ANALYSIS OF CHEROKEE GROUP CUTTINGS SAMPLES FOR GAS CONTENT -- PRODUCTION MAINTENANCE SERVICE #1 SCHERTZER-BARTON; W2 sec. 35-T.33S.-R.22E.; CHEROKEE COUNTY, KANSAS

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# SUMMARY

Two cuttings samples from the Pennsylvanian Cherokee Group were collected from the Production Maintenance Service #1 Schertzer-Barton well; W2 sec. 35-T.33S.-R.22E.; Cherokee County, KS. The samples calculate as having the following gas contents:

- Dry Wood (?) coal at 180' to 182' depth<sup>1</sup> (80 scf/ton)•
- Riverton coal at 324'-326' depth<sup>1</sup> (89 scf/ton) •

<sup>1</sup>assuming accompanying dark shales in sample desorb 3 scf/ton

#### BACKGROUND

The Production Maintenance Service #1 Schertzer-Barton well: W2 sec. 35-T.33S.-R.22E., in Cherokee County was selected for cuttings desorption tests in association with an on-going coalbed gas research project at the Kansas Geological Survey. The samples were gathered September 21, 2004, by K. David Newell of the Kansas Geological Survey, with assistance of Mike McClenning of Production Maintenance Service. Samples were obtained during normal drilling of the well, with no cessation of drilling before zones of interest (i.e., coals and dark shales in the Cherokee Group) were penetrated. The well was drilled using a air rotary rig owned by MOKAT, Inc.

The samples were canistered, with surface time and canistering times noted. Lag times for samples to reach the surface (important for assessing lost gas) were determined by a nearby well drilled by the same drilling rig.

Three cuttings samples from the Pennsylvanian Cherokee Group were collected:

- Dry Wood (?) coal at 180' to 182' depth (231 grams dry wt.) (936 grams dry wt.)
- Riverton coal at 324'-326' depth ٠

The cuttings were caught in mesh bucket as they exited the air line emptying to the mud pit. The samples were then washed in water while in kitchen strainers to rid them of as much drilling mud as possible before the cuttings were placed in desorption canisters. Water with zephyrn chloride biocide was then added to the canisters, with a headspace of 1 to 2 inches being preserved at the top of the canister.

All samples were transported September 21 to the laboratory at the Kansas Geological Survey in Lawrence, KS, and desorption measurements were continued at approximately 68 °F. Desorption measurements were periodically made until the canisters produced negligible gas with daily testing for at least two successive days.

## DESORPTION MEASUREMENTS

The equipment and method for measuring desorption gas is that prescribed by McLennan and others (1995). The volumetric displacement apparatus is a set of connected

dispensing burettes, one of which measures the gas evolved from the desorption canister. The other burette compensates for the compression that occurs when the desorbed gas displaces the water in the measuring burette. This compensation is performed by adjusting the cylinders so that their water levels are identical, then figuring the amount of gas that evolved by reading the difference in water level using the volumetric scale on the side of the burette.

The W3 desorption canister (holding the Dry Wood(?) sample) was made in house at the Kansas Geological Survey. This canister is approximately 1 foot in length (30 cm), 2 inches in diameter (5 cm), and encloses a volume of 44 cubic inches (720 cm<sup>3</sup>). The L canister (holding the Riverton sample) was obtained from SSD, Inc., in Grand Junction, CO. This canister is 12.5 inches high (32 cm), 3 1/2 inches (9 cm) in diameter, and encloses a volume of approximately 150 cubic inches (2450 cm<sup>3</sup>). The desorbed gas that collected in the desorption canisters was periodically released into the volumetric displacement apparatus and measured as a function of time, temperature, and atmospheric pressure.

The time and atmospheric pressure were measured in the field using a portable weather station (model BA928) marketed by Oregon Scientific (Tualatin, OR). The atmospheric pressure was displayed in millibars on this instrument, however, this measurement was not the actual barometric pressure, but rather an altitude-compensated barometric pressure automatically converted to a sea-level-equivalent pressure. To translate this measurement to actual atmospheric pressure, a regression correlation was determined over several weeks by comparing readings from the Oregon Scientific instrument to that from a pressure transducer in the Petrophysics Laboratory in the Kansas Geological Survey in Lawrence, KS (Figure 1). The regression equation shown graphically in Figure 1 was entered into a spreadsheet and was used to automatically convert the millibar measurement to barometric pressure in pounds per square inch (psi).

A spreadsheet program written by K.D. Newell (Kansas Geological Survey) was used to convert all gas volumes at standard temperature and pressure. Conversion of gas volumes to standard temperature and pressure was by application of the perfect-gas equation, obtainable from basic college chemistry texts:

n = PV/RT

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

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

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, 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 period for which the coal samples evolved all of their gas.

Lost gas for samples (i.e., the gas lost from the sample from the time it was drilled, brought to the surface, to the time it was canistered) were determined using the direct method (Kissel and others, 1975; also see McLennan and others, 1995, p. 6.1-6.14) in which the cumulative gas evolved is plotted against the square root of elapsed time. Time zero is assumed to be the moment that the rock is cut and its cuttings circulated off bottom.

## LITHOLOGIC ANALYSIS

Upon removal from the canisters, the cuttings were washed of drilling mud, and air dried for 7 to 21 days. After drying, the cuttings were weighed and then dry sieved into 5 size fractions: >0.0930", >0.0661", >0.0460", >0.0331", and <0.0331". For large sample sizes, the cuttings were run through a sample splitter and a lesser portion (approximately 75 grams) were sieved and weighed, and the derived size-fraction ratios were applied to the entire sample.

The size fractions were then inspected and sorted by hand under a dissecting microscope. Three major lithologic categories were differentiated: coal, dark shales (generally Munsell rock colors N3 [dark gray], N2 [grayish black], and N1 [black] on dry surface), and lighter-colored lithologies and/or dark and light-colored carbonates. The lightercolored lithologies are considered to be incapable of generating significant amounts of gas. After sorting, and for every size class, each of these three lithologic categories was weighed and the proportion of coal, dark shale, and light-colored lithologies were determined for the entire cuttings sample based on the weight percentages.

DATA PRESENTATION

Data and analyses accompanying this report are presented in the following order: 1) data tables for the desorption analyses, 2) lost-gas graphs, 3) "lithologic component sensitivity analyses" showing the interdependence of gas evolved from dark shale versus coal in each sample, 4) a summary component analysis for all samples showing relative reliability of the data from all the samples, and 5) a desorption graph for all the samples.

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

These are the basic data used for lost-gas analysis and determination of total gas desorbed from the cuttings samples. Basic temperature, volume, and barometric measurements are listed at left. Farther to the right, these are converted to standard temperature, pressure, and volumes. The volumes are cumulatively summed, and converted to scf/ton based on the total weight of coal and dark shale in the sample. At the right of the table, the time of the measurements are listed and converted to hours (and square root of hours) since the sample was drilled.

#### Lost-Gas Graphs (Figure 2-3)

Gas lost prior to the canistering of the sample was estimated by extrapolation of the first few data points after the sample was canistered. The linear characteristic of the initial desorption measurements was usually lost within the first hour after canistering, thus data are presented in the lost-gas graphs for only up to one hour after canistering. Lost-gas volumes derived from this analysis are incorporated in the data tables described above.

#### "Lithologic Component Sensitivity Analyses" (Figures 4-5)

The rapidity of penetration of a well makes collection of pure lithologies from relatively thin-bedded strata rather difficult. Mixed lithologies are more the norm rather than the exception. Some of this mixing is due to cavings from strata farther up hole. The mixing may also be due to collection of two or more successively drilled lithologies in the kitchen sieve at the exit line, or differential lifting of relatively less-dense coal compared to other lithologies, all of which are more dense than coal.

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

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

Total gas  $(cm^3) = [weight_{coal} (grams) X gas content_{coal} (cm^3/gram)] + [weight_{dark shale} (grams) X gas content_{dark shale} (cm^3/gram)]$ 

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 vice versa. If there is little dark shale in a sample, a relatively well constrained answer for gas  $content_{coal}$  can be obtained. Conversely, if considerable dark shale is in a sample, the gas content of a coal will be hard to precisely determine.

The lithologic-component-sensitivity-analysis diagram therefore expresses the bivariant nature inherent in the determination of gas content in mixed cuttings. The gas content of dark shales in Kansas can vary greatly. Proprietary desorption analyses of dark shales in cores from southeastern Kansas have registered as much as 50 scf/ton, but can be as low as 2-4 scf/ton.

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

In general, shale gas content does not have to be very much greater that 10 scf/ton before the associated coal starts to have a gas content less than that of the dark shale. In all the lithologic-component-sensitivity-analysis diagrams, a "break-even" point is therefore noted where the gas content of the coal is equal to that of the dark shale. This "breakeven" point corresponds to the minimum gas content assignable to the coal and maximum gas content assignable to the dark shale. It can also be thought of the scf/ton gas content of the cuttings sample minus the weight of any of the lighter-colored lithologies, which are assumed to have no inherent gas content. Conversely though, to assume that all the gas evolved from a cuttings sample is derived solely from the coal would result in an erroneously high gas content for the coal.

#### Summary Component Analysis for all Samples (Figure 6)

This diagram is a summary of the individual "lithologic component sensitivity analyses" for each sample, all set at a common scale. The steeper the angle of the line for a sample, the more uncertainty is attached to the results (i.e., *gas content<sub>coal</sub>*) for that sample. If the coal content is miniscule (i.e., < approximately 5%), the results are a better reflection of the *gas content<sub>dark shale</sub>*.

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

## **RESULTS and DISCUSSION**

The amount of coal in both samples is exceptionally good for an air-drilled well. The Dry Wood (?) sample has slightly better constrained results than the Riverton due to its exceptional purity. The Dry Wood (?) (180'-182') and Riverton samples (324'-326') samples respectively contained 99% and 83% coal.

Samples were also tested for their density. Approximately 5 grams of sample were weighed and then immersed in water in a 10-cc graduated cylinder, noting the amount of water displaced by the sample. Three measurements were made for each sample. The following density measurements were calculated:

| unit         | depth | density and uncertainty      |
|--------------|-------|------------------------------|
| Dry Wood (?) | 180'  | $1.36 \text{ g/cc} \pm 0.04$ |
| Riverton     | 324'  | $1.35 \text{ g/cc} \pm 0.04$ |

#### REFERENCES

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

FIGURES and TABLES

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

TABLE 1. Desorption measurements for samples.

FIGURE 2. Lost-gas graph for Dry Wood(?) coal at 180' to 182' depth.

FIGURE 3. Lost-gas graph for Riverton coal at 324'-326' depth.

FIGURE 4. Sensitivity analysis for Dry Wood(?) coal at 180' to 182' depth.

FIGURE 5. Sensitivity analysis for Riverton coal at 324'-326' depth.

FIGURE 6. Lithologic component sensitivity analyses for all samples.

FIGURE 7. Desorption graph for all samples.



Correlation of Field Barometer to KGS Petrophysics Lab Barometer

FIGURE 1.

TABLE 1 - Desorption data for PRODUCTION MAINTENANCE SERVICES #1 SCHERTZER-BARTON #1; W2 35-T.33S.-R.22E., Cherokee Co. KS.

| by market with both state   genral with with with state   endited with with with state   endited with with with with with with with with  | SAMPLE:       | Dry Wood(  | ?) coal | (180' to | 182') cutti | ings in caniste | r W3   |                 |                         |                 |           |                      |               | -           |                |              |   | alaread time (all bottom to conjetaring |
|---|---------------|------------|---------|----------|-------------|-----------------|--------|-----------------|-------------------------|-----------------|-----------|----------------------|---------------|-------------|----------------|--------------|---|---|
| dy auryoit   0.905   29.7   0.001   | Ibs           |            |         | grams    |             |                 |        |                 |                         |                 |           | est. lost gas (oc) = | TIME OF:      |             | at an electric |              | elapsed lime (on bottom to califstering |   |
| CONCERNICY ProMALT   CONCENCE OF PACLES ACCOUNTS TO STY 9880 age 14.7 pp 0.544 / TYPE VOLAME   CONTON   CURLENT Rescars   THE CARCE   CONCENCE   CONCENCE   THE CARCE   CONCENCE  | dry sample we | ight:      |         | 0.5065   | 229.77      |                 |        |                 |                         |                 |           |                      | 1             | 7 on Dottom | 0.47           | at sunace    | In canister                             | 0.110 hours                             |
| INCLA MESSIGNOR FINALSH M |               |            |         |          |             |                 |        |                 |                         |                 |           |                      | 0057011       | 9/21/04     | 8:47           | 9/21/04 8:48 | 9/21/04 0:54                            | 0.222080881 SORT (brs)                  |
| measured T (F)   measure  | RIG/LAB MEASL | REMENTS    |         |          | CONVER      | SION OF RIGA    | AB MEA | SUREMENTS TO ST | P (@60 deg F; 14.7 psi) | CUMULATIVE VO   | LUMES     | SCF/TON              | SCH/TON       |             | -              | I ME SINCE   | le empleter                             | COPT hm (since off bottom)              |
| 4   66   1091   0.0001   328   3.78   0.0.3   2.49   9.710   8.80   0.04.39   0.04.30   0.05.30   1.55   0.07.35   0.05.30   1.55   0.07.40   1.50   0.07.40   1.50   0.07.32   0.05.30   | measured oc   | measured 1 | (F) me  | asured P | cubic ft    | absolute T (F   | ) psia | cubic ft (@STP) | cc (OSTP)               | cubic ft (@STP) | cc (OSTP) | without lost gas     | with lost gas | TIME OF ME  | SUHE           | ON DOTTOM    | in canister                             | 0.278060567                             |
| 4   66   1091   0.0001   528   1.418   0.00024803   7.93   1.09   3.43   92/104   150   0.01300   0.01220   0.01300   0.01220   0.01300   0.01220   0.01300   0.01220   0.01300   0.01220   0.01300   0.01220   0.01300   0.01220   0.01300   0.01220   0.01300   0.01220   0.01300   0.01220   0.01300   0.01220   0.0100   0.01220   0.0100   0.01220   0.0100   0.012200   0.01000   0.012200   0.01000   0.012200   0.010000   0.010000   0.010000   0.0100000   0.010000000   0.0100000000000   0.010000000000000000000000000000000000   | 4             |            | 68      | 1091     | 0.0001      | 52              | 8 14.1 | 61 0.000134015  | 3.79                    | 0.000134015     | 3.79      | 0.53                 | 2.9           | 0 9/21/04   | 8:56           | 0:08:37      | 0:02:00                                 | 0.370900307                             |
| 2   66   1091   7E-05   528   14.161   6.7007E-05   1.90   0.0003006   17.007   2.31   4.53   9.210   9.11.32   0.11.31   0.11.33   0   | 4             |            | 68      | 1091     | 0.0001      | 52              | 8 14.1 | 61 0.000134015  | 3.79                    | 0.00026803      | 7.59      | 1.06                 | 3.4           | 3 9/21/04   | 9:02           | 0:14:37      | 0.08:00                                 | 0.493309703                             |
| 6   6   101   0.0003   528   14.16   0.00020003   7.59   0.00000010   22.77   3.17   5.57   0.2104   9.15   0.2122   0.2149   0.013993355     7   6   101   0.0002   228   14.16   0.000201023   0.216   2.314   0.014   2.1607   2.203   3.327   2.516   2.216   3.327   2.253   3.327   2.253   3.327   2.253   3.327   2.253   3.327   2.253   3.327   2.253   3.327   2.253   3.327   2.253   3.327   2.253   3.27833851     20   1030   0.0017   5.52   14.07   0.00289467   10.37   17.47   92714   13.37   7.128.30   2.47833861     21   1030   0.0017   5.52   14.07   0.00078548   45.57   0.006242621   10.32   11.37   17.47   92714   13.307   21.2830   2.478308224     22   100   0.0017   5.52   10.000785431   21.64<  | 2             |            | 68      | 1091     | 7E-05       | 52              | 3 14.1 | 6.70076E-05     | 5 1.90                  | 0.000335038     | 9.49      | 1.32                 | 3.6           | 9 9/21/04   | 9:05           | 0:17:37      | 0:11:00                                 | 0.34103034                              |
| 6   6   101   0.0002   528   14.16   0.00021023   5.69   0.0008401   22.7   3.17   5.55   9.2104   9.28   0.39.22   0.31.83   0.13.93   0.503   9.2104   9.28   0.39.22   0.013   0.913936244     27   68   1091   0.001   528   1.416   0.00034613   2.41   1.13   1.147   21.04   11.34   2.15.07   2.25.93   1.480234437     28   0.0011   530   1.407   0.00039378   2.81.5   0.0024492   10.12   2.15.07   7.95.30   2.278238451     22   1084   0.0015   532   1.407   0.001422057   0.0024492   10.12   2.15.07   2.12.33   3.44.642041182     44   72   1085   0.0015   521   4.143   0.009092418   2.16.49   30.19   32.56   9/22/41 (9.44   3.06.07   3.45.80   5.45.80   7.43.37   1.44.89   3.06.07   7.43.37   7.43.37   7.43.37   7.43.37   7.43.37 <td>8</td> <td></td> <td>68</td> <td>1091</td> <td>0.0003</td> <td>52</td> <td>3 14.1</td> <td>61 0.00026803</td> <td>7.59</td> <td>0.000603068</td> <td>17.08</td> <td>2.38</td> <td>4.7</td> <td>5 9/21/04</td> <td>9:15</td> <td>0:27:22</td> <td>0:20:45</td> <td>0.075359900</td>  | 8             |            | 68      | 1091     | 0.0003      | 52              | 3 14.1 | 61 0.00026803   | 7.59                    | 0.000603068     | 17.08     | 2.38                 | 4.7           | 5 9/21/04   | 9:15           | 0:27:22      | 0:20:45                                 | 0.075359900                             |
| 7   66   101   0.0002   528   14.16   0.0034327   6.64   0.0018432   55.03   7.57   10.04   21.104   21.104   21.104   21.04  | 6             |            | 68      | 1091     | 0.0002      | 52              | 3 14.1 | 0.000201023     | 5.69                    | 0.000804091     | 22.77     | 3.17                 | 5.5           | 5 9/21/04   | 9:26           | 0:38:22      | 0:31:45                                 | 0.799652702                             |
| 27   68   1091   0.001   528   14.161   0.00094463   25.62   0.0018422   55.03   7.67   10.04   92/104   11.04   2.18.07   2.20.93   1.306   939249     30   70   1083   0.0011   50   14.057   0.00093879   26.15   0.00284445   109.71   15.30   1.767   92/104   16.23   97.32.07   10.25.30   1.275.336451     22   72   1007   0.0017   532   14.100   0.00163389   40.20   0.01246119   21.64   62.04   62.31   7.75.35.30   7.467.07   34.89.30   5.924663398     43   72   1085   0.001   52   14.135   0.0098237   27.28   0.0098755   23.3.6   39.47   41.44   92404   13.30   7.542.07   75.35.30   F.4637333     72   1085   0.011   52   14.06   0.00969885   27.30   0.31.8283   33.44   47.20   45.57   92.604   20.51   13.123.01   1   | 7             |            | 68      | 1091     | 0.0002      | 52              | 3 14.1 | 0.000234527     | 6.64                    | 0.001038618     | 29.41     | 4.10                 | 6.4           | 7 9/21/04   | 9:38           | 0:50:07      | 0:43:30                                 | 0.913935325                             |
| 28   68   1000   0.001   528   14.146   0.00093724   26.54   0.002387445   11.57   13.74   927.04   12.30   3.32.07   3.32.07   3.32.07   3.32.07   3.32.07   3.32.07   3.32.07   3.32.07   3.32.07   3.32.07   3.32.07   1.32.30   2.13.08   1.4007   0.00072644   2.65.8   0.004.01   1.03.07   2.13.07   2.13.08   1.4007   3.32.07   1.33.07   2.13.08   3.24500224     43   72   1085   0.0015   5.21   1.07   0.01420657   40.23   0.00743138   216.48   30.19   3.25.07   34.64   35.06.07   34.63.53   7.453735     20   72   1085   0.001   5.21   1.40   0.00084262   22.20   0.10383237   35.67   46.90   51.27   10.140.07   101.42.20   10.0085084     20   72   1085   0.001   52   1.4005   0.001.8327   7.21   0.001   1.57.73   1.41.419.200.1101.42.20   11.014.02.07   | 27            |            | 68      | 1091     | 0.001       | 52              | 3 14.1 | 0.000904603     | 3 25.62                 | 0.00194322      | 55.03     | 7.67                 | 10.0          | 4 9/21/04   | 11:04          | 2:16:07      | 2:09:30                                 | 1.506190928                             |
| 30 70 1083 0.0011 530 14.67 0.00993979 26.15 0.00392462 130.29 110.27 103.20 7.238.30 7.24300 7.238.30 2.742500244   49 72 1007 0.0017 532 14.19 0.00162338 45.97 0.00242462 176.28 24.68 26.95 922/04 621 132.03 1.228.30 3.245690244   42 72 1065 0.0015 532 14.08 0.00138089 30.30 0.00964218 255.42 35.47 30.04 922/04 161.3 55.42.07 55.38.30 7.463073333   50 72 1096 0.0011 532 14.148 0.009968573 27.26 0.00969377 311.30 43.41 45.75 922/04 14.37 101.48.30 10.09022085   13 72 1087 0.0005 532 14.06 0.00054986 27.18 0.01195223 35.67 46.80 51.27 27.77/4 9.85 14.1010 10.428.30 10.29922464 12.33 11.4597644 14.495 10.428.05 11.46976474 <   | 28            |            | 68      | 1090     | 0.001       | 52              | 3 14.1 | 48 0.000937246  | 26.54                   | 0.002880467     | 81.57     | 11.37                | 13.7          | 4 9/21/04   | 12:20          | 3:32:07      | 3:25:30                                 | 1.880233437                             |
| 22 72 1084 0.0008 52 14.070 0.000726546 20.56 0.00440123 190.29 16.17 20.54 9/2/104 19:2.00 10/28:00 12/28:00 3.246909264   43 72 1084 0.0015 532 14.070 0.001420557 40.23 0.007745319 216.49 30.19 32.6 9/22/04 19:54 35.0007 34.642077182   29 72 1085 0.001 532 14.135 0.000986757 27.26 0.09998757 28.06 39.47 41.84 9/22/04 12:30 75.42:07 75.33:30 8.700866435   29 72 1086 0.001 532 14.18 0.000986562 27.18 0.1195323 35.64 47.20 49.57 9/26/04 20:16 13/28:07 13.128:07 13.148597624   13 7 1086 0.0005 531 14.09 0.001316929 371.43 51.79 54.16 9/26/04 20:52 160.04:07 13.42859764   12 71 1086 0.0005 531 14.09 0.00381377  | 30            |            | 70      | 1083     | 0.0011      | 53              | 14.0   | 0.000993979     | 28.15                   | 0.003874445     | 109.71    | 15.30                | 17.6          | 7 9/21/04   | 16:31          | 7:43:07      | 7:36:30                                 | 2.778238851                             |
| 49 72 1067 0.0017 532 14.109 0.001823689 45.57 0.008224682 176.28 24.58 26.58 92204 19.54 5.50 24.649/182   42 72 1065 0.0015 532 14.003 0.001368899 39.33 0.009934218 255.62 35.87 38.04 92204 19.3 5.42.07 55.33.03 7.46337333   30 72 1095 0.0011 532 14.148 0.00996257 27.26 0.0099397 31.31 43.41 45.76 92204 19.3 11.40:07 101.42.30 10.0092375   29 72 1086 0.001 532 14.109 0.00036865 27.16 0.013238973 350.67 48.90 51.27 92704 20.6 10.01.01 11.46597242   13 72 1067 0.0005 530 14.070 0.00449734 11.40 11.4697243 11.4697243 11.4697244 11.4517 11.46170 11.4637244 11.4517 11.461704 11.4517 11.4517 11.4517 11.4517 11.416170 11.416187244   | 22            |            | 72      | 1084     | 0.0008      | 53              | 2 14.0 | 0.000726848     | 20.58                   | 0.004601293     | 130.29    | 18.17                | 20.5          | 4 9/21/04   | 19:20          | 10:32:07     | 10:25:30                                | 3.245809264                             |
| 43 72 1084 0.0015 532 14.070 0.00142057 40.23 0.00764519 216.49 30.19 32.56 92204 19.54 35.06.07 55.323 7.46337353   29 72 1085 0.001 532 14.130 0.000962337 22.26 0.00999575 283.06 93.47 41.84 92204 10.30 75.42.07 55.35.30 7.46337353   29 72 1086 0.001 532 14.18 0.000956865 27.18 0.01185233 383.46 47.20 49.57 92504 40.16 131.28.107 114.597624   22 70 1087 0.0005 531 14.109 0.000744537 35.15 5.75 61.12 92204 92.56 145.1007 145.033 12.468974   12 70 1089 0.0005 531 14.07 0.00047446 14.09 0.013116229 371.43 51.79 54.16 92204 92.57 28.30.07 323.330.07 31.4886461   12 71 1081 0.00045744 14.09 0.01404273 95.7  | 49            |            | 72      | 1087     | 0.0017      | 53              | 2 14.1 | 0.001623369     | 45.97                   | 0.006224662     | 176.28    | 24.58                | 26.9          | 5 9/22/04   | 6:21           | 21:33:07     | 21:26:30                                | 4.642407182                             |
| 42 72 1065 0.0015 532 14.083 0.003904216 255.62 35.67 38.04 9/2/304 16:30 55.42:07 55.35:30 7.44033333   30 72 1069 0.0011 532 14.148 0.000966422 22.22 0.10995397 311.30 43.41 45.76 9/25/04 14.37 10148:07 10148:03 10.09052085   13 72 1087 0.0005 532 14.069 0.00058686 12.20 0.012383973 350.67 48.90 51.27 9/27/04 9.58 14.51:00.07 145:03:37 13.4986461   15 70 1086 0.0005 530 14.070 0.00049744 14.09 0.014477 48.73 55.2 56.12 9/2/304 14.22 213.007 213.207 213.407 221.304 14.28313005 12.44893474 14.231 14.018 0.000497757 12.30 0.144272 22.31 55.06 10/104 14.22 213.007 31.22.81.01 17.42.8130 17.44831305   12 71 1080 0.0005 521 14.013  | 43            |            | 72      | 1084     | 0.0015      | 53              | 2 14.0 | 0.001420657     | 40.23                   | 0.007645319     | 216.49    | 30.19                | 32.5          | 6 9/22/04   | 19:54          | 35:06:07     | 34:59:30                                | 5.924689396                             |
| 29 72 1099 0.001 532 14.148 0.000986547 27.2 0.009986763 28.2 0.1099397 311.30 43.41 45.78 9726/04 101.49.07  | 42            |            | 72      | 1085     | 0.0015      | 53              | 2 14.0 | 0.001388899     | 39.33                   | 0.009034218     | 255.82    | 35.87                | 38.0          | 4 9/23/04   | 16:30          | 55:42:07     | 55:35:30                                | 7.46337353                              |
| 30 72 1090 0.0011 5.2 14.48 0.000958085 27.18 0.10195283 33.48 47.20 49.57 92504 41.37 101.49.07 131.21.30 1.1.4597624   13 72 1087 0.0005 5.32 14.109 0.000959885 27.18 0.01195283 350.67 48.90 51.27 92704 9:58 1451:0:07 145:03:30 12.4689374   15 70 1089 0.0005 530 14.070 0.000372956 20.75 0.013116293 55.75 56.12 92204 20.51 230:03:01 14.48518092   15 71 1081 0.0005 531 14.018 0.000449745 14.10 0.01402477 355.52 57.69 93004 14.22 221:34:01 7.4384359   16 71 1080 0.0005 527 14.201 0.00439767 14.23 0.01482742 231.3 59.00 61.37 1071/04 241.53:01 7.474384359   17 1086 0.0003 527 14.201 0.000330314 8.59 0.01524563 431.72 <td>29</td> <td></td> <td>72</td> <td>1089</td> <td>0.001</td> <td>53</td> <td>2 14.1</td> <td>0.000962537</td> <td>27.26</td> <td>0.009996755</td> <td>283.08</td> <td>39.47</td> <td>41.8</td> <td>4 9/24/04</td> <td>12:30</td> <td>75:42:07</td> <td>75:35:30</td> <td>8.700686435</td>  | 29            |            | 72      | 1089     | 0.001       | 53              | 2 14.1 | 0.000962537     | 27.26                   | 0.009996755     | 283.08    | 39.47                | 41.8          | 4 9/24/04   | 12:30          | 75:42:07     | 75:35:30                                | 8.700686435                             |
| 29 72 1086 0.001 552 14.096 0.000558865 12.20 0.012383973 350.67 48.90 51.27 9/27/04 20:16 131:22:07  | 30            |            | 72      | 1090     | 0.0011      | 53              | 2 14.1 | 18 0.000996642  | 28.22                   | 0.010993397     | 311.30    | 43.41                | 45.7          | 8 9/25/04   | 14:37          | 101:49:07    | 101:42:30                               | 10.09052085                             |
| 13 72 1087 0.0005 532 14.109 0.00034069 12.20 0.012383973 350.67 48.90 51.27 9/27/04 9:58 145:10:07 145:03:07 145:03:07 145:03:07 145:03:07 145:03:07 145:03:07 15:04:07 179:57:30 13.41994611   12 70 1084 0.0005 531 14:03 0.00039611 112.20 0.01410467 396:73 55:32 57.8 9:3004 14:22 221:34:07 221:27:30 14.8511092   12 71 1081 0.0005 531 14.018 0.000494767 14.01 0.01495166 410.74 57.27 59.64 101/104 16:40 247:85:07 247:45:30 15.488818992   13 67 1095 0.0003 527 14.20 0.0003954 8.52 0.01524565 431.72 60.20 62.57 10/704 18:30:007 356:23:0 18.54898933   14 70 1085 0.0004 531 14.08 0.000338131 9.38 0.01524952 40.024 61.38 63.75 10/70/4 9.69 </td <td>29</td> <td></td> <td>72</td> <td>1086</td> <td>0.001</td> <td>53</td> <td>2 14.0</td> <td>0.000959885</td> <td>27.18</td> <td>0.011953283</td> <td>338.48</td> <td>47.20</td> <td>49.5</td> <td>7 9/26/04</td> <td>20:16</td> <td>131:28:07</td> <td>131:21:30</td> <td>11.46597624</td>   | 29            |            | 72      | 1086     | 0.001       | 53              | 2 14.0 | 0.000959885     | 27.18                   | 0.011953283     | 338.48    | 47.20                | 49.5          | 7 9/26/04   | 20:16          | 131:28:07    | 131:21:30                               | 11.46597624                             |
| 22 70 1089 0.0005 530 14.135 0.00732956 20.75 0.013116229 371.43 51.79 54.16 9/28/04 20:57 180.0407 179.57.30 134.1896461   15 70 1084 0.0005 531 14.03 0.00039611 11.22 0.01401467 396.73 55.32 57.69 9/30/04 14:22 221:34:07 221:7:30 14.85818092   15 71 1080 0.0005 531 14.018 0.000494679 12.93 0.01494274 42.31 59.00 61.37 10/40.04 9.21 223.30 731.22.83.01 15.74384359   13 67 1095 0.0003 527 14.213 0.00303214 8.59 0.01524556 431.72 60.20 62.57 10/504 9.18 336.031.07 336.243.01 18.0489993   11 70 1087 0.004 531 14.108 0.00333131 9.38 0.01624408 459.98 64.14 66.51 10/7/04 9.20 344.32.07 344.25.01 24.738838   10 10.186 0.00   | 13            |            | 72      | 1087     | 0.0005      | 53              | 2 14.1 | 0.00043069      | 12.20                   | 0.012383973     | 350.67    | 48.90                | 51.2          | 7 9/27/04   | 9:58           | 145:10:07    | 145:03:30                               | 12.04859374                             |
| 15 70 1084 0.0005 530 14.07 0.0004/744 14.09 0.013614377 385.51 53.75 56.12 9/29/04 19:57 20:39:07 20:30:07 20:30:30 14.25313806   12 71 1080 0.0004 531 14.01 0.00494757 14.01 0.01496716 410.74 57.27 56.4 10/1/04 16:40 247:32:07 247:45:30 15.74384359   13 67 1094 0.0003 527 14.20 0.00030214 8:59 0.01524555 431.72 60.20 62.57 10/6/04 9:18 336:30:07 336:23:30 18.34398933   9 69 1091 0.0003 529 14.161 0.00030964 8:52 0.01524595 431.72 60.20 62.57 10/6/04 9:18 336:30:07 386:23:00 18.34398933   10 71 1085 0.0004 531 14.08 0.00133131 9:38 0.016244038 65.05 10/6/04 9:66 49:8:57 0.38:43:207 384:32:01 19.699697108   10 71 1085   | 22            |            | 70      | 1089     | 0.0008      | 53              | 14.1   | 0.000732956     | 20.75                   | 0.013116929     | 371.43    | 51.79                | 54.1          | 6 9/28/04   | 20:52          | 180:04:07    | 179:57:30                               | 13.41896461                             |
| 11 71 1081 0.0004 531 14.031 0.00039611 11.22 0.014010487 396.73 55.32 57.69 9/30/04 14:22 221:37:30 14.88518092   15 71 1080 0.0005 531 14.018 0.000494679 14.01 0.014950566 10.74 57.27 59.64 10/1/04 64.04 247:52:07 247:45:30 17.67913868   13 67 1095 0.0003 527 14.20 0.0003964 6.52 0.1554892 40.24 61.38 63.75 10/6/04 918 386:30:07 386:23:03 18.9398933   9 69 1091 0.0004 530 14.109 0.00039646 61.20 01554922 40.24 61.38 63.75 10/6/04 919 368:30:07 386:23:03 18.69732765   10 71 1085 0.0004 530 14.096 0.000385805 10.36 0.015912725 450.60 62.83 65.20 10/7/04 92.03 84:32:07 384:32:07 384:32:07 384:32:07 384:32:07 10.90.109 202.077666   | 15            |            | 70      | 1084     | 0.0005      | 53              | 14.0   | 0.000497448     | 14.09                   | 0.013614377     | 385.51    | 53.75                | 56.1          | 2 9/29/04   | 19:57          | 203:09:07    | 203:02:30                               | 14.25313806                             |
| 1 1080 0.0005 531 14.018 0.0044679 14.01 0.014505166 410.74 57.27 59.64 101/04 16.40 247.52:07 247.45:30 15.74384359   13 67 1094 0.0005 527 14.20 0.00037576 12.39 0.014942742 423.13 59.00 61.37 10/4/04 9:18 336:30.07 336:23:30 18.34398933   9 67 1095 0.0003 529 14.161 0.0030364 8.52 0.015245856 431.72 60.20 62.57 10/5/04 9:18 336:30.07 336:23:30 18.34398933   11 70 1085 0.0004 531 14.08 0.00331313 9.36 0.016244036 459.96 64.14 66.51 10/6/04 9:06:07 409:01:30 20.22709267   14 70 1086 0.0001 530 14.096 0.00033131 9.36 0.016376353 463.74 64.66 67.03 10/6/04 20:61 61:50:30 74.738636   12 65 1067 0.0004 525 13.09  | 12            |            | 71      | 1081     | 0.0004      | 53              | 14.0   | 0.00039611      | 11.22                   | 0.014010487     | 396.73    | 55.32                | 57.6          | 9 9/30/04   | 14:22          | 221:34:07    | 221:27:30                               | 14.88518092                             |
| 13 67 1094 0.0005 527 14.200 0.000437576 12.39 0.014942742 423.13 59.00 61.37 104/04 9:21 312:33:07 312:26:30 17.67913868   9 67 1095 0.0003 527 14.213 0.00303214 8.59 0.015245956 431.72 60.20 62.57 10/f0/4 9:18 336:007 336:23:30 18.34399933   9 69 1091 0.0004 530 14.109 0.00365805 10.36 0.015245924 460.66 62.83 65.20 10/f0/4 9:68 90:90:107 384:25:30 19.60957108   10 71 1085 0.0004 531 14.068 0.000132898 3.78 0.016244038 459.56 64.14 66.51 10/f0/4 9:56 409:08:07 409:0130 20.22709267   4 70 1086 0.0001 530 14.056 0.00033116 23.59 0.17210051 487.33 67.95 70.32 10/f16/d 49:56 419:11:30 20.47686364   25 65 1079 7E-65 527<   | 15            |            | 71      | 1080     | 0.0005      | 53              | 14.0   | 18 0.000494679  | 14.01                   | 0.014505166     | 410.74    | 57.27                | 59.6          | 4 10/1/04   | 16:40          | 247:52:07    | 247:45:30                               | 15.74384359                             |
| 9 67 1095 0.0003 527 14.213 0.000303214 8.59 0.015245956 431.72 60.20 62.57 10/5/04 9:18 336:30:07 336:23:30 18.34399933   9 69 1091 0.0003 529 14.161 0.000365805 10.36 0.015512225 450.60 62.83 65.20 10/7/04 9:19 368:32:07 348:425:03 19.60957108   10 71 1085 0.0004 531 14.09 0.00035898 3.78 0.016244038 459.98 64.14 66.51 10/7/04 9:16 409:08:07 499:01:30 20.22709267   4 70 1086 0.0001 530 14.096 0.00033116 23.59 0.017210051 487.33 67.95 70.32 10/16/04 2:51 612:03:07 611:56:30 24.7396836   12 65 1067 0.0004 525 18.49 0.00736448 11.20 0.017780549 496.53 69.51 71.88 10/18/04 9:18 648:30:07 648:23:30 25.46570133   2 67 107   | 13            |            | 67      | 1094     | 0.0005      | 52              | 14.2   | 0 0.000437576   | 12.39                   | 0.014942742     | 423.13    | 59.00                | 61.3          | 7 10/4/04   | 9:21           | 312:33:07    | 312:26:30                               | 17.67913868                             |
| 9   99   1091   0.0003   529   14.161   0.000300964   8.52   0.01554892   440.24   61.38   63.75   10/6/04   9.19   360:31:07   380:24:30   18.9732765     11   70   1087   0.0004   530   14.109   0.000331313   9.38   0.016524038   459.98   64.14   66.51   10/6/04   9:26   384:32:07   384:25:30   19.60957108     10   71   1086   0.0001   530   14.096   0.000132898   3.78   0.016376935   463.74   64.66   67.03   10/6/04   20:66   419:18:07   419:11:30   20.47686364     25   65   1067   0.0004   525   14.005   6.63963E-05   1.88   0.017671896   50.41   69.77   72.14   10/18/04   2:e8   875.58:07   675.51:30   25.98939636     2   67   1083   7E-05   527   14.005   6.63963E-05   1.88   0.01739683   50.20   70.14   10/19/04   12:4   875  | 9             |            | 67      | 1095     | 0.0003      | 52              | 7 14.2 | 3 0.000303214   | 8.59                    | 0.015245956     | 431.72    | 60.20                | 62.5          | 7 10/5/04   | 9:18           | 336:30:07    | 336:23:30                               | 18.34398933                             |
| 11 70 1007 0.0004 530 14.109 0.000365805 10.36 0.015912725 450.60 62.83 65.20 10/7/04 9:20 384:32:07 384:32:07 384:32:07 384:32:07 384:32:07 384:32:07 384:32:07 384:32:07 384:32:07 384:32:07 384:32:07 384:32:07 384:32:07 384:32:07 384:32:07 384:32:07 384:32:07 384:32:07 384:32:07 480:32:07 480:32:07 480:32:07 480:32:07 490:01:30 20.22709267   4 70 1086 0.0001 530 14.096 0.00033116 23.59 0.017210051 487.33 67.95 70.32 10/16/04 20:51 611:56:30 24.7396836   12 65 1067 0.0004 525 13.849 0.000395448 11.20 0.017605499 498.53 69.51 71.88 10/16/04 9:26 675:51:02 25.9939636   2 67 1079 7E-05 527 14.05 6.68425E-05 1.88 0.01738538 502.30 70.04 72.14 10/19/04 9:22 756:037:07 72  | 9             |            | 69      | 1091     | 0.0003      | 52              | 9 14.1 | 0.000300964     | 8.52                    | 0.01554692      | 440.24    | 61.38                | 63.7          | 5 10/6/04   | 9:19           | 360:31:07    | 380:24:30                               | 18.98732765                             |
| 10 71 1085 0.0004 531 14.083 0.000331313 9.38 0.016244038 459.98 64.14 66.51 10/8/04 9:56 409:08:07 409:01:30 20.22709267   4 70 1086 0.0001 530 14.996 0.00132898 3.78 0.016376935 463.74 64.66 67.03 10/8/04 20:61 419:18:07 419:11:30 20.47686364   25 65 1067 0.0004 525 13.849 0.00395448 11.20 0.017605499 498.53 69.51 71.88 10/18/04 9:18 648:30:07 648:23:30 25.46570133   2 67 1079 7E-05 527 14.005 6.63968E-05 1.88 0.017671896 500.41 69.77 72.14 10/18/04 9:18 648:30:07 669:27:30 25.99939636   2 67 1083 7E-05 527 14.057 6.66425E-05 1.89 0.017796538 502.30 70.04 72.14 10/12/04 9:25 720:37:07 720:30:30 26.84434039   1 68 10   | 11            |            | 70      | 1087     | 0.0004      | 53              | 14.1   | 0.000365805     | 5 10.36                 | 0.015912725     | 450.60    | 62.83                | 65.2          | 0 10/7/04   | 9:20           | 384:32:07    | 384:25:30                               | 19.60957108                             |
| 4 70 1086 0.0001 530 14.096 0.000132898 3.78 0.016376935 463.74 64.66 67.03 10/8/04 20:06 419:18:07 419:11:30 20.47686364   25 65 1079 0.0009 525 14.005 0.000395448 11.20 0.017605499 496.53 69.51 71.88 10/18/04 20:16 648:30:07 648:30:07 848:30 25.46570133   2 67 1079 7E-05 527 14.005 6.63983E-05 1.88 0.017708538 502.30 70.04 72.41 10/18/04 92:8 696:27:30 25.99939636   2 67 1083 7E-05 527 14.005 6.66425E-05 1.89 0.017738538 502.30 70.04 72.41 10/2/0/4 92:2 896:34:07 696:27:30 26.392568629   5 67 1080 0.0002 527 14.018 0.000166145 4.70 0.01826782 517.29 72.13 74.50 10/23/04 14:20 73:32:07 73:32:07 73:32:07 73:32:50 27.81250218  | 10            |            | 71      | 1085     | 0.0004      | 53              | 14.0   | 33 0.000331313  | 9.38                    | 0.016244038     | 459.98    | 64.14                | 66.5          | 1 10/8/04   | 9:56           | 409:08:07    | 409:01:30                               | 20.22709267                             |
| 25 65 1079 0.0009 525 14.005 0.000833116 23.59 0.017210051 487.33 67.95 70.32 10/16/04 20:51 611:66:30 24.7396836   12 65 1067 0.0004 525 13.849 0.000395448 11.20 0.017605499 488.53 69.51 71.88 10/18/04 91.8 648:30:07 848:23:30 25.46570133   2 67 1079 7E-05 527 14.005 6.63963E-05 1.88 0.017671895 500.41 69.77 72.41 10/18/04 92.28 896:34:07 696:27:30 26.39258629   5 67 1083 7E-05 527 14.015 6.6425E-05 1.89 0.017794638 507.00 70.69 73.06 10/21/04 9:25 720:37:07 720:30:30 26.84434039   11 68 1075 0.0004 528 13.953 0.000363137 10.28 0.01826782 517.29 72.13 74.50 10/23/04 9:20 773:32:07 773:32:02 78.182630 28.98931194   6 1079   | 10            |            | 70      | 1086     | 0.0001      | 53              | 14.0   | 0.000132898     | 3.78                    | 0.016376935     | 463.74    | 64.66                | 67.0          | 3 10/8/04   | 20:06          | 419:18:07    | 419:11:30                               | 20.47686364                             |
| 12 65 1067 0.0004 525 13.849 0.000396448 11.20 0.017605499 498.53 69.51 71.88 10/18/04 9:18 648:30:07 848:23:30 25.46570133   2 67 1079 7E-05 527 14.005 6.63963E-05 1.88 0.017671896 500.41 69.77 72.14 10/19/04 12:46 875:58:07 675:51:30 25.99393636   2 67 1083 7E-05 527 14.015 6.68425E-05 1.89 0.017738538 502.30 70.04 72.41 10/19/04 9:22 896:34:07 696:27:30 26.39256629   5 67 1080 0.0002 527 14.018 0.00166145 4.70 0.01794683 507.00 70.69 73.06 10/21/04 9:22 896:34:07 696:27:30 26.864343039   11 68 1075 0.0004 528 14.057 0 0.01826782 517.29 72.13 74.50 10/25/04 9:21 816:33:07 816:26:30 28.57537304   5 67 1079 0.0002 <td>25</td> <td></td> <td>65</td> <td>1079</td> <td>0.0009</td> <td>52</td> <td>5 14.0</td> <td>0.000833116</td> <td>23.59</td> <td>0.017210051</td> <td>487.33</td> <td>67.95</td> <td>70.3</td> <td>2 10/16/04</td> <td>20:51</td> <td>612:03:07</td> <td>611:56:30</td> <td>24.7396836</td>  | 25            |            | 65      | 1079     | 0.0009      | 52              | 5 14.0 | 0.000833116     | 23.59                   | 0.017210051     | 487.33    | 67.95                | 70.3          | 2 10/16/04  | 20:51          | 612:03:07    | 611:56:30                               | 24.7396836                              |
| 12 67 1079 7E-05 527 14.005 6.83963E-05 1.88 0.017671896 50.41 69.77 72.14 10/19/04 12:46 875:58:07 675:51:30 25.99939636   2 67 1083 7E-05 527 14.057 6.66425E-05 1.89 0.017738538 502.30 70.04 72.41 10/19/04 9:22 896:34:07 696:27:30 26.39258629   5 67 1080 0.0002 527 14.017 0.00166145 4.70 0.017904683 507.00 70.69 73.06 10/21/04 9:22 720:37:07 720:30:30 26.84243039   11 68 1075 0.0004 528 13.585 0.000363137 10.28 0.01826782 517.29 72.13 74.50 10/23/04 4:20 73:32:07 773:32:07 773:32:30 27.81250218   0 66 1083 0 526 14.057 0 0.01826782 517.29 72.13 74.50 10/28/04 9:10 840:22:07 840:15:30 28.57537304   5 67 1079  | 10            |            | 65      | 1067     | 0.0004      | 52              | 13.8   | 0.000395448     | 11.20                   | 0.017605499     | 498.53    | 69.51                | 71.8          | 8 10/18/04  | 9:18           | 648:30:07    | 848:23:30                               | 25.46570133                             |
| 2   67   1083   7E-05   527   14.057   6.86425E-05   1.89   0.017738538   502.30   70.04   72.41   10/2/04   9:22   896:34:07   696:27:30   26.39258629     5   67   1080   0.0002   527   14.018   0.000166145   4.70   0.017904683   507.00   70.69   73.06   10/21/04   9:22   720:37:07   773:32:07   78:01   50:00:01   50:00:01:05:01   50:01:05:01   | 2             |            | 67      | 1079     | 7E-05       | 52              | 14.0   | 05 6.63963E-05  | 5 1.88                  | 0.017671896     | 500.41    | 69.77                | 72.1          | 4 10/19/04  | 12:46          | 875:58:07    | 675:51:30                               | 25.99939636                             |
| 2 67 1080 0.0002 527 14.018 0.000166145 4.70 0.017904683 507.00 70.69 73.06 10/21/04 9:25 720:37:07 720:30:30 26.8443039   11 68 1075 0.0004 528 13.953 0.000363137 10.28 0.01826782 517.29 72.13 74.50 10/23/04 14:20 773:32:07 73:25:30 27.81250218   0 66 1083 0 526 14.057 0 0.00 0.01826782 517.29 72.13 74.50 10/25/04 9:11 816:33:07 816:63:00 28.57537304   5 67 1079 0.0002 527 14.005 0.000165991 4.70 0.01843381 521.99 72.78 75.15 10/25/04 9:10 840:22:07 840:15:30 28.98911194   2 68 1086 7E-05 528 14.095 0.000165663 4.69 0.018606174 528.57 73.05 75.42 10/27/04 9:19 886:31:07 864:20:30 29.40156564   5 70 1083 <t< td=""><td>2</td><td></td><td>67</td><td>1083</td><td>7E-05</td><td>52</td><td>14.0</td><td>57 6.66425E-05</td><td>1.89</td><td>0.017738538</td><td>502.30</td><td>70.04</td><td>72.4</td><td>1 10/20/04</td><td>9:22</td><td>896:34:07</td><td>696:27:30</td><td>26.39258629</td></t<>  | 2             |            | 67      | 1083     | 7E-05       | 52              | 14.0   | 57 6.66425E-05  | 1.89                    | 0.017738538     | 502.30    | 70.04                | 72.4          | 1 10/20/04  | 9:22           | 896:34:07    | 696:27:30                               | 26.39258629                             |
| 1 68 1075 0.0004 528 13.953 0.00363137 10.28 0.01826782 517.29 72.13 74.50 10/23/04 14:20 773:32:07 773:25:30 27.81250218   0 66 1083 0 526 14.057 0 0.00 0.01826782 517.29 72.13 74.50 10/23/04 9:21 816:33:07 816:26:30 28.57537304   5 67 1079 0.0002 527 14.005 0.00165991 4.70 0.0183381 521.99 72.78 75.15 10/25/04 9:10 840:22:07 840:15:30 28.98911194   2 68 1086 7E-05 528 14.095 0.00165991 4.70 0.01830511 523.87 73.05 75.15 10/28/04 9:15 864:27:07 840:15:30 29.80802931   5 70 1083 0.0002 530 14.057 0.00029544 8.37 0.018961614 538.93 74.87 77.24 10/28/04 9:19 888:31:07 888:24:30 29.80802931   9 70 1073 0.0  | 5             |            | 67      | 1080     | 0.0002      | 52              | 7 14 0 | 8 0.000166145   | 4.70                    | 0.017904683     | 507.00    | 70.69                | 73.0          | 6 10/21/04  | 9:25           | 720:37:07    | 720:30:30                               | 26.84434039                             |
| 1 0 66 1083 0 526 14.057 0 0.00 0.01826782 517.29 72.13 74.50 10/25/04 9:21 816:33:07 816:26:30 28.57537304   5 67 1079 0.0002 527 14.005 0.000165991 4.70 0.01843381 521.99 72.78 75.15 10/25/04 9:10 840:15:30 28.57537304   2 68 1086 7E-05 528 14.096 6.67005E-05 1.89 0.018500511 52.87 73.05 75.42 10/25/04 9:10 840:12:07 840:15:30 29.80802931   5 70 1083 0.0002 530 14.057 0.00029544 8.37 0.018961614 538.93 74.87 77.24 10/29/04 9:19 888:31:07 88:24:30 29.80802931   9 70 1073 0.0003 530 13.827 0.00029544 8.37 0.018961614 538.93 74.87 77.24 10/29/04 9:09 912:21:07 912:14:30 30.2051642   3 67 1074 0.0001   | 11            |            | 68      | 1075     | 0.0004      | 52              | 13.9   | 53 0.000363137  | 10.28                   | 0.01826782      | 517.29    | 72.13                | 74.5          | 0 10/23/04  | 14:20          | 773:32:07    | 773:25:30                               | 27.81250218                             |
| 5 67 1079 0.0002 527 14.005 0.00165991 4.70 0.01843381 521.99 72.78 75.15 10/26/04 9:10 840:22:07 840:15:30 28.98911194   2 68 1086 7E-05 528 14.096 6.67005E-05 1.89 0.018500511 523.87 73.05 75.42 10/27/04 9:15 864:22:07 840:15:30 29.40156644   5 70 1083 0.0002 530 14.057 0.000165663 4.69 0.018666174 528.57 73.70 76.07 10/28/04 9:19 886:31:07 864:23:03 29.80802931   9 70 1073 0.0003 530 13.927 0.0029544 8.37 0.018961614 538.93 74.87 77.24 10/29/04 9:19 886:31:07 94:24:30 30.2051642   3 67 1074 0.0001 527 13.940 9.9138E-05 2.81 0.019060747 539.74 75.26 77.63 11/1/04 919 984:31:07 984:24:30 31.379738454   10 72 1090 <td></td> <td></td> <td>66</td> <td>1083</td> <td>0.0004</td> <td>52</td> <td>5 14 0</td> <td>57 0</td> <td>0.00</td> <td>0.01826782</td> <td>517.29</td> <td>72.13</td> <td>74.5</td> <td>0 10/25/04</td> <td>9:21</td> <td>816:33:07</td> <td>816:26:30</td> <td>28.57537304</td>   |               |            | 66      | 1083     | 0.0004      | 52              | 5 14 0 | 57 0            | 0.00                    | 0.01826782      | 517.29    | 72.13                | 74.5          | 0 10/25/04  | 9:21           | 816:33:07    | 816:26:30                               | 28.57537304                             |
| 2 68 1073 0.0002 528 14.096 6.67005E-05 1.89 0.018500511 523.87 73.05 75.42 10/27/04 9:15 864:27:07 864:20:30 29.40156364   5 70 1083 0.0002 530 14.057 0.000165663 4.69 0.018666174 528.57 73.70 78.07 10/28/04 9:19 888:31:07 888:24:30 29.80802931   9 70 1073 0.0003 530 13.927 0.00029544 8.37 0.018961614 538.93 74.87 77.24 10/28/04 9:19 988:31:07 988:24:30 30.2051642   3 67 1074 0.0001 527 13.940 9.913E-05 2.81 0.019060747 539.74 75.26 77.63 11/1/04 919 984:31:07 984:24:30 31.37703955   10 72 1090 0.0004 532 14.148 0.00332214 9.41 0.019392961 549.15 76.57 78.94 11/5/04 11:02 1082:14:07 1092:730 32.89734454   10 73 1078<   | 6             |            | 67      | 1070     | 0.0002      | 52              | 7 14 0 | 0 000165991     | 4.70                    | 0.01843381      | 521.99    | 72.78                | 75.1          | 5 10/26/0   | 9:10           | 840:22:07    | 840:15:30                               | 28.98911194                             |
| 2 00 1000 1200 0002 530 14.057 0.000165663 4.69 0.018666174 528.57 73.70 78.07 10/28/04 9:19 888:31:07 888:24:30 29.80802931   9 70 1073 0.0003 530 13.927 0.00029544 8.37 0.018961614 538.93 74.87 77.24 10/29/04 9:09 912:21:07 912:14:30 30.2051642   3 67 1074 0.0001 527 13.940 9.9138E-05 2.61 0.019060747 539.74 75.26 77.63 11/1/04 919 984:31:07 984:24:30 31.37703955   10 72 1090 0.0004 532 14.148 0.00332214 9.41 0.019392961 549.15 76.57 78.94 11/5/04 11.02 1082:14:07 1082:145/07 1082:145/07 1082:145/07 1082:145/07 1082:145/07 1082:145/07 1082:145/07 1082:145/07 1082:145/07 1082:145/07 1082:145/07 1082:145/07 1082:145/07 1082:145/07 1082:145/07 1082:145/07 1082:145/07 1082:145/07 10   | 0             |            | 69      | 1096     | 7E-05       | 52              | 14 0   | 6 6 67005E-05   | 1.89                    | 0.018500511     | 523.87    | 73.05                | 75.4          | 2 10/27/04  | 9:15           | 864:27:07    | 864:20:30                               | 29.40156364                             |
| 5   70   1073   0.0003   530   13.827   0.0029544   8.37   0.018961614   538.93   74.87   77.24   10/29/04   9:09   912:21:07   912:14:30   30.2051642     3   67   1074   0.0001   527   13.940   9.9138E-05   2.81   0.019060747   539.74   75.26   77.63   11/1/04   919   984:24:30   31.3703955     10   72   1090   0.0004   532   14.148   0.00332214   9.41   0.019392961   549.15   76.57   76.94   11/5/04   11:02   1082:14:07   1082:07:30   32.8703454     10   73   1078   0.0004   533   13.992   0.003322794   9.29   0.019720902   556.43   77.86   80.23   11/6/04   14:54   110:06:07   1109:59:30   33.31819239   | 2             |            | 20      | 1082     | 0.0002      | 53              | 14.0   | 57 0.000165663  | 4 69                    | 0.018666174     | 528.57    | 73.70                | 78.0          | 7 10/28/04  | 9:19           | 888:31:07    | 888:24:30                               | 29.80802931                             |
| 9   70   1073   0.0003   530   10.22   10.21   0.012064   531   0.019060747   539.74   75.26   77.63   11/1/04   9:19   984:31:07   984:24:30   31.37703955     10   72   1090   0.0004   532   14.148   0.00332214   9.41   0.019392961   549.15   76.57   78.94   11/5/04   11:02   1082:14:07   1082:07:30   32.89734454     10   73   1078   0.0004   533   13.992   0.0032794   9.29   0.019720902   558.43   77.86   80.23   11/6/04   14:54   1110:06:07   1109:59:30   33.31819239  | 5             |            | 70      | 1073     | 0.0002      | 53              | 13.0   | 0 00029544      | 8.37                    | 0.018961614     | 538.93    | 74.87                | 77.2          | 4 10/29/0   | 9:09           | 912:21:07    | 912:14:30                               | 30.2051642                              |
| 3   67   1074   0.0001   527   10.30   61.50   10.10   54.15   76.57   78.94   11/5/04   11:02   1082:07:30   32.89734454     10   73   1078   0.0004   532   14.148   0.00032214   9.29   0.019392961   549.15   76.57   78.94   11/5/04   11:02   1082:07:30   32.89734454     10   73   1078   0.0004   533   13.992   0.0032794   9.29   0.019720902   558.43   77.86   80.23   11/6/04   14:54   1110:06:07   1109:59:30   33.31819239   | 9             |            | 67      | 1073     | 0.0003      | 52              | 7 13 0 | 0 991335-05     | 2.81                    | 0.019060747     | 539 74    | 75.26                | 77.6          | 3 11/1/04   | 9:19           | 984:31:07    | 984:24:30                               | 31.37703955                             |
| 10 73 1078 0.0004 533 13.992 0.00032794 9.29 0.019720902 558.43 77.86 80.23 11/6/04 14:54 1110:06:07 1109:59:30 33.31819239   | 3             |            | 70      | 1004     | 0.0004      | 52              | 2 14 1 | 18 0.000332214  | 9.41                    | 0.019392961     | 549.15    | 76.57                | 78.9          | 4 11/5/04   | 11:02          | 1082:14:07   | 1082:07:30                              | 32.89734454                             |
|   | 10            |            | 72      | 1030     | 0.0004      | 53              | 3 13 0 | 0 00032704      | 0.20                    | 0.019720903     | 558.43    | 77 86                | 80.2          | 3 11/6/04   | 14:54          | 1110:06:07   | 1109:59:30                              | 33.31819239                             |
| 50 1084 0 0001 529 14 070 9 98777E-05 -2 82 0 019621224 555.81 77.47 79.84 11/10/04 10:40 1201:52:07 1201:45:30 34.66797674   | 10            |            | 60      | 1024     | -0.0001     | 50              | 14.0   | 70 -9 98777F-0F | -2.82                   | 0.019621224     | 555.81    | 77.47                | 79.8          | 4 11/10/04  | 10:40          | 1201:52:07   | 1201:45:30                              | 34.66797674                             |
| -3 b3 1004 0.001 020 1.000 020 1.000 020 1.000 020 1.000 010554028 553 71 77 21 79.58 11/11/04 9:23 1224:35:07 1224:28:30 34.9940749  | -3            |            | 67      | 1004     | 75.05       | 52              | 7 14 1 | 74 .6 710695.04 | -1.00                   | 0.019554029     | 553 71    | 77 21                | 79.5          | 8 11/11/0   | 9:23           | 1224:35:07   | 1224:28:30                              | 34.9940749                              |

DESORPTION TERMINATED 11/11/2004 DUE TO NO MORE GAS BEING EVOLVED; sample overn dried at 150 degrees F for 1 day

| SAMPLE: Riverton coal (324' to 326') cuttings in SSD canister L<br>lbs. grams est. lost gas (oc) = TIME 0F: elapsed time (off bottom to can |               |                  |        |           |            |                  |               |                     |              |                |       |                          |                          |      | elapsed time (off bottom to canistering) |      |                         |           |            |       |  |
|---|---------------|------------------|--------|-----------|------------|------------------|---------------|---------------------|--------------|----------------|-------|--------------------------|--------------------------|------|--|------|-------------------------|-----------|------------|-------|--|
| dry sample w  | eight:        | 2.0566           | 932.87 |           |            |                  |               |                     |              |                |       |                          |                          | 92 0 | off bottom<br>9/21/04                    | 9:37 | at surface<br>9/21/04 9 | li<br>38: | 9/21/04    | 9:49  | 11.4 minutes<br>0.191 hours                            |
| RIG/LAB MEAS  | UREMENTS      | D managurad E    | CONVER | SION OF R |            |                  | REMENTS TO ST | P (060 deg F; 14.7) | psi)         | CUMULATIVE VOL | UMES  | SCF/TON without lost gas | SCF/TON<br>with lost gas | т    | TIME OF MEAS                             | URE  | TIME SINCE              | i         | n canister |       | 0.436526695 SQRT (hrs)<br>SQRT hrs. (since off bottom) |
| measured cc<br>10   | measured I (F | 8 1091           | 0.0004 | 00301018  | 528        | 14.161           | 0.000335038   | 5                   | 9.49         | 0.000335038    | 9.49  | 0.33                     | 3                        | 3.49 | 9/21/04                                  | 9:51 | 0:13                    | :11       | 0:         | 01:45 | 0.46874537   |
| 9   | 61            | 8 1091<br>8 1091 | 0.0003 |           | 528<br>528 | 14.161<br>14.161 | 0.000301534   | 10                  | 8.54<br>0.44 | 0.000636572    | 18.03 | 0.62                     | 3                        | 4.14 | 9/21/04                                  | 9:53 | 0:19                    | :41       | 0:         | 08:15 | 0.572761343  |
| 11  | 61            | 8 1091           | 0.0004 |           | 528        | 14.161           | 0.000368542   | 10                  | 0.44         | 0.001373658    | 38.90 | 1.34                     | 1                        | 4.50 | 9/21/04 1                                | 0:01 | 0:23                    | :26       | 0:         | 12:00 | 0.624944442  |

| 9   | 68 | 1091 | 0.0003  | 528 | 14.161 | 0.000301534  | 8.54   | 0.00167519  | 47.44   | 1.63  | 4.79  | 9/21/04  | 10:06 | 0:28:11    | 0:16:45    | 0.68536284  |
|-----|----|------|---------|-----|--------|--------------|--------|-------------|---------|-------|-------|----------|-------|------------|------------|-------------|
| 8   | 68 | 1091 | 0.0003  | 528 | 14.161 | 0.00026803   | 7.59   | 0.00194322  | 55.03   | 1.89  | 5.05  | 9/21/04  | 10:08 | 0:30:56    | 0:19:30    | 0.718021974 |
| 20  | 68 | 1091 | 0.0007  | 528 | 14.161 | 0.000670076  | 18.97  | 0.002613296 | 74.00   | 2.54  | 5.70  | 9/21/04  | 10:18 | 0:40:11    | 0:28:45    | 0.81836558  |
| 19  | 68 | 1091 | 0.0007  | 528 | 14.181 | 0.000636572  | 18.03  | 0.003249868 | 92.03   | 3.16  | 8.32  | 9/21/04  | 10:23 | 0:45:11    | 0:33:45    | 0.867787736 |
| 14  | 68 | 1091 | 0.0005  | 528 | 14.161 | 0.000469053  | 13.28  | 0.003718922 | 105.31  | 3.62  | 8.78  | 9/21/04  | 10:29 | 0:51:26    | 0:40:00    | 0.925862981 |
| 16  | 68 | 1091 | 0.0006  | 528 | 14.161 | 0.000536061  | 15.18  | 0.004254982 | 120.49  | 4.14  | 7.30  | 9/21/04  | 10:37 | 0:59:26    | 0:48:00    | 0.995266575 |
| 21  | 68 | 1091 | 0.0007  | 528 | 14.161 | 0.00070358   | 19.92  | 0.004958562 | 140.41  | 4.82  | 7.98  | 9/21/04  | 10:47 | 1:09:41    | 0:58:15    | 1.077877544 |
| 17  | 68 | 1091 | 0.0006  | 528 | 14.161 | 0.000569565  | 16.13  | 0.005528127 | 156.54  | 5.38  | 8.54  | 9/21/04  | 10:57 | 1:19:26    | 1:08:00    | 1.150603706 |
| 10  | 68 | 1091 | 0.0004  | 528 | 14.181 | 0.000335038  | 9.49   | 0.005863165 | 166.03  | 5.70  | 8.86  | 9/21/04  | 11:02 | 1:24:56    | 1:13:30    | 1.18977122  |
| 29  | 68 | 1091 | 0.001   | 528 | 14.181 | 0.00097161   | 27.51  | 0.006834775 | 193.54  | 6.65  | 9.81  | 9/21/04  | 11:21 | 1:43:11    | 1:31:45    | 1.311381799 |
| 50  | 68 | 1091 | 0.0018  | 528 | 14.161 | 0.00167519   | 47.44  | 0.008509965 | 240.97  | 8.28  | 11.44 | 9/21/04  | 11:53 | 2:15:11    | 2:03:45    | 1.501018173 |
| 39  | 68 | 1090 | 0.0014  | 528 | 14.148 | 0.00130545   | 38.97  | 0.009815415 | 277.94  | 9.55  | 12.70 | 9/21/04  | 12:16 | 2:38:11    | 2:28:45    | 1.623696058 |
| 147 | 70 | 1083 | 0.0052  | 530 | 14.057 | 0.004870495  | 137.92 | 0.01468591  | 415.86  | 14.28 | 17.44 | 9/21/04  | 16:33 | 6:55:11    | 6:43:45    | 2.630536489 |
| 84  | 72 | 1084 | 0.003   | 532 | 14.070 | 0.002775237  | 78.59  | 0.017461148 | 494.44  | 16.98 | 20.14 | 9/21/04  | 19:17 | 9:39:11    | 9:27:45    | 3.106936684 |
| 213 | 72 | 1087 | 0.0075  | 532 | 14.109 | 0.007056685  | 199.82 | 0.024517833 | 694.27  | 23.84 | 27.00 | 9/22/04  | 6:22  | 20:44:11   | 20:32:45   | 4.553722531 |
| 173 | 72 | 1084 | 0.0061  | 532 | 14.070 | 0.005715668  | 161.85 | 0.0302335   | 856.11  | 29.40 | 32.56 | 9/22/04  | 19:49 | 34:11:11   | 33:59:45   | 5.846912766 |
| 171 | 72 | 1085 | 0.006   | 532 | 14.083 | 0.005654802  | 160.13 | 0.035888302 | 1018.24 | 34.90 | 38.06 | 9/23/04  | 16:30 | 54:52:11   | 54:40:45   | 7.407409954 |
| 121 | 71 | 1089 | 0.0043  | 531 | 14.135 | 0.004023666  | 113.94 | 0.039911968 | 1130.18 | 38.81 | 41.97 | 9/24/04  | 12:31 | 74:53:11   | 74:41:45   | 8.653692211 |
| 120 | 71 | 1090 | 0.0042  | 531 | 14.148 | 0.003994077  | 113.10 | 0.043906045 | 1243.28 | 42.70 | 45.86 | 9/25/04  | 14:37 | 100:59:11  | 100:47:45  | 10.04919842 |
| 110 | 71 | 1086 | 0.0039  | 531 | 14.096 | 0.003647801  | 103.29 | 0.047553847 | 1346.57 | 48.24 | 49.40 | 9/26/04  | 20:17 | 130:39:11  | 130:27:45  | 11.43035676 |
| 48  | 71 | 1087 | 0.0017  | 531 | 14.109 | 0.001593234  | 45.12  | 0.049147081 | 1391.69 | 47.79 | 50.95 | 9/27/04  | 9:58  | 144:20:11  | 144:08:45  | 12.01400603 |
| 79  | 69 | 1089 | 0.0028  | 529 | 14.135 | 0.002636954  | 74.67  | 0.051784034 | 1466.36 | 50.36 | 53.52 | 9/28/04  | 20:52 | 179:14:11  | 179:02:45  | 13.38791951 |
| 57  | 70 | 1084 | 0.002   | 530 | 14.070 | 0.001890303  | 53.53  | 0.053674338 | 1519.88 | 52.20 | 55.36 | 9/29/04  | 19:58 | 202:20:11  | 202:08:45  | 14.2244996  |
| 40  | 69 | 1081 | 0.0014  | 529 | 14.031 | 0.001325358  | 37.53  | 0.054999696 | 1557.41 | 53.49 | 56.65 | 9/30/04  | 14:20 | 220:42:11  | 220:30:45  | 14.85607807 |
| 51  | 71 | 1080 | 0.0018  | 531 | 14.018 | 0.001681909  | 47.63  | 0.056681605 | 1605.04 | 55.12 | 58.28 | 10/1/04  | 16:40 | 247:02:11  | 246:50:45  | 15.71739129 |
| 51  | 67 | 1094 | 0.0018  | 527 | 14.200 | 0.001716643  | 48.61  | 0.058398248 | 1653.65 | 56.79 | 59.95 | 10/4/04  | 9:22  | 311:44:11  | 311:32:45  | 17.65605814 |
| 35  | 67 | 1095 | 0.0012  | 527 | 14.213 | 0.001179165  | 33.39  | 0.059577414 | 1687.04 | 57.94 | 61.10 | 10/5/04  | 9:20  | 335:42:11  | 335:30:45  | 18.32220117 |
| 32  | 68 | 1091 | 0.0011  | 528 | 14.161 | 0.001072122  | 30.36  | 0.060649535 | 1717.40 | 58.98 | 62.14 | 10/6/04  | 9:22  | 359:44:11  | 359:32:45  | 18.96671793 |
| 32  | 69 | 1087 | 0.0011  | 529 | 14.109 | 0.001066171  | 30.19  | 0.061715707 | 1747.59 | 60.02 | 63.18 | 10/7/04  | 9:21  | 383:43:11  | 383:31:45  | 19.5887652  |
| 29  | 70 | 1085 | 0.001   | 530 | 14.083 | 0.00096262   | 27.26  | 0.062678327 | 1774.85 | 60.95 | 64.11 | 10/8/04  | 9:58  | 408:20:11  | 408:08:45  | 20.20733503 |
| 13  | 70 | 1086 | 0.0005  | 530 | 14.096 | 0.000431917  | 12.23  | 0.063110245 | 1787.08 | 61.37 | 84.53 | 10/8/04  | 20:08 | 418:30:11  | 418:18:45  | 20.45734723 |
| 100 | 64 | 1079 | 0.0035  | 524 | 14.005 | 0.003338823  | 94.54  | 0.066449067 | 1881.62 | 64.82 | 67.78 | 10/16/04 | 20:53 | 611:15:11  | 611:03:45  | 24.72353242 |
| 36  | 64 | 1067 | 0.0013  | 524 | 13.849 | 0.001188609  | 33.66  | 0.067637676 | 1915.28 | 85.78 | 68.94 | 10/18/04 | 9:19  | 647:41:11  | 647:29:45  | 25.44968347 |
| 9   | 66 | 1079 | 0.0003  | 526 | 14.005 | 0.000299351  | 8.48   | 0.067937027 | 1923.76 | 66.07 | 69.23 | 10/19/04 | 12:47 | 675:09:11  | 674:57:45  | 25.983/075  |
| 7   | 66 | 1083 | 0.0002  | 526 | 14.057 | 0.000233692  | 6.62   | 0.088170719 | 1930.37 | 66.29 | 69.45 | 10/20/04 | 9:23  | 695:45:11  | 695:33:45  | 26.37/1313  |
| 13  | 66 | 1080 | 0.0005  | 526 | 14.018 | 0.000432797  | 12.26  | 0.068803517 | 1942.63 | 68.71 | 69.87 | 10/21/04 | 9:26  | 719:48:11  | 719:36:45  | 26.82914564 |
| 33  | 67 | 1075 | 0.0012  | 527 | 13.953 | 0.001091478  | 30.91  | 0.069694995 | 1973.54 | 67.78 | 70.94 | 10/23/04 | 14:21 | 772:43:11  | 772:31:45  | 27.79783665 |
| 0.5 | 64 | 1083 | 2E-05   | 524 | 14.057 | 1.8756E-05   | 0.47   | 0.069711751 | 1974.01 | 67.79 | 70.95 | 10/25/04 | 9:23  | 815:45:11  | 815:33:45  | 28.56139099 |
| 18  | 67 | 1079 | 0.0006  | 527 | 14.005 | 0.000597567  | 16.92  | 0.070309318 | 1990.93 | 68.37 | 71.53 | 10/26/04 | 9:12  | 839:34:11  | 839:22:45  | 28.97532954 |
| 4   | 68 | 1086 | 0.0001  | 528 | 14.096 | 0.000133401  | 3.78   | 0.070442719 | 1994.71 | 68.50 | 71.66 | 10/27/04 | 9:15  | 863:37:11  | 883:25:45  | 29.38/40/55 |
| 15  | 68 | 1083 | 0.0005  | 528 | 14.057 | 0.000498872  | 14.13  | 0.07094159  | 2008.83 | 68.99 | 72.15 | 10/28/04 | 9:20  | 887:42:11  | 887:30:45  | 29./9434603 |
| 27  | 70 | 1073 | 0.001   | 530 | 13.927 | 0.000886321  | 25.10  | 0.071827911 | 2033.93 | 69.85 | 73.01 | 10/29/04 | 9:10  | 911:32:11  | 911:20:45  | 30.19166092 |
| 15  | 67 | 1074 | 0.0005  | 527 | 13.940 | 0.000495665  | 14.04  | 0.072323576 | 2047.97 | 70.33 | 73.49 | 11/1/04  | 9:20  | 983:42:11  | 983:30:45  | 31.3040408  |
| -3  | 63 | 1090 | -0.0001 | 523 | 14.148 | -0.000101379 | -2.87  | 0.072222197 | 2045.10 | 70.23 | 73.39 | 11/5/04  | 11:04 | 1081:26:11 | 1081:14:45 | 32.88520015 |
| 44  | 73 | 1078 | 0.0016  | 533 | 13.992 | 0.001442937  | 40.86  | 0.073685134 | 2085.96 | 71.64 | 74.80 | 11/6/04  | 14:55 | 1109:17:11 | 109:05:45  | 33.30333123 |
| -5  | 69 | 1084 | -0.0002 | 529 | 14.070 | -0.00018613  | -4.70  | 0.073499004 | 2081.25 | 71.48 | 74.64 | 11/10/04 | 10:41 | 1201:03:11 | 1200:51:45 | 34.03021237 |
| -3  | 67 | 1092 | -0.0001 | 527 | 14.174 | -0.000100794 | -2.85  | 0.07339821  | 2078.40 | /1.38 | /4.54 | 11/11/04 | 9.24  | 1223:40:11 | 1223.34.45 | 34.30242019 |

DESORPTION TERMINATED 11/11/2004 DUE TO NO MORE GAS BEING EVOLVED; sample overn dried at 150 degrees F for 1 day

Dry Wood(?) coal (180' to 182') in canister W3

Production Maintenance Service #1 Schertzer-Barton; W2 sec. 35-T.33S.-R.22E., Cherokee County, KS



Riverton coal (324' to 326') in SSD canister L  $\,$ 

Production Maintenance Service #1 Schertzer-Barton; W2 sec. 35-T.33S.-R.22E., Cherokee County, KS



# Desorption Characteristics of Cuttings Samples

Production Maintenance Service #1 Schertzer-Barton, W2 35-T.33S.-R.22E., Cherokee Co., KS

LITHOLOGIC COMPONENT SENSITIVITY ANALYSIS for calculation of gas content of shale associated with Dry Wood(?) coal from 180' to 182'



FIGURE 4.

# Desorption Characteristics of Cuttings Samples Production Maintenance Service #1 Schertzer-Barton, W2 35-T.33S.-R.22E., Cherokee Co., KS

LITHOLOGIC COMPONENT SENSITIVITY ANALYSIS for calculation of gas content of shale associated with Riverton coal from 324' to 326'



FIGURE 5.

# Desorption Characteristics of Cuttings Samples Production Maintenance Service #1 Schertzer-Barton, W2 35-T.33S.-R.22E., Cherokee Co., KS

# LITHOLOGIC COMPONENT SENSITIVITY ANALYSIS for all samples



# **Desorption Characteristics of Cuttings Samples**

based on total weight of gas-generating lithologies (i.e., coal and dark shale) in sample Production Maintenance Services #1 Schertzer-Barton, W2 35-T.33S.-R.22E., Cherokee County, KS

