107.564	3.15104645	4.176353697	6/5/02 22:25	80:05:00	80:05:00	79:52:24	8.946929172
15.2	82.8	0.000536765	542.8	14.018	0.000490561	13.89108	0.004269177	121.456	3.557978532	4.583265979	6/6/02 8:11	89:51:00	89:51:00	69:38:24	9.47892399
14.9	85	0.000526191	545	14.060	0.000480878	13.61691	0.004770056	135.072	3.958678955	4.982186402	6/6/02 16:44	98:24:00	98:24:00	98:11:24	9.919677414
22.8	84	0.000798114	544	13.985	0.000725796	20.55219	0.005495852	155.825	4.558944933	5.58425236	6/7/02 21:57	127:37:00	127:37:00	127:24:24	11.2967547
23	84	0.00081224	544	13.990	0.000738906	20.92342	0.006234756	176.548	5.17166601	6.197193457	6/9/02 22:21	176:01:00	176:01:00	175:48:24	13.2671273
33	82	0.001165368	542	13.985	0.001063702	30.12057	0.00729648	208.669	6.054252894	7.079580341	6/11/02 22:16	223:56:00	223:56:00	223:43:24	14.9644022
37	84	0.001306648	544	14.085	0.001195048	33.83986	0.008493508	240.508	7.045574649	8.070882098	6/14/02 17:11	290:51:00	290:51:00	290:38:24	17.05432496
24	85	0.000847555	545	13.960	0.000769086	21.77749	0.009262576	262.286	7.683535439	8.708642666	6/16/02 16:37	386:17:00	388:17:00	386:04:24	19.70490633
21	85	0.000741811	545	14.155	0.000681356	19.29384	0.009943934	281.56	8.248738808	9.274046255	6/20/02 18:14	433:54:00	433:54:00	433:41:24	20.83026644
13	85	0.000459092	545	14.175	0.000422369	11.96068	0.010366323	293.54	8.599120975	9.624428422	6/22/02 0:53	466:33:00	466:33:00	466:20:24	21.59976852
21	85	0.000741811	545	14.080	0.000676765	19.16435	0.011043108	312.705	9.160531033	10.16583646	6/25/02 14:49	552:29:00	552:29:00	552:16:24	23.50496401
20	65	0.000706296	545	13.985	0.000641119	18.1544	0.011684227	330.859	9.692355168	10.71766261	6/27/02 19:41	605:21:00	605:21:00	605:08:24	24.60386149
5	65	0.000176574	545	14.055	0.000161082	4.581318	0.01184531	335.421	9.825976692	10.85128414	6/30/02 20:23	678:03:00	678:03:00	677:50:24	26.03939323
3	85	0.000105944	545	14.080	9.68211E-05	2.741859	0.011942131	338.162	9.906292214	10.93159988	7/2/02 17:40	723:20:00	723:20:00	723:07:24	26.89485701
2	65	7.06296E-05	545	14.110	6.4665E-05	1.831667	0.012008818	339.994	9.959949979	10.98525743	7/5/02 15:15	792:55:00	792:55:00	792:42:24	28.15877602
3	65	0.000105944	545	14.115	9.70618E-05	2.746474	0.012103677	342.742	10.04046515	11.0657728	7/7/02 21:45	847:25:00	847:25:00	847:12:24	29.11042196
5	85	0.000176574	545	14.070	0.000161254	4.566186	0.012265131	347.309	10.17422926	11.19953873	7/10/02 14:05	911:45:00	911:45:00	911:32:24	30.19519629
2	85	7.08296E-05	545	14.075	6.45245E-05	1.827124	0.012329656	349.136	10.22775395	11.25308139	7/13/02 20:48	990:28:00	990:28:00	990:15:24	31.47188039

DESORPTION TERMINATED 7/15/02 DUE TO NO GAS GENERATION

Excello (687.1'-688.1') Brady container #23

Colt Energy Hinthorn #CW-1; sec. SE SW 14-T.32S.-R.16E.

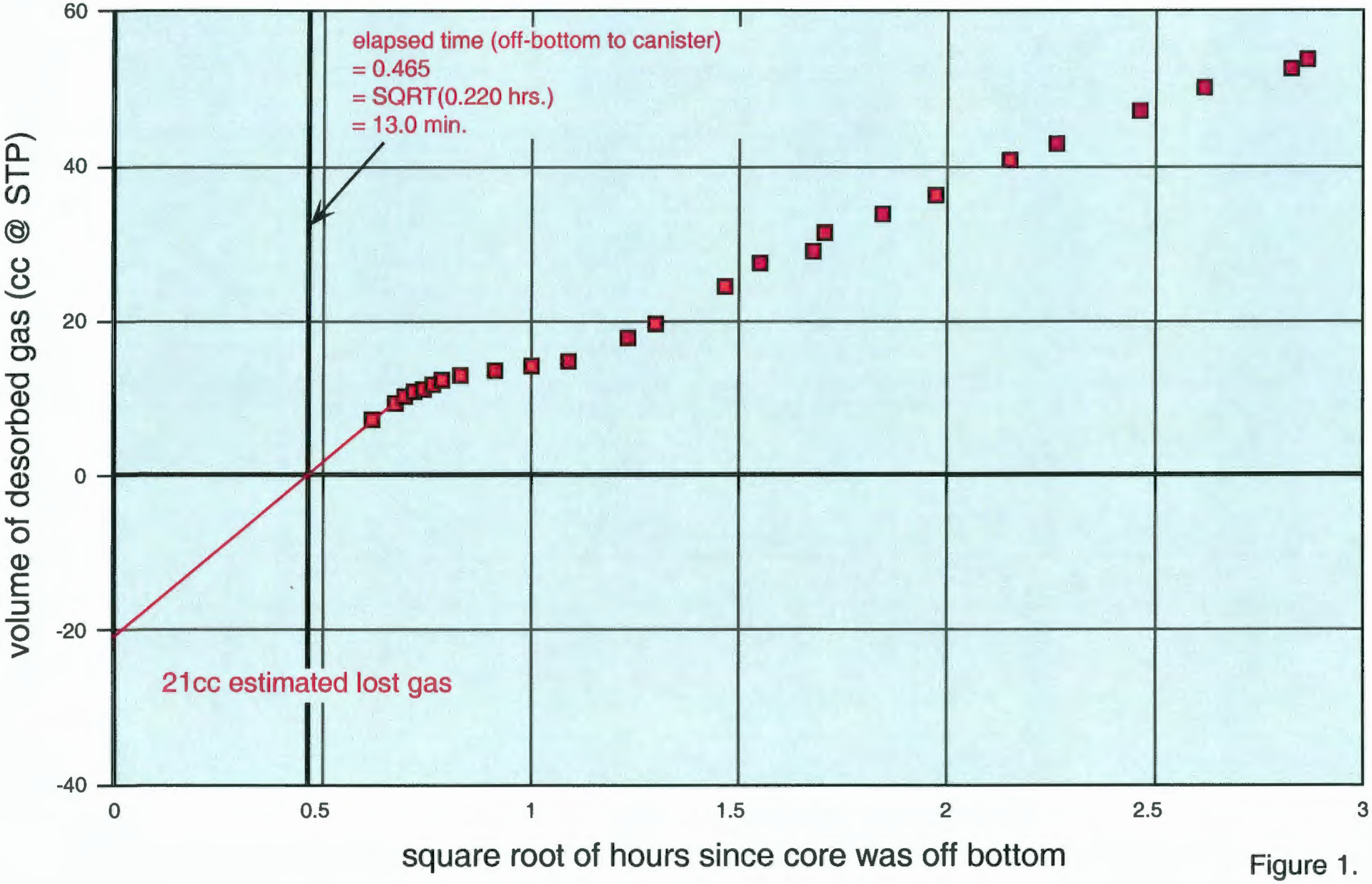


Figure 1.

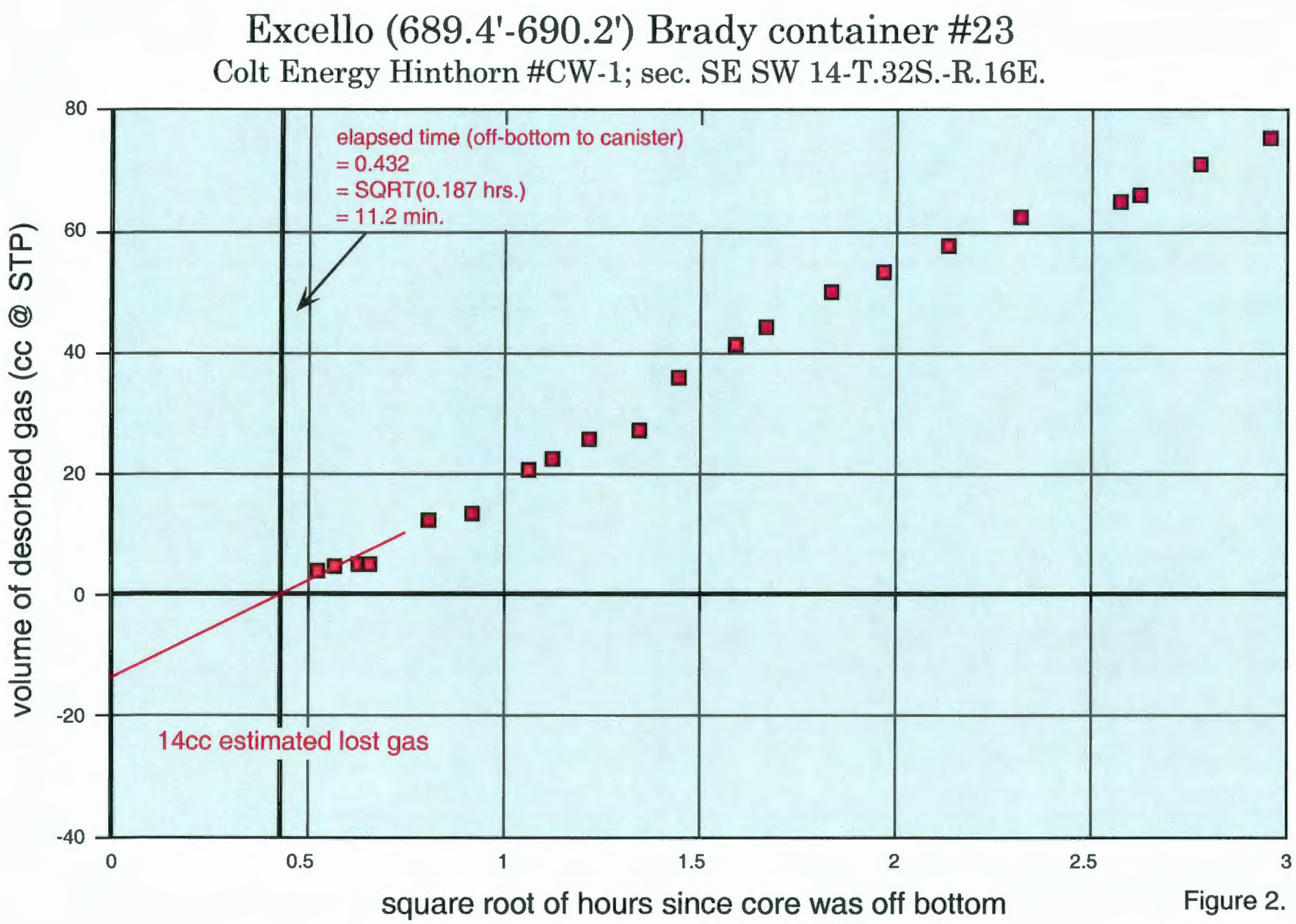
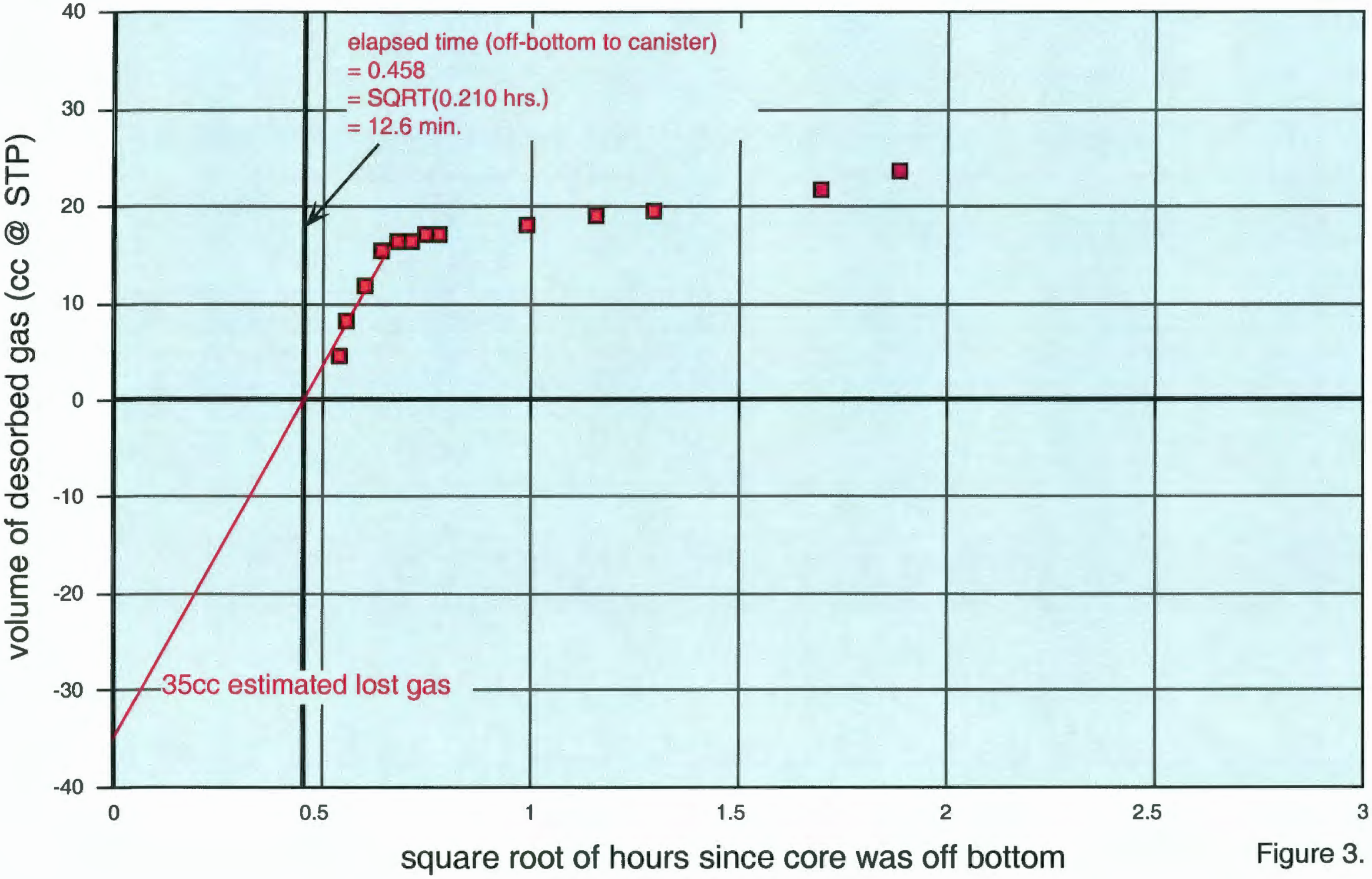

Excello (689.4'-690.2') Brady container #23
Colt Energy Hinthorn #CW-1; sec. SE SW 14-T.32S.-R.16E.
elapsed time (off-bottom to canister)
= 0.432
= SQRT(0.187 hrs.)
= 11.2 min.
14cc estimated lost gas
volume of desorbed gas (cc @ STP)
80
60
40
20
0
-20
-40
0
0.5
1
1.5
2
2.5
3
square root of hours since core was off bottom

Figure 2.

Mineral Shale, plus 0.2 ft coal (778.2'-779.2') in Brady #25 canister

Colt Energy Hinthorn #CW-1; sec. SE SW 14-T.32S.-R.16E.



elapsed time (off-bottom to canister)
= 0.458
= SQRT(0.210 hrs.)
= 12.6 min.

35cc estimated lost gas

Figure 3.

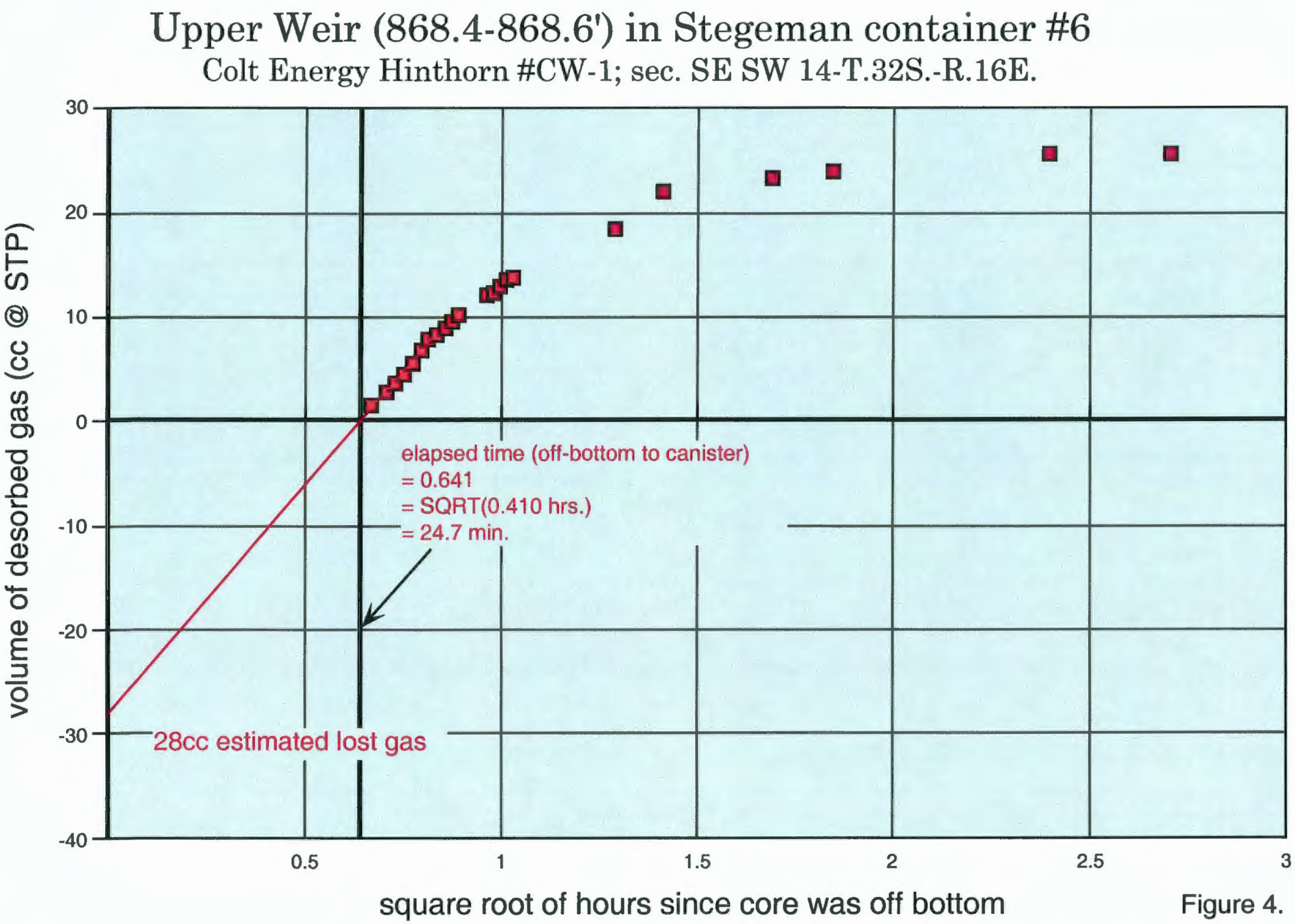

Upper Weir (868.4-868.6') in Stegeman container #6
Colt Energy Hinthorn #CW-1; sec. SE SW 14-T.32S.-R.16E.
volume of desorbed gas (cc @ STP)
30
20
10
0
-10
-20
-30
-40
0.5
1
1.5
2
2.5
3
square root of hours since core was off bottom
elapsed time (off-bottom to canister)
= 0.641
= SQRT(0.410 hrs.)
= 24.7 min.
28cc estimated lost gas

Figure 4.

Lower Weir (895.1'-896.1') in Stegeman container #5

Colt Energy Hinthorn #CW-1; sec. SE SW 14-T.32S.-R.16E.

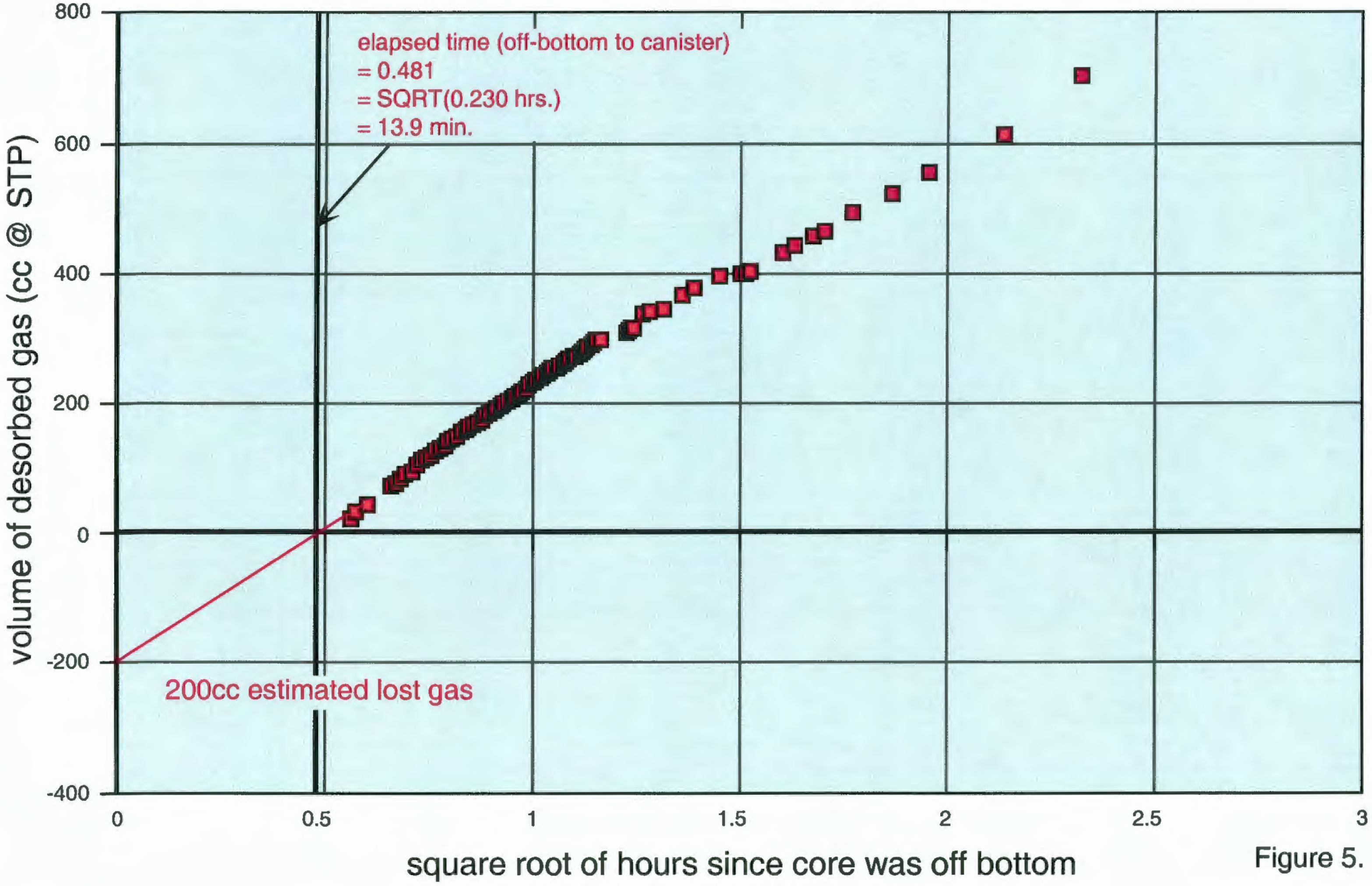


Figure 5.

Riverton Coal (1068.3'-1069.3') in numberless Stegeman container

Colt Energy Hinthorn #CW-1; sec. SE SW 14-T.32S.-R.16E.

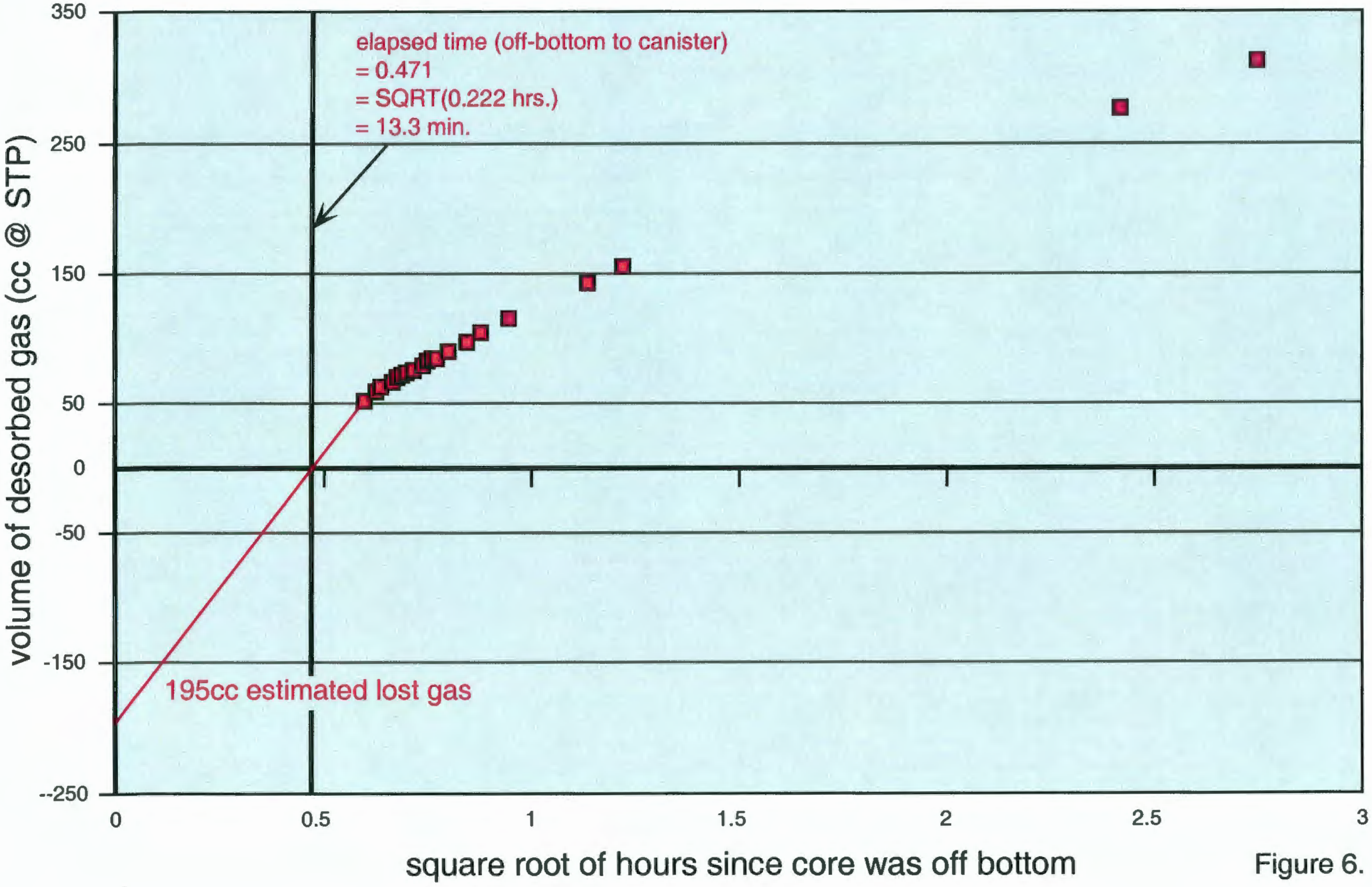
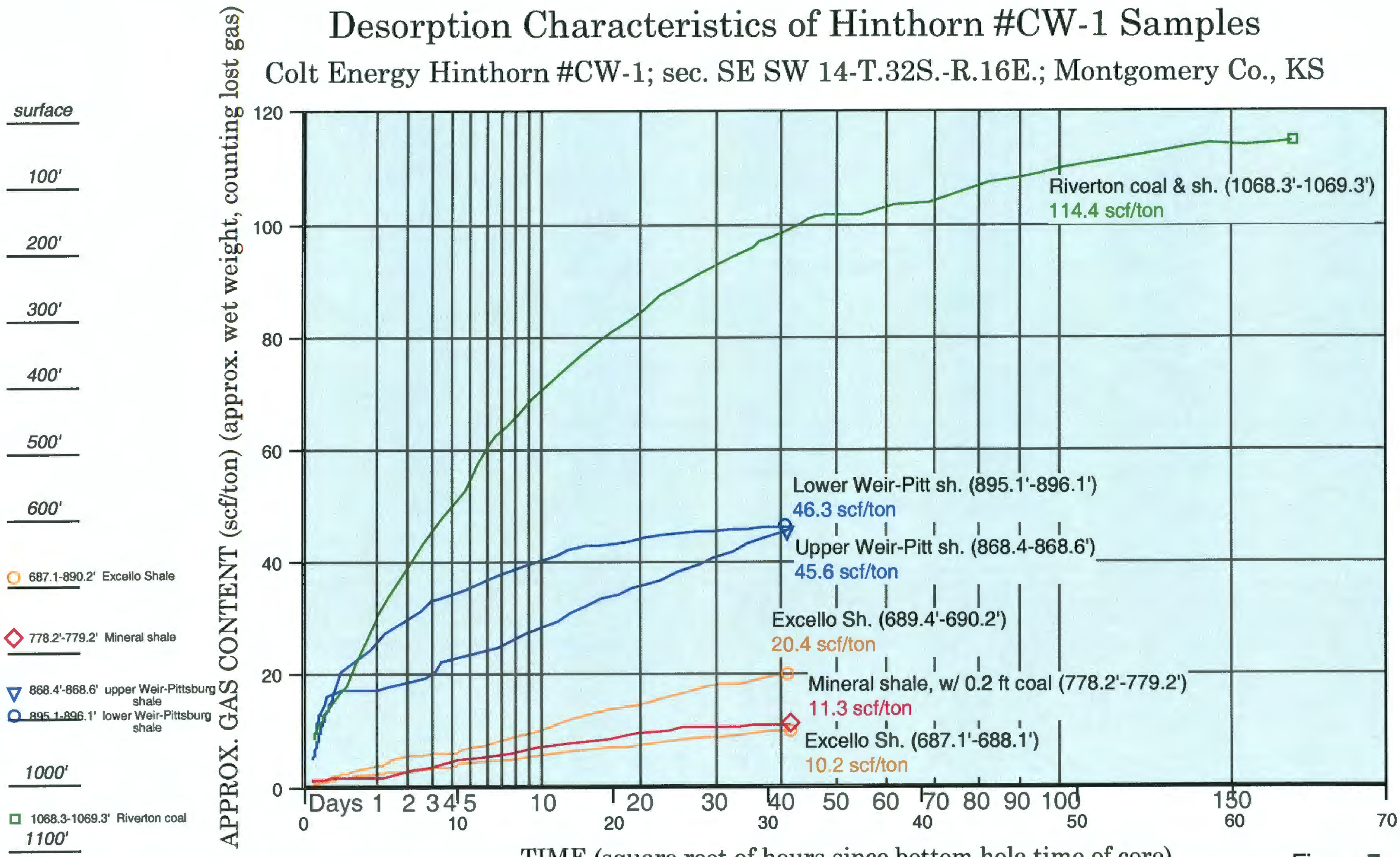


Figure 6.


Desorption Characteristics of Hinthorn #CW-1 Samples

Colt Energy Hinthorn #CW-1; sec. SE SW 14-T.32S.-R.16E.; Montgomery Co., KS

Figure 7.

Desorption Characteristics of Mixed-Lithology Core Sample

Colt Energy Hinthorn #CW-1; SE SW sec. 14-T.32S.-R.16E.; Mongomery Co., KS

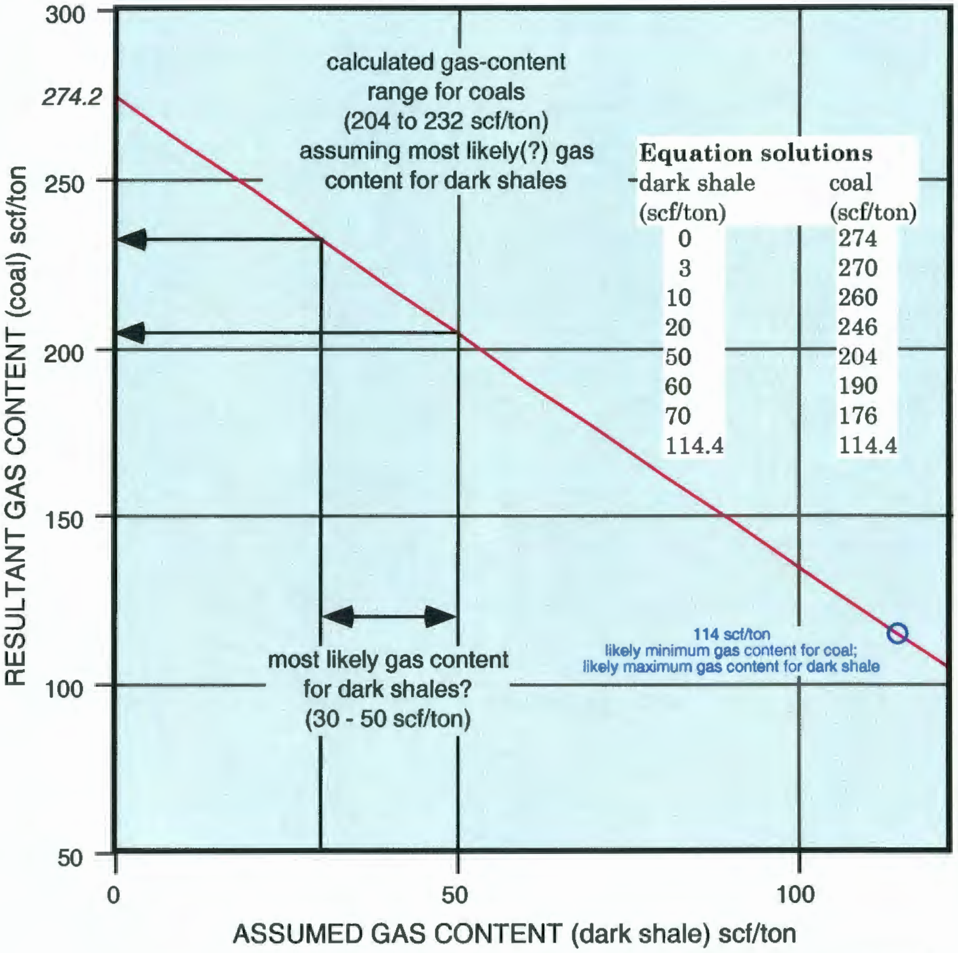
LITHOLOGIC COMPONENT SENSITIVITY ANALYSIS for calculation of gas content of Riverton coal from 1068.3-1069.3'

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

total gas desorbed = 3198 ccs
$\text{weight}_{dark\ shale}$ = 521.84 grams (58.3%)
weight_{coal} = 373.64 grams (41.7%)

TOTAL DRY WEIGHT OF SAMPLE = 895.48 grams

UNIT	coal in sample	scf/ton w/ shale @ 3 scf/ton	maximum scf/ton	minimum scf/ton
Riverton	42%	270.0	274.2	114.4



calculated gas-content range for coals (204 to 232 scf/ton) assuming most likely(?) gas content for dark shales

Equation solutions

dark shale (scf/ton)	coal (scf/ton)
0	274
3	270
10	260
20	246
50	204
60	190
70	176
114.4	114.4

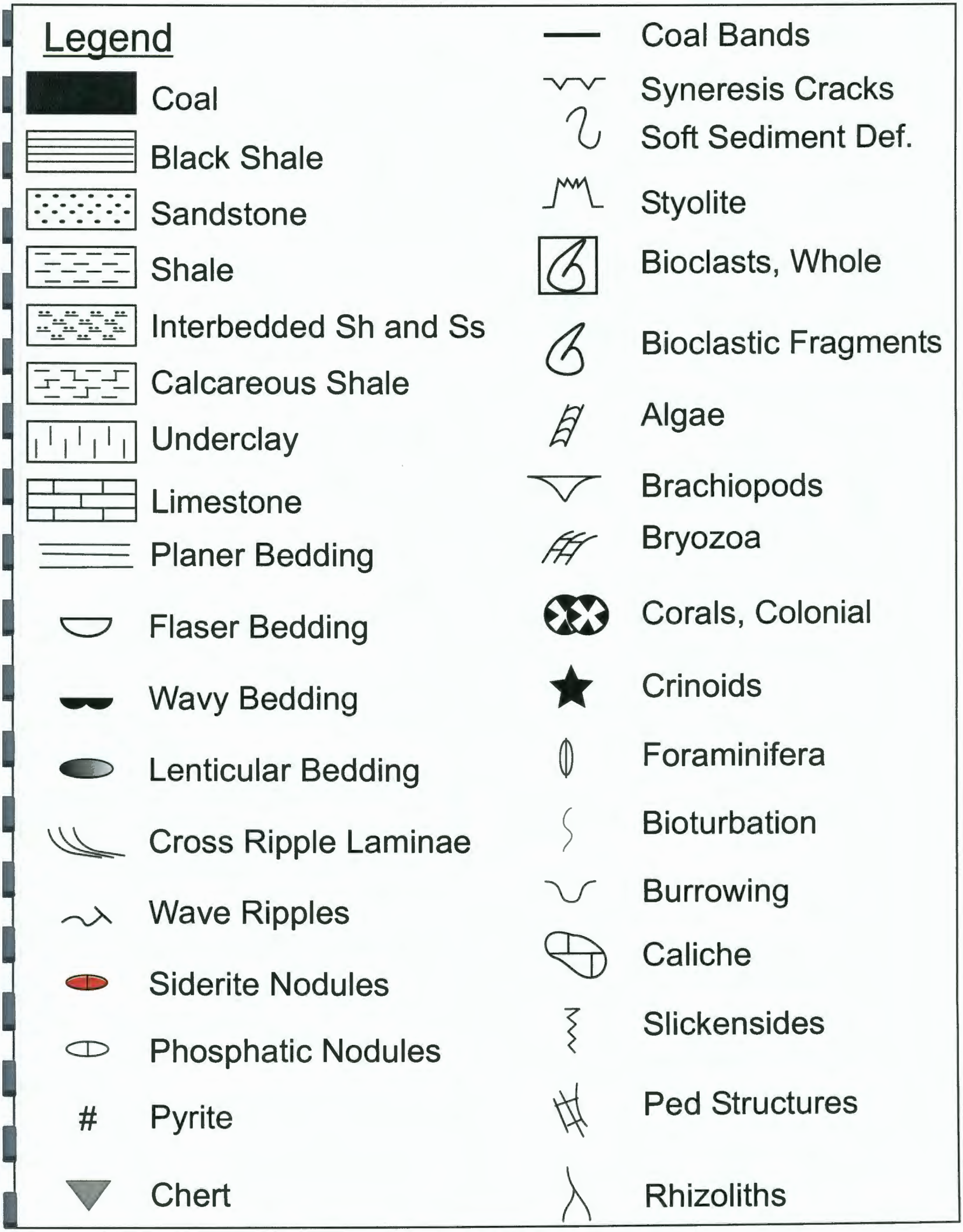
most likely gas content for dark shales? (30 - 50 scf/ton)

114 scf/ton
likely minimum gas content for coal;
likely maximum gas content for dark shale

Figure 8.

Appendix A

Graphical and Verbal Descriptions of Core


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

NAME HINTHORN CW-1

STRUCTURAL SETTING CHEROKEE BASIN

LOCATION SE SE SE 14-T32S-R16E

DESCRIBED BY: JONATHAN LANGE

DATE JUNE 2002

UNIT: Fort Scott

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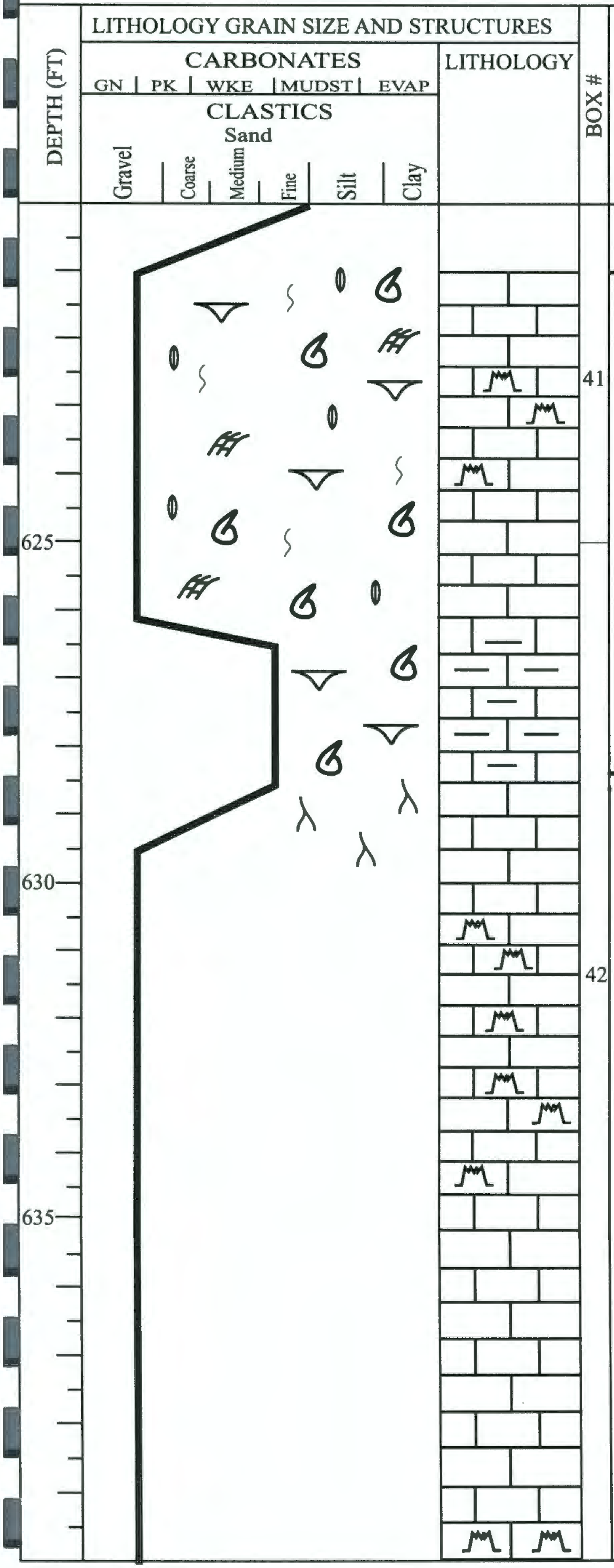


DESCRIPTION

- Lithology
- Color
- Comp., Cement, or Matrix
- Shape and Sorting
- Bedding
- Sed. Structures
- Upper Contact
- Fossils

Limestone
- Light gray to tan
- Calcareous
- Medium Bedded
- Styolites and horse tail styolites
- Rooting and plant fragments
- Clacite viens
- Gradational upper contact
- Bioturbated
- Abundant bioclasts of brachiopods, tabulate corals, fusilinids, and bryozoans
- Slightly oil stained

Peloidal and non-fossiliferous from 631' - 640'

REMARKS, INTERPRETATION

Top of Fort Scott - Higginsville Limestone

-Shallowing upward, regressive upper limestone

Tidal flat
- Above wave base

Transgressive muddy limestone

Flooding Surface

Exposure Surface

Tidal flat
- Supratidal at 629' and intertidal to subtidal from 631' to 640'
- Above wave base

NAME HINTHORN CW-1

STRUCTURAL SETTING CHEROKEE BASIN

LOCATION SE SE SE 14-T32S-R16E

DESCRIBED BY: JONATHAN LANGE

DATE JUNE 2002

UNIT: Fort Scott

PAGE 02 OF 24 PAGES

DEPTH (FT)

LITHOLOGY GRAIN SIZE AND STRUCTURES

CARBONATES

GN | PK | WKE | MUDST | EVAP

CLASTICS

Sand

Gravel | Coarse | Medium | Fine | Silt | Clay

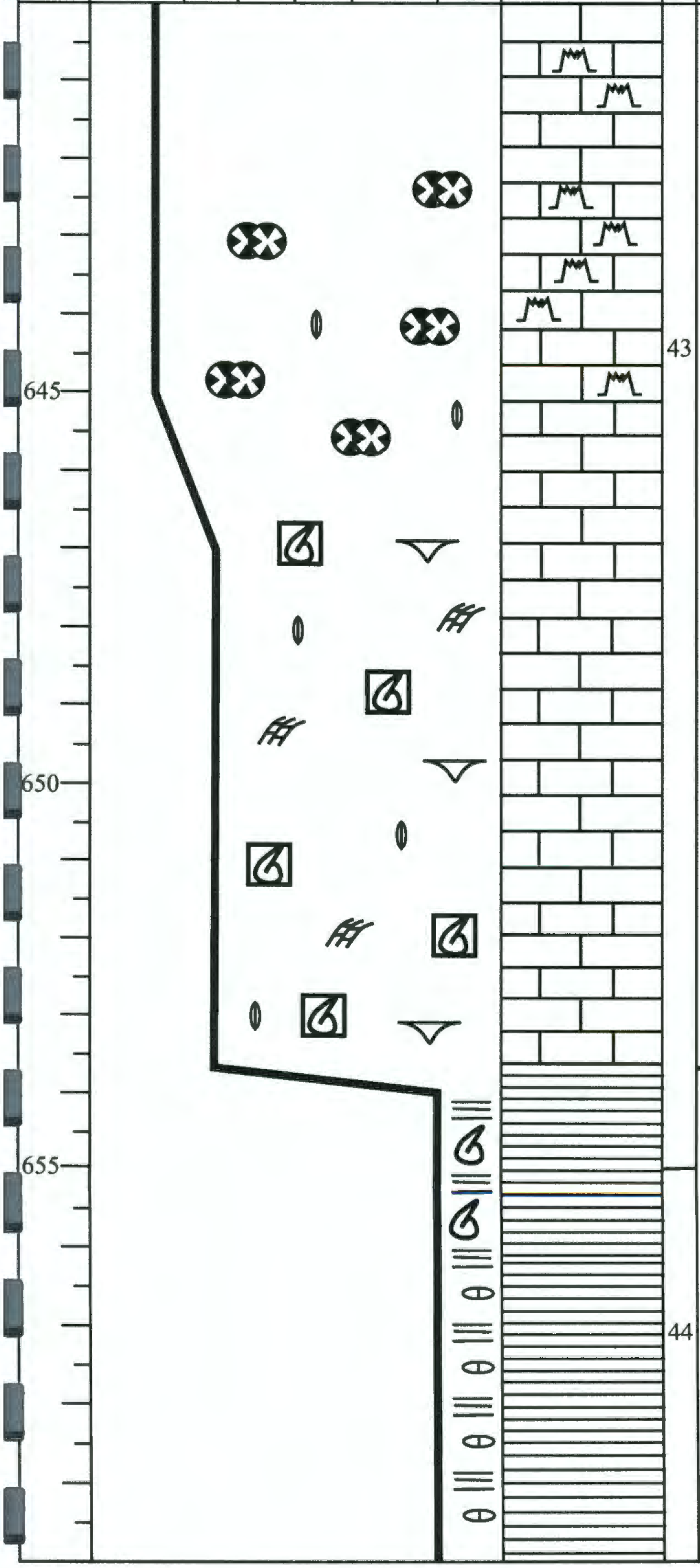
LITHOLOGY

BOX #

DESCRIPTION

- Lithology
- Color
- Comp., Cement, or Matrix
- Shape and Sorting
- Bedding
- Sed. Structures
- Upper Contact
- Fossils

REMARKS, INTERPRETATION



Chaetetes corals	Coral and shell reef - Below wave base
Black Shale - Black - Micaceous - Very thinly laminated - Planar bedding - Phosphatic - Gradational contact - Sparse bioclastic fragments - Oil and gas show	**Little Osage Shale** - Transgressive marine, core shale

NAME HINTHORN CW-1

STRUCTURAL SETTING CHEROKEE BASIN

LOCATION SE SE SE 14-T32S-R16E

DESCRIBED BY: JONATHAN LANGE

DATE JUNE 2002

UNIT: Fort Scott

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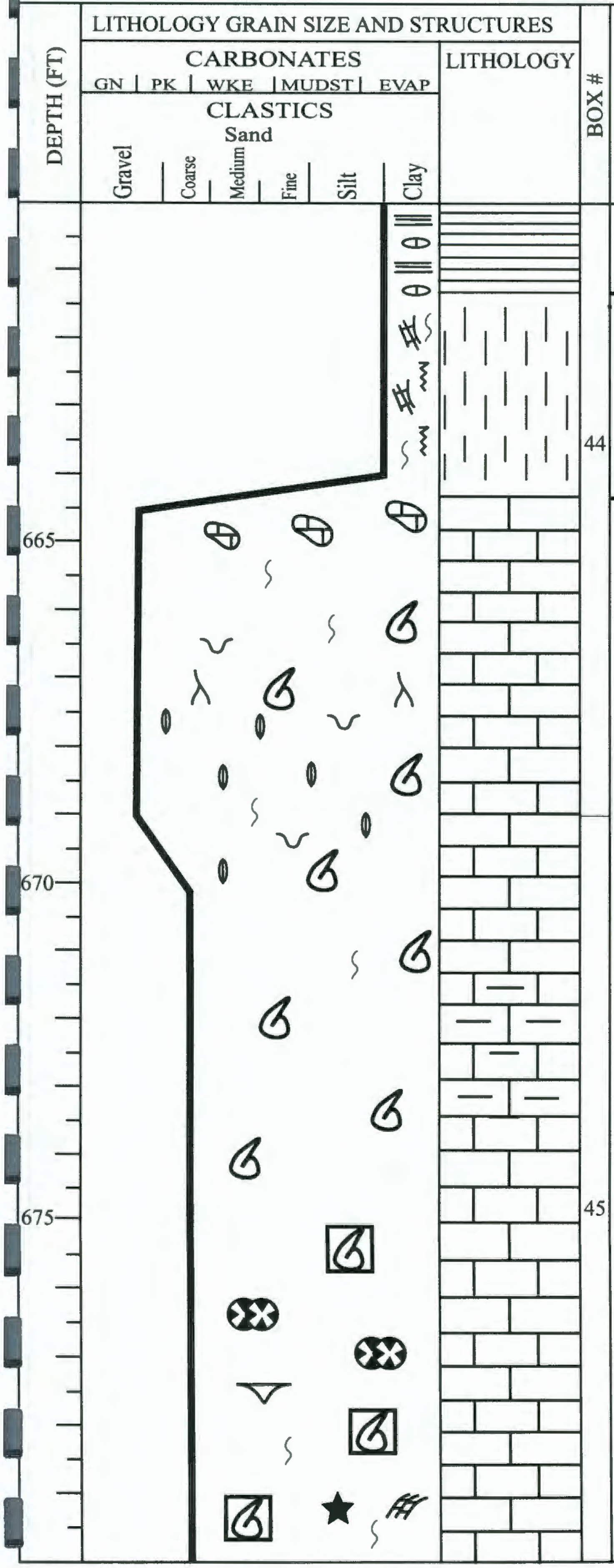

DESCRIPTION

- Lithology
- Color
- Comp., Cement, or Matrix
- Shape and Sorting
- Bedding
- Sed. Structures
- Upper Contact
- Fossils

REMARKS, INTERPRETATION

Flooding Surface

Exposure surface

Paleosol
- Light Gray
- Pedogenic
- Slickensides
- Sharp Contact
- Bioturbated

Summit Coal is not present in this core

Limestone
- Dark to medium gray
- Calcareous
- Medium bedded
- Caliche
- Calcrete
- Rip up clasts in lower part of section
- Gradational contact
- Bioclasts of crinoids, bryozoans, brachiopods, corals, and algae
- Slightly oil stained

Blackjack Creek Limestone
- Regressive upper limestone
- Top contact is an exposure surface
- Shallowing upward sequence

Tidal flat
- Above wave base

Coral and shell reef
- Below wave base

NAME HINTHORN CW-1

STRUCTURAL SETTING CHEROKEE BASIN

LOCATION SE SE SE 14-T32S-R16E

DESCRIBED BY: JONATHAN LANGE

DATE JUNE 2002

UNIT: Fort Scott - Cherokee Group

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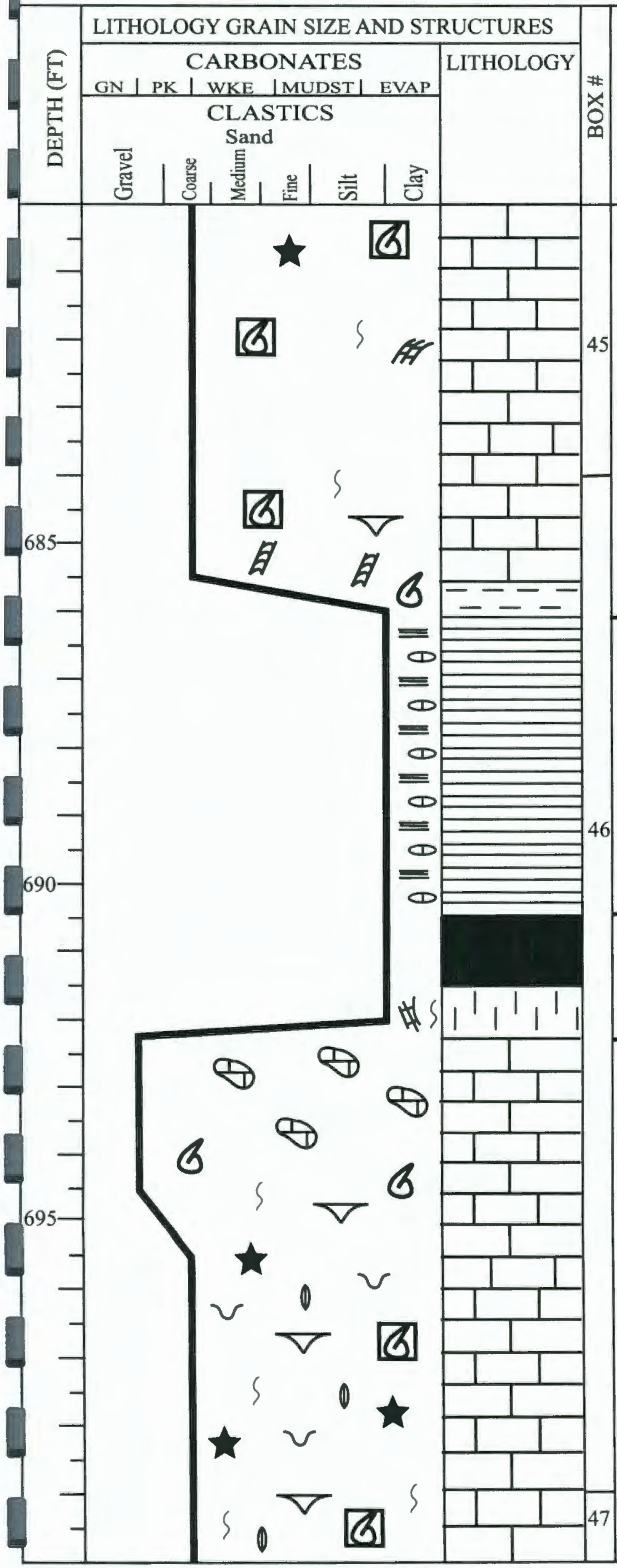

DESCRIPTION - Lithology - Color - Comp., Cement, or Matrix - Shape and Sorting - Bedding - Sed. Structures - Upper Contact - Fossils	REMARKS, INTERPRETATION
Limestone - Same as above Calcrete	Exposure surface **Top of Cherokee Group**
Black Shale - Black - Micaceous - Very thinly bedded - Planner bedding - Phosphatic - Gradational contact - Non-fossiliferous	**Excello Shale** - Transgressive marine core shale
Coal - gas show Paleosol - Dark gray - Pedogenic - Bioturbated	Flooding Surface **Mulky Coal** - Elevated mire
Limestone - Gray - Calcareous - Thickly bedded - Calcite viens - Caliche - Gradtional contact - Bioclasts of brachiopods, fusilinids and crinoids - Burrowed and bioturbated	Exposure surface **Brezzy Hill Limestone** - Shallowing upward sequence, regressive upper limestone Tidal flat - Above wave base Reef - Below wave base

NAME HINTHORN CW-1

STRUCTURAL SETTING CHEROKEE BASIN

LOCATION SE SE SE 14-T32S-R16E

DESCRIBED BY: JONATHAN LANGE

DATE JUNE 2002

UNIT: Cherokee Group

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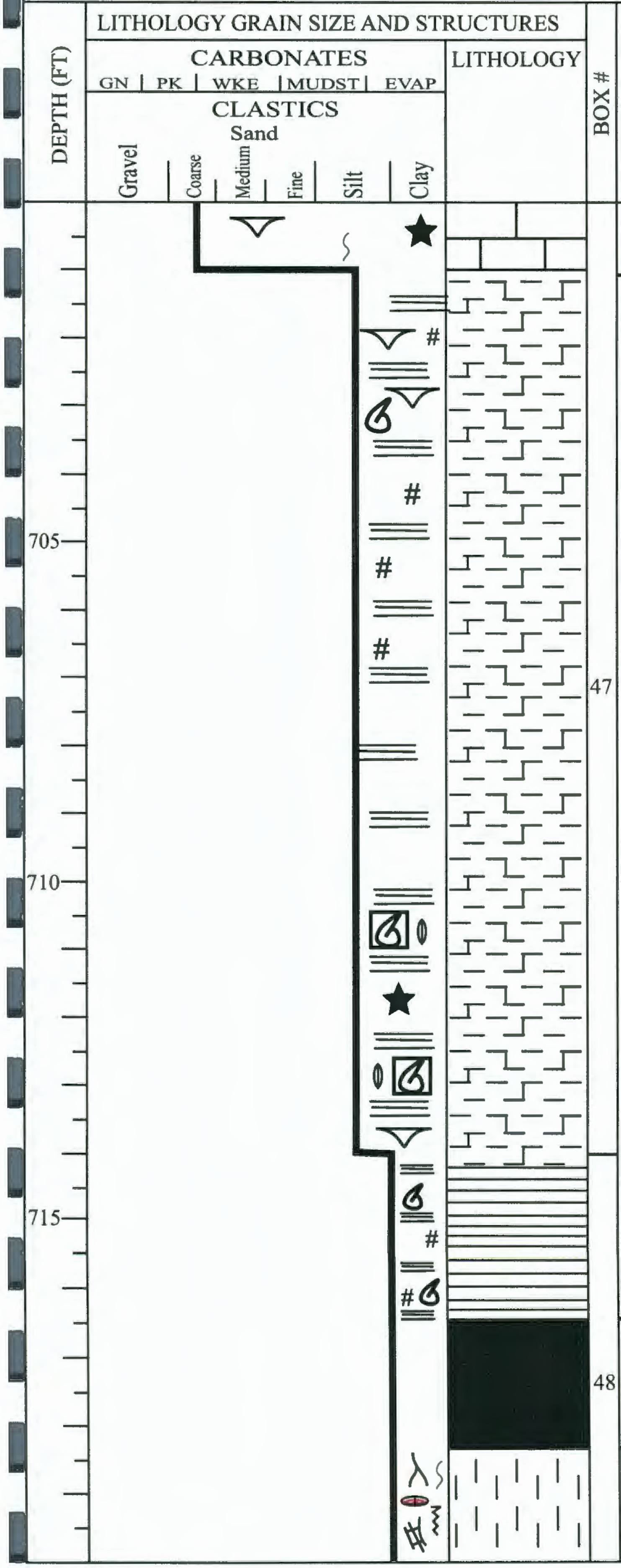

DESCRIPTION - Lithology - Color - Comp., Cement, or Matrix - Shape and Sorting - Bedding - Sed. Structures - Upper Contact - Fossils	REMARKS, INTERPRETATION
	Flooding surface
Shale - Dark gray - Micaceous with a calcareous cement - Thinly laminated, very fissile from 703.5'-708.8' - Planner bedding - Abundant pyrite - Sharp contact - Abundant bioclastic fragments of brachiopods, fusilinids and crinoids	Subtidal - Shallowing upward Near the anaerobic - disaerobic zone
Concave down shells	Higher energy, storm deposits - Mean storm wave base
Graded bedding	
Black Shale - Micaceous with a slightly calcareous cement - Thinly laminated - Plannar bedded - Gradational contact - Pyritized bioclastic fragments	Transgressive marine core shale
	Flooding surface
Coal - Black - Well developed cleats - Sharp contact - Good gas show	**Iron Post Coal**
	Exposure surface
Paleosol - Gray - Pedogenic, siderite nodules - Slickensides and bioturbated	Non-marine

NAME HINTHORN CW-1

STRUCTURAL SETTING CHEROKEE BASIN

LOCATION SE SE SE 14-T32S-R16E

DESCRIBED BY: JONATHAN LANGE

DATE JUNE 2002

UNIT: Cherokee Group

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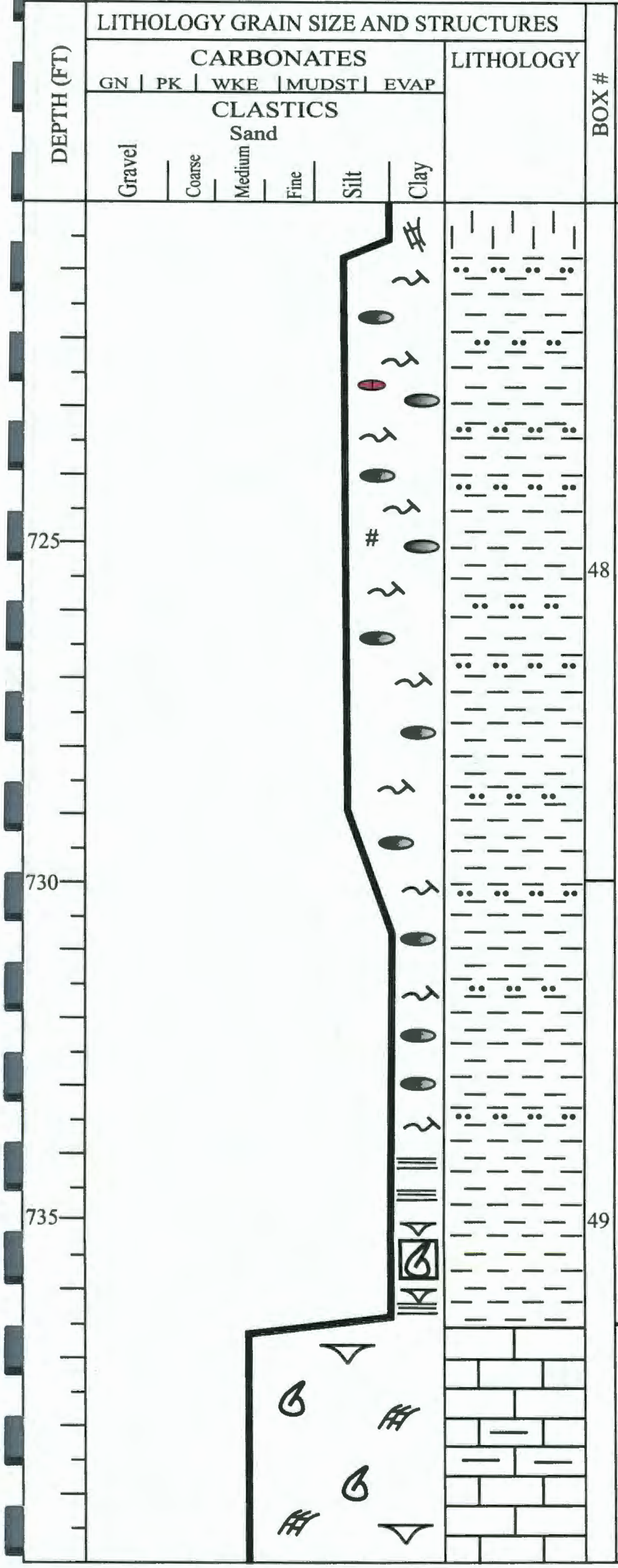
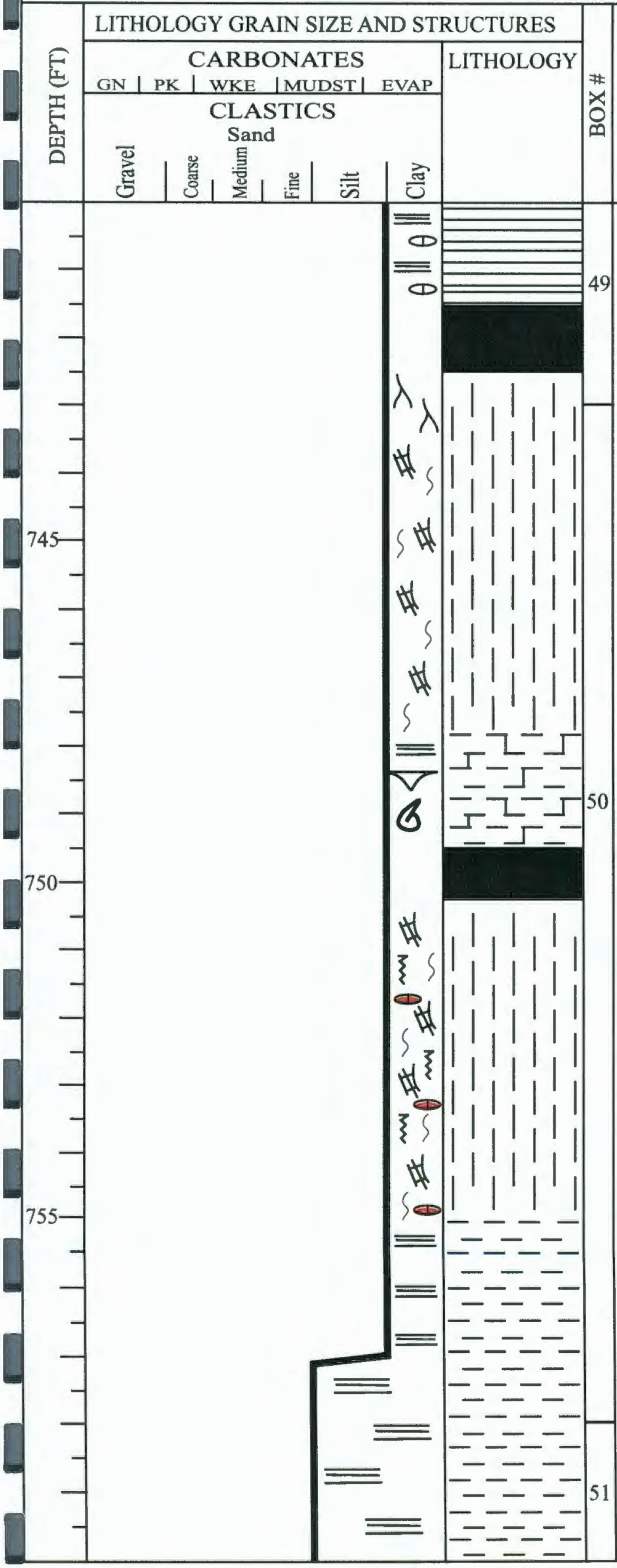


DESCRIPTION - Lithology - Color - Comp., Cement, or Matrix - Shape and Sorting - Bedding - Sed. Structures - Upper Contact - Fossils	REMARKS, INTERPRETATION
Sandy Shale - Light brown from 721'-723' and medium gray from 723'- 736' - Micaceous and siliceous with a slightly calcareous cement - Rounded and well sorted sand - Thickly laminated - Lenticular and planar bedded - Starved wave ripples - Sparse pyrite and siderite - Gradational contact - Brachiopods in lower portion	Outside, nearshore shale Tidal - estuarine fill
Graded bedding	Transgressive lag or storm deposits
Limestone - Dark gray - Calcareous - Thinly to medium bedded - Gradational contact - Bioclasts of brachiopods and bryozoans	**Verdegris Limestone** - Upper regressive limestone Shelf edge - Normal marine

NAME HINTHORN CW-1 STRUCTURAL SETTING CHEROKEE BASIN

LOCATION SE SE SE 14-T32S-R16E DESCRIBED BY: JONATHAN LANGE



DESCRIPTION
- Lithology
- Color
- Comp., Cement, or Matrix
- Shape and Sorting
- Bedding
- Sed. Structures
- Upper Contact
- Fossils

DATE JUNE 2002

UNIT: Cherokee Group

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REMARKS, INTERPRETATION

Black Shale
- Micaceous with a slightly calcareous cement
- Thinly laminated
- Planar bedding
- Phosphatic
- Slight gas show

Coal
- Black
- Poor cleating development
- Sharp contact
- Slight gas show

Paleosol
- Light gray
- Pedogenic
- Plant fragments and rooting
- Sharp contact
- Bioturbated

Shale
- Dark gray to black
- Micaceous with a calcareous cement
- Thickly laminated
- planar bedding
- Bioturbated and brachiopod frag.

Coal
- Black
- Calcite mineralization in cleats
- Sharp contact
- Gas show

Paleosol
- Gray
- Pedogenic
- Plant fragments
- Slickensides
- Siderite nodules
- Sharp contact
- Bioturbated

Shale
- Dark gray to black shale that transitions to a gray shale
- Micaceous
- Very thinly bedded
- Planar, fissile, and some lenticular bedding
- Sparse pyrite nodules
- Gradational contact
- Brachiopod bioclasts in lower portion

V-Shale
- Transgressive marine core shale

Flooding surface

Croweburg Coal

Exposure surface

Non-marine

Wave base

Flooding surface

Fleming Coal

Exposure surface

Non-marine

Outside near shore shale
- Shallowing upward

NAME HINTHORN CW-1

STRUCTURAL SETTING CHEROKEE BASIN

LOCATION SE SE SE 14-T32S-R16E

DESCRIBED BY: JONATHAN LANGE

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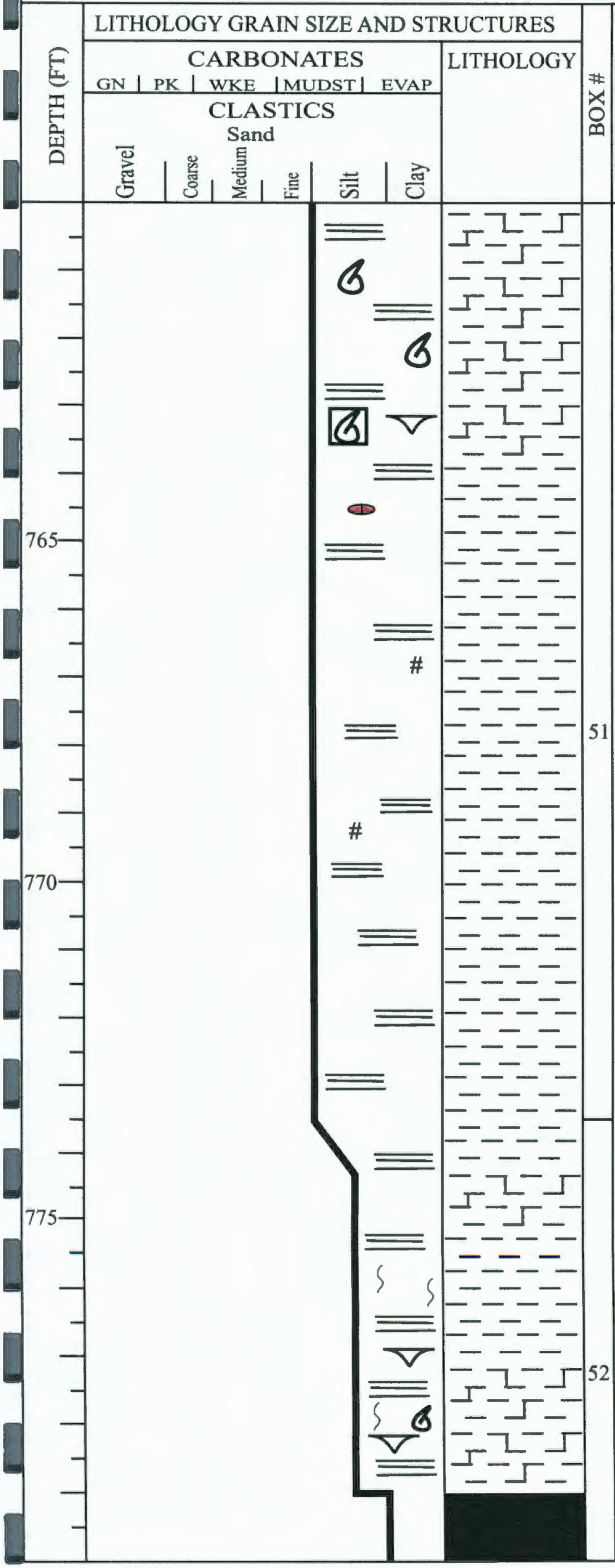

DESCRIPTION - Lithology - Color - Comp., Cement, or Matrix - Shape and Sorting - Bedding - Sed. Structures - Upper Contact - Fossils	REMARKS, INTERPRETATION
Shale, same as above	
	Storm deposits
Pyritized burrows	
Firmground	Ravinement surface
Pyritized bioclasts	
Rip-up clasts	
	Transgressive lag
	Flooding surface
Coal and carbonaceous shale - Calcite mineralization in cleats - Good gas show	**Mineral Coal**

NAME HINTHORN CW-1

STRUCTURAL SETTING CHEROKEE BASIN

LOCATION SE SE SE 14-T32S-R16E

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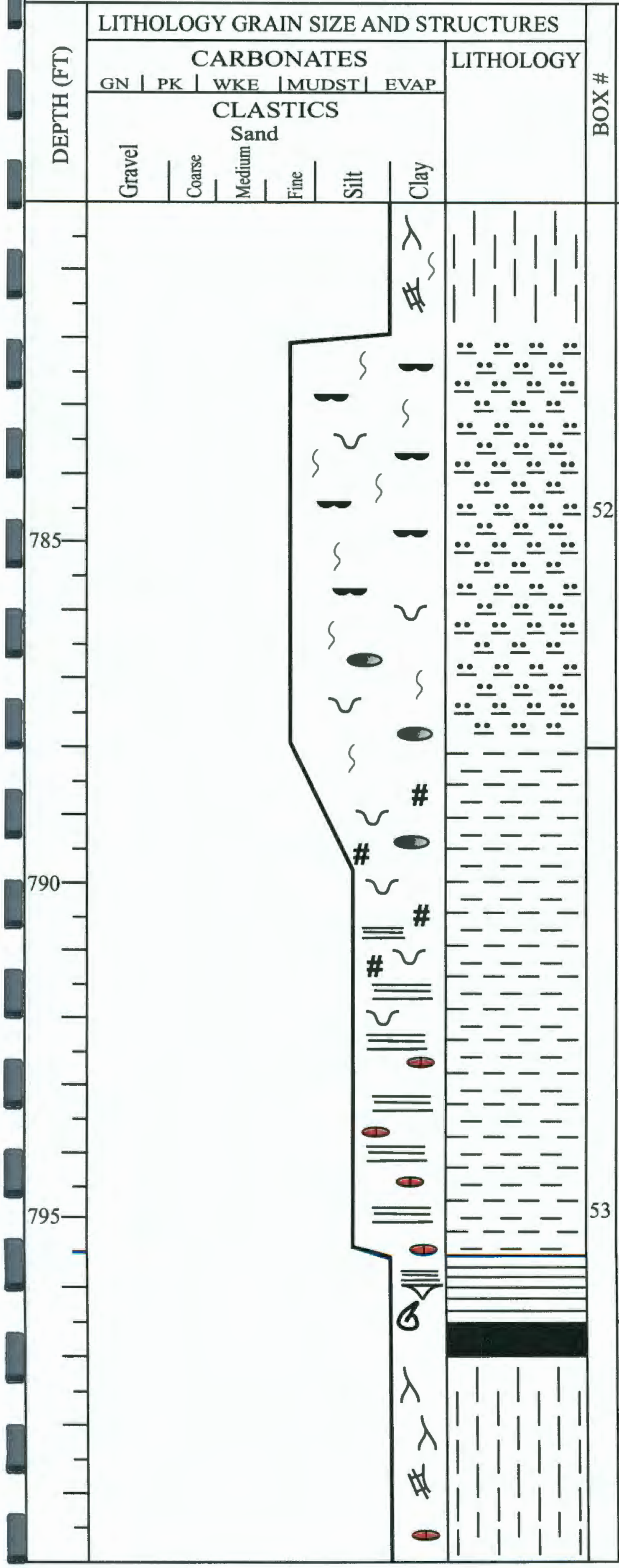

DESCRIPTION
- Lithology
- Color
- Comp., Cement, or Matrix
- Shape and Sorting
- Bedding
- Sed. Structures
- Upper Contact
- Fossils

REMARKS, INTERPRETATION

Paleosol
- Light to medium gray
- Pedogenic
- Plant fragments
- Sharp contact
- Bioturbation

Non-marine

Tidal flat

Sandy Shale
- Light gray
- Micaceous with siliceous laminae
- Thickly laminated
- Wavy to lenticulatr bedding
- Rip-up clasts
- Gradational contact
- Actively filled vertical burrows
- Heavily bioturbated

Shale
- Gray
- Micaceous
- Thinly laminated
- Planar bedding
- Pyritized plant fragments
- Siderite nodules in lower portion
- Gradational contact
- Burrowing

Shelf shale

Black Shale
- Micaceous/ slightly calcareous
- Thinly laminated
- Planar bedding
- Gradational contact
- Brachiopod fragments

Transgressive marine core shale

Transgressive lag

Flooding surface

Coal
- Sharp contact
- Gas show

Scammon Coal

Exposure surface

Non-marine

Paleosol
- Medium gray
- Pedogenic
- Plant fragments
- Siderite nodules
- Sharp contact

NAME HINTHORN CW-1 STRUCTURAL SETTING CHEROKEE BASIN

LOCATION SE SE SE 14-T32S-R16E DESCRIBED BY: JONATHAN LANGE

DEPTH (FT)

LITHOLOGY GRAIN SIZE AND STRUCTURES

CARBONATES

GN | PK | WKE | MUDST | EVAP

CLASTICS

Sand

Gravel | Coarse | Medium | Fine | Silt | Clay

LITHOLOGY

BOX #

DESCRIPTION
- Lithology
- Color
- Comp., Cement, or Matrix
- Shape and Sorting
- Bedding
- Sed. Structures
- Upper Contact
- Fossils

DATE JUNE 2002

UNIT: Cherokee Group

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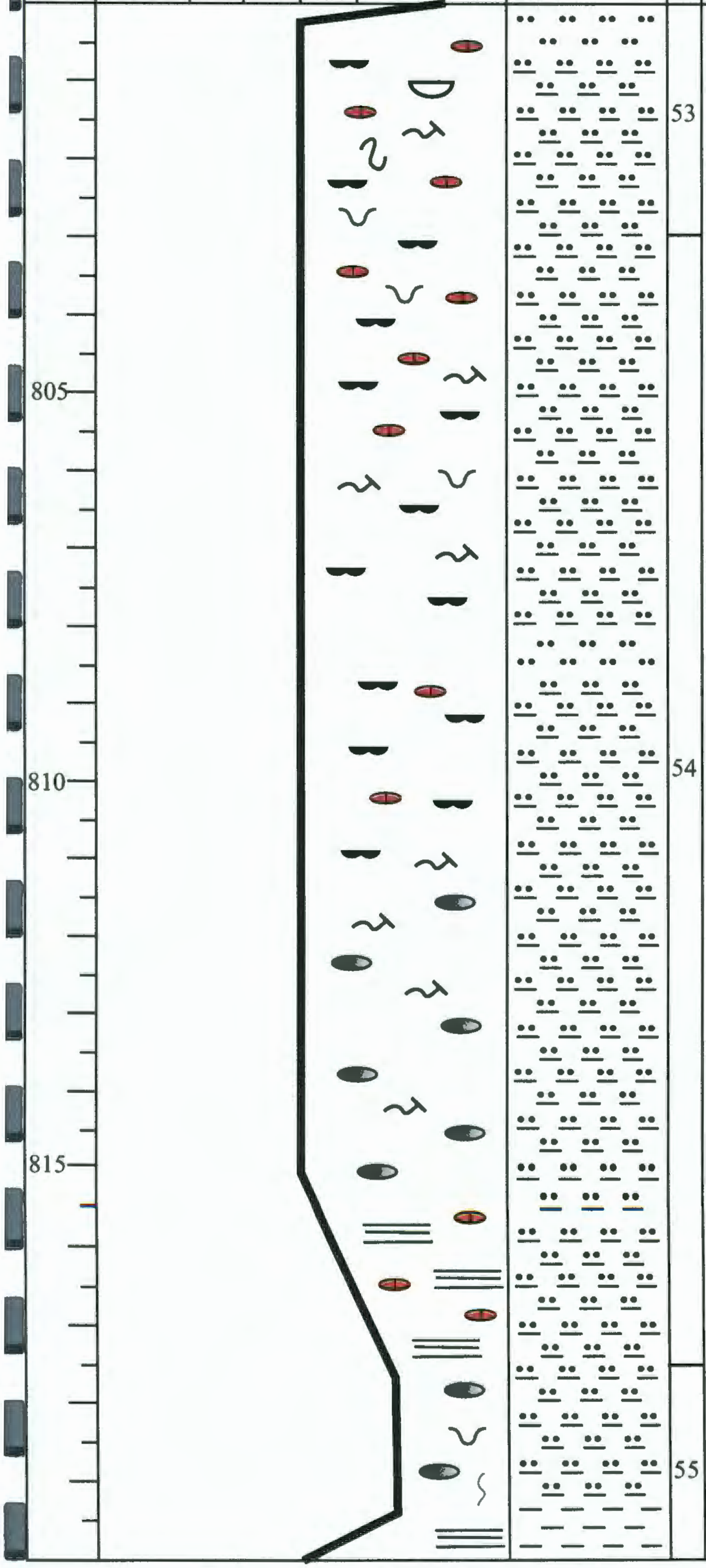
REMARKS, INTERPRETATION



Sandstone
- Light gray sand with medium gray muddy laminae
- Well rounded and well sorted
- Thickly laminated
- Flaser bedding on top to wavy, lenticular and planar bedding
- Wave ripples
- Soft sediment deformation
- Rip-up clasts
- Siderite crystals
- Gradational contact
- Actively filled vertical burrows

Very fissile to fryable

Skinner/Chelsea Sandstone

Tidal Flat, Possibly in an Estuary of an Incised Vally Fill
- Bimodal flow
- Tidalites

NAME HINTHORN CW-1

STRUCTURAL SETTING CHEROKEE BASIN

LOCATION SE SE SE 14-T32S-R16E

DESCRIBED BY: JONATHAN LANGE

DEPTH (FT)

LITHOLOGY GRAIN SIZE AND STRUCTURES

CARBONATES

GN | PK | WKE | MUDST | EVAP

CLASTICS

Sand

Gravel | Coarse | Medium | Fine | Silt | Clay

LITHOLOGY

BOX #

DESCRIPTION
- Lithology
- Color
- Comp., Cement, or Matrix
- Shape and Sorting
- Bedding
- Sed. Structures
- Upper Contact
- Fossils

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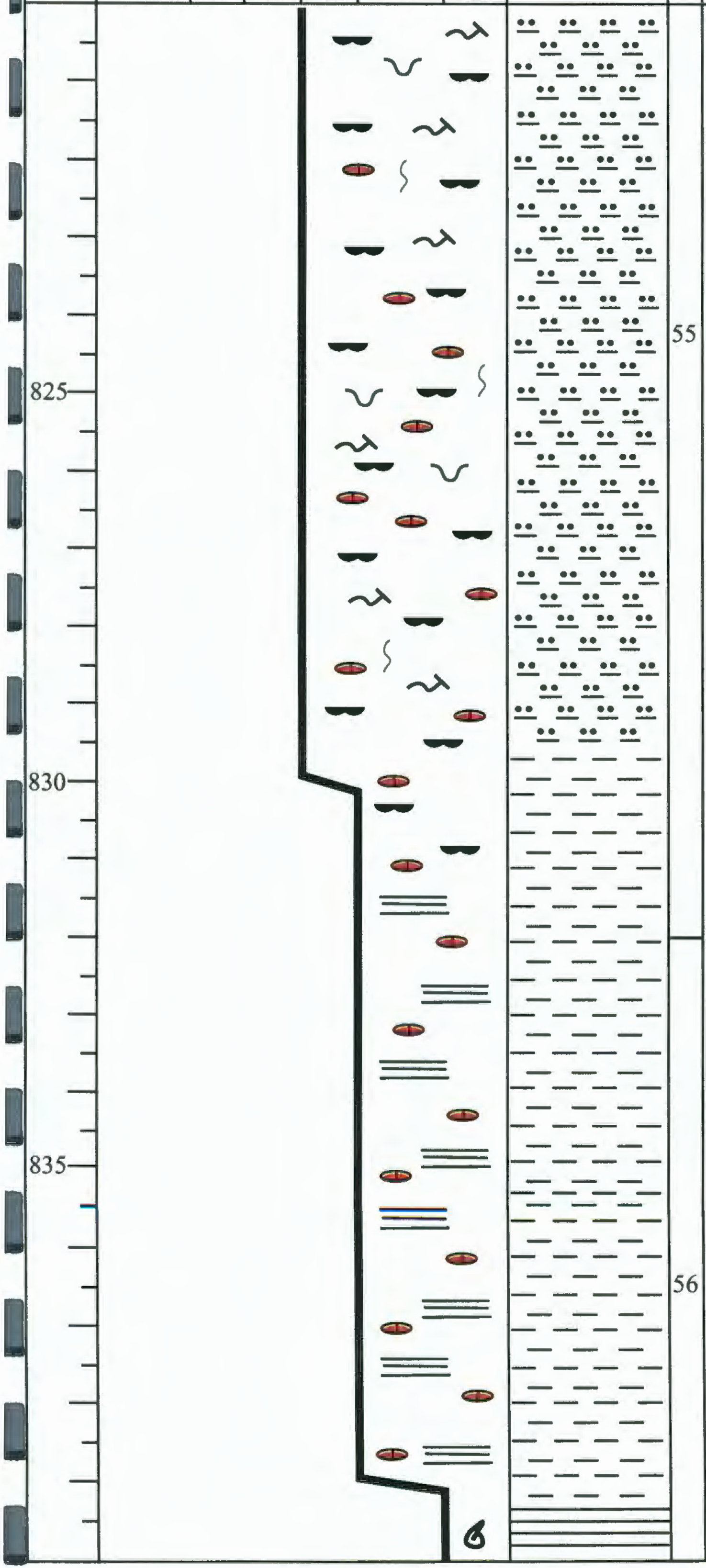
REMARKS, INTERPRETATION



Sandstone
- Light brown
- Siliceous with muddy laminae
- Well rounded and well sorted
- Thickly laminated
- Wavy bedding
- Current ripples
- Siderite crystals
- Gradational contact
- Bioturbated
- Actively filled vertical and horizontal burrows

Shale
- Dark gray, darkens downward
- Micaceous
- Thinly laminated with a few siliceous laminae
- Planar bedding with wavy bedding in transition
- Siderite bands
- Gradational contact
- Non-fossiliferous

Shelf Shale

Black Shale, description on next page

NAME HINTHORN CW-1

STRUCTURAL SETTING CHEROKEE BASIN

LOCATION SE SE SE 14-T32S-R16E

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DEPTH (FT)

LITHOLOGY GRAIN SIZE AND STRUCTURES

CARBONATES

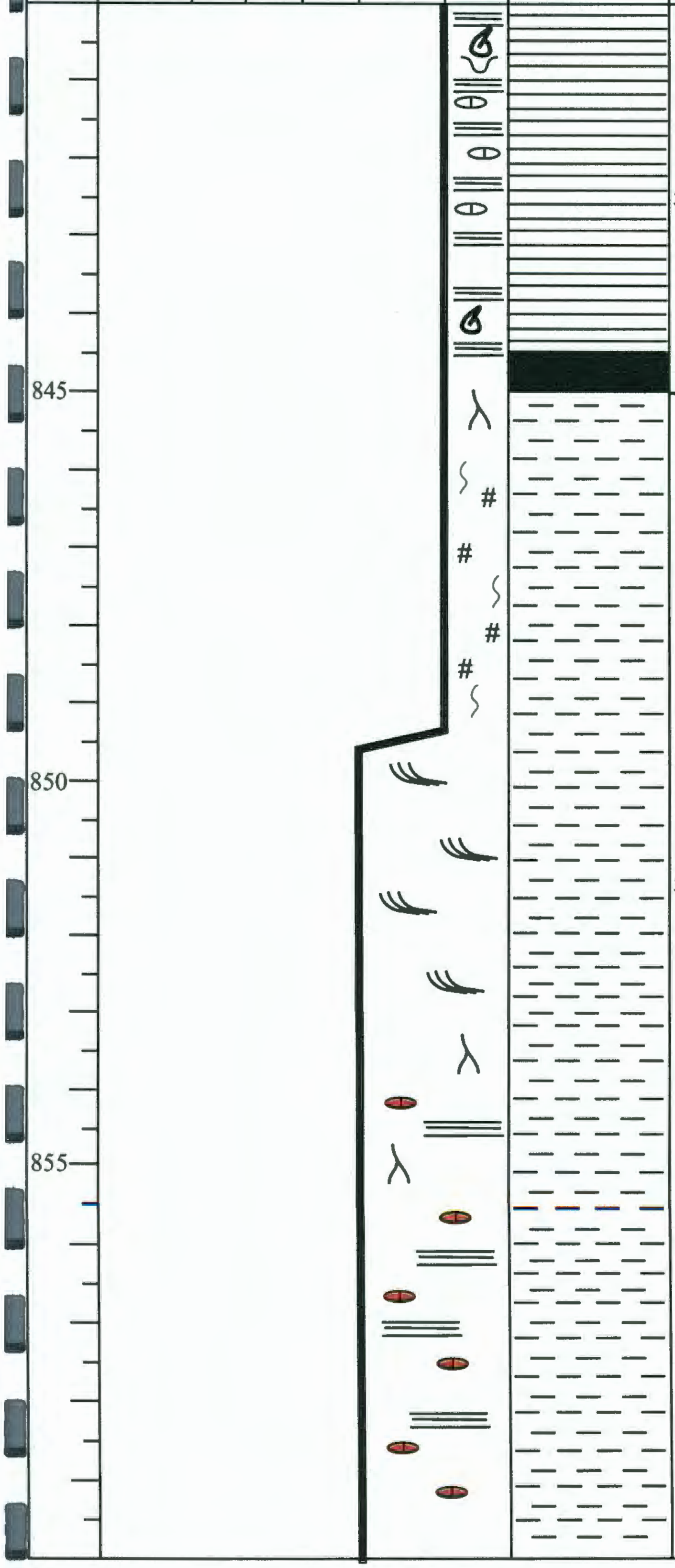
GN | PK | WKE | MUDST | EVAP

CLASTICS

Sand

Gravel | Coarse | Medium | Fine | Silt | Clay

LITHOLOGY



BOX #	DESCRIPTION - Lithology - Color - Comp., Cement, or Matrix - Shape and Sorting - Bedding - Sed. Structures - Upper Contact - Fossils	REMARKS, INTERPRETATION
56	Black shale - Micaceous w/ a calcareous cement - Thinly laminated - Planar bedding - Phosphatic - Gradational contact - Bioclastic fragments - Burrowing	**Tebo marker** - Transgressive marine core shale Transgressive lag
	Coal - Gas show	Flooding surface **Tebo Coal** Exposure surface
	Shale - Medium gray - Grainy - Non-laminated - Plant fragments - Pyrite - Sharp contact - Bioturbated	Salt water marsh
57	Shale - Light to medium gray - Micaceous - Thinly laminated and fissile - Ripple cross laminae and planar bedding - Rooting and plant fragments - Siderite nodules - Gradational contact - Non - fossiliferous	Muddy tidal flat or coastal plain Estuarine

NAME HINTHORN CW-1

STRUCTURAL SETTING CHEROKEE BASIN

LOCATION SE SE SE 14-T32S-R16E

DESCRIBED BY: JONATHAN LANGE

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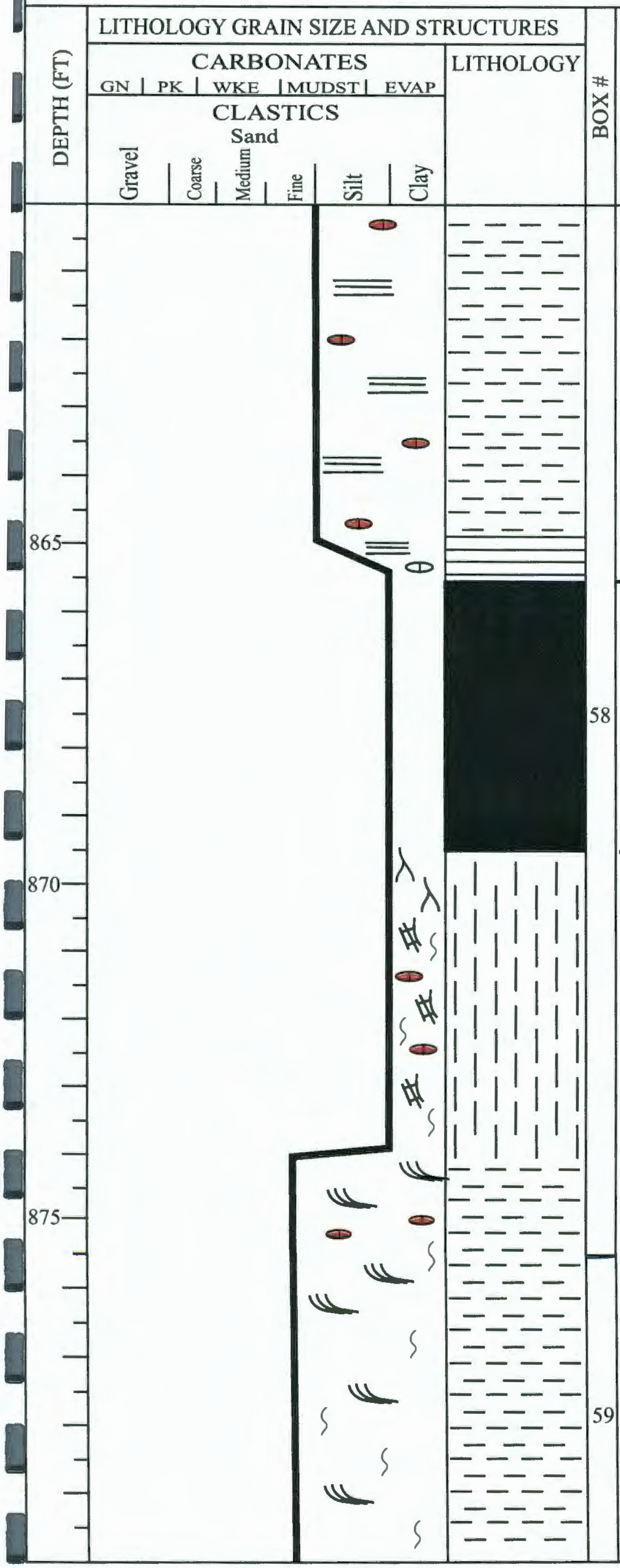


DESCRIPTION
- Lithology
- Color
- Comp., Cement, or Matrix
- Shape and Sorting
- Bedding
- Sed. Structures
- Upper Contact
- Fossils

REMARKS, INTERPRETATION

Shale, same as above

Black Shale
- Micaceous
- Diagonally laminated
- Planar bedding
- Phosphatic
- Gradational contact
- Gas show

Flooding Surface

Coal
- Black
- Well developed cleating
- Sharp contact
- Gas show

Weir-Pittsburg Coal
- Back barrier coastal coal

Exposure surface

Paleosol
- Brown to gray
- Fissile
- Pedogenic
- Rooting and plant fragments
- Siderite nodules
- Sharp contact
- Bioturbated

Non-marine

Shale
- Dark gray
- Micaceous
- Thinly laminated
- Ripple cross laminae
- Few plant fragments
- Siderite nodules
- Gradational contact
- Bioturbated

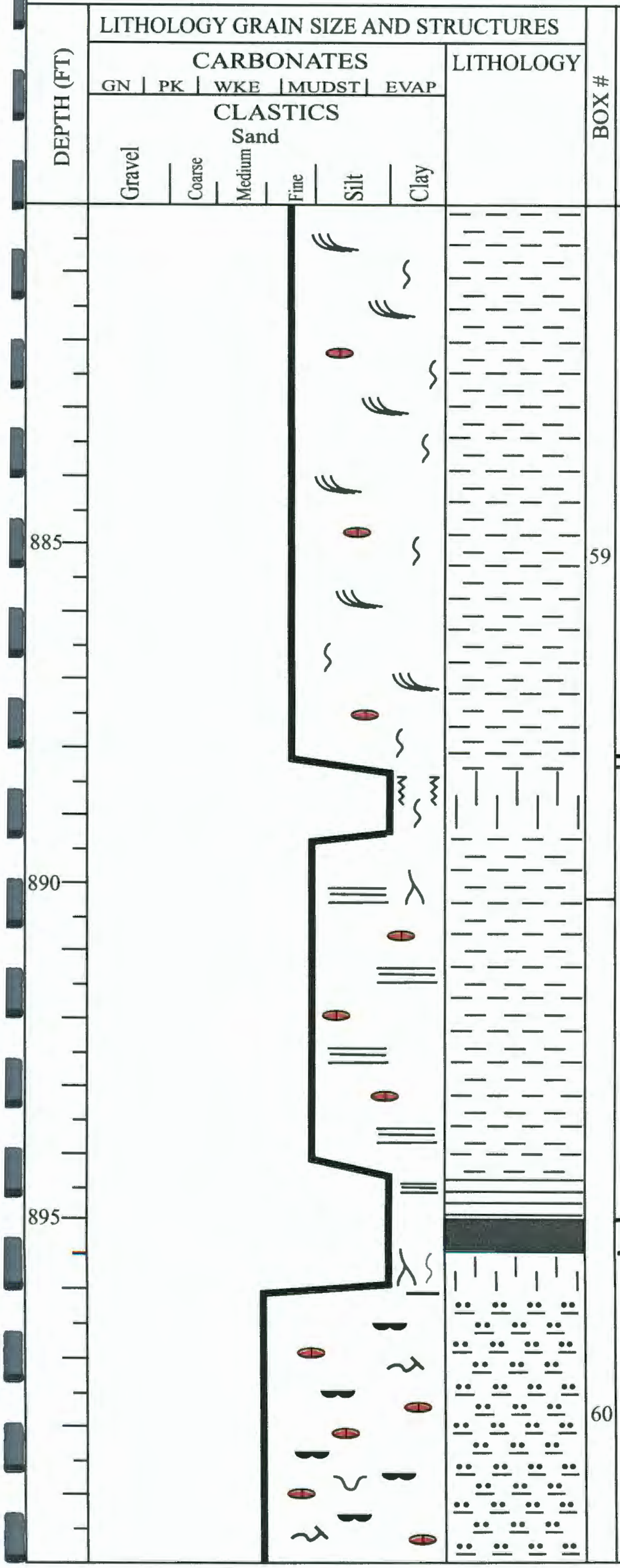
Muddy tidal flat or coastal plain

NAME HINTHORN CW-1

STRUCTURAL SETTING CHEROKEE BASIN

LOCATION SE SE SE 14-T32S-R16E

DESCRIBED BY: JONATHAN LANGE



DESCRIPTION
- Lithology
- Color
- Comp., Cement, or Matrix
- Shape and Sorting
- Bedding
- Sed. Structures
- Upper Contact
- Fossils

DATE JUNE 2002

UNIT: Cherokee Group

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REMARKS, INTERPRETATION

Shale, same as above

Flooding Surface

Exposure Surface

Paleosol
- Light gray
- Slickensides
- Bioturbated

Non-marine

Estuarine

Shale
- Dark gray
- Micaceous
- Thinly laminated
- Planar bedding
- Few plant fragments
- Siderite bands
- Gradational contact
- Non-fossiliferous

Black shale
- Thinly laminated and fissile

Flooding Surface

Coal, good gas show

Lower Weir-Pittsburg Coal

Exposure Surface

Paleosol
- Coaly
- Rooting and slickensides

Bartlesville Sandstone

Sandstone, description on next page

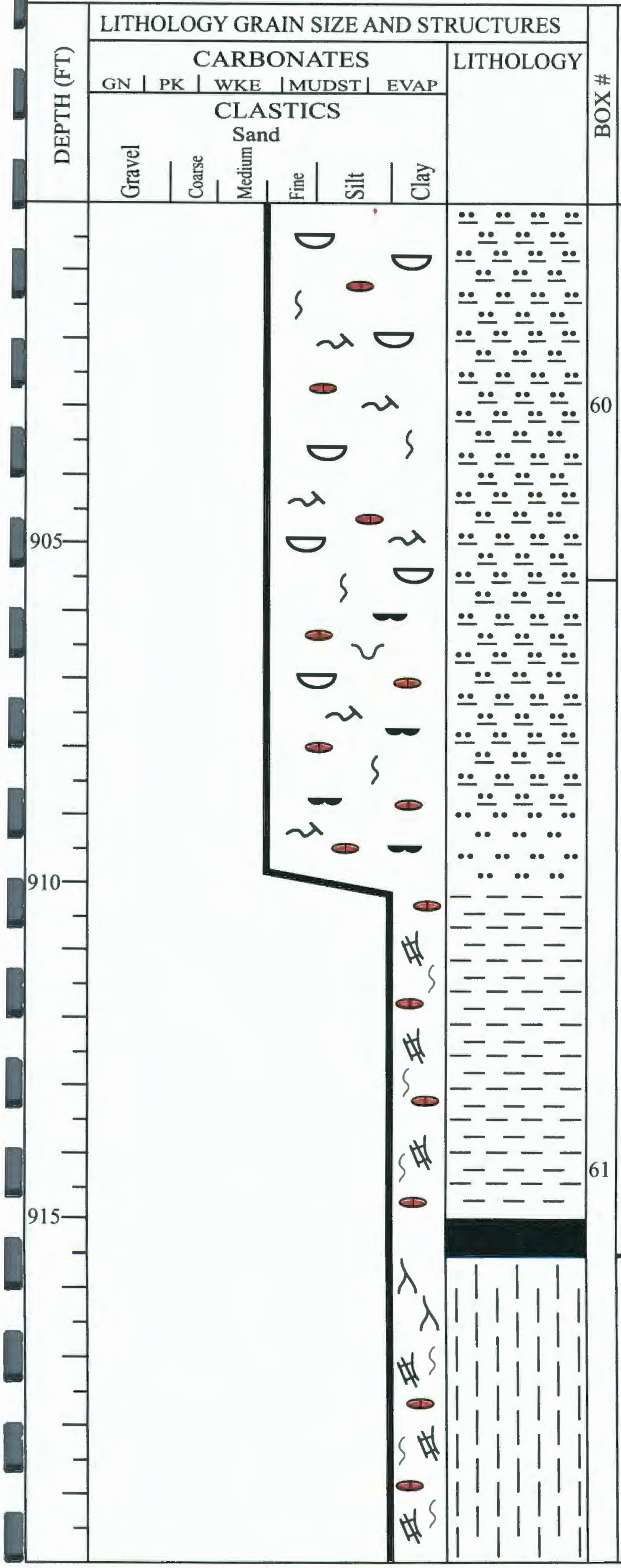
Tidal Flat Possibly in an Estuary of an Incised Valley
- Tidal influence
- Bimodal flow
- Sequence boundary at bottom

NAME HINTHORN CW-1

STRUCTURAL SETTING CHEROKEE BASIN

LOCATION SE SE SE 14-T32S-R16E

DESCRIBED BY: JONATHAN LANGE



DESCRIPTION
- Lithology
- Color
- Comp., Cement, or Matrix
- Shape and Sorting
- Bedding
- Sed. Structures
- Upper Contact
- Fossils

DATE JUNE 2002

UNIT: Cherokee Group

PAGE 15 OF 24 PAGES

REMARKS, INTERPRETATION

Sandstone
- Light gray
- Siliceous with micaceous laminae
- Thickly laminated
- Flaser to wavy bedding
- Wave ripples
- Abundant siderite nodules
- Gradational contact
- Erosional lower contact
- Some bioturbation
- Vertical burrows

Shale
- Medium gray
- Micaceous
- Blocky to thinly laminated
- Planar bedding
- Pedogenically altered
- Siderite crystals
- Gradational contact
- Some bioturbation
- Similar to an undercaly

Non-marine
- Similar to a paleosol

Coal - Gas show

Drywood Coal

Exposure surface

Paleosol
- Gray
- Organic
- Pedogenic
- Plant fragments
- Siderite crystals

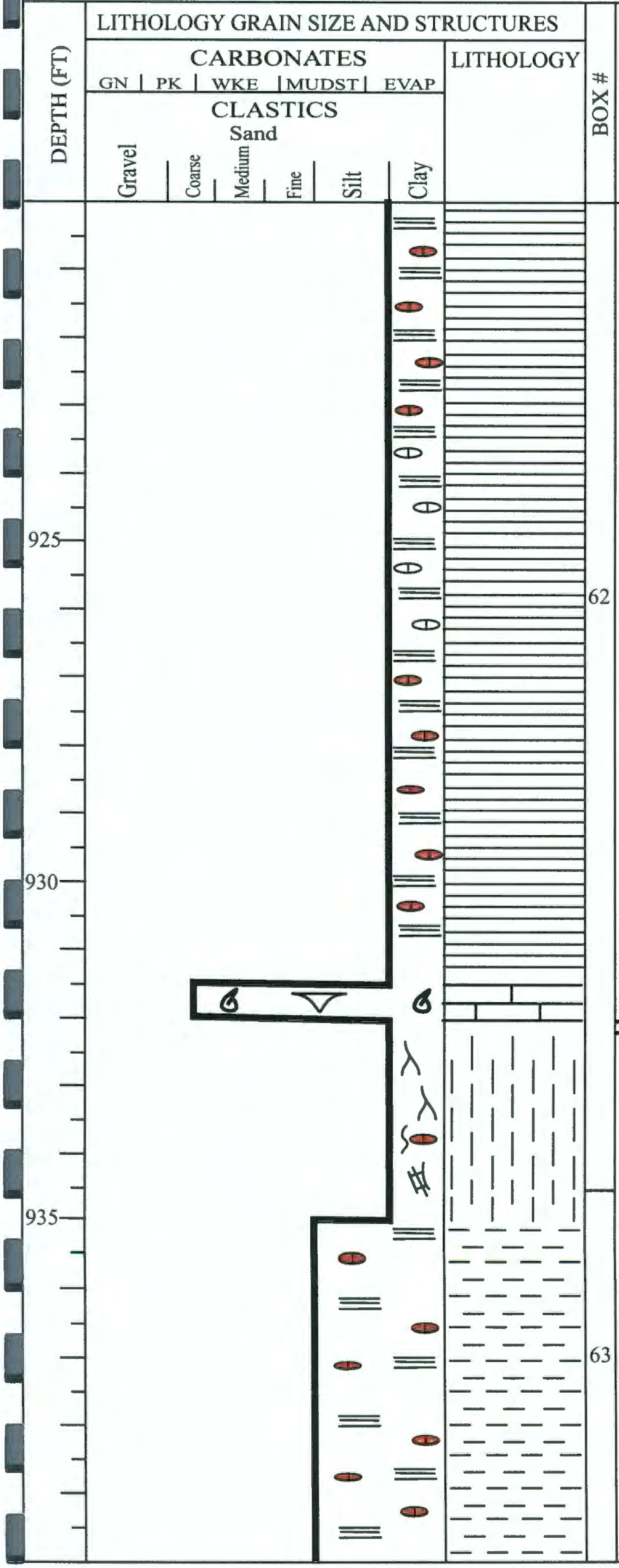
Non-marine

NAME HINTHORN CW-1

STRUCTURAL SETTING CHEROKEE BASIN

LOCATION SE SE SE 14-T32S-R16E

DESCRIBED BY: JONATHAN LANGE



DESCRIPTION
- Lithology
- Color
- Comp., Cement, or Matrix
- Shape and Sorting
- Bedding
- Sed. Structures
- Upper Contact
- Fossils

DATE JUNE 2002

UNIT: Cherokee Group

PAGE 16 OF 24 PAGES

REMARKS, INTERPRETATION

Black Shale
- Black
- Micaceous
- Very thinly laminated
- Fissile
- Siderite bands
- Phosphatic nodules
- Sharp contact
- Non-fossiliferous

Transgressive marine core shale
- Max flooding possible at 925’

Transgressive lag

Flooding surface

Exposure surface

Paleosol
- Medium gray
- Pedogenic
- Plant fragments
- Siderite nodules
- Sharp contact
- Bioturbated

Non-marine

Shale
- Dark gray
- Micaceous
- Thinly laminated
- Planar bedded
- Siderite bands
- Sharp contact
- Non-fossiliferous

Nearshore outside shale
- Estuarine

NAME HINTHORN CW-1

STRUCTURAL SETTING CHEROKEE BASIN

LOCATION SE SE SE 14-T32S-R16E

DESCRIBED BY: JONATHAN LANGE

DEPTH (FT)

LITHOLOGY GRAIN SIZE AND STRUCTURES

CARBONATES
GN | PK | WKE | MUDST | EVAP

CLASTICS
Sand
Gravel | Coarse | Medium | Fine | Silt | Clay

LITHOLOGY

BOX #

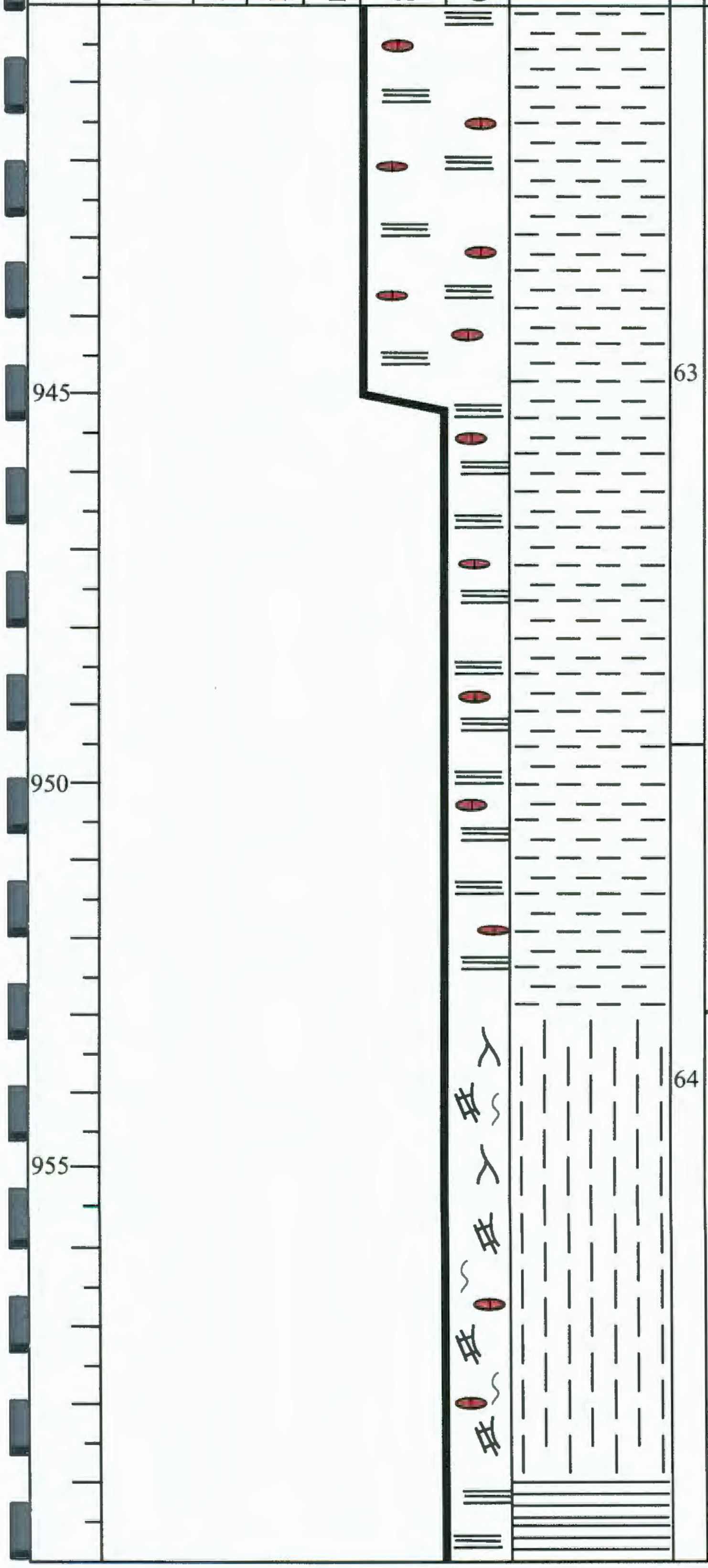
DESCRIPTION
- Lithology
- Color
- Comp., Cement, or Matrix
- Shape and Sorting
- Bedding
- Sed. Structures
- Upper Contact
- Fossils

DATE JUNE 2002

UNIT: Cherokee Group

PAGE 17 OF 24 PAGES

REMARKS, INTERPRETATION



Shale, same as above

Shale
- Medium to dark gray
- Micaceous
- Very thinly laminated
- Planar bedded
- Fissile
- Sparse Siderite bands
- Gradational contact
- Non-fossiliferous

Nearshore, outside shale

Flooding surface
Exposure surface

Paleosol
- Brown
- Pedogenic
- Fissile
- Plant fragments
- Siderite nodules
- Gradational contact
- Bioturbated

Non-marine

Black shale, described on next page

NAME HINTHORN CW-1

STRUCTURAL SETTING CHEROKEE BASIN

LOCATION SE SE SE 14-T32S-R16E

DESCRIBED BY: JONATHAN LANGE

DEPTH (FT)

LITHOLOGY GRAIN SIZE AND STRUCTURES

CARBONATES

GN | PK | WKE | MUDST | EVAP

CLASTICS

Sand

Gravel | Coarse | Medium | Fine | Silt | Clay

LITHOLOGY

BOX #

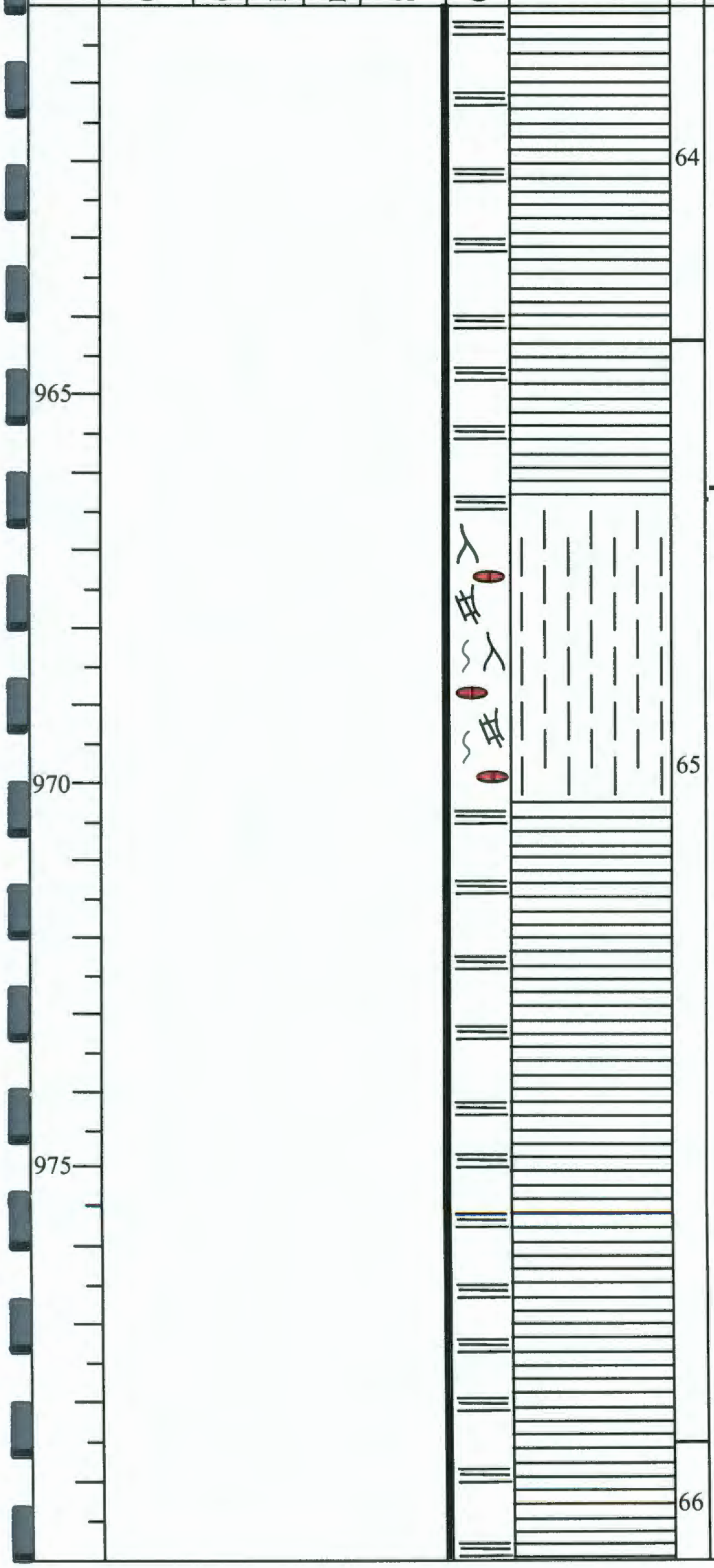
DESCRIPTION
- Lithology
- Color
- Comp., Cement, or Matrix
- Shape and Sorting
- Bedding
- Sed. Structures
- Upper Contact
- Fossils

DATE JUNE 2002

UNIT: Cherokee Group

PAGE 18 OF 24 PAGES

REMARKS, INTERPRETATION



Black Shale
- Black
- Micaceous
- Very thinly laminated
- Planar bedded
- Gradational contact
- Non-fossiliferous

Transgressive marine core shale

Flooding surface

Exposure surface

Paleosol
- Medium gray
- Pedogenic
- Plant fragments
- Siderite nodules
- Sharp contact w/siderite
- Bioturbated

Non-marine

Black shale
- Black
- Micaceous
- Thinly laminated
- Fissile
- Planar bedded
- Gradational contact
- Non-fossiliferous

Transgressive marine core shale

NAME HINTHORN CW-1

STRUCTURAL SETTING CHEROKEE BASIN

LOCATION SE SE SE 14-T32S-R16E

DESCRIBED BY: JONATHAN LANGE

DEPTH (FT)

LITHOLOGY GRAIN SIZE AND STRUCTURES

CARBONATES
GN | PK | WKE | MUDST | EVAP

CLASTICS
Sand
Gravel | Coarse | Medium | Fine | Silt | Clay

LITHOLOGY

BOX #

DESCRIPTION
- Lithology
- Color
- Comp., Cement, or Matrix
- Shape and Sorting
- Bedding
- Sed. Structures
- Upper Contact
- Fossils

DATE JUNE 2002

UNIT: Cherokee Group

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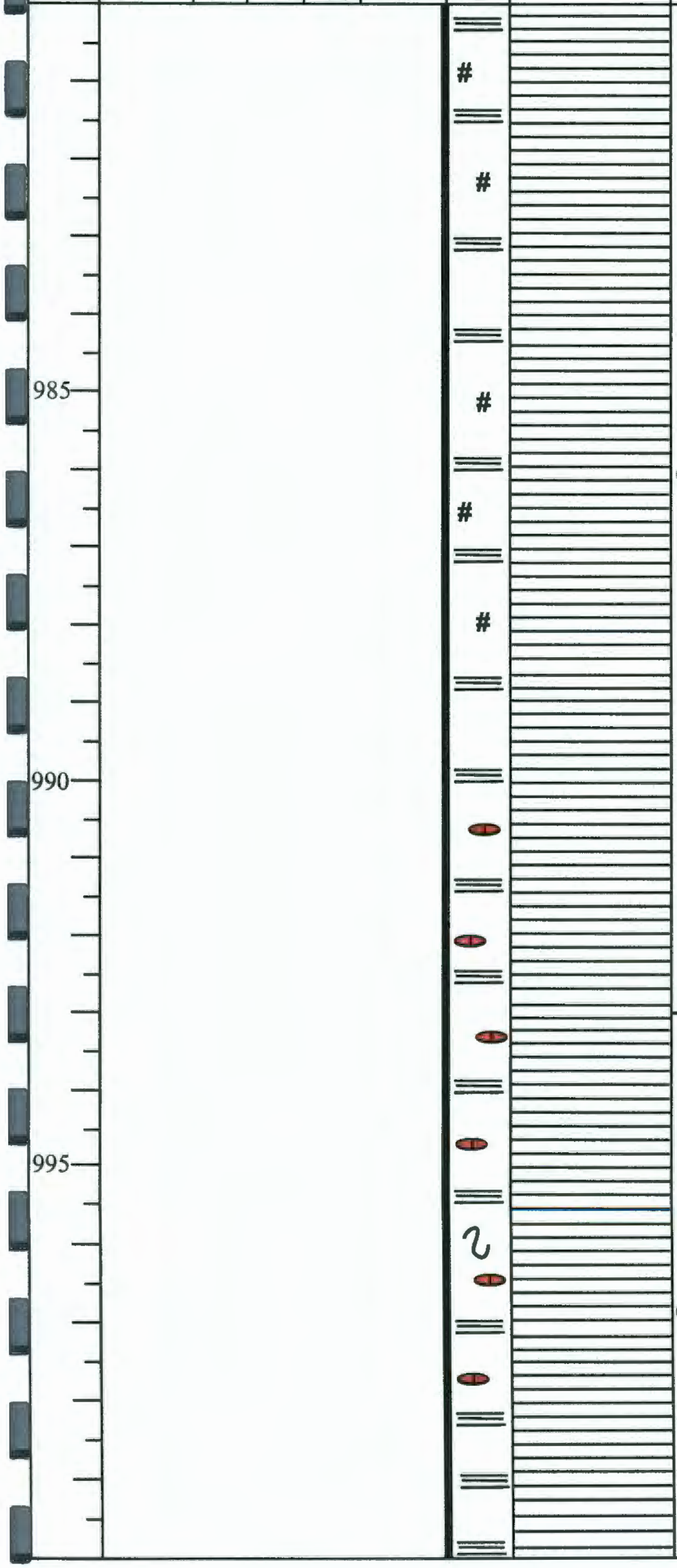
REMARKS, INTERPRETATION



66

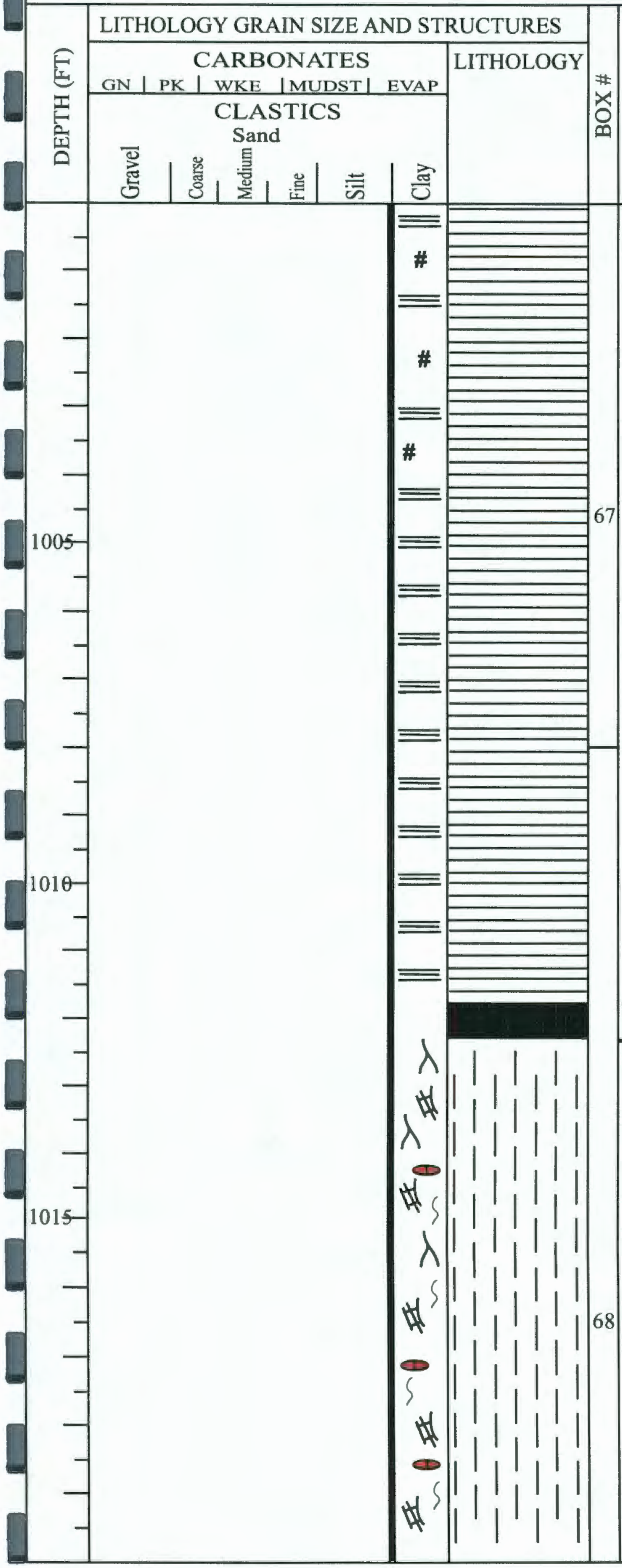
67

Black Shale
- Black
- Micaceous
- Thinly laminated
- Planar bedding
- Fissile from 985'-990'
- Pyrite and Siderite bands
- Soft sediment deformation
- Gradational contact
- Non-fossiliferous

Costal marsh

NAME HINTHORN CW-1
STRUCTURAL SETTING CHEROKEE BASIN

LOCATION SE SE SE 14-T32S-R16E
DESCRIBED BY: JONATHAN LANGE



DESCRIPTION
- Lithology
- Color
- Comp., Cement, or Matrix
- Shape and Sorting
- Bedding
- Sed. Structures
- Upper Contact
- Fossils

DATE JUNE 2002
UNIT: Cherokee Group
PAGE 20 OF 24 PAGES

REMARKS, INTERPRETATION

Black shale, same as above

Flooding surface

Coal - Good gas show

Aw Coal

Exposure surface

Paleosol
- Light gray
- Pedogenic
- Plant fragments
- Siderite crystals
- Sharp contact
- Bioturbated

Non-marine

NAME HINTHORN CW-1

STRUCTURAL SETTING CHEROKEE BASIN

LOCATION SE SE SE 14-T32S-R16E

DESCRIBED BY: JONATHAN LANGE

DATE JUNE 2002

UNIT: Cherokee Group

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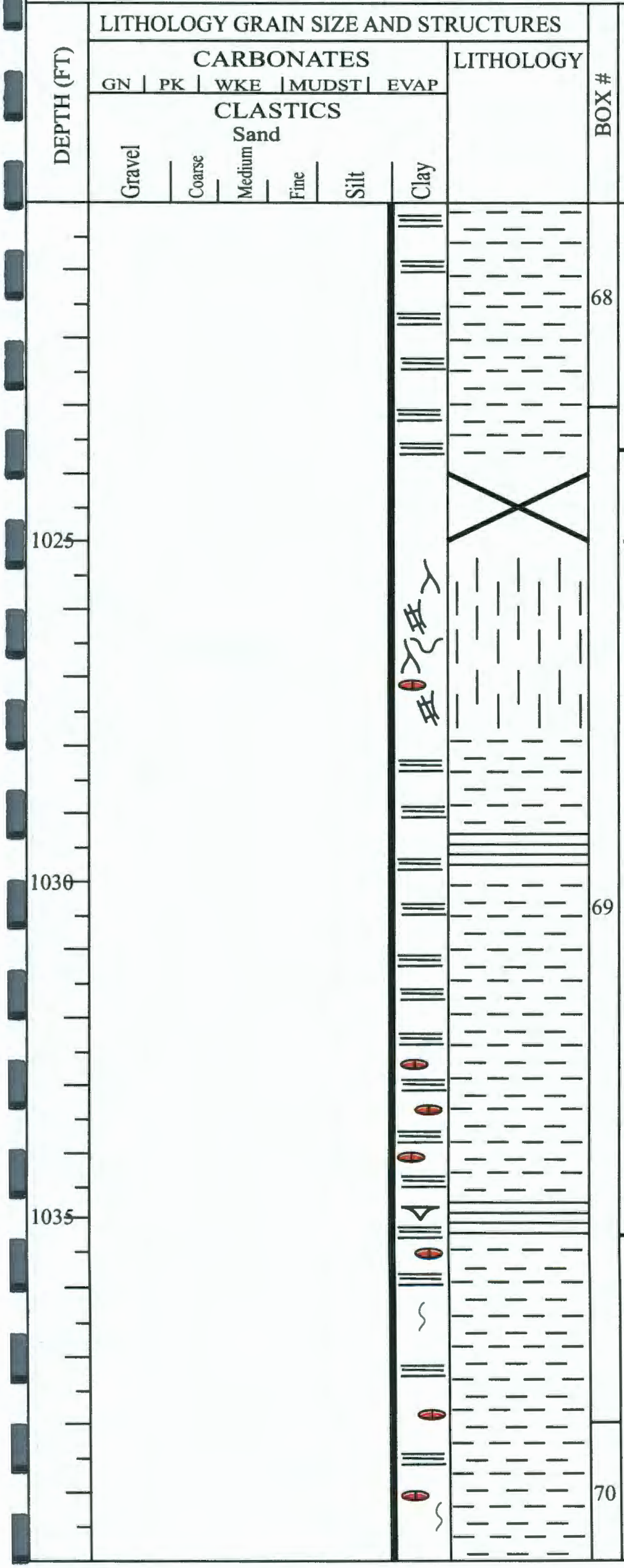

DESCRIPTION
- Lithology
- Color
- Comp., Cement, or Matrix
- Shape and Sorting
- Bedding
- Sed. Structures
- Upper Contact
- Fossils

REMARKS, INTERPRETATION

Shale
- Dark gray to black
- Micaceous
- Thinly laminated
- Fissile
- Planar bedded
- Gradational contact
- Non-fossiliferous

Nearshore outside shale

Flooding surface

Lost core

Possible paleosol in lost portion of core

Exposure surface

Paleosol
- Gray
- Hard, Pedogenic
- Plant fragments
- Siderite nodules
- Gradational contact
- Burrowing

Non-marine

Shale
- Dark gray to black
- Micaceous
- Thinly laminated
- Planar bedded
- Fissile
- Siderite in lower portion
- Gradational contact

Estuarine

Brachiopod fragments

Transgressive lag

Flooding surface

Shale
- Dark brown
- Micaceous
- Thinly laminated
- Planar bedded
- Fissile
- Siderite
- Gradational contact
- Bioturbated

Swamp

NAME HINTHORN CW-1 STRUCTURAL SETTING CHEROKEE BASIN

LOCATION SE SE SE 14-T32S-R16E DESCRIBED BY: JONATHAN LANGE

DEPTH (FT)

LITHOLOGY GRAIN SIZE AND STRUCTURES

CARBONATES
GN | PK | WKE | MUDST | EVAP

CLASTICS
Sand
Gravel | Coarse | Medium | Fine | Silt | Clay

LITHOLOGY

BOX #

DESCRIPTION
- Lithology
- Color
- Comp., Cement, or Matrix
- Shape and Sorting
- Bedding
- Sed. Structures
- Upper Contact
- Fossils

DATE JUNE 2002

UNIT: Cherokee Group

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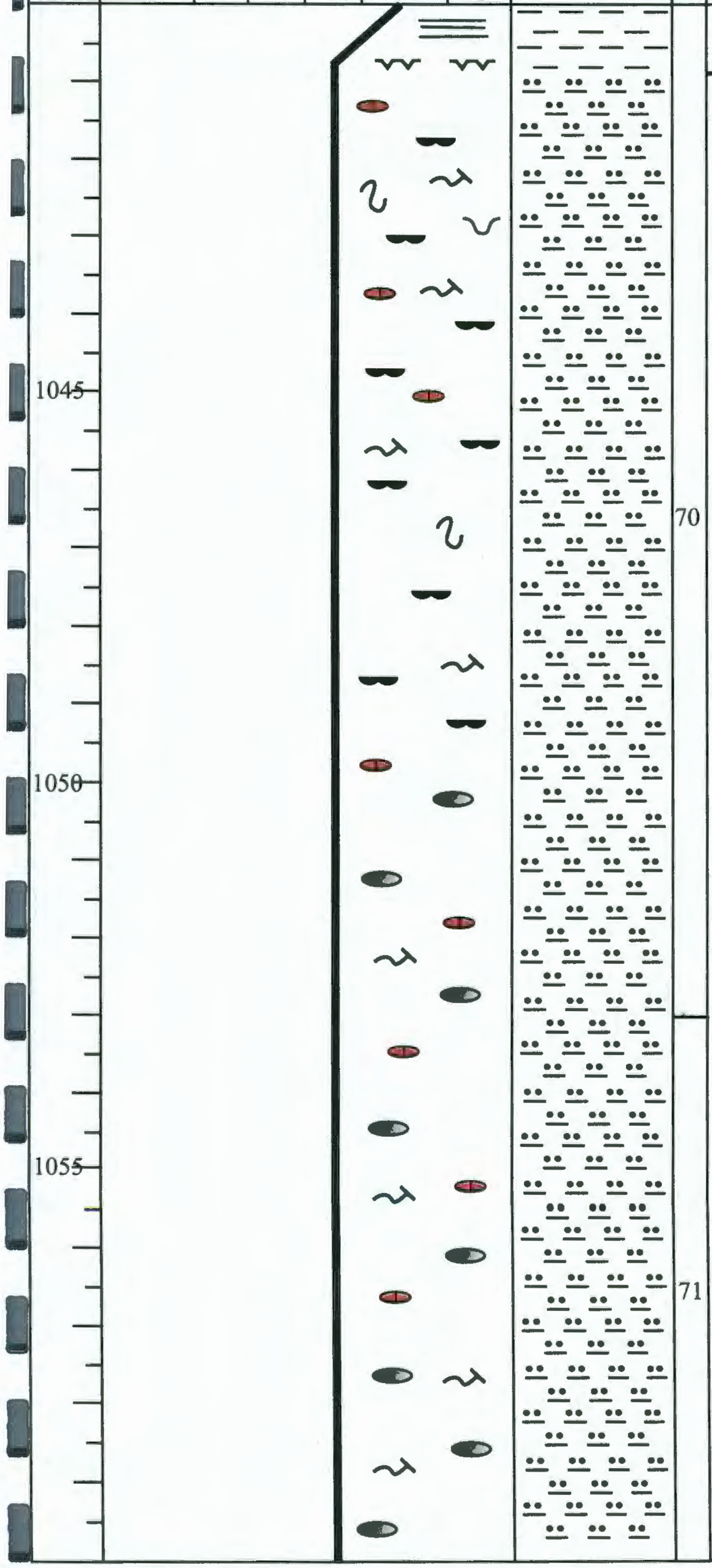
REMARKS, INTERPRETATION



Sandstone
- Siliceous with micaceous laminae
- Very fine-grained, well sorted and well rounded
- Thickly laminated
- Wavy bedded in upper half and lenticular bedded on bottom half
- Starved wave ripples
- Siderite bands
- Syneresis cracks
- Slumping
- Gradational contact
- Arenicolites and Diplocraterion burrows

Warner Sandstone

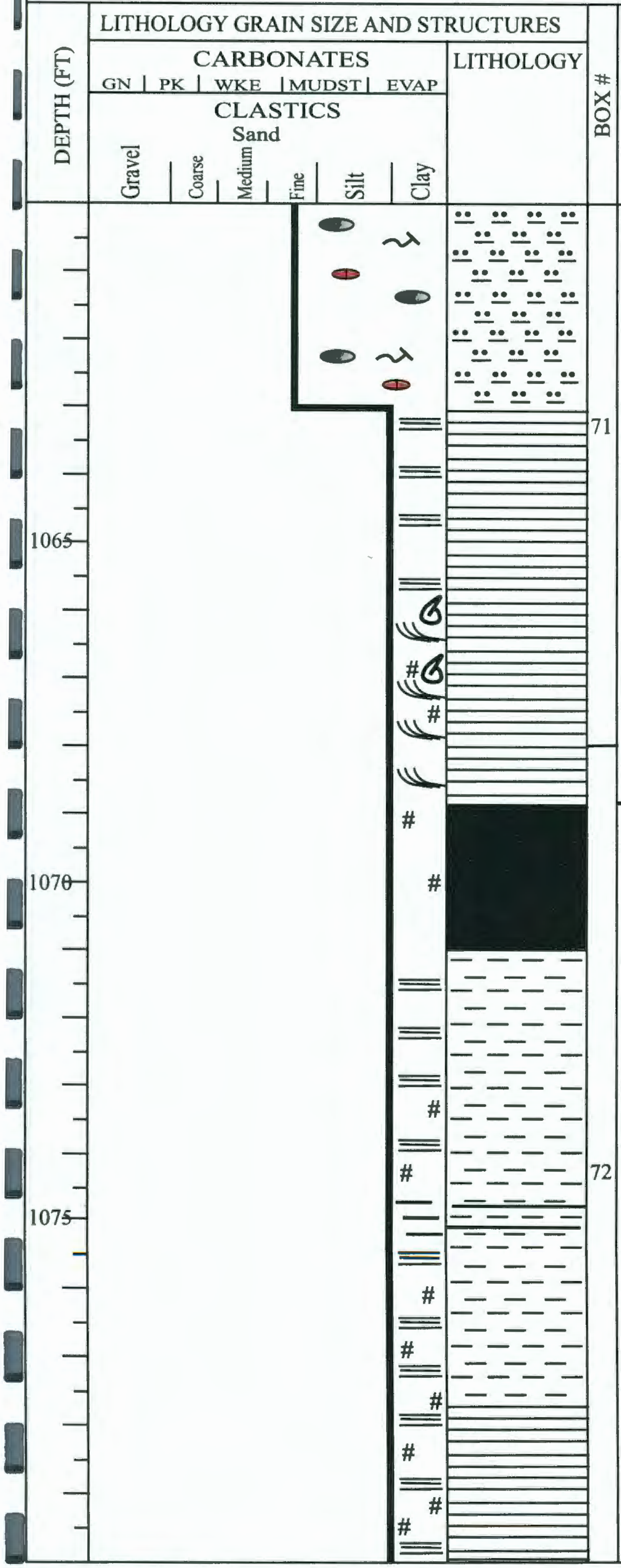
Tidal flat - estuarine fill
- There are several 1-5cm silting upward packages representing tidal cycles
- Low trace fossil diversity indicates a stressed environment

NAME HINTHORN CW-1

STRUCTURAL SETTING CHEROKEE BASIN

LOCATION SE SE SE 14-T32S-R16E

DESCRIBED BY: JONATHAN LANGE



DESCRIPTION
- Lithology
- Color
- Comp., Cement, or Matrix
- Shape and Sorting
- Bedding
- Sed. Structures
- Upper Contact
- Fossils

DATE JUNE 2002

UNIT: Cherokee Group

PAGE 23 OF 24 PAGES

REMARKS, INTERPRETATION

Sandstone, same as above

Black Shale
- Black
- Micaceous
- Thinly laminated
- Planar bedded on top and cross ripple laminae on bottom
- Sharp contact
- Bioclastic fragments
- Pyritized burrows

Transgressive marine core shale
- Maximum flooding around 1067'

Flooding Surface

Coal
- Organic
- Well developed cleating
- Calcite mineralization in cleats
- Pyrite
- Good gas show

Riverton Coal
- Marsh coal

Shale
- Black to medium gray
- Micaceous, very organic rich
- Thinly laminated
- Planar bedding
- Fissile
- Coal bands
- Abundant pyrite
- Sharp contact
- Non-fossiliferous

Outside nearshore shale
- Swamp environment
- Very rich in organics

NAME HINTHORN CW-1 STRUCTURAL SETTING CHEROKEE BASIN

LOCATION SE SE SE 14-T32S-R16E DESCRIBED BY: JONATHAN LANGE

DEPTH (FT)

LITHOLOGY GRAIN SIZE AND STRUCTURES

CARBONATES

GN | PK | WKE | MUDST | EVAP

CLASTICS

Sand

Gravel | Coarse | Medium | Fine | Silt | Clay

LITHOLOGY

BOX #

DESCRIPTION
- Lithology
- Color
- Comp., Cement, or Matrix
- Shape and Sorting
- Bedding
- Sed. Structures
- Upper Contact
- Fossils

DATE JUNE 2002

UNIT: Cherokee Group

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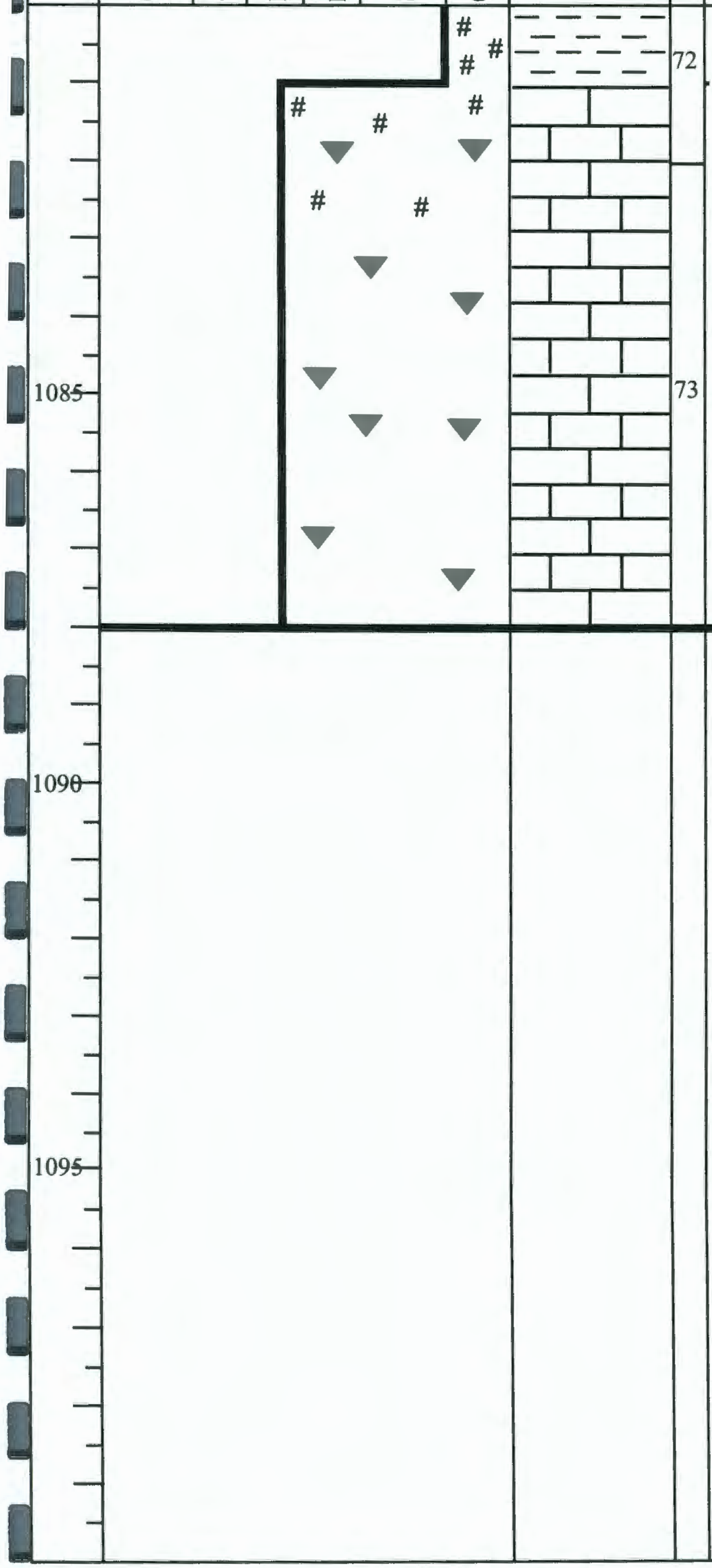
REMARKS, INTERPRETATION



Limestone
- Light gray
- Slightly calcareous
- Thinly bedded
- Vugy and fractured
- Cherty
- Pyrite
- Sharp contact
- Non-fossiliferous
- Slightly oil stained near upper portion

Mississippian/Pennsylvanian Unconformity

Karstic

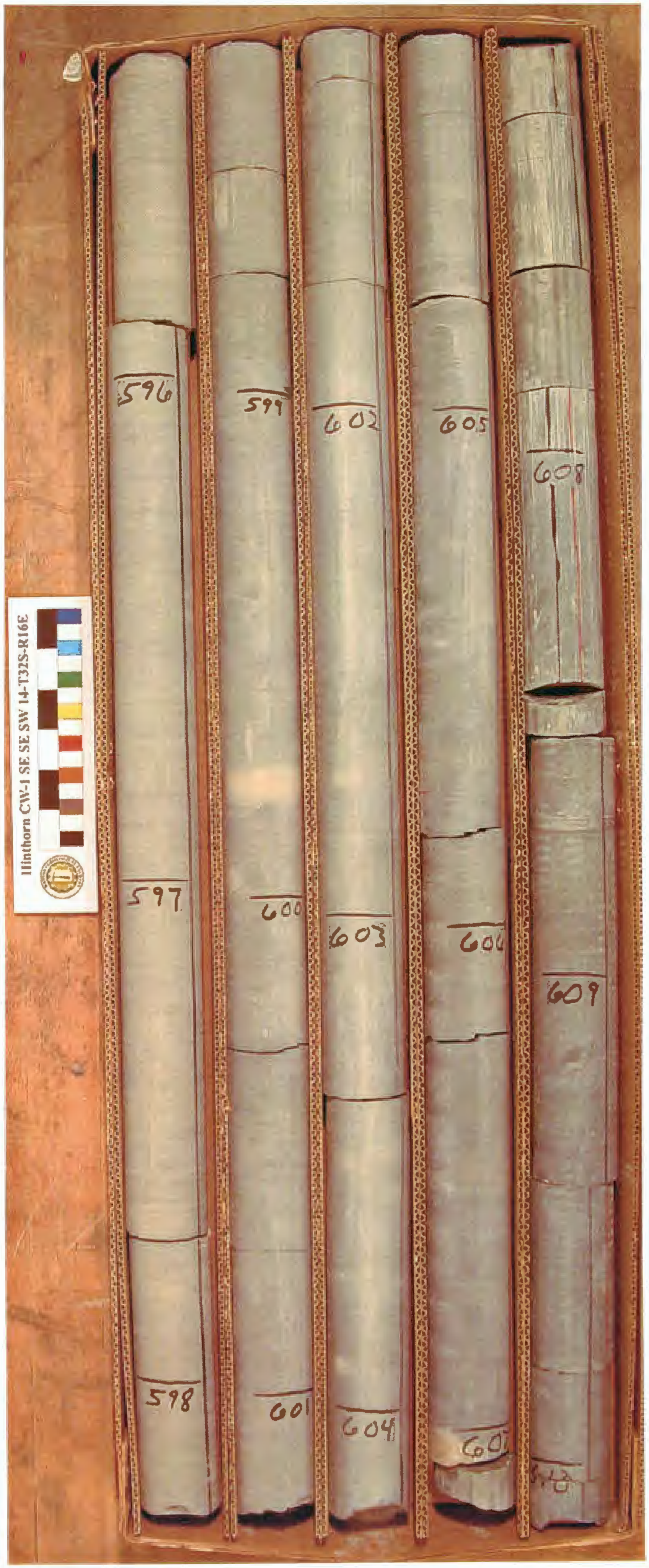
Bottom of core

Appendix B

Core Photos

Company: Colt Energy
Well: Hinthorn CW-1
County: Montgomery State: Kansas
Location: 110' FSL & 2760' FEL SE SE SW 14-T32S-R16E

Formation Tops	Depth (md)	Box #1
Chanute Shale	0'	01
Drum Limestone	24'	01-02
Cherryvale Shale	47'	02-08
Dennis Limestone	125'	08-09
Coffeville Formation	147'	09-12
Checkerboard Limestone	194'	12-14
Seminole Shale	213'	14-15
Lenaph Limestone	239'	15-17
Nowata Shale	258'	17-20
Worland Limestone	335'	22-24
Lake Neosho Shale	362'	24-25
Amoret Limestone	375'	25-26
Bandera Shale	393'	26-35
Mulberry Coal	530'	35
Pawnee Limestone	532'	35-38
Lexington	557'	37
Peru Sandstone	573'	38-41
Fort Scott	621'	41
Higginsville Limestone	621'	41-43
Little Osage Shale	654'	43-44
Black Jack Creek Limestone	664'	44-46
Excello Shale	686'	46
Cherokee Group	691'	46
Mulky Coal	691'	46
Brezzy Hill Limestone	692'	46-47
Iron Post Coal	716'	48
Verdigris	737'	49
V-Shale	740'	49-50
Croweburg Coal	742'	50
Fleming Coal	750'	50
Mineral Coal	779'	52
Scammon Coal	797'	53
Skinner Sandstone	800'	53-56
Tebo Coal	845'	56
Wier-Pitt Coal	865'	58
Lower Wier-Pitt Coal	895'	60
Bartlesville Sandstone	896'	60-61
Drywood Coal	915'	61
Aw Coal	1012'	68
Warner Sandstone	1041'	70-71
Riverton Coal	1069'	72
Mississippian	1081	72-73


Hinthorn CW-1 SE SE SW 14-T32S-R16E
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Hinthorn CW-1 SE SE SE SW 14-T32S-R16E
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Hinthorn CW-1 SE SE SW 14-T32S-R16E
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Hinthorn CW-1 SE SE SW 14-T32S-R16E
LITTLE OSAGE SHALE
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Hinthorn CW-1 SE SE SW 14-T32S-R16E
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Hinthorn CW-1 SE SE SW 14-T32S-R16E
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EXCELLO SHALE
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MULKY COAL
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Hinthorn CW-1 SE SE SW 14-T32S-R16E
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Hinthorn CW-1 SE SE SW 14-T32S-R16E
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IRON POST COAL
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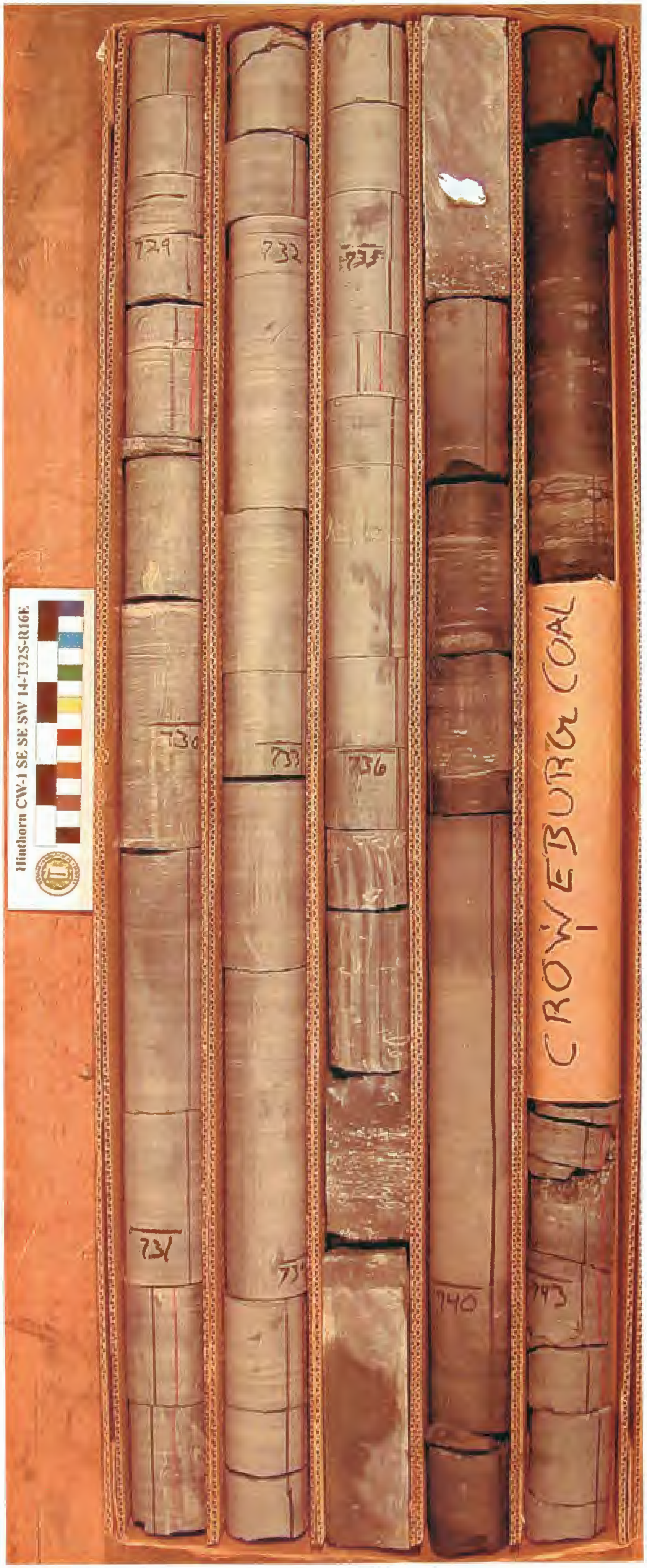
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CROWEBURG COAL


Hinthorn CW-1 SE SE SW 14-T32S-R16E
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Hinthorn CW-1 SE SE SW 14-T32S-R16E
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Hinthorn CW-1 SE SE SW 14-T32S-R16E
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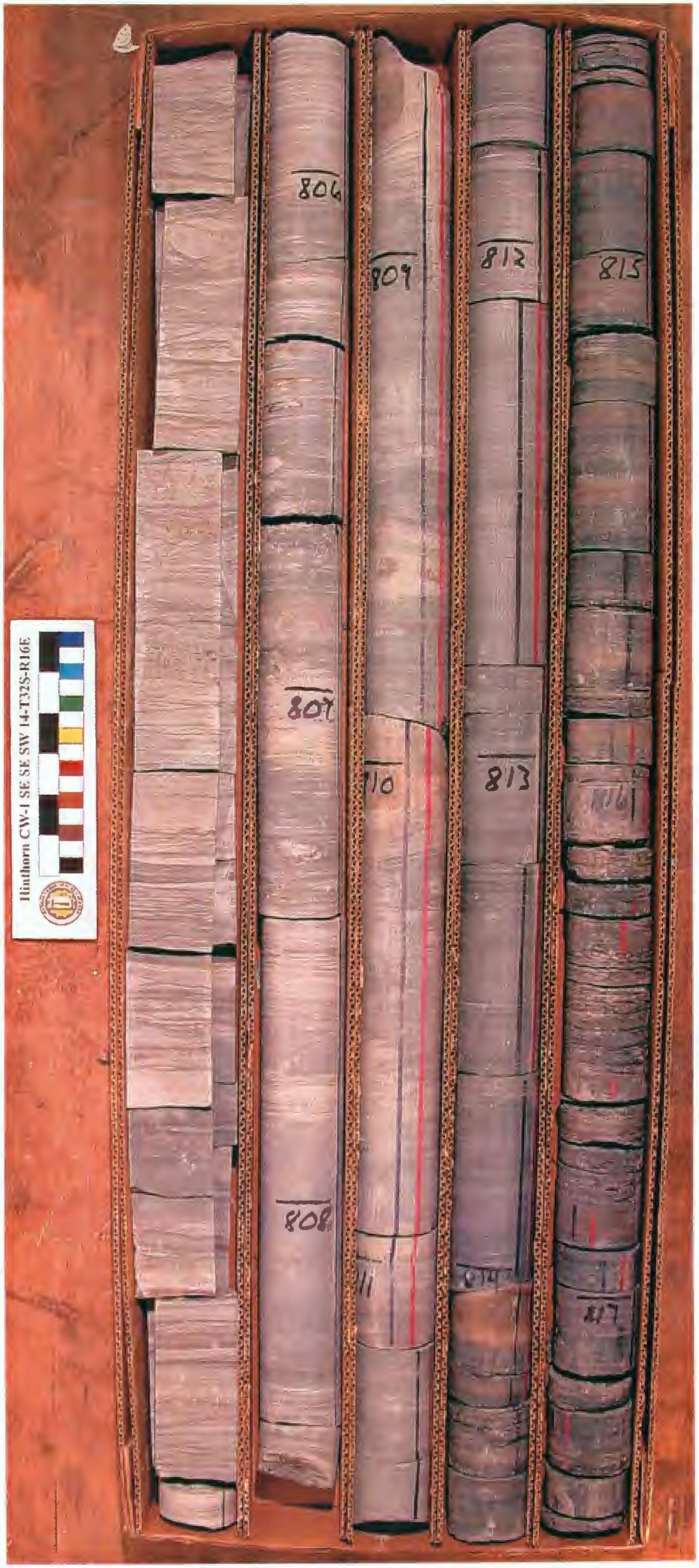
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TEBO COAL


Hiathorn CW-1 SE SE SE SW 14-T32S-R16E
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Hinthorn CW-1 SE SE SW 14-T32S-R16E
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WEIR-PITT COAL
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Hinthorn CW-1 SE SE SW 14-T32S-R16E
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Hinthorn CW-1 SE SE SW 14-T32S-R16E
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LOWER WIER-PITT
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Hinthorn CW-1 SE SE SW 14-T32S-R16E
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Hinthorn CW-1 SE SE SW 14-T32S-R16E
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Hinthorn CW-1 SE SE SW 14-T32S-R16E
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Hinthorn CW-1 SE SE SW 14-T32S-R16E
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Hinthorn CW-1 SE SE SW 14-T32S-R16E
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Hinthorn CW-1 SE SE SW 14-T32S-R16E
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Hinthorn CW-1 SE SE SW 14-T32S-R16E
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1005


Hinthorn CW-1 SE SE SW 14-T32S-R16E
GT-343
1013
1011
1010


Hinthorn CW-1 SE SE SW 14-T32S-R16E
1025
1' LOST CORE


Hinthorn CW-1 SE SE SW 14-T32S-R16E
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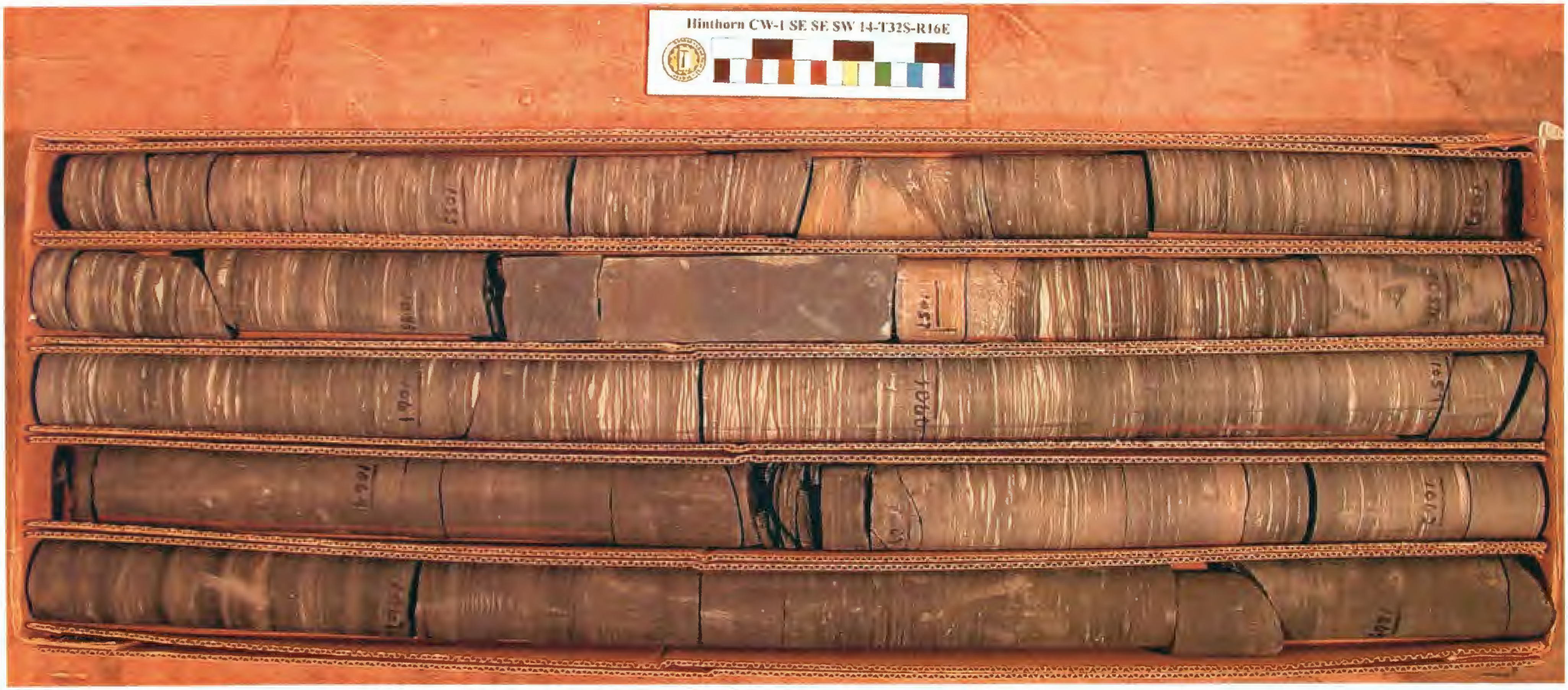
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Hinthorn CW-1 SE SE SW 14-T32S-R16E
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RIVERTON COAL
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1082


Hinthorn CW-1 SE SE SW 14-T32S-R16E
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