Analytical results from samples collected during coal-bed methane exploration drilling in Caldwell Parish, Louisiana

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Introduction

In December, 2001, and January, 2002, the U.S. Geological Survey (USGS) and the Louisiana Geological Survey (LGS), through a Cooperative Research and Development Agreement (CRADA) with Devon SFS Operating, Inc. (Devon), participated in an exploratory drilling and coring program for coal-bed methane in north-central Louisiana. The USGS and LGS collected 25 coal core and cuttings samples from two coal-bed methane test wells that were drilled in west-central Caldwell Parish, Louisiana (fig. 1). Table 1 provides location and other pertinent information for both test wells; Devon SFS Operating Co Etal 5 no. 1 (SFS 5-1), and Devon SFS Operating Co Etal 9 no. 1 (SFS 9-1). Table 2 provides a list of the sample intervals and a summary of the results contained in this report. Field sample depth intervals were later corrected to true depth intervals using geophysical logs. Both depths are given on Table 2 because many of the analytical data sheets use the original field sample depth intervals. Both, USGS/LGS and Ticora Geosciences, Inc. (Ticora; contract laboratory for Devon), collected coal core from the two test wells. The purpose of this report is to provide the results of the analytical program conducted on the USGS/LGS samples. Analytical data from Ticora are not contained in this report; however, their sample intervals are indicated on Table 2 and appear on other tables in this report. After the desorption tests were complete, splits of the samples collected by Ticora were sent to the USGS laboratories in

Reston, VA, and combined with samples collected by USGS/LGS to form composite interval samples used for sorption isotherm analyses. A detailed description of individual and interval isotherm samples is contained in the Methane and Carbon Dioxide Adsorption Isotherms section of this report.

The data generated from this project are summarized in the various topical sections below. The raw analytical data are contained in several appendices. A summary of the analytical results from both wells, including molecular and isotopic data from coal gas samples are found in the Summary of Results section below. The results of low-temperature ashing and X-ray analysis to determine ash mineralogy are summarized in the text. The palynology section contains a review of palynological data collected from selected samples. Down-hole temperature data from both wells are discussed in the text. Appendix 1 contains detailed core descriptions and selected core photographs from both wells. Proximate, ultimate, forms of sulfur, ash fusion temperatures, free swelling index, apparent specific gravity, and trace and minor element data for samples collected from both wells are contained in Appendix 2. Coal gas desorption results are contained in Appendix 3, whereas methane and carbon dioxide sorption data from selected samples are summarized in the text. Analytical data are presented in Appendix 4. Coal petrographic results, including coal maceral composition and vitrinite reflectance data, are compiled in the Petrographic section below and in Appendix 5. Images of the geophysical logs (natural gamma, caliper, gamma-gamma density, and resistivity) and mud logs from both wells are contained in Appendix 6. Digital spread-sheet files for various data in this report are found in Appendix 7. Finally, a copy of the CRADA and a letter from Devon Energy Corporation that allows release of CRADA proprietary information is contained in Appendix 8.

Summary of Results

A review of the organic petrology and the low-temperature ash/X-ray mineralogy of the coal samples, along with the results of palynological analyses from selected intervals of both drill holes are found in subsequent sections of this report. Below is a

summary of the sample intervals and the associated geochemical and gas desorption/adsorption and geochemical data found in Tables 2a, 2b, and 3.

Devon SFS Operating Co Etal 5 no.1

Cuttings and non-core coal sample intervals: In order to compare desorption results from coal cuttings and coal core, the USGS desorbed a total of 33.9 ft of predominately coal cuttings in 4 canisters (Table 2a). The cuttings sample intervals were selected based on an abundance of coal chips in cuttings: composite samples were collected from the following intervals: 1,686.2 to 1,696.0 ft; 2,039.0 to 2,042.0 ft (non-core); 2,244.2 to 2,247.2 ft; and 2,673.0 to 2,689.0 ft. All samples were from the Wilcox Group (Paleocene-Eocene; fig. 2).

Cored intervals: The following intervals were cored during the drilling operation: core 1: 1,671 to 1,701 ft; core 2: 2,240 to 2,256 ft; and core 3: 2,673 to 2,689 ft. All core was from the Wilcox Group (Paleocene-Eocene, fig. 2) (Table 2a).

Total coal core recovered: A total of 25.9 ft of coal were recovered from three cored intervals: core 1 contained 8 ft of coal; core 2 contained 4 ft (includes 1 ft of carbonaceous shale); and core 3 contained 13.9 ft. The USGS desorbed a total of 7 ft of coal core in 5 canisters (Table 2a).

Moisture contents of coal: The moisture content of the coal samples ranges from 15.21% to 21.19% on an equilibrium moisture (EM) basis. Equilibrium moisture values are used because as-received values may be influenced by the water added to the canisters to eliminate headspace and to prevent coal oxidation. (See a discussion of desorption methods in the coal gas desorption section of this report.) The cuttings samples did not have equilibrium moisture values determined in the laboratory (Table 2a). For these samples, equilibrium moisture values were estimated using an ash function relationship as illustrated on figure 3. Appendix 2 contains all values obtained from proximate and ultimate analyses of the coal and cuttings samples. Trace and minor element data are also contained in Appendix 2.

Ash yields of coal: Ash yield of the coal samples ranges from 5.77% to 41.81% on an equilibrium moisture basis (Table 2a). Equilibrium moisture values are used because as-received values may be influenced by water added to the canisters. Appendix 2 contains all values obtained from proximate and ultimate analyses of the coal and cuttings samples.

Estimated coal rank: Estimated ranks using the Parr Formula (ASTM, 2004; standard D 388) for the coal samples range from subbituminous B to subbituminous A (Table 2a).

Gas contents of coal: As determined by canister desorption (see Barker and others, 2002), gas content of the coal core ranges from 31.39 standard cubic ft/ton (SCF/ton) to 166.16 SCF/ton on a raw coal (as analyzed) basis, or 73.04 SCF/ton to 233.43 SCF/ton on a dry, ash-free basis. Gas content for the coal cuttings ranges from 18.23 SCF/ton to 59.06 SCF/ton on a raw coal basis, or 40.67 SCF/ton to 121.57 SCF/ton on a dry, ash-free basis (Table 2a). Because of rapid desorption and presumably high lost-gas values, the coal cuttings gas content values on a dry ash-free basis are increased by 25% in an effort to better estimate the true gas content of the original coal (Mavor and Nelson, 1997; Nelson, 1998; Barker and others, 2002). A plot of the gas content values of the coal cuttings and coal core is shown on figure 4. Gas content values obtained from coal cuttings do not match the values obtained from the coal core that was obtained from similar depths. Mavor and Nelson (1997) and Nelson (1998) attribute decreased cuttings gas content to a reduction in the average gas diffusion distance within cuttings particles and a general mixing with rock cuttings extraneous to the reservoir. The rank and gas content of the coal samples increases with depth. A complete set of desorption data sheets are contained in Appendix 3. (Note that field depths and thicknesses are used in Appendix 3.)

Adsorption isotherm data: Multiple adsorption isotherm analyses were run on both individual and composite coal samples from the Devon SFS Operating Co Etal 5 no. 1 (SFS 5-1) well. A list of samples selected from each well is contained in Appendix 4. Figure 5 shows plots of sorption isotherm data and measured gas desorption data from two samples from the SFS 5-1 well. The shallow coal

sample (4-LA-1, depth 1,685.2-1,686.2 ft) is under-saturated with respect to methane, whereas the deep sample (4-LA-2, depth 2,679-2,680 ft) is above the predicted saturation with respect to methane. The complete data set for all sorption isotherms are contained in Appendix 4.

Gas molecular and isotopic data: No coal gas samples were collected from the SFS 5-1 well.

Devon SFS Operating Co Etal 9 no.1

Cuttings and non-core coal sample intervals: In order to compare desorption results from coal cuttings and coal core, the USGS desorbed a total of 9.2 ft of predominantly coal cuttings in 5 canisters (Table 2b). The sample intervals were selected based on an abundance of coal chips in the cuttings. The sample intervals (corrected depths) are from 2,053 to 2,055 ft (non-core); 2,688 to 2,689 ft, 2,689 to 2,690 ft, and 2 composite samples were collected from 2,692.3 to 2,697.5 ft depths. All samples were from the Wilcox Group (Paleocene-Eocene, fig. 2).

Cored intervals: The following intervals (corrected depths) were cored during the drilling operation: core 1: 1,646.6 to 1,676.6 ft; core 2: 2,214.3 to 2,231 ft; core 3: 2,256 to 2,284 ft (base depth of core 3 is not certain); and core 4: 2,682.6 to 2,698.5 ft depths. A total of 90.6 ft of core was recovered. All cores were from the Wilcox Group (Paleocene-Eocene, fig. 2) (Table 2b).

Total coal core recovered: A total of 24.8 ft of coal was recovered from the four cored intervals: core 1 (30 ft) contained 2.4 ft of coal; core 2 (16.7 ft) contained 6.2 ft; core 3 (28 ft) contained 6.5 ft (includes 0.5 ft carbonaceous shale); and core 4 (15.9 ft) contained 9.7 ft (includes 1 ft carbonaceous shale). The USGS desorbed a total of 6.3 ft of coal core and 4.9 ft of composite coal core in 11 canisters (Table 2b).

Moisture contents of coal: The equilibrium moisture (EM) content of the coal samples (Table 2b) ranges from 19.94% to 28.83%. For the carbonaceous shale core samples, moisture ranges from 9.96% to 18.54% (EM). Equilibrium moisture

values are used because as-received values may be influenced by the water added to the canisters. (See a discussion of desorption methods in the coal gas desorption section of this report.) The cuttings samples did not have equilibrium moisture values determined in the laboratory (Table 2b). For these samples, equilibrium moisture values were estimated using an ash function relationship as illustrated on figure 3. Appendix 2 contains all values obtained from proximate and ultimate analyses of the coal and cuttings samples, along with trace, and minor element data.

Ash yields of coal: Ash yield (EM Ash %) of the coal samples ranges from 8.47% to 44.7% (EM), and for the carbonaceous shale samples ash yield ranges from 49.17% (technically coal) to 75.27% (EM) (Table 2b). Equilibrium moisture values are used because as-received values may be influenced by water used in the canister. Appendix 2 contains all values obtained from proximate and ultimate analyses of the coal and cuttings samples.

Estimated coal rank: Estimated ranks using the Parr Formula (ASTM, 2004, standard D 388) for the coal samples range from subbituminous C to subituminous A (Table 2b).

Gas contents of coal: As determined by canister desorption (see Barker and others, 2002), gas content of the coal core ranges from 32.39 standard cubic ft/ton (SCF/ton) to 127.83 SCF/ton on a raw coal basis, or 83.38 SCF/ton to 183.83 SCF/ton on a dry, ash-free basis. Gas content for the carbonaceous shale core samples ranges from 11.87 SCF/ton to 51.31 SCF/ton on a raw coal basis, or 38.41 SCF/ton to 293.17 SCF/ton on a dry, ash-free basis. Gas content for the coal cuttings ranges from 21.34 SCF/ton to 31.97 SCF/ton on a raw coal basis, or 40.24 SCF/ton to 71.67 SCF/ton on a dry, ash-free basis. Because of rapid desorption and presumably high lost gas values, the coal cuttings gas content values on a dry ash-free basis are increased by 25% in an effort to better estimate the true gas content of the original coal (Barker and others, 2002). A plot of the gas content values of the coal cuttings and coal core is shown on figure 4. Note that coal cuttings gas content values do not match the values obtained from the coal core canisters. The rank and gas content of the coal samples increases with

depth. A complete set of desorption data sheets are contained in Appendix 3. (Note that field depths and thicknesses are used in Appendix 3.)

Adsorption isotherm data: Multiple adsorption isotherm analyses were run on both individual and composite coal samples from the Devon SFS Operating Co Etal 9 no. 1 (SFS 9-1) well. A list of samples selected from each well is contained in Appendix 4. Figure 5 shows plots of sorption isotherm data and measured gas desorption data from one sample from a middle Wilcox coal bed from the SFS 9-1 well. The coal sample (4-LA-8) is under-saturated with respect to methane. The complete data set for all sorption isotherms is contained in Appendix 4.

Gas molecular and isotopic data: Five coal gas samples were collected from the manometer during the desorption of coal core and cuttings samples from the SFS 9-1 well in Caldwell Parish, LA. The results of molecular and isotopic analyses are listed on Table 3. Because\of air contamination in the manometer, the molecular data have been corrected to an oxygen-free (O-free) basis. Methane (C_1) content for the coal core samples ranges from 90.93 to 97.11%, O-free basis. The methane content of the cuttings gas sample (62.83% O-free) is lower than that of the coal core samples and is probably due to strong air contamination of the cuttings sample (9.73% O, raw basis). Coal gas isotopic data indicates $\delta^{13}C_1$ values range from -62.66‰ to -60.73‰ relative to the Pee Dee Belemnite (PDB), and δDC_1 values range from -196‰ to -193‰ relative to Standard Mean Ocean Water (SMOW). Using the Whiticar and others (1986) $\delta^{13}C_1$-δDC_1 diagram to interpret the origin of natural gases, the coal gases from the SFS 9-1 coal samples were determined to be derived from bacterial reduction of CO_2 (fig. 6).

Petrography

Methods

Coal and carbonaceous shale samples from two test wells in northern Louisiana (Devon SFS Operating Co Etal 5 no. 1, and Devon SFS Operating Co Etal 9 no. 1; fig. 1) were ground to pass -16 mesh, cast in epoxy, and polished following the procedures

outlined in Pontolillo and Stanton (1994). Two sample mounts were made from each sample. Measurement of maximum huminite reflectance in immersion oil (R_{max}) was performed according to the ASTM D2798 protocol (ASTM, 2002). Results of reflectance measurements are found in Appendix 5.

The samples also were examined in blue-light fluorescence by a modification of ASTM D2799 (ASTM, 2002). Identifications of liptinite or non-fluorescing organic/mineral matter were made at 500 points on each sample mount. Identifications of huminite and inertinite macerals were made at 500 points on each mount under oil immersion in white light. Identification of coal macerals follows the maceral nomenclature proposed by the International Committee for Coal and Organic Petrology (ICCP System 1994) (ICCP, 2001; Sýkorová and others, 2005). Volume percent mineral matter was calculated from the Parr formula (ASTM, 2004, standard D388). Results of petrographic analyses are found in Appendix 5.

Petrographic Analyses

Coal sample macerals (Appendix 5, Tables 2a and 2b) are dominated by huminite (avg. 71 vol.%; range 49-96 vol.%, mineral-free basis), followed by inertinite (avg. 20 vol.%; range 1-40 vol.%), and liptinite (avg. 9 vol.%; range 3-19 vol.%). Mineral content as determined by the Parr formula averages 26 vol. % (range 4-82 vol.%). Most samples contain approximately equal proportions of telohuminite and detrohuminite; however, some samples are dominated by one huminite type over another (e.g., 4-LA-1). Inertinite content typically is dominated by semifusinite or inertodetrinite, followed by approximately equal amounts of fusinite and macrinite. Funginite, macrinite, and secretinite (sensu fusinitized corpohuminite) are present in amounts of <1 vol.%. Liptinite group macerals typically are dominated by liptodetrinite (avg. 5 vol.%), followed by sporinite (avg. 1.5 vol.%). Structured liptinite macerals cutinite and suberinite are rare or absent. A summary of the volume percent of the major maceral groups and mineral matter for each well is illustrated on figure 7.

Huminite Reflectance

The maximum reflectance of huminite (telohuminite) ranges from 0.28-0.47%. Measured values of reflectance increase with depth. Measured values are limited to a maximum of 0.40% at the bottom of SFS 9-1 and are slightly higher in SFS 5-1 (maximum values 0.42-0.47%). Coal rank as determined by reflectance is lignite-subbituminous B.

Low Temperature Ashing and X-ray Analysis

Eighteen representative samples from the two test wells in northern Louisiana (Devon SFS Operating Co Etal 5 no. 1, and Devon SFS Operating Co Etal 9 no. 1; fig. 1; Table 4) were ground to -200 mesh (75 µm) in a rotary mill, oven-dried overnight, and ashed in a LTA-504 asher at 100°C. The samples were weighed daily on a five-decimal-place balance until no more weight loss could be determined. Table 4 lists the low-temperature ashing results. The samples were then cast into pressed pellets and analyzed on a Scintag X1 automated powder diffractometer. The mineralogical quantification program used to determine mineralogy is a modified version from Hosterman and Dulong (1989). The kaolinite/chlorite ratio (K/K+C) was calculated from the quantification program's determination of the integrated intensities for the 002 and 004 kaolinite and chlorite peaks. The peak width at half maximum (PW) in degrees two-theta of the 001 illite peak was determined using the raw intensity (CPS) data. Table 5 contains a summary for each sample describing the semi-quantitative mineralogy. Samples LA-SWC-00-3 (RBF15614) and 3-LA-8 (RFB15617) contain a rectorite (illite/smectite). The factor used in the quantification of rectorite was not experimentally determined and therefore the entire quantification of those samples are a "best guess". Table 6 contains a narrative for each sample describing the semi-quantitative mineralogy.

Palynology

Nine samples from multiple coal zones in the Wilcox Group were selected from both wells (Devon SFS Operating Co Etal 5 no. 1, and Devon SFS Operating Co Etal 9 no. 1; fig. 1) for palynological analysis (Table 7). All samples analyzed are coal. The drill holes are located 1.8 miles apart (fig. 1), and given their close proximity, the different results from each are somewhat surprising.

The sampled interval in the SFS 5-1 well ranges from 1679.2 to 2679.5 feet in depth; the sampled interval in the SFS 9-1 well ranges from 1651.6 to 2693.3 feet in depth. The age of the sampled intervals in both wells is Paleocene, and the palynofloral assemblages in each are closely similar, comprising common Wilcox species. Species having more specific biostratigraphic significance, for example species indicative of late Paleocene age, are present in samples from the SFS 9-1 well that were not recorded in samples from SFS 5-1. For this reason, close correlation of the two intervals is not fully supported on the basis of palynostratigraphy. Slightly differing assemblages in the two wells could be due to slight differences in the floras of the ancient mires, although such differences are subtle, involving only a few species. Detailed biostratigraphic age determinations are based on comparisons with palynomorph species ranges in the Rocky Mountain region. Table 8 contains a species lists and photomicrograph reference number for Plates 1 and 2 of common Wilcox palynomorphs. Tables 9 and 10 illustrate the pollen distribution versus depth for the two wells.

Coal Gas Desorption Analyses

The coal and carbonaceous shale core and cuttings samples collected from the two test wells in northern Louisiana (Devon SFS Operating Co Etal 5 no. 1, and Devon SFS Operating Co Etal 9 no. 1; fig. 1; Tables 1 and 2) were placed in canisters and desorbed gas was measured and lost gas was estimated following the procedures outlined in Barker and others (2002). The target desorption water bath temperatures used for the canisters were determined by Devon to be an estimate of reservoir temperature and were based on

down-hole temperature data obtained from nearby well logs. Samples from the upper and middle Wilcox coal-bearing intervals were desorbed at 100° to 110°F, and samples from the lower Wilcox coal-bearing interval were desorbed at 120°F (Tables 2a and 2b). The desorption results, lost gas estimates, and estimated total gas content for each sample are contained in Appendix 3. The analytical results are also summarized on Table 2 and in the Summary of Results section above. Residual gas was not measured for the samples in this study and therefore the estimates of total gas content should be considered a minimum value. Nelson and others (2000) report that residual gas in subbituminous coal from the Powder River basin in Wyoming is as much as 6 percent of the total gas content of the coal. The coal and carbonaceous shale samples analyzed in this study were allowed to fully desorb in the canisters; therefore the residual gas content should be very low. Residual gas probably only accounts for 2 to 3 percent of the total gas content and most likely will not be producible.

Coal Physical and Chemical Analyses

After the gas desorption process was complete, the coal and carbonaceous shale core and cuttings samples were removed from the canisters, described in the laboratory, and split and packaged for further analyses. Photographs and lithologic descriptions of the desorbed samples are contained in Appendix 1. Solid core samples were split in half using a rock trim saw. One of the half splits of each core sample was packaged in air-tight plastic bags and sent to contract laboratories for proximate, ultimate and other physical and chemical analyses. The results of these analyses are found in Appendix 2. The remaining core sample half was split again into halves (quarters of the original core). One half (or quarter of the original core) of the remaining split was placed in archive storage at the USGS laboratories in Reston, VA; the other half (quarter of the original core) was used for individual or composite samples that were submitted for sorption isotherm analyses. Tables 1a and 1b of Appendix 4 list the individual samples and sample intervals that were used to form the composite samples for sorption isotherm analyses.

Methane and Carbon Dioxide Adsorption Isotherms

High-pressure methane adsorption analysis was carried out on three individual core samples and seven composite samples collected from two test wells in northern Louisiana (Devon SFS Operating Co Etal 5 no. 1, and Devon SFS Operating Co Etal 9 no. 1; fig. 1; Appendix 4 Table 1). High-pressure carbon dioxide adsorption analysis was carried out on the three individual core samples from both wells and the composite samples from the Devon SFS Operating Co Etal 5 no. 1 well (Appendix 4 Table 1). The composite samples of the upper, middle, and lower coal zones were compiled by adding 10 g of sample for every 0.1 ft of coal or carbonaceous shale core. For example, if a sample interval was 1 ft thick, then the contribution to the composite sample was 100 g; if a sample interval was 0.3 ft thick, then the contribution to the composite was 30 g. All composite samples consisted of representative splits derived by the quartering method. Samples desorbed by both USGS/LGS and Ticora were used to form the composite samples. The analytical methods to determine the adsorption isotherms are summarized below and the analytical results are contained in Appendix 4. Adsorption isotherm temperatures for the various samples were determined by comparing the sample depth interval to down-hole temperature log data from the two wells (fig. 8). The sorption isotherm temperature for upper Wilcox coal samples was 97°F; middle Wilcox coal samples was 108°F; and lower Wilcox coal samples was 118°F.

Methods

The samples were received at the RMB Earth Science Consultants laboratory wet and in a mud-like or slurry state. Because of the susceptibility of the samples to over drying and oxidation, they were carefully dried in an inert atmosphere and then placed in an equilibrium bath. If low-rank coals are dried it is virtually impossible to return them to equilibrium moisture and, at less than equilibrium moisture, the capacity of the coals is much higher. On the other hand, excess moisture does not adversely affect sorption apart

from the moisture diluting the samples. Hence the samples were, if anything, left 'wetter' than equilibrium moisture. If the in-situ moisture content of the coals were known, the results from this study could be adjusted by considering the moisture in excess of equilibrium moisture as a diluent.

The sorption analyses were carried out following the general procedures outlined below.

Obtaining and interpreting isotherm data and Langmuir Isotherms

These high-pressure methane, carbon dioxide or mixed gas adsorption analyses were performed using a high-pressure volumetric adsorption technique. The isotherms were measured on a custom-made apparatus based on Boyles Law. A known volume of gas within a reference cell is used to dose a sample cell containing the sample. The amount of gas adsorbed, using the real gas law, in the sample cell is then determined based on change in pressure in the sample cell. Normally 100 g of sample is utilized in such analyses although a full 3.5 inch core, up to 12 inches in length, can be used. Tests show that reproducible results can be obtained on samples as small as 5 g but the larger samples yield better quality data. Each sample has multiple adsorption analyses using a constant temperature (usually reservoir temperature) and increasing pressures to simulate overburden pressures related to depth of burial.

The pressures in the reference and sample cells are measured using pressure transducers that are interfaced to a computer equipped with specialized boards and software for this purpose. The computer monitors the transducers, determines when equilibrium is reached, and controls valves and switches for dosing and purging the reference and sample cells. Following dosing of the sample cell with a known volume of gas (CH_4 or CO_2, depending on the test), the pressure in the sample cell is monitored. As gas is adsorbed by the sample the pressure drops until equilibrium is reached; that is no more gas can be adsorbed by the samples at that particular specified pressure. Critical to obtaining quality isotherms is deciding when the equilibrium is reached. In the current

instrumentation, test equilibrium is reached only when the pressure in the cell does not change over a designated period of time. When equilibrium is reached, the sample is dosed at a higher pressure. Normally, nine to 12 separate pressure points are collected so that the best Langmuir regression can be obtained. Data points can also be collected at pre-determined pressures if needed. The temperature of the references and sample cells is maintained at the exact temperature requested by the client. The temperature is maintained within a tolerance less than 1/10 of one degree centigrade.

For a routine adsorption analysis about five to seven days are required once equilibrium moisture has been determined.

For calculation of the head space (space not occupied by sample in the bombs) and helium density, 12 separate helium expansions are automatically performed and averaged. The compressibilites of the various gases required for volumetric calculations at each pressure and temperature are obtained using the Peng-Robinson equation of state (Peng and Robison, 1976) utilizing the SUPERTRAPP program (Huber, 2003).

Quality assurance of the isotherms: potential sources of error and recognition of problems

With the apparatus that is used, the only potential error is a change in the characteristics of the pressure transducers, a leak in the system, or non-isothermal conditions.

Pressure transducers were selected for optimum performance within the range of pressures that isotherms are collected. The transducers are not only factory guaranteed, but are also cross-calibrated periodically to test for drift. The accuracy of the transducers used is better than 0.001 MPa.

Prior to running the experiment, the reference and sample cells and plumbing are pressure tested for leaks using helium. Leak tests are performed at 9 MPa. Because the He molecule is smaller than either methane or carbon dioxide (the gases normally used for adsorption work), He assures a leak free system. If a leak were to develop during analyses (one never has) it would be readily apparent because the cells would never come

to equilibrium at a given pressure (the leak would appear as an infinitely adsorbing material).

Non-isothermal conditions are not a potential problem with the instrument used, unless a prolonged power failure occurs. The bath temperature is maintained by a submerged electric heater and a circulating pump. The heater is controlled by a temperature controller to a tolerance less than 1/10 of a degree centigrade.

Standard samples periodically are run in the apparatus to confirm system performance.

The Langmuir model

The classic theory used to describe the Type I isotherm for microporous materials with small external surface area is based on the Langmuir (1916) equation. The Type I isotherm displays a steep increase in adsorption at low relative pressures due to enhanced adsorption caused by the overlapping adsorption potentials between walls of pores whose diameters are commensurate in size with the adsorbate molecule. The Type I isotherm then flattens out into a plateau region at higher relative pressure, which is believed to be due to the completion of a monolayer of adsorbed gas. The micropore volume is then thought to be filled by only a few molecular layers of adsorbate, and further uptake is limited by the dimensions of the micropores.

The Langmuir model assumes that a state of dynamic equilibrium is established between the adsorbate vapor and the adsorbent surface and that adsorption is restricted to a single monolayer (Gregg and Sing, 1982). The adsorbent surface is thought to be composed of a regular array of energetically homogeneous adsorption sites upon which an adsorbed monolayer is assumed to form. The rate of condensation is assumed to be equal to the rate of evaporation from the adsorbed monolayer at a given relative pressure and constant temperature. The Langmuir equation was developed with these assumptions and takes the following form:

$$\frac{p}{V} = \frac{1}{BV_m} + \frac{P}{V_m}$$

where P is the equilibrium pressure, V is the volume of gas adsorbed at equilibrium, V_m is the volume of adsorbate occupying a monolayer, and B is an empirical constant. A plot of P/V versus relative pressure should yield a straight line whose slope will yield V_m from which the surface area may be obtained. As shown on the figures in Appendix 4, a best fit Langmuir isotherm and the data points have been plotted for each sample.

The Langmuir Isotherm can be written:

$$V(P) = \frac{V_L P}{P_L + P}$$

P = gas pressure
V(P) = predicated amount of gas adsorbed at P
V_L = Langmuir volume parameter
P_L = Langmuir pressure parameter

The difference between the measured amount of gas adsorbed (V(P)) and that predicted using the Langmuir Equation (Vi(P)) is a measure of error and is given as:

$$\text{Err(P)} = \text{Vi(P)} - \text{V(P)}$$

This error may be positive or negative. The square of the error is always positive and is a measure of the how well the calculated isotherm matches the data. This error can be calculated for each point and summed giving a measure of the overall error:

$$SSE = \sum_{i=1}^{N} Er\,r_i^2$$

N= number of measured points.

The goodness of fit of the isotherm can be expressed by calculation of the correlation coefficient between the measured points and the calculated points. Results generally yield correlations that are better than $r^2 = 0.99$ and standard errors of Langmuir volumes of 2%. The errors for the Louisiana samples can be found on the bottom of the data sheets that are included for each sample in Appendix 4.

In examining the data, note that adsorption values are provided for the raw data and corrected for ash yield. The ash yield will also be corrected for equilibrium moisture content.

Results

The results of the high-pressure methane analysis of the samples are summarized in Appendix 4 in Imperial and SI units. Note that STP in SI units is at 0°C whereas in Imperial units (standard oil industry convention) STP is at a temperature of 60° F. Detailed plots of the isotherm results are provided in Appendix 4.

Down-hole Temperature Data

Temperature surveys were run on both wells (Devon SFS Operating Co Etal 5 no. 1, and Devon SFS Operating Co Etal 9 no. 1; fig. 8) and the data were used to estimate the reservoir temperatures for adsorption isotherm analyses (Appendix 4). The temperature data were obtained by shutting-in the well at various depths and allowing the down-hole temperature to equilibrate with down-hole ambient conditions. The data shows a gradient of around 2 degrees/100 ft through the Wilcox interval. Both wells are about the same temperature near the top of the Wilcox (~1,700 ft), but the Devon SFS 5-1 well is slightly hotter than the Devon SFS 9-1 (about 2 degrees) at a depth of 2,700 ft. The elevated down-hole temperatures for the Devon SFS 5-1 well may be related to the well's proximity to the Chester salt dome (fig. 1) and possible increased geothermal heat flow through the salt.

Geophysical logs

Scanned copies of the geophysical logs for both wells (Devon SFS Operating Co Etal 5 no. 1, and Devon SFS Operating Co Etal 9 no. 1) are contained in Appendices 6 and 7.

Raw Digital Data

Copies of all digital data files used in this report are contained in Appendix 7.

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Table 1. Summary of location and other data for the two wells described in this report. Information obtained from Louisiana Department of Natural Resources Strategic Online Natural Resources Information System (SONIRS) website: http://sonris-www.dnr.state.la.us/www_root /sonris_portal_1.htm and from well log header information. Longitude and latitude data for Devon SFS Operating Co ETAL 9 no. 1 are from a global positioning system hand-held unit.

Well name	DEVON SFS OPERATING CO ETAL no. 5	DEVON SFS OPERATING CO ETAL no. 9
Well number	001	001
API number	17021214070000	17021214090000
Louisiana serial number	226630	226687
Operator	Devon SFS Operating, Inc.	Devon SFS Operating, Inc.
Latitude	32° 08' 37.088" N	32° 07' 07.6" N
Longitude	92° 16' 50.644" W	92° 16' 08.2" W
Township	13N	13N
Range	2E	2E
Section	5	9
Description	669 ft from north line and 903 ft from east line of section 5	760 ft from south line and 2,825 ft from west line of section 9
Parish	Caldwell	Caldwell
State	Louisiana	Louisiana
Ground elevation	214.2 ft	204.5 ft
Kelly bushing elevation	221.7 ft	212 ft
Total depth	2,844 ft	2,878 ft
Spud date	12/17/2001	12/26/2001

Table 2a. Devon SFS Operating Co Etal 5 no. 1 sample intervals and summary results.

Sample number	Sample type	Core run	Field depth From (ft)	Field depth To (ft)	Corrected depth From (ft)	Corrected depth To (ft)	Field Thickness (ft)	Corrected Thickness (ft)	Sample descriptions (field depths in ft)	Raw total gas (SCF/ton)	Total gas (SCF/ton, DAF)	Desorption temperature (F°)	EM (%)	EM Ash (%)	EM Sulfur (%)	EM Btu	MMmF Btu#	Estimated Rank
			1665.0		**1671.0**				**Top of core #1**									
			1665.0	1679.2	1671.0	1685.2	14.2	14.2	Rock									
	Cuttings	1	1679.2	1680.2	1685.2	1686.2	1.0	1.0	Coal core cuttings, not desorbed									
LA-SWC-01-3	Cuttings	1	1681.0	1692.0	1686.2	1696.0	11.0	9.8	Coal core cuttings, composite 1686.2'-1696'	26.39	57.18*	100-110	**20.21+**	22.10	3.06	7622	10032	subB
4-LA-1		1	1679.2	1680.2	1685.2	1686.2	1.0	1.0	Coal core, shaley	31.39	73.04	100-110	15.21	41.81	4.30	5434	9946	subB
	Not sampled	1	1680.2	1680.6	1686.2	1686.6	0.4	0.4	Coal, not sampled									
TICORA 201-1		1	1680.6	1681.6	1686.6	1687.6	1.0	1.0	Coal core									
TICORA 201-2		1	1681.6	1682.6	1687.6	1688.6	1.0	1.0	Coal core									
TICORA 201-3		1	1682.6	1683.6	1688.6	1689.6	1.0	1.0	Coal core									
	Not sampled	1	1683.6	1685.4	1689.6	1692.4	1.8	2.8	Rock?, not sampled									
TICORA 201-4		1	1685.4	1686.4	1692.4	1693.4	1.0	1.0	Coal core									
USGS 1.1,1.2,1.3		1	1686.4	1687.8	1693.4	1696.0	1.4	2.6	Solid coal core & broken pieces, not desorbed, USGS sample									
			1687.8	1695.0	1696.0	1701.0	7.2	5.0	Rock									
				1695.0		**1701.0**			**Base of core #1**									
3-LA-8	Cuttings	non-core	2033.0	2035.0	2039.0	2042.0	2.0	3.0	Coal cuttings from non-cored interval	18.23	40.67*	100-110	**19.88+**	24.09	0.75	7397	10004	subB
			2236.0		**2240.0**				**Top of core #2**									
			2236.0	2240.2	2240.0	2244.2	4.2	4.2	Rock									
LA-SWC-00-3	Cuttings	2	2240.2	2243.2	2244.2	2247.2	3.0	3.0	Coal core cuttings	59.06	121.57*	110	**20.38+**	18.90	1.20	8194	10306	subB
LA-3-01-73	Core	2	2240.2	2243.2	2244.2	2247.2	3.0	3.0	Coal core, broken pieces, composite 2244.2'-2247.2'	149.09	208.16	110	22.61	5.77	0.88	9771	10427	subB
TICORA 201-5	Core	2	2240.2	2241.2	2244.2	2245.2	1.0	1.0	Coal core									
TICORA 201-6	Core	2	2241.2	2242.2	2245.2	2246.2	1.0	1.0	Coal core									
TICORA 201-7	Core	2	2242.2	2243.2	2246.2	2247.2	1.0	1.0	Coal core									
TICORA 201-8	Core	2	2243.2	2244.2	2247.2	2248.2	1.0	1.0	Clay and carbonaceous shale core									
			2244.2	2252.0	2248.2	2256.0	7.8	7.8	Rock									
				2252.0		**2256.0**			**Base of core #2**									
			2668.0		**2673.0**				**Top of core #3**									
		3	2668.0	2669.6	2673.0	2674.6	1.6	1.6	Rock									
LA-3-01-74	Cuttings	3	2668.0	2684.0	2673.0	2689.0	16.0	16.0	Coal core cuttings	37.08	68.94*	110-120	**21.19+**	11.58	1.22	9140	10456	subB
TICORA 201-9	Core	3	2669.6	2670.6	2674.6	2675.6	1.0	1.0	Coal core									
USGS 2	Core	3	2670.6	2671.4	2675.6	2676.4	0.8	0.8	Coal core, broken pieces, not desorbed, USGS sample									
	Not sampled	3	2671.4	2671.6	2676.4	2676.6	0.2	0.2	Coal, not sampled									
4-LA-6	Core	3	2671.6	2672.6	2676.6	2677.6	1.0	1.0	Coal core	146.12	206.8	110-120	18.57	10.77	0.99	9628	10907	subA
	Not sampled	3	2672.6	2673.0	2677.6	2678.0	0.4	0.4	Coal, not sampled									
TICORA 201-10	Core	3	2673.0	2674.0	2678.0	2679.0	1.0	1.0	Coal core									
4-LA-2	Core	3	2674.0	2675.0	2679.0	2680.0	1.0	1.0	Coal core, blocky, cleated	166.16	233.43	110-120	18.35	10.47	1.14	9742	10998	subA
TICORA 201-11	Core	3	2675.0	2676.0	2680.0	2681.0	1.0	1.0	Coal core									
	Not sampled	3	2676.0	2676.7	2681.0	2681.7	0.7	0.7	Coal, not sampled									
USGS 3	Core	3	2676.7	2677.5	2681.7	2682.5	0.8	0.8	Coal core, broken pieces, not desorbed, USGS sample									
TICORA 201-12	Core	3	2677.5	2678.5	2682.5	2683.5	1.0	1.0	Coal core									
4-LA-4	Core	3	2678.5	2679.5	2683.5	2684.5	1.0	1.0	Coal core	134.79	192.48	110-120	18.5	11.47	1.08	9475	10826	subA
TICORA 201-13	Core	3	2679.5	2680.5	2684.5	2685.5	1.0	1.0	Coal core									
TICORA 201-14	Core	3	2680.5	2681.5	2685.5	2686.5	1.0	1.0	Coal core	**Ave. C. #3**	**210.90**		**18.47**	**10.90**				
TICORA 201-15	Core	3	2681.5	2682.5	2686.5	2687.5	1.0	1.0	Coal core									
TICORA 201-16	Core	3	2682.5	2683.5	2687.5	2688.5	1.0	1.0	Coal core									
		3	2683.5	2684.0	2688.5	2689.0	0.5	0.5	Rock									
				2684.0		**2689.0**			**Base of core #3**									

SCF/ton = standard cubic feet /ton; DAF = dry, ash free; EM = equilibrium moisture; Btu = British thermal units; MMmF = moist, mineral matter free; Ave. C. # = average for core number
Corrected depths and thicknesses based on e-log picks; estimated rank following ASTM (2004, D 388); subB = subbituminous B, subA = subbituminous A; LA = Louisiana
DAF SCF/ton values for cuttings samples were increased by 25 percent to better estimate true gas content. Field depths were based on drillers depths and length of core.
*** +25% cuttings correction** **+estimated using ash and moisture equation (fig. 3)** #Calculated using EM

Table 2b. Devon SFS Operating Co Etal 9 no. 1 sample intervals and summary results

Sample number	Sample type	Core run	Field depth From (ft)	Field depth To (ft)	Corrected depth From (ft)	Corrected depth To (ft)	Field Thickness (ft)	Corrected Thickness (ft)	Samples descriptions	Raw total gas (SCF/ton)	Total gas (SCF/ton, DAF)	Desorption temperature (F°)	EM (%)	EM Ash (%)	EM Sulfur (%)	EM Btu	MMmF Btu#	Estimated Rank
					1646.6				**Top of core #1**									
	Cuttings	1	1648.0	1653.0	1648.0	1653.0	5.0	5.0	Coal core cuttings, not desorbed									
4-LA-3	Core	1	1651.6	1652.0	1651.6	1652.0	0.4	0.4	Coal core	32.61	55.68	110	28.83	12.62	3.50	7705	8916	subC
TICORA 204-1	Core	1	1652.0	1653.0	1652.0	1653.0	1.0	1.0	Coal core									
TICORA 204-2	Core	1	1653.0	1654.0	1653.0	1654.0	1.0	1.0	Coal core									
						1676.6			**Base of core #1**									
	Cuttings	non-core	1694.0	1699.0	1697.0	1699.0	5.0	2.0	Coal cuttings from non-cored interval, not desorbed									
LA-SWC-01-2	Cuttings	non-core	2050.0	2055.0	2053.0	2055.0	5.0	2.0	Coal cuttings, non core interval	29.71	65.81*	110	**20.15***	23.41	0.62	7403	9911	subB
	Cuttings	non-core	2174.0	2178.0	2179.0	2181.0	4.0	2.0	Coal cuttings from non-cored interval, not desorbed									
					2214.3				**Top of core #2**									
4-LA-9	Core	2	2223.0	2224.0	2223.0	2224.0	1.0	1.0	Coal/carb sh core, solid	16.16	63.72	110	16.68	57.95	2.73	2853	7565	carb sh
4-LA-5	Core	2	2224.0	2225.0	2224.0	2225.0	1.0	1.0	Coal core, solid	11.87	38.41	110	19.92	49.17	1.91	3747	7965	carb sh
4-LA-7	Core	2	2224.0	2228.9	2224.0	2228.9	4.9	4.9	Coal core, broken pieces, composite sample	32.39	83.38	110	16.68	44.47	2.97	4744	9129	subC
TICORA 204-6	Core	2	2225.0	2226.0	2225.0	2226.0	1.0	1.0	Coal core									
TICORA 204-5	Core	2	2226.0	2227.0	2226.0	2227.0	1.0	1.0	Coal core									
TICORA 204-4	Core	2	2227.0	2228.0	2227.0	2228.0	1.0	1.0	Coal core									
TICORA 204-3	Core	2	2228.0	2229.0	2228.0	2229.0	1.0	1.0	Coal core									
3-LA-C13	Core	2	2228.9	2229.2	2228.9	2229.2	0.3	0.3	Coal core, broken pieces, composite sample	115.32	165.72	110	21.94	8.47	2.12	9443	10411	subB
						2231.0			**Base of core #2**	**Ave. C#2**	**87.81**							
	Cuttings	non-core	2233.0	2238.0	2233.0	2238.0	5.0	5.0	Coal core cuttings, not desorbed [from above coal?]									
					2256.0				**Top of core #3**									
4-LA-8	Core	3	2265.3	2266.3	2265.3	2266.3	1.0	1.0	Coal and carb sh core, solid	18.42	105.51	110	15.18	67.36	0.21	1801	6596	carb sh
TICORA 204-7	Core	3	2266.3	2267.3	2266.3	2267.3	1.0	1.0	Coal core									
	Not sampled	3	2267.3	2269.6	2267.3	2269.6	2.3	2.3	Not sampled									
4-LA-10	Core	3	2269.6	2270.6	2269.6	2270.6	1.0	1.0	Coal core, broken pieces	49.97	80.04	110	21.22	16.35	2.19	8267	10054	subB
TICORA 204-8	Core	3	2270.6	2271.6	2270.6	2271.6	1.0	1.0	Coal core									
TICORA 204-9	Core	3	2271.6	2272.6	2271.6	2272.6	1.0	1.0	Coal core									
TICORA 204-10	Core	3	2272.6	2273.6	2272.6	2273.6	1.0	1.0	Coal core									
4-LA-11	Core	3	2273.6	2274.1	2273.6	2274.1	0.5	0.5	Carb sh core, solid	13	87.99	110	9.96	75.27	0.73	1411	7506	carb sh
						2284.0?			**Base of core #3, depth uncertain**	**Ave. C#3**	**91.18**							
					2682.6				**Top of core #4**									
3-LA-C10	Cuttings	4	2688.0	2689.0	2688.0	2689.0	1.0	1.0	Coal core cuttings	31.46	62.66*	120	**20.81+**	16.44	0.90	8515	10361	subB
LA-3-01-12	Cuttings	4	2689.0	2690.0	2689.0	2690.0	1.0	1.0	Coal core cuttings	21.34	40.24*	120	**21.31+**	12.39	0.92	8999	10397	subB
3-LA-C12	Cuttings	4	2692.3	2697.5	2692.3	2697.5	5.2	5.2	Coal core cuttings, composite sample 1 of 2	31.97	71.67*	120	**20.00+**	24.23	0.79	7580	10274	subB
3-LA-C14	Cuttings	4	2692.3	2697.5	2692.3	2697.5	5.2	5.2	Coal core cuttings, composite sample 2 of 2	25.97	50.57*	120	**21.02+**	14.80	0.92	8684	10344	subB
	Core	4			2688.0	2688.3	0.0	0.3	Coal? lost									
TICORA 204-17	Core	4	2688.3	2689.3	2688.3	2689.3	1.0	1.0	Coal core									
	Not sampled	4	2689.3	2690.3	2689.3	2690.3	1.0	1.0	Carb sh, not sampled									
TICORA 204-16	Core	4	2690.3	2691.3	2690.3	2691.3	1.0	1.0	Coal core									
TICORA 204-15	Core	4	2691.3	2692.3	2691.3	2692.3	1.0	1.0	Coal core									
4-LA-12	Core	4	2692.3	2693.3	2692.3	2693.3	1.0	1.0	Coal/carb sh core, solid and broken pieces	51.31	293.17	120	18.54	63.96	0.26	1995	6438	carb sh
TICORA 204-14	Core	4	2693.3	2694.3	2693.3	2694.3	1.0	1.0	Coal core									
TICORA 204-13	Core	4	2694.3	2695.3	2694.3	2695.3	1.0	1.0	Coal core									
3-LA-9	Core	4	2695.0	2695.3	2695.0	2695.3	0.3	0.3	Coal core, broken pieces	127.83	183.83	120	19.94	10.52	0.83	9376	10585	subA
TICORA 204-12	Core	4	2695.3	2696.3	2695.3	2696.3	1.0	1.0	Coal core									
TICORA 204-11	Core	4	2696.3	2697.3	2696.3	2697.3	1.0	1.0	Coal core									
LA-3-01-15	Core	4	2697.1	2697.5	2697.1	2697.5	0.4	0.4	Coal core, broken pieces	111.07	176.97	120	20.59	16.65	0.56	8295	10118	subB
						2698.5			**Base of core #4**	**Ave. C#4**	**217.99**							

SCF/ton = standard cubic feet /ton; DAF = dry, ash free; EM = equilibrium moisture; Btu = British thermal units; MMmF = moist, mineral matter free; Ave. C. # = average for core number

Corrected depths and thicknesses based on e-log picks; estimated rank following ASTM (2004, D 388); subC = subbituminous C, subB = subbituminous B, subA = subbituminous A; carb sh = carbonaceous shale (no rank determined); LA = Louisiana

DAF SCF/ton values for cuttings samples were increased by 25 percent to better estimate true gas content Field depths were based on drillers depths and length of core.

*** +25% cuttings correction** **+estimated using ash and moisture equation (fig. 3)** #Calculated using EM

Table 3. Coal gas geochemical data obtained from manometer gas samples collected during desorption of core and cuttings samples from the Devon SFS Operating Co Etal 9 001 (SFS 9-1) well in Caldwell Parish, LA. For more details on the sample intervals please refer to Table 2b. M. = middle; L. = lower.

Raw data

Sample Name	Well	Formation	Top depth (ft)	He %	H_2 %	Ar %	O_2 %	CO_2 %	N_2 %	CO %	C_1 %	C_2 %	C_2H_4 %	C_3 %	*i* C_4 %	*n* C_4 %	*i* C_5 %	*n* C_5 %	C_6+ %	C_2+% %	C_1/C_2+	$\delta^{13}C_1$ ‰	δDC_1 ‰
4-LA-5	SFS 9-1	M. Wilcox coal	2224.0	0.89	0.0042	0.41	8.5	0.78	30.88	0	58.49	0.048	0	0.0016	0	0	0	0	0	0.050	1179	-61.93	-196.0
4-LA-10	SFS 9-1	M. Wilcox coal	2269.6	0.14	2.23	0.44	9	0.47	35.75	0	51.92	0.049	0	0.0017	0	0	0	0	0	0.051	1024	-61.55	-195.3
3-LA-C10	SFS 9-1	L. Wilcox coal	2688.0	2.28	0	0.64	9.73	1.18	52.68	0	33.44	0.047	0	0.0021	0	0	0	0	0	0.049	681	-60.73	-196.2
4-LA-12	SFS 9-1	L. Wilcox coal	2692.3	0.11	2.58	0.16	2.82	0.79	11.2	0	82.26	0.08	0	0.0015	0	0	0	0	0	0.082	1009	-62.19	-193.0
LA-3-01-15	SFS 9-1	L. Wilcox coal	2697.1	0.78	0.018	0.38	7.19	0.83	31.24	0	59.5	0.057	0	0.0011	0	0	0	0	0	0.058	1024	-62.66	-193.2

Oxygen-free (O-free) basis

Sample Name	Well	Formation	Top depth (ft)	He %	H_2 %	Ar %	O_2 %	CO_2 %	N_2 %	CO %	C_1 %	C_2 %	C_2H_4 %	C_3 %	*i* C_4 %	*n* C_4 %	*i* C_5 %	*n* C_5 %	C_6+ %	Total % C_2+%	O-free C_1/C_2+
4-LA-5	SFS 9-1	M. Wilcox coal	2224.0	1.48	0.007	0.05	0.00	1.27	0.00	0	97.11	0.080	0	0.0027	0	0	0	0	0	0.082	1179
4-LA-10	SFS 9-1	M. Wilcox coal	2269.6	0.25	3.931	0.07	0.00	0.80	3.35	0	91.51	0.086	0	0.0030	0	0	0	0	0	0.089	1024
3-LA-C10	SFS 9-1	L. Wilcox coal	2688.0	4.28	0.000	0.39	0.00	2.19	30.22	0	62.83	0.088	0	0.0039	0	0	0	0	0	0.092	681
4-LA-12	SFS 9-1	L. Wilcox coal	2692.3	0.13	2.985	0.04	0.00	0.91	0.69	0	95.16	0.093	0	0.0017	0	0	0	0	0	0.094	1009
LA-3-01-15	SFS 9-1	L. Wilcox coal	2697.1	1.19	0.027	0.09	0.00	1.25	6.41	0	90.93	0.087	0	0.0017	0	0	0	0	0	0.089	1024
			Averages:	1.47	1.390	0.13	0.00	1.28	8.13	0	87.51	0.087	0	0.0026	0	0	0	0	0	0.089	984

Sample Name	Collection date	Collection time* start	Collection time* end	Sample type
4-LA-5	1/5/2002	19:32	21:12	core
4-LA-10	1/6/2002	12:35	13:35	core
3-LA-C10	1/7/2002	13:06	14:58	cuttings
4-LA-12	1/7/2002	16:52	19:11	core
LA-3-01-15	1/7/2002	15:37	15:52	core

*Central Standard Time

Abbreviations: % = percent; He = helium; H_2 = hydrogen; Ar = argon; O_2 = oxygen; CO_2 = carbon dioxide; N_2 = nitrogen; CO = carbon monoxide, C_1 = methane; C_2 = ethane; C_2H_4 = ethylene; C_3 = propane; *i* C_4 = isobutane; *n* C_4 = *n*-butane; *i* C_5 = isopentane; *n* C_5 = *n*-pentane; C_6+ = hexanes; C_2+ = methane + ethane + ethylene + propane + isobutane + *n*-butane + isopentane + *n*-pentane + hexanes; $C_2+ = C_2+ + C_3 + C_4 + C_5 + C_6$; $\delta^{13}C_1$ = carbon isotope of methane; δDC_1 = hydrogen (deuterium) isotope of methane

Table 4. Low temperature ash (LTA) data for several samples from the Devon SFS Operating Co Etal 5 no. 1 (SFS 5-1), and Devon SFS Operating Co Etal 9 no. 1 (SFS 5-1) wells in north-central Louisiana. See Tables 1 and 2 for well location and depth intervals for the samples.

SFS 5-1			SFS 9-1		
Sample number	**Lab number**	**LTA %**	**Sample number**	**Lab number**	**LTA %**
4-LA-1	RBF15612	55.59	4-LA-9	RBF1567	75.22
3-LA-8	RBF15617	34.20	4-LA-5	RBF1563	65.74
LA-SWC-00-3	RBF15614	26.51	4-LA-7	RBF1561	58.01
LA-3-01-73	RBF15613	9.48	4-LA-8	RBF1562	83.78
LA-3-01-74	RBF15615	17.56	4-LA-10	RBF1564	24.50
4-LA-6	RBF15611	15.16	4-LA-11	RBF15610	89.54
4-LA-2	RBF15618	17.04	3-LA-C10	RBF1566	24.20
4-LA-4	RBF15616	17.20	3-LA-C12	RBF1568	44.61
			4-LA-12	RBF1565	82.25
			LA-3-01-15	RBF1569	25.92

Table 5. Sample semi-quantitative mineralogy of low-temperature ash as determined by X-ray analysis. Refer to Tables 1 and 2 for sample depths, well number, and location. Values are percentages.

Spl-ID	QTZ	FLD	CAL	DOL	ANK	SID	ILL	PW	REC	KOL	CHL	K/C	PYR	DIA	GIB	BOE	PY	MRC	SPH	BAS	HEM	APA	ANA	RUT	BAR	ANAL	SUM
4-LA-7	35	T				T	25	0.18		20	T	0.73					T	T	T		T				T	T	80
4-LA-8	50	T				T	20	0.16		15	M	0.67					T				T	T		T	T	<1*	85
4-LA-5	45	T				T	15	0.12		30	T			T	T		T	T	T	T	T	T		T			90
4-LA-10	35	T	T	T	T	T	15	0.13		35				T			M	T	T		T			T	T	T	85
4-LA-12	50	T				T	20	0.12		25			T			T	T			T		T		T			95
3-LA-C10	25	T				T	10	0.15		50	T					T	T		T	M	T			T			85
4-LA-9	35	T				T	20	0.14		30	T						T		T	T	T	T		T			85
3-LA-C12	40	T				T	10	0.16		40	T						T		T	T	T			T			90
LA-3-01-15	20	T				T	M	0.18		65	T		T				T		T	T	T			T			85
4-LA-11	40	T				T	20	0.18		20	15	0.58			T		T			T	T			T			95
4-LA-6	50	T			T	T	T	0.16		35				T		T				M			T	T			85
4-LA-1	35	10		T	T	T	15	0.12		T	20	0.14	T			T	10		T	T	T	T		T			90
LA-3-01-73	20				T	T	M	0.94		45							T	T	T	15			T				80
LA-SWC-00-3	25	15	M		T	T	15	0.14	15	M	T	0.69					T		T	M	T						70
LA-3-01-74	30	T	T		T	T	M	0.13		50	T						T			T		T					80
4-LA-4	M		T	T	T	T	10	0.20		70				T			T			T	R						80
3-LA-8	40	M		T	T	T	20	0.11	M	10	T	0.77					T		T	15	T	T	T	T			85
4-LA-2	20		T		T	T	T	0.20		70				T			T		T								90

Spl-ID = sample number; T= trace amount, < 5; M= minor amount, ≥5<10

QTZ= quartz; FLD= feldspars; CAL= calcite; DOL= dolomite; ANK= ankerite; SID= siderite; ILL= illite; PW= 001 illite peak width at half maximum;

REC= rectorite (I/S); KOL= kaolinite; CHL= chlorite; K/C= kaolinite/chlorite ratio (K/K+C); PYR= pyrophyllite; DIA= diaspore; GIB= gibbsite;

BOE= boehmite; PY= pyrite; MRC= marcasite; SPH= spalerite; BAS= bassantie; HEM= hematite; APA= apatite; ANA= anatase; RUT= rutile;

BAR= barite; ANAL= analcime; and SUM= row sum

Table 6. Sample narratives describing semi-quantitative mineralogy as determined by X-ray analysis. Refer to Tables 1 and 2 for sample depths, well number, and location. Table 5 shows estimated mineral percentages.

4-LA-7 (RBF1561)

Mostly quartz followed by subequal amounts of illite and kaolinite with minor amounts of pyrite and chlorite and trace amounts of feldspars, marcasite, hematite, sphalerite, barite, analcime and siderite (Mn). The 001 chlorite peak protrudes above considerably elevated low-angle background. The 001 illite peak is very sharp.

4-LA-8 (RBF1562)

Dominated (>50 percent) by quartz followed distantly by kaolinite and illite with trace amounts of feldspars, siderite, chlorite, hematite, rutile, pyrite, barite, analcime apatite and siderite (Mn). The 001 illite peak is very sharp.

4-LA-5 (RBF1563)

Mostly quartz followed by kaolinite and illite with trace amounts of feldspars, siderite, pyrite, chlorite, sphalerite, apatite, diaspore, siderite (Mn), marcasite, gibbsite, bassanite and rutile. The 001 chlorite peak protrudes above considerably elevated low-angle background. However the program did not separate the 002 and 004 kaolinite and chlorite peaks. The 001 illite peak is very sharp.

4-LA-10 (RBF1564)

Nearly subequal amounts of quartz and kaolinite followed by half as much illite, a minor amount of pyrite and trace amounts of feldspar, calcite, marcasite and siderite (Mn), diaspore, analcime, dolomite, ankerite, hematite, sphalerite, barite and rutile. The 001 chlorite peak protrudes above considerably elevated low-angle background. However the program did not separate the 002 and 004 kaolinite and chlorite peaks. The 001 illite peak is very sharp.

4-LA-12 (RBF1565)

Dominated (>50 percent) by quartz followed by half as much kaolinite, then illite with trace amounts of feldspars, bassanite, pyrite, pyrophyllite, siderite, boehmite, siderite (Mn), apatite and rutile. The 001 illite peak is very sharp.

3-LA-C10 (RBF1566)

Mostly kaolinite followed by quartz and illite with trace amounts of feldspars, pyrite, chlorite, bassanite, rutile, siderite (Mn), sphalerite, hematite and boehmite. The 001 chlorite peak protrudes above considerably elevated low-angle background. However the program did not separate the 002 and 004 kaolinite and chlorite peaks. The 001 illite peak is very sharp. Behind the 001 illite peak and in front of the 001 chlorite peak there is an indication of a poorly crystalline mixed-layer and/or smectite phase. The prism peaks of kaolinite are present and indicate a fairly well crystallized kaolin phase.

4-LA-9 (RBF1567)

Subequal amounts of quartz and kaolinite followed by illite with trace amounts of feldspars, pyrite, chlorite, hematite, sphalerite, apatite, rutile, siderite, siderite (Mn) and bassanite. The 001 chlorite peak protrudes above considerably elevated low-angle background. However the program did not separate the 002 and 004 kaolinite and chlorite peaks. The 001 illite peak is very sharp.

3-LA-C12 (RBF1568)

Subequal amounts of quartz and kaolinite followed by illite and trace amounts of feldspars, pyrite, chlorite, bassanite, hematite, siderite (Mn), rutile and sphalerite. The 001 chlorite peak protrudes above considerably elevated low-angle background. However the program did not separate the 002 and 004 kaolinite and chlorite peaks. The 001 illite peak is very sharp. Behind the 001 illite peak and in front of the 001 chlorite peak there is an indication of a poorly crystalline mixed-layer and/or smectite phase. The prism peaks of kaolinite are present and indicate a fairly well crystallized kaolin phase.

LA-3-01-15 (RBF1569)

Dominated (>50 percent) by well crystallized kaolinite followed distantly by quartz and a minor amount of illite with trace amounts of feldspars, pyrite, chlorite, siderite (Mn), bassanite, pyrophyllite, sphalerite, hematite and rutile. The 001 chlorite peak is weakly discernable above the low-angle elevated background. However the program did not separate the 002 and 004

kaolinite and chlorite peaks. The 001 illite peak is very sharp. The prism peaks of kaolinite are present and indicate a well crystallized kaolin phase.

4-LA-11 (RBF15610)

Mostly quartz followed by subequal illite and kaolinite and then chlorite with trace amounts of feldspars, pyrite and gibbsite, bassanite, rutile, siderite (Mn) and hematite. The 001 chlorite peak protrudes above considerably elevated low-angle background. The 001 illite peak is sharp. The kaolinite prism peaks are broad and not sharp.

4-LA-6 (RBF15611)

Nearly dominated by quartz followed by kaolinite and a minor amount of bassanite with trace amounts of feldspars, ankerite, anatase, rutile, diaspore, boehmite and siderite (Mn). The 001 illite peak is small and sharp. The prism peaks of kaolinite are present and indicate a fairly well crystallized kaolin phase.

4-LA-1 (RBF15612)

Mostly quartz followed by chlorite, illite and pyrite with minor amounts of feldspar and a trace amount of bassanite, rutile, pyrphyllite, dolomite, ankerite, siderite, apatite, siderite (Mn), sphalerite, hematite and boehmite. There is considerably more chlorite than kaolinite. The 001 chlorite peak protrudes above considerably elevated low-angle background. The 001 illite peak is very sharp. Behind the 001 illite peak and in front of the 001 chlorite peak there is an indication of a poorly crystalline mixed-layer and/or smectite phase.

LA-3-01-73 (RBF15613)

Mostly kaolinite followed by half as much quartz and a large amount of bassanite with a minor amount of illite and trace amounts of ankerite and siderite (Mn), marcasite, anatase, sphalerite and pyrite. The 001 illite peak is broad and double-peaked (?).

LA-SWC-00-3 (RBF15614)

Mostly quartz followed by subequal amounts of illite, rectorite and feldspars then kaolinite and minor amounts of calcite and bassanite with trace amounts of pyrite, chlorite, siderite (Mn), sphalerite, ankerite and hematite. The 001 illite peak is very sharp.

LA-3-01-74 (RBF15615)

Nearly dominated by kaolinite followed by quartz and a minor amount of illite with trace amounts of feldspars, calcite, ankerite, pyrite, chlorite, apatite, siderite (Mn) and bassanite. The 001 chlorite peak protrudes above considerably elevated low-angle background. The 001 illite peak is very sharp. The prism peaks of kaolinite are present and indicate a fairly well crystallized kaolin phase.

4-LA-4 (RBF15616)

Dominated (>50 percent) by kaolinite followed distantly by illite and a minor amount of quartz with trace amounts of calcite, ankerite, pyrite, siderite (Mn), bassanite, diaspore, dolomite and hematite. The 001 chlorite peak protrudes above considerably elevated low-angle background. The 001 illite peak is sharp. Behind the 001 illite peak and in front of the 001 chlorite peak there is a weak indication of a poorly crystalline mixed-layer and/or smectite phase. The prism peaks of kaolinite are present and indicate a fairly well crystallized kaolin phase.

3-LA-8 (RBF15617)

Mostly quartz followed by illite and kaolinite and minor amounts of rectorite and bassanite with trace amounts of feldspars, ankerite, pyrite, chlorite and sphalerite, and rutile. The 001 chlorite peak protrudes above the broad-based rectorite peak. The 001 illite peak is sharp.

4-LA-2 (RBF15618)

Dominated (>50 percent) by kaolinite followed distantly by quartz with trace amounts of calcite, ankerite, illite and siderite (Mn), diaspore, pyrite, and sphalerite. The 001 chlorite peak protrudes above considerably elevated low-angle background. The 001 illite peak is sharp. The prism peaks of kaolinite are present and indicate a fairly well crystallized kaolin phase.

Table 7. Palynological samples and age determinations.

Devon SFS 5-1 (lat. 32.143611, long. –92.280833)

Samples	Intervals in feet	Age
4-LA-1	1679.2-1680.2	Paleocene, probably early
LA-3-01-73	2240.3-2243.2	do.
4-LA-6	2671.6-2672.6	do.
4-LA-4	2678.5-2679.5	do.

Devon SFS 9-1 (lat. 32.11879, long. –92.26897)

Samples	Intervals in feet	Age
4-LA-3	1651.6-1652.0	Paleocene
4-LA-9	2223.0-2224.0	late Paleocene
4-LA-7	2224.0-2225.0	do.
4-LA-8	2265.3-2266.3	do.
4-LA-12	2692.3-2693.3	Paleocene, probably late

Table 8. Species lists and photomicrograph reference number for Plates 1 and 2 of common Wilcox palynomorphs.

Species list, core SFS 5-1	Photomicrograph number
Arecipites sp.	16
Basopollenites basalis	10
Chenopodipollis multiplex	15
Choanopollenites eximius	13
Cicatricosisporites. sp.	29
Clavatricolpites baculoferus	19
Ephedra voluta	
Faguspollenites sp.	24
Holkopollenites chemardensis	21
Laevigatosporites spp.	
Leiotriletes sp.	28
Microreticulatisporites sp.	
Momipites anellus	
Momipites dilatus	
Momipites inaequalis	
Momipites tenuipolus	6
Momipites triorbicularis	
Momipites triradiatus	7
Momipites sp.	
Nudopollis terminalis	11
Nyssapollenites spp.	22, 23
Psilastephanocolpites sp.	
Rhoipites sp. B of DJN	
Rhoipites sp. C of DJN	
Sernapollenites duratus	26
Stereisporites spp.	30
Taxodiaceaepollenites hiatus	27
Thomsonipollis magnificus	9
Tricolpites sp. A of DJN	
Tricolpites sp. B of DJN	17
Triporopollenites spp.	1, 2, 3, 4
Trudopollenites pertrudens	12

Species list, core SFS 9-1	Photomicrograph number
Aesculiidites circumstriatus	18
Alnipollenites speciipites	5
Aquilapollenites spinulosus	
Arecipites sp.	16
Basopollenites basalis	10
Bombacacidites nacimientoensis	20
Caryapollenites veripites	8
Caryapollenites wodehousei	
Chenopodipollis multiplex	15
Choanopollenites eximius	13
Cicatricosisporites. sp.	29
Clavatricolpites baculoferus	19
Holkopollenites chemardensis	21
Insulapollenites rugulatus	25
Kyandopollenites anneratus	14
Laevigatosporites spp.	
Lanagiopollis lihokus	
Liliacidites sp.	
Momipites actinus	
Momipites anellus	
Momipites tenuipolus	6
Momipites triorbicularis	
Momipites triradiatus	7
Momipites ventifluminis	
Nudopollis terminalis	11
Nyssapollenites spp.	22, 23
Reticuloidospories pseudomurii	
Rhoipites sp. B of DJN	
Rhoipites sp. C of DJN	
Sernapollenites duratus	26
Stereisporites spp.	30
Taxodiaceaepollenites hiatus	27
Thomsonipollis magnificus	9
Tricolpites sp. B of DJN	17
Triporopollenites spp.	1, 2, 3, 4
Trudopollenites pertrudens	12

Table 9. Devon SFS Operating Co Etal 5 no. 1 pollen distribution.

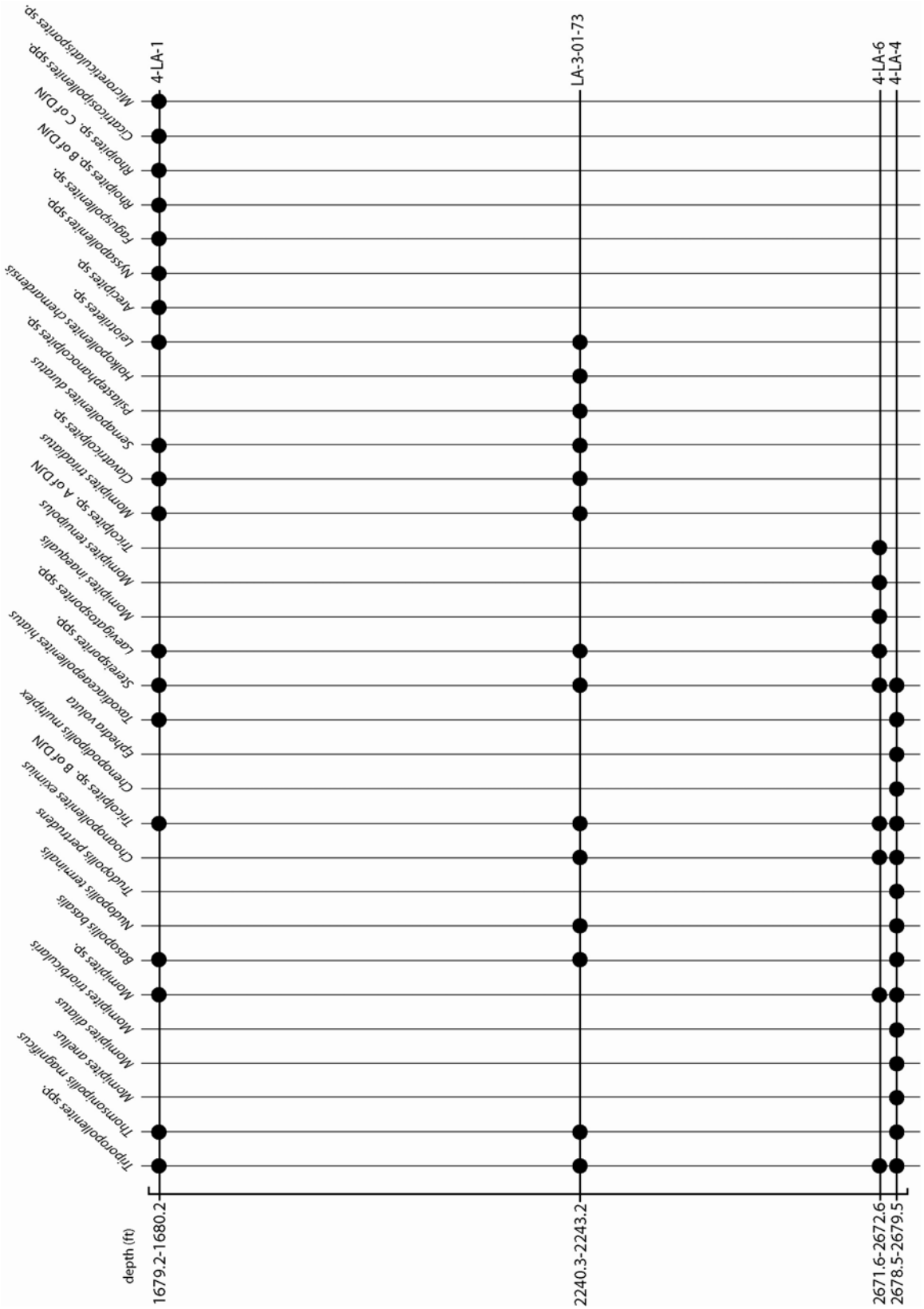


Table 10. Devon SFS Operating Co Etal 9 no. 1 pollen distribution.

depth (ft)	Triporopolenites spp.	Thomsonipollis magnificus	Bombacacidites spp.	Aquilapollenites nacimientoensis	Momipites spinulosus	Momipites acanus	Momipites amelius	Momipites triorbicularis	Basopollis ventifilumenis	Nudopollis bacsalis	Choanopollenites tenuinalis	Insulapollenites exilimus	Arecipites rugulatus	Myssapollenites sp.	Alnipollenites spp.	Chenopodipollis speciplies	Tricolpites multiplex	Stereisporites sp. B of DJN	Laevigatosporites spp.	Caryapollenites spp.	Caryapollenites verrpiles	Momipites wodehouseiei	Holkopollenites tenuipolus	Tiuidopollenites chemardensis	Rhoipollis pertrudens	Rhoipites sp. B of DJN	Rhoipites sp. C of DJN	Taxodiaceapollenites hiatus	Semapollenites duratus	Momipites triradiatus	Aesculiidites circumstriatus	Clavatricolpites circumstriatus	Lanagiopolites sp.	Lilacidites sp.	Granticosipollenites sp.	Reticuloidosporites pseudomuri	Kyandopollenites amerarus
1651.6-1652.0	●																	●								●		●										
2223.0-2228.9	●	●				●				●				●			●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
2265.3-2266.3	●	●						●		●	●						●	●	●	●	●	●	●	●	●	●												
2692.3-2693.3	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

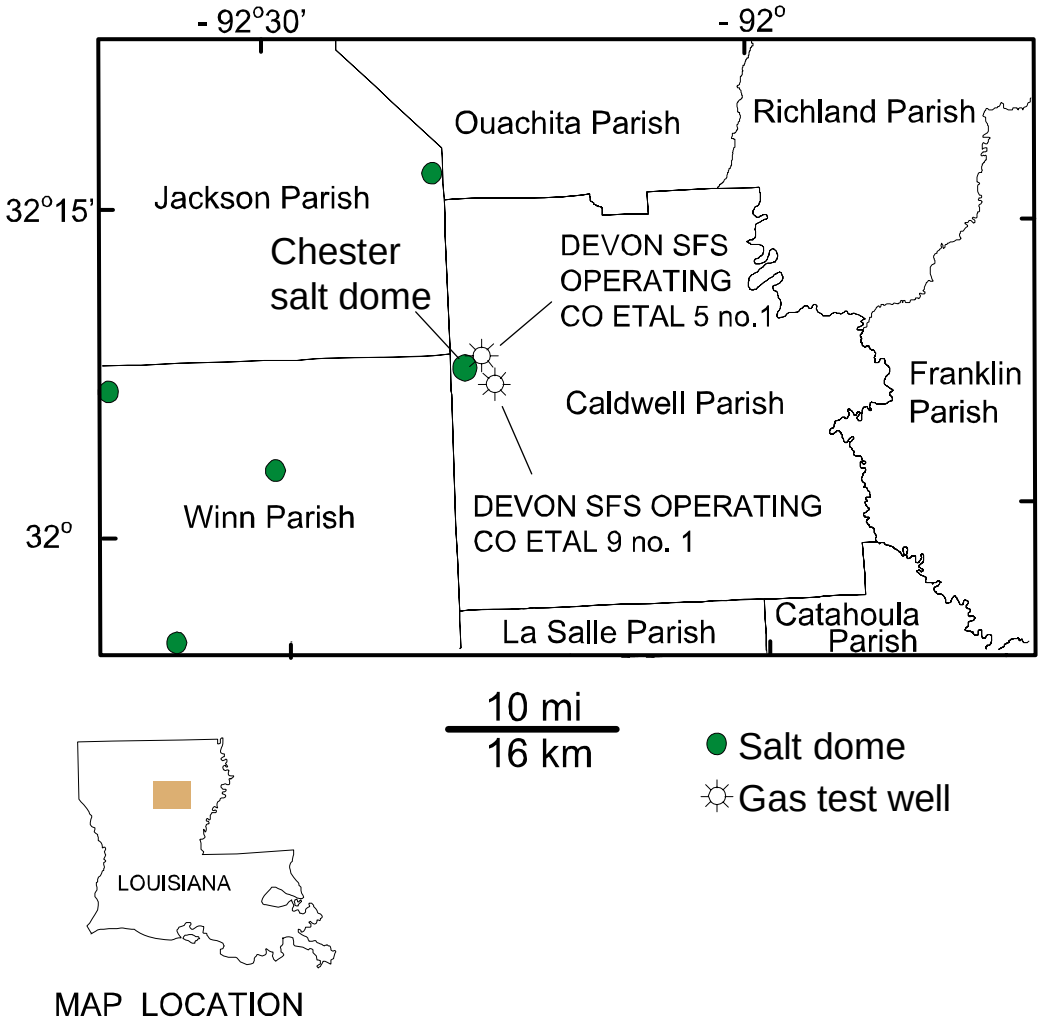


Figure 1. Location of the Devon SFS Operating test wells discussed in this report. Salt dome locations are from Lopez (1995).

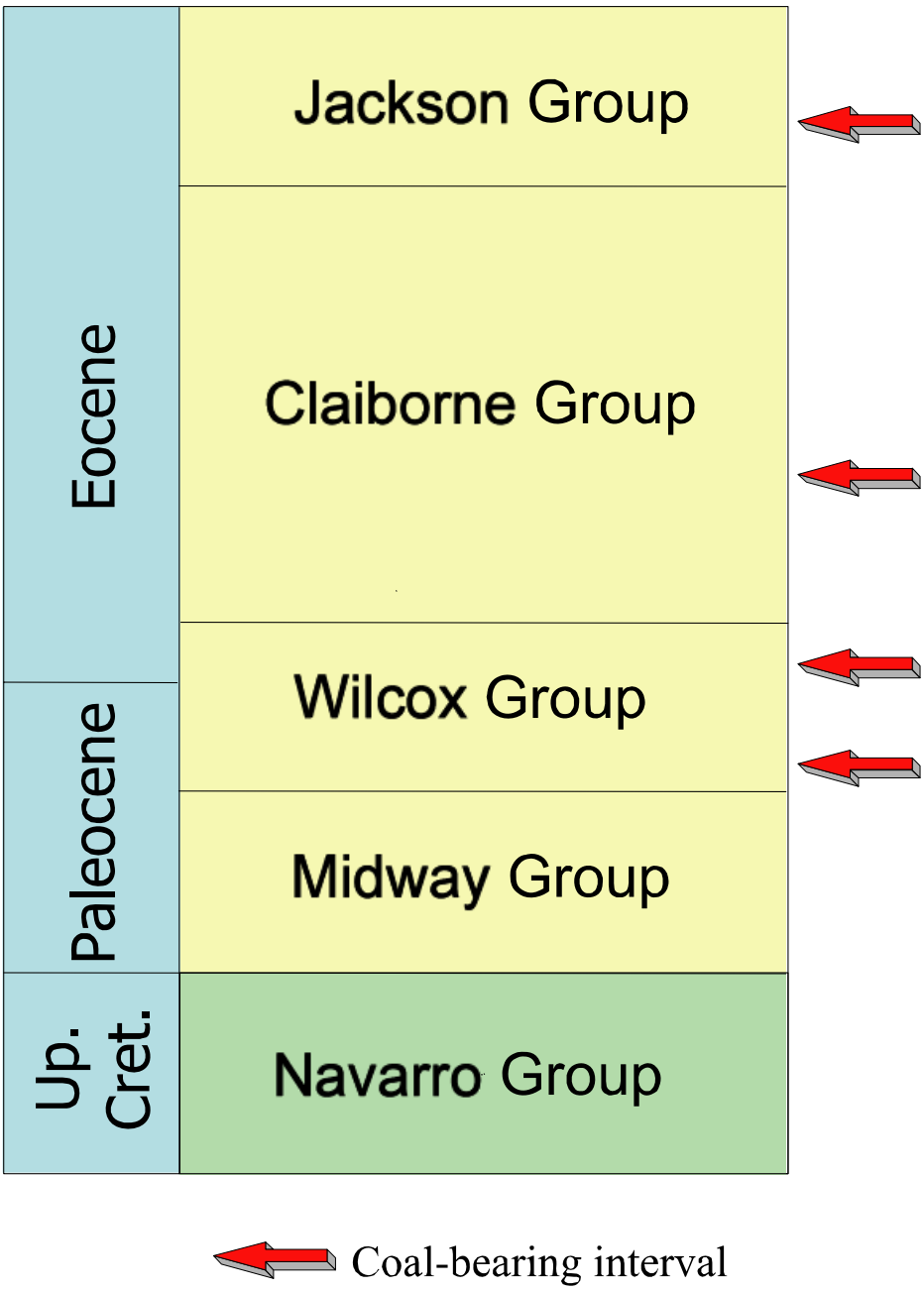


Figure 2. Generalized stratigraphy of major coal-bearing intervals in the U.S. Gulf Coastal Plain. Red arrows show approximate stratigraphic position of the major coal-bearing intervals. Up. Cret. = Upper Cretaceous. (After Warwick and others, 2002).

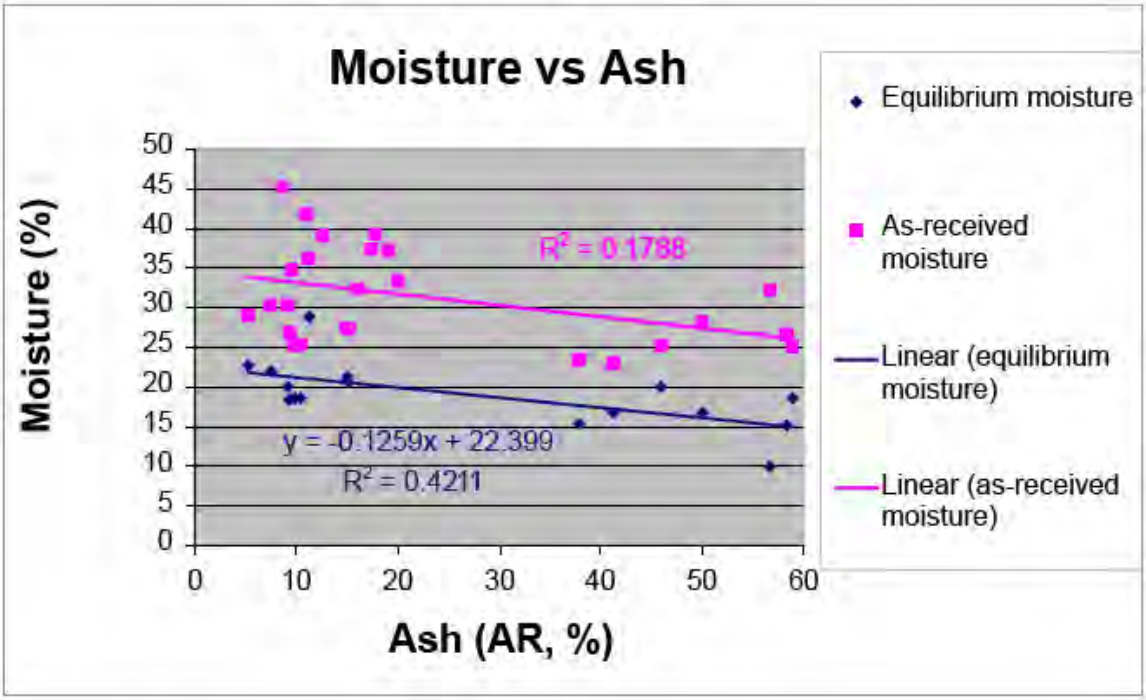


Figure 3. Plot of as-received (AR) and equilibrium moisture versus ash (AR) for samples collected from both test wells. The calculated relationship between equilibrium moisture and ash ($y = -0.1259x + 22.399$) was used to estimate equilibrium moisture values for some samples (as indicated on Table 2).

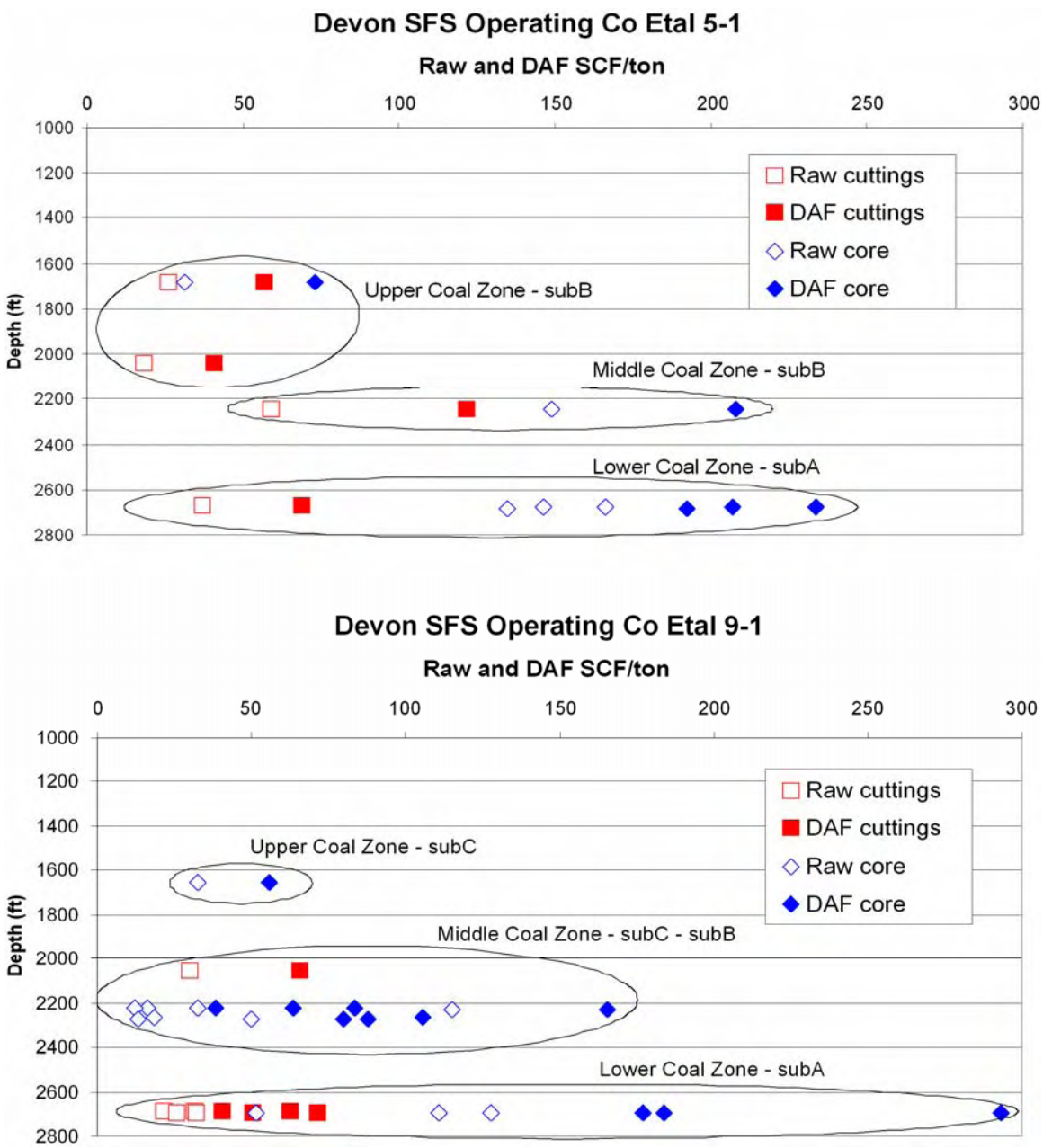


Figure 4. Plot of gas content (SCF/ton, Raw and DAF) versus depth (ft) for cuttings and core samples from both test wells. Estimated rank is also indicated for each coal zone. Abbreviations follow those used on Table 2.

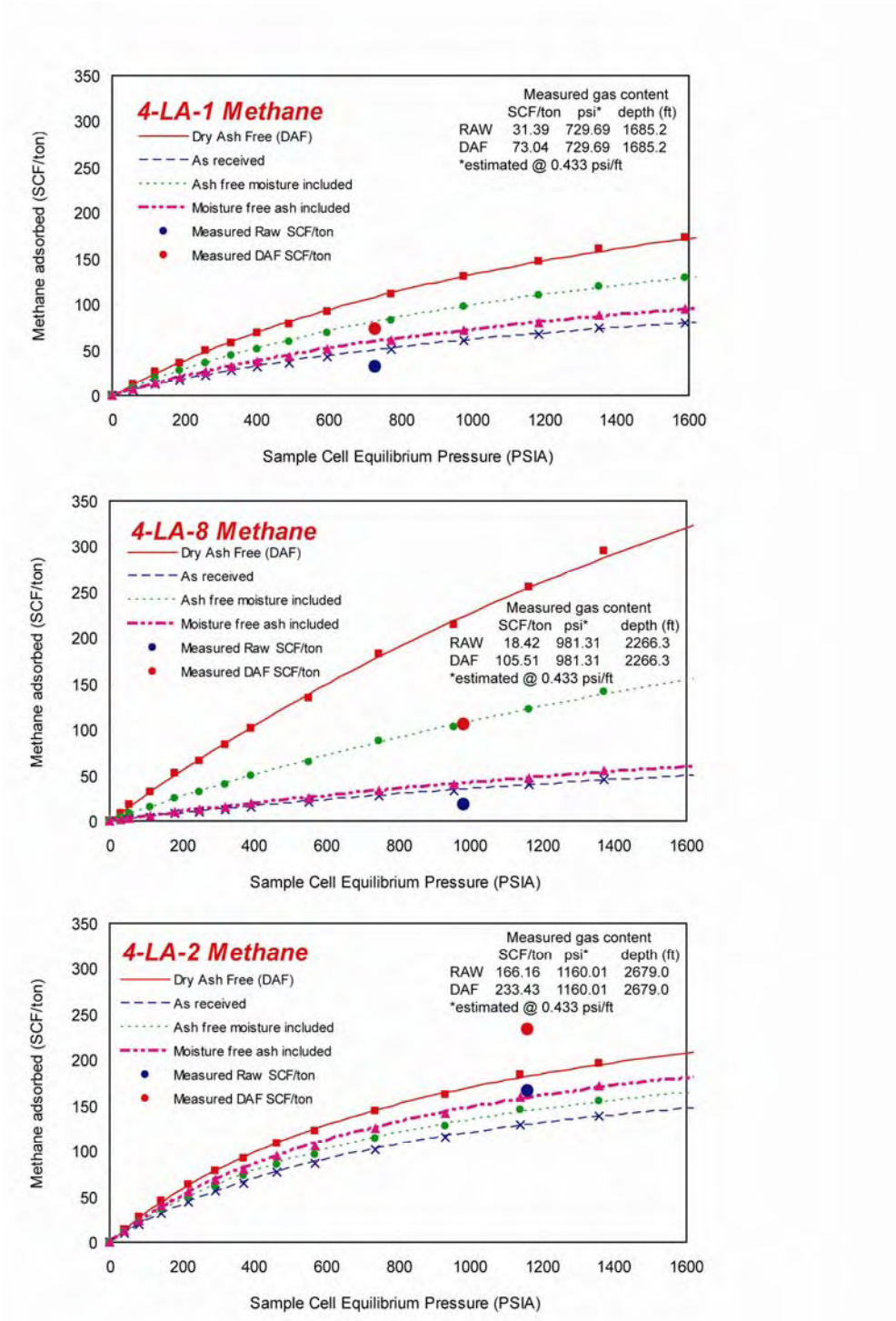


Figure 5. Plot of sorption isotherm data and predicted gas saturation based on expected pressures at sample depth under normal hydrostatic gradient (0.433 psi/ft, Tssot and Welte, 1978) and measured gas desorption data (red and blue dots) from two samples (4-LA-1 and 4-LA-2) from the Devon SFS Operating Co Etal 5 no. 1 (SFS 5-1) well, and one sample from the Devon SFS Operating Co Etal 9 no. 1 well (SFS 9-1; 4-LA-8). The shallow coal sample (4-LA-1) is under-saturated with respect to methane, whereas the deep sample (4-LA-2) is above the isotherm saturation with respect to methane. Sample 4-LA-8 is under-saturated with respect to methane. The complete data set for all sorption isotherms are contained in Appendix 4.

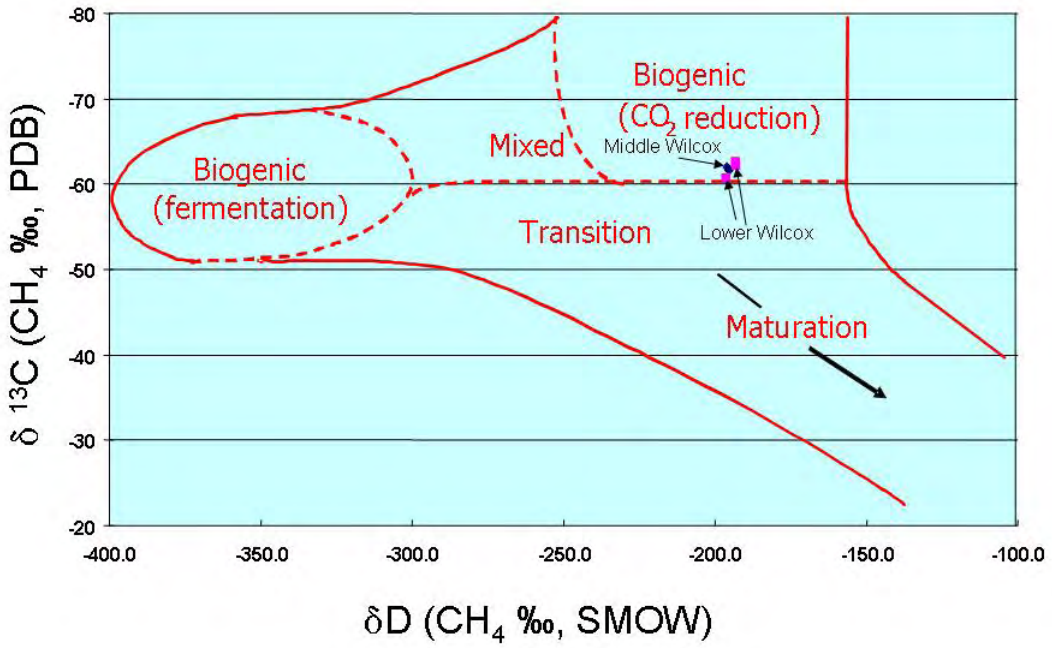


Figure 6. Plot of the isotopic values of carbon (C) and hydrogen (D) from methane with fields showing the origin of gases after Whiticar and others (1986). Wilcox coal gas from north Louisiana plots within the biogenic (bacterial) CO_2 reduction field. Samples collected from middle Wilcox coal zones are shown in blue, whereas samples collected from lower Wilcox coal zones are shown in pink. PDB = Pee Dee Belemnite; SMOW = standard mean ocean water.

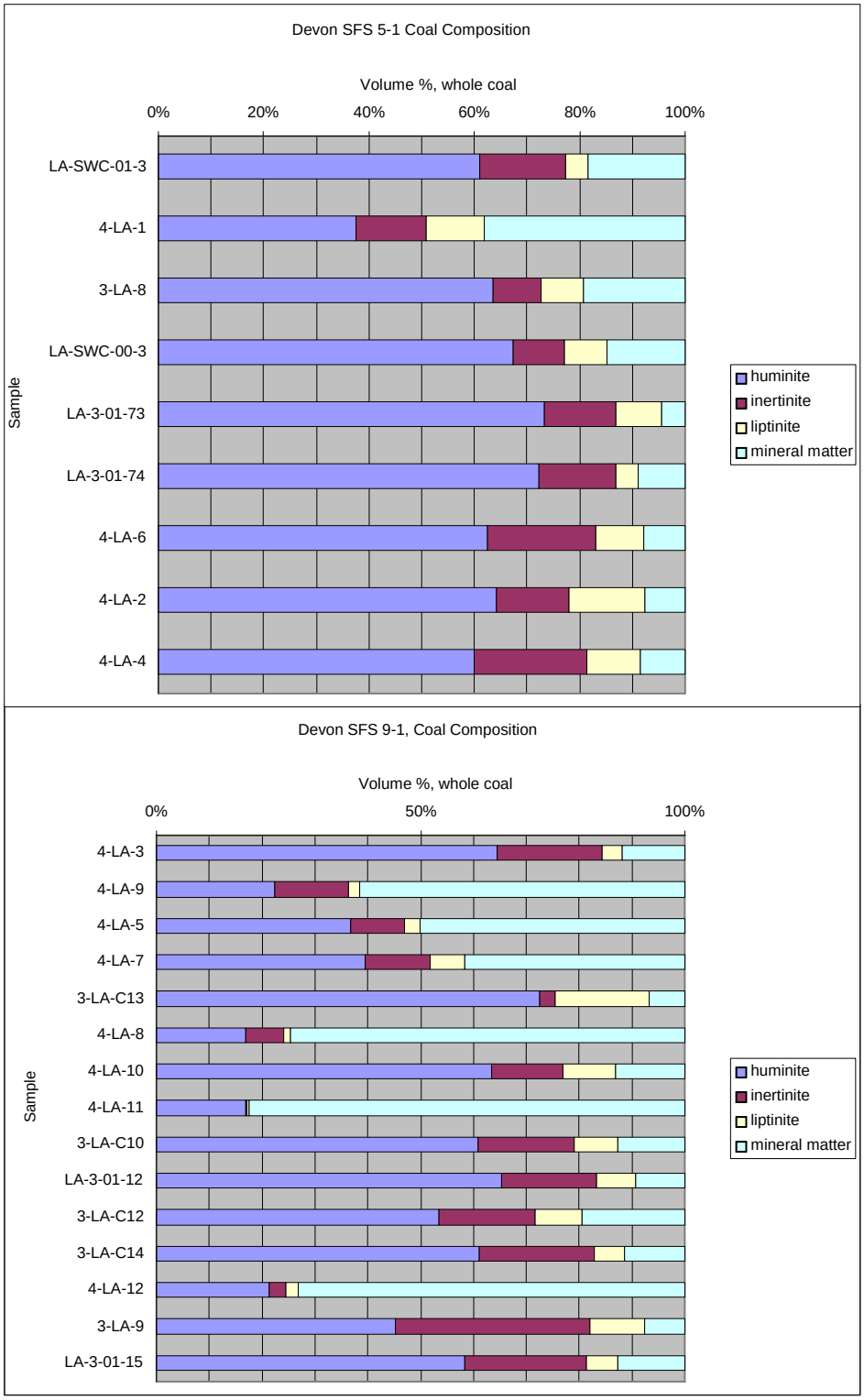


Figure 7. Summary charts showing the distribution of the major maceral groups and mineral matter in the coal and carbonaceous shale samples collected from the Devon SFS Operating Co Etal 5 no. 1 (Devon SFS 5-1) and Devon SFS Operating Co Etal 9 no. 1 (Devon SFS 9-1) wells in northern Louisiana. Samples are shown in stratigraphic order. Detailed petrographic composition of each samples is contained in Appendix 5. Refer to Tables 1 and 2 for well locations and sample intervals.

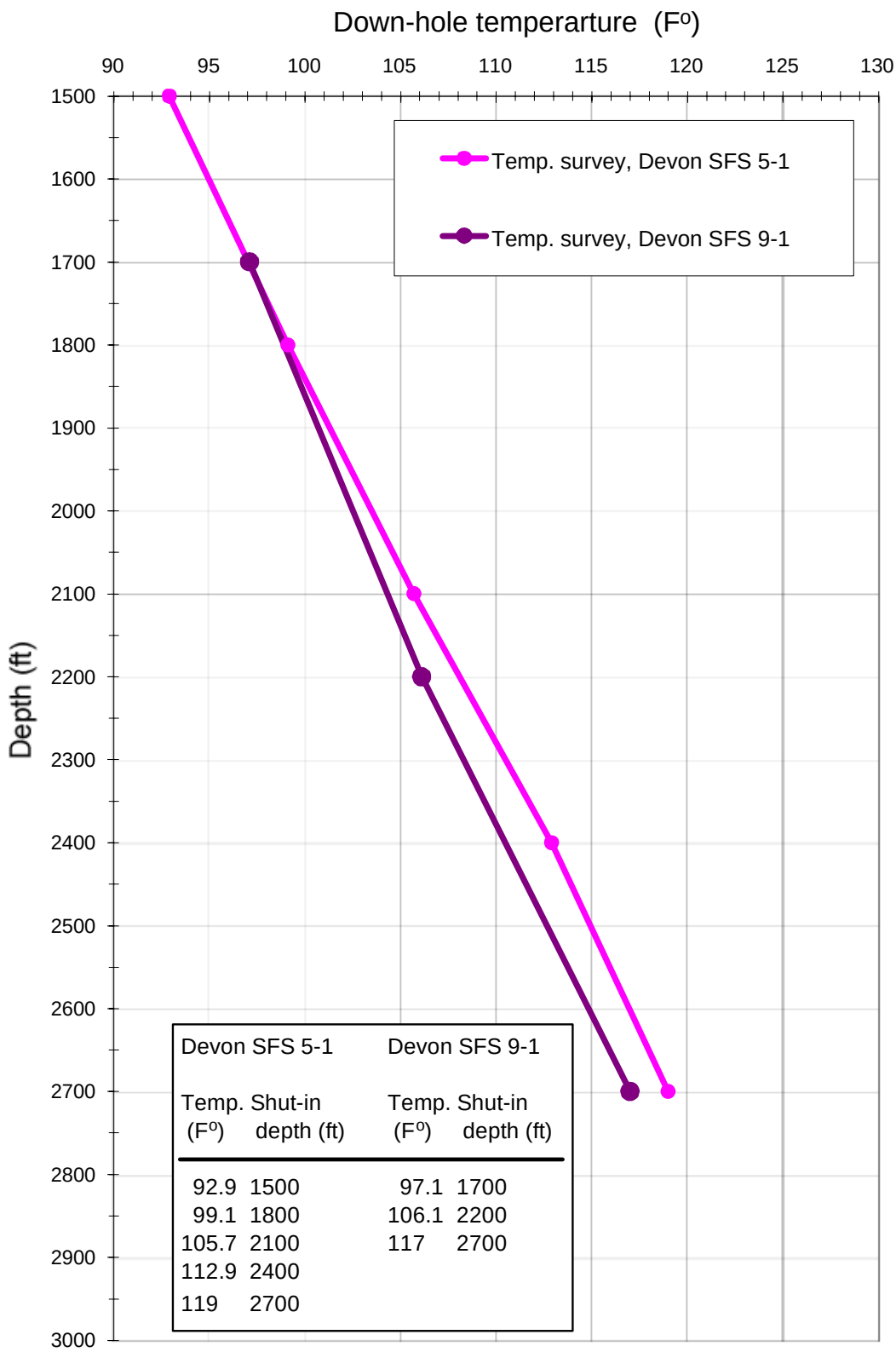


Figure 8. Down-hole temperature data for the Devon SFS Operating Co Etal 5 no. 1 (Devon SFS 5-1) and Devon SFS Operating Co Etal 9 no. 1 (Devon SFS 9-1) wells in northern Louisiana.

Plate 1. Wilcox palynomorphs: porates including Normapolles. Refer to Table 8 for explanation of reference numbers.

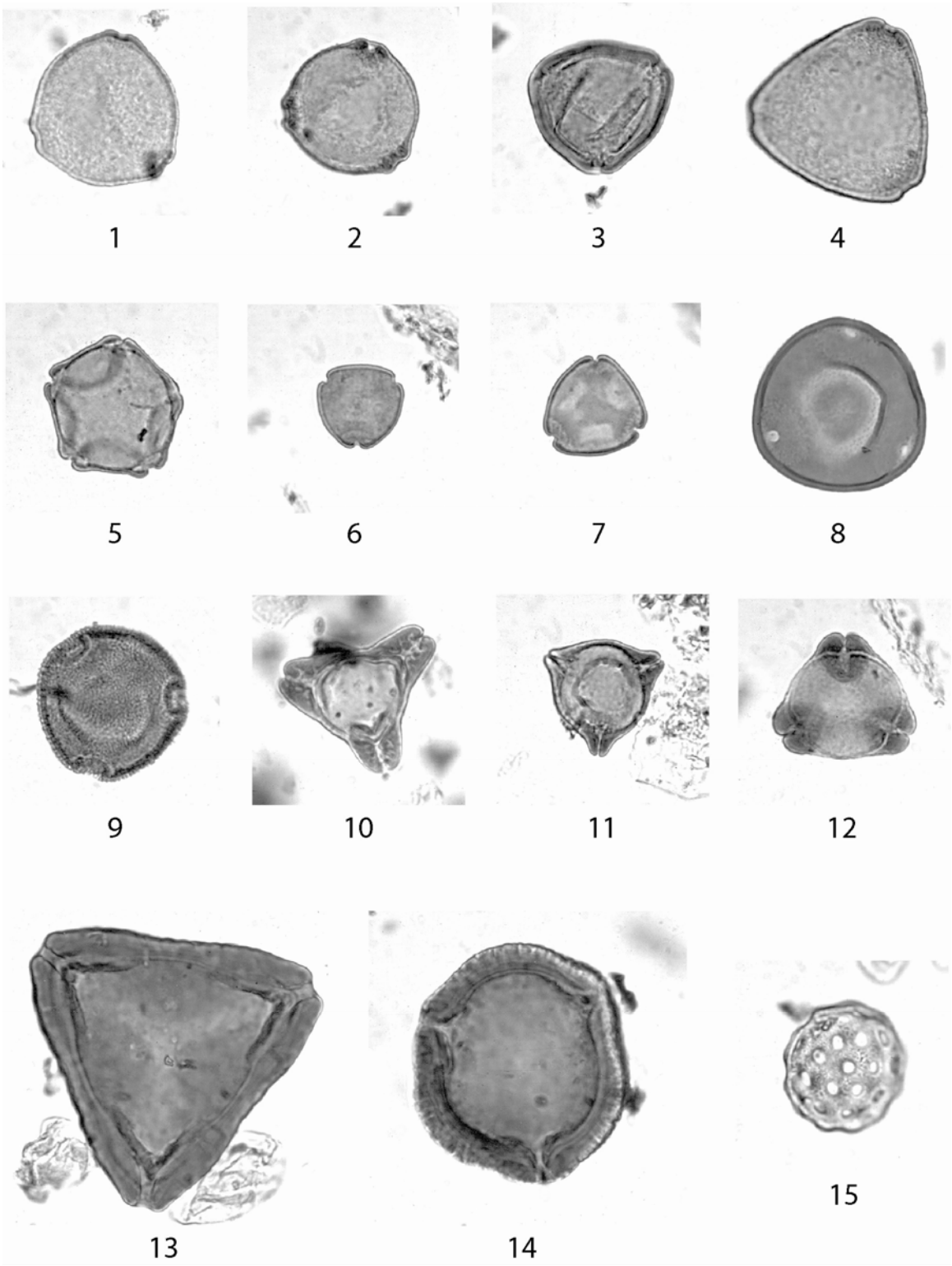
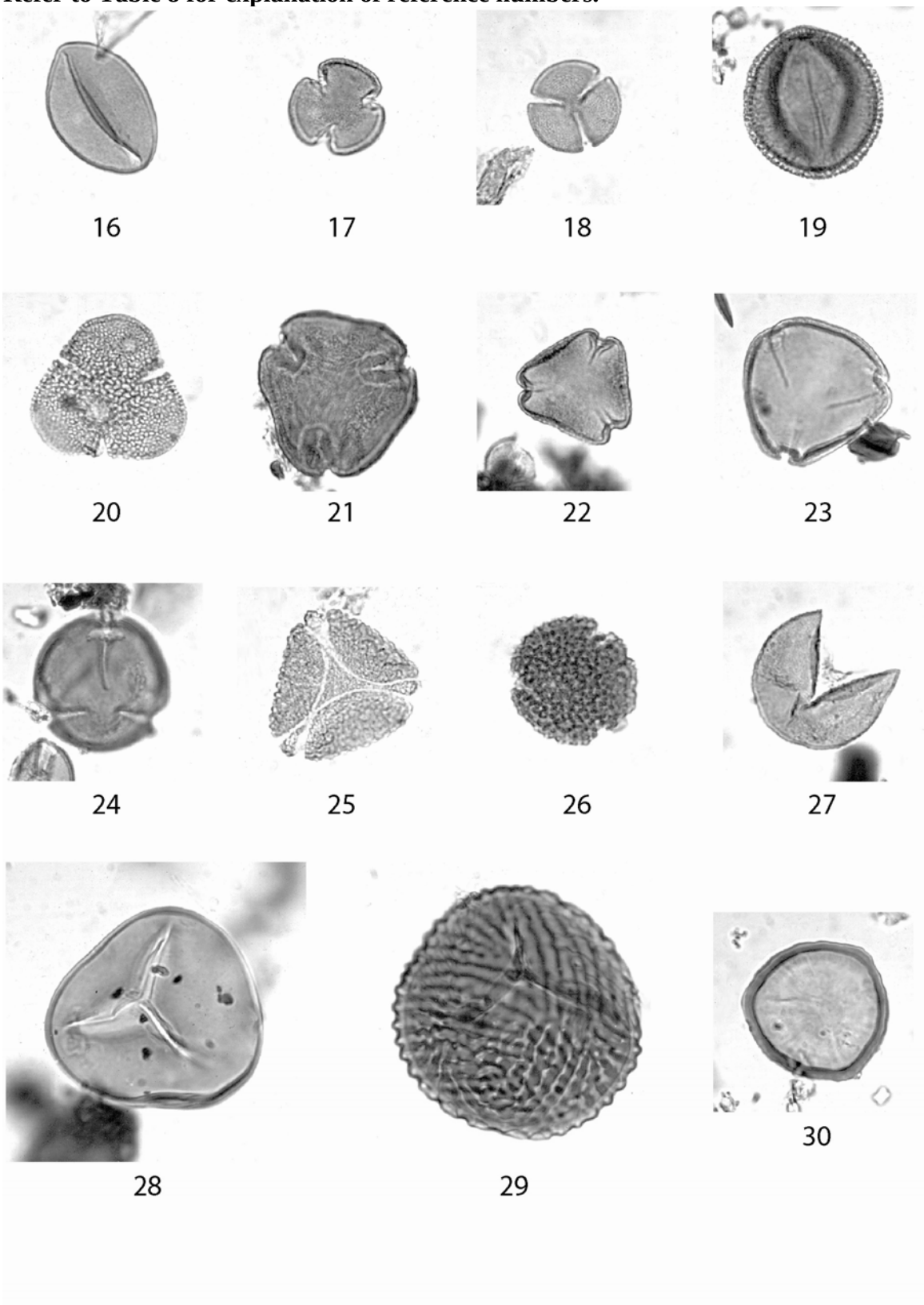
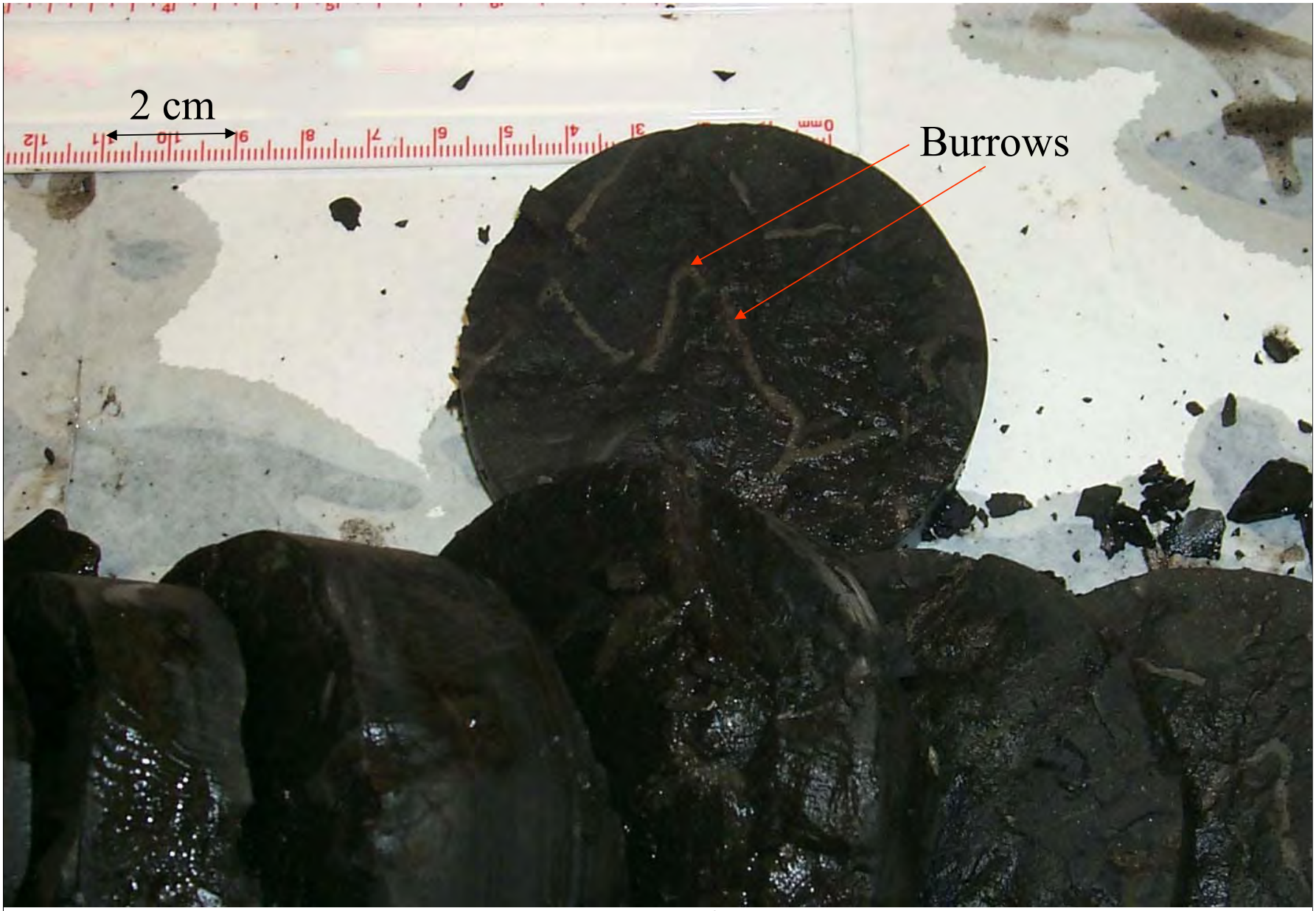


Plate 2. Wilcox palynomorphs: colpates, colporates, "TCT" pollen, and spores. Refer to Table 8 for explanation of reference numbers.

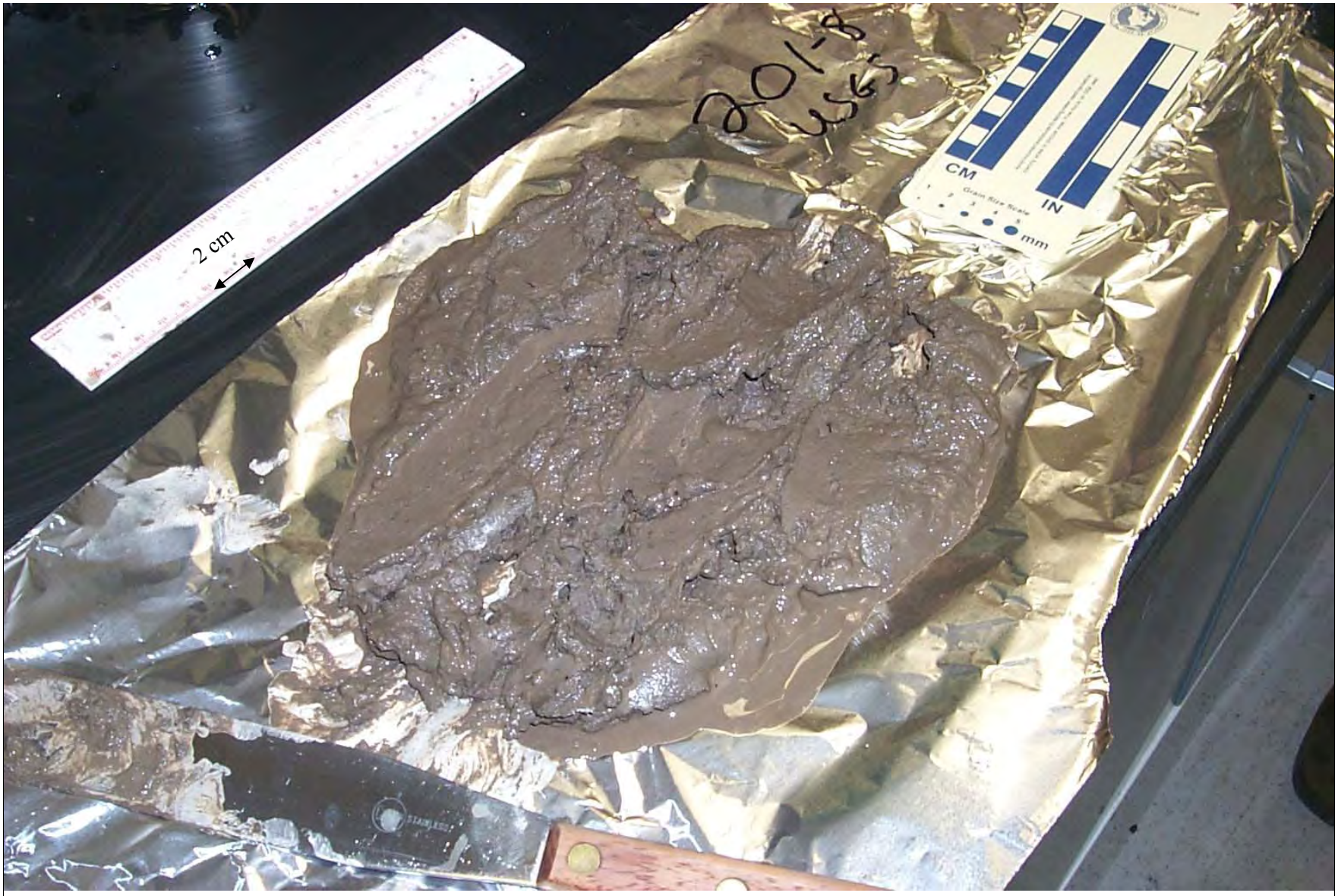


Appendix 1. Core Descriptions



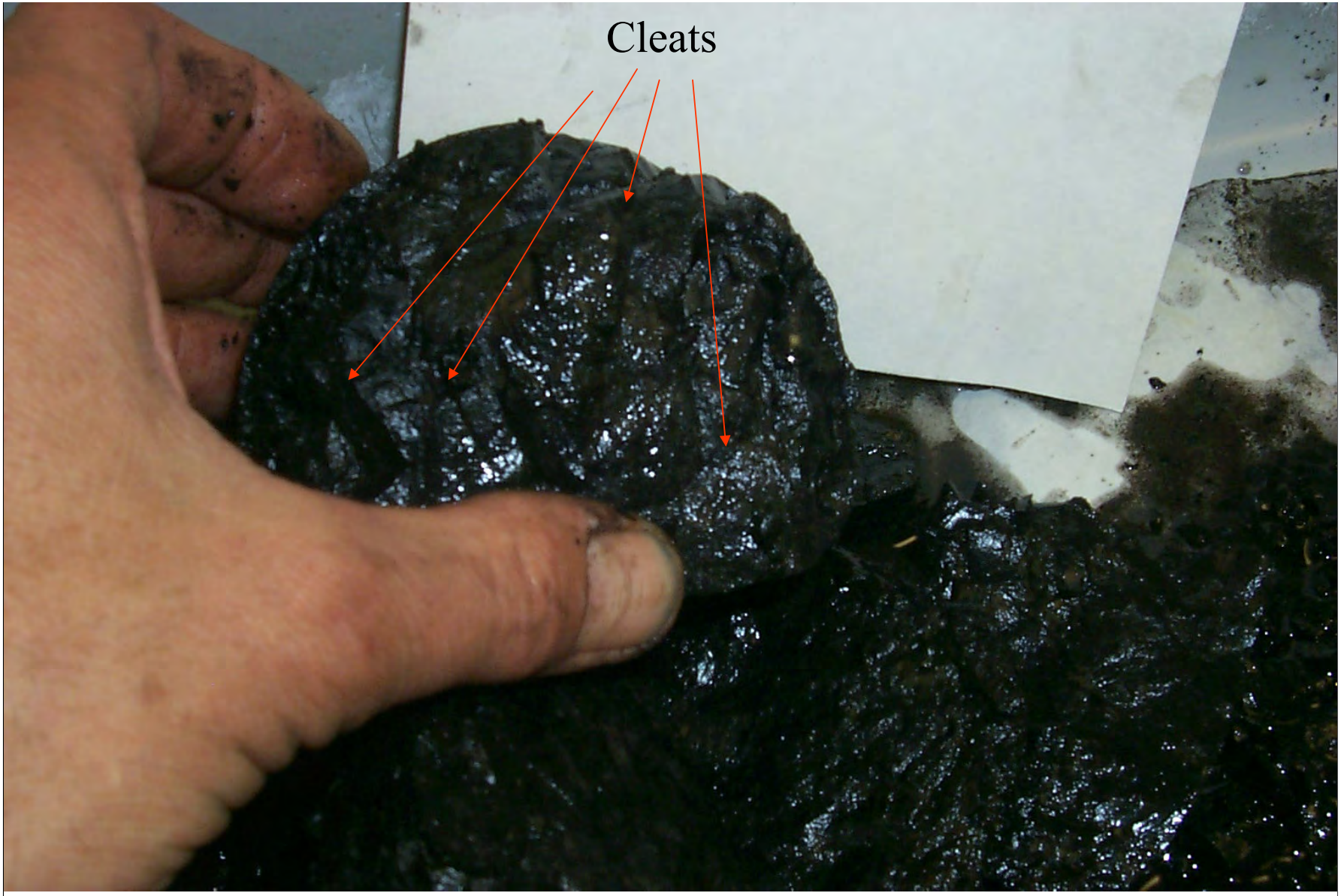
4-LA-1

4-LA-1 (SFS 5-1, core 1) – Massive coal, conchoidal fracture, shale layers a few mm thick, horizontal burrows, about 2 mm across and filled with clay, becoming massive and woody toward the base. Refer to Tables 1 and 2 for sample depths, well number, and location.



TICORA 201-8

TICORA 201-8 (SFS 5-1, core 2) - Carbonaceous shale, clay, not added to composite sample analyzed. Refer to Tables 1 and 2 for sample depths, well number, and location.

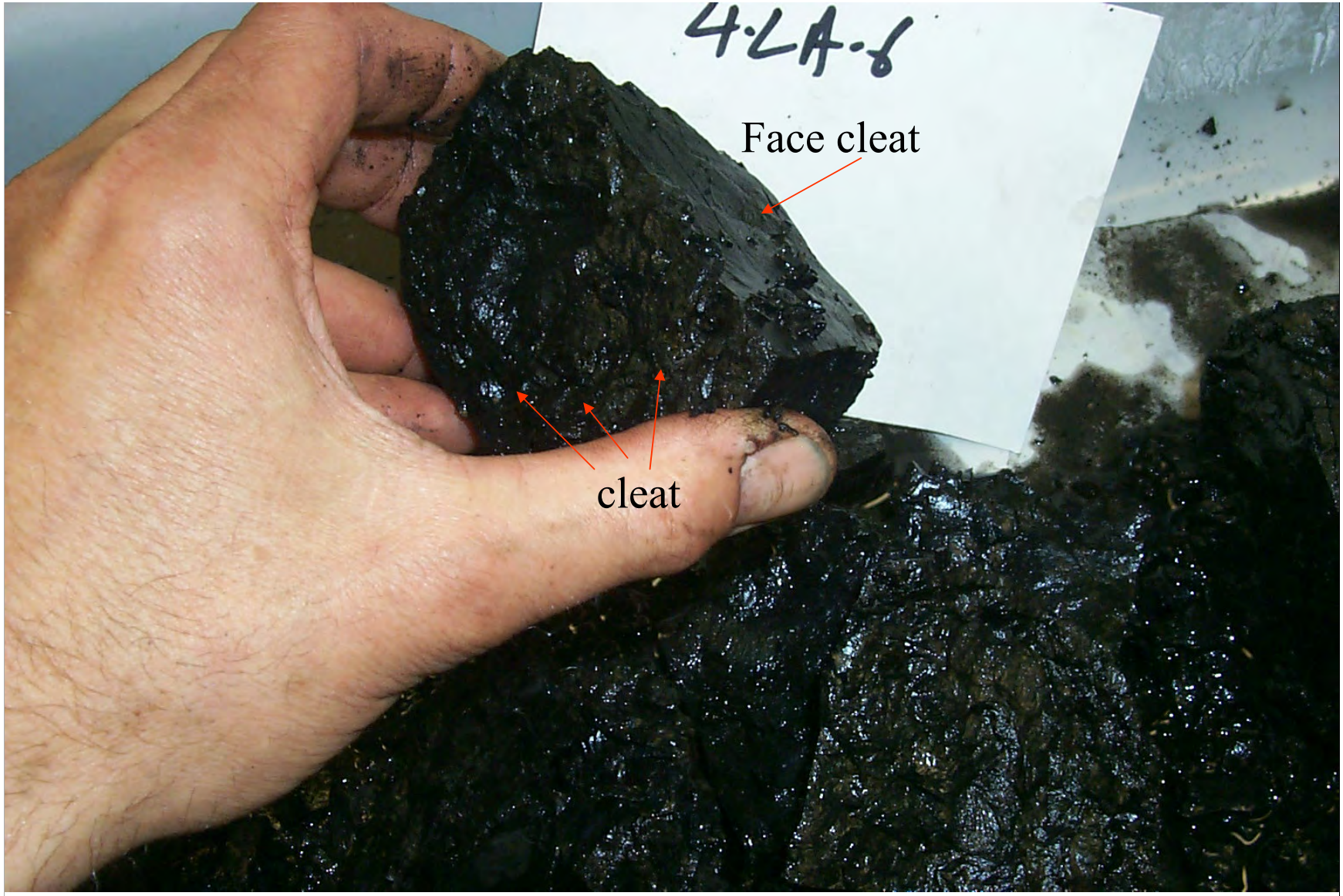


4-LA-6

4-LA-6 (SFS 5-1, core 3) – Coal core, cleat spacing ~5 mm; face and butt cleats, cleats occur throughout; coal is massive to dull in some places, banded in other parts, bands ~ 3 mm thickness, finely laminated at bottom, some bands bright; coal is crumbly, with no apparent partings. Refer to Tables 1 and 2 for sample depths, well number, and location.

4-LA-6

4-LA-6 (SFS 5-1, core 3) – Coal core, cleat spacing ~5 mm; face and butt cleats, cleats occur throughout; coal is massive to dull in some places, banded in other parts, bands ~ 3 mm thickness, finely laminated at bottom, some bands bright; coal is crumbly, with no apparent partings. Refer to Tables 1 and 2 for sample depths, well number, and location.

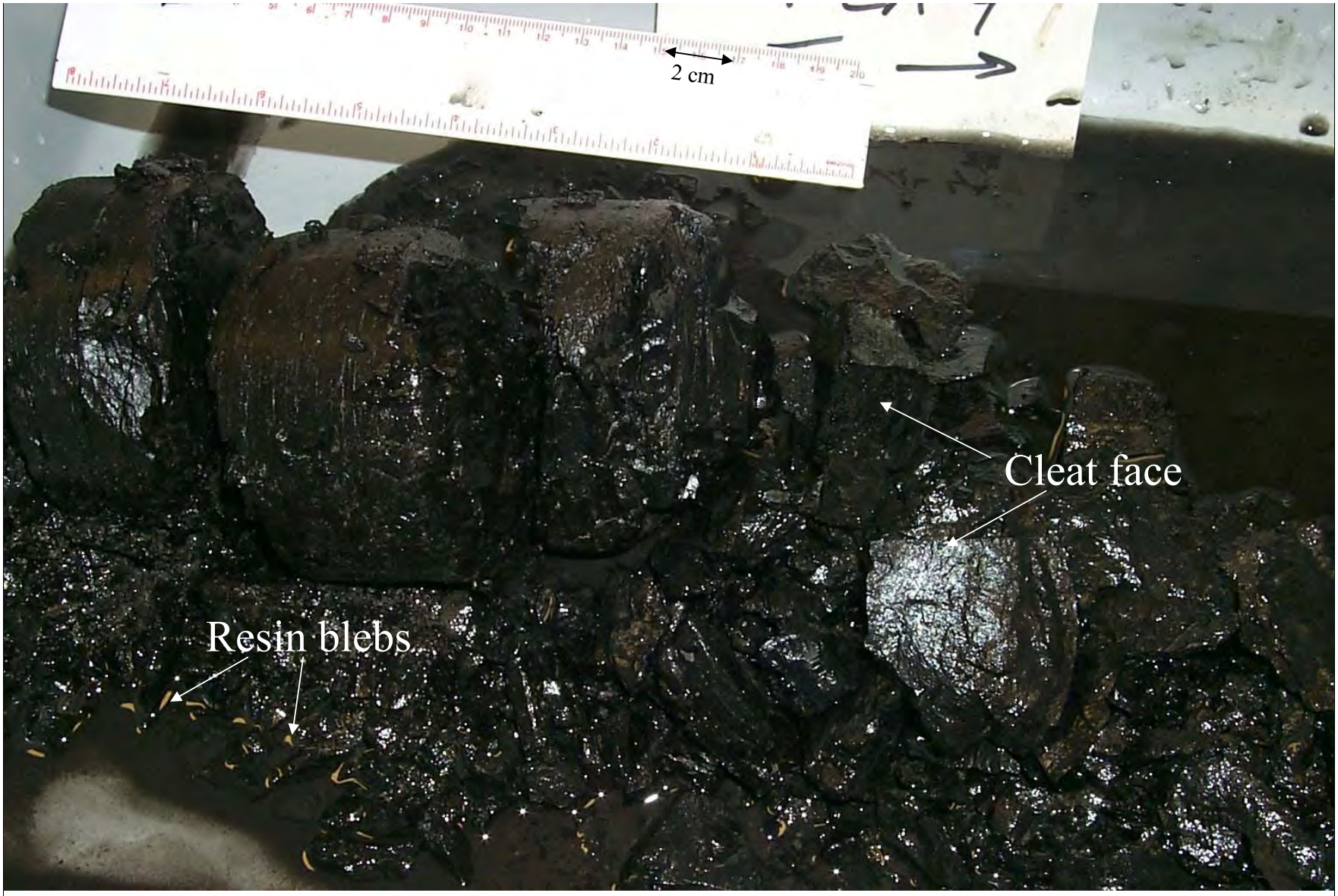


4-LA-6

4-LA-6 (SFS 5-1, core 3) – Coal core, cleat spacing ~5 mm; face and butt cleats, cleats occur throughout; coal is massive to dull in some places, banded in other parts, bands ~ 3 mm thickness, finely laminated at bottom, some bands bright; coal is crumbly, with no apparent partings. Refer to Tables 1 and 2 for sample depths, well number, and location.

4-LA-6

4-LA-6 (SFS 5-1, core 3) – Coal core, cleat spacing ~5 mm; face and butt cleats, cleats occur throughout; coal is massive to dull in some places, banded in other parts, bands ~ 3 mm thickness, finely laminated at bottom, some bands bright; coal is crumbly, with no apparent partings. Refer to Tables 1 and 2 for sample depths, well number, and location.

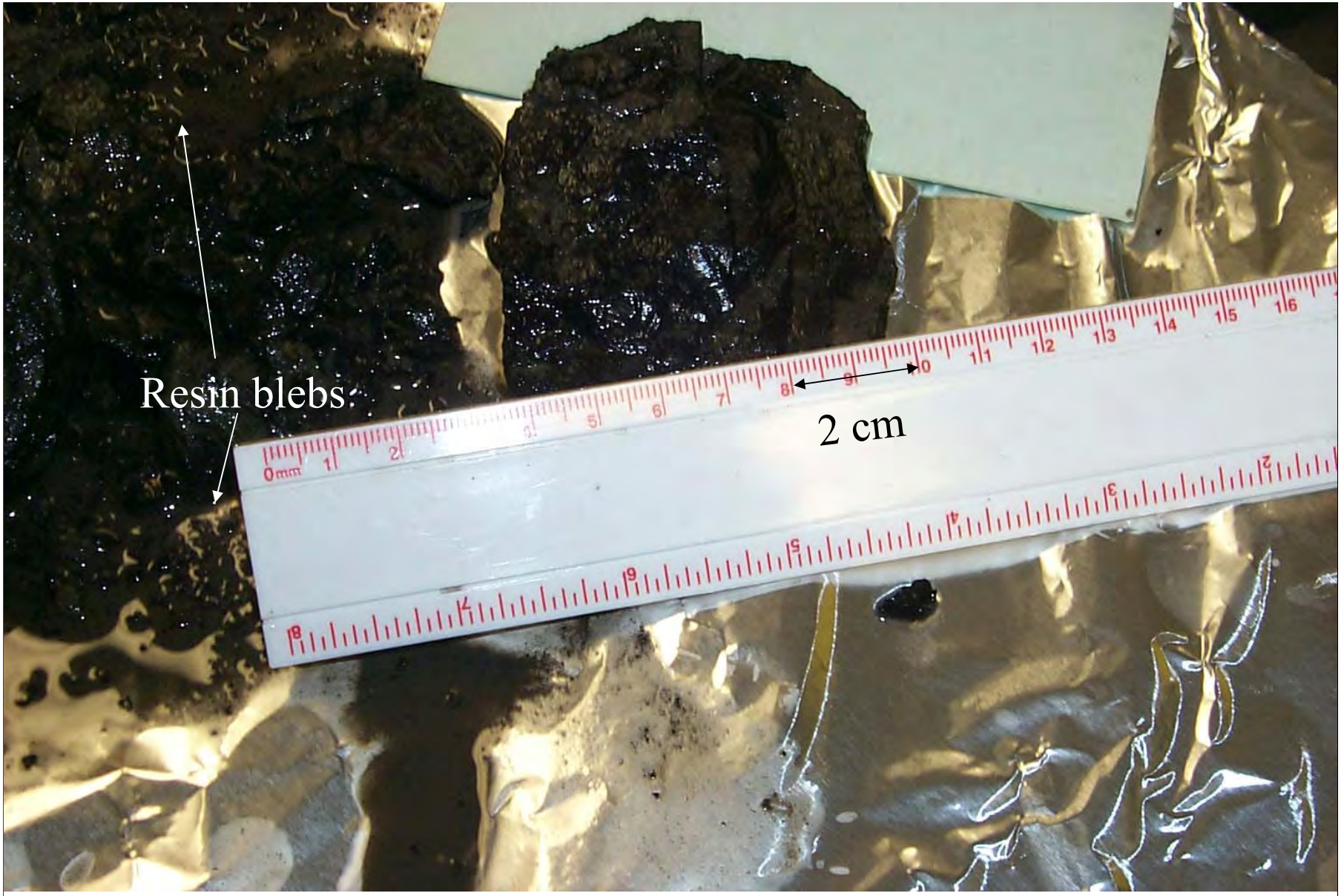


4-LA-4

4-LA-4 (SFS 5-1, core 3) – Coal, base solid, top crumbly, cleated, spacing ~ 5 mm, banded with bands ~ 2-3 mm thickness, finely laminated in places, resin blebs 1-2 mm diameter. Refer to Tables 1 and 2 for sample depths, well number, and location.

4-LA-4

4-LA-4 (SFS 5-1, core 3) – Coal, base solid, top crumbly, cleated, spacing ~ 5 mm, banded with bands ~ 2-3 mm thickness, finely laminated in places, resin blebs 1-2 mm diameter. Refer to Tables 1 and 2 for sample depths, well number, and location.



4-LA-3

4-LA-3 (SFS 5-1, core 3) – Small pieces of coal core in canister with lots of water; coal burrowed with clay filling, cleated with spacing 5-10 mm, with resin blebs, generally dull. Refer to Tables 1 and 2 for sample depths, well number, and location.

4-LA-3

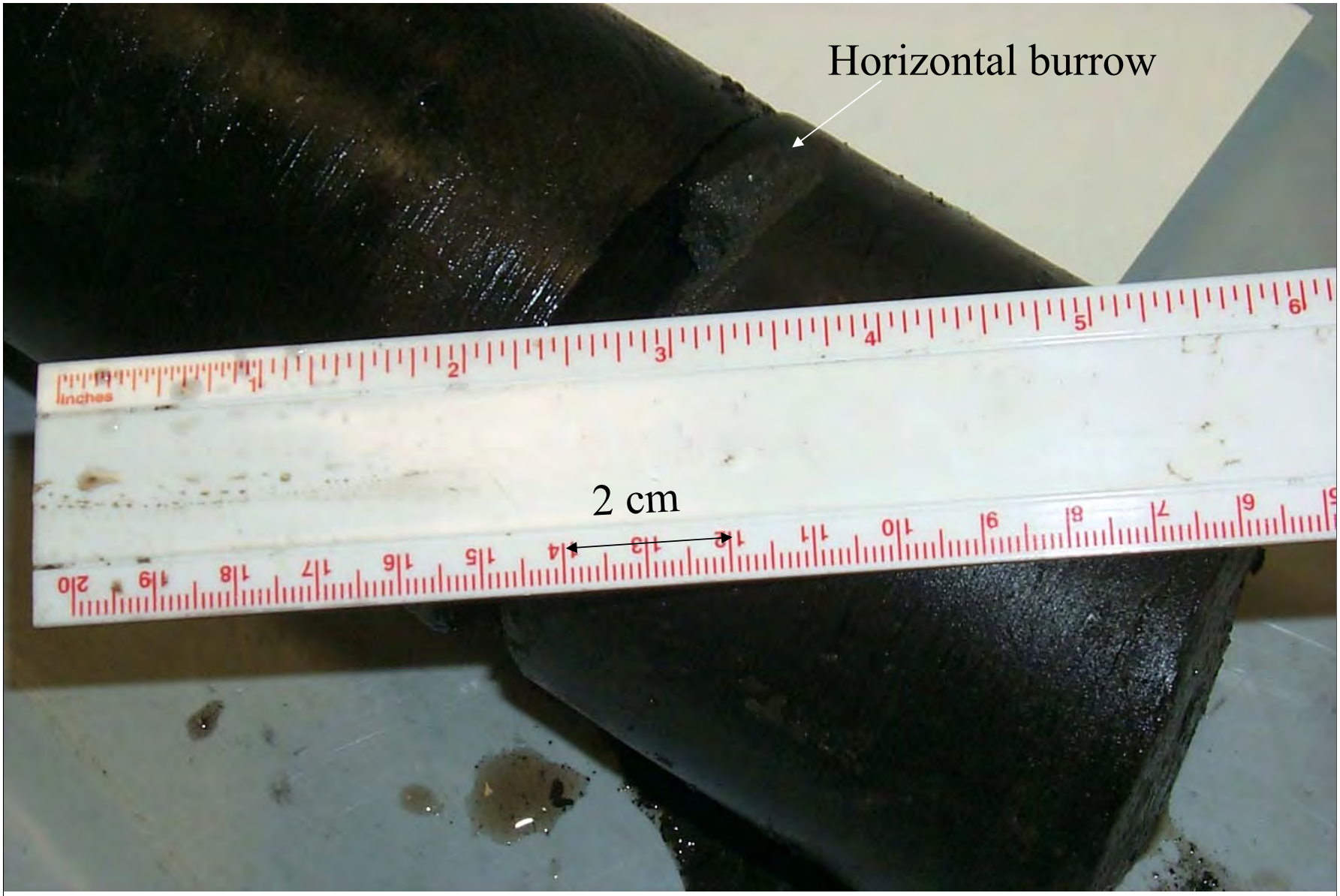
4-LA-3 **(SFS 5-1, core 3)** – Small pieces of coal core in canister with lots of water; coal burrowed with clay filling, cleated with spacing 5-10 mm, generally dull. Refer to Tables 1 and 2 for sample depths, well number, and location.

4-LA-7

4-LA-7 (SFS 9-1, core 2) – Coal, solid, 3 pieces left over from TICORA, combined to make a composite, dull, not well cleated, lots of detrital material, scattered resin blebs, small pieces of bright fusain?, a few woody bands 1-2 mm thick, generally dull, attrital-rich, seems heavy. Refer to Tables 1 and 2 for sample depths, well number, and location.

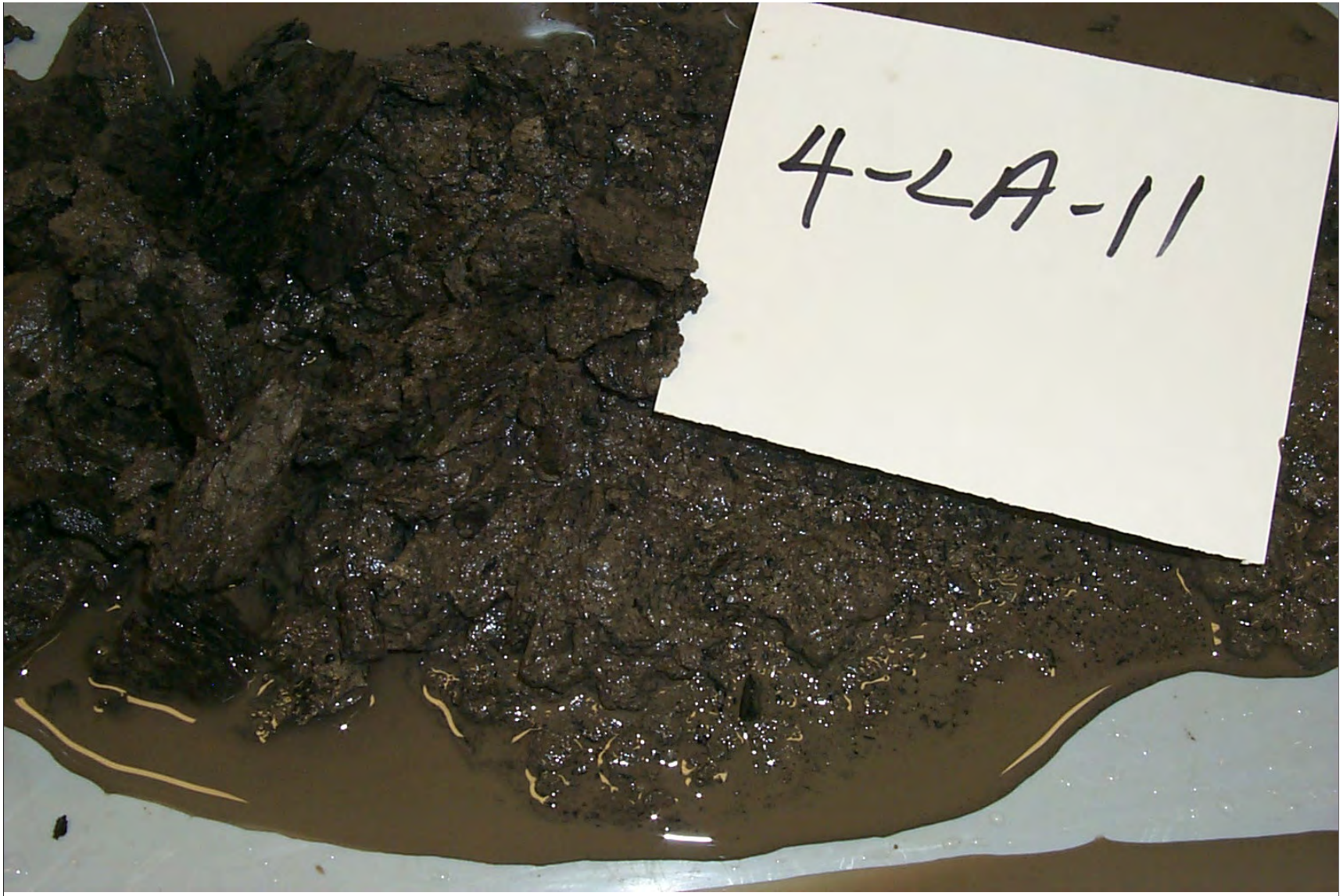
4-LA-7

4-LA-7 (SFS 9-1, core 2) – Coal, solid, 3 pieces left over from TICORA, combined to make a composite, dull, not well cleated, lots of detrital material, scattered resin blebs, small pieces of bright fusain?, a few woody bands 1-2 mm thick, generally dull, attrital-rich, seems to have high specific gravity (heavy). Refer to Tables 1 and 2 for sample depths, well number, and location.



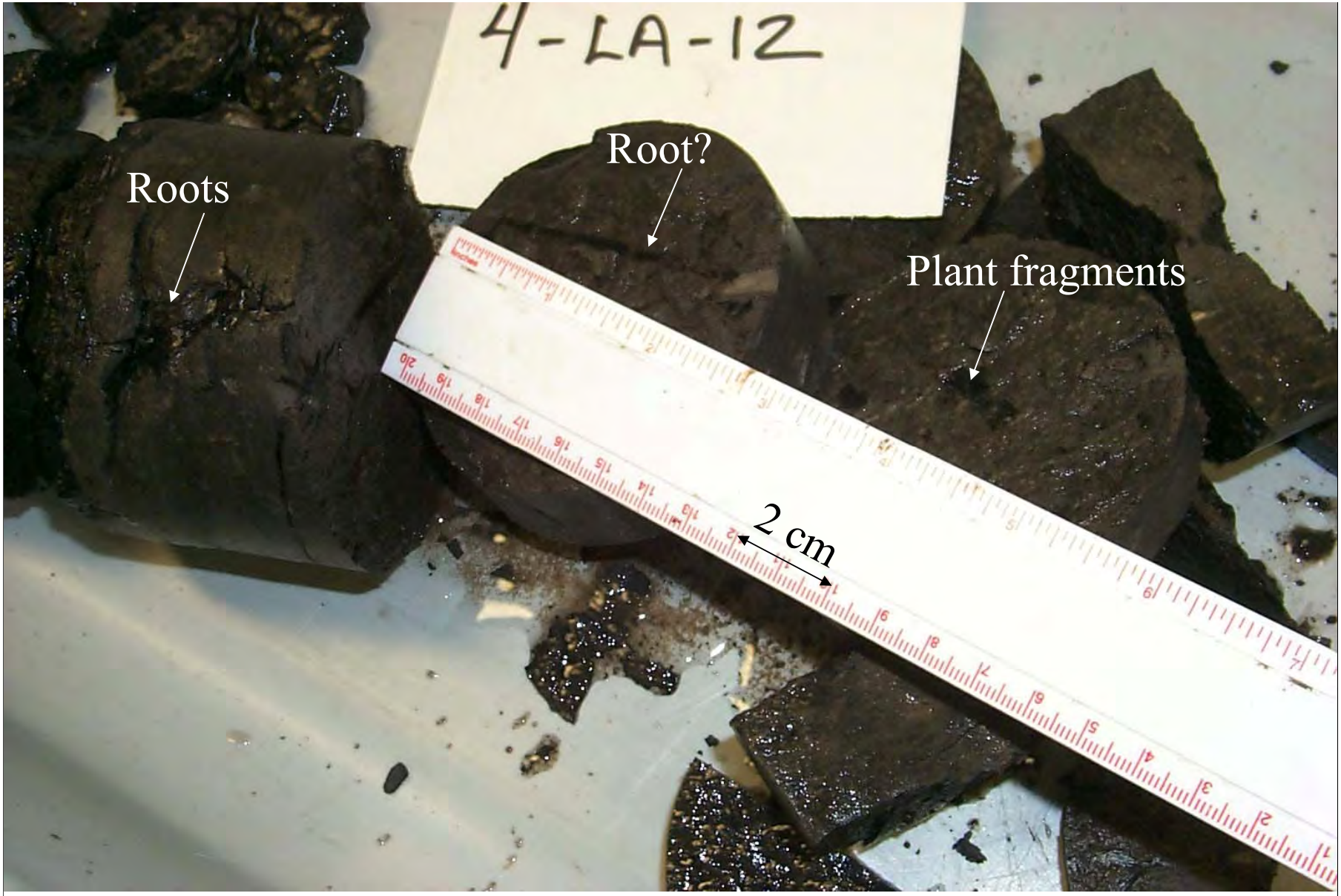
4-LA-9

4-LA-9 (SFS 9-1, core 2) – Coal core, solid, brown, heavy, detrital- rich, large (5 cm across) horizontal burrows filled with silt, vertical burrows ~ 2 cm, burrows throughout, poorly cleated, no apparent woody bands. Refer to Tables 1 and 2 for sample depths, well number, and location.



4-LA-11

4-LA-11 (SFS 9-1, core 3) – Carbonaceous shale and clay; broken pieces of core, brown clay. Refer to Tables 1 and 2 for sample depths, well number, and location.



4-LA-12

4-LA-12 (SFS 9-1, core 4) – Coal, 9.5 in. of solid core; top 6.5 in. rooted clay, dark brown with plant fragments; bottom 3 in. are coal, solid, cleated, good quality; cleat spacing in coal is ~1.5 cm. Refer to Tables 1 and 2 for sample depths, well number, and location.

Appendix 2. Coal Physical and Chemical Data

Appendix 2, Table 1. Proximate, ultimate, and physical data from samples collected from the Devon SFS Operating Co Etal 5-1 and 9-1 wells in Caldwell Parish, Louisiana. Refer to Tables 2a and 2b in text for sample depth intervals. All values in percent except for Btu, Ash Fusing Temperature, FSI, AGS, and TGS. Moist = Moisture; EM = equilibrium moisture; V.M. = volatile matter; Btu = British thermal unit; Init = initial; Hemi = hemispheric; FSI = Free Swelling Index; ASG = apparent specific gravity; TSG = true specific gravity.

Sample number	Field number	Total Moist	Residual Moist	Air Dry Loss	EM	Ash	V.M.	Fixed Carbon	Hydrogen	Carbon	Nitrogen	Sulfur	Oxygen	Btu	---- Forms of Sulfur ----			Ash Fusing Temperature (^{o}F)				FSI	ASG	TSG
															Sulfate	Pyritic	Organic	Init	Soft	Hemi	Fluid			
Devon SFS Operating Co Etal 5-1																								
047872	LA-SWC-01-3	37.35	4.29	34.54		17.35	24.11	21.19				2.4		5985								0		1.63
047906	4-LA-1	23.31	3.15	20.82	15.21	37.82	20.39	18.48	4.76	26.88	0.55	3.89	26.1	4915	0.03	2.71	1.15	2020	2120	2280	2480	0	1.65	1.91
047873	3-LA-8	33.36	3.71	30.79		20.04	24.96	21.64				0.62		6152								0		1.62
047871	LA-SWC-00-3	32.39	3.6	29.86		16.05	26.85	24.71				1.02		6958								0		1.55
047905	LA-3-01-73	28.87	4.49	25.53	22.61	5.3	31.36	34.47	6.98	50.82	1.07	0.81	35.02	8981	0.01	0.07	0.73	1880	1970	1990	2020	0	1.26	1.43
047869	LA-3-01-74	34.71	4.11	31.91		9.59	25.56	30.14				1.01		7572								0		1.48
047909	4-LA-6	25.18	5.88	20.51	18.57	9.9	28.71	36.21	6.42	50.24	0.96	0.91	31.57	8846	0.02	0.04	0.85	2080	2270	2520	2600	0	1.38	1.47
047910	4-LA-2	26.76	4.33	23.45	18.35	9.39	28.98	34.87	6.68	49.06	0.98	1.02	32.87	8739	0.04	0.03	0.95	2580	2690	2720	2790	0	1.32	1.45
047911	4-LA-4	25.39	5.24	21.26	18.5	10.5	28.29	35.82	6.42	49	0.95	0.99	32.14	8674	0.02	0.26	0.71	2610	2670	2730	2760	0	1.36	1.47
Devon SFS Operating Co Etal 9-1																								
047897	4-LA-3	36.2	5.02	32.83	28.83	11.31	24.11	28.38	6.78	38.79	0.68	3.14	39.3	6907	0.04	2.13	0.97	1750	1790	1810	1880	0	1.44	1.62
047870	LA-SWC-01-2	39.18	4.14	36.55		17.83	22.62	20.37				0.47		5639								0		1.63
047898	4-LA-9	28.1	1.6	26.93	16.68	50.01	12.75	9.14	4.4	13.6	0.26	2.36	29.37	2462	0.01	1.86	0.49	2470	2550	2650	2690	0	1.99	2.19
047899	4-LA-5	25.2	2.34	23.41	19.92	45.93	15.64	13.23	4.47	19.46	0.37	1.78	27.99	3500	0.08	1.06	0.64	2470	2560	2690	2730	0	1.81	2.03
047900	4-LA-7	22.79	2.78	20.58	16.68	41.21	18.89	17.11	4.56	24.41	0.49	2.75	26.58	4396	0.09	1.83	0.83	2290	2400	2590	2640	0	1.79	1.96
047901	3-LA-C13	30.17	4.65	26.76	21.94	7.58	33.67	28.58	7.1	46.56	0.89	1.9	35.97	8447	0.01	0.97	0.92	1850	1870	1890	1910	0	1.33	1.44
047902	4-LA-8	26.56	1.42	25.5	15.18	58.32	9.5	5.62	3.93	8.88	0.22	0.18	28.47	1559	0.01	0.09	0.08	2680	2740	2790	2800+	0	2.04	2.4
047903	4-LA-10	27.29	4.26	24.05	21.22	15.09	27.49	30.13	6.24	43.02	0.85	2.02	32.78	7630	0.02	1.06	0.94	1970	2110	2150	2510	0	1.44	1.56
047933	4-LA-11	32.22	1.75	31.01	9.96	56.66	8.24	2.88	4.43	5.55	0.16	0.55	32.65	1062	0.01	0.46	0.08	2800+	2800+	2800+	2800+	0	2.02	2.44
047868	3-LA-C10	39	5.11	35.71		12.66	22.65	25.69				0.69		6559								0		1.55
047867	LA-3-01-12	45.14	4.12	42.78		8.64	20.75	25.47				0.64		6274								0		1.48
047866	3-LA-C12	37.15	3.26	35.03		19.04	21.95	21.86				0.62		5955								0		1.6
047865	3-LA-C14	41.67	3.05	39.83		10.93	21.71	25.69				0.68		6414								0		1.54
047907	4-LA-12	25.06	1.62	23.83	18.54	58.84	10.16	5.94	3.9	10.25	0.21	0.24	26.56	1835	0.02	0.08	0.14	2790	2800+	2800+	2800+	0	2.03	2.26
047904	3-LA-9	30.15	3.88	27.33	19.94	9.18	27.12	33.55	6.59	47.06	0.9	0.72	35.55	8180	0.01	0.07	0.64	2530	2580	2590	2640	0	1.4	1.5
047908	LA-3-01-15	27.41	4.33	24.12	20.59	15.22	26.59	30.78	6.33	43.42	0.89	0.51	33.63	7583	0.02	0.05	0.44	2690	2800+	2800+	2800+	0	1.45	1.54

Appendix 2, Table 2a. Total oxide data from coal and carbonaceous shale samples collected from the Devon SFS Operating Co Etal 5-1 and 9-1 wells in Caldwell Parish, Louisiana. Refer to Tables 2a and 2b in text for sample depth intervals. All data shown on dry-ash basis. Samples were ground to -60 in Pittsburgh and shipped to Denver for analysis. /A denotes the item is recorded as a percentage of the ash. See Bullock and others (2002) for explanation of methodologies.

Lab No.	Field No.	% Ash	SiO_2/A	Al_2O_3/A	CaO/A	MgO	Na_2O/A	K_2O/A	Fe_2O_3/A	TiO_2/A	P_2O_5/A	SO_3/A	Total Oxides
units		(525°C)	Weight %	Weight %	Weight %	Weight %	Weight %	Weight %	Weight %	Weight %	Weight %	Weight %	Weight %
E-205261	3-LA-8	30.9	52	11.5	11.1	2.4	2.9	1.4	6.2	0.65	0.09	5.2	93.44
E-205262	LA-SWC-01-3	27.6	41.8	10.9	8.4	2.4	3	1.3	14.3	0.69	0.14	9.2	92.13
E-205263	LA-SWC-00-3	23.8	47.2	13.6	8.2	2.5	3.1	1.5	8.9	0.85	0.11	7.6	93.56
E-205264	LA-3-01-74	14.8	47.3	18.2	4.8	1.7	3.3	1.1	7.0	1.7	0.25	8.4	93.75
E-205265	4-LA-1	50.0	52.3	16.9	1.2	1.8	1.7	2.8	11.8	0.8	0.10	4.2	93.6
E-205266	4-LA-2	13.1	47.8	26.8	3.6	1.0	3.3	0.66	2.0	2.4	0.13	6.1	93.79
E-205267	4-LA-6	12.9	58.3	18.3	3.8	0.92	4	0.18	1.9	3.4	0.08	6.9	97.78
E-205268	4-LA-4	14.2	42.0	27.7	3.3	0.91	3.5	0.51	4.5	1.2	0.65	5.3	89.57
E-205269	3-LA-9	13.4	46.6	23.4	4.1	1.1	3.8	0.33	2.3	1.6	0.04	8.3	91.57
E-205270	LA-3-01-73	7.83	34.0	17.0	8.2	1.9	7.2	0.53	3.8	1.4	0.08	14.8	88.91
E-205271	4-LA-10	20.8	52.4	14.8	3.2	1.3	2.9	1.5	9.4	1.1	0.04	7.5	94.14
E-205272	4-LA-12	77.4	72.5	16.6	0.26	0.63	0.51	1.7	1.1	0.84	<0.02	0.51	94.65
E-205273	3-LA-C12	30.1	20.5	6.2	2.1	0.72	2.0	0.44	2.0	0.68	0.04	1.5	36.18
E-205274	4-LA-11	83.6	63.7	21.4	0.23	1.2	0.59	2.3	2.9	0.92	<0.02	0.55	93.79
E-205275	3-LA-C14	18.7	51.3	18.2	4.3	1.4	3.5	1.2	4.0	1.2	0.08	5.8	90.98
E-205276	3-LA-C10	20.3	50.6	19.6	4.0	1.3	2.9	1.1	3.7	1.6	0.08	5.0	89.88
E-205277	LA-3-01-12	15.8	48.0	19.3	4.8	1.4	3.7	1.1	4.0	1.3	0.07	7.2	90.87
E-205278	LA-3-01-15	20.5	51.0	29.0	2.6	0.98	3.0	0.78	1.9	0.65	0.02	3.8	93.73
E-205279	4-LA-8	79.5	68.1	19.6	0.33	1.6	0.79	3.0	2.6	0.86	0.08	0.47	97.43
E-205280	3-LA-C13	10.9	30.8	14.5	6.7	1.6	5.5	0.48	16.3	0.58	0.05	14.6	91.11
E-205281	4-LA-7	53.2	54.2	17.1	0.66	1.1	1.4	1.9	7.5	0.87	0.07	1.8	86.6
E-205282	4-LA-3	17.2	33.6	7.8	4.8	1.9	4.9	1.1	24.5	0.94	0.07	12.7	92.31
E-205283	LA-SWC-01-2	29.4	50	12.7	4.1	2.4	2.3	1.5	9.8	0.78	0.10	7.4	91.08
E-205284	4-LA-9	69.7	59.2	18.2	0.44	1.1	1.1	2.2	6.5	0.95	0.07	1.1	90.86
E-205285	4-LA-5	60.9	57.7	15.5	0.67	0.96	1.1	1.9	4.4	0.85	0.04	1.2	84.32

Appendix 2, Table 2b. Trace- and minor-element data (whole-coal, dry basis) from coal and carbonaceous shale samples collected from the Devon SFS Operating Co Etal 5-1 and 9-1 wells in Caldwell Parish, Louisiana. Refer to Tables 2a and 2b in text for sample depth intervals. Samples were ground to -60 in Pittsburgh and shipped to Denver for analysis. Items are shown as percent or ppm of the whole coal. See Bullock and others (2002) for explanation of methodologies. Values in red denote suspect data due to spectral interference.

Lab No.	Field No.	Si	Al	Ca	Mg	Na	K	Fe	Ti	P	S*	Ag	As	Au
		Weight %	Weight %	Weight %	Weight %	Weight %	Weight %	Weight %	Weight %	Weight %	Weight %	ppm	ppm	ppm
E-205261	3-LA-8	7.98	2	2.6	0.475	0.706	0.381	1.42	0.128	0.0129	0.878	<0.66	6.27	<3.3
E-205262	LA-SWC-01-3	5.77	1.7	1.77	0.427	0.657	0.319	2.95	0.122	0.018	3.83	<0.6	6.5	<3
E-205263	LA-SWC-00-3	5.57	1.82	1.48	0.381	0.581	0.315	1.57	0.129	0.0121	1.53	<0.51	3.54	<2.6
E-205264	LA-3-01-74	3.48	1.52	0.54	0.161	0.385	0.144	0.77	0.16	0.0172	1.53	<0.32	5.18	<1.6
E-205265	4-LA-1	12.8	4.68	0.448	0.568	0.659	1.22	4.32	0.251	0.0228	4.98	<1.1	11	<5.3
E-205266	4-LA-2	3.11	1.97	0.358	0.0839	0.341	0.0762	0.195	0.2	0.00789	1.4	<0.28	1.86	<1.4
E-205267	4-LA-6	3.76	1.34	0.375	0.0766	0.41	0.0206	0.184	0.282	0.00482	1.25	0.304	2.74	<1.4
E-205268	4-LA-4	2.98	2.22	0.357	0.0832	0.394	0.0642	0.477	0.109	0.043	1.3	<0.31	7.91	<1.6
E-205269	3-LA-9	3.1	1.76	0.417	0.0943	0.401	0.039	0.229	0.136	0.00248	1.03	<0.29	1.86	<1.5
E-205270	LA-3-01-73	1.33	0.754	0.491	0.096	0.448	0.0369	0.223	0.0703	0.00293	1.13	<0.17	1.24	<0.84
E-205271	4-LA-10	5.39	1.72	0.504	0.173	0.474	0.274	1.45	0.145	0.00384	2.71	<0.45	13.9	<2.3
E-205272	4-LA-12	26.8	6.96	0.147	0.301	0.3	1.12	0.61	0.399	0.00691	0.328	<1.6	6.5	<8
E-205273	3-LA-C12	3.03	1.04	0.475	0.137	0.469	0.116	0.442	0.129	0.00552	0.977	<0.64	3.57	<3.2
E-205274	4-LA-11	25.5	9.69	0.141	0.619	0.375	1.63	1.74	0.472	0.00747	0.787	<1.8	12.2	<8.6
E-205275	3-LA-C14	4.75	1.91	0.609	0.167	0.515	0.197	0.555	0.143	0.00692	1.14	<0.4	2.93	<2
E-205276	3-LA-C10	5.12	2.24	0.619	0.17	0.466	0.198	0.56	0.208	0.00755	1.13	<0.44	2.99	<2.2
E-205277	LA-3-01-12	3.78	1.72	0.577	0.142	0.462	0.154	0.471	0.131	0.00514	1.17	<0.34	2.29	<1.7
E-205278	LA-3-01-15	5.19	3.34	0.405	0.129	0.485	0.141	0.29	0.0849	0.0019	0.67	<0.44	1.5	<2.2
E-205279	4-LA-8	25.9	8.45	0.192	0.786	0.477	2.03	1.48	0.42	0.0284	0.248	<1.7	5.3	<8.2
E-205280	3-LA-C13	1.67	0.892	0.556	0.112	0.474	0.0463	1.32	0.0404	0.00254	2.68	<0.24	2.1	<1.2
E-205281	4-LA-7	14.0	5	0.261	0.366	0.574	0.871	2.9	0.288	0.0169	3.58	<1.2	10.7	<5.6
E-205282	4-LA-3	2.9	0.762	0.633	0.211	0.671	0.168	3.16	0.104	0.00564	4.61	<0.37	23.8	<1.9
E-205283	LA-SWC-01-2	7.32	2.1	0.918	0.453	0.534	0.39	2.15	0.146	0.0137	0.778	<0.63	7.61	<3.2
E-205284	4-LA-9	19.8	6.89	0.225	0.475	0.584	1.31	3.25	0.407	0.0219	3.24	<1.5	16	<7.2
E-205285	4-LA-5	17	5.17	0.302	0.365	0.514	0.993	1.94	0.321	0.011	2.41	<1.3	8.25	<6.3

*Sulfur is determined on a whole coal basis and not calculated from SO_3 determined on the ash.

Lab No.	Field No.	B	Ba	Be	Bi	Cd	Cl	Co	Cr	Cs	Cu	Ga	Ge	Hg	Li
		ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
E-205261	3-LA-8	273	410	1.51	<0.033	0.0624	0.0595	5.45	23.3	1.18	9.19	5.28	1.9	0.032	17.9
E-205262	LA-SWC-01-3	285	620	1.24	<0.03	0.0325	0.0588	4.96	21.3	1.12	12	5.37	4.37	0.2	16.9
E-205263	LA-SWC-00-3	351	465	1.74	<0.026	0.0581	0.0255	4.75	19.2	1.19	15.4	5.43	4.17	0.24	16.8
E-205264	LA-3-01-74	269	374	0.834	0.173	0.104	0.0276	4.03	16.4	0.503	24.9	5.71	4.29	0.19	21.6
E-205265	4-LA-1	123	643	2.14	0.152	0.68	0.0241	15.9	40.6	3.5	30.6	11.5	2.61	0.51	43.6
E-205266	4-LA-2	314	357	0.598	0.32	0.0988	0.0319	3.6	17.1	0.334	29.9	6.72	0.709	0.064	28.9
E-205267	4-LA-6	264	380	0.58	0.47	0.152	0.0568	4.28	15.9	0.0718	33.7	4.68	0.484	0.075	24.9
E-205268	4-LA-4	276	365	0.697	0.273	<0.016	0.0555	2.67	8.46	0.318	17.4	5.88	0.728	0.44	31.2
E-205269	3-LA-9	203	353	0.526	0.299	0.0171	0.0424	3.03	10.3	0.132	19.5	4.61	0.313	0.085	10.8
E-205270	LA-3-01-73	372	409	1.35	0.126	0.0251	0.031	2.03	6.87	0.201	8.97	2.98	3.98	0.17	5.74
E-205271	4-LA-10	255	493	1.92	0.194	0.139	0.0212	6.36	21.5	1.43	20.9	7.47	2.95	0.65	15.7
E-205272	4-LA-12	<16	469	0.871	0.19	0.792	0.0194	16	65.6	4.28	21.7	14.7	2.38	0.25	33.5
E-205273	3-LA-C12	29.5	247	1.36	0.278	0.152	0.0368	8.25	28.3	1.77	24.8	9.08	1.99	0.21	32.6
E-205274	4-LA-11	<18	546	2.22	0.394	0.804	0.0215	20.9	84.7	11	63.3	22.6	3.25	0.31	89
E-205275	3-LA-C14	279	365	0.951	0.218	0.0912	0.0297	4.97	16.6	0.813	19.7	6.1	1.7	0.12	17.7
E-205276	3-LA-C10	219	409	1.84	0.325	0.0649	0.0266	5.37	20.2	0.757	24.5	8.01	5.43	0.2	32
E-205277	LA-3-01-12	284	367	0.808	0.202	0.0909	0.0756	3.9	14	0.522	17	4.95	1.45	0.12	15.4
E-205278	LA-3-01-15	296	359	1.94	0.181	<0.022	0.0616	2.31	7.63	0.479	11	8.8	6.78	0.032	20.2
E-205279	4-LA-8	<17	562	2.36	0.375	0.391	0.0266	17.5	56.9	8.8	36.3	19.7	5.21	1.6	68.6
E-205280	3-LA-C13	335	452	2.25	0.0651	0.0337	0.0363	2	7.24	0.128	7.74	4.74	1.34	0.43	11.9
E-205281	4-LA-7	81.2	454	1.66	0.182	0.171	0.0374	11.4	58	4.2	13.1	12.6	4.31	0.47	40.8
E-205282	4-LA-3	402	642	2.77	0.101	0.137	0.0333	4.5	23.8	0.351	5.85	8.58	16.5	0.42	6.62
E-205283	LA-SWC-01-2	170	479	2.19	0.125	0.0939	0.0234	6.01	25.9	1.47	15	6.26	5.32	0.064	16.2
E-205284	4-LA-9	<15	490	2.07	0.186	0.258	0.0205	15.3	79.4	5.72	15.5	16.2	5.94	0.44	48.9
E-205285	4-LA-5	32.5	438	1.76	0.189	<0.063	0.0217	11.5	60.1	4.6	14	13.5	3.97	0.28	39

Lab No.	Field No.	Mn	Mo	Nb	Ni	Pb	Rb	Sb	Sc	Se	Sn	Sr	Te	Th	Tl	U
		ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
E-205261	3-LA-8	139	0.722	2.13	25.7	5.68	19.1	0.591	5.05	4	10.3	624	0.0853	3.22	0.131	1.05
E-205262	LA-SWC-01-3	146	1.18	2.27	13.5	5.28	15.7	0.28	5.31	8.1	24.9	729	0.0915	3.22	0.121	1.68
E-205263	LA-SWC-00-3	78.6	0.556	2.27	15.6	4.62	15.9	0.606	6.21	4.2	2.65	530	0.0909	4.47	0.354	1.16
E-205264	LA-3-01-74	80.4	2.36	2.56	9.27	4.28	6.61	1.51	5.84	8.8	2.52	387	0.145	3.78	0.488	2.08
E-205265	4-LA-1	74.8	1.31	5.18	34.4	12.8	47.8	0.523	10.7	26	7.53	528	0.136	7.43	1.1	3.03
E-205266	4-LA-2	9.63	2.52	2.98	7.58	7.41	3.51	1.17	6.02	8.8	2.13	344	0.181	4.48	0.0807	2.09
E-205267	4-LA-6	9.81	2.22	3.34	3.63	18.8	0.829	1.42	5.39	7.9	8.8	396	0.262	3.84	0.0732	1.6
E-205268	4-LA-4	8.88	0.985	3	6.71	6.09	2.94	0.455	4.03	13	12.4	447	0.118	3	0.682	1.71
E-205269	3-LA-9	9.39	0.882	2.36	6.24	4.48	1.76	0.427	4.54	8.6	12.7	449	0.142	3.57	0.242	1.49
E-205270	LA-3-01-73	6.82	0.503	1.14	5.93	1.2	1.97	0.57	3.75	3.9	3.27	482	0.0704	1.57	0.168	0.662
E-205271	4-LA-10	18.3	8.04	2.97	16.9	3.92	16.1	0.903	10.7	8.6	2.88	502	0.123	2.27	1.15	3.94
E-205272	4-LA-12	20	1.27	8.64	21.3	11.3	59.6	0.729	9.51	10	6.26	165	0.158	9.51	0.871	3.17
E-205273	3-LA-C12	61	1.23	3.98	18.2	9.65	18.2	0.822	8.73	8.4	5.79	379	0.158	5.47	0.632	2.06
E-205274	4-LA-11	57.6	1.8	11.9	61.5	23.4	100	1.71	15.2	4.2	11.9	184	0.18	11.6	1.37	4.28
E-205275	3-LA-C14	38.3	1.55	2.64	12.8	5.93	10.8	0.872	5.23	6.4	18.7	402	0.143	3.39	0.396	1.72
E-205276	3-LA-C10	37	1.28	3.31	14.6	7.27	10.1	1.23	7.21	7.8	6.36	426	0.121	3.51	0.584	1.73
E-205277	LA-3-01-12	29.8	1.26	2.15	10.5	4.8	6.98	0.724	4.56	9.5	2.05	377	0.114	3.57	0.32	1.5
E-205278	LA-3-01-15	13.5	1.2	3.38	5.66	8.76	6.06	0.828	3.57	5.7	5.23	383	0.098	5.29	0.183	1.96
E-205279	4-LA-8	64.8	1.3	9.45	28	21.5	112	0.896	13.9	3.1	82.3	249	0.155	10.8	0.676	4.32
E-205280	3-LA-C13	11.9	0.999	1.19	8.2	1.64	1.91	0.453	4.92	4.8	1.02	533	0.107	1.29	0.372	1.16
E-205281	4-LA-7	77.3	1.44	6.19	22.8	11.2	55.8	0.508	9.67	4.2	26.2	317	0.0939	7.51	1.05	2.71
E-205282	4-LA-3	76	3.47	5.5	10.6	1.35	6.55	0.701	12.3	13	1.61	716	0.0701	<1.5	0.904	3.12
E-205283	LA-SWC-01-2	230	0.564	3.26	21.2	6.29	18.6	0.595	6.29	4.3	19.5	514	0.0564	<2.6	0.2	1.5
E-205284	4-LA-9	165	1.57	9.66	37.5	14.7	78	0.651	12.3	3.6	8.8	253	0.129	9.01	0.859	3
E-205285	4-LA-5	69.3	1.32	7.43	22.9	11.9	61	0.548	9.7	3.6	74.9	287	0.0819	10.2	0.592	2.64

Lab No.	Field No.	V	Y	Zn	Zr
		ppm	ppm	ppm	ppm
E-205261	3-LA-8	38.1	8.73	31.3	60.4
E-205262	LA-SWC-01-3	39.6	11.9	32.2	56.7
E-205263	LA-SWC-00-3	41.9	9.55	26	55.3
E-205264	LA-3-01-74	49.7	8.48	65.1	51.3
E-205265	4-LA-1	64.3	15.2	99.4	105
E-205266	4-LA-2	47	8.23	2.59	52
E-205267	4-LA-6	46.1	6.78	31.9	63.1
E-205268	4-LA-4	24.1	7.18	6.76	35.5
E-205269	3-LA-9	32.6	5.75	10.5	38.3
E-205270	LA-3-01-73	14.7	6.82	3.3	22
E-205271	4-LA-10	57.7	12.6	52.6	52.9
E-205272	4-LA-12	109	8.4	45.6	163
E-205273	3-LA-C12	70.8	13.3	45.9	47.8
E-205274	4-LA-11	184	15	135	153
E-205275	3-LA-C14	46.2	8.88	33.5	48.2
E-205276	3-LA-C10	51.7	10.7	49.8	61.9
E-205277	LA-3-01-12	40.2	8.03	26.6	41.2
E-205278	LA-3-01-15	21.4	9.22	21.7	39.7
E-205279	4-LA-8	140	18.7	120	185
E-205280	3-LA-C13	17.5	11.2	8.22	17.5
E-205281	4-LA-7	83.4	11.2	58	95
E-205282	4-LA-3	90.8	12	14.8	253
E-205283	LA-SWC-01-2	47.6	11.3	32.6	62.3
E-205284	4-LA-9	117	14.6	80.8	128
E-205285	4-LA-5	89.4	11	42	99.5

Appendix 2, Table 2c. Trace- and minor-element data (whole-coal, remnant-moisture basis*) from coal and carbonaceous shale samples collected from the Devon SFS Operating Co Etal 5-1 and 9-1 wells in Caldwell Parish, Louisiana. Refer to Tables 2a and 2b in text for sample depth intervals. Samples were ground to -60 in Pittsburgh and shipped to Denver for analysis. Items are shown as percent or ppm of the whole coal. See Bullock and others (2002) for explanation of methodologies. Values in red denote suspect data due to spectral interference.

Lab No.	Field No.	% Ash	% Moisture	Si	Al	Ca	Mg	Na	K	Fe	Ti	P	S**	Ag
		(525°C)	(remnant*)	Weight %	Weight %	Weight %	Weight %	Weight %	Weight %	Weight %	Weight %	Weight %	Weight %	ppm
E-205261	3-LA-8	30.9	5.85	7.51	1.88	2.45	0.447	0.665	0.359	1.34	0.12	0.0121	0.827	<0.62
E-205262	LA-SWC-01-3	27.6	6.52	5.39	1.59	1.66	0.399	0.614	0.298	2.76	0.114	0.0169	3.58	<0.56
E-205263	LA-SWC-00-3	23.8	5.78	5.25	1.71	1.39	0.359	0.547	0.296	1.48	0.121	0.0114	1.44	<0.48
E-205264	LA-3-01-74	14.8	5.92	3.27	1.43	0.508	0.152	0.362	0.135	0.725	0.151	0.0161	1.44	<0.3
E-205265	4-LA-1	50.0	4.38	12.2	4.47	0.429	0.543	0.631	1.16	4.13	0.24	0.0218	4.76	<1
E-205266	4-LA-2	13.1	5.82	2.93	1.86	0.337	0.079	0.321	0.0718	0.183	0.188	0.00743	1.32	<0.27
E-205267	4-LA-6	12.9	6.62	3.52	1.25	0.35	0.0716	0.383	0.0193	0.171	0.263	0.0045	1.17	0.284
E-205268	4-LA-4	14.2	6.32	2.79	2.08	0.335	0.0779	0.369	0.0601	0.447	0.102	0.0403	1.22	<0.29
E-205269	3-LA-9	13.4	5.77	2.92	1.66	0.393	0.0889	0.378	0.0367	0.216	0.129	0.00234	0.971	<0.27
E-205270	LA-3-01-73	7.8	6.57	1.24	0.704	0.459	0.0897	0.418	0.0345	0.208	0.0657	0.00273	1.06	<0.16
E-205271	4-LA-10	20.8	5.55	5.09	1.63	0.476	0.163	0.447	0.259	1.37	0.137	0.00363	2.56	<0.42
E-205272	4-LA-12	77.4	2.30	26.2	6.8	0.144	0.294	0.293	1.09	0.596	0.39	0.00676	0.32	<1.6
E-205273	3-LA-C12	30.1	4.82	2.88	0.988	0.452	0.131	0.447	0.11	0.421	0.123	0.00525	0.93	<0.61
E-205274	4-LA-11	83.6	2.31	24.9	9.47	0.137	0.605	0.366	1.6	1.7	0.461	0.0073	0.769	<1.7
E-205275	3-LA-C14	18.7	5.65	4.48	1.8	0.575	0.158	0.486	0.186	0.523	0.135	0.00653	1.08	<0.38
E-205276	3-LA-C10	20.3	6.19	4.8	2.11	0.58	0.159	0.437	0.185	0.525	0.195	0.00709	1.06	<0.41
E-205277	LA-3-01-12	15.8	6.11	3.55	1.61	0.542	0.133	0.434	0.144	0.442	0.123	0.00483	1.1	<0.32
E-205278	LA-3-01-15	20.5	5.91	4.89	3.15	0.381	0.121	0.456	0.133	0.272	0.0799	0.00179	0.63	<0.41
E-205279	4-LA-8	79.5	2.41	25.3	8.25	0.188	0.767	0.466	1.98	1.45	0.41	0.0278	0.242	<1.6
E-205280	3-LA-C13	10.9	6.21	1.57	0.836	0.522	0.105	0.445	0.0434	1.24	0.0379	0.00238	2.51	<0.22
E-205281	4-LA-7	53.2	3.69	13.5	4.81	0.251	0.353	0.553	0.839	2.79	0.277	0.0163	3.45	<1.1
E-205282	4-LA-3	17.2	6.77	2.7	0.71	0.59	0.197	0.625	0.157	2.95	0.0969	0.00525	4.3	<0.35
E-205283	LA-SWC-01-2	29.4	6.11	6.87	1.98	0.861	0.426	0.502	0.366	2.02	0.137	0.0128	0.73	<0.59
E-205284	4-LA-9	69.7	2.58	19.3	6.71	0.219	0.462	0.569	1.27	3.17	0.397	0.0213	3.16	<1.4
E-205285	4-LA-5	60.9	3.29	16.4	5	0.292	0.353	0.497	0.961	1.87	0.31	0.0106	2.33	<1.3

*Remnant moisture is the moisture as determined in the USGS laboratories at the time of analysis.
**Sulfur is determined on a whole coal basis and not calculated from SO_3 determined on the ash.

Lab No.	Field No.	As	Au	B	Ba	Be	Bi	Cd	Cl	Co	Cr	Cs	Cu	Ga	Ge
		ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
E-205261	3-LA-8	5.9	<3.1	257	386	1.42	<0.031	0.0587	0.056	5.13	21.9	1.11	8.65	4.97	1.79
E-205262	LA-SWC-01-3	6.07	<2.8	267	580	1.16	<0.028	0.0304	0.055	4.64	19.9	1.05	11.3	5.02	4.08
E-205263	LA-SWC-00-3	3.33	<2.4	331	438	1.64	<0.024	0.0547	0.024	4.47	18.1	1.12	14.5	5.12	3.93
E-205264	LA-3-01-74	4.87	<1.5	253	352	0.784	0.163	0.0977	0.026	3.79	15.4	0.474	23.4	5.37	4.04
E-205265	4-LA-1	10.6	<5	118	615	2.05	0.145	0.65	0.023	15.3	38.8	3.35	29.3	11	2.5
E-205266	4-LA-2	1.76	<1.4	296	337	0.563	0.301	0.093	0.03	3.39	16.1	0.314	28.2	6.33	0.668
E-205267	4-LA-6	2.55	<1.3	246	355	0.542	0.439	0.142	0.053	4	14.8	0.0671	31.5	4.37	0.452
E-205268	4-LA-4	7.41	<1.5	258	342	0.653	0.256	<0.015	0.052	2.5	7.92	0.298	16.3	5.51	0.682
E-205269	3-LA-9	1.76	<1.4	192	332	0.496	0.281	0.0161	0.04	2.85	9.72	0.125	18.4	4.34	0.295
E-205270	LA-3-01-73	1.16	<0.79	348	382	1.26	0.117	0.0235	0.029	1.89	6.42	0.188	8.38	2.79	3.72
E-205271	4-LA-10	13.1	<2.1	241	466	1.81	0.183	0.131	0.02	6.01	20.3	1.35	19.7	7.05	2.79
E-205272	4-LA-12	6.35	<7.8	<16	458	0.851	0.186	0.774	0.019	15.6	64.1	4.18	21.2	14.3	2.32
E-205273	3-LA-C12	3.4	<3.1	28.1	235	1.29	0.265	0.144	0.035	7.86	27	1.69	23.6	8.64	1.9
E-205274	4-LA-11	11.9	<8.4	<17	533	2.17	0.385	0.786	0.021	20.4	82.8	10.7	61.9	22.1	3.18
E-205275	3-LA-C14	2.77	<1.9	264	344	0.898	0.206	0.086	0.028	4.69	15.7	0.767	18.6	5.76	1.61
E-205276	3-LA-C10	2.8	<2.1	205	384	1.73	0.305	0.0609	0.025	5.03	18.9	0.711	22.9	7.51	5.1
E-205277	LA-3-01-12	2.15	<1.6	267	344	0.758	0.19	0.0853	0.071	3.67	13.2	0.49	16	4.65	1.36
E-205278	LA-3-01-15	1.41	<2.1	279	338	1.82	0.17	<0.021	0.058	2.17	7.18	0.451	10.4	8.28	6.38
E-205279	4-LA-8	5.17	<8	<16	549	2.31	0.366	0.382	0.026	17.1	55.5	8.59	35.5	19.2	5.09
E-205280	3-LA-C13	1.97	<1.1	314	424	2.11	0.061	0.0316	0.034	1.87	6.79	0.12	7.26	4.45	1.25
E-205281	4-LA-7	10.3	<5.4	78.2	437	1.6	0.176	0.165	0.036	11	55.9	4.04	12.7	12.2	4.15
E-205282	4-LA-3	22.2	<1.8	375	599	2.58	0.0946	0.127	0.031	4.2	22.2	0.327	5.45	8	15.4
E-205283	LA-SWC-01-2	7.14	<3	159	450	2.06	0.118	0.0882	0.022	5.64	24.3	1.38	14.1	5.88	5
E-205284	4-LA-9	15.6	<7	<14	477	2.02	0.181	0.251	0.02	14.9	77.4	5.58	15.1	15.8	5.79
E-205285	4-LA-5	7.98	<6.1	31.4	423	1.71	0.183	<0.061	0.021	11.1	58.1	4.45	13.6	13	3.84

Lab No.	Field No.	Hg	Li	Mn	Mo	Nb	Ni	Pb	Rb	Sb	Sc	Se	Sn	Sr	Te	Th
		ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
E-205261	3-LA-8	0.03	16.8	131	0.68	2.01	24.2	5.35	18	0.556	4.76	3.8	9.73	587	0.0803	3.03
E-205262	LA-SWC-01-3	0.19	15.8	137	1.1	2.13	12.6	4.94	14.7	0.262	4.97	7.6	23.3	682	0.0856	3.01
E-205263	LA-SWC-00-3	0.23	15.9	74	0.524	2.14	14.7	4.36	15	0.571	5.85	4	2.5	500	0.0857	4.21
E-205264	LA-3-01-74	0.18	20.3	75.6	2.22	2.41	8.72	4.03	6.22	1.42	5.49	8.3	2.37	364	0.136	3.55
E-205265	4-LA-1	0.49	41.7	71.5	1.25	4.95	32.9	12.2	45.8	0.5	10.2	24.7	7.2	505	0.13	7.1
E-205266	4-LA-2	0.06	27.2	9.07	2.37	2.8	7.14	6.98	3.3	1.1	5.67	8.3	2	324	0.17	4.22
E-205267	4-LA-6	0.07	23.2	9.16	2.08	3.12	3.39	17.5	0.774	1.33	5.03	7.4	8.22	370	0.245	3.59
E-205268	4-LA-4	0.41	29.3	8.32	0.923	2.81	6.29	5.71	2.75	0.426	3.78	12.3	11.7	419	0.111	2.81
E-205269	3-LA-9	0.08	10.2	8.84	0.831	2.22	5.88	4.22	1.66	0.402	4.27	8.1	12	423	0.134	3.36
E-205270	LA-3-01-73	0.16	5.36	6.37	0.47	1.06	5.54	1.12	1.84	0.532	3.51	3.6	3.05	450	0.0658	1.46
E-205271	4-LA-10	0.61	14.9	17.3	7.59	2.81	16	3.7	15.2	0.853	10.1	8.1	2.72	474	0.116	2.14
E-205272	4-LA-12	0.24	32.7	19.6	1.24	8.44	20.8	11.1	58.2	0.712	9.29	10.1	6.11	161	0.155	9.29
E-205273	3-LA-C12	0.2	31	58.1	1.17	3.79	17.3	9.18	17.3	0.783	8.31	8	5.51	361	0.151	5.21
E-205274	4-LA-11	0.3	86.9	56.3	1.76	11.6	60.1	22.8	97.8	1.67	14.9	4.1	11.6	180	0.176	11.4
E-205275	3-LA-C14	0.11	16.7	36.1	1.46	2.49	12	5.59	10.2	0.823	4.94	6	17.7	380	0.135	3.2
E-205276	3-LA-C10	0.19	30	34.7	1.2	3.11	13.7	6.82	9.46	1.16	6.76	7.3	5.97	400	0.114	3.29
E-205277	LA-3-01-12	0.11	14.5	28	1.19	2.02	9.89	4.5	6.56	0.679	4.28	8.9	1.93	354	0.107	3.35
E-205278	LA-3-01-15	0.03	19	12.7	1.13	3.18	5.33	8.24	5.7	0.779	3.36	5.4	4.92	361	0.0923	4.98
E-205279	4-LA-8	1.6	66.9	63.3	1.27	9.22	27.3	21	110	0.875	13.6	3	80.3	243	0.151	10.5
E-205280	3-LA-C13	0.4	11.1	11.1	0.937	1.11	7.7	1.54	1.79	0.425	4.61	4.5	0.959	500	0.1	1.21
E-205281	4-LA-7	0.45	39.3	74.5	1.38	5.96	22	10.7	53.7	0.489	9.31	4	25.3	305	0.0904	7.24
E-205282	4-LA-3	0.39	6.17	70.9	3.23	5.13	9.86	1.26	6.11	0.654	11.4	12.1	1.5	667	0.0654	<1.4
E-205283	LA-SWC-01-2	0.06	15.2	216	0.529	3.06	19.9	5.91	17.4	0.559	5.91	4	18.3	482	0.0529	<2.4
E-205284	4-LA-9	0.43	47.6	160	1.53	9.41	36.5	14.4	76	0.634	12	3.5	8.57	247	0.125	8.78
E-205285	4-LA-5	0.27	37.8	67	1.28	7.19	22.2	11.5	59	0.53	9.38	3.5	72.5	277	0.0792	9.87

Lab No.	Field No.	Tl	U	V	Y	Zn	Zr
		ppm	ppm	ppm	ppm	ppm	ppm
E-205261	3-LA-8	0.124	0.989	35.8	8.22	29.5	56.9
E-205262	LA-SWC-01-3	0.113	1.57	37	11.1	30.1	53
E-205263	LA-SWC-00-3	0.333	1.09	39.5	9	24.5	52.1
E-205264	LA-3-01-74	0.459	1.95	46.8	7.98	61.3	48.2
E-205265	4-LA-1	1.05	2.9	61.5	14.6	95	101
E-205266	4-LA-2	0.076	1.97	44.3	7.76	2.44	49
E-205267	4-LA-6	0.0684	1.5	43.1	6.33	29.8	59
E-205268	4-LA-4	0.639	1.6	22.6	6.73	6.33	33.2
E-205269	3-LA-9	0.228	1.41	30.7	5.41	9.9	36
E-205270	LA-3-01-73	0.157	0.619	13.8	6.37	3.09	20.5
E-205271	4-LA-10	1.08	3.72	54.5	11.9	49.7	49.9
E-205272	4-LA-12	0.851	3.1	106	8.2	44.5	159
E-205273	3-LA-C12	0.602	1.96	67.4	12.7	43.6	45.5
E-205274	4-LA-11	1.34	4.18	180	14.6	132	150
E-205275	3-LA-C14	0.374	1.63	43.6	8.38	31.6	45.4
E-205276	3-LA-C10	0.548	1.62	48.5	10	46.7	58.1
E-205277	LA-3-01-12	0.3	1.41	37.8	7.54	25	38.7
E-205278	LA-3-01-15	0.172	1.85	20.1	8.67	20.5	37.3
E-205279	4-LA-8	0.66	4.21	137	18.3	117	180
E-205280	3-LA-C13	0.349	1.09	16.5	10.6	7.71	16.5
E-205281	4-LA-7	1.01	2.61	80.3	10.7	55.9	91.5
E-205282	4-LA-3	0.843	2.91	84.6	11.2	13.8	236
E-205283	LA-SWC-01-2	0.188	1.41	44.7	10.6	30.6	58.5
E-205284	4-LA-9	0.836	2.93	114	14.2	78.8	125
E-205285	4-LA-5	0.572	2.56	86.5	10.7	40.6	96.2

Appendix 3. Methane Desorption Data

Refer to Table 2 in text for sample intervals and descriptions.

Devon SFS Operating Co Etal 5 no. 1

LA-SWC-01-3
4-LA-1
3-LA-8
LA-SWC-00-3
LA-3-01-73
LA-3-01-74
4-LA-6
4-LA-2
4-LA-4

Devon SFS Operating Co Etal 9 no. 1

4-LA-3
LA-SWC-01-2
4-LA-9
4-LA-5
4-LA-7
3-LA-C13
4-LA-8
4-LA-10
4-LA-11
3-LA-C10
LA-3-01-12
3-LA-C12
3-LA-C14
4-LA-12
3-LA-9
LA-3-01-15

Project	DEVON			Cumulative volume @ STP:	98.5	Raw total gas (cc/g)	0.82
Well ID:	SFS # 5-1	Can no.	LA-SWC-01-3				
Sample Interval (ft):	From: 1681	To:	1692	Milliliters/gram raw coal:	0.57	DAF total gas (cc/g)	1.43
Core Date: (mm/dd/yr)			12/19/2001				
Time Zero-Coal penetrated (hh:mm) (24 hour clock)			21:45	Milliliter/gram coal d.a.f.: (excluding lost gas)	0.98	Raw total gas (SCF/ton)	26.39
Raw coal mass (air-dry): (grams)			174				
Coal mass (d.a.f.): (grams)			100.38	Lost gas estimate (cc) (from lost gas graph)	45	DAF total gas (SCF/ton)	45.74
Headspace volume: (cc)			0				
						Cuttings correction 25% (SCF/ton)	57.18

Sample Type: ○ Core ◉ Cuttings

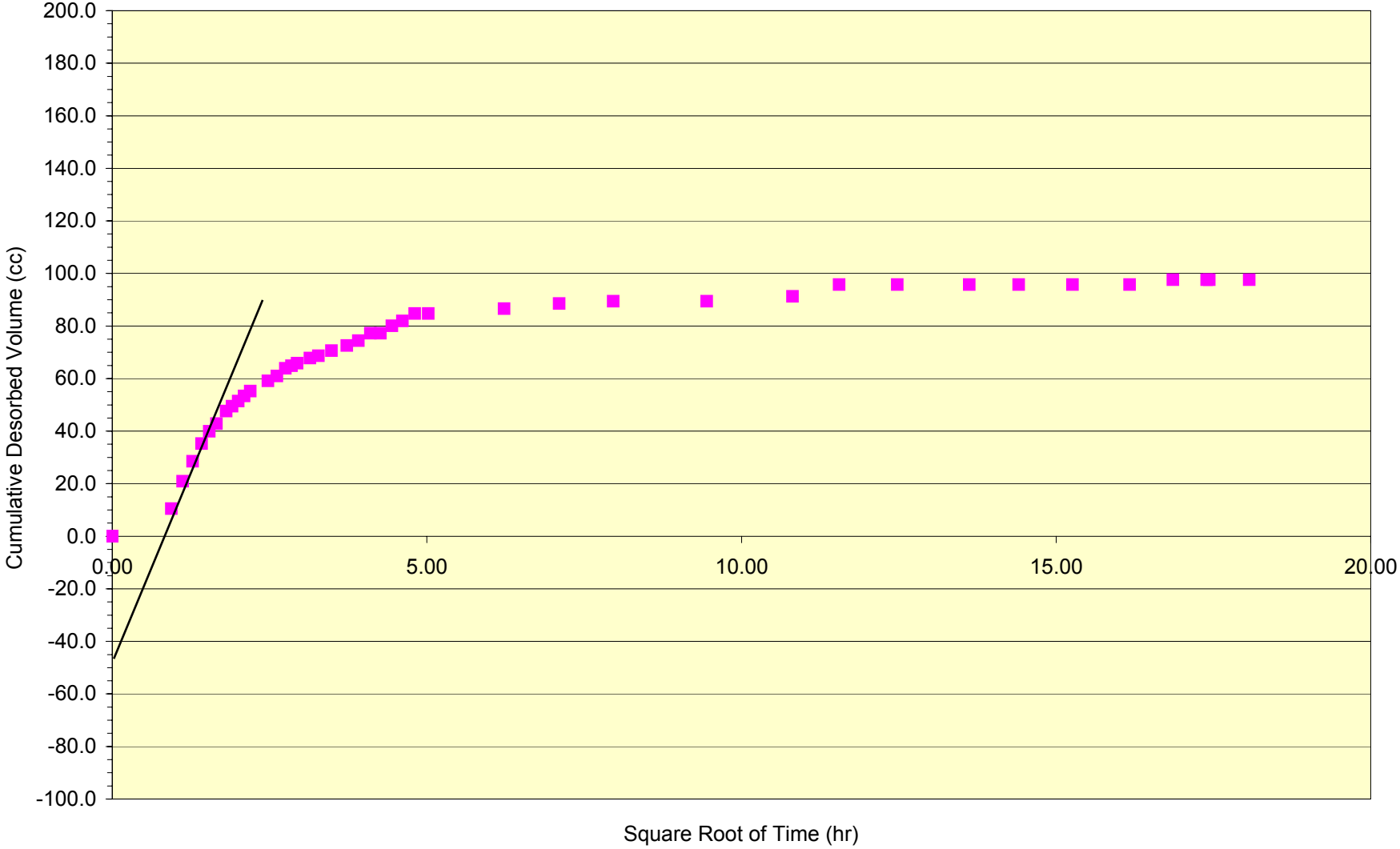
Data Summary: ◉ Final Results

enter data only in shaded areas, copy and paste formulas as needed to calculate more desorption data (columns H through N)

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction: Cumulative Volume @ STP (milliliter)	Headspace Correction: Cumulative Gas Content (SCF)
In Can	12/19/2001	22:16	57.0	30.082	0	80.0	0.00	0.00	0.72	0.00	0.00	0.0	0.0
1	12/19/2001	22:38	59.3	30.087	11	95.5	10.36	10.36	0.94	0.06	0.10	10.5	0.000
2	12/19/2001	23:00	61.4	30.090	11	97.0	10.33	20.69	1.12	0.12	0.21	20.9	0.001
3	12/19/2001	23:23	60.1	30.092	8	88.8	7.63	28.32	1.28	0.16	0.28	28.5	0.001
4	12/19/2001	23:46	59.5	30.093	7	90.8	6.65	34.97	1.42	0.20	0.35	35.2	0.001
5	12/20/2001	0:08	59.8	30.098	5	93.2	4.73	39.70	1.54	0.23	0.40	40.0	0.001
6	12/20/2001	0:30	58.9	30.091	3	92.9	2.84	42.54	1.66	0.24	0.42	42.8	0.002
7	12/20/2001	1:02	58.0	30.094	5	91.9	4.74	47.28	1.81	0.27	0.47	47.6	0.002
8	12/20/2001	1:23	57.5	30.092	2	94.2	1.89	49.17	1.91	0.28	0.49	49.5	0.002
9	12/20/2001	1:46	57.4	30.096	2	95.1	1.89	51.06	2.00	0.29	0.51	51.4	0.002
10	12/20/2001	2:09	57.8	30.097	2	91.1	1.90	52.96	2.10	0.30	0.53	53.3	0.002
11	12/20/2001	2:34	56.7	30.097	2	90.2	1.90	54.86	2.19	0.32	0.55	55.2	0.002
12	12/20/2001	3:53	56.5	30.113	4	92.0	3.79	58.65	2.48	0.34	0.58	59.1	0.002
13	12/20/2001	4:36	55.1	30.124	2	92.4	1.90	60.55	2.62	0.35	0.60	61.0	0.002
14	12/20/2001	5:19	54.5	30.128	3	93.4	2.84	63.39	2.75	0.36	0.63	63.9	0.002
15	12/20/2001	5:52	53.2	30.138	1	97.4	0.94	64.33	2.85	0.37	0.64	64.9	0.002
16	12/20/2001	6:23	53.5	30.146	1	94.4	0.95	65.28	2.94	0.38	0.65	65.8	0.002
17	12/20/2001	7:37	56.7	30.173	2	96.0	1.89	67.16	3.14	0.39	0.67	67.7	0.002
18	12/20/2001	8:30	58.3	30.182	1	98.3	0.94	68.10	3.28	0.39	0.68	68.7	0.002
19	12/20/2001	9:53	60.3	30.198	2	98.5	1.88	69.98	3.48	0.40	0.70	70.6	0.002
20	12/20/2001	11:39	60.3	30.177	2	97.0	1.88	71.87	3.73	0.41	0.72	72.5	0.003

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction Cumulative Volume @ STP (milliliter)	Headspace Correction Cumulative Gas Content (SCF)
21	12/20/2001	13:04	63.8	30.148	2	96.8	1.88	73.75	3.91	0.42	0.73	74.4	0.003
22	12/20/2001	14:36	67.4	30.134	3	97.9	2.81	76.56	4.10	0.44	0.76	77.2	0.003
23	12/20/2001	15:54	67.5	30.136	0	98.5	0.00	76.56	4.26	0.44	0.76	77.2	0.003
24	12/20/2001	17:31	66.3	30.133	3	99.0	2.82	79.39	4.45	0.46	0.79	80.1	0.003
25	12/20/2001	19:02	69.4	30.140	2	96.5	1.87	81.26	4.61	0.47	0.81	81.9	0.003
26	12/20/2001	20:52	69.4	30.149	3	100.3	2.84	84.10	4.81	0.48	0.84	84.7	0.003
27	12/20/2001	23:00	64.5	30.149	0	93.1	0.00	84.10	5.02	0.48	0.84	84.7	0.003
28	12/21/2001	12:33	64.0	30.080	2	96.0	1.88	85.98	6.23	0.49	0.86	86.6	0.003
29	12/22/2001	0:11	67.3	29.918	2	96.5	1.86	87.84	7.10	0.50	0.88	88.5	0.003
30	12/22/2001	13:11	71.0	29.775	1	98.8	0.93	88.77	7.96	0.51	0.88	89.4	0.003
31	12/22/2001	15:02	73.3	29.740	0	98.2	0.00	88.77	9.45	0.51	0.88	89.4	0.003
32	12/23/2001	18:40	71.1	29.380	2	99.8	1.81	90.58	10.81	0.52	0.90	91.2	0.003
33	12/24/2001	11:12	72.6	29.320	5	104.3	4.54	95.12	11.55	0.55	0.95	95.8	0.003
34	12/25/2001	9:25	72.6	29.590	0	102.1	0.00	95.12	12.48	0.55	0.95	95.8	0.003
35	12/26/2001	15:15	72.6	29.260	0	100.9	0.00	95.12	13.62	0.55	0.95	95.8	0.003
36	12/27/2001	13:20	12.4	29.210	0	99.0	0.00	95.12	14.41	0.55	0.95	95.8	0.003
37	12/28/2001	14:40	73.0	29.150	0	97.8	0.00	95.12	15.26	0.55	0.95	95.8	0.003
38	12/29/2001	19:15	72.8	29.440	0	96.8	0.00	95.12	16.17	0.55	0.95	95.8	0.003
39	12/30/2001	17:54	73.4	29.560	2	104.6	1.82	96.94	16.86	0.56	0.97	97.6	0.003
40	12/31/2001	12:23	74.1	29.590	0	105.1	0.00	96.94	17.40	0.56	0.97	97.6	0.003
41	1/1/2002	13:45	73.6	29.680	0	103.2	0.00	96.94	17.44	0.56	0.97	97.6	0.003
42	1/2/2002	12:21	73.6	29.800	0	106.1	0.00	96.94	18.07	0.56	0.97	97.6	0.003
43	1/5/2002	14:52	73.0	29.560	1	100.0	0.92	97.86	20.03	0.56	0.97	98.5	0.003
44	1/8/2002	14:19	73.1	29.500	0	100.1	0.00	97.86	21.74	0.56	0.97	98.5	0.003
45	1/9/2002	13:15	74.3	29.230	0	100.5	0.00	97.86	22.26	0.56	0.97	98.5	0.003
46	1/10/2002	17:06	72.8	29.350	0	103.4	0.00	97.86	22.88	0.56	0.97	98.5	0.003
47	1/11/2002	6:43	74.2	29.440	0	102.4	0.00	97.86	31.51	0.56	0.97	98.5	0.003

DEVON SFS # 5-1 can LA-SWC-01-3



Project	DEVON				Cumulative volume @ STP:	1241.4	Raw total gas (g/cc) 0.98
Well ID:	SFS # 5-1	Can no.	4-LA-1				
Sample Interval (ft):	From: 1679.2	To:	1680.2		Milliliters/gram raw coal:	0.61	DAF total gas (g/cc) 2.28
Core Date: (mm/dd/yr)			12/19/2001				
Time Zero-Coal penetrated (hh:mm) (24 hour clock)			22:33		Milliliter/gram coal d.a.f.: (excluding lost gas)	1.42	Raw total gas (SCF/ton) 31.39
Raw coal mass (air-dry): (grams)			2030				
Coal mass (d.a.f.): (grams)			872.4		Lost gas estimate (cc) (from lost gas graph)	750	DAF total gas (SCF/ton) 73.04
Headspace volume: (cc)			0				Cuttings correction 25% (SCF/ton) N/A

Sample Type: (●) Core ( ) Cuttings

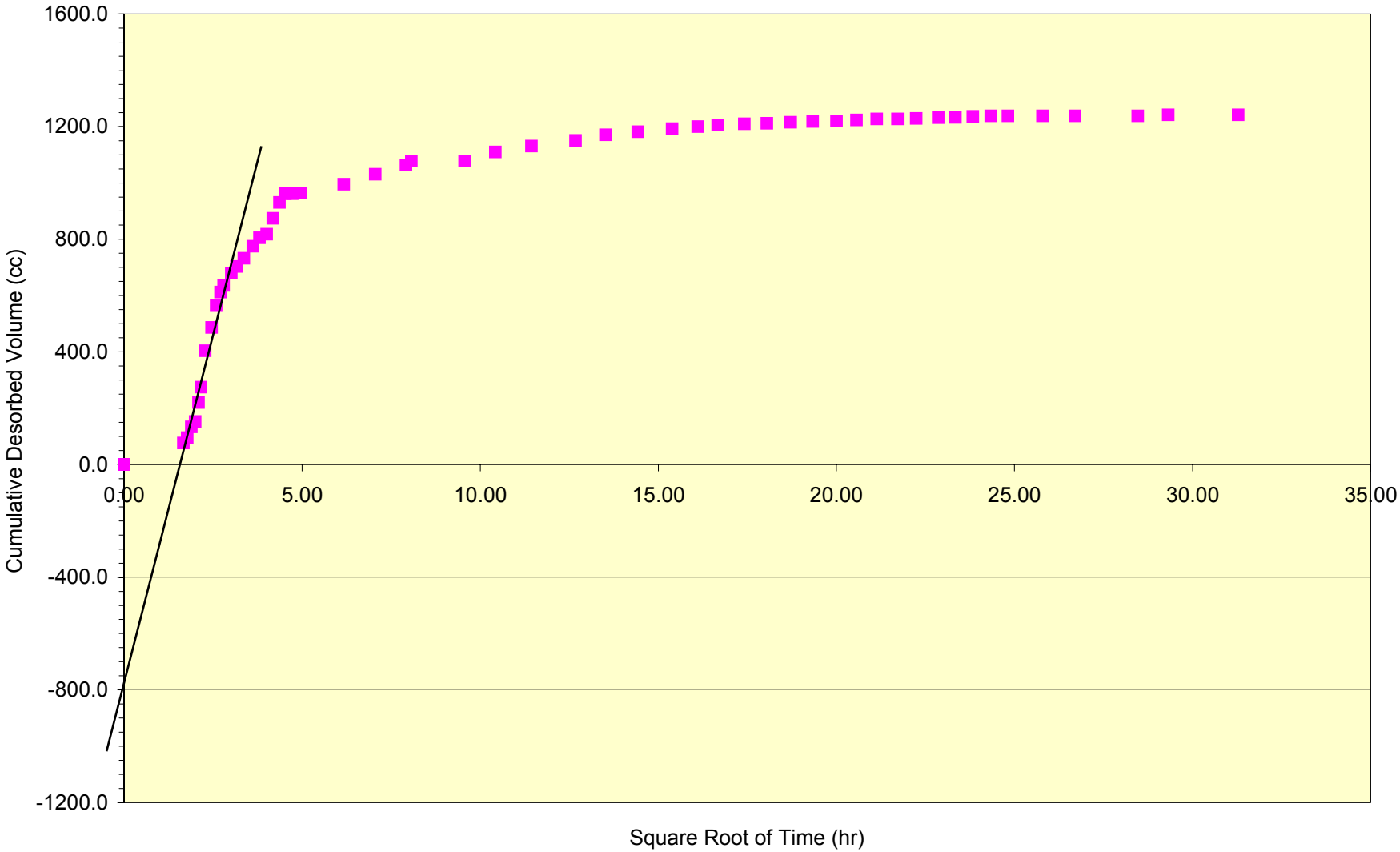
Data Summary: ( ) Preliminary (●) Final Results

enter data only in shaded areas, copy and paste formulas as needed to calculate more desorption data (columns H through N)

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction: Cumulative Volume @ STP (milliliter)	Headspace Correction: Cumulative Gas Content (SCF)
In Can	12/20/2001	0:56	57.0	30.094	0	80.0	0.00	0.00	1.54	0.00	0.00	0.0	0.0
1	12/20/2001	1:20	57.1	30.094	80	83.5	77.03	77.03	1.67	0.04	0.09	76.6	0.003
2	12/20/2001	1:43	57.0	30.094	20	84.9	19.21	96.24	1.78	0.05	0.11	95.7	0.003
3	12/20/2001	2:07	57.1	30.097	40	87.0	38.27	134.51	1.89	0.07	0.15	134.0	0.005
4	12/20/2001	2:32	56.4	30.096	20	86.4	19.16	153.67	2.00	0.08	0.18	153.1	0.005
5	12/20/2001	2:55	57.1	30.104	70	87.3	66.96	220.62	2.09	0.11	0.25	220.2	0.008
6	12/20/2001	3:15	56.6	30.104	57	88.5	54.40	275.02	2.17	0.14	0.32	274.8	0.010
7	12/20/2001	3:45	56.5	30.113	135	88.2	128.95	403.98	2.28	0.20	0.46	404.2	0.014
8	12/20/2001	4:36	55.3	30.125	86	90.1	81.90	485.88	2.46	0.24	0.56	486.9	0.017
9	12/20/2001	5:15	55.6	30.128	80	96.9	75.26	561.14	2.59	0.28	0.64	563.7	0.020
10	12/20/2001	5:53	54.4	30.138	50	97.7	46.99	608.12	2.71	0.30	0.70	611.9	0.022
11	12/20/2001	6:23	53.5	30.146	25	97.5	23.51	631.63	2.80	0.31	0.72	636.0	0.022
12	12/20/2001	7:37	56.7	30.173	45	97.3	42.37	674.00	3.01	0.33	0.77	679.3	0.024
13	12/20/2001	8:30	58.3	30.182	25	97.7	23.53	697.52	3.15	0.34	0.80	703.2	0.025
14	12/20/2001	9:52	60.3	30.198	30	97.3	28.27	725.79	3.36	0.36	0.83	731.8	0.026
15	12/20/2001	11:39	60.1	30.177	45	98.6	42.27	768.06	3.62	0.38	0.88	774.8	0.027
16	12/20/2001	13:01	63.8	30.148	32	100.4	29.94	798.00	3.80	0.39	0.91	805.0	0.028
17	12/20/2001	14:34	67.4	30.134	13	101.2	12.14	810.14	4.00	0.40	0.93	817.3	0.029
18	12/20/2001	16:01	67.3	30.134	60	101.3	56.01	866.15	4.18	0.43	0.99	873.6	0.031
19	12/20/2001	17:35	66.3	30.134	60	101.2	56.02	922.18	4.36	0.45	1.06	930.1	0.033
20	12/20/2001	19:06	69.9	30.140	33	101.5	30.80	952.98	4.53	0.47	1.09	961.0	0.034
21	12/20/2001	20:54	69.4	30.149	0	101.7	0.00	952.98	4.73	0.47	1.09	961.0	0.034
22	12/20/2001	23:04	65.2	30.147	3	98.9	2.81	955.79	4.95	0.47	1.10	963.8	0.034
23	12/21/2001	12:35	64.0	30.080	33	101.5	30.74	986.53	6.17	0.49	1.13	995.0	0.035

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction Cumulative Volume @ STP (milliliter)	Headspace Correction Cumulative Gas Content (SCF)
24	12/22/2001	0:21	67.3	29.917	38	100.3	35.28	1021.82	7.06	0.50	1.17	1030.4	0.036
25	12/22/2001	13:13	71.0	29.775	36	102.2	33.15	1054.97	7.92	0.52	1.21	1063.6	0.038
26	12/22/2001	15:41	73.2	29.740	16	101.6	14.73	1069.71	8.07	0.53	1.23	1078.3	0.038
27	12/23/2001	18:03	70.0	29.410	0	99.9	0.00	1069.71	9.57	0.53	1.23	1078.3	0.038
28	12/24/2001	11:14	72.6	29.320	35	111.2	31.24	1100.95	10.43	0.54	1.26	1110.0	0.039
29	12/25/2001	9:25	72.6	29.590	23	108.7	20.81	1121.76	11.44	0.55	1.29	1131.0	0.040
30	12/26/2001	15:15	72.6	29.260	22	110.1	19.63	1141.39	12.68	0.56	1.31	1150.9	0.041
31	12/27/2001	13:20	72.4	29.210	22	109.6	19.62	1161.01	13.52	0.57	1.33	1170.7	0.041
32	12/28/2001	14:40	73.0	29.150	12	101.6	10.83	1171.84	14.43	0.58	1.34	1181.5	0.042
33	12/29/2001	19:18	72.8	29.440	12	109.8	10.78	1182.62	15.39	0.58	1.36	1192.4	0.042
34	12/30/2001	17:59	73.4	29.560	8	110.9	7.20	1189.82	16.11	0.59	1.36	1199.7	0.042
35	12/31/2001	12:27	74.1	29.590	6	111.2	5.40	1195.23	16.67	0.59	1.37	1205.1	0.043
36	1/1/2002	13:48	73.6	29.680	5	111.0	4.52	1199.75	17.41	0.59	1.38	1209.7	0.043
37	1/2/2002	12:24	73.6	29.800	2	111.2	1.81	1201.56	18.05	0.59	1.38	1211.6	0.043
38	1/3/2002	12:50	73.2	29.440	4	110.6	3.59	1205.15	18.72	0.59	1.38	1215.2	0.043
39	1/4/2002	12:26	73.0	29.650	3	111.0	2.71	1207.86	19.34	0.60	1.38	1217.9	0.043
40	1/5/2002	14:55	73.0	29.560	2	111.1	1.80	1209.66	20.01	0.60	1.39	1219.8	0.043
41	1/6/2002	13:42	73.2	29.060	4	110.4	3.54	1213.21	20.57	0.60	1.39	1223.3	0.043
42	1/7/2002	13:19	73.7	29.180	4	110.3	3.56	1216.76	21.14	0.60	1.39	1226.9	0.043
43	1/8/2002	14:20	73.1	29.500	0	109.3	0.00	1216.76	21.72	0.60	1.39	1226.9	0.043
44	1/9/2002	13:16	74.3	29.230	2	108.0	1.79	1218.55	22.24	0.60	1.40	1228.7	0.043
45	1/10/2002	17:09	72.8	29.350	3	109.8	2.69	1221.24	22.86	0.60	1.40	1231.5	0.043
46	1/11/2002	15:29	74.2	29.440	1	111.1	0.90	1222.14	23.34	0.60	1.40	1232.4	0.044
47	1/12/2002	14:28	73.6	29.320	4	111.6	3.57	1225.71	23.83	0.60	1.40	1236.0	0.044
48	1/13/2002	14:45	73.6	29.290	2	111.8	1.78	1227.49	24.34	0.60	1.41	1237.8	0.044
49	1/14/2002	14:33	73.3	29.440	0	111.8	0.00	1227.49	24.82	0.60	1.41	1237.8	0.044
50	1/16/2002	15:29	74.2	29.740	0	110.3	0.00	1227.49	25.79	0.60	1.41	1237.8	0.044
51	1/18/2002	15:36	73.7	29.650	0	109.6	0.00	1227.49	26.70	0.60	1.41	1237.8	0.044
52	1/22/2002	16:40	73.4	29.850	0	108.4	0.00	1227.49	28.46	0.60	1.41	1237.8	0.044
53	1/24/2002	18:18	73.4	29.230	4	108.7	3.58	1231.06	29.32	0.61	1.41	1241.4	0.044
54	1/29/2002	17:04	72.9	29.530	0	107.4	0.00	1231.06	31.28	0.61	1.41	1241.4	0.044

DEVON SFS # 5-1 can 4-LA-1



Project	DEVON				Cumulative volume @ STP:	346.2	Raw total gas (g/cc) 0.57
Well ID:	SFS # 5-1	Can no.	3-LA-8				
Sample Interval (ft):	From: 2033	To:	2035		Milliliters/gram raw coal:	0.46	DAF total gas (g/cc) 1.02
Core Date: (mm/dd/yr)			12/20/2001				
Time Zero-Coal penetrated (hh:mm) (24 hour clock)			10:34		Milliliter/gram coal d.a.f.: (excluding lost gas)	0.83	Raw total gas (SCF/ton) 18.23
Raw coal mass (air-dry): (grams)			748				
Coal mass (d.a.f.): (grams)			419.1		Lost gas estimate (cc) (from lost gas graph)	80	DAF total gas (SCF/ton) 32.54
Headspace volume: (cc)			0				
							Cuttings correction 25% (SCF/ton) 40.67

Sample Type: ○ Core ● Cuttings

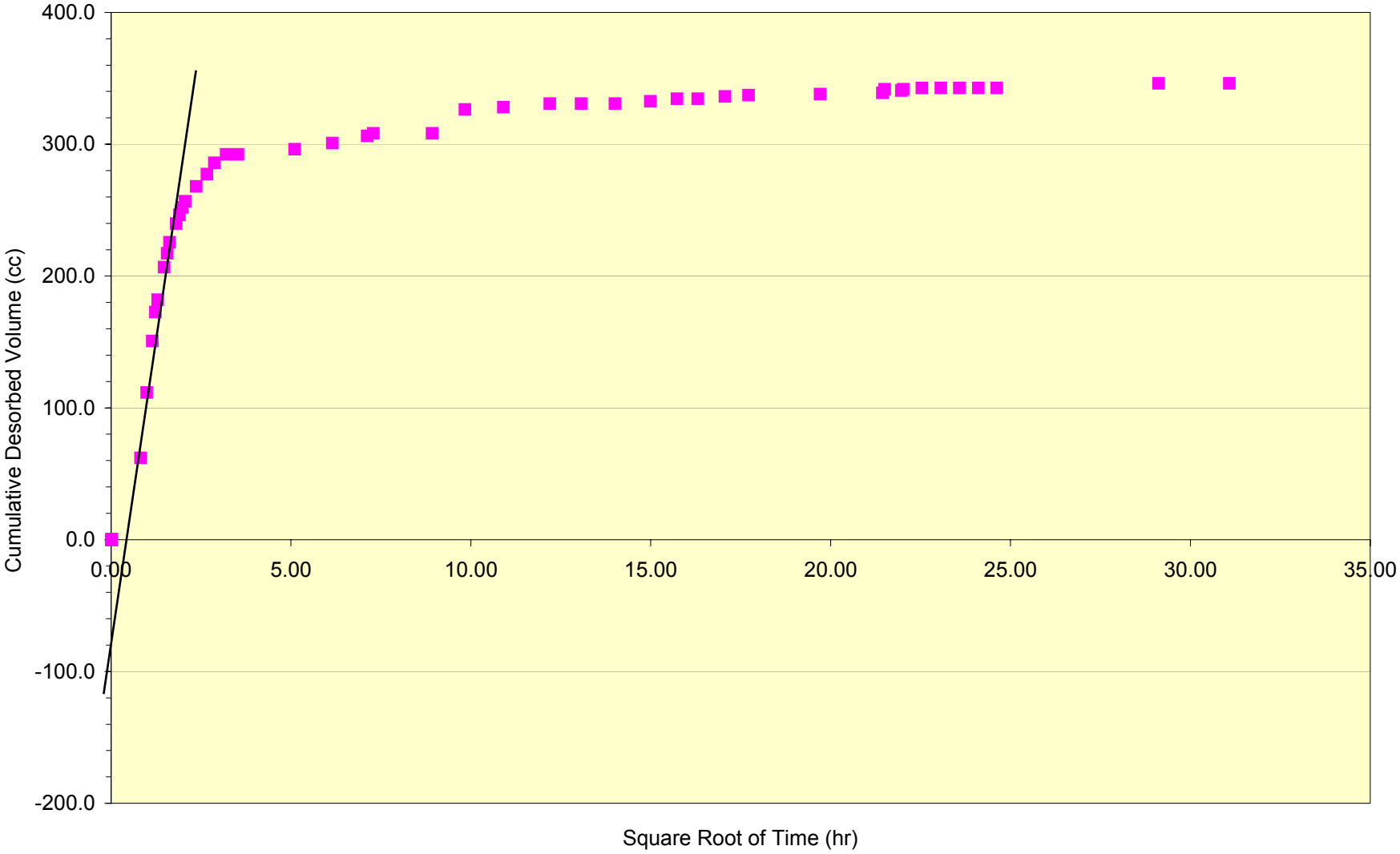
Data Summary: ○ Preliminary ● Final Results

enter data only in shaded areas, copy and paste formulas as needed to calculate more desorption data (columns H through N)

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction: Cumulative Volume @ STP (milliliter)	Headspace Correction: Cumulative Gas Content (SCF)
In Can	12/20/2001	10:58	58.3	30.196	0	71.0	0.00	0.00	0.63	0.00	0.00	0.0	0.0
1	12/20/2001	11:14	60.0	30.190	65	79.8	63.22	63.22	0.82	0.08	0.15	62.1	0.002
2	12/20/2001	11:33	60.3	30.183	52	84.0	50.17	113.39	0.99	0.15	0.27	111.7	0.004
3	12/20/2001	11:53	61.2	30.174	41	87.0	39.33	152.72	1.15	0.20	0.36	150.7	0.005
4	12/20/2001	12:05	61.6	30.167	23	89.9	21.94	174.66	1.23	0.23	0.42	172.6	0.006
5	12/20/2001	12:15	61.6	30.163	10	90.8	9.52	184.18	1.30	0.25	0.44	182.1	0.006
6	12/20/2001	12:45	63.8	30.152	26	95.5	24.54	208.72	1.48	0.28	0.50	206.7	0.007
7	12/20/2001	13:00	63.8	30.148	11	96.2	10.37	219.09	1.56	0.29	0.52	217.1	0.008
8	12/20/2001	13:13	64.1	30.148	9	96.5	8.48	227.57	1.63	0.30	0.54	225.6	0.008
9	12/20/2001	13:51	66.1	30.138	15	98.0	14.09	241.66	1.81	0.32	0.58	239.7	0.008
10	12/20/2001	14:12	66.8	30.136	7	97.7	6.58	248.24	1.91	0.33	0.59	246.3	0.009
11	12/20/2001	14:28	67.6	30.135	6	99.7	5.62	253.85	1.97	0.34	0.61	251.9	0.009
12	12/20/2001	14:48	67.1	30.132	5	100.1	4.68	258.53	2.06	0.35	0.62	256.6	0.009
13	12/20/2001	16:10	66.6	30.130	12	100.5	11.22	269.75	2.37	0.36	0.64	267.9	0.009
14	12/20/2001	17:41	68.4	30.135	10	99.1	9.37	279.12	2.67	0.37	0.67	277.3	0.010
15	12/20/2001	18:50	69.3	30.139	9	100.9	8.41	287.53	2.88	0.38	0.69	285.7	0.010
16	12/20/2001	20:49	69.1	30.140	7	100.9	6.54	294.07	3.20	0.39	0.70	292.3	0.010
17	12/20/2001	23:01	64.5	30.149	0	100.9	0.00	294.07	3.53	0.39	0.70	292.3	0.010
18	12/21/2001	12:37	64.0	30.080	4	100.0	3.74	297.81	5.10	0.40	0.71	296.1	0.010
19	12/22/2001	0:22	67.3	29.917	5	98.6	4.66	302.46	6.15	0.40	0.72	300.7	0.011

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction Cumulative Volume @ STP (milliliter)	Headspace Correction Cumulative Gas Content (SCF)
20	12/22/2001	13:14	71.0	29.775	6	101.5	5.53	308.00	7.12	0.41	0.73	306.3	0.011
21	12/22/2001	15:46	73.2	29.740	2	99.3	1.85	309.85	7.29	0.41	0.74	308.1	0.011
22	12/23/2001	18:10	70.0	29.410	0	98.1	0.00	309.85	8.92	0.41	0.74	308.1	0.011
23	12/24/2001	11:16	72.6	29.320	20	107.8	17.96	327.80	9.83	0.44	0.78	326.2	0.012
24	12/25/2001	9:29	72.6	29.590	2	103.0	1.83	329.63	10.90	0.44	0.79	328.0	0.012
25	12/26/2001	15:15	72.6	29.260	3	103.9	2.71	332.34	12.19	0.44	0.79	330.7	0.012
26	12/27/2001	13:20	72.4	29.210	0	103.2	0.00	332.34	13.07	0.44	0.79	330.7	0.012
27	12/28/2001	14:40	73.0	29.150	0	102.7	0.00	332.34	14.00	0.44	0.79	330.7	0.012
28	12/29/2001	19:20	72.8	29.440	2	104.2	1.81	334.15	14.99	0.45	0.80	332.6	0.012
29	12/30/2001	18:02	73.4	29.560	2	106.2	1.82	335.97	15.73	0.45	0.80	334.4	0.012
30	12/31/2001	12:39	74.1	29.590	0	106.6	0.00	335.97	16.31	0.45	0.80	334.4	0.012
31	1/1/2002	13:51	73.6	29.680	2	106.6	1.82	337.79	17.07	0.45	0.81	336.2	0.012
32	1/2/2002	12:33	73.6	29.800	1	104.3	0.92	338.71	17.72	0.45	0.81	337.1	0.012
33	1/5/2002	14:56	73.0	29.560	1	102.9	0.91	339.62	19.71	0.45	0.81	338.0	0.012
34	1/8/2002	14:23	73.1	29.500	1	104.8	0.91	340.53	21.44	0.46	0.81	339.0	0.012
35	1/9/2002	13:18	74.3	29.230	2	108.8	1.79	342.32	21.97	0.46	0.82	340.8	0.012
36	1/10/2002	17:10	72.8	29.350	1	107.9	0.90	343.22	21.51	0.46	0.82	341.7	0.012
37	1/11/2002	15:30	74.2	29.440	0	109.6	0.00	343.22	22.02	0.46	0.82	341.7	0.012
38	1/12/2002	14:32	73.6	29.320	1	109.8	0.89	344.11	22.54	0.46	0.82	342.6	0.012
39	1/13/2002	14:47	73.6	29.290	0	106.8	0.00	344.11	23.07	0.46	0.82	342.6	0.012
40	1/14/2002	14:35	73.3	29.440	0	110.4	0.00	344.11	23.58	0.46	0.82	342.6	0.012
41	1/18/2002	15:37	73.7	29.650	0	107.5	0.00	344.11	24.10	0.46	0.82	342.6	0.012
42	1/22/2002	16:43	73.4	29.850	0	107.3	0.00	344.11	24.62	0.46	0.82	342.6	0.012
43	1/24/2002	18:21	73.4	29.230	4	106.7	3.59	347.70	29.12	0.46	0.83	346.2	0.012
44	1/29/2002	17:06	72.9	29.530	0	106.8	0.00	347.70	31.09	0.46	0.83	346.2	0.012

DEVON SFS # 5-1 can 3-LA-8



Project	DEVON				Cumulative volume @ STP:	654.3	Raw total gas (g/cc)	1.85
Well ID:	SFS # 5-1	Can no.	LA-SWC-00-3				
Sample Interval (ft):	From:	2240.2	To:	2243.2	Milliliters/gram raw coal:	1.34	DAF total gas (g/cc)	3.04
Core Date: (mm/dd/yr)				12/20/2001			
Time Zero-Coal penetrated (hh:mm) (24 hour clock)				22:35	Milliliter/gram coal d.a.f.:	2.20	Raw total gas (SCF/ton)	59.06
Raw coal mass (air-dry): (grams)				490	(excluding lost gas)			
Coal mass (d.a.f.): (grams)				297.53	Lost gas estimate (cc)	250	DAF total gas (SCF/ton)	97.26
Headspace volume: (cc)				0	(from lost gas graph)			
							Cuttings correction 25% (SCF/ton)	121.57

Sample Type: ○ Core ◉ Cuttings

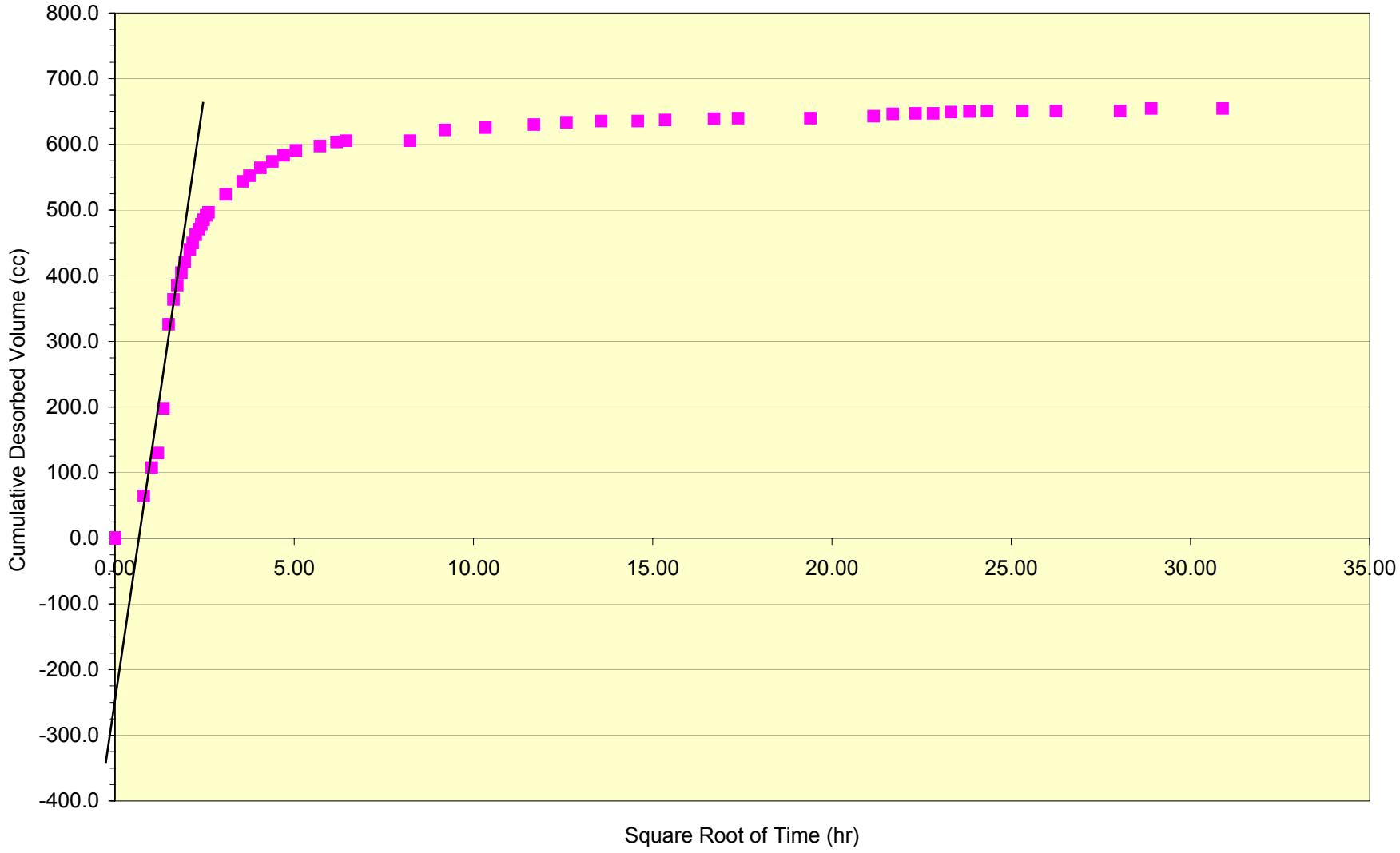
Data Summary: ◉ Final Results

enter data only in shaded areas, copy and paste formulas as needed to calculate more desorption data (columns H through N)

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction: Cumulative Volume @ STP (milliliter)	Headspace Correction: Cumulative Gas Content (SCF)
In Can	12/20/2001	22:53	60.0	30.152	0	80.0	0.00	0.00	0.55	0.00	0.00	0.0	0.0
1	12/20/2001	23:14	64.5	30.144	68	84.5	65.46	65.46	0.81	0.13	0.22	64.3	0.002
2	12/20/2001	23:38	64.3	30.139	46	90.7	43.78	109.24	1.02	0.22	0.37	107.7	0.004
3	12/21/2001	0:01	62.4	30.133	23	94.8	21.72	130.96	1.20	0.27	0.44	129.6	0.005
4	12/21/2001	0:25	61.1	30.129	72	96.1	67.83	198.80	1.35	0.41	0.67	198.0	0.007
5	12/21/2001	0:49	62.7	30.122	135	98.4	126.64	325.43	1.49	0.66	1.09	325.9	0.012
6	12/21/2001	1:15	63.0	30.119	40	98.6	37.50	362.94	1.63	0.74	1.22	363.8	0.013
7	12/21/2001	1:37	63.1	30.120	23	99.6	21.53	384.47	1.74	0.78	1.29	385.6	0.014
8	12/21/2001	2:01	59.2	30.121	20	99.9	18.71	403.18	1.85	0.82	1.36	404.7	0.014
9	12/21/2001	2:23	58.9	30.118	17	99.0	15.93	419.10	1.95	0.86	1.41	420.9	0.015
10	12/21/2001	2:57	57.9	30.116	20	98.3	18.76	437.86	2.09	0.89	1.47	440.0	0.016
11	12/21/2001	3:18	57.3	30.117	10	96.8	9.41	447.27	2.17	0.91	1.50	449.6	0.016
12	12/21/2001	3:40	58.5	30.118	13	97.0	12.22	459.49	2.25	0.94	1.54	462.0	0.016
13	12/21/2001	4:05	58.1	30.114	9	98.6	8.44	467.93	2.35	0.95	1.57	470.6	0.017
14	12/21/2001	4:23	58.5	30.120	8	98.9	7.50	475.43	2.41	0.97	1.60	478.2	0.017
15	12/21/2001	4:43	57.8	30.121	7	99.3	6.56	481.98	2.48	0.98	1.62	484.9	0.017
16	12/21/2001	5:03	59.0	30.121	7	99.8	6.55	488.53	2.54	1.00	1.64	491.6	0.017
17	12/21/2001	5:23	58.3	30.122	5	99.6	4.68	493.21	2.61	1.01	1.66	496.4	0.018
18	12/21/2001	8:07	52.6	30.142	28	100.8	26.17	519.38	3.09	1.06	1.75	523.5	0.018
19	12/21/2001	11:19	58.7	30.133	21	101.5	19.60	538.98	3.57	1.10	1.81	543.5	0.019
20	12/21/2001	12:39	64.0	30.080	9	103.0	8.35	547.33	3.75	1.12	1.84	552.0	0.019
21	12/21/2001	15:04	63.1	30.014	13	104.0	12.03	559.35	4.06	1.14	1.88	564.3	0.020

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction Cumulative Volume @ STP (milliliter)	Headspace Correction Cumulative Gas Content (SCF)
22	12/21/2001	17:52	65.6	29.998	10	104.1	9.22	568.57	4.39	1.16	1.91	573.7	0.020
23	12/21/2001	20:44	68.3	29.982	10	106.0	9.22	577.79	4.71	1.18	1.94	583.0	0.021
24	12/22/2001	0:05	67.3	29.927	8	105.4	7.40	585.19	5.05	1.19	1.97	590.5	0.021
25	12/22/2001	7:16	63.5	29.862	7	102.6	6.44	591.63	5.72	1.21	1.99	597.0	0.021
26	12/22/2001	12:52	70.9	29.790	7	104.5	6.45	598.08	6.19	1.22	2.01	603.5	0.021
27	12/22/2001	16:07	73.2	29.732	2	102.3	1.85	599.93	6.44	1.22	2.02	605.3	0.021
28	12/23/2001	18:14	70.0	29.410	0	99.6	0.00	599.93	8.22	1.22	2.02	605.3	0.021
29	12/24/2001	11:19	72.6	29.320	18	105.3	16.37	616.30	9.21	1.26	2.07	621.6	0.022
30	12/25/2001	9:25	72.6	29.990	4	100.7	3.70	620.00	10.34	1.27	2.08	625.3	0.022
31	12/26/2001	15:15	72.6	29.260	5	103.1	4.50	624.50	11.69	1.27	2.10	629.9	0.022
32	12/27/2001	13:20	72.4	29.210	4	105.1	3.59	628.10	12.60	1.28	2.11	633.5	0.022
33	12/28/2001	14:40	73.0	29.150	2	105.3	1.80	629.90	13.57	1.29	2.12	635.3	0.022
34	12/29/2001	19:23	72.8	29.440	0	103.2	0.00	629.90	14.59	1.29	2.12	635.3	0.022
35	12/30/2001	18:05	73.4	29.590	2	107.7	1.81	631.71	15.35	1.29	2.12	637.1	0.022
36	1/1/2002	13:55	73.6	29.680	2	108.6	1.82	633.53	16.71	1.29	2.13	638.9	0.023
37	1/2/2002	12:38	73.6	29.800	1	106.2	0.92	634.45	17.38	1.29	2.13	639.8	0.023
38	1/5/2002	14:58	73.0	29.560	0	105.5	0.00	634.45	19.40	1.29	2.13	639.8	0.023
39	1/8/2002	14:25	73.1	29.500	3	104.5	2.73	637.17	21.16	1.30	2.14	642.6	0.023
40	1/9/2002	13:20	74.3	29.230	4	104.7	3.59	640.76	21.70	1.31	2.15	646.2	0.023
41	1/10/2002	17:11	72.8	29.350	1	107.1	0.90	641.66	22.33	1.31	2.16	647.1	0.023
42	1/11/2002	15:32	74.2	29.440	0	106.6	0.00	641.66	22.82	1.31	2.16	647.1	0.023
43	1/12/2002	14:35	73.6	29.320	2	107.4	1.80	643.45	23.32	1.31	2.16	648.9	0.023
44	1/13/2002	14:48	73.6	29.290	1	107.9	0.89	644.35	23.84	1.31	2.17	649.8	0.023
45	1/14/2002	14:37	73.3	29.440	1	109.2	0.89	645.24	24.33	1.32	2.17	650.7	0.023
46	1/16/2002	15:30	74.2	29.740	0	114.6	0.00	645.24	25.32	1.32	2.17	650.7	0.023
47	1/18/2002	15:38	73.7	29.650	0	111.9	0.00	645.24	26.25	1.32	2.17	650.7	0.023
48	1/22/2002	16:45	73.4	29.850	0	111.9	0.00	645.24	28.04	1.32	2.17	650.7	0.023
49	1/24/2002	18:23	73.4	29.230	4	112.2	3.56	648.80	28.91	1.32	2.18	654.3	0.023
50	1/29/2002	17:08	72.9	29.530	0	111.2	0.00	648.80	30.90	1.32	2.18	654.3	0.023

DEVON SFS # 5-1 can LA-SWC-00-3



Project	DEVON				Cumulative volume @ STP:	1271.4	Raw total gas (cc/g)	4.66
Well ID:	SFS # 5-1	Can no.	LA-3-01-73				
Sample Interval (ft):	From:	2240.2	To:	2243.2	Milliliters/gram raw coal:	2.50	DAF total gas (cc/g)	6.50
Core Date: (mm/dd/yr)				12/20/2001			
Time Zero-Coal penetrated (hh:mm) (24 hour clock)				23:58	Milliliter/gram coal d.a.f.:	3.49	Raw total gas (SCF/ton)	149.09
Raw coal mass (air-dry): (grams)				509	(excluding lost gas)			
Coal mass (d.a.f.): (grams)				364.56	Lost gas estimate (cc)	1100	DAF total gas (SCF/ton)	208.16
Headspace volume: (cc)				0	(from lost gas graph)			
							Cuttings correction 25% (SCF/ton)	N/A

Sample Type: (●) Core ( ) Cuttings

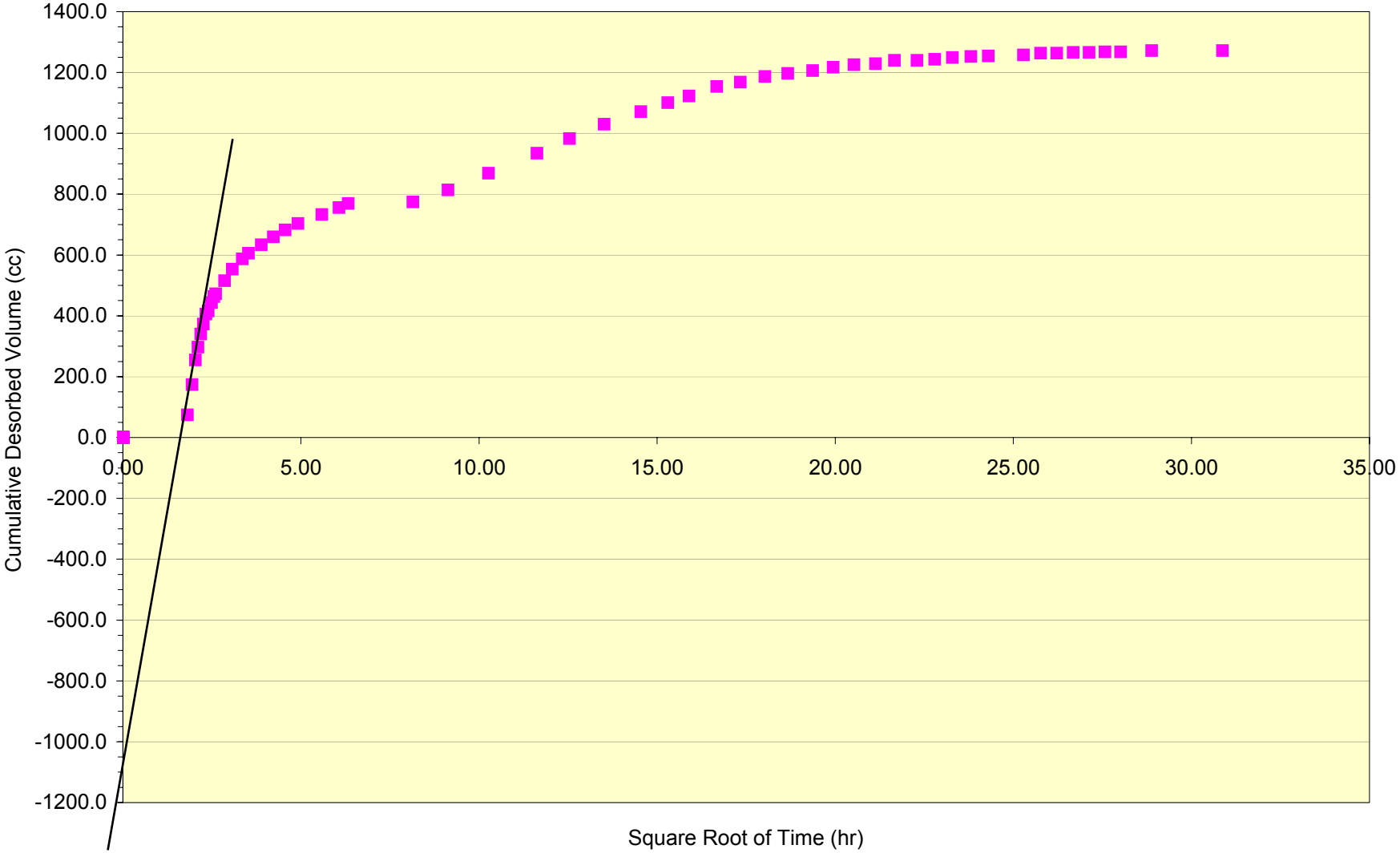
Data Summary: ( ) Preliminary (●) Final Results

enter data only in shaded areas, copy and paste formulas as needed to calculate more desorption data (columns H through N)

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction: Cumulative Volume @ STP (milliliter)	Headspace Correction: Cumulative Gas Content (SCF)
In Can	12/21/2001	2:53	57.9	30.116	0	80.0	0.00	0.00	1.71	0.00	0.00	0.0	0.0
1	12/21/2001	3:15	61.2	30.117	78	96.3	73.43	73.43	1.81	0.14	0.20	74.1	0.003
2	12/21/2001	3:45	61.7	30.118	105	101.0	98.02	171.46	1.95	0.34	0.47	173.8	0.006
3	12/21/2001	4:08	62.0	30.114	85	102.8	79.09	250.54	2.04	0.49	0.69	254.4	0.009
4	12/21/2001	4:25	62.0	30.120	45	103.6	41.82	292.36	2.11	0.57	0.80	297.1	0.010
5	12/21/2001	4:45	63.0	30.121	45	104.5	41.75	334.12	2.19	0.66	0.92	339.7	0.012
6	12/21/2001	5:04	63.0	30.121	35	105.5	32.42	366.54	2.26	0.72	1.01	372.9	0.013
7	12/21/2001	5:24	63.3	30.122	35	105.6	32.41	398.95	2.33	0.78	1.09	406.0	0.014
8	12/21/2001	5:43	62.5	30.127	10	105.7	9.26	408.21	2.40	0.80	1.12	415.5	0.015
9	12/21/2001	6:10	62.0	30.126	30	105.9	27.77	435.98	2.49	0.86	1.20	444.0	0.016
10	12/21/2001	6:30	61.3	30.126	20	104.4	18.56	454.55	2.56	0.89	1.25	463.0	0.016
11	12/21/2001	6:46	60.2	30.128	10	105.4	9.27	463.81	2.61	0.91	1.27	472.5	0.017
12	12/21/2001	8:08	58.6	30.142	45	106.4	41.64	505.45	2.86	0.99	1.39	515.5	0.018
13	12/21/2001	9:25	59.2	30.160	40	105.0	37.13	542.58	3.07	1.07	1.49	553.7	0.020
14	12/21/2001	11:14	60.6	30.133	35	106.9	32.35	574.93	3.36	1.13	1.58	587.0	0.021
15	12/21/2001	12:26	64.4	30.080	20	103.2	18.57	593.51	3.53	1.17	1.63	605.9	0.021
16	12/21/2001	15:04	70.2	30.014	30	107.2	27.61	621.11	3.89	1.22	1.70	633.8	0.022
17	12/21/2001	17:51	65.6	29.998	27	108.2	24.79	645.90	4.23	1.27	1.77	659.1	0.023
18	12/21/2001	20:45	68.3	29.982	25	107.6	22.96	668.87	4.56	1.31	1.83	682.5	0.024
19	12/22/2001	0:07	67.3	29.927	22	107.3	20.18	689.05	4.91	1.35	1.89	703.0	0.025
20	12/22/2001	7:13	63.5	29.862	32	107.1	29.31	718.35	5.59	1.41	1.97	733.0	0.026
21	12/22/2001	12:50	70.9	29.790	25	107.0	22.80	741.15	6.07	1.46	2.03	756.1	0.027
22	12/22/2001	16:01	73.2	29.738	14	108.1	12.80	753.95	6.33	1.48	2.07	768.9	0.027
23	12/23/2001	18:17	70.0	29.410	6	105.7	5.37	759.32	8.14	1.49	2.08	774.4	0.027

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction Cumulative Volume @ STP (milliliter)	Headspace Correction Cumulative Gas Content (SCF)
24	12/24/2001	11:21	72.6	29.320	44	111.0	39.41	798.73	9.13	1.57	2.19	814.2	0.029
25	12/25/2001	9:25	72.6	29.590	60	109.3	54.48	853.20	10.27	1.68	2.34	869.0	0.031
26	12/26/2001	15:15	72.6	29.260	72	106.7	64.50	917.70	11.63	1.80	2.52	934.1	0.033
27	12/27/2001	13:20	72.4	29.210	54	108.0	48.45	966.15	12.54	1.90	2.65	982.8	0.035
28	12/28/2001	14:40	73.0	29.150	52	106.1	46.61	1012.76	13.52	1.99	2.78	1029.6	0.036
29	12/29/2001	19:24	72.8	29.440	46	105.5	41.52	1054.28	14.54	2.07	2.89	1071.3	0.038
30	12/30/2001	18:10	73.4	29.590	32	107.2	28.96	1083.25	15.30	2.13	2.97	1100.5	0.039
31	12/31/2001	12:42	74.1	29.590	24	108.5	21.65	1104.89	15.90	2.17	3.03	1122.4	0.040
32	1/1/2002	13:56	73.6	29.680	34	110.5	30.82	1135.71	16.67	2.23	3.12	1153.5	0.041
33	1/2/2002	12:40	73.6	29.800	16	109.4	14.53	1150.24	17.34	2.26	3.16	1168.2	0.041
34	1/3/2002	12:59	73.2	29.440	20	110.5	17.94	1168.18	18.03	2.30	3.20	1186.3	0.042
35	1/4/2002	12:29	73.0	29.650	11	110.7	9.94	1178.13	18.67	2.31	3.23	1196.4	0.042
36	1/5/2002	15:00	73.0	29.560	11	110.3	9.91	1188.04	19.37	2.33	3.26	1206.4	0.043
37	1/6/2002	13:44	73.2	29.060	12	110.3	10.64	1198.68	19.94	2.35	3.29	1217.2	0.043
38	1/7/2002	13:22	73.7	29.180	9	110.1	8.03	1206.71	20.53	2.37	3.31	1225.3	0.043
39	1/8/2002	14:26	73.1	29.500	4	108.8	3.60	1210.31	21.13	2.38	3.32	1228.9	0.043
40	1/9/2002	13:21	74.3	29.230	12	109.5	10.74	1221.05	21.67	2.40	3.35	1239.7	0.044
41	1/10/2002	17:11	72.8	29.350	0	107.9	0.00	1221.05	22.30	2.40	3.35	1239.7	0.044
42	1/11/2002	15:32	74.2	29.440	4	108.7	3.60	1224.65	22.79	2.41	3.36	1243.3	0.044
43	1/12/2002	14:36	73.6	29.320	6	109.0	5.38	1230.03	23.29	2.42	3.37	1248.8	0.044
44	1/13/2002	14:49	73.6	29.290	4	109.0	3.58	1233.61	23.81	2.42	3.38	1252.4	0.044
45	1/14/2002	14:37	73.3	29.440	2	109.2	1.80	1235.41	24.30	2.43	3.39	1254.2	0.044
46	1/16/2002	15:31	74.2	29.740	4	108.9	3.63	1239.04	25.29	2.43	3.40	1257.8	0.044
47	1/17/2002	15:59	73.5	29.470	6	109.4	5.41	1244.45	25.77	2.44	3.41	1263.3	0.045
48	1/18/2002	15:40	73.7	29.650	0	108.0	0.00	1244.45	26.22	2.44	3.41	1263.3	0.045
49	1/19/2002	15:54	73.2	29.380	3	107.0	2.70	1247.15	26.68	2.45	3.42	1266.0	0.045
50	1/20/2002	16:11	76.8	29.650	0	107.5	0.00	1247.15	27.13	2.45	3.42	1266.0	0.045
51	1/21/2002	16:29	74.2	29.380	2	106.8	1.80	1248.96	27.58	2.45	3.43	1267.8	0.045
52	1/22/2002	16:47	73.4	29.850	0	106.7	0.00	1248.96	28.01	2.45	3.43	1267.8	0.045
53	1/24/2002	18:24	73.4	29.230	4	106.2	3.59	1252.55	28.89	2.46	3.44	1271.4	0.045
54	1/29/2002	17:10	72.9	29.530	0	106.1	0.00	1252.55	30.87	2.46	3.44	1271.4	0.045

DEVON SFS # 5-1 can LA-3-01-73



Project	DEVON				Cumulative volume @ STP:	638.4	Raw total gas (cc/g) 1.16
Well ID:	SFS # 5-1	Can no.	LA-3-01-74				
Sample Interval (ft):	From:	2668	To:	2684	Milliliters/gram raw coal:	0.55	DAF total gas (cc/g) 1.72
Core Date: (mm/dd/yr)				12/22/2001			
Time Zero-Coal penetrated (hh:mm) (24 hour clock)				4:00	Milliliter/gram coal d.a.f.:	0.82	Raw total gas (SCF/ton) 37.08
Raw coal mass (air-dry): (grams)				1155	(excluding lost gas)		
Coal mass (d.a.f.): (grams)				776.54	Lost gas estimate (cc)	700	DAF total gas (SCF/ton) 55.15
Headspace volume: (cc)				0	(from lost gas graph)		
							Cuttings correction 25% (SCF/ton) 68.94

Sample Type: ○ Core ● Cuttings

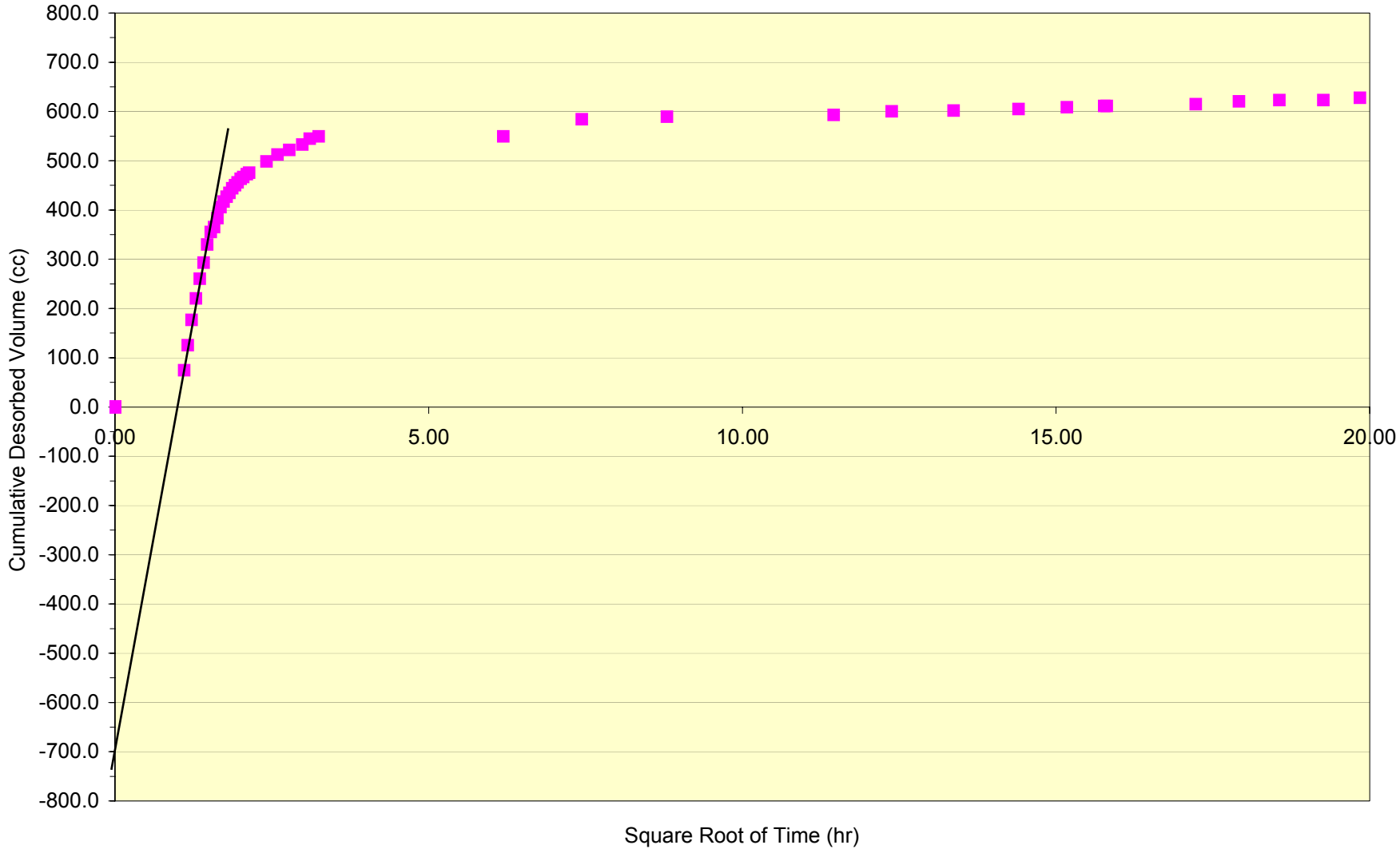
Data Summary: ● Final Results

enter data only in shaded areas, copy and paste formulas as needed to calculate more desorption data (columns H through N)

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction: Cumulative Volume @ STP (milliliter)	Headspace Correction: Cumulative Gas Content (SCF)
In Can	12/22/2001	5:05	68.0	29.883		64.4	0.00	0.00	1.04	0.00	0.00	0.0	0.0
1	12/22/2001	5:13	68.2	29.886	80	72.5	78.08	78.08	1.10	0.07	0.10	74.4	0.003
2	12/22/2001	5:21	68.6	29.881	55	80.3	52.89	130.97	1.16	0.11	0.17	125.6	0.004
3	12/22/2001	5:30	68.5	29.880	55	88.0	52.15	183.12	1.22	0.16	0.24	176.7	0.006
4	12/22/2001	5:40	68.6	29.873	47	93.7	44.09	227.22	1.29	0.20	0.29	220.4	0.008
5	12/22/2001	5:50	68.9	29.874	43	97.9	40.04	267.26	1.35	0.23	0.34	260.3	0.009
6	12/22/2001	6:00	69.0	29.870	35	100.2	32.45	299.71	1.41	0.26	0.39	292.8	0.010
7	12/22/2001	6:10	68.9	29.867	40	100.4	37.07	336.78	1.47	0.29	0.43	329.9	0.012
8	12/22/2001	6:20	68.8	29.868	27	100.7	25.01	361.79	1.53	0.31	0.47	355.0	0.013
9	12/22/2001	6:30	688.0	29.857	23	101.0	21.29	383.08	1.58	0.33	0.49	364.8	0.013
10	12/22/2001	6:40	68.6	29.858	20	101.6	18.49	401.57	1.63	0.35	0.52	383.4	0.014
11	12/22/2001	6:50	68.7	29.859	24	102.3	22.16	423.73	1.68	0.37	0.55	405.7	0.014
12	12/22/2001	7:00	68.5	29.864	12	103.1	11.07	434.80	1.73	0.38	0.56	416.9	0.015
13	12/22/2001	7:10	68.4	29.862	11	103.7	10.13	444.93	1.78	0.39	0.57	427.1	0.015
14	12/22/2001	7:20	68.2	29.863	8	103.6	7.37	452.30	1.83	0.39	0.58	434.5	0.015
15	12/22/2001	7:30	68.5	29.865	10	103.5	9.22	461.52	1.87	0.40	0.59	443.8	0.016
16	12/22/2001	7:40	68.6	29.863	7	103.7	6.45	467.96	1.91	0.41	0.60	450.3	0.016
17	12/22/2001	7:50	68.1	29.860	6	103.7	5.53	473.49	1.96	0.41	0.61	455.9	0.016
18	12/22/2001	8:01	68.4	29.864	8	103.2	7.38	480.87	2.00	0.42	0.62	463.3	0.016
19	12/22/2001	8:11	68.5	29.867	4	103.1	3.69	484.56	2.05	0.42	0.62	467.0	0.016
20	12/22/2001	8:25	68.5	29.867	6	102.8	5.54	490.09	2.10	0.42	0.63	472.6	0.017
21	12/22/2001	8:35	68.7	29.870	3	102.9	2.76	492.85	2.14	0.43	0.63	475.4	0.017
22	12/22/2001	9:51	68.5	29.875	25	105.4	22.97	515.82	2.42	0.45	0.66	498.6	0.018
23	12/22/2001	10:43	68.4	29.886	15	105.4	13.81	529.63	2.59	0.46	0.68	512.6	0.018
24	12/22/2001	11:44	68.7	29.829	10	104.5	9.14	538.77	2.78	0.47	0.69	521.9	0.018

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction Cumulative Volume @ STP (milliliter)	Headspace Correction Cumulative Gas Content (SCF)
25	12/22/2001	12:56	70.5	29.782	12	107.4	10.94	549.71	2.99	0.48	0.71	532.9	0.019
26	12/22/2001	13:38	72.3	29.754	13	108.2	11.76	561.47	3.10	0.49	0.72	544.9	0.019
27	12/22/2001	14:33	73.1	29.729	5	111.9	4.66	566.13	3.25	0.49	0.73	549.5	0.019
28	12/23/2001	18:19	70.0	29.410	0	95.0	0.00	566.13	6.19	0.49	0.73	549.5	0.019
29	12/24/2001	11:24	72.6	29.320	38	101.3	34.27	600.40	7.44	0.52	0.77	583.9	0.021
30	12/25/2001	9:25	71.6	29.590	6	105.3	5.58	605.98	8.80	0.52	0.78	589.4	0.021
31	12/26/2001	15:15	72.6	29.260	4	92.8	3.66	609.64	11.46	0.53	0.79	593.0	0.021
32	12/27/2001	13:20	72.4	29.210	8	96.8	7.31	616.95	12.38	0.53	0.79	600.2	0.021
33	12/28/2001	14:40	73.0	29.150	2	95.7	1.82	618.77	13.37	0.54	0.80	602.0	0.021
34	12/29/2001	19:27	72.8	29.440	3	97.3	2.73	621.50	14.40	0.54	0.80	604.7	0.021
35	12/30/2001	18:12	73.4	29.590	4	102.0	3.66	625.16	15.17	0.54	0.81	608.4	0.021
36	12/31/2001	12:44	74.1	29.590	3	102.9	2.79	627.95	15.77	0.54	0.81	611.1	0.022
37	1/1/2002	13:58	73.6	29.680	0	95.2	0.00	627.95	15.81	0.54	0.81	611.1	0.022
38	1/2/2001	12:49	73.6	29.800	4	103.3	3.62	631.57	17.23	0.55	0.81	614.7	0.022
39	1/3/2002	13:00	73.2	29.440	6	106.1	5.44	637.01	17.92	0.55	0.82	620.2	0.022
40	1/4/2002	12:32	73.0	29.650	3	108.3	2.72	639.73	18.56	0.55	0.82	623.0	0.022
41	1/5/2002	15:02	73.0	29.560	0	106.1	0.00	639.73	19.26	0.55	0.82	623.0	0.022
42	1/6/2002	13:46	73.2	29.060	5	105.6	4.47	644.21	19.84	0.56	0.83	627.5	0.022
43	1/7/2002	13:24	73.7	29.180	4	107.3	3.64	647.84	20.43	0.56	0.83	631.1	0.022
44	1/8/2002	14:28	73.1	29.500	0	104.2	0.00	647.84	21.03	0.56	0.83	631.1	0.022
45	1/9/2002	13:24	74.3	29.230	0	106.3	0.00	647.84	21.57	0.56	0.83	631.1	0.022
46	1/10/2002	17:15	72.8	29.350	0	102.5	0.00	647.84	22.21	0.56	0.83	631.1	0.022
47	1/11/2002	15:33	74.2	29.440	0	107.2	0.00	647.84	22.71	0.56	0.83	631.1	0.022
48	1/12/2002	14:37	73.6	29.320	3	101.8	2.72	650.56	23.21	0.56	0.84	633.8	0.022
49	1/13/2002	14:50	73.6	29.290	0	101.9	0.00	650.56	23.72	0.56	0.84	633.8	0.022
50	1/14/2002	14:38	73.3	29.440	0	102.2	0.00	650.56	25.19	0.56	0.84	633.8	0.022
51	1/17/2002	16:02	73.5	29.470	2	105.3	1.83	652.39	25.69	0.56	0.84	635.6	0.022
52	1/18/2002	15:42	73.7	29.650	0	103.8	0.00	652.39	26.15	0.56	0.84	635.6	0.022
53	1/19/2002	15:57	73.2	29.380	0	102.5	0.00	652.39	27.49	0.56	0.84	635.6	0.022
54	1/22/2002	16:19	73.4	29.850	0	100.1	0.00	652.39	28.36	0.56	0.84	635.6	0.022
55	1/24/2002	18:26	73.4	29.230	3	97.9	2.75	655.14	30.44	0.57	0.84	638.4	0.023
56	1/29/2002	17:12	72.9	29.530	0	100.8	0.00	655.14	30.42	0.57	0.84	638.4	0.023

DEVON SFS # 5-1 can LA-3-01-74



Project	DEVON				Cumulative volume @ STP:	3577.4	Raw total gas (cc/g)	4.57
Well ID:	SFS # 5-1	Can no.	4-LA-6				
Sample Interval (ft):	From: 2671.6	To:	2672.6		Milliliters/gram raw coal:	1.80	DAF total gas (cc/g)	6.46
Core Date: (mm/dd/yr)			12/22/2001				
Time Zero-Coal penetrated (hh:mm) (24 hour clock)			5:51		Milliliter/gram coal d.a.f.:	2.55	Raw total gas (SCF/ton)	146.12
Raw coal mass (air-dry): (grams)			1988		(excluding lost gas)			
Coal mass (d.a.f.): (grams)			1404.63		Lost gas estimate (cc)	5500	DAF total gas (SCF/ton)	206.80
Headspace volume: (cc)			0		(from lost gas graph)			
							Cuttings correction 25% (SCF/ton)	N/A

Sample Type: (●) Core ( ) Cuttings

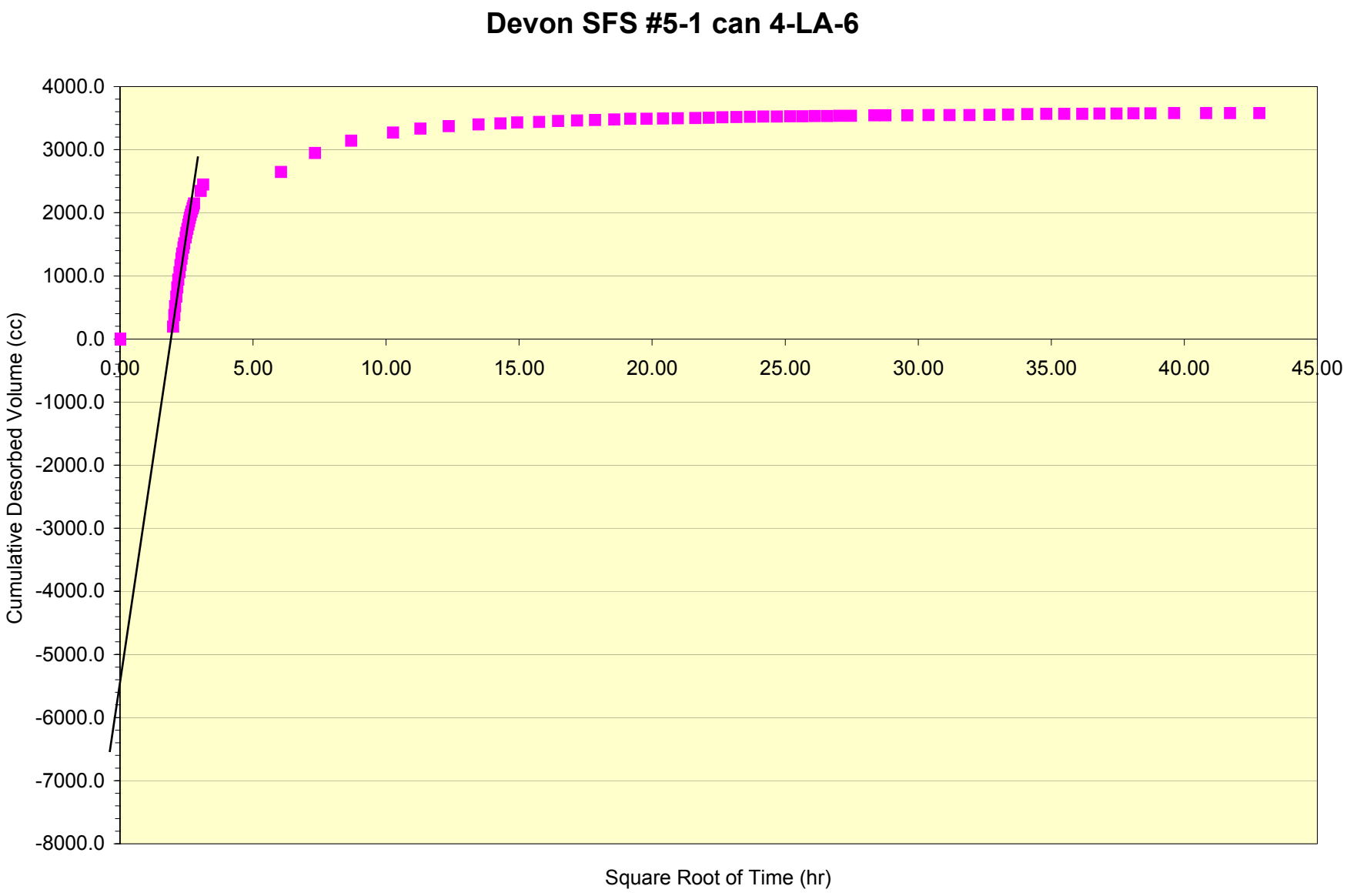
Data Summary: ( ) Preliminary (●) Final Results

enter data only in shaded areas, copy and paste formulas as needed to calculate more desorption data (columns H through N)

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction: Cumulative Volume @ STP (milliliter)	Headspace Correction: Cumulative Gas Content (SCF)
In Can	12/22/2001	9:29	68.7	29.88	0	100.0	0.00	0.00	1.91	0.00	0.00	0.0	0.0
1	12/22/2001	9:50	68.7	29.88	210	100.0	194.81	194.81	2.00	0.10	0.14	195.1	0.007
2	12/22/2001	10:02	68.0	29.87	195	102.0	180.24	375.05	2.05	0.19	0.27	376.5	0.013
3	12/22/2001	10:10	68.1	29.87	150	103.6	138.25	513.30	2.08	0.26	0.37	516.0	0.018
4	12/22/2001	10:21	68.7	29.87	165	105.3	151.61	664.91	2.12	0.33	0.47	669.3	0.024
5	12/22/2001	10:31	68.4	29.88	155	107.1	142.00	806.91	2.16	0.41	0.57	813.4	0.029
6	12/22/2001	10:40	68.4	29.89	135	108.2	123.48	930.38	2.19	0.47	0.66	939.0	0.033
7	12/22/2001	10:52	68.4	29.88	127	109.5	115.88	1046.27	2.24	0.53	0.74	1057.1	0.037
8	12/22/2001	11:03	68.4	29.87	120	110.0	109.35	1155.62	2.28	0.58	0.82	1168.6	0.041
9	12/22/2001	11:13	68.9	29.81	112	111.2	101.65	1257.26	2.32	0.63	0.90	1272.4	0.045
10	12/22/2001	11:21	68.7	29.85	88	111.4	79.95	1337.21	2.35	0.67	0.95	1354.1	0.048
11	12/22/2001	11:33	68.8	29.84	100	112.2	90.68	1427.89	2.39	0.72	1.02	1446.9	0.051
12	12/22/2001	11:42	68.7	29.83	70	112.7	63.40	1491.29	2.42	0.75	1.06	1511.9	0.053
13	12/22/2001	11:57	68.9	29.81	102	113.3	92.23	1583.53	2.47	0.80	1.13	1606.4	0.057
14	12/22/2001	12:07	69.6	29.82	80	113.8	72.29	1655.81	2.50	0.83	1.18	1680.5	0.059
15	12/22/2001	12:17	69.8	29.82	70	114.0	63.23	1719.04	2.54	0.86	1.22	1745.2	0.062
16	12/22/2001	12:27	69.7	29.81	70	114.4	63.17	1782.21	2.57	0.90	1.27	1810.0	0.064
17	12/22/2001	12:37	69.7	29.80	60	114.9	54.07	1836.28	2.60	0.92	1.31	1865.5	0.066
18	12/22/2001	12:47	69.9	29.79	60	115.1	54.04	1890.33	2.63	0.95	1.35	1921.0	0.068
19	12/22/2001	12:56	70.5	29.78	50	115.5	44.99	1935.32	2.66	0.97	1.38	1967.1	0.069

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction Cumulative Volume @ STP (milliliter)	Headspace Correction Cumulative Gas Content (SCF)
20	12/22/2001	13:07	70.4	29.78	55	115.6	49.47	1984.79	2.70	1.00	1.41	2017.9	0.071
21	12/22/2001	13:18	70.7	29.77	55	115.8	49.44	2034.23	2.73	1.02	1.45	2068.6	0.073
22	12/22/2001	13:28	71.1	29.76	40	115.7	35.96	2070.19	2.76	1.04	1.47	2105.5	0.074
23	12/22/2001	13:37	71.2	29.75	45	116.0	40.42	2110.62	2.79	1.06	1.50	2146.9	0.076
24	12/22/2001	15:05	72.5	29.73	215	117.2	192.54	2303.16	3.04	1.16	1.64	2344.3	0.083
25	12/22/2001	15:37	72.8	29.74	110	117.3	98.54	2401.70	3.13	1.21	1.71	2445.2	0.086
26	12/23/2001	18:30	71.1	29.41	220	102.6	199.99	2601.68	6.05	1.31	1.85	2645.6	0.093
27	12/24/2001	11:37	72.6	29.29	334	110.9	297.98	2899.66	7.33	1.46	2.06	2947.6	0.104
28	12/25/2001	9:25	72.6	29.99	208	110.0	190.30	3089.96	8.69	1.55	2.20	3140.2	0.111
29	12/26/2001	15:15	72.6	29.26	143	109.7	127.72	3217.68	10.27	1.62	2.29	3269.3	0.115
30	12/27/2001	13:20	72.4	29.21	72	108.5	64.33	3282.01	11.29	1.65	2.34	3334.3	0.118
31	12/28/2001	14:40	73.0	29.15	42	107.0	37.55	3319.55	12.36	1.67	2.36	3372.1	0.119
32	12/29/2001	19:29	72.8	29.44	30	107.7	27.05	3346.61	13.48	1.68	2.38	3399.3	0.120
33	12/30/2001	18:18	73.4	29.59	18	108.3	16.30	3362.90	14.30	1.69	2.39	3415.7	0.121
34	12/31/2001	12:48	74.1	29.59	14	109.1	12.66	3375.56	14.93	1.70	2.40	3428.5	0.121
35	1/1/2002	14:04	73.6	29.68	12	109.0	10.88	3386.45	15.75	1.70	2.41	3439.5	0.121
36	1/2/2002	12:56	73.6	29.80	15	109.9	13.64	3400.09	16.46	1.71	2.42	3453.2	0.122
37	1/3/2002	13:11	73.2	29.44	10	109.2	8.99	3409.08	17.19	1.71	2.43	3462.3	0.122
38	1/4/2002	12:36	73.0	29.65	8	109.5	7.24	3416.32	17.85	1.72	2.43	3469.6	0.123
39	1/5/2002	15:07	73.0	29.56	8	108.5	7.23	3423.56	18.58	1.72	2.44	3476.9	0.123
40	1/6/2002	13:53	73.2	29.09	11	108.1	9.79	3433.35	19.18	1.73	2.44	3486.8	0.123
41	1/7/2002	13:31	73.7	29.21	4	108.3	3.58	3436.93	19.79	1.73	2.45	3490.4	0.123
42	1/8/2002	14:34	73.1	29.50	1	108.1	0.90	3437.83	20.41	1.73	2.45	3491.3	0.123
43	1/9/2002	13:29	74.3	29.23	6	108.1	5.37	3443.20	20.97	1.73	2.45	3496.7	0.123
44	1/10/2002	17:19	72.8	29.35	5	109.6	4.48	3447.68	21.62	1.73	2.45	3501.2	0.124
45	1/11/2002	15:36	74.2	29.44	5	110.4	4.49	3452.16	22.13	1.74	2.46	3505.8	0.124
46	1/12/2002	14:41	73.6	29.32	7	110.5	6.26	3458.42	22.65	1.74	2.46	3512.1	0.124
47	1/13/2002	14:53	73.6	29.29	5	110.9	4.46	3462.88	23.17	1.74	2.47	3516.6	0.124
48	1/14/2002	14:41	73.3	29.44	4	110.9	3.59	3466.47	23.68	1.74	2.47	3520.2	0.124
49	1/15/2002	14:40	74.0	29.44	4	110.9	3.59	3470.05	24.18	1.75	2.47	3523.9	0.124
50	1/16/2002	15:34	74.2	29.74	2	110.5	1.81	3471.87	24.69	1.75	2.47	3525.7	0.125
51	1/17/2002	16:08	73.5	29.50	4	110.3	3.60	3475.47	25.18	1.75	2.47	3529.3	0.125

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction Cumulative Volume @ STP (milliliter)	Headspace Correction Cumulative Gas Content (SCF)
52	1/18/2002	15:47	73.7	29.65	0	108.7	0.00	3475.47	25.65	1.75	2.47	3529.3	0.125
53	1/19/2002	16:02	73.2	29.38	3	108.4	2.70	3478.16	26.12	1.75	2.48	3532.1	0.125
54	1/20/2002	16:19	76.8	29.65	1	108.9	0.91	3479.07	26.58	1.75	2.48	3533.0	0.125
55	1/21/2002	16:39	72.4	29.38	2	107.9	1.80	3480.87	27.03	1.75	2.48	3534.8	0.125
56	1/22/2002	16:54	734.0	29.85	0	108.1	0.00	3480.87	27.48	1.75	2.48	3534.8	0.125
57	1/24/2002	17:58	73.4	29.21	10	107.3	8.95	3489.82	28.36	1.76	2.48	3543.8	0.125
58	1/25/2002	17:47	73.5	29.71	1	108.3	0.91	3490.73	28.77	1.76	2.49	3544.7	0.125
59	1/27/2002	17:45	74.2	29.65	0	107.6	0.00	3490.73	29.60	1.76	2.49	3544.7	0.125
60	1/29/2002	17:17	72.9	29.53	2	106.1	1.81	3492.54	30.39	1.76	2.49	3546.5	0.125
61	1/31/2002	17:50	74.1	29.65	0	108.0	0.00	3492.54	31.18	1.76	2.49	3546.5	0.125
62	2/2/2002	17:07	73.6	29.88	1	108.2	0.91	3493.46	31.93	1.76	2.49	3547.4	0.125
63	2/4/2002	17:28	74.2	29.50	4	107.9	3.61	3497.07	32.67	1.76	2.49	3551.1	0.125
64	2/6/2002	16:01	73.8	29.71	6	107.3	5.46	3502.54	33.38	1.76	2.49	3556.6	0.126
65	2/8/2002	16:44	73.9	29.56	6	105.9	5.45	3507.99	34.10	1.76	2.50	3562.0	0.126
66	2/10/2002	17:54	73.9	29.41	5	105.8	4.52	3512.51	34.81	1.77	2.50	3566.6	0.126
67	2/12/2002	17:36	72.7	29.35	0	104.0	0.00	3512.51	35.49	1.77	2.50	3566.6	0.126
68	2/14/2002	17:52	74.1	29.85	0	105.4	0.00	3512.51	36.17	1.77	2.50	3566.6	0.126
69	2/16/2002	17:07	73.0	29.26	6	105.6	5.40	3517.90	36.81	1.77	2.50	3572.0	0.126
70	2/18/2002	16:52	73.6	29.83	0	104.8	0.00	3517.90	37.46	1.77	2.50	3572.0	0.126
71	2/20/2002	16:42	73.1	29.32	2	104.3	1.81	3519.71	38.09	1.77	2.51	3573.8	0.126
72	2/22/2002	17:44	73.3	29.56	0	103.5	0.00	3519.71	38.73	1.77	2.51	3573.8	0.126
73	2/25/2002	15:31	73.1	29.56	4	104.6	3.64	3523.35	39.62	1.77	2.51	3577.4	0.126
74	3/1/2002	16:27	73.2	29.94	0	104.2	0.00	3523.35	40.82	1.77	2.51	3577.4	0.126
75	3/4/2002	18:57	73.9	29.74	0	102.1	0.00	3523.35	41.73	1.77	2.51	3577.4	0.126
76	3/8/2002	15:30	73.4	29.83	0	102.6	0.00	3523.35	42.82	1.77	2.51	3577.4	0.126


Devon SFS #5-1 can 4-LA-6
4000.0
3000.0
2000.0
1000.0
0.0
-1000.0
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-4000.0
-5000.0
-6000.0
-7000.0
-8000.0
0.00
5.00
10.00
15.00
20.00
25.00
30.00
35.00
40.00
45.00
Cumulative Desorbed Volume (cc)
Square Root of Time (hr)

Project	DEVON				Cumulative volume @ STP:	3674.5	Raw total gas (cc/g) 5.19
Well ID:	SFS # 5-1	Can no.	4-LA-2				
Sample Interval (ft):	From:	2674	To:	2675	Milliliters/gram raw coal:	2.49	DAF total gas (cc/g) 7.29
Core Date: (mm/dd/yr)				12/22/2001			
Time Zero-Coal penetrated (hh:mm) (24 hour clock)				5:51	Milliliter/gram coal d.a.f.: (excluding lost gas)	3.49	Raw total gas (SCF/ton) 166.16
Raw coal mass (air-dry): (grams)				1478			
Coal mass (d.a.f.): (grams)				1052.07	Lost gas estimate (cc) (from lost gas graph)	4000	DAF total gas (SCF/ton) 233.43
Headspace volume: (cc)				0			
							Cuttings correction 25% (SCF/ton) N/A

Sample Type: (●) Core ( ) Cuttings

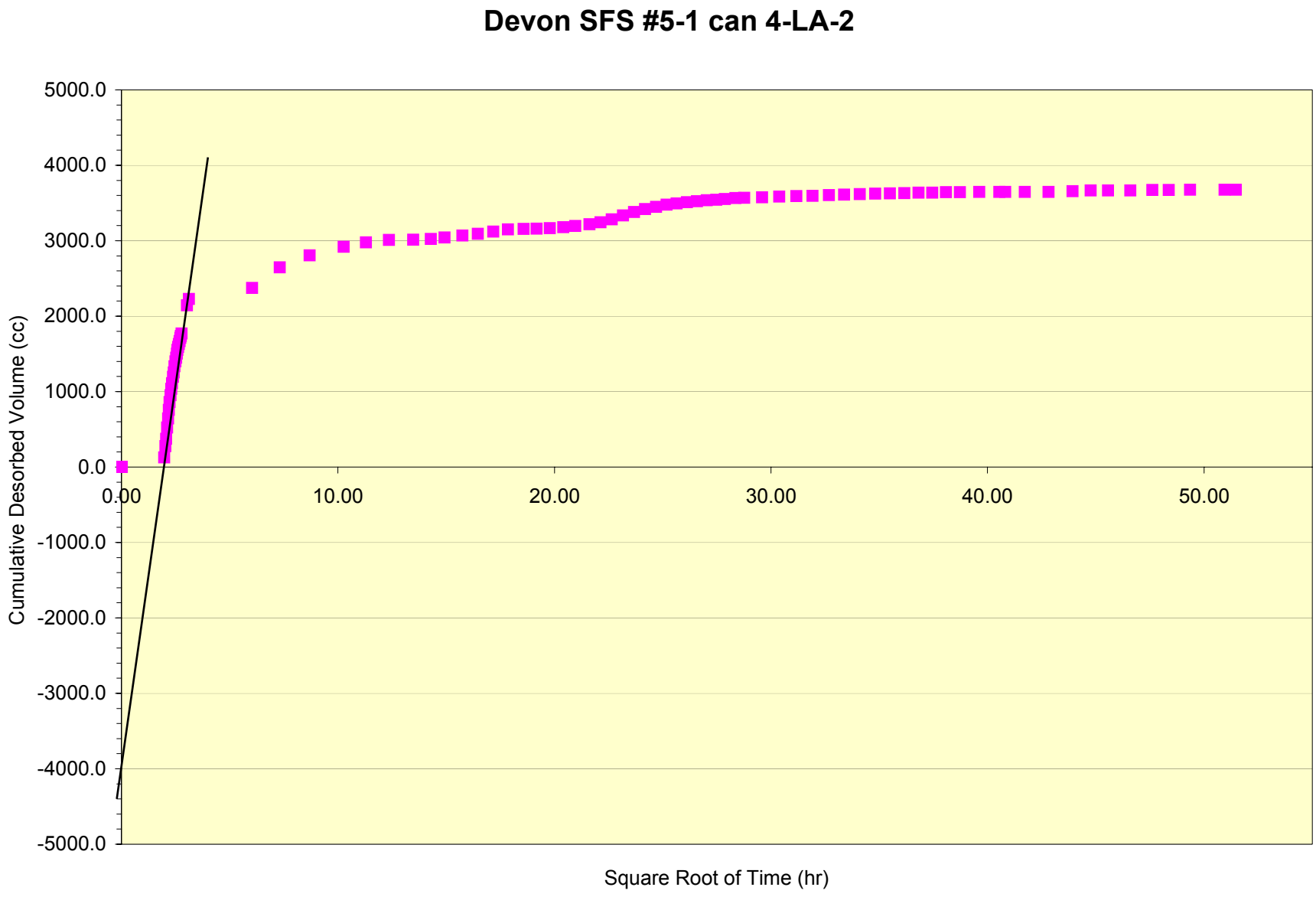
Data Summary: ( ) Preliminary (●) Final Results

enter data only in shaded areas, copy and paste formulas as needed to calculate more desorption data (columns H through N)

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction: Cumulative Volume @ STP (milliliter)	Headspace Correction: Cumulative Gas Content (SCF)
In Can	12/22/2001	9:37	68.8	29.88		95.8	0.00	0.00	1.94	0.00	0.00	0.0	0.0
1	12/22/2001	9:47	68.8	29.88	135	95.8	126.18	126.18	1.98	0.09	0.12	125.4	0.004
2	12/22/2001	9:59	68.0	29.87	163	98.9	151.50	277.68	2.03	0.19	0.26	277.0	0.010
3	12/22/2001	10:09	68.2	29.87	105	102.3	97.00	374.68	2.07	0.25	0.36	374.7	0.013
4	12/22/2001	10:19	68.7	29.87	160	104.5	147.23	521.90	2.11	0.35	0.50	523.3	0.018
5	12/22/2001	10:30	68.4	29.88	130	106.8	119.16	641.06	2.16	0.43	0.61	644.2	0.023
6	12/22/2001	10:40	68.4	29.89	122	108.6	111.51	752.57	2.19	0.51	0.72	757.7	0.027
7	12/22/2001	10:50	68.4	29.89	110	110.1	100.28	852.85	2.23	0.58	0.81	860.0	0.030
8	12/22/2001	11:01	68.4	29.87	100	111.3	90.91	943.77	2.27	0.64	0.90	952.9	0.034
9	12/22/2001	11:10	68.9	29.86	90	111.3	81.80	1025.57	2.31	0.69	0.97	1036.5	0.037
10	12/22/2001	11:20	68.7	29.85	80	112.8	72.50	1098.07	2.34	0.74	1.04	1110.7	0.039
11	12/22/2001	11:31	68.8	29.84	90	113.7	81.40	1179.47	2.38	0.80	1.12	1194.3	0.042
12	12/22/2001	11:41	68.7	29.83	65	113.5	58.79	1238.26	2.42	0.84	1.18	1254.6	0.044
13	12/22/2001	11:53	68.9	29.81	85	113.9	76.78	1315.04	2.46	0.89	1.25	1333.3	0.047
14	12/22/2001	12:05	69.6	29.82	70	115.2	63.10	1378.14	2.50	0.93	1.31	1398.1	0.049
15	12/22/2001	12:15	69.8	29.82	55	115.4	49.56	1427.70	2.53	0.97	1.36	1449.0	0.051
16	12/22/2001	12:26	69.7	29.81	60	115.9	54.00	1481.70	2.57	1.00	1.41	1504.6	0.053
17	12/22/2001	12:35	69.7	29.80	50	116.5	44.94	1526.64	2.59	1.03	1.45	1550.8	0.055
18	12/22/2001	12:45	69.9	29.79	45	116.9	40.41	1567.04	2.63	1.06	1.49	1592.4	0.056
19	12/22/2001	12:55	70.5	29.78	40	116.7	35.92	1602.96	2.66	1.08	1.52	1629.3	0.058
20	12/22/2001	13:05	70.4	29.78	42	116.4	37.73	1640.69	2.69	1.11	1.56	1668.1	0.059
21	12/22/2001	13:16	70.7	29.77	45	117.4	40.34	1681.03	2.72	1.14	1.60	1709.6	0.060
22	12/22/2001	13:25	71.1	29.76	30	117.3	26.89	1707.93	2.75	1.16	1.62	1737.2	0.061

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction Cumulative Volume @ STP (milliliter)	Headspace Correction Cumulative Gas Content (SCF)
23	12/22/2001	13:35	71.2	29.75	35	117.8	31.34	1739.27	2.78	1.18	1.65	1769.5	0.062
24	12/22/2001	15:02	72.5	29.73	408	117.5	365.19	2104.46	3.03	1.42	2.00	2144.0	0.076
25	12/22/2001	15:37	72.8	29.74	90	118.6	80.44	2184.90	3.13	1.48	2.08	2226.6	0.079
26	12/23/2001	18:22	71.1	29.41	162	102.2	147.37	2332.27	6.04	1.58	2.22	2374.1	0.084
27	12/24/2001	11:24	72.6	29.32	302	110.4	269.94	2602.21	7.32	1.76	2.47	2647.5	0.093
28	12/25/2001	9:26	72.6	29.59	174	109.4	157.24	2759.44	8.69	1.87	2.62	2806.4	0.099
29	12/26/2001	15:15	72.6	29.26	124	109.1	110.86	2870.31	10.27	1.94	2.73	2918.4	0.103
30	12/27/2001	13:20	72.4	29.21	64	109.0	57.13	2927.44	11.29	1.98	2.78	2976.2	0.105
31	12/28/2001	14:40	73.0	29.15	36	107.9	32.13	2959.57	12.36	2.00	2.81	3008.5	0.106
32	12/29/2001	19:29	72.8	29.44	6	108.4	5.40	2964.97	13.48	2.01	2.82	3014.0	0.106
33	12/30/2001	18:14	73.4	29.59	10	110.0	9.03	2974.00	14.30	2.01	2.83	3023.1	0.107
34	12/31/2001	12:45	74.1	29.59	22	110.2	19.85	2993.85	14.93	2.03	2.85	3043.2	0.107
35	1/1/2002	14:00	73.6	29.68	27	109.7	24.46	3018.31	15.75	2.04	2.87	3067.9	0.108
36	1/2/2002	12:52	73.6	29.80	26	108.9	23.68	3042.00	16.46	2.06	2.89	3091.7	0.109
37	1/3/2002	13:03	73.2	29.44	33	108.1	29.74	3071.73	17.18	2.08	2.92	3121.7	0.110
38	1/4/2002	12:34	73.0	29.65	30	109.0	27.18	3098.92	17.85	2.10	2.95	3149.1	0.111
39	1/5/2002	15:04	73.0	29.56	7	108.3	6.33	3105.25	18.58	2.10	2.95	3155.5	0.111
40	1/6/2002	13:48	73.2	29.06	4	107.0	3.56	3108.82	19.18	2.10	2.95	3159.1	0.112
41	1/7/2002	13:26	73.7	29.21	7	107.7	6.26	3115.08	19.79	2.11	2.96	3165.4	0.112
42	1/8/2002	14:30	73.1	29.50	15	107.5	13.56	3128.64	20.41	2.12	2.97	3179.0	0.112
43	1/9/2002	13:25	74.3	29.23	19	105.5	17.08	3145.72	20.97	2.13	2.99	3196.1	0.113
44	1/10/2002	17:16	72.8	29.35	25	108.5	22.44	3168.16	21.62	2.14	3.01	3218.8	0.114
45	1/11/2002	15:34	74.2	29.44	28	109.8	25.16	3193.32	22.13	2.16	3.04	3244.2	0.115
46	1/12/2002	14:38	73.6	29.32	43	109.6	38.49	3231.80	22.64	2.19	3.07	3283.0	0.116
47	1/13/2002	14:52	73.6	29.29	56	109.8	50.06	3281.86	23.17	2.22	3.12	3333.6	0.118
48	1/14/2002	14:39	73.3	29.44	51	109.5	45.85	3327.71	23.68	2.25	3.16	3379.8	0.119
49	1/15/2002	14:38	74.0	29.44	44	109.4	39.56	3367.27	24.18	2.28	3.20	3419.7	0.121
50	1/16/2002	15:33	74.2	29.74	32	106.5	29.21	3396.48	24.69	2.30	3.23	3449.0	0.122
51	1/17/2002	16:04	73.5	29.47	30	109.3	27.00	3423.48	25.18	2.32	3.25	3476.3	0.123
52	1/18/2002	15:44	73.7	29.65	18	107.8	16.34	3439.83	25.65	2.33	3.27	3492.7	0.123
53	1/19/2002	15:58	73.2	29.38	19	108.2	17.08	3456.91	26.12	2.34	3.29	3509.9	0.124
54	1/20/2002	16:16	76.8	29.65	14	108.3	12.70	3469.61	26.58	2.35	3.30	3522.6	0.124
55	1/21/2002	16:33	72.4	29.38	14	107.5	12.60	3482.22	27.03	2.36	3.31	3535.4	0.125
56	1/22/2002	16:50	73.4	29.85	6	107.0	5.49	3487.71	27.48	2.36	3.32	3540.9	0.125
57	1/23/2002	14:33	73.4	29.50	12	107.6	10.85	3498.56	27.87	2.37	3.33	3551.8	0.125

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction Cumulative Volume @ STP (milliliter)	Headspace Correction Cumulative Gas Content (SCF)
58	1/24/2002	17:50	73.4	29.21	13	107.5	11.64	3510.19	28.35	2.37	3.34	3563.5	0.126
59	1/25/2002	17:41	73.5	29.71	6	106.8	5.47	3515.66	28.77	2.38	3.34	3569.0	0.126
60	1/27/2002	17:40	74.2	29.66	8	106.5	7.28	3522.94	29.59	2.38	3.35	3576.3	0.126
61	1/29/2002	17:13	72.9	29.52	10	106.1	9.07	3532.01	30.39	2.39	3.36	3585.4	0.127
62	1/31/2002	17:41	74.1	29.65	5	107.9	4.54	3536.55	31.17	2.39	3.36	3590.0	0.127
63	2/2/2002	17:04	73.6	29.88	5	107.3	4.58	3541.13	31.93	2.40	3.37	3594.6	0.127
64	2/4/2002	17:25	74.2	29.50	10	106.2	9.06	3550.19	32.67	2.40	3.37	3603.6	0.127
65	2/6/2002	15:59	73.8	29.71	7	106.5	6.38	3556.57	33.38	2.41	3.38	3610.1	0.127
66	2/8/2002	16:39	73.9	29.56	8	105.8	7.27	3563.84	34.10	2.41	3.39	3617.3	0.128
67	2/10/2002	17:50	73.9	29.41	8	105.9	7.23	3571.07	34.81	2.42	3.39	3624.6	0.128
68	2/12/2002	17:33	72.7	29.35	3	103.3	2.72	3573.79	35.49	2.42	3.40	3627.3	0.128
69	2/14/2002	17:48	74.1	29.85	2	105.2	1.84	3575.63	36.17	2.42	3.40	3629.1	0.128
70	2/16/2002	17:05	73.0	29.26	9	104.6	8.11	3583.74	36.81	2.42	3.41	3637.3	0.128
71	2/18/2002	16:47	73.6	29.83	0	104.2	0.00	3583.74	37.46	2.42	3.41	3637.3	0.128
72	2/20/2002	16:35	73.1	29.32	5	102.5	4.53	3588.27	38.09	2.43	3.41	3641.8	0.129
73	2/22/2002	17:41	73.3	29.56	0	102.7	0.00	3588.27	38.73	2.43	3.41	3641.8	0.129
74	2/25/2002	15:28	73.1	29.56	4	104.4	3.64	3591.91	39.62	2.43	3.41	3645.4	0.129
75	2/28/2002	17:46	73.2	29.65	0	96.4	0.00	3591.91	40.55	2.43	3.41	3645.4	0.129
76	3/1/2002	16:24	73.2	29.94	2	102.3	1.85	3593.76	40.82	2.43	3.42	3647.3	0.129
77	3/4/2002	18:54	73.9	29.74	0	101.6	0.00	3593.76	41.73	2.43	3.42	3647.3	0.129
78	3/8/2002	15:27	73.4	29.83	0	101.7	0.00	3593.76	42.82	2.43	3.42	3647.3	0.129
79	3/12/2002	15:33	73.4	29.62	11	105.3	10.02	3603.79	43.93	2.44	3.43	3657.3	0.129
80	3/15/2002	17:59	72.7	29.38	10	104.6	9.05	3612.84	44.77	2.44	3.43	3666.4	0.129
81	3/18/2002	17:59	74.0	29.71	0	106.3	0.00	3612.84	45.56	2.44	3.43	3666.4	0.129
82	3/22/2002	17:29	74.8	29.65	0	104.2	0.00	3612.84	46.60	2.44	3.43	3666.4	0.129
83	3/26/2002	17:13	74.7	29.38	7	106.1	6.32	3619.15	47.62	2.45	3.44	3672.7	0.130
84	3/29/2002	17:53	73.6	29.38	0	105.9	0.00	3619.15	48.37	2.45	3.44	3672.7	0.130
85	4/2/2002	18:00	74.1	29.38	2	105.7	1.81	3620.96	49.36	2.45	3.44	3674.5	0.130
86	4/9/2002	9:25	72.7	29.68	0	108.4	0.00	3620.96	50.95	2.45	3.44	3674.5	0.130
87	4/11/2002	15:02	74.0	29.97	0	106.3	0.00	3620.96	51.47	2.45	3.44	3674.5	0.130


Devon SFS #5-1 can 4-LA-2
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10.00
20.00
30.00
40.00
50.00
Cumulative Desorbed Volume (cc)
Square Root of Time (hr)

Project	DEVON				Cumulative volume @ STP:	3454.1	Raw total gas (cc/g)	4.21
Well ID:	SFS #5-1	Can no.	4-LA-4				
Sample Interval (ft):	From:	2678.5	To:	2679.5	Milliliters/gram raw coal:	1.72	DAF total gas (cc/g)	6.01
Core Date: (mm/dd/yr)				12/22/2001			
Time Zero-Coal penetrated (hh:mm) (24 hour clock)				5:57	Milliliter/gram coal d.a.f.:	2.46	Raw total gas (SCF/ton)	134.79
Raw coal mass (air-dry): (grams)				2007	(excluding lost gas)			
Coal mass (d.a.f.): (grams)				1405.51	Lost gas estimate (cc)	5000	DAF total gas (SCF/ton)	192.48
Headspace volume: (cc)				0	(from lost gas graph)			
							Cuttings correction 25% (SCF/ton)	N/A

Sample Type: (●) Core ( ) Cuttings

Data Summary: ( ) Preliminary (●) Final Results

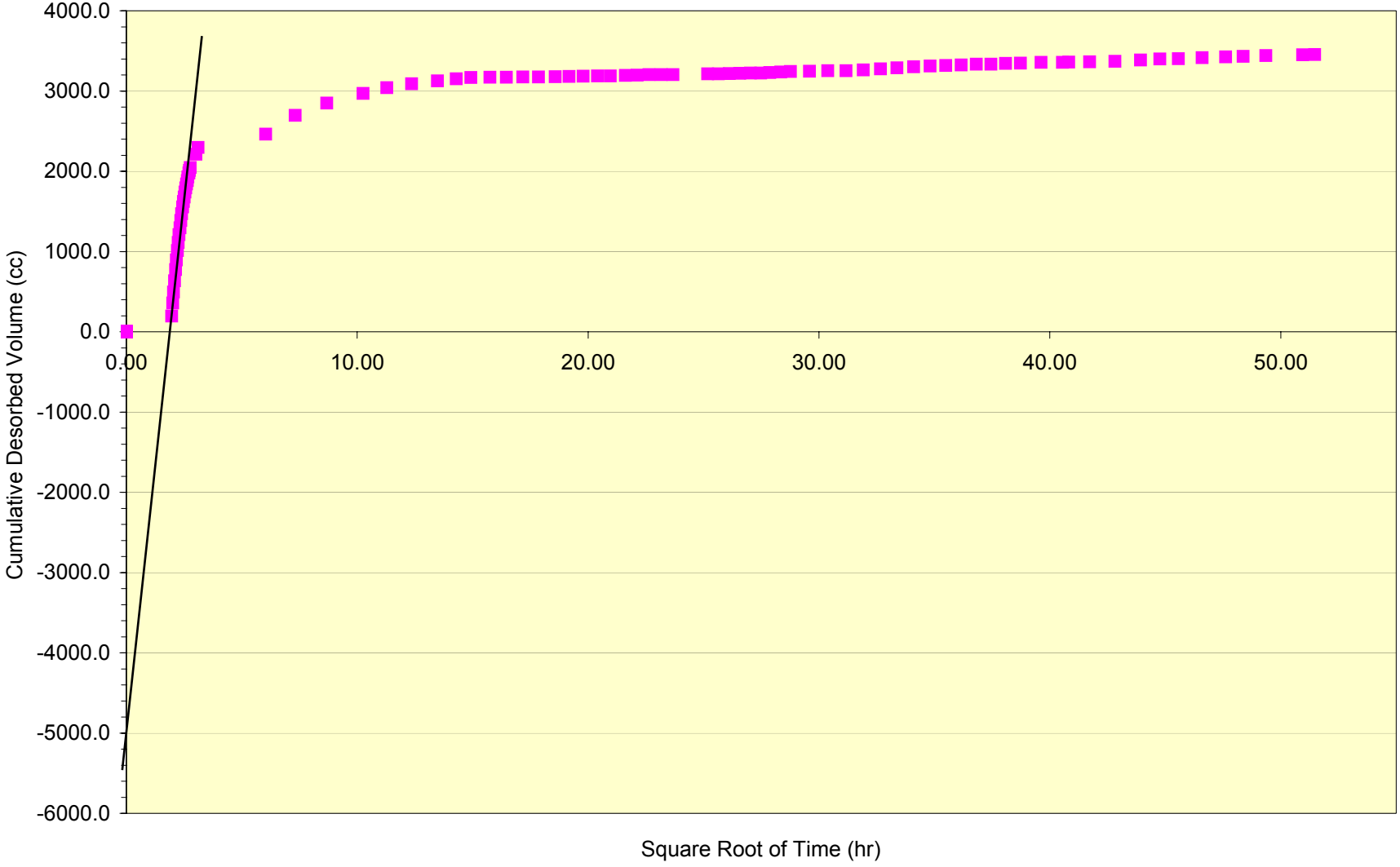
enter data only in shaded areas, copy and paste formulas as needed to calculate more desorption data (columns H through N)

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction Cumulative Volume @ STP (milliliter)	Headspace Correction Cumulative Gas Content (SCF)
In Can	12/22/2001	9:33	68.8	29.88		93.3	0.00	0.00	1.90	0.00	0.00	0.0	0.0
1	12/22/2001	9:49	68.8	29.88	210	93.3	197.17	197.17	1.97	0.10	0.14	195.1	0.007
2	12/22/2001	10:00	68.0	29.87	175	96.2	163.44	360.61	2.01	0.18	0.26	357.9	0.013
3	12/22/2001	10:09	68.2	29.87	145	100.6	134.35	494.97	2.05	0.25	0.35	492.7	0.017
4	12/22/2001	10:20	68.7	29.87	152	101.8	140.54	635.50	2.09	0.32	0.45	633.9	0.022
5	12/22/2001	10:31	68.4	29.88	150	105.5	137.81	773.31	2.14	0.39	0.55	773.4	0.027
6	12/22/2001	10:41	68.4	29.89	130	106.2	119.32	892.63	2.18	0.44	0.64	894.3	0.032
7	12/22/2001	10:51	68.4	29.88	125	106.5	114.66	1007.30	2.21	0.50	0.72	1010.5	0.036
8	12/22/2001	11:02	68.4	29.87	110	108.0	100.59	1107.89	2.25	0.55	0.79	1112.8	0.039
9	12/22/2001	11:11	68.9	29.86	105	109.8	95.69	1203.58	2.29	0.60	0.86	1210.3	0.043
10	12/22/2001	11:21	68.7	29.85	90	110.6	81.88	1285.45	2.32	0.64	0.91	1293.8	0.046
11	12/22/2001	11:32	68.8	29.84	100	110.6	90.94	1376.39	2.36	0.69	0.98	1386.6	0.049
12	12/22/2001	11:42	68.7	29.82	90	111.5	81.67	1458.06	2.40	0.73	1.04	1470.1	0.052
13	12/22/2001	11:55	68.9	29.81	90	111.4	81.65	1539.71	2.44	0.77	1.10	1553.5	0.055
14	12/22/2001	12:06	69.6	29.82	75	112.7	67.90	1607.61	2.48	0.80	1.14	1622.9	0.057
15	12/22/2001	12:15	69.8	29.82	60	113.3	54.26	1661.88	2.51	0.83	1.18	1678.5	0.059
16	12/22/2001	12:27	69.7	29.81	67	113.6	60.54	1722.42	2.55	0.86	1.23	1740.4	0.061
17	12/22/2001	12:36	69.7	29.80	55	113.7	49.67	1772.09	2.58	0.88	1.26	1791.3	0.063
18	12/22/2001	12:46	69.9	29.79	55	114.9	49.56	1821.65	2.61	0.91	1.30	1842.2	0.065
19	12/22/2001	12:56	70.5	29.78	45	114.9	40.54	1862.19	2.64	0.93	1.32	1883.7	0.067
20	12/22/2001	13:06	70.4	29.78	50	114.2	45.09	1907.27	2.67	0.95	1.36	1929.9	0.068
21	12/22/2001	13:18	70.7	29.77	50	115.2	44.99	1952.27	2.71	0.97	1.39	1976.0	0.070

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction Cumulative Volume @ STP (milliliter)	Headspace Correction Cumulative Gas Content (SCF)
22	12/22/2001	13:25	71.1	29.76	35	114.8	31.51	1983.78	2.73	0.99	1.41	2008.2	0.071
23	12/22/2001	13:36	71.2	29.75	40	115.3	35.97	2019.75	2.77	1.01	1.44	2045.1	0.072
24	12/22/2001	15:04	72.5	29.73	180	116.1	161.51	2181.26	3.02	1.09	1.55	2210.3	0.078
25	12/22/2001	15:36	72.8	29.74	95	117.0	85.15	2266.40	3.11	1.13	1.61	2297.5	0.081
26	12/23/2001	18:27	71.1	29.41	180	99.6	164.50	2430.91	6.04	1.21	1.73	2461.4	0.087
27	12/24/2001	11:33	72.6	29.29	260	105.7	234.09	2665.00	7.32	1.33	1.90	2696.5	0.095
28	12/25/2001	9:25	72.6	29.99	166	103.7	153.57	2818.57	8.69	1.40	2.01	2850.2	0.101
29	12/26/2001	15:15	72.6	29.26	130	105.6	116.95	2935.52	10.26	1.46	2.09	2967.6	0.105
30	12/27/2001	13:20	72.4	29.21	80	102.7	72.21	3007.73	11.29	1.50	2.14	3039.8	0.107
31	12/28/2001	14:40	73.0	29.15	54	101.6	48.74	3056.47	12.36	1.52	2.17	3088.4	0.109
32	12/29/2001	19:30	72.8	29.44	40	102.4	36.41	3092.89	13.47	1.54	2.20	3124.7	0.110
33	12/30/2001	18:16	73.4	29.59	30	102.0	27.47	3120.35	14.29	1.55	2.22	3152.1	0.111
34	12/31/2001	12:47	74.1	29.59	18	102.3	16.47	3136.82	14.93	1.56	2.23	3168.5	0.112
35	1/1/2002	14:03	73.6	29.68	2	102.0	1.84	3138.66	15.75	1.56	2.23	3170.3	0.112
36	1/2/2002	12:54	73.6	29.80	2	110.1	1.82	3140.48	16.46	1.56	2.23	3172.1	0.112
37	1/3/2002	13:07	73.2	29.44	2	110.3	1.80	3142.27	17.18	1.57	2.24	3173.9	0.112
38	1/4/2002	12:35	73.0	29.65	1	109.8	0.90	3143.18	17.85	1.57	2.24	3174.9	0.112
39	1/5/2002	15:05	73.0	29.56	4	111.6	3.60	3146.78	18.58	1.57	2.24	3178.5	0.112
40	1/6/2002	13:51	73.2	29.09	4	109.2	3.55	3150.33	19.18	1.57	2.24	3182.1	0.112
41	1/7/2002	13:27	73.7	29.21	3	108.8	2.68	3153.01	19.79	1.57	2.24	3184.8	0.112
42	1/8/2002	14:32	73.1	29.50	2	109.7	1.80	3154.81	20.41	1.57	2.24	3186.6	0.113
43	1/9/2002	13:27	74.3	29.23	0	105.2	0.00	3154.81	20.96	1.57	2.24	3186.6	0.113
44	1/10/2002	17:17	72.8	29.35	6	109.0	5.38	3160.19	21.62	1.57	2.25	3192.0	0.113
45	1/11/2002	15:35	74.2	29.44	6	110.3	5.39	3165.58	22.13	1.58	2.25	3197.5	0.113
46	1/12/2002	14:40	73.6	29.32	7	109.8	6.26	3171.84	22.64	1.58	2.26	3203.8	0.113
47	1/13/2002	14:53	73.6	29.29	1	110.1	0.89	3172.73	23.17	1.58	2.26	3204.7	0.113
48	1/14/2002	14:40	73.3	29.44	0	111.1	0.00	3172.73	23.68	1.58	2.26	3204.7	0.113
49	1/17/2002	16:05	73.5	29.50	8	109.9	7.20	3179.94	25.18	1.58	2.26	3212.0	0.113
50	1/18/2002	15:46	73.7	29.65	0	109.2	0.00	3179.94	25.65	1.58	2.26	3212.0	0.113
51	1/19/2002	16:00	73.2	29.38	5	108.8	4.49	3184.43	26.12	1.59	2.27	3216.5	0.114
52	1/20/2002	16:18	76.8	29.65	3	108.8	2.72	3187.15	26.58	1.59	2.27	3219.2	0.114
53	1/21/2002	16:38	74.2	29.38	4	108.3	3.60	3190.74	27.03	1.59	2.27	3222.9	0.114
54	1/22/2002	16:52	73.4	29.85	0	108.1	0.00	3190.74	27.48	1.59	2.27	3222.9	0.114
55	1/23/2002	14:36	73.4	29.50	6	108.3	5.42	3196.16	27.87	1.59	2.27	3228.3	0.114
56	1/24/2002	17:51	73.4	29.21	10	107.1	8.96	3205.11	28.35	1.60	2.28	3237.3	0.114

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction Cumulative Volume @ STP (milliliter)	Headspace Correction Cumulative Gas Content (SCF)
57	1/25/2002	17:44	73.5	29.71	4	108.5	3.64	3208.75	28.77	1.60	2.28	3241.0	0.114
58	1/27/2002	17:44	74.2	29.65	4	107.7	3.63	3212.38	29.59	1.60	2.29	3244.6	0.115
59	1/29/2002	17:15	72.9	29.53	7	107.2	6.34	3218.72	30.39	1.60	2.29	3251.0	0.115
60	1/31/2002	17:48	74.1	29.65	2	106.1	1.82	3220.54	31.17	1.60	2.29	3252.8	0.115
61	2/2/2002	17:06	73.6	29.88	11	105.7	10.10	3230.65	31.92	1.61	2.30	3263.0	0.115
62	2/4/2002	17:27	74.2	29.50	14	104.7	12.72	3243.36	32.67	1.62	2.31	3275.7	0.116
63	2/6/2002	16:00	73.8	29.71	12	105.9	10.96	3254.32	33.38	1.62	2.32	3286.7	0.116
64	2/8/2002	16:43	73.9	29.56	14	106.1	12.71	3267.03	34.10	1.63	2.32	3299.4	0.117
65	2/10/2002	17:51	73.9	29.41	14	106.3	12.64	3279.67	34.81	1.63	2.33	3312.1	0.117
66	2/12/2002	17:35	72.7	29.35	5	104.0	4.52	3284.20	35.49	1.64	2.34	3316.6	0.117
67	2/14/2002	17:50	74.1	29.85	9	105.1	8.27	3292.46	36.16	1.64	2.34	3324.9	0.117
68	2/16/2002	17:06	73.0	29.26	11	105.5	9.90	3302.36	36.81	1.65	2.35	3334.8	0.118
69	2/18/2002	16:50	73.3	29.83	0	104.8	0.00	3302.36	37.46	1.65	2.35	3334.8	0.118
70	2/20/2002	16:37	73.1	29.32	10	104.2	9.04	3311.40	38.09	1.65	2.36	3343.9	0.118
71	2/22/2002	17:43	73.3	29.56	4	104.1	3.64	3315.04	38.73	1.65	2.36	3347.5	0.118
72	2/25/2002	15:30	73.1	29.56	10	105.4	9.09	3324.14	39.62	1.66	2.37	3356.6	0.119
73	2/28/2002	17:48	73.2	29.65	0	96.6	0.00	3324.14	40.54	1.66	2.37	3356.6	0.119
74	3/1/2002	16:28	73.2	29.94	3	102.3	2.78	3326.91	40.82	1.66	2.37	3359.4	0.119
75	3/4/2002	18:55	73.9	29.74	4	102.4	3.68	3330.59	41.72	1.66	2.37	3363.1	0.119
76	3/8/2002	15:29	73.4	29.83	7	100.8	6.47	3337.07	42.82	1.66	2.37	3369.5	0.119
77	3/12/2002	15:39	73.4	29.62	18	105.7	16.39	3353.45	43.93	1.67	2.39	3385.9	0.120
78	3/15/2002	18:01	72.7	29.38	15	105.6	13.55	3367.00	44.77	1.68	2.40	3399.5	0.120
79	3/18/2002	18:01	74.0	29.71	4	105.1	3.66	3370.66	45.56	1.68	2.40	3403.2	0.120
80	3/22/2002	17:32	74.8	29.65	11	104.0	10.06	3380.72	46.60	1.68	2.41	3413.2	0.121
81	3/26/2002	17:17	74.7	29.38	14	106.2	12.63	3393.35	47.62	1.69	2.41	3425.9	0.121
82	3/29/2002	17:54	73.6	29.38	5	105.4	4.52	3397.87	48.37	1.69	2.42	3430.4	0.121
83	4/2/2002	18:03	74.1	29.38	12	106.6	10.82	3408.69	49.36	1.70	2.43	3441.2	0.122
84	4/9/2002	9:29	72.7	29.68	10	105.8	9.12	3417.81	50.95	1.70	2.43	3450.4	0.122
85	4/11/2002	15:08	74.0	29.97	4	105.6	3.69	3421.50	51.47	1.70	2.43	3454.1	0.122

DEVON SFS #5-1 can 4-LA-4



Project	Devon				Cumulative volume @ STP:	196.1	Raw total gas (cc/g) 1.02
Well ID:	SFS #9-1	Can no.	4-LA-3				
Sample Interval (ft):	From: 1651.6	To:	1652		Milliliters/gram raw coal:	0.37	DAF total gas (cc/g) 1.74
Core Date: (mm/dd/yr)			1/4/2002				
Time Zero-Coal penetrated (hh:mm) (24 hour clock)			7:21		Milliliter/gram coal d.a.f.: (excluding lost gas)	0.62	Raw total gas (SCF/ton) 32.61
Raw coal mass (air-dry): (grams)			536				
Coal mass (d.a.f.): (grams)			313.85		Lost gas estimate (cc) (from lost gas graph)	350	DAF total gas (SCF/ton) 55.68
Headspace volume: (cc)			0				Cuttings correction 25% (SCF/ton) N/A

Sample Type: (●) Core ( ) Cuttings

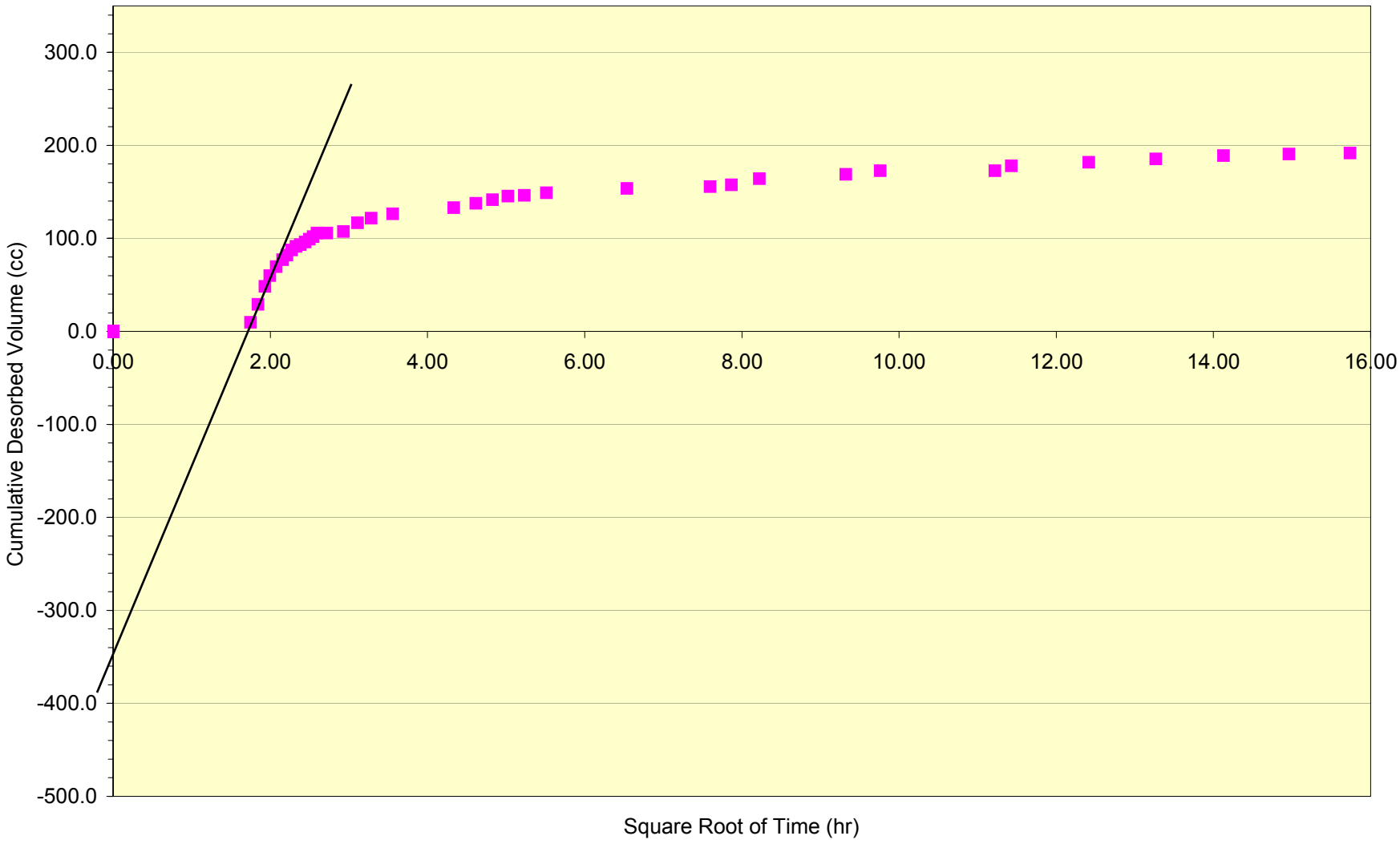
Data Summary: ( ) Preliminary (●) Final Results

enter data only in shaded areas, copy and paste formulas as needed to calculate more desorption data (columns H through N)

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction: Cumulative Volume @ STP (milliliter)	Headspace Correction: Cumulative Gas Content (SCF)
In Can	1/4/2002	10:05	49.9	30.25	0	98.3	0.00	0.00	1.65	0.00	0.00	0.0	0.0
1	1/4/2002	10:25	51.9	30.24	10	98.9	9.41	9.41	1.75	0.02	0.03	9.7	0.000
2	1/4/2002	10:45	54.3	30.23	20	100.8	18.75	28.16	1.84	0.05	0.09	29.0	0.001
3	1/4/2002	11:05	55.9	30.23	20	102.1	18.70	46.86	1.93	0.09	0.15	48.3	0.002
4	1/4/2002	11:20	58.1	30.22	12	101.8	11.22	58.08	2.00	0.11	0.19	59.8	0.002
5	1/4/2002	11:40	59.0	30.21	10	102.0	9.35	67.43	2.08	0.13	0.21	69.4	0.002
6	1/4/2002	12:00	59.6	30.19	8	101.5	7.48	74.91	2.16	0.14	0.24	77.0	0.003
7	1/4/2002	12:15	59.6	30.18	5	101.4	4.67	79.58	2.21	0.15	0.25	81.8	0.003
8	1/4/2002	12:31	60.6	30.17	6	100.9	5.61	85.19	2.27	0.16	0.27	87.5	0.003
9	1/4/2002	12:46	61.5	30.16	4	100.4	3.74	88.94	2.33	0.17	0.28	91.3	0.003
10	1/4/2002	13:02	62.5	30.15	2	99.9	1.87	90.81	2.38	0.17	0.29	93.2	0.003
11	1/4/2002	13:20	63.0	30.14	3	99.7	2.81	93.62	2.45	0.17	0.30	96.1	0.003
12	1/4/2002	13:35	63.4	30.14	3	99.3	2.81	96.43	2.50	0.18	0.31	98.9	0.003
13	1/4/2002	13:50	64.1	30.13	3	99.2	2.81	99.24	2.55	0.19	0.32	101.7	0.004
14	1/4/2002	14:05	64.6	30.12	4	99.1	3.75	102.99	2.59	0.19	0.33	105.5	0.004
15	1/4/2002	14:45	66.2	30.11	0	98.8	0.00	102.99	2.72	0.19	0.33	105.5	0.004
16	1/4/2002	15:57	67.0	30.10	2	99.9	1.87	104.86	2.93	0.20	0.33	107.4	0.004
17	1/4/2002	17:02	67.0	30.09	10	100.0	9.34	114.20	3.11	0.21	0.36	116.8	0.004
18	1/4/2002	18:08	64.4	30.08	5	100.6	4.67	118.87	3.28	0.22	0.38	121.5	0.004
19	1/4/2002	20:01	62.3	30.09	5	100.5	4.67	123.53	3.56	0.23	0.39	126.2	0.004

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction Cumulative Volume @ STP (milliliter)	Headspace Correction Cumulative Gas Content (SCF)
20	1/5/2002	2:09	57.1	29.99	7	99.9	6.52	130.05	4.34	0.24	0.41	132.9	0.005
21	1/5/2002	4:39	58.0	29.94	5	100.4	4.65	134.70	4.62	0.25	0.43	137.7	0.005
22	1/5/2002	6:40	58.5	29.92	4	100.7	3.71	138.41	4.83	0.26	0.44	141.5	0.005
23	1/5/2002	8:36	58.9	29.90	4	100.8	3.71	142.12	5.02	0.27	0.45	145.3	0.005
24	1/5/2002	10:44	59.9	29.88	1	100.9	0.93	143.05	5.23	0.27	0.46	146.2	0.005
25	1/5/2002	13:46	59.0	29.75	3	101.1	2.77	145.81	5.52	0.27	0.46	149.0	0.005
26	1/6/2002	2:06	59.6	29.72	5	100.9	4.61	150.42	6.54	0.28	0.48	153.7	0.005
27	1/6/2002	17:03	67.5	29.86	2	100.4	1.85	152.27	7.60	0.28	0.49	155.6	0.005
28	1/6/2002	21:15	70.0	29.95	2	101.3	1.86	154.13	7.87	0.29	0.49	157.5	0.006
29	1/7/2002	2:58	62.9	30.02	7	109.8	6.41	160.54	8.22	0.30	0.51	164.1	0.006
30	1/7/2002	22:17	67.1	30.13	5	111.1	4.59	165.13	9.32	0.31	0.53	168.8	0.006
31	1/8/2002	6:37	51.5	30.11	4	110.2	3.67	168.80	9.76	0.31	0.54	172.6	0.006
32	1/9/2002	13:13	74.3	29.23	0	103.0	0.00	168.80	11.22	0.31	0.54	172.6	0.006
33	1/9/2002	17:57	74.1	29.21	6	110.6	5.34	174.14	11.43	0.32	0.55	178.0	0.006
34	1/10/2002	17:31	72.8	29.35	4	109.8	3.58	177.72	12.42	0.33	0.57	181.6	0.006
35	1/11/2002	15:25	74.2	29.41	4	111.1	3.58	181.31	13.27	0.34	0.58	185.3	0.007
36	1/12/2002	14:59	73.6	29.32	4	110.9	3.57	184.88	14.13	0.34	0.59	188.9	0.007
37	1/13/2002	15:10	73.6	29.32	2	111.4	1.78	186.66	14.96	0.35	0.59	190.7	0.007
38	1/14/2002	15:03	73.3	29.44	1	111.4	0.90	187.56	15.74	0.35	0.60	191.6	0.007
39	1/16/2002	15:40	74.2	29.74	2	111.4	1.81	189.37	17.21	0.35	0.60	193.4	0.007
40	1/17/2002	16:27	73.5	29.50	1	111.3	0.90	190.27	17.92	0.35	0.61	194.3	0.007
41	1/18/2002	15:56	73.7	29.65	0	109.4	0.00	190.27	18.56	0.35	0.61	194.3	0.007
42	1/19/2002	16:14	73.2	29.38	0	109.2	0.00	190.27	19.21	0.35	0.61	194.3	0.007
43	1/22/2002	17:04	73.4	29.85	0	109.8	0.00	190.27	21.02	0.35	0.61	194.3	0.007
44	1/24/2002	18:14	73.4	29.23	2	108.4	1.79	192.06	22.16	0.36	0.61	196.1	0.007
45	1/25/2002	17:57	73.5	29.74	0	108.4	0.00	192.06	22.68	0.36	0.61	196.1	0.007
46	1/29/2002	17:30	72.9	29.53	0	107.4	0.00	192.06	24.70	0.36	0.61	196.1	0.007

Devon SFS #9-1
CAN 4-LA-3



Well ID:	SFS #9-1	Can no.	LA-SWC-01-2				
Sample Interval (ft):	From: 2050?	To:	2055?	Milliliters/gram raw coal:	0.59	DAF total gas (cc/g)	1.65
Core Date: (mm/dd/yr)			1/4/2002				
Time Zero-Coal penetrated (hh:mm) (24 hour clock)			22:30	Milliliter/gram coal d.a.f.: (excluding lost gas)	1.04	Raw total gas (SCF/ton)	29.71
Raw coal mass (air-dry): (grams)			76				
Coal mass (d.a.f.): (grams)			42.89	Lost gas estimate (cc) (from lost gas graph)	26	DAF total gas (SCF/ton)	52.65
Headspace volume: (cc)			0				
						Cuttings correction 25% (SCF/ton)	65.81

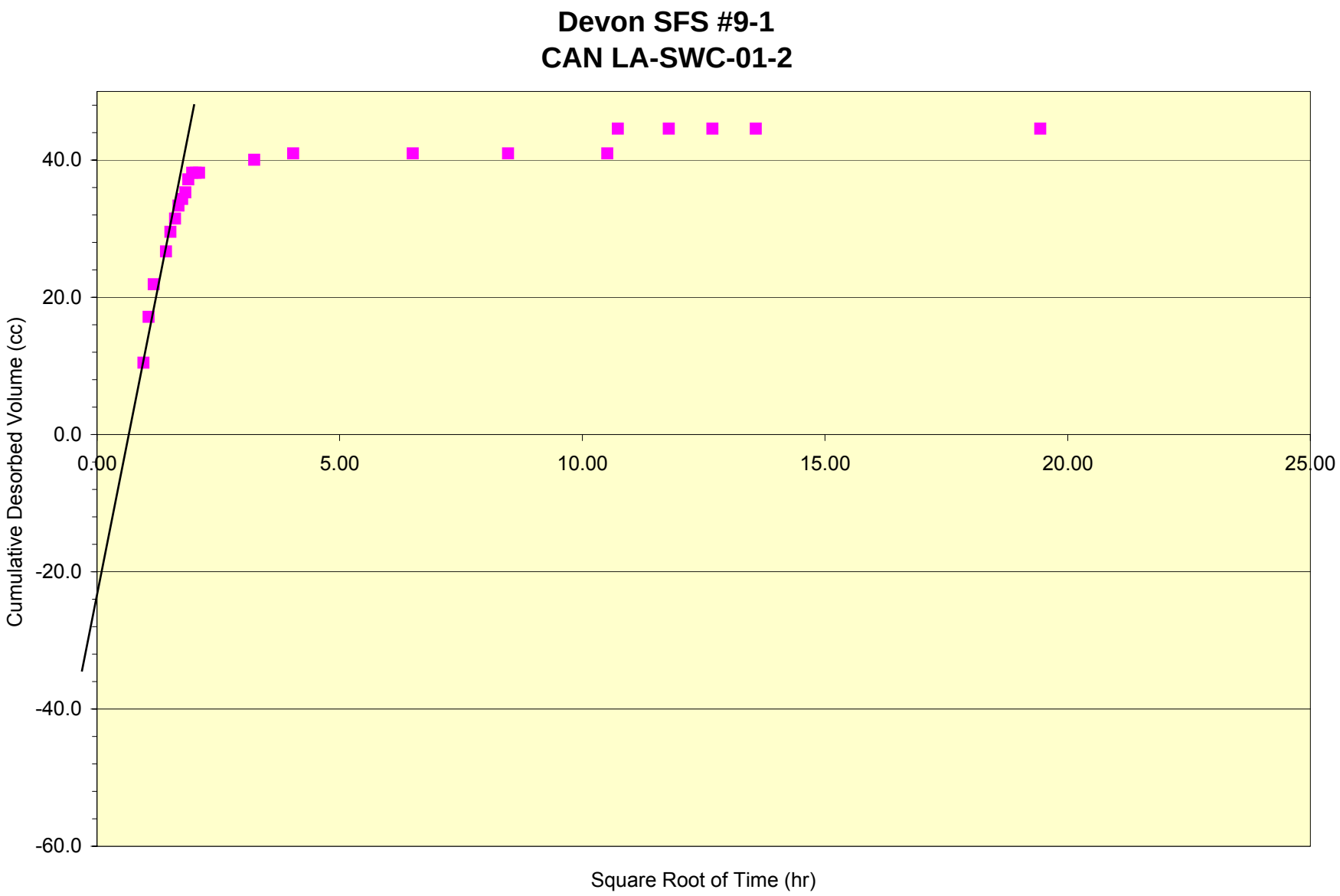
Sample Type: ○ Core ● Cuttings

Data Summary: ○ Preliminary ● Final Results

enter data only in shaded areas, copy and paste formulas as needed to calculate more desorption data (columns H through N)

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction: Cumulative Volume @ STP (milliliter)	Headspace Correction: Cumulative Gas Content (SCF)
In Can	1/4/2002	23:07	62.1	30.05	0	82.3	0.00	0.00	0.79	0.00	0.00	0.0	0.0
1	1/4/2002	23:25	59.5	30.05	11	89.7	10.46	10.46	0.96	0.14	0.24	10.5	0.000
2	1/4/2002	23:38	58.6	30.04	7	89.6	6.65	17.11	1.06	0.23	0.40	17.1	0.001
3	1/4/2002	23:52	58.2	30.03	5	95.6	4.70	21.81	1.17	0.29	0.51	21.9	0.001
4	1/5/2002	0:32	56.0	30.01	5	100.2	4.66	26.47	1.43	0.35	0.62	26.7	0.001
5	1/5/2002	0:48	56.0	30.00	3	101.0	2.79	29.25	1.52	0.38	0.68	29.5	0.001
6	1/5/2002	1:06	56.0	29.97	2	102.0	1.85	31.11	1.61	0.41	0.73	31.5	0.001
7	1/5/2002	1:20	56.0	30.00	2	102.6	1.85	32.96	1.68	0.43	0.77	33.4	0.001
8	1/5/2002	1:35	56.0	30.00	1	103.5	0.93	33.89	1.76	0.45	0.79	34.3	0.001
9	1/5/2002	1:49	56.4	29.99	1	103.7	0.93	34.81	1.82	0.46	0.81	35.3	0.001
10	1/5/2002	2:03	56.4	30.00	2	104.1	1.85	36.66	1.88	0.48	0.85	37.2	0.001
11	1/5/2002	2:21	56.2	29.99	1	103.9	0.92	37.59	1.96	0.49	0.88	38.1	0.001
12	1/5/2002	2:38	56.6	29.98	0	104.5	0.00	37.59	2.03	0.49	0.88	38.1	0.001
13	1/5/2002	2:56	56.9	29.97	0	103.2	0.00	37.59	2.11	0.49	0.88	38.1	0.001
14	1/5/2002	9:01	60.1	29.88	2	105.2	1.84	39.43	3.24	0.52	0.92	40.0	0.001
15	1/5/2002	14:51	58.8	29.72	1	111.0	0.91	40.33	4.04	0.53	0.94	41.0	0.001
16	1/6/2002	16:50	67.8	29.85	0	108.8	0.00	40.33	6.51	0.53	0.94	41.0	0.001
17	1/7/2002	22:15	67.1	30.13	0	107.6	0.00	40.33	8.47	0.53	0.94	41.0	0.001
18	1/9/2002	13:06	74.3	29.23	0	98.7	0.00	40.33	10.52	0.53	0.94	41.0	0.001
19	1/9/2002	17:40	74.1	29.21	4	106.4	3.59	43.92	10.73	0.58	1.02	44.6	0.002
20	1/10/2002	17:21	72.8	29.35	0	105.3	0.00	43.92	11.78	0.58	1.02	44.6	0.002

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction Cumulative Volume @ STP (milliliter)	Headspace Correction Cumulative Gas Content (SCF)
21	1/11/2002	15:16	74.2	29.41	0	104.8	0.00	43.92	12.68	0.58	1.02	44.6	0.002
22	1/12/2002	14:44	73.6	29.32	0	103.5	0.00	43.92	13.57	0.58	1.02	44.6	0.002
23	1/20/2002	16:22	76.8	29.65	0	102.9	0.00	43.92	19.44	0.58	1.02	44.6	0.002


Devon SFS #9-1
CAN LA-SWC-01-2
Cumulative Desorbed Volume (cc)
40.0
20.0
0.0
-20.0
-40.0
-60.0
0.00
5.00
10.00
15.00
20.00
25.00
Square Root of Time (hr)

Project	Devon			Cumulative volume @ STP:	458.3	Raw total gas (cc/g)	0.51
Well ID:	SFS #9-1	Can no.	4-LA-9				
Sample Interval (ft):	From: 2223	To:	2224	Milliliters/gram raw coal:	0.14	DAF total gas (cc/g)	1.99
Core Date: (mm/dd/yr)			1/5/2002				
Time Zero-Coal penetrated (hh:mm) (24 hour clock)			15:20	Milliliter/gram coal d.a.f.: (excluding lost gas)	0.55	Raw total gas (SCF/ton)	16.16
Raw coal mass (air-dry): (grams)			3283				
Coal mass (d.a.f.): (grams)			832.79	Lost gas estimate (cc) (from lost gas graph)	1200	DAF total gas (SCF/ton)	63.72
Headspace volume: (cc)			0				
						Cuttings correction 25% (SCF/ton)	N/A

Sample Type: (●) Core ( ) Cuttings

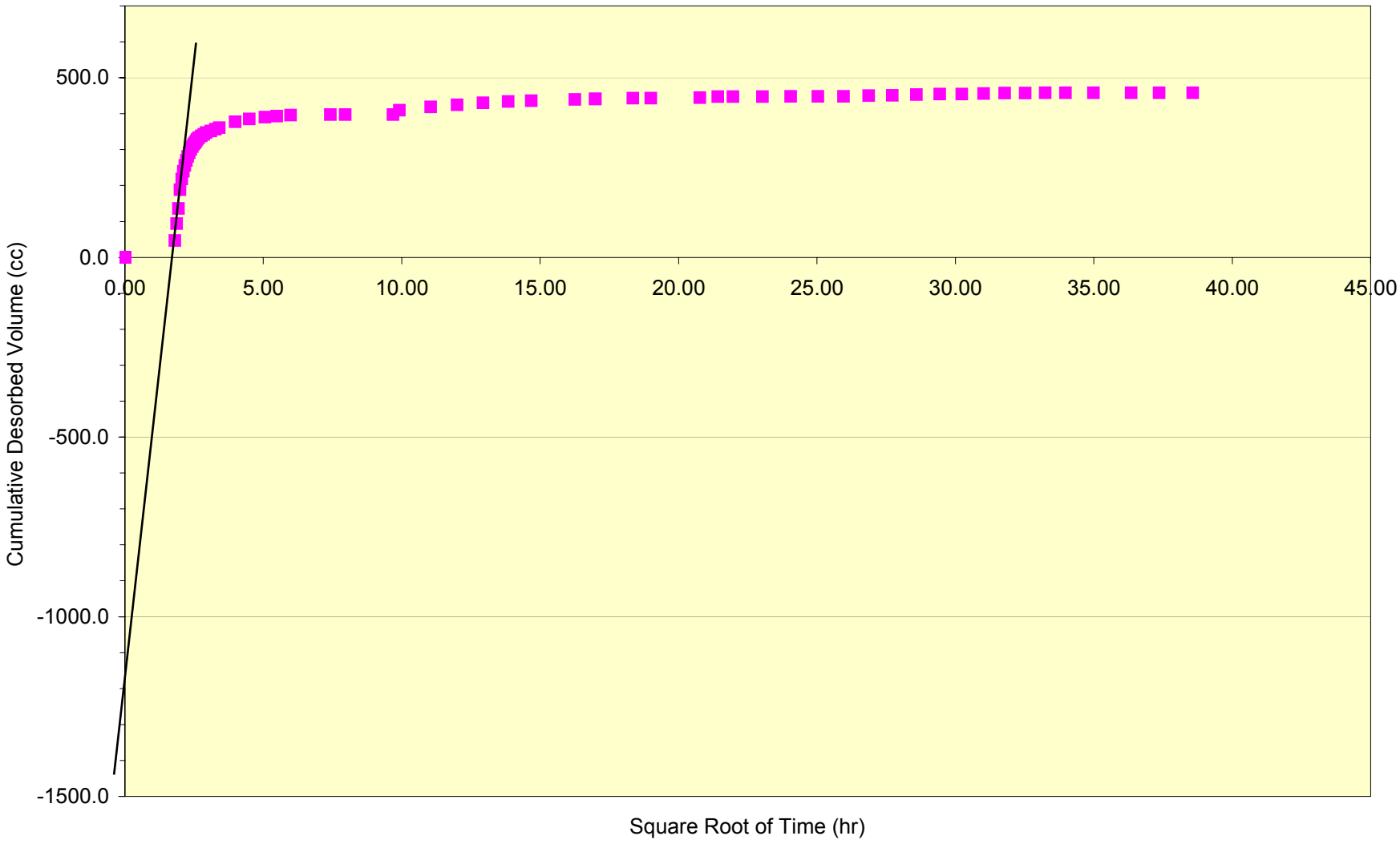
Data Summary: ( ) Preliminary (●) Final Results

enter data only in shaded areas, copy and paste formulas as needed to calculate more desorption data (columns H through N)

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction: Cumulative Volume @ STP (milliliter)	Headspace Correction: Cumulative Gas Content (SCF)
In Can	1/5/2002	18:19	57.3	29.68	0	90.5	0.00	0.00	1.73	0.00	0.00	0.0	0.0
1	1/5/2002	18:37	58.1	29.68	50	92.2	46.74	46.74	1.81	0.01	0.06	47.1	0.002
2	1/5/2002	18:50	59.5	29.67	50	97.3	46.29	93.03	1.87	0.03	0.11	94.1	0.003
3	1/5/2002	19:05	60.0	29.68	45	100.5	41.43	134.46	1.94	0.04	0.16	136.3	0.005
4	1/5/2002	19:19	60.3	29.68	55	103.7	50.36	184.82	2.00	0.06	0.22	187.9	0.007
5	1/5/2002	19:35	28.5	29.67	30	104.6	27.41	212.23	2.06	0.06	0.25	217.8	0.008
6	1/5/2002	19:48	59.8	29.67	23	106.0	20.96	233.20	2.11	0.07	0.28	239.4	0.008
7	1/5/2002	20:02	59.8	29.67	18	106.9	16.38	249.58	2.17	0.08	0.30	256.3	0.009
8	1/5/2002	20:16	60.1	29.68	14	107.7	12.73	262.31	2.22	0.08	0.31	269.5	0.010
9	1/5/2002	20:30	60.2	29.68	12	108.7	10.89	273.19	2.27	0.08	0.33	280.7	0.010
10	1/5/2002	20:45	60.6	29.68	11	108.2	9.99	283.19	2.33	0.09	0.34	291.0	0.010
11	1/5/2002	21:00	60.7	29.69	10	108.6	9.08	292.26	2.38	0.09	0.35	300.4	0.011
12	1/5/2002	21:16	61.7	29.69	8	108.7	7.26	299.53	2.44	0.09	0.36	307.9	0.011
13	1/5/2002	21:30	62.1	29.69	7	108.7	6.36	305.88	2.48	0.09	0.37	314.4	0.011
14	1/5/2002	21:44	62.2	29.70	5	108.6	4.54	310.42	2.53	0.09	0.37	319.1	0.011
15	1/5/2002	21:57	62.6	29.70	5	108.6	4.54	314.97	2.57	0.10	0.38	323.8	0.011
16	1/5/2002	22:11	62.6	29.71	5	108.5	4.54	319.51	2.62	0.10	0.38	328.5	0.012
17	1/5/2002	22:28	62.4	29.71	5	108.6	4.54	324.05	2.67	0.10	0.39	333.1	0.012
18	1/5/2002	22:59	63.4	29.72	5	108.6	4.54	328.60	2.77	0.10	0.39	337.8	0.012
19	1/5/2002	23:28	63.3	29.72	5	108.5	4.54	333.14	2.85	0.10	0.40	342.5	0.012
20	1/5/2002	23:59	63.2	29.72	5	108.9	4.54	337.68	2.94	0.10	0.41	347.1	0.012
21	1/6/2002	0:58	62.5	29.71	5	109.4	4.54	342.22	3.10	0.10	0.41	351.8	0.012
22	1/6/2002	2:01	59.6	29.72	5	108.6	4.54	346.76	3.27	0.11	0.42	356.5	0.013
23	1/6/2002	2:57	62.9	29.73	5	107.4	4.56	351.32	3.41	0.11	0.42	361.2	0.013
24	1/6/2002	7:11	63.5	29.82	17	107.7	15.53	366.85	3.98	0.11	0.44	377.1	0.013
25	1/6/2002	11:34	66.6	29.89	9	109.9	8.21	375.06	4.50	0.11	0.45	385.5	0.014
26	1/6/2002	16:58	67.5	29.85	5	108.6	4.56	379.62	5.06	0.12	0.46	390.2	0.014
27	1/6/2002	21:24	70.0	29.95	3	109.8	2.74	382.37	5.48	0.12	0.46	393.0	0.014
28	1/7/2002	3:09	62.7	30.02	3	110.0	2.75	385.11	5.98	0.12	0.46	395.8	0.014

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction Cumulative Volume @ STP (milliliter)	Headspace Correction Cumulative Gas Content (SCF)
29	1/7/2002	22:25	64.4	30.15	2	109.3	1.84	386.96	7.42	0.12	0.46	397.7	0.014
30	1/8/2002	6:45	51.5	30.11	0	109.5	0.00	386.96	7.96	0.12	0.46	397.7	0.014
31	1/9/2002	13:09	74.3	29.23	0	103.3	0.00	386.96	9.69	0.12	0.46	397.7	0.014
32	1/9/2002	17:44	74.1	29.21	13	111.0	11.56	398.52	9.92	0.12	0.48	409.4	0.014
33	1/10/2002	17:25	72.8	29.35	10	111.0	8.94	407.46	11.05	0.12	0.49	418.4	0.015
34	1/11/2002	15:20	74.2	29.41	7	112.3	6.26	413.71	12.00	0.13	0.50	424.8	0.015
35	1/12/2002	14:50	73.6	29.32	6	112.2	5.35	419.06	12.94	0.13	0.50	430.2	0.015
36	1/13/2002	15:01	73.6	29.32	4	112.4	3.56	422.62	13.84	0.13	0.51	433.8	0.015
37	1/14/2002	14:56	73.3	29.44	2	111.1	1.79	424.42	14.68	0.13	0.51	435.6	0.015
38	1/16/2002	15:37	74.2	29.74	4	112.0	3.62	428.03	16.26	0.13	0.51	439.3	0.016
39	1/17/2002	16:18	73.5	29.50	2	112.2	1.79	429.82	17.00	0.13	0.52	441.1	0.016
40	1/17/2002	15:51	73.7	29.65	0	110.2	0.00	429.82	16.99	0.13	0.52	441.1	0.016
41	1/19/2002	16:09	73.2	29.38	2	110.3	1.79	431.62	18.35	0.13	0.52	442.9	0.016
42	1/20/2002	16:27	76.8	29.65	0	110.6	0.00	431.62	19.00	0.13	0.52	442.9	0.016
43	1/23/2002	14:51	73.4	29.50	2	109.6	1.80	433.42	20.77	0.13	0.52	444.7	0.016
44	1/24/2002	18:04	73.4	29.23	3	109.8	2.68	436.09	21.42	0.13	0.52	447.4	0.016
45	1/25/2002	17:54	73.5	29.74	0	109.7	0.00	436.09	21.97	0.13	0.52	447.4	0.016
46	1/27/2002	17:53	74.2	29.53	0	109.0	0.00	436.09	23.03	0.13	0.52	447.4	0.016
47	1/29/2002	17:53	72.9	29.53	1	109.4	0.90	437.00	24.05	0.13	0.52	448.3	0.016
48	1/31/2002	17:56	74.1	29.65	0	107.5	0.00	437.00	25.03	0.13	0.52	448.3	0.016
49	2/2/2002	17:11	73.6	29.88	0	108.4	0.00	437.00	25.96	0.13	0.52	448.3	0.016
50	2/4/2002	17:35	74.2	29.50	2	108.3	1.81	438.80	26.87	0.13	0.53	450.2	0.016
51	2/6/2002	16:07	73.8	29.71	1	108.2	0.91	439.71	27.73	0.13	0.53	451.1	0.016
52	2/8/2002	16:52	73.9	29.56	2	107.7	1.81	441.52	28.59	0.13	0.53	452.9	0.016
53	2/10/2002	18:00	73.9	29.41	2	105.5	1.81	443.33	29.44	0.14	0.53	454.7	0.016
54	2/12/2002	17:42	72.7	29.35	0	103.1	0.00	443.33	30.24	0.14	0.53	454.7	0.016
55	2/14/2002	17:59	74.1	29.85	1	105.9	0.92	444.25	31.03	0.14	0.53	455.6	0.016
56	2/16/2002	17:13	73.0	29.26	2	105.9	1.80	446.04	31.78	0.14	0.54	457.4	0.016
57	2/18/2002	16:58	73.6	29.83	0	106.3	0.00	446.04	32.52	0.14	0.54	457.4	0.016
58	2/20/2002	16:51	73.1	29.32	1	103.7	0.90	446.95	33.25	0.14	0.54	458.3	0.016
59	2/22/2002	17:50	73.3	29.56	0	104.2	0.00	446.95	33.98	0.14	0.54	458.3	0.016
60	2/25/2002	15:34	73.1	29.56	0	105.8	0.00	446.95	34.99	0.14	0.54	458.3	0.016
61	3/1/2002	16:30	73.2	29.94	0	102.6	0.00	446.95	36.35	0.14	0.54	458.3	0.016
62	3/4/2002	19:02	73.9	29.74	0	102.1	0.00	446.95	37.36	0.14	0.54	458.3	0.016
63	3/8/2002	15:35	73.4	29.83	0	102.6	0.00	446.95	38.58	0.14	0.54	458.3	0.016

Devon SFS #9-1
CAN 4-LA-9



Project	Devon			Cumulative volume @ STP:	595.2	Raw total gas (cc/g)	0.37
Well ID:	SFS #9-1	Can no.	4-LA-5				
Sample Interval (ft):	From: 2240	To:	2225	Milliliters/gram raw coal:	0.16	DAF total gas (cc/g)	1.20
Core Date: (mm/dd/yr)			1/5/2002				
Time Zero-Coal penetrated (hh:mm) (24 hour clock)			15:20	Milliliter/gram coal d.a.f.: (excluding lost gas)	0.53	Raw total gas (SCF/ton)	11.87
Raw coal mass (air-dry): (grams)			3653				
Coal mass (d.a.f.): (grams)			1129.06	Lost gas estimate (cc) (from lost gas graph)	760	DAF total gas (SCF/ton)	38.41
Headspace volume: (cc)			0				
						Cuttings correction 25% (SCF/ton)	N/A

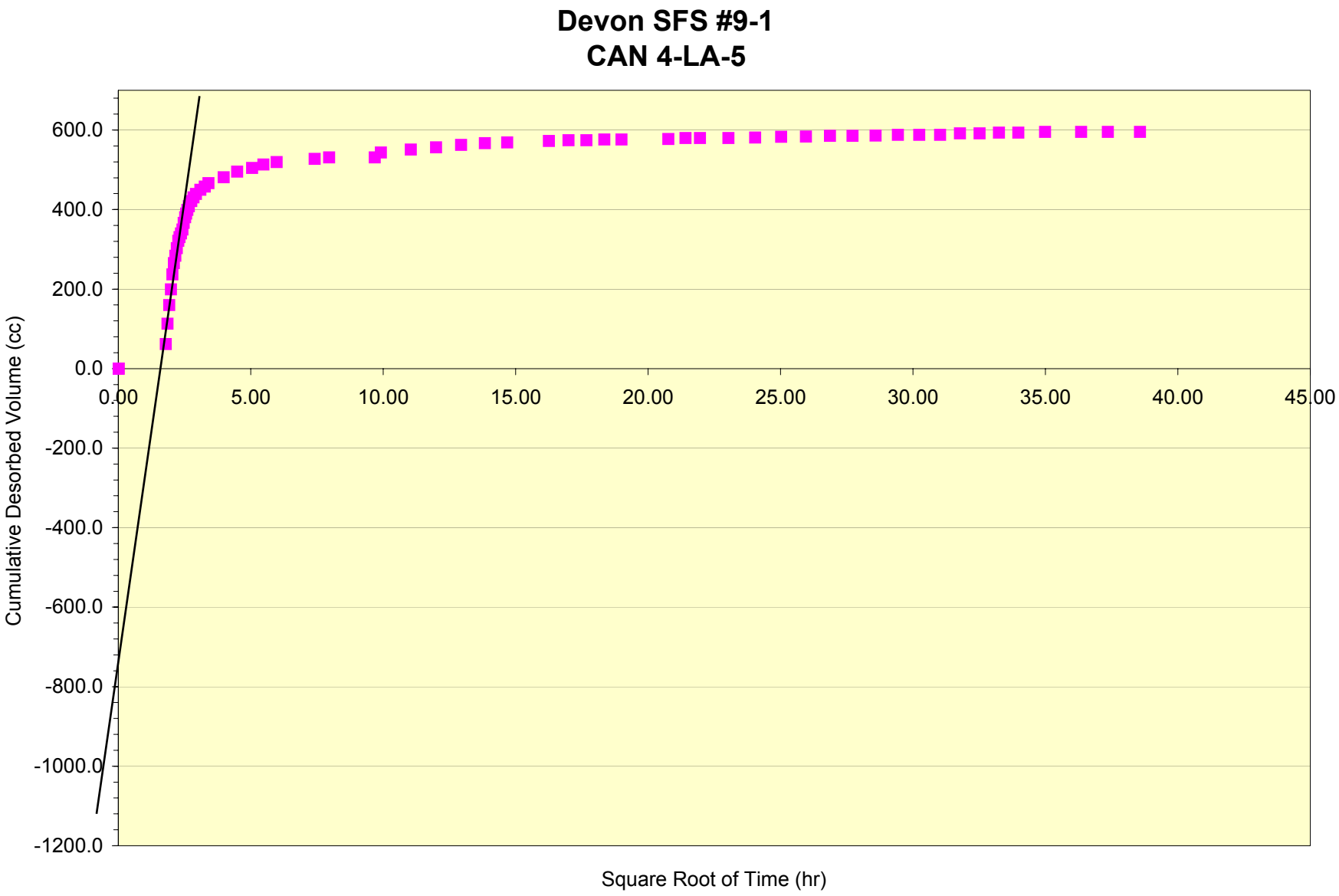
Sample Type: (●) Core ( ) Cuttings

Data Summary: ( ) Preliminary (●) Final Results

enter data only in shaded areas, copy and paste formulas as needed to calculate more desorption data (columns H through N)

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction: Cumulative Volume @ STP (milliliter)	Headspace Correction: Cumulative Gas Content (SCF)
In Can	1/5/2002	18:17	57.3	29.68	0	86.6	0.00	0.00	1.72	0.00	0.00	0.0	0.0
1	1/5/2002	18:33	58.1	29.68	65	90.3	60.96	60.96	1.79	0.02	0.05	61.2	0.002
2	1/5/2002	18:48	59.5	29.67	55	94.4	51.19	112.15	1.86	0.03	0.10	112.9	0.004
3	1/5/2002	19:03	60.0	29.67	50	97.7	46.26	158.41	1.93	0.04	0.14	159.8	0.006
4	1/5/2002	19:18	60.3	29.68	42	100.4	38.68	197.09	1.99	0.05	0.17	199.2	0.007
5	1/5/2002	19:32	59.1	29.67	40	101.5	36.75	233.85	2.05	0.06	0.21	236.8	0.008
6	1/5/2002	19:46	59.7	29.67	30	103.2	27.48	261.33	2.11	0.07	0.23	264.9	0.009
7	1/5/2002	19:59	59.8	29.67	20	104.2	18.29	279.62	2.16	0.08	0.25	283.7	0.010
8	1/5/2002	20:14	60.1	29.68	20	105.5	18.25	297.87	2.21	0.08	0.26	302.5	0.011
9	1/5/2002	20:28	60.2	29.68	20	106.2	18.23	316.09	2.27	0.09	0.28	321.2	0.011
10	1/5/2002	20:42	61.0	29.68	10	106.7	9.11	325.20	2.32	0.09	0.29	330.6	0.012
11	1/5/2002	20:57	61.1	29.69	10	107.0	9.10	334.30	2.37	0.09	0.30	340.0	0.012
12	1/5/2002	21:12	61.6	29.69	10	107.4	9.10	343.40	2.42	0.09	0.30	349.3	0.012
13	1/5/2002	21:28	62.1	29.69	18	107.9	16.37	359.77	2.48	0.10	0.32	366.2	0.013
14	1/5/2002	21:43	62.2	29.70	15	108.0	13.64	373.41	2.53	0.10	0.33	380.2	0.013
15	1/5/2002	21:56	62.6	29.70	10	107.8	9.10	382.50	2.57	0.10	0.34	389.5	0.014
16	1/5/2002	22:10	61.6	29.70	10	108.3	9.09	391.59	2.61	0.11	0.35	398.9	0.014
17	1/5/2002	22:27	62.4	29.71	10	108.3	9.09	400.68	2.67	0.11	0.35	408.3	0.014
18	1/5/2002	22:57	63.4	29.72	14	108.8	12.72	413.40	2.76	0.11	0.37	421.3	0.015
19	1/5/2002	23:26	63.3	29.72	10	108.8	9.08	422.49	2.85	0.12	0.37	430.7	0.015
20	1/5/2002	23:58	63.2	29.72	9	109.0	8.17	430.66	2.94	0.12	0.38	439.1	0.016
21	1/6/2002	0:56	62.5	29.71	11	109.7	9.98	440.64	3.10	0.12	0.39	449.4	0.016
22	1/6/2002	2:00	59.6	29.72	9	108.7	8.18	448.82	3.27	0.12	0.40	457.8	0.016
23	1/6/2002	2:55	62.9	29.73	9	109.5	8.17	456.99	3.40	0.13	0.40	466.2	0.016
24	1/6/2002	7:09	63.4	29.82	16	108.7	14.59	471.58	3.98	0.13	0.42	481.2	0.017
25	1/6/2002	11:32	66.6	29.89	15	110.6	13.66	485.24	4.49	0.13	0.43	495.2	0.017
26	1/6/2002	16:56	67.4	29.85	10	109.4	9.12	494.36	5.06	0.14	0.44	504.5	0.018
27	1/6/2002	21:22	69.8	29.95	9	109.5	8.23	502.59	5.48	0.14	0.45	512.9	0.018
28	1/7/2002	3:05	62.6	30.02	7	110.0	6.41	509.00	5.98	0.14	0.45	519.5	0.018

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction Cumulative Volume @ STP (milliliter)	Headspace Correction Cumulative Gas Content (SCF)
29	1/7/2002	22:23	64.4	30.15	8	110.2	7.36	516.35	7.42	0.14	0.46	527.1	0.019
30	1/8/2002	6:43	51.5	30.11	4	109.5	3.68	520.03	7.96	0.14	0.46	530.9	0.019
31	1/9/2002	13:08	74.3	29.23	0	103.3	0.00	520.03	9.69	0.14	0.46	530.9	0.019
32	1/9/2002	17:43	74.1	29.21	14	110.8	12.46	532.49	9.92	0.15	0.47	543.5	0.019
33	1/10/2002	17:24	72.8	29.35	8	110.9	7.15	539.64	11.05	0.15	0.48	550.8	0.019
34	1/11/2002	15:18	74.2	29.41	6	111.8	5.37	545.01	12.00	0.15	0.48	556.2	0.020
35	1/12/2002	14:50	73.6	29.32	7	112.0	6.24	551.25	12.94	0.15	0.49	562.5	0.020
36	1/13/2002	14:59	73.6	29.29	5	112.2	4.45	555.70	13.84	0.15	0.49	567.1	0.020
37	1/14/2002	14:56	73.3	29.44	2	112.5	1.79	557.49	14.68	0.15	0.49	568.9	0.020
38	1/16/2002	15:35	74.2	29.74	4	111.9	3.62	561.10	16.26	0.15	0.50	572.5	0.020
39	1/17/2002	16:16	73.5	29.50	2	112.2	1.79	562.90	17.00	0.15	0.50	574.3	0.020
40	1/18/2002	15:50	73.7	29.65	0	110.1	0.00	562.90	17.68	0.15	0.50	574.3	0.020
41	1/19/2002	16:08	73.2	29.38	2	110.0	1.79	564.69	18.35	0.15	0.50	576.2	0.020
42	1/20/2002	16:25	76.8	29.65	0	110.1	0.00	564.69	19.00	0.15	0.50	576.2	0.020
43	1/23/2002	14:49	73.4	29.50	1	109.5	0.90	565.59	20.77	0.15	0.50	577.1	0.020
44	1/24/2002	18:01	73.4	29.23	3	109.7	2.68	568.27	21.42	0.16	0.50	579.8	0.020
45	1/25/2002	17:53	73.5	29.74	0	109.6	0.00	568.27	21.97	0.16	0.50	579.8	0.020
46	1/27/2002	17:51	74.2	29.65	0	109.0	0.00	568.27	23.03	0.16	0.50	579.8	0.020
47	1/29/2002	17:23	72.9	29.53	1	108.8	0.90	569.17	24.04	0.16	0.50	580.7	0.021
48	1/31/2002	17:55	74.1	29.65	2	108.3	1.81	570.98	25.03	0.16	0.51	582.5	0.021
49	2/2/2002	17:11	73.6	29.88	1	107.8	0.92	571.90	25.96	0.16	0.51	583.4	0.021
50	2/4/2002	17:33	74.2	29.50	2	107.6	1.81	573.71	26.87	0.16	0.51	585.2	0.021
51	2/6/2002	16:06	73.8	29.71	0	107.6	0.00	573.71	27.73	0.16	0.51	585.2	0.021
52	2/8/2002	16:49	73.9	29.56	1	107.7	0.91	574.61	28.59	0.16	0.51	586.2	0.021
53	2/10/2002	17:58	73.9	29.41	2	107.2	1.80	576.41	29.44	0.16	0.51	588.0	0.021
54	2/12/2002	17:41	72.7	29.35	0	104.7	0.00	576.41	30.24	0.16	0.51	588.0	0.021
55	2/14/2002	17:59	74.1	29.85	0	106.8	0.00	576.41	31.03	0.16	0.51	588.0	0.021
56	2/16/2002	17:11	73.0	29.26	4	108.5	3.58	579.99	31.78	0.16	0.51	591.6	0.021
57	2/18/2002	16:57	73.6	29.83	0	105.7	0.00	579.99	32.52	0.16	0.51	591.6	0.021
58	2/20/2002	16:49	73.1	29.32	2	104.6	1.81	581.80	33.25	0.16	0.52	593.4	0.021
59	2/22/2002	17:48	73.3	29.56	0	104.5	0.00	581.80	33.98	0.16	0.52	593.4	0.021
60	2/25/2002	15:33	73.1	29.56	2	105.9	1.82	583.62	34.99	0.16	0.52	595.2	0.021
61	3/1/2002	16:29	73.2	29.94	0	104.3	0.00	583.62	36.35	0.16	0.52	595.2	0.021
62	3/4/2002	19:01	73.9	29.74	0	102.6	0.00	583.62	37.36	0.16	0.52	595.2	0.021
63	3/8/2002	15:34	73.4	29.83	0	102.7	0.00	583.62	38.58	0.16	0.52	595.2	0.021


Devon SFS #9-1
CAN 4-LA-5
Cumulative Desorbed Volume (cc)
600.0
400.0
200.0
0.0
-200.0
-400.0
-600.0
-800.0
-1000.0
-1200.0
0.00
5.00
10.00
15.00
20.00
25.00
30.00
35.00
40.00
45.00
Square Root of Time (hr)

Project	Devon			Cumulative volume @ STP:	700.2	Raw total gas (cc/g)	1.01
Well ID:	SFS #9-1	Can no.	4-LA-7				
Sample Interval (ft):	From: 2228.9	To:	2224	Milliliters/gram raw coal:	0.28	DAF total gas (cc/g)	2.61
Core Date: (mm/dd/yr)			1/5/2002				
Time Zero-Coal penetrated (hh:mm) (24 hour clock)			15:20	Milliliter/gram coal d.a.f.: (excluding lost gas)	0.73	Raw total gas (SCF/ton)	32.39
Raw coal mass (air-dry): (grams)			2470				
Coal mass (d.a.f.): (grams)			959.57	Lost gas estimate (cc) (from lost gas graph)	1800	DAF total gas (SCF/ton)	83.38
Headspace volume: (cc)			0				
						Cuttings correction 25% (SCF/ton)	N/A

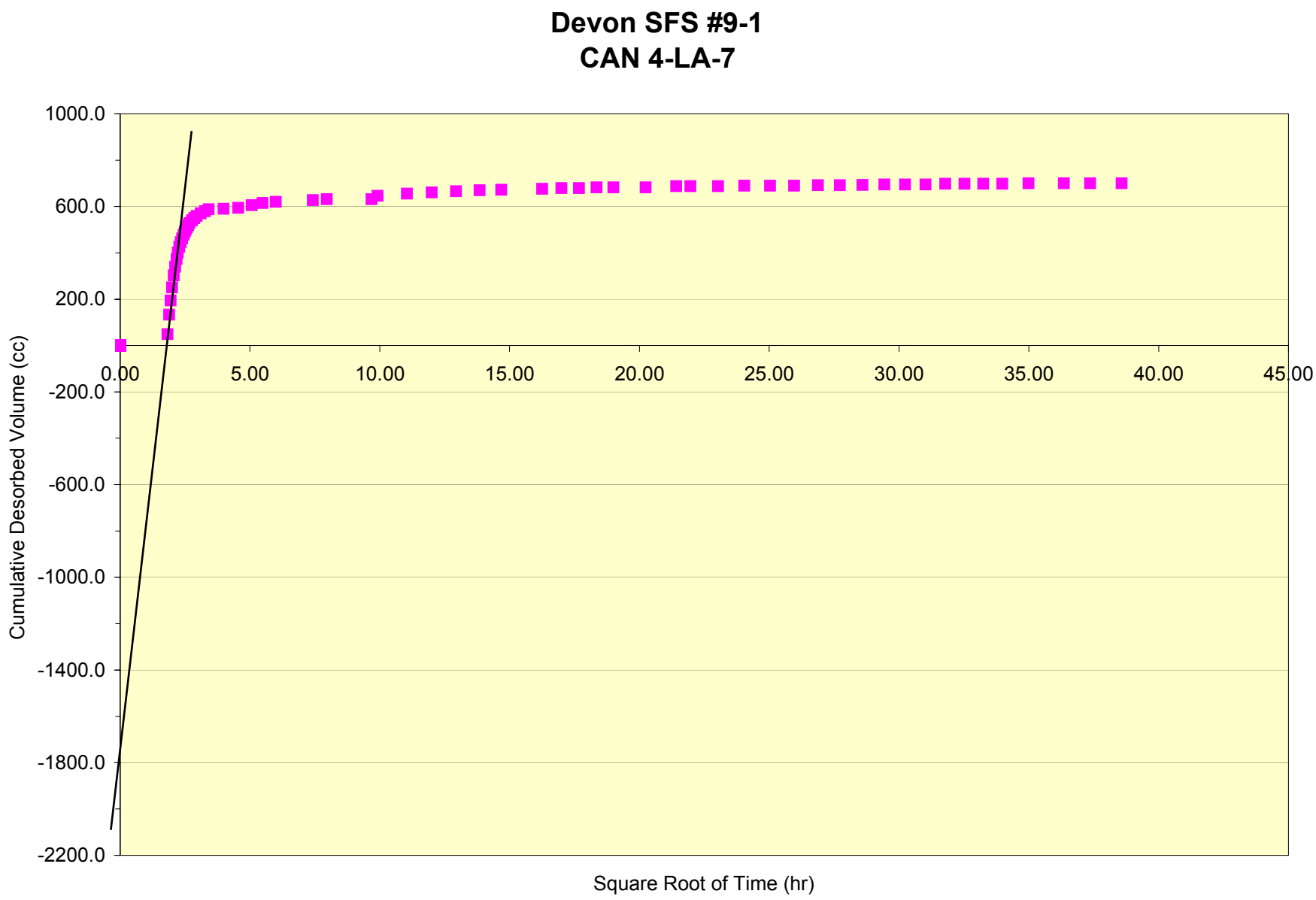
Sample Type: (●) Core ( ) Cuttings

Data Summary: ( ) Preliminary (●) Final Results

enter data only in shaded areas, copy and paste formulas as needed to calculate more desorption data (columns H through N)

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction: Cumulative Volume @ STP (milliliter)	Headspace Correction: Cumulative Gas Content (SCF)
In Can	1/5/2002	18:22	57.3	29.68	0	87.6	0.00	0.00	1.74	0.00	0.00	0.0	0.0
1	1/5/2002	18:40	58.1	29.68	52	89.4	48.86	48.86	1.83	0.02	0.05	49.0	0.002
2	1/5/2002	18:54	59.5	29.67	90	94.2	83.78	132.64	1.89	0.05	0.14	133.5	0.005
3	1/5/2002	19:07	60.0	29.68	65	99.1	60.00	192.64	1.95	0.08	0.20	194.5	0.007
4	1/5/2002	19:21	60.3	29.68	60	101.8	55.12	247.76	2.00	0.10	0.26	250.8	0.009
5	1/5/2002	19:36	58.5	29.67	55	103.8	50.33	298.09	2.07	0.12	0.31	302.5	0.011
6	1/5/2002	19:50	59.8	29.67	40	105.6	36.49	334.57	2.12	0.14	0.35	340.1	0.012
7	1/5/2002	20:04	59.8	29.67	35	106.7	31.87	366.44	2.18	0.15	0.38	372.9	0.013
8	1/5/2002	20:17	60.1	29.68	30	107.6	27.28	393.72	2.22	0.16	0.41	401.1	0.014
9	1/5/2002	20:32	60.2	29.68	26	108.5	23.60	417.32	2.28	0.17	0.43	425.5	0.015
10	1/5/2002	20:47	60.6	29.68	21	108.5	19.07	436.38	2.33	0.18	0.45	445.2	0.016
11	1/5/2002	21:02	60.9	29.69	18	108.7	16.34	452.72	2.39	0.18	0.47	462.0	0.016
12	1/5/2002	21:18	61.7	29.69	17	108.9	15.43	468.15	2.44	0.19	0.49	477.9	0.017
13	1/5/2002	21:32	62.1	29.69	13	109.2	11.79	479.94	2.49	0.19	0.50	490.1	0.017
14	1/5/2002	21:45	62.2	29.70	11	109.3	9.98	489.92	2.53	0.20	0.51	500.4	0.018
15	1/5/2002	21:58	62.6	29.70	10	109.4	9.07	498.99	2.58	0.20	0.52	509.7	0.018
16	1/5/2002	22:13	62.6	29.71	10	109.5	9.07	508.06	2.62	0.21	0.53	519.1	0.018
17	1/5/2002	22:29	62.4	29.71	10	109.4	9.07	517.14	2.67	0.21	0.54	528.4	0.019
18	1/5/2002	23:00	63.4	29.72	13	109.7	11.79	528.93	2.77	0.21	0.55	540.6	0.019
19	1/5/2002	23:30	63.3	29.72	10	109.6	9.07	538.00	2.86	0.22	0.56	549.9	0.019
20	1/6/2002	0:00	63.2	29.72	10	109.9	9.07	547.07	2.94	0.22	0.57	559.2	0.020
21	1/6/2002	1:00	62.5	29.71	12	110.3	10.87	557.94	3.11	0.23	0.58	570.5	0.020
22	1/6/2002	2:03	59.6	29.72	10	109.9	9.07	567.01	3.27	0.23	0.59	579.9	0.020
23	1/6/2002	2:59	62.9	29.73	8	108.5	7.28	574.28	3.41	0.23	0.60	587.3	0.021
24	1/6/2002	7:13	63.5	29.82	3	108.4	2.74	577.02	3.99	0.23	0.60	590.1	0.021
25	1/6/2002	12:01	68.1	29.89	4	109.5	3.65	580.67	4.55	0.24	0.61	593.9	0.021
26	1/6/2002	17:01	67.6	29.86	12	111.0	10.91	591.58	5.07	0.24	0.62	605.0	0.021
27	1/6/2002	21:25	70.1	29.95	10	110.9	9.12	600.70	5.48	0.24	0.63	614.3	0.022
28	1/7/2002	3:16	63.0	30.03	6	110.4	5.49	606.20	5.99	0.25	0.63	620.0	0.022

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction Cumulative Volume @ STP (milliliter)	Headspace Correction Cumulative Gas Content (SCF)
29	1/7/2002	22:28	64.4	30.14	8	107.0	7.40	613.59	7.43	0.25	0.64	627.6	0.022
30	1/8/2002	6:47	51.5	30.11	4	109.9	3.67	617.27	7.97	0.25	0.64	631.4	0.022
31	1/9/2002	13:10	74.3	29.23	0	101.6	0.00	617.27	9.69	0.25	0.64	631.4	0.022
32	1/9/2002	17:45	74.1	29.21	16	110.7	14.24	631.51	9.92	0.26	0.66	645.8	0.023
33	1/10/2002	17:26	72.8	29.35	10	110.5	8.95	640.45	11.05	0.26	0.67	654.9	0.023
34	1/11/2002	15:20	74.2	29.41	6	111.4	5.37	645.82	12.00	0.26	0.67	660.3	0.023
35	1/12/2002	14:52	73.6	29.32	6	111.2	5.36	651.18	12.94	0.26	0.68	665.7	0.024
36	1/13/2002	15:05	73.6	29.32	5	111.6	4.46	655.64	13.85	0.27	0.68	670.2	0.024
37	1/14/2002	14:58	73.3	29.44	2	111.2	1.79	657.43	14.68	0.27	0.69	672.1	0.024
38	1/16/2002	15:38	74.2	29.74	4	111.1	3.62	661.05	16.26	0.27	0.69	675.7	0.024
39	1/17/2002	16:20	73.5	29.50	4	111.1	3.59	664.65	17.00	0.27	0.69	679.4	0.024
40	1/18/2002	15:52	73.7	29.65	0	109.4	0.00	664.65	17.68	0.27	0.69	679.4	0.024
41	1/19/2002	16:12	73.2	29.38	3	108.5	2.70	667.34	18.35	0.27	0.70	682.1	0.024
42	1/20/2002	16:29	76.8	29.65	0	108.9	0.00	667.34	19.00	0.27	0.70	682.1	0.024
43	1/22/2002	16:59	73.4	29.85	0	107.9	0.00	667.34	20.24	0.27	0.70	682.1	0.024
44	1/24/2002	18:06	73.4	29.23	6	108.1	5.37	672.71	21.42	0.27	0.70	687.5	0.024
45	1/25/2002	17:55	73.5	29.74	0	107.7	0.00	672.71	21.97	0.27	0.70	687.5	0.024
46	1/27/2002	17:54	74.2	29.65	0	106.4	0.00	672.71	23.03	0.27	0.70	687.5	0.024
47	1/29/2002	17:25	72.9	29.53	2	106.9	1.81	674.52	24.04	0.27	0.70	689.3	0.024
48	1/31/2002	17:58	74.1	29.65	0	108.0	0.00	674.52	25.03	0.27	0.70	689.3	0.024
49	2/2/2002	17:13	73.6	29.88	0	107.0	0.00	674.52	25.96	0.27	0.70	689.3	0.024
50	2/4/2002	17:36	74.2	29.50	2	107.5	1.81	676.33	26.88	0.27	0.70	691.1	0.024
51	2/6/2002	16:08	73.8	29.71	0	107.7	0.00	676.33	27.73	0.27	0.70	691.1	0.024
52	2/8/2002	16:54	73.9	29.56	2	108.0	1.81	678.14	28.59	0.27	0.71	692.9	0.024
53	2/10/2002	18:01	73.9	29.41	2	106.9	1.80	679.94	29.44	0.28	0.71	694.7	0.025
54	2/12/2002	17:43	72.7	29.35	0	104.2	0.00	679.94	30.24	0.28	0.71	694.7	0.025
55	2/14/2002	18:01	74.1	29.85	0	105.9	0.00	679.94	31.03	0.28	0.71	694.7	0.025
56	2/16/2002	17:14	73.0	29.26	4	106.6	3.59	683.54	31.78	0.28	0.71	698.4	0.025
57	2/18/2002	17:00	73.6	29.83	0	106.0	0.00	683.54	32.52	0.28	0.71	698.4	0.025
58	2/20/2002	16:52	73.1	29.32	0	104.4	0.00	683.54	33.25	0.28	0.71	698.4	0.025
59	2/22/2002	17:51	73.3	29.56	0	104.1	0.00	683.54	33.98	0.28	0.71	698.4	0.025
60	2/25/2002	15:35	73.1	29.56	2	105.5	1.82	685.35	34.99	0.28	0.71	700.2	0.025
61	3/1/2002	16:31	73.2	29.94	0	103.4	0.00	685.35	36.35	0.28	0.71	700.2	0.025
62	3/4/2002	19:07	73.9	29.74	0	102.5	0.00	685.35	37.36	0.28	0.71	700.2	0.025
63	3/8/2002	15:36	73.4	29.83	0	102.0	0.00	685.35	38.58	0.28	0.71	700.2	0.025


Devon SFS #9-1
CAN 4-LA-7
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-1000.0
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-1800.0
-2200.0
0.00
5.00
10.00
15.00
20.00
25.00
30.00
35.00
40.00
45.00
Cumulative Desorbed Volume (cc)
Square Root of Time (hr)

Project	Devon			Cumulative volume @ STP:	679.3	Raw total gas (cc/g)	3.60
Well ID:	SFS #9-1	Can no.	3-LA-C13				
Sample Interval (ft):	From: 2228.9	To:	2229.2 +/- 0.3	Milliliters/gram raw coal:	1.46	DAF total gas (cc/g)	5.18
Core Date: (mm/dd/yr)			1/5/2002				
Time Zero-Coal penetrated (hh:mm) (24 hour clock)			15:20	Milliliter/gram coal d.a.f.: (excluding lost gas)	2.09	Raw total gas (SCF/ton)	115.32
Raw coal mass (air-dry): (grams)			466				
Coal mass (d.a.f.): (grams)			324.27	Lost gas estimate (cc) (from lost gas graph)	1000	DAF total gas (SCF/ton)	165.72
Headspace volume: (cc)			0				
						Cuttings correction 25% (SCF/ton)	N/A

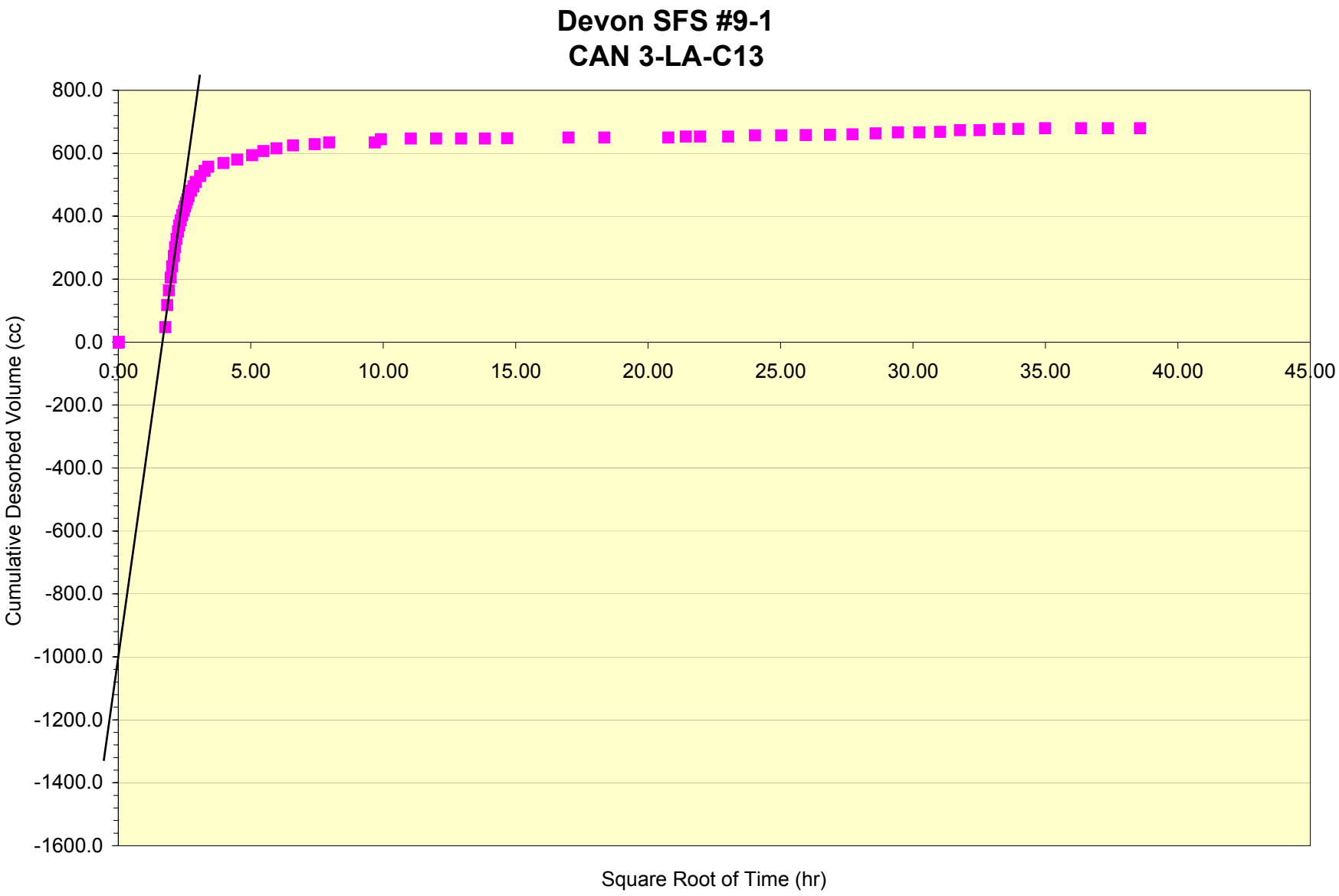
Sample Type: (●) Core ( ) Cuttings

Data Summary: ( ) Preliminary (●) Final Results

enter data only in shaded areas, copy and paste formulas as needed to calculate more desorption data (columns H through N)

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction: Cumulative Volume @ STP (milliliter)	Headspace Correction: Cumulative Gas Content (SCF)
In Can	1/5/2002	18:07	57.3	29.68	0	86.0	0.00	0.00	1.67	0.00	0.00	0.0	0.0
1	1/5/2002	18:30	58.1	29.68	50	86.4	47.24	47.24	1.78	0.10	0.15	47.1	0.002
2	1/5/2002	18:45	59.5	29.67	75	89.9	70.37	117.61	1.85	0.25	0.36	117.5	0.004
3	1/5/2002	19:01	60.0	29.67	50	94.2	46.55	164.16	1.92	0.35	0.51	164.5	0.006
4	1/5/2002	19:15	60.3	29.68	43	96.9	39.85	204.01	1.98	0.44	0.63	204.8	0.007
5	1/5/2002	19:29	58.5	29.67	38	99.6	35.03	239.05	2.04	0.51	0.74	240.5	0.008
6	1/5/2002	19:44	59.8	29.67	35	99.5	32.27	271.32	2.10	0.58	0.84	273.4	0.010
7	1/5/2002	19:58	59.8	29.67	30	105.8	27.36	298.67	2.15	0.64	0.92	301.5	0.011
8	1/5/2002	20:12	60.1	29.68	28	107.0	25.48	324.16	2.21	0.70	1.00	327.8	0.012
9	1/5/2002	20:26	60.4	29.67	25	107.6	22.73	346.88	2.26	0.74	1.07	351.3	0.012
10	1/5/2002	20:40	60.6	29.68	20	106.3	18.23	365.11	2.31	0.78	1.13	370.0	0.013
11	1/5/2002	20:55	60.9	29.69	18	105.3	16.44	381.55	2.36	0.82	1.18	386.9	0.014
12	1/5/2002	21:10	61.7	29.69	17	105.4	15.52	397.07	2.42	0.85	1.22	402.8	0.014
13	1/5/2002	21:26	62.1	29.69	15	107.0	13.66	410.73	2.47	0.88	1.27	416.8	0.015
14	1/5/2002	21:41	62.2	29.70	15	107.8	13.64	424.37	2.52	0.91	1.31	430.8	0.015
15	1/5/2002	21:54	62.6	29.70	12	108.4	10.90	435.28	2.56	0.93	1.34	442.1	0.016
16	1/5/2002	22:08	62.6	29.70	12	108.7	10.90	446.18	2.61	0.96	1.38	453.3	0.016
17	1/5/2002	22:25	62.4	29.70	11	108.6	9.99	456.17	2.66	0.98	1.41	463.6	0.016
18	1/5/2002	22:55	63.4	29.71	18	109.2	16.34	472.51	2.75	1.01	1.46	480.4	0.017
19	1/5/2002	23:24	63.3	29.72	15	109.6	13.61	486.12	2.84	1.04	1.50	494.4	0.017
20	1/5/2002	23:55	63.2	29.72	15	109.5	13.61	499.73	2.93	1.07	1.54	508.4	0.018
21	1/6/2002	0:54	62.5	29.71	20	109.9	18.13	517.86	3.09	1.11	1.60	527.1	0.019
22	1/6/2002	1:58	59.6	29.72	18	110.4	16.31	534.17	3.26	1.15	1.65	544.0	0.019
23	1/6/2002	2:54	62.9	29.73	14	111.7	12.66	546.83	3.40	1.17	1.69	557.1	0.020
24	1/6/2002	7:08	63.4	29.82	12	103.7	11.04	557.87	3.97	1.20	1.72	568.3	0.020
25	1/6/2002	11:30	66.6	29.89	12	108.7	10.97	568.84	4.49	1.22	1.75	579.5	0.020
26	1/6/2002	16:54	66.8	29.85	15	101.4	13.87	582.71	5.06	1.25	1.80	593.5	0.021
27	1/6/2002	21:20	70.1	29.95	14	107.0	12.86	595.56	5.48	1.28	1.84	606.5	0.021

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction Cumulative Volume @ STP (milliliter)	Headspace Correction Cumulative Gas Content (SCF)
28	1/7/2002	3:01	62.3	30.02	9	106.9	8.29	603.85	5.97	1.30	1.86	615.0	0.022
29	1/7/2002	10:53	64.4	30.15	10	109.9	9.20	613.05	6.60	1.32	1.89	624.5	0.022
30	1/7/2002	22:21	65.9	30.14	4	106.3	3.70	616.75	7.42	1.32	1.90	628.2	0.022
31	1/8/2002	6:41	51.5	30.11	6	110.1	5.51	622.26	7.96	1.34	1.92	634.1	0.022
32	1/9/2002	13:07	74.3	29.23	0	110.1	0.00	622.26	9.68	1.34	1.92	634.1	0.022
33	1/9/2002	17:42	74.1	29.21	11	108.7	9.82	632.09	9.92	1.36	1.95	643.9	0.023
34	1/10/2002	17:23	72.8	29.35	3	108.6	2.69	634.78	11.05	1.36	1.96	646.7	0.023
35	1/11/2002	15:18	74.2	29.41	0	109.8	0.00	634.78	12.00	1.36	1.96	646.7	0.023
36	1/12/2002	14:48	73.6	29.32	0	109.2	0.00	634.78	12.94	1.36	1.96	646.7	0.023
37	1/13/2002	14:57	73.6	29.29	0	108.3	0.00	634.78	13.84	1.36	1.96	646.7	0.023
38	1/14/2002	14:53	73.3	29.44	1	109.8	0.90	635.68	14.68	1.36	1.96	647.6	0.023
39	1/17/2002	16:14	73.5	29.50	2	109.5	1.80	637.48	17.00	1.37	1.97	649.4	0.023
40	1/19/2002	16:06	73.2	29.38	0	107.5	0.00	637.48	18.35	1.37	1.97	649.4	0.023
41	1/23/2002	14:47	73.4	29.50	0	106.2	0.00	637.48	20.77	1.37	1.97	649.4	0.023
42	1/24/2002	18:16	73.4	29.23	4	107.4	3.58	641.06	21.42	1.38	1.98	653.0	0.023
43	1/25/2002	17:50	73.5	29.71	0	107.4	0.00	641.06	21.97	1.38	1.98	653.0	0.023
44	1/27/2002	17:48	74.2	29.65	0	106.5	0.00	641.06	23.03	1.38	1.98	653.0	0.023
45	1/29/2002	17:19	72.9	29.53	4	108.2	3.61	644.68	24.04	1.38	1.99	656.6	0.023
46	1/31/2002	17:52	74.1	29.65	0	101.1	0.00	644.68	25.03	1.38	1.99	656.6	0.023
47	2/2/2002	17:09	73.6	29.88	1	101.6	0.93	645.60	25.96	1.39	1.99	657.6	0.023
48	2/4/2002	17:31	74.2	29.50	1	101.8	0.91	646.52	26.87	1.39	1.99	658.5	0.023
49	2/6/2002	16:04	73.8	29.71	1	104.1	0.92	647.43	27.73	1.39	2.00	659.4	0.023
50	2/8/2002	16:48	73.9	29.56	4	101.8	3.66	651.09	28.59	1.40	2.01	663.0	0.023
51	2/10/2002	17:57	73.9	29.41	3	99.9	2.74	653.83	29.44	1.40	2.02	665.7	0.024
52	2/12/2002	17:39	72.7	29.35	0	100.3	0.00	653.83	30.24	1.40	2.02	665.7	0.024
53	2/14/2002	17:57	74.1	29.85	2	101.8	1.85	655.68	31.03	1.41	2.02	667.6	0.024
54	2/16/2002	17:10	73.0	29.26	6	103.9	5.41	661.09	31.78	1.42	2.04	673.0	0.024
55	2/18/2002	16:55	73.6	29.83	0	102.2	0.00	661.09	32.52	1.42	2.04	673.0	0.024
56	2/20/2002	16:45	73.1	29.32	4	103.3	3.62	664.71	33.25	1.43	2.05	676.6	0.024
57	2/22/2002	17:47	73.3	29.56	0	100.2	0.00	664.71	33.98	1.43	2.05	676.6	0.024
58	2/25/2002	15:32	73.1	29.56	3	103.0	2.74	667.45	34.99	1.43	2.06	679.3	0.024
59	3/1/2002	16:28	73.2	29.94	0	99.8	0.00	667.45	36.35	1.43	2.06	679.3	0.024
60	3/4/2002	19:00	73.9	29.74	0	99.5	0.00	667.45	37.36	1.43	2.06	679.3	0.024
61	3/8/2002	15:32	73.4	29.83	0	97.9	0.00	667.45	38.58	1.43	2.06	679.3	0.024


Devon SFS #9-1
CAN 3-LA-C13
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-1600.0
0.00
5.00
10.00
15.00
20.00
25.00
30.00
35.00
40.00
45.00
Cumulative Desorbed Volume (cc)
Square Root of Time (hr)

Project	Devon				Cumulative volume @ STP:	681.4	Raw total gas (cc/g) 0.58
Well ID:	SFS #9-1	Can no.	4-LA-8				
Sample Interval (ft):	From: 2265.3	To:	2266.3		Milliliters/gram raw coal:	0.22	DAF total gas (cc/g) 3.30
Core Date: (mm/dd/yr)			1/6/2002				
Time Zero-Coal penetrated (hh:mm) (24 hour clock)			7:20		Milliliter/gram coal d.a.f.: (excluding lost gas)	1.26	Raw total gas (SCF/ton) 18.42
Raw coal mass (air-dry): (grams)			3094				
Coal mass (d.a.f.): (grams)			540.3		Lost gas estimate (cc) (from lost gas graph)	1100	DAF total gas (SCF/ton) 105.51
Headspace volume: (cc)			0				
							Cuttings correction 25% (SCF/ton) N/A

Sample Type: (●) Core ( ) Cuttings

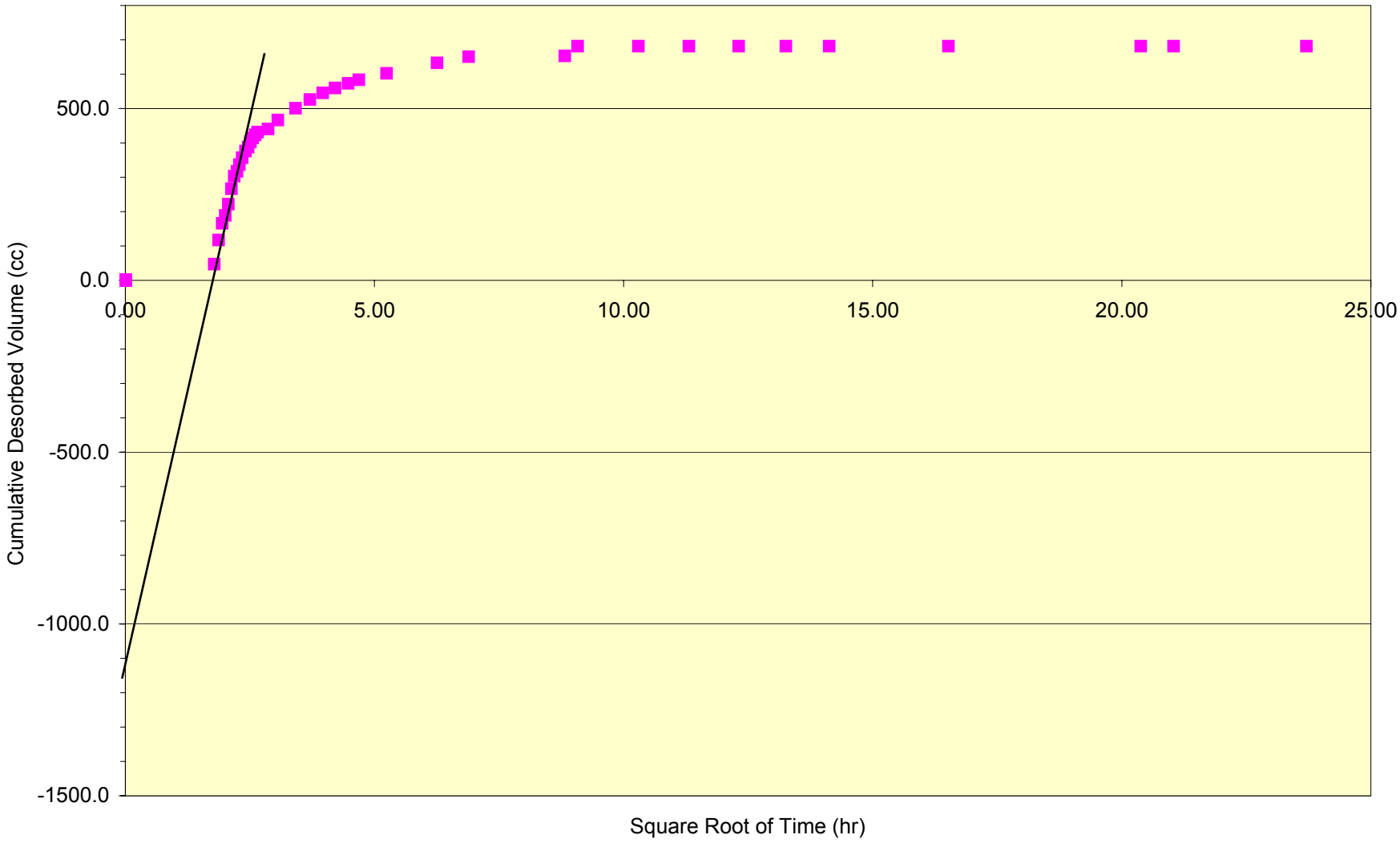
Data Summary: ( ) Preliminary (●) Final Results

enter data only in shaded areas, copy and paste formulas as needed to calculate more desorption data (columns H through N)

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction: Cumulative Volume @ STP (milliliter)	Headspace Correction: Cumulative Gas Content (SCF)
In Can	1/6/2002	10:10	62.0	29.89	0	86.0	0.00	0.00	1.68	0.00	0.00	0.0	0.0
1	1/6/2002	10:31	64.7	29.89	50	86.6	47.55	47.55	1.78	0.02	0.09	46.8	0.002
2	1/6/2002	10:51	65.3	29.89	75	88.5	71.07	118.62	1.88	0.04	0.22	117.0	0.004
3	1/6/2002	11:07	65.8	29.89	52	94.4	48.75	167.38	1.95	0.05	0.31	165.6	0.006
4	1/6/2002	11:22	66.6	29.89	25	97.3	23.32	190.69	2.01	0.06	0.35	189.0	0.007
5	1/6/2002	11:37	68.2	29.89	35	100.5	32.46	223.15	2.07	0.07	0.41	221.5	0.008
6	1/6/2002	11:52	68.1	29.89	48	102.5	44.35	267.50	2.13	0.09	0.50	266.2	0.009
7	1/6/2002	12:07	69.0	29.89	40	104.1	36.85	304.35	2.19	0.10	0.56	303.4	0.011
8	1/6/2002	12:22	69.5	29.88	15	104.9	13.80	318.15	2.24	0.10	0.59	317.3	0.011
9	1/6/2002	12:35	71.4	29.88	21	105.8	19.28	337.43	2.29	0.11	0.62	336.7	0.012
10	1/6/2002	12:51	72.2	29.87	22	106.1	20.19	357.62	2.35	0.12	0.66	357.0	0.013
11	1/6/2002	13:09	73.2	29.88	21	107.2	19.23	376.85	2.41	0.12	0.70	376.3	0.013
12	1/6/2002	13:24	73.8	29.85	12	107.9	10.97	387.82	2.46	0.13	0.72	387.4	0.014
13	1/6/2002	13:38	75.2	29.85	16	108.3	14.62	402.44	2.51	0.13	0.74	402.0	0.014
14	1/6/2002	13:53	75.3	29.84	13	108.8	11.86	414.30	2.56	0.13	0.77	414.0	0.015
15	1/6/2002	14:08	75.3	29.84	10	108.7	9.12	423.42	2.61	0.14	0.78	423.1	0.015
16	1/6/2002	14:23	75.9	29.84	9	108.9	8.21	431.63	2.66	0.14	0.80	431.4	0.015
17	1/6/2002	15:33	72.8	29.87	10	106.8	9.17	440.79	2.87	0.14	0.82	440.6	0.016
18	1/6/2002	16:43	68.1	29.85	28	108.3	25.57	466.36	3.06	0.15	0.86	466.6	0.016
19	1/6/2002	19:00	69.9	29.89	37	107.8	33.87	500.23	3.42	0.16	0.93	500.9	0.018

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction Cumulative Volume @ STP (milliliter)	Headspace Correction Cumulative Gas Content (SCF)
20	1/6/2002	21:03	69.6	29.94	27	107.9	24.75	524.99	3.70	0.17	0.97	526.0	0.019
21	1/6/2002	23:03	67.9	29.98	21	109.4	19.22	544.21	3.96	0.18	1.01	545.6	0.019
22	1/7/2002	1:03	65.3	29.99	15	109.0	13.75	557.95	4.21	0.18	1.03	559.7	0.020
23	1/7/2002	3:20	62.9	30.03	14	108.3	12.86	570.82	4.47	0.18	1.06	572.9	0.020
24	1/7/2002	5:20	60.7	30.03	11	108.6	10.10	580.92	4.69	0.19	1.08	583.4	0.021
25	1/7/2002	10:51	64.4	30.15	20	109.5	18.41	599.33	5.25	0.19	1.11	602.3	0.021
26	1/7/2002	22:31	65.2	30.15	32	106.9	29.59	628.92	6.26	0.20	1.16	632.5	0.022
27	1/8/2002	6:49	51.5	30.11	19	108.6	17.49	646.41	6.89	0.21	1.20	650.9	0.023
28	1/9/2002	13:10	74.3	29.23	2	108.2	1.79	648.20	8.82	0.21	1.20	652.7	0.023
29	1/9/2002	17:49	74.1	29.21	32	114.9	28.27	676.48	9.08	0.22	1.25	681.4	0.024
30	1/10/2002	17:27	72.8	29.35	0	105.3	0.00	676.48	10.30	0.22	1.25	681.4	0.024
31	1/11/2002	15:21	74.2	29.41	0	106.1	0.00	676.48	11.31	0.22	1.25	681.4	0.024
32	1/12/2002	14:54	73.6	29.32	0	105.4	0.00	676.48	12.31	0.22	1.25	681.4	0.024
33	1/13/2002	15:07	73.6	29.32	0	105.9	0.00	676.48	13.26	0.22	1.25	681.4	0.024
34	1/14/2002	14:59	73.3	29.44	0	105.1	0.00	676.48	14.13	0.22	1.25	681.4	0.024
35	1/17/2002	16:22	73.5	29.50	0	107.1	0.00	676.48	16.52	0.22	1.25	681.4	0.024
36	1/23/2002	14:52	73.4	29.50	0	104.0	0.00	676.48	20.38	0.22	1.25	681.4	0.024
37	1/24/2002	18:09	73.4	29.23	0	102.2	0.00	676.48	21.04	0.22	1.25	681.4	0.024
38	1/29/2002	17:26	72.9	29.53	0	104.6	0.00	676.48	23.71	0.22	1.25	681.4	0.024

Devon SFS #9-1
CAN 4-LA-8



Project	DEVON			Cumulative volume @ STP:	1179.6	Raw total gas (cc/g)	1.56
Well ID:	SFS #9-1	Can no.	4-LA-10				
Sample Interval (ft):	From: 2269.6	To:	2270.6	Milliliters/gram raw coal:	0.69	DAF total gas (cc/g)	2.50
Core Date: (mm/dd/yr)			1/6/2002				
Time Zero-Coal penetrated (hh:mm) (24 hour clock)			7:20	Milliliter/gram coal d.a.f.:	1.10	Raw total gas (SCF/ton)	49.97
Raw coal mass (air-dry): (grams)			1716	(excluding lost gas)			
Coal mass (d.a.f.): (grams)			1071.3	Lost gas estimate (cc)	1500	DAF total gas (SCF/ton)	80.04
Headspace volume: (cc)			0	(from lost gas graph)			
						Cuttings correction 25% (SCF/ton)	N/A

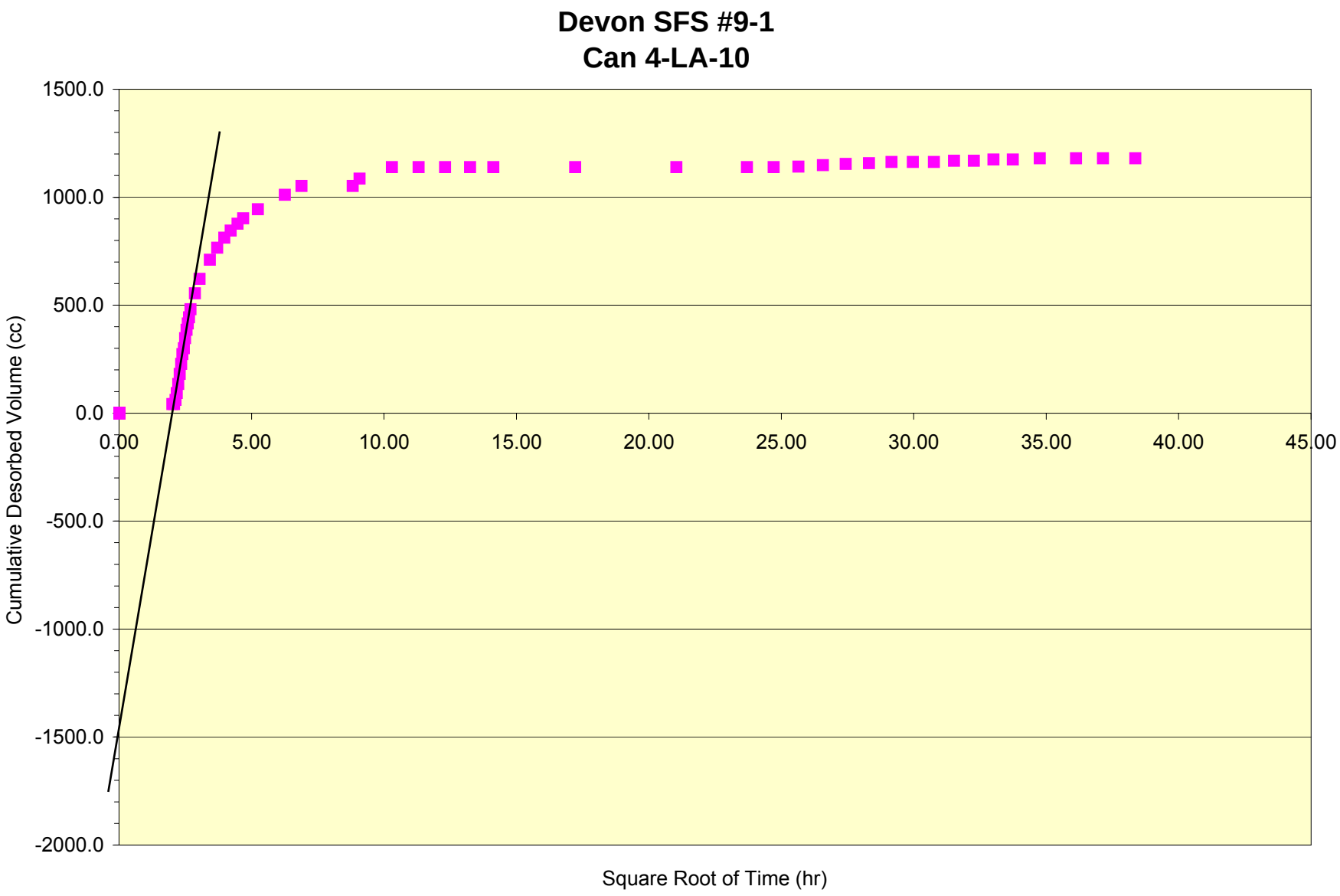
Sample Type: (●) Core ( ) Cuttings

Data Summary: ( ) Preliminary (●) Final Results

enter data only in shaded areas, copy and paste formulas as needed to calculate more desorption data (columns H through N)

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction: Cumulative Volume @ STP (milliliter)	Headspace Correction: Cumulative Gas Content (SCF)
In Can	1/6/2002	11:25	66.6	29.89		97.4	0.00	0.00	2.02	0.00	0.00	0.0	0.0
1	1/6/2002	11:25	66.6	29.89	45	97.4	41.96	41.96	2.02	0.02	0.04	42.0	0.001
2	1/6/2002	11:40	68.2	29.89	0	101.2	0.00	41.96	2.08	0.02	0.04	42.0	0.001
3	1/6/2002	11:55	68.1	29.89	20	102.2	18.49	60.45	2.14	0.04	0.06	60.6	0.002
4	1/6/2002	12:05	69.0	29.89	35	103.2	32.30	92.75	2.18	0.05	0.09	93.1	0.003
5	1/6/2002	12:20	69.5	29.88	45	105.1	41.37	134.12	2.24	0.08	0.13	134.9	0.005
6	1/6/2002	12:35	71.4	29.88	50	106.4	45.86	179.98	2.29	0.10	0.17	181.1	0.006
7	1/6/2002	12:50	72.2	29.87	50	107.2	45.79	225.77	2.35	0.13	0.21	227.2	0.008
8	1/6/2002	13:05	73.2	29.86	50	107.7	45.73	271.50	2.40	0.16	0.25	273.3	0.010
9	1/6/2002	13:20	73.8	29.85	30	108.3	27.40	298.90	2.45	0.17	0.28	300.9	0.011
10	1/6/2002	13:35	75.2	29.85	50	108.9	45.62	344.52	2.50	0.20	0.32	346.7	0.012
11	1/6/2002	13:50	75.3	29.84	42	109.3	38.29	382.81	2.55	0.22	0.36	385.2	0.014
12	1/6/2002	14:05	75.3	29.84	33	109.5	30.06	412.87	2.60	0.24	0.39	415.5	0.015
13	1/6/2002	14:20	75.9	29.84	30	109.6	27.33	440.20	2.65	0.26	0.41	442.9	0.016
14	1/6/2002	14:38	75.9	29.84	42	109.6	38.26	478.46	2.70	0.28	0.45	481.4	0.017
15	1/6/2002	15:34	72.8	29.84	80	109.0	72.95	551.41	2.87	0.32	0.51	555.1	0.020
16	1/6/2002	16:37	68.5	29.84	72	109.1	65.65	617.07	3.05	0.36	0.58	621.9	0.022
17	1/6/2002	19:05	69.9	29.89	95	110.3	86.59	703.65	3.43	0.41	0.66	710.0	0.025
18	1/6/2002	21:07	70.4	29.94	60	110.1	54.80	758.45	3.71	0.44	0.71	765.7	0.027
19	1/6/2002	23:07	69.4	29.98	50	110.8	45.66	804.11	3.97	0.47	0.75	812.3	0.029
20	1/7/2002	1:06	67.3	29.99	35	110.5	31.99	836.10	4.22	0.49	0.78	845.0	0.030
21	1/7/2002	3:22	62.6	30.03	34	110.2	31.13	867.23	4.48	0.51	0.81	877.1	0.031
22	1/7/2002	5:21	60.7	30.03	26	109.8	23.83	891.06	4.69	0.52	0.83	901.8	0.032

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction Cumulative Volume @ STP (milliliter)	Headspace Correction Cumulative Gas Content (SCF)
23	1/7/2002	10:48	64.4	30.15	45	109.7	41.41	932.47	5.24	0.54	0.87	944.3	0.033
24	1/7/2002	22:33	65.2	30.15	70	108.6	64.54	997.01	6.26	0.58	0.93	1010.4	0.036
25	1/8/2002	6:52	51.5	30.11	43	111.0	39.42	1036.43	6.89	0.60	0.97	1052.0	0.037
26	1/9/2002	13:12	74.3	29.23	0	104.1	0.00	1036.43	8.82	0.60	0.97	1052.0	0.037
27	1/9/2002	17:52	74.1	29.21	37	108.4	33.06	1069.50	9.08	0.62	1.00	1085.3	0.038
28	1/10/2002	17:28	72.8	29.35	59	108.7	52.95	1122.44	10.30	0.65	1.05	1138.7	0.040
29	1/11/2002	15:23	74.2	29.41	0	109.6	0.00	1122.44	11.32	0.65	1.05	1138.7	0.040
30	1/12/2002	14:54	73.6	29.32	0	109.0	0.00	1122.44	12.31	0.65	1.05	1138.7	0.040
31	1/13/2002	15:08	73.6	29.32	0	109.8	0.00	1122.44	13.26	0.65	1.05	1138.7	0.040
32	1/14/2002	15:00	73.3	29.44	0	109.4	0.00	1122.44	14.13	0.65	1.05	1138.7	0.040
33	1/18/2002	15:53	73.7	29.65	0	107.8	0.00	1122.44	17.22	0.65	1.05	1138.7	0.040
34	1/24/2002	18:11	73.4	29.23	0	106.5	0.00	1122.44	21.04	0.65	1.05	1138.7	0.040
35	1/29/2002	17:28	72.9	29.53	1	105.5	0.91	1123.35	23.71	0.65	1.05	1139.6	0.040
36	1/31/2002	18:00	74.1	29.65	0	106.4	0.00	1123.35	24.71	0.65	1.05	1139.6	0.040
37	2/2/2002	17:15	73.6	29.88	2	105.5	1.84	1125.19	25.65	0.66	1.05	1141.5	0.040
38	2/4/2002	17:37	74.2	29.53	8	105.7	7.26	1132.45	26.58	0.66	1.06	1148.7	0.041
39	2/6/2002	16:09	73.8	29.71	5	105.5	4.57	1137.02	27.44	0.66	1.06	1153.3	0.041
40	2/8/2002	16:55	73.9	29.56	4	105.4	3.64	1140.66	28.31	0.66	1.06	1157.0	0.041
41	2/10/2002	18:03	73.9	29.41	7	105.1	6.34	1146.99	29.17	0.67	1.07	1163.3	0.041
42	2/12/2002	17:44	72.7	29.35	0	102.9	0.00	1146.99	29.97	0.67	1.07	1163.3	0.041
43	2/14/2002	18:02	74.1	29.85	0	104.4	0.00	1146.99	30.77	0.67	1.07	1163.3	0.041
44	2/16/2002	17:15	73.0	29.26	6	104.2	5.41	1152.40	31.53	0.67	1.08	1168.7	0.041
45	2/18/2002	17:01	73.6	29.83	0	103.2	0.00	1152.40	32.28	0.67	1.08	1168.7	0.041
46	2/20/2002	16:54	73.1	29.32	6	102.5	5.44	1157.84	33.01	0.67	1.08	1174.1	0.041
47	2/22/2002	17:52	73.3	29.56	0	102.5	0.00	1157.84	33.74	0.67	1.08	1174.1	0.041
48	2/25/2002	15:36	73.1	29.56	6	104.2	5.47	1163.31	34.76	0.68	1.09	1179.6	0.042
49	3/1/2002	16:32	73.2	29.94	0	102.5	0.00	1163.31	36.13	0.68	1.09	1179.6	0.042
50	3/4/2002	19:09	73.9	29.74	0	101.4	0.00	1163.31	37.15	0.68	1.09	1179.6	0.042
51	3/8/2002	15:36	73.4	29.83	0	101.5	0.00	1163.31	38.37	0.68	1.09	1179.6	0.042


Devon SFS #9-1
Can 4-LA-10
1500.0
1000.0
500.0
0.0
-500.0
-1000.0
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35.00
40.00
45.00
Cumulative Desorbed Volume (cc)
Square Root of Time (hr)

Project	Devon				Cumulative volume @ STP:	288.9	Raw total gas (cc/g) 0.41
Well ID:	SFS #9-1	Can no.	4-LA-11				
Sample Interval (ft):	From: 2273.6	To:	2274.1		Milliliters/gram raw coal:	0.19	DAF total gas (cc/g) 2.75
Core Date: (mm/dd/yr)			1/6/2002				
Time Zero-Coal penetrated (hh:mm) (24 hour clock)			7:20		Milliliter/gram coal d.a.f.: (excluding lost gas)	1.30	Raw total gas (SCF/ton) 13.00
Raw coal mass (air-dry): (grams)			1499				
Coal mass (d.a.f.): (grams)			221.43		Lost gas estimate (cc) (from lost gas graph)	320	DAF total gas (SCF/ton) 87.99
Headspace volume: (cc)			0				Cuttings correction 25% (SCF/ton) N/A

Sample Type: (●) Core ( ) Cuttings

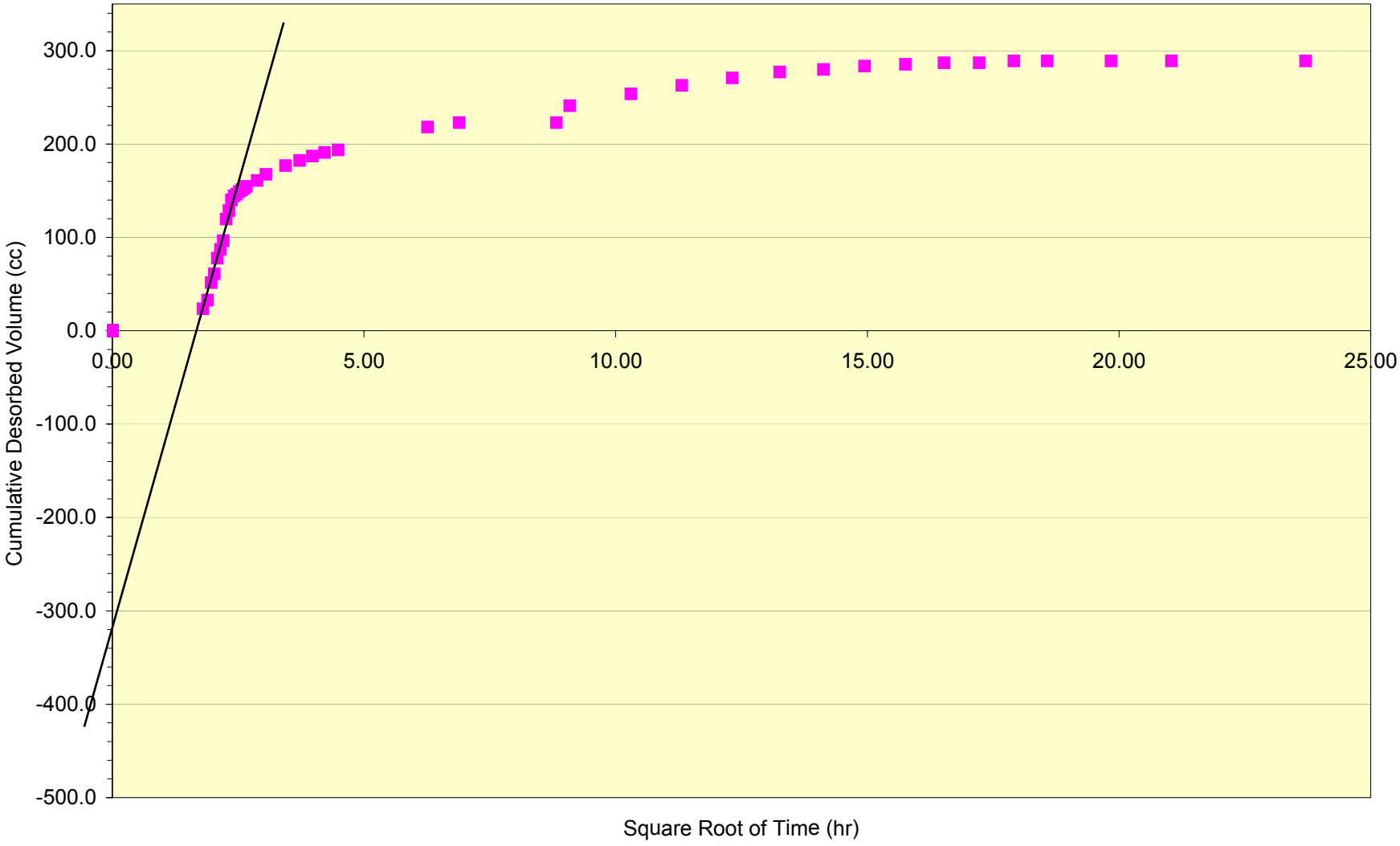
Data Summary: ( ) Preliminary (●) Final Results

enter data only in shaded areas, copy and paste formulas as needed to calculate more desorption data (columns H through N)

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction: Cumulative Volume @ STP (milliliter)	Headspace Correction: Cumulative Gas Content (SCF)
In Can	1/6/2002	10:15	62.0	29.89	0	84.0	0.00	0.00	1.71	0.00	0.00	0.0	0.0
1	1/6/2002	10:35	62.0	29.89	25	94.3	23.44	23.44	1.80	0.02	0.11	23.5	0.001
2	1/6/2002	10:55	65.3	29.89	10	98.5	9.31	32.75	1.89	0.02	0.15	32.9	0.001
3	1/6/2002	11:12	65.8	29.89	20	101.6	18.51	51.26	1.97	0.03	0.23	51.6	0.002
4	1/6/2002	11:27	66.6	29.89	10	101.2	9.26	60.52	2.03	0.04	0.27	60.9	0.002
5	1/6/2002	11:42	68.2	29.89	18	103.6	16.60	77.12	2.09	0.05	0.35	77.7	0.003
6	1/6/2002	11:57	68.1	29.89	10	105.5	9.19	86.32	2.15	0.06	0.39	87.0	0.003
7	1/6/2002	12:12	69.0	29.89	10	106.7	9.17	95.49	2.21	0.06	0.43	96.3	0.003
8	1/6/2002	12:27	69.5	29.88	25	107.6	22.88	118.37	2.26	0.08	0.53	119.5	0.004
9	1/6/2002	12:42	71.4	29.88	10	107.8	9.15	127.52	2.32	0.09	0.58	128.7	0.005
10	1/6/2002	12:57	72.2	29.87	12	108.8	10.96	138.48	2.37	0.09	0.63	139.8	0.005
11	1/6/2002	13:12	73.2	29.86	5	109.3	4.56	143.04	2.42	0.10	0.65	144.4	0.005
12	1/6/2002	13:27	73.8	29.85	2	109.9	1.82	144.86	2.47	0.10	0.65	146.2	0.005
13	1/6/2002	13:42	75.2	29.85	3	109.7	2.73	147.59	2.52	0.10	0.67	149.0	0.005
14	1/6/2002	13:57	75.3	29.84	2	109.7	1.82	149.41	2.57	0.10	0.67	150.8	0.005
15	1/6/2002	14:12	75.3	29.84	2	109.8	1.82	151.23	2.62	0.10	0.68	152.6	0.005
16	1/6/2002	14:27	75.9	29.84	2	109.9	1.82	153.06	2.67	0.10	0.69	154.5	0.005
17	1/6/2002	15:37	72.8	29.85	7	109.7	6.38	159.43	2.88	0.11	0.72	160.9	0.006
18	1/6/2002	16:40	67.0	29.84	7	110.0	6.37	165.81	3.06	0.11	0.75	167.4	0.006
19	1/6/2002	19:11	70.0	29.89	10	110.2	9.11	174.92	3.44	0.12	0.79	176.7	0.006

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction Cumulative Volume @ STP (milliliter)	Headspace Correction Cumulative Gas Content (SCF)
20	1/6/2002	21:11	69.9	29.94	6	110.1	5.48	180.40	3.72	0.12	0.81	182.3	0.006
21	1/6/2002	23:10	67.9	29.98	5	110.4	4.57	184.97	3.98	0.12	0.84	187.0	0.007
22	1/7/2002	1:08	65.3	29.99	4	110.3	3.66	188.63	4.22	0.13	0.85	190.7	0.007
23	1/7/2002	3:28	62.7	30.03	3	110.0	2.75	191.38	4.49	0.13	0.86	193.5	0.007
24	1/7/2002	22:35	65.2	60.15	13	109.5	23.87	215.25	6.26	0.14	0.97	218.0	0.008
25	1/8/2002	6:53	51.5	30.11	5	110.1	4.59	219.84	6.90	0.15	0.99	222.9	0.008
26	1/9/2002	13:13	74.3	29.23	0	102.8	0.00	219.84	8.83	0.15	0.99	222.9	0.008
27	1/9/2002	17:55	74.1	29.21	20	110.0	17.82	237.66	9.09	0.16	1.07	240.9	0.009
28	1/10/2002	17:30	72.8	29.35	14	110.2	12.53	250.19	10.30	0.17	1.13	253.5	0.009
29	1/11/2002	15:25	74.2	29.41	10	110.5	8.96	259.16	11.32	0.17	1.17	262.6	0.009
30	1/12/2002	14:58	73.6	29.32	9	110.7	8.04	267.20	12.31	0.18	1.21	270.7	0.010
31	1/13/2002	15:09	73.6	29.32	7	111.1	6.25	273.45	13.26	0.18	1.23	277.0	0.010
32	1/14/2002	15:01	73.3	29.44	3	110.0	2.69	276.14	14.13	0.18	1.25	279.8	0.010
33	1/15/2002	14:43	74.0	29.44	4	110.6	3.59	279.73	14.95	0.19	1.26	283.4	0.010
34	1/16/2002	15:39	74.2	29.74	2	109.3	1.82	281.55	15.76	0.19	1.27	285.2	0.010
35	1/17/2002	16:25	73.5	29.50	2	109.4	1.80	283.35	16.53	0.19	1.28	287.0	0.010
36	1/18/2002	15:55	73.7	29.65	0	102.5	0.00	283.35	17.22	0.19	1.28	287.0	0.010
37	1/19/2002	16:13	73.2	29.38	2	108.2	1.80	285.15	17.91	0.19	1.29	288.9	0.010
38	1/20/2002	16:30	76.8	29.65	0	108.7	0.00	285.15	18.58	0.19	1.29	288.9	0.010
39	1/22/2002	17:02	73.4	29.85	0	107.9	0.00	285.15	19.84	0.19	1.29	288.9	0.010
40	1/24/2002	18:13	73.4	29.23	0	107.5	0.00	285.15	21.04	0.19	1.29	288.9	0.010
41	1/29/2002	17:29	72.9	29.53	0	107.1	0.00	285.15	23.71	0.19	1.29	288.9	0.010

Devon SFS #9-1
CAN 4-LA-11



Project	Devon				Cumulative volume @ STP:	767.0	Raw total gas (cc/g)	0.98
Well ID:	SFS #9-1	Can no.	3-LA-C10				
Sample Interval (ft):	From:	2688	To:	2689	Milliliters/gram raw coal:	0.62	DAF total gas (cc/g)	1.57
Core Date: (mm/dd/yr)				1/7/2002			
Time Zero-Coal penetrated (hh:mm) (24 hour clock)				11:12	Milliliter/gram coal d.a.f.:	0.99	Raw total gas (SCF/ton)	31.46
Raw coal mass (air-dry): (grams)				1238	(excluding lost gas)			
Coal mass (d.a.f.): (grams)				776.95	Lost gas estimate (cc)	450	DAF total gas (SCF/ton)	50.13
Headspace volume: (cc)			(est.)	300	(from lost gas graph)			
							Cuttings correction 25% (SCF/ton)	62.66

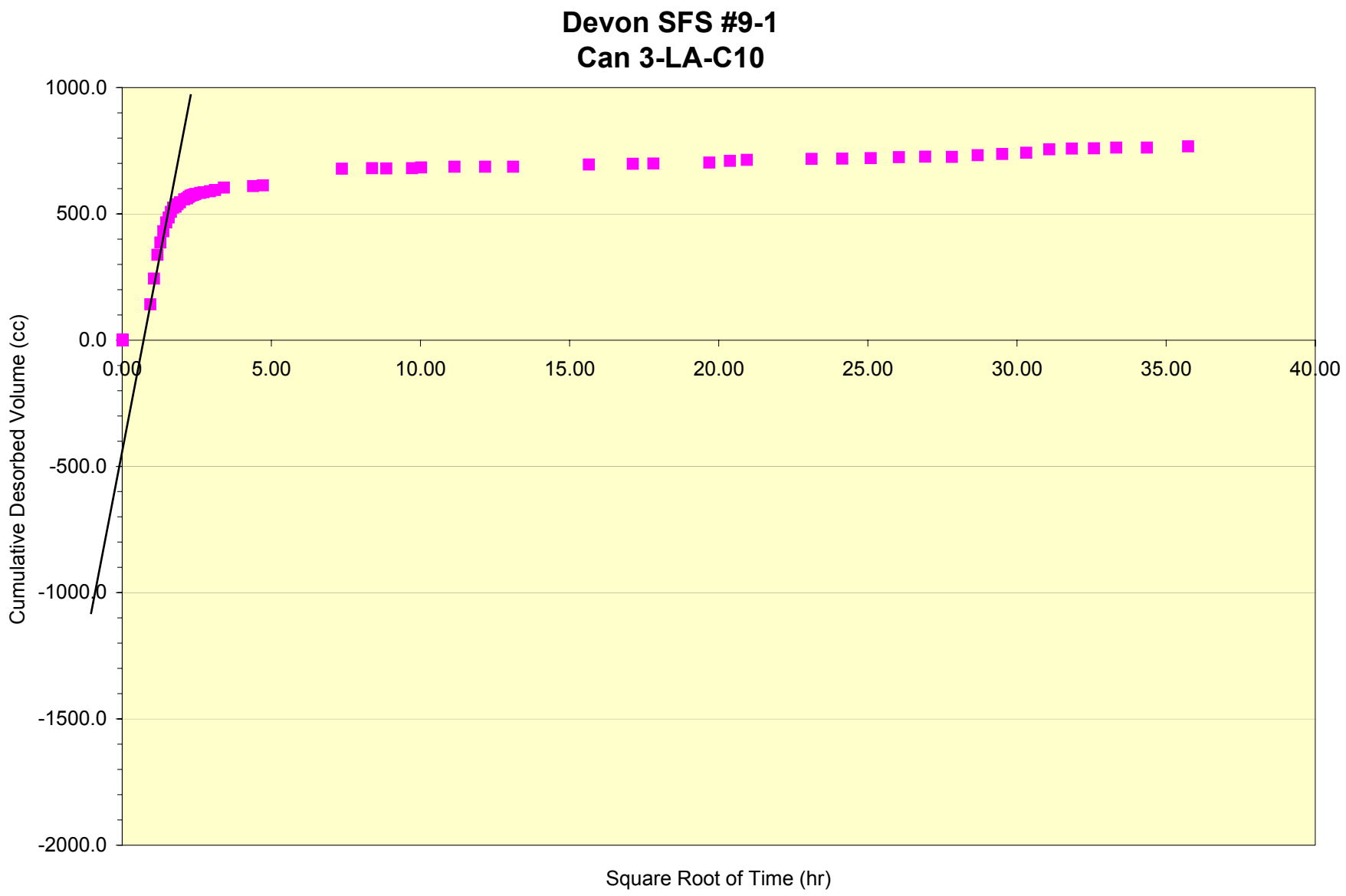
Sample Type
- ○ Core
- ● Cuttings

Data Summary
- ○ Preliminary
- ● Final Results

enter data only in shaded areas, copy and paste formulas as needed to calculate more desorption data (columns H through N)

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction: Cumulative Volume @ STP (milliliter)	Headspace Correction: Cumulative Gas Content (SCF)
In Can	1/7/2002	11:51	66.5	30.14	0	76.5	0.00	0.00	0.81	0.00	0.00	0.0	0.0
1	1/7/2002	12:06	66.5	30.14	150	76.5	146.54	146.54	0.95	0.12	0.19	141.2	0.005
2	1/7/2002	12:21	66.5	30.13	110	78.7	107.00	253.53	1.07	0.20	0.33	243.5	0.009
3	1/7/2002	12:36	66.5	30.13	100	78.7	97.27	350.80	1.18	0.28	0.45	337.6	0.012
4	1/7/2002	12:51	68.2	30.13	55	85.3	52.84	403.64	1.28	0.33	0.52	385.8	0.014
5	1/7/2002	13:06	69.9	30.12	50	87.7	47.82	451.46	1.38	0.36	0.58	431.3	0.015
6	1/7/2002	13:23	69.7	30.12	40	93.5	37.85	489.31	1.48	0.40	0.63	465.8	0.016
7	1/7/2002	13:38	70.2	30.11	30	112.0	27.46	516.77	1.56	0.42	0.67	485.1	0.017
8	1/7/2002	13:53	70.2	30.11	25	112.9	22.85	539.62	1.64	0.44	0.69	508.1	0.018
9	1/7/2002	14:08	70.2	30.11	10	97.7	9.39	549.01	1.71	0.44	0.71	524.4	0.019
10	1/7/2002	14:24	70.6	30.11	5	99.4	4.68	553.69	1.79	0.45	0.71	528.3	0.019
11	1/7/2002	14:39	70.2	30.11	10	98.2	9.38	563.07	1.86	0.45	0.72	538.2	0.019
12	1/7/2002	14:58	69.7	30.11	5	92.9	4.74	567.81	1.94	0.46	0.73	545.5	0.019
13	1/7/2002	15:32	68.0	30.11	12	92.5	11.37	579.18	2.08	0.47	0.75	556.9	0.020
14	1/7/2002	15:57	69.2	30.11	6	95.0	5.66	584.84	2.18	0.47	0.75	561.3	0.020
15	1/7/2002	16:12	70.4	30.11	6	94.8	5.66	590.50	2.24	0.48	0.76	566.9	0.020
16	1/7/2002	16:27	71.0	30.10	5	94.0	4.72	595.22	2.29	0.48	0.77	572.0	0.020
17	1/7/2002	16:43	71.8	30.11	2	93.9	1.89	597.11	2.35	0.48	0.77	573.9	0.020
18	1/7/2002	16:58	71.7	30.11	2	93.7	1.89	599.01	2.40	0.48	0.77	575.9	0.020
19	1/7/2002	17:14	71.8	30.12	2	92.7	1.90	600.90	2.46	0.49	0.77	578.3	0.020
20	1/7/2002	18:02	72.3	30.13	5	93.7	4.73	605.63	2.61	0.49	0.78	582.6	0.021
21	1/7/2002	18:40	70.7	30.12	2	90.9	1.90	607.53	2.73	0.49	0.78	585.8	0.021
22	1/7/2002	19:51	71.3	30.13	5	93.0	4.74	612.27	2.94	0.49	0.79	589.5	0.021
23	1/7/2002	20:56	68.1	30.13	10	102.0	9.32	621.59	3.12	0.50	0.80	594.5	0.021
24	1/7/2002	22:50	64.3	30.14	8	98.4	7.51	629.10	3.41	0.51	0.81	603.9	0.021

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction Cumulative Volume @ STP (milliliter)	Headspace Correction Cumulative Gas Content (SCF)
25	1/8/2002	6:27	51.2	30.10	4	93.5	3.78	632.89	4.39	0.51	0.81	609.8	0.022
26	1/8/2002	9:28	45.1	30.11	0	87.1	0.00	632.89	4.72	0.51	0.81	613.0	0.022
27	1/9/2002	17:29	74.1	29.21	90	101.6	81.40	714.29	7.37	0.58	0.92	679.0	0.024
28	1/10/2002	9:29	74.5	29.38	0	101.5	0.00	714.29	8.38	0.58	0.92	680.5	0.024
29	1/10/2002	17:38	72.8	29.35	0	102.9	0.00	714.29	8.86	0.58	0.92	679.6	0.024
30	1/11/2002	9:44	73.2	29.35	0	102.0	0.00	714.29	9.72	0.58	0.92	680.0	0.024
31	1/11/2002	15:37	74.2	29.44	3	102.9	2.73	717.02	10.02	0.58	0.92	683.1	0.024
32	1/12/2002	15:17	73.6	29.32	4	102.1	3.63	720.64	11.14	0.58	0.93	686.1	0.024
33	1/13/2002	15:16	73.6	29.32	0	101.7	0.00	720.64	12.17	0.58	0.93	686.3	0.024
34	1/14/2002	15:05	73.3	29.44	0	103.8	0.00	720.64	13.11	0.58	0.93	686.3	0.024
35	1/17/2002	16:10	73.5	29.50	8	102.0	7.30	727.95	15.65	0.59	0.94	695.0	0.025
36	1/19/2002	16:28	73.2	29.38	4	101.4	3.64	731.59	17.13	0.59	0.94	697.8	0.025
37	1/20/2002	16:32	76.8	29.65	0	103.5	0.00	731.59	17.81	0.59	0.94	699.2	0.025
38	1/23/2002	14:39	73.4	29.50	6	103.9	5.46	737.04	19.68	0.60	0.95	703.2	0.025
39	1/24/2002	18:27	73.4	29.23	8	100.9	7.25	744.29	20.38	0.60	0.96	709.4	0.025
40	1/25/2002	17:59	73.5	29.74	0	102.4	0.00	744.29	20.95	0.60	0.96	713.2	0.025
41	1/29/2002	17:41	72.9	29.53	6	102.0	5.48	749.78	23.12	0.61	0.97	717.0	0.025
42	1/31/2002	18:09	74.1	29.65	0	101.2	0.00	749.78	24.14	0.61	0.97	718.4	0.025
43	2/2/2002	17:18	73.6	29.88	0	100.7	0.00	749.78	25.10	0.61	0.97	720.7	0.025
44	2/4/2002	17:40	74.2	29.53	8	102.2	7.31	757.08	26.05	0.61	0.97	724.2	0.026
45	2/6/2002	16:16	73.8	29.71	0	102.1	0.00	757.08	26.93	0.61	0.97	725.8	0.026
46	2/8/2002	17:03	73.9	29.56	0	100.5	0.00	757.08	27.82	0.61	0.97	725.2	0.026
47	2/10/2002	18:05	73.9	29.38	9	100.7	8.20	765.28	28.69	0.62	0.98	731.7	0.026
48	2/12/2002	17:50	72.7	29.38	6	100.9	5.47	770.75	29.51	0.62	0.99	737.0	0.026
49	2/14/2002	18:13	74.1	29.85	0	100.1	0.00	770.75	30.32	0.62	0.99	741.5	0.026
50	2/16/2002	17:22	73.0	29.26	22	103.1	19.88	790.63	31.08	0.64	1.02	754.8	0.027
51	2/18/2002	17:11	73.4	29.83	0	105.9	0.00	790.63	31.84	0.64	1.02	758.5	0.027
52	2/20/2002	17:02	73.1	29.29	5	103.3	4.52	795.15	32.59	0.64	1.02	759.5	0.027
53	2/22/2002	18:00	73.3	29.56	0	102.3	0.00	795.15	33.33	0.64	1.02	762.3	0.027
54	2/25/2002	15:37	73.1	29.56	0	103.0	0.00	795.15	34.36	0.64	1.02	762.0	0.027
55	3/1/2002	16:33	73.2	29.94	0	99.4	0.00	795.15	35.74	0.64	1.02	767.0	0.027


Devon SFS #9-1
Can 3-LA-C10
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0.0
-500.0
-1000.0
-1500.0
-2000.0
0.00
5.00
10.00
15.00
20.00
25.00
30.00
35.00
40.00
Cumulative Desorbed Volume (cc)
Square Root of Time (hr)

Project	Devon			Cumulative volume @ STP:	670.5	Raw total gas (cc/g)	0.67
Well ID:	SFS #9-1	Can no.	LA-3-01-12				
Sample Interval (ft): From:	2689	To:	2690	Milliliters/gram raw coal:	0.47	DAF total gas (cc/g)	1.01
Core Date: (mm/dd/yr)			1/7/2002				
Time Zero-Coal penetrated (hh:mm) (24 hour clock)			11:23	Milliliter/gram coal d.a.f.:	0.71	Raw total gas (SCF/ton)	21.34
Raw coal mass (air-dry): (grams)			1425	(excluding lost gas)			
Coal mass (d.a.f.): (grams)			944.72	Lost gas estimate (cc)	280	DAF total gas (SCF/ton)	32.20
Headspace volume: (cc)			0	(from lost gas graph)			
						Cuttings correction 25% (SCF/ton)	40.24

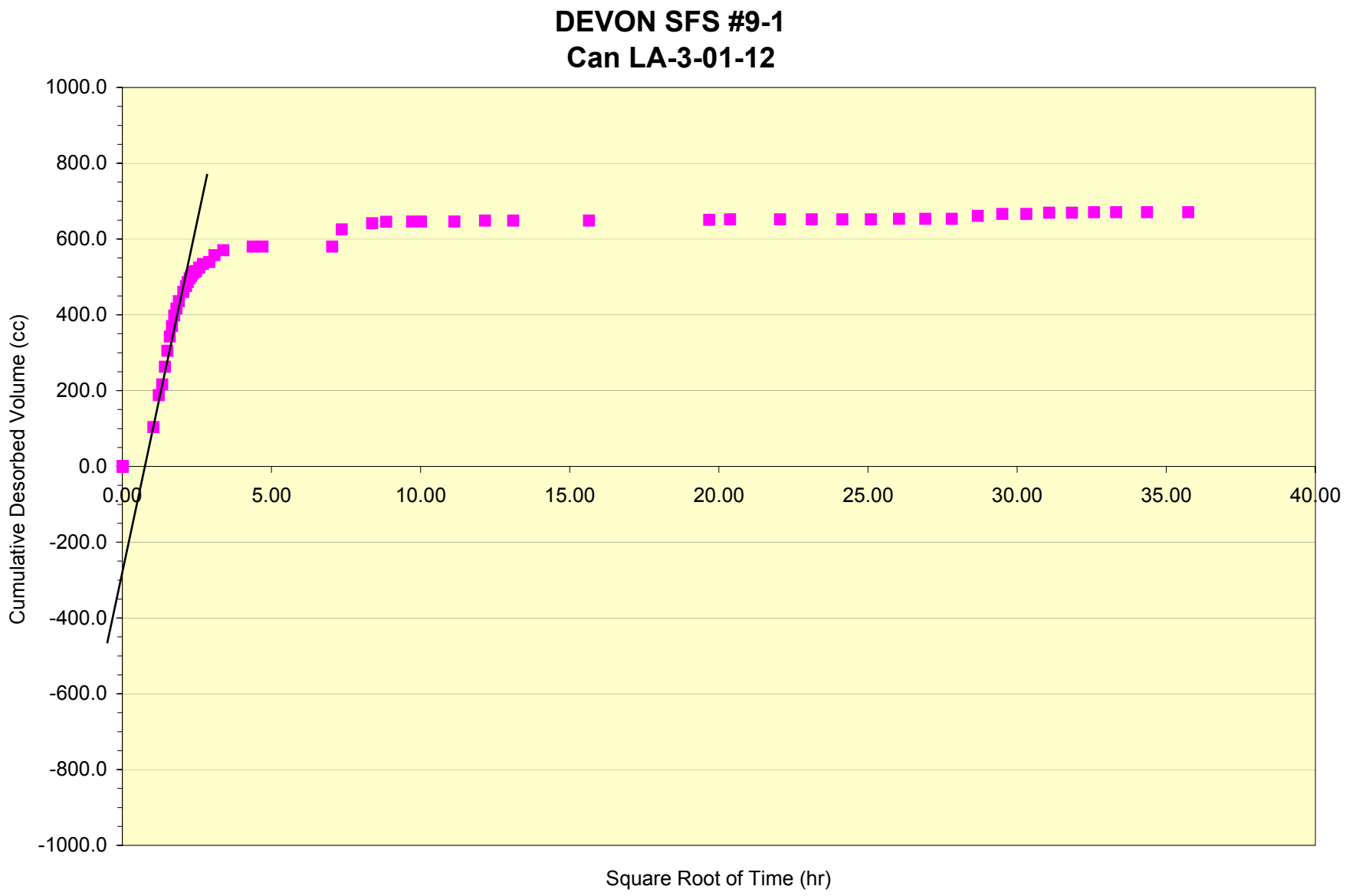
Sample Type
- ○ Core
- ◉ Cuttings

Data Summary
- ○ Preliminary
- ◉ Final Results

enter data only in shaded areas, copy and paste formulas as needed to calculate more desorption data (columns H through N)

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction Cumulative Volume @ STP (milliliter)	Headspace Correction Cumulative Gas Content (SCF)
In Can	1/7/2002	12:23	66.5	30.15	0	85.8	0.00	0.00	1.00	0.00	0.00	0.0	0.0
1	1/7/2002	12:28	66.5	30.15	110	85.8	105.67	105.67	1.04	0.07	0.11	103.6	0.004
2	1/7/2002	12:53	68.2	30.13	90	90.4	85.67	191.34	1.22	0.13	0.20	188.0	0.007
3	1/7/2002	13:11	70.0	30.12	30	83.7	28.90	220.24	1.34	0.15	0.23	216.0	0.008
4	1/7/2002	13:26	70.2	30.12	50	99.1	46.83	267.07	1.43	0.19	0.28	262.7	0.009
5	1/7/2002	13:40	70.2	30.11	45	98.4	42.20	309.27	1.51	0.22	0.33	304.8	0.011
6	1/7/2002	13:55	70.7	30.11	40	102.8	37.22	346.49	1.59	0.24	0.37	342.1	0.012
7	1/7/2002	14:10	69.3	30.11	30	104.9	27.81	374.30	1.67	0.26	0.40	370.1	0.013
8	1/7/2002	14:25	68.5	30.11	30	104.4	27.83	402.13	1.74	0.28	0.43	398.2	0.014
9	1/7/2002	14:41	67.7	30.11	19	101.3	17.72	419.85	1.82	0.29	0.44	416.1	0.015
10	1/7/2002	15:00	69.7	30.11	21	99.6	19.65	439.50	1.90	0.31	0.47	435.7	0.015
11	1/7/2002	15:34	68.0	30.11	26	96.2	24.48	463.97	2.05	0.33	0.49	460.1	0.016
12	1/7/2002	15:58	69.2	30.11	17	95.4	16.03	480.00	2.14	0.34	0.51	476.0	0.017
13	1/7/2002	16:13	70.4	30.11	11	98.1	10.32	490.32	2.20	0.34	0.52	486.2	0.017
14	1/7/2002	16:30	71.7	30.10	10	97.6	9.39	499.71	2.26	0.35	0.53	495.6	0.018
15	1/7/2002	16:44	71.8	30.11	7	97.6	6.57	506.28	2.31	0.36	0.54	502.1	0.018
16	1/7/2002	16:59	71.7	30.11	7	96.9	6.58	512.86	2.37	0.36	0.54	508.6	0.018
17	1/7/2002	17:15	71.8	30.12	5	96.8	4.70	517.56	2.42	0.36	0.55	513.2	0.018
18	1/7/2002	17:31	71.4	30.12	2	92.7	1.90	519.46	2.48	0.36	0.55	515.1	0.018
19	1/7/2002	18:03	72.3	30.13	10	98.1	9.39	528.85	2.58	0.37	0.56	524.4	0.019
20	1/7/2002	18:42	70.7	30.12	10	96.1	9.42	538.27	2.70	0.38	0.57	533.7	0.019
21	1/7/2002	19:53	71.3	30.13	6	96.2	5.65	543.92	2.92	0.38	0.58	539.3	0.019
22	1/7/2002	20:57	68.1	30.13	19	99.6	17.79	561.71	3.09	0.39	0.59	557.2	0.020
23	1/7/2002	22:52	69.3	30.14	14	102.0	13.06	574.76	3.39	0.40	0.61	570.3	0.020

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction Cumulative Volume @ STP (milliliter)	Headspace Correction Cumulative Gas Content (SCF)
24	1/8/2002	6:30	51.2	30.10	10	97.2	9.39	584.16	4.37	0.41	0.62	580.0	0.020
25	1/8/2002	9:30	45.1	30.11	0	93.8	0.00	584.16	4.70	0.41	0.62	580.0	0.020
26	1/9/2002	12:56	74.3	29.23	0	92.8	0.00	584.16	7.04	0.41	0.62	580.0	0.020
27	1/9/2002	17:31	71.4	29.21	50	105.8	44.89	629.04	7.36	0.44	0.67	625.2	0.022
28	1/10/2002	9:36	71.5	29.38	18	111.7	16.09	645.13	8.38	0.45	0.68	641.5	0.023
29	1/10/2002	17:40	72.8	29.35	4	113.3	3.56	648.69	8.85	0.46	0.69	645.1	0.023
30	1/11/2002	9:48	73.2	29.35	1	111.3	0.89	649.58	9.72	0.46	0.69	646.0	0.023
31	1/11/2002	15:39	74.2	29.40	0	110.3	0.00	649.58	10.01	0.46	0.69	646.0	0.023
32	1/12/2002	15:18	73.6	29.32	0	108.2	0.00	649.58	11.13	0.46	0.69	646.0	0.023
33	1/13/2002	15:18	73.6	29.32	3	107.3	2.70	652.28	12.16	0.46	0.69	648.8	0.023
34	1/14/2002	15:18	73.3	29.44	0	105.8	0.00	652.28	13.11	0.46	0.69	648.8	0.023
35	1/17/2002	16:12	73.5	29.50	0	101.5	0.00	652.28	15.65	0.46	0.69	648.8	0.023
36	1/23/2002	14:41	73.4	29.50	2	105.9	1.81	654.09	19.68	0.46	0.69	650.6	0.023
37	1/24/2002	18:31	73.4	29.23	1	99.6	0.91	655.00	20.37	0.46	0.69	651.5	0.023
38	1/27/2002	17:56	74.2	29.65	0	102.4	0.00	655.00	22.06	0.46	0.69	651.5	0.023
39	1/29/2002	17:42	72.9	29.53	0	101.8	0.00	655.00	23.12	0.46	0.69	651.5	0.023
40	1/31/2002	18:11	74.1	29.65	0	101.8	0.00	655.00	24.14	0.46	0.69	651.5	0.023
41	2/2/2002	17:20	73.6	29.88	0	101.1	0.00	655.00	25.10	0.46	0.69	651.5	0.023
42	2/4/2002	17:41	74.2	29.53	2	101.4	1.83	656.83	26.04	0.46	0.70	653.3	0.023
43	2/6/2002	16:18	73.8	29.71	0	100.5	0.00	656.83	26.92	0.46	0.70	653.3	0.023
44	2/8/2002	17:05	73.9	29.56	0	97.2	0.00	656.83	27.82	0.46	0.70	653.3	0.023
45	2/10/2002	18:07	73.9	29.38	8	99.0	7.31	664.14	28.68	0.47	0.70	660.5	0.023
46	2/12/2002	17:51	72.7	29.38	6	99.5	5.48	669.62	29.50	0.47	0.71	666.0	0.024
47	2/14/2002	18:14	74.1	29.85	0	97.4	0.00	669.62	30.31	0.47	0.71	666.0	0.024
48	2/16/2002	17:24	73.0	29.26	4	99.3	3.64	673.26	31.08	0.47	0.71	669.6	0.024
49	2/18/2002	17:13	73.6	29.83	0	97.5	0.00	673.26	31.84	0.47	0.71	669.6	0.024
50	2/20/2002	17:01	73.1	29.29	1	98.2	0.91	674.17	32.58	0.47	0.71	670.5	0.024
51	2/22/2002	18:01	73.3	29.56	0	98.0	0.00	674.17	33.33	0.47	0.71	670.5	0.024
52	2/25/2002	15:39	73.1	29.56	0	103.2	0.00	674.17	34.36	0.47	0.71	670.5	0.024
53	3/1/2002	16:34	73.2	29.94	0	99.6	0.00	674.17	35.74	0.47	0.71	670.5	0.024


DEVON SFS #9-1
Can LA-3-01-12
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400.0
200.0
0.0
-200.0
-400.0
-600.0
-800.0
-1000.0
0.00
5.00
10.00
15.00
20.00
25.00
30.00
35.00
40.00
Cumulative Desorbed Volume (cc)
Square Root of Time (hr)

Project	Devon				Cumulative volume @ STP:	541.2	Raw total gas (cc/g) 1.00
Well ID:	SFS #9-1	Can no.	3-LA-C12	COMPOSITE CAN 1 OF 2 (OTHER CAN 3-LA-C14)			
Sample Interval (ft):	From: 2692.3	To:	2697.5		Milliliters/gram raw coal:	0.57	DAF total gas (cc/g) 1.79
Core Date: (mm/dd/yr)			1/7/2002				
Time Zero-Coal penetrated (hh:mm) (24 hour clock)			11:37		Milliliter/gram coal d.a.f.:	1.03	Raw total gas (SCF/ton) 31.97
Raw coal mass (air-dry): (grams)			942		(excluding lost gas)		
Coal mass (d.a.f.): (grams)			525.29		Lost gas estimate (cc)	400	DAF total gas (SCF/ton) 57.34
Headspace volume: (cc)		(est.)	300		(from lost gas graph)		
							Cuttings correction 25% (SCF/ton) 71.67

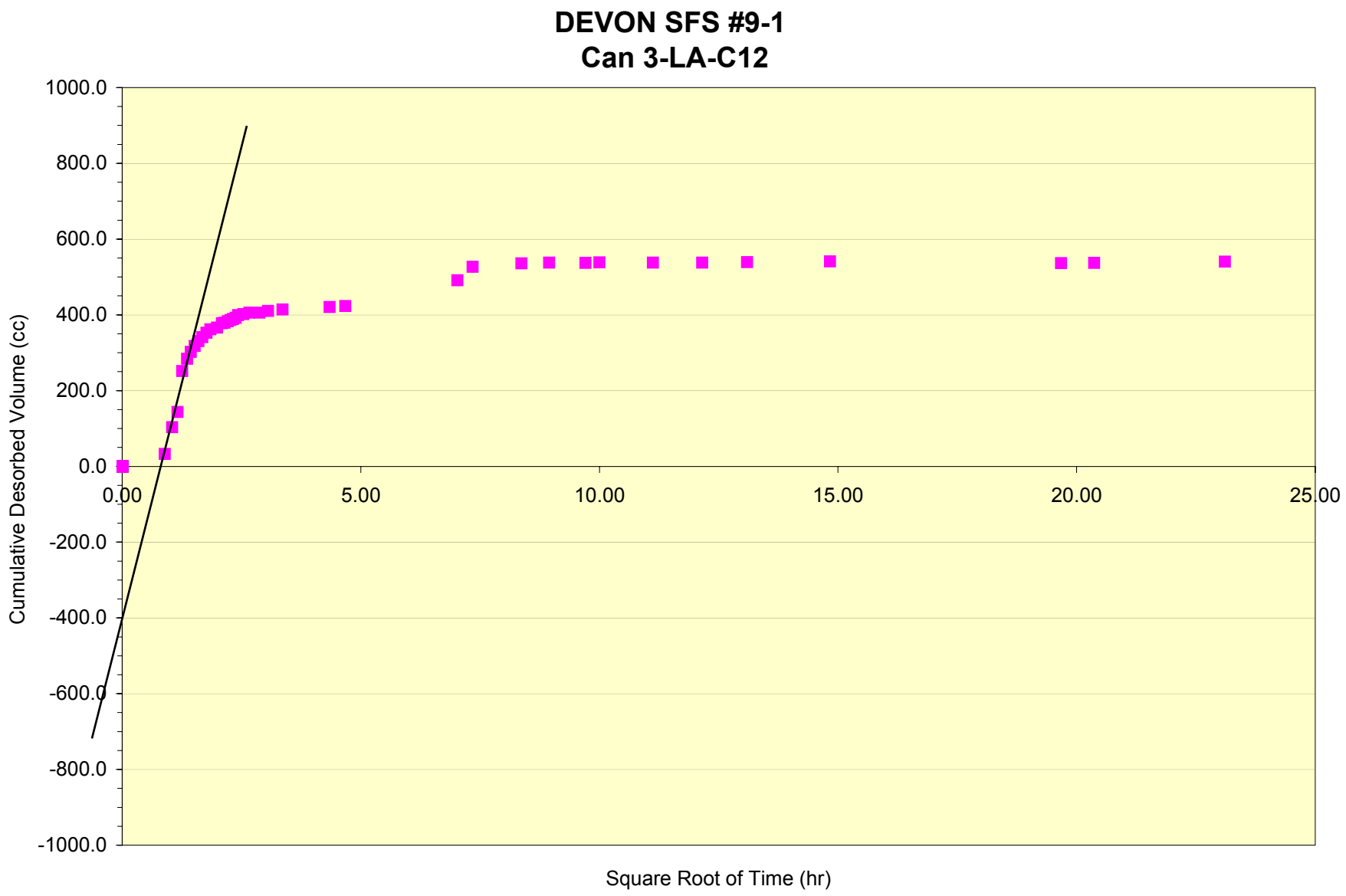
Sample Type: ○ Core ● Cuttings

Data Summary: ○ Preliminary ● Final Results

enter data only in shaded areas, copy and paste formulas as needed to calculate more desorption data (columns H through N)

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction: Cumulative Volume @ STP (milliliter)	Headspace Correction: Cumulative Gas Content (SCF)
In Can	1/7/2002	12:10	66.5	30.135	0	74.1	0.00	0.00	0.74	0.00	0.00	0.0	0.0
1	1/7/2002	12:25	66.5	30.135	35	74.1	34.34	34.34	0.89	0.04	0.07	32.9	0.001
2	1/7/2002	12:43	66.5	30.135	75	74.7	73.50	107.85	1.05	0.11	0.21	103.2	0.004
3	1/7/2002	12:58	68.2	30.129	45	78.1	43.82	151.66	1.16	0.16	0.29	143.6	0.005
4	1/7/2002	13:12	69.8	30.120	125	95.3	117.90	269.56	1.26	0.29	0.51	251.8	0.009
5	1/7/2002	13:28	70.2	30.115	30	87.5	28.70	298.26	1.36	0.32	0.57	283.6	0.010
6	1/7/2002	13:41	70.2	30.114	20	87.9	19.12	317.37	1.44	0.34	0.60	302.1	0.011
7	1/7/2002	13:56	70.7	30.113	20	94.9	18.87	336.25	1.52	0.36	0.64	317.3	0.011
8	1/7/2002	14:10	69.3	30.110	15	97.0	14.10	350.35	1.60	0.37	0.67	330.3	0.012
9	1/7/2002	14:27	68.5	30.108	13	99.8	12.16	362.51	1.68	0.38	0.69	341.1	0.012
10	1/7/2002	14:45	67.7	30.108	11	98.1	10.32	372.83	1.77	0.40	0.71	352.3	0.012
11	1/7/2002	15:02	69.7	30.113	10	98.2	9.38	382.21	1.85	0.41	0.73	361.6	0.013
12	1/7/2002	15:34	68.0	30.109	6	100.9	5.60	387.81	1.99	0.41	0.74	365.9	0.013
13	1/7/2002	15:59	69.2	30.108	11	97.4	10.33	398.14	2.09	0.42	0.76	377.9	0.013
14	1/7/2002	16:14	70.4	30.106	5	104.3	4.64	402.78	2.15	0.43	0.77	379.2	0.013
15	1/7/2002	16:31	71.7	30.103	5	106.6	4.62	407.40	2.21	0.43	0.78	382.8	0.014
16	1/7/2002	16:46	71.8	30.107	4	107.6	3.69	411.09	2.27	0.44	0.78	386.1	0.014
17	1/7/2002	17:01	71.7	30.111	2	106.4	1.85	412.94	2.32	0.44	0.79	388.6	0.014
18	1/7/2002	17:17	71.8	30.117	2	103.4	1.86	414.79	2.38	0.44	0.79	391.9	0.014
19	1/7/2002	17:32	71.4	30.118	5	97.3	4.70	419.49	2.43	0.45	0.80	399.4	0.014

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction Cumulative Volume @ STP (milliliter)	Headspace Correction Cumulative Gas Content (SCF)
20	1/7/2002	18:04	72.3	30.128	7	106.3	6.48	425.97	2.54	0.45	0.81	401.8	0.014
21	1/7/2002	18:44	70.7	30.124	3	104.1	2.79	428.76	2.67	0.46	0.82	405.6	0.014
22	1/7/2002	19:54	71.3	30.132	1	106.7	0.92	429.68	2.88	0.46	0.82	405.4	0.014
23	1/7/2002	20:59	68.1	30.127	6	108.6	5.53	435.21	3.06	0.46	0.83	410.1	0.014
24	1/7/2002	22:54	64.3	30.143	4	108.2	3.69	438.90	3.36	0.47	0.84	414.2	0.015
25	1/8/2002	6:31	51.2	30.102	4	102.2	3.72	442.62	4.35	0.47	0.84	420.5	0.015
26	1/8/2002	9:31	45.1	30.107	0	96.4	0.00	442.62	4.68	0.47	0.84	423.3	0.015
27	1/9/2002	12:58	74.3	29.230	82	93.2	75.34	517.97	7.02	0.55	0.99	490.8	0.017
28	1/9/2002	17:32	74.1	29.210	48	108.5	42.89	560.85	7.34	0.60	1.07	526.7	0.019
29	1/10/2002	9:39	74.5	29.380	8	107.4	7.20	568.06	8.37	0.60	1.08	535.9	0.019
30	1/10/2002	19:41	72.8	29.350	0	103.1	0.00	568.06	8.95	0.60	1.08	537.6	0.019
31	1/11/2002	9:50	73.2	29.350	1	105.8	0.90	568.96	9.71	0.60	1.08	537.3	0.019
32	1/11/2002	15:40	74.2	29.440	0	105.2	0.00	568.96	10.00	0.60	1.08	538.4	0.019
33	1/12/2002	15:19	73.6	29.320	0	105.0	0.00	568.96	11.12	0.60	1.08	537.4	0.019
34	1/13/2002	15:19	73.6	29.320	0	103.9	0.00	568.96	12.15	0.60	1.08	537.9	0.019
35	1/14/2002	15:10	73.3	29.440	1	105.9	0.90	569.86	13.10	0.60	1.08	539.0	0.019
36	1/16/2002	15:42	74.2	29.740	0	106.7	0.00	569.86	14.84	0.60	1.08	541.2	0.019
37	1/23/2002	14:43	73.4	29.500	0	112.2	0.00	569.86	19.67	0.60	1.08	536.7	0.019
38	1/24/2002	18:32	73.4	29.230	0	105.7	0.00	569.86	20.37	0.60	1.08	537.2	0.019
39	1/29/2002	17:43	72.9	29.530	0	104.9	0.00	569.86	23.11	0.60	1.08	540.2	0.019


DEVON SFS #9-1
Can 3-LA-C12
1000.0
800.0
600.0
400.0
200.0
0.0
-200.0
-400.0
-600.0
-800.0
-1000.0
0.00
5.00
10.00
15.00
20.00
25.00
Cumulative Desorbed Volume (cc)
Square Root of Time (hr)

Project	Devon				Cumulative volume @ STP:	444.9		Raw total gas (cc/g)	0.81
Well ID:	SFS #9-1	Can no.	3-LA-C14	COMPOSITE CAN 2 OF 2 (OTHER CAN 3-LA-C12)					
Sample Interval (ft):	From:	2692.3	To:	2697.5	Milliliters/gram raw coal:	0.48		DAF total gas (cc/g)	1.26
Core Date: (mm/dd/yr)				1/7/2002					
Time Zero-Coal penetrated (hh:mm) (24 hour clock)				11:37	Milliliter/gram coal d.a.f.:	0.76		Raw total gas (SCF/ton)	25.97
Raw coal mass (air-dry): (grams)				918	(excluding lost gas)				
Coal mass (d.a.f.): (grams)				589.16	Lost gas estimate (cc)	300		DAF total gas (SCF/ton)	40.46
Headspace volume: (cc)			(est.)	300	(from lost gas graph)				
								Cuttings correction 25% (SCF/ton)	50.57

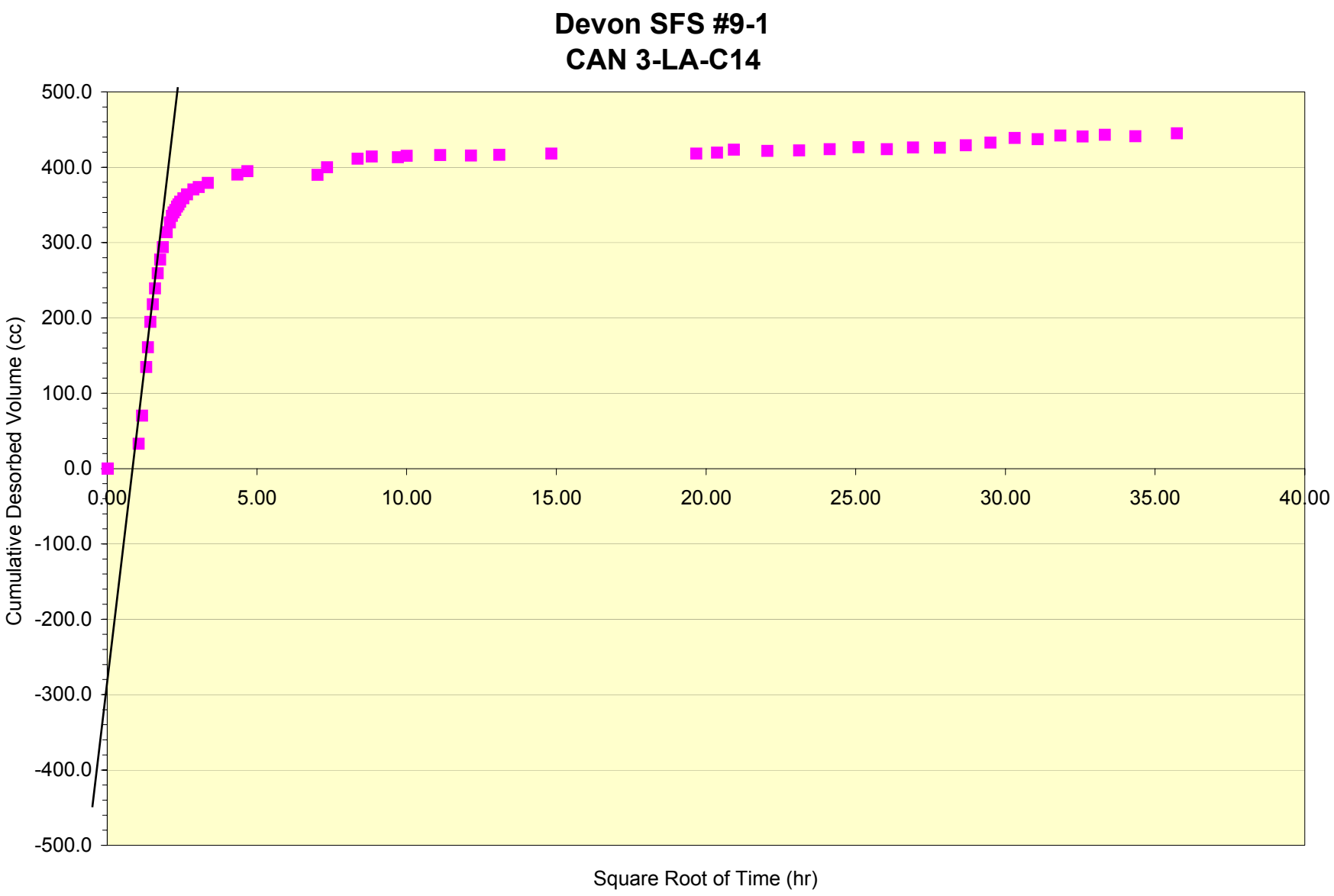
Sample Type
- ○ Core
- ● Cuttings

Data Summary
- ○ Preliminary
- ● Final Results

enter data only in shaded areas, copy and paste formulas as needed to calculate more desorption data (columns H through N)

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction Cumulative Volume @ STP (milliliter)	Headspace Correction Cumulative Gas Content (SCF)
In Can	1/7/2002	12:29	66.5	30.13	0	83.5	0.00	0.00	0.93	0.00	0.00	0.0	0.0
1	1/7/2002	12:44	66.5	30.13	35	83.5	33.74	33.74	1.06	0.04	0.06	32.9	0.001
2	1/7/2002	12:59	68.2	30.13	40	84.1	38.52	72.26	1.17	0.08	0.12	70.1	0.002
3	1/7/2002	13:19	70.5	30.12	75	95.2	70.75	143.01	1.30	0.16	0.24	134.6	0.005
4	1/7/2002	13:29	70.5	30.12	30	98.3	28.14	171.15	1.37	0.19	0.29	161.1	0.006
5	1/7/2002	13:42	70.2	30.11	35	96.5	32.93	204.08	1.44	0.22	0.35	194.6	0.007
6	1/7/2002	13:57	70.7	30.12	25	96.4	23.53	227.61	1.53	0.25	0.39	218.0	0.008
7	1/7/2002	14:11	69.3	30.11	24	99.2	22.47	250.08	1.60	0.27	0.42	239.1	0.008
8	1/7/2002	14:28	68.5	30.11	22	100.5	20.55	270.63	1.69	0.29	0.46	259.0	0.009
9	1/7/2002	14:46	67.7	30.11	18	97.4	16.91	287.54	1.77	0.31	0.49	277.4	0.010
10	1/7/2002	15:04	69.7	30.11	18	98.1	16.89	304.43	1.86	0.33	0.52	293.9	0.010
11	1/7/2002	15:35	68.0	30.11	21	98.2	19.70	324.13	1.99	0.35	0.55	313.6	0.011
12	1/7/2002	16:00	69.2	30.11	17	104.0	15.78	339.91	2.09	0.37	0.58	326.7	0.012
13	1/7/2002	16:18	70.4	30.10	8	101.8	7.45	347.36	2.16	0.38	0.59	335.2	0.012
14	1/7/2002	16:33	71.7	30.10	5	102.0	4.66	352.02	2.22	0.38	0.60	339.7	0.012
15	1/7/2002	16:47	71.8	30.11	4	102.7	3.72	355.74	2.27	0.39	0.60	343.2	0.012
16	1/7/2002	17:03	71.7	30.11	5	103.2	4.65	360.39	2.33	0.39	0.61	347.6	0.012
17	1/7/2002	17:18	71.8	30.12	3	103.2	2.79	363.18	2.38	0.40	0.62	350.5	0.012
18	1/7/2002	17:34	71.4	30.12	4	103.2	3.72	366.90	2.44	0.40	0.62	354.2	0.013
19	1/7/2002	18:06	72.3	30.13	5	103.5	4.65	371.55	2.55	0.40	0.63	358.8	0.013
20	1/7/2002	18:45	70.7	30.12	5	102.6	4.66	376.20	2.67	0.41	0.64	363.8	0.013
21	1/7/2002	19:55	71.3	30.13	7	103.0	6.51	382.72	2.88	0.42	0.65	370.3	0.013
22	1/7/2002	21:00	68.1	30.13	5	105.8	4.63	387.35	3.06	0.42	0.66	373.6	0.013
23	1/7/2002	22:56	65.1	30.15	6	106.2	5.55	392.90	3.36	0.43	0.67	379.2	0.013

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction Cumulative Volume @ STP (milliliter)	Headspace Correction Cumulative Gas Content (SCF)
24	1/8/2002	6:33	51.2	30.10	9	100.6	8.40	401.31	4.35	0.44	0.68	390.2	0.014
25	1/8/2002	9:32	45.1	30.11	3	97.2	2.82	404.13	4.68	0.44	0.69	394.8	0.014
26	1/9/2002	13:00	74.3	29.23	0	91.4	0.00	404.13	7.03	0.44	0.69	389.8	0.014
27	1/9/2002	17:36	74.1	29.21	20	108.5	17.87	421.99	7.35	0.46	0.72	399.7	0.014
28	1/10/2002	9:34	74.5	29.38	10	106.2	9.02	431.02	8.36	0.47	0.73	411.2	0.015
29	1/10/2002	17:43	72.8	29.35	2	103.6	1.81	432.83	8.84	0.47	0.73	414.0	0.015
30	1/11/2002	9:52	73.2	29.35	0	105.4	0.00	432.83	9.71	0.47	0.73	413.2	0.015
31	1/11/2002	15:41	74.2	29.44	0	103.0	0.00	432.83	10.00	0.47	0.73	415.0	0.015
32	1/12/2002	15:21	73.6	29.32	0	98.8	0.00	432.83	11.12	0.47	0.73	415.9	0.015
33	1/13/2002	15:21	73.6	29.32	0	99.7	0.00	432.83	12.15	0.47	0.73	415.5	0.015
34	1/14/2002	15:13	73.3	29.44	1	101.8	0.91	433.74	13.10	0.47	0.74	416.5	0.015
35	1/16/2002	15:44	74.2	29.74	0	104.0	0.00	433.74	14.84	0.47	0.74	418.1	0.015
36	1/23/2002	14:45	73.5	29.50	2	103.5	1.82	435.56	19.68	0.47	0.74	418.1	0.015
37	1/24/2002	18:34	73.4	29.23	3	101.7	2.71	438.28	20.37	0.48	0.74	419.2	0.015
38	1/25/2002	18:01	73.5	29.74	0	102.9	0.00	438.28	20.94	0.48	0.74	423.1	0.015
39	1/27/2002	17:58	74.2	29.65	0	104.4	0.00	438.28	22.05	0.48	0.74	421.7	0.015
40	1/29/2002	17:45	72.9	29.53	1	103.2	0.91	439.19	23.11	0.48	0.75	422.1	0.015
41	1/31/2002	18:12	74.1	29.65	0	102.0	0.00	439.19	24.14	0.48	0.75	423.7	0.015
42	2/2/2002	17:23	73.6	29.88	0	100.7	0.00	439.19	25.10	0.48	0.75	426.3	0.015
43	2/4/2002	17:43	74.2	29.53	2	103.1	1.82	441.01	26.04	0.48	0.75	423.9	0.015
44	2/6/2002	16:20	73.8	29.71	0	101.7	0.00	441.01	26.92	0.48	0.75	426.2	0.015
45	2/8/2002	17:09	73.9	29.56	0	100.0	0.00	441.01	27.81	0.48	0.75	425.6	0.015
46	2/10/2002	18:09	73.9	29.38	5	99.2	4.57	445.58	28.68	0.49	0.76	428.9	0.015
47	2/12/2002	17:53	72.7	29.38	5	101.4	4.55	450.13	29.50	0.49	0.76	432.5	0.015
48	2/14/2002	18:17	74.1	29.85	0	96.7	0.00	450.13	30.31	0.49	0.76	438.8	0.015
49	2/16/2002	17:26	73.0	29.26	5	99.0	4.55	454.68	31.08	0.50	0.77	437.0	0.015
50	2/18/2002	17:14	73.6	29.83	0	99.4	0.00	454.68	31.84	0.50	0.77	441.9	0.016
51	2/20/2002	17:04	73.1	29.29	4	99.5	3.64	458.32	32.58	0.50	0.78	440.7	0.016
52	2/22/2002	18:03	73.3	29.56	0	99.5	0.00	458.32	33.32	0.50	0.78	443.1	0.016
53	2/25/2002	15:04	73.1	29.56	0	104.0	0.00	458.32	34.34	0.50	0.78	441.0	0.016
54	3/1/2002	16:36	73.2	29.94	0	102.7	0.00	458.32	35.73	0.50	0.78	444.9	0.016


Devon SFS #9-1
CAN 3-LA-C14
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
-200.0
-300.0
-400.0
-500.0
0.00
5.00
10.00
15.00
20.00
25.00
30.00
35.00
40.00
Cumulative Desorbed Volume (cc)
Square Root of Time (hr)

Project	Devon			Cumulative volume @ STP:	1343.1
Well ID:	SFS #9-1	Can no.	4-LA-12		
Sample Interval (ft):	From: 2692.3	To:	2693.3	Milliliters/gram raw coal:	0.56
Core Date: (mm/dd/yr)			1/7/2002		
Time Zero-Coal penetrated (hh:mm) (24 hour clock)			12:30	Milliliter/gram coal d.a.f.: (excluding lost gas)	3.20
Raw coal mass (air-dry): (grams)			2397		
Coal mass (d.a.f.): (grams)			419.49	Lost gas estimate (cc) (from lost gas graph)	2500
Headspace volume: (cc)			0		

Raw total gas (cc/g)	1.60
DAF total gas (cc/g)	9.16
Raw total gas (SCF/ton)	51.31
DAF total gas (SCF/ton)	293.17
Cuttings correction 25% (SCF/ton)	N/A

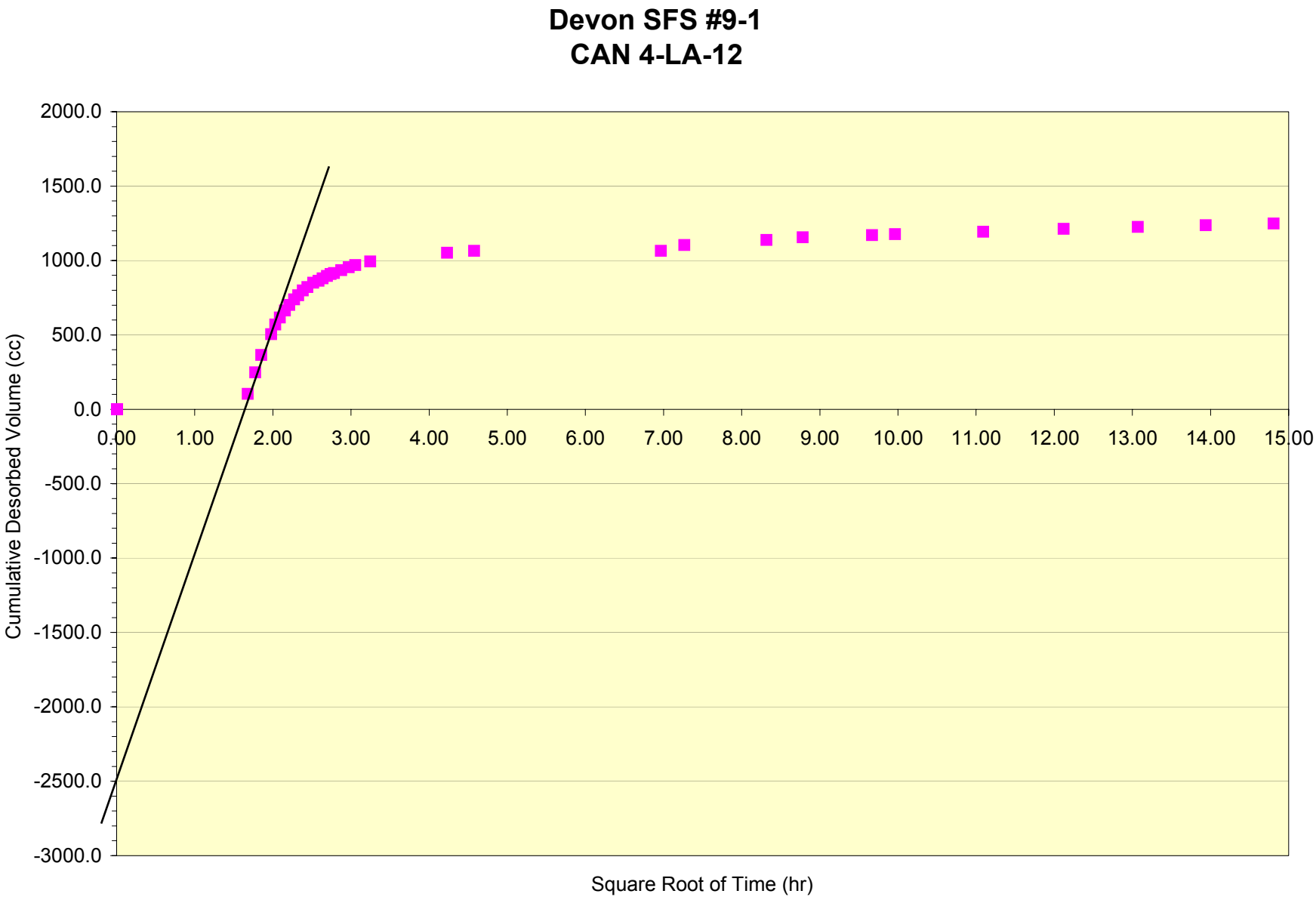
Sample Type: (●) Core ( ) Cuttings

Data Summary: ( ) Preliminary (●) Final Results

enter data only in shaded areas, copy and paste formulas as needed to calculate more desorption data (columns H through N)

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction: Cumulative Volume @ STP (milliliter)	Headspace Correction: Cumulative Gas Content (SCF)
In Can	1/7/2002	15:05	69.7	30.11	0	92.3	0.00	0.00	1.61	0.00	0.00	0.0	0.0
1	1/7/2002	15:19	69.7	30.11	110	92.3	104.29	104.29	1.68	0.04	0.25	102.8	0.004
2	1/7/2002	15:39	69.7	30.11	155	100.3	144.84	249.13	1.77	0.10	0.59	247.7	0.009
3	1/7/2002	15:56	69.9	30.11	125	103.2	116.21	365.35	1.85	0.15	0.87	364.5	0.013
4	1/7/2002	16:25	70.1	30.10	150	109.6	137.86	503.20	1.98	0.21	1.20	504.6	0.018
5	1/7/2002	16:38	71.5	30.11	70	111.3	64.14	567.34	2.03	0.24	1.35	569.8	0.020
6	1/7/2002	16:52	71.1	30.11	50	112.0	45.76	613.11	2.09	0.26	1.46	616.4	0.022
7	1/7/2002	17:09	70.8	30.11	50	113.1	45.69	658.80	2.16	0.27	1.57	663.0	0.023
8	1/7/2002	17:23	70.9	30.12	40	113.4	36.53	695.33	2.21	0.29	1.66	700.3	0.025
9	1/7/2002	17:40	70.6	30.12	40	114.6	36.46	731.79	2.27	0.31	1.74	737.7	0.026
10	1/7/2002	17:54	70.8	30.13	30	114.8	27.34	759.14	2.32	0.32	1.81	765.7	0.027
11	1/7/2002	18:11	70.6	30.13	35	115.2	31.88	791.01	2.38	0.33	1.89	798.3	0.028
12	1/7/2002	18:28	70.9	30.13	25	114.1	22.81	813.83	2.44	0.34	1.94	821.7	0.029
13	1/7/2002	18:50	69.8	30.13	30	114.4	27.36	841.19	2.52	0.35	2.01	849.7	0.030
14	1/7/2002	19:11	69.2	30.13	15	114.0	13.69	854.88	2.59	0.36	2.04	863.8	0.031
15	1/7/2002	19:27	69.3	30.13	16	114.4	14.60	869.47	2.64	0.36	2.07	878.7	0.031
16	1/7/2002	19:45	70.6	30.13	18	115.1	16.40	885.87	2.69	0.37	2.11	895.5	0.032
17	1/7/2002	20:00	70.7	30.13	14	114.9	12.76	898.63	2.74	0.37	2.14	908.6	0.032
18	1/7/2002	20:15	70.0	30.13	7	114.7	6.38	905.01	2.78	0.38	2.16	915.2	0.032
19	1/7/2002	20:46	67.8	30.13	20	115.6	18.20	923.21	2.88	0.39	2.20	933.9	0.033
20	1/7/2002	21:20	68.6	30.13	21	115.7	19.11	942.32	2.97	0.39	2.25	953.6	0.034
21	1/7/2002	21:50	67.4	30.13	17	115.5	15.48	957.80	3.06	0.40	2.28	969.6	0.034
22	1/7/2002	23:02	64.5	30.14	25	114.7	22.80	980.60	3.25	0.41	2.34	993.2	0.035
23	1/8/2002	6:24	51.2	30.10	60	117.5	54.38	1034.99	4.23	0.43	2.47	1051.3	0.037
24	1/8/2002	9:26	45.1	30.11	14	113.0	12.79	1047.78	4.58	0.44	2.50	1065.0	0.038
25	1/9/2002	13:03	74.3	29.23	0	104.4	0.00	1047.78	6.97	0.44	2.50	1065.0	0.038
26	1/9/2002	17:18	74.1	29.21	43	115.9	37.93	1085.70	7.27	0.45	2.59	1103.7	0.039

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction Cumulative Volume @ STP (milliliter)	Headspace Correction Cumulative Gas Content (SCF)
27	1/10/2002	9:41	74.5	29.38	38	119.3	33.51	1119.21	8.32	0.47	2.67	1138.0	0.040
28	1/10/2002	17:36	72.8	29.35	19	115.0	16.86	1136.08	8.78	0.47	2.71	1155.2	0.041
29	1/11/2002	9:58	73.2	29.35	16	115.5	14.19	1150.27	9.67	0.48	2.74	1169.7	0.041
30	1/11/2002	15:45	74.2	29.44	7	115.7	6.22	1156.49	9.96	0.48	2.76	1176.1	0.042
31	1/12/2002	15:30	73.6	29.32	18	115.0	15.96	1172.45	11.09	0.49	2.79	1192.3	0.042
32	1/13/2002	15:26	73.6	29.32	22	115.9	19.48	1191.93	12.12	0.50	2.84	1212.2	0.043
33	1/14/2002	15:18	73.3	29.44	15	116.5	13.32	1205.25	13.07	0.50	2.87	1225.8	0.043
34	1/15/2002	14:47	74.0	29.44	12	114.2	10.70	1215.95	13.94	0.51	2.90	1236.7	0.044
35	1/16/2002	15:48	74.2	29.74	12	114.9	10.79	1226.74	14.81	0.51	2.92	1247.7	0.044
36	1/17/2002	16:28	73.5	29.50	10	115.9	8.91	1235.65	15.62	0.52	2.95	1256.8	0.044
37	1/18/2002	16:00	73.7	29.65	6	116.5	5.37	1241.02	16.36	0.52	2.96	1262.3	0.045
38	1/19/2002	16:22	73.2	29.38	8	115.3	7.10	1248.12	17.08	0.52	2.98	1269.5	0.045
39	1/20/2002	16:38	76.8	29.65	6	115.7	5.37	1253.49	17.78	0.52	2.99	1275.0	0.045
40	1/21/2002	16:46	74.2	29.38	8	115.7	7.10	1260.59	18.45	0.53	3.01	1282.2	0.045
41	1/22/2002	17:14	73.4	29.88	2	115.9	1.80	1262.40	19.10	0.53	3.01	1284.0	0.045
42	1/23/2002	14:55	73.4	29.50	6	116.4	5.34	1267.74	19.66	0.53	3.02	1289.5	0.046
43	1/24/2002	18:41	73.4	29.23	6	115.7	5.30	1273.04	20.35	0.53	3.03	1294.9	0.046
44	1/25/2002	18:07	73.5	29.74	1	115.9	0.90	1273.93	20.92	0.53	3.04	1295.8	0.046
45	1/27/2002	18:03	74.2	29.65	6	117.0	5.36	1279.29	22.04	0.53	3.05	1301.3	0.046
46	1/29/2002	17:48	72.9	29.53	6	115.6	5.35	1284.65	23.09	0.54	3.06	1306.8	0.046
47	1/31/2002	18:06	74.1	29.65	0	115.3	0.00	1284.65	24.12	0.54	3.06	1306.8	0.046
48	2/2/2002	17:26	73.6	29.88	2	115.0	1.81	1286.45	25.08	0.54	3.07	1308.6	0.046
49	2/4/2002	17:48	74.2	29.53	5	114.6	4.47	1290.92	26.02	0.54	3.08	1313.1	0.046
50	2/6/2002	16:14	73.8	29.71	6	115.9	5.38	1296.31	26.90	0.54	3.09	1318.6	0.047
51	2/8/2002	17:00	73.9	29.56	0	113.8	0.00	1296.31	27.79	0.54	3.09	1318.6	0.047
52	2/10/2002	18:15	73.9	29.38	5	115.5	4.44	1300.74	28.67	0.54	3.10	1323.2	0.047
53	2/12/2002	17:49	72.7	29.38	4	115.3	3.55	1304.30	29.48	0.54	3.11	1326.8	0.047
54	2/14/2002	18:10	74.1	29.85	0	115.3	0.00	1304.30	30.29	0.54	3.11	1326.8	0.047
55	2/16/2002	17:21	73.0	29.26	11	116.8	9.70	1314.00	31.06	0.55	3.13	1336.7	0.047
56	2/18/2002	17:09	73.6	29.83	7	119.1	6.27	1320.27	31.82	0.55	3.15	1343.1	0.047
57	2/20/2002	16:59	73.1	29.29	0	116.0	0.00	1320.27	32.57	0.55	3.15	1343.1	0.047
58	2/22/2002	17:58	73.3	29.56	0	115.3	0.00	1320.27	33.31	0.55	3.15	1343.1	0.047
59	2/25/2002	15:44	73.1	29.56	0	114.8	0.00	1320.27	34.34	0.55	3.15	1343.1	0.047
60	3/1/2002	16:38	73.2	29.94	0	114.6	0.00	1320.27	35.72	0.55	3.15	1343.1	0.047


Devon SFS #9-1
CAN 4-LA-12
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1500.0
1000.0
500.0
0.0
-500.0
-1000.0
-1500.0
-2000.0
-2500.0
-3000.0
Cumulative Desorbed Volume (cc)
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00
11.00
12.00
13.00
14.00
15.00
Square Root of Time (hr)

Project	Devon				Cumulative volume @ STP:	581.9	Raw total gas (cc/g)	3.99
Well ID:	SFS #9-1	Can no.	3-LA-9				
Sample Interval (ft):	From:	2695	To:	2695.3	Milliliters/gram raw coal:	1.47	DAF total gas (cc/g)	5.74
Core Date: (mm/dd/yr)				1/7/2002				
Time Zero-Coal penetrated (hh:mm) (24 hour clock)				12:30	Milliliter/gram coal d.a.f.:	2.11	Raw total gas (SCF/ton)	127.83
Raw coal mass (air-dry): (grams)				396	(excluding lost gas)			
Coal mass (d.a.f.): (grams)				275.37	Lost gas estimate (cc)	1000	DAF total gas (SCF/ton)	183.83
Headspace volume: (cc)				0	(from lost gas graph)			
							Cuttings correction 25% (SCF/ton)	N/A

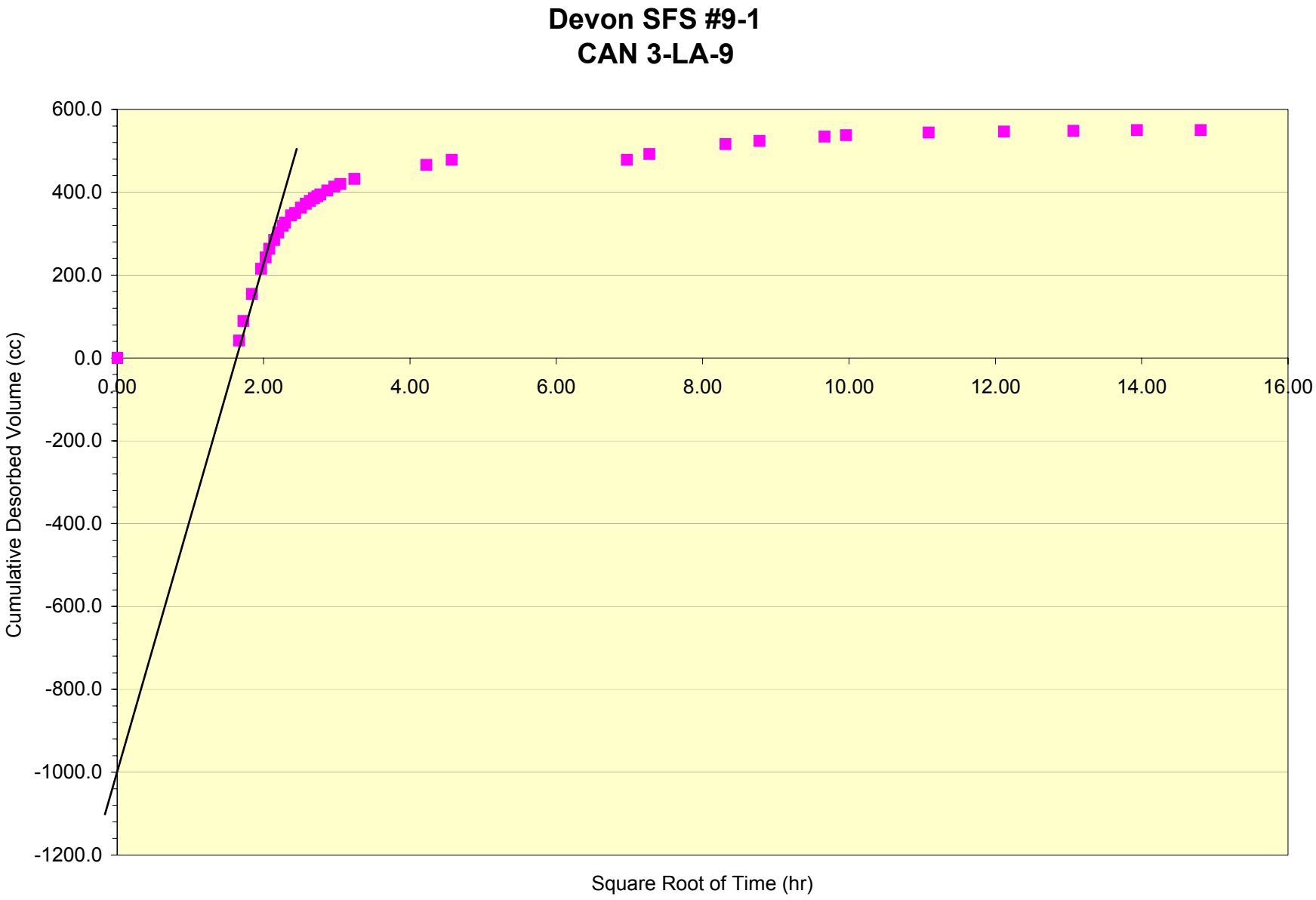
Sample Type: (●) Core ( ) Cuttings

Data Summary: ( ) Preliminary (●) Final Results

enter data only in shaded areas, copy and paste formulas as needed to calculate more desorption data (columns H through N)

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction: Cumulative Volume @ STP (milliliter)	Headspace Correction: Cumulative Gas Content (SCF)
In Can	1/7/2002	14:59	69.7	30.11	0	85.4	0.00	0.00	1.58	0.00	0.00	0.0	0.0
1	1/7/2002	15:17	69.7	30.11	45	85.4	43.21	43.21	1.67	0.11	0.16	42.1	0.001
2	1/7/2002	15:29	69.7	30.11	50	92.5	47.39	90.59	1.73	0.23	0.33	88.8	0.003
3	1/7/2002	15:54	69.9	30.11	70	100.2	65.43	156.02	1.84	0.39	0.57	154.2	0.005
4	1/7/2002	16:22	71.1	30.10	65	105.5	60.17	216.19	1.97	0.55	0.79	214.8	0.008
5	1/7/2002	16:37	71.6	30.11	30	107.5	27.67	243.86	2.03	0.62	0.89	242.7	0.009
6	1/7/2002	16:50	71.7	30.11	22	108.4	20.26	264.13	2.08	0.67	0.96	263.2	0.009
7	1/7/2002	17:06	72.4	30.11	23	109.2	21.16	285.29	2.14	0.72	1.04	284.6	0.010
8	1/7/2002	17:21	72.0	30.12	19	110.3	17.45	302.73	2.20	0.76	1.10	302.3	0.011
9	1/7/2002	17:38	71.7	30.12	18	110.9	16.51	319.25	2.27	0.81	1.16	319.1	0.011
10	1/7/2002	17:46	72.0	30.13	8	111.4	7.33	326.58	2.29	0.82	1.19	326.5	0.012
11	1/7/2002	18:09	72.4	30.12	19	110.1	17.46	344.04	2.38	0.87	1.25	344.2	0.012
12	1/7/2002	18:25	72.4	30.13	6	111.8	5.50	349.54	2.43	0.88	1.27	349.8	0.012
13	1/7/2002	18:49	71.5	30.12	14	112.4	12.81	362.35	2.51	0.92	1.32	362.8	0.013
14	1/7/2002	19:09	70.8	30.13	10	111.7	9.16	371.51	2.58	0.94	1.35	372.1	0.013
15	1/7/2002	19:26	69.3	30.13	7	111.8	6.41	377.93	2.63	0.95	1.37	378.7	0.013
16	1/7/2002	19:44	70.6	30.13	7	112.3	6.41	384.34	2.69	0.97	1.40	385.2	0.014
17	1/7/2002	19:59	70.7	30.13	5	112.5	4.58	388.91	2.74	0.98	1.41	389.9	0.014
18	1/7/2002	20:13	70.0	30.13	5	112.8	4.57	393.49	2.78	0.99	1.43	394.6	0.014
19	1/7/2002	20:45	67.8	30.13	10	114.1	9.12	402.61	2.87	1.02	1.46	404.0	0.014
20	1/7/2002	21:19	68.6	30.12	10	114.2	9.12	411.73	2.97	1.04	1.50	413.3	0.015
21	1/7/2002	21:49	67.4	30.13	7	114.2	6.39	418.12	3.05	1.06	1.52	419.9	0.015
22	1/7/2002	23:01	64.5	30.14	13	113.7	11.88	430.00	3.24	1.09	1.56	432.2	0.015
23	1/8/2002	6:22	51.2	30.10	35	113.4	31.95	461.95	4.23	1.17	1.68	466.1	0.016
24	1/8/2002	9:25	45.1	30.11	12	111.8	10.99	472.94	4.57	1.19	1.72	477.8	0.017
25	1/9/2002	13:02	74.3	29.23	0	102.2	0.00	472.94	6.97	1.19	1.72	477.8	0.017

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction Cumulative Volume @ STP (milliliter)	Headspace Correction Cumulative Gas Content (SCF)
26	1/9/2002	17:24	74.1	29.21	16	113.8	14.16	487.10	7.27	1.23	1.77	492.2	0.017
27	1/10/2002	9:38	74.5	29.38	26	111.4	23.25	510.35	8.31	1.29	1.85	515.7	0.018
28	1/10/2002	17:35	72.8	29.35	9	114.2	8.00	518.35	8.78	1.31	1.88	523.9	0.019
29	1/11/2002	9:57	73.2	29.35	11	110.8	9.84	528.18	9.67	1.33	1.92	533.8	0.019
30	1/11/2002	15:44	74.2	29.44	4	112.0	3.58	531.76	9.96	1.34	1.93	537.5	0.019
31	1/12/2002	15:28	73.6	29.32	7	111.2	6.25	538.01	11.09	1.36	1.95	543.8	0.019
32	1/13/2002	15:24	73.6	29.32	3	111.6	2.68	540.69	12.12	1.37	1.96	546.5	0.019
33	1/14/2002	15:18	73.3	29.44	2	113.3	1.79	542.47	13.07	1.37	1.97	548.3	0.019
34	1/15/2002	14:46	74.0	29.44	2	113.3	1.79	544.26	13.94	1.37	1.98	550.1	0.019
35	1/16/2002	15:47	74.2	29.74	0	113.5	0.00	544.26	14.81	1.37	1.98	550.1	0.019
36	1/18/2002	15:59	73.7	29.65	0	113.4	0.00	544.26	16.35	1.37	1.98	550.1	0.019
37	1/19/2002	16:20	73.2	29.38	3	113.1	2.67	546.93	17.08	1.38	1.99	552.8	0.020
38	1/20/2002	16:37	76.8	29.65	2	112.9	1.80	548.73	17.78	1.39	1.99	554.7	0.020
39	1/21/2002	16:45	74.2	29.38	4	113.7	3.56	552.29	18.45	1.39	2.01	558.3	0.020
40	1/22/2002	17:12	73.4	29.88	0	113.8	0.00	552.29	19.10	1.39	2.01	558.3	0.020
41	1/24/2002	18:39	73.4	29.23	4	112.1	3.55	555.85	20.35	1.40	2.02	561.9	0.020
42	1/25/2002	18:05	73.5	29.74	0	112.8	0.00	555.85	20.92	1.40	2.02	561.9	0.020
43	1/27/2002	18:01	74.2	29.65	2	114.2	1.80	557.64	22.03	1.41	2.03	563.7	0.020
44	1/29/2002	17:47	72.9	29.53	2	113.2	1.79	559.44	23.09	1.41	2.03	565.5	0.020
45	1/31/2002	18:04	74.1	29.65	0	112.2	0.00	559.44	24.12	1.41	2.03	565.5	0.020
46	2/2/2002	17:24	73.6	29.88	0	110.7	0.00	559.44	25.08	1.41	2.03	565.5	0.020
47	2/4/2002	17:46	74.2	29.53	3	109.6	2.70	562.14	26.02	1.42	2.04	568.3	0.020
48	2/6/2002	16:12	73.8	29.71	1	111.8	0.90	563.04	26.90	1.42	2.04	569.2	0.020
49	2/8/2002	16:59	73.9	29.56	3	110.3	2.70	565.75	27.79	1.43	2.05	571.9	0.020
50	2/10/2002	18:14	73.9	29.38	2	108.9	1.80	567.54	28.67	1.43	2.06	573.7	0.020
51	2/12/2002	17:47	72.7	29.38	4	111.3	3.58	571.12	29.48	1.44	2.07	577.3	0.020
52	2/14/2002	18:09	74.1	29.85	0	107.6	0.00	571.12	30.29	1.44	2.07	577.3	0.020
53	2/16/2002	17:19	73.0	29.26	1	110.3	0.89	572.01	31.06	1.44	2.08	578.2	0.020
54	2/18/2002	17:08	73.6	29.83	0	107.3	0.00	572.01	31.82	1.44	2.08	578.2	0.020
55	2/20/2002	16:57	73.1	29.29	0	106.5	0.00	572.01	32.56	1.44	2.08	578.2	0.020
56	2/22/2002	17:57	73.3	29.56	0	107.5	0.00	572.01	33.31	1.44	2.08	578.2	0.020
57	2/25/2002	15:42	73.1	29.56	4	110.4	3.60	575.62	34.34	1.45	2.09	581.9	0.021
58	3/1/2002	16:34	73.2	29.94	0	110.7	0.00	575.62	35.72	1.45	2.09	581.9	0.021


Devon SFS #9-1
CAN 3-LA-9
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200.0
0.0
-200.0
-400.0
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-800.0
-1000.0
-1200.0
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
Cumulative Desorbed Volume (cc)
Square Root of Time (hr)

Project	Devon			Cumulative volume @ STP:	1585.9	Raw total gas (cc/g)	3.47
Well ID:	SFS #9-1	Can no.	LA-3-01-15				
Sample Interval (ft):	From: 2697.1	To:	2697.5	Milliliters/gram raw coal:	1.32	DAF total gas (cc/g)	5.53
Core Date: (mm/dd/yr)			1/7/2002				
Time Zero-Coal penetrated (hh:mm) (24 hour clock)			12:30	Milliliter/gram coal d.a.f.: (excluding lost gas)	2.10	Raw total gas (SCF/ton)	111.07
Raw coal mass (air-dry): (grams)			1206				
Coal mass (d.a.f.): (grams)			756.89	Lost gas estimate (cc) (from lost gas graph)	2600	DAF total gas (SCF/ton)	176.97
Headspace volume: (cc)			0				
						Cuttings correction 25% (SCF/ton)	N/A

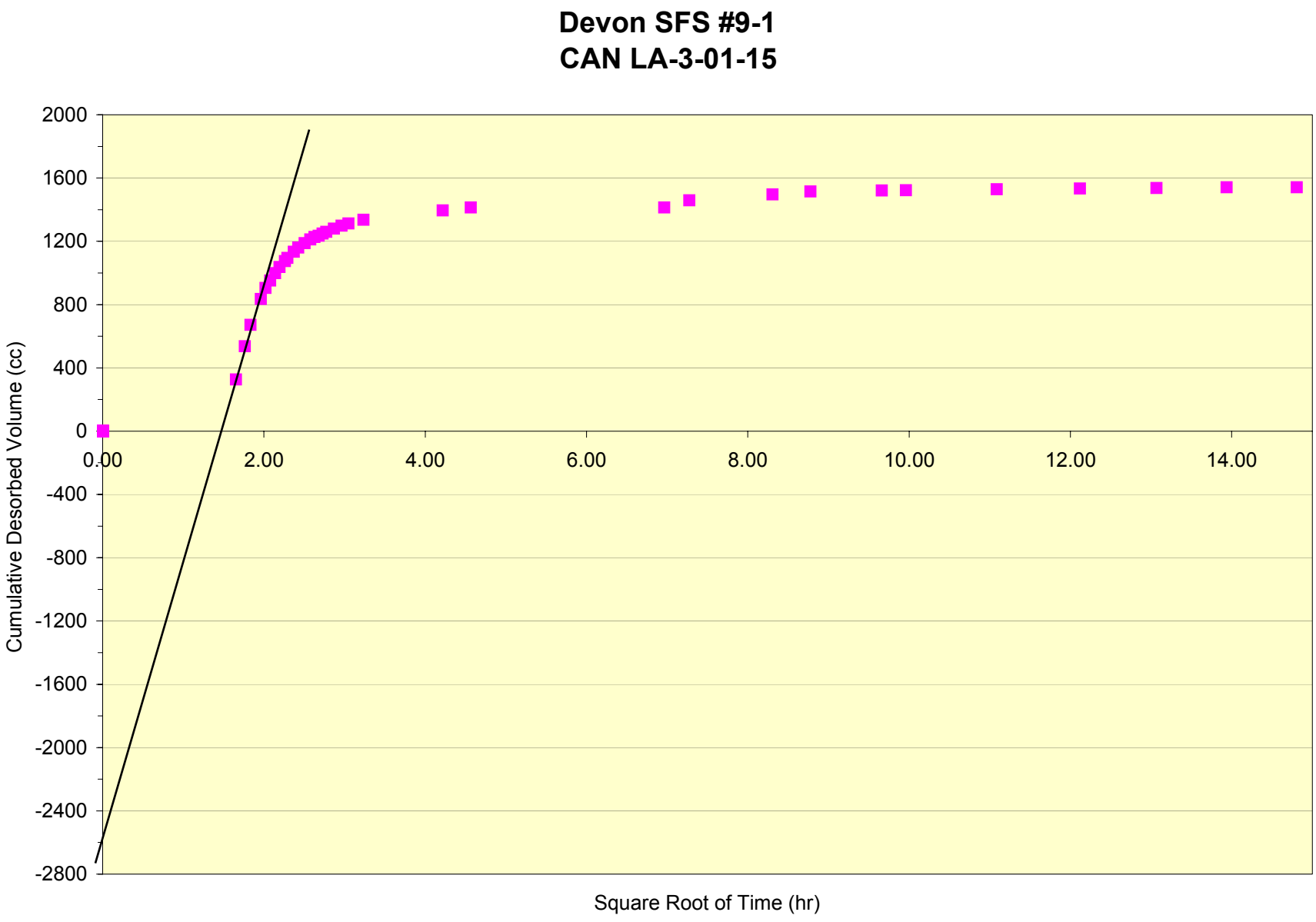
Sample Type: (●) Core ( ) Cuttings

Data Summary: ( ) Preliminary (●) Final Results

enter data only in shaded areas, copy and paste formulas as needed to calculate more desorption data (columns H through N)

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction: Cumulative Volume @ STP (milliliter)	Headspace Correction: Cumulative Gas Content (SCF)
In Can	1/7/2002	14:53	69.7	30.11	0	76.2	0.00	0.00	1.54	0.00	0.00	0.0	0.0
1	1/7/2002	15:14	69.7	30.11	350	88.5	334.11	334.11	1.65	0.28	0.44	327.1	0.012
2	1/7/2002	15:37	70.8	30.11	225	94.7	212.38	546.49	1.77	0.45	0.72	537.0	0.019
3	1/7/2002	15:52	70.3	30.11	145	100.2	135.53	682.01	1.83	0.57	0.90	672.4	0.024
4	1/7/2002	16:21	71.1	30.10	175	103.8	162.49	844.50	1.96	0.70	1.12	835.5	0.030
5	1/7/2002	16:35	71.6	30.10	75	102.0	69.86	914.36	2.02	0.76	1.21	905.3	0.032
6	1/7/2002	16:49	71.7	30.11	50	106.1	46.24	960.60	2.08	0.80	1.27	951.9	0.034
7	1/7/2002	17:05	72.4	30.11	50	99.3	46.81	1007.41	2.14	0.84	1.33	998.4	0.035
8	1/7/2002	17:19	72.0	30.12	42	99.7	39.30	1046.71	2.19	0.87	1.38	1037.5	0.037
9	1/7/2002	17:37	71.7	30.12	40	103.4	37.19	1083.90	2.26	0.90	1.43	1074.7	0.038
10	1/7/2002	17:45	72.0	30.13	21	104.2	19.50	1103.40	2.29	0.91	1.46	1094.3	0.039
11	1/7/2002	18:07	72.4	30.12	42	110.2	38.58	1141.99	2.37	0.95	1.51	1133.4	0.040
12	1/7/2002	18:23	73.3	30.13	28	112.2	25.63	1167.62	2.43	0.97	1.54	1159.4	0.041
13	1/7/2002	18:47	71.5	30.12	30	111.3	27.51	1195.13	2.51	0.99	1.58	1187.3	0.042
14	1/7/2002	19:08	70.8	30.13	25	111.2	22.93	1218.06	2.58	1.01	1.61	1210.7	0.043
15	1/7/2002	19:24	69.3	30.13	18	115.7	16.38	1234.44	2.63	1.02	1.63	1227.5	0.043
16	1/7/2002	19:41	70.6	30.13	8	111.3	7.34	1241.78	2.68	1.03	1.64	1235.0	0.044
17	1/7/2002	19:57	70.7	30.13	15	115.0	13.67	1255.45	2.73	1.04	1.66	1249.0	0.044
18	1/7/2002	20:12	70.0	30.13	11	115.1	10.02	1265.47	2.77	1.05	1.67	1259.3	0.044
19	1/7/2002	20:44	67.8	30.13	22	118.2	19.93	1285.40	2.87	1.07	1.70	1279.9	0.045
20	1/7/2002	21:17	68.6	30.12	20	118.4	18.11	1303.51	2.96	1.08	1.72	1298.7	0.046
21	1/7/2002	21:48	67.4	30.13	15	117.5	13.61	1317.12	3.05	1.09	1.74	1312.7	0.046
22	1/7/2002	22:58	64.5	30.14	25	116.3	22.74	1339.86	3.24	1.11	1.77	1336.4	0.047
23	1/8/2002	6:18	49.5	30.10	60	108.2	55.27	1395.13	4.22	1.16	1.84	1394.7	0.049
24	1/8/2002	9:21	45.1	30.11	20	109.4	18.39	1413.52	4.57	1.17	1.87	1414.3	0.050

	Date (mm/dd/yr)	Time 24 hour Clock HH:MM	Ambient Temp °F	Pressure inches Hg	Delta Gas Volume (milliliter)	Internal Canister Temp. °F	Delta Volume @ STP (milliliter)	Cumulative Volume @ STP (milliliter)	Sq. Root Elapsed Time ($Hrs^{1/2}$)	ml/gram Raw Coal Mass	ml/g d.a.f Coal Mass	Headspace Correction Cumulative Volume @ STP (milliliter)	Headspace Correction Cumulative Gas Content (SCF)
25	1/9/2002	13:01	74.3	29.23	0	96.8	0.00	1413.52	6.97	1.17	1.87	1414.3	0.050
26	1/9/2002	17:27	74.1	29.21	50	113.5	44.28	1457.81	7.28	1.21	1.93	1459.2	0.052
27	1/10/2002	9:32	74.5	29.38	40	107.3	36.02	1493.83	8.31	1.24	1.97	1495.4	0.053
28	1/10/2002	17:33	72.8	29.35	22	110.1	19.70	1513.52	8.78	1.25	2.00	1515.3	0.054
29	1/11/2002	9:53	73.2	29.35	6	108.1	5.39	1518.91	9.66	1.26	2.01	1520.7	0.054
30	1/11/2002	15:43	74.2	29.44	2	108.6	1.80	1520.71	9.96	1.26	2.01	1522.6	0.054
31	1/12/2002	15:27	73.6	29.32	6	106.0	5.40	1526.12	11.09	1.27	2.02	1528.0	0.054
32	1/13/2002	15:23	73.6	29.32	6	104.2	5.42	1531.54	12.12	1.27	2.02	1533.4	0.054
33	1/14/2002	15:16	73.3	29.44	4	107.2	3.61	1535.15	13.07	1.27	2.03	1537.0	0.054
34	1/15/2002	14:44	74.0	29.44	4	108.4	3.60	1538.75	13.94	1.28	2.03	1540.7	0.054
35	1/16/2002	15:45	74.2	29.74	0	106.8	0.00	1538.75	14.81	1.28	2.03	1540.7	0.054
36	1/18/2002	15:58	73.7	29.65	2	106.9	1.82	1540.57	16.35	1.28	2.04	1542.5	0.054
37	1/19/2002	16:18	73.2	29.38	6	107.0	5.41	1545.98	17.08	1.28	2.04	1547.9	0.055
38	1/20/2002	16:35	76.8	29.65	0	107.9	0.00	1545.98	17.78	1.28	2.04	1547.9	0.055
39	1/22/2002	17:08	73.4	29.85	0	108.6	0.00	1545.98	19.10	1.28	2.04	1547.9	0.055
40	1/24/2002	18:38	73.4	29.23	10	107.9	8.95	1554.93	20.35	1.29	2.05	1556.9	0.055
41	1/25/2002	18:03	73.5	29.74	0	108.2	0.00	1554.93	20.92	1.29	2.05	1556.9	0.055
42	1/29/2002	17:46	72.9	29.53	2	107.5	1.81	1556.74	23.09	1.29	2.06	1558.7	0.055
43	1/31/2002	18:03	74.1	29.65	0	107.3	0.00	1556.74	24.12	1.29	2.06	1558.7	0.055
44	2/2/2002	17:24	73.6	29.88	0	106.4	0.00	1556.74	25.08	1.29	2.06	1558.7	0.055
45	2/4/2002	17:45	74.3	29.53	6	108.0	5.42	1562.16	26.02	1.30	2.06	1564.2	0.055
46	2/6/2002	16:11	73.8	29.71	0	107.9	0.00	1562.16	26.90	1.30	2.06	1564.2	0.055
47	2/8/2002	16:58	73.9	29.56	0	106.5	0.00	1562.16	27.79	1.30	2.06	1564.2	0.055
48	2/10/2002	18:12	73.9	29.38	4	107.0	3.60	1565.77	28.67	1.30	2.07	1567.8	0.055
49	2/12/2002	17:46	72.7	29.38	6	108.3	5.39	1571.16	29.48	1.30	2.08	1573.3	0.056
50	2/14/2002	18:06	74.1	29.85	0	104.9	0.00	1571.16	30.29	1.30	2.08	1573.3	0.056
51	2/16/2002	17:17	73.0	29.26	12	104.2	10.82	1581.98	31.06	1.31	2.09	1584.1	0.056
52	2/18/2002	17:05	73.6	29.83	1	107.5	0.91	1582.90	31.82	1.31	2.09	1585.0	0.056
53	2/20/2002	16:57	73.1	29.32	1	105.3	0.90	1583.80	32.56	1.31	2.09	1585.9	0.056
54	2/22/2002	17:55	73.3	29.56	0	107.1	0.00	1583.80	33.31	1.31	2.09	1585.9	0.056
55	2/25/2002	15:41	73.1	29.56	0	104.7	0.00	1583.80	34.34	1.31	2.09	1585.9	0.056
56	3/1/2002	16:36	73.2	29.94	0	102.4	0.00	1583.80	35.72	1.31	2.09	1585.9	0.056


Devon SFS #9-1
CAN LA-3-01-15
Cumulative Desorbed Volume (cc)
2000
1600
1200
800
400
0
-400
-800
-1200
-1600
-2000
-2400
-2800
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
Square Root of Time (hr)

Appendix 4. High Pressure Methane and Carbon Dioxide Adsorption Analyses

This Appendix is reproduced and edited from the laboratory report provided to the USGS by R.M.B Earth Science Consultants, Ltd.

Tables

Appendix 4, Table 1a. Devon SFS Operating Co Etal 5 no. 1 isotherm sample intervals and temperatures
Appendix 4, Table 1b. Devon SFS Operating Co Etal 9 no. 1 isotherm sample intervals and temperatures

Raw data

5-1A CH_4 at 97°F (Imperial units)……
5-1A CH_4 at 97°F (SI units)……
5-1A CO_2 at 97°F (Imperial units)……
5-1A CO_2 at 97°F (SI units)……
4-LA-1 CH_4 at 97°F (Imperial units)……
4-LA-1 CH_4 at 97°F (SI units)……
4-LA-1 CO_2 at 97°F (Imperial units)……
4-LA-1 CO_2 at 97°F (SI units)……
5-1B CH_4 at 108°F (Imperial units)……
5-1B CH_4 at 108°F (SI units)……
5-1B CO_2 at 108°F (Imperial units)……
5-1B CO_2 at 108°F (SI units)……
4-LA-2 CH_4 at 118°F (Imperial units)……
4-LA-2 CH_4 at 118°F (SI units)……
4-LA-2 CO_2 at 118°F (Imperial units)……
4-LA-2 CO_2 at 118°F (SI units)……
5-1C CH_4 at 118°F (Imperial units)……
5-1C CH_4 at 118°F (SI units)……
5-1C CO_2 at 118°F (Imperial units)……
5-1C CO_2 at 118°F (SI units)……
9-1A CH_4 at 97°F (Imperial units)……
9-1A CH_4 at 97°F (SI units)……
9-1B CH_4 at 108°F (Imperial units)……
9-1B CH_4 at 108°F (SI units)……
4-LA-8 CH_4 at 108°F (Imperial units)……
4-LA-8 CH_4 at 108°F (SI units)……
4-LA-8 CO_2 at 108°F (Imperial units)……
4-LA-8 CO_2 108°F (SI units)……
9-1C CH_4 at 108°F (Imperial units)……
9-1C CH_4 at 108°F (SI units)……
9-1D CH_4 at 108°F (Imperial units)……
9-1D CH_4 at 108°F (SI units)……

Appendix 4, Table 1a. Devon SFS Operating Co Etal 5 no. 1 isotherm sample intervals and temperatures.

Sample number	Sample type	Core run	Field depth From (ft)	Field depth To (ft)	Corrected depth From (ft)	Corrected depth To (ft)	Field Thickness (ft)	Corrected Thickness (ft)	Sample descriptions (field depths in ft)	Composite CH_4 isotherm sample number	Composite CO_2 isotherm sample number	Core CH_4 isotherm sample number	Core CO_2 isotherm sample number	Isotherm Temperature (^oF)
			1665.0		**1671.0**				**Top of core #1**					
			1665.0	1679.2	1671.0	1685.2	14.2	14.2	Rock					
	Cuttings	1	1679.2	1680.2	1685.2	1686.2	1.0	1.0	Coal core cuttings, not desorbed					
LA-SWC-01-3	Cuttings	1	1681.0	1692.0	1686.2	1696.0	11.0	9.8	Coal core cuttings, composite 1686.2'-1696'					
4-LA-1		1	1679.2	1680.2	1685.2	1686.2	1.0	1.0	Coal core, shaley	5-1A	5-1A	4-LA-1	4-LA-1	97
	Not sampled	1	1680.2	1680.6	1686.2	1686.6	0.4	0.4	Coal, not sampled					
TICORA 201-1		1	1680.6	1681.6	1686.6	1687.6	1.0	1.0	Coal core	5-1A	5-1A			97
TICORA 201-2		1	1681.6	1682.6	1687.6	1688.6	1.0	1.0	Coal core	5-1A	5-1A			97
TICORA 201-3		1	1682.6	1683.6	1688.6	1689.6	1.0	1.0	Coal core	5-1A	5-1A			97
	Not sampled	1	1683.6	1685.4	1689.6	1692.4	1.8	2.8	Rock?, not sampled					
TICORA 201-4		1	1685.4	1686.4	1692.4	1693.4	1.0	1.0	Coal core	5-1A	5-1A			97
USGS 1.1,1.2,1.3		1	1686.4	1687.8	1693.4	1696.0	1.4	2.6	Solid coal core & broken pieces, not desorbed, USGS sample					
			1687.8	1695.0	1696.0	1701.0	7.2	5.0	Rock					
				1695.0		**1701.0**			**Base of core #1**					
3-LA-8	Cuttings	non-core	2033.0	2035.0	2039.0	2042.0	2.0	3.0	Coal cuttings from non-cored interval					
			2236.0		**2240.0**				**Top of core #2**					
			2236.0	2240.2	2240.0	2244.2	4.2	4.2	Rock					
LA-SWC-00-3	Cuttings	2	2240.2	2243.2	2244.2	2247.2	3.0	3.0	Coal core cuttings					
LA-3-01-73	Core	2	2240.2	2243.2	2244.2	2247.2	3.0	3.0	Coal core, broken pieces, composite 2244.2'-2247.2'					
TICORA 201-5	Core	2	2240.2	2241.2	2244.2	2245.2	1.0	1.0	Coal core	5-1B	5-1B			108
TICORA 201-6	Core	2	2241.2	2242.2	2245.2	2246.2	1.0	1.0	Coal core	5-1B	5-1B			108
TICORA 201-7	Core	2	2242.2	2243.2	2246.2	2247.2	1.0	1.0	Coal core	5-1B	5-1B			108
TICORA 201-8	Core	2	2243.2	2244.2	2247.2	2248.2	1.0	1.0	Clay and carbonaceous shale core					
			2244.2	2252.0	2248.2	2256.0	7.8	7.8	Rock					
				2252.0		**2256.0**			**Base of core #2**					
			2668.0		**2673.0**				**Top of core #3**					
		3	2668.0	2669.6	2673.0	2674.6	1.6	1.6	Rock					
LA-3-01-74	Cuttings	3	2668.0	2684.0	2673.0	2689.0	16.0	16.0	Coal core cuttings					
TICORA 201-9	Core	3	2669.6	2670.6	2674.6	2675.6	1.0	1.0	Coal core	5-1C	5-1C			118
USGS 2	Core	3	2670.6	2671.4	2675.6	2676.4	0.8	0.8	Coal core, broken pieces, not desorbed, USGS sample					
	Not sampled	3	2671.4	2671.6	2676.4	2676.6	0.2	0.2	Coal, not sampled					
4-LA-6	Core	3	2671.6	2672.6	2676.6	2677.6	1.0	1.0	Coal core	5-1C	5-1C			118
	Not sampled	3	2672.6	2673.0	2677.6	2678.0	0.4	0.4	Coal, not sampled					
TICORA 201-10	Core	3	2673.0	2674.0	2678.0	2679.0	1.0	1.0	Coal core	5-1C	5-1C			118
4-LA-2	Core	3	2674.0	2675.0	2679.0	2680.0	1.0	1.0	Coal core, blocky, cleated	5-1C	5-1C	4-LA-2	4-LA-2	118
TICORA 201-11	Core	3	2675.0	2676.0	2680.0	2681.0	1.0	1.0	Coal core	5-1C	5-1C			118
	Not sampled	3	2676.0	2676.7	2681.0	2681.7	0.7	0.7	Coal, not sampled					
USGS 3	Core	3	2676.7	2677.5	2681.7	2682.5	0.8	0.8	Coal core, broken pieces, not desorbed, USGS sample					
TICORA 201-12	Core	3	2677.5	2678.5	2682.5	2683.5	1.0	1.0	Coal core	5-1C	5-1C			118
4-LA-4	Core	3	2678.5	2679.5	2683.5	2684.5	1.0	1.0	Coal core	5-1C	5-1C			118
TICORA 201-13	Core	3	2679.5	2680.5	2684.5	2685.5	1.0	1.0	Coal core	5-1C	5-1C			118
TICORA 201-14	Core	3	2680.5	2681.5	2685.5	2686.5	1.0	1.0	Coal core	5-1C	5-1C			118
TICORA 201-15	Core	3	2681.5	2682.5	2686.5	2687.5	1.0	1.0	Coal core	5-1C	5-1C			118
TICORA 201-16	Core	3	2682.5	2683.5	2687.5	2688.5	1.0	1.0	Coal core	5-1C	5-1C			118
		3	2683.5	2684.0	2688.5	2689.0	0.5	0.5	Rock					
				2684.0		**2689.0**			**Base of core #3**					

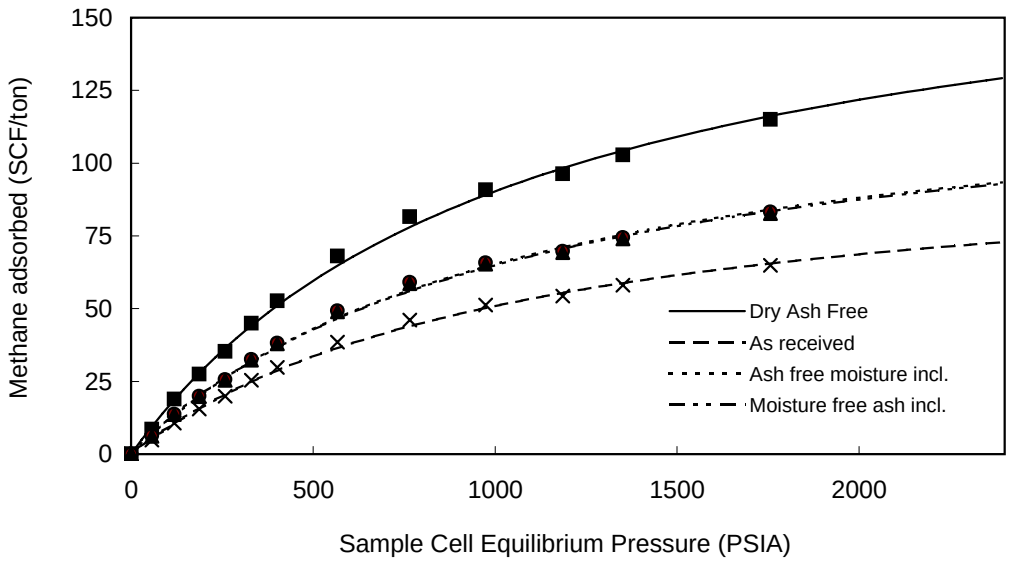
Corrected depths and thicknesses based on e-log picks; carb sh = carbonaceous shale.

Appendix 4, Table 1b. Devon SFS Operating Co Etal 9 no. 1 isotherm sample intervals and temperatures.

Sample number	Sample type	Core run	Field depth From (ft)	Field depth To (ft)	Corrected depth From (ft)	Corrected depth To (ft)	Field Thickness (ft)	Corrected Thickness (ft)	Sample descriptions (field depths in ft)	Composite CH_4 isotherm sample number	Composite CO_2 isotherm sample number	Core CH_4 isotherm sample number	Core CO_2 isotherm sample number	Isotherm Temperature (°F)
			1665.0		**1671.0**				**Top of core #1**					
			1665.0	1679.2	1671.0	1685.2	14.2	14.2	Rock					
	Cuttings	1	1679.2	1680.2	1685.2	1686.2	1.0	1.0	Coal core cuttings, not desorbed	9-1A				97
LA-SWC-01-3	Cuttings	1	1681.0	1692.0	1686.2	1696.0	11.0	9.8	Coal core cuttings, composite 1686.2'-1696'	9-1A				97
4-LA-1		1	1679.2	1680.2	1685.2	1686.2	1.0	1.0	Coal core, shaley	9-1A				97
	Not sampled	1	1680.2	1680.6	1686.2	1686.6	0.4	0.4	Coal, not sampled					
TICORA 201-1		1	1680.6	1681.6	1686.6	1687.6	1.0	1.0	Coal core					
TICORA 201-2		1	1681.6	1682.6	1687.6	1688.6	1.0	1.0	Coal core					
TICORA 201-3		1	1682.6	1683.6	1688.6	1689.6	1.0	1.0	Coal core					
	Not sampled	1	1683.6	1685.4	1689.6	1692.4	1.8	2.8	Rock?, not sampled					
TICORA 201-4		1	1685.4	1686.4	1692.4	1693.4	1.0	1.0	Coal core					
USGS 1.1,1.2,1.3		1	1686.4	1687.8	1693.4	1696.0	1.4	2.6	Solid coal core & broken pieces, not desorbed, USGS sample					
			1687.8	1695.0	1696.0	1701.0	7.2	5.0	Rock	9-1B				108
				1695.0		**1701.0**			**Base of core #1**	9-1B				
3-LA-8	Cuttings	non-core	2033.0	2035.0	2039.0	2042.0	2.0	3.0	Coal cuttings from non-cored interval	9-1B				108
										9-1B				108
			2236.0		**2240.0**				**Top of core #2**	9-1B				108
			2236.0	2240.2	2240.0	2244.2	4.2	4.2	Rock					
LA-SWC-00-3	Cuttings	2	2240.2	2243.2	2244.2	2247.2	3.0	3.0	Coal core cuttings					
LA-3-01-73	Core	2	2240.2	2243.2	2244.2	2247.2	3.0	3.0	Coal core, broken pieces, composite 2244.2'-2247.2'					
TICORA 201-5	Core	2	2240.2	2241.2	2244.2	2245.2	1.0	1.0	Coal core					
TICORA 201-6	Core	2	2241.2	2242.2	2245.2	2246.2	1.0	1.0	Coal core					
TICORA 201-7	Core	2	2242.2	2243.2	2246.2	2247.2	1.0	1.0	Coal core	9-1C		4-LA-8	4-LA-8	108
TICORA 201-8	Core	2	2243.2	2244.2	2247.2	2248.2	1.0	1.0	Clay and carbonaceous shale core	9-1C				
			2244.2	2252.0	2248.2	2256.0	7.8	7.8	Rock					
				2252.0		**2256.0**			**Base of core #2**	9-1C				108
										9-1C				108
			2668.0		**2673.0**				**Top of core #3**	9-1C				108
		3	2668.0	2669.6	2673.0	2674.6	1.6	1.6	Rock	9-1C				108
LA-3-01-74	Cuttings	3	2668.0	2684.0	2673.0	2689.0	16.0	16.0	Coal core cuttings	9-1C				108
TICORA 201-9	Core	3	2669.6	2670.6	2674.6	2675.6	1.0	1.0	Coal core					
USGS 2	Core	3	2670.6	2671.4	2675.6	2676.4	0.8	0.8	Coal core, broken pieces, not desorbed, USGS sample					
	Not sampled	3	2671.4	2671.6	2676.4	2676.6	0.2	0.2	Coal, not sampled					
4-LA-6	Core	3	2671.6	2672.6	2676.6	2677.6	1.0	1.0	Coal core					
	Not sampled	3	2672.6	2673.0	2677.6	2678.0	0.4	0.4	Coal, not sampled					
TICORA 201-10	Core	3	2673.0	2674.0	2678.0	2679.0	1.0	1.0	Coal core					
4-LA-2	Core	3	2674.0	2675.0	2679.0	2680.0	1.0	1.0	Coal core, blocky, cleated					
TICORA 201-11	Core	3	2675.0	2676.0	2680.0	2681.0	1.0	1.0	Coal core	9-1D				118
	Not sampled	3	2676.0	2676.7	2681.0	2681.7	0.7	0.7	Coal, not sampled					
USGS 3	Core	3	2676.7	2677.5	2681.7	2682.5	0.8	0.8	Coal core, broken pieces, not desorbed, USGS sample	9-1D				118
TICORA 201-12	Core	3	2677.5	2678.5	2682.5	2683.5	1.0	1.0	Coal core	9-1D				118
4-LA-4	Core	3	2678.5	2679.5	2683.5	2684.5	1.0	1.0	Coal core	9-1D				118
TICORA 201-13	Core	3	2679.5	2680.5	2684.5	2685.5	1.0	1.0	Coal core	9-1D				118
TICORA 201-14	Core	3	2680.5	2681.5	2685.5	2686.5	1.0	1.0	Coal core	9-1D				118
TICORA 201-15	Core	3	2681.5	2682.5	2686.5	2687.5	1.0	1.0	Coal core	9-1D				118
TICORA 201-16	Core	3	2682.5	2683.5	2687.5	2688.5	1.0	1.0	Coal core	9-1D				118
		3	2683.5	2684.0	2688.5	2689.0	0.5	0.5	Rock	9-1D				118
				2684.0		**2689.0**			**Base of core #3**	9-1D				118

Corrected depths and thicknesses based on e-log picks; carb sh = carbonaceous shale.

5-1A Methane



Pressure (PSIA)	Adsorbed gas (ft^3 /ton)			
	As Received	moisture free ash incl.	ash free moisture incl.	Dry Ash Free
57	4.8	6.2	6.2	8.6
119	10.7	13.6	13.7	18.9
188	15.5	19.8	19.9	27.5
259	19.9	25.4	25.6	35.3
330	25.4	32.3	32.6	45.0
401	29.7	37.9	38.2	52.7
567	38.4	49.0	49.3	68.1
766	46.0	58.7	59.1	81.6
974	51.2	65.3	65.7	90.8
1186	54.3	69.2	69.7	96.3
1352	58.0	74.0	74.5	102.9
1756	64.9	82.7	83.2	115.0

Langmuir Parameters

	As Received	Moisture free ash incl	Ash free moisture incl	Dry Ash Free
Vol. (ft^3 /ton)	105.4	134.4	135.3	186.9
Pressure (PSIA)	1068.8	1068.8	1068.8	1068.8

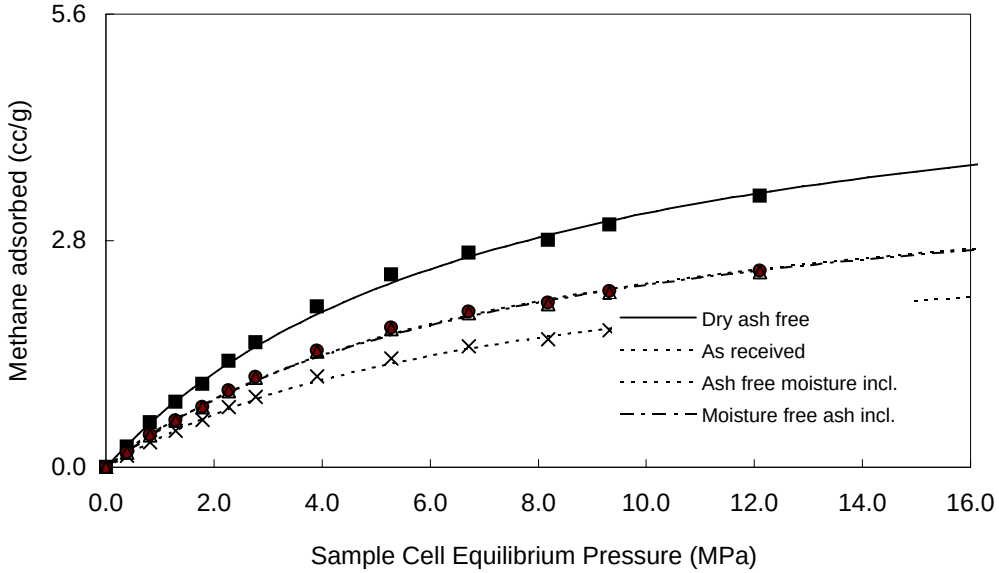
SUMMARY OF ADSORPTION ANALYSES IMP. UNITS

Isotherm Temperature: 97.0 ºF

Goodness of fit of Langmuir regression: 0.99

% Ash= 22.05 % Moisture= 21.52 Density g/cc 1.545

5-1A Methane



Pressure (MPa)	Adsorbed gas (cc/g)			
	As Received	Moisture free ash incl.	ash free moisture incl	Dry Ash Free
0.395	0.14	0.18	0.18	0.25
0.820	0.31	0.40	0.40	0.56
1.293	0.46	0.58	0.59	0.81
1.784	0.59	0.75	0.75	1.04
2.277	0.75	0.95	0.96	1.32
2.768	0.87	1.11	1.12	1.55
3.911	1.13	1.44	1.45	2.00
5.280	1.35	1.72	1.74	2.40
6.717	1.51	1.92	1.93	2.67
8.179	1.60	2.03	2.05	2.83
9.319	1.71	2.17	2.19	3.02
12.109	1.91	2.43	2.45	3.38

Langmuir Parameters

	As Received	Moisture free ash incl.	Ash free moisture incl	Dry Ash Free
Vol. (cc/g)	3.10	3.95	3.98	5.49
Pressure (MPa)	7.37	7.37	7.37	7.37

SUMMARY OF ADSORPTION ANALYSES SI UNITS

Isotherm Temperature: **36.1 ºC**

Goodness of fit of Langmuir regression: **0.99**

% Ash= 22.05 **% Moisture = 21.52** **Density (g/cc) 1.545**

5-1A Methane

Methane Adsorption
(Imperial Units)

Summary of Analyses		
	As Received	DAF basis
Langmuir Volume (SCF)	105	187
Langmuir Pressure (PSIA)	1069	1069
Goodness of fit Langmuir Equation R-squared	0.99	0.99
Ash Content Wt.%	22.05	22.05
Equilibrium Moisture Wt.%	21.52	21.52

Contents of Appendix

data sheets	***Charts***
As Received	As Received
Dry Ash Free	Dry Ash Free
Dry Ash Included	Dry Ash Included
Moist Ash Free	Moist Ash Free

5-1A Methane

GAS ADSORPTION ISOTHERM IMPERIAL UNITS

AS RECEIVED BASIS

		Moisture Content % :	21.52
Isotherm Temperature º F:	97.0	Ash Content, % :	22.05
Gas used:	Methane	Helium Density g/cc	1.545

PRESSURE (PSI)	ADSORBED GAS (SCF/ton)	P / V
57	4.85	11.81
119	10.68	11.13
188	15.53	12.08
259	19.95	12.97
330	25.38	13.01
401	29.75	13.50
567	38.44	14.76
766	46.03	16.64
974	51.25	19.01
1186	54.33	21.83
1352	58.04	23.29
1756	64.89	27.07

Saturated Monolayer Volume (SCF/ton):	105.4
Langmuir Pressure (PSIA):	1068.8
Correlation Coefficient:	0.9886

DRY ASH FREE BASIS

57	8.59	6.67
119	18.93	6.28
188	27.52	6.82
259	35.35	7.32
330	44.98	7.34
401	52.72	7.62
567	68.11	8.33
766	81.57	9.39
974	90.82	10.73
1186	96.28	12.32
1352	102.85	13.14
1756	114.99	15.27

Saturated Monolayer Volume (SCF/ton, daf):	187
Langmuir Pressure (PSIA):	1069
Correlation Coefficient:	0.9886

5-1A Methane

GAS ADSORPTION ISOTHERM IMPERIAL UNITS

MOISTURE FREE ASH INCLUDED

		Moisture Content % :	21.52
Isotherm Temperature° F:	97.0	Ash Content, % :	22.05
Gas used:	Methane	Helium Density g/cc	1.545

PRESSURE (PSI)	ADSORBED GAS (SCF/ton)	P / V
57	6	9.27
119	14	8.73
188	20	9.48
259	25	10.18
330	32	10.21
401	38	10.59
567	49	11.58
766	59	13.06
974	65	14.92
1186	69	17.13
1352	74	18.28
1756	83	21.24

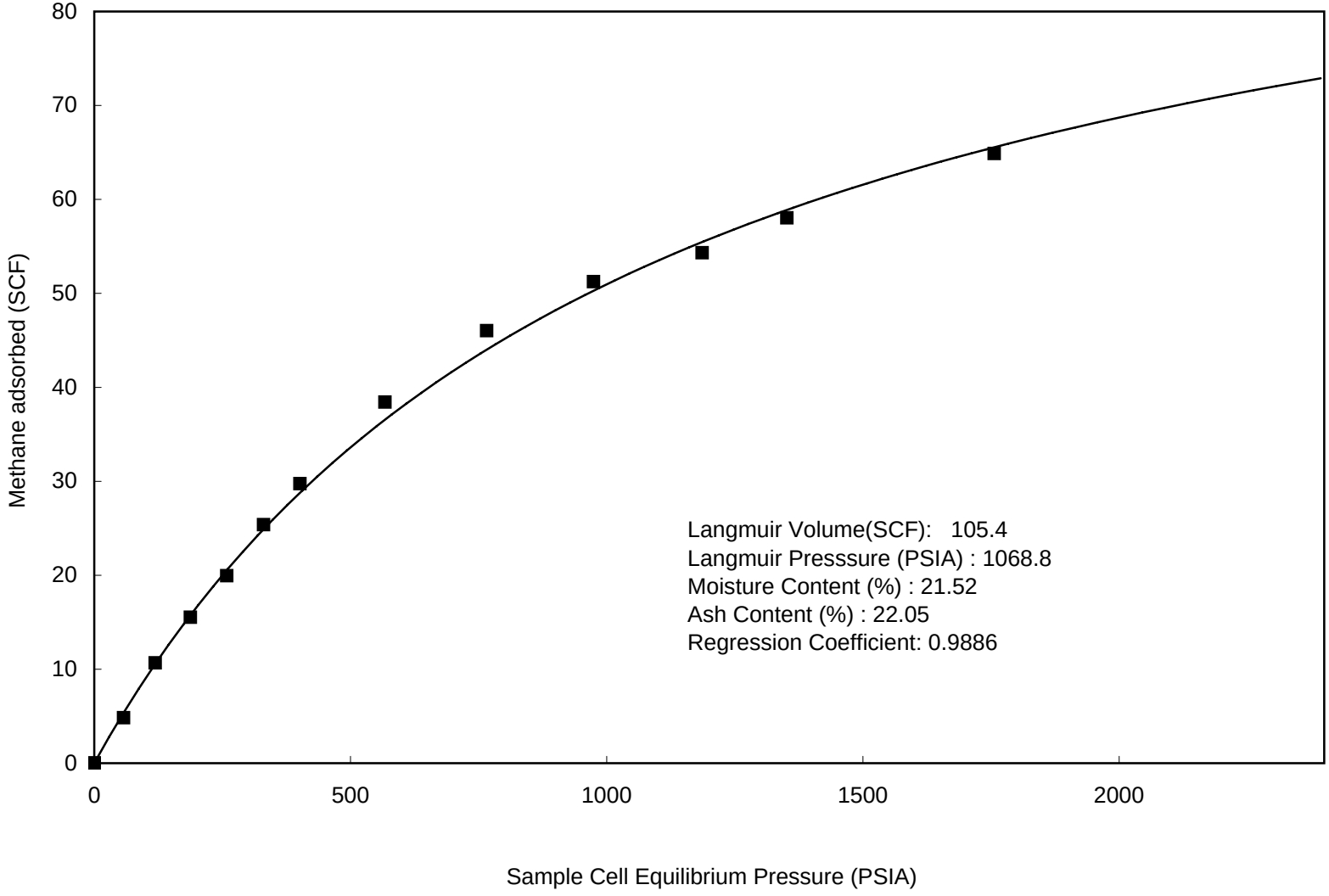
Saturated Monolayer Volume (SCF/ton):	134
Langmuir Pressure (PSIA):	1069
Correlation Coefficient:	0.9886

ASH FREE MOISTURE INCLUDED

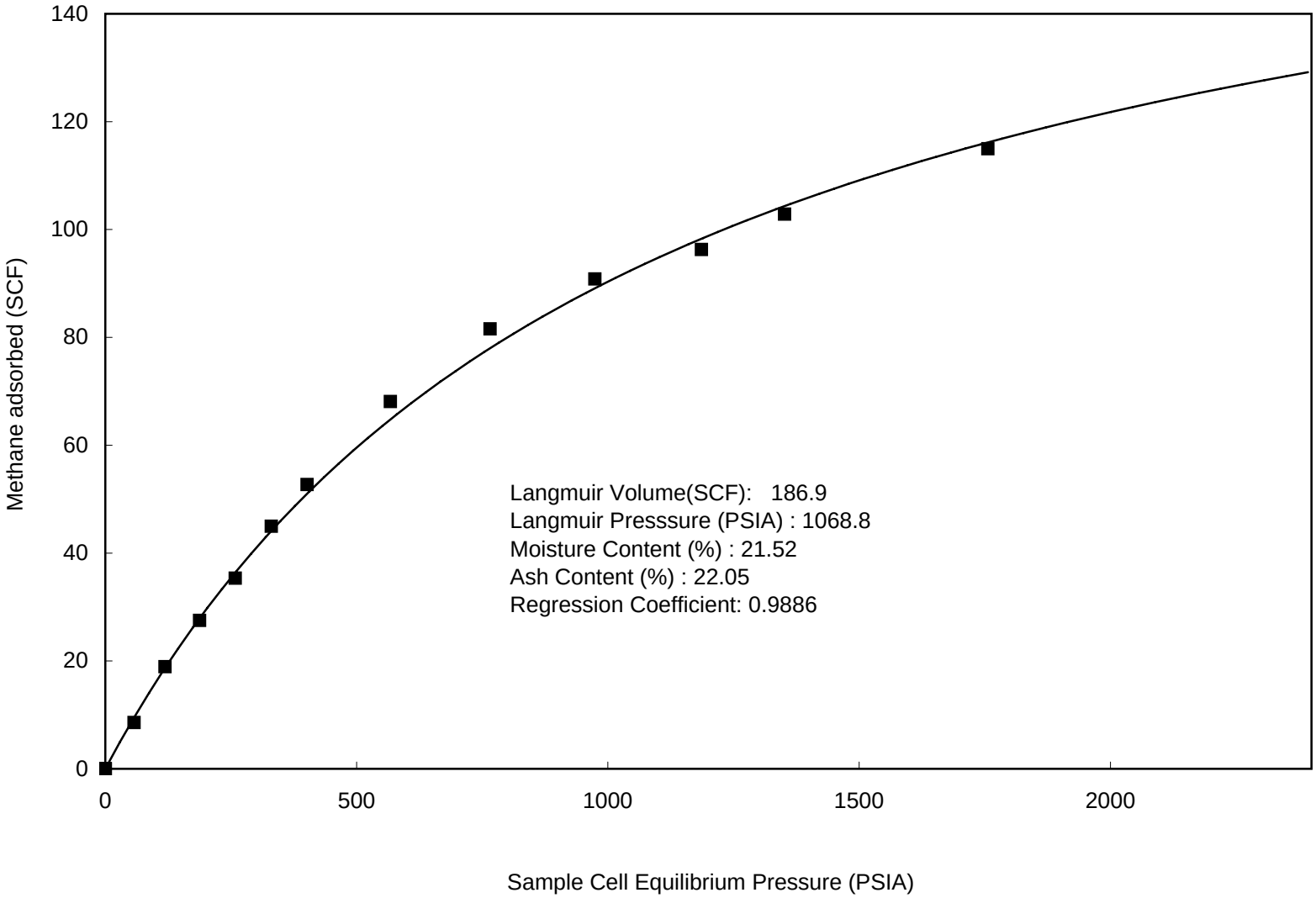
57	6	9.21
119	14	8.67
188	20	9.42
259	26	10.11
330	33	10.14
401	38	10.52
567	49	11.50
766	59	12.97
974	66	14.82
1186	70	17.02
1352	74	18.15
1756	83	21.10

Saturated Monolayer Volume (SCF/ton):	135
Langmuir Pressure (PSIA):	1069
Correlation Coefficient:	0.9886

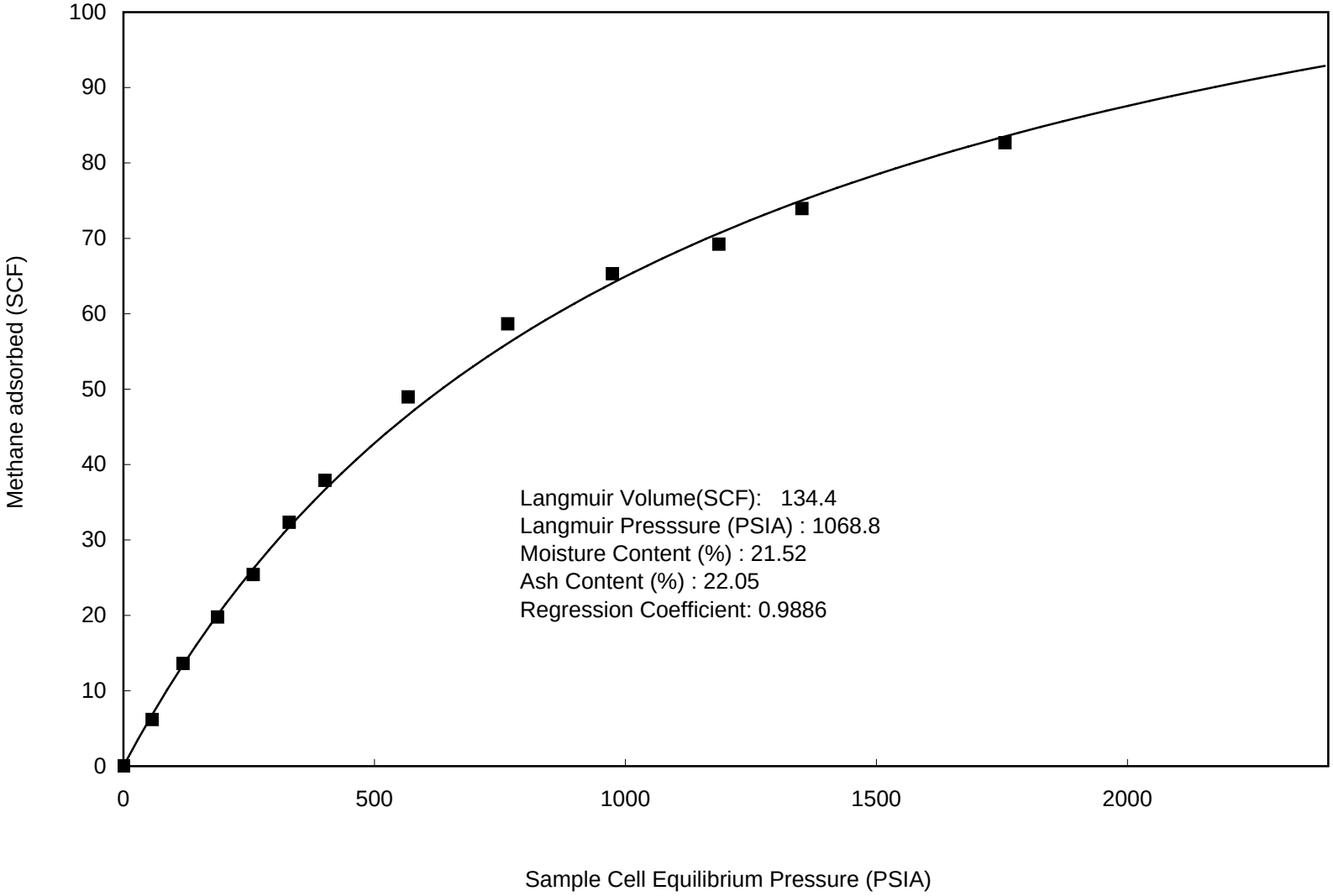
5-1A Methane (as received basis)



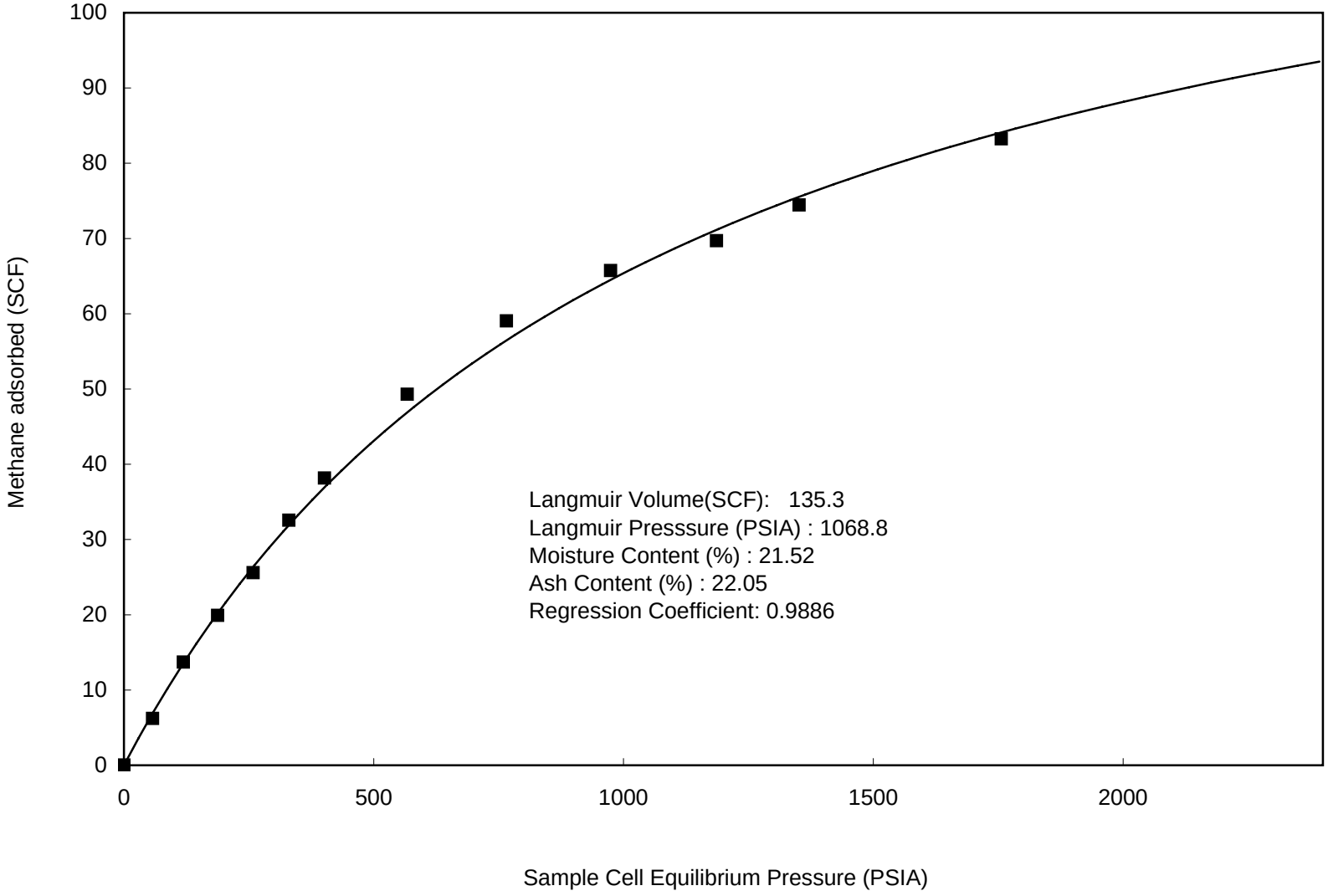
5-1A Methane (dry & ash free basis)

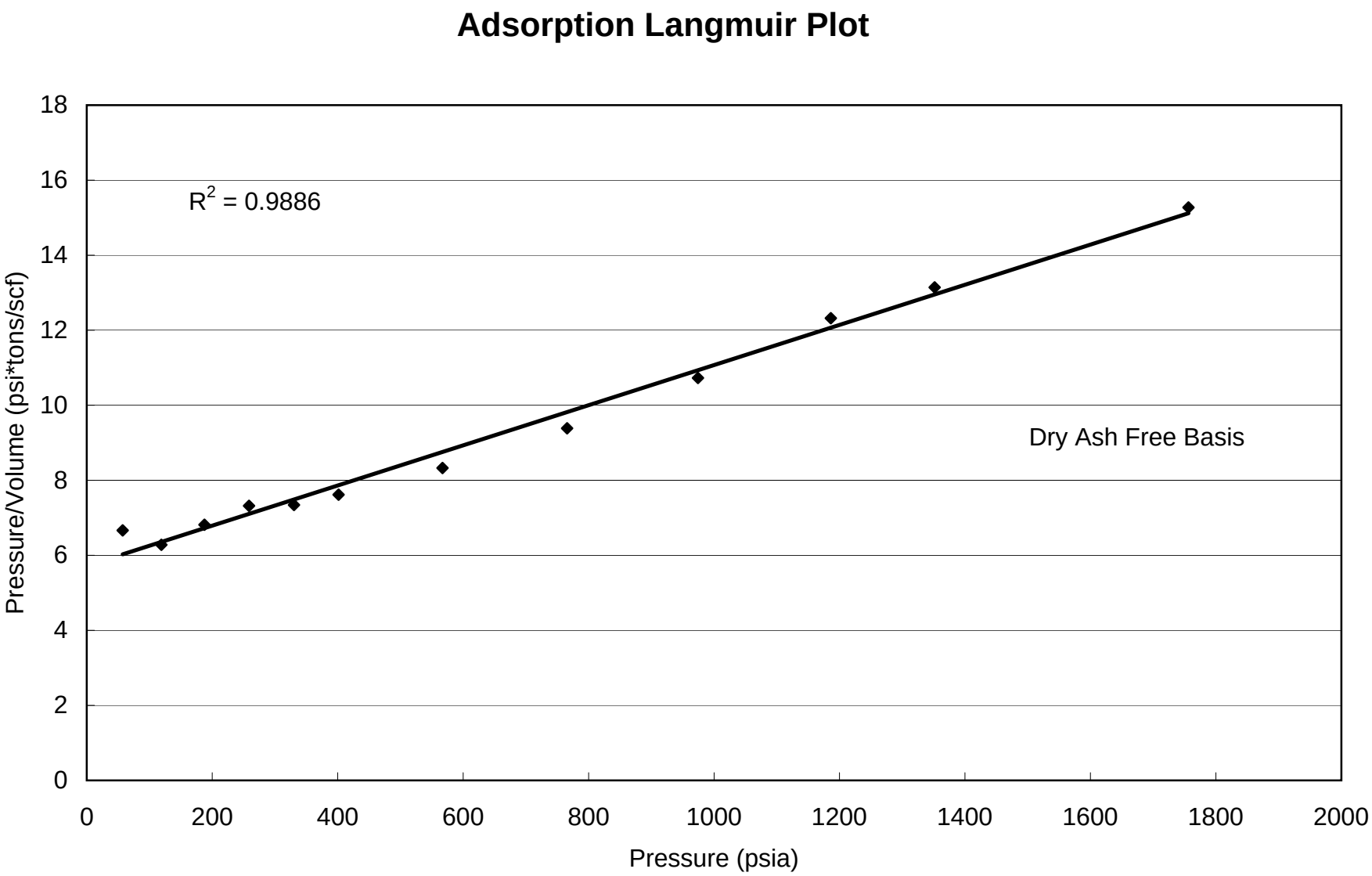


5-1A Methane (moisture free, ash included basis)



5-1A Methane (ash free, moisture included basis)




Adsorption Langmuir Plot
R2 = 0.9886
Dry Ash Free Basis
Pressure/Volume (psi*tons/scf)
Pressure (psia)
0
2
4
6
8
10
12
14
16
18
0
200
400
600
800
1000
1200
1400
1600
1800
2000

5-1A Methane

Methane Adsorption (SI Units)

Summary of Analyses		
	As Received	DAF basis
Langmuir Volume cc/g	3.10	5.49
Langmuir Pressure MPa	7.37	7.37
Goodness of fit Langmuir Equation R-squared	0.99	0.99
Ash Content Wt.%	22.05	22.05
Equilibrium Moisture Wt.%	21.52	21.52

Contents of Appendix

data sheets	***Charts***
As Received	As Received
Dry Ash Free	Dry Ash Free
Dry Ash Included	Dry Ash Included
Moist Ash Free	Moist Ash Free

5-1A Methane

GAS ADSORPTION ISOTHERM SI UNITS

AS RECEIVED BASIS

Sample I.D. :	5-1A Methane	Moisture Content (EQ) % :	21.52
Isotherm Temperature º C:	36.1	Ash Content % :	22.05
Gas used:	Methane	Helium Density g/cc	1.545

PRESSURE (MPa)	ADSORBED GAS (cc/g @STP)	P / V
0.395	0.14	2.771
0.820	0.31	2.611
1.293	0.46	2.834
1.784	0.59	3.043
2.277	0.75	3.053
2.768	0.87	3.166
3.911	1.13	3.462
5.280	1.35	3.903
6.717	1.51	4.460
8.179	1.60	5.122
9.319	1.71	5.463
12.109	1.91	6.350

Saturated Monolayer Volume (cc/g @ STP):	3.10
Langmuir Pressure (MPa):	7.37

DRY ASH FREE BASIS

0.395	0.25	1.564
0.820	0.56	1.473
1.293	0.81	1.599
1.784	1.04	1.717
2.277	1.32	1.723
2.768	1.55	1.787
3.911	2.00	1.954
5.280	2.40	2.202
6.717	2.67	2.517
8.179	2.83	2.890
9.319	3.02	3.083
12.109	3.38	3.583

Saturated Monolayer Volume (cc/g @ STP, daf):	5.49
Langmuir Pressure (MPa):	7.37
Correlation Coefficient:	0.9886

5-1A Methane

GAS ADSORPTION ISOTHERM SI UNITS

MOISTURE FREE ASH INCLUDED

		Moisture Content (EQ) % :	21.52
Isotherm Temperature º C:	36.1	Ash Content % :	22.05
Gas used:	Methane	Helium Density g/cc	1.545

PRESSURE (MPa)	ADSORBED GAS (cc/g@STP)	P / V
0.395	0.18	2.17
0.820	0.40	2.05
1.293	0.58	2.22
1.784	0.75	2.39
2.277	0.95	2.40
2.768	1.11	2.48
3.911	1.44	2.72
5.280	1.72	3.06
6.717	1.92	3.50
8.179	2.03	4.02
9.319	2.17	4.29
12.109	2.43	4.98

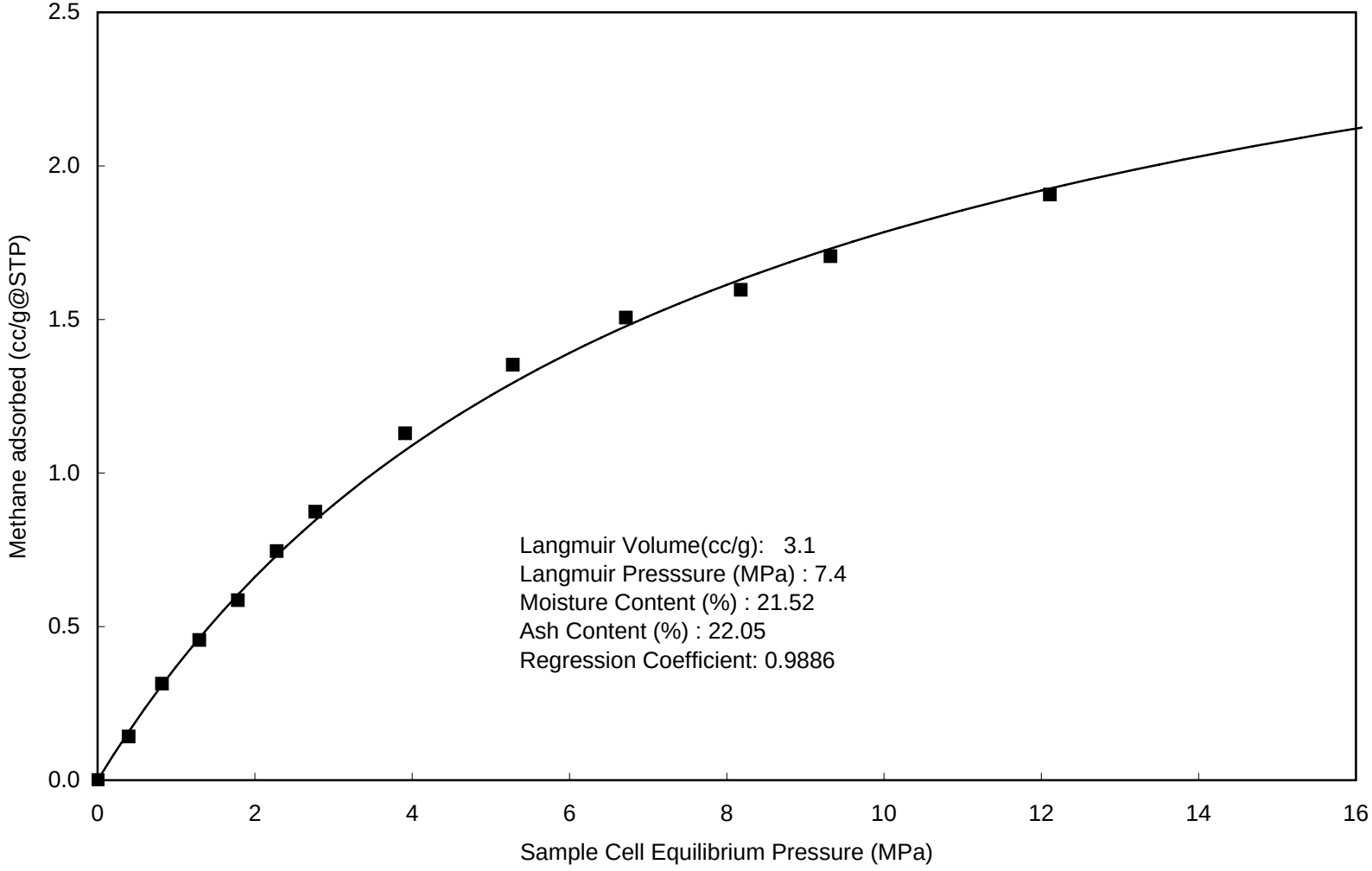
Saturated Monolayer Volume (cc/g):	3.95
Langmuir Pressure (MPa):	7.37

ASH FREE MOISTURE INCLUDED

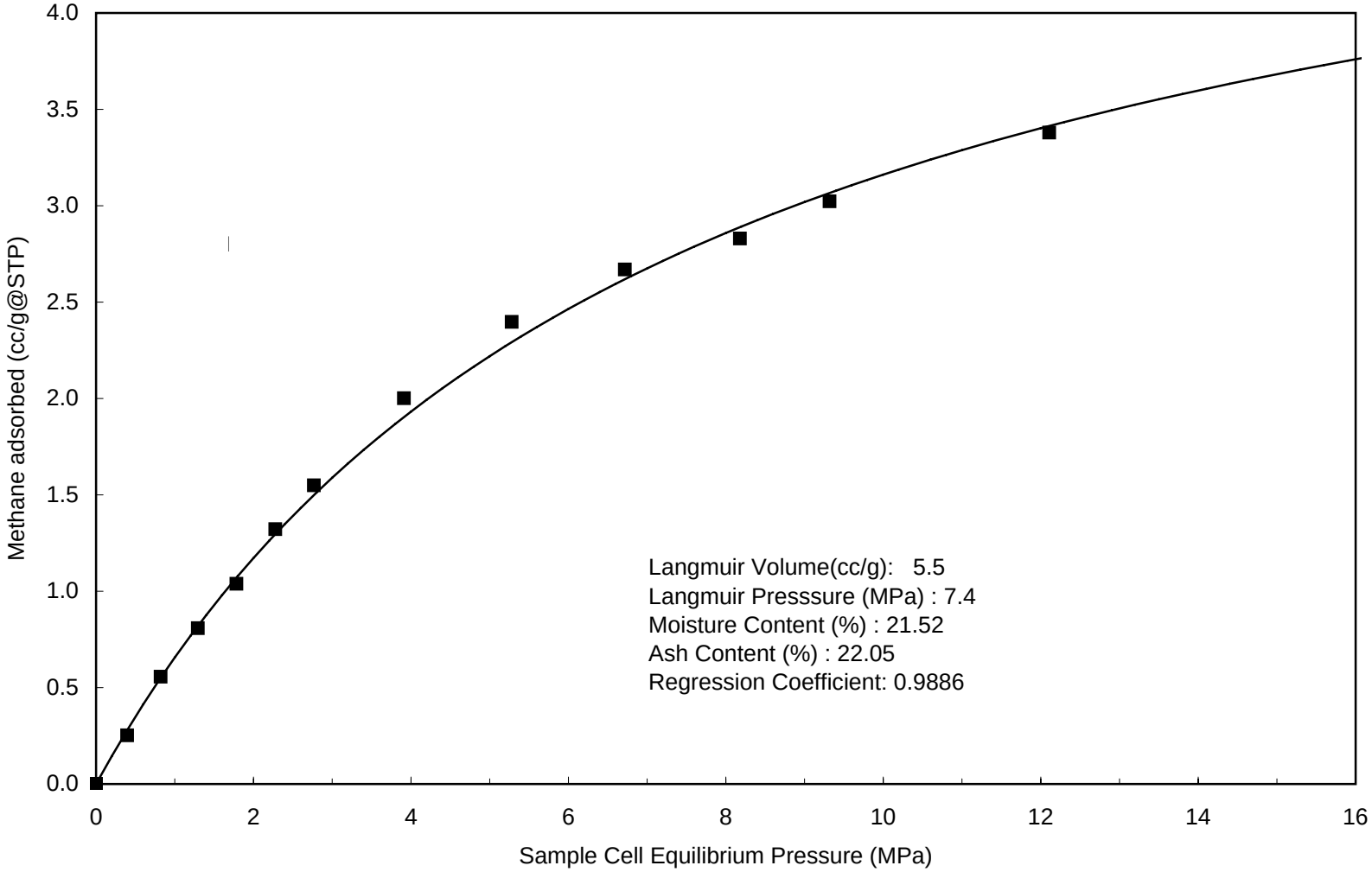
0.395	0.18	0.00
0.820	0.40	2.04
1.293	0.59	2.21
1.784	0.75	2.37
2.277	0.96	2.38
2.768	1.12	2.47
3.911	1.45	2.70
5.280	1.74	3.04
6.717	1.93	3.48
8.179	2.05	3.99
9.319	2.19	4.26
12.109	2.45	4.95

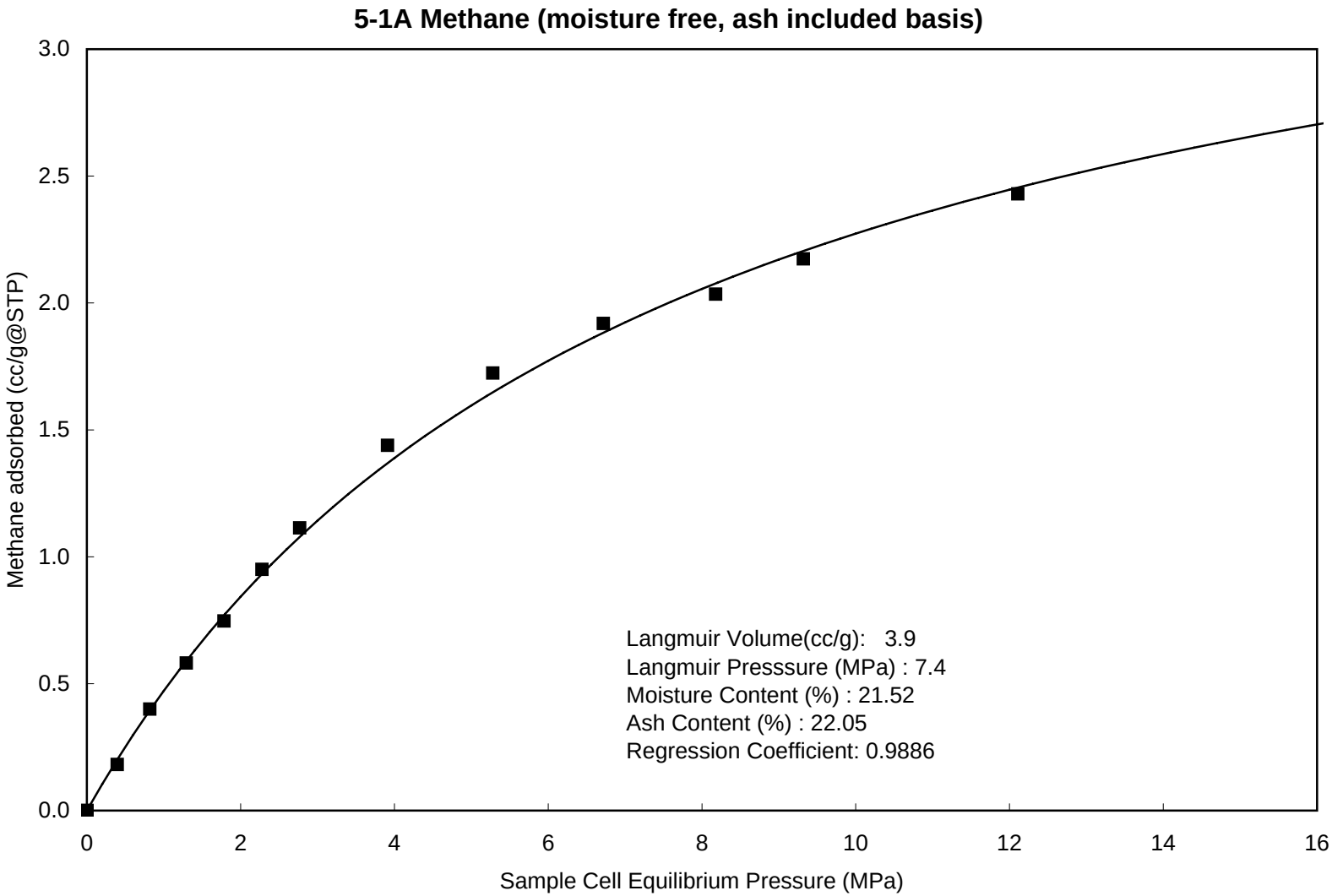
Saturated Monolayer Volume (cc/g, ash free):	3.98
Langmuir Pressure (MPa):	7.37
Correlation Coefficient:	0.9886

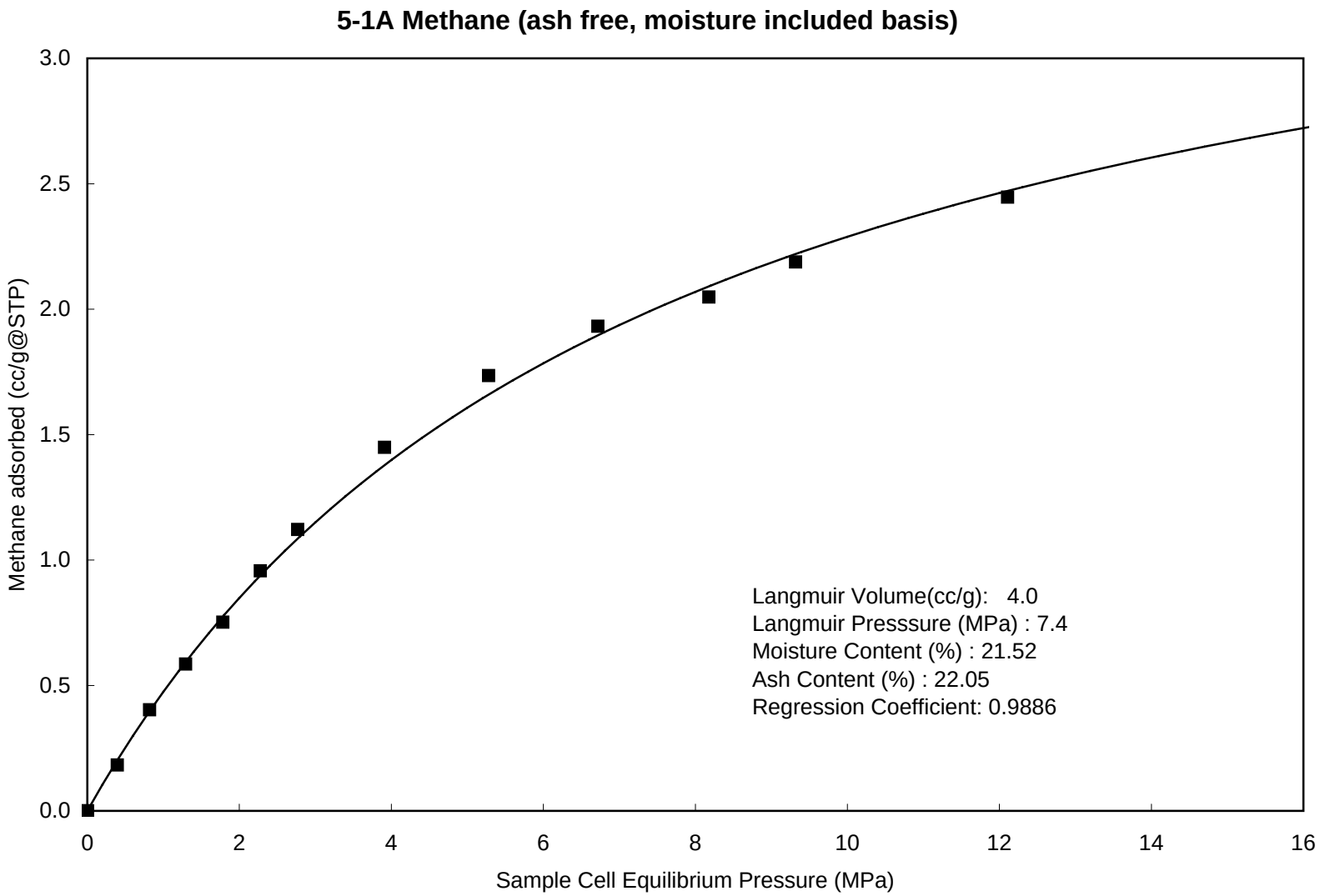
5-1A Methane (as received basis)

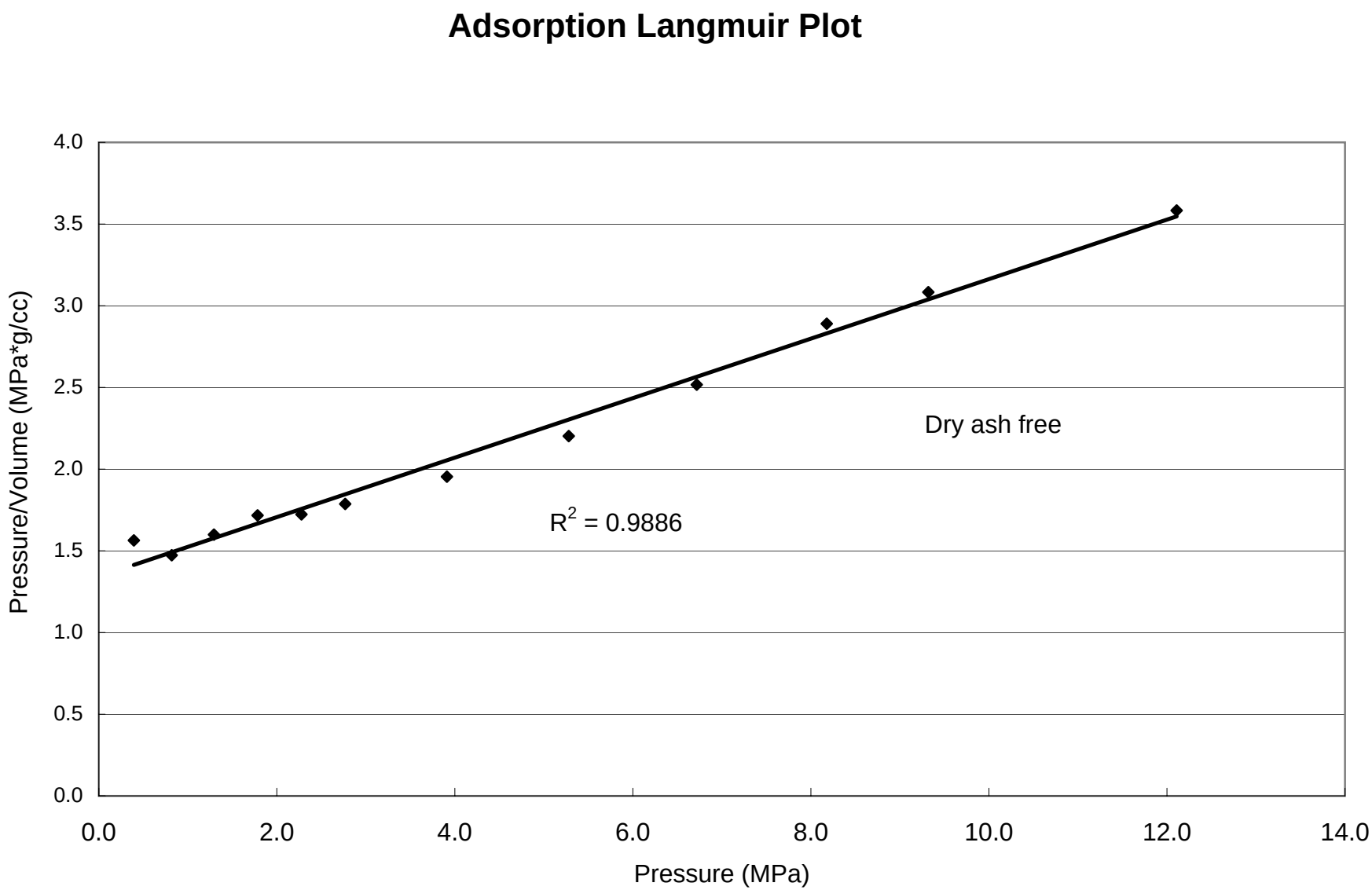


5-1A Methane (dry & ash free basis)

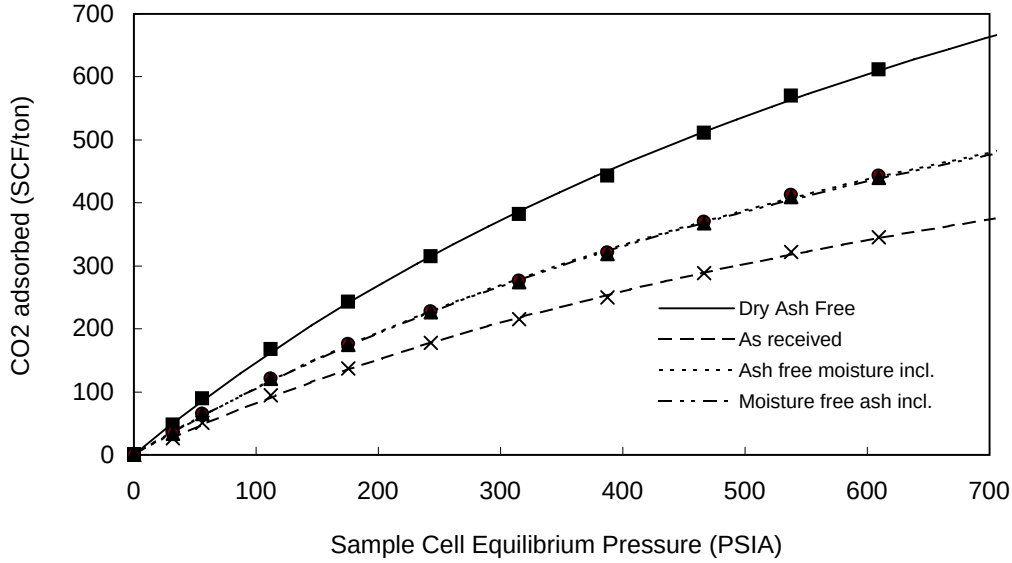



5-1A Methane (moisture free, ash included basis)
Methane adsorbed (cc/g@STP)
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0
2
4
6
8
10
12
14
16
Sample Cell Equilibrium Pressure (MPa)
Langmuir Volume(cc/g): 3.9
Langmuir Presssure (MPa) : 7.4
Moisture Content (%) : 21.52
Ash Content (%) : 22.05
Regression Coefficient: 0.9886


5-1A Methane (ash free, moisture included basis)
Methane adsorbed (cc/g@STP)
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0
2
4
6
8
10
12
14
16
Sample Cell Equilibrium Pressure (MPa)
Langmuir Volume(cc/g): 4.0
Langmuir Presssure (MPa) : 7.4
Moisture Content (%) : 21.52
Ash Content (%) : 22.05
Regression Coefficient: 0.9886


Adsorption Langmuir Plot
Pressure/Volume (MPa*g/cc)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
Pressure (MPa)
Dry ash free
R2 = 0.9886

5-1A Carbon Dioxide



Pressure (PSIA)	Adsorbed gas (ft^3 /ton)			
	As Received	moisture free ash incl.	ash free moisture incl.	Dry Ash Free
32	26.7	34.0	34.3	47.3
56	50.7	64.6	65.0	89.9
112	94.5	120.4	121.2	167.4
175	137.1	174.6	175.8	242.9
243	177.7	226.4	228.0	314.9
315	215.3	274.3	276.2	381.5
388	250.2	318.8	321.0	443.4
467	288.4	367.4	369.9	511.0
538	321.6	409.8	412.6	569.9
609	345.3	440.0	443.0	612.0

Langmuir Parameters

	As Received	Moisture free ash incl	Ash free moisture incl	Dry Ash Free
Vol. (ft^3 /ton)	901.4	1148.6	1156.4	1597.4
Pressure (PSIA)	986.4	986.4	986.4	986.4

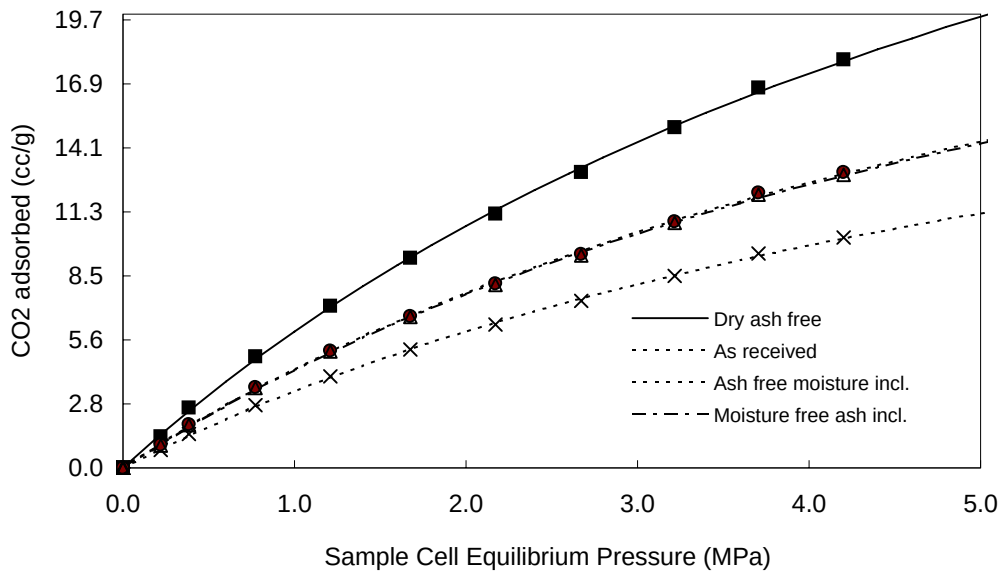
SUMMARY OF ADSORPTION ANALYSES IMP. UNITS

Isotherm Temperature: 97.0 ºF

Goodness of fit of Langmuir regression: 0.98

% Ash= 22.05 % Moisture= 21.52 Density g/cc 1.545

5-1A Carbon Dioxide



Pressure (MPa)	Adsorbed gas (cc/g)			
	As Received	Moisture free ash incl.	ash free moisture incl	Dry Ash Free
0.220	0.78	1.00	1.01	1.39
0.385	1.49	1.90	1.91	2.64
0.773	2.78	3.54	3.56	4.92
1.210	4.03	5.13	5.17	7.14
1.677	5.22	6.65	6.70	9.25
2.172	6.33	8.06	8.12	11.21
2.673	7.35	9.37	9.43	13.03
3.217	8.47	10.80	10.87	15.02
3.706	9.45	12.04	12.12	16.75
4.201	10.15	12.93	13.02	17.98

Langmuir Parameters

	As Received	Moisture free ash incl.	Ash free moisture incl	Dry Ash Free
Vol. (cc/g)	26.49	33.76	33.99	46.95
Pressure (MPa)	6.80	6.80	6.80	6.80

SUMMARY OF ADSORPTION ANALYSES SI UNITS

Isotherm Temperature: **36.1 ºC**

Goodness of fit of Langmuir regression: **0.98**

% Ash= 22.05 **% Moisture = 21.52** **Density (g/cc) 1.545**

5-1A Carbon Dioxide

CO2 Adsorption (Imperial Units)

Summary of Analyses		
	As Received	DAF basis
Langmuir Volume (SCF)	901	1597
Langmuir Pressure (PSIA)	986	986
Goodness of fit Langmuir Equation R-squared	0.98	0.98
Ash Content Wt.%	22.05	22.05
Equilibrium Moisture Wt.%	21.52	21.52

Contents of Appendix

data sheets	***Charts***
As Received	As Received
Dry Ash Free	Dry Ash Free
Dry Ash Included	Dry Ash Included
Moist Ash Free	Moist Ash Free

5-1A Carbon Dioxide

GAS ADSORPTION ISOTHERM IMPERIAL UNITS

AS RECEIVED BASIS

		Moisture Content % :	21.52
Isotherm Temperature º F:	97.0	Ash Content, % :	22.05
Gas used:	CO2	Helium Density g/cc	1.545

PRESSURE (PSI)	ADSORBED GAS (SCF/ton)	P / V
32	26.71	1.19
56	50.70	1.10
112	94.49	1.19
175	137.07	1.28
243	177.69	1.37
315	215.28	1.46
388	250.20	1.55
467	288.37	1.62
538	321.59	1.67
609	345.32	1.76

Saturated Monolayer Volume (SCF/ton):	901.4
Langmuir Pressure (PSIA):	986.4
Correlation Coefficient:	0.9790

DRY ASH FREE BASIS

32	47.33	0.67
56	89.85	0.62
112	167.44	0.67
175	242.89	0.72
243	314.89	0.77
315	381.50	0.83
388	443.39	0.87
467	511.03	0.91
538	569.89	0.94
609	611.95	1.00

Saturated Monolayer Volume (SCF/ton, daf):	1597
Langmuir Pressure (PSIA):	986
Correlation Coefficient:	0.9790

5-1A Carbon Dioxide

GAS ADSORPTION ISOTHERM IMPERIAL UNITS

MOISTURE FREE ASH INCLUDED

		Moisture Content % :	21.52
Isotherm Temperature° F:	97.0	Ash Content, % :	22.05
Gas used:	CO2	Helium Density g/cc	1.545

PRESSURE (PSI)	ADSORBED GAS (SCF/ton)	P / V
32	34	0.94
56	65	0.86
112	120	0.93
175	175	1.00
243	226	1.07
315	274	1.15
388	319	1.22
467	367	1.27
538	410	1.31
609	440	1.38

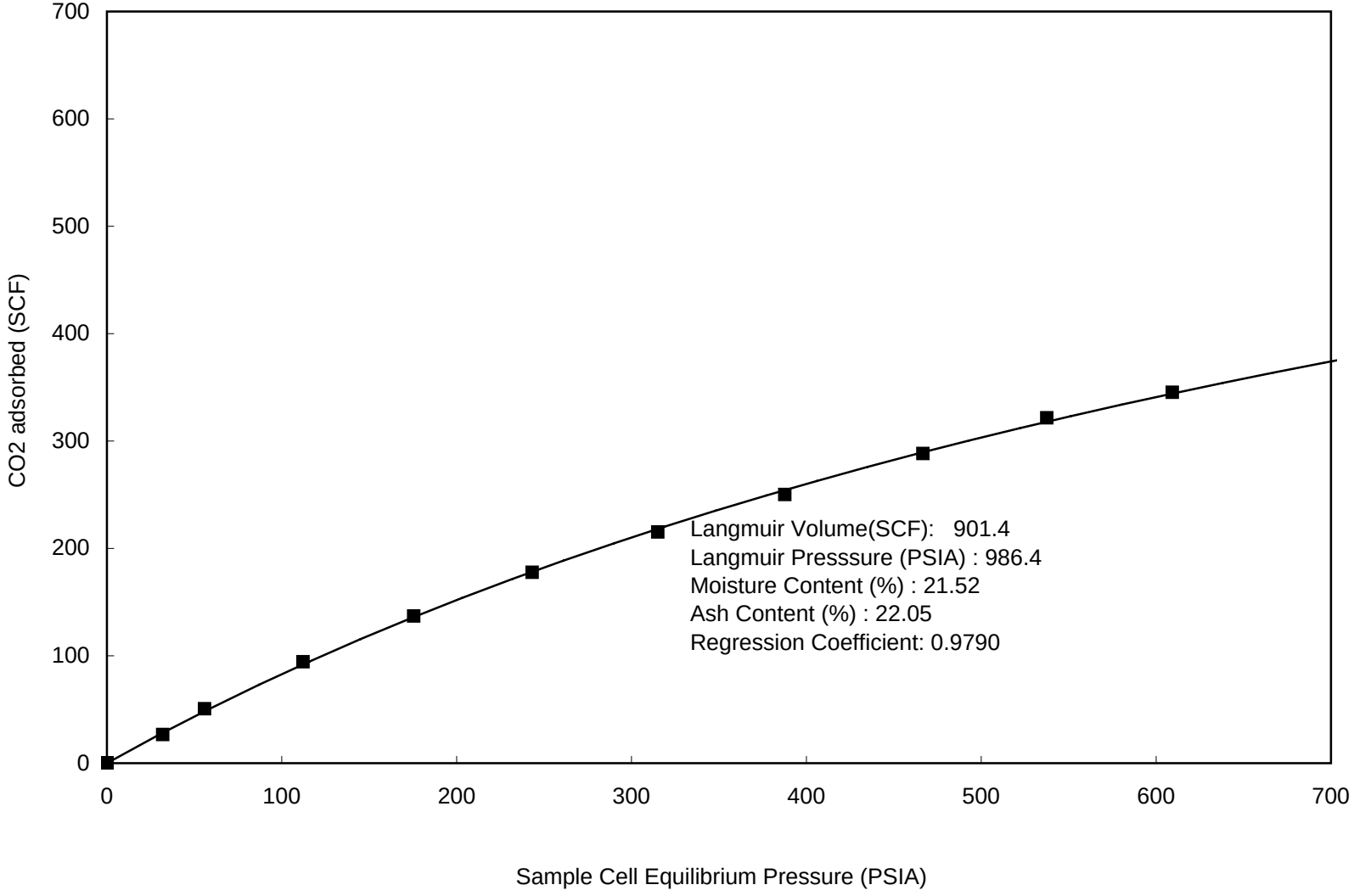
Saturated Monolayer Volume (SCF/ton):	1149
Langmuir Pressure (PSIA):	986
Correlation Coefficient:	0.9790

ASH FREE MOISTURE INCLUDED

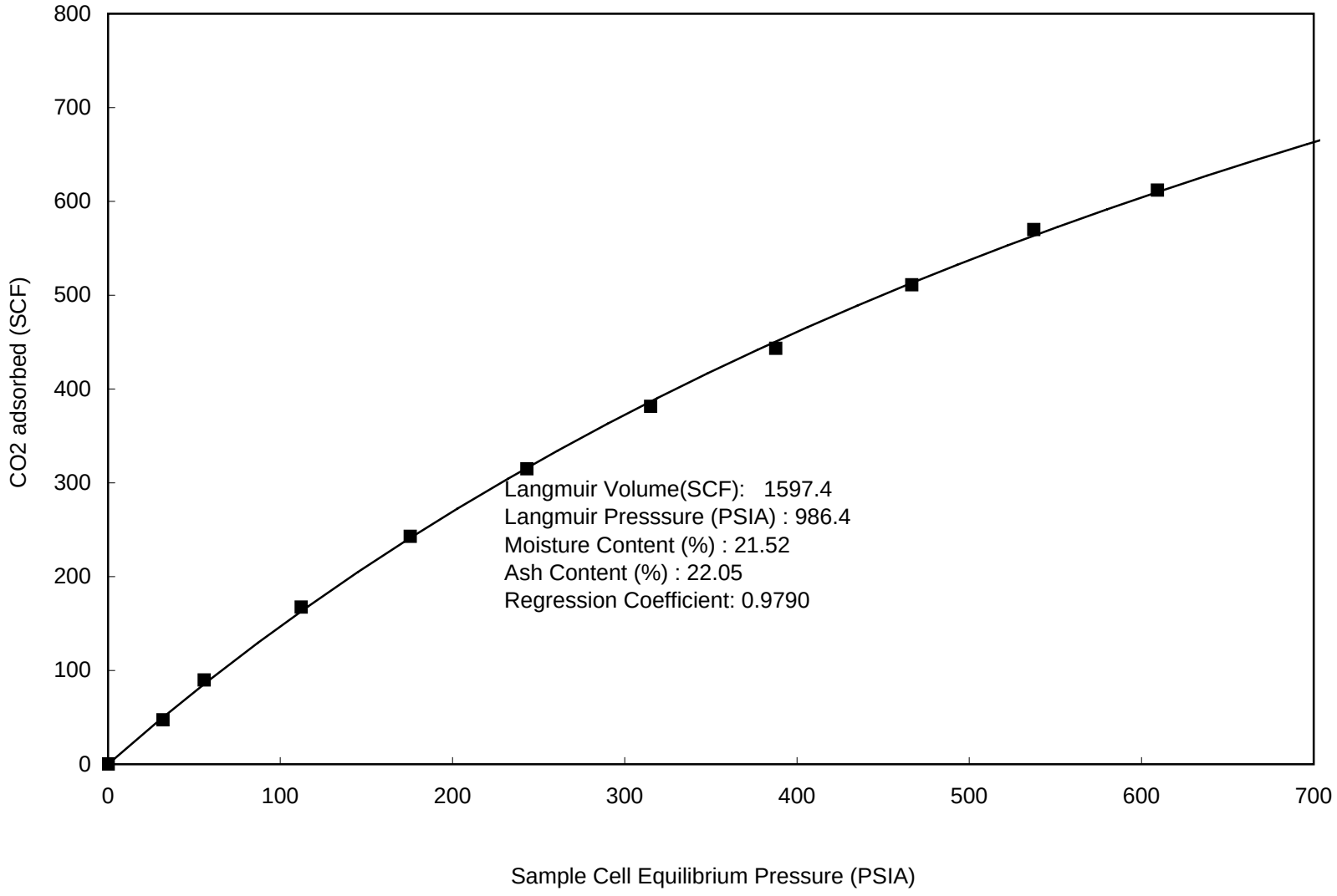
32	34	0.93
56	65	0.86
112	121	0.93
175	176	1.00
243	228	1.07
315	276	1.14
388	321	1.21
467	370	1.26
538	413	1.30
609	443	1.38

Saturated Monolayer Volume (SCF/ton):	1156
Langmuir Pressure (PSIA):	986
Correlation Coefficient:	0.9790

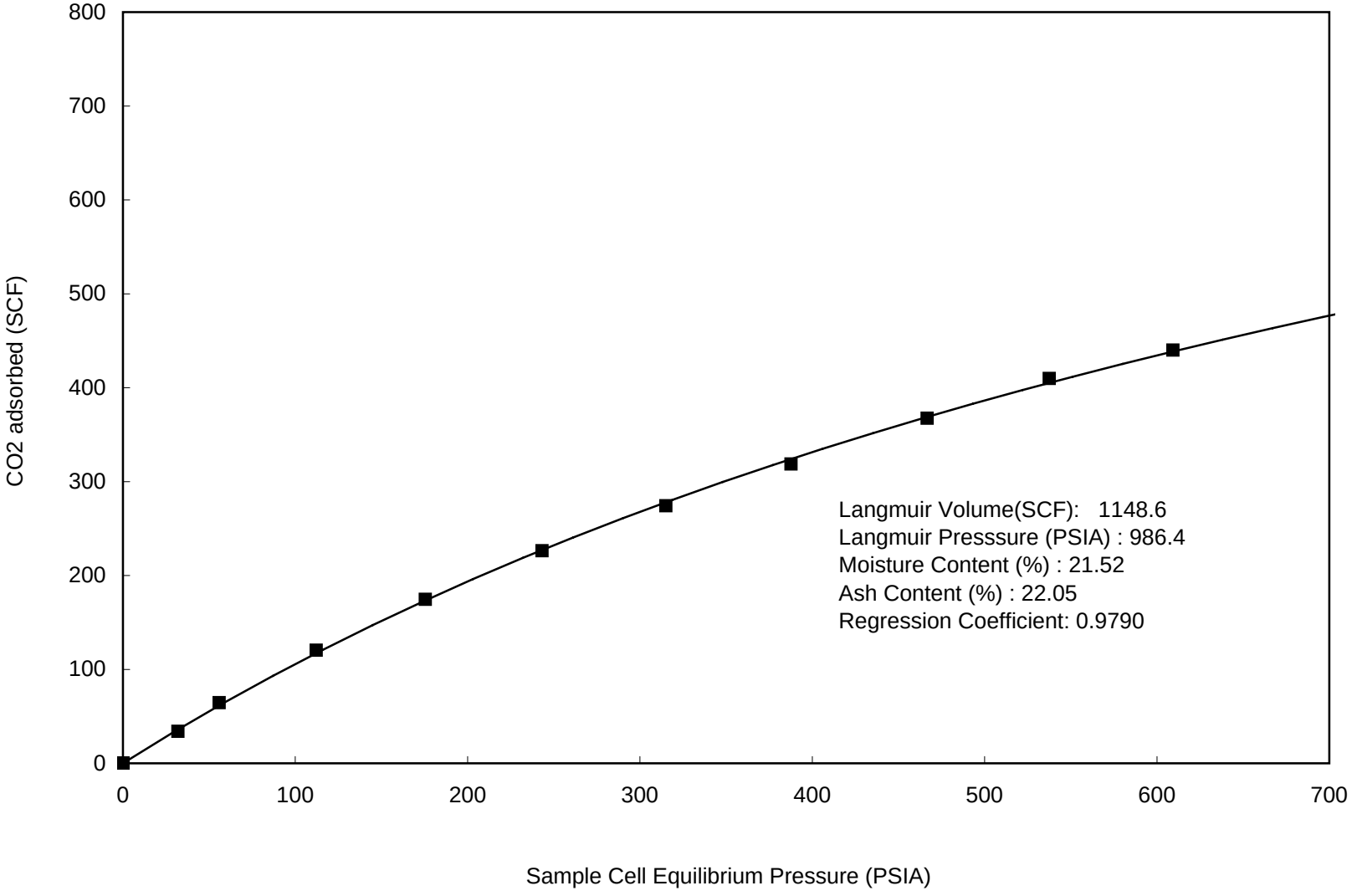
5-1A Carbon Dioxide (as received basis)



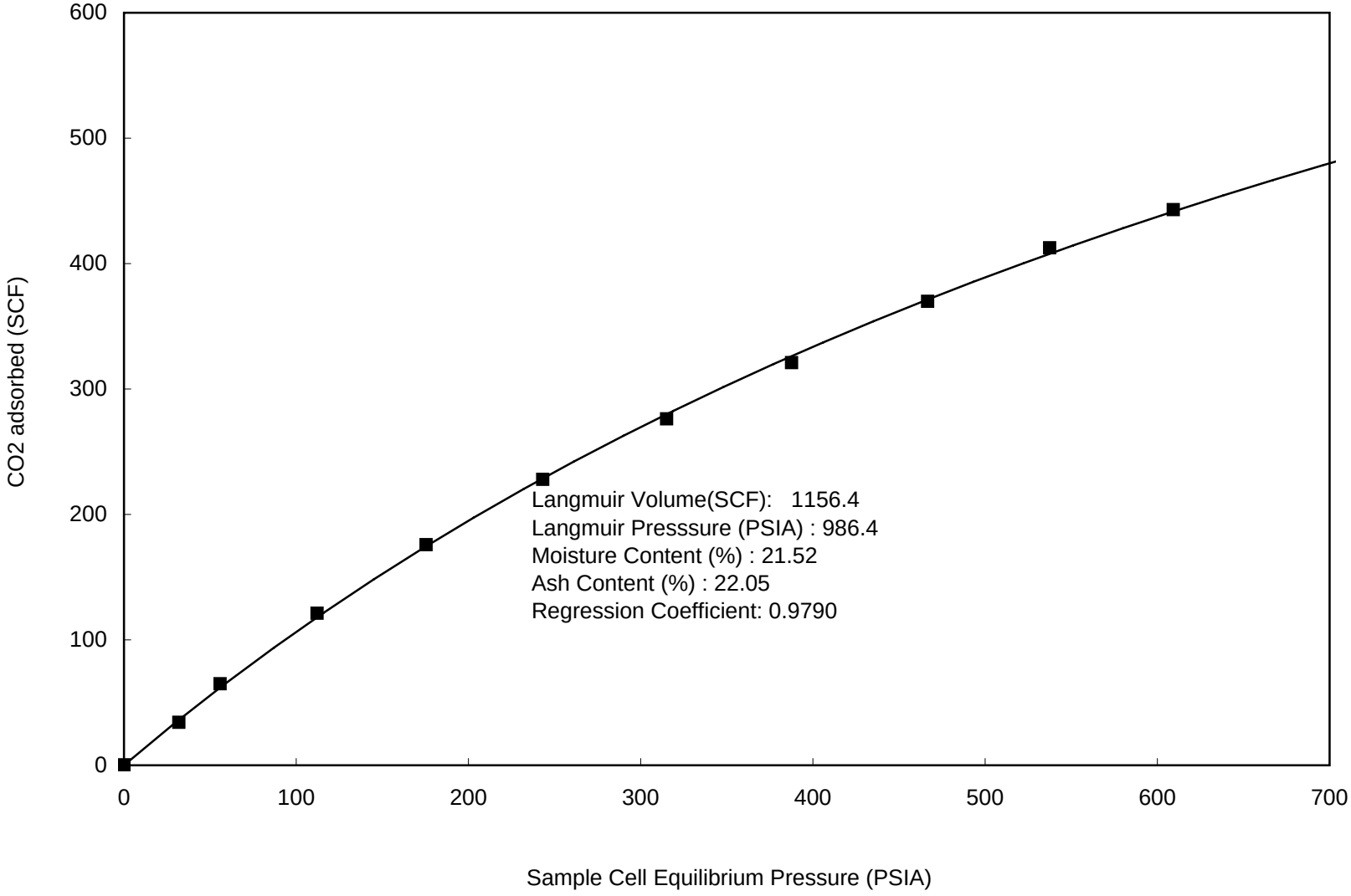
5-1A Carbon Dioxide (dry & ash free basis)



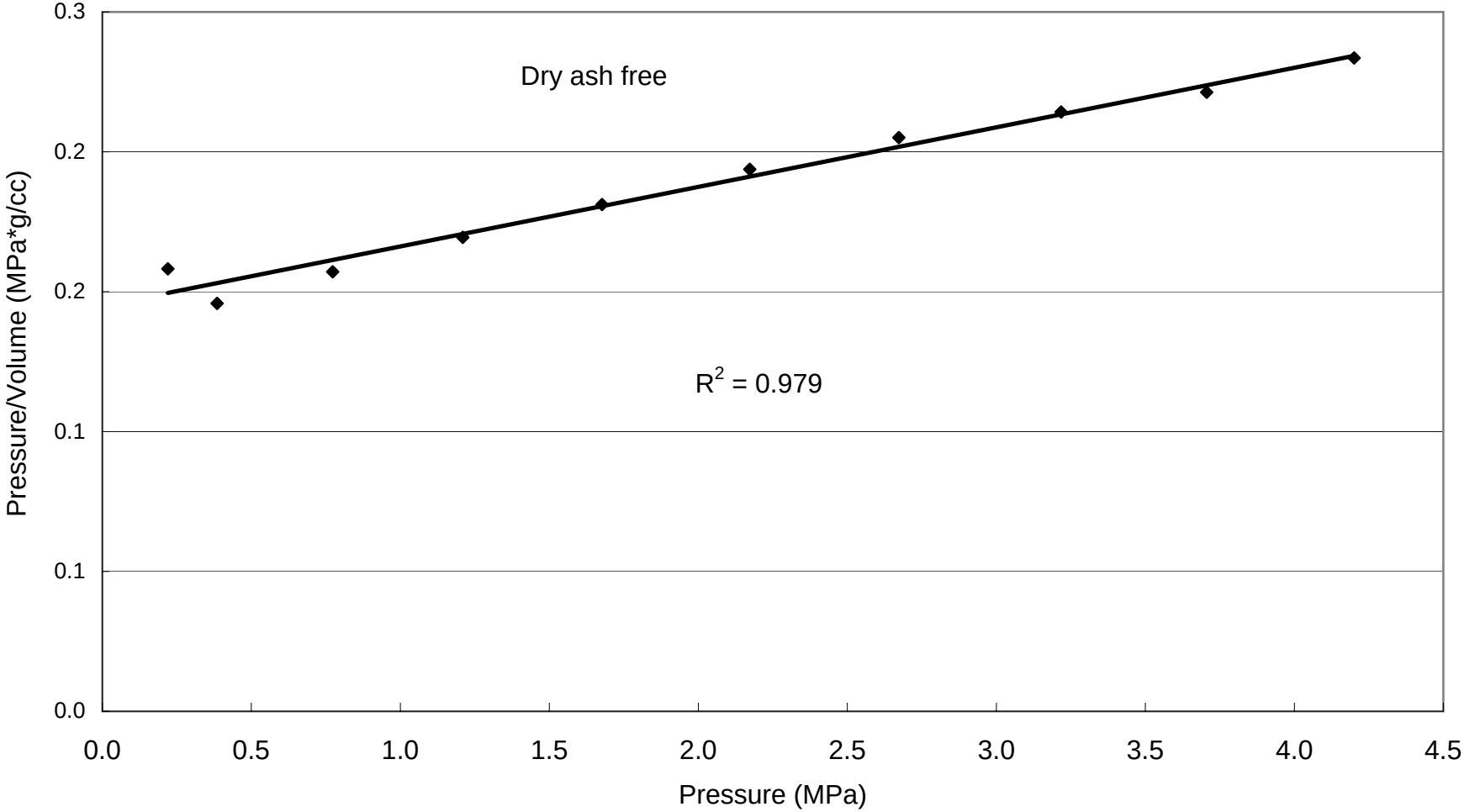
5-1A Carbon Dioxide (moisture free, ash included basis)



5-1A Carbon Dioxide (ash free, moisture included basis)



Adsorption Langmuir Plot



5-1A Carbon Dioxide

CO2 Adsorption (SI Units)

Summary of Analyses		
	As Received	DAF basis
Langmuir Volume cc/g	26.49	46.95
Langmuir Pressure MPa	6.80	6.80
Goodness of fit Langmuir Equation R-squared	0.98	0.98
Ash Content Wt.%	22.05	22.05
Equilibrium Moisture Wt.%	21.52	21.52

Contents of Appendix

data sheets	***Charts***
As Received	As Received
Dry Ash Free	Dry Ash Free
Dry Ash Included	Dry Ash Included
Moist Ash Free	Moist Ash Free

5-1A Carbon Dioxide

GAS ADSORPTION ISOTHERM SI UNITS

AS RECEIVED BASIS

Sample I.D. :	5-1A Carbon Dioxide	Moisture Content (EQ) % :	21.52
Isotherm Temperature º C:	36.1	Ash Content % :	22.05
Gas used:	CO2	Helium Density g/cc	1.545

PRESSURE (MPa)	ADSORBED GAS (cc/g @STP)	P / V
0.220	0.78	0.280
0.385	1.49	0.258
0.773	2.78	0.278
1.210	4.03	0.300
1.677	5.22	0.321
2.172	6.33	0.343
2.673	7.35	0.363
3.217	8.47	0.380
3.706	9.45	0.392
4.201	10.15	0.414

Saturated Monolayer Volume (cc/g @ STP):	26.49
Langmuir Pressure (MPa):	6.80

DRY ASH FREE BASIS

0.220	1.39	0.158
0.385	2.64	0.146
0.773	4.92	0.157
1.210	7.14	0.169
1.677	9.25	0.181
2.172	11.21	0.194
2.673	13.03	0.205
3.217	15.02	0.214
3.706	16.75	0.221
4.201	17.98	0.234

Saturated Monolayer Volume (cc/g @ STP, daf):	46.95
Langmuir Pressure (MPa):	6.80
Correlation Coefficient:	0.9790

5-1A Carbon Dioxide

GAS ADSORPTION ISOTHERM SI UNITS

MOISTURE FREE ASH INCLUDED

		Moisture Content (EQ) % :	21.52
Isotherm Temperature º C:	36.1	Ash Content % :	22.05
Gas used:	CO2	Helium Density g/cc	1.545

PRESSURE (MPa)	ADSORBED GAS (cc/g@STP)	P / V
0.220	1.00	0.22
0.385	1.90	0.20
0.773	3.54	0.22
1.210	5.13	0.24
1.677	6.65	0.25
2.172	8.06	0.27
2.673	9.37	0.29
3.217	10.80	0.30
3.706	12.04	0.31
4.201	12.93	0.32

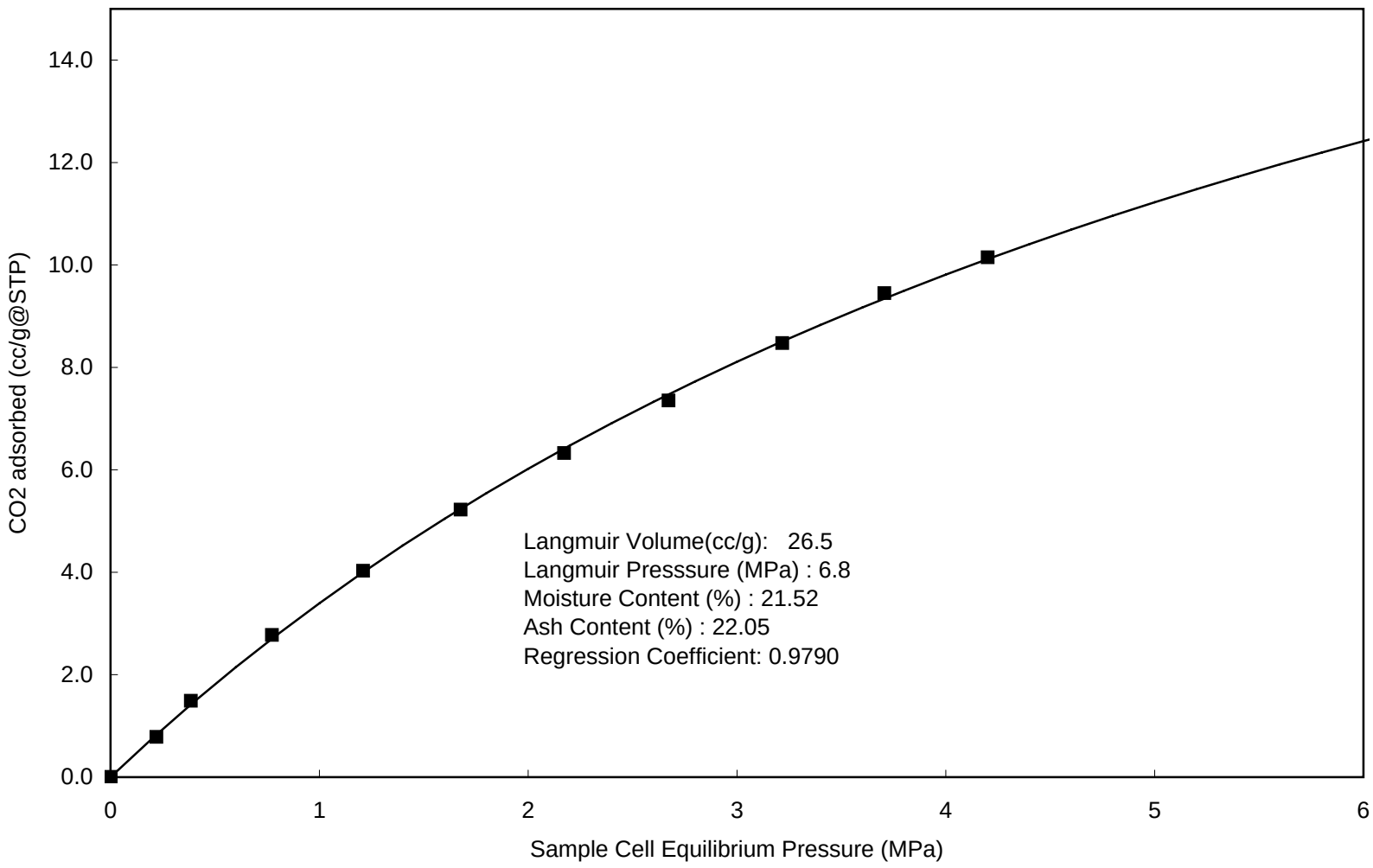
Saturated Monolayer Volume (cc/g):	33.76
Langmuir Pressure (MPa):	6.80

ASH FREE MOISTURE INCLUDED

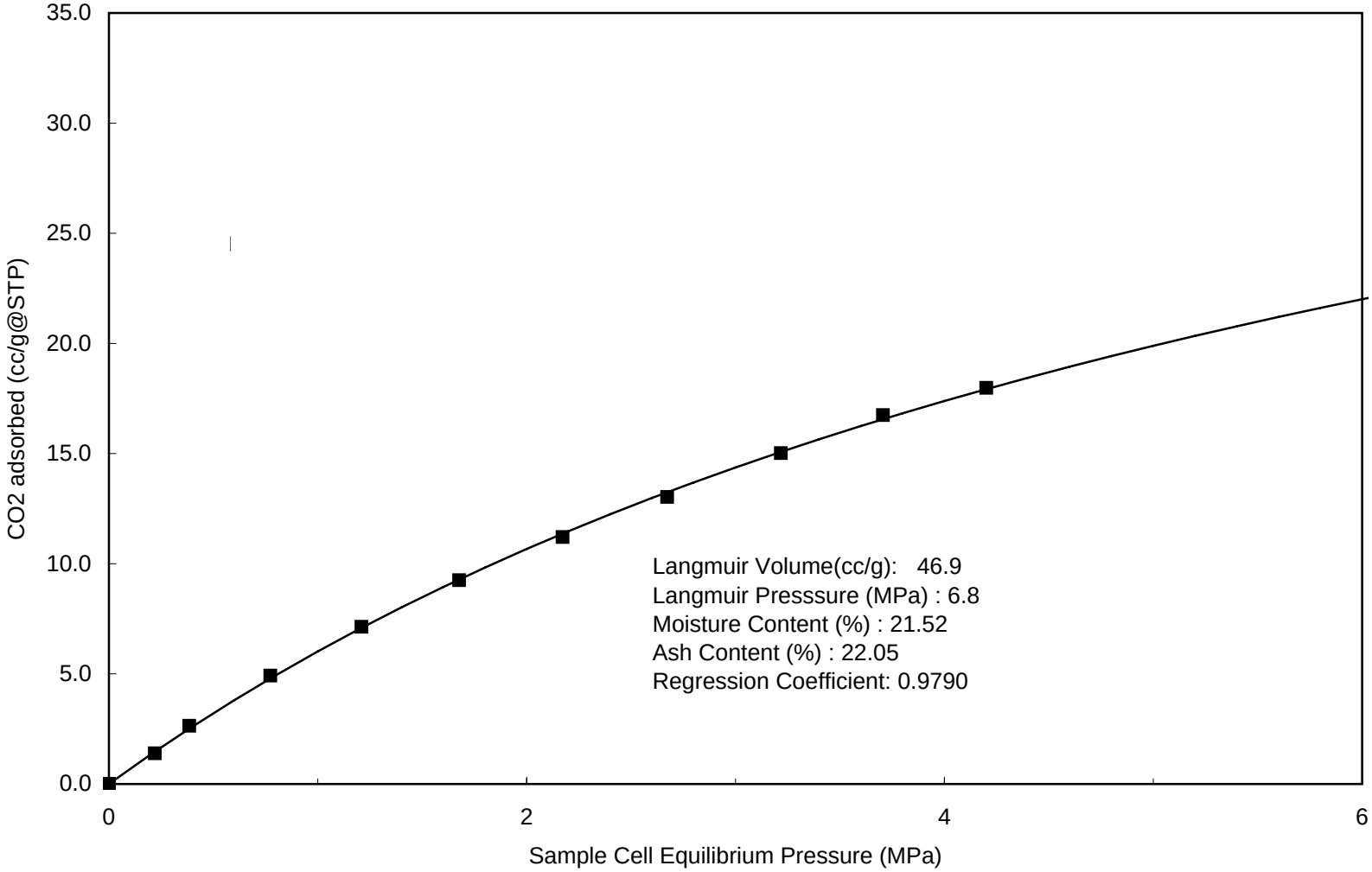
0.220	1.01	0.00
0.385	1.91	0.20
0.773	3.56	0.22
1.210	5.17	0.23
1.677	6.70	0.25
2.172	8.12	0.27
2.673	9.43	0.28
3.217	10.87	0.30
3.706	12.12	0.31
4.201	13.02	0.32

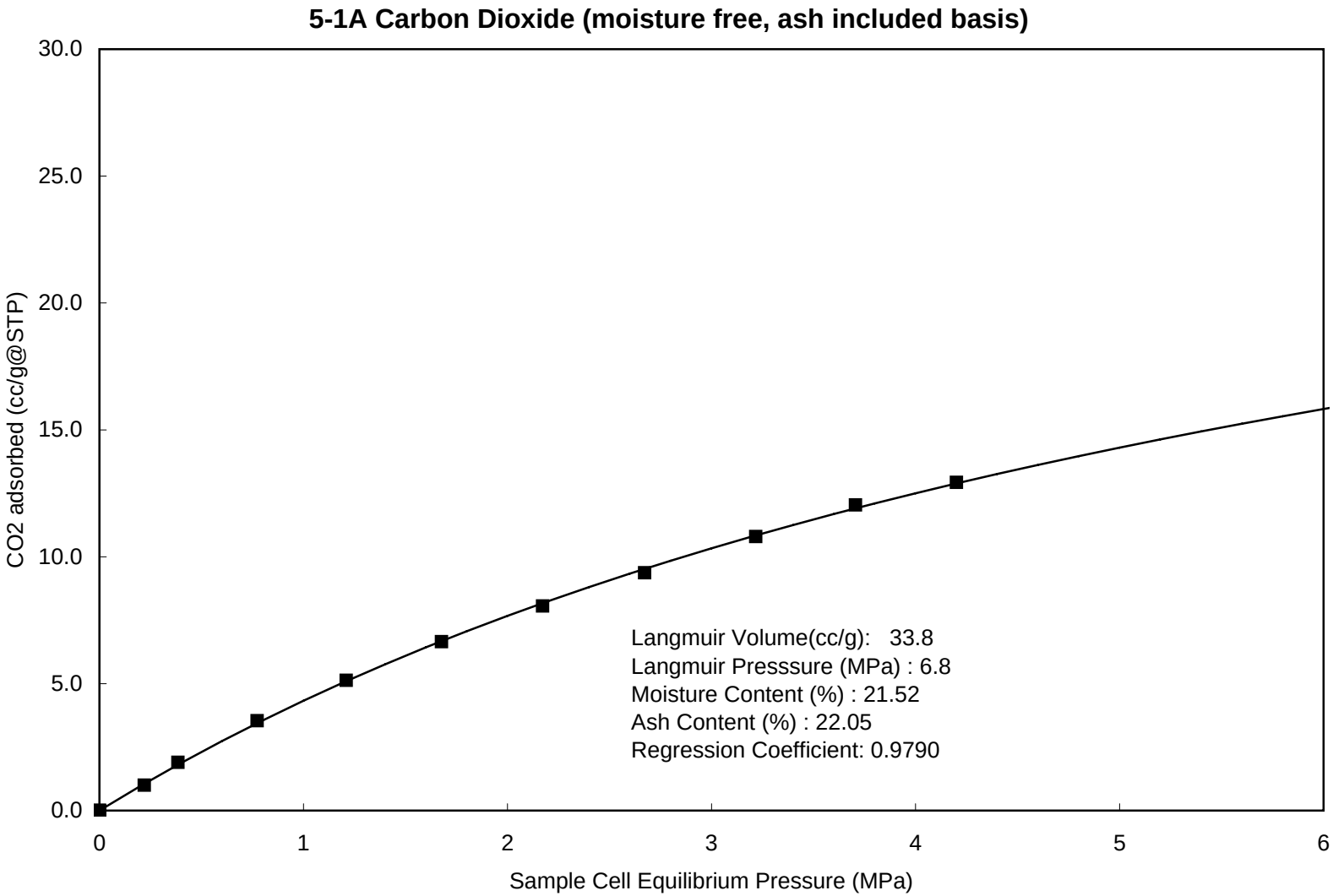
Saturated Monolayer Volume (cc/g, ash free):	33.99
Langmuir Pressure (MPa):	6.80
Correlation Coefficient:	0.9790

5-1A Carbon Dioxide (as received basis)

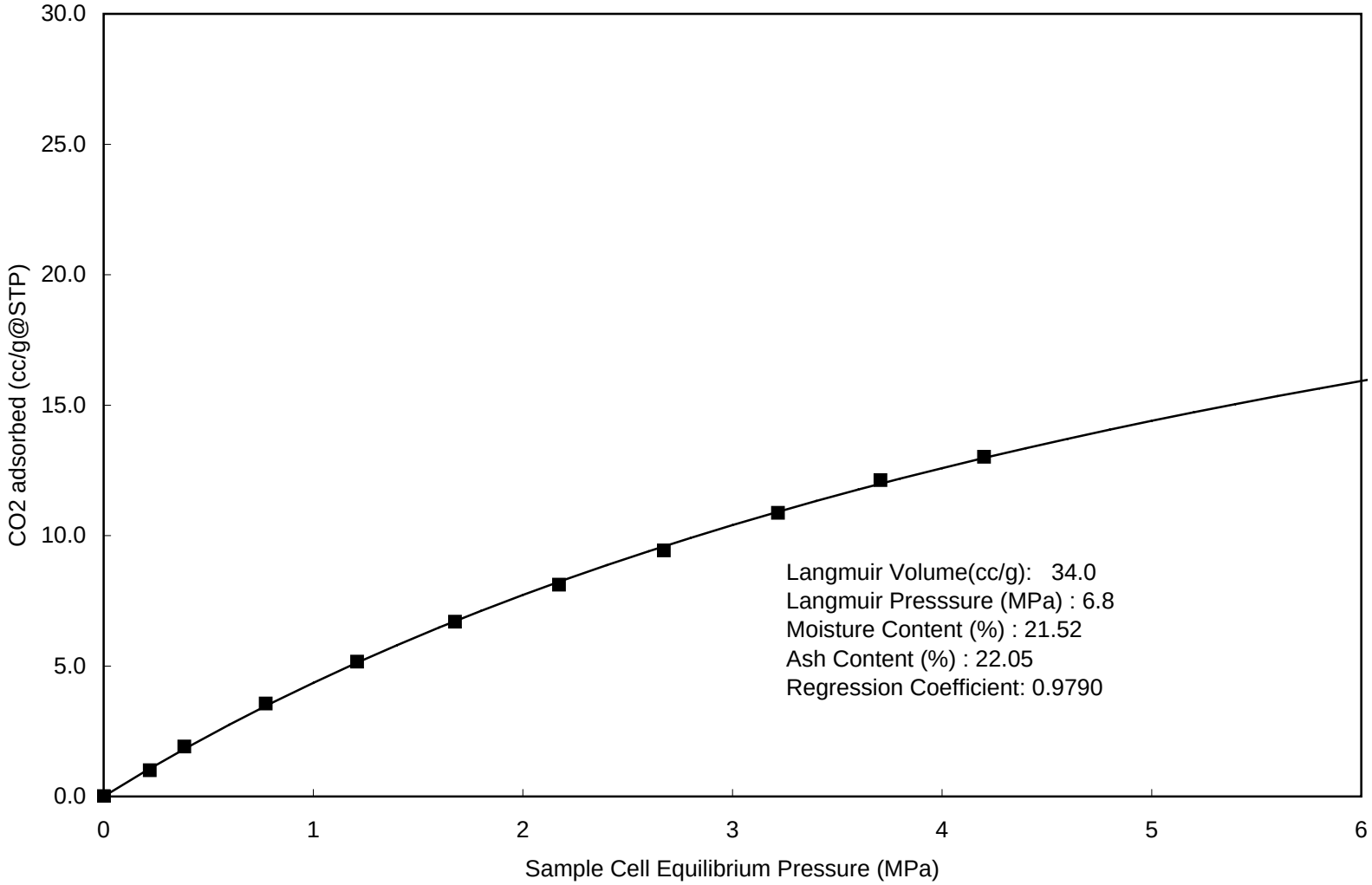


5-1A Carbon Dioxide (dry & ash free basis)

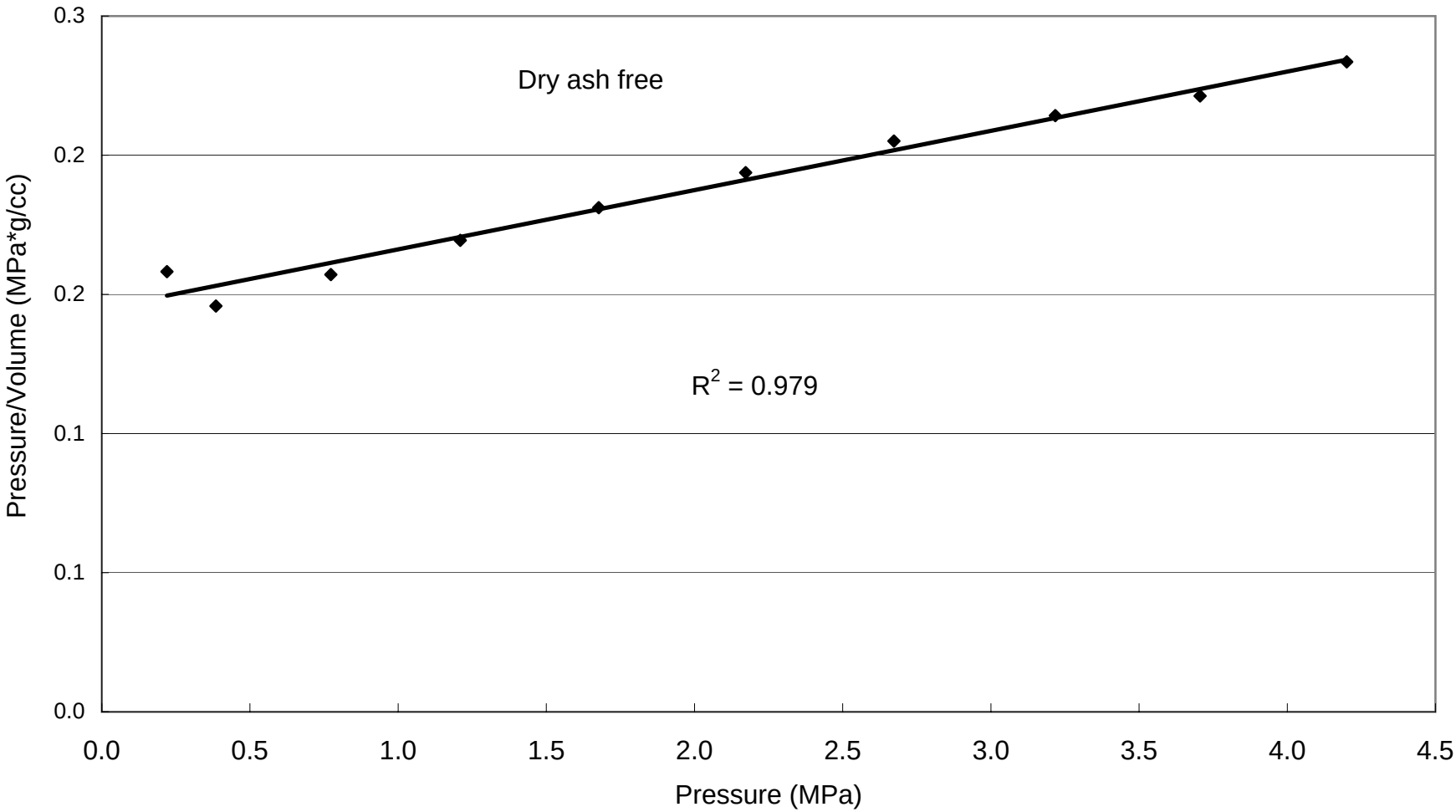



5-1A Carbon Dioxide (moisture free, ash included basis)
30.0
25.0
20.0
15.0
10.0
5.0
0.0
CO2 adsorbed (cc/g@STP)
0
1
2
3
4
5
6
Sample Cell Equilibrium Pressure (MPa)
Langmuir Volume(cc/g): 33.8
Langmuir Presssure (MPa) : 6.8
Moisture Content (%) : 21.52
Ash Content (%) : 22.05
Regression Coefficient: 0.9790

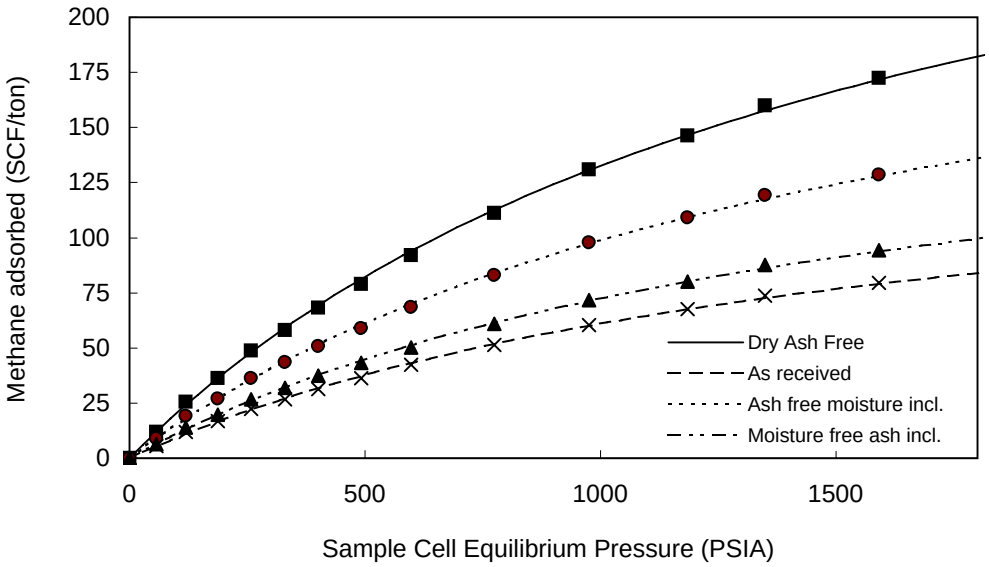
5-1A Carbon Dioxide (ash free, moisture included basis)



Adsorption Langmuir Plot



4-LA-1 Methane



Pressure (PSIA)	Adsorbed gas (ft^3 /ton)			
	As Received	moisture free ash incl.	ash free moisture incl.	Dry Ash Free
57	5.5	6.5	8.9	11.9
119	11.8	14.0	19.1	25.5
188	16.7	19.8	27.1	36.3
258	22.5	26.7	36.4	48.7
330	26.8	31.8	43.4	58.2
401	31.5	37.4	50.9	68.3
492	36.4	43.1	58.8	78.8
598	42.4	50.4	68.7	92.0
774	51.3	60.9	83.0	111.3
976	60.4	71.7	97.8	131.0
1185	67.5	80.1	109.2	146.3
1350	73.8	87.5	119.4	160.0
1591	79.6	94.4	128.7	172.5

Langmuir Parameters

	As Received	Moisture free ash incl	Ash free moisture incl	Dry Ash Free
Vol. (ft^3 /ton)	158.0	187.4	255.5	342.4
Pressure (PSIA)	1581.6	1581.6	1581.6	1581.6

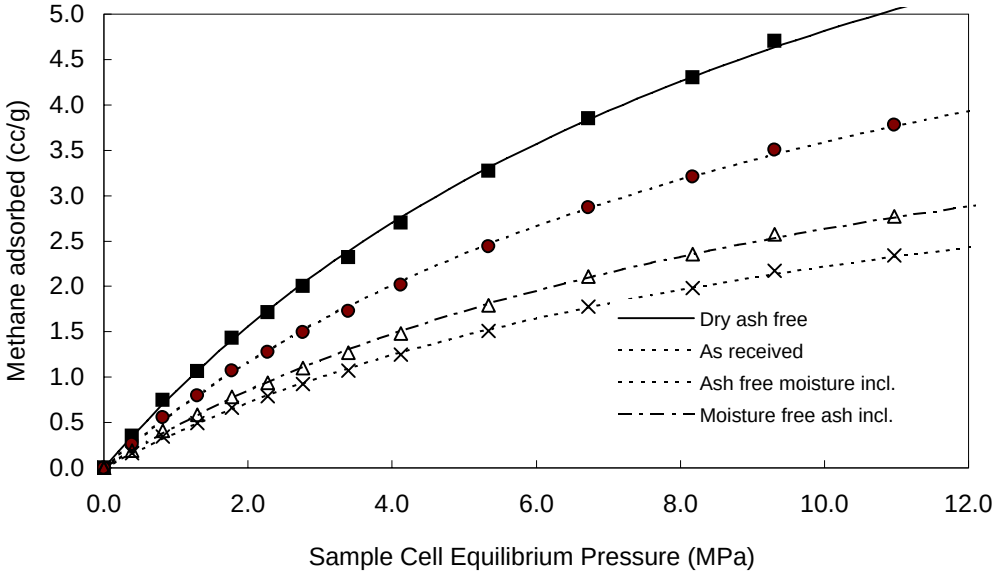
SUMMARY OF ADSORPTION ANALYSES IMP. UNITS

Isotherm Temperature: 97.0 ºF

Goodness of fit of Langmuir regression: 0.99

% Ash= 38.17 % Moisture= 15.70 Density g/cc 1.588

4-LA-1 Methane



Pressure (MPa)	Adsorbed gas (cc/g)			
	As Received	Moisture free ash incl.	ash free moisture incl	Dry Ash Free
0.392	0.16	0.19	0.26	0.35
0.821	0.35	0.41	0.56	0.75
1.294	0.49	0.58	0.80	1.07
1.779	0.66	0.78	1.07	1.43
2.273	0.79	0.94	1.28	1.71
2.764	0.93	1.10	1.50	2.01
3.389	1.07	1.27	1.73	2.32
4.122	1.25	1.48	2.02	2.70
5.338	1.51	1.79	2.44	3.27
6.726	1.78	2.11	2.87	3.85
8.168	1.98	2.35	3.21	4.30
9.305	2.17	2.57	3.51	4.70
10.969	2.34	2.77	3.78	5.07

Langmuir Parameters

	As Received	Moisture free ash incl.	Ash free moisture incl	Dry Ash Free
Vol. (cc/g)	4.64	5.51	7.51	10.06
Pressure (MPa)	10.90	10.90	10.90	10.90

SUMMARY OF ADSORPTION ANALYSES SI UNITS

Isotherm Temperature: **36.1 ºC**

Goodness of fit of Langmuir regression: **0.99**

% Ash= 38.17 **% Moisture = 15.70** **Density (g/cc) 1.588**

4-LA-1 Methane

Methane Adsorption
(Imperial Units)

Summary of Analyses		
	As Received	DAF basis
Langmuir Volume (SCF)	158	342
Langmuir Pressure (PSIA)	1582	1582
Goodness of fit Langmuir Equation R-squared	0.99	0.99
Ash Content Wt.%	38.17	38.17
Equilibrium Moisture Wt.%	15.70	15.70

Contents of Appendix

data sheets	***Charts***
As Received	As Received
Dry Ash Free	Dry Ash Free
Dry Ash Included	Dry Ash Included
Moist Ash Free	Moist Ash Free

4-LA-1 Methane

GAS ADSORPTION ISOTHERM IMPERIAL UNITS

AS RECEIVED BASIS

		Moisture Content % :	15.70
Isotherm Temperature º F:	97.0	Ash Content, % :	38.17
Gas used:	Methane	Helium Density g/cc	1.588

PRESSURE (PSI)	ADSORBED GAS (SCF/ton)	P / V
57	5.49	10.34
119	11.78	10.11
188	16.73	11.22
258	22.48	11.48
330	26.84	12.28
401	31.49	12.73
492	36.37	13.51
598	42.45	14.08
774	51.34	15.08
976	60.45	16.14
1185	67.49	17.55
1350	73.79	18.29
1591	79.57	20.00

Saturated Monolayer Volume (SCF/ton):	158.0
Langmuir Pressure (PSIA):	1581.6
Correlation Coefficient:	0.9927

DRY ASH FREE BASIS

57	11.91	4.77
119	25.54	4.66
188	36.26	5.18
258	48.74	5.29
330	58.19	5.67
401	68.26	5.87
492	78.85	6.23
598	92.01	6.50
774	111.29	6.96
976	131.03	7.44
1185	146.31	8.10
1350	159.97	8.44
1591	172.48	9.22

Saturated Monolayer Volume (SCF/ton, daf):	342
Langmuir Pressure (PSIA):	1582
Correlation Coefficient:	0.9927

4-LA-1 Methane

GAS ADSORPTION ISOTHERM IMPERIAL UNITS

MOISTURE FREE ASH INCLUDED

		Moisture Content % :	15.70
Isotherm Temperature° F:	97.0	Ash Content, % :	38.17
Gas used:	Methane	Helium Density g/cc	1.588

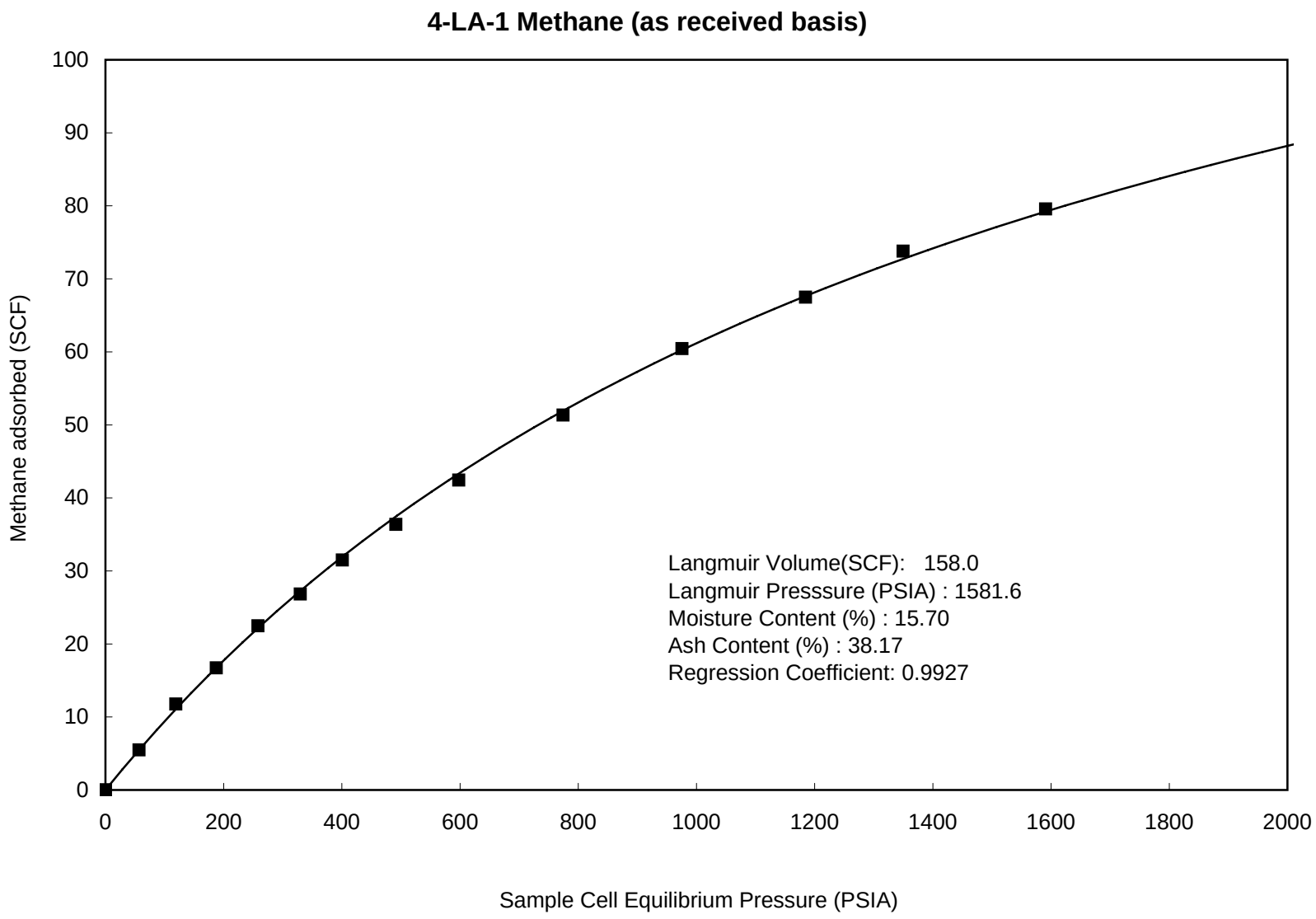
PRESSURE (PSI)	ADSORBED GAS (SCF/ton)	P / V
57	7	8.72
119	14	8.52
188	20	9.46
258	27	9.68
330	32	10.35
401	37	10.73
492	43	11.39
598	50	11.87
774	61	12.71
976	72	13.61
1185	80	14.80
1350	88	15.42
1591	94	16.86

Saturated Monolayer Volume (SCF/ton):	187
Langmuir Pressure (PSIA):	1582
Correlation Coefficient:	0.9927

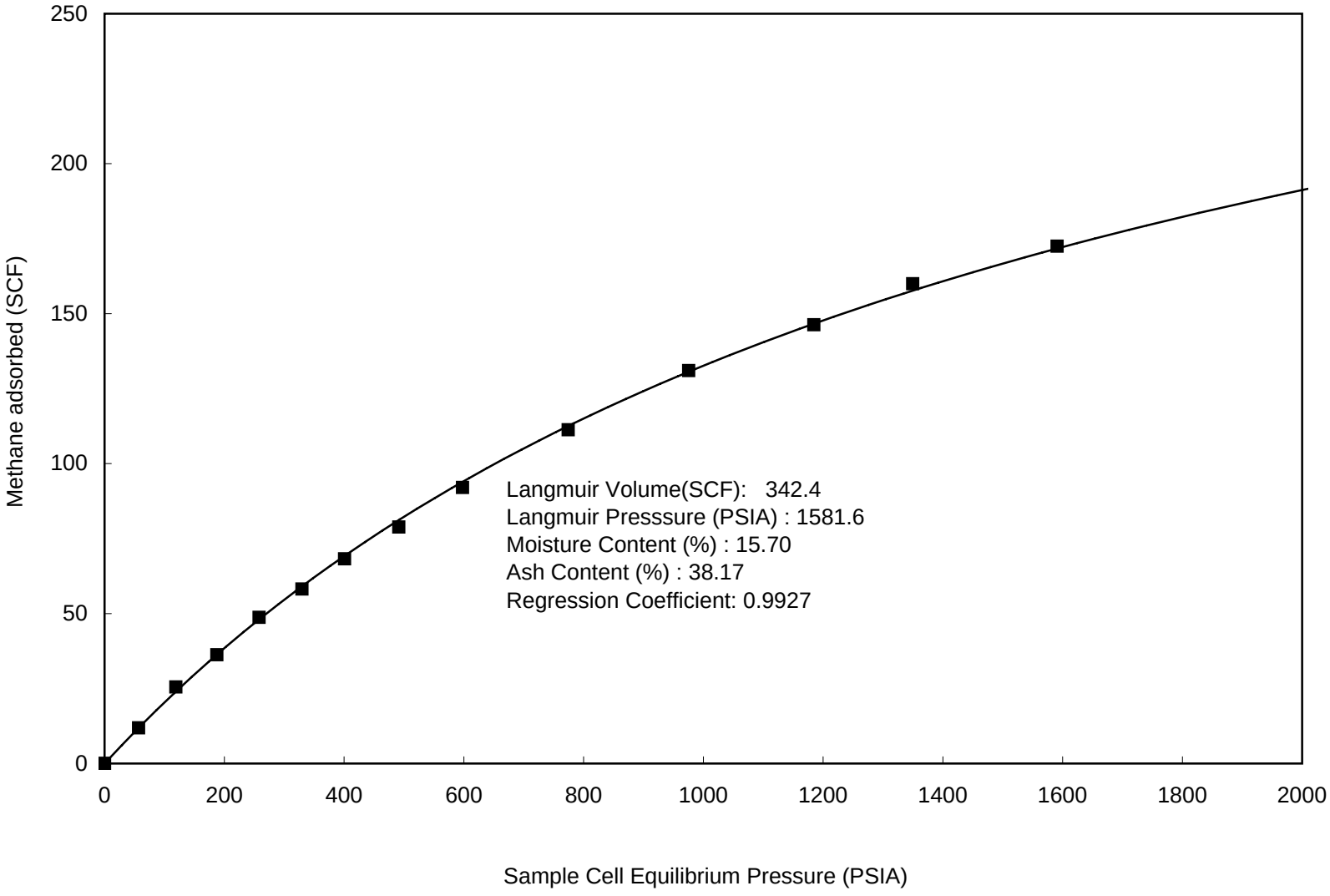
ASH FREE MOISTURE INCLUDED

57	9	6.39
119	19	6.25
188	27	6.94
258	36	7.10
330	43	7.59
401	51	7.87
492	59	8.36
598	69	8.71
774	83	9.32
976	98	9.98
1185	109	10.85
1350	119	11.31
1591	129	12.36

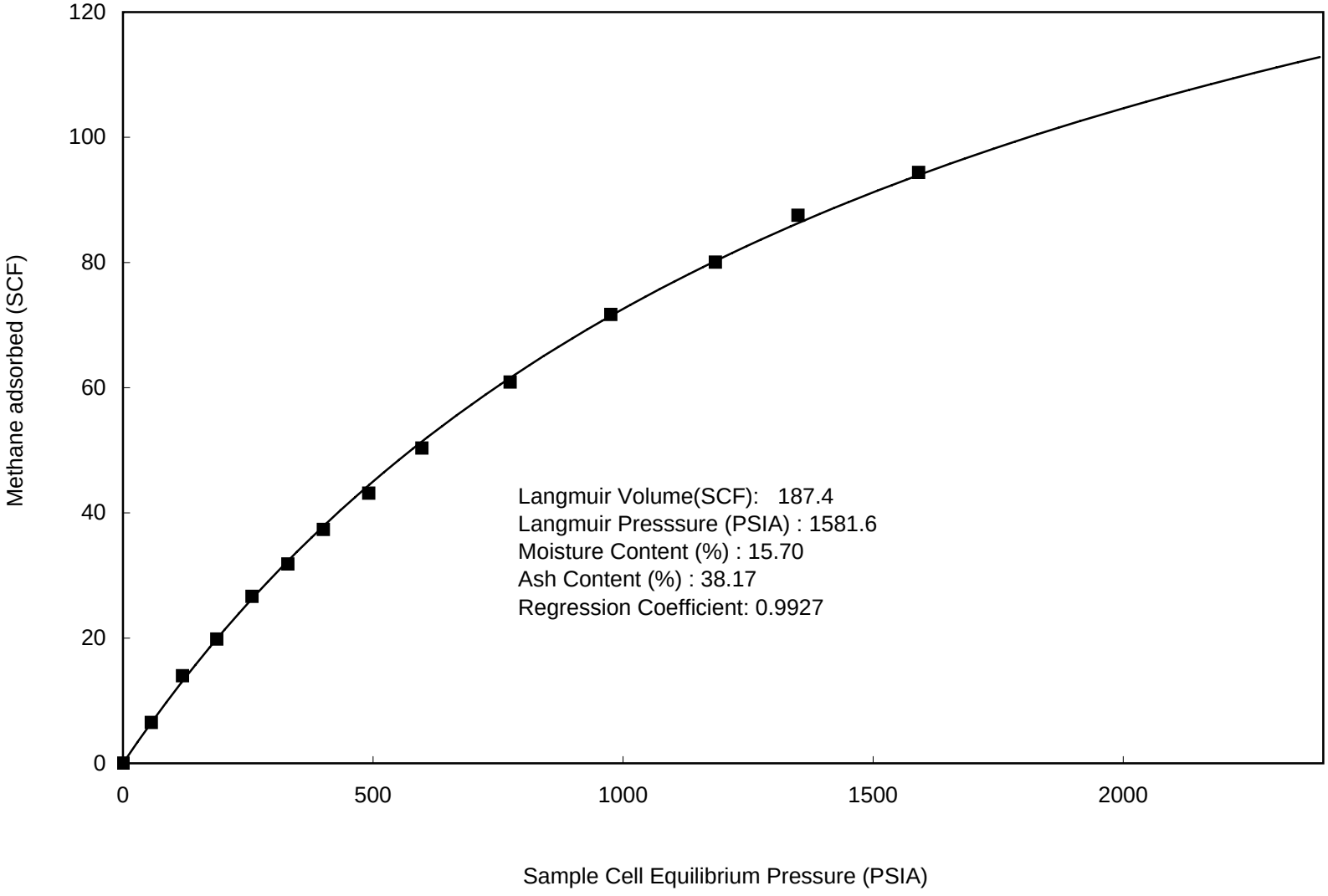
Saturated Monolayer Volume (SCF/ton):	255
Langmuir Pressure (PSIA):	1582
Correlation Coefficient:	0.9927


4-LA-1 Methane (as received basis)
Methane adsorbed (SCF)
Sample Cell Equilibrium Pressure (PSIA)
0
10
20
30
40
50
60
70
80
90
100
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Langmuir Volume(SCF): 158.0
Langmuir Presssure (PSIA) : 1581.6
Moisture Content (%) : 15.70
Ash Content (%) : 38.17
Regression Coefficient: 0.9927

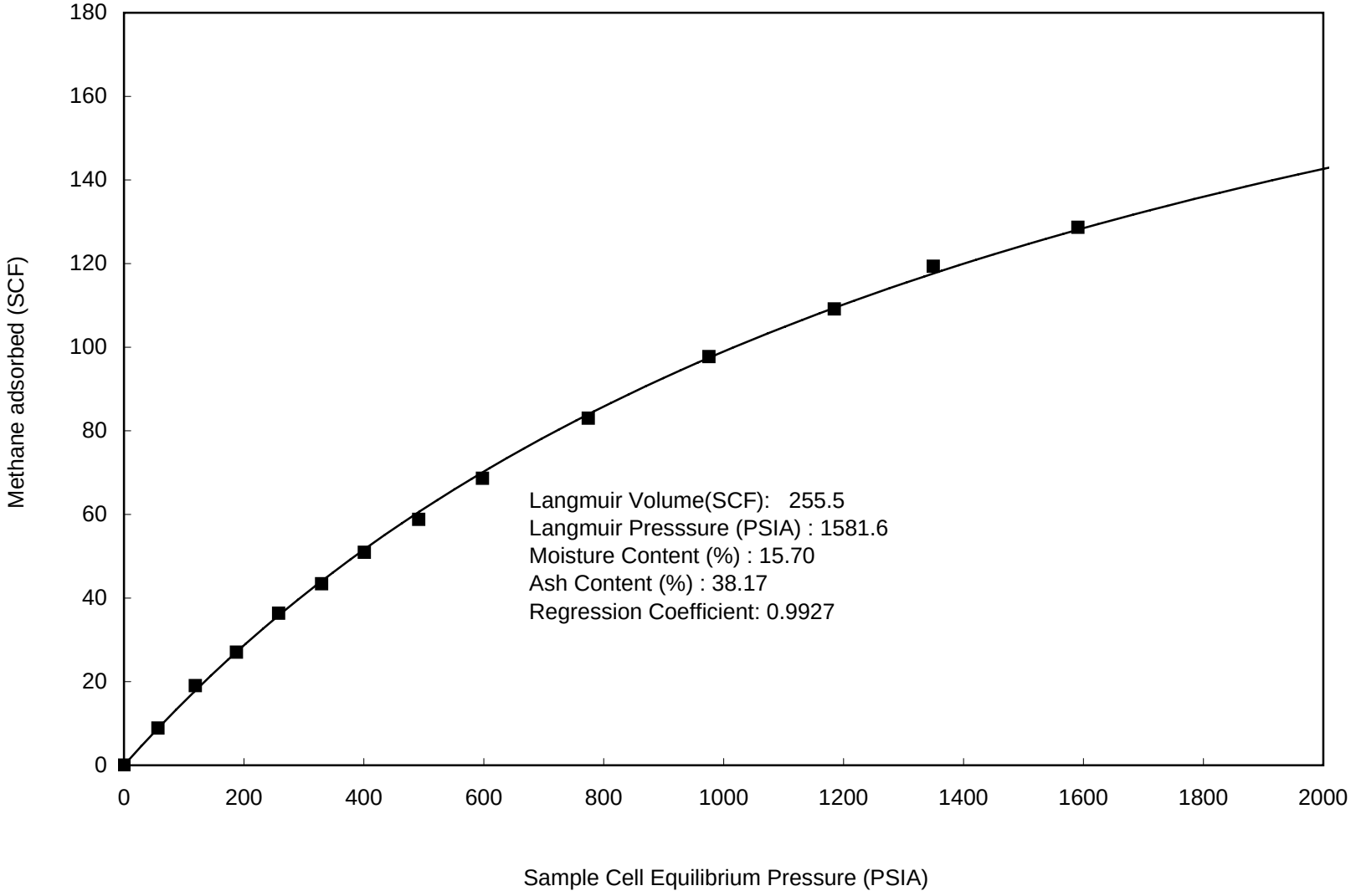
4-LA-1 Methane (dry & ash free basis)

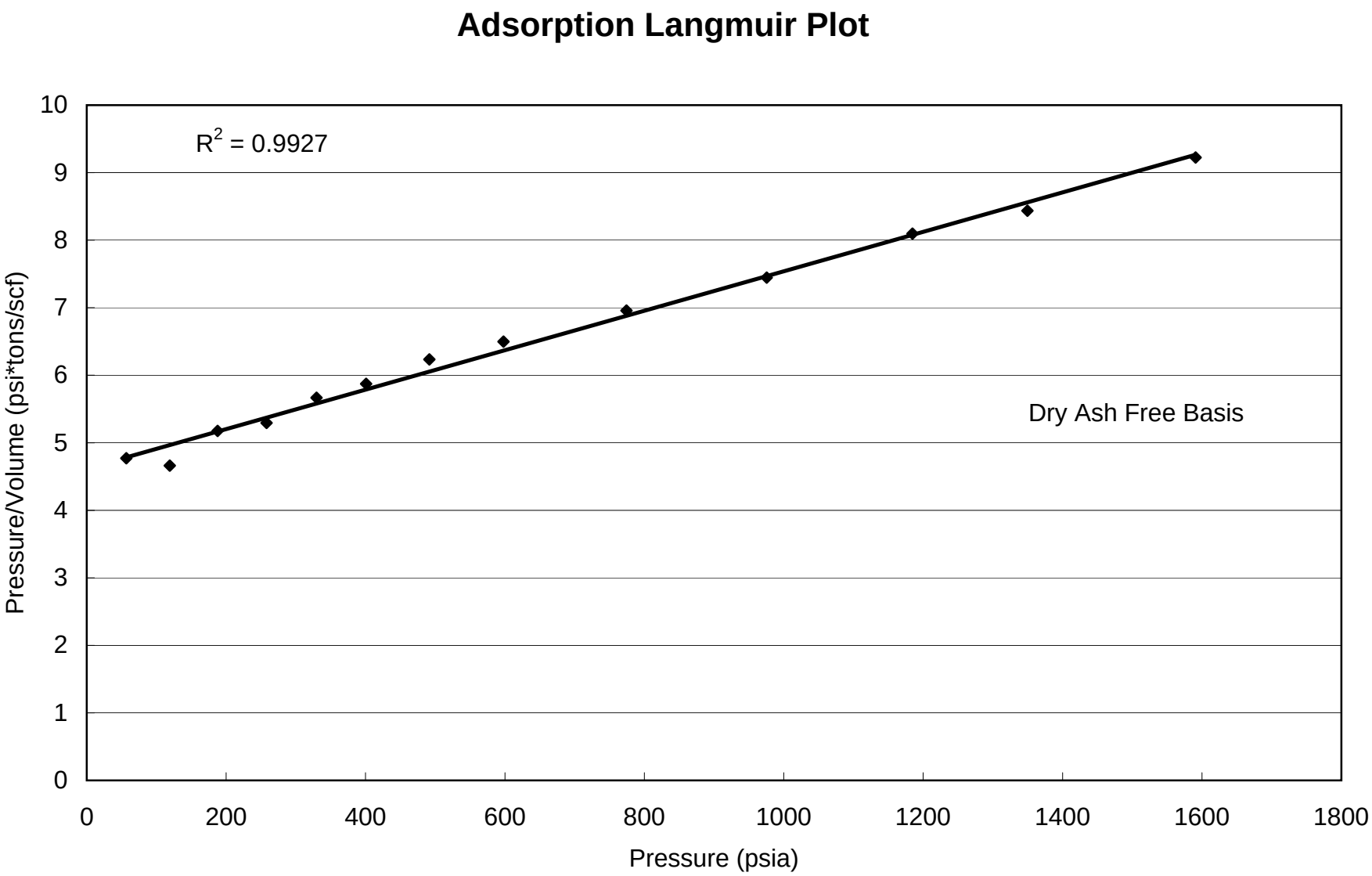


4-LA-1 Methane (moisture free, ash included basis)



4-LA-1 Methane (ash free, moisture included basis)




Adsorption Langmuir Plot
R2 = 0.9927
Dry Ash Free Basis
Pressure/Volume (psi*tons/scf)
Pressure (psia)
0
1
2
3
4
5
6
7
8
9
10
0
200
400
600
800
1000
1200
1400
1600
1800

4-LA-1 Methane

Methane Adsorption (SI Units)

Summary of Analyses		
	As Received	DAF basis
Langmuir Volume cc/g	4.64	10.06
Langmuir Pressure MPa	10.90	10.90
Goodness of fit Langmuir Equation R-squared	0.99	0.99
Ash Content Wt.%	38.17	38.17
Equilibrium Moisture Wt.%	15.70	15.70

Contents of Appendix

data sheets	***Charts***
As Received	As Received
Dry Ash Free	Dry Ash Free
Dry Ash Included	Dry Ash Included
Moist Ash Free	Moist Ash Free

4-LA-1 Methane

GAS ADSORPTION ISOTHERM SI UNITS

AS RECEIVED BASIS

Sample I.D. :	4-LA-1 Methane	Moisture Content (EQ) % :	15.70
Isotherm Temperature º C:	36.1	Ash Content % :	38.17
Gas used:	Methane	Helium Density g/cc	1.588

PRESSURE (MPa)	ADSORBED GAS (cc/g @STP)	P / V
0.392	0.16	2.426
0.821	0.35	2.371
1.294	0.49	2.632
1.779	0.66	2.693
2.273	0.79	2.882
2.764	0.93	2.986
3.389	1.07	3.171
4.122	1.25	3.304
5.338	1.51	3.538
6.726	1.78	3.786
8.168	1.98	4.118
9.305	2.17	4.291
10.969	2.34	4.691

Saturated Monolayer Volume (cc/g @ STP):	4.64
Langmuir Pressure (MPa):	10.90

DRY ASH FREE BASIS

0.392	0.35	1.119
0.821	0.75	1.094
1.294	1.07	1.214
1.779	1.43	1.242
2.273	1.71	1.329
2.764	2.01	1.378
3.389	2.32	1.463
4.122	2.70	1.524
5.338	3.27	1.632
6.726	3.85	1.747
8.168	4.30	1.900
9.305	4.70	1.979
10.969	5.07	2.164

Saturated Monolayer Volume (cc/g @ STP, daf):	10.06
Langmuir Pressure (MPa):	10.90
Correlation Coefficient:	0.9927

4-LA-1 Methane

GAS ADSORPTION ISOTHERM SI UNITS

MOISTURE FREE ASH INCLUDED

		Moisture Content (EQ) % :	15.70
Isotherm Temperature º C:	36.1	Ash Content % :	38.17
Gas used:	Methane	Helium Density g/cc	1.588

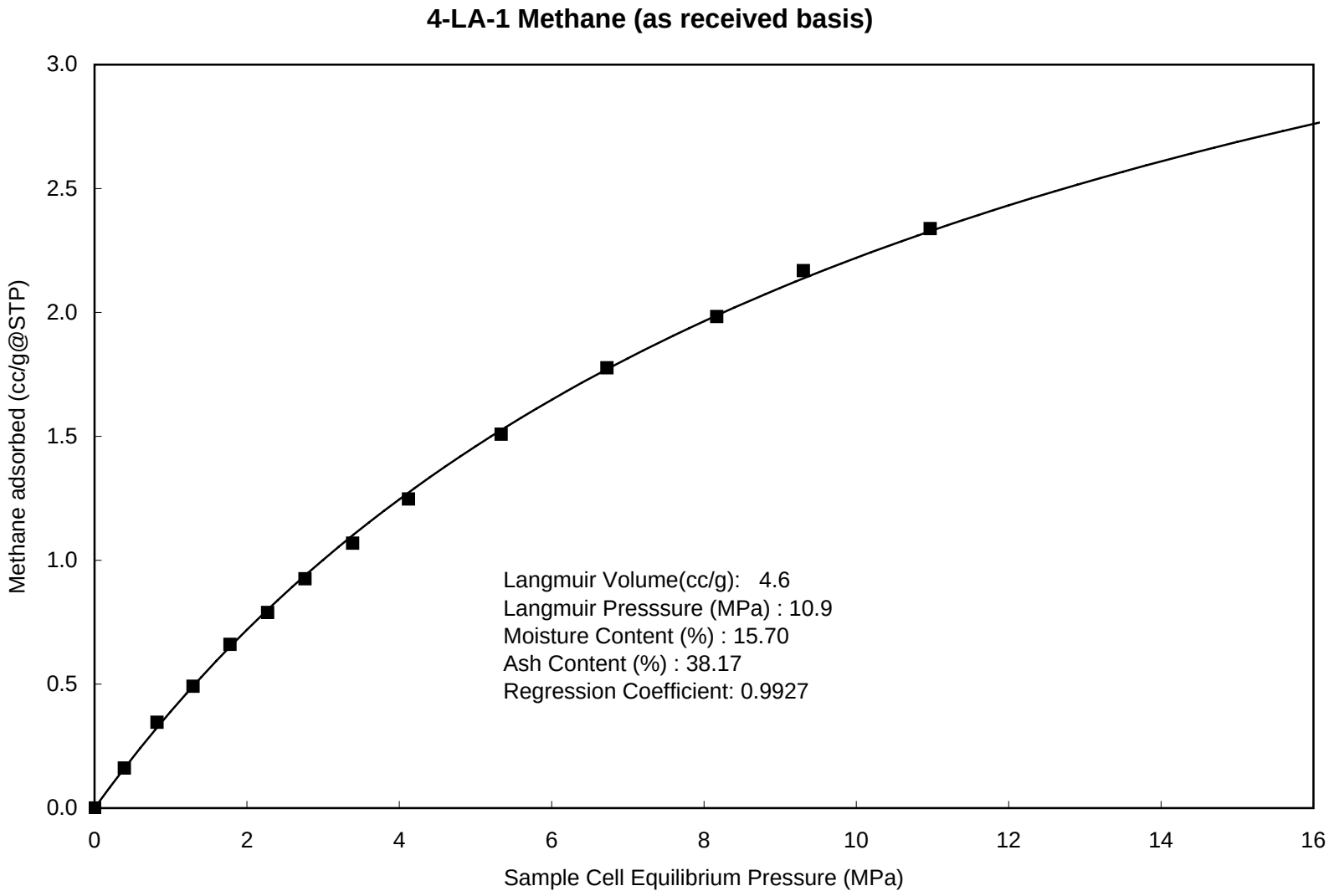
PRESSURE (MPa)	ADSORBED GAS (cc/g@STP)	P / V
0.392	0.19	2.05
0.821	0.41	2.00
1.294	0.58	2.22
1.779	0.78	2.27
2.273	0.94	2.43
2.764	1.10	2.52
3.389	1.27	2.67
4.122	1.48	2.79
5.338	1.79	2.98
6.726	2.11	3.19
8.168	2.35	3.47
9.305	2.57	3.62
10.969	2.77	3.95

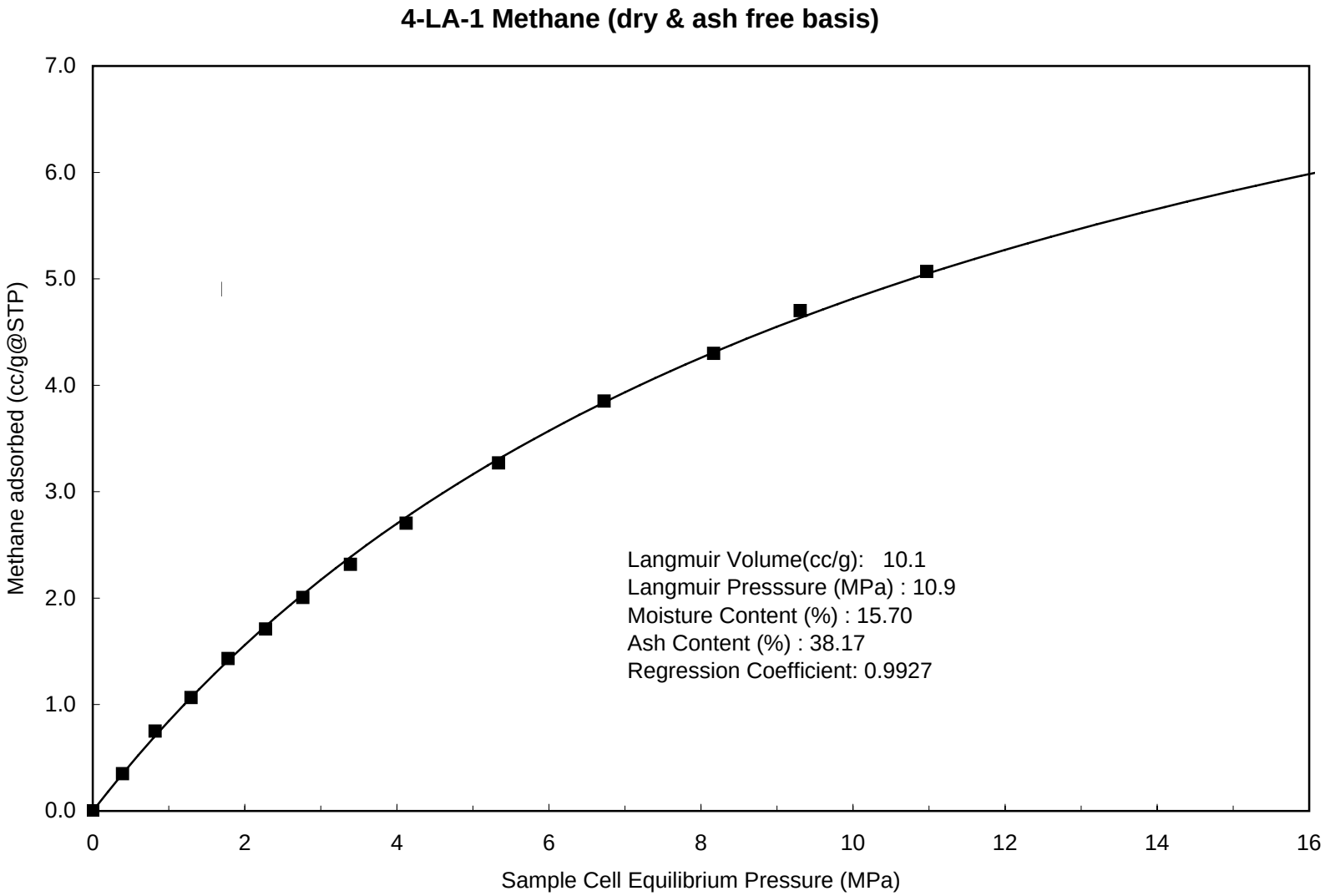
Saturated Monolayer Volume (cc/g):	5.51
Langmuir Pressure (MPa):	10.90

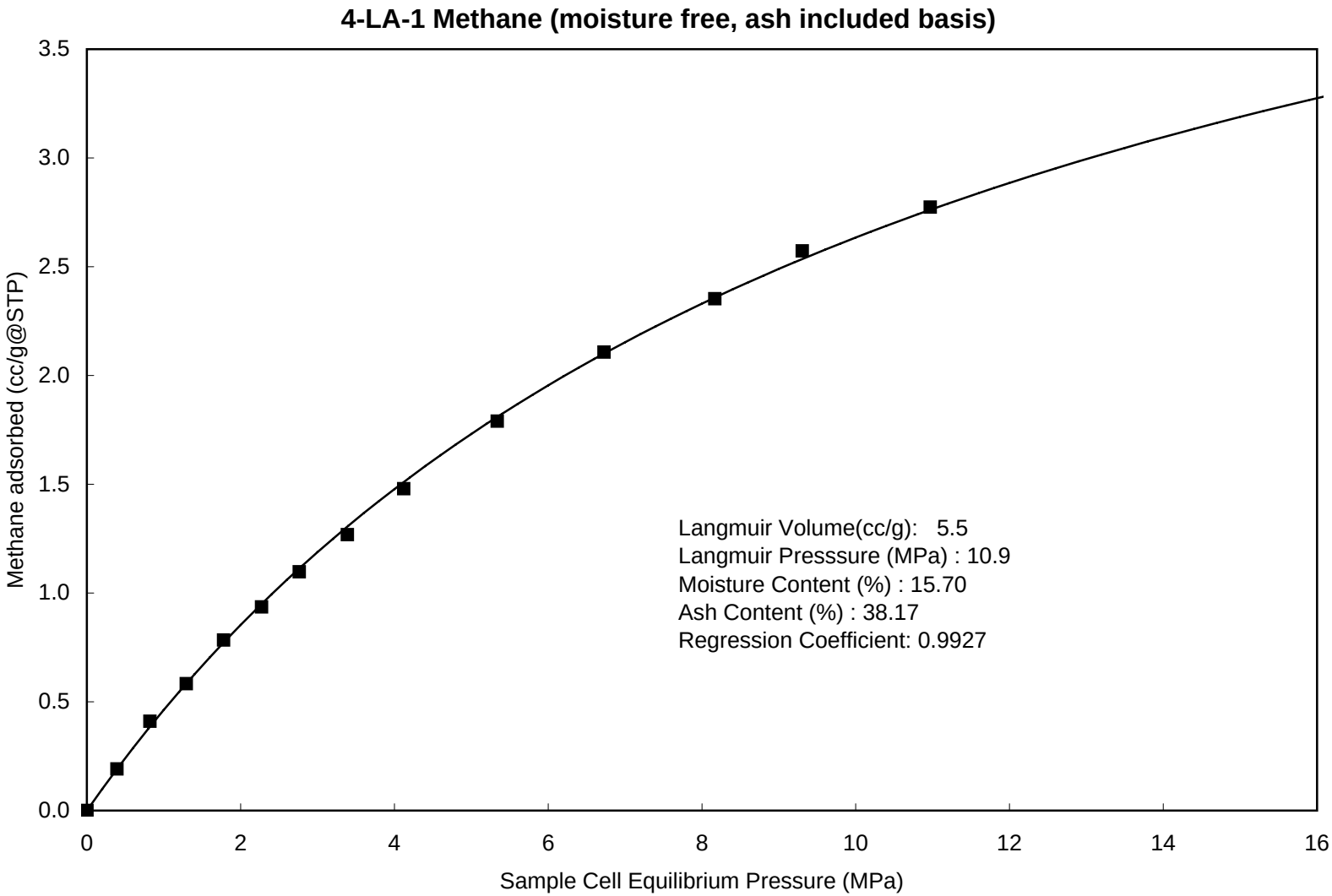
ASH FREE MOISTURE INCLUDED

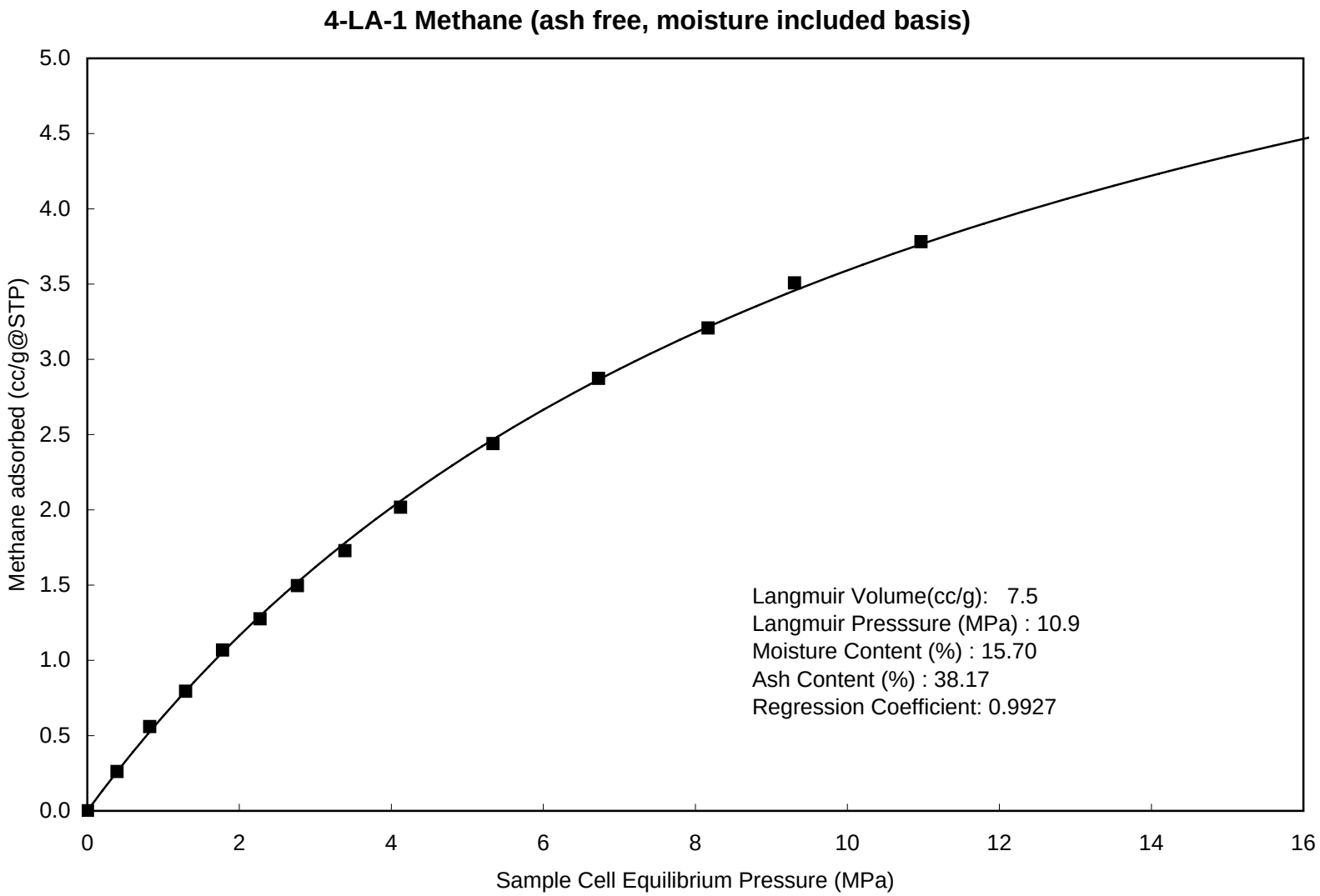
0.392	0.26	0.00
0.821	0.56	1.47
1.294	0.80	1.63
1.779	1.07	1.66
2.273	1.28	1.78
2.764	1.50	1.85
3.389	1.73	1.96
4.122	2.02	2.04
5.338	2.44	2.19
6.726	2.87	2.34
8.168	3.21	2.55
9.305	3.51	2.65
10.969	3.78	2.90

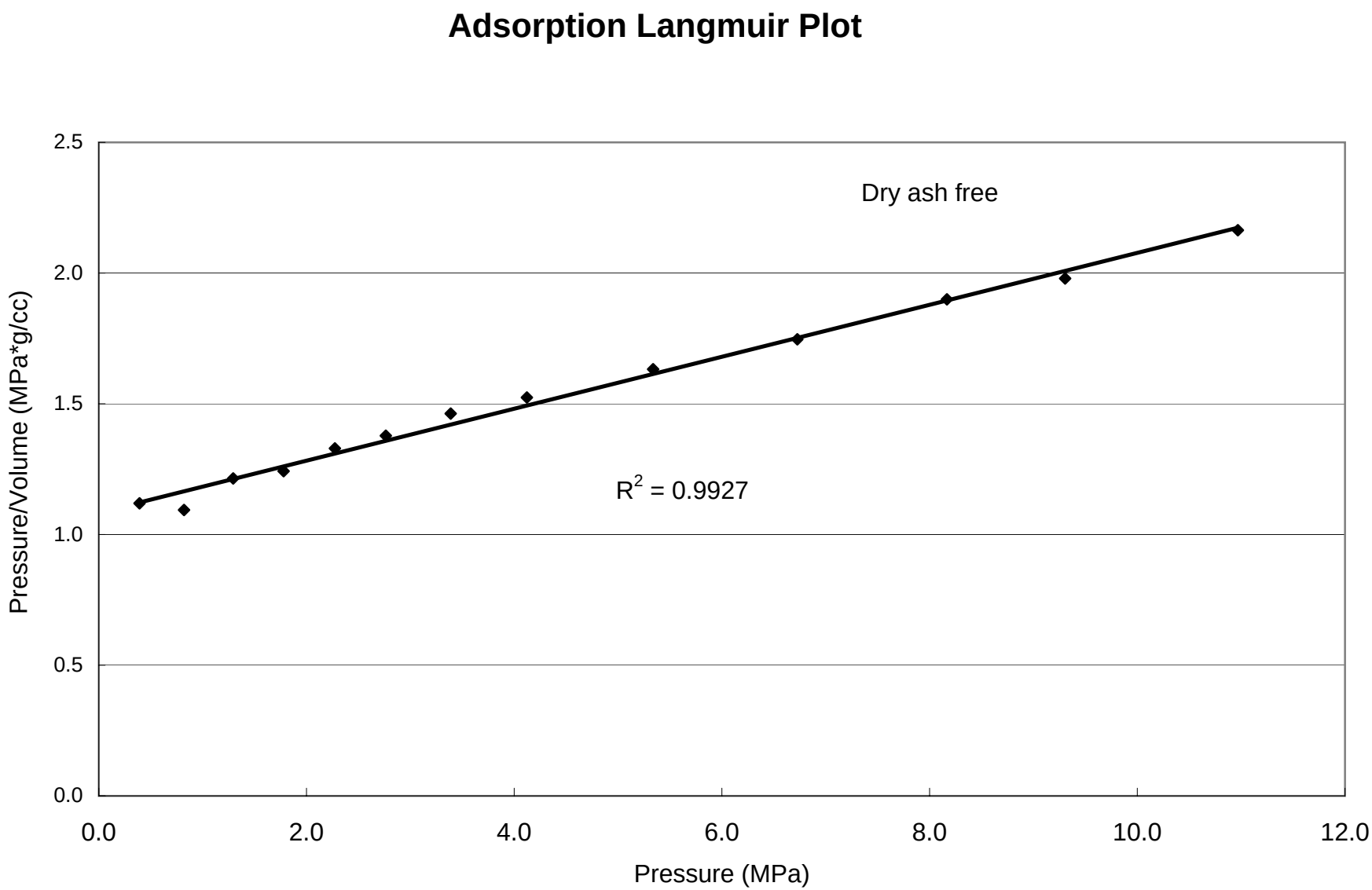
Saturated Monolayer Volume (cc/g, ash free):	7.51
Langmuir Pressure (MPa):	10.90
Correlation Coefficient:	0.9927


4-LA-1 Methane (as received basis)
Methane adsorbed (cc/g@STP)
Sample Cell Equilibrium Pressure (MPa)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
0
2
4
6
8
10
12
14
16
Langmuir Volume(cc/g): 4.6
Langmuir Presssure (MPa) : 10.9
Moisture Content (%) : 15.70
Ash Content (%) : 38.17
Regression Coefficient: 0.9927

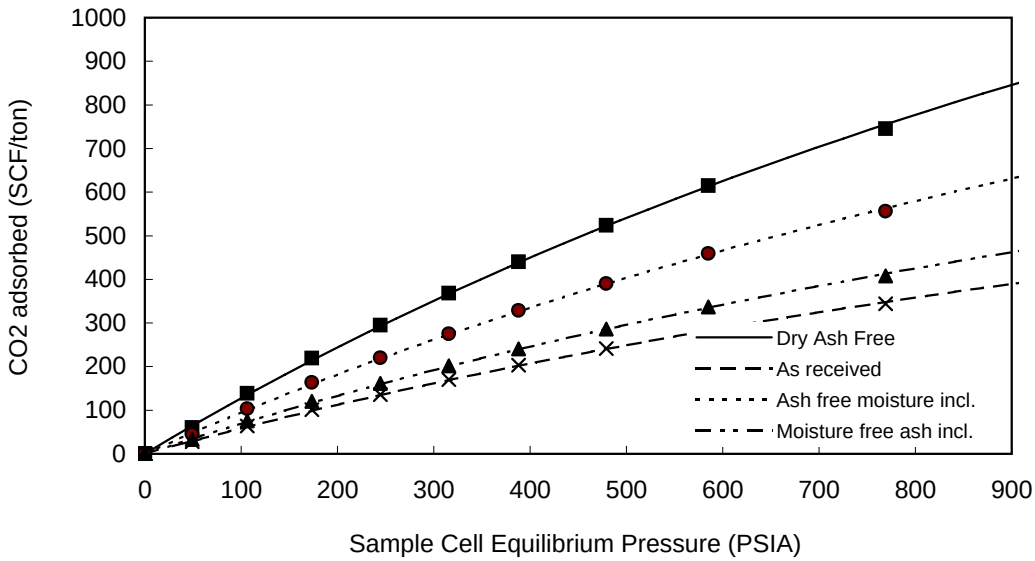

4-LA-1 Methane (dry & ash free basis)
Methane adsorbed (cc/g@STP)
Sample Cell Equilibrium Pressure (MPa)
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
0
2
4
6
8
10
12
14
16
Langmuir Volume(cc/g): 10.1
Langmuir Presssure (MPa) : 10.9
Moisture Content (%) : 15.70
Ash Content (%) : 38.17
Regression Coefficient: 0.9927


4-LA-1 Methane (moisture free, ash included basis)
Methane adsorbed (cc/g@STP)
Sample Cell Equilibrium Pressure (MPa)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
0
2
4
6
8
10
12
14
16
Langmuir Volume(cc/g): 5.5
Langmuir Presssure (MPa) : 10.9
Moisture Content (%) : 15.70
Ash Content (%) : 38.17
Regression Coefficient: 0.9927


4-LA-1 Methane (ash free, moisture included basis)
Methane adsorbed (cc/g@STP)
Sample Cell Equilibrium Pressure (MPa)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
0
2
4
6
8
10
12
14
16
Langmuir Volume(cc/g): 7.5
Langmuir Presssure (MPa) : 10.9
Moisture Content (%) : 15.70
Ash Content (%) : 38.17
Regression Coefficient: 0.9927


Adsorption Langmuir Plot
Dry ash free
R^2 = 0.9927
Pressure/Volume (MPa*g/cc)
Pressure (MPa)
2.5
2.0
1.5
1.0
0.5
0.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0

4-LA-1 Carbon Dioxide



Pressure (PSIA)	Adsorbed gas (ft^3 /ton)			
	As Received	moisture free ash incl.	ash free moisture incl.	Dry Ash Free
49	27.7	32.9	44.9	60.1
106	64.0	75.9	103.4	138.6
173	101.3	120.2	163.9	219.7
244	135.9	161.2	219.8	294.7
316	170.0	201.7	275.0	368.6
388	203.0	240.8	328.4	440.1
479	241.5	286.5	390.6	523.5
585	283.8	336.6	459.0	615.2
769	343.7	407.8	555.9	745.2

Langmuir Parameters

	As Received	Moisture free ash incl	Ash free moisture incl	Dry Ash Free
Vol. (ft^3 /ton)	1322.3	1568.5	2138.5	2866.4
Pressure (PSIA)	2150.0	2150.0	2150.0	2150.0

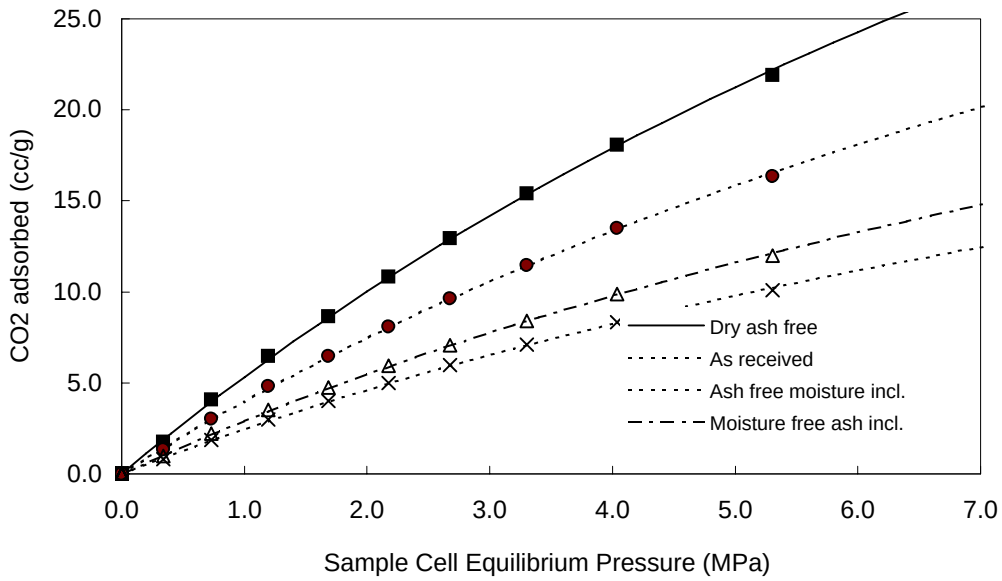
SUMMARY OF ADSORPTION ANALYSES IMP. UNITS

Isotherm Temperature: 97.0 ºF

Goodness of fit of Langmuir regression: 0.94

% Ash= 38.17 % Moisture= 15.70 Density g/cc 1.588

4-LA-1 Carbon Dioxide



Pressure (MPa)	Adsorbed gas (cc/g)			
	As Received	Moisture free ash incl.	ash free moisture incl	Dry Ash Free
0.338	0.82	0.97	1.32	1.77
0.732	1.88	2.23	3.04	4.07
1.195	2.98	3.53	4.82	6.46
1.685	3.99	4.74	6.46	8.66
2.177	5.00	5.93	8.08	10.83
2.675	5.97	7.08	9.65	12.93
3.303	7.10	8.42	11.48	15.38
4.035	8.34	9.89	13.49	18.08
5.303	10.10	11.98	16.34	21.90

Langmuir Parameters

	As Received	Moisture free ash incl.	Ash free moisture incl	Dry Ash Free
Vol. (cc/g)	38.86	46.10	62.85	84.24
Pressure (MPa)	14.82	14.82	14.82	14.82

SUMMARY OF ADSORPTION ANALYSES SI UNITS

Isotherm Temperature: **36.1 ºC**

Goodness of fit of Langmuir regression: **0.94**

% Ash= 38.17 **% Moisture = 15.70** **Density (g/cc) 1.588**

4-LA-1 Carbon Dioxide

CO2 Adsorption (Imperial Units)

Summary of Analyses		
	As Received	DAF basis
Langmuir Volume (SCF)	1322	2866
Langmuir Pressure (PSIA)	2150	2150
Goodness of fit Langmuir Equation R-squared	0.94	0.94
Ash Content Wt.%	38.17	38.17
Equilibrium Moisture Wt.%	15.70	15.70

Contents of Appendix

data sheets	***Charts***
As Received	As Received
Dry Ash Free	Dry Ash Free
Dry Ash Included	Dry Ash Included
Moist Ash Free	Moist Ash Free

4-LA-1 Carbon Dioxide

GAS ADSORPTION ISOTHERM IMPERIAL UNITS

AS RECEIVED BASIS

		Moisture Content % :	15.70
Isotherm Temperature º F:	97.0	Ash Content, % :	38.17
Gas used:	CO2	Helium Density g/cc	1.588

PRESSURE (PSI)	ADSORBED GAS (SCF/ton)	P / V
49	27.75	1.77
106	63.96	1.66
173	101.34	1.71
244	135.93	1.80
316	170.04	1.86
388	203.03	1.91
479	241.49	1.98
585	283.78	2.06
769	343.74	2.24

Saturated Monolayer Volume (SCF/ton):	1322.3
Langmuir Pressure (PSIA):	2150.0
Correlation Coefficient:	0.9393

DRY ASH FREE BASIS

49	60.15	0.82
106	138.65	0.77
173	219.68	0.79
244	294.67	0.83
316	368.61	0.86
388	440.13	0.88
479	523.49	0.92
585	615.18	0.95
769	745.16	1.03

Saturated Monolayer Volume (SCF/ton, daf):	2866
Langmuir Pressure (PSIA):	2150
Correlation Coefficient:	0.9393

4-LA-1 Carbon Dioxide

GAS ADSORPTION ISOTHERM IMPERIAL UNITS

MOISTURE FREE ASH INCLUDED

		Moisture Content % :	15.70
Isotherm Temperature° F:	97.0	Ash Content, % :	38.17
Gas used:	CO2	Helium Density g/cc	1.588

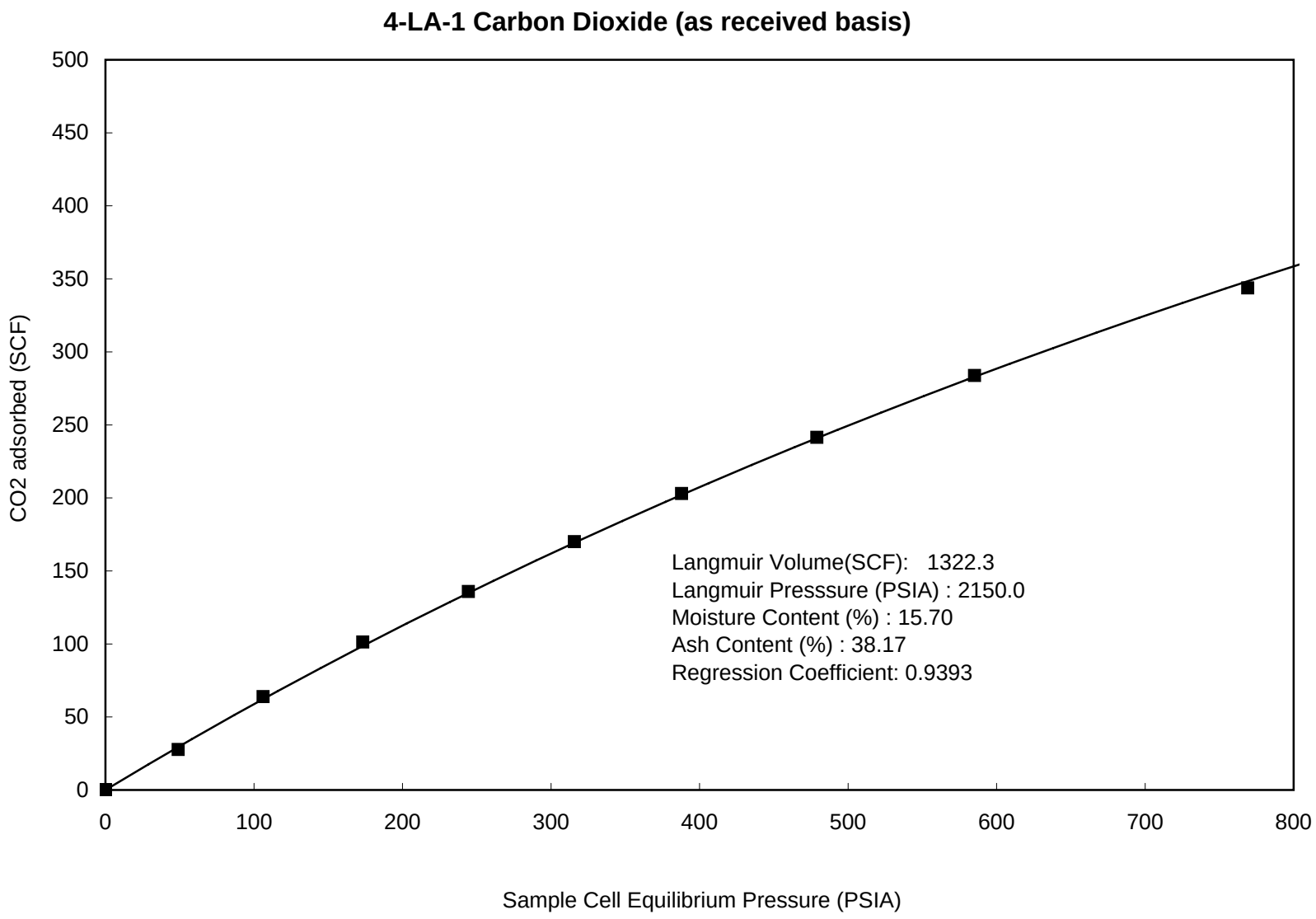
PRESSURE (PSI)	ADSORBED GAS (SCF/ton)	P / V
49	33	1.49
106	76	1.40
173	120	1.44
244	161	1.52
316	202	1.57
388	241	1.61
479	286	1.67
585	337	1.74
769	408	1.89

Saturated Monolayer Volume (SCF/ton):	1569
Langmuir Pressure (PSIA):	2150
Correlation Coefficient:	0.9393

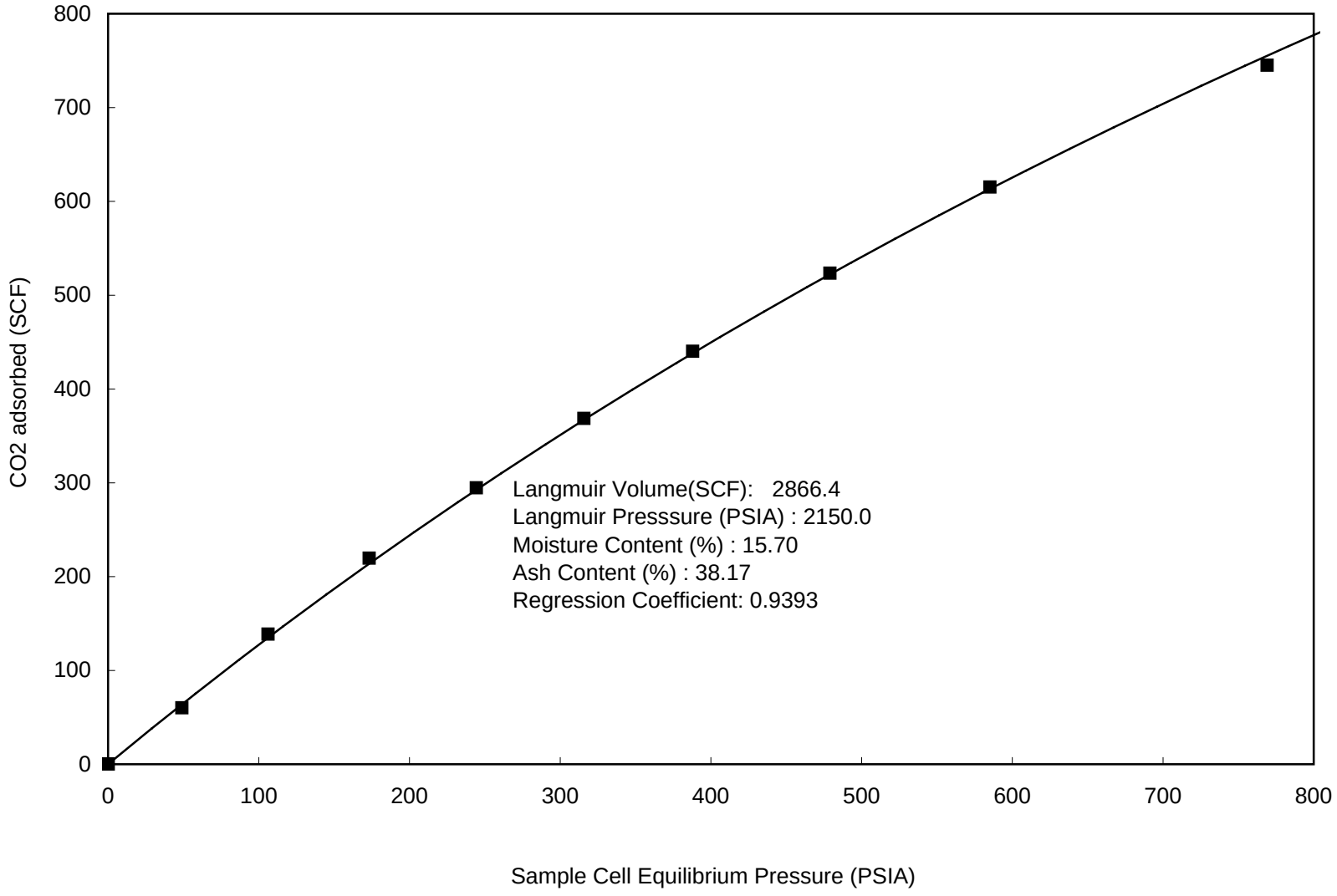
ASH FREE MOISTURE INCLUDED

49	45	1.09
106	103	1.03
173	164	1.06
244	220	1.11
316	275	1.15
388	328	1.18
479	391	1.23
585	459	1.28
769	556	1.38

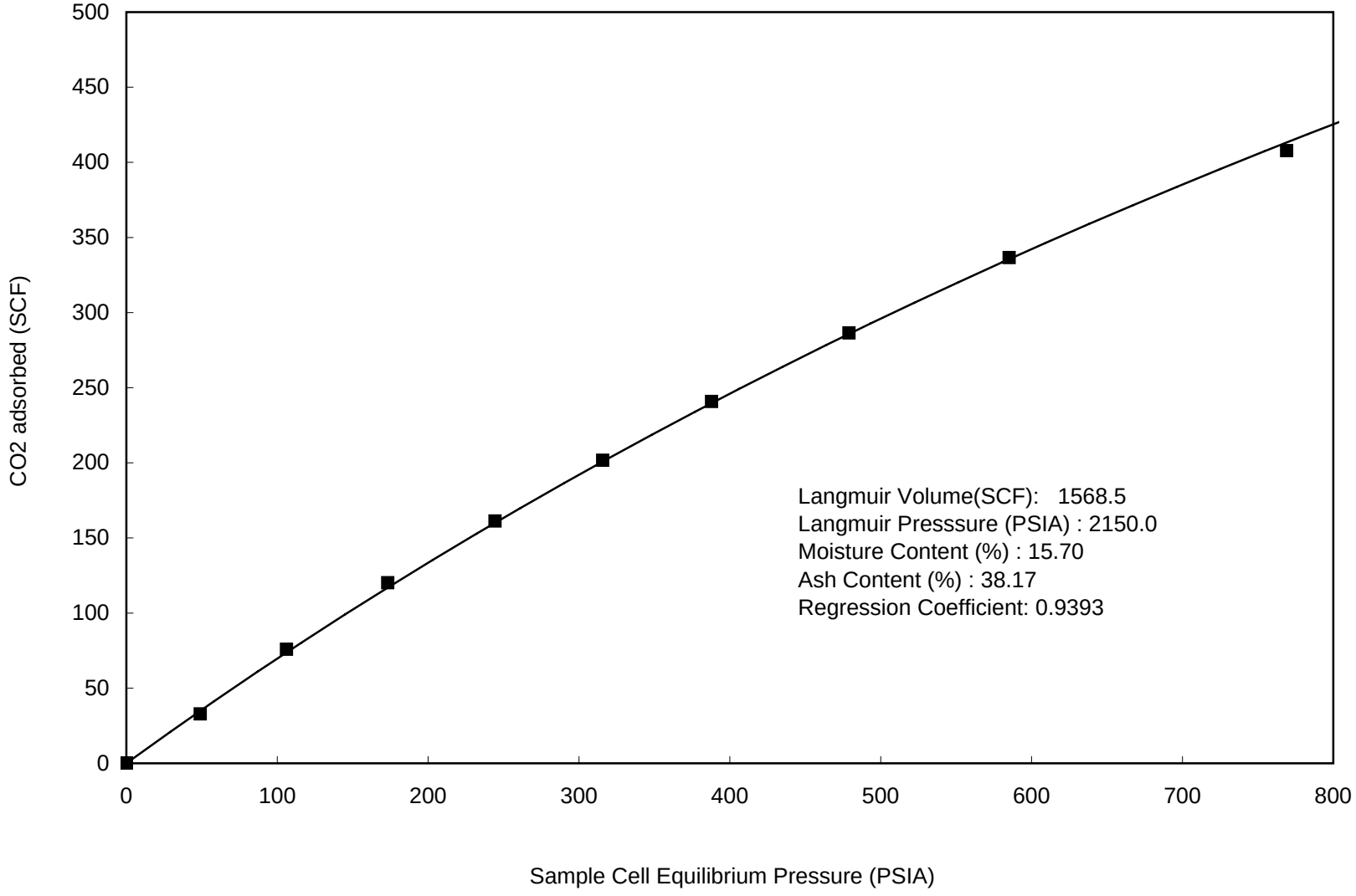
Saturated Monolayer Volume (SCF/ton):	2139
Langmuir Pressure (PSIA):	2150
Correlation Coefficient:	0.9393


4-LA-1 Carbon Dioxide (as received basis)
CO2 adsorbed (SCF)
Sample Cell Equilibrium Pressure (PSIA)
0
50
100
150
200
250
300
350
400
450
500
0
100
200
300
400
500
600
700
800
Langmuir Volume(SCF): 1322.3
Langmuir Presssure (PSIA) : 2150.0
Moisture Content (%) : 15.70
Ash Content (%) : 38.17
Regression Coefficient: 0.9393

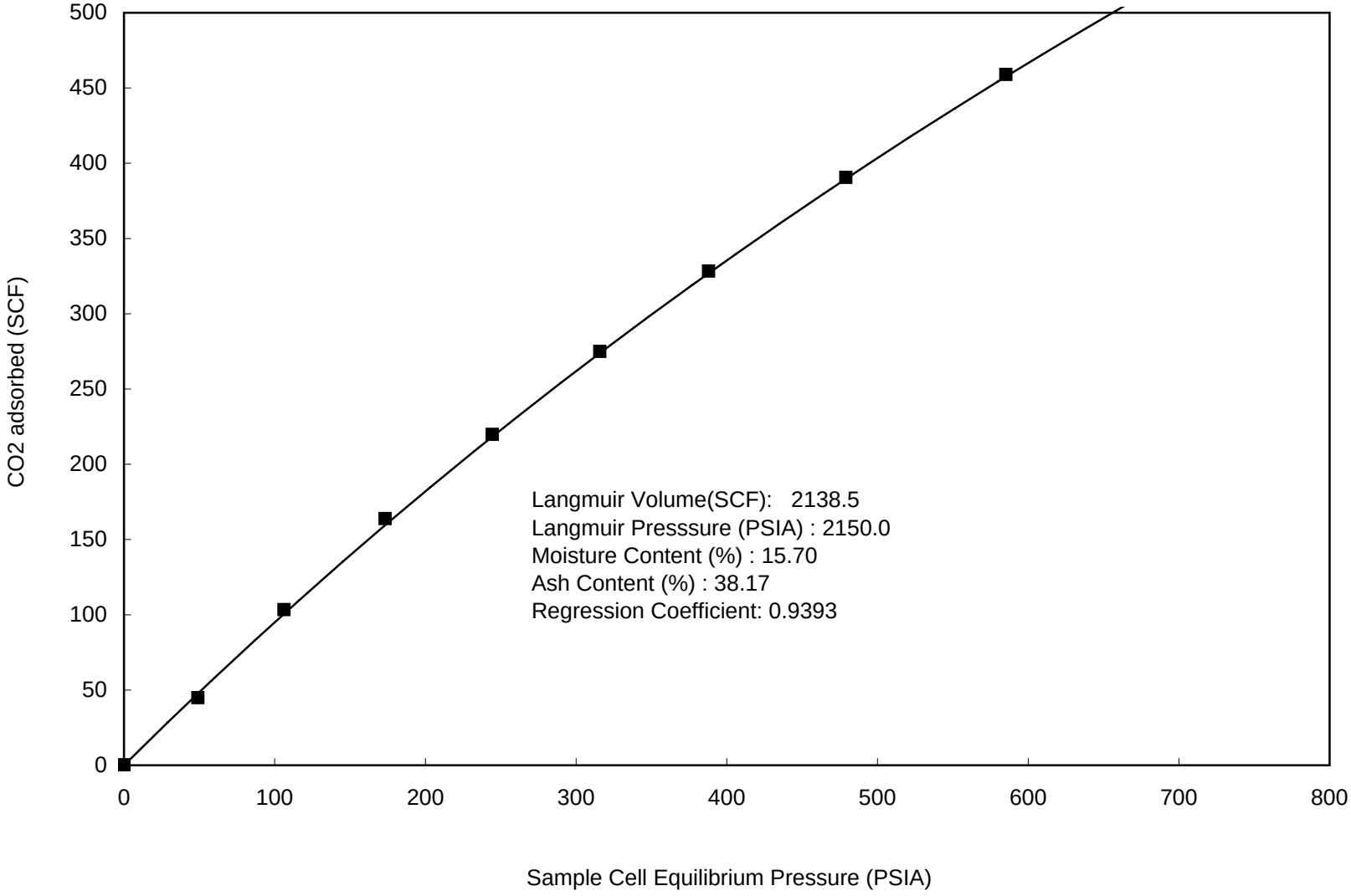
4-LA-1 Carbon Dioxide (dry & ash free basis)

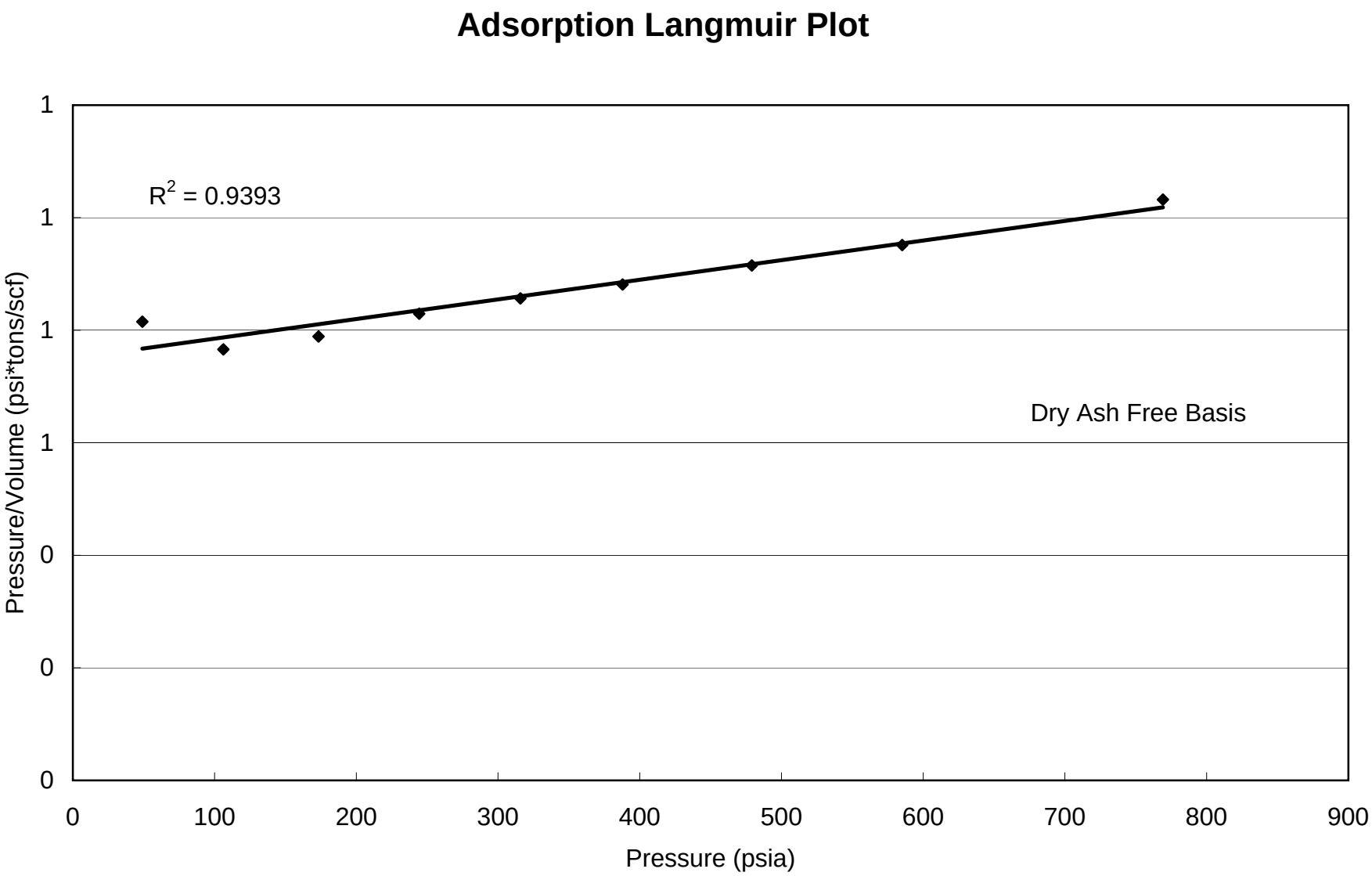


4-LA-1 Carbon Dioxide (moisture free, ash included basis)



4-LA-1 Carbon Dioxide (ash free, moisture included basis)




Adsorption Langmuir Plot
R2 = 0.9393
Dry Ash Free Basis
Pressure/Volume (psi*tons/scf)
Pressure (psia)
1
1
1
1
0
0
0
0
100
200
300
400
500
600
700
800
900

4-LA-1 Carbon Dioxide

CO2 Adsorption (SI Units)

Summary of Analyses

	As Received	DAF basis
Langmuir Volume cc/g	38.86	84.24
Langmuir Pressure MPa	14.82	14.82
Goodness of fit Langmuir Equation R-squared	0.94	0.94
Ash Content Wt.%	38.17	38.17
Equilibrium Moisture Wt.%	15.70	15.70

Contents of Appendix

data sheets	***Charts***
As Received	As Received
Dry Ash Free	Dry Ash Free
Dry Ash Included	Dry Ash Included
Moist Ash Free	Moist Ash Free

4-LA-1 Carbon Dioxide

GAS ADSORPTION ISOTHERM SI UNITS

AS RECEIVED BASIS

Sample I.D. :	4-LA-1 Carbon Dioxide	Moisture Content (EQ) % :	15.70
Isotherm Temperature º C:	36.1	Ash Content % :	38.17
Gas used:	CO2	Helium Density g/cc	1.588

PRESSURE (MPa)	ADSORBED GAS (cc/g @STP)	P / V
0.338	0.82	0.415
0.732	1.88	0.389
1.195	2.98	0.401
1.685	3.99	0.422
2.177	5.00	0.436
2.675	5.97	0.448
3.303	7.10	0.465
4.035	8.34	0.484
5.303	10.10	0.525

Saturated Monolayer Volume (cc/g @ STP):	38.86
Langmuir Pressure (MPa):	14.82

DRY ASH FREE BASIS

0.338	1.77	0.191
0.732	4.07	0.180
1.195	6.46	0.185
1.685	8.66	0.195
2.177	10.83	0.201
2.675	12.93	0.207
3.303	15.38	0.215
4.035	18.08	0.223
5.303	21.90	0.242

Saturated Monolayer Volume (cc/g @ STP, daf):	84.24
Langmuir Pressure (MPa):	14.82
Correlation Coefficient:	0.9393

4-LA-1 Carbon Dioxide

GAS ADSORPTION ISOTHERM SI UNITS

MOISTURE FREE ASH INCLUDED

		Moisture Content (EQ) % :	15.70
Isotherm Temperature º C:	36.1	Ash Content % :	38.17
Gas used:	CO2	Helium Density g/cc	1.588

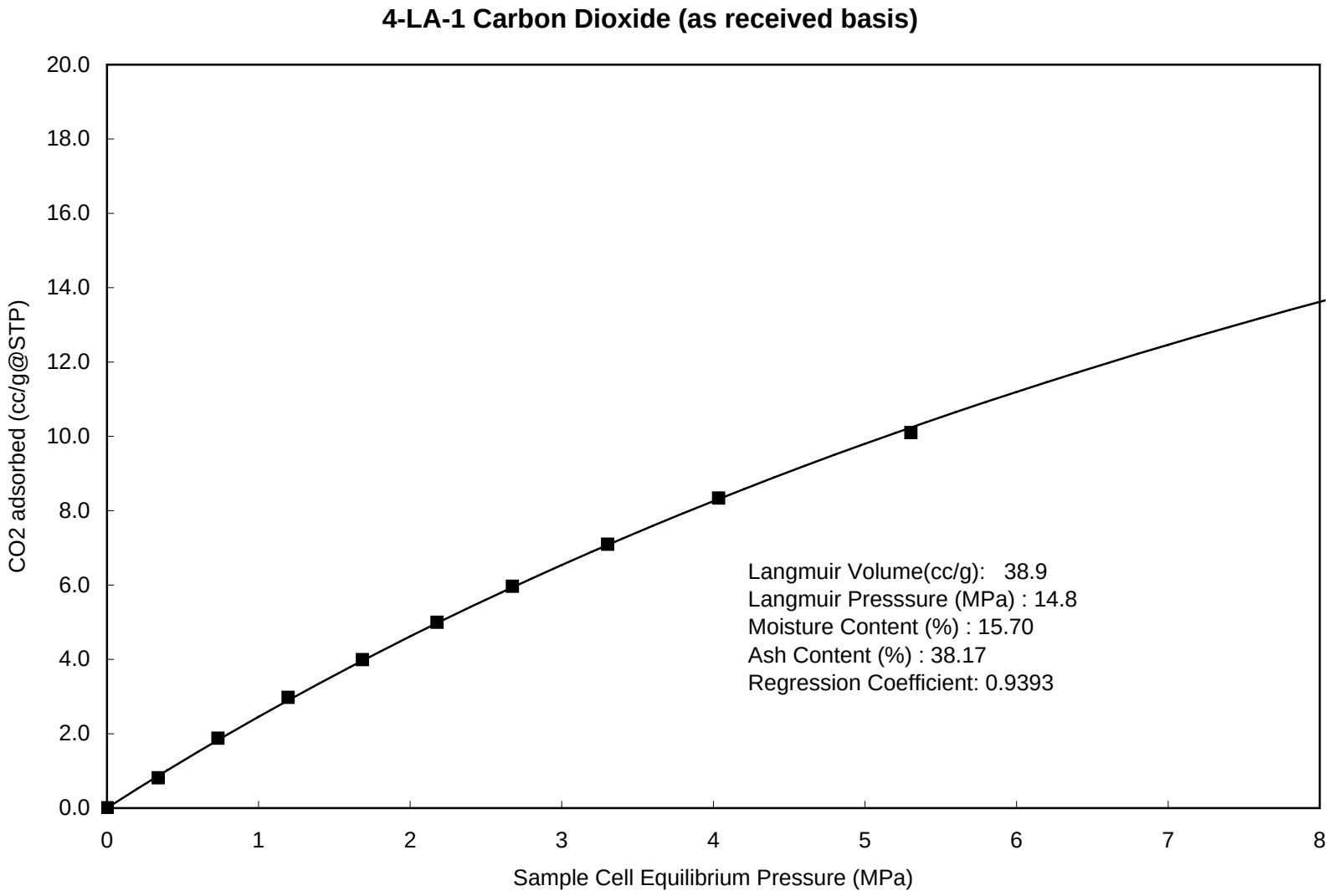
PRESSURE (MPa)	ADSORBED GAS (cc/g@STP)	P / V
0.338	0.97	0.35
0.732	2.23	0.33
1.195	3.53	0.34
1.685	4.74	0.36
2.177	5.93	0.37
2.675	7.08	0.38
3.303	8.42	0.39
4.035	9.89	0.41
5.303	11.98	0.44

Saturated Monolayer Volume (cc/g):	46.10
Langmuir Pressure (MPa):	14.82

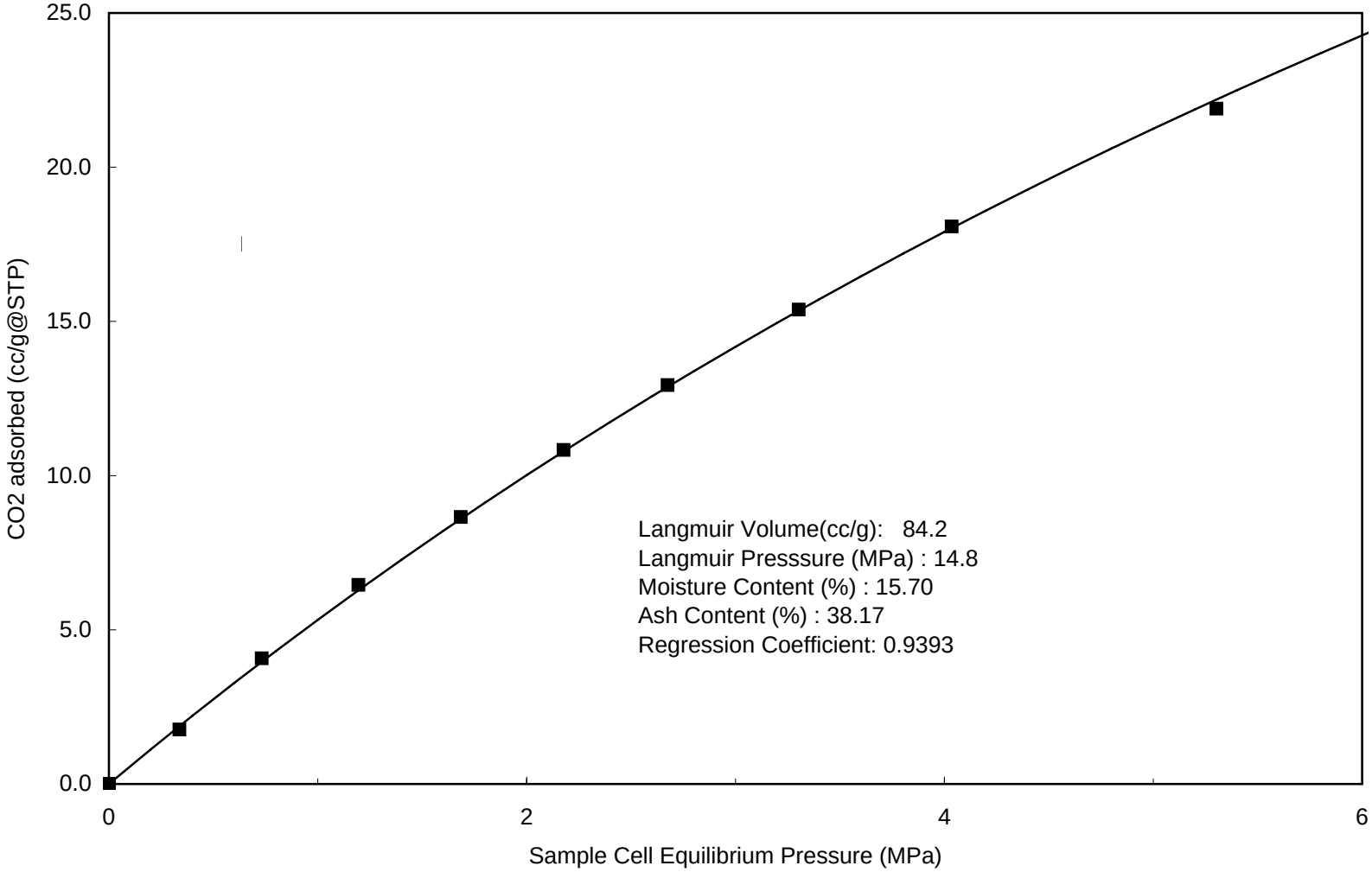
ASH FREE MOISTURE INCLUDED

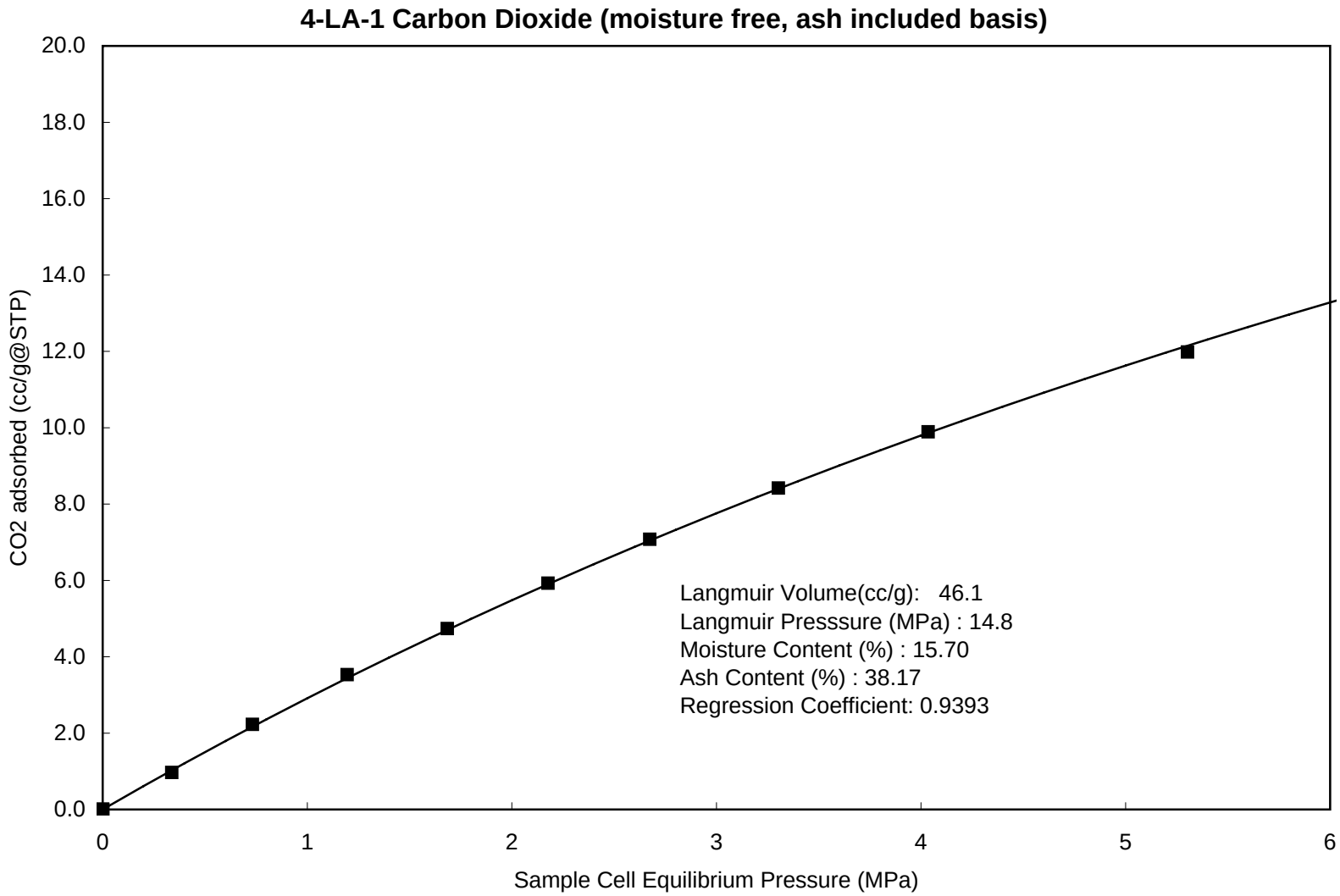
0.338	1.32	0.00
0.732	3.04	0.24
1.195	4.82	0.25
1.685	6.46	0.26
2.177	8.08	0.27
2.675	9.65	0.28
3.303	11.48	0.29
4.035	13.49	0.30
5.303	16.34	0.32

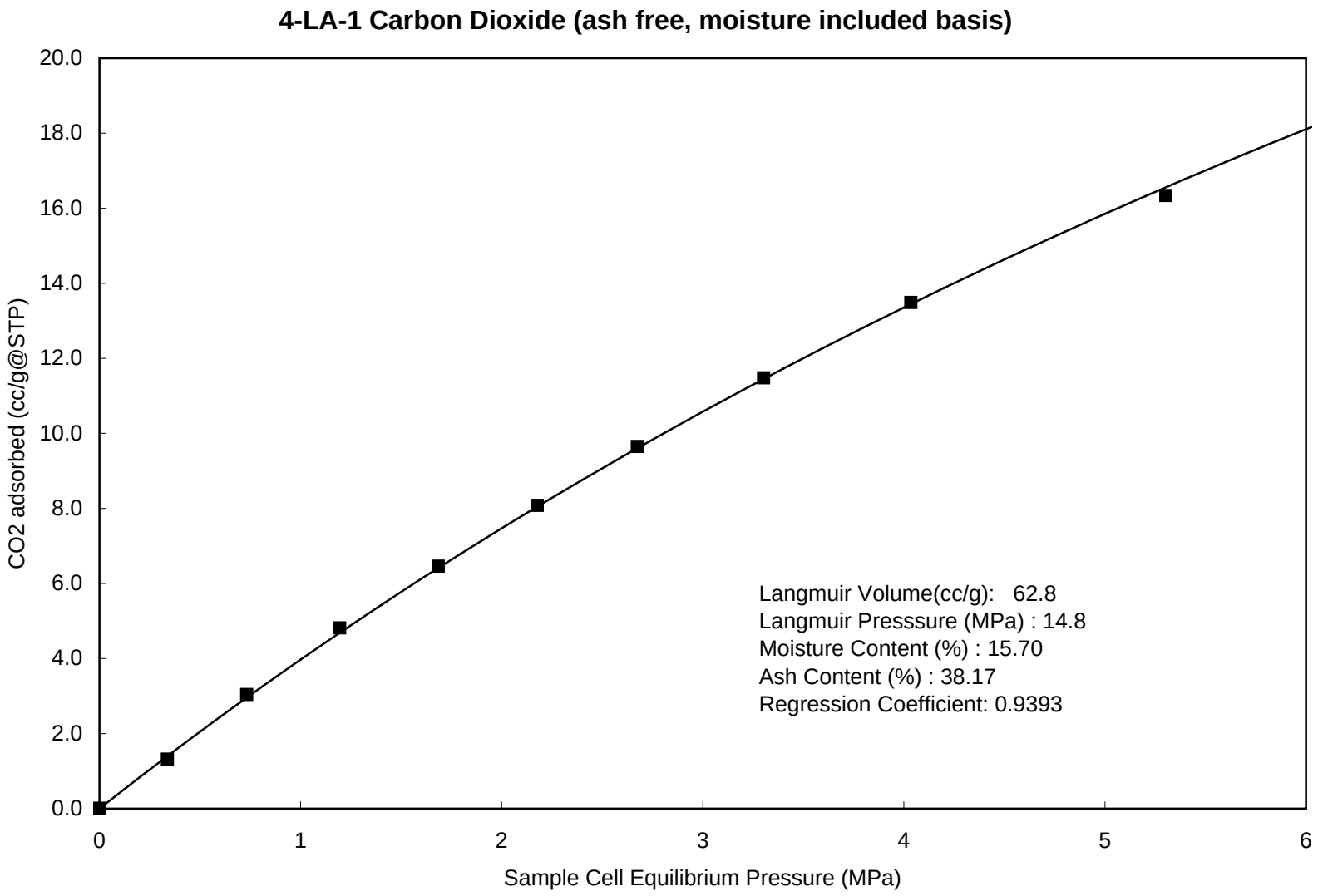
Saturated Monolayer Volume (cc/g, ash free):	62.85
Langmuir Pressure (MPa):	14.82
Correlation Coefficient:	0.9393

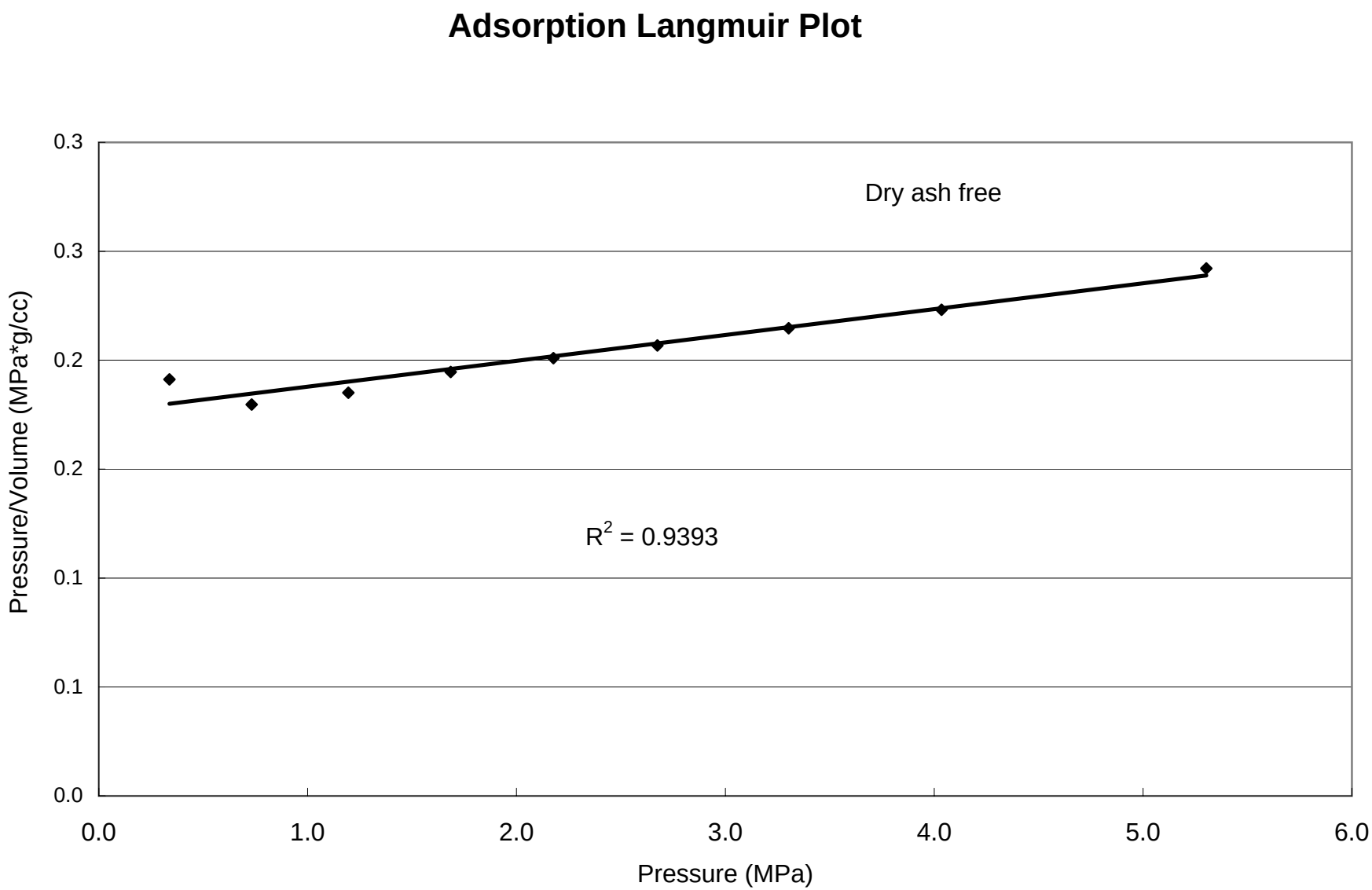

4-LA-1 Carbon Dioxide (as received basis)
CO2 adsorbed (cc/g@STP)
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
0
1
2
3
4
5
6
7
8
Sample Cell Equilibrium Pressure (MPa)
Langmuir Volume(cc/g): 38.9
Langmuir Presssure (MPa) : 14.8
Moisture Content (%) : 15.70
Ash Content (%) : 38.17
Regression Coefficient: 0.9393

4-LA-1 Carbon Dioxide (dry & ash free basis)

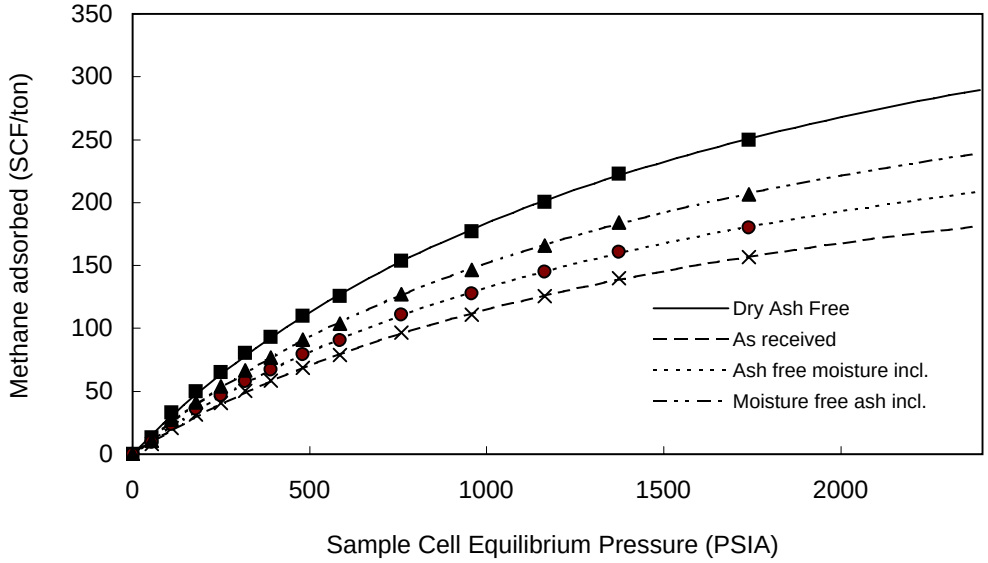



4-LA-1 Carbon Dioxide (moisture free, ash included basis)
CO2 adsorbed (cc/g@STP)
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
0
1
2
3
4
5
6
Sample Cell Equilibrium Pressure (MPa)
Langmuir Volume(cc/g): 46.1
Langmuir Presssure (MPa) : 14.8
Moisture Content (%) : 15.70
Ash Content (%) : 38.17
Regression Coefficient: 0.9393


4-LA-1 Carbon Dioxide (ash free, moisture included basis)
CO2 adsorbed (cc/g@STP)
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
0
1
2
3
4
5
6
Sample Cell Equilibrium Pressure (MPa)
Langmuir Volume(cc/g): 62.8
Langmuir Presssure (MPa) : 14.8
Moisture Content (%) : 15.70
Ash Content (%) : 38.17
Regression Coefficient: 0.9393


Adsorption Langmuir Plot
Dry ash free
R^2 = 0.9393
Pressure/Volume (MPa*g/cc)
0.3
0.3
0.2
0.2
0.1
0.1
0.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
Pressure (MPa)

5-1B Methane



Pressure (PSIA)	Adsorbed gas (ft^3 /ton)			
	As Received	moisture free ash incl.	ash free moisture incl.	Dry Ash Free
54	8.2	10.8	9.4	13.1
111	20.7	27.3	23.8	33.0
178	31.3	41.3	36.0	50.0
249	40.7	53.7	46.8	64.9
318	50.3	66.4	57.9	80.3
391	58.3	77.0	67.1	93.0
481	68.9	90.9	79.3	109.9
585	78.6	103.8	90.5	125.4
758	96.4	127.2	111.0	153.8
957	110.9	146.3	127.6	176.9
1164	125.8	166.0	144.7	200.6
1374	139.7	184.4	160.8	222.9
1741	156.6	206.6	180.2	249.7

Langmuir Parameters

	As Received	Moisture free ash incl	Ash free moisture incl	Dry Ash Free
Vol. (ft^3 /ton)	309.8	408.8	356.6	494.2
Pressure (PSIA)	1690.0	1690.0	1690.0	1690.0

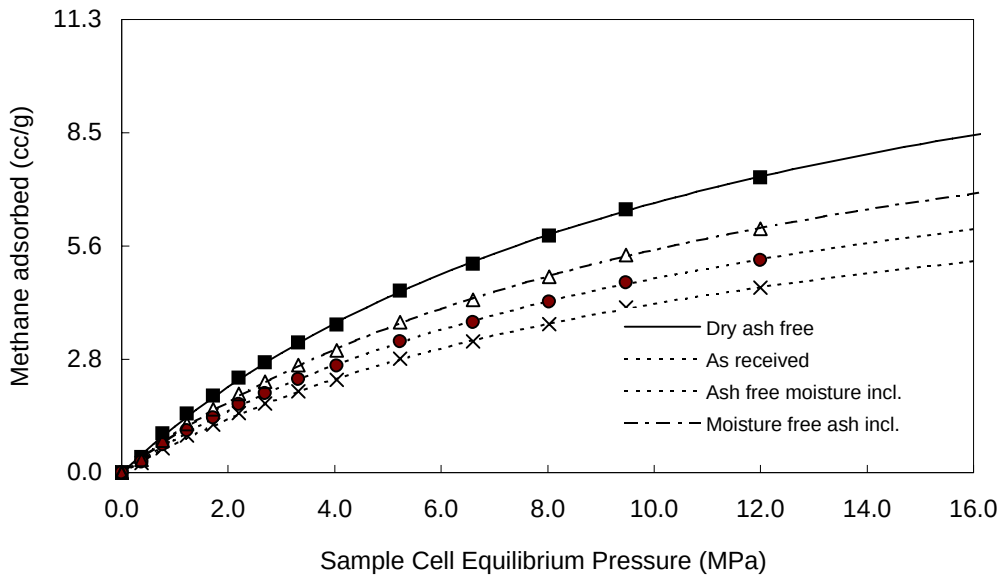
SUMMARY OF ADSORPTION ANALYSES IMP. UNITS

Isotherm Temperature: 107.6 ºF

Goodness of fit of Langmuir regression: 0.96

% Ash= 13.10 % Moisture= 24.21 Density g/cc 1.368

5-1B Methane



Pressure (MPa)	Adsorbed gas (cc/g)			
	As Received	Moisture free ash incl.	ash free moisture incl	Dry Ash Free
0.372	0.24	0.32	0.28	0.38
0.764	0.61	0.80	0.70	0.97
1.229	0.92	1.21	1.06	1.47
1.717	1.20	1.58	1.38	1.91
2.195	1.48	1.95	1.70	2.36
2.695	1.71	2.26	1.97	2.73
3.313	2.03	2.67	2.33	3.23
4.036	2.31	3.05	2.66	3.69
5.229	2.83	3.74	3.26	4.52
6.599	3.26	4.30	3.75	5.20
8.029	3.70	4.88	4.25	5.90
9.470	4.11	5.42	4.73	6.55
12.001	4.60	6.07	5.29	7.34

Langmuir Parameters

	As Received	Moisture free ash incl.	Ash free moisture incl	Dry Ash Free
Vol. (cc/g)	9.11	12.01	10.48	14.53
Pressure (MPa)	11.65	11.65	11.65	11.65

SUMMARY OF ADSORPTION ANALYSES SI UNITS

Isotherm Temperature: **42.0 ºC**

Goodness of fit of Langmuir regression: **0.96**

% Ash= 13.10 **% Moisture = 24.21** **Density (g/cc) 1.368**

5-1B Methane

Methane Adsorption
(Imperial Units)

Summary of Analyses		
	As Received	DAF basis
Langmuir Volume (SCF)	310	494
Langmuir Pressure (PSIA)	1690	1690
Goodness of fit Langmuir Equation R-squared	0.96	0.96
Ash Content Wt.%	13.10	13.10
Equilibrium Moisture Wt.%	24.21	24.21

Contents of Appendix

data sheets	***Charts***
As Received	As Received
Dry Ash Free	Dry Ash Free
Dry Ash Included	Dry Ash Included
Moist Ash Free	Moist Ash Free

5-1B Methane

GAS ADSORPTION ISOTHERM IMPERIAL UNITS

AS RECEIVED BASIS

		Moisture Content % :	24.21
Isotherm Temperature º F:	107.6	Ash Content, % :	13.10
Gas used:	Methane	Helium Density g/cc	1.368

PRESSURE (PSI)	ADSORBED GAS (SCF/ton)	P / V
54	8.20	6.58
111	20.67	5.36
178	31.31	5.69
249	40.68	6.12
318	50.33	6.32
391	58.32	6.70
481	68.92	6.97
585	78.64	7.44
758	96.44	7.86
957	110.91	8.63
1164	125.78	9.26
1374	139.74	9.83
1741	156.56	11.12

Saturated Monolayer Volume (SCF/ton):	309.8
Langmuir Pressure (PSIA):	1690.0
Correlation Coefficient:	0.9641

DRY ASH FREE BASIS

54	13.08	4.12
111	32.98	3.36
178	49.95	3.57
249	64.89	3.84
318	80.29	3.96
391	93.04	4.20
481	109.93	4.37
585	125.45	4.67
758	153.84	4.93
957	176.92	5.41
1164	200.63	5.80
1374	222.91	6.16
1741	249.73	6.97

Saturated Monolayer Volume (SCF/ton, daf):	494
Langmuir Pressure (PSIA):	1690
Correlation Coefficient:	0.9641

5-1B Methane

GAS ADSORPTION ISOTHERM IMPERIAL UNITS

MOISTURE FREE ASH INCLUDED

		Moisture Content % :	24.21
Isotherm Temperature° F:	107.6	Ash Content, % :	13.10
Gas used:	Methane	Helium Density g/cc	1.368

PRESSURE (PSI)	ADSORBED GAS (SCF/ton)	P / V
54	11	4.99
111	27	4.06
178	41	4.31
249	54	4.64
318	66	4.79
391	77	5.08
481	91	5.28
585	104	5.64
758	127	5.96
957	146	6.54
1164	166	7.02
1374	184	7.45
1741	207	8.43

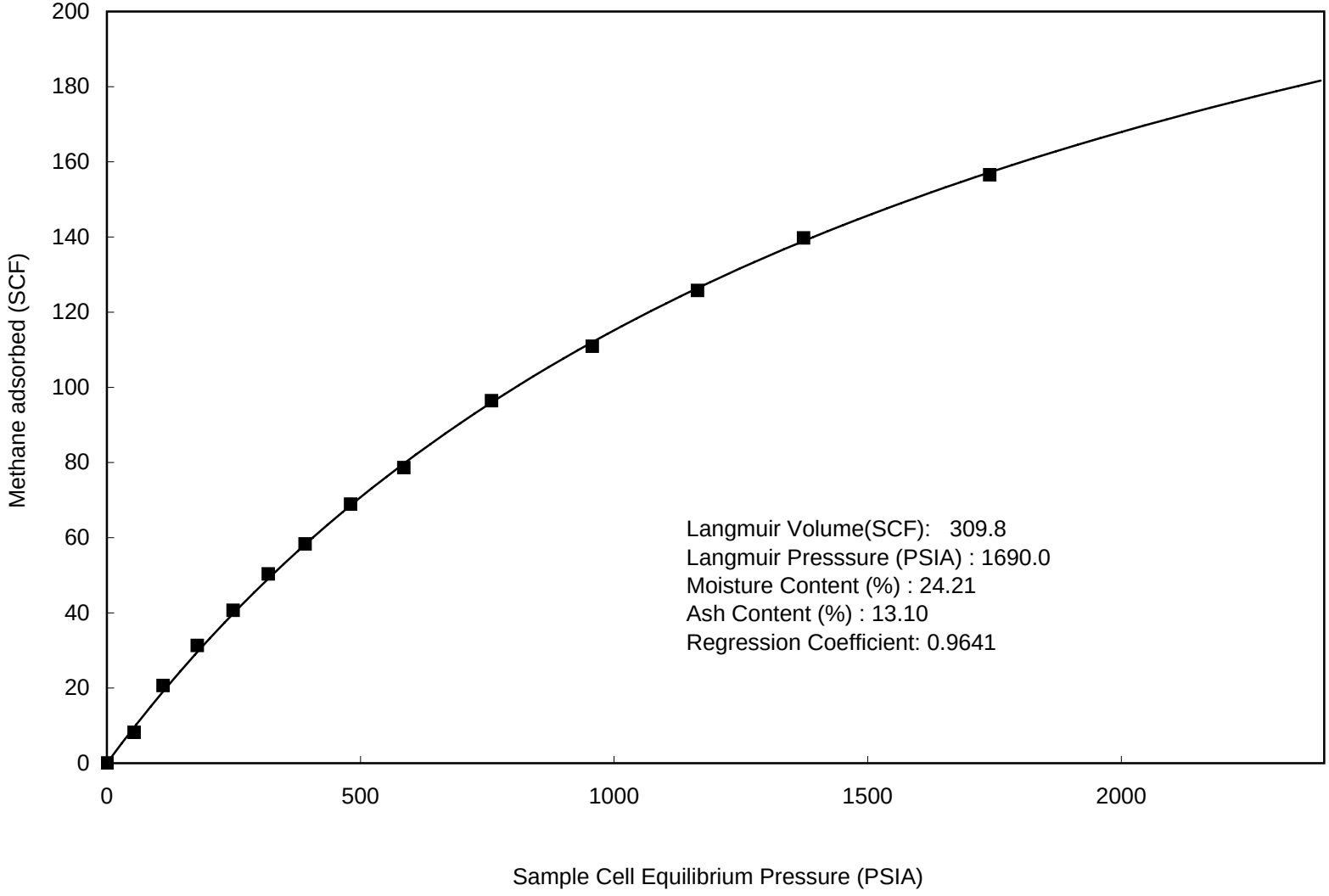
Saturated Monolayer Volume (SCF/ton):	409
Langmuir Pressure (PSIA):	1690
Correlation Coefficient:	0.9641

ASH FREE MOISTURE INCLUDED

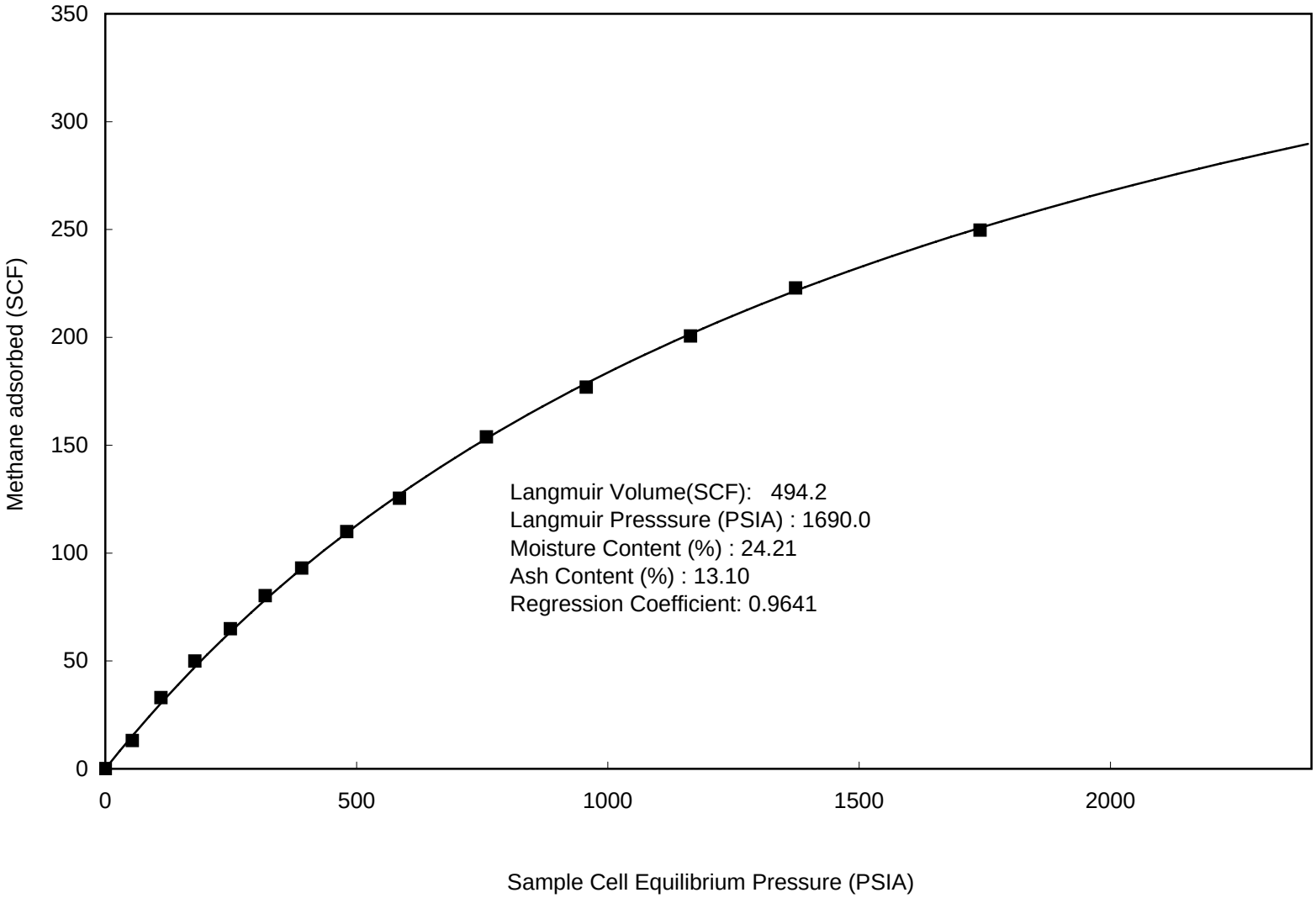
54	9	5.72
111	24	4.66
178	36	4.95
249	47	5.32
318	58	5.50
391	67	5.82
481	79	6.06
585	90	6.47
758	111	6.83
957	128	7.50
1164	145	8.05
1374	161	8.54
1741	180	9.66

Saturated Monolayer Volume (SCF/ton):	357
Langmuir Pressure (PSIA):	1690
Correlation Coefficient:	0.9641

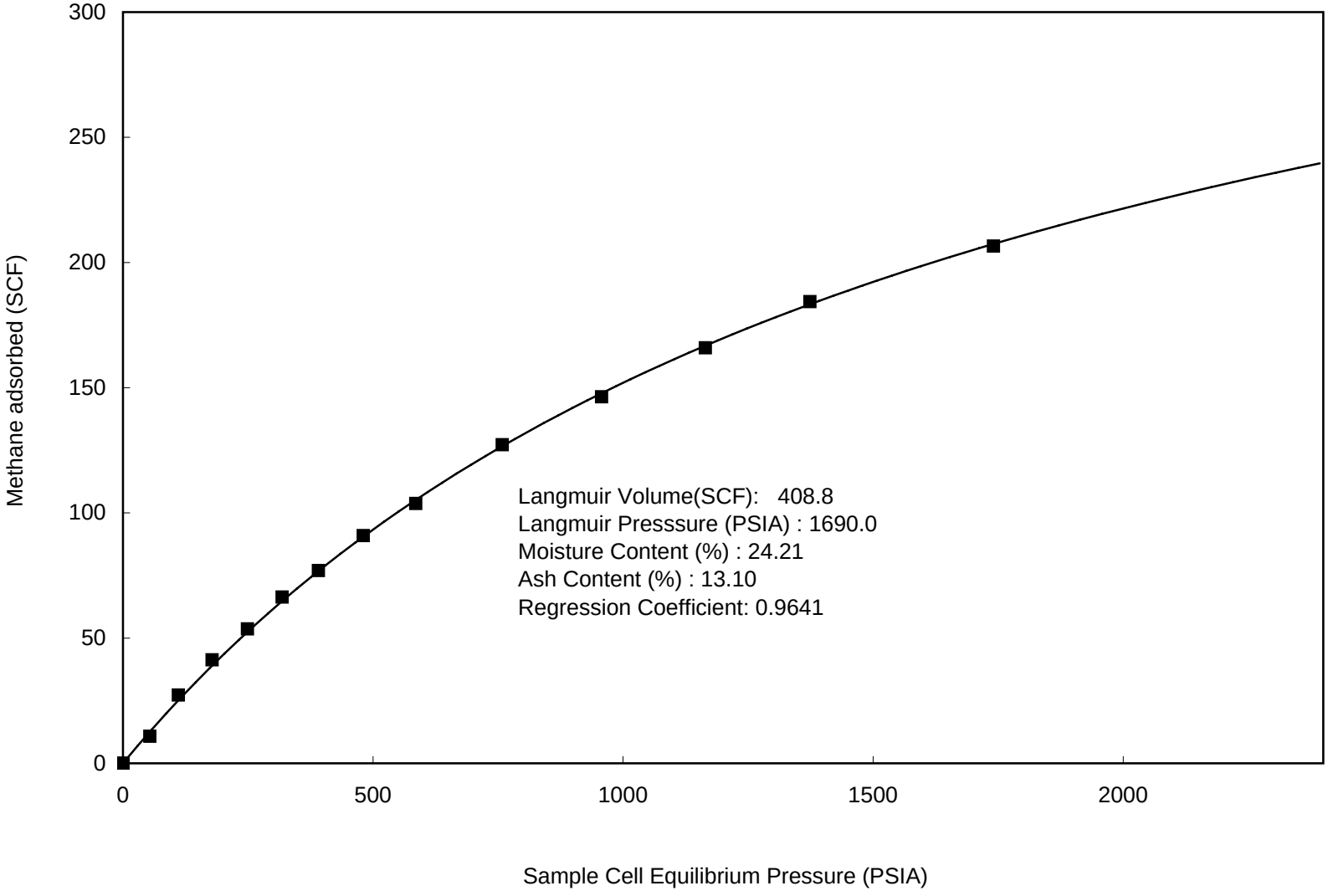
5-1B Methane (as received basis)



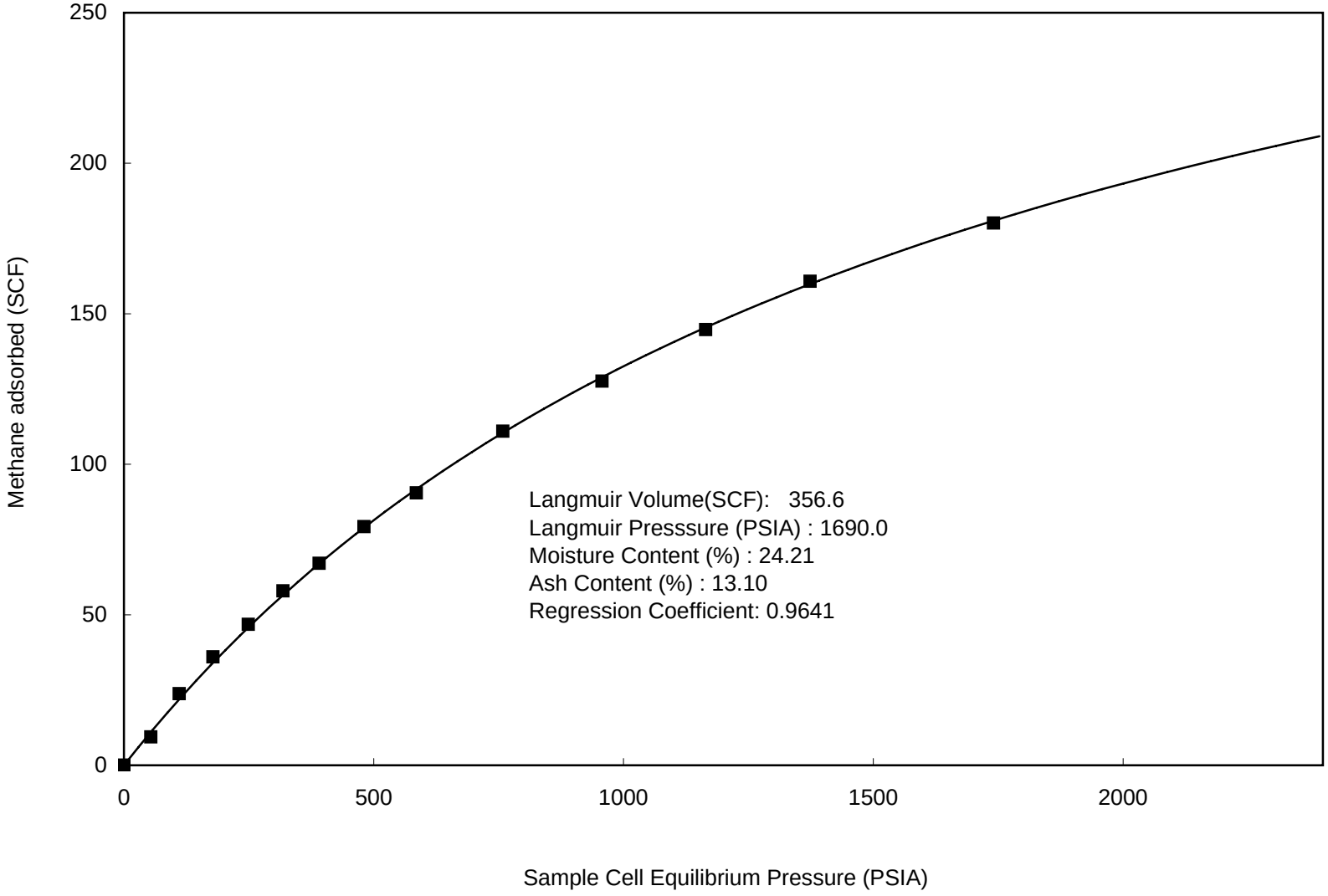
5-1B Methane (dry & ash free basis)

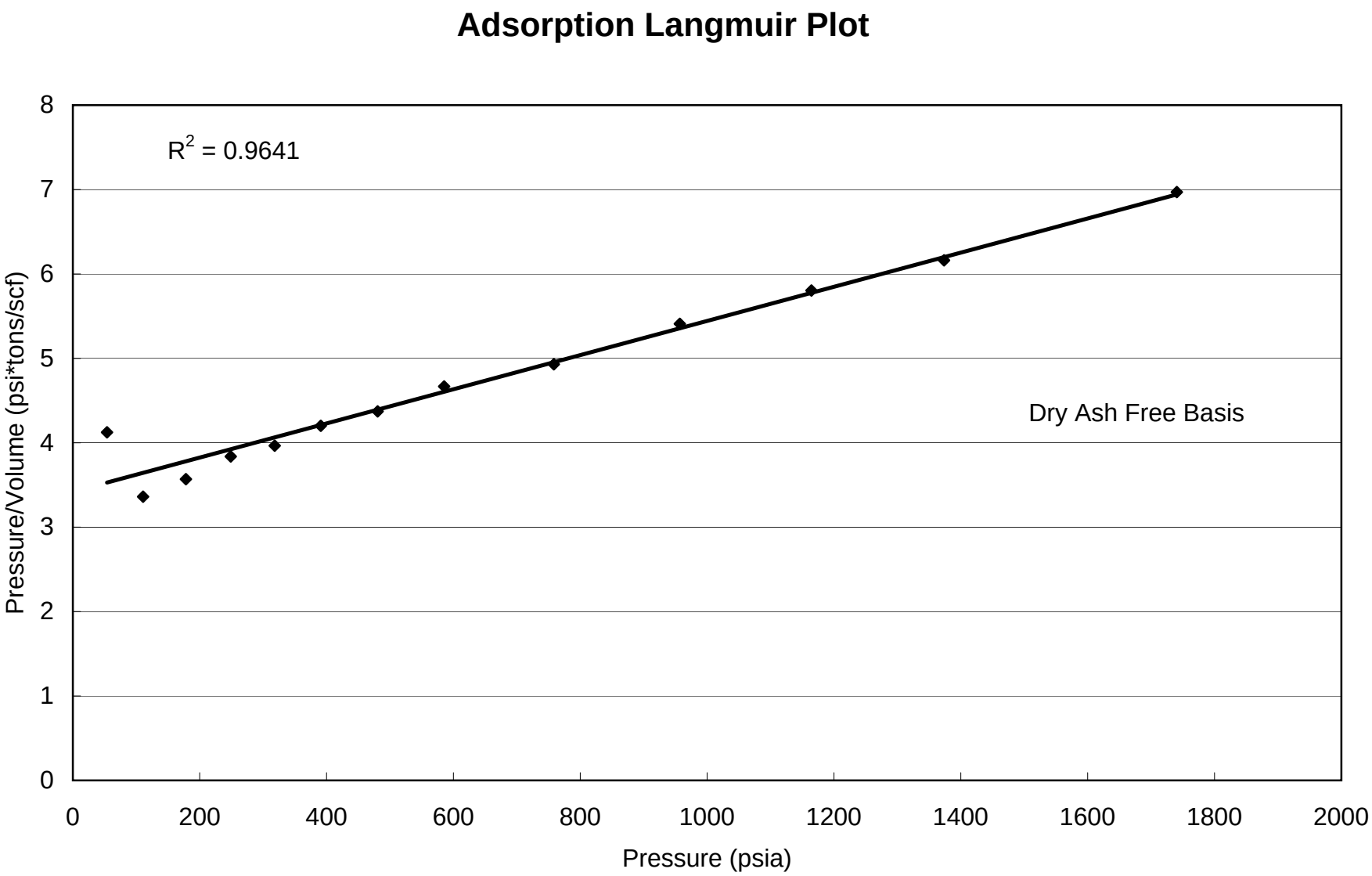


5-1B Methane (moisture free, ash included basis)



5-1B Methane (ash free, moisture included basis)




Adsorption Langmuir Plot
R2 = 0.9641
Dry Ash Free Basis
Pressure/Volume (psi*tons/scf)
Pressure (psia)
0
1
2
3
4
5
6
7
8
0
200
400
600
800
1000
1200
1400
1600
1800
2000

5-1B Methane

Methane Adsorption (SI Units)

Summary of Analyses		
	As Received	DAF basis
Langmuir Volume cc/g	9.11	14.53
Langmuir Pressure MPa	11.65	11.65
Goodness of fit Langmuir Equation R-squared	0.96	0.96
Ash Content Wt.%	13.10	13.10
Equilibrium Moisture Wt.%	24.21	24.21

Contents of Appendix

data sheets	***Charts***
As Received	As Received
Dry Ash Free	Dry Ash Free
Dry Ash Included	Dry Ash Included
Moist Ash Free	Moist Ash Free

5-1B Methane

GAS ADSORPTION ISOTHERM SI UNITS

AS RECEIVED BASIS

Sample I.D. :	5-1B Methane	Moisture Content (EQ) % :	24.21
Isotherm Temperature º C:	42	Ash Content % :	13.10
Gas used:	Methane	Helium Density g/cc	1.368

PRESSURE (MPa)	ADSORBED GAS (cc/g @STP)	P / V
0.372	0.24	1.543
0.764	0.61	1.258
1.229	0.92	1.336
1.717	1.20	1.436
2.195	1.48	1.484
2.695	1.71	1.572
3.313	2.03	1.636
4.036	2.31	1.746
5.229	2.83	1.845
6.599	3.26	2.024
8.029	3.70	2.172
9.470	4.11	2.306
12.001	4.60	2.608

Saturated Monolayer Volume (cc/g @ STP):	9.11
Langmuir Pressure (MPa):	11.65

DRY ASH FREE BASIS

0.372	0.38	0.967
0.764	0.97	0.788
1.229	1.47	0.837
1.717	1.91	0.900
2.195	2.36	0.930
2.695	2.73	0.986
3.313	3.23	1.026
4.036	3.69	1.095
5.229	4.52	1.157
6.599	5.20	1.269
8.029	5.90	1.362
9.470	6.55	1.446
12.001	7.34	1.635

Saturated Monolayer Volume (cc/g @ STP, daf):	14.53
Langmuir Pressure (MPa):	11.65
Correlation Coefficient:	0.9641

5-1B Methane

GAS ADSORPTION ISOTHERM SI UNITS

MOISTURE FREE ASH INCLUDED

		Moisture Content (EQ) % :	24.21
Isotherm Temperature º C:	42	Ash Content % :	13.10
Gas used:	Methane	Helium Density g/cc	1.368

PRESSURE (MPa)	ADSORBED GAS (cc/g@STP)	P / V
0.372	0.32	1.17
0.764	0.80	0.95
1.229	1.21	1.01
1.717	1.58	1.09
2.195	1.95	1.12
2.695	2.26	1.19
3.313	2.67	1.24
4.036	3.05	1.32
5.229	3.74	1.40
6.599	4.30	1.53
8.029	4.88	1.65
9.470	5.42	1.75
12.001	6.07	1.98

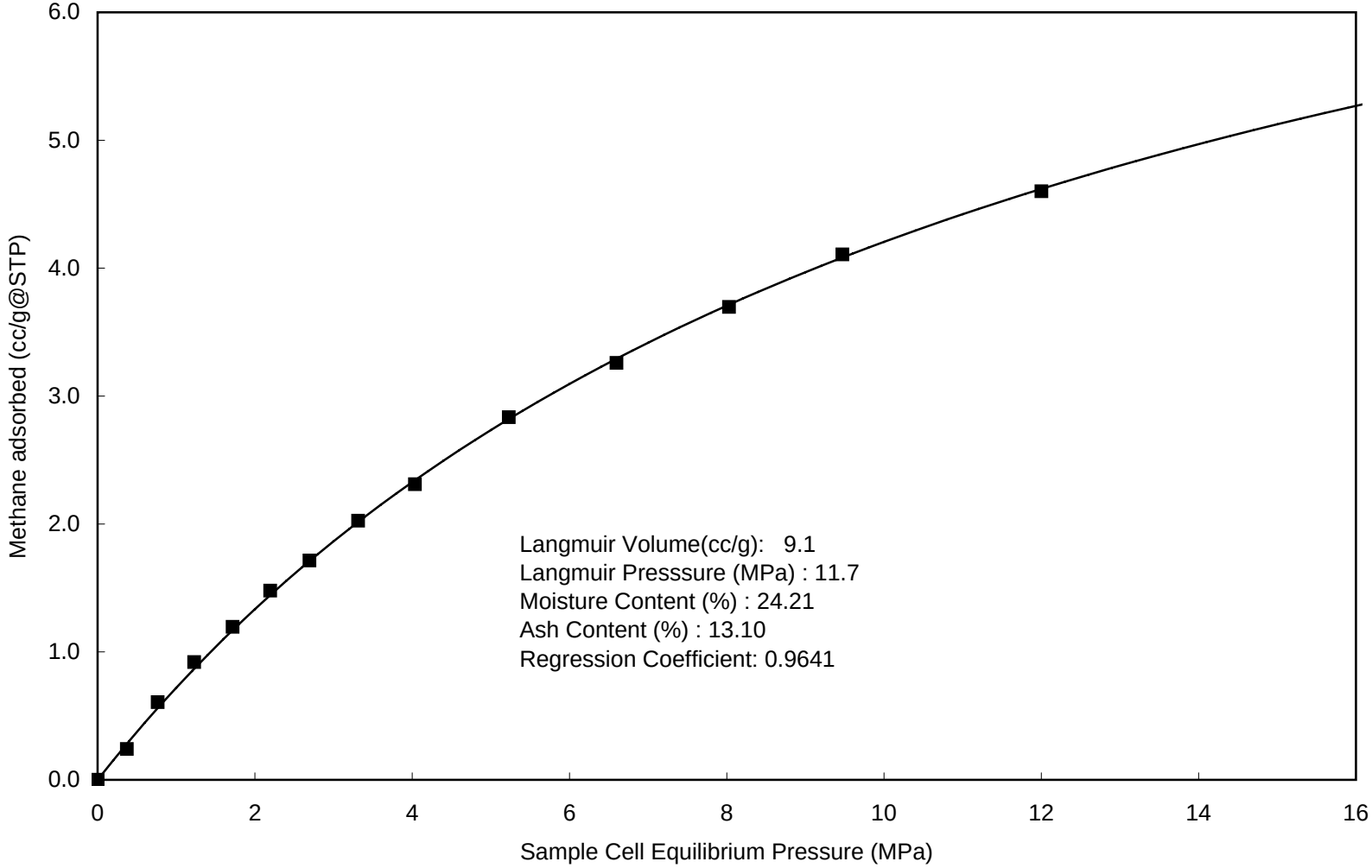
Saturated Monolayer Volume (cc/g):	12.01
Langmuir Pressure (MPa):	11.65

ASH FREE MOISTURE INCLUDED

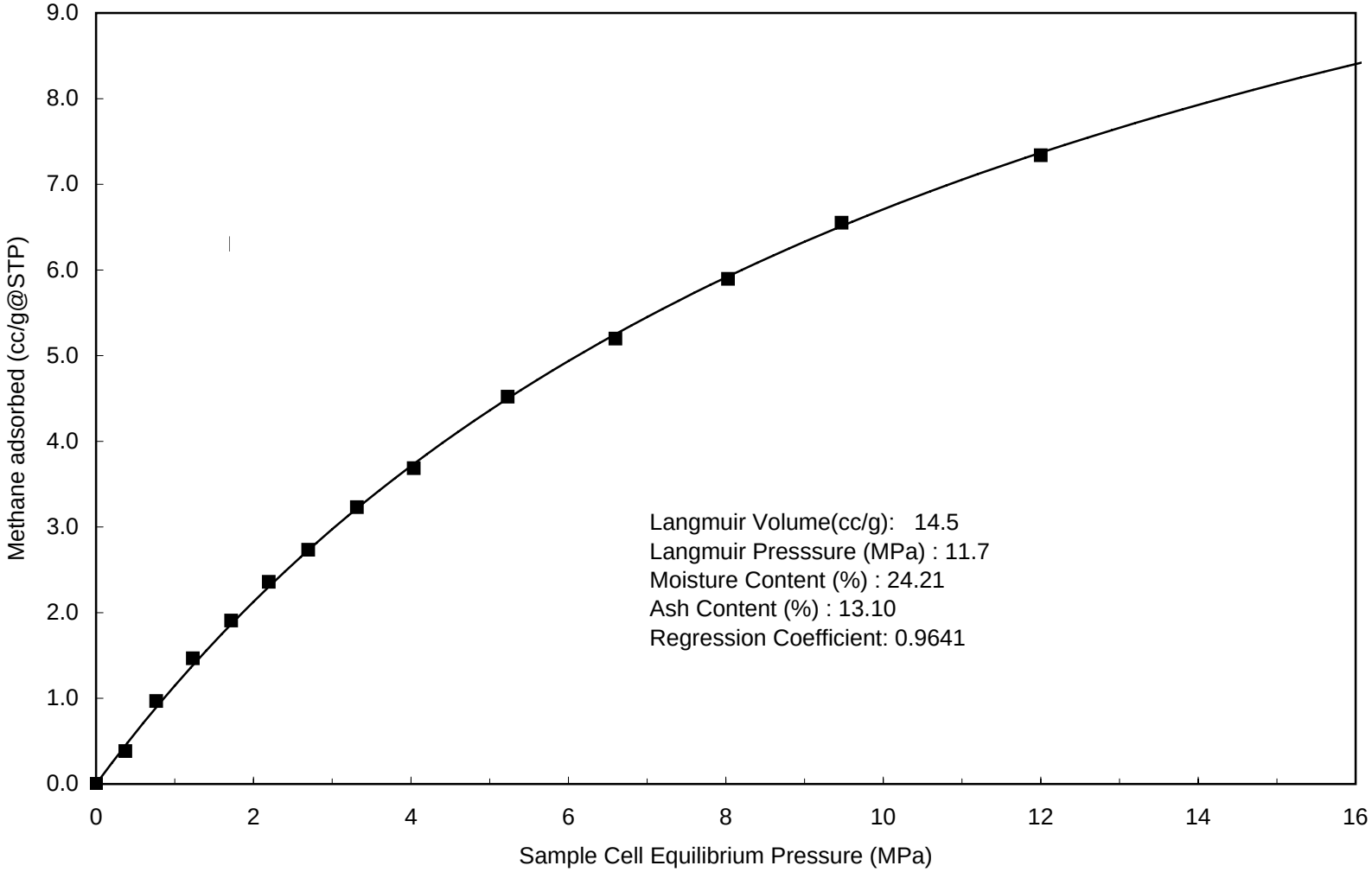
0.372	0.28	0.00
0.764	0.70	1.09
1.229	1.06	1.16
1.717	1.38	1.25
2.195	1.70	1.29
2.695	1.97	1.37
3.313	2.33	1.42
4.036	2.66	1.52
5.229	3.26	1.60
6.599	3.75	1.76
8.029	4.25	1.89
9.470	4.73	2.00
12.001	5.29	2.27

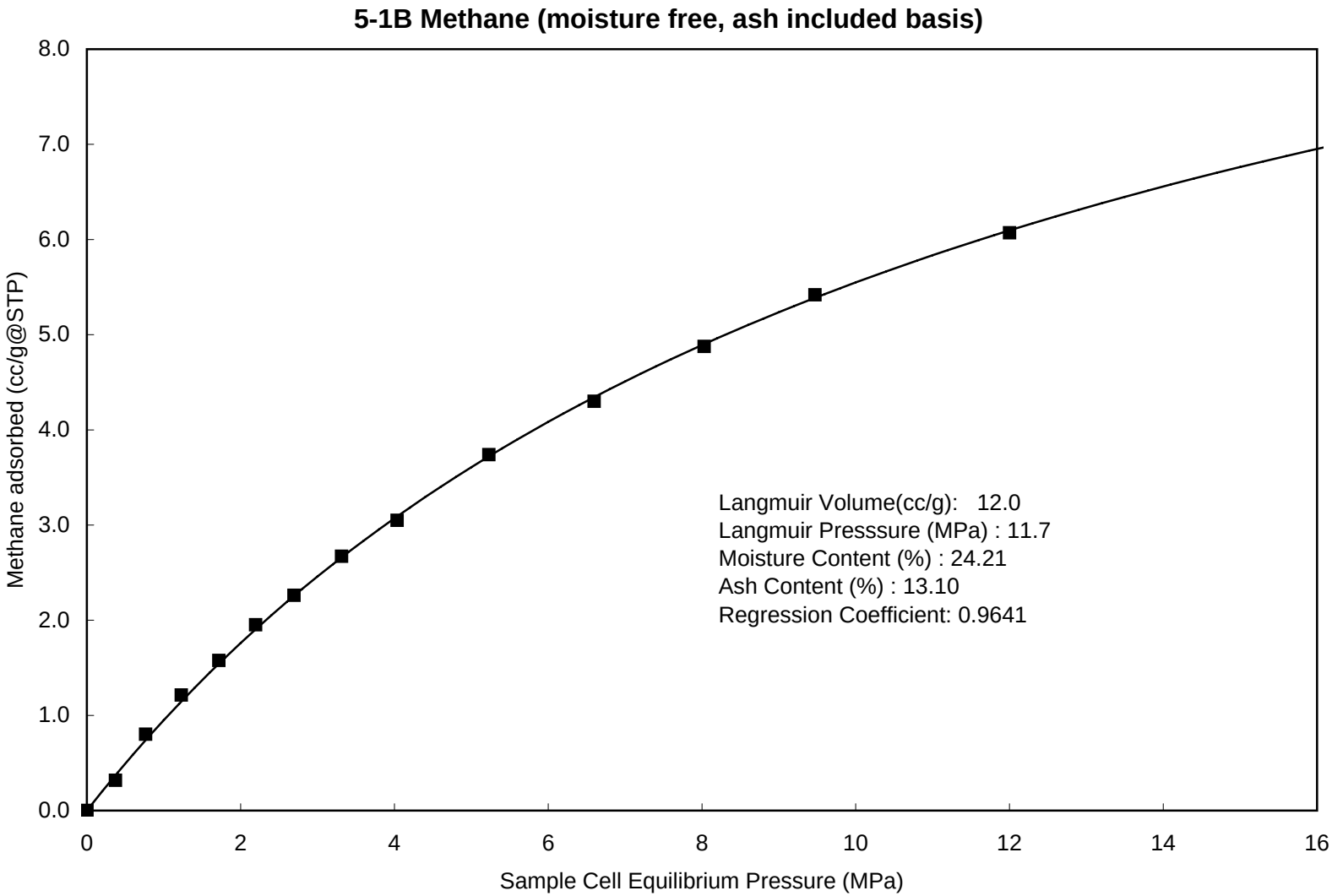
Saturated Monolayer Volume (cc/g, ash free):	10.48
Langmuir Pressure (MPa):	11.65
Correlation Coefficient:	0.9641

5-1B Methane (as received basis)

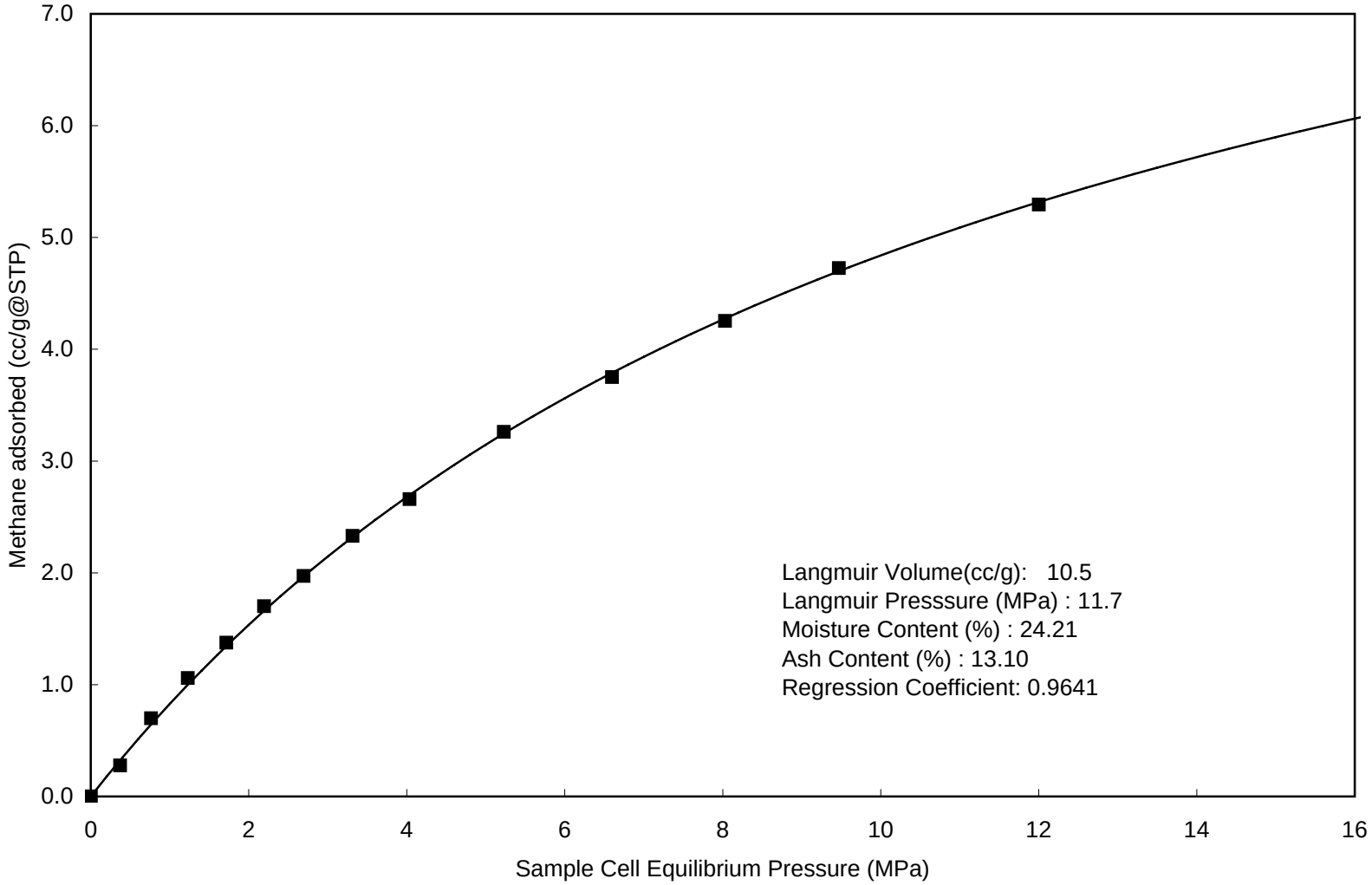


5-1B Methane (dry & ash free basis)

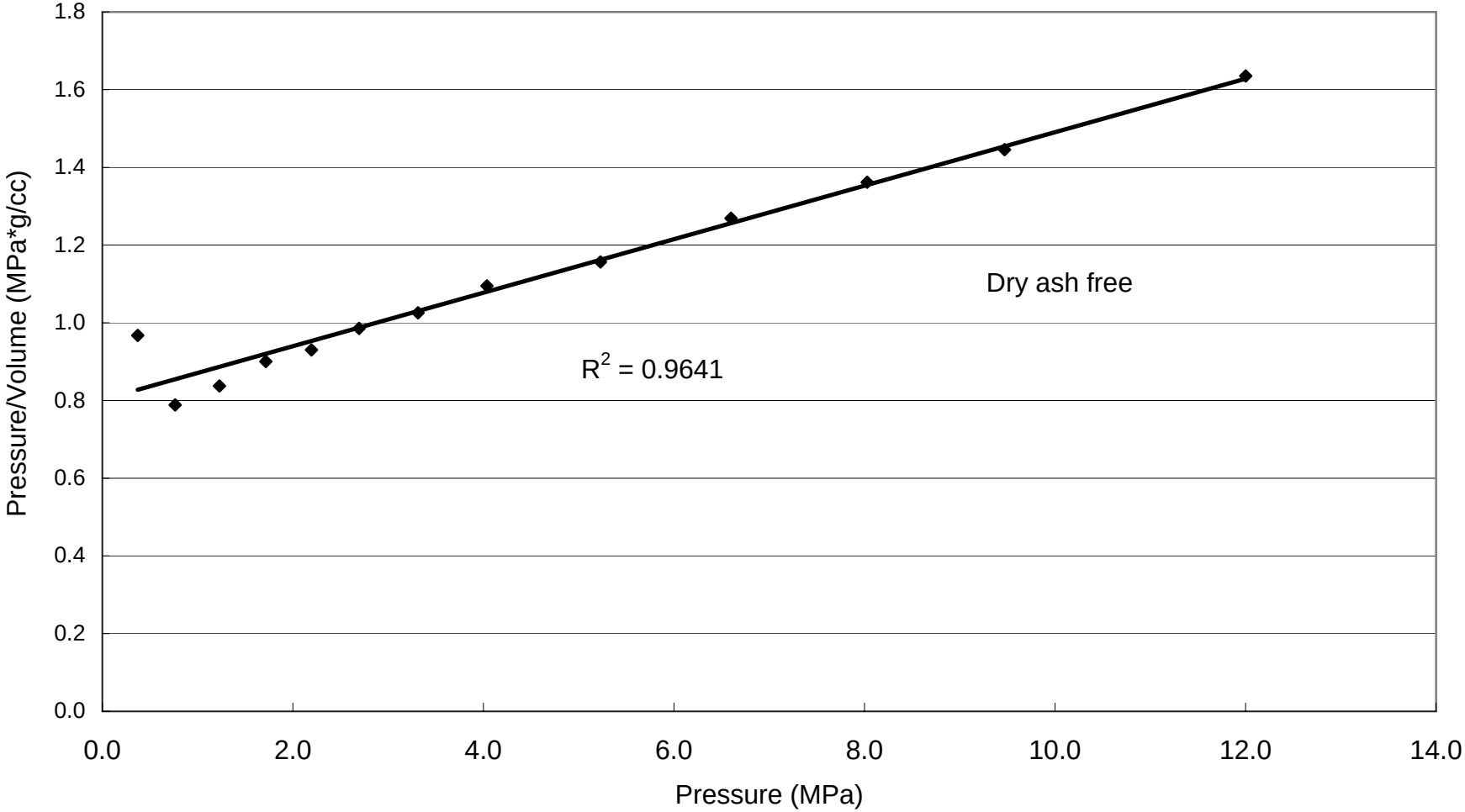



5-1B Methane (moisture free, ash included basis)
Methane adsorbed (cc/g@STP)
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
0
2
4
6
8
10
12
14
16
Sample Cell Equilibrium Pressure (MPa)
Langmuir Volume(cc/g): 12.0
Langmuir Presssure (MPa) : 11.7
Moisture Content (%) : 24.21
Ash Content (%) : 13.10
Regression Coefficient: 0.9641

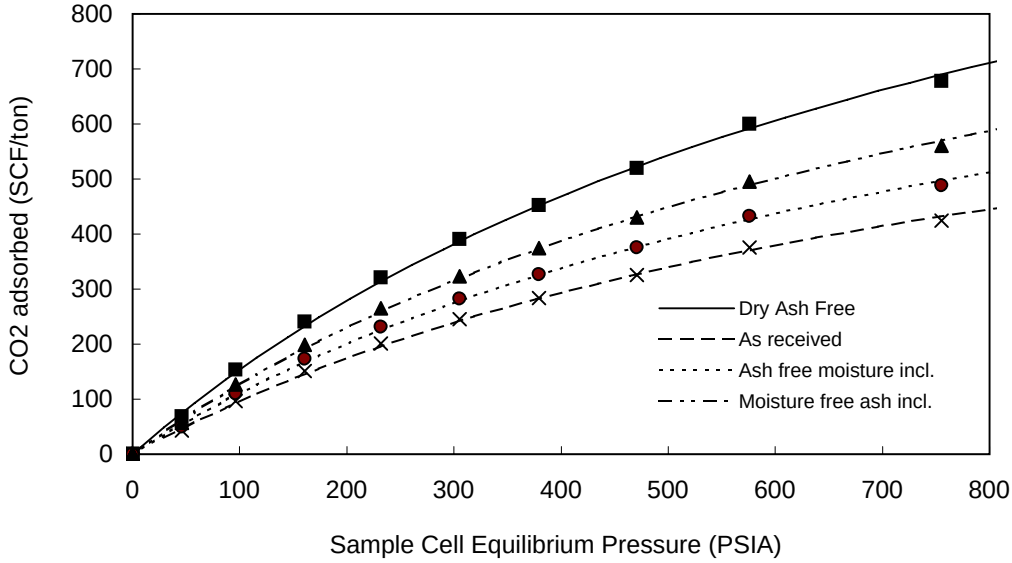
5-1B Methane (ash free, moisture included basis)



Adsorption Langmuir Plot



5-1B Carbon Dioxide



Pressure (PSIA)	Adsorbed gas (ft^3 /ton)			
	As Received	moisture free ash incl.	ash free moisture incl.	Dry Ash Free
46	43.3	57.2	49.9	69.1
96	96.3	127.1	110.8	153.6
161	151.0	199.3	173.8	240.9
232	201.2	265.4	231.5	320.9
306	245.3	323.6	282.2	391.2
380	283.8	374.5	326.6	452.7
471	326.0	430.2	375.2	520.1
576	375.8	495.9	432.5	599.5
755	424.8	560.4	488.8	677.5

Langmuir Parameters

	As Received	Moisture free ash incl	Ash free moisture incl	Dry Ash Free
Vol. (ft^3 /ton)	921.2	1215.5	1060.1	1469.5
Pressure (PSIA)	853.9	853.9	853.9	853.9

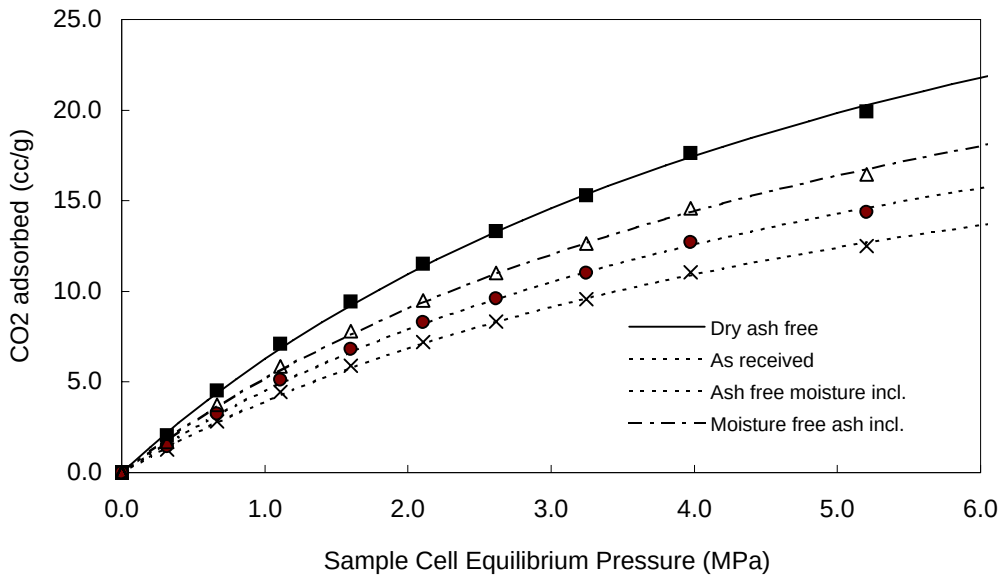
SUMMARY OF ADSORPTION ANALYSES IMP. UNITS

Isotherm Temperature: 107.8 ºF

Goodness of fit of Langmuir regression: 0.98

% Ash= 13.10 % Moisture= 24.21 Density g/cc 1.368

5-1B Carbon Dioxide



Pressure (MPa)	Adsorbed gas (cc/g)			
	As Received	Moisture free ash incl.	ash free moisture incl	Dry Ash Free
0.318	1.27	1.68	1.47	2.03
0.665	2.83	3.73	3.26	4.52
1.109	4.44	5.86	5.11	7.08
1.600	5.91	7.80	6.80	9.43
2.107	7.21	9.51	8.29	11.50
2.617	8.34	11.00	9.60	13.30
3.246	9.58	12.64	11.03	15.28
3.972	11.05	14.57	12.71	17.62
5.206	12.48	16.47	14.36	19.91

Langmuir Parameters

	As Received	Moisture free ash incl.	Ash free moisture incl	Dry Ash Free
Vol. (cc/g)	27.07	35.72	31.15	43.19
Pressure (MPa)	5.89	5.89	5.89	5.89

SUMMARY OF ADSORPTION ANALYSES SI UNITS

Isotherm Temperature: **42.1 ºC**

Goodness of fit of Langmuir regression: **0.98**

% Ash= 13.10 **% Moisture = 24.21** **Density (g/cc) 1.368**

5-1B Carbon Dioxide

CO2 Adsorption (Imperial Units)

Summary of Analyses		
	As Received	DAF basis
Langmuir Volume (SCF)	921	1469
Langmuir Pressure (PSIA)	854	854
Goodness of fit Langmuir Equation R-squared	0.98	0.98
Ash Content Wt.%	13.10	13.10
Equilibrium Moisture Wt.%	24.21	24.21

Contents of Appendix

data sheets	***Charts***
As Received	As Received
Dry Ash Free	Dry Ash Free
Dry Ash Included	Dry Ash Included
Moist Ash Free	Moist Ash Free

5-1B Carbon Dioxide

GAS ADSORPTION ISOTHERM IMPERIAL UNITS

AS RECEIVED BASIS

		Moisture Content % :	24.21
Isotherm Temperature º F:	107.8	Ash Content, % :	13.10
Gas used:	CO2	Helium Density g/cc	1.368

PRESSURE (PSI)	ADSORBED GAS (SCF/ton)	P / V
46	43.33	1.07
96	96.32	1.00
161	151.03	1.06
232	201.17	1.15
306	245.27	1.25
380	283.80	1.34
471	326.05	1.44
576	375.83	1.53
755	424.75	1.78

Saturated Monolayer Volume (SCF/ton):	921.2
Langmuir Pressure (PSIA):	853.9
Correlation Coefficient:	0.9766

DRY ASH FREE BASIS

46	69.12	0.67
96	153.64	0.63
161	240.91	0.67
232	320.89	0.72
306	391.24	0.78
380	452.70	0.84
471	520.09	0.91
576	599.51	0.96
755	677.54	1.11

Saturated Monolayer Volume (SCF/ton, daf):	1469
Langmuir Pressure (PSIA):	854
Correlation Coefficient:	0.9766

5-1B Carbon Dioxide

GAS ADSORPTION ISOTHERM IMPERIAL UNITS

MOISTURE FREE ASH INCLUDED

		Moisture Content % :	24.21
Isotherm Temperature° F:	107.8	Ash Content, % :	13.10
Gas used:	CO2	Helium Density g/cc	1.368

PRESSURE (PSI)	ADSORBED GAS (SCF/ton)	P / V
46	57	0.81
96	127	0.76
161	199	0.81
232	265	0.87
306	324	0.94
380	374	1.01
471	430	1.09
576	496	1.16
755	560	1.35

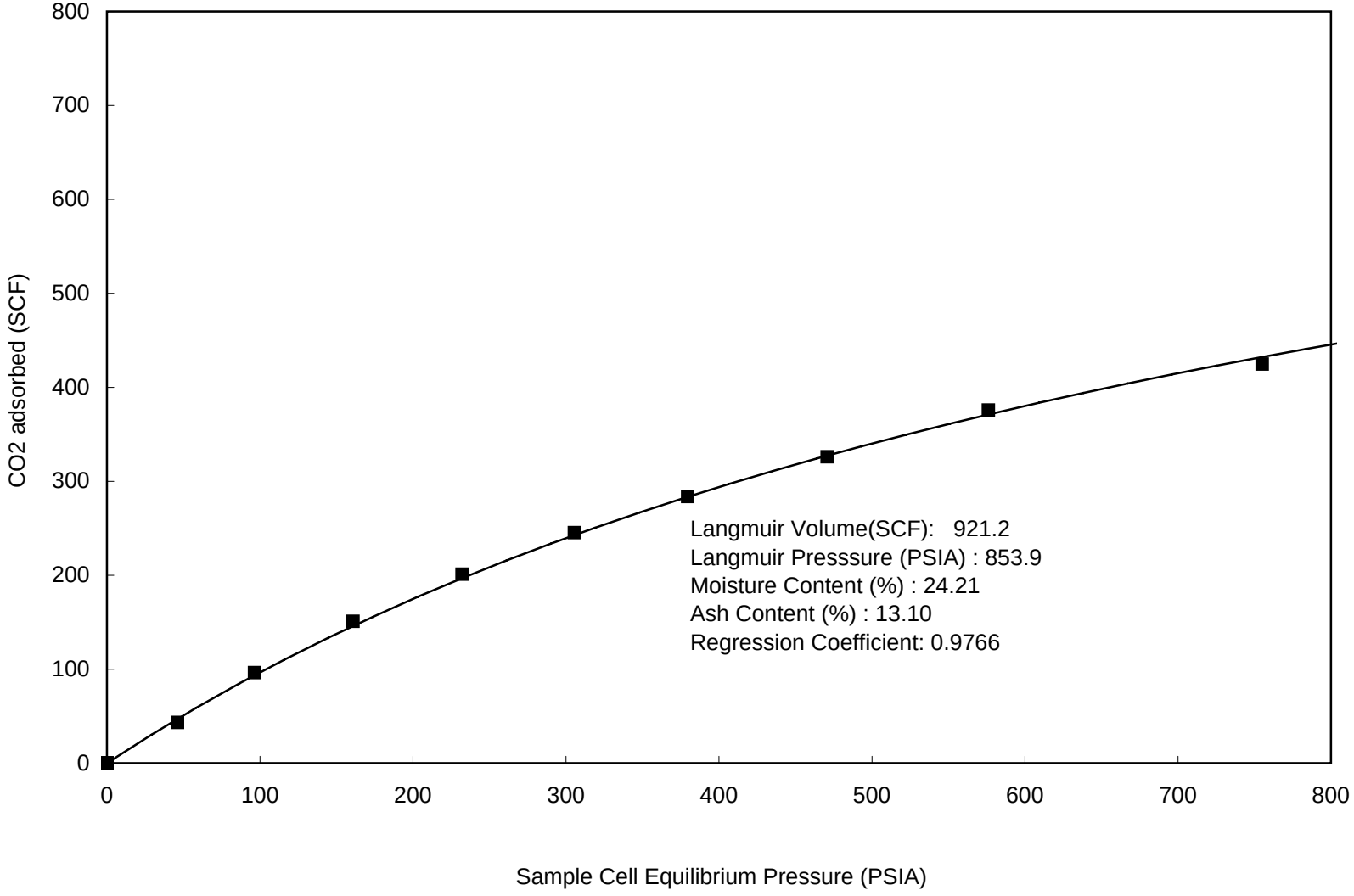
Saturated Monolayer Volume (SCF/ton):	1215
Langmuir Pressure (PSIA):	854
Correlation Coefficient:	0.9766

ASH FREE MOISTURE INCLUDED

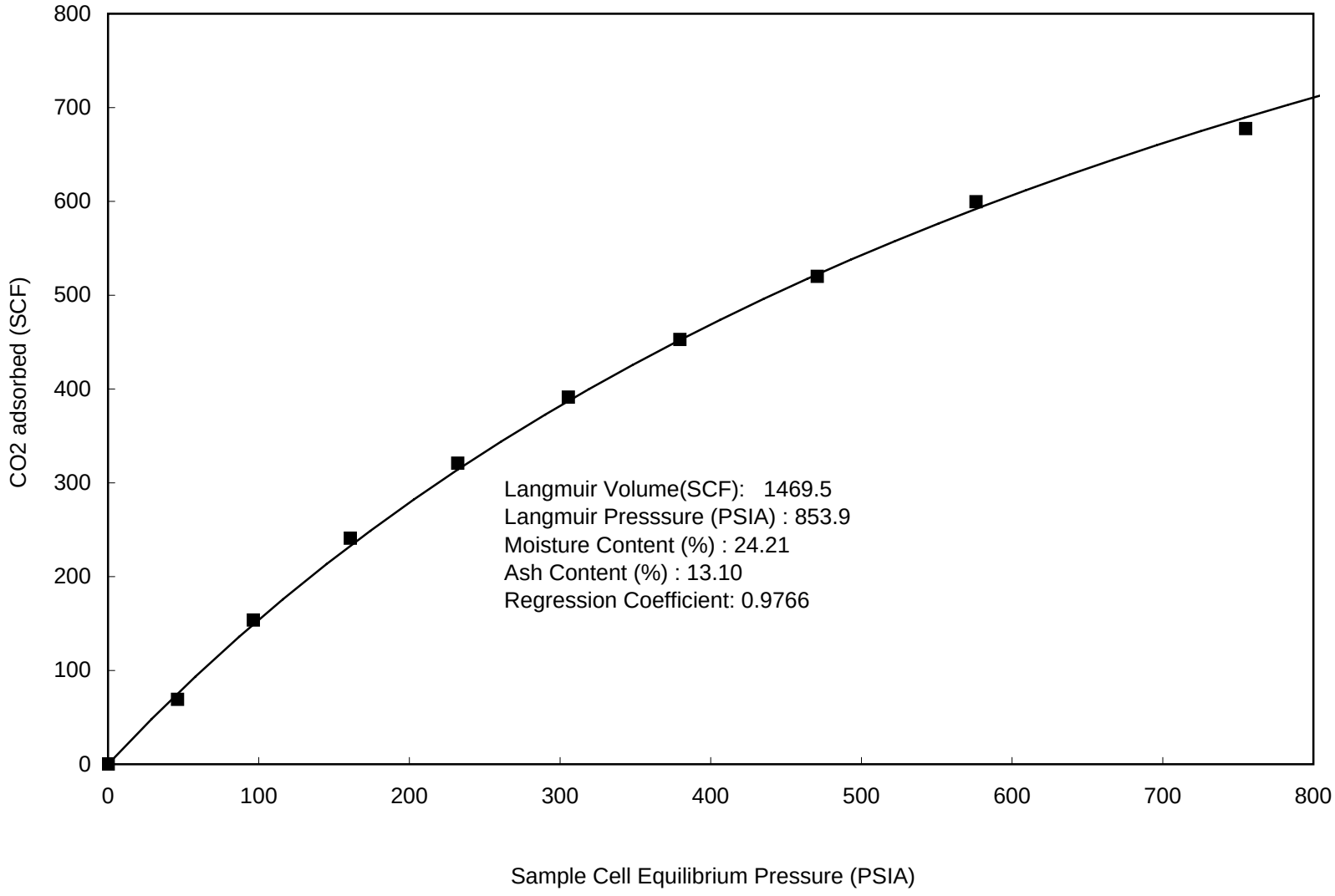
46	50	0.93
96	111	0.87
161	174	0.93
232	231	1.00
306	282	1.08
380	327	1.16
471	375	1.25
576	432	1.33
755	489	1.54

Saturated Monolayer Volume (SCF/ton):	1060
Langmuir Pressure (PSIA):	854
Correlation Coefficient:	0.9766

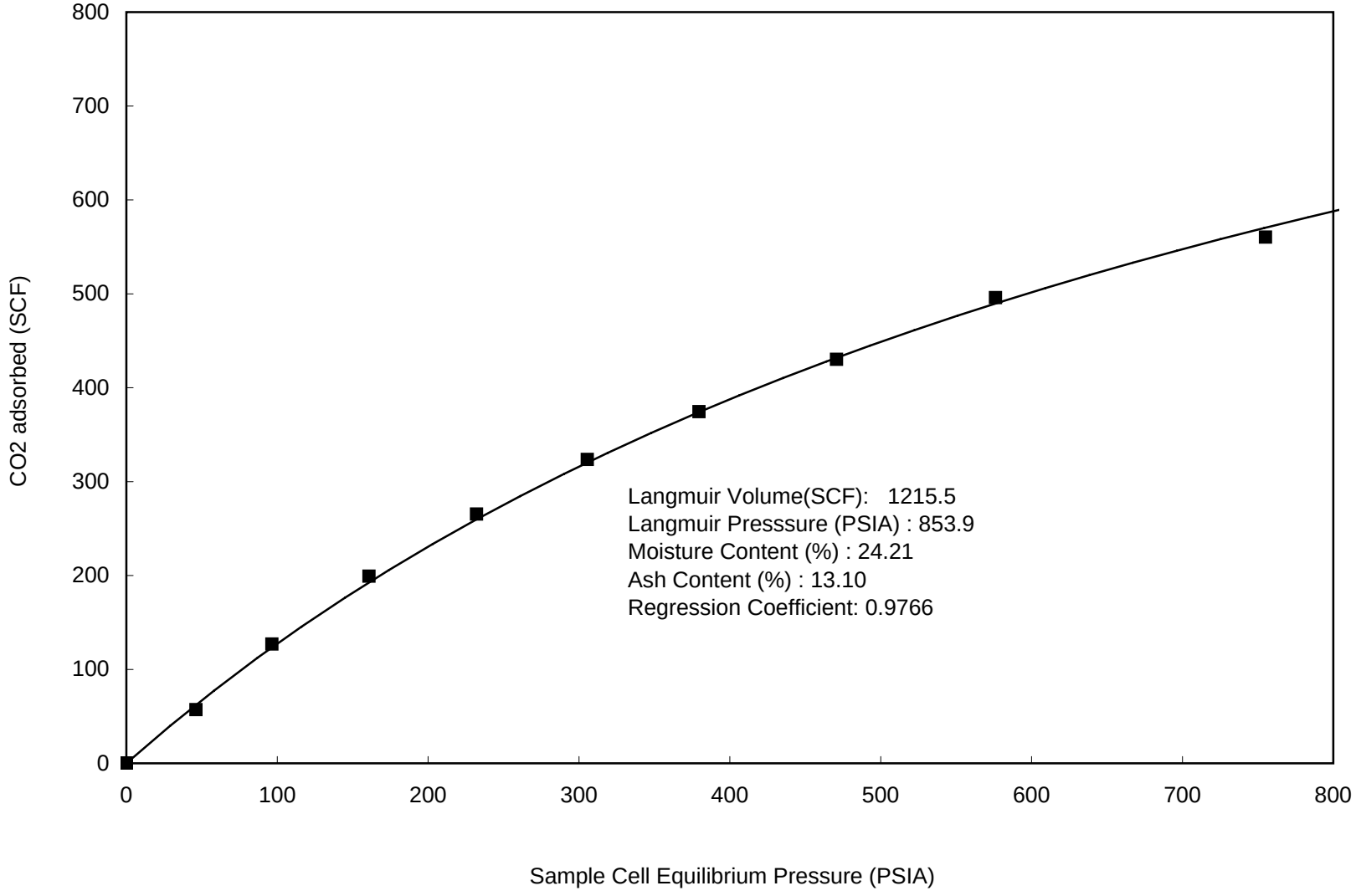
5-1B Carbon Dioxide (as received basis)



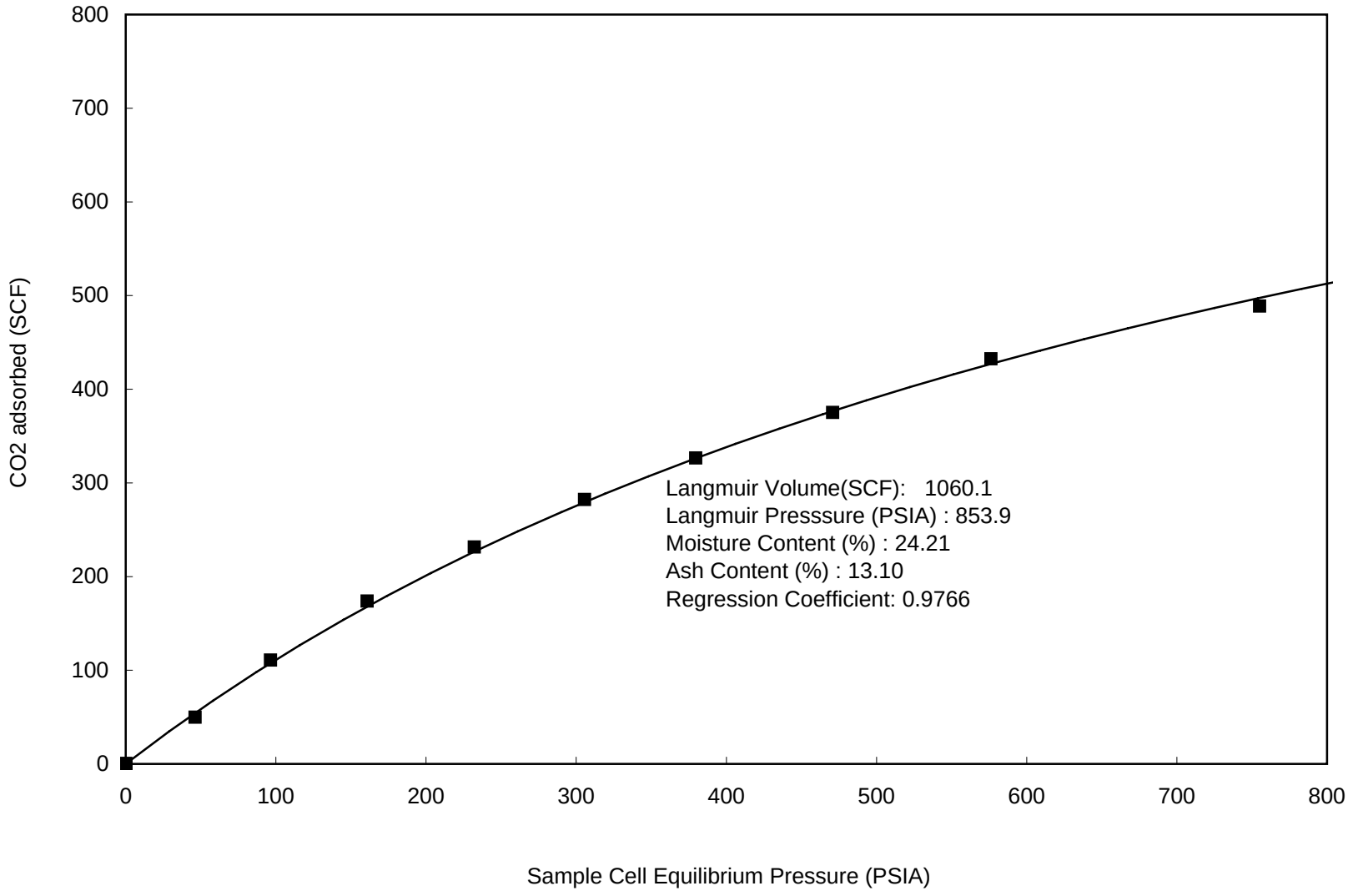
5-1B Carbon Dioxide (dry & ash free basis)

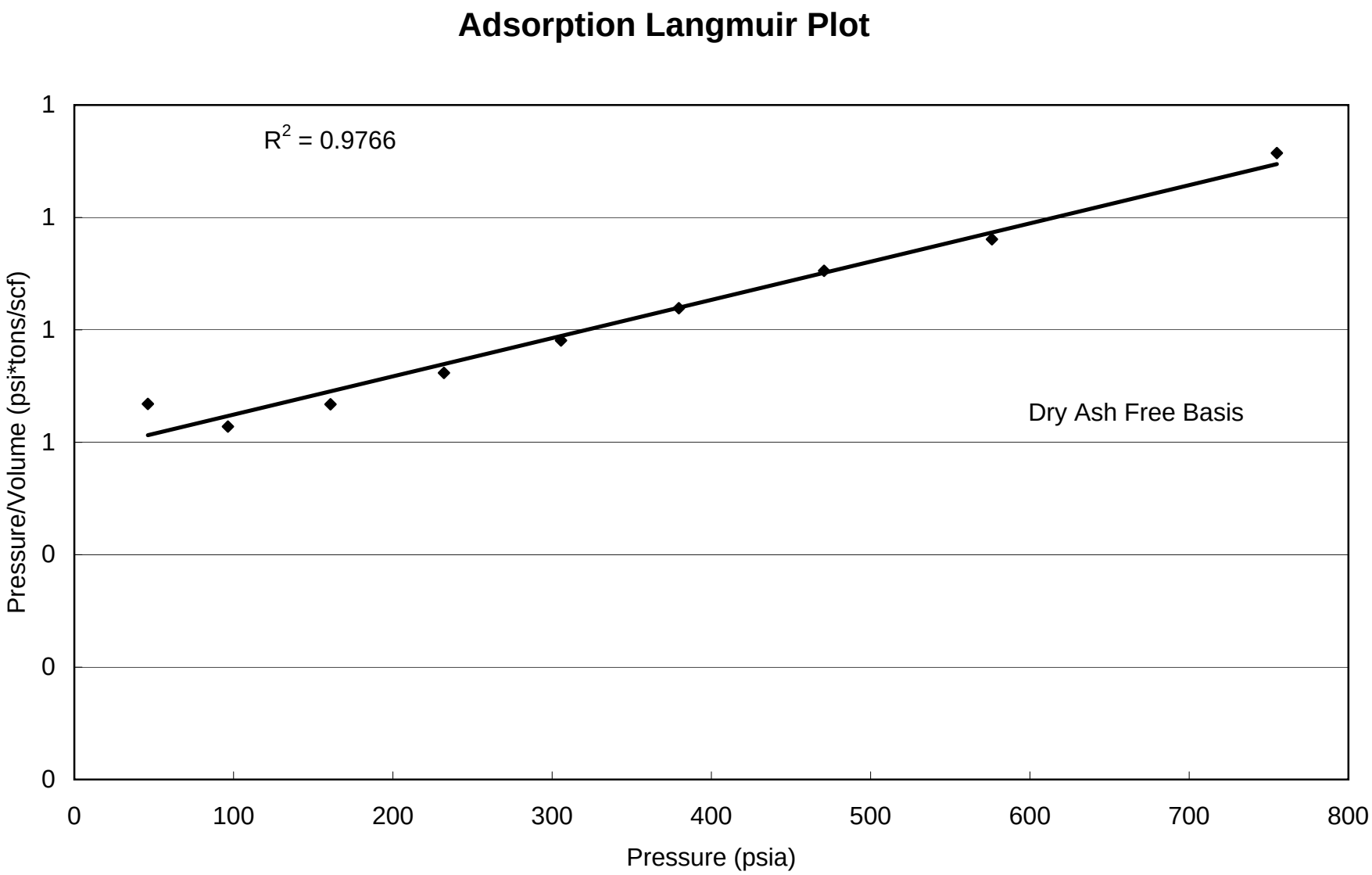


5-1B Carbon Dioxide (moisture free, ash included basis)



5-1B Carbon Dioxide (ash free, moisture included basis)




Adsorption Langmuir Plot
R2 = 0.9766
Dry Ash Free Basis
Pressure/Volume (psi*tons/scf)
Pressure (psia)
1
1
1
1
0
0
0
0
100
200
300
400
500
600
700
800

5-1B Carbon Dioxide

CO2 Adsorption (SI Units)

Summary of Analyses

	As Received	DAF basis
Langmuir Volume cc/g	27.07	43.19
Langmuir Pressure MPa	5.89	5.89
Goodness of fit Langmuir Equation R-squared	0.98	0.98
Ash Content Wt.%	13.10	13.10
Equilibrium Moisture Wt.%	24.21	24.21

Contents of Appendix

data sheets	***Charts***
As Received	As Received
Dry Ash Free	Dry Ash Free
Dry Ash Included	Dry Ash Included
Moist Ash Free	Moist Ash Free

5-1B Carbon Dioxide

GAS ADSORPTION ISOTHERM SI UNITS

AS RECEIVED BASIS

Sample I.D. :	5-1B Carbon Dioxide	Moisture Content (EQ) % :	24.21
Isotherm Temperature º C:	42.1	Ash Content % :	13.10
Gas used:	CO2	Helium Density g/cc	1.368

PRESSURE (MPa)	ADSORBED GAS (cc/g @STP)	P / V
0.318	1.27	0.250
0.665	2.83	0.235
1.109	4.44	0.250
1.600	5.91	0.271
2.107	7.21	0.292
2.617	8.34	0.314
3.246	9.58	0.339
3.972	11.05	0.360
5.206	12.48	0.417

Saturated Monolayer Volume (cc/g @ STP):	27.07
Langmuir Pressure (MPa):	5.89

DRY ASH FREE BASIS

0.318	2.03	0.157
0.665	4.52	0.147
1.109	7.08	0.157
1.600	9.43	0.170
2.107	11.50	0.183
2.617	13.30	0.197
3.246	15.28	0.212
3.972	17.62	0.225
5.206	19.91	0.261

Saturated Monolayer Volume (cc/g @ STP, daf):	43.19
Langmuir Pressure (MPa):	5.89
Correlation Coefficient:	0.9766

5-1B Carbon Dioxide

GAS ADSORPTION ISOTHERM SI UNITS

MOISTURE FREE ASH INCLUDED

		Moisture Content (EQ) % :	24.21
Isotherm Temperature º C:	42.1	Ash Content % :	13.10
Gas used:	CO2	Helium Density g/cc	1.368

PRESSURE (MPa)	ADSORBED GAS (cc/g@STP)	P / V
0.318	1.68	0.19
0.665	3.73	0.18
1.109	5.86	0.19
1.600	7.80	0.21
2.107	9.51	0.22
2.617	11.00	0.24
3.246	12.64	0.26
3.972	14.57	0.27
5.206	16.47	0.32

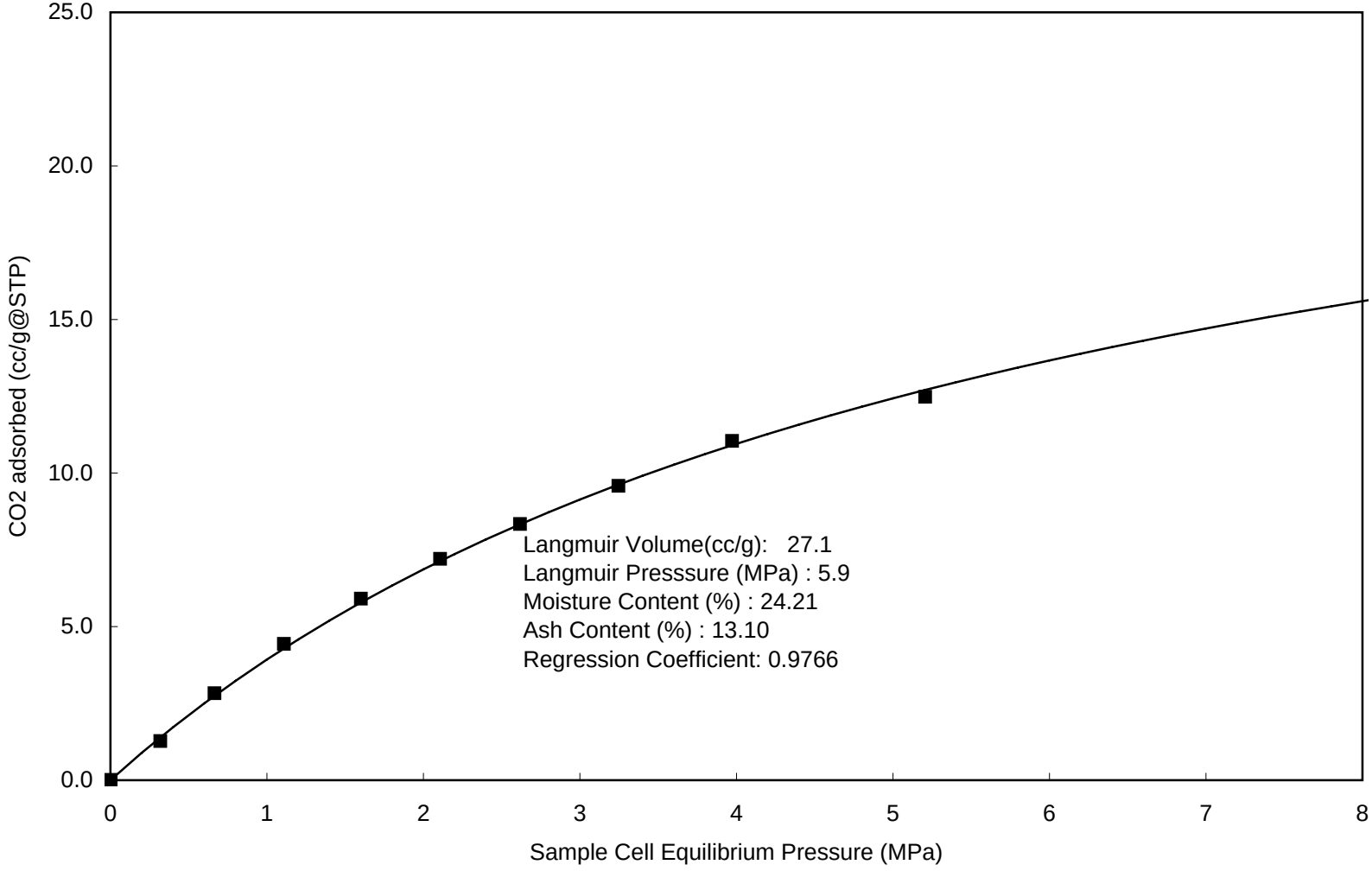
Saturated Monolayer Volume (cc/g):	35.72
Langmuir Pressure (MPa):	5.89

ASH FREE MOISTURE INCLUDED

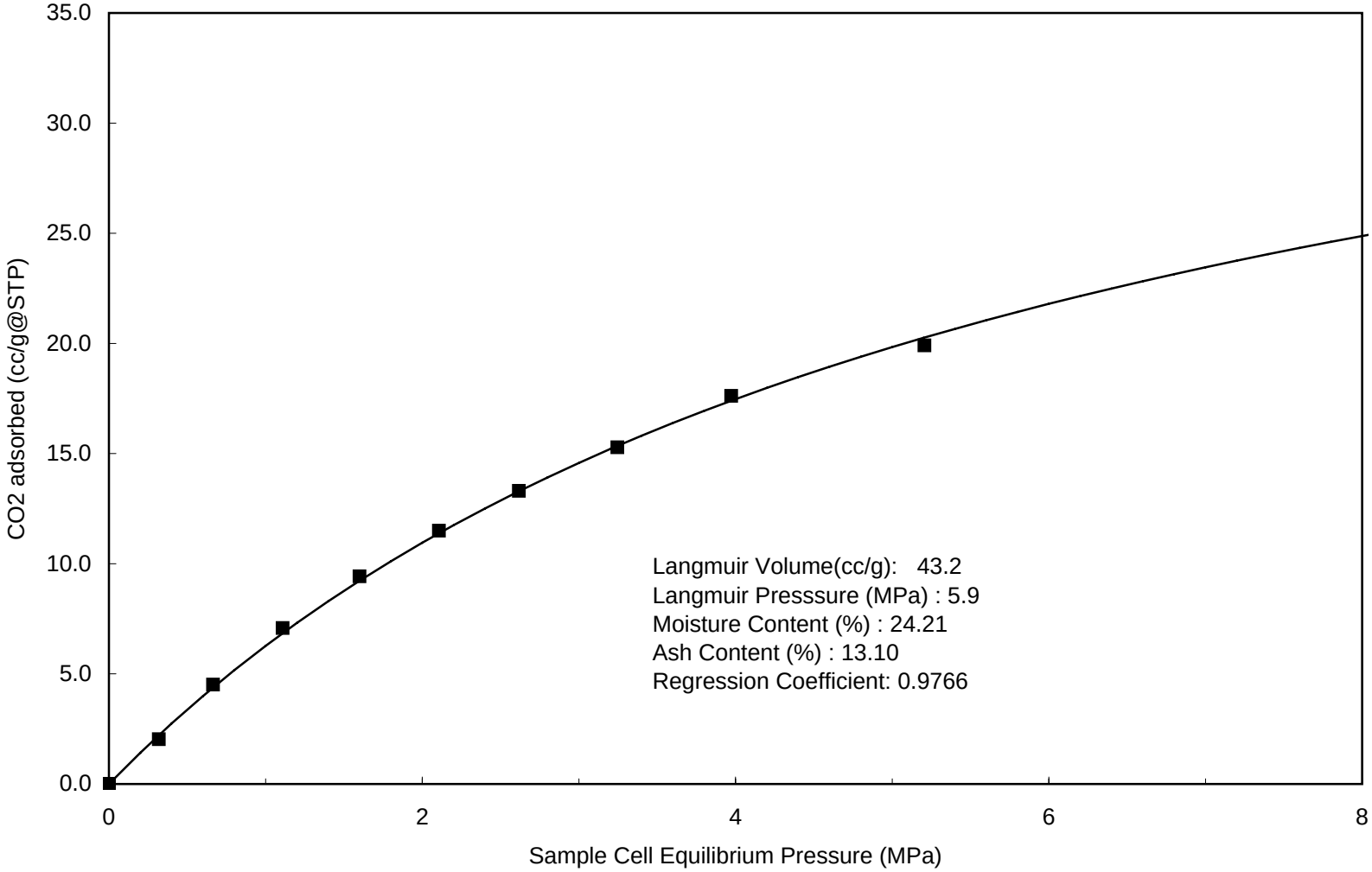
0.318	1.47	0.00
0.665	3.26	0.20
1.109	5.11	0.22
1.600	6.80	0.24
2.107	8.29	0.25
2.617	9.60	0.27
3.246	11.03	0.29
3.972	12.71	0.31
5.206	14.36	0.36

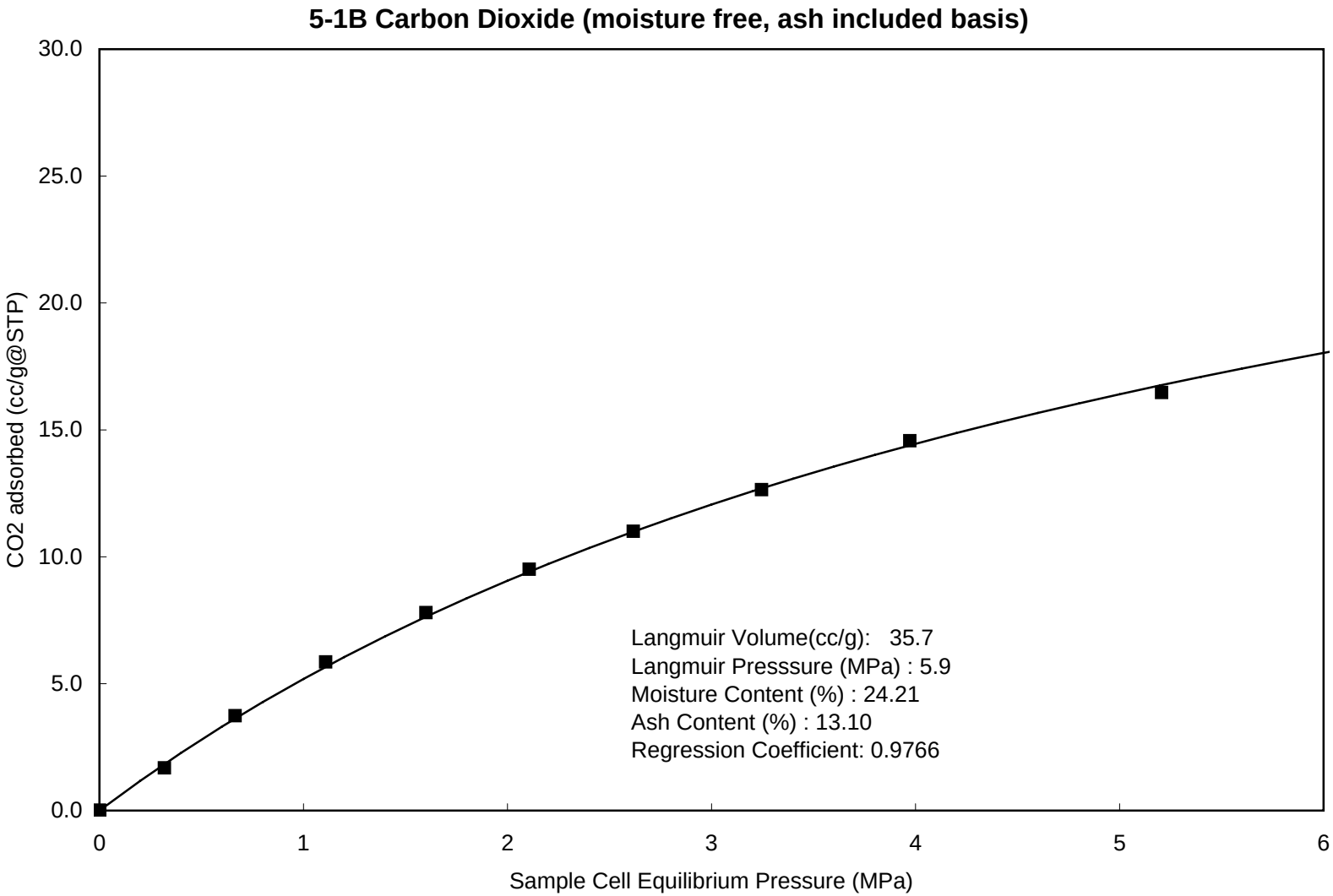
Saturated Monolayer Volume (cc/g, ash free):	31.15
Langmuir Pressure (MPa):	5.89
Correlation Coefficient:	0.9766

5-1B Carbon Dioxide (as received basis)

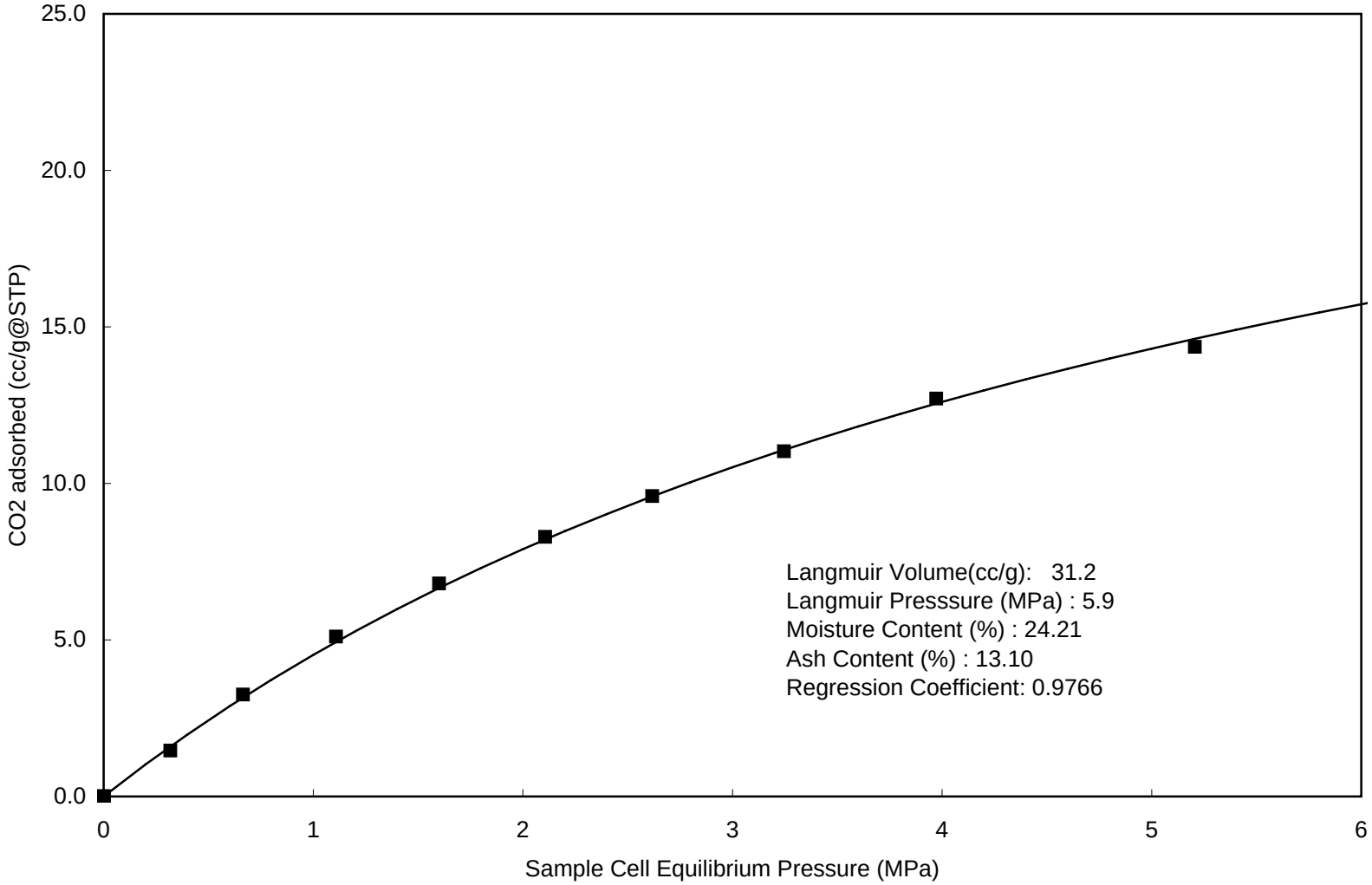


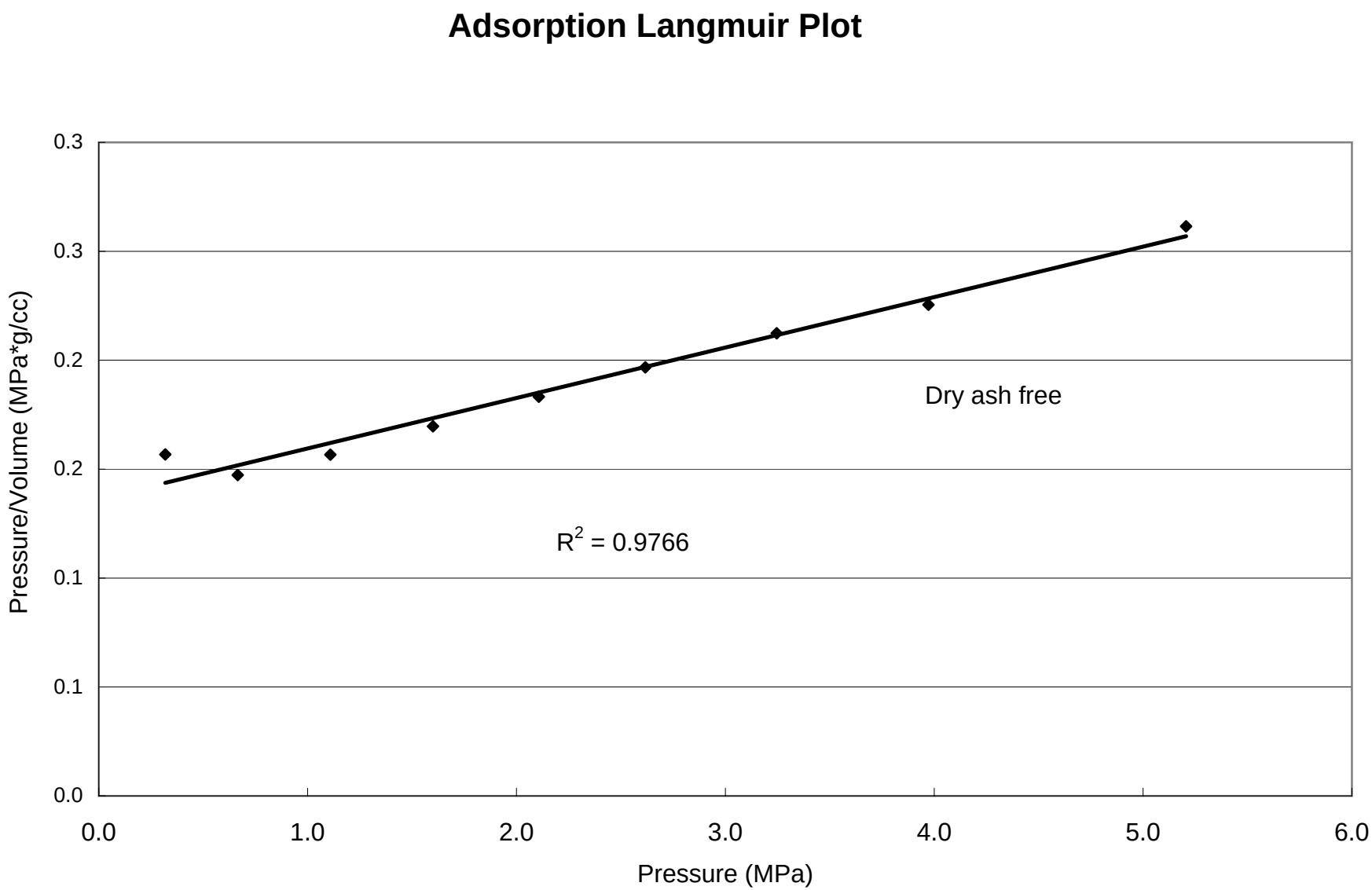
5-1B Carbon Dioxide (dry & ash free basis)



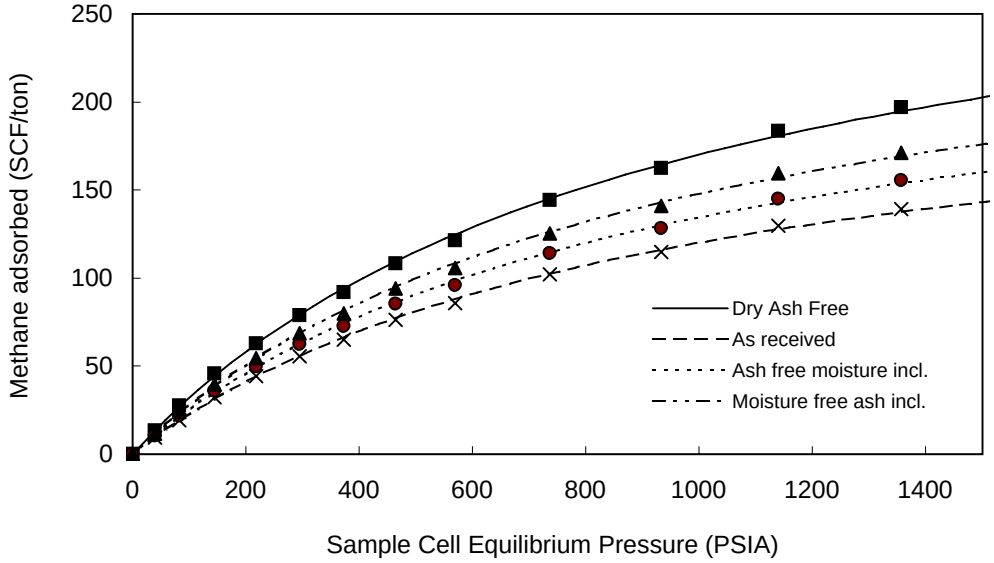

5-1B Carbon Dioxide (moisture free, ash included basis)
30.0
25.0
20.0
15.0
10.0
5.0
0.0
CO2 adsorbed (cc/g@STP)
0
1
2
3
4
5
6
Sample Cell Equilibrium Pressure (MPa)
Langmuir Volume(cc/g): 35.7
Langmuir Presssure (MPa) : 5.9
Moisture Content (%) : 24.21
Ash Content (%) : 13.10
Regression Coefficient: 0.9766

5-1B Carbon Dioxide (ash free, moisture included basis)




Adsorption Langmuir Plot
0.3
0.3
0.2
0.2
0.1
0.1
0.0
Pressure/Volume (MPa*g/cc)
Dry ash free
R2 = 0.9766
0.0
1.0
2.0
3.0
4.0
5.0
6.0
Pressure (MPa)

4-LA-2 Methane



Pressure (PSIA)	Adsorbed gas (ft^3 /ton)			
	As Received	moisture free ash incl.	ash free moisture incl.	Dry Ash Free
39	9.5	11.7	10.7	13.5
82	19.4	23.9	21.7	27.5
144	32.2	39.7	36.1	45.6
218	44.4	54.7	49.7	62.9
295	55.7	68.5	62.3	78.8
373	65.0	79.9	72.6	91.9
464	76.5	94.1	85.5	108.2
570	85.9	105.7	96.1	121.5
737	102.0	125.5	114.1	144.3
933	114.7	141.1	128.3	162.3
1140	129.7	159.5	145.1	183.4
1356	139.2	171.2	155.7	196.8

Langmuir Parameters

	As Received	Moisture free ash incl	Ash free moisture incl	Dry Ash Free
Vol. (ft^3 /ton)	231.4	284.6	258.8	327.2
Pressure (PSIA)	923.4	923.4	923.4	923.4

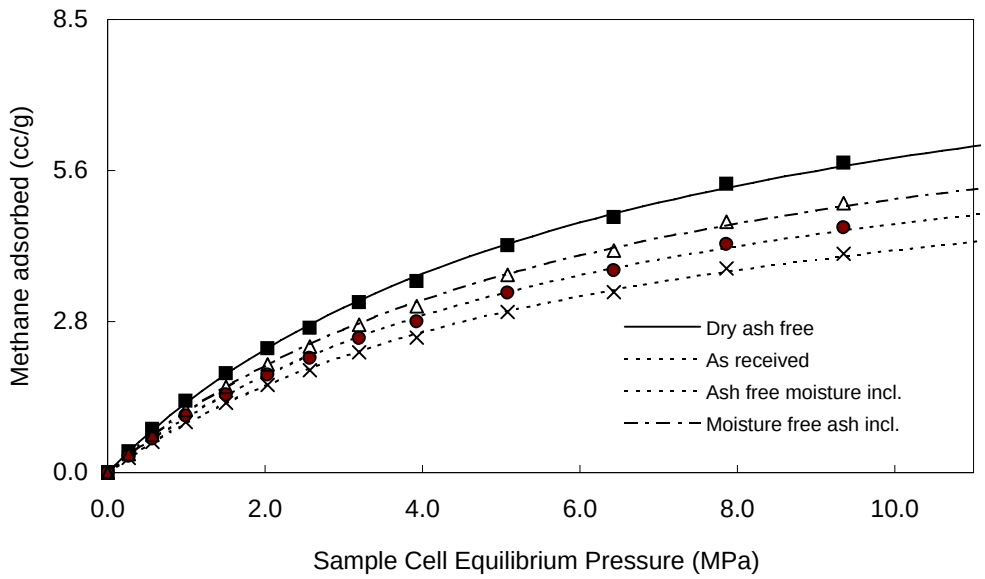
SUMMARY OF ADSORPTION ANALYSES IMP. UNITS

Isotherm Temperature: 118.4 ºF

Goodness of fit of Langmuir regression: 1.00

% Ash= 10.59 % Moisture= 18.70 Density g/cc 1.362

4-LA-2 Methane



Pressure (MPa)	Adsorbed gas (cc/g)			
	As Received	Moisture free ash incl.	ash free moisture incl	Dry Ash Free
0.271	0.28	0.34	0.31	0.40
0.566	0.57	0.70	0.64	0.81
0.994	0.95	1.17	1.06	1.34
1.505	1.31	1.61	1.46	1.85
2.031	1.64	2.01	1.83	2.32
2.572	1.91	2.35	2.13	2.70
3.199	2.25	2.76	2.51	3.18
3.928	2.52	3.11	2.82	3.57
5.079	3.00	3.69	3.35	4.24
6.432	3.37	4.15	3.77	4.77
7.859	3.81	4.69	4.26	5.39
9.351	4.09	5.03	4.57	5.78

Langmuir Parameters

	As Received	Moisture free ash incl.	Ash free moisture incl	Dry Ash Free
Vol. (cc/g)	6.80	8.36	7.61	9.62
Pressure (MPa)	6.37	6.37	6.37	6.37

SUMMARY OF ADSORPTION ANALYSES SI UNITS

Isotherm Temperature: **48.0 ºC**

Goodness of fit of Langmuir regression: **1.00**

% Ash= 10.59 **% Moisture = 18.70** **Density (g/cc) 1.362**

4-LA-2 Methane

Methane Adsorption
(Imperial Units)

Summary of Analyses		
	As Received	DAF basis
Langmuir Volume (SCF)	231	327
Langmuir Pressure (PSIA)	923	923
Goodness of fit Langmuir Equation R-squared	1.00	1.00
Ash Content Wt.%	10.59	10.59
Equilibrium Moisture Wt.%	18.70	18.70

Contents of Appendix

data sheets	***Charts***
As Received	As Received
Dry Ash Free	Dry Ash Free
Dry Ash Included	Dry Ash Included
Moist Ash Free	Moist Ash Free

4-LA-2 Methane

GAS ADSORPTION ISOTHERM IMPERIAL UNITS

AS RECEIVED BASIS

		Moisture Content % :	18.70
Isotherm Temperature º F:	118.4	Ash Content, % :	10.59
Gas used:	Methane	Helium Density g/cc	1.362

PRESSURE (PSI)	ADSORBED GAS (SCF/ton)	P / V
39	9.53	4.12
82	19.42	4.23
144	32.25	4.47
218	44.45	4.91
295	55.72	5.29
373	64.95	5.74
464	76.47	6.07
570	85.91	6.63
737	102.05	7.22
933	114.73	8.13
1140	129.70	8.79
1356	139.17	9.75

Saturated Monolayer Volume (SCF/ton):	231.4
Langmuir Pressure (PSIA):	923.4
Correlation Coefficient:	0.9964

DRY ASH FREE BASIS

39	13.48	2.91
82	27.47	2.99
144	45.61	3.16
218	62.86	3.47
295	78.80	3.74
373	91.86	4.06
464	108.15	4.29
570	121.50	4.69
737	144.32	5.10
933	162.26	5.75
1140	183.42	6.21
1356	196.82	6.89

Saturated Monolayer Volume (SCF/ton, daf):	327
Langmuir Pressure (PSIA):	923
Correlation Coefficient:	0.9964

4-LA-2 Methane

GAS ADSORPTION ISOTHERM IMPERIAL UNITS

MOISTURE FREE ASH INCLUDED

		Moisture Content % :	18.70
Isotherm Temperature° F:	118.4	Ash Content, % :	10.59
Gas used:	Methane	Helium Density g/cc	1.362

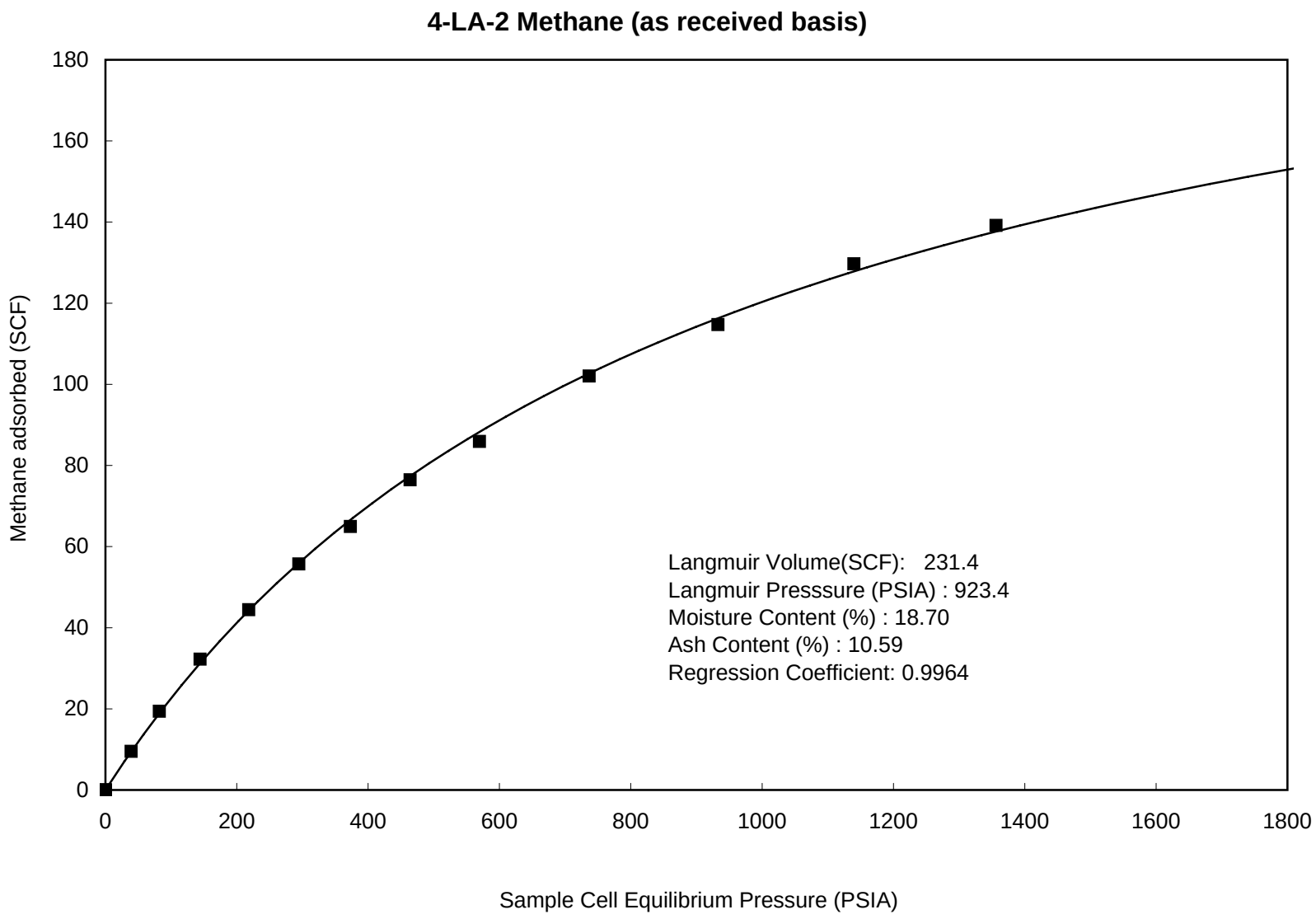
PRESSURE (PSI)	ADSORBED GAS (SCF/ton)	P / V
39	12	3.35
82	24	3.44
144	40	3.63
218	55	3.99
295	69	4.30
373	80	4.67
464	94	4.93
570	106	5.39
737	126	5.87
933	141	6.61
1140	160	7.15
1356	171	7.92

Saturated Monolayer Volume (SCF/ton):	285
Langmuir Pressure (PSIA):	923
Correlation Coefficient:	0.9964

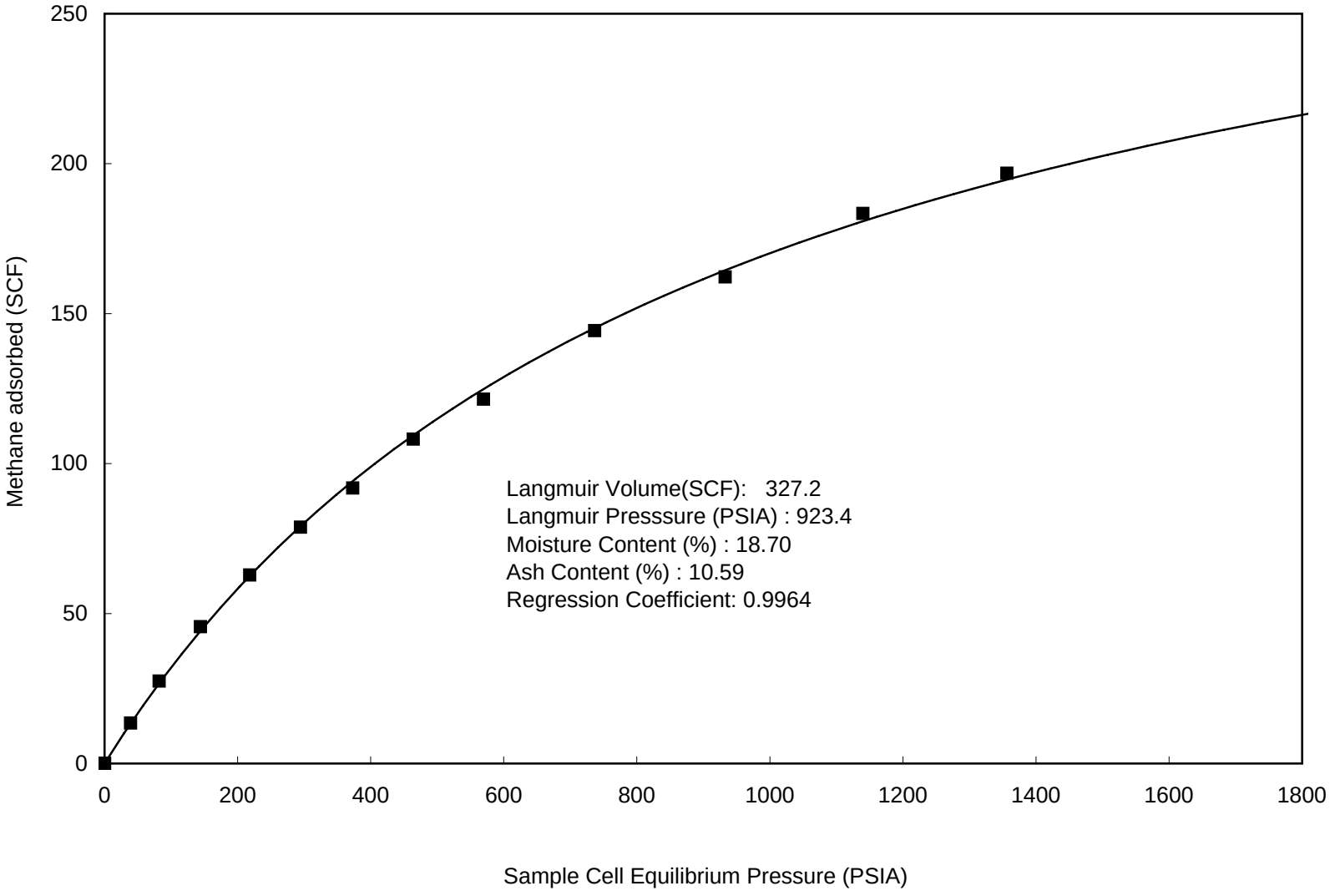
ASH FREE MOISTURE INCLUDED

39	11	3.68
82	22	3.78
144	36	4.00
218	50	4.39
295	62	4.73
373	73	5.14
464	86	5.42
570	96	5.93
737	114	6.45
933	128	7.27
1140	145	7.86
1356	156	8.71

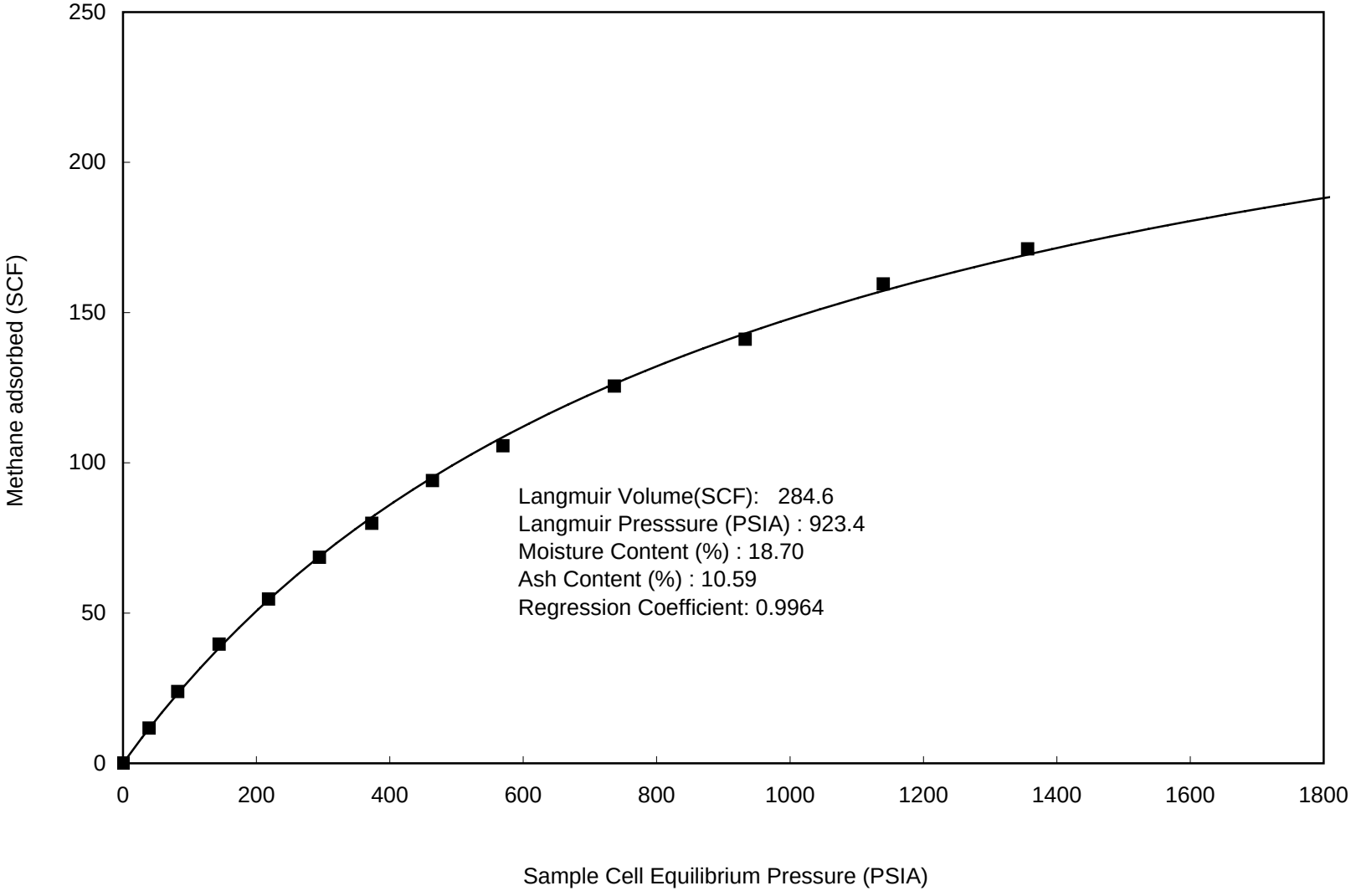
Saturated Monolayer Volume (SCF/ton):	259
Langmuir Pressure (PSIA):	923
Correlation Coefficient:	0.9964


4-LA-2 Methane (as received basis)
Methane adsorbed (SCF)
Sample Cell Equilibrium Pressure (PSIA)
0
20
40
60
80
100
120
140
160
180
0
200
400
600
800
1000
1200
1400
1600
1800
Langmuir Volume(SCF): 231.4
Langmuir Presssure (PSIA) : 923.4
Moisture Content (%) : 18.70
Ash Content (%) : 10.59
Regression Coefficient: 0.9964

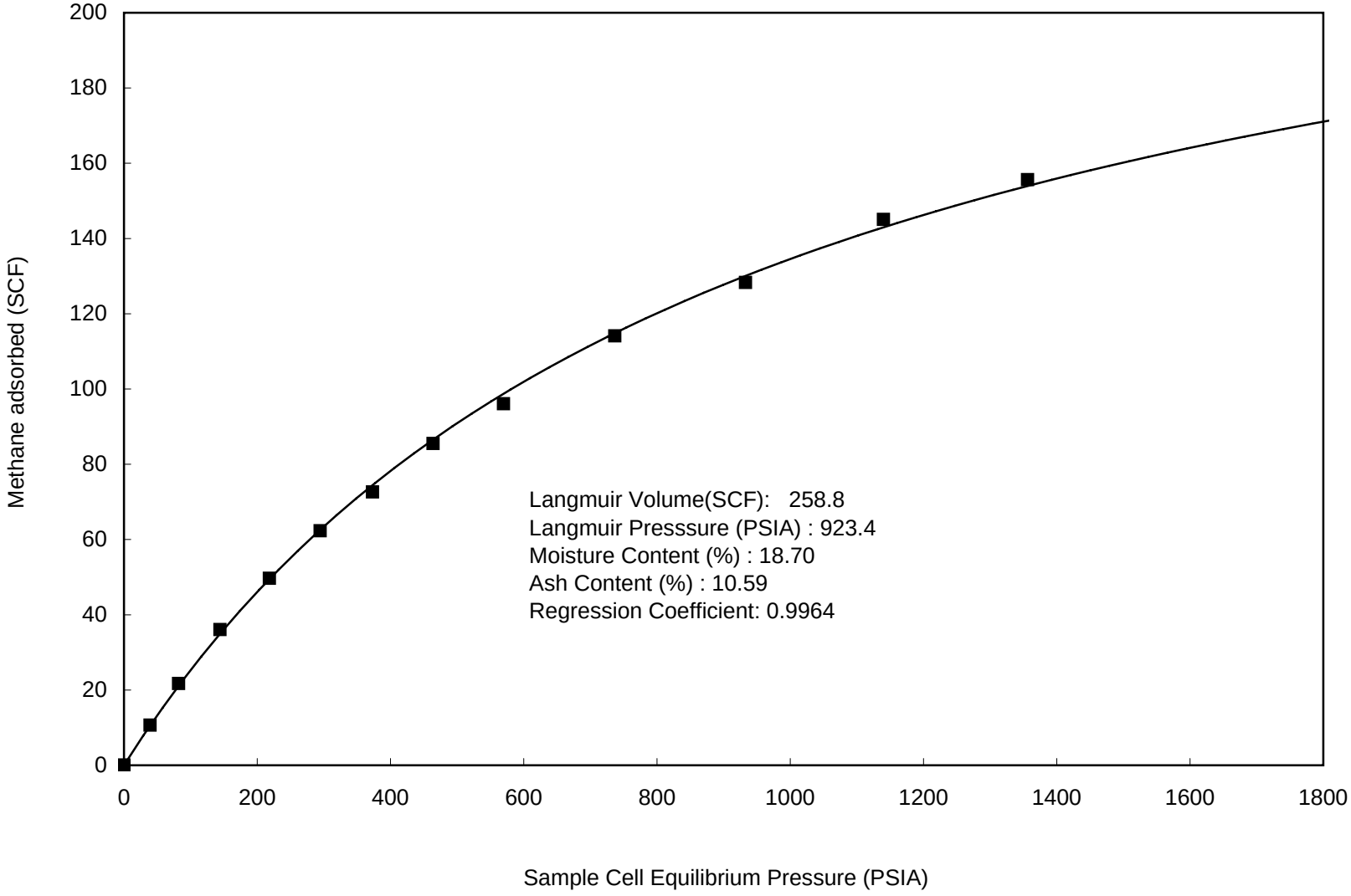
4-LA-2 Methane (dry & ash free basis)

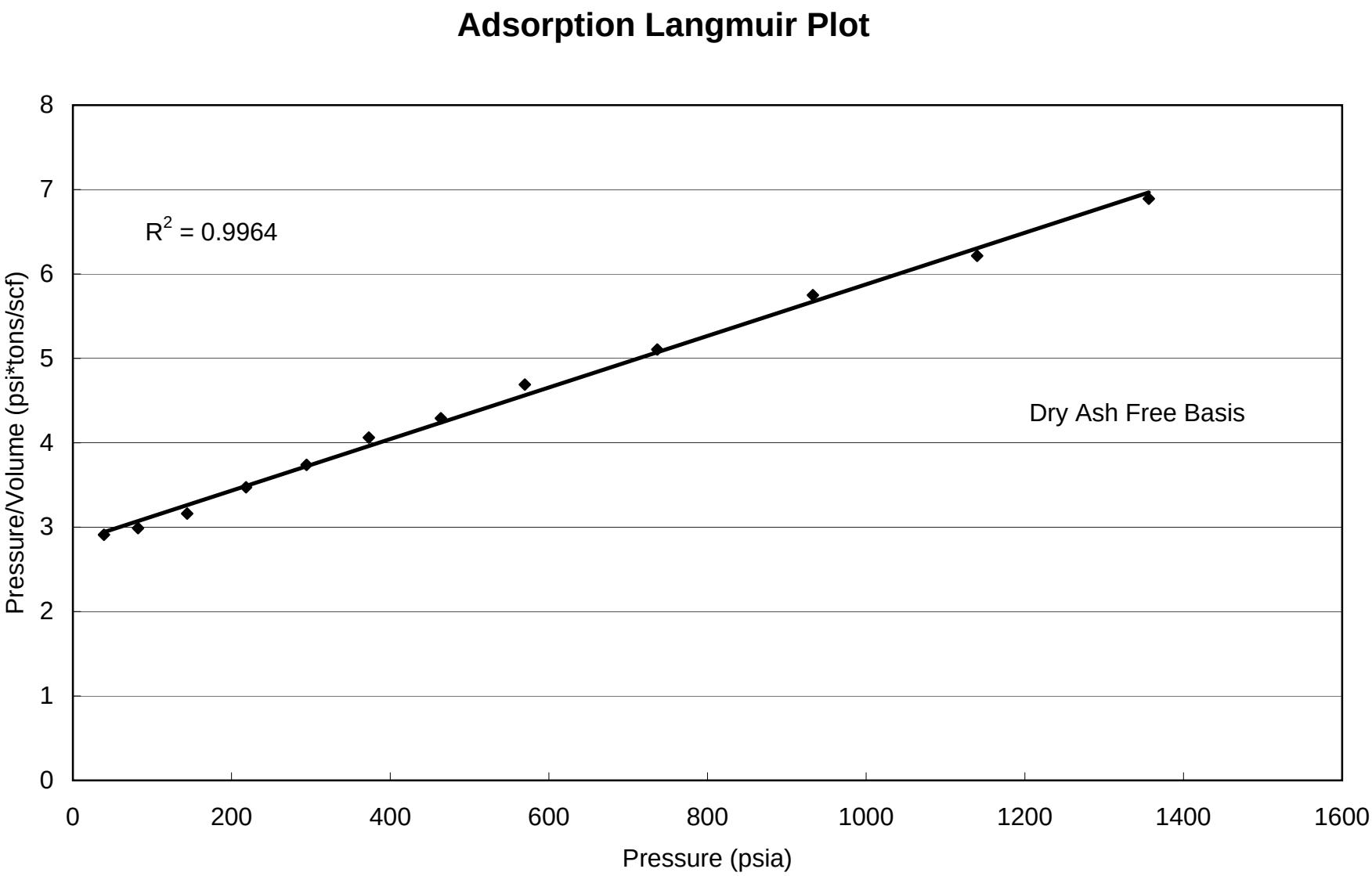


4-LA-2 Methane (moisture free, ash included basis)



4-LA-2 Methane (ash free, moisture included basis)




Adsorption Langmuir Plot
R^2 = 0.9964
Dry Ash Free Basis
Pressure/Volume (psi*tons/scf)
Pressure (psia)
0
1
2
3
4
5
6
7
8
0
200
400
600
800
1000
1200
1400
1600

4-LA-2 Methane

Methane Adsorption (SI Units)

Summary of Analyses		
	As Received	DAF basis
Langmuir Volume cc/g	6.80	9.62
Langmuir Pressure MPa	6.37	6.37
Goodness of fit Langmuir Equation R-squared	1.00	1.00
Ash Content Wt.%	10.59	10.59
Equilibrium Moisture Wt.%	18.70	18.70

Contents of Appendix

data sheets	***Charts***
As Received	As Received
Dry Ash Free	Dry Ash Free
Dry Ash Included	Dry Ash Included
Moist Ash Free	Moist Ash Free

4-LA-2 Methane

GAS ADSORPTION ISOTHERM SI UNITS

AS RECEIVED BASIS

Sample I.D. :	4-LA-2 Methane	Moisture Content (EQ) % :	18.70
Isotherm Temperature º C:	48	Ash Content % :	10.59
Gas used:	Methane	Helium Density g/cc	1.362

PRESSURE (MPa)	ADSORBED GAS (cc/g @STP)	P / V
0.271	0.28	0.965
0.566	0.57	0.992
0.994	0.95	1.048
1.505	1.31	1.152
2.031	1.64	1.240
2.572	1.91	1.348
3.199	2.25	1.423
3.928	2.52	1.556
5.079	3.00	1.694
6.432	3.37	1.908
7.859	3.81	2.062
9.351	4.09	2.286

Saturated Monolayer Volume (cc/g @ STP):	6.80
Langmuir Pressure (MPa):	6.37

DRY ASH FREE BASIS

0.271	0.40	0.683
0.566	0.81	0.701
0.994	1.34	0.741
1.505	1.85	0.815
2.031	2.32	0.877
2.572	2.70	0.953
3.199	3.18	1.006
3.928	3.57	1.100
5.079	4.24	1.197
6.432	4.77	1.349
7.859	5.39	1.458
9.351	5.78	1.617

Saturated Monolayer Volume (cc/g @ STP, daf):	9.62
Langmuir Pressure (MPa):	6.37
Correlation Coefficient:	0.9964

4-LA-2 Methane

GAS ADSORPTION ISOTHERM SI UNITS

MOISTURE FREE ASH INCLUDED

		Moisture Content (EQ) % :	18.70
Isotherm Temperature º C:	48	Ash Content % :	10.59
Gas used:	Methane	Helium Density g/cc	1.362

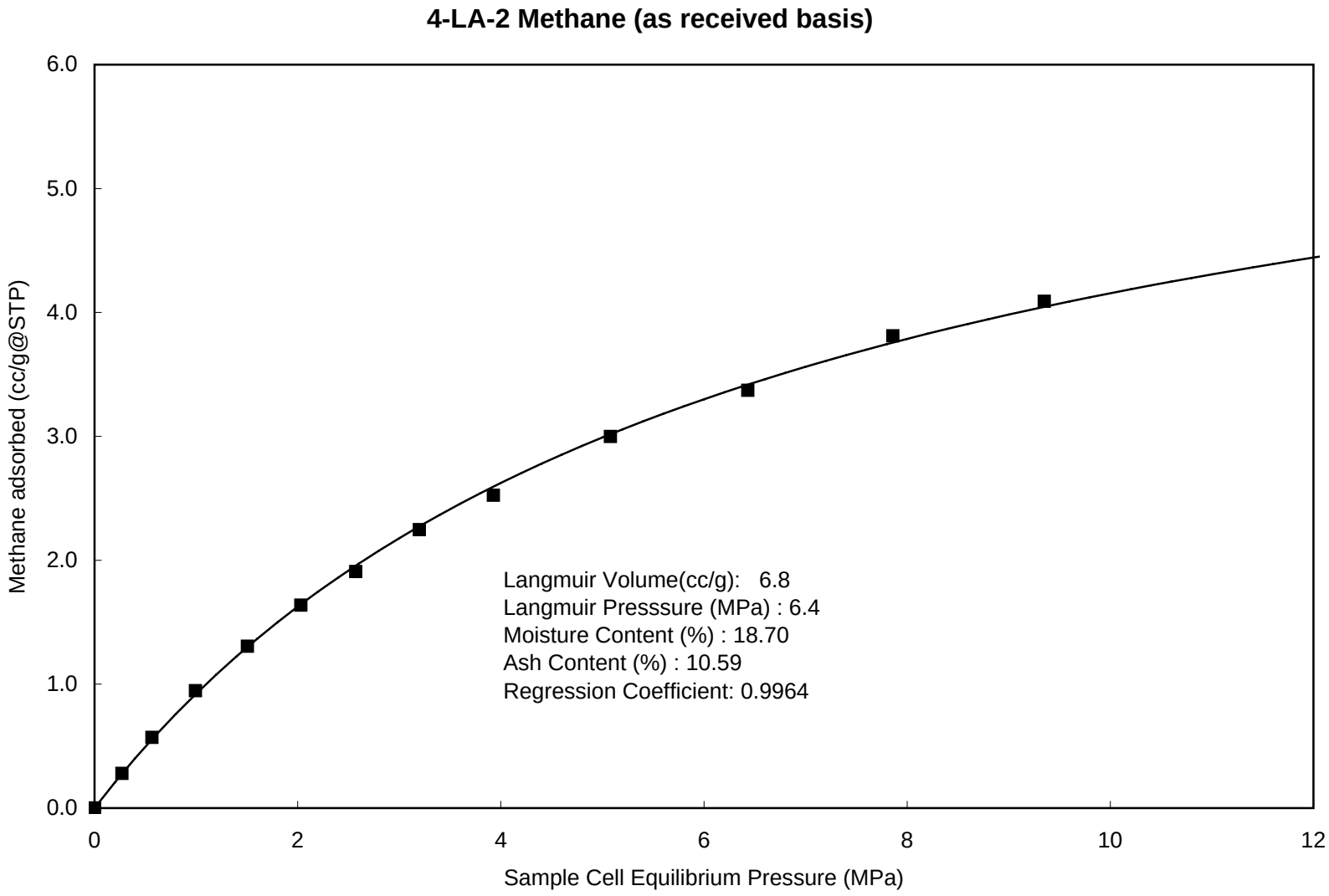
PRESSURE (MPa)	ADSORBED GAS (cc/g@STP)	P / V
0.271	0.34	0.78
0.566	0.70	0.81
0.994	1.17	0.85
1.505	1.61	0.94
2.031	2.01	1.01
2.572	2.35	1.10
3.199	2.76	1.16
3.928	3.11	1.26
5.079	3.69	1.38
6.432	4.15	1.55
7.859	4.69	1.68
9.351	5.03	1.86

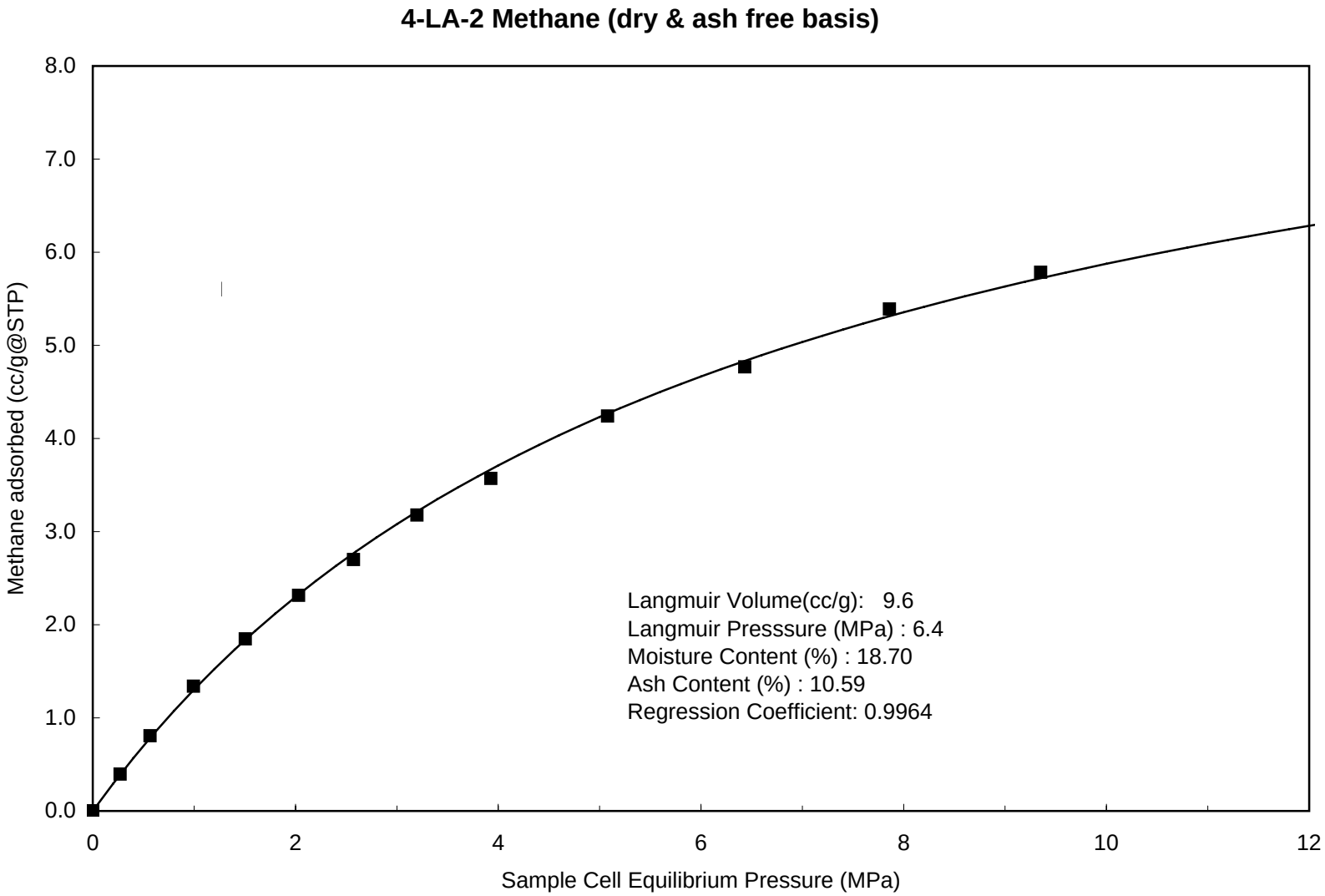
Saturated Monolayer Volume (cc/g):	8.36
Langmuir Pressure (MPa):	6.37

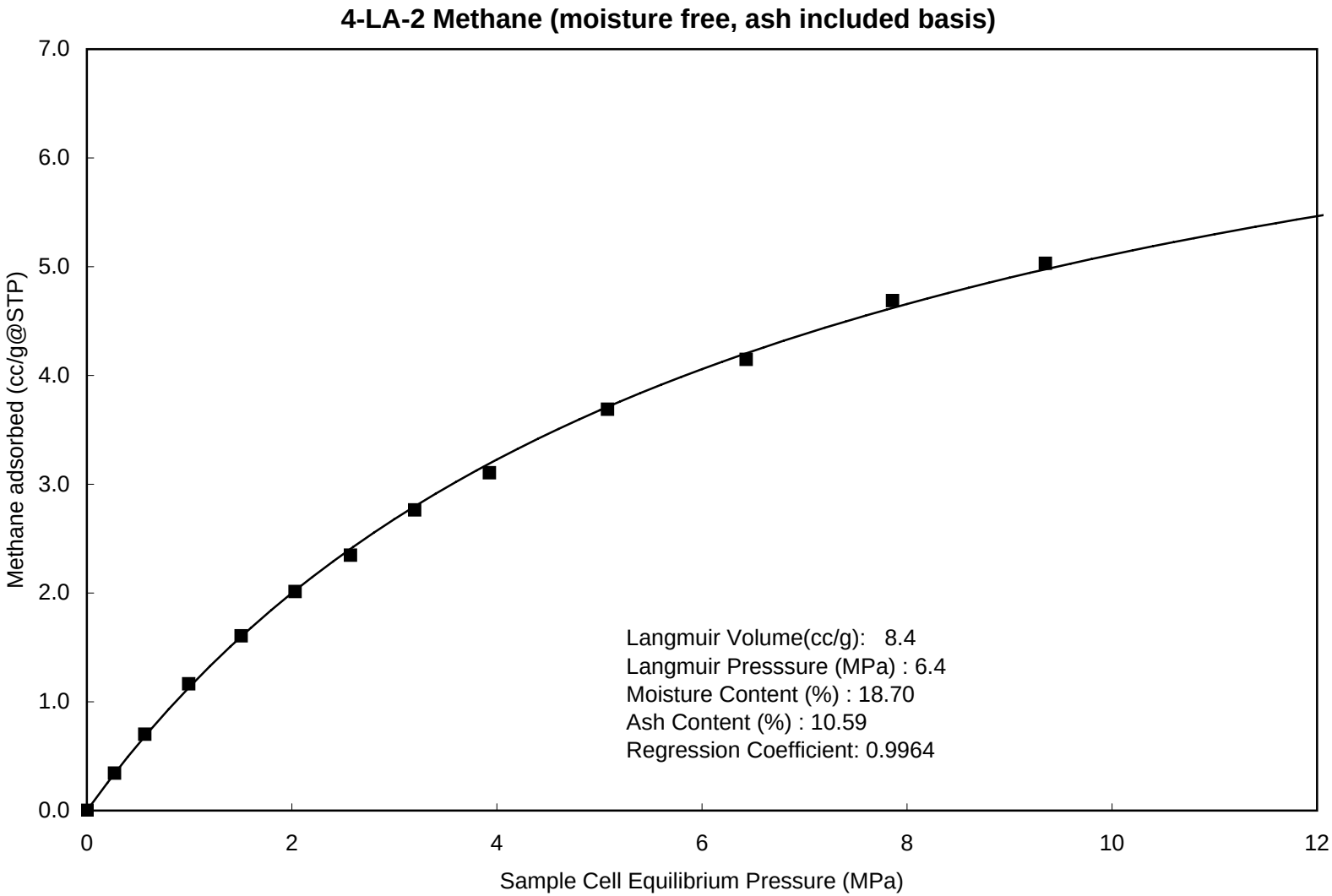
ASH FREE MOISTURE INCLUDED

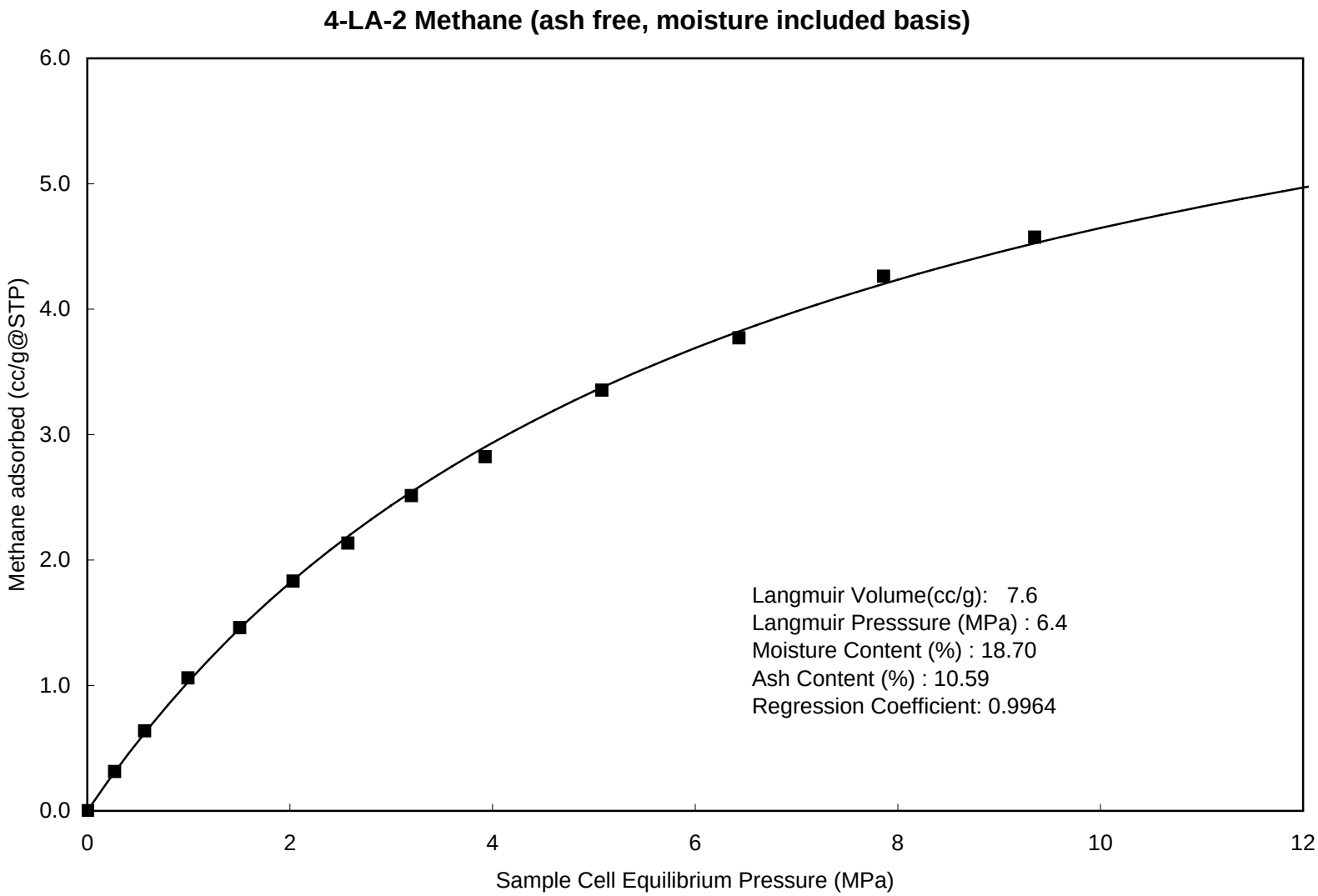
0.271	0.31	0.00
0.566	0.64	0.89
0.994	1.06	0.94
1.505	1.46	1.03
2.031	1.83	1.11
2.572	2.13	1.20
3.199	2.51	1.27
3.928	2.82	1.39
5.079	3.35	1.51
6.432	3.77	1.71
7.859	4.26	1.84
9.351	4.57	2.04

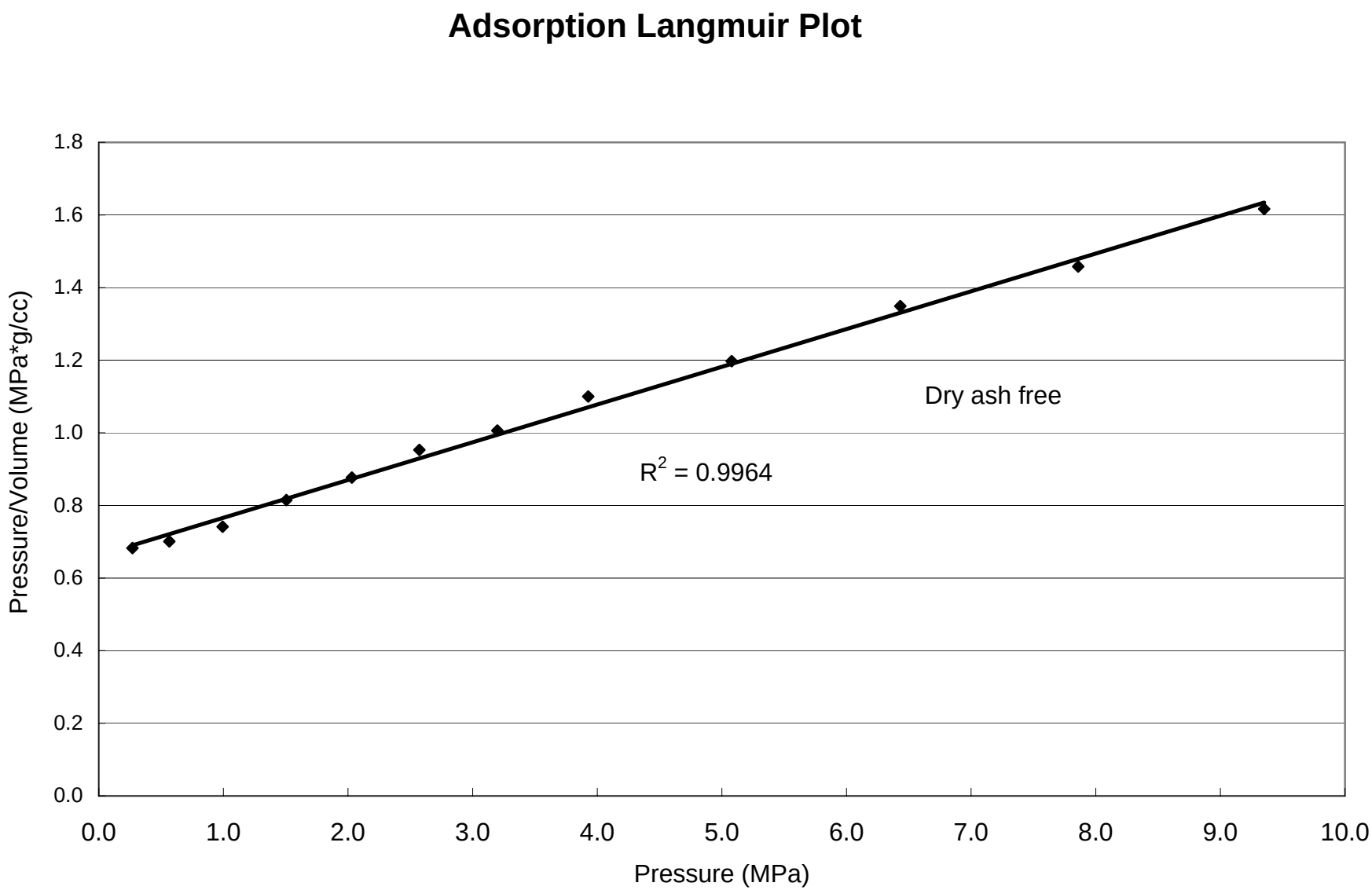
Saturated Monolayer Volume (cc/g, ash free):	7.61
Langmuir Pressure (MPa):	6.37
Correlation Coefficient:	0.9964


4-LA-2 Methane (as received basis)
Methane adsorbed (cc/g@STP)
6.0
5.0
4.0
3.0
2.0
1.0
0.0
0
2
4
6
8
10
12
Sample Cell Equilibrium Pressure (MPa)
Langmuir Volume(cc/g): 6.8
Langmuir Presssure (MPa) : 6.4
Moisture Content (%) : 18.70
Ash Content (%) : 10.59
Regression Coefficient: 0.9964

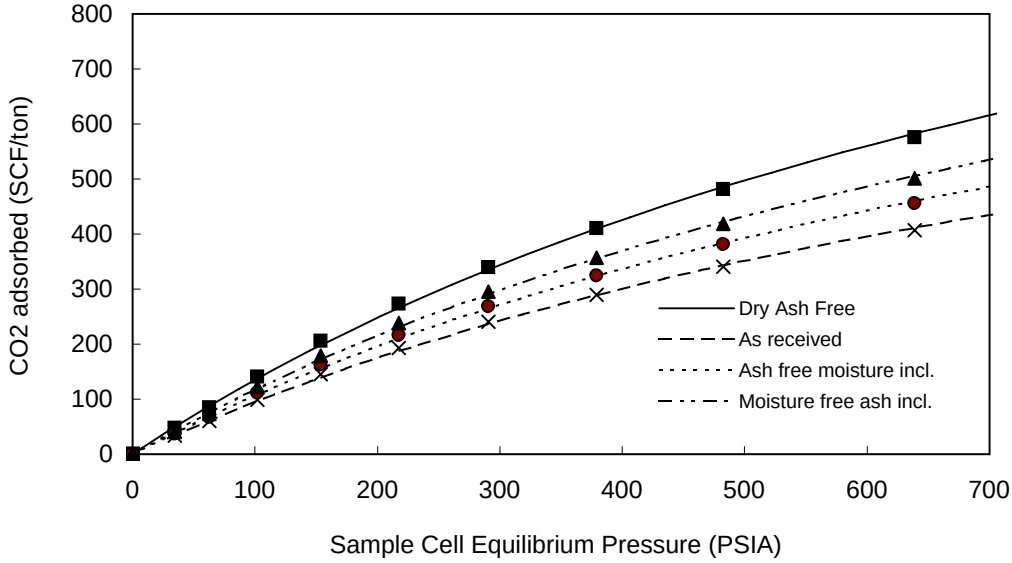

4-LA-2 Methane (dry & ash free basis)
Methane adsorbed (cc/g@STP)
Sample Cell Equilibrium Pressure (MPa)
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
0
2
4
6
8
10
12
Langmuir Volume(cc/g): 9.6
Langmuir Presssure (MPa) : 6.4
Moisture Content (%) : 18.70
Ash Content (%) : 10.59
Regression Coefficient: 0.9964


4-LA-2 Methane (moisture free, ash included basis)
Methane adsorbed (cc/g@STP)
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
0
2
4
6
8
10
12
Sample Cell Equilibrium Pressure (MPa)
Langmuir Volume(cc/g): 8.4
Langmuir Presssure (MPa) : 6.4
Moisture Content (%) : 18.70
Ash Content (%) : 10.59
Regression Coefficient: 0.9964


4-LA-2 Methane (ash free, moisture included basis)
Methane adsorbed (cc/g@STP)
6.0
5.0
4.0
3.0
2.0
1.0
0.0
0
2
4
6
8
10
12
Sample Cell Equilibrium Pressure (MPa)
Langmuir Volume(cc/g): 7.6
Langmuir Presssure (MPa) : 6.4
Moisture Content (%) : 18.70
Ash Content (%) : 10.59
Regression Coefficient: 0.9964


Adsorption Langmuir Plot
Pressure/Volume (MPa*g/cc)
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
Pressure (MPa)
Dry ash free
R2 = 0.9964

4-LA-2 Carbon Dioxide



Pressure (PSIA)	Adsorbed gas (ft^3 /ton)			
	As Received	moisture free ash incl.	ash free moisture incl.	Dry Ash Free
35	33.4	41.1	37.4	47.3
63	59.9	73.7	67.0	84.8
102	99.3	122.1	111.1	140.4
154	145.2	178.7	162.4	205.4
217	193.5	238.0	216.4	273.7
291	240.4	295.7	268.9	340.0
379	290.1	356.8	324.4	410.2
482	340.7	419.1	381.0	481.8
639	407.1	500.8	455.3	575.7

Langmuir Parameters

	As Received	Moisture free ash incl	Ash free moisture incl	Dry Ash Free
Vol. (ft^3 /ton)	1071.9	1318.4	1198.8	1515.9
Pressure (PSIA)	1023.4	1023.4	1023.4	1023.4

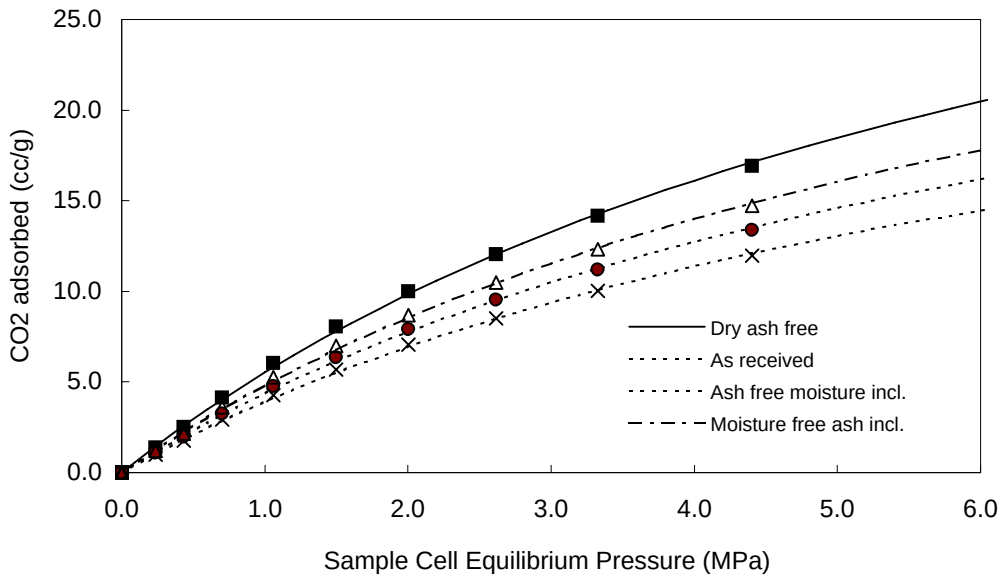
SUMMARY OF ADSORPTION ANALYSES IMP. UNITS

Isotherm Temperature: 118.4 ºF

Goodness of fit of Langmuir regression: 0.97

% Ash= 10.59 % Moisture= 18.70 Density g/cc 1.362

4-LA-2 Carbon Dioxide



Pressure (MPa)	Adsorbed gas (cc/g)			
	As Received	Moisture free ash incl.	ash free moisture incl	Dry Ash Free
0.239	0.98	1.21	1.10	1.39
0.433	1.76	2.17	1.97	2.49
0.703	2.92	3.59	3.26	4.13
1.061	4.27	5.25	4.77	6.04
1.499	5.69	6.99	6.36	8.04
2.003	7.07	8.69	7.90	9.99
2.613	8.52	10.49	9.53	12.06
3.327	10.01	12.32	11.20	14.16
4.406	11.96	14.72	13.38	16.92

Langmuir Parameters

	As Received	Moisture free ash incl.	Ash free moisture incl	Dry Ash Free
Vol. (cc/g)	31.50	38.75	35.23	44.55
Pressure (MPa)	7.06	7.06	7.06	7.06

SUMMARY OF ADSORPTION ANALYSES SI UNITS

Isotherm Temperature: **48.0 ºC**

Goodness of fit of Langmuir regression: **0.97**

% Ash= 10.59 **% Moisture = 18.70** **Density (g/cc) 1.362**

4-LA-2 Carbon Dioxide

CO2 Adsorption (Imperial Units)

Summary of Analyses		
	As Received	DAF basis
Langmuir Volume (SCF)	1072	1516
Langmuir Pressure (PSIA)	1023	1023
Goodness of fit Langmuir Equation R-squared	0.97	0.97
Ash Content Wt.%	10.59	10.59
Equilibrium Moisture Wt.%	18.70	18.70

Contents of Appendix

data sheets	***Charts***
As Received	As Received
Dry Ash Free	Dry Ash Free
Dry Ash Included	Dry Ash Included
Moist Ash Free	Moist Ash Free

4-LA-2 Carbon Dioxide

GAS ADSORPTION ISOTHERM IMPERIAL UNITS

AS RECEIVED BASIS

		Moisture Content % :	18.70
Isotherm Temperature º F:	118.4	Ash Content, % :	10.59
Gas used:	CO2	Helium Density g/cc	1.362

PRESSURE (PSI)	ADSORBED GAS (SCF/ton)	P / V
35	33.42	1.04
63	59.95	1.05
102	99.30	1.03
154	145.24	1.06
217	193.50	1.12
291	240.41	1.21
379	290.06	1.31
482	340.70	1.42
639	407.11	1.57

Saturated Monolayer Volume (SCF/ton):	1071.9
Langmuir Pressure (PSIA):	1023.4
Correlation Coefficient:	0.9745

DRY ASH FREE BASIS

35	47.27	0.73
63	84.78	0.74
102	140.43	0.73
154	205.41	0.75
217	273.65	0.79
291	339.99	0.85
379	410.21	0.92
482	481.82	1.00
639	575.75	1.11

Saturated Monolayer Volume (SCF/ton, daf):	1516
Langmuir Pressure (PSIA):	1023
Correlation Coefficient:	0.9745

4-LA-2 Carbon Dioxide

GAS ADSORPTION ISOTHERM IMPERIAL UNITS

MOISTURE FREE ASH INCLUDED

		Moisture Content % :	18.70
Isotherm Temperature° F:	118.4	Ash Content, % :	10.59
Gas used:	CO2	Helium Density g/cc	1.362

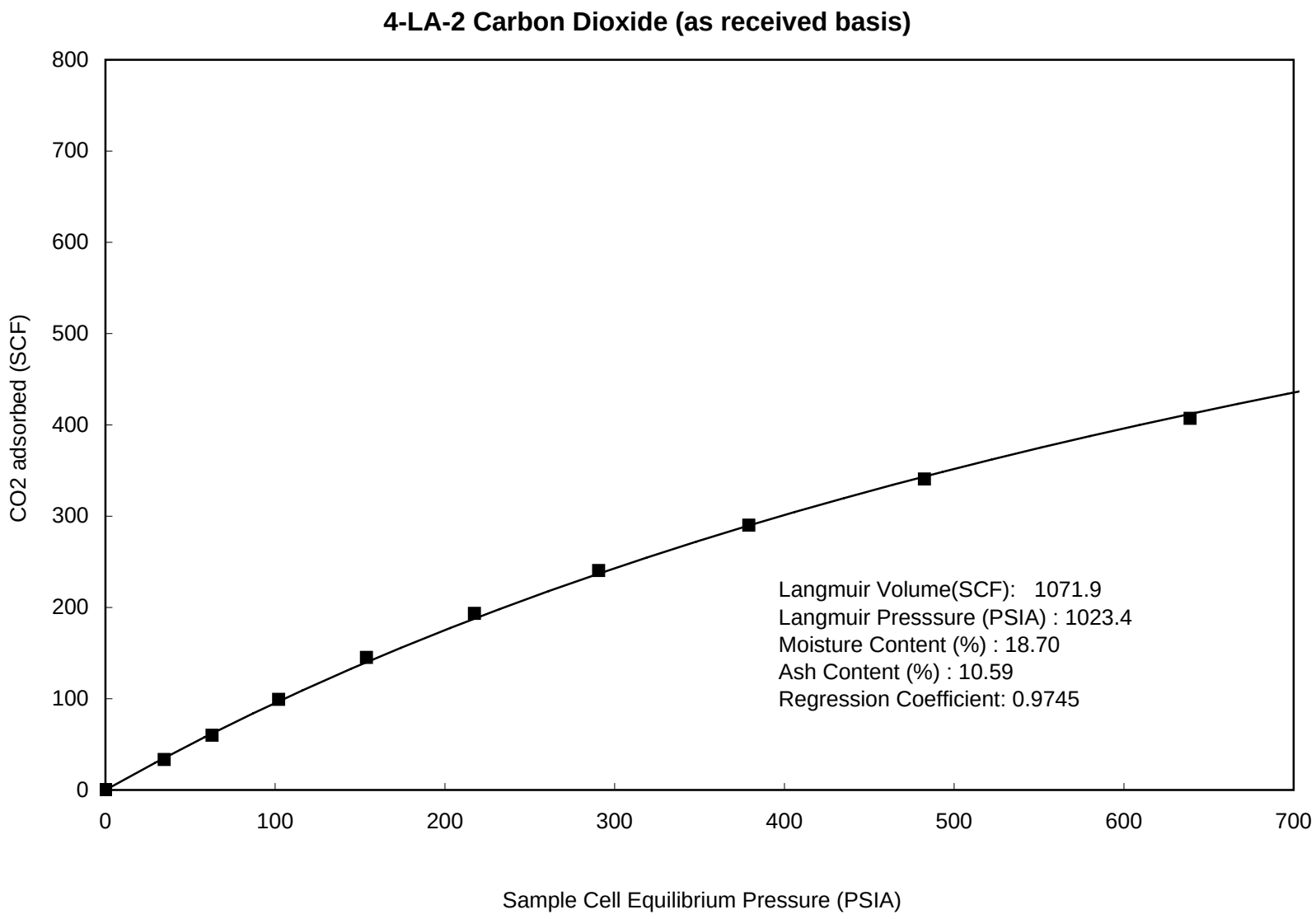
PRESSURE (PSI)	ADSORBED GAS (SCF/ton)	P / V
35	41	0.84
63	74	0.85
102	122	0.84
154	179	0.86
217	238	0.91
291	296	0.98
379	357	1.06
482	419	1.15
639	501	1.28

Saturated Monolayer Volume (SCF/ton):	1318
Langmuir Pressure (PSIA):	1023
Correlation Coefficient:	0.9745

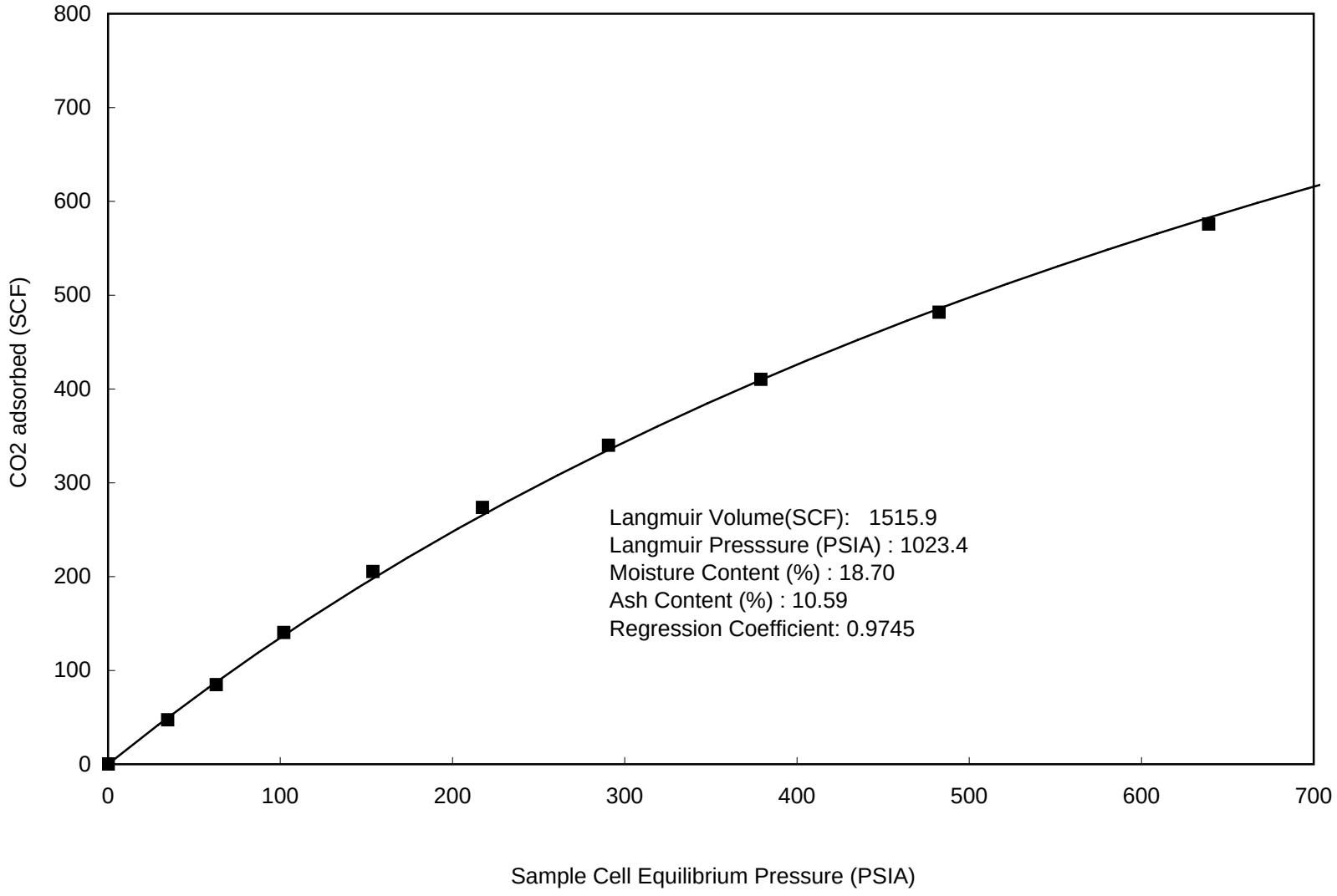
ASH FREE MOISTURE INCLUDED

35	37	0.93
63	67	0.94
102	111	0.92
154	162	0.95
217	216	1.00
291	269	1.08
379	324	1.17
482	381	1.27
639	455	1.40

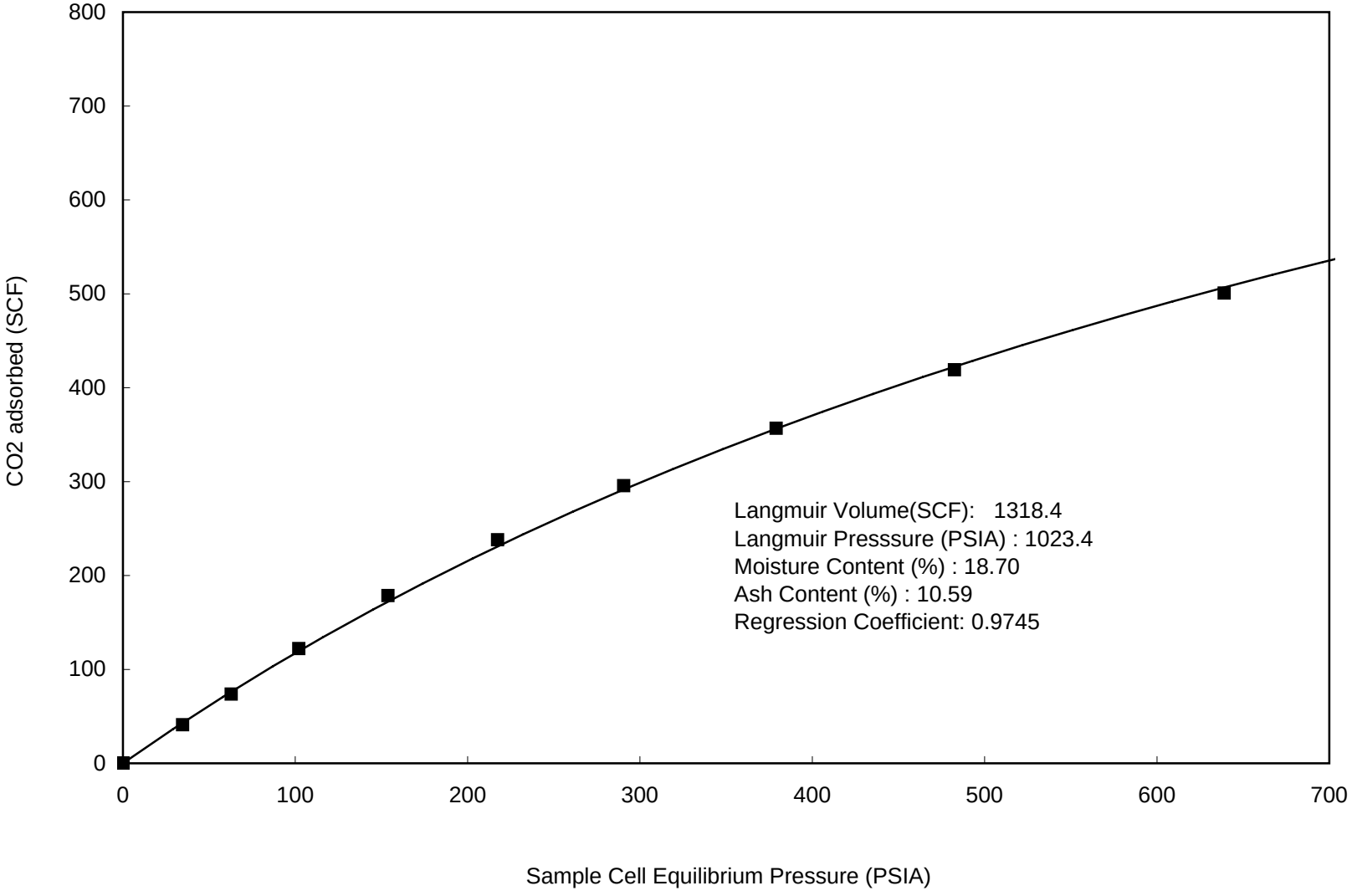
Saturated Monolayer Volume (SCF/ton):	1199
Langmuir Pressure (PSIA):	1023
Correlation Coefficient:	0.9745


4-LA-2 Carbon Dioxide (as received basis)
CO2 adsorbed (SCF)
800
700
600
500
400
300
200
100
0
0
100
200
300
400
500
600
700
Sample Cell Equilibrium Pressure (PSIA)
Langmuir Volume(SCF): 1071.9
Langmuir Presssure (PSIA) : 1023.4
Moisture Content (%) : 18.70
Ash Content (%) : 10.59
Regression Coefficient: 0.9745

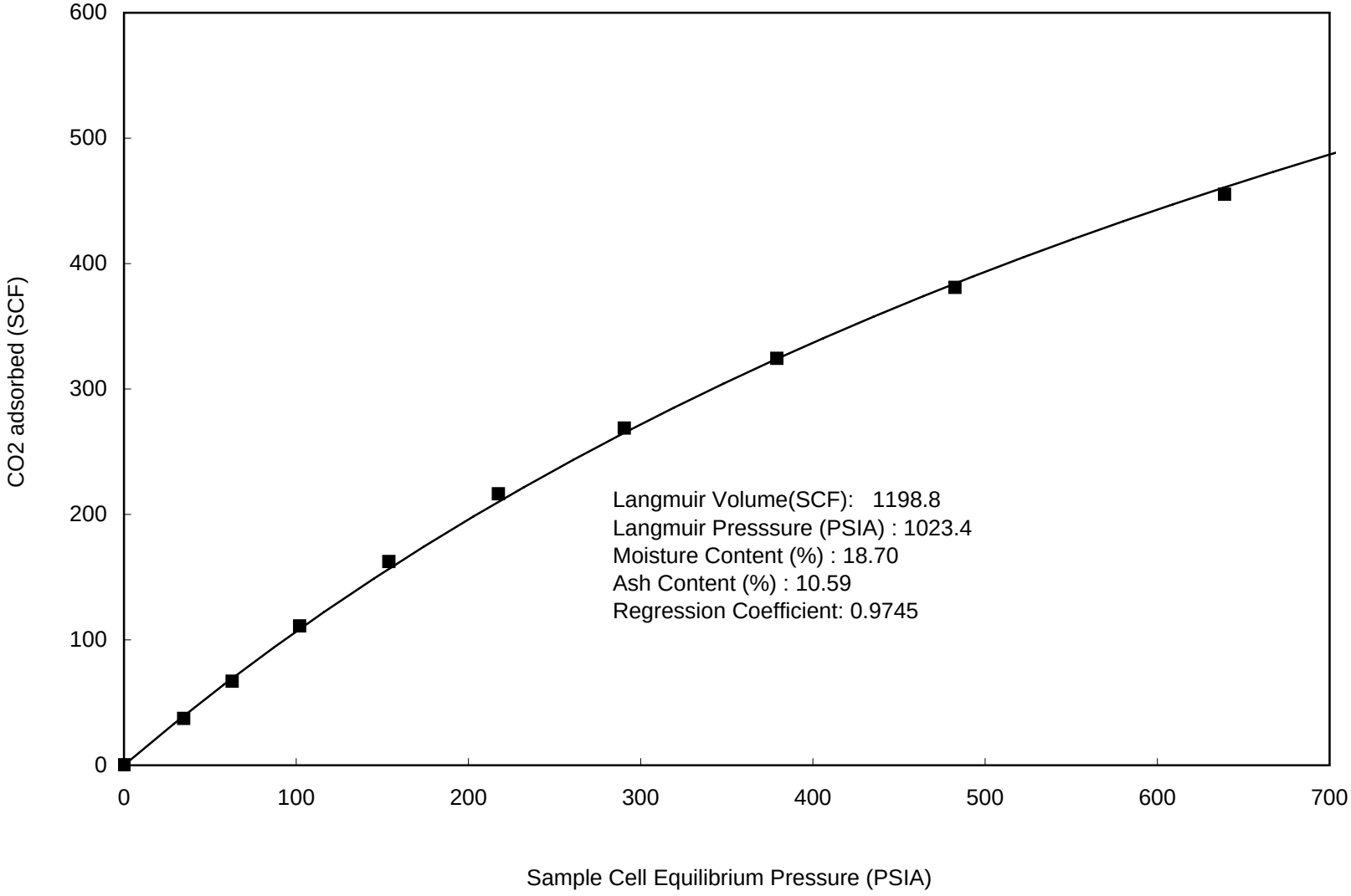
4-LA-2 Carbon Dioxide (dry & ash free basis)

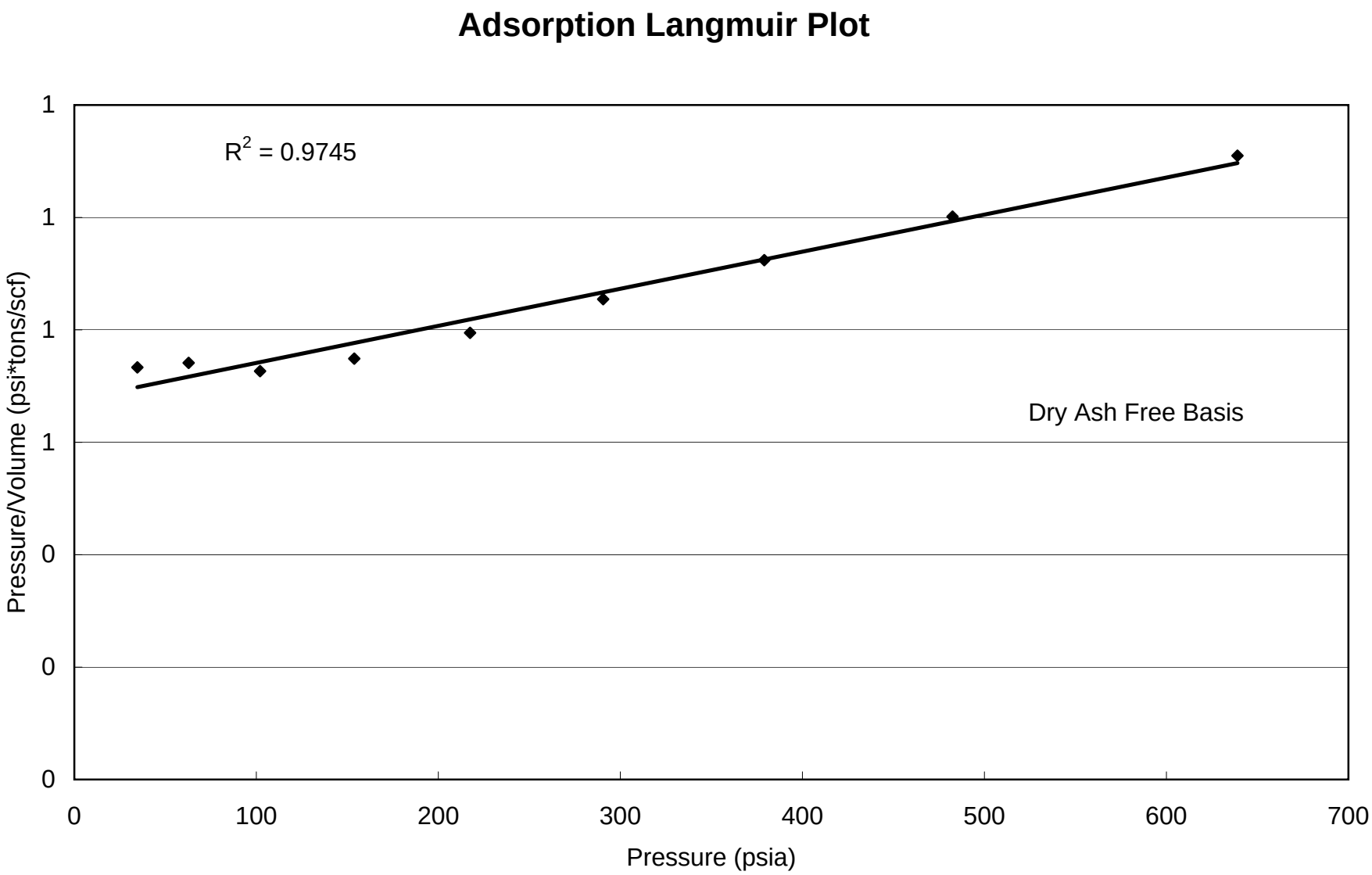


4-LA-2 Carbon Dioxide (moisture free, ash included basis)



4-LA-2 Carbon Dioxide (ash free, moisture included basis)




Adsorption Langmuir Plot
R2 = 0.9745
Dry Ash Free Basis
Pressure/Volume (psi*tons/scf)
Pressure (psia)
1
1
1
1
0
0
0
0
100
200
300
400
500
600
700

4-LA-2 Carbon Dioxide

CO2 Adsorption (SI Units)

Summary of Analyses		
	As Received	DAF basis
Langmuir Volume cc/g	31.50	44.55
Langmuir Pressure MPa	7.06	7.06
Goodness of fit Langmuir Equation R-squared	0.97	0.97
Ash Content Wt.%	10.59	10.59
Equilibrium Moisture Wt.%	18.70	18.70

Contents of Appendix

data sheets	***Charts***
As Received	As Received
Dry Ash Free	Dry Ash Free
Dry Ash Included	Dry Ash Included
Moist Ash Free	Moist Ash Free

4-LA-2 Carbon Dioxide

GAS ADSORPTION ISOTHERM SI UNITS

AS RECEIVED BASIS

Sample I.D. :	4-LA-2 Carbon Dioxide	Moisture Content (EQ) % :	18.70
Isotherm Temperature º C:	48	Ash Content % :	10.59
Gas used:	CO2	Helium Density g/cc	1.362

PRESSURE (MPa)	ADSORBED GAS (cc/g @STP)	P / V
0.239	0.98	0.243
0.433	1.76	0.246
0.703	2.92	0.241
1.061	4.27	0.248
1.499	5.69	0.264
2.003	7.07	0.284
2.613	8.52	0.307
3.327	10.01	0.332
4.406	11.96	0.368

Saturated Monolayer Volume (cc/g @ STP):	31.50
Langmuir Pressure (MPa):	7.06

DRY ASH FREE BASIS

0.239	1.39	0.172
0.433	2.49	0.174
0.703	4.13	0.170
1.061	6.04	0.176
1.499	8.04	0.186
2.003	9.99	0.200
2.613	12.06	0.217
3.327	14.16	0.235
4.406	16.92	0.260

Saturated Monolayer Volume (cc/g @ STP, daf):	44.55
Langmuir Pressure (MPa):	7.06
Correlation Coefficient:	0.9745

4-LA-2 Carbon Dioxide

GAS ADSORPTION ISOTHERM SI UNITS

MOISTURE FREE ASH INCLUDED

		Moisture Content (EQ) % :	18.70
Isotherm Temperature º C:	48	Ash Content % :	10.59
Gas used:	CO2	Helium Density g/cc	1.362

PRESSURE (MPa)	ADSORBED GAS (cc/g@STP)	P / V
0.239	1.21	0.20
0.433	2.17	0.20
0.703	3.59	0.20
1.061	5.25	0.20
1.499	6.99	0.21
2.003	8.69	0.23
2.613	10.49	0.25
3.327	12.32	0.27
4.406	14.72	0.30

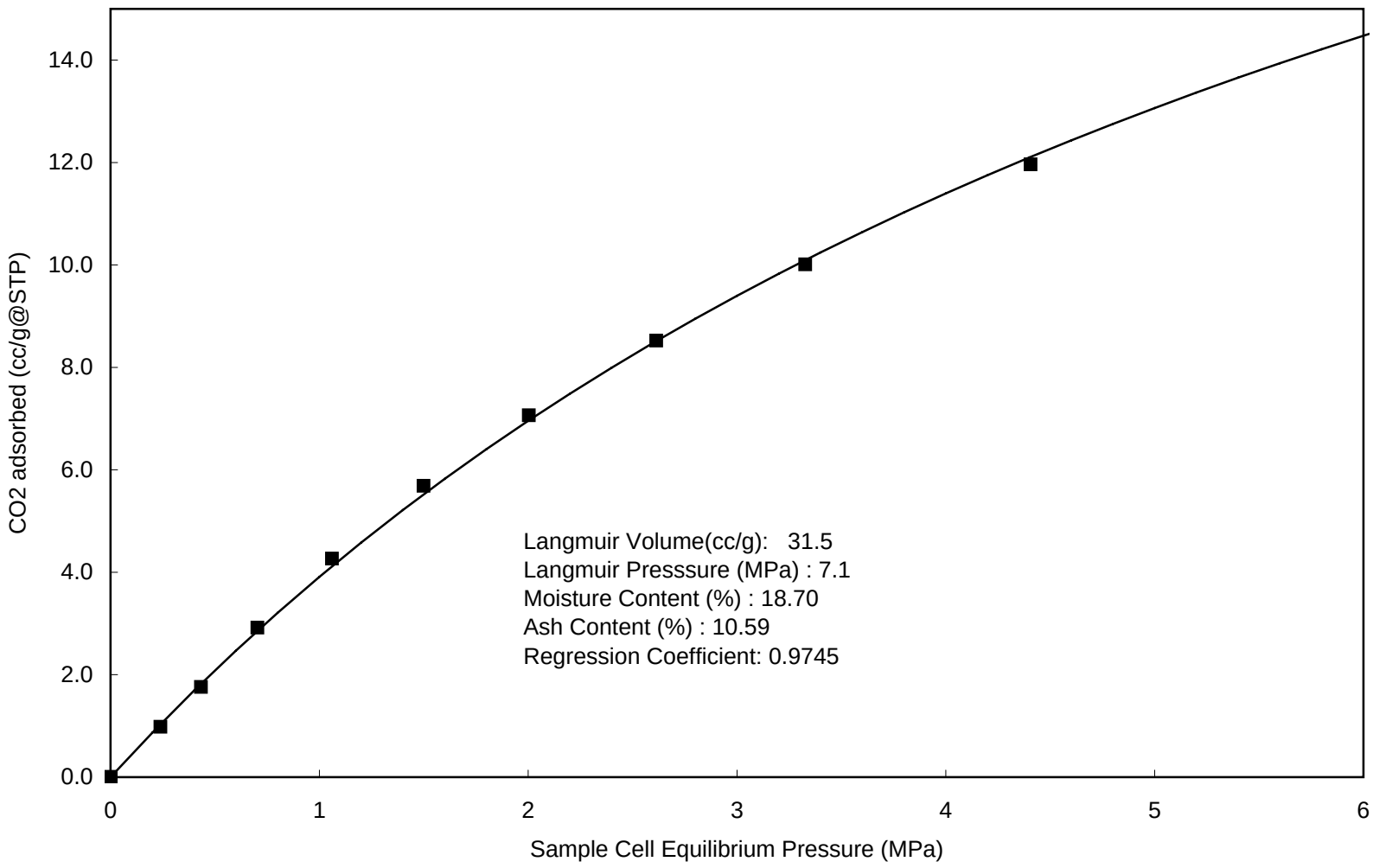
Saturated Monolayer Volume (cc/g): 38.75
Langmuir Pressure (MPa): 7.06

ASH FREE MOISTURE INCLUDED

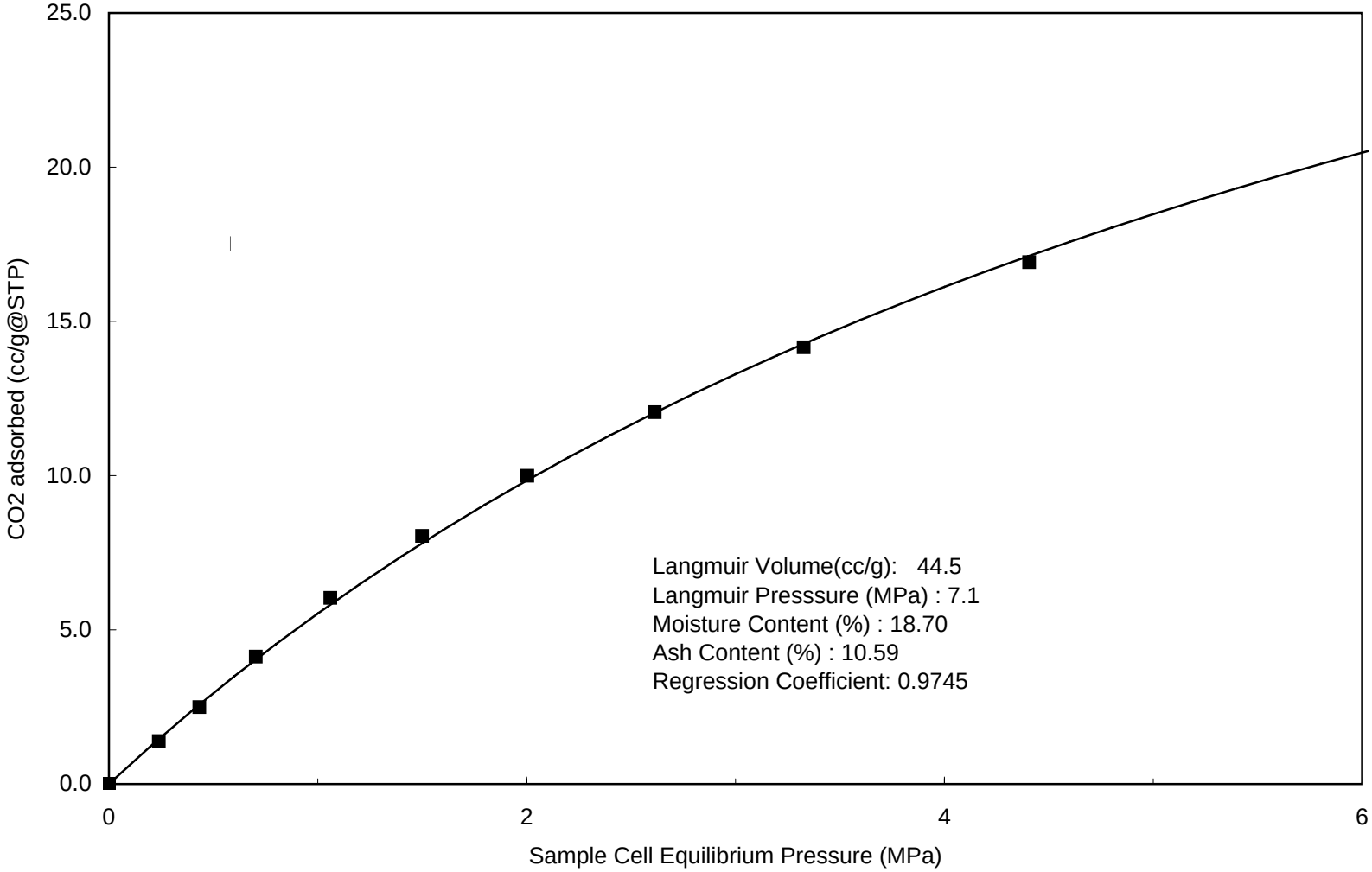
0.239	1.10	0.00
0.433	1.97	0.22
0.703	3.26	0.22
1.061	4.77	0.22
1.499	6.36	0.24
2.003	7.90	0.25
2.613	9.53	0.27
3.327	11.20	0.30
4.406	13.38	0.33

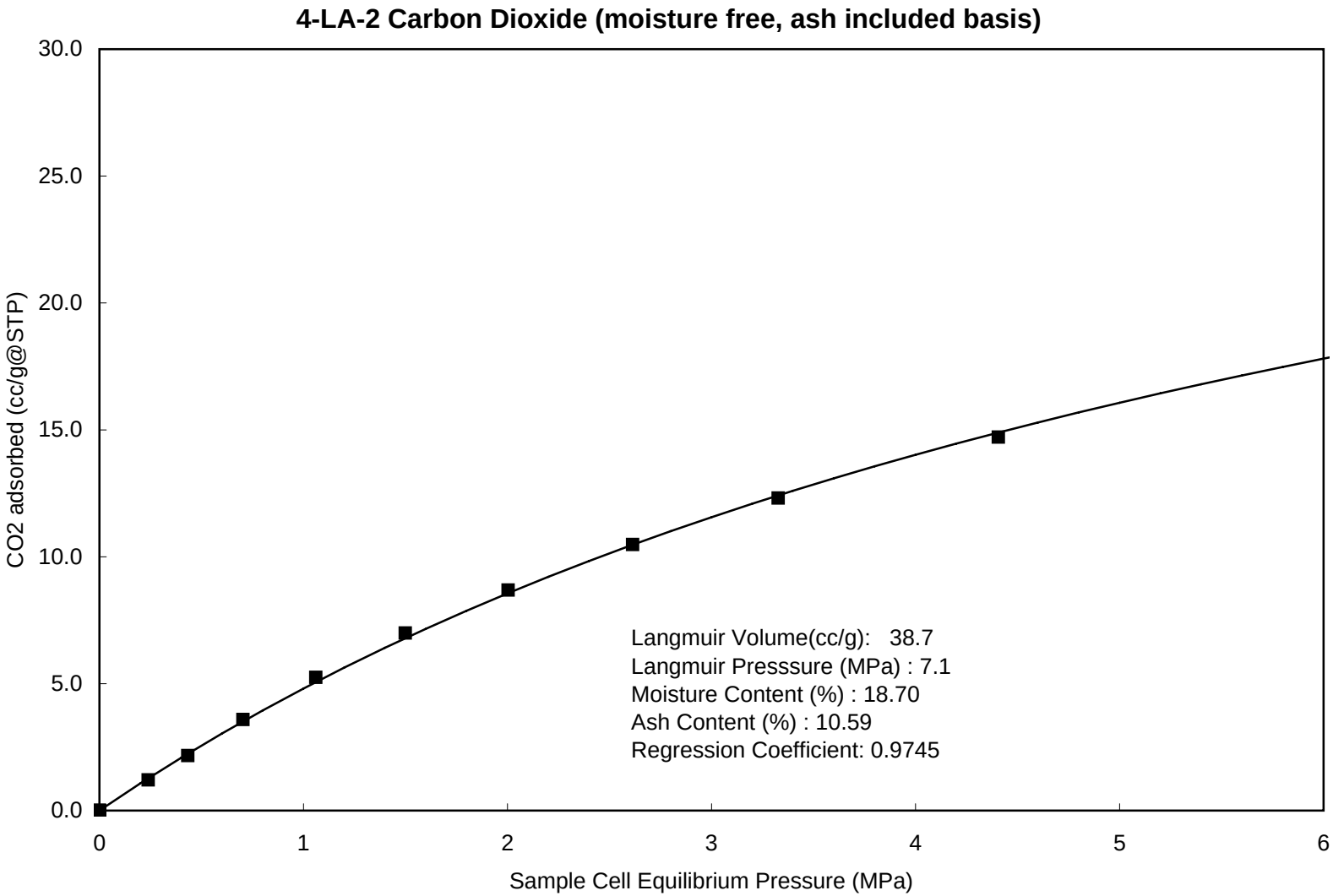
Saturated Monolayer Volume (cc/g, ash free): 35.23
Langmuir Pressure (MPa): 7.06
Correlation Coefficient: 0.9745

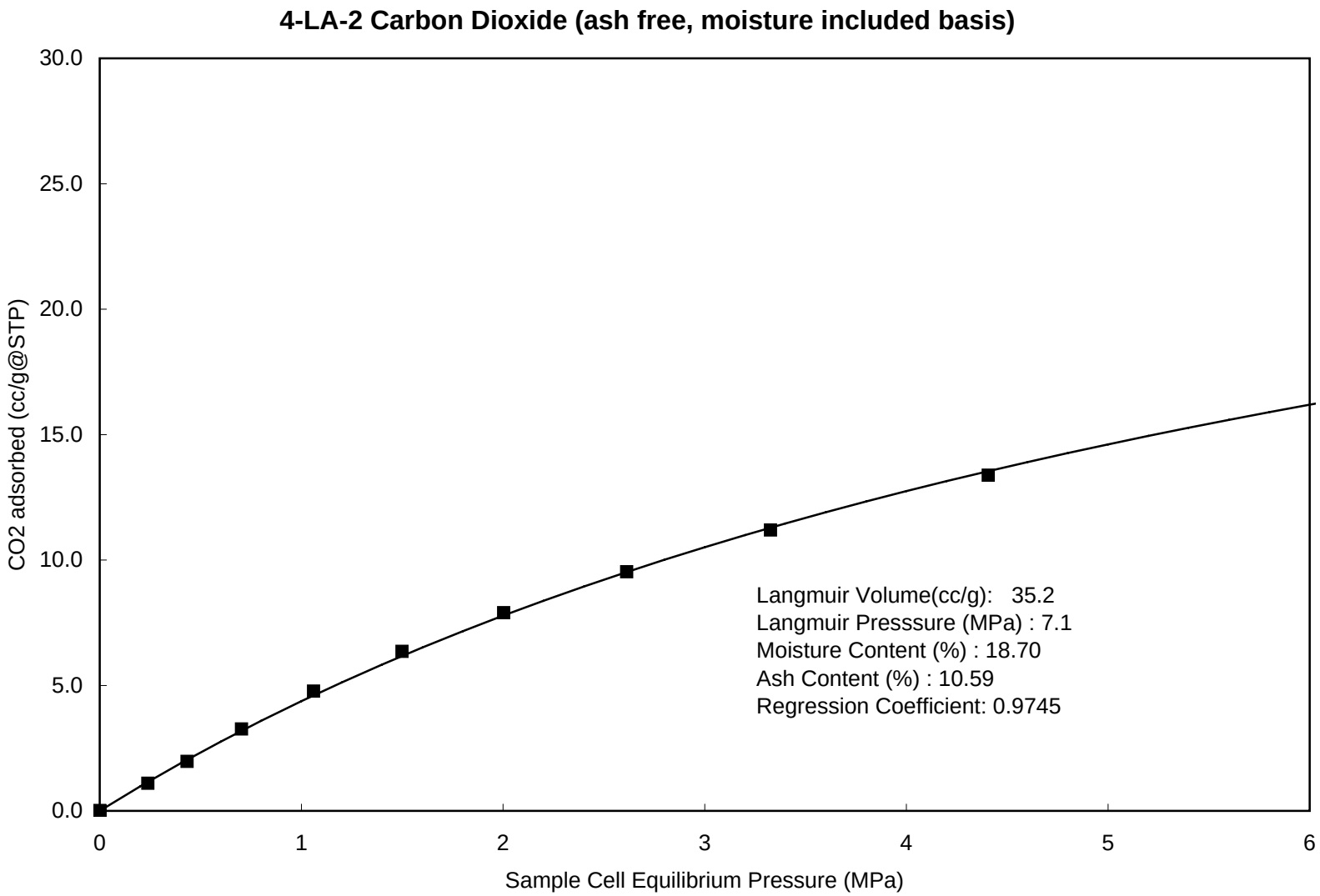
4-LA-2 Carbon Dioxide (as received basis)

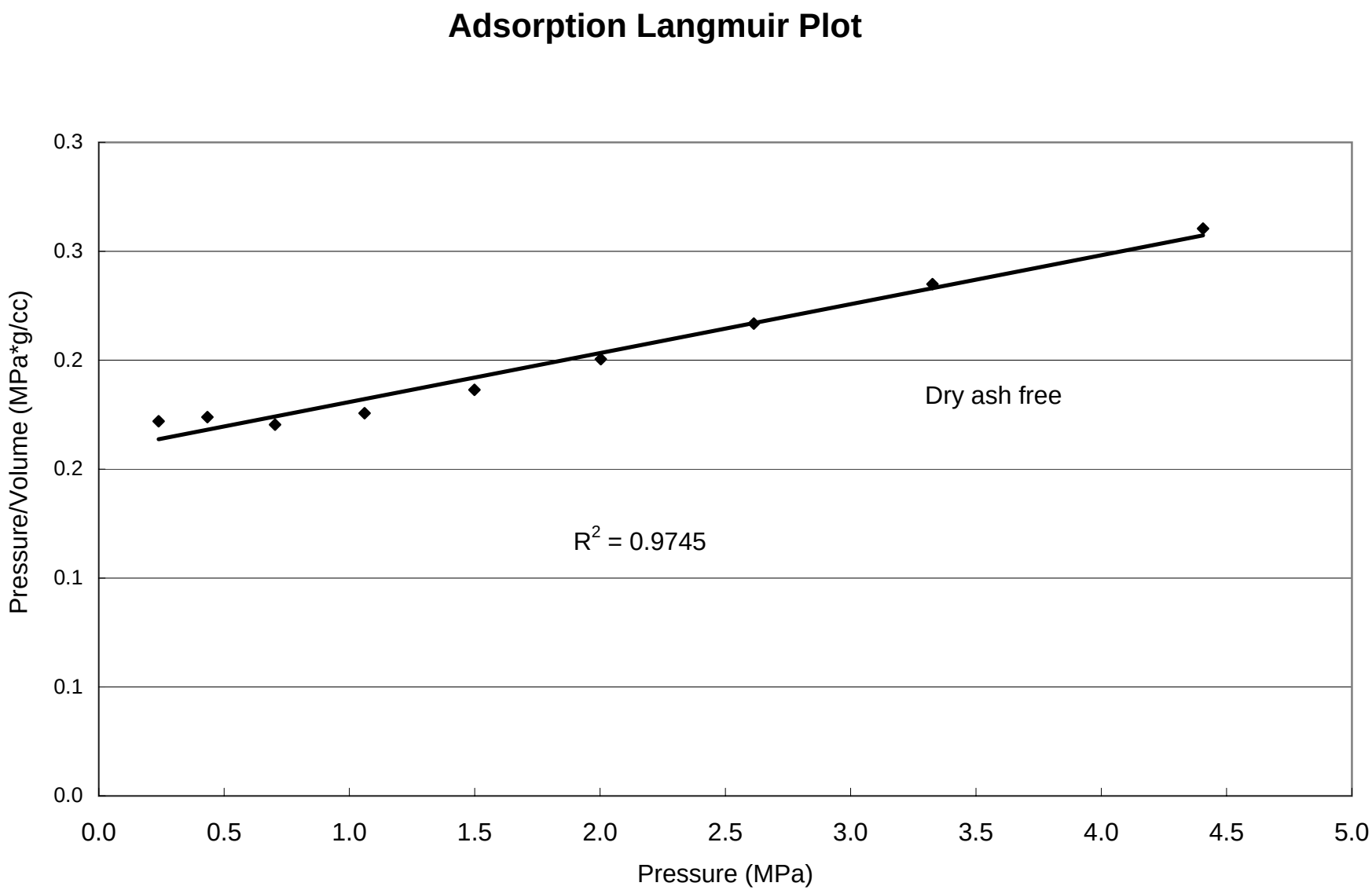


4-LA-2 Carbon Dioxide (dry & ash free basis)

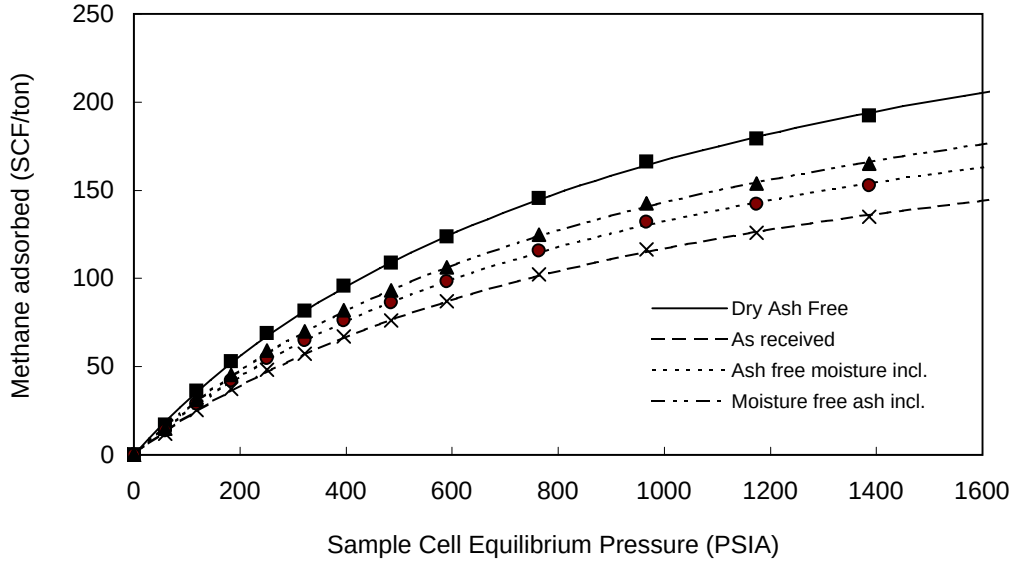



4-LA-2 Carbon Dioxide (moisture free, ash included basis)
30.0
25.0
20.0
15.0
10.0
5.0
0.0
CO2 adsorbed (cc/g@STP)
0
1
2
3
4
5
6
Sample Cell Equilibrium Pressure (MPa)
Langmuir Volume(cc/g): 38.7
Langmuir Presssure (MPa) : 7.1
Moisture Content (%) : 18.70
Ash Content (%) : 10.59
Regression Coefficient: 0.9745


4-LA-2 Carbon Dioxide (ash free, moisture included basis)
30.0
25.0
20.0
15.0
10.0
5.0
0.0
CO2 adsorbed (cc/g@STP)
0
1
2
3
4
5
6
Sample Cell Equilibrium Pressure (MPa)
Langmuir Volume(cc/g): 35.2
Langmuir Presssure (MPa) : 7.1
Moisture Content (%) : 18.70
Ash Content (%) : 10.59
Regression Coefficient: 0.9745


Adsorption Langmuir Plot
Pressure/Volume (MPa*g/cc)
0.3
0.3
0.2
0.2
0.1
0.1
0.0
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
Pressure (MPa)
Dry ash free
R2 = 0.9745

5-1C Methane



Pressure (PSIA)	Adsorbed gas (ft^3 /ton)			
	As Received	moisture free ash incl.	ash free moisture incl.	Dry Ash Free
59	12.1	14.7	13.7	17.2
118	25.5	31.2	28.9	36.4
184	37.3	45.5	42.2	53.1
252	48.3	59.1	54.7	68.9
322	57.3	70.1	64.9	81.7
396	67.2	82.2	76.1	95.8
485	76.3	93.2	86.3	108.7
590	86.9	106.2	98.4	123.8
764	102.2	124.9	115.7	145.7
967	116.6	142.5	132.0	166.2
1174	125.8	153.7	142.3	179.2
1387	135.0	164.9	152.8	192.3

Langmuir Parameters

	As Received	Moisture free ash incl	Ash free moisture incl	Dry Ash Free
Vol. (ft^3 /ton)	233.9	285.8	264.7	333.2
Pressure (PSIA)	995.4	995.4	995.4	995.4

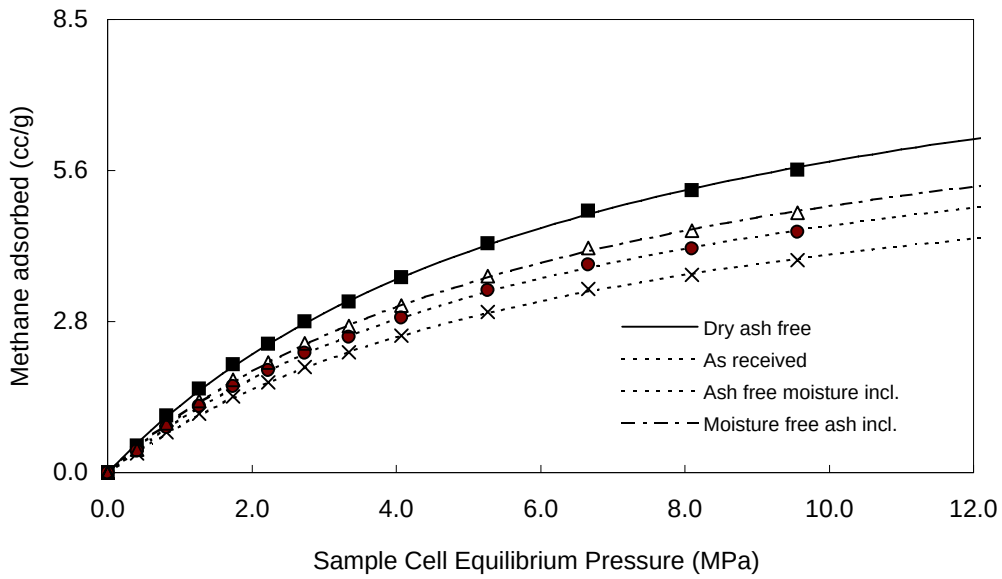
SUMMARY OF ADSORPTION ANALYSES IMP. UNITS

Isotherm Temperature: 118.4 ºF

Goodness of fit of Langmuir regression: 0.99

% Ash= 11.64 % Moisture= 18.17 Density g/cc 1.350

5-1C Methane



Pressure (MPa)	Adsorbed gas (cc/g)			
	As Received	Moisture free ash incl.	ash free moisture incl	Dry Ash Free
0.410	0.35	0.43	0.40	0.51
0.816	0.75	0.92	0.85	1.07
1.267	1.10	1.34	1.24	1.56
1.734	1.42	1.74	1.61	2.02
2.223	1.69	2.06	1.91	2.40
2.728	1.98	2.41	2.24	2.82
3.346	2.24	2.74	2.54	3.19
4.070	2.55	3.12	2.89	3.64
5.267	3.00	3.67	3.40	4.28
6.664	3.43	4.19	3.88	4.88
8.096	3.70	4.52	4.18	5.27
9.561	3.97	4.85	4.49	5.65

Langmuir Parameters

	As Received	Moisture free ash incl.	Ash free moisture incl	Dry Ash Free
Vol. (cc/g)	6.87	8.40	7.78	9.79
Pressure (MPa)	6.86	6.86	6.86	6.86

SUMMARY OF ADSORPTION ANALYSES SI UNITS

Isotherm Temperature: **48.0 ºC**

Goodness of fit of Langmuir regression: **0.99**

% Ash= 11.64 **% Moisture = 18.17** **Density (g/cc) 1.350**

5-1C Methane

Methane Adsorption
(Imperial Units)

Summary of Analyses		
	As Received	DAF basis
Langmuir Volume (SCF)	234	333
Langmuir Pressure (PSIA)	995	995
Goodness of fit Langmuir Equation R-squared	0.99	0.99
Ash Content Wt.%	11.64	11.64
Equilibrium Moisture Wt.%	18.17	18.17

Contents of Appendix

data sheets	***Charts***
As Received	As Received
Dry Ash Free	Dry Ash Free
Dry Ash Included	Dry Ash Included
Moist Ash Free	Moist Ash Free

5-1C Methane

GAS ADSORPTION ISOTHERM IMPERIAL UNITS

AS RECEIVED BASIS

		Moisture Content % :	18.17
Isotherm Temperature º F:	118.4	Ash Content, % :	11.64
Gas used:	Methane	Helium Density g/cc	1.350

PRESSURE (PSI)	ADSORBED GAS (SCF/ton)	P / V
59	12.07	4.92
118	25.54	4.64
184	37.26	4.93
252	48.33	5.20
322	57.35	5.62
396	67.23	5.88
485	76.29	6.36
590	86.91	6.79
764	102.23	7.47
967	116.64	8.29
1174	125.76	9.34
1387	134.97	10.27

Saturated Monolayer Volume (SCF/ton):	233.9
Langmuir Pressure (PSIA):	995.4
Correlation Coefficient:	0.9935

DRY ASH FREE BASIS

59	17.19	3.45
118	36.39	3.25
184	53.08	3.46
252	68.86	3.65
322	81.70	3.95
396	95.79	4.13
485	108.69	4.46
590	123.83	4.77
764	145.65	5.24
967	166.17	5.82
1174	179.17	6.55
1387	192.30	7.21

Saturated Monolayer Volume (SCF/ton, daf):	333
Langmuir Pressure (PSIA):	995
Correlation Coefficient:	0.9935

5-1C Methane

GAS ADSORPTION ISOTHERM IMPERIAL UNITS

MOISTURE FREE ASH INCLUDED

		Moisture Content % :	18.17
Isotherm Temperature° F:	118.4	Ash Content, % :	11.64
Gas used:	Methane	Helium Density g/cc	1.350

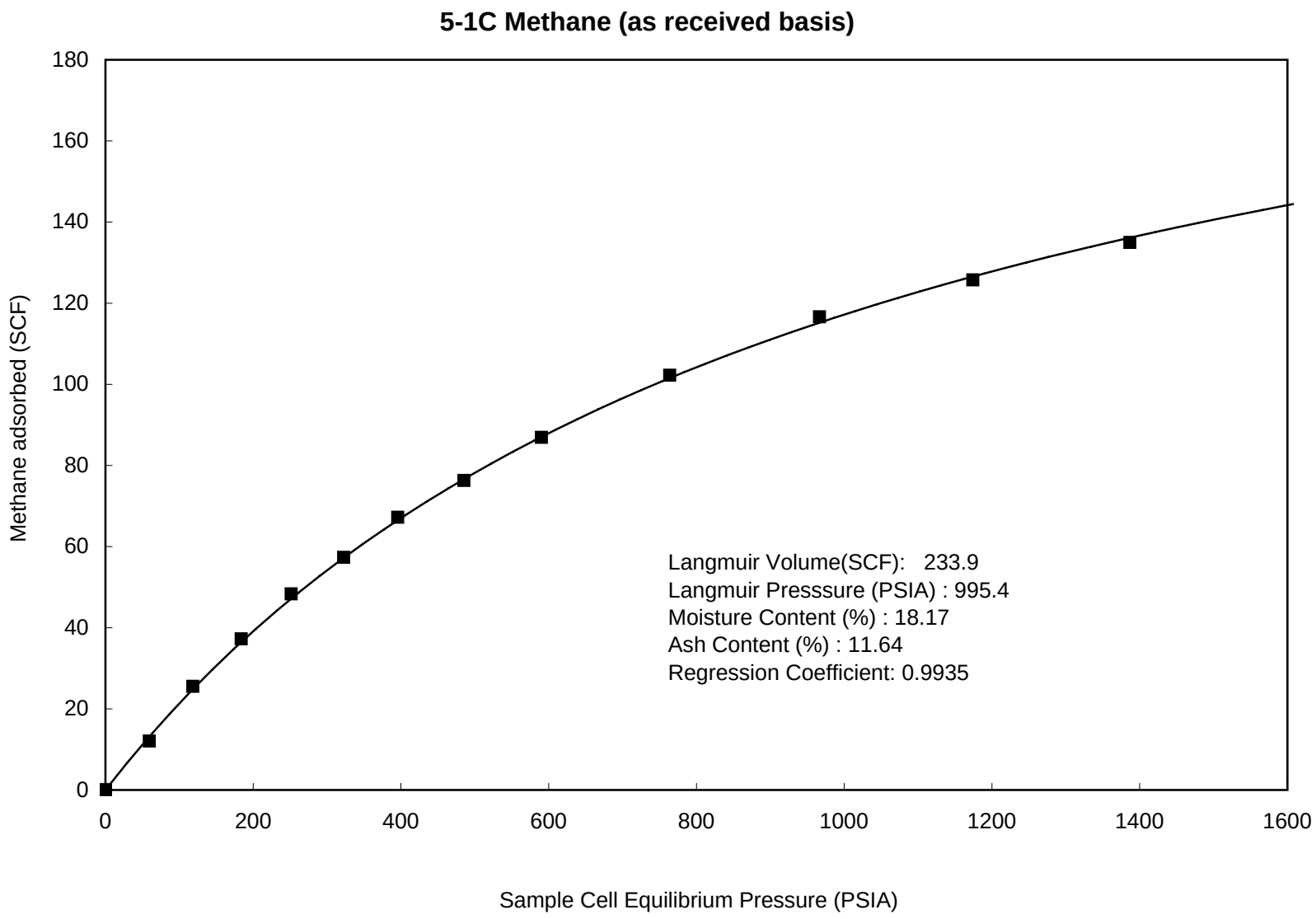
PRESSURE (PSI)	ADSORBED GAS (SCF/ton)	P / V
59	15	4.03
118	31	3.79
184	46	4.04
252	59	4.26
322	70	4.60
396	82	4.82
485	93	5.20
590	106	5.56
764	125	6.11
967	143	6.78
1174	154	7.64
1387	165	8.41

Saturated Monolayer Volume (SCF/ton):	286
Langmuir Pressure (PSIA):	995
Correlation Coefficient:	0.9935

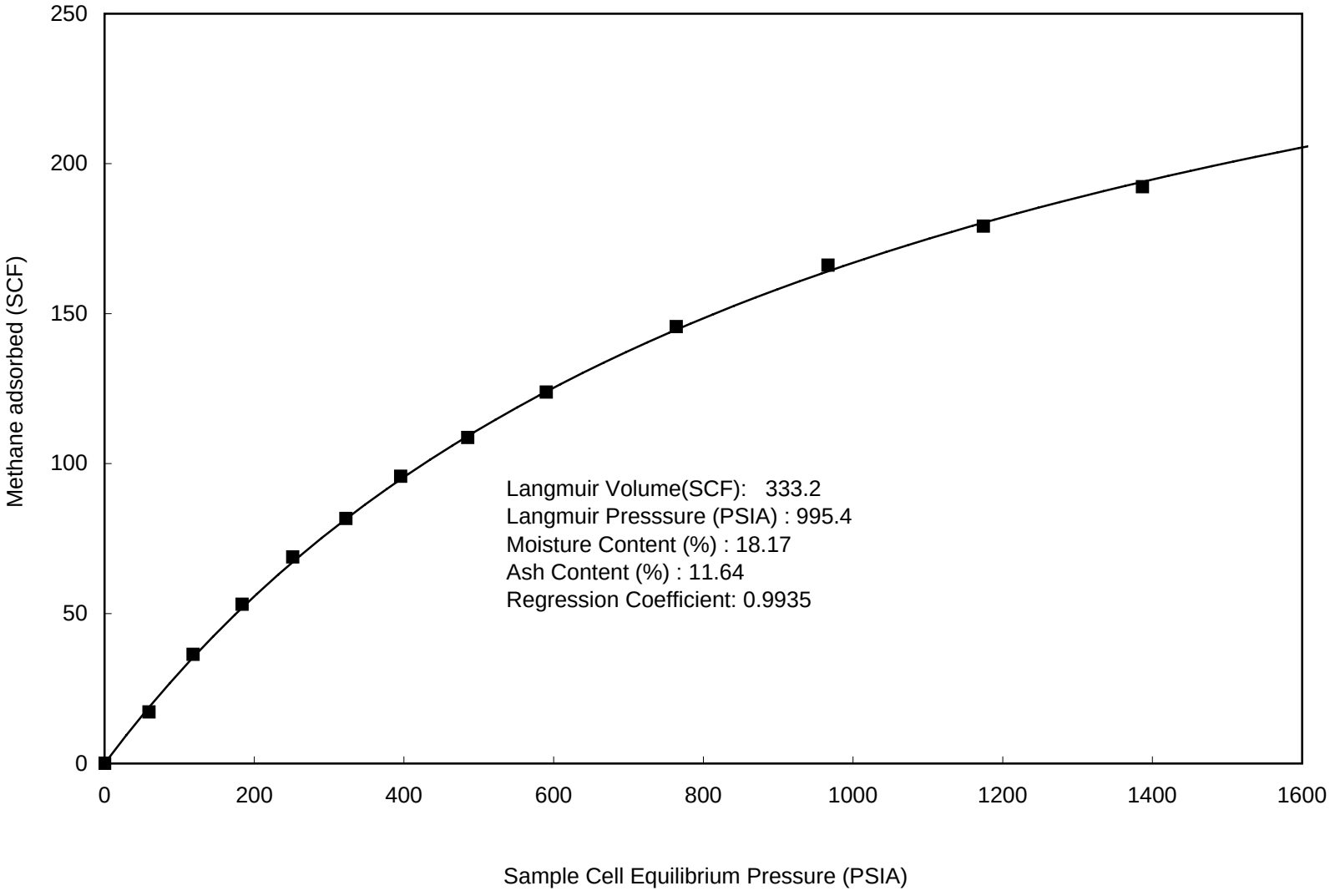
ASH FREE MOISTURE INCLUDED

59	14	4.35
118	29	4.10
184	42	4.36
252	55	4.60
322	65	4.97
396	76	5.20
485	86	5.62
590	98	6.00
764	116	6.60
967	132	7.32
1174	142	8.25
1387	153	9.08

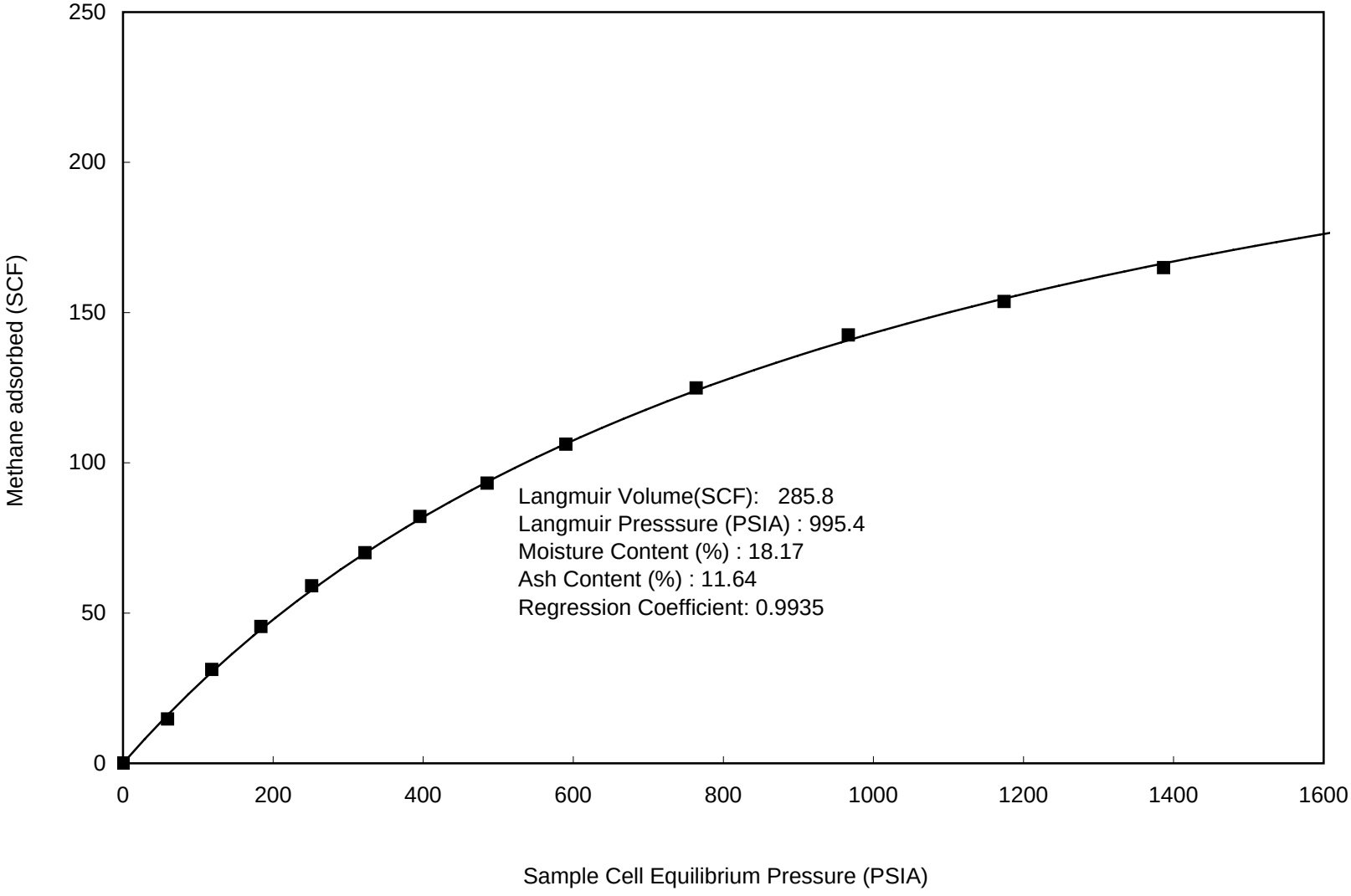
Saturated Monolayer Volume (SCF/ton):	265
Langmuir Pressure (PSIA):	995
Correlation Coefficient:	0.9935


5-1C Methane (as received basis)
Methane adsorbed (SCF)
Sample Cell Equilibrium Pressure (PSIA)
0
20
40
60
80
100
120
140
160
180
0
200
400
600
800
1000
1200
1400
1600
Langmuir Volume(SCF): 233.9
Langmuir Presssure (PSIA) : 995.4
Moisture Content (%) : 18.17
Ash Content (%) : 11.64
Regression Coefficient: 0.9935

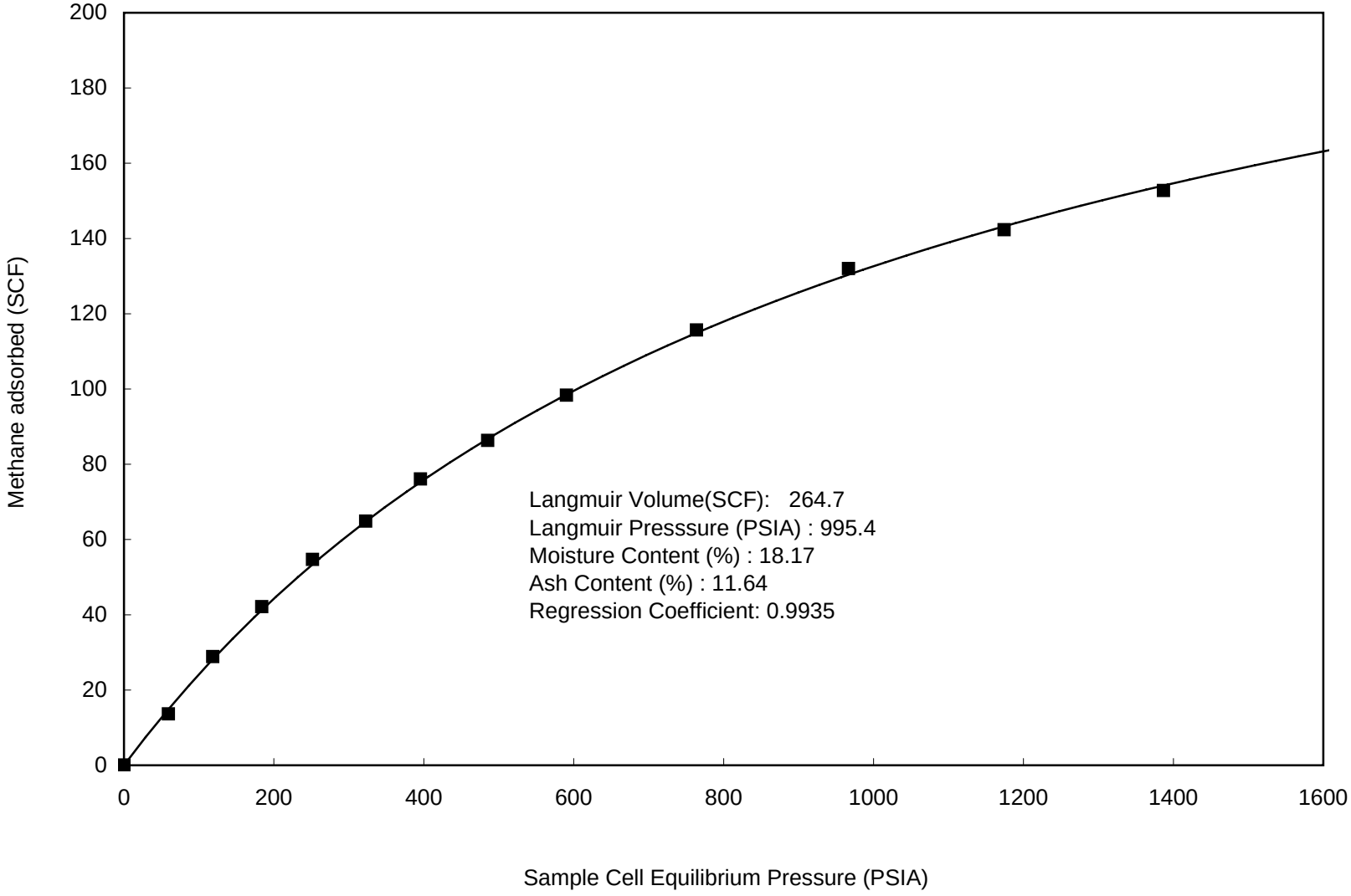
5-1C Methane (dry & ash free basis)

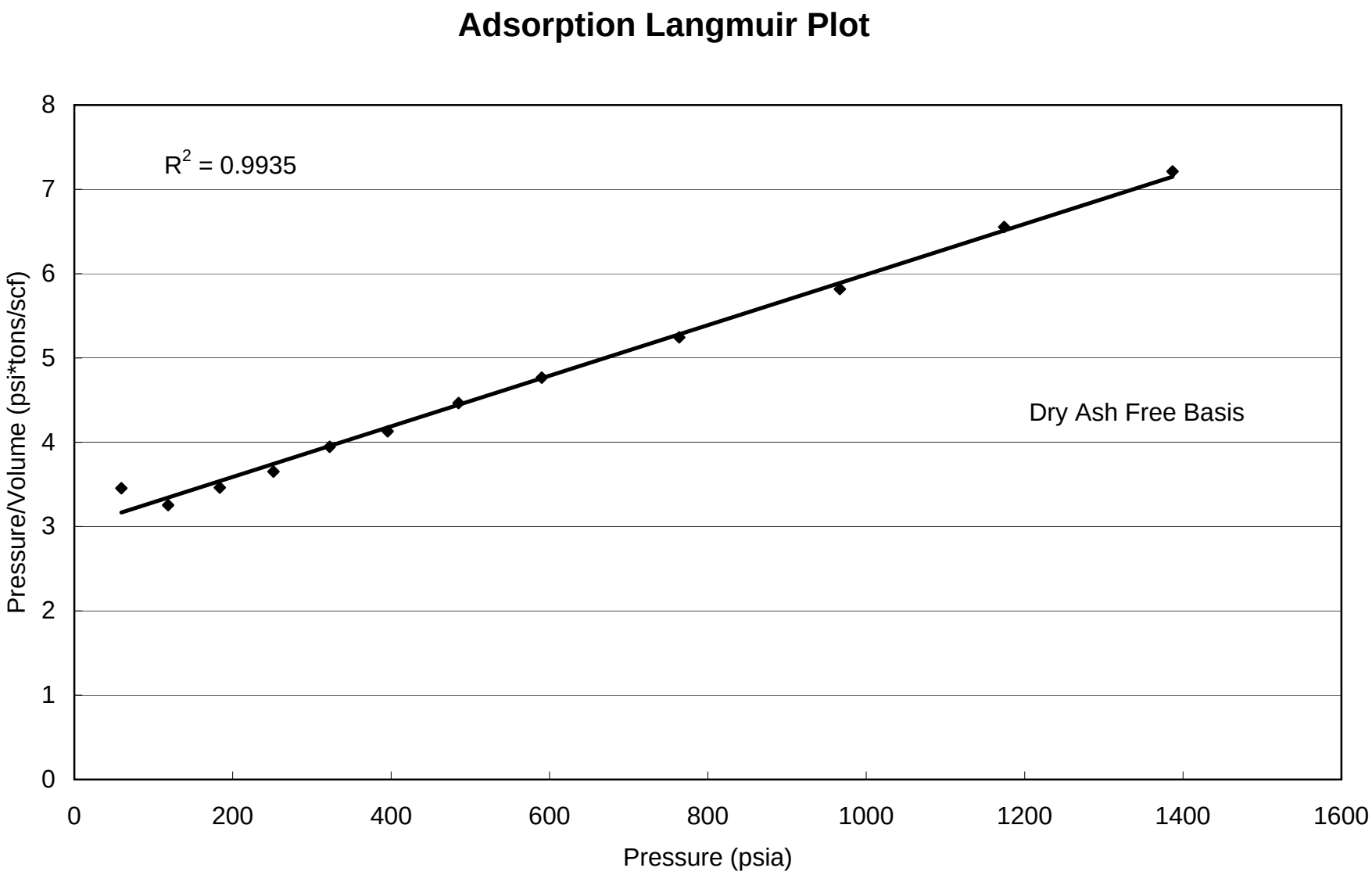


5-1C Methane (moisture free, ash included basis)



5-1C Methane (ash free, moisture included basis)




Adsorption Langmuir Plot
R2 = 0.9935
Dry Ash Free Basis
Pressure/Volume (psi*tons/scf)
Pressure (psia)
0
1
2
3
4
5
6
7
8
0
200
400
600
800
1000
1200
1400
1600

5-1C Methane

Methane Adsorption (SI Units)

Summary of Analyses		
	As Received	DAF basis
Langmuir Volume cc/g	6.87	9.79
Langmuir Pressure MPa	6.86	6.86
Goodness of fit Langmuir Equation R-squared	0.99	0.99
Ash Content Wt.%	11.64	11.64
Equilibrium Moisture Wt.%	18.17	18.17

Contents of Appendix

data sheets	***Charts***
As Received	As Received
Dry Ash Free	Dry Ash Free
Dry Ash Included	Dry Ash Included
Moist Ash Free	Moist Ash Free

5-1C Methane

GAS ADSORPTION ISOTHERM SI UNITS

AS RECEIVED BASIS

Sample I.D. :	5-1C Methane	Moisture Content (EQ) % :	18.17
Isotherm Temperature º C:	48	Ash Content % :	11.64
Gas used:	Methane	Helium Density g/cc	1.350

PRESSURE (MPa)	ADSORBED GAS (cc/g @STP)	P / V
0.410	0.35	1.155
0.816	0.75	1.088
1.267	1.10	1.157
1.734	1.42	1.221
2.223	1.69	1.319
2.728	1.98	1.381
3.346	2.24	1.492
4.070	2.55	1.593
5.267	3.00	1.753
6.664	3.43	1.944
8.096	3.70	2.190
9.561	3.97	2.410

Saturated Monolayer Volume (cc/g @ STP):	6.87
Langmuir Pressure (MPa):	6.86

DRY ASH FREE BASIS

0.410	0.51	0.810
0.816	1.07	0.763
1.267	1.56	0.812
1.734	2.02	0.857
2.223	2.40	0.926
2.728	2.82	0.969
3.346	3.19	1.047
4.070	3.64	1.118
5.267	4.28	1.230
6.664	4.88	1.365
8.096	5.27	1.537
9.561	5.65	1.692

Saturated Monolayer Volume (cc/g @ STP, daf):	9.79
Langmuir Pressure (MPa):	6.86
Correlation Coefficient:	0.9935

5-1C Methane

GAS ADSORPTION ISOTHERM SI UNITS

MOISTURE FREE ASH INCLUDED

		Moisture Content (EQ) % :	18.17
Isotherm Temperature º C:	48	Ash Content % :	11.64
Gas used:	Methane	Helium Density g/cc	1.350

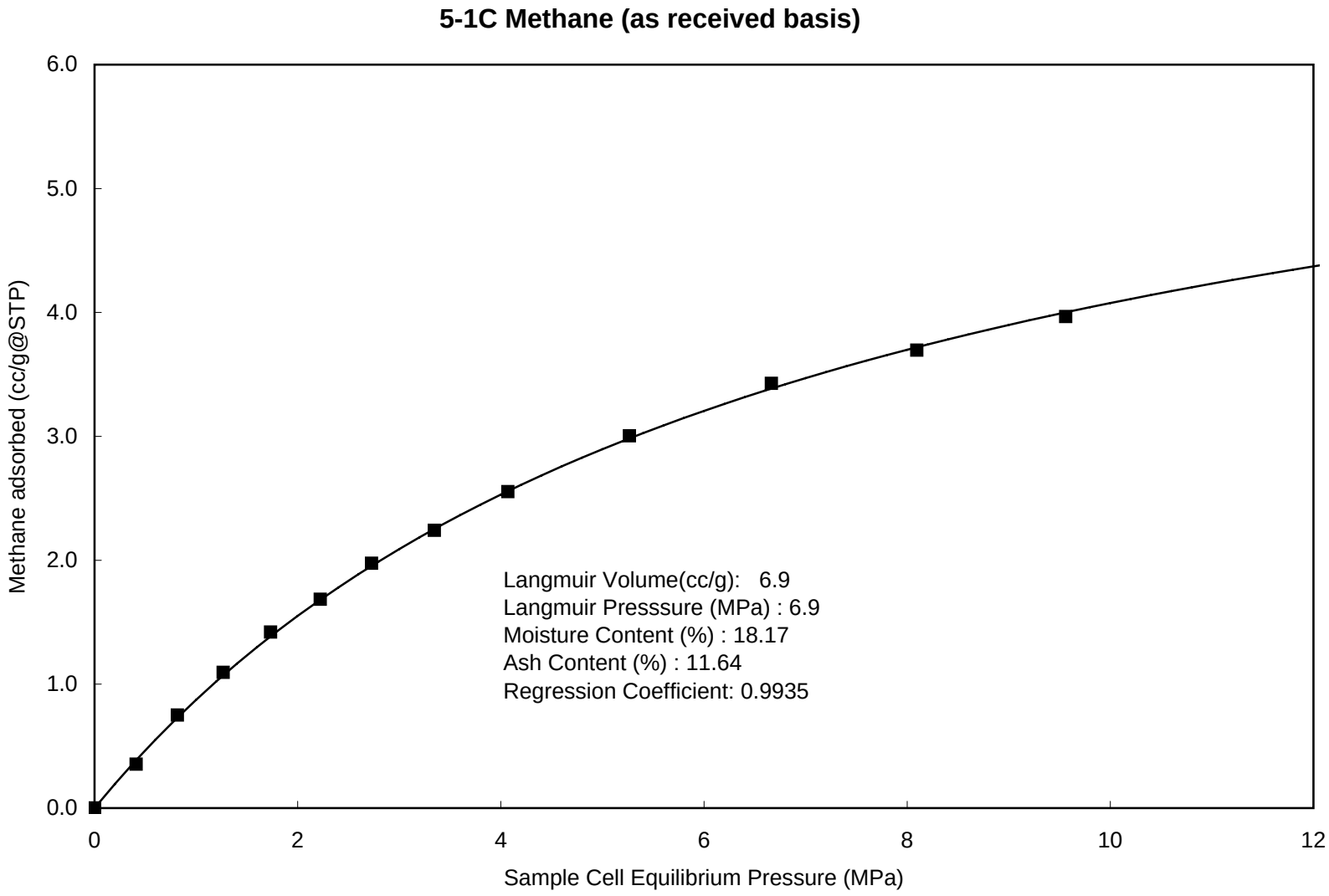
PRESSURE (MPa)	ADSORBED GAS (cc/g@STP)	P / V
0.410	0.43	0.94
0.816	0.92	0.89
1.267	1.34	0.95
1.734	1.74	1.00
2.223	2.06	1.08
2.728	2.41	1.13
3.346	2.74	1.22
4.070	3.12	1.30
5.267	3.67	1.43
6.664	4.19	1.59
8.096	4.52	1.79
9.561	4.85	1.97

Saturated Monolayer Volume (cc/g):	8.40
Langmuir Pressure (MPa):	6.86

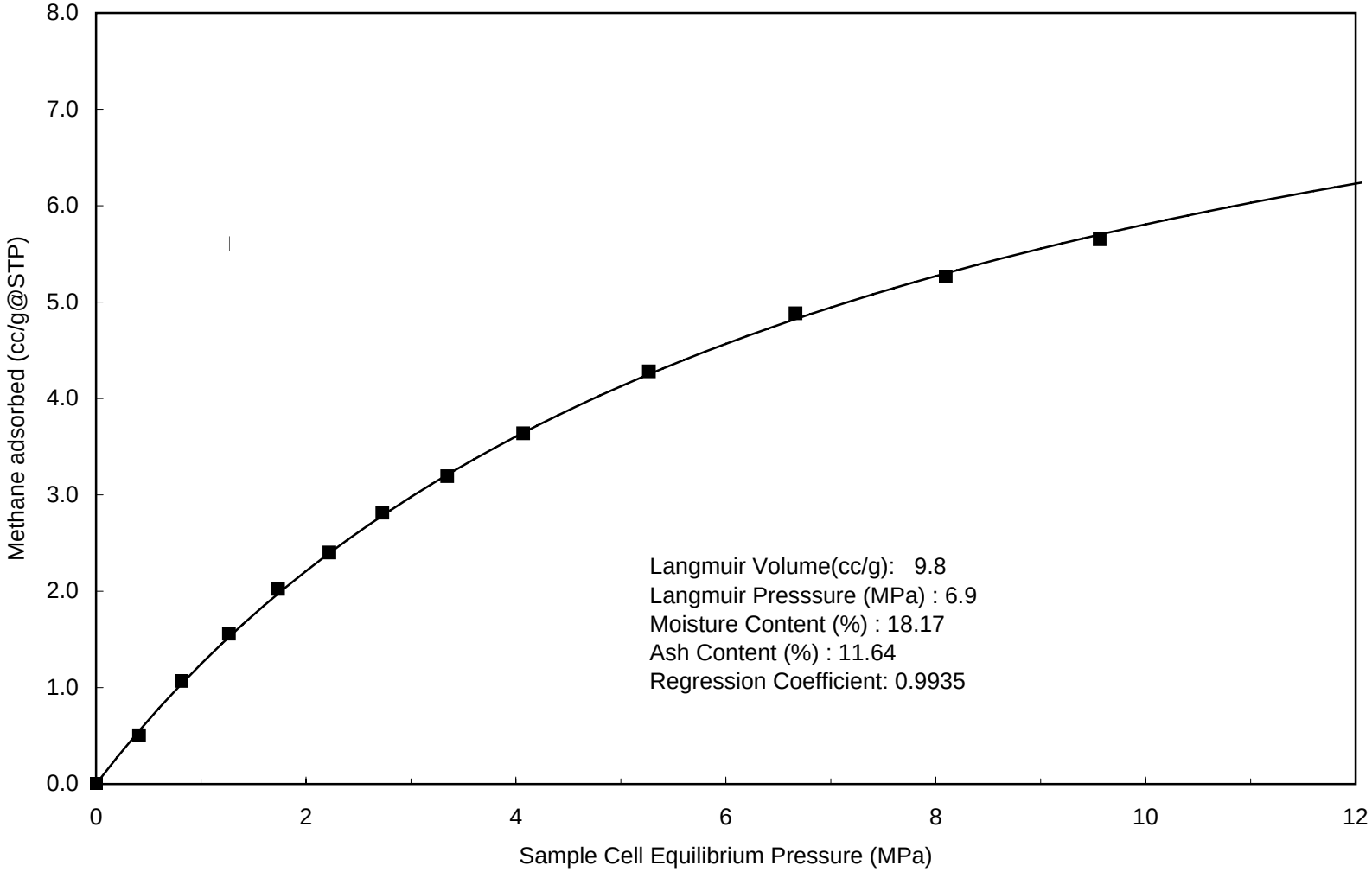
ASH FREE MOISTURE INCLUDED

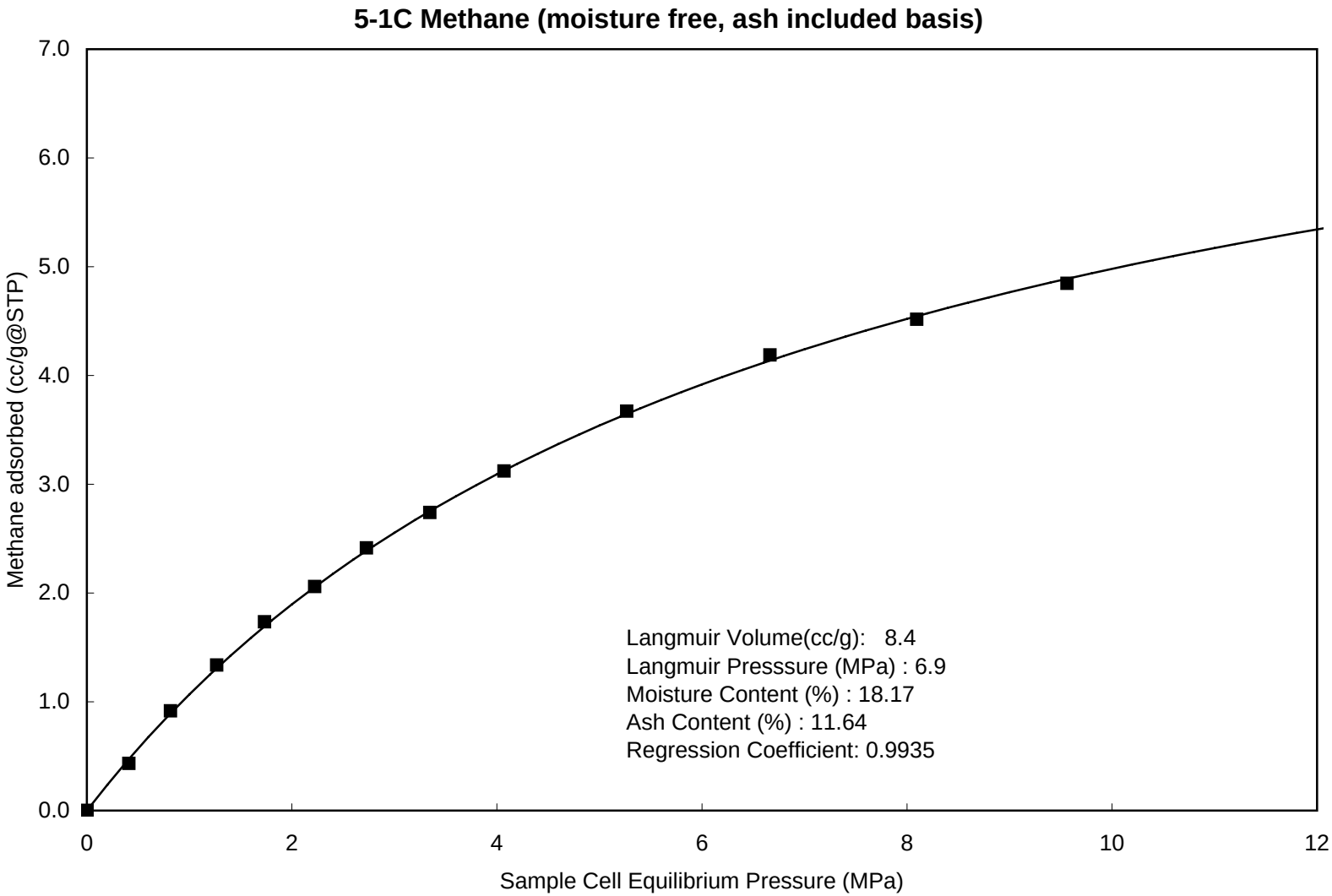
0.410	0.40	0.00
0.816	0.85	0.96
1.267	1.24	1.02
1.734	1.61	1.08
2.223	1.91	1.17
2.728	2.24	1.22
3.346	2.54	1.32
4.070	2.89	1.41
5.267	3.40	1.55
6.664	3.88	1.72
8.096	4.18	1.94
9.561	4.49	2.13

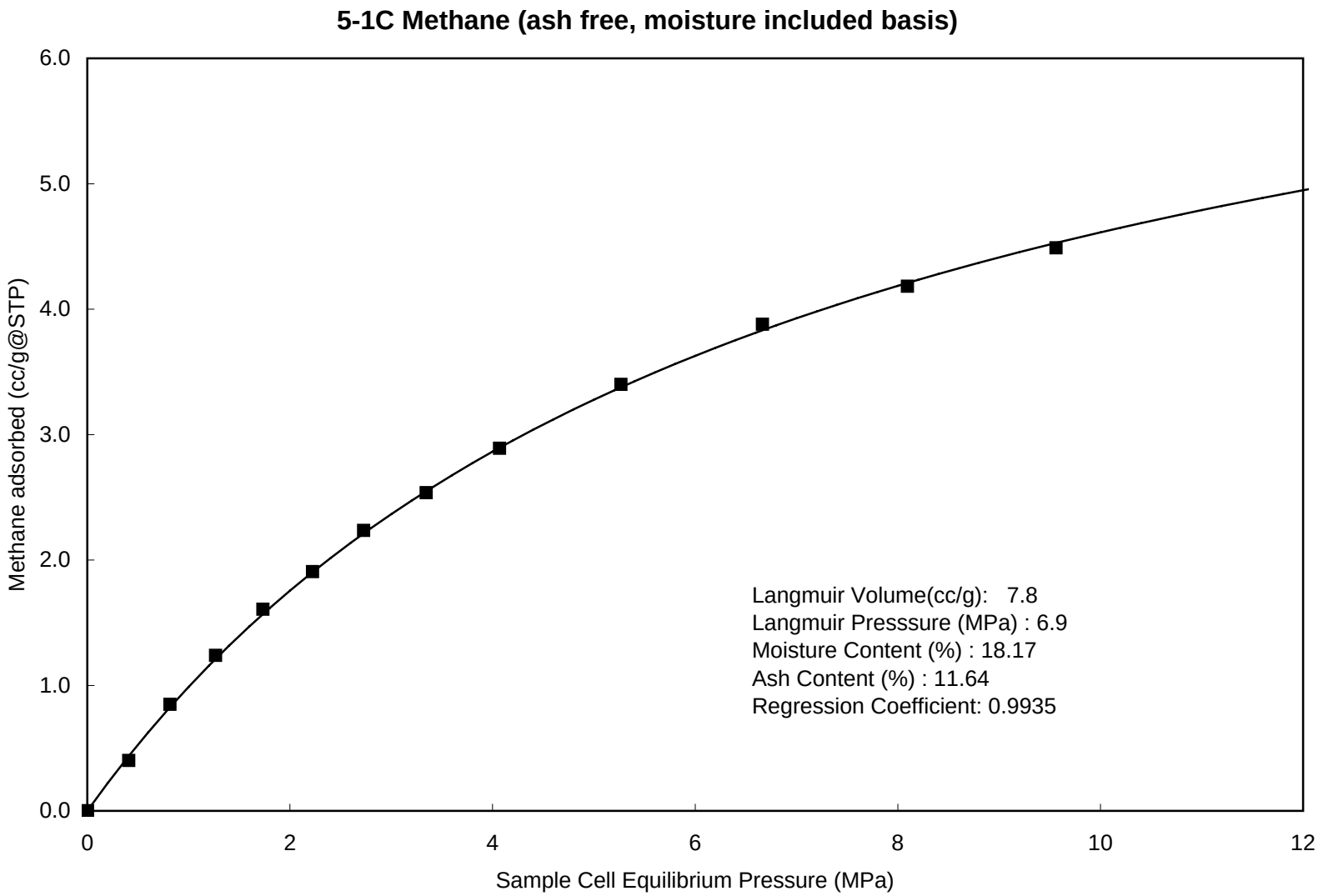
Saturated Monolayer Volume (cc/g, ash free):	7.78
Langmuir Pressure (MPa):	6.86
Correlation Coefficient:	0.9935


5-1C Methane (as received basis)
Methane adsorbed (cc/g@STP)
6.0
5.0
4.0
3.0
2.0
1.0
0.0
0
2
4
6
8
10
12
Sample Cell Equilibrium Pressure (MPa)
Langmuir Volume(cc/g): 6.9
Langmuir Presssure (MPa) : 6.9
Moisture Content (%) : 18.17
Ash Content (%) : 11.64
Regression Coefficient: 0.9935

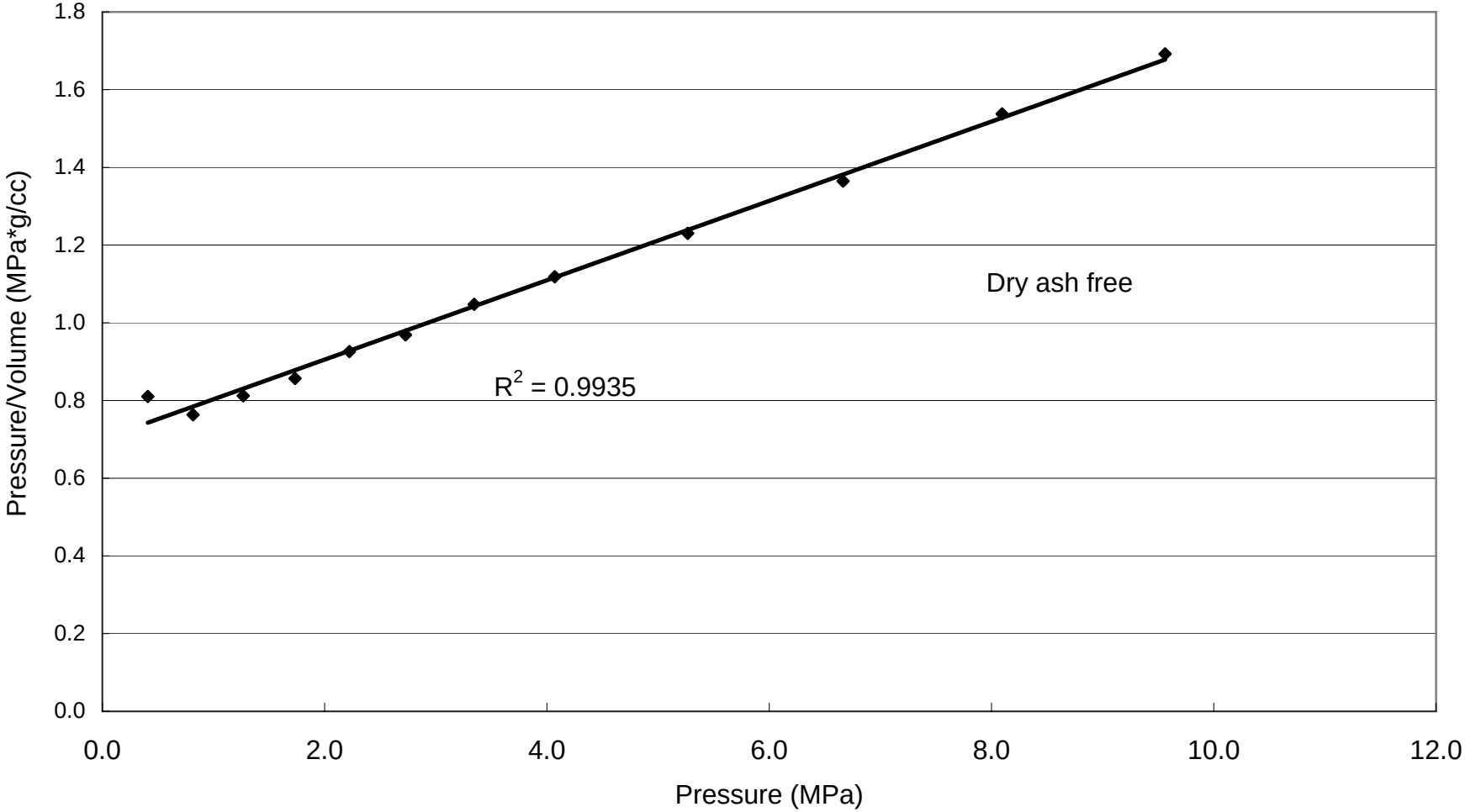
5-1C Methane (dry & ash free basis)



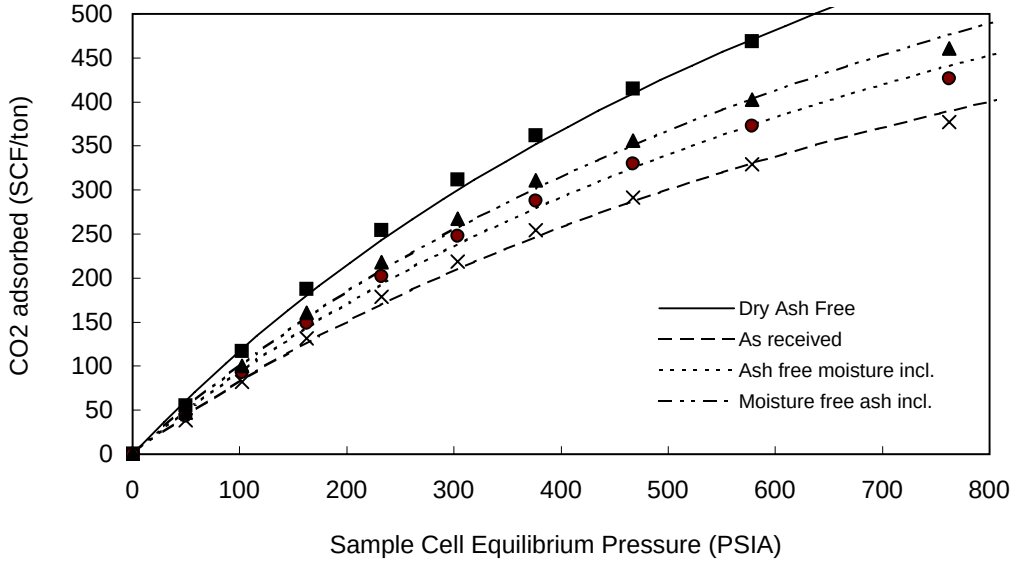

5-1C Methane (moisture free, ash included basis)
Methane adsorbed (cc/g@STP)
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
0
2
4
6
8
10
12
Sample Cell Equilibrium Pressure (MPa)
Langmuir Volume(cc/g): 8.4
Langmuir Presssure (MPa) : 6.9
Moisture Content (%) : 18.17
Ash Content (%) : 11.64
Regression Coefficient: 0.9935


5-1C Methane (ash free, moisture included basis)
Methane adsorbed (cc/g@STP)
6.0
5.0
4.0
3.0
2.0
1.0
0.0
0
2
4
6
8
10
12
Sample Cell Equilibrium Pressure (MPa)
Langmuir Volume(cc/g): 7.8
Langmuir Presssure (MPa) : 6.9
Moisture Content (%) : 18.17
Ash Content (%) : 11.64
Regression Coefficient: 0.9935

Adsorption Langmuir Plot



5-1C Carbon Dioxide



Pressure (PSIA)	Adsorbed gas (ft^3 /ton)			
	As Received	moisture free ash incl.	ash free moisture incl.	Dry Ash Free
49	38.6	47.2	43.7	55.0
102	81.9	100.1	92.7	116.7
163	131.4	160.6	148.7	187.2
232	178.5	218.1	202.0	254.3
304	219.0	267.6	247.8	312.0
377	254.2	310.7	287.7	362.2
467	291.5	356.2	329.9	415.3
578	329.2	402.3	372.5	469.0
762	376.9	460.6	426.6	537.0

Langmuir Parameters

	As Received	Moisture free ash incl	Ash free moisture incl	Dry Ash Free
Vol. (ft^3 /ton)	893.9	1092.4	1011.7	1273.6
Pressure (PSIA)	985.3	985.3	985.3	985.3

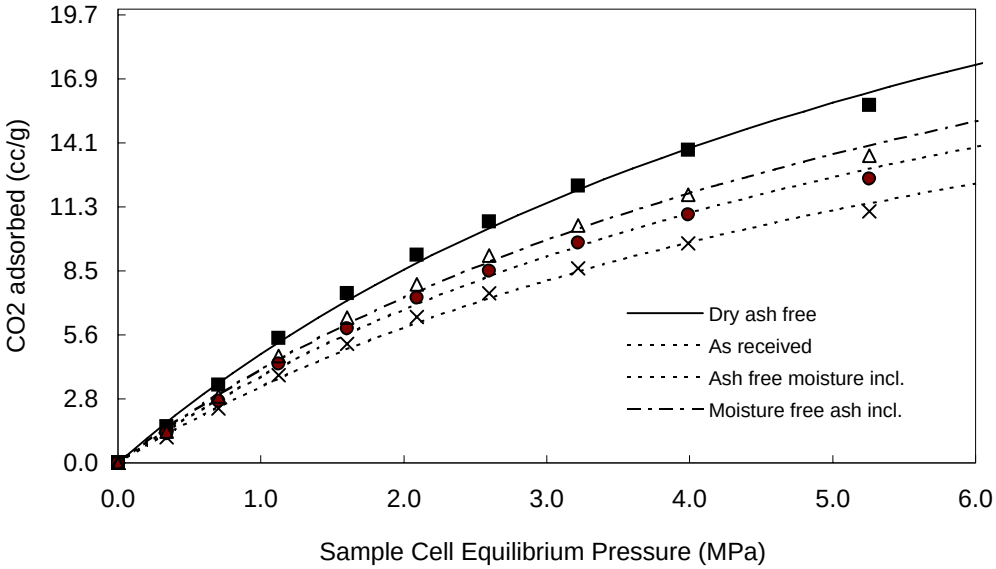
SUMMARY OF ADSORPTION ANALYSES IMP. UNITS

Isotherm Temperature: 118.4 ºF

Goodness of fit of Langmuir regression: 0.95

% Ash= 11.64 % Moisture= 18.17 Density g/cc 1.375

5-1C Carbon Dioxide



Pressure (MPa)	Adsorbed gas (cc/g)			
	As Received	Moisture free ash incl.	ash free moisture incl	Dry Ash Free
0.341	1.13	1.39	1.28	1.62
0.703	2.41	2.94	2.73	3.43
1.122	3.86	4.72	4.37	5.50
1.602	5.25	6.41	5.94	7.47
2.093	6.44	7.86	7.28	9.17
2.597	7.47	9.13	8.46	10.65
3.221	8.57	10.47	9.69	12.20
3.988	9.67	11.82	10.95	13.78
5.255	11.08	13.54	12.54	15.78

Langmuir Parameters

	As Received	Moisture free ash incl.	Ash free moisture incl	Dry Ash Free
Vol. (cc/g)	26.27	32.10	29.73	37.43
Pressure (MPa)	6.79	6.79	6.79	6.79

SUMMARY OF ADSORPTION ANALYSES SI UNITS

Isotherm Temperature: **48.0 ºC**

Goodness of fit of Langmuir regression: **0.95**

% Ash= 11.64 **% Moisture = 18.17** **Density (g/cc) 1.375**

5-1C Carbon Dioxide

CO2 Adsorption (Imperial Units)

Summary of Analyses		
	As Received	DAF basis
Langmuir Volume (SCF)	894	1274
Langmuir Pressure (PSIA)	985	985
Goodness of fit Langmuir Equation R-squared	0.95	0.95
Ash Content Wt.%	11.64	11.64
Equilibrium Moisture Wt.%	18.17	18.17

Contents of Appendix

data sheets	***Charts***
As Received	As Received
Dry Ash Free	Dry Ash Free
Dry Ash Included	Dry Ash Included
Moist Ash Free	Moist Ash Free

5-1C Carbon Dioxide

GAS ADSORPTION ISOTHERM IMPERIAL UNITS

AS RECEIVED BASIS

		Moisture Content % :	18.17
Isotherm Temperature º F:	118.4	Ash Content, % :	11.64
Gas used:	CO2	Helium Density g/cc	1.375

PRESSURE (PSI)	ADSORBED GAS (SCF/ton)	P / V
49	38.59	1.28
102	81.94	1.24
163	131.43	1.24
232	178.51	1.30
304	218.99	1.39
377	254.24	1.48
467	291.48	1.60
578	329.18	1.76
762	376.94	2.02

Saturated Monolayer Volume (SCF/ton):	893.9
Langmuir Pressure (PSIA):	985.3
Correlation Coefficient:	0.9454

DRY ASH FREE BASIS

49	54.98	0.90
102	116.74	0.87
163	187.25	0.87
232	254.32	0.91
304	311.99	0.97
377	362.21	1.04
467	415.27	1.12
578	468.98	1.23
762	537.03	1.42

Saturated Monolayer Volume (SCF/ton, daf):	1274
Langmuir Pressure (PSIA):	985
Correlation Coefficient:	0.9454

5-1C Carbon Dioxide

GAS ADSORPTION ISOTHERM IMPERIAL UNITS

MOISTURE FREE ASH INCLUDED

		Moisture Content % :	18.17
Isotherm Temperature° F:	118.4	Ash Content, % :	11.64
Gas used:	CO2	Helium Density g/cc	1.375

PRESSURE (PSI)	ADSORBED GAS (SCF/ton)	P / V
49	47	1.05
102	100	1.02
163	161	1.01
232	218	1.07
304	268	1.13
377	311	1.21
467	356	1.31
578	402	1.44
762	461	1.65

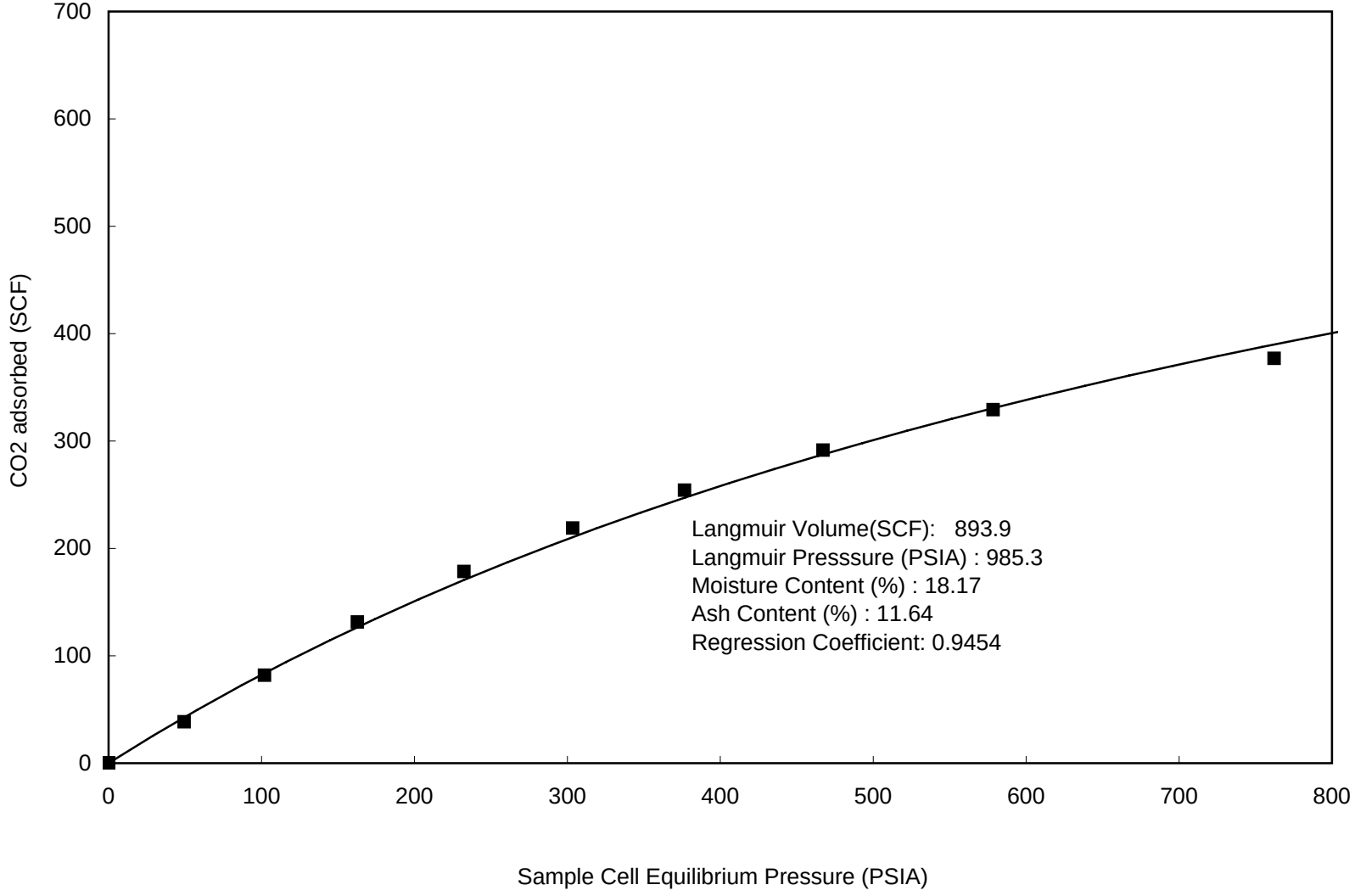
Saturated Monolayer Volume (SCF/ton):	1092
Langmuir Pressure (PSIA):	985
Correlation Coefficient:	0.9454

ASH FREE MOISTURE INCLUDED

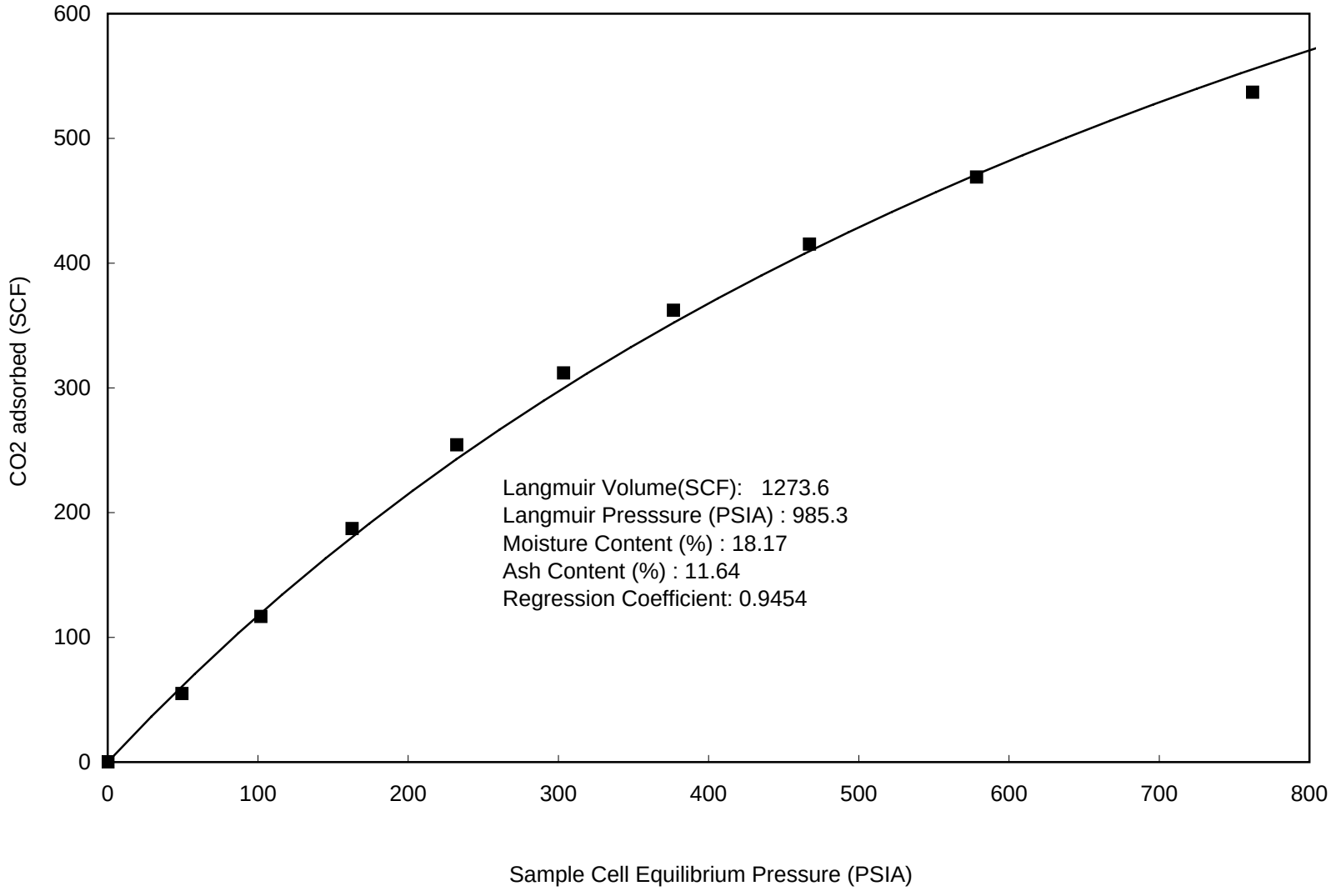
49	44	1.13
102	93	1.10
163	149	1.09
232	202	1.15
304	248	1.22
377	288	1.31
467	330	1.42
578	373	1.55
762	427	1.79

Saturated Monolayer Volume (SCF/ton):	1012
Langmuir Pressure (PSIA):	985
Correlation Coefficient:	0.9454

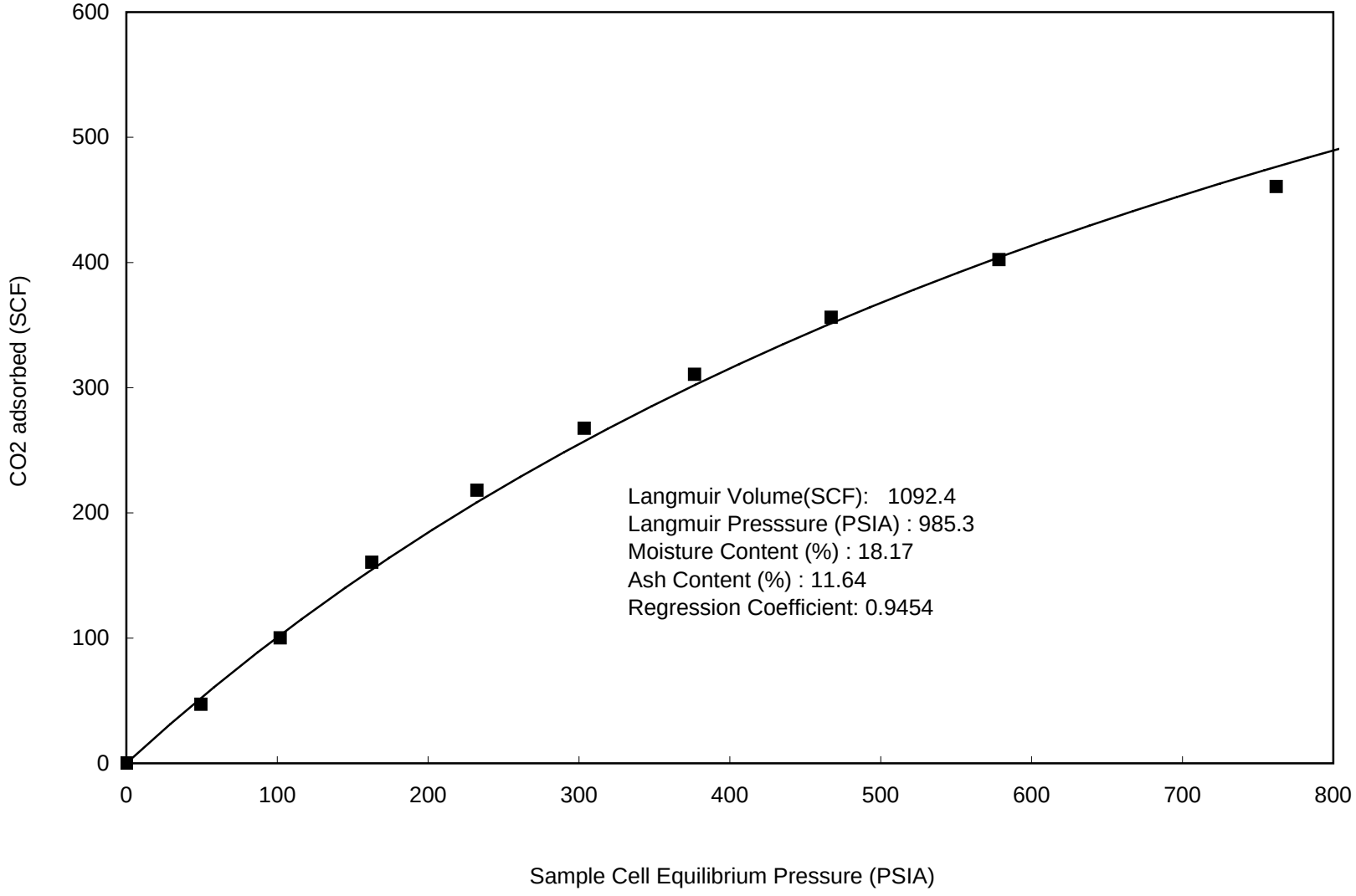
5-1C Carbon Dioxide (as received basis)



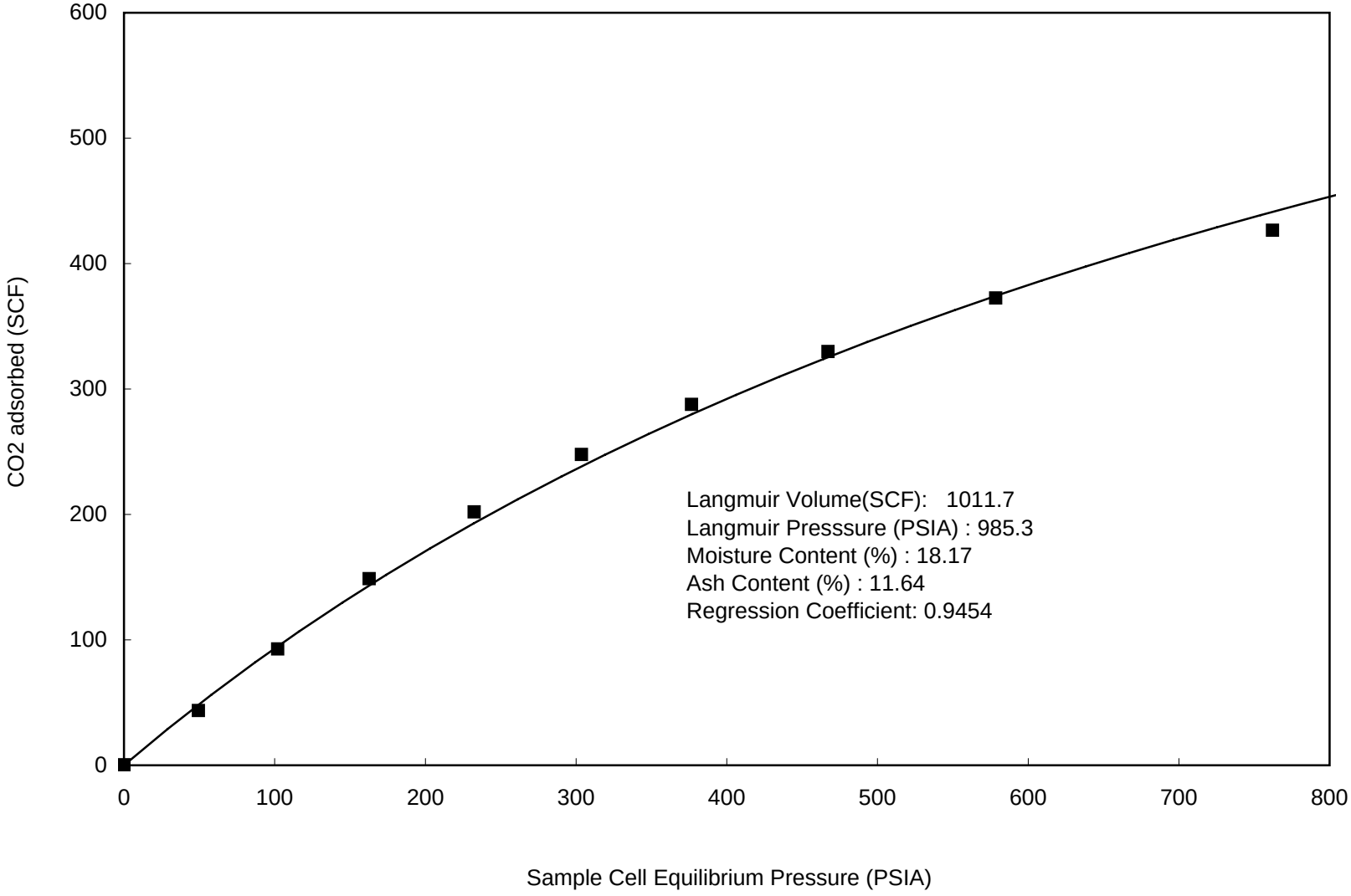
5-1C Carbon Dioxide (dry & ash free basis)

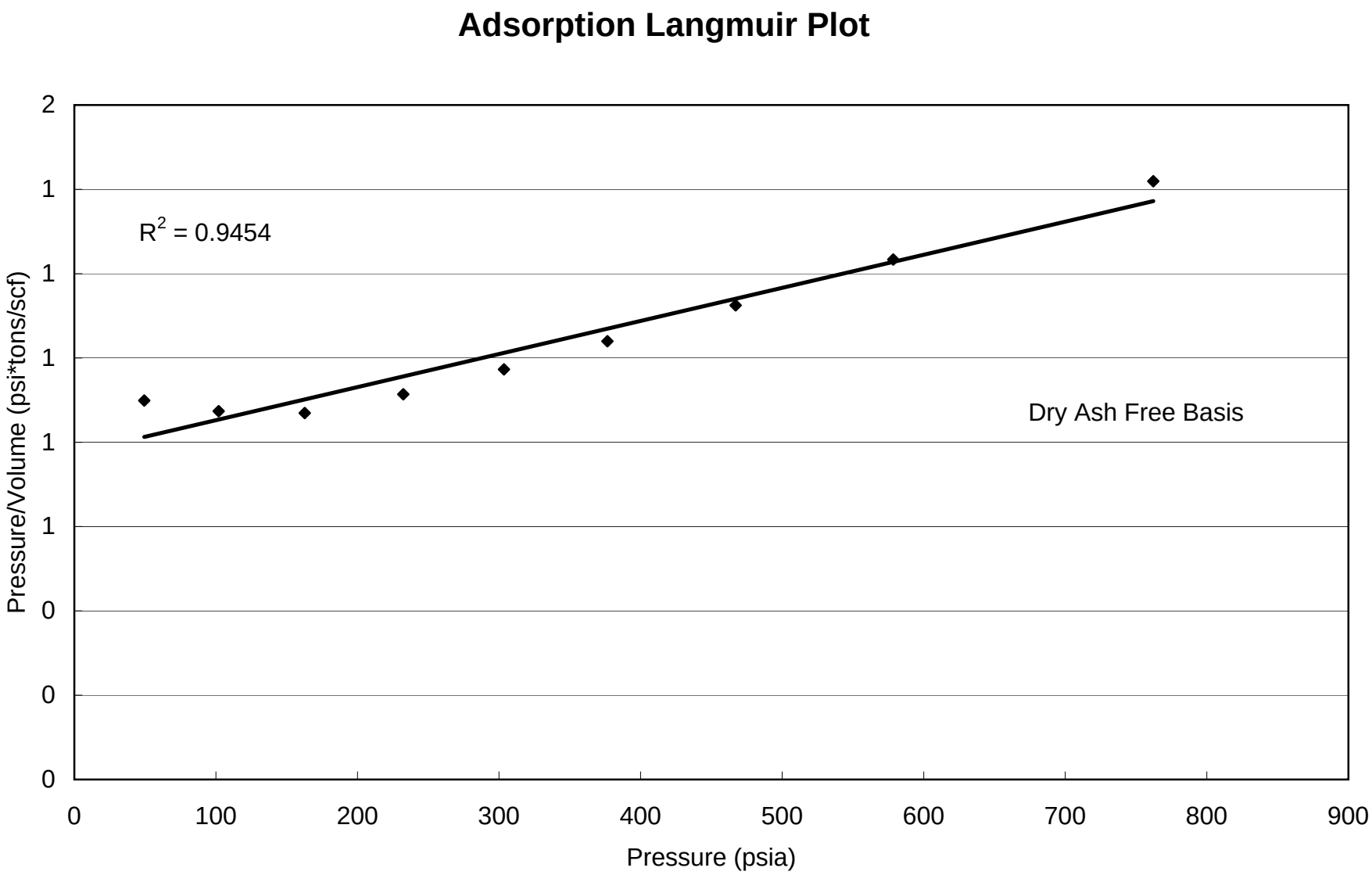


5-1C Carbon Dioxide (moisture free, ash included basis)



5-1C Carbon Dioxide (ash free, moisture included basis)




Adsorption Langmuir Plot
R2 = 0.9454
Dry Ash Free Basis
Pressure/Volume (psi*tons/scf)
Pressure (psia)
2
1
1
1
1
1
0
0
0
0
100
200
300
400
500
600
700
800
900

5-1C Carbon Dioxide

CO2 Adsorption (SI Units)

Summary of Analyses		
	As Received	DAF basis
Langmuir Volume cc/g	26.27	37.43
Langmuir Pressure MPa	6.79	6.79
Goodness of fit Langmuir Equation R-squared	0.95	0.95
Ash Content Wt.%	11.64	11.64
Equilibrium Moisture Wt.%	18.17	18.17

Contents of Appendix

data sheets	***Charts***
As Received	As Received
Dry Ash Free	Dry Ash Free
Dry Ash Included	Dry Ash Included
Moist Ash Free	Moist Ash Free

5-1C Carbon Dioxide

GAS ADSORPTION ISOTHERM SI UNITS

AS RECEIVED BASIS

Sample I.D. :	5-1C Carbon Dioxide	Moisture Content (EQ) % :	18.17
Isotherm Temperature º C:	48	Ash Content % :	11.64
Gas used:	CO2	Helium Density g/cc	1.375

PRESSURE (MPa)	ADSORBED GAS (cc/g @STP)	P / V
0.341	1.13	0.300
0.703	2.41	0.292
1.122	3.86	0.291
1.602	5.25	0.305
2.093	6.44	0.325
2.597	7.47	0.348
3.221	8.57	0.376
3.988	9.67	0.412
5.255	11.08	0.474

Saturated Monolayer Volume (cc/g @ STP):	26.27
Langmuir Pressure (MPa):	6.79

DRY ASH FREE BASIS

0.341	1.62	0.211
0.703	3.43	0.205
1.122	5.50	0.204
1.602	7.47	0.214
2.093	9.17	0.228
2.597	10.65	0.244
3.221	12.20	0.264
3.988	13.78	0.289
5.255	15.78	0.333

Saturated Monolayer Volume (cc/g @ STP, daf):	37.43
Langmuir Pressure (MPa):	6.79
Correlation Coefficient:	0.9454

5-1C Carbon Dioxide

GAS ADSORPTION ISOTHERM SI UNITS

MOISTURE FREE ASH INCLUDED

		Moisture Content (EQ) % :	18.17
Isotherm Temperature º C:	48	Ash Content % :	11.64
Gas used:	CO2	Helium Density g/cc	1.375

PRESSURE (MPa)	ADSORBED GAS (cc/g@STP)	P / V
0.341	1.39	0.25
0.703	2.94	0.24
1.122	4.72	0.24
1.602	6.41	0.25
2.093	7.86	0.27
2.597	9.13	0.28
3.221	10.47	0.31
3.988	11.82	0.34
5.255	13.54	0.39

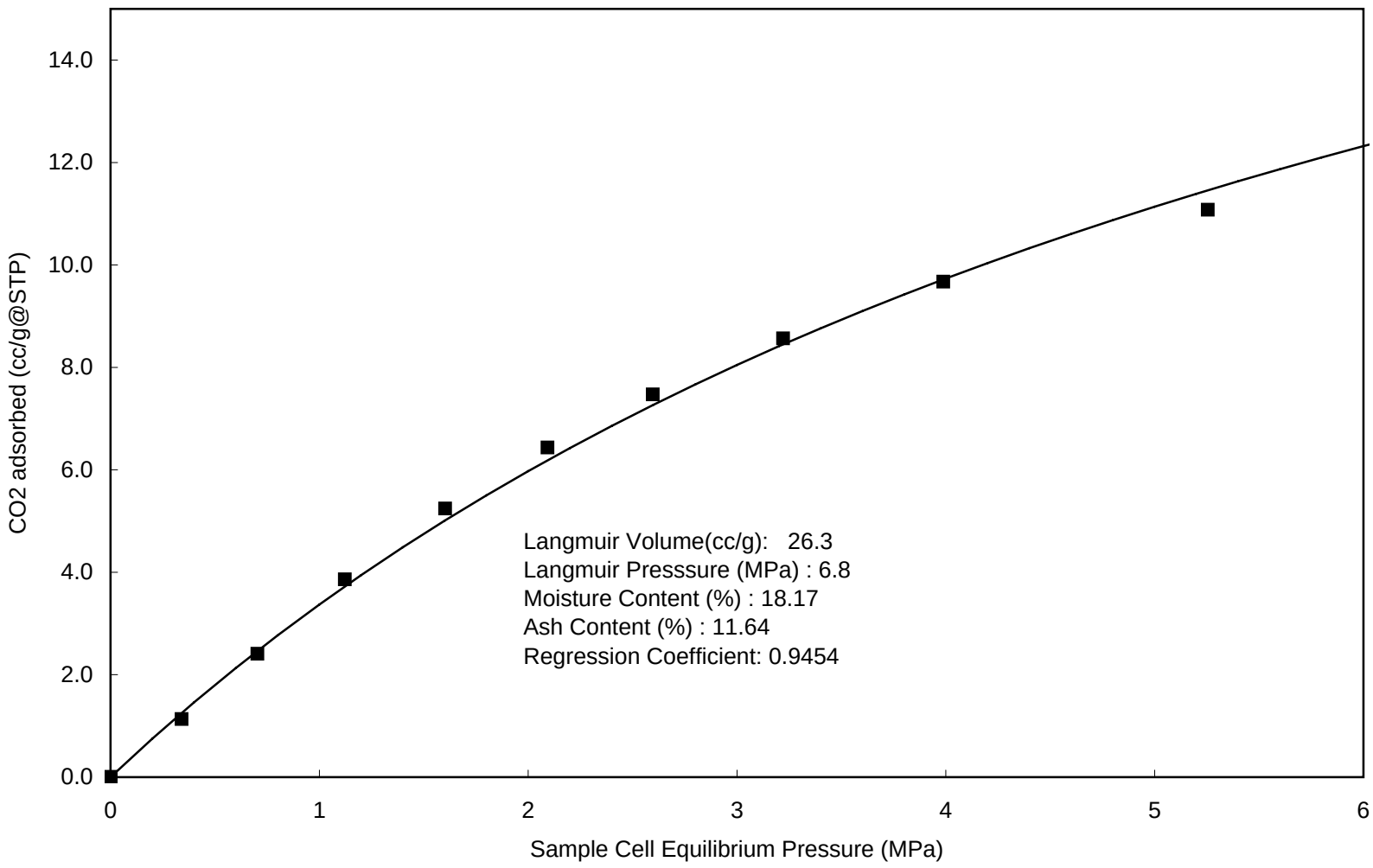
Saturated Monolayer Volume (cc/g):	32.10
Langmuir Pressure (MPa):	6.79

ASH FREE MOISTURE INCLUDED

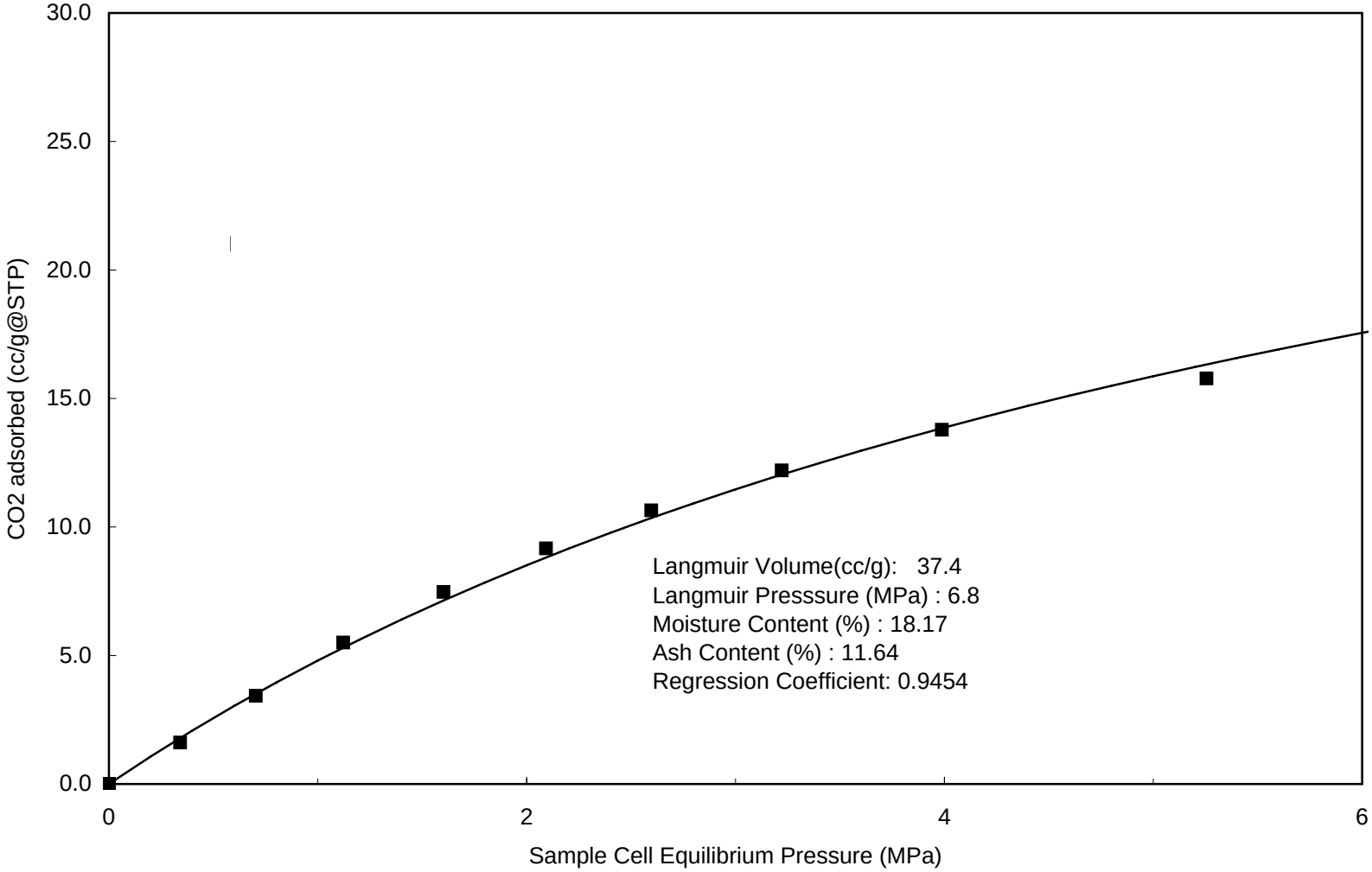
0.341	1.28	0.00
0.703	2.73	0.26
1.122	4.37	0.26
1.602	5.94	0.27
2.093	7.28	0.29
2.597	8.46	0.31
3.221	9.69	0.33
3.988	10.95	0.36
5.255	12.54	0.42

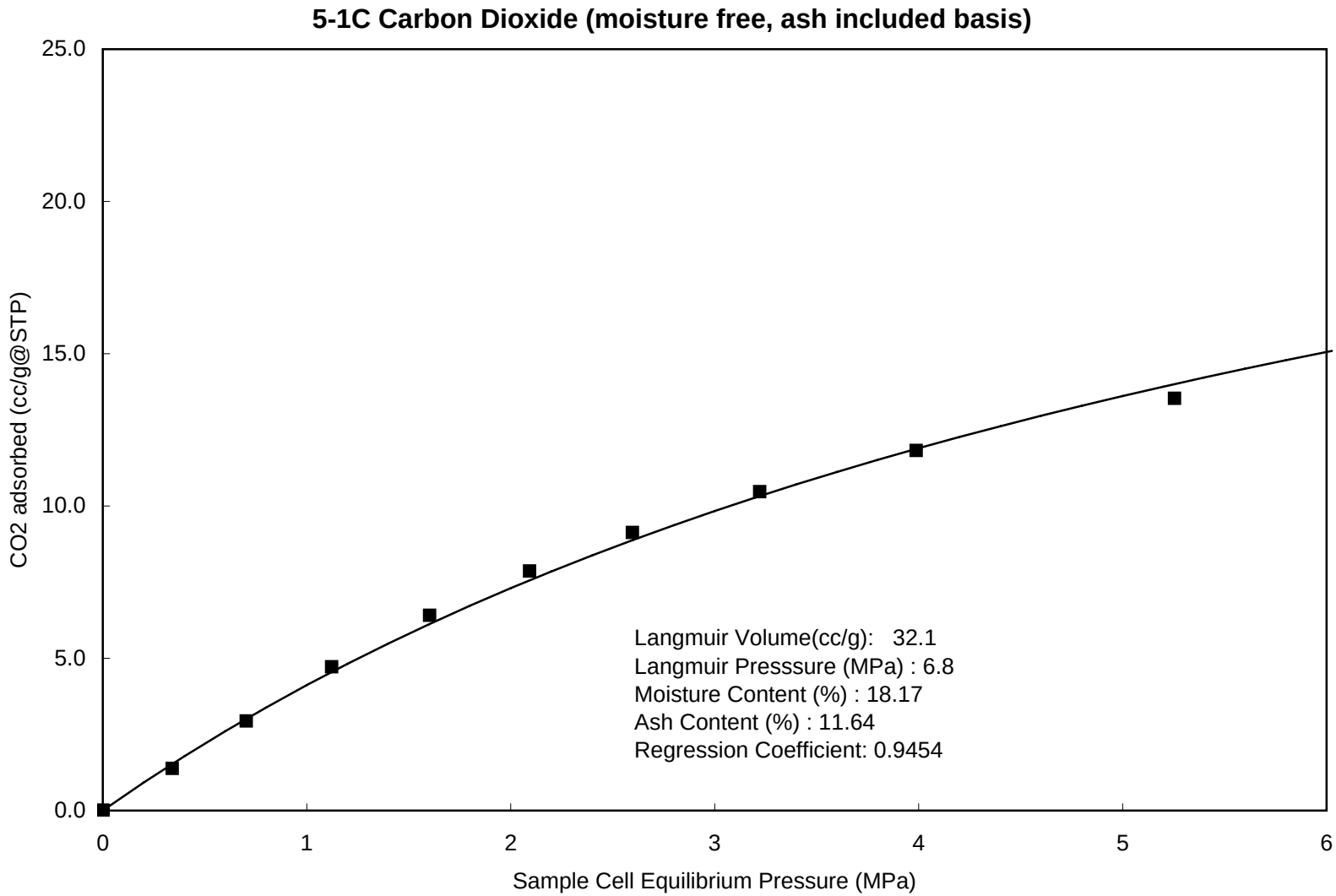
Saturated Monolayer Volume (cc/g, ash free):	29.73
Langmuir Pressure (MPa):	6.79
Correlation Coefficient:	0.9454

5-1C Carbon Dioxide (as received basis)

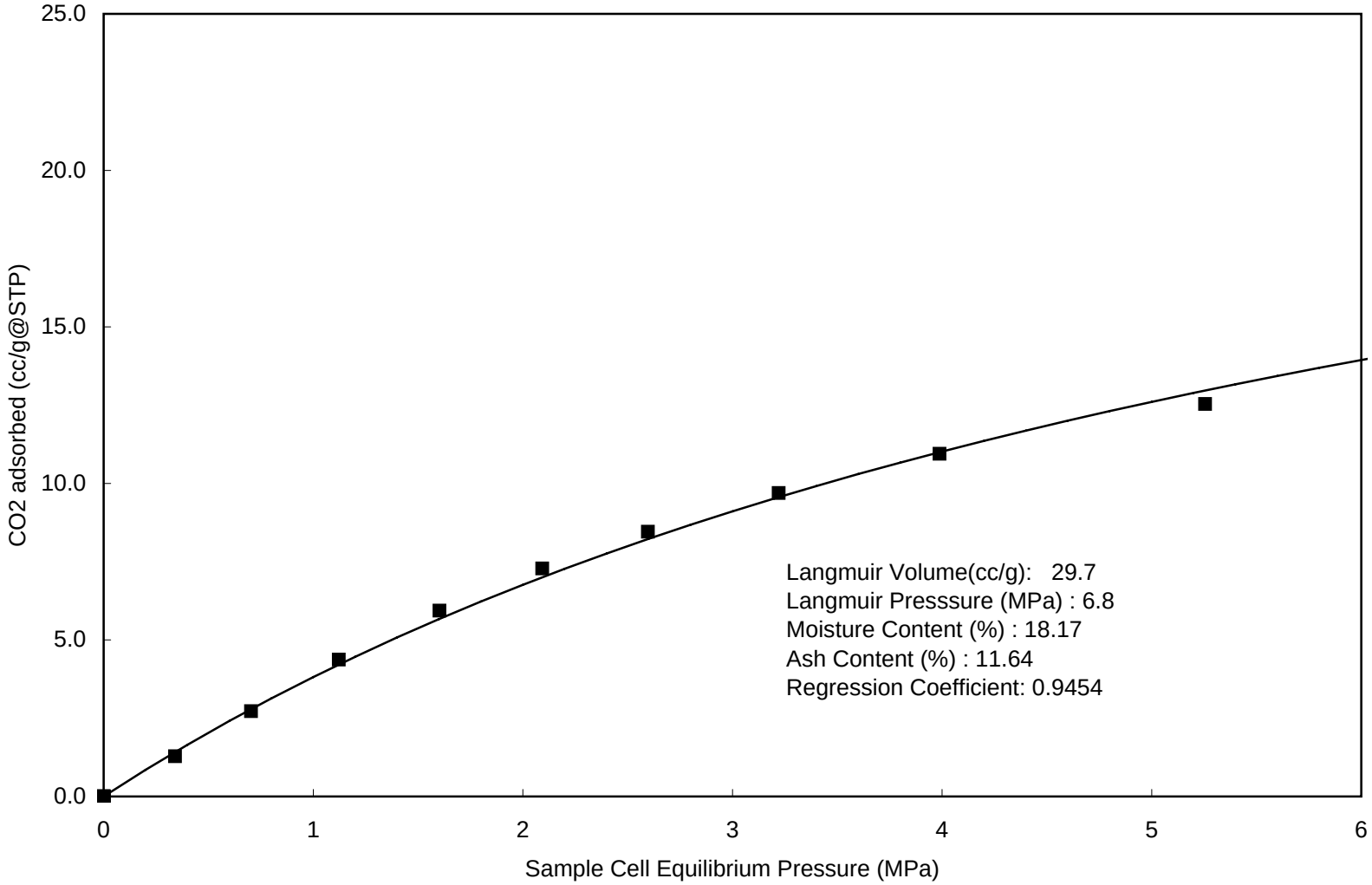


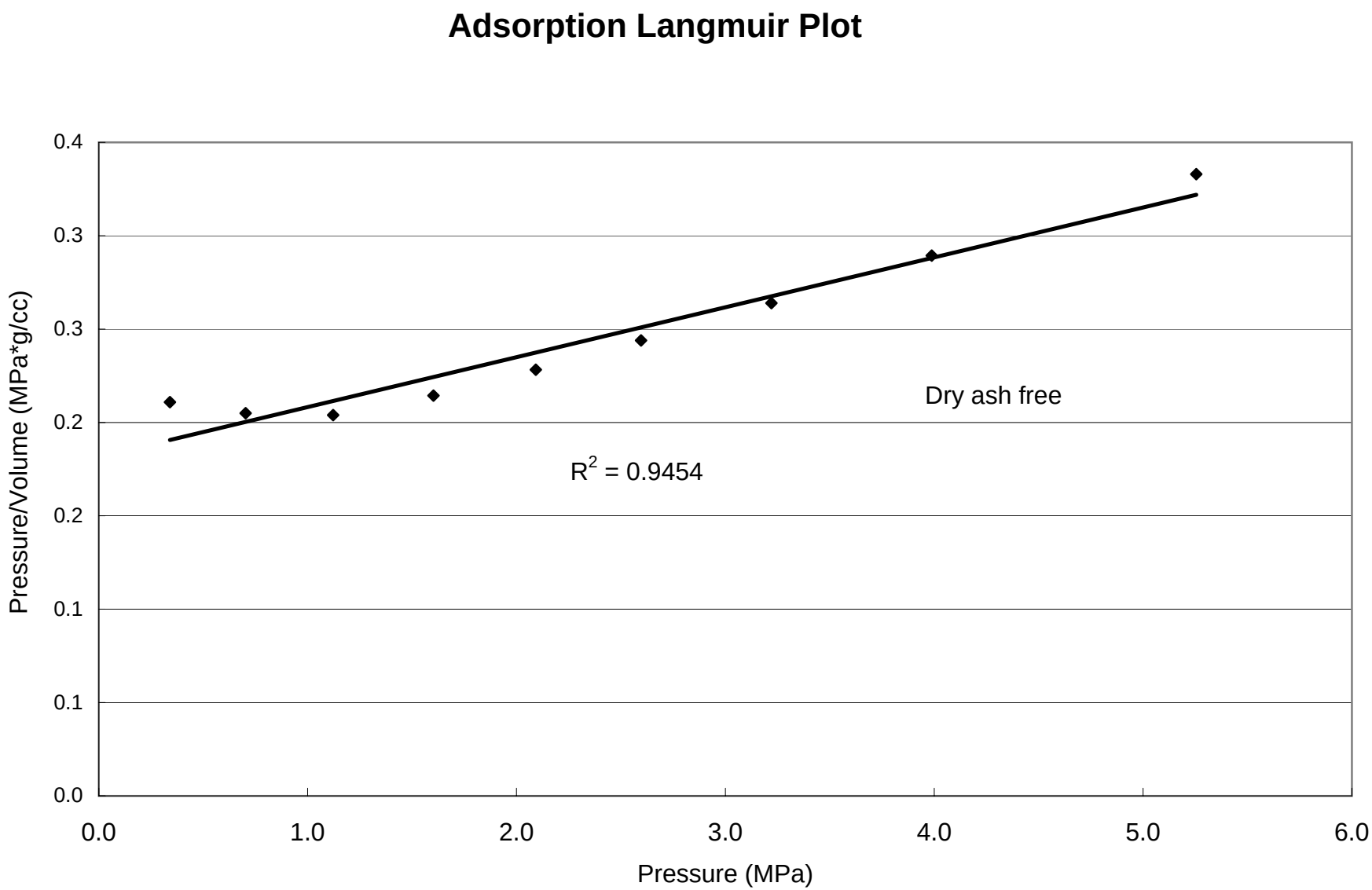
5-1C Carbon Dioxide (dry & ash free basis)



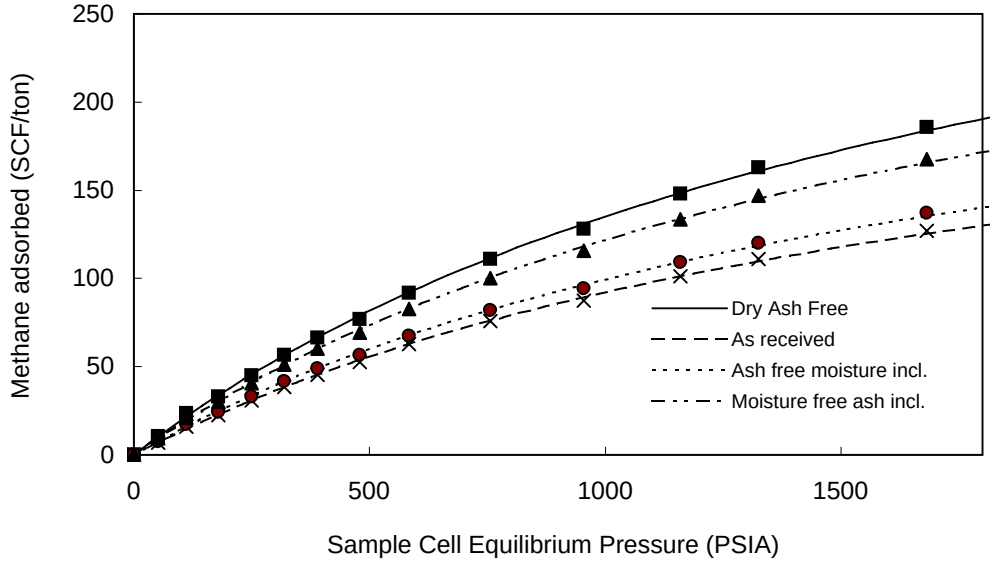

5-1C Carbon Dioxide (moisture free, ash included basis)
25.0
20.0
15.0
10.0
5.0
0.0
CO2 adsorbed (cc/g@STP)
0
1
2
3
4
5
6
Sample Cell Equilibrium Pressure (MPa)
Langmuir Volume(cc/g): 32.1
Langmuir Presssure (MPa) : 6.8
Moisture Content (%) : 18.17
Ash Content (%) : 11.64
Regression Coefficient: 0.9454

5-1C Carbon Dioxide (ash free, moisture included basis)




Adsorption Langmuir Plot
0.4
0.3
0.3
0.2
0.2
0.1
0.1
0.0
Pressure/Volume (MPa*g/cc)
Dry ash free
R2 = 0.9454
0.0
1.0
2.0
3.0
4.0
5.0
6.0
Pressure (MPa)

9-1A Methane



Pressure (PSIA)	Adsorbed gas (ft^3 /ton)			
	As Received	moisture free ash incl.	ash free moisture incl.	Dry Ash Free
51	7.1	9.3	7.6	10.4
111	16.1	21.2	17.3	23.5
179	22.7	29.9	24.5	33.2
249	30.7	40.5	33.1	44.9
319	38.6	51.0	41.7	56.6
390	45.5	60.1	49.1	66.6
479	52.5	69.4	56.7	76.9
583	62.6	82.7	67.6	91.7
756	75.8	100.2	81.9	111.0
954	87.5	115.6	94.5	128.1
1159	101.1	133.6	109.2	148.0
1324	111.2	146.9	120.0	162.8
1682	127.0	167.8	137.1	185.9

Langmuir Parameters

	As Received	Moisture free ash incl	Ash free moisture incl	Dry Ash Free
Vol. (ft^3 /ton)	266.3	351.8	287.5	389.8
Pressure (PSIA)	1885.1	1885.1	1885.1	1885.1

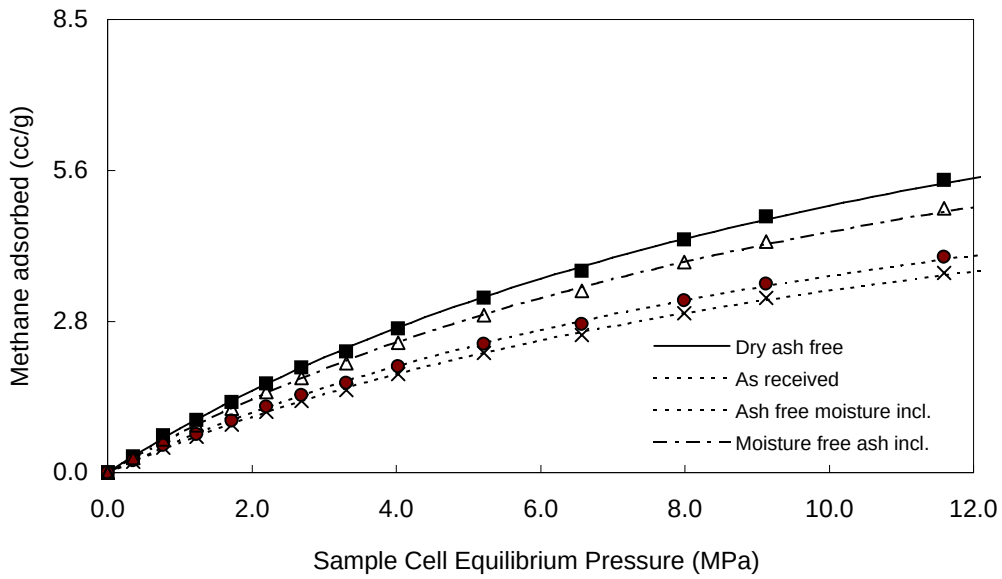
SUMMARY OF ADSORPTION ANALYSES IMP. UNITS

Isotherm Temperature: **97.0 ºF**

Goodness of fit of Langmuir regression: **0.99**

% Ash= 7.39 **% Moisture= 24.31** **Density g/cc 1.308**

9-1A Methane



Pressure (MPa)	Adsorbed gas (cc/g)			
	As Received	Moisture free ash incl.	ash free moisture incl	Dry Ash Free
0.353	0.21	0.27	0.22	0.30
0.768	0.47	0.62	0.51	0.69
1.236	0.67	0.88	0.72	0.98
1.718	0.90	1.19	0.97	1.32
2.201	1.14	1.50	1.23	1.66
2.690	1.34	1.77	1.44	1.96
3.305	1.54	2.04	1.67	2.26
4.022	1.84	2.43	1.99	2.69
5.216	2.23	2.94	2.41	3.26
6.575	2.57	3.40	2.78	3.77
7.989	2.97	3.93	3.21	4.35
9.130	3.27	4.32	3.53	4.78
11.595	3.73	4.93	4.03	5.46

Langmuir Parameters

	As Received	Moisture free ash incl.	Ash free moisture incl	Dry Ash Free
Vol. (cc/g)	7.83	10.34	8.45	11.46
Pressure (MPa)	13.00	13.00	13.00	13.00

SUMMARY OF ADSORPTION ANALYSES SI UNITS

Isotherm Temperature: **36.1 ºC**

Goodness of fit of Langmuir regression: **0.99**

% Ash= 7.39 **% Moisture = 24.31** **Density (g/cc)** **1.308**

9-1A Methane

GAS ADSORPTION ISOTHERM IMPERIAL UNITS

AS RECEIVED BASIS

		Moisture Content % :	24.31
Isotherm Temperature º F:	97.0	Ash Content, % :	7.39
Gas used:	Methane	Helium Density g/cc	1.308

PRESSURE (PSI)	ADSORBED GAS (SCF/ton)	P / V
51	7.07	7.23
111	16.06	6.94
179	22.67	7.91
249	30.66	8.13
319	38.63	8.26
390	45.47	8.58
479	52.54	9.12
583	62.60	9.32
756	75.83	9.98
954	87.51	10.90
1159	101.11	11.46
1324	111.17	11.91
1682	126.99	13.24

Saturated Monolayer Volume (SCF/ton):	266.3
Langmuir Pressure (PSIA):	1885.1
Correlation Coefficient:	0.9883

DRY ASH FREE BASIS

51	10.36	4.94
111	23.51	4.74
179	33.19	5.40
249	44.90	5.55
319	56.56	5.64
390	66.57	5.86
479	76.93	6.23
583	91.66	6.36
756	111.02	6.81
954	128.12	7.44
1159	148.04	7.83
1324	162.77	8.14
1682	185.92	9.05

Saturated Monolayer Volume (SCF/ton, daf):	390
Langmuir Pressure (PSIA):	1885
Correlation Coefficient:	0.9883

9-1A Methane

Methane Adsorption
(Imperial Units)

Summary of Analyses		
	As Received	DAF basis
Langmuir Volume (SCF)	266	390
Langmuir Pressure (PSIA)	1885	1885
Goodness of fit Langmuir Equation R-squared	0.99	0.99
Ash Content Wt.%	7.39	7.39
Equilibrium Moisture Wt.%	24.31	24.31

Contents of Appendix

data sheets	***Charts***
As Received	As Received
Dry Ash Free	Dry Ash Free
Dry Ash Included	Dry Ash Included
Moist Ash Free	Moist Ash Free

9-1A Methane

GAS ADSORPTION ISOTHERM IMPERIAL UNITS

MOISTURE FREE ASH INCLUDED

		Moisture Content % :	24.31
Isotherm Temperature° F:	97.0	Ash Content, % :	7.39
Gas used:	Methane	Helium Density g/cc	1.308

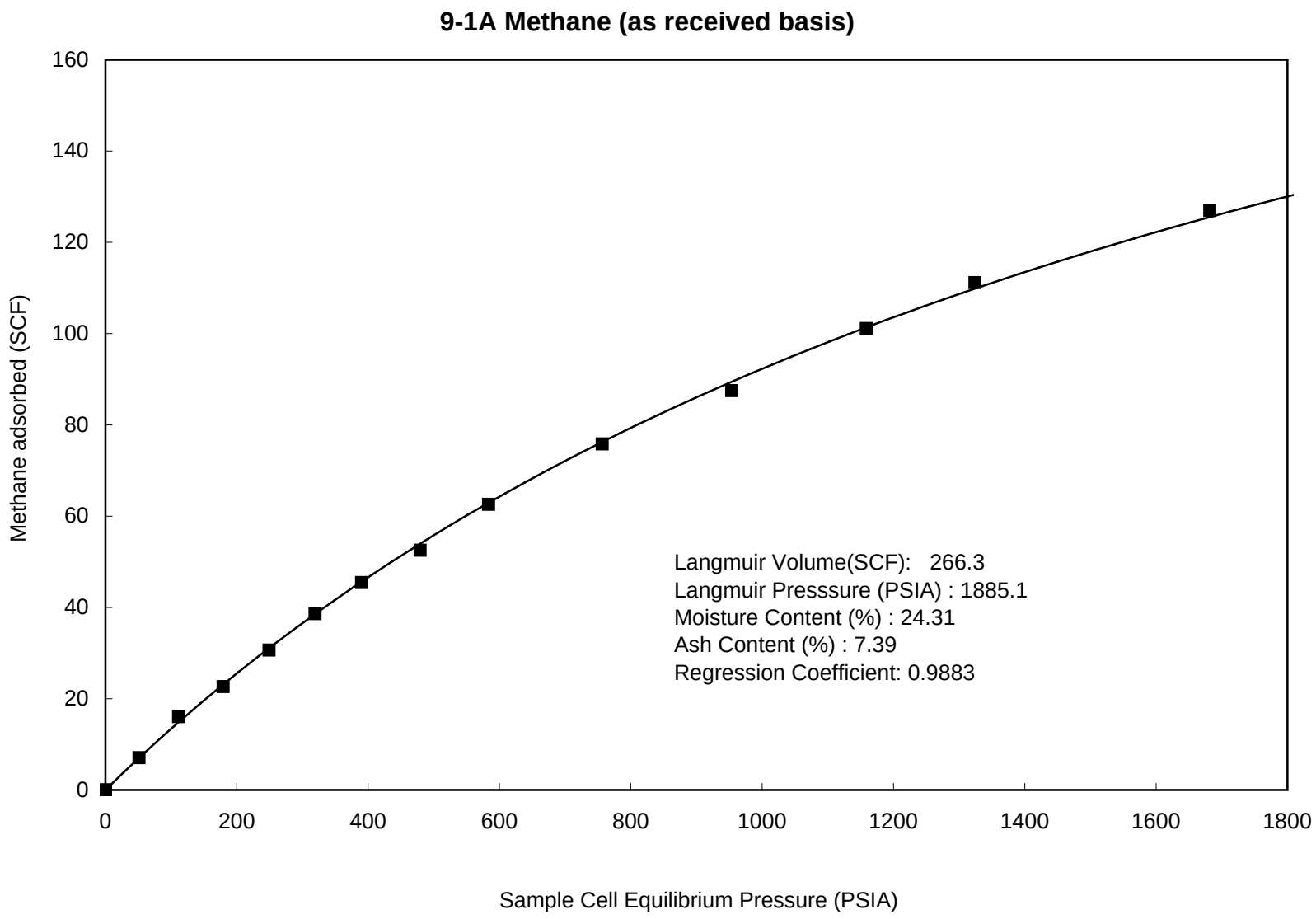
PRESSURE (PSI)	ADSORBED GAS (SCF/ton)	P / V
51	9	5.47
111	21	5.25
179	30	5.99
249	41	6.15
319	51	6.25
390	60	6.50
479	69	6.91
583	83	7.05
756	100	7.55
954	116	8.25
1159	134	8.67
1324	147	9.02
1682	168	10.02

Saturated Monolayer Volume (SCF/ton):	352
Langmuir Pressure (PSIA):	1885
Correlation Coefficient:	0.9883

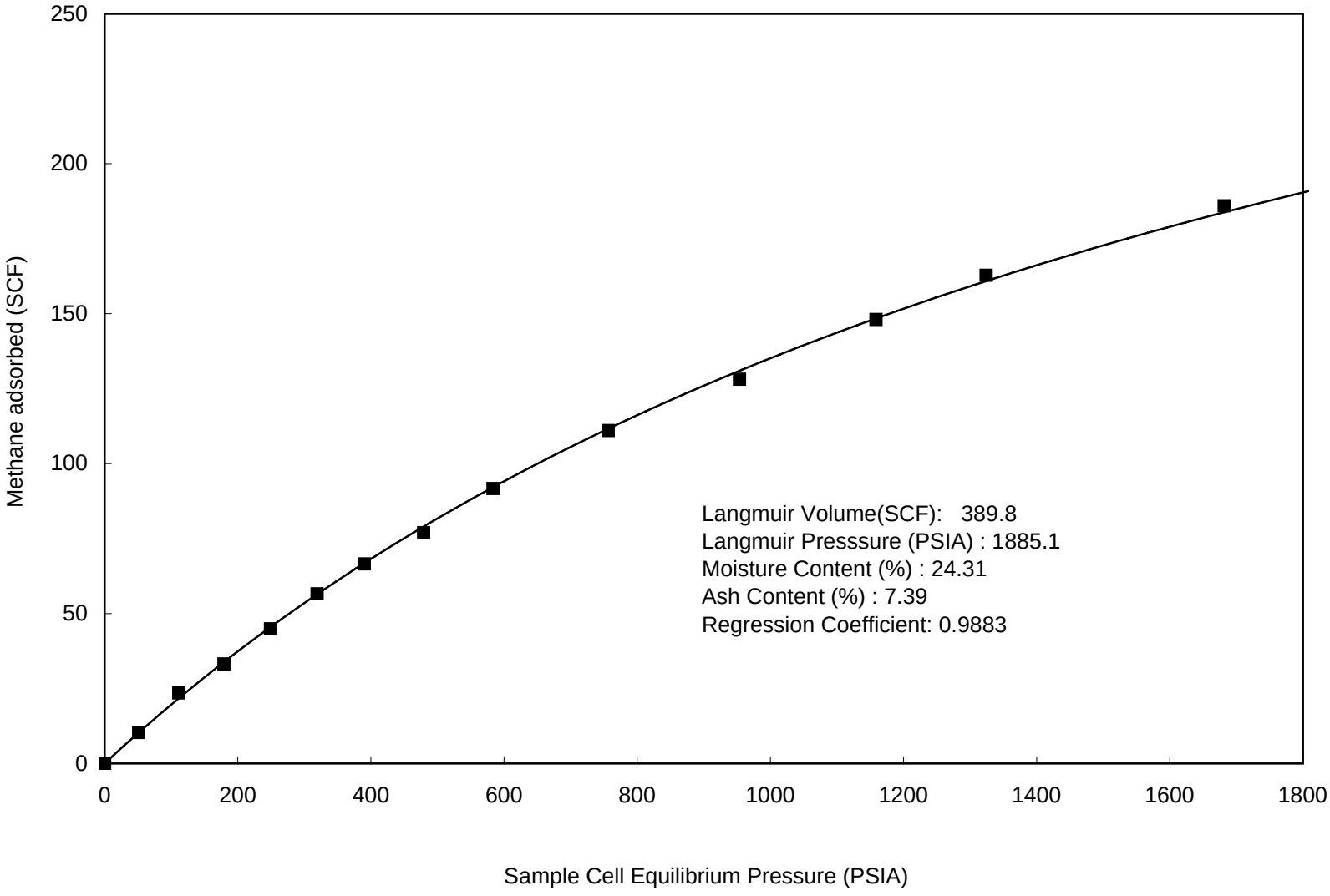
ASH FREE MOISTURE INCLUDED

51	8	6.70
111	17	6.42
179	24	7.32
249	33	7.53
319	42	7.65
390	49	7.95
479	57	8.45
583	68	8.63
756	82	9.24
954	94	10.09
1159	109	10.61
1324	120	11.03
1682	137	12.26

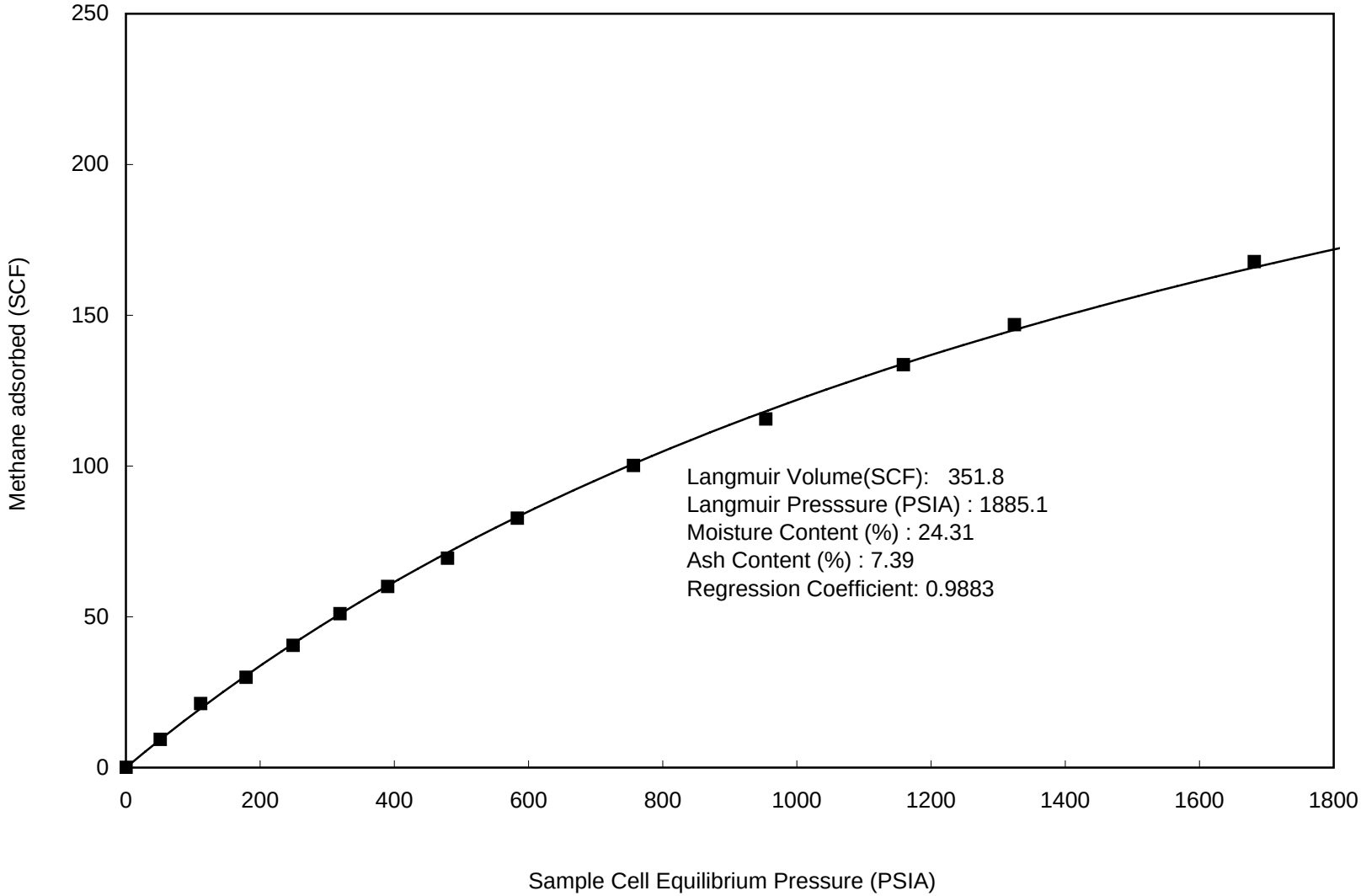
Saturated Monolayer Volume (SCF/ton):	288
Langmuir Pressure (PSIA):	1885
Correlation Coefficient:	0.9883


9-1A Methane (as received basis)
Methane adsorbed (SCF)
Sample Cell Equilibrium Pressure (PSIA)
0
20
40
60
80
100
120
140
160
0
200
400
600
800
1000
1200
1400
1600
1800
Langmuir Volume(SCF): 266.3
Langmuir Presssure (PSIA) : 1885.1
Moisture Content (%) : 24.31
Ash Content (%) : 7.39
Regression Coefficient: 0.9883

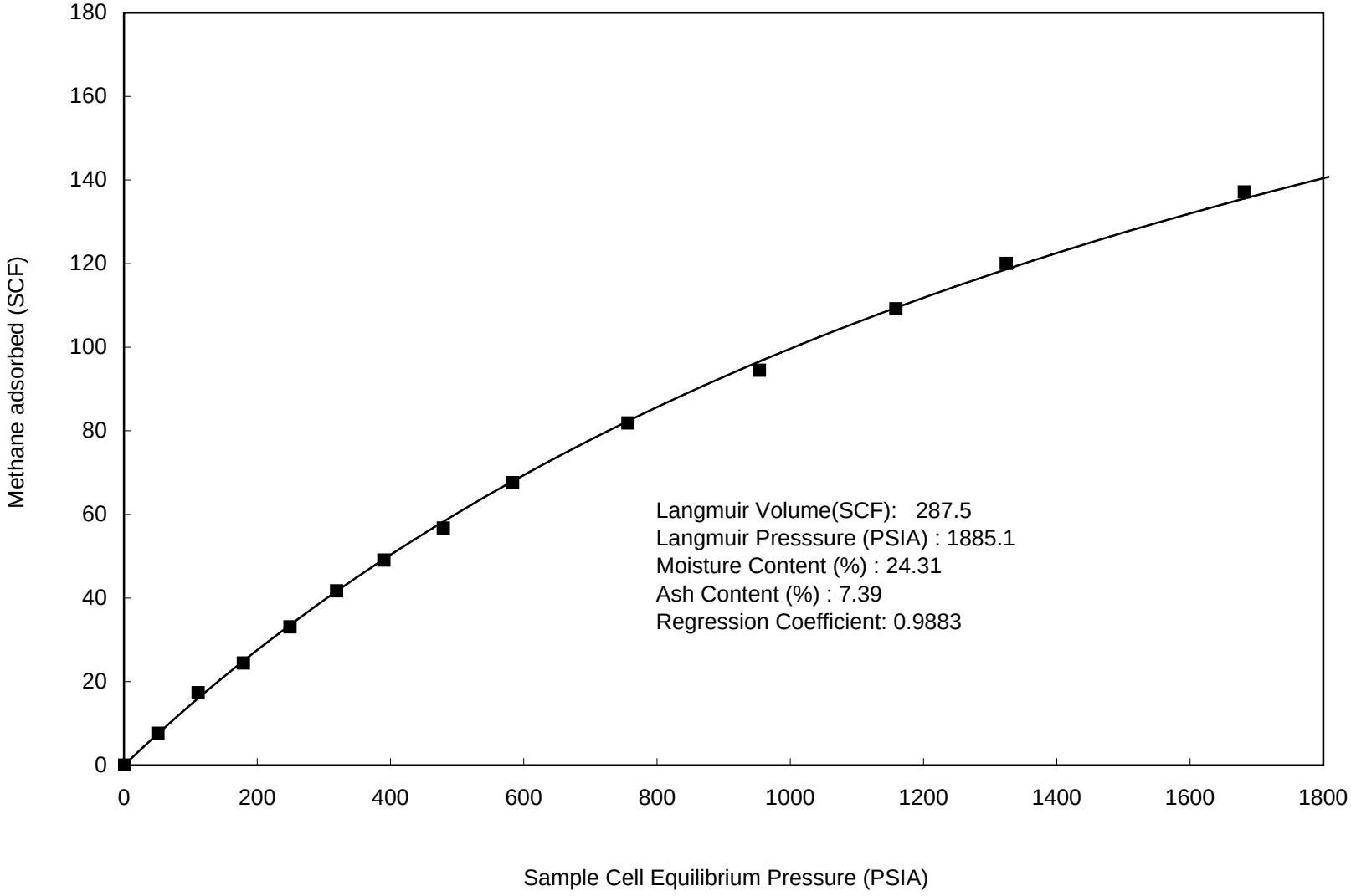
9-1A Methane (dry & ash free basis)

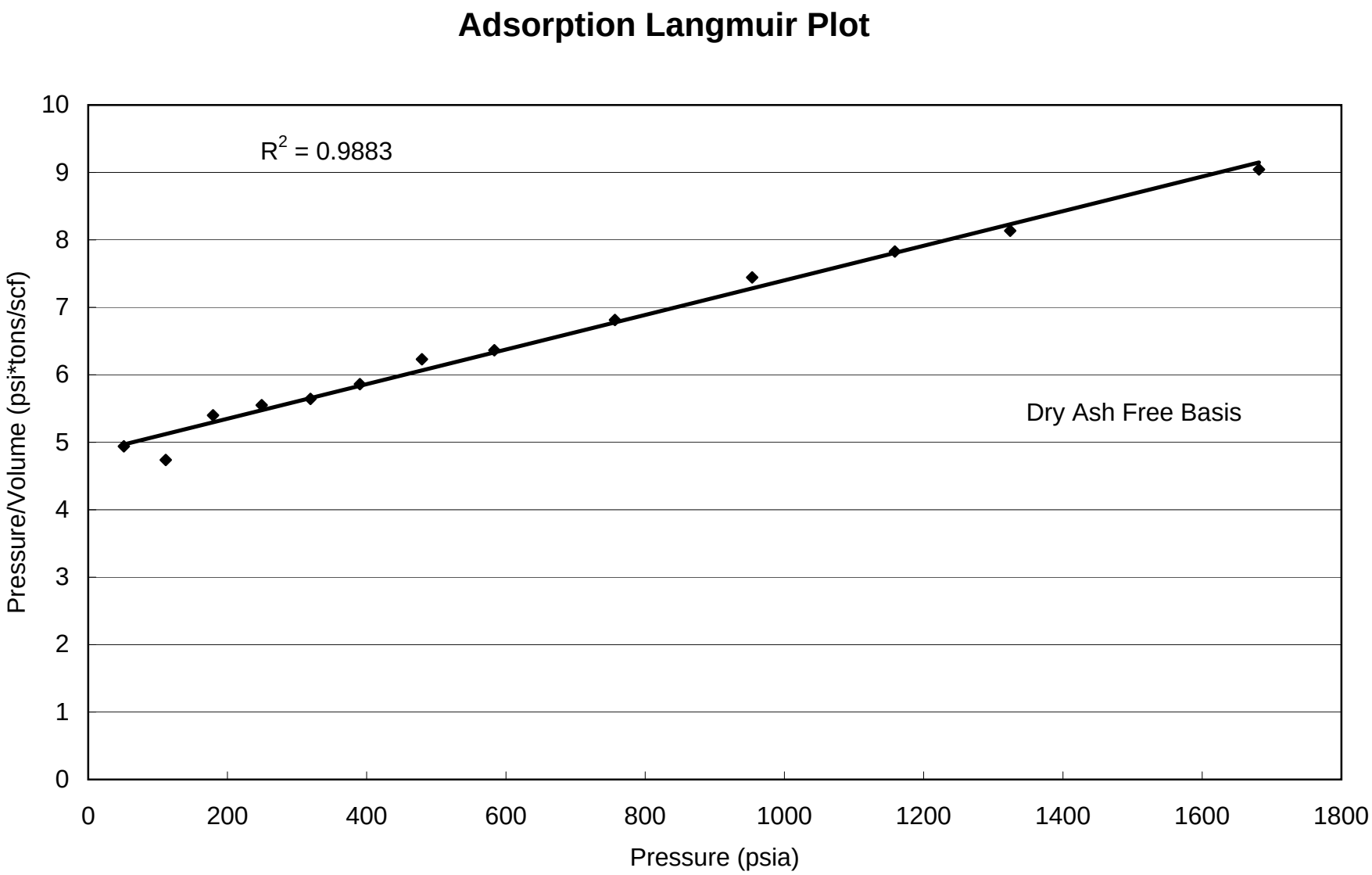


9-1A Methane (moisture free, ash included basis)



9-1A Methane (ash free, moisture included basis)




Adsorption Langmuir Plot
R2 = 0.9883
Dry Ash Free Basis
Pressure/Volume (psi*tons/scf)
Pressure (psia)
0
1
2
3
4
5
6
7
8
9
10
0
200
400
600
800
1000
1200
1400
1600
1800

9-1A Methane

Methane Adsorption (SI Units)

Summary of Analyses		
	As Received	DAF basis
Langmuir Volume cc/g	7.83	11.46
Langmuir Pressure MPa	13.00	13.00
Goodness of fit Langmuir Equation R-squared	0.99	0.99
Ash Content Wt.%	7.39	7.39
Equilibrium Moisture Wt.%	24.31	24.31

Contents of Appendix

data sheets	***Charts***
As Received	As Received
Dry Ash Free	Dry Ash Free
Dry Ash Included	Dry Ash Included
Moist Ash Free	Moist Ash Free

9-1A Methane

GAS ADSORPTION ISOTHERM SI UNITS

AS RECEIVED BASIS

Sample I.D. :	9-1A Methane	Moisture Content (EQ) % :	24.31
Isotherm Temperature º C:	36.1	Ash Content % :	7.39
Gas used:	Methane	Helium Density g/cc	1.308

PRESSURE (MPa)	ADSORBED GAS (cc/g @STP)	P / V
0.353	0.21	1.697
0.768	0.47	1.627
1.236	0.67	1.855
1.718	0.90	1.907
2.201	1.14	1.938
2.690	1.34	2.013
3.305	1.54	2.140
4.022	1.84	2.186
5.216	2.23	2.340
6.575	2.57	2.557
7.989	2.97	2.688
9.130	3.27	2.794
11.595	3.73	3.107

Saturated Monolayer Volume (cc/g @ STP):	7.83
Langmuir Pressure (MPa):	13.00

DRY ASH FREE BASIS

0.353	0.30	1.159
0.768	0.69	1.111
1.236	0.98	1.267
1.718	1.32	1.302
2.201	1.66	1.324
2.690	1.96	1.375
3.305	2.26	1.462
4.022	2.69	1.493
5.216	3.26	1.598
6.575	3.77	1.746
7.989	4.35	1.836
9.130	4.78	1.909
11.595	5.46	2.122

Saturated Monolayer Volume (cc/g @ STP, daf):	11.46
Langmuir Pressure (MPa):	13.00
Correlation Coefficient:	0.9883

9-1A Methane

GAS ADSORPTION ISOTHERM SI UNITS

MOISTURE FREE ASH INCLUDED

		Moisture Content (EQ) % :	24.31
Isotherm Temperature º C:	36.1	Ash Content % :	7.39
Gas used:	Methane	Helium Density g/cc	1.308

PRESSURE (MPa)	ADSORBED GAS (cc/g@STP)	P / V
0.353	0.27	1.28
0.768	0.62	1.23
1.236	0.88	1.40
1.718	1.19	1.44
2.201	1.50	1.47
2.690	1.77	1.52
3.305	2.04	1.62
4.022	2.43	1.65
5.216	2.94	1.77
6.575	3.40	1.94
7.989	3.93	2.03
9.130	4.32	2.12
11.595	4.93	2.35

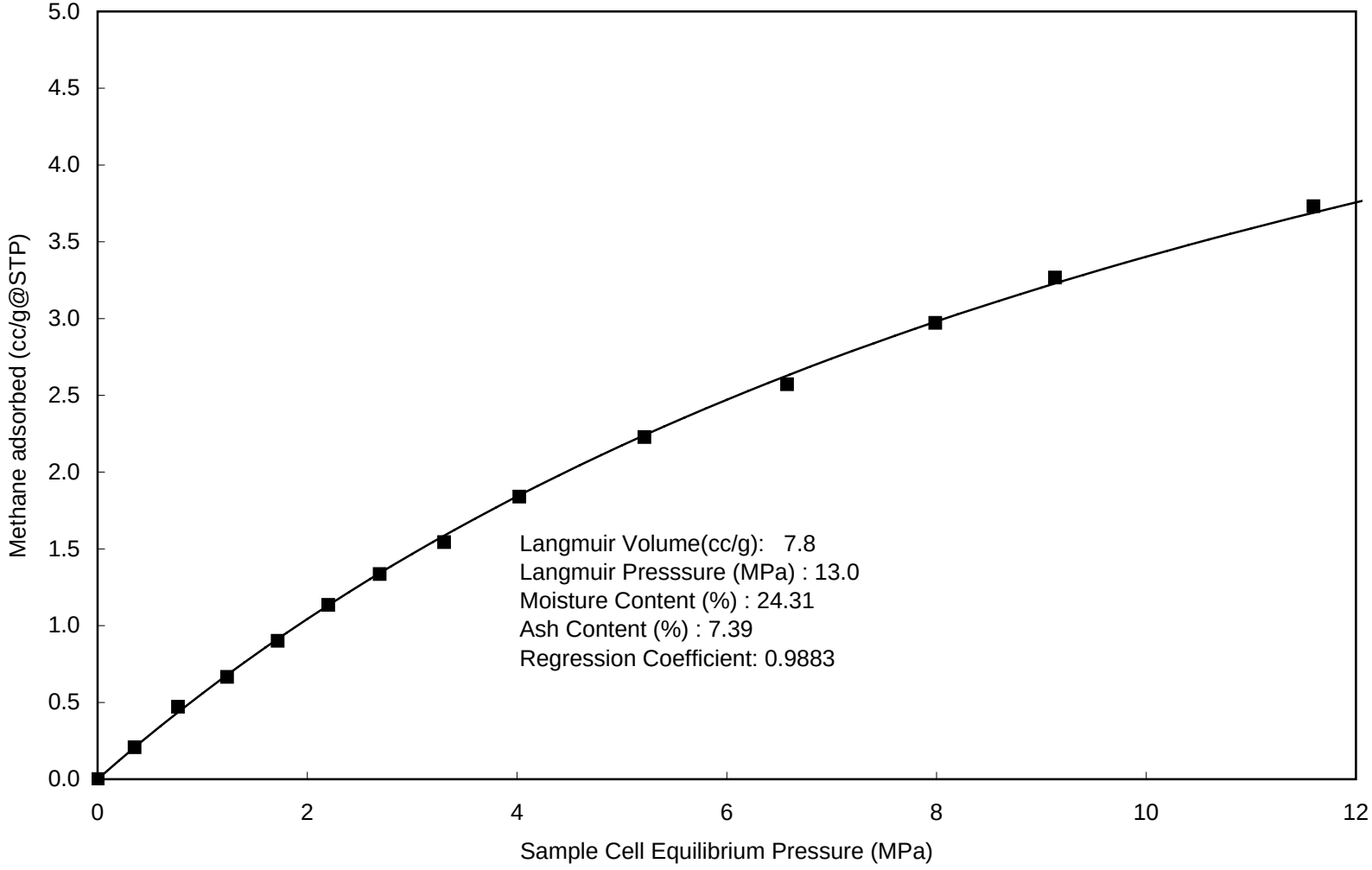
Saturated Monolayer Volume (cc/g):	10.34
Langmuir Pressure (MPa):	13.00

ASH FREE MOISTURE INCLUDED

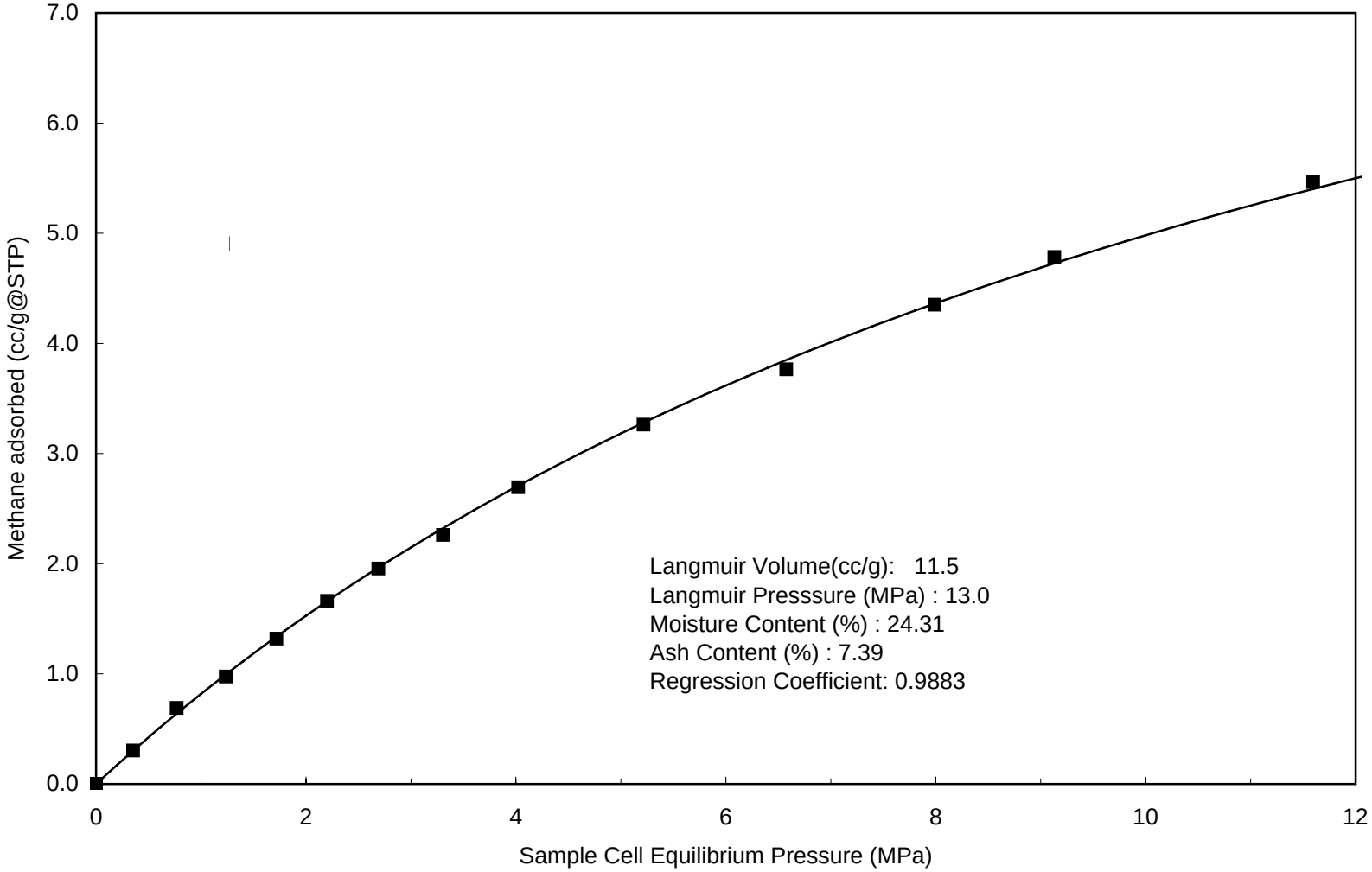
0.353	0.22	0.00
0.768	0.51	1.51
1.236	0.72	1.72
1.718	0.97	1.77
2.201	1.23	1.80
2.690	1.44	1.86
3.305	1.67	1.98
4.022	1.99	2.02
5.216	2.41	2.17
6.575	2.78	2.37
7.989	3.21	2.49
9.130	3.53	2.59
11.595	4.03	2.88

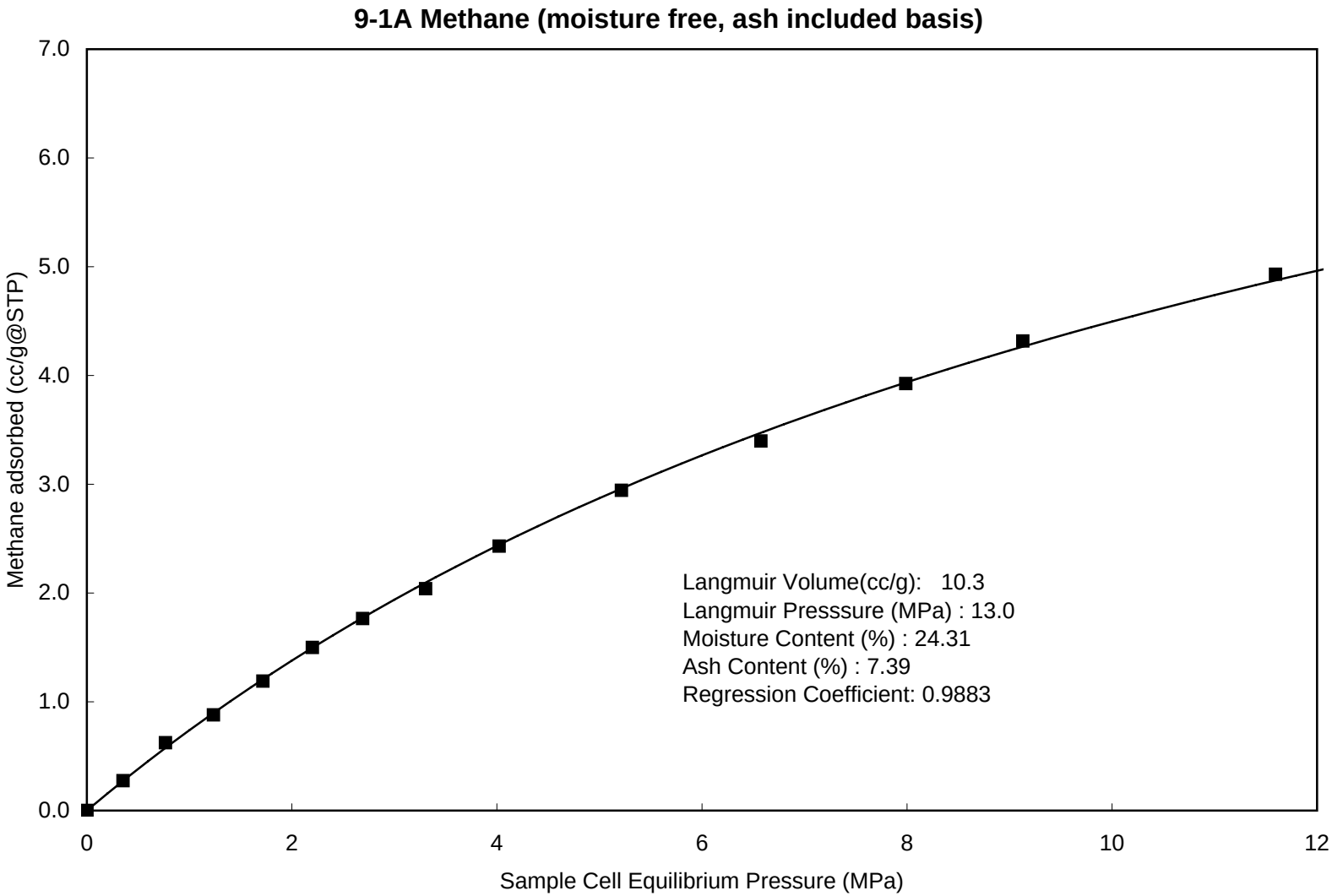
Saturated Monolayer Volume (cc/g, ash free):	8.45
Langmuir Pressure (MPa):	13.00
Correlation Coefficient:	0.9883

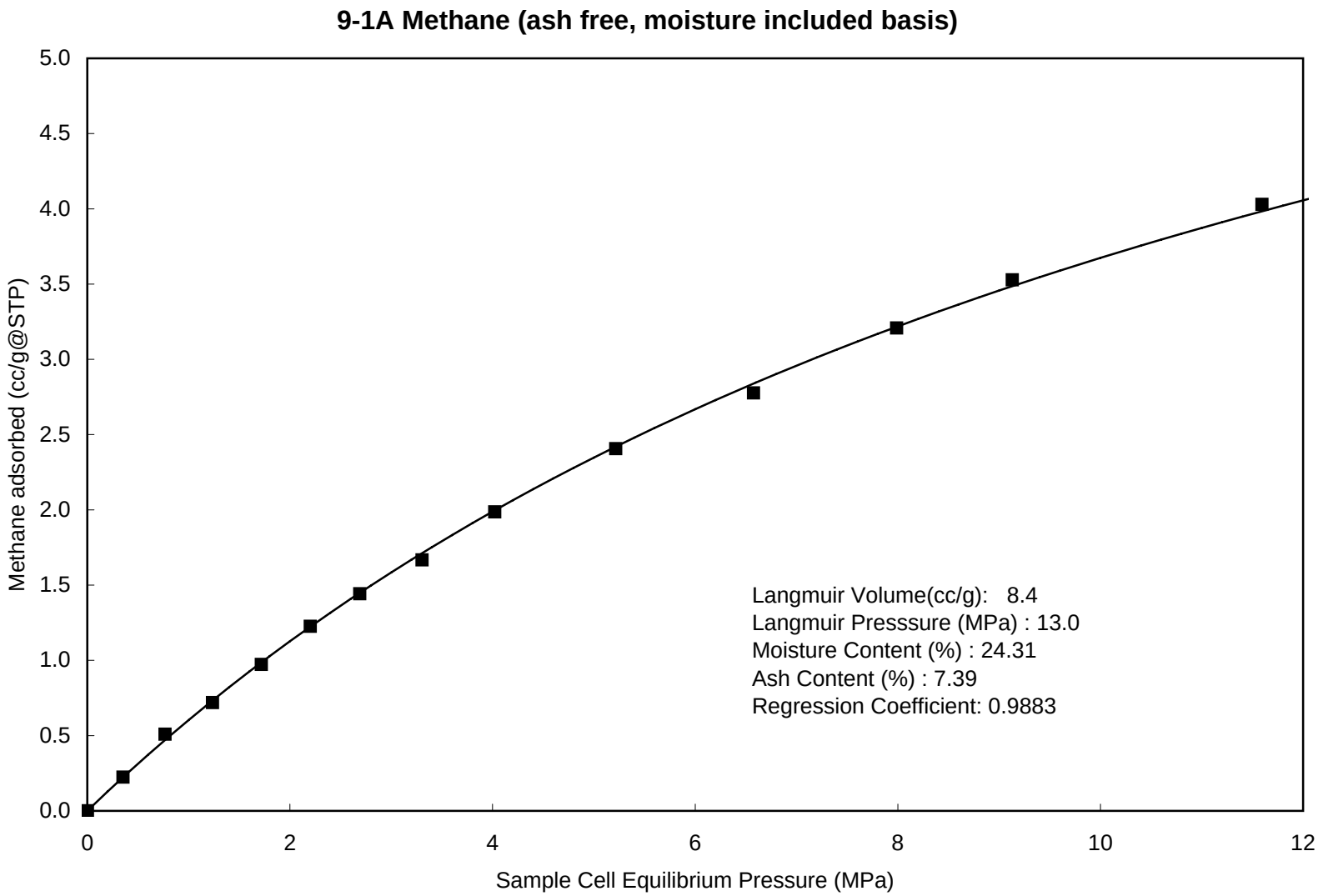
9-1A Methane (as received basis)

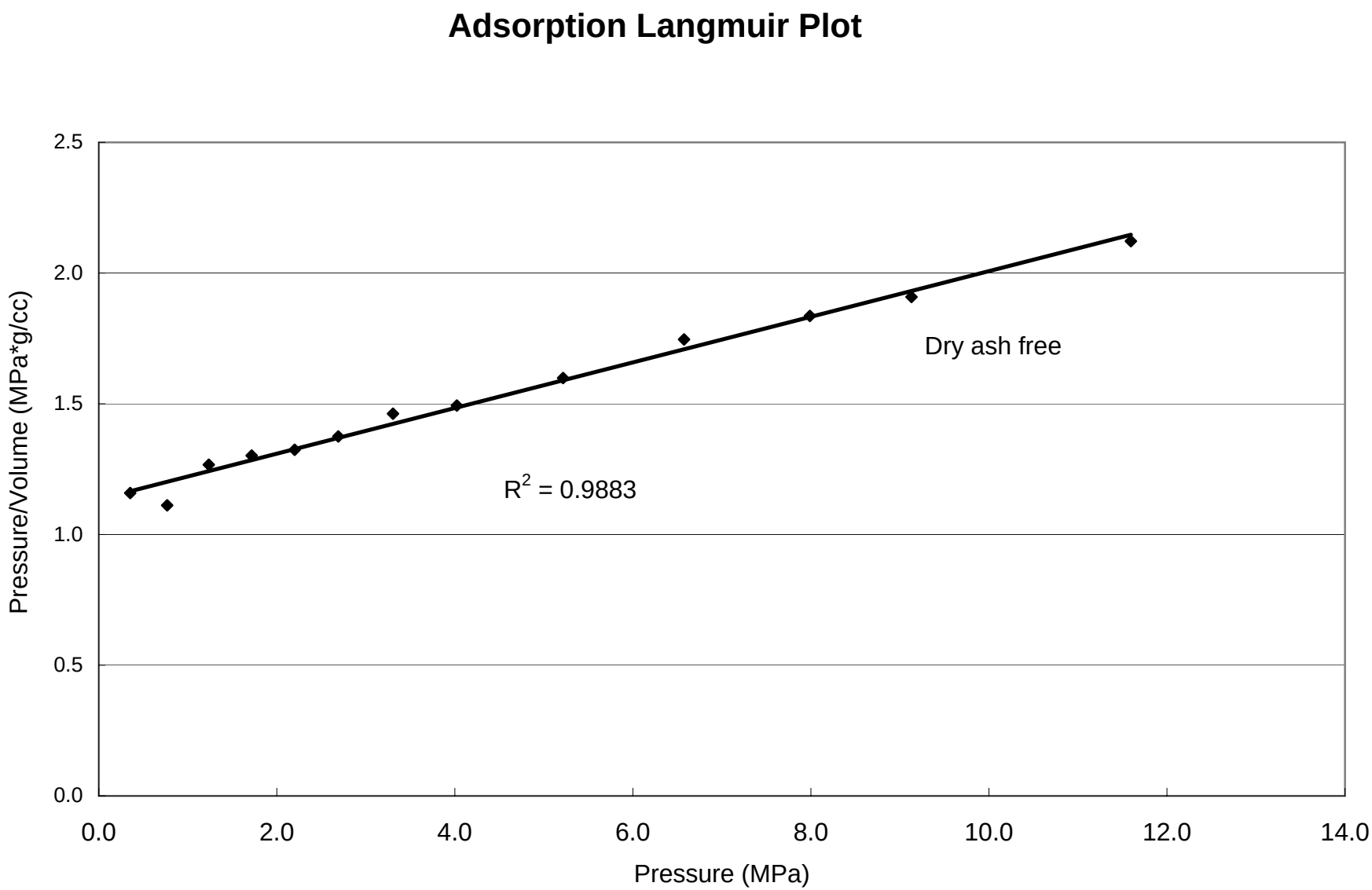


9-1A Methane (dry & ash free basis)

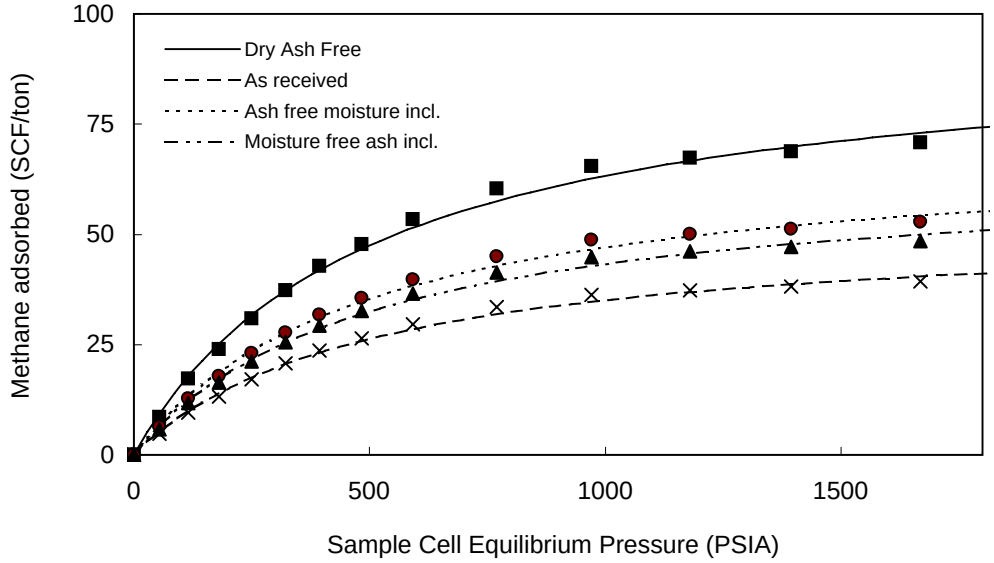



9-1A Methane (moisture free, ash included basis)
Methane adsorbed (cc/g@STP)
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
0
2
4
6
8
10
12
Sample Cell Equilibrium Pressure (MPa)
Langmuir Volume(cc/g): 10.3
Langmuir Presssure (MPa) : 13.0
Moisture Content (%) : 24.31
Ash Content (%) : 7.39
Regression Coefficient: 0.9883


9-1A Methane (ash free, moisture included basis)
Methane adsorbed (cc/g@STP)
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0
2
4
6
8
10
12
Sample Cell Equilibrium Pressure (MPa)
Langmuir Volume(cc/g): 8.4
Langmuir Presssure (MPa) : 13.0
Moisture Content (%) : 24.31
Ash Content (%) : 7.39
Regression Coefficient: 0.9883


Adsorption Langmuir Plot
Pressure/Volume (MPa*g/cc)
2.5
2.0
1.5
1.0
0.5
0.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
Pressure (MPa)
Dry ash free
R2 = 0.9883

9-1B Methane



Pressure (PSIA)	Adsorbed gas (ft^3 /ton)			
	As Received	moisture free ash incl.	ash free moisture incl.	Dry Ash Free
54	4.8	5.9	6.4	8.6
116	9.6	11.8	12.8	17.2
181	13.3	16.4	17.8	23.9
249	17.2	21.2	23.1	30.9
322	20.7	25.5	27.8	37.3
394	23.7	29.3	31.9	42.8
484	26.5	32.7	35.5	47.7
591	29.6	36.6	39.8	53.4
769	33.5	41.4	45.0	60.4
970	36.3	44.8	48.8	65.5
1180	37.3	46.1	50.1	67.3
1394	38.2	47.1	51.3	68.8
1668	39.3	48.5	52.8	70.8

Langmuir Parameters

	As Received	Moisture free ash incl	Ash free moisture incl	Dry Ash Free
Vol. (ft^3 /ton)	52.6	64.9	70.6	94.8
Pressure (PSIA)	497.3	497.3	497.3	497.3

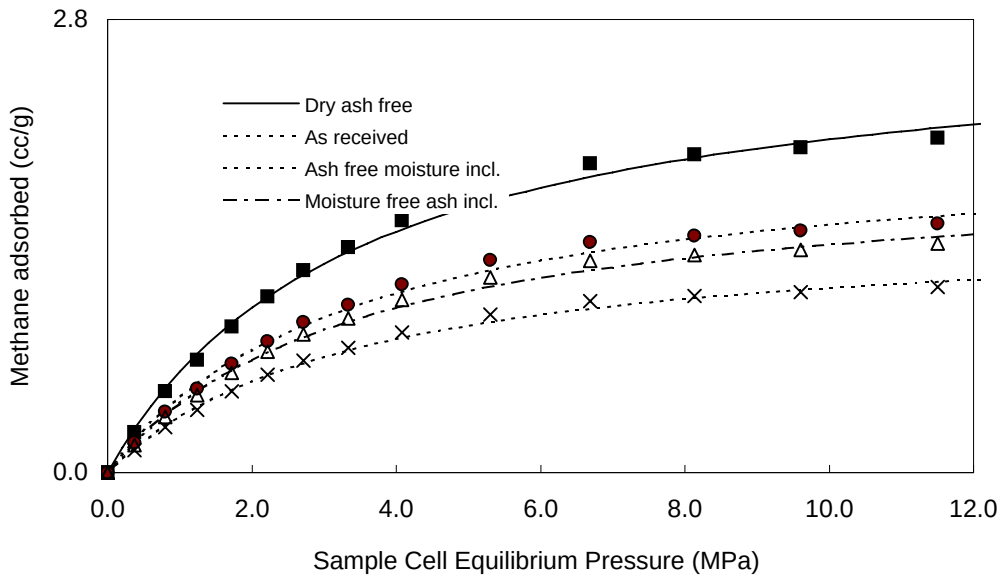
SUMMARY OF ADSORPTION ANALYSES IMP. UNITS

Isotherm Temperature: 107.6 ºF

Goodness of fit of Langmuir regression: 0.99

% Ash= 25.52 % Moisture= 18.99 Density g/cc 1.737

9-1B Methane



Pressure (MPa)	Adsorbed gas (cc/g)			
	As Received	Moisture free ash incl.	ash free moisture incl	Dry Ash Free
0.371	0.14	0.17	0.19	0.25
0.797	0.28	0.35	0.38	0.51
1.245	0.39	0.48	0.52	0.70
1.720	0.50	0.62	0.68	0.91
2.220	0.61	0.75	0.82	1.10
2.714	0.70	0.86	0.94	1.26
3.336	0.78	0.96	1.04	1.40
4.076	0.87	1.08	1.17	1.57
5.305	0.98	1.22	1.32	1.77
6.690	1.07	1.32	1.43	1.92
8.137	1.10	1.35	1.47	1.98
9.608	1.12	1.39	1.51	2.02
11.499	1.15	1.43	1.55	2.08

Langmuir Parameters

	As Received	Moisture free ash incl.	Ash free moisture incl	Dry Ash Free
Vol. (cc/g)	1.55	1.91	2.07	2.78
Pressure (MPa)	3.43	3.43	3.43	3.43

SUMMARY OF ADSORPTION ANALYSES SI UNITS

Isotherm Temperature: **42.0 ºC**

Goodness of fit of Langmuir regression: **0.99**

% Ash= 25.52 **% Moisture = 18.99** **Density (g/cc) 1.737**

9-1B Methane

Methane Adsorption
(Imperial Units)

Summary of Analyses		
	As Received	DAF basis
Langmuir Volume (SCF)	53	95
Langmuir Pressure (PSIA)	497	497
Goodness of fit Langmuir Equation R-squared	0.99	0.99
Ash Content Wt.%	25.52	25.52
Equilibrium Moisture Wt.%	18.99	18.99

Contents of Appendix

data sheets	***Charts***
As Received	As Received
Dry Ash Free	Dry Ash Free
Dry Ash Included	Dry Ash Included
Moist Ash Free	Moist Ash Free

9-1B Methane

GAS ADSORPTION ISOTHERM IMPERIAL UNITS

AS RECEIVED BASIS

		Moisture Content % :	18.99
Isotherm Temperature º F:	107.6	Ash Content, % :	25.52
Gas used:	Methane	Helium Density g/cc	1.737

PRESSURE (PSI)	ADSORBED GAS (SCF/ton)	P / V
54	4.75	11.33
116	9.56	12.09
181	13.25	13.63
249	17.17	14.53
322	20.70	15.56
394	23.73	16.59
484	26.47	18.28
591	29.64	19.95
769	33.51	22.96
970	36.33	26.71
1180	37.35	31.60
1394	38.18	36.50
1668	39.30	42.44

Saturated Monolayer Volume (SCF/ton):	52.6
Langmuir Pressure (PSIA):	497.3
Correlation Coefficient:	0.9939

DRY ASH FREE BASIS

54	8.56	6.29
116	17.23	6.71
181	23.88	7.56
249	30.94	8.06
322	37.30	8.63
394	42.76	9.21
484	47.70	10.14
591	53.42	11.07
769	60.38	12.74
970	65.47	14.82
1180	67.30	17.54
1394	68.80	20.25
1668	70.82	23.55

Saturated Monolayer Volume (SCF/ton, daf):	95
Langmuir Pressure (PSIA):	497
Correlation Coefficient:	0.9939

9-1B Methane

GAS ADSORPTION ISOTHERM IMPERIAL UNITS

MOISTURE FREE ASH INCLUDED

		Moisture Content % :	18.99
Isotherm Temperature° F:	107.6	Ash Content, % :	25.52
Gas used:	Methane	Helium Density g/cc	1.737

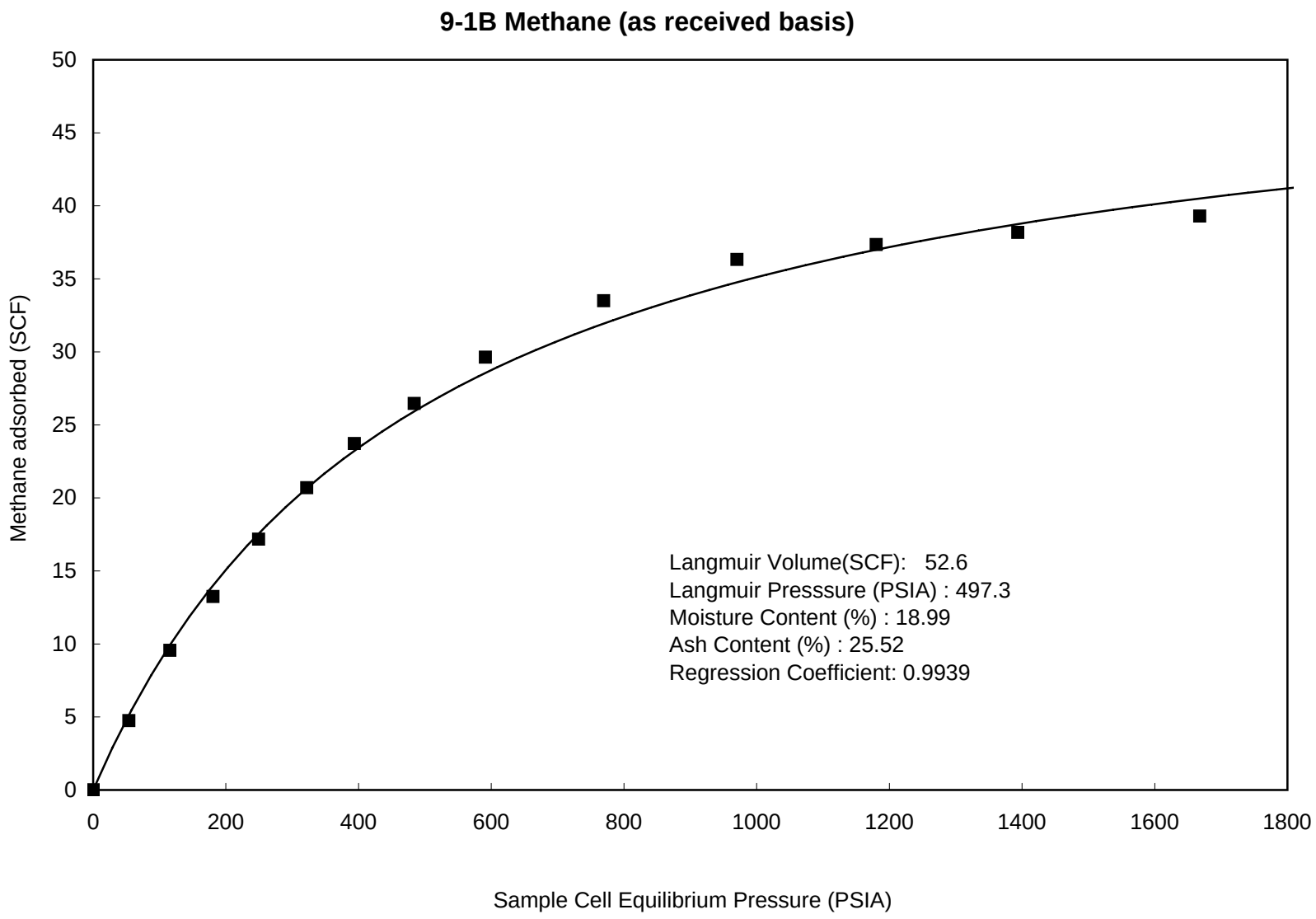
PRESSURE (PSI)	ADSORBED GAS (SCF/ton)	P / V
54	6	9.18
116	12	9.80
181	16	11.04
249	21	11.77
322	26	12.60
394	29	13.44
484	33	14.81
591	37	16.16
769	41	18.60
970	45	21.63
1180	46	25.60
1394	47	29.57
1668	49	34.38

Saturated Monolayer Volume (SCF/ton):	65
Langmuir Pressure (PSIA):	497
Correlation Coefficient:	0.9939

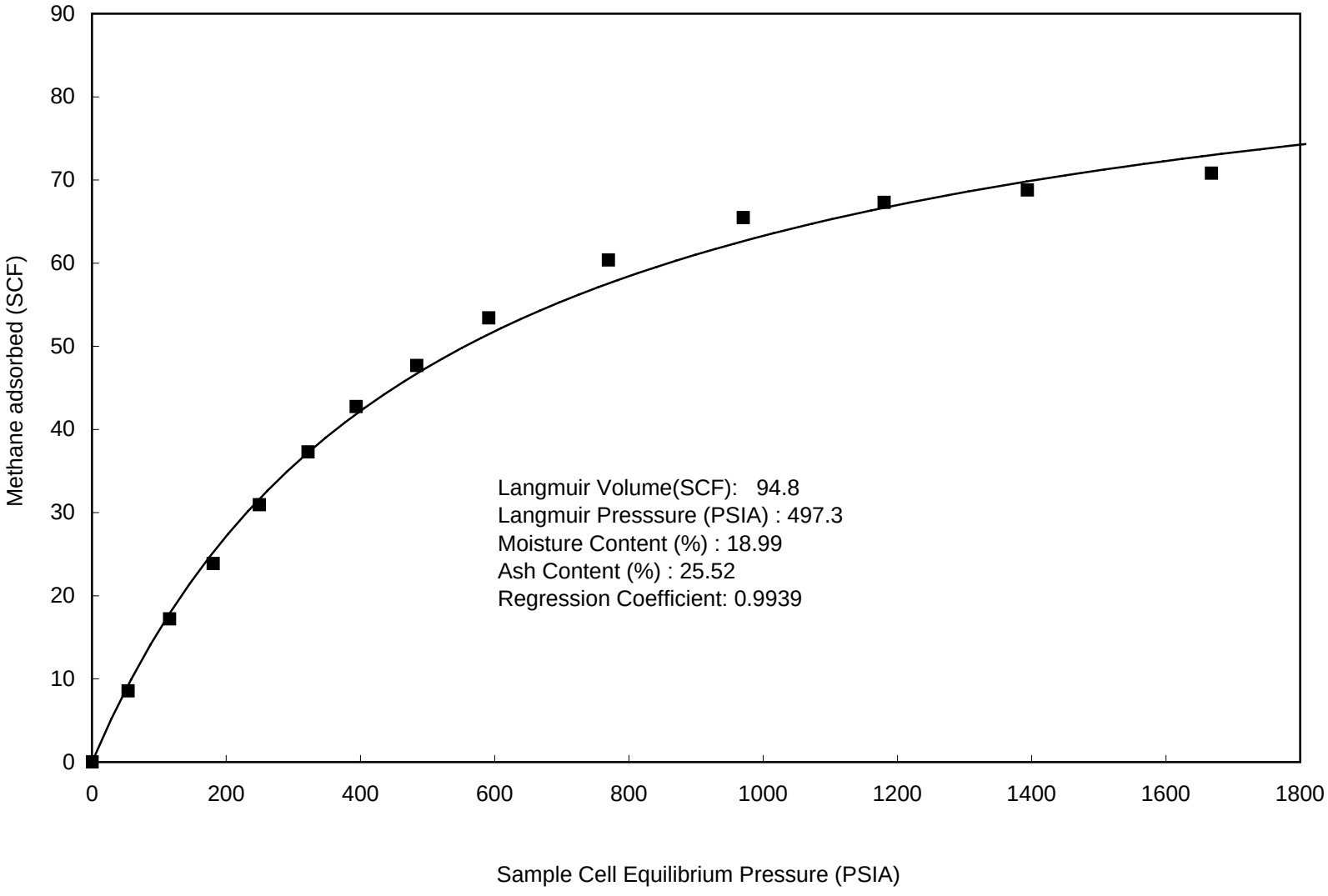
ASH FREE MOISTURE INCLUDED

54	6	8.44
116	13	9.01
181	18	10.15
249	23	10.82
322	28	11.59
394	32	12.36
484	36	13.62
591	40	14.86
769	45	17.10
970	49	19.89
1180	50	23.54
1394	51	27.19
1668	53	31.61

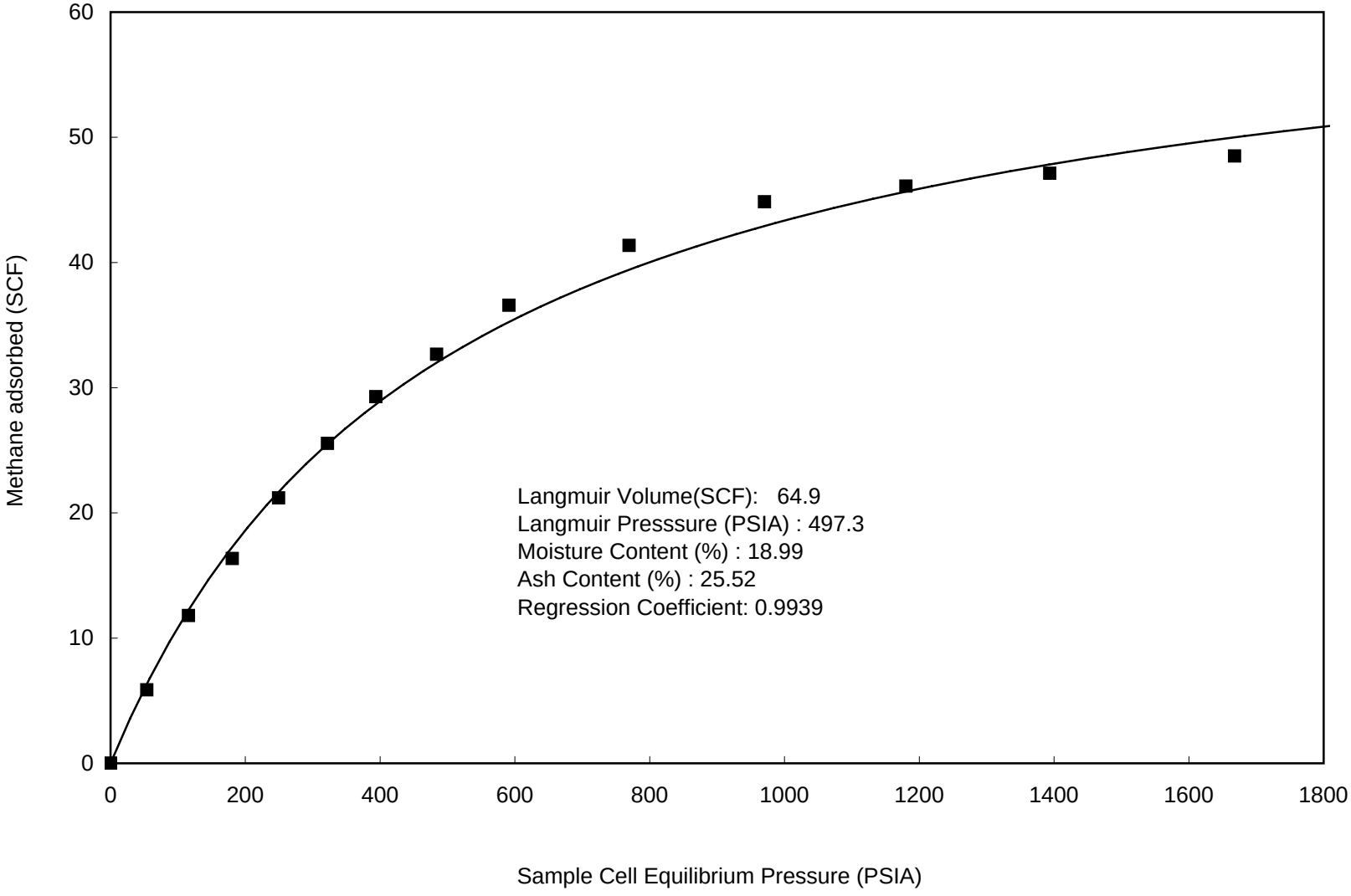
Saturated Monolayer Volume (SCF/ton):	71
Langmuir Pressure (PSIA):	497
Correlation Coefficient:	0.9939


9-1B Methane (as received basis)
Methane adsorbed (SCF)
Sample Cell Equilibrium Pressure (PSIA)
0
5
10
15
20
25
30
35
40
45
50
0
200
400
600
800
1000
1200
1400
1600
1800
Langmuir Volume(SCF): 52.6
Langmuir Presssure (PSIA) : 497.3
Moisture Content (%) : 18.99
Ash Content (%) : 25.52
Regression Coefficient: 0.9939

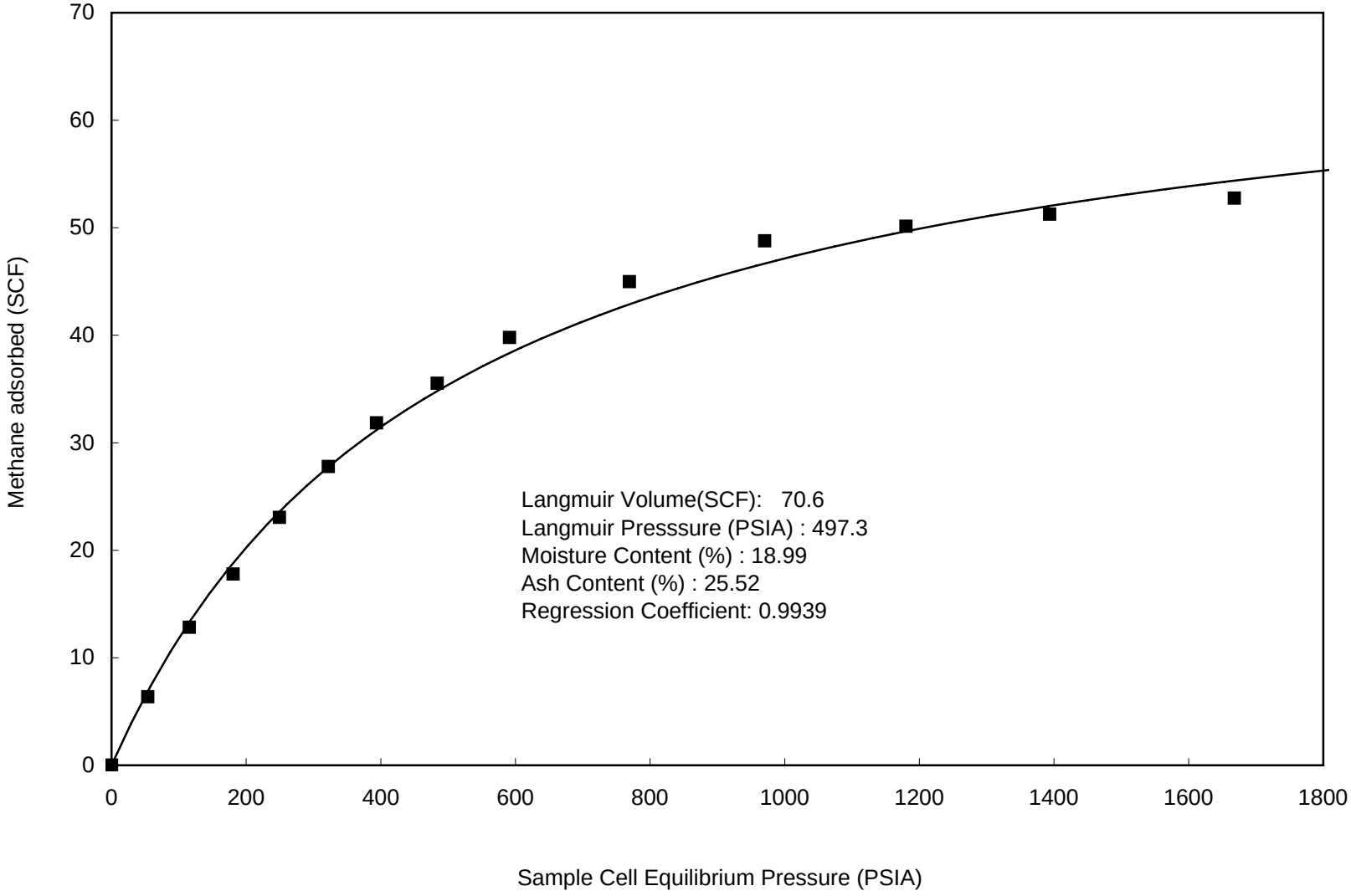
9-1B Methane (dry & ash free basis)

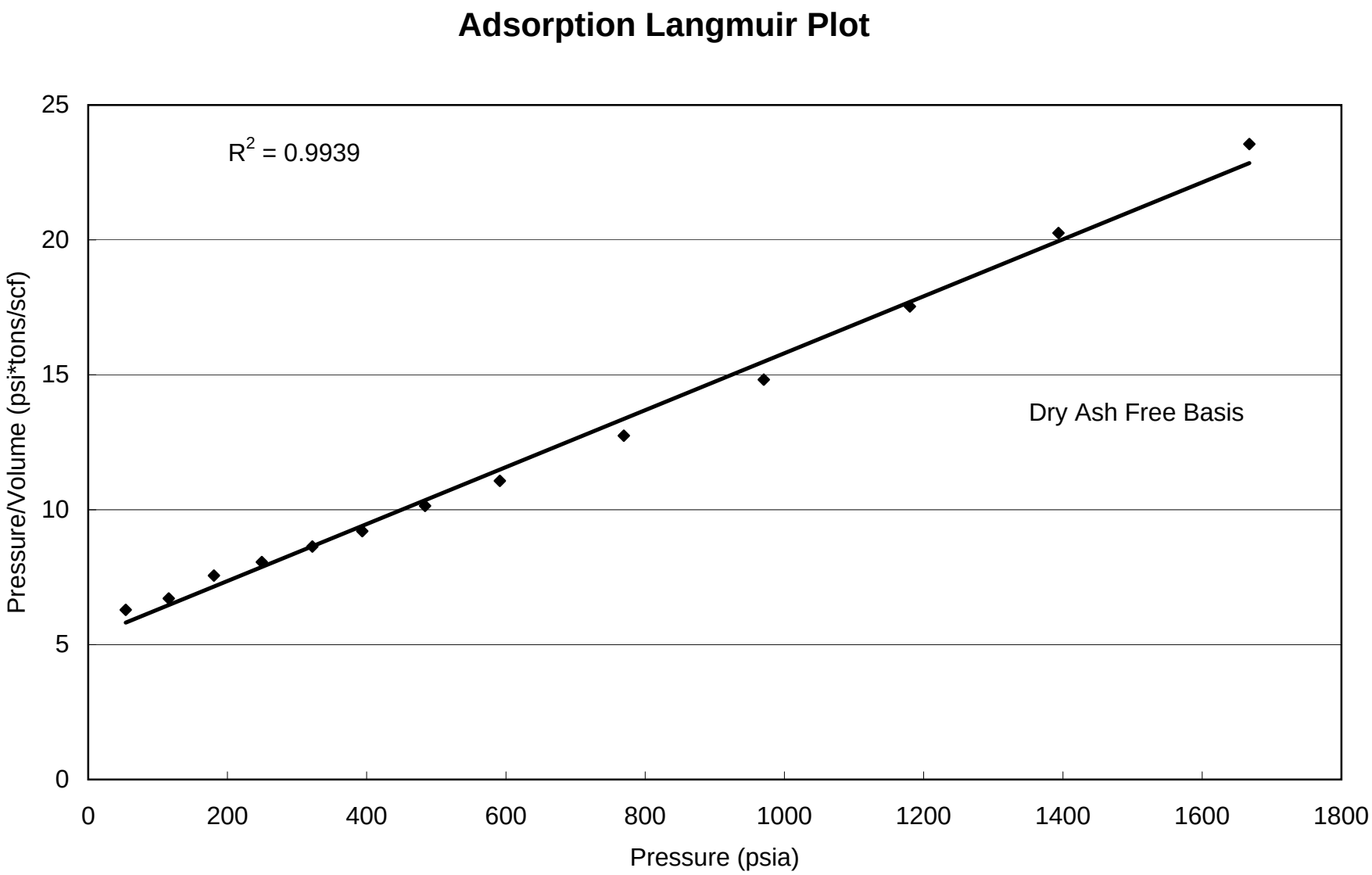


9-1B Methane (moisture free, ash included basis)



9-1B Methane (ash free, moisture included basis)




Adsorption Langmuir Plot
R2 = 0.9939
Dry Ash Free Basis
Pressure/Volume (psi*tons/scf)
Pressure (psia)
0
5
10
15
20
25
0
200
400
600
800
1000
1200
1400
1600
1800

9-1B Methane

Methane Adsorption (SI Units)

Summary of Analyses		
	As Received	DAF basis
Langmuir Volume cc/g	1.55	2.78
Langmuir Pressure MPa	3.43	3.43
Goodness of fit Langmuir Equation R-squared	0.99	0.99
Ash Content Wt.%	25.52	25.52
Equilibrium Moisture Wt.%	18.99	18.99

Contents of Appendix

data sheets	***Charts***
As Received	As Received
Dry Ash Free	Dry Ash Free
Dry Ash Included	Dry Ash Included
Moist Ash Free	Moist Ash Free

9-1B Methane

GAS ADSORPTION ISOTHERM SI UNITS

AS RECEIVED BASIS

Sample I.D. :	9-1B Methane	Moisture Content (EQ) % :	18.99
Isotherm Temperature º C:	42	Ash Content % :	25.52
Gas used:	Methane	Helium Density g/cc	1.737

PRESSURE (MPa)	ADSORBED GAS (cc/g @STP)	P / V
0.371	0.14	2.659
0.797	0.28	2.837
1.245	0.39	3.197
1.720	0.50	3.408
2.220	0.61	3.650
2.714	0.70	3.892
3.336	0.78	4.289
4.076	0.87	4.680
5.305	0.98	5.387
6.690	1.07	6.265
8.137	1.10	7.414
9.608	1.12	8.563
11.499	1.15	9.957

Saturated Monolayer Volume (cc/g @ STP):	1.55
Langmuir Pressure (MPa):	3.43

DRY ASH FREE BASIS

0.371	0.25	1.475
0.797	0.51	1.574
1.245	0.70	1.774
1.720	0.91	1.891
2.220	1.10	2.025
2.714	1.26	2.160
3.336	1.40	2.380
4.076	1.57	2.597
5.305	1.77	2.989
6.690	1.92	3.477
8.137	1.98	4.114
9.608	2.02	4.752
11.499	2.08	5.525

Saturated Monolayer Volume (cc/g @ STP, daf):	2.78
Langmuir Pressure (MPa):	3.43
Correlation Coefficient:	0.9939

9-1B Methane

GAS ADSORPTION ISOTHERM SI UNITS

MOISTURE FREE ASH INCLUDED

		Moisture Content (EQ) % :	18.99
Isotherm Temperature º C:	42	Ash Content % :	25.52
Gas used:	Methane	Helium Density g/cc	1.737

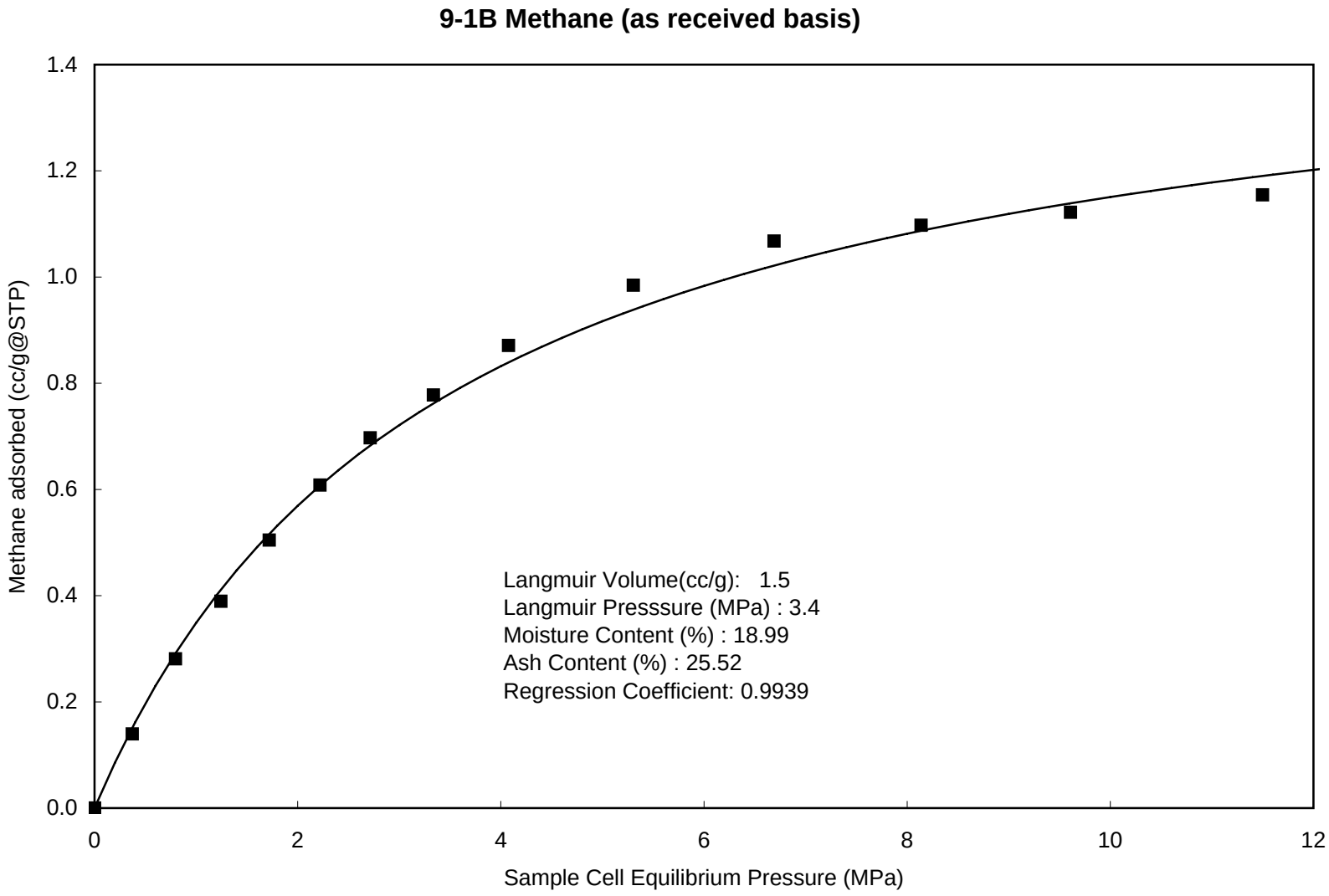
PRESSURE (MPa)	ADSORBED GAS (cc/g@STP)	P / V
0.371	0.17	2.15
0.797	0.35	2.30
1.245	0.48	2.59
1.720	0.62	2.76
2.220	0.75	2.96
2.714	0.86	3.15
3.336	0.96	3.47
4.076	1.08	3.79
5.305	1.22	4.36
6.690	1.32	5.08
8.137	1.35	6.01
9.608	1.39	6.94
11.499	1.43	8.07

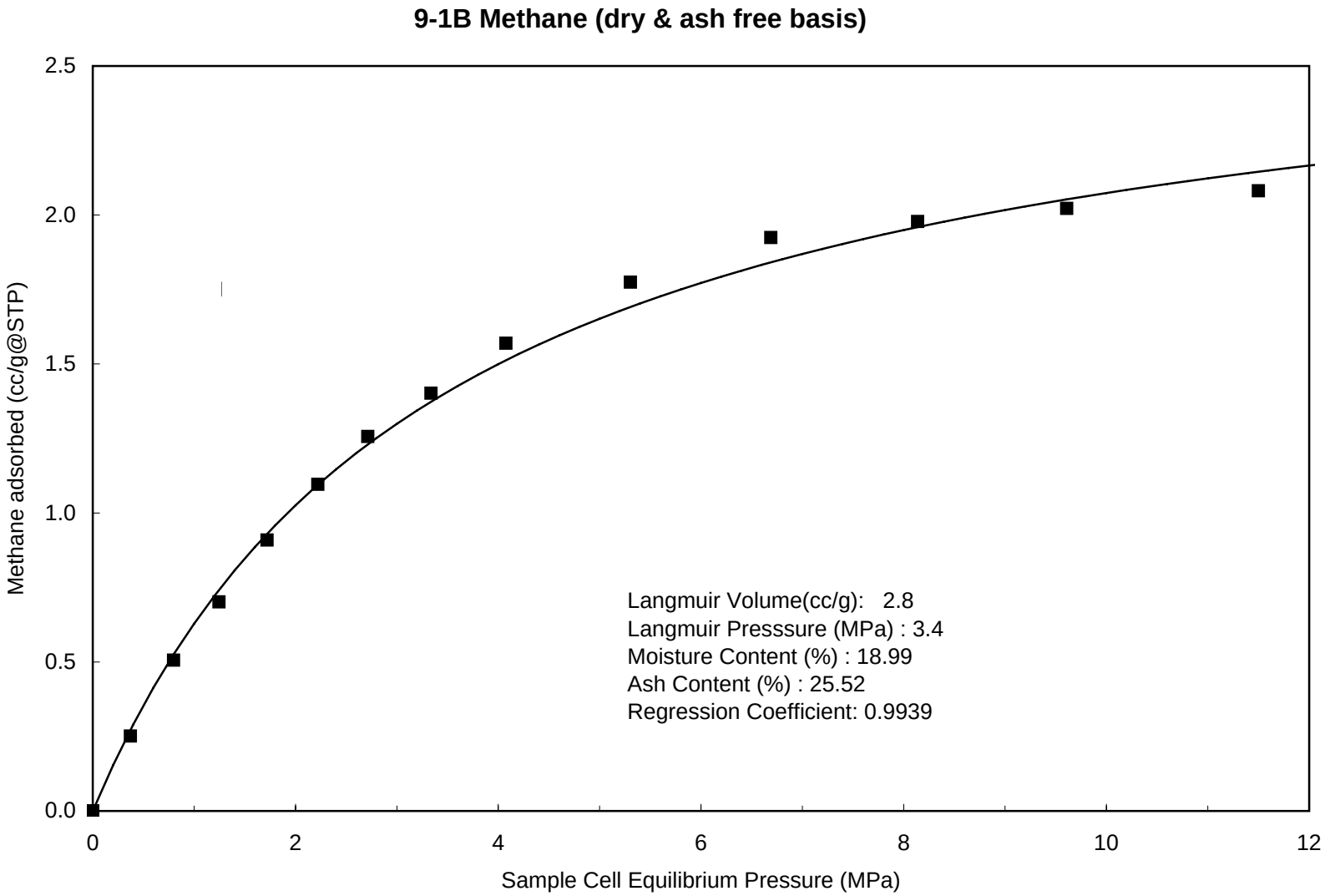
Saturated Monolayer Volume (cc/g):	1.91
Langmuir Pressure (MPa):	3.43

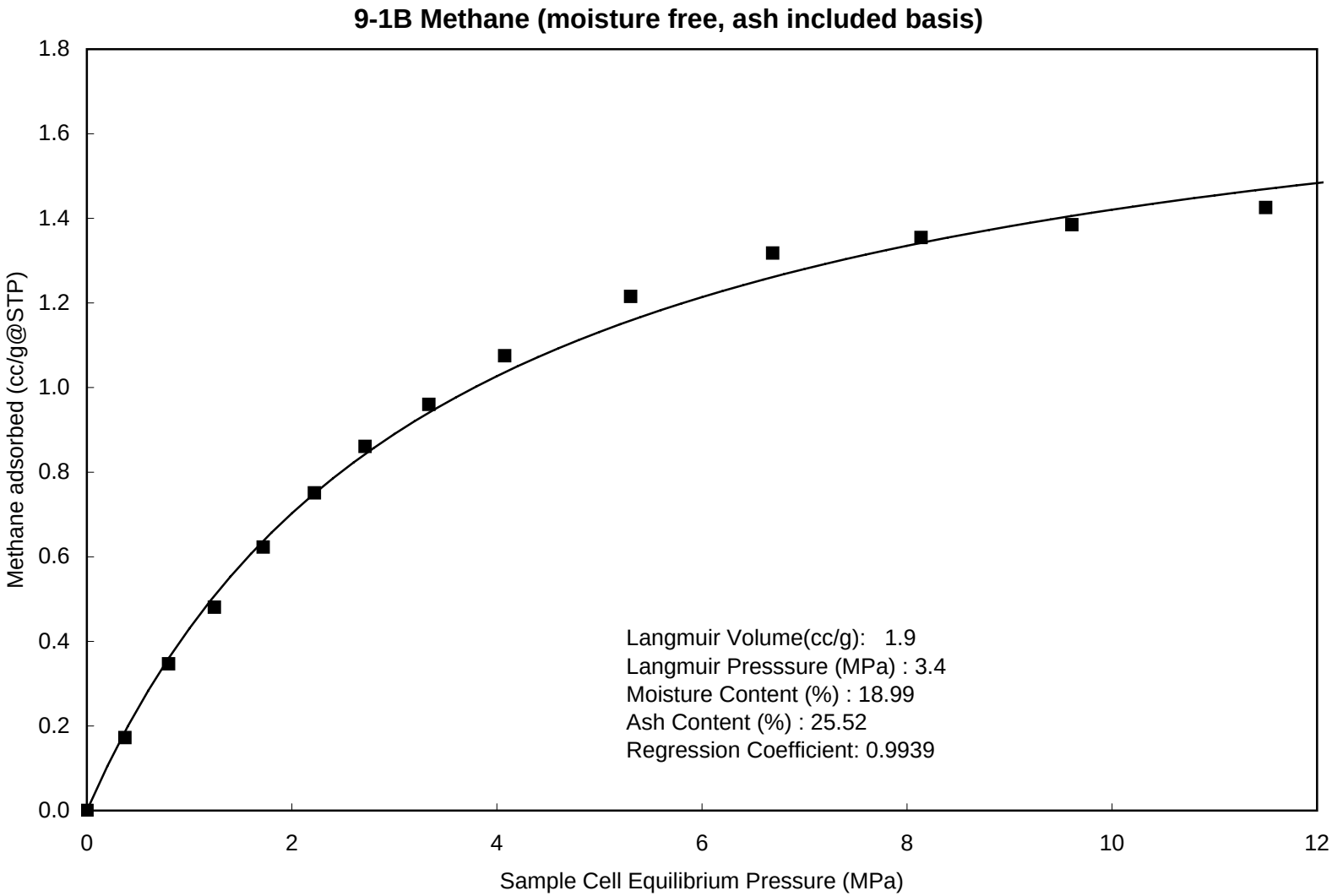
ASH FREE MOISTURE INCLUDED

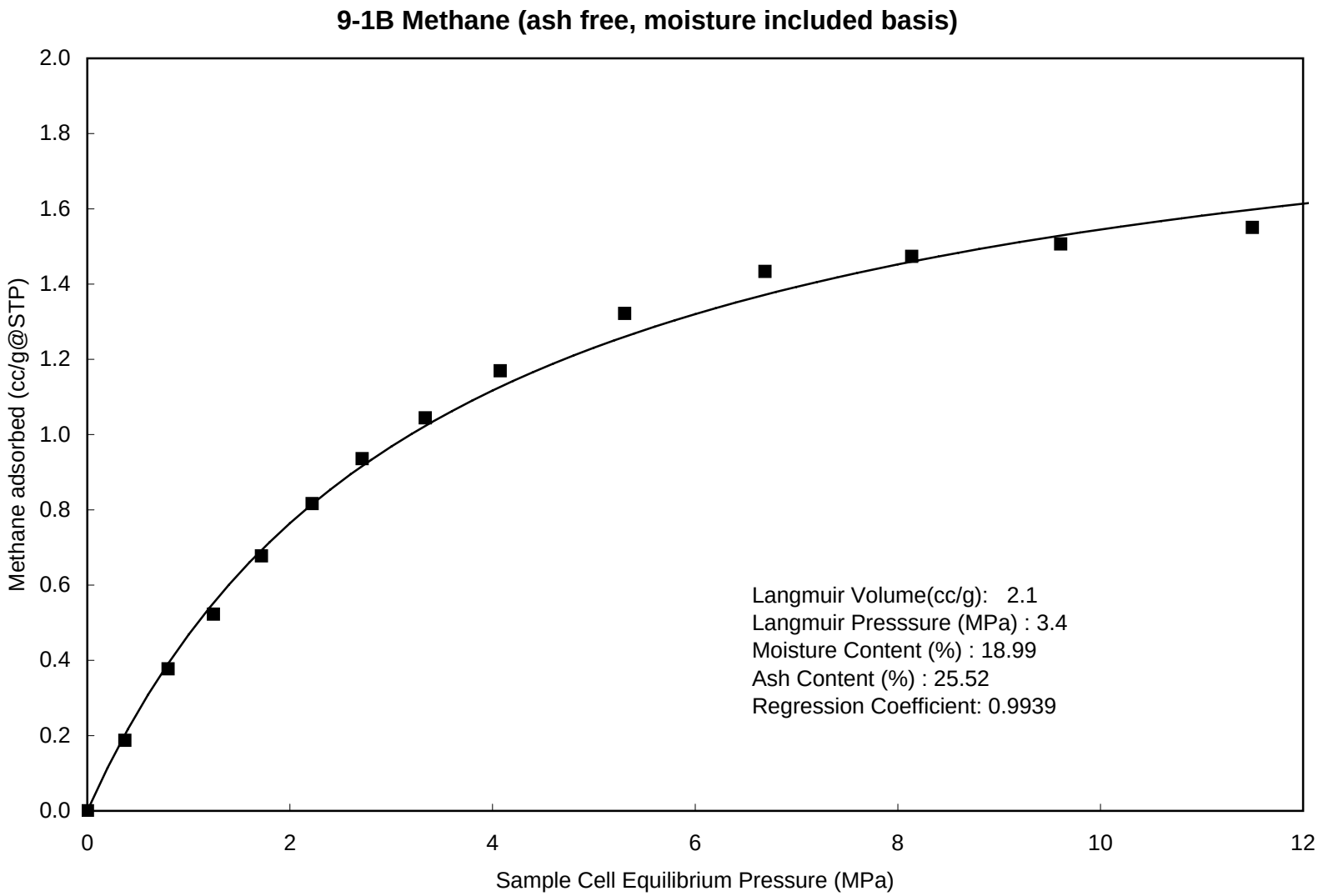
0.371	0.19	0.00
0.797	0.38	2.11
1.245	0.52	2.38
1.720	0.68	2.54
2.220	0.82	2.72
2.714	0.94	2.90
3.336	1.04	3.19
4.076	1.17	3.49
5.305	1.32	4.01
6.690	1.43	4.67
8.137	1.47	5.52
9.608	1.51	6.38
11.499	1.55	7.42

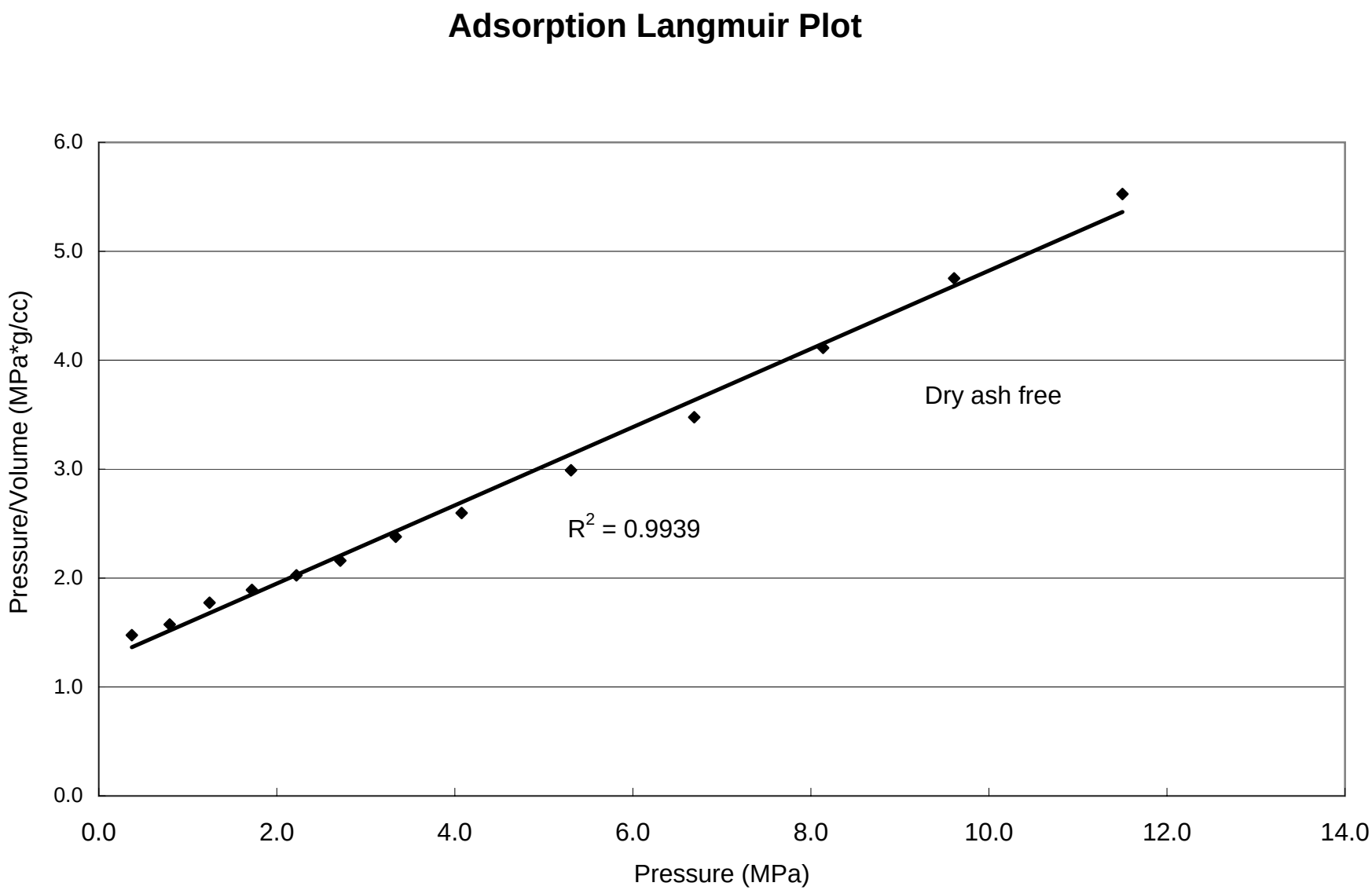
Saturated Monolayer Volume (cc/g, ash free):	2.07
Langmuir Pressure (MPa):	3.43
Correlation Coefficient:	0.9939


9-1B Methane (as received basis)
Methane adsorbed (cc/g@STP)
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
2
4
6
8
10
12
Sample Cell Equilibrium Pressure (MPa)
Langmuir Volume(cc/g): 1.5
Langmuir Presssure (MPa) : 3.4
Moisture Content (%) : 18.99
Ash Content (%) : 25.52
Regression Coefficient: 0.9939

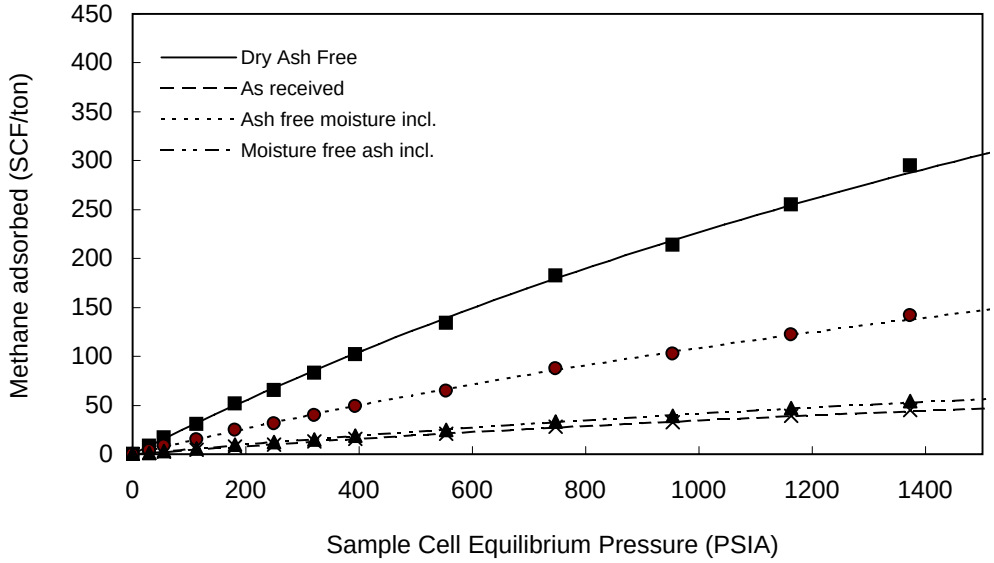

9-1B Methane (dry & ash free basis)
Methane adsorbed (cc/g@STP)
2.5
2.0
1.5
1.0
0.5
0.0
0
2
4
6
8
10
12
Sample Cell Equilibrium Pressure (MPa)
Langmuir Volume(cc/g): 2.8
Langmuir Presssure (MPa) : 3.4
Moisture Content (%) : 18.99
Ash Content (%) : 25.52
Regression Coefficient: 0.9939


9-1B Methane (moisture free, ash included basis)
Methane adsorbed (cc/g@STP)
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
2
4
6
8
10
12
Sample Cell Equilibrium Pressure (MPa)
Langmuir Volume(cc/g): 1.9
Langmuir Presssure (MPa) : 3.4
Moisture Content (%) : 18.99
Ash Content (%) : 25.52
Regression Coefficient: 0.9939


9-1B Methane (ash free, moisture included basis)
Methane adsorbed (cc/g@STP)
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
2
4
6
8
10
12
Sample Cell Equilibrium Pressure (MPa)
Langmuir Volume(cc/g): 2.1
Langmuir Presssure (MPa) : 3.4
Moisture Content (%) : 18.99
Ash Content (%) : 25.52
Regression Coefficient: 0.9939


Adsorption Langmuir Plot
Pressure/Volume (MPa*g/cc)
6.0
5.0
4.0
3.0
2.0
1.0
0.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
Pressure (MPa)
Dry ash free
R2 = 0.9939

4-LA-8 Methane



Pressure (PSIA)	Adsorbed gas (ft^3 /ton)			
	As Received	moisture free ash incl.	ash free moisture incl.	Dry Ash Free
29	1.3	1.6	4.1	8.6
56	2.6	3.2	8.2	17.2
113	4.8	5.7	14.9	31.0
180	7.9	9.5	24.8	51.7
250	10.1	12.1	31.5	65.7
320	12.8	15.3	39.9	83.1
393	15.7	18.8	49.1	102.2
553	20.6	24.8	64.5	134.3
747	28.0	33.6	87.5	182.2
954	32.9	39.4	102.7	214.0
1162	39.1	47.0	122.3	254.8
1372	45.3	54.4	141.6	295.0

Langmuir Parameters

	As Received	Moisture free ash incl	Ash free moisture incl	Dry Ash Free
Vol. (ft^3 /ton)	157.4	188.8	491.8	1024.6
Pressure (PSIA)	3517.5	3517.5	3517.5	3517.5

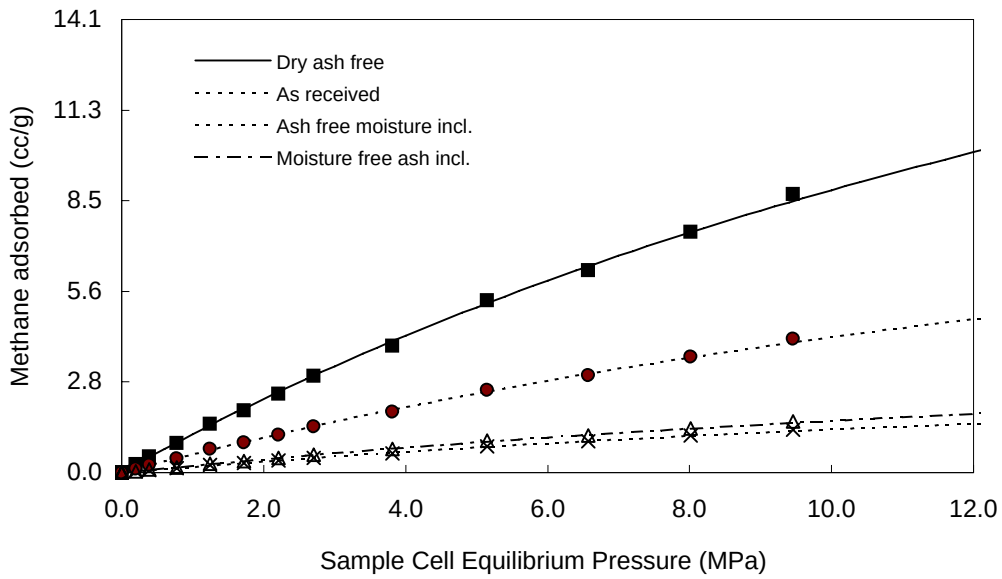
SUMMARY OF ADSORPTION ANALYSES IMP. UNITS

Isotherm Temperature: 107.8 ºF

Goodness of fit of Langmuir regression: 0.93

% Ash= 68.00 % Moisture= 16.64 Density g/cc 2.107

4-LA-8 Methane



Pressure (MPa)	Adsorbed gas (cc/g)			
	As Received	Moisture free ash incl.	ash free moisture incl	Dry Ash Free
0.203	0.04	0.05	0.12	0.25
0.385	0.08	0.09	0.24	0.51
0.777	0.14	0.17	0.44	0.91
1.243	0.23	0.28	0.73	1.52
1.725	0.30	0.36	0.93	1.93
2.210	0.38	0.45	1.17	2.44
2.708	0.46	0.55	1.44	3.00
3.816	0.61	0.73	1.90	3.95
5.151	0.82	0.99	2.57	5.36
6.575	0.97	1.16	3.02	6.29
8.012	1.15	1.38	3.59	7.49
9.461	1.33	1.60	4.16	8.67

Langmuir Parameters

	As Received	Moisture free ash incl.	Ash free moisture incl	Dry Ash Free
Vol. (cc/g)	4.63	5.55	14.45	30.11
Pressure (MPa)	24.25	24.25	24.25	24.25

SUMMARY OF ADSORPTION ANALYSES SI UNITS

Isotherm Temperature: **42.1 ºC**

Goodness of fit of Langmuir regression: **0.93**

% Ash= 68.00 **% Moisture = 16.64** **Density (g/cc) 2.107**

4-LA-8 Methane

Methane Adsorption
(Imperial Units)

Summary of Analyses		
	As Received	DAF basis
Langmuir Volume (SCF)	157	1025
Langmuir Pressure (PSIA)	3518	3518
Goodness of fit Langmuir Equation R-squared	0.93	0.93
Ash Content Wt.%	68.00	68.00
Equilibrium Moisture Wt.%	16.64	16.64

Contents of Appendix

data sheets	***Charts***
As Received	As Received
Dry Ash Free	Dry Ash Free
Dry Ash Included	Dry Ash Included
Moist Ash Free	Moist Ash Free

4-LA-8 Methane

GAS ADSORPTION ISOTHERM IMPERIAL UNITS

AS RECEIVED BASIS

		Moisture Content % :	16.64
Isotherm Temperature º F:	107.8	Ash Content, % :	68.00
Gas used:	Methane	Helium Density g/cc	2.107

PRESSURE (PSI)	ADSORBED GAS (SCF/ton)	P / V
29	1.32	22.30
56	2.64	21.13
113	4.77	23.63
180	7.94	22.70
250	10.09	24.78
320	12.76	25.11
393	15.70	25.03
553	20.63	26.82
747	27.99	26.69
954	32.87	29.02
1162	39.14	29.69
1372	45.31	30.28

Saturated Monolayer Volume (SCF/ton):	157.4
Langmuir Pressure (PSIA):	3517.5
Correlation Coefficient:	0.9300

DRY ASH FREE BASIS

29	8.59	3.42
56	17.19	3.25
113	31.03	3.63
180	51.70	3.49
250	65.72	3.81
320	83.10	3.86
393	102.19	3.84
553	134.34	4.12
747	182.21	4.10
954	213.97	4.46
1162	254.82	4.56
1372	295.02	4.65

Saturated Monolayer Volume (SCF/ton, daf):	1025
Langmuir Pressure (PSIA):	3518
Correlation Coefficient:	0.9300

4-LA-8 Methane

GAS ADSORPTION ISOTHERM IMPERIAL UNITS

MOISTURE FREE ASH INCLUDED

		Moisture Content % :	16.64
Isotherm Temperature° F:	107.8	Ash Content, % :	68.00
Gas used:	Methane	Helium Density g/cc	2.107

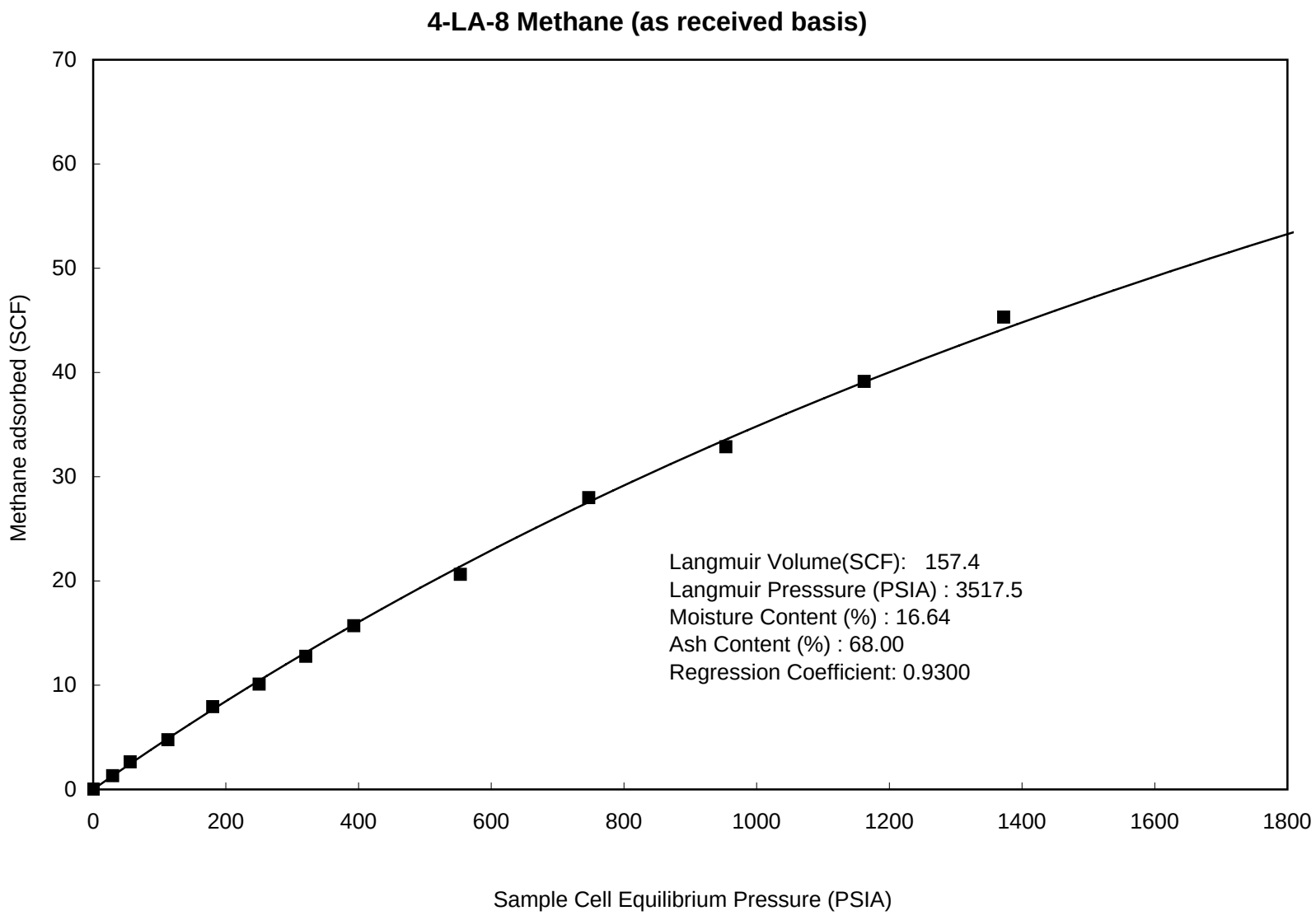
PRESSURE (PSI)	ADSORBED GAS (SCF/ton)	P / V
29	2	18.59
56	3	17.61
113	6	19.70
180	10	18.92
250	12	20.66
320	15	20.93
393	19	20.86
553	25	22.36
747	34	22.25
954	39	24.19
1162	47	24.75
1372	54	25.24

Saturated Monolayer Volume (SCF/ton):	189
Langmuir Pressure (PSIA):	3518
Correlation Coefficient:	0.9300

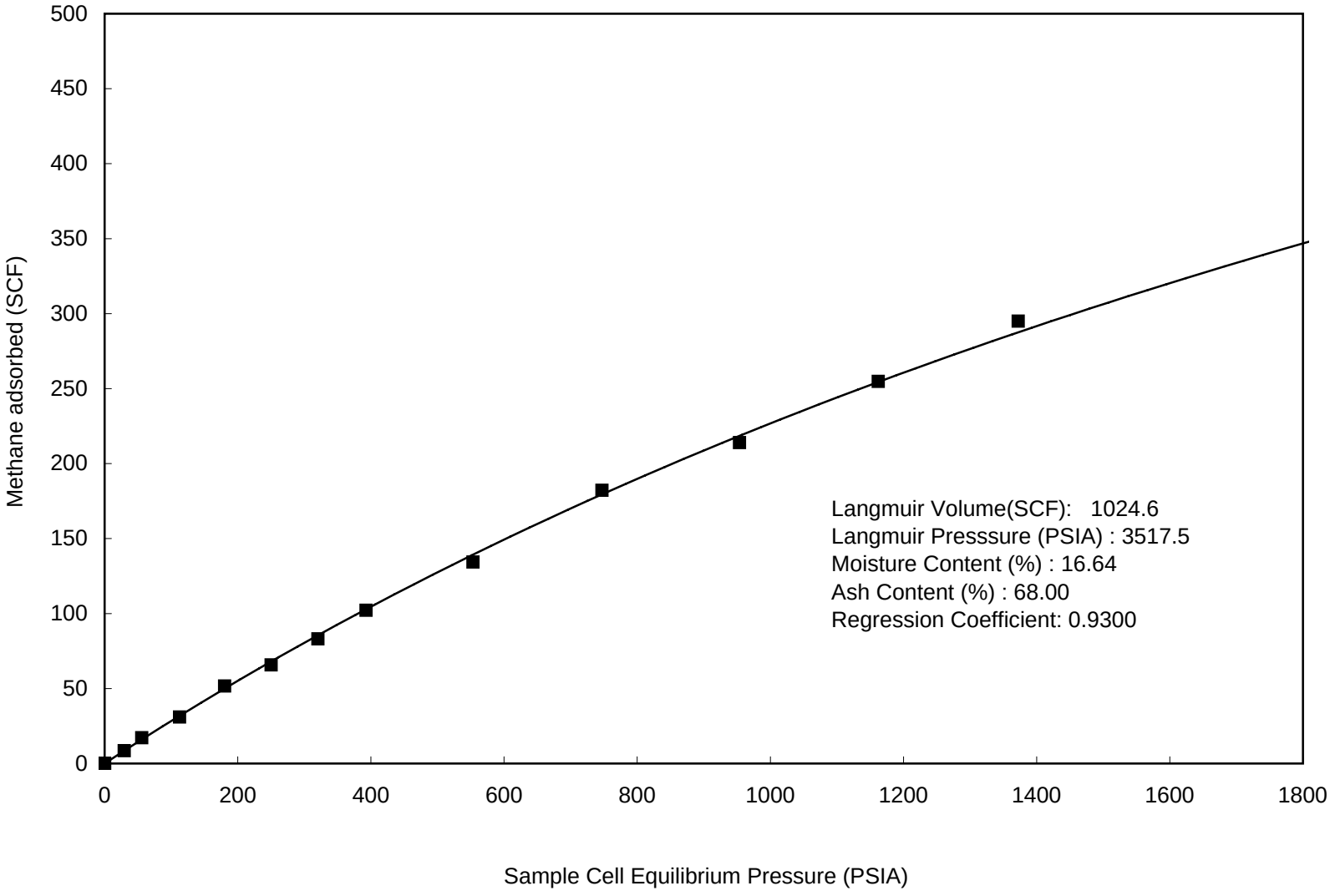
ASH FREE MOISTURE INCLUDED

29	4	7.14
56	8	6.76
113	15	7.56
180	25	7.26
250	32	7.93
320	40	8.03
393	49	8.01
553	64	8.58
747	87	8.54
954	103	9.29
1162	122	9.50
1372	142	9.69

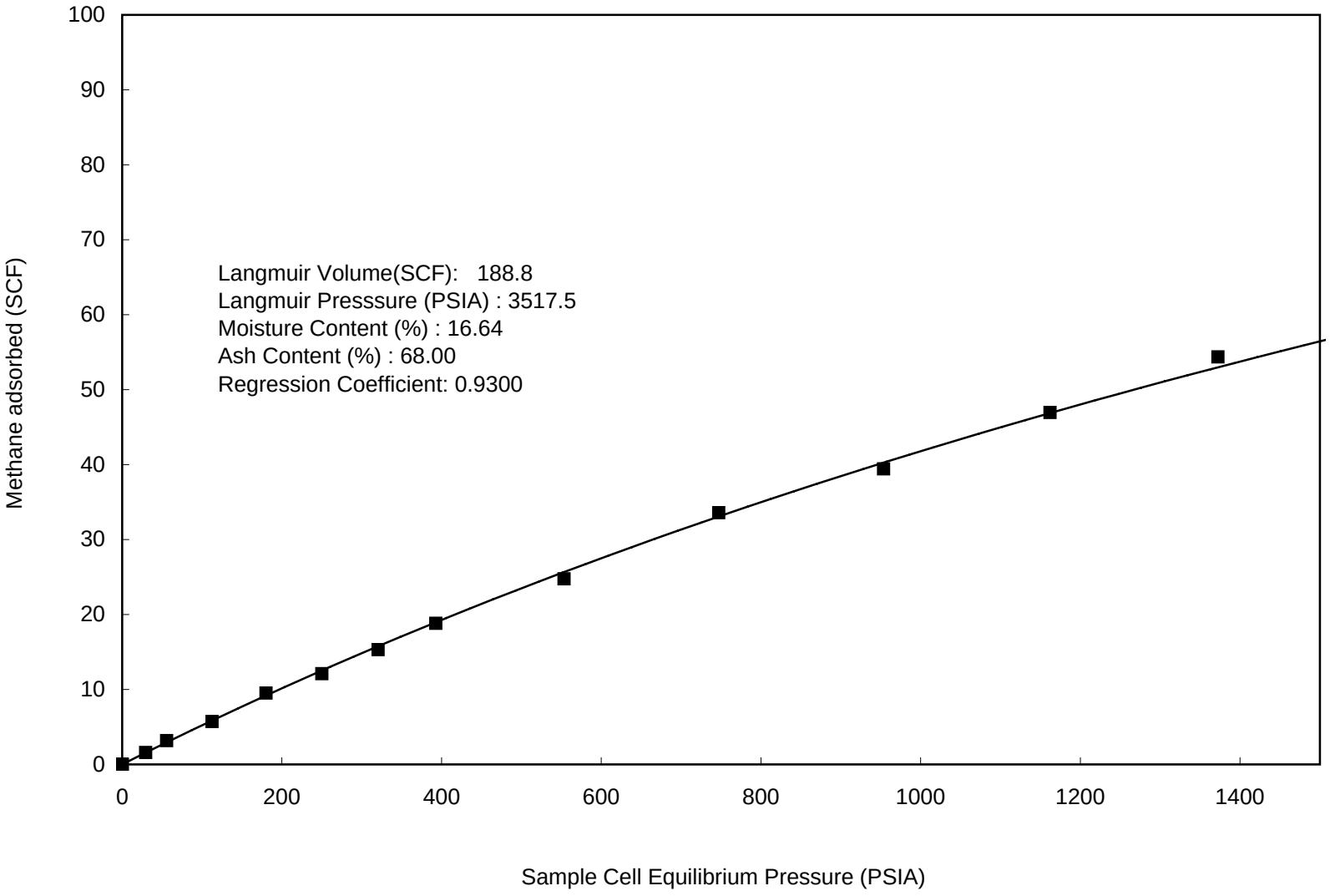
Saturated Monolayer Volume (SCF/ton):	492
Langmuir Pressure (PSIA):	3518
Correlation Coefficient:	0.9300


4-LA-8 Methane (as received basis)
Methane adsorbed (SCF)
Sample Cell Equilibrium Pressure (PSIA)
0
10
20
30
40
50
60
70
0
200
400
600
800
1000
1200
1400
1600
1800
Langmuir Volume(SCF): 157.4
Langmuir Presssure (PSIA) : 3517.5
Moisture Content (%) : 16.64
Ash Content (%) : 68.00
Regression Coefficient: 0.9300

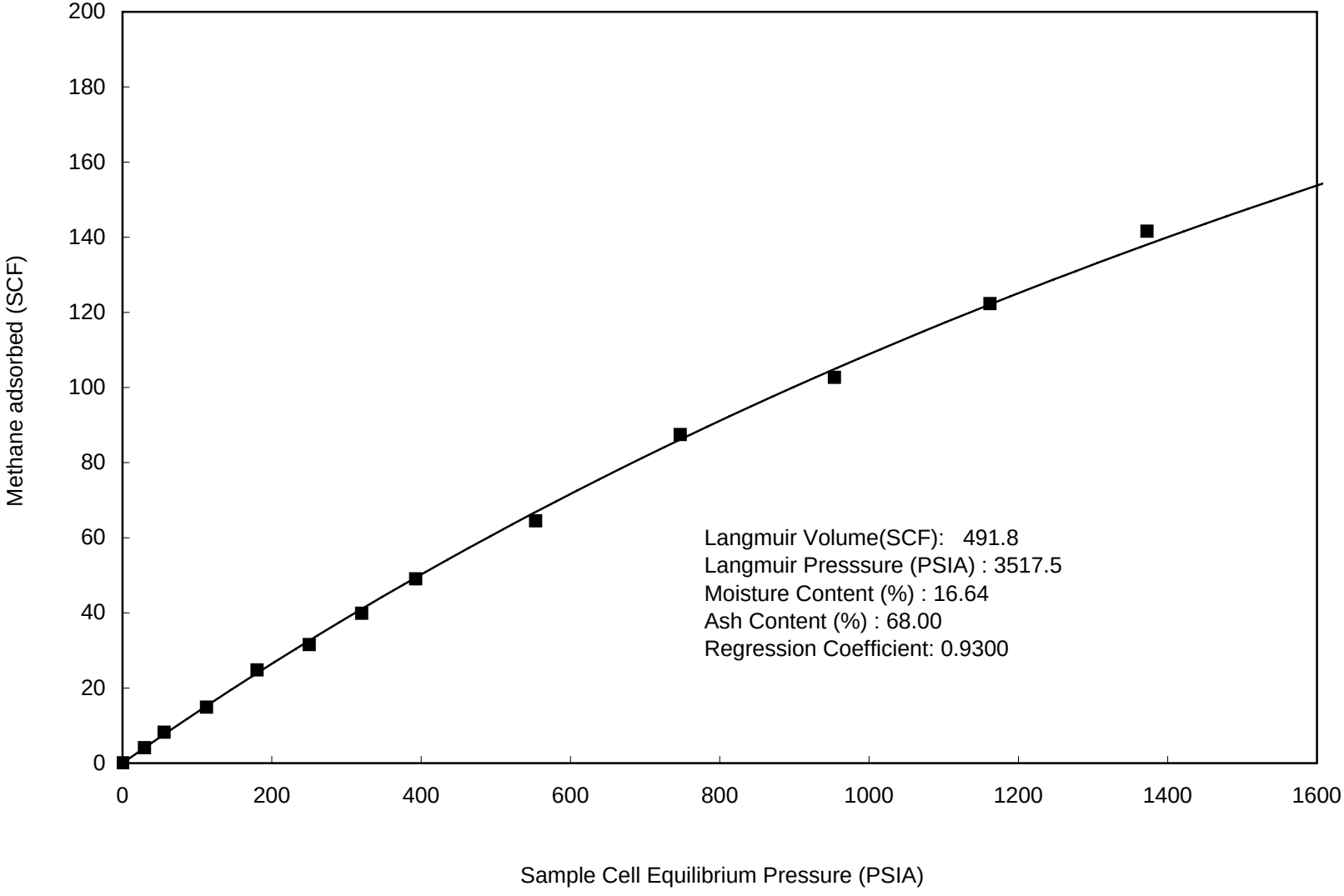
4-LA-8 Methane (dry & ash free basis)

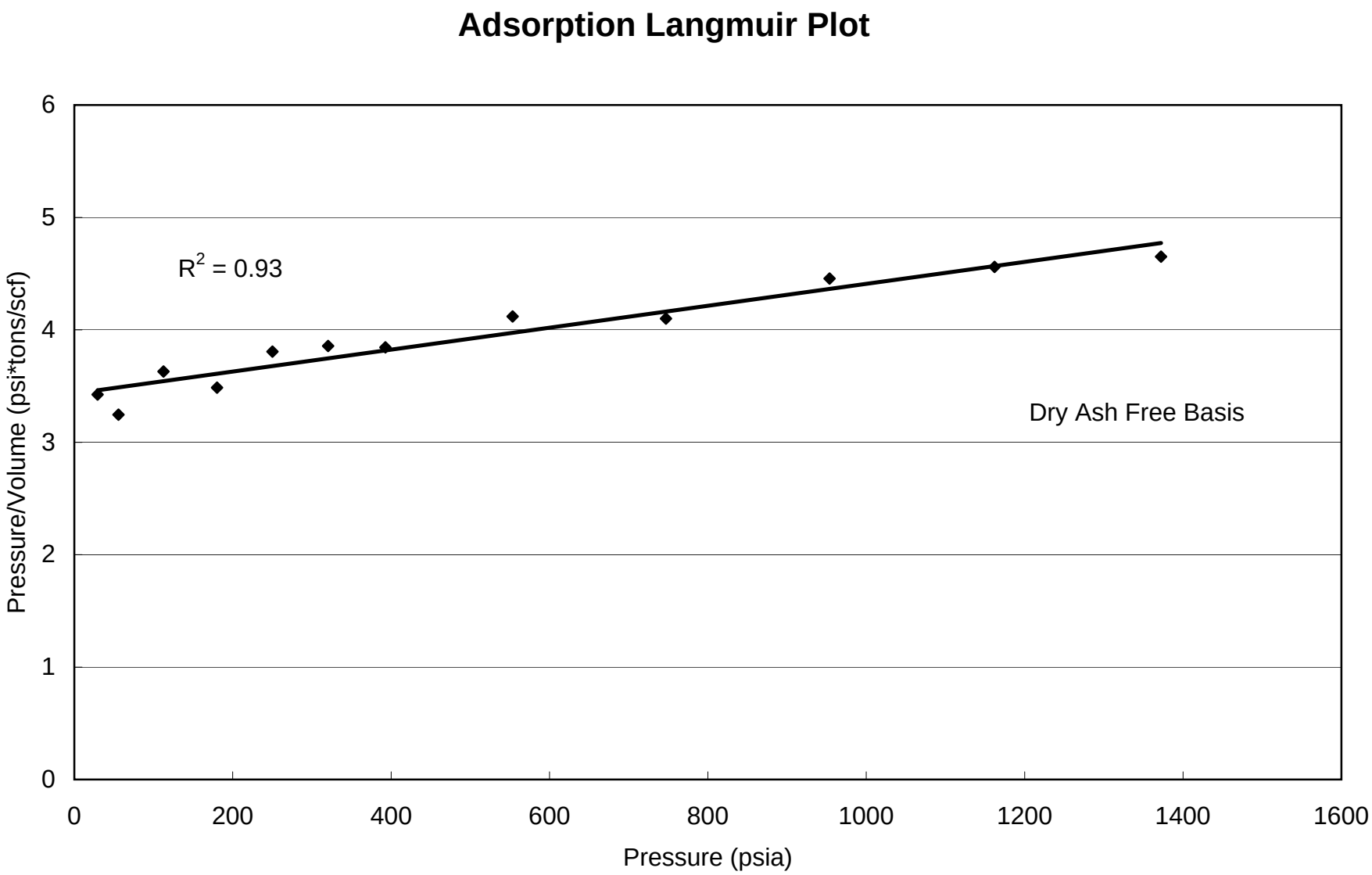


4-LA-8 Methane (moisture free, ash included basis)



4-LA-8 Methane (ash free, moisture included basis)




Adsorption Langmuir Plot
6
5
4
3
2
1
0
Pressure/Volume (psi*tons/scf)
R2 = 0.93
Dry Ash Free Basis
0
200
400
600
800
1000
1200
1400
1600
Pressure (psia)

4-LA-8 Methane

Methane Adsorption (SI Units)

Summary of Analyses		
	As Received	DAF basis
Langmuir Volume cc/g	4.63	30.11
Langmuir Pressure MPa	24.25	24.25
Goodness of fit Langmuir Equation R-squared	0.93	0.93
Ash Content Wt.%	68.00	68.00
Equilibrium Moisture Wt.%	16.64	16.64

Contents of Appendix

data sheets	***Charts***
As Received	As Received
Dry Ash Free	Dry Ash Free
Dry Ash Included	Dry Ash Included
Moist Ash Free	Moist Ash Free

4-LA-8 Methane

GAS ADSORPTION ISOTHERM SI UNITS

AS RECEIVED BASIS

Sample I.D. :	4-LA-8 Methane	Moisture Content (EQ) % :	16.64
Isotherm Temperature º C:	42.1	Ash Content % :	68.00
Gas used:	Methane	Helium Density g/cc	2.107

PRESSURE (MPa)	ADSORBED GAS (cc/g @STP)	P / V
0.203	0.04	5.231
0.385	0.08	4.957
0.777	0.14	5.544
1.243	0.23	5.324
1.725	0.30	5.814
2.210	0.38	5.890
2.708	0.46	5.871
3.816	0.61	6.292
5.151	0.82	6.262
6.575	0.97	6.807
8.012	1.15	6.965
9.461	1.33	7.105

Saturated Monolayer Volume (cc/g @ STP):	4.63
Langmuir Pressure (MPa):	24.25

DRY ASH FREE BASIS

0.203	0.25	0.804
0.385	0.51	0.761
0.777	0.91	0.852
1.243	1.52	0.818
1.725	1.93	0.893
2.210	2.44	0.905
2.708	3.00	0.902
3.816	3.95	0.966
5.151	5.36	0.962
6.575	6.29	1.046
8.012	7.49	1.070
9.461	8.67	1.091

Saturated Monolayer Volume (cc/g @ STP, daf):	30.11
Langmuir Pressure (MPa):	24.25
Correlation Coefficient:	0.9300

4-LA-8 Methane

GAS ADSORPTION ISOTHERM SI UNITS

MOISTURE FREE ASH INCLUDED

		Moisture Content (EQ) % :	16.64
Isotherm Temperature º C:	42.1	Ash Content % :	68.00
Gas used:	Methane	Helium Density g/cc	2.107

PRESSURE (MPa)	ADSORBED GAS (cc/g@STP)	P / V
0.203	0.05	4.36
0.385	0.09	4.13
0.777	0.17	4.62
1.243	0.28	4.44
1.725	0.36	4.85
2.210	0.45	4.91
2.708	0.55	4.89
3.816	0.73	5.25
5.151	0.99	5.22
6.575	1.16	5.67
8.012	1.38	5.81
9.461	1.60	5.92

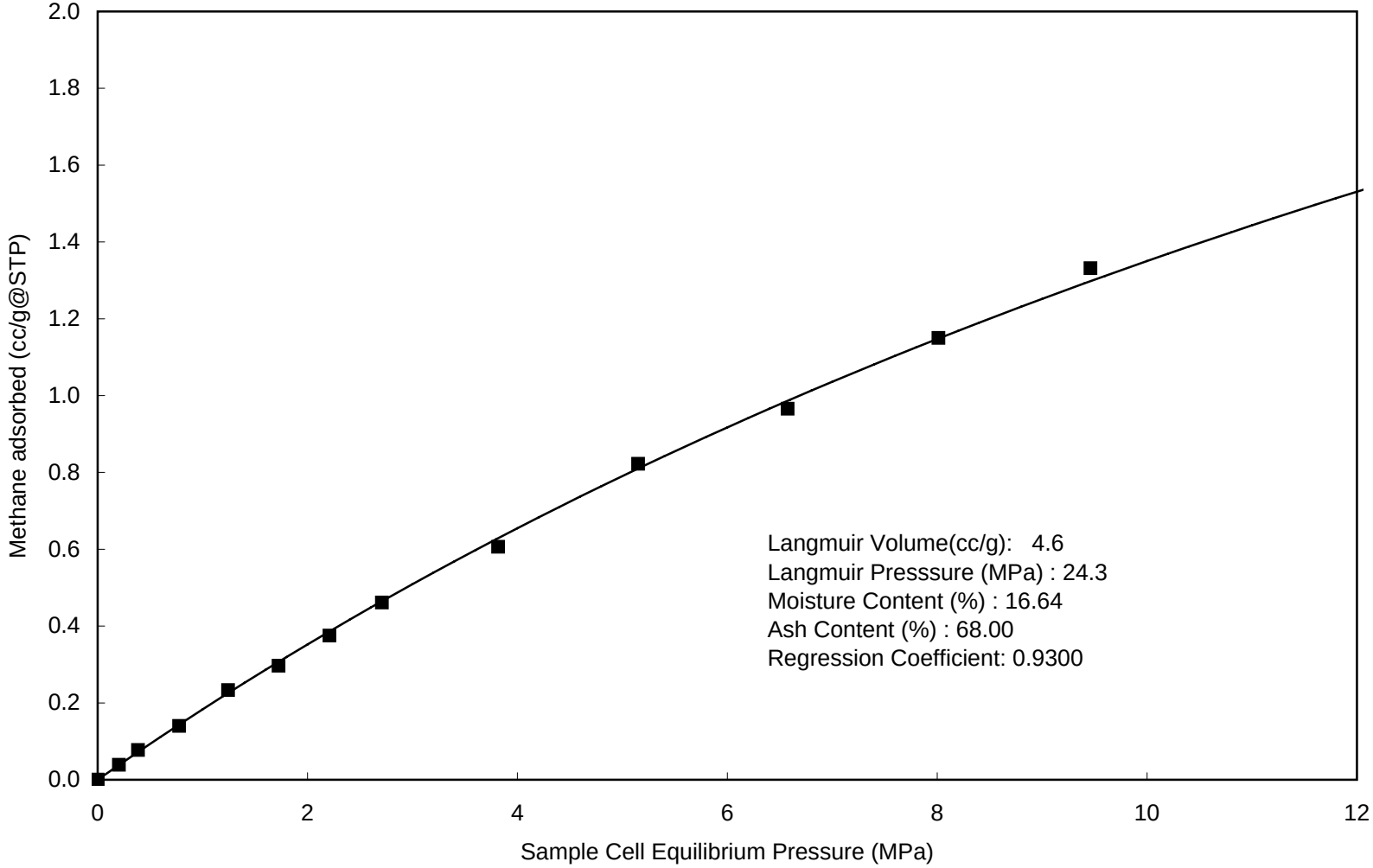
Saturated Monolayer Volume (cc/g):	5.55
Langmuir Pressure (MPa):	24.25

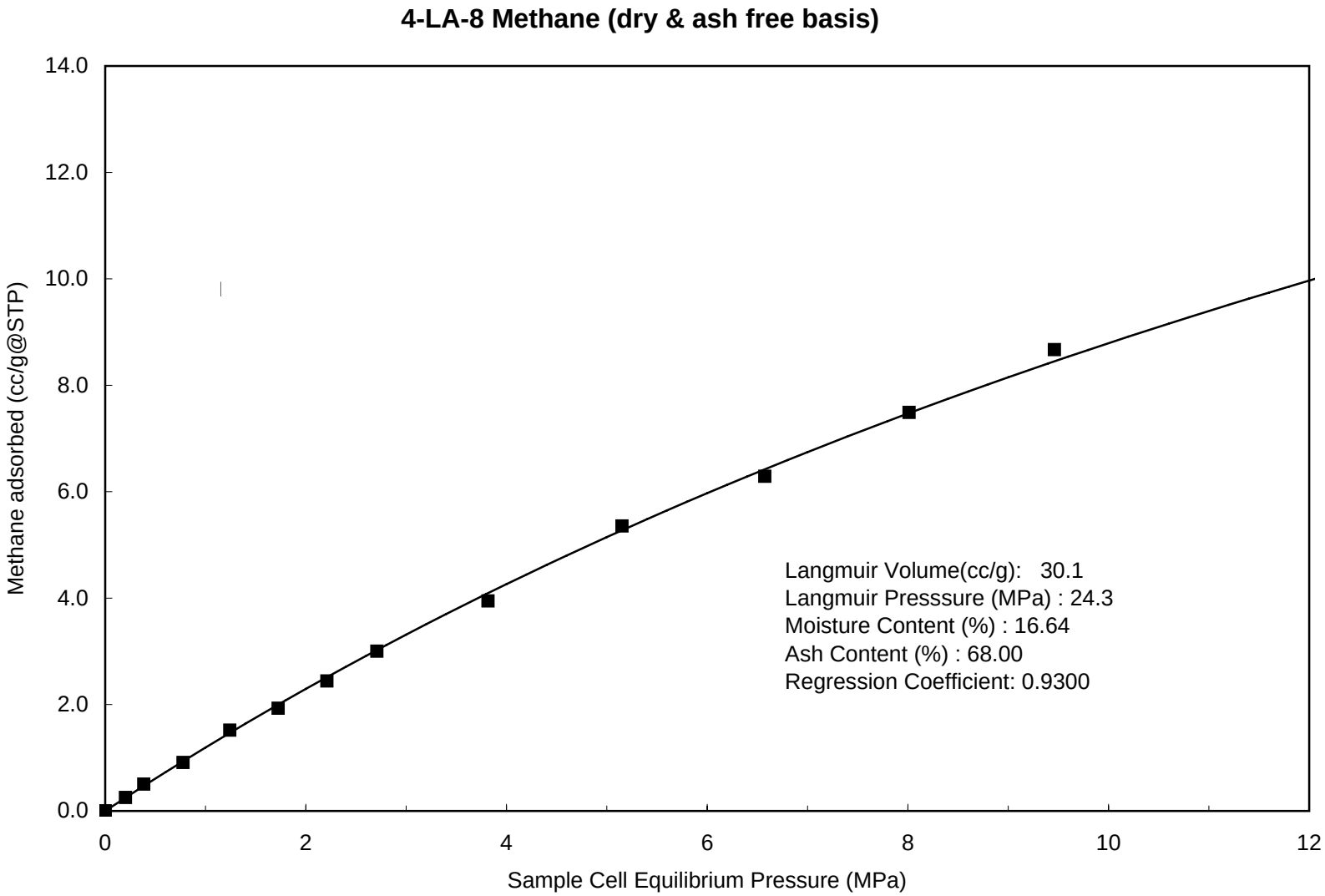
ASH FREE MOISTURE INCLUDED

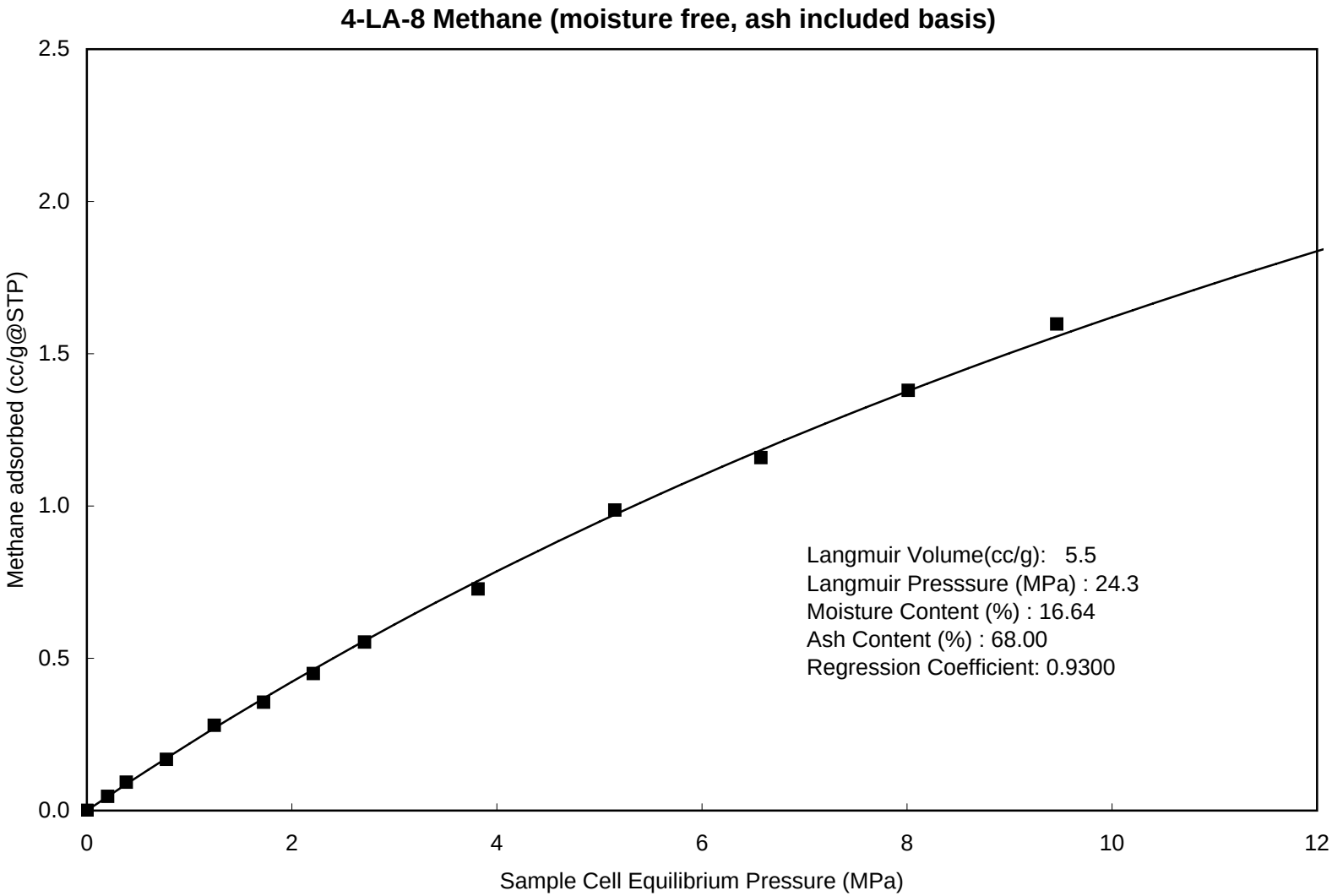
0.203	0.12	0.00
0.385	0.24	1.59
0.777	0.44	1.77
1.243	0.73	1.70
1.725	0.93	1.86
2.210	1.17	1.88
2.708	1.44	1.88
3.816	1.90	2.01
5.151	2.57	2.00
6.575	3.02	2.18
8.012	3.59	2.23
9.461	4.16	2.27

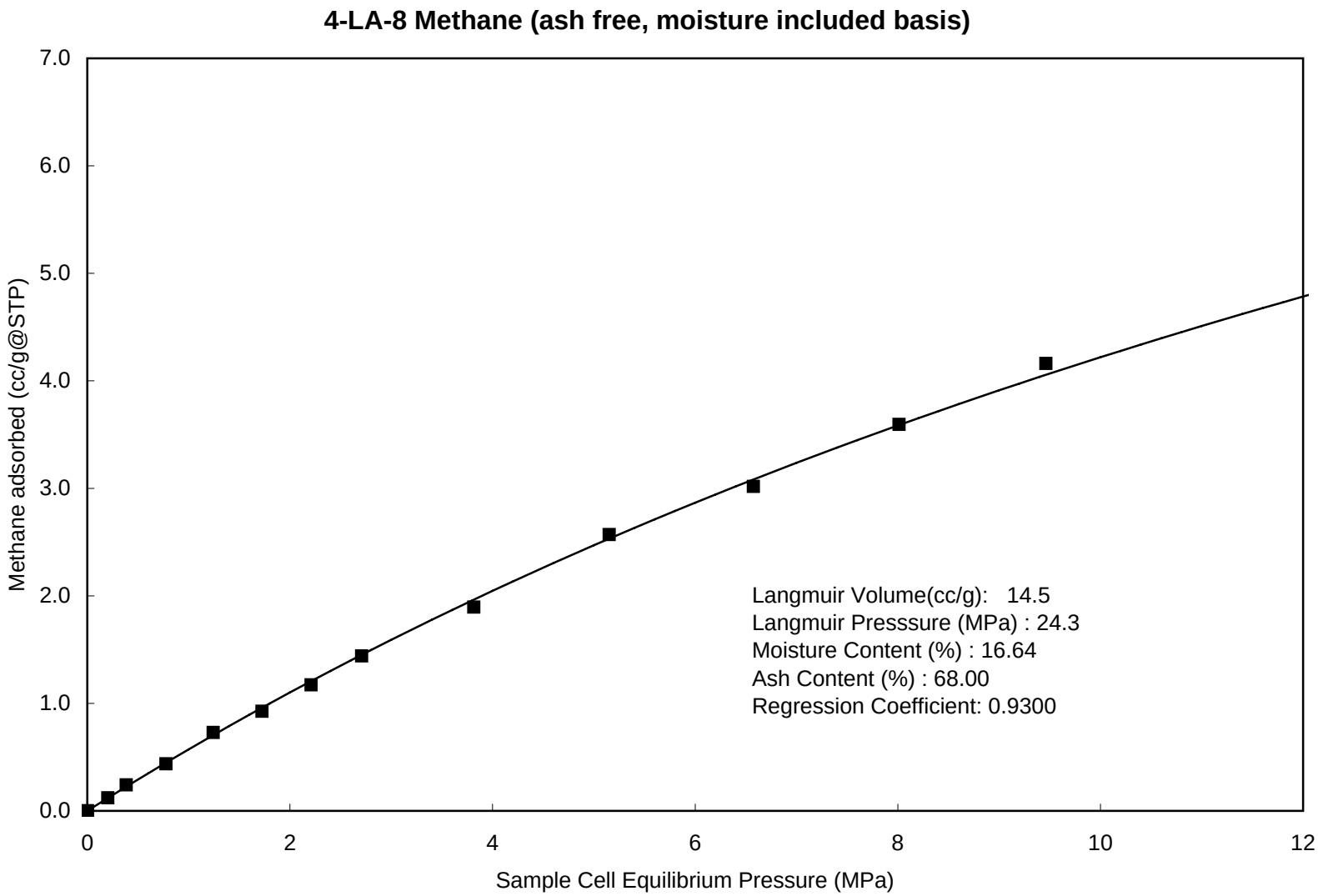
Saturated Monolayer Volume (cc/g, ash free):	14.45
Langmuir Pressure (MPa):	24.25
Correlation Coefficient:	0.9300

4-LA-8 Methane (as received basis)

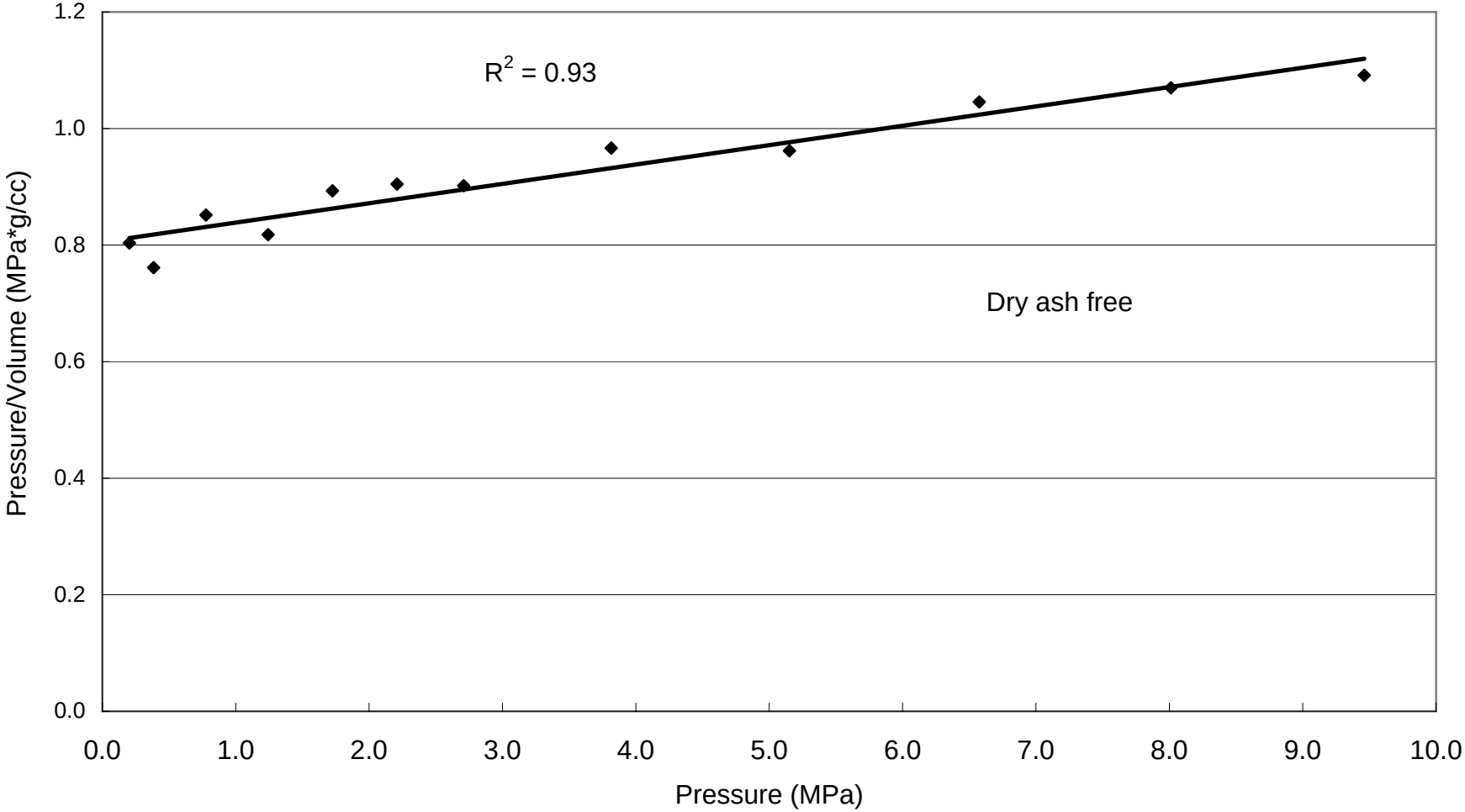



4-LA-8 Methane (dry & ash free basis)
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Methane adsorbed (cc/g@STP)
0
2
4
6
8
10
12
Sample Cell Equilibrium Pressure (MPa)
Langmuir Volume(cc/g): 30.1
Langmuir Presssure (MPa) : 24.3
Moisture Content (%) : 16.64
Ash Content (%) : 68.00
Regression Coefficient: 0.9300

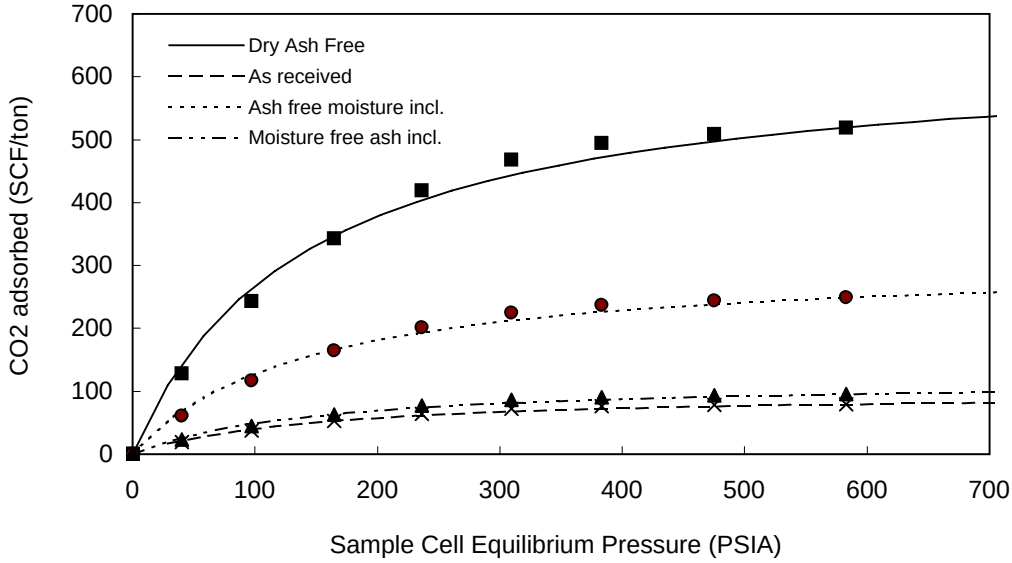

4-LA-8 Methane (moisture free, ash included basis)
Methane adsorbed (cc/g@STP)
2.5
2.0
1.5
1.0
0.5
0.0
0
2
4
6
8
10
12
Sample Cell Equilibrium Pressure (MPa)
Langmuir Volume(cc/g): 5.5
Langmuir Presssure (MPa) : 24.3
Moisture Content (%) : 16.64
Ash Content (%) : 68.00
Regression Coefficient: 0.9300


4-LA-8 Methane (ash free, moisture included basis)
Methane adsorbed (cc/g@STP)
Sample Cell Equilibrium Pressure (MPa)
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
0
2
4
6
8
10
12
Langmuir Volume(cc/g): 14.5
Langmuir Presssure (MPa) : 24.3
Moisture Content (%) : 16.64
Ash Content (%) : 68.00
Regression Coefficient: 0.9300

Adsorption Langmuir Plot



4-LA-8 Carbon Dioxide



Pressure (PSIA)	Adsorbed gas (ft^3 /ton)			
	As Received	moisture free ash incl.	ash free moisture incl.	Dry Ash Free
40	19.7	23.6	61.5	128.1
97	37.3	44.8	116.7	243.1
164	52.6	63.1	164.5	342.7
236	64.4	77.3	201.4	419.6
309	71.8	86.1	224.4	467.5
383	75.9	91.0	237.1	494.0
475	78.1	93.7	244.0	508.4
583	79.6	95.5	248.9	518.5
767	81.2	97.4	253.7	528.6

Langmuir Parameters

	As Received	Moisture free ash incl	Ash free moisture incl	Dry Ash Free
Vol. (ft^3 /ton)	99.2	118.9	309.8	645.5
Pressure (PSIA)	141.3	141.3	141.3	141.3

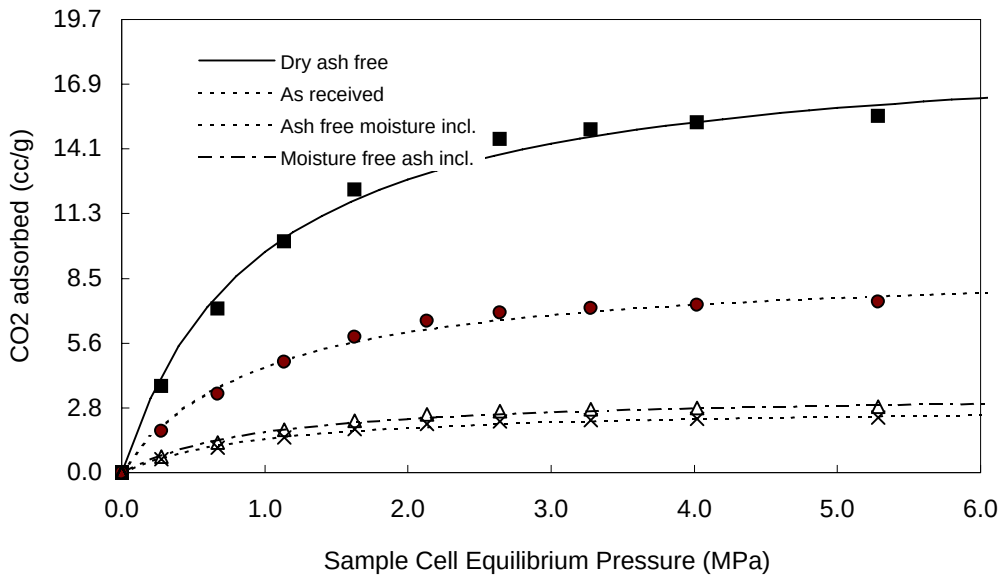
SUMMARY OF ADSORPTION ANALYSES IMP. UNITS

Isotherm Temperature: 107.8 ºF

Goodness of fit of Langmuir regression: 0.99

% Ash= 68.00 % Moisture= 16.64 Density g/cc 2.107

4-LA-8 Carbon Dioxide



Pressure (MPa)	Adsorbed gas (cc/g)			
	As Received	Moisture free ash incl.	ash free moisture incl	Dry Ash Free
0.278	0.58	0.69	1.81	3.76
0.669	1.10	1.32	3.43	7.15
1.134	1.55	1.86	4.83	10.07
1.628	1.89	2.27	5.92	12.33
2.134	2.11	2.53	6.60	13.74
2.643	2.23	2.67	6.97	14.52
3.276	2.29	2.75	7.17	14.94
4.020	2.34	2.81	7.31	15.24
5.287	2.39	2.86	7.46	15.53

Langmuir Parameters

	As Received	Moisture free ash incl.	Ash free moisture incl	Dry Ash Free
Vol. (cc/g)	2.91	3.50	9.11	18.97
Pressure (MPa)	0.97	0.97	0.97	0.97

SUMMARY OF ADSORPTION ANALYSES SI UNITS

Isotherm Temperature: **42.1 ºC**

Goodness of fit of Langmuir regression: **0.99**

% Ash= 68.00 **% Moisture = 16.64** **Density (g/cc) 2.107**

4-LA-8 Carbon Dioxide

CO2 Adsorption (Imperial Units)

Summary of Analyses		
	As Received	DAF basis
Langmuir Volume (SCF)	99	646
Langmuir Pressure (PSIA)	141	141
Goodness of fit Langmuir Equation R-squared	0.99	0.99
Ash Content Wt.%	68.00	68.00
Equilibrium Moisture Wt.%	16.64	16.64

Contents of Appendix

data sheets	***Charts***
As Received	As Received
Dry Ash Free	Dry Ash Free
Dry Ash Included	Dry Ash Included
Moist Ash Free	Moist Ash Free

4-LA-8 Carbon Dioxide

GAS ADSORPTION ISOTHERM IMPERIAL UNITS

AS RECEIVED BASIS

		Moisture Content % :	16.64
Isotherm Temperature º F:	107.8	Ash Content, % :	68.00
Gas used:	CO2	Helium Density g/cc	2.107

PRESSURE (PSI)	ADSORBED GAS (SCF/ton)	P / V
40	19.68	2.05
97	37.35	2.60
164	52.63	3.12
236	64.44	3.66
309	71.81	4.31
383	75.87	5.05
475	78.09	6.08
583	79.65	7.32
767	81.19	9.44

Saturated Monolayer Volume (SCF/ton):	99.2
Langmuir Pressure (PSIA):	141.3
Correlation Coefficient:	0.9931

DRY ASH FREE BASIS

40	128.11	0.31
97	243.14	0.40
164	342.65	0.48
236	419.56	0.56
309	467.54	0.66
383	493.98	0.78
475	508.40	0.93
583	518.53	1.12
767	528.59	1.45

Saturated Monolayer Volume (SCF/ton, daf):	646
Langmuir Pressure (PSIA):	141
Correlation Coefficient:	0.9931

4-LA-8 Carbon Dioxide

GAS ADSORPTION ISOTHERM IMPERIAL UNITS

MOISTURE FREE ASH INCLUDED

		Moisture Content % :	16.64
Isotherm Temperature° F:	107.8	Ash Content, % :	68.00
Gas used:	CO2	Helium Density g/cc	2.107

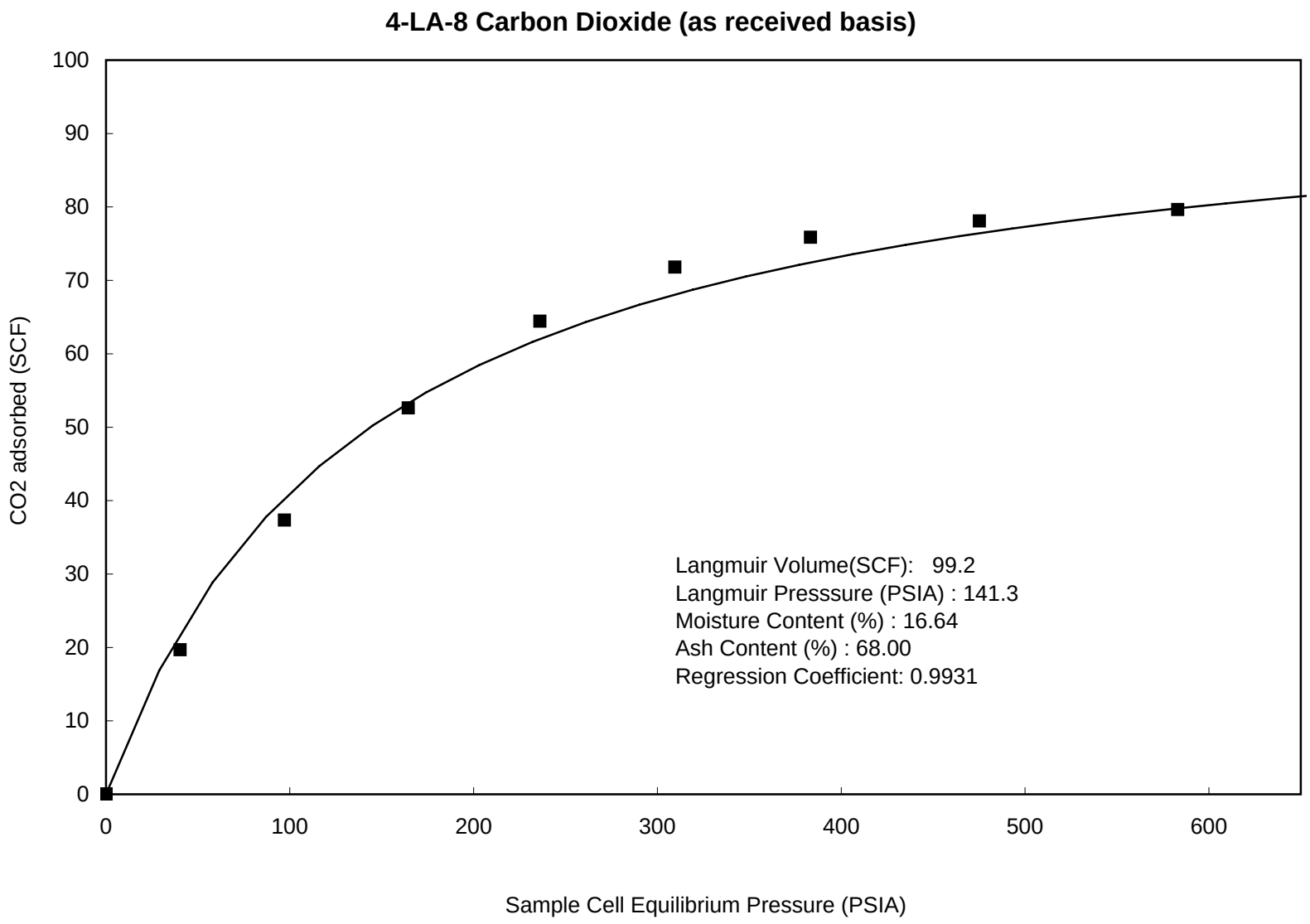
PRESSURE (PSI)	ADSORBED GAS (SCF/ton)	P / V
40	24	1.71
97	45	2.17
164	63	2.60
236	77	3.05
309	86	3.59
383	91	4.21
475	94	5.07
583	96	6.10
767	97	7.87

Saturated Monolayer Volume (SCF/ton):	119
Langmuir Pressure (PSIA):	141
Correlation Coefficient:	0.9931

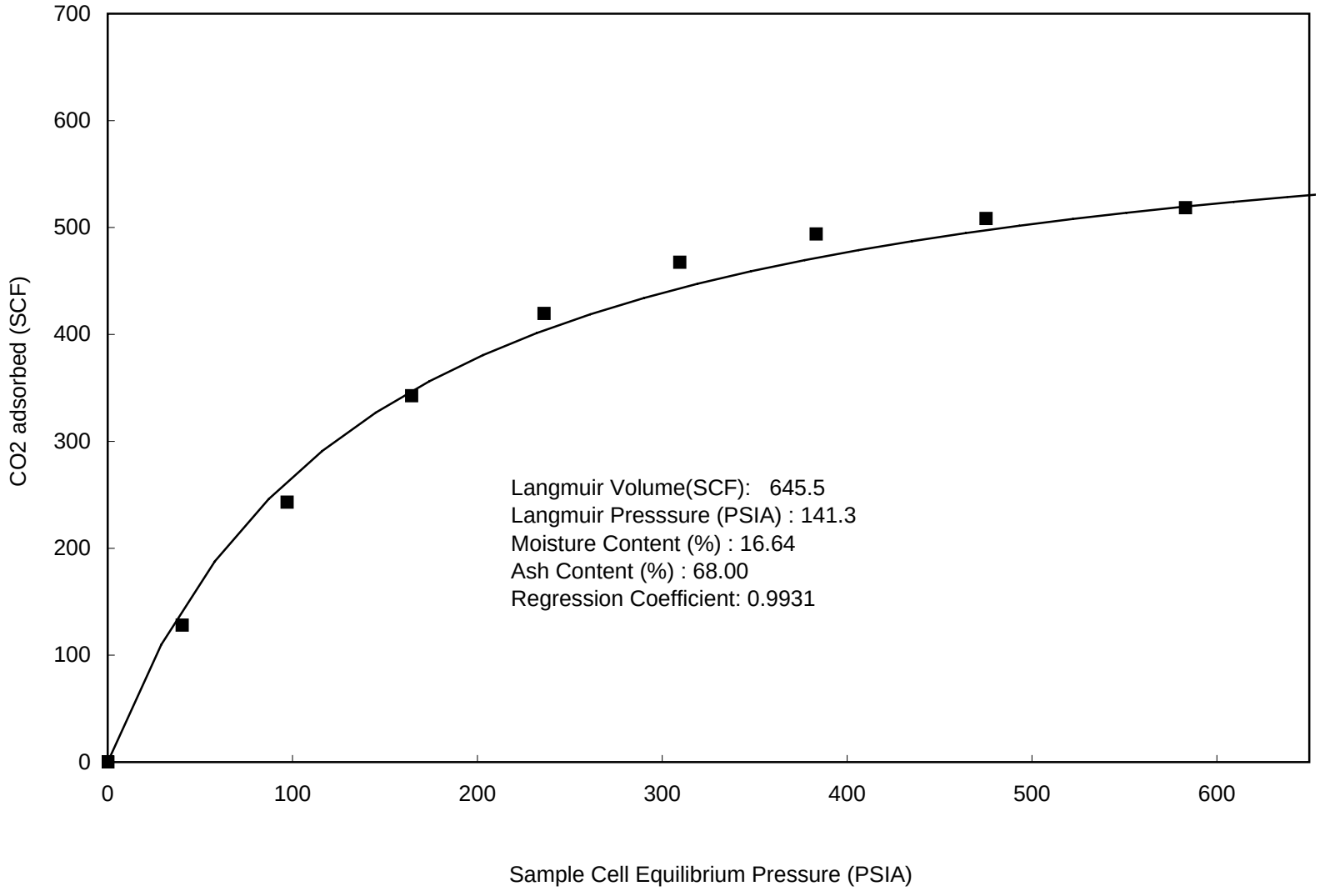
ASH FREE MOISTURE INCLUDED

40	61	0.66
97	117	0.83
164	164	1.00
236	201	1.17
309	224	1.38
383	237	1.62
475	244	1.95
583	249	2.34
767	254	3.02

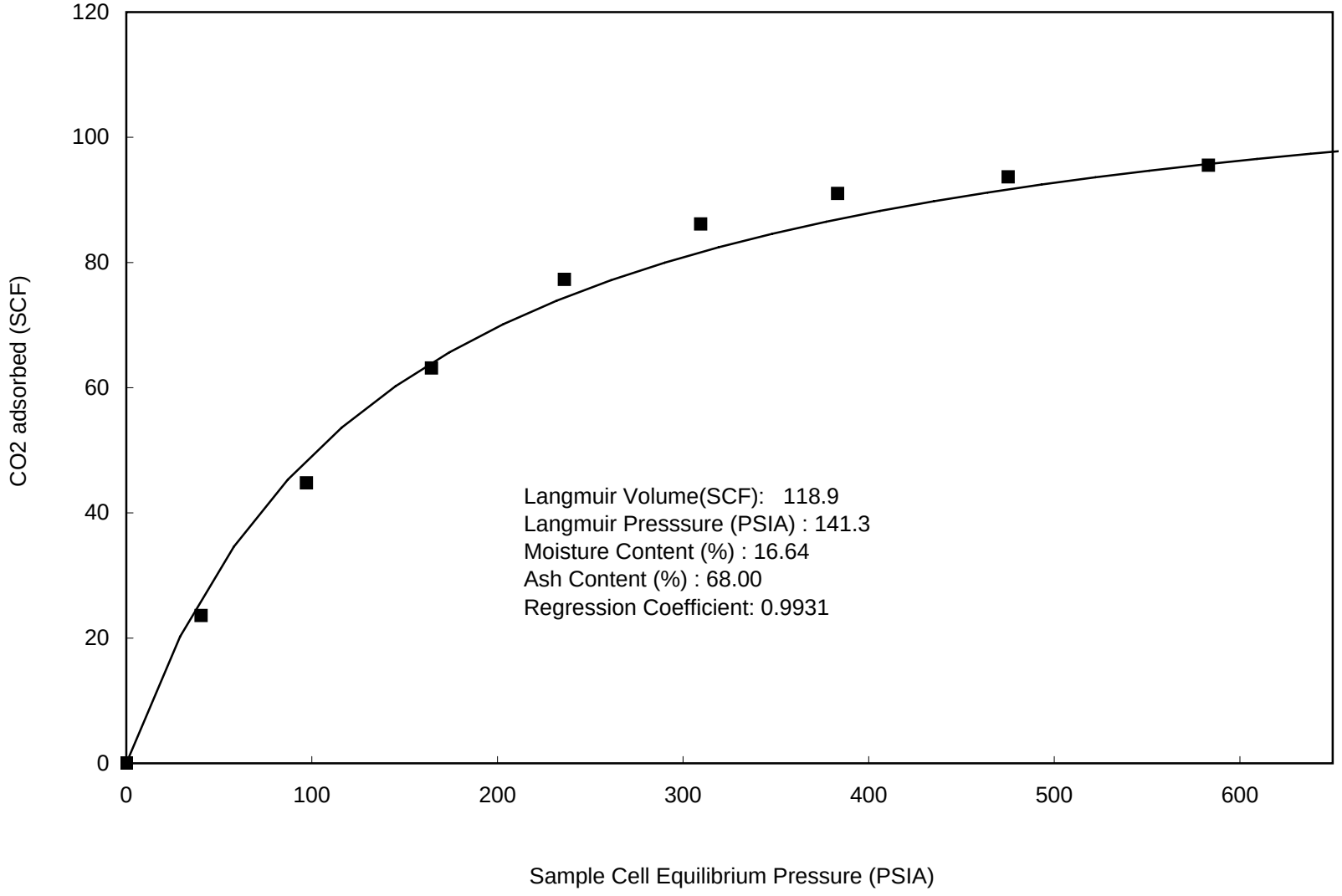
Saturated Monolayer Volume (SCF/ton):	310
Langmuir Pressure (PSIA):	141
Correlation Coefficient:	0.9931


4-LA-8 Carbon Dioxide (as received basis)
CO2 adsorbed (SCF)
Sample Cell Equilibrium Pressure (PSIA)
0
10
20
30
40
50
60
70
80
90
100
0
100
200
300
400
500
600
Langmuir Volume(SCF): 99.2
Langmuir Presssure (PSIA) : 141.3
Moisture Content (%) : 16.64
Ash Content (%) : 68.00
Regression Coefficient: 0.9931

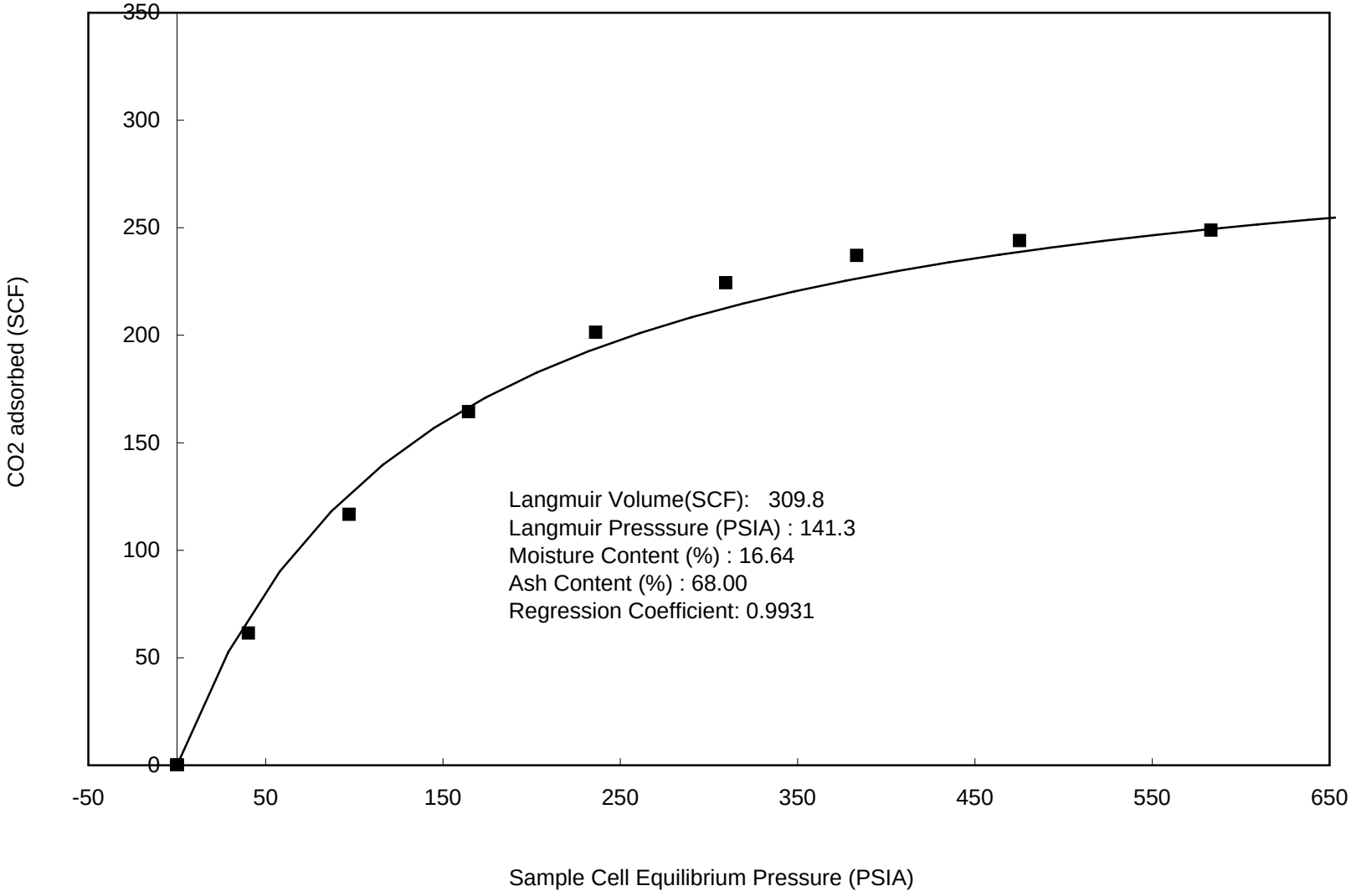
4-LA-8 Carbon Dioxide (dry & ash free basis)

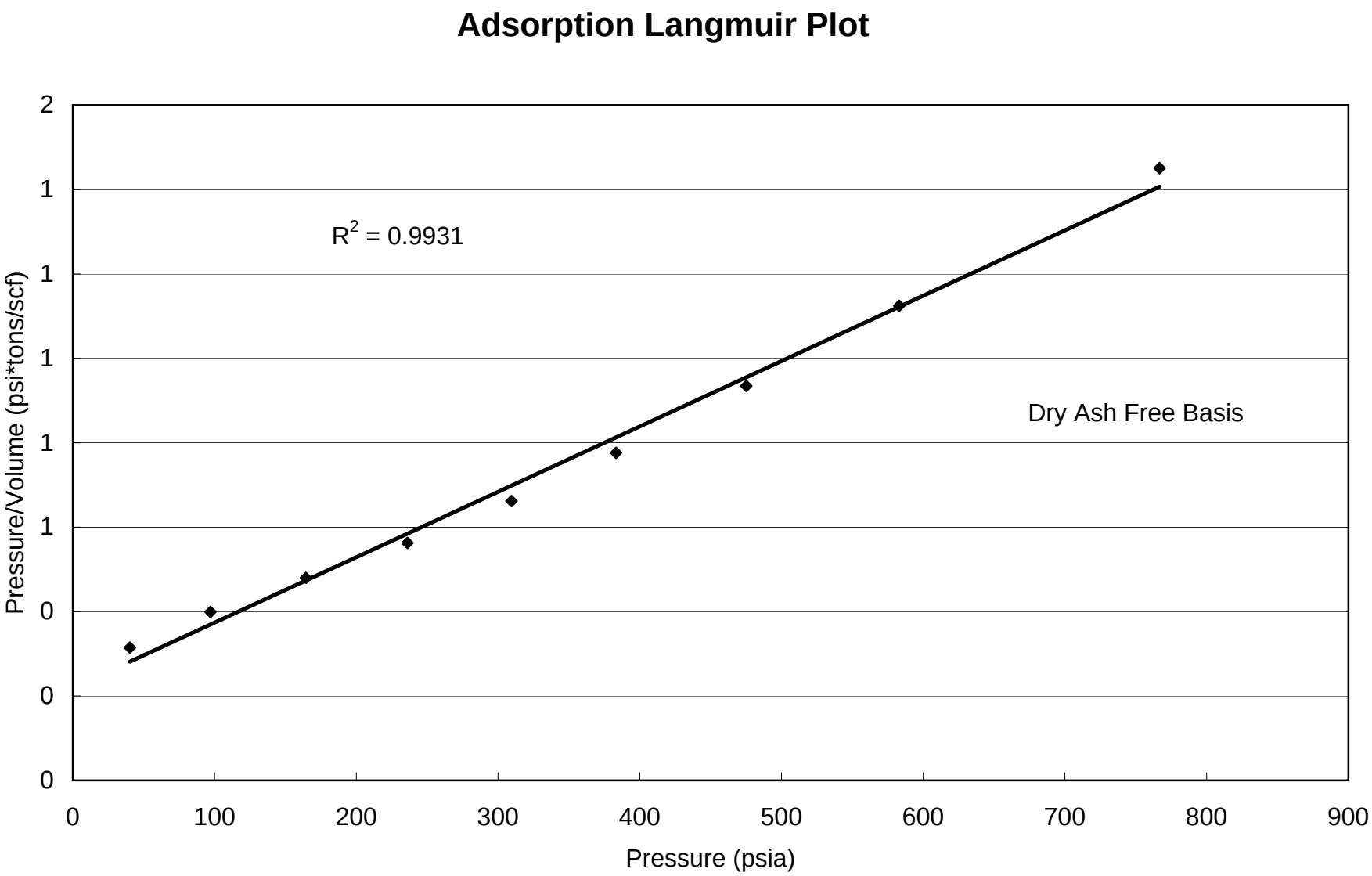


4-LA-8 Carbon Dioxide (moisture free, ash included basis)



4-LA-8 Carbon Dioxide (ash free, moisture included basis)




Adsorption Langmuir Plot
R2 = 0.9931
Dry Ash Free Basis
Pressure/Volume (psi*tons/scf)
Pressure (psia)
2
1
1
1
1
1
0
0
0
0
100
200
300
400
500
600
700
800
900

4-LA-8 Carbon Dioxide

CO2 Adsorption (SI Units)

Summary of Analyses		
	As Received	DAF basis
Langmuir Volume cc/g	2.91	18.97
Langmuir Pressure MPa	0.97	0.97
Goodness of fit Langmuir Equation R-squared	0.99	0.99
Ash Content Wt.%	68.00	68.00
Equilibrium Moisture Wt.%	16.64	16.64

Contents of Appendix

data sheets	***Charts***
As Received	As Received
Dry Ash Free	Dry Ash Free
Dry Ash Included	Dry Ash Included
Moist Ash Free	Moist Ash Free

4-LA-8 Carbon Dioxide

GAS ADSORPTION ISOTHERM SI UNITS

AS RECEIVED BASIS

Sample I.D. :	4-LA-8 Carbon Dioxide	Moisture Content (EQ) % :	16.64
Isotherm Temperature º C:	42.1	Ash Content % :	68.00
Gas used:	CO2	Helium Density g/cc	2.107

PRESSURE (MPa)	ADSORBED GAS (cc/g @STP)	P / V
0.278	0.58	0.480
0.669	1.10	0.610
1.134	1.55	0.733
1.628	1.89	0.859
2.134	2.11	1.011
2.643	2.23	1.185
3.276	2.29	1.427
4.020	2.34	1.717
5.287	2.39	2.216

Saturated Monolayer Volume (cc/g @ STP):	2.91
Langmuir Pressure (MPa):	0.97

DRY ASH FREE BASIS

0.278	3.76	0.074
0.669	7.15	0.094
1.134	10.07	0.113
1.628	12.33	0.132
2.134	13.74	0.155
2.643	14.52	0.182
3.276	14.94	0.219
4.020	15.24	0.264
5.287	15.53	0.340

Saturated Monolayer Volume (cc/g @ STP, daf):	18.97
Langmuir Pressure (MPa):	0.97
Correlation Coefficient:	0.9931

4-LA-8 Carbon Dioxide

GAS ADSORPTION ISOTHERM SI UNITS

MOISTURE FREE ASH INCLUDED

		Moisture Content (EQ) % :	16.64
Isotherm Temperature º C:	42.1	Ash Content % :	68.00
Gas used:	CO2	Helium Density g/cc	2.107

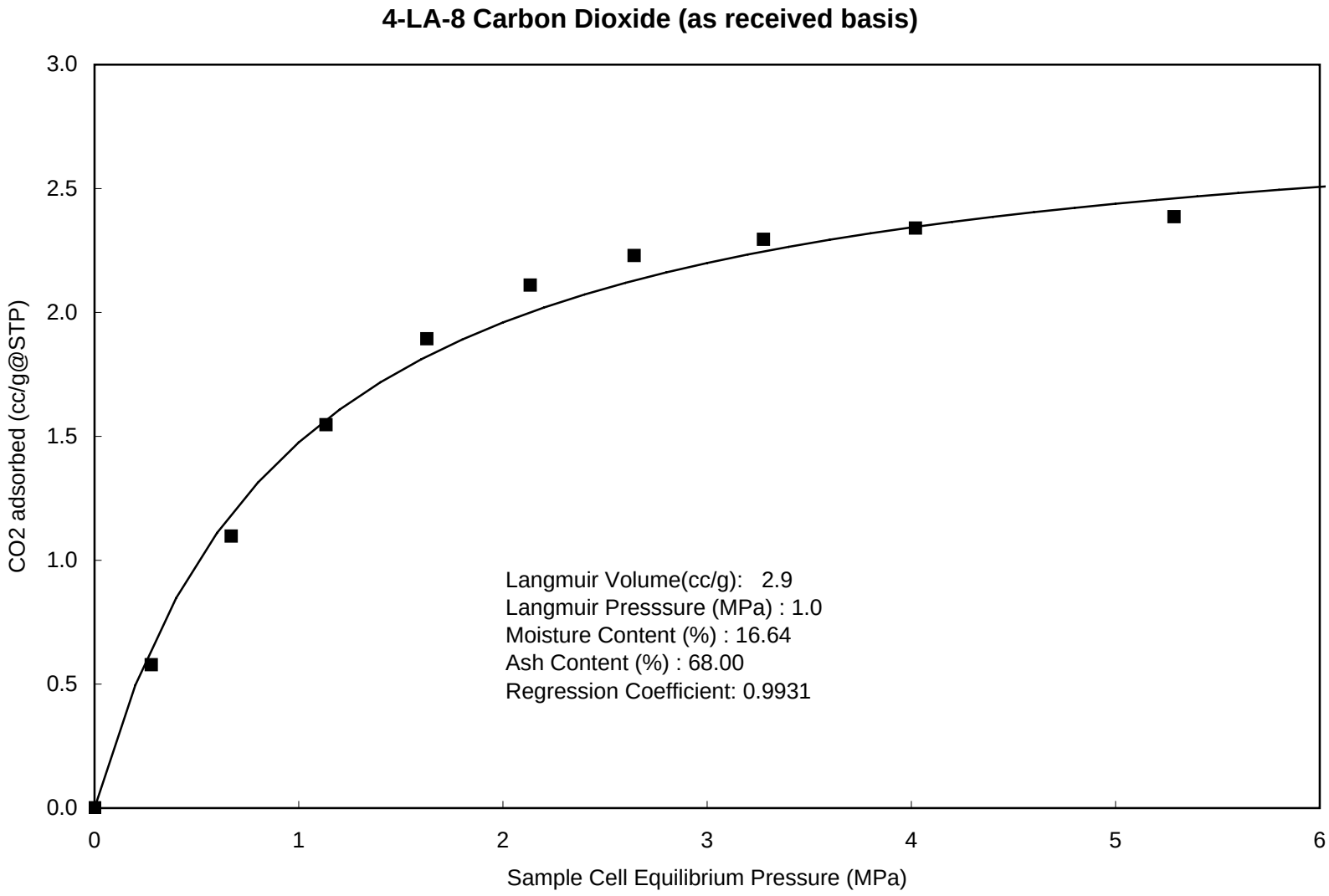
PRESSURE (MPa)	ADSORBED GAS (cc/g@STP)	P / V
0.278	0.69	0.40
0.669	1.32	0.51
1.134	1.86	0.61
1.628	2.27	0.72
2.134	2.53	0.84
2.643	2.67	0.99
3.276	2.75	1.19
4.020	2.81	1.43
5.287	2.86	1.85

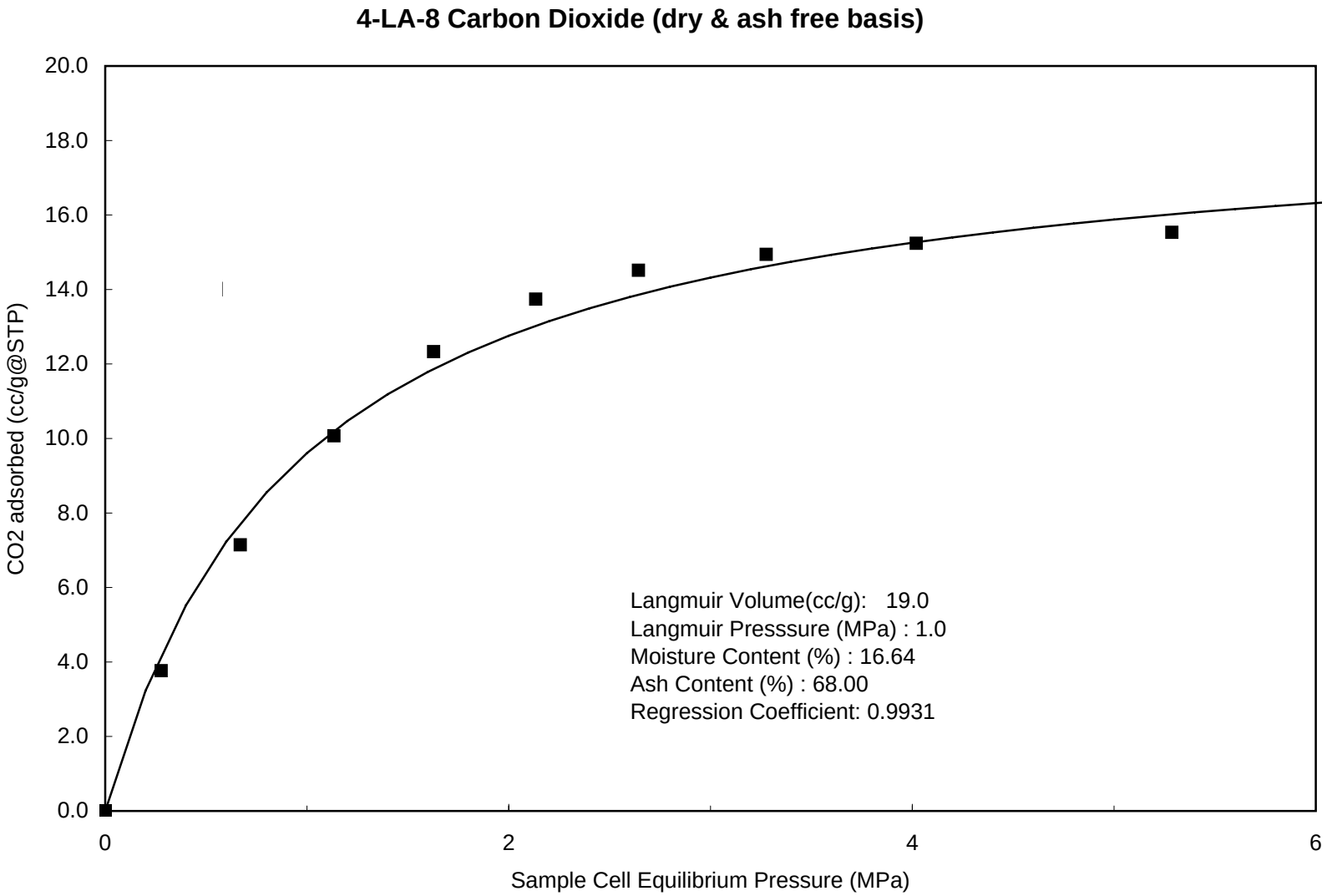
Saturated Monolayer Volume (cc/g):	3.50
Langmuir Pressure (MPa):	0.97

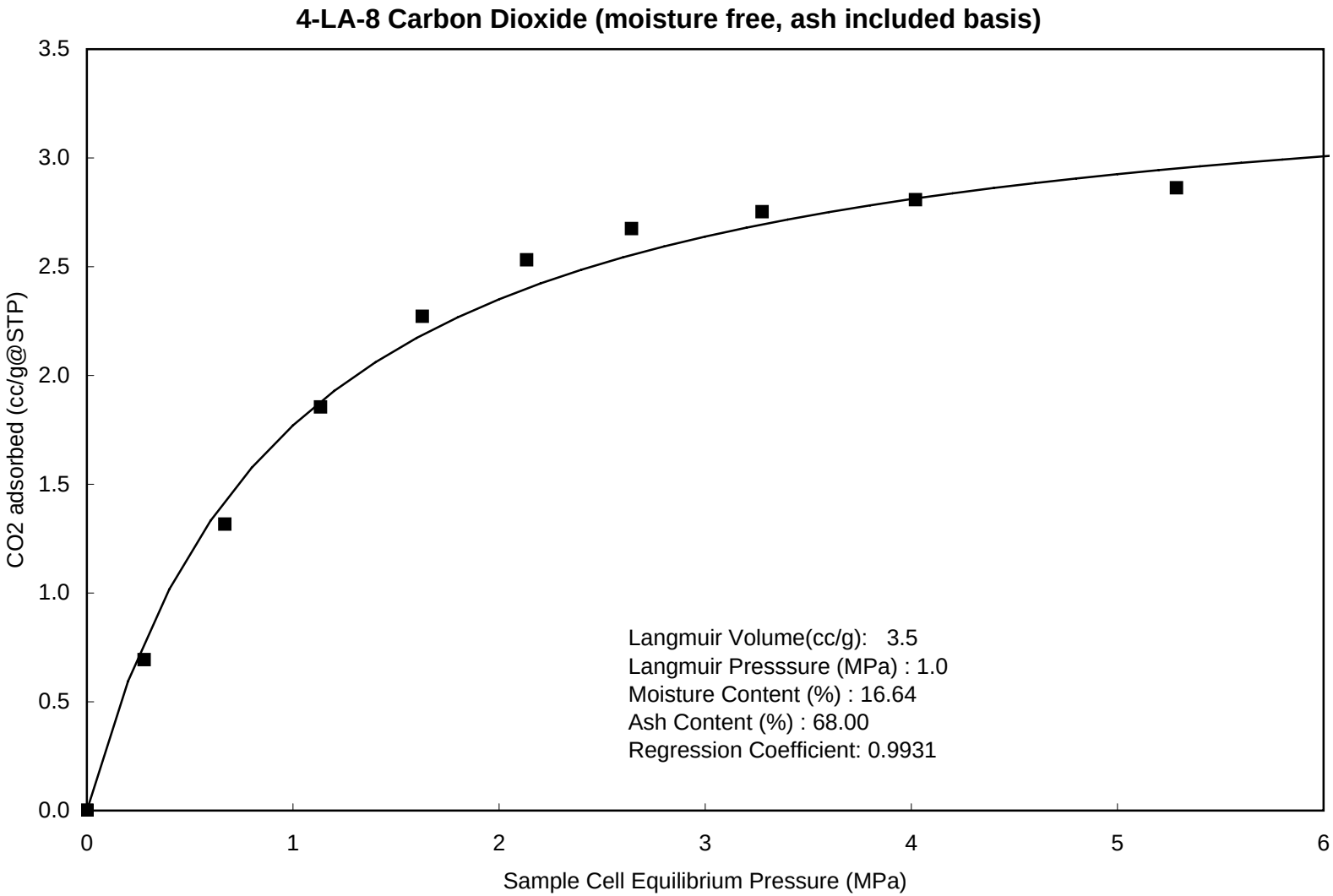
ASH FREE MOISTURE INCLUDED

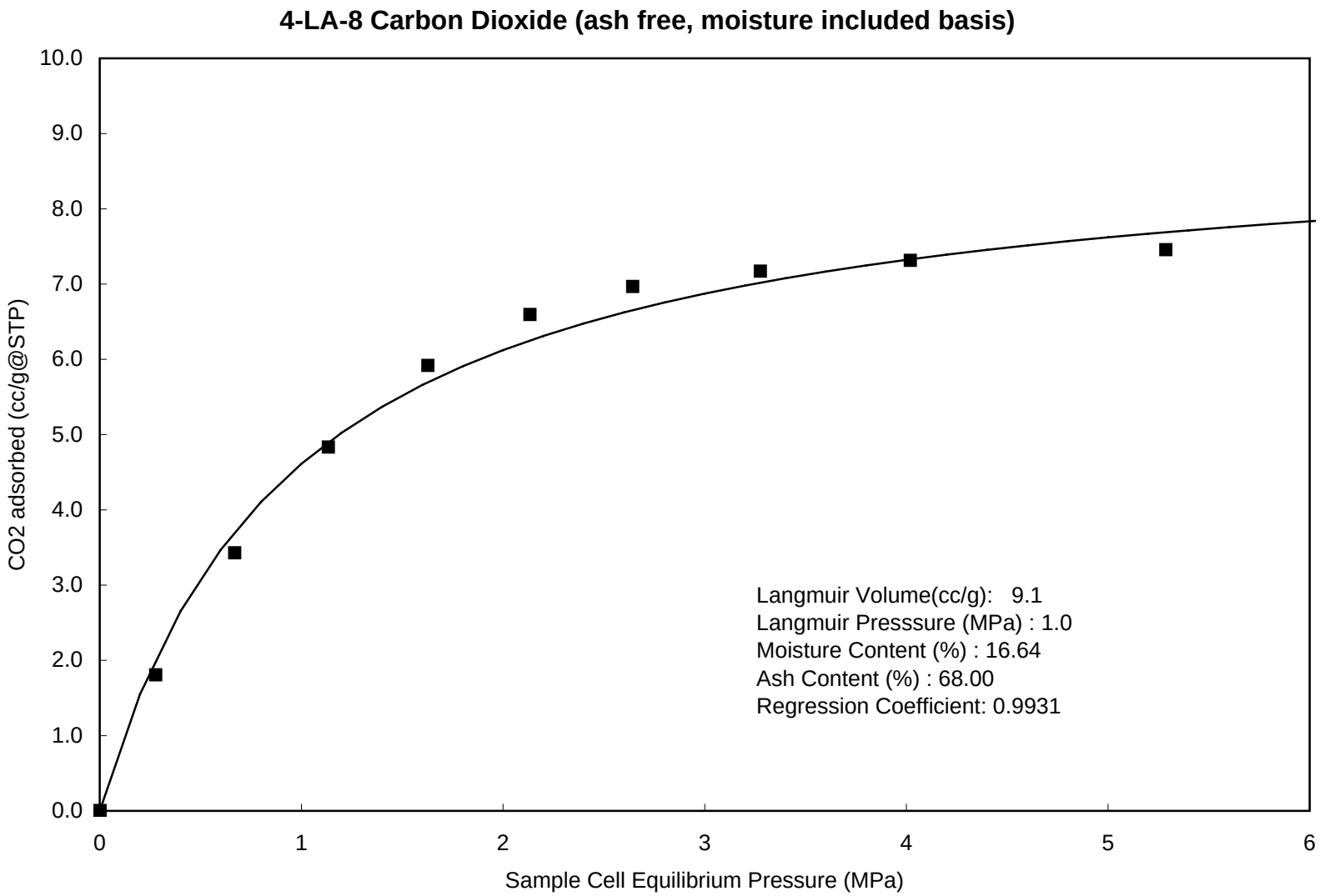
0.278	1.81	0.00
0.669	3.43	0.20
1.134	4.83	0.23
1.628	5.92	0.28
2.134	6.60	0.32
2.643	6.97	0.38
3.276	7.17	0.46
4.020	7.31	0.55
5.287	7.46	0.71

Saturated Monolayer Volume (cc/g, ash free):	9.11
Langmuir Pressure (MPa):	0.97
Correlation Coefficient:	0.9931

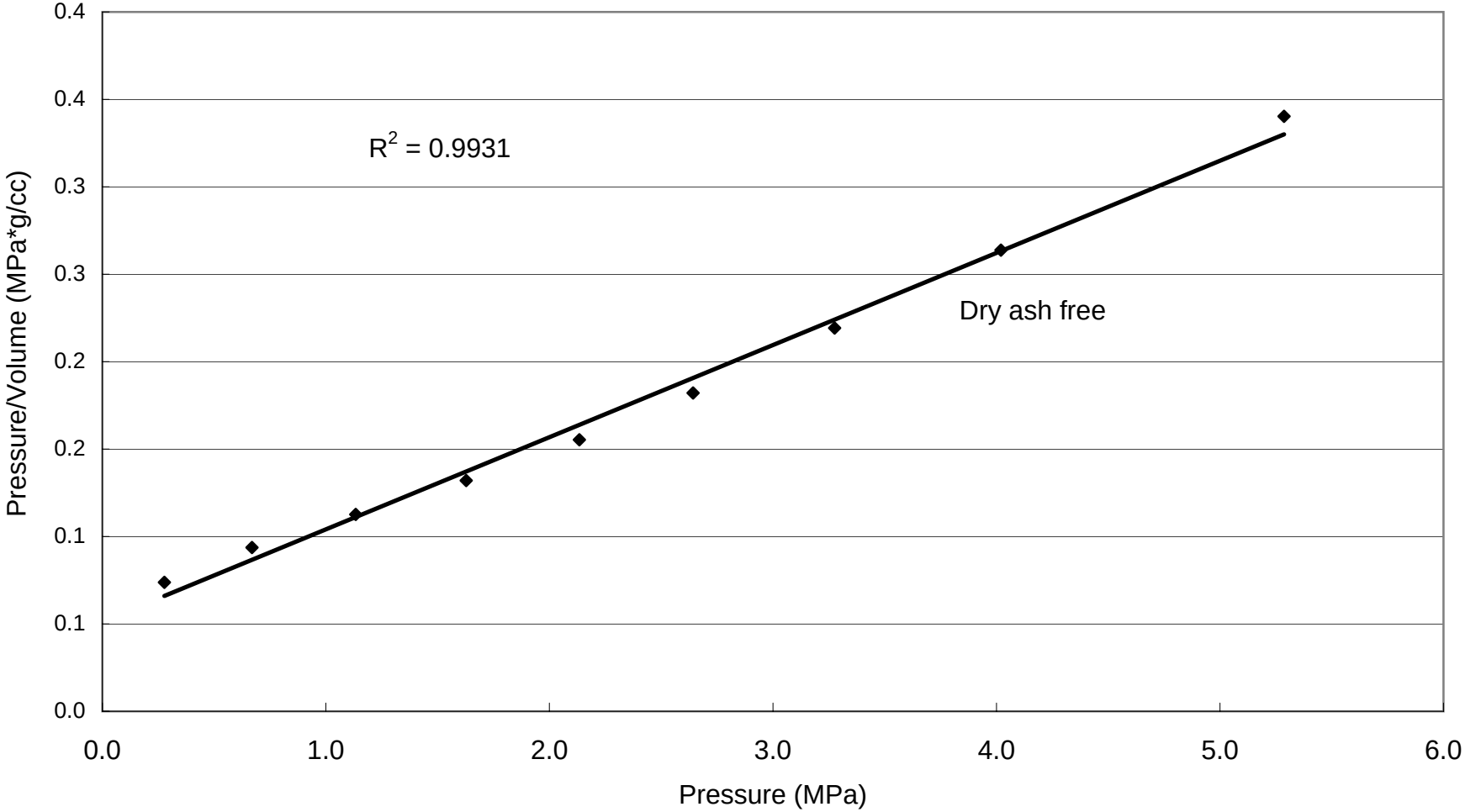

4-LA-8 Carbon Dioxide (as received basis)
3.0
2.5
2.0
1.5
1.0
0.5
0.0
CO2 adsorbed (cc/g@STP)
0
1
2
3
4
5
6
Sample Cell Equilibrium Pressure (MPa)
Langmuir Volume(cc/g): 2.9
Langmuir Presssure (MPa) : 1.0
Moisture Content (%) : 16.64
Ash Content (%) : 68.00
Regression Coefficient: 0.9931


4-LA-8 Carbon Dioxide (dry & ash free basis)
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
CO2 adsorbed (cc/g@STP)
0
2
4
6
Sample Cell Equilibrium Pressure (MPa)
Langmuir Volume(cc/g): 19.0
Langmuir Presssure (MPa) : 1.0
Moisture Content (%) : 16.64
Ash Content (%) : 68.00
Regression Coefficient: 0.9931

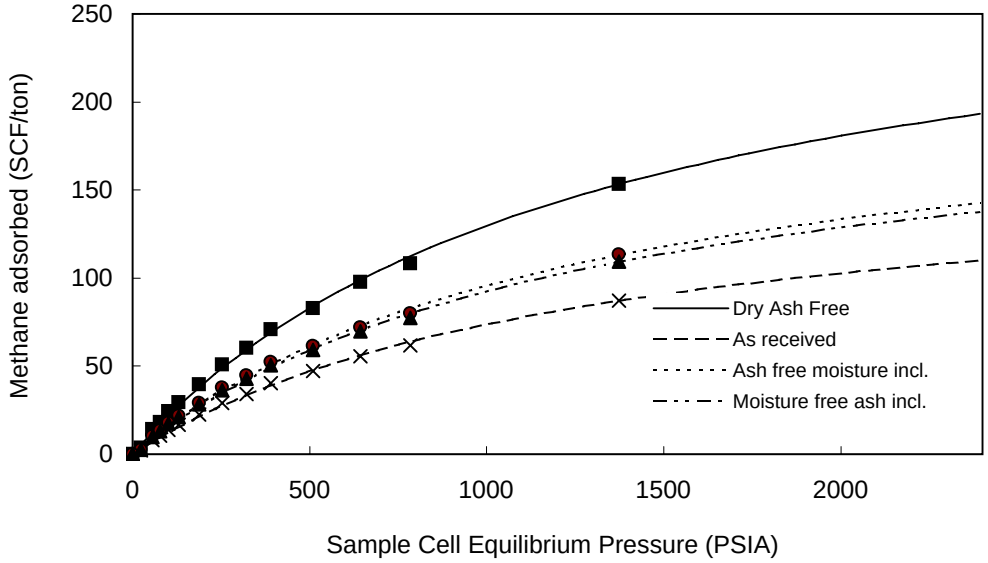

4-LA-8 Carbon Dioxide (moisture free, ash included basis)
CO2 adsorbed (cc/g@STP)
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0
1
2
3
4
5
6
Sample Cell Equilibrium Pressure (MPa)
Langmuir Volume(cc/g): 3.5
Langmuir Presssure (MPa) : 1.0
Moisture Content (%) : 16.64
Ash Content (%) : 68.00
Regression Coefficient: 0.9931


4-LA-8 Carbon Dioxide (ash free, moisture included basis)
CO2 adsorbed (cc/g@STP)
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
0
1
2
3
4
5
6
Sample Cell Equilibrium Pressure (MPa)
Langmuir Volume(cc/g): 9.1
Langmuir Presssure (MPa) : 1.0
Moisture Content (%) : 16.64
Ash Content (%) : 68.00
Regression Coefficient: 0.9931

Adsorption Langmuir Plot



9-1C Methane



Pressure (PSIA)	Adsorbed gas (ft^3 /ton)			
	As Received	moisture free ash incl.	ash free moisture incl.	Dry Ash Free
23	2.1	2.6	2.7	3.6
57	8.0	10.0	10.4	14.0
77	10.4	13.0	13.4	18.2
102	13.8	17.3	17.9	24.2
130	16.7	20.9	21.7	29.3
187	22.5	28.2	29.2	39.6
253	29.0	36.3	37.6	51.0
322	34.3	43.0	44.5	60.3
391	40.4	50.5	52.4	70.9
510	47.2	59.1	61.2	82.9
644	55.6	69.6	72.1	97.6
785	61.7	77.2	80.0	108.4
1374	87.4	109.4	113.4	153.5

Langmuir Parameters

	As Received	Moisture free ash incl	Ash free moisture incl	Dry Ash Free
Vol. (ft^3 /ton)	169.4	212.1	219.8	297.6
Pressure (PSIA)	1292.3	1292.3	1292.3	1292.3

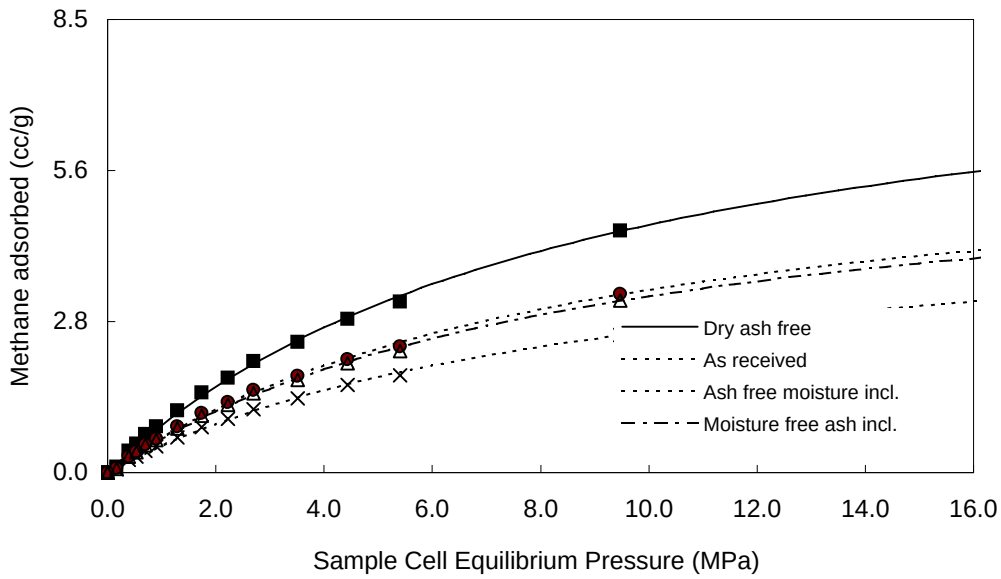
SUMMARY OF ADSORPTION ANALYSES IMP. UNITS

Isotherm Temperature: 107.6 ºF

Goodness of fit of Langmuir regression: 0.80

% Ash= 22.94 % Moisture= 20.14 Density g/cc 1.488

9-1C Methane



Pressure (MPa)	Adsorbed gas (cc/g)			
	As Received	Moisture free ash incl.	ash free moisture incl	Dry Ash Free
0.160	0.06	0.08	0.08	0.11
0.390	0.23	0.29	0.30	0.41
0.530	0.30	0.38	0.40	0.54
0.702	0.41	0.51	0.53	0.71
0.895	0.49	0.61	0.64	0.86
1.292	0.66	0.83	0.86	1.16
1.744	0.85	1.07	1.11	1.50
2.219	1.01	1.26	1.31	1.77
2.695	1.19	1.49	1.54	2.08
3.516	1.39	1.74	1.80	2.44
4.439	1.63	2.05	2.12	2.87
5.410	1.81	2.27	2.35	3.18
9.470	2.57	3.22	3.33	4.51

Langmuir Parameters

	As Received	Moisture free ash incl.	Ash free moisture incl	Dry Ash Free
Vol. (cc/g)	4.98	6.23	6.46	8.74
Pressure (MPa)	8.91	8.91	8.91	8.91

SUMMARY OF ADSORPTION ANALYSES SI UNITS

Isotherm Temperature: **42.0 ºC**

Goodness of fit of Langmuir regression: **0.80**

% Ash= 22.94 **% Moisture = 20.14** **Density (g/cc) 1.488**

9-1C Methane

Methane Adsorption
(Imperial Units)

Summary of Analyses		
	As Received	DAF basis
Langmuir Volume (SCF)	169	298
Langmuir Pressure (PSIA)	1292	1292
Goodness of fit Langmuir Equation R-squared	0.80	0.80
Ash Content Wt.%	22.94	22.94
Equilibrium Moisture Wt.%	20.14	20.14

Contents of Appendix

data sheets	***Charts***
As Received	As Received
Dry Ash Free	Dry Ash Free
Dry Ash Included	Dry Ash Included
Moist Ash Free	Moist Ash Free

9-1C Methane

GAS ADSORPTION ISOTHERM IMPERIAL UNITS

AS RECEIVED BASIS

		Moisture Content % :	20.14
Isotherm Temperature º F:	107.6	Ash Content, % :	22.94
Gas used:	Methane	Helium Density g/cc	1.488

PRESSURE (PSI)	ADSORBED GAS (SCF/ton)	P / V
23	2.07	11.26
57	7.98	7.09
77	10.36	7.41
102	13.80	7.38
130	16.70	7.78
187	22.54	8.32
253	29.01	8.72
322	34.33	9.38
391	40.35	9.68
510	47.19	10.81
644	55.58	11.58
785	61.68	12.72
1374	87.37	15.72

Saturated Monolayer Volume (SCF/ton):	169.4
Langmuir Pressure (PSIA):	1292.3
Correlation Coefficient:	0.8013

DRY ASH FREE BASIS

23	3.63	6.41
57	14.02	4.04
77	18.21	4.22
102	24.25	4.20
130	29.34	4.43
187	39.59	4.73
253	50.97	4.96
322	60.31	5.34
391	70.90	5.51
510	82.91	6.15
644	97.65	6.59
785	108.37	7.24
1374	153.49	8.95

Saturated Monolayer Volume (SCF/ton, daf):	298
Langmuir Pressure (PSIA):	1292
Correlation Coefficient:	0.8013

9-1C Methane

GAS ADSORPTION ISOTHERM IMPERIAL UNITS

MOISTURE FREE ASH INCLUDED

		Moisture Content % :	20.14
Isotherm Temperature° F:	107.6	Ash Content, % :	22.94
Gas used:	Methane	Helium Density g/cc	1.488

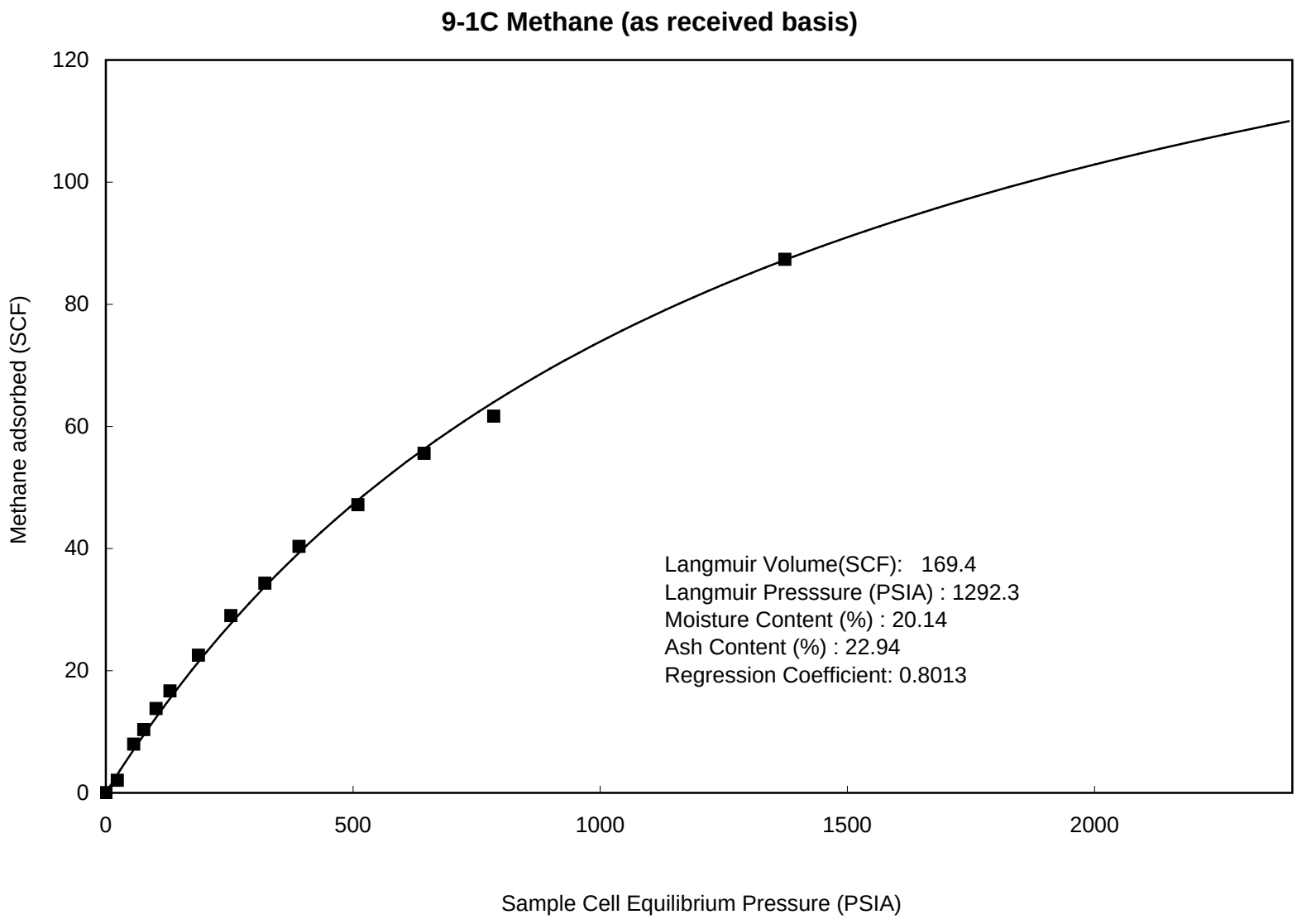
PRESSURE (PSI)	ADSORBED GAS (SCF/ton)	P / V
23	3	8.99
57	10	5.66
77	13	5.92
102	17	5.89
130	21	6.21
187	28	6.64
253	36	6.96
322	43	7.49
391	51	7.73
510	59	8.63
644	70	9.25
785	77	10.16
1374	109	12.56

Saturated Monolayer Volume (SCF/ton):	212
Langmuir Pressure (PSIA):	1292
Correlation Coefficient:	0.8013

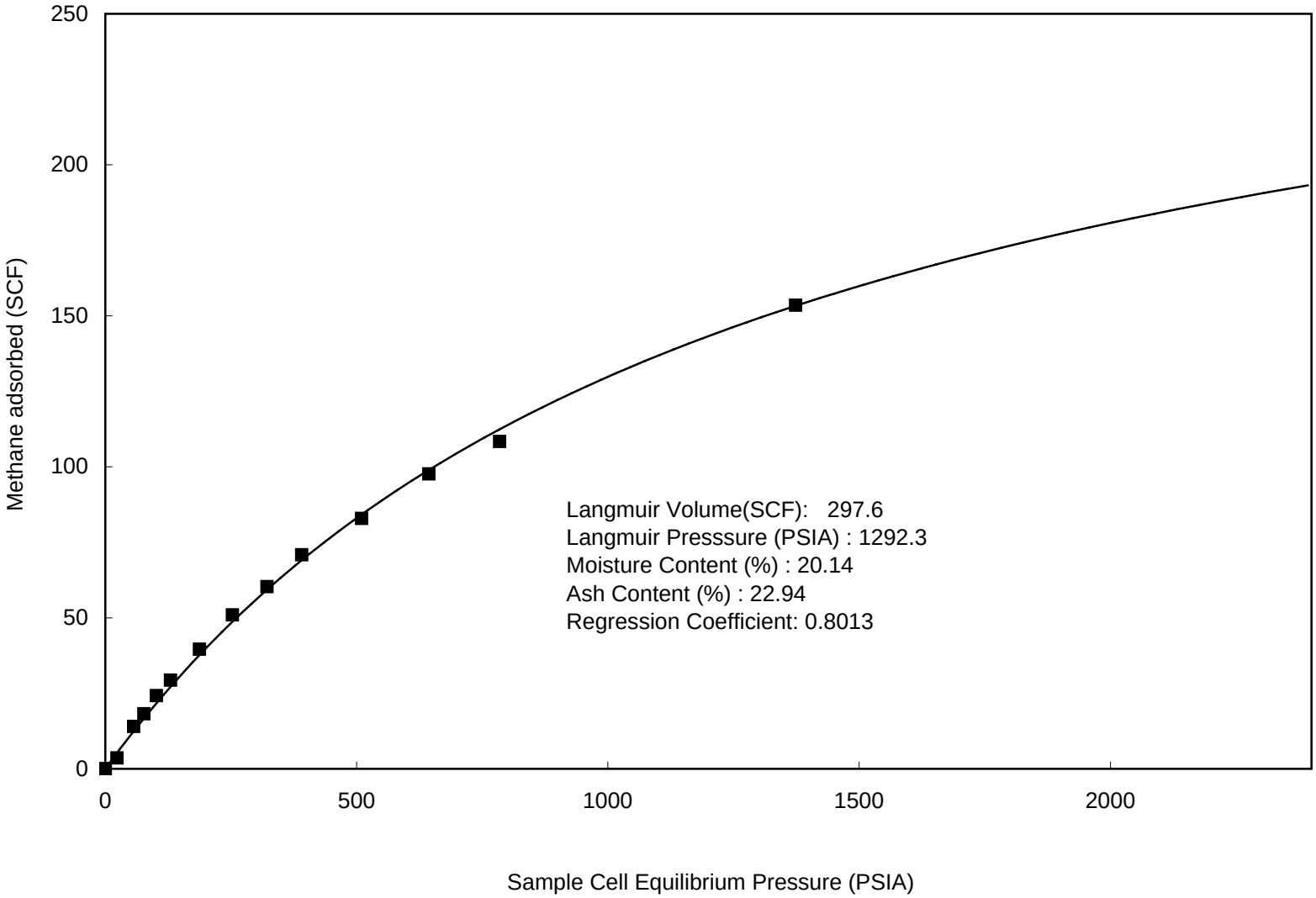
ASH FREE MOISTURE INCLUDED

23	3	8.67
57	10	5.47
77	13	5.71
102	18	5.69
130	22	5.99
187	29	6.41
253	38	6.72
322	45	7.23
391	52	7.46
510	61	8.33
644	72	8.93
785	80	9.80
1374	113	12.12

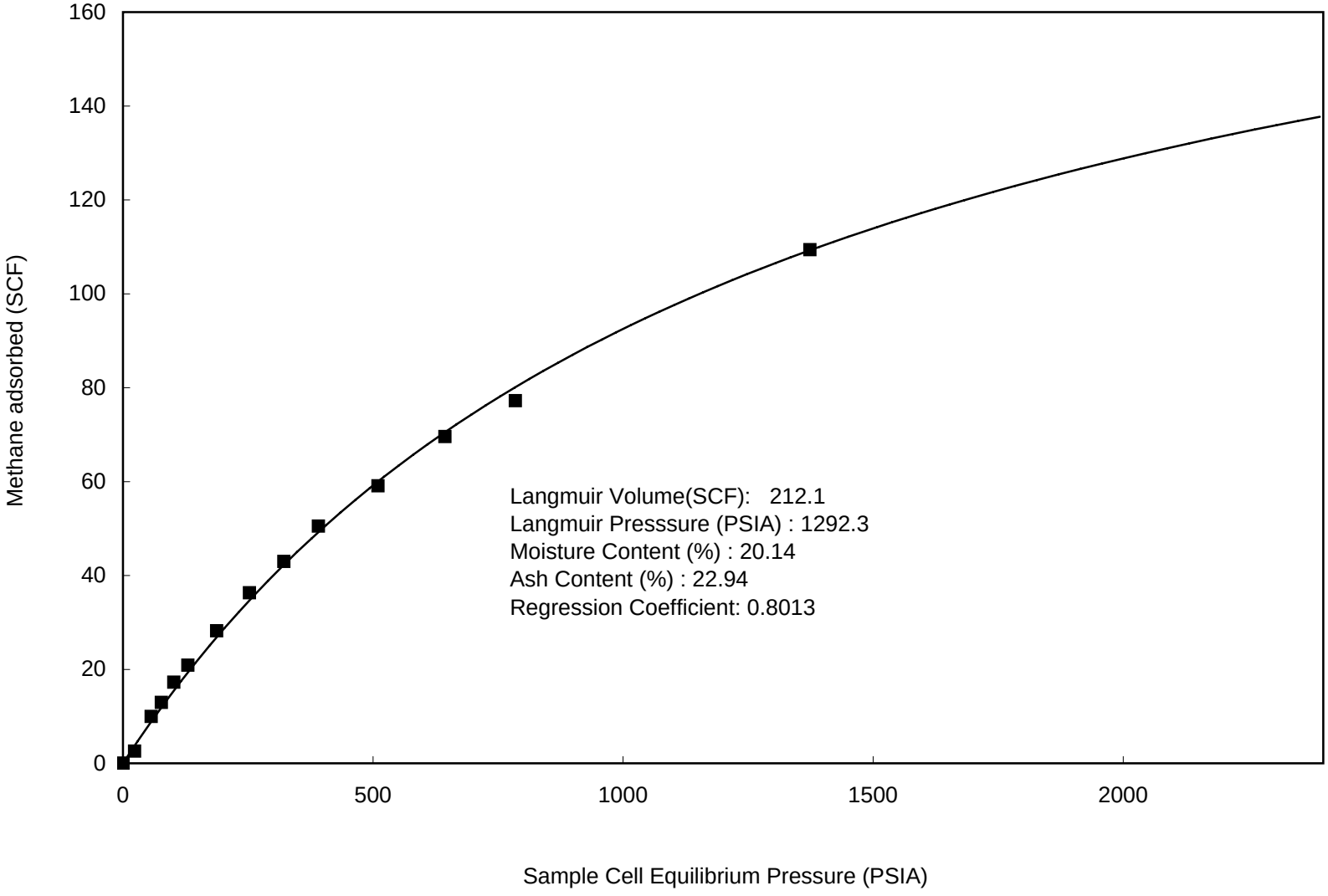
Saturated Monolayer Volume (SCF/ton):	220
Langmuir Pressure (PSIA):	1292
Correlation Coefficient:	0.8013


9-1C Methane (as received basis)
Methane adsorbed (SCF)
Sample Cell Equilibrium Pressure (PSIA)
0
20
40
60
80
100
120
0
500
1000
1500
2000
Langmuir Volume(SCF): 169.4
Langmuir Presssure (PSIA) : 1292.3
Moisture Content (%) : 20.14
Ash Content (%) : 22.94
Regression Coefficient: 0.8013

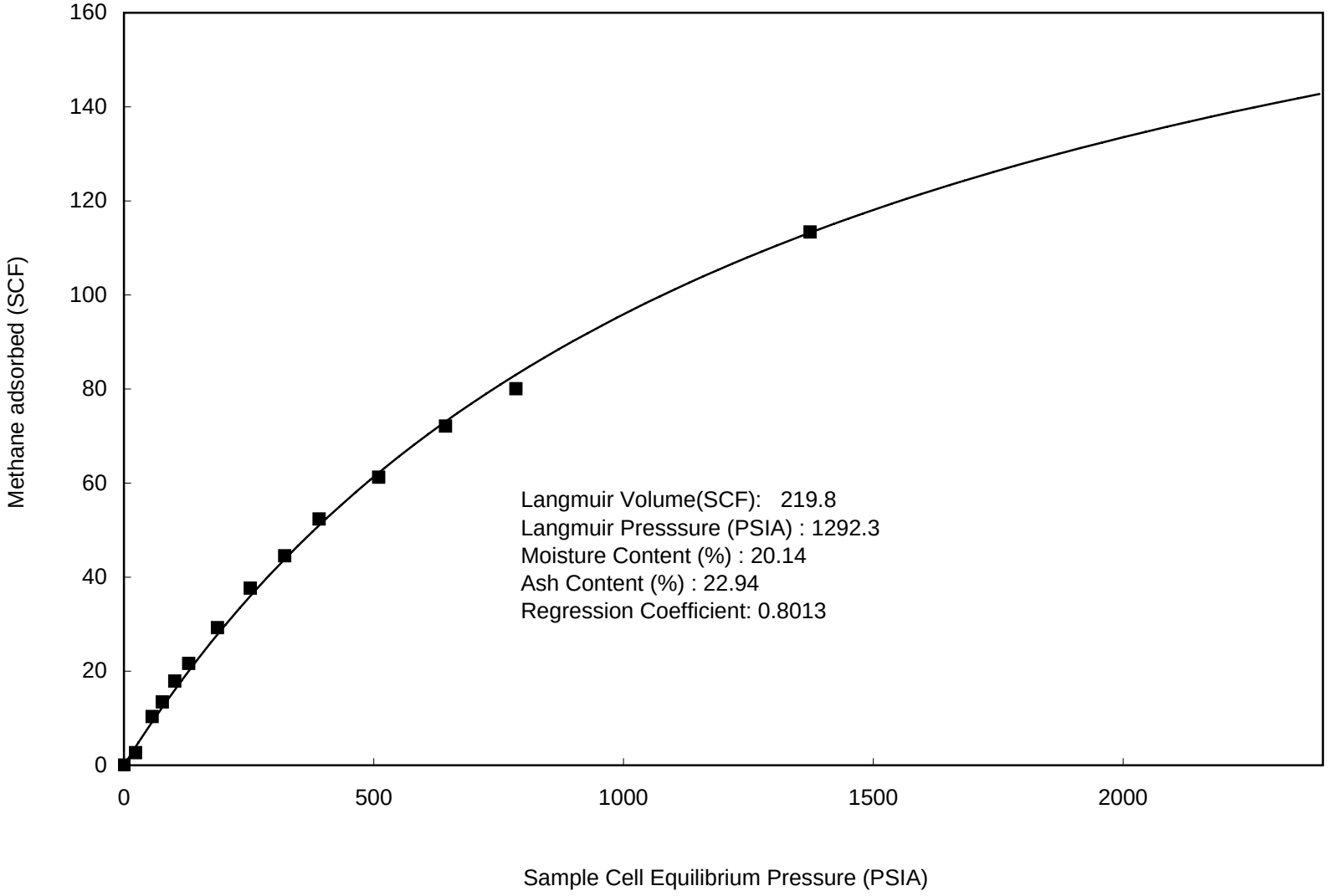
9-1C Methane (dry & ash free basis)

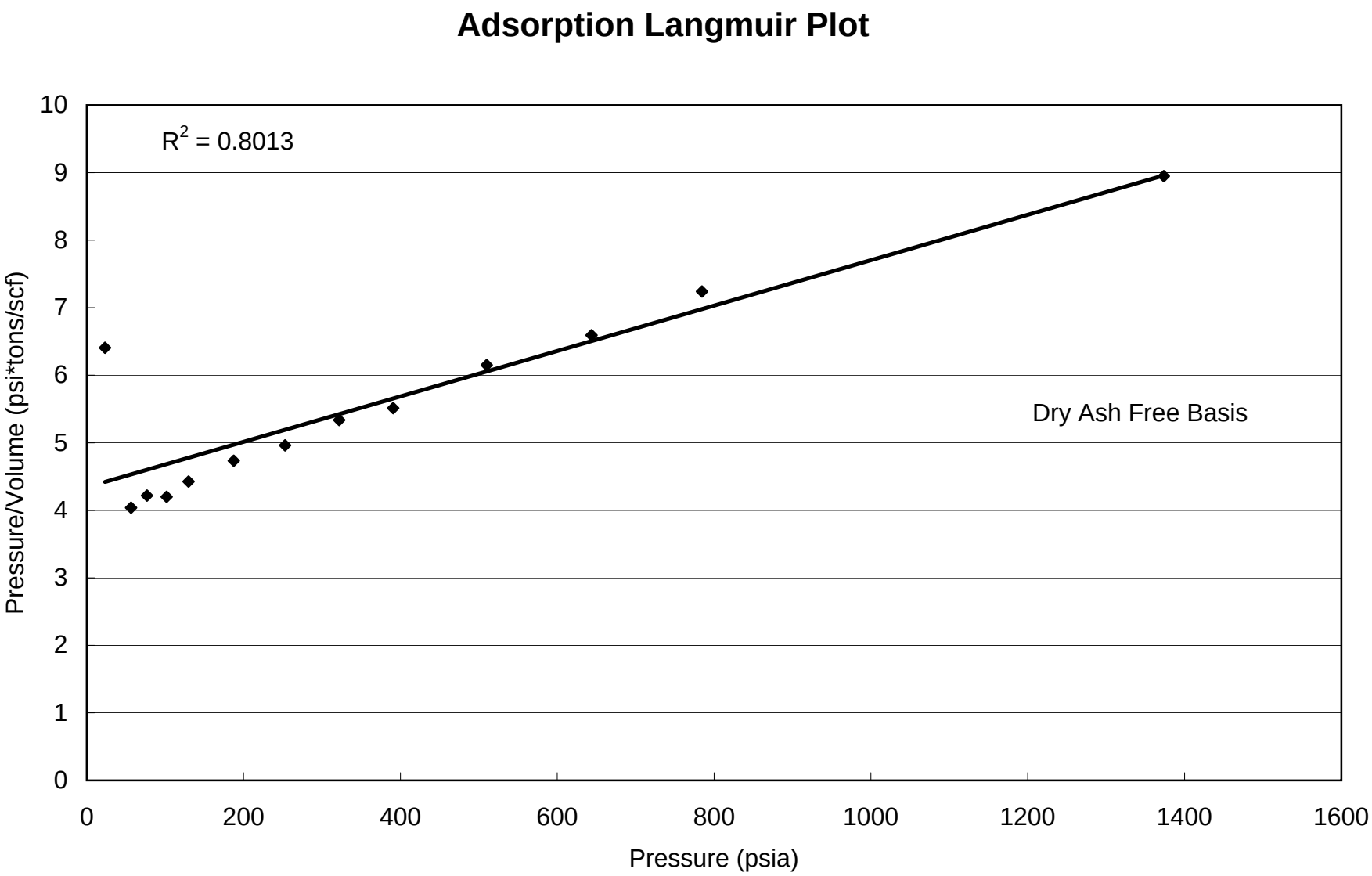


9-1C Methane (moisture free, ash included basis)



9-1C Methane (ash free, moisture included basis)




Adsorption Langmuir Plot
R2 = 0.8013
Dry Ash Free Basis
Pressure/Volume (psi*tons/scf)
Pressure (psia)
0
1
2
3
4
5
6
7
8
9
10
0
200
400
600
800
1000
1200
1400
1600

9-1C Methane

Methane Adsorption (SI Units)

Summary of Analyses		
	As Received	DAF basis
Langmuir Volume cc/g	4.98	8.74
Langmuir Pressure MPa	8.91	8.91
Goodness of fit Langmuir Equation R-squared	0.80	0.80
Ash Content Wt.%	22.94	22.94
Equilibrium Moisture Wt.%	20.14	20.14

Contents of Appendix

data sheets	***Charts***
As Received	As Received
Dry Ash Free	Dry Ash Free
Dry Ash Included	Dry Ash Included
Moist Ash Free	Moist Ash Free

9-1C Methane

GAS ADSORPTION ISOTHERM SI UNITS

AS RECEIVED BASIS

Sample I.D. :	9-1C Methane	Moisture Content (EQ) % :	20.14
Isotherm Temperature º C:	42	Ash Content % :	22.94
Gas used:	Methane	Helium Density g/cc	1.488

PRESSURE (MPa)	ADSORBED GAS (cc/g @STP)	P / V
0.160	0.06	2.641
0.390	0.23	1.664
0.530	0.30	1.739
0.702	0.41	1.731
0.895	0.49	1.824
1.292	0.66	1.951
1.744	0.85	2.045
2.219	1.01	2.200
2.695	1.19	2.272
3.516	1.39	2.536
4.439	1.63	2.717
5.410	1.81	2.984
9.470	2.57	3.688

Saturated Monolayer Volume (cc/g @ STP):	4.98
Langmuir Pressure (MPa):	8.91

DRY ASH FREE BASIS

0.160	0.11	1.503
0.390	0.41	0.947
0.530	0.54	0.990
0.702	0.71	0.985
0.895	0.86	1.038
1.292	1.16	1.111
1.744	1.50	1.164
2.219	1.77	1.252
2.695	2.08	1.293
3.516	2.44	1.443
4.439	2.87	1.547
5.410	3.18	1.699
9.470	4.51	2.099

Saturated Monolayer Volume (cc/g @ STP, daf):	8.74
Langmuir Pressure (MPa):	8.91
Correlation Coefficient:	0.8013

9-1C Methane

GAS ADSORPTION ISOTHERM SI UNITS

MOISTURE FREE ASH INCLUDED

		Moisture Content (EQ) % :	20.14
Isotherm Temperature º C:	42	Ash Content % :	22.94
Gas used:	Methane	Helium Density g/cc	1.488

PRESSURE (MPa)	ADSORBED GAS (cc/g@STP)	P / V
0.160	0.08	2.11
0.390	0.29	1.33
0.530	0.38	1.39
0.702	0.51	1.38
0.895	0.61	1.46
1.292	0.83	1.56
1.744	1.07	1.63
2.219	1.26	1.76
2.695	1.49	1.81
3.516	1.74	2.02
4.439	2.05	2.17
5.410	2.27	2.38
9.470	3.22	2.95

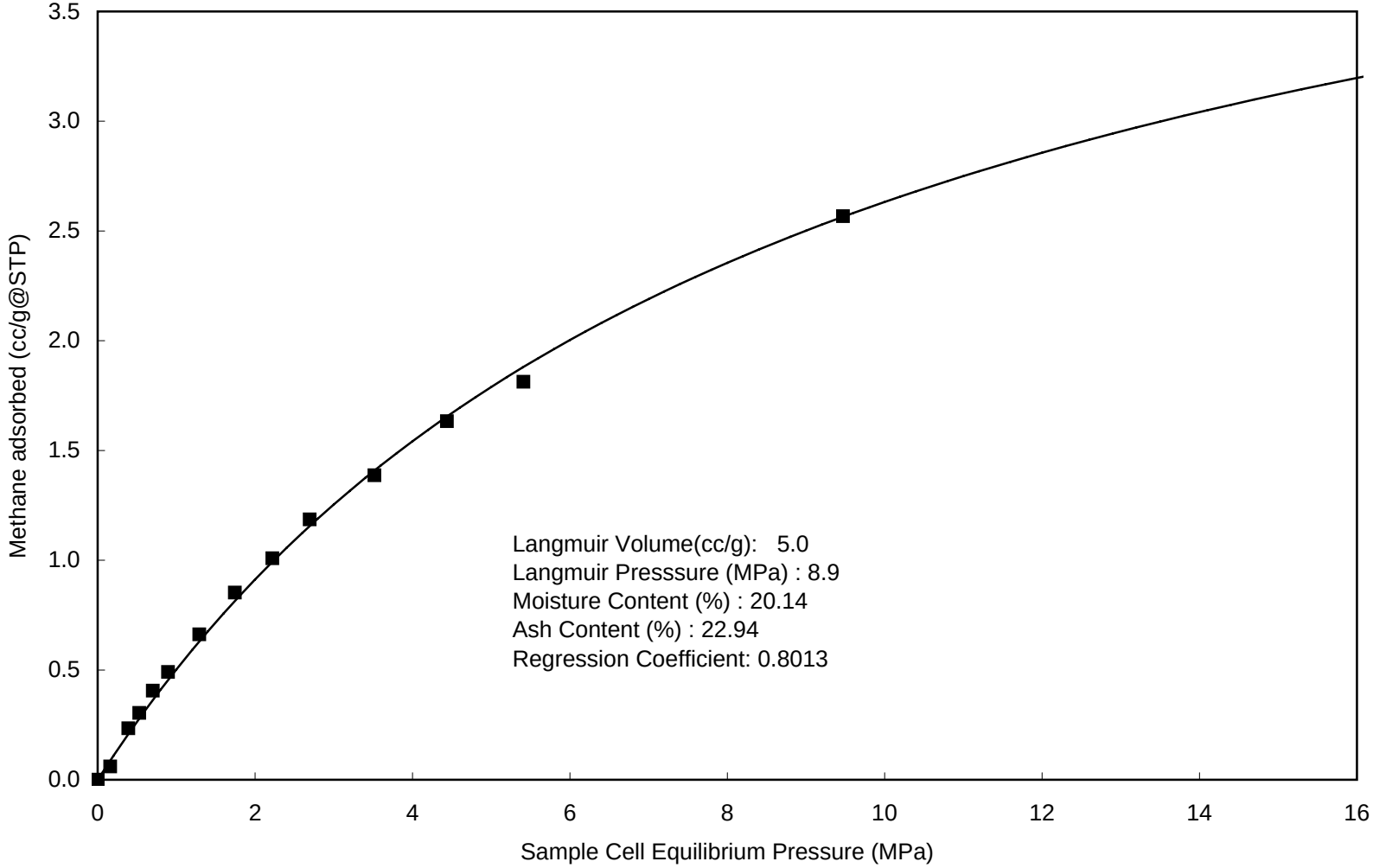
Saturated Monolayer Volume (cc/g): 6.23
Langmuir Pressure (MPa): 8.91

ASH FREE MOISTURE INCLUDED

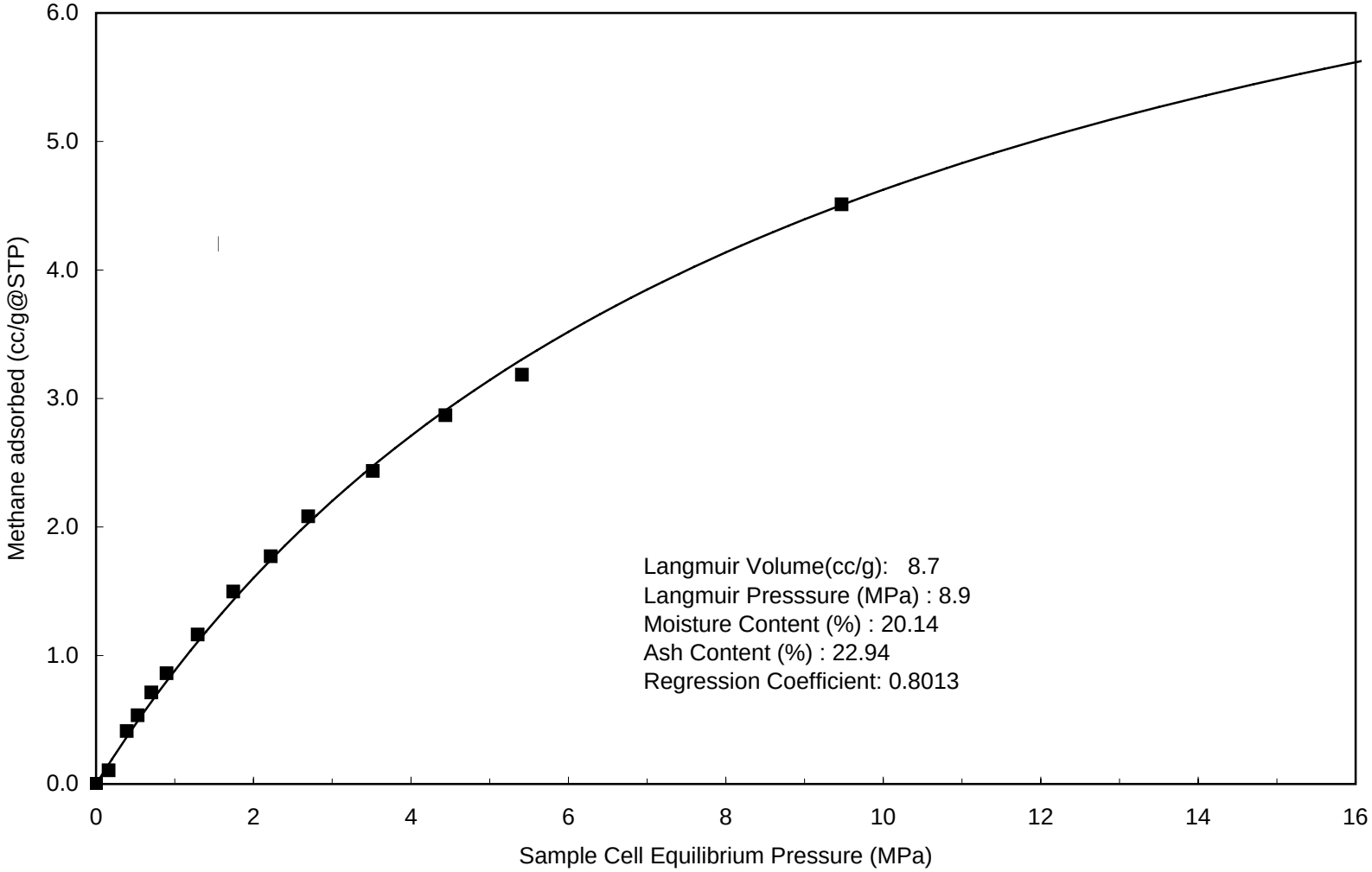
0.160	0.08	0.00
0.390	0.30	1.28
0.530	0.40	1.34
0.702	0.53	1.33
0.895	0.64	1.41
1.292	0.86	1.50
1.744	1.11	1.58
2.219	1.31	1.70
2.695	1.54	1.75
3.516	1.80	1.95
4.439	2.12	2.09
5.410	2.35	2.30
9.470	3.33	2.84

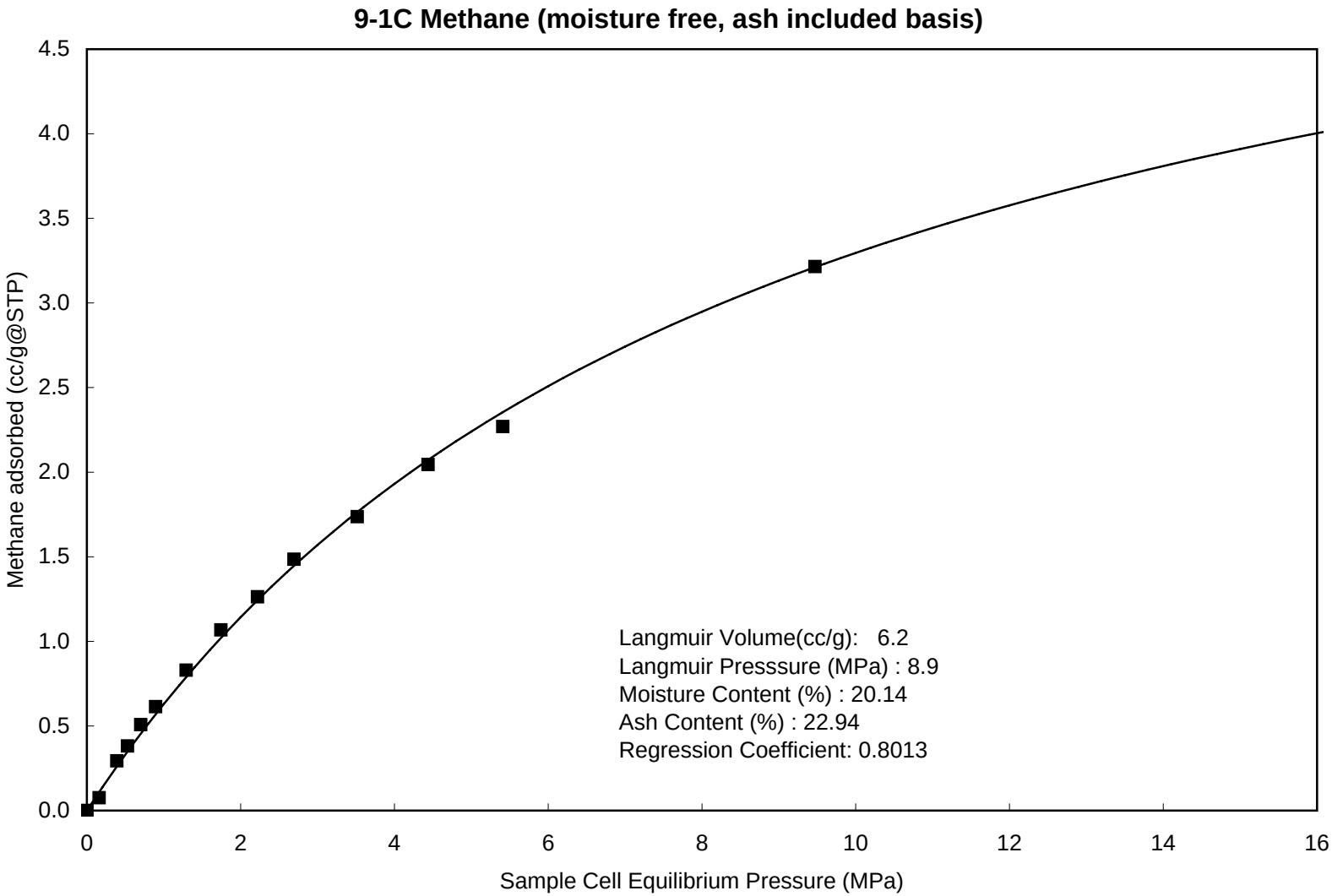
Saturated Monolayer Volume (cc/g, ash free): 6.46
Langmuir Pressure (MPa): 8.91
Correlation Coefficient: 0.8013

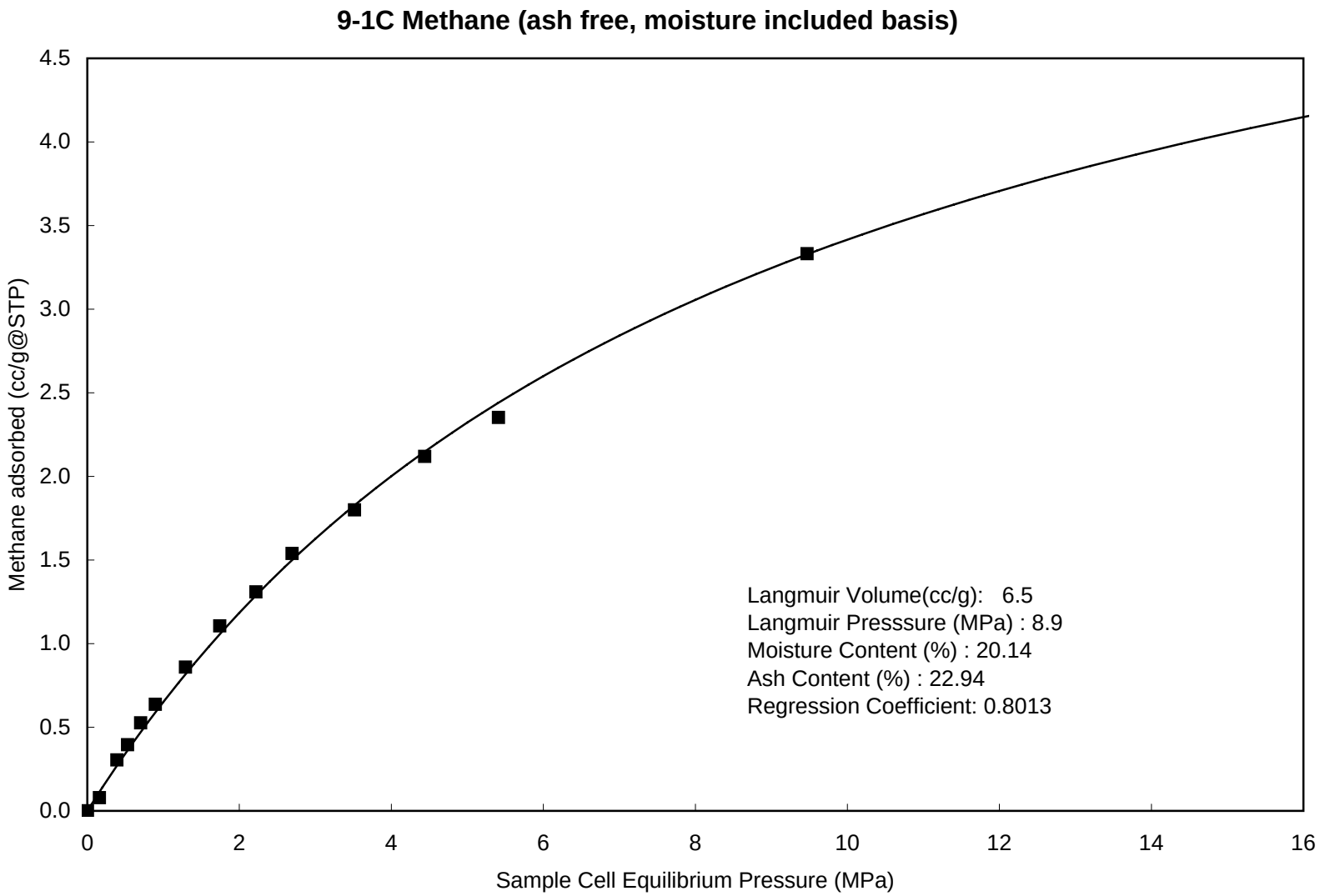
9-1C Methane (as received basis)



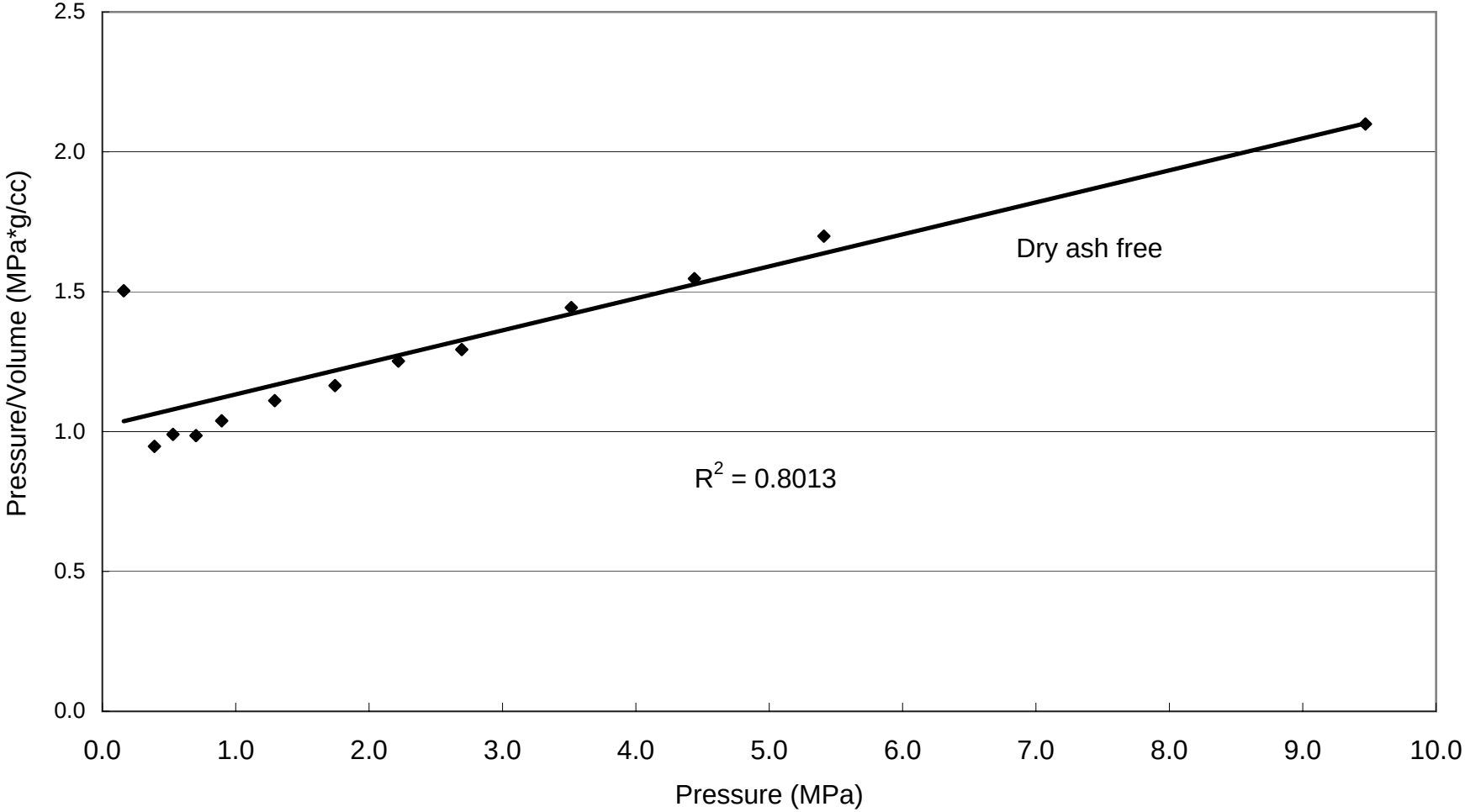
9-1C Methane (dry & ash free basis)



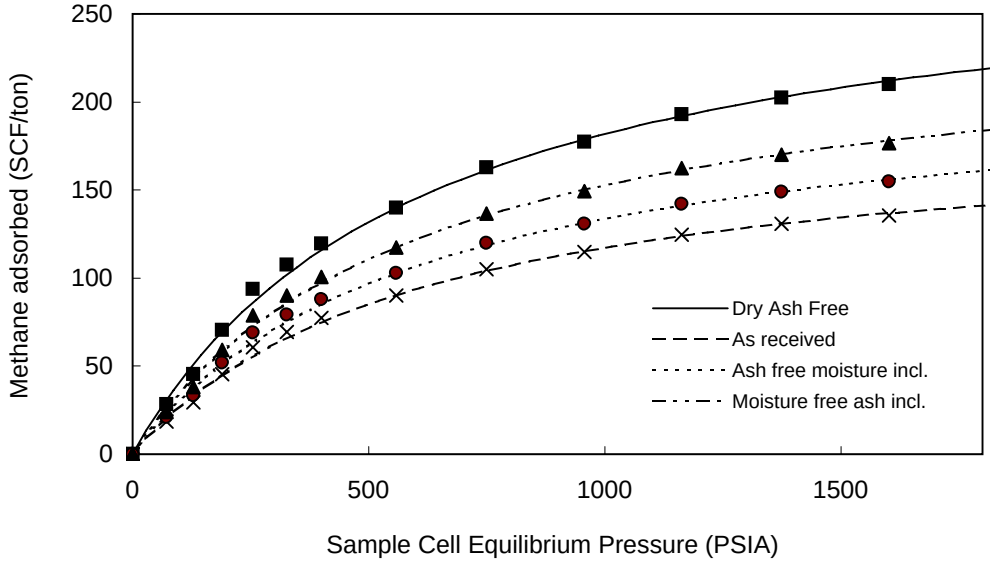

9-1C Methane (moisture free, ash included basis)
Methane adsorbed (cc/g@STP)
Sample Cell Equilibrium Pressure (MPa)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
0
2
4
6
8
10
12
14
16
Langmuir Volume(cc/g): 6.2
Langmuir Presssure (MPa) : 8.9
Moisture Content (%) : 20.14
Ash Content (%) : 22.94
Regression Coefficient: 0.8013


9-1C Methane (ash free, moisture included basis)
Methane adsorbed (cc/g@STP)
Sample Cell Equilibrium Pressure (MPa)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
0
2
4
6
8
10
12
14
16
Langmuir Volume(cc/g): 6.5
Langmuir Presssure (MPa) : 8.9
Moisture Content (%) : 20.14
Ash Content (%) : 22.94
Regression Coefficient: 0.8013

Adsorption Langmuir Plot



9-1D Methane



Pressure (PSIA)	Adsorbed gas (ft^3 /ton)			
	As Received	moisture free ash incl.	ash free moisture incl.	Dry Ash Free
71	18.4	23.9	20.9	28.4
129	29.4	38.3	33.5	45.5
190	45.5	59.2	51.8	70.4
255	60.5	78.7	69.0	93.7
327	69.4	90.3	79.1	107.4
400	77.3	100.5	88.0	119.6
559	90.3	117.4	102.9	139.7
750	105.1	136.8	119.8	162.7
957	114.7	149.2	130.7	177.5
1163	124.7	162.3	142.1	193.0
1375	130.6	170.0	148.9	202.2
1602	135.7	176.6	154.7	210.1

Langmuir Parameters

	As Received	Moisture free ash incl	Ash free moisture incl	Dry Ash Free
Vol. (ft^3 /ton)	189.3	246.3	215.7	293.0
Pressure (PSIA)	611.6	611.6	611.6	611.6

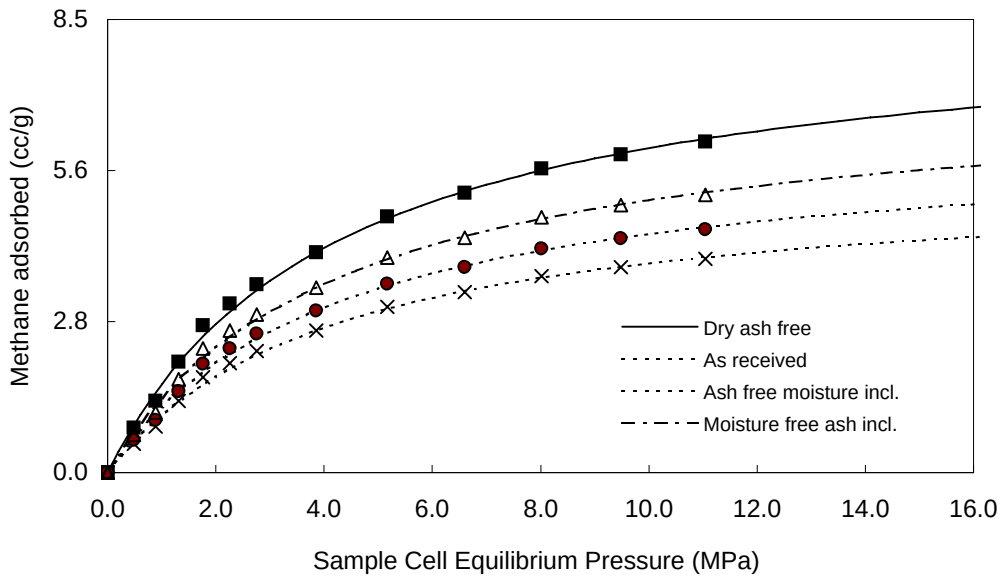
SUMMARY OF ADSORPTION ANALYSES IMP. UNITS

Isotherm Temperature: 118.4 ºF

Goodness of fit of Langmuir regression: 0.99

% Ash= 12.25 % Moisture= 23.15 Density g/cc 1.344

9-1D Methane



Pressure (MPa)	Adsorbed gas (cc/g)			
	As Received	Moisture free ash incl.	ash free moisture incl	Dry Ash Free
0.491	0.54	0.70	0.62	0.84
0.890	0.86	1.13	0.99	1.34
1.310	1.34	1.74	1.52	2.07
1.760	1.78	2.31	2.03	2.75
2.256	2.04	2.65	2.32	3.16
2.756	2.27	2.95	2.59	3.51
3.851	2.65	3.45	3.02	4.11
5.170	3.09	4.02	3.52	4.78
6.598	3.37	4.39	3.84	5.22
8.016	3.66	4.77	4.18	5.67
9.479	3.84	5.00	4.38	5.94
11.049	3.99	5.19	4.55	6.17

Langmuir Parameters

	As Received	Moisture free ash incl.	Ash free moisture incl	Dry Ash Free
Vol. (cc/g)	5.56	7.24	6.34	8.61
Pressure (MPa)	4.22	4.22	4.22	4.22

SUMMARY OF ADSORPTION ANALYSES SI UNITS

Isotherm Temperature: **48.0 ºC**

Goodness of fit of Langmuir regression: **0.99**

% Ash= 12.25 **% Moisture = 23.15** **Density (g/cc) 1.344**

9-1D Methane

Methane Adsorption
(Imperial Units)

Summary of Analyses		
	As Received	DAF basis
Langmuir Volume (SCF)	189	293
Langmuir Pressure (PSIA)	612	612
Goodness of fit Langmuir Equation R-squared	0.99	0.99
Ash Content Wt.%	12.25	12.25
Equilibrium Moisture Wt.%	23.15	23.15

Contents of Appendix

data sheets	***Charts***
As Received	As Received
Dry Ash Free	Dry Ash Free
Dry Ash Included	Dry Ash Included
Moist Ash Free	Moist Ash Free

9-1D Methane

GAS ADSORPTION ISOTHERM IMPERIAL UNITS

AS RECEIVED BASIS

		Moisture Content % :	23.15
Isotherm Temperature º F:	118.4	Ash Content, % :	12.25
Gas used:	Methane	Helium Density g/cc	1.344

PRESSURE (PSI)	ADSORBED GAS (SCF/ton)	P / V
71	18.37	3.87
129	29.42	4.39
190	45.47	4.18
255	60.51	4.22
327	69.37	4.72
400	77.25	5.17
559	90.26	6.19
750	105.10	7.13
957	114.67	8.35
1163	124.70	9.32
1375	130.64	10.52
1602	135.71	11.81

Saturated Monolayer Volume (SCF/ton):	189.3
Langmuir Pressure (PSIA):	611.6
Correlation Coefficient:	0.9935

DRY ASH FREE BASIS

71	28.43	2.50
129	45.55	2.83
190	70.39	2.70
255	93.67	2.72
327	107.38	3.05
400	119.59	3.34
559	139.72	4.00
750	162.70	4.61
957	177.50	5.39
1163	193.04	6.02
1375	202.23	6.80
1602	210.08	7.63

Saturated Monolayer Volume (SCF/ton, daf):	293
Langmuir Pressure (PSIA):	612
Correlation Coefficient:	0.9935

9-1D Methane

GAS ADSORPTION ISOTHERM IMPERIAL UNITS

MOISTURE FREE ASH INCLUDED

		Moisture Content % :	23.15
Isotherm Temperature° F:	118.4	Ash Content, % :	12.25
Gas used:	Methane	Helium Density g/cc	1.344

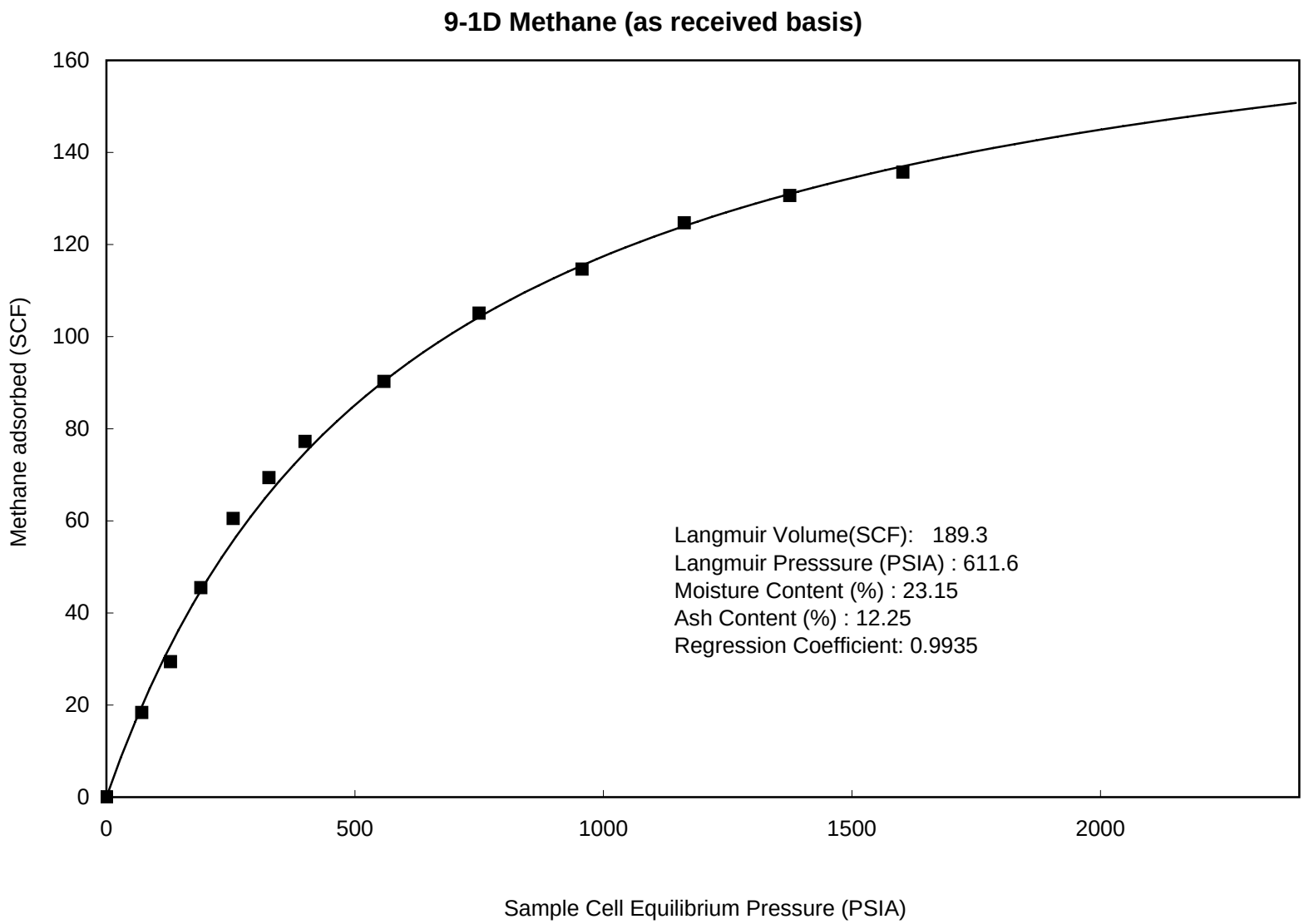
PRESSURE (PSI)	ADSORBED GAS (SCF/ton)	P / V
71	24	2.98
129	38	3.37
190	59	3.21
255	79	3.24
327	90	3.62
400	101	3.98
559	117	4.76
750	137	5.48
957	149	6.41
1163	162	7.17
1375	170	8.09
1602	177	9.07

Saturated Monolayer Volume (SCF/ton):	246
Langmuir Pressure (PSIA):	612
Correlation Coefficient:	0.9935

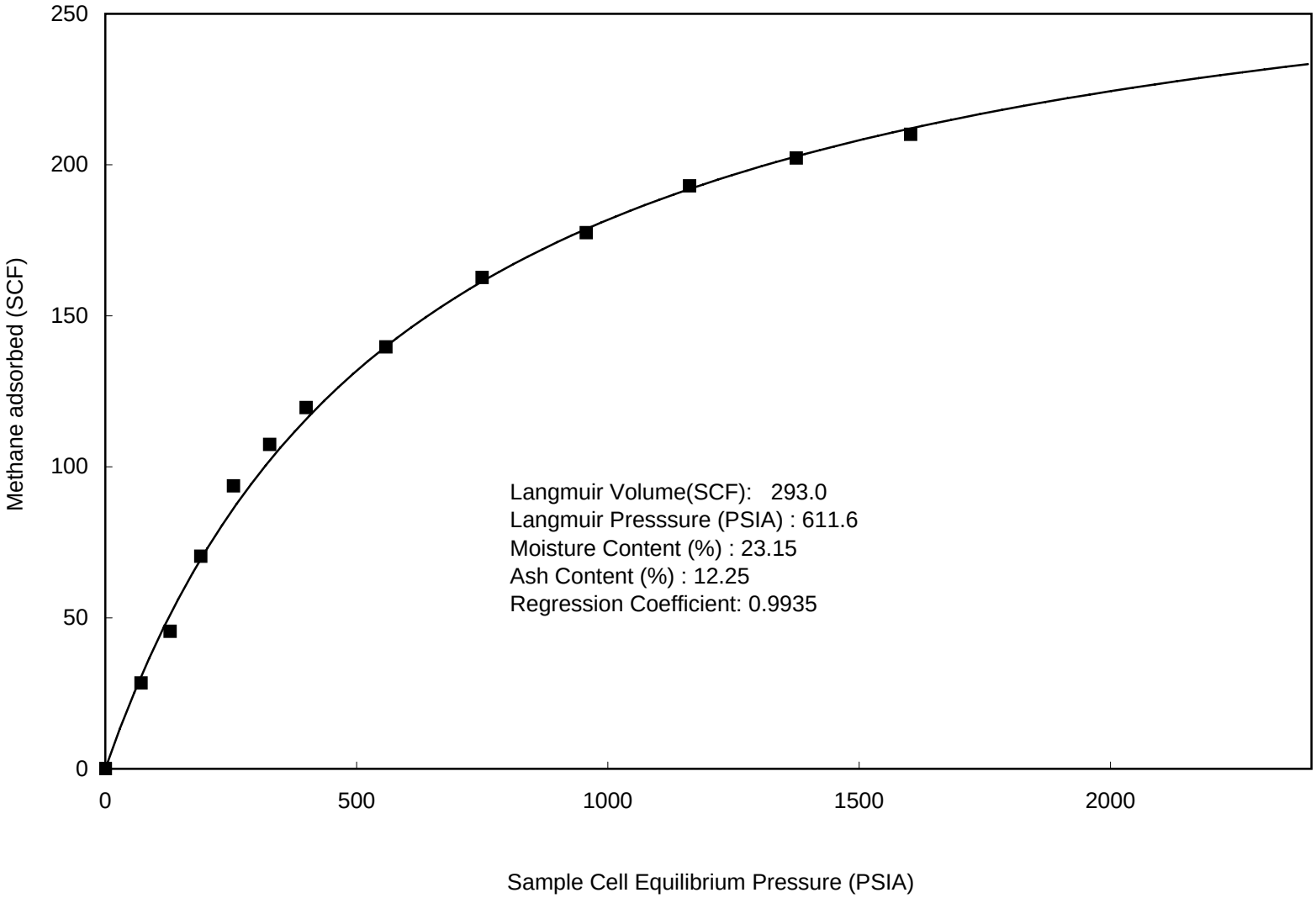
ASH FREE MOISTURE INCLUDED

71	21	3.40
129	34	3.85
190	52	3.67
255	69	3.70
327	79	4.14
400	88	4.54
559	103	5.43
750	120	6.26
957	131	7.32
1163	142	8.18
1375	149	9.24
1602	155	10.36

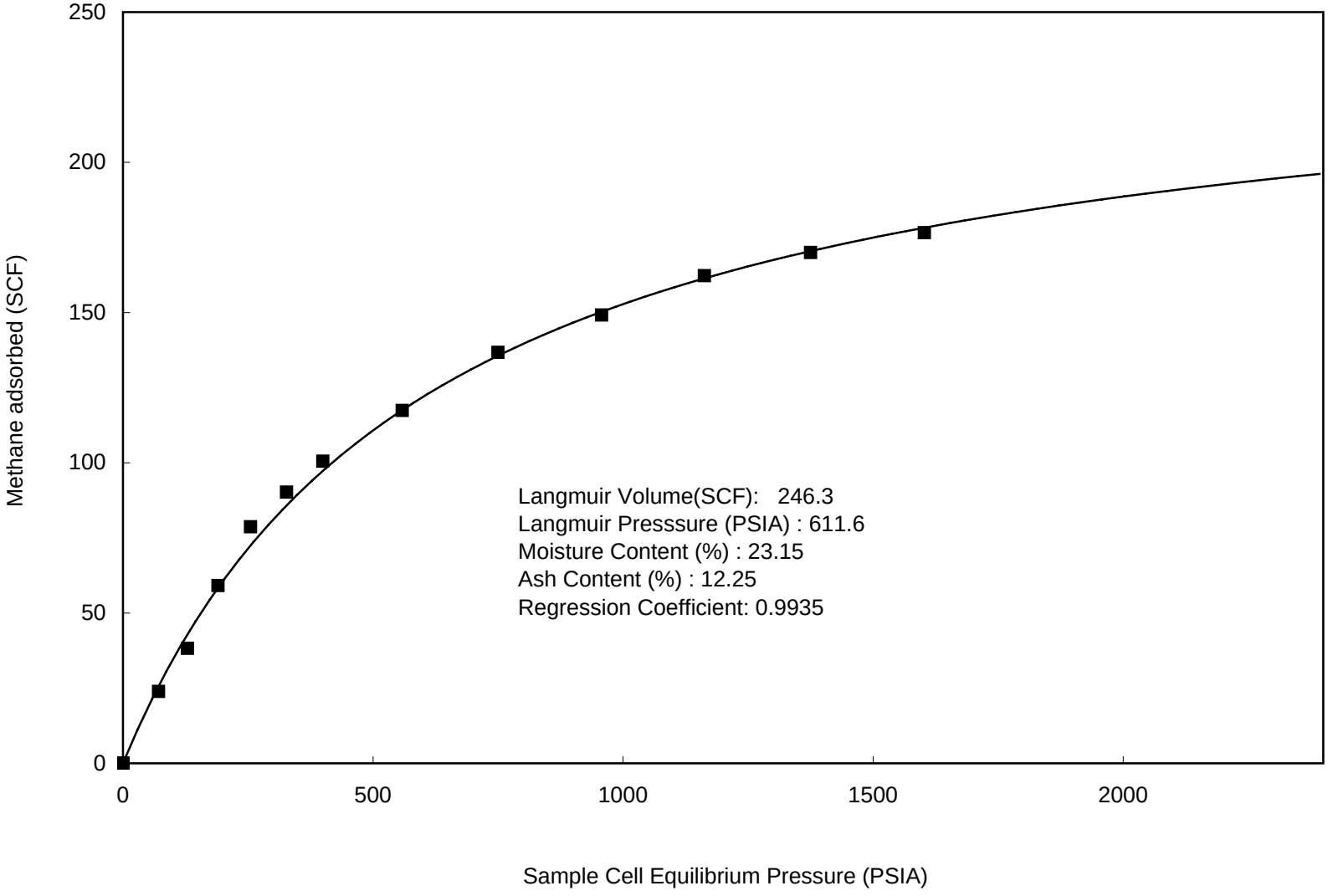
Saturated Monolayer Volume (SCF/ton):	216
Langmuir Pressure (PSIA):	612
Correlation Coefficient:	0.9935


9-1D Methane (as received basis)
Methane adsorbed (SCF)
Sample Cell Equilibrium Pressure (PSIA)
0
20
40
60
80
100
120
140
160
0
500
1000
1500
2000
Langmuir Volume(SCF): 189.3
Langmuir Presssure (PSIA) : 611.6
Moisture Content (%) : 23.15
Ash Content (%) : 12.25
Regression Coefficient: 0.9935

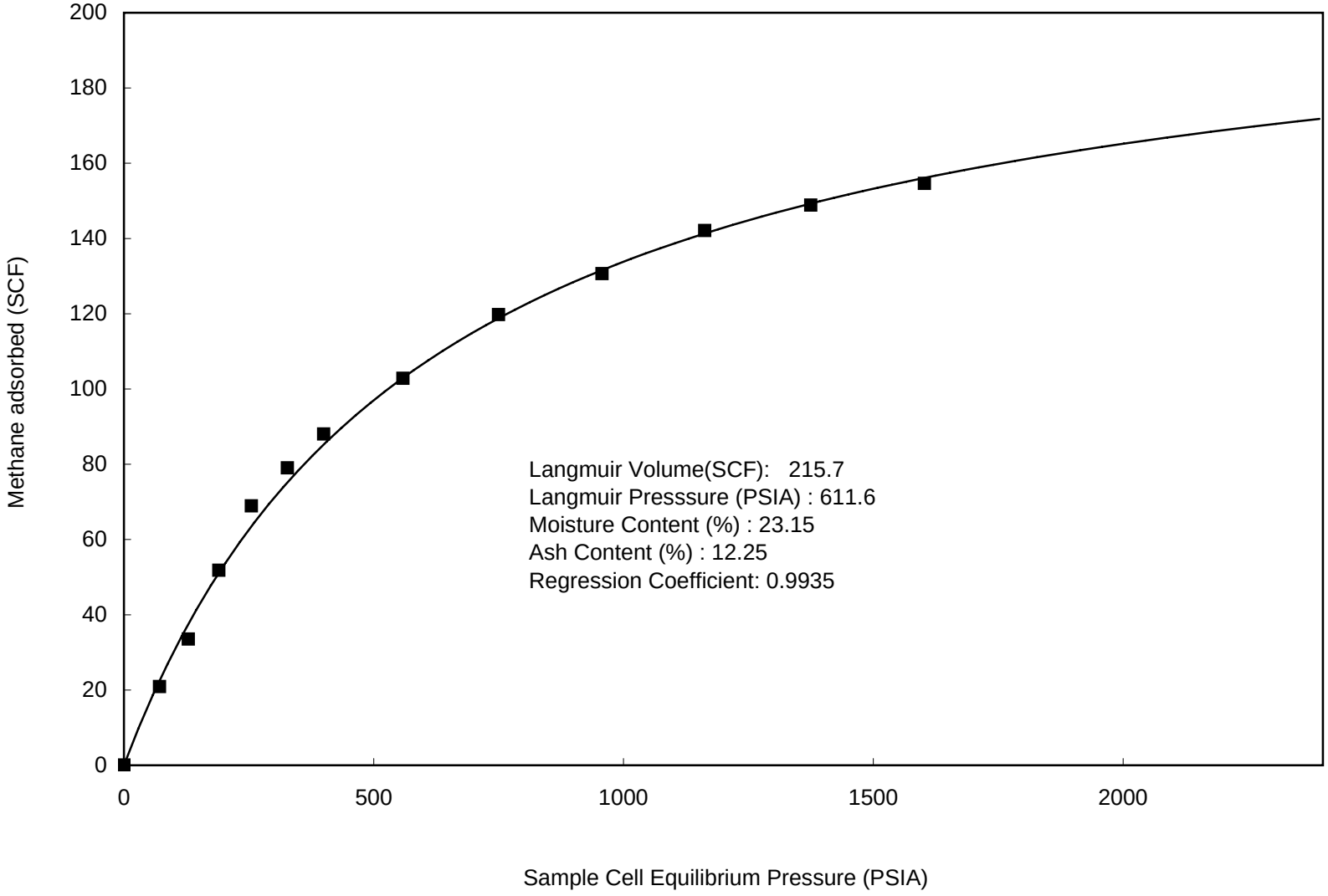
9-1D Methane (dry & ash free basis)

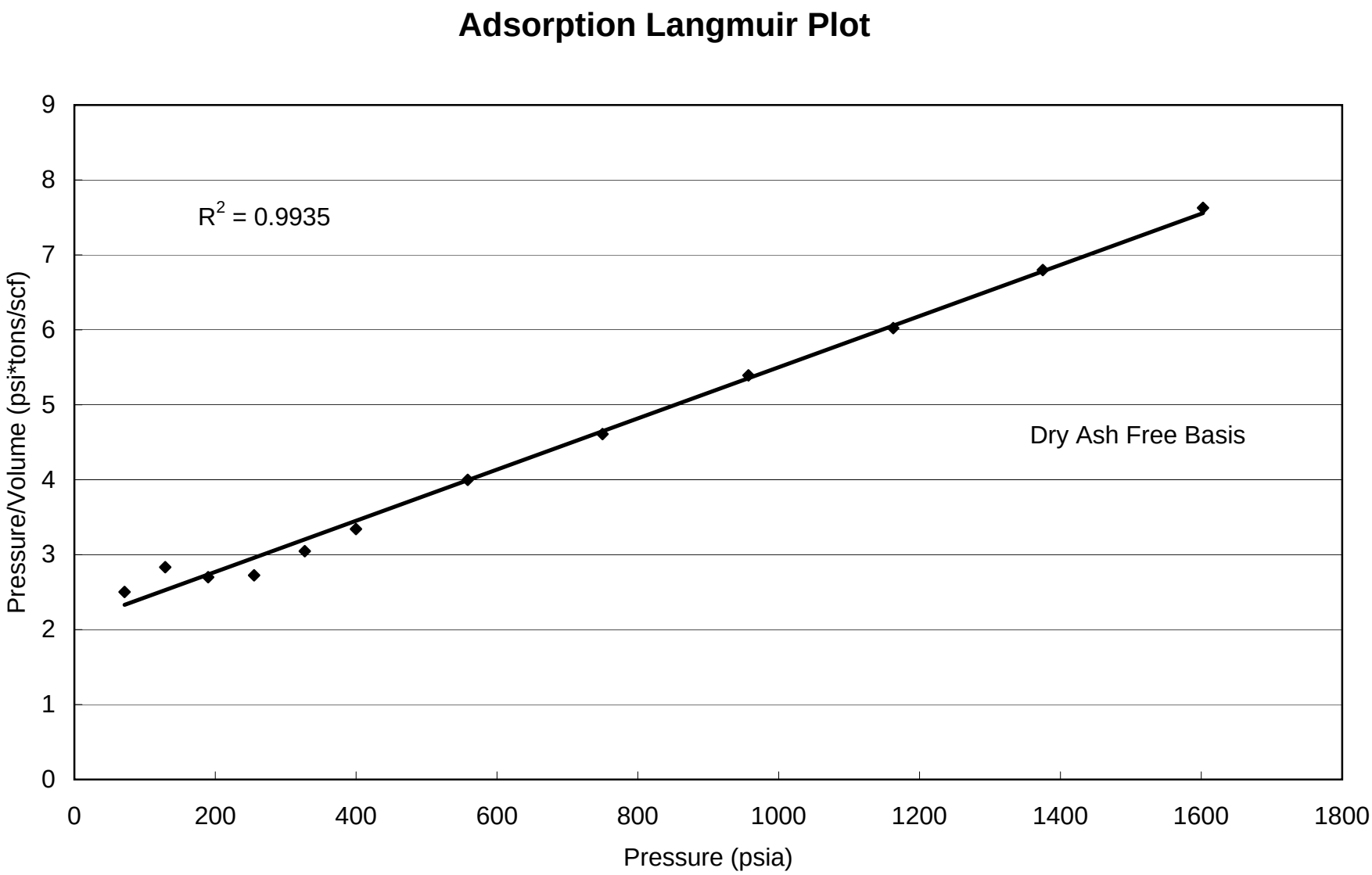


9-1D Methane (moisture free, ash included basis)



9-1D Methane (ash free, moisture included basis)




Adsorption Langmuir Plot
R^2 = 0.9935
Dry Ash Free Basis
Pressure/Volume (psi*tons/scf)
Pressure (psia)
0
1
2
3
4
5
6
7
8
9
0
200
400
600
800
1000
1200
1400
1600
1800

9-1D Methane

Methane Adsorption (SI Units)

Summary of Analyses		
	As Received	DAF basis
Langmuir Volume cc/g	5.56	8.61
Langmuir Pressure MPa	4.22	4.22
Goodness of fit Langmuir Equation R-squared	0.99	0.99
Ash Content Wt.%	12.25	12.25
Equilibrium Moisture Wt.%	23.15	23.15

Contents of Appendix

data sheets	***Charts***
As Received	As Received
Dry Ash Free	Dry Ash Free
Dry Ash Included	Dry Ash Included
Moist Ash Free	Moist Ash Free

9-1D Methane

GAS ADSORPTION ISOTHERM SI UNITS

AS RECEIVED BASIS

Sample I.D. :	9-1D Methane	Moisture Content (EQ) % :	23.15
Isotherm Temperature º C:	48	Ash Content % :	12.25
Gas used:	Methane	Helium Density g/cc	1.344

PRESSURE (MPa)	ADSORBED GAS (cc/g @STP)	P / V
0.491	0.54	0.909
0.890	0.86	1.029
1.310	1.34	0.980
1.760	1.78	0.990
2.256	2.04	1.107
2.756	2.27	1.214
3.851	2.65	1.452
5.170	3.09	1.674
6.598	3.37	1.958
8.016	3.66	2.187
9.479	3.84	2.469
11.049	3.99	2.770

Saturated Monolayer Volume (cc/g @ STP):	5.56
Langmuir Pressure (MPa):	4.22

DRY ASH FREE BASIS

0.491	0.84	0.587
0.890	1.34	0.665
1.310	2.07	0.633
1.760	2.75	0.639
2.256	3.16	0.715
2.756	3.51	0.784
3.851	4.11	0.938
5.170	4.78	1.081
6.598	5.22	1.265
8.016	5.67	1.413
9.479	5.94	1.595
11.049	6.17	1.790

Saturated Monolayer Volume (cc/g @ STP, daf):	8.61
Langmuir Pressure (MPa):	4.22
Correlation Coefficient:	0.9935

9-1D Methane

GAS ADSORPTION ISOTHERM SI UNITS

MOISTURE FREE ASH INCLUDED

		Moisture Content (EQ) % :	23.15
Isotherm Temperature º C:	48	Ash Content % :	12.25
Gas used:	Methane	Helium Density g/cc	1.344

PRESSURE (MPa)	ADSORBED GAS (cc/g@STP)	P / V
0.491	0.70	0.70
0.890	1.13	0.79
1.310	1.74	0.75
1.760	2.31	0.76
2.256	2.65	0.85
2.756	2.95	0.93
3.851	3.45	1.12
5.170	4.02	1.29
6.598	4.39	1.50
8.016	4.77	1.68
9.479	5.00	1.90
11.049	5.19	2.13

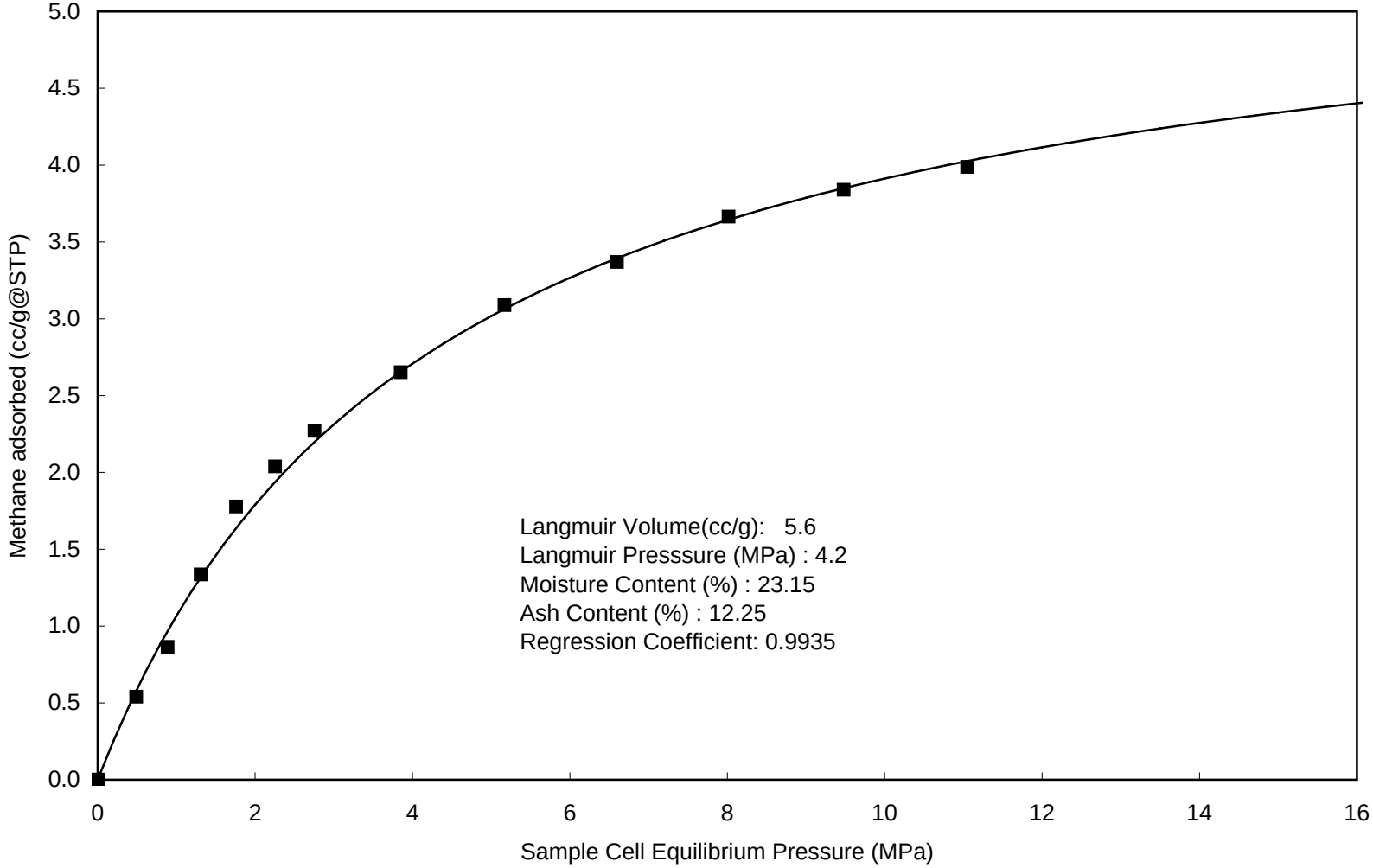
Saturated Monolayer Volume (cc/g):	7.24
Langmuir Pressure (MPa):	4.22

ASH FREE MOISTURE INCLUDED

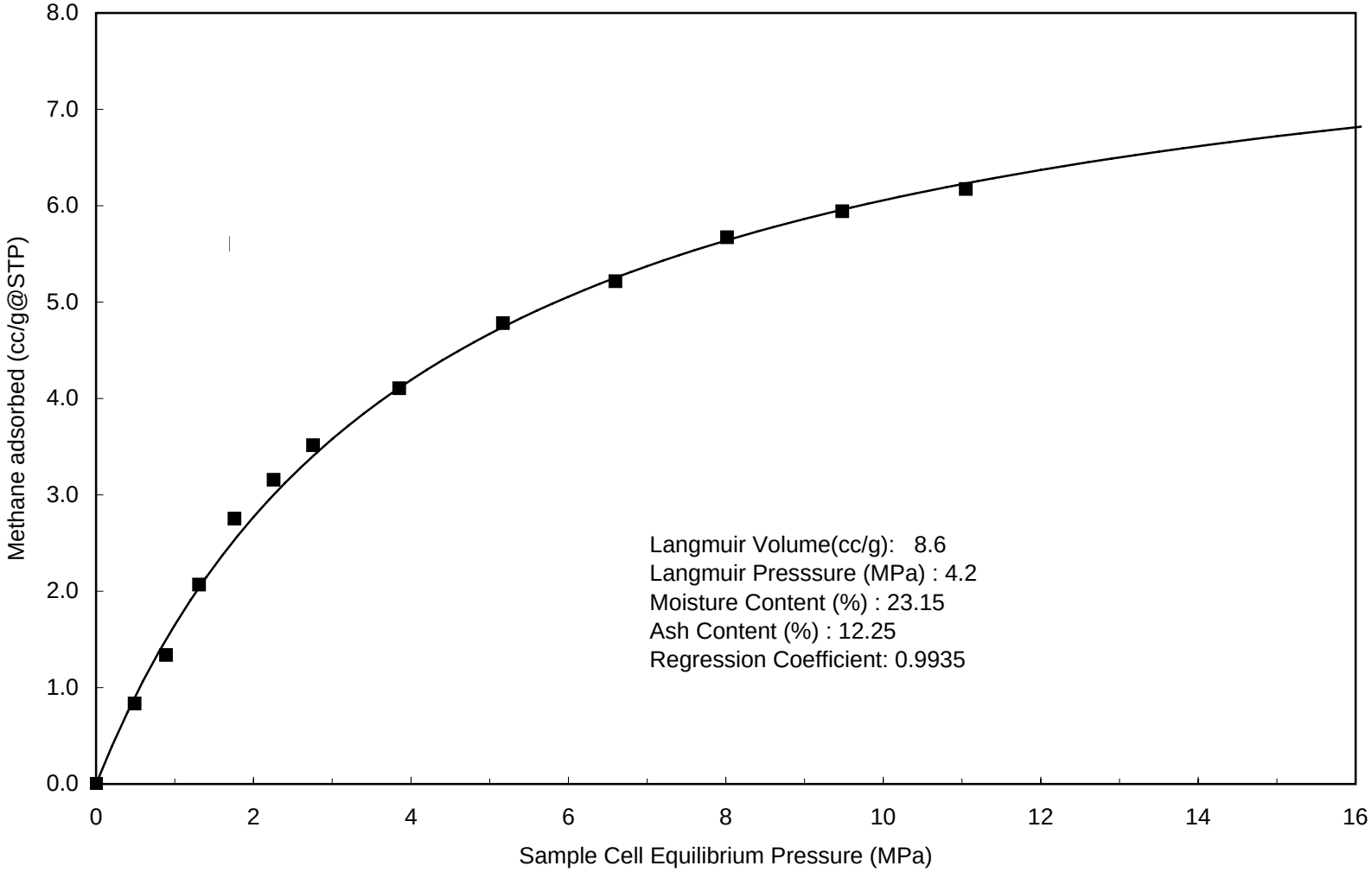
0.491	0.62	0.00
0.890	0.99	0.90
1.310	1.52	0.86
1.760	2.03	0.87
2.256	2.32	0.97
2.756	2.59	1.07
3.851	3.02	1.27
5.170	3.52	1.47
6.598	3.84	1.72
8.016	4.18	1.92
9.479	4.38	2.17
11.049	4.55	2.43

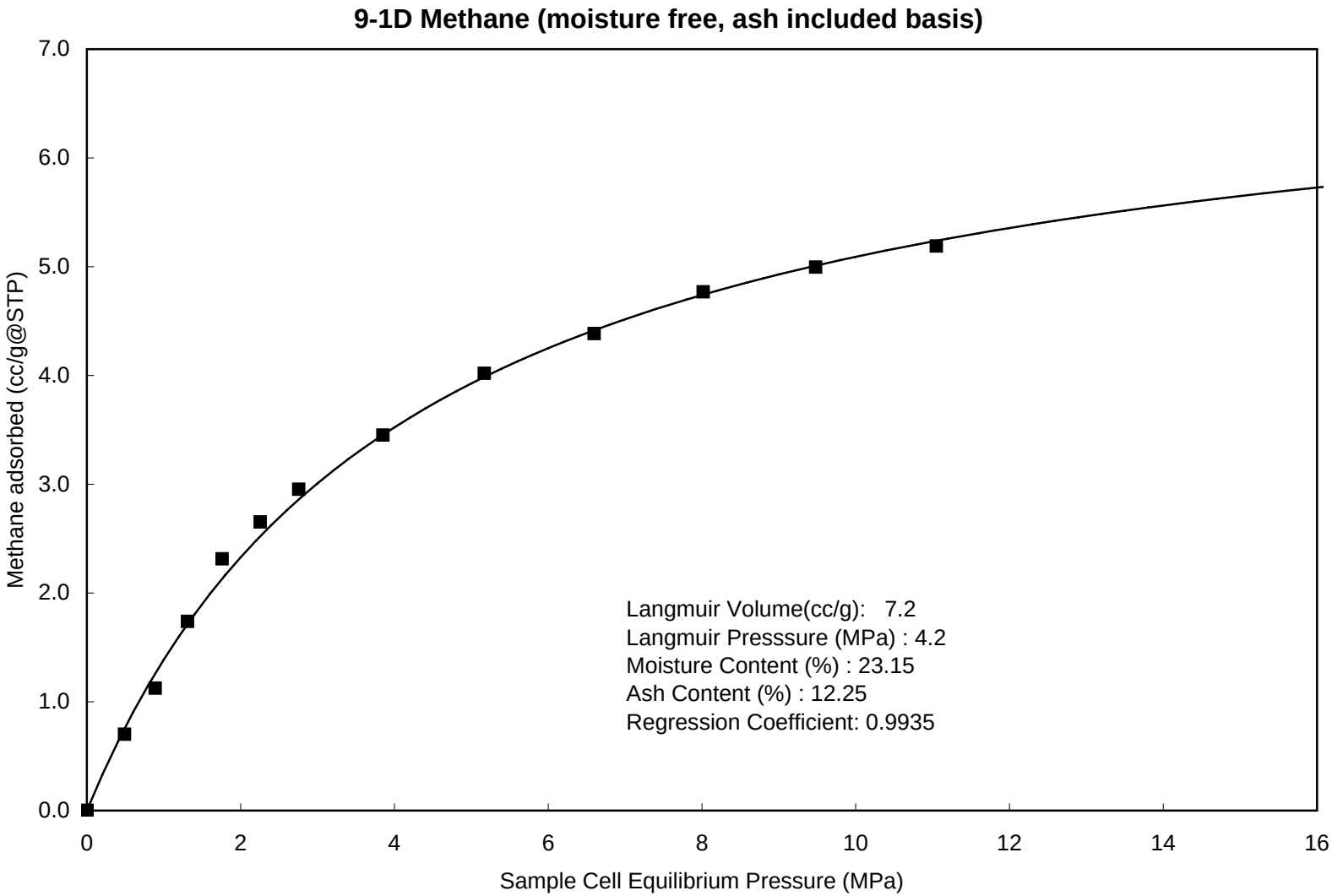
Saturated Monolayer Volume (cc/g, ash free):	6.34
Langmuir Pressure (MPa):	4.22
Correlation Coefficient:	0.9935

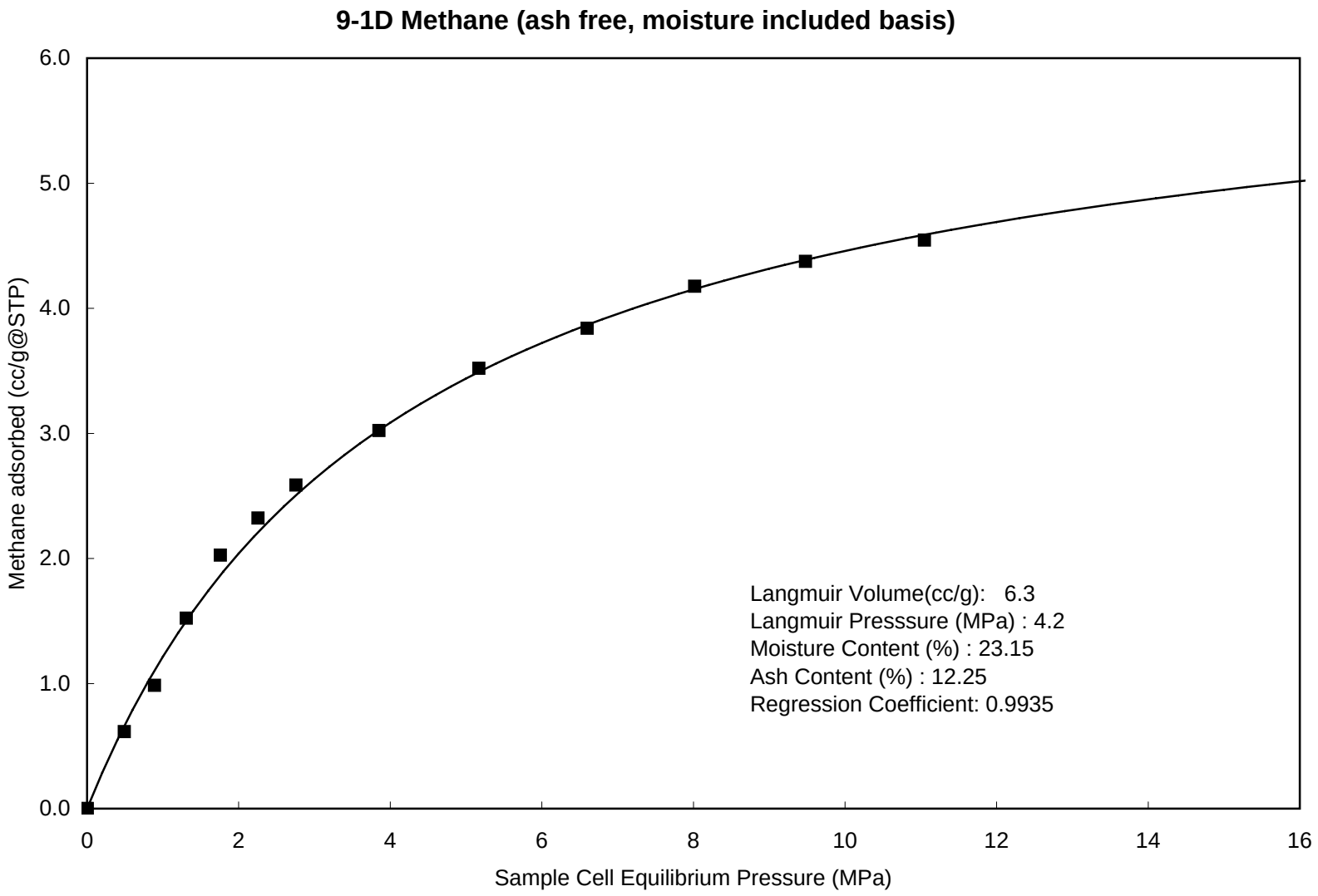
9-1D Methane (as received basis)



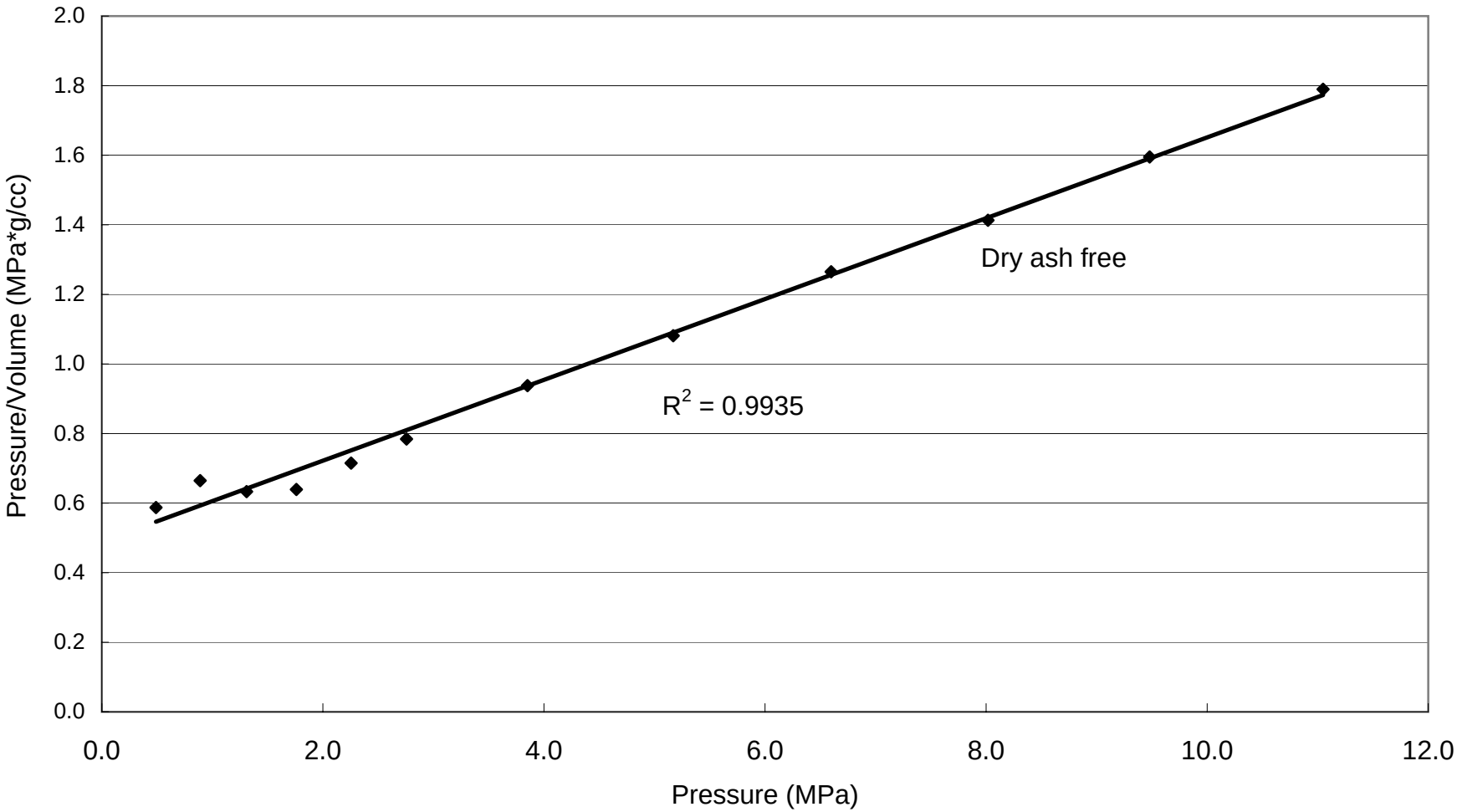
9-1D Methane (dry & ash free basis)




9-1D Methane (moisture free, ash included basis)
Methane adsorbed (cc/g@STP)
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
0
2
4
6
8
10
12
14
16
Sample Cell Equilibrium Pressure (MPa)
Langmuir Volume(cc/g): 7.2
Langmuir Presssure (MPa) : 4.2
Moisture Content (%) : 23.15
Ash Content (%) : 12.25
Regression Coefficient: 0.9935


9-1D Methane (ash free, moisture included basis)
Methane adsorbed (cc/g@STP)
6.0
5.0
4.0
3.0
2.0
1.0
0.0
0
2
4
6
8
10
12
14
16
Sample Cell Equilibrium Pressure (MPa)
Langmuir Volume(cc/g): 6.3
Langmuir Presssure (MPa) : 4.2
Moisture Content (%) : 23.15
Ash Content (%) : 12.25
Regression Coefficient: 0.9935

Adsorption Langmuir Plot



Appendix 5. Petrographic Data

Report Information

Tables

Appendix 5, Table 1. Coal petrographic summary report, vol.%, whole coal basis

Appendix 5, Table 2a. Organic petrography and maximum reflectance of huminite (Rmax) of Wilcox samples on vol.% mmf basis, Devon SFS Operating Co Etal 5 no.1 coalbed methane test well.

Appendix 5, Table 2b. Organic petrography and maximum reflectance of huminite (Rmax) of Wilcox samples on vol.% mmf basis, Devon SFS Operating Co Etal 9 no.1 coalbed methane test well.

Raw data

SFS 5-1
LA-SWC-01-3
4-LA-1
3-LA-8
LA-SWC-00-3
LA-3-01-73
LA-3-01-74
4-LA-6
4-LA-2
4-LA-4

SFS 9-1
4-LA-3
4-LA-9
4-LA-5
4-LA-7
3-LA-C13
4-LA-8
4-LA-10
4-LA-11
3-LA-C10
LA-3-01-12
3-LA-C12
3-LA-C14
4-LA-12
3-LA-9
LA-3-01-15

Report Information

Results of petrographic analyses of coal and rock samples in the U.S. Geological Survey Organic Petrology Laboratory usually are reported in three parts; 1) a summary table, 2) a petrographic analysis report, and 3) a vitrinite reflectance report.

The summary table includes the name of the sample submitter, the name of the analyst or report writer, and the date of report preparation. The petrographic data are summarized in tabular format and usually include vitrinite reflectance values, gross maceral group composition, and mineral matter content.

The petrographic analysis report includes five components; 1) a header with basic sample information including sample submitter, submission date, project name, sample identification, sample type, date of analysis, the name of the analyst, the number of points counted, and the sample rank as determined by vitrinite reflectance, 2) a bar chart showing gross maceral group composition on a mineral-matter-free basis (volume percent

of organic matter basis), 3) a bar chart showing organic composition on a mineral-containing basis (volume percent of whole coal/rock), 4) a data table listing the measured amounts of the individual organic components on mineral-containing and mineral-free bases, and 5) a comment section which allows the analyst to record any pertinent details about the petrographic character of the sample.

The vitrinite reflectance report includes five components; 1) a header with basic sample information including sample submitter, submission date, project name, sample identification, sample type, date of analysis, and the name of the analyst, 2) results, including the number of vitrinite reflectance measurements, the type of vitrinite maceral analyzed, the mean maximum or mean random reflectance value, the standard deviation of the mean reflectance value, and the sample rank, 3) data, which contains all of the measured reflectance values to three decimal places, the maximum and minimum measured values, and the number of V-types (reflectance ranges of 0.1 percent), 4) a histogram of the reflectance data, and 5) a comment section which allows the analyst to record any pertinent details about the petrographic character of the sample. Contained within the reflectance digital spreadsheets in Appendix 7 are worksheets for “Data entry” and “Chart data” (contains frequency data) used to generate the graph on the “Report and chart” worksheet.

USGS

Appendix 5, Table 1. Coal petrographic summary report

Prepared by: P.Hackley
Date: 4/25/2005

	List of Samples:	From (ft)	To (ft)	R_{max}	s.d.	Volume% Whole Coal %Hum	%Inert	%Lip	%Min
SFS #5-1	LA-SWC-01-3	1686.2	1696.0	0.30	0.03	61.1	16.3	4.1	18.5
	4-LA-1	1685.2	1686.2	n.d.	n.d.	37.5	13.3	11.1	38.1
	3-LA-8	2039.0	2042.0	0.33	0.06	63.5	9.2	8.1	19.2
	LA-SWC-00-3	2244.2	2247.2	0.36*	0.05	67.3	9.8	8.1	14.8
	LA-3-01-73	2244.2	2247.2	0.37	0.05	73.3	13.6	8.7	4.4
	LA-3-01-74	2673.0	2689.0	0.38*	0.04	72.3	14.6	4.3	8.8
	4-LA-6	2676.6	2677.6	0.42	0.05	62.6	20.5	9.1	7.8
	4-LA-2	2679.0	2680.0	0.42	0.05	64.3	13.7	14.4	7.6
	4-LA-4	2683.5	2684.5	0.47	0.07	60.0	21.4	10.3	8.4
SFS #9-1	4-LA-3	1651.6	1652.0	0.34	0.04	64.4	20.0	3.7	11.9
	LA-SWC-01-2	2053.0	2055.0		n.d., insufficient sample				18.6
	4-LA-9	2223.0	2224.0	0.28	0.04	22.5	13.8	2.2	61.6
	4-LA-5	2224.0	2225.0	0.36*	0.04	36.9	10.0	3.0	50.2
	4-LA-7	2224.0	2228.9	0.30	0.05	39.6	12.2	6.5	41.6
	3-LA-C13	2228.9	2229.2	0.34*	0.03	72.6	2.9	17.7	6.8
	4-LA-8	2265.3	2266.3	0.37*	0.04	16.9	7.1	1.4	74.6
	4-LA-10	2269.6	2270.6	0.33	0.04	63.4	13.6	9.8	13.2
	4-LA-11	2273.6	2274.1	0.37*	0.04	16.9	0.2	0.5	82.5
	3-LA-C10	2688.0	2689.0	0.40*	0.04	60.9	18.1	8.4	12.6
	LA-3-01-12	2689.0	2690.0	0.40*	0.04	65.4	18.0	7.2	9.4
	3-LA-C12	2692.3	2697.5	0.37*	0.04	53.4	18.1	9.0	19.4
	3-LA-C14	2692.3	2697.5	0.37	0.05	61.0	21.7	5.9	11.3
	4-LA-12	2692.3	2693.3	0.37*	0.04	21.3	3.3	2.2	73.2
	3-LA-9	2695.0	2695.3	0.40*	0.04	45.3	36.8	10.2	7.7
	LA-3-01-15	2697.1	2697.5	0.40	0.05	58.4	23.1	5.9	12.6

*R_{max} calculated from $R_{o,r}$

n.d.= not determined, insufficient sample; Hum = huminite; Inert = Inertinite; Lip = liptinite; Min = mineral

Appendix 5, Table 2a. Organic petrography and maximum reflectance of huminite (R_{max}) of Wilcox samples on vol.% mmf basis, Devon SFS Operating Co Etal 5 no.1 coalbed methane test well.

SAMPLE	LA-SWC-01-3	4-LA-1	3-LA-8	LA-SWC-00-3	LA-3-01-73	LA-3-01-74	4-LA-6	4-LA-2	4-LA-4
R_{max}	0.30	n.d.	0.33	0.36	0.37	0.38	0.42	0.42	0.47
No. measurements	100		100	100	100	100	100	100	100
standard deviation	0.03	n.d.	0.06	0.05	0.05	0.04	0.05	0.05	0.07
HUMINITE (total)	75.0	60.6	78.6	79.0	76.7	79.3	67.9	69.6	65.5
ulminite/textinite	36.0	X	28.0	43.8	36.8	42.5	37.5	37.7	31.7
attrinite/densinite	39.0	60.6	50.7	35.2	39.9	36.8	30.4	31.9	33.8
INERTINITE (total)	20.0	21.4	11.4	11.5	14.2	16.0	22.2	14.8	23.3
fusinite	3.3	1.8	2.0	2.3	3.2	1.2	6.1	2.1	3.9
semifusinite	5.1	2.6	3.5	3.1	3.8	2.8	4.5	2.9	5.7
secretinite	X	X	X	0.2	0.3	X	0.2	0.1	X
macrinite	1.6	0.2	1.8	2.3	3.4	4.8	2.3	1.8	1.8
micrinite	X	X	X	0.2	X	0.3	0.2	X	0.3
funginite	0.4	X	0.2	0.8	0.5	0.1	X	0.1	0.2
inertodetrinite	9.6	16.8	3.9	2.5	3.0	6.7	8.9	7.8	11.5
LIPTINITE (total)	5.0	18.0	10.0	9.5	9.1	4.7	9.9	15.6	11.2
sporinite	0.7	6.0	1.4	0.9	0.5	0.4	0.6	0.4	1.3
cutinite	X	X	0.8	0.2	0.2	0.1	X	0.4	0.5
resinite in textinite	X	X	0.3	X	0.4	X	X	X	X
resinite in matrix	0.5	1.2	0.6	0.2	0.4	0.7	0.7	0.8	0.3
bituminite	0.1	X	0.6	1.5	2.4	0.8	2.2	2.5	1.4
exsudatinite	X	X	0.1	0.3	0.7	0.1	X	0.6	0.1
alginite	X	0.2	1.1	1.0	0.6	X	0.8	1.6	0.5
liptodetrinite	3.7	10.6	5.1	5.4	3.9	2.6	5.6	9.3	7.1
suberinite	tr	X	tr	X	X	tr	X	X	X
vol. % Mineral Matter	18.5	38.1	19.2	14.8	4.4	8.8	7.8	7.6	8.4

X=not present, tr=present in quantities <0.1vol.%, vol.%. Mineral matter determined by Parr formula.
mmf = moist, mineral-matter-free basis

Appendix 5, Table 2b. Organic petrography and maximum reflectance of huminite (R_{max}) of Wilcox samples on vol.% mmf basis, Devon SFS Operating Co Etal 9 no.1 coalbed methane test well.

SAMPLE	4-LA-3	4-LA-9	4-LA-5	4-LA-7	3-LA-C13	4-LA-8	4-LA-10	4-LA-11	3-LA-C10	LA-3-01-12	3-LA-C12	3-LA-C14	4-LA-12	3-LA-9	LA-3-01-15
R_{max}	0.34	0.28	0.36	0.30	0.34	0.39	0.33	0.37	0.40	0.40	0.37	0.37	0.37	0.40	0.40
No. measurements	100	100	100	100	100	50	100	100	100	100	100	100	100	100	100
standard deviation	0.04	0.04	0.04	0.05	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.04	0.04	0.05
HUMINITE (total)	73.1	58.6	74.0	67.9	77.9	66.5	73.0	96.3	69.7	72.2	66.3	68.8	79.6	49.1	66.9
ulminite/textinite	45.5	36.4	22.7	18.8	25.8	27.5	29.6	92.1	25.7	34.6	13.9	29.1	20.5	19.9	33.6
attrinite/densinite	27.6	22.2	51.3	49.1	52.0	39.0	43.4	4.3	43.9	37.5	52.4	39.7	59.1	29.1	33.2
INERTINITE (total)	22.7	35.8	20.0	20.9	3.1	27.9	15.7	1.0	20.7	19.8	22.5	24.5	12.2	39.9	26.4
fusinite	5.4	12.8	5.6	4.3	0.3	3.2	3.3	X	1.8	3.3	3.0	1.9	4.1	4.0	5.7
semifusinite	7.2	10.1	2.3	7.3	0.6	9.9	3.5	X	4.8	3.4	3.8	3.5	3.0	11.1	10.5
secretinite	0.2	X	X	0.2	X	0.3	0.1	X	X	X	X	X	0.2	0.1	0.1
macrinite	2.2	2.7	2.9	4.4	0.5	4.2	4.6	0.3	6.3	3.6	3.2	3.1	0.6	2.4	3.3
micrinite	0.1	X	X	X	0.1	X	X	X	X	X	0.1	0.7	X	1.0	X
funginite	0.2	0.2	0.6	0.2	0.5	X	X	0.3	0.1	0.1	0.3	0.2	X	0.1	0.5
inertodetrinite	7.4	10.1	8.5	4.6	1.0	10.2	4.2	0.3	7.7	9.5	12.1	15.1	4.3	21.2	6.4
LIPTINITE (total)	4.2	5.6	6.0	11.2	19.0	5.7	11.3	2.7	9.6	8.0	11.2	6.7	8.2	11.0	6.7
sporinite	1.8	0.4	0.8	0.2	0.3	2.7	1.6	0.3	2.8	2.4	3.4	2.4	2.4	3.8	1.8
cutinite	X	X	X	X	X	1.0	0.1	X	0.3	0.9	0.2	0.2	0.8	0.2	X
resinite in textinite	X	X	X	X	0.3	X	0.7	X	X	0.2	0.1	0.2	X	0.1	X
resinite in matrix	0.9	0.8	1.2	X	0.8	X	0.4	0.3	0.2	0.8	0.6	0.3	0.6	0.6	0.8
bituminite	0.2	0.6	0.6	0.4	0.5	0.3	0.1	X	0.3	0.2	X	X	0.2	X	0.2
exsudatinite	0.1	X	X	X	X	X	0.4	X	0.2	0.1	X	X	0.2	0.2	0.4
alginite	0.2	X	0.2	1.0	0.4	X	1.1	0.3	1.3	0.3	2.0	0.7	1.8	1.6	0.1
liptodetrinite	1.0	3.8	3.2	9.6	16.7	1.7	6.9	1.7	3.7	2.8	4.7	2.7	2.2	4.5	3.4
suberinite	X	X	X	X	X	X	X	X	0.8	0.3	0.2	0.2	X	X	X
vol. % Mineral Matter	11.9	61.6	50.2	41.6	6.8	74.6	13.2	82.5	12.6	9.4	19.4	11.3	73.2	7.7	12.6

X=not present, tr=present in quantities <0.1vol.%, vol.%. Mineral matter determined by Parr formula. mmf = moist, mineral-matter-free basis

PETROGRAPHIC ANALYSIS REPORT

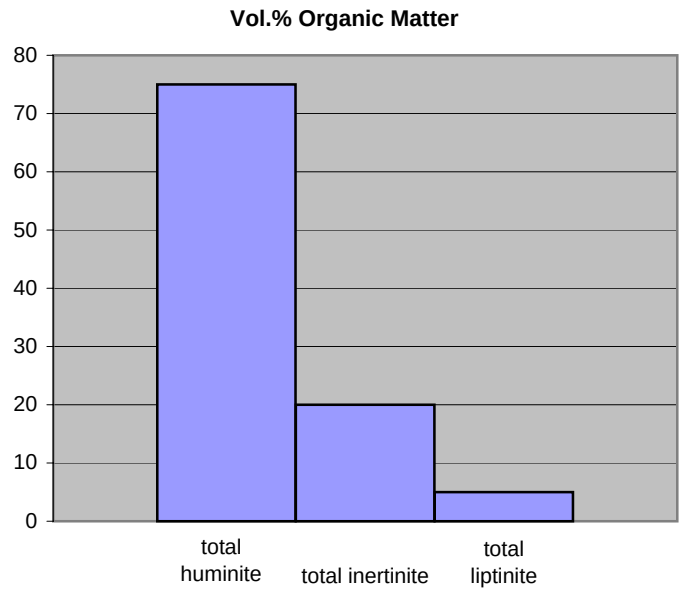
USGS

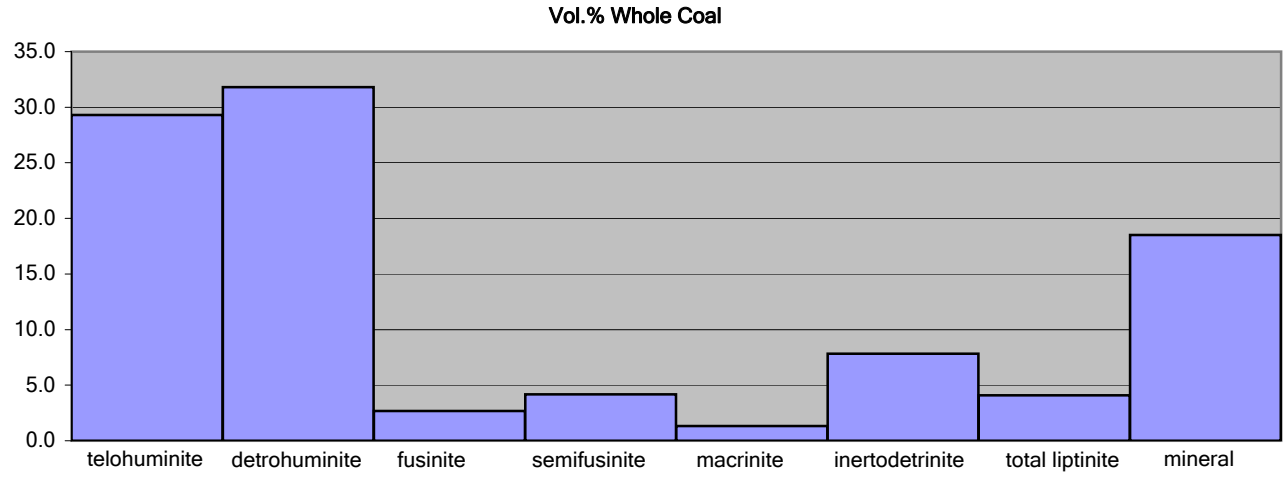
SAMPLE INFORMATION

Submitted by:	P.Warwick
Date Submitted:	1/1/2003
Project:	Devon
Sample:	LA-SWC-01-3
Sample Type	coal core cuttings
Date Analyzed:	1/6/2003
Operator:	P.Warwick
#counts	2000
Rank:	lignite

RESULTS

	Vol.% whole coal	Vol.% organic matter
textinite/ulminite	29.3	36.0
attrinite/densinite	31.8	39.0
corpohuminite	0.0	0.0
total huminite	61.1	75.0
fusinite	2.7	3.3
semifusinite	4.2	5.1
macrinite	1.3	1.6
micrinite	0.0	0.0
funginite	0.3	0.4
inertodetrinite	7.8	9.6
total inertinite	16.3	20.0
sporinite	0.6	0.7
cutinite	0.0	0.0
resinite in textinite	0.0	0.0
resinite in matrix	0.4	0.5
bituminite	0.1	0.1
exsudatinite	0.0	0.0
alginite	0.0	0.0
liptodetrinite	3.0	3.7
suberinite	0.0	0.0
total liptinite	4.1	5.0
mineral	18.5	
total	100.0	100.0





COMMENT

Pyrite-rich, some cleat-filling pyrite. Difference in inertinite content A vs B pellet probably reflects poor polish on B pellet. Beautiful suberinite present. More likely difference in pellet point counts reflects destruction (vs enlightenment) of B pellet via etching. So report uses data only from A pellet, whereas data for both pellets are recorded in LA-SWC-01-3 spreadsheet.

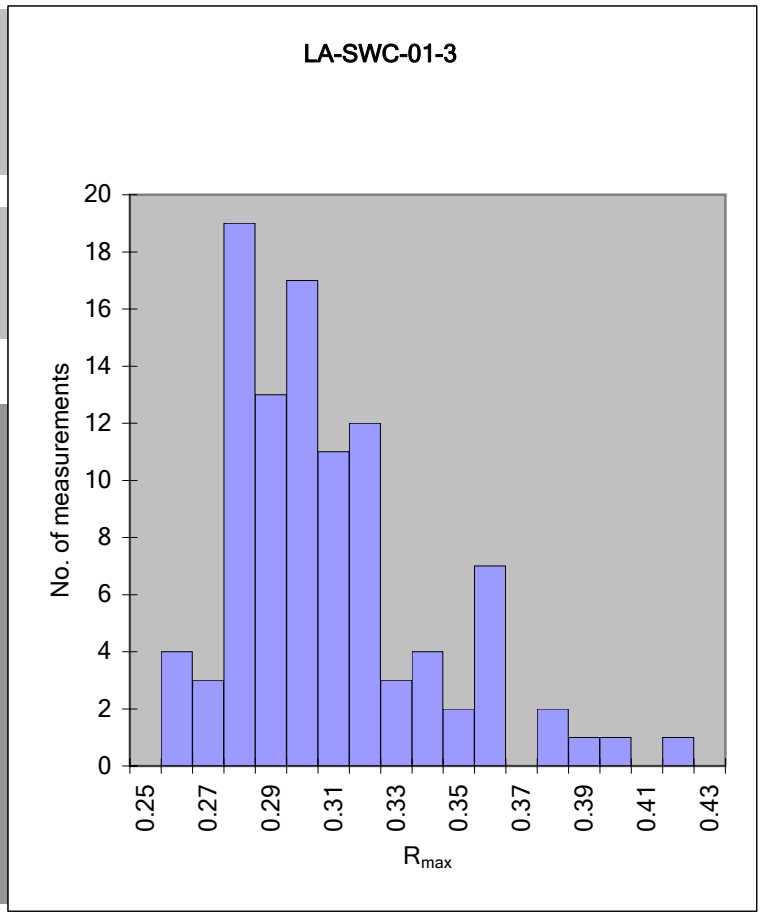
VITRINITE REFLECTANCE REPORT

USGS

SAMPLE INFORMATION

Submitted by: P.Warwick
Date Submitted: 1/1/2003
Project: Devon

Sample: LA-SWC-01-3
Sample Type coal core cuttings
Date Analyzed: 1/1/2003
Operator: P.Hackley



RESULTS

measurements: 100
maceral type: telohuminite
R_{max}: 0.30
s.d.: 0.03

RANK: lignite

DATA

0.290	0.303	0.325	0.277	0.317	0.292	0.277	0.301	0.396	0.320
0.312	0.328	0.295	0.271	0.317	0.279	0.278	0.300	0.316	0.353
0.347	0.292	0.342	0.291	0.274	0.312	0.276	0.372	0.310	0.312
0.286	0.256	0.296	0.260	0.270	0.274	0.312	0.371	0.274	0.273
0.315	0.293	0.420	0.301	0.272	0.284	0.332	0.297	0.289	0.298
0.297	0.291	0.300	0.286	0.273	0.358	0.280	0.276	0.288	0.272
0.256	0.287	0.310	0.300	0.301	0.331	0.290	0.317	0.289	0.280
0.283	0.322	0.265	0.260	0.286	0.298	0.351	0.306	0.293	0.285
0.306	0.300	0.304	0.331	0.269	0.291	0.357	0.381	0.359	0.302
0.310	0.320	0.332	0.275	0.285	0.278	0.352	0.353	0.277	0.312

min: 0.256 max: 0.420 V-types: 3

COMMENT

PETROGRAPHIC ANALYSIS REPORT

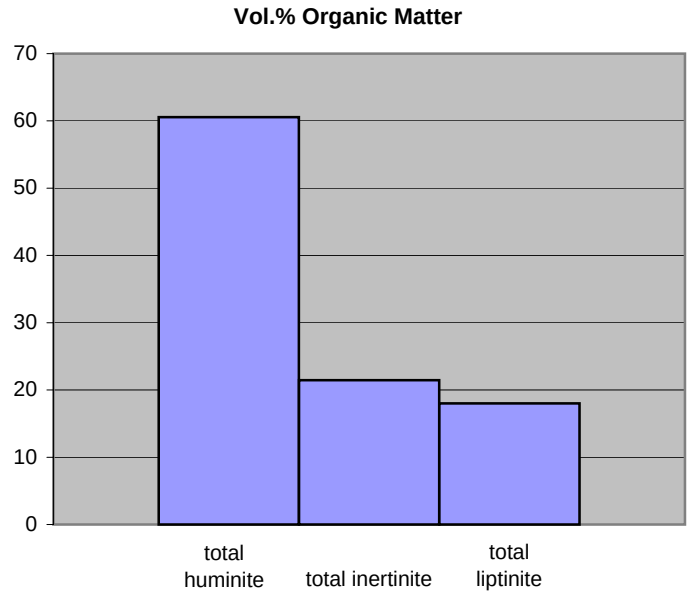
USGS

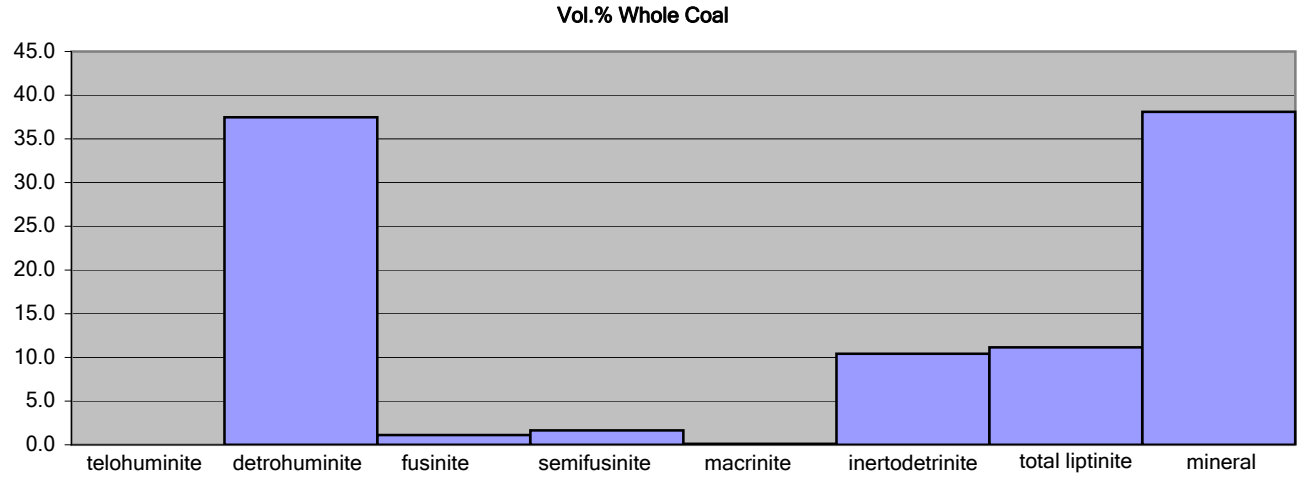
SAMPLE INFORMATION

Submitted by:	P.Warwick
Date Submitted:	1/1/2003
Project:	Devon
Sample:	4-LA-1
Sample Type	coal core
Date Analyzed:	1/7/2003
Operator:	P.Warwick
#counts	1500
Rank:	n.d.

RESULTS

	Vol.% whole coal	Vol.% organic matter
textinite/ulminite	0.0	0.0
attrinite/densinite	37.5	60.6
corpohuminite	0.0	0.0
total huminite	37.5	60.6
fusinite	1.1	1.8
semifusinite	1.6	2.6
macrinite	0.1	0.2
micrinite	0.0	0.0
funginite	0.0	0.0
inertodetrinite	10.4	16.8
total inertinite	13.3	21.4
sporinite	3.7	6.0
cutinite	0.0	0.0
resinite in textinite	0.0	0.0
resinite in matrix	0.7	1.2
bituminite	0.0	0.0
exsudatinite	0.0	0.0
alginite	0.1	0.2
liptodetrinite	6.6	10.6
suberinite	0.0	0.0
total liptinite	11.1	18.0
mineral	38.1	
total	100.0	100.0





COMMENT

Sample described as shaley in field notes. Coal particles in sample mount are mineral-rich attrinite, probably greater than 50 percent of particles are dispersed inertodetrinite-vitrodetrinite in bituminite-mineral matter groundmass. 250 points counted on each pellet in oil immersion. Dispersed vitrinite particles <10um counted as attrinite. n.d. = not determined.

VITRINITE REFLECTANCE REPORT

USGS

SAMPLE INFORMATION

Submitted by: P.Warwick
Date Submitted: 1/1/2003
Project: Devon

Sample: 4-LA-1
Sample Type coal core
Date Analyzed: 4/13/2005
Operator: P.Hackley

RESULTS

measurements: 3
maceral type: telohuminite
R_{ran}: 0.30
s.d.: 0.01

RANK: lignite

DATA

0.296
0.312
0.303

min: 0.296 max: 0.312 V-types: 2

COMMENT

Sample is high-ash, little organic material available for reflectance analysis. Sample is mostly attrinite and mineral matter. High pyrite content. Very little homogeneous areas present for reflectance analysis, 3 readings obtained on A pellet.

PETROGRAPHIC ANALYSIS REPORT

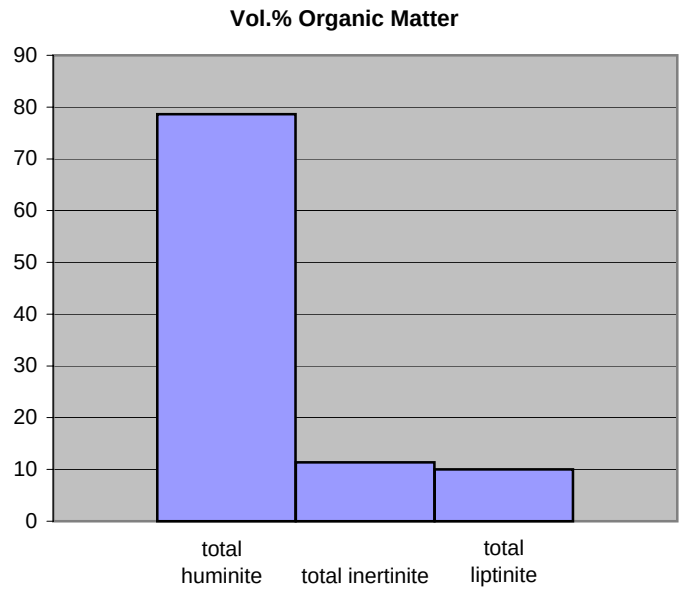
USGS

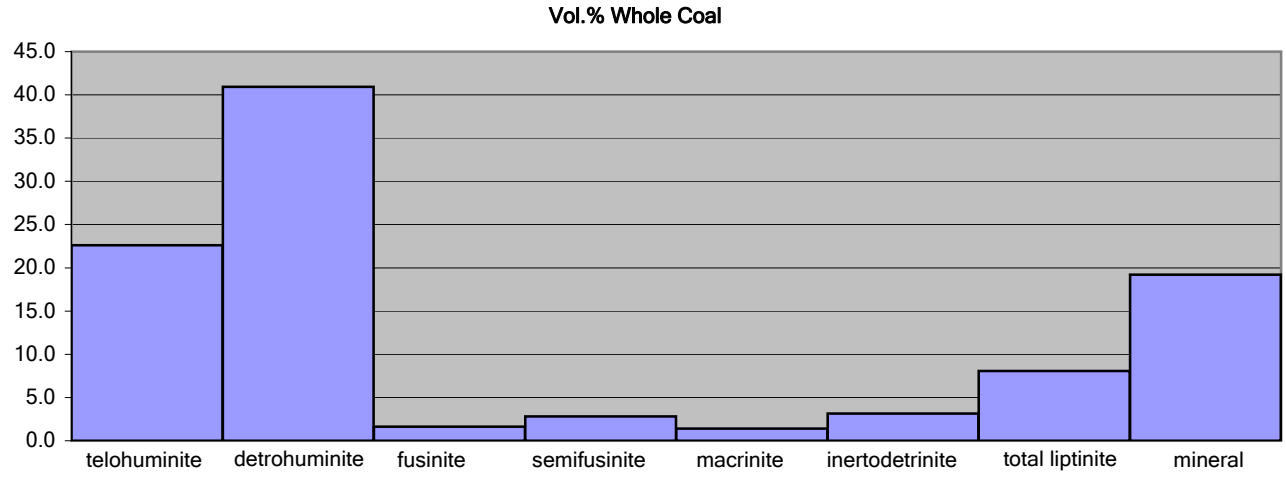
SAMPLE INFORMATION

Submitted by:	P.Warwick
Date Submitted:	1/1/2003
Project:	Devon
Sample:	3-LA-8
Sample Type	cuttings
Date Analyzed:	1/10/2003
Operator:	P.Warwick
#counts	2000
Rank:	lignite

RESULTS

	Vol.% whole coal	Vol.% organic matter
textinite/ulminite	22.6	28.0
attrinite/densinite	40.9	50.7
corpohuminite	0.0	0.0
total huminite	63.5	78.6
fusinite	1.6	2.0
semifusinite	2.8	3.5
macrinite	1.4	1.8
micrinite	0.0	0.0
funginite	0.2	0.2
inertodetrinite	3.1	3.9
total inertinite	9.2	11.4
sporinite	1.1	1.4
cutinite	0.6	0.8
resinite in textinite	0.2	0.3
resinite in matrix	0.5	0.6
bituminite	0.5	0.6
exsudatinite	0.1	0.1
alginite	0.9	1.1
liptodetrinite	4.1	5.1
suberinite	0.0	0.0
total liptinite	8.1	10.0
mineral	19.2	
total	100.0	100.0





COMMENT

trace suberinite (photograph).

VITRINITE REFLECTANCE REPORT

USGS

SAMPLE INFORMATION

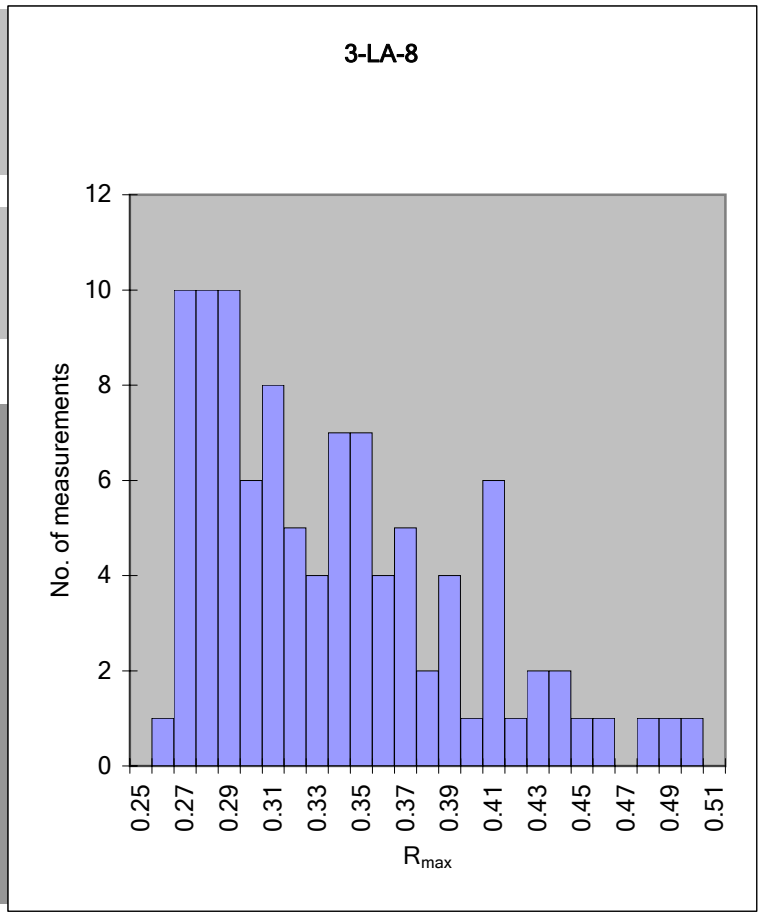
Submitted by: P.Warwick
Date Submitted: 1/1/2003
Project: Devon

Sample: 3-LA-8
Sample Type cuttings
Date Analyzed: 1/1/2003
Operator: P.Hackley

RESULTS

measurements: 100
maceral type: telohuminite
R_{max}: 0.33
s.d.: 0.06

RANK: lignite



DATA

0.294	0.309	0.283	0.294	0.356	0.258	0.265	0.271	0.283	0.276
0.335	0.333	0.340	0.438	0.283	0.358	0.288	0.270	0.426	0.390
0.270	0.452	0.346	0.416	0.489	0.268	0.278	0.270	0.272	0.311
0.312	0.336	0.291	0.402	0.301	0.387	0.339	0.303	0.273	0.271
0.268	0.358	0.346	0.291	0.348	0.286	0.322	0.267	0.305	0.361
0.273	0.380	0.307	0.476	0.365	0.317	0.401	0.272	0.302	0.271
0.292	0.342	0.366	0.287	0.344	0.318	0.266	0.364	0.410	0.300
0.310	0.423	0.285	0.325	0.316	0.384	0.265	0.402	0.360	0.289
0.495	0.394	0.339	0.436	0.276	0.325	0.408	0.386	0.285	0.327
0.350	0.304	0.409	0.375	0.283	0.266	0.338	0.448	0.345	0.362

min: 0.258 max: 0.495 V-types: 3

COMMENT

PETROGRAPHIC ANALYSIS REPORT

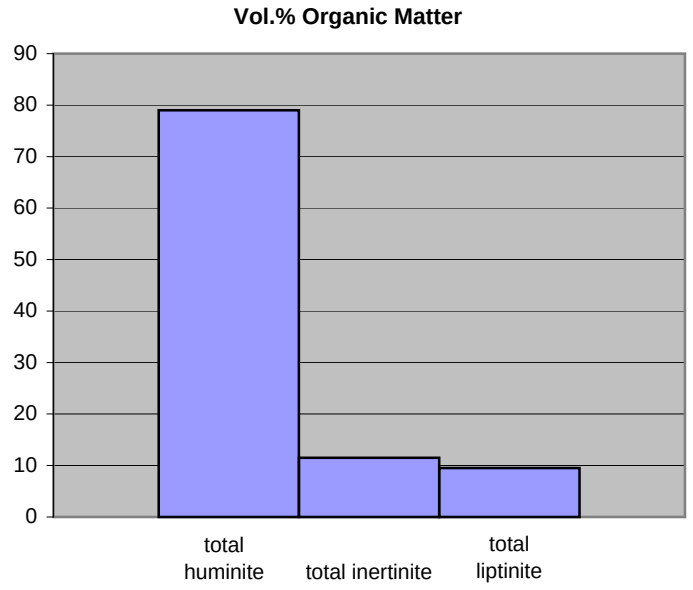
USGS

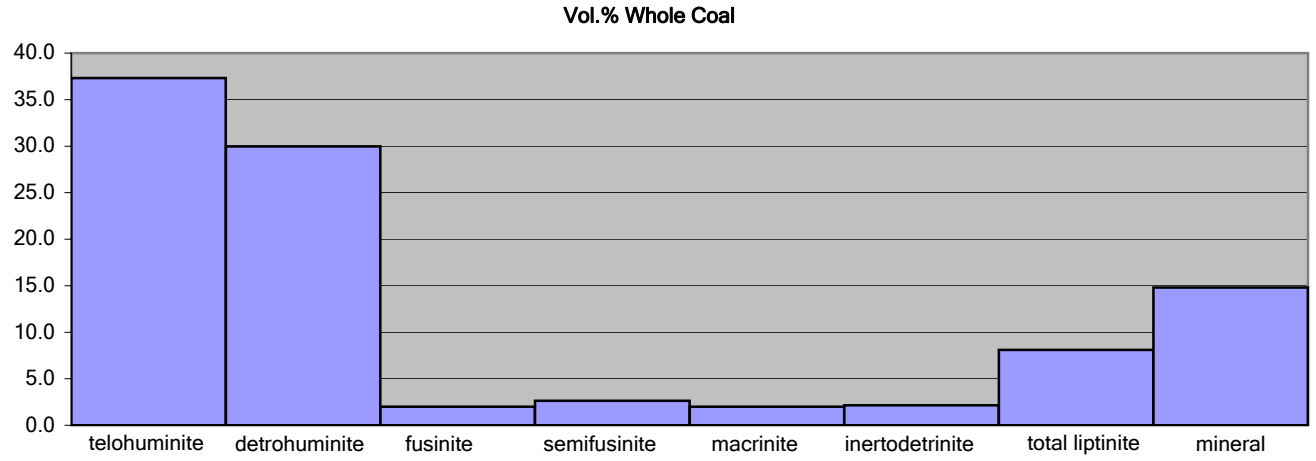
SAMPLE INFORMATION

Submitted by:	P.Warwick
Date Submitted:	1/1/2003
Project:	Devon
Sample:	LA-SWC-00-3
Sample Type	coal core cuttings
Date Analyzed:	1/16/2003
Operator:	P.Warwick
#counts	2000
Rank:	lignite

RESULTS

	Vol.% whole coal	Vol.% organic matter
textinite/ulminite	37.3	43.8
attrinite/densinite	30.0	35.2
corpohuminite	0.0	0.0
total huminite	67.3	79.0
fusinite	2.0	2.3
semifusinite	2.6	3.1
secretinite	0.2	0.2
macrinite	2.0	2.3
micrinite	0.2	0.2
funginite	0.7	0.8
inertodetrinite	2.2	2.5
total inertinite	9.8	11.5
sporinite	0.8	0.9
cutinite	0.2	0.2
resinite in textinite	0.0	0.0
resinite in matrix	0.2	0.2
bituminite	1.3	1.5
exsudatinite	0.3	0.3
alginite	0.9	1.0
liptodetrinite	4.6	5.4
suberinite	0.0	0.0
total liptinite	8.1	9.5
mineral	14.8	
total	100.0	100.0





COMMENT

corpohuminite bodies and some textinite display faint flourescence.

VITRINITE REFLECTANCE REPORT

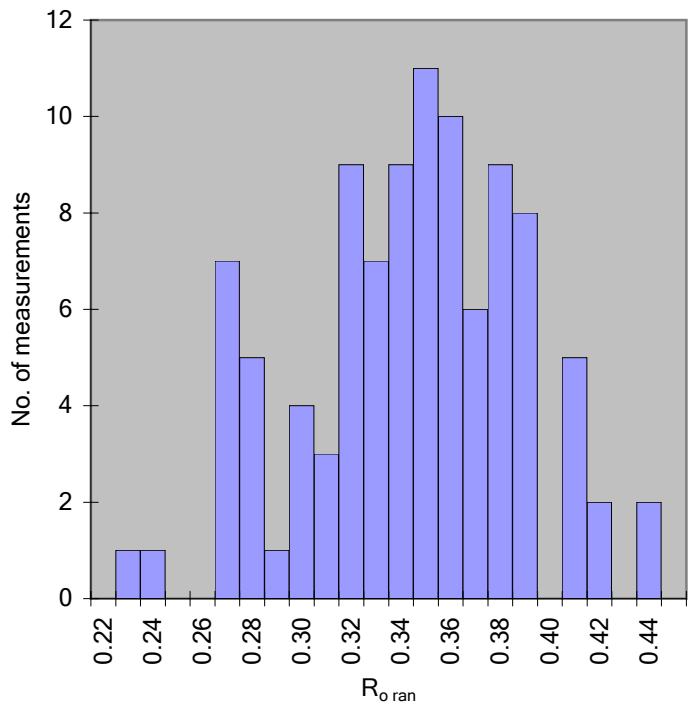
USGS

SAMPLE INFORMATION

Submitted by:	P.Warwick
Date Submitted:	1/1/2003
Project:	Devon
Sample:	LA-SWC-00-3
Sample Type	coal core cuttings
Date Analyzed:	4/13/2005
Operator:	P.Hackley

RESULTS

# measurements:	100
maceral type:	telohuminite
$R_{o\ ran}$ (ISO/ASTM):	0.34
s.d.:	0.04
calc. $R_{o\ max}$ (ISO):	0.36
s.d.:	0.05
calc. $R_{o\ max}$ (ASTM):	0.34
s.d.:	0.05
RANK:	lignite



DATA

0.376	0.335	0.313	0.383	0.357	0.349	0.231	0.304	0.379	0.344
0.382	0.312	0.327	0.374	0.291	0.351	0.354	0.363	0.376	0.406
0.389	0.274	0.264	0.414	0.344	0.375	0.298	0.364	0.338	0.263
0.346	0.267	0.263	0.329	0.385	0.318	0.357	0.376	0.404	0.335
0.273	0.388	0.332	0.357	0.367	0.401	0.294	0.370	0.313	0.312
0.311	0.288	0.323	0.331	0.316	0.322	0.348	0.438	0.354	0.338
0.385	0.386	0.266	0.370	0.403	0.277	0.357	0.350	0.280	0.318
0.306	0.347	0.319	0.373	0.304	0.411	0.261	0.278	0.380	0.343
0.344	0.347	0.338	0.339	0.328	0.298	0.364	0.267	0.322	0.373
0.360	0.352	0.357	0.348	0.406	0.433	0.335	0.229	0.382	0.329

min: 0.229 **max:** 0.438 **V-types:** 3

COMMENT

Polish is lousy on A pellet. Repolished annd analyzed on 4/13/05

PETROGRAPHIC ANALYSIS REPORT

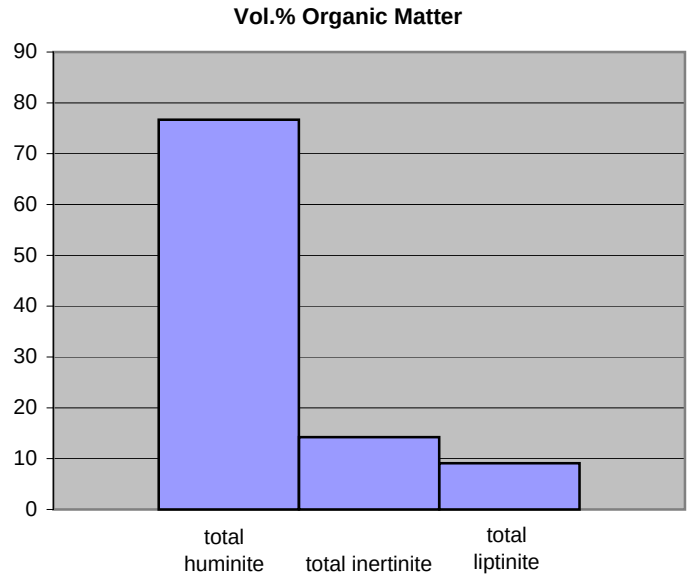
USGS

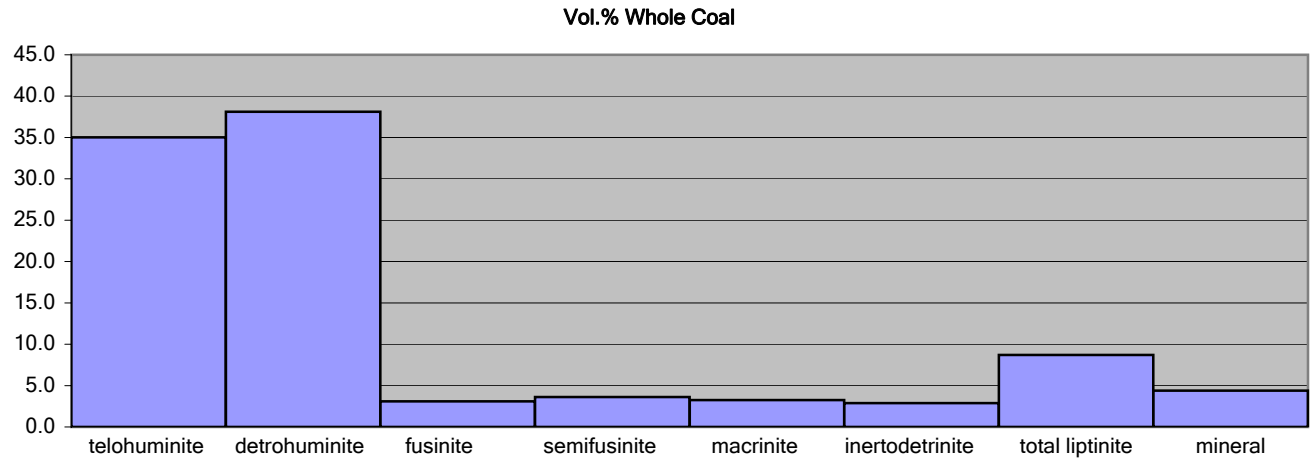
SAMPLE INFORMATION

Submitted by:	P.Warwick
Date Submitted:	1/1/2003
Project:	Devon
Sample:	LA-3-01-73
Sample Type	coal core
Date Analyzed:	n.d.
Operator:	P.Warwick
#counts	2000
Rank:	lignite

RESULTS

	Vol.% whole coal	Vol.% organic matter
textinite/ulminite	35.0	36.6
attrinite/densinite	38.1	39.9
corpohuminite	0.2	0.2
total huminite	73.3	76.7
fusinite	3.1	3.2
semifusinite	3.6	3.8
secretinite	0.3	0.3
macrinite	3.3	3.4
micrinite	0.0	0.0
funginite	0.5	0.5
inertodetrinite	2.9	3.0
total inertinite	13.6	14.2
sporinite	0.5	0.5
cutinite	0.2	0.2
resinite in textinite	0.4	0.4
resinite in matrix	0.4	0.4
bituminite	2.3	2.4
exsudatinite	0.7	0.7
alginite	0.6	0.6
liptodetrinite	3.7	3.9
suberinite	0.0	0.0
total liptinite	8.7	9.1
mineral	4.4	
total	100.0	100.0





COMMENT

Attrinite>telohuminite. Poor polish on both pellets.

VITRINITE REFLECTANCE REPORT

USGS

SAMPLE INFORMATION

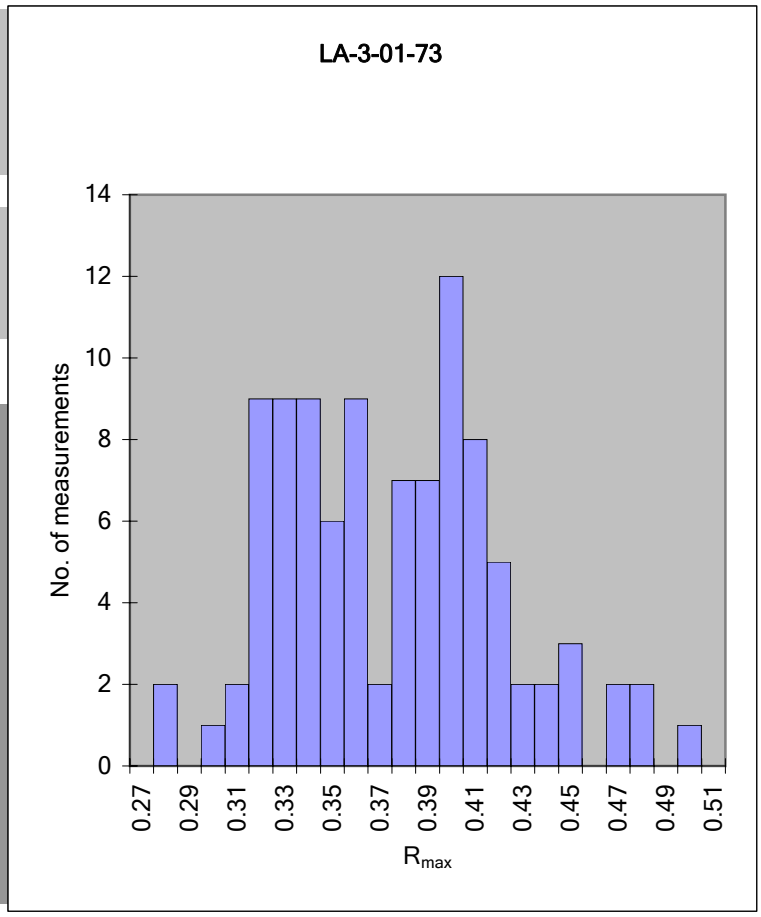
Submitted by: P.Warwick
Date Submitted: 1/1/2003
Project: Devon

Sample: LA-3-01-73
Sample Type coal core
Date Analyzed: 1/1/2003
Operator: P.Hackley

RESULTS

measurements: 100
maceral type: telohuminite
R_{max}: 0.37
s.d.: 0.05

RANK: lignite



DATA

0.351	0.347	0.306	0.403	0.397	0.394	0.306	0.367	0.476	0.396
0.336	0.470	0.418	0.403	0.348	0.381	0.323	0.386	0.404	0.423
0.334	0.442	0.379	0.417	0.462	0.338	0.392	0.333	0.315	0.350
0.379	0.391	0.323	0.320	0.372	0.384	0.317	0.272	0.323	0.416
0.395	0.438	0.388	0.315	0.393	0.385	0.327	0.394	0.491	0.320
0.384	0.411	0.311	0.355	0.372	0.342	0.419	0.356	0.324	0.300
0.425	0.371	0.405	0.326	0.398	0.406	0.400	0.409	0.336	0.319
0.431	0.335	0.382	0.331	0.375	0.276	0.344	0.351	0.375	0.317
0.350	0.351	0.407	0.330	0.355	0.339	0.397	0.311	0.394	0.445
0.362	0.355	0.448	0.330	0.336	0.357	0.324	0.474	0.406	0.358

min: 0.272 max: 0.491 V-types: 3

COMMENT

PETROGRAPHIC ANALYSIS REPORT

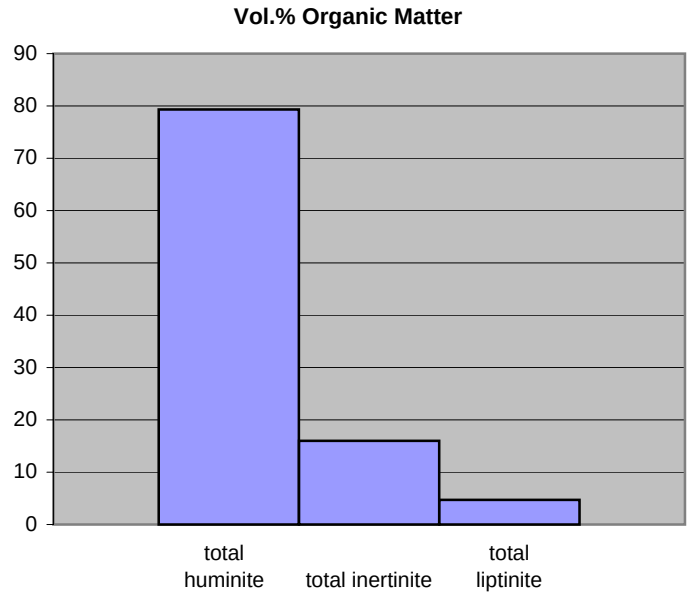
USGS

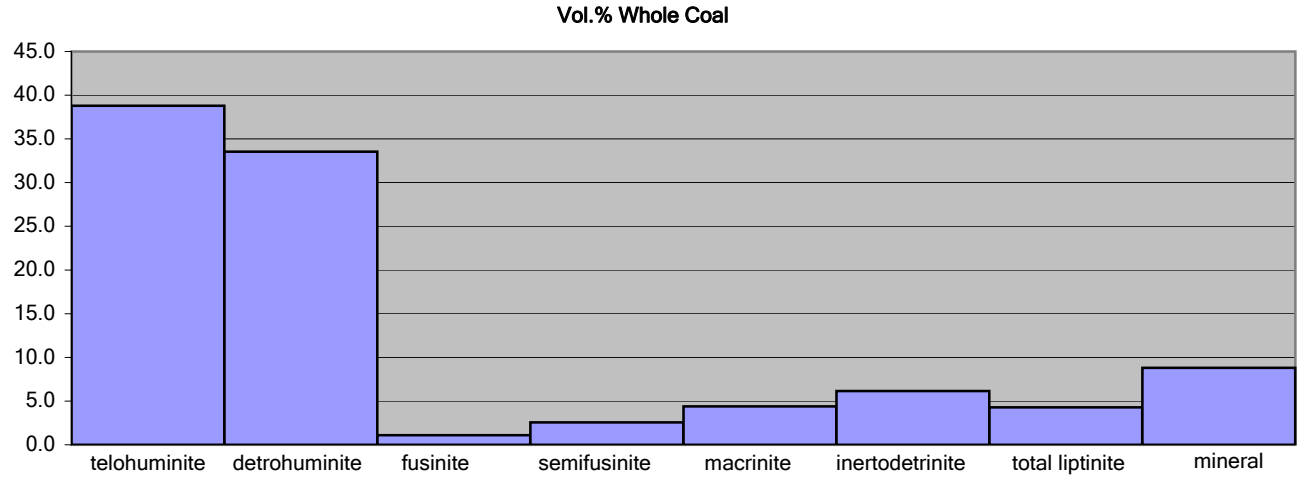
SAMPLE INFORMATION

Submitted by:	P.Warwick
Date Submitted:	1/1/2003
Project:	Devon
Sample:	LA-3-01-74
Sample Type	coal core cuttings
Date Analyzed:	1/30/2003
Operator:	P.Warwick
#counts	2000
Rank:	lignite

RESULTS

	Vol.% whole coal	Vol.% organic matter
textinite/ulminite	38.8	42.5
attrinite/densinite	33.5	36.8
corpohuminite	0.0	0.0
total huminite	72.3	79.3
fusinite	1.1	1.2
semifusinite	2.6	2.8
macrinite	4.4	4.8
micrinite	0.3	0.3
funginite	0.1	0.1
inertodetrinite	6.1	6.7
total inertinite	14.6	16.0
sporinite	0.4	0.4
cutinite	0.1	0.1
resinite in textinite	0.0	0.0
resinite in matrix	0.6	0.7
bituminite	0.7	0.8
exsudatinite	0.1	0.1
alginite	0.0	0.0
liptodetrinite	2.4	2.6
suberinite	0.0	0.0
total liptinite	4.3	4.7
mineral	8.8	
total	100.0	100.0





COMMENT

contains abundant macrinite-inertodetrinite durite, what appears to be oxidized attrinite (similar texture but all is oxidized). Beuatiful suberinite (photograph).

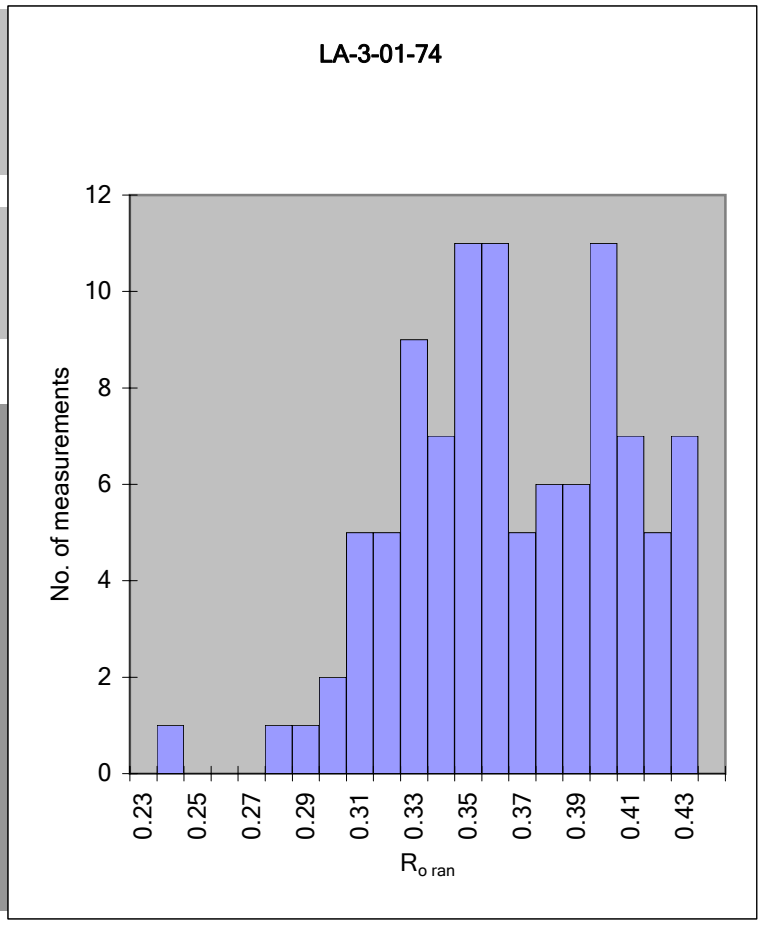
VITRINITE REFLECTANCE REPORT

USGS

SAMPLE INFORMATION

Submitted by: P.Warwick
Date Submitted: 1/1/2003
Project: Devon

Sample: LA-3-01-74
Sample Type coal core cuttings
Date Analyzed: 4/15/2005
Operator: P.Hackley



RESULTS

measurements: 100
maceral type: telohuminite
$R_{o\ ran}$ (ISO/ASTM): 0.36
s.d.: 0.04

calc. $R_{o\ max}$ (ISO): 0.38
s.d.: 0.04

calc. $R_{o\ max}$ (ASTM): 0.36
s.d.: 0.04

RANK: lignite

DATA

0.331	0.421	0.317	0.373	0.348	0.423	0.330	0.323	0.388	0.391
0.302	0.355	0.348	0.326	0.395	0.322	0.386	0.422	0.416	0.300
0.347	0.372	0.291	0.352	0.326	0.411	0.363	0.319	0.323	0.394
0.392	0.401	0.395	0.392	0.403	0.372	0.319	0.319	0.414	0.382
0.343	0.401	0.395	0.287	0.358	0.368	0.392	0.359	0.402	0.373
0.385	0.419	0.356	0.332	0.235	0.394	0.348	0.344	0.328	0.342
0.366	0.346	0.352	0.313	0.328	0.380	0.354	0.306	0.301	0.305
0.339	0.341	0.357	0.337	0.327	0.355	0.423	0.405	0.424	0.404
0.339	0.406	0.424	0.386	0.414	0.304	0.399	0.382	0.372	0.271
0.347	0.399	0.333	0.343	0.335	0.369	0.369	0.422	0.355	0.357

min: 0.235 max: 0.424 V-types: 3

COMMENT

Polish is lousy on A pellet

PETROGRAPHIC ANALYSIS REPORT

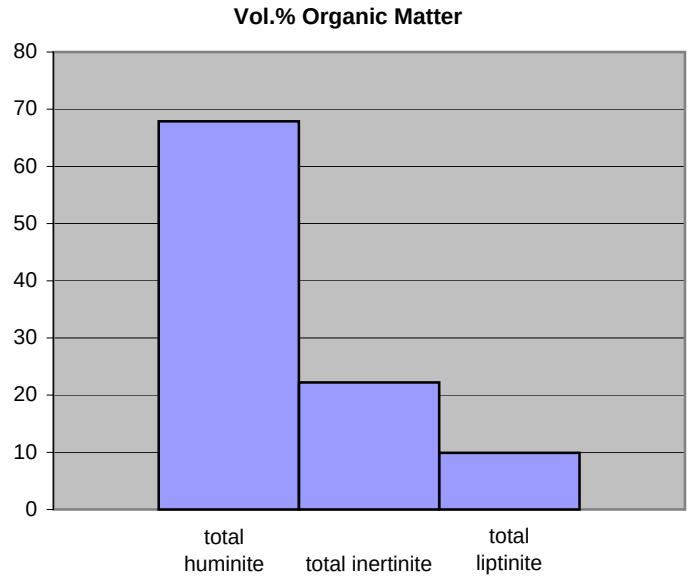
USGS

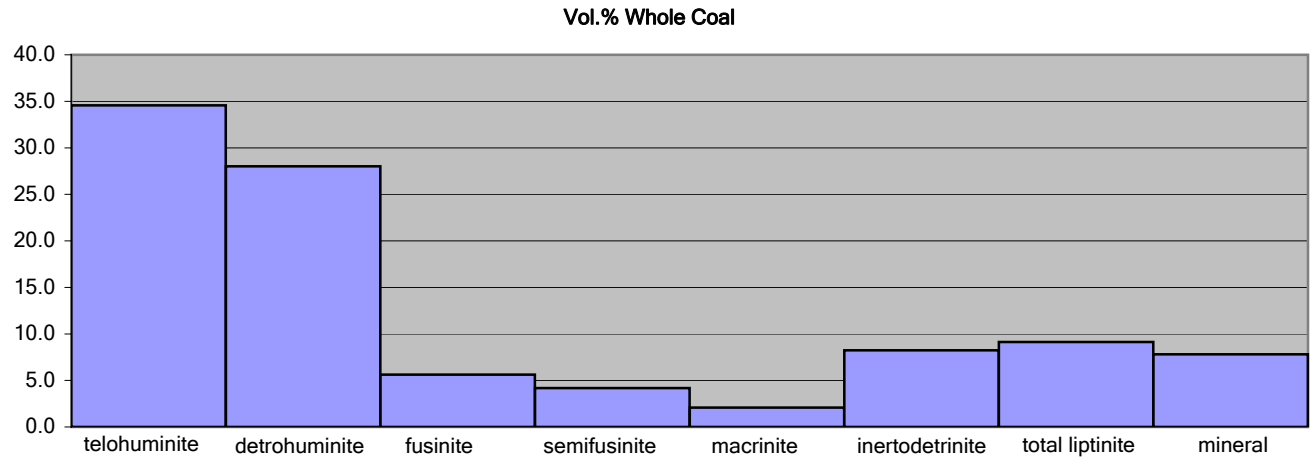
SAMPLE INFORMATION

Submitted by:	P.Warwick
Date Submitted:	1/1/2003
Project:	Devon
Sample:	4-LA-6
Sample Type	coal core
Date Analyzed:	2/4/2003
Operator:	P.Warwick
#counts	2000
Rank:	subB

RESULTS

	Vol.% whole coal	Vol.% organic matter
textinite/ulminite	34.6	37.5
attrinite/densinite	28.0	30.4
corpohuminite	0.0	0.0
total huminite	62.6	67.9
fusinite	5.6	6.1
semifusinite	4.2	4.5
secretinite	0.2	0.2
macrinite	2.1	2.3
micrinite	0.2	0.2
funginite	0.0	0.0
inertodetrinite	8.2	8.9
total inertinite	20.5	22.2
sporinite	0.6	0.6
cutinite	0.0	0.0
resinite in textinite	0.0	0.0
resinite in matrix	0.6	0.7
bituminite	2.0	2.2
exsudatinite	0.0	0.0
alginite	0.7	0.8
liptodetrinite	5.2	5.6
suberinite	0.0	0.0
total liptinite	9.1	9.9
mineral	7.8	
total	100.0	100.0





COMMENT

Contains ornately textured fusinite filled with exudate, similar to Wilcox from Zavala Co., TX. Beautiful liptinite textures.

VITRINITE REFLECTANCE REPORT

USGS

SAMPLE INFORMATION

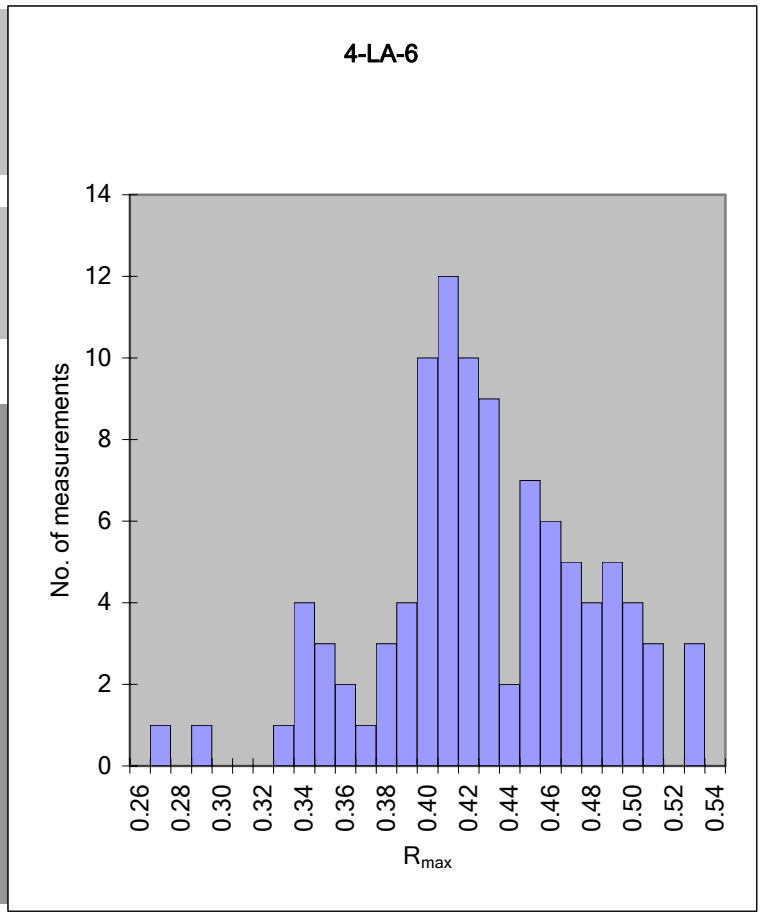
Submitted by: P.Warwick
Date Submitted: 1/1/2003
Project: Devon

Sample: 4-LA-6
Sample Type coal core
Date Analyzed: 1/1/2003
Operator: P.Hackley

RESULTS

measurements: 100
maceral type: telohuminite
R_{max}: 0.42
s.d.: 0.05

RANK: subB



DATA

0.426	0.456	0.424	0.495	0.476	0.475	0.388	0.461	0.414	0.376
0.422	0.437	0.424	0.432	0.489	0.339	0.329	0.332	0.528	0.460
0.425	0.468	0.403	0.354	0.448	0.443	0.464	0.398	0.395	0.444
0.442	0.464	0.346	0.420	0.401	0.407	0.287	0.419	0.510	0.454
0.350	0.397	0.387	0.407	0.338	0.391	0.426	0.405	0.527	0.483
0.397	0.485	0.420	0.497	0.415	0.398	0.480	0.419	0.389	0.263
0.390	0.445	0.348	0.522	0.448	0.410	0.420	0.412	0.443	0.409
0.402	0.415	0.453	0.494	0.394	0.507	0.454	0.410	0.422	0.377
0.415	0.488	0.406	0.404	0.508	0.399	0.499	0.490	0.356	0.365
0.336	0.469	0.454	0.400	0.473	0.425	0.405	0.429	0.392	0.374

min: 0.263 max: 0.528 V-types: 4

COMMENT

PETROGRAPHIC ANALYSIS REPORT

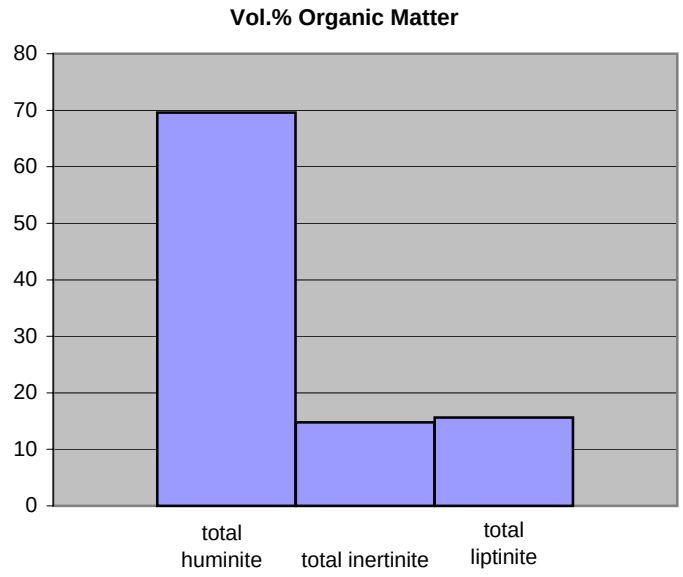
USGS

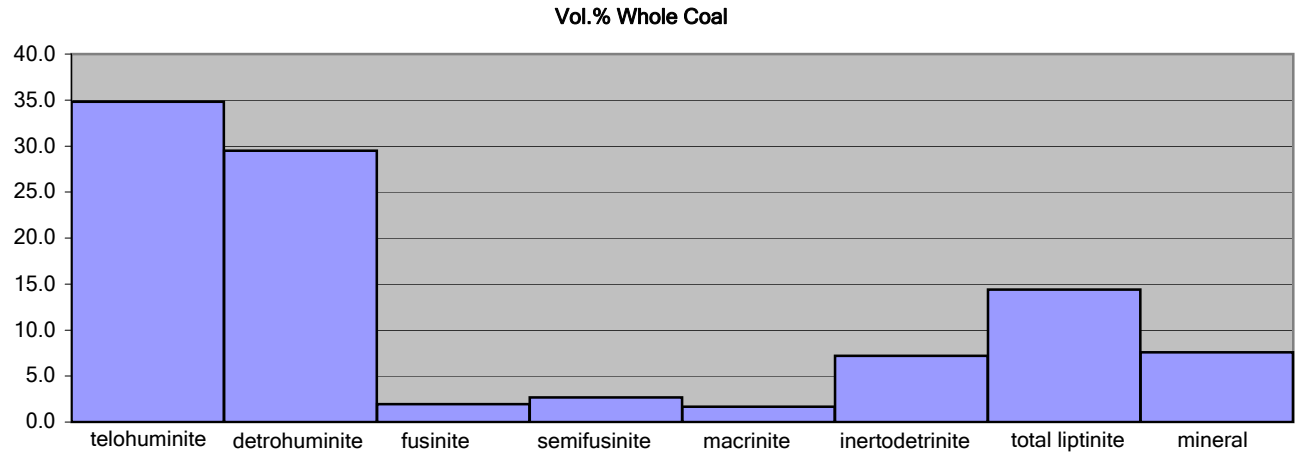
SAMPLE INFORMATION

Submitted by:	P.Warwick
Date Submitted:	1/1/2003
Project:	Devon
Sample:	**4-LA-2**
Sample Type	coal core
Date Analyzed:	3/10/2003
Operator:	P.Warwick
#counts	2000
Rank:	subB

RESULTS

	Vol.% whole coal	Vol.% organic matter
textinite/ulminite	34.8	37.7
attrinite/densinite	29.5	31.9
corpohuminite	0.0	0.0
total huminite	64.3	69.6
fusinite	1.9	2.1
semifusinite	2.7	2.9
secretinite	0.1	0.1
macrinite	1.7	1.8
micrinite	0.0	0.0
funginite	0.1	0.1
inertodetrinite	7.2	7.8
total inertinite	13.7	14.8
sporinite	0.4	0.4
cutinite	0.4	0.4
resinite in textinite	0.0	0.0
resinite in matrix	0.7	0.8
bituminite	2.3	2.5
exsudatinite	0.6	0.6
alginite	1.5	1.6
liptodetrinite	8.6	9.3
suberinite	0.0	0.0
total liptinite	14.4	15.6
mineral	7.6	
total	100.0	100.0





COMMENT

VITRINITE REFLECTANCE REPORT

USGS

SAMPLE INFORMATION

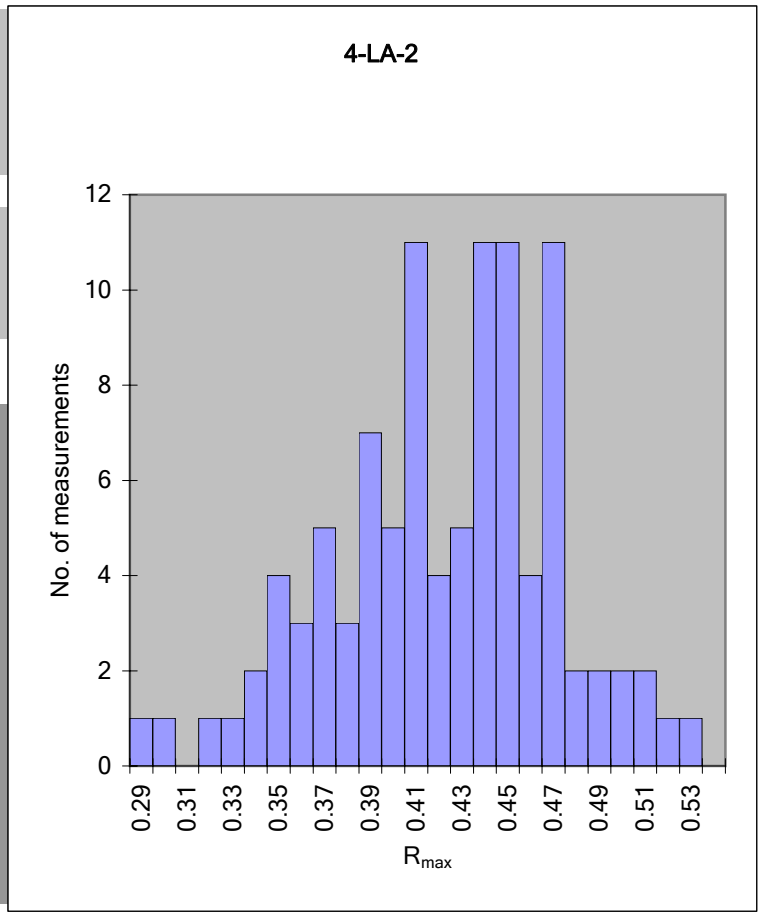
Submitted by: P.Warwick
Date Submitted: 1/1/2003
Project: Devon

Sample: 4-LA-2
Sample Type coal core
Date Analyzed: 1/1/2003
Operator: P.Hackley

RESULTS

measurements: 100
maceral type: telohuminite
R_{max}: 0.42
s.d.: 0.05

RANK: subB



DATA

0.470	0.417	0.521	0.440	0.467	0.449	0.494	0.431	0.402	0.382
0.372	0.360	0.452	0.395	0.485	0.441	0.424	0.368	0.468	0.345
0.451	0.300	0.378	0.432	0.383	0.423	0.437	0.339	0.465	0.468
0.468	0.446	0.431	0.362	0.368	0.344	0.368	0.410	0.396	0.408
0.509	0.437	0.424	0.452	0.401	0.440	0.384	0.432	0.432	0.387
0.468	0.368	0.315	0.290	0.347	0.465	0.465	0.403	0.477	0.358
0.445	0.378	0.385	0.391	0.332	0.419	0.447	0.408	0.414	0.389
0.403	0.408	0.506	0.443	0.437	0.418	0.396	0.403	0.496	0.448
0.447	0.430	0.514	0.408	0.445	0.421	0.446	0.396	0.408	0.326
0.461	0.486	0.431	0.444	0.458	0.480	0.347	0.465	0.359	0.390

min: 0.290 max: 0.521 V-types: 4

COMMENT

PETROGRAPHIC ANALYSIS REPORT

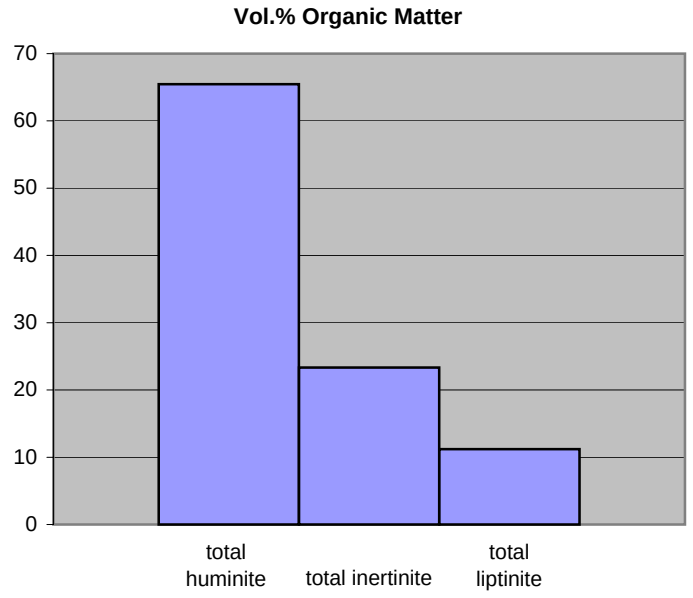
USGS

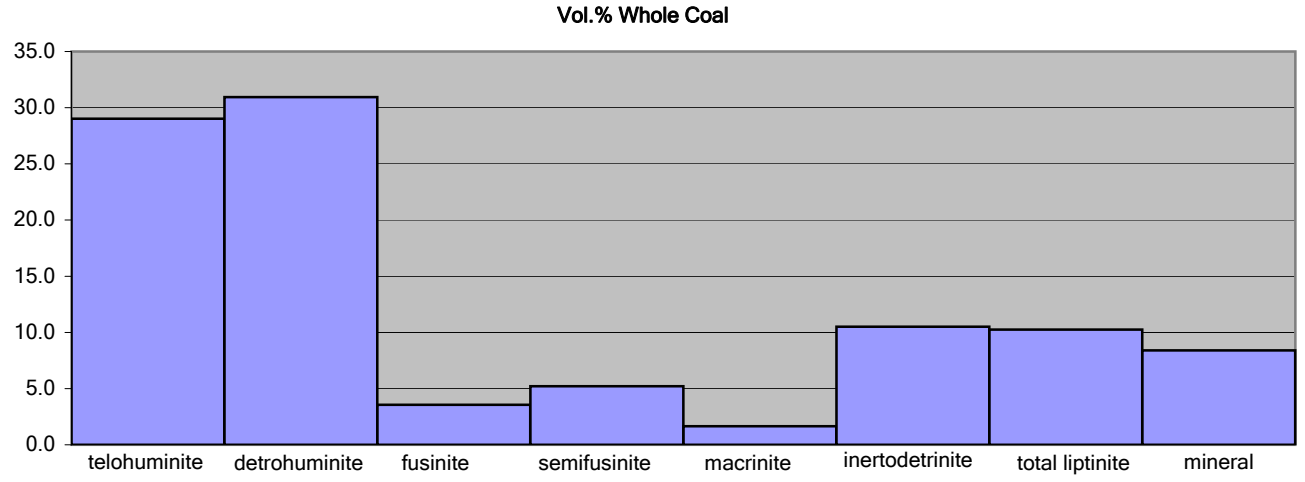
SAMPLE INFORMATION

Submitted by:	P.Warwick
Date Submitted:	1/1/2003
Project:	Devon
Sample:	4-LA-4
Sample Type	coal core
Date Analyzed:	3/17/2003
Operator:	P.Warwick
#counts	2000
Rank:	subB

RESULTS

	Vol.% whole coal	Vol.% organic matter
textinite/ulminite	29.0	31.7
attrinite/densinite	30.9	33.8
corpohuminite	0.0	0.0
total huminite	60.0	65.5
fusinite	3.6	3.9
semifusinite	5.2	5.7
macrinite	1.7	1.8
micrinite	0.3	0.3
funginite	0.2	0.2
inertodetrinite	10.5	11.5
total inertinite	21.4	23.3
sporinite	1.2	1.3
cutinite	0.5	0.5
resinite in textinite	0.0	0.0
resinite in matrix	0.3	0.3
bituminite	1.3	1.4
exsudatinite	0.1	0.1
alginite	0.5	0.5
liptodetrinite	6.5	7.1
suberinite	0.0	0.0
total liptinite	10.3	11.2
mineral	8.4	
total	100.0	100.0





COMMENT

A pellet counted on area not covered by former etching treatment

VITRINITE REFLECTANCE REPORT

USGS

SAMPLE INFORMATION

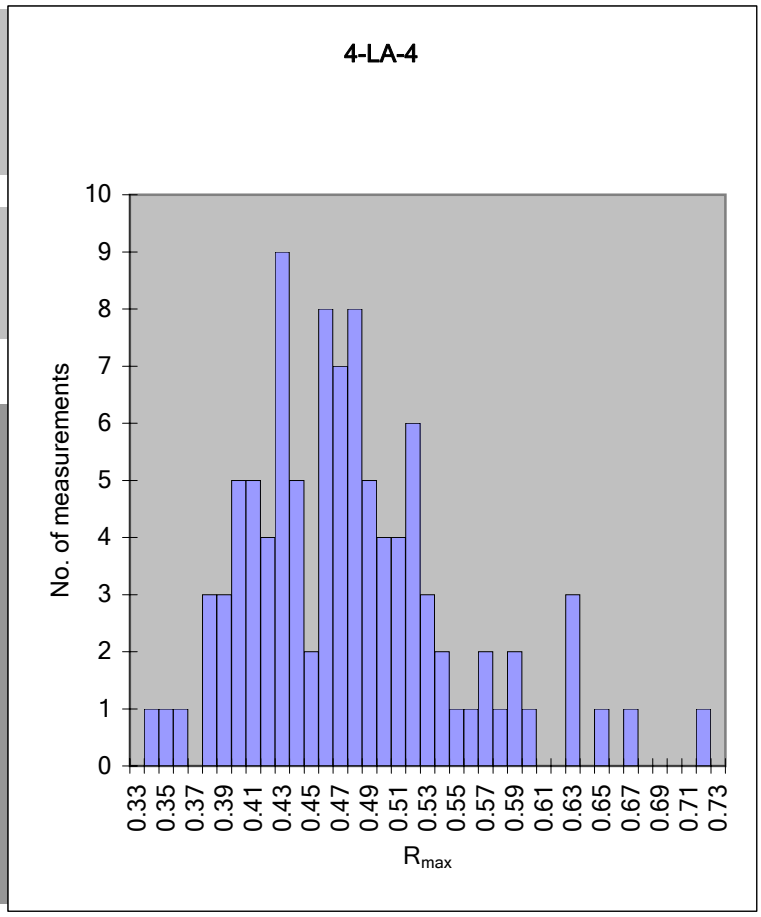
Submitted by: P.Warwick
Date Submitted: 1/1/2003
Project: Devon

Sample: 4-LA-4
Sample Type coal core
Date Analyzed: 1/1/2003
Operator: P.Hackley

RESULTS

measurements: 100
maceral type: telohuminite
R_{max}: 0.47
s.d.: 0.07

RANK: subB



DATA

0.465	0.475	0.550	0.496	0.428	0.439	0.399	0.392	0.338	0.520
0.661	0.428	0.456	0.387	0.435	0.493	0.477	0.389	0.490	0.474
0.715	0.622	0.523	0.434	0.421	0.455	0.453	0.397	0.407	0.485
0.379	0.463	0.523	0.432	0.454	0.496	0.342	0.386	0.409	0.502
0.646	0.559	0.489	0.529	0.512	0.417	0.477	0.423	0.481	0.427
0.452	0.537	0.395	0.621	0.401	0.411	0.425	0.371	0.449	0.499
0.567	0.510	0.505	0.417	0.425	0.452	0.401	0.508	0.402	0.425
0.587	0.623	0.471	0.454	0.571	0.519	0.469	0.379	0.430	0.512
0.587	0.564	0.469	0.352	0.420	0.463	0.481	0.440	0.532	0.473
0.598	0.468	0.474	0.513	0.400	0.514	0.459	0.461	0.450	0.475

min: 0.338 max: 0.715 V-types: 5

COMMENT

PETROGRAPHIC ANALYSIS REPORT

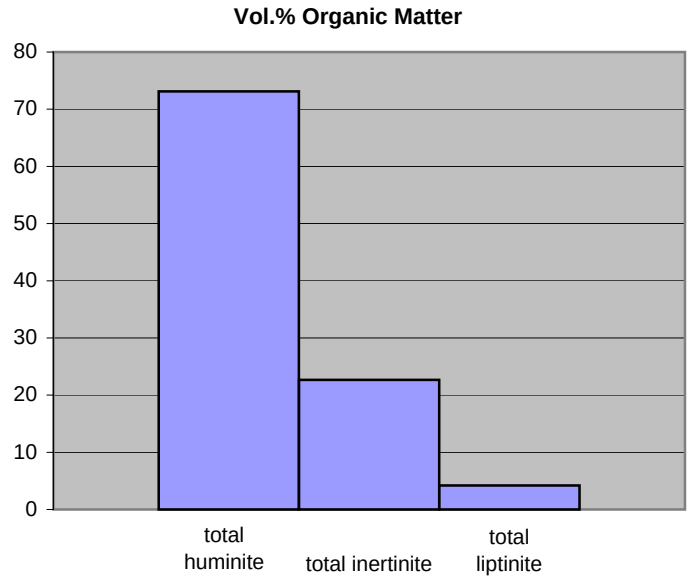
USGS

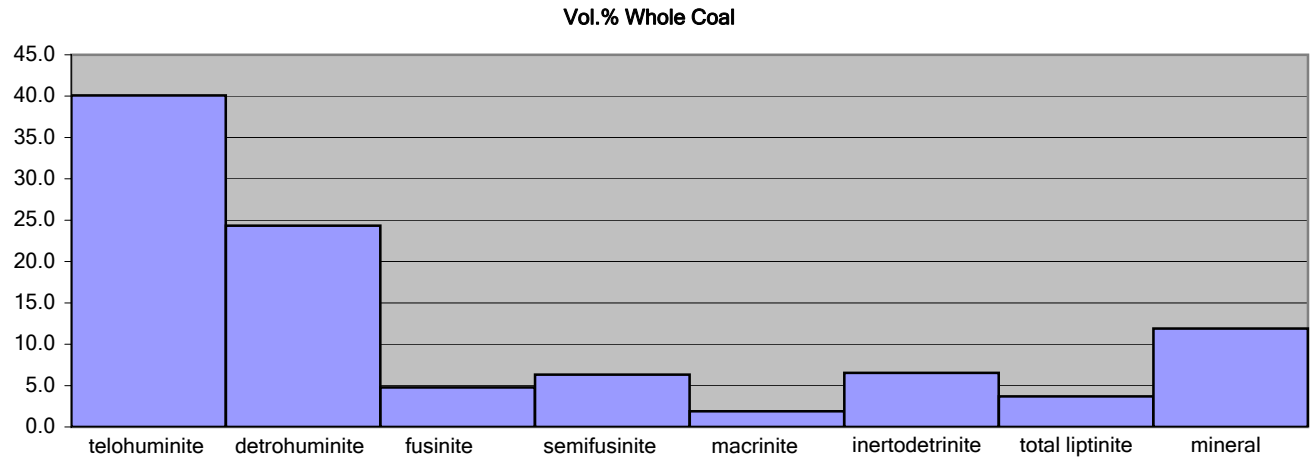
SAMPLE INFORMATION

Submitted by:	P.Warwick
Date Submitted:	1/1/2003
Project:	Devon
Sample:	**4-LA-3**
Sample Type	coal core
Date Analyzed:	5/15/2003
Operator:	P.Hackley
#counts	2000
Rank:	lignite

RESULTS

	Vol.% whole coal	Vol.% organic matter
textinite/ulminite	40.1	45.5
attrinite/densinite	24.3	27.6
corpohuminite	0.0	0.0
total huminite	64.4	73.1
fusinite	4.8	5.4
semifusinite	6.3	7.2
secretinite	0.2	0.2
macrinite	1.9	2.2
micrinite	0.1	0.1
funginite	0.2	0.2
inertodetrinite	6.5	7.4
total inertinite	20.0	22.7
sporinite	1.6	1.8
cutinite	0.0	0.0
resinite in textinite	0.0	0.0
resinite in matrix	0.8	0.9
bituminite	0.2	0.2
exsudatinite	0.1	0.1
alginite	0.2	0.2
liptodetrinite	0.9	1.0
suberinite	0.0	0.0
total liptinite	3.7	4.2
mineral	11.9	
total	100.0	100.0





COMMENT

In flourescence mode, resin-exudates are apparent. In oil, high pyrite content noted, abundant inertinites. Corpohuminite, var. porigelinite, counted as telohuminite

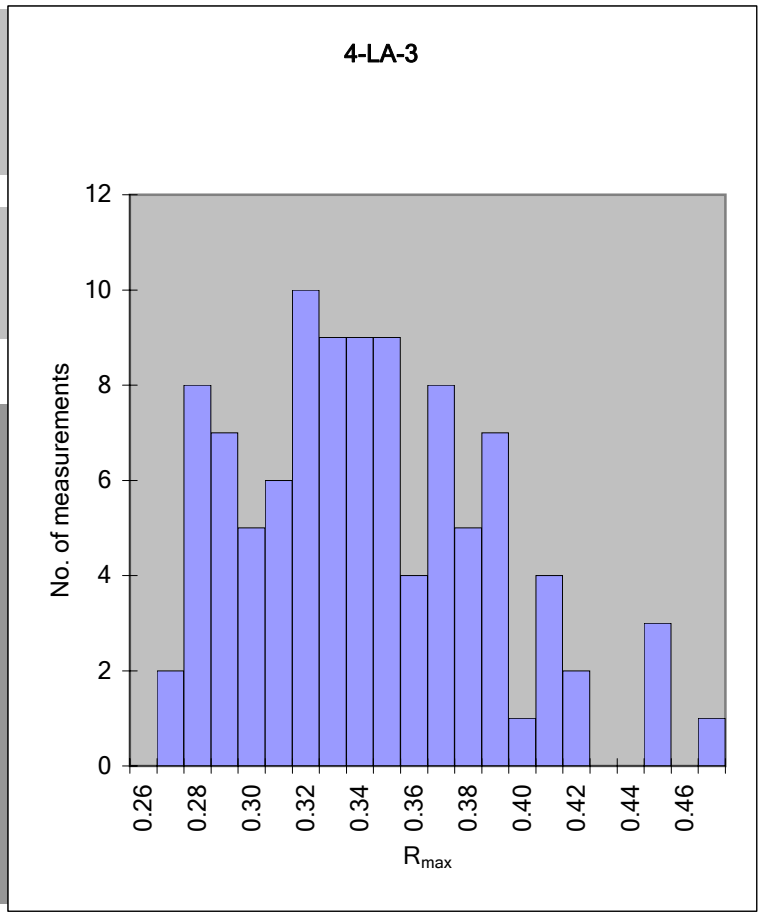
VITRINITE REFLECTANCE REPORT

USGS

SAMPLE INFORMATION

Submitted by: P.Warwick
Date Submitted: 1/1/2003
Project: Devon

Sample: 4-LA-3
Sample Type channel
Date Analyzed: 1/1/2003
Operator: P.Hackley



RESULTS

measurements: 100
maceral type: telohuminite
R_{max}: 0.34
s.d.: 0.04

RANK: lignite

DATA

0.293	0.267	0.375	0.280	0.290	0.341	0.366	0.340	0.385	0.360
0.331	0.322	0.340	0.278	0.282	0.412	0.408	0.332	0.446	0.379
0.293	0.370	0.293	0.315	0.334	0.363	0.303	0.368	0.385	0.325
0.355	0.304	0.320	0.312	0.312	0.305	0.364	0.360	0.320	0.314
0.332	0.308	0.285	0.353	0.309	0.287	0.445	0.344	0.410	0.322
0.314	0.299	0.278	0.327	0.343	0.364	0.387	0.321	0.374	0.278
0.265	0.311	0.324	0.315	0.280	0.401	0.385	0.296	0.401	0.374
0.278	0.326	0.318	0.279	0.283	0.369	0.382	0.339	0.361	0.374
0.343	0.305	0.341	0.287	0.279	0.416	0.468	0.385	0.383	0.337
0.397	0.348	0.282	0.334	0.349	0.350	0.442	0.348	0.323	0.325

min: 0.265 max: 0.468 V-types: 3

COMMENT

PETROGRAPHIC ANALYSIS REPORT

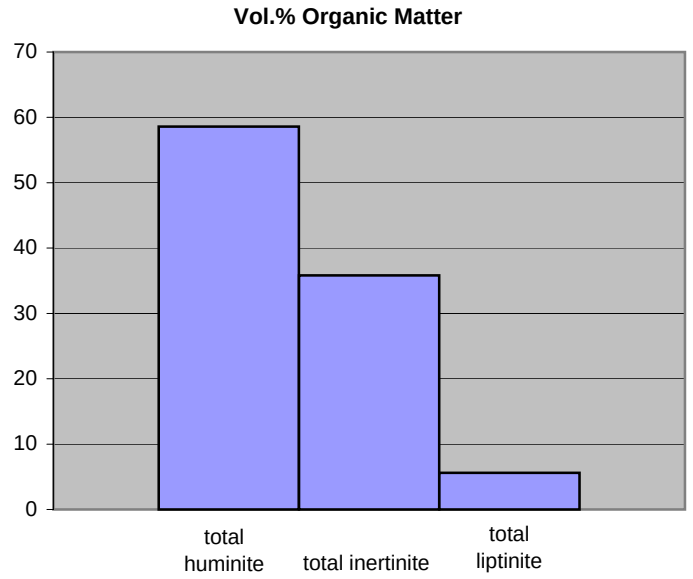
USGS

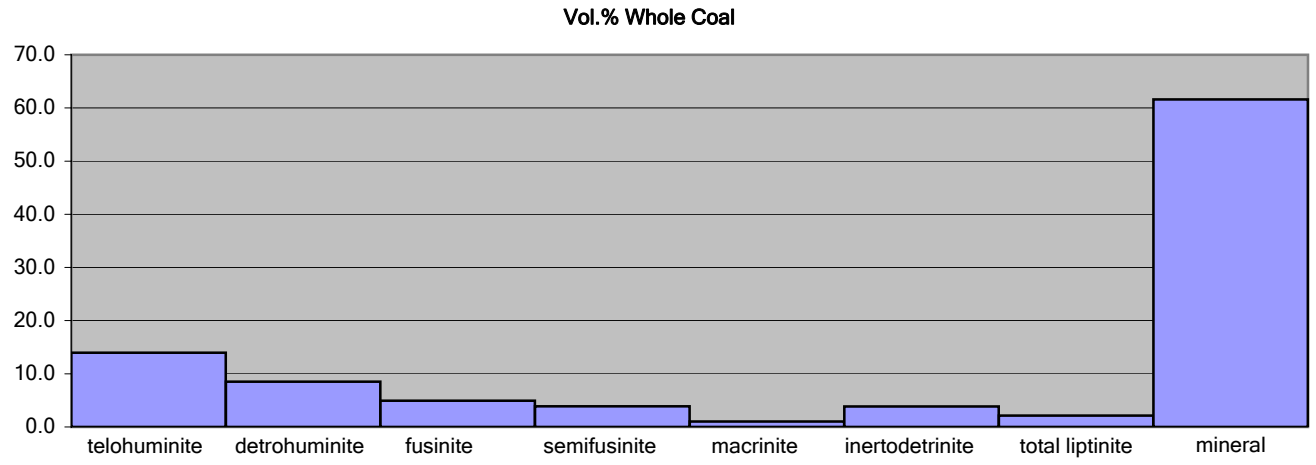
SAMPLE INFORMATION

Submitted by:	P.Warwick
Date Submitted:	1/1/2003
Project:	Devon
Sample:	**4-LA-9**
Sample Type	coal core
Date Analyzed:	6/9/2003
Operator:	P.Warwick
#counts	1500
Rank:	lignite

RESULTS

	Vol.% whole coal	Vol.% organic matter
textinite/ulminite	14.0	36.4
attrinite/densinite	8.5	22.2
corpohuminite	0.0	0.0
total huminite	22.5	58.6
fusinite	4.9	12.8
semifusinite	3.9	10.1
secretinite	0.0	0.0
macrinite	1.0	2.7
micrinite	0.0	0.0
funginite	0.1	0.2
inertodetrinite	3.9	10.1
total inertinite	13.8	35.8
sporinite	0.2	0.4
cutinite	0.0	0.0
resinite in textinite	0.0	0.0
resinite in matrix	0.3	0.8
bituminite	0.2	0.6
exsudatinite	0.0	0.0
alginite	0.0	0.0
liptodetrinite	1.5	3.8
suberinite	0.0	0.0
total liptinite	2.2	5.6
mineral	61.6	
total	100.0	100.0





COMMENT

Pyrite-rich. Sample is essentially identical to underlying 4-LA-7. Attrinite includes detrital vitrinite <10 um and also larger attrinite fragments.

VITRINITE REFLECTANCE REPORT

USGS

SAMPLE INFORMATION

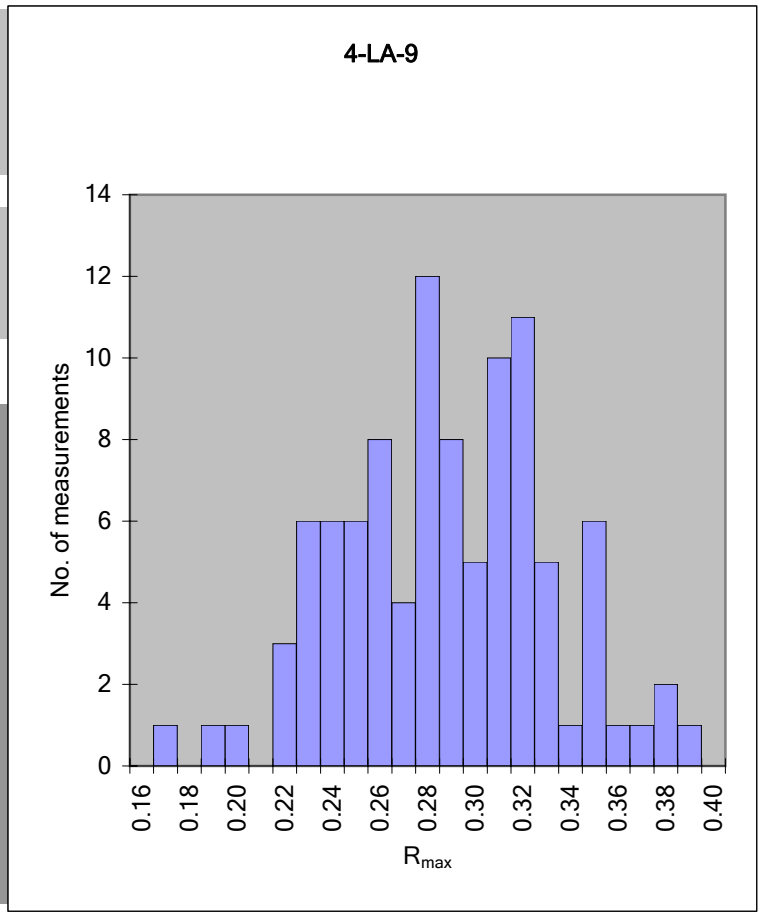
Submitted by: P.Warwick
Date Submitted: 1/1/2003
Project: Devon

Sample: 4-LA-9
Sample Type coal core
Date Analyzed: 1/1/2003
Operator: P.Hackley

RESULTS

measurements: 100
maceral type: telohuminite
R_{max}: 0.28
s.d.: 0.04

RANK: lignite



DATA

0.365	0.281	0.250	0.344	0.286	0.259	0.260	0.216	0.271	0.311
0.233	0.302	0.322	0.265	0.373	0.313	0.323	0.313	0.278	0.263
0.252	0.307	0.288	0.318	0.308	0.218	0.249	0.311	0.320	0.237
0.240	0.302	0.234	0.271	0.377	0.249	0.300	0.344	0.338	0.248
0.291	0.281	0.220	0.313	0.316	0.222	0.318	0.255	0.282	0.228
0.286	0.271	0.352	0.382	0.276	0.269	0.240	0.228	0.228	0.228
0.328	0.246	0.301	0.402	0.314	0.265	0.302	0.258	0.304	0.161
0.275	0.274	0.275	0.221	0.343	0.294	0.288	0.250	0.302	0.279
0.291	0.273	0.186	0.295	0.311	0.257	0.341	0.342	0.271	0.253
0.341	0.260	0.329	0.303	0.238	0.306	0.285	0.328	0.277	0.194

min: 0.161 max: 0.402 V-types: 4

COMMENT

PETROGRAPHIC ANALYSIS REPORT

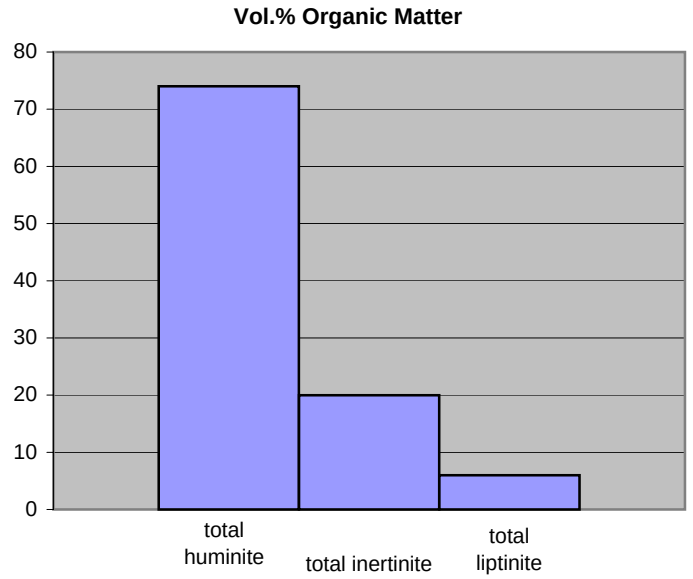
USGS

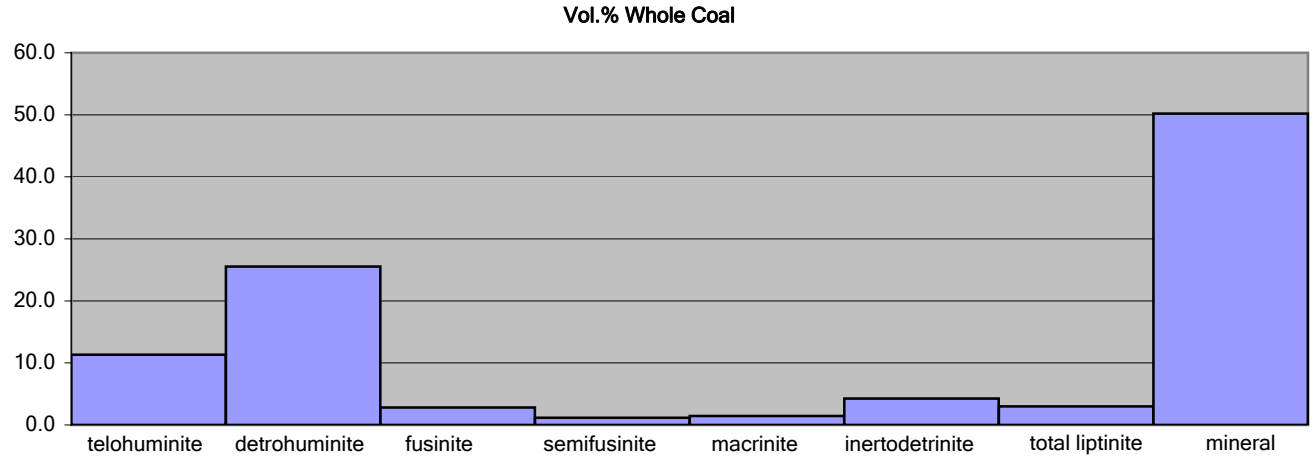
SAMPLE INFORMATION

Submitted by:	P.Warwick
Date Submitted:	1/1/2003
Project:	Devon
Sample:	4-LA-5
Sample Type	coal core
Date Analyzed:	6/19/2003
Operator:	P.Warwick
#counts	1500
Rank:	lignite

RESULTS

	Vol.% whole coal	Vol.% organic matter
textinite/ulminite	11.3	22.7
attrinite/densinite	25.5	51.3
corpohuminite	0.0	0.0
total huminite	36.9	74.0
fusinite	2.8	5.6
semifusinite	1.2	2.3
secretinite	0.0	0.0
macrinite	1.4	2.9
micrinite	0.0	0.0
funginite	0.3	0.6
inertodetrinite	4.3	8.5
total inertinite	10.0	20.0
sporinite	0.4	0.8
cutinite	0.0	0.0
resinite in textinite	0.0	0.0
resinite in matrix	0.6	1.2
bituminite	0.3	0.6
exsudatinite	0.0	0.0
alginite	0.1	0.2
liptodetrinite	1.6	3.2
suberinite	0.0	0.0
total liptinite	3.0	6.0
mineral	50.2	
total	100.0	100.0





COMMENT

Lousy polish on A pellet 4/22/05. Counted 500 points on B pellet in 2 sets of 250 each. Sample is essentially identical to 4-LA-9, 4-LA-7.

VITRINITE REFLECTANCE REPORT

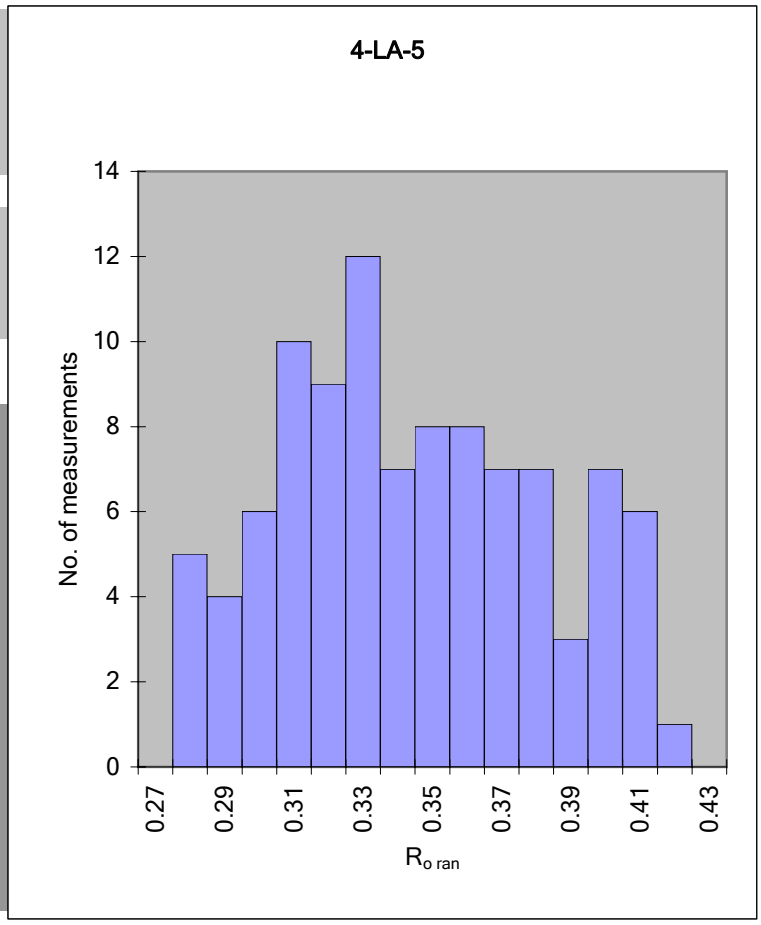
USGS

SAMPLE INFORMATION

Submitted by:	P.Warwick
Date Submitted:	1/1/2003
Project:	Devon
Sample:	4-LA-5
Sample Type	coal core
Date Analyzed:	4/22/2005
Operator:	P.Hackley

RESULTS

# measurements:	100
maceral type:	telohuminite
$R_{o\ ran}$ (ISO/ASTM):	0.34
s.d.:	0.04
calc. $R_{o\ max}$ (ISO):	0.36
s.d.:	0.04
calc. $R_{o\ max}$ (ASTM):	0.34
s.d.:	0.04
RANK:	lignite



DATA

0.277	0.324	0.351	0.380	0.309	0.360	0.382	0.339	0.366	0.273
0.324	0.324	0.361	0.303	0.329	0.307	0.387	0.334	0.352	0.315
0.355	0.344	0.348	0.291	0.303	0.354	0.315	0.334	0.327	0.326
0.375	0.281	0.316	0.345	0.328	0.310	0.293	0.304	0.291	0.279
0.314	0.404	0.355	0.414	0.401	0.298	0.304	0.343	0.323	0.272
0.379	0.403	0.372	0.401	0.318	0.343	0.331	0.332	0.297	0.298
0.376	0.393	0.399	0.344	0.342	0.387	0.333	0.282	0.368	0.392
0.399	0.371	0.372	0.402	0.333	0.367	0.278	0.366	0.304	0.316
0.308	0.357	0.403	0.318	0.396	0.306	0.282	0.330	0.370	0.346
0.288	0.396	0.322	0.314	0.327	0.328	0.363	0.314	0.357	0.391

min: 0.272 max: 0.414 V-types: 3

COMMENT

Polish is lousy on A pellet. Measured 100 points on B pellet.

PETROGRAPHIC ANALYSIS REPORT

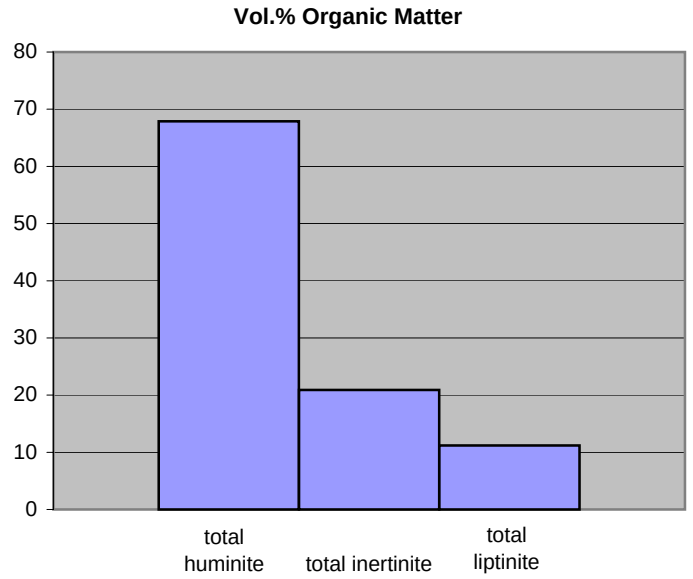
USGS

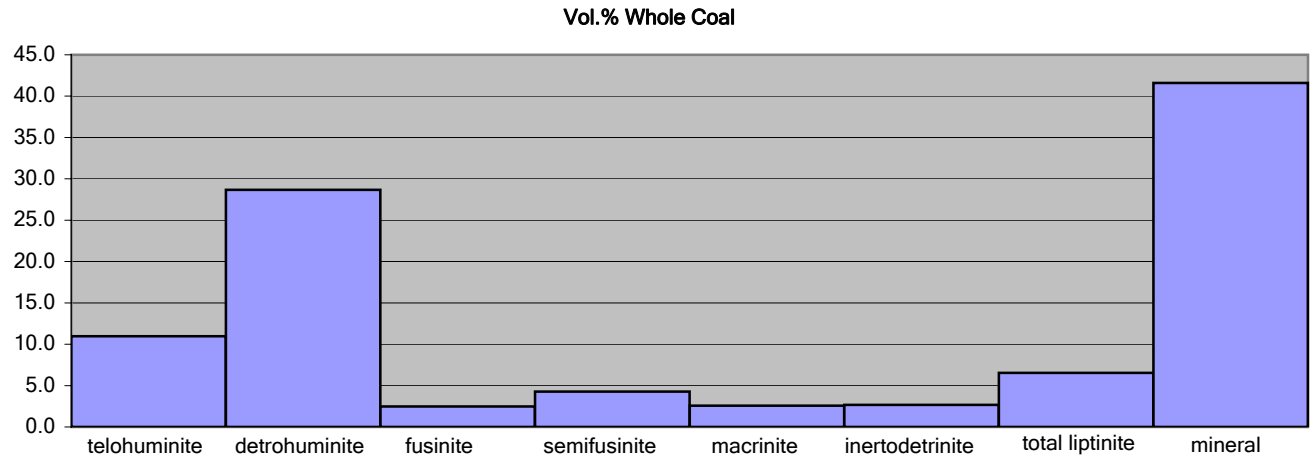
SAMPLE INFORMATION

Submitted by:	P.Warwick
Date Submitted:	1/1/2003
Project:	Devon
Sample:	**4-LA-7**
Sample Type	coal core
Date Analyzed:	6/30/2003
Operator:	P.Warwick
#counts	1500
Rank:	lignite

RESULTS

	Vol.% whole coal	Vol.% organic matter
textinite/ulminite	11.0	18.8
attrinite/densinite	28.7	49.1
corpohuminite	0.0	0.0
total huminite	39.6	67.9
fusinite	2.5	4.3
semifusinite	4.3	7.3
secretinite	0.1	0.2
macrinite	2.6	4.4
micrinite	0.0	0.0
funginite	0.1	0.2
inertodetrinite	2.7	4.6
total inertinite	12.2	20.9
sporinite	0.1	0.2
cutinite	0.0	0.0
resinite in textinite	0.0	0.0
resinite in matrix	0.0	0.0
bituminite	0.2	0.4
exsudatinite	0.0	0.0
alginite	0.6	1.0
liptodetrinite	5.6	9.6
suberinite	0.0	0.0
total liptinite	6.5	11.2
mineral	41.6	
total	100.0	100.0





COMMENT

Coal fragments (mostly attrinite) are mineral matter rich. Pyrite rich. Counted attrinite includes actual coal fragments and dispersed <10 um vitrinite fragments in sediment.

VITRINITE REFLECTANCE REPORT

USGS

SAMPLE INFORMATION

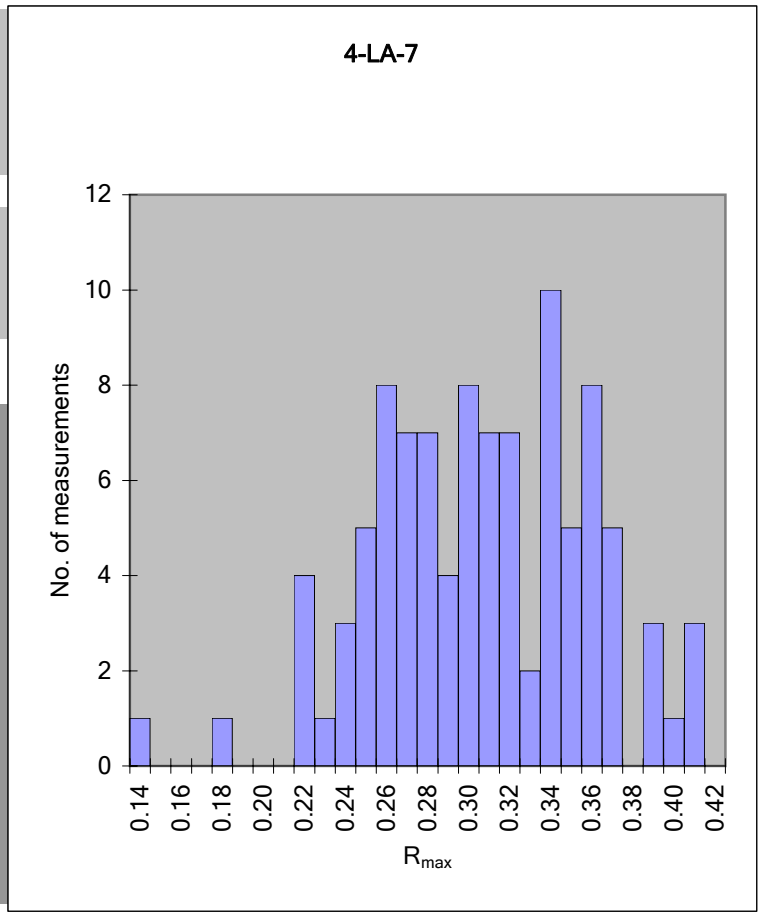
Submitted by: P.Warwick
Date Submitted: 1/1/2003
Project: Devon

Sample: 4-LA-7
Sample Type coal core
Date Analyzed: 1/1/2003
Operator: P.Hackley

RESULTS

measurements: 100
maceral type: telohuminite
R_{max}: 0.30
s.d.: 0.05

RANK: lignite



DATA

0.221	0.273	0.356	0.272	0.292	0.307	0.362	0.367	0.275	0.232
0.232	0.251	0.265	0.290	0.287	0.300	0.312	0.213	0.342	0.220
0.338	0.338	0.352	0.335	0.304	0.346	0.276	0.257	0.335	0.261
0.345	0.140	0.273	0.351	0.264	0.256	0.258	0.299	0.265	0.259
0.336	0.333	0.285	0.296	0.313	0.300	0.328	0.293	0.293	0.265
0.386	0.282	0.332	0.318	0.241	0.408	0.368	0.271	0.348	0.312
0.353	0.242	0.363	0.358	0.351	0.261	0.259	0.304	0.295	0.335
0.349	0.319	0.328	0.356	0.269	0.214	0.243	0.391	0.311	0.251
0.242	0.357	0.308	0.274	0.362	0.214	0.408	0.405	0.258	0.233
0.339	0.385	0.301	0.303	0.318	0.171	0.243	0.310	0.384	0.334

min: 0.140 max: 0.408 V-types: 4

COMMENT

PETROGRAPHIC ANALYSIS REPORT

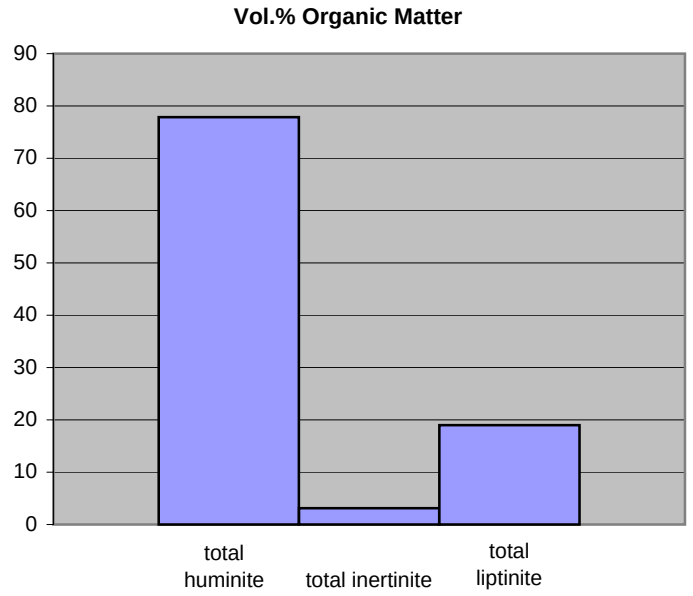
USGS

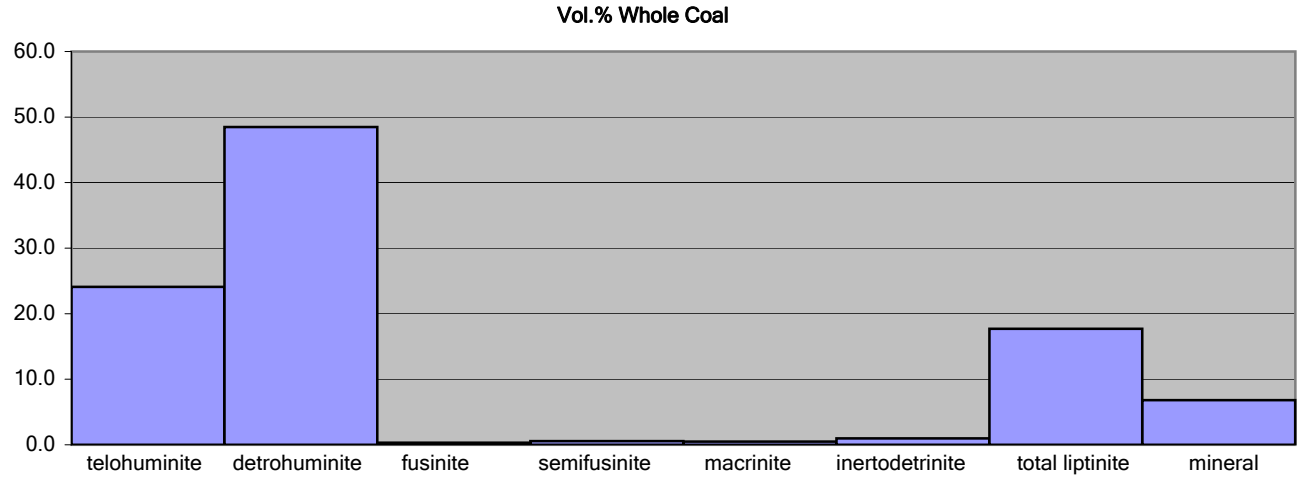
SAMPLE INFORMATION

Submitted by:	P.Warwick
Date Submitted:	1/1/2003
Project:	Devon
Sample:	3-LA-C13
Sample Type	coal core
Date Analyzed:	8/21/2003
Operator:	P.Warwick
#counts	2000
Rank:	lignite

RESULTS

	Vol.% whole coal	Vol.% organic matter
textinite/ulminite	24.1	25.8
attrinite/densinite	48.5	52.0
corpohuminite	0.0	0.0
total huminite	72.6	77.9
fusinite	0.3	0.3
semifusinite	0.6	0.6
macrinite	0.5	0.5
micrinite	0.1	0.1
funginite	0.5	0.5
inertodetrinite	1.0	1.0
total inertinite	2.9	3.1
sporinite	0.3	0.3
cutinite	0.0	0.0
resinite in textinite	0.3	0.3
resinite in matrix	0.7	0.8
bituminite	0.5	0.5
exsudatinite	0.0	0.0
alginite	0.4	0.4
liptodetrinite	15.6	16.7
suberinite	0.0	0.0
total liptinite	17.7	19.0
mineral	6.8	
total	100.0	100.0





COMMENT

attrinite texture is relatively hard to discern relative to other Devon samples as it contains little inertinite. Sample contains abundant flourescing textinite with flourescing corpohuminite cell filling (photographs).

VITRINITE REFLECTANCE REPORT

USGS

SAMPLE INFORMATION

Submitted by: P.Warwick
Date Submitted: 1/1/2003
Project: Devon

Sample: 3-LA-C13
Sample Type coal core
Date Analyzed: 4/18/2005
Operator: P.Hackley

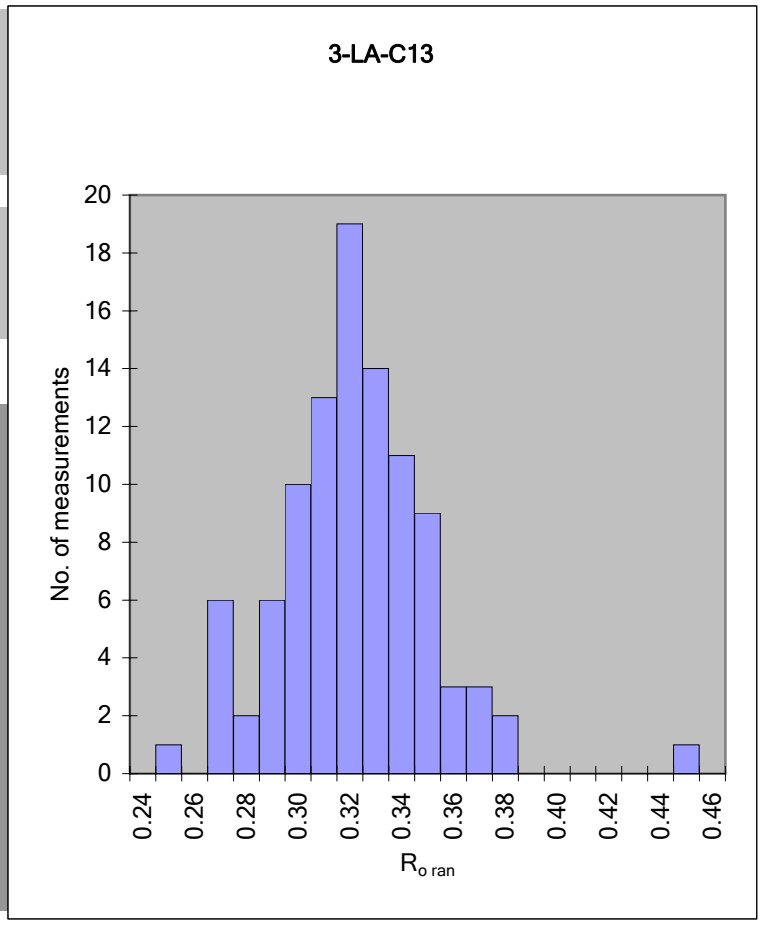
RESULTS

measurements: 100
maceral type: telohuminite
$R_{o\ ran}$ (ISO/ASTM): 0.32
s.d.: 0.03

calc. $R_{o\ max}$ (ISO): 0.34
s.d.: 0.03

calc. $R_{o\ max}$ (ASTM): 0.31
s.d.: 0.03

RANK: lignite



DATA

0.313	0.336	0.351	0.292	0.314	0.300	0.346	0.338	0.311	0.306
0.298	0.347	0.343	0.314	0.313	0.333	0.298	0.349	0.317	0.295
0.270	0.336	0.315	0.326	0.328	0.445	0.343	0.302	0.310	0.322
0.332	0.320	0.371	0.320	0.287	0.302	0.379	0.285	0.334	0.300
0.341	0.312	0.369	0.311	0.320	0.245	0.339	0.311	0.305	0.338
0.277	0.267	0.313	0.301	0.305	0.262	0.352	0.321	0.305	0.358
0.303	0.263	0.322	0.294	0.322	0.319	0.335	0.342	0.366	0.323
0.321	0.345	0.267	0.271	0.286	0.332	0.302	0.330	0.305	0.362
0.283	0.339	0.299	0.281	0.306	0.263	0.281	0.327	0.319	0.326
0.304	0.319	0.296	0.328	0.347	0.297	0.313	0.327	0.311	0.328

min: 0.245 max: 0.445 V-types: 3

COMMENT

Polish is lousy on A pellet. Repolished, analyzed on 4/18/05. Beautiful flourescing textinite common.

PETROGRAPHIC ANALYSIS REPORT

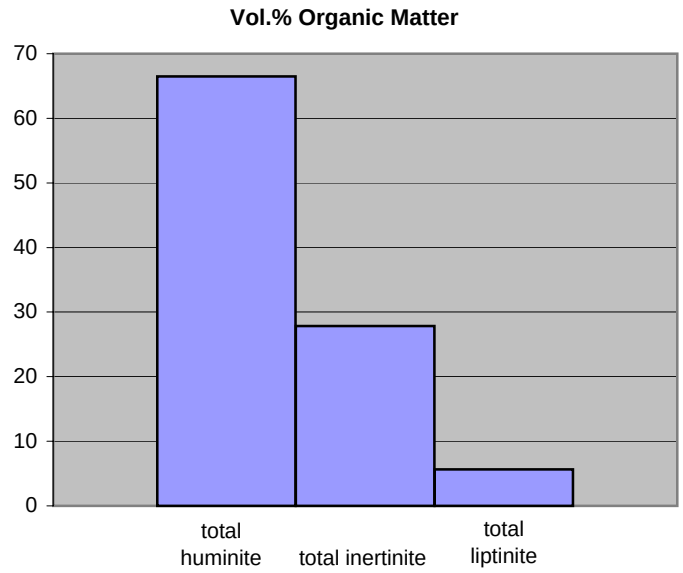
USGS

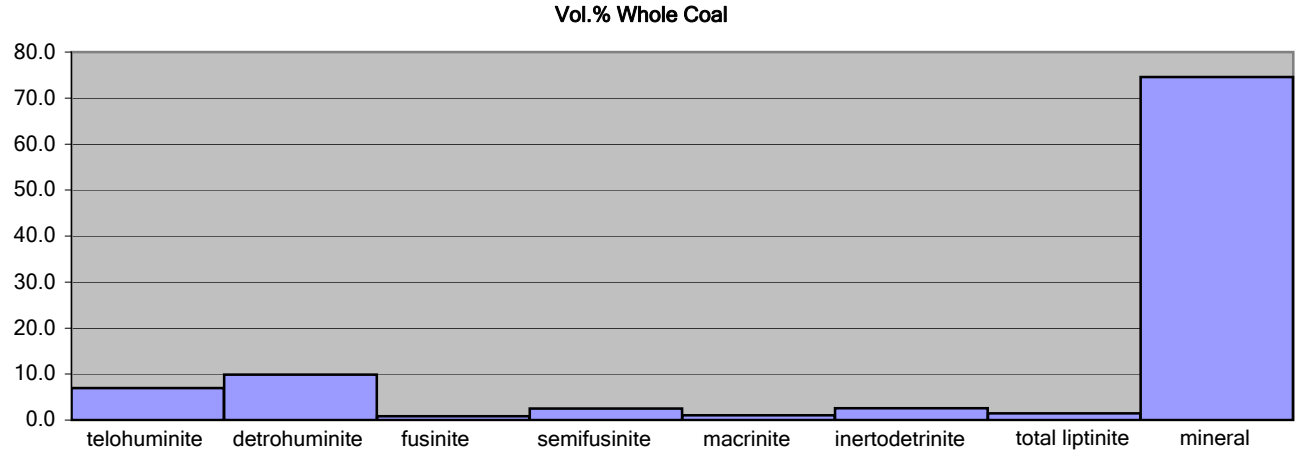
SAMPLE INFORMATION

Submitted by:	P.Warwick
Date Submitted:	1/1/2003
Project:	Devon
Sample:	4-LA-8
Sample Type	coal core
Date Analyzed:	4/4/2005
Operator:	P.Hackley
#counts	1000
Rank:	subC

RESULTS

	Vol.% whole coal	Vol.% organic matter
textinite/ulminite	7.0	27.5
attrinite/densinite	9.9	39.0
corpohuminite	0.0	0.0
total huminite	16.9	66.5
fusinite	0.8	3.2
semifusinite	2.5	9.9
secretinite	0.1	0.3
macrinite	1.1	4.2
micrinite	0.0	0.0
funginite	0.0	0.0
inertodetrinite	2.6	10.2
total inertinite	7.1	27.9
sporinite	0.7	2.7
cutinite	0.3	1.0
resinite in textinite	0.0	0.0
resinite in matrix	0.0	0.0
bituminite	0.1	0.3
exsudatinite	0.0	0.0
alginite	0.0	0.0
liptodetrinite	0.4	1.7
suberinite	0.0	0.0
total liptinite	1.4	5.7
mineral	74.6	
total	100.0	100.0





COMMENT

Contains dispersed fine-grained vitrinite in mineral matter groundmass with occasional coarse grains of attrinite or macrinite. Detrital vitrinite particles <10um counted as attrinite.

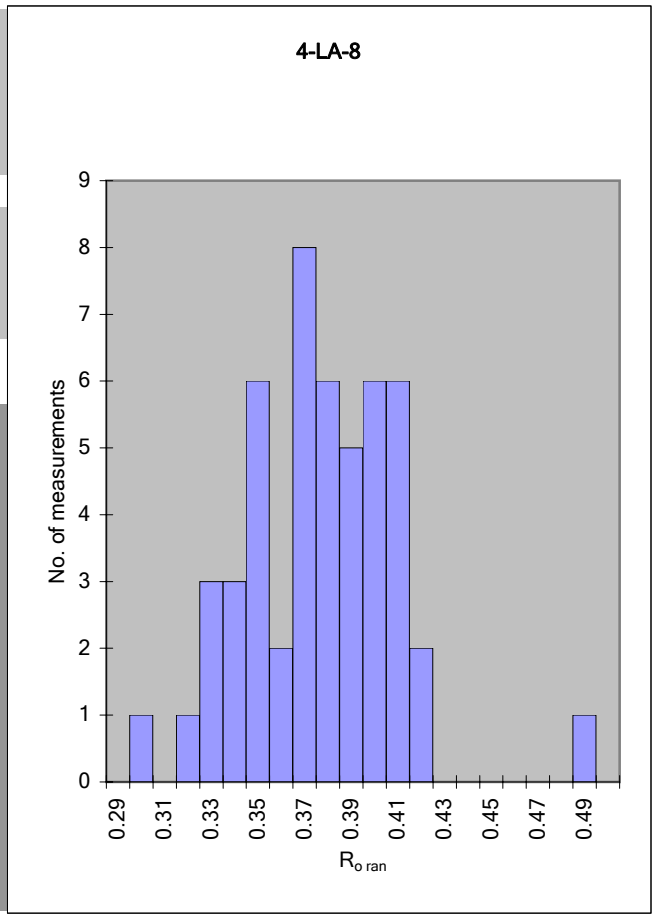
VITRINITE REFLECTANCE REPORT

USGS

SAMPLE INFORMATION

Submitted by: P.Warwick
Date Submitted: 1/1/2003
Project: Devon

Sample: **4-LA-8**
Sample Type coal core
Date Analyzed: 4/4/2005
Operator: P.Hackley



RESULTS

measurements: 50
maceral type: telovitrinite
$R_{o\ ran}$ (ISO/ASTM): 0.37
s.d.: 0.03

calc. $R_{o\ max}$ (ISO): 0.39
s.d.: 0.03

calc. $R_{o\ max}$ (ASTM): 0.37
s.d.: 0.03

RANK: subC

DATA

0.376	0.482	0.391	0.404	0.365	0.369
0.326	0.380	0.402	0.384	0.395	0.365
0.330	0.317	0.348	0.349	0.379	0.347
0.339	0.376	0.376	0.392	0.382	0.403
0.393	0.365	0.382	0.375	0.369	0.408
0.408	0.386		0.336	0.358	
0.352	0.415		0.363	0.385	
0.412	0.329		0.338	0.392	
0.347	0.342		0.394	0.349	
0.297	0.361		0.410	0.364	

min: 0.297 **max:** 0.482 **V-types:** 3

COMMENT

Vitrinite is poorly polished. Sample is 74.6% mineral matter.

PETROGRAPHIC ANALYSIS REPORT

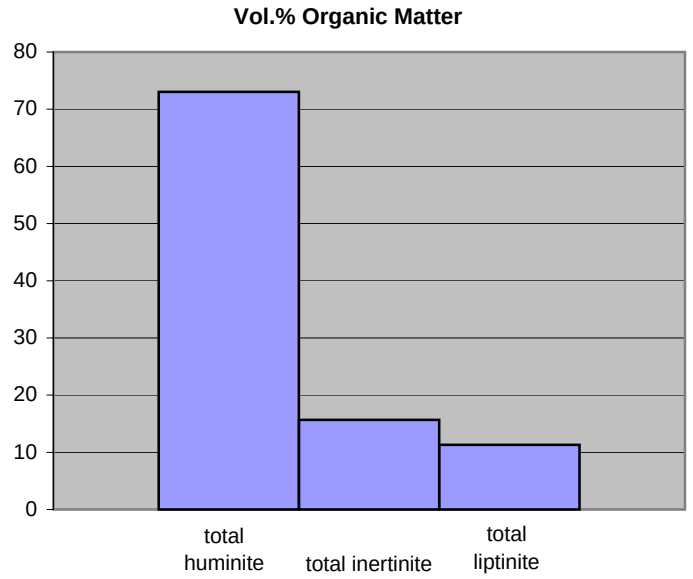
USGS

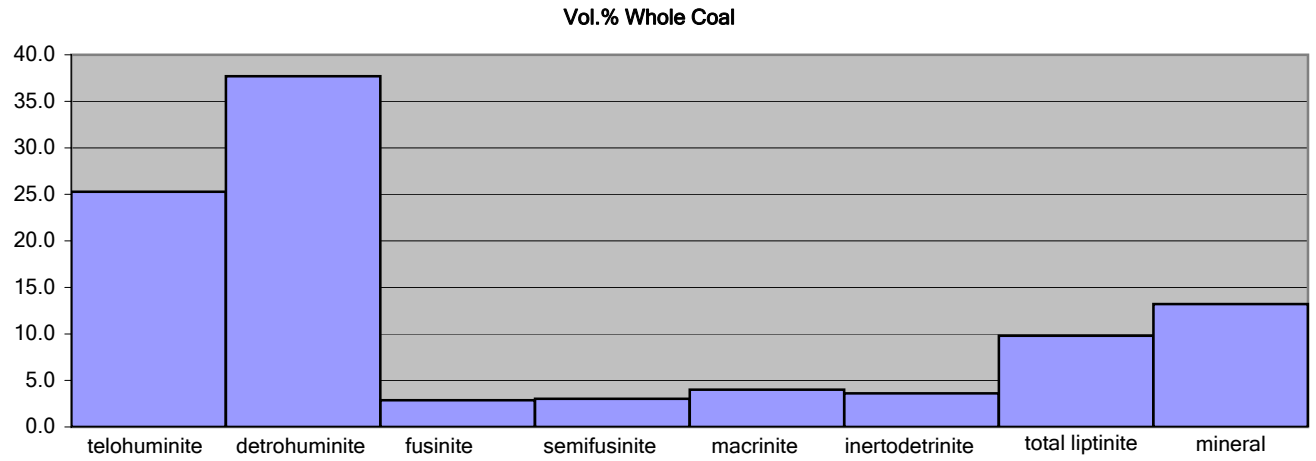
SAMPLE INFORMATION

Submitted by:	P.Warwick
Date Submitted:	1/1/2003
Project:	Devon
Sample:	**4-LA-10**
Sample Type	coal core
Date Analyzed:	4/5/2005
Operator:	P.Hackley
#counts	2000
Rank:	lignite

RESULTS

	Vol.% whole coal	Vol.% organic matter
textinite/ulminite	25.3	29.1
attrinite/densinite	37.7	43.4
corpohuminite	0.4	0.5
total huminite	63.4	73.0
fusinite	2.9	3.3
semifusinite	3.0	3.5
secretinite	0.1	0.1
macrinite	4.0	4.6
micrinite	0.0	0.0
funginite	0.0	0.0
inertodetrinite	3.6	4.2
total inertinite	13.6	15.7
sporinite	1.4	1.6
cutinite	0.1	0.1
resinite in textinite	0.6	0.7
resinite in matrix	0.3	0.4
bituminite	0.1	0.1
exsudatinite	0.3	0.4
alginite	1.0	1.1
liptodetrinite	6.0	6.9
suberinite	0.0	0.0
total liptinite	9.8	11.3
mineral	13.2	
total	100.0	100.0





COMMENT

In flourescence mode dominated by highly-flourescent resinite (bright green flourinite), ornamented sporinite, and mostly macerated alginite (now liptodetrinite) set in an attrinite groundmass. Contains 10-30 um faintly flourescing resinite in textinite. Polish is very poor on A pellet, mediocre on B pellet. Contains thick cutinite? (photographs). Attrinite>ulminite.

VITRINITE REFLECTANCE REPORT

USGS

SAMPLE INFORMATION

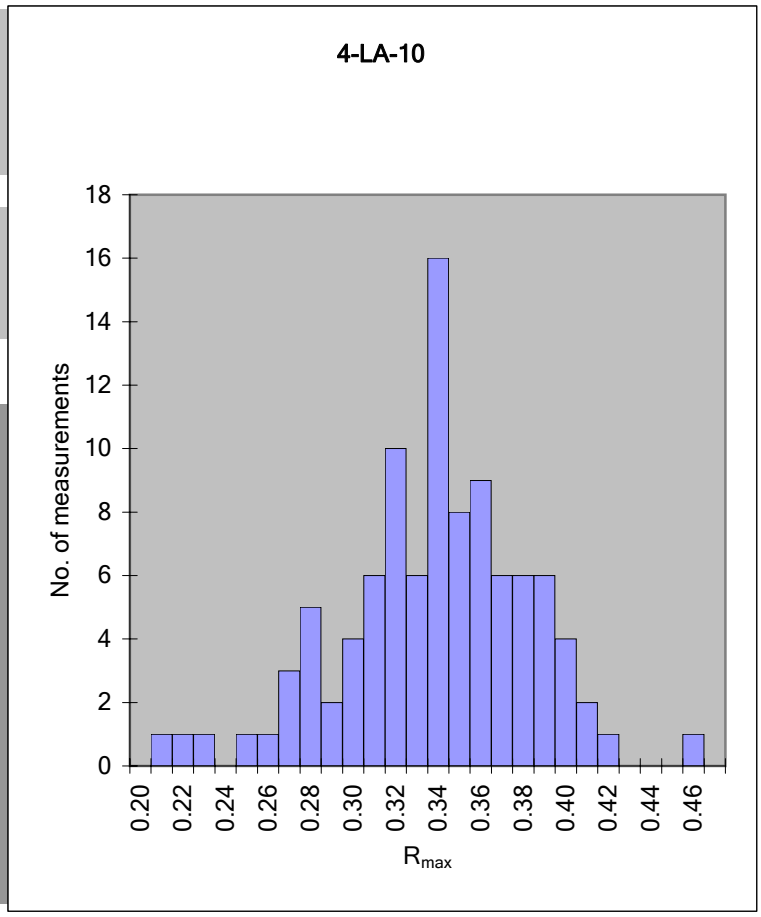
Submitted by: P.Warwick
Date Submitted: 1/1/2003
Project: Devon

Sample: 4-LA-10
Sample Type coal core
Date Analyzed: 1/1/2003
Operator: P.Hackley

RESULTS

measurements: 100
maceral type: telohuminite
R_{max}: 0.33
s.d.: 0.04

RANK: lignite



DATA

0.356	0.381	0.363	0.333	0.316	0.364	0.216	0.397	0.269	0.268
0.292	0.369	0.326	0.363	0.317	0.385	0.252	0.392	0.337	0.287
0.334	0.302	0.348	0.204	0.315	0.333	0.318	0.412	0.279	0.265
0.355	0.320	0.318	0.335	0.346	0.341	0.343	0.288	0.332	0.351
0.372	0.273	0.380	0.364	0.372	0.335	0.360	0.271	0.320	0.343
0.322	0.334	0.303	0.329	0.340	0.355	0.393	0.343	0.332	0.280
0.312	0.372	0.338	0.401	0.301	0.356	0.332	0.278	0.297	0.355
0.298	0.304	0.382	0.390	0.310	0.353	0.341	0.380	0.328	0.322
0.337	0.293	0.340	0.336	0.387	0.309	0.452	0.229	0.323	0.398
0.241	0.314	0.366	0.318	0.344	0.380	0.401	0.338	0.385	0.358

min: 0.204 max: 0.452 V-types: 3

COMMENT

PETROGRAPHIC ANALYSIS REPORT

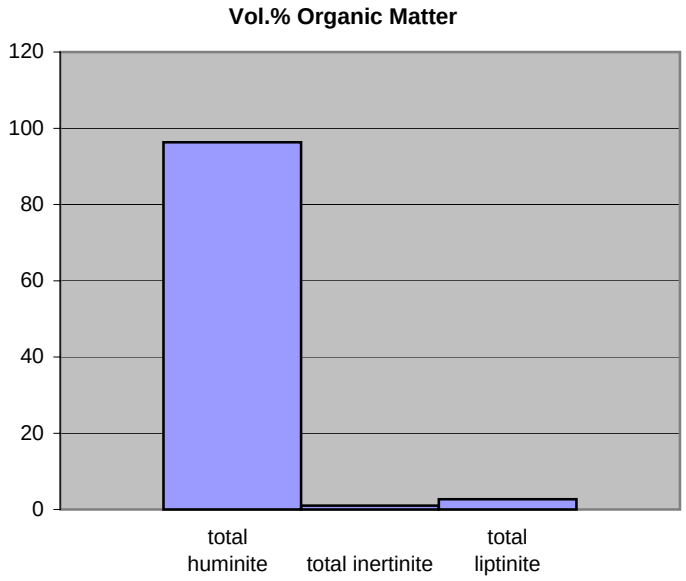
USGS

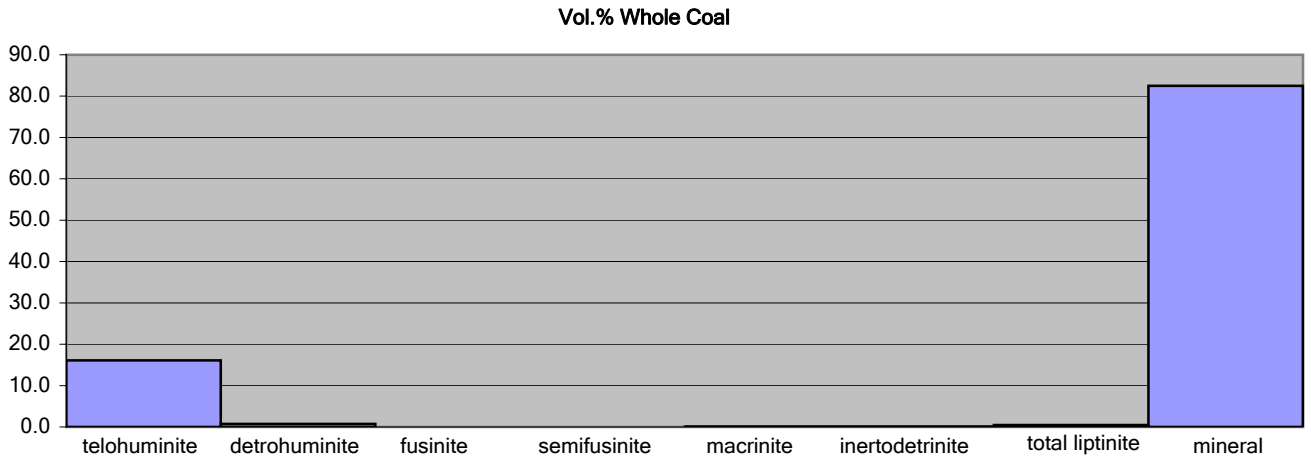
SAMPLE INFORMATION

Submitted by:	P.Warwick
Date Submitted:	1/1/2003
Project:	Devon
Sample:	**4-LA-11**
Sample Type	coal core cuttings
Date Analyzed:	4/20/2005
Operator:	P.Hackley
#counts	1000
Rank:	lignite

RESULTS

	Vol.% whole coal	Vol.% organic matter
textinite/ulminite	16.1	92.1
attrinite/densinite	0.7	4.3
corpohuminite	0.0	0.0
total huminite	16.9	96.3
fusinite	0.0	0.0
semifusinite	0.0	0.0
secretinite	0.0	0.0
macrinite	0.1	0.3
micrinite	0.0	0.0
funginite	0.1	0.3
inertodetrinite	0.1	0.3
total inertinite	0.2	1.0
sporinite	0.1	0.3
cutinite	0.0	0.0
resinite in textinite	0.0	0.0
resinite in matrix	0.1	0.3
bituminite	0.0	0.0
exsudatinite	0.0	0.0
alginite	0.1	0.3
liptodetrinite	0.3	1.7
suberinite	0.0	0.0
total liptinite	0.5	2.7
mineral	82.5	
total	100.0	100.0





COMMENT

Organic material consists of ulminte and some texto-ulminite, primarily linear fragments >100 um in long dimension with high aspect ratio. Very minor lipto and inertodetrinite.

VITRINITE REFLECTANCE REPORT

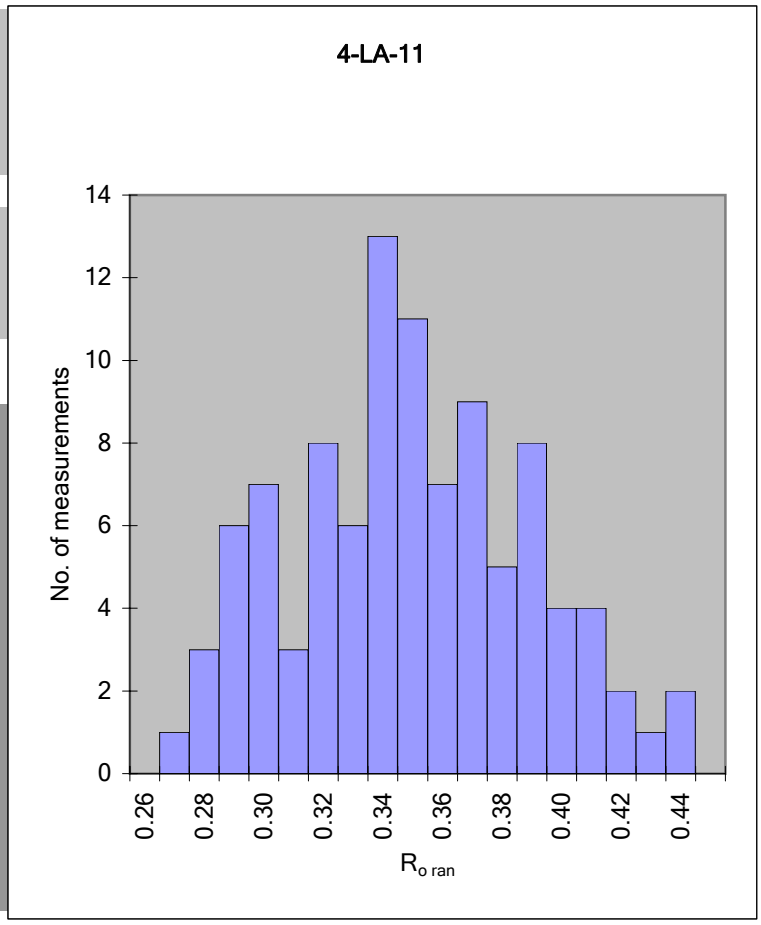
USGS

SAMPLE INFORMATION

Submitted by:	P.Warwick
Date Submitted:	1/1/2003
Project:	Devon
Sample:	4-LA-11
Sample Type	carb. shale core
Date Analyzed:	4/21/2005
Operator:	P.Hackley

RESULTS

# measurements:	100
maceral type:	telohuminite
$R_{o\ ran}$ (ISO/ASTM):	0.34
s.d.:	0.04
calc. $R_{o\ max}$ (ISO):	0.37
s.d.:	0.04
calc. $R_{o\ max}$ (ASTM):	0.34
s.d.:	0.04
RANK:	lignite



DATA

0.336	0.377	0.356	0.382	0.295	0.285	0.357	0.403	0.343	0.355
0.379	0.285	0.333	0.375	0.354	0.361	0.302	0.436	0.364	0.334
0.414	0.394	0.348	0.432	0.383	0.339	0.370	0.343	0.313	0.278
0.292	0.296	0.391	0.328	0.350	0.382	0.331	0.312	0.312	0.367
0.385	0.268	0.384	0.336	0.361	0.406	0.322	0.426	0.334	0.367
0.368	0.348	0.288	0.363	0.359	0.278	0.386	0.374	0.334	0.347
0.322	0.353	0.296	0.317	0.317	0.310	0.313	0.329	0.284	0.342
0.292	0.298	0.343	0.368	0.345	0.391	0.407	0.412	0.333	0.381
0.306	0.401	0.339	0.315	0.358	0.316	0.340	0.329	0.350	0.325
0.335	0.387	0.282	0.280	0.398	0.292	0.289	0.331	0.344	0.378

min: 0.268 max: 0.436 V-types: 3

COMMENT

Polish is lousy on A pellet. Repolished, analyzed on 4/21/05. Sample is carb shale, 82% ash, organic matter dominated by ulminite and texto-ulminite.

PETROGRAPHIC ANALYSIS REPORT

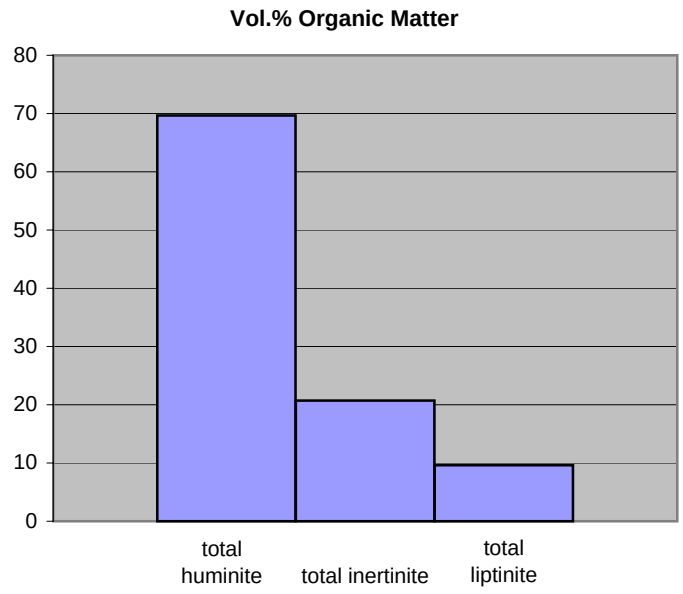
USGS

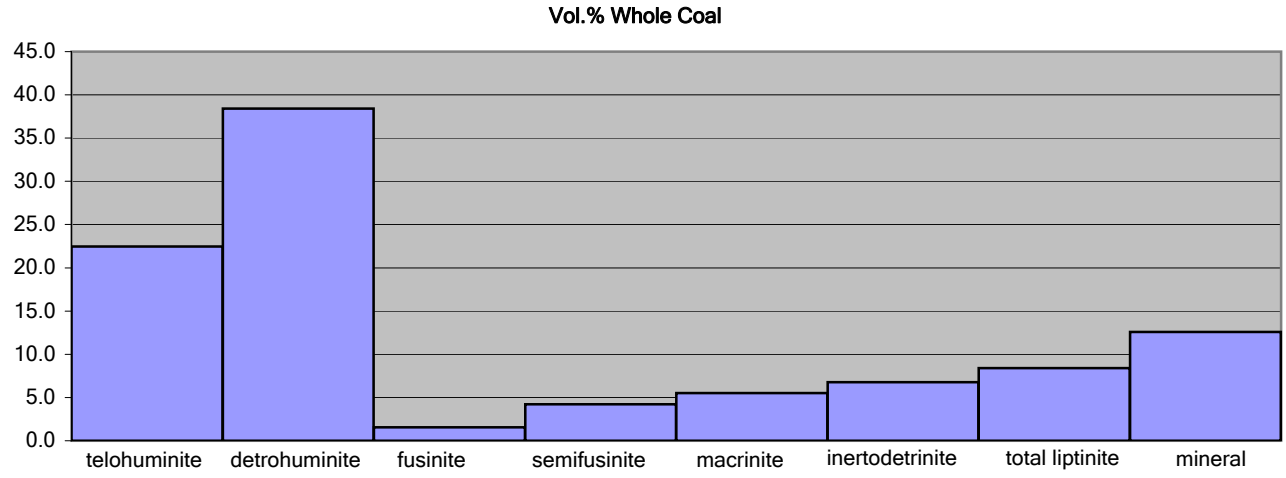
SAMPLE INFORMATION

Submitted by:	P.Warwick
Date Submitted:	1/1/2003
Project:	Devon
Sample:	3-LA-C10
Sample Type	coal core cuttings
Date Analyzed:	4/1/2005
Operator:	P.Hackley
#counts	1999
Rank:	subC

RESULTS

	Vol.% whole coal	Vol.% organic matter
textinite/ulminite	22.5	25.7
attrinite/densinite	38.4	43.9
corpohuminite	0.0	0.0
total huminite	60.9	69.7
fusinite	1.5	1.8
semifusinite	4.2	4.8
macrinite	5.5	6.3
micrinite	0.0	0.0
funginite	0.1	0.1
inertodetrinite	6.8	7.7
total inertinite	18.1	20.7
sporinite	2.4	2.8
cutinite	0.3	0.3
resinite in textinite	0.0	0.0
resinite in matrix	0.2	0.2
bituminite	0.3	0.3
exsudatinite	0.2	0.2
alginite	1.1	1.3
liptodetrinite	3.2	3.7
suberinite	0.7	0.8
total liptinite	8.4	9.6
mineral	12.6	
total	100.0	100.0





COMMENT

beautiful exudate in bogen fusinite texture in flourescence. Resinite poor compared to other Wilcox samples. In oil, sample appears to contain mostly attrital huminite, some durite fragments, most of the telohuminite appears to have undergone some oxidation, shrinkage cracks, etc. Sample may have been stressed during preparation, creating microfaults, disaggregated texture. This texture is present in both mounts and probably reflects in situ stress.

U.S.Department of the Interior
U.S.Geological Survey

Eastern Energy Resources Team
Organic Petrology Laboratory

VITRINITE REFLECTANCE REPORT

USGS

SAMPLE INFORMATION

Submitted by: P.Warwick
Date Submitted: 1/1/2003
Project: Devon

Sample: 3-LA-C10
Sample Type coal core cuttings
Date Analyzed: 4/11/2005
Operator: P.Hackley

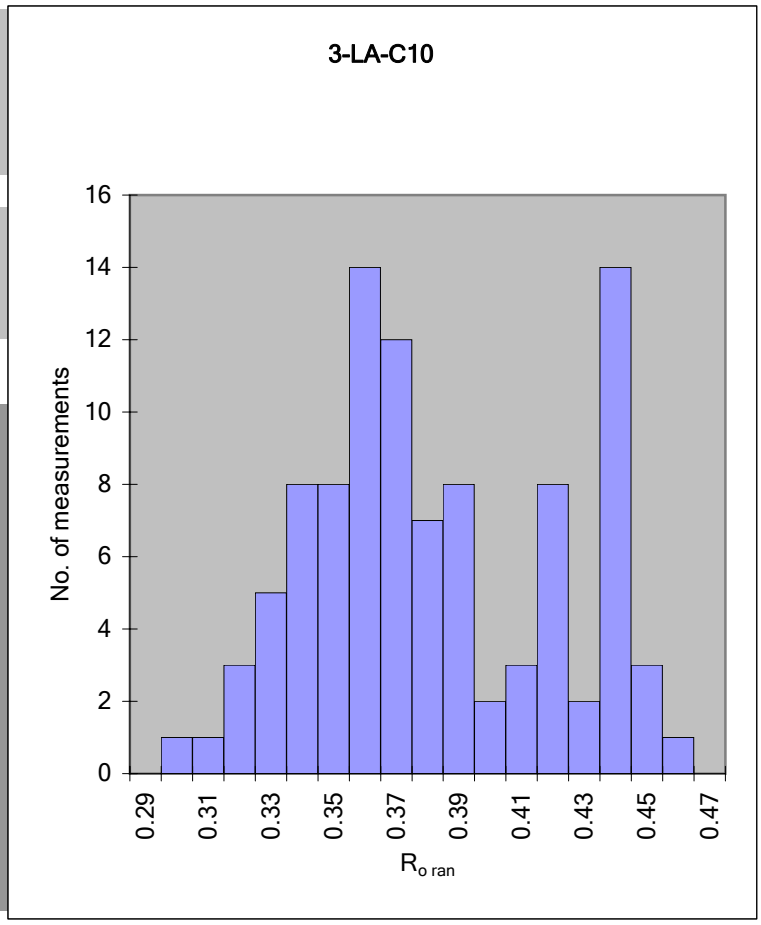
RESULTS

measurements: 100
maceral type: telohuminite
$R_{o\ ran}$ (ISO/ASTM): 0.38
s.d.: 0.04

calc. $R_{o\ max}$ (ISO): 0.40
s.d.: 0.04

calc. $R_{o\ max}$ (ASTM): 0.38
s.d.: 0.04

RANK: subC



DATA

0.415	0.348	0.341	0.433	0.382	0.375	0.436	0.403	0.431	0.356
0.409	0.356	0.418	0.386	0.367	0.328	0.365	0.373	0.441	0.359
0.433	0.432	0.317	0.357	0.436	0.312	0.352	0.388	0.361	0.352
0.361	0.346	0.438	0.421	0.352	0.363	0.345	0.329	0.389	0.342
0.347	0.418	0.415	0.291	0.437	0.338	0.366	0.327	0.433	0.339
0.369	0.367	0.306	0.430	0.381	0.338	0.327	0.333	0.332	0.314
0.432	0.344	0.396	0.365	0.434	0.368	0.389	0.412	0.358	0.385
0.409	0.435	0.333	0.336	0.442	0.375	0.444	0.337	0.374	0.414
0.369	0.357	0.372	0.355	0.420	0.452	0.389	0.412	0.399	0.356
0.352	0.377	0.433	0.325	0.433	0.362	0.345	0.360	0.355	0.371

min: 0.291 **max:** 0.452 **V-types:** 3

COMMENT

Polish is lousy on A pellet. Electronics will not stabilize on 4/12/05.

PETROGRAPHIC ANALYSIS REPORT

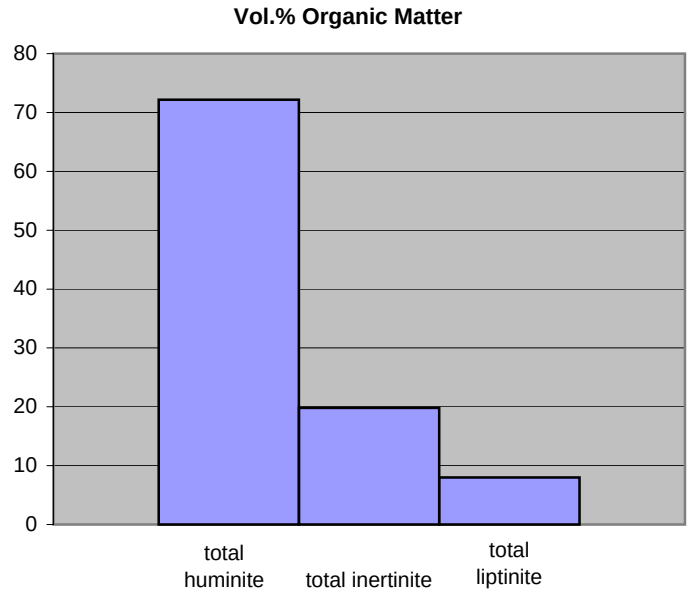
USGS

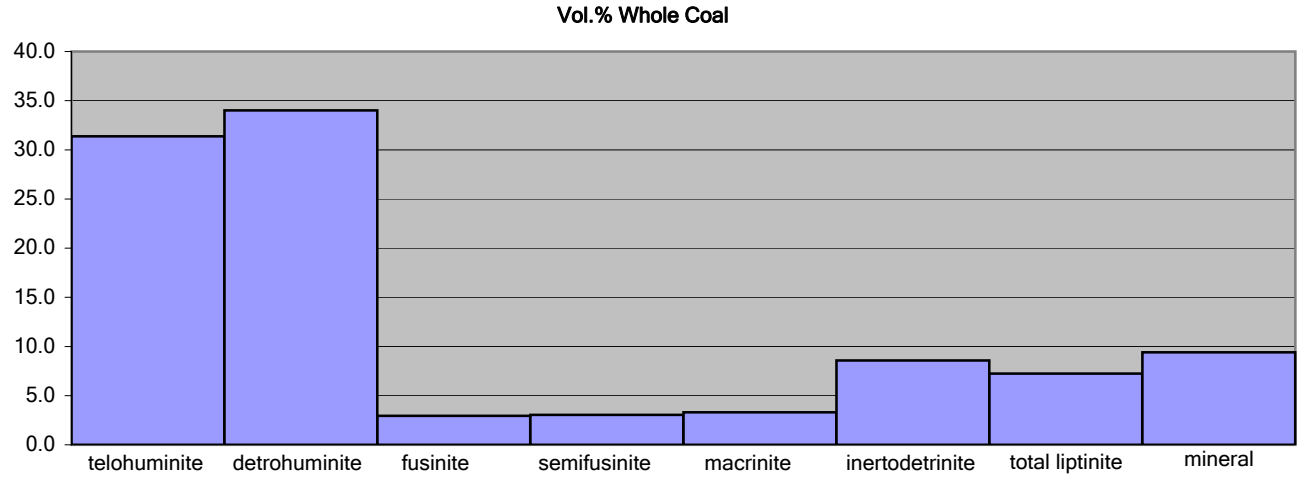
SAMPLE INFORMATION

Submitted by:	P.Warwick
Date Submitted:	1/1/2003
Project:	Devon
Sample:	LA-3-01-12
Sample Type	coal core cuttings
Date Analyzed:	4/8/2005
Operator:	P.Hackley
#counts	2000
Rank:	subC

RESULTS

	Vol.% whole coal	Vol.% organic matter
textinite/ulminite	31.4	34.6
attrinite/densinite	34.0	37.5
corpohuminite	0.0	0.0
total huminite	65.4	72.2
fusinite	3.0	3.3
semifusinite	3.0	3.4
macrinite	3.3	3.6
micrinite	0.0	0.0
funginite	0.1	0.1
inertodetrinite	8.6	9.5
total inertinite	18.0	19.8
sporinite	2.2	2.4
cutinite	0.8	0.9
resinite in textinite	0.2	0.2
resinite in matrix	0.7	0.8
bituminite	0.2	0.2
exsudatinite	0.1	0.1
alginite	0.3	0.3
liptodetrinite	2.5	2.8
suberinite	0.3	0.3
total liptinite	7.2	8.0
mineral	9.4	
total	100.0	100.0





COMMENT

inertinite-rich, wet durite comprises many grains. Trace micrinite in vitrite layers (photograph). Corpohuminite in situ not counted separately from telohuminite.

VITRINITE REFLECTANCE REPORT

USGS

SAMPLE INFORMATION

Submitted by: P.Warwick
Date Submitted: 1/1/2003
Project: Devon

Sample: LA-3-01-12
Sample Type coal core cuttings
Date Analyzed: 4/8/2005
Operator: P.Hackley

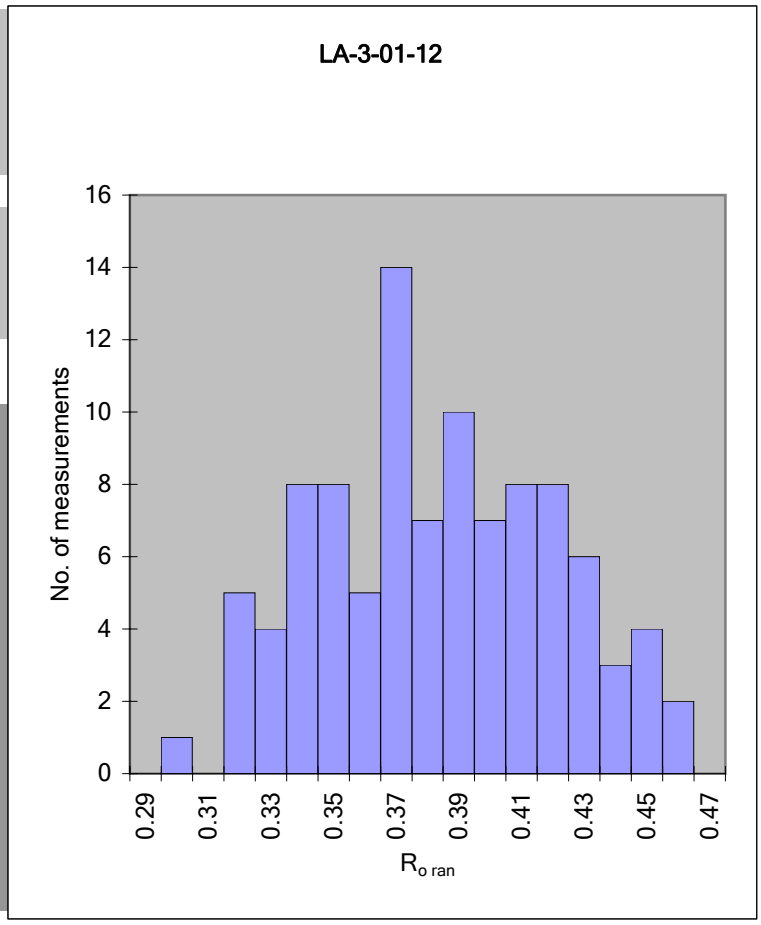
RESULTS

measurements: 100
maceral type: telohuminite
$R_{o\ ran}$ (ISO/ASTM): 0.38
s.d.: 0.04

calc. $R_{o\ max}$ (ISO): 0.40
s.d.: 0.04

calc. $R_{o\ max}$ (ASTM): 0.38
s.d.: 0.04

RANK: subC



DATA

0.351	0.347	0.320	0.331	0.389	0.389	0.412	0.378	0.326	0.335
0.339	0.376	0.392	0.369	0.341	0.327	0.402	0.354	0.404	0.415
0.398	0.402	0.363	0.362	0.345	0.424	0.333	0.444	0.444	0.341
0.360	0.337	0.424	0.384	0.376	0.374	0.391	0.395	0.455	0.414
0.424	0.422	0.326	0.371	0.402	0.404	0.382	0.325	0.443	0.338
0.369	0.412	0.363	0.365	0.392	0.312	0.389	0.366	0.386	0.365
0.358	0.365	0.358	0.365	0.390	0.391	0.384	0.435	0.408	0.361
0.438	0.348	0.363	0.408	0.443	0.361	0.385	0.451	0.424	0.342
0.362	0.343	0.314	0.379	0.391	0.420	0.421	0.320	0.314	0.343
0.339	0.376	0.334	0.411	0.403	0.294	0.415	0.415	0.438	0.385

min: 0.294 **max:** 0.455 **V-types:** 3

COMMENT

Polish is lousy on A pellet. Repolished and analyzed on 4/11/05.

PETROGRAPHIC ANALYSIS REPORT

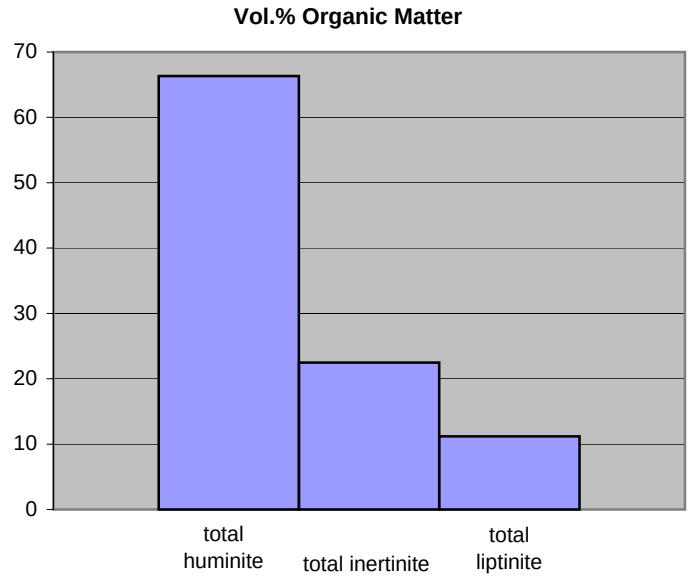
USGS

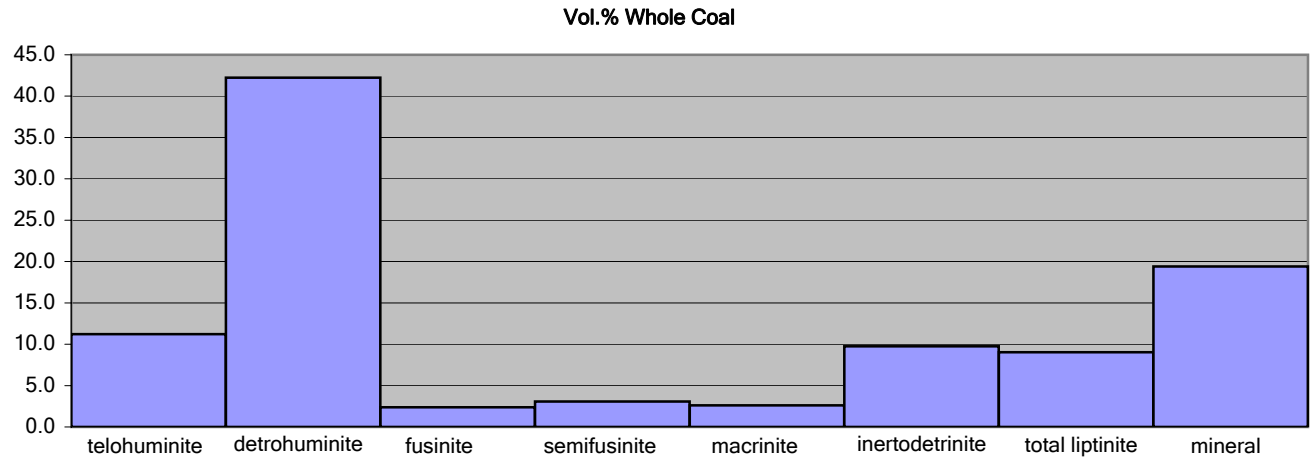
SAMPLE INFORMATION

Submitted by:	P.Warwick
Date Submitted:	1/1/2003
Project:	Devon
Sample:	3-LA-C12
Sample Type	coal core cuttings
Date Analyzed:	4/20/2005
Operator:	P.Hackley
#counts	2000
Rank:	lignite

RESULTS

	Vol.% whole coal	Vol.% organic matter
textinite/ulminite	11.2	13.9
attrinite/densinite	42.2	52.4
corpohuminite	0.0	0.0
total huminite	53.5	66.3
fusinite	2.4	3.0
semifusinite	3.1	3.8
secretinite	0.0	0.0
macrinite	2.6	3.2
micrinite	0.1	0.1
funginite	0.2	0.3
inertodetrinite	9.7	12.1
total inertinite	18.1	22.5
sporinite	2.7	3.4
cutinite	0.2	0.2
resinite in textinite	0.1	0.1
resinite in matrix	0.5	0.6
bituminite	0.0	0.0
exsudatinite	0.0	0.0
alginite	1.6	2.0
liptodetrinite	3.8	4.7
suberinite	0.2	0.2
total liptinite	9.0	11.2
mineral	19.4	
total	100.0	100.0





COMMENT

VITRINITE REFLECTANCE REPORT

USGS

SAMPLE INFORMATION

Submitted by: P.Warwick
Date Submitted: 1/1/2003
Project: Devon

Sample: 3-LA-C12
Sample Type coal core cuttings
Date Analyzed: 4/21/2005
Operator: P.Hackley

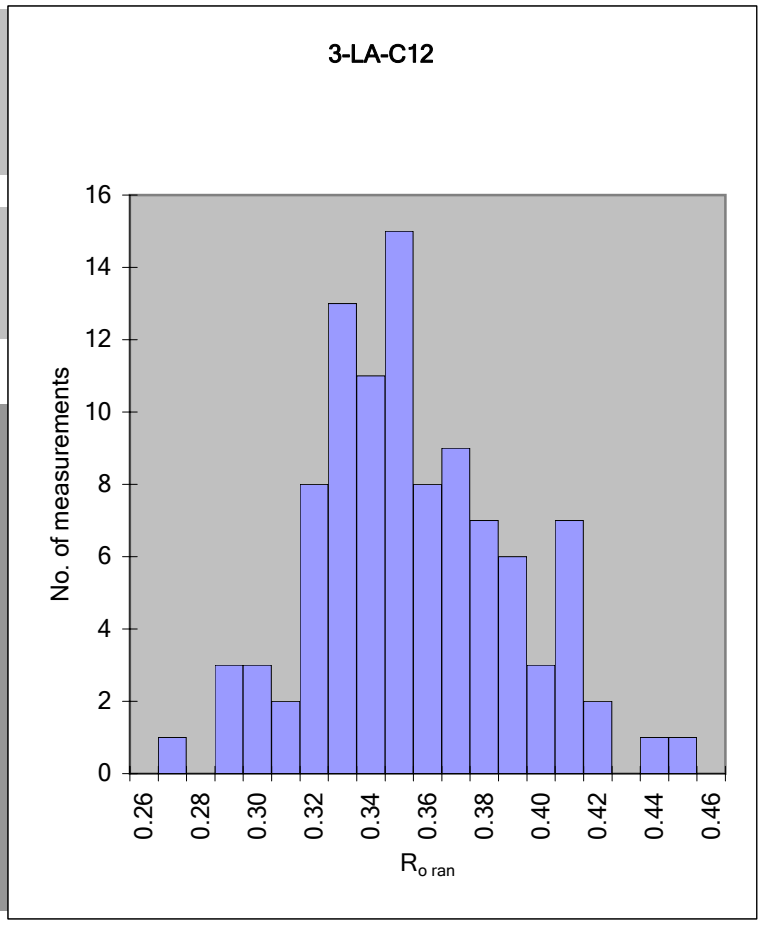
RESULTS

measurements: 100
maceral type: telohuminite
$R_{o\ ran}$ (ISO/ASTM): 0.35
s.d.: 0.03

calc. $R_{o\ max}$ (ISO): 0.37
s.d.: 0.04

calc. $R_{o\ max}$ (ASTM): 0.35
s.d.: 0.04

RANK: lignite



DATA

0.349	0.343	0.342	0.342	0.286	0.349	0.315	0.331	0.319	0.443
0.323	0.433	0.345	0.352	0.326	0.321	0.361	0.328	0.291	0.298
0.412	0.364	0.331	0.349	0.294	0.323	0.397	0.368	0.352	0.264
0.332	0.375	0.345	0.369	0.353	0.405	0.374	0.312	0.301	0.308
0.332	0.347	0.344	0.325	0.312	0.328	0.332	0.383	0.384	0.373
0.321	0.409	0.325	0.395	0.387	0.356	0.323	0.332	0.323	0.352
0.339	0.366	0.339	0.389	0.317	0.344	0.326	0.334	0.339	0.350
0.311	0.342	0.363	0.357	0.352	0.401	0.409	0.318	0.386	0.404
0.402	0.367	0.315	0.377	0.335	0.284	0.365	0.348	0.376	0.287
0.374	0.327	0.352	0.405	0.395	0.371	0.390	0.364	0.413	0.344

min: 0.264 max: 0.443 V-types: 3

COMMENT

PETROGRAPHIC ANALYSIS REPORT

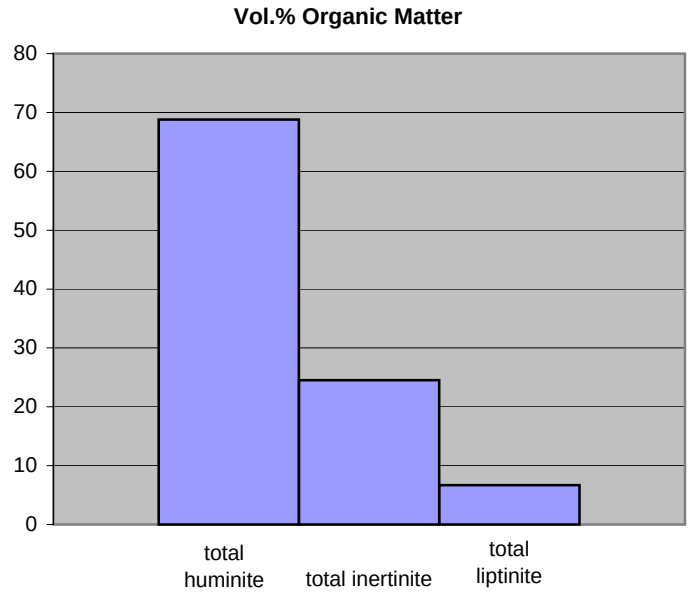
USGS

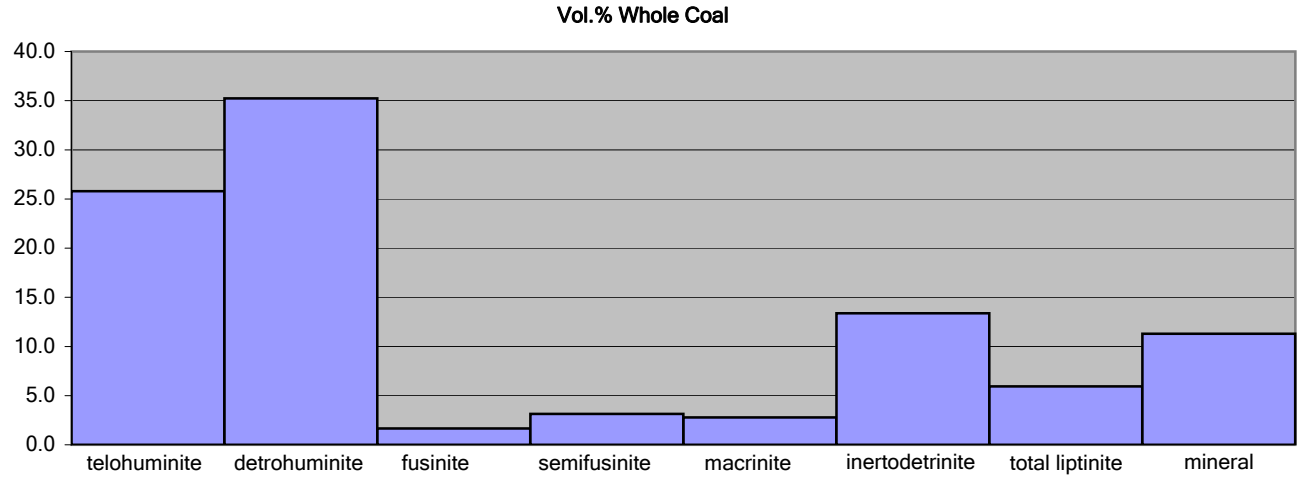
SAMPLE INFORMATION

Submitted by:	P.Warwick
Date Submitted:	1/1/2003
Project:	Devon
Sample:	3-LA-C14
Sample Type	coal core cuttings
Date Analyzed:	4/19/2005
Operator:	P.Hackley
#counts	2000
Rank:	lignite

RESULTS

	Vol.% whole coal	Vol.% organic matter
textinite/ulminite	25.8	29.1
attrinite/densinite	35.2	39.7
corpohuminite	0.0	0.0
total huminite	61.0	68.8
fusinite	1.7	1.9
semifusinite	3.1	3.5
macrinite	2.8	3.1
micrinite	0.6	0.7
funginite	0.2	0.2
inertodetrinite	13.4	15.1
total inertinite	21.7	24.5
sporinite	2.1	2.4
cutinite	0.2	0.2
resinite in textinite	0.2	0.2
resinite in matrix	0.3	0.3
bituminite	0.0	0.0
exsudatinite	0.0	0.0
alginite	0.6	0.7
liptodetrinite	2.4	2.7
suberinite	0.2	0.2
total liptinite	5.9	6.7
mineral	11.3	
total	100.0	100.0





COMMENT

VITRINITE REFLECTANCE REPORT

USGS

SAMPLE INFORMATION

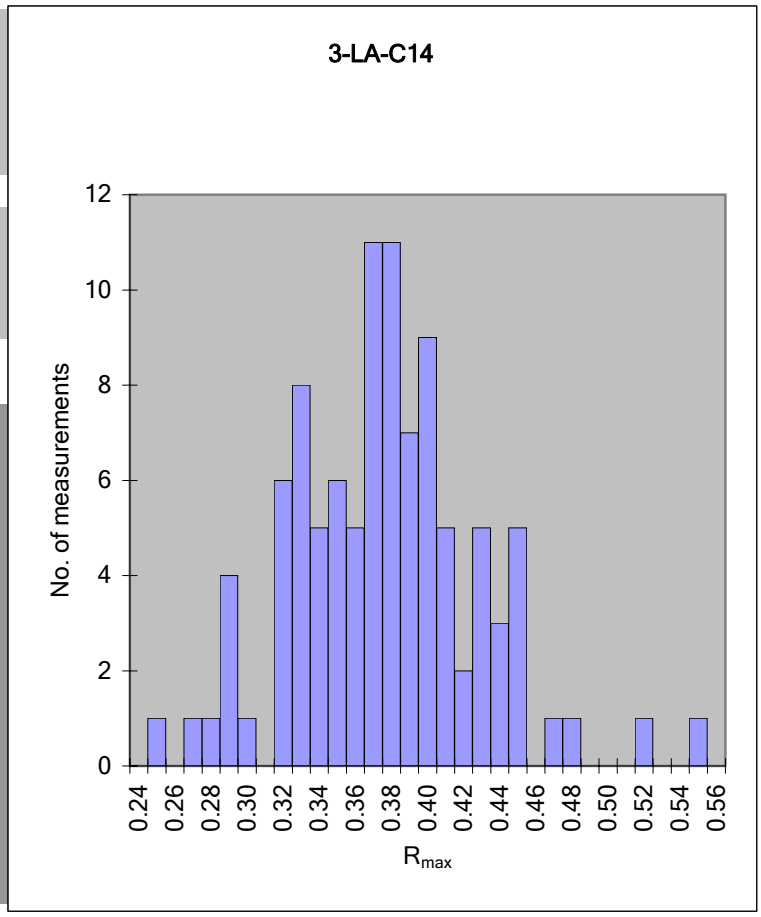
Submitted by: P.Warwick
Date Submitted: 1/1/2003
Project: Devon

Sample: 3-LA-C14
Sample Type coal core cuttings
Date Analyzed: 1/1/2003
Operator: P.Hackley

RESULTS

measurements: 100
maceral type: telohuminite
R_{max}: 0.37
s.d.: 0.05

RANK: lignite



DATA

0.545	0.344	0.404	0.375	0.369	0.392	0.316	0.403	0.367	0.329
0.447	0.408	0.354	0.423	0.386	0.465	0.393	0.321	0.281	0.357
0.411	0.394	0.369	0.311	0.367	0.349	0.329	0.375	0.376	0.326
0.325	0.286	0.313	0.242	0.445	0.317	0.342	0.363	0.381	0.359
0.336	0.393	0.378	0.341	0.376	0.319	0.383	0.264	0.383	0.449
0.363	0.424	0.367	0.331	0.435	0.373	0.330	0.278	0.343	0.428
0.395	0.391	0.375	0.374	0.350	0.389	0.426	0.287	0.281	0.373
0.333	0.322	0.402	0.384	0.445	0.435	0.338	0.372	0.422	0.367
0.406	0.372	0.361	0.384	0.394	0.517	0.352	0.446	0.437	0.298
0.325	0.315	0.399	0.364	0.396	0.473	0.412	0.370	0.338	0.358

min: 0.242 max: 0.545 V-types: 4

COMMENT

PETROGRAPHIC ANALYSIS REPORT

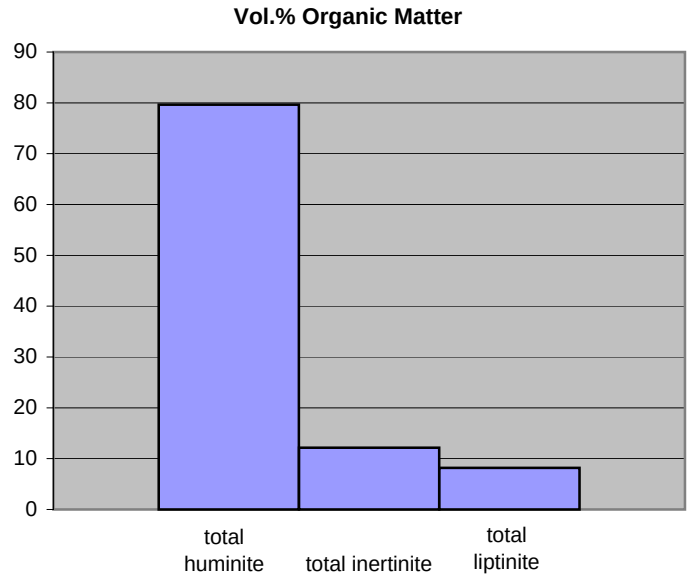
USGS

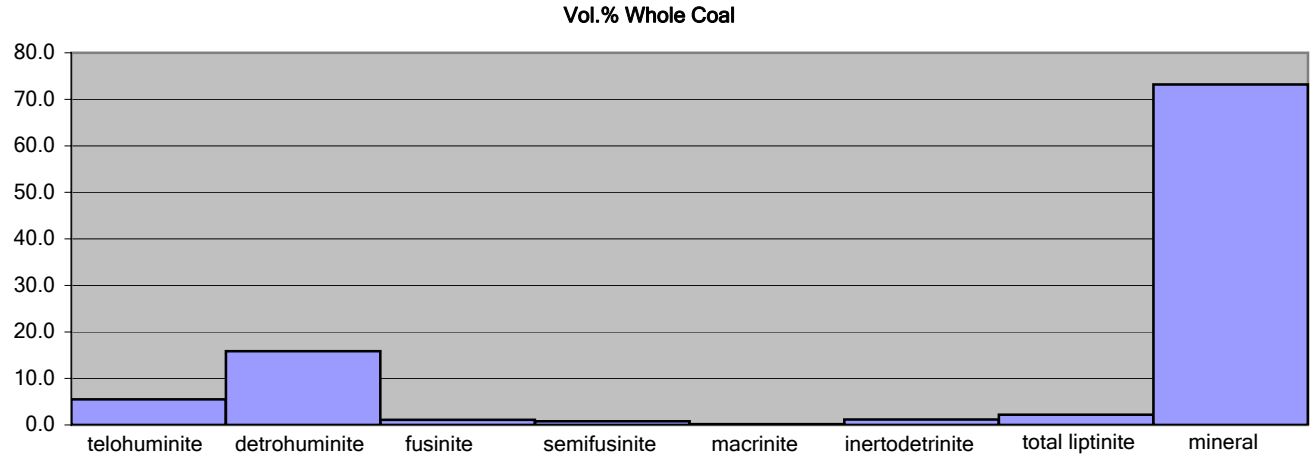
SAMPLE INFORMATION

Submitted by:	P.Warwick
Date Submitted:	1/1/2003
Project:	Devon
Sample:	**4-LA-12**
Sample Type	coal core
Date Analyzed:	4/1/2005
Operator:	P.Hackley
#counts	1500
Rank:	lignite

RESULTS

	Vol.% whole coal	Vol.% organic matter
textinite/ulminite	5.5	20.5
attrinite/densinite	15.9	59.1
corpohuminite	0.0	0.0
total huminite	21.3	79.6
fusinite	1.1	4.1
semifusinite	0.8	3.0
secretinite	0.1	0.2
macrinite	0.2	0.6
micrinite	0.0	0.0
funginite	0.0	0.0
inertodetrinite	1.2	4.3
total inertinite	3.3	12.2
sporinite	0.6	2.4
cutinite	0.2	0.8
resinite in textinite	0.0	0.0
resinite in matrix	0.2	0.6
bituminite	0.1	0.2
exsudatinite	0.1	0.2
alginite	0.5	1.8
liptodetrinite	0.6	2.2
suberinite	0.0	0.0
total liptinite	2.2	8.2
mineral	73.2	
total	100.0	100.0





COMMENT

cutinite fragments dispersed throughout mineral matter. Scattered coal fragments. Rare bituminite/flourescing attrinite.

VITRINITE REFLECTANCE REPORT

USGS

SAMPLE INFORMATION

Submitted by: P.Warwick
Date Submitted: 1/1/2003
Project: Devon

Sample: 4-LA-12
Sample Type coal core
Date Analyzed: 4/22/2005
Operator: P.Hackley

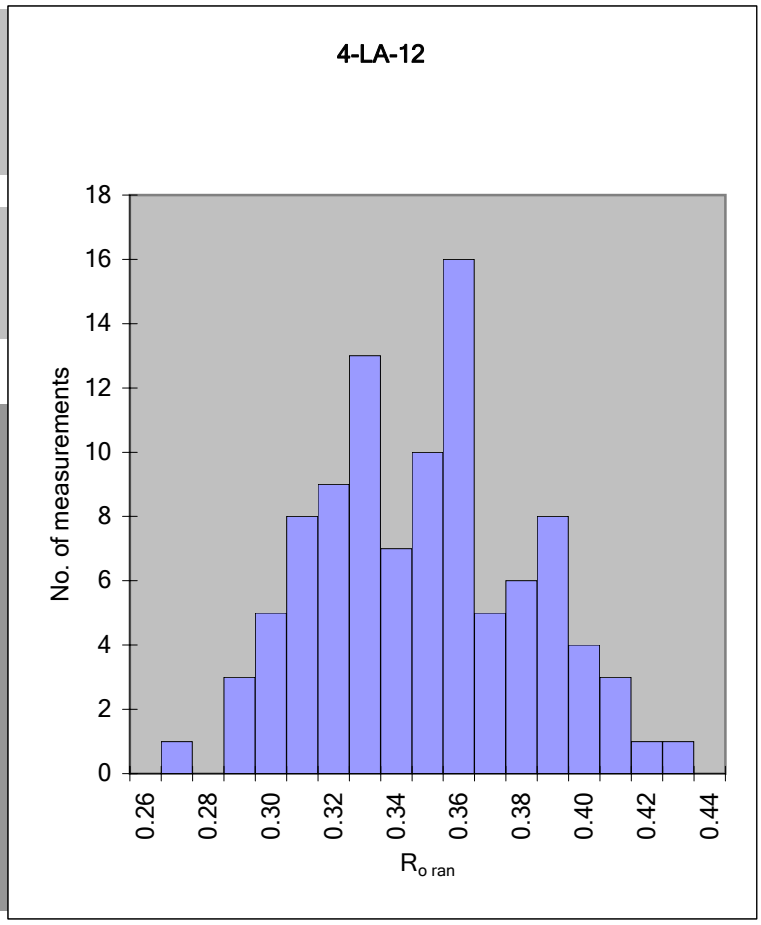
RESULTS

measurements: 100
maceral type: telohuminite
$R_{o\ ran}$ (ISO/ASTM): 0.34
s.d.: 0.03

calc. $R_{o\ max}$ (ISO): 0.37
s.d.: 0.04

calc. $R_{o\ max}$ (ASTM): 0.34
s.d.: 0.04

RANK: lignite



DATA

0.369	0.352	0.384	0.403	0.348	0.320	0.361	0.294	0.338	0.367
0.300	0.313	0.282	0.332	0.343	0.301	0.380	0.333	0.325	0.336
0.395	0.306	0.355	0.400	0.328	0.329	0.299	0.357	0.344	0.375
0.365	0.397	0.309	0.334	0.355	0.351	0.340	0.390	0.359	0.416
0.381	0.387	0.376	0.358	0.344	0.309	0.379	0.340	0.359	0.323
0.348	0.422	0.321	0.267	0.306	0.314	0.382	0.388	0.323	0.303
0.389	0.358	0.403	0.343	0.319	0.319	0.318	0.329	0.286	0.355
0.351	0.327	0.293	0.347	0.376	0.302	0.356	0.298	0.321	0.312
0.358	0.354	0.349	0.367	0.403	0.307	0.313	0.356	0.341	0.285
0.322	0.314	0.349	0.374	0.386	0.322	0.398	0.359	0.327	0.325

min: 0.267 **max:** 0.422 **V-types:** 3

COMMENT

Polish is lousy on A pellet. Repolished, analyzed 4/22/05.

PETROGRAPHIC ANALYSIS REPORT

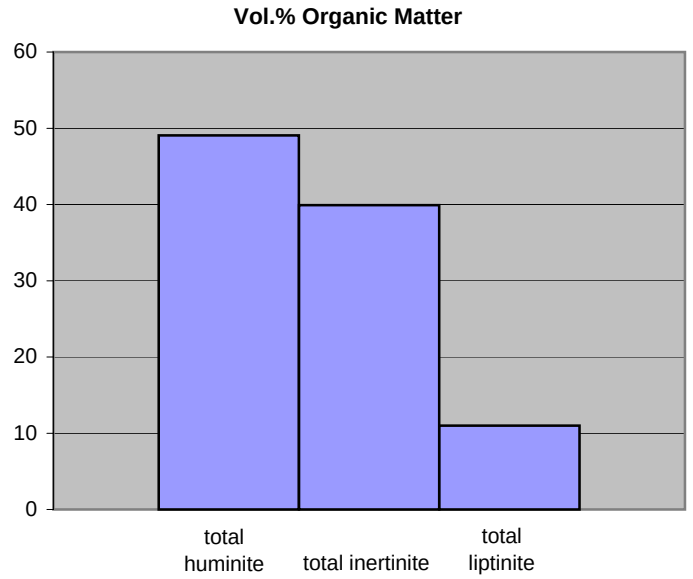
USGS

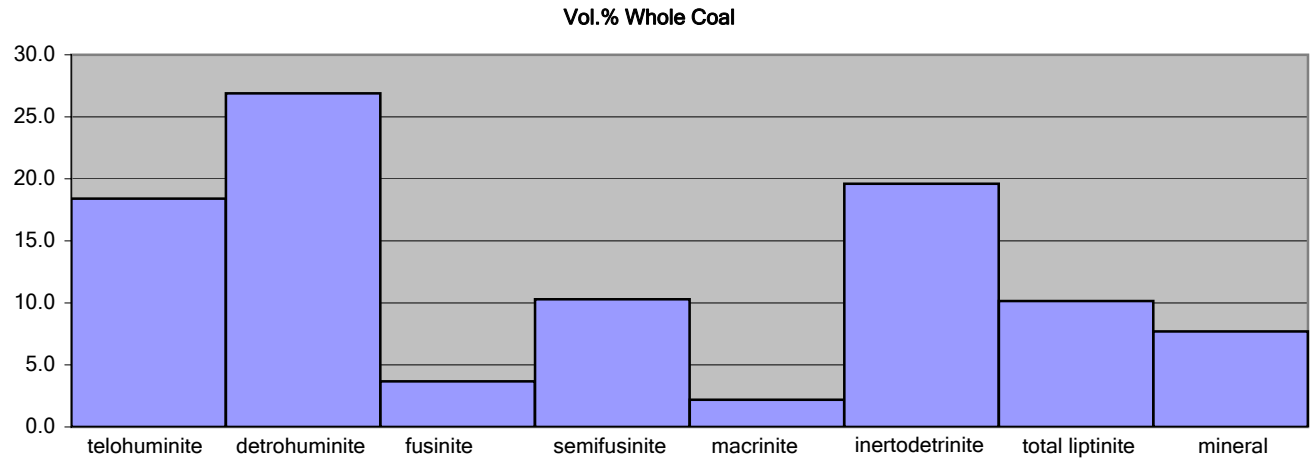
SAMPLE INFORMATION

Submitted by:	P.Warwick
Date Submitted:	1/1/2003
Project:	Devon
Sample:	3-LA-9
Sample Type	coal core
Date Analyzed:	4/18/2005
Operator:	P.Hackley
#counts	2000
Rank:	subC

RESULTS

	Vol.% whole coal	Vol.% organic matter
textinite/ulminite	18.4	19.9
attrinite/densinite	26.9	29.1
corpohuminite	0.0	0.0
total huminite	45.3	49.1
fusinite	3.7	4.0
semifusinite	10.3	11.1
secretinite	0.1	0.1
macrinite	2.2	2.4
micrinite	0.9	1.0
funginite	0.1	0.1
inertodetrinite	19.6	21.2
total inertinite	36.9	39.9
sporinite	3.5	3.8
cutinite	0.2	0.2
resinite in textinite	0.1	0.1
resinite in matrix	0.6	0.6
bituminite	0.0	0.0
exsudatinite	0.2	0.2
alginite	1.5	1.6
liptodetrinite	4.2	4.5
suberinite	0.0	0.0
total liptinite	10.2	11.0
mineral	7.7	
total	100.0	100.0





COMMENT

highest inertinite content of any Devon sample.

VITRINITE REFLECTANCE REPORT

USGS

SAMPLE INFORMATION

Submitted by: P.Warwick
Date Submitted: 1/1/2003
Project: Devon

Sample: 3-LA-9
Sample Type coal core
Date Analyzed: 4/18/2005
Operator: P.Hackley

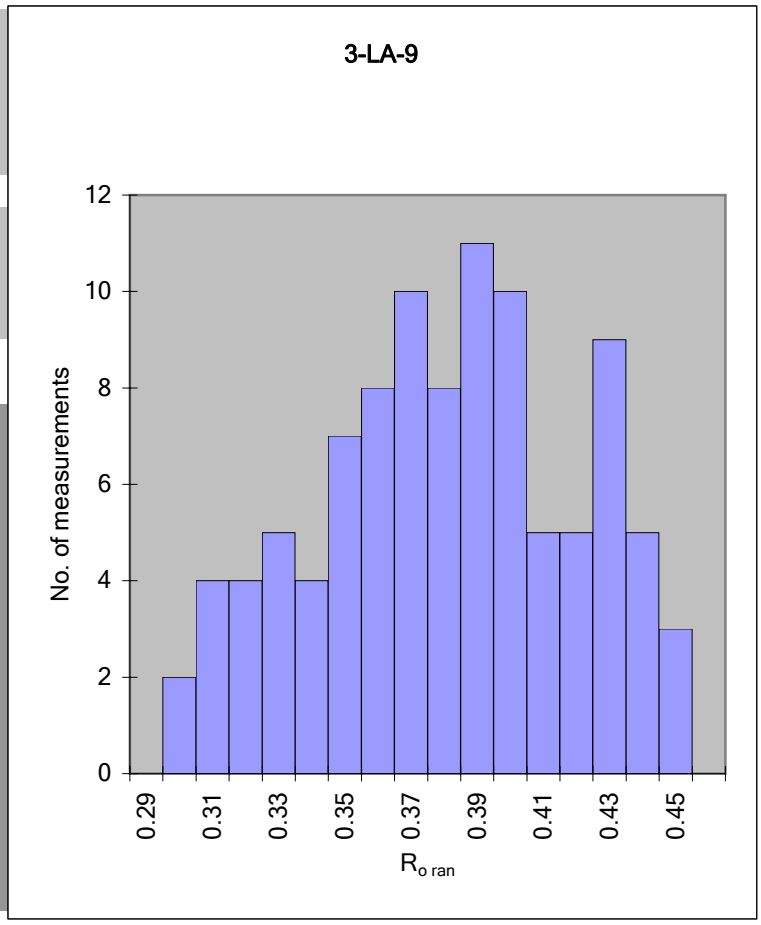
RESULTS

measurements: 100
maceral type: telohuminite
$R_{o\ ran}$ (ISO/ASTM): 0.38
s.d.: 0.04

calc. $R_{o\ max}$ (ISO): 0.40
s.d.: 0.04

calc. $R_{o\ max}$ (ASTM): 0.38
s.d.: 0.04

RANK: subC



DATA

0.422	0.365	0.425	0.339	0.348	0.397	0.351	0.329	0.358	0.361
0.393	0.408	0.433	0.346	0.381	0.354	0.445	0.440	0.320	0.441
0.373	0.418	0.358	0.384	0.380	0.381	0.326	0.402	0.386	0.405
0.395	0.349	0.402	0.393	0.332	0.396	0.435	0.299	0.424	0.386
0.373	0.373	0.318	0.306	0.324	0.365	0.319	0.384	0.310	0.396
0.415	0.427	0.402	0.380	0.345	0.388	0.338	0.386	0.355	0.378
0.434	0.430	0.332	0.376	0.324	0.368	0.369	0.368	0.382	0.414
0.422	0.396	0.294	0.427	0.383	0.348	0.394	0.344	0.424	0.368
0.416	0.344	0.354	0.363	0.306	0.428	0.439	0.322	0.317	0.370
0.387	0.411	0.352	0.307	0.380	0.396	0.358	0.393	0.446	0.363

min: 0.294 **max:** 0.446 **V-types:** 3

COMMENT

Polish is lousy on A pellet. Repolished. Analyzed 4/18/05. Coal is inertinite-rich.

PETROGRAPHIC ANALYSIS REPORT

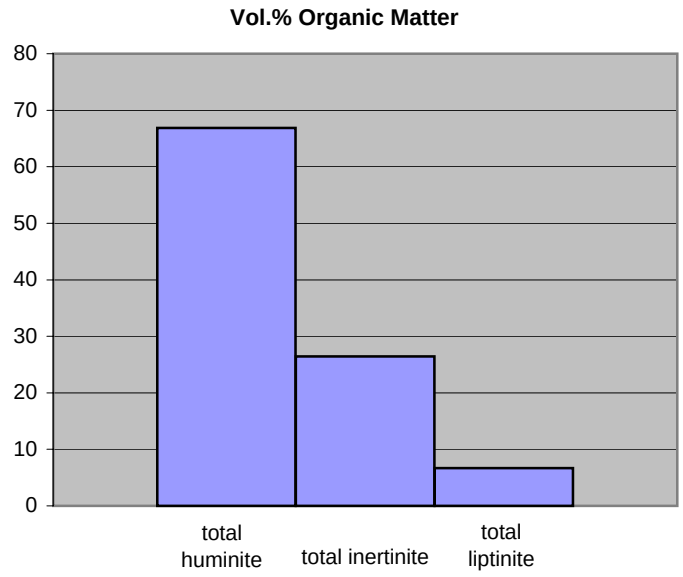
USGS

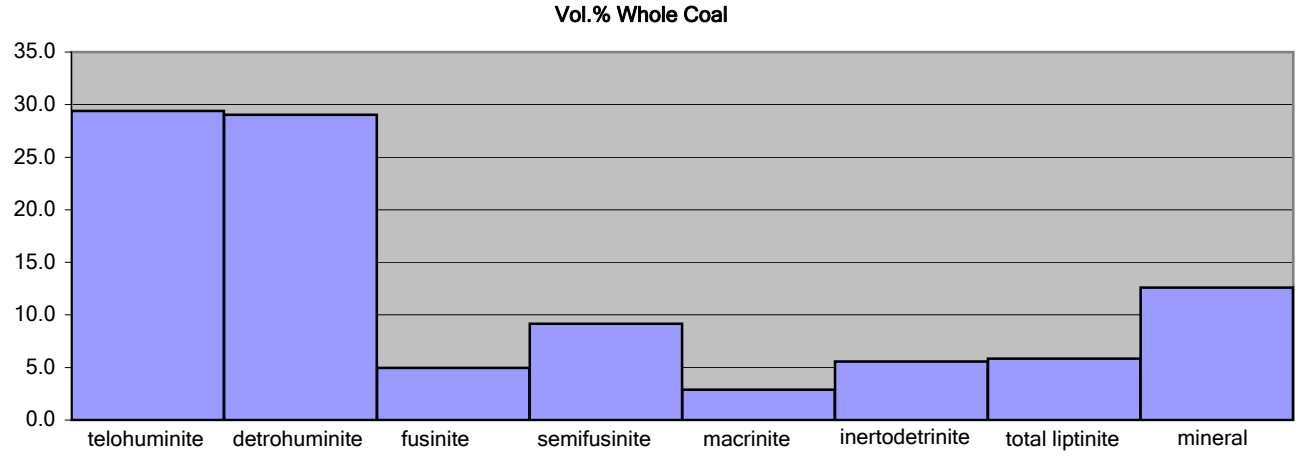
SAMPLE INFORMATION

Submitted by:	P.Warwick
Date Submitted:	1/1/2003
Project:	Devon
Sample:	LA-3-01-15
Sample Type	coal core
Date Analyzed:	4/8/2005
Operator:	P.Hackley
#counts	2000
Rank:	subC

RESULTS

	Vol.% whole coal	Vol.% organic matter
textinite/ulminite	29.4	33.6
attrinite/densinite	29.0	33.2
corpohuminite	0.0	0.0
total huminite	58.4	66.9
fusinite	5.0	5.7
semifusinite	9.2	10.5
secretinite	0.1	0.1
macrinite	2.9	3.3
micrinite	0.0	0.0
funginite	0.4	0.5
inertodetrinite	5.6	6.4
total inertinite	23.1	26.4
sporinite	1.6	1.8
cutinite	0.0	0.0
resinite in textinite	0.0	0.0
resinite in matrix	0.7	0.8
bituminite	0.2	0.2
exsudatinite	0.3	0.4
alginite	0.1	0.1
liptodetrinite	3.0	3.4
suberinite	0.0	0.0
total liptinite	5.9	6.7
mineral	12.6	
total	100.0	100.0





COMMENT

High inertinite compared to other LA Wilcox.

VITRINITE REFLECTANCE REPORT

USGS

SAMPLE INFORMATION

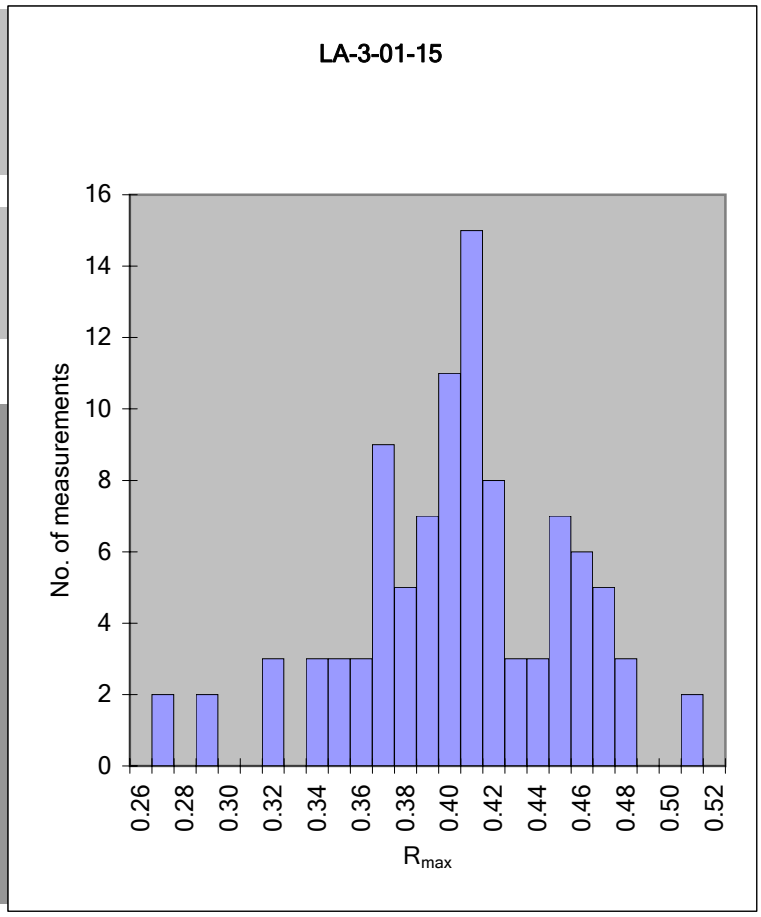
Submitted by: P.Warwick
Date Submitted: 1/1/2003
Project: Devon

Sample: LA-3-01-15
Sample Type coal core
Date Analyzed: 1/1/2003
Operator: P.Hackley

RESULTS

measurements: 100
maceral type: telohuminite
R_{max}: 0.40
s.d.: 0.05

RANK: subC



DATA

0.478	0.363	0.461	0.444	0.394	0.454	0.450	0.408	0.447	0.420
0.410	0.393	0.442	0.423	0.475	0.466	0.413	0.413	0.443	0.406
0.472	0.350	0.409	0.356	0.507	0.338	0.414	0.402	0.375	0.356
0.403	0.467	0.455	0.365	0.428	0.406	0.448	0.269	0.345	0.399
0.409	0.406	0.468	0.388	0.418	0.393	0.393	0.336	0.398	0.405
0.417	0.391	0.381	0.406	0.336	0.453	0.363	0.315	0.437	0.389
0.386	0.386	0.311	0.501	0.379	0.403	0.286	0.402	0.459	0.363
0.443	0.409	0.380	0.396	0.287	0.413	0.394	0.317	0.373	0.369
0.358	0.370	0.422	0.383	0.452	0.403	0.463	0.348	0.366	0.262
0.431	0.368	0.399	0.392	0.389	0.456	0.437	0.413	0.370	0.373

min: 0.262 max: 0.507 V-types: 4

COMMENT

Appendix 6. Geophysical logs

Scans of the geophysical logs are stored by the Louisiana serial number of each well.

226630 = Devon SFS Operating Co Etal 5 no. 1 geophysical log
226630_mud_log = Devon SFS Operating Co Etal 5 no. 1 mud log
226687 = Devon SFS Operating Co Etal 9 no. 1 geophysical log
226687_mud_log = Devon SFS Operating Co Etal 5 no. 1 mud log

Schlumberger
Devon SFS Operating, Inc.
Array Induction/Litho Density
EQUIPMENT DESCRIPTION
Output DLIS Files
OP System Version: 10C0-306
Changed Parameter Summary

PETROLEUM MUD LOGGING
5600 S.W. 11th
OKLAHOMA CITY, OKLA. 73128
Scale 1:240 (5"=100') Imperial

Well Name:	DEVON PRODUCTION CO., L.P. Devon SFS Oper. Et al 5 #1
Location:	Sec 5, T13N, R2E, CALDWELL PARISH, LOUISIANA
Licence Number:	17-021-00000
Region:	
Spud Date:	12-17-2001
Drilling Completed:	12-22-2001
Surface Coordinates:	669' FNL & 903' FEL
Bottom Hole Coordinates:	
Ground Elevation (ft):	214.2'
K.B. Elevation (ft):	220.2
Logged Interval (ft):	336' To: 2,828'
Total Depth (ft):	2,828'
Formation:	
Type of Drilling Fluid:	

Printed by MUD.LOG from WellSight Systems Inc. 1-800-447-1534 www.wellsight.com

OPERATOR

Company: DEVON PRODUCTION COMPANY, L.P.
Address: 20 NORTH BROADWAY, SUITE 1500
OKLAHOMA CITY, OKLAHOMA 73102-8260

GEOLOGIST

Name: WAYNE ROBERTS
Company: DEVON PRODUCTION CO., L.P.
Address: 20MN. BROADWAY, STE 1500
OKLAHOMA CITY, OK 73102

ROCK TYPES

Anhy, Bent, Brec, Cht, Clyst, Coal, Congl, Dol, Gyp, Igne, Lmst, Meta, Mrlst, Salt, Shale, Shcol, Shgy, Sltst, Ss, Till, Blank

ACCESSORIES

MINERAL: Anhy, Arggrn, Arg, Bent, Bit, Brecfrag, Calc, Carb, Chtdk, Chtlt, Dol, Feldspar, Ferrpel, Ferr, Glau, Gyp, Hvymin, Kaol, Marl, Minxl, Nodule, Phos, Pyr, Salt, Sandy, Silt, Sil, Sulphur, Tuff

FOSSIL: Algae, Amph, Belm, Bioclst, Brach, Bryozoa, Cephal, Coral, Crin, Echin, Fish, Foram, Fossil, Gastro, Oolite, Ostra, Pelec, Pellet, Pisolite, Plant, Strom

STRINGER: Anhy, Arg, Bent, Coal, Dol, Gyp, Ls, Mrst, Sltstrg, Ssstrg

TEXTURE: Boundst, Chalky, Cryxln, Earthy, Finexln, Grainst, Lithogr, Microxln, Mudst, Packst, Wackest

OTHER SYMBOLS

POROSITY TYPE: Earthy, Fenest, Fracture, Inter, Moldic, Organic, Pinpoint, Vuggy

SORTING: Well, Moderate, Poor

ROUNDING: Rounded, Subrnd, Subang, Angular

OIL SHOWS: Even, Spotted, Ques, Dead

INTERVALS: None, Core, Dst

EVENTS: Rft, Sidewall

PETROLEUM MUD LOGGING

5600 S.W. 11th
OKLAHOMA CITY, OKLA. 73128

Scale 1:240 (5"=100') imperial

Well Name:	DEVON ENERGY PRODUCTION DEVON SFS OPER. ET AL 9#1		
Location:	SEC 9-T13N-R2E,	CALDWELL PARISH, LOUISIANA	
Licence Number:	17-021-00000	Region:	
Spud Date:	12-26-2001	Drilling Completed:	1-7-2002
Surface Coordinates:	660' FSL & 2,825' FWL		
Bottom Hole Coordinates:			
Ground Elevation (ft):	220 FT.	K.B. Elevation (ft):	227.5 FT.
Logged Interval (ft):	300' To: 2,882'	Total Depth (ft):	2,882 FT.
Formation:			
Type of Drilling Fluid:	FRESH WATER MUD		

Printed by MUD.LOG from WellSight Systems Inc. 1-800-447-1534 www.wellsight.com

OPERATOR

Company: DEVON PRODUCTION COMPANY, L.P.
Address: 20 NORTH BROADWAY, SUITE 1500
OKLAHOMA CITY, OKLAHOMA 73102-8260

GEOLOGIST

Name: WAYNE ROBERTS
Company: DEVON PRODUCTION C0.
Address: 20 N. BROADWAY, STE 1500
OKLAHOMA CITY, OK

Cores

CORE NO 1 - 1,543 ft. to 1,673 ft. REC. 26 ft. (3' COAL)
CORE NO.2 - 2,215 ft. to 2,232 ft. REC. 14'1" (4' COAL)
CORE NO.3 - 2,256 ft. to 2,284 ft. REC. 28' (2' & 4' COAL)
CORE NO.4 - 2,680 ft. to 2,699 ft. REC. 13'3" (7' COAL)

Comments

LARRY JOHNSON – MUDLOGGER

ROCK TYPES

Anhy, Bent, Brec, Cht, Clyst, Coal, Congl, Dol, Gyp, Igne, Lmst, Meta, Mrlst, Salt, Shale, Shcol, Shgy, Sltst, Ss, Till, Blank

ACCESSORIES

MINERAL: Anhy, Arggrn, Arg, Bent, Bit, Brecfrag, Calc, Carb, Chtdk, Chtlt, Dol, Feldspar, Ferrpel, Ferr, Glau, Gyp, Hvymin, Kaol, Marl, Minxl, Nodule, Phos, Pyr, Salt, Sandy, Silt, Sil, Sulphur, Tuff

FOSSIL: Algae, Amph, Belm, Bioclst, Brach, Bryozoa, Cephal, Coral, Crin, Echin, Fish, Foram, Fossil, Gastro, Oolite, Ostra, Pelec, Pellet, Pisolite, Plant, Strom

STRINGER: Anhy, Arg, Bent, Coal, Dol, Gyp, Ls, Mrst, Sltstrg, Sssstrg

TEXTURE: Boundst, Chalky, Cryxln, Earthy, Finexln, Grainst, Lithogr, Microxln, Mudst, Packst, Wackest

OTHER SYMBOLS

POROSITY TYPE: Earthy, Fenest, Fracture, Inter, Moldic, Organic, Pinpoint, Vuggy

SORTING: Well, Moderate, Poor

ROUNDING: Rounded, Subrnd, Subang, Angular

OIL SHOWS: Even, Spotted, Ques, Dead

INTERVALS: None, Core, Dst

EVENTS: Rft, Sidewall

Appendix 7. Raw Digital Data

The following is a list of digital files available in Appendix 7.

Text Tables
- Table 2 sample list.xls
- Table 3 Gas data.xls

Appendix 2 Physical and Chemical data
- Appendix 2_Table_1.xls
- Appendix 2_Table_2a oxides.xls
- Appendix 2_Table_2b.xls
- Appendix 2_Table_2c.xls

Appendix 3 Methane Desorption data
- SFS 5-1
  - 3-LA-8.xls
  - 4-LA-1.xls
  - 4-LA-2.xls
  - 4-LA-4.xls
  - 4-LA-6.xls
  - LA-3-01-73.xls
  - LA-3-01-74.xls
  - LA-SWC-00-3.xls
  - LA-SWC-01-3.xls
- SFS 9-1
  - 3-LA-9.xls
  - 3-LA-C10.xls
  - 3-LA-C12.xls
  - 3-LA-C13.xls
  - 3-LA-C14.xls
  - 4-LA-3.xls
  - 4-LA-5.xls
  - 4-LA-7.xls
  - 4-LA-8.xls
  - 4-LA-9.xls

4-LA-10.xls
4-LA-11.xls
4-LA-12.xls
LA-3-01-12.xls
LA-3-01-15.xls
LA-SWC-01-2.xls

Appendix 4 Methane & CO2 Adsorption Isotherms

4-LA-1

4-LA-1 carbon dioxide.pdf
4-LA-1 carbon dioxide.xls
4-LA-1 methane.pdf
4-LA-1 methane.xls

4-LA-2

4-LA-2 carbon dioxide.pdf
4-LA-2 carbon dioxide.xls
4-LA-2 methane.pdf
4-LA-2 methane.xls

4-LA-8

4-LA-8 carbon dioxide.pdf
4-LA-8 carbon dioxide.xls
4-LA-8 methane.pdf
4-LA-8 methane.xls

5-1A

5-1A carbon dioxide.pdf
5-1A carbon dioxide.xls
5-1A methane.pdf
5-1A methane.xls

5-1B

5-1B carbon dioxide.pdf
5-1B carbon dioxide.xls
5-1B methane.pdf
5-1B methane.xls

5-1C

5-1C carbon dioxide.pdf
5-1C carbon dioxide.xls
5-1C methane.pdf
5-1C methane.xls

9-1A

9-1A methane.pdf
9-1A methane.xls

9-1B

9-1A methane.pdf
9-1A methane.xls

9-1C

9-1C methane.pdf

- 9-1C methane.xls
- 9-1D
  - 9-1D methane.pdf
  - 9-1D methane.xls
- Appendix 4_Table 1.xls

Appendix 5 Petrography
- Petrographic Data
  - SFS #5-1
    - 3-LA-8-MP.xls
    - 4-LA-1-MP.xls
    - 4-LA-2-MP.xls
    - 4-LA-4-MP.xls
    - 4-LA-6-MP.xls
    - LA-3-01-73-MP.xls
    - LA-3-01-74-MP.xls
    - LA-SWC-00-3-MP.xls
    - LA-SWC-01-3-MP.xls
  - SFS #9-1
    - 3-LA-9-MP.xls
    - 3-LA-C10-MP.xls
    - 3-LA-C12-MP.xls
    - 3-LA-C13-MP.xls
    - 3-LA-C14-MP.xls
    - 4-LA-3-MP.xls
    - 4-LA-5-MP.xls
    - 4-LA-7-MP.xls
    - 4-LA-8-MP.xls
    - 4-LA-9-MP.xls
    - 4-LA-10-MP.xls
    - 4-LA-11-MP.xls
    - 4-LA-12-MP.xls
    - LA-3-01-12-MP.xls
    - LA-3-01-15-MP.xls
- Reflectance Data
  - SFS #5-1
    - 3-LA-8REF.xls
    - 4-LA-1REF.xls
    - 4-LA-2REF.xls
    - 4-LA-4REF.xls
    - 4-LA-6REF.xls
    - LA-3-01-73REF.xls
    - LA-3-01-74REF.xls
    - LA-SWC-00-3REF.xls
    - LA-SWC-01-3REF.xls

SFS #9-1

3-LA-9REF.xls
3-LA-C10REF.xls
3-LA-C12REF.xls
3-LA-C13REF.xls
3-LA-C14REF.xls
4-LA-3REF.xls
4-LA-5REF.xls
4-LA-7REF.xls
4-LA-8REF.xls
4-LA-9REF.xls
4-LA-10REF.xls
4-LA-11REF.xls
4-LA-12REF.xls
LA-3-01-12REF.xls
LA-3-01-15REF.xls

Appendix 5 Tab_2.xls
Appendix_ 5 Tab_1_&_Fig_7.xls

Appendix 6 Geophysical logs

226630.tif (Devon SFS Operating Co Etal 5 no. 1 geophysical log)
226630_mud_log.tif (Devon SFS Operating Co Etal 5 no. 1 mud log)
226687.tif (Devon SFS Operating Co Etal 9 no. 1 geophysical log)
226687_mud_log.tif (Devon SFS Operating Co Etal 5 no. 1 mud log)

Appendix 8. Cooperative Research and Development Agreement (CRADA)

ACIS Ref ID: 7453

Form 9-2040 (Dec. 1992)

U.S. DEPARTMENT OF THE INTERIOR
U.S. Geological Survey
12201 Sunrise Valley Drive
Reston, Virginia 20192

COOPERATIVE RESEARCH AND DEVELOPMENT AGREEMENT (CRADA)

1. PROPOSAL NUMBER	2. EFFECTIVE DATE ~~May 15, 2001~~ MAY 15 ~~DECEMBER 1~~	4. AGREEMENT NUMBER CG-078
4. REMIT CONTRIBUTION Office of Financial Management 270 National Center Reston, VA 20192	5. USGS PROJECT OFFICER Peter D. Warwick, Ph.D	6. TOTAL AMOUNT OF CONTRIBUTION Devon SFS Operating, Inc. $500,000. in kind USGS: $75,000. in kind; Louisiana Geological Survey $10,000 in kind.

7. COLLABORATING PARTY NAME AND ADDRESS (Sign)

James J. Doherty, Jr
Devon SFS Operating, Inc.
20 North Broadway, Suite 1500
Oklahoma City, OK 73102

F. Clayton Breland, Jr. (LSU)
Louisiana State University
Louisiana Geological Survey
208 Howe-Russell Geoscience Complex
LSU, Baton Rouge, LA 70803

8. ADMINISTRATIVE OFFICE	9. COGNIZANT USGS PROJECT OFFICE
U.S. Geological Survey, 12201 Sunrise Valley Road, MS 956 Reston, VA 20192	Same as # 8
10. ACCOUNTING AND APPROPRIATION DATA	11. PAYMENT WILL BE MADE BY

12. AUTHORITY	13. STARTING DATE	14. DURATION (MONTHS)	15. PAYMENT SCHEDULE
Technology Transfer Act of 1986 Public Law 99-502	~~February 2002~~ ~~DECEMBER 2001~~ FEBRUARY 2002	January 2005 36 Months	In-kind contribution

16. PRINCIPAL INVESTIGATOR(S)

Peter D. Warwick (USGS) phone: (703) 648-6469 fax: (703) 648-6419	James J. Doherty, Jr. (Devon) phone: (405) 552-4583 fax: (405) 552-7683	F. Clayton Breland, Jr. (LSU) phone: (225) 388-8300 fax: (225) 388-3662

17. PROJECT DESCRIPTION

Obtain and characterize coal samples from North Central Louisiana using modern analytical tools.

18. OFFER AND ACCEPTANCE

The U.S. Geological Survey, in furtherance of its mission and programs, offers a Cooperative Research and Development Agreement, with Devon SFS Operating, Inc. (Collaborating Party), and Louisiana State University, Louisiana Geological Survey (LGS), whereby the Collaborating Party and LGS will contribute in-kind contribution valued at $500,000 and $10,000 respectively for the support of project titled: ***North-Central Louisiana Coalbed Methane Investigations.*** This project and funding strategy are described in the attached Statement of Work and subject to the attached terms and conditions.

19. DEVON SFS OPERATING, INC.	20. UNITED STATES OF AMERICA BY THE USGS.
BY _____ 2/12/02 SIGNATURE DATE	BY _____ 02/05/02 SIGNATURE OF AUTHORIZED OFFICIAL DATE
R D Clark Vice President TYPED NAME	P. Patrick Leahy, Associate Director Geology TYPED NAME

Form 9-2040 (Dec. 1992)

U.S. DEPARTMENT OF THE INTERIOR
U.S. Geological Survey
12201 Sunrise Valley Drive
Reston, Virginia 20192

COOPERATIVE RESEARCH AND DEVELOPMENT AGREEMENT (CRADA)

1. PROPOSAL NUMBER	2. EFFECTIVE DATE – February 2002	4. AGREEMENT NUMBER CG-078
4. REMIT CONTRIBUTION Office of Financial Management 270 National Center Reston, VA 20192	5. USGS PROJECT OFFICER Peter D. Warwick, Ph.D	6. TOTAL AMOUNT OF CONTRIBUTION Devon SFS Operating, Inc. $500,000. in kind; USGS: $75,000. in kind; and Louisiana Geological Survey $10,000 in kind.

7. COLLABORATING PARTY NAME AND ADDRESS (Sign)

James J. Doherty, Jr
Devon SFS Operating, Inc
20 North Broadway, Suite 1500
Oklahoma City, OK 73102

F. Clayton Breland, Jr. (LSU)
Louisiana State University
Louisiana Geological Survey
208 Howe-Russell Geoscience Complex
LSU, Baton Rouge, LA 70803

8. ADMINISTRATIVE OFFICE	9. COGNIZANT USGS PROJECT OFFICE
U.S. Geological Survey, 12201 Sunrise Valley Road, MS 956 Reston, VA 20192	Same as # 8
10. ACCOUNTING AND APPROPRIATION DATA	11. PAYMENT WILL BE MADE BY

12. AUTHORITY	13. STARTING DATE	14. DURATION (MONTHS)	15. PAYMENT SCHEDULE
Technology Transfer Act of 1986 Public Law 99-502	February 2002	January 2002 36 Months	In-kind contribution

16. PRINCIPAL INVESTIGATOR(S)

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17. PROJECT DESCRIPTION

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19. LOUISNA STATE UNIVERSITY, LOUISIANA GEOLOGICAL SURVEY	20. UNITED STATES OF AMERICA BY THE USGS.
BY James L. Bates for 4/12/02 SIGNATURE DATE	BY 02/05/07 SIGNATURE OF AUTHORIZED OFFICIAL DATE
Jerry J. Baudin TYPED NAME	P. Patrick Leahy, Associate Director Geology TYPED NAME

Statement of Work

Cooperative Research and Development Agreement

between

U.S. Geological Survey, Devon SFS Operating, Inc.,
and Louisiana State University, Louisiana Geological Survey

for

North-Central Louisiana Coalbed Methane Investigations

Purpose

Domestic and international shortages of natural gas are prompting a reevaluation of coal and natural gas resources in the United States. A major mission of the U.S. Geological Survey (USGS) is to find and identify the energy resources of the country. In many locations, reliable information on the thickness of various coal beds and the presence of coal bed methane (CBM) is not available. Many coal-bearing areas have not been characterized by gas desorption data from coal core samples and by modern geophysical logs that include gamma and neutron density.

The purpose of this Collaborative Research and Development Agreement (CRADA) is to obtain and characterize necessary modern coal core samples from the largely un-explored north-central Louisiana coal basin. The findings of this research will be published so that, if economic CBM is present in the region, the resources can be developed in a systematic and environmentally sound manor that benefits the American public and the economics of the region.

The parties to the CRADA are the USGS Energy Resources Team, (ERT), the Louisiana State University, Louisiana Geological Survey (LGS), and the industrial partner, Devon SFS Operating, Inc. (Collaborator/ Devon) engaged in the exploration, development and production of oil and natural gas.

Objectives

Recent investigations by Devon, the LGS, the USGS, and others suggest the potential for significant CBM stored in the coals of the north-central Louisiana coal basin. To date, only two or three CBM wells have been tested in the area, and the data are not publicly available. Available data from conventional oil and gas wells in the area, suggests that there are three or more coal zones within Wilcox Group (Paleocene-Eocene) strata in the north-central Louisiana coal basin that may have potential for significant coalbed methane accumulations. The primary goal of this joint project is to core portions of the three primary coal zones of the Wilcox Group and develop geologic models for the occurrence of coal and CBM in the Wilcox coals of north-central Louisiana. The possibility of CBM sourced from coals in this region has been discussed by the USGS and LGS with multiple state and private organizations for several years. This project constitutes the first major effort in the region to quantify the stratigraphy and facies of coal occurrence as well as provide more data on total coal tonnage and the basin gas content and character.

Under the project plan, two initial wells will be drilled in late 2001 and early 2002. Devon will cover the cost of site preparation and reclamation, drilling, coring, mud logging, geophysical logging, testing of selected coal samples for gas content (by desorption), insurance, well capping or completion, all required permits, and other activities related to normal testing and completion of Wilcox coal zones for two wells

located in Caldwell Parish, Louisiana. The USGS will provide additional advanced analytical characterizations (including desorption) for selected core and cuttings samples from the two wells. For selected coal samples, tests will include: proximate and ultimate analyses; adsorption isotherms for CH_4 and CO_2; X-radiograph and detailed megascopic description; vitrinite reflectance and standard petrography. In addition molecular and isotopic analyses will be run on selected gas samples. Other tests such as palynology, trace element characterization, and radiometric age dating may be performed on a few samples. If the wells are productive, USGS may provide analyses of co-produced water. The LGS will provide well-site support for sample collection and will help to integrate the analytical results into regional subsurface maps and models that can be used to estimate and predict the CBM resources of the north-central Louisiana coal basin. It is expected that initial analytical data (desorption, adsorption, and gas analyses) will be complete within 4 to 6 months after the first two drill holes are completed. Coal petrography and other mentioned analytical work might take several months longer to complete.

The data developed by the Parties under the scope of work will be considered as Protected CRADA Information for a period of three years from the time that core-data is shared, and becomes available for joint public reports, publications and presentations describing the geology, occurrence and geochemistry of coal and CBM in the north-central Louisiana coal basin.

The results of this research will be a boost to the potential commercial development of the CBM resources in the north-central Louisiana coal basin.

Collaborator's Role

Devon SFS Operating, Inc will select the drill sites, provide all construction, maintenance and rehabilitation of drill site access roads, drilling pads, mud pits, and diverter flow pits, insurance, and permitting required for the operation. The drill sites will be selected to maximize the gain of new data by being placed far away from all existing CBM wells.

Devon will also assist USGS and LGS in cooperative mapping of the depth to the Wilcox coal zones, the extent of the coal basin, number of coalbeds, the net coal thickness for the north-central Louisiana coal basin using existing subsurface logs and seismic data. To accomplish these goals, Devon will provide management, personnel, funds and technology transfer as listed in Specific Tasks below. Devon's in-kind contribution to this project is estimated to be $500,000.

Specific Tasks

Devon SFS Operating, Inc.

1) Provide drill site selection, determination of core point and cored interval thickness. Provide logs and any other relevant data (excluding seismic) that they possess by virtue of the two wells in Caldwell Parish, LA.

2) Provide all drilling permits, bonds, and insurance or other State of Louisiana or U.S. Government requirements for drilling CBM test wells.

3) Provide road grading pad clearing and preparation of mud pits, diverter blow pits or other necessary improvement for drilling rig access.

4) Provide contract support for drilling, coring, mud logging, geophysical logging, normal site maintenance, and CBM desorption data acquisition for selected coal samples from the cored intervals.

5) Provide the appropriate personnel to assist with real time collection of coal, rock, gas, water samples, and

general well drilling and contractor supervision.

6) Assist with the interpretation of all data including desorption, log, and reservoir test data and in the preparation of reports and presentations.

7) Devon will pay the cost of abandonment, in the event that one or both wells have to be abandoned.

8) Provide for reclamation of the wellhead and drilling pad as required by the permits or bonds issued by the State of Louisiana or the U.S. Government. Devon SFS Operating, Inc. will also indemnify the USGS and the LGS from any liability for environmental or land reclamation caused by drilling activities or injury or damage to Devon SFS Operating, Inc. personnel or equipment resulting from drilling operations unless caused by negligence on the part of the USGS, LGS or their agents.

9) At the conclusion of the drilling operations for each of the two wells in Caldwell Parish, Devon SFS Operating, Inc. will have full control of the wellbore and it may use it for whatever purposes it so desires (including gas production).

USGS Role

The USGS role is to assist in collection of samples selected for their specialized analytical tests. All equipment and coal and rock, gas and water samples developed or collected by the USGS during this program will be retained by the USGS. Such coal and rock samples gained during this cooperative project will be stored in the USGS ERT core facilities in Reston (VA) or Denver (CO) for the term of the agreement. Coal and rock cores collected by the Devon will be stored at C&M Storage Inc., Schulemburg, TX by Devon for the term of the agreement, Devon will have access to study the coal and rock core samples in the USGS Library in Reston or Denver by giving written notice to the USGS of its desire to do so. The USGS and /or LGS will have access to study the coal and rock core and samples stored by the Devon by giving written notice of their desire to do so.

With prior Devon approval, coal and rock cuttings may be sampled from subsequent developmental drill holes drilled by Devon for the purposes of comparison between the original two cored holes and subsequent non-cored drill holes. The USGS is especially interested in those holes that may be sited over salt domes. The purpose of this portion of the study is to compare rank, gas content, adsorption isotherm, gas hydrocarbon and isotopic composition of the coal and produced water over the salt dome with similar data gathered from coals sampled from the previously drilled holes.

USGS will arrange for the appropriate chemical and physical characterization of the all coal and selected rock samples at their analytical facilities in Denver and Reston. Commercial or university laboratories may characterize some samples. USGS in-kind contribution to this project is estimated to be $75,000.

Specific USGS scientific tasks include: 1) determination of gas content by canister desorption of selected coal cuttings and core (not analyzed by Devon's contract desorption company) that are cut from the two cooperative exploration drill holes in north-central Louisiana; 2) determination of coal rank, facies and properties from ultimate and proximate analysis, X-radiograph and detailed megascopic description, adsorption isotherms for CH_4 and CO_2, vitrinite reflectance and standard petrography; 3) study of coal cleat frequency and orientation in appropriate coal core; 4) origin of CBM using C, O and H isotope analyses and hydrocarbon GC/MS analysis with thermal history and gas generation modeling; 5) other tests such as palynology, trace element characterization, and radiometric age dating may be performed on a few samples. 6) If the wells are productive, The USGS may provide analyses of produced water to assess the potential environmental impact of produced water disposal from the coal zones.

Devon SFS Operating, Inc., USGS and LGS will share in data interpretation and in report writing. All reports derived from the cooperative project will be published in the open literature (journal and proceeding articles) or as USGS or LGS open-file reports. Publication will commence no sooner than three years after the wells are drilled and the data is collected unless USGS, LGS, and Devon SFS Operating, Inc. agree to release the information sooner.

Specific Tasks

USGS

1) In consultation and with Devon SFS Operating, Inc. and the LGS, the USGS will conduct coal quality, coal petrography, vitrinite reflectance and geochemical analyses on approximately 16 one-foot coal core or selected coal interval cuttings samples collected from the two cored wells. The selected geochemical analyses will be appropriate to the sample characteristics and selected by consensus between Devon SFS Operating, Inc. and the USGS. The analyses include, but are not limited to: vitrinite reflectance, coal maceral composition, Rock-Eval pyrolysis, solvent extraction and GC/MS analysis of whole rock samples extracts as well as samples of produced and desorbed gases and liquids by isotopic and GC/MS methods. Several coal samples from each well will be selected for adsorption isotherms for CH_4 and CO_2 (CO_2 is for USGS sequestration studies). Formation water samples, if available, will be chemically analyzed for total dissolved solids and elemental composition as well as oxygen and hydrogen isotopes.

2) USGS personnel will assist with the interpretation of the data and in the preparation of reports and presentations.

3) The USGS will be responsible for any lost or damaged USGS-owned sampling and field-testing equipment.

4) The USGS will be responsible for the salaries, expenses, insurance and other costs needed to provide 2 geologists and 2 technicians to the drill site.

LGS Role

The LGS will provide 1) well-site support for sample collection and 2) will help to integrate the analytical results into regional subsurface maps and models that can be used to estimate and predict the CBM resources of the north-central Louisiana coal basin. With the USGS and Collaborator, LGS will provide subsurface maps that show the depth to Wilcox coal, the extent of the coal basin, number of coalbeds, the net coal thickness for the north-central Louisiana coal basin using among other data, the existing subsurface geophysical logs and seismic data.

3) The LGS will be responsible for any lost or damaged LGS-owned sampling and field-testing equipment.

4) The LGS will be responsible for the salaries, expenses, insurance and other costs needed to provide 1 geologist at the drill site.

The LGS in-kind contribution to this project is estimated to be $10,000.

Principal Investigators for the Research

Devon:

James J. Doherty, Jr.

Senior Reservoir Engineering Advisor
Devon Energy Corporation
20 North Broadway, Suite 1500
Oklahoma City, OK 73102-8260
Phone: (405) 552-4583
Fax: (405) 552-7683
Email: jim.doherty@dvn.com

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Peter D. Warwick, Ph.D
USGS Research Geologist
956 National Center
12201 Sunrise Valley Drive.
Reston, VA 20190
Phone: (703) 648-6469
Fax: (703) 648-6419
Email: pwarwick@usgs.gov

LSU/LGS:

F. Clayton Breland, Jr., Ph.D.
Louisiana Geological Survey
208 Howe-Russell Geoscience Complex
Louisiana State University
Baton Rouge, Louisiana 70803-4101
Phone: (225) 388-8300
Fax: (225) 388-3662
Email: clayton@lgs.bri.lsu.edu

with a copy to:
James Bates
Director, Office of Sponsored Programs
330 Thomas Boyd Hall
Louisiana State University
Baton Rouge, LA 70803
Phone: (225) 388-3386
Fax: (225) 388 5403
Email: jbates@lsu.edu

COOPERATIVE RESEARCH AND DEVELOPMENT AGREEMENT

for

NORTH-CENTRAL LOUISIANA COALBED METHANE INVESTIGATIONS

between

U.S. GEOLOGICAL SURVEY,

DEVON SFS OPERATING, INC.,

and

LOUISIANA STATE UNIVERSITY,
LOUSIANA GEOLOGICAL SURVEY

General Provisions

This Cooperative Research and Development Agreement ("CRADA") is entered into by and between Devon SFS Operating, Inc. ("the Collaborator"), Louisiana State University, Louisiana Geological Survey (LGS), and the Department of Interior, United States Geological Survey ("USGS"), an agency of the United States Government under authority of the Stevenson-Wydler Act (15 USC 3710 as amended). The parties agree as follows:

Article 1. **Definitions**

A. “Government” means the United States of America and agencies thereof.

B. “USGS” means the Department of Interior, U.S. Geological Survey.

C. “Proprietary Information" means information which embodies trade secrets developed at private expense outside of this CRADA or which is confidential, technical, business, or financial information that:

(i) Is not generally known or available from other sources without obligations concerning its confidentiality;

(ii) Has not been made available by the owners to others without obligation concerning its confidentiality; and

(iii) Is not already available to the Government without obligation concerning its confidentiality.

D. "Intellectual Property" means patents, trademarks, copyrights, trade secrets, mask works, and other forms of comparable property protectable by either Party to the agreement under appropriate Federal, State, or foreign laws.

E. "Generated Information" means information produced in the performance of the CRADA.

F. "Protected CRADA Information" means Generated Information which is marked as being Protected CRADA Information by a party to this agreement and which would have been Proprietary Information had it been obtained from a non-Federal entity.

G. "Background Intellectual Property" (BIP) refers to Intellectual Property, which was in existence prior to or first produced outside of this CRADA, and developed by a Party either alone or with others, using separate funding sources not related to the CRADA. BIP is not considered as a Subject Invention. BIP may be added to the research at any time during the course of the project, it must be marked and identified by the Party contributing the BIP to the project.

Article 2. **Statement of Work**

Appendix A is the Statement of Work for this cooperative effort. If intellectual property is involved in this cooperative project it is detailed in the Statement of Work.

Article 3. **Funding & Costs**

The term of the joint project is for thirty-sic (36) months from February 1, 2001 to January 31, 2005. Collaborator's in-kind participation is valued at $500,000. LGS's in-kind participation is valued at $10,000. USGS in-kind participation is valued at $75,000. In the event that the cooperative analysis and development work contemplated by the SOW leads to a commercially viable methane gas wells/field within three years of the completion of the research effort, Collaborator may choose to reimburse USGS for part of its costs associated with the project which will not exceed: $25,000. Such payments shall be at a rate and timetable negotiated by the Parties in either a separate agreement, or an amendment to the CRADA.

Article 4. **Personal Property**

Any tangible personal property produced or provided in conducting the work under this CRADA shall be owned by the Party paying for it. There shall be no jointly funded property. Each party is expected to dispose of any personal property at their own expense at the close of the CRADA.

Article 5. **Invention, Copyright and Patents**

5.1. Reporting. USGS, LGS, and Collaborator do not anticipate the development of Intellectual Property (Subject Inventions, or patentable and copyrightable material) as

copyright material in the course of performing tasks under the specific SOW, the inventing party agrees to report the invention or intellectual property to his/her Principal Investigator; who will in turn report the invention to the other parties' Principal Investigator (PI). The USGS PI agrees to notify and furnish the USGS Technology Transfer Office with a copy of the report of invention within 30 days. The report provided by the inventing party should be in sufficient detail to explain the invention, its uses and identify any statutory bars that could impact the patenting or protection of the invention. The Party preparing the report shall mark the report as Protected CRADA Information. As a general rule, each party will own inventions or creations made solely by its employees. Joint inventions will be jointly owned.

5.2 Amendment. In the event that Intellectual Property is created under the SOW, the parties will negotiate in good faith an amendment to this Agreement, or a separate agreement that will assign responsibilities for obtaining patent or other intellectual property protection. Such agreement will provide for the appropriate allocation of patent or other property rights and costs based upon the contribution of the respective parties.

Article 6. **Disclaimer**

USGS, LGS, AND COLLABORATOR MAKE NO EXPRESS OR IMPLIED WARRANTY AS TO THE CONDITIONS OF THE RESEARCH, ANY INTELLECTUAL PROPERTY, OR THE OWNERSHIP, MERCHANTIBILITY OR FITNESS FOR A PARTICULAR PURPOSE OF THE RESEARCH, DATA OR ANY RESULTING PRODUCT INCORPORATING DATA DEVELOPED AND EXCHANGED UNDER THE STATEMENT OF WORK. THESE PROVISIONS SHALL SURVIVE TERMINATION OF THE CRADA.

Article 7. **Hold Harmless**

USGS agrees to be responsible for its negligent acts or omissions as provided under the Federal Tort Claims Act. To the extent permitted by law LGS agrees to indemnify and hold harmless the U.S. Government for any loss, claim, damage, or liability of any kind involving an employee of the LGS arising in connection with this CRADA, except to the extent that such loss, claim, damage or liability arises from the negligence of USGS or its employees. Collaborator agrees to hold the USGS harmless for any damages, costs, or expenses arising from personal injury or property damage occurring as a result of its making, using, or selling of a product, process or service by or on behalf of the Collaborator its assignees, or licensees, which was derived from the work performed under this CRADA.

Article 8. **Data and Publication**

8.1 Generated Information**.** The Collaborator, LGS, and the USGS shall have an unlimited right to use any Generated Information not marked as being either Protected CRADA Information or Proprietary Information. As part of the SOW both USGS and the Collaborator will be archiving coal cores in their respective storage facilities, a CRADA partner can have access to the core samples located at another facility, by giving the appropriate Principal Investigator ten days

written notice of the intended visit. All visits will be arranged during regularly scheduled business hours.

8.2. Proprietary Information. The Collaborator shall place a Proprietary notice on all information it delivers to USGS or LGS under this CRADA which the Collaborator asserts is proprietary. USGS and LGS agree that any information designated as Proprietary, which is furnished by the Collaborator to USGS or LGS under this CRADA, shall be used by USGS and LGS only for the purpose of carrying out this CRADA. Information designated as Proprietary shall not be disclosed, copied, reproduced, or otherwise made available in any form whatsoever to any other person, firm, corporation, partnership, association, or other entity without the consent of the Collaborator.

8.3 Protected CRADA Information. Each party may designate as Protected CRADA Information any Generated Information produced by its employees, and with the agreement of the other party, mark any Generated Information produced by the other party's employees. All designated Protected CRADA Information shall be appropriately marked.

The Parties agree not to disclose for a period of 36 months from the date that the Protected CRADA Information is produced, such Information except: (a) as necessary to perform this CRADA; and (b) as mutually agreed by the Parties in advance.

8.4 Publication. Each Party may submit for publication information about the joint research or its results. The Party interested in publication shall submit to the other Parties a draft copy of the intended publication, giving the reviewing Parties thirty days to comment on the proposed draft and ensure that no Proprietary Information or Protected CRADA Information is released and that patent rights are not jeopardized. The parties receiving the document for review has 30 days from receipt to object in writing detailing the objections to the proposed submissions.

Use of the name of another Party or its employees in any promotional activity, or with reference to this CRADA, requires the written approval of the other Party.

Article 9. **Force Majeure**.
No party shall be liable for any unforeseeable event beyond its reasonable control which is not caused by the fault of negligence of the non-performing party, and which causes a party to be unable to perform its obligations under the CRADA.

Article 10. **Miscellaneous**

10.1 Entire Agreement**.** This CRADA and any attachments constitute the entire agreement between the parties concerning the subject matter hereto and supersedes any prior understanding or written or oral agreement relative to said matter.

10.2 Independent Contractors. The relationship of the parties to this CRADA is that of independent contractors and not as agents of each other or as joint venturers or partners.

10.3 No Benefits**.** No member of or delegate to the US Congress, or resident commissioner, shall be entitled to any share or part of this CRADA, nor to any benefit that may arise therefrom; however this provision shall not be construed to extend to this CRADA if made with a corporation for its general benefit.

10.4 Use of Name or Endorsements. No Party shall use the name, trademark, service mark of another Party on any product or service which is directly or indirectly related to this CRADA or any patent license or assignment agreement without the prior approval of the other Party. The Collaborator shall not publicize, or otherwise circulate, promotional material (such as advertisements, sales brochures, press releases, speeches, still or motion pictures, articles, manuscripts, or other publications) which state or implies governmental, departmental, bureau or government employee endorsement of a product or service or position which the Collaborator represents. No release of information relating to this CRADA may state or imply that the Government approves of the LGS or Collaborator's work product or considers the LGS or Collaborator's work product to be superior to other products or services.

10.5 Termination**.** This CRADA may be terminated by any Party with 30 days written notice to the other Parties. Each party will be responsible for its own costs as a result of termination. The confidentiality, use and or / nondisclsoure obligations described in this CRADA survive any termination.

10.5 Disputes**.** Any dispute arising under this CRADA which is not disposed of by agreement of the Principal Investigators for the Statement of Work shall be submitted jointly to the signatories of the CRADA. If the signatories are unable to jointly resolve a dispute within a reasonable time (60 days), the matter shall be submitted to the Director of the USGS or his designee, the Director of the LGS or his designee, and a Senior Manager for the Collaborator for the resolution of the issue.

This agreement is effective between all parties as of the date of the last signature, unless another date is provided in the Statement of Work. The agreement becomes effective between the USGS and the Collaborator upon signature of their representative. The CRADA may be signed in counterpart.

For Devon SFS Operating, Inc.:

_____ /Date: 2/12/02

R D Clark

Title: Vice President

For Louisiana State University, Louisiana Geological Survey:

James L Bates for Jerry J. Boudin /Date: 3/22/02

Title: VICE CHANCELLOR FOR FINANCE AND ADMINISTRATIVE SERVICES

For the US Geological Survey

_____ /Date: 2/5/02

Title: Associate Director/Geology

USGS Technology Transfer Review:

Julia M. Giller /Date: 2/04/02

Title: Program Manager

June 1, 2005

Devon Energy Corporation
1200 Smith Street
Houston, Texas 77002

Dr. Peter Warwick
U. S. Geological Survey
956 National Center
12201 Sunrise Valley Drive
Reston, VA 20192

Dr. Clayton Breland, Jr.
Louisiana Geological Survey
Louisiana State University
3079 Energy Coast and Environment
Building
Baton Rouge, Louisiana 70803

Re: Cooperative Research and Development Agreement for North-Central Louisiana Coalbed Methane Investigations ("CRADA") dated March 22, 2002 between the U.S. Geological Survey, Devon SFS Operating, Inc. ("Devon") and Louisiana State University, Louisiana Geological Survey

Gentlemen:

Reference is made to the above agreement and particularly to the confidentiality provisions contained in paragraphs 8.2 and 8.3 of the CRADA. The parties hereto agree that the information designated as Proprietary by Devon and any Protected CRADA Information shall no longer be subject to the confidentiality provisions of the CRADA. This Amendment shall be effective as of April 15, 2005.

Except as hereby amended, the CRADA shall remain unchanged.

If the above meets with your approval, please so indicate by signing dating and returning an original of this letter to Walter Parlange at the above address. Also, please fax a copy of this letter to his attention at 713-265-8865.

Should you have any questions regarding this matter, please contact Walter Parlange at 713-265-6763. Thank you.

Sincerely,

Devon Energy Production Company, L.P.,
Successor in title to Devon SFS Operating, Inc.

Hank Wood
Attorney-In-Fact

Agreed to on this 27 day of June 2005.

United States of America by U. S. Geological Survey

By: [signature]

Name: Peter Warwick

Title: Research Geologist

Agreed to on this 30 day of June 2005.

Louisiana State University, Louisiana Geologic Survey

By: [signature]

Name: F. CLAYTON BAELAND, JR.

Title: Assistant Professor