

Prepared in cooperation with the Bureau of Land Management,
Wyoming State Office Reservoir Management Group

Megascopic Lithologic Studies of Coals in the Powder River Basin in Wyoming and in Adjacent Basins in Wyoming and North Dakota



Open-File Report 2010–1114

U.S. Department of the Interior
U.S. Geological Survey

Cover. Photographs showing coal and core-drilling activities. (All photographs by Michael H. Trippi, except as noted.)

Top, Coalbed-methane drill site in the Powder River Basin in Montana.

Left middle, Drilling crew removing coal core from core barrel.

Right middle, Coal core segment being placed in gas desorption canister. (Photograph by Margaret S. Ellis.)

Bottom, Section of coal core split open for lithologic examination, showing alternating vitrain (shiny) and attrital (dull) bands.

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By Michael H. Trippi, Gary D. Stricker, Romeo M. Flores, Ronald W. Stanton,
Lora A. Chiehowsky, and Timothy A. Moore

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KEN SALAZAR, Secretary

U.S. Geological Survey
Marcia K. McNutt, Director

U.S. Geological Survey, Reston, Virginia: 2010

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Conversion Factors

Multiply	By	To obtain
Length		
inch (in.)	2.54	centimeter (cm)
inch (in.)	25.4	millimeter (mm)
foot (ft)	0.3048	meter (m)
Volume		
cubic foot per ton (ft ³ /ton)	0.0312	cubic meters per metric ton (m ³ /t)

Megascopic Lithologic Studies of Coals in the Powder River Basin in Wyoming and in Adjacent Basins in Wyoming and North Dakota

By Michael H. Trippi,¹ Gary D. Stricker,² Romeo M. Flores,² Ronald W. Stanton,³ Lora A. Chiehowsky,¹ and Timothy A. Moore⁴

Introduction

Between 1999 and 2007, the U.S. Geological Survey (USGS) investigated coalbed methane (CBM) resources in the Wyoming portion of the Powder River Basin (PRB) (fig. 1). The study also included the CBM resources in the North Dakota portion of the Williston Basin (WB) of North Dakota and the Wyoming portion of the Green River Basin (GRB) of Wyoming (fig. 1). This project involved the cooperation of the State Office, Reservoir Management Group (RMG) of the Bureau of Land Management (BLM) in Casper, Wyo., and 16 independent gas operators in the Powder River, Williston, and Green River Basins. The USGS and BLM entered into agreements with these CBM operators to supply samples for the USGS to analyze and provide the RMG with rapid, timely results of total gas desorbed, coal quality, and high-pressure methane adsorption isotherm data (Stricker and others, 2006, 2007). This program resulted in the collection of 963 cored coal samples (also called canister samples, or simply canisters, in this report) from 37 core holes (also called wells in this report; fig. 1, table 1). This report presents megascopic lithologic descriptive data collected from canister samples extracted from the 37 wells cored for this project.

Objectives

The purpose of this study was to determine if there was any relationship between the parameters studied and the volumes of gas generated by the coals sampled. This report contains data, summary tables, histograms, and charts of coal analyses for the megascopic petrologic characteristics of the coal in the region. For each unit (a lithologically distinct subdivision of a canister sample) described, the following characteristics were recorded: cumulative fusain thickness; lithotype

code; cleat spacing; cleat frequency; the percentages of vitrain, attritus, and fusain; and the average attrital band thickness and vitrain band thickness.

Included in this report are data and summaries, as needed, from the two previous reports on gas desorption and coal quality for these 37 core holes (Stricker and others, 2006; and Stricker and others, 2007, respectively).

General Geology

Powder River Basin

The coal beds that were sampled from the Powder River Basin are in the Tongue River Member of the Paleocene Fort Union Formation (fig. 2) and include, in ascending order, the Roberts, Cache, Pawnee, Wall, and Cook coal beds and beds in the Wyodak-Anderson coal zone (including the Werner, Canyon-Wyodak, Anderson-Big George, School, and Smith coal beds). The Tongue River Member contains the thick coal beds and coal zones that are targets for coal mining and coalbed-methane production. The names of the sampled coal beds are those given by gas operators and do not necessarily follow USGS names and correlations as established in earlier studies by Mapel (1973), Culbertson and others (1979), Kent (1986), Flores, Ochs, and others (1999), and Luppens and others (2008). See Stricker and others (2007) for explanations of some of these inconsistencies. Flores and others (2005) show the confusion that has arisen in the naming and correlation of the Cook, Canyon, and Anderson coal beds by gas operators in two different adjacent lease areas of the PRB. The stratigraphic positions and correlations of the Wyodak-Anderson coal zone are considered to be less problematic than those involving coal beds lower in the stratigraphic section (see Flores, Ochs, and others, 1999; McGarry and Flores, 2004). Thirty-four core holes penetrated several different coal beds in the Powder River basin, as follows (in ascending order): Roberts coal bed, core hole 29; Cache coal bed, core hole 27; Pawnee coal bed, core holes 25, 27, 36, and 37; Wall coal bed, core holes 4 and 6; Cook coal

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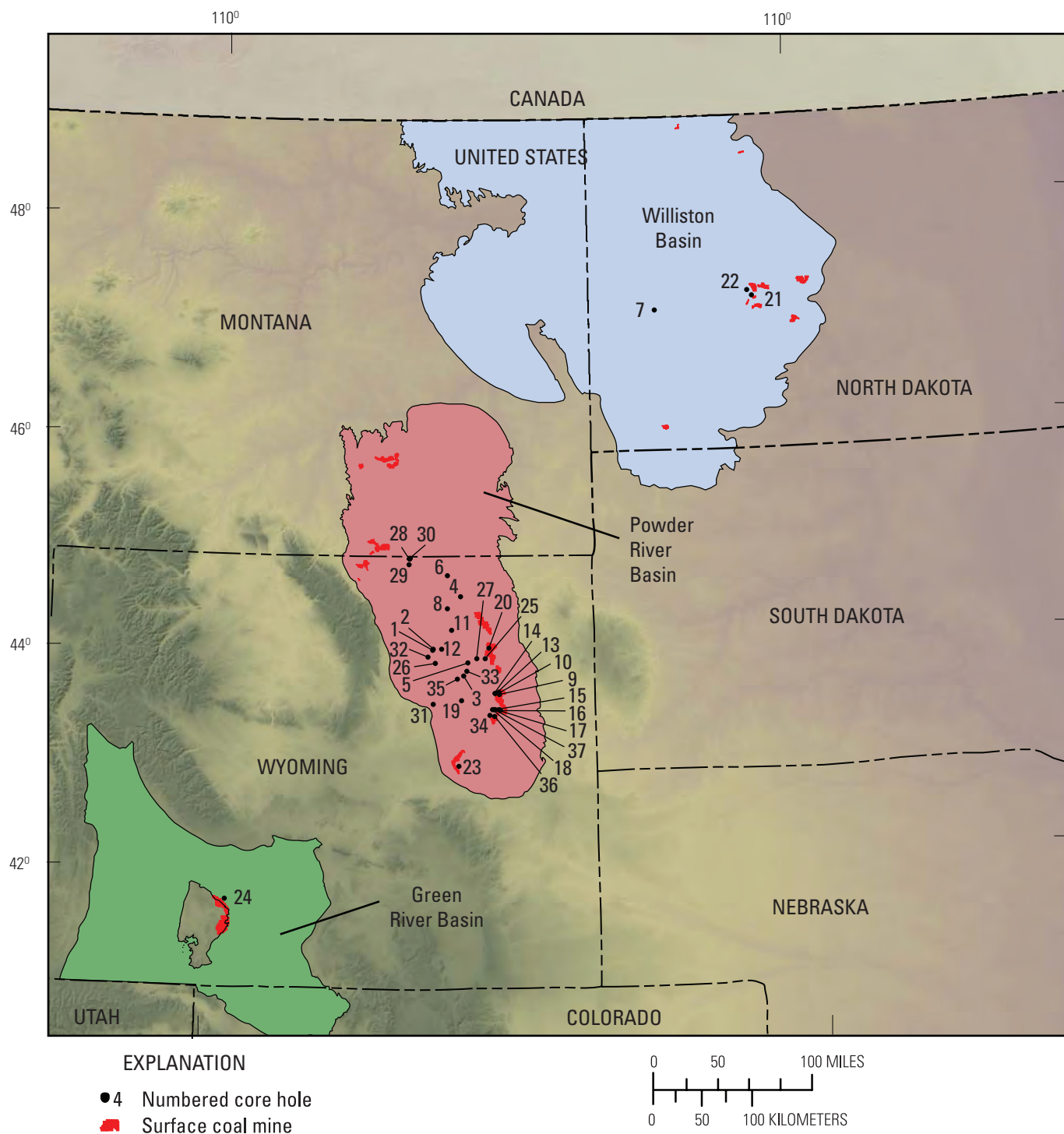


Figure 1. Map showing the location of the 37 core holes that were sampled for this study of the coalbed methane resources in the Wyoming part of the Powder River and Green River Basins, and the North Dakota part of the Williston Basin.

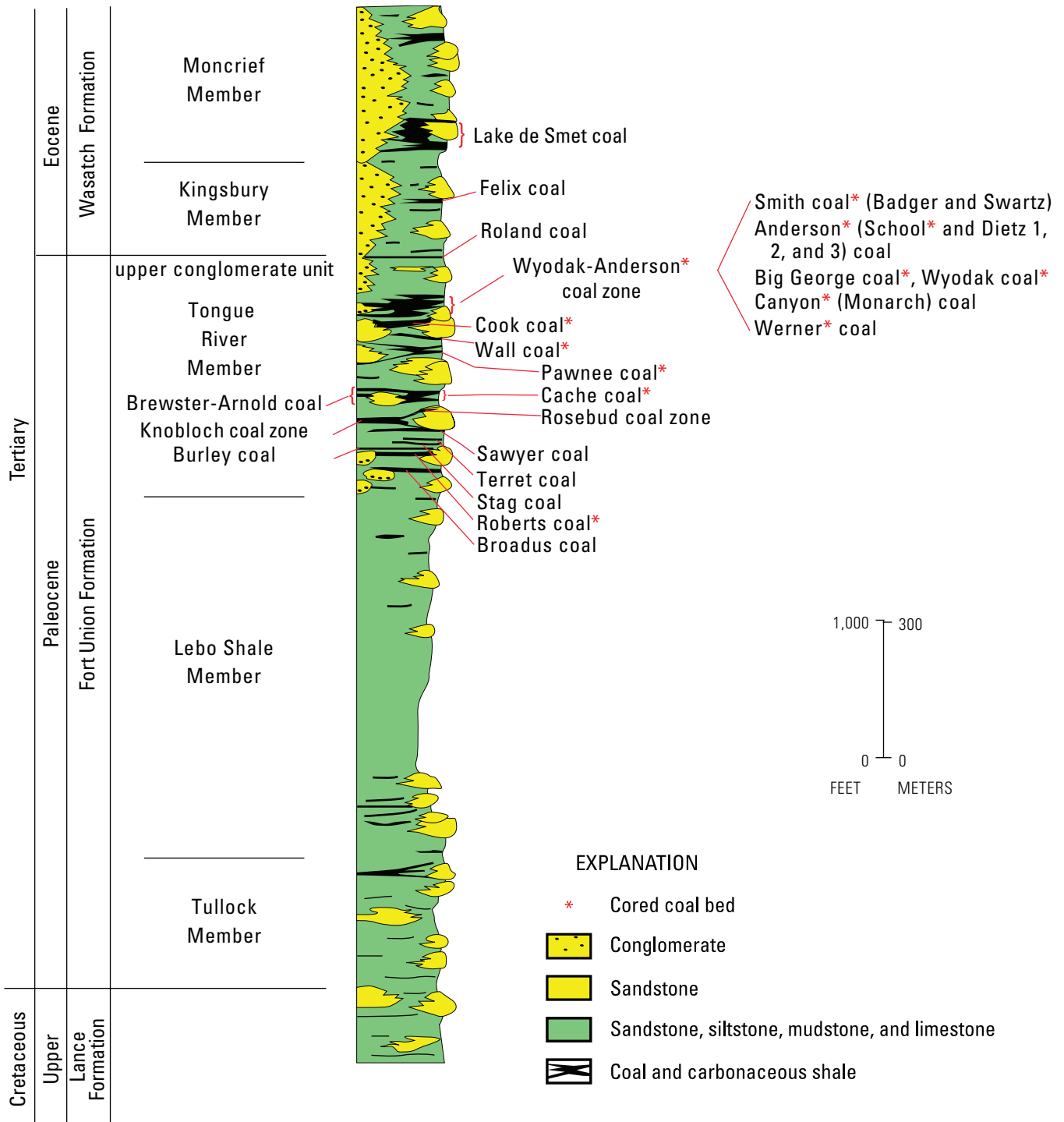


Figure 2. Stratigraphic column for the Fort Union Formation in the Powder River Basin, Wyoming and Montana, showing location of sampled coal beds.

4 Megascopic Lithologic Studies of Coals, Wyoming and North Dakota

Table 1. Core holes used in coal studies, Wyoming part of the Powder River and Green River Basins, and the North Dakota part of the Williston Basin.

[Abbreviations are as follows: GRB, Green River Basin; N., north; NA, no API number; n.d., no data recorded; NE, northeast; NW, northwest; SE, southeast; SW, southwest; N.D., North Dakota; PRB, Powder River Basin; R., range; sec., section; T., township; W., west; WB, Williston Basin; Wyo., Wyoming]

Core hole number	Gas operator	Core hole name	American Petroleum Institute (API) well number	State
1	MichiWest Energy, Inc.	Pilot State 16–14	049–019–21068	Wyo.
2	MichiWest Energy, Inc.	Pilot State 16–32	049–019–21071	Wyo.
3	Ocean Energy, Inc.	Schlautmann 9–10–45–74WY (Ocean 43–10C)	049–005–34173	Wyo.
4	Pennaco Energy, Inc.	Sorenson 2–33–54–74W	049–005–35137	Wyo.
5	Barrett Resources Corp.	Haas 32–31	049–005–35287	Wyo.
6	CMS Oil and Gas Co.	West 6–19W	049–005–35339	Wyo.
7	Gregory Water and Energy, Inc.	Leroy Gregory 1	NA	N.D.
8	CMS Oil and Gas Co.	Laramore 11–6C	049–005–37516	Wyo.
9	Kennecott Energy	Kennecott CBM–1	NA	Wyo.
10	Kennecott Energy	Kennecott CBM–2	NA	Wyo.
11	Barrett Resources Corp.	CARU State 22–16–5075W	049–005–38103	Wyo.
12	Barrett Resources Corp.	Schoonover Road Unit (SRU) State 12–16–4876	049–005–36110	Wyo.
13	Rim Operating, Inc.	CBM H–11–04	049–005–37359	Wyo.
14	Rim Operating, Inc.	CBM C–33–1R	049–005–37386	Wyo.
15	Peabody Natural Gas, LLC	PNG 34–1	NA	Wyo.
16	Peabody Natural Gas, LLC	PNG 33–1	NA	Wyo.
17	Peabody Natural Gas, LLC	PNG 31–1	NA	Wyo.
18	Peabody Natural Gas, LLC	PNG 35–1	NA	Wyo.
19	Barrett Resources Corp.	All Night Creek (ANCU) Iberlin 21–33–4374	049–005–37965	Wyo.
20	Peabody Natural Gas, LLC	PNG 16–2	NA	Wyo.
21	The Coteau Properties Co.	Coteau MC00250C	NA	N.D.
22	The Coteau Properties Co.	Coteau MC00251	NA	N.D.
23	Ammonite Energy Texas, Inc.	Thomas Jefferson State 36–3	049–009–22996	Wyo.
24	Bridger Coal Co.	BCX–9	NA	Wyo.
25	Peabody Natural Gas, LLC	PNG Duvall 13J–D	049–005–44594	Wyo.
26	Barrett Resources Corp.	KU Harriett 41–34–4777	049–019–21774	Wyo.
27	Peabody Natural Gas, LLC	PNG Carter–Federal 18F–D	049–005–37063	Wyo.
28	Nance Petroleum Corp.	Remington 58–79–30–07A	049–033–23127	Wyo.
29	Nance Petroleum Corp.	Remington 57–79–18–03R	049–033–23136	Wyo.
30	Nance Petroleum Corp.	Remington 58–79–30–01C	049–033–23131	Wyo.
31	Williams Production RMT Co.	Bullwacker Creek Unit (BCU) 32–9–4277	049–019–21969	Wyo.
32	Lance Oil and Gas Company, Inc.	Whiskey Draw Unit 12–12–4778	049–019–22873	Wyo.
33	Lance Oil and Gas Company, Inc.	McBeth 12–30–4673–BG	049–005–50378	Wyo.
34	Williams Production RMT Co.	State 23–16–4171	049–005–50711	Wyo.
35	Williams Production RMT Co.	Groves 12–19–4574	049–005–51276	Wyo.
36	Peabody Natural Gas, LLC	PNG 24–1	NA	Wyo.
37	Peabody Natural Gas, LLC	PNG 26–1	NA	Wyo.

Table 1. Core holes used in coal studies, Wyoming part of the Powder River and Green River Basins, and the North Dakota part of the Williston Basin.—Continued

[Abbreviations are as follows: GRB, Green River Basin; N., north; NA, no API number; n.d., no data recorded; NE, northeast; NW, northwest; SE, southeast; SW, southwest; N.D., North Dakota; PRB, Powder River Basin; R., range; sec., section; T., township; W., west; WB, Williston Basin; Wyo., Wyoming]

Core hole number	Basin	Latitude (in decimal degrees)	Longitude (in decimal degrees)	Section, township, and range	Date cored	Lithologic description method (table 3)
1	PRB	44.12838N.	106.12824W.	SW1/4SW1/4 sec. 16, T. 48 N., R. 77 W.	01/27/1999	A
2	PRB	44.13568N.	106.11822W.	SW1/4NE1/4 sec. 16, T. 48 N., R. 77 W.	04/07/1999	A
3	PRB	43.88730N.	105.73104W.	NE1/4SE1/4 sec. 10, T. 45 N., R. 74 W.	06/25/1999	A
4	PRB	44.62333N.	105.76500W.	NW1/4NE1/4 sec. 33, T. 54 N., R. 74 W.	08/13/1999	n.d.
5	PRB	44.00851N.	105.67651W.	SW1/4NE1/4 sec. 31, T. 47 N., R. 73 W.	09/24/1999	n.d.
6	PRB	44.81796N.	105.93621W.	SE1/4NW1/4 sec. 19, T. 56 N., R. 75 W.	09/27/1999	n.d.
7	WB	47.23228N.	103.14541W.	SE1/4SE1/4 sec. 6, T. 143 N., R. 98 W.	10/13/1999	n.d.
8	PRB	44.51333N.	105.93560W.	NE1/4SW1/4 sec. 6, T. 52 N., R. 75 W.	12/10/1999	A
9	PRB	43.71728N.	105.27447W.	SW1/4NW1/4 sec. 9, T. 43 N., R. 70 W.	01/05/2000	C
10	PRB	43.72136N.	105.27680W.	SW1/4NW1/4 sec. 9, T. 43 N., R. 70 W.	01/06/2000	A
11	PRB	44.31003N.	105.88602W.	SE1/4NW1/4 sec. 16, T. 50 N., R. 75 W.	02/20/2000	A
12	PRB	44.13523N.	106.00883W.	SW1/4NW1/4 sec. 16, T. 48 N., R. 76 W.	02/29/2000	A
13	PRB	43.73564N.	105.27828W.	NW1/4NW1/4 sec. 4, T. 43 N., R. 70 W.	03/22/2000	A
14	PRB	43.72872N.	105.32945W.	NW1/4SE1/4 sec. 1, T. 43 N., R. 71 W.	04/27/2000	A
15	PRB	43.57330N.	105.26031W.	NE1/4NW1/4 sec. 34, T. 42 N., R. 70 W.	06/02/2000	A
16	PRB	43.57583N.	105.28145W.	NE1/4NW1/4 sec. 33, T. 42 N., R. 70 W.	06/02/2000	A
17	PRB	43.57895N.	105.32843W.	NE1/4NW1/4 sec. 31, T. 42 N., R. 70 W.	06/03/2000	D
18	PRB	43.57624N.	105.35947W.	SW1/4NE1/4 sec. 35, T. 42 N., R. 71 W.	07/12/2000	D
19	PRB	43.66122N.	105.75760W.	NE1/4NW1/4 sec. 33, T. 43 N., R. 74 W.	07/14/2000	B
20	PRB	44.14510N.	105.40291W.	NW1/4NW1/4 sec. 9, T. 48 N., R. 71 W.	07/31/2000	B
21	WB	47.33781N.	101.82531W.	C SE1/4NE1/4 sec. 36, T. 145 N., R. 88 W.	08/22/2000	B
22	WB	47.38478N.	101.88874W.	C NE1/4NE1/4 sec. 16, T. 145 N., R. 88 W.	08/24/2000	B
23	PRB	43.05322N.	105.79355W.	NE1/4NE1/4 sec. 36, T. 36 N., R. 75 W.	09/07/2000	A
24	GRB	41.80364N.	108.70250W.	SW1/4NW1/4 sec. 11, T. 21 N., R. 100 W.	10/24/2000	A
25	PRB	44.04874N.	105.45364W.	NW1/4SE1/4 sec. 13, T. 47 N., R. 72 W.	06/10/2001	E
26	PRB	44.00798N.	106.09271W.	NE1/4NE1/4 sec. 34, T. 47 N., R. 77 W.	07/13/2001	E
27	PRB	44.05166N.	105.56000W.	SE1/4NW1/4 sec. 18, T. 47 N., R. 72 W.	07/21/2001	E
28	PRB	44.97265N.	106.42874W.	SW1/4NE1/4 sec. 30, T. 58 N., R. 79 W.	12/05/2001	E
29	PRB	44.91805N.	106.43215W.	NE1/4NW1/4 sec. 18, T. 57 N., R. 79 W.	12/08/2001	n.d.
30	PRB	44.97623N.	106.42377W.	NE1/4NE1/4 sec. 30, T. 58 N., R. 79 W.	12/08/2001	E
31	PRB	43.62830N.	106.11680W.	SW1/4NE1/4 sec. 9, T. 42 N., R. 77 W.	01/18/2002	E
32	PRB	44.06227N.	106.18863W.	SW1/4NW1/4 sec. 12, T. 47 N., R. 77 W.	01/08/2003	E
33	PRB	43.93458N.	105.68611W.	SW1/4NW1/4 sec. 30, T. 46 N., R. 73 W.	04/22/2003	E
34	PRB	43.52525N.	105.39694W.	NE1/4SW1/4 sec. 16, T. 41 N., R. 71 W.	07/09/2003	C
35	PRB	43.86103N.	105.80693W.	SW1/4NW1/4 sec. 19, T. 45 N., R. 74 W.	10/22/2003	C
36	PRB	43.51627N.	105.33530W.	SE1/4SW1/4 sec. 24, T. 41 N., R. 71 W.	10/25/2003	C
37	PRB	43.57958N.	105.34513W.	SE1/4SE1/4 sec. 26, T. 42 N., R. 71 W.	10/28/2003	C

bed, core holes 4 and 6; Werner coal bed, core hole 11; Canyon coal bed, core holes 6, 8, 30, and 34; Wyodak coal bed (including upper, middle, and lower Wyodak coal beds), core holes 5, 9, 10, 13-18, and 20; Anderson coal bed, core holes 3, 5, 8, 28, and 34; Big George coal bed, core holes 1, 2, 5, 11, 12, 19, 26, 31-33, and 35; School coal bed, core hole 23; and Smith coal bed, core hole 8 (see figure 2).

Williston Basin

The Williston Basin contains three main coal-bearing intervals: the Harmon-Hansen coal zone, the Hagel coal zone, and the Beulah-Zap coal zone, which are in the lower, middle, and upper parts of the Paleocene Fort Union Formation, respectively (Flores, Keighin, and others, 1999) (fig. 3). One sampled coal bed (unnamed coal bed 1, probably from the Harmon-Hansen coal zone) in the Leroy Gregory 1 well (core hole 7; table 1) is up to 14 feet (ft) thick. Four coal beds sampled at the Coteau Coal Mines (the Beulah coal bed and unnamed 2 coal bed from core hole 21 (Coteau MC00250C) and the unnamed 3 and unnamed 4 coal beds from core hole 22 (Coteau MC00251); table 1) came from the Beulah-Zap coal zone (fig. 3).

Green River Basin

The Green River Basin contains two coal zones: the Deadman coal zone in the lower part of the Paleocene Fort Union Formation and the Cherokee coal zone in the upper part. These two zones contain more than eight coal beds (fig. 4) that are separated by a fluvial-channel-sandstone-dominated interval (Hettinger and Kirschbaum, 1991). Samples from core hole 24 (BCX-9) came from the Bridger Coal Company mine (table 1) from the Deadman coal zone (fig. 4) (Flores, Ochs, and Bader, 1999), which is up to 20 ft thick.

Collection and Analyses of New Data

Non-Lithotype Data

Analyses performed on coal samples extracted from the 37 core holes include methane desorption and adsorption, gas composition (Stricker and others, 2006), and coal chemistry (Stricker and others, 2007). At the drill site, cored coal samples were cut into sections (usually about 2 ft long) and immediately placed into desorption canisters. After the coal samples were desorbed, they were shipped to the USGS in Reston, Va. In the USGS laboratory in Reston, the sealed samples were unwrapped and split lengthwise. After splitting, the coal was examined and, where deemed appropriate, subdivided into units on the basis of observed megascopic lithologic features, as shown in figure 5. The thicknesses of these units were measured to the nearest centimeter (occasionally to the nearest half centimeter) and recorded (see

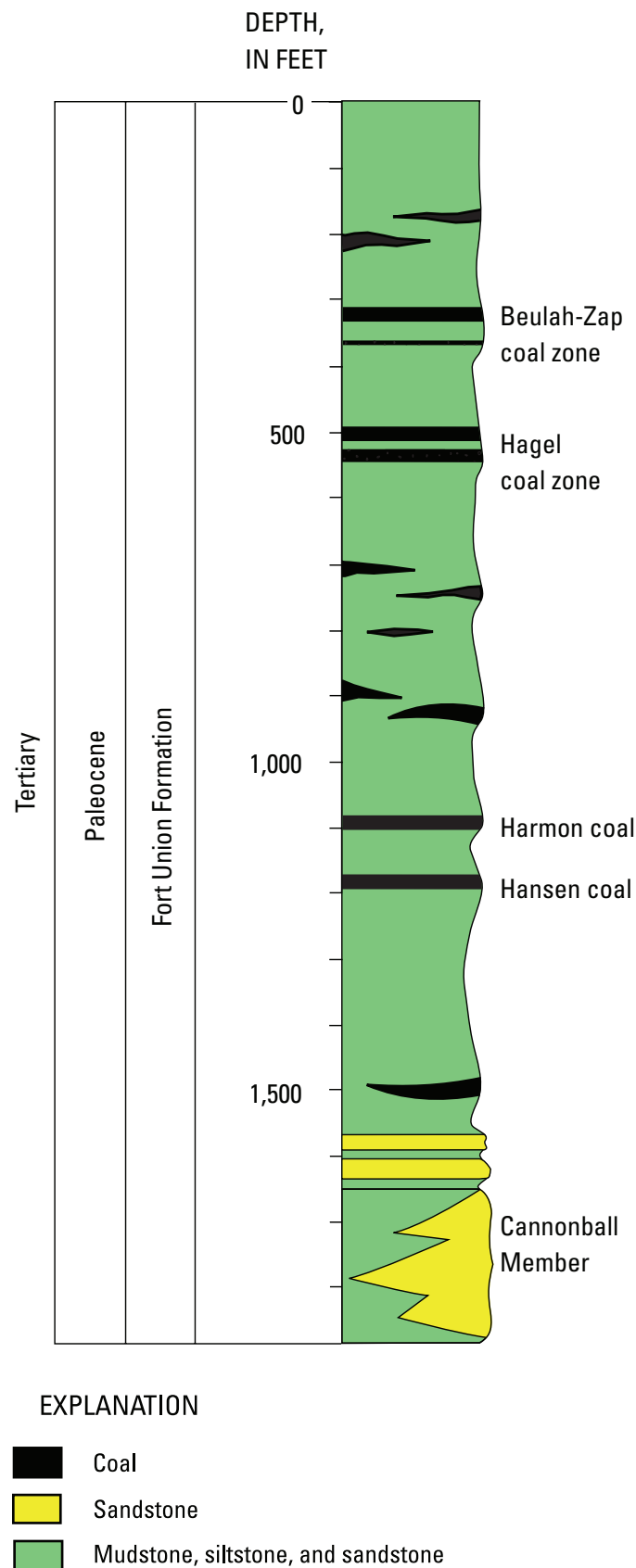


Figure 3. Stratigraphic column for the Fort Union Formation in the Williston Basin, North Dakota.

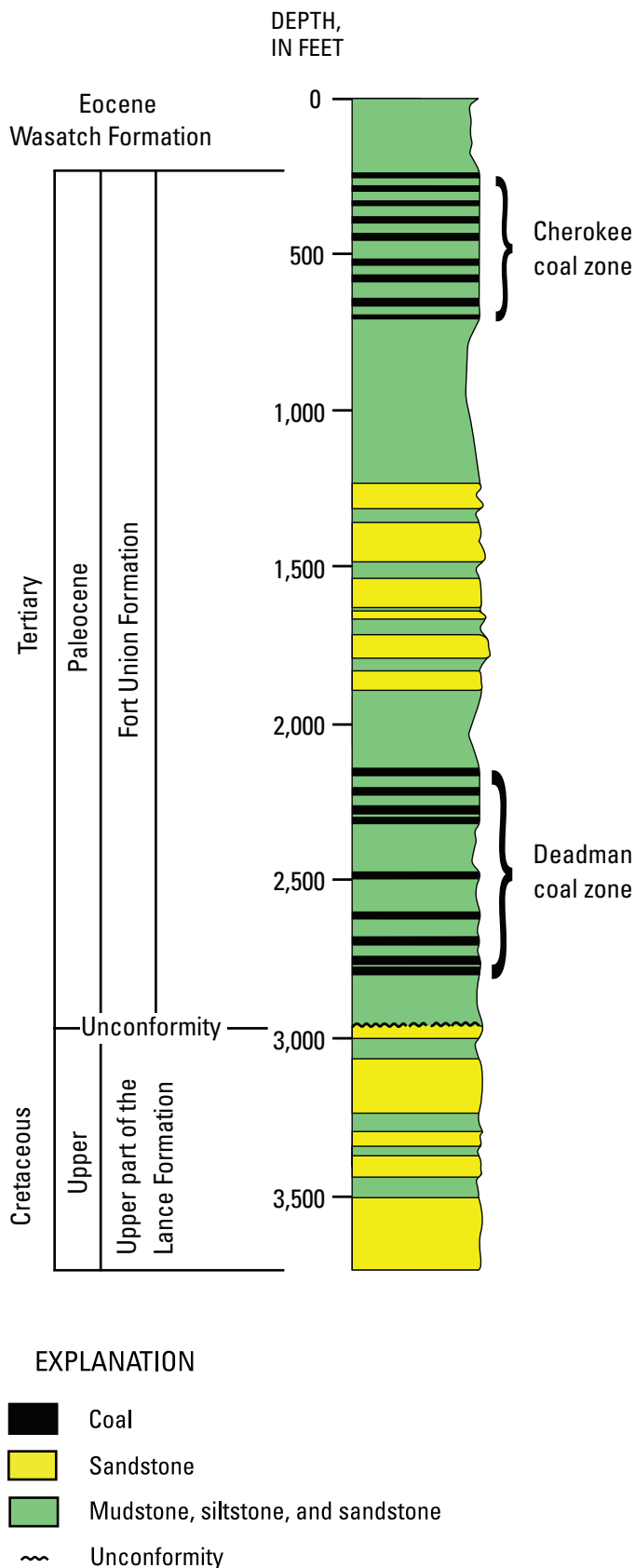


Figure 4. Stratigraphic column for the Fort Union Formation in the Green River Basin, Wyoming.

the unit thickness (UT) column in appendix 1; see table 2 for a list of all acronyms used in the lithologic descriptions and calculations of this report). The sum of the UT values for all units in each canister sample is the total thickness of coal in each canister, or the canister total measured thickness (CaToMT) (appendix 1). The unit proportion of the canister thickness (UPrCaT) for each unit is determined by dividing each UT by CaToMT (appendix 1). Finally, the core cumulative measured thickness (CoCuMT) is the cumulative sum of UT values from the top of the cored section of the well (note that it is not the surface elevation of the well) to the base of each unit (appendix 1). Canister 39 of core hole 2 (MichiWest Energy, Inc., Pilot State 16–32) is a common example of a canister sample that was divided into three units, with a UT of 5 centimeters (cm) for the top unit, 9 cm for the middle unit, and 39 cm for the bottom unit (appendix 1, table 1–2). The CaToMT is therefore 53 cm ($5 + 9 + 39$), and UPrCaT values are 0.09 ($5/53$), 0.17 ($9/53$), and 0.74 ($39/53$) for the top, middle, and bottom units, respectively (values are reported to two decimal places). The CoCuMT values for the three units in canister 39 are 61.01, 61.30, and 62.58 ft for the top, middle, and bottom units, respectively (all UT values in the well were divided by 2.54 to convert from centimeters to inches, then divided by twelve to obtain feet, then summed from the top of the cored section of the well to the unit concerned). For the vertical axes of the charts in appendix 2, the CoCuMT was used instead of the approximate depth values determined at the drill site because the sum of UT values for each canister was rarely equal to the canister thickness recorded in the field (usually 2 ft).

Several other characteristics were determined in the laboratory (appendix 1): (1) the cleat spacing (CS), which is the distance between adjacent (vertical) cleat surfaces measured to the nearest millimeter; (2) the cleat frequency (CFr), which is the number of cleats per meter (cleats/m, equal to $1000/CS$); and (3) the canister average cleat frequency (CaAvCFr, which is the average of all CFr values for all units within the entire canister (determined by multiplying the CFr by the UPrCaT for each unit within a canister, and summing the results).

For the three units in canister 39 of core hole 2, the CS values are 4 millimeters (mm) (top), 4 mm (middle), and 10 mm (bottom) (appendix 1, table 1–2). The CFr values for these three units are therefore 250 ($1000/4$), 250 ($1000/4$), and 100 ($1000/10$) cleats/m, for the top, middle, and bottom units, respectively. The CaAvCFr for canister 39 is 139.62 cleats/m, which is the result of the following calculation: $(250 \times 0.09) + (250 \times 0.17) + (100 \times 0.74)$. Units with no CFr values (for example, non-coal partings or gaps in the section with no data) were excluded from the CaAvCFr calculations.

The total gas (in standard cubic feet per ton (SCF/ton), which is standard industry usage) and apparent rank data were obtained from Stricker and others (2007) (appendix 1). For some canisters, we do not report total gas and (or) apparent rank data. No canisters have more than one value for either total gas or apparent rank. Finally, miscellaneous interesting or unusual features (such as the presence of pyrite, kaolinite, or calcite on cleat surfaces) were recorded in the laboratory and appear in appendix 1.



Figure 5. Photograph of canister coal sample split open for examination of megascopic lithologic features. Notice alternating vitrain (V, shiny) and attritus (A, dull) bands. Thicknesses of vitrain and attritus bands were measured in millimeters with the ruler.

Table 2. Acronyms used frequently throughout the report, listed in alphabetical order.

Acronym	Attribute represented by acronym	Description of attribute	Method of determination (calculated by formula, measurement in lab, visually estimated in lab, and so on)
AP	Attritus percent	Percentage of attritus within a unit	Visually estimated (see table 3)
AvABT	Average attritus band thickness	Average thickness of attrital bands within a unit	Visually estimated or calculated by formula (see table 3)
AvVBT	Average vitrain band thickness	Average thickness of vitrain bands within a unit	Visually estimated or calculated by formula (see table 3)
CaAvAP	Canister average attrital percentage	Average percentage of attritus within an entire canister	$CaAvAP = (AP_1 \times UPrCaT_1) + (AP_2 \times UPrCaT_2) + \dots (AP_n \times UPrCaT_n)$, where n is the total number of units in the canister in question
CaAvCFr	Canister average cleat frequency	Average cleat frequency value within an entire canister	$CaAvCFr = (CFr_1 \times UPrCaT_1) + (CFr_2 \times UPrCaT_2) + \dots (CFr_n \times UPrCaT_n)$, where n is the total number of units in the canister in question
CaAvFP	Canister average fusain percentage	Average percentage of fusain within an entire canister	$CaAvFP = (FP_1 \times UPrCaT_1) + (FP_2 \times UPrCaT_2) + \dots (FP_n \times UPrCaT_n)$, where n is the total number of units in the canister in question
CaAvVP	Canister average vitrain percentage	Average percentage of vitrain within an entire canister	$CaAvVP = (VP_1 \times UPrCaT_1) + (VP_2 \times UPrCaT_2) + \dots (VP_n \times UPrCaT_n)$, where n is the total number of units in the canister in question
CaToMT	Canister total measured thickness	Total of unit thicknesses for all units within a canister	Sum of UT values for all units in a canister
CFr	Cleat frequency	Average number of (vertical) cleats per meter for unit in question	$CFr = 1000 / CS$
CoCuMT	Core cumulative measured thickness	Total thickness from top of core to the base of the unit in question	Sum of UT values for all units from top of cored section of coal to unit in question
CS	Cleat spacing	Average distance (measured to nearest mm) between (vertical) cleat surfaces for unit in question	Average of measurements in lab for unit in question
CuAT	Cumulative attritus thickness	Cumulative thickness of attritus within a unit	Calculated by formula (see table 3)
CuFT	Cumulative fusain thickness	Cumulative thickness of fusain within a unit	Visually estimated (see table 3)
CuVT	Cumulative vitrain thickness	Cumulative thickness of vitrain within a unit	Calculated by formula (see table 3)
FP	Fusain percent	Percentage of fusain within a unit	$FP = 100 \times CuFT / UT$
UPrCaT	Unit proportion of canister thickness	Percentage of canister total measured thickness for the unit in question	$UPrCaT = UT / CaToMT$
UT	Unit thickness	Thickness of unit	Measured in lab
VP	Vitrain percent	Percentage of vitrain within a unit	Visually estimated (see table 3)

Lithotype Data

Coal lithology described in this report follows the classification scheme and definitions presented by American Society for Testing and Materials (1994), which is a modification of a classification scheme originally developed by Schopf (1960). This method involves the description of coal using three lithotypes: attritus (also called attrital coal), vitrain, and fusain. Attritus is derived from a variety of materials of vegetal origin and occurs as a fine-grained, tightly compacted mass (Theissen, 1920). Attritus makes up the groundmass in which vitrain and fusain are embedded. The luster of attritus can vary, but is generally duller than vitrain and not as dull as fusain. Stopes (1919) prefers to use the terms “clarain” for the brighter varieties of attritus and “durain” for the duller varieties. Vitrain is composed of shiny bands embedded in attrital groundmass and generally is considered to be the coalified remains of the woody portions of plants. Fusain is silky to dull, fibrous, and so soft and friable that it makes one’s hands dirty when handled (Taylor and others, 1998). Fusain is generally considered to be the charcoal remains of burnt woody material (Taylor and others, 1998); however, Moore and others (1996) report that fungal activity during the peat accumulation stage has produced “inertinite”-like material (that is, fusain) in modern peat swamps.

Vitrain and fusain form bands of varying thickness, parallel or subparallel to bedding, separated by attrital groundmass (fig. 5). For most coal samples, vitrain bands alternate with attrital “bands” (which actually are areas of attrital groundmass separating vitrain bands), with occasional bands of fusain interspersed. Measurements (or visual estimates) of band thicknesses are made approximately perpendicular to the plane of bedding. These thickness measurements form the basis of the various methods used to describe the coal in this report. The methodologies used for describing the megascopic lithologic features of the coals evolved over the course of the project based on decisions made by several different researchers involved with the project. In general, we believe that point-counting methods (methods D and E, below) result in more accurate data than methods that depend on visual estimation alone (methods A, B, and C, below); however, there is no objective way for us to compare the accuracy of data created using these different methods because the coal samples are no longer available for reexamination in their original form (after the lithotype descriptions were completed, the samples were sent out for grinding and chemical analyses). The methods used to describe the lithology of the coal are presented in detail below. Table 3 also summarizes these different methods.

Methods

Five methods were used to describe the coal samples in this project. Method A, developed by Ronald W. Stanton, employed a visual estimation of the average vitrain

band thickness (AvVBT), the average attrital band thickness (AvABT), and the cumulative fusain thickness (CuFT) in each unit. This method was useful and quick, but the possibility of inaccuracy of the visually estimated values was a major drawback. Also, in its original form, this method did not include a determination of the cumulative vitrain thickness (CuVT) or cumulative attritus thickness (CuAT); therefore, the percentages of vitrain and attritus (VP and AP, respectively) also were not determined. Later, when it was decided that the VP and AP were needed, we assumed that the ratio of vitrain to attritus in each unit was equal to the ratio of the AvVBT to AvABT in order to calculate the CuVT, CuAT, VP, and AP (see formulas in table 3). This assumption may not be accurate, but we had no other means to determine these values.

As a way of improving on method A, method B also included visual estimation of the VP and AP. These visually estimated percentages also may have had some inaccuracy, but were probably more reliable than the calculated percentages of method A.

Method C improved upon method B by visually estimating only the AvVBT, CuFT, VP, and AP. The CuVT and CuAT were still determined using VP and AP, but AvABT was determined by dividing CuAT by the number of vitrain bands (CuVT/AvVBT) (the number of vitrain bands was assumed to be equal to the number of attrital bands, which was reasonable because the bands alternated from vitrain to attritus and back). Once again, the visual estimations were a possible source of inaccuracy, but with the AvABT calculated instead of estimated, this method may have been even more accurate than the previous two.

Method D, developed by Timothy A. Moore, attempted to remove even more inaccuracy by using a point-count method instead of visual estimation to determine VP and AP (see table 3 for formulas); however, the AvVBT, AvABT, and CuFT were still visually estimated, and may have been a source of inaccuracy as described above for methods A and B. This method was more time consuming due to the use of point counting, but the VP and AP values were probably more accurate than the visually estimated values of methods B and C and the calculated values of method A.

Finally, method E attempted to eliminate almost all visually estimated values (except CuFT) by using point-count values to determine the CuVT, CuAT, VP, AP, AvVBT, and AvABT. Although method E was more time consuming than any of the previous methods, it was considered to be the most accurate method.

Because of the evolving nature of the methodology as described above, the values determined by different methods may be of different accuracies and, therefore, perhaps not always compatible with each other. Unfortunately, the samples (which were all sent to the laboratory for chemical analyses) are no longer available to check the accuracy of this assumption; however, we believe that the inaccuracies mentioned above are small enough that the results are still comparable from the beginning of the project to the end.

Table 3. Summary of methods used for determining the average vitrain band thickness (AvVBT), average attrital band thickness (AvABT), cumulative fusain thickness (CuFT), cumulative vitrain thickness (CuVT), and cumulative attritus thickness (CuAT) for coal units, grouped by methodology.

[Abbreviations are as follows: AP, percent of attritus; UT, unit thickness (measured in the laboratory); VP, percent of vitrain]

Core hole number	Average vitrain band thickness (AvVBT)	Average attrital band thickness (AvABT)	Cumulative fusain thickness (CuFT)	Vitrain percentage (VP)	Attrital percentage (AP)	Fusain percentage (AP)	Cumulative vitrain thickness (CuVT)	Cumulative attritus thickness (CuAT)	Method used
1–3, 8, 10–16, 23–24	Visually estimated	Visually estimated	Visually estimated	$(\text{AvVBT} / [\text{AvVBT} + \text{AvABT}]) \times 100$	$(\text{AvABT} / [\text{AvVBT} + \text{AvABT}]) \times 100$	$(\text{CuFT} / \text{UT}) \times 100$	$(\text{VP} / 100) \times (\text{UT} - \text{CuFT})$	$(\text{AP} / 100) \times (\text{UT} - \text{CuFT})$	A (the original method by Ronald W. Stanton, unpub. data, 1999).
19–22	Visually estimated	Visually estimated	Visually estimated	$(\text{CuVT} / \text{UT}) \times 100$	$(\text{CuAT} / \text{UT}) \times 100$	$(\text{CuFT} / \text{UT}) \times 100$	$(\text{visually estimated VP} / 100) \times (\text{UT} - \text{CuFT})$	$(\text{visually estimated AP} / 100) \times (\text{UT} - \text{CuFT})$	B (method A with visually estimated VP and AP).
9, 34–37	Visually estimated	$\text{CuAT} / (\text{CuVT} / \text{AvVBT})$	Visually estimated	$(\text{CuVT} / \text{UT}) \times 100$	$(\text{CuAT} / \text{UT}) \times 100$	$(\text{CuFT} / \text{UT}) \times 100$	$(\text{visually estimated VP} / 100) \times (\text{UT} - \text{CuFT})$	$(\text{visually estimated AP} / 100) \times (\text{UT} - \text{CuFT})$	C (method A with visually estimated VP and AP and corrected AvABT).
17–18	Visually estimated	Visually estimated	Visually estimated	$(\text{CuVT} / \text{UT}) \times 100$	$(\text{CuAT} / \text{UT}) \times 100$	$(\text{CuFT} / \text{UT}) \times 100$	$(\text{vitrain bands counted} / [\text{vitrain bands counted} + \text{attritus bands counted}]) \times (\text{UT} - \text{CuFT})$	$(\text{attritus bands counted} / [\text{vitrain bands counted} + \text{attritus bands counted}]) \times (\text{UT} - \text{CuFT})$	D (method A with point-count method modified from Moore and others (1993)).
25–28, 30–33	CuVT / vitrain bands counted	$\text{CuAT} / \text{attritus bands counted} (= \text{vitrain bands counted})$	Visually estimated	$(\text{CuVT} / \text{UT}) \times 100$	$(\text{CuAT} / \text{UT}) \times 100$	$(\text{CuFT} / \text{UT}) \times 100$	Sum of vitrain band thicknesses (measured in the lab)	$\text{UT} - (\text{CuFT} + \text{CuVT})$	E (method A with point-count method modified from Moore and others (1993) and corrected AvVBT and AvABT).

Method A

A coal lithotype descriptive system, first developed by Ronald W. Stanton (unpub. data, 1999), was followed for coal samples from core holes 1–3, 8, 10 through 16, 23, and 24. (Lithologic descriptions of coal samples from core holes 4 through 7 were never performed. Coal samples from core holes 17 through 22 were described in the laboratory at a later time (using methods B and D, described below) even though these core holes were drilled in the field before core holes 23 and 24. Samples from core hole 9 were placed in storage for more than three years before we decided to describe their lithology in the lab (using method C, described below).) For each unit in a canister the AvVBT, AvABT, and CuFT were visually estimated and recorded for each unit (table 3; appendix 1). The AvVBT and AvABT values were divided into five categories each. These categories were used to construct a coal lithotype matrix (fig. 6, developed by Ronald W. Stanton, unpub. data, 1999) that produced a lithotype code that was then assigned to each unit. Non-coal material (such as that found in partings) is labeled as “clay” (lithotype code 0) regardless of grain size and (or) mineralogy. Coal units are classified as follows, on the basis AvVBT and AvABT values and the presence or absence of fusain (fig. 6): attritus (nearly all attritus with little or no vitrain; lithotype code 1), finely laminated attritus and vitrain (code 2), medium to coarsely laminated attritus and vitrain (code 3), very coarsely laminated attritus and vitrain (code 4), woody material (nearly all vitrain with little or no attritus; code 5), and fusain (100 percent fusain; code 8). Note that from the late 1980s, Stanton used coal “facies” descriptions without actually assigning numerical lithotype codes or using a lithotype matrix (Stanton and others, 1989; Roberts and Stanton, 1994; Roberts and others, 1994; and Stanton and others, 2005).

As an example, the top and bottom units of canister 39, core hole 2, had an AvVBT value of 5 mm and an AvABT value of 10 mm, which indicated a lithotype code of 3 (medium to coarsely laminated attritus and vitrain) at the intersection of the third row (with AvVBT values between 5 and 20 mm) and the third column (with AvABT values between 5 and 20 mm) on the lithotype matrix (fig. 6). The middle unit had both AvVBT and AvABT values equal to zero mm and a CuFT equal to 90 mm; therefore, the lithotype matrix indicated a code of 8 (fusain) at the intersection of the first row (AvVBT equal to zero) and the first column (AvABT equal to zero) (fig. 6).

In this method, the CuFT was visually estimated in the laboratory, but similar cumulative thicknesses of vitrain and attritus (CuVT and CuAT, respectively) were not. Later, when we decided to graph canister average percentages of vitrain (CaAvVP) and attritus (CaAvAP) against total gas (appendix 3), it became apparent that we needed CuVT and CuAT values to calculate the percentages of vitrain and attritus (VP and AP, respectively) in each unit. For this reason, we needed to derive values for the CuVT and CuAT using the AvVBT and AvABT values collected in the laboratory. Because all coal units are a

combination of vitrain, attritus, and fusain, the UT value minus the CuFT value had to equal the thickness of the non-fusain portion of the unit, or the sum of the CuVT and CuAT (that is, $UT - CuFT = CuVT + CuAT$) (UT, recorded in centimeters, had to be converted to millimeters before subtracting the CuFT). Then, assuming an equal number of vitrain and attritus bands in each unit (which was reasonable because vitrain bands alternated with attritus bands), the ratios ($AvVBT / (AvVBT + AvABT)$) and ($AvABT / (AvVBT + AvABT)$) gave us the proportions of vitrain and attritus, respectively, in the non-fusain portion of the unit. Therefore, if we multiplied ($UT - CuFT$) by ($AvVBT / (AvVBT + AvABT)$), the result was the CuVT. Likewise, the product of ($UT - CuFT$) and ($AvABT / (AvVBT + AvABT)$) was the CuAT. For example, in the top unit of canister 39, core hole 2, $UT - CuFT = 50 \text{ mm} - 0 \text{ mm}$, or 50 mm. The CuVT was therefore $50 \text{ mm} \times (5 \text{ mm} / (5 \text{ mm} + 10 \text{ mm}))$ or 16.67 mm, and the CuAT was $50 \times (10 / (5 + 10))$, or 33.33 mm (appendix 1, table 1–2).

At this point, the percentages of vitrain (VP), attritus (AP), and fusain (FP) in each unit were calculated by using the following formulas: $VP = 100 \times CuVT / UT$; $AP = 100 \times CuAT / UT$; and $FP = 100 \times CuFT / UT$. For example, for the top unit of canister 39, core hole 2, $VP = 100 \times 16.67 \text{ mm} / 50 \text{ mm} = 33.33$ percent, $AP = 100 \times 33.33 \text{ mm} / 50 \text{ mm} = 66.67$ percent, and $FP = 100 \times 0 \text{ mm} / 50 \text{ mm} = 0$ percent (appendix 1, table 1–2).

The coal in most of the canisters was subdivided into several units. The total gas values and coal chemistry values (from Stricker and others (2006) and Stricker and others (2007), respectively), however, represented an average value for all of the coal in a canister. Therefore, whenever the canister was subdivided, it was necessary to determine the canister average percentages of vitrain (CaAvVP), attritus (CaAvAP), fusain (CaAvFP), and cleat frequency (CaAvCfr) in order to match the total gas and coal chemistry values. The canister average percentages for each of the three lithotypes were calculated in a manner similar to the canister average cleat frequency (CaAvCfr) described above. The CaAvVP was calculated by dividing the sum of the CuVT values for all units within the canister by the CaToMT, and multiplying by 100. For example, in canister 39 of core hole 2, the sum of the CuVT values for the three units was $16.67 \text{ mm} + 0.00 \text{ mm} + 126.67 \text{ mm} = 143.34$ mm. Next, 143.34 was divided by the CaToMT (first converted from 53 cm to 530 mm), and multiplied by 100 to yield the CaAvVP value of 27.04 percent (appendix 1, table 1–2). Calculating the canister average attritus percentage (CaAvAP) and canister average fusain percentage (CaAvFP) was done in the same manner, but by using the sums of the CuAT and CuFT values, respectively, instead of the CuVT. Non-coal (sand, clay, ash, and so on) layers were included because they were included in the canister when the gas was desorbed and in the chemical analysis. Intervals that were not described or were missing (because of isotherm analysis sample removal, loss during drilling, or other reasons) were not included in these calculations.

Coal lithotype matrix		Average attrital band thickness (AvABT)				
		0 mm	Less than 5 mm	5–20 mm	Greater than 20–40 mm	Greater than 40 mm
Average vitrain band thickness (AvVBT)	0 mm	8	1	1	1	1
	Less than 5 mm	2	2	2	1	1
	5–20 mm	3	3	3	3	3
	Greater than 20–40 mm	5	4	4	4	4
	Greater than 40 mm	5	5	4	4	4

Figure 6. Chart showing coal lithotype matrix developed by Ronald W. Stanton (unpub. data, 1999). The average attrital band thickness (AvABT, columns) and average vitrain band thickness (AvVBT, rows) determine the lithotype code at the cell of intersection. Lithotype codes are as follows: 0, “clay” (non-coal lithotype, not found on matrix); 1, attritus (nearly all attritus with little or no vitrain); 2, finely laminated attritus and vitrain; 3, medium to coarsely laminated attritus and vitrain; 4, very coarsely laminated attritus and vitrain; 5, woody material (nearly all vitrain with little or no attritus); 8, fusain (100 percent fusain). mm, millimeter.

Method B

As mentioned above, the original procedure followed in method A only recorded visual estimates of the AvVBT, AvABT, and CuFT values in the laboratory. Two years into the project we decided to add visual estimation of vitrain percent (VP) and attrital percent (AP) during laboratory examination of the coal samples (table 3). Beginning with core hole 19 and continuing through core hole 22, we visually estimated and recorded the VP and AP for each unit (with the exception of canisters C5 and C6 of core hole 19, method A was used for these two canisters). However, these percentages ignored the amount contributed by fusain (when present), so we corrected them (when fusain was present) in the following manner: (1) the thickness of non-fusain material (equal to CuVT + CuAT) was determined by subtracting the CuFT from the UT (that is, $\text{CuVT} + \text{CuAT} = \text{UT} - \text{CuFT}$); (2) the result was multiplied by the uncorrected VP (divided by 100) to obtain the CuVT, and by the uncorrected AP to get the CuAT; (3) the corrected VP was determined by dividing the CuVT by the UT and multiplying by 100; the corrected AP was determined by dividing the CuAT by the UT and multiplying by 100. For example, canister C2 of core hole 19 (All Night Creek (ANCU) Iberlin 21–33–4374, table 1) had a VP of 30 percent and an AP of 70 percent recorded in the laboratory; however, these percentages ignored the presence of fusain in the unit (the CuFT was 8 mm, appendix 1, table 1–15). Correcting for the 8 mm of fusain yielded a VP of 29.58 percent, which was determined by the following calculation: $[(570 \text{ mm} - 8 \text{ mm}) \times (30 / 100)]$

$/ 570 \text{ mm}) \times 100$ (appendix 1, table 1–15). Appendix 1 lists only the corrected VP and AP values.

Method C

For samples from core holes 9 and 34 through 37, we originally followed the same procedure as method B. Unfortunately, our visually estimated AvABT values for these samples were later determined to be erroneous, so we recalculated the AvABT in the following manner: (1) the average number of vitrain bands was determined by dividing the CuVT by the AvVBT; (2) assuming an equal number of attrital and vitrain bands, the CuAT was divided by the average number of vitrain bands to find the AvABT. For example, for the top unit of canister A-5 in core hole 9 (Kennecott CBM-1), the AvABT was calculated in the following manner: $(90 \text{ mm} / [10 \text{ mm} / 1 \text{ mm}]) = 9 \text{ mm}$ (appendix 1, table 1–5). The recalculated AvABT values are reported in appendix 1 for samples from core holes 9 and 34 through 37.

Method D

For samples from core holes 17 and 18, a point-counting method to calculate percentages of attritus and vitrain was developed by Timothy A. Moore. This method was a simplified version of the procedure described in Moore and others (1993) and was performed in addition to method A (described above). As in method A, the AvVBT, AvABT, and CuFT were visually estimated and recorded in the laboratory. In addition,

the coal lithotype (vitrain or attritus) was determined at 2-cm intervals and recorded (fig. 7). The VP (or AP) was then calculated by dividing the number of vitrain (or attrital) bands counted by the total number of bands (vitrain and attritus) counted and multiplying by 100 (point-count data was not included in appendix 1). As in method B above, the VP and AP were corrected for the presence of fusain by (1) subtracting the CuFT from the UT, (2) multiplying by the uncorrected VP (or AP) (divided by 100) to obtain the CuVT (or CuAT), and (3) dividing the CuVT (or CuAT) by UT and multiplying by 100 to obtain the corrected VP (or AP). For example, in canister A12 of core hole 17 (PNG 31-1), there were 10 vitrain bands counted out of a total of 20 vitrain and attritus bands, which yielded an uncorrected VP of 50 percent in the non-fusain portion of the canister (not shown in appendix 1); however, with a CuFT of 2 mm and a UT of 590 mm, the VP is corrected as follows: $[(590 \text{ mm} - 2 \text{ mm}) \times (50/100)] / 590 \text{ mm} \times 100 = 49.83 \text{ percent}$ (appendix 1, table 1-13). Note that the same raw data (UT, AvVBT, AvABT, CuFT, vitrain and attrital band count values, and CFr) that were previously summarized by Moore and others (2001) correspond to the raw data used for samples from core holes 17 and 18 in this report.

Method E

For samples from core holes 25 through 28 and 30 through 33 (samples from core hole 29 were not described), we used a procedure similar to method D (see above), but which employed the point-counting procedure described by Moore and others (1993). As in method D, the coal lithotype (attritus or vitrain) was determined at 2-cm intervals and recorded. In addition to the number of attrital and vitrain bands, the thicknesses of individual vitrain bands encountered at the 2-cm intervals also were recorded (these data are not included in appendix 1). In cases where vitrain bands spanned more than one 2-cm interval, the vitrain band was counted only once. The AvVBT was calculated by dividing the sum of the recorded vitrain band thicknesses (that is, the CuVT) by the number of vitrain bands. The CuAT was determined by subtracting the sum of the CuVT and the CuFT from the UT (or $\text{CuAT} = \text{UT} - (\text{CuVT} + \text{CuFT})$). Assuming an equal number of attrital and vitrain bands (a significant difference from method D), the AvABT was determined by dividing the CuAT by the number of vitrain bands. The VP (or AP) was then determined by dividing the CuVT (or CuAT) by the UT. For example, in canister D31 of core hole 25 (PNG Duvall 13J-D) we counted 7 vitrain bands with thicknesses of 18 mm, 1 mm, 2 mm, 2 mm, 30 mm, 1 mm, and 60 mm (not shown in appendix 1). The sum of these vitrain band thicknesses, or the CuVT, was 114 mm (appendix 1, table 1-21). The AvVBT was determined by dividing 114 mm by 7 to yield 16.29 mm (appendix 1, page table 1-21). The CuAT was determined by subtracting the sum of the CuFT and the CuVT from the UT ($600 \text{ mm} - [114 \text{ mm} + 7 \text{ mm}] = 479 \text{ mm}$) (appendix 1, page table 1-21). Finally, the AvABT was determined by dividing the CuAT by the number of attrital bands (assumed to be equal

to the number of vitrain bands) as follows: $479 \text{ mm} / 7 = 68.43 \text{ mm}$ (appendix 1, table 1-21). Note that point counting was not done on 12 units in core hole 26 (all units in canisters D12, D15, D17, and D18), one unit in core hole 32 (canister C17), three units in core hole 32 (canisters 36 (the middle and bottom units) and canister 47 (the fifth unit from the top)), and one unit in core hole 33 (canister D2). For these 17 units, method A had to be used to determine the AvVBT, AvABT, CuVT, and CuAT.

Discussion of Data and Results

The thicknesses of coal samples measured in the laboratory commonly were found to differ from the thicknesses indicated by the approximate top and bottom depths recorded in the field (usually 2-ft-thick segments). There are several possible explanations for the discrepancies. First, the total length of the original coal sample placed in the canister may have been slightly shorter or longer than the thickness indicated by the top and bottom field depths. Second, movement of the coal samples during desorption and shipment often resulted in the breakage of the coal into smaller, more loosely packed fragments. It was often very difficult in the laboratory to reassemble these fragments into a reasonable facsimile of the original coal sample; thus, the thickness measurements may have been erroneous for some samples. Finally, it is possible that the coal may have expanded slightly after absorbing water in the desorption canister. As a result, the base depths calculated from unit thickness measurements in the laboratory often differed from the canister base depths recorded in the field. To avoid confusion, the total measured thickness from the top of the highest canister sample in the core hole (the core cumulative measured thickness (CoCuMT) in appendix 1) was used rather than drilling depth (from the surface) to the unit base for the vertical axes of the graphs in appendix 2. The thicknesses of the unsampled portions of the core hole were included to graphically represent the locations of gaps in the stratigraphic column.

Graphs showing the total measured thickness plotted against total gas and five other variables (average attrital band thickness, cleat frequency, cumulative fusain thickness, lithotype code, and average vitrain band thickness) are presented in appendix 2. In a few cases, a relationship between total gas and one or more of these variables may be evident. For example, in core holes 1, 8 (in the Cook coal bed section), 20, and 34 (in the Anderson coal bed section) (appendix 2, figs. 2-1, 2-7, 2-20, and 2-36, respectively), the total gas values on the cleat frequency graphs seem to partially mimic the variations in cleat frequency. Similarly, the total gas values may exhibit a trend slightly parallel to the average vitrain band thickness in core holes 8 (in the Cook coal bed section), 10, and 23 (appendix 2, figs. 2-7, 2-9, and 2-25, respectively). In most cases, however, it was difficult or impossible to recognize any positive relationship between the total gas and these variables. In some cases, the amount of measured gas was very



Figure 7. Photograph of canister coal sample with a string that is marked at 2-cm intervals and was used for the point-counting procedure. At this location, 11 bands of vitrain with a total thickness of 218 mm were recorded, resulting in an average vitrain band thickness of 19.8 mm (218/11). Assuming an equal number of attrital and vitrain bands, an average attrital thickness of 33.8 mm was calculated $((590-218)/11$, where 590 mm is the total canister thickness). Using these values for average vitrain and attrital band thicknesses a lithotype code of 3 (medium to coarsely laminated attritus and vitrain) was determined from the lithotype matrix (fig. 6).

small (less than 10 standard cubic feet per ton), so the likelihood of obtaining measurable variations of gas content would be low (for example, core holes 9, 10, 13, 15, 16, 21 through 27, and 34 through 37; appendix 2, figs. 2–8, 2–9, 2–13, 2–15, 2–16, 2–21 through 2–29, and 2–36 through 2–40, respectively). Also, some core holes had such a small number of gas samples (fewer than 6 per bed) that the likelihood of noticing variation within the canister was very small (for example, core holes 3, 8, 21, 22, 25, and 36; appendix 2, figs. 2–3 through 2–7, 2–21 through 2–24, 2–27, and 2–39, respectively).

In general, we found no obvious positive correlation between the total gas and the average vitrain band thickness, canister average attrital band thickness, and canister average cleat frequency (appendix 3). The samples in core hole 32 appear to form a cluster of points that may show a slightly positive correlation between the canister average vitrain band thickness and the total gas (appendix 3, fig. 3–1D), but the trend line passing through these points (not shown) has a very low R-squared value of 0.18. Similarly, a slight negative correlation may be present between canister average attrital percentage and total depth based on an R-squared value of -0.18 for samples from core hole 32 (appendix 3, fig. 3–3D).

Interpretations

Previous studies using data from some of the same samples (core holes 2, 17, and 18) from this study have noted a possible relationship between the percent of vitrain in the sample and the amount of gas desorbed (Moore and others, 2001; Chiehowsky and others, 2003). As noted above, there were a few instances where a positive relationship between the percentage of vitrain and total gas may exist (core holes 8 (Cook coal bed), 10, and 23 in appendix 2 (figs. 2–7, 2–9, and 2–25; core hole 32 in appendix 3, figs. 3–1D and 3–3D), but in general, a good relation between vitrain thickness and total gas values was not observable in this study. The reason for the weak relationship is unknown, but may be due to one or more of the following: (1) gas may have migrated out of the source areas along cleat or porous fusain channels; (2) low levels of gas may be a result of high ash content in coals; (3) canister-level total gas values may not reflect variations in gas content that correlate with lithotype variations at the millimeter scale; or (4) variation in hydrostatic pressure may be a greater influence on gas content than the lithology of the coal.

As already mentioned above, we observed no apparent relationship between average (vertical) cleat frequency and total gas or heating value. Note that cleat spacing was often very difficult to determine with certainty for a number of reasons, including the following: (1) highly fractured coal samples often were difficult to reassemble and, consequently, cleat measurements may have been difficult to determine; (2) cleat spacing varied from unit to unit in the coal sample, and sometimes even varied within the unit; (3) some units had very wide spacing of cleats that was greater than the diameter of

the core hole; and (4) some units (usually those with high ash content) had a massive “uncleated” appearance. Also, the total gas values of the canisters may not have correlated well with average cleat frequencies calculated for each canister.

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Appendix 1. Tables of Lithologic Data for Samples From 32 Cores

The following tables are arranged according to core hole number (see figure 1 and table 1 in report). They show canister number, approximate depth (top and bottom), coal bed name, unit thickness (UT), canister total measured thickness (CaToMT), unit proportion of canister thickness (UPrCaT), core cumulative measured thickness (CoCuMT), average vitrain band thickness (AvVBT), average attrital band thickness (AvABT), cumulative fusain thickness (CuFT), lithotype code (see table 3), cumulative vitrain thickness (CuVT), cumulative attritus thickness (CuAT), percentages of vitrain (VP), attritus (AP), and fusain (FP), canister average percentages of vitrain (CaAvVP), attritus (CaAvAP), and fusain (CaAvFP), cleat

spacing (CS), cleat frequency (CFr), canister average cleat frequency (CaAvCFr), total gas per canister, apparent rank, and comments. In cases where no sample was available, the coal was too fragmented to describe, and (or) no descriptions were made, the following abbreviations are either appended to the canister number or used alone in the first column for further description: ns, no sample available; fr, highly fractured sample; nr, data not recorded. In these cases, the unit concerned was not included in determination of vitrain, attritus, fusain, and cleat frequency canister averages. The total gas and apparent rank data are from Stricker and others (2007).

Table 1–1. Data for samples from core hole 1, MichiWest Energy Inc., Pilot State 16–14.

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubA, subbituminous A; SubB, subbituminous B; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)	Average attrital band thickness (AvABT) (mm)
	Top	Bottom							
1	1,213.00	---	Big George	4.00	---	0.04	0.13	0.0	0.0
1	---	1,215.00	Big George	56.60	60.60	0.51	1.99	6.0	6.0
2	1,215.00	---	Big George	38.10	---	0.58	3.24	2.0	20.0
2	---	1,217.00	Big George	27.90	66.00	0.42	4.15	30.0	0.0
3	1,217.00	1,219.00	Big George	60.10	60.10	1.00	6.13	30.0	0.0
4	1,219.00	---	Big George	40.00	---	0.67	7.44	2.0	20.0
4	---	1,221.00	Big George	20.00	60.00	0.33	8.09	30.0	0.0
5	1,221.00	---	Big George	40.90	---	0.68	9.44	2.0	20.0
5	---	1,223.00	Big George	19.60	60.50	0.32	10.08	20.0	0.0
6	1,223.00	---	Big George	52.00	---	0.85	11.78	30.0	0.0
6	---	1,225.00	Big George	9.00	61.00	0.15	12.08	20.0	0.0
7	1,225.00	---	Big George	15.00	---	0.25	12.57	30.0	0.0
7	---	---	Big George	7.00	---	0.11	12.80	3.0	10.0
7	---	1,227.00	Big George	39.00	61.00	0.64	14.08	20.0	1.0
8	1,227.00	1,229.00	Big George	50.80	111.40	0.46	15.75	0.0	0.0
9	1,229.00	---	Big George	2.54	---	0.04	15.83	0.0	0.0
9	---	1,231.00	Big George	58.50	61.04	0.96	17.75	20.0	2.0
10	1,231.00	---	Big George	30.50	---	0.50	18.75	20.0	2.0
10	---	---	Big George	7.00	---	0.11	18.98	2.0	4.0
10	---	1,233.00	Big George	23.50	61.00	0.39	19.75	4.0	4.0
11	1,233.00	---	Big George	35.00	---	0.57	20.90	10.0	20.0
11	---	---	Big George	21.00	---	0.34	21.59	10.0	20.0
11	---	1,235.00	Big George	5.00	61.00	0.08	21.75	4.0	4.0
12	1,235.00	---	Big George	24.50	---	0.42	22.56	3.0	5.0
12	---	1,237.00	Big George	34.50	59.00	0.58	23.69	20.0	0.0
13	1,237.00	---	Big George	30.00	---	0.49	24.67	20.0	0.0
13	---	---	Big George	15.00	---	0.25	25.17	40.0	0.0
13	---	1,239.00	Big George	16.00	61.00	0.26	25.69	0.0	50.0
14	1,239.00	---	Big George	40.00	---	0.66	27.00	10.0	1.0
14	---	1,241.00	Big George	21.00	61.00	0.34	27.69	5.0	5.0
ns1	1,241.00	1,242.50	ns1	46.00	46.00	1.00	29.20	---	---
15	1,242.50	---	Big George	38.00	---	0.62	30.45	20.0	10.0
15	---	1,244.50	Big George	23.00	61.00	0.38	31.20	2.0	4.0
16	1,244.50	---	Big George	39.62	---	0.91	32.50	5.0	2.0
16	---	1,246.70	Big George	3.81	43.43	0.09	32.63	0.0	0.0
17	1,246.70	---	Big George	15.24	---	0.20	33.13	10.0	40.0
17	---	---	Big George	15.00	---	0.20	33.62	10.0	10.0
17	---	---	Big George	37.00	---	0.49	34.83	4.0	4.0
17	---	1,248.80	Big George	9.00	76.24	0.12	35.13	2.0	2.0
18	1,248.80	---	Big George	7.60	---	0.12	35.38	2.0	20.0
18	---	1,250.80	Big George	54.00	61.60	0.88	37.15	2.0	20.0
19	1,250.80	---	Big George	4.00	---	0.07	37.28	20.0	0.0
19	---	---	Big George	1.00	---	0.02	37.31	0.0	0.0
19	---	1,252.80	Big George	56.00	61.00	0.92	39.15	20.0	0.0
20	1,252.80	1,254.90	Big George	61.00	61.00	1.00	41.15	5.0	20.0
21	1,254.90	---	Big George	35.00	---	0.57	42.30	20.0	1.0
21	---	1,257.00	Big George	26.00	61.00	0.43	43.15	30.0	0.0
22	1,257.00	1,259.00	Big George	61.00	61.00	1.00	45.15	8.0	2.0
23	1,259.00	1,261.00	Big George	61.00	61.00	1.00	47.16	30.0	0.0
24	1,261.00	1,263.00	Big George	61.00	61.00	1.00	49.16	10.0	40.0
ns2	1,263.00	1,272.00	ns2	274.00	274.00	1.00	58.15	---	---

Table 1–1. Data for samples from core hole 1, MichiWest Energy Inc., Pilot State 16–14.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubA, subbituminous A; SubB, subbituminous B; ---, no data]

Canister number	Cumulative fusain thickness (CuFT) (mm)	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)	Attritus percentage (AP)	Fusain percentage (FP)	Canister average vitrain percentage (CaAvVP)
1	0.0	0	0.00	0.00	0.00	0.00	0.00	---
1	1.0	3	282.50	282.50	49.91	49.91	0.18	---
2	1.0	2	34.55	345.45	9.07	90.67	0.26	---
2	0.0	5	279.00	0.00	100.00	0.00	0.00	---
3	1.0	5	600.00	0.00	99.83	0.00	0.17	---
4	0.0	2	36.36	363.64	9.09	90.91	0.00	---
4	0.0	5	200.00	0.00	100.00	0.00	0.00	---
5	0.0	2	37.18	371.82	9.09	90.91	0.00	---
5	0.0	3	196.00	0.00	100.00	0.00	0.00	---
6	0.0	5	520.00	0.00	100.00	0.00	0.00	---
6	1.0	3	89.00	0.00	98.89	0.00	1.11	---
7	0.0	5	150.00	0.00	100.00	0.00	0.00	---
7	0.0	2	16.15	53.85	23.08	76.92	0.00	---
7	0.0	3	371.43	18.57	95.24	4.76	0.00	---
8	0.0	0	0.00	0.00	0.00	0.00	0.00	---
9	0.0	0	0.00	0.00	0.00	0.00	0.00	---
9	0.0	3	531.82	53.18	90.91	9.09	0.00	87.13
10	0.0	3	277.27	27.73	90.91	9.09	0.00	---
10	0.0	2	23.33	46.67	33.33	66.67	0.00	---
10	0.0	2	117.50	117.50	50.00	50.00	0.00	68.54
11	10.0	3	113.33	226.67	32.38	64.76	2.86	---
11	0.0	3	70.00	140.00	33.33	66.67	0.00	---
11	0.0	2	25.00	25.00	50.00	50.00	0.00	---
12	1.0	2	91.50	152.50	37.35	62.24	0.41	---
12	0.0	3	345.00	0.00	100.00	0.00	0.00	---
13	0.0	3	300.00	0.00	100.00	0.00	0.00	---
13	0.0	5	150.00	0.00	100.00	0.00	0.00	---
13	0.0	1	0.00	160.00	0.00	100.00	0.00	73.77
14	0.0	3	363.64	36.36	90.91	9.09	0.00	---
14	0.0	3	105.00	105.00	50.00	50.00	0.00	---
ns1	---	---	---	---	---	---	---	---
15	0.0	3	253.33	126.67	66.67	33.33	0.00	---
15	1.0	2	76.33	152.67	33.19	66.38	0.43	---
16	0.0	3	283.03	113.21	71.43	28.57	0.00	---
16	0.0	0	0.00	0.00	0.00	0.00	0.00	---
17	0.0	3	30.48	121.92	20.00	80.00	0.00	---
17	0.0	3	75.00	75.00	50.00	50.00	0.00	---
17	0.0	2	185.00	185.00	50.00	50.00	0.00	---
17	0.0	2	45.00	45.00	50.00	50.00	0.00	---
18	0.0	2	6.91	69.09	9.09	90.91	0.00	---
18	0.0	2	49.09	490.91	9.09	90.91	0.00	---
19	0.0	3	40.00	0.00	100.00	0.00	0.00	---
19	10.0	8	0.00	0.00	0.00	0.00	100.00	---
19	0.0	3	560.00	0.00	100.00	0.00	0.00	---
20	1.0	3	121.80	487.20	19.97	79.87	0.16	---
21	0.0	3	333.33	16.67	95.24	4.76	0.00	---
21	0.0	5	260.00	0.00	100.00	0.00	0.00	---
22	0.0	3	488.00	122.00	80.00	20.00	0.00	---
23	0.0	5	610.00	0.00	100.00	0.00	0.00	---
24	0.0	3	122.00	488.00	20.00	80.00	0.00	20.00
ns2	---	---	---	---	---	---	---	---

Table 1–1. Data for samples from core hole 1, MichiWest Energy Inc., Pilot State 16–14.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubA, subbituminous A; SubB, subbituminous B; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)	Average attrital band thickness (AvABT) (mm)
	Top	Bottom							
25	1,272.00	---	Big George	30.00	---	0.50	59.13	20.0	0.0
25	---	1,274.00	Big George	30.00	60.00	0.50	60.12	4.0	20.0
26	1,274.00	---	Big George	15.00	---	0.25	60.61	1.0	20.0
26	---	---	Big George	20.00	---	0.33	61.26	30.0	0.0
26	---	1,276.00	Big George	26.00	61.00	0.43	62.12	10.0	10.0
27	1,276.00	---	Big George	27.00	---	0.53	63.00	3.0	30.0
27	---	---	Big George	13.00	---	0.25	63.43	30.0	0.0
27	---	1,278.00	Big George	11.00	51.00	0.22	63.79	2.0	20.0
28	1,278.00	---	Big George	10.00	---	0.16	64.12	1.0	10.0
28	---	1,280.00	Big George	51.00	61.00	0.84	65.79	30.0	0.0
29	1,280.00	1,282.00	Big George	61.00	61.00	1.00	67.79	30.0	0.0
30	1,282.00	1,284.00	Big George	61.00	61.00	1.00	69.79	30.0	0.0
31	1,284.00	---	Big George	17.78	---	0.37	70.38	30.0	0.0
31	---	---	Big George	2.54	---	0.05	70.46	0.0	0.0
ns3	---	---	ns3	12.70	---	1.00	70.88	---	---
31	---	---	Big George	25.40	---	0.53	71.71	30.0	4.0
31	---	1,286.00	Big George	2.54	48.26	0.05	71.79	0.0	0.0
ns4	1,286.00	1,287.00	ns4	30.50	30.50	1.00	72.79	---	---
35	1,287.00	1,289.00	Big George	61.00	61.00	1.00	74.80	3.0	20.0
36	1,289.00	---	Big George	2.00	---	0.03	74.86	20.0	0.0
36	---	---	Big George	18.32	---	0.30	75.46	5.0	1.0
36	---	1,291.00	Big George	40.68	61.00	0.67	76.80	5.0	1.0
37	1,291.00	1,293.00	Big George	61.00	61.00	1.00	78.80	3.0	20.0
38	1,293.00	1,295.00	Big George	61.00	61.00	1.00	80.80	20.0	0.0
ns5	1,295.00	1,303.00	ns5	244.00	244.00	1.00	88.80	---	---
32	1,303.00	---	Big George	55.00	---	0.90	90.61	1.0	10.0
32	---	1,305.00	Big George	6.00	61.00	0.10	90.81	30.0	0.0
33	1,305.00	---	Big George	20.32	---	0.50	91.47	10.0	30.0
33	---	---	Big George	20.32	40.64	0.50	92.14	10.0	20.0
ns6	---	1,307.00	ns6	20.32	---	1.00	92.81	---	---
34	1,307.00	---	Big George	22.86	---	0.47	93.56	20.0	4.0
34	---	---	Big George	12.70	---	0.26	93.97	20.0	2.0
34	---	---	Big George	12.70	48.26	0.26	94.39	5.0	5.0
ns7	---	1,309.00	ns7	12.74	---	1.00	94.81	---	---
39	1,309.00	---	Big George	0.50	---	0.01	94.82	0.0	0.0
39	---	---	Big George	14.00	---	0.23	95.28	20.0	10.0
39	---	---	Big George	11.00	---	0.18	95.64	20.0	0.0
39	---	1,311.00	Big George	35.00	60.50	0.58	96.79	1.0	20.0
40	1,311.00	1,313.00	Big George	61.00	61.00	1.00	98.79	50.0	30.0
41	1,313.00	---	Big George	20.32	---	0.33	99.46	40.0	0.0
41	---	---	Big George	16.51	---	0.27	100.00	20.0	0.0
41	---	1,315.00	Big George	25.40	62.23	0.41	100.84	10.0	2.0
42	1,315.00	1,317.00	Big George	61.00	61.00	1.00	102.84	5.0	5.0
43	1,317.00	---	Big George	38.10	---	0.65	104.09	15.0	0.0
43	---	1,319.00	Big George	20.32	58.42	0.35	104.75	50.0	0.0
44	1,319.00	1,321.00	Big George	61.00	61.00	1.00	106.75	20.0	0.0
45	1,321.00	---	Big George	7.62	---	0.13	107.00	10.0	2.0
45	---	---	Big George	20.32	---	0.33	107.67	40.0	0.0
45	---	1,323.00	Big George	33.02	60.96	0.54	108.75	5.0	0.0

Table 1–1. Data for samples from core hole 1, MichiWest Energy Inc., Pilot State 16–14.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubA, subbituminous A; SubB, subbituminous B; ---, no data]

Canister number	Cumulative fusain thickness (CuFT) (mm)	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)	Attritus percentage (AP)	Fusain percentage (FP)	Canister average vitrain percentage (CaAvVP)
25	0.0	3	300.00	0.00	100.00	0.00	0.00	---
25	0.0	2	50.00	250.00	16.67	83.33	0.00	---
26	0.0	2	7.14	142.86	4.76	95.24	0.00	---
26	0.0	5	200.00	0.00	100.00	0.00	0.00	---
26	0.0	3	130.00	130.00	50.00	50.00	0.00	---
27	0.0	1	24.55	245.45	9.09	90.91	0.00	---
27	0.0	5	130.00	0.00	100.00	0.00	0.00	---
27	0.0	2	10.00	100.00	9.09	90.91	0.00	---
28	0.0	2	9.09	90.91	9.09	90.91	0.00	---
28	3.0	5	507.00	0.00	99.41	0.00	0.59	---
29	0.0	5	610.00	0.00	100.00	0.00	0.00	---
30	0.0	5	610.00	0.00	100.00	0.00	0.00	---
31	0.0	5	177.80	0.00	100.00	0.00	0.00	---
31	25.4	8	0.00	0.00	0.00	0.00	100.00	---
ns3	---	---	---	---	---	---	---	---
31	0.0	4	224.12	29.88	88.24	11.76	0.00	---
31	25.4	8	0.00	0.00	0.00	0.00	100.00	83.28
ns4	---	---	---	---	---	---	---	---
35	0.0	2	79.57	530.43	13.04	86.96	0.00	13.04
36	0.0	3	20.00	0.00	100.00	0.00	0.00	---
36	0.0	3	152.67	30.53	83.33	16.67	0.00	---
36	0.0	3	339.00	67.80	83.33	16.67	0.00	---
37	0.0	2	79.57	530.43	13.04	86.96	0.00	---
38	0.0	3	610.00	0.00	100.00	0.00	0.00	100.00
ns5	---	---	---	---	---	---	---	---
32	0.5	2	49.95	499.55	9.08	90.83	0.09	---
32	0.0	5	60.00	0.00	100.00	0.00	0.00	---
33	0.0	3	50.80	152.40	25.00	75.00	0.00	---
33	0.0	3	67.73	135.47	33.33	66.67	0.00	29.17
ns6	---	---	---	---	---	---	---	---
34	0.0	3	190.50	38.10	83.33	16.67	0.00	---
34	0.0	3	115.45	11.55	90.91	9.09	0.00	---
34	5.0	3	61.00	61.00	48.03	48.03	3.94	76.04
ns7	---	---	---	---	---	---	---	---
39	0.5	8	0.00	0.00	0.00	0.00	10.00	---
39	1.0	3	92.67	46.33	66.19	33.10	0.71	---
39	0.0	3	110.00	0.00	100.00	0.00	0.00	---
39	0.0	2	16.67	333.33	4.76	95.24	0.00	---
40	1.0	4	380.63	228.38	62.40	37.44	0.16	---
41	1.0	5	202.20	0.00	99.51	0.00	0.49	---
41	3.0	3	162.10	0.00	98.18	0.00	1.82	---
41	4.0	3	208.33	41.67	82.02	16.40	1.57	---
42	10.0	3	300.00	300.00	49.18	49.18	1.64	---
43	30.0	3	351.00	0.00	92.13	0.00	7.87	---
43	0.0	5	203.20	0.00	100.00	0.00	0.00	94.86
44	10.0	3	600.00	0.00	98.36	0.00	1.64	---
45	10.0	3	55.17	11.03	72.40	14.48	13.12	---
45	20.0	5	183.20	0.00	90.16	0.00	9.84	---
45	5.0	3	325.20	0.00	98.49	0.00	1.51	---

Table 1–1. Data for samples from core hole 1, MichiWest Energy Inc., Pilot State 16–14.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubA, subbituminous A; SubB, subbituminous B; ---, no data]

Canister number	Canister average attrital percentage (CaAvAP)	Canister average fusain percentage (CaAvFP)	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
25	---	---	20	50.00	---	---	---	---
25	---	---	20	50.00	---	---	---	---
26	---	---	50	20.00	---	---	---	---
26	---	---	50	20.00	---	---	---	---
26	---	---	10	100.00	---	---	---	---
27	---	---	20	50.00	---	---	---	---
27	---	---	20	50.00	---	---	---	---
27	---	---	20	50.00	---	---	---	---
28	---	---	20	50.00	---	---	---	---
28	---	---	20	50.00	---	---	---	---
29	---	---	100	10.00	---	---	---	---
30	---	---	80	12.50	---	---	---	---
31	---	---	10	100.00	---	---	---	---
31	---	---	10	100.00	---	---	SubA	Fusain layer.
ns3	---	---	---	---	---	---	---	No sample.
31	---	---	10	100.00	---	---	---	---
31	6.19	10.53	5	200.00	105.26	69.21	---	Fusain layer.
ns4	---	---	---	---	---	---	---	No sample.
35	86.96	0.00	20	50.00	50.00	68.12	---	---
36	---	---	5	200.00	---	---	---	---
36	---	---	5	200.00	---	---	---	---
36	---	---	100	10.00	---	---	---	---
37	---	---	10	100.00	---	---	---	---
38	0.00	0.00	50	20.00	20.00	25.97	---	---
ns5	---	---	---	---	---	---	---	No sample.
32	---	---	20	50.00	---	---	---	---
32	---	---	20	50.00	---	---	---	---
33	---	---	20	50.00	---	---	---	---
33	70.83	0.00	10	100.00	75.00	26.46	---	---
ns6	---	---	---	---	---	---	---	No sample.
34	---	---	10	100.00	---	---	---	---
34	---	---	10	100.00	---	---	---	---
34	22.93	1.04	10	100.00	100.00	46.68	---	---
ns7	---	---	---	---	---	---	---	No sample.
39	---	---	10	100.00	---	---	---	Fusain layer.
39	---	---	50	20.00	---	---	---	---
39	---	---	50	20.00	---	---	---	---
39	---	---	25	40.00	---	---	---	---
40	---	---	10	100.00	---	---	---	---
41	---	---	5	200.00	---	---	---	---
41	---	---	5	200.00	---	---	---	---
41	---	---	5	200.00	---	---	---	---
42	---	---	25	40.00	---	---	---	---
43	---	---	20	50.00	---	---	---	---
43	0.00	5.14	20	50.00	50.00	33.42	---	---
44	---	---	10	100.00	---	---	---	---
45	---	---	10	100.00	---	---	---	---
45	---	---	10	100.00	---	---	---	---
45	---	---	10	100.00	---	---	---	---

Table 1–1. Data for samples from core hole 1, MichiWest Energy Inc., Pilot State 16–14.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubA, subbituminous A; SubB, subbituminous B; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)	Average attrital band thickness (AvABT) (mm)
	Top	Bottom							
46	1,323.00	---	Big George	20.32	---	0.33	109.42	40.0	0.0
46	---	---	Big George	10.16	---	0.17	109.75	4.0	0.0
46	---	1,325.00	Big George	30.48	60.96	0.50	110.75	5.0	0.0
47	1,325.00	1,327.00	Big George	61.00	61.00	1.00	112.76	4.0	15.0
ns8	1,327.00	1,332.00	ns8	152.00	152.00	1.00	117.74	---	---
48	1,332.00	---	Big George	7.62	---	0.13	117.99	1.0	5.0
48	---	---	Big George	10.16	---	0.17	118.33	20.0	10.0
48	---	---	Big George	13.97	---	0.24	118.78	0.0	5.0
48	---	---	Big George	21.59	---	0.37	119.49	20.0	10.0
48	---	1,334.00	Big George	5.08	58.42	0.09	119.66	1.0	2.0
ns9	1,334.00	1,335.00	ns9	30.50	30.50	1.00	120.66	---	---
49	1,335.00	---	Big George	25.40	---	0.42	121.49	4.0	10.0
49	---	1,337.00	Big George	35.60	61.00	0.58	122.66	5.0	5.0
50	1,337.00	---	Big George	57.00	---	0.93	124.53	2.0	40.0
50	---	1,339.00	Big George	4.00	61.00	0.07	124.66	0.0	0.0
51	1,339.00	---	Big George	45.76	---	0.75	126.16	60.0	0.0
51	---	1,341.00	Big George	15.24	61.00	0.25	126.66	10.0	100.0
52	1,341.00	1,343.00	Big George	61.00	61.00	1.00	128.67	50.0	0.0
53	1,343.00	1,345.00	Big George	61.00	61.00	1.00	130.67	10.0	40.0
54	1,345.00	1,347.00	Big George	61.00	61.00	1.00	132.67	50.0	0.0
55	1,347.00	---	Big George	20.32	---	0.33	133.33	50.0	0.0
55	---	---	Big George	30.48	---	0.50	134.33	20.0	0.0
55	---	1,349.00	Big George	10.16	60.96	0.17	134.67	20.0	0.0
56	1,349.00	1,351.00	Big George	61.00	61.00	1.00	136.67	30.0	0.0
57	1,351.00	---	Big George	27.94	---	0.46	137.59	20.0	10.0
57	---	---	Big George	20.32	---	0.33	138.25	12.0	5.0
57	---	1,353.00	Big George	12.70	60.96	0.21	138.67	3.0	0.0
58	1,353.00	---	Big George	38.10	---	0.63	139.92	10.0	0.0
58	---	---	Big George	12.70	---	0.21	140.34	20.0	10.0
58	---	1,355.00	Big George	10.16	60.96	0.17	140.67	4.0	0.0
59	1,355.00	1,357.00	Big George	61.00	61.00	1.00	142.67	20.0	0.0
61	1,357.00	1,359.00	Big George	61.00	61.00	1.00	144.67	20.0	30.0
64	1,359.00	---	Big George	17.78	---	0.29	145.26	3.0	0.0
64	---	---	Big George	2.50	---	0.04	145.34	0.0	0.0
64	---	---	Big George	7.62	---	0.13	145.59	5.0	0.0
64	---	1,361.00	Big George	33.02	60.92	0.54	146.67	0.0	20.0

Table 1–1. Data for samples from core hole 1, MichiWest Energy Inc., Pilot State 16–14.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubA, subbituminous A; SubB, subbituminous B; ---, no data]

Canister number	Cumulative fusain thickness (CuFT) (mm)	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)	Attritus percentage (AP)	Fusain percentage (FP)	Canister average vitrain percentage (CaAvVP)
46	40.0	5	163.20	0.00	80.31	0.00	19.69	---
46	1.0	2	100.60	0.00	99.02	0.00	0.98	---
46	1.0	3	303.80	0.00	99.67	0.00	0.33	---
47	0.0	2	128.42	481.58	21.05	78.95	0.00	---
ns8	---	---	---	---	---	---	---	---
48	3.0	2	12.20	61.00	16.01	80.05	3.94	---
48	2.0	3	66.40	33.20	65.35	32.68	1.97	---
48	2.0	1	0.00	137.70	0.00	98.57	1.43	---
48	5.0	3	140.60	70.30	65.12	32.56	2.32	---
48	0.0	2	16.93	33.87	33.33	66.67	0.00	40.42
ns9	---	---	---	---	---	---	---	---
49	10.0	2	69.71	174.29	27.45	68.62	3.94	---
49	1.0	3	177.50	177.50	49.86	49.86	0.28	40.53
50	0.0	1	27.14	542.86	4.76	95.24	0.00	---
50	40.0	8	0.00	0.00	0.00	0.00	100.00	---
51	0.0	5	457.60	0.00	100.00	0.00	0.00	---
51	0.0	3	13.85	138.55	9.09	90.91	0.00	---
52	10.0	5	600.00	0.00	98.36	0.00	1.64	---
53	0.0	3	122.00	488.00	20.00	80.00	0.00	---
54	10.0	5	600.00	0.00	98.36	0.00	1.64	---
55	20.0	5	183.20	0.00	90.16	0.00	9.84	---
55	30.0	3	274.80	0.00	90.16	0.00	9.84	---
55	10.0	3	91.60	0.00	90.16	0.00	9.84	90.16
56	10.0	5	600.00	0.00	98.36	0.00	1.64	98.36
57	10.0	3	179.60	89.80	64.28	32.14	3.58	---
57	1.0	3	142.73	59.47	70.24	29.27	0.49	---
57	40.0	2	87.00	0.00	68.50	0.00	31.50	67.15
58	15.0	3	366.00	0.00	96.06	0.00	3.94	---
58	4.0	3	82.00	41.00	64.57	32.28	3.15	---
58	10.0	2	91.60	0.00	90.16	0.00	9.84	88.52
59	20.0	3	590.00	0.00	96.72	0.00	3.28	96.72
61	4.0	3	242.40	363.60	39.74	59.61	0.66	39.74
64	5.0	2	172.80	0.00	97.19	0.00	2.81	---
64	25.0	8	0.00	0.00	0.00	0.00	100.00	---
64	5.0	3	71.20	0.00	93.44	0.00	6.56	---
64	10.0	1	0.00	320.20	0.00	96.97	3.03	40.05

Table 1–1. Data for samples from core hole 1, MichiWest Energy Inc., Pilot State 16–14.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubA, subbituminous A; SubB, subbituminous B; ---, no data]

Canister number	Canister average attrital percentage (CaAvAP)	Canister average fusain percentage (CaAvFP)	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
46	---	---	20	50.00	---	---	---	---
46	---	---	20	50.00	---	---	---	---
46	---	---	20	50.00	---	---	---	---
47	---	---	10	100.00	---	---	---	---
ns8	---	---	---	---	---	---	---	No sample.
48	---	---	20	50.00	---	---	---	---
48	---	---	20	50.00	---	---	---	---
48	---	---	20	50.00	---	---	---	---
48	---	---	20	50.00	---	---	---	---
48	57.53	2.05	20	50.00	50.00	77.45	SubA	---
ns9	---	---	---	---	---	---	---	No sample.
49	---	---	40	25.00	---	---	---	---
49	57.67	1.80	40	25.00	25.00	21.98	---	---
50	---	---	25	40.00	---	---	---	---
50	---	---	25	40.00	---	---	---	Fusain layer.
51	---	---	50	20.00	---	---	---	---
51	---	---	50	20.00	---	---	---	---
52	---	---	60	16.67	---	---	---	---
53	---	---	25	40.00	---	---	---	---
54	---	---	10	100.00	---	---	---	---
55	---	---	10	100.00	---	---	---	---
55	---	---	10	100.00	---	---	---	---
55	0.00	9.84	10	100.00	100.00	63.82	---	---
56	0.00	1.64	5	200.00	200.00	46.98	---	---
57	---	---	5	200.00	---	---	---	---
57	---	---	5	200.00	---	---	---	---
57	24.49	8.37	5	200.00	200.00	64.15	SubB	---
58	---	---	10	100.00	---	---	---	---
58	---	---	10	100.00	---	---	---	---
58	6.73	4.76	10	100.00	100.00	53.23	---	---
59	0.00	3.28	10	100.00	100.00	55.36	---	---
61	59.61	0.66	20	50.00	50.00	76.09	---	---
64	---	---	5	200.00	---	---	---	---
64	---	---	5	200.00	---	---	---	Fusain layer.
64	---	---	5	200.00	---	---	---	---
64	52.56	7.39	5	200.00	200.00	70.87	SubA	---

Table 1–2. Data for samples from core hole 2, MichiWest Energy Inc., Pilot State 16–32.

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; fr, highly fractured sample; SubA, subbituminous A; SubB, subbituminous B; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)	Average attrital band thickness (AvABT) (mm)	Cumulative fusain thickness (CuFT) (mm)
	Top	Bottom								
1	1,077.00	---	Big George	28.00	---	0.52	0.92	50.0	0.0	0.0
1	---	1,079.00	Big George	26.00	54.00	0.48	1.77	10.0	2.0	26.0
MC–1	1,079.00	---	Big George	10.00	---	0.16	2.10	50.0	0.0	0.0
MC–1	---	---	Big George	20.00	---	0.31	2.76	10.0	10.0	0.0
MC–1	---	1,081.00	Big George	34.00	64.00	0.53	3.87	50.0	0.0	5.0
2	1,081.00	---	Big George	27.00	---	0.45	4.76	20.0	4.0	0.0
2	---	1,083.00	Big George	33.00	60.00	0.55	5.84	10.0	30.0	2.0
3	1,083.00	1,085.00	Big George	60.00	60.00	1.00	7.81	2.0	20.0	0.0
4	1,085.00	---	Big George	38.00	---	0.63	9.06	2.0	10.0	5.0
4	---	1,087.00	Big George	22.00	60.00	0.37	9.78	50.0	0.0	0.0
5	1,087.00	---	Big George	16.00	---	0.25	10.30	20.0	5.0	0.0
5	---	1,089.00	Big George	47.00	63.00	0.75	11.84	2.0	50.0	15.0
6	1,089.00	---	Big George	8.00	---	0.13	12.11	2.0	50.0	2.0
6	---	1,091.00	Big George	52.00	60.00	0.87	13.81	50.0	2.0	1.0
ns1	1,091.00	1,092.00	ns1	30.50	30.50	1.00	14.81	---	---	---
7	1,092.00	---	Big George	45.00	---	0.70	16.29	50.0	30.0	0.0
7	---	1,094.00	Big George	19.00	64.00	0.30	16.91	5.0	2.0	5.0
8	1,094.00	---	Big George	10.00	---	0.15	17.24	5.0	2.0	2.0
8	---	---	Big George	33.00	---	0.49	18.32	5.0	8.0	10.0
8	---	---	Big George	20.00	---	0.30	18.98	20.0	4.0	0.0
8	---	1,096.00	Big George	4.00	67.00	0.06	19.11	10.0	2.0	5.0
11	1,096.00	1,098.00	Big George	59.00	59.00	1.00	21.05	5.0	8.0	10.0
12	1,098.00	---	Big George	15.00	---	0.24	21.54	5.0	8.0	0.0
12	---	1,100.00	Big George	47.00	62.00	0.76	23.08	10.0	10.0	20.0
13	1,100.00	---	Big George	30.00	---	0.52	24.06	20.0	30.0	20.0
13	---	1,102.00	Big George	28.00	58.00	0.48	24.98	2.0	10.0	10.0
14	1,102.00	1,104.00	Big George	65.00	65.00	1.00	27.12	5.0	10.0	5.0
MC–3	1,104.00	1,106.00	Big George	60.00	60.00	1.00	29.08	50.0	0.0	0.0
15	1,106.00	---	Big George	11.00	---	0.20	29.45	50.0	5.0	20.0
15	---	---	Big George	15.00	---	0.28	29.94	5.0	5.0	0.0
15	---	1,108.00	Big George	28.00	54.00	0.52	30.86	50.0	0.0	0.0
16	1,108.00	---	Big George	30.00	---	0.49	31.84	3.0	10.0	10.0
16	---	1,110.00	Big George	31.00	61.00	0.51	32.86	10.0	3.0	5.0
18	1,110.00	---	Big George	24.00	---	0.38	33.65	10.0	3.0	5.0
18	---	---	Big George	19.00	---	0.30	34.27	3.0	3.0	0.0
18	---	1,112.00	Big George	20.00	63.00	0.32	34.92	30.0	40.0	5.0
19	1,112.00	---	Big George	8.00	---	0.13	35.19	5.0	5.0	0.0
19	---	---	Big George	47.00	---	0.78	36.73	50.0	0.0	0.0
19	---	1,114.00	Big George	5.00	60.00	0.08	36.89	49.0	1.0	0.0
20	1,114.00	1,116.00	Big George	59.00	59.00	1.00	38.83	50.0	0.0	0.0
21	1,116.00	1,118.00	Big George	61.00	61.00	1.00	40.83	70.0	0.0	5.0
ns2	1,118.00	1,119.00	ns2	30.50	30.50	1.00	41.83	---	---	---
MC–4ns	1,119.00	---	Big George	19.00	---	1.00	42.45	---	---	---
MC–4	---	---	Big George	18.00	---	0.44	43.04	50.0	0.0	0.0
MC–4	---	1,121.00	Big George	23.00	41.00	0.56	43.80	5.0	30.0	0.0
25	1,121.00	---	Big George	16.00	---	0.26	44.32	70.0	0.0	0.0
25	---	1,123.00	Big George	45.00	61.00	0.74	45.80	30.0	5.0	0.0
26	1,123.00	1,125.00	Big George	61.00	61.00	1.00	47.80	2.0	10.0	0.0
27	1,125.00	---	Big George	14.00	---	0.24	48.26	2.0	10.0	0.0
27	---	1,127.00	Big George	45.00	59.00	0.76	49.74	50.0	0.0	0.0
28	1,127.00	1,129.00	Big George	64.00	64.00	1.00	51.84	70.0	0.0	5.0

Table 1–2. Data for samples from core hole 2, MichiWest Energy Inc., Pilot State 16–32.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; fr, highly fractured sample; SubA, subbituminous A; SubB, subbituminous B; ---, no data]

Canister number	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)	Attritus percentage (AP)	Fusain percentage (FP)	Canister average vitrain percentage (CaAvVP)	Canister average attrital percentage (CaAvAP)	Canister average fusain percentage (CaAvFP)
1	5	280.00	0.00	100.00	0.00	0.00	---	---	---
1	3	195.00	39.00	75.00	15.00	10.00	87.96	7.22	4.81
MC–1	5	100.00	0.00	100.00	0.00	0.00	---	---	---
MC–1	3	100.00	100.00	50.00	50.00	0.00	---	---	---
MC–1	5	335.00	0.00	98.53	0.00	1.47	---	---	---
2	3	225.00	45.00	83.33	16.67	0.00	---	---	---
2	3	82.00	246.00	24.85	74.55	0.61	51.17	48.50	0.33
3	2	54.55	545.45	9.09	90.91	0.00	9.09	90.91	0.00
4	2	62.50	312.50	16.45	82.24	1.32	---	---	---
4	5	220.00	0.00	100.00	0.00	0.00	47.08	52.08	0.83
5	3	128.00	32.00	80.00	20.00	0.00	---	---	---
5	1	17.50	437.50	3.72	93.09	3.19	23.10	74.52	2.38
6	1	3.00	75.00	3.75	93.75	2.50	---	---	---
6	5	499.04	19.96	95.97	3.84	0.19	83.67	15.83	0.50
ns1	---	---	---	---	---	---	---	---	---
7	4	281.25	168.75	62.50	37.50	0.00	---	---	---
7	3	132.14	52.86	69.55	27.82	2.63	64.59	34.63	0.78
8	3	70.00	28.00	70.00	28.00	2.00	---	---	---
8	3	123.08	196.92	37.30	59.67	3.03	---	---	---
8	3	166.67	33.33	83.33	16.67	0.00	---	---	---
8	3	29.17	5.83	72.92	14.58	12.50	58.05	39.42	2.54
11	3	223.08	356.92	37.81	60.50	1.69	37.81	60.50	1.69
12	3	57.69	92.31	38.46	61.54	0.00	---	---	---
12	3	225.00	225.00	47.87	47.87	4.26	45.60	51.18	3.23
13	3	112.00	168.00	37.33	56.00	6.67	---	---	---
13	2	45.00	225.00	16.07	80.36	3.57	27.07	67.76	5.17
14	3	215.00	430.00	33.08	66.15	0.77	33.08	66.15	0.77
MC–3	5	600.00	0.00	100.00	0.00	0.00	---	---	---
15	4	81.82	8.18	74.38	7.44	18.18	---	---	---
15	3	75.00	75.00	50.00	50.00	0.00	---	---	---
15	5	280.00	0.00	100.00	0.00	0.00	80.89	15.40	3.70
16	2	66.92	223.08	22.31	74.36	3.33	---	---	---
16	3	234.62	70.38	75.68	22.70	1.61	49.43	48.11	2.46
18	3	180.77	54.23	75.32	22.60	2.08	---	---	---
18	2	95.00	95.00	50.00	50.00	0.00	---	---	---
18	4	83.57	111.43	41.79	55.71	2.50	57.04	41.37	1.59
19	3	40.00	40.00	50.00	50.00	0.00	---	---	---
19	5	470.00	0.00	100.00	0.00	0.00	---	---	---
19	5	49.00	1.00	98.00	2.00	0.00	93.17	6.83	0.00
20	5	590.00	0.00	100.00	0.00	0.00	100.00	0.00	0.00
21	5	605.00	0.00	99.18	0.00	0.82	99.18	0.00	0.82
ns2	---	---	---	---	---	---	---	---	---
MC–4ns	---	---	---	---	---	---	---	---	---
MC–4	5	180.00	0.00	100.00	0.00	0.00	---	---	---
MC–4	3	32.86	197.14	14.29	85.71	0.00	---	---	---
25	5	160.00	0.00	100.00	0.00	0.00	---	---	---
25	4	385.71	64.29	85.71	14.29	0.00	89.46	10.54	0.00
26	2	101.67	508.33	16.67	83.33	0.00	16.67	83.33	0.00
27	2	23.33	116.67	16.67	83.33	0.00	---	---	---
27	5	450.00	0.00	100.00	0.00	0.00	80.23	19.77	0.00
28	5	635.00	0.00	99.22	0.00	0.78	99.22	0.00	0.78

Table 1–2. Data for samples from core hole 2, MichiWest Energy Inc., Pilot State 16–32.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; fr, highly fractured sample; SubA, subbituminous A; SubB, subbituminous B; ---, no data]

Canister number	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
1	10	100.00	---	---	---	---
1	10	100.00	100.00	62.03	---	Kaolinite on cleat.
MC–1	---	---	---	---	---	---
MC–1	---	---	---	---	---	---
MC–1	---	---	---	---	---	---
2	5	200.00	---	---	---	---
2	2	500.00	365.00	68.17	SubA	---
3	20	50.00	50.00	78.09	---	---
4	5	200.00	---	---	---	---
4	10	100.00	163.33	70.29	---	---
5	30	33.33	---	---	---	Curvilinear fractures, bright vitrain.
5	30	33.33	33.33	74.09	---	---
6	10	100.00	---	---	---	Curvilinear fractures and microfractures.
6	10	100.00	100.00	90.52	SubA	---
ns1	---	---	---	---	---	Adsorption analysis sample removed.
7	10	100.00	---	---	---	---
7	20	50.00	85.16	73.59	---	Bright.
8	70	14.29	---	---	---	Tight.
8	70	14.29	---	---	---	---
8	50	20.00	---	---	---	Resin.
8	50	20.00	16.33	72.68	---	Horizontal fractures.
11	40	25.00	25.00	72.68	---	Inert attritus.
12	40	25.00	---	---	---	---
12	10	100.00	81.85	75.16	---	---
13	15	66.67	---	---	---	Minor cleat.
13	5	200.00	131.03	76.02	---	---
14	30	33.33	33.33	74.06	SubA	More fractured at basal 10 cm.
MC–3	10	100.00	---	---	---	Highly fractured sample.
15	30	33.33	---	---	---	1 cm thick fusain bands at 9 and 11 cm.
15	50	20.00	---	---	---	Closed cleat, hard.
15	40	25.00	25.31	72.07	---	Bright, brittle.
16	10	100.00	---	---	---	---
16	70	14.29	56.44	73.39	---	Hard, mineralization along tight cleat.
18	30	33.33	---	---	---	---
18	70	14.29	---	---	---	Hard, cleat mineralization at base.
18	40	25.00	24.94	75.96	---	Cleat mineralization.
19	40	25.00	---	---	---	---
19	70	14.29	---	---	---	Hard to break, bright.
19	10	100.00	22.86	72.88	---	---
20	50	20.00	20.00	72.17	---	Hard to find cleat.
21	50	20.00	20.00	79.51	SubA	Brittle, bright, cleat mineralization at 8 and 50 cm.
ns2	---	---	---	---	---	No sample.
MC–4ns	---	---	---	---	---	Adsorption analysis sample removed.
MC–4	30	33.33	---	---	---	---
MC–4	30	33.33	---	---	---	---
25	20	50.00	---	---	---	---
25	20	50.00	50.00	73.29	---	---
26	40	25.00	25.00	74.18	---	Kaolinite(?).
27	40	25.00	---	---	---	Curvilinear cleat, tight, kaolinite on surface.
27	70	14.29	16.83	77.46	---	---
28	70	14.29	14.29	75.35	---	---

Table 1–2. Data for samples from core hole 2, MichiWest Energy Inc., Pilot State 16–32.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; fr, highly fractured sample; SubA, subbituminous A; SubB, subbituminous B; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)	Average attrital band thickness (AvABT) (mm)	Cumulative fusain thickness (CuFT) (mm)
	Top	Bottom								
30	1,129.00	1,131.00	Big George	64.00	64.00	1.00	53.94	70.0	0.0	60.0
32	1,131.00	---	Big George	6.00	---	0.10	54.13	50.0	0.0	0.0
32	---	1,133.00	Big George	54.00	60.00	0.90	55.91	5.0	10.0	35.0
MC–6ns	1,133.00	1,134.00	Big George	30.50	30.50	1.00	56.91	---	---	---
MC–5	1,134.00	1,136.00	Big George	60.00	60.00	1.00	58.87	5.0	20.0	10.0
38	1,136.00	1,138.00	Big George	60.00	60.00	1.00	60.84	5.0	10.0	10.0
39	1,138.00	---	Big George	5.00	---	0.09	61.01	5.0	10.0	0.0
39	---	---	Big George	9.00	---	0.17	61.30	0.0	0.0	90.0
39	---	1,140.00	Big George	39.00	53.00	0.74	62.58	5.0	10.0	10.0
40	1,140.00	---	Big George	9.00	---	0.16	62.88	5.0	10.0	2.0
40	---	---	Big George	29.00	---	0.50	63.83	50.0	0.0	6.0
40	---	1,142.00	Big George	20.00	58.00	0.34	64.48	10.0	30.0	0.0
42	1,142.00	---	Big George	51.00	---	0.91	66.16	50.0	10.0	0.0
42	---	1,144.00	Big George	5.00	56.00	0.09	66.32	50.0	0.0	0.0
47	1,144.00	1,146.00	Big George	58.00	58.00	1.00	68.23	70.0	0.0	0.0
MC–7fr	1,146.00	1,148.00	Big George	60.00	60.00	1.00	70.19	---	---	---
ns3	1,148.00	1,149.00	ns3	30.50	30.50	1.00	71.19	---	---	---
50	1,149.00	1,151.00	Big George	58.00	58.00	1.00	73.10	20.0	5.0	10.0
51	1,151.00	1,153.00	Big George	60.00	60.00	1.00	75.07	5.0	20.0	25.0
53	1,153.00	1,155.00	Big George	60.00	60.00	1.00	77.03	10.0	30.0	10.0
60	1,155.00	---	Big George	17.00	---	0.28	77.59	5.0	10.0	0.0
60	---	1,157.00	Big George	43.00	60.00	0.72	79.00	70.0	0.0	10.0
62	1,157.00	---	Big George	41.00	---	0.68	80.35	2.0	10.0	14.0
62	---	1,159.00	Big George	19.00	60.00	0.32	80.97	70.0	5.0	10.0
63	1,159.00	---	Big George	7.00	---	0.14	81.20	65.0	5.0	0.0
63	---	---	Big George	20.00	---	0.41	81.86	2.0	20.0	10.0
63	---	---	Big George	10.00	---	0.20	82.19	10.0	10.0	10.0
63	---	---	Big George	6.00	---	0.12	82.38	30.0	5.0	0.0
63	---	1,161.00	Big George	6.00	49.00	0.12	82.58	10.0	40.0	0.0
ns4	1,161.00	1,162.00	ns4	30.50	30.50	1.00	83.58	---	---	---
MC–8	1,162.00	1,164.00	Big George	60.00	60.00	1.00	85.55	10.0	20.0	20.0
65	1,164.00	---	Big George	14.00	---	0.23	86.01	3.0	1.0	10.0
65	---	---	Big George	12.00	---	0.20	86.40	20.0	0.0	0.0
65	---	1,166.00	Big George	34.00	60.00	0.57	87.52	5.0	3.0	30.0
66	1,166.00	---	Big George	42.00	---	0.70	88.89	5.0	3.0	30.0
66	---	1,168.00	Big George	18.00	60.00	0.30	89.48	3.0	5.0	0.0
67	1,168.00	1,170.00	Big George	63.00	63.00	1.00	91.55	10.0	5.0	50.0
68	1,170.00	1,172.00	Big George	64.00	64.00	1.00	93.65	10.0	5.0	100.0
69	1,172.00	---	Big George	9.00	---	0.15	93.95	10.0	5.0	10.0
69	---	---	Big George	20.00	---	0.33	94.60	30.0	0.0	0.0
69	---	1,174.00	Big George	31.00	60.00	0.52	95.62	10.0	2.0	15.0
70	1,174.00	---	Big George	15.00	---	0.23	96.11	10.0	2.0	15.0
70	---	1,176.00	Big George	50.00	65.00	0.77	97.75	10.0	20.0	0.0
ns5	1,176.00	1,177.00	ns5	30.50	30.50	1.00	98.75	---	---	---
MC–9	1,177.00	---	Big George	16.00	---	0.27	99.28	5.0	5.0	0.0
MC–9	---	---	Big George	16.00	---	0.27	99.80	20.0	30.0	5.0
MC–9	---	1,179.00	Big George	27.00	59.00	0.46	100.69	20.0	50.0	10.0
ns6	1,179.00	1,180.50	ns6	45.70	45.70	1.00	102.19	---	---	---
MC–10	1,180.50	1,182.50	Big George	60.00	60.00	1.00	104.16	30.0	30.0	0.0

Table 1–2. Data for samples from core hole 2, MichiWest Energy Inc., Pilot State 16–32.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; fr, highly fractured sample; SubA, subbituminous A; SubB, subbituminous B; ---, no data]

Canister number	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)	Attritus percentage (AP)	Fusain percentage (FP)	Canister average vitrain percentage (CaAvVP)	Canister average attrital percentage (CaAvAP)	Canister average fusain percentage (CaAvFP)
30	5	580.00	0.00	90.63	0.00	9.38	90.63	0.00	9.38
32	5	60.00	0.00	100.00	0.00	0.00	---	---	---
32	3	168.33	336.67	31.17	62.35	6.48	38.06	56.11	5.83
MC–6ns	---	---	---	---	---	---	---	---	---
MC–5	3	118.00	472.00	19.67	78.67	1.67	---	---	---
38	3	196.67	393.33	32.78	65.56	1.67	32.78	65.56	1.67
39	3	16.67	33.33	33.33	66.67	0.00	---	---	---
39	8	0.00	0.00	0.00	0.00	100.00	---	---	---
39	3	126.67	253.33	32.48	64.96	2.56	27.04	54.09	18.87
40	3	29.33	58.67	32.59	65.19	2.22	---	---	---
40	5	284.00	0.00	97.93	0.00	2.07	---	---	---
40	3	50.00	150.00	25.00	75.00	0.00	62.64	35.98	1.38
42	4	425.00	85.00	83.33	16.67	0.00	---	---	---
42	5	50.00	0.00	100.00	0.00	0.00	84.82	15.18	0.00
47	5	580.00	0.00	100.00	0.00	0.00	100.00	0.00	0.00
MC–7fr	---	---	---	---	---	---	---	---	---
ns3	---	---	---	---	---	---	---	---	---
50	3	456.00	114.00	78.62	19.66	1.72	78.62	19.66	1.72
51	3	115.00	460.00	19.17	76.67	4.17	19.17	76.67	4.17
53	3	147.50	442.50	24.58	73.75	1.67	24.58	73.75	1.67
60	3	56.67	113.33	33.33	66.67	0.00	---	---	---
60	5	420.00	0.00	97.67	0.00	2.33	79.44	18.89	1.67
62	2	66.00	330.00	16.10	80.49	3.41	---	---	---
62	4	168.00	12.00	88.42	6.32	5.26	39.00	57.00	4.00
63	4	65.00	5.00	92.86	7.14	0.00	---	---	---
63	2	17.27	172.73	8.64	86.36	5.00	---	---	---
63	3	45.00	45.00	45.00	45.00	10.00	---	---	---
63	4	51.43	8.57	85.71	14.29	0.00	---	---	---
63	3	12.00	48.00	20.00	80.00	0.00	38.92	57.00	4.08
ns4	---	---	---	---	---	---	---	---	---
MC–8	3	193.33	386.67	32.22	64.44	3.33	---	---	---
65	2	97.50	32.50	69.64	23.21	7.14	---	---	---
65	3	120.00	0.00	100.00	0.00	0.00	---	---	---
65	3	193.75	116.25	56.99	34.19	8.82	68.54	24.79	6.67
66	3	243.75	146.25	58.04	34.82	7.14	---	---	---
66	2	67.50	112.50	37.50	62.50	0.00	51.88	43.13	5.00
67	3	386.67	193.33	61.38	30.69	7.94	61.38	30.69	7.94
68	3	360.00	180.00	56.25	28.13	15.63	56.25	28.13	15.63
69	3	53.33	26.67	59.26	29.63	11.11	---	---	---
69	5	200.00	0.00	100.00	0.00	0.00	---	---	---
69	3	245.83	49.17	79.30	15.86	4.84	83.19	12.64	4.17
70	3	112.50	22.50	75.00	15.00	10.00	---	---	---
70	3	166.67	333.33	33.33	66.67	0.00	42.95	54.74	2.31
ns5	---	---	---	---	---	---	---	---	---
MC–9	3	80.00	80.00	50.00	50.00	0.00	---	---	---
MC–9	3	62.00	93.00	38.75	58.13	3.13	---	---	---
MC–9	3	74.29	185.71	27.51	68.78	3.70	---	---	---
ns6	---	---	---	---	---	---	---	---	---
MC–10	4	300.00	300.00	50.00	50.00	0.00	---	---	---

Table 1–2. Data for samples from core hole 2, MichiWest Energy Inc., Pilot State 16–32.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; fr, highly fractured sample; SubA, subbituminous A; SubB, subbituminous B; ---, no data]

Canister number	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
30	40	25.00	25.00	74.33	---	2 thick fusain attrital layers, kaolinite on cleat.
32	40	25.00	---	---	---	---
32	30	33.33	32.50	79.57	---	---
MC–6ns	---	---	---	---	---	Adsorption analysis sample removed.
MC–5	10	100.00	---	---	---	Adsorption analysis sample removed.
38	4	250.00	250.00	79.05	SubA	Highly fractured sample, 50 mm of vitrain at 49 cm, calcite.
39	4	250.00	---	---	---	Highly fractured sample, calcite on cleat.
39	4	250.00	---	---	---	Fusain layer, no calcite.
39	10	100.00	139.62	77.32	---	Thick calcite on cleat.
40	4	250.00	---	---	---	Calcite.
40	4	250.00	---	---	---	Calcite.
40	4	250.00	250.00	79.82	---	Calcite.
42	4	250.00	---	---	---	No obvious high ash layers (unless parting was removed).
42	40	25.00	229.91	78.94	---	No cleat mineralization.
47	50	20.00	20.00	67.92	SubB	Less cleat in basal 20 cm.
MC–7fr	---	---	---	---	---	Highly fractured sample, not described.
ns3	---	---	---	---	---	No sample.
50	10	100.00	100.00	75.34	---	Top 15 cm is highly fractured, fusain at 18 and 20 cm, kaolinite on cleat.
51	20	50.00	50.00	78.80	---	Fusain at 34 and 55 cm, bright vitrain at 24 cm.
53	20	50.00	50.00	74.97	---	Fusain at 24 and 43 cm, cleat kaolinite at base, bright vitrain.
60	20	50.00	---	---	---	---
60	30	33.33	38.06	73.83	---	Fusain at 19 and 60 cm, kaolinite on cleat.
62	10	100.00	---	---	---	Minor calcite at 38 cm.
62	10	100.00	100.00	77.18	SubA	Hard parting at 59 cm, calcite at base.
63	20	50.00	---	---	---	---
63	20	50.00	---	---	---	---
63	20	50.00	---	---	---	Kaolinite on cleat.
63	20	50.00	---	---	---	---
63	20	50.00	50.00	72.53	SubA	Parting at base.
ns4	---	---	---	---	---	Sample removed for MichiWest geologist.
MC–8	5	200.00	---	---	---	Highly fractured sample, not described.
65	10	100.00	---	---	---	---
65	20	50.00	---	---	---	---
65	20	50.00	61.67	71.38	---	Fusain-rich attritus.
66	10	100.00	---	---	---	Resin bleb.
66	20	50.00	85.00	74.00	---	---
67	30	33.33	33.33	69.13	---	---
68	20	50.00	50.00	69.73	---	---
69	10	100.00	---	---	---	---
69	20	50.00	---	---	---	---
69	10	100.00	83.33	71.43	---	---
70	5	200.00	---	---	---	---
70	10	100.00	123.08	72.64	---	Inert attritus, no true fusain.
ns5	---	---	---	---	---	Sample removed for adsorption analysis.
MC–9	10	100.00	---	---	---	---
MC–9	10	100.00	---	---	---	---
MC–9	5	200.00	---	---	---	---
ns6	---	---	---	---	---	No sample.
MC–10	20	50.00	---	---	---	Sheared, minor kaolinite.

Table 1–2. Data for samples from core hole 2, MichiWest Energy Inc., Pilot State 16–32.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; fr, highly fractured sample; SubA, subbituminous A; SubB, subbituminous B; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)	Average attrital band thickness (AvABT) (mm)	Cumulative fusain thickness (CuFT) (mm)
	Top	Bottom								
71	1,182.50	---	Big George	30.00	---	0.50	105.14	10.0	20.0	5.0
71	---	---	Big George	6.00	---	0.10	105.34	0.0	0.0	0.0
71	---	1,184.50	Big George	24.00	60.00	0.40	106.13	30.0	30.0	2.0
72	1,184.50	---	Big George	28.00	---	0.45	107.04	20.0	2.0	20.0
72	---	---	Big George	6.00	---	0.10	107.24	0.0	0.0	0.0
72	---	1,186.50	Big George	28.00	62.00	0.45	108.16	10.0	5.0	15.0
73	1,186.50	---	Big George	44.00	---	0.79	109.60	10.0	10.0	20.0
73	---	1,188.50	Big George	12.00	56.00	0.21	110.00	2.0	5.0	10.0
ns7	1,188.50	1,189.50	ns7	30.50	30.50	1.00	111.00	---	---	---
74	1,189.50	---	Big George	17.50	---	0.28	111.57	10.0	3.0	10.0
74	---	---	Big George	2.00	---	0.03	111.64	0.0	0.0	0.0
74	---	---	Big George	8.00	---	0.13	111.90	10.0	2.0	10.0
74	---	---	Big George	12.00	---	0.20	112.29	0.0	0.0	0.0
74	---	---	Big George	9.00	---	0.15	112.59	10.0	1.0	0.0
74	---	1,191.50	Big George	13.00	61.50	0.21	113.02	0.0	0.0	0.0
75	1,191.50	1,193.50	Big George	40.00	40.00	1.00	114.33	10.0	3.0	30.0
ns8	1,193.50	1,196.50	ns8	91.00	91.00	1.00	117.31	---	---	---
76	1,196.50	1,199.00	Big George	64.00	64.00	1.00	119.41	60.0	40.0	0.0
A1	1,199.00	1,199.50	Big George	15.00	15.00	0.23	119.90	10.0	5.0	20.0
ns9	1,199.50	1,201.50	ns9	60.00	60.00	1.00	121.87	---	---	---
A1	1,201.50	1,203.00	Big George	49.00	64.00	0.77	123.48	10.0	5.0	20.0
MC–11	1,203.00	1,205.00	Big George	49.00	49.00	1.00	125.09	5.0	30.0	10.0
ns10	1,205.00	1,209.00	ns10	122.00	122.00	1.00	129.09	---	---	---
A2	1,209.00	1,211.00	Big George	59.00	59.00	1.00	131.03	40.0	10.0	30.0
MC–12	1,211.00	---	Big George	32.00	---	0.62	132.08	50.0	0.0	0.0
MC–12	---	1,213.00	Big George	20.00	52.00	0.38	132.73	10.0	0.0	20.0
A3	1,213.00	1,215.00	Big George	48.00	48.00	1.00	134.31	20.0	2.0	10.0

Table 1–2. Data for samples from core hole 2, MichiWest Energy Inc., Pilot State 16–32.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; fr, highly fractured sample; SubA, subbituminous A; SubB, subbituminous B; ---, no data]

Canister number	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)	Attritus percentage (AP)	Fusain percentage (FP)	Canister average vitrain percentage (CaAvVP)	Canister average attrital percentage (CaAvAP)	Canister average fusain percentage (CaAvFP)
71	3	98.33	196.67	32.78	65.56	1.67	---	---	---
71	0	0.00	0.00	0.00	0.00	0.00	---	---	---
71	4	119.00	119.00	49.58	49.58	0.83	36.22	52.61	1.17
72	3	236.36	23.64	84.42	8.44	7.14	---	---	---
72	0	0.00	0.00	0.00	0.00	0.00	---	---	---
72	3	176.67	88.33	63.10	31.55	5.36	66.62	18.06	5.65
73	3	210.00	210.00	47.73	47.73	4.55	---	---	---
73	2	31.43	78.57	26.19	65.48	8.33	43.11	51.53	5.36
ns7	---	---	---	---	---	---	---	---	---
74	3	126.92	38.08	72.53	21.76	5.71	---	---	---
74	0	0.00	0.00	0.00	0.00	0.00	---	---	---
74	3	58.33	11.67	72.92	14.58	12.50	---	---	---
74	0	0.00	0.00	0.00	0.00	0.00	---	---	---
74	3	81.82	8.18	90.91	9.09	0.00	---	---	---
74	0	0.00	0.00	0.00	0.00	0.00	---	---	---
75	3	284.62	85.38	71.15	21.35	7.50	71.15	21.35	7.50
ns8	---	---	---	---	---	---	---	---	---
76	4	384.00	256.00	60.00	40.00	0.00	60.00	40.00	0.00
A1	3	86.67	43.33	57.78	28.89	13.33	---	---	---
ns9	---	---	---	---	---	---	---	---	---
A1	3	313.33	156.67	63.95	31.97	4.08	62.50	31.25	6.25
MC–11	3	68.57	411.43	13.99	83.97	2.04	---	---	---
ns10	---	---	---	---	---	---	---	---	---
A2	4	448.00	112.00	75.93	18.98	5.08	75.93	18.98	5.08
MC–12	5	320.00	0.00	100.00	0.00	0.00	---	---	---
MC–12	3	180.00	0.00	90.00	0.00	10.00	---	---	---
A3	3	427.27	42.73	89.02	8.90	2.08	89.02	8.90	2.08

Table 1–2. Data for samples from core hole 2, MichiWest Energy Inc., Pilot State 16–32.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; fr, highly fractured sample; SubA, subbituminous A; SubB, subbituminous B; ---, no data]

Canister number	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
71	10	100.00	---	---	---	Kaolinite on cleat.
71	---	---	---	---	---	Sand dike(?), kaolinite on cleat.
71	20	50.00	77.78	63.17	---	Slickensides below sand, no loss around sand.
72	20	50.00	---	---	---	Sand at top.
72	---	---	---	---	---	Sand dike.
72	30	33.33	41.67	63.13	---	Sand at 16–18 cm.
73	10	100.00	---	---	---	Curvilinear.
73	40	25.00	83.93	75.52	SubA	Tight.
ns7	---	---	---	---	---	No sample.
74	20	50.00	---	---	---	---
74	---	---	---	---	---	Sand.
74	10	100.00	---	---	---	---
74	---	---	---	---	---	Sand.
74	10	100.00	---	---	---	---
74	---	---	---	---	SubA	Sand with coal stringers at basal 9 cm.
75	20	50.00	50.00	58.78	---	Permeable, mostly fusain and vitrain, sulfate.
ns8	---	---	---	---	---	No sample.
76	10	100.00	100.00	62.67	---	Bedding dips 25 degrees, sand blebs at 24 cm.
A1	10	100.00	---	---	---	Bedding dips 25 degrees, tight cleat.
ns9	---	---	---	---	---	Sand excluded from canister.
A1	10	100.00	100.00	62.67	---	Bedding dips 25 degrees, tight cleat.
MC–11	30	33.33	---	---	---	---
ns10	---	---	---	---	---	No sample.
A2	30	33.33	33.33	75.68	---	Horizontal bedding.
MC–12	30	33.33	---	---	---	Kaolinite on cleat at 29–32 cm.
MC–12	30	33.33	---	---	---	---
A3	10	100.00	100.00	72.12	---	Horizontal bedding.

Table 1–3. Data for samples from core hole 3, Ocean Energy, Inc., Schlautmann 9–10–45–74WY (Ocean 43–10C).

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; SubC, subbituminous C; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)	Average attrital band thickness (AvABT) (mm)
	Top	Bottom							
14	1,190.00	---	Anderson	40.00	---	0.69	1.31	50.0	0.0
14	---	1,192.00	Anderson	18.00	58.00	0.31	1.90	20.0	5.0

Table 1–3. Data for samples from core hole 3, Ocean Energy, Inc., Schlautmann 9–10–45–74WY (Ocean 43–10C).—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; SubC, subbituminous C; ---, no data]

Canister number	Cumulative fusain thickness (CuFT) (mm)	Lithotype code	Canister number	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)	Attritus percentage (AP)	Fusain percentage (FP)	Canister average vitrain percentage (CaAvVP)
14	0.0	5	14	400.00	0.00	100.00	0.00	0.00	---
14	0.0	3	14	144.00	36.00	80.00	20.00	0.00	93.79

Table 1–3. Data for samples from core hole 3, Ocean Energy, Inc., Schlautmann 9–10–45–74WY (Ocean 43–10C).—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; SubC, subbituminous C; ---, no data]

Canister number	Canister average attrital percentage (CaAvAP)	Canister average fusain percentage (CaAvFP)	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
14	---	---	30	33.33	---	---	---	---
14	6.21	0.00	20	50.00	38.51	27.12	SubC	---

Table 1–4. Data for samples from core hole 8, CMS Oil and Gas Company, Laramore 11–6C.

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)	Average attrital band thickness (AvABT) (mm)	Cumulative fusain thickness (CuFT) (mm)
	Top	Bottom								
A–7	343.00	---	Smith	29.00	---	0.47	0.95	0.0	50.0	0.0
A–7	---	345.00	Smith	33.00	62.00	0.53	2.03	20.0	0.0	80.0
A–10	345.00	---	Smith	6.00	---	0.10	2.23	10.0	5.0	0.0
A–10	---	---	Smith	16.00	---	0.25	2.76	5.0	10.0	0.0
A–10	---	---	Smith	35.00	---	0.56	3.90	20.0	5.0	5.0
A–10	---	347.00	Smith	6.00	63.00	0.10	4.10	20.0	5.0	0.0
A–11	347.00	---	Smith	24.00	---	0.39	4.89	2.0	10.0	0.0
A–11	---	---	Smith	33.00	---	0.53	5.97	50.0	5.0	0.0
A–11	---	349.00	Smith	5.00	62.00	0.08	6.14	2.0	5.0	10.0
A–12	349.00	351.00	Smith	64.00	64.00	1.00	8.23	10.0	2.0	5.0
A–13	351.00	---	Smith	53.00	---	0.87	9.97	10.0	2.0	22.0
A–13	---	353.00	Smith	8.00	61.00	0.13	10.24	5.0	30.0	0.0
A–14	353.00	---	Smith	47.00	---	0.81	11.78	5.0	20.0	5.0
A–14	---	355.00	Smith	11.00	58.00	0.19	12.14	20.0	2.0	0.0
A–15	355.00	---	Smith	15.00	---	0.24	12.63	50.0	0.0	0.0
A–15	---	---	Smith	33.00	---	0.52	13.71	3.0	10.0	25.0
A–15	---	357.00	Smith	15.00	63.00	0.24	14.21	20.0	1.0	0.0
A–16	357.00	---	Smith	11.00	---	0.32	14.57	5.0	10.0	0.0
A–16	---	---	Smith	11.00	---	0.32	14.93	2.0	3.0	60.0
A–16	---	358.00	Smith	12.00	34.00	0.35	15.32	2.0	5.0	0.0
ns1	358.00	358.50	ns1	15.00	15.00	1.00	15.81	---	---	---
A–16	358.50	359.50	Smith	19.00	19.00	1.00	16.44	40.0	10.0	0.0
A–17	359.50	---	Smith	49.00	---	0.74	18.04	40.0	10.0	0.0
A–17	---	361.50	Smith	17.00	66.00	0.26	18.60	2.0	10.0	0.0
ns2	361.50	374.00	ns2	381.00	381.00	1.00	31.10	---	---	---
A–18	374.00	---	Smith	33.00	---	0.56	32.19	3.0	10.0	10.0
A–18	---	---	Smith	19.00	---	0.32	32.81	0.0	20.0	0.0
A–18	---	376.00	Smith	7.00	59.00	0.12	33.04	5.0	5.0	10.0
A–19	376.00	378.00	Smith	59.00	59.00	1.00	34.97	50.0	0.0	10.0
A–20	378.00	---	Smith	34.00	---	0.54	36.09	50.0	0.0	0.0
A–20	---	---	Smith	12.00	---	0.19	36.48	0.0	0.0	0.0
A–20	---	---	Smith	9.00	---	0.14	36.78	10.0	2.0	20.0
A–20	---	380.00	Smith	8.00	63.00	0.13	37.04	0.0	0.0	80.0
A–23	380.00	---	Smith	27.00	---	0.44	37.93	8.0	10.0	12.0
A–23	---	382.00	Smith	35.00	62.00	0.56	39.07	50.0	0.0	0.0
A–24	382.00	---	Smith	30.00	---	0.47	40.06	8.0	3.0	0.0
A–24	---	384.00	Smith	34.00	64.00	0.53	41.17	50.0	0.0	0.0
A–25	384.00	386.00	Smith	59.00	59.00	1.00	43.11	50.0	0.0	2.0
ns3	386.00	779.20	ns3	11,985.00	11,985.00	1.00	436.32	---	---	---
C–1	779.20	---	Anderson	43.00	---	0.68	437.73	50.0	10.0	0.0
C–1	---	781.20	Anderson	20.00	63.00	0.32	438.39	3.0	5.0	0.0
C–4	781.20	---	Anderson	7.00	---	0.12	438.62	3.0	0.0	30.0
C–4	---	---	Anderson	31.00	---	0.52	439.63	50.0	20.0	5.0
C–4	---	783.20	Anderson	22.00	60.00	0.37	440.35	5.0	2.0	10.0
C–5	783.20	---	Anderson	24.00	---	0.44	441.14	50.0	5.0	0.0
C–5	---	785.20	Anderson	30.00	54.00	0.56	442.13	3.0	2.0	10.0
C–6	785.20	---	Anderson	10.00	---	0.16	442.45	50.0	0.0	0.0
C–6	---	787.20	Anderson	54.00	64.00	0.84	444.23	5.0	5.0	0.0
C–7	787.20	---	Anderson	58.00	---	0.91	446.13	2.0	1.0	40.0
C–7	---	789.20	Anderson	6.00	64.00	0.09	446.33	50.0	0.0	0.0

Table 1-4. Data for samples from core hole 8, CMS Oil and Gas Company, Laramore 11-6C.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)	Attritus percentage (AP)	Fusain percentage (FP)	Canister average vitrain percentage (CaAvVP)	Canister average attrital percentage (CaAvAP)	Canister average fusain percentage (CaAvFP)
A-7	1	0.00	290.00	0.00	100.00	0.00	---	---	---
A-7	3	250.00	0.00	75.76	0.00	24.24	40.32	46.77	12.90
A-10	3	40.00	20.00	66.67	33.33	0.00	---	---	---
A-10	3	53.33	106.67	33.33	66.67	0.00	---	---	---
A-10	3	276.00	69.00	78.86	19.71	1.43	---	---	---
A-10	3	48.00	12.00	80.00	20.00	0.00	66.24	32.96	0.79
A-11	2	40.00	200.00	16.67	83.33	0.00	---	---	---
A-11	4	300.00	30.00	90.91	9.09	0.00	---	---	---
A-11	2	11.43	28.57	22.86	57.14	20.00	56.68	41.71	1.61
A-12	3	529.17	105.83	82.68	16.54	0.78	82.68	16.54	0.78
A-13	3	423.33	84.67	79.87	15.97	4.15	---	---	---
A-13	3	11.43	68.57	14.29	85.71	0.00	71.27	25.12	3.61
A-14	3	93.00	372.00	19.79	79.15	1.06	---	---	---
A-14	3	100.00	10.00	90.91	9.09	0.00	33.28	65.86	0.86
A-15	5	150.00	0.00	100.00	0.00	0.00	---	---	---
A-15	2	70.38	234.62	21.33	71.10	7.58	---	---	---
A-15	3	142.86	7.14	95.24	4.76	0.00	57.66	38.37	3.97
A-16	3	36.67	73.33	33.33	66.67	0.00	---	---	---
A-16	2	20.00	30.00	18.18	27.27	54.55	---	---	---
A-16	2	34.29	85.71	28.57	71.43	0.00	26.75	55.60	17.65
ns1	---	---	---	---	---	---	---	---	---
A-16	4	152.00	38.00	80.00	20.00	0.00	80.00	20.00	0.00
A-17	4	392.00	98.00	80.00	20.00	0.00	---	---	---
A-17	2	28.33	141.67	16.67	83.33	0.00	63.69	36.31	0.00
ns2	---	---	---	---	---	---	---	---	---
A-18	2	73.85	246.15	22.38	74.59	3.03	---	---	---
A-18	1	0.00	190.00	0.00	100.00	0.00	---	---	---
A-18	3	30.00	30.00	42.86	42.86	14.29	17.60	79.01	3.39
A-19	5	580.00	0.00	98.31	0.00	1.69	98.31	0.00	1.69
A-20	5	340.00	0.00	100.00	0.00	0.00	---	---	---
A-20	0	0.00	0.00	0.00	0.00	0.00	---	---	---
A-20	3	58.33	11.67	64.81	12.96	22.22	---	---	---
A-20	8	0.00	0.00	0.00	0.00	100.00	63.23	1.85	15.87
A-23	3	114.67	143.33	42.47	53.09	4.44	---	---	---
A-23	5	350.00	0.00	100.00	0.00	0.00	74.95	23.12	1.94
A-24	3	218.18	81.82	72.73	27.27	0.00	---	---	---
A-24	5	340.00	0.00	100.00	0.00	0.00	87.22	12.78	0.00
A-25	5	588.00	0.00	99.66	0.00	0.34	---	---	---
ns3	---	---	---	---	---	---	---	---	---
C-1	4	358.33	71.67	83.33	16.67	0.00	---	---	---
C-1	2	75.00	125.00	37.50	62.50	0.00	68.78	31.22	0.00
C-4	2	40.00	0.00	57.14	0.00	42.86	---	---	---
C-4	4	217.86	87.14	70.28	28.11	1.61	---	---	---
C-4	3	150.00	60.00	68.18	27.27	4.55	67.98	24.52	7.50
C-5	4	218.18	21.82	90.91	9.09	0.00	---	---	---
C-5	2	174.00	116.00	58.00	38.67	3.33	72.63	25.52	1.85
C-6	5	100.00	0.00	100.00	0.00	0.00	---	---	---
C-6	3	270.00	270.00	50.00	50.00	0.00	57.81	42.19	0.00
C-7	2	360.00	180.00	62.07	31.03	6.90	---	---	---
C-7	5	60.00	0.00	100.00	0.00	0.00	65.63	28.13	6.25

Table 1-4. Data for samples from core hole 8, CMS Oil and Gas Company, Laramore 11-6C.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
A-7	10.00	100.00	---	---	---	---
A-7	10.00	100.00	100.00	16.99	---	Hard.
A-10	10.00	100.00	---	---	---	---
A-10	---	---	---	---	---	---
A-10	---	---	---	---	---	---
A-10	10.00	100.00	100.00	22.28	---	---
A-11	5.00	200.00	---	---	---	---
A-11	10.00	100.00	---	---	---	---
A-11	20.00	50.00	134.68	22.75	---	---
A-12	30.00	33.33	33.33	23.52	SubC	Hard, resin at 54 cm.
A-13	---	---	---	---	---	---
A-13	---	---	---	26.7	---	---
A-14	30.00	33.33	---	---	---	---
A-14	10.00	100.00	45.98	22.03	---	---
A-15	---	---	---	---	---	---
A-15	10.00	100.00	---	---	---	---
A-15	5.00	200.00	131.25	19.26	---	---
A-16	20.00	50.00	---	---	---	---
A-16	40.00	25.00	---	---	---	---
A-16	30.00	33.33	36.03	20.68	---	---
ns1	---	---	---	---	---	6 inches of shale, excluded from canister A16.
A-16	20.00	50.00	50.00	22.35	---	---
A-17	10.00	100.00	---	---	---	---
A-17	30.00	33.33	82.83	25.51	---	---
ns2	---	---	---	---	---	No sample.
A-18	30.00	33.33	---	---	---	Resin at 4 cm.
A-18	---	---	---	---	---	---
A-18	20.00	50.00	36.25	23.55	---	---
A-19	10.00	100.00	100.00	22.37	SubC	Kaolinite at 50–55 cm.
A-20	10.00	100.00	---	---	---	Kaolinite at 12 cm.
A-20	---	---	---	---	---	Parting.
A-20	20.00	50.00	---	---	---	---
A-20	20.00	50.00	83.33	24.78	---	Fusain layer.
A-23	20.00	50.00	---	---	---	---
A-23	10.00	100.00	78.23	22.48	---	---
A-24	5.00	200.00	---	---	---	---
A-24	40.00	25.00	107.03	18.97	---	---
A-25	50.00	20.00	---	---	SubB	---
ns3	---	---	---	---	---	No sample.
C-1	40.00	25.00	---	---	---	Kaolinite at 15–25 cm.
C-1	50.00	20.00	23.41	32.14	---	---
C-4	50	20.00	---	---	---	---
C-4	5	200.00	---	---	---	---
C-4	10	100.00	142.33	28.73	---	---
C-5	2	500.00	---	---	---	Highly fractured sample.
C-5	2	500.00	500.00	30.17	---	Highly fractured sample.
C-6	10	100.00	---	---	---	---
C-6	5	200.00	184.38	28.80	---	---
C-7	5	200.00	---	---	---	---
C-7	10	100.00	190.63	32.42	---	Kaolinite at top.

Table 1–4. Data for samples from core hole 8, CMS Oil and Gas Company, Laramore 11–6C.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)	Average attrital band thickness (AvABT) (mm)	Cumulative fusain thickness (CuFT) (mm)
	Top	Bottom								
C–8	789.20	---	Anderson	47.00	---	0.82	447.87	10.0	20.0	25.0
C–8	---	791.20	Anderson	10.00	57.00	0.18	448.20	50.0	0.0	0.0
ns4	791.20	986.00	ns4	5937.50	5,937.50	1.00	643.00	---	---	---
C–9	986.00	988.00	Canyon	63.00	63.00	1.00	645.06	10.0	30.0	18.0
C–10	988.00	---	Canyon	50.00	---	0.81	646.70	20.0	10.0	20.0
C–10	---	990.00	Canyon	12.00	62.00	0.19	647.10	10.0	2.0	0.0
C–11	990.00	992.00	Canyon	60.00	60.00	1.00	649.06	5.0	2.0	5.0
C–12	992.00	994.00	Canyon	56.00	56.00	1.00	650.90	10.0	2.0	10.0
ns5	994.00	1,340.00	ns5	10,546.00	10,546.00	1.00	996.90	---	---	---
C–13	1,340.00	---	Cook	2.00	---	0.03	996.97	0.0	20.0	0.0
C–13	---	---	Cook	8.00	---	0.13	997.23	0.0	0.0	0.0
C–13	---	---	Cook	13.00	---	0.22	997.65	5.0	20.0	0.0
C–13	---	1,342.00	Cook	37.00	60.00	0.62	998.87	5.0	0.0	0.0
C–14	1,342.00	---	Cook	14.00	---	0.22	999.33	10.0	0.0	0.0
C–14	---	---	Cook	42.00	---	0.67	1,000.71	50.0	2.0	0.0
C–14	---	---	Cook	1.00	---	0.02	1,000.74	0.0	0.0	0.0
C–14	---	1,344.00	Cook	6.00	63.00	0.10	1,000.94	50.0	0.0	0.0
C–15	1,344.00	---	Cook	32.00	---	0.51	1,001.98	1.0	0.0	0.0
C–15	---	1,346.00	Cook	31.00	63.00	0.49	1,003.00	5.0	30.0	0.0
C–16	1,346.00	---	Cook	22.00	---	0.37	1,003.72	1.0	20.0	2.0
C–16	---	1,348.00	Cook	38.00	60.00	0.63	1,004.97	50.0	5.0	0.0
C–17	1,348.00	---	Cook	37.00	---	0.61	1,006.18	20.0	10.0	5.0
C–17	---	---	Cook	6.00	---	0.10	1,006.38	0.0	0.0	0.0
C–17	---	---	Cook	12.00	---	0.20	1,006.77	2.0	5.0	5.0
C–17	---	1,350.00	Cook	6.00	61.00	0.10	1,006.97	50.0	0.0	0.0

Table 1–4. Data for samples from core hole 8, CMS Oil and Gas Company, Laramore 11–6C.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)	Attritus percentage (AP)	Fusain percentage (FP)	Canister average vitrain percentage (CaAvVP)	Canister average attrital percentage (CaAvAP)	Canister average fusain percentage (CaAvFP)
C–8	3	148.33	296.67	31.56	63.12	5.32	---	---	---
C–8	5	100.00	0.00	100.00	0.00	0.00	43.57	52.05	4.39
ns4	---	---	---	---	---	---	---	---	---
C–9	3	153.00	459.00	24.29	72.86	2.86	24.29	72.86	2.86
C–10	3	320.00	160.00	64.00	32.00	4.00	---	---	---
C–10	3	100.00	20.00	83.33	16.67	0.00	67.74	29.03	3.23
C–11	3	425.00	170.00	70.83	28.33	0.83	70.83	28.33	0.83
C–12	3	458.33	91.67	81.85	16.37	1.79	81.85	16.37	1.79
ns5	---	---	---	---	---	---	---	---	---
C–13	1	0.00	20.00	0.00	100.00	0.00	---	---	---
C–13	0	0.00	0.00	0.00	0.00	0.00	---	---	---
C–13	3	26.00	104.00	20.00	80.00	0.00	---	---	---
C–13	3	370.00	0.00	100.00	0.00	0.00	66.00	20.67	0.00
C–14	3	140.00	0.00	100.00	0.00	0.00	---	---	---
C–14	5	403.85	16.15	96.15	3.85	0.00	---	---	---
C–14	0	0.00	0.00	0.00	0.00	0.00	---	---	---
C–14	5	60.00	0.00	100.00	0.00	0.00	95.85	2.56	0.00
C–15	2	320.00	0.00	100.00	0.00	0.00	---	---	---
C–15	3	44.29	265.71	14.29	85.71	0.00	57.82	42.18	0.00
C–16	2	10.38	207.62	4.72	94.37	0.91	---	---	---
C–16	4	345.45	34.55	90.91	9.09	0.00	59.31	40.36	0.33
C–17	3	243.33	121.67	65.77	32.88	1.35	---	---	---
C–17	0	0.00	0.00	0.00	0.00	0.00	---	---	---
C–17	2	32.86	82.14	27.38	68.45	4.17	---	---	---
C–17	5	60.00	0.00	100.00	0.00	0.00	55.11	33.41	1.64

Table 1-4. Data for samples from core hole 8, CMS Oil and Gas Company, Laramore 11-6C.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
C-8	10	100.00	---	---	---	---
C-8	40	25.00	86.84	28.95	---	---
ns4	---	---	---	---	---	No sample.
C-9	20	50.00	50.00	37.78	SubB	---
C-10	5	200.00	---	---	---	---
C-10	5	200.00	200.00	38.77	---	---
C-11	5	200.00	200.00	36.80	---	Highly fractured sample.
C-12	10	100.00	100.00	38.46	SubB	Pyrite at 54 cm along cleat.
ns5	---	---	---	---	---	No sample.
C-13	40	25.00	---	---	---	---
C-13	---	---	---	---	---	Parting.
C-13	50	20.00	---	---	---	---
C-13	---	---	20.67	51.56	---	---
C-14	30	33.33	---	---	---	---
C-14	20	50.00	---	---	---	---
C-14	---	---	---	---	---	Parting.
C-14	20	50.00	46.24	60.74	---	Kaolinite on cleat.
C-15	---	---	---	---	---	---
C-15	20	50.00	50.00	33.83	---	---
C-16	30	33.33	---	---	---	---
C-16	10	100.00	75.56	68.87	---	Kaolinite at 55 mm.
C-17	40	25.00	---	---	---	---
C-17	---	---	---	---	---	Parting.
C-17	10	100.00	---	---	---	---
C-17	10	100.00	49.55	61.99	---	---

Table 1–5. Data for samples from core hole 9, Kennecott Energy, Kennecott CBM–1.

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)
	Top	Bottom						
A5	134.00	---	upper Wyodak	10.00	---	0.24	0.33	1.0
ns1	---	---	ns1	25.00	---	1.00	1.15	---
A5	---	---	upper Wyodak	15.00	---	0.37	1.64	2.0
A5	---	136.00	upper Wyodak	16.00	41.00	0.39	2.17	4.0
A6	136.00	---	upper Wyodak	7.50	---	0.12	2.41	4.0
A6	---	---	upper Wyodak	21.00	---	0.33	3.10	2.0
A6	---	---	upper Wyodak	7.00	---	0.11	3.33	4.0
A6	---	---	upper Wyodak	10.50	---	0.16	3.67	105.0
A6	---	---	upper Wyodak	6.50	---	0.10	3.89	4.0
A6	---	---	upper Wyodak	3.50	---	0.05	4.00	1.0
A6	---	138.00	upper Wyodak	8.50	64.50	0.13	4.28	85.0
A8	138.00	---	upper Wyodak	1.50	---	0.03	4.33	2.0
A8	---	---	upper Wyodak	4.00	---	0.07	4.46	40.0
A8	---	---	upper Wyodak	4.00	---	0.07	4.59	1.0
A8	---	---	upper Wyodak	3.00	---	0.05	4.69	2.0
A8	---	---	upper Wyodak	2.00	---	0.04	4.76	0.0
A8	---	---	upper Wyodak	5.00	---	0.09	4.92	2.0
A8	---	---	upper Wyodak	6.50	---	0.11	5.13	2.0
A8	---	---	upper Wyodak	17.50	---	0.31	5.71	1.0
A8	---	---	upper Wyodak	8.00	---	0.14	5.97	80.0
A8	---	140.00	upper Wyodak	5.50	57.00	0.10	6.15	2.0
A9	140.00	---	upper Wyodak	1.50	---	0.03	6.20	2.0
A9	---	---	upper Wyodak	9.50	---	0.16	6.51	2.0
A9	---	---	upper Wyodak	34.00	---	0.59	7.63	1.0
A9	---	142.00	upper Wyodak	13.00	58.00	0.22	8.05	0.0
A21	142.00	---	upper Wyodak	8.00	---	0.14	8.32	1.0
A21	---	143.00	upper Wyodak	6.00	---	0.11	8.51	0.0
ns2	143.00	145.50	ns2	76.00	76.00	1.00	11.01	---
A21	145.50	---	upper Wyodak	2.00	---	0.04	11.07	1.0
A21	---	---	upper Wyodak	17.50	---	0.31	11.65	1.0
A21	---	---	upper Wyodak	4.50	---	0.08	11.79	0.0
A21	---	146.50	upper Wyodak	19.00	43.00	0.33	12.42	1.0
ns3	146.50	150.00	ns3	107.00	107.00	1.00	15.93	---
B1	150.00	---	middle and lower Wyodak	9.00	---	0.14	16.22	1.0
B1	---	---	middle and lower Wyodak	16.00	---	0.25	16.75	2.0
B1	---	---	middle and lower Wyodak	2.00	---	0.03	16.81	20.0
B1	---	---	middle and lower Wyodak	5.50	---	0.09	16.99	2.0
B1	---	---	middle and lower Wyodak	8.50	---	0.13	17.27	85.0
B1	---	---	middle and lower Wyodak	5.00	---	0.08	17.44	2.0
B1	---	---	middle and lower Wyodak	2.00	---	0.03	17.50	20.0
B1	---	---	middle and lower Wyodak	8.50	---	0.13	17.78	2.0
B1	---	---	middle and lower Wyodak	1.50	---	0.02	17.83	15.0
B1	---	152.00	middle and lower Wyodak	5.50	63.50	0.09	18.01	1.0
B2	152.00	---	middle and lower Wyodak	4.50	---	0.08	18.16	1.0
B2	---	---	middle and lower Wyodak	1.00	---	0.02	18.19	10.0
B2	---	---	middle and lower Wyodak	33.00	---	0.56	19.27	1.0
B2	---	---	middle and lower Wyodak	1.50	---	0.03	19.32	15.0
B2	---	---	middle and lower Wyodak	13.50	---	0.23	19.77	1.0
B2	---	154.00	middle and lower Wyodak	5.00	58.50	0.09	19.93	3.0
B3	154.00	156.00	middle and lower Wyodak	61.00	61.00	1.00	21.93	1.0

Table 1–5. Data for samples from core hole 9, Kennecott Energy, Kennecott CBM–1.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Average attrital band thickness (AvABT) (mm)	Cumulative fusain thickness (CuFT) (mm)	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)	Attritus percentage (AP)	Fusain percentage (FP)
A5	9.0	0.0	2	10.00	90.00	10.00	90.00	0.00
ns1	---	---	---	---	---	---	---	---
A5	18.0	0.0	2	15.00	135.00	10.00	90.00	0.00
A5	6.0	0.0	2	64.00	96.00	40.00	60.00	0.00
A6	6.0	0.0	2	30.00	45.00	40.00	60.00	0.00
A6	18.0	0.0	2	21.00	189.00	10.00	90.00	0.00
A6	6.0	0.0	2	28.00	42.00	40.00	60.00	0.00
A6	0.0	0.0	5	105.00	0.00	100.00	0.00	0.00
A6	6.0	0.0	2	26.00	39.00	40.00	60.00	0.00
A6	19.0	0.0	2	1.75	33.25	5.00	95.00	0.00
A6	0.0	0.0	5	85.00	0.00	100.00	0.00	0.00
A8	3.0	0.0	2	6.00	9.00	40.00	60.00	0.00
A8	0.0	0.0	5	40.00	0.00	100.00	0.00	0.00
A8	19.0	0.0	2	2.00	38.00	5.00	95.00	0.00
A8	3.0	0.0	2	12.00	18.00	40.00	60.00	0.00
A8	20.0	0.0	1	0.00	20.00	0.00	100.00	0.00
A8	3.0	0.0	2	20.00	30.00	40.00	60.00	0.00
A8	18.0	0.0	2	6.50	58.50	10.00	90.00	0.00
A8	19.0	0.0	2	8.75	166.25	5.00	95.00	0.00
A8	0.0	0.0	5	80.00	0.00	100.00	0.00	0.00
A8	3.0	0.0	2	22.00	33.00	40.00	60.00	0.00
A9	18.0	0.0	2	1.50	13.50	10.00	90.00	0.00
A9	3.0	0.0	2	38.00	57.00	40.00	60.00	0.00
A9	19.0	0.0	2	17.00	323.00	5.00	95.00	0.00
A9	0.0	0.0	0	0.00	0.00	0.00	0.00	0.00
A21	9.0	0.0	2	8.00	72.00	10.00	90.00	0.00
A21	0.0	0.0	0	0.00	0.00	0.00	0.00	0.00
ns2	---	---	---	---	---	---	---	---
A21	9.0	5.0	2	1.50	13.50	7.50	67.50	25.00
A21	19.0	0.0	2	8.75	166.25	5.00	95.00	0.00
A21	0.0	0.0	0	0.00	0.00	0.00	0.00	0.00
A21	19.0	0.0	2	9.50	180.50	5.00	95.00	0.00
ns3	---	---	---	---	---	---	---	---
B1	19.0	0.0	2	4.50	85.50	5.00	95.00	0.00
B1	3.0	0.0	2	64.00	96.00	40.00	60.00	0.00
B1	0.0	0.0	3	20.00	0.00	100.00	0.00	0.00
B1	3.0	0.0	2	22.00	33.00	40.00	60.00	0.00
B1	0.0	0.0	5	85.00	0.00	100.00	0.00	0.00
B1	18.0	0.0	2	5.00	45.00	10.00	90.00	0.00
B1	0.0	0.0	3	20.00	0.00	100.00	0.00	0.00
B1	18.0	0.0	2	8.50	76.50	10.00	90.00	0.00
B1	0.0	0.0	3	15.00	0.00	100.00	0.00	0.00
B1	19.0	0.0	2	2.75	52.25	5.00	95.00	0.00
B2	19.0	0.0	2	2.25	42.75	5.00	95.00	0.00
B2	0.0	0.0	3	10.00	0.00	100.00	0.00	0.00
B2	19.0	0.0	2	16.50	313.50	5.00	95.00	0.00
B2	0.0	0.0	3	15.00	0.00	100.00	0.00	0.00
B2	19.0	0.0	2	6.75	128.25	5.00	95.00	0.00
B2	12.0	0.0	2	10.00	40.00	20.00	80.00	0.00
B3	19.0	0.0	2	30.50	579.50	5.00	95.00	0.00

Table 1–5. Data for samples from core hole 9, Kennecott Energy, Kennecott CBM–1.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Canister average vitrain percentage (CaAvVP)	Canister average attrital percentage (CaAvAP)	Canister average fusain percentage (CaAvFP)	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
A5	---	---	---	20	50.00	---	---	---	---
ns1	---	---	---	---	---	---	---	---	No sample.
A5	---	---	---	20	50.00	---	---	---	---
A5	21.71	78.29	0.00	60	16.67	36.99	3.39	---	---
A6	---	---	---	60	16.67	---	---	---	---
A6	---	---	---	30	33.33	---	---	---	---
A6	---	---	---	60	16.67	---	---	---	---
A6	---	---	---	25	40.00	---	---	---	---
A6	---	---	---	60	16.67	---	---	---	---
A6	---	---	---	25	40.00	---	---	---	---
A6	46.01	53.99	0.00	20	50.00	31.55	3.19	---	---
A8	---	---	---	60	16.67	---	---	---	---
A8	---	---	---	20	50.00	---	---	---	---
A8	---	---	---	60	16.67	---	---	---	---
A8	---	---	---	60	16.67	---	---	---	---
A8	---	---	---	60	16.67	---	---	---	---
A8	---	---	---	60	16.67	---	---	---	---
A8	---	---	---	60	16.67	---	---	---	---
A8	---	---	---	60	16.67	---	---	---	---
A8	34.61	65.39	0.00	60	16.67	19.01	3.12	---	---
A9	---	---	---	60	16.67	---	---	---	---
A9	---	---	---	60	16.67	---	---	---	---
A9	---	---	---	60	16.67	---	---	---	---
A9	9.74	67.84	0.00	60	16.67	16.67	1.90	SubB	Parting.
A21	---	---	---	25	40.00	---	---	---	---
A21	---	---	---	25	40.00	---	---	---	Parting.
ns2	---	---	---	---	---	---	---	---	No sample.
A21	---	---	---	20	50.00	---	---	---	---
A21	---	---	---	25	40.00	---	---	---	---
A21	---	---	---	60	16.67	---	---	---	Parting.
A21	4.87	75.83	0.88	25	40.00	38.02	2.72	---	---
ns3	---	---	---	---	---	---	---	---	No sample.
B1	---	---	---	20	50.00	---	---	---	---
B1	---	---	---	60	16.67	---	---	---	---
B1	---	---	---	60	16.67	---	---	---	---
B1	---	---	---	60	16.67	---	---	---	---
B1	---	---	---	60	16.67	---	---	---	---
B1	---	---	---	25	40.00	---	---	---	---
B1	---	---	---	25	40.00	---	---	---	---
B1	---	---	---	25	40.00	---	---	---	---
B1	38.86	61.14	0.00	25	40.00	27.82	2.59	---	---
B2	---	---	---	20	50.00	---	---	---	---
B2	---	---	---	20	50.00	---	---	---	---
B2	---	---	---	20	50.00	---	---	---	---
B2	---	---	---	20	50.00	---	---	---	---
B2	---	---	---	20	50.00	---	---	---	---
B2	10.34	89.66	0.00	20	50.00	50.00	1.95	---	---
B3	5.00	95.00	0.00	20	50.00	50.00	2.61	---	---

Table 1–5. Data for samples from core hole 9, Kennecott Energy, Kennecott CBM–1.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)
	Top	Bottom						
B4	156.00	---	middle and lower Wyodak	5.00	---	0.08	22.10	1.0
B4	---	---	middle and lower Wyodak	1.00	---	0.02	22.13	10.0
B4	---	---	middle and lower Wyodak	2.00	---	0.03	22.19	1.0
B4	---	---	middle and lower Wyodak	2.50	---	0.04	22.28	2.0
B4	---	---	middle and lower Wyodak	21.00	---	0.33	22.97	1.0
B4	---	---	middle and lower Wyodak	13.50	---	0.21	23.41	135.0
B4	---	158.00	middle and lower Wyodak	18.00	63.00	0.29	24.00	10.0
B14	158.00	---	middle and lower Wyodak	17.00	---	0.27	24.56	1.0
B14	---	---	middle and lower Wyodak	13.00	---	0.20	24.98	130.0
B14	---	---	middle and lower Wyodak	13.00	---	0.20	25.41	1.0
B14	---	---	middle and lower Wyodak	2.50	---	0.04	25.49	25.0
B14	---	160.00	middle and lower Wyodak	18.00	63.50	0.28	26.08	1.0
ns4	160.00	161.50	ns4	46.00	46.00	1.00	27.59	---
B15	161.50	---	middle and lower Wyodak	20.00	---	0.38	28.25	1.0
B15	---	---	middle and lower Wyodak	5.50	---	0.10	28.43	55.0
B15	---	163.50	middle and lower Wyodak	27.00	52.50	0.51	29.31	3.0
B16	163.50	---	middle and lower Wyodak	40.50	---	0.64	30.64	2.0
B16	---	---	middle and lower Wyodak	20.50	---	0.33	31.32	3.0
B16	---	165.50	middle and lower Wyodak	2.00	63.00	0.03	31.38	20.0
B17	165.50	---	middle and lower Wyodak	3.00	---	0.05	31.48	3.0
B17	---	---	middle and lower Wyodak	29.00	---	0.48	32.43	1.0
B17	---	---	middle and lower Wyodak	2.00	---	0.03	32.50	20.0
B17	---	167.50	middle and lower Wyodak	26.00	60.00	0.43	33.35	3.0
B18	167.50	---	middle and lower Wyodak	32.50	---	0.46	34.42	3.0
B18	---	---	middle and lower Wyodak	25.00	---	0.35	35.24	1.0
B18	---	169.50	middle and lower Wyodak	13.00	70.50	0.18	35.66	130.0
B19	169.50	---	middle and lower Wyodak	2.50	---	0.04	35.74	25.0
B19	---	---	middle and lower Wyodak	23.00	---	0.37	36.50	3.0
B19	---	---	middle and lower Wyodak	1.00	---	0.02	36.53	0.0
B19	---	---	middle and lower Wyodak	24.00	---	0.39	37.32	3.0
B19	---	---	middle and lower Wyodak	5.50	---	0.09	37.50	55.0
B19	---	---	middle and lower Wyodak	3.50	---	0.06	37.61	1.0
B19	---	171.50	middle and lower Wyodak	2.50	62.00	0.04	37.70	25.0
B20	171.50	---	middle and lower Wyodak	38.00	---	0.54	38.94	3.0
B20	---	---	middle and lower Wyodak	1.50	---	0.02	38.99	15.0
B20	---	---	middle and lower Wyodak	8.50	---	0.12	39.27	1.0
B20	---	---	middle and lower Wyodak	2.00	---	0.03	39.34	20.0
B20	---	---	middle and lower Wyodak	3.50	---	0.05	39.45	1.0
B20	---	---	middle and lower Wyodak	1.50	---	0.02	39.50	15.0
B20	---	---	middle and lower Wyodak	11.50	---	0.16	39.88	1.0
B20	---	173.50	middle and lower Wyodak	4.50	71.00	0.06	40.03	45.0
B21	173.50	---	middle and lower Wyodak	9.00	---	0.15	40.32	90.0
B21	---	---	middle and lower Wyodak	18.00	---	0.30	40.91	3.0
B21	---	---	middle and lower Wyodak	5.00	---	0.08	41.08	50.0
B21	---	---	middle and lower Wyodak	8.00	---	0.13	41.34	1.0
B21	---	---	middle and lower Wyodak	7.50	---	0.13	41.58	5.0
B21	---	---	middle and lower Wyodak	6.50	---	0.11	41.80	65.0
B21	---	175.50	middle and lower Wyodak	5.50	59.50	0.09	41.98	1.0

Table 1–5. Data for samples from core hole 9, Kennecott Energy, Kennecott CBM–1.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Average attrital band thickness (AvABT) (mm)	Cumulative fusain thickness (CuFT) (mm)	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)	Attritus percentage (AP)	Fusain percentage (FP)
B4	19.0	0.0	2	2.50	47.50	5.00	95.00	0.00
B4	0.0	0.0	3	10.00	0.00	100.00	0.00	0.00
B4	19.0	0.0	2	1.00	19.00	5.00	95.00	0.00
B4	3.0	0.0	2	10.00	15.00	40.00	60.00	0.00
B4	19.0	0.0	2	10.50	199.50	5.00	95.00	0.00
B4	0.0	0.0	5	135.00	0.00	100.00	0.00	0.00
B4	10.0	0.0	3	90.00	90.00	50.00	50.00	0.00
B14	19.0	0.0	2	8.50	161.50	5.00	95.00	0.00
B14	0.0	0.0	5	130.00	0.00	100.00	0.00	0.00
B14	19.0	0.0	2	6.50	123.50	5.00	95.00	0.00
B14	0.0	0.0	5	25.00	0.00	100.00	0.00	0.00
B14	19.0	0.0	2	9.00	171.00	5.00	95.00	0.00
ns4	---	---	---	---	---	---	---	---
B15	19.0	0.0	2	10.00	190.00	5.00	95.00	0.00
B15	0.0	0.0	5	55.00	0.00	100.00	0.00	0.00
B15	27.0	0.0	2	27.00	243.00	10.00	90.00	0.00
B16	38.0	0.0	2	20.25	384.75	5.00	95.00	0.00
B16	12.0	0.0	2	41.00	164.00	20.00	80.00	0.00
B16	0.0	0.0	3	20.00	0.00	100.00	0.00	0.00
B17	12.0	0.0	2	6.00	24.00	20.00	80.00	0.00
B17	19.0	0.0	2	14.50	275.50	5.00	95.00	0.00
B17	0.0	0.0	3	20.00	0.00	100.00	0.00	0.00
B17	27.0	0.0	2	26.00	234.00	10.00	90.00	0.00
B18	12.0	0.0	2	65.00	260.00	20.00	80.00	0.00
B18	19.0	0.0	2	12.50	237.50	5.00	95.00	0.00
B18	0.0	0.0	5	130.00	0.00	100.00	0.00	0.00
B19	0.0	0.0	5	25.00	0.00	100.00	0.00	0.00
B19	12.0	0.0	2	46.00	184.00	20.00	80.00	0.00
B19	0.0	10.0	1	0.00	0.00	0.00	0.00	100.00
B19	12.0	0.0	2	48.00	192.00	20.00	80.00	0.00
B19	0.0	0.0	5	55.00	0.00	100.00	0.00	0.00
B19	19.0	0.0	2	1.75	33.25	5.00	95.00	0.00
B19	0.0	0.0	5	25.00	0.00	100.00	0.00	0.00
B20	27.0	0.0	2	38.00	342.00	10.00	90.00	0.00
B20	0.0	0.0	3	15.00	0.00	100.00	0.00	0.00
B20	19.0	0.0	2	4.25	80.75	5.00	95.00	0.00
B20	0.0	0.0	3	20.00	0.00	100.00	0.00	0.00
B20	19.0	0.0	2	1.75	33.25	5.00	95.00	0.00
B20	0.0	0.0	3	15.00	0.00	100.00	0.00	0.00
B20	19.0	0.0	2	5.75	109.25	5.00	95.00	0.00
B20	0.0	0.0	5	45.00	0.00	100.00	0.00	0.00
B21	0.0	0.0	5	90.00	0.00	100.00	0.00	0.00
B21	12.0	0.0	2	36.00	144.00	20.00	80.00	0.00
B21	0.0	0.0	5	50.00	0.00	100.00	0.00	0.00
B21	19.0	0.0	2	4.00	76.00	5.00	95.00	0.00
B21	5.0	0.0	3	37.50	37.50	50.00	50.00	0.00
B21	0.0	0.0	5	65.00	0.00	100.00	0.00	0.00
B21	19.0	0.0	2	2.75	52.25	5.00	95.00	0.00

Table 1–5. Data for samples from core hole 9, Kennecott Energy, Kennecott CBM–1.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Canister average vitrain percentage (CaAvVP)	Canister average attrital percentage (CaAvAP)	Canister average fusain percentage (CaAvFP)	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
B4	---	---	---	30	33.33	---	---	---	---
B4	---	---	---	60	16.67	---	---	---	---
B4	---	---	---	60	16.67	---	---	---	---
B4	---	---	---	60	16.67	---	---	---	---
B4	---	---	---	20	50.00	---	---	---	---
B4	---	---	---	20	50.00	---	---	---	---
B4	41.11	58.89	0.00	20	50.00	45.77	2.92	---	---
B14	---	---	---	60	16.67	---	---	---	---
B14	---	---	---	60	16.67	---	---	---	---
B14	---	---	---	30	33.33	---	---	---	---
B14	---	---	---	30	33.33	---	---	---	---
B14	28.19	71.81	0.00	30	33.33	25.46	3.39	---	---
ns4	---	---	---	---	---	---	---	---	No sample.
B15	---	---	---	20	50.00	---	---	---	---
B15	---	---	---	60	16.67	---	---	---	---
B15	17.52	82.48	0.00	25	40.00	41.37	4.79	---	---
B16	---	---	---	20	50.00	---	---	---	---
B16	---	---	---	60	16.67	---	---	---	---
B16	12.90	87.10	0.00	60	16.67	38.10	3.38	---	---
B17	---	---	---	60	16.67	---	---	---	---
B17	---	---	---	25	40.00	---	---	---	---
B17	---	---	---	25	40.00	---	---	---	---
B17	11.08	88.92	0.00	25	40.00	38.83	3.52	SubC	---
B18	---	---	---	25	40.00	---	---	---	---
B18	---	---	---	25	40.00	---	---	---	---
B18	29.43	70.57	0.00	25	40.00	40.00	2.92	---	---
B19	---	---	---	25	40.00	---	---	---	---
B19	---	---	---	20	50.00	---	---	---	---
B19	---	---	---	60	16.67	---	---	---	---
B19	---	---	---	60	16.67	---	---	---	---
B19	---	---	---	60	16.67	---	---	---	---
B19	---	---	---	60	16.67	---	---	---	---
B19	32.38	66.01	1.61	60	16.67	29.97	2.21	---	---
B20	---	---	---	60	16.67	---	---	---	---
B20	---	---	---	60	16.67	---	---	---	---
B20	---	---	---	60	16.67	---	---	---	---
B20	---	---	---	60	16.67	---	---	---	---
B20	---	---	---	60	16.67	---	---	---	---
B20	---	---	---	60	16.67	---	---	---	---
B20	---	---	---	60	16.67	---	---	---	---
B20	20.39	79.61	0.00	60	16.67	16.67	3.18	---	---
B21	---	---	---	20	50.00	---	---	---	---
B21	---	---	---	20	50.00	---	---	---	---
B21	---	---	---	60	16.67	---	---	---	---
B21	---	---	---	60	16.67	---	---	---	---
B21	---	---	---	60	16.67	---	---	---	---
B21	---	---	---	60	16.67	---	---	---	---
B21	47.94	52.06	0.00	60	16.67	31.79	2.53	---	---

Table 1–5. Data for samples from core hole 9, Kennecott Energy, Kennecott CBM–1.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)
	Top	Bottom						
B23	175.50	---	middle and lower Wyodak	6.50	---	0.14	42.19	1.0
B23	---	---	middle and lower Wyodak	21.50	---	0.46	42.90	2.0
B23	---	---	middle and lower Wyodak	4.00	---	0.09	43.03	40.0
B23	---	---	middle and lower Wyodak	11.00	---	0.23	43.39	2.0
B23	---	177.50	middle and lower Wyodak	4.00	47.00	0.09	43.52	4.0
B24	177.50	---	middle and lower Wyodak	21.50	---	0.33	44.23	1.0
B24	---	---	middle and lower Wyodak	1.50	---	0.02	44.27	15.0
B24	---	---	middle and lower Wyodak	3.00	---	0.05	44.37	1.0
B24	---	---	middle and lower Wyodak	3.00	---	0.05	44.47	30.0
B24	---	---	middle and lower Wyodak	3.00	---	0.05	44.57	1.0
B24	---	---	middle and lower Wyodak	5.00	---	0.08	44.73	50.0
B24	---	---	middle and lower Wyodak	5.50	---	0.08	44.91	5.0
B24	---	---	middle and lower Wyodak	10.50	---	0.16	45.26	1.0
B24	---	179.50	middle and lower Wyodak	12.00	65.00	0.18	45.65	5.0
C2	179.50	---	middle and lower Wyodak	1.50	---	0.03	45.70	1.0
C2	---	---	middle and lower Wyodak	8.00	---	0.13	45.96	2.0
C2	---	181.50	middle and lower Wyodak	50.50	60.00	0.84	47.62	1.0
C18	181.50	---	middle and lower Wyodak	3.50	---	0.07	47.74	1.0
C18	---	---	middle and lower Wyodak	1.00	---	0.02	47.77	10.0
C18	---	---	middle and lower Wyodak	19.00	---	0.36	48.39	1.0
C18	---	---	middle and lower Wyodak	1.00	---	0.02	48.43	10.0
C18	---	183.50	middle and lower Wyodak	29.00	53.50	0.54	49.38	3.0
B22	183.50	---	middle and lower Wyodak	6.50	---	0.10	49.59	1.0
B22	---	---	middle and lower Wyodak	2.00	---	0.03	49.66	20.0
B22	---	---	middle and lower Wyodak	22.50	---	0.35	50.39	1.0
B22	---	---	middle and lower Wyodak	1.00	---	0.02	50.43	10.0
B22	---	---	middle and lower Wyodak	14.00	---	0.22	50.89	1.0
B22	---	---	middle and lower Wyodak	9.00	---	0.14	51.18	90.0
B22	---	185.50	middle and lower Wyodak	9.50	64.50	0.15	51.49	1.0
C19	185.50	187.50	middle and lower Wyodak	54.00	54.00	1.00	53.26	1.0
ns5	187.50	188.50	ns5	30.50	30.50	1.00	54.27	---
C20	188.50	---	middle and lower Wyodak	56.00	---	0.93	56.10	1.0
C20	---	---	middle and lower Wyodak	1.50	---	0.03	56.15	15.0
C20	---	190.50	middle and lower Wyodak	2.50	60.00	0.04	56.23	1.0
C21	190.50	---	middle and lower Wyodak	2.50	---	0.04	56.32	1.0
C21	---	---	middle and lower Wyodak	2.50	---	0.04	56.40	5.0
C21	---	---	middle and lower Wyodak	47.00	---	0.80	57.94	1.0
C21	---	192.50	middle and lower Wyodak	6.50	58.50	0.11	58.15	3.0
C22	192.50	---	middle and lower Wyodak	25.50	---	0.41	58.99	1.0
C22	---	---	middle and lower Wyodak	4.00	---	0.07	59.12	10.0
C22	---	---	middle and lower Wyodak	5.50	---	0.09	59.30	0.0
C22	---	194.50	middle and lower Wyodak	26.50	61.50	0.43	60.17	3.0
C23	194.50	---	middle and lower Wyodak	8.00	---	0.14	60.43	1.0
C23	---	---	middle and lower Wyodak	13.00	---	0.23	60.86	3.0
C23	---	---	middle and lower Wyodak	12.00	---	0.21	61.25	1.0
C23	---	196.50	middle and lower Wyodak	24.00	57.00	0.42	62.04	2.0
C24	196.50	---	middle and lower Wyodak	12.00	---	0.28	62.43	1.0
C24	---	---	middle and lower Wyodak	5.00	---	0.12	62.60	50.0
C24	---	---	middle and lower Wyodak	15.00	---	0.35	63.09	1.0
C24	---	198.50	middle and lower Wyodak	11.00	43.00	0.26	63.45	5.0

Table 1–5. Data for samples from core hole 9, Kennecott Energy, Kennecott CBM–1.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Average attrital band thickness (AvABT) (mm)	Cumulative fusain thickness (CuFT) (mm)	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)	Attritus percentage (AP)	Fusain percentage (FP)
B23	19.0	0.0	2	3.25	61.75	5.00	95.00	0.00
B23	8.0	0.0	2	43.00	172.00	20.00	80.00	0.00
B23	0.0	0.0	5	40.00	0.00	100.00	0.00	0.00
B23	3.0	1.0	2	43.60	65.40	39.64	59.45	0.91
B23	4.0	0.0	2	20.00	20.00	50.00	50.00	0.00
B24	19.0	1.0	2	10.70	203.30	4.98	94.56	0.47
B24	0.0	0.0	3	15.00	0.00	100.00	0.00	0.00
B24	19.0	0.0	2	1.50	28.50	5.00	95.00	0.00
B24	0.0	0.0	5	30.00	0.00	100.00	0.00	0.00
B24	19.0	0.0	2	1.50	28.50	5.00	95.00	0.00
B24	0.0	0.0	5	50.00	0.00	100.00	0.00	0.00
B24	5.0	0.0	3	27.50	27.50	50.00	50.00	0.00
B24	19.0	0.0	2	5.25	99.75	5.00	95.00	0.00
B24	5.0	0.0	3	60.00	60.00	50.00	50.00	0.00
C2	19.0	0.0	2	0.75	14.25	5.00	95.00	0.00
C2	2.0	0.0	2	40.00	40.00	50.00	50.00	0.00
C2	19.0	0.0	2	25.25	479.75	5.00	95.00	0.00
C18	19.0	0.0	2	1.75	33.25	5.00	95.00	0.00
C18	0.0	0.0	3	10.00	0.00	100.00	0.00	0.00
C18	19.0	0.0	2	9.50	180.50	5.00	95.00	0.00
C18	0.0	0.0	3	10.00	0.00	100.00	0.00	0.00
C18	17.0	0.0	2	43.50	246.50	15.00	85.00	0.00
B22	19.0	0.0	2	3.25	61.75	5.00	95.00	0.00
B22	0.0	0.0	3	20.00	0.00	100.00	0.00	0.00
B22	19.0	0.0	2	11.25	213.75	5.00	95.00	0.00
B22	0.0	0.0	3	10.00	0.00	100.00	0.00	0.00
B22	19.0	0.0	2	7.00	133.00	5.00	95.00	0.00
B22	0.0	0.0	5	90.00	0.00	100.00	0.00	0.00
B22	19.0	0.0	2	4.75	90.25	5.00	95.00	0.00
C19	9.0	0.0	2	54.00	486.00	10.00	90.00	0.00
ns5	---	---	---	---	---	---	---	---
C20	19.0	0.0	2	28.00	532.00	5.00	95.00	0.00
C20	0.0	0.0	3	15.00	0.00	100.00	0.00	0.00
C20	19.0	0.0	2	1.25	23.75	5.00	95.00	0.00
C21	19.0	0.0	2	1.25	23.75	5.00	95.00	0.00
C21	5.0	0.0	3	12.50	12.50	50.00	50.00	0.00
C21	19.0	0.0	2	23.50	446.50	5.00	95.00	0.00
C21	12.0	0.0	2	13.00	52.00	20.00	80.00	0.00
C22	19.0	0.0	2	12.75	242.25	5.00	95.00	0.00
C22	6.7	0.0	3	24.00	16.00	60.00	40.00	0.00
C22	0.0	0.0	0	0.00	0.00	0.00	0.00	0.00
C22	7.0	0.0	2	79.50	185.50	30.00	70.00	0.00
C23	19.0	0.0	2	4.00	76.00	5.00	95.00	0.00
C23	3.0	0.0	2	65.00	65.00	50.00	50.00	0.00
C23	19.0	0.0	2	6.00	114.00	5.00	95.00	0.00
C23	3.0	0.0	2	96.00	144.00	40.00	60.00	0.00
C24	9.0	0.0	2	12.00	108.00	10.00	90.00	0.00
C24	0.0	0.0	5	50.00	0.00	100.00	0.00	0.00
C24	19.0	0.0	2	7.50	142.50	5.00	95.00	0.00
C24	7.5	0.0	3	44.00	66.00	40.00	60.00	0.00

Table 1–5. Data for samples from core hole 9, Kennecott Energy, Kennecott CBM–1.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Canister average vitrain percentage (CaAvVP)	Canister average attrital percentage (CaAvAP)	Canister average fusain percentage (CaAvFP)	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
B23	---	---	---	60	16.67	---	---	---	---
B23	---	---	---	60	16.67	---	---	---	---
B23	---	---	---	60	16.67	---	---	---	---
B23	---	---	---	60	16.67	---	---	---	---
B23	31.88	67.90	0.21	60	16.67	16.67	3.75	---	---
B24	---	---	---	60	16.67	---	---	---	---
B24	---	---	---	60	16.67	---	---	---	---
B24	---	---	---	60	16.67	---	---	---	---
B24	---	---	---	60	16.67	---	---	---	---
B24	---	---	---	60	16.67	---	---	---	---
B24	---	---	---	60	16.67	---	---	---	---
B24	---	---	---	60	16.67	---	---	---	---
B24	---	---	---	60	16.67	---	---	---	---
B24	---	---	---	30	33.33	---	---	---	---
B24	30.99	68.85	0.15	60	16.67	19.36	1.89	---	---
C2	---	---	---	60	16.67	---	---	---	---
C2	---	---	---	60	16.67	---	---	---	---
C2	11.00	89.00	0.00	60	16.67	16.67	1.59	---	---
C18	---	---	---	60	16.67	---	---	---	---
C18	---	---	---	60	16.67	---	---	---	---
C18	---	---	---	60	16.67	---	---	---	---
C18	---	---	---	60	16.67	---	---	---	---
C18	13.97	86.03	0.00	60	16.67	16.67	1.24	---	---
B22	---	---	---	60	16.67	---	---	---	---
B22	---	---	---	60	16.67	---	---	---	---
B22	---	---	---	20	50.00	---	---	---	---
B22	---	---	---	20	50.00	---	---	---	---
B22	---	---	---	60	16.67	---	---	---	---
B22	---	---	---	60	16.67	---	---	---	---
B22	22.67	77.33	0.00	60	16.67	28.81	2.61	---	---
C19	10.00	90.00	0.00	60	16.67	16.67	2.23	---	---
ns5	---	---	---	---	---	---	---	---	No sample.
C20	---	---	---	60	16.67	---	---	---	---
C20	---	---	---	60	16.67	---	---	---	---
C20	7.38	92.63	0.00	60	16.67	16.67	2.78	---	---
C21	---	---	---	60	16.67	---	---	---	---
C21	---	---	---	60	16.67	---	---	---	---
C21	---	---	---	60	16.67	---	---	---	---
C21	8.59	91.41	0.00	60	16.67	16.67	2.44	---	---
C22	---	---	---	60	16.67	---	---	---	---
C22	---	---	---	60	16.67	---	---	---	---
C22	---	---	---	60	16.67	---	---	---	Parting.
C22	18.90	72.15	0.00	15	66.67	38.21	2.15	SubB	---
C23	---	---	---	60	16.67	---	---	---	---
C23	---	---	---	30	33.33	---	---	---	---
C23	---	---	---	60	16.67	---	---	---	---
C23	30.00	70.00	0.00	20	50.00	34.50	1.34	---	---
C24	---	---	---	20	50.00	---	---	---	---
C24	---	---	---	20	50.00	---	---	---	---
C24	---	---	---	20	50.00	---	---	---	---
C24	26.40	73.60	0.00	20	50.00	50.00	1.48	---	---

Table 1–5. Data for samples from core hole 9, Kennecott Energy, Kennecott CBM–1.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)
	Top	Bottom						
C25	198.50	---	middle and lower Wyodak	7.50	---	0.14	63.70	3.0
C25	---	---	middle and lower Wyodak	4.50	---	0.08	63.85	45.0
C25	---	---	middle and lower Wyodak	20.00	---	0.36	64.50	2.0
C25	---	---	middle and lower Wyodak	13.00	---	0.24	64.93	5.0
C25	---	---	middle and lower Wyodak	7.00	---	0.13	65.16	70.0
C25	---	200.50	middle and lower Wyodak	3.00	55.00	0.05	65.26	5.0
C26	200.50	---	middle and lower Wyodak	46.00	---	0.78	66.77	2.0
C26	---	202.50	middle and lower Wyodak	13.00	59.00	0.22	67.19	130.0
C27	202.50	---	middle and lower Wyodak	2.50	---	0.04	67.27	25.0
C27	---	---	middle and lower Wyodak	18.50	---	0.30	67.88	3.0
C27	---	---	middle and lower Wyodak	2.00	---	0.03	67.95	20.0
C27	---	---	middle and lower Wyodak	14.00	---	0.23	68.41	1.0
C27	---	---	middle and lower Wyodak	1.00	---	0.02	68.44	10.0
C27	---	204.50	middle and lower Wyodak	23.00	61.00	0.38	69.19	3.0

Table 1–5. Data for samples from core hole 9, Kennecott Energy, Kennecott CBM–1.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Average attrital band thickness (AvABT) (mm)	Cumulative fusain thickness (CuFT) (mm)	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)	Attritus percentage (AP)	Fusain percentage (FP)
C25	4.5	0.0	2	30.00	45.00	40.00	60.00	0.00
C25	0.0	0.0	5	45.00	0.00	100.00	0.00	0.00
C25	8.0	0.0	2	40.00	160.00	20.00	80.00	0.00
C25	11.7	0.0	3	39.00	91.00	30.00	70.00	0.00
C25	0.0	0.0	5	70.00	0.00	100.00	0.00	0.00
C25	11.7	0.0	3	9.00	21.00	30.00	70.00	0.00
C26	18.0	0.0	2	46.00	414.00	10.00	90.00	0.00
C26	0.0	0.0	5	130.00	0.00	100.00	0.00	0.00
C27	0.0	0.0	5	25.00	0.00	100.00	0.00	0.00
C27	12.0	0.0	2	37.00	148.00	20.00	80.00	0.00
C27	0.0	0.0	3	20.00	0.00	100.00	0.00	0.00
C27	19.0	0.0	2	7.00	133.00	5.00	95.00	0.00
C27	0.0	0.0	3	10.00	0.00	100.00	0.00	0.00
C27	27.0	0.0	2	23.00	207.00	10.00	90.00	0.00

Table 1–5. Data for samples from core hole 9, Kennecott Energy, Kennecott CBM–1.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Canister average vitrain percentage (CaAvVP)	Canister average attrital percentage (CaAvAP)	Canister average fusain percentage (CaAvFP)	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
C25	---	---	---	60	16.67	---	---	---	---
C25	---	---	---	60	16.67	---	---	---	---
C25	---	---	---	60	16.67	---	---	---	---
C25	---	---	---	60	16.67	---	---	---	---
C25	---	---	---	60	16.67	---	---	---	---
C25	42.36	57.64	0.00	60	16.67	16.67	1.72	---	---
C26	---	---	---	60	16.67	---	---	---	---
C26	29.83	70.17	0.00	60	16.67	16.67	1.52	---	---
C27	---	---	---	60	16.67	---	---	---	---
C27	---	---	---	60	16.67	---	---	---	---
C27	---	---	---	60	16.67	---	---	---	---
C27	---	---	---	60	16.67	---	---	---	---
C27	---	---	---	60	16.67	---	---	---	---
C27	20.00	80.00	0.00	60	16.67	16.67	1.70	---	---

Table 1-6. Data for samples from core hole 10, Kennecott Energy, Kennecott CBM-2.

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; nr, data not recorded; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)	Average attrital band thickness (AvABT) (mm)	Cumulative fusain thickness (CuFT) (mm)
	Top	Bottom								
10	165.00	---	upper Wyodak	33.00	---	0.49	1.08	50.0	0.0	0.0
10	---	---	upper Wyodak	1.00	---	0.01	1.12	0.0	0.0	10.0
10	---	---	upper Wyodak	33.50	---	0.49	2.21	50.0	0.0	0.0
10	---	167.00	upper Wyodak	0.50	68.00	0.01	2.23	0.0	0.0	5.0
22	167.00	---	upper Wyodak	46.00	---	0.68	3.74	50.0	0.0	0.0
22	---	---	upper Wyodak	17.00	---	0.25	4.30	4.0	15.0	0.0
22	---	169.00	upper Wyodak	5.00	68.00	0.07	4.46	0.0	2.0	0.0
ns1	169.00	180.50	ns1	350.50	350.50	1.00	15.96	---	---	---
23	180.50	182.50	middle and lower Wyodak	63.00	63.00	1.00	18.03	50.0	0.0	10.0
24	182.50	---	middle and lower Wyodak	19.00	---	0.31	18.65	50.0	0.0	20.0
24	---	184.50	middle and lower Wyodak	43.00	62.00	0.69	20.06	40.0	50.0	10.0
29	184.50	186.50	middle and lower Wyodak	65.50	65.50	1.00	22.21	40.0	50.0	10.0
31	186.50	188.50	middle and lower Wyodak	63.00	63.00	1.00	24.28	10.0	40.0	5.0
33	188.50	---	middle and lower Wyodak	32.00	---	0.52	25.33	10.0	40.0	5.0
33	---	190.50	middle and lower Wyodak	30.00	62.00	0.48	26.31	30.0	0.0	5.0
ns2	190.50	191.50	ns2	30.50	30.50	1.00	27.31	---	---	---
34	191.50	---	middle and lower Wyodak	8.00	---	0.14	27.58	30.0	0.0	2.0
34	---	193.50	middle and lower Wyodak	50.00	58.00	0.86	29.22	50.0	0.0	2.0
35	193.50	195.50	middle and lower Wyodak	63.00	63.00	1.00	31.28	40.0	10.0	2.0
36	195.50	197.50	middle and lower Wyodak	61.00	61.00	1.00	33.28	50.0	40.0	5.0
37	197.50	---	middle and lower Wyodak	37.00	---	0.64	34.50	2.0	100.0	0.0
37	---	199.50	middle and lower Wyodak	21.00	58.00	0.36	35.19	20.0	20.0	0.0
41	199.50	---	middle and lower Wyodak	26.00	---	0.43	36.04	10.0	40.0	2.0
41	---	201.46	middle and lower Wyodak	34.00	60.00	0.57	37.16	50.0	0.0	0.0
41-nr	201.46	201.50	middle and lower Wyodak	7.00	7.00	1.00	37.39	---	---	---
43	201.50	203.50	middle and lower Wyodak	63.00	63.00	1.00	39.45	40.0	40.0	4.0
44	203.50	---	middle and lower Wyodak	13.00	---	0.22	39.88	2.0	20.0	0.0
44	---	---	middle and lower Wyodak	10.00	---	0.17	40.21	2.0	30.0	0.0
44	---	205.50	middle and lower Wyodak	36.00	59.00	0.61	41.39	2.0	30.0	5.0
ns3	205.50	206.50	ns3	30.50	30.50	1.00	42.39	---	---	---
45	206.50	---	middle and lower Wyodak	33.00	---	0.52	43.47	40.0	0.0	10.0
45	---	208.50	middle and lower Wyodak	30.00	63.00	0.48	44.46	3.0	40.0	0.0
46	208.50	210.50	middle and lower Wyodak	60.00	60.00	1.00	46.42	5.0	0.0	200.0
48	210.50	---	middle and lower Wyodak	8.00	---	0.13	46.69	5.0	0.0	20.0
48	---	212.50	middle and lower Wyodak	56.00	64.00	0.88	48.52	2.0	40.0	20.0
49	212.50	---	middle and lower Wyodak	60.00	---	0.87	50.49	5.0	30.0	20.0
49	---	214.50	middle and lower Wyodak	9.00	69.00	0.13	50.79	1.0	3.0	0.0
54	214.50	---	middle and lower Wyodak	14.00	---	0.21	51.25	20.0	0.0	2.0
54	---	216.50	middle and lower Wyodak	52.00	66.00	0.79	52.95	2.0	40.0	5.0
56	216.50	---	middle and lower Wyodak	9.00	---	0.13	53.25	2.0	40.0	0.0
56	---	218.50	middle and lower Wyodak	58.00	67.00	0.87	55.15	40.0	40.0	0.0
57	218.50	---	middle and lower Wyodak	18.00	---	0.45	55.74	20.0	60.0	0.0
57	---	219.80	middle and lower Wyodak	22.00	40.00	0.55	56.46	5.0	0.0	50.0
57-nr	219.80	220.50	middle and lower Wyodak	20.00	20.00	1.00	57.12	---	---	---
ns4	220.50	221.50	ns4	30.50	30.50	1.00	58.12	---	---	---
58	221.50	---	middle and lower Wyodak	30.00	---	0.53	59.10	2.0	6.0	250.0
58	---	223.50	middle and lower Wyodak	27.00	57.00	0.47	59.99	40.0	20.0	15.0
59	223.50	---	middle and lower Wyodak	6.00	---	0.09	60.19	35.0	15.0	10.0
59	---	---	middle and lower Wyodak	34.00	---	0.52	61.30	2.0	2.0	10.0
59	---	---	middle and lower Wyodak	23.00	---	0.35	62.06	1.0	40.0	5.0
59	---	225.50	middle and lower Wyodak	2.00	65.00	0.03	62.12	2.0	2.0	5.0

Table 1–6. Data for samples from core hole 10, Kennecott Energy, Kennecott CBM–2.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; nr, data not recorded; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)	Attritus percentage (AP)	Fusain percentage (FP)	Canister average vitrain percentage (CaAvVP)	Canister average attrital percentage (CaAvAP)	Canister average fusain percentage (CaAvFP)	Cleat spacing (CS) (mm)
10	5	330.00	0.00	100.00	0.00	0.00	---	---	---	50
10	8	0.00	0.00	0.00	0.00	100.00	---	---	---	---
10	5	335.00	0.00	100.00	0.00	0.00	---	---	---	50
10	8	0.00	0.00	0.00	0.00	100.00	97.79	0.00	2.21	---
22	5	460.00	0.00	100.00	0.00	0.00	---	---	---	50
22	2	35.79	134.21	21.05	78.95	0.00	---	---	---	50
22	1	0.00	50.00	0.00	100.00	0.00	---	---	---	50
ns1	---	---	---	---	---	---	---	---	---	---
23	5	620.00	0.00	98.41	0.00	1.59	98.41	0.00	1.59	20
24	5	170.00	0.00	89.47	0.00	10.53	---	---	---	30
24	4	186.67	233.33	43.41	54.26	2.33	57.53	37.63	4.84	30
29	4	286.67	358.33	43.77	54.71	1.53	43.77	54.71	1.53	10
31	3	125.00	500.00	19.84	79.37	0.79	19.84	79.37	0.79	10
33	3	63.00	252.00	19.69	78.75	1.56	---	---	---	10
33	5	295.00	0.00	98.33	0.00	1.67	57.74	40.65	1.61	10
ns2	---	---	---	---	---	---	---	---	---	---
34	5	78.00	0.00	97.50	0.00	2.50	---	---	---	50
34	5	498.00	0.00	99.60	0.00	0.40	99.31	0.00	0.69	5
35	4	502.40	125.60	79.75	19.94	0.32	79.75	19.94	0.32	30
36	4	336.11	268.89	55.10	44.08	0.82	55.10	44.08	0.82	50
37	1	7.25	362.75	1.96	98.04	0.00	---	---	---	50
37	3	105.00	105.00	50.00	50.00	0.00	19.35	80.65	0.00	30
41	3	51.60	206.40	19.85	79.38	0.77	---	---	---	30
41	5	340.00	0.00	100.00	0.00	0.00	65.27	34.40	0.33	50
41-nr	---	---	---	---	---	---	---	---	---	50
43	4	313.00	313.00	49.68	49.68	0.63	49.68	49.68	0.63	50
44	2	11.82	118.18	9.09	90.91	0.00	---	---	---	50
44	1	6.25	93.75	6.25	93.75	0.00	---	---	---	5
44	1	22.19	332.81	6.16	92.45	1.39	6.82	92.33	0.85	50
ns3	---	---	---	---	---	---	---	---	---	---
45	5	320.00	0.00	96.97	0.00	3.03	---	---	---	5
45	1	20.93	279.07	6.98	93.02	0.00	54.12	44.30	1.59	20
46	3	400.00	0.00	66.67	0.00	33.33	66.67	0.00	33.33	50
48	3	60.00	0.00	75.00	0.00	25.00	---	---	---	50
48	1	25.71	514.29	4.59	91.84	3.57	13.39	80.36	6.25	50
49	3	82.86	497.14	13.81	82.86	3.33	---	---	---	30
49	2	22.50	67.50	25.00	75.00	0.00	15.27	81.83	2.90	50
54	3	138.00	0.00	98.57	0.00	1.43	---	---	---	30
54	1	24.52	490.48	4.72	94.32	0.96	24.62	74.31	1.06	20
56	1	4.29	85.71	4.76	95.24	0.00	---	---	---	30
56	4	290.00	290.00	50.00	50.00	0.00	43.92	56.08	0.00	10
57	3	45.00	135.00	25.00	75.00	0.00	---	---	---	10
57	3	170.00	0.00	77.27	0.00	22.73	53.75	33.75	12.50	5
57-nr	---	---	---	---	---	---	---	---	---	2
ns4	---	---	---	---	---	---	---	---	---	---
58	2	12.50	37.50	4.17	12.50	83.33	---	---	---	10
58	4	170.00	85.00	62.96	31.48	5.56	32.02	21.49	46.49	20
59	4	35.00	15.00	58.33	25.00	16.67	---	---	---	20
59	2	165.00	165.00	48.53	48.53	2.94	---	---	---	30
59	1	5.49	219.51	2.39	95.44	2.17	---	---	---	20
59	2	7.50	7.50	37.50	37.50	25.00	32.77	62.62	4.62	20

Table 1–6. Data for samples from core hole 10, Kennecott Energy, Kennecott CBM–2.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; nr, data not recorded; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Cleat frequency (CFr) (cleats/m)	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
10	20.00	---	---	---	Hard, solid.
10	---	---	---	---	Hard, solid.
10	20.00	---	---	---	Hard, solid.
10	---	20.00	3.62	SubC	Hard, solid.
22	20.00	---	---	---	Hard, solid.
22	20.00	---	---	---	Hard, solid.
22	20.00	---	---	---	Hard, solid.
ns1	---	---	---	---	No sample.
23	50.00	50.00	3.61	---	---
24	33.33	---	---	---	Clay blebs at base.
24	33.33	33.33	3.30	SubC	---
29	100.00	100.00	3.74	---	---
31	100.00	100.00	3.02	---	---
33	100.00	---	---	---	---
33	100.00	100.00	1.23	SubC	---
ns2	---	---	---	---	No sample.
34	20.00	---	---	---	---
34	200.00	175.17	0.83	---	---
35	33.33	33.33	1.64	---	---
36	20.00	20.00	1.12	---	---
37	20.00	---	---	---	---
37	33.33	24.83	1.29	---	---
41	33.33	---	---	---	---
41	20.00	25.78	1.10	---	---
41-nr	20.00	---	---	---	Vitrain, attritus, and fusain not recorded.
43	20.00	20.00	1.02	SubC	---
44	20.00	---	---	---	---
44	200.00	---	---	---	---
44	20.00	50.51	0.94	---	One large 30-mm-thick vitrain band with 5 mm of fusain (cumulative thickness)
ns3	---	---	---	---	No sample.
45	200.00	---	---	---	---
45	50.00	128.57	0.05	SubC	---
46	20.00	20.00	1.44	---	Hard.
48	20.00	---	---	---	---
48	20.00	20.00	1.85	---	---
49	33.33	---	---	---	Papery fusain at 40 cm with small amount of pyrite.
49	20.00	31.59	1.77	---	---
54	33.33	---	---	---	Highly fractured sample.
54	50.00	46.46	1.51	---	---
56	33.33	---	---	---	---
56	100.00	91.04	1.07	---	---
57	100.00	---	---	SubB	---
57	200.00	155.00	1.50	---	---
57-nr	500.00	---	---	---	Vitrain, attritus, and fusain not recorded, resin.
ns4	---	---	---	---	No sample.
58	100.00	---	---	---	---
58	50.00	76.32	1.37	SubC	---
59	50.00	---	---	---	---
59	33.33	---	---	---	---
59	50.00	---	---	---	---
59	50.00	41.28	0.85	---	---

Table 1–6. Data for samples from core hole 10, Kennecott Energy, Kennecott CBM–2.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; nr, data not recorded; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)	Average attrital band thickness (AvABT) (mm)	Cumulative fusain thickness (CuFT) (mm)
	Top	Bottom								
61	225.50	227.50	middle and lower Wyodak	57.00	57.00	1.00	63.99	5.0	10.0	50.0
C28	227.50	---	middle and lower Wyodak	34.00	---	0.53	65.11	10.0	0.0	35.0
C28	---	229.50	middle and lower Wyodak	30.00	64.00	0.47	66.09	1.0	5.0	40.0
C29	229.50	231.50	middle and lower Wyodak	58.00	58.00	1.00	68.00	10.0	20.0	7.0
C30	231.50	233.50	middle and lower Wyodak	61.00	61.00	1.00	70.00	10.0	20.0	30.0
C31	233.50	---	middle and lower Wyodak	34.00	---	0.57	71.11	5.0	0.0	150.0
C31	---	235.50	middle and lower Wyodak	26.00	60.00	0.43	71.97	5.0	10.0	5.0
C32	235.50	---	middle and lower Wyodak	10.00	---	0.15	72.29	5.0	40.0	5.0
C32	---	237.00	middle and lower Wyodak	25.00	35.00	0.38	73.11	30.0	0.0	0.0
ns5	237.00	239.70	ns5	82.00	82.00	1.00	75.80	---	---	---
C32	239.70	240.40	middle and lower Wyodak	31.00	66.00	0.47	76.82	5.0	5.0	5.0

Table 1–6. Data for samples from core hole 10, Kennecott Energy, Kennecott CBM–2.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; nr, data not recorded; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)	Attritus percentage (AP)	Fusain percentage (FP)	Canister average vitrain percentage (CaAvVP)	Canister average attrital percentage (CaAvAP)	Canister average fusain percentage (CaAvFP)	Cleat spacing (CS) (mm)
61	3	173.33	346.67	30.41	60.82	8.77	30.41	60.82	8.77	10
C28	3	305.00	0.00	89.71	0.00	10.29	---	---	---	10
C28	2	43.33	216.67	14.44	72.22	13.33	54.43	33.85	11.72	10
C29	3	191.00	382.00	32.93	65.86	1.21	32.93	65.86	1.21	10
C30	3	193.33	386.67	31.69	63.39	4.92	31.69	63.39	4.92	5
C31	3	190.00	0.00	55.88	0.00	44.12	---	---	---	5
C31	3	85.00	170.00	32.69	65.38	1.92	45.83	28.33	25.83	20
C32	3	10.56	84.44	10.56	84.44	5.00	---	---	---	30
C32	5	250.00	0.00	100.00	0.00	0.00	74.44	24.13	1.43	30
ns5	---	---	---	---	---	---	---	---	---	---
C32	3	152.50	152.50	49.19	49.19	1.61	62.58	35.90	1.52	20

Table 1–6. Data for samples from core hole 10, Kennecott Energy, Kennecott CBM–2.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; nr, data not recorded; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Cleat frequency (C _{Fr}) (cleats/m)	Canister average cleat frequency (CaAvC _{Fr}) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
61	100.00	100.00	0.78 ---	----	
C28	100.00	---	---	----	
C28	100.00	100.00	2.05 SubC		5 mm of fusain at 28, 42, and 45 cm.
C29	100.00	100.00	0.31 ---	----	
C30	200.00	200.00	1.29 ---		Highly fractured sample.
C31	200.00	---	---	----	
C31	50.00	135.00	0.93 ---	----	
C32	33.33	---	---	----	Slickensides.
C32	33.33	17.68	0.89 ---	----	
ns5	---	---	---	----	Rock excluded from canister.
C32	50.00	41.16	3.50 SubB	---	

Table 1–7. Data for samples from core hole 11, Barrett Resources Corporation, CARU State 22–16–5075W.

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)	Average attrital band thickness (AvABT) (mm)	Cumulative fusain thickness (CuFT) (mm)
	Top	Bottom								
D1	1,352.80	1,354.80	Big George	60.00	60.00	1.00	1.97	2.0	5.0	0.0
D2	1,354.80	1,356.80	Big George	58.00	58.00	1.00	3.87	5.0	20.0	3.0
D3	1,356.80	1,358.80	Big George	60.00	60.00	1.00	5.84	5.0	30.0	0.0
D4	1,358.80	1,360.80	Big George	60.00	60.00	1.00	7.81	5.0	30.0	0.0
D5	1,360.80	---	Big George	20.00	---	0.33	8.46	5.0	30.0	0.0
D5	---	1,362.80	Big George	40.00	60.00	0.67	9.78	2.0	5.0	2.0
D6	1,362.80	1,364.80	Big George	58.00	58.00	1.00	11.68	3.0	10.0	0.0
ns1	1,364.80	1,365.80	ns1	30.50	30.50	1.00	12.68	---	---	---
ns2	1,365.80	1,368.00	ns2	67.00	67.00	1.00	14.88	---	---	---
D7	1,368.00	1,370.00	Big George	60.00	60.00	1.00	16.85	10.0	30.0	0.0
D8	1,370.00	1,372.00	Big George	60.00	60.00	1.00	18.82	2.0	20.0	0.0
D9	1,372.00	---	Big George	35.00	---	0.58	19.96	5.0	2.0	0.0
D9	---	1,374.00	Big George	25.00	60.00	0.42	20.78	2.0	1.0	5.0
D10	1,374.00	1,376.00	Big George	63.00	63.00	1.00	22.85	10.0	10.0	0.0
D11	1,376.00	1,378.00	Big George	58.00	58.00	1.00	24.75	3.0	10.0	2.0
D12	1,378.00	1,380.00	Big George	58.00	58.00	1.00	26.66	2.0	10.0	0.0
ns3	1,380.00	1,381.00	ns3	30.50	30.50	1.00	27.66	---	---	---
ns4	1,381.00	1,382.00	ns4	30.50	30.50	1.00	28.66	---	---	---
ns5	1,382.00	1,384.00	ns5	61.00	61.00	1.00	30.66	---	---	---
ns6	1,384.00	1,751.00	ns6	11,187.00	11,187.00	1.00	397.69	---	---	---
D14	1,751.00	1,752.00	Werner	30.00	30.00	1.00	398.67	3.0	3.0	0.0
D13	1,752.00	1,754.00	Werner	61.00	61.00	1.00	400.67	10.0	30.0	25.0
ns7	1,754.00	1,755.00	ns7	30.50	30.50	1.00	401.67	---	---	---
ns8	1,755.00	1,759.00	ns8	122.00	122.00	1.00	405.68	---	---	---
ns9	1,759.00	1,761.00	ns9	61.00	61.00	1.00	407.68	---	---	---
D25	1,761.00	---	Werner	20.00	---	0.36	408.33	50.0	20.0	10.0
D25	---	1,763.00	Werner	36.00	56.00	0.64	409.51	5.0	5.0	10.0
D15	1,763.00	1,765.00	Werner	60.00	60.00	1.00	411.48	5.0	10.0	25.0
D16	1,765.00	---	Werner	30.00	---	0.50	412.47	5.0	10.0	25.0
D16	---	1,767.00	Werner	30.00	60.00	0.50	413.45	10.0	5.0	0.0
D17	1,767.00	1,769.00	Werner	60.00	60.00	1.00	415.42	10.0	5.0	85.0
D18	1,769.00	1,771.00	Werner	60.00	60.00	1.00	417.39	10.0	10.0	110.0
D19	1,771.00	---	Werner	26.00	---	0.46	418.24	10.0	5.0	30.0
D19	---	1,773.00	Werner	30.00	56.00	0.54	419.23	30.0	2.0	5.0
D20	1,773.00	1,775.00	Werner	60.00	60.00	1.00	421.19	5.0	3.0	60.0
D21	1,775.00	1,777.00	Werner	60.00	60.00	1.00	423.16	5.0	3.0	60.0
D22	1,777.00	1,779.00	Werner	49.00	49.00	1.00	424.77	10.0	5.0	35.0
D23	1,779.00	1,781.00	Werner	60.00	60.00	1.00	426.74	10.0	5.0	50.0
D24	1,781.00	---	Werner	24.00	---	0.40	427.53	20.0	30.0	20.0
D24	---	1,783.00	Werner	36.00	60.00	0.60	428.71	10.0	5.0	10.0

Table 1–7. Data for samples from core hole 11, Barrett Resources Corporation, CARU State 22–16–5075W.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; ---, no data]

Canister number	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)	Attritus percentage (AP)	Fusain percentage (FP)	Canister average vitrain percentage (CaAvVP)	Canister average attrital percentage (CaAvAP)	Canister average fusain percentage (CaAvFP)
D1	2	171.43	428.57	28.57	71.43	0.00	28.57	71.43	0.00
D2	3	115.40	461.60	19.90	79.59	0.52	19.90	79.59	0.52
D3	3	85.71	514.29	14.29	85.71	0.00	14.29	85.71	0.00
D4	3	85.71	514.29	14.29	85.71	0.00	14.29	85.71	0.00
D5	3	28.57	171.43	14.29	85.71	0.00	---	---	---
D5	2	113.71	284.29	28.43	71.07	0.50	23.71	75.95	0.33
D6	2	133.85	446.15	23.08	76.92	0.00	23.08	76.92	0.00
ns1	---	---	---	---	---	---	---	---	---
ns2	---	---	---	---	---	---	---	---	---
D7	3	150.00	450.00	25.00	75.00	0.00	25.00	75.00	0.00
D8	2	54.55	545.45	9.09	90.91	0.00	9.09	90.91	0.00
D9	3	250.00	100.00	71.43	28.57	0.00	---	---	---
D9	2	163.33	81.67	65.33	32.67	2.00	68.89	30.28	0.83
D10	3	315.00	315.00	50.00	50.00	0.00	50.00	50.00	0.00
D11	2	133.38	444.62	23.00	76.66	0.34	23.00	76.66	0.34
D12	2	96.67	483.33	16.67	83.33	0.00	16.67	83.33	0.00
ns3	---	---	---	---	---	---	---	---	---
ns4	---	---	---	---	---	---	---	---	---
ns5	---	---	---	---	---	---	---	---	---
ns6	---	---	---	---	---	---	---	---	---
D14	2	150.00	150.00	50.00	50.00	0.00	50.00	50.00	0.00
D13	3	146.25	438.75	23.98	71.93	4.10	23.98	71.93	4.10
ns7	---	---	---	---	---	---	---	---	---
ns8	---	---	---	---	---	---	---	---	---
ns9	---	---	---	---	---	---	---	---	---
D25	4	135.71	54.29	67.86	27.14	5.00	---	---	---
D25	3	175.00	175.00	48.61	48.61	2.78	55.48	40.94	3.57
D15	3	191.67	383.33	31.94	63.89	4.17	31.94	63.89	4.17
D16	3	91.67	183.33	30.56	61.11	8.33	---	---	---
D16	3	200.00	100.00	66.67	33.33	0.00	48.61	47.22	4.17
D17	3	343.33	171.67	57.22	28.61	14.17	57.22	28.61	14.17
D18	3	245.00	245.00	40.83	40.83	18.33	40.83	40.83	18.33
D19	3	153.33	76.67	58.97	29.49	11.54	---	---	---
D19	4	276.56	18.44	92.19	6.15	1.67	76.77	16.98	6.25
D20	3	337.50	202.50	56.25	33.75	10.00	56.25	33.75	10.00
D21	3	337.50	202.50	56.25	33.75	10.00	56.25	33.75	10.00
D22	3	303.33	151.67	61.90	30.95	7.14	61.90	30.95	7.14
D23	3	366.67	183.33	61.11	30.56	8.33	61.11	30.56	8.33
D24	3	88.00	132.00	36.67	55.00	8.33	---	---	---
D24	3	233.33	116.67	64.81	32.41	2.78	53.56	41.44	5.00

Table 1–7. Data for samples from core hole 11, Barrett Resources Corporation, CARU State 22–16–5075W.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; ---, no data]

Canister number	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
D1	20	50.00	50.00	28.46	SubB	Highly fragmented sample.
D2	20	50.00	50.00	29.49	---	---
D3	10	100.00	100.00	32.00	---	Highly fragmented sample/slickensides.
D4	10	100.00	100.00	33.14	---	Solid.
D5	30	33.33	---	---	---	---
D5	10	100.00	77.78	31.20	---	---
D6	30	33.33	33.33	34.10	---	---
ns1	---	---	---	---	---	Sample taken for adsorption analysis.
ns2	---	---	---	---	---	No sample, lost in core hole.
D7	20	50.00	50.00	31.11	---	---
D8	30	33.33	33.33	31.27	---	Tight.
D9	30	33.33	---	---	---	---
D9	30	33.33	33.33	34.81	---	Fusain in attritus.
D10	30	33.33	33.33	35.02	---	Resin at 10 cm.
D11	20	50.00	50.00	32.95	---	Kaolinite.
D12	10	100.00	100.00	30.81	---	---
ns3	---	---	---	---	---	Bagged sample.
ns4	---	---	---	---	---	Bagged sample.
ns5	---	---	---	---	---	No sample, lost in core hole.
ns6	---	---	---	---	---	No sample.
D14	5	200.00	200.00	32.62	---	---
D13	20	50.00	50.00	38.16	---	---
ns7	---	---	---	---	---	Bagged sample for adsorption analysis.
ns8	---	---	---	---	---	No sample.
ns9	---	---	---	---	---	Bagged sample.
D25	20	50.00	---	---	---	---
D25	20	50.00	50.00	37.45	---	Some kaolinite.
D15	5	200.00	200.00	39.09	---	Highly fragmented sample, kaolinite on cleat.
D16	5	200.00	---	---	---	---
D16	10	100.00	150.00	42.27	---	Highly fragmented sample.
D17	30	33.33	33.33	40.85	SubB	Fusain rich.
D18	30	33.33	33.33	43.47	---	Fusain rich.
D19	10	100.00	---	---	---	Highly fragmented sample.
D19	10	100.00	100.00	38.39	---	---
D20	5	200.00	200.00	41.39	---	Fusain rich.
D21	5	200.00	200.00	41.96	---	---
D22	5	200.00	200.00	37.38	---	Highly fragmented sample.
D23	5	200.00	200.00	44.70	---	---
D24	10	100.00	---	---	---	---
D24	10	100.00	100.00	39.65	SubB	---

Table 1–8. Data for samples from core hole 12, Barrett Resources Corporation, Schoonover Road Unit (SRU) State 12–16–4876.

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; fr, highly fractured sample; SubB, subbituminous B; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)	Average attrital band thickness (AvABT) (mm)	Cumulative fusain thickness (CuFT) (mm)
	Top	Bottom								
D30fr	1,360.00	1,362.00	Big George	40.00	40.00	1.00	1.31	---	---	---
D31	1,362.00	1,364.00	Big George	47.00	47.00	1.00	2.85	50.0	1.0	0.0
ns1	1,364.00	1,371.00	ns1	213.50	213.50	1.00	9.86	---	---	---
D38	1,371.00	1,372.00	Big George	30.00	30.00	1.00	10.84	10.0	1.0	10.0
D37	1,372.00	1,374.00	Big George	67.00	67.00	1.00	13.04	50.0	0.0	0.0
D36	1,374.00	1,376.00	Big George	67.00	67.00	1.00	15.24	50.0	0.0	0.0
D32	1,376.00	---	Big George	24.00	---	0.35	16.03	50.0	0.0	0.0
D32	---	1,378.00	Big George	44.00	68.00	0.65	17.47	10.0	2.0	5.0
D33	1,378.00	---	Big George	27.00	---	0.44	18.36	20.0	2.0	5.0
D33	---	1,380.00	Big George	35.00	62.00	0.56	19.50	5.0	2.0	10.0
D34	1,380.00	1,382.00	Big George	64.00	64.00	1.00	21.60	20.0	2.0	10.0
ns2	1,382.00	1,383.00	ns2	30.50	30.50	1.00	22.60	---	---	---
D35	1,383.00	1,384.00	Big George	30.00	30.00	1.00	23.59	30.0	2.0	5.0
D39	1,384.00	1,385.00	Big George	30.00	30.00	1.00	24.57	40.0	1.0	0.0
ns3	1,385.00	1,390.00	ns3	152.50	152.50	1.00	29.58	---	---	---
D43	1,390.00	1,394.00	Big George	54.00	54.00	1.00	31.35	20.0	5.0	0.0
D42	1,392.00	1,394.00	Big George	59.00	59.00	1.00	33.28	20.0	2.0	0.0
D41	1,394.00	1,396.00	Big George	54.00	54.00	1.00	35.06	10.0	5.0	5.0
D40	1,396.00	1,398.00	Big George	52.00	52.00	1.00	36.76	10.0	2.0	10.0
ns4	1,398.00	1,399.00	ns4	30.50	30.50	1.00	37.76	---	---	---
D50	1,399.00	1,400.00	Big George	30.00	30.00	1.00	38.75	5.0	1.0	0.0
D44	1,400.00	1,402.00	Big George	58.00	58.00	1.00	40.65	30.0	3.0	10.0
D45	1,402.00	1,404.00	Big George	58.00	58.00	1.00	42.55	50.0	2.0	0.0
D46	1,404.00	1,406.00	Big George	60.00	60.00	1.00	44.52	50.0	5.0	0.0
D47	1,406.00	1,408.00	Big George	63.00	63.00	1.00	46.59	30.0	10.0	0.0
D48fr	1,408.00	1,410.00	Big George	40.00	40.00	1.00	47.90	---	---	---
D49	1,410.00	1,412.00	Big George	65.00	65.00	1.00	50.03	10.0	2.0	0.0
ns5	1,412.00	1,415.00	ns5	91.50	91.50	1.00	53.03	---	---	---
D29	1,415.00	1,417.00	Big George	63.00	63.00	1.00	55.10	10.0	5.0	5.0
D51	1,417.00	1,419.00	Big George	64.00	64.00	1.00	57.20	5.0	10.0	0.0
D52	1,419.00	---	Big George	40.00	---	0.60	58.51	50.0	20.0	20.0
D52	---	1,421.00	Big George	27.00	67.00	0.40	59.40	50.0	0.0	0.0
D53	1,421.00	1,423.00	Big George	64.00	64.00	1.00	61.50	10.0	2.0	5.0
D54	1,423.00	---	Big George	16.00	---	0.27	62.02	30.0	2.0	10.0
D54	---	1,425.00	Big George	44.00	60.00	0.73	63.47	3.0	5.0	40.0
D55	1,425.00	1,427.00	Big George	60.00	60.00	1.00	65.44	10.0	2.0	120.0
D56	1,427.00	---	Big George	46.00	---	0.70	66.95	10.0	2.0	90.0
D56	---	1,429.00	Big George	20.00	66.00	0.30	67.60	10.0	2.0	5.0
D57fr	1,429.00	1,430.30	Big George	40.00	40.00	1.00	68.91	---	---	---
D57	1,430.30	1,431.00	Big George	30.00	30.00	1.00	69.90	5.0	2.0	95.0
ns6	1,431.00	1,432.00	ns6	30.50	30.50	1.00	70.90	---	---	---
D26	1,432.00	1,432.40	Big George	13.00	13.00	1.00	71.33	2.0	50.0	0.0
D26fr	1,432.40	1,433.00	Big George	17.50	17.50	1.00	71.90	---	---	---
D28	1,433.00	---	Big George	31.00	---	0.56	72.92	10.0	2.0	15.0
D28	---	---	Big George	17.00	---	0.31	73.47	50.0	2.0	10.0
D28	---	1,435.00	Big George	7.00	55.00	0.13	73.70	0.0	0.0	0.0
D27	1,435.00	1437.00	Big George	64.00	64.00	1.00	75.80	2.0	5.0	10.0

Table 1–8. Data for samples from core hole 12, Barrett Resources Corporation, Schoonover Road Unit (SRU) State 12–16–4876.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; fr, highly fractured sample; SubB, subbituminous B; ---, no data]

Canister number	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)	Attritus percentage (AP)	Fusain percentage (FP)	Canister average vitrain percentage (CaAvVP)	Canister average attrital percentage (CaAvAP)	Canister average fusain percentage (CaAvFP)
D30fr	---	---	---	---	---	---	---	---	---
D31	5	460.78	9.22	98.04	1.96	0.00	98.04	1.96	0.00
ns1	---	---	---	---	---	---	---	---	---
D38	3	263.64	26.36	87.88	8.79	3.33	87.88	8.79	3.33
D37	5	670.00	0.00	100.00	0.00	0.00	100.00	0.00	0.00
D36	5	670.00	0.00	100.00	0.00	0.00	100.00	0.00	0.00
D32	5	240.00	0.00	100.00	0.00	0.00	---	---	---
D32	3	362.50	72.50	82.39	16.48	1.14	88.60	10.66	0.74
D33	3	240.91	24.09	89.23	8.92	1.85	---	---	---
D33	3	242.86	97.14	69.39	27.76	2.86	78.03	19.55	2.42
D34	3	572.73	57.27	89.49	8.95	1.56	89.49	8.95	1.56
ns2	---	---	---	---	---	---	---	---	---
D35	4	276.56	18.44	92.19	6.15	1.67	92.19	6.15	1.67
D39	4	292.68	7.32	97.56	2.44	0.00	97.56	2.44	0.00
ns3	---	---	---	---	---	---	---	---	---
D43	3	432.00	108.00	80.00	20.00	0.00	80.00	20.00	0.00
D42	3	536.36	53.64	90.91	9.09	0.00	90.91	9.09	0.00
D41	3	356.67	178.33	66.05	33.02	0.93	66.05	33.02	0.93
D40	3	425.00	85.00	81.73	16.35	1.92	81.73	16.35	1.92
ns4	---	---	---	---	---	---	---	---	---
D50	3	250.00	50.00	83.33	16.67	0.00	83.33	16.67	0.00
D44	4	518.18	51.82	89.34	8.93	1.72	89.34	8.93	1.72
D45	5	557.69	22.31	96.15	3.85	0.00	96.15	3.85	0.00
D46	4	545.45	54.55	90.91	9.09	0.00	90.91	9.09	0.00
D47	4	472.50	157.50	75.00	25.00	0.00	75.00	25.00	0.00
D48fr	---	---	---	---	---	---	---	---	---
D49	3	541.67	108.33	83.33	16.67	0.00	83.33	16.67	0.00
ns5	---	---	---	---	---	---	---	---	---
D29	3	416.67	208.33	66.14	33.07	0.79	66.14	33.07	0.79
D51	3	213.33	426.67	33.33	66.67	0.00	33.33	66.67	0.00
D52	4	271.43	108.57	67.86	27.14	5.00	---	---	---
D52	5	270.00	0.00	100.00	0.00	0.00	80.81	16.20	2.99
D53	3	529.17	105.83	82.68	16.54	0.78	82.68	16.54	0.78
D54	4	140.63	9.38	87.89	5.86	6.25	---	---	---
D54	2	150.00	250.00	34.09	56.82	9.09	48.44	43.23	8.33
D55	3	400.00	80.00	66.67	13.33	20.00	66.67	13.33	20.00
D56	3	308.33	61.67	67.03	13.41	19.57	---	---	---
D56	3	162.50	32.50	81.25	16.25	2.50	71.34	14.27	14.39
D57fr	---	---	---	---	---	---	---	---	---
D57	3	146.43	58.57	48.81	19.52	31.67	48.81	19.52	31.67
ns6	---	---	---	---	---	---	---	---	---
D26	1	5.00	125.00	3.85	96.15	0.00	3.85	96.15	0.00
D26fr	---	---	---	---	---	---	---	---	---
D28	3	245.83	49.17	79.30	15.86	4.84	---	---	---
D28	5	153.85	6.15	90.50	3.62	5.88	---	---	---
D28	0	0.00	0.00	0.00	0.00	0.00	72.67	10.06	4.55
D27	2	180.00	450.00	28.13	70.31	1.56	28.13	70.31	1.56

Table 1–8. Data for samples from core hole 12, Barrett Resources Corporation, Schoonover Road Unit (SRU) State 12–16–4876.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; fr, highly fractured sample; SubB, subbituminous B; ---, no data]

Canister number	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
D30fr	---	---	---	25.33	---	Sample too highly fractured to describe.
D31	20	50.00	50.00	24.24	---	Highly fractured sample.
ns1	---	---	---	---	---	No sample, top 1 ft is sample for adsorption analysis.
D38	40	25.00	25.00	32.06	---	Resin at 3 cm.
D37	20	50.00	50.00	28.33	---	---
D36	20	50.00	50.00	31.93	SubB	---
D32	20	50.00	---	---	---	---
D32	30	33.33	39.22	32.39	---	---
D33	30	33.33	---	---	---	---
D33	40	25.00	28.63	34.36	---	---
D34	30	33.33	33.33	36.00	---	---
ns2	---	---	---	---	---	No sample, lost during drilling.
D35	30	33.33	33.33	30.95	---	---
D39	10	100.00	100.00	27.06	---	---
ns3	---	---	---	---	---	No sample, top 1 ft is sample taken for adsorption analysis.
D43	30	33.33	33.33	30.95	SubB	---
D42	20	50.00	50.00	34.46	---	---
D41	20	50.00	50.00	33.38	---	---
D40	20	50.00	50.00	30.09	---	---
ns4	---	---	---	---	---	Sample taken for adsorption analysis.
D50	10	100.00	100.00	26.02	---	Highly fractured sample.
D44	5	200.00	200.00	31.74	---	Kaolinite on cleat.
D45	10	100.00	100.00	31.30	---	---
D46	10	100.00	100.00	34.39	---	---
D47	10	100.00	100.00	30.06	---	Highly fractured sample.
D48fr	---	---	---	30.52	---	Sample too highly fractured to describe.
D49	5	200.00	200.00	30.72	SubB	---
ns5	---	---	---	---	---	Sample taken for adsorption analysis.
D29	30	33.33	33.33	32.00	---	---
D51	20	50.00	50.00	28.38	---	---
D52	10	100.00	---	---	---	---
D52	10	100.00	100.00	30.41	---	---
D53	10	100.00	100.00	30.58	---	Dark band is fusain.
D54	40	25.00	---	---	---	---
D54	20	50.00	43.33	29.62	---	---
D55	30	33.33	33.33	33.70	---	Fusain-rich attritus at 54 cm.
D56	10	100.00	---	---	---	Fusain-rich 5 mm fractures at 0–5 cm.
D56	30	33.33	79.80	23.98	---	---
D57fr	---	---	---	---	---	Sample too highly fractured to describe.
D57	10	100.00	100.00	24.32	---	---
ns6	---	---	---	---	---	No sample, lost during drilling.
D26	10	100.00	100.00	16.97	SubB	---
D26fr	---	---	---	---	---	Sample too highly fractured to describe.
D28	50	20.00	---	---	---	---
D28	50	20.00	---	---	---	---
D28	50	20.00	20.00	15.00	---	Clay parting included.
D27	50	20.00	20.00	19.02	SubB	Calcite on cleat, very bright pyrite bleb at 35 cm.

Table 1–9. Data for samples from core hole 13, Rim Operating Inc., CBM H –11–04.

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; fr, highly fractured sample; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness	Average vitrain band thickness (AvVBT) (mm)
	Top	Bottom						
C–2	204.00	---	Upper Wyodak	5.00	---	0.08	0.16	0.0
C–2	---	206.00	Upper Wyodak	55.00	60.00	0.92	1.97	50.0
C–3	206.00	---	Upper Wyodak	13.00	---	0.25	2.40	0.0
C–3	---	---	Upper Wyodak	35.00	---	0.69	3.54	2.0
C–3	---	208.00	Upper Wyodak	3.00	51.00	0.06	3.64	0.0
C–18	208.00	---	Upper Wyodak	4.00	---	0.07	3.77	0.0
C–18	---	210.00	Upper Wyodak	51.00	55.00	0.93	5.45	50.0
C–19	210.00	---	Upper Wyodak	30.00	---	0.54	6.43	2.0
C–19	---	212.00	Upper Wyodak	26.00	56.00	0.46	7.28	50.0
C–20	212.00	---	Upper Wyodak	34.00	---	0.56	8.40	50.0
C–20	---	214.00	Upper Wyodak	27.00	61.00	0.44	9.28	5.0
C–21	214.00	216.00	Upper Wyodak	60.00	60.00	1.00	11.25	5.0
C–22	216.00	---	Upper Wyodak	7.00	---	0.12	11.48	5.0
C–22	---	218.00	Upper Wyodak	53.00	60.00	0.88	13.22	50.0
C–23	218.00	---	Upper Wyodak	33.00	---	0.56	14.30	1.0
C–23	---	220.00	Upper Wyodak	26.00	59.00	0.44	15.16	50.0
ns1	220.00	222.00	ns1	61.00	61.00	1.00	17.16	---
43	222.00	224.00	Mid-Lower Wyodak	42.00	42.00	1.00	18.54	0.0
C–24	224.00	226.00	Mid-Lower Wyodak	59.00	59.00	1.00	20.47	50.0
C–27	226.00	228.00	Mid-Lower Wyodak	60.00	60.00	1.00	22.44	10.0
C–26	228.00	230.00	Mid-Lower Wyodak	60.00	60.00	1.00	24.41	50.0
C–28	230.00	232.00	Mid-Lower Wyodak	55.00	55.00	1.00	26.21	50.0
C–29A	232.00	234.00	Mid-Lower Wyodak	60.00	60.00	1.00	28.18	50.0
C–30	234.00	236.00	Mid-Lower Wyodak	59.00	59.00	1.00	30.12	50.0
C–31	236.00	238.00	Mid-Lower Wyodak	52.00	52.00	1.00	31.82	50.0
C–32	238.00	240.00	Mid-Lower Wyodak	57.00	57.00	1.00	33.69	50.0
C–33	240.00	242.00	Mid-Lower Wyodak	60.00	60.00	1.00	35.66	2.0
ns2	242.00	244.00	ns2	61.00	61.00	1.00	37.66	---
C–35	244.00	246.00	Mid-Lower Wyodak	58.00	58.00	1.00	39.57	50.0
C–36	246.00	248.00	Mid-Lower Wyodak	62.00	62.00	1.00	41.60	2.0
C–37	248.00	---	Mid-Lower Wyodak	8.00	---	0.13	41.86	2.0
C–37	---	250.00	Mid-Lower Wyodak	56.00	64.00	0.88	43.70	50.0
C–38	250.00	---	Mid-Lower Wyodak	24.00	---	0.40	44.49	10.0
C–38	---	252.00	Mid-Lower Wyodak	36.00	60.00	0.60	45.67	2.0
C–39	252.00	---	Mid-Lower Wyodak	20.00	---	0.33	46.33	5.0
C–39	---	---	Mid-Lower Wyodak	3.00	---	0.05	46.42	0.0
C–39	---	254.00	Mid-Lower Wyodak	37.00	60.00	0.62	47.64	10.0
C–40	254.00	---	Mid-Lower Wyodak	44.00	---	0.71	49.08	2.0
C–40	---	256.00	Mid-Lower Wyodak	18.00	62.00	0.29	49.67	50.0
C–41	256.00	---	Mid-Lower Wyodak	17.00	---	0.27	50.23	50.0
C–41	---	---	Mid-Lower Wyodak	2.00	---	0.03	50.30	0.0
C–41	---	---	Mid-Lower Wyodak	27.00	---	0.42	51.18	1.0
C–41	---	258.00	Mid-Lower Wyodak	18.00	64.00	0.28	51.77	50.0
C–42	258.00	260.00	Mid-Lower Wyodak	56.00	56.00	1.00	53.61	50.0
C–43	260.00	262.00	Mid-Lower Wyodak	52.00	52.00	1.00	55.31	50.0
6	262.00	264.00	Mid-Lower Wyodak	43.00	43.00	1.00	56.73	30.0
10	264.00	266.00	Mid-Lower Wyodak	62.00	62.00	1.00	58.76	10.0
56	266.00	268.00	Mid-Lower Wyodak	58.00	58.00	1.00	60.66	50.0
65	268.00	270.00	Mid-Lower Wyodak	60.00	60.00	1.00	62.63	5.0
A3fr	270.00	272.00	Mid-Lower Wyodak	54.00	54.00	1.00	64.40	---
A5fr	272.00	274.00	Mid-Lower Wyodak	59.00	59.00	1.00	66.34	---
A6fr	274.00	276.00	Mid-Lower Wyodak	60.00	60.00	1.00	68.31	---
A8fr	276.00	---	Mid-Lower Wyodak	21.00	---	1.00	69.00	---
A8	---	278.00	Mid-Lower Wyodak	33.00	33.00	1.00	70.08	50.0
A21	278.00	280.00	Mid-Lower Wyodak	43.00	43.00	1.00	71.49	---

Table 1–9. Data for samples from core hole 13, Rim Operating Inc., CBM H –11–04.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; fr, highly fractured sample; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Average attrital band thickness (AvABT) (mm)	Cumulative fusain thickness (CuFT) (mm)	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)	Attritus percentage (AP)
C–2	10.0	0.0	1	0.00	50.00	0.00	100.00
C–2	0.0	0.0	5	550.00	0.00	100.00	0.00
C–3	0.0	0.0	0	0.00	0.00	0.00	0.00
C–3	50.0	0.0	1	13.46	336.54	3.85	96.15
C–3	0.0	0.0	0	0.00	0.00	0.00	0.00
C–18	0.0	0.0	0	0.00	0.00	0.00	0.00
C–18	0.0	0.0	5	510.00	0.00	100.00	0.00
C–19	50.0	0.0	1	11.54	288.46	3.85	96.15
C–19	0.0	0.0	5	260.00	0.00	100.00	0.00
C–20	0.0	0.0	5	340.00	0.00	100.00	0.00
C–20	20.0	10.0	3	52.00	208.00	19.26	77.04
C–21	10.0	10.0	3	196.67	393.33	32.78	65.56
C–22	10.0	0.0	3	23.33	46.67	33.33	66.67
C–22	5.0	0.0	4	481.82	48.18	90.91	9.09
C–23	50.0	0.0	1	6.47	323.53	1.96	98.04
C–23	0.0	0.0	5	260.00	0.00	100.00	0.00
ns1	---	---	---	---	---	---	---
43	0.0	0.0	0	0.00	0.00	0.00	0.00
C–24	0.0	0.0	5	590.00	0.00	100.00	0.00
C–27	20.0	0.0	3	200.00	400.00	33.33	66.67
C–26	50.0	0.0	4	300.00	300.00	50.00	50.00
C–28	0.0	10.0	5	540.00	0.00	98.18	0.00
C–29A	50.0	8.0	4	296.00	296.00	49.33	49.33
C–30	50.0	0.0	4	295.00	295.00	50.00	50.00
C–31	0.0	0.0	5	520.00	0.00	100.00	0.00
C–32	0.0	0.0	5	570.00	0.00	100.00	0.00
C–33	50.0	0.0	1	23.08	576.92	3.85	96.15
ns2	---	---	---	---	---	---	---
C–35	0.0	0.0	5	580.00	0.00	100.00	0.00
C–36	10.0	0.0	2	103.33	516.67	16.67	83.33
C–37	10.0	0.0	2	13.33	66.67	16.67	83.33
C–37	0.0	5.0	5	555.00	0.00	99.11	0.00
C–38	5.0	0.0	3	160.00	80.00	66.67	33.33
C–38	50.0	0.0	1	13.85	346.15	3.85	96.15
C–39	5.0	0.0	3	100.00	100.00	50.00	50.00
C–39	0.0	30.0	8	0.00	0.00	0.00	0.00
C–39	20.0	0.0	3	123.33	246.67	33.33	66.67
C–40	10.0	0.0	2	73.33	366.67	16.67	83.33
C–40	30.0	0.0	4	112.50	67.50	62.50	37.50
C–41	0.0	0.0	5	170.00	0.00	100.00	0.00
C–41	0.0	20.0	8	0.00	0.00	0.00	0.00
C–41	40.0	0.0	1	6.59	263.41	2.44	97.56
C–41	0.0	0.0	5	180.00	0.00	100.00	0.00
C–42	0.0	0.0	5	560.00	0.00	100.00	0.00
C–43	40.0	0.0	4	288.89	231.11	55.56	44.44
6	10.0	10.0	4	315.00	105.00	73.26	24.42
10	20.0	5.0	3	205.00	410.00	33.06	66.13
56	10.0	0.0	4	483.33	96.67	83.33	16.67
65	10.0	10.0	3	196.67	393.33	32.78	65.56
A3fr	---	---	---	---	---	---	---
A5fr	---	---	---	---	---	---	---
A6fr	---	---	---	---	---	---	---
A8fr	---	---	---	---	---	---	---
A8	40.0	10.0	4	177.78	142.22	53.87	43.10
A21	---	---	---	---	---	---	---

Table 1–9. Data for samples from core hole 13, Rim Operating Inc., CBM H –11–04.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; fr, highly fractured sample; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Fusain percentage (FP)	Canister average vitrain percentage (CaAvVP)	Canister average attrital percentage (CaAvAP)	Canister average fusain percentage (CaAvFP)	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)
C–2	0.00	---	---	---	---	---
C–2	0.00	91.67	8.33	0.00	10	100.00
C–3	0.00	---	---	---	---	---
C–3	0.00	---	---	---	20	50.00
C–3	0.00	2.64	65.99	0.00	---	---
C–18	0.00	---	---	---	---	---
C–18	0.00	92.73	0.00	0.00	5	200.00
C–19	0.00	---	---	---	20	50.00
C–19	0.00	48.49	51.51	0.00	5	200.00
C–20	0.00	---	---	---	5	200.00
C–20	3.70	64.26	34.10	1.64	10	100.00
C–21	1.67	32.78	65.56	1.67	20	50.00
C–22	0.00	---	---	---	10	100.00
C–22	0.00	84.19	15.81	0.00	5	200.00
C–23	0.00	---	---	---	---	---
C–23	0.00	45.16	54.84	0.00	---	---
ns1	---	---	---	---	---	---
43	0.00	---	---	---	---	---
C–24	0.00	100.00	0.00	0.00	10	100.00
C–27	0.00	33.33	66.67	0.00	5	200.00
C–26	0.00	50.00	50.00	0.00	10	100.00
C–28	1.82	98.18	0.00	1.82	5	200.00
C–29A	1.33	49.33	49.33	1.33	5	200.00
C–30	0.00	50.00	50.00	0.00	5	200.00
C–31	0.00	100.00	0.00	0.00	5	200.00
C–32	0.00	100.00	0.00	0.00	10	100.00
C–33	0.00	3.85	96.15	0.00	30	33.33
ns2	---	---	---	---	---	---
C–35	0.00	100.00	0.00	0.00	10	100.00
C–36	0.00	16.67	83.33	0.00	10	100.00
C–37	0.00	---	---	---	5	200.00
C–37	0.89	88.80	10.42	0.78	5	200.00
C–38	0.00	---	---	---	30	33.33
C–38	0.00	28.97	71.03	0.00	40	25.00
C–39	0.00	---	---	---	5	200.00
C–39	100.00	---	---	---	---	---
C–39	0.00	37.22	57.78	5.00	30	33.33
C–40	0.00	---	---	---	5	200.00
C–40	0.00	29.97	70.03	0.00	10	100.00
C–41	0.00	---	---	---	5	200.00
C–41	100.00	---	---	---	---	---
C–41	0.00	---	---	---	20	50.00
C–41	0.00	55.72	41.16	3.13	5	200.00
C–42	0.00	100.00	0.00	0.00	5	200.00
C–43	0.00	55.56	44.44	0.00	5	200.00
6	2.33	73.26	24.42	2.33	5	200.00
10	0.81	33.06	66.13	0.81	5	200.00
56	0.00	83.33	16.67	0.00	5	200.00
65	1.67	32.78	65.56	1.67	5	200.00
A3fr	---	---	---	---	---	---
A5fr	---	---	---	---	---	---
A6fr	---	---	---	---	---	---
A8fr	---	---	---	---	---	---
A8	3.03	53.87	43.10	3.03	10	100.00
A21	---	---	---	---	---	---

Table 1–9. Data for samples from core hole 13, Rim Operating Inc., CBM H –11–04.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; fr, highly fractured sample; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
C–2	---	---	---	---
C–2	100.00	4.46	---	---
C–3	---	---	---	Clay.
C–3	---	---	---	---
C–3	50.00	2.10	---	Clay.
C–18	---	---	---	Highly fractured sample, clay.
C–18	200.00	3.21	---	Highly fractured sample.
C–19	---	---	---	Highly fractured sample.
C–19	119.64	2.09	---	Pyrite at 15 cm.
C–20	---	---	---	Highly fractured sample.
C–20	155.74	2.61	---	---
C–21	50.00	1.94	SubC	---
C–22	---	---	---	---
C–22	188.33	4.59	---	Highly fractured sample.
C–23	---	---	---	Kaolinite at 16 cm.
C–23	---	1.96	---	---
ns1	---	---	---	No sample, top 1 ft is coal, bottom 1 ft is rock.
43	---	---	---	Dark-gray siltstone.
C–24	100.00	2.80	---	Woody.
C–27	200.00	2.10	---	Pyrite at 41–42 cm, 1 cm thick, pyrite blebs throughout bed.
C–26	100.00	1.32	---	Woody.
C–28	200.00	1.79	---	Highly fractured sample.
C–29A	200.00	1.75	SubC	---
C–30	200.00	1.59	---	Highly fractured sample.
C–31	200.00	1.83	---	Highly fractured sample.
C–32	100.00	2.28	---	Highly fractured sample.
C–33	33.33	2.45	---	Highly fractured sample.
ns2	---	---	---	No sample, lost during drilling.
C–35	100.00	2.40	SubB	Highly fractured sample.
C–36	100.00	1.27	---	---
C–37	---	---	---	---
C–37	200.00	1.60	---	---
C–38	---	---	---	---
C–38	28.33	1.94	---	---
C–39	---	---	---	Highly fractured sample.
C–39	---	---	---	Bed of fusain.
C–39	91.81	1.20	---	---
C–40	---	---	---	Highly fractured sample.
C–40	170.97	3.41	---	---
C–41	---	---	---	Highly fractured sample.
C–41	---	---	---	Bed of fusain.
C–41	---	---	---	---
C–41	134.68	2.15	---	Highly fractured sample.
C–42	200.00	2.37	---	Highly fractured sample.
C–43	200.00	1.52	---	Highly fractured sample.
6	200.00	2.44	---	Highly fractured sample.
10	200.00	1.47	---	Highly fractured sample.
56	200.00	1.23	SubC	Highly fractured sample.
65	200.00	2.01	---	Highly fractured sample.
A3fr	---	1.32	---	Sample too fractured to describe.
A5fr	---	14.59	---	Sample too fractured to describe.
A6fr	---	2.17	---	Sample too fractured to describe.
A8fr	---	---	---	Sample too fractured to describe.
A8	100.00	2.77	---	---
A21	---	37.10	---	Sample too fractured to describe.

Table 1–10. Data for samples from core hole 14, Rim Operating Inc., CBM C 33–1R.

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; fr, highly fractured sample; SubC, subbituminous C; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)
	Top	Bottom						
8	259.00	261.00	middle and lower Wyodak	52.00	52.00	1.00	1.71	50.0
9fr	261.00	263.00	middle and lower Wyodak	60.00	60.00	1.00	3.67	---
11	263.00	---	middle and lower Wyodak	30.00	---	0.56	4.66	10.0
11	---	264.80	middle and lower Wyodak	24.00	54.00	0.44	5.45	2.0
ns1	264.80	265.00	ns1	6.00	6.00	1.00	5.64	---
12fr	265.00	267.00	middle and lower Wyodak	60.00	60.00	1.00	7.61	---
13fr	267.00	269.00	middle and lower Wyodak	60.00	60.00	1.00	9.58	---
14	269.00	271.00	middle and lower Wyodak	60.00	60.00	1.00	11.55	20.0
15	271.00	273.00	middle and lower Wyodak	60.00	60.00	1.00	13.52	2.0
16	273.00	274.80	middle and lower Wyodak	56.00	56.00	1.00	15.35	20.0
ns2	274.80	275.00	ns2	6.00	6.00	1.00	15.55	---
18	275.00	277.00	middle and lower Wyodak	60.00	60.00	1.00	17.52	5.0
19	277.00	279.00	middle and lower Wyodak	59.00	59.00	1.00	19.46	10.0
20fr	279.00	281.00	middle and lower Wyodak	60.00	60.00	1.00	21.42	---
21	281.00	283.00	middle and lower Wyodak	60.00	60.00	1.00	23.39	5.0
22	283.00	285.00	middle and lower Wyodak	54.00	54.00	1.00	25.16	10.0
23fr	285.00	287.00	middle and lower Wyodak	52.00	52.00	1.00	26.87	---
24fr	287.00	289.00	middle and lower Wyodak	54.00	54.00	1.00	28.64	---
25	289.00	291.00	middle and lower Wyodak	54.00	54.00	1.00	30.41	2.0
26fr	291.00	293.00	middle and lower Wyodak	53.00	53.00	1.00	32.15	---
27	293.00	295.00	middle and lower Wyodak	56.00	56.00	1.00	33.99	5.0
28fr	295.00	297.00	middle and lower Wyodak	49.00	49.00	1.00	35.60	---
29fr	297.00	299.00	middle and lower Wyodak	60.00	60.00	1.00	37.57	---
30fr	299.00	301.00	middle and lower Wyodak	60.00	60.00	1.00	39.53	---
31fr	301.00	303.00	middle and lower Wyodak	60.00	60.00	1.00	41.50	---
32	303.00	305.00	middle and lower Wyodak	50.00	50.00	1.00	43.14	3.0
33fr	305.00	307.00	middle and lower Wyodak	48.00	48.00	1.00	44.72	---
34fr	307.00	309.00	middle and lower Wyodak	54.00	54.00	1.00	46.49	---
35	309.00	311.00	middle and lower Wyodak	58.00	58.00	1.00	48.39	5.0
36	311.00	313.00	middle and lower Wyodak	40.00	40.00	1.00	49.70	30.0
37	313.00	315.00	middle and lower Wyodak	56.00	56.00	1.00	51.54	10.0
38	315.00	317.00	middle and lower Wyodak	40.00	40.00	1.00	52.85	2.0
39	317.00	319.00	middle and lower Wyodak	60.00	60.00	1.00	54.82	5.0

Table 1–10. Data for samples from core hole 14, Rim Operating Inc., CBM C 33–1R.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; fr, highly fractured sample; SubC, subbituminous C; ---, no data]

Canister number	Average attrital band thickness (AvABT) (mm)	Cumulative fusain thickness (CuFT) (mm)	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)	Attritus percentage (AP)	Fusain percentage (FP)	Canister average vitrain percentage (CaAvVP)
8	0.0	0.0	5	520.00	0.00	100.00	0.00	0.00	100.00
9fr	---	---	---	---	---	---	---	---	---
11	5.0	0.0	3	200.00	100.00	66.67	33.33	0.00	---
11	10.0	0.0	2	40.00	200.00	16.67	83.33	0.00	44.44
ns1	---	---	---	---	---	---	---	---	---
12fr	---	---	---	---	---	---	---	---	---
13fr	---	---	---	---	---	---	---	---	---
14	2.0	25.0	3	522.73	52.27	87.12	8.71	4.17	87.12
15	5.0	10.0	2	168.57	421.43	28.10	70.24	1.67	28.10
16	20.0	0.0	3	280.00	280.00	50.00	50.00	0.00	50.00
ns2	---	---	---	---	---	---	---	---	---
18	5.0	0.0	3	300.00	300.00	50.00	50.00	0.00	50.00
19	20.0	0.0	3	196.67	393.33	33.33	66.67	0.00	33.33
20fr	---	---	---	---	---	---	---	---	---
21	5.0	0.0	3	300.00	300.00	50.00	50.00	0.00	50.00
22	20.0	30.0	3	170.00	340.00	31.48	62.96	5.56	31.48
23fr	---	---	---	---	---	---	---	---	---
24fr	---	---	---	---	---	---	---	---	---
25	20.0	0.0	2	49.09	490.91	9.09	90.91	0.00	9.09
26fr	---	---	---	---	---	---	---	---	---
27	20.0	0.0	3	112.00	448.00	20.00	80.00	0.00	20.00
28fr	---	---	---	---	---	---	---	---	---
29fr	---	---	---	---	---	---	---	---	---
30fr	---	---	---	---	---	---	---	---	---
31fr	---	---	---	---	---	---	---	---	---
32	5.0	30.0	2	176.25	293.75	35.25	58.75	6.00	35.25
33fr	---	---	---	---	---	---	---	---	---
34fr	---	---	---	---	---	---	---	---	---
35	5.0	40.0	3	270.00	270.00	46.55	46.55	6.90	46.55
36	30.0	20.0	4	190.00	190.00	47.50	47.50	5.00	47.50
37	10.0	20.0	3	270.00	270.00	48.21	48.21	3.57	48.21
38	40.0	0.0	1	19.05	380.95	4.76	95.24	0.00	4.76
39	40.0	5.0	3	66.11	528.89	11.02	88.15	0.83	11.02

Table 1–10. Data for samples from core hole 14, Rim Operating Inc., CBM C 33–1R.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; fr, highly fractured sample; SubC, subbituminous C; ---, no data]

Canister number	Canister average attrital percentage (CaAvAP)	Canister average fusain percentage (CaAvFP)	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
8	0.00	0.00	10	100.00	100.00	9.54	SubC	Highly fragmented sample.
9fr	---	---	---	---	---	10.51	---	Sample too fragmented to describe.
11	---	---	20	50.00	---	---	---	---
11	55.56	0.00	10	100.00	72.22	10.43	---	Highly fragmented sample.
ns1	---	---	---	---	---	---	---	No sample, lost during drilling.
12fr	---	---	---	---	---	8.22	---	Sample too fragmented to describe.
13fr	---	---	---	---	---	11.41	---	Sample too fragmented to describe.
14	8.71	4.17	20	50.00	50.00	12.83	---	Highly fragmented sample.
15	70.24	1.67	20	50.00	50.00	12.73	---	---
16	50.00	0.00	20	50.00	50.00	14.32	---	---
ns2	---	---	---	---	---	---	---	No sample, lost during drilling.
18	50.00	0.00	20	50.00	50.00	11.57	---	Highly fragmented sample.
19	66.67	0.00	10	100.00	100.00	11.81	---	---
20fr	---	---	---	---	---	11.37	---	Sample too fragmented to describe.
21	50.00	0.00	10	100.00	100.00	15.44	SubC	---
22	62.96	5.56	20	50.00	50.00	12.22	---	---
23fr	---	---	---	---	---	12.19	---	Sample too fragmented to describe.
24fr	---	---	---	---	---	12.21	---	Sample too fragmented to describe.
25	90.91	0.00	10	100.00	100.00	12.07	---	Highly fragmented sample.
26fr	---	---	---	---	---	12.33	---	Sample too fragmented to describe.
27	80.00	0.00	5	200.00	200.00	13.50	---	Highly fragmented sample.
28fr	---	---	---	---	---	10.81	---	Sample too fragmented to describe.
29fr	---	---	---	---	---	10.36	---	Sample too fragmented to describe.
30fr	---	---	---	---	---	11.58	---	Sample too fragmented to describe.
31fr	---	---	---	---	---	11.78	---	Sample too fragmented to describe.
32	58.75	6.00	5	200.00	200.00	12.34	---	Highly fragmented sample.
33fr	---	---	---	---	---	11.35	---	Sample too fragmented to describe.
34fr	---	---	---	---	---	12.40	---	Sample too fragmented to describe.
35	46.55	6.90	5	200.00	200.00	12.74	SubC	Highly fragmented, kaolinite on cleats.
36	47.50	5.00	10	100.00	100.00	13.03	SubC	Highly fragmented sample.
37	48.21	3.57	10	100.00	100.00	13.36	---	Highly fragmented sample.
38	95.24	0.00	5	200.00	200.00	12.01	---	Highly fragmented sample.
39	88.15	0.83	10	100.00	100.00	11.68	---	Highly fragmented sample.

Table 1–11. Data for samples from core hole 15, Peabody Natural Gas LLC, PNG 34–1.

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; fr, highly fractured sample; SubC, subbituminous C; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)	Average attrital band thickness (AvABT) (mm)
	Top	Bottom							
B–1	258.30	260.30	middle and lower Wyodak	64.00	64.00	1.00	2.10	5.0	40.0
B–2	260.30	---	middle and lower Wyodak	47.00	---	0.73	3.64	20.0	40.0
B–2	---	262.30	middle and lower Wyodak	17.00	64.00	0.27	4.20	2.0	20.0
B–3	262.30	---	middle and lower Wyodak	15.00	---	0.22	4.69	50.0	0.0
B–3	---	---	middle and lower Wyodak	32.00	---	0.48	5.74	2.0	10.0
B–3	---	264.30	middle and lower Wyodak	20.00	67.00	0.30	6.40	50.0	0.0
ns1	264.30	266.00	ns1	52.00	52.00	1.00	8.10	---	---
B–4fr	266.00	268.00	middle and lower Wyodak	58.00	58.00	1.00	10.01	---	---
B–5fr	268.00	270.00	middle and lower Wyodak	58.00	58.00	1.00	11.91	---	---
B–6fr	270.00	272.00	middle and lower Wyodak	54.00	54.00	1.00	13.68	---	---
B–7fr	272.00	274.00	middle and lower Wyodak	60.00	60.00	1.00	15.65	---	---
B–8	274.00	---	middle and lower Wyodak	26.00	---	0.46	16.50	50.0	50.0
B–8	---	---	middle and lower Wyodak	19.00	---	0.33	17.13	5.0	50.0
B–8	---	276.00	middle and lower Wyodak	12.00	57.00	0.21	17.52	5.0	20.0
B–9fr	276.00	278.00	middle and lower Wyodak	60.00	60.00	1.00	19.49	---	---
B10	278.00	280.00	middle and lower Wyodak	48.00	48.00	1.00	21.06	20.0	20.0
B–11fr	280.00	282.00	middle and lower Wyodak	63.00	63.00	1.00	23.13	---	---
B–12fr	282.00	284.00	middle and lower Wyodak	60.00	60.00	1.00	25.10	---	---
B–13	284.00	---	middle and lower Wyodak	20.00	---	0.33	25.75	5.0	5.0
B–13	---	---	middle and lower Wyodak	30.00	---	0.50	26.74	50.0	50.0
B–13	---	286.00	middle and lower Wyodak	10.00	60.00	0.17	27.07	5.0	30.0
B–14fr	286.00	---	middle and lower Wyodak	18.00	---	1.00	27.66	---	---
B–14	---	288.00	middle and lower Wyodak	45.00	45.00	1.00	29.13	10.0	20.0
B–15	288.00	---	middle and lower Wyodak	17.00	---	0.27	29.69	5.0	30.0
B–15	---	290.00	middle and lower Wyodak	46.00	63.00	0.73	31.20	50.0	50.0
ns2	290.00	291.00	ns2	30.50	30.50	1.00	32.20	---	---
B16	291.00	293.00	middle and lower Wyodak	60.00	60.00	1.00	34.17	5.0	20.0
B18	293.00	295.00	middle and lower Wyodak	60.00	60.00	1.00	36.14	5.0	15.0
B19	295.00	297.00	middle and lower Wyodak	60.00	60.00	1.00	38.11	10.0	10.0
B17	297.00	---	middle and lower Wyodak	39.00	---	0.62	39.39	10.0	10.0
B17	---	299.00	middle and lower Wyodak	24.00	63.00	0.38	40.17	30.0	70.0
B20	299.00	---	middle and lower Wyodak	35.00	---	0.56	41.32	30.0	70.0
B20	---	301.00	middle and lower Wyodak	28.00	63.00	0.44	42.24	2.0	10.0
B21	301.00	---	middle and lower Wyodak	24.00	---	0.33	43.03	2.0	10.0
B21	---	---	middle and lower Wyodak	24.00	---	0.33	43.82	5.0	10.0
B21	---	---	middle and lower Wyodak	10.00	---	0.14	44.14	50.0	50.0
B21	---	303.00	middle and lower Wyodak	14.00	72.00	0.19	44.60	3.0	5.0
B22	303.00	305.00	middle and lower Wyodak	52.00	52.00	1.00	46.31	1.0	5.0
ns3	305.00	307.00	ns3	61.00	61.00	1.00	48.31	---	---
B23fr	307.00	309.00	middle and lower Wyodak	52.00	52.00	1.00	50.02	---	---
B24	309.00	311.00	middle and lower Wyodak	50.00	50.00	1.00	51.66	5.0	20.0
40	311.00	313.00	middle and lower Wyodak	58.00	58.00	1.00	53.56	10.0	40.0
41	313.00	315.00	middle and lower Wyodak	63.00	63.00	1.00	55.63	2.0	50.0
42	315.00	317.00	middle and lower Wyodak	60.00	60.00	1.00	57.60	10.0	50.0
43	317.00	---	middle and lower Wyodak	45.00	---	0.70	59.07	1.0	5.0
43	---	319.00	middle and lower Wyodak	19.00	64.00	0.30	59.69	20.0	20.0
44	319.00	---	middle and lower Wyodak	14.00	---	0.23	60.15	20.0	20.0
44	---	321.00	middle and lower Wyodak	46.00	60.00	0.77	61.66	5.0	5.0
ns4	321.00	322.00	ns4	30.50	30.50	1.00	62.66	---	---
45	322.00	324.00	middle and lower Wyodak	56.00	56.00	1.00	64.50	2.0	20.0
46fr	324.00	326.00	middle and lower Wyodak	60.00	60.00	1.00	66.47	---	---
47fr	326.00	328.00	middle and lower Wyodak	60.00	60.00	1.00	68.44	---	---

Table 1–11. Data for samples from core hole 15, Peabody Natural Gas LLC, PNG 34–1.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; fr, highly fractured sample; SubC, subbituminous C; ---, no data]

Canister number	Canister average fusain percentage (CaAvFP)	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
B–1	0.00	40	25.00	25.00	1.26	SubC	---
B–2	---	10	100.00	---	---	---	---
B–2	0.78	40	25.00	80.08	0.48	---	---
B–3	---	30	33.33	---	---	---	---
B–3	---	20	50.00	---	---	---	---
B–3	0.75	10	100.00	61.19	0.82	---	---
ns1	---	---	---	---	---	---	Bag sample taken.
B–4fr	---	---	---	---	1.55	---	Sample too fragmented to describe.
B–5fr	---	---	---	---	1.15	---	Sample too fragmented to describe.
B–6fr	---	---	---	---	0.56	---	Sample too fragmented to describe.
B–7fr	---	---	---	---	0.59	SubC	Sample too fragmented to describe.
B–8	---	20	50.00	---	---	---	---
B–8	---	30	33.33	---	---	---	---
B–8	0.00	20	50.00	44.44	0.69	---	---
B–9fr	---	---	---	---	0.58	---	Sample too fragmented to describe.
B10	0.00	10	100.00	100.00	1.30	---	Highly fragmented sample.
B–11fr	---	---	---	---	0.77	---	Sample too fragmented to describe.
B–12fr	---	---	---	---	1.00	---	Sample too fragmented to describe.
B–13	---	5	200.00	---	---	---	---
B–13	---	30	33.33	---	---	---	---
B–13	0.83	20	50.00	91.67	0.64	SubC	---
B–14fr	---	---	---	---	---	---	Sample taken for adsorption analysis.
B–14	3.33	10	100.00	100.00	0.92	---	---
B–15	---	30	33.33	---	---	---	---
B–15	1.59	50	20.00	23.60	0.78	---	---
ns2	---	---	---	---	---	---	Bag sample taken.
B16	0.00	10	100.00	100.00	1.93	---	Highly fragmented sample.
B18	0.83	10	100.00	100.00	0.89	---	Highly fragmented sample.
B19	2.50	10	100.00	100.00	0.96	---	Highly fragmented sample.
B17	---	5	200.00	---	---	---	---
B17	1.59	10	100.00	161.90	0.95	---	---
B20	---	10	100.00	---	---	---	---
B20	1.59	30	33.33	70.37	1.10	SubC	Fusain-rich attritus.
B21	---	10	100.00	---	---	---	---
B21	---	20	50.00	---	---	---	---
B21	---	20	50.00	---	---	---	---
B21	2.08	20	50.00	66.67	0.89	---	---
B22	2.88	20	50.00	50.00	1.27	---	Fusain-rich attritus.
ns3	---	---	---	---	---	---	Bag sample taken.
B23fr	---	---	---	---	1.04	---	Sample too fragmented to describe.
B24	1.00	5	200.00	200.00	1.54	---	Highly fragmented sample.
40	0.00	5	200.00	200.00	1.53	---	Highly fragmented sample.
41	0.00	5	200.00	200.00	1.28	SubC	Highly fragmented sample.
42	0.00	5	200.00	200.00	0.86	---	---
43	---	30	33.33	---	---	---	---
43	1.56	20	50.00	38.28	1.32	---	---
44	---	20	50.00	---	---	---	---
44	1.67	30	33.33	37.22	1.67	---	---
ns4	---	---	---	---	---	---	No sample.
45	0.00	20	50.00	50.00	1.77	---	Highly fragmented sample.
46fr	---	---	---	---	1.72	---	Sample too fragmented to describe.
47fr	---	---	---	---	1.55	---	Sample too fragmented to describe.

Table 1–12. Data for samples from core hole 16, Peabody Natural Gas LLC, PNG 33–1.

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; fr, highly fractured sample; SubC, subbituminous C; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)	Average attrital band thickness (AvABT) (mm)
	Top	Bottom							
C1	286.00	288.00	middle and lower Wyodak	60.00	60.00	1.00	1.97	10.0	10.0
C2	288.00	---	middle and lower Wyodak	20.00	---	0.31	2.62	5.0	50.0
C2	---	290.00	middle and lower Wyodak	44.00	64.00	0.69	4.07	30.0	30.0
C3	290.00	---	middle and lower Wyodak	24.00	---	0.37	4.86	5.0	50.0
C3	---	292.00	middle and lower Wyodak	41.00	65.00	0.63	6.20	10.0	40.0
C4	292.00	294.00	middle and lower Wyodak	57.00	57.00	1.00	8.07	10.0	50.0
C5fr	294.20	296.40	middle and lower Wyodak	62.00	62.00	1.00	10.10	---	---
C6fr	296.40	298.60	middle and lower Wyodak	58.00	58.00	1.00	12.01	---	---
C7	298.60	300.80	middle and lower Wyodak	63.00	63.00	1.00	14.07	50.0	10.0
C8	300.80	303.00	middle and lower Wyodak	67.00	67.00	1.00	16.27	50.0	0.0
ns1	303.00	303.50	ns1	15.00	15.00	1.00	16.77	---	---
C9	303.50	305.50	middle and lower Wyodak	57.00	57.00	1.00	18.64	50.0	10.0
C10fr	305.50	307.50	middle and lower Wyodak	61.00	61.00	1.00	20.64	---	---
C11	307.50	309.50	middle and lower Wyodak	59.00	59.00	1.00	22.57	50.0	5.0
C12	309.50	311.50	middle and lower Wyodak	59.00	59.00	1.00	24.51	50.0	20.0
ns2	311.50	314.30	ns2	85.00	85.00	1.00	27.30	---	---
C13	314.30	316.30	middle and lower Wyodak	63.00	63.00	1.00	29.36	30.0	10.0
C14fr	316.30	318.30	middle and lower Wyodak	60.00	60.00	1.00	31.33	---	---
C15	318.30	320.30	middle and lower Wyodak	62.00	62.00	1.00	33.37	2.0	10.0
C16fr	320.30	322.30	middle and lower Wyodak	62.00	62.00	1.00	35.40	---	---
ns3	322.30	328.00	ns3	174.00	174.00	1.00	41.11	---	---
C17	328.00	330.00	middle and lower Wyodak	47.00	47.00	1.00	42.65	5.0	20.0
C18	330.00	---	middle and lower Wyodak	32.00	---	0.53	43.70	20.0	5.0
C18	---	332.00	middle and lower Wyodak	28.00	60.00	0.47	44.62	5.0	50.0
C19	332.00	334.00	middle and lower Wyodak	66.00	66.00	1.00	46.78	5.0	30.0
C20	334.00	336.00	middle and lower Wyodak	65.00	65.00	1.00	48.92	5.0	20.0
C21	336.00	338.00	middle and lower Wyodak	62.00	62.00	1.00	50.95	20.0	50.0
C22	338.00	340.00	middle and lower Wyodak	60.00	60.00	1.00	52.92	2.0	20.0
C23	340.00	342.00	middle and lower Wyodak	60.00	60.00	1.00	54.89	50.0	10.0
ns4	342.00	343.30	ns4	40.00	40.00	1.00	56.20	---	---
C24	343.30	345.30	middle and lower Wyodak	64.00	64.00	1.00	58.30	50.0	10.0
C26	345.30	347.30	middle and lower Wyodak	62.00	62.00	1.00	60.33	10.0	30.0
C27fr	347.30	349.30	middle and lower Wyodak	60.00	60.00	1.00	62.30	---	---
C28fr	349.30	351.30	middle and lower Wyodak	60.00	60.00	1.00	64.27	---	---
C29fr	351.30	353.30	middle and lower Wyodak	60.00	60.00	1.00	66.24	---	---

Table 1–12. Data for samples from core hole 16, Peabody Natural Gas LLC, PNG 33–1.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; fr, highly fractured sample; SubC, subbituminous C; ---, no data]

Canister number	Canister average fusain percentage (CaAvFP)	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
C1	0.83	30	33.33	33.33	3.19	SubC	---
C2	---	50	20.00	---	---	---	---
C2	0.63	20	50.00	40.63	2.26	---	---
C3	---	30	33.33	---	---	---	---
C3	0.00	30	33.33	33.33	2.10	---	---
C4	0.00	30	33.33	33.33	3.34	---	Highly fragmented sample.
C5fr	---	---	---	---	2.07	---	Sample too fragmented to describe.
C6fr	---	---	---	---	2.27	---	Sample too fragmented to describe.
C7	0.00	10	100.00	100.00	2.45	---	Highly fragmented sample.
C8	0.00	10	100.00	100.00	2.83	SubC	---
ns1	---	---	---	---	---	---	Bag sample taken.
C9	0.00	10	100.00	100.00	1.84	---	Highly fragmented sample.
C10fr	---	---	---	---	3.84	---	Sample too fragmented to describe.
C11	1.69	10	100.00	100.00	1.37	---	---
C12	0.00	10	100.00	100.00	1.22	---	---
ns2	---	---	---	---	---	---	Top 2.5 ft lost during coring, bottom 0.3 ft is bag sample.
C13	0.00	10	100.00	100.00	2.99	SubC	Highly fragmented sample.
C14fr	---	---	---	---	3.00	---	Sample too fragmented to describe.
C15	0.00	20	50.00	50.00	2.94	---	Highly fragmented sample.
C16fr	---	---	---	---	2.40	---	Sample too fragmented to describe.
ns3	---	---	---	---	---	---	Top 4.7 ft lost during coring, bottom 1 ft is bag sample.
C17	2.13	10	100.00	100.00	1.98	SubC	Highly fragmented sample.
C18	---	30	33.33	---	---	---	---
C18	0.00	30	33.33	33.33	2.33	---	---
C19	1.52	20	50.00	50.00	2.59	---	---
C20	0.77	5	200.00	200.00	2.98	---	---
C21	0.00	10	100.00	100.00	2.84	---	---
C22	0.00	30	33.33	33.33	2.96	---	---
C23	0.00	30	33.33	33.33	3.04	---	---
ns4	---	---	---	---	---	---	Bag sample taken.
C24	0.00	---	---	---	2.68	SubC	Highly fragmented sample.
C26	0.00	10	100.00	100.00	2.36	---	---
C27fr	---	---	---	---	1.64	---	Sample too fragmented to describe.
C28fr	---	---	---	---	1.57	---	Sample too fragmented to describe.
C29fr	---	---	---	---	2.40	---	Sample too fragmented to describe.

Table 1–13. Data for samples from core hole 17, Peabody Natural Gas LLC, PNG 31–1.

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)
	Top	Bottom						
A1	252.00	254.00	middle and lower Wyodak	59.00	59.00	1.00	1.94	1.0
A2	254.00	256.00	middle and lower Wyodak	55.00	55.00	1.00	3.74	4.0
A7	256.00	258.00	middle and lower Wyodak	58.00	58.00	1.00	5.64	4.0
A9	258.00	260.00	middle and lower Wyodak	52.00	52.00	1.00	7.35	10.0
A10	260.00	262.00	middle and lower Wyodak	60.00	60.00	1.00	9.32	4.0
A11	262.00	264.00	middle and lower Wyodak	60.00	60.00	1.00	11.29	5.0
A12	264.00	266.00	middle and lower Wyodak	59.00	59.00	1.00	13.22	10.0
ns1	266.00	267.00	ns1	30.50	30.50	1.00	14.22	---
A13	267.00	269.00	middle and lower Wyodak	56.00	56.00	1.00	16.06	2.0
A14	269.00	271.00	middle and lower Wyodak	55.00	55.00	1.00	17.86	2.0
A15	271.00	273.00	middle and lower Wyodak	56.00	56.00	1.00	19.70	3.0
A16	273.00	275.00	middle and lower Wyodak	64.00	64.00	1.00	21.80	3.0
A17	275.00	---	middle and lower Wyodak	50	---	0.84	23.44	3.0
A17	---	277.00	middle and lower Wyodak	9.50	59.50	0.16	23.75	20.0
A18	277.00	279.00	middle and lower Wyodak	64.00	64.00	1.00	25.85	20.0
A19	279.00	281.00	middle and lower Wyodak	60.00	60.00	1.00	27.82	8.0
ns2	281.00	282.00	ns2	30.50	30.50	1.00	28.82	---
A20	282.00	284.00	middle and lower Wyodak	57.00	57.00	1.00	30.69	4.0
A21	284.00	286.00	middle and lower Wyodak	60.00	60.00	1.00	32.66	3.0
A22	286.00	288.00	middle and lower Wyodak	58.00	58.00	1.00	34.56	5.0
A23	288.00	---	middle and lower Wyodak	39	---	0.63	35.84	15.0
A23	---	290.00	middle and lower Wyodak	23.00	62.00	0.37	36.60	2.0
A24	290.00	292.00	middle and lower Wyodak	56.00	56.00	1.00	38.44	20.0
A25	292.00	294.00	middle and lower Wyodak	57.00	57.00	1.00	40.31	8.0
A26	294.00	296.00	middle and lower Wyodak	59.00	59.00	1.00	42.24	8.0
ns3	296.00	297.00	ns3	30.50	30.50	1.00	43.24	---
48	297.00	---	middle and lower Wyodak	25	---	0.45	44.06	10.0
48	---	---	middle and lower Wyodak	3	---	0.05	44.16	0.0
48	---	299.00	middle and lower Wyodak	28.00	56.00	0.50	45.08	10.0
49	299.00	301.00	middle and lower Wyodak	57.00	57.00	1.00	46.95	5.0
50	301.00	303.00	middle and lower Wyodak	65.00	65.00	1.00	49.08	8.0
51	303.00	305.00	middle and lower Wyodak	57.00	57.00	1.00	50.95	15.0
52	305.00	---	middle and lower Wyodak	23	---	0.37	51.71	2.0
52	---	307.00	middle and lower Wyodak	39.00	62.00	0.63	52.99	10.0
53	307.00	309.00	middle and lower Wyodak	59.00	59.00	1.00	54.92	20.0
54	309.00	311.00	middle and lower Wyodak	59.00	59.00	1.00	56.86	10.0
55	311.00	313.00	middle and lower Wyodak	58.00	58.00	1.00	58.76	8.0
57	313.00	315.00	middle and lower Wyodak	52.00	52.00	1.00	60.47	3.0
58	315.00	317.00	middle and lower Wyodak	57.00	57.00	1.00	62.34	15.0
59	317.00	319.00	middle and lower Wyodak	60.00	60.00	1.00	64.30	8.0
61	319.00	---	middle and lower Wyodak	47	---	0.78	65.85	10.0
61	---	321.00	middle and lower Wyodak	13.00	60.00	0.22	66.27	130.0
62	321.00	323.00	middle and lower Wyodak	63.00	63.00	1.00	68.34	20.0
63	323.00	325.00	middle and lower Wyodak	60.00	60.00	1.00	70.31	10.0
ns4	325.00	326.30	ns4	40.00	40.00	1.00	71.62	---
64	326.30	328.30	middle and lower Wyodak	64.00	64.00	1.00	73.72	5.0
66	328.30	---	middle and lower Wyodak	44	---	0.73	75.16	7.0
66	---	330.30	middle and lower Wyodak	16.00	60.00	0.27	75.69	2.0
67	330.30	---	middle and lower Wyodak	50	---	0.83	77.33	7.0
67	---	332.30	middle and lower Wyodak	10.00	60.00	0.17	77.66	100.0
68	332.30	---	middle and lower Wyodak	39	---	0.64	78.94	10.0
68	---	---	middle and lower Wyodak	1	---	0.02	78.97	0.0
68	---	334.30	middle and lower Wyodak	21.00	61.00	0.34	79.66	3.0

Table 1–13. Data for samples from core hole 17, Peabody Natural Gas LLC, PNG 31–1.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Average attrital band thickness (AvABT) (mm)	Cumulative fusain thickness (CuFT) (mm)	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)	Attritus percentage (AP)	Fusain percentage (FP)	Canister average vitrain percentage (CaAvVP)
A1	50.0	1.0	1	53.55	535.45	9.08	90.76	0.17	9.08
A2	20.0	0.0	2	150.00	400.00	27.27	72.73	0.00	27.27
A7	15.0	0.0	2	136.47	443.53	23.53	76.47	0.00	23.53
A9	20.0	0.0	3	185.71	334.29	35.71	64.29	0.00	35.71
A10	15.0	10.0	2	173.53	416.47	28.92	69.41	1.67	28.92
A11	25.0	5.0	3	148.75	446.25	24.79	74.38	0.83	24.79
A12	10.0	2.0	3	294.00	294.00	49.83	49.83	0.34	49.83
ns1	---	---	---	---	---	---	---	---	---
A13	20.0	4.0	2	69.50	486.50	12.41	86.88	0.71	12.41
A14	30.0	1.0	1	219.60	329.40	39.93	59.89	0.18	39.93
A15	30.0	2.0	1	223.20	334.80	39.86	59.79	0.36	39.86
A16	10.0	5.0	2	282.22	352.78	44.10	55.12	0.78	44.10
A17	15.0	3.0	2	94.67	402.33	18.93	80.47	0.60	---
A17	5.0	3.0	3	73.60	18.40	77.47	19.37	3.16	28.28
A18	5.0	2.0	3	261.00	377.00	40.78	58.91	0.31	40.78
A19	20.0	1.0	3	119.80	479.20	19.97	79.87	0.17	19.97
ns2	---	---	---	---	---	---	---	---	---
A20	10.0	3.0	2	236.25	330.75	41.45	58.03	0.53	41.45
A21	8.0	10.0	2	295.00	295.00	49.17	49.17	1.67	49.17
A22	10.0	8.0	3	254.22	317.78	43.83	54.79	1.38	43.83
A23	15.0	5.0	3	192.50	192.50	49.36	49.36	1.28	---
A23	20.0	2.0	2	32.57	195.43	14.16	84.97	0.87	36.30
A24	15.0	10.0	3	305.56	244.44	54.56	43.65	1.79	54.56
A25	10.0	5.0	3	188.33	376.67	33.04	66.08	0.88	33.04
A26	5.0	8.0	3	304.86	277.14	51.67	46.97	1.36	51.67
ns3	---	---	---	---	---	---	---	---	---
48	8.0	5.0	3	142.92	102.08	57.17	40.83	2.00	---
48	0.0	0.0	0	0.00	0.00	0.00	0.00	0.00	---
48	8.0	5.0	3	160.42	114.58	57.29	40.92	1.79	54.17
49	15.0	30.0	3	216.00	324.00	37.89	56.84	5.26	37.89
50	8.0	20.0	3	288.75	341.25	44.42	52.50	3.08	44.42
51	5.0	20.0	3	412.50	137.50	72.37	24.12	3.51	72.37
52	20.0	10.0	2	27.50	192.50	11.96	83.70	4.35	---
52	5.0	25.0	3	219.00	146.00	56.15	37.44	6.41	39.76
53	5.0	40.0	3	246.55	303.45	41.79	51.43	6.78	41.79
54	5.0	20.0	3	332.50	237.50	56.36	40.25	3.39	56.36
55	10.0	5.0	3	191.67	383.33	33.05	66.09	0.86	33.05
57	10.0	5.0	2	206.00	309.00	39.62	59.42	0.96	39.62
58	10.0	10.0	3	263.53	296.47	46.23	52.01	1.75	46.23
59	15.0	15.0	3	265.91	319.09	44.32	53.18	2.50	44.32
61	10.0	50.0	3	224.00	196.00	47.66	41.70	10.64	---
61	0.0	0.0	5	130.00	0.00	100.00	0.00	0.00	59.00
62	5.0	5.0	3	343.75	281.25	54.56	44.64	0.79	54.56
63	10.0	0.0	3	300.00	300.00	50.00	50.00	0.00	50.00
ns4	---	---	---	---	---	---	---	---	---
64	8.0	0.0	3	247.74	392.26	38.71	61.29	0.00	38.71
66	8.0	0.0	3	165.00	275.00	37.50	62.50	0.00	---
66	15.0	0.0	2	35.56	124.44	22.22	77.78	0.00	33.43
67	10.0	0.0	3	147.06	352.94	29.41	70.59	0.00	---
67	0.0	0.0	5	100.00	0.00	100.00	0.00	0.00	41.18
68	8.0	30.0	3	180.00	180.00	46.15	46.15	7.69	---
68	0.0	0.0	0	0.00	0.00	0.00	0.00	0.00	---
68	5.0	0.0	2	105.00	105.00	50.00	50.00	0.00	46.72

Table 1–13. Data for samples from core hole 17, Peabody Natural Gas LLC, PNG 31–1.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Canister average attrital percentage (CaAvAP)	Canister average fusain percentage (CaAvFP)	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
A1	90.76	0.17	40	25.00	25.00	5.27	SubC	---
A2	72.73	0.00	30	33.33	33.33	7.92	---	---
A7	76.47	0.00	9	111.11	111.11	10.10	---	---
A9	64.29	0.00	25	40.00	40.00	10.04	---	---
A10	69.41	1.67	28	35.71	35.71	8.85	---	---
A11	74.38	0.83	25	40.00	40.00	9.40	---	---
A12	49.83	0.34	30	33.33	33.33	7.62	---	---
ns1	---	---	---	---	---	---	---	No sample.
A13	86.88	0.71	32	31.25	31.25	8.49	---	---
A14	59.89	0.18	23	43.48	43.48	8.74	---	---
A15	59.79	0.36	35	28.57	28.57	10.66	SubC	---
A16	55.12	0.78	40	25.00	25.00	10.00	---	---
A17	---	---	25	40.00	---	---	---	White clay on cleat.
A17	70.71	1.01	25	40.00	40.00	9.98	---	White clay on cleat.
A18	58.91	0.31	21	47.62	47.62	9.55	---	---
A19	79.87	0.17	40	25.00	25.00	7.82	---	White clay on cleat.
ns2	---	---	---	---	---	---	---	No sample.
A20	58.03	0.53	15	66.67	66.67	11.11	---	---
A21	49.17	1.67	25	40.00	40.00	9.99	---	---
A22	54.79	1.38	25	40.00	40.00	11.64	---	---
A23	---	---	34	29.41	---	---	---	---
A23	62.57	1.13	34	29.41	29.41	10.35	---	---
A24	43.65	1.79	9	111.11	111.11	10.15	---	---
A25	66.08	0.88	25	40.00	40.00	12.35	SubB	---
A26	46.97	1.36	25	40.00	40.00	11.35	---	---
ns3	---	---	---	---	---	---	---	No sample.
48	---	---	50	20.00	---	---	---	---
48	---	---	50	20.00	---	---	---	High ash.
48	38.69	1.79	50	20.00	20.00	10.83	---	---
49	56.84	5.26	25	40.00	40.00	10.94	---	---
50	52.50	3.08	55	18.18	18.18	6.32	---	---
51	24.12	3.51	20	50.00	50.00	10.49	---	---
52	---	---	35	28.57	---	---	---	---
52	54.60	5.65	35	28.57	28.57	11.54	---	---
53	51.43	6.78	30	33.33	33.33	12.03	---	Fusain band 35 mm thick.
54	40.25	3.39	18	55.56	55.56	11.11	---	---
55	66.09	0.86	32	31.25	31.25	12.96	---	---
57	59.42	0.96	25	40.00	40.00	9.42	SubC	Highly fractured sample.
58	52.01	1.75	35	28.57	28.57	11.67	---	---
59	53.18	2.50	32	31.25	31.25	12.01	---	---
61	---	---	30	33.33	---	---	---	Fusain band 50 mm thick.
61	32.67	8.33	30	33.33	33.33	10.51	---	---
62	44.64	0.79	25	40.00	40.00	11.17	---	---
63	50.00	0.00	40	25.00	25.00	12.45	---	---
ns4	---	---	---	---	---	---	---	No sample.
64	61.29	0.00	50	20.00	20.00	13.08	---	Sooty appearance.
66	---	---	20	50.00	---	---	---	Sooty appearance.
66	66.57	0.00	20	50.00	50.00	13.01	---	---
67	---	---	40	25.00	---	---	---	Slightly sooty appearance.
67	58.82	0.00	40	25.00	25.00	12.02	---	---
68	---	---	40	25.00	---	---	---	Fusain band 30 mm thick.
68	---	---	40	25.00	---	---	---	High ash content.
68	46.72	4.92	40	25.00	25.00	12.03	---	White clay on cleat.

Table 1–14. Data for samples from core hole 18, Peabody Natural Gas LLC, PNG 35–1.

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubC, subbituminous C; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)	Average attrital band thickness (AvABT) (mm)
	Top	Bottom							
B8	322.00	324.00	middle and lower Wyodak	62.00	62.00	1.00	2.03	10.0	10.0
B9	324.00	326.00	middle and lower Wyodak	62.00	62.00	1.00	4.07	5.0	10.0
ns1	326.00	327.00	ns1	30.50	30.50	1.00	5.07	---	---
B10	327.00	329.00	middle and lower Wyodak	60.00	60.00	1.00	7.04	4.0	15.0
B11	329.00	331.00	middle and lower Wyodak	60.00	60.00	1.00	9.01	15.0	5.0
B12	331.00	333.00	middle and lower Wyodak	66.00	66.00	1.00	11.17	15.0	10.0
B13	333.00	---	middle and lower Wyodak	52.00	---	0.85	12.88	10.0	20.0
B13	---	335.00	middle and lower Wyodak	9.00	61.00	0.15	13.17	20.0	5.0
B14	335.00	337.00	middle and lower Wyodak	59.00	59.00	1.00	15.11	25.0	5.0
B15	337.00	---	middle and lower Wyodak	12.00	---	0.20	15.50	20.0	5.0
B15	---	339.00	middle and lower Wyodak	47.00	59.00	0.80	17.04	5.0	20.0
B16	339.00	341.00	middle and lower Wyodak	59.00	59.00	1.00	18.98	30.0	5.0
ns2	341.00	342.00	ns2	30.50	30.50	1.00	19.98	---	---
B17	342.00	---	middle and lower Wyodak	15.00	---	0.26	20.47	140.0	0.0
B17	---	---	middle and lower Wyodak	10.00	---	0.18	20.80	1.0	20.0
B17	---	344.00	middle and lower Wyodak	32.00	57.00	0.56	21.85	310.0	0.0
B18	344.00	346.00	middle and lower Wyodak	56.00	56.00	1.00	23.69	10.0	15.0
B19	346.00	---	middle and lower Wyodak	22.00	---	0.38	24.41	215.0	0.0
B19	---	348.00	middle and lower Wyodak	36.00	58.00	0.62	25.59	50.0	5.0
B20	348.00	---	middle and lower Wyodak	36.00	---	0.55	26.77	12.0	5.0
B20	---	350.00	middle and lower Wyodak	30.00	66.00	0.45	27.76	2.0	15.0
B21	350.00	---	middle and lower Wyodak	47.00	---	0.84	29.30	10.0	20.0
B21	---	352.00	middle and lower Wyodak	9.00	56.00	0.16	29.59	90.0	0.0
B22	352.00	---	middle and lower Wyodak	10.00	---	0.17	29.92	100.0	0.0
B22	---	354.00	middle and lower Wyodak	49.00	59.00	0.83	31.53	3.0	20.0
B23	354.00	---	middle and lower Wyodak	41.00	---	0.69	32.87	20.0	10.0
B23	---	356.00	middle and lower Wyodak	18.00	59.00	0.31	33.46	15.0	5.0
ns3	356.00	357.00	ns3	30.50	30.50	1.00	34.47	---	---
B24	357.00	359.00	middle and lower Wyodak	58.00	58.00	1.00	36.37	3.0	20.0
A3	359.00	361.00	middle and lower Wyodak	57.00	57.00	1.00	38.24	5.0	25.0
A5	361.00	363.00	middle and lower Wyodak	58.00	58.00	1.00	40.14	8.0	15.0
A6	363.00	365.00	middle and lower Wyodak	60.00	60.00	1.00	42.11	5.0	10.0
A8	365.00	---	middle and lower Wyodak	54.00	---	0.83	43.88	15.0	10.0
A8	---	367.00	middle and lower Wyodak	11.00	65.00	0.17	44.24	110.0	0.0
6	367.00	368.35	middle and lower Wyodak	41.00	41.00	0.62	45.59	2.0	20.0
6	368.35	369.00	middle and lower Wyodak	25.00	66.00	0.38	46.41	8.0	10.0
10	369.00	371.00	middle and lower Wyodak	58.00	58.00	1.00	48.31	10.0	10.0
ns4	371.00	372.00	ns4	30.50	30.50	1.00	49.31	---	---
40	372.00	374.00	middle and lower Wyodak	62.00	62.00	1.00	51.35	15.0	5.0
41	374.00	376.00	middle and lower Wyodak	62.00	62.00	1.00	53.38	10.0	5.0
42	376.00	378.00	middle and lower Wyodak	61.00	61.00	1.00	55.38	5.0	10.0
43	378.00	380.00	middle and lower Wyodak	63.00	63.00	1.00	57.45	3.0	20.0
44	380.00	---	middle and lower Wyodak	10.00	---	0.16	57.78	2.0	20.0
44	---	---	middle and lower Wyodak	28.00	---	0.45	58.69	280.0	0.0
44	---	382.00	middle and lower Wyodak	24.00	62.00	0.39	59.48	2.0	20.0
45	382.00	---	middle and lower Wyodak	20.00	---	0.31	60.14	5.0	10.0
45	---	---	middle and lower Wyodak	17.00	---	0.27	60.70	170.0	0.0
45	---	384.00	middle and lower Wyodak	27.00	64.00	0.42	61.58	5.0	10.0
46	384.00	---	middle and lower Wyodak	28.00	---	0.49	62.50	5.0	15.0
46	---	386.00	middle and lower Wyodak	29.00	57.00	0.51	63.45	15.0	5.0
ns5	386.00	387.00	ns5	30.50	30.50	1.00	64.45	---	---

Table 1-14. Data for samples from core hole 18, Peabody Natural Gas LLC, PNG 35-1.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubC, subbituminous C; ---, no data]

Canister number	Cumulative fusain thickness (CuFT) (mm)	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)	Attritus percentage (AP)	Fusain percentage (FP)	Canister average vitrain percentage (CaAvVP)	Canister average attrital percentage (CaAvAP)
B8	0.0	3	284.17	335.83	45.83	54.17	0.00	45.83	54.17
B9	8.0	3	226.67	385.33	36.56	62.15	1.29	36.56	62.15
ns1	---	---	---	---	---	---	---	---	---
B10	5.0	2	247.92	347.08	41.32	57.85	0.83	41.32	57.85
B11	4.0	3	255.43	340.57	42.57	56.76	0.67	42.57	56.76
B12	2.0	3	329.00	329.00	49.85	49.85	0.30	49.85	49.85
B13	0.0	3	113.04	406.96	21.74	78.26	0.00	---	---
B13	0.0	3	67.50	22.50	75.00	25.00	0.00	29.60	70.40
B14	2.0	4	261.33	326.67	44.29	55.37	0.34	44.29	55.37
B15	0.0	3	60.00	60.00	50.00	50.00	0.00	---	---
B15	20.0	3	120.00	330.00	25.53	70.21	4.26	30.51	66.10
B16	50.0	4	180.00	360.00	30.51	61.02	8.47	30.51	61.02
ns2	---	---	---	---	---	---	---	---	---
B17	10.0	5	140.00	0.00	93.33	0.00	6.67	---	---
B17	0.0	2	0.00	100.00	0.00	100.00	0.00	---	---
B17	10.0	5	310.00	0.00	96.88	0.00	3.13	78.95	17.54
B18	5.0	3	194.25	360.75	34.69	64.42	0.89	34.69	64.42
B19	5.0	5	215.00	0.00	97.73	0.00	2.27	---	---
B19	2.0	4	223.75	134.25	62.15	37.29	0.56	75.65	23.15
B20	5.0	3	126.79	228.21	35.22	63.39	1.39	---	---
B20	0.0	2	60.00	240.00	20.00	80.00	0.00	28.30	70.94
B21	0.0	3	128.18	341.82	27.27	72.73	0.00	---	---
B21	0.0	5	90.00	0.00	100.00	0.00	0.00	38.96	61.04
B22	0.0	5	100.00	0.00	100.00	0.00	0.00	---	---
B22	2.0	2	102.74	385.26	20.97	78.63	0.41	34.36	65.30
B23	1.0	3	204.50	204.50	49.88	49.88	0.24	---	---
B23	20.0	3	120.00	40.00	66.67	22.22	11.11	55.00	41.44
ns3	---	---	---	---	---	---	---	---	---
B24	2.0	2	236.45	341.55	40.77	58.89	0.34	40.77	58.89
A3	0.0	3	147.78	422.22	25.93	74.07	0.00	25.93	74.07
A5	0.0	3	204.71	375.29	35.29	64.71	0.00	35.29	64.71
A6	2.0	3	208.00	390.00	34.67	65.00	0.33	34.67	65.00
A8	5.0	3	197.11	337.89	36.50	62.57	0.93	---	---
A8	0.0	5	110.00	0.00	100.00	0.00	0.00	47.25	51.98
6	2.0	2	45.33	362.67	11.06	88.46	0.49	---	---
6	10.0	3	120.00	120.00	48.00	48.00	4.00	25.05	73.13
10	5.0	3	265.38	309.62	45.76	53.38	0.86	45.76	53.38
ns4	---	---	---	---	---	---	---	---	---
40	5.0	3	294.13	320.87	47.44	51.75	0.81	47.44	51.75
41	3.0	3	359.92	257.08	58.05	41.47	0.48	58.05	41.47
42	5.0	3	277.29	327.71	45.46	53.72	0.82	45.46	53.72
43	2.0	2	171.27	456.73	27.19	72.50	0.32	27.19	72.50
44	0.0	2	40.00	60.00	40.00	60.00	0.00	---	---
44	0.0	5	280.00	0.00	100.00	0.00	0.00	---	---
44	0.0	2	80.00	160.00	33.33	66.67	0.00	64.52	35.48
45	0.0	3	111.11	88.89	55.56	44.44	0.00	---	---
45	0.0	5	170.00	0.00	100.00	0.00	0.00	---	---
45	0.0	3	81.00	189.00	30.00	70.00	0.00	56.58	43.42
46	5.0	3	84.62	190.38	30.22	67.99	1.79	---	---
46	5.0	3	178.13	106.88	61.42	36.85	1.72	46.09	52.15
ns5	---	---	---	---	---	---	---	---	---

Table 1–14. Data for samples from core hole 18, Peabody Natural Gas LLC, PNG 35–1.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubC, subbituminous C; ---, no data]

Canister number	Canister average fusain percentage (CaAvFP)	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
B8	0.00	35	28.57	28.57	11.65	---	---
B9	1.29	55	18.18	18.18	12.74	---	---
ns1	---	---	---	---	---	---	No sample.
B10	0.83	40	25.00	25.00	15.18	---	---
B11	0.67	25	40.00	40.00	14.24	---	---
B12	0.30	44	22.73	22.73	13.30	---	---
B13	---	25	40.00	---	---	---	Pyrite bleb, 1 cm thick.
B13	0.00	25	40.00	40.00	13.34	---	---
B14	0.34	35	28.57	28.57	14.77	---	---
B15	---	19	52.63	---	---	---	---
B15	3.39	19	52.63	52.63	13.50	---	Sooty with fusain.
B16	8.47	30	33.33	33.33	12.81	---	---
ns2	---	---	---	---	---	---	No sample.
B17	---	50	20.00	---	---	---	---
B17	---	50	20.00	---	---	---	---
B17	3.51	50	20.00	20.00	15.07	---	Sooty .
B18	0.89	25	40.00	40.00	15.50	SubC	---
B19	---	45	22.22	---	---	---	---
B19	1.21	40	25.00	23.95	15.52	---	---
B20	---	50	20.00	---	---	---	---
B20	0.76	50	20.00	20.00	13.53	---	---
B21	---	35	28.57	---	---	---	---
B21	0.00	35	28.57	28.57	13.80	---	---
B22	---	20	50.00	---	---	---	---
B22	0.34	20	50.00	50.00	14.82	---	---
B23	---	30	33.33	---	---	---	---
B23	3.56	30	33.33	33.33	15.02	---	Sooty.
ns3	---	---	---	---	---	---	No sample.
B24	0.34	22	45.45	45.45	16.69	---	---
A3	0.00	28	35.71	35.71	16.30	---	---
A5	0.00	35	28.57	28.57	10.59	---	White clay on cleat.
A6	0.33	22	45.45	45.45	17.15	---	Wood at base, 70 mm thick.
A8	---	70	14.29	---	---	---	---
A8	0.77	70	14.29	14.29	13.84	---	---
6	---	38	26.32	---	---	---	Dull, hard.
6	1.82	38	26.32	26.32	15.49	---	Sooty.
10	0.86	40	25.00	25.00	15.71	---	---
ns4	---	---	---	---	---	---	No sample.
40	0.81	15	66.67	66.67	15.99	---	---
41	0.48	35	28.57	28.57	15.59	SubC	---
42	0.82	20	50.00	50.00	16.57	---	---
43	0.32	25	40.00	40.00	14.41	---	---
44	---	40	25.00	---	---	---	---
44	---	40	25.00	---	---	---	---
44	0.00	40	25.00	25.00	15.57	---	---
45	---	40	25.00	---	---	---	---
45	---	40	25.00	---	---	---	---
45	0.00	40	25.00	25.00	14.00	---	---
46	---	22	45.45	---	---	---	---
46	1.75	22	45.45	45.45	13.22	---	---
ns5	---	---	---	---	---	---	No sample.

Table 1–14. Data for samples from core hole 18, Peabody Natural Gas LLC, PNG 35–1.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubC, subbituminous C; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)	Average attrital band thickness (AvABT) (mm)
	Top	Bottom							
47	387.00	389.00	middle and lower Wyodak	64.00	64.00	1.00	66.55	3.0	20.0
56	389.00	391.00	middle and lower Wyodak	62.00	62.00	1.00	68.59	3.0	10.0
65	391.00	393.00	middle and lower Wyodak	62.00	62.00	1.00	70.62	8.0	10.0
69	393.00	---	middle and lower Wyodak	38.00	---	0.63	71.87	1.0	30.0
69	---	---	middle and lower Wyodak	1.00	---	0.02	71.90	0.0	0.0
69	---	395.00	middle and lower Wyodak	21.00	60.00	0.35	72.59	5.0	10.0
70	395.00	---	middle and lower Wyodak	9.00	---	0.16	72.88	20.0	5.0
70	---	---	middle and lower Wyodak	16.00	---	0.28	73.41	0.0	0.0
70	---	397.00	middle and lower Wyodak	32.00	57.00	0.56	74.46	15.0	5.0
71	397.00	399.00	middle and lower Wyodak	33.00	33.00	1.00	75.54	8.0	8.0
72	399.00	401.00	middle and lower Wyodak	61.00	61.00	1.00	77.54	3.0	15.0
73	401.00	---	middle and lower Wyodak	15.00	---	0.33	78.03	2.0	15.0
73	---	403.00	middle and lower Wyodak	31.00	46.00	0.67	79.05	10.0	5.0
74	403.00	---	middle and lower Wyodak	42.00	---	0.69	80.43	5.0	10.0
74	---	---	middle and lower Wyodak	5.00	---	0.08	80.59	0.0	0.0
74	---	405.00	middle and lower Wyodak	14.00	61.00	0.23	81.05	5.0	10.0
75	405.00	---	middle and lower Wyodak	40.00	---	0.71	82.37	20.0	5.0
75	---	---	middle and lower Wyodak	6.00	---	0.11	82.56	0.0	0.0
75	---	407.00	middle and lower Wyodak	10.00	56.00	0.18	82.89	20.0	5.0

Table 1–14. Data for samples from core hole 18, Peabody Natural Gas LLC, PNG 35–1.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubC, subbituminous C; ---, no data]

Canister number	Cumulative fusain thickness (CuFT) (mm)	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)	Attritus percentage (AP)	Fusain percentage (FP)	Canister average vitrain percentage (CaAvVP)	Canister average attrital percentage (CaAvAP)
47	5.0	2	79.38	555.63	12.40	86.82	0.78	12.40	86.82
56	5.0	2	223.64	391.36	36.07	63.12	0.81	36.07	63.12
65	10.0	3	244.00	366.00	39.35	59.03	1.61	39.35	59.03
69	5.0	1	26.79	348.21	7.05	91.64	1.32	---	---
69	0.0	0	0.00	0.00	0.00	0.00	0.00	---	---
69	5.0	3	93.18	111.82	44.37	53.25	2.38	19.99	76.67
70	5.0	3	28.33	56.67	31.48	62.96	5.56	---	---
70	160.0	8	0.00	0.00	0.00	0.00	100.00	---	---
70	3.0	3	176.11	140.89	55.03	44.03	0.94	35.87	34.66
71	2.0	3	178.91	149.09	54.21	45.18	0.61	54.21	45.18
72	0.0	2	213.50	396.50	35.00	65.00	0.00	35.00	65.00
73	0.0	2	60.00	90.00	40.00	60.00	0.00	---	---
73	0.0	3	186.00	124.00	60.00	40.00	0.00	53.48	46.52
74	2.0	3	185.78	232.22	44.23	55.29	0.48	---	---
74	0.0	0	0.00	0.00	0.00	0.00	0.00	---	---
74	2.0	3	61.33	76.67	43.81	54.76	1.43	40.51	50.64
75	5.0	3	131.67	263.33	32.92	65.83	1.25	---	---
75	0.0	0	0.00	0.00	0.00	0.00	0.00	---	---
75	0.0	3	33.33	66.67	33.33	66.67	0.00	29.46	58.93

Table 1–14. Data for samples from core hole 18, Peabody Natural Gas LLC, PNG 35–1.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubC, subbituminous C; ---, no data]

Canister number	Canister average fusain percentage (CaAvFP)	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
47	0.78	50	20.00	20.00	14.70	---	Dull.
56	0.81	55	18.18	18.18	13.86	---	---
65	1.61	70	14.29	14.29	14.90	---	---
69	---	30	33.33	---	---	---	---
69	---	30	33.33	---	---	---	---
69	1.67	30	33.33	33.33	14.12	---	---
70	---	35	28.57	---	---	---	---
70	---	35	28.57	---	---	---	Very minor amounts of vitrain and attritus.
70	29.47	35	28.57	28.57	15.16	---	---
71	0.61	45	22.22	22.22	15.87	---	---
72	0.00	50	20.00	20.00	14.85	SubC	---
73	---	35	28.57	---	---	---	Pyrite.
73	0.00	35	28.57	28.57	15.90	---	---
74	---	40	25.00	---	---	---	---
74	---	40	25.00	---	---	---	Very minor amount of vitrain.
74	0.66	40	25.00	25.00	16.28	---	---
75	---	35	28.57	---	---	---	---
75	---	35	28.57	---	---	---	Very minor amount of vitrain.
75	0.89	35	28.57	28.57	12.68	---	---

Table 1–15. Data for samples from core hole 19, Barrett Resources Corporation, All Night Creek Unit (ANCU) Iberlin 21–33–4374.

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)
	Top	Bottom					
C1	1,300.00	1,302.00	Big George	55.00	55.00	1.00	1.80
C2	1,302.00	1,304.00	Big George	57.00	57.00	1.00	3.67
C3	1,304.00	1,306.00	Big George	37.00	37.00	1.00	4.89
ns1	1,306.00	1,309.00	ns1	91.00	91.00	1.00	7.87
C5	1,309.00	1,311.00	Big George	49.00	49.00	1.00	9.48
C4	1,311.00	1,313.00	Big George	69.00	69.00	1.00	11.75
ns2	1,313.00	1,316.00	ns2	91.00	91.00	1.00	14.73
C6	1,316.00	1,318.00	Big George	60.00	60.00	1.00	16.70

Table 1–15. Data for samples from core hole 19, Barrett Resources Corporation, All Night Creek Unit (ANCU) Iberlin 21–33–4374.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; ---, no data]

Canister number	Average vitrain band thickness (AvVBT) (mm)	Average attrital band thickness (AvABT) (mm)	Cumulative fusain thickness (CuFT) (mm)	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)
C1	10.0	15.0	0.0	3	275.00	275.00	50.00
C2	8.0	25.0	8.0	3	168.60	393.40	29.58
C3	5.0	8.0	0.0	3	148.00	222.00	40.00
ns1	---	---	---	---	---	---	---
C5	70.0	2.0	0.0	5	476.39	13.61	97.22
C4	5.0	3.0	0.0	3	483.00	207.00	70.00
ns2	---	---	---	---	---	---	---
C6	70.0	15.0	0.0	4	494.12	105.88	82.35

Table 1–15. Data for samples from core hole 19, Barrett Resources Corporation, All Night Creek Unit (ANCU) Iberlin 21–33–4374.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; ---, no data]

Canister number	Attritus percentage (AP)	Fusain percentage (FP)	Canister average vitrain percentage (CaAvVP)	Canister average attrital percentage (CaAvAP)	Canister average fusain percentage (CaAvFP)	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)
C1	50.00	0.00	50.00	50.00	0.00	30	33.33
C2	69.02	1.40	29.58	69.02	1.40	10	100.00
C3	60.00	0.00	40.00	60.00	0.00	60	16.67
ns1	---	---	---	---	---	---	---
C5	2.78	0.00	97.22	2.78	0.00	30	33.33
C4	30.00	0.00	70.00	30.00	0.00	40	25.00
ns2	---	---	---	---	---	---	---
C6	17.65	0.00	82.35	17.65	0.00	30	33.33

Table 1–15. Data for samples from core hole 19, Barrett Resources Corporation, All Night Creek Unit (ANCU) Iberlin 21–33–4374.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; ---, no data]

Canister number	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
C1	33.33	16.97	SubB	Bedding at 70 degrees to horizontal.
C2	100.00	14.04	---	Fusain band at 44 cm, bedding at 60 degrees to horizontal, kaolinite on cleat.
C3	16.67	16.36	---	Bedding at 45 degrees to horizontal.
ns1	---	---	---	Top 2 ft is bag sample, bottom 1 ft was lost during drilling.
C5	33.33	12.92	---	Highly fragmented sample.
C4	25.00	15.38	---	Vertical wood grain at top, bedding 90 degrees to horizontal.
ns2	---	---	---	Top 1 ft is bag sample, bottom 2 ft was lost during drilling.
C6	33.33	12.95	---	High-angle bedding.

Table 1–16. Data for samples from core hole 20, Peabody Natural Gas LLC, PNG 16–2.

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)
	Top	Bottom						
C–7	213.00	---	middle and lower Wyodak	14.00	---	0.23	0.46	40.0
C–7	---	215.00	middle and lower Wyodak	46.00	60.00	0.77	1.97	2.0
C–8	215.00	217.00	middle and lower Wyodak	60.00	60.00	1.00	3.94	8.0
C–9	217.00	219.00	middle and lower Wyodak	60.00	60.00	1.00	5.91	10.0
C–10	219.00	221.00	middle and lower Wyodak	60.00	60.00	1.00	7.87	10.0
C–11	221.00	---	middle and lower Wyodak	23.00	---	0.37	8.63	5.0
C–11	---	---	middle and lower Wyodak	22.00	---	0.35	9.35	40.0
C–11	---	223.00	middle and lower Wyodak	18.00	63.00	0.29	9.94	3.0
C–12	223.00	225.00	middle and lower Wyodak	60.00	60.00	1.00	11.91	30.0
C–13	225.00	227.00	middle and lower Wyodak	60.00	60.00	1.00	13.88	4.0
ns1	227.00	228.00	ns1	30.50	30.50	1.00	14.88	---
C–14	228.00	230.00	middle and lower Wyodak	60.00	60.00	1.00	16.85	4.0
C–15	230.00	---	middle and lower Wyodak	54.00	---	0.84	18.62	40.0
C–15	---	232.00	middle and lower Wyodak	10.00	64.00	0.16	18.95	4.0
C–16	232.00	234.00	middle and lower Wyodak	65.00	65.00	1.00	21.08	50.0
C–17	234.00	236.00	middle and lower Wyodak	60.00	60.00	1.00	23.05	25.0
C–18	236.00	238.00	middle and lower Wyodak	60.00	60.00	1.00	25.02	2.0
C–19	238.00	240.00	middle and lower Wyodak	60.00	60.00	1.00	26.98	10.0
C–20	240.00	---	middle and lower Wyodak	45.00	---	0.75	28.46	2.0
C–20	---	242.00	middle and lower Wyodak	15.00	60.00	0.25	28.95	50.0
ns2	242.00	243.00	ns2	30.50	30.50	1.00	29.95	---
C–21	243.00	---	middle and lower Wyodak	46.00	---	0.77	31.46	6.0
C–21	---	245.00	middle and lower Wyodak	14.00	60.00	0.23	31.92	50.0
C–22	245.00	247.00	middle and lower Wyodak	58.00	58.00	1.00	33.83	4.0
C–23	247.00	---	middle and lower Wyodak	12.00	---	0.20	34.22	1.0
C–23	---	249.00	middle and lower Wyodak	48.00	60.00	0.80	35.79	30.0
C–24	249.00	251.00	middle and lower Wyodak	63.00	63.00	1.00	37.86	5.0
C–26	251.00	---	middle and lower Wyodak	20.00	---	0.42	38.52	5.0
C–26	---	---	middle and lower Wyodak	10.00	---	0.21	38.85	6.0
C–26	---	253.00	middle and lower Wyodak	18.00	48.00	0.38	39.44	35.0
C–27	253.00	255.00	middle and lower Wyodak	60.00	60.00	1.00	41.40	6.0
C–28	255.00	---	middle and lower Wyodak	30.00	---	0.50	42.39	6.0
C–28	---	257.00	middle and lower Wyodak	30.00	60.00	0.50	43.37	4.0
ns3	257.00	258.00	ns3	30.50	30.50	1.00	44.37	---
C–29	258.00	260.00	middle and lower Wyodak	60.00	60.00	1.00	46.34	3.0
C–30	260.00	---	middle and lower Wyodak	8.00	---	0.13	46.60	3.0
C–30	---	---	middle and lower Wyodak	24.00	---	0.40	47.39	4.0
C–30	---	---	middle and lower Wyodak	6.00	---	0.10	47.59	2.0
C–30	---	---	middle and lower Wyodak	16.00	---	0.27	48.11	1.0
C–30	---	262.00	middle and lower Wyodak	6.00	60.00	0.10	48.31	40.0
C–31	262.00	---	middle and lower Wyodak	20.00	---	0.33	48.97	4.0
C–31	---	---	middle and lower Wyodak	20.00	---	0.33	49.62	1.0
C–31	---	264.00	middle and lower Wyodak	20.00	60.00	0.33	50.28	3.0
C–32	264.00	---	middle and lower Wyodak	22.00	---	0.37	51.00	7.0
C–32	---	---	middle and lower Wyodak	28.00	---	0.47	51.92	30.0
C–32	---	266.00	middle and lower Wyodak	10.00	60.00	0.17	52.25	4.0
C–33	266.00	---	middle and lower Wyodak	50.00	---	0.83	53.89	7.0
C–33	---	268.00	middle and lower Wyodak	10.00	60.00	0.17	54.22	1.0
C–35	268.00	---	middle and lower Wyodak	19.00	---	0.30	54.84	6.0
C–35	---	---	middle and lower Wyodak	12.00	---	0.19	55.23	2.0
C–35	---	---	middle and lower Wyodak	12.00	---	0.19	55.63	1.0
C–35	---	270.00	middle and lower Wyodak	21.00	64.00	0.33	56.32	30.0

Table 1–16. Data for samples from core hole 20, Peabody Natural Gas LLC, PNG 16–2.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Average attrital band thickness (AvABT) (mm)	Cumulative fusain thickness (CuFT) (mm)	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)	Attritus percentage (AP)
C–7	1.0	0.0	5	126.00	14.00	90.00	10.00
C–7	10.0	0.0	2	138.00	322.00	30.00	70.00
C–8	4.0	0.0	3	240.00	360.00	40.00	60.00
C–9	8.0	0.0	3	360.00	240.00	60.00	40.00
C–10	25.0	0.0	3	240.00	360.00	40.00	60.00
C–11	20.0	1.0	3	91.60	137.40	39.83	59.74
C–11	1.0	0.0	5	198.00	22.00	90.00	10.00
C–11	40.0	0.0	1	108.00	72.00	60.00	40.00
C–12	4.0	1.0	4	419.30	179.70	69.88	29.95
C–13	10.0	4.0	2	298.00	298.00	49.67	49.67
ns1	---	---	---	---	---	---	---
C–14	10.0	2.0	2	239.20	358.80	39.87	59.80
C–15	4.0	0.0	4	486.00	54.00	90.00	10.00
C–15	10.0	0.0	2	30.00	70.00	30.00	70.00
C–16	4.0	1.0	5	584.10	64.90	89.86	9.98
C–17	0.0	2.0	5	538.20	0.00	89.70	0.00
C–18	20.0	0.0	2	120.00	480.00	20.00	80.00
C–19	50.0	0.0	3	120.00	480.00	20.00	80.00
C–20	4.0	0.0	2	247.50	202.50	55.00	45.00
C–20	2.0	3.0	5	132.30	14.70	88.20	9.80
ns2	---	---	---	---	---	---	---
C–21	9.0	0.0	3	184.00	276.00	40.00	60.00
C–21	2.0	0.0	5	126.00	14.00	90.00	10.00
C–22	8.0	0.0	2	290.00	290.00	50.00	50.00
C–23	20.0	0.0	2	12.00	108.00	10.00	90.00
C–23	2.0	0.0	4	432.00	48.00	90.00	10.00
C–24	20.0	0.0	3	189.00	441.00	30.00	70.00
C–26	2.0	0.0	3	160.00	40.00	80.00	20.00
C–26	1.0	0.0	3	80.00	20.00	80.00	20.00
C–26	1.0	2.0	4	160.20	17.80	89.00	9.89
C–27	4.0	0.0	3	240.00	360.00	40.00	60.00
C–28	10.0	0.0	3	60.00	240.00	20.00	80.00
C–28	3.0	0.0	2	180.00	120.00	60.00	40.00
ns3	---	---	---	---	---	---	---
C–29	30.0	0.0	1	120.00	480.00	20.00	80.00
C–30	2.0	0.0	2	48.00	32.00	60.00	40.00
C–30	1.0	0.0	2	192.00	48.00	80.00	20.00
C–30	5.0	0.0	2	30.00	30.00	50.00	50.00
C–30	20.0	0.0	1	16.00	144.00	10.00	90.00
C–30	1.0	0.0	5	54.00	6.00	90.00	10.00
C–31	15.0	0.0	2	60.00	140.00	30.00	70.00
C–31	45.0	0.0	1	20.00	180.00	10.00	90.00
C–31	15.0	2.0	2	59.40	138.60	29.70	69.30
C–32	15.0	0.0	3	154.00	66.00	70.00	30.00
C–32	30.0	0.0	4	112.00	168.00	40.00	60.00
C–32	15.0	0.0	2	40.00	60.00	40.00	60.00
C–33	5.0	2.0	3	298.80	199.20	59.76	39.84
C–33	1.0	0.0	2	70.00	30.00	70.00	30.00
C–35	6.0	0.0	3	95.00	95.00	50.00	50.00
C–35	25.0	0.0	1	12.00	108.00	10.00	90.00
C–35	1.0	20.0	2	60.00	40.00	50.00	33.33
C–35	20.0	2.0	4	145.60	62.40	69.33	29.71

Table 1–16. Data for samples from core hole 20, Peabody Natural Gas LLC, PNG 16–2.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Fusain percentage (FP)	Canister average vitrain percentage (CaAvVP)	Canister average attrital percentage (CaAvAP)	Canister average fusain percentage (CaAvFP)	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)	Canister average cleat frequency (CaAvCFr) (cleats/m)
C–7	0.00	---	---	---	35	28.57	---
C–7	0.00	44.00	56.00	0.00	10	100.00	83.33
C–8	0.00	40.00	60.00	0.00	25	40.00	40.00
C–9	0.00	60.00	40.00	0.00	40	25.00	25.00
C–10	0.00	40.00	60.00	0.00	60	16.67	16.67
C–11	0.43	---	---	---	65	15.38	---
C–11	0.00	---	---	---	30	33.33	---
C–11	0.00	63.11	36.73	0.16	50	20.00	22.97
C–12	0.17	69.88	29.95	0.17	50	20.00	20.00
C–13	0.67	49.67	49.67	0.67	30	33.33	33.33
ns1	---	---	---	---	---	---	---
C–14	0.33	39.87	59.80	0.33	40	25.00	25.00
C–15	0.00	---	---	---	30	33.33	---
C–15	0.00	80.63	19.38	0.00	50	20.00	31.25
C–16	0.15	89.86	9.98	0.15	20	50.00	50.00
C–17	0.33	89.70	0.00	0.33	30	33.33	33.33
C–18	0.00	20.00	80.00	0.00	50	20.00	20.00
C–19	0.00	20.00	80.00	0.00	20	50.00	50.00
C–20	0.00	---	---	---	20	50.00	---
C–20	2.00	63.30	36.20	0.50	30	33.33	45.83
ns2	---	---	---	---	---	---	---
C–21	0.00	---	---	---	20	50.00	---
C–21	0.00	51.67	48.33	0.00	40	25.00	44.17
C–22	0.00	50.00	50.00	0.00	---	---	---
C–23	0.00	---	---	---	30	33.33	---
C–23	0.00	74.00	26.00	0.00	20	50.00	46.67
C–24	0.00	30.00	70.00	0.00	20	50.00	50.00
C–26	0.00	---	---	---	---	---	---
C–26	0.00	---	---	---	30	33.33	---
C–26	1.11	83.38	16.21	0.42	20	50.00	44.05
C–27	0.00	40.00	60.00	0.00	65	15.38	15.38
C–28	0.00	---	---	---	30	33.33	---
C–28	0.00	40.00	60.00	0.00	20	50.00	41.67
ns3	---	---	---	---	---	---	---
C–29	0.00	20.00	80.00	0.00	20	50.00	50.00
C–30	0.00	---	---	---	40	25.00	---
C–30	0.00	---	---	---	40	25.00	---
C–30	0.00	---	---	---	---	---	---
C–30	0.00	---	---	---	40	25.00	---
C–30	0.00	56.67	43.33	0.00	30	33.33	25.93
C–31	0.00	---	---	---	30	33.33	---
C–31	0.00	---	---	---	55	18.18	---
C–31	1.00	23.23	76.43	0.33	40	25.00	25.51
C–32	0.00	---	---	---	30	33.33	---
C–32	0.00	---	---	---	15	66.67	---
C–32	0.00	51.00	49.00	0.00	30	33.33	48.89
C–33	0.40	---	---	---	20	50.00	---
C–33	0.00	61.47	38.20	0.33	10	100.00	58.33
C–35	0.00	---	---	---	30	33.33	---
C–35	0.00	---	---	---	50	20.00	---
C–35	16.67	---	---	---	40	25.00	---
C–35	0.95	48.84	47.72	3.44	15	66.67	40.21

Table 1–16. Data for samples from core hole 20, Peabody Natural Gas LLC, PNG 16–2.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Total gas (SCF/ton)	Apparent rank	Comments
C–7	---	---	---
C–7	3.67	SubB	Gypsum on cleat.
C–8	4.71	---	Slickensides at top.
C–9	10.60	---	---
C–10	7.01	---	---
C–11	---	---	---
C–11	---	---	---
C–11	6.06	---	Hard.
C–12	5.64	---	Numerous wood structures visible, kaolinite at 50–60 cm.
C–13	6.59	---	Kaolinite at 58–63 cm.
ns1	---	---	No sample.
C–14	5.82	---	Dull.
C–15	---	---	A lot of wood grain visible, kaolinite on cleat.
C–15	5.27	---	---
C–16	8.08	---	A lot of wood grain visible, kaolinite on cleat.
C–17	5.18	---	Numerous wood structures visible, kaolinite on cleat.
C–18	7.40	SubB	Fewer wood structures visible, kaolinite on cleat.
C–19	7.37	---	---
C–20	---	---	---
C–20	6.97	---	Fusain layer at 45 cm.
ns2	---	---	No sample.
C–21	---	---	Top half is very fractured.
C–21	9.06	---	Almost all vitrain.
C–22	8.40	---	Highly fractured sample.
C–23	---	---	---
C–23	9.45	---	Very woody.
C–24	9.56	---	Highly fractured sample.
C–26	---	---	Banding thickness increases downward.
C–26	---	---	Banding thickness increases downward.
C–26	9.33	---	Banding thickness increases downward.
C–27	7.86	---	---
C–28	---	---	---
C–28	9.99	---	---
ns3	---	---	No sample.
C–29	8.31	---	Hard.
C–30	---	---	Compressed banding at 5 cm, very disturbed banding from 8 to 28 cm .
C–30	---	---	---
C–30	---	---	---
C–30	---	---	---
C–30	8.81	SubC	Conchoidally fractured.
C–31	---	---	---
C–31	---	---	---
C–31	7.27	---	---
C–32	---	---	---
C–32	---	---	---
C–32	8.85	---	---
C–33	---	---	---
C–33	12.28	---	Very hard, shiny.
C–35	---	---	---
C–35	---	---	Small amount of resin present.
C–35	---	---	Numerous gypsum crystals on bedding and cleat surfaces, highly fractured sample, large amount of fusain present.
C–35	9.06	---	Large woody structures present.

Table 1–16. Data for samples from core hole 20, Peabody Natural Gas LLC, PNG 16–2.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)
	Top	Bottom						
C–36	270.00	---	middle and lower Wyodak	46.00	---	0.75	57.82	3.0
C–36	---	---	middle and lower Wyodak	9.00	---	0.15	58.12	50.0
C–36	---	272.00	middle and lower Wyodak	6.00	61.00	0.10	58.32	20.0
ns4	272.00	273.00	ns4	30.50	30.50	1.00	59.32	---
C–37	273.00	275.00	middle and lower Wyodak	60.00	60.00	1.00	61.29	1.0
C–38	275.00	277.00	middle and lower Wyodak	55.00	55.00	1.00	63.09	3.0
C–39	277.00	279.00	middle and lower Wyodak	54.00	54.00	1.00	64.86	4.0
C–40	279.00	---	middle and lower Wyodak	27.00	---	0.45	65.75	4.0
C–40	---	281.00	middle and lower Wyodak	33.00	60.00	0.55	66.83	8.0
C–41	281.00	283.00	middle and lower Wyodak	60.00	60.00	1.00	68.80	5.0
C–42	283.00	---	middle and lower Wyodak	15.00	---	0.25	69.29	2.0
C–42	---	---	middle and lower Wyodak	30.00	---	0.50	70.28	25.0
C–42	---	285.00	middle and lower Wyodak	15.00	60.00	0.25	70.77	2.0

Table 1–16. Data for samples from core hole 20, Peabody Natural Gas LLC, PNG 16–2.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Average attrital band thickness (AvABT) (mm)	Cumulative fusain thickness (CuFT) (mm)	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)	Attritus percentage (AP)
C–36	2.0	0.0	2	276.00	184.00	60.00	40.00
C–36	0.0	0.0	5	90.00	0.00	100.00	0.00
C–36	2.0	4.0	3	39.20	16.80	65.33	28.00
ns4	---	---	---	---	---	---	---
C–37	4.0	0.0	2	240.00	360.00	40.00	60.00
C–38	2.0	3.0	2	328.20	218.80	59.67	39.78
C–39	1.0	1.0	2	377.30	161.70	69.87	29.94
C–40	1.0	0.0	2	189.00	81.00	70.00	30.00
C–40	30.0	0.0	3	99.00	231.00	30.00	70.00
C–41	4.0	1.0	3	359.40	239.60	59.90	39.93
C–42	10.0	1.0	2	74.50	74.50	49.67	49.67
C–42	1.0	0.0	4	240.00	60.00	80.00	20.00
C–42	5.0	3.0	2	102.90	44.10	68.60	29.40

Table 1–16. Data for samples from core hole 20, Peabody Natural Gas LLC, PNG 16–2.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Fusain percentage (FP)	Canister average vitrain percentage (CaAvVP)	Canister average attrital percentage (CaAvAP)	Canister average fusain percentage (CaAvFP)	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)	Canister average cleat frequency (CaAvCFr) (cleats/m)
C–36	0.00	---	---	---	20	50.00	---
C–36	0.00	---	---	---	35	28.57	---
C–36	6.67	66.43	32.92	0.66	30	33.33	45.20
ns4	---	---	---	---	---	---	---
C–37	0.00	40.00	60.00	0.00	50	20.00	20.00
C–38	0.55	59.67	39.78	0.55	30	33.33	33.33
C–39	0.19	69.87	29.94	0.19	30	33.33	33.33
C–40	0.00	---	---	---	30	33.33	---
C–40	0.00	48.00	52.00	0.00	40	25.00	28.75
C–41	0.17	59.90	39.93	0.17	25	40.00	40.00
C–42	0.67	---	---	---	70	14.29	---
C–42	0.00	---	---	---	20	50.00	---
C–42	2.00	69.57	29.77	0.67	30	33.33	36.90

Table 1–16. Data for samples from core hole 20, Peabody Natural Gas LLC, PNG 16–2.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Total gas (SCF/ton)	Apparent rank	Comments
C–36	---	---	---
C–36	---	---	---
C–36	10.39	---	Fusian layers at 55 and 61 cm.
ns4	---	---	No sample.
C–37	12.10	---	Highly fractured sample.
C–38	8.47	---	---
C–39	11.36	---	---
C–40	---	---	Highly fractured sample.
C–40	7.56	---	Highly fractured sample.
C–41	11.19	---	---
C–42	---	---	---
C–42	---	---	---
C–42	12.52	SubC	Fusain layer at 47 cm.

Table 1–17. Data for samples from core hole 21, The Coteau Properties Co., Coteau MC00250C.

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; LigA, lignite A; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)	Average attrital band thickness (AvABT) (mm)	Cumulative fusain thickness (CuFT) (mm)
	Top	Bottom								
D20	167.00	169.00	Beulah	56.00	56.00	1.00	1.84	4.0	25.0	1.0
ns1	169.00	173.00	ns1	122.00	122.00	1.00	5.84	---	---	---
D21	173.00	---	Beulah	25.00	---	0.51	6.66	4.0	25.0	0.0
D21	---	175.00	Beulah	24.00	49.00	0.49	7.45	7.0	25.0	0.0
ns2	175.00	438.20	ns2	8022.00	8,022.00	1.00	270.64	---	---	---
D22	438.20	440.20	unnamed 2	60.00	60.00	1.00	272.60	10.0	13.0	3.0
D23	440.20	442.20	unnamed 2	60.00	60.00	1.00	274.57	10.0	15.0	2.0
ns3	442.20	443.00	ns3	24.00	24.00	1.00	275.36	---	---	---
D24	443.00	445.00	unnamed 2	59.00	59.00	1.00	277.30	10.0	10.0	1.0
D25	445.00	447.00	unnamed 2	55.00	55.00	1.00	279.10	5.0	7.0	2.0
ns4	447.00	571.00	ns4	3779.50	3,779.50	1.00	403.10	---	---	---
D26	571.00	573.40	unnamed 3	66.00	66.00	1.00	405.27	4.0	5.0	0.0

Table 1–17. Data for samples from core hole 21, The Coteau Properties Co., Coteau MC00250C.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; LigA, lignite A; ---, no data]

Canister number	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)	Attritus percentage (AP)	Fusain percentage (FP)	Canister average vitrain percentage (CaAvVP)	Canister average attrital percentage (CaAvAP)	Canister average fusain percentage (CaAvFP)
D20	1	111.80	447.20	19.96	79.86	0.18	19.96	79.86	0.18
ns1	---	---	---	---	---	---	---	---	---
D21	1	50.00	200.00	20.00	80.00	0.00	---	---	---
D21	3	72.00	168.00	30.00	70.00	0.00	24.90	75.10	0.00
ns2	---	---	---	---	---	---	---	---	---
D22	3	358.20	238.80	59.70	39.80	0.50	59.70	39.80	0.50
D23	3	299.00	299.00	49.83	49.83	0.33	49.83	49.83	0.33
ns3	---	---	---	---	---	---	---	---	---
D24	3	235.60	353.40	39.93	59.90	0.17	39.93	59.90	0.17
D25	3	219.20	328.80	39.85	59.78	0.36	39.85	59.78	0.36
ns4	---	---	---	---	---	---	---	---	---
D26	2	198.00	462.00	30.00	70.00	0.00	30.00	70.00	0.00

Table 1–17. Data for samples from core hole 21, The Coteau Properties Co., Coteau MC00250C.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; LigA, lignite A; ---, no data]

Canister number	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
D20	50	20.00	20.00	0.57	---	Fusain on bedding.
ns1	---	---	---	---	---	Sample taken by Coteau mine engineer.
D21	75	13.33	---	---	---	Blebs of resin at 4 mm.
D21	75	13.33	13.33	0.88	---	Woody material near base.
ns2	---	---	---	---	---	No sample.
D22	75	13.33	13.33	2.55	---	---
D23	75	13.33	13.33	2.18	LigA	---
ns3	---	---	---	---	---	Shale, no sample.
D24	30	33.33	33.33	2.51	---	---
D25	40	25.00	25.00	2.16	---	---
ns4	---	---	---	---	---	No sample.
D26	30	33.33	33.33	0.96	---	---

Table 1–18. Data for samples from core hole 22, The Coteau Properties Co., Coteau MC00251.

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; LigA, lignite A; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)	Average attrital band thickness (AvABT) (mm)
	Top	Bottom							
D28	791.00	---	unnamed 4	17.00	---	0.24	0.56	2.0	6.0
D28	---	793.00	unnamed 4	53.00	70.00	0.76	2.30	20.0	10.0
D27	793.00	---	unnamed 4	17.00	---	0.35	2.85	1.0	0.0
D27	---	795.00	unnamed 4	32.00	49.00	0.65	3.90	7.0	4.0
D29	795.00	---	unnamed 4	10.50	---	0.20	4.25	0.0	0.0
D29	---	797.00	unnamed 4	41.50	52.00	0.80	5.61	7.0	10.0

Table 1–18. Data for samples from core hole 22, The Coteau Properties Co., Coteau MC00251.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; LigA, lignite A; ---, no data]

Canister number	Cumulative fusain thickness (CuFT) (mm)	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)	Attritus percentage (AP)	Fusain percentage (FP)	Canister average vitrain percentage (CaAvVP)	Canister average attrital percentage (CaAvAP)
D28	0.0	2	51.00	119.00	30.00	70.00	0.00	---	---
D28	4.0	3	315.60	210.40	59.55	39.70	0.75	52.37	47.06
D27	0.0	2	0.00	0.00	0.00	0.00	0.00	---	---
D27	0.0	3	288.00	32.00	90.00	10.00	0.00	58.78	6.53
D29	0.0	0	0.00	0.00	0.00	0.00	0.00	---	---
D29	0.0	3	124.50	290.50	30.00	70.00	0.00	23.94	55.87

Table 1–18. Data for samples from core hole 22, The Coteau Properties Co., Coteau MC00251.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; LigA, lignite A; ---, no data]

Canister number	Canister average fusain percentage (CaAvFP)	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
D28	---	---	---	---	---	---	16-mm-thick clay band at 9 cm.
D28	0.57	---	---	---	0.40	LigA	4 mm of fusain at 44 cm.
D27	---	---	---	---	---	---	---
D27	0.00	25	40.00	40.00	0.67	---	---
D29	---	---	---	---	---	---	Rooted clay, dark brown.
D29	0.00	---	---	---	0.86	---	---

Table 1–19. Data for samples from core hole 23, Ammonite Energy Texas, Inc., Thomas Jefferson State 36–3.

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; SubC, subbituminous C; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)	Average attrital band thickness (AvABT) (mm)
	Top	Bottom							
D1	337.00	---	School	53.00	---	0.88	1.74	50.0	0.0
D1	---	339.00	School	7.00	60.00	0.12	1.97	5.0	20.0
D2	339.00	---	School	42.00	---	0.70	3.35	2.0	10.0
D2	---	341.00	School	18.00	60.00	0.30	3.94	10.0	5.0
D3	341.00	---	School	7.00	---	0.12	4.17	2.0	10.0
D3	---	---	School	19.00	---	0.32	4.79	0.0	0.0
D3	---	---	School	21.00	---	0.35	5.48	1.0	10.0
D3	---	343.00	School	13.00	60.00	0.22	5.91	2.0	5.0
D4	343.00	---	School	23.00	---	0.43	6.66	1.0	40.0
D4	---	---	School	19.00	---	0.36	7.28	10.0	2.0
D4	---	345.00	School	11.00	53.00	0.21	7.64	3.0	5.0
D5	345.00	---	School	2.00	---	0.04	7.71	0.0	0.0
D5	---	---	School	17.00	---	0.30	8.27	30.0	2.0
D5	---	347.00	School	38.00	57.00	0.67	9.51	1.0	20.0
D6	347.00	349.00	School	54.00	54.00	1.00	11.29	5.0	2.0
D7	349.00	---	School	19.00	---	0.32	11.91	2.0	3.0
D7	---	---	School	15.00	---	0.25	12.40	10.0	15.0
D7	---	351.00	School	26.00	60.00	0.43	13.25	20.0	10.0
D8	351.00	---	School	55.00	---	0.87	15.06	20.0	10.0
D8	---	353.00	School	8.00	63.00	0.13	15.32	2.0	8.0
D9	353.00	---	School	23.00	---	0.38	16.08	2.0	8.0
D9	---	355.00	School	37.00	60.00	0.62	17.29	40.0	0.0

Table 1–19. Data for samples from core hole 23, Ammonite Energy Texas, Inc., Thomas Jefferson State 36–3.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; SubC, subbituminous C; ---, no data]

Canister number	Cumulative fusain thickness (CuFT) (mm)	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)	Attritus percentage (AP)	Fusain percentage (FP)	Canister average vitrain percentage (CaAvVP)	Canister average attrital percentage (CaAvAP)
D1	3.0	5	527.00	0.00	99.43	0.00	0.57	---	---
D1	0.0	3	14.00	56.00	20.00	80.00	0.00	90.17	9.33
D2	0.0	2	70.00	350.00	16.67	83.33	0.00	---	---
D2	2.0	3	118.67	59.33	65.93	32.96	1.11	31.44	68.22
D3	0.0	2	11.67	58.33	16.67	83.33	0.00	---	---
D3	0.0	0	0.00	0.00	0.00	0.00	0.00	---	---
D3	0.0	2	19.09	190.91	9.09	90.91	0.00	---	---
D3	0.0	2	37.14	92.86	28.57	71.43	0.00	11.32	57.02
D4	2.0	1	5.56	222.44	2.42	96.71	0.87	---	---
D4	2.0	3	156.67	31.33	82.46	16.49	1.05	---	---
D4	0.0	2	41.25	68.75	37.50	62.50	0.00	38.39	60.85
D5	20.0	8	0.00	0.00	0.00	0.00	100.00	---	---
D5	0.0	4	159.38	10.63	93.75	6.25	0.00	---	---
D5	0.0	2	18.10	361.90	4.76	95.24	0.00	31.14	65.36
D6	6.0	3	381.43	152.57	70.63	28.25	1.11	70.63	28.25
D7	0.0	2	76.00	114.00	40.00	60.00	0.00	---	---
D7	0.0	3	60.00	90.00	40.00	60.00	0.00	---	---
D7	0.0	3	173.33	86.67	66.67	33.33	0.00	51.56	48.44
D8	0.0	3	366.67	183.33	66.67	33.33	0.00	---	---
D8	1.0	2	15.80	63.20	19.75	79.00	1.25	60.71	39.13
D9	1.0	2	45.80	183.20	19.91	79.65	0.43	---	---
D9	0.0	5	370.00	0.00	100.00	0.00	0.00	69.30	30.53

Table 1–19. Data for samples from core hole 23, Ammonite Energy Texas, Inc., Thomas Jefferson State 36–3.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; SubC, subbituminous C; ---, no data]

Canister number	Canister average fusain percentage (CaAvFP)	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
D1	---	30	33.33	---	---	---	---
D1	0.50	20	50.00	35.28	1.33	SubC	---
D2	---	50	20.00	---	---	---	---
D2	0.33	50	20.00	20.00	0.57	---	---
D3	---	2	500.00	---	---	---	---
D3	---	---	---	---	---	---	Clay included in sample.
D3	---	40	25.00	---	---	---	Light-gray.
D3	0.00	40	25.00	106.10	1.21	---	---
D4	---	40	25.00	---	---	---	---
D4	---	30	33.33	---	---	---	---
D4	0.75	40	25.00	27.99	1.48	---	Hard and dense.
D5	---	---	---	---	---	---	---
D5	---	30	33.33	---	---	---	---
D5	3.51	40	25.00	27.58	2.01	---	---
D6	1.11	10	100.00	100.00	2.47	---	---
D7	---	10	100.00	---	---	---	---
D7	---	10	100.00	---	---	---	---
D7	0.00	5	200.00	143.33	1.18	---	---
D8	---	10	100.00	---	---	---	---
D8	0.16	40	25.00	90.48	1.05	---	Hard and dense.
D9	---	30	33.33	---	---	---	---
D9	0.17	5	200.00	136.11	0.94	SubC	---

Table 1–20. Data for samples from core hole 24, Bridger Coal Company, BCX–9.

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; m, meter; SCF, standard cubic feet; SubA, subbituminous A; HvolC, high-volatile C; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)	Average attrital band thickness (AvABT) (mm)	Cumulative fusain thickness (CuFT) (mm)
	Top	Bottom								
D–10	943.20	945.00	Deadman	45.00	45.00	1.00	1.48	30.0	2.0	0.0
D–11	945.00	---	Deadman	25.00	---	0.41	2.30	15.0	2.0	1.0
D–11	---	---	Deadman	7.00	---	0.11	2.53	0.0	0.0	0.0
D–11	---	947.00	Deadman	29.00	61.00	0.48	3.48	5.0	7.0	2.0
D–12	947.00	949.00	Deadman	59.00	59.00	1.00	5.41	5.0	20.0	3.0
D–13	949.00	---	Deadman	40.00	---	0.68	6.73	15.0	5.0	1.0
D–13	---	951.00	Deadman	19.00	59.00	0.32	7.35	5.0	30.0	1.0
D–14	951.00	953.00	Deadman	60.00	60.00	1.00	9.32	5.0	7.0	2.0
D–15	953.00	---	Deadman	45.00	---	0.75	10.79	2.0	10.0	1.0
D–15	---	955.00	Deadman	15.00	60.00	0.25	11.29	5.0	2.0	1.0

Table 1–20. Data for samples from core hole 24, Bridger Coal Company, BCX–9.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; m, meter; SCF, standard cubic feet; SubA, subbituminous A; HvolC, high-volatile C; ---, no data]

Canister number	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)	Attritus percentage (AP)	Fusain percentage (FP)	Canister average vitrain percentage (CaAvVP)	Canister average attrital percentage (CaAvAP)	Canister average fusain percentage (CaAvFP)
D–10	4	421.88	28.13	93.75	6.25	0.00	93.75	6.25	0.00
D–11	3	219.71	29.29	87.88	11.72	0.40	---	---	---
D–11	0	0.00	0.00	0.00	0.00	0.00	---	---	---
D–11	3	120.00	168.00	41.38	57.93	0.69	55.69	32.34	0.49
D–12	3	117.40	469.60	19.90	79.59	0.51	19.90	79.59	0.51
D–13	3	299.25	99.75	74.81	24.94	0.25	---	---	---
D–13	3	27.00	162.00	14.21	85.26	0.53	55.30	44.36	0.34
D–14	3	249.17	348.83	41.53	58.14	0.33	41.53	58.14	0.33
D–15	2	74.83	374.17	16.63	83.15	0.22	---	---	---
D–15	3	106.43	42.57	70.95	28.38	0.67	30.21	69.46	0.33

Table 1–20. Data for samples from core hole 24, Bridger Coal Company, BCX–9.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; m, meter; SCF, standard cubic feet; SubA, subbituminous A; HvolC, high-volatile C; ---, no data]

Canister number	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
D–10	40	25.00	25.00	0.77	SubA	Highly fragmented sample.
D–11	30	33.33	---	---	---	Pyrite and kaolinite on cleats.
D–11	---	---	---	---	---	Parting.
D–11	25	40.00	36.91	0.69	---	Pyrite and kaolinite on cleats.
D–12	25	40.00	40.00	0.60	---	Pyrite, kaolinite, and calcite on cleats.
D–13	15	66.67	---	---	---	Pyrite on cleats, 5-mm-thick clastic dike in lower part of core.
D–13	60	16.67	50.56	0.98	---	5-mm-thick clastic dike in upper part of core.
D–14	20	50.00	50.00	1.31	---	Pyrite on cleats, finely laminated to coarsely laminated at base.
D–15	25	40.00	---	---	---	Pyrite and kaolin on cleats.
D–15	25	40.00	40.00	0.33	HvolC	---

Table 1–21. Data for samples from core hole 25, Peabody Natural Gas LLC, Duvall 13J–D.

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)	Average attrital band thickness (AvABT) (mm)	Cumulative fusain thickness (CuFT) (mm)
	Top	Bottom								
D30	1,238.00	1,240.00	Pawnee	27.00	27.00	1.00	0.89	3.5	130.5	2.0
D31	1,240.00	1,242.00	Pawnee	60.00	60.00	1.00	2.85	16.3	68.4	7.0
D32	1,242.00	1,244.00	Pawnee	57.00	57.00	1.00	4.72	3.8	90.7	3.0
D33	1,244.00	1,246.00	Pawnee	59.00	59.00	1.00	6.66	5.3	189.7	5.0
D34	1,246.00	1,248.00	Pawnee	35.00	35.00	1.00	7.81	8.6	61.4	0.0

Table 1–21. Data for samples from core hole 25, Peabody Natural Gas LLC, Duvall 13J–D.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)	Attritus percentage (AP)	Fusain percentage (FP)	Canister average vitrain percentage (CaAvVP)	Canister average attrital percentage (CaAvAP)	Canister average fusain percentage (CaAvFP)
D30	1	7.00	261.00	2.59	96.67	0.74	2.59	96.67	0.74
D31	3	114.00	479.00	19.00	79.83	1.17	19.00	79.83	1.17
D32	1	23.00	544.00	4.04	95.44	0.53	4.04	95.44	0.53
D33	3	16.00	569.00	2.71	96.44	0.85	2.71	96.44	0.85
D34	3	43.00	307.00	12.29	87.71	0.00	12.29	87.71	0.00

Table 1–21. Data for samples from core hole 25, Peabody Natural Gas LLC, Duvall 13J–D.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
D30	25	40.00	40.00	4.65	SubB	Clay on cleat surfaces.
D31	18	55.56	55.56	2.40	---	Clay on cleat surfaces, more than 60 mm of vitrain at base.
D32	22	45.45	45.45	2.89	---	Clay on cleats.
D33	30	33.33	33.33	2.54	---	Clay on cleats, broken.
D34	22	45.45	45.45	1.70	SubC	Clay on cleats, broken.

Table 1–22. Data for samples from core hole 26, Barrett Resources Corporation, KU Harriett 41–34–4777.

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubA, subbituminous A; SubB, subbituminous B; HvolC, high-volatile C; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)
	Top	Bottom					
D35	1,313.00	1,315.00	Big George	61.00	61.00	1.00	2.00
D36	1,315.00	1,317.00	Big George	66.00	66.00	1.00	4.17
D37	1,317.00	1,319.00	Big George	71.00	71.00	1.00	6.50
D38	1,319.00	1,321.00	Big George	66.00	66.00	1.00	8.66
D39	1,321.00	1,323.00	Big George	69.00	69.00	1.00	10.93
D40	1,323.00	1,325.00	Big George	69.00	69.00	1.00	13.19
D41	1,325.00	1,327.00	Big George	69.00	69.00	1.00	15.45
D42	1,327.00	1,329.00	Big George	64.00	64.00	1.00	17.55
D43	1,329.00	1,331.00	Big George	64.00	64.00	1.00	19.65
D44	1,331.00	---	Big George	45.00	---	0.83	21.13
D44	---	1,331.00	Big George	9.00	54.00	0.17	21.42
D45	1,333.00	1,335.00	Big George	60.00	60.00	1.00	23.39
D46	1,335.00	1,337.00	Big George	67.00	67.00	1.00	25.59
ns1	1,337.00	1,338.00	ns1	30.50	30.50	1.00	26.59
D47	1,338.00	1,340.00	Big George	64.00	64.00	1.00	28.69
D48	1,340.00	1,342.00	Big George	62.00	62.00	1.00	30.73
D49	1,342.00	1,344.00	Big George	66.00	66.00	1.00	32.89
D50	1,344.00	---	Big George	50.00	---	0.83	34.53
D50	---	1,346.00	Big George	10.00	60.00	0.17	34.86
D51	1,346.00	1,348.00	Big George	66.00	66.00	1.00	37.02
D52	1,348.00	1,350.00	Big George	64.00	64.00	1.00	39.12
D53	1,350.00	1,352.00	Big George	66.00	66.00	1.00	41.29
D54	1,352.00	---	Big George	15.00	---	0.23	41.78
D54	---	1,354.00	Big George	49.00	64.00	0.77	43.39
D55	1,354.00	1,356.00	Big George	60.00	60.00	1.00	45.36
D56	1,356.00	1,358.00	Big George	62.00	62.00	1.00	47.39
D5	1,358.00	1,360.00	Big George	64.00	64.00	1.00	49.49
D8	1,360.00	1,362.00	Big George	73.00	73.00	1.00	51.89
D9	1,362.00	1,364.00	Big George	63.00	63.00	1.00	53.95
D10	1,364.00	1,366.00	Big George	74.00	74.00	1.00	56.38
D11	1,366.00	1,368.00	Big George	63.00	63.00	1.00	58.45
D12	1,368.00	---	Big George	16.00	---	0.26	58.97
D12	---	---	Big George	29.00	---	0.47	59.92
D12	---	---	Big George	5.00	---	0.08	60.09
D12	---	1,370.00	Big George	12.00	62.00	0.19	60.48
D15	1,370.00	---	Big George	15.00	---	0.25	60.97
D15	---	1,372.00	Big George	46.00	61.00	0.75	62.48
D16	1,372.00	1,374.00	Big George	64.00	64.00	1.00	64.58
D17	1,374.00	---	Big George	21.00	---	0.38	65.27
D17	---	1,376.00	Big George	34.00	55.00	0.62	66.39
D18	1,376.00	---	Big George	4.50	---	0.07	66.54
D18	---	---	Big George	21.00	---	0.32	67.22
D18	---	---	Big George	28.00	---	0.42	68.14
D18	---	1378.00	Big George	12.50	66.00	0.19	68.55
D19	1,378.00	1,380.00	Big George	63.00	63.00	1.00	70.62
D23	1,380.00	1,382.00	Big George	66.00	66.00	1.00	72.79
D25	1,382.00	1,384.00	Big George	67.00	67.00	1.00	74.98
D26	1,384.00	---	Big George	44.00	---	0.66	76.43
D26	---	1,386.00	Big George	23.00	67.00	0.34	77.18
D28	1,386.00	---	Big George	27.00	---	0.44	78.07
D28	---	1,388.00	Big George	34.00	61.00	0.56	79.18
ns2	1,388.00	1,389.50	ns2	46.00	46.00	1.00	80.69
26	1,389.50	1,391.50	Big George	62.00	62.00	1.00	82.73

Table 1–22. Data for samples from core hole 26, Barrett Resources Corporation, KU Harriett 41–34–4777.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubA, subbituminous A; SubB, subbituminous B; HvolC, high-volatile C; ---, no data]

Canister number	Average vitrain band thickness (AvVBT) (mm)	Average attrital band thickness (AvABT) (mm)	Cumulative fusain thickness (CuFT) (mm)	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)
D35	26.3	75.3	0.0	4	158.00	452.00	25.90
D36	1.8	107.7	3.0	1	11.00	646.00	1.67
D37	8.6	109.4	2.0	3	51.50	656.50	7.25
D38	4.3	68.4	5.0	1	39.00	616.00	5.91
D39	30.5	26.2	10.0	4	366.00	314.00	53.04
D40	2.5	169.5	2.0	1	10.00	678.00	1.45
D41	10.0	82.9	40.0	3	70.00	580.00	10.14
D42	4.8	152.8	10.0	1	19.00	611.00	2.97
D43	1.2	202.2	30.0	1	3.50	606.50	0.55
D44	4.6	106.6	5.0	1	18.50	426.50	4.11
D44	22.5	22.0	1.0	4	45.00	44.00	50.00
D45	6.0	39.9	3.0	3	78.00	519.00	13.00
D46	17.1	43.4	4.0	3	188.50	477.50	28.13
ns1	---	---	---	---	0.00	---	---
D47	14.4	37.6	16.0	3	173.00	451.00	27.03
D48	18.3	58.0	10.0	3	146.00	464.00	23.55
D49	12.9	51.7	15.0	3	128.50	516.50	19.47
D50	7.4	62.6	10.0	3	52.00	438.00	10.40
D50	7.4	8.9	2.0	3	44.50	53.50	44.50
D51	13.0	314.5	5.0	3	26.00	629.00	3.94
D52	11.6	78.7	8.0	3	81.00	551.00	12.66
D53	7.0	58.6	5.0	3	69.50	585.50	10.53
D54	4.3	44.0	5.0	1	13.00	132.00	8.67
D54	8.3	101.8	50.0	3	33.00	407.00	6.73
D55	9.4	49.9	8.0	3	93.50	498.50	15.58
D56	19.7	48.7	5.0	3	177.00	438.00	28.55
D5	9.4	52.1	25.0	3	94.00	521.00	14.69
D8	3.1	77.2	8.0	1	27.50	694.50	3.77
D9	7.9	35.7	20.0	3	110.00	500.00	17.46
D10	38.5	42.6	10.0	4	346.50	383.50	46.82
D11	2.8	66.1	10.0	1	25.50	594.50	4.05
D12	7.0	5.0	5.0	3	90.42	64.58	56.51
D12	0.0	0.0	0.0	0	0.00	0.00	0.00
D12	0.0	0.0	50.0	8	0.00	0.00	0.00
D12	2.0	8.0	2.0	2	23.60	94.40	19.67
D15	2.0	10.0	5.0	2	24.17	120.83	16.11
D15	15.0	5.0	19.0	3	330.75	110.25	71.90
D16	37.5	67.5	10.0	4	225.00	405.00	35.16
D17	30.0	5.0	5.0	5	175.71	29.29	83.67
D17	7.0	5.0	0.0	3	198.33	141.67	58.33
D18	2.0	2.0	0.0	2	22.50	22.50	50.00
D18	7.0	5.0	0.0	3	122.50	87.50	58.33
D18	30.0	5.0	0.0	5	240.00	40.00	85.71
D18	3.0	8.0	0.0	2	34.09	90.91	27.27
D19	6.4	37.5	15.0	3	90.00	525.00	14.29
D23	7.8	42.6	5.0	3	101.00	554.00	15.30
D25	20.0	35.4	5.0	4	240.50	424.50	35.90
D26	14.9	28.6	5.0	3	149.00	286.00	33.86
D26	6.0	36.0	20.0	3	30.00	180.00	13.04
D28	6.2	36.3	15.0	3	37.00	218.00	13.70
D28	7.0	163.0	0.0	3	14.00	326.00	4.12
ns2	---	---	---	---	---	---	---
26	13.1	18.6	50.0	3	236.00	334.00	38.06

Table 1–22. Data for samples from core hole 26, Barrett Resources Corporation, KU Harriett 41–34–4777.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubA, subbituminous A; SubB, subbituminous B; HvolC, high-volatile C; ---, no data]

Canister number	Attritus percentage (AP)	Fusain percentage (FP)	Canister average vitrain percentage (CaAvVP)	Canister average attrital percentage (CaAvAP)	Canister average fusain percentage (CaAvFP)	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)
D35	74.10	0.00	25.90	74.10	0.00	30	33.33
D36	97.88	0.45	1.67	97.88	0.45	25	40.00
D37	92.46	0.28	7.25	92.46	0.28	45	22.22
D38	93.33	0.76	5.91	93.33	0.76	40	25.00
D39	45.51	1.45	53.04	45.51	1.45	20	50.00
D40	98.26	0.29	1.45	98.26	0.29	30	33.33
D41	84.06	5.80	10.14	84.06	5.80	45	22.22
D42	95.47	1.56	2.97	95.47	1.56	15	66.67
D43	94.77	4.69	0.55	94.77	4.69	20	50.00
D44	94.78	1.11	---	---	---	25	40.00
D44	48.89	1.11	11.76	87.13	1.11	25	40.00
D45	86.50	0.50	13.00	86.50	0.50	35	28.57
D46	71.27	0.60	28.13	71.27	0.60	25	40.00
ns1	---	---	---	---	---	---	---
D47	70.47	2.50	27.03	70.47	2.50	45	22.22
D48	74.84	1.61	23.55	74.84	1.61	20	50.00
D49	78.26	2.27	19.47	78.26	2.27	25	40.00
D50	87.60	2.00	---	---	---	25	40.00
D50	53.50	2.00	16.08	81.92	2.00	30	33.33
D51	95.30	0.76	3.94	95.30	0.76	30	33.33
D52	86.09	1.25	12.66	86.09	1.25	15	66.67
D53	88.71	0.76	10.53	88.71	0.76	22	45.45
D54	88.00	3.33	---	---	---	16	62.50
D54	83.06	10.20	7.19	84.22	8.59	20	50.00
D55	83.08	1.33	15.58	83.08	1.33	20	50.00
D56	70.65	0.81	28.55	70.65	0.81	25	40.00
D5	81.41	3.91	14.69	81.41	3.91	25	40.00
D8	95.14	1.10	3.77	95.14	1.10	26	38.46
D9	79.37	3.17	17.46	79.37	3.17	15	66.67
D10	51.82	1.35	46.82	51.82	1.35	20	50.00
D11	94.37	1.59	4.05	94.37	1.59	22	45.45
D12	40.36	3.13	---	---	---	12	83.33
D12	0.00	0.00	---	---	---	12	83.33
D12	0.00	100.00	---	---	---	12	83.33
D12	78.67	1.67	18.39	25.64	9.19	12	83.33
D15	80.56	3.33	---	---	---	20	50.00
D15	23.97	4.13	58.18	37.88	3.93	20	50.00
D16	63.28	1.56	35.16	63.28	1.56	32	31.25
D17	13.95	2.38	---	---	---	30	33.33
D17	41.67	0.00	68.01	31.08	0.91	30	33.33
D18	50.00	0.00	---	---	---	25	40.00
D18	41.67	0.00	---	---	---	25	40.00
D18	14.29	0.00	---	---	---	25	40.00
D18	72.73	0.00	63.50	36.50	0.00	25	40.00
D19	83.33	2.38	14.29	83.33	2.38	28	35.71
D23	83.94	0.76	15.30	83.94	0.76	23	43.48
D25	63.36	0.75	35.90	63.36	0.75	32	31.25
D26	65.00	1.14	---	---	---	20	50.00
D26	78.26	8.70	26.72	69.55	3.73	20	50.00
D28	80.74	5.56	---	---	---	35	28.57
D28	95.88	0.00	8.36	89.18	2.46	---	---
ns2	---	---	---	---	---	---	---
26	53.87	8.06	38.06	53.87	8.06	17	58.82

Table 1–22. Data for samples from core hole 26, Barrett Resources Corporation, KU Harriett 41–34–4777.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubA, subbituminous A; SubB, subbituminous B; HvolC, high-volatile C; ---, no data]

Canister number	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
D35	33.33	80.53	SubA	Wood in top 10 cm.
D36	40.00	89.85	---	.
D37	22.22	87.03	---	Wood from 40 to 46 cm from top.
D38	25.00	89.30	---	Wood fracture zone from 54 to 56 cm.
D39	50.00	84.37	---	Wood from 7 to 15 cm from top.
D40	33.33	69.50	---	---
D41	22.22	88.29	---	Fusain from 56 to 59 cm, wood from 59 to 69 cm.
D42	66.67	85.21	---	Wood in top 15 cm.
D43	50.00	88.35	---	Fusain from 0 to 3 cm, wood from 3 to 15 cm.
D44	---	---	---	---
D44	40.00	92.75	---	---
D45	28.57	89.20	---	---
D46	40.00	89.27	---	Wood from 8 to 19 cm.
ns1	---	---	---	No sample.
D47	22.22	77.96	---	Fusain from 40 to 42 cm, wood from 58 to 67 cm.
D48	50.00	98.59	---	---
D49	40.00	68.27	---	---
D50	---	---	---	---
D50	38.89	98.20	---	---
D51	33.33	98.87	---	---
D52	66.67	63.01	---	---
D53	45.45	94.44	---	---
D54	---	---	---	---
D54	52.93	93.69	---	2-cm thick-fusain at 35 and 45 cm.
D55	50.00	53.27	---	---
D56	40.00	98.69	---	---
D5	40.00	103.33	---	Fusain from 41 to 43 cm.
D8	38.46	101.98	---	---
D9	66.67	89.69	---	Fusain from 18 to 19 cm.
D10	50.00	88.60	---	Wood from 1.5 to 2.3, 3.7 to 4.9, and 52 to 62 cm, fusain at 62 cm(?).
D11	45.45	93.60	---	---
D12	---	---	---	Attrital and vitrain band thicknesses are estimated.
D12	---	---	---	Clay.
D12	---	---	---	Fusain layer.
D12	83.33	59.58	---	Attrital and vitrain band thicknesses are estimated.
D15	---	---	---	Attrital and vitrain band thicknesses are estimated.
D15	50.00	87.63	---	Attrital and vitrain band thicknesses are estimated.
D16	31.25	87.57	---	---
D17	---	---	---	60-mm-thick vitrain band at 15 cm, attrital and vitrain band thicknesses are estimated.
D17	33.33	90.32	---	Attrital and vitrain band thicknesses are estimated.
D18	---	---	---	Attrital and vitrain band thicknesses are estimated.
D18	---	---	---	Attrital and vitrain band thicknesses are estimated.
D18	---	---	---	75-mm-thick vitrain band at 40 cm, attrital and vitrain band thicknesses are estimated.
D18	40.00	93.39	---	Attrital and vitrain band thicknesses are estimated.
D19	35.71	77.29	---	4-mm-thick fusain bands at 15 and 19 cm.
D23	43.48	100.44	---	---
D25	31.25	97.92	---	---
D26	---	---	---	Wood in top 70 mm.
D26	50.00	70.49	---	Fusain in top 25 mm, scattered fusain throughout(?).
D28	---	---	---	Fusain in top 15 cm.
D28	28.57	67.35	SubB	---
ns2	---	---	---	No sample.
26	58.82	86.47	---	Fusain from 30 to 32 cm and 49 to 52 cm.

Table 1–22. Data for samples from core hole 26, Barrett Resources Corporation, KU Harriett 41–34–4777.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubA, subbituminous A; SubB, subbituminous B; HvolC, high-volatile C; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)
	Top	Bottom					
27	1,391.50	1,393.50	Big George	63.00	63.00	1.00	84.79
28	1,393.50	---	Big George	36.00	---	0.60	85.97
28	---	---	Big George	14.50	---	0.24	86.45
28	---	1,395.50	Big George	9.50	60.00	0.16	86.76
29	1,395.50	---	Big George	35.00	---	0.53	87.91
29	---	1,397.50	Big George	31.00	66.00	0.47	88.93
30	1,397.50	---	Big George	6.00	---	0.10	89.12
30	---	1,399.50	Big George	57.00	63.00	0.90	90.99
31	1,399.50	---	Big George	58.00	---	0.91	92.90
31	---	1,401.50	Big George	6.00	64.00	0.09	93.09
32	1,401.50	---	Big George	6.00	---	0.09	93.29
32	---	1,403.50	Big George	60.00	66.00	0.91	95.26
33	1,403.50	---	Big George	15.00	---	0.23	95.75
33	---	---	Big George	17.00	---	0.27	96.31
33	---	1,405.50	Big George	32.00	64.00	0.50	97.36
34	1,405.50	1,407.50	Big George	62.00	62.00	1.00	99.39
35	1,407.50	---	Big George	39.00	---	0.63	100.67
35	---	---	Big George	5.00	---	0.08	100.84
35	---	1,409.50	Big George	18.00	62.00	0.29	101.43
36	1,409.50	1,411.50	Big George	65.00	65.00	1.00	103.56
37	1,411.50	1,413.50	Big George	63.00	63.00	1.00	105.63
38	1,413.50	1,415.50	Big George	63.00	63.00	1.00	107.69
39	1,415.50	1,417.50	Big George	52.00	52.00	1.00	109.40

Table 1–22. Data for samples from core hole 26, Barrett Resources Corporation, KU Harriett 41–34–4777.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubA, subbituminous A; SubB, subbituminous B; HvolC, high-volatile C; ---, no data]

Canister number	Average vitrain band thickness (AvVBT) (mm)	Average attrital band thickness (AvABT) (mm)	Cumulative fusain thickness (CuFT) (mm)	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)
27	4.5	36.5	14.0	1	68.00	548.00	10.79
28	1.0	59.0	0.0	1	6.00	354.00	1.67
28	12.7	8.0	0.0	3	89.00	56.00	61.38
28	0.0	85.5	9.5	1	0.00	85.50	0.00
29	13.6	35.1	9.0	3	95.00	246.00	27.14
29	6.5	148.5	0.0	3	13.00	297.00	4.19
30	2.4	12.6	0.0	2	9.50	50.50	15.83
30	7.6	35.5	10.0	3	99.00	461.00	17.37
31	23.4	39.9	10.0	4	211.00	359.00	36.38
31	0.0	0.0	60.0	8	0.00	0.00	0.00
32	0.0	0.0	60.0	8	0.00	0.00	0.00
32	11.8	41.8	10.0	3	130.00	460.00	21.67
33	6.8	65.8	5.0	3	13.50	131.50	9.00
33	0.0	0.0	170.0	8	0.00	0.00	0.00
33	3.0	75.8	5.0	1	12.00	303.00	3.75
34	8.3	40.8	30.0	3	100.00	490.00	16.13
35	6.8	57.3	5.0	3	41.00	344.00	10.51
35	0.0	0.0	0.0	0	0.00	0.00	0.00
35	5.7	53.0	4.0	3	17.00	159.00	9.44
36	7.2	64.8	2.0	3	65.00	583.00	10.00
37	3.6	74.6	5.0	1	28.50	596.50	4.52
38	5.0	64.4	5.0	3	45.00	580.00	7.14
39	7.7	95.9	2.0	3	38.50	479.50	7.40

Table 1–22. Data for samples from core hole 26, Barrett Resources Corporation, KU Harriett 41–34–4777.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubA, subbituminous A; SubB, subbituminous B; HvolC, high-volatile C; ---, no data]

Canister number	Attritus percentage (AP)	Fusain percentage (FP)	Canister average vitrain percentage (CaAvVP)	Canister average attrital percentage (CaAvAP)	Canister average fusain percentage (CaAvFP)	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)
27	86.98	2.22	10.79	86.98	2.22	35	28.57
28	98.33	0.00	---	---	---	30	33.33
28	38.62	0.00	---	---	---	30	33.33
28	90.00	10.00	15.83	82.58	1.58	30	33.33
29	70.29	2.57	---	---	---	18	55.56
29	95.81	0.00	16.36	82.27	1.36	18	55.56
30	84.17	0.00	---	---	---	25	40.00
30	80.88	1.75	17.22	81.19	1.59	25	40.00
31	61.90	1.72	---	---	---	15	66.67
31	0.00	100.00	32.97	56.09	10.94	15	66.67
32	0.00	100.00	---	---	---	22	45.45
32	76.67	1.67	19.70	69.70	10.61	22	45.45
33	87.67	3.33	---	---	---	27	37.04
33	0.00	100.00	---	---	---	27	37.04
33	94.69	1.56	3.98	67.89	28.13	27	37.04
34	79.03	4.84	16.13	79.03	4.84	20	50.00
35	88.21	1.28	---	---	---	22	45.45
35	0.00	0.00	---	---	---	22	45.45
35	88.33	2.22	9.35	81.13	1.45	22	45.45
36	89.69	0.31	10.00	89.69	0.31	20	50.00
37	94.68	0.79	4.52	94.68	0.79	22	45.45
38	92.06	0.79	7.14	92.06	0.79	15	66.67
39	92.21	0.38	7.40	92.21	0.38	60	16.67

Table 1–22. Data for samples from core hole 26, Barrett Resources Corporation, KU Harriett 41–34–4777.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubA, subbituminous A; SubB, subbituminous B; HvolC, high-volatile C; ---, no data]

Canister number	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
27	28.57	86.97	---	Fusain from 50 to 64 cm.
28	---	---	---	---
28	---	---	---	---
28	33.33	87.83	---	Very hard fusain.
29	---	---	---	---
29	55.56	94.72	---	Fusain(?).
30	---	---	---	Dispersed fusain(?).
30	40.00	93.27	---	Dispersed fusain(?) (a bit dull and sooty).
31	---	---	---	Wood in top 7 cm.
31	66.67	88.39	---	Hard fusain layer.
32	---	---	---	Hard fusain layer.
32	45.45	96.30	---	Wood in top 45 mm.
33	---	---	---	---
33	---	---	---	Fusain layer.
33	37.04	78.48	---	---
34	50.00	82.06	---	Fusain at 54–56 cm, 57–58 cm, 60–61 cm.
35	---	---	---	---
35	---	---	---	Clay.
35	45.45	87.53	---	---
36	50.00	88.20	---	---
37	45.45	86.82	---	---
38	66.67	87.42	---	Clay 50.5–51 cm from top.
39	16.67	82.91	HvolC	Wood in top 33 cm.

Table 1–23. Data for samples from core hole 27, Peabody Natural Gas LLC, Carter-Federal 18F–D.

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)	Average attrital band thickness (AvABT) (mm)	Cumulative fusain thickness (CuFT) (mm)
	Top	Bottom								
5	1,527.00	1,529.00	Pawnee	50.00	50.00	1.00	1.64	3.9	49.4	20.0
4	1,529.00	1,531.00	Pawnee	52.00	52.00	1.00	3.35	12.2	83.8	40.0
3	1,531.00	1,533.00	Pawnee	56.00	56.00	1.00	5.18	7.2	35.3	50.0
2	1,533.00	1,535.00	Pawnee	58.00	58.00	1.00	7.09	11.9	63.9	50.0
1	1,535.00	1,537.00	Pawnee	50.00	50.00	1.00	8.73	28.4	51.6	100.0
9	1,537.00	---	Pawnee	27.00	---	0.48	9.61	7.9	27.9	20.0
9	---	1,539.50	Pawnee	29.00	56.00	0.52	10.56	6.4	20.7	100.0
8	1,539.50	1,542.00	Pawnee	56.00	56.00	1.00	12.40	11.4	41.9	80.0
7	1,542.00	1,544.50	Pawnee	54.00	54.00	1.00	14.17	18.3	30.5	150.0
6	1,544.50	1,547.00	Pawnee	57.00	57.00	1.00	16.04	3.2	163.5	70.0
12	1,547.00	1,549.00	Pawnee	39.00	39.00	1.00	17.32	9.8	82.8	20.0
11	1,549.00	---	Pawnee	40.00	---	0.87	18.64	6.7	120.0	20.0
11	---	1,551.00	Pawnee	6.00	46.00	0.13	18.83	0.0	0.0	0.0
ns1	1,551.00	1,704.00	ns1	4667.00	4,667.00	1.00	171.95	---	---	---
14	1,704.00	1,706.00	Cache	59.00	59.00	1.00	173.88	8.1	61.9	30.0
13	1,706.00	1,708.00	Cache	58.00	58.00	1.00	175.79	2.5	135.0	30.0
19	1,708.00	1,710.00	Cache	65.00	65.00	1.00	177.92	5.4	43.1	20.0
18	1,710.00	1,712.00	Cache	65.00	65.00	1.00	180.05	9.2	40.8	100.0
17	1,712.00	1,714.00	Cache	46.00	46.00	1.00	181.56	5.5	99.5	40.0
16	1,714.00	1,716.00	Cache	57.00	57.00	1.00	183.43	6.2	32.3	70.0
15	1,716.00	1,718.00	Cache	54.00	54.00	1.00	185.20	3.2	29.3	20.0
24	1,718.00	1,720.00	Cache	58.00	58.00	1.00	187.11	5.9	34.1	20.0
23	1,720.00	1,722.00	Cache	55.00	55.00	1.00	188.91	8.7	32.1	20.0
22	1,722.00	---	Cache	40.00	---	0.73	190.22	13.7	40.6	20.0
22	---	1,724.00	Cache	15.00	55.00	0.27	190.72	1.9	26.1	10.0
21	1,724.00	1,726.00	Cache	54.00	54.00	1.00	192.49	3.7	40.9	50.0
20	1,726.00	1,728.00	Cache	55.00	55.00	1.00	194.29	12.7	29.0	50.0
43	1,728.00	1,729.00	Cache	46.00	46.00	1.00	195.80	6.2	32.9	30.0
42	1,729.00	1,731.00	Cache	52.00	52.00	1.00	197.51	9.0	40.0	30.0
40	1,731.00	---	Cache	20.25	---	0.36	198.17	4.0	28.1	10.0
40	---	1,733.00	Cache	35.75	56.00	0.64	199.34	4.8	18.6	100.0
25	1,733.00	---	Cache	36.00	---	0.60	200.52	32.1	15.0	30.0
25	---	1,735.00	Cache	24.00	60.00	0.40	201.31	1.9	58.1	0.0

Table 1–23. Data for samples from core hole 27, Peabody Natural Gas LLC, Carter-Federal 18F–D.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; ---, no data]

Canister number	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)	Attritus percentage (AP)	Fusain percentage (FP)	Canister average vitrain percentage (CaAvVP)	Canister average attrital percentage (CaAvAP)	Canister average fusain percentage (CaAvFP)
5	1	35.00	445.00	7.00	89.00	4.00	7.00	89.00	4.00
4	3	61.00	419.00	11.73	80.58	7.69	11.73	80.58	7.69
3	3	86.00	424.00	15.36	75.71	8.93	15.36	75.71	8.93
2	3	83.00	447.00	14.31	77.07	8.62	14.31	77.07	8.62
1	4	142.00	258.00	28.40	51.60	20.00	28.40	51.60	20.00
9	3	55.00	195.00	20.37	72.22	7.41	---	---	---
9	3	45.00	145.00	15.52	50.00	34.48	17.86	60.71	21.43
8	3	102.50	377.50	18.30	67.41	14.29	18.30	67.41	14.29
7	3	146.00	244.00	27.04	45.19	27.78	27.04	45.19	27.78
6	1	9.50	490.50	1.67	86.05	12.28	1.67	86.05	12.28
12	3	39.00	331.00	10.00	84.87	5.13	10.00	84.87	5.13
11	3	20.00	360.00	5.00	90.00	5.00	5.00	90.00	5.00
11	0	0.00	0.00	0.00	0.00	0.00	---	---	---
ns1	---	---	---	---	---	---	---	---	---
14	3	65.00	495.00	11.02	83.90	5.08	11.02	83.90	5.08
13	1	10.00	540.00	1.72	93.10	5.17	1.72	93.10	5.17
19	3	70.00	560.00	10.77	86.15	3.08	10.77	86.15	3.08
18	3	101.50	448.50	15.62	69.00	15.38	15.62	69.00	15.38
17	3	22.00	398.00	4.78	86.52	8.70	4.78	86.52	8.70
16	3	80.00	420.00	14.04	73.68	12.28	14.04	73.68	12.28
15	1	51.00	469.00	9.44	86.85	3.70	9.44	86.85	3.70
24	3	83.00	477.00	14.31	82.24	3.45	14.31	82.24	3.45
23	3	112.50	417.50	20.45	75.91	3.64	20.45	75.91	3.64
22	3	96.00	284.00	24.00	71.00	5.00	---	---	---
22	1	9.50	130.50	6.33	87.00	6.67	19.18	75.36	5.45
21	1	40.50	449.50	7.50	83.24	9.26	7.50	83.24	9.26
20	3	152.00	348.00	27.64	63.27	9.09	27.64	63.27	9.09
43	3	68.00	362.00	14.78	78.70	6.52	14.78	78.70	6.52
42	3	90.00	400.00	17.31	76.92	5.77	17.31	76.92	5.77
40	1	24.00	168.50	11.85	83.21	4.94	---	---	---
40	2	53.00	204.50	14.83	57.20	27.97	13.75	66.61	19.64
25	4	225.00	105.00	62.50	29.17	8.33	---	---	---
25	1	7.50	232.50	3.13	96.88	0.00	38.75	56.25	5.00

Table 1–23. Data for samples from core hole 27, Peabody Natural Gas LLC, Carter-Federal 18F–D.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; ---, no data]

Canister number	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
5	20	50.00	50.00	8.51	SubB	Clay on cleat.
4	12	83.33	83.33	8.31	---	Clay on cleat, wood from 22 to 29 cm.
3	20	50.00	50.00	7.97	---	Some clay on cleat.
2	16	62.50	62.50	8.59	---	Some clay on cleat.
1	25	40.00	40.00	8.97	---	Some clay on cleat.
9	20	50.00	---	---	---	Some clay on cleat.
9	20	50.00	50.00	7.58	---	Some clay on cleat, fusain from 30 to 30.5 cm.
8	21	47.62	47.62	9.22	---	Some clay on cleat, highly fractured sample.
7	20	50.00	50.00	8.45	---	Clay on cleat, fusain from 32 to 33 cm.
6	22	45.45	45.45	8.61	---	Highly fractured sample.
12	---	---	---	5.14	---	Highly fractured sample.
11	32	31.25	31.25	4.51	SubB	Clay on cleat.
11	---	---	---	---	---	Clay.
ns1	---	---	---	---	---	No sample.
14	26	38.46	38.46	2.78	SubB	Some clay.
13	20	50.00	50.00	2.77	---	---
19	27	37.04	37.04	1.98	---	---
18	15	66.67	66.67	2.53	---	---
17	18	55.56	55.56	1.25	---	---
16	21	47.62	47.62	1.76	---	---
15	24	41.67	41.67	1.96	---	---
24	25	40.00	40.00	2.55	---	.
23	22	45.45	45.45	2.13	---	---
22	12	83.33	---	---	---	---
22	12	83.33	83.33	2.58	---	.
21	19	52.63	52.63	1.98	---	Sample taken for adsorption analysis.
20	30	33.33	33.33	2.12	---	---
43	30	33.33	33.33	1.75	---	.
42	15	66.67	66.67	2.43	---	---
40	19	52.63	---	---	---	---
40	19	52.63	52.63	1.90	---	---
25	22	45.45	---	---	---	---
25	22	45.45	45.45	2.62	SubB	High ash content(?).

Table 1–24. Data for samples from core hole 28, Nance Petroleum Corporation, Remington 58–79–30–07A.

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; SubC, subbituminous C; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)	Average attrital band thickness (AvABT) (mm)
	Top	Bottom							
B5	320.00	---	Anderson	14.00	---	0.32	0.46	4.3	42.0
B5	---	---	Anderson	13.00	---	0.30	0.89	50.0	80.0
B5	---	322.00	Anderson	17.00	44.00	0.39	1.44	2.0	40.3
B6	322.00	---	Anderson	25.00	---	0.41	2.26	14.1	21.6
B6	---	324.00	Anderson	36.00	61.00	0.59	3.44	5.5	39.5
B7	324.00	326.00	Anderson	63.00	63.00	1.00	5.51	12.2	29.8
B13	326.00	---	Anderson	42.00	---	0.71	6.89	5.7	35.6
B13	---	328.00	Anderson	17.00	59.00	0.29	7.45	42.5	35.0
B9	328.00	330.00	Anderson	60.00	60.00	1.00	9.42	4.4	41.5
B10	330.00	---	Anderson	36.00	---	0.59	10.60	1.6	49.9
B10	---	---	Anderson	17.00	---	0.28	11.15	5.8	22.2
B10	---	332.00	Anderson	8.00	61.00	0.13	11.42	80.0	0.0
B15	332.00	334.00	Anderson	63.00	63.00	1.00	13.48	4.0	37.9
B12	334.00	336.00	Anderson	43.00	43.00	1.00	14.90	4.9	48.8

Table 1–24. Data for samples from core hole 28, Nance Petroleum Corporation, Remington 58–79–30–07A.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; SubC, subbituminous C; ---, no data]

Canister number	Cumulative fusain thickness (CuFT) (mm)	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)	Attritus percentage (AP)	Fusain percentage (FP)	Canister average vitrain percentage (CaAvVP)	Canister average attrital percentage (CaAvAP)
B5	1.0	1	13.00	126.00	9.29	90.00	0.71	---	---
B5	0.0	4	50.00	80.00	38.46	61.54	0.00	---	---
B5	1.0	1	8.00	161.00	4.71	94.71	0.59	16.14	83.41
B6	0.0	3	99.00	151.00	39.60	60.40	0.00	---	---
B6	0.0	3	44.00	316.00	12.22	87.78	0.00	23.44	76.56
B7	0.0	3	183.00	447.00	29.05	70.95	0.00	29.05	70.95
B13	7.0	3	57.00	356.00	13.57	84.76	1.67	---	---
B13	15.0	4	85.00	70.00	50.00	41.18	8.82	24.07	72.20
B9	3.0	1	57.00	540.00	9.50	90.00	0.50	9.50	90.00
B10	0.0	1	11.00	349.00	3.06	96.94	0.00	---	---
B10	2.0	3	35.00	133.00	20.59	78.24	1.18	---	---
B10	0.0	5	80.00	0.00	100.00	0.00	0.00	20.66	79.02
B15	1.0	1	60.00	569.00	9.52	90.32	0.16	9.52	90.32
B12	1.0	1	39.00	390.00	9.07	90.70	0.23	9.07	90.70

Table 1–24. Data for samples from core hole 28, Nance Petroleum Corporation, Remington 58–79–30–07A.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; SubC, subbituminous C; ---, no data]

Canister number	Canister average fusain percentage (CaAvFP)	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
B5	---	42	23.81	---	---	---	Metallic grease from drill on core.
B5	---	55	18.18	---	---	---	Hard.
B5	0.45	50	20.00	20.67	14.04	---	---
B6	---	20	50.00	---	---	---	---
B6	0.00	30	33.33	40.16	15.54	SubC	---
B7	0.00	30	33.33	33.33	15.13	---	Broken material.
B13	---	45	22.22	---	---	---	---
B13	3.73	60	16.67	20.62	15.13	---	---
B9	0.50	40	25.00	25.00	14.61	SubC	---
B10	---	30	33.33	---	---	---	Clay on cleats.
B10	---	35	28.57	---	---	---	---
B10	0.33	70	14.29	29.51	14.61	---	---
B15	0.16	45	22.22	22.22	15.13	---	---
B12	0.23	50	20.00	20.00	14.61	SubC	---

Table 1–25. Data for samples from core hole 30, Nance Petroleum Corporation, Remington 58–79–30–01C.

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; SubB, subbituminous B; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)	Average attrital band thickness (AvABT) (mm)	Cumulative fusain thickness (CuFT) (mm)
	Top	Bottom								
B16	633.00	635.00	Canyon	54.00	54.00	1.00	1.77	6.3	32.9	30.0
B17	635.00	637.00	Canyon	57.00	57.00	1.00	3.64	11.5	17.8	13.0
B18	637.00	---	Canyon	25.00	---	0.42	4.46	42.4	7.2	2.0
B18	---	639.00	Canyon	35.00	60.00	0.58	5.61	3.3	27.6	10.0
B19	639.00	641.00	Canyon	60.00	60.00	1.00	7.58	10.5	49.5	0.0
B20	641.00	---	Canyon	15.00	---	0.25	8.07	57.5	17.5	0.0
B20	---	643.00	Canyon	45.00	60.00	0.75	9.55	7.6	33.1	2.0
B21	643.00	645.00	Canyon	54.00	54.00	1.00	11.32	5.5	32.7	5.0
B22	645.00	---	Canyon	32.00	---	0.53	12.37	28.9	16.6	2.0
B22	---	647.00	Canyon	28.00	60.00	0.47	13.29	2.2	28.9	0.0

Table 1–25. Data for samples from core hole 30, Nance Petroleum Corporation, Remington 58–79–30–01C.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; SubB, subbituminous B; ---, no data]

Canister number	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)	Attritus percentage (AP)	Fusain percentage (FP)	Canister average vitrain percentage (CaAvVP)	Canister average attrital percentage (CaAvAP)	Canister average fusain percentage (CaAvFP)
B16	3	82.00	428.00	15.19	79.26	5.56	15.19	79.26	5.56
B17	3	218.00	339.00	38.25	59.47	2.28	38.25	59.47	2.28
B18	4	212.00	36.00	84.80	14.40	0.80	---	---	---
B18	1	36.00	304.00	10.29	86.86	2.86	41.33	56.67	2.00
B19	3	105.00	495.00	17.50	82.50	0.00	17.50	82.50	0.00
B20	4	115.00	35.00	76.67	23.33	0.00	---	---	---
B20	3	84.00	364.00	18.67	80.89	0.44	33.17	66.50	0.33
B21	3	77.00	458.00	14.26	84.81	0.93	14.26	84.81	0.93
B22	4	202.00	116.00	63.13	36.25	0.63	---	---	---
B22	1	20.00	260.00	7.14	92.86	0.00	37.00	62.67	0.33

Table 1–25. Data for samples from core hole 30, Nance Petroleum Corporation, Remington 58–79–30–01C.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; SubB, subbituminous B; ---, no data]

Canister number	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
B16	35	28.57	28.57	19.99	SubB	Very hard, abundant fusain.
B17	30	33.33	33.33	19.35	---	Fusain band from 39 to 40 cm.
B18	30	33.33	---	---	---	---
B18	40	25.00	28.47	20.31	---	Abundant fusain in attritus bands.
B19	25	40.00	40.00	19.55	SubB	Mostly laminated with 1-cm-thick woody band.
B20	25	40.00	---	---	---	---
B20	70	14.29	20.71	18.95	---	---
B21	30	33.33	33.33	22.47	---	---
B22	30	33.33	---	---	---	---
B22	13	76.92	53.68	17.91	SubB	2-cm-thick clay band at 40 cm, small number of resin blebs.

Table 1–26. Data for samples from core hole 31, Williams Production RMT Company, Bullwacker Creek Unit (BCU) 32–9–4277.

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; fr, highly fractured sample; SubA, subbituminous A; SubB, subbituminous B; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)	Average attrital band thickness (AvABT) (mm)	Cumulative fusain thickness (CuFT) (mm)
	Top	Bottom								
C7	1,402.90	---	Big George	6.00	---	0.09	0.20	60.0	0.0	0.0
C7	---	---	Big George	4.00	---	0.06	0.33	5.0	35.0	0.0
C7	---	---	Big George	6.00	---	0.09	0.52	60.0	0.0	0.0
C7	---	---	Big George	14.00	---	0.22	0.98	10.0	60.0	0.0
C7	---	---	Big George	6.00	---	0.09	1.18	60.0	0.0	0.0
C7	---	---	Big George	18.00	---	0.28	1.77	15.0	45.0	0.0
C7	---	---	Big George	5.00	---	0.08	1.94	50.0	0.0	0.0
C7	---	1,404.90	Big George	5.00	64.00	0.08	2.10	5.0	45.0	0.0
ns1	1,404.90	1,409.00	ns1	125.00	125.00	1.00	6.20	---	---	---
C9	1,409.00	---	Big George	22.00	---	0.45	6.92	5.0	68.3	0.0
C9	---	---	Big George	4.50	---	0.09	7.07	45.0	0.0	0.0
C9	---	---	Big George	11.50	---	0.23	7.45	0.0	115.0	0.0
C9	---	1,410.80	Big George	11.00	49.00	0.22	7.81	110.0	0.0	0.0
C10	1,410.80	---	Big George	24.00	---	0.48	8.60	13.8	46.3	0.0
C10	---	---	Big George	22.00	---	0.44	9.32	13.0	31.0	0.0
C10	---	1,413.00	Big George	4.00	50.00	0.08	9.45	40.0	0.0	0.0
C11	1,413.00	---	Big George	7.00	---	0.14	9.68	10.0	60.0	0.0
C11	---	---	Big George	5.00	---	0.10	9.84	50.0	0.0	0.0
C11	---	---	Big George	5.00	---	0.10	10.01	10.0	40.0	0.0
C11	---	---	Big George	5.00	---	0.10	10.17	50.0	0.0	0.0
C11	---	1,415.30	Big George	27.00	49.00	0.55	11.06	15.0	120.0	0.0
ns2	1,415.30	1,418.00	ns2	82.00	82.00	1.00	13.75	---	---	---
C12	1,418.00	---	Big George	22.00	---	0.69	14.47	220.0	0.0	0.0
C12	---	1,419.40	Big George	10.00	32.00	0.31	14.80	5.0	95.0	0.0
C13	1,419.40	---	Big George	28.00	---	0.43	15.72	280.0	0.0	0.0
C13	---	1,421.40	Big George	37.00	65.00	0.57	16.93	3.0	182.0	0.0
C14	1,421.40	---	Big George	2.50	---	0.05	17.01	0.0	25.0	0.0
C14	---	---	Big George	18.00	---	0.38	17.60	26.7	33.3	0.0
C14	---	---	Big George	6.00	---	0.13	17.80	1.0	59.0	0.0
C14	---	---	Big George	19.00	---	0.40	18.42	23.3	40.0	0.0
C14	---	1,423.40	Big George	1.50	47.00	0.03	18.47	0.0	12.0	3.0
C15	1,423.40	---	Big George	24.00	---	0.55	19.26	16.3	43.8	0.0
C15	---	---	Big George	6.00	---	0.14	19.46	10.0	50.0	0.0
C15	---	---	Big George	12.00	---	0.27	19.85	47.5	12.5	0.0
C15	---	1,425.40	Big George	2.00	44.00	0.05	19.91	0.0	20.0	0.0
C16	1,425.40	---	Big George	23.00	---	0.48	20.67	8.1	24.7	0.0
C16	---	---	Big George	15.00	---	0.31	21.16	12.5	25.0	0.0
C16	---	---	Big George	6.00	---	0.13	21.36	5.0	55.0	0.0
C16	---	1,427.40	Big George	4.00	48.00	0.08	21.49	40.0	0.0	0.0
ns3	1,427.40	1,428.00	ns3	18.00	18.00	1.00	22.08	---	---	---
C26	1,428.00	---	Big George	21.00	---	0.55	22.77	4.8	47.8	0.0
C26	---	---	Big George	3.00	---	0.08	22.87	0.0	30.0	0.0
C26	---	---	Big George	9.00	---	0.23	23.16	6.7	23.3	0.0
C26	---	1,429.80	Big George	5.50	38.50	0.14	23.34	0.0	55.0	0.0
C17	1,429.80	1,431.60	Big George	60.00	60.00	1.00	25.31	45.0	1.0	0.0
C29	1,431.60	1,433.40	Big George	64.00	64.00	1.00	27.41	58.0	6.0	0.0

Table 1–26. Data for samples from core hole 31, Williams Production RMT Company, Bullwacker Creek Unit (BCU) 32–9–4277.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; fr, highly fractured sample; SubA, subbituminous A; SubB, subbituminous B; ---, no data]

Canister number	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)	Attritus percentage (AP)	Fusain percentage (FP)	Canister average vitrain percentage (CaAvVP)	Canister average attrital percentage (CaAvAP)	Canister average fusain percentage (CaAvFP)
C7	5	60.00	0.00	100.00	0.00	0.00	---	---	---
C7	3	5.00	35.00	12.50	87.50	0.00	---	---	---
C7	5	60.00	0.00	100.00	0.00	0.00	---	---	---
C7	3	20.00	120.00	14.29	85.71	0.00	---	---	---
C7	5	60.00	0.00	100.00	0.00	0.00	---	---	---
C7	3	45.00	135.00	25.00	75.00	0.00	---	---	---
C7	5	50.00	0.00	100.00	0.00	0.00	---	---	---
C7	3	5.00	45.00	10.00	90.00	0.00	47.66	52.34	0.00
ns1	---	---	---	---	---	---	---	---	---
C9	3	15.00	205.00	6.82	93.18	0.00	---	---	---
C9	5	45.00	0.00	100.00	0.00	0.00	---	---	---
C9	1	0.00	115.00	0.00	100.00	0.00	---	---	---
C9	5	110.00	0.00	100.00	0.00	0.00	34.69	65.31	0.00
C10	3	55.00	185.00	22.92	77.08	0.00	---	---	---
C10	3	65.00	155.00	29.55	70.45	0.00	---	---	---
C10	5	40.00	0.00	100.00	0.00	0.00	32.00	68.00	0.00
C11	3	10.00	60.00	14.29	85.71	0.00	---	---	---
C11	5	50.00	0.00	100.00	0.00	0.00	---	---	---
C11	3	10.00	40.00	20.00	80.00	0.00	---	---	---
C11	5	50.00	0.00	100.00	0.00	0.00	---	---	---
C11	3	30.00	240.00	11.11	88.89	0.00	30.61	69.39	0.00
ns2	---	---	---	---	---	---	---	---	---
C12	5	220.00	0.00	100.00	0.00	0.00	---	---	---
C12	3	5.00	95.00	5.00	95.00	0.00	70.31	29.69	0.00
C13	5	280.00	0.00	100.00	0.00	0.00	---	---	---
C13	1	6.00	364.00	1.62	98.38	0.00	44.00	56.00	0.00
C14	1	0.00	25.00	0.00	100.00	0.00	---	---	---
C14	4	80.00	100.00	44.44	55.56	0.00	---	---	---
C14	1	1.00	59.00	1.67	98.33	0.00	---	---	---
C14	4	70.00	120.00	36.84	63.16	0.00	---	---	---
C14	1	0.00	12.00	0.00	80.00	20.00	32.13	67.23	0.64
C15	3	65.00	175.00	27.08	72.92	0.00	---	---	---
C15	3	10.00	50.00	16.67	83.33	0.00	---	---	---
C15	4	95.00	25.00	79.17	20.83	0.00	---	---	---
C15	1	0.00	20.00	0.00	100.00	0.00	38.64	61.36	0.00
C16	3	57.00	173.00	24.78	75.22	0.00	---	---	---
C16	3	50.00	100.00	33.33	66.67	0.00	---	---	---
C16	3	5.00	55.00	8.33	91.67	0.00	---	---	---
C16	5	40.00	0.00	100.00	0.00	0.00	31.67	68.33	0.00
ns3	---	---	---	---	---	---	---	---	---
C26	1	19.00	191.00	9.05	90.95	0.00	---	---	---
C26	1	0.00	30.00	0.00	100.00	0.00	---	---	---
C26	3	20.00	70.00	22.22	77.78	0.00	---	---	---
C26	1	0.00	55.00	0.00	100.00	0.00	10.13	89.87	0.00
C17	5	586.96	13.04	97.83	2.17	0.00	97.83	2.17	0.00
C29	5	580.00	60.00	90.63	9.38	0.00	90.63	9.38	0.00

Table 1–26. Data for samples from core hole 31, Williams Production RMT Company, Bullwacker Creek Unit (BCU) 32–9–4277.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; fr, highly fractured sample; SubA, subbituminous A; SubB, subbituminous B; ---, no data]

Canister number	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
C7	---	---	---	---	---	Bedding oriented 45 degrees to horizontal.
C7	---	---	---	---	---	Bedding oriented 45 degrees to horizontal.
C7	---	---	---	---	---	Bedding oriented 45 degrees to horizontal.
C7	---	---	---	---	---	Bedding oriented 45 degrees to horizontal.
C7	---	---	---	---	---	Bedding oriented 45 degrees to horizontal.
C7	---	---	---	---	---	Bedding oriented 45 degrees to horizontal.
C7	---	---	---	---	---	Bedding oriented 45 degrees to horizontal.
C7	---	---	---	66.70	SubA	Bedding oriented 45 degrees to horizontal.
ns1	---	---	---	---	---	No sample.
C9	---	---	---	---	---	Bedding oriented 30 degrees to horizontal.
C9	---	---	---	---	---	Bedding oriented 30 degrees to horizontal.
C9	---	---	---	---	---	Bedding oriented 30 degrees to horizontal.
C9	---	---	---	65.37	---	Bedding oriented 30 degrees to horizontal.
C10	---	---	---	---	---	Bedding oriented 20 degrees to horizontal.
C10	---	---	---	---	---	Bedding oriented 20 degrees to horizontal.
C10	---	---	---	72.41	---	Bedding oriented 20 degrees to horizontal.
C11	---	---	---	---	---	Bedding oriented 20 degrees to horizontal.
C11	---	---	---	---	---	Bedding oriented 20 degrees to horizontal.
C11	---	---	---	---	---	Bedding oriented 20 degrees to horizontal.
C11	---	---	---	---	---	Bedding oriented 20 degrees to horizontal.
C11	---	---	---	77.06	---	Bedding oriented 20 degrees to horizontal.
ns2	---	---	---	---	---	No sample.
C12	---	---	---	---	---	Bedding oriented 30 degrees to horizontal.
C12	---	---	---	65.42	---	Bedding oriented 30 degrees to horizontal.
C13	---	---	---	---	---	Bedding oriented 30 degrees to horizontal.
C13	---	---	---	68.74	---	Bedding oriented 30 degrees to horizontal.
C14	---	---	---	---	---	Bedding oriented 30 degrees to horizontal.
C14	---	---	---	---	---	Bedding oriented 30 degrees to horizontal.
C14	---	---	---	---	---	Bedding oriented 30 degrees to horizontal.
C14	---	---	---	---	---	Bedding oriented 30 degrees to horizontal.
C14	---	---	---	69.90	---	Bedding oriented 30 degrees to horizontal.
C15	---	---	---	---	---	Bedding oriented 30 degrees to horizontal.
C15	---	---	---	---	---	Bedding oriented 30 degrees to horizontal.
C15	---	---	---	---	---	Bedding oriented 30 degrees to horizontal.
C15	---	---	---	73.73	---	Bedding oriented 30 degrees to horizontal.
C16	---	---	---	---	---	---
C16	---	---	---	---	---	---
C16	---	---	---	---	---	---
C16	---	---	---	78.33	---	---
ns3	---	---	---	---	---	No sample.
C26	---	---	---	---	---	---
C26	---	---	---	---	---	---
C26	---	---	---	---	---	---
C26	---	---	---	60.54	---	---
C17	15	66.67	66.67	84.64	---	Highly fractured sample, estimated attritus and vitrain band thicknesses.
C29	15	66.67	66.67	70.10	SubB	Highly fractured sample.

Table 1–26. Data for samples from core hole 31, Williams Production RMT Company, Bullwacker Creek Unit (BCU) 32–9–4277.—
Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; fr, highly fractured sample; SubA, subbituminous A; SubB, subbituminous B; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)	Average attrital band thickness (AvABT) (mm)	Cumulative fusain thickness (CuFT) (mm)
	Top	Bottom								
C19	1,433.40	---	Big George	4.00	---	0.09	27.54	0.0	0.0	0.0
C19	---	---	Big George	6.00	---	0.13	27.74	3.0	57.0	0.0
C19	---	---	Big George	7.00	---	0.15	27.97	70.0	0.0	0.0
C19	---	---	Big George	9.00	---	0.20	28.26	10.0	35.0	0.0
C19ns	---	---	Big George	9.00	---	1.00	28.56	---	---	---
C19	---	1,435.20	Big George	20.00	46.00	0.43	29.22	9.3	24.0	0.0
C20	1,435.20	1,437.00	Big George	60.00	60.00	1.00	31.18	29.4	45.6	0.0
C21	1,437.00	1,438.80	Big George	54.00	54.00	1.00	32.96	18.2	23.3	0.0
C22ns	1,438.80	---	Big George	12.50	---	1.00	33.37	---	---	---
C22	---	1,440.60	Big George	40.00	40.00	1.00	34.68	8.8	24.5	0.0
C23	1,440.60	---	Big George	24.50	---	0.43	35.48	241.0	0.0	4.0
C23	---	---	Big George	2.50	---	0.04	35.56	0.0	25.0	0.0
C23	---	---	Big George	3.00	---	0.05	35.66	30.0	0.0	0.0
C23	---	---	Big George	7.00	---	0.12	35.89	0.0	70.0	0.0
C23	---	---	Big George	7.50	---	0.13	36.14	71.0	0.0	4.0
C23	---	1,442.40	Big George	12.50	57.00	0.22	36.55	2.5	28.8	0.0
C24	1,442.40	---	Big George	15.00	---	0.23	37.04	14.0	16.0	0.0
C24	---	---	Big George	22.00	---	0.33	37.76	28.3	44.3	2.0
C24	---	1,444.20	Big George	29.00	66.00	0.44	38.71	1.8	56.2	0.0
C27	1,444.20	1,446.00	Big George	55.00	55.00	1.00	40.52	4.3	70.0	30.0
C33	1,446.00	---	Big George	7.00	---	0.14	40.75	0.0	70.0	0.0
C33	---	---	Big George	2.00	---	0.04	40.81	20.0	0.0	0.0
C33	---	---	Big George	10.00	---	0.19	41.14	10.0	90.0	0.0
C33	---	---	Big George	1.50	---	0.03	41.19	15.0	0.0	0.0
C33	---	---	Big George	10.00	---	0.19	41.52	10.0	90.0	0.0
C33	---	---	Big George	10.00	---	0.19	41.85	7.5	42.5	0.0
C33	---	1,448.00	Big George	11.00	51.50	0.21	42.21	1.7	35.0	0.0
C28	1,448.00	---	Big George	3.00	---	0.05	42.31	0.0	30.0	0.0
C28	---	---	Big George	9.00	---	0.15	42.60	90.0	0.0	0.0
C28	---	---	Big George	11.00	---	0.18	42.96	7.5	47.5	0.0
C28	---	---	Big George	7.00	---	0.11	43.19	70.0	0.0	0.0
C28	---	---	Big George	22.00	---	0.35	43.91	45.0	175.0	0.0
C28	---	---	Big George	4.00	---	0.06	44.05	0.0	0.0	40.0
C28	---	1,450.00	Big George	6.00	62.00	0.10	44.24	10.0	50.0	0.0
C31	1,450.00	---	Big George	5.00	---	0.09	44.41	50.0	0.0	0.0
C31	---	---	Big George	22.00	---	0.39	45.13	5.0	31.7	0.0
C31	---	---	Big George	2.00	---	0.04	45.19	20.0	0.0	0.0
C31	---	---	Big George	17.00	---	0.30	45.75	9.0	76.0	0.0
C31	---	---	Big George	1.00	---	0.02	45.78	0.0	0.0	10.0
C31	---	---	Big George	4.00	---	0.07	45.92	0.0	40.0	0.0
C31	---	1452.00	Big George	6.00	57.00	0.11	46.11	60.0	0.0	0.0
C32	1,452.00	---	Big George	32.00	---	0.57	47.16	23.3	30.0	0.0
C32	---	1,454.00	Big George	24.00	56.00	0.43	47.95	0.0	240.0	0.0
ns4	1,454.00	1,454.60	ns4	18.00	18.00	1.00	48.54	---	---	---
C35	1,454.60	1,456.10	Big George	59.00	59.00	1.00	50.48	7.6	66.1	0.0
C36	1,456.10	---	Big George	15.00	---	0.23	50.97	150.0	0.0	0.0
C36	---	---	Big George	24.00	---	0.36	51.76	3.3	56.8	0.0
C36	---	---	Big George	5.00	---	0.08	51.92	50.0	0.0	0.0
C36	---	1,458.10	Big George	22.00	66.00	0.33	52.64	10.0	100.0	0.0
C37	1,458.10	1,460.00	Big George	54.00	54.00	1.00	54.41	10.8	43.2	0.0
C38	1,460.00	1,462.00	Big George	60.00	60.00	1.00	56.38	71.4	14.3	0.0

Table 1–26. Data for samples from core hole 31, Williams Production RMT Company, Bullwacker Creek Unit (BCU) 32–9–4277.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; fr, highly fractured sample; SubA, subbituminous A; SubB, subbituminous B; ---, no data]

Canister number	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)	Attritus percentage (AP)	Fusain percentage (FP)	Canister average vitrain percentage (CaAvVP)	Canister average attrital percentage (CaAvAP)	Canister average fusain percentage (CaAvFP)
C19	0	0.00	40.00	0.00	100.00	0.00	---	---	---
C19	1	3.00	57.00	5.00	95.00	0.00	---	---	---
C19	5	70.00	0.00	100.00	0.00	0.00	---	---	---
C19	3	20.00	70.00	22.22	77.78	0.00	---	---	---
C19 _{ns}	---	---	---	---	---	---	---	---	---
C19	3	56.00	144.00	28.00	72.00	0.00	32.39	67.61	0.00
C20	4	235.00	365.00	39.17	60.83	0.00	39.17	60.83	0.00
C21	3	237.00	303.00	43.89	56.11	0.00	43.89	56.11	0.00
C22 _{ns}	---	---	---	---	---	---	---	---	---
C22	3	106.00	294.00	26.50	73.50	0.00	26.50	73.50	0.00
C23	5	241.00	0.00	98.37	0.00	1.63	---	---	---
C23	1	0.00	25.00	0.00	100.00	0.00	---	---	---
C23	5	30.00	0.00	100.00	0.00	0.00	---	---	---
C23	1	0.00	70.00	0.00	100.00	0.00	---	---	---
C23	5	71.00	0.00	94.67	0.00	5.33	---	---	---
C23	1	10.00	115.00	8.00	92.00	0.00	61.75	36.84	1.40
C24	3	70.00	80.00	46.67	53.33	0.00	---	---	---
C24	4	85.00	133.00	38.64	60.45	0.91	---	---	---
C24	1	9.00	281.00	3.10	96.90	0.00	24.85	74.85	0.30
C27	1	30.00	490.00	5.45	89.09	5.45	5.45	89.09	5.45
C33	1	0.00	70.00	0.00	100.00	0.00	---	---	---
C33	3	20.00	0.00	100.00	0.00	0.00	---	---	---
C33	3	10.00	90.00	10.00	90.00	0.00	---	---	---
C33	3	15.00	0.00	100.00	0.00	0.00	---	---	---
C33	3	10.00	90.00	10.00	90.00	0.00	---	---	---
C33	3	15.00	85.00	15.00	85.00	0.00	---	---	---
C33	1	5.00	105.00	4.55	95.45	0.00	14.56	85.44	0.00
C28	1	0.00	30.00	0.00	100.00	0.00	---	---	---
C28	5	90.00	0.00	100.00	0.00	0.00	---	---	---
C28	3	15.00	95.00	13.64	86.36	0.00	---	---	---
C28	5	70.00	0.00	100.00	0.00	0.00	---	---	---
C28	4	45.00	175.00	20.45	79.55	0.00	---	---	---
C28	8	0.00	0.00	0.00	0.00	100.00	---	---	---
C28	3	10.00	50.00	16.67	83.33	0.00	37.10	56.45	6.45
C31	5	50.00	0.00	100.00	0.00	0.00	---	---	---
C31	3	30.00	190.00	13.64	86.36	0.00	---	---	---
C31	3	20.00	0.00	100.00	0.00	0.00	---	---	---
C31	3	18.00	152.00	10.59	89.41	0.00	---	---	---
C31	8	0.00	0.00	0.00	0.00	100.00	---	---	---
C31	1	0.00	40.00	0.00	100.00	0.00	---	---	---
C31	5	60.00	0.00	100.00	0.00	0.00	31.23	67.02	1.75
C32	4	140.00	180.00	43.75	56.25	0.00	---	---	---
C32	1	0.00	240.00	0.00	100.00	0.00	25.00	75.00	0.00
ns4	---	---	---	---	---	---	---	---	---
C35	3	61.00	529.00	10.34	89.66	0.00	10.34	89.66	0.00
C36	5	150.00	0.00	100.00	0.00	0.00	---	---	---
C36	1	13.00	227.00	5.42	94.58	0.00	---	---	---
C36	5	50.00	0.00	100.00	0.00	0.00	---	---	---
C36	3	20.00	200.00	9.09	90.91	0.00	35.30	64.70	0.00
C37	3	108.00	432.00	20.00	80.00	0.00	20.00	80.00	0.00
C38	4	500.00	100.00	83.33	16.67	0.00	83.33	16.67	0.00

Table 1–26. Data for samples from core hole 31, Williams Production RMT Company, Bullwacker Creek Unit (BCU) 32–9–4277.—
Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; fr, highly fractured sample; SubA, subbituminous A; SubB, subbituminous B; ---, no data]

Canister number	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
C19	---	---	---	---	---	Carbonaceous shale.
C19	25	40.00	---	---	---	---
C19	10	100.00	---	---	---	---
C19	35	28.57	---	---	---	"Roasted wood."
C19ns	---	---	---	---	---	No data, adsorption analysis sample taken.
C19	40	25.00	40.41	89.91	---	---
C20	10	100.00	100.00	87.92	---	Pyrite on cleat.
C21	25	40.00	40.00	85.24	---	Pyrite on cleat.
C22ns	---	---	---	---	---	No data, adsorption analysis sample.
C22	20	50.00	50.00	88.62	---	Pyrite on cleat.
C23	25	40.00	---	---	---	---
C23	55	18.18	---	---	---	---
C23	25	40.00	---	---	---	---
C23	55	18.18	---	---	---	---
C23	20	50.00	---	---	---	---
C23	55	18.18	32.89	83.45	---	---
C24	25	40.00	---	---	---	Pyrite on cleat, laminations oriented 45 degrees to bedding.
C24	25	40.00	---	---	---	---
C24	55	18.18	30.41	80.01	---	---
C27	55	18.18	18.18	88.69	---	Dull, abundant fusain.
C33	---	---	---	---	---	Tilted bedding, "swirling" attritus.
C33	---	---	---	---	---	Tilted bedding.
C33	---	---	---	---	---	---
C33	---	---	---	---	---	---
C33	---	---	---	---	---	---
C33	---	---	---	---	---	Shaly.
C33	---	---	---	61.33	---	---
C28	---	---	---	---	---	---
C28	---	---	---	---	---	---
C28	---	---	---	---	---	---
C28	---	---	---	---	---	---
C28	---	---	---	---	---	Thick fusain layer.
C28	---	---	---	75.28	SubA	Shaly.
C31	---	---	---	---	---	---
C31	---	---	---	---	---	---
C31	---	---	---	---	---	---
C31	---	---	---	---	---	---
C31	---	---	---	---	---	Fusain layer.
C31	---	---	---	---	---	---
C31	---	---	---	74.50	---	---
C32	---	---	---	---	---	Tilted bedding, "swirling" attritus.
C32	---	---	---	84.47	---	Tilted bedding.
ns4	---	---	---	---	---	No sample.
C35	---	---	---	81.92	---	---
C36	---	---	---	---	---	---
C36	---	---	---	---	---	---
C36	---	---	---	---	---	---
C36	---	---	---	78.44	---	---
C37	45	22.22	22.22	89.50	---	Pyrite sampled, bedding at 35 degrees to horizontal.
C38	65	15.38	15.38	73.82	---	Bottom 2/3 at 30 degrees to horizontal, top 1/3 at 10 degrees.

Table 1–26. Data for samples from core hole 31, Williams Production RMT Company, Bullwacker Creek Unit (BCU) 32–9–4277.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; fr, highly fractured sample; SubA, subbituminous A; SubB, subbituminous B; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)	Average attrital band thickness (AvABT) (mm)	Cumulative fusain thickness (CuFT) (mm)
	Top	Bottom								
C39	1,462.00	1,464.00	Big George	50.00	50.00	1.00	58.02	16.0	15.1	3.0
C40	1,464.00	---	Big George	16.00	---	0.34	58.55	160.0	0.0	0.0
C40	---	---	Big George	10.00	---	0.21	58.87	5.0	95.0	0.0
C40	---	---	Big George	4.00	---	0.09	59.01	40.0	0.0	0.0
C40	---	---	Big George	8.00	---	0.17	59.27	0.0	80.0	0.0
C40	---	---	Big George	4.00	---	0.09	59.40	40.0	0.0	0.0
C40	---	1,466.00	Big George	5.00	47.00	0.11	59.56	10.0	40.0	0.0
C41	1,466.00	---	Big George	11.00	---	0.19	59.92	12.3	24.3	0.0
C41	---	---	Big George	23.50	---	0.41	60.70	10.0	68.3	0.0
C41	---	---	Big George	4.50	---	0.08	60.84	45.0	0.0	0.0
C41	---	---	Big George	4.50	---	0.08	60.99	0.0	45.0	0.0
C41	---	---	Big George	5.00	---	0.09	61.15	50.0	0.0	0.0
C41	---	1,468.00	Big George	9.50	58.00	0.16	61.47	5.0	42.5	0.0
C42	1,468.00	---	Big George	39.00	---	1.00	62.75	10.0	68.0	0.0
C42fr	---	1,470.00	Big George	21.00	21.00	1.00	63.44	---	---	---
C43	1,470.00	1,471.80	Big George	53.00	53.00	1.00	65.17	5.5	127.0	0.0

Table 1–26. Data for samples from core hole 31, Williams Production RMT Company, Bullwacker Creek Unit (BCU) 32–9–4277.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; fr, highly fractured sample; SubA, subbituminous A; SubB, subbituminous B; ---, no data]

Canister number	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)	Attritus percentage (AP)	Fusain percentage (FP)	Canister average vitrain percentage (CaAvVP)	Canister average attrital percentage (CaAvAP)	Canister average fusain percentage (CaAvFP)
C39	3	256.00	241.00	51.20	48.20	0.60	51.20	48.20	0.60
C40	5	160.00	0.00	100.00	0.00	0.00	---	---	---
C40	3	5.00	95.00	5.00	95.00	0.00	---	---	---
C40	5	40.00	0.00	100.00	0.00	0.00	---	---	---
C40	1	0.00	80.00	0.00	100.00	0.00	---	---	---
C40	5	40.00	0.00	100.00	0.00	0.00	---	---	---
C40	3	10.00	40.00	20.00	80.00	0.00	54.26	45.74	0.00
C41	3	37.00	73.00	33.64	66.36	0.00	---	---	---
C41	3	30.00	205.00	12.77	87.23	0.00	---	---	---
C41	5	45.00	0.00	100.00	0.00	0.00	---	---	---
C41	1	0.00	45.00	0.00	100.00	0.00	---	---	---
C41	5	50.00	0.00	100.00	0.00	0.00	---	---	---
C41	3	10.00	85.00	10.53	89.47	0.00	29.66	70.34	0.00
C42	3	50.00	340.00	12.82	87.18	0.00	12.82	87.18	0.00
C42fr	---	---	---	---	---	---	---	---	---
C43	3	22.00	508.00	4.15	95.85	0.00	4.15	95.85	0.00

Table 1–26. Data for samples from core hole 31, Williams Production RMT Company, Bullwacker Creek Unit (BCU) 32–9–4277.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; fr, highly fractured sample; SubA, subbituminous A; SubB, subbituminous B; ---, no data]

Canister number	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
C39	40	25.00	25.00	76.62	---	---
C40	---	---	---	---	---	---
C40	---	---	---	---	---	---
C40	---	---	---	---	---	---
C40	---	---	---	---	---	---
C40	---	---	---	---	---	---
C40	---	---	---	69.68	---	---
C41	---	---	---	---	---	---
C41	---	---	---	---	---	---
C41	---	---	---	---	---	---
C41	---	---	---	---	---	---
C41	---	---	---	---	---	---
C41	---	---	---	69.11	---	---
C42	---	---	---	73.85	---	---
C42fr	---	---	---	---	---	Sample too fragmented to describe.
C43	---	---	---	77.17	SubA	---

Table 1–27. Data for samples from core hole 32, Lance Oil and Gas Company, Inc., Whiskey Draw Unit 12–12–4778.

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; fr, highly fractured sample; SubA, subbituminous A; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)	Average attrital band thickness (AvABT) (mm)	Cumulative fusain thickness (CuFT) (mm)
	Top	Bottom								
34	1,518.00	---	Big George	5.50	---	0.10	0.18	3.0	52.0	0.0
34	---	---	Big George	12.00	---	0.23	0.57	2.6	21.4	0.0
34	---	---	Big George	5.00	---	0.10	0.74	0.0	50.0	0.0
34	---	---	Big George	5.00	---	0.10	0.90	7.5	17.5	0.0
34	---	---	Big George	3.00	---	0.06	1.00	0.0	30.0	0.0
34	---	---	Big George	8.50	---	0.16	1.28	4.0	38.5	0.0
34	---	---	Big George	3.00	---	0.06	1.38	0.0	30.0	0.0
34	---	---	Big George	1.50	---	0.03	1.43	15.0	0.0	0.0
34	---	---	Big George	3.00	---	0.06	1.53	0.0	30.0	0.0
34	---	---	Big George	3.00	---	0.06	1.62	30.0	0.0	0.0
34	---	1,520.00	Big George	3.00	52.50	0.06	1.72	0.0	30.0	0.0
32	1,520.00	---	Big George	12.00	---	0.27	2.12	5.0	55.0	0.0
32	---	---	Big George	18.00	---	0.41	2.71	10.6	25.4	0.0
32	---	---	Big George	2.50	---	0.06	2.79	0.0	25.0	0.0
32	---	---	Big George	3.00	---	0.07	2.89	30.0	0.0	0.0
32	---	---	Big George	7.00	---	0.16	3.12	2.0	68.0	0.0
32	---	1,522.00	Big George	1.50	44.00	0.03	3.17	0.0	15.0	0.0
31	1,522.00	---	Big George	20.00	---	0.35	3.82	1.3	65.3	0.0
31	---	---	Big George	6.00	---	0.11	4.02	60.0	0.0	0.0
31	---	---	Big George	10.50	---	0.19	4.36	3.0	49.5	0.0
31	---	---	Big George	3.00	---	0.05	4.46	0.0	0.0	0.0
31	---	---	Big George	9.00	---	0.16	4.76	1.0	29.0	0.0
31	---	---	Big George	6.50	---	0.12	4.97	5.5	27.0	0.0
31	---	1,524.00	Big George	1.50	56.50	0.03	5.02	0.0	15.0	0.0
30	1,524.00	---	Big George	4.50	---	0.08	5.17	12.5	10.0	0.0
30	---	---	Big George	14.50	---	0.26	5.64	3.0	142.0	0.0
30	---	---	Big George	17.00	---	0.30	6.20	20.0	36.7	0.0
30	---	1,526.00	Big George	20.00	56.00	0.36	6.86	8.0	58.7	0.0
ns1	1,526.00	1,534.00	ns1	244.00	244.00	1.00	14.86	---	---	---
35	1,534.00	---	Big George	2.50	---	0.05	14.94	25.0	0.0	0.0
35	---	---	Big George	5.00	---	0.09	15.11	0.0	0.0	0.0
35	---	---	Big George	20.00	---	0.38	15.76	2.3	47.8	0.0
35	---	---	Big George	4.00	---	0.08	15.90	8.5	11.5	0.0
35	---	1,536.00	Big George	21.50	53.00	0.41	16.60	4.0	67.7	0.0
36	1,536.00	---	Big George	15.50	---	0.28	17.11	5.7	46.0	0.0
36	---	---	Big George	3.00	---	0.05	17.21	30.0	0.0	0.0
36	---	---	Big George	26.00	---	0.46	18.06	2.0	4.0	0.0
36	---	---	Big George	3.00	---	0.05	18.16	30.0	0.0	0.0
36	---	1,538.00	Big George	8.50	56.00	0.15	18.44	1.0	3.0	0.0
ns2	1,538.00	1,538.40	ns2	12.00	12.00	1.00	18.83	---	---	---
37	1,538.40	---	Big George	22.00	---	0.33	19.55	10.0	34.0	0.0
37	---	---	Big George	2.00	---	0.03	19.62	20.0	0.0	0.0
37	---	---	Big George	8.00	---	0.12	19.88	7.5	32.5	0.0
37	---	---	Big George	3.00	---	0.05	19.98	30.0	0.0	0.0
37	---	---	Big George	22.50	---	0.34	20.72	12.6	32.4	0.0
37	---	1,540.40	Big George	8.50	66.00	0.13	21.00	7.0	78.0	0.0
38	1,540.40	---	Big George	17.50	---	0.48	21.57	3.0	84.5	0.0
38	---	---	Big George	12.00	---	0.33	21.97	8.4	8.7	0.0
38	---	1,542.40	Big George	7.00	36.50	0.19	22.19	2.0	68.0	0.0

Table 1–27. Data for samples from core hole 32, Lance Oil and Gas Company, Inc., Whiskey Draw Unit 12–12–4778.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; fr, highly fractured sample; SubA, subbituminous A; ---, no data]

Canister number	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)	Attritus percentage (AP)	Fusain percentage (FP)	Canister average vitrain percentage (CaAvVP)	Canister average attrital percentage (CaAvAP)	Canister average fusain percentage (CaAvFP)
34	1	3.00	52.00	5.45	94.55	0.00	---	---	---
34	1	13.00	107.00	10.83	89.17	0.00	---	---	---
34	1	0.00	50.00	0.00	100.00	0.00	---	---	---
34	3	15.00	35.00	30.00	70.00	0.00	---	---	---
34	1	0.00	30.00	0.00	100.00	0.00	---	---	---
34	1	8.00	77.00	9.41	90.59	0.00	---	---	---
34	1	0.00	30.00	0.00	100.00	0.00	---	---	---
34	3	15.00	0.00	100.00	0.00	0.00	---	---	---
34	1	0.00	30.00	0.00	100.00	0.00	---	---	---
34	5	30.00	0.00	100.00	0.00	0.00	---	---	---
34	1	0.00	30.00	0.00	100.00	0.00	16.00	84.00	0.00
32	3	10.00	110.00	8.33	91.67	0.00	---	---	---
32	3	53.00	127.00	29.44	70.56	0.00	---	---	---
32	1	0.00	25.00	0.00	100.00	0.00	---	---	---
32	5	30.00	0.00	100.00	0.00	0.00	---	---	---
32	1	2.00	68.00	2.86	97.14	0.00	---	---	---
32	1	0.00	15.00	0.00	100.00	0.00	21.59	78.41	0.00
31	1	4.00	196.00	2.00	98.00	0.00	---	---	---
31	5	60.00	0.00	100.00	0.00	0.00	---	---	---
31	1	6.00	99.00	5.71	94.29	0.00	---	---	---
31	0	0.00	0.00	0.00	0.00	0.00	---	---	---
31	1	3.00	87.00	3.33	96.67	0.00	---	---	---
31	3	11.00	54.00	16.92	83.08	0.00	---	---	---
31	1	0.00	15.00	0.00	100.00	0.00	14.87	79.82	0.00
30	3	25.00	20.00	55.56	44.44	0.00	---	---	---
30	1	3.00	142.00	2.07	97.93	0.00	---	---	---
30	3	60.00	110.00	35.29	64.71	0.00	---	---	---
30	3	24.00	176.00	12.00	88.00	0.00	20.00	80.00	0.00
ns1	---	---	---	---	---	---	---	---	---
35	5	25.00	0.00	100.00	0.00	0.00	---	---	---
35	0	0.00	0.00	0.00	0.00	0.00	---	---	---
35	1	9.00	191.00	4.50	95.50	0.00	---	---	---
35	3	17.00	23.00	42.50	57.50	0.00	---	---	---
35	1	12.00	203.00	5.58	94.42	0.00	11.89	78.68	0.00
36	3	17.00	138.00	10.97	89.03	0.00	---	---	---
36	5	30.00	0.00	100.00	0.00	0.00	---	---	---
36	2	86.67	173.33	33.33	66.67	0.00	---	---	---
36	5	30.00	0.00	100.00	0.00	0.00	---	---	---
36	2	21.25	63.75	25.00	75.00	0.00	33.02	66.98	0.00
ns2	---	---	---	---	---	---	---	---	---
37	3	50.00	170.00	22.73	77.27	0.00	---	---	---
37	3	20.00	0.00	100.00	0.00	0.00	---	---	---
37	3	15.00	65.00	18.75	81.25	0.00	---	---	---
37	5	30.00	0.00	100.00	0.00	0.00	---	---	---
37	3	63.00	162.00	28.00	72.00	0.00	---	---	---
37	3	7.00	78.00	8.24	91.76	0.00	28.03	71.97	0.00
38	1	6.00	169.00	3.43	96.57	0.00	---	---	---
38	3	59.00	61.00	49.17	50.83	0.00	---	---	---
38	1	2.00	68.00	2.86	97.14	0.00	18.36	81.64	0.00

Table 1–27. Data for samples from core hole 32, Lance Oil and Gas Company, Inc., Whiskey Draw Unit 12–12–4778.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; fr, highly fractured sample; SubA, subbituminous A; ---, no data]

Canister number	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
34	20	50.00	---	---	---	---
34	20	50.00	---	---	---	---
34	20	50.00	---	---	---	---
34	20	50.00	---	---	---	---
34	20	50.00	---	---	---	---
34	20	50.00	---	---	---	---
34	20	50.00	---	---	---	---
34	20	50.00	---	---	---	---
34	20	50.00	---	---	---	---
34	20	50.00	---	---	---	---
34	20	50.00	---	---	---	---
34	20	50.00	50.00	85.85	---	---
32	20	50.00	---	---	---	---
32	20	50.00	---	---	---	---
32	20	50.00	---	---	---	---
32	20	50.00	---	---	---	---
32	20	50.00	---	---	---	---
32	20	50.00	---	---	---	---
32	20	50.00	50.00	102.39	SubA	---
31	20	50.00	---	---	---	---
31	20	50.00	---	---	---	---
31	20	50.00	---	---	---	---
31	---	---	---	---	---	Shale.
31	20	50.00	---	---	---	---
31	20	50.00	---	---	---	---
31	20	50.00	50.00	77.29	---	---
30	20	50.00	---	---	---	---
30	20	50.00	---	---	---	---
30	20	50.00	---	---	---	---
30	20	50.00	50.00	100.37	---	---
ns1	---	---	---	---	---	No sample.
35	20	50.00	---	---	---	---
35	---	---	---	---	---	Shale.
35	20	50.00	---	---	---	---
35	20	50.00	---	---	---	---
35	20	50.00	50.00	96.49	---	---
36	30	33.33	---	---	---	---
36	30	33.33	---	---	---	---
36	30	33.33	---	---	---	Estimated attritus and vitrain thicknesses and percentages.
36	30	33.33	---	---	---	---
36	30	33.33	33.33	91.85	---	Estimated attritus and vitrain thicknesses and percentages.
ns2	---	---	---	---	---	No sample.
37	25	40.00	---	---	---	---
37	25	40.00	---	---	---	---
37	25	40.00	---	---	---	---
37	25	40.00	---	---	---	---
37	25	40.00	---	---	---	---
37	25	40.00	40.00	102.66	SubA	---
38	20	50.00	---	---	---	---
38	20	50.00	---	---	---	---
38	20	50.00	50.00	102.41	---	---

Table 1–27. Data for samples from core hole 32, Lance Oil and Gas Company, Inc., Whiskey Draw Unit 12–12–4778.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; fr, highly fractured sample; SubA, subbituminous A; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)	Average attrital band thickness (AvABT) (mm)	Cumulative fusain thickness (CuFT) (mm)
	Top	Bottom								
39	1,542.40	---	Big George	10.00	---	0.17	22.52	3.0	47.0	0.0
39	---	---	Big George	13.00	---	0.22	22.95	15.5	17.0	0.0
39	---	---	Big George	7.50	---	0.13	23.20	75.0	0.0	0.0
39	---	---	Big George	7.00	---	0.12	23.43	0.0	70.0	0.0
39	---	1,544.40	Big George	20.50	58.00	0.35	24.10	3.8	47.5	0.0
40	1,544.40	---	Big George	21.50	---	0.36	24.80	7.0	100.5	0.0
40	---	---	Big George	3.50	---	0.06	24.92	35.0	0.0	0.0
40	---	---	Big George	19.50	---	0.33	25.56	3.7	61.3	0.0
40	---	---	Big George	3.00	---	0.05	25.66	30.0	0.0	0.0
40	---	1,546.40	Big George	11.50	59.00	0.19	26.03	13.5	44.0	0.0
41	1,546.40	---	Big George	19.50	---	0.32	26.67	3.0	62.0	0.0
41	---	---	Big George	6.50	---	0.11	26.89	65.0	0.0	0.0
41	---	---	Big George	1.50	---	0.02	26.94	1.0	14.0	0.0
41ns	---	---	Big George	12.50	---	1.00	27.35	---	---	---
41	---	---	Big George	16.50	---	0.27	27.89	2.5	80.0	0.0
41	---	---	Big George	2.50	---	0.04	27.97	25.0	0.0	0.0
41	---	1,548.40	Big George	15.00	61.50	0.24	28.46	6.3	43.7	0.0
42	1,548.40	---	Big George	23.50	---	0.39	29.23	7.5	51.3	0.0
42	---	---	Big George	7.00	---	0.11	29.46	70.0	0.0	0.0
42	---	---	Big George	4.50	---	0.07	29.61	0.0	45.0	0.0
42	---	---	Big George	20.00	---	0.33	30.27	4.3	45.8	0.0
42	---	---	Big George	3.00	---	0.05	30.36	0.0	30.0	0.0
42	---	1,550.40	Big George	3.00	61.00	0.05	30.46	30.0	0.0	0.0
43	1,550.40	---	Big George	2.50	---	0.06	30.54	25.0	0.0	0.0
43	---	---	Big George	13.50	---	0.31	30.99	2.0	65.5	0.0
43	---	---	Big George	6.50	---	0.15	31.20	65.0	0.0	0.0
43	---	1,552.40	Big George	20.50	43.00	0.48	31.87	4.5	46.8	0.0
ns3	1,552.40	1,554.00	ns3	49.00	49.00	1.00	33.48	---	---	---
44	1,554.00	---	Big George	5.50	---	0.10	33.66	10.0	45.0	0.0
44	---	---	Big George	6.50	---	0.12	33.87	65.0	0.0	0.0
44	---	---	Big George	9.00	---	0.17	34.17	1.0	89.0	0.0
44	---	---	Big George	23.00	---	0.43	34.92	8.5	49.0	0.0
44	---	1,556.00	Big George	9.00	53.00	0.17	35.22	5.5	37.0	5.0
45	1,556.00	---	Big George	28.50	---	0.48	36.15	4.6	52.4	0.0
45	---	---	Big George	16.00	---	0.27	36.68	160.0	0.0	0.0
45	---	---	Big George	13.00	---	0.22	37.11	5.5	59.5	0.0
45	---	1,558.00	Big George	2.50	60.00	0.04	37.19	0.0	25.0	0.0
46	1,558.00	---	Big George	8.50	---	0.13	37.47	3.0	82.0	0.0
46	---	---	Big George	5.00	---	0.08	37.63	0.0	50.0	0.0
46	---	---	Big George	11.50	---	0.18	38.01	1.5	55.0	2.0
46	---	---	Big George	25.00	---	0.39	38.83	3.4	21.4	2.0
46	---	1,560.00	Big George	14.00	64.00	0.22	39.29	2.5	67.5	0.0
47	1,560.00	---	Big George	9.00	---	0.17	39.58	1.0	89.0	0.0
47	---	---	Big George	7.50	---	0.14	39.83	4.0	33.5	0.0
47	---	---	Big George	4.50	---	0.08	39.98	0.0	45.0	0.0
47	---	---	Big George	7.00	---	0.13	40.21	2.0	68.0	0.0
47	---	---	Big George	24.00	---	0.45	40.99	1.0	10.0	0.0
47	---	---	Big George	1.50	---	0.03	41.04	15.0	0.0	0.0
47fr	---	1,562.00	Big George	10.50	10.50	1.00	41.39	---	---	---

Table 1–27. Data for samples from core hole 32, Lance Oil and Gas Company, Inc., Whiskey Draw Unit 12–12–4778.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; fr, highly fractured sample; SubA, subbituminous A; ---, no data]

Canister number	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
39	25	40.00	---	---	---	---
39	25	40.00	---	---	---	---
39	25	40.00	---	---	---	---
39	25	40.00	---	---	---	---
39	25	40.00	40.00	97.99	---	---
40	15	66.67	---	---	---	---
40	15	66.67	---	---	---	---
40	15	66.67	---	---	---	---
40	15	66.67	---	---	---	---
40	15	66.67	66.67	76.54	---	---
41	15	66.67	---	---	---	---
41	15	66.67	---	---	---	---
41	15	66.67	---	---	---	---
41ns	35	28.57	---	---	---	Sample taken for adsorption analysis.
41	35	28.57	---	---	---	---
41	35	28.57	---	---	---	---
41	35	28.57	45.61	69.23	SubA	---
42	25	40.00	---	---	---	---
42	25	40.00	---	---	---	---
42	25	40.00	---	---	---	---
42	25	40.00	---	---	---	---
42	25	40.00	---	---	---	---
42	25	40.00	40.00	94.95	---	---
43	25	40.00	---	---	---	---
43	25	40.00	---	---	---	---
43	25	40.00	---	---	---	---
43	25	40.00	40.00	120.73	---	---
ns3	---	---	---	---	---	No sample.
44	20	50.00	---	---	---	---
44	20	50.00	---	---	---	---
44	20	50.00	---	---	---	---
44	20	50.00	---	---	---	---
44	20	50.00	50.00	95.18	---	5 mm of fusain at top of unit.
45	20	50.00	---	---	---	---
45	20	50.00	---	---	---	---
45	20	50.00	---	---	---	---
45	20	50.00	50.00	100.27	---	---
46	20	50.00	---	---	---	---
46	20	50.00	---	---	---	---
46	---	---	---	---	---	Fusain at 16.5 cm.
46	---	---	---	---	---	Wood grain visible.
46	20	50.00	50.00	89.41	---	---
47	20	50.00	---	---	---	---
47	20	50.00	---	---	---	---
47	20	50.00	---	---	---	---
47	20	50.00	---	---	---	---
47	20	50.00	---	---	---	Estimated attritus and vitrain thicknesses and percentages.
47	20	50.00	50.00	80.48	SubA	---
47fr	---	---	---	---	---	Sample too fractured to describe.

Table 1–28. Data for samples from core hole 33, Lance Oil and Gas Company, Inc., McBeth 12–30–4673–BG.

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)	Average attrital band thickness (AvABT) (mm)	Cumulative fusain thickness (CuFT) (mm)
	Top	Bottom								
D2	950.00	952.00	Big George	56.50	56.50	1.00	1.85	1.0	4.0	0.0
D3	952.00	---	Big George	40.50	---	0.68	3.18	1.4	56.4	0.0
D3	---	---	Big George	3.50	---	0.06	3.30	35.0	0.0	0.0
D3	---	954.00	Big George	15.50	59.50	0.26	3.81	1.5	76.0	0.0
D9	954.00	956.00	Big George	64.50	64.50	1.00	5.92	3.0	77.6	0.0
D10	956.00	958.00	Big George	56.00	56.00	1.00	7.76	9.8	60.3	0.0
D13	958.00	960.00	Big George	60.50	60.50	1.00	9.74	9.8	141.5	0.0
D19	960.00	---	Big George	50.00	---	0.70	11.38	1.3	165.3	0.0
D19	---	---	Big George	4.00	---	0.06	11.52	40.0	0.0	0.0
D19	---	962.00	Big George	17.00	71.00	0.24	12.07	2.0	83.0	0.0
D20	962.00	964.00	Big George	70.00	70.00	1.00	14.37	3.4	96.6	0.0
D21	964.00	---	Big George	18.50	---	0.30	14.98	1.0	91.5	0.0
D21	---	---	Big George	2.00	---	0.03	15.04	20.0	0.0	0.0
D21	---	966.00	Big George	42.00	62.50	0.67	16.42	4.4	79.6	0.0
ns1	966.00	967.00	ns1	30.50	30.50	1.00	17.42	---	---	---
D27	967.00	---	Big George	8.00	---	0.15	17.68	80.0	0.0	0.0
D27	---	---	Big George	14.00	---	0.25	18.14	10.7	36.0	0.0
D27	---	969.00	Big George	33.00	55.00	0.60	19.23	4.0	106.0	0.0
D30	969.00	971.00	Big George	56.50	56.50	1.00	21.08	1.0	281.5	0.0

Table 1–28. Data for samples from core hole 33, Lance Oil and Gas Company, Inc., McBeth 12–30–4673–BG.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; ---, no data]

Canister number	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)	Attritus percentage (AP)	Fusain percentage (FP)	Canister average vitrain percentage (CaAvVP)	Canister average attrital percentage (CaAvAP)	Canister average fusain percentage (CaAvFP)
D2	2	113.000	452.000	20.00	80.00	0.00	20.00	80.00	0.00
D3	1	10.000	395.000	2.47	97.53	0.00	---	---	---
D3	5	35.000	0.000	100.00	0.00	0.00	---	---	---
D3	1	3.000	152.000	1.94	98.06	0.00	8.07	91.93	0.00
D9	1	24.000	621.000	3.72	96.28	0.00	3.72	96.28	0.00
D10	3	78.000	482.000	13.93	86.07	0.00	13.93	86.07	0.00
D13	3	39.000	566.000	6.45	93.55	0.00	6.45	93.55	0.00
D19	1	4.000	496.000	0.80	99.20	0.00	---	---	---
D19	5	40.000	0.000	100.00	0.00	0.00	---	---	---
D19	1	4.000	166.000	2.35	97.65	0.00	6.76	93.24	0.00
D20	1	24.000	676.000	3.43	96.57	0.00	3.43	96.57	0.00
D21	1	2.000	183.000	1.08	98.92	0.00	---	---	---
D21	3	20.000	0.000	100.00	0.00	0.00	---	---	---
D21	1	22.000	398.000	5.24	94.76	0.00	7.04	92.96	0.00
ns1	---	---	---	---	---	---	---	---	---
D27	5	80.000	0.000	100.00	0.00	0.00	---	---	---
D27	3	32.000	108.000	22.86	77.14	0.00	---	---	---
D27	1	12.000	318.000	3.64	96.36	0.00	22.55	77.45	0.00
D30	1	2.000	563.000	0.35	99.65	0.00	0.35	99.65	0.00

Table 1–28. Data for samples from core hole 33, Lance Oil and Gas Company, Inc., McBeth 12–30–4673–BG.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; ---, no data]

Canister number	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
D2	20	50.00	50.00	12.98	---	Estimated attritus and vitrain thicknesses.
D3	20	50.00	---	---	---	
D3	20	50.00	---	---	---	
D3	20	50.00	50.00	12.58	SubB	
D9	20	50.00	50.00	13.43	---	---
D10	30	33.33	33.33	13.52	SubB	---
D13	30	33.33	33.33	12.15	---	---
D19	20	50.00	---	---	---	---
D19	20	50.00	---	---	---	---
D19	20	50.00	50.00	13.98	SubB	---
D20	20	50.00	50.00	12.97	---	---
D21	20	50.00	---	---	---	---
D21	20	50.00	---	---	---	---
D21	20	50.00	50.00	13.23	---	---
ns1	---	---	---	---	---	No sample.
D27	25	40.00	---	---	---	---
D27	25	40.00	---	---	---	---
D27	25	40.00	40.00	14.31	SubB	---
D30	30	33.33	33.33	12.93	---	---

Table 1–29. Data for samples from core hole 34, Williams Production RMT Company, State 23–16–4171.

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)	Average attrital band thickness (AvABT) (mm)	Cumulative fusain thickness (CuFT) (mm)
	Top	Bottom								
48	328.00	---	Anderson	12.00	---	0.21	0.39	120.0	0.0	0.0
48	---	---	Anderson	24.00	---	0.41	1.18	1.0	19.0	0.0
48	---	---	Anderson	14.00	---	0.24	1.64	10.0	30.0	2.0
48	---	---	Anderson	6.00	---	0.10	1.84	60.0	0.0	0.0
48	---	330.00	Anderson	2.50	58.50	0.04	1.92	1.0	19.0	0.0
49	330.00	---	Anderson	6.50	---	0.14	2.13	65.0	0.0	0.0
49	---	---	Anderson	33.00	---	0.70	3.22	2.0	38.0	0.0
49	---	332.00	Anderson	7.50	47.00	0.16	3.46	75.0	0.0	0.0
50	332.00	334.00	Anderson	58.00	58.00	1.00	5.36	3.0	12.0	0.0
51	334.00	---	Anderson	6.50	---	0.14	5.58	2.0	18.0	0.0
51	---	---	Anderson	11.50	---	0.25	5.95	20.0	13.3	2.0
51	---	336.00	Anderson	28.00	46.00	0.61	6.87	10.0	15.0	0.0
52	336.00	---	Anderson	22.50	---	0.37	7.61	2.0	18.0	0.0
52	---	---	Anderson	13.50	---	0.22	8.05	20.0	8.6	0.0
52	---	---	Anderson	19.50	---	0.32	8.69	2.0	38.0	0.0
52	---	338.00	Anderson	5.00	60.50	0.08	8.86	20.0	20.0	0.0
53	338.00	---	Anderson	21.00	---	0.36	9.55	2.0	11.3	0.0
53	---	---	Anderson	8.50	---	0.14	9.83	85.0	0.0	0.0
53	---	340.00	Anderson	29.50	59.00	0.50	10.79	3.0	27.0	0.0
54	340.00	---	Anderson	9.00	---	0.15	11.09	90.0	0.0	0.0
54	---	342.00	Anderson	50.00	59.00	0.85	12.73	15.0	22.5	0.0
55	342.00	344.00	Anderson	59.00	59.00	1.00	14.67	1.0	19.0	0.0
56	344.00	---	Anderson	21.00	---	0.65	15.35	4.0	76.0	0.0
56	---	---	Anderson	5.50	---	0.17	15.53	55.0	0.0	0.0
56	---	346.00	Anderson	6.00	32.50	0.18	15.73	1.0	19.0	0.0
57	346.00	---	Anderson	12.50	---	0.23	16.14	3.0	27.0	0.0
57	---	---	Anderson	7.00	---	0.13	16.37	70.0	0.0	0.0
57	---	348.00	Anderson	35.00	54.50	0.64	17.52	5.0	20.0	0.0
58	348.00	---	Anderson	21.50	---	0.37	18.23	215.0	0.0	0.0
58	---	350.00	Anderson	36.50	58.00	0.63	19.42	3.0	12.0	0.0
59	350.00	352.00	Anderson	58.00	58.00	1.00	21.33	1.0	19.0	0.0
61	352.00	---	Anderson	8.00	---	0.13	21.59	1.0	9.0	0.0
61	---	---	Anderson	10.50	---	0.16	21.93	20.0	2.2	0.0
61	---	---	Anderson	35.00	---	0.55	23.08	2.0	18.0	0.0
61	---	354.00	Anderson	10.50	64.00	0.16	23.43	20.0	2.2	0.0
62	354.00	356.00	Anderson	52.50	52.50	1.00	25.15	2.0	11.3	2.0
63	356.00	---	Anderson	30.00	---	0.48	26.13	2.0	18.0	0.0
63	---	---	Anderson	7.00	---	0.11	26.36	70.0	0.0	0.0
63	---	358.00	Anderson	25.00	62.00	0.40	27.18	2.0	18.0	0.0
8	358.00	360.00	Anderson	58.00	58.00	1.00	29.08	2.0	4.7	0.0
7	360.00	---	Anderson	26.00	---	0.55	29.94	3.0	17.0	0.0
7	---	361.80	Anderson	21.50	47.50	0.45	30.64	0.0	0.0	0.0
ns1	361.80	507.50	ns1	4440.94	4,440.94	1.00	176.34	---	---	---
6	507.50	---	Canyon	13.50	---	0.38	176.79	2.0	8.0	0.0
6	---	508.50	Canyon	22.00	35.50	0.62	177.51	10.0	10.0	0.0
5	508.50	510.50	Canyon	54.00	54.00	1.00	179.28	3.0	12.0	0.0
4	510.50	512.50	Canyon	67.00	67.00	1.00	181.48	3.0	27.0	0.0
3	512.50	514.50	Canyon	54.00	54.00	1.00	183.25	3.0	27.0	0.0
2	514.50	516.50	Canyon	60.50	60.50	1.00	185.23	3.0	57.0	0.0
71	516.50	518.50	Canyon	64.00	64.00	1.00	187.33	15.0	60.0	0.0
70	518.50	520.50	Canyon	56.50	56.50	1.00	189.19	3.0	12.0	0.0

Table 1–29. Data for samples from core hole 34, Williams Production RMT Company, State 23–16–4171.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)	Attritus percentage (AP)	Fusain percentage (FP)	Canister average vitrain percentage (CaAvVP)	Canister average attrital percentage (CaAvAP)	Canister average fusain percentage (CaAvFP)
48	5	120.00	0.00	100.00	0.00	0.00	---	---	---
48	2	12.00	228.00	5.00	95.00	0.00	---	---	---
48	3	34.50	103.50	24.64	73.93	1.43	---	---	---
48	5	60.00	0.00	100.00	0.00	0.00	---	---	---
48	2	1.25	23.75	5.00	95.00	0.00	38.93	60.73	0.34
49	5	65.00	0.00	100.00	0.00	0.00	---	---	---
49	2	16.50	313.50	5.00	95.00	0.00	---	---	---
49	5	75.00	0.00	100.00	0.00	0.00	33.30	66.70	0.00
50	2	116.00	464.00	20.00	80.00	0.00	20.00	80.00	0.00
51	2	6.50	58.50	10.00	90.00	0.00	---	---	---
51	3	67.80	45.20	58.96	39.30	1.74	---	---	---
51	3	112.00	168.00	40.00	60.00	0.00	40.50	59.07	0.43
52	2	22.50	202.50	10.00	90.00	0.00	---	---	---
52	3	94.50	40.50	70.00	30.00	0.00	---	---	---
52	2	9.75	185.25	5.00	95.00	0.00	---	---	---
52	3	25.00	25.00	50.00	50.00	0.00	25.08	74.92	0.00
53	2	31.50	178.50	15.00	85.00	0.00	---	---	---
53	5	85.00	0.00	100.00	0.00	0.00	---	---	---
53	2	29.50	265.50	10.00	90.00	0.00	24.75	75.25	0.00
54	5	90.00	0.00	100.00	0.00	0.00	---	---	---
54	3	200.00	300.00	40.00	60.00	0.00	49.15	50.85	0.00
55	2	29.50	560.50	5.00	95.00	0.00	5.00	95.00	0.00
56	2	10.50	199.50	5.00	95.00	0.00	---	---	---
56	5	55.00	0.00	100.00	0.00	0.00	---	---	---
56	2	3.00	57.00	5.00	95.00	0.00	21.08	78.92	0.00
57	2	12.50	112.50	10.00	90.00	0.00	---	---	---
57	5	70.00	0.00	100.00	0.00	0.00	---	---	---
57	3	70.00	280.00	20.00	80.00	0.00	27.98	72.02	0.00
58	5	215.00	0.00	100.00	0.00	0.00	---	---	---
58	2	73.00	292.00	20.00	80.00	0.00	49.66	50.34	0.00
59	2	29.00	551.00	5.00	95.00	0.00	5.00	95.00	0.00
61	2	8.00	72.00	10.00	90.00	0.00	---	---	---
61	3	94.50	10.50	90.00	10.00	0.00	---	---	---
61	2	35.00	315.00	10.00	90.00	0.00	---	---	---
61	3	94.50	10.50	90.00	10.00	0.00	36.25	63.75	0.00
62	2	78.45	444.55	14.94	84.68	0.38	14.94	84.68	0.38
63	2	30.00	270.00	10.00	90.00	0.00	---	---	---
63	5	70.00	0.00	100.00	0.00	0.00	---	---	---
63	2	25.00	225.00	10.00	90.00	0.00	20.16	79.84	0.00
8	2	174.00	406.00	30.00	70.00	0.00	30.00	70.00	0.00
7	2	39.00	221.00	15.00	85.00	0.00	---	---	---
7	0	0.00	0.00	0.00	0.00	0.00	8.21	46.53	0.00
ns1	---	---	---	---	---	---	---	---	---
6	2	27.00	108.00	20.00	80.00	0.00	---	---	---
6	3	110.00	110.00	50.00	50.00	0.00	38.59	61.41	0.00
5	2	108.00	432.00	20.00	80.00	0.00	20.00	80.00	0.00
4	2	67.00	603.00	10.00	90.00	0.00	10.00	90.00	0.00
3	2	54.00	486.00	10.00	90.00	0.00	10.00	90.00	0.00
2	2	30.25	574.75	5.00	95.00	0.00	5.00	95.00	0.00
71	3	128.00	512.00	20.00	80.00	0.00	20.00	80.00	0.00
70	2	113.00	452.00	20.00	80.00	0.00	20.00	80.00	0.00

Table 1–29. Data for samples from core hole 34, Williams Production RMT Company, State 23–16–4171.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
48	20	50.00	---	---	---	---
48	60	16.67	---	---	---	---
48	60	16.67	---	---	---	Fusain is at top of unit.
48	60	16.67	---	---	---	---
48	60	16.67	23.50	2.44	---	---
49	60	16.67	---	---	---	---
49	60	16.67	---	---	---	---
49	60	16.67	16.67	0.43	SubC	---
50	20	50.00	50.00	2.41	---	---
51	20	50.00	---	---	---	---
51	20	50.00	---	---	---	Fusain is at top of unit.
51	20	50.00	50.00	2.33	---	---
52	20	50.00	---	---	---	---
52	20	50.00	---	---	---	---
52	20	50.00	---	---	---	---
52	20	50.00	50.00	1.16	---	---
53	15	66.67	---	---	---	---
53	25	40.00	---	---	---	---
53	25	40.00	49.49	2.20	---	---
54	25	40.00	---	---	---	---
54	25	40.00	40.00	2.86	---	---
55	60	16.67	16.67	2.34	SubB	---
56	60	16.67	---	---	---	---
56	60	16.67	---	---	---	---
56	60	16.67	16.67	1.46	---	---
57	25	40.00	---	---	---	---
57	25	40.00	---	---	---	---
57	15	66.67	57.13	2.48	---	---
58	25	40.00	---	---	---	---
58	25	40.00	40.00	1.82	---	---
59	60	16.67	16.67	1.54	---	---
61	60	16.67	---	---	---	---
61	60	16.67	---	---	---	---
61	60	16.67	---	---	---	---
61	60	16.67	16.67	1.22	---	---
62	60	16.67	16.67	0.99	---	Fusain at 4.5 cm.
63	60	16.67	---	---	---	---
63	60	16.67	---	---	---	---
63	60	16.67	16.67	2.20	SubC	---
8	60	16.67	16.67	1.59	---	---
7	60	16.67	---	---	---	---
7	60	16.67	16.67	0.87	---	Carbonaceous shale.
ns1	---	---	---	---	---	No sample.
6	60	16.67	---	---	---	---
6	60	16.67	16.67	1.23	---	---
5	60	16.67	16.67	5.53	---	---
4	60	16.67	16.67	5.10	---	---
3	60	16.67	16.67	4.63	---	---
2	60	16.67	16.67	3.05	---	---
71	60	16.67	16.67	3.81	---	---
70	60	16.67	16.67	2.60	---	---

Table 1–29. Data for samples from core hole 34, Williams Production RMT Company, State 23–16–4171.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)	Average attrital band thickness (AvABT) (mm)	Cumulative fusain thickness (CuFT) (mm)
	Top	Bottom								
69	520.50	522.50	Canyon	48.00	48.00	1.00	190.76	10.0	90.0	0.0
68	522.50	524.50	Canyon	70.00	70.00	1.00	193.06	5.0	20.0	0.0
67	524.50	---	Canyon	8.00	---	0.13	193.32	80.0	0.0	0.0
67	---	---	Canyon	41.00	---	0.65	194.67	3.0	12.0	0.0
67	---	---	Canyon	10.00	---	0.16	194.99	100.0	0.0	0.0
67	---	526.50	Canyon	4.00	63.00	0.06	195.13	2.0	18.0	0.0
66	526.50	528.50	Canyon	58.50	58.50	1.00	197.05	5.0	20.0	0.0
65	528.50	---	Canyon	32.00	---	0.51	198.10	15.0	60.0	4.0
65	---	530.50	Canyon	31.00	63.00	0.49	199.11	1.0	19.0	0.0
64	530.50	532.50	Canyon	51.00	51.00	1.00	200.79	5.0	11.7	0.0

Table 1–29. Data for samples from core hole 34, Williams Production RMT Company, State 23–16–4171.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)	Attritus percentage (AP)	Fusain percentage (FP)	Canister average vitrain percentage (CaAvVP)	Canister average attrital percentage (CaAvAP)	Canister average fusain percentage (CaAvFP)
69	3	48.00	432.00	10.00	90.00	0.00	10.00	90.00	0.00
68	3	140.00	560.00	20.00	80.00	0.00	20.00	80.00	0.00
67	5	80.00	0.00	100.00	0.00	0.00	---	---	---
67	2	82.00	328.00	20.00	80.00	0.00	---	---	---
67	5	100.00	0.00	100.00	0.00	0.00	---	---	---
67	2	4.00	36.00	10.00	90.00	0.00	42.22	57.78	0.00
66	3	117.00	468.00	20.00	80.00	0.00	20.00	80.00	0.00
65	3	63.20	252.80	19.75	79.00	1.25	---	---	---
65	2	15.50	294.50	5.00	95.00	0.00	12.49	86.87	0.63
64	3	153.00	357.00	30.00	70.00	0.00	30.00	70.00	0.00

Table 1–29. Data for samples from core hole 34, Williams Production RMT Company, State 23–16–4171.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
69	60	16.67	16.67	4.02	SubC	---
68	60	16.67	16.67	4.71	---	---
67	60	16.67	---	---	---	---
67	60	16.67	---	---	---	Pyrite layer sampled at 115 mm.
67	60	16.67	---	---	---	---
67	60	16.67	16.67	4.09	---	---
66	60	16.67	16.67	2.78	---	Thick vitrain at 14 cm above base.
65	60	16.67	---	---	---	Fusain at 20.5 cm below top.
65	60	16.67	16.67	2.64	---	---
64	60	16.67	16.67	1.13	SubB	---

Table 1–30. Data for samples from core hole 35, Williams Production Company, Groves 12–19–4574.

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)	Average attrital band thickness (AvABT) (mm)	Cumulative fusain thickness (CuFT) (mm)
	Top	Bottom								
D1	1,197.00	1,199.00	Big George	59.00	59.00	1.00	1.94	2.0	18.0	0.0
D2	1,199.00	---	Big George	34.50	---	0.61	3.07	3.0	9.0	3.0
D2	---	---	Big George	5.00	---	0.09	3.23	5.0	1.3	0.0
D2	---	1,201.00	Big George	17.00	56.50	0.30	3.79	2.0	11.3	0.0
D3	1,201.00	---	Big George	10.00	---	0.16	4.12	1.0	19.0	0.0
D3	---	---	Big George	17.00	---	0.27	4.68	170.0	0.0	0.0
D3	---	---	Big George	24.00	---	0.38	5.46	2.0	18.0	0.0
D3	---	---	Big George	9.00	---	0.14	5.76	5.0	5.0	0.0
D3	---	1,203.00	Big George	4.00	64.00	0.06	5.89	8.0	1.4	0.0
D5	1,203.00	---	Big George	22.00	---	0.45	6.61	10.0	1.1	0.0
D5	---	---	Big George	23.00	---	0.47	7.37	1.0	19.0	0.0
D5	---	1,205.00	Big George	4.00	49.00	0.08	7.50	40.0	0.0	0.0
D6	1,205.00	---	Big George	18.00	---	0.32	8.09	180.0	0.0	0.0
D6	---	---	Big George	20.00	---	0.36	8.74	1.0	19.0	0.0
D6	---	1,207.00	Big George	18.00	56.00	0.32	9.33	4.0	22.7	0.0
ns1	1,207.00	1,225.00	ns1	548.50	548.50	1.00	27.33	---	---	---
D7	1,225.00	1,227.00	Big George	61.50	61.50	1.00	29.35	1.0	19.0	0.0
D8	1,227.00	---	Big George	37.50	---	0.65	30.58	2.0	18.0	0.0
D8	---	1,229.00	Big George	20.00	57.50	0.35	31.23	5.0	5.0	0.0
D9	1,229.00	1,231.00	Big George	52.00	52.00	1.00	32.94	2.0	18.0	0.0
D10	1,231.00	1,233.00	Big George	62.00	62.00	1.00	34.97	3.0	27.0	0.0
D11	1,233.00	---	Big George	22.50	---	0.39	35.71	1.0	19.0	0.0
D11	---	1,235.00	Big George	35.00	57.50	0.61	36.86	5.0	5.0	0.0
D12	1,235.00	---	Big George	12.00	---	0.21	37.25	1.0	9.0	0.0
D12	---	---	Big George	10.00	---	0.18	37.58	100.0	0.0	0.0
D12	---	---	Big George	16.00	---	0.28	38.11	5.0	20.0	0.0
D12	---	---	Big George	11.00	---	0.19	38.47	110.0	0.0	0.0
D12	---	1,237.00	Big George	8.00	57.00	0.14	38.73	1.0	19.0	0.0
D13	1,237.00	---	Big George	17.00	---	0.28	39.29	1.0	19.0	0.0
D13	---	---	Big George	22.50	---	0.38	40.03	225.0	0.0	0.0
D13	---	1,239.00	Big George	20.50	60.00	0.34	40.70	1.0	19.0	0.0
D14	1,239.00	---	Big George	36.00	---	0.58	41.88	5.0	7.5	0.0
D14	---	1,241.00	Big George	26.00	62.00	0.42	42.73	1.0	19.0	0.0
D15	1,241.00	---	Big George	24.50	---	0.73	43.54	1.0	19.0	0.0
D15ns	---	---	Big George	27.00	---	1.00	44.42	---	---	---
D15	---	1,243.00	Big George	9.00	33.50	0.27	44.72	1.0	19.0	0.0
D17	1,243.00	---	Big George	15.00	---	0.55	45.21	5.0	5.0	0.0
D17ns	---	---	Big George	30.00	---	1.00	46.19	---	---	---
D17	---	1,245.00	Big George	12.50	27.50	0.45	46.60	1.0	19.0	0.0
ns2	1,245.00	1,246.50	ns2	46.00	46.00	1.00	48.11	---	---	---
D18	1,246.50	---	Big George	8.50	---	0.15	48.39	5.0	5.0	0.0
D18	---	---	Big George	32.00	---	0.58	49.44	2.0	18.0	0.0
D18	---	1,248.50	Big George	14.50	55.00	0.26	49.92	5.0	5.0	0.0
D19	1,248.50	---	Big George	51.00	---	0.87	51.59	3.0	12.0	0.0
D19	---	1,250.50	Big George	7.50	58.50	0.13	51.84	75.0	0.0	0.0
D20	1,250.50	---	Big George	15.00	---	0.25	52.33	10.0	6.7	0.0
D20	---	1,252.50	Big George	46.00	61.00	0.75	53.84	2.0	18.0	0.0
D21	1,252.50	---	Big George	16.00	---	0.27	54.36	3.0	27.0	0.0
D21	---	---	Big George	6.00	---	0.10	54.56	60.0	0.0	0.0
D21	---	1,254.50	Big George	37.00	59.00	0.63	55.77	3.0	12.0	0.0
D22	1,254.50	1,256.50	Big George	45.00	45.00	1.00	57.25	1.0	9.0	0.0

Table 1–30. Data for samples from core hole 35, Williams Production Company, Groves 12–19–4574.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)	Attritus percentage (AP)	Fusain percentage (FP)	Canister average vitrain percentage (CaAvVP)	Canister average attrital percentage (CaAvAP)	Canister average fusain percentage (CaAvFP)
D1	2	59.00	531.00	10.00	90.00	0.00	10.00	90.00	0.00
D2	2	85.50	256.50	24.78	74.35	0.87	---	---	---
D2	3	40.00	10.00	80.00	20.00	0.00	---	---	---
D2	2	25.50	144.50	15.00	85.00	0.00	26.73	72.74	0.53
D3	2	5.00	95.00	5.00	95.00	0.00	---	---	---
D3	5	170.00	0.00	100.00	0.00	0.00	---	---	---
D3	2	24.00	216.00	10.00	90.00	0.00	---	---	---
D3	3	45.00	45.00	50.00	50.00	0.00	---	---	---
D3	3	34.00	6.00	85.00	15.00	0.00	43.44	56.56	0.00
D5	3	198.00	22.00	90.00	10.00	0.00	---	---	---
D5	2	11.50	218.50	5.00	95.00	0.00	---	---	---
D5	5	40.00	0.00	100.00	0.00	0.00	50.92	49.08	0.00
D6	5	180.00	0.00	100.00	0.00	0.00	---	---	---
D6	2	10.00	190.00	5.00	95.00	0.00	---	---	---
D6	2	27.00	153.00	15.00	85.00	0.00	38.75	61.25	0.00
ns1	---	---	---	---	---	---	---	---	---
D7	2	30.75	584.25	5.00	95.00	0.00	5.00	95.00	0.00
D8	2	37.50	337.50	10.00	90.00	0.00	---	---	---
D8	3	100.00	100.00	50.00	50.00	0.00	23.91	76.09	0.00
D9	2	52.00	468.00	10.00	90.00	0.00	10.00	90.00	0.00
D10	2	62.00	558.00	10.00	90.00	0.00	10.00	90.00	0.00
D11	2	11.25	213.75	5.00	95.00	0.00	---	---	---
D11	3	175.00	175.00	50.00	50.00	0.00	32.39	67.61	0.00
D12	2	12.00	108.00	10.00	90.00	0.00	---	---	---
D12	5	100.00	0.00	100.00	0.00	0.00	---	---	---
D12	3	32.00	128.00	20.00	80.00	0.00	---	---	---
D12	5	110.00	0.00	100.00	0.00	0.00	---	---	---
D12	2	4.00	76.00	5.00	95.00	0.00	45.26	54.74	0.00
D13	2	8.50	161.50	5.00	95.00	0.00	---	---	---
D13	5	225.00	0.00	100.00	0.00	0.00	---	---	---
D13	2	10.25	194.75	5.00	95.00	0.00	40.63	59.38	0.00
D14	3	144.00	216.00	40.00	60.00	0.00	---	---	---
D14	2	13.00	247.00	5.00	95.00	0.00	25.32	74.68	0.00
D15	2	12.25	232.75	5.00	95.00	0.00	---	---	---
D15ns	---	---	---	---	---	---	---	---	---
D15	2	4.50	85.50	5.00	95.00	0.00	5.00	95.00	0.00
D17	3	75.00	75.00	50.00	50.00	0.00	---	---	---
D17ns	---	199.50	199.50	66.50	66.50	-33.00	---	---	---
D17	2	6.25	118.75	5.00	95.00	0.00	29.55	70.45	0.00
ns2	---	---	---	---	---	---	---	---	---
D18	3	42.50	42.50	50.00	50.00	0.00	---	---	---
D18	2	32.00	288.00	10.00	90.00	0.00	---	---	---
D18	3	72.50	72.50	50.00	50.00	0.00	26.73	73.27	0.00
D19	2	102.00	408.00	20.00	80.00	0.00	---	---	---
D19	5	75.00	0.00	100.00	0.00	0.00	30.26	69.74	0.00
D20	3	90.00	60.00	60.00	40.00	0.00	---	---	---
D20	2	46.00	414.00	10.00	90.00	0.00	22.30	77.70	0.00
D21	2	16.00	144.00	10.00	90.00	0.00	---	---	---
D21	5	60.00	0.00	100.00	0.00	0.00	---	---	---
D21	2	74.00	296.00	20.00	80.00	0.00	25.42	74.58	0.00
D22	2	45.00	405.00	10.00	90.00	0.00	10.00	90.00	0.00

Table 1–30. Data for samples from core hole 35, Williams Production Company, Groves 12–19–4574.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubB, subbituminous B; SubC, subbituminous C; ---, no data]

Canister number	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
D1	25	40.00	40.00	18.01	---	Highly fragmented sample.
D2	25	40.00	---	---	---	---
D2	25	40.00	---	---	---	---
D2	25	40.00	40.00	16.82	---	---
D3	30	33.33	---	---	---	---
D3	30	33.33	---	---	---	---
D3	30	33.33	---	---	---	---
D3	25	40.00	---	---	---	---
D3	25	40.00	34.69	19.81	---	---
D5	30	33.33	---	---	---	---
D5	30	33.33	---	---	---	---
D5	35	28.57	32.94	17.93	---	---
D6	30	33.33	---	---	---	---
D6	30	33.33	---	---	---	---
D6	25	40.00	35.48	17.31	---	---
ns1	---	---	---	---	---	No sample.
D7	30	33.33	33.33	19.51	SubC	---
D8	30	33.33	---	---	---	---
D8	25	40.00	35.65	18.61	---	---
D9	25	40.00	40.00	17.16	---	Calcite(?) on cleat.
D10	25	40.00	40.00	18.34	---	---
D11	25	40.00	---	---	---	---
D11	25	40.00	40.00	17.18	---	---
D12	25	40.00	---	---	---	---
D12	20	50.00	---	---	---	---
D12	20	50.00	---	---	---	---
D12	30	33.33	---	---	---	---
D12	25	40.00	43.27	17.68	---	---
D13	30	33.33	---	---	---	---
D13	30	33.33	---	---	---	---
D13	30	33.33	33.33	17.32	SubC	---
D14	20	50.00	---	---	---	---
D14	20	50.00	50.00	17.01	---	---
D15	30	33.33	---	---	---	---
D15ns	---	---	---	---	---	Bag sample taken.
D15	30	33.33	33.33	15.89	---	---
D17	20	50.00	---	---	---	Large vitrain fragment (30 mm thick) at 75 mm below top of canister.
D17ns	---	---	---	---	---	Bag sample taken.
D17	15	66.67	57.58	13.91	---	---
ns2	---	---	---	---	---	No sample.
D18	30	33.33	---	---	---	---
D18	30	33.33	---	---	---	---
D18	30	33.33	33.33	18.32	---	---
D19	35	28.57	---	---	---	---
D19	30	33.33	29.18	17.19	---	---
D20	20	50.00	---	---	---	Thick vitrain (40 mm) at 45 and 100 mm below top.
D20	25	40.00	42.46	19.20	SubB	---
D21	25	40.00	---	---	---	---
D21	25	40.00	---	---	---	---
D21	25	40.00	40.00	18.08	---	---
D22	25	40.00	40.00	16.05	---	---

Table 1–31. Data for samples from core hole 36, Peabody Natural Gas, LLC, PNG 24–1.

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubA, subbituminous A; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)	Average attrital band thickness (AvABT) (mm)
	Top	Bottom							
D23	1,256.70	---	Pawnee	20.30	---	0.36	0.67	0.0	0.0
D23	---	1,258.20	Pawnee	36.50	56.80	0.64	1.86	3.0	17.0
D24	1,258.20	1,259.20	Pawnee	45.00	45.00	1.00	3.34	2.0	18.0
ns1	1,259.20	1,272.10	ns1	393.00	393.00	1.00	16.23	---	---
D25	1,272.10	---	Pawnee	45.50	---	0.65	17.73	4.0	16.0
D25	---	---	Pawnee	11.00	---	0.16	18.09	1.0	19.0
D25	---	1,275.10	Pawnee	14.00	70.50	0.20	18.55	5.0	7.5
D26	1,275.20	1,276.20	Pawnee	35.00	35.00	1.00	19.69	3.0	7.0

Table 1–31. Data for samples from core hole 36, Peabody Natural Gas, LLC, PNG 24–1.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubA, subbituminous A; ---, no data]

Canister number	Cumulative fusain thickness (CuFT) (mm)	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)	Attritus percentage (AP)	Fusain percentage (FP)	Canister average vitrain percentage (CaAvVP)	Canister average attrital percentage (CaAvAP)
D23	0.0	0	0.00	0.00	0.00	0.00	0.00	---	---
D23	0.0	2	54.75	310.25	15.00	85.00	0.00	9.64	54.62
D24	0.0	2	45.00	405.00	10.00	90.00	0.00	10.00	90.00
ns1	---	---	---	---	---	---	---	---	---
D25	0.0	2	91.00	364.00	20.00	80.00	0.00	---	---
D25	0.0	3	5.50	104.50	5.00	95.00	0.00	---	---
D25	0.0	2	56.00	84.00	40.00	60.00	0.00	21.63	78.37
D26	0.0	5	105.00	245.00	30.00	70.00	0.00	30.00	70.00

Table 1–31. Data for samples from core hole 36, Peabody Natural Gas, LLC, PNG 24–1.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; ns, no sample available; SubA, subbituminous A; ---, no data]

Canister number	Canister average fusain percentage (CaAvFP)	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
D23	---	---	---	---	---	---	Top 8 inches is carbonaceous shale.
D23	0.00	15	66.67	66.67	2.16	---	---
D24	0.00	15	66.67	66.67	6.16	---	Pyrite sampled at 110 mm.
ns1	---	---	---	---	---	---	No sample.
D25	---	35	28.57	---	---	---	---
D25	---	60	16.67	---	---	---	---
D25	0.00	35	28.57	26.71	2.44	---	---
D26	0.00	30	33.33	33.33	5.08	SubA	Pyrite sampled at 45 mm.

Table 1–32. Data for samples from core hole 37, Peabody Natural Gas, LLC, PNG 26–1.

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; SubA, subbituminous A; ---, no data]

Canister number	Approximate depth (ft)		Coal bed name	Unit thickness (UT) (cm)	Canister total measured thickness (CaToMT) (cm)	Unit proportion of canister thickness (UPrCaT)	Core cumulative measured thickness (CoCuMT) (ft)	Average vitrain band thickness (AvVBT) (mm)	Average attrital band thickness (AvABT) (mm)
	Top	Bottom							
D28	1,156.00	1,158.00	Pawnee	52.00	52.00	1.00	1.71	3.0	27.0
D27	1,158.00	1,160.00	Pawnee	55.00	55.00	1.00	3.51	3.0	17.0
D29	1,160.00	---	Pawnee	38.00	---	0.70	4.76	3.0	12.0
D29	---	1,162.00	Pawnee	16.00	54.00	0.30	5.28	6.0	6.0
D30	1,166.00	1,170.00	Pawnee	54.00	54.00	1.00	7.05	15.0	15.0
D33	1,170.00	---	Pawnee	8.00	---	0.16	7.32	2.0	18.0
D33	---	---	Pawnee	25.50	---	0.53	8.15	155.0	0.0
D33	---	1,172.00	Pawnee	15.00	48.50	0.31	8.65	15.0	15.0
D32	1,172.00	---	Pawnee	11.00	---	0.20	9.01	15.0	15.0
D32	---	1,174.00	Pawnee	45.00	56.00	0.80	10.48	2.0	18.0
D31	1,174.00	---	Pawnee	15.00	---	0.27	10.97	15.0	15.0
D31	---	---	Pawnee	11.00	---	0.20	11.34	110.0	0.0
D31	---	1,176.00	Pawnee	29.00	55.00	0.53	12.29	5.0	11.7

Table 1–32. Data for samples from core hole 37, Peabody Natural Gas, LLC, PNG 26–1.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; SubA, subbituminous A; ---, no data]

Canister number	Cumulative fusain thickness (CuFT) (mm)	Lithotype code	Cumulative vitrain thickness (CuVT) (mm)	Cumulative attritus thickness (CuAT) (mm)	Vitrain percentage (VP)	Attritus percentage (AP)	Fusain percentage (FP)	Canister average vitrain percentage (CaAvVP)
D28	0.0	2	52.00	468.00	10.00	90.00	0.00	10.00
D27	0.0	2	82.50	467.50	15.00	85.00	0.00	15.00
D29	0.0	2	76.00	304.00	20.00	80.00	0.00	---
D29	0.0	3	80.00	80.00	50.00	50.00	0.00	28.89
D30	0.0	3	270.00	270.00	50.00	50.00	0.00	50.00
D33	0.0	2	8.00	72.00	10.00	90.00	0.00	---
D33	0.0	5	255.00	0.00	100.00	0.00	0.00	---
D33	0.0	3	75.00	75.00	50.00	50.00	0.00	69.69
D32	5.0	3	52.50	52.50	47.73	47.73	4.55	---
D32	0.0	2	45.00	405.00	10.00	90.00	0.00	17.41
D31	0.0	3	75.00	75.00	50.00	50.00	0.00	---
D31	0.0	5	110.00	0.00	100.00	0.00	0.00	---
D31	0.0	3	87.00	203.00	30.00	70.00	0.00	49.45

Table 1–32. Data for samples from core hole 37, Peabody Natural Gas, LLC, PNG 26–1.—Continued

[See figure 1 and table 1 in text for locations and other details. Abbreviations are as follows: ft, feet; cm, centimeters; mm, millimeters; m, meter; SCF, standard cubic feet; SubA, subbituminous A; ---, no data]

Canister number	Canister average attrital percentage (CaAvAP)	Canister average fusain percentage (CaAvFP)	Cleat spacing (CS) (mm)	Cleat frequency (CFr) (cleats/m)	Canister average cleat frequency (CaAvCFr) (cleats/m)	Total gas (SCF/ton)	Apparent rank	Comments
D28	90.00	0.00	30	33.33	33.33	2.58	---	---
D27	85.00	0.00	30	33.33	33.33	1.67	---	---
D29	---	---	25	40.00	---	---	---	---
D29	71.11	0.00	30	33.33	38.02	1.91	---	---
D30	50.00	0.00	20	50.00	50.00	1.79	---	---
D33	---	---	25	40.00	---	---	---	---
D33	---	---	25	40.00	---	---	---	---
D33	30.31	0.00	25	40.00	40.00	1.99	---	---
D32	---	---	25	40.00	---	---	---	---
D32	81.70	0.89	60	16.67	21.25	2.41	SubA	---
D31	---	---	25	40.00	---	---	---	---
D31	---	---	30	33.33	---	---	---	---
D31	50.55	0.00	30	33.33	35.15	1.67	---	---

Appendix 2. Graphs of Total Gas With Average Attrital Band Thickness, Cleat Frequency, Cumulative Fusain Thickness, Lithotype Code, and Average Vitrain Band Thickness, Against Core Cumulative Measured Thickness for All Cores

Graphs for all cores in this report showing total gas with average attrital band thickness, cleat frequency, cumulative fusain thickness, coal lithotype code (see figure 6 of report),

and average vitrain band thickness plotted against core cumulative measured thickness.

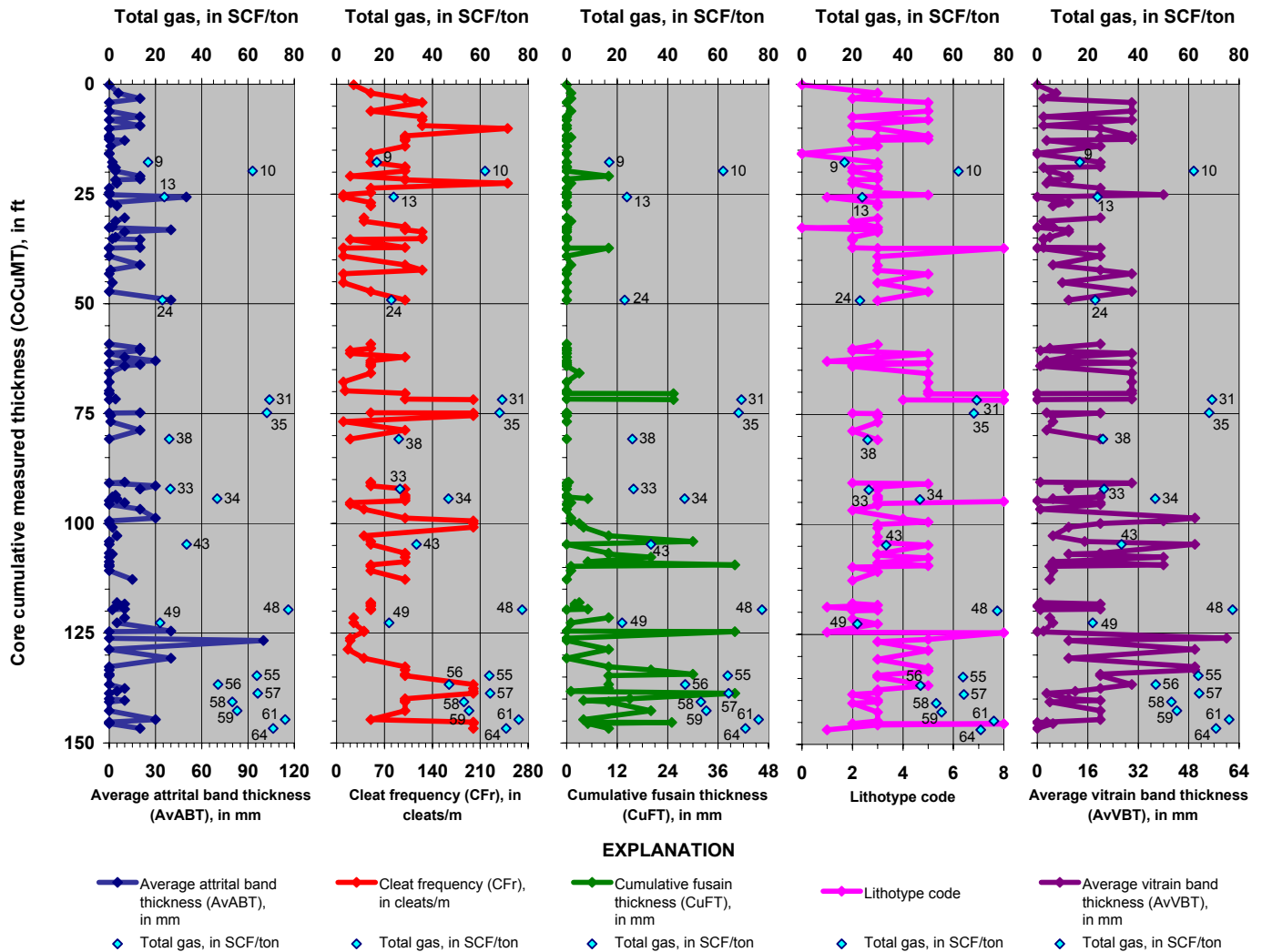


Figure 2-1. Graphs of total gas (standard cubic feet per ton, SCF/ton), average attrital band thickness (AvABT), cleat frequency (CFr), cumulative fusain thickness (CuFT), lithotype code, and average vitrain band thickness (AvVBT) plotted against core cumulative measured thickness (CoCuMT) for core hole 1, MichiWest Energy, Inc., Pilot State 16-14 (Big George coal bed). Total gas points are labeled with canister numbers. See figure 6 for lithotype codes. All variables are listed in appendix 1, table 1-1.

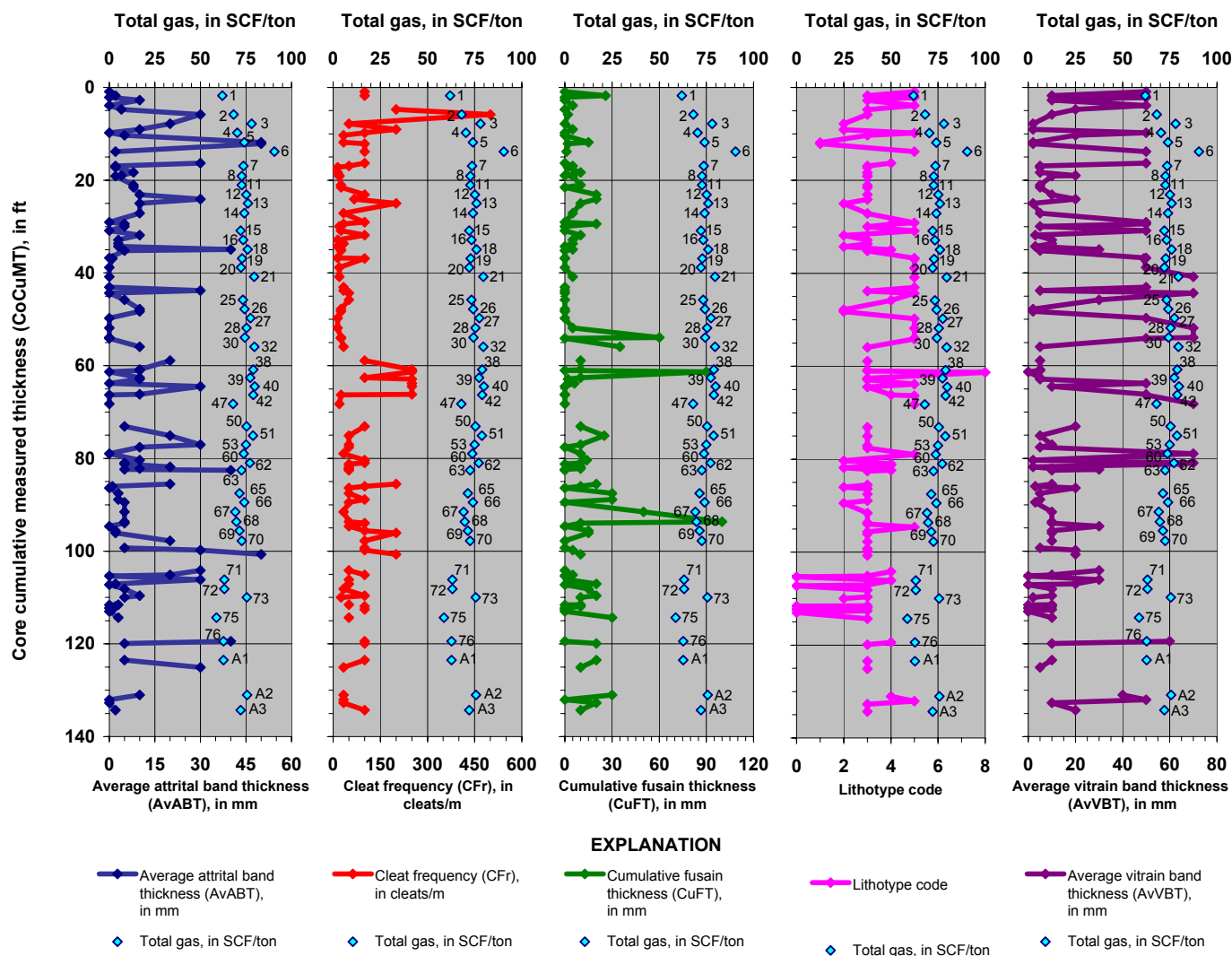


Figure 2-2. Graphs of total gas (standard cubic feet per ton, SCF/ton), average attrital band thickness (AvABT), cleat frequency (CFr), cumulative fusain thickness (CuFT), lithotype code, and average vitrain band thickness (AvVBT) plotted against core cumulative measured thickness (CoCuMT) for core hole 2, MichiWest Energy, Inc., Pilot State 16–32 (Big George coal bed). Total gas points are labeled with canister numbers. See figure 6 for lithotype codes. All variables are listed in appendix 1, table 1–2.

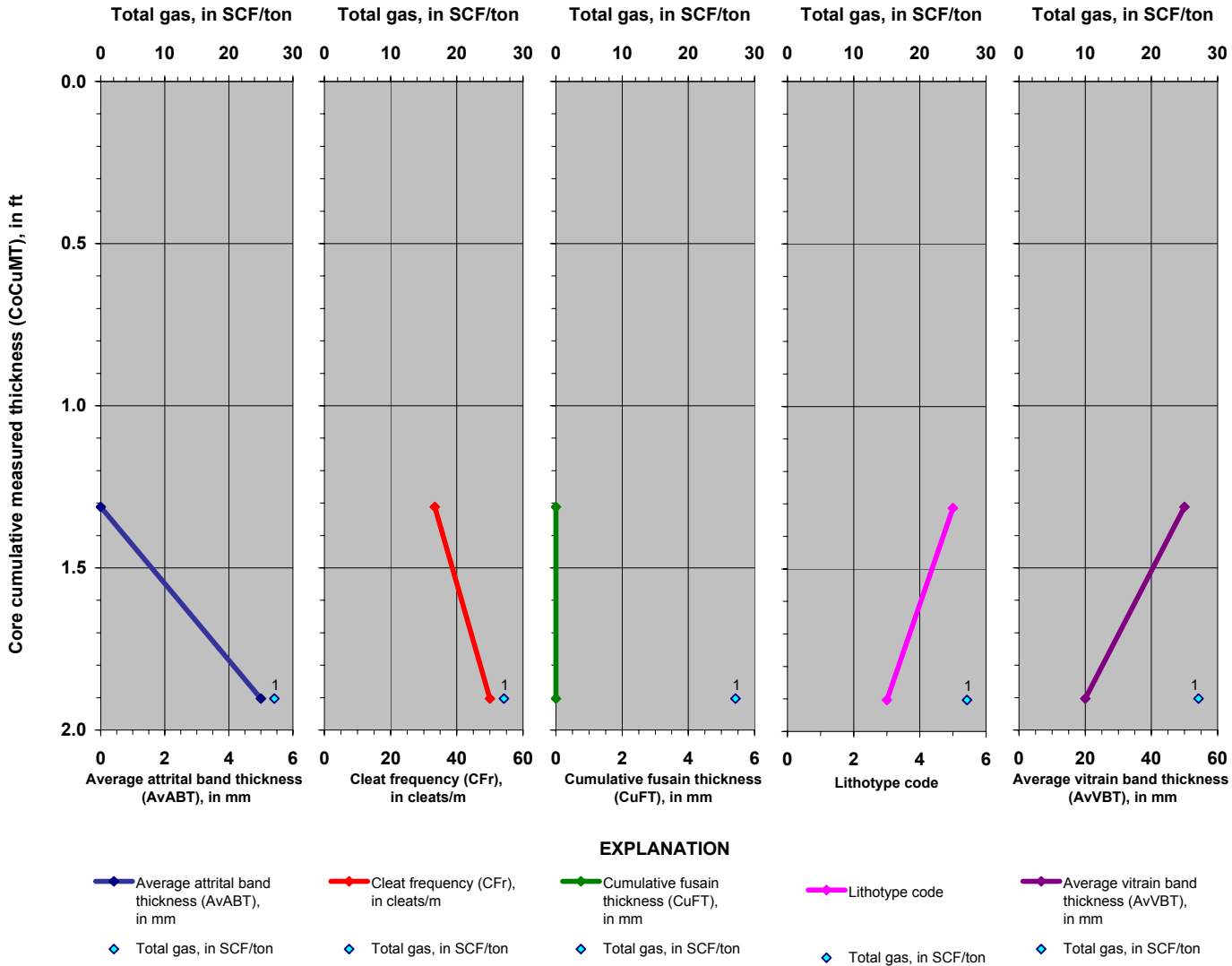


Figure 2-3. Graphs of total gas (standard cubic feet per ton, SCF/ton), average attrital band thickness (AvABT), cleat frequency (CFr), cumulative fusain thickness (CuFT), lithotype code, and average vitrain band thickness (AvVBT) plotted against core cumulative measured thickness (CoCuMT) for core hole 3, Ocean Energy, Inc., Schlautmann 9-10-45-74WY (Ocean 43-10C) (Anderson coal bed). Total gas points are labeled with canister numbers. See figure 6 for lithotype codes. All variables are listed in appendix 1, table 1-3.

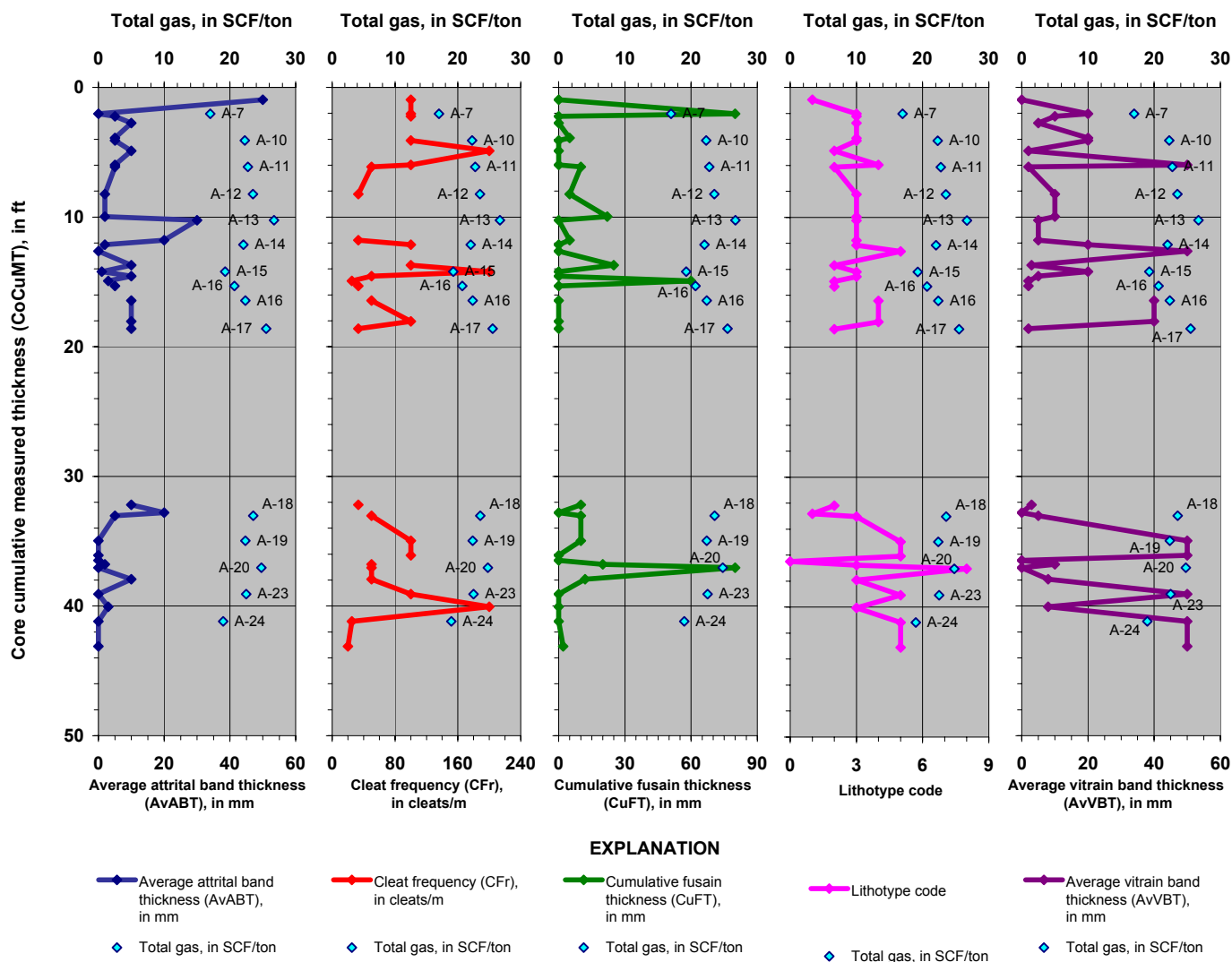


Figure 2-4. Graphs of total gas (standard cubic feet per ton, SCF/ton), average attrital band thickness (AvABT), cleat frequency (CFr), cumulative fusain thickness (CuFT), lithotype code, and average vitrain band thickness (AvVBT) plotted against core cumulative measured thickness (CoCuMT) for core hole 8, CMS Oil and Gas Company, Laramore 11-6C (Smith coal bed). Total gas points are labeled with canister numbers. See figure 6 for lithotype codes. All variables are listed in appendix 1, table 1-4.

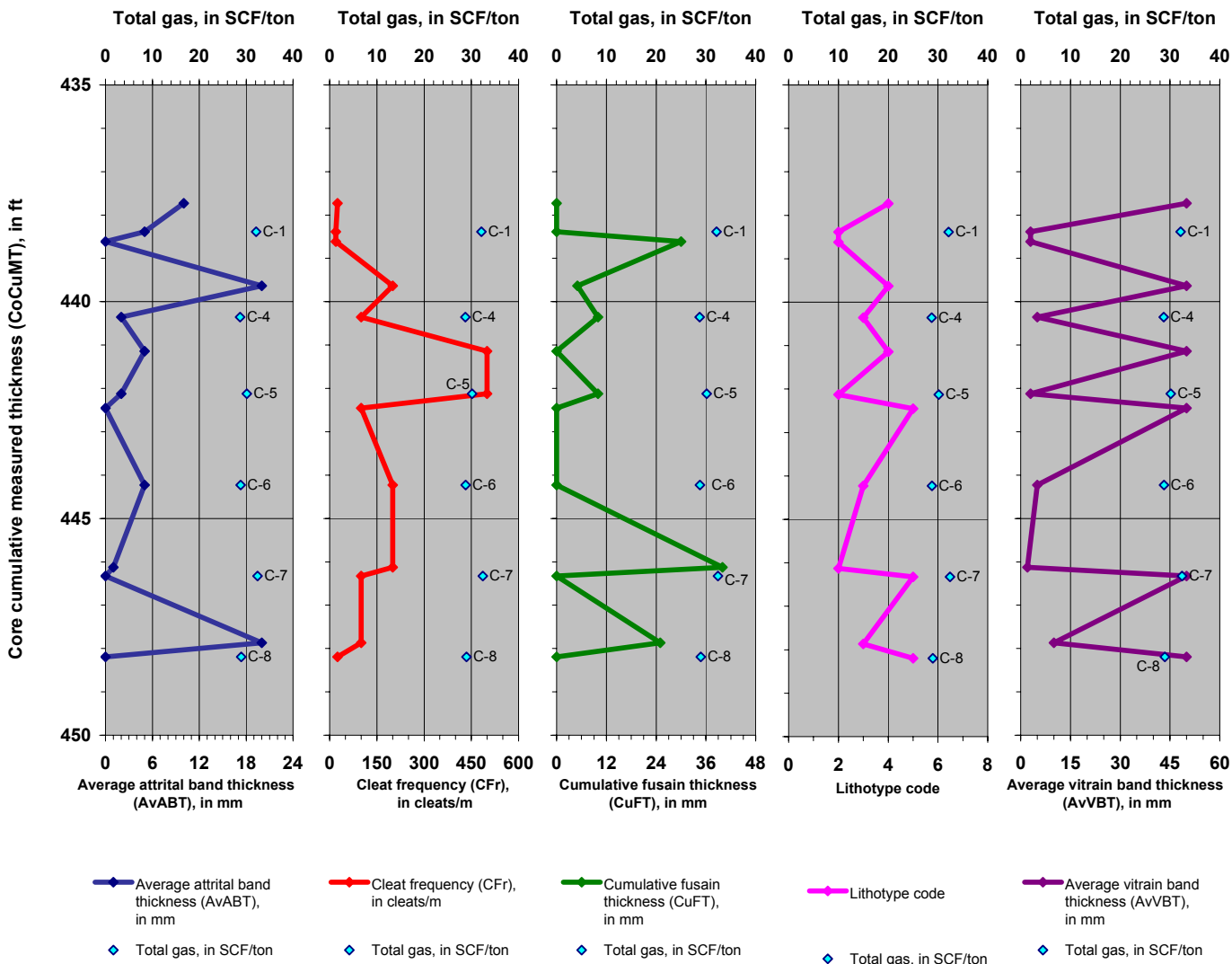


Figure 2-5. Graphs of total gas (standard cubic feet per ton, SCF/ton), average attrital band thickness (AvABT), cleat frequency (CFr), cumulative fusain thickness (CuFT), lithotype code, and average vitrain band thickness (AvVBT) plotted against core cumulative measured thickness (CoCuMT) for core hole 8, CMS Oil and Gas Company, Laramore 11-6C (Anderson coal bed). Total gas points are labeled with canister numbers. See figure 6 for lithotype codes. All variables are listed in appendix 1, table 1-4.

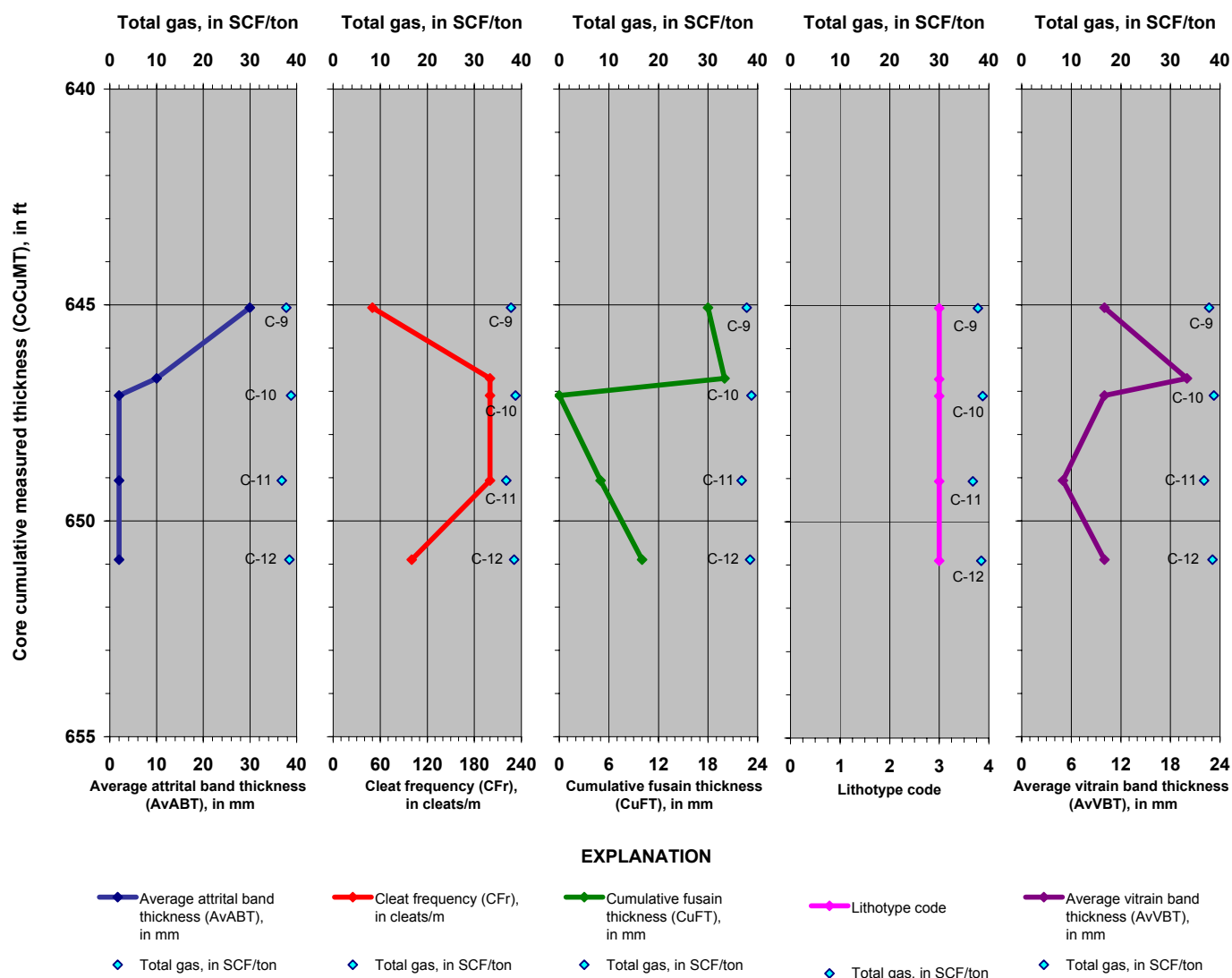


Figure 2-6. Graphs of total gas (standard cubic feet per ton, SCF/ton), average attrital band thickness (AvABT), cleat frequency (CFr), cumulative fusain thickness (CuFT), lithotype code, and average vitrain band thickness (AvVBT) plotted against core cumulative measured thickness (CoCuMT) for core hole 8, CMS Oil and Gas Company, Laramore 11-6C (Canyon coal bed). Total gas points are labeled with canister numbers. See figure 6 for lithotype codes. All variables are listed in appendix 1, table 1-4.

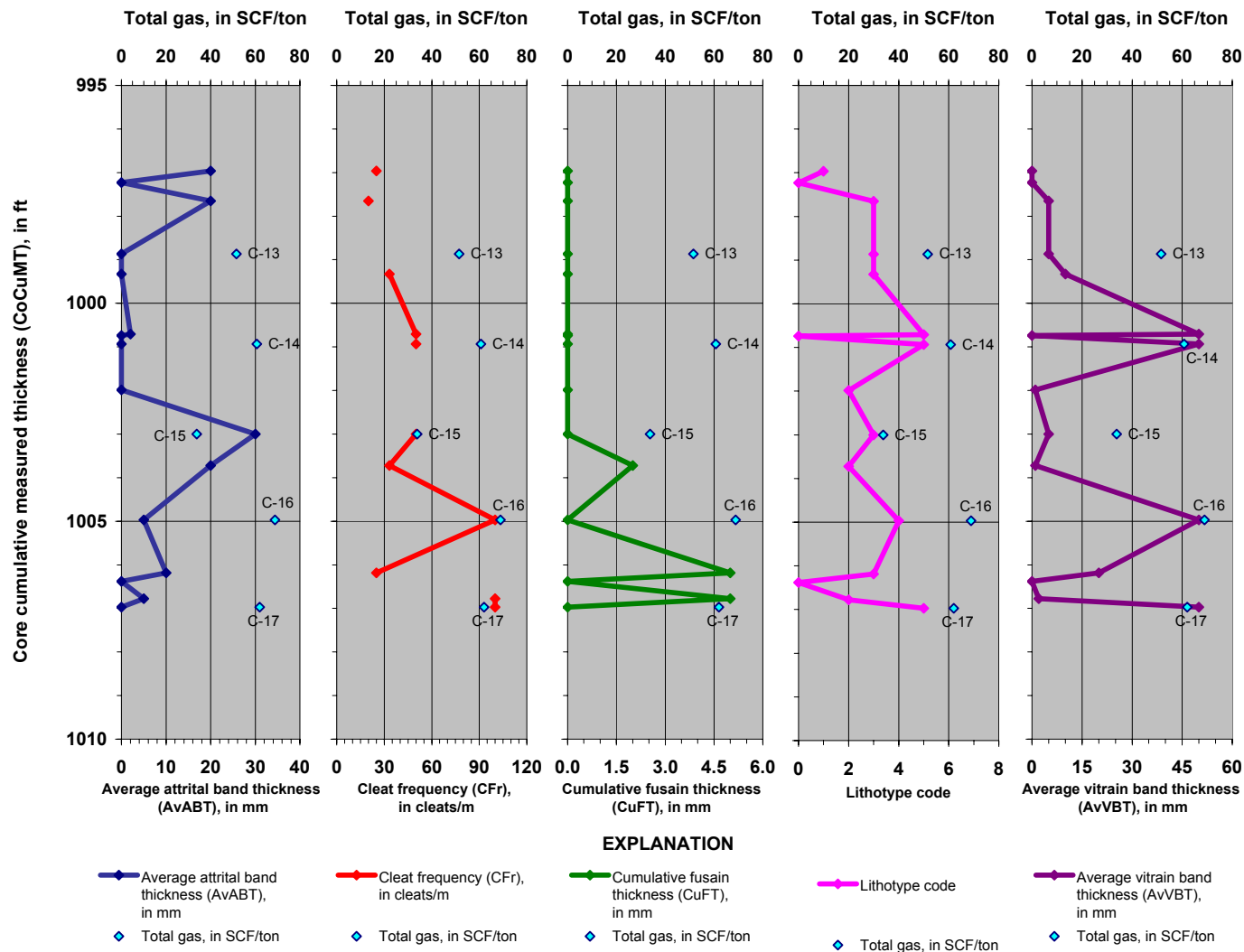


Figure 2-7. Graphs of total gas (standard cubic feet per ton, SCF/ton), average attrital band thickness (AvABT), cleat frequency (CFr), cumulative fusain thickness (CuFT), lithotype code, and average vitrain band thickness (AvVBT) plotted against core cumulative measured thickness (CoCuMT) for core hole 8, CMS Oil and Gas Company, Laramore 11-6C (Cook coal bed). Total gas points are labeled with canister numbers. See figure 6 for lithotype codes. All variables are listed in appendix 1, table 1-4.

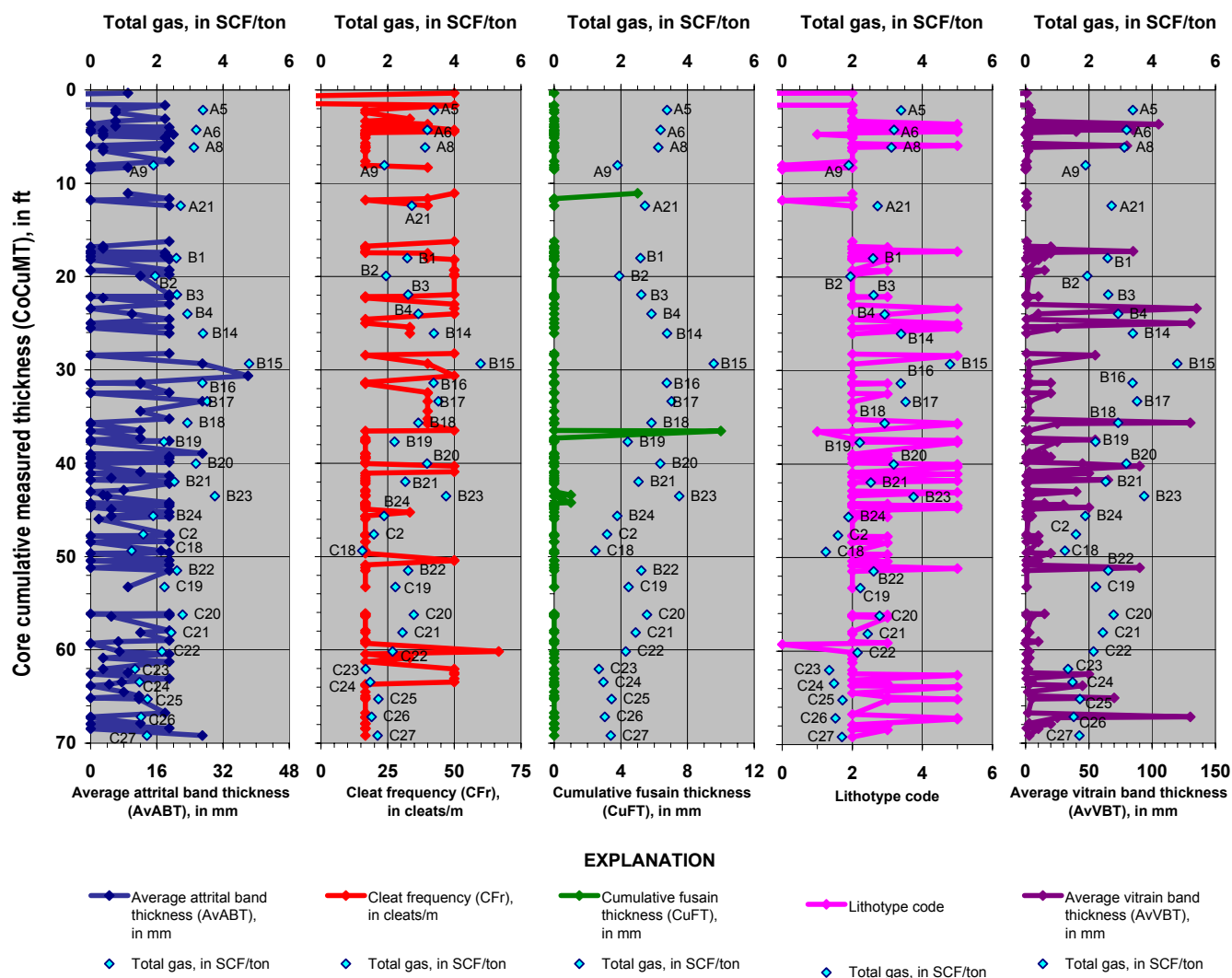


Figure 2-8. Graphs of total gas (standard cubic feet per ton, SCF/ton), average attrital band thickness (AvABT), cleat frequency (CFr), cumulative fusain thickness (CuFT), lithotype code, and average vitrain band thickness (AvVBT) plotted against core cumulative measured thickness (CoCuMT) for core hole 9, Kennecott Energy, Kennecott CBM-1 (upper, and middle and lower Wyodak coal beds). Total gas points are labeled with canister numbers. See figure 6 for lithotype codes. All variables are listed in appendix 1, table 1-5.

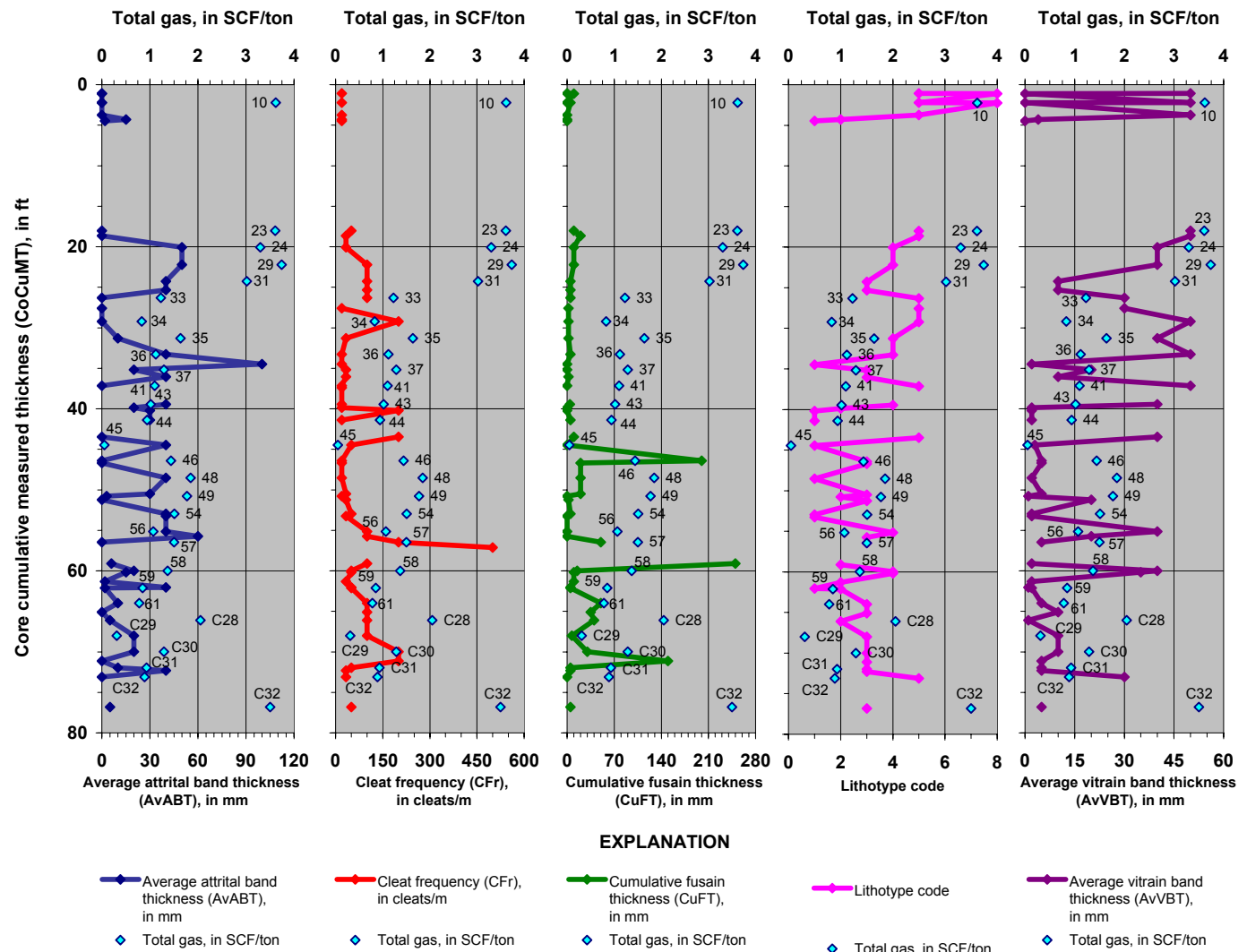


Figure 2-9. Graphs of total gas (standard cubic feet per ton, SCF/ton), average attrital band thickness (AvABT), cleat frequency (CFr), cumulative fusain thickness (CuFT), lithotype code, and average vitrain band thickness (AvVBT) plotted against core cumulative measured thickness (CoCuMT) for core hole 10, Kennecott Energy, Kennecott CBM-2 (upper, and middle and lower Wyodak coal beds). Total gas points are labeled with canister numbers. See figure 6 for lithotype codes. All variables are listed in appendix 1, table 1-6.

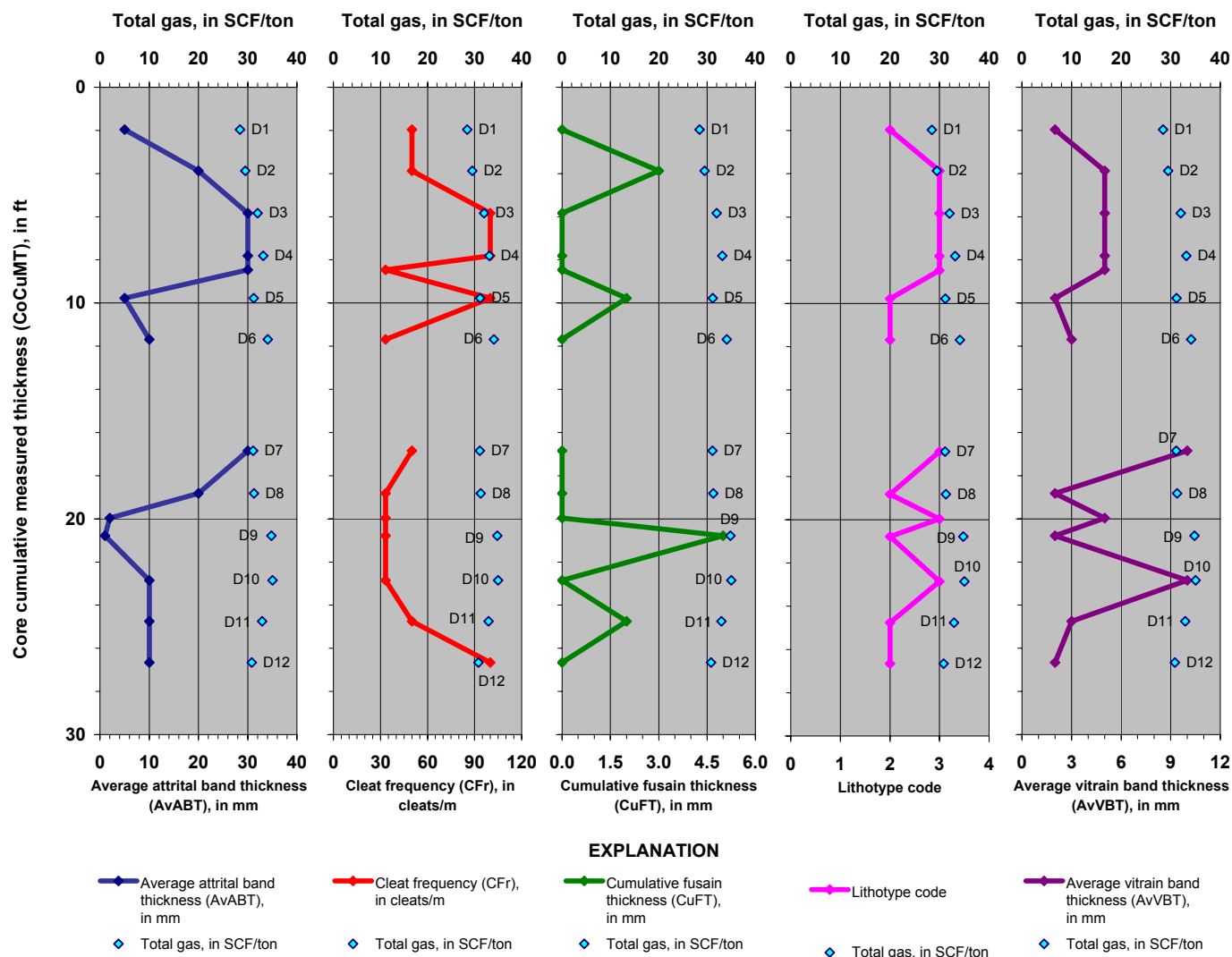


Figure 2-10. Graphs of total gas (standard cubic feet per ton, SCF/ton), average attrital band thickness (AvABT), cleat frequency (CFr), cumulative fusain thickness (CuFT), lithotype code, and average vitrain band thickness (AvVBT) plotted against core cumulative measured thickness (CoCuMT) for core hole 11, Barrett Resources Corporation, CARU State 22-16-5075W (Big George coal bed). Total gas points are labeled with canister numbers. See figure 6 for lithotype codes. All variables are listed in appendix 1, table 1-7.

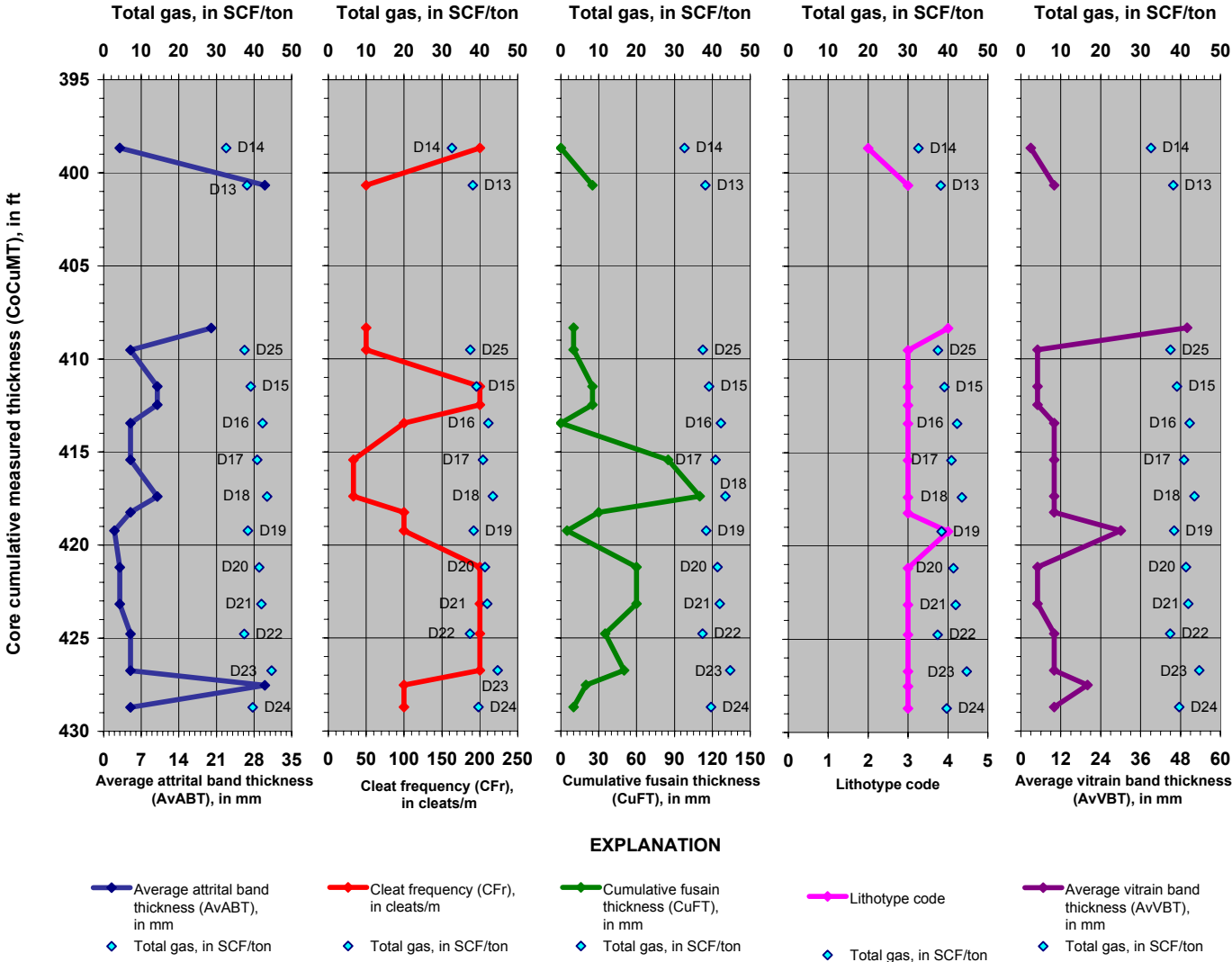


Figure 2-11. Graphs of total gas (standard cubic feet per ton, SCF/ton), average attrital band thickness (AvABT), cleat frequency (CFr), cumulative fusain thickness (CuFT), lithotype code, and average vitrain band thickness (AvVBT) plotted against core cumulative measured thickness (CoCuMT) for core hole 11, Barrett Resources Corporation, CARU State 22-16-5075W (Werner coal bed). Total gas points are labeled with canister numbers. See figure 6 for lithotype codes. All variables are listed in appendix 1, table 1-7.

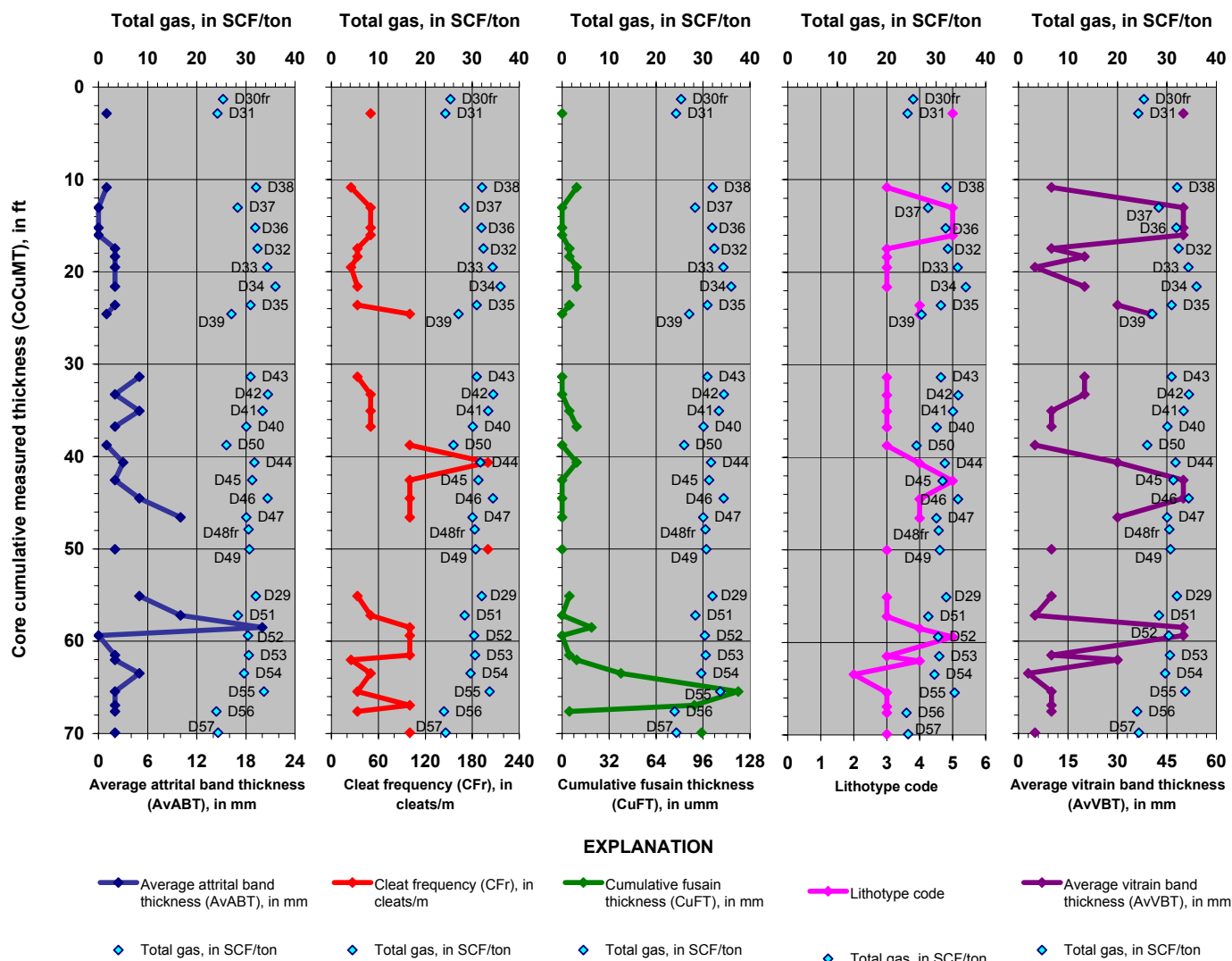


Figure 2-12. Graphs of total gas (standard cubic feet per ton, SCF/ton), average attrital band thickness (AvABT), cleat frequency (CFr), cumulative fusain thickness (CuFT), lithotype code, and average vitrain band thickness (AvVBT) plotted against core cumulative measured thickness (CoCuMT) for core hole 12, Barrett Resources Corporation, Schoonover Road Unit (SRU) State 12-16-4576 (Big George coal bed). Total gas points are labeled with canister numbers. See figure 6 for lithotype codes. All variables are listed in appendix 1, table 1-8.

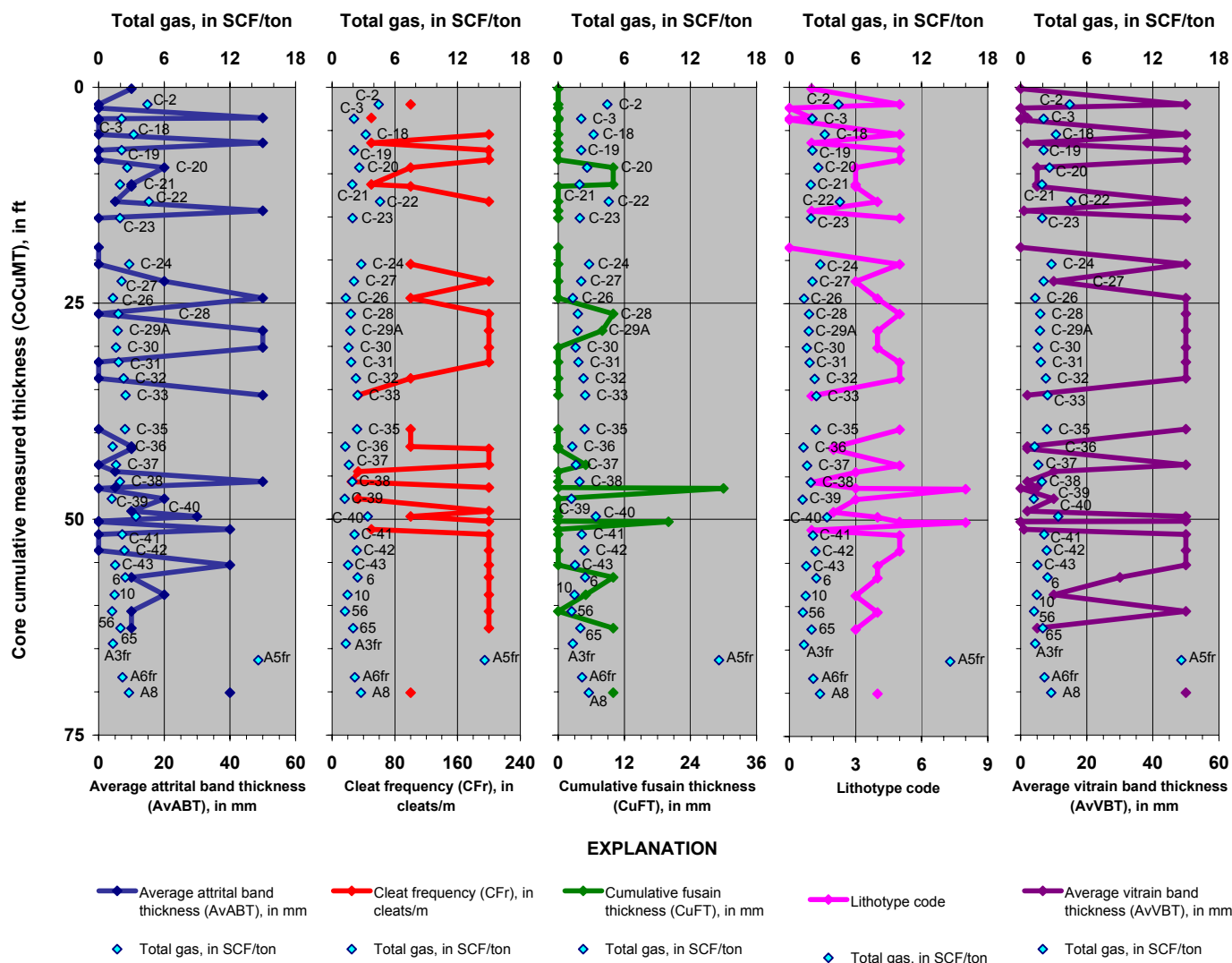


Figure 2-13. Graphs of total gas (standard cubic feet per ton, SCF/ton), average attrital band thickness (AvABT), cleat frequency (CFr), cumulative fusain thickness (CuFT), lithotype code, and average vitrain band thickness (AvVBT) plotted against core cumulative measured thickness (CoCuMT) for core hole 13, Rim Operating Inc., CBM H-11-04 (upper and middle and lower Wyodak coal beds). Total gas points are labeled with canister numbers. See figure 6 for lithotype codes. All variables are listed in appendix 1, table 1-9.

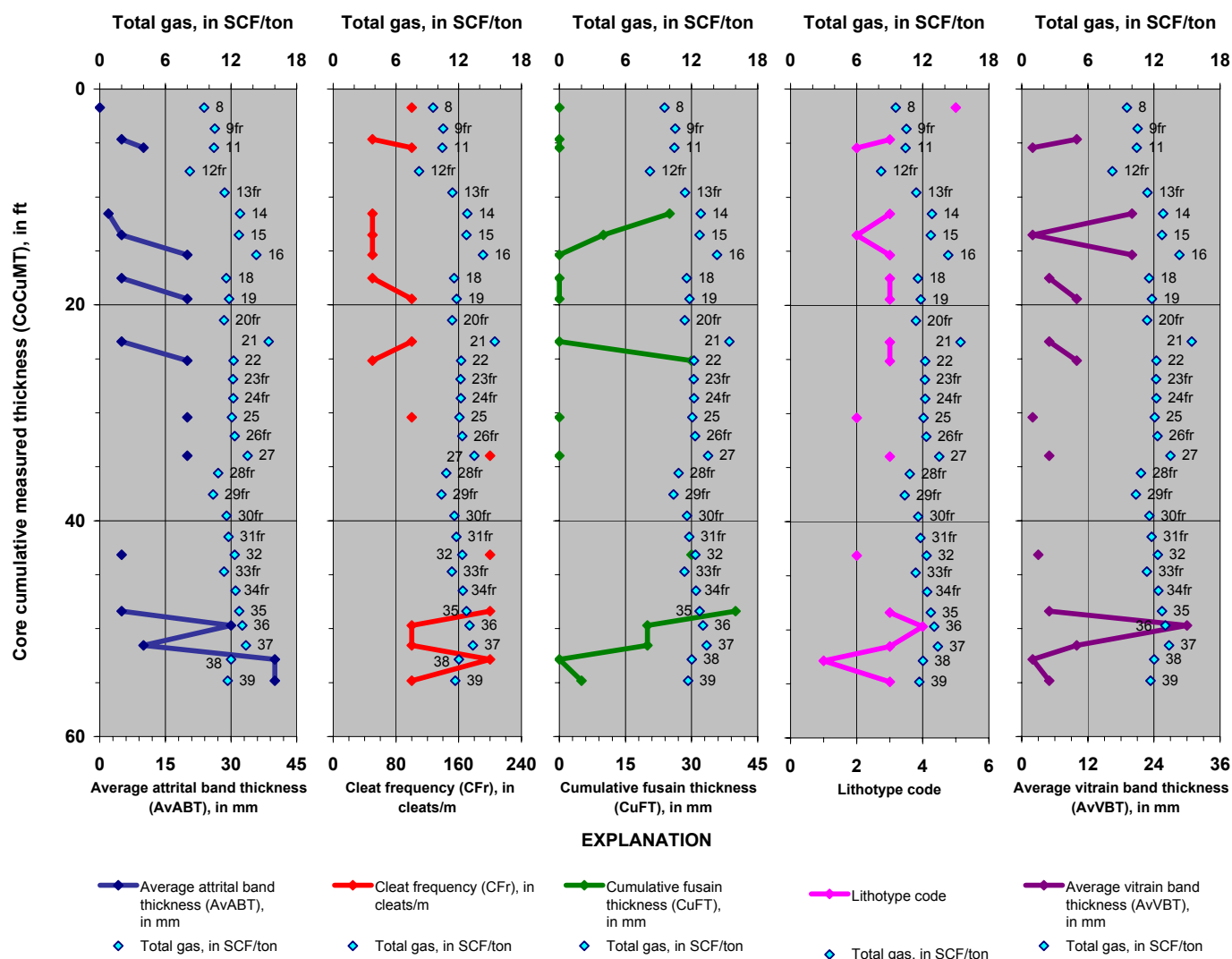


Figure 2-14. Graphs of total gas (standard cubic feet per ton, SCF/ton), average attrital band thickness (AvABT), cleat frequency (CFr), cumulative fusain thickness (CuFT), lithotype code, and average vitrain band thickness (AvVBT) plotted against core cumulative measured thickness (CoCuMT) for core hole 14, Rim Operating Inc., CBM C-33-1R (middle and lower Wyodak coal beds). Total gas points are labeled with canister numbers. See figure 6 for lithotype codes. All variables are listed in appendix 1, table 1-10.

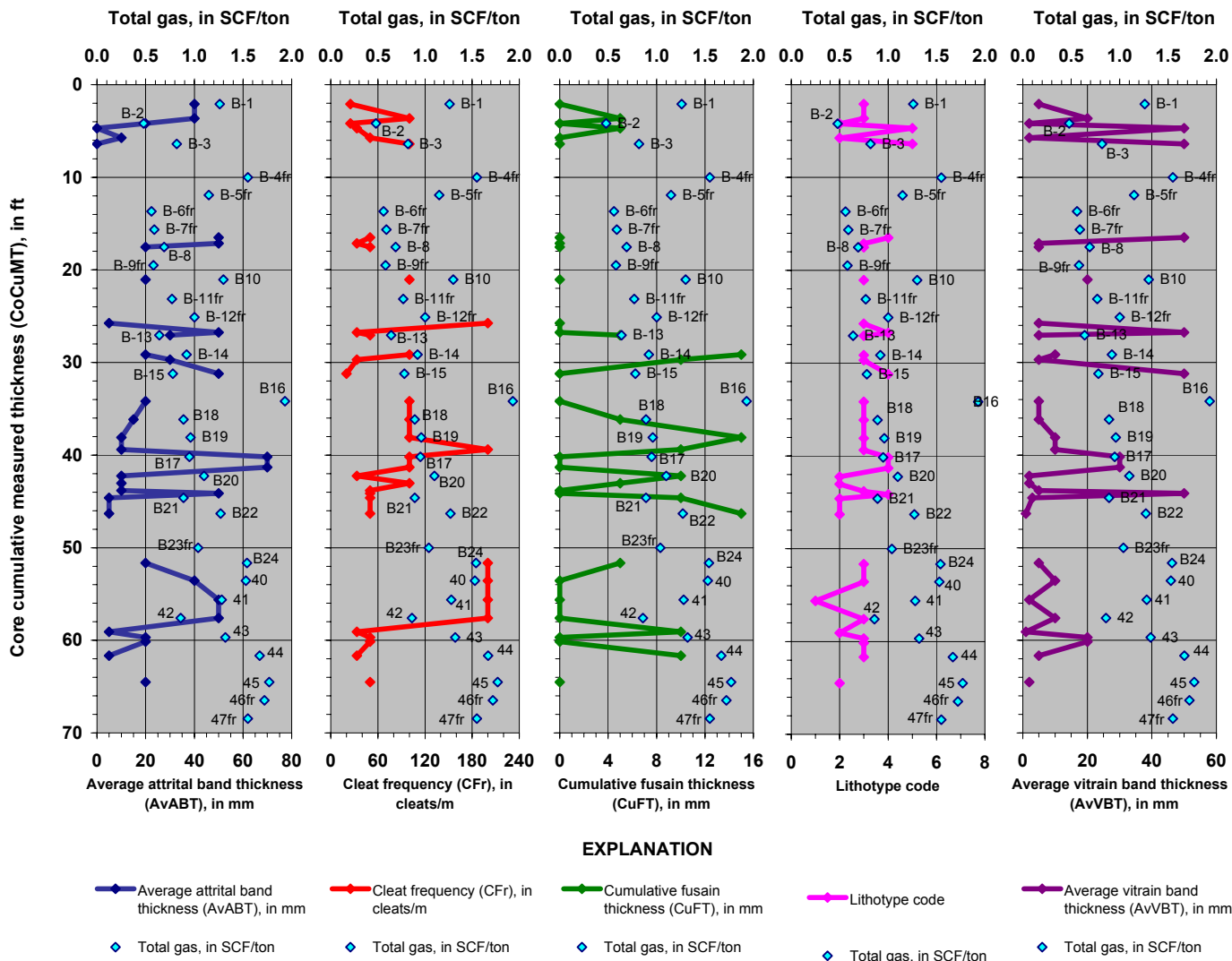


Figure 2-15. Graphs of total gas (standard cubic feet per ton, SCF/ton), average attrital band thickness (AvABT), cleat frequency (CFr), cumulative fusain thickness (CuFT), lithotype code, and average vitrain band thickness (AvVBT) plotted against core cumulative measured thickness (CoCuMT) for core hole 15, Peabody Natural Gas LLC, PNG 34-1 (middle and lower Wyodak coal beds). Total gas points are labeled with canister numbers. See figure 6 for lithotype codes. All variables are listed in appendix 1, table 1-11.

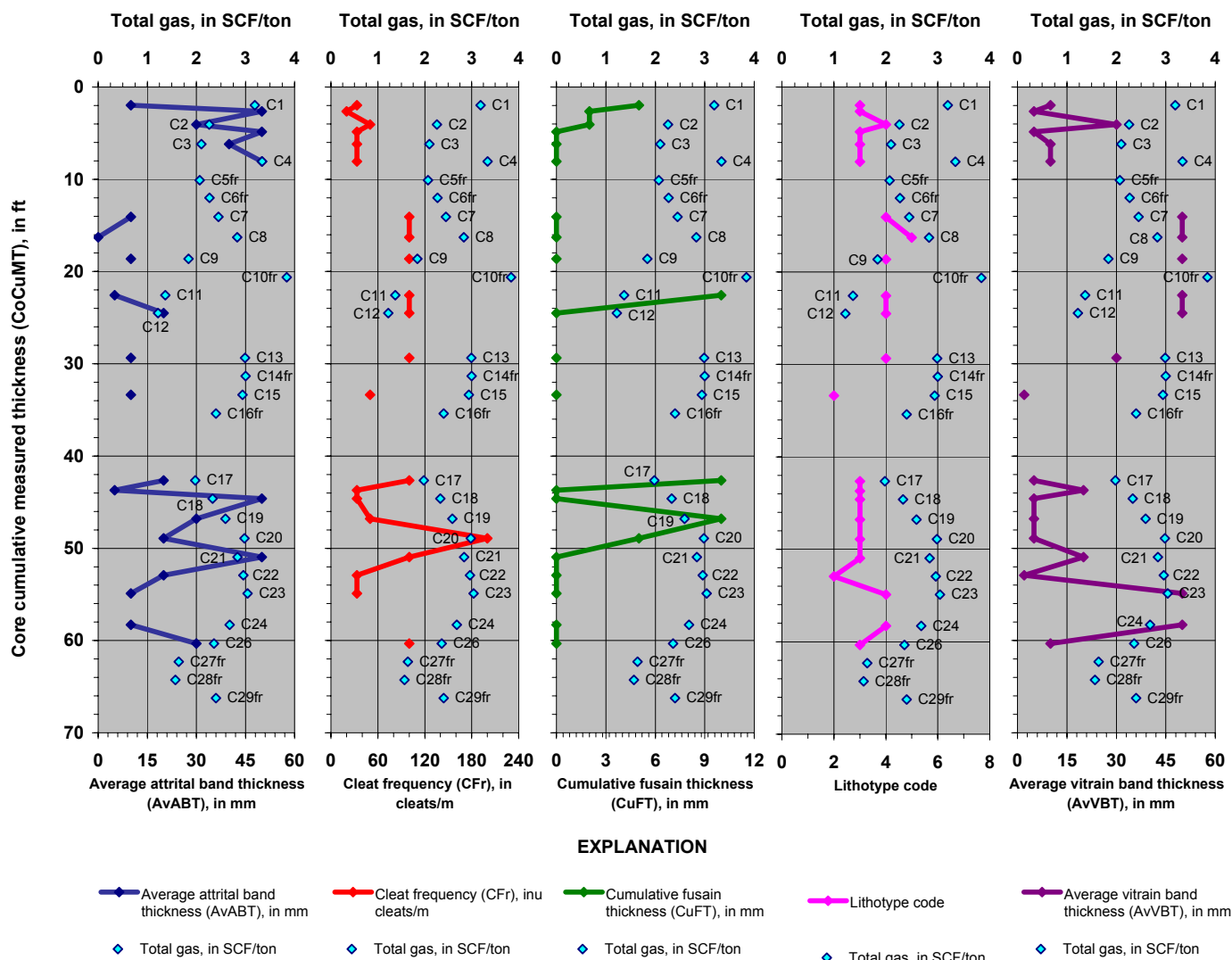


Figure 2-16. Graphs of total gas (standard cubic feet per ton, SCF/ton), average attrital band thickness (AvABT), cleat frequency (CFr), cumulative fusain thickness (CuFT), lithotype code, and average vitrain band thickness (AvVBT) plotted against core cumulative measured thickness (CoCuMT) for core hole 16, Peabody Natural Gas LLC, PNG 33-1 (middle and lower Wyodak coal beds). Total gas points are labeled with canister numbers. See figure 6 for lithotype codes. All variables are listed in appendix 1, table 1-12.

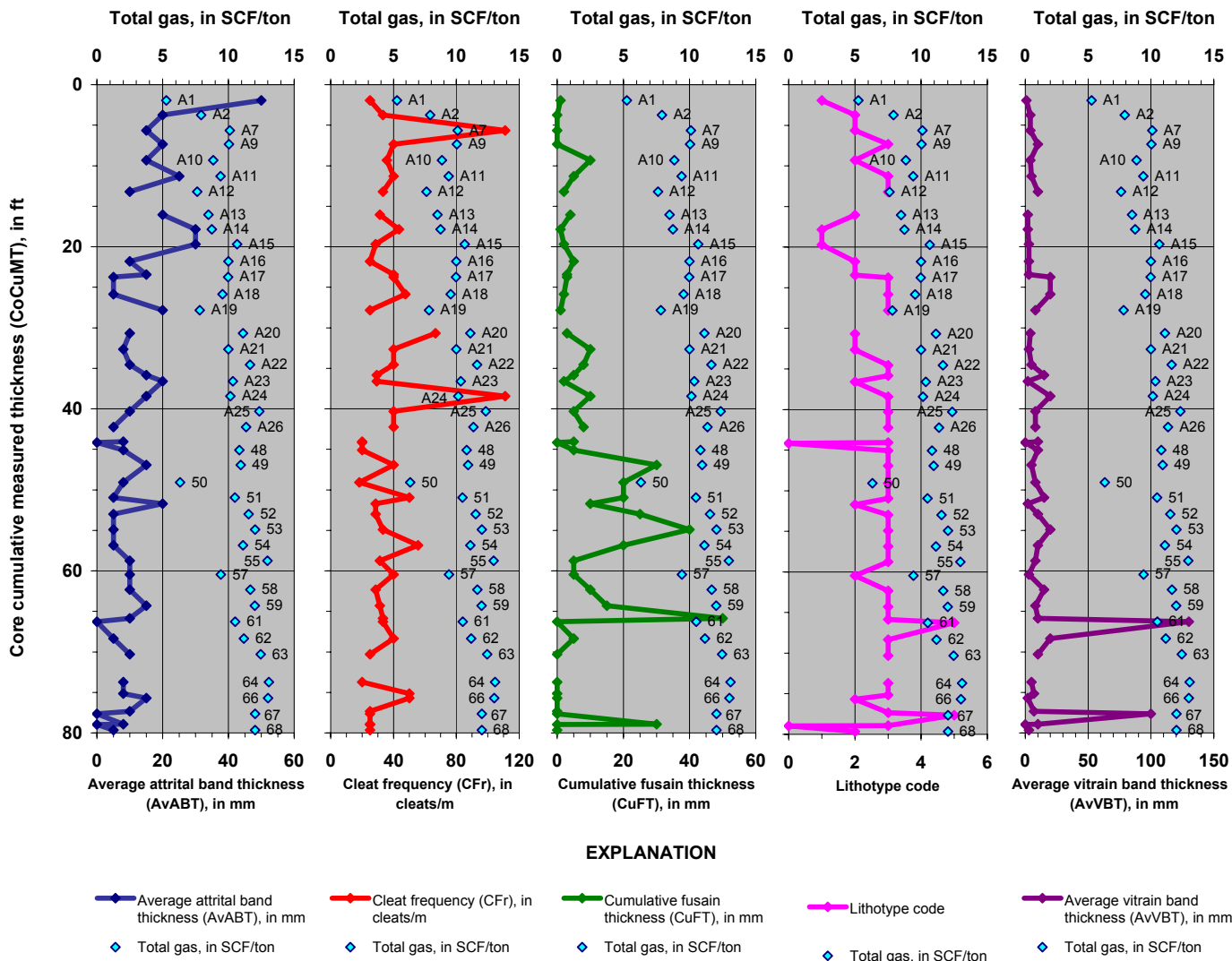


Figure 2-17. Graphs of total gas (standard cubic feet per ton, SCF/ton), average attrital band thickness (AvABT), cleat frequency (CFr), cumulative fusain thickness (CuFT), lithotype code, and average vitrain band thickness (AvVBT) plotted against core cumulative measured thickness (CoCuMT) for core hole 17, Peabody Natural Gas LLC, PNG 31-1 (middle and lower Wyodak coal beds). Total gas points are labeled with canister numbers. See figure 6 for lithotype codes. All variables are listed in appendix 1, table 1-13.

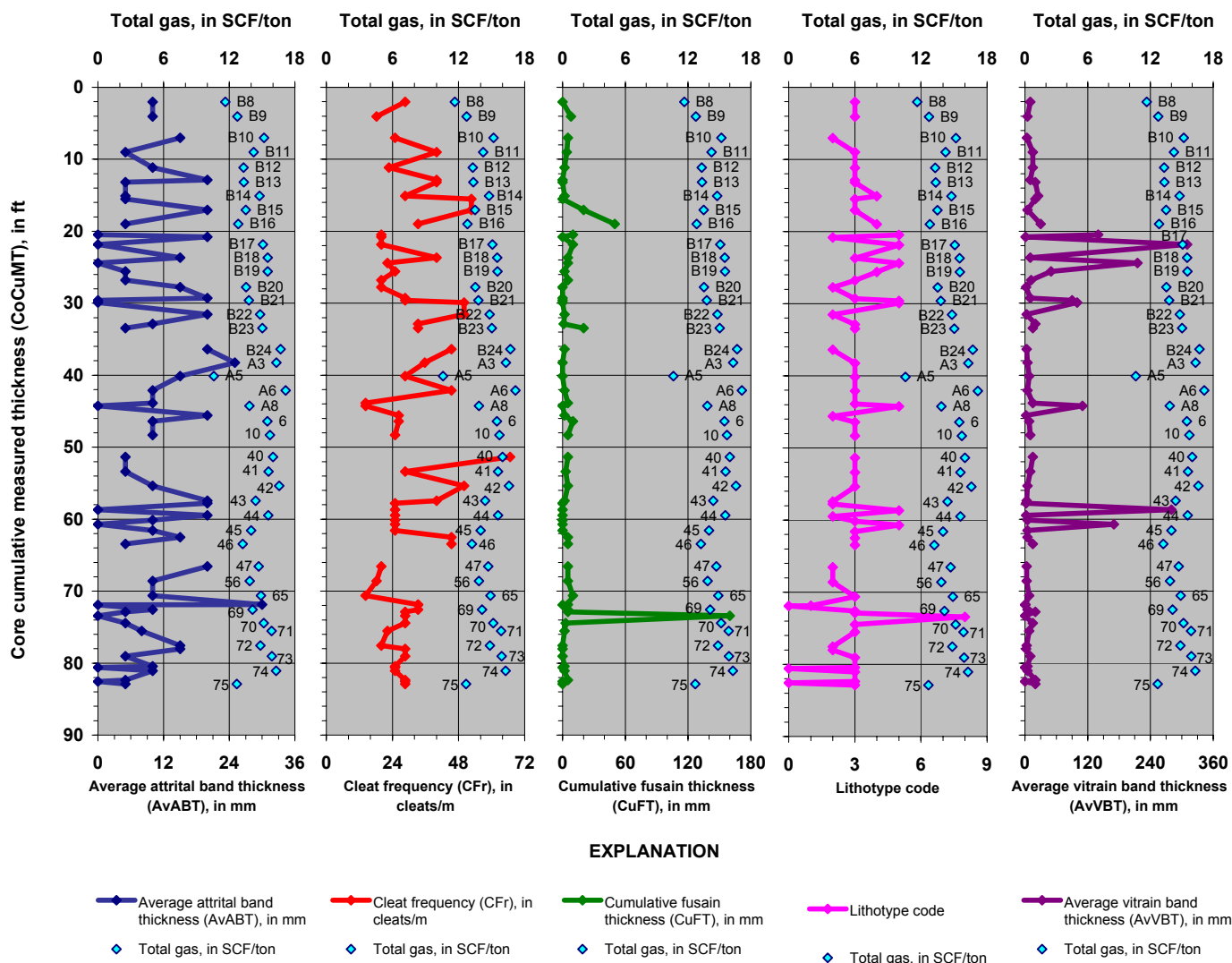


Figure 2-18. Graphs of total gas (standard cubic feet per ton, SCF/ton), average attrital band thickness (AvABT), cleat frequency (CFr), cumulative fusain thickness (CuFT), lithotype code, and average vitrain band thickness (AvVBT) plotted against core cumulative measured thickness (CoCuMT) for core hole 18, Peabody Natural Gas LLC, PNG 35-1 (middle and lower Wyodak coal beds). Total gas points are labeled with canister numbers. See figure 6 for lithotype codes. All variables are listed in appendix 1, table 1-14.

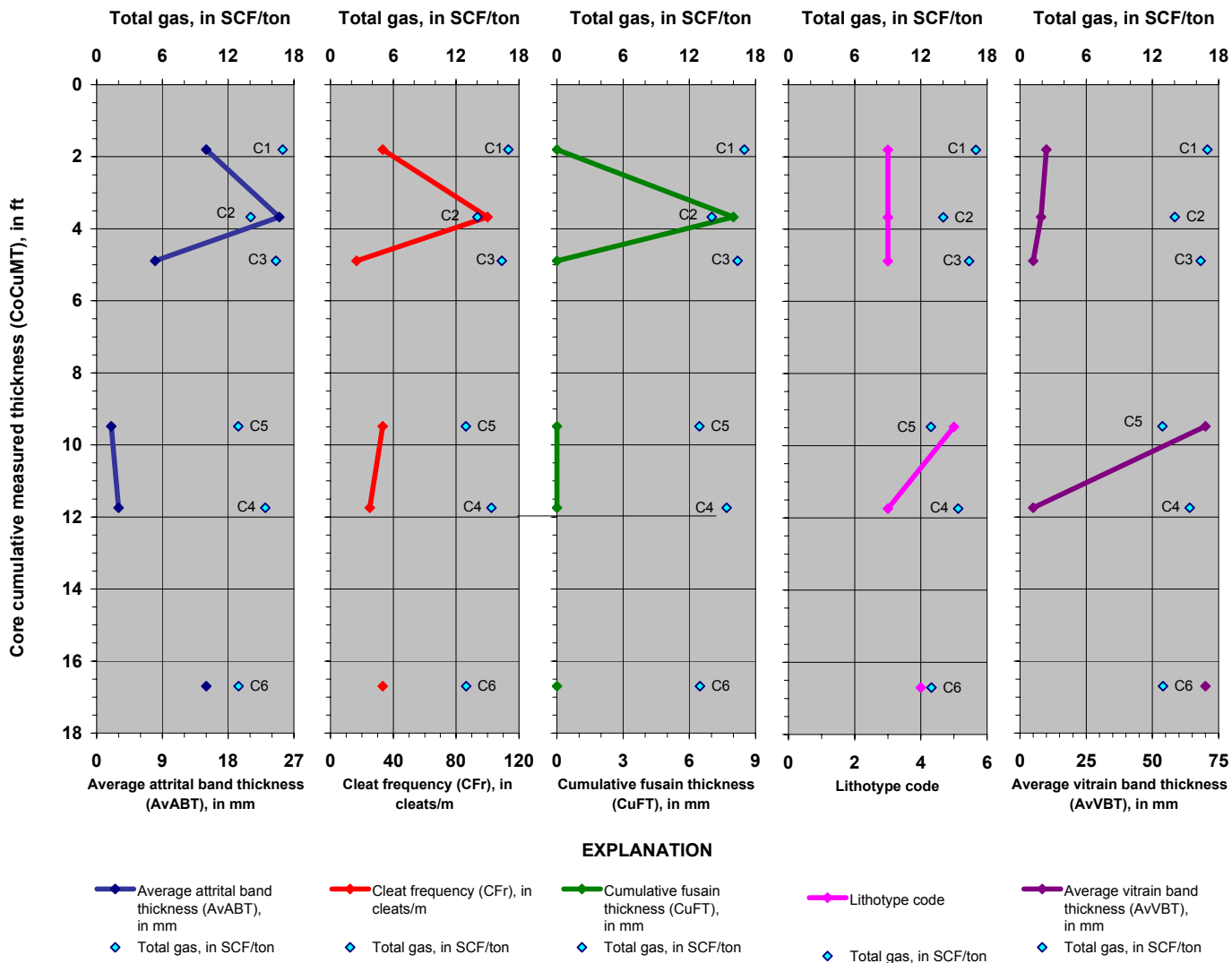


Figure 2-19. Graphs of total gas (standard cubic feet per ton, SCF/ton), average attrital band thickness (AvABT), cleat frequency (CFr), cumulative fusain thickness (CuFT), lithotype code, and average vitrain band thickness (AvVBT) plotted against core cumulative measured thickness (CoCuMT) for core hole 19, Barrett Resources Corporation, All Night Creek Unit (ANCU) Iberlin 21-33-4374 (Big George coal bed). Total gas points are labeled with canister numbers. See figure 6 for lithotype codes. All variables are listed in appendix 1, table 1-15.

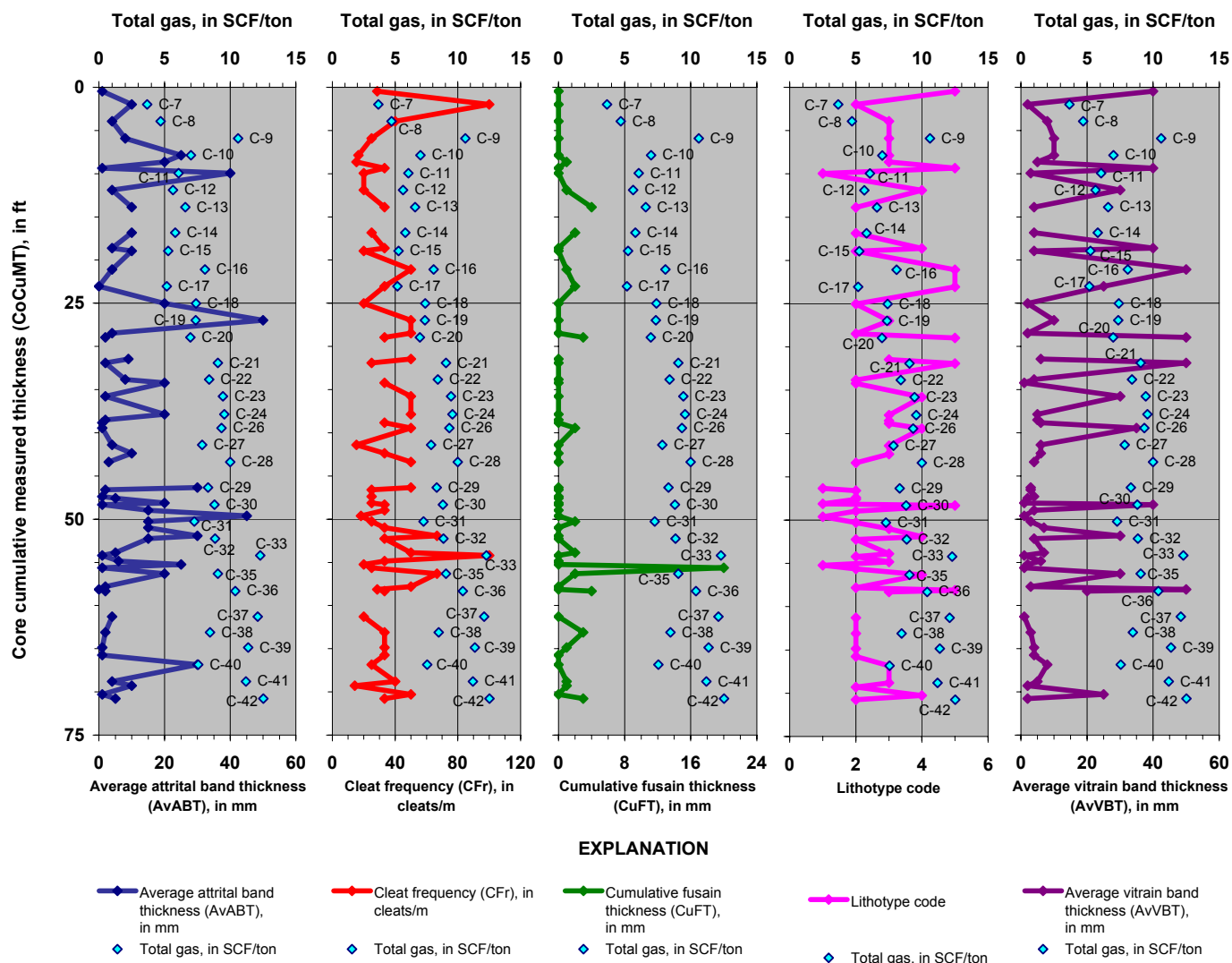


Figure 2–20. Graphs of total gas (standard cubic feet per ton, SCF/ton), average attrital band thickness (AvABT), cleat frequency (CFr), cumulative fusain thickness (CuFT), lithotype code, and average vitrain band thickness (AvVBT) plotted against core cumulative measured thickness (CoCuMT) for core hole 20, Peabody Natural Gas LLC, PNG 16–2 (middle and lower Wyodak coal beds). Total gas points are labeled with canister numbers. See figure 6 for lithotype codes. All variables are listed in appendix 1, table 1–16.

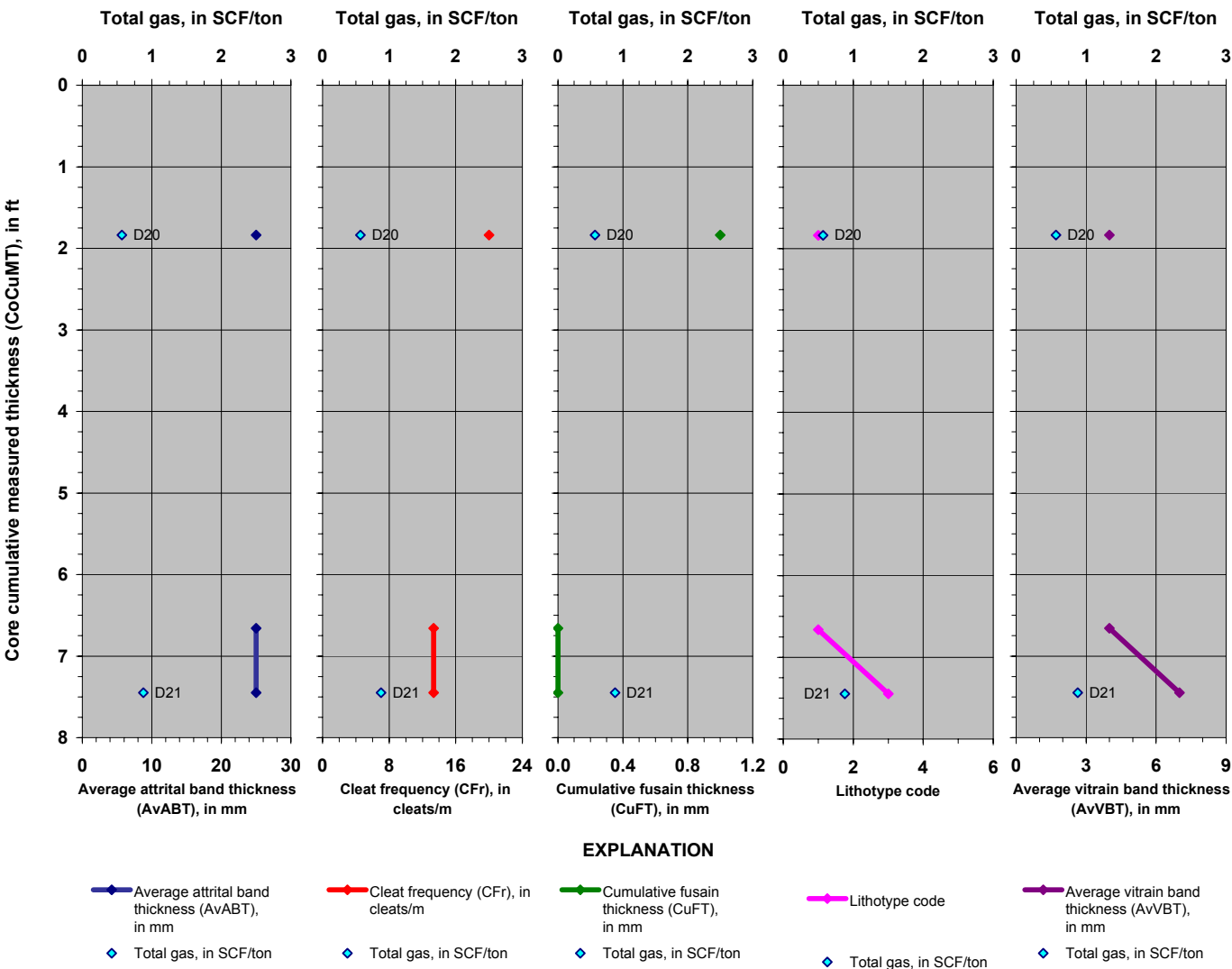


Figure 2–21. Graphs of total gas (standard cubic feet per ton, SCF/ton), average attrital band thickness (AvABT), cleat frequency (CFr), cumulative fusain thickness (CuFT), lithotype code, and average vitrain band thickness (AvVBT) plotted against core cumulative measured thickness (CoCuMT) for core hole 21, The Coteau Properties Co., Coteau MC00250C (Beulah coal bed). Total gas points are labeled with canister numbers. See figure 6 for lithotype codes. All variables are listed in appendix 1, table 1–17.

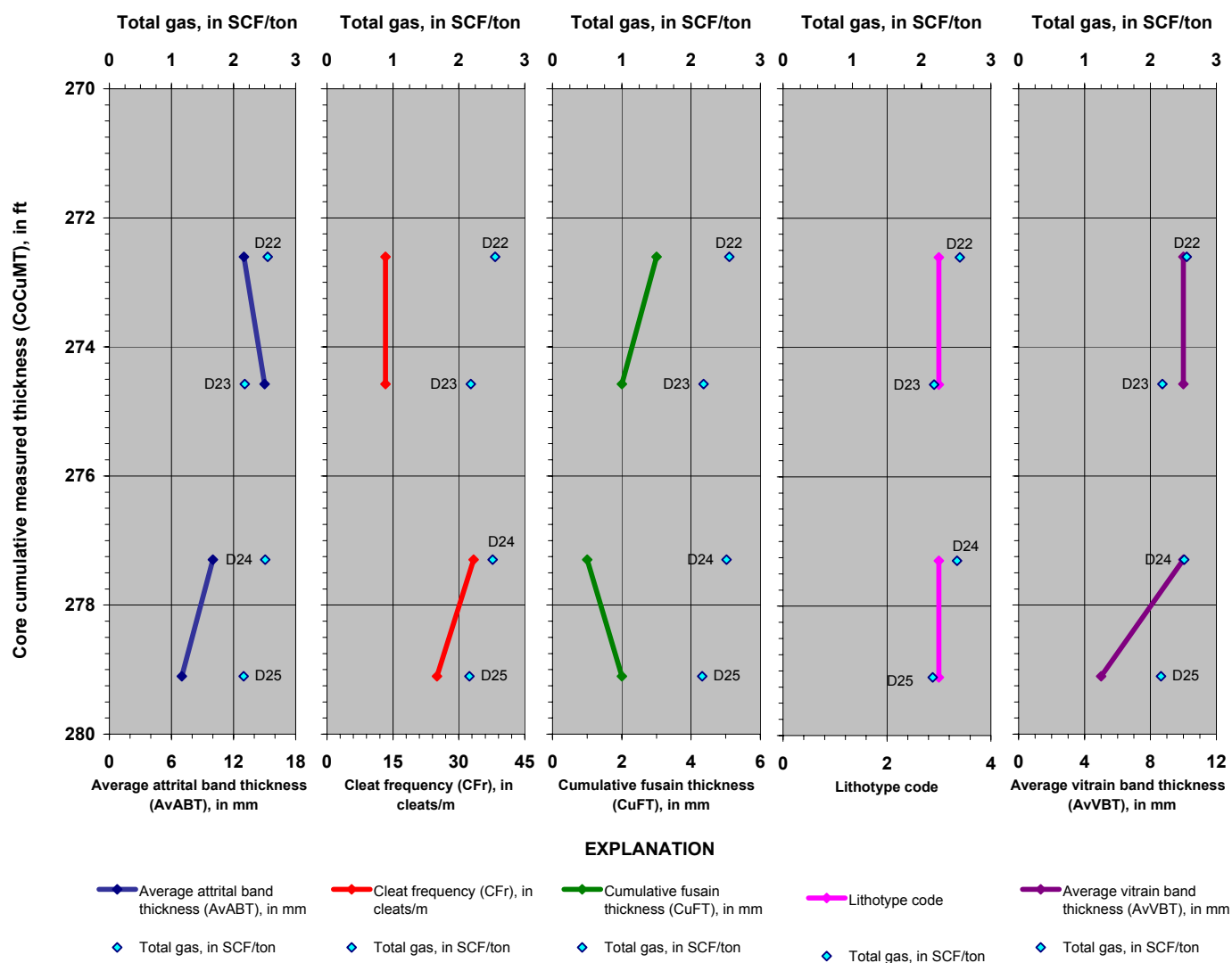


Figure 2-22. Graphs of total gas (standard cubic feet per ton, SCF/ton), average attrital band thickness (AvABT), cleat frequency (CFr), cumulative fusain thickness (CuFT), lithotype code, and average vitrain band thickness (AvVBT) plotted against core cumulative measured thickness (CoCuMT) for core hole 21, The Coteau Properties Co., Coteau MC00250C (unnamed 2 coal bed). Total gas points are labeled with canister numbers. See figure 6 for lithotype codes. All variables are listed in appendix 1, table 1-17.

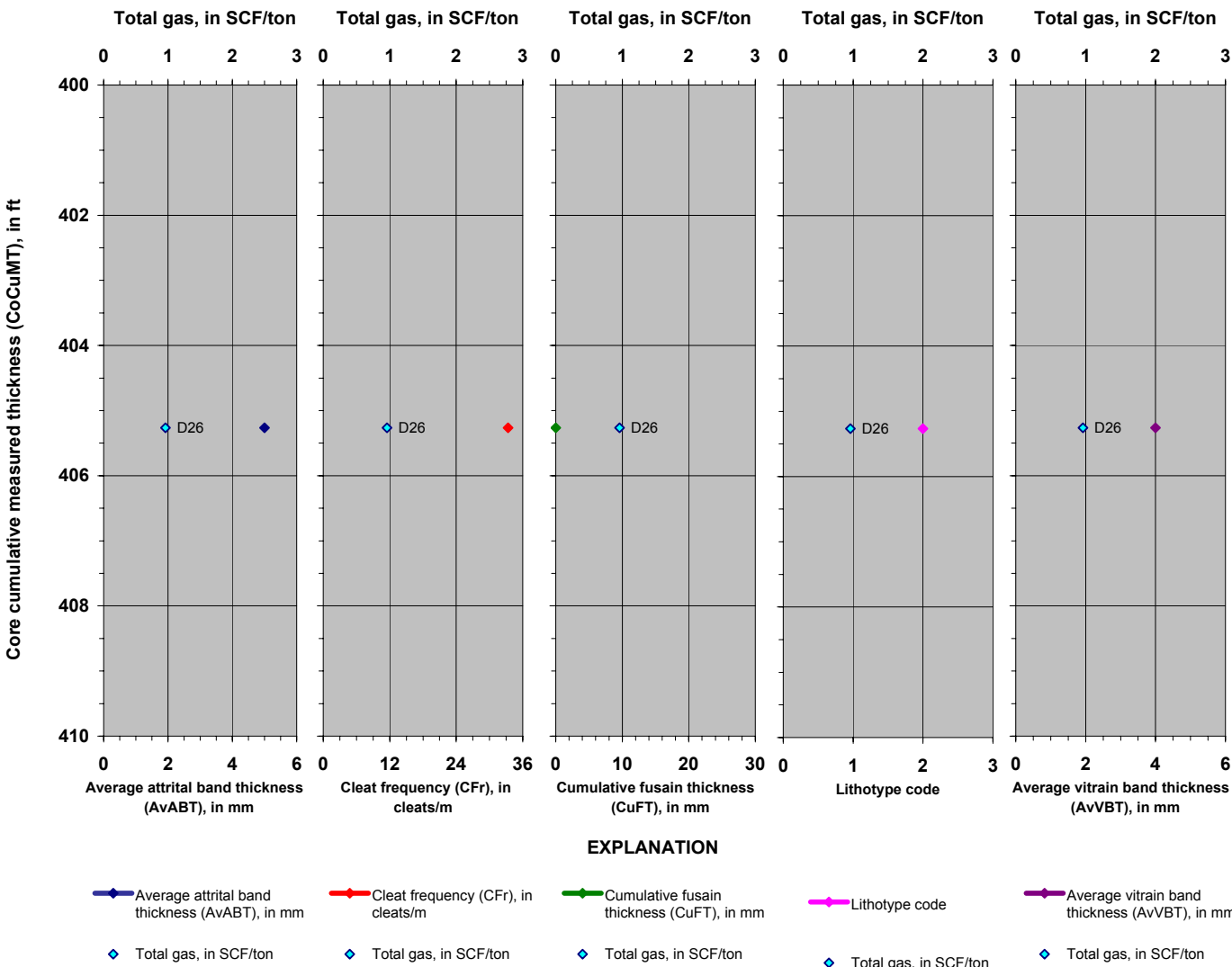


Figure 2–23. Graphs of total gas (standard cubic feet per ton, SCF/ton), average attrital band thickness (AvABT), cleat frequency (CFr), cumulative fusain thickness (CuFT), lithotype code, and average vitrain band thickness (AvVBT) plotted against core cumulative measured thickness (CoCuMT) for core hole 21, The Coteau Properties Co., Coteau MC00250C (unnamed 3 coal bed). Total gas points are labeled with canister numbers. See figure 6 for lithotype codes. All variables are listed in appendix 1, table 1–17.

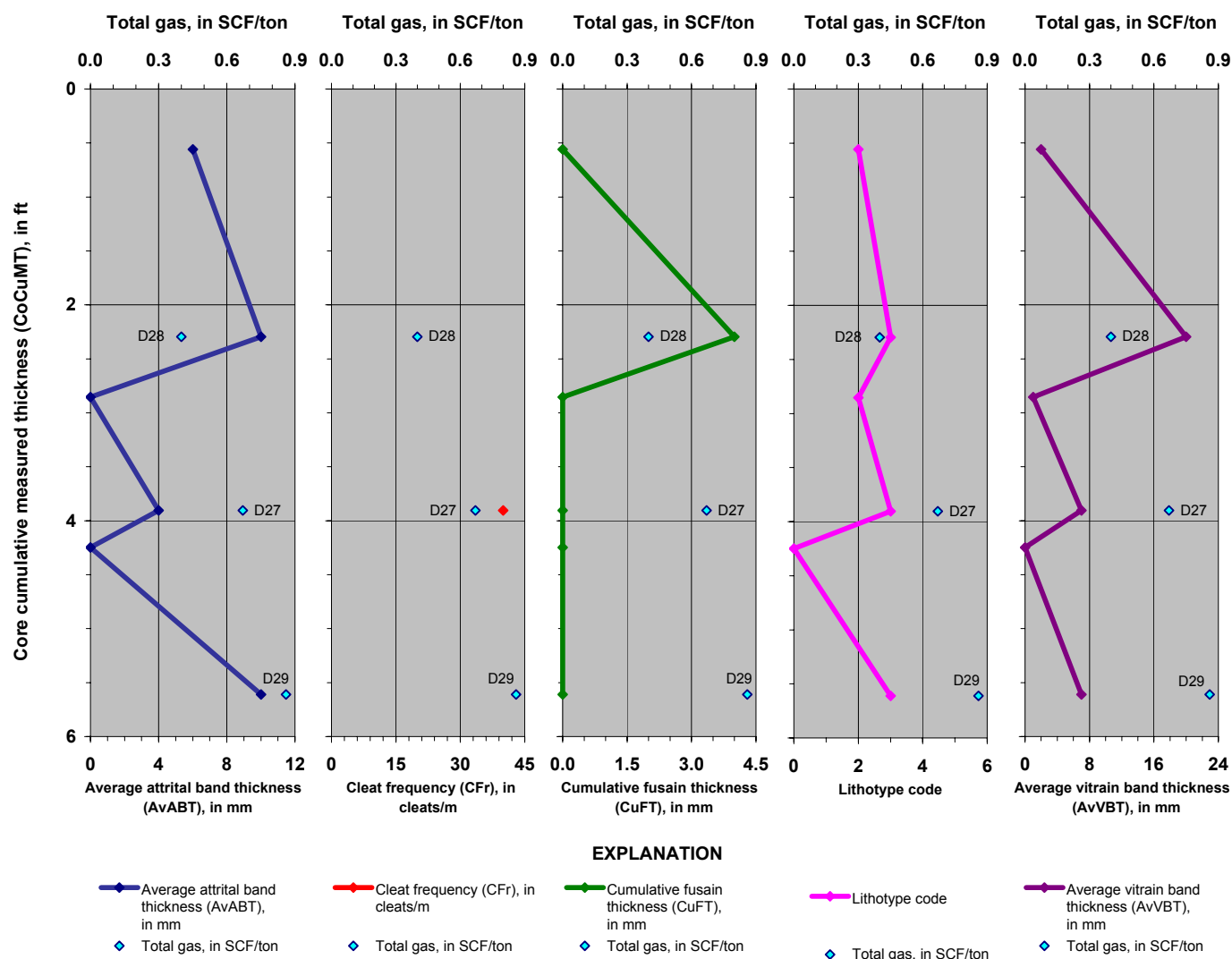


Figure 2–24. Graphs of total gas (standard cubic feet per ton, SCF/ton), average attrital band thickness (AvABT), cleat frequency (CFr), cumulative fusain thickness (CuFT), lithotype code, and average vitrain band thickness (AvVBT) plotted against core cumulative measured thickness (CoCuMT) for core hole 22, The Coteau Properties Co., Coteau MC00251 (unnamed 4 coal bed). Total gas points are labeled with canister numbers. See figure 6 for lithotype codes. All variables are listed in appendix 1, table 1–18.

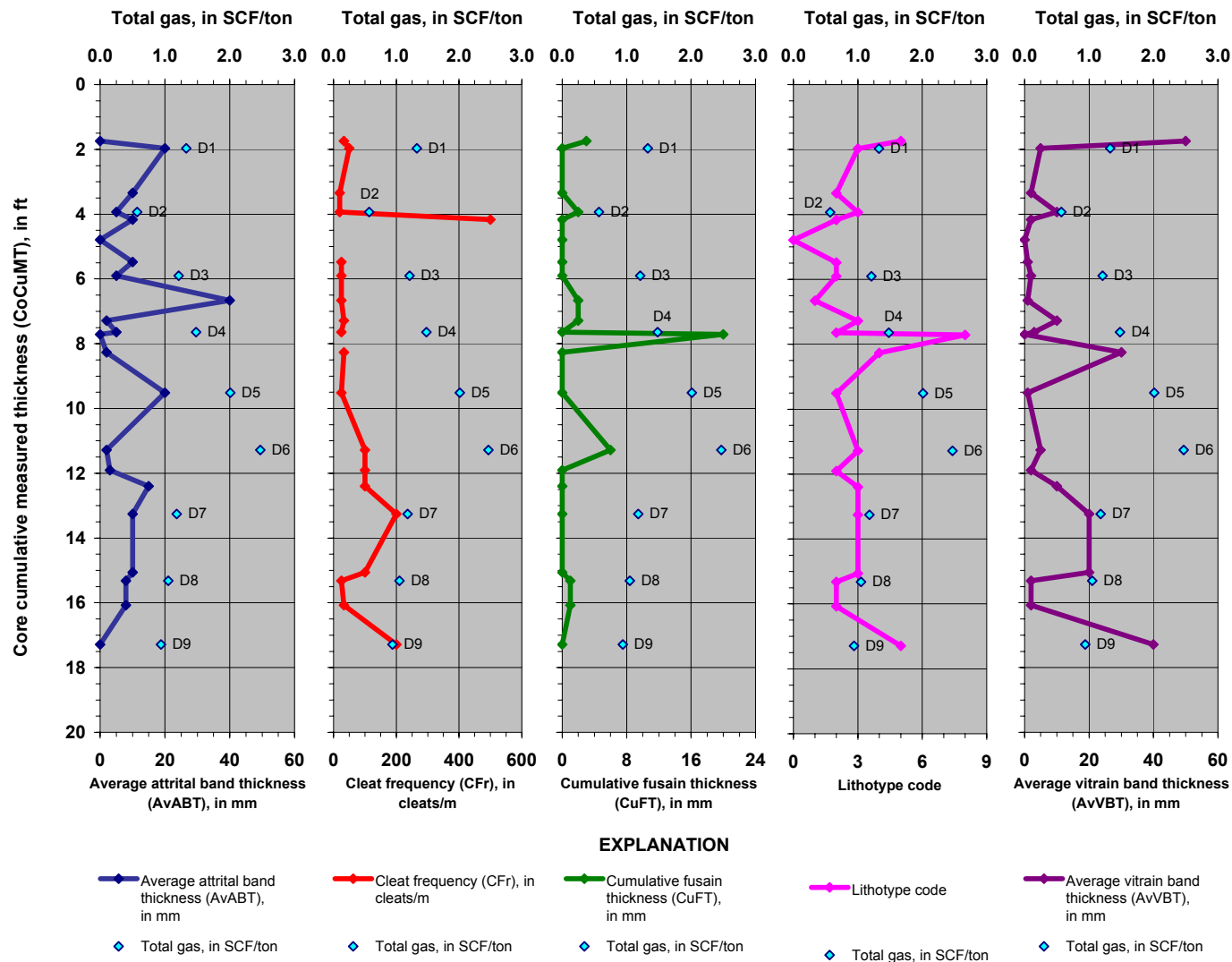


Figure 2–25. Graphs of total gas (standard cubic feet per ton, SCF/ton), average attrital band thickness (AvABT), cleat frequency (CFr), cumulative fusain thickness (CuFT), lithotype code, and average vitrain band thickness (AvVBT) plotted against core cumulative measured thickness (CoCuMT) for core hole 23, Ammonite Energy Texas, Inc., Thomas Jefferson State 36–3 (School coal bed). Total gas points are labeled with canister numbers. See figure 6 for lithotype codes. All variables are listed in appendix 1, table 1–19.

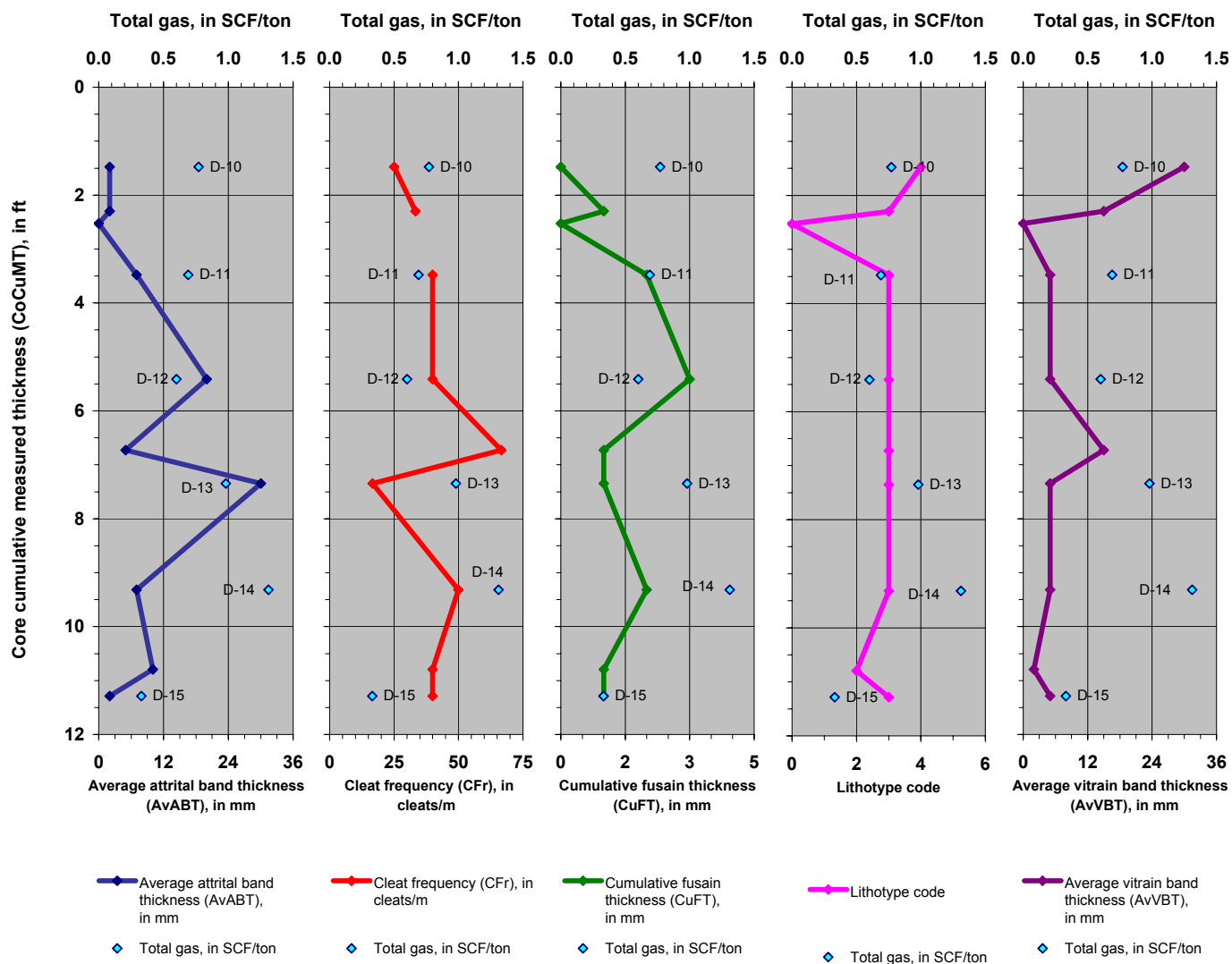


Figure 2-26. Graphs of total gas (standard cubic feet per ton, SCF/ton), average attrital band thickness (AvABT), cleat frequency (CFr), cumulative fusain thickness (CuFT), lithotype code, and average vitrain band thickness (AvVBT) plotted against core cumulative measured thickness (CoCuMT) for core hole 24, Bridger Coal Company, BCX-9 (Deadman coal zone). Total gas points are labeled with canister numbers. See figure 6 for lithotype codes. All variables are listed in appendix 1, table 1-20.

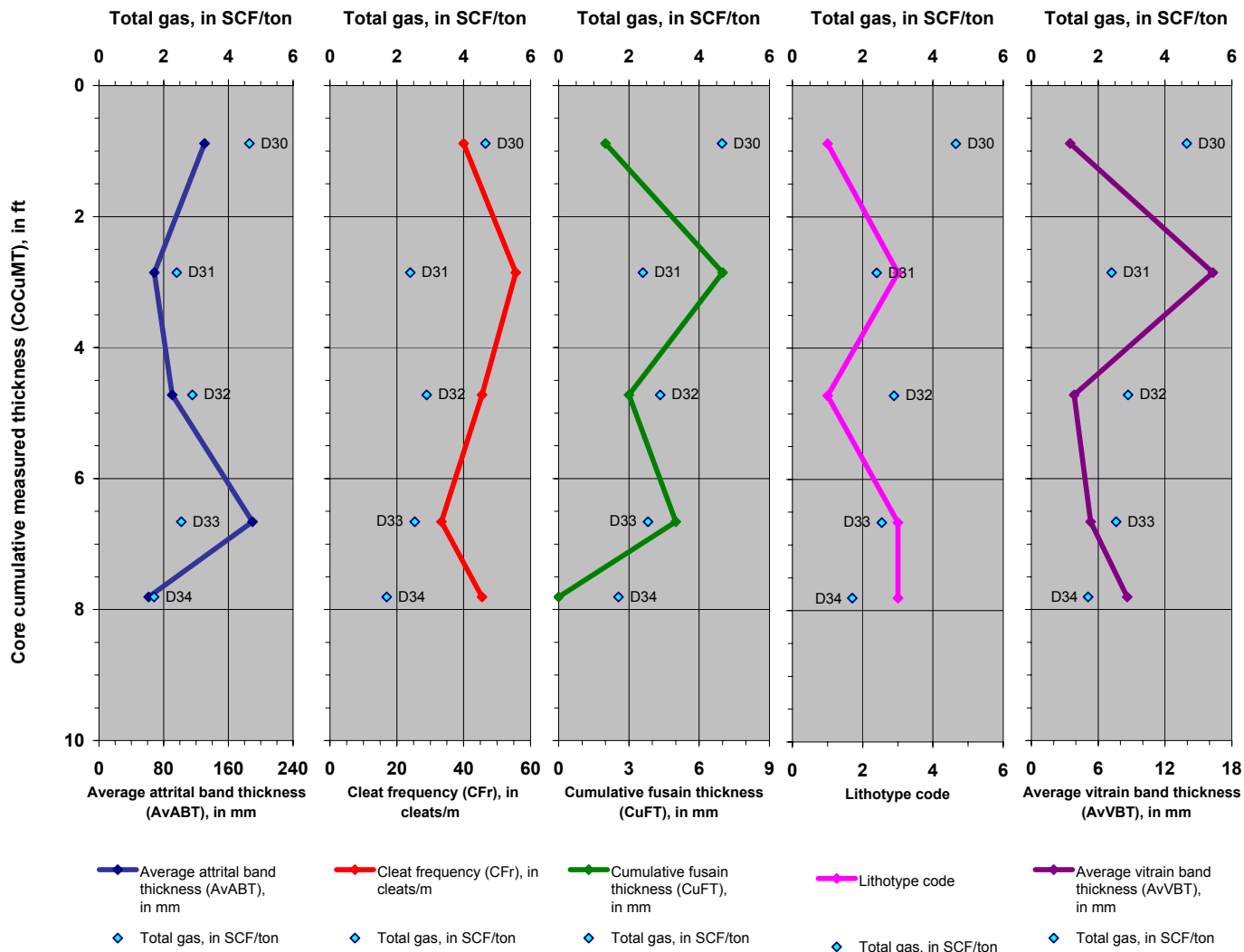


Figure 2–27. Graphs of total gas (standard cubic feet per ton, SCF/ton), average attrital band thickness (AvABT), cleat frequency (CFe), cumulative fusain thickness (CuFT), lithotype code, and average vitrain band thickness (AvVBT) plotted against core cumulative measured thickness (CoCuMT) for core hole 25, Peabody Natural Gas LLC, Duvall 13J–D (Pawnee coal bed). Total gas points are labeled with canister numbers. See figure 6 for lithotype codes. All variables are listed in appendix 1, table 1–21.

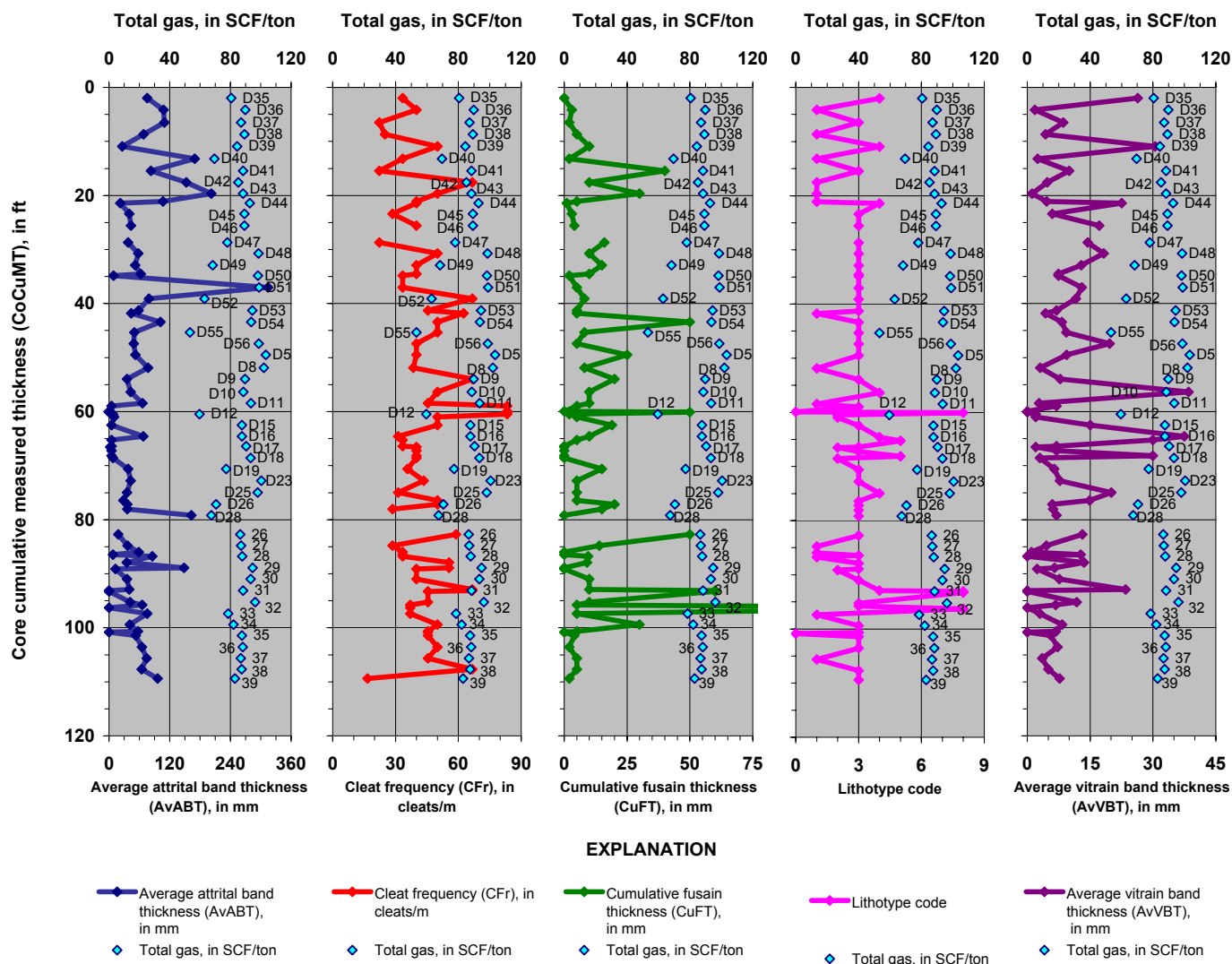


Figure 2-28. Graphs of total gas (standard cubic feet per ton, SCF/ton), average attrital band thickness (AvABT), cleat frequency (CFr), cumulative fusain thickness (CuFT), lithotype code, and average vitrain band thickness (AvVBT) plotted against core cumulative measured thickness (CoCuMT) for core hole 26, Barrett Resources Corporation, KU Harriett 41–34–4777 (Big George coal bed). Total gas points are labeled with canister numbers. See figure 6 for lithotype codes. All variables are listed in appendix 1, table 1–22.

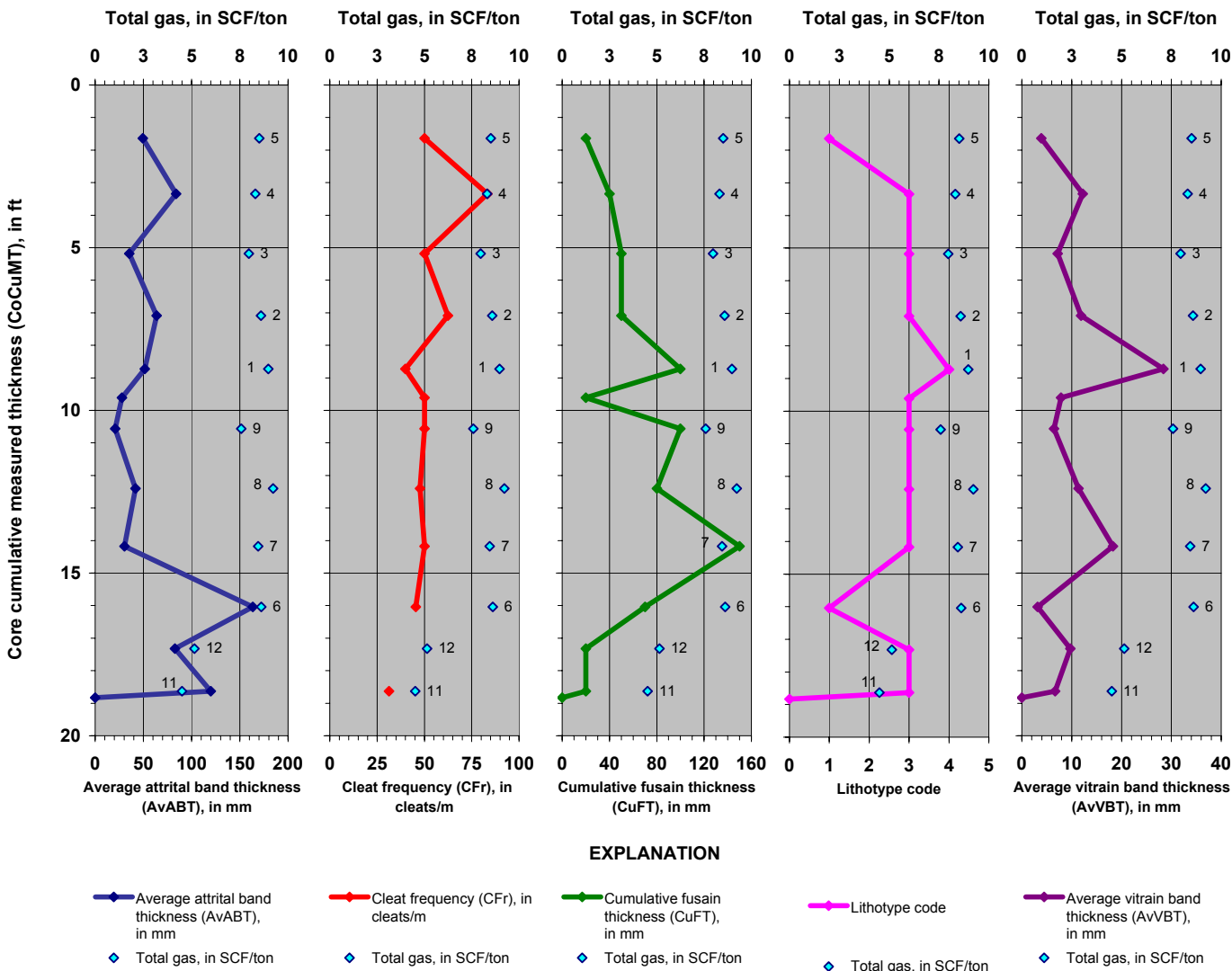


Figure 2–29. Graphs of total gas (standard cubic feet per ton, SCF/ton), average attrital band thickness (AvABT), cleat frequency (CFr), cumulative fusain thickness (CuFT), lithotype code, and average vitrain band thickness (AvVBT) plotted against core cumulative measured thickness (CoCuMT) for core hole 27, Peabody Natural Gas LLC, Carter-Federal 18F–D (Pawnee coal bed). Total gas points are labeled with canister numbers. See figure 6 for lithotype codes. All variables are listed in appendix 1, table 1–23.

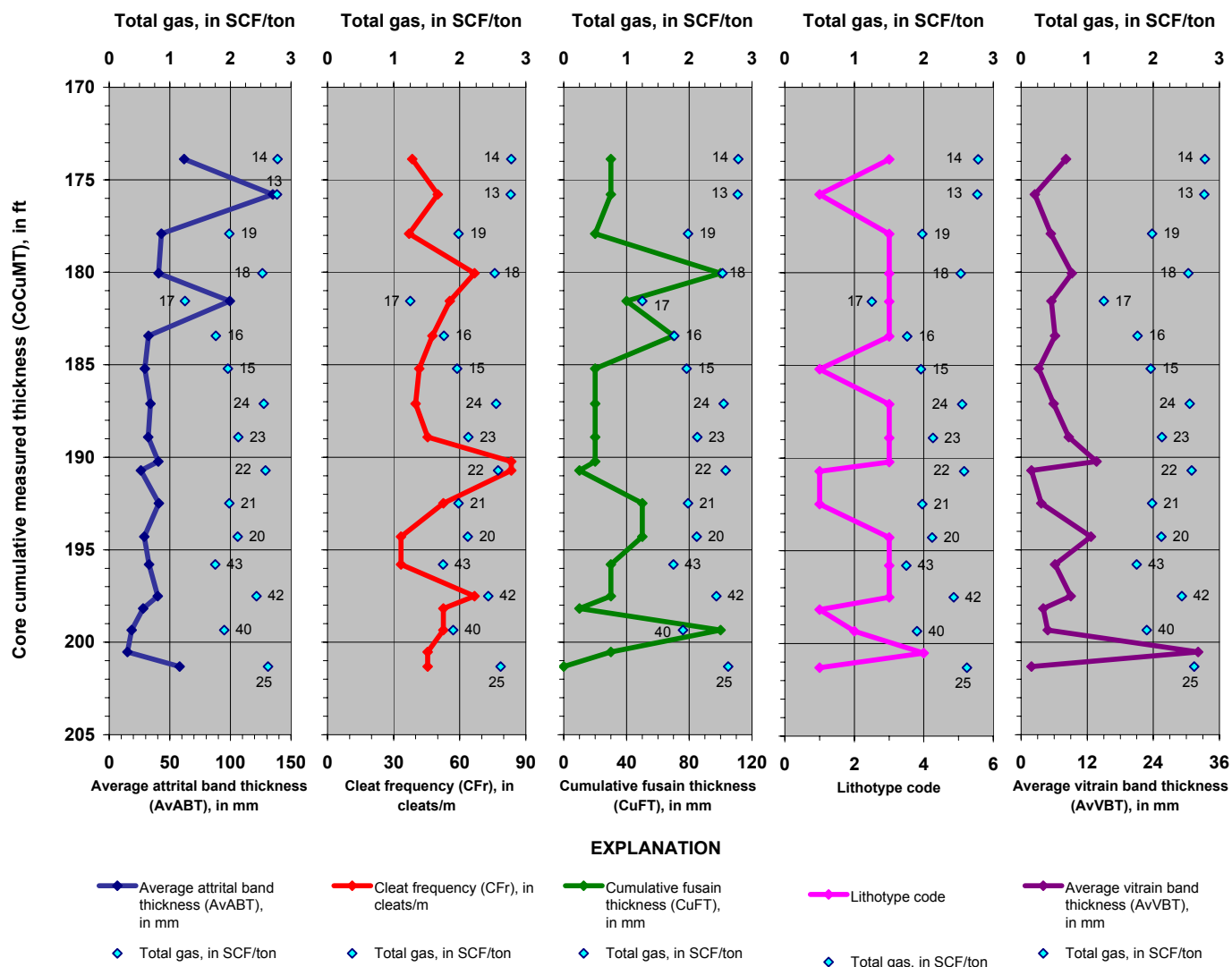


Figure 2–30. Graphs of total gas (standard cubic feet per ton, SCF/ton), average attrital band thickness (AvABT), cleat frequency (CFr), cumulative fusain thickness (CuFT), lithotype code, and average vitrain band thickness (AvVBT) plotted against core cumulative measured thickness (CoCuMT) for core hole 27, Peabody Natural Gas LLC, Carter-Federal 18F–D (Cache coal bed). Total gas points are labeled with canister numbers. See figure 6 for lithotype codes. All variables are listed in appendix 1, table 1–23.

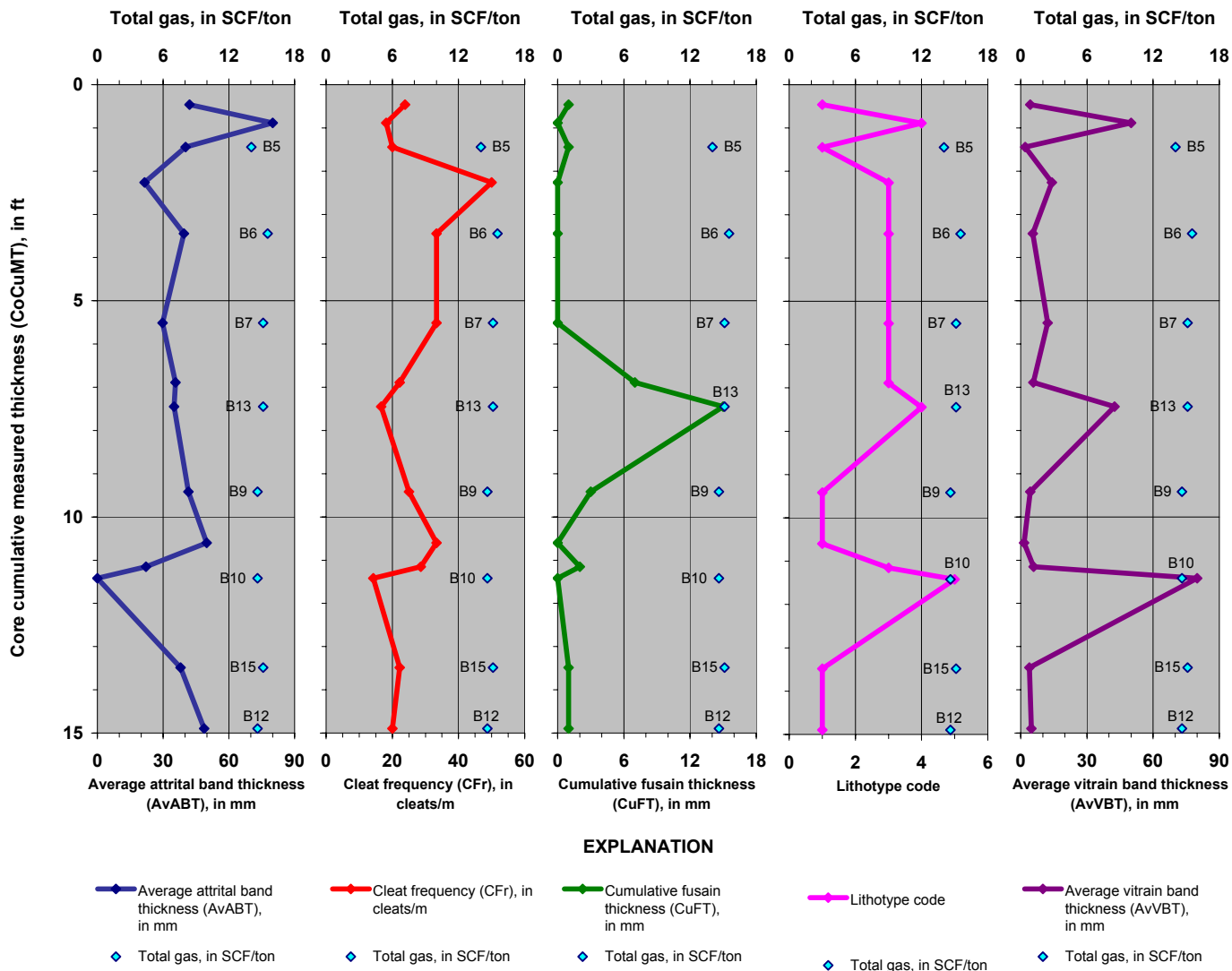


Figure 2-31. Graphs of total gas (standard cubic feet per ton, SCF/ton), average attrital band thickness (AvABT), cleat frequency (CFr), cumulative fusain thickness (CuFT), lithotype code, and average vitrain band thickness (AvVBT) plotted against core cumulative measured thickness (CoCuMT) for core hole 28, Nance Petroleum Corporation, Remington 58-79-30-07A (Anderson coal bed). Total gas points are labeled with canister numbers. See figure 6 for lithotype codes. All variables are listed in appendix 1, table 1-24.

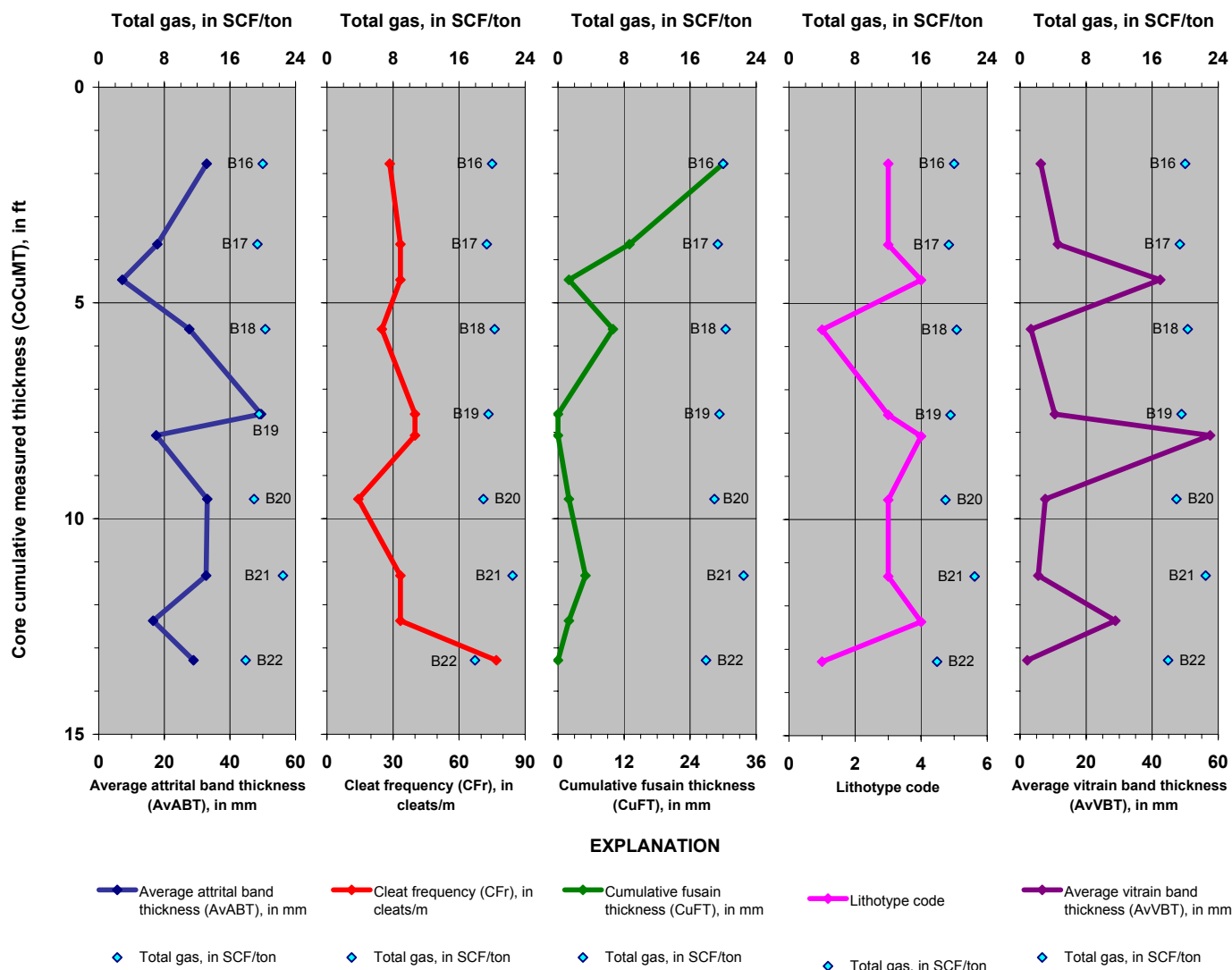


Figure 2-32. Graphs of total gas (standard cubic feet per ton, SCF/ton), average attrital band thickness (AvABT), cleat frequency (CFr), cumulative fusain thickness (CuFT), lithotype code, and average vitrain band thickness (AvVBT) plotted against core cumulative measured thickness (CoCuMT) for core hole 30, Nance Petroleum Corporation, Remington 58-79-30-01C (Canyon coal bed). Total gas points are labeled with canister numbers. See figure 6 for lithotype codes. All variables are listed in appendix 1, table 1-25.

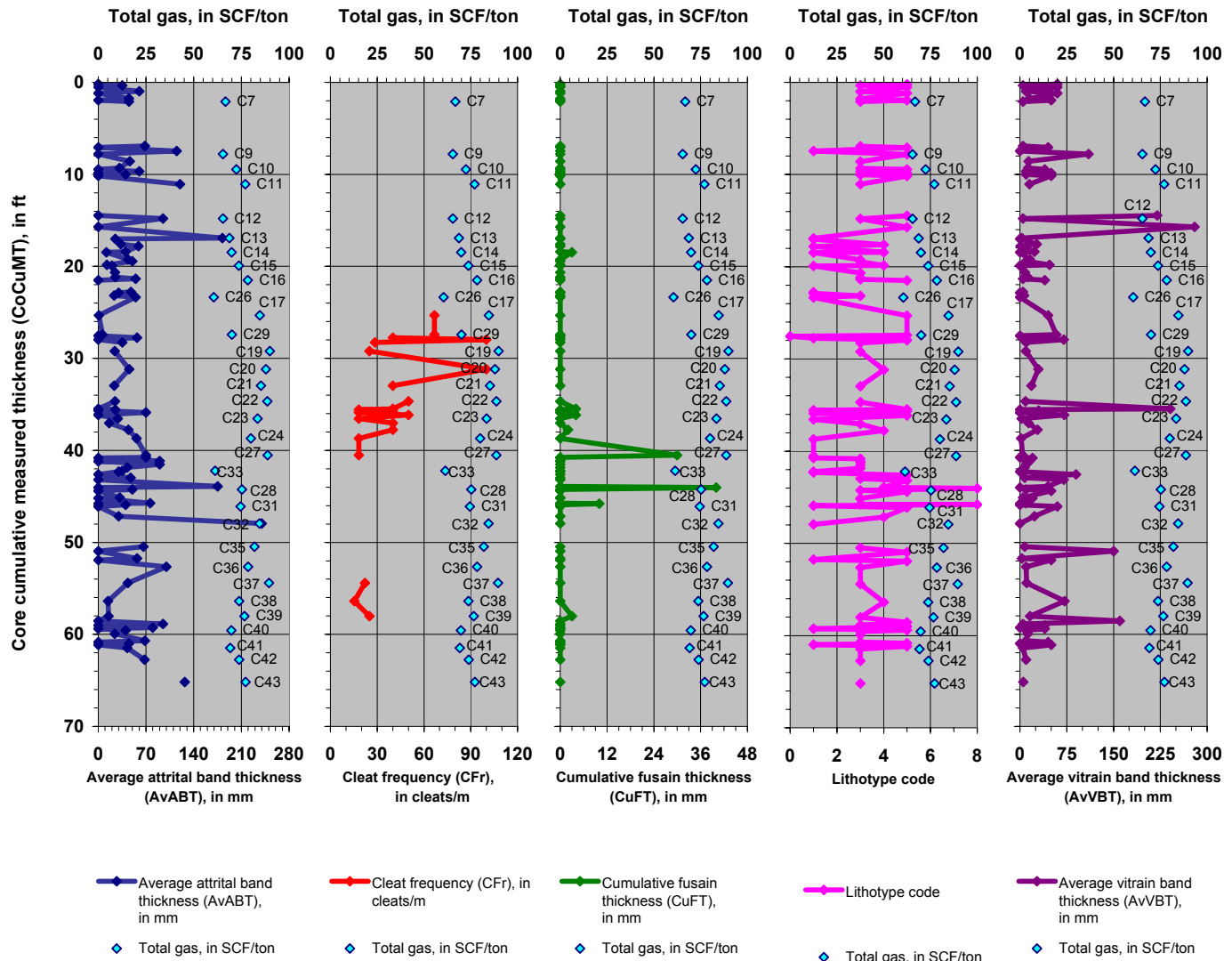


Figure 2-33. Graphs of total gas (standard cubic feet per ton, SCF/ton), average attrital band thickness (AvABT), cleat frequency (CFr), cumulative fusain thickness (CuFT), lithotype code, and average vitrain band thickness (AvVBT) plotted against core cumulative measured thickness (CoCuMT) for core hole 31, Williams Production RMT Company, Bullwacker Creek Unit (BCU) 32-9-4277 (Big George coal bed). Total gas points are labeled with canister numbers. See figure 6 for lithotype codes. All variables are listed in appendix 1, table 1-26.

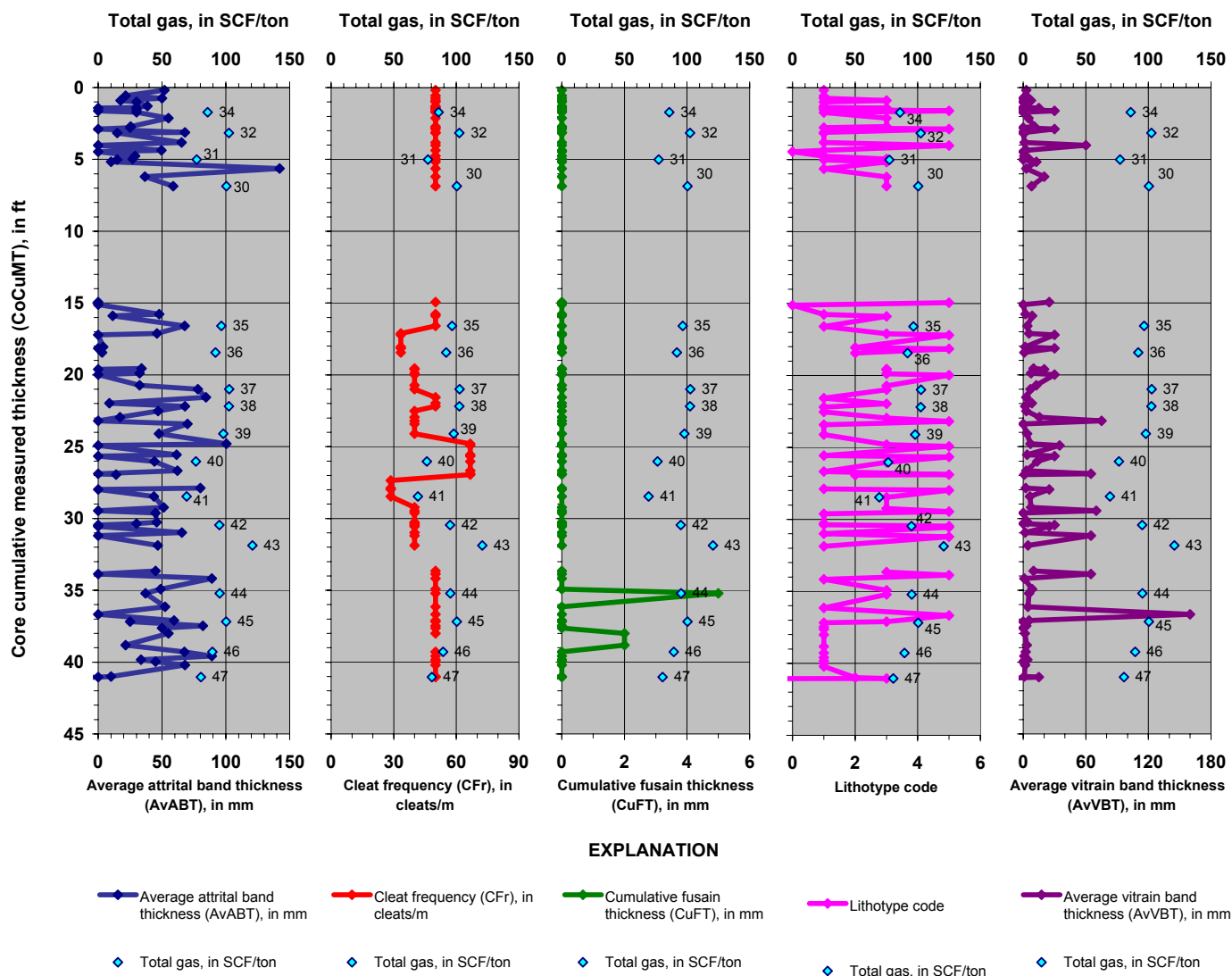


Figure 2-34. Graphs of total gas (standard cubic feet per ton, SCF/ton), average attrital band thickness (AvABT), cleat frequency (CFr), cumulative fusain thickness (CuFT), lithotype code, and average vitrain band thickness (AvVBT) plotted against core cumulative measured thickness (CoCuMT) for core hole 32, Lance Oil and Gas Company, Whiskey Draw Unit 12-12-4778 (Big George coal bed). Total gas points are labeled with canister numbers. See figure 6 for lithotype codes. All variables are listed in appendix 1, table 1-27.

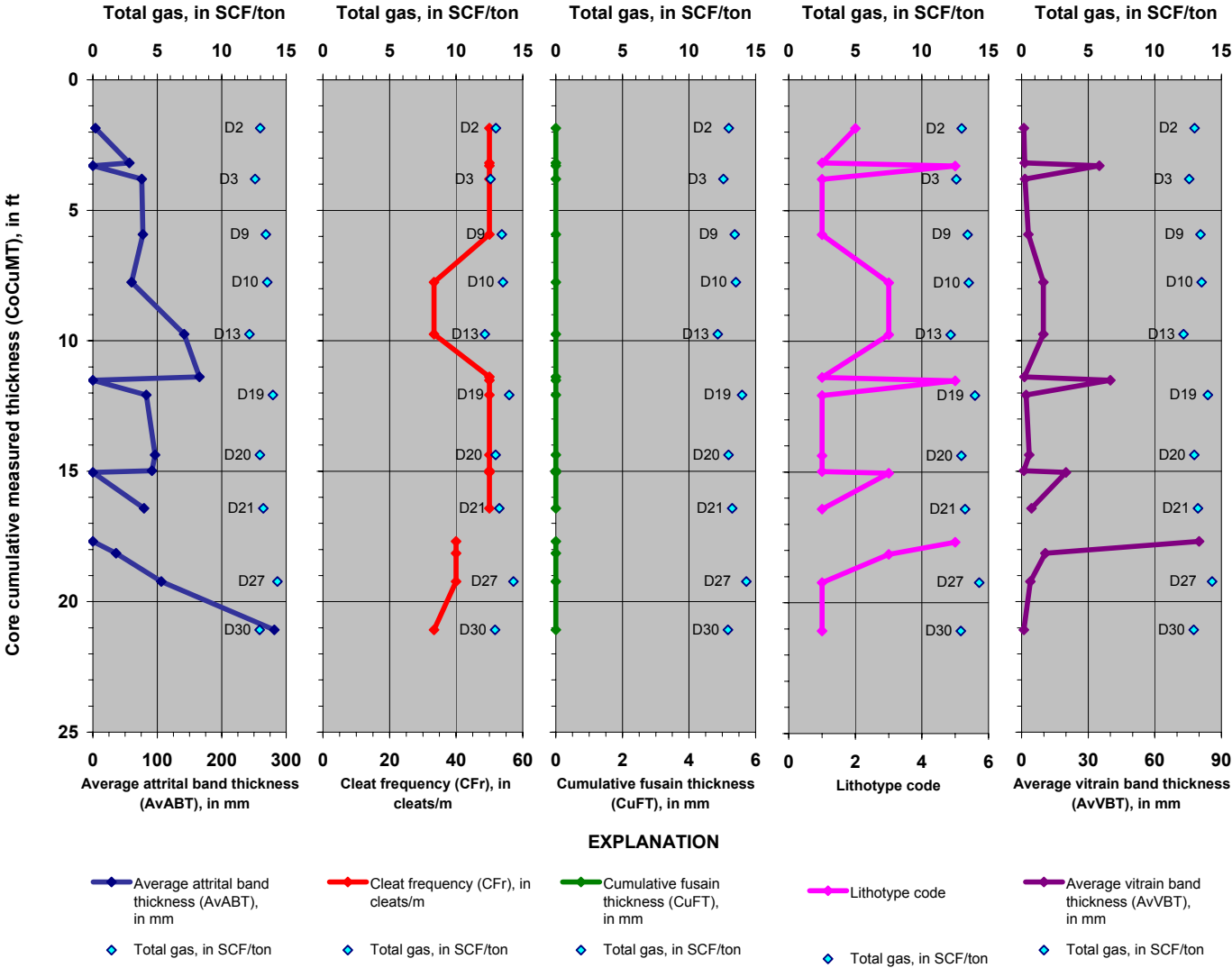


Figure 2-35. Graphs of total gas (standard cubic feet per ton, SCF/ton), average attrital band thickness (AvABT), cleat frequency (CFr), cumulative fusain thickness (CuFT), lithotype code, and average vitrain band thickness (AvVBT) plotted against core cumulative measured thickness (CoCuMT) for core hole 33, Lance Oil and Gas Company, Inc., McBeth 12-30-4673-BG (Big George coal bed). Total gas points are labeled with canister numbers. See figure 6 for lithotype codes. All variables are listed in appendix 1, table 1-28.

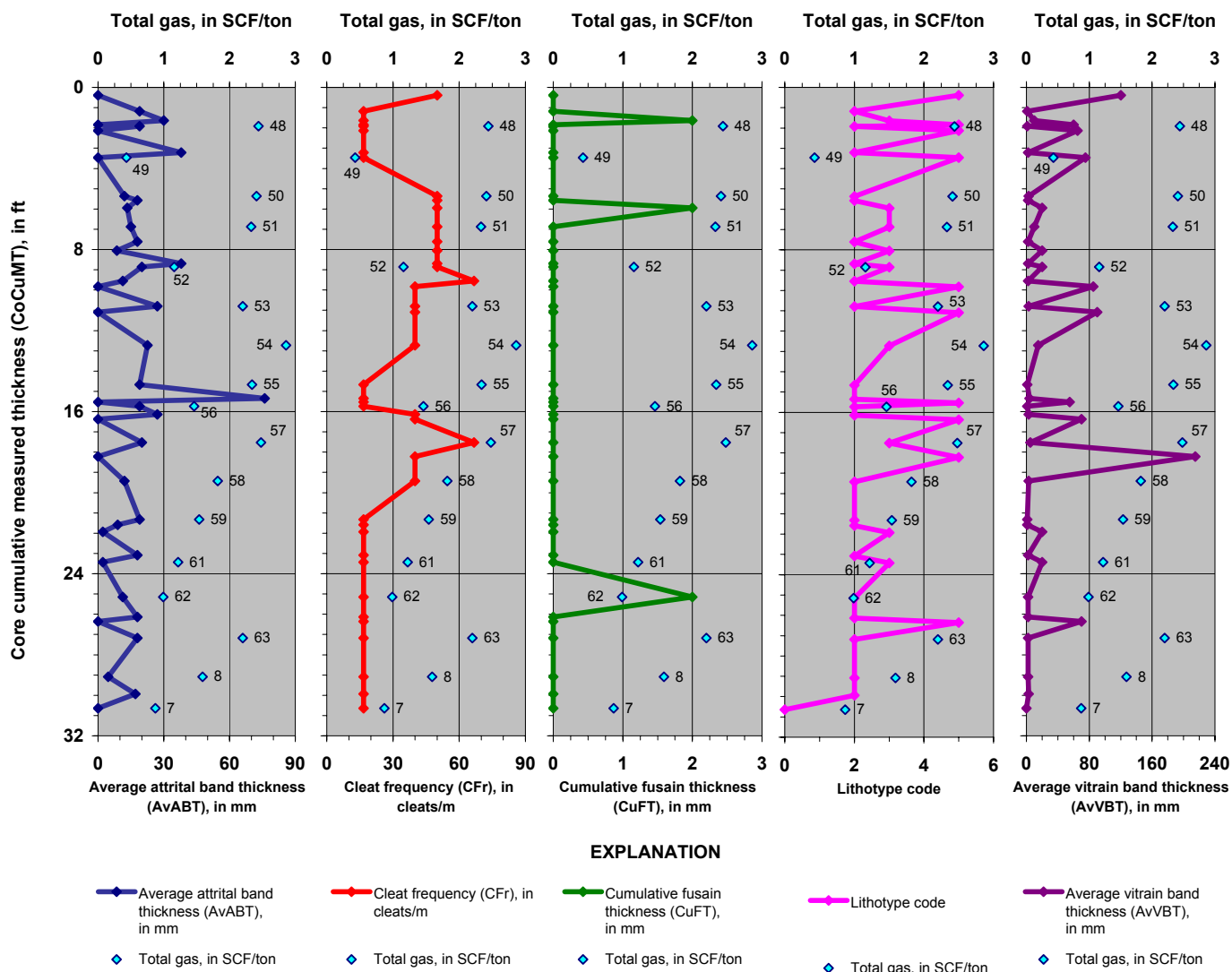


Figure 2-36. Graphs of total gas (standard cubic feet per ton, SCF/ton), average attrital band thickness (AvABT), cleat frequency (CFr), cumulative fusain thickness (CuFT), lithotype code, and average vitrain band thickness (AvVBT) plotted against core cumulative measured thickness (CoCuMT) for core hole 34, Williams Production RMT Company, State 23-16-4171 (Anderson coal bed). Total gas points are labeled with canister numbers. See figure 6 for lithotype codes. All variables are listed in appendix 1, table 1-29.

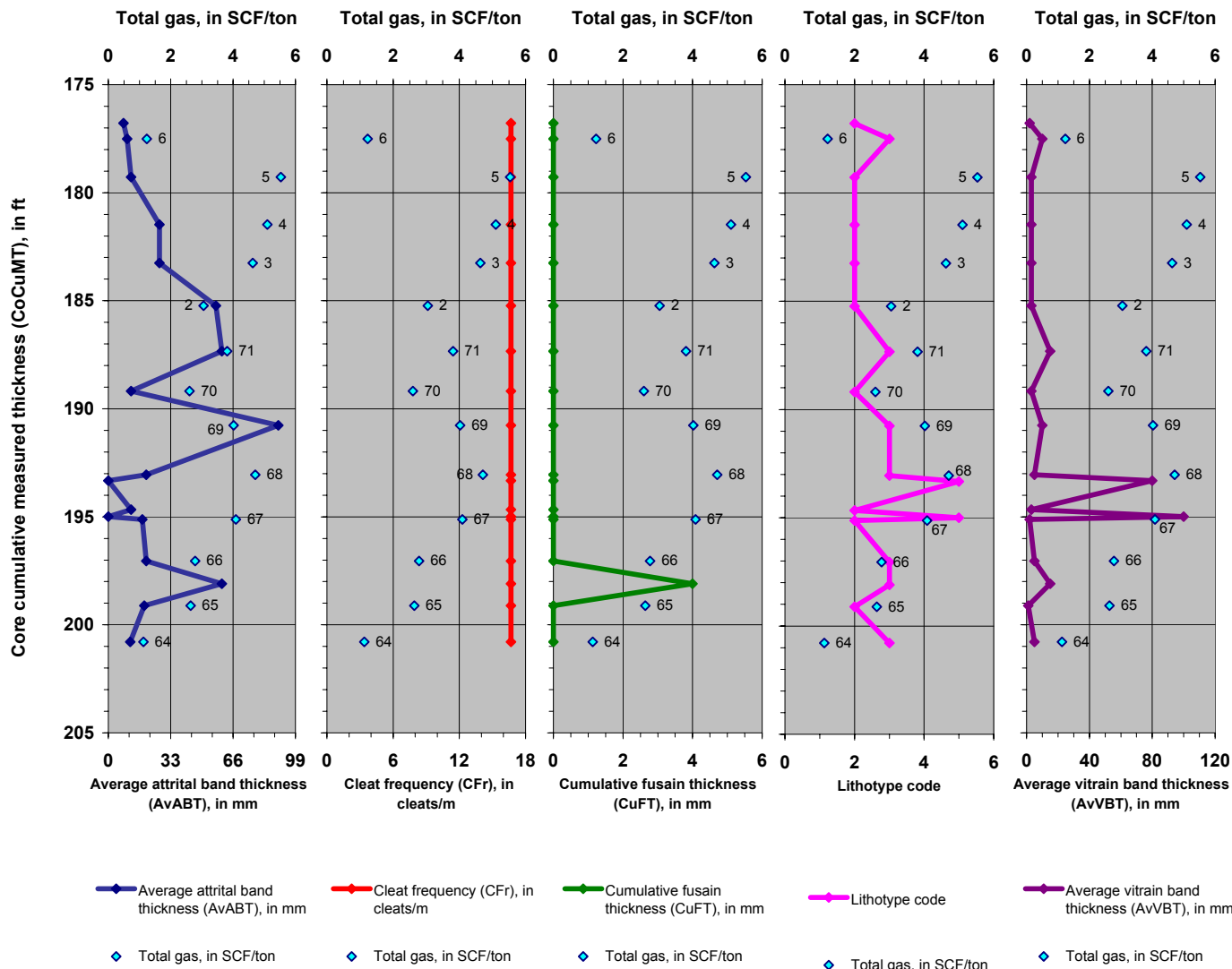


Figure 2-37. Graphs of total gas (standard cubic feet per ton, SCF/ton), average attrital band thickness (AvABT), cleat frequency (CFr), cumulative fusain thickness (CuFT), lithotype code, and average vitrain band thickness (AvVBT) plotted against core cumulative measured thickness (CoCuMT) for core hole 34, Williams Production RMT Company, State 23-16-4171 (Canyon coal bed). Total gas points are labeled with canister numbers. See figure 6 for lithotype codes. All variables are listed in appendix 1, table 1-29.

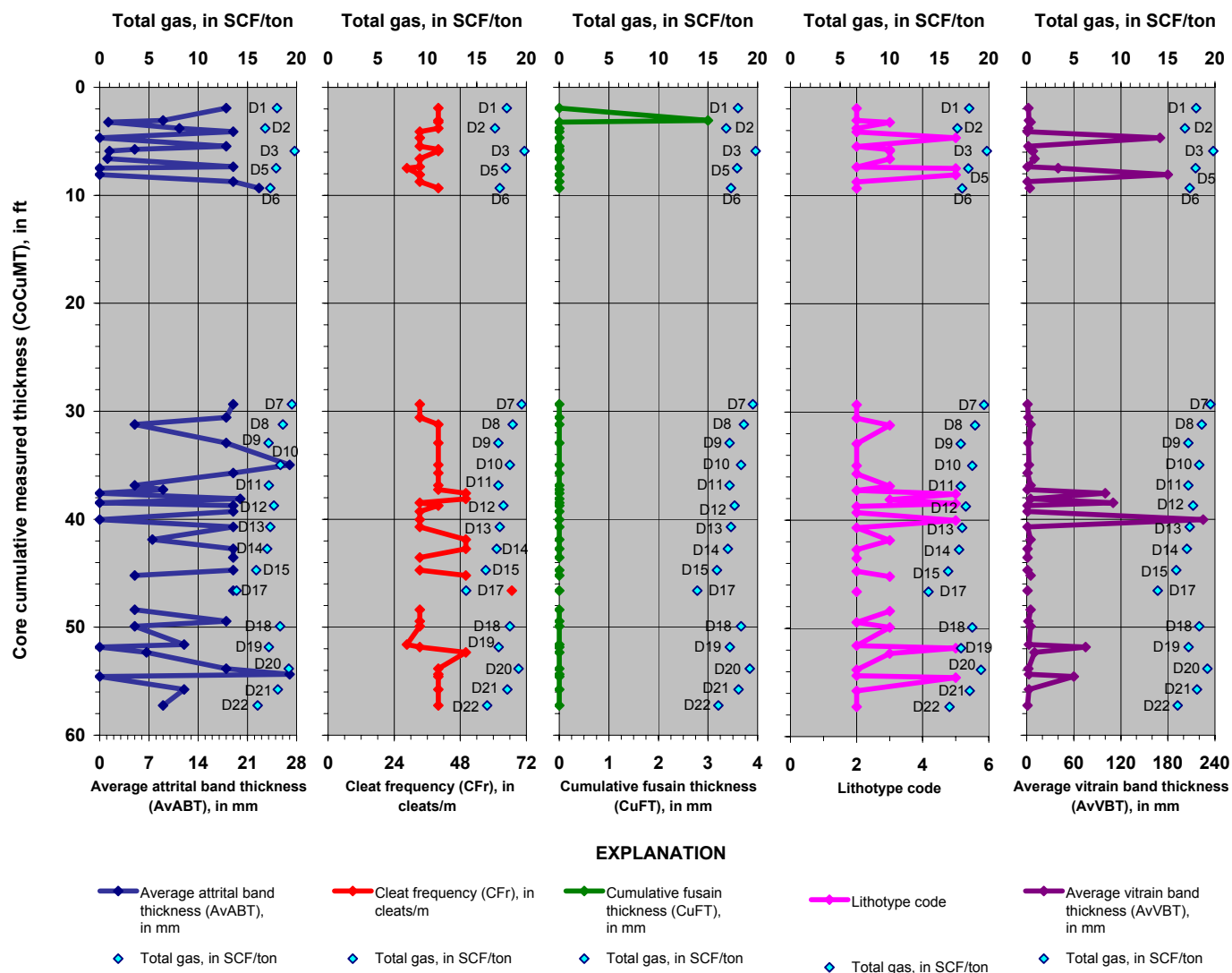


Figure 2-38. Graphs of total gas (standard cubic feet per ton, SCF/ton), average attrital band thickness (AvABT), cleat frequency (CFr), cumulative fusain thickness (CuFT), lithotype code, and average vitrain band thickness (AvVBT) plotted against core cumulative measured thickness (CoCuMT) for core hole 35, Williams Production Company, Groves 12-19-4574 (Big George coal bed). Total gas points are labeled with canister numbers. See figure 6 for lithotype codes. All variables are listed in appendix 1, table 1-30.

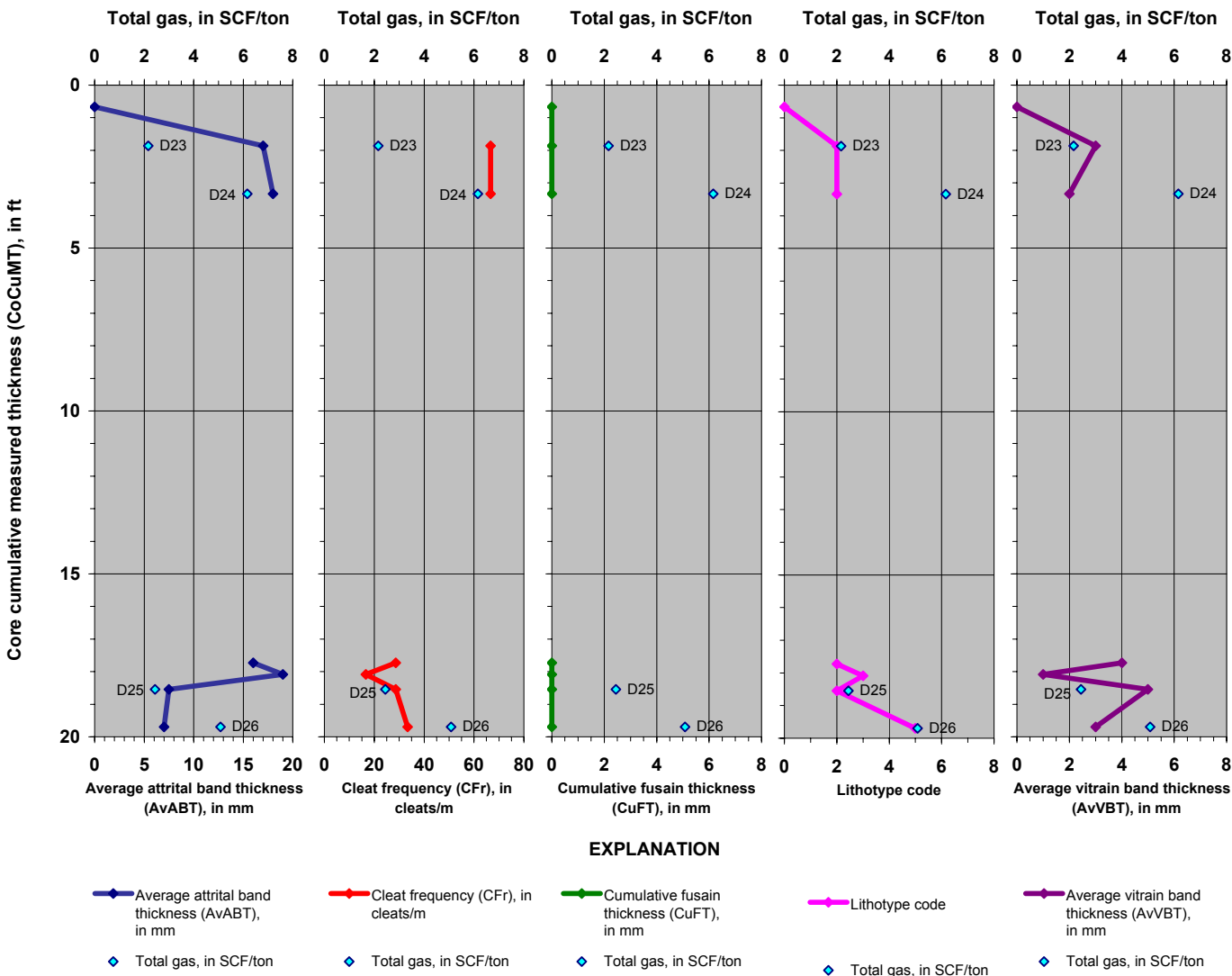


Figure 2-39. Graphs of total gas (standard cubic feet per ton, SCF/ton), average attrital band thickness (AvABT), cleat frequency (CFr), cumulative fusain thickness (CuFT), lithotype code, and average vitrain band thickness (AvVBT) plotted against core cumulative measured thickness (CoCuMT) for core hole 36, Peabody Natural Gas LLC, PNG 24-1 (Pawnee coal bed). Total gas points are labeled with canister numbers. See figure 6 for lithotype codes. All variables are listed in appendix 1, table 1-31.

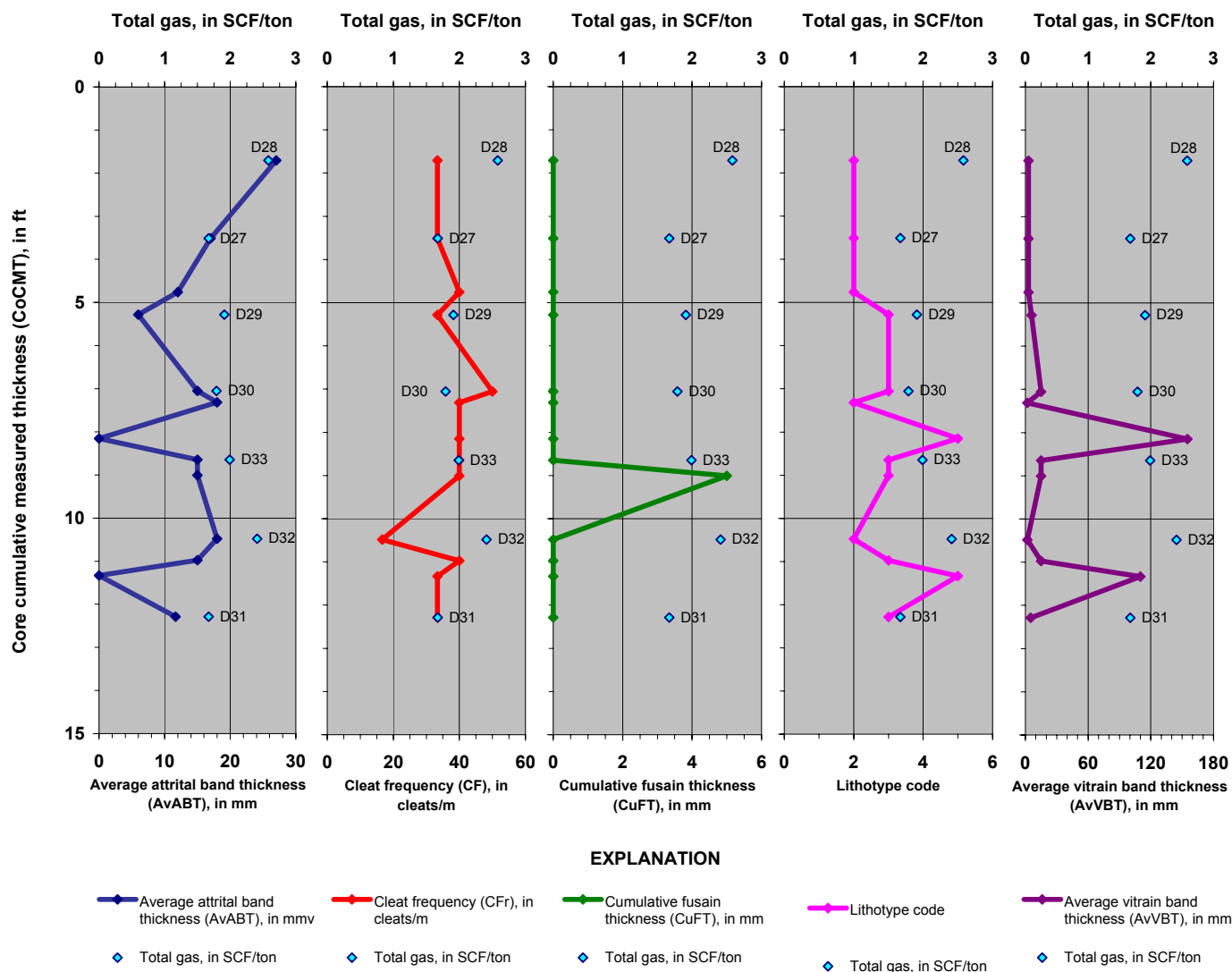


Figure 2-40. Graphs of total gas (standard cubic feet per ton, SCF/ton), average attrital band thickness (AvABT), cleat frequency (CFr), cumulative fusain thickness (CuFT), lithotype code, and average vitrain band thickness (AvVBT) plotted against core cumulative measured thickness (CoCuMT) for core hole 37, Peabody Natural Gas, LLC, PNG 26-1 (Pawnee coal bed). Total gas points are labeled with canister numbers. See figure 6 for lithotype codes. All variables are listed in appendix 1, table 1-32.

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Appendix 3. Graphs of Total Gas Against Canister Average Vitrain Percentage, Canister Average Attrital Percentage, Canister Average Cleat Frequency for Data From All Cores

Graphs for all cores showing total gas (SCF/ton) plotted against canister average vitrain percentage (CaAvVP), canister average attrital percentage (CaAvAP), and canister average cleat frequency (CaAvCFr).

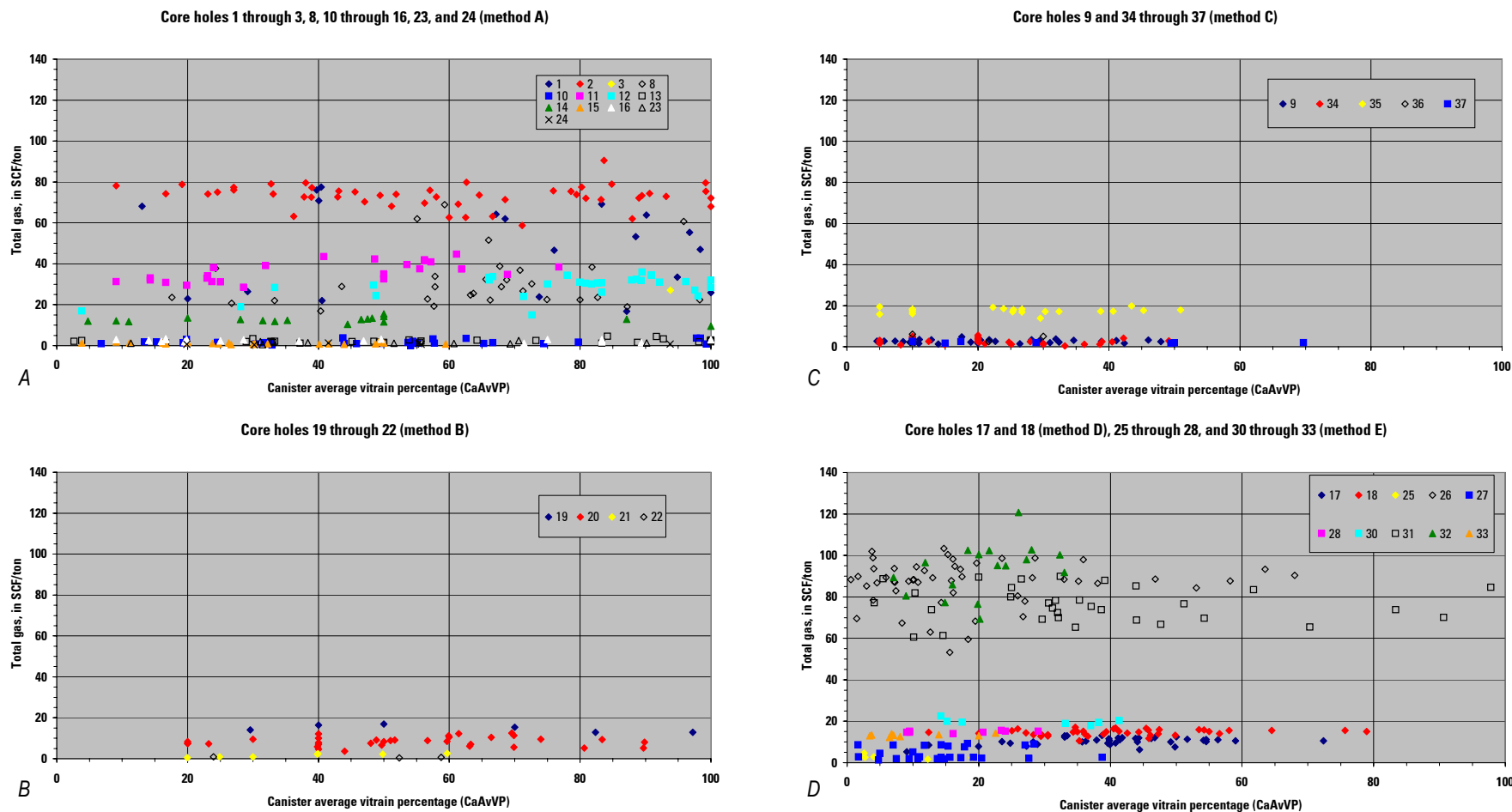


Figure 3-1. Graphs showing canister average vitrain percentage (CaAvVP) plotted against total gas (in standard cubic feet per ton, SCF/ton), grouped by lithologic description method, and color coded by core hole number (see table 1 in text for well name). A, Core holes 1 through 3, 8, 10 through 16, 23, and 24 (method A). B, Core holes 19 through 22 (method B). C, Core holes 9 and 34 through 37 (method C). D, Core holes 17 and 18 (method D), 25 through 28, and 30 through 33 (method E). Trend line for points in core hole 32 (part D) has an R-squared value of 0.179.

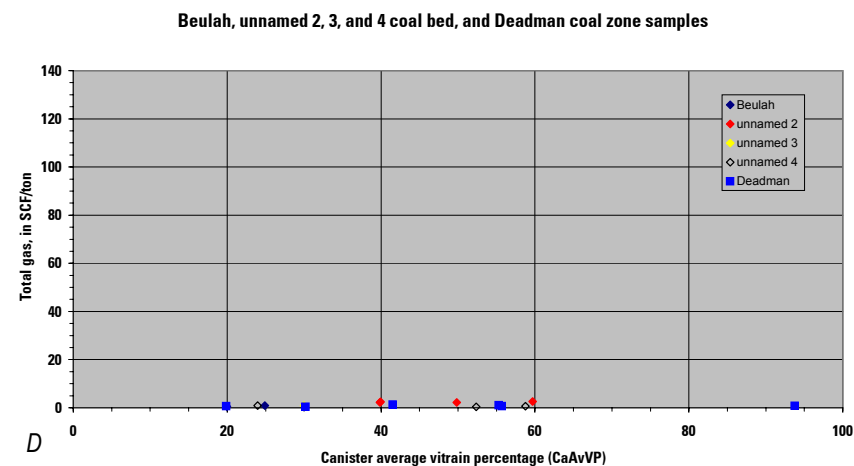
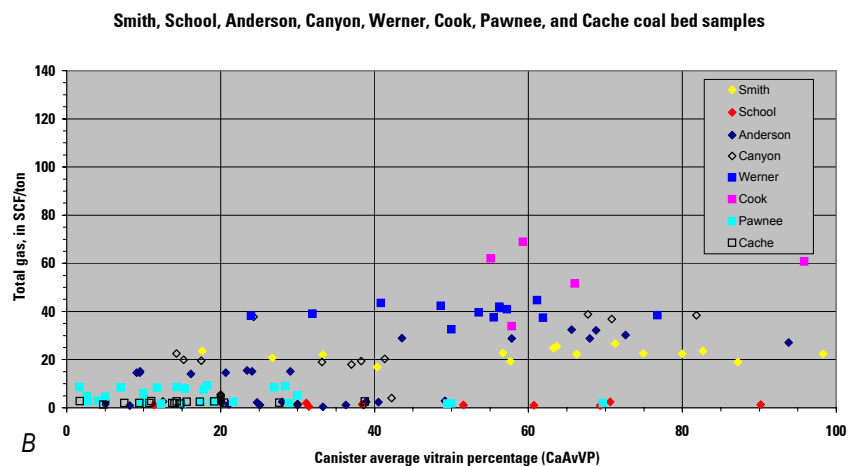
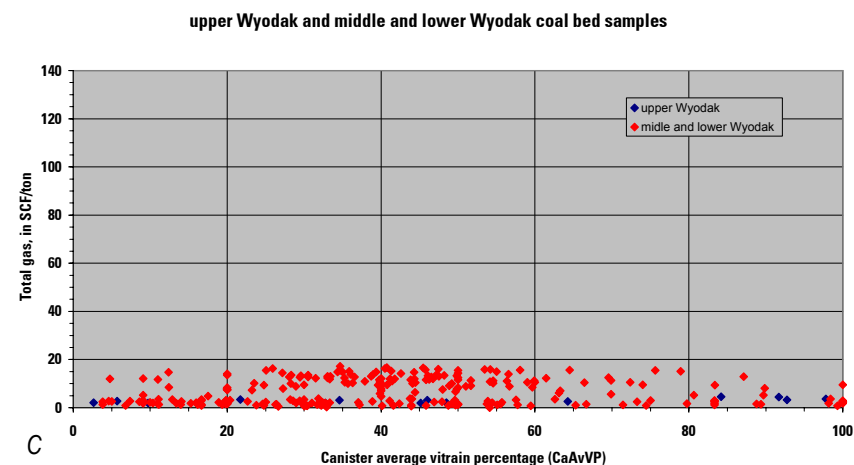
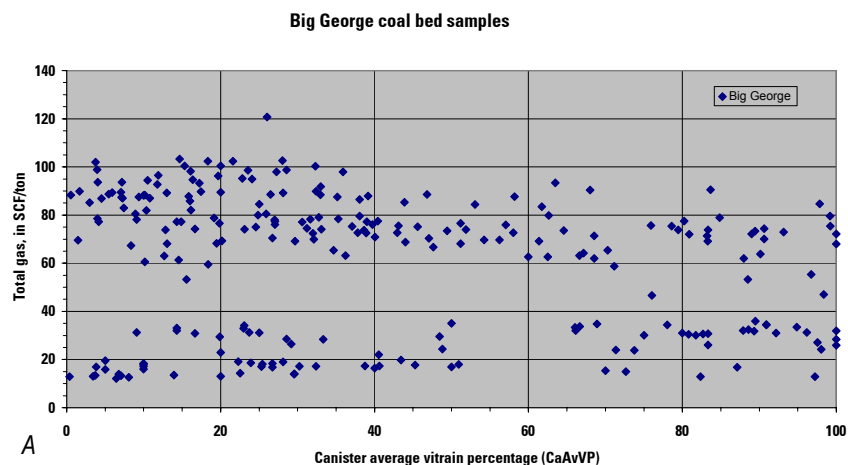


Figure 3–2. Graphs showing canister average vitrain percentage (CaAvVP) plotted against total gas(in standard cubic feet per ton, SCF/ton) for all core holes, color coded by coal bed. A, Big George coal bed. B, Smith, School, Anderson, Canyon, Werner, Cook, Pawnee, and Cache coal beds. C, upper Wyodak and middle and lower Wyodak coal beds. D, Beulah, unnamed 2, unnamed 3, and unnamed 4 coal beds, and Deadman coal zone.

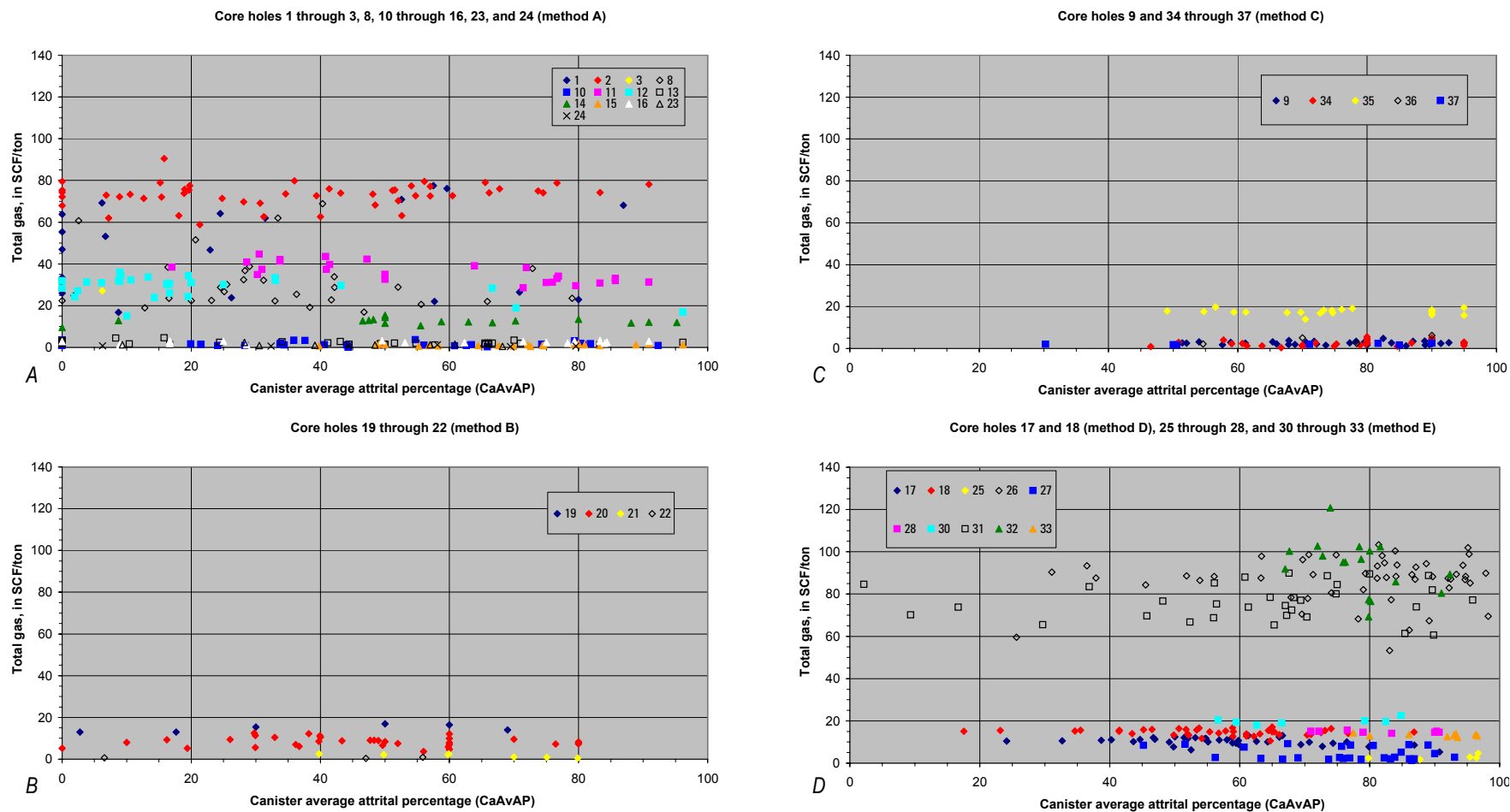


Figure 3-3. Graphs showing canister average attrital percentage (CaAvAP) plotted against total gas (in standard cubic feet per ton, SCF/ton), grouped by lithologic description method, and color coded by core hole number (see table 1 in text for well name). A, Core holes 1 through 3, 8, 10 through 16, 23, and 24 (method A). B, Core holes 19 through 22 (method B). C, Core holes 9 and 34 through 37 (method C). D, Core holes 17 and 18 (method D), 25 through 28, and 30 through 33 (method E). Trend line for points from core 32 (part D) has an R-squared value of 0.1775 with a negative slope.

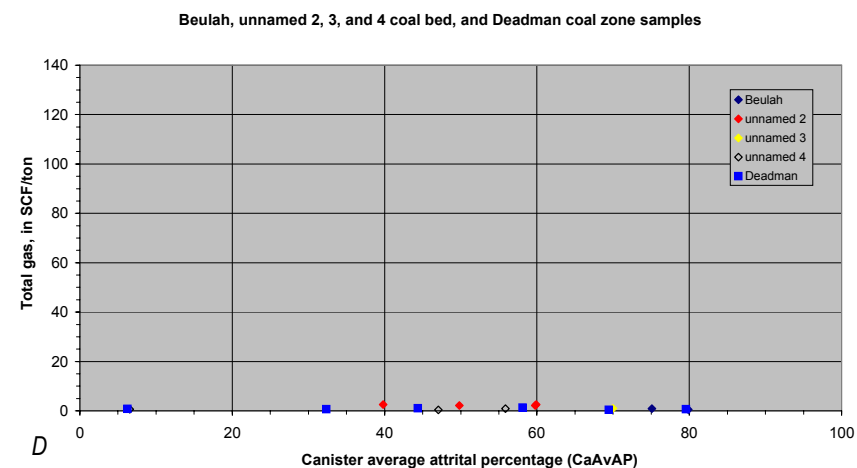
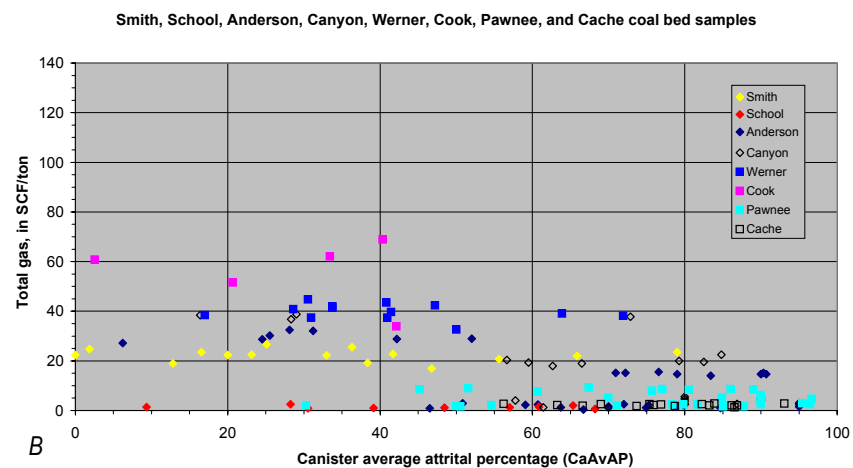
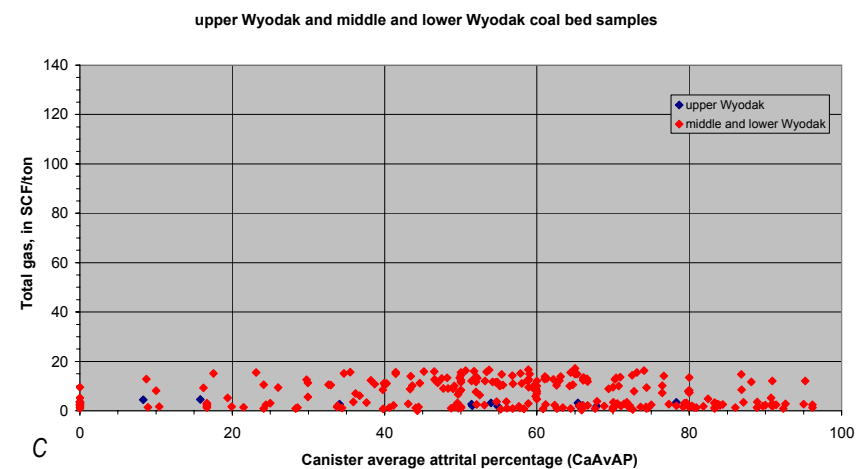
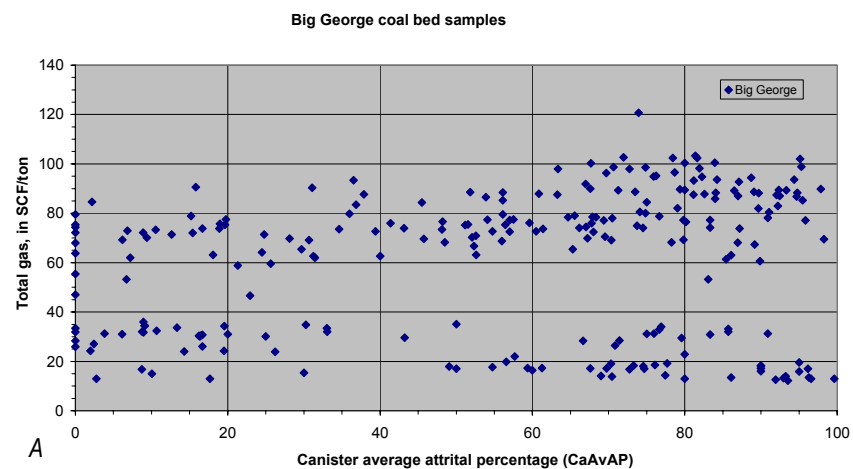


Figure 3–4. Graphs showing canister average attrital percentage (CaAvAP) plotted against total gas (in standard cubic feet per ton, SCF/ton) for all core holes, color coded by coal bed. A, Big George coal bed. B, Smith, School, Anderson, Canyon, Werner, Cook, Pawnee, and Cache coal beds. C, upper Wyodak and middle and lower Wyodak coal beds. D, Beulah, unnamed 2, unnamed 3, and unnamed 4 coal beds, and Deadman coal zone.

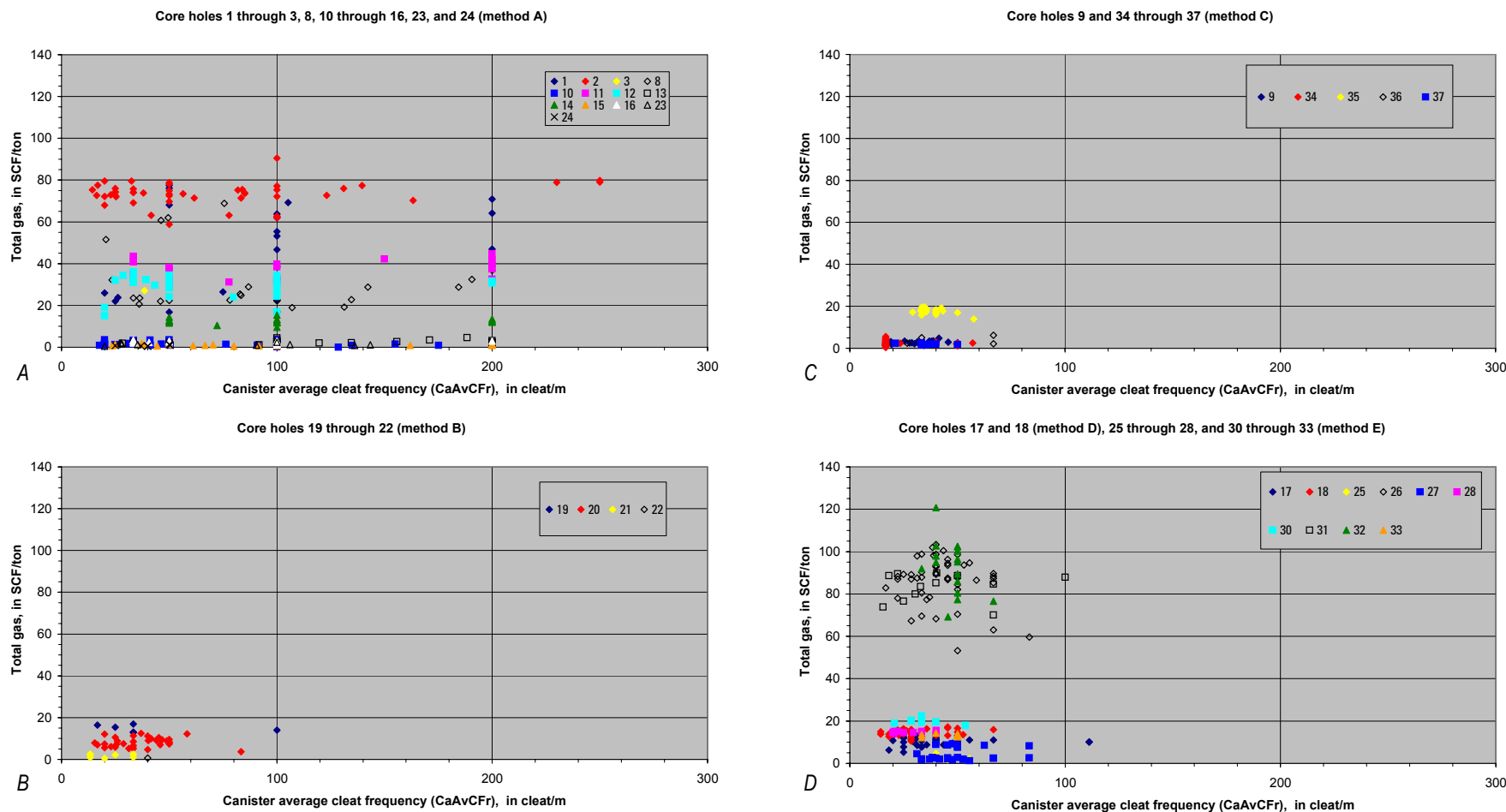


Figure 3-5. Graphs showing canister average cleat frequency (CaAvCFr) (in cleats per meter, cleats/m) plotted against total gas (in standard cubic feet per ton, SCF/ton), grouped by lithologic description method, and color coded by core hole number (see table 1 in text for well name). A, Core holes 1 through 3, 8, 10 through 16, 23, and 24 (method A). B, Core holes 19 through 22 (method B). C, Core holes 9 and 34 through 37 (method C). D, Core holes 17 and 18 (method D), 25 through 28, and 30 through 33 (method E).

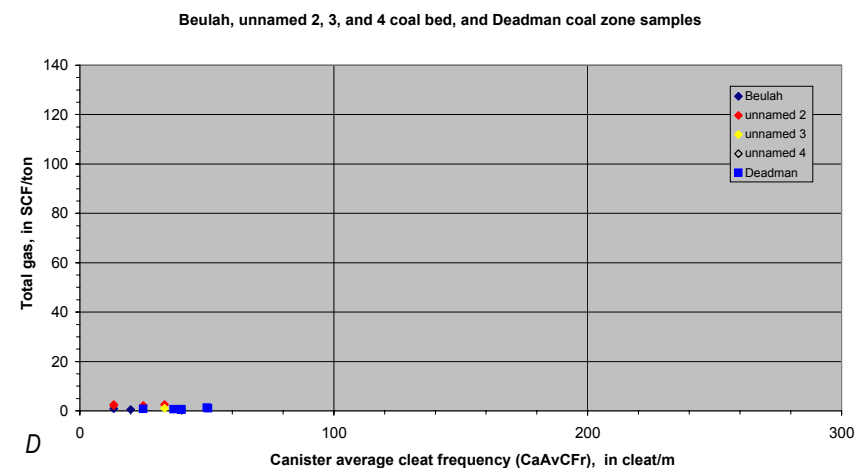
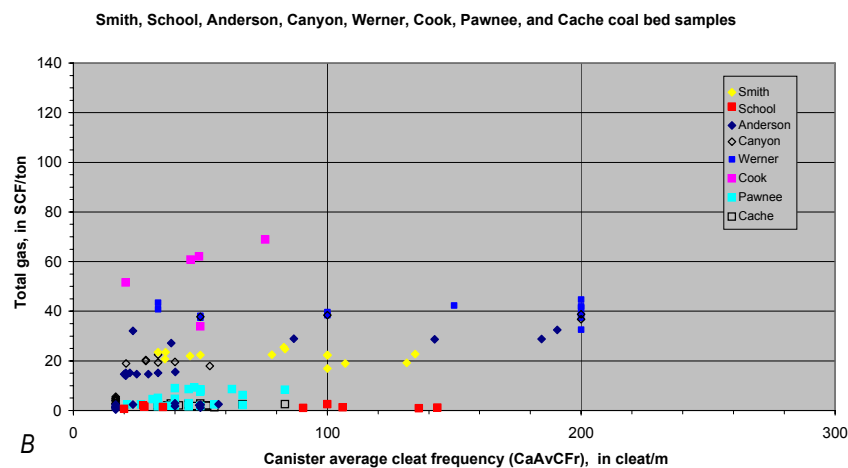
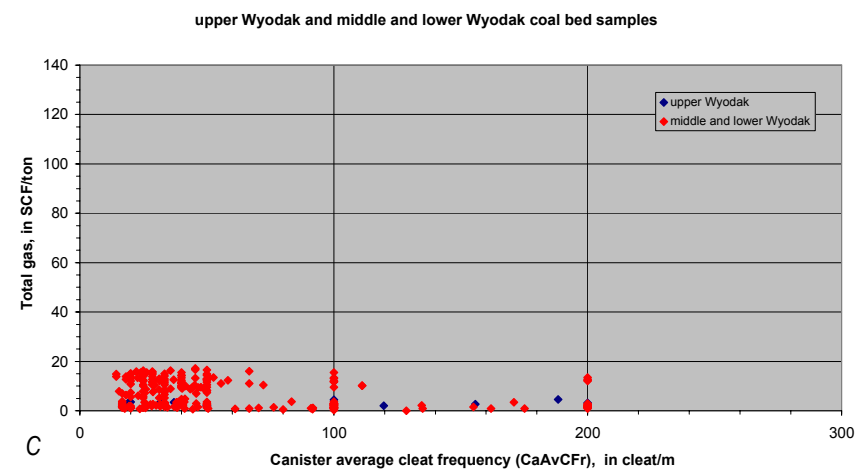
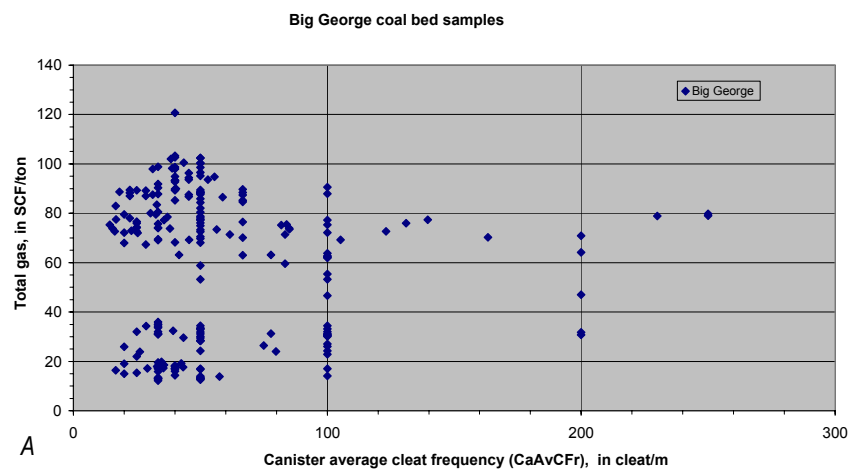


Figure 3–6. Graphs showing canister average cleat frequency (CaAvCFr) (in cleats per meter, cleats/m) plotted against total gas (in standard cubic feet per ton, SCF/ton) for all core holes, color coded by coal bed. A, Big George coal bed. B, Smith, School, Anderson, Canyon, Werner, Cook, Pawnee, and Cache coal beds. C, upper Wyodak and middle and lower Wyodak coal beds. D, Beulah, unnamed 2, unnamed 3, and unnamed 4 coal beds, and Deadman coal zone.