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Methane Emission From U.S. Coal Mines in 1975, A Survey

A Supplement to Information Circulars 8558 and 8659

UNITED STATES DEPARTMENT OF THE INTERIOR

Information Circular 8733

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By M. C. Irani, J. H. Jansky, P. W. Jeran, and G. L. Hassett

UNITED STATES DEPARTMENT OF THE INTERIOR
Cecil D. Andrus, Secretary

BUREAU OF MINES

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CONTENTS

ILLUSTRATIONS

TABLES

METHANE EMISSION FROM U.S. COAL MINES IN 1975, A SURVEY

A Supplement to Information Circulars 8558 and 8659

by

M. C. Irani,[1] J. H. Jansky,[2] P. W. Jeran,[2] and G. L. Hassett[3]

ABSTRACT

This Bureau of Mines report tabulates methane emissions from U.S. bituminous coal mines with daily emission rates of at least 100,000 cfd according to States, counties, and coalbeds. Most of the methane emitted is from mines in the Appalachian States. Total daily emission in 1975 was 216.3 MMcfd, compared with 227.0 MMcfd in 1971 and 214.5 MMcfd in 1973.

Thirty counties in nine States had daily methane emissions of 1 MMcfd or more. These emitted 93 percent of the total methane. The highest emissions were from Monongalia County, W. Va., which accounted for 18.9 percent of the total. This was followed by Marion County, W. Va., 9.6 percent; Buchanan County, Va., 8.5 percent; Jefferson County, Ala., 6.1 percent; and Washington County, Pa., 5.9 percent. The Pittsburgh coalbed emitted 45.7 percent of the total methane, followed by the Pocahontas No. 3 coalbed with 12.9 percent.

The report lists 196 mines, of which 60 had daily methane emissions of 1 MMcfd or more. Included in this compilation are the identification and thickness of the coalbed, methane emission, coal production and ventilation rates, number of drifts, shafts, and slopes used for ventilation purposes, shaft depth, age of mine, and gas-to-coal ratio.

INTRODUCTION

Methane in coal mines constitutes an explosion hazard with which the Bureau of Mines has been concerned since its establishment in 1910. In recent years, the Bureau has been conducting a vigorous and increasingly comprehensive methane control research program. The need for this program was evidenced by the fact that while coal mine fatalities were decreasing in the years from 1965 to 1970, the number of fatalities due to ignitions and

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explosions in the underground coal mines was increasing (12).[4] This has been attributed largely to the fact that deeper coalbeds were being mined at faster rates and that more methane was emitted under these conditions.

All parts of our country's coalfields are not equally gaseous. This has been pointed out in previous reports (4-5), updated herein, which tabulate daily methane emissions according to mines, States, counties, and coalbeds for underground bituminous coal mines in the United States. The Pittsburgh coalbed emitted 45 to 47 percent of the total methane emissions in 1971 and 1973. The Pocahontas No. 3 coalbed emitted 16 percent of the total for both years, and the Illinois Nos. 5 and 6 coalbeds emitted 7 percent of the total for both years. In 1971 and 1973, West Virginia produced more methane than any other State containing mines with methane emissions of at least 100,000 cfd. For both years, New Mexico was the least gassy State of those containing mines with methane emissions of at least 100,000 cfd.

The present fuel shortage has led to some interest in the recovery of methane from coal. The data in the three Bureau reports can be used to direct investigation to those areas with demonstrated high methane emissions. Cross reference to geographical needs for further gas may pinpoint the most economically attractive areas for further consideration.

Comparison of the data from several years may show trends in methane emissions for individual mines, coalbeds, counties, or States. Notable changes in these emissions can initiate research to determine causes of variations. The results of such research will aid in the understanding of methane emission and its controlling factors. This understanding will help in developing mining technology to improve the safety of the mine environment.

ACKNOWLEDGMENTS

The authors express their appreciation to the district and subdistrict managers, supervisors, and inspectors of the Mining Enforcement and Safety Administration (MESA) who willingly contributed their time and experience. The successful completion of this study would not have been possible without their cooperation.

DATA SOURCES

The data presented in this report were obtained from the MESA district and subdistrict offices. They were supplemented by interviews with officials and mining companies with whom the Bureau has active cooperative agreements and with individual mine inspectors. The Bureau has 29 continuous-recording methanometers installed at the exhaust fans of 14 mines; data from these fans are being treated separately for a report in a different form because they are much more detailed.

[4]Underlined numbers in parentheses refer to items in the list of references preceding the appendixes.

METHANE EMISSIONS INTO MINE WORKINGS

Hydrocarbon gases are an integral part of coal formed by biochemical and physical processes which take place during conversion of accumulated plant material into coal. Methane constitutes 98 percent of the hydrocarbon gases formed during genesis of coal (8). Most of the remaining 2 percent is made up of ethane, propane, butane, and pentane. A large part of these gases are retained in the coal.

When a coalbed is mined, the equilibrium conditions change and the methane and other gases within the coal migrate to the mine opening. This migration is by diffusion through the solid coal and flow through the fractures. In U.S. coalbeds, flow through fractures has been reported to be the dominant method of migration (1).

Recent studies utilizing continuous-recording methane monitors have shown that changes in the emission rates from advancing sections in the Pittsburgh and Beckley coalbeds are related to length of virgin mine ribs (6-7). In some coalbeds in this country, methane is also contained in the rock strata adjacent to the coal. One study conducted at a retreating longwall face showed methane emissions to average 34 cfm prior to the first fall of roof (9); breakup of roof strata behind the longwall face increased the methane emissions to more than 700 cfm.

PRESENTATION OF DATA

The data are summarized in tabular form. The most detailed data, in appendix A, provide information on 60 bituminous coal mines that produced at least 1 MMcfd of methane, the identification and thickness of the coalbed being mined, daily methane emission and coal production rates, ventilation rates, number of mine openings used for ventilation purposes, average shaft depth, and age of mine. The ratio of methane emissions to coal production as cubic feet of gas produced per ton mined has been taken as a measure of gassiness in the past and is included in this report for comparison with figures from past years. This quantity is only an approximation, based on average daily coal production and methane removed by ventilation, for mature mines.

Appendix B lists 196 mines in order of daily gas emission rates from 11.6 to 0.1 MMcfd. These mines emitted a total of 216.3 MMcfd. This list does not contain mines which have daily methane emission rates less than 100,000 cfd; data for these mines are not available.

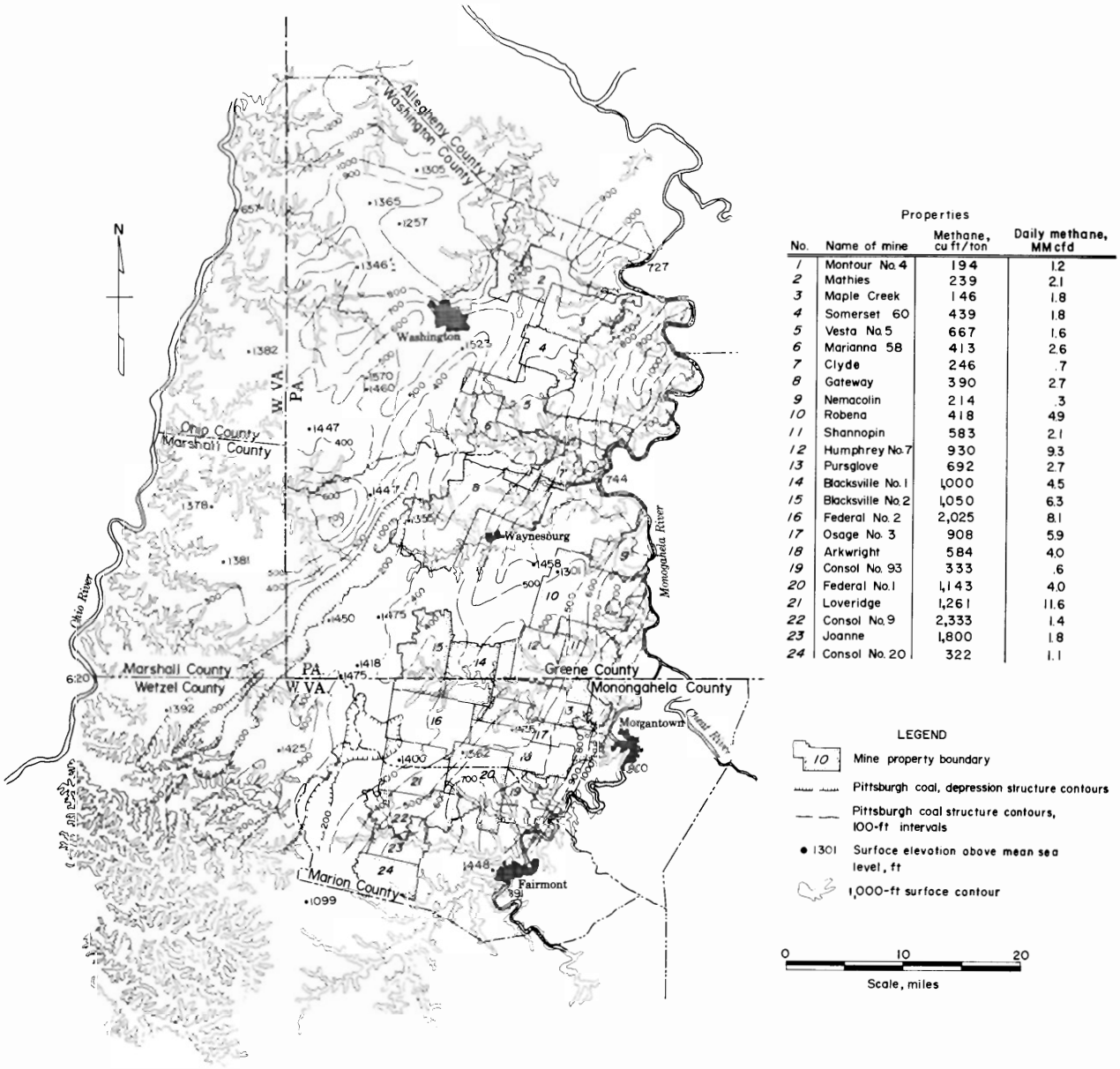
Appendix C presents methane emission data by State and county for mines with emission rates in excess of 100,000 cfd.

Appendix D lists methane emission from mines in coalbeds with emissions of at least 1 MMcfd per coalbed.

A complete listing of methane emissions for States and counties containing mines with total daily methane emission rates of at least 100,000 cfd is

given in appendix E. It also contains data for 1971 and 1973, and the percent change from year to year.

Figure 1 shows coal structure contours, surface elevations, and the locations of a number of active mines in the Pittsburgh coalbed, which emits more methane than any other coalbed in this country. These mines are identified in the appendixes, which also contain the current methane emission figures for each mine. Note in particular the increase of methane emission rate for mines developed towards the southwest away from the Monongahela River under deeper cover.



No.	Name of mine	Methane, cu ft/ton	Daily methane, MMcfd
1	Montour No. 4	194	1.2
2	Mathies	239	2.1
3	Maple Creek	146	1.8
4	Somerset 60	439	1.8
5	Vesta No. 5	667	1.6
6	Marianna 58	413	2.6
7	Clyde	246	.7
8	Gateway	390	2.7
9	Nemacolin	214	.3
10	Robena	418	4.9
11	Shannopin	583	2.1
12	Humphrey No. 7	930	9.3
13	Pursglove	692	2.7
14	Blacksville No. 1	1,000	4.5
15	Blacksville No. 2	1,050	6.3
16	Federal No. 2	2,025	8.1
17	Osage No. 3	908	5.9
18	Arkwright	584	4.0
19	Consol No. 93	333	.6
20	Federal No. 1	1,143	4.0
21	Loveridge	1,261	11.6
22	Consol No. 9	2,333	1.4
23	Joanne	1,800	1.8
24	Consol No. 20	322	1.1

FIGURE 1. - Locations of selected active mines in the Pittsburgh coalbed.

DISCUSSION

In 1975, 196 underground bituminous coal mines in the United States had methane emissions of at least 100,000 cfd (appendix B). These mines had a total daily methane emission of 216.3 MMcfd and were distributed through 67 counties in 11 States (fig. 2). Of these 196 mines, 60 had emission rates of 1 MMcfd or more (appendix A) and collectively emitted a total of 177.2 MMcfd, or 79 percent of the total daily methane emissions.

Geographically, the Appalachian area accounted for 86 percent of the total emissions. West Virginia had the highest daily emissions (96.4 MMcfd), followed by Pennsylvania (43.1 MMcfd), Virginia (22.1 MMcfd), Alabama (16.6 MMcfd), Ohio (6.1 MMcfd), eastern Kentucky (1.7 MMcfd), and eastern Tennessee (0.3 MMcfd). The only States with significant gas emissions outside the Appalachian area were Illinois with 14.2 MMcfd (6.8 percent of the total) and Colorado with 9.1 MMcfd (4.2 percent of the total) (appendix C).

Thirty counties had total daily methane emissions of 1 MMcfd or more. These counties, located in figure 3, accounted for 93 percent of all emissions. The Appalachian area contains 22 of these counties with high methane emissions. Of the remaining eight counties, four are in Illinois, two in western Kentucky, one in Colorado, and one in Utah. The coals being mined in Colorado and Utah

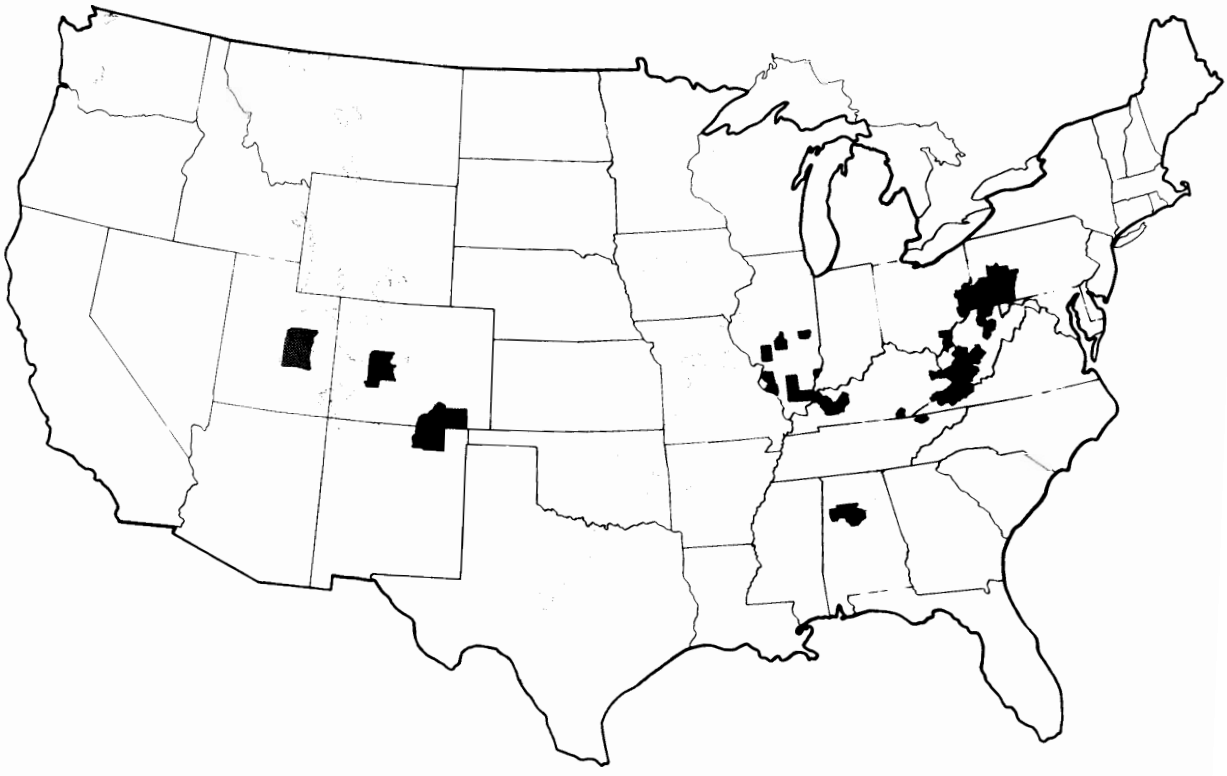


FIGURE 2. - Location map of counties with bituminous coal mines emitting at least 100,000 cfd of methane in 1975.

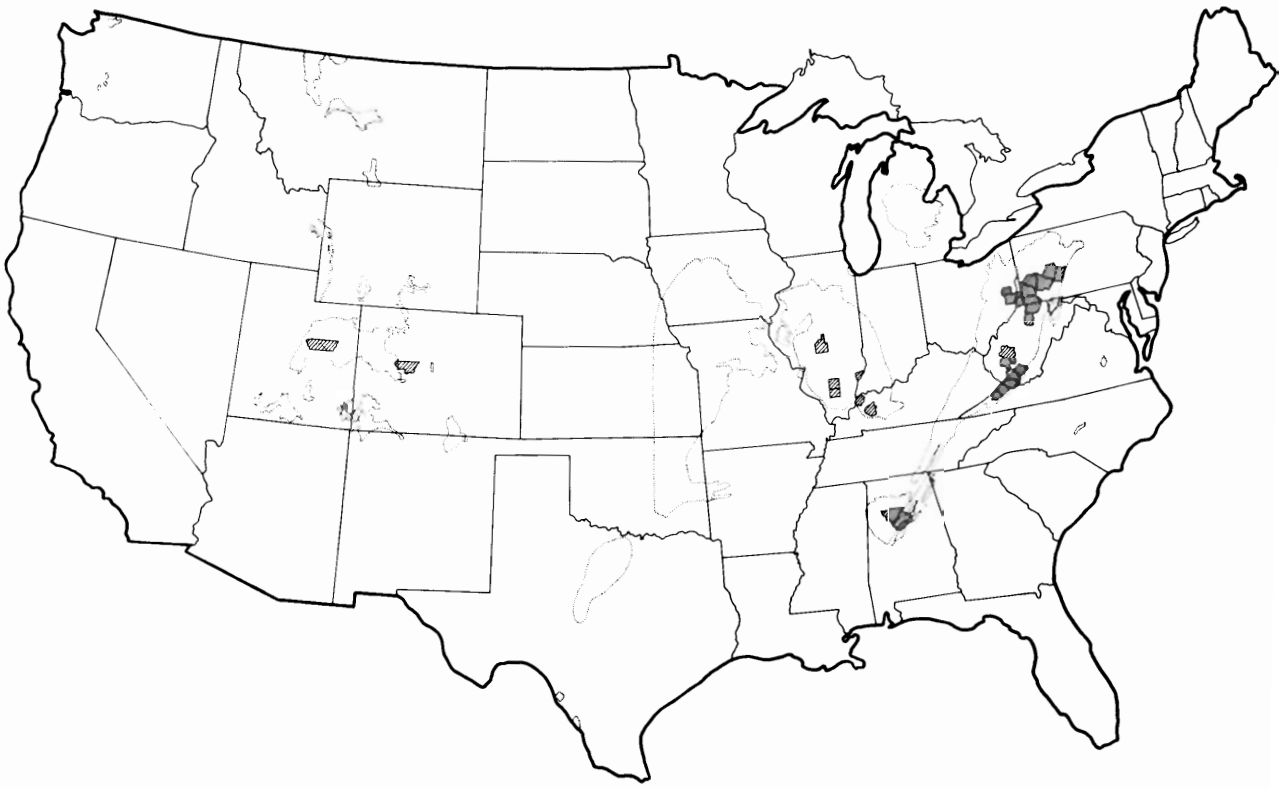


FIGURE 3. - Location map of counties with total methane emissions in excess of 1 MMcfd in 1975.

are Cretaceous in age, and the Appalachian, Illinois, and Kentucky coals are Pennsylvanian in age.

The Pittsburgh coalbed underlies southwestern Pennsylvania, eastern Ohio, and northern West Virginia. Mines in this coalbed emitted more methane (98.8 MMcfd) than mines in any other coalbed and accounted for 45.6 percent of the total emission. The next highest emission was from the Pocahontas No. 3 coalbed, 27.8 MMcfd or 12.8 percent of the total. This coalbed underlies southern West Virginia and northwestern Virginia. Mines in the Illinois Nos. 5 and 6 coalbeds emitted 14.0 MMcfd, or 6.4 percent; mines in the Freeport coalbeds, 12.5 MMcfd, or 5.7 percent; and mines in the Kittanning coalbeds, 11.0 MMcfd, or 5.1 percent. Collectively, the foregoing mines accounted for 91 percent of the total methane emission (appendix D). It has been reported (11) that the Illinois 5 coalbed is correlative with the Kentucky 9 and that the Illinois 6 coalbed is correlative with the Kentucky 11. These coalbeds are listed separately in this report to be consistent with previous reports (4-5).

Table 1 shows the numerical distribution of coal mines with a methane emission rate of at least 100,000 cfd by State and coalbed. West Virginia had the greatest number of mines in this category (64), followed by Pennsylvania with 43. There are more of these mines (50) in the Pittsburgh coalbed than any other coalbed in the United States.

TABLE 1. - Numerical distribution of coal mines with an emission rate of at least 100,000 cfd, by State and coalbed

Coalbed	WV	PA	IL	KY	VA	OH	AL	CO	UT	NM	TN	Mines per coalbed
America	-	-	-	-	-	-	2	-	-	-	-	2
Basin B	-	-	-	-	-	-	-	5	-	-	-	5
Beckley	3	-	-	-	-	-	-	-	-	-	-	3
Blue Creek	-	-	-	-	-	-	1	-	-	-	-	1
Campbell Creek	1	-	-	-	-	-	-	-	-	-	-	1
Castle Gate B	-	-	-	-	-	-	-	-	1	-	-	1
Cedar Grove	4	-	-	-	-	-	-	-	-	-	-	4
Dorchester	-	-	-	-	1	-	-	-	-	-	-	1
Eagle	3	-	-	-	-	-	-	-	-	-	-	3
Ferron J	-	-	-	-	-	-	-	-	1	-	-	1
4-A	-	-	-	-	-	1	-	-	-	-	-	1
Freeport[1]	1	16	-	-	-	5	-	-	-	-	-	22
Illinois Nos. 5 and 6	-	-	16	-	-	-	-	-	-	-	-	16
Imboden	-	-	-	1	4	-	-	-	-	-	-	5
Jellico	-	-	-	-	-	-	-	-	-	-	1	1
Kentucky Nos. 9 and 11	-	-	1	12	-	-	-	-	-	-	-	13
Kittanning[1]	2	8	-	-	-	-	-	-	-	-	-	10
Lower Seaboard	-	-	-	-	1	-	-	-	-	-	-	1
Mary Lee	-	-	-	-	-	-	6	-	-	-	-	6
Millerscreek	-	-	-	1	-	-	-	-	-	-	-	1
Pittsburgh	25	18	-	-	-	7	-	-	-	-	-	50
Pocahontas No. 3	14	-	-	-	5	-	-	-	-	-	-	19
Pocahontas No. 4	5	-	-	-	-	-	-	-	-	-	-	5
Powellton	1	-	-	-	-	-	-	-	-	-	-	1
Pratt	-	-	-	-	-	-	3	-	-	-	-	3
Raton	-	-	-	-	-	-	-	1	-	-	-	1
Rock Canyon	-	-	-	-	-	-	-	-	1	-	-	1
Sewell	5	-	-	-	-	-	-	-	-	-	-	5
Sewickley	-	1	-	-	-	-	-	-	-	-	-	1
Splashdam	-	-	-	-	1	-	-	-	-	-	-	1
Stearns No. 2	-	-	-	1	-	-	-	-	-	-	-	1
Sunnyside[1]	-	-	-	-	-	-	-	-	2	-	-	2
Tiller	-	-	-	-	3	-	-	-	-	-	-	3
Warfield	-	-	-	3	-	-	-	-	-	-	-	3
York Canyon	-	-	-	-	-	-	-	-	-	1	-	1
Uncorrelated	-	-	1	-	-	-	-	-	-	-	-	1
Total	64	43	18	18	15	13	12	6	5	1	1	196

[1]These coalbeds contain more than 1 minable seam.

Total daily methane emissions from U.S. bituminous coal mines are compared for 1971, 1973, and 1975 (table 2). In 1971, the total daily methane

emissions were 227.0 MMcfd from 199 mines (5); in 1973, the emissions were 214.5 MMcfd from 192 mines (4); and in 1975, the emissions were 216.3 MMcfd from 196 mines. Table 2 lists only those coalbeds which contained mines emitting at least 100,000 cfd in 1975. These data for 1971, 1973, and 1975 show that the change in emissions from coalbeds tends to correlate with the change in the number of mines operating in these coalbeds. A notable exception is the Pittsburgh coalbed, which had a decline in emissions from 102.8 MMcfd to 98.8 MMcfd between 1971 and 1975 but an increase in the number of active mines from 47 to 50. This decline may be related to the increased use of gob degasification boreholes by several mines operating in the coalbed. The lack of accurate data on the output of these boreholes precludes a conclusion.

TABLE 2. - Methane emissions from and number of mines emitting at least 100,000 cfd in individual coalbeds for 1971, 1973, and 1975

Coalbeds	1971		1973		1975	
	CH_4 emissions, MMcfd	Mines	CH_4 emissions, MMcfd	Mines	CH_4 emissions, MMcfd	Mines
America	0.3	2	0.4	2	0.7	2
Basin B	7.4	3	4.0	4	8.6	5
Beckley	-	0	.4	1	3.0	3
Blue Creek	-	0	-	0	2.3	1
Campbell Creek	-	0	-	0	.1	1
Castle Gate B	-	0	-	0	.2	1
Cedar Grove	3.9	6	3.7	7	1.2	4
Dorchester	.3	1	-	0	.3	1
Eagle	-	0	1.3	5	1.1	3
Ferron J	-	0	-	0	.1	1
4-A	-	0	-	0	.4	1
Freeport[1]	11.8	18	10.9	18	12.5	22
Illinois Nos. 5 and 6	15.3	19	11.8	17	14.0	16
Imboden	.9	3	1.4	3	1.1	5
Jellico	-	0	.1	1	.3	1
Kentucky Nos. 9 and 11	4.1	15	4.6	15	3.9	13
Kittanning[1]	11.5	10	10.5	10	11.0	10
Lower Seaboard	-	0	.4	1	.5	1
Mary Lee	3.3	4	3.4	4	5.5	6
Millerscreek	-	0	-	0	.2	1
Pittsburgh	102.8	47	99.9	48	98.8	50
Pocahontas No. 3	34.1	21	34.9	26	27.8	19
Pocahontas No. 4	8.9	9	6.1	5	6.2	5
Powellton	.5	1	.7	1	.4	1
Pratt	7.6	2	7.3	2	8.1	3
Raton	.4	1	.3	1	.5	1
Rock Canyon	.2	1	.2	1	.2	1
Sewell	1.7	4	-	0	.9	5
Sewickley	.3	1	.6	1	.3	1
Splashdam	-	0	-	0	.1	1
Stearns No. 2	-	0	-	0	.1	1
Sunnyside[1]	1.5	2	3.2	5	1.8	2
Tiller	4.6	5	4.8	5	2.5	3
Warfield	-	0	-	0	.5	3
York Canyon	.3	1	.1	1	.7	1
Uncorrelated	.6	1	.5	1	.4	1

[1]These coalbeds contain more than 1 minable seam.

A comparison of counties producing 1 MMcfd or more of methane in 1971, 1973, and 1975 shows that the counties which produced the most gas have remained relatively constant (table 3). For all 3 reporting years, Monongalia County, W. Va., Marion County, W. Va., and Buchanan County, Va., have remained first, second, and third, respectively.

TABLE 3. - Counties with total daily methane emissions of at least 1 MMcfd during 1971, 1973, and 1975

Rank	1971		1973		1975	
	County	MMcfd	County	MMcfd	County	MMcfd
1	Monongalia, W. Va.	39.0	Monongalia, W. Va.	40.7	Monongalia, W. Va.	40.8
2	Marion, W. Va....	30.4	Marion, W. Va....	23.1	Marion, W. Va....	20.8
3	Buchanan, Va.....	21.6	Buchanan, Va.....	21.7	Buchanan, Va.....	18.4
4	McDowell, W. Va..	13.1	Washington, Pa...	12.4	Jefferson, Ala...	13.2
5	Washington, Pa...	11.9	Greene, Pa.....	11.7	Washington, Pa...	12.7
6	Greene, Pa.....	11.4	McDowell, W. Va..	11.4	Greene, Pa.....	10.6
7	Jefferson, Ala...	10.3	Jefferson, Ala...	9.5	McDowell, W. Va..	10.5
8	Cambria, Pa.....	9.1	Cambria, Pa.....	9.5	Cambria, Pa.....	10.3
9	Pitkin, Colo.....	6.7	Wyoming, W. Va...	6.0	Pitkin, Colo.....	7.7
10	Franklin, Ill....	6.6	Marshall, W. Va..	4.8	Franklin, Ill....	5.3
11	Indiana, Pa.....	4.8	Indiana, Pa.....	4.7	Indiana, Pa.....	5.2
12	Jefferson, Ill...	4.0	Franklin, Ill....	4.1	Raleigh, W. Va...	4.8
13	Harrison, Ohio...	3.9	Jefferson, Ill...	3.9	Harrison, W. Va..	4.4
14	Raleigh, W. Va...	3.7	Pitkin, Colo.....	3.5	Marshall, W. Va..	4.2
15	Marshall, W. Va..	3.4	Harrison, W. Va..	3.5	Wyoming, W. Va...	3.9
16	Harrison, W. Va..	3.4	Harrison, Ohio...	3.4	Harrison, Ohio...	3.5
17	Wyoming, W. Va...	3.0	Carbon, Utah.....	3.3	Walker, Ala.....	2.9
18	Carbon, Utah.....	2.8	Raleigh, W. Va...	2.9	Jefferson, Ill...	2.7
19	Dickenson, Va....	2.1	Russell, Va.....	2.8	Ohio, W. Va.....	2.5
20	Logan, W. Va.....	2.1	Boone, W. Va.....	2.5	Carbon, Utah.....	2.2
21	Boone, W. Va.....	2.0	Anderson, Tenn...	2.5	Hopkins, Ky.....	2.0
22	Russell, Va.....	2.0	Hopkins, Ky.....	2.0	Allegheny, Pa....	1.7
23	Allegheny, Pa....	1.9	Dickenson, Va....	1.8	Belmont, Ohio....	1.5
24	Hopkins, Ky.....	1.8	Kanawha, W. Va...	1.6	Christian, Ill...	1.5
25	LeFlore, Okla....	1.6	Walker, Ala.....	1.6	Dickenson, Va....	1.5
26	Nicholas, W. Va..	1.5	Allegheny, Pa....	1.6	Wabash, Ill.....	1.4
27	Ohio, W. Va.....	1.4	Ohio, W. Va.....	1.6	Kanawha, W. Va...	1.3
28	Montgomery, Ala..	1.2	Belmont, Ohio....	1.5	Boone, W. Va.....	1.0
29	Belmont, Ohio....	1.2	Logan, W. Va.....	1.4	Westmoreland, Pa.	1.0
30	Somerset, Pa.....	1.2	Union, Ky.....	1.1	Union, Ky.....	1.0
31	Kanawha, W. Va...	1.1	Christian, Ill...	1.1	-	-
32	Williamson, Ala..	1.1	-	-	-	-
33	Muhlenberg, Ky...	1.0	-	-	-	-
34	Westmoreland, Pa.	1.0	-	-	-	-
35	Wise, Va.....	1.0	-	-	-	-

An expanded comparison for all counties shows that the only significant changes have occurred in the mines with lower methane emissions (appendix D).

CONCLUSIONS

In 1975, there were 196 bituminous coal mines in the United States emitting 100,000 cfd of methane or more. This is an increase of four mines since 1973. The total methane emissions from these mines in 1975 was 216.3 MMcfd, an increase of 1.8 MMcfd since 1973. Sixty mines had emissions of 1 MMcfd or more and accounted for 79 percent of the total methane emissions.

In 1975 the Appalachian region led all other coal mining areas in the United States in methane emissions. It contained 79 percent of the gassy mines and accounted for 86 percent of the total methane emissions. The western coalfields had 6 percent of the mines and 6 percent of the daily methane emissions. The central basin coalfields had 15 percent of the mines but only 8 percent of the total methane emissions. This indicates that research into methane emissions and their control should be directed primarily towards the Appalachian and western coalfields.

With increased emphasis on coal production to achieve energy independence, there will be an increase in methane emissions as more mines are opened in deeper coalbeds. This increase can be maintained by the use of degasification techniques which remove methane from the mine environment prior to its entering mine ventilation systems (2-3, 10). Methane removed in this way could be utilized as an auxiliary energy source.

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APPENDIX A.--CHARACTERISTICS OF U.S. COAL MINES PRODUCING OVER 1 MMcfd OF METHANE

Owner, name of mine, and location	Coalbed	Thickness of coalbed,[1] inches	Average methane emission in 24 hours, MMcfd	Coal production, tons per day	Gas per ton of coal mined, cubic feet	Air circulated in 24 hours, MMcf	Number of drifts (dr), shafts (sh), and slopes (sl)	Average depth of shaft, drift, or slope,[2] feet	Age of mine, years
Amex Coal Co.:									
Wabash mine	Illinois No. 5..	84	1.4	6,800	206	459	1 sl	-	3
Wabash County, Ill.							1 sh	768	
Alabama By-Products:									
Mary Lee mine	Mary Lee.....	54	1.7	4,800	354	988	1 sl	-	3
Walker County, Ala.		(36-62)					2 sh	565	
								(460-670)	
Allied Chemical Corp.:									
Shannon Branch mine	Pocahontas	45	1.1	1,500	733	2,847	7 sl	-	70
McDowell County, W. Va.	Nos. 3 and 4.	(38-52)					2 sh	(425-525)	
Barnes and Tucker Co.:									
Lancashire No. 20 mine	Lower Kittanning	54	1.0	2,000	500	613	1 dr	-	76
Cambria County, Pa.							1 sl	-	
							3 sh	485	
								(375-590)	
Beatrice Pocahontas Co.:									
Beatrice mine	Pocahontas No. 3	54	5.6	3,300	1,697	1,497	6 sh	1,454	12
Buchanan County, Va.		(48-60)							
Beckley Coal Co.:									
Beckley mine	Beckley.....	66	2.6	4,900	531	1,006	1 sl	-	4
Raleigh County, W. Va.							2 sh	594	
Bethlehem Mines Corp.:									
Bethlehem No. 32 mine	Lower Kittanning	54	4.5	3,000	1,500	1,147	5 sh	690	59
Cambria County, Pa.								(358-953)	
Cambria Slope No. 33 mine	Upper Kittanning Lower Kittanning	54	3.9	6,500	600	993	1 sl	-	12
Cambria County, Pa.							4 sh	573	
								(400-801)	
Marianna No. 58 mine	Pittsburgh.....	68	2.6	6,300	413	1,802	9 sh	(385-413)	71
Washington County, Pa.									
Somerset No. 60 mine	Pittsburgh.....	70	1.8	4,100	439	1,553	1 sl	-	75
Westmoreland County, Pa.							7 sh	(450-760)	
Clinchfield Coal Co.:									
Moss No. 3 mine (portal A)	Tiller.....	(84-180)	1.4	2,100	666	640	3 dr	-	17
Dickenson County, Va.							1 sh	722	
								(626-817)	
Consolidation Coal Co., Blacksville Division:									
Blacksville No. 1 mine	Pittsburgh.....	84	4.5	4,500	1,000	1,727	4 sh	(649-663)	8
Monongalia County, W. Va.									

Blacksville No. 2 mine Monongalia County, W. Va.	.....do.....	84	6.3	6,000	1,050	1,884	5 sh	(738-760)	6
Consolidation Coal Co., Christopher Coal Co.: Arkwright mine Monongalia County, W. Va.	.....do.....	84	4.0	6,845	584	1,575	3 sh	(374-465)	53
Humphrey No. 7 mine Monongalia County, W. Va.	.....do.....	84	9.3	10,000	930	2,242	5 sh	(356-568)	20
Osage No. 3 mine Monongalia County, W. Va.	.....do.....	100	5.9	6,500	908	1,663	5 sh	(260-614)	33
Pursglove No. 15 mine Monongalia County, W. Va.	.....do.....	90	2.7	3,900	692	8,640	8 dr 5 sh	- (321-525)	34
Consolidation Coal Co., Mountaineer Coal Division: Consol No. 9 mine Marion County, W. Va.	.....do.....	84	1.4	600	2,333	1,215	1 sl 7 sh	- (324-592)	34
Consol No. 20 mine Marion County, W. Va.	.....do.....	84	1.1	3,414	322	1,072	6 sh	(397-547)	33
Loveridge mine Marion County, W. Va.	.....do.....	96	11.6	9,200	1,261	3,017	5 sh	(678-735)	24
Robinson Run No. 95 mine Harrison County, W. Va.	.....do.....	84	4.3	12,000	358	2,146	10 dr 4 sh	- (297-406)	9
Consolidation Coal Co., Ohio Valley Division: Ireland mine Marshall County, W. Va.	.....do.....	62	1.8	9,400	191	1,868	2 sl 7 sh	- (355-388)	20
Shoemaker mine Marshall County, W. Va.	.....do.....	62	1.0	6,660	150	1,298	1 sl 1 dr 2 sh	- - 290	9
Consolidation Coal Co., Pittsburgh Coal Co.: Montour No. 4 mine Washington County, Pa.	.....do.....	60	1.2	6,200	194	1,415	2 sl 2 sh	- (92-198)	62
Eastern Associated Coal Corp.: Federal No. 1 mine Marion County, W. Va.	.....do.....	95 (78-112)	4.0	3,500	1,143	2,158	8 sh	(335-637)	33
Federal No. 2 mine Monongalia County, W. Va.	.....do.....	100	8.1	4,000	2,025	1,180	5 sh	(734-830)	8

[1] Figures in parentheses indicate range of thickness.
[2] Figures in parentheses indicate range of depth of shaft(s) in previous column.

Owner, name of mine, and location	Coalbed	Thickness of coalbed,[1] inches	Average methane emission in 24 hours, MMcfd	Coal production, tons per day	Gas per ton of coal mined, cubic feet	Air circulated in 24 hours, MMcf	Number of drifts (dr), shafts (sh), and slopes (sl)	Average depth of shaft, drift, or slope,[2] feet	Age of mine, years
Eastern Associated Coal Corp. (Con.)									
Joanne mine Marion County, W. Va.	Pittsburgh.....	84	1.8	1,000	1,800	1,162	1 sl 6 sh	- (480-490)	34
Keystone No. 1 mine McDowell County, W. Va.	Pocahontas No. 3	60	1.4	3,000	467	2,440	1 sl 2 dr 7 sh	- - 700	75
Gateway Coal Co.:									
Gateway mine Greene County, Pa.	Pittsburgh.....	84	2.7	6,910	390	668	2 sl 6 sh	- (50-700)	57
Helvetia Coal Co., Rochester and Pittsburgh Coal Co.:									
Lucerne No. 6 mine Indiana County, Pa.	Upper Freeport..	57 (42-72)	1.5	5,000	300	977	1 sl 2 sh	- 494 (352-635)	8
Inland Steel Co.:									
Inland mine Jefferson County, Ill.	Illinois No. 6..	108	1.2	9,500	126	609	2 sh	735	10
Island Creek Coal Co.:									
Fies mine Hopkins County, Ky.	Kentucky No. 11.	55	1.1	4,200	262	481	1 sl 3 sh	- 270	26
Virginia Pocahontas No. 1 mine Buchanan County, Va.	Pocahontas No. 3	50	3.9	3,000	1,300	1,587	5 sh	(1,157-1,500)	9
Virginia Pocahontas No. 2 mine Buchanan County, Va.	.....do.....	52 (46-58)	3.4	1,100	3,091	766	3 sh	1,250	8
Virginia Pocahontas No. 3 mine Buchanan County, Va.	.....do.....	68	3.3	2,400	1,375	1,298	3 sh	(1,200-1,300)	7
Virginia Pocahontas No. 4 mine Buchanan County, Va.	.....do.....	50	1.9	850	2,235	979	3 sh	1,316	4
Itmann Coal Co.:									
Itmann No. 3 mine Wyoming County, W. Va.	Pocahontas No. 3	48	1.5	5,000	300	1,387	2 dr 3 sh	- 600	16
Jones and Laughlin Steel Corp., Vesta Shannopin Coal Division:									
Shannopin mine Greene County, Pa.	Pittsburgh.....	90	2.1	3,600	583	490	10 dr 5 sh	- 225	64

Vesta No. 5 mine Washington County, Pa.	.....do.....	72	1.6	2,400	667	1,037	8 dr 1 sl 6 sh	- - 250	71
Mathies Coal Co.: Mathies mine Washington County, Pa.	.....do.....	66	2.1	8,775	239	2,187	1 dr 6 sh	- 175	32
Mead Corp.: Mulga mine Jefferson County, Ala.	Pratt.....	81 (42-120)	2.5	4,100	609	1,977	5 sl 8 sh	- (215-500)	75
Mid-Continent Coal and Coke Co.: Coal Basin mine Pitkin County, Colo.	Basin B.....	84	1.2	480	2,428	304	3 sl	(250-1,350)	3
Dutch Creek mine Pitkin County, Colo.	.....do.....	80 (76-84)	2.5	1,366	1,830	1,459	10 sl 4 dr	- 5,000	20
L. S. Wood mine Pitkin County, Colo.	.....do.....	84	3.3	1,584	2,083	749	7 sl	6,200	11
North American Coal Co., Helen Mining Co.: Homer City mine Indiana County, Pa.	Upper Freeport..	54 (36-72)	2.1	3,100	677	896	1 sl 3 sh	- (614-682)	7
Old Ben Coal Co.: Old Ben No. 21 mine Franklin County, Ill.	Illinois No. 6..	96	1.6	6,200	258	1,227	4 sh	666	16
Old Ben No. 24 mine Franklin County, Ill.	.....do.....	86	1.9	8,000	237	863	4 sh	660	11
Old Ben No. 26 mine Franklin County, Ill.	.....do.....	90	1.8	8,660	208	688	4 sh	658	8
Olga Coal Co.: Olga mine McDowell County, W. Va.	Pocahontas No. 4	72	5.0	7,000	714	2,491	13 sh	800	52
Peabody Coal Co.: Peabody No. 10 mine Saline County, Ill.	Illinois No. 6..	85	1.5	16,800	89	808	1 sl 3 sh	- 325	24
United States Steel Corp.: Concord No. 1 mine Jefferson County, Ala.	Pratt.....	80 (52-108)	5.1	6,000	850	2,618	2 sl 8 sh	- (400-600)	30
Maple Creek mine Washington County, Pa.	Pittsburgh.....	72	1.8	12,345	146	3,100	2 sl 9 sh	- 230	56
Oak Grove mine Jefferson County, Ala.	Mary Lee.....	54	1.3	800	1,625	504	2 sl 2 sh	- 1,130	2

[1]Figures in parentheses indicate range of thickness.
[2]Figures in parentheses indicate range of depth of shaft(s) in previous column.

Owner, name of mine, and location	Coalbed	Thickness of coalbed,[1] inches	Average methane emission in 24 hours, MMcfd	Coal production, tons per day	Gas per ton of coal mined, cubic feet	Air circulated in 24 hours, MMcf	Number of drifts (dr), shafts (sh), and slopes (sl)	Average depth of shaft, drift, or slope,[2] feet	Age of mine, years
United States Steel Corp. (Con.):									
Pinnacle Creek No. 50 mine Wyoming County, W. Va.	Pocahontas No. 3	53	1.6	3,000	533	2,440	2 sl 4 dr 4 sh	- - 280	6
Robena mine Greene County, Pa.	Pittsburgh.....	78	4.8	11,473	418	4,559	1 sl 10 sh	- (445-667)	37
Sunnyside No. 1 mine Carbon County, Utah	Upper Sunnyside. Lower Sunnyside.	60 (54-66)	1.4	4,500	311	982	2 sl 1 dr 2 sh	- - 1,250 (500-2,000)	78
Valley Camp Coal Co.:									
Valley Camp No. 3 mine Ohio County, W. Va.	Pittsburgh.....	60	2.0	4,212	475	6,709	2 sl 4 sh	- (359-600)	34
Walter Resources, Inc.:									
Bessie mine Jefferson County, Ala.	Mary Lee.....	96	1.0	1,800	556	881	4 dr 3 sh	- (350-500)	76
No. 3 mine Jefferson County, Ala.	Blue Creek.....	52	2.3	1,500	1,533	1,102	3 sh	1,300	2
Youghiogheny & Ohio Coal Co.:									
Nelms No. 1 mine Harrison County, Ohio	Freeport.....	(36-120)	2.1	4,500	466	510	4 sh	450	49

[1]Figures in parentheses indicate range of thickness.
[2]Figures in parentheses indicate range of depth of shaft(s) in previous column.

APPENDIX B.--MEASURED METHANE EMISSION FROM COAL MINES OF THE UNITED STATES WITH AN EMISSION RATE OF AT LEAST 100,000 cfd

Mine, owner, and location of mine	Average methane emission, MMcfd
Loveridge mine Consolidation Coal Co. Marion County, W. Va.	11.6
Humphrey No. 7 mine Consolidation Coal Co. Monongalia County, W. Va.	9.3
Federal No. 2 mine Eastern Associated Coal Corp. Monongalia County, W. Va.	8.1
Blacksville No. 2 mine Consolidation Coal Co. Monongalia County, W. Va.	6.3
Osage No. 3 mine Consolidation Coal Co. Monongalia County, W. Va.	5.9
Beatrice mine Beatrice Pocahontas Co. Buchanan County, Va.	5.6
Concord No. 1 mine United States Steel Corp. Jefferson County, Ala.	5.1
Olga mine Olga Coal Co. McDowell County, W. Va.	5.0
Robena mine United States Steel Corp. Greene County, Pa.	4.9
Bethlehem No. 32 mine Bethlehem Mines Corp. Cambria County, Pa.	4.5
Blacksville No. 1 mine Consolidation Coal Co. Monongalia County, W. Va.	4.5

Mine, owner, and location of mine	Average methane emission, MMcfd
Robinson Run No. 95 mine Consolidation Coal Co. Harrison County, W. Va.	4.3
Arkwright No. 1 mine Consolidation Coal Co. Monongalia County, W. Va.	4.0
Federal No. 1 mine Eastern Associated Coal Corp. Marion County, W. Va.	4.0
Cambria Slope No. 33 mine Bethlehem Mines Corp. Cambria County, Pa.	3.9
Virginia Pocahontas No. 1 mine Island Creek Coal Co. Buchanan County, Va.	3.9
Virginia Pocahontas No. 2 mine Virginia Pocahontas Co. Buchanan County, Va.	3.4
L. S. Wood mine Mid-Continent Coal and Coke Co. Pitkin County, Colo.	3.3
Virginia Pocahontas No. 3 mine Island Creek Coal Co. Buchanan County, Va.	3.3
Gateway mine Gateway Coal Co. Greene County, Pa.	2.7
Pursglove No. 15 mine Consolidation Coal Co. Monongalia County, W. Va.	2.7
Beckley mine Beckley Coal Mining Co. Raleigh County, W. Va.	2.6
Marianna No. 58 mine Bethlehem Mines Corp. Washington County, Pa.	2.6

Mine, owner, and location of mine	Average methane emission, MMcfd
Dutch Creek mine Mid-Continent Coal and Coke Co. Pitkin County, Colo.	2.5
Mulga mine Mead Corp. Jefferson County, Ala.	2.5
Walter Resources No. 3 mine Jim Walter Resources, Inc. (formerly U.S. Pipe and Foundry) Jefferson County, Ala.	2.3
Homer City mine Helen Mining Co. Indiana County, Pa.	2.1
Mathies mine Mathies Coal Co. Washington County, Pa.	2.1
Nelms No. 1 mine Youghiogheny and Ohio Coal Co. Harrison County, Ohio	2.1
Shannopin mine Jones & Laughlin Steel Corp. Greene County, Pa.	2.1
Valley Camp No. 3 mine Valley Camp Coal Co. Ohio County, W. Va.	2.0
Old Ben No. 24 mine Old Ben Coal Co. Franklin County, Ill.	1.9
Virginia Pocahontas No. 4 mine Island Creek Coal Co. Buchanan County, Va.	1.9
Ireland mine Consolidation Coal Co. Marshall County, W. Va.	1.8
Joanne mine Eastern Associated Coal Corp. Marion County, W. Va.	1.8

Name, owner, and location of mine	Average methane emission, MMcfd
Maple Creek mine United States Steel Corp. Washington County, Pa.	1.8
Old Ben No. 26 mine Old Ben Coal Co. Franklin County, Ill.	1.8
Somerset No. 60 mine Bethlehem Mines Corp. Washington County, Pa.	1.8
Mary Lee No. 1 mine Alabama By-Products Corp. Walker County, Ill.	1.7
Old Ben No. 21 mine Old Ben Coal Co. Franklin County, Ill.	1.6
Pinnacle Creek No. 50 mine United States Steel Corp. Wyoming County, W. Va.	1.6
Vesta No. 5 mine Jones & Laughlin Steel Corp. Washington County, Pa.	1.6
Itmann No. 3 mine Itmann Coal Co. Wyoming County, W. Va.	1.5
Lucerne No. 6 mine Helvetia Coal Co. Indiana County, Pa.	1.5
Peabody No. 10 mine Peabody Coal Co. Saline County, Ill.	1.5
Consol No. 9 mine Consolidation Coal Corp. Marion County, W. Va.	1.4
Keystone No. 1 mine Eastern Associated Coal Corp. McDowell County, W. Va.	1.4

Name, owner, and location of mine	Average methane emission, MMcfd
Moss No. 3 Portal A mine Clinchfield Coal Co. Dickenson County, Va.	1.4
Sunnyside No. 1 mine Kaiser Steel Corp. Carbon County, Utah	1.4
Wabash mine Amex Coal Co. Wabash County, Ill.	1.4
Oak Grove mine United States Steel Corp. Jefferson County, Ala.	1.3
Coal Basin mine Mid-Continent Coal and Coke Co. Pitkin County, Colo.	1.2
Inland mine Inland Steel Co. Jefferson County, Ill.	1.2
Montour No. 4 mine Consolidation Coal Co. Washington County, Pa.	1.2
Consol No. 20 mine Consolidation Coal Co. Marion County, W. Va.	1.1
Fies mine Island Creek Coal Co. Hopkins County, Ky.	1.1
Shannon Branch mine Allied Chemical Corp. McDowell County, W. Va.	1.1
Bessie mine Jim Walter Resources, Inc. Jefferson County, Ala.	1.0
Lancashire No. 20 mine Barnes & Tucker Co. Cambria County, Pa.	1.0

Name, owner, and location of mine	Average methane emission, MMcfd
Shoemaker mine Consolidation Coal Co. Marshall County, W. Va.	1.0
Somerset mine United States Steel Corp. Gunnison County, Colo.	.9
Jane Nos. 1 and 2 mines Rochester & Pittsburgh Coal Co. Armstrong County, Pa.	.8
McElroy mine Consolidation Coal Co. Marshall County, W. Va.	.8
Moss No. 2 mine Clinchfield Coal Co. Russell County, Va.	.8
Orient No. 6 mine Freeman United Coal Mining Co. Jefferson County, Ill.	.8
Segco No. 1 mine Alabama By-Products Corp. Walker County, Ala.	.8
Bear Creek mine Mid-Continent Coal and Coke Co. Pitkin County, Colo.	.7
Clyde mine Republic Steel Corp. Washington County, Pa.	.7
Eagle No. 2 mine Peabody Coal Co. Gallatin County, Ill.	.7
Hampton No. 3 mine Westmoreland Coal Co. Boone County, W. Va.	.7
Marion mine Tunnelton Mining Co. Indiana County, Pa.	.7

Name owner, and location of mine	Average methane emission, MMcfd
Morton mine Carbon Fuel Co. Kanawha County, W. Va.	0.7
Orient No. 3 mine Freeman United Coal Mining Co. Jefferson County, Ill.	.7
York Canyon No. 1 mine Kaiser Steel Co. Colfax County, N. Mex.	.7
United States Steel No. 14-4 mine United States Steel Corp. McDowell County, W. Va.	.7
Alexander mine Valley Camp Coal Co. Marshall County, W. Va.	.6
Consol No. 93 mine Consolidation Coal Co. Marion County, W. Va.	.6
Monterey No. 1 mine Monterey Coal Co. Macoupin County, Ill.	.6
Oak Park No. 7 mine Consolidation Coal Co. Harrison County, Ohio	.6
Renton mine Consolidation Coal Co. Allegheny County, Pa.	.6
Allen mine C.F. & I. Steel Corp. Las Animas County, Colo.	.5
Bethlehem No. 51 mine Bethlehem Mines Corp. Washington County, Pa.	.5
Bishop mine Bishop Coal Co. McDowell County, W. Va.	.5

Name, owner, and location of mine	Average methane emission, MMcfd
Bishop Nos. 33 and 37 mines Bishop Coal Co. McDowell County, W. Va.	0.5
Maitland mine Pocahontas Fuel Co. McDowell County, W. Va.	.5
Newfield mine Republic Steel Corp. Allegheny County, Pa.	.5
North River No. 1 mine Republic Steel Corp. Fayette County, Ala.	.5
Powhatan No. 6 mine N.A.C.C.O. Mining Co. Belmont County, Ohio	.5
Scotia mine Scotia Coal Co. Letcher County, Ky.	.5
Seaboard No. 1 mine Jewell Ridge Coal Corp. Tazewell County, Va.	.5
Valley Camp No. 1 mine Valley Camp Coal Co. Ohio County, W. Va.	.5
United States Steel No. 2 mine United States Steel Corp. McDowell County, W. Va.	.5
Zeigler No. 4 mine Zeigler Coal Co. Williamson County, Ill.	.5
Bethlehem No. 77 mine Bethlehem Mines Corp. Cambria County, Pa.	.4
Bird No. 3 mine Island Creek Coal Co. Somerset County, Pa.	.4

Name, owner, and location of mine	Average methane emission, MMcfd
Chetopa mine Alabama By-Products Corp. Jefferson County, Ala.	0.4
Gorgas No. 7 mine Alabama By-Products Corp. Walker County, Ala.	.4
Keystone No. 2 mine Eastern Associated Coal Corp. Wyoming County, W. Va.	.4
Lady Dunn No. 105 mine Cannelton Industries, Inc. Kanawha County, W. Va.	.4
Lancashire No. 24 B mine Barnes & Tucker Coal Co. Indiana County, Pa.	.4
Meigs No. 2 mine Southern Ohio Coal Co. Meigs County, Ohio	.4
Murdock mine Zeigler Coal Co. Douglas County, Ill.	.4
Nelms No. 2 mine Youghiogheny & Ohio Coal Co. Harrison County, Ohio	.4
Peabody Camp No. 2 mine Peabody Coal Co. Union County, Ky.	.4
Powhatan No. 4 mine Quarto Mining Co. Monroe County, Ohio	.4
Rose Valley No. 6 mine Consolidation Coal Co. Harrison County, Ohio	.4
Sahara No. 21 mine Sahara Coal Co., Inc. Saline County, Ill.	.4

Name, owner, and location of mine	Average methane emission, MMcfd
Slab Fork No. 10 mine Slab Fork Coal Co. Raleigh County, W. Va.	0.4
Sunnyside No. 3 mine Kaiser Steel Co. Carbon County, Utah	.4
Westland mine Consolidation Coal Co. Washington County, Pa.	.4
Zeigler No. 9 mine Zeigler Coal Co. Hopkins County, Ky.	.4
Bethlehem No. 41 mine Bethlehem Mines Corp. Marion County, W. Va.	.3
Bullitt No. 1 mine Westmoreland Coal Co. Wise County, Va.	.3
East Gulf mine Westmoreland Coal Co. Raleigh County, W. Va.	.3
Flat Top mine Jim Walter Resources, Inc. Jefferson County, Ala.	.3
Greenwich Collieries No. 1 mine Pennsylvania Mines Corp. Indiana County, Pa.	.3
Hamilton No. 1 mine Island Creek Coal Co. Union County, Ky.	.3
Itmann No. 4 mine Itmann Coal Co. Wyoming County, W. Va.	.3
Lambert Fork mine Clinchfield Coal Co. Buchanan County, Va.	.3

Name, owner, and location of mine	Average methane emission, MMcfd
Lancashire No. 25 mine Barnes & Tucker Coal Co. Cambria County, Pa.	0.3
MacAlpin No. 3 mine Westmoreland Coal Co. Raleigh County, W. Va.	.3
Maple Meadow mine Maple Meadow Mining Co. Raleigh County, W. Va.	.3
Mathews mine Consolidation Coal Co. Claiborne County, Tenn.	.3
Maxine mine Alabama By-Products Corp. Jefferson County, Ala.	.3
Nemacolin mine Buckeye Coal Co. Greene County, Pa.	.3
Oakmont mine Harmar Coal Co. Allegheny County, Pa.	.3
Orient No. 4 mine Freeman United Coal Mining Co. Williamson County, Ill.	.3
Phillip Sporn No. 1 mine Central Coal Co. Marion County, W. Va.	.3
Powhatan No. 1 mine North American Coal Corp. Belmont County, Ohio	.3
Powhatan No. 3 mine North American Coal Corp. Belmont County, Ohio	.3
Sahara No. 20 mine Sahara Coal Co., Inc. Saline County, Ill.	.3

Name, owner, and location of mine	Average methane emission, MMcfd
Sewell No. 1 mine Sewell Coal Co. Nicholas County, W. Va.	0.3
Slab Fork No. 8 mine Slab Fork Coal Co. Raleigh County, W. Va.	.3
United States Steel No. 14 mine (No. 3 seam portal) United States Steel Corp. McDowell County, W. Va.	.3
Warwick Portal No. 3 mine Duquesne Light Co. Greene County, Pa.	.3
Zeigler No. 5 mine Zeigler Coal Co. Douglas County, Ill.	.3
Adrian mine Upshur Coals Inc. Upshur County, W. Va.	.2
Alston No. 3 mine Peabody Coal Co. Ohio County, Ky.	.2
Badger No. 14 mine Badger Coal Co. Barbour County, W. Va.	.2
Baldwin No. 1 mine Peabody Coal Co. Randolph County, Ill.	.2
Banning No. 4 mine Republic Steel Corp. Westmoreland County, Pa.	.2
Beech Bottom mine Windsor Power House Brooke County, W. Va.	.2
Bethlehem No. 31 mine Bethlehem Mines Corp. Cambria County, Pa.	.2

Name, owner, and location of mine	Average methane emission, MMcfd
Bird No. 2 mine Island Creek Coal Co. Somerset County, Pa.	0.2
Braztah No. 3 mine Braztah Corp. Carbon County, Utah	.2
Cannelton No. 8 mine Cannelton Industries, Inc. Kanawha County, W. Va.	.2
David mine Canterbury Coal Co. Westmoreland County, Pa.	.2
Dehue mine Youngstown Mines Corp. Logan County, W. Va.	.2
Delmont mine Eastern Associated Coal Corp. Westmoreland County, Pa.	.2
Dotiki mine Webster Coal Corp. Webster County, Ky.	.2
Drake No. 4 mine Pittsburgh and Midway Coal Mining Co. Hopkins County, Ky.	.2
Florence No. 1 mine Florence Mining Co. Westmoreland County, Pa.	.2
Greenwich Collieries No. 2 mine Pennsylvania Mines Corp. Indiana County, Pa.	.2
Hampton No. 4 mine Westmoreland Coal Co. Boone County, W. Va.	.2
Harmar mine Harmar Coal Co. Allegheny County, Pa.	.2

Name, owner, and location of mine	Average methane emission, MMcfd
Isabella mine National Mines Corp. Fayette County, Pa.	0.2
Jensie mine North American Coal Corp. Jefferson County, Ohio	.2
Keystone No. 4 mine Eastern Associated Coal Corp. Raleigh County, W. Va.	.2
National Pocahontas mine National Mines Corp. Mingo County, W. Va.	.2
Osaka No. 2 mine Westmoreland Coal Co. Wise County, Va.	.2
Peabody Camp No. 1 mine Peabody Coal Co. Union County, Ky.	.2
Powhatan No. 4 mine North American Coal Corp. Belmont County, Ohio	.2
Prescott No. 1 mine Westmoreland Coal Co. Wise County, Va.	.2
Royal No. 5 mine United Pocahontas Co. Fayette County, W. Va.	.2
Saginaw mine Saginaw Mining Co. Belmont County, Ohio	.2
Sewell No. 1A mine Sewell Coal Co. Nicholas County, W. Va.	.2
Soldier Canyon mine Premium Coal Co. Carbon County, Utah	.2

Name, owner, and location of mine	Average methane emission, MMcfd
South Hopkins No. 2 mine South Hopkins Coal Co. Hopkins County, Ky.	0.2
Star Underground mine Peabody Coal Co. Muhlenberg County, Ky.	.2
Warwick No. 2 mine Duquesne Light Co. Greene County, Pa.	.2
White Ash No. 1 mine White Ash Mining Co. Johnson County, Ky.	.2
Wolf Creek Collieries No. 3 mine Wolf Creek Collieries Co., Inc. Martin County, Ky.	.2
Wolf Creek Collieries No. 4 mine Wolf Creek Collieries Co., Inc. Martin County, Ky.	.2
Angus mine Robinson and Phillips Coal Co. Wyoming County, W. Va.	.1
Badger No. 15 mine Badger Coal Co. Barbour County, W. Va.	.1
Beckley No. 1 mine Ranger Fuel Corp. Raleigh County, W. Va.	.1
Bethlehem No. 46 mine Bethlehem Mines Corp. Raleigh County, W. Va.	.1
Conemaugh No. 1 mine North American Coal Corp. Westmoreland County, Pa.	.1
Dilworth mine United States Steel Corp. Greene County, Pa.	.1

Name, owner, and location of mine	Average methane emission, MMcfd
Eccles No. 6 mine Westmoreland Coal Co. Raleigh County, W. Va.	0.1
Emery mine Consolidation Coal Co. Emery, Utah	.1
Florence No. 2 mine Florence Mining Co. Westmoreland County, Pa.	.1
Hamilton Mine No. 2 Island Creek Coal Co. Union County, Ky.	.1
Island Creek No. 9 mine Island Creek Coal Co. Hopkins County, Ky.	.1
Justus mine Stearns Mining Co. McCreary County, Ky.	.1
Keystone No. 5 mine Affininty Mining Co. Raleigh County, W. Va.	.1
National No. 25 mine National Coal Mining Co. Mingo County, W. Va.	.1
Ocean No. 5 mine Crescent Hills Coal Co., Inc. Allegheny County, Pa.	.1
Peter Cave No. 1 mine Peter Cave Coal Co. Martin County, Ky.	.1
Powhatan No. 7 mine Quarto Mining Co. Monroe County, Ohio	.1
Prescott No. 2 mine Westmoreland Coal Co. Wise County, Va.	.1

Name, owner, and location of mine	Average methane emission, MMcfd
River King Underground No. 1 mine Peabody Coal Co. St. Clair County, Ill.	0.1
Splashdam No. 1 mine Clinchfield Coal Co. Dickenson County, Va.	.1
Virginia No. 1 mine Eastover Mining Co. Wise County, Va.	.1
Wharton No. 4 mine Eastern Associated Coal Corp. Boone County, W. Va.	.1
Williams mine Consolidation Coal Co. Harrison County, W. Va.	.1

APPENDIX C.--METHANE EMISSION IN RELATION TO COUNTIES FROM MINES EMITTING AT LEAST 100,000 cfd

County and mine	Methane, MMcfd
ALABAMA, STATE TOTAL 16.6 MMcfd	
Fayette: North River No. 1	0.5
Jefferson:	
Concord No. 1	5.1
Mulga	2.5
Walter Resources No. 3	2.3
Oak Grove	1.3
Bessie	1.0
Chetopa	.4
Flat Top	.3
Maxine	.3
Total	13.2
Walker:	
Mary Lee No. 1	1.7
Segco No. 1	.8
Gorgas No. 7	.4
Total	2.9
COLORADO, STATE TOTAL 9.1 MMcfd	
Gunnison: Somerset	0.9
Las Animas: Allen	.5
Pitkin:	
L. S. Wood	3.3
Dutch Creek	2.5
Coal Basin	1.2
Bear Creek	.7
Total	7.7
ILLINOIS, STATE TOTAL 14.7 MMcfd	
Christian: Peabody No. 10	1.5
Douglas:	
Murdock	.4
Zeigler No. 5	.3
Total	.7
Franklin:	
Old Ben No. 24	1.9
Old Ben No. 26	1.8
Old Ben No. 21	1.6
Total	5.3
Gallatin: Eagle No. 2	.7
Jefferson:	
Inland	1.2
Orient No. 6	.8
Orient No. 3	.7
Total	2.7
Macoupin: Monterey No. 1	.6
Randolph: Baldwin No. 1	.2

County and mine	Methane, MMcfd
ILLINOIS, STATE TOTAL 14.7 MMcfd--Continued	
Saline:	
Sahara No. 21	0.4
Sahara No. 20	.3
Total	.7
St. Clair: River King	.1
Wabash: Wabash	1.4
Williamson:	
Zeigler No. 4	.5
Orient No. 4	.3
Total	.8
KENTUCKY, STATE TOTAL 4.9 MMcfd	
Hopkins:	
Fies	1.1
Zeigler No. 9	.4
Drake No. 4	.2
South Hopkins No. 2	.2
Island Creek No. 9	.1
Total	2.0
Johnson: White Ash No. 1	.2
Letcher: Scotia	.5
Martin:	
Wolf Collieries No. 3	.2
Wolf Collieries No. 4	.2
Peter Cave No. 1	.1
Total	.5
McCreary: Justus	.1
Muhlenberg: Star Underground	.2
Ohio: Alston No. 3	.2
Union:	
Peabody Camp No. 2	.4
Hamilton No. 1	.3
Peabody Camp No. 1	.2
Hamilton No. 2	.1
Total	1.0
Webster: Dotiki	.2
NEW MEXICO, STATE TOTAL 0.7 MMcfd	
Colfax: York Canyon	0.7
OHIO, STATE TOTAL 6.1 MMcfd	
Belmont:	
Powhatan No. 6	0.5
Powhatan No. 1	.3
Powhatan No. 3	.3
Powhatan No. 5	.2
Saginaw	.2
Total	1.5

County and mine	Methane, MMcfd
OHIO, STATE TOTAL 6.1 MMcfd--Continued	
Harrison:	
Nelms No. 1	2.1
Oak Park No. 7	.6
Nelms No. 2	.4
Rose Valley No. 6	.4
Total	3.5
Jefferson: Jensie	.2
Meigs: Meigs No. 2	.4
Monroe:	
Powhatan No. 4	.4
Powhatan No. 7	.1
Total	.5
PENNSYLVANIA, STATE TOTAL 43.1 MMcfd	
Allegheny:	
Renton	0.6
Newfield	.5
Oakmont	.3
Harmar	.2
Ocean No. 5	.1
Total	1.7
Armstrong: Jane Nos. 1 and 2	.8
Cambria:	
Bethlehem No. 32	4.5
Cambria Slope No. 33	3.9
Lancashire No. 20	1.0
Bethlehem No. 77	.4
Lancashire No. 25	.3
Bethlehem No. 31	.2
Total	10.3
Fayette: Isabella	.2
Greene:	
Robena	4.9
Gateway	2.7
Shannopin	2.1
Nemacolin	.3
Warwick Portal No. 3	.3
Warwick Portal No. 2	.2
Dilworth	.1
Total	10.6
Indiana:	
Homer City	2.1
Lucerne No. 6	1.5
Marion	.7
Lancashire No. 24B	.4
Greenwich Colliery No. 1	.3
Greenwich Colliery No. 2	.2
Total	5.2

County and mine	Methane, MMcfd
PENNSYLVANIA, STATE TOTAL 43.1 MMcfd--Continued	
Somerset:	
Bird No. 3	0.4
Bird No. 2	.2
Total	.6
Washington:	
Marianna No. 58	2.6
Mathies	2.1
Maple Creek	1.8
Somerset No. 60	1.8
Vesta No. 5	1.6
Montour No. 4	1.2
Clyde	.7
Bethlehem No. 51	.5
Westland	.4
Total	12.7
Westmoreland:	
Banning No. 4	.2
David	.2
Delmont	.2
Florence No. 1	.2
Conemaugh No. 1	.1
Florence No. 2	.1
Total	1.0
TENNESSEE, STATE TOTAL 0.3 MMcfd	
Clairborne: Matthews	0.3
UTAH, STATE TOTAL 2.3 MMcfd	
Carbon:	
Sunnyside No. 1	1.4
Sunnyside No. 3	.4
Braztah No. 3	.2
Soldier Canyon	.2
Total	2.2
Emery: Emery	.1
VIRGINIA, STATE TOTAL 22.1 MMcfd	
Buchanan:	
Beatrice	5.6
Virginia Pocahontas No. 1	3.9
Virginia Pocahontas No. 2	3.4
Virginia Pocahontas No. 3	3.3
Virginia Pocahontas No. 4	1.9
Lambert Fork	.3
Total	18.4
Dickenson:	
Moss No. 3 Portal A	1.4
Splashdam No. 1	.1
Total	1.5
Russell: Moss No. 2	.8
Tazewell: Seaboard No. 1	.5

County and mine	Methane, MMcfd
VIRGINIA, STATE TOTAL 22.1 MMcfd--Continued	
Wise:	
Bullitt No. 1	0.3
Osaka No. 2	.2
Prescott No. 1	.2
Prescott No. 2	.1
Virginia No. 1 mine	.1
Total	.9
WEST VIRGINIA, STATE TOTAL 96.4 MMcfd	
Barbour:	
Badger No. 14	0.2
Badger No. 15	.1
Total	.3
Boone:	
Hampton No. 3	.7
Hampton No. 4	.2
Wharton No. 4	.1
Total	1.0
Brooke: Beech Bottom	.2
Fayettee: Royal No. 5	.2
Harrison:	
Robinson Run No. 95	4.3
Williams	.1
Total	4.4
Kanawha:	
Morton	.7
Lady Dunn No. 105	.4
Cannelton No. 8	.2
Total	1.3
Logan: Dehue	.2
Marion:	
Loveridge	11.6
Federal No. 1	4.0
Joanne	1.8
Consol No. 9	1.4
Consol No. 20	1.1
Consol No. 93	.6
Bethlehem No. 41	.3
Total	20.8
Marshall:	
Ireland	1.8
Shoemaker	1.0
McElroy	.8
Alexander	.6
Total	4.2
Mason: Phillip Sporn No. 1	.3

County and mine	Methane, MMcfd
WEST VIRGINIA, STATE TOTAL 96.4 MMcfd--Continued	
McDowell:	
Olga	5.0
Keystone No. 1	1.4
Shannon Branch	1.1
United States Steel No. 14-4	.7
Bishop	.5
Bishop Nos. 33 and 37	.5
Maitland	.5
United States Steel No. 2	.5
United States Steel No. 14 (No. 3 seam portal)	.3
Total	10.5
Mingo:	
National Pocahontas	.2
National No. 25	.1
Total	.3
Monongalia:	
Humphrey No. 7	9.3
Federal No. 2	8.1
Blacksville No. 2	6.3
Osage No. 3	5.9
Blacksville No. 1	4.5
Arkwright No. 1	4.0
Pursglove	2.7
Total	40.8
Nicholas:	
Sewell No. 1	.3
Sewell No. 1A	.2
Total	.5
Ohio:	
Valley Camp No. 3	2.0
Valley Camp No. 1	.5
Total	2.5
Raleigh:	
Beckley	2.6
Slab Fork No. 10	.4
East Gulf	.3
MacAlpin No. 3	.3
Maple Meadow	.3
Slab Fork No. 8	.3
Keystone No. 4	.2
Beckley No. 1	.1
Bethlehem No. 46	.1
Eccles No. 6	.1
Keystone No. 5	.1
Total	4.8
Upshur: Adrian	.2

County and mine	Methane, MMcfd
WEST VIRGINIA, STATE TOTAL 96.4 MMcfd--Continued	
Wyoming:	
Pinnacle Creek No. 50	1.6
Itmann No. 3	1.5
Keystone No. 2	.4
Itmann No. 4	.3
Angus	.1
Total	3.9
U.S. total	216.3

APPENDIX D.--METHANE EMISSION FROM MINES IN COALBEDS WITH TOTAL EMISSIONS IN EXCESS OF 1 MMcfd

Coalbed and name and location of mine	Methane, MMcfd
Pittsburgh bed:	
Loveridge mine Marion County, W. Va.	11.6
Humphrey No. 7 mine Monongalia County, W. Va.	9.3
Federal No. 2 mine Monongalia County, W. Va.	8.1
Blacksville No. 2 mine Monongalia County, W. Va.	6.3
Osage No. 3 mine Monongalia County, W. Va.	5.9
Robena mine Greene County, Pa.	4.9
Blacksville No. 1 mine Monongalia County, W. Va.	4.5
Robinson Run No. 95 mine Harrison County, W. Va.	4.3
Arkwright mine Monongalia County, W. Va.	4.0
Federal No. 1 mine Marion County, W. Va.	4.0
Gateway mine Greene County, Pa.	2.7
Pursglove mine Monongalia County, W. Va.	2.7
Marianna No. 58 mine Washington County, Pa.	2.6
Mathies mine Washington County, Pa.	2.1
Shannopin mine Greene County, Pa.	2.1

Coalbed and name and location of mine	Methane, MMcfd
Pittsburgh bed--Continued:	
Valley Camp No. 3 mine Ohio County, W. Va.	2.0
Ireland mine Marshall County, W. Va.	1.8
Joanne mine Marion County, W. Va.	1.8
Maple Creek mine Washington County, Pa.	1.8
Somerset No. 60 mine Washington County, Pa.	1.8
Vesta No. 5 mine Washington County, Pa.	1.6
Consol No. 9 mine Marion County, W. Va.	1.4
Montour No. 4 mine Washington County, Pa.	1.2
Consol No. 20 mine Marion County, W. Va.	1.1
Shoemaker mine Marshall County, W. Va.	1.0
McElroy mine Marshall County, W. Va.	.8
Clyde mine Washington County, Pa.	.7
Alexander mine Marshall County, W. Va.	.6
Consol No. 93 mine Marion County, W. Va.	.6
Bethlehem No. 51 mine Washington County, Pa.	.5
Powhatan No. 6 mine Belmont County, Ohio	.5

Coalbed and name and location of mine	Methane, MMcfd
Pittsburgh bed--Continued:	
Valley Camp No. 1 mine Ohio County, W. Va.	0.5
Powhatan No. 4 mine Belmont County, Ohio	.4
Westland mine Washington County, Pa.	.4
Bethlehem No. 41 mine Marion County, W. Va.	.3
Nemacolin mine Greene County, Pa.	.3
Phillip Sporn No. 1 mine Mason County, W. Va.	.3
Powhatan No. 1 mine Belmont County, Ohio	.3
Powhatan No. 3 mine Belmont County, Ohio	.3
Banning No. 4 mine Westmoreland County, Pa.	.2
Beech Bottom mine Brooke County, W. Va.	.2
Isabella mine Fayette County, Pa.	.2
Powhatan No. 5 mine Belmont County, Ohio	.2
Saginaw mine Belmont County, Ohio	.2
Warwick No. 2 mine Greene County, Pa.	.2
Bethlehem No. 46 mine Raleigh County, W. Va.	.1
Dilworth mine Greene County, Pa.	.1

Coalbed and name and location of mine	Methane, MMcfd
Pittsburgh bed--Continued:	
Ocean No. 5 mine Allegheny County, Pa.	0.1
Powhatan No. 7 mine Monroe County, Ohio	.1
Williams mine Harrison County, W. Va.	.1
Total	98.8
Pocahontas No. 3 bed:	
Beatrice mine Buchanan County, Va.	5.6
Virginia Pocahontas No. 1 mine Buchanan County, Va.	3.9
Virginia Pocahontas No. 2 mine Buchanan County, Va.	3.4
Virginia Pocahontas No. 3 mine Buchanan County, Va.	3.3
Virginia Pocahontas No. 4 mine Buchanan County, Va.	1.9
Pinnacle Creek No. 50 mine Wyoming County, W. Va.	1.6
Itmann No. 3 mine Wyoming County, W. Va.	1.5
Keystone No. 1 mine McDowell County, W. Va.	1.4
Shannon Branch mine McDowell County, W. Va.	1.1
United States Steel No. 14-4 mine McDowell County, W. Va.	.7
Bishop mine McDowell County, W. Va.	.5
Bishop Nos 33 and 37 mine McDowell County, W. Va.	.5

Coalbed and name and location of mine	Methane, MMcfd
Pocahontas No. 3 bed--Continued:	
Maitland mine McDowell County, W. Va.	0.5
Keystone No. 2 mine Wyoming County, W. Va.	.4
Slab Fork No. 10 mine Raleigh County, W. Va.	.4
East Gulf mine Raleigh County, W. Va.	.3
MacAlpin No. 3 mine Raleigh County, W. Va.	.3
United States Steel No. 14 mine (No. 3 seam portal) McDowell County, W. Va.	.3
Keystone No. 4 mine Raleigh County, W. Va.	.2
Total.....	27.8
Illinois Nos. 5 and 6 beds:	
Old Ben No. 24 mine Franklin County, Ill.	1.9
Old Ben No. 26 mine Franklin County, Ill.	1.8
Old Ben No. 21 mine Franklin County, Ill.	1.6
Peabody No. 10 mine Saline County, Ill.	1.5
Wabash mine Wabash County, Ill.	1.4
Inland mine Jefferson County, Ill.	1.2
Orient No. 6 mine Jefferson County, Ill.	.8
Eagle No. 2 mine Gallatin County, Ill.	.7

Coalbed and name and location of mine	Methane, MMcfd
Illinois Nos. 5 and 6 beds:	
Orient No. 3 mine Jefferson County, Ill.	0.7
Monterey No. 1 mine Macoupin County, Ill.	.6
Zeigler No. 4 mine Williamson County, Ill.	.5
Sahara No. 21 mine Saline County, Ill.	.4
Orient No. 4 mine Williamson County, Ill.	.3
Sahara No. 20 mine Saline County, Ill.	.3
Baldwin No. 1 mine Randolph County, Ill.	.2
River King Underground No. 1 mine St. Clair County, Ill.	.1
Total.....	14.0
Freeport and Lower Freeport beds:	
Homer City mine Indiana County, Pa.	2.1
Nelms No. 1 mine Harrison County, Ohio	2.1
Lucerne No. 6 mine Indiana County, Pa.	1.5
Jane Nos. 1 and 2 mine Armstrong County, Pa.	.8
Marion mine Indiana County, Pa.	.7
Oak Park No. 7 mine Harrison County, Ohio	.6
Renton mine Allegheny County, Pa.	.6

Coalbed and name and location of mine	Methane, MMcfd
Freeport and Lower Freeport beds:	
Newfield mine Allegheny County, Pa.	0.5
Lancashire No. 24B mine Indiana County, Pa.	.4
Nelms No. 2 mine Harrison County, Ohio	.4
Rose Valley No. 6 mine Harrison County, Ohio	.4
Greenwich Collieries No. 1 mine Indiana County, Pa.	.3
Lancashire No. 25 mine Cambria County, Pa.	.3
Oakmont mine Allegheny County, Pa.	.3
Adrian mine Upshur County, W. Va.	.2
David mine Westmoreland County, Pa.	.2
Delmont mine Westmoreland County, Pa.	.2
Florence No. 1 mine Westmoreland County, Pa.	.2
Greenwich Collieries No. 2 mine Indiana County, Pa.	.2
Harmar mine Allegheny County, Pa.	.2
Jensie mine Jefferson County, Ohio	.2
Florence No. 2 mine Westmoreland County, Pa.	.1
Total.....	12.5

Coalbed and name and location of mine	Methane, MMcfd
Upper and Lower Kittanning beds:	
Bethlehem No. 32 mine Cambria County, Pa.	4.5
Cambria Slope No. 33 mine Cambria County, Pa.	3.9
Lancashire No. 20 mine Cambria County, Pa.	1.0
Bethlehem No. 77 mine Cambria County, Pa.	.4
Bird No. 3 mine Somerset County, Pa.	.4
Badger No. 14 mine Barbour County, W. Va.	.2
Bethlehem No. 31 mine Cambria County, Pa.	.2
Bird No. 2 mine Somerset County, Pa.	.2
Badger No. 15 mine Barbour County, W. Va.	.1
Conemaugh No. 1 mine Westmoreland County, Pa.	.1
Total.....	11.0
Basin B bed:	
L. S. Wood mine Pitkin County, Colo.	3.3
Dutch Creek mine Pitkin County, Colo.	2.5
Coal Basin mine Pitkin County, Colo.	1.2
Somerset mine Gunnison County, Colo.	.9
Bear Creek mine Pitkin County, Colo.	.7
Total.....	8.6

Coalbed and name and location of mine	Methane, MMcfd
Pratt bed:	
Concord No. 1 mine, Jefferson County, Ala.	5.1
Mulga mine, Jefferson County, Ala.	2.5
North River No. 1 mine, Fayette County, Ala.	.5
Total	8.1
Pocahontas No. 4 bed:	
Olga mine, McDowell County, W. Va.	5.0
United States Steel No. 2 mine, McDowell County, W. Va.	.5
Itmann No. 4 mine, Wyoming County, W. Va.	.3
Slab Fork No. 8 mine, Raleigh County, W. Va.	.3
Keystone No. 5 mine, Raleigh County, W. Va.	.1
Total	6.2
Mary Lee bed:	
Mary Lee No. 1 mine, Walker County, Ala.	1.7
Oak Grove mine, Jefferson County, Ala.	1.3
Bessie mine, Jefferson County, Ala.	1.0
Segco No. 1 mine, Walker County, Ala.	.8
Chetopa mine, Jefferson County, Ala.	.4
Flat Top mine, Jefferson County, Ala.	.3
Total	5.5

Coalbed and name and location of mine	Methane, MMcfd
Kentucky Nos. 9 and 11 beds:	
Fies mine Hopkins County, Ky.	1.1
Peabody Camp No. 2 mine Union County, Ky.	.4
Zeigler No. 9 mine Hopkins County, Ky.	.4
Hamilton No. 1 mine Union County, Ky.	.3
Zeigler No. 5 mine Douglas County, Ill.	.3
Alston No. 3 mine Ohio County, Ky.	.2
Dotiki mine Webster County, Ky.	.2
Drake No. 4 mine Hopkins County, Ky.	.2
Peabody Camp No. 1 mine Union County, Ky.	.2
South Hopkins No. 2 mine Hopkins County, Ky.	.2
Star Underground mine Muhlenberg County, Ky.	.2
Hamilton No. 2 mine Union County, Ky.	.1
Island Creek No. 9 mine Hopkins County, Ky.	.1
Total.....	3.9
Beckley bed:	
Beckley mine Raleigh County, W. Va.	2.6
Maple Meadow mine Raleigh County, W. Va.	.3

Coalbed and name and location of mine	Methane, MMcfd
Beckley bed--Continued:	
Beckley No. 1 mine Raleigh County, W. Va.	0.1
Total	3.0
Tiller bed:	
Moss 3 Portal A mine Dickenson County, Va.	1.4
Moss No. 2 mine Russell County, Va.	.8
Lambert Fork mine Buchanan County, Va.	.3
Total	2.5
Blue Creek bed:	
Walter Resources No. 3 mine (formerly U.S. Pipe and Foundry) Jefferson County, Ala.	2.3
Upper and Lower Sunnside beds:	
Sunnyside No. 1 mine Carbon County, Utah	1.4
Sunnyside No. 3 mine Carbon County, Utah	.4
Total	1.8
Cedar Grove bed:	
Hampton No. 3 mine Boone County, W. Va.	.7
Hampton No. 4 mine Boone County, W. Va.	.2
National Pocahontas mine Mingo County, W. Va.	.2
National No. 25 mine Mingo County, W. Va.	.1
Total	1.2
Eagle bed:	
Morton mine Kanawha County, W. Va.	.7
Cannelton No. 8 mine Kanawha County, W. Va.	.2

Coalbed and name and location of mine	Methane, MMcfd
Eagle bed--Continued:	
Dehue mine Logan County, W. Va.	0.2
Total	1.1
Imboden bed:	
Scotia mine Letcher County, Ky.	.5
Osaka No. 2 mine Wise County, Va.	.2
Prescott No. 1 mine Wise County, Va.	.2
Prescott No. 2 mine Wise County, Va.	.1
Virginia No. 1 mine Wise County, Va.	.1
Total	1.1

APPENDIX E.--AVERAGE DAILY METHANE EMISSIONS DURING 1971, 1973, AND 1975 FROM MINES WITH AN EMISSION RATE OF AT LEAST 100,000 cfd, LISTED BY STATE AND COUNTY

(Columns 1-3 contain methane emissions in million cfd and number of mines; columns 4-6 show the change in methane emissions between the years shown at the top of each column)

State and county	(1) 1971		(2) 1973		(3) 1975		(4) 1971-73,	(5) 1971-75,	(6) 1973-75,
	MMcfd	No.	MMcfd	No.	MMcfd	No.	percent	percent	percent
Alabama:									
Fayette	-	0	-	0	0.5	1	NAp	NAp	NAp
Jefferson	10.3	6	9.5	6	13.2	8	-7.8	+28.1	+39.0
Shelby	.4	1	-	0	-	0	NAp	NAp	NAp
Walker	.9	2	1.6	3	2.9	3	+77.8	+222.2	+81.3
Total	11.6	9	11.1	9	16.6	12	-4.3	+43.1	+49.6
Colorado:									
Gunnison	.8	2	.5	2	.9	1	-37.5	-12.5	+80.0
Las Animas	.4	1	.3	1	.5	1	-25.0	+25.0	+66.7
Pitkin	6.7	2	3.5	2	7.7	4	-48.0	+14.9	+120.0
Total	7.9	5	4.3	5	9.1	6	-45.6	+15.2	+111.6
Illinois:									
Douglas	.6	1	.5	1	.7	2	-16.7	+16.7	+40.0
Christian	.5	1	1.1	1	1.5	1	+120.0	+200.0	+36.4
Franklin	6.6	4	4.1	3	5.3	3	-37.9	-19.7	+29.3
Gallatin	.5	2	.5	2	.7	1	0	+40.0	+40.0
Jefferson	4.0	3	3.9	3	2.7	3	-2.5	-32.5	-30.8
Macoupin	.4	1	.5	1	.6	1	+25.0	+50.0	+20.0
Montgomery	1.2	2	.1	1	-	0	-91.7	NAp	NAp
Randolph	.1	1	-	0	.2	1	NAp	+100.0	NAp
Saline	.3	2	.3	2	.7	2	0	+134.0	+134.0
St. Clair	-	0	.1	1	.1	1	NAp	NAp	0
Wabash	-	0	-	0	1.4	1	NAp	NAp	NAp
Williamson	1.1	2	.7	2	.8	2	-36.4	-27.3	+14.3
Total	15.3	19	11.8	17	14.7	18	-22.9	-3.9	+24.6
Indiana:									
Gibson	.2	1	.3	1	-	0	+50.0	NAp	NAp
Sullivan	.7	1	-	0	-	0	NAp	NAp	NAp
Total	.9	2	.3	1	-	0	-66.7	NAp	NAp

NAp--Not applicable.

State and county	(1) 1971		(2) 1973		(3) 1975		(4) 1971-73, percent	(5) 1971-75, percent	(6) 1973-75, percent
	MMcfd	No.	MMcfd	No.	MMcfd	No.			
Kentucky:									
Harlan	0.1	1	-	0	-	0	NAp	NAp	NAp
Henderson	-	0	.3	1	-	0	NAp	NAp	NAp
Hopkins	1.8	5	2.0	4	2.0	5	+11.1	+11.1	0
Johnson	-	0	-	0	.2	1	NAp	NAp	NAp
Letcher	.3	1	.4	1	.5	1	+33.3	+66.7	+25.0
Martin	.3	1	.5	1	.5	3	+66.7	+66.7	0
McCreary	-	0	-	0	.1	1	NAp	NAp	NAp
Muhlenberg	1.0	4	.7	3	.2	1	-30.0	-80.0	-71.4
Ohio	.2	1	.2	1	.2	1	0	0	0
Union	.7	4	1.1	5	1.0	4	+57.1	+42.9	-9.1
Webster	.4	1	.3	1	.2	1	-25.0	-50.0	-33.3
Total	4.8	18	5.5	17	4.9	18	+14.6	+2.1	-10.9
New Mexico: Colfax	.3	1	.1	1	.7	1	-66.7	+133.3	+600.0
Ohio:									
Belmont	1.2	5	1.5	6	1.5	5	+25.0	+25.0	0
Harrison	3.9	5	3.4	4	3.5	4	-12.8	-10.3	+2.9
Jefferson	.4	1	.3	1	.2	1	-25.0	-50.0	-33.3
Meigs	-	0	-	0	.4	1	NAp	NAp	NAp
Monroe	-	0	.5	1	.5	2	NAp	NAp	0
Total	5.5	11	5.7	12	6.1	13	+3.6	+10.9	+7.0
Oklahoma:									
Haskell	.3	1	.4	1	-	0	+33.3	NAp	NAp
LeFlore	1.6	1	-	0	-	0	NAp	NAp	NAp
Total	1.9	2	.4	1	-	0	-79.0	NAp	NAp
Pennsylvania:									
Allegheny	1.9	4	1.6	4	1.7	5	-15.8	-10.5	+6.3
Armstrong	.5	1	.5	2	.8	1	0	+60.0	+60.0
Cambria	9.1	5	9.5	6	10.3	6	+4.4	+13.2	+8.4
Fayette	.1	1	.2	1	.2	1	+100.0	+100.0	0
Greene	11.4	6	11.7	6	10.6	7	+2.6	-7.0	-9.4
Indiana	4.8	4	4.7	4	5.2	6	-2.1	+8.3	+10.6
Somerset	1.2	2	.6	2	.6	2	-50.0	-50.0	0
Washington	11.9	10	12.4	10	12.7	9	+4.2	+6.7	+2.4
Westmoreland	1.0	7	.8	4	1.0	6	-20.0	0	+25.0
Total	43.6	40	42.0	39	43.1	43	-3.7	-1.4	+2.4
Tennessee:									
Anderson	-	0	2.5	1	-	0	NAp	NAp	NAp
Clairborne	-	0	.1	1	.3	1	NAp	NAp	+200.0
Total	-	0	2.6	2	.3	1	NAp	NAp	-88.5
Utah:									
Carbon	2.8	5	3.3	5	2.2	4	+17.9	-21.4	-33.3
Emery	-	0	-	0	.1	1	NAp	NAp	NAp
Total	2.8	5	3.3	5	2.3	5	+17.9	-17.9	-30.3

NAp--Not applicable.

State and county	(1) 1971		(2) 1973		(3) 1975		(4) 1971-73, percent	(5) 1971-75, percent	(6) 1973-75, percent
	MMcfd	No.	MMcfd	No.	MMcfd	No.			
Virginia:									
Buchanan	21.6	5	21.7	6	18.4	6	+0.5	-14.8	-15.2
Dickenson	2.1	3	1.8	3	1.5	2	-14.3	-28.6	-16.7
Russell	2.0	3	2.8	3	.8	1	+40.0	-60.0	-71.4
Tazewell	-	0	.4	1	.5	1	NAp	NAp	+25.0
Wise	1.0	4	.3	1	.9	5	-70.0	-10.0	+200.0
Total	26.7	15	27.0	14	22.1	15	+1.1	-17.2	-18.2
West Virginia:									
Barbour	.3	1	.3	1	.3	2	0	0	0
Boone	2.0	2	2.5	4	1.0	3	+25.0	-50.0	-60.0
Brooke	.2	1	.1	1	.2	1	-50.0	0	+100.0
Fayette	.5	1	.2	1	.2	1	-60.0	-60.0	0
Harrison	3.4	4	3.5	4	4.4	2	+2.9	+29.4	+25.7
Kanawha	1.1	3	1.6	4	1.3	3	+45.5	+18.2	-18.8
Logan	2.1	5	1.4	4	.2	1	-33.3	-90.5	-85.7
Marion	30.4	8	23.1	6	20.8	7	-24.0	-31.6	-10.0
Marshall	3.4	4	4.8	4	4.2	4	+41.1	+23.5	-12.5
Mason	.2	1	-	0	.3	1	NAp	-50.0	NAp
McDowell	13.1	11	11.4	11	10.5	9	-13.0	-19.9	-7.9
Mingo	.3	1	.2	1	.3	2	-33.3	0	+50.0
Monongalia	39.0	7	40.7	7	40.8	7	+4.4	+4.6	+.25
Nicholas	1.5	4	-	0	.5	2	NAp	-66.7	NAp
Ohio	1.4	2	1.6	2	2.5	2	+14.3	+78.6	+56.3
Raleigh	3.7	9	2.9	8	4.8	11	-21.6	+29.7	+65.5
Upshur	.1	1	.1	1	.2	1	0	+100.0	+100.0
Wyoming	3.0	8	6.0	9	3.9	5	+100.0	+30.0	-35.0
Total	105.7	73	100.4	68	96.4	64	-5.0	-8.8	-4.0

NAp--Not applicable.

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